



## ST7735R

### 262K Color Single-Chip TFT Controller/Driver

#### 1 Introduction

The ST7735R is a single-chip controller/driver for 262K-color, graphic type TFT-LCD. It consists of 396 source line and 162 gate line driving circuits. This chip is capable of connecting directly to an external microprocessor, and accepts Serial Peripheral Interface (SPI), 8-bit/9-bit/16-bit/18-bit parallel interface. Display data can be stored in the on-chip display data RAM of 132 x 162 x 18 bits. It can perform display data RAM read/write operation with no external operation clock to minimize power consumption. In addition, because of the integrated power supply circuits necessary to drive liquid crystal, it is possible to make a display system with fewer components.

#### 2 Features

##### Single chip TFT-LCD Controller/Driver with RAM On-chip Display Data RAM (i.e. Frame Memory)

132 (H) x RGB x 162 (V) bits

##### LCD Driver Output Circuits:

Source Outputs: 132 RGB channels

Gate Outputs: 162 channels

Common electrode output

##### Display Colors (Color Mode)

Full Color: 262K, RGB=(666) max., Idle Mode OFF

Color Reduce: 8-color, RGB=(111), Idle Mode ON

##### Programmable Pixel Color Format (Color Depth) for Various Display Data input Format

12-bit/pixel: RGB=(444) using the 384k-bit frame memory and LUT

16-bit/pixel: RGB=(565) using the 384k-bit frame memory and LUT

18-bit/pixel: RGB=(666) using the 384k-bit frame memory and LUT

##### Various Interfaces

Parallel 8080-series MCU Interface  
(8-bit, 9-bit, 16-bit & 18-bit)

Parallel 6800-series MCU Interface  
(8-bit, 9-bit, 16-bit & 18-bit)

3-line serial interface

4-line serial interface

##### Display Features

Support both normal-black & normal-white LC

Software programmable color depth mode

##### Built-in Circuits

DC/DC converter

Adjustable VCOM generation

Non-volatile (NV) memory to store initial register setting

Oscillator for display clock generation

Factory default value (module ID, module version, etc) are stored in NV memory

Timing controller

##### Built-in NV Memory for LCD Initial Register Setting

7-bits for ID2

8-bits for ID3

7-bits for VCOM adjustment

##### Wide Supply Voltage Range

I/O Voltage (VDDI to DGND): 1.65V~3.7V (VDDI ≤ VDD)

Analog Voltage (VDD to AGND): 2.3V~4.8V

##### On-Chip Power System

Source Voltage (GVDD to AGND): 3.0V~4.5V

VCOM level (VCOM to AGND): -0.4V to -2.0V

Gate driver HIGH level (VGH to AGND): +10.0V to +15V

Gate driver LOW level (VGL to AGND): -13V to -7.5V

##### Operating Temperature: -30°C to +85°C

ST7735R

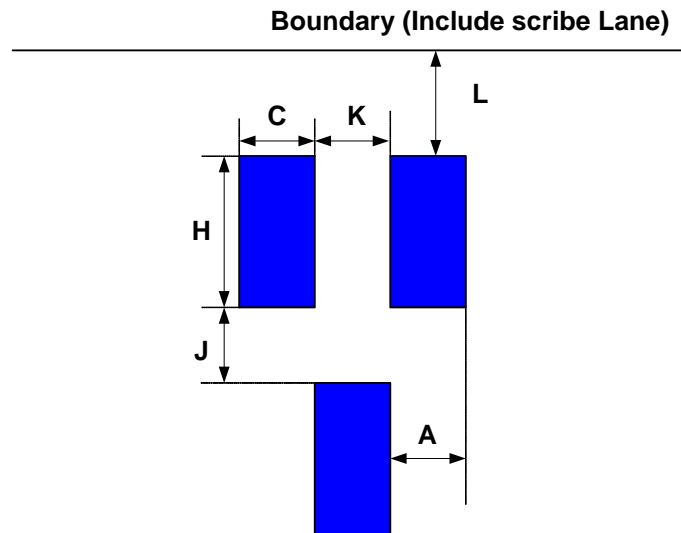
Parallel Interface: 8080,6800(8-bit/9-bit/16-bit/18-bit)  
Serial Interface: 3-line, 4-line



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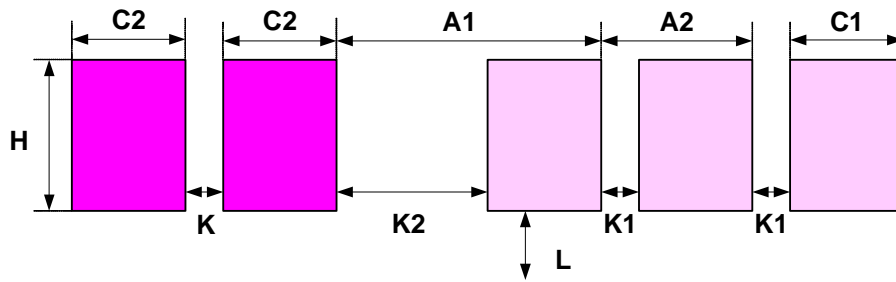
## 3 Pad arrangement

### 3.1 Output Bump Dimension



| Item                                | Symbol | Size                 |
|-------------------------------------|--------|----------------------|
| Bump pitch                          | A      | 16 um                |
| Bump width                          | C      | 16 um                |
| Bump height                         | H      | 98 um                |
| Bump gap1 (Vertical)                | J      | 19 um                |
| Bump gap2 (Horizontal)              | K      | 16 um                |
| Bump area                           | C x H  | 1568 um <sup>2</sup> |
| Chip Boundary (include scribe Lane) | L      | 59 um                |

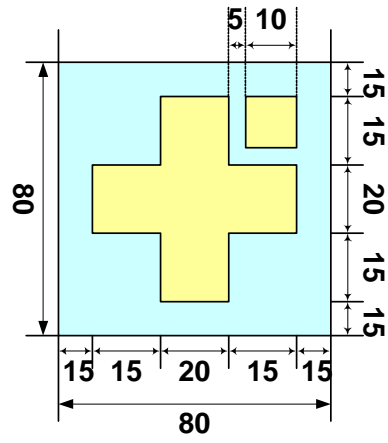
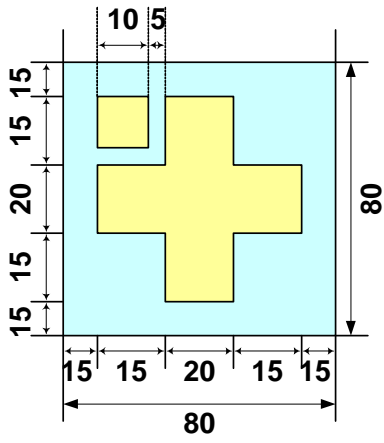
## 3.2 Input Bump Dimension



Boundary (Include scribe Lane)

| Item                               | Symbol | Size                 |
|------------------------------------|--------|----------------------|
| Bump pitch 1                       | A1     | 67 um                |
| Bump pitch 2                       | A2     | 50 um                |
| Bump width 1                       | C1     | 33 um                |
| Bump width 2                       | C2     | 38 um                |
| Bump height                        | H      | 88 um                |
| Bump gap                           | K      | 22 um                |
| Bump gap1                          | K1     | 17 um                |
| Bump gap2                          | K2     | 34 um                |
| Bump area 1                        | C1 X H | 2904 um <sup>2</sup> |
| Bump area 2                        | C2 X H | 3344 um <sup>2</sup> |
| Chip Boundary(include scribe Lane) | L      | 59 um                |

## 3.3 Alignment Mark Dimension





## 4 Pad Center Coordinates

| No. | PAD Name  | X     | Y    |
|-----|-----------|-------|------|
| 1   | Dummy     | -4750 | -231 |
| 2   | VDDIO     | -4700 | -231 |
| 3   | EXTC      | -4650 | -231 |
| 4   | DGND      | -4600 | -231 |
| 5   | IM[0]     | -4550 | -231 |
| 6   | VDDIO     | -4500 | -231 |
| 7   | IM[1]     | -4450 | -231 |
| 8   | DGND      | -4400 | -231 |
| 9   | P68       | -4350 | -231 |
| 10  | VDDIO     | -4300 | -231 |
| 11  | TEST1P    | -4250 | -231 |
| 12  | DGND      | -4200 | -231 |
| 13  | TEST2P    | -4150 | -231 |
| 14  | VDDIO     | -4100 | -231 |
| 15  | SRGB      | -4050 | -231 |
| 16  | DGND      | -4000 | -231 |
| 17  | SMX       | -3950 | -231 |
| 18  | VDDIO     | -3900 | -231 |
| 19  | SMY       | -3850 | -231 |
| 20  | DGND      | -3800 | -231 |
| 21  | Dummy     | -3750 | -231 |
| 22  | VDDIO     | -3700 | -231 |
| 23  | Dummy     | -3650 | -231 |
| 24  | DGND      | -3600 | -231 |
| 25  | Dummy     | -3550 | -231 |
| 26  | VDDIO     | -3500 | -231 |
| 27  | Dummy     | -3450 | -231 |
| 28  | DGND      | -3400 | -231 |
| 29  | Dummy     | -3350 | -231 |
| 30  | VDDIO     | -3300 | -231 |
| 31  | LCM       | -3250 | -231 |
| 32  | DGND      | -3200 | -231 |
| 33  | Dummy     | -3150 | -231 |
| 34  | VDDIO     | -3100 | -231 |
| 35  | Dummy     | -3050 | -231 |
| 36  | DGND      | -3000 | -231 |
| 37  | GM[1]     | -2950 | -231 |
| 38  | VDDIO     | -2900 | -231 |
| 39  | GM[0]     | -2850 | -231 |
| 40  | DGND      | -2800 | -231 |
| 41  | Dummy     | -2750 | -231 |
| 42  | GS        | -2700 | -231 |
| 43  | SPI4W     | -2650 | -231 |
| 44  | VDDIO     | -2600 | -231 |
| 45  | TESTOP[8] | -2550 | -231 |
| 46  | TESTOP[7] | -2500 | -231 |
| 47  | TESTOP[6] | -2450 | -231 |
| 48  | TESTOP[5] | -2400 | -231 |
| 49  | TESTOP[4] | -2350 | -231 |
| 50  | OSC       | -2300 | -231 |

| No. | PAD Name  | X     | Y    |
|-----|-----------|-------|------|
| 51  | VDD       | -2250 | -231 |
| 52  | VDD       | -2200 | -231 |
| 53  | VDD       | -2150 | -231 |
| 54  | VDD       | -2100 | -231 |
| 55  | VDD       | -2050 | -231 |
| 56  | VDD       | -2000 | -231 |
| 57  | AGND      | -1950 | -231 |
| 58  | AGND      | -1900 | -231 |
| 59  | AGND      | -1850 | -231 |
| 60  | AGND      | -1800 | -231 |
| 61  | AGND      | -1750 | -231 |
| 62  | AGND      | -1700 | -231 |
| 63  | RDX       | -1630 | -231 |
| 64  | D_CX      | -1570 | -231 |
| 65  | TESEL     | -1510 | -231 |
| 66  | DGND      | -1450 | -231 |
| 67  | D[17]     | -1390 | -231 |
| 68  | D[16]     | -1330 | -231 |
| 69  | D[15]     | -1270 | -231 |
| 70  | D[14]     | -1210 | -231 |
| 71  | D[13]     | -1150 | -231 |
| 72  | D[12]     | -1090 | -231 |
| 73  | D[11]     | -1030 | -231 |
| 74  | D[10]     | -970  | -231 |
| 75  | D[9]      | -910  | -231 |
| 76  | D[8]      | -850  | -231 |
| 77  | D[1]      | -790  | -231 |
| 78  | D[3]      | -730  | -231 |
| 79  | D[5]      | -670  | -231 |
| 80  | D[7]      | -610  | -231 |
| 81  | TE        | -550  | -231 |
| 82  | RESX      | -490  | -231 |
| 83  | CSX       | -430  | -231 |
| 84  | D[6]      | -370  | -231 |
| 85  | D[4]      | -310  | -231 |
| 86  | D[2]      | -250  | -231 |
| 87  | IM[2]     | -190  | -231 |
| 88  | D[0]      | -130  | -231 |
| 89  | WRX       | -70   | -231 |
| 90  | Dummy     | 0     | -231 |
| 91  | Dummy     | 50    | -231 |
| 92  | Dummy     | 100   | -231 |
| 93  | Dummy     | 150   | -231 |
| 94  | TESTOP[3] | 200   | -231 |
| 95  | TESTOP[2] | 250   | -231 |
| 96  | TESTOP[1] | 300   | -231 |
| 97  | DGND      | 350   | -231 |
| 98  | DGND      | 400   | -231 |
| 99  | DGND      | 450   | -231 |
| 100 | DGND      | 500   | -231 |

| No. | PAD Name | X    | Y    |
|-----|----------|------|------|
| 101 | DGND     | 550  | -231 |
| 102 | DGND     | 600  | -231 |
| 103 | VDDI     | 650  | -231 |
| 104 | VDDI     | 700  | -231 |
| 105 | VDDI     | 750  | -231 |
| 106 | VDDI     | 800  | -231 |
| 107 | VDDI     | 850  | -231 |
| 108 | VDDI     | 900  | -231 |
| 109 | VPP      | 950  | -231 |
| 110 | VPP      | 1000 | -231 |
| 111 | VPP      | 1050 | -231 |
| 112 | GVDD     | 1100 | -231 |
| 113 | GVDD     | 1150 | -231 |
| 114 | GVDD     | 1200 | -231 |
| 115 | VCC      | 1250 | -231 |
| 116 | Dummy    | 1300 | -231 |
| 117 | Dummy    | 1350 | -231 |
| 118 | GVCL     | 1400 | -231 |
| 119 | Dummy    | 1450 | -231 |
| 120 | AVDD     | 1500 | -231 |
| 121 | AVDD     | 1550 | -231 |
| 122 | AVDD     | 1600 | -231 |
| 123 | AVDD     | 1650 | -231 |
| 124 | AVDD     | 1700 | -231 |
| 125 | Dummy    | 1750 | -231 |
| 126 | Dummy    | 1800 | -231 |
| 127 | Dummy    | 1850 | -231 |
| 128 | Dummy    | 1900 | -231 |
| 129 | Dummy    | 1950 | -231 |
| 130 | Dummy    | 2000 | -231 |
| 131 | Dummy    | 2050 | -231 |
| 132 | Dummy    | 2100 | -231 |
| 133 | Dummy    | 2150 | -231 |
| 134 | Dummy    | 2200 | -231 |
| 135 | Dummy    | 2250 | -231 |
| 136 | Dummy    | 2300 | -231 |
| 137 | Dummy    | 2350 | -231 |
| 138 | Dummy    | 2400 | -231 |
| 139 | Dummy    | 2450 | -231 |
| 140 | Dummy    | 2500 | -231 |
| 141 | Dummy    | 2550 | -231 |
| 142 | Dummy    | 2600 | -231 |
| 143 | Dummy    | 2650 | -231 |
| 144 | Dummy    | 2700 | -231 |
| 145 | Dummy    | 2750 | -231 |
| 146 | AGND     | 2800 | -231 |
| 147 | AGND     | 2850 | -231 |
| 148 | AGND     | 2900 | -231 |
| 149 | AVCL     | 2950 | -231 |
| 150 | AVCL     | 3000 | -231 |

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| No. | PAD Name | X    | Y    |
|-----|----------|------|------|
| 151 | AVCL     | 3050 | -231 |
| 152 | Dummy    | 3100 | -231 |
| 153 | Dummy    | 3150 | -231 |
| 154 | Dummy    | 3200 | -231 |
| 155 | Dummy    | 3250 | -231 |
| 156 | Dummy    | 3300 | -231 |
| 157 | Dummy    | 3350 | -231 |
| 158 | Dummy    | 3400 | -231 |
| 159 | Dummy    | 3450 | -231 |
| 160 | Dummy    | 3500 | -231 |
| 161 | Dummy    | 3550 | -231 |
| 162 | Dummy    | 3600 | -231 |
| 163 | Dummy    | 3650 | -231 |
| 164 | Dummy    | 3700 | -231 |
| 165 | Dummy    | 3750 | -231 |
| 166 | Dummy    | 3800 | -231 |
| 167 | Dummy    | 3850 | -231 |
| 168 | Dummy    | 3900 | -231 |
| 169 | Dummy    | 3950 | -231 |
| 170 | VGL      | 4000 | -231 |
| 171 | Dummy    | 4050 | -231 |
| 172 | Dummy    | 4100 | -231 |
| 173 | VGH      | 4150 | -231 |
| 174 | Dummy    | 4200 | -231 |
| 175 | Dummy    | 4250 | -231 |
| 176 | Dummy    | 4300 | -231 |
| 177 | Dummy    | 4350 | -231 |
| 178 | Dummy    | 4400 | -231 |
| 179 | Dummy    | 4450 | -231 |
| 180 | Dummy    | 4500 | -231 |
| 181 | Dummy    | 4550 | -231 |
| 182 | VCOM     | 4600 | -231 |
| 183 | VCOM     | 4650 | -231 |
| 184 | VCOM     | 4700 | -231 |
| 185 | Dummy    | 4750 | -231 |
| 186 | Dummy    | 4772 | 110  |
| 187 | Dummy    | 4756 | 227  |
| 188 | G162     | 4740 | 110  |
| 189 | G160     | 4724 | 227  |
| 190 | G158     | 4708 | 110  |
| 191 | G156     | 4692 | 227  |
| 192 | G154     | 4676 | 110  |
| 193 | G152     | 4660 | 227  |
| 194 | G150     | 4644 | 110  |
| 195 | G148     | 4628 | 227  |
| 196 | G146     | 4612 | 110  |
| 197 | G144     | 4596 | 227  |
| 198 | G142     | 4580 | 110  |
| 199 | G140     | 4564 | 227  |
| 200 | G138     | 4548 | 110  |

| No. | PAD Name | X    | Y   |
|-----|----------|------|-----|
| 201 | G136     | 4532 | 227 |
| 202 | G134     | 4516 | 110 |
| 203 | G132     | 4500 | 227 |
| 204 | G130     | 4484 | 110 |
| 205 | G128     | 4468 | 227 |
| 206 | G126     | 4452 | 110 |
| 207 | G124     | 4436 | 227 |
| 208 | G122     | 4420 | 110 |
| 209 | G120     | 4404 | 227 |
| 210 | G118     | 4388 | 110 |
| 211 | G116     | 4372 | 227 |
| 212 | G114     | 4356 | 110 |
| 213 | G112     | 4340 | 227 |
| 214 | G110     | 4324 | 110 |
| 215 | G108     | 4308 | 227 |
| 216 | G106     | 4292 | 110 |
| 217 | G104     | 4276 | 227 |
| 218 | G102     | 4260 | 110 |
| 219 | G100     | 4244 | 227 |
| 220 | G98      | 4228 | 110 |
| 221 | G96      | 4212 | 227 |
| 222 | G94      | 4196 | 110 |
| 223 | G92      | 4180 | 227 |
| 224 | G90      | 4164 | 110 |
| 225 | G88      | 4148 | 227 |
| 226 | G86      | 4132 | 110 |
| 227 | G84      | 4116 | 227 |
| 228 | G82      | 4100 | 110 |
| 229 | G80      | 4084 | 227 |
| 230 | G78      | 4068 | 110 |
| 231 | G76      | 4052 | 227 |
| 232 | G74      | 4036 | 110 |
| 233 | G72      | 4020 | 227 |
| 234 | G70      | 4004 | 110 |
| 235 | G68      | 3988 | 227 |
| 236 | G66      | 3972 | 110 |
| 237 | G64      | 3956 | 227 |
| 238 | G62      | 3940 | 110 |
| 239 | G60      | 3924 | 227 |
| 240 | G58      | 3908 | 110 |
| 241 | G56      | 3892 | 227 |
| 242 | G54      | 3876 | 110 |
| 243 | G52      | 3860 | 227 |
| 244 | G50      | 3844 | 110 |
| 245 | G48      | 3828 | 227 |
| 246 | G46      | 3812 | 110 |
| 247 | G44      | 3796 | 227 |
| 248 | G42      | 3780 | 110 |
| 249 | G40      | 3764 | 227 |
| 250 | G38      | 3748 | 110 |

| No. | PAD Name | X    | Y   |
|-----|----------|------|-----|
| 251 | G36      | 3732 | 227 |
| 252 | G34      | 3716 | 110 |
| 253 | G32      | 3700 | 227 |
| 254 | G30      | 3684 | 110 |
| 255 | G28      | 3668 | 227 |
| 256 | G26      | 3652 | 110 |
| 257 | G24      | 3636 | 227 |
| 258 | G22      | 3620 | 110 |
| 259 | G20      | 3604 | 227 |
| 260 | G18      | 3588 | 110 |
| 261 | G16      | 3572 | 227 |
| 262 | G14      | 3556 | 110 |
| 263 | G12      | 3540 | 227 |
| 264 | G10      | 3524 | 110 |
| 265 | G8       | 3508 | 227 |
| 266 | G6       | 3492 | 110 |
| 267 | G4       | 3476 | 227 |
| 268 | G2       | 3460 | 110 |
| 269 | Dummy    | 3444 | 227 |
| 270 | Dummy    | 3428 | 110 |
| 271 | Dummy    | 3412 | 227 |
| 272 | Dummy    | 3396 | 110 |
| 273 | S396     | 3380 | 227 |
| 274 | S395     | 3364 | 110 |
| 275 | S394     | 3348 | 227 |
| 276 | S393     | 3332 | 110 |
| 277 | S392     | 3316 | 227 |
| 278 | S391     | 3300 | 110 |
| 279 | S390     | 3284 | 227 |
| 280 | S389     | 3268 | 110 |
| 281 | S388     | 3252 | 227 |
| 282 | S387     | 3236 | 110 |
| 283 | S386     | 3220 | 227 |
| 284 | S385     | 3204 | 110 |
| 285 | S384     | 3188 | 227 |
| 286 | S383     | 3172 | 110 |
| 287 | S382     | 3156 | 227 |
| 288 | S381     | 3140 | 110 |
| 289 | S380     | 3124 | 227 |
| 290 | S379     | 3108 | 110 |
| 291 | S378     | 3092 | 227 |
| 292 | S377     | 3076 | 110 |
| 293 | S376     | 3060 | 227 |
| 294 | S375     | 3044 | 110 |
| 295 | S374     | 3028 | 227 |
| 296 | S373     | 3012 | 110 |
| 297 | S372     | 2996 | 227 |
| 298 | S371     | 2980 | 110 |
| 299 | S370     | 2964 | 227 |
| 300 | S369     | 2948 | 110 |

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| No. | PAD Name | X    | Y   |
|-----|----------|------|-----|
| 301 | S368     | 2932 | 227 |
| 302 | S367     | 2916 | 110 |
| 303 | S366     | 2900 | 227 |
| 304 | S365     | 2884 | 110 |
| 305 | S364     | 2868 | 227 |
| 306 | S363     | 2852 | 110 |
| 307 | S362     | 2836 | 227 |
| 308 | S361     | 2820 | 110 |
| 309 | S360     | 2804 | 227 |
| 310 | S359     | 2788 | 110 |
| 311 | S358     | 2772 | 227 |
| 312 | S357     | 2756 | 110 |
| 313 | S356     | 2740 | 227 |
| 314 | S355     | 2724 | 110 |
| 315 | S354     | 2708 | 227 |
| 316 | S353     | 2692 | 110 |
| 317 | S352     | 2676 | 227 |
| 318 | S351     | 2660 | 110 |
| 319 | S350     | 2644 | 227 |
| 320 | S349     | 2628 | 110 |
| 321 | S348     | 2612 | 227 |
| 322 | S347     | 2596 | 110 |
| 323 | S346     | 2580 | 227 |
| 324 | S345     | 2564 | 110 |
| 325 | S344     | 2548 | 227 |
| 326 | S343     | 2532 | 110 |
| 327 | S342     | 2516 | 227 |
| 328 | S341     | 2500 | 110 |
| 329 | S340     | 2484 | 227 |
| 330 | S339     | 2468 | 110 |
| 331 | S338     | 2452 | 227 |
| 332 | S337     | 2436 | 110 |
| 333 | S336     | 2420 | 227 |
| 334 | S335     | 2404 | 110 |
| 335 | S334     | 2388 | 227 |
| 336 | S333     | 2372 | 110 |
| 337 | S332     | 2356 | 227 |
| 338 | S331     | 2340 | 110 |
| 339 | S330     | 2324 | 227 |
| 340 | S329     | 2308 | 110 |
| 341 | S328     | 2292 | 227 |
| 342 | S327     | 2276 | 110 |
| 343 | S326     | 2260 | 227 |
| 344 | S325     | 2244 | 110 |
| 345 | S324     | 2228 | 227 |
| 346 | S323     | 2212 | 110 |
| 347 | S322     | 2196 | 227 |
| 348 | S321     | 2180 | 110 |
| 349 | S320     | 2164 | 227 |
| 350 | S319     | 2148 | 110 |

| No. | PAD Name | X    | Y   |
|-----|----------|------|-----|
| 351 | S318     | 2132 | 227 |
| 352 | S317     | 2116 | 110 |
| 353 | S316     | 2100 | 227 |
| 354 | S315     | 2084 | 110 |
| 355 | S314     | 2068 | 227 |
| 356 | S313     | 2052 | 110 |
| 357 | S312     | 2036 | 227 |
| 358 | S311     | 2020 | 110 |
| 359 | S310     | 2004 | 227 |
| 360 | S309     | 1988 | 110 |
| 361 | S308     | 1972 | 227 |
| 362 | S307     | 1956 | 110 |
| 363 | S306     | 1940 | 227 |
| 364 | S305     | 1924 | 110 |
| 365 | S304     | 1908 | 227 |
| 366 | S303     | 1892 | 110 |
| 367 | S302     | 1876 | 227 |
| 368 | S301     | 1860 | 110 |
| 369 | S300     | 1844 | 227 |
| 370 | S299     | 1828 | 110 |
| 371 | S298     | 1812 | 227 |
| 372 | S297     | 1796 | 110 |
| 373 | S296     | 1780 | 227 |
| 374 | S295     | 1764 | 110 |
| 375 | S294     | 1748 | 227 |
| 376 | S293     | 1732 | 110 |
| 377 | S292     | 1716 | 227 |
| 378 | S291     | 1700 | 110 |
| 379 | S290     | 1684 | 227 |
| 380 | S289     | 1668 | 110 |
| 381 | S288     | 1652 | 227 |
| 382 | S287     | 1636 | 110 |
| 383 | S286     | 1620 | 227 |
| 384 | S285     | 1604 | 110 |
| 385 | S284     | 1588 | 227 |
| 386 | S283     | 1572 | 110 |
| 387 | S282     | 1556 | 227 |
| 388 | S281     | 1540 | 110 |
| 389 | S280     | 1524 | 227 |
| 390 | S279     | 1508 | 110 |
| 391 | S278     | 1492 | 227 |
| 392 | S277     | 1476 | 110 |
| 393 | S276     | 1460 | 227 |
| 394 | S275     | 1444 | 110 |
| 395 | S274     | 1428 | 227 |
| 396 | S273     | 1412 | 110 |
| 397 | S272     | 1396 | 227 |
| 398 | S271     | 1380 | 110 |
| 399 | S270     | 1364 | 227 |
| 400 | S269     | 1348 | 110 |

| No. | PAD Name | X    | Y   |
|-----|----------|------|-----|
| 401 | S268     | 1332 | 227 |
| 402 | S267     | 1316 | 110 |
| 403 | S266     | 1300 | 227 |
| 404 | S265     | 1284 | 110 |
| 405 | S264     | 1268 | 227 |
| 406 | S263     | 1252 | 110 |
| 407 | S262     | 1236 | 227 |
| 408 | S261     | 1220 | 110 |
| 409 | S260     | 1204 | 227 |
| 410 | S259     | 1188 | 110 |
| 411 | S258     | 1172 | 227 |
| 412 | S257     | 1156 | 110 |
| 413 | S256     | 1140 | 227 |
| 414 | S255     | 1124 | 110 |
| 415 | S254     | 1108 | 227 |
| 416 | S253     | 1092 | 110 |
| 417 | S252     | 1076 | 227 |
| 418 | S251     | 1060 | 110 |
| 419 | S250     | 1044 | 227 |
| 420 | S249     | 1028 | 110 |
| 421 | S248     | 1012 | 227 |
| 422 | S247     | 996  | 110 |
| 423 | S246     | 980  | 227 |
| 424 | S245     | 964  | 110 |
| 425 | S244     | 948  | 227 |
| 426 | S243     | 932  | 110 |
| 427 | S242     | 916  | 227 |
| 428 | S241     | 900  | 110 |
| 429 | S240     | 884  | 227 |
| 430 | S239     | 868  | 110 |
| 431 | S238     | 852  | 227 |
| 432 | S237     | 836  | 110 |
| 433 | S236     | 820  | 227 |
| 434 | S235     | 804  | 110 |
| 435 | S234     | 788  | 227 |
| 436 | S233     | 772  | 110 |
| 437 | S232     | 756  | 227 |
| 438 | S231     | 740  | 110 |
| 439 | S230     | 724  | 227 |
| 440 | S229     | 708  | 110 |
| 441 | S228     | 692  | 227 |
| 442 | S227     | 676  | 110 |
| 443 | S226     | 660  | 227 |
| 444 | S225     | 644  | 110 |
| 445 | S224     | 628  | 227 |
| 446 | S223     | 612  | 110 |
| 447 | S222     | 596  | 227 |
| 448 | S221     | 580  | 110 |
| 449 | S220     | 564  | 227 |
| 450 | S219     | 548  | 110 |

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| No. | PAD Name | X    | Y   |
|-----|----------|------|-----|
| 451 | S218     | 532  | 227 |
| 452 | S217     | 516  | 110 |
| 453 | S216     | 500  | 227 |
| 454 | S215     | 484  | 110 |
| 455 | S214     | 468  | 227 |
| 456 | S213     | 452  | 110 |
| 457 | S212     | 436  | 227 |
| 458 | S211     | 420  | 110 |
| 459 | S210     | 404  | 227 |
| 460 | S209     | 388  | 110 |
| 461 | S208     | 372  | 227 |
| 462 | S207     | 356  | 110 |
| 463 | S206     | 340  | 227 |
| 464 | S205     | 324  | 110 |
| 465 | S204     | 308  | 227 |
| 466 | S203     | 292  | 110 |
| 467 | S202     | 276  | 227 |
| 468 | S201     | 260  | 110 |
| 469 | S200     | 244  | 227 |
| 470 | S199     | 228  | 110 |
| 471 | Dummy    | 212  | 227 |
| 472 | Dummy    | 196  | 110 |
| 473 | Dummy    | -196 | 110 |
| 474 | Dummy    | -212 | 227 |
| 475 | S198     | -228 | 110 |
| 476 | S197     | -244 | 227 |
| 477 | S196     | -260 | 110 |
| 478 | S195     | -276 | 227 |
| 479 | S194     | -292 | 110 |
| 480 | S193     | -308 | 227 |
| 481 | S192     | -324 | 110 |
| 482 | S191     | -340 | 227 |
| 483 | S190     | -356 | 110 |
| 484 | S189     | -372 | 227 |
| 485 | S188     | -388 | 110 |
| 486 | S187     | -404 | 227 |
| 487 | S186     | -420 | 110 |
| 488 | S185     | -436 | 227 |
| 489 | S184     | -452 | 110 |
| 490 | S183     | -468 | 227 |
| 491 | S182     | -484 | 110 |
| 492 | S181     | -500 | 227 |
| 493 | S180     | -516 | 110 |
| 494 | S179     | -532 | 227 |
| 495 | S178     | -548 | 110 |
| 496 | S177     | -564 | 227 |
| 497 | S176     | -580 | 110 |
| 498 | S175     | -596 | 227 |
| 499 | S174     | -612 | 110 |
| 500 | S173     | -628 | 227 |

| No. | PAD Name | X     | Y   |
|-----|----------|-------|-----|
| 501 | S172     | -644  | 110 |
| 502 | S171     | -660  | 227 |
| 503 | S170     | -676  | 110 |
| 504 | S169     | -692  | 227 |
| 505 | S168     | -708  | 110 |
| 506 | S167     | -724  | 227 |
| 507 | S166     | -740  | 110 |
| 508 | S165     | -756  | 227 |
| 509 | S164     | -772  | 110 |
| 510 | S163     | -788  | 227 |
| 511 | S162     | -804  | 110 |
| 512 | S161     | -820  | 227 |
| 513 | S160     | -836  | 110 |
| 514 | S159     | -852  | 227 |
| 515 | S158     | -868  | 110 |
| 516 | S157     | -884  | 227 |
| 517 | S156     | -900  | 110 |
| 518 | S155     | -916  | 227 |
| 519 | S154     | -932  | 110 |
| 520 | S153     | -948  | 227 |
| 521 | S152     | -964  | 110 |
| 522 | S151     | -980  | 227 |
| 523 | S150     | -996  | 110 |
| 524 | S149     | -1012 | 227 |
| 525 | S148     | -1028 | 110 |
| 526 | S147     | -1044 | 227 |
| 527 | S146     | -1060 | 110 |
| 528 | S145     | -1076 | 227 |
| 529 | S144     | -1092 | 110 |
| 530 | S143     | -1108 | 227 |
| 531 | S142     | -1124 | 110 |
| 532 | S141     | -1140 | 227 |
| 533 | S140     | -1156 | 110 |
| 534 | S139     | -1172 | 227 |
| 535 | S138     | -1188 | 110 |
| 536 | S137     | -1204 | 227 |
| 537 | S136     | -1220 | 110 |
| 538 | S135     | -1236 | 227 |
| 539 | S134     | -1252 | 110 |
| 540 | S133     | -1268 | 227 |
| 541 | S132     | -1284 | 110 |
| 542 | S131     | -1300 | 227 |
| 543 | S130     | -1316 | 110 |
| 544 | S129     | -1332 | 227 |
| 545 | S128     | -1348 | 110 |
| 546 | S127     | -1364 | 227 |
| 547 | S126     | -1380 | 110 |
| 548 | S125     | -1396 | 227 |
| 549 | S124     | -1412 | 110 |
| 550 | S123     | -1428 | 227 |

| No. | PAD Name | X     | Y   |
|-----|----------|-------|-----|
| 551 | S122     | -1444 | 110 |
| 552 | S121     | -1460 | 227 |
| 553 | S120     | -1476 | 110 |
| 554 | S119     | -1492 | 227 |
| 555 | S118     | -1508 | 110 |
| 556 | S117     | -1524 | 227 |
| 557 | S116     | -1540 | 110 |
| 558 | S115     | -1556 | 227 |
| 559 | S114     | -1572 | 110 |
| 560 | S113     | -1588 | 227 |
| 561 | S112     | -1604 | 110 |
| 562 | S111     | -1620 | 227 |
| 563 | S110     | -1636 | 110 |
| 564 | S109     | -1652 | 227 |
| 565 | S108     | -1668 | 110 |
| 566 | S107     | -1684 | 227 |
| 567 | S106     | -1700 | 110 |
| 568 | S105     | -1716 | 227 |
| 569 | S104     | -1732 | 110 |
| 570 | S103     | -1748 | 227 |
| 571 | S102     | -1764 | 110 |
| 572 | S101     | -1780 | 227 |
| 573 | S100     | -1796 | 110 |
| 574 | S99      | -1812 | 227 |
| 575 | S98      | -1828 | 110 |
| 576 | S97      | -1844 | 227 |
| 577 | S96      | -1860 | 110 |
| 578 | S95      | -1876 | 227 |
| 579 | S94      | -1892 | 110 |
| 580 | S93      | -1908 | 227 |
| 581 | S92      | -1924 | 110 |
| 582 | S91      | -1940 | 227 |
| 583 | S90      | -1956 | 110 |
| 584 | S89      | -1972 | 227 |
| 585 | S88      | -1988 | 110 |
| 586 | S87      | -2004 | 227 |
| 587 | S86      | -2020 | 110 |
| 588 | S85      | -2036 | 227 |
| 589 | S84      | -2052 | 110 |
| 590 | S83      | -2068 | 227 |
| 591 | S82      | -2084 | 110 |
| 592 | S81      | -2100 | 227 |
| 593 | S80      | -2116 | 110 |
| 594 | S79      | -2132 | 227 |
| 595 | S78      | -2148 | 110 |
| 596 | S77      | -2164 | 227 |
| 597 | S76      | -2180 | 110 |
| 598 | S75      | -2196 | 227 |
| 599 | S74      | -2212 | 110 |
| 600 | S73      | -2228 | 227 |

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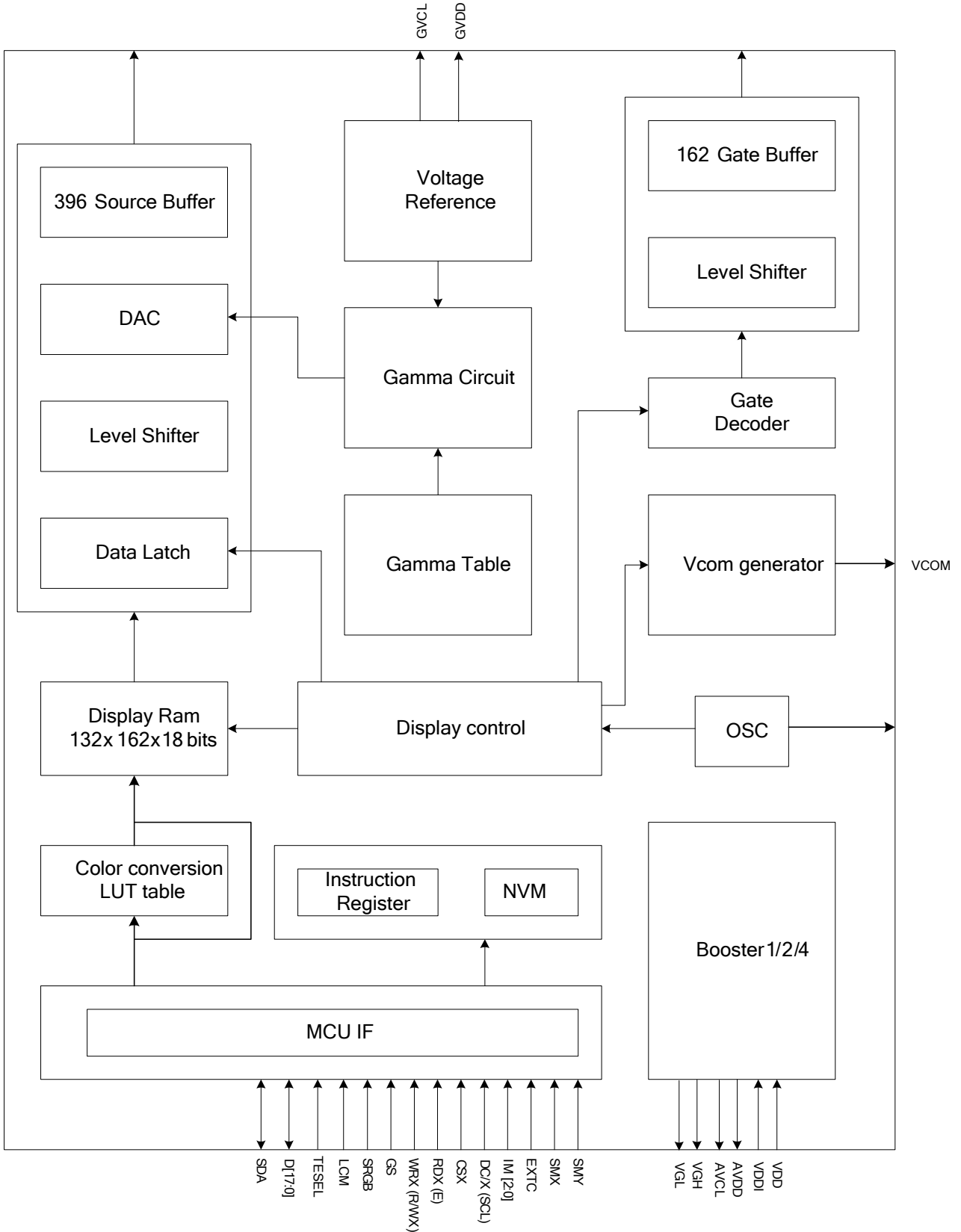
| No. | PAD Name | X     | Y   |
|-----|----------|-------|-----|
| 601 | S72      | -2244 | 110 |
| 602 | S71      | -2260 | 227 |
| 603 | S70      | -2276 | 110 |
| 604 | S69      | -2292 | 227 |
| 605 | S68      | -2308 | 110 |
| 606 | S67      | -2324 | 227 |
| 607 | S66      | -2340 | 110 |
| 608 | S65      | -2356 | 227 |
| 609 | S64      | -2372 | 110 |
| 610 | S63      | -2388 | 227 |
| 611 | S62      | -2404 | 110 |
| 612 | S61      | -2420 | 227 |
| 613 | S60      | -2436 | 110 |
| 614 | S59      | -2452 | 227 |
| 615 | S58      | -2468 | 110 |
| 616 | S57      | -2484 | 227 |
| 617 | S56      | -2500 | 110 |
| 618 | S55      | -2516 | 227 |
| 619 | S54      | -2532 | 110 |
| 620 | S53      | -2548 | 227 |
| 621 | S52      | -2564 | 110 |
| 622 | S51      | -2580 | 227 |
| 623 | S50      | -2596 | 110 |
| 624 | S49      | -2612 | 227 |
| 625 | S48      | -2628 | 110 |
| 626 | S47      | -2644 | 227 |
| 627 | S46      | -2660 | 110 |
| 628 | S45      | -2676 | 227 |
| 629 | S44      | -2692 | 110 |
| 630 | S43      | -2708 | 227 |
| 631 | S42      | -2724 | 110 |
| 632 | S41      | -2740 | 227 |
| 633 | S40      | -2756 | 110 |
| 634 | S39      | -2772 | 227 |
| 635 | S38      | -2788 | 110 |
| 636 | S37      | -2804 | 227 |
| 637 | S36      | -2820 | 110 |
| 638 | S35      | -2836 | 227 |
| 639 | S34      | -2852 | 110 |
| 640 | S33      | -2868 | 227 |
| 641 | S32      | -2884 | 110 |
| 642 | S31      | -2900 | 227 |
| 643 | S30      | -2916 | 110 |
| 644 | S29      | -2932 | 227 |
| 645 | S28      | -2948 | 110 |
| 646 | S27      | -2964 | 227 |
| 647 | S26      | -2980 | 110 |
| 648 | S25      | -2996 | 227 |
| 649 | S24      | -3012 | 110 |
| 650 | S23      | -3028 | 227 |

| No. | PAD Name | X     | Y   |
|-----|----------|-------|-----|
| 651 | S22      | -3044 | 110 |
| 652 | S21      | -3060 | 227 |
| 653 | S20      | -3076 | 110 |
| 654 | S19      | -3092 | 227 |
| 655 | S18      | -3108 | 110 |
| 656 | S17      | -3124 | 227 |
| 657 | S16      | -3140 | 110 |
| 658 | S15      | -3156 | 227 |
| 659 | S14      | -3172 | 110 |
| 660 | S13      | -3188 | 227 |
| 661 | S12      | -3204 | 110 |
| 662 | S11      | -3220 | 227 |
| 663 | S10      | -3236 | 110 |
| 664 | S9       | -3252 | 227 |
| 665 | S8       | -3268 | 110 |
| 666 | S7       | -3284 | 227 |
| 667 | S6       | -3300 | 110 |
| 668 | S5       | -3316 | 227 |
| 669 | S4       | -3332 | 110 |
| 670 | S3       | -3348 | 227 |
| 671 | S2       | -3364 | 110 |
| 672 | S1       | -3380 | 227 |
| 673 | Dummy    | -3396 | 110 |
| 674 | Dummy    | -3412 | 227 |
| 675 | Dummy    | -3428 | 110 |
| 676 | Dummy    | -3444 | 227 |
| 677 | G1       | -3460 | 110 |
| 678 | G3       | -3476 | 227 |
| 679 | G5       | -3492 | 110 |
| 680 | G7       | -3508 | 227 |
| 681 | G9       | -3524 | 110 |
| 682 | G11      | -3540 | 227 |
| 683 | G13      | -3556 | 110 |
| 684 | G15      | -3572 | 227 |
| 685 | G17      | -3588 | 110 |
| 686 | G19      | -3604 | 227 |
| 687 | G21      | -3620 | 110 |
| 688 | G23      | -3636 | 227 |
| 689 | G25      | -3652 | 110 |
| 690 | G27      | -3668 | 227 |
| 691 | G29      | -3684 | 110 |
| 692 | G31      | -3700 | 227 |
| 693 | G33      | -3716 | 110 |
| 694 | G35      | -3732 | 227 |
| 695 | G37      | -3748 | 110 |
| 696 | G39      | -3764 | 227 |
| 697 | G41      | -3780 | 110 |
| 698 | G43      | -3796 | 227 |
| 699 | G45      | -3812 | 110 |
| 700 | G47      | -3828 | 227 |

| No. | PAD Name | X     | Y   |
|-----|----------|-------|-----|
| 701 | G49      | -3844 | 110 |
| 702 | G51      | -3860 | 227 |
| 703 | G53      | -3876 | 110 |
| 704 | G55      | -3892 | 227 |
| 705 | G57      | -3908 | 110 |
| 706 | G59      | -3924 | 227 |
| 707 | G61      | -3940 | 110 |
| 708 | G63      | -3956 | 227 |
| 709 | G65      | -3972 | 110 |
| 710 | G67      | -3988 | 227 |
| 711 | G69      | -4004 | 110 |
| 712 | G71      | -4020 | 227 |
| 713 | G73      | -4036 | 110 |
| 714 | G75      | -4052 | 227 |
| 715 | G77      | -4068 | 110 |
| 716 | G79      | -4084 | 227 |
| 717 | G81      | -4100 | 110 |
| 718 | G83      | -4116 | 227 |
| 719 | G85      | -4132 | 110 |
| 720 | G87      | -4148 | 227 |
| 721 | G89      | -4164 | 110 |
| 722 | G91      | -4180 | 227 |
| 723 | G93      | -4196 | 110 |
| 724 | G95      | -4212 | 227 |
| 725 | G97      | -4228 | 110 |
| 726 | G99      | -4244 | 227 |
| 727 | G101     | -4260 | 110 |
| 728 | G103     | -4276 | 227 |
| 729 | G105     | -4292 | 110 |
| 730 | G107     | -4308 | 227 |
| 731 | G109     | -4324 | 110 |
| 732 | G111     | -4340 | 227 |
| 733 | G113     | -4356 | 110 |
| 734 | G115     | -4372 | 227 |
| 735 | G117     | -4388 | 110 |
| 736 | G119     | -4404 | 227 |
| 737 | G121     | -4420 | 110 |
| 738 | G123     | -4436 | 227 |
| 739 | G125     | -4452 | 110 |
| 740 | G127     | -4468 | 227 |
| 741 | G129     | -4484 | 110 |
| 742 | G131     | -4500 | 227 |
| 743 | G133     | -4516 | 110 |
| 744 | G135     | -4532 | 227 |
| 745 | G137     | -4548 | 110 |
| 746 | G139     | -4564 | 227 |
| 747 | G141     | -4580 | 110 |
| 748 | G143     | -4596 | 227 |
| 749 | G145     | -4612 | 110 |
| 750 | G147     | -4628 | 227 |



## 5 Block diagram



## 6 Driver IC Pin Description

### 6.1 Power Supply Pin

| Name | I/O | Description                                                  | Connect pin |
|------|-----|--------------------------------------------------------------|-------------|
| VDD  | I   | Power supply for analog, digital system and booster circuit. | VDD         |
| VDDI | I   | Power supply for I/O system.                                 | VDDI        |
| AGND | I   | System ground for analog system and booster circuit.         | GND         |
| DGND | I   | System ground for I/O system and digital system.             | GND         |

### 6.2 Interface logic pin

| Name          | I/O | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Connect pin |     |                    |   |   |                    |   |   |                     |   |   |                    |   |   |                     |           |
|---------------|-----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|-----|--------------------|---|---|--------------------|---|---|---------------------|---|---|--------------------|---|---|---------------------|-----------|
| P68           | I   | -8080/6800 MCU interface mode select.<br>-P68='1', select 6800 MCU parallel interface.<br>-P68='0', select 8080 MCU parallel interface.<br>-If not used, please fix this pin at DGND level.                                                                                                                                                                                                                                                                                                                                | DGND/VDDI   |     |                    |   |   |                    |   |   |                     |   |   |                    |   |   |                     |           |
| IM2           | I   | MCU Parallel interface bus and Serial interface select<br>IM2='1', Parallel interface<br>IM2='0', Serial interface                                                                                                                                                                                                                                                                                                                                                                                                         | DGND/VDDI   |     |                    |   |   |                    |   |   |                     |   |   |                    |   |   |                     |           |
| IM1,IM0       | I   | - MCU parallel interface type selection<br>-If not used, please fix this pin at VDDI or DGND level.<br><table border="1"> <thead> <tr> <th>IM1</th> <th>IM0</th> <th>Parallel interface</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>0</td> <td>MCU 8-bit parallel</td> </tr> <tr> <td>0</td> <td>1</td> <td>MCU 16-bit parallel</td> </tr> <tr> <td>1</td> <td>0</td> <td>MCU 9-bit parallel</td> </tr> <tr> <td>1</td> <td>1</td> <td>MCU 18-bit parallel</td> </tr> </tbody> </table> | IM1         | IM0 | Parallel interface | 0 | 0 | MCU 8-bit parallel | 0 | 1 | MCU 16-bit parallel | 1 | 0 | MCU 9-bit parallel | 1 | 1 | MCU 18-bit parallel | DGND/VDDI |
| IM1           | IM0 | Parallel interface                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |             |     |                    |   |   |                    |   |   |                     |   |   |                    |   |   |                     |           |
| 0             | 0   | MCU 8-bit parallel                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |             |     |                    |   |   |                    |   |   |                     |   |   |                    |   |   |                     |           |
| 0             | 1   | MCU 16-bit parallel                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |             |     |                    |   |   |                    |   |   |                     |   |   |                    |   |   |                     |           |
| 1             | 0   | MCU 9-bit parallel                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |             |     |                    |   |   |                    |   |   |                     |   |   |                    |   |   |                     |           |
| 1             | 1   | MCU 18-bit parallel                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |             |     |                    |   |   |                    |   |   |                     |   |   |                    |   |   |                     |           |
| SPI4W         | I   | - SPI4W='0', 3-line SPI enable.<br>- SPI4W='1', 4-line SPI enable.<br>-If not used, please fix this pin at DGND level.                                                                                                                                                                                                                                                                                                                                                                                                     | DGND/VDDI   |     |                    |   |   |                    |   |   |                     |   |   |                    |   |   |                     |           |
| RESX          | I   | -This signal will reset the device and it must be applied to properly initialize the chip.<br>-Signal is active low.                                                                                                                                                                                                                                                                                                                                                                                                       | MCU         |     |                    |   |   |                    |   |   |                     |   |   |                    |   |   |                     |           |
| CSX           | I   | -Chip selection pin<br>-Low enable.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | MCU         |     |                    |   |   |                    |   |   |                     |   |   |                    |   |   |                     |           |
| D/CX<br>(SCL) | I   | -Display data/command selection pin in MCU interface.<br>-D/CX='1': display data or parameter.<br>-D/CX='0': command data.<br>-In serial interface, this is used as SCL.<br>-If not used, please fix this pin at VDDI or DGND level.                                                                                                                                                                                                                                                                                       | MCU         |     |                    |   |   |                    |   |   |                     |   |   |                    |   |   |                     |           |
| RDX           | I   | -Read enable in 8080 MCU parallel interface.<br>-If not used, please fix this pin at VDDI or DGND level.                                                                                                                                                                                                                                                                                                                                                                                                                   | MCU         |     |                    |   |   |                    |   |   |                     |   |   |                    |   |   |                     |           |

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|               |     |                                                                                                                                                                                                                   |     |
|---------------|-----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| WRX<br>(D/CX) | I   | -Write enable in MCU parallel interface.<br>-In 4-line SPI, this pin is used as D/CX (data/ command selection).<br>-If not used, please fix this pin at VDDI or DGND level.                                       | MCU |
| D[17:0]       | I/O | -D[17:0] are used as MCU parallel interface data bus.<br>-D0 is the serial input/output signal in serial interface mode.<br>-In serial interface, D[17:1] are not used and should be fixed at VDDI or DGND level. | MCU |
| TE            | O   | -Tearing effect output pin to synchronies MCU to frame rate, activated by S/W command.<br>-If not used, please open this pin.                                                                                     | MCU |
| OSC           | O   | -Monitoring pin of internal oscillator clock and is turned ON/OFF by S/W command.<br>-When this pin is inactive (function OFF), this pin is DGND level.<br>-If not used, please open this pin.                    | -   |

Note1. When in parallel mode, no use data pin must be connected to "1" or "0".

Note2. When CSX="1", there is no influence to the parallel and serial interface.

## 6.3 Mode selection pin

| Name     | I/O                                           | Description                                                                                                                                                                                                                                                                                                                                                                                                                                        | Connect pin |                                               |                               |                                         |          |                                         |           |            |            |   |                                         |            |           |                                         |           |
|----------|-----------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|-----------------------------------------------|-------------------------------|-----------------------------------------|----------|-----------------------------------------|-----------|------------|------------|---|-----------------------------------------|------------|-----------|-----------------------------------------|-----------|
| EXTC     | I                                             | <p>-During normal operation, please open this pin.</p> <table border="1"> <thead> <tr> <th>EXTC</th> <th>Enable/disable modification of extend command</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>Normal operation mode</td> </tr> <tr> <td>1</td> <td>Use NVM command set</td> </tr> </tbody> </table>                                                                                                                                       | EXTC        | Enable/disable modification of extend command | 0                             | Normal operation mode                   | 1        | Use NVM command set                     | Open      |            |            |   |                                         |            |           |                                         |           |
| EXTC     | Enable/disable modification of extend command |                                                                                                                                                                                                                                                                                                                                                                                                                                                    |             |                                               |                               |                                         |          |                                         |           |            |            |   |                                         |            |           |                                         |           |
| 0        | Normal operation mode                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                    |             |                                               |                               |                                         |          |                                         |           |            |            |   |                                         |            |           |                                         |           |
| 1        | Use NVM command set                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                    |             |                                               |                               |                                         |          |                                         |           |            |            |   |                                         |            |           |                                         |           |
| GM1, GM0 | I                                             | <p>-Panel resolution selection pins.</p> <table border="1"> <thead> <tr> <th>G</th> <th>G</th> <th rowspan="2">Selection of panel resolution</th> </tr> <tr> <th>M</th> <th>M</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>0</td> <td></td> </tr> <tr> <td>0</td> <td>0</td> <td>132RGB x 162 (S1~S396 &amp; G1~G162 output)</td> </tr> <tr> <td>1</td> <td>1</td> <td>128RGB x 160 (S7~S390 &amp; G2~G161 output)</td> </tr> </tbody> </table> | G           | G                                             | Selection of panel resolution | M                                       | M        | 1                                       | 0         |            | 0          | 0 | 132RGB x 162 (S1~S396 & G1~G162 output) | 1          | 1         | 128RGB x 160 (S7~S390 & G2~G161 output) | VDDI/DGND |
| G        | G                                             | Selection of panel resolution                                                                                                                                                                                                                                                                                                                                                                                                                      |             |                                               |                               |                                         |          |                                         |           |            |            |   |                                         |            |           |                                         |           |
| M        | M                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                    |             |                                               |                               |                                         |          |                                         |           |            |            |   |                                         |            |           |                                         |           |
| 1        | 0                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                    |             |                                               |                               |                                         |          |                                         |           |            |            |   |                                         |            |           |                                         |           |
| 0        | 0                                             | 132RGB x 162 (S1~S396 & G1~G162 output)                                                                                                                                                                                                                                                                                                                                                                                                            |             |                                               |                               |                                         |          |                                         |           |            |            |   |                                         |            |           |                                         |           |
| 1        | 1                                             | 128RGB x 160 (S7~S390 & G2~G161 output)                                                                                                                                                                                                                                                                                                                                                                                                            |             |                                               |                               |                                         |          |                                         |           |            |            |   |                                         |            |           |                                         |           |
| SRGB     | I                                             | <p>-RGB direction select H/W pin for color filter setting.</p> <table border="1"> <thead> <tr> <th>SRGB</th> <th>RGB arrangement</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>S1, S2, S3 filter order = 'R', 'G', 'B'</td> </tr> <tr> <td>1</td> <td>S1, S2, S3 filter order = 'B', 'G', 'R'</td> </tr> </tbody> </table>                                                                                                                       | SRGB        | RGB arrangement                               | 0                             | S1, S2, S3 filter order = 'R', 'G', 'B' | 1        | S1, S2, S3 filter order = 'B', 'G', 'R' | VDDI/DGND |            |            |   |                                         |            |           |                                         |           |
| SRGB     | RGB arrangement                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                    |             |                                               |                               |                                         |          |                                         |           |            |            |   |                                         |            |           |                                         |           |
| 0        | S1, S2, S3 filter order = 'R', 'G', 'B'       |                                                                                                                                                                                                                                                                                                                                                                                                                                                    |             |                                               |                               |                                         |          |                                         |           |            |            |   |                                         |            |           |                                         |           |
| 1        | S1, S2, S3 filter order = 'B', 'G', 'R'       |                                                                                                                                                                                                                                                                                                                                                                                                                                                    |             |                                               |                               |                                         |          |                                         |           |            |            |   |                                         |            |           |                                         |           |
| SMX      | I                                             | <p>-Module source output direction H/W selection pin.</p> <table border="1"> <thead> <tr> <th>SMX</th> <th colspan="2">Scanning direction of source output</th> </tr> <tr> <td></td> <th>GM= '00'</th> <th>GM= '11'</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>S1 -&gt; S396</td> <td>S7 -&gt; S390</td> </tr> <tr> <td>1</td> <td>S396 -&gt; S1</td> <td>S390 -&gt; S7</td> </tr> </tbody> </table>                                          | SMX         | Scanning direction of source output           |                               |                                         | GM= '00' | GM= '11'                                | 0         | S1 -> S396 | S7 -> S390 | 1 | S396 -> S1                              | S390 -> S7 | VDDI/DGND |                                         |           |
| SMX      | Scanning direction of source output           |                                                                                                                                                                                                                                                                                                                                                                                                                                                    |             |                                               |                               |                                         |          |                                         |           |            |            |   |                                         |            |           |                                         |           |
|          | GM= '00'                                      | GM= '11'                                                                                                                                                                                                                                                                                                                                                                                                                                           |             |                                               |                               |                                         |          |                                         |           |            |            |   |                                         |            |           |                                         |           |
| 0        | S1 -> S396                                    | S7 -> S390                                                                                                                                                                                                                                                                                                                                                                                                                                         |             |                                               |                               |                                         |          |                                         |           |            |            |   |                                         |            |           |                                         |           |
| 1        | S396 -> S1                                    | S390 -> S7                                                                                                                                                                                                                                                                                                                                                                                                                                         |             |                                               |                               |                                         |          |                                         |           |            |            |   |                                         |            |           |                                         |           |
| SMY      | I                                             | <p>-Module Gate output direction H/W selection pin.</p> <table border="1"> <thead> <tr> <th>SMY</th> <th colspan="2">Scanning direction of gate output</th> </tr> <tr> <td></td> <th>GM= '00'</th> <th>GM= '11'</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>G1 -&gt; G162</td> <td>G2 -&gt; G161</td> </tr> <tr> <td>1</td> <td>G162 -&gt; G1</td> <td>G161 -&gt; G2</td> </tr> </tbody> </table>                                              | SMY         | Scanning direction of gate output             |                               |                                         | GM= '00' | GM= '11'                                | 0         | G1 -> G162 | G2 -> G161 | 1 | G162 -> G1                              | G161 -> G2 | VDDI/DGND |                                         |           |
| SMY      | Scanning direction of gate output             |                                                                                                                                                                                                                                                                                                                                                                                                                                                    |             |                                               |                               |                                         |          |                                         |           |            |            |   |                                         |            |           |                                         |           |
|          | GM= '00'                                      | GM= '11'                                                                                                                                                                                                                                                                                                                                                                                                                                           |             |                                               |                               |                                         |          |                                         |           |            |            |   |                                         |            |           |                                         |           |
| 0        | G1 -> G162                                    | G2 -> G161                                                                                                                                                                                                                                                                                                                                                                                                                                         |             |                                               |                               |                                         |          |                                         |           |            |            |   |                                         |            |           |                                         |           |
| 1        | G162 -> G1                                    | G161 -> G2                                                                                                                                                                                                                                                                                                                                                                                                                                         |             |                                               |                               |                                         |          |                                         |           |            |            |   |                                         |            |           |                                         |           |
| LCM      | I                                             | <p>-Liquid crystal (LC) type selection pins.</p> <table border="1"> <thead> <tr> <th>LCM</th> <th>Selection of LC type</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>Normally white LC type</td> </tr> <tr> <td>1</td> <td>Normally black LC type</td> </tr> </tbody> </table>                                                                                                                                                                   | LCM         | Selection of LC type                          | 0                             | Normally white LC type                  | 1        | Normally black LC type                  | VDDI/DGND |            |            |   |                                         |            |           |                                         |           |
| LCM      | Selection of LC type                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                    |             |                                               |                               |                                         |          |                                         |           |            |            |   |                                         |            |           |                                         |           |
| 0        | Normally white LC type                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                    |             |                                               |                               |                                         |          |                                         |           |            |            |   |                                         |            |           |                                         |           |
| 1        | Normally black LC type                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                    |             |                                               |                               |                                         |          |                                         |           |            |            |   |                                         |            |           |                                         |           |
| GS       | I                                             | <p>-Gamma curve selection pin.</p> <table border="1"> <thead> <tr> <th>GS</th> <th>Selection of gamma curve</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>GC0=1.0, GC1=2.5, GC2=2.2, GC3=1.8</td> </tr> <tr> <td>1</td> <td>GC0=2.2, GC1=1.8, GC2=2.5, GC3=1.0</td> </tr> </tbody> </table>                                                                                                                                                      | GS          | Selection of gamma curve                      | 0                             | GC0=1.0, GC1=2.5, GC2=2.2, GC3=1.8      | 1        | GC0=2.2, GC1=1.8, GC2=2.5, GC3=1.0      | VDDI/DGND |            |            |   |                                         |            |           |                                         |           |
| GS       | Selection of gamma curve                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                    |             |                                               |                               |                                         |          |                                         |           |            |            |   |                                         |            |           |                                         |           |
| 0        | GC0=1.0, GC1=2.5, GC2=2.2, GC3=1.8            |                                                                                                                                                                                                                                                                                                                                                                                                                                                    |             |                                               |                               |                                         |          |                                         |           |            |            |   |                                         |            |           |                                         |           |
| 1        | GC0=2.2, GC1=1.8, GC2=2.5, GC3=1.0            |                                                                                                                                                                                                                                                                                                                                                                                                                                                    |             |                                               |                               |                                         |          |                                         |           |            |            |   |                                         |            |           |                                         |           |

| VPP   | I                        | When writing NVM, it needs external power supply voltage (7.5V).                                                                                                                                                                                                                                                                           |       |                          |   |                     |   |                     |           |
|-------|--------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|--------------------------|---|---------------------|---|---------------------|-----------|
| TESEL | I                        | <p>Input pin to select horizontal line number in TE signal.<br/>This pin is only for GM[1:0]='00' mode</p> <table border="1"> <thead> <tr> <th>TESEL</th> <th>Selection of gamma curve</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>TE output 162 lines</td> </tr> <tr> <td>1</td> <td>TE output 160 lines</td> </tr> </tbody> </table> | TESEL | Selection of gamma curve | 0 | TE output 162 lines | 1 | TE output 160 lines | VDDI/DGND |
| TESEL | Selection of gamma curve |                                                                                                                                                                                                                                                                                                                                            |       |                          |   |                     |   |                     |           |
| 0     | TE output 162 lines      |                                                                                                                                                                                                                                                                                                                                            |       |                          |   |                     |   |                     |           |
| 1     | TE output 160 lines      |                                                                                                                                                                                                                                                                                                                                            |       |                          |   |                     |   |                     |           |

## 6.4 Driver output pins

| Name       | I/O | Description                                                                                                                                                         | Connect pin      |
|------------|-----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|
| S1 to S396 | O   | - Source driver output pins.                                                                                                                                        | -                |
| G1 to G162 | O   | - Gate driver output pins.                                                                                                                                          | -                |
| AVDD       | O   | Power pin for analog circuits.<br>Connect a capacitor for stabilization.                                                                                            | Capacitor        |
| AVCL       | O   | - A power supply pin for generating GVCL.<br>- Connect a capacitor for stabilization.                                                                               | Capacitor        |
| VGH        | O   | - Power output pin for gate driver                                                                                                                                  |                  |
| VGL        | O   | - Power output (Negative) pin for gate driver                                                                                                                       |                  |
| GVDD       | O   | - A power output of grayscale voltage generator.<br>- When internal GVDD generator is not used, connect an external power supply (AVDD-0.5V) to this pin.           |                  |
| GVCL       | O   | - A power output(Negative) of grayscale voltage generator.<br>- When internal GVCL generator is not used, connect an external power supply (AVCL+0.5V) to this pin. | -                |
| VCOM       | O   | - A power supply for the TFT-LCD common electrode.                                                                                                                  | Common electrode |
| VCC        | O   | - Monitoring pin of internal digital reference voltage.<br>- Please open these pins.                                                                                |                  |
| VDDIO      | O   | - VDDI voltage output level for monitoring.                                                                                                                         | -                |
| DGND0      | O   | - DGND voltage output level for monitoring.                                                                                                                         | -                |

## 6.5 Test pins

| Name                                                                                                 | I/O | Description                                                                                                                                    | Connect pin |
|------------------------------------------------------------------------------------------------------|-----|------------------------------------------------------------------------------------------------------------------------------------------------|-------------|
| TEST2P<br>TEST1P                                                                                     | I   | -These test pins for Driver vender test used.<br>-Please connect these pins to DGND.                                                           | DGND        |
| TESTOP[8]<br>TESTOP[7]<br>TESTOP[6]<br>TESTOP[5]<br>TESTOP[4]<br>TESTOP[3]<br>TESTOP[2]<br>TESTOP[1] | O   | -These test pins for Driver vender test used.<br>-Please open these pins.                                                                      | Open        |
| Dummy                                                                                                | -   | -These pins are dummy (have no function inside).<br>-Can allow signal traces pass through these pads on TFT glass.<br>-Please open these pins. | Open        |

## 7 Driver electrical characteristics

### 7.1 Absolute operation range

| Item                        | Symbol  | Rating           | Unit |
|-----------------------------|---------|------------------|------|
| Supply voltage              | VDD     | - 0.3 ~ +4.6     | V    |
| Supply voltage (Logic)      | VDDI    | - 0.3 ~ +4.6     | V    |
| Supply voltage (Digital)    | VCC     | -0.3 ~ +1.95     | V    |
| Driver supply voltage       | VGH-VGL | -0.3 ~ +30.0     | V    |
| Logic input voltage range   | VIN     | 0.3 ~ VDDI + 0.3 | V    |
| Logic output voltage range  | VO      | 0.3 ~ VDDI + 0.3 | V    |
| Operating temperature range | TOPR    | -30 ~ +85        | °C   |
| Storage temperature range   | TSTG    | -40 ~ +125       | °C   |

*Note: If one of the above items is exceeded its maximum limitation momentarily, the quality of the product may be degraded. Absolute maximum limitation, therefore, specify the values exceeding which the product may be physically damaged. Be sure to use the product within the recommend range.*

## 7.2 DC characteristic

| Parameter                   | Symbol  | Condition                | Specification |      |         | Unit | Related Pins |
|-----------------------------|---------|--------------------------|---------------|------|---------|------|--------------|
|                             |         |                          | Min           | Typ  | Max     |      |              |
| Power & operation voltage   |         |                          |               |      |         |      |              |
| System voltage              | VDD     | Operating voltage        | 2.3           | 2.75 | 4.8     | V    |              |
| Interface operation voltage | VDDI    | I/O supply voltage       | 1.65          | 1.8  | 3.7     | V    |              |
| Gate driver high voltage    | VGH     |                          | 10            |      | 15      | V    |              |
| Gate driver low voltage     | VGL     |                          | -12.4         |      | -7.5    | V    |              |
| Gate driver supply voltage  |         | VGH-VGL                  | 17.5          |      | 27.5    | V    |              |
| Input / Output              |         |                          |               |      |         |      |              |
| Logic-high input voltage    | VIH     |                          | 0.7VDDI       |      | VDDI    | V    | Note 1       |
| Logic-low input voltage     | VIL     |                          | VSS           |      | 0.3VDDI | V    | Note 1       |
| Logic-high output voltage   | VOH     | IOH = -1.0mA             | 0.8VDDI       |      | VDDI    | V    | Note 1       |
| Logic-low output voltage    | VOL     | IOL = +1.0mA             | VSS           |      | 0.2VDDI | V    | Note 1       |
| Logic-high input current    | IIH     | VIN = VDDI               |               |      | 1       | uA   | Note 1       |
| Logic-low input current     | IIL     | VIN = VSS                | -1            |      |         | uA   | Note 1       |
| Input leakage current       | IIL     | IOH = -1.0mA             | -0.1          |      | +0.1    | uA   | Note 1       |
| VCOM voltage                |         |                          |               |      |         |      |              |
| VCOM amplitude              | VCOM    |                          | -2            |      | -0.425  | V    |              |
| Source driver               |         |                          |               |      |         |      |              |
| Source output range         | Vsout   |                          | 0.1           |      | GVDD    | V    |              |
| Gamma reference voltage     | GVDD    |                          | 3.0           |      | 5.0     | V    |              |
| Source output settling time | Tr      | Below with 99% precision |               |      | 20      | us   | Note 2       |
| Output offset voltage       | Voffset |                          |               |      | 35      | mV   | Note 3       |

Notes:

1. TA= -30 to 85°C.
2. Source channel loading= 2KΩ+12pF/channel, Gate channel loading=5KΩ+40pF/channel.
3. The Max. value is between measured point of source output and gamma setting value.

## 7.3 Power consumption

Ta=25°C, Frame rate = 60Hz, the registers setting are IC default setting.

| Operation mode                 | Image  | Current consumption |             |              |             |
|--------------------------------|--------|---------------------|-------------|--------------|-------------|
|                                |        | Typical             |             | Maximum      |             |
|                                |        | IDDI<br>(mA)        | IDD<br>(mA) | IDDI<br>(mA) | IDD<br>(mA) |
| Normal mode                    | Note 1 | TBD                 | TBD         | TBD          | TBD         |
|                                | Note 2 | TBD                 | TBD         | TBD          | TBD         |
| Partial + Idle mode (40 lines) | Note 1 | TBD                 | TBD         | TBD          | TBD         |
|                                | Note 2 | TBD                 | TBD         | TBD          | TBD         |
| Sleep-in mode                  | N/A    | TBD                 | TBD         | TBD          | TBD         |

Notes:

1. All pixels black.
2. All pixels white.
3. The Current Consumption is DC characteristics of ST7735R.
4. Typical: VDDI=1.8V, VDD=2.75V; Maximum: VDDI=1.65 to 3.7V, VDD=2.3 to 4.8V

## 8 Timing chart

### 8.1 Parallel interface characteristics: 18, 16, 9 or 8-bit bus (8080 series MCU interface)

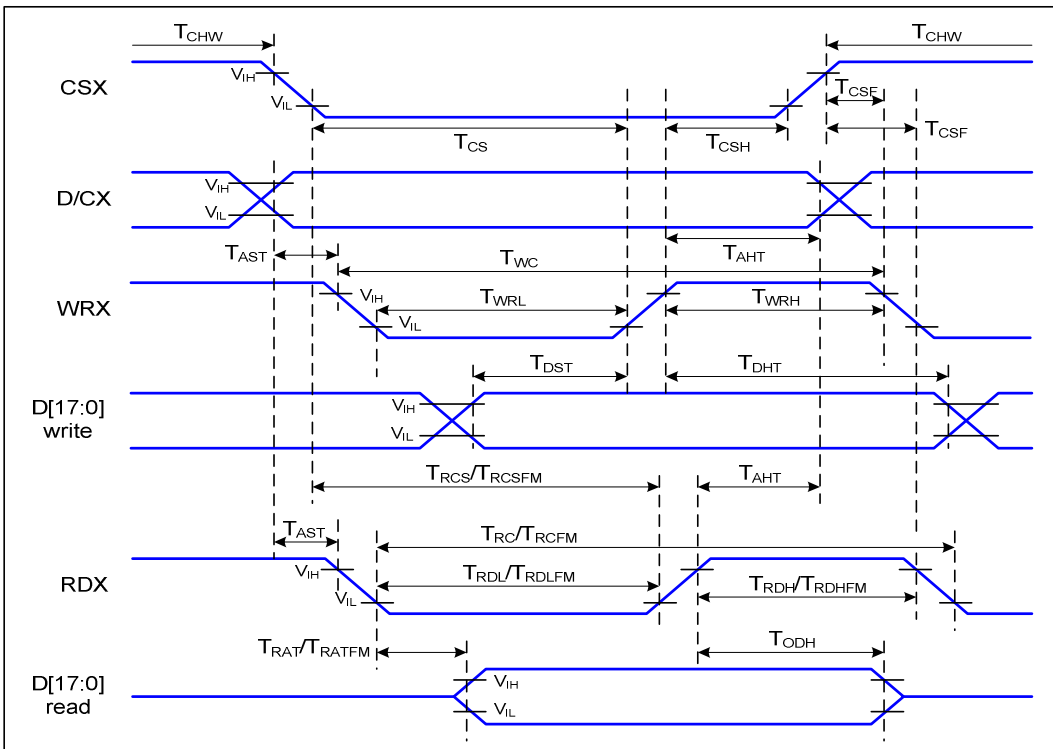
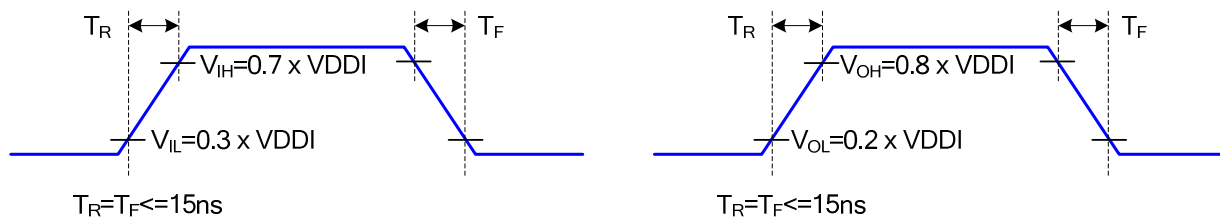


Figure 8.1.1 Parallel interface timing characteristics (8080 series MCU interface)

Ta=25 °C, VDDI=1.65~3.7V, VDD=2.3~4.8V

| Signal   | Symbol | Parameter                          | Min | Max | Unit | Description                 |
|----------|--------|------------------------------------|-----|-----|------|-----------------------------|
| D/CX     | TAST   | Address setup time                 | 10  |     | ns   | -                           |
|          | TAHT   | Address hold time (Write/Read)     | 10  |     | ns   |                             |
| CSX      | TCHW   | Chip select "H" pulse width        | 0   |     | ns   | -                           |
|          | TCS    | Chip select setup time (Write)     | 15  |     | ns   |                             |
|          | TRCS   | Chip select setup time (Read ID)   | 45  |     | ns   |                             |
|          | TRCSFM | Chip select setup time (Read FM)   | 355 |     | ns   |                             |
|          | TCSF   | Chip select wait time (Write/Read) | 10  |     | ns   |                             |
|          | TCSH   | Chip select hold time              | 10  |     | ns   |                             |
| WRX      | TWC    | Write cycle                        | 66  |     | ns   |                             |
|          | TWRH   | Control pulse "H" duration         | 15  |     | ns   |                             |
|          | TWRL   | Control pulse "L" duration         | 15  |     | ns   |                             |
| RDX (ID) | TRC    | Read cycle (ID)                    | 160 |     | ns   | When read ID data           |
|          | TRDH   | Control pulse "H" duration (ID)    | 90  |     | ns   |                             |
|          | TRDL   | Control pulse "L" duration (ID)    | 45  |     | ns   |                             |
| RDX (FM) | TRCFM  | Read cycle (FM)                    | 450 |     | ns   | When read from frame memory |
|          | TRDHFM | Control pulse "H" duration (FM)    | 90  |     | ns   |                             |
|          | TRDLFM | Control pulse "L" duration (FM)    | 355 |     | ns   |                             |
| D[17:0]  | TDST   | Data setup time                    | 10  |     | ns   | For CL=30pF                 |
|          | TDHT   | Data hold time                     | 10  |     | ns   |                             |
|          | TRAT   | Read access time (ID)              |     | 40  | ns   |                             |
|          | TRATFM | Read access time (FM)              |     | 340 | ns   |                             |
|          | TODH   | Output disable time                | 20  | 80  | ns   |                             |

Table 8.1.1 8080 parallel Interface Characteristics



Figure

## 8.1.2 Rising and falling timing for input and output signal

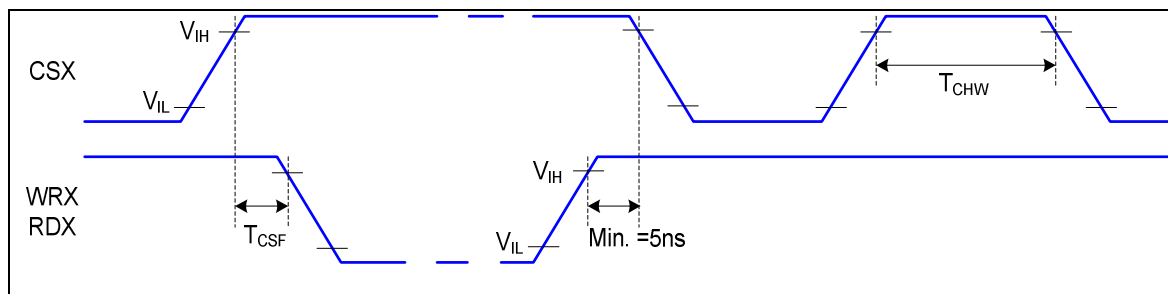


Figure 8.1.3 Chip selection (CSX) timing

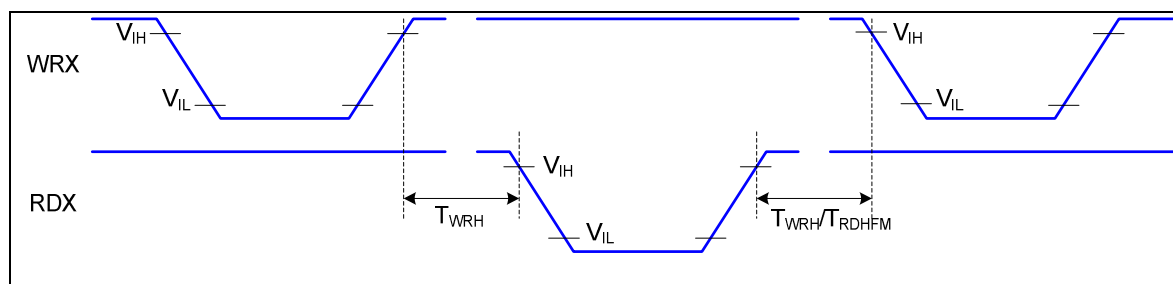


Figure 8.1.4 Write-to-read and read-to-write timing

Note: The rising time and falling time ( $T_r$ ,  $T_f$ ) of input signal are specified at 15 ns or less. Logic high and low levels are specified as 30% and 70% of VDDI for Input signals.

## 8.2 Parallel interface characteristics: 18, 16, 9 or 8-bit bus (6800 series MCU interface)

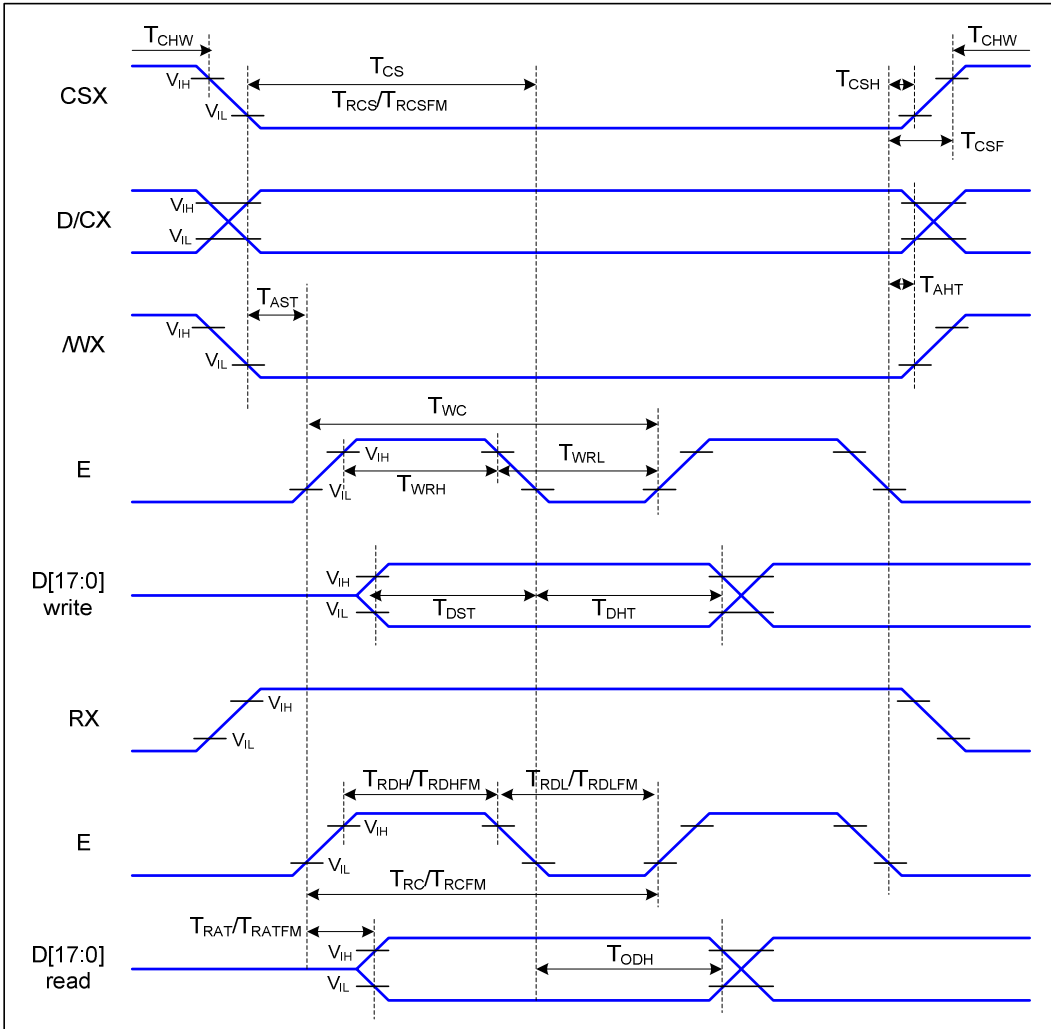


Figure 8.2.1 Parallel interface timing characteristics (6800-series MCU interface)

$T_a=25\text{ }^\circ\text{C}$ ,  $V_{DDI}=1.65\sim 3.7\text{V}$ ,  $V_{DD}=2.3\sim 4.8\text{V}$

| Signal   | Symbol      | Parameter                          | Min | Max | Unit | Description                                                 |
|----------|-------------|------------------------------------|-----|-----|------|-------------------------------------------------------------|
| D/CX     | $T_{AST}$   | Address setup time                 | 10  |     | ns   | -                                                           |
|          | $T_{AHT}$   | Address hold time (Write/Read)     | 10  |     | ns   |                                                             |
| CSX      | $T_{CHW}$   | Chip select "H" pulse width        | 0   |     | ns   | -                                                           |
|          | $T_{CS}$    | Chip select setup time (Write)     | 15  |     | ns   |                                                             |
|          | $T_{RCS}$   | Chip select setup time (Read ID)   | 45  |     | ns   |                                                             |
|          | $T_{RCSFM}$ | Chip select setup time (Read FM)   | 355 |     | ns   |                                                             |
|          | $T_{CSF}$   | Chip select wait time (Write/Read) | 10  |     | ns   |                                                             |
|          | $T_{CSH}$   | Chip select hold time              | 10  |     | ns   |                                                             |
| WRX      | $T_{WC}$    | Write cycle                        | 66  |     | ns   | -                                                           |
|          | $T_{WRH}$   | Control pulse "H" duration         | 15  |     | ns   |                                                             |
|          | $T_{WRL}$   | Control pulse "L" duration         | 15  |     | ns   |                                                             |
| RDX (ID) | $T_{RC}$    | Read cycle (ID)                    | 160 |     | ns   | When read ID data                                           |
|          | $T_{RDH}$   | Control pulse "H" duration (ID)    | 90  |     | ns   |                                                             |
|          | $T_{RDL}$   | Control pulse "L" duration (ID)    | 45  |     | ns   |                                                             |
| RDX (FM) | $T_{RCFM}$  | Read cycle (FM)                    | 450 |     | ns   | When read from frame memory                                 |
|          | $T_{RDHF}$  | Control pulse "H" duration (FM)    | 90  |     | ns   |                                                             |
|          | $T_{RDLF}$  | Control pulse "L" duration (FM)    | 355 |     | ns   |                                                             |
| D[17:0]  | $T_{DST}$   | Data setup time                    | 10  |     | ns   | For maximum $CL=30\text{pF}$<br>For minimum $CL=8\text{pF}$ |
|          | $T_{DHT}$   | Data hold time                     | 10  |     | ns   |                                                             |
|          | $T_{ODH}$   | Output disable time                | 20  | 80  | ns   |                                                             |

Table 8.2.1 6800 parallel Interface Characteristics

Note: The rising time and falling time ( $T_r$ ,  $T_f$ ) of input signal are specified at 15 ns or less. Logic high and low levels are specified as 30% and 70% of  $V_{DDI}$  for Input signals.

## 8.3 Serial interface characteristics (3-line serial)

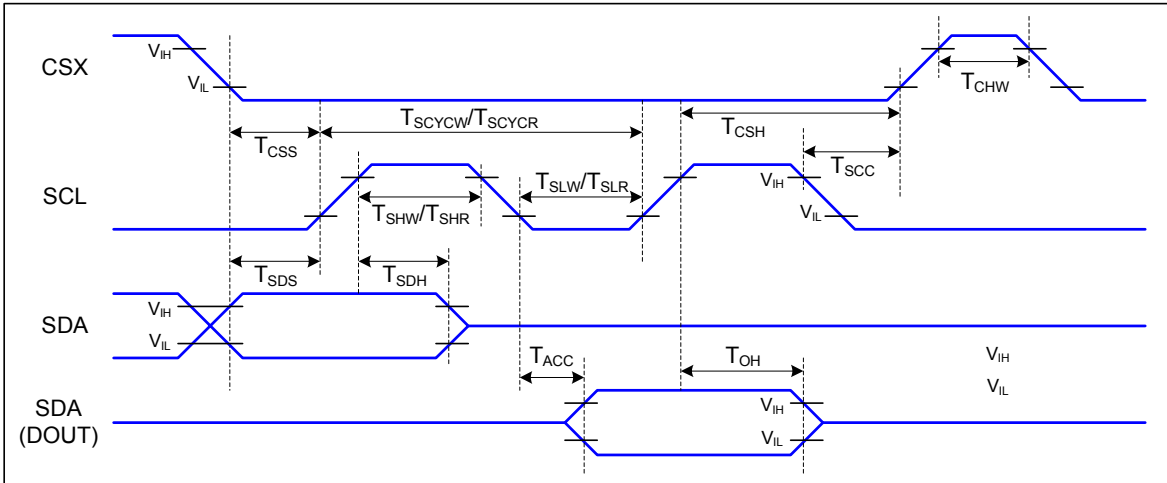


Figure 8.3.1 3-line serial interface timing

T<sub>a</sub>=25 °C, VDDI=1.65~3.7V, VDD=2.3~4.8V

| Signal           | Symbol             | Parameter                      | Min | Max | Unit | Description                               |
|------------------|--------------------|--------------------------------|-----|-----|------|-------------------------------------------|
| CSX              | T <sub>CSS</sub>   | Chip select setup time (write) | 15  |     | ns   |                                           |
|                  | T <sub>CSH</sub>   | Chip select hold time (write)  | 15  |     | ns   |                                           |
|                  | T <sub>CSS</sub>   | Chip select setup time (read)  | 60  |     | ns   |                                           |
|                  | T <sub>SCC</sub>   | Chip select hold time (read)   | 65  |     | ns   |                                           |
|                  | T <sub>CHW</sub>   | Chip select "H" pulse width    | 40  |     | ns   |                                           |
| SCL              | T <sub>SCYCW</sub> | Serial clock cycle (Write)     | 66  |     | ns   |                                           |
|                  | T <sub>SHW</sub>   | SCL "H" pulse width (Write)    | 15  |     | ns   |                                           |
|                  | T <sub>SLW</sub>   | SCL "L" pulse width (Write)    | 15  |     | ns   |                                           |
|                  | T <sub>SCYCR</sub> | Serial clock cycle (Read)      | 150 |     | ns   |                                           |
|                  | T <sub>SHR</sub>   | SCL "H" pulse width (Read)     | 60  |     | ns   |                                           |
| SDA (DIN) (DOUT) | T <sub>SLR</sub>   | SCL "L" pulse width (Read)     | 60  |     | ns   |                                           |
|                  | T <sub>SDS</sub>   | Data setup time                | 10  |     | ns   |                                           |
|                  | T <sub>SDH</sub>   | Data hold time                 | 10  |     | ns   |                                           |
|                  | T <sub>ACC</sub>   | Access time                    | 10  | 50  | ns   |                                           |
|                  | T <sub>OH</sub>    | Output disable time            | 15  | 50  | ns   | For maximum CL=30pF<br>For minimum CL=8pF |

Table 8.3.1 3-line Serial Interface Characteristics

Note : The rising time and falling time (T<sub>r</sub>, T<sub>f</sub>) of input signal are specified at 15 ns or less. Logic high and low levels are specified as 30% and 70% of VDDI for Input signals.

## 8.4 Serial interface characteristics (4-line serial)

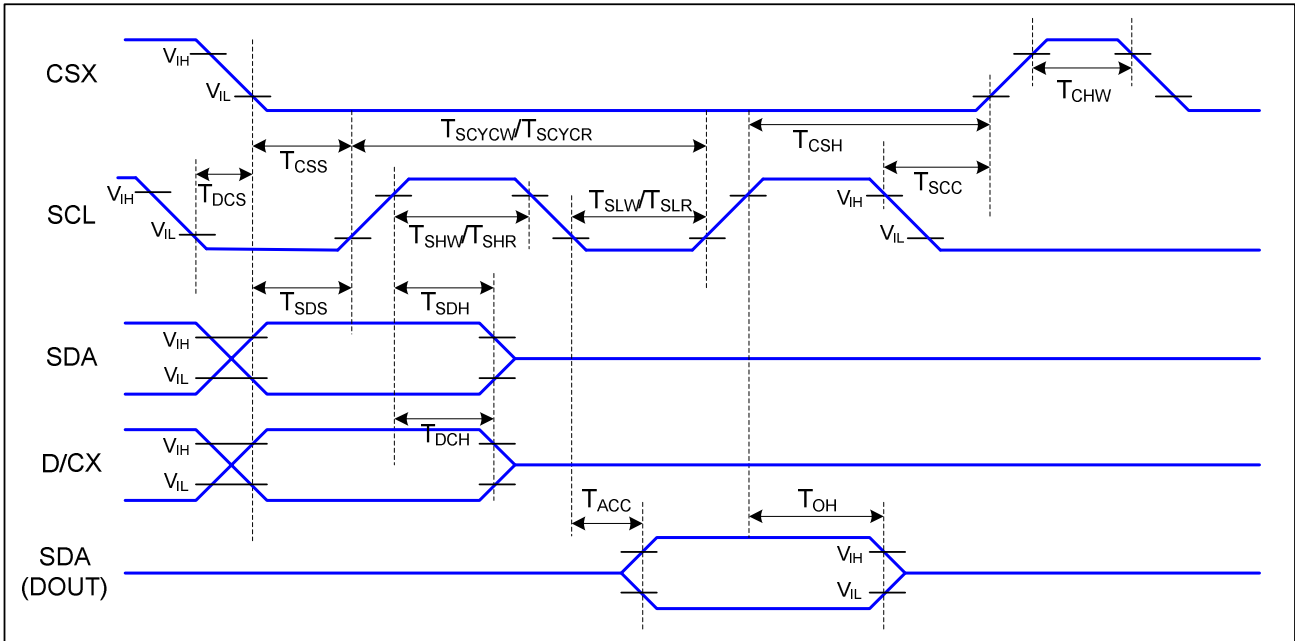


Figure 8.4.1 4-line serial interface timing  
 Ta=25 °C, VDDI=1.65~3.7V, VDD=2.3~4.8V

| Signal           | Symbol             | Parameter                      | MIN | MAX | Unit | Description                               |
|------------------|--------------------|--------------------------------|-----|-----|------|-------------------------------------------|
| CSX              | T <sub>CSS</sub>   | Chip select setup time (write) | 45  |     | ns   |                                           |
|                  | T <sub>CSH</sub>   | Chip select hold time (write)  | 45  |     | ns   |                                           |
|                  | T <sub>CSS</sub>   | Chip select setup time (read)  | 60  |     | ns   |                                           |
|                  | T <sub>SCC</sub>   | Chip select hold time (read)   | 65  |     | ns   |                                           |
|                  | T <sub>CHW</sub>   | Chip select "H" pulse width    | 40  |     | ns   |                                           |
| SCL              | T <sub>SCYCW</sub> | Serial clock cycle (Write)     | 66  |     | ns   | -write command & data ram                 |
|                  | T <sub>SHW</sub>   | SCL "H" pulse width (Write)    | 15  |     | ns   |                                           |
|                  | T <sub>SLW</sub>   | SCL "L" pulse width (Write)    | 15  |     | ns   |                                           |
|                  | T <sub>SCYCR</sub> | Serial clock cycle (Read)      | 150 |     | ns   | -read command & data ram                  |
|                  | T <sub>SHR</sub>   | SCL "H" pulse width (Read)     | 60  |     | ns   |                                           |
|                  | T <sub>SLR</sub>   | SCL "L" pulse width (Read)     | 60  |     | ns   |                                           |
| D/CX             | T <sub>DCS</sub>   | D/CX setup time                | 10  |     | ns   |                                           |
|                  | T <sub>DCH</sub>   | D/CX hold time                 | 10  |     | ns   |                                           |
| SDA (DIN) (DOUT) | T <sub>SDS</sub>   | Data setup time                | 10  |     | ns   | For maximum CL=30pF<br>For minimum CL=8pF |
|                  | T <sub>SDH</sub>   | Data hold time                 | 10  |     | ns   |                                           |
|                  | T <sub>ACC</sub>   | Access time                    | 10  | 50  | ns   |                                           |
|                  | T <sub>OH</sub>    | Output disable time            | 15  | 50  | ns   |                                           |

Table 8.4.1 4-line Serial Interface Characteristics

Note : The rising time and falling time (Tr, Tf) of input signal are specified at 15 ns or less. Logic high and low levels are specified as 30% and 70% of VDDI for Input signals.

## 9 Function description

### 9.1 Interface type selection

The selection of given interfaces are done by setting IM2, IM1, and IM0 pins as shown in following table.

| P68 | IM2 | IM1 | IM0 | Interface                | Read back selection                                    |
|-----|-----|-----|-----|--------------------------|--------------------------------------------------------|
| -   | 0   | -   | -   | 3-line serial interface  | Via the read instruction                               |
| 0   | 1   | 0   | 0   | 8080 MCU 8-bit parallel  | RDX strobe (8-bit read data and 8-bit read parameter)  |
| 0   | 1   | 0   | 1   | 8080 MCU 16-bit parallel | RDX strobe (16-bit read data and 8-bit read parameter) |
| 0   | 1   | 1   | 0   | 8080 MCU 9-bit parallel  | RDX strobe (9-bit read data and 8-bit read parameter)  |
| 0   | 1   | 1   | 1   | 8080 MCU 18-bit parallel | RDX strobe (18-bit read data and 8-bit read parameter) |
| -   | 0   | -   | -   | 3-line serial interface  | Via the read instruction                               |
| 1   | 1   | 0   | 0   | 6800 MCU 8-bit parallel  | E strobe (8-bit read data and 8-bit read parameter)    |
| 1   | 1   | 0   | 1   | 6800 MCU 16-bit parallel | E strobe (16-bit read data and 8-bit read parameter)   |
| 1   | 1   | 1   | 0   | 6800 MCU 9-bit parallel  | E strobe (9-bit read data and 8-bit read parameter)    |
| 1   | 1   | 1   | 1   | 6800 MCU 18-bit parallel | E strobe (18-bit read data and 8-bit read parameter)   |

Table 9.1.1 Selection of MCU interface

| P68 | IM2 | IM1 | IM0 | Interface               | RDX   | WRX   | D/CX | Read back selection                   |
|-----|-----|-----|-----|-------------------------|-------|-------|------|---------------------------------------|
| -   | 0   | -   | -   | 3-line serial interface | Note1 | Note1 | SCL  | D[17:1]: unused, D0: SDA              |
| 0   | 1   | 0   | 0   | 8080 8-bit parallel     | RDX   | WRX   | D/CX | D[17:8]: unused, D7-D0: 8-bit data    |
| 0   | 1   | 0   | 1   | 8080 16-bit parallel    | RDX   | WRX   | D/CX | D[17:16]: unused, D15-D0: 16-bit data |
| 0   | 1   | 1   | 0   | 8080 9-bit parallel     | RDX   | WRX   | D/CX | D[17:9]: unused, D8-D0: 9-bit data    |
| 0   | 1   | 1   | 1   | 8080 18-bit parallel    | RDX   | WRX   | D/CX | D17-D0: 18-bit data                   |
| -   | 0   | -   | -   | 3-line serial interface | Note1 | D/CX  | SCL  | D[17:1]: unused, D0: SDA              |
| 1   | 1   | 0   | 0   | 6800 8-bit parallel     | E     | WRX   | RS   | D[17:8]: unused, D7-D0: 8-bit data    |
| 1   | 1   | 0   | 1   | 6800 16-bit parallel    | E     | WRX   | RS   | D[17:16]: unused, D15-D0: 16-bit data |
| 1   | 1   | 1   | 0   | 6800 9-bit parallel     | E     | WRX   | RS   | D[17:9]: unused, D8-D0: 9-bit data    |
| 1   | 1   | 1   | 1   | 6800 18-bit parallel    | E     | WRX   | RS   | D17-D0: 18-bit data                   |

Table 9.1.2 Pin connection according to various MCU interface

Note: Unused pins can be open, or connected to DGND or VDDI.

## 9.2 8080-series MCU parallel interface (P68 = '0')

The MCU can use one of following interfaces: 11-lines with 8-data parallel interface, 12-lines with 9-data parallel interface, 19-line with 16-data parallel interface or 21-lines with 18-data parallel interface. The chip-select CSX (active low) enables/disables the parallel interface. RESX (active low) is an external reset signal. WRX is the parallel data write enable, RDX is the parallel data read enable and D[17:0] is parallel data bus.

The LCD driver reads the data at the rising edge of WRX signal. The D/CX is the data/command flag. When D/CX='1', D[17:0] bits is either display data or command parameter. When D/C='0', D[17:0] bits is command. The interface functions of 8080-series parallel interface are given in following table.

| IM2 | IM1 | IM0 | Interface       | D/CX | RDX | WRX | Read back selection                                      |
|-----|-----|-----|-----------------|------|-----|-----|----------------------------------------------------------|
| 1   | 0   | 0   | 8-bit parallel  | 0    | 1   | ↑   | Write 8-bit command (D7 to D0)                           |
|     |     |     |                 | 1    | 1   | ↑   | Write 8-bit display data or 8-bit parameter (D7 to D0)   |
|     |     |     |                 | 1    | ↑   | 1   | Read 8-bit display data (D7 to D0)                       |
|     |     |     |                 | 1    | ↑   | 1   | Read 8-bit parameter or status (D7 to D0)                |
| 1   | 0   | 1   | 16-bit parallel | 0    | 1   | ↑   | Write 8-bit command (D7 to D0)                           |
|     |     |     |                 | 1    | 1   | ↑   | Write 16-bit display data or 8-bit parameter (D15 to D0) |
|     |     |     |                 | 1    | ↑   | 1   | Read 16-bit display data (D15 to D0)                     |
|     |     |     |                 | 1    | ↑   | 1   | Read 8-bit parameter or status (D7 to D0)                |
| 1   | 1   | 0   | 9-bit parallel  | 0    | 1   | ↑   | Write 8-bit command (D7 to D0)                           |
|     |     |     |                 | 1    | 1   | ↑   | Write 9-bit display data or 8-bit parameter (D8 to D0)   |
|     |     |     |                 | 1    | ↑   | 1   | Read 9-bit display data (D8 to D0)                       |
|     |     |     |                 | 1    | ↑   | 1   | Read 8-bit parameter or status (D7 to D0)                |
| 1   | 1   | 1   | 18-bit parallel | 0    | 1   | ↑   | Write 8-bit command (D7 to D0)                           |
|     |     |     |                 | 1    | 1   | ↑   | Write 18-bit display data or 8-bit parameter (D17 to D0) |
|     |     |     |                 | 1    | ↑   | 1   | Read 18-bit display data (D17 to D0)                     |
|     |     |     |                 | 1    | ↑   | 1   | Read 8-bit parameter or status (D7 to D0)                |

Table 9.2.1 the function of 8080-series parallel interface

Note: applied for command code: DAh, DBh, DCh, 04h, 09h, 0Ah, 0Bh, 0Ch, 0Dh, 0Eh, 0Fh

## 9.2.1 Write cycle sequence

The write cycle means that the host writes information (command or/and data) to the display via the interface. Each write cycle (WRX high-low-high sequence) consists of 3 control signals (D/CX, RDX, WRX) and data signals (D[17:0]). D/CX bit is a control signal, which tells if the data is a command or a data. The data signals are the command if the control signal is low (=‘0’) and vice versa it is data (=‘1’).

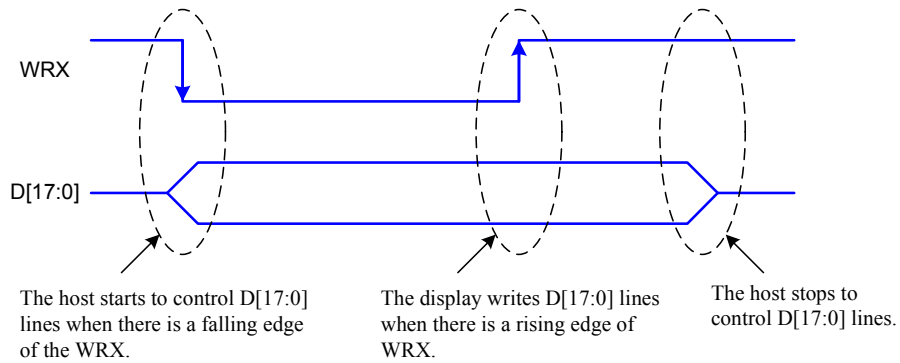


Figure 9.2.1 8080-series WRX protocol

Note: WRX is an unsynchronized signal (It can be stopped).

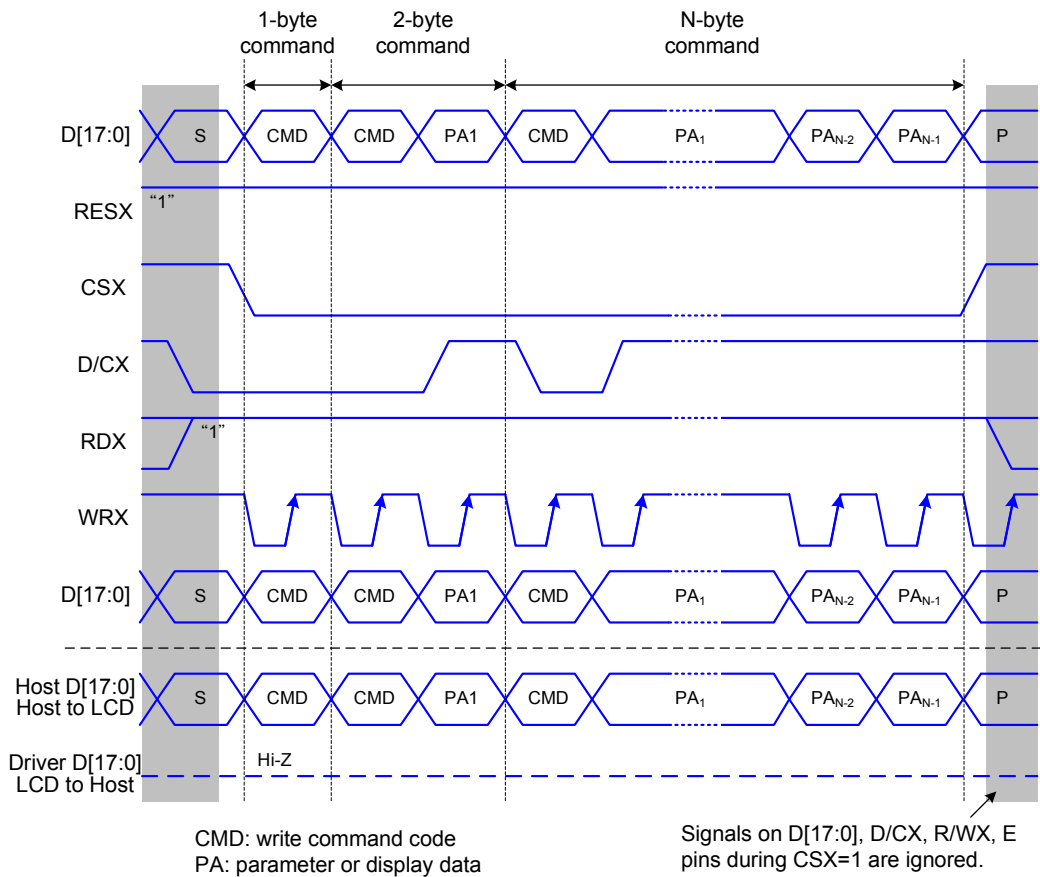


Figure 9.2.2 8080-series parallel bus protocol, write to register or display RAM

## 9.2.2 Read cycle sequence

The read cycle (RDX high-low-high sequence) means that the host reads information from LCD driver via interface. The driver sends data (D[17:0]) to the host when there is a falling edge of RDX and the host reads data when there is a rising edge of RDX.

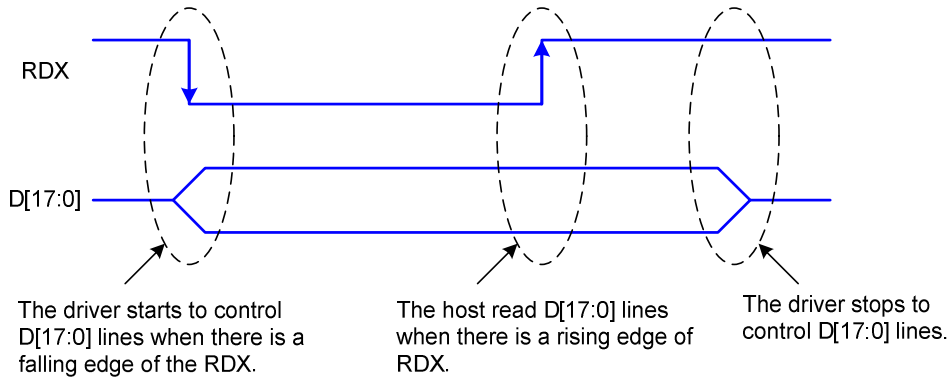


Figure 9.2.3 8080-series RDX protocol

Note: RDX is an unsynchronized signal (It can be stopped).

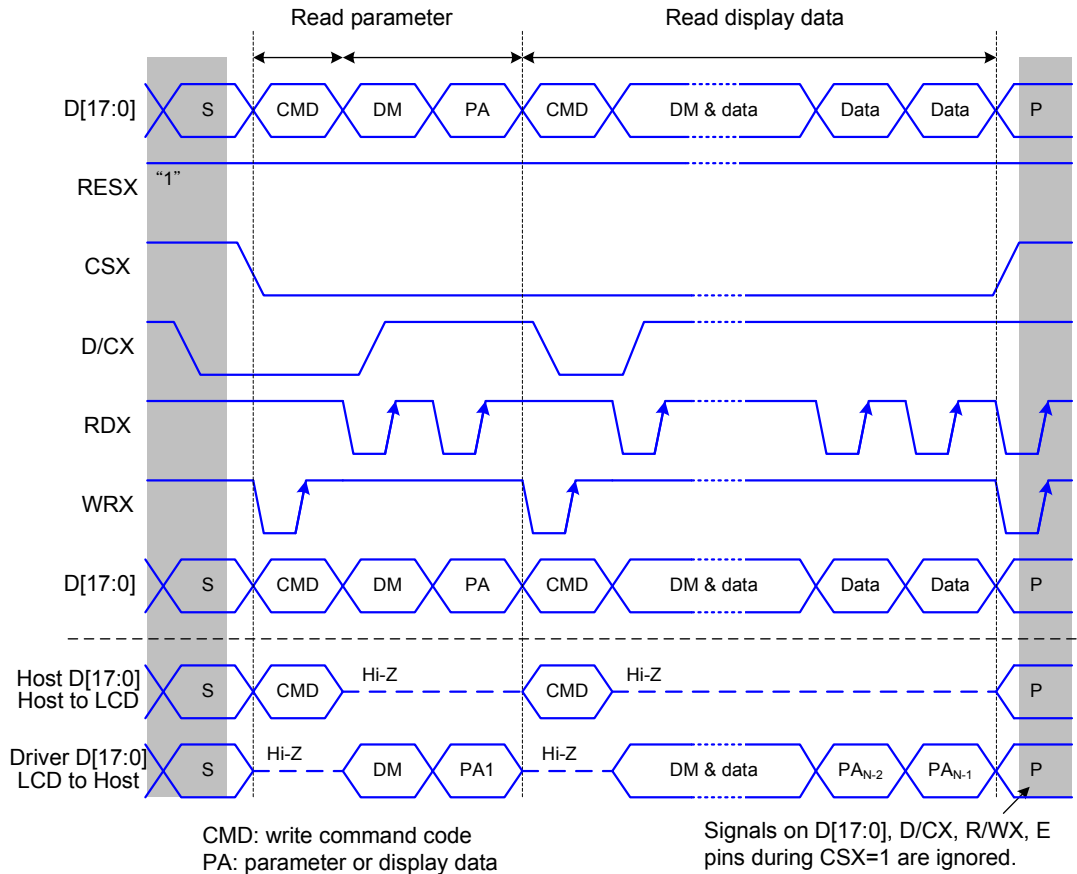


Figure 9.2.4 8080-series parallel bus protocol, read data from register or display RAM

## 9.3 6800-series MCU parallel interface (P68 = '1')

The MCU uses one of following interface: 11-lines with 8-data parallel interface, 12-lines with 9-data parallel interface, 19-lines with 16-data parallel interface, or 21-lines with 18-data parallel interface. The chip-select CSX(active low) enables and disables the parallel interface. RESX (active low) is an external reset signal. The R/WX is the Read/Write flag and D[17:0] is parallel data bus.

The LCD driver reads the data at the falling edge of E signal when R/WX= '1' and Writes the data at the falling of the E signal when R/WX='0'. The D/CX is the data/command flag. When D/CX='1', D[17:0] bits are display RAM data or command parameters. When D/C= '0', D[17:0] bits are commands.

The 6800-series bi-directional interface can be used for communication between the micro controller and LCD driver. The selection of this interface is done when P68 pin is high state (VDDI). Interface bus width can be selected with IM2, IM1 and IM0. The interface functions of 6800-series parallel interface are given in Table 8.1.1.

| P68 | IM2 | IM1 | IM0 | Interface       | D/CX | R/WX | E | Function                                                 |
|-----|-----|-----|-----|-----------------|------|------|---|----------------------------------------------------------|
| 1   | 1   | 0   | 0   | 8-bit Parallel  | 0    | 0    | ↓ | Write 8-bit command (D7 to D0)                           |
|     |     |     |     |                 | 1    | 0    | ↓ | Write 8-bit display data or 8-bit parameter (D7 to D0)   |
|     |     |     |     |                 | 1    | 1    | ↓ | Read 8-bit Display data (D7 to D0)                       |
|     |     |     |     |                 | 1    | 1    | ↓ | Read 8-bit parameter or status (D7 to D0)                |
| 1   | 1   | 0   | 1   | 16-bit Parallel | 0    | 0    | ↓ | Write 8-bit command (D7 to D0)                           |
|     |     |     |     |                 | 1    | 0    | ↓ | Write 16-bit display data or 8-bit parameter (D15 to D0) |
|     |     |     |     |                 | 1    | 1    | ↓ | Read 16-bit Display data (D15 to D0)                     |
|     |     |     |     |                 | 1    | 1    | ↓ | Read 8-bit parameter or status (D7 to D0)                |
| 1   | 1   | 1   | 0   | 9-bit Parallel  | 0    | 0    | ↓ | Write 8-bit command (D7 to D0)                           |
|     |     |     |     |                 | 1    | 0    | ↓ | Write 9-bit display data or 8-bit parameter (D8 to D0)   |
|     |     |     |     |                 | 1    | 1    | ↓ | Read 9-bit Display data (D8 to D0)                       |
|     |     |     |     |                 | 1    | 1    | ↓ | Read 8-bit parameter or status (D7 to D0)                |
| 1   | 1   | 1   | 1   | 18-bit Parallel | 0    | 0    | ↓ | Write 8-bit command (D7 to D0)                           |
|     |     |     |     |                 | 1    | 0    | ↓ | Write 18-bit display data or 8-bit parameter (D17 to D0) |
|     |     |     |     |                 | 1    | 1    | ↓ | Read 18-bit Display data (D17 to D0)                     |
|     |     |     |     |                 | 1    | 1    | ↓ | Read 8-bit parameter or status (D7 to D0)                |

Table 9.3.1 The function of 6800-series parallel interface

Note: applied for command code: DAh, DBh, DCh, 04h, 09h, 0Ah, 0Bh, 0Ch, 0Dh, 0Eh, 0Fh.

### 9.3.1 Write cycle sequence

The write cycle means that the host writes information (command or/and data) to the display via the interface. Each write cycle (E low-high-low sequence) consists of 3 control signals (D/CX, E, R/WX) and data signals (D[17:0]). D/CX bit is a control signal, which tells if the data is a command or a data. The data signals are the command if the control signal is low (= '0') and vice versa it is data (= '1').

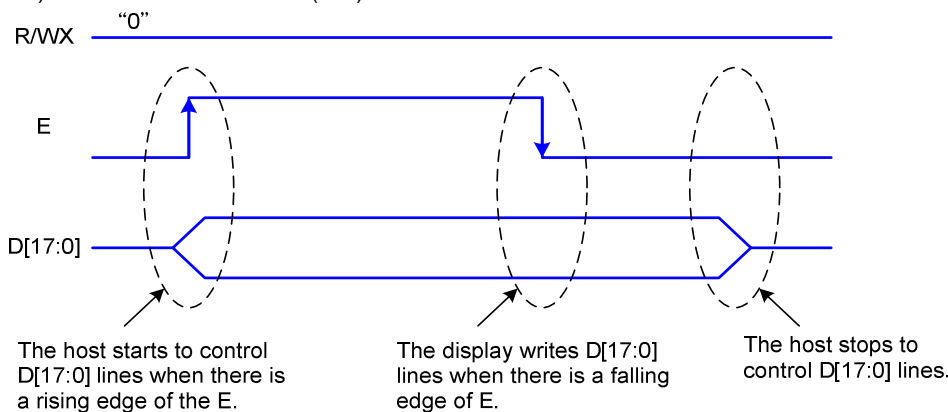


Figure 9.3.1 6800-Series Write Protocol

Note: E is an unsynchronized signal (It can be stopped)

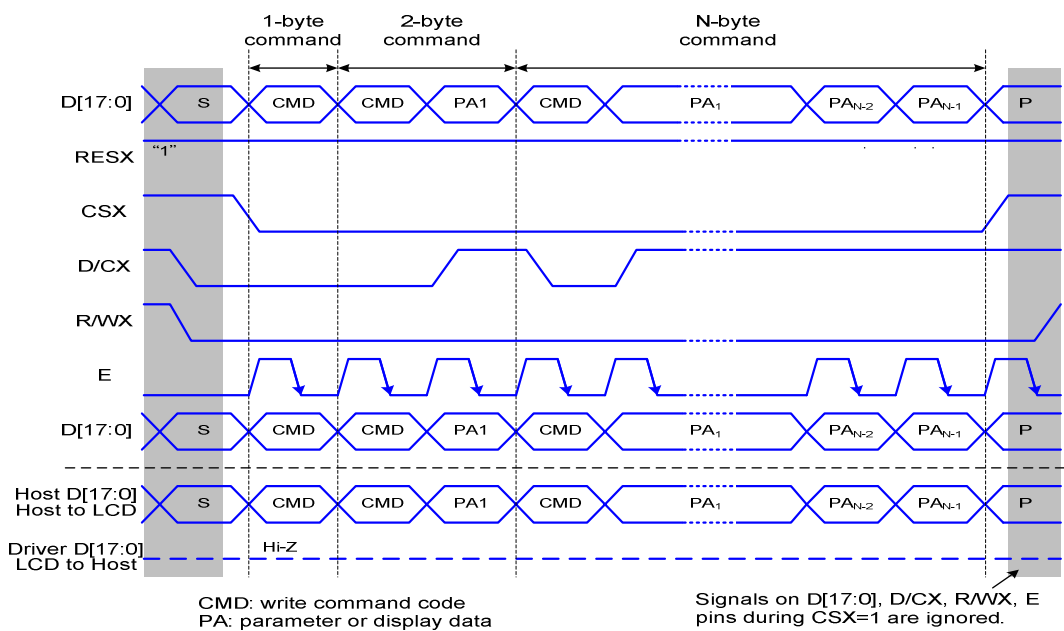


Figure 9.3.2 6800-series parallel bus protocol, write to register or display RAM

## 9.3.2 9.3.2 Read cycle sequence

The read cycle (E low-high-low sequence) means that the host reads information from LCD driver via interface. The driver sends data (D[17:0]) to the host when there is a rising edge of E and the host reads data when there is a falling edge of E.

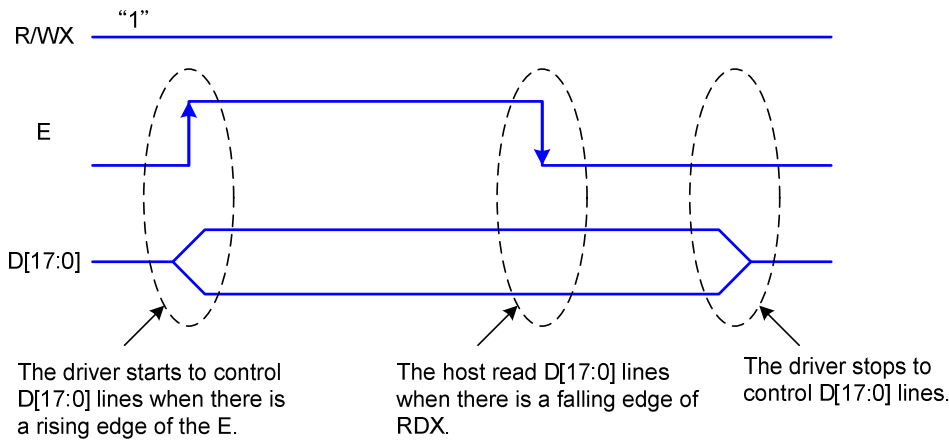


Figure 9.3.3 6800-series read protocol

Note: E is an unsynchronized signal (It can be stopped)

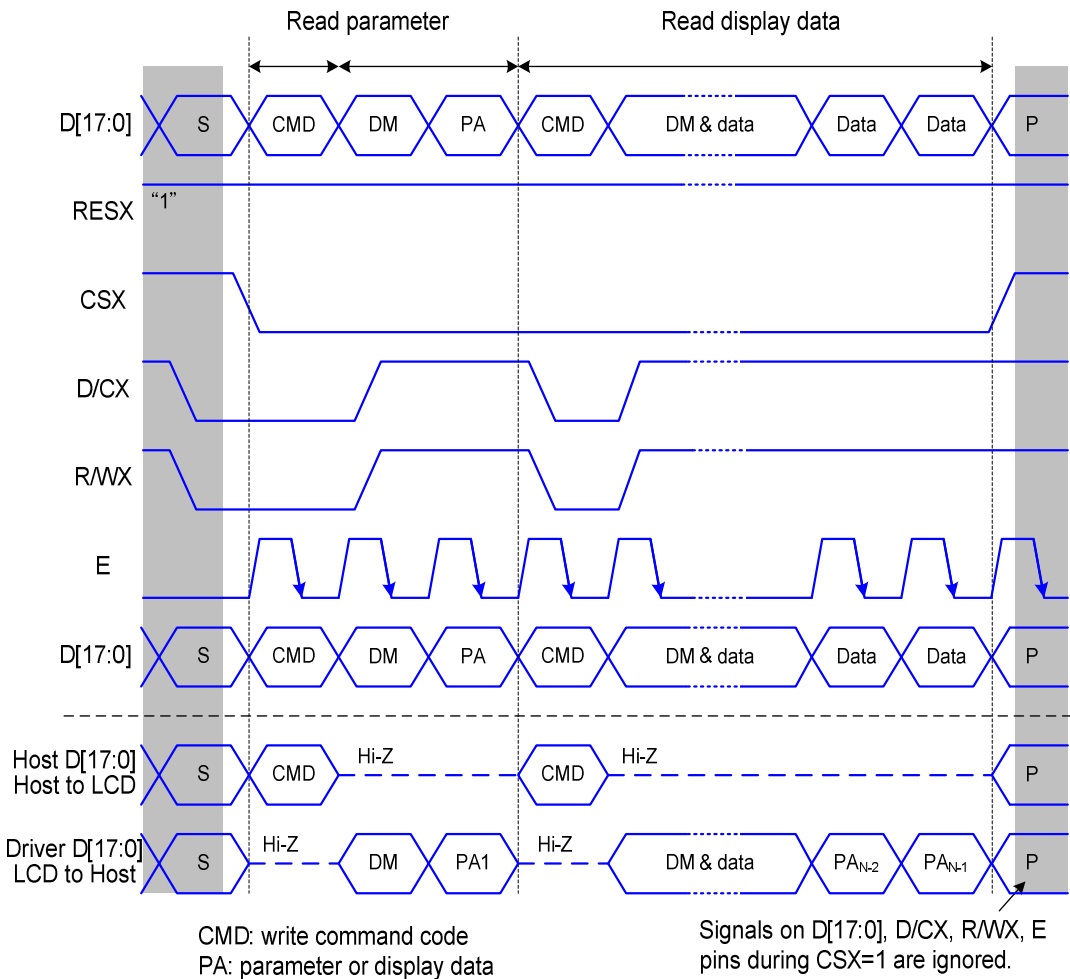


Figure 9.3.4 6800-series parallel bus protocol, read data form register or display RAM

## 9.4 Serial interface

The selection of this interface is done by IM2. See the Table 9.4.1.

| IM2 | 4WSPI | Interface               | Read back selection                                                |
|-----|-------|-------------------------|--------------------------------------------------------------------|
| 0   | 0     | 3-line serial interface | Via the read instruction (8-bit, 24-bit and 32-bit read parameter) |
| 0   | 1     | 4-line serial interface | Via the read instruction (8-bit, 24-bit and 32-bit read parameter) |

Table 9.4.2 Selection of serial interface

The serial interface is either 3-lines/9-bits or 4-lines/8-bits bi-directional interface for communication between the micro controller and the LCD driver. The 3-lines serial interface use: CSX (chip enable), SCL (serial clock) and SDA (serial data input/output), and the 4-lines serial interface use: CSX (chip enable), D/CX (data/ command flag), SCL (serial clock) and SDA (serial data input/output). Serial clock (SCL) is used for interface with MCU only, so it can be stopped when no communication is necessary.

### 9.4.1 Command Write Mode

The write mode of the interface means the micro controller writes commands and data to the LCD driver. 3-lines serial data packet contains a control bit D/CX and a transmission byte. In 4-lines serial interface, data packet contains just transmission byte and control bit D/CX is transferred by the D/CX pin. If D/CX is "low", the transmission byte is interpreted as a command byte. If D/CX is "high", the transmission byte is stored in the display data RAM (memory write command), or command register as parameter.

Any instruction can be sent in any order to the driver. The MSB is transmitted first. The serial interface is initialized when CSX is high. In this state, SCL clock pulse or SDA data have no effect. A falling edge on CSX enables the serial interface and indicates the start of data transmission.

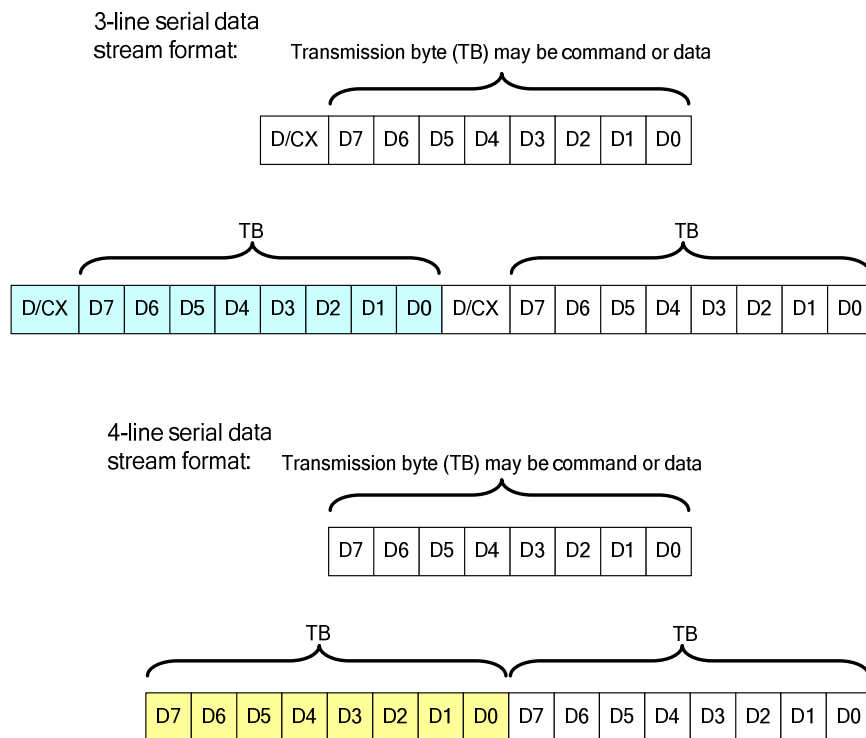


Figure 9.4.1 Serial interface data stream format

When CSX is "high", SCL clock is ignored. During the high period of CSX the serial interface is initialized. At the falling edge of CSX, SCL can be high or low (see Figure 9.4.2). SDA is sampled at the rising edge of SCL. D/CX indicates whether the byte is command (D/CX='0') or parameter/RAM data (D/CX='1'). D/CX is sampled when first rising edge of SCL (3-lines serial interface) or 8th rising edge of SCL (4-lines serial interface). If CSX stays low after the last bit of command/data byte, the serial interface expects the D/CX bit (3-lines serial interface) or D7 (4-lines serial interface) of the next byte at the next rising edge of SCL..

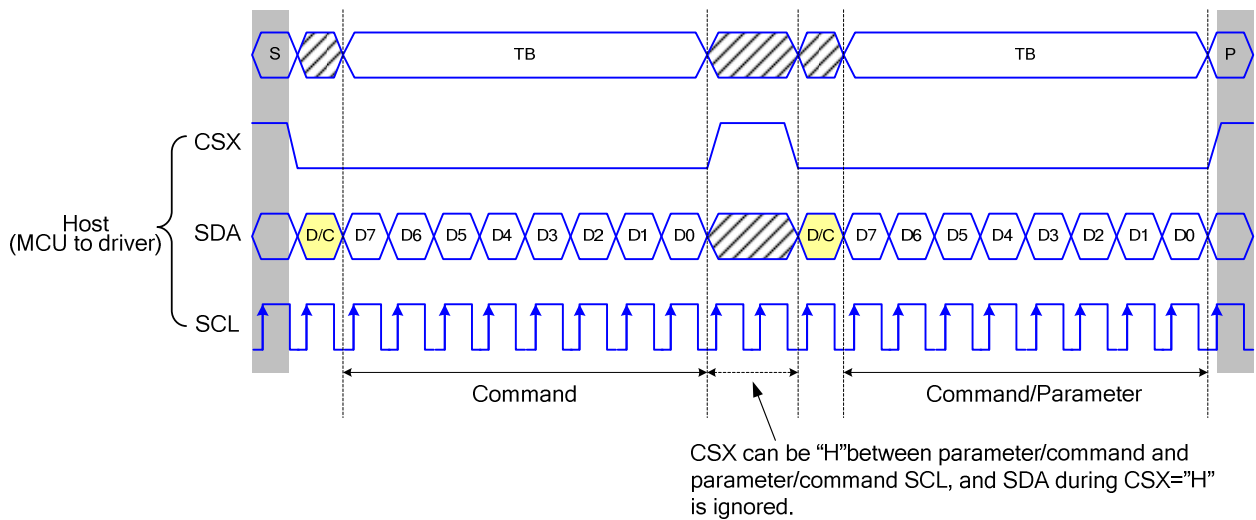


Figure 9.4.3 3-line serial interface write protocol (write to register with control bit in transmission)

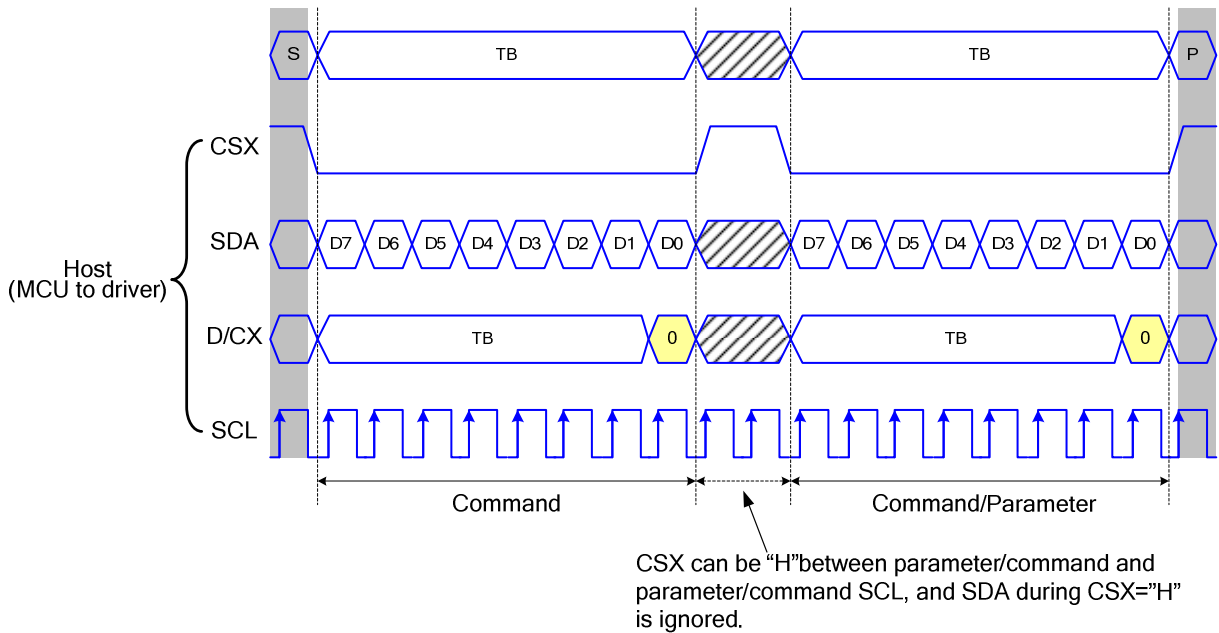


Figure 9.4.4 4-line serial interface write protocol (write to register with control bit in transmission)

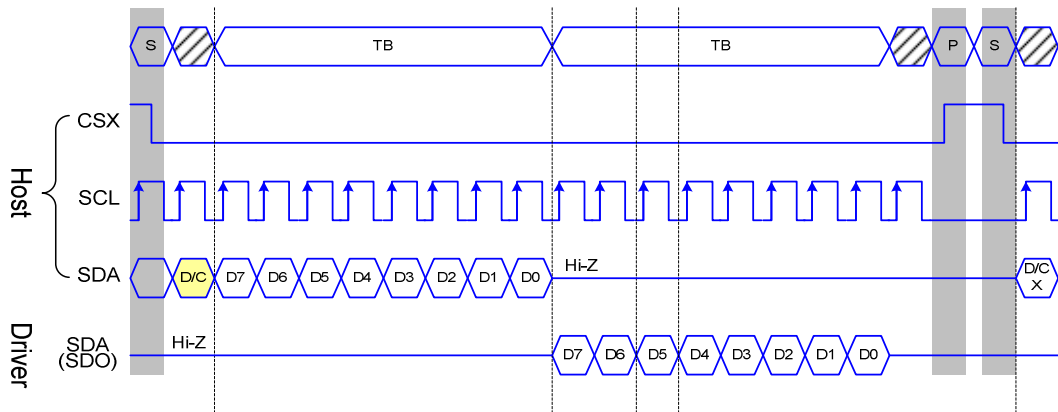
**9.4.2 Read Functions**

The read mode of the interface means that the micro controller reads register value from the driver. To achieve read function, the micro controller first has to send a command (read ID or register command) and then the following byte is transmitted in the opposite direction. After that CSX is required to go to high before a new command is send (see the below figure). The driver samples the SDA (input data) at rising edge of SCL, but shifts SDA (output data) at the falling edge of SCL. Thus the micro controller is supported to read at the rising edge of SCL.

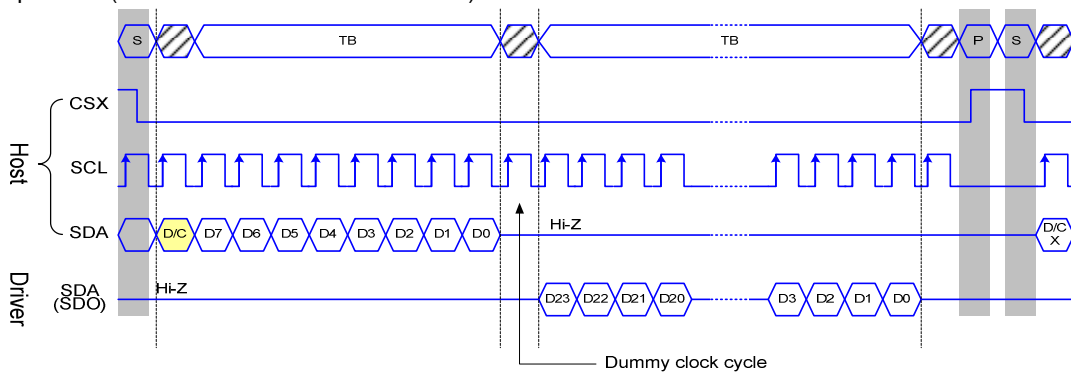
After the read status command has been sent, the SDA line must be set to tri-state no later than at the falling edge of SCL of the last bit.

## 9.4.3 3-line serial protocol

3-line serial protocol (for RDID1/RDID2/RDID3/0Ah/0Bh/0Ch/0Dh/0Eh/0Fh command: 8-bit read):



3-line serial protocol (for RDDID command: 24-bit read)



3-line Serial Protocol (for RDDST command: 32-bit read)

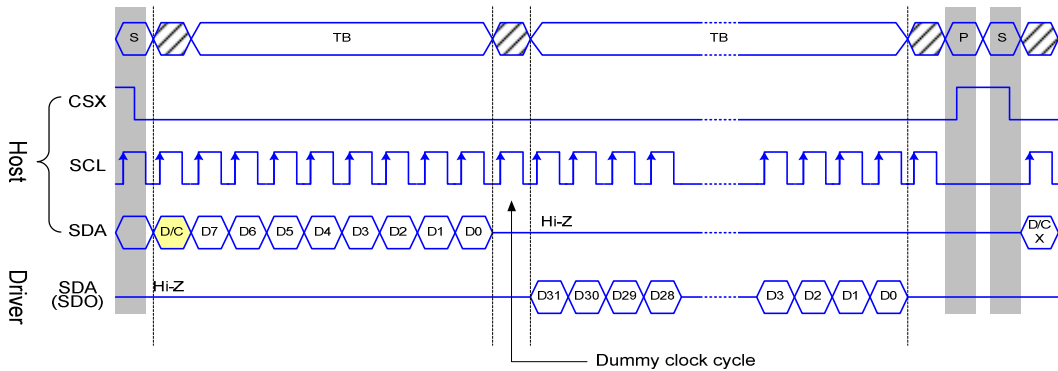
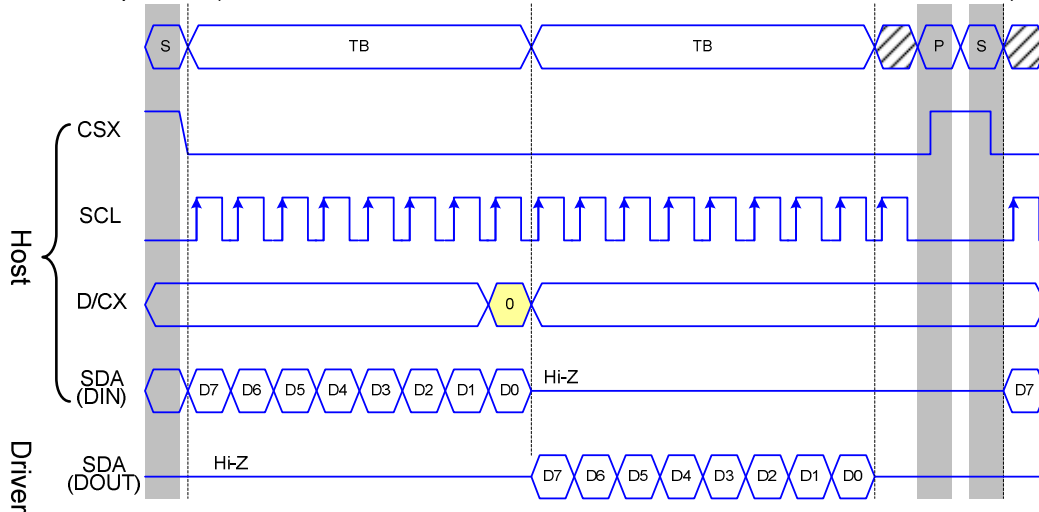


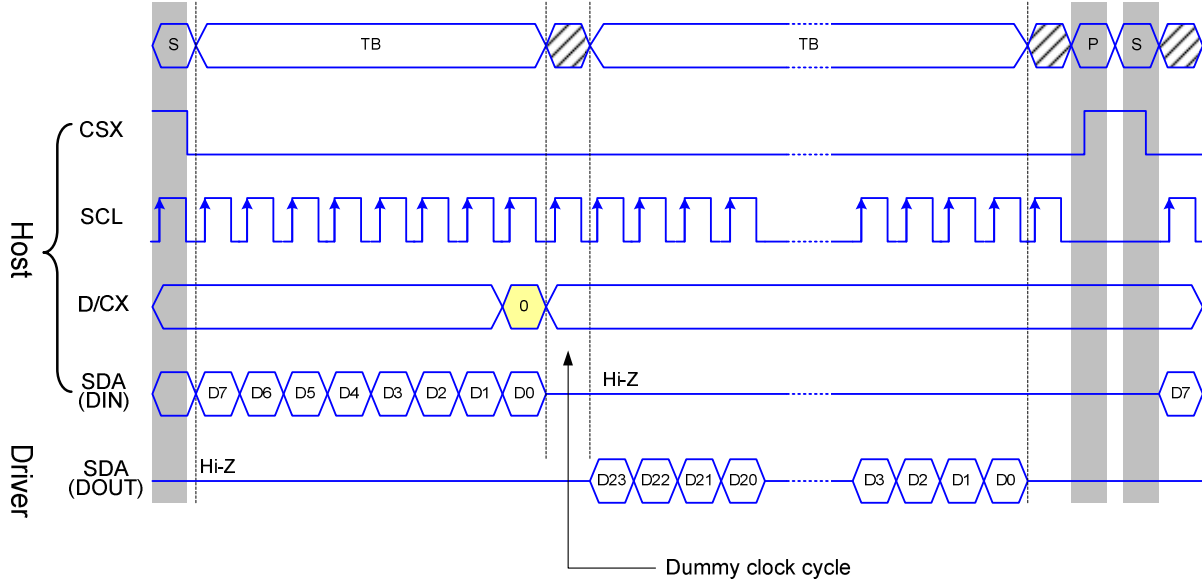
Figure 9.4.5 3-line serial interface read protocol

## 9.4.4 4-line serial protocol

4-line serial protocol (for RDID1/RDID2/RDID3/0Ah/0Bh/0Ch/0Dh/0Eh/0Fh command: 8-bit read):



4-line serial protocol (for RDDID command: 24-bit read)



4-line Serial Protocol (for RDDST command: 32-bit read)

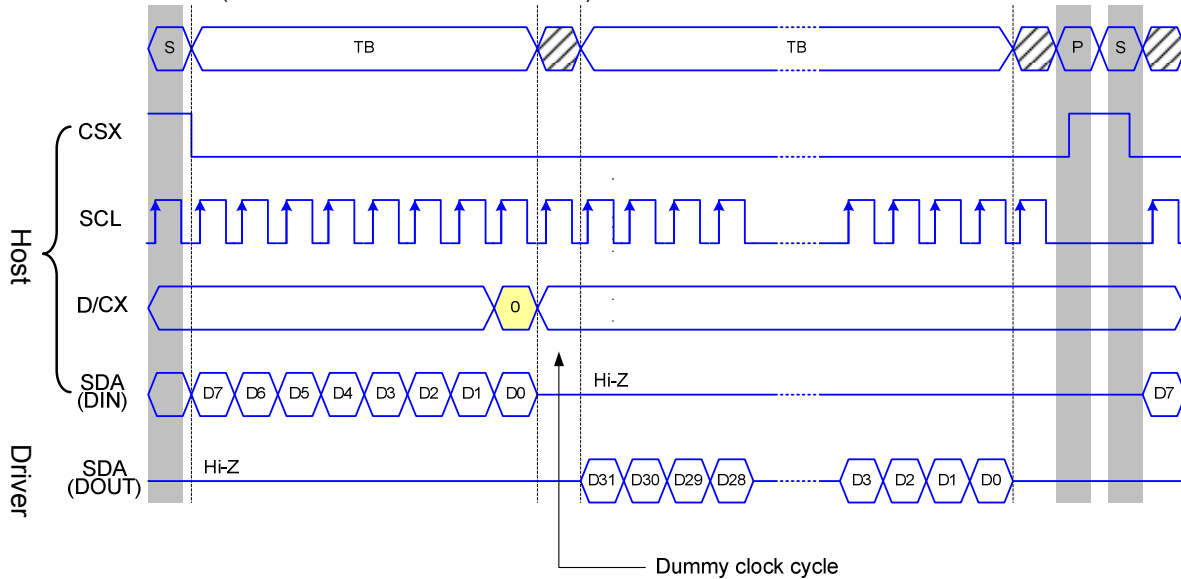


Figure 9.4.6 4-line serial interface read protocol

## 9.5 Data Transfer Break and Recovery

If there is a break in data transmission by RESX pulse, while transferring a command or frame memory data or multiple parameter command data, before Bit D0 of the byte has been completed, then driver will reject the previous bits and have reset the interface such that it will be ready to receive command data again when the chip select line (CSX) is next activated after RESX have been HIGH state. See the following example

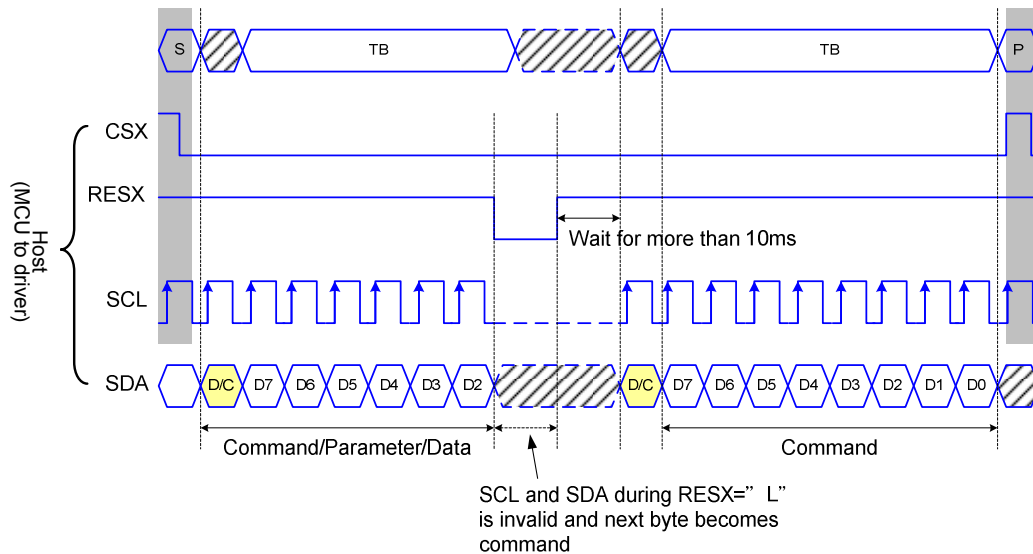


Figure 9.5.1 Serial bus protocol, write mode – interrupted by RESX

If there is a break in data transmission by CSX pulse, while transferring a command or frame memory data or multiple parameter command data, before Bit D0 of the byte has been completed, then driver will reject the previous bits and have reset the interface such that it will be ready to receive the same byte re-transmitted when the chip select line (CSX) is next activated. See the following example

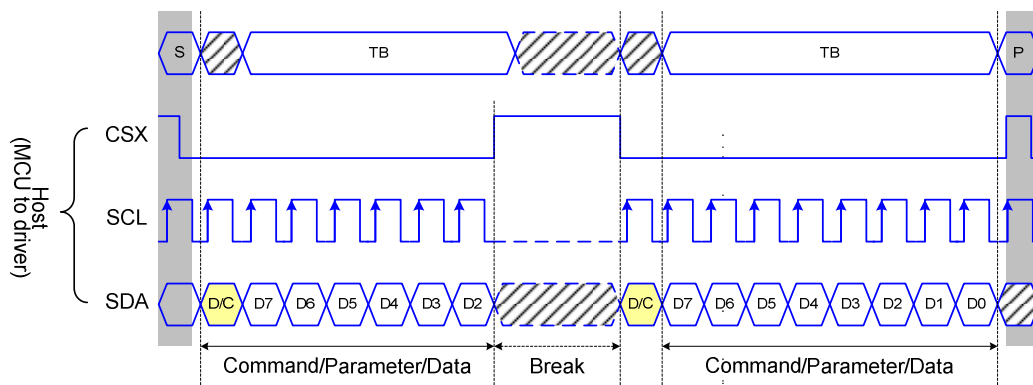


Figure 9.5.2 Serial bus protocol, write mode – interrupted by CSX

If 1, 2 or more parameter commands are being sent and a break occurs while sending any parameter before the last one and if the host then sends a new command rather than re-transmitting the parameter that was interrupted, then the parameters that were successfully sent are stored and the parameter where the break occurred is rejected. The interface is ready to receive next byte as shown below.

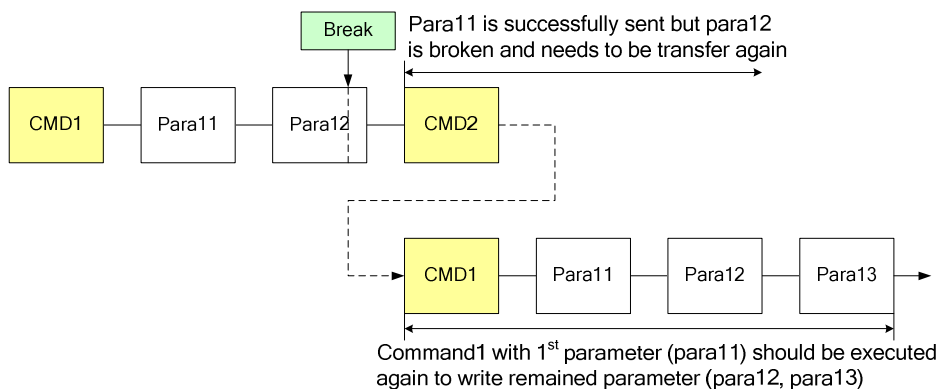


Figure 9.5.3 Write interrupts recovery (serial interface)

If a 2 or more parameter commands are being sent and a break occurs by the other command before the last one is sent, then the parameters that were successfully sent are stored and the other parameter of that command remains previous value.

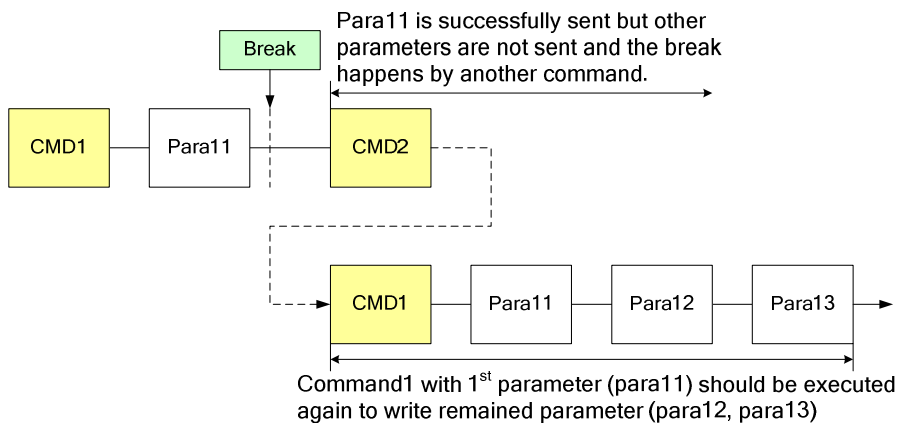


Figure 9.5.4 Write interrupts recovery (both serial and parallel Interface)

## 9.6 Data transfer pause

It will be possible when transferring a command, frame memory data or multiple parameter data to invoke a pause in the data transmission. If the chip select line is released after a whole byte of a frame memory data or multiple parameter data has been completed, then driver will wait and continue the frame memory data or parameter data transmission from the point where it was paused. If the chip select Line is released after a whole byte of a command has been completed, then the display module will receive either the command's parameters (if appropriate) or a new command when the chip select line is next enabled as shown below.

This applies to the following 4 conditions:

- 1) Command-Pause-Command
- 2) Command-Pause-Parameter
- 3) Parameter-Pause-Command
- 4) Parameter-Pause-Parameter

### 9.6.1 Serial interface pause

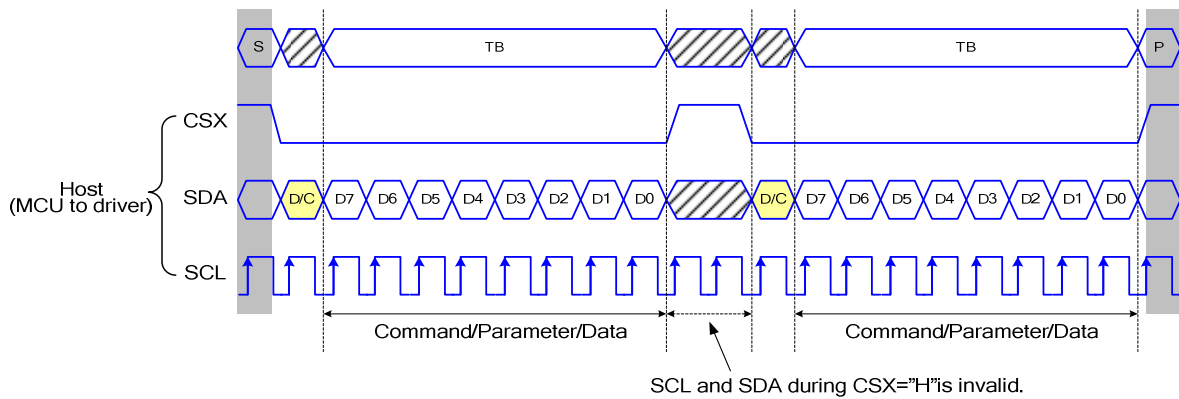


Figure 9.6.1 Serial interface pause protocol (pause by CSX)

### 9.6.2 Parallel interface pause

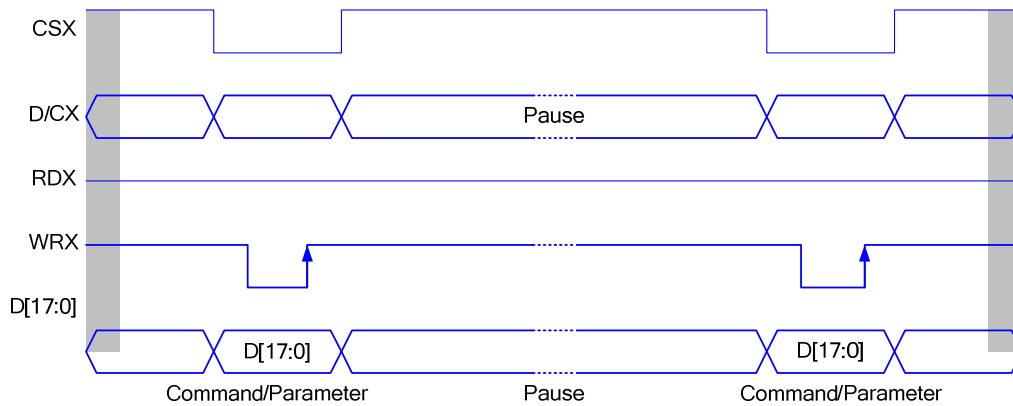


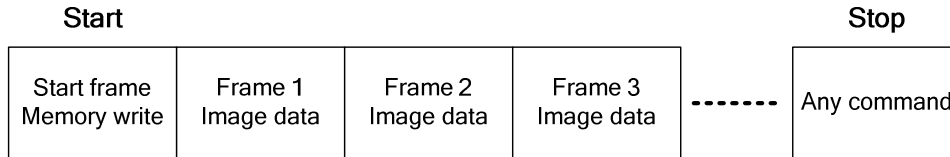
Figure 9.6.2 Parallel bus pause protocol (paused by CSX)

## 9.7 Data Transfer Modes

The module has three kinds color modes for transferring data to the display RAM. These are 12-bit color per pixel, 16-bit color per pixel and 18-bit color per pixel. The data format is described for each interface. Data can be downloaded to the frame memory by 2 methods.

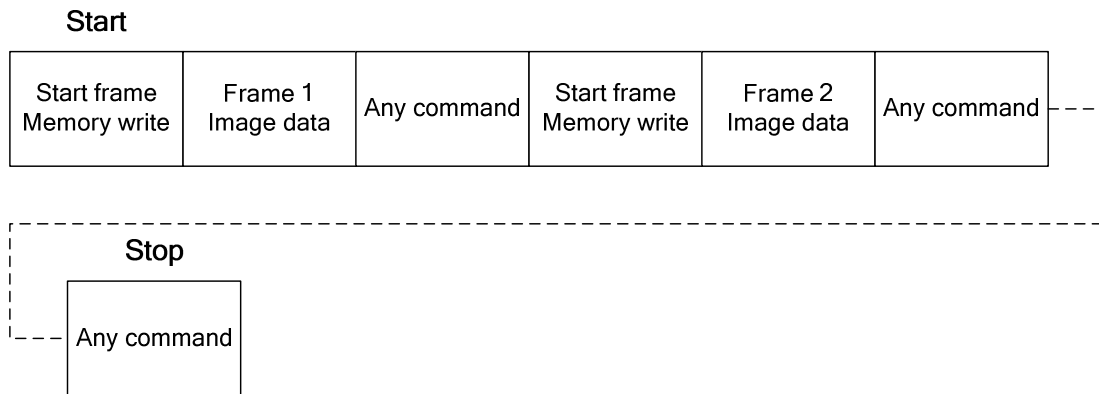
### 9.7.1 Method 1

The image data is sent to the frame memory in successive frame writes, each time the frame memory is filled, the frame memory pointer is reset to the start point and the next frame is written.



### 9.7.2 Method 2

The image data is sent and at the end of each frame memory download, a command is sent to stop frame memory write. Then start memory write command is sent, and a new frame is downloaded.



Note 1: These apply to all data transfer Color modes on both serial and parallel interfaces.

Note 2: The frame memory can contain both odd and even number of pixels for both methods. Only complete pixel data will be stored in the frame memory.

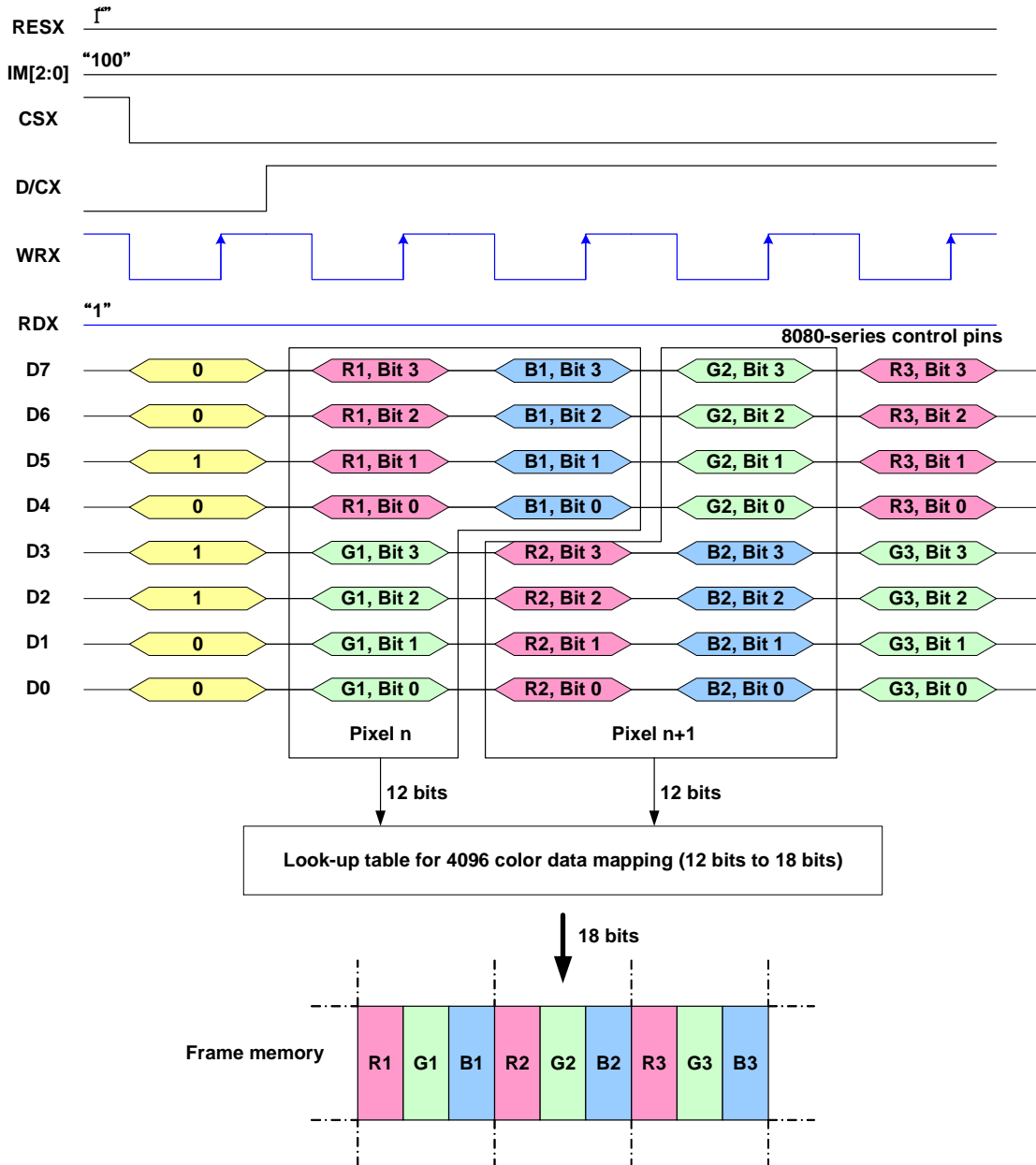
## 9.8 Data Color Coding

### 9.8.1 8-bit Parallel Interface (IM2, IM1, IM0= "100")

Different display data formats are available for three Colors depth supported by listed below.

- 4k colors, RGB 4,4,4-bit input.
- 65k colors, RGB 5,6,5-bit input.
- 262k colors, RGB 6,6,6-bit input.

### 9.8.2 8-bit data bus for 12-bit/pixel (RGB 4-4-4-bit input), 4K-Colors, 3AH= "03h"



Note 1: The data order is as follows, MSB=D7, LSB=D0 and picture data is MSB=Bit 3, LSB=Bit 0 for Red, Green and Blue data.

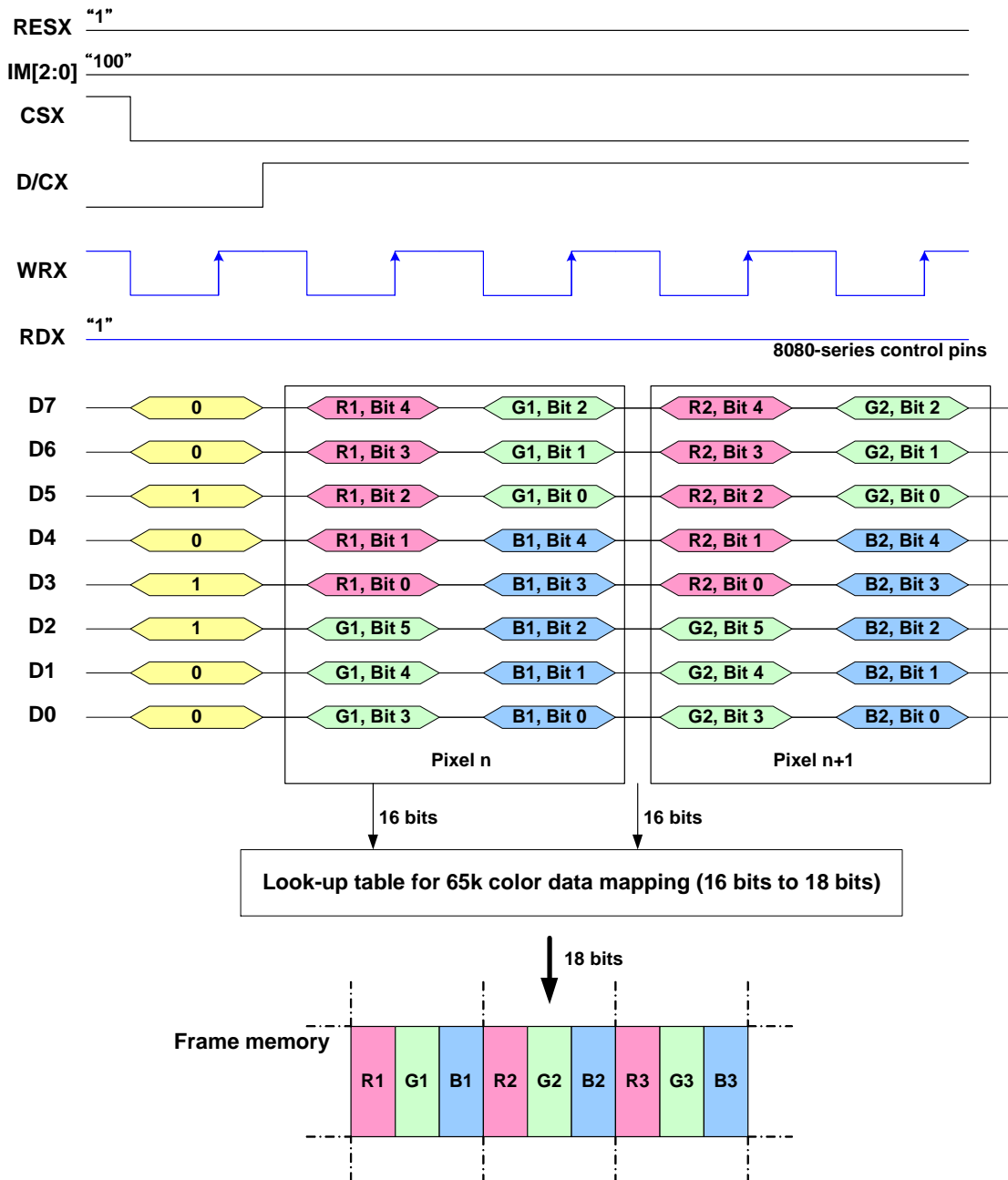
Note 2: 3-time transfer is used to transmit 1 pixel data with the 12-bit color depth information.

Note 3: '-' = Don't care - Can be set to '0' or '1'

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## 9.8.3 8-bit data bus for 16-bit/pixel (RGB 5-6-5-bit input), 65K-Colors, 3AH= "05h"

There is 1 pixel (3 sub-pixels) per 2-byte



Note 1: The data order is as follows, MSB=D7, LSB=D0 and picture data is MSB=Bit 5, LSB=Bit 0 for Green and MSB=Bit 4, LSB=Bit 0 for Red and Blue data.

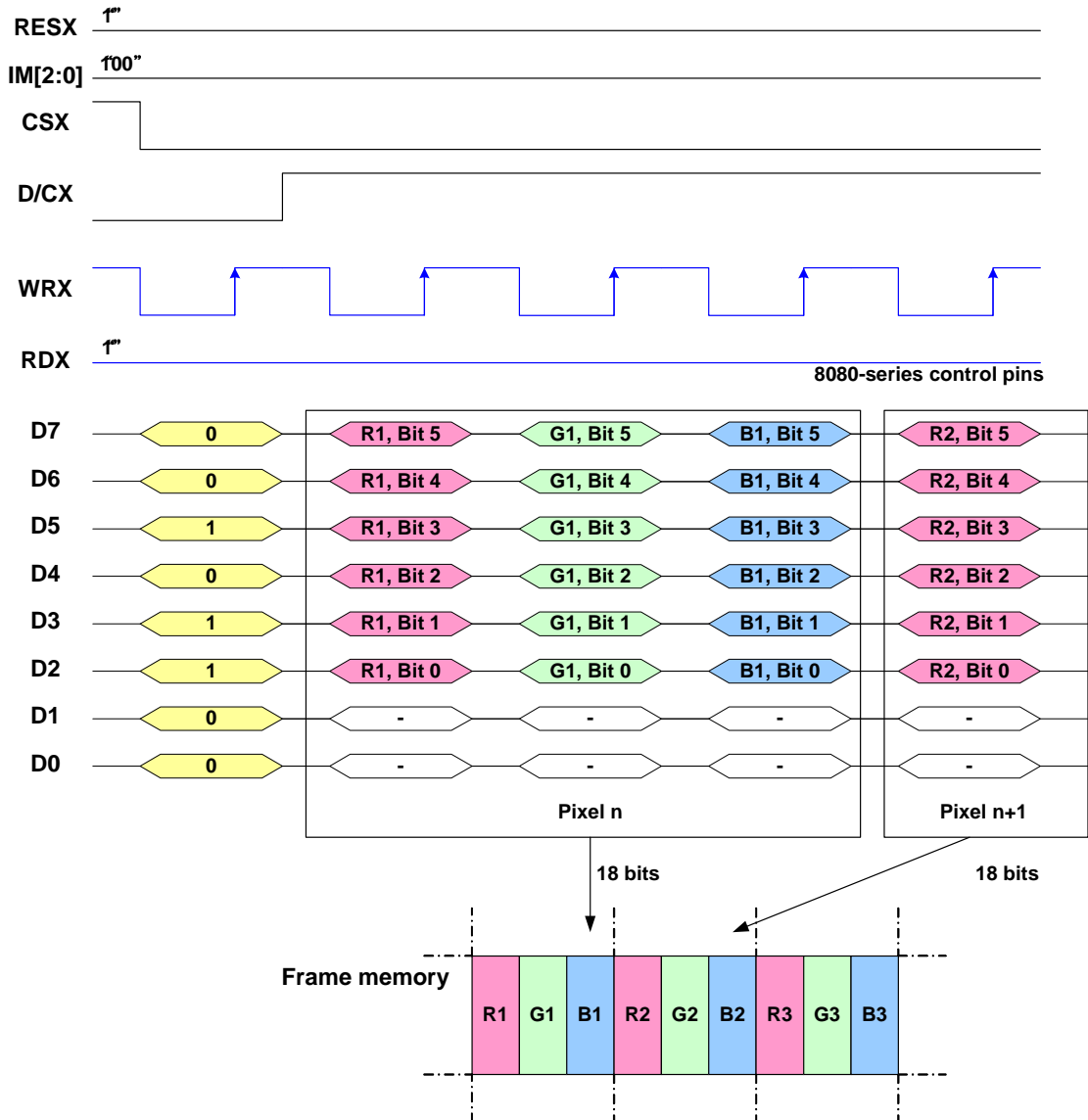
Note 2: 2-times transfer is used to transmit 1 pixel data with the 16-bit color depth information.

Note 3: '-' = Don't care - Can be set to '0' or '1'

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## 9.8.4 8-bit data bus for 18-bit/pixel (RGB 6-6-6-bit input), 262K-Colors, 3AH= "06h"

There is 1 pixel (3 sub-pixels) per 3-bytes.



Note 1: The data order is as follows, MSB=D7, LSB=D0 and picture data is MSB=Bit 5, LSB=Bit 0 for Red, Green and Blue data.

Note 2: 3-times transfer is used to transmit 1 pixel data with the 18-bit color depth information.

Note 3: '-' = Don't care - Can be set to '0' or '1'

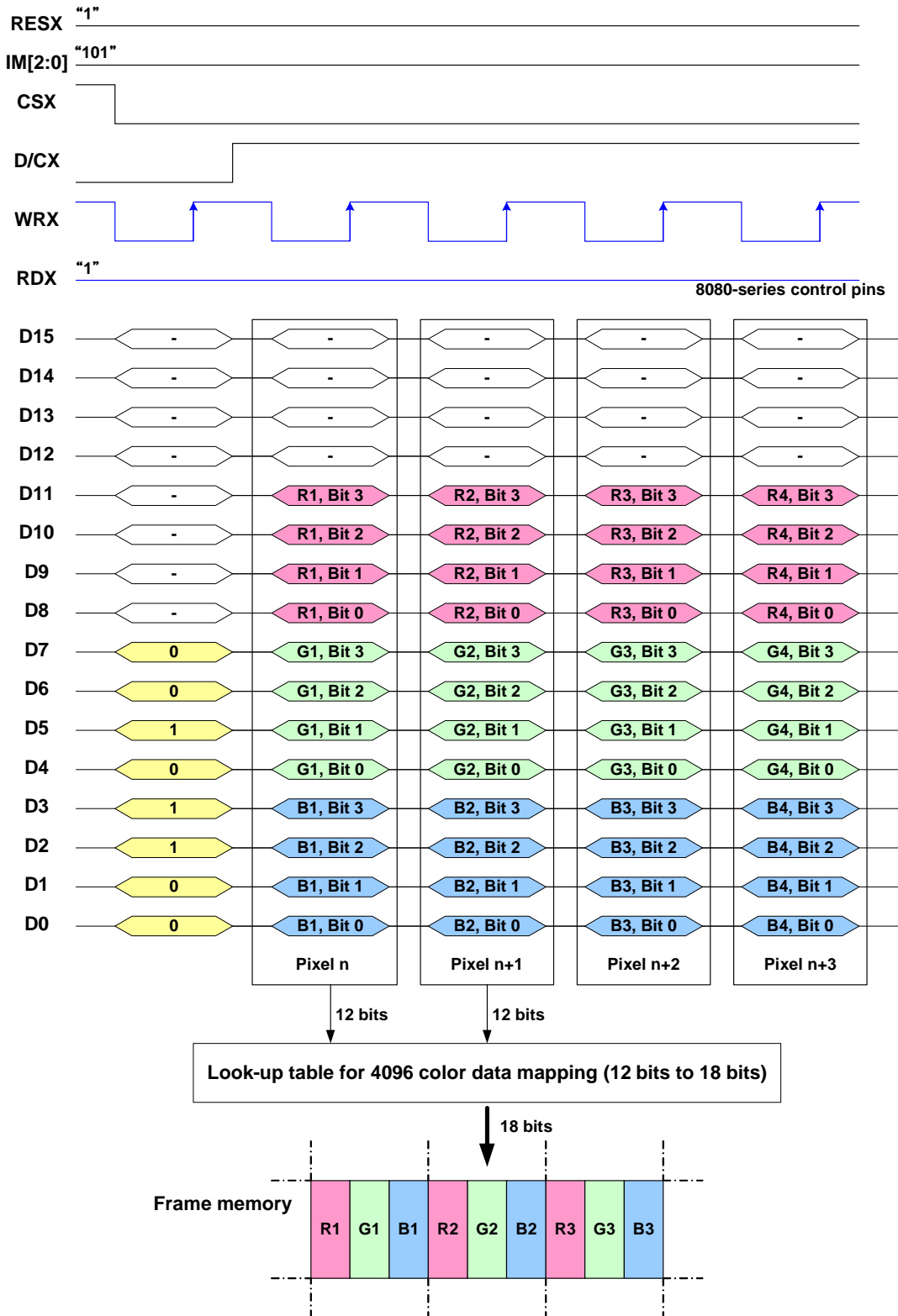
## 9.8.5 16-Bit Parallel Interface (IM2,IM1, IM0= "101")

Different display data formats are available for three colors depth supported by listed below.

- 4k colors, RGB 4,4,4-bit input
- 65k colors, RGB 5,6,5-bit input
- 262k colors, RGB 6,6,6-bit input

## 9.8.6 16-bit data bus for 12-bit/pixel (RGB 4-4-4-bit input), 4K-Colors, 3AH= "03h"

There is 1 pixel (3 sub-pixels) per 1 byte

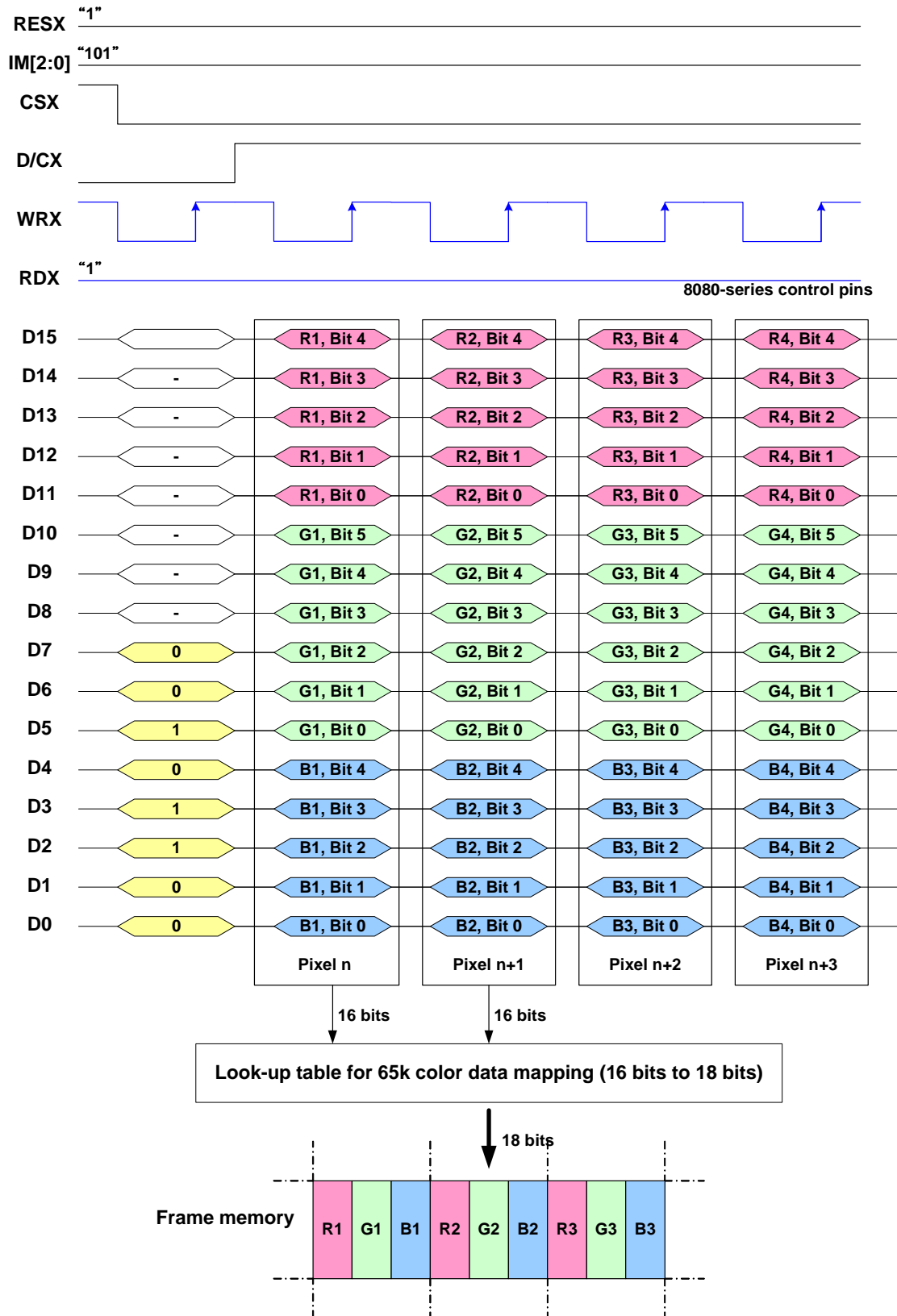


Note 1: The data order is as follows, MSB=D11, LSB=D0 and picture data is MSB=Bit 3, LSB=Bit 0 for Red, Green and Blue data.  
 Note 2: 1-times transfer (D11 to D0) is used to transmit 1 pixel data with the 12-bit color depth information.

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## 9.8.7 16-bit data bus for 16-bit/pixel (RGB 5-6-5-bit input), 65K-Colors, 3AH= "05h"

There is 1 pixel (3 sub-pixels) per 1 byte



Note 1: The data order is as follows, MSB=D15, LSB=D0 and picture data is MSB=Bit 5, LSB=Bit 0 for Green, and MSB=Bit 4, LSB=Bit 0 for Red and Blue data.

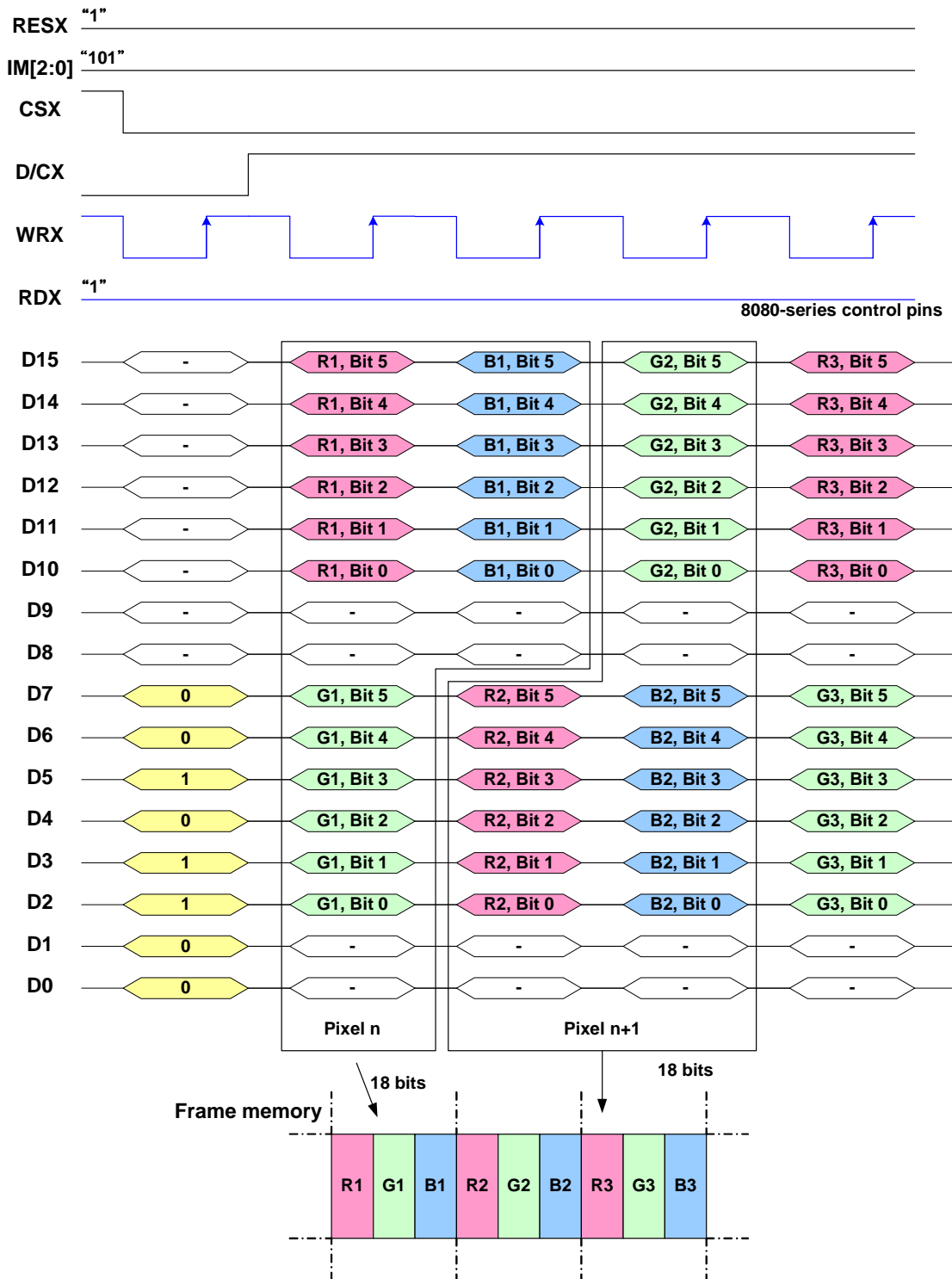
Note 2: 1-times transfer (D15 to D0) is used to transmit 1 pixel data with the 16-bit color depth information.

Note 3: '-' = Don't care - Can be set to '0' or '1'

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## 9.8.8 16-bit data bus for 18-bit/pixel (RGB 6-6-6-bit input), 262K-Colors, 3AH= "06h"

There are 2 pixels (6 sub-pixels) per 3 bytes



Note 1: The data order is as follows, MSB=D15, LSB=D0 and picture data is MSB=Bits 5, LSB=Bit 0 for Red, Green and Blue data.

Note 2: 3-times transfer is used to transmit 1 pixel data with the 18-bit color depth information.

Note 3: '-' = Don't care - Can be set to '0' or '1'

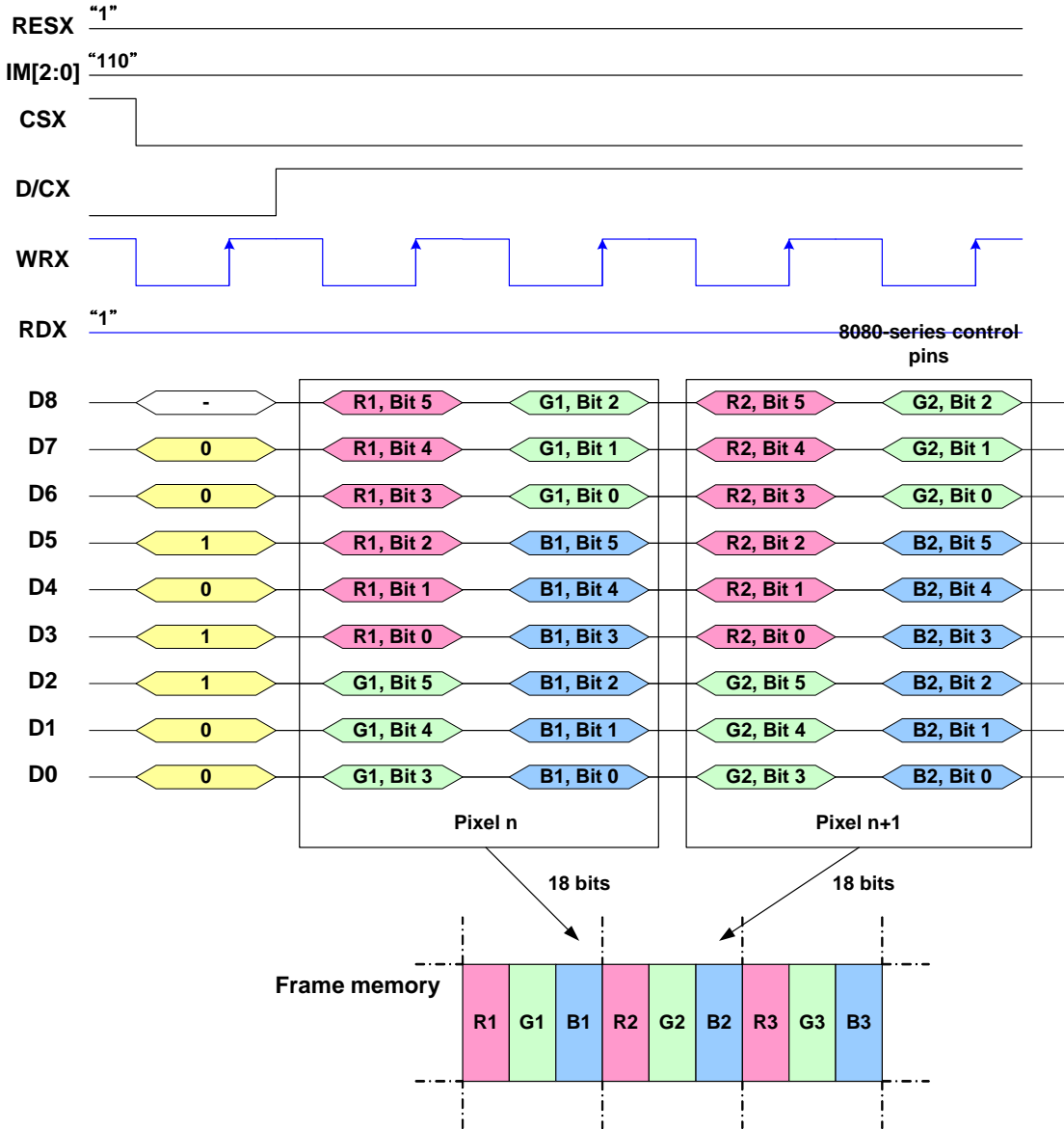
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## 9.8.9 9-Bit Parallel Interface (IM2, IM1, IM0="110")

Different display data formats are available for three colors depth supported by listed below.  
 -262k colors, RGB 6,6,6-bit input

## 9.8.10 Write 9-bit data for RGB 6-6-6-bit input (262k-color)

There is 1 pixel (6 sub-pixels) per 3 bytes



Note 1: The data order is as follows, MSB=D8, LSB=D0 and picture data is MSB=Bit 5, LSB=Bit 0 for Red, Green and Blue data.

Note 2: 3-times transfer is used to transmit 1 pixel data with the 18-bit color depth information.

Note 3: '-' = Don't care - Can be set to '0' or '1'

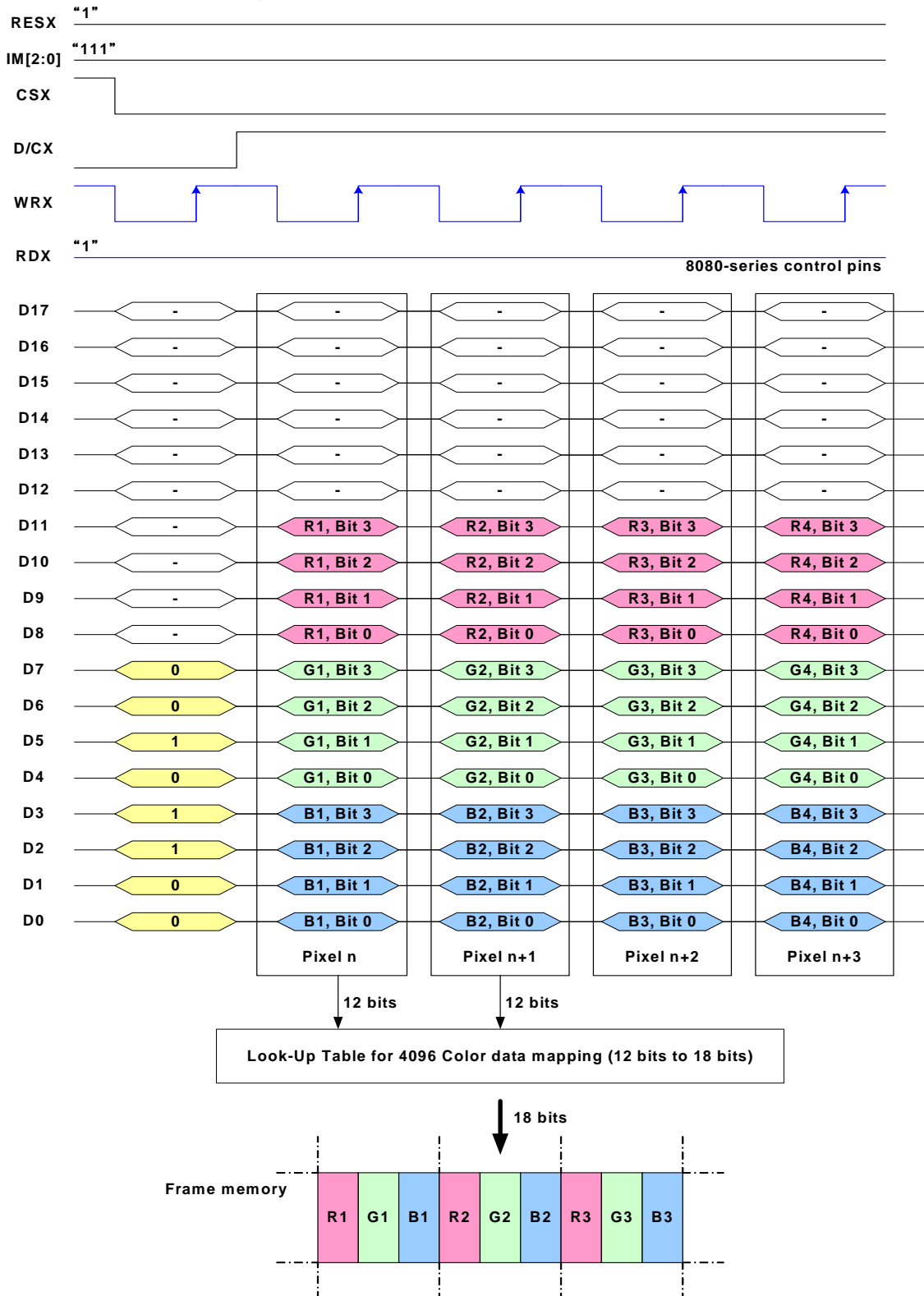
## 9.8.11 18-Bit Parallel Interface (IM2, IM1, IM0="111")

Different display data formats are available for three colors depth supported by listed below.

- 4k colors, RGB 4,4,4-bit input
- 65k colors, RGB 5,6,5-bit input
- 262k colors, RGB 6,6,6-bit input.

## 9.8.12 18-bit data bus for 12-bit/pixel (RGB 4-4-4-bit input), 4K-Colors, 3AH="03h"

There is 1 pixel (3 sub-pixels) per 1 byte

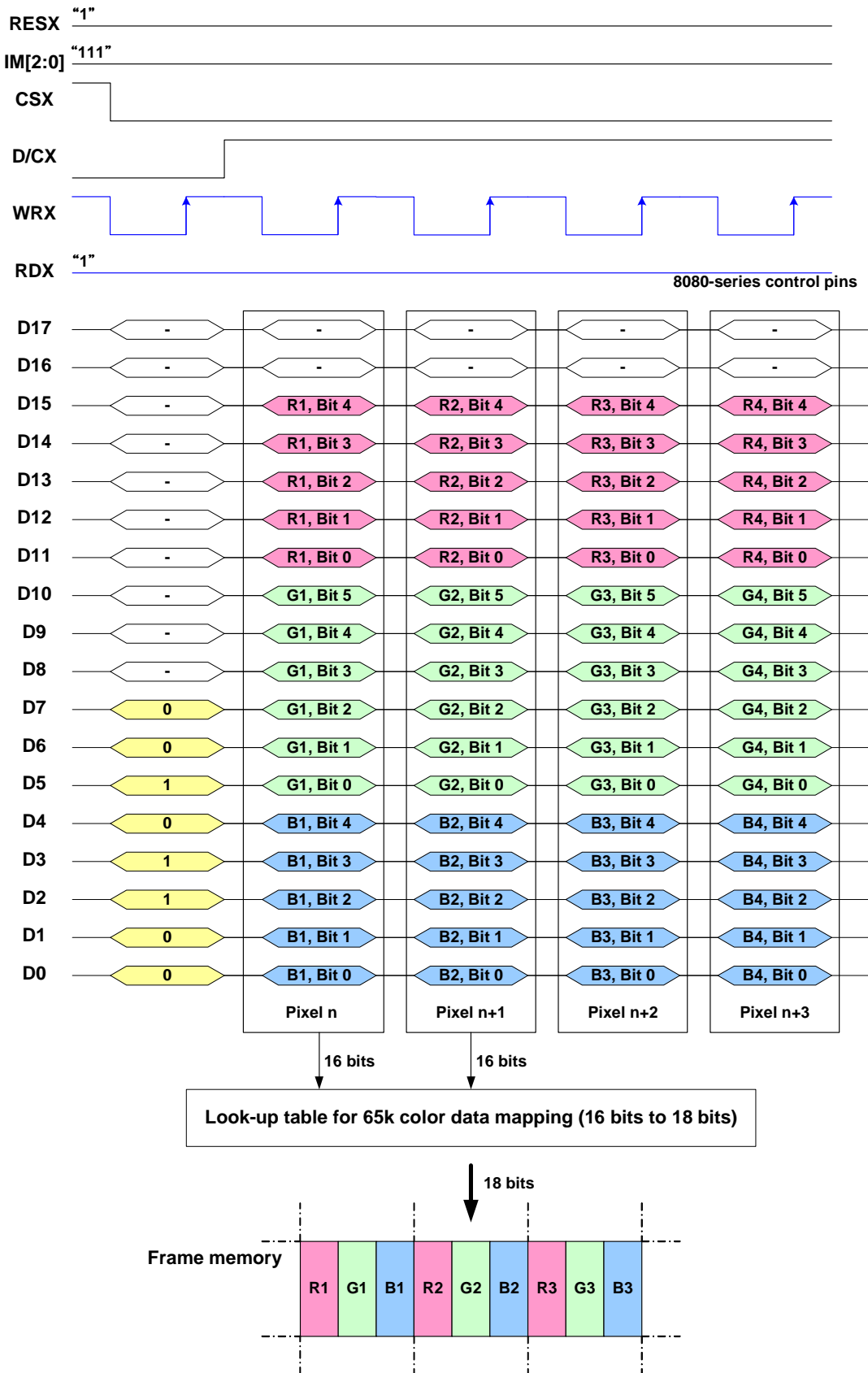


Note 1: The data order is as follows, MSB=D11, LSB=D0 and picture data is MSB=Bit 3, LSB=Bit 0 for Red, Green and Blue data.

Note 2: 1-times transfer is used to transmit 1 pixel data with the 12-bit color depth information.

## 9.8.13 18-bit data bus for 16-bit/pixel (RGB 5-6-5-bit input), 65K-Colors, 3AH="05h"

There is 1 pixel (3 sub-pixels) per 1 byte



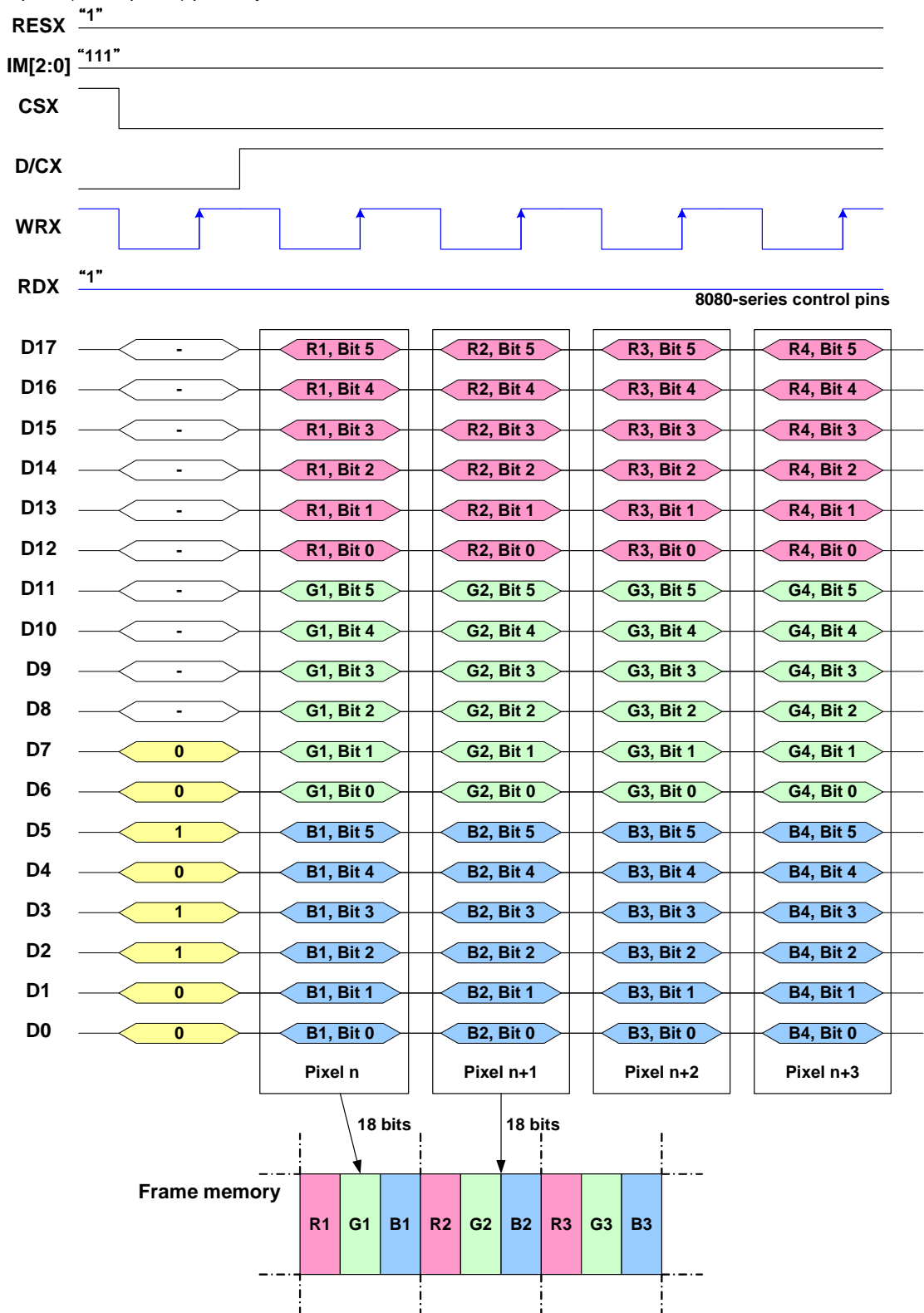
Note 1: The data order is as follows, MSB=D15, LSB=D0 and picture data is MSB=Bit 5, LSB=Bit 0 for Green, and MSB=Bit 4, LSB=Bit 0 for Red and Blue data.

Note 2: 1-time transfer is used to transmit 1 pixel data with the 16-bit color depth information.

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## 9.8.14 18-bit data bus for 18-bit/pixel (RGB 6-6-6-bit input), 262K-Colors, 3AH="06h"

There is 1 pixel (3 sub-pixels) per 1 byte



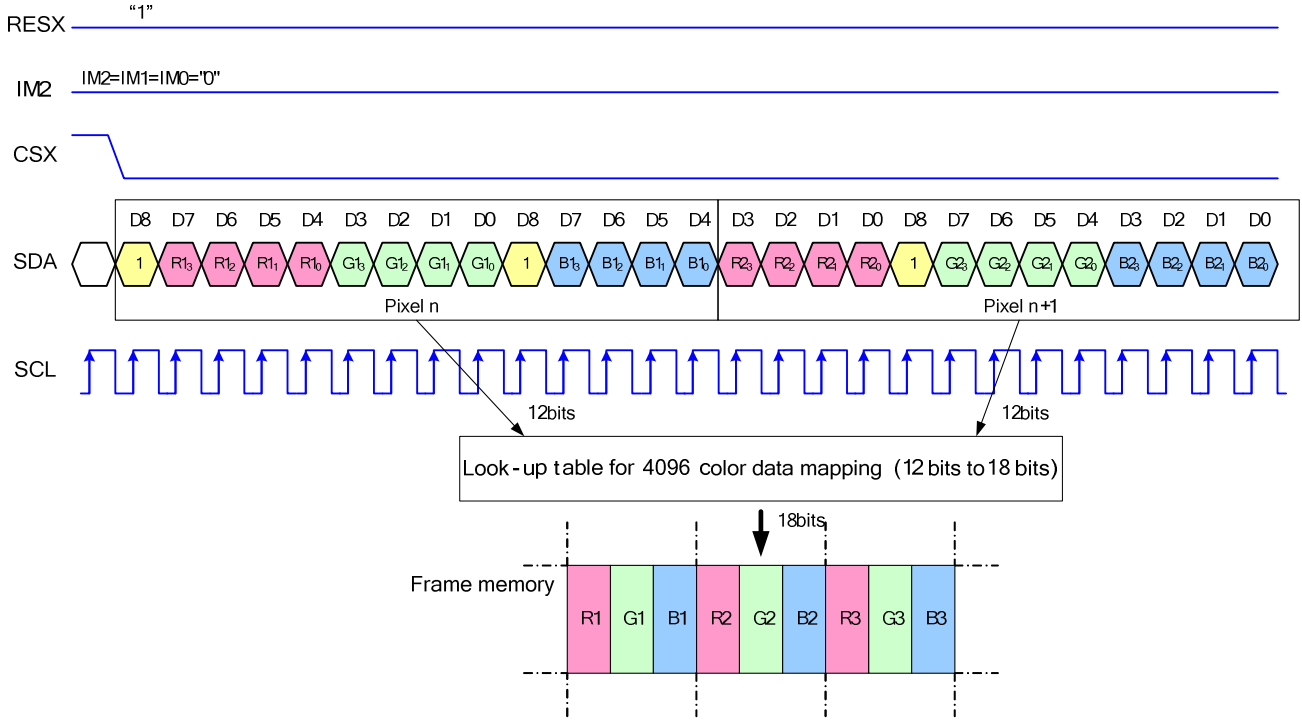
Note 1: The data order is as follows, MSB=D17, LSB=D0 and picture data is MSB=Bit 5, LSB=Bit 0 for Read, Green and Blue data.

Note 2: 1-times transfer (D17o D0) is used to transmit 1 pixel data with the 18-bit color depth information.

## 9.8.15 3-line serial Interface

Different display data formats are available for three colors depth supported by the LCM listed below.  
 4k colors, RGB 4-4-4-bit input  
 65k colors, RGB 5-6-5-bit input  
 262k colors, RGB 6-6-6-bit input

## 9.8.16 Write data for 12-bit/pixel (RGB 4-4-4-bit input), 4K-Colors, 3AH="03h"

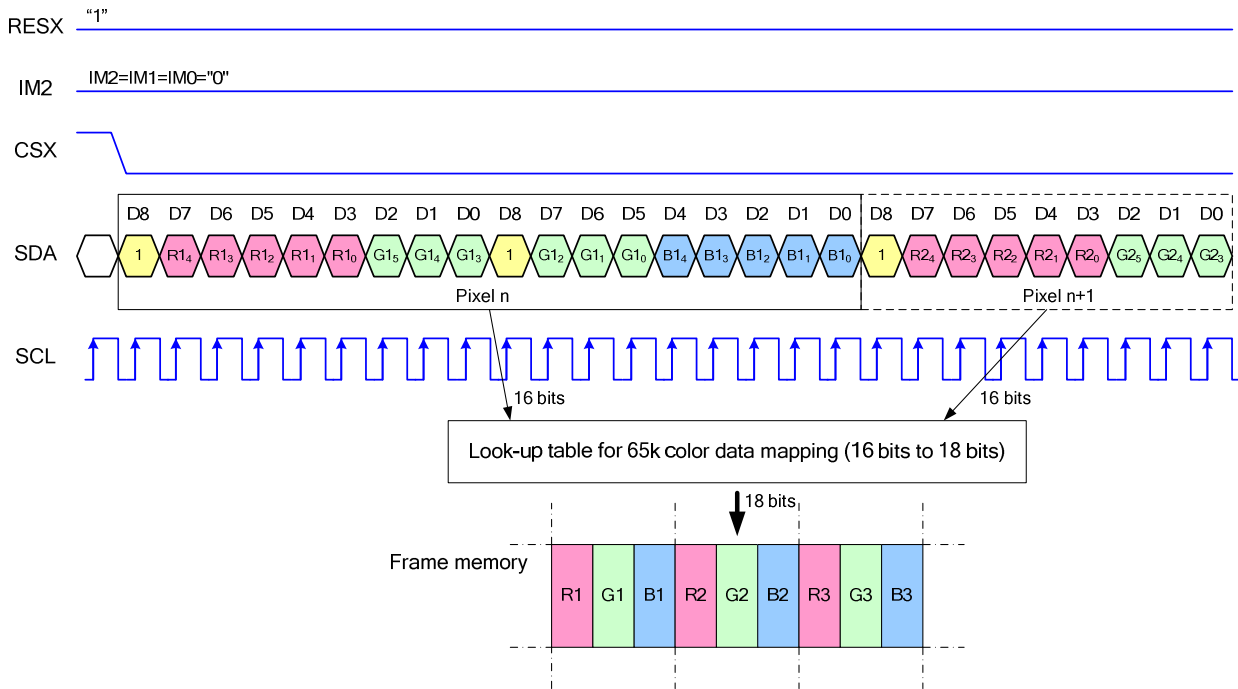


Note 1: Pixel data with the 12-bit color depth information

Note 2: The most significant bits are: Rx3, Gx3 and Bx3

Note 3: The least significant bits are: Rx0, Gx0 and Bx0

## 9.8.17 Write data for 16-bit/pixel (RGB 5-6-5-bit input), 65K-Colors, 3AH="05h"

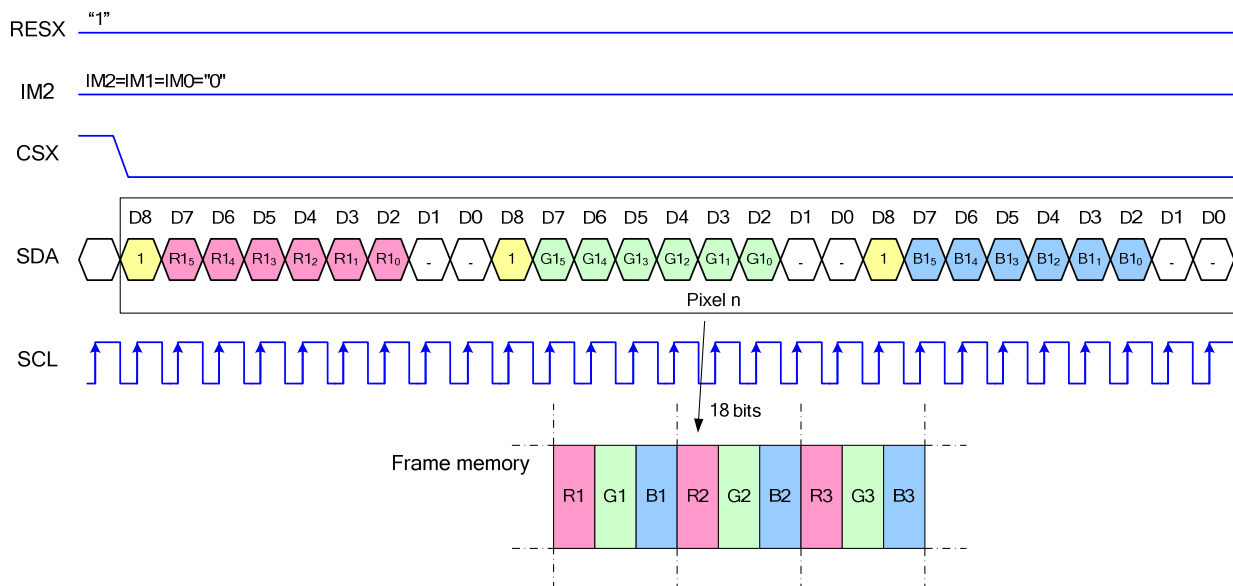


Note 1: Pixel data with the 16-bit color depth information

Note 2: The most significant bits are: Rx4, Gx5 and Bx4

Note 3: The least significant bits are: Rx0, Gx0 and Bx0

## 9.8.18 Write data for 18-bit/pixel (RGB 6-6-6-bit input), 262K-Colors, 3AH="06h"



Note 1: Pixel data with the 18-bit color depth information

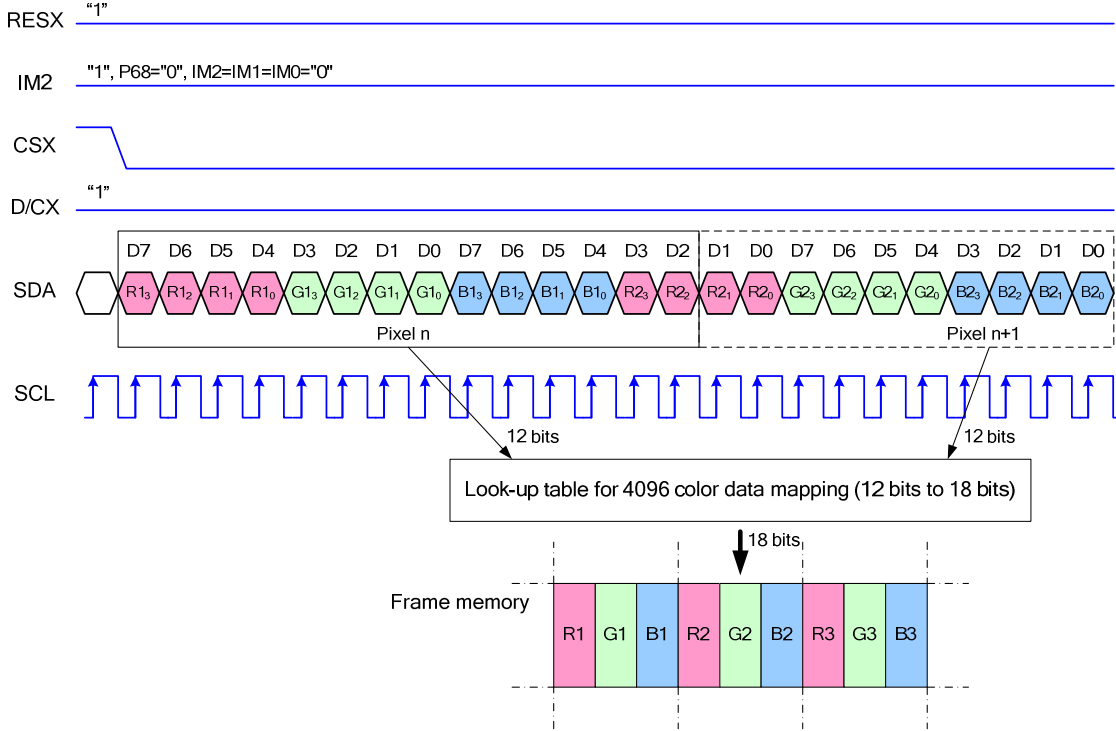
Note 2: The most significant bits are: Rx5, Gx5 and Bx5

Note 3: The least significant bits are: Rx0, Gx0 and Bx0

## 9.8.19 4-line serial Interface

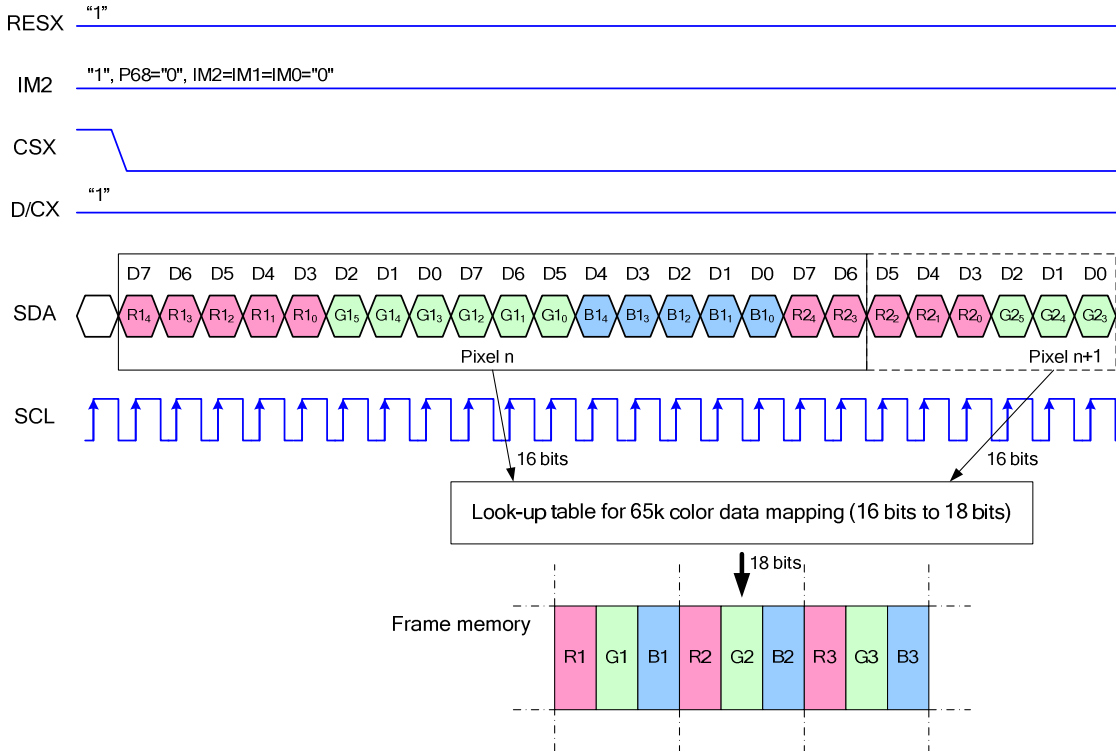
Different display data formats are available for three colors depth supported by the LCM listed below.  
 4k colors, RGB 4-4-4-bit input  
 65k colors, RGB 5-6-5-bit input  
 262k colors, RGB 6-6-6-bit input

## 9.8.20 Write data for 12-bit/pixel (RGB 4-4-4-bit input), 4K-Colors, 3AH="03h"



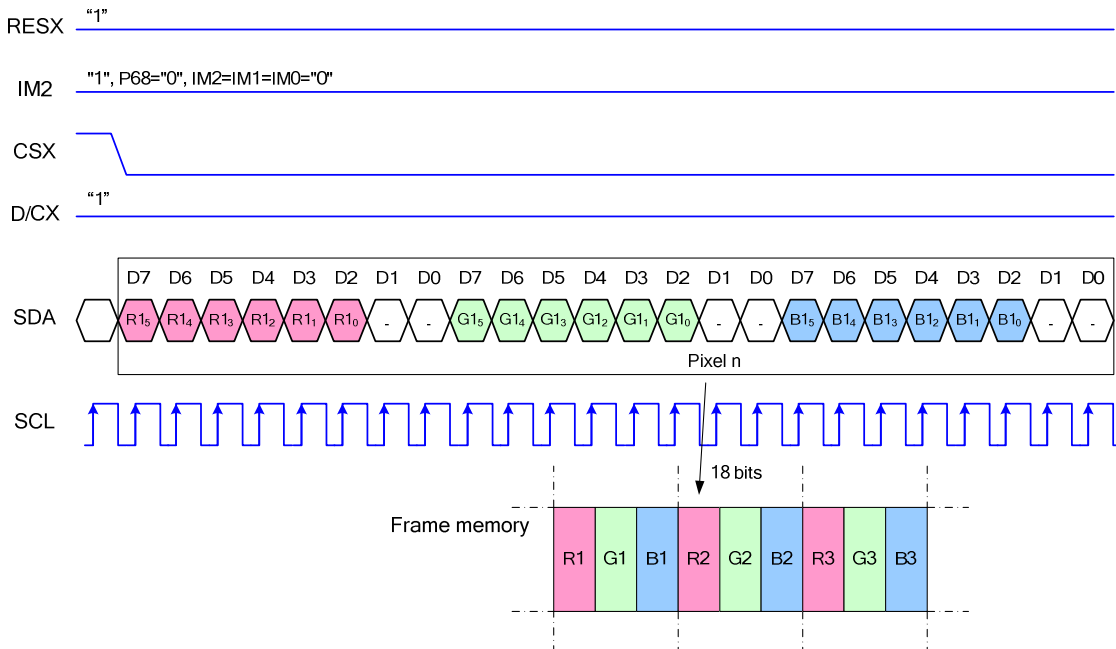
Note 1. pixel data with the 12-bit color depth information  
 Note 2. The most significant bits are: Rx3, Gx3 and Bx3  
 Note 3. The least significant bits are: Rx0, Gx0 and Bx0

## 9.8.21 Write data for 16-bit/pixel (RGB 5-6-5-bit input), 65K-Colors, 3AH="05h"



- Note 1. pixel data with the 16-bit color depth information
- Note 2. The most significant bits are: Rx4, Gx5 and Bx4
- Note 3. The least significant bits are: Rx0, Gx0 and Bx0

## 9.8.22 Write data for 18-bit/pixel (RGB 6-6-6-bit input), 262K-Colors, 3AH="06h"



- Note 1. pixel data with the 18-bit color depth information
- Note 2. The most significant bits are: Rx5, Gx5 and Bx5
- Note 3. The least significant bits are: Rx0, Gx0 and Bx0

## 9.9 Display Data RAM

### 9.9.1 Configuration (GM[1:0] = "00")

The display module has an integrated 132x162x18-bit graphic type static RAM. This 384,912-bit memory allows storing on-chip a 132xRGBx162 image with an 18-bpp resolution (262K-color). There will be no abnormal visible effect on the display when there is a simultaneous Panel Read and Interface Read or Write to the same location of the Frame Memory.

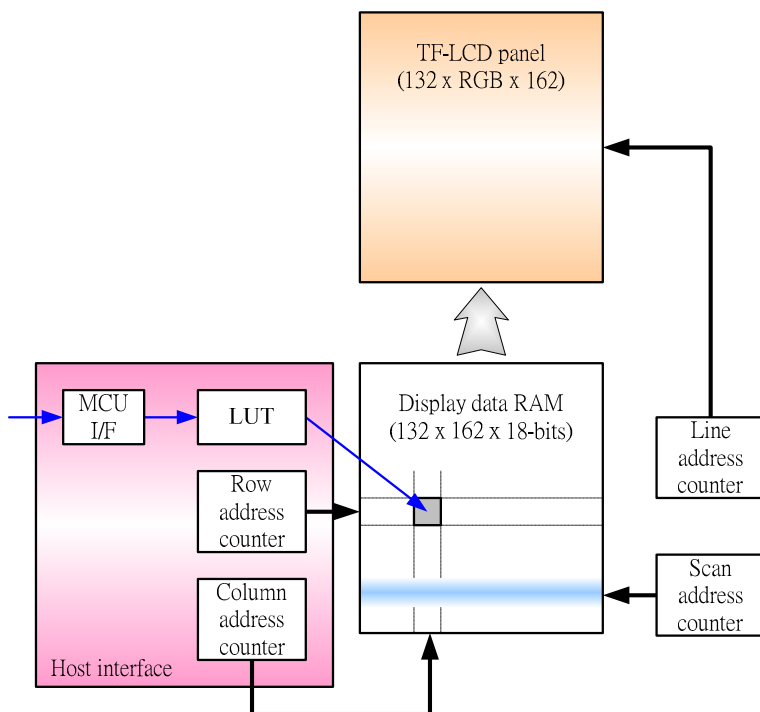
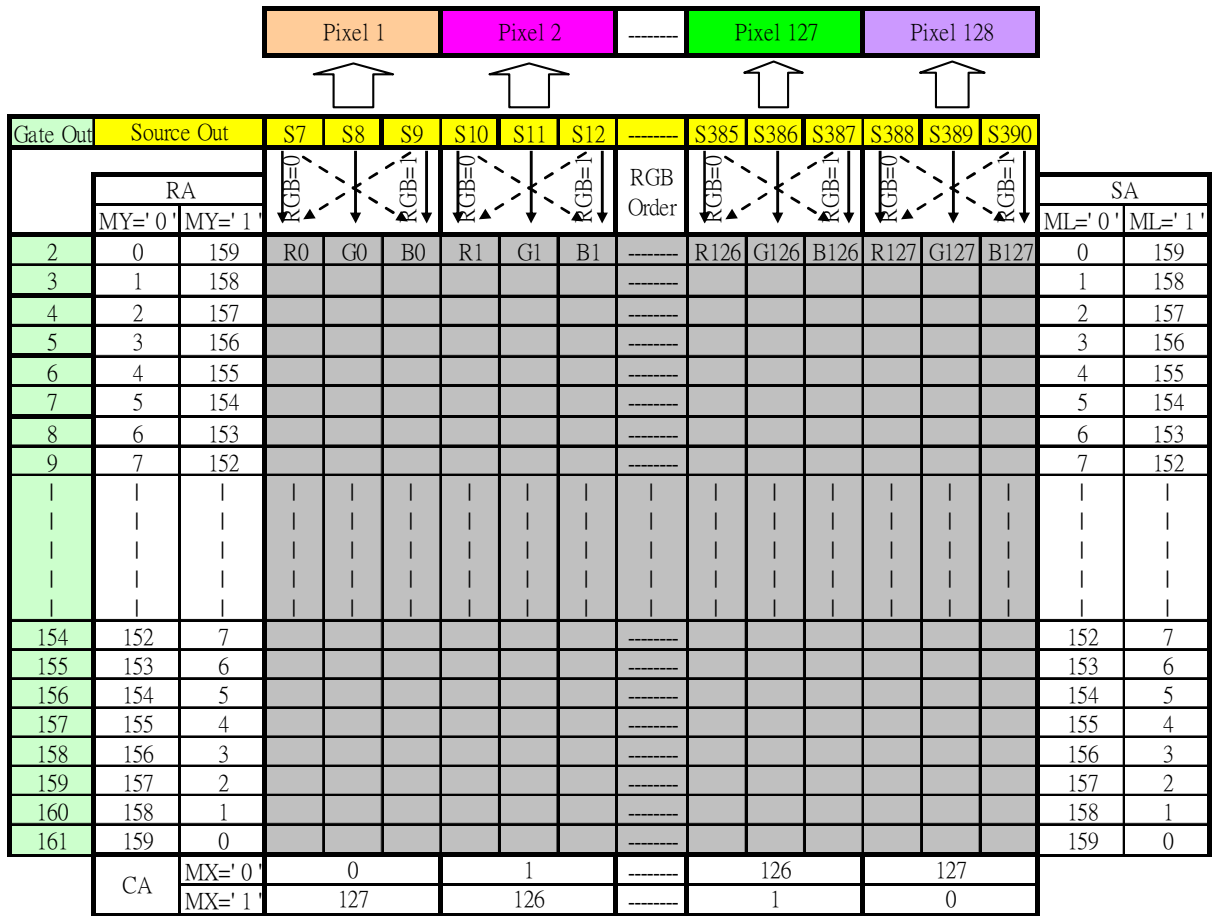


Figure 9.9.1 Display data RAM organization

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## 9.9.2 Memory to Display Address Mapping

### 9.9.3 When using 128RGB x 160 resolution (GM[1:0] = "11", SMX=SMY=SRGB= '0')



Note

RA = Row Address,

CA = Column Address

SA = Scan Address

MX = Mirror X-axis (Column address direction parameter), D6 parameter of MADCTL command

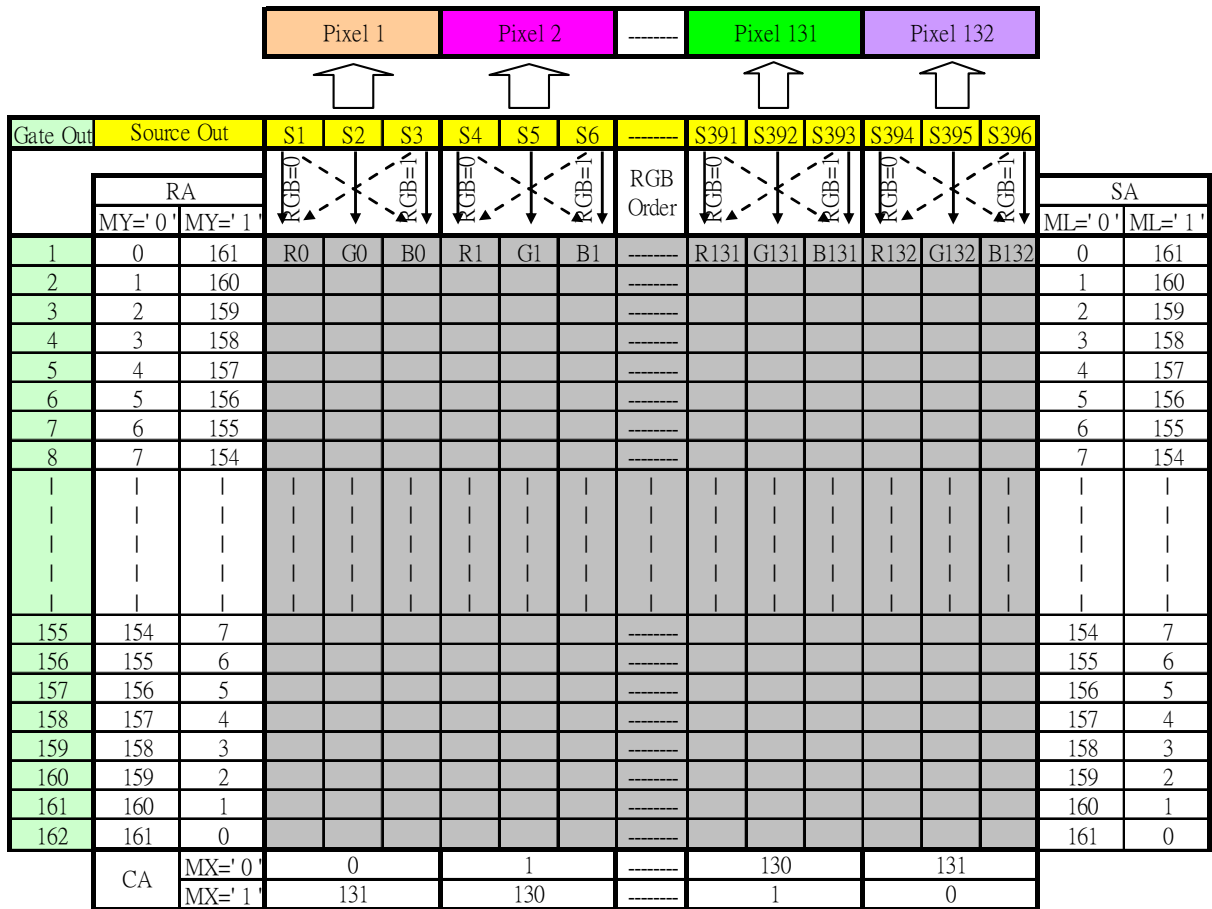
MY = Mirror Y-axis (Row address direction parameter), D7 parameter of MADCTL command

ML = Scan direction parameter, D4 parameter of MADCTL command

RGB = Red, Green and Blue pixel position change, D3 parameter of MADCTL command

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## 9.9.4 When using 132RGB x 162 resolution (GM[1:0] = "00", SMX=SMY=SRGB= '0')



Note

RA = Row Address,

CA = Column Address

SA = Scan Address

MX = Mirror X-axis (Column address direction parameter), D6 parameter of MADCTL command

MY = Mirror Y-axis (Row address direction parameter), D7 parameter of MADCTL command

ML = Scan direction parameter, D4 parameter of MADCTL command

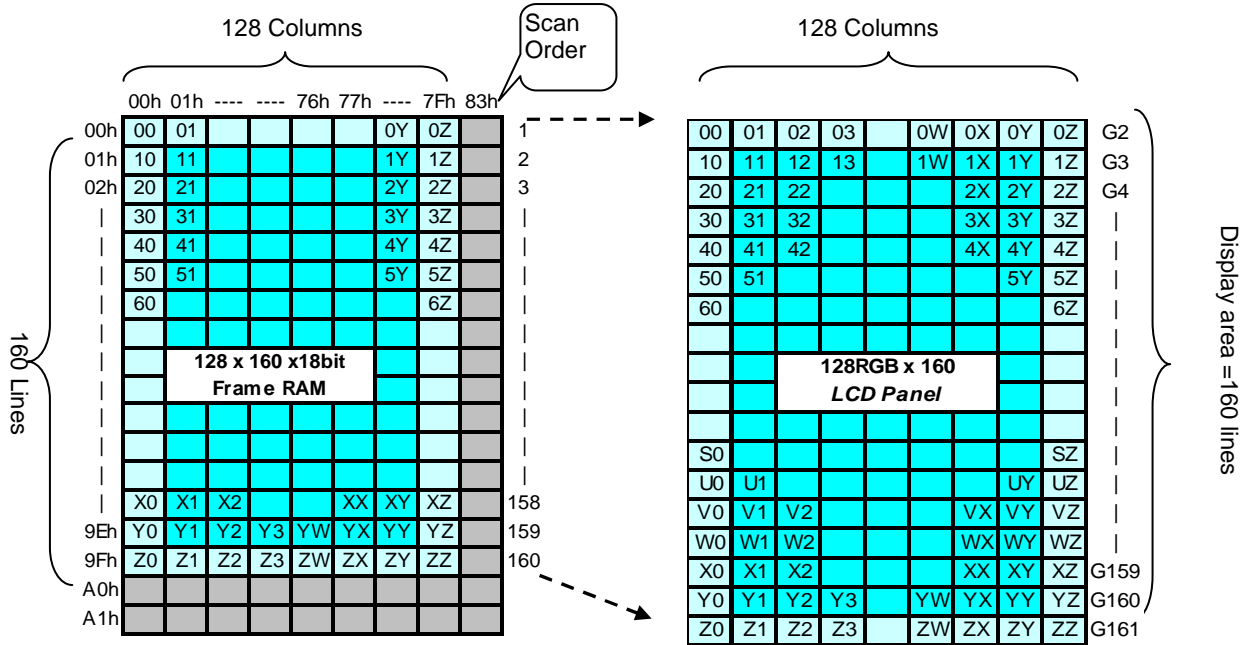
RGB = Red, Green and Blue pixel position change, D3 parameter of MADCTL command

## 9.9.5 Normal Display On or Partial Mode On

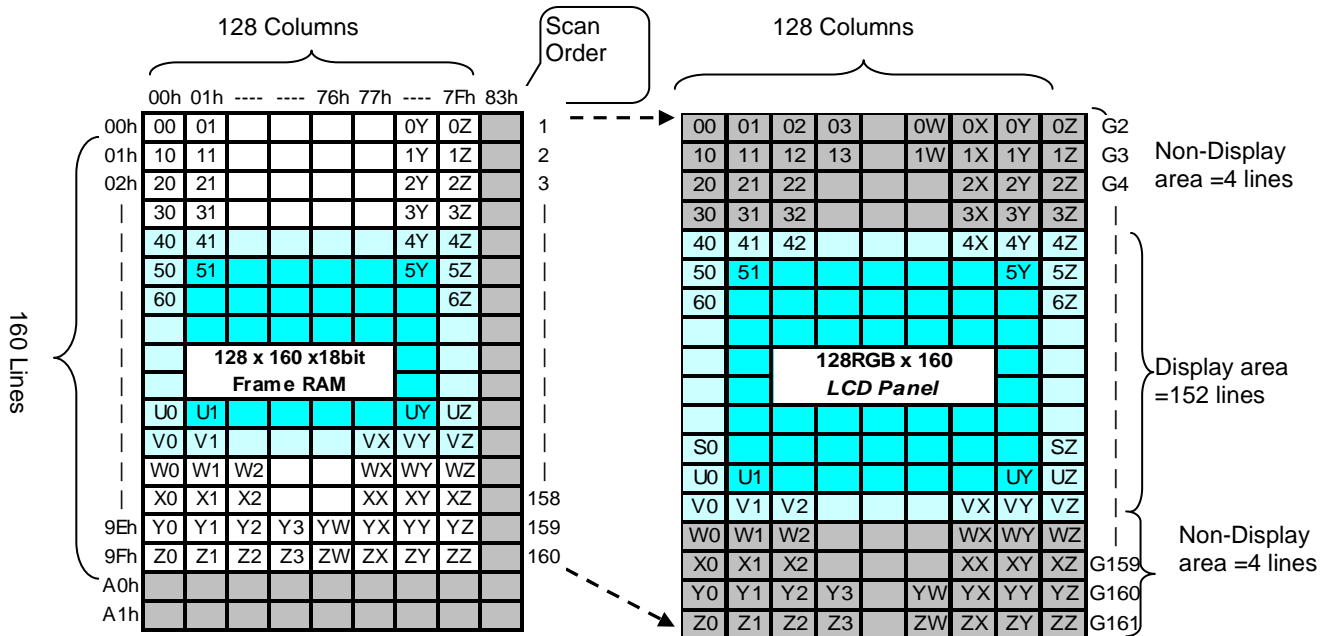
### 9.9.6 When using 128RGB x 160 resolution (GM[1:0] = "11")

In this mode, the content of the frame memory within an area where column pointer is 00h to 7Fh and page pointer is 00h to 9Fh is displayed. To display a dot on leftmost top corner, store the dot data at (column pointer, row pointer) = (0, 0).

1). Example for Normal Display On (MX=MY=ML='0', SMX=SMY='0')



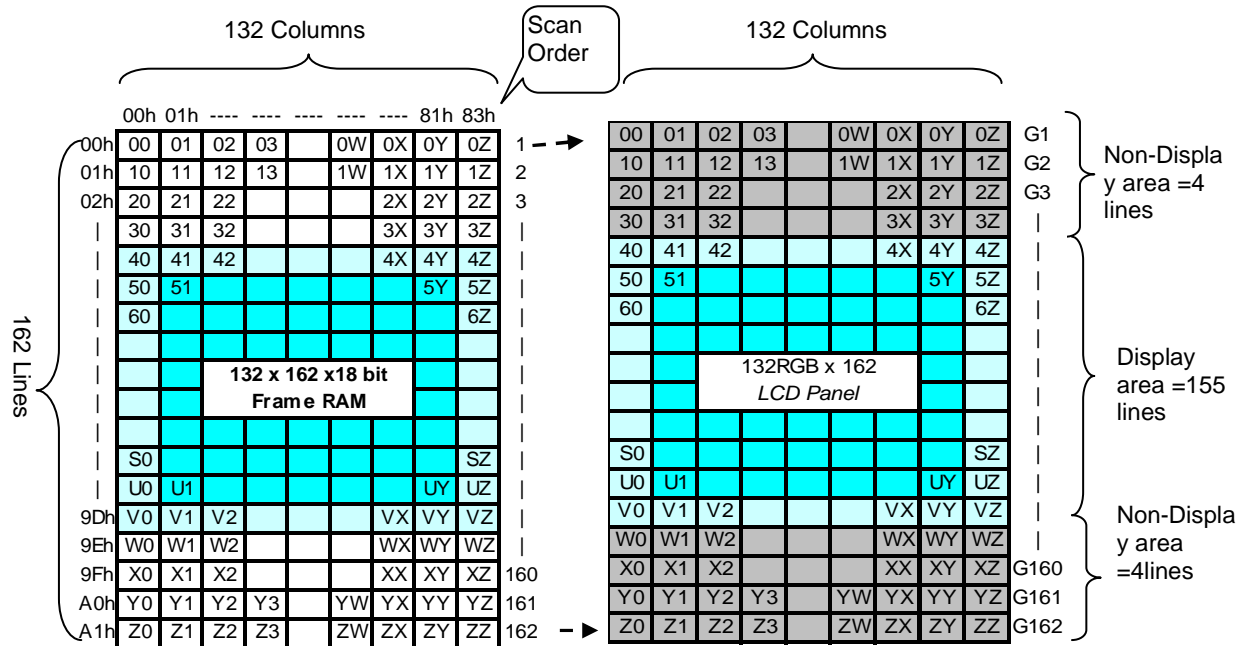
2). Example for Partial Display On (PSL[7:0]=04h, PEL[7:0]=9Bh, MX=MV=ML='0', SMX=SMY='0')



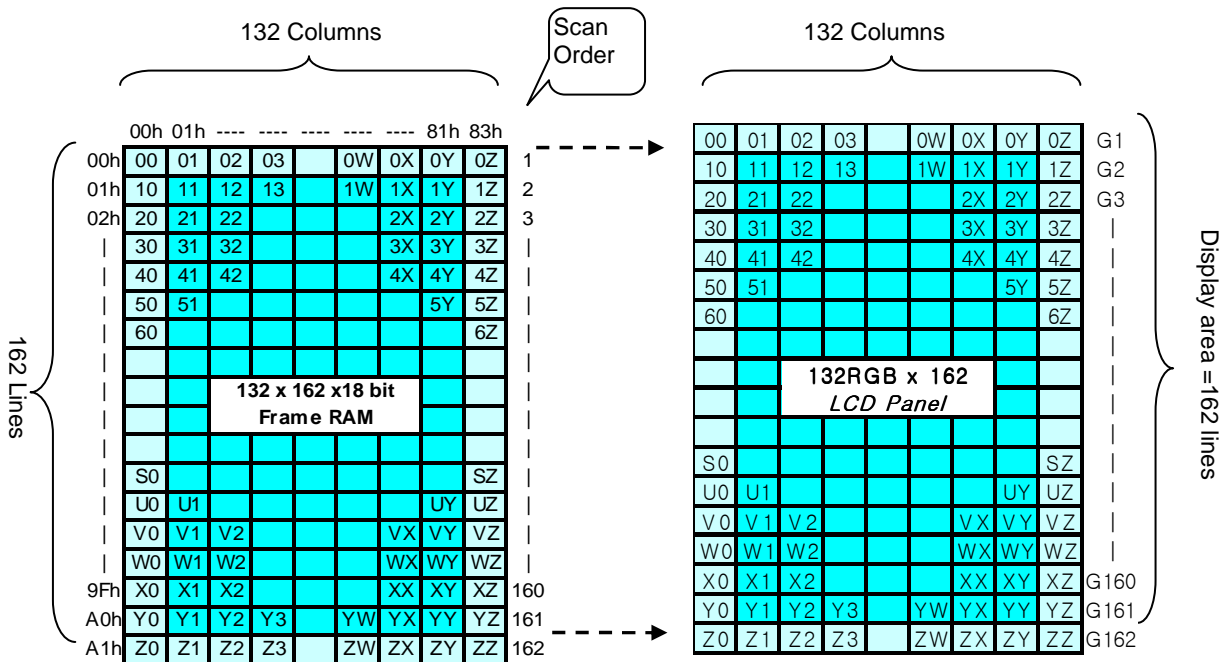
## 9.9.7 When using 132RGB x 162 resolution (GM[1:0] = "00")

In this mode, contents of the frame memory within an area where column pointer is 00h to 83h and page pointer is 00h to A1h is displayed. To display a dot on leftmost top corner, store the dot data at (column pointer, row pointer) = (0, 0)

1). Example for Normal Display On (MX=MY=ML='0', SMX=SMY='0')



2). Example for Partial Display On (PSL[7:0]=04h, PEL[7:0]=9Dh, MX=MV=ML='0', SMX=SMY='0')



## 9.10 Address Counter

The address counter sets the addresses of the display data RAM for writing and reading.

Data is written pixel-wise into the RAM matrix of DRIVER. The data for one pixel or two pixels is collected (RGB 6-6-6-bit), according to the data formats. As soon as this pixel-data information is complete the "Write access" is activated on the RAM. The locations of RAM are addressed by the address pointers. The address ranges are X=0 to X=131 (83h) and Y=0 to Y=161 (A1h). Addresses outside these ranges are not allowed. Before writing to the RAM, a window must be defined that will be written. The window is programmable via the command registers XS, YS designating the start address and XE, YE designating the end address.

For example the whole display contents will be written, the window is defined by the following values: XS=0 (0h) YS=0 (0h) and XE=127 (83h), YE=161 (A1h).

In vertical addressing mode (MV=1), the Y-address increments after each byte, after the last Y-address (Y=YE), Y wraps around to YS and X increments to address the next column. In horizontal addressing mode (V=0), the X-address increments after each byte, after the last X-address (X=XE), X wraps around to XS and Y increments to address the next row. After the every last address (X=XE and Y=YE) the address pointers wrap around to address (X=XS and Y=YS).

For flexibility in handling a wide variety of display architectures, the commands "CASET, RASET and MADCTL" (see section 10 command list), define flags MX and MY, which allows mirroring of the X-address and Y-address. All combinations of flags are allowed. Section 9.10 show the available combinations of writing to the display RAM. When MX, MY and MV will be changed the data must be rewritten to the display RAM.

For each image condition, the controls for the column and row counters apply as section 9.11 below

| Condition                                                                                                         | Column Counter                | Row Counter                |
|-------------------------------------------------------------------------------------------------------------------|-------------------------------|----------------------------|
| When RAMWR/RAMRD command is accepted                                                                              | Return to "Start Column (XS)" | Return to "Start Row (YS)" |
| Complete Pixel Read / Write action                                                                                | Increment by 1                | No change                  |
| The Column counter value is larger than "End Column (XE)"                                                         | Return to "Start Column (XS)" | Increment by 1             |
| The Column counter value is larger than "End Column (XE)" and the Row counter value is larger than "End Row (YE)" | Return to "Start Column (XS)" | Return to "Start Row (YS)" |

## 9.11 Memory Data Write/ Read Direction

The data is written in the order illustrated above. The Counter which dictates where in the physical memory the data is to be written is controlled by “Memory Data Access Control” Command, bits B5 (MV), B6 (MX), B7 (MY) as described below.

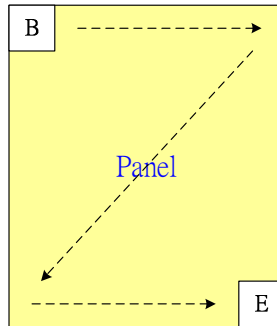


Figure 9.11.1 Data streaming order

### 9.11.1 When 128RGBx160 (GM= “11”)

| MV | MX | MY | CASET                                   | RASET                                   |
|----|----|----|-----------------------------------------|-----------------------------------------|
| 0  | 0  | 0  | Direct to Physical Column Pointer       | Direct to Physical Row Pointer          |
| 0  | 0  | 1  | Direct to Physical Column Pointer       | Direct to (159-Physical Row Pointer)    |
| 0  | 1  | 0  | Direct to (127-Physical Column Pointer) | Direct to Physical Row Pointer          |
| 0  | 1  | 1  | Direct to (127-Physical Column Pointer) | Direct to (159-Physical Row Pointer)    |
| 1  | 0  | 0  | Direct to Physical Row Pointer          | Direct to Physical Column Pointer       |
| 1  | 0  | 1  | Direct to (159-Physical Row Pointer)    | Direct to Physical Column Pointer       |
| 1  | 1  | 0  | Direct to Physical Row Pointer          | Direct to (127-Physical Column Pointer) |
| 1  | 1  | 1  | Direct to (159-Physical Row Pointer)    | Direct to (127-Physical Column Pointer) |

### 9.11.2 When 132RGBx162 (GM= “00”)

| MV | MX | MY | CASET                                   | RASET                                   |
|----|----|----|-----------------------------------------|-----------------------------------------|
| 0  | 0  | 0  | Direct to Physical Column Pointer       | Direct to Physical Row Pointer          |
| 0  | 0  | 1  | Direct to Physical Column Pointer       | Direct to (161-Physical Row Pointer)    |
| 0  | 1  | 0  | Direct to (131-Physical Column Pointer) | Direct to Physical Row Pointer          |
| 0  | 1  | 1  | Direct to (131-Physical Column Pointer) | Direct to (161-Physical Row Pointer)    |
| 1  | 0  | 0  | Direct to Physical Row Pointer          | Direct to Physical Column Pointer       |
| 1  | 0  | 1  | Direct to (161-Physical Row Pointer)    | Direct to Physical Column Pointer       |
| 1  | 1  | 0  | Direct to Physical Row Pointer          | Direct to (131-Physical Column Pointer) |
| 1  | 1  | 1  | Direct to (161-Physical Row Pointer)    | Direct to (131-Physical Column Pointer) |

Note: Data is always written to the Frame Memory in the same order, regardless of the Memory Write Direction set by MADCTL bits B7 (MY), B6 (MX), B5 (MV). The write order for each pixel unit is

|     |     |     |     |     |     |     |     |    |    |    |    |    |    |    |    |    |    |
|-----|-----|-----|-----|-----|-----|-----|-----|----|----|----|----|----|----|----|----|----|----|
| D17 | D16 | D15 | D14 | D13 | D12 | D11 | D10 | D9 | D8 | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 |
| R5  | R4  | R3  | R2  | R1  | R0  | G5  | G4  | G3 | G2 | G1 | G0 | B5 | B4 | B3 | B2 | B1 | B0 |

One pixel unit represents 1 column and 1page counter value on the Frame Memory.

## 9.11.3 Frame Data Write Direction According to the MADCTL parameters (MV, MX and MY)

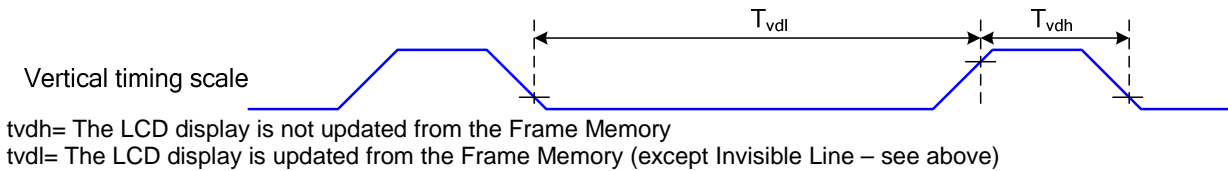
| Display Data Direction               | MADCTL Parameter |    |    | Image in the Host (MPU) | Image in the Driver (DDRAM) |
|--------------------------------------|------------------|----|----|-------------------------|-----------------------------|
|                                      | MV               | MX | MY |                         |                             |
| Normal                               | 0                | 0  | 0  |                         |                             |
| Y-Mirror                             | 0                | 0  | 1  |                         |                             |
| X-Mirror                             | 0                | 1  | 0  |                         |                             |
| X-Mirror<br>Y-Mirror                 | 0                | 1  | 1  |                         |                             |
| X-Y Exchange                         | 1                | 0  | 0  |                         |                             |
| X-Y Exchange<br>Y-Mirror             | 1                | 0  | 1  |                         |                             |
| X-Y Exchange<br>X-Mirror             | 1                | 1  | 0  |                         |                             |
| X-Y Exchange<br>X-Mirror<br>Y-Mirror | 1                | 1  | 1  |                         |                             |

## 9.12 Tearing Effect Output Line

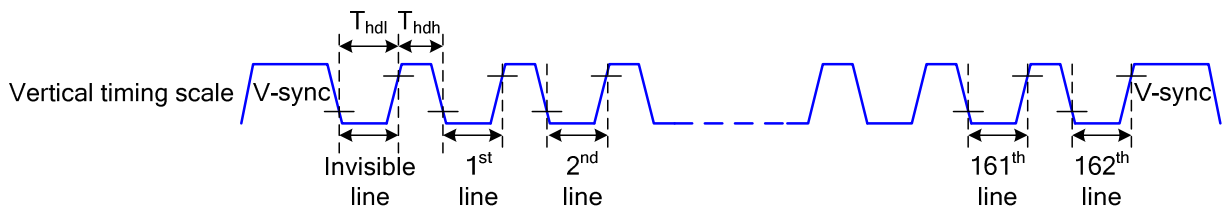
The Tearing Effect output line supplies to the MPU a Panel synchronization signal. This signal can be enabled or disabled by the Tearing Effect Line Off & On commands. The mode of the Tearing Effect signal is defined by the parameter of the Tearing Effect Line On command. The signal can be used by the MPU to synchronize Frame Memory Writing when displaying video images.

### 9.12.1 Tearing Effect Line Modes

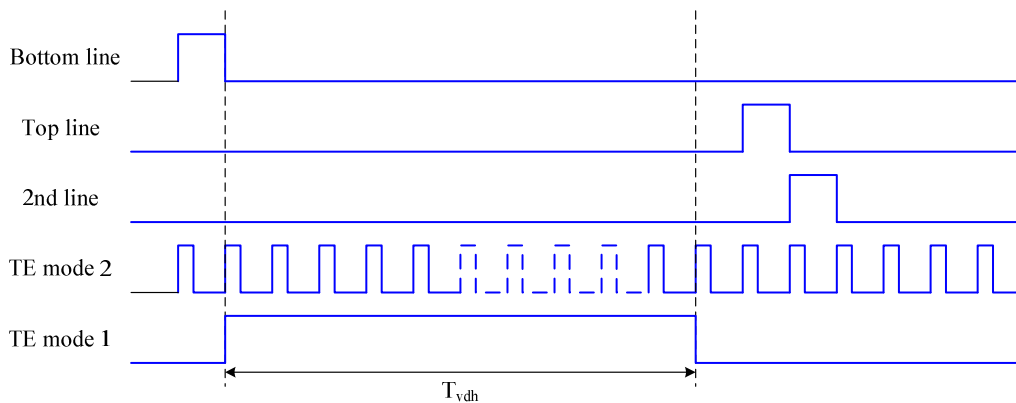
Mode 1, the Tearing Effect Output signal consists of V-Blanking Information only:



Mode 2, the Tearing Effect Output signal consists of V-Blanking and H-Blanking Information, there is one V-sync and 162 H-sync pulses per field.



thdh= The LCD display is not updated from the Frame Memory  
 thdl= The LCD display is updated from the Frame Memory (except Invisible Line – see above)

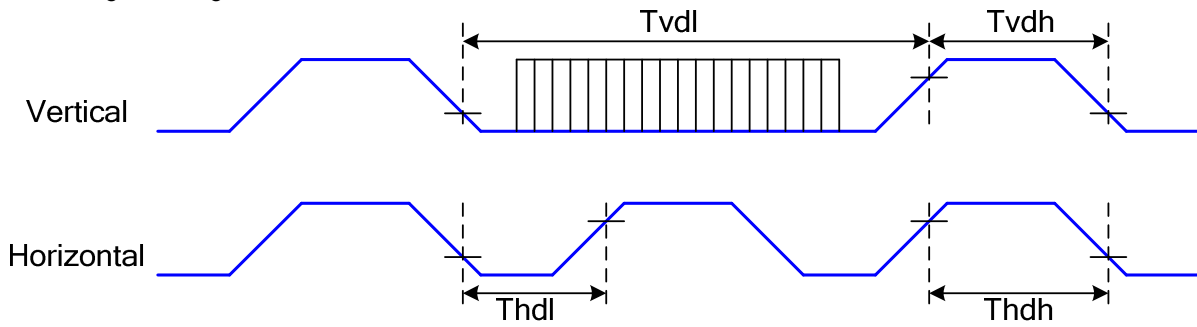


Note: During Sleep In Mode, the Tearing Output Pin is active Low.

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## 9.12.2 Tearing Effect Line Timings

The Tearing Effect signal is described below:

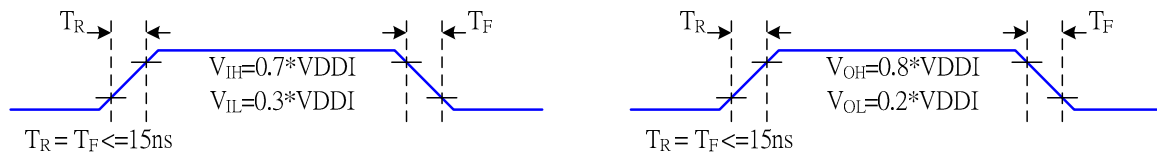


| Symbol | Parameter                       | min  | max | unit    | description |
|--------|---------------------------------|------|-----|---------|-------------|
| tvdl   | Vertical Timing Low Duration    | 13   | -   | ms      |             |
| tvdh   | Vertical Timing High Duration   | 1000 | -   | $\mu$ s |             |
| thdl   | Horizontal Timing Low Duration  | 33   | -   | $\mu$ s |             |
| thdh   | Horizontal Timing High Duration | 25   | 500 | $\mu$ s |             |

Table 9.12.1 AC characteristics of Tearing Effect Signal Idle Mode Off (Frame Rate = 60 Hz,  $T_a=25^\circ\text{C}$ )

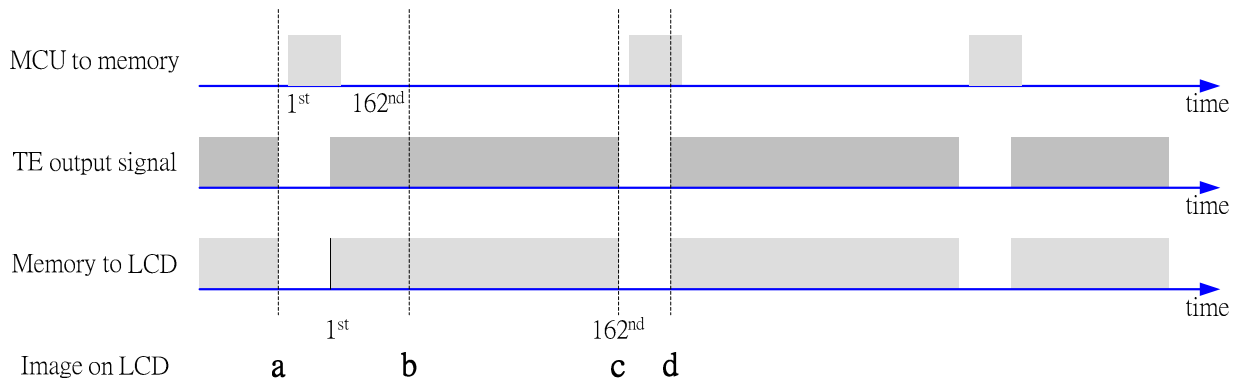
Note: The timings in Table 9.10.1 apply when  $MADCTL\ ML=0$  and  $ML=1$

The signal's rise and fall times ( $t_f$ ,  $t_r$ ) are stipulated to be equal to or less than 15ns.

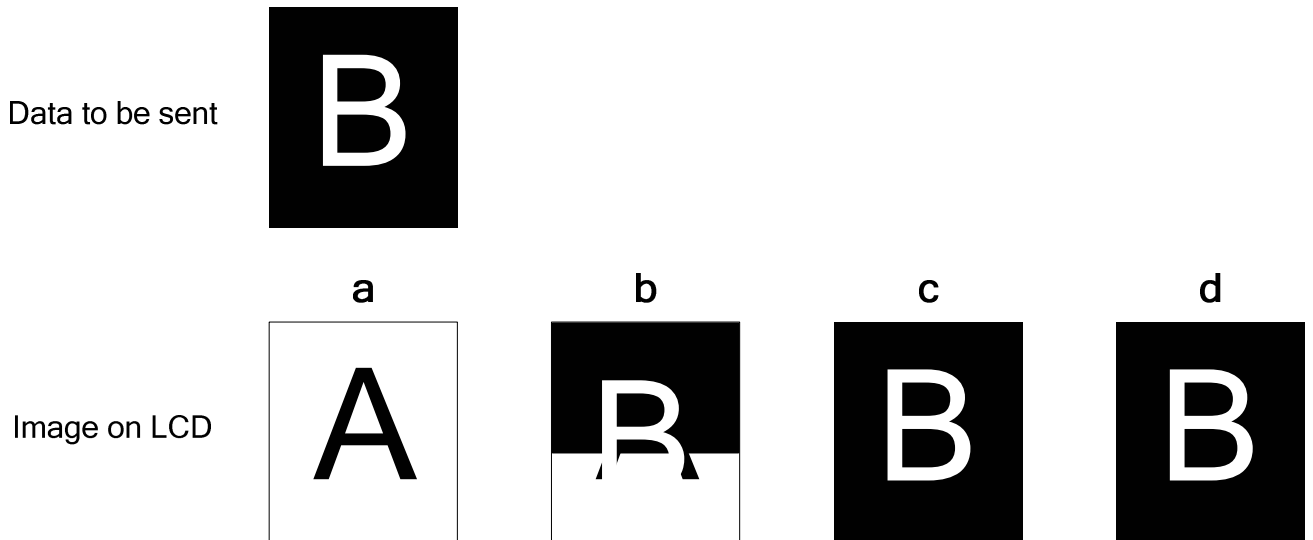


The Tearing Effect Output Line is fed back to the MPU and should be used as shown below to avoid Tearing Effect:

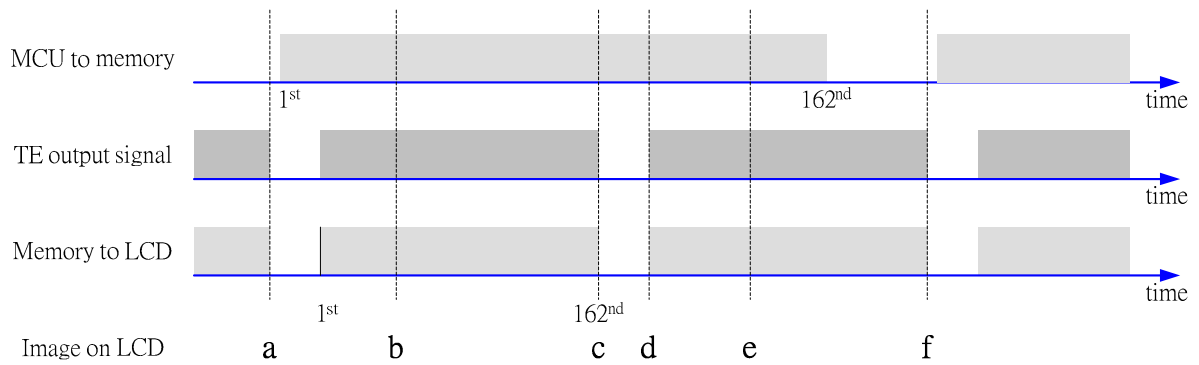
## 9.12.3 Example 1: MPU Write is faster than panel read



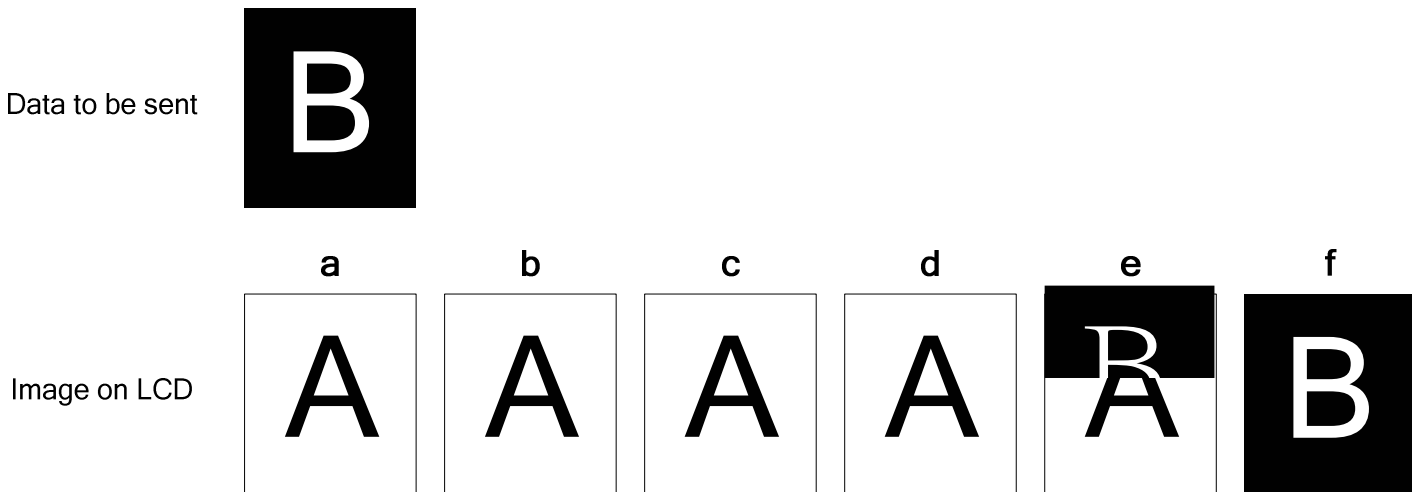
Data write to Frame Memory is now synchronized to the Panel Scan. It should be written during the vertical sync pulse of the Tearing Effect Output Line. This ensures that data is always written ahead of the panel scan and each Panel Frame refresh has a complete new image:



## 9.12.4 Example 2: MPU write is slower than panel read



The MPU to Frame Memory write begins just after Panel Read has commenced i.e. after one horizontal sync pulse of the Tearing Effect Output Line. This allows time for the image to download behind the Panel Read pointer and finishing download during the subsequent Frame before the Read Pointer “catches” the MPU to Frame memory write position.



## 9.13 Power ON/OFF Sequence

VDD must be powered on before the VDDI.

VDDI must be powered off before the VDD.

During power off, if LCD is in the Sleep Out mode, VDD and VDDI must be powered down minimum 120msec after RESX has been released.

During power off, if LCD is in the Sleep In mode, VDDI or VDD can be powered down minimum 0msec after RESX has been released.

CSX can be applied at any timing or can be permanently grounded. RESX has priority over CSX.

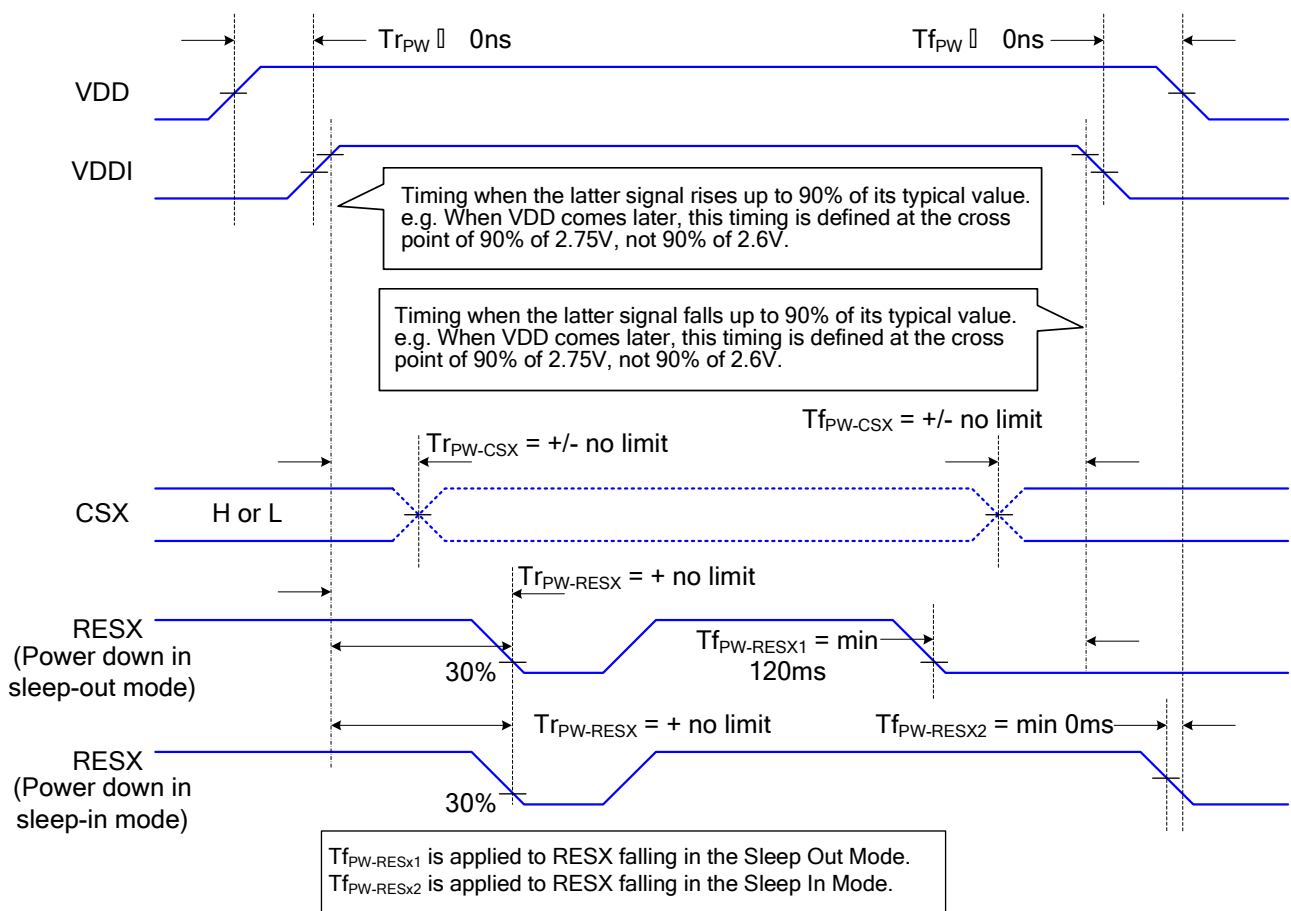
Note 1: There will be no damage to the display module if the power sequences are not met.

Note 2: There will be no abnormal visible effects on the display panel during the Power On/Off Sequences.

Note 3: There will be no abnormal visible effects on the display between end of Power On Sequence and before receiving Sleep Out command. Also between receiving Sleep In command and Power Off Sequence.

Note 4: If RESX line is not held stable by host during Power On Sequence as defined in the sequence below, then it will be necessary to apply a Hardware Reset (RESX) after Host Power On Sequence is complete to ensure correct operation. Otherwise function is not guaranteed.

The power on/off sequence is illustrated below



### 9.13.1 Uncontrolled Power Off

The uncontrolled power-off means a situation which removed a battery without the controlled power off sequence. It will neither damage the module or the host interface.

If uncontrolled power-off happened, the display will go blank and there will not any visible effect on the display (blank display) and remains blank until "Power On Sequence" powers it up.

## 9.14 Power Level Definition

### 9.14.1 Power Level

6 level modes are defined they are in order of Maximum Power consumption to Minimum Power Consumption

1. Normal Mode On (full display), Idle Mode Off, Sleep Out.

In this mode, the display is able to show maximum 262,144 colors.

2. Partial Mode On, Idle Mode Off, Sleep Out.

In this mode part of the display is used with maximum 262,144 colors.

3. Normal Mode On (full display), Idle Mode On, Sleep Out.

In this mode, the full display area is used but with 8 colors.

4. Partial Mode On, Idle Mode On, Sleep Out.

In this mode, part of the display is used but with 8 colors.

5. Sleep In Mode

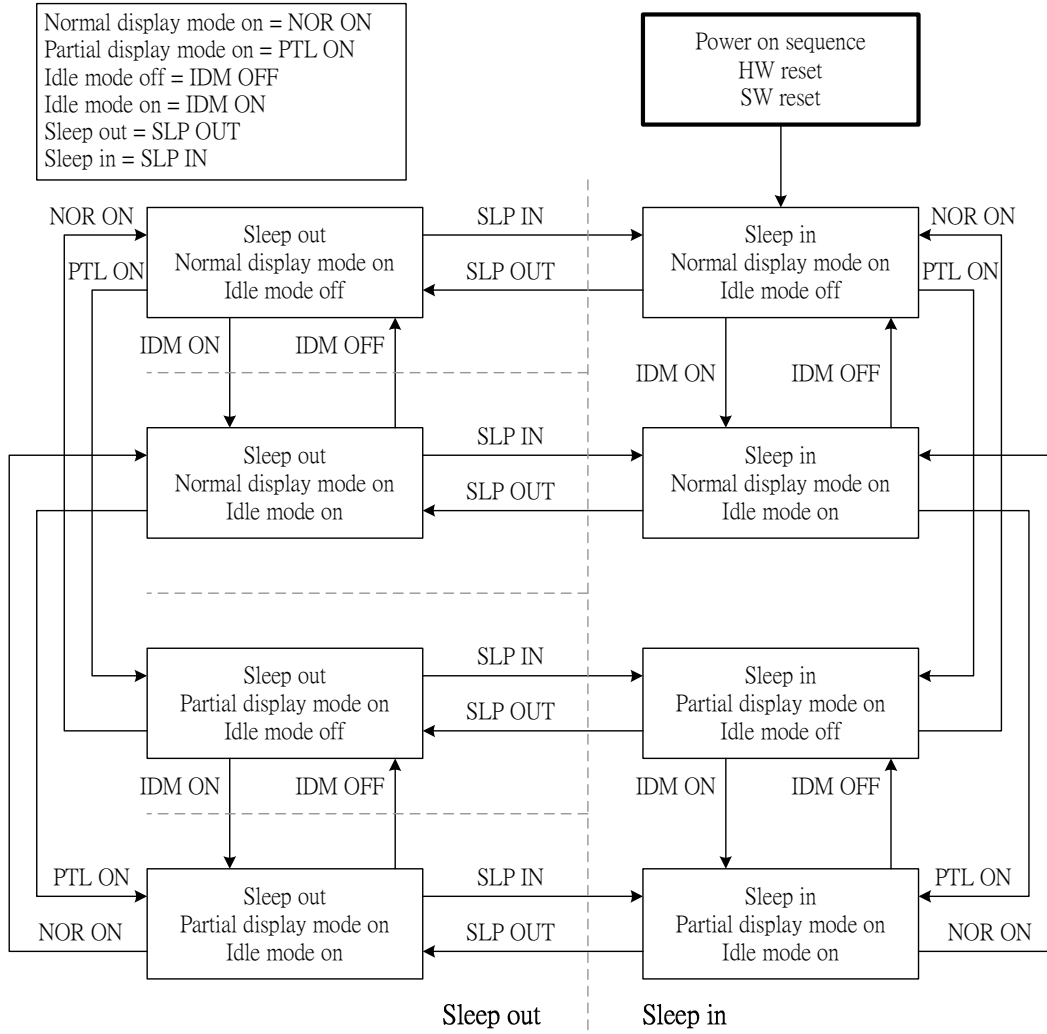
In this mode, the DC: DC converter, internal oscillator and panel driver circuit are stopped. Only the MCU interface and memory works with VDDI power supply. Contents of the memory are safe.

6. Power Off Mode

In this mode, both VDD and VDDI are removed.

*Note: Transition between modes 1-5 is controllable by MCU commands. Mode 6 is entered only when both Power supplies are removed.*

## 9.14.2 Power Flow Chart



## 9.15 Reset Table

### 9.15.1 Reset Table (Default Value, GM[1:0]="11", 128RGB x 160)

| Item                                         | After Power On   | After H/W Reset  | After S/W Reset                                      |
|----------------------------------------------|------------------|------------------|------------------------------------------------------|
| Frame memory                                 | Random           | No Change        | No Change                                            |
| Sleep In/Out                                 | In               | In               | In                                                   |
| Display On/Off                               | Off              | Off              | Off                                                  |
| Display mode (normal/partial)                | Normal           | Normal           | Normal                                               |
| Display Inversion On/Off                     | Off              | Off              | Off                                                  |
| Display Idle Mode On/Off                     | Off              | Off              | Off                                                  |
| Column: Start Address (XS)                   | 0000h            | 0000h            | 0000h                                                |
| Column: End Address (XE)                     | 007Fh            | 007Fh            | 007Fh (127d) (when MV=0)<br>009Fh (159d) (when MV=1) |
| Row: Start Address (YS)                      | 0000h            | 0000h            | 0000h                                                |
| Row: End Address (YE)                        | 009Fh            | 009Fh            | 009Fh (159d) (when MV=0)<br>007Fh (127d) (when MV=1) |
| Gamma setting                                | GC0              | GC0              | GC0                                                  |
| RGB for 4k and 65k Color Mode                | Random values    | Random values    | No Change                                            |
| Partial: Start Address (PSL)                 | 0000h            | 0000h            | 0000h                                                |
| Partial: End Address (PEL)                   | 009Fh            | 009Fh            | 009Fh                                                |
| Tearing: On/Off                              | Off              | Off              | Off                                                  |
| Tearing Effect Mode (*1)                     | 0 (Mode1)        | 0 (Mode1)        | 0 (Mode1)                                            |
| Memory Data Access Control (MY/MX/MV/ML/RGB) | 0/0/0/0/0        | 0/0/0/0/0        | No Change                                            |
| Interface Pixel Color Format                 | 6 (18-Bit/Pixel) | 6 (18-Bit/Pixel) | No Change                                            |
| RDDPM                                        | 08h              | 08h              | 08h                                                  |
| RDDMADCTL                                    | 00h              | 00h              | No Change                                            |
| RDDCOLMOD                                    | 6 (18-Bit/Pixel) | 6 (18-Bit/Pixel) | No Change                                            |
| RDDIM                                        | 00h              | 00h              | 00h                                                  |
| RDDSM                                        | 00h              | 00h              | 00h                                                  |
| ID2                                          | NV value         | NV value         | NV value                                             |
| ID3                                          | NV value         | NV value         | NV value                                             |

Note: TE Mode 1 means Tearing Effect Output Line consists of V-Blanking Information only

## 9.15.2 Reset Table (GM[1:0]= "00", 132RGB x 162)

| Item                                         | After Power On   | After H/W Reset  | After S/W Reset                                      |
|----------------------------------------------|------------------|------------------|------------------------------------------------------|
| Frame memory                                 | Random           | No Change        | No Change                                            |
| Sleep In/Out                                 | In               | In               | In                                                   |
| Display On/Off                               | Off              | Off              | Off                                                  |
| Display mode (normal/partial)                | Normal           | Normal           | Normal                                               |
| Display Inversion On/Off                     | Off              | Off              | Off                                                  |
| Display Idle Mode On/Off                     | Off              | Off              | Off                                                  |
| Column: Start Address (XS)                   | 0000h            | 0000h            | 0000h                                                |
| Column: End Address (XE)                     | 0083h            | 0083h            | 0083h (131d) (when MV=0)<br>00A1h (161d) (when MV=1) |
| Row: Start Address (YS)                      | 0000h            | 0000h            | 0000h                                                |
| Row: End Address (YE)                        | 00A1h            | 00A1h            | 00A1h (161d) (when MV=0)<br>0083h (131d) (when MV=1) |
| Gamma setting                                | GC0              | GC0              | GC0                                                  |
| RGB for 4k and 65k Color Mode                | Random values    | Random values    | No Change                                            |
| Partial: Start Address (PSL)                 | 0000h            | 0000h            | 0000h                                                |
| Partial: End Address (PEL)                   | 00A1h            | 00A1h            | 00A1h                                                |
| Tearing: On/Off                              | Off              | Off              | Off                                                  |
| Tearing Effect Mode (*1)                     | 0 (Mode1)        | 0 (Mode1)        | 0 (Mode1)                                            |
| Memory Data Access Control (MY/MX/MV/ML/RGB) | 0/0/0/0          | 0/0/0/0          | No Change                                            |
| Interface Pixel Color Format                 | 6 (18-Bit/Pixel) | 6 (18-Bit/Pixel) | No Change                                            |
| RDDPM                                        | 08h              | 08h              | 08h                                                  |
| RDDMADCTL                                    | 00h              | 00h              | No Change                                            |
| RDDCOLMOD                                    | 6 (18-Bit/Pixel) | 6 (18-Bit/Pixel) | No Change                                            |
| RDDIM                                        | 00h              | 00h              | 00h                                                  |
| RDDSM                                        | 00h              | 00h              | 00h                                                  |
| ID2                                          | NV value         | NV value         | NV value                                             |
| ID3                                          | NV value         | NV value         | NV value                                             |

Note: TE Mode 1 means Tearing Effect Output Line consists of V-Blanking Information only

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## 9.16 Module Input/Output Pins

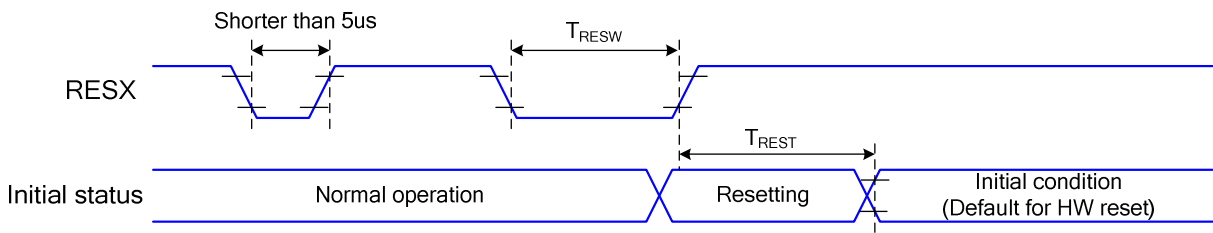
### 9.16.1 Output or Bi-directional (I/O) Pins

| Output or Bi-directional pins | After Power On    | After Hardware Reset | After Software Reset |
|-------------------------------|-------------------|----------------------|----------------------|
| TE                            | Low               | Low                  | Low                  |
| D7 to D0 (Output driver)      | High-Z (Inactive) | High-Z (Inactive)    | High-Z (Inactive)    |

| Input pins | During Power On Process | After Power On | After Hardware Reset | After Software Reset | During Power Off Process |
|------------|-------------------------|----------------|----------------------|----------------------|--------------------------|
| RESX       | See 9.14                | Input valid    | Input valid          | Input valid          | See 9.14                 |
| CSX        | Input invalid           | Input valid    | Input valid          | Input valid          | Input invalid            |
| D/CX       | Input invalid           | Input valid    | Input valid          | Input valid          | Input invalid            |
| WRX        | Input invalid           | Input valid    | Input valid          | Input valid          | Input invalid            |
| RDX        | Input invalid           | Input valid    | Input valid          | Input valid          | Input invalid            |
| D7 to D0   | Input invalid           | Input valid    | Input valid          | Input valid          | Input invalid            |

*Note: There will be no output from D7-D0 during Power On/Off sequence, Hardware Reset and Software Reset.*

## 9.17 Reset Timing



| Related Pins | Symbol | Parameter            | MIN | MAX | Unit |
|--------------|--------|----------------------|-----|-----|------|
| RESX         | tRESW  | Reset pulse duration | 10  | -   | us   |
|              | tREST  | Reset cancel         | -   | 5   | ms   |
|              |        |                      | -   | 120 | ms   |

Table 9.17.1 Reset timing

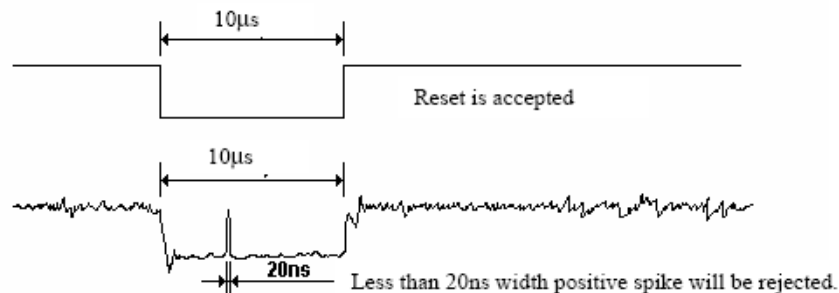
Notes:

1. The reset cancel includes also required time for loading ID bytes, VCOM setting and other settings from NVM (or similar device) to registers. This loading is done every time when there is HW reset cancel time ( $t_{RT}$ ) within 5 ms after a rising edge of RESX.
2. Spike due to an electrostatic discharge on RESX line does not cause irregular system reset according to the table below:

| RESX Pulse          | Action         |
|---------------------|----------------|
| Shorter than 5us    | Reset Rejected |
| Longer than 9us     | Reset          |
| Between 5us and 9us | Reset starts   |

3. During the Resetting period, the display will be blanked (The display is entering blanking sequence, which maximum time is 120 ms, when Reset Starts in Sleep Out –mode. The display remains the blank state in Sleep In -mode.) and then return to Default condition for Hardware Reset.

4. Spike Rejection also applies during a valid reset pulse as shown below:



5. When Reset applied during Sleep In Mode.
6. When Reset applied during Sleep Out Mode.
7. It is necessary to wait 5msec after releasing RESX before sending commands. Also Sleep Out command cannot be sent for 120msec.

## 9.18 Color Depth Conversion Look Up Tables

### 9.18.1 65536 Color to 262,144 Color

| Color | Look Up Table Output<br>Frame Memory Data (6-bits) | RGBSET<br>Parameter | Look Up Table Input Data |
|-------|----------------------------------------------------|---------------------|--------------------------|
|       |                                                    |                     | 65k Color (5-bits)       |
| RED   | R005 R004 R003 R002 R001 R000                      | 1                   | 00000                    |
|       | R015 R014 R013 R012 R011 R010                      | 2                   | 00001                    |
|       | R025 R024 R023 R022 R021 R020                      | 3                   | 00010                    |
|       | R035 R034 R033 R032 R031 R030                      | 4                   | 00011                    |
|       | R045 R044 R043 R042 R041 R040                      | 5                   | 00100                    |
|       | R055 R054 R053 R052 R051 R050                      | 6                   | 00101                    |
|       | R065 R064 R063 R062 R061 R060                      | 7                   | 00110                    |
|       | R075 R074 R073 R072 R071 R070                      | 8                   | 00111                    |
|       | R085 R084 R083 R082 R081 R080                      | 9                   | 01000                    |
|       | R095 R094 R093 R092 R091 R090                      | 10                  | 01001                    |
|       | R105 R104 R103 R102 R101 R100                      | 11                  | 01010                    |
|       | R115 R114 R113 R112 R111 R110                      | 12                  | 01011                    |
|       | R125 R124 R123 R122 R121 R120                      | 13                  | 01100                    |
|       | R135 R134 R133 R132 R131 R130                      | 14                  | 01101                    |
|       | R145 R144 R143 R142 R141 R140                      | 15                  | 01110                    |
|       | R155 R154 R153 R152 R151 R150                      | 16                  | 01111                    |
|       | R165 R164 R163 R162 R161 R160                      | 17                  | 10000                    |
|       | R175 R174 R173 R172 R171 R170                      | 18                  | 10001                    |
|       | R185 R184 R183 R182 R181 R180                      | 19                  | 10010                    |
|       | R195 R194 R193 R192 R191 R190                      | 20                  | 10011                    |
|       | R205 R204 R203 R202 R201 R200                      | 21                  | 10100                    |
|       | R215 R214 R213 R212 R211 R210                      | 22                  | 10101                    |
|       | R225 R224 R223 R222 R221 R220                      | 23                  | 10110                    |
|       | R235 R234 R233 R232 R231 R230                      | 24                  | 10111                    |
|       | R245 R244 R243 R242 R241 R240                      | 25                  | 11000                    |
|       | R255 R254 R253 R252 R251 R250                      | 26                  | 11001                    |
|       | R265 R264 R263 R262 R261 R260                      | 27                  | 11010                    |
|       | R275 R274 R273 R272 R271 R270                      | 28                  | 11011                    |
|       | R285 R284 R283 R282 R281 R280                      | 29                  | 11100                    |
|       | R295 R294 R293 R292 R291 R290                      | 30                  | 11101                    |
|       | R305 R304 R303 R302 R301 R300                      | 31                  | 11110                    |
|       | R315 R314 R313 R312 R311 R310                      | 32                  | 11111                    |

| Color | Look Up Table Output<br>Frame Memory Data (6-bits) | RGBSET<br>Parameter | Look Up Table Input Data |
|-------|----------------------------------------------------|---------------------|--------------------------|
|       |                                                    |                     | 65k Color (5-bits)       |
| GREEN | G005 G004 G003 G002 G001 G000                      | 33                  | 000000                   |
|       | G015 G014 G013 G012 G011 G010                      | 34                  | 000001                   |
|       | G025 G024 G023 G022 G021 G020                      | 35                  | 000010                   |
|       | G035 G034 G033 G032 G031 G030                      | 36                  | 000011                   |
|       | G045 G044 G043 G042 G041 G040                      | 37                  | 000100                   |
|       | G055 G054 G053 G052 G051 G050                      | 38                  | 000101                   |
|       | G065 G064 G063 G062 G061 G060                      | 39                  | 000110                   |
|       | G075 G074 G073 G072 G071 G070                      | 40                  | 000111                   |
|       | G085 G084 G083 G082 G081 G080                      | 41                  | 001000                   |
|       | G095 G094 G093 G092 G091 G090                      | 42                  | 001001                   |
|       | G105 G104 G103 G102 G101 G100                      | 43                  | 001010                   |
|       | G115 G114 G113 G112 G111 G110                      | 44                  | 001011                   |
|       | G125 G124 G123 G122 G121 G120                      | 45                  | 001100                   |
|       | G135 G134 G133 G132 G131 G130                      | 46                  | 001101                   |
|       | G145 G144 G143 G142 G141 G140                      | 47                  | 001110                   |
|       | G155 G154 G153 G152 G151 G150                      | 48                  | 001111                   |
|       | G165 G164 G163 G162 G161 G160                      | 49                  | 010000                   |
|       | G175 G174 G173 G172 G171 G170                      | 50                  | 010001                   |
|       | G185 G184 G183 G182 G181 G180                      | 51                  | 010010                   |
|       | G195 G194 G193 G192 G191 G190                      | 52                  | 010011                   |
|       | G205 G204 G203 G202 G201 G200                      | 53                  | 010100                   |

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|                                |    |        |
|--------------------------------|----|--------|
| G215 G214 G213 G212 G211 G210  | 54 | 010101 |
| G225 G224 G223 G222 G221 G220  | 55 | 010110 |
| G235 G234 G233 G232 G231 G230  | 56 | 010111 |
| G245 G244 G243 G242 G241 G240  | 57 | 011000 |
| G255 G254 G253 G252 G251 G250  | 58 | 011001 |
| G265 G264 G263 G262 G261 G260  | 59 | 011010 |
| G275 G 274 G273 G272 G271 G270 | 60 | 011011 |
| G285 G 284 G283 G282 G281 G280 | 61 | 011100 |
| G295 G 294 G293 G292 G291 G290 | 62 | 011101 |
| G305 G 304 G303 G302 G301 G300 | 63 | 011110 |
| G315 G 314 G313 G312 G311 G310 | 64 | 011111 |
| G325 G324 G323 G322 G321 G320  | 65 | 100000 |
| G335 G334 G333 G332 G331 G330  | 66 | 100001 |
| G345 G344 G343 G342 G341 G340  | 67 | 100010 |
| G355 G354 G353 G352 G351 G350  | 68 | 100011 |
| G365 G364 G363 G362 G361 G360  | 69 | 100100 |
| G375 G374 G373 G372 G371 G370  | 70 | 100101 |
| G385 G384 G383 G382 G381 G380  | 71 | 100110 |
| G395 G394 G393 G392 G391 G390  | 72 | 100111 |
| G405 G404 G403 G402 G401 G400  | 73 | 101000 |
| G415 G414 G413 G412 G411 G410  | 74 | 101001 |
| G425 G424 G423 G422 G421 G420  | 75 | 101010 |
| G435 G434 G433 G432 G431 G430  | 76 | 101011 |
| G445 G444 G443 G442 G441 G440  | 77 | 101100 |
| G455 G454 G453 G452 G451 G450  | 78 | 101101 |
| G465 G464 G463 G462 G461 G460  | 79 | 101110 |
| G475 G474 G473 G472 G471 G470  | 80 | 101111 |
| G485 G484 G483 G482 G481 G480  | 81 | 110000 |
| G495 G494 G493 G492 G491 G490  | 82 | 110001 |
| G505 G504 G503 G502 G501 G500  | 83 | 110010 |
| G515 G514 G513 G512 G511 G510  | 84 | 110011 |
| G525 G524 G523 G522 G521 G520  | 85 | 110100 |
| G535 G534 G533 G532 G531 G530  | 86 | 110101 |
| G545 G544 G543 G542 G541 G540  | 87 | 110110 |
| G555 G554 G553 G552 G551 G550  | 88 | 110111 |
| G565 G564 G563 G562 G561 G560  | 89 | 111000 |
| G575 G574 G573 G572 G571 G570  | 90 | 111001 |
| G585 G584 G583 G582 G581 G580  | 91 | 111010 |
| G595 G594 G593 G592 G591 G590  | 92 | 111011 |
| G605 G604 G603 G602 G601 G600  | 93 | 111100 |
| G615 G614 G613 G612 G611 G610  | 94 | 111101 |
| G625 G624 G623 G622 G621 G620  | 95 | 111110 |
| G635 G634 G633 G632 G631 G630  | 96 | 111111 |

| Color | Look Up Table Output<br>Frame Memory Data (6-bits) | RGBSET<br>Parameter | Look Up Table Input Data<br>65k Color (5-bits) |
|-------|----------------------------------------------------|---------------------|------------------------------------------------|
| BLUE  | B005 B004 B003 B002 B001 B000                      | 97                  | 00000                                          |
|       | B015 B014 B013 B012 B011 B010                      | 98                  | 00001                                          |
|       | B025 B024 B023 B022 B021 B020                      | 99                  | 00010                                          |
|       | B035 B034 B033 B032 B031 B030                      | 100                 | 00011                                          |
|       | B045 B044 B043 B042 B041 B040                      | 101                 | 00100                                          |
|       | B055 B054 B053 B052 B051 B050                      | 102                 | 00101                                          |
|       | B065 B064 B063 B062 B061 B060                      | 103                 | 00110                                          |
|       | B075 B074 B073 B072 B071 B070                      | 104                 | 00111                                          |
|       | B085 B084 B083 B082 B081 B080                      | 105                 | 01000                                          |
|       | B095 B094 B093 B092 B091 B090                      | 106                 | 01001                                          |
|       | B105 B104 B103 B102 B101 B100                      | 107                 | 01010                                          |
|       | B115 B114 B113 B112 B111 B110                      | 108                 | 01011                                          |
|       | B125 B124 B123 B122 B121 B120                      | 109                 | 01100                                          |
|       | B135 B134 B133 B132 B131 B130                      | 110                 | 01101                                          |
|       | B145 B144 B143 B142 B141 B140                      | 111                 | 01110                                          |
|       | B155 B154 B153 B152 B151 B150                      | 112                 | 01111                                          |
|       | B165 B164 B163 B162 B161 B160                      | 113                 | 10000                                          |

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|                               |     |       |
|-------------------------------|-----|-------|
| B175 B174 B173 B172 B171 B170 | 114 | 10001 |
| B185 B184 B183 B182 B181 B180 | 115 | 10010 |
| B195 B194 B193 B192 B191 B190 | 116 | 10011 |
| B205 B204 B203 B202 B201 B200 | 117 | 10100 |
| B215 B214 B213 B212 B211 B210 | 118 | 10101 |
| B225 B224 B223 B222 B221 B220 | 119 | 10110 |
| B235 B234 B233 B232 B231 B230 | 120 | 10111 |
| B245 B244 B243 B242 B241 B240 | 121 | 11000 |
| B255 B254 B253 B252 B251 B250 | 122 | 11001 |
| B265 B264 B263 B262 B261 B260 | 123 | 11010 |
| B275 B274 B273 B272 B271 B270 | 124 | 11011 |
| B285 B284 B283 B282 B281 B280 | 125 | 11100 |
| B295 B294 B293 B292 B291 B290 | 126 | 11101 |
| B305 B304 B303 B302 B301 B300 | 127 | 11110 |
| B315 B314 B313 B312 B311 B310 | 128 | 11111 |

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## 9.18.2 4096 Color to 262,144 Color

| Color | Look Up Table Output<br>Frame Memory Data (6-bits) | RGBSET<br>Parameter | Look Up Table Input Data |
|-------|----------------------------------------------------|---------------------|--------------------------|
|       |                                                    |                     | 4k Color (4-bits)        |
| RED   | R005 R004 R003 R002 R001 R000                      | 1                   | 0000                     |
|       | R015 R014 R013 R012 R011 R010                      | 2                   | 0001                     |
|       | R025 R024 R023 R022 R021 R020                      | 3                   | 0010                     |
|       | R035 R034 R033 R032 R031 R030                      | 4                   | 0011                     |
|       | R045 R044 R043 R042 R041 R040                      | 5                   | 0100                     |
|       | R055 R054 R053 R052 R051 R050                      | 6                   | 0101                     |
|       | R065 R064 R063 R062 R061 R060                      | 7                   | 0110                     |
|       | R075 R074 R073 R072 R071 R070                      | 8                   | 0111                     |
|       | R085 R084 R083 R082 R081 R080                      | 9                   | 1000                     |
|       | R095 R094 R093 R092 R091 R090                      | 10                  | 1001                     |
|       | R105 R104 R103 R102 R101 R100                      | 11                  | 1010                     |
|       | R115 R114 R113 R112 R111 R110                      | 12                  | 1011                     |
|       | R125 R124 R123 R122 R121 R120                      | 13                  | 1100                     |
|       | R135 R134 R133 R132 R131 R130                      | 14                  | 1101                     |
|       | R145 R144 R143 R142 R141 R140                      | 15                  | 1110                     |
|       | R155 R154 R153 R152 R151 R150                      | 16                  | 1111                     |
|       | R165 R164 R163 R162 R161 R160                      | 17                  | Not used                 |
|       |                                                    |                     |                          |
|       | R315 R314 R313 R312 R311 R310                      | 32                  |                          |
| GREEN | G005 G004 G003 G002 G001 G000                      | 33                  | 0000                     |
|       | G015 G014 G013 G012 G011 G010                      | 34                  | 0001                     |
|       | G025 G024 G023 G022 G021 G020                      | 35                  | 0010                     |
|       | G035 G034 G033 G032 G031 G030                      | 36                  | 0011                     |
|       | G045 G044 G043 G042 G041 G040                      | 37                  | 0100                     |
|       | G055 G054 G053 G052 G051 G050                      | 38                  | 0101                     |
|       | G065 G064 G063 G062 G061 G060                      | 39                  | 0110                     |
|       | G075 G074 G073 G072 G071 G070                      | 40                  | 0111                     |
|       | G085 G084 G083 G082 G081 G080                      | 41                  | 1000                     |
|       | G095 G094 G093 G092 G091 G090                      | 42                  | 1001                     |
|       | G105 G104 G103 G102 G101 G100                      | 43                  | 1010                     |
|       | G115 G114 G113 G112 G111 G110                      | 44                  | 1011                     |
|       | G125 G124 G123 G122 G121 G120                      | 45                  | 1100                     |
|       | G135 G134 G133 G132 G131 G130                      | 46                  | 1101                     |
|       | G145 G144 G143 G142 G141 G140                      | 47                  | 1110                     |
|       | G155 G154 G153 G152 G151 G150                      | 48                  | 1111                     |
|       | G165 G164 G163 G162 G161 G160                      | 49                  | Not used                 |
|       |                                                    |                     |                          |
|       | G635 G634 G633 G632 G631 G630                      | 96                  |                          |
| BLUE  | B005 B004 B003 B002 B001 B000                      | 97                  | 0000                     |
|       | B015 B014 B013 B012 B011 B010                      | 98                  | 0001                     |
|       | B025 B024 B023 B022 B021 B020                      | 99                  | 0010                     |
|       | B035 B034 B033 B032 B031 B030                      | 100                 | 0011                     |
|       | B045 B044 B043 B042 B041 B040                      | 101                 | 0100                     |
|       | B055 B054 B053 B052 B051 B050                      | 102                 | 0101                     |
|       | B065 B064 B063 B062 B061 B060                      | 103                 | 0110                     |
|       | B075 B074 B073 B072 B071 B070                      | 104                 | 0111                     |
|       | B085 B084 B083 B082 B081 B080                      | 105                 | 1000                     |
|       | B095 B094 B093 B092 B091 B090                      | 106                 | 1001                     |
|       | B105 B104 B103 B102 B101 B100                      | 107                 | 1010                     |
|       | B115 B114 B113 B112 B111 B110                      | 108                 | 1011                     |
|       | B125 B124 B123 B122 B121 B120                      | 109                 | 1100                     |
|       | B135 B134 B133 B132 B131 B130                      | 110                 | 1101                     |
|       | B145 B144 B143 B142 B141 B140                      | 111                 | 1110                     |
|       | B155 B154 B153 B152 B151 B150                      | 112                 | 1111                     |
|       | B165 B164 B163 B162 B161 B160                      | 113                 | Not used                 |
|       |                                                    |                     |                          |
|       | B315 B314 B313 B312 B311 B310                      | 128                 |                          |

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## 10 Command

### 10.1 System function Command List and Description

Table 10.1.1 System Function command List (1)

| Instruction   | Refer  | D/CX | WRX | RDX  | D17-8 | D7    | D6    | D5    | D4     | D3    | D2    | D1    | D0    | Hex   | Function            |
|---------------|--------|------|-----|------|-------|-------|-------|-------|--------|-------|-------|-------|-------|-------|---------------------|
| NOP           | 10.1.1 | 0    | ↑   | 1    | -     | 0     | 0     | 0     | 0      | 0     | 0     | 0     | 0     | (00h) | No Operation        |
| SWRESET       | 10.1.2 | 0    | ↑   | 1    | -     | 0     | 0     | 0     | 0      | 0     | 0     | 0     | 1     | (01h) | Software reset      |
| RDDID         | 10.1.3 | 0    | ↑   | 1    | -     | 0     | 0     | 0     | 0      | 0     | 1     | 0     | 0     | (04h) | Read Display ID     |
|               |        | 1    | 1   | ↑    | -     | -     | -     | -     | -      | -     | -     | -     | -     | -     | Dummy read          |
|               |        | 1    | 1   | ↑    | -     | ID17  | ID16  | ID15  | ID14   | ID13  | ID12  | ID11  | ID10  | -     | ID1 read            |
|               |        | 1    | 1   | ↑    | -     | 1     | ID26  | ID25  | ID24   | ID23  | ID22  | ID21  | ID20  | -     | ID2 read            |
|               |        | 1    | 1   | ↑    | -     | ID37  | ID36  | ID35  | ID34   | ID33  | ID32  | ID31  | ID30  | -     | ID3 read            |
| RDDST         | 10.1.4 | 0    | ↑   | 1    | -     | 0     | 0     | 0     | 0      | 1     | 0     | 0     | 1     | (09h) | Read Display Status |
|               |        | 1    | 1   | ↑    | -     | -     | -     | -     | -      | -     | -     | -     | -     | -     | Dummy read          |
|               |        | 1    | 1   | ↑    | -     | BSTON | MY    | MX    | MV     | ML    | RGB   | MH    | ST24  | -     | -                   |
|               |        | 1    | 1   | ↑    | -     | ST23  | IFPF2 | IFPF1 | IFPF0  | IDMON | PTLON | SLOUT | NORON | -     | -                   |
|               |        | 1    | 1   | ↑    | -     | VSSON | ST14  | INVON | ST12   | ST11  | DISON | TEON  | GCS2  | -     | -                   |
| 1             | 1      | ↑    | -   | GCS1 | GCS0  | TEM   | ST4   | ST3   | ST2    | ST1   | ST0   | -     | -     |       |                     |
| RDDPM         | 10.1.5 | 0    | ↑   | 1    | -     | 0     | 0     | 0     | 0      | 1     | 0     | 1     | 0     | (0Ah) | Read Display Power  |
|               |        | 1    | 1   | ↑    | -     | -     | -     | -     | -      | -     | -     | -     | -     | -     | Dummy read          |
|               |        | 1    | 1   | ↑    | -     | BSTON | IDMON | PTLON | SLPOUT | NORON | DISON | -     | -     | -     | -                   |
| RDD<br>MADCTL | 10.1.6 | 0    | ↑   | 1    | -     | 0     | 0     | 0     | 0      | 1     | 0     | 1     | 1     | (0Bh) | Read Display        |
|               |        | 1    | 1   | ↑    | -     | -     | -     | -     | -      | -     | -     | -     | -     | -     | Dummy read          |
|               |        | 1    | 1   | ↑    | -     | MY    | MX    | MV    | ML     | RGB   | MH    | -     | -     | -     | -                   |
| RDD<br>COLMOD | 10.1.7 | 0    | ↑   | 1    | -     | 0     | 0     | 0     | 0      | 1     | 1     | 0     | 0     | (0Ch) | Read Display Pixel  |
|               |        | 1    | 1   | ↑    | -     | -     | -     | -     | -      | -     | -     | -     | -     | -     | Dummy read          |
|               |        | 1    | 1   | ↑    | -     | 0     | 0     | 0     | 0      | 0     | -     | IFPF2 | IFPF1 | IFPF0 | -                   |
| RDDIM         | 10.1.8 | 0    | ↑   | 1    | -     | 0     | 0     | 0     | 0      | 1     | 1     | 0     | 1     | (0Dh) | Read Display Image  |
|               |        | 1    | 1   | ↑    | -     | -     | -     | -     | -      | -     | -     | -     | -     | -     | Dummy read          |
|               |        | 1    | 1   | ↑    | -     | VSSON | D6    | INVON | -      | -     | GCS2  | GCS1  | GCS0  | -     | -                   |
| RDDSM         | 10.1.9 | 0    | ↑   | 1    | -     | 0     | 0     | 0     | 0      | 1     | 1     | 1     | 0     | (0Eh) | Read Display Signal |
|               |        | 1    | 1   | ↑    | -     | -     | -     | -     | -      | -     | -     | -     | -     | -     | Dummy read          |
|               |        | 1    | 1   | ↑    | -     | TEON  | TEM   | -     | -      | -     | -     | -     | -     | -     | -                   |

“-“: Don't care

Table 10.1.2 System Function command List (2)

| Instructio | Refer   | D/C | WR | RDX | D17- | D7   | D6   | D5   | D4   | D3   | D2   | D1   | D0   | Hex   | Function                            |
|------------|---------|-----|----|-----|------|------|------|------|------|------|------|------|------|-------|-------------------------------------|
| SLPIN      | 10.1.10 | 0   | ↑  | 1   | -    | 0    | 0    | 0    | 1    | 0    | 0    | 0    | 0    | (10h) | Sleep in & booster off              |
| SLPOUT     | 10.1.11 | 0   | ↑  | 1   | -    | 0    | 0    | 0    | 1    | 0    | 0    | 0    | 1    | (11h) | Sleep out & booster on              |
| PTLON      | 10.1.12 | 0   | ↑  | 1   | -    | 0    | 0    | 0    | 1    | 0    | 0    | 1    | 0    | (12h) | Partial mode on                     |
| NORON      | 10.1.13 | 0   | ↑  | 1   | -    | 0    | 0    | 0    | 1    | 0    | 0    | 1    | 1    | (13h) | Partial off (Normal)                |
| INVOFF     | 10.1.14 | 0   | ↑  | 1   | -    | 0    | 0    | 1    | 0    | 0    | 0    | 0    | 0    | (20h) | Display inversion off               |
| INVON      | 10.1.15 | 0   | ↑  | 1   | -    | 0    | 0    | 1    | 0    | 0    | 0    | 0    | 1    | (21h) | Display inversion on                |
| GAMSET     | 10.1.16 | 0   | ↑  | 1   | -    | 0    | 0    | 1    | 0    | 0    | 1    | 1    | 0    | (26h) | Gamma curve select                  |
|            |         | 1   | ↑  | 1   | -    | -    | -    | -    | -    | GC3  | GC2  | GC1  | GC0  |       | -                                   |
| DISPOFF    | 10.1.17 | 0   | ↑  | 1   | -    | 0    | 0    | 1    | 0    | 1    | 0    | 0    | 0    | (28h) | Display off                         |
| DISPON     | 10.1.18 | 0   | ↑  | 1   | -    | 0    | 0    | 1    | 0    | 1    | 0    | 0    | 1    | (29h) | Display on                          |
| CASET      | 10.1.19 | 0   | ↑  | 1   | -    | 0    | 0    | 1    | 0    | 1    | 0    | 1    | 0    | (2Ah) | Column address set                  |
|            |         | 1   | ↑  | 1   | -    | XS15 | XS14 | XS13 | XS12 | XS11 | XS10 | XS9  | XS8  |       | X address start: $0 \leq XS \leq X$ |
|            |         | 1   | ↑  | 1   | -    | XS7  | XS6  | XS5  | XS4  | XS3  | XS2  | XS1  | XS0  |       |                                     |
|            |         | 1   | ↑  | 1   | -    | XE15 | XE14 | XE13 | XE12 | XE11 | XE10 | XE9  | XE8  |       | X address end: $S \leq XE \leq X$   |
|            |         | 1   | ↑  | 1   | -    | XE7  | XE6  | XE5  | XE4  | XE3  | XE2  | XE1  | XE0  |       |                                     |
| RASET      | 10.1.20 | 0   | ↑  | 1   | -    | 0    | 0    | 1    | 0    | 1    | 0    | 1    | 1    | (2Bh) | Row address set                     |
|            |         | 1   | ↑  | 1   | -    | YS15 | YS14 | YS13 | YS12 | YS11 | YS10 | YS9  | YS8  |       | Y address start: $0 \leq YS \leq Y$ |
|            |         | 1   | ↑  | 1   | -    | YS7  | YS6  | YS5  | YS4  | YS3  | YS2  | YS1  | YS0  |       |                                     |
|            |         | 1   | ↑  | 1   | -    | YE15 | YE14 | YE13 | YE12 | YE11 | YE10 | YE9  | YE8  |       | Y address end: $S \leq YE \leq Y$   |
|            |         | 1   | ↑  | 1   | -    | YE7  | YE6  | YE5  | YE4  | YE3  | YE2  | YE1  | YE0  |       |                                     |
| RAMWR      | 10.1.21 | 0   | ↑  | 1   | -    | 0    | 0    | 1    | 0    | 1    | 1    | 0    | 0    | (2Ch) | Memory write                        |
|            |         | 1   | ↑  | 1   | -    | D7   | D6   | D5   | D4   | D3   | D2   | D1   | D0   |       | Write data                          |
| RGBSET     | 10.1.22 | 0   | ↑  | 1   | -    | 0    | 0    | 1    | 0    | 1    | 1    | 0    | 1    | (2Dh) | LUT for 4k,65k,262k color           |
|            |         | 1   | ↑  | 1   | -    | -    | -    | R005 | R004 | R003 | R002 | R001 | R000 |       | Red tone 0                          |
|            |         | 1   | ↑  | 1   | -    | -    | -    | :    | :    | :    | :    | :    | :    |       | :                                   |
|            |         | 1   | ↑  | 1   | -    | -    | -    | Ra5  | Ra4  | Ra3  | Ra2  | Ra1  | Ra0  |       | Red tone "a"                        |
|            |         | 1   | ↑  | 1   | -    | -    | -    | G005 | G004 | G003 | G002 | G001 | G000 |       | Green tone 0                        |
|            |         | 1   | ↑  | 1   | -    | -    | -    | :    | :    | :    | :    | :    | :    |       | :                                   |
|            |         | 1   | ↑  | 1   | -    | -    | -    | Gb5  | Gb4  | Gb3  | Gb2  | Gb1  | Gb0  |       | Green tone "b"                      |
|            |         | 1   | ↑  | 1   | -    | -    | -    | B005 | B004 | B003 | B002 | B001 | B000 |       | Blue tone 0                         |
|            |         | 1   | ↑  | 1   | -    | -    | -    | :    | :    | :    | :    | :    | :    |       | :                                   |
|            |         | 1   | ↑  | 1   | -    | -    | -    | Bc5  | Bc4  | Bc3  | Bc2  | Bc1  | Bc0  |       | Blue tone "c"                       |
| RAMRD      | 10.1.23 | 0   | ↑  | 1   | -    | 0    | 0    | 1    | 0    | 1    | 1    | 1    | 0    | (2Eh) | Memory read                         |
|            |         | 1   | 1  | ↑   | -    | -    | -    | -    | -    | -    | -    | -    | -    |       | Dummy read                          |
|            |         | 1   | 1  | ↑   | -    | D7   | D6   | D5   | D4   | D3   | D2   | D1   | D0   |       | Read data                           |

"-": Don't care

Table 10.1.3 System Function command List (3)

| Instruction | Refer   | D/CX | WRX | RDX | D17-8 | D7    | D6    | D5    | D4    | D3    | D2    | D1    | D0    | Hex   | Function                            |
|-------------|---------|------|-----|-----|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------------------------------------|
| PTLAR       | 10.1.24 | 0    | ↑   | 1   | -     | 0     | 0     | 1     | 1     | 0     | 0     | 0     | 0     | (30h) | Partial start/end address set       |
|             |         | 1    | ↑   | 1   | -     | PSL15 | PSL14 | PSL13 | PSL12 | PSL11 | PSL10 | PSL9  | PSL8  |       | Partial start address (0,1,2, ..P)  |
|             |         | 1    | ↑   | 1   | -     | PSL7  | PSL6  | PSL5  | PSL4  | PSL3  | PSL2  | PSL1  | PSL0  |       |                                     |
|             |         | 1    | ↑   | 1   | -     | PEL15 | PEL14 | PEL13 | PEL12 | PEL11 | PEL10 | PEL9  | PEL8  |       | Partial end address (0,1,2, ..., P) |
|             |         | 1    | ↑   | 1   | -     | PEL7  | PEL6  | PEL5  | PEL4  | PEL3  | PEL2  | PEL1  | PEL0  |       |                                     |
| TEOFF       | 10.1.25 | 0    | ↑   | 1   | -     | 0     | 0     | 1     | 1     | 0     | 1     | 0     | 0     | (34h) | Tearing effect line off             |
| TEON        | 10.1.26 | 0    | ↑   | 1   | -     | 0     | 0     | 1     | 1     | 0     | 1     | 0     | 1     | (35h) | Tearing effect mode set & on        |
|             |         | 1    | ↑   | 1   | -     | -     | -     | -     | -     | -     | -     | -     | TEM   |       | Mode1: TEM="0"<br>Mode2: TEM="1"    |
| MADCTL      | 10.1.27 | 0    | ↑   | 1   | -     | 0     | 0     | 1     | 1     | 0     | 1     | 1     | 0     | (36h) | Memory data access control          |
|             |         | 1    | ↑   | 1   | -     | MY    | MX    | MV    | ML    | RGB   | MH    | -     | -     |       | -                                   |
| IDMOFF      | 10.1.28 | 0    | ↑   | 1   | -     | 0     | 0     | 1     | 1     | 1     | 0     | 0     | 0     | (38h) | Idle mode off                       |
| IDMON       | 10.1.29 | 0    | ↑   | 1   | -     | 0     | 0     | 1     | 1     | 1     | 0     | 0     | 1     | (39h) | Idle mode on                        |
| COLMOD      | 10.1.30 | 0    | ↑   | 1   | -     | 0     | 0     | 1     | 1     | 1     | 0     | 1     | 0     | (3Ah) | Interface pixel format              |
|             |         | 1    | ↑   | 1   | -     | -     | -     | -     | -     | -     | IFPF2 | IFPF1 | IFPF0 |       | Interface format                    |
| RDID1       | 10.1.31 | 0    | ↑   | 1   | -     | 1     | 1     | 0     | 1     | 1     | 0     | 1     | 0     | (DAh) | Read ID1                            |
|             |         | 1    | 1   | ↑   | -     | -     | -     | -     | -     | -     | -     | -     | -     |       | Dummy read                          |
|             |         | 1    | 1   | ↑   | -     | ID17  | ID16  | ID15  | ID14  | ID13  | ID12  | ID11  | ID10  |       | Read parameter                      |
| RDID2       | 10.1.32 | 0    | ↑   | 1   | -     | 1     | 1     | 0     | 1     | 1     | 0     | 1     | 1     | (DBh) | Read ID2                            |
|             |         | 1    | 1   | ↑   | -     | -     | -     | -     | -     | -     | -     | -     | -     |       | Dummy read                          |
|             |         | 1    | 1   | ↑   | -     | 1     | ID26  | ID25  | ID24  | ID23  | ID22  | ID21  | ID20  |       | Read parameter                      |
| RDID3       | 10.1.33 | 0    | ↑   | 1   | -     | 1     | 1     | 0     | 1     | 1     | 1     | 0     | 0     | (DCh) | Read ID3                            |
|             |         | 1    | 1   | ↑   | -     | -     | -     | -     | -     | -     | -     | -     | -     |       | Dummy read                          |
|             |         | 1    | 1   | ↑   | -     | ID37  | ID36  | ID35  | ID34  | ID33  | ID32  | ID31  | ID30  |       | Read parameter                      |

"-": Don't care

Note 1: After the H/W reset by RESX pin or S/W reset by SWRESET command, each internal register becomes default state (Refer "RESET TABLE" section)

Note 2: Undefined commands are treated as NOP (00 h) command.

Note 3: B0 to D9 and DA to F are for factory use of driver supplier.

Note 4: Commands 10h, 12h, 13h, 20h, 21h, 26h, 28h, 29h, 30h, 33h, 36h (ML parameter only), 37h, 38h and 39h are updated during V-sync when Module is in Sleep Out Mode to avoid abnormal visual effects. During Sleep In mode, these commands are updated immediately. Read status (09h), Read Display Power Mode (0Ah), Read Display MADCTL (0Bh), Read Display Pixel Format (0Ch), Read Display Image Mode (0Dh), Read Display Signal Mode (0Eh).

# ST7735R

## 10.1.1 NOP (00h)

| 00H         | NOP (No Operation)             |     |     |       |    |    |    |    |    |    |    |    |       |
|-------------|--------------------------------|-----|-----|-------|----|----|----|----|----|----|----|----|-------|
| Inst / Para | D/CX                           | WRX | RDX | D17-8 | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | HEX   |
| NOP         | 0                              | ↑   | 1   | -     | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | (00h) |
| Parameter   | No Parameter                   |     |     |       |    |    |    |    |    |    |    |    | -     |
| Description | This command is empty command. |     |     |       |    |    |    |    |    |    |    |    |       |

“-“ Don't care

## 10.1.2 SWRESET (01h): Software Reset

| 01H         | SWRESET (Software Reset)                                                                                                                                                                                                                                                                                                                                                            |     |     |       |    |    |    |    |    |    |    |    |       |
|-------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|-------|----|----|----|----|----|----|----|----|-------|
| Inst / Para | D/CX                                                                                                                                                                                                                                                                                                                                                                                | WRX | RDX | D17-8 | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | HEX   |
| SWRESET     | 0                                                                                                                                                                                                                                                                                                                                                                                   | ↑   | 1   | -     | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 1  | (01h) |
| Parameter   | No Parameter                                                                                                                                                                                                                                                                                                                                                                        |     |     |       |    |    |    |    |    |    |    |    | -     |
| Description | <p>“-“ Don't care</p> <p>-If Software Reset is applied during Sleep In mode, it will be necessary to wait 120msec before sending next command.</p> <p>-The display module loads all default values to the registers during 120msec.</p> <p>-If Software Reset is applied during Sleep Out or Display On Mode, it will be necessary to wait 120msec before sending next command.</p> |     |     |       |    |    |    |    |    |    |    |    |       |
| Flow Chart  | <pre> graph TD     A[SWRESET] --&gt; B[Display whole blank screen]     B --&gt; C[Set Commands to S/W Default Value]     C --&gt; D[Sleep In Mode]     </pre> <p><b>Legend</b></p> <ul style="list-style-type: none"> <li>Command</li> <li>Parameter</li> <li>Display</li> <li>Action</li> <li>Mode</li> <li>Sequential transfer</li> </ul>                                         |     |     |       |    |    |    |    |    |    |    |    |       |

## 10.1.3 RDDID (04h): Read Display ID

| 04H                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | RDDID (Read Display ID) |          |       |      |      |      |      |      |      |      |      |       |        |               |  |  |     |     |     |                   |   |          |          |           |   |          |          |           |   |          |          |
|---------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|----------|-------|------|------|------|------|------|------|------|------|-------|--------|---------------|--|--|-----|-----|-----|-------------------|---|----------|----------|-----------|---|----------|----------|-----------|---|----------|----------|
| Inst / Para               | D/CX                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | WRX                     | RDX      | D17-8 | D7   | D6   | D5   | D4   | D3   | D2   | D1   | D0   | HEX   |        |               |  |  |     |     |     |                   |   |          |          |           |   |          |          |           |   |          |          |
| RDDID                     | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | ↑                       | 1        | -     | 0    | 0    | 0    | 0    | 0    | 1    | 0    | 0    | (04h) |        |               |  |  |     |     |     |                   |   |          |          |           |   |          |          |           |   |          |          |
| 1 <sup>st</sup> parameter | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 1                       | ↑        | -     | -    | -    | -    | -    | -    | -    | -    | -    | -     |        |               |  |  |     |     |     |                   |   |          |          |           |   |          |          |           |   |          |          |
| 2 <sup>nd</sup> parameter | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 1                       | ↑        | -     | ID17 | ID16 | ID15 | ID14 | ID13 | ID12 | ID11 | ID10 |       |        |               |  |  |     |     |     |                   |   |          |          |           |   |          |          |           |   |          |          |
| 3 <sup>rd</sup> parameter | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 1                       | ↑        | -     | 1    | ID26 | ID25 | ID24 | ID23 | ID22 | ID21 | ID20 |       |        |               |  |  |     |     |     |                   |   |          |          |           |   |          |          |           |   |          |          |
| 4 <sup>th</sup> parameter | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 1                       | ↑        | -     | ID37 | ID36 | ID35 | ID34 | ID33 | ID32 | ID31 | ID30 |       |        |               |  |  |     |     |     |                   |   |          |          |           |   |          |          |           |   |          |          |
| Description               | <p>-This read byte returns 24-bit display identification information.</p> <p>-The 1st parameter is dummy data</p> <p>-The 2nd parameter (ID17 to ID10): LCD module's manufacturer ID.</p> <p>-The 3rd parameter (ID26 to ID20): LCD module/driver version ID</p> <p>-The 4th parameter (ID37 to UD30): LCD module/driver ID.</p> <p>-Commands RDID1/2/3(DAh, DBh, DCh) read data correspond to the parameters 2,3,4 of the command 04h, respectively.</p> <p>“-“ Don't care</p> |                         |          |       |      |      |      |      |      |      |      |      |       |        |               |  |  |     |     |     |                   |   |          |          |           |   |          |          |           |   |          |          |
| Default                   | <table border="1"> <thead> <tr> <th rowspan="2">Status</th> <th colspan="3">Default Value</th> </tr> <tr> <th>ID1</th> <th>ID2</th> <th>ID3</th> </tr> </thead> <tbody> <tr> <td>Power On Sequence</td> <td>-</td> <td>NV Value</td> <td>NV Value</td> </tr> <tr> <td>S/W Reset</td> <td>-</td> <td>NV Value</td> <td>NV Value</td> </tr> <tr> <td>H/W Reset</td> <td>-</td> <td>NV Value</td> <td>NV Value</td> </tr> </tbody> </table>                                        |                         |          |       |      |      |      |      |      |      |      |      |       | Status | Default Value |  |  | ID1 | ID2 | ID3 | Power On Sequence | - | NV Value | NV Value | S/W Reset | - | NV Value | NV Value | H/W Reset | - | NV Value | NV Value |
| Status                    | Default Value                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                         |          |       |      |      |      |      |      |      |      |      |       |        |               |  |  |     |     |     |                   |   |          |          |           |   |          |          |           |   |          |          |
|                           | ID1                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | ID2                     | ID3      |       |      |      |      |      |      |      |      |      |       |        |               |  |  |     |     |     |                   |   |          |          |           |   |          |          |           |   |          |          |
| Power On Sequence         | -                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | NV Value                | NV Value |       |      |      |      |      |      |      |      |      |       |        |               |  |  |     |     |     |                   |   |          |          |           |   |          |          |           |   |          |          |
| S/W Reset                 | -                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | NV Value                | NV Value |       |      |      |      |      |      |      |      |      |       |        |               |  |  |     |     |     |                   |   |          |          |           |   |          |          |           |   |          |          |
| H/W Reset                 | -                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | NV Value                | NV Value |       |      |      |      |      |      |      |      |      |       |        |               |  |  |     |     |     |                   |   |          |          |           |   |          |          |           |   |          |          |
| Flow Chart                | <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p><b>Serial I/F Mode</b></p> </div> <div style="text-align: center;"> <p><b>Parallel I/F Mode</b></p> </div> </div> <div style="margin-top: 20px;"> <p><b>Legend</b></p> <ul style="list-style-type: none"> <li> Command</li> <li> Parameter</li> <li> Display</li> <li> Action</li> <li> Mode</li> <li> Sequential transfer</li> </ul> </div>                                   |                         |          |       |      |      |      |      |      |      |      |      |       |        |               |  |  |     |     |     |                   |   |          |          |           |   |          |          |           |   |          |          |

## 10.1.4 RDDST (09h): Read Display Status

| 09H                       | RDDST (Read Display Status)                                                               |                                            |                     |                                                                                                                                                      |       |       |       |       |       |       |       |       |       |
|---------------------------|-------------------------------------------------------------------------------------------|--------------------------------------------|---------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Inst / Para               | D/CX                                                                                      | WRX                                        | RDX                 | D17-8                                                                                                                                                | D7    | D6    | D5    | D4    | D3    | D2    | D1    | D0    | HEX   |
| RDDST                     | 0                                                                                         | ↑                                          | 1                   | -                                                                                                                                                    | 0     | 0     | 0     | 0     | 1     | 0     | 0     | 1     | (09h) |
| 1 <sup>st</sup> parameter | 1                                                                                         | 1                                          | ↑                   | -                                                                                                                                                    | -     | -     | -     | -     | -     | -     | -     | -     | -     |
| 2 <sup>nd</sup> parameter | 1                                                                                         | 1                                          | ↑                   | -                                                                                                                                                    | BSTON | MY    | MX    | MV    | ML    | RGB   | MH    | ST24  |       |
| 3 <sup>rd</sup> parameter | 1                                                                                         | 1                                          | ↑                   | -                                                                                                                                                    | ST23  | IFPF2 | IFPF1 | IFPF0 | IDMON | PTLON | SLOUT | NORON |       |
| 4 <sup>th</sup> parameter | 1                                                                                         | 1                                          | ↑                   | -                                                                                                                                                    | ST15  | ST14  | INVON | ST12  | ST11  | DISON | TEON  | GCS2  |       |
| 5 <sup>th</sup> parameter | 1                                                                                         | 1                                          | ↑                   | -                                                                                                                                                    | GCS1  | GCS0  | TEM   | ST4   | ST3   | ST2   | ST1   | ST0   |       |
| Description               | This command indicates the current status of the display as described in the table below: |                                            |                     |                                                                                                                                                      |       |       |       |       |       |       |       |       |       |
|                           | <b>Bit</b>                                                                                | <b>Description</b>                         |                     | <b>Value</b>                                                                                                                                         |       |       |       |       |       |       |       |       |       |
|                           | BSTON                                                                                     | Booster Voltage Status                     |                     | '1' =Booster on,<br>'0' =Booster off                                                                                                                 |       |       |       |       |       |       |       |       |       |
|                           | MY                                                                                        | Row Address Order (MY)                     |                     | '1' =Decrement, (Bottom to Top, when MADCTL (36h) D7='1')<br>'0' =Increment, (Top to Bottom, when MADCTL (36h) D7='0')                               |       |       |       |       |       |       |       |       |       |
|                           | MX                                                                                        | Column Address Order (MX)                  |                     | '1' =Decrement, (Right to Left, when MADCTL (36h) D6='1')<br>'0' =Increment, (Left to Right, when MADCTL (36h) D6='1')                               |       |       |       |       |       |       |       |       |       |
|                           | MV                                                                                        | Row/Column Exchange (MV)                   |                     | '1' = Row/column exchange, (when MADCTL (36h) D5='1')<br>'0' = Normal, (when MADCTL (36h) D5='0')                                                    |       |       |       |       |       |       |       |       |       |
|                           | ML                                                                                        | Scan Address Order (ML)                    |                     | '0' =Decrement,<br>(LCD refresh Top to Bottom, when MADCTL (36h) D4='0')<br>'1' =Increment,<br>(LCD refresh Bottom to Top, when MADCTL (36h) D4='1') |       |       |       |       |       |       |       |       |       |
|                           | RGB                                                                                       | RGB/ BGR Order (RGB)                       |                     | '1' =BGR, (When MADCTL (36h) D3='1')<br>'0' =RGB, (When MADCTL (36h) D3='0')                                                                         |       |       |       |       |       |       |       |       |       |
|                           | MH                                                                                        | Horizontal Order                           |                     | '0' =Decrement,<br>(LCD refresh Left to Right, when MADCTL (36h) D2='0')<br>'1' =Increment,<br>(LCD refresh Right to Left, when MADCTL (36h) D2='1') |       |       |       |       |       |       |       |       |       |
|                           | ST24                                                                                      | For Future Use                             |                     | '0'                                                                                                                                                  |       |       |       |       |       |       |       |       |       |
|                           | ST23                                                                                      | For Future Use                             |                     | '0'                                                                                                                                                  |       |       |       |       |       |       |       |       |       |
|                           | IFPF2                                                                                     | Interface Color Pixel Format<br>Definition |                     | "011" = 12-bit / pixel,                                                                                                                              |       |       |       |       |       |       |       |       |       |
|                           | IFPF1                                                                                     |                                            |                     | "101" = 16-bit / pixel,                                                                                                                              |       |       |       |       |       |       |       |       |       |
|                           | IFPF0                                                                                     |                                            |                     | "110" = 18-bit / pixel, others are no define                                                                                                         |       |       |       |       |       |       |       |       |       |
|                           | IDMON                                                                                     | Idle Mode On/Off                           |                     | '1' = On, "0" = Off                                                                                                                                  |       |       |       |       |       |       |       |       |       |
|                           | PTLON                                                                                     | Partial Mode On/Off                        |                     | '1' = On, "0" = Off                                                                                                                                  |       |       |       |       |       |       |       |       |       |
|                           | SLPOUT                                                                                    | Sleep In/Out                               |                     | '1' = Out, "0" = In                                                                                                                                  |       |       |       |       |       |       |       |       |       |
|                           | NORON                                                                                     | Display Normal Mode On/Off                 |                     | '1' = Normal Display,<br>'0' = Partial Display                                                                                                       |       |       |       |       |       |       |       |       |       |
|                           | ST15                                                                                      | Vertical Scrolling Status (Not Used)       |                     | '1' = Scroll on, "0" = Scroll off                                                                                                                    |       |       |       |       |       |       |       |       |       |
|                           | ST14                                                                                      | Horizontal Scroll Status (Not Used)        |                     | '0'                                                                                                                                                  |       |       |       |       |       |       |       |       |       |
| INVON                     | Inversion Status                                                                          |                                            | '1' = On, "0" = Off |                                                                                                                                                      |       |       |       |       |       |       |       |       |       |
| ST12                      | All Pixels On (Not Used)                                                                  |                                            | '0'                 |                                                                                                                                                      |       |       |       |       |       |       |       |       |       |
| ST11                      | All Pixels Off (Not Used)                                                                 |                                            | '0'                 |                                                                                                                                                      |       |       |       |       |       |       |       |       |       |

# ST7735R

|                 |                                                           |                            |                                                             |           |                                                                                                                                                                                                                 |           |
|-----------------|-----------------------------------------------------------|----------------------------|-------------------------------------------------------------|-----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
|                 | DISON                                                     | Display On/Off             | '1' = On, "0" = Off                                         |           |                                                                                                                                                                                                                 |           |
|                 | TEON                                                      | Tearing effect line on/off | '1' = On, "0" = Off                                         |           |                                                                                                                                                                                                                 |           |
|                 | GCSEL2                                                    | Gamma Curve Selection      | "000" = GC0                                                 |           |                                                                                                                                                                                                                 |           |
|                 | GCSEL1                                                    |                            | "001" = GC1                                                 |           |                                                                                                                                                                                                                 |           |
|                 | GCSEL0                                                    |                            | "010" = GC2                                                 |           |                                                                                                                                                                                                                 |           |
|                 |                                                           |                            | "011" = GC3                                                 |           |                                                                                                                                                                                                                 |           |
|                 |                                                           |                            | "100" to "111" = Not defined                                |           |                                                                                                                                                                                                                 |           |
|                 | TEM                                                       | Tearing effect line mode   | '0' = mode1, '1' = mode2                                    |           |                                                                                                                                                                                                                 |           |
|                 | ST4                                                       | For Future Use             | '0'                                                         |           |                                                                                                                                                                                                                 |           |
|                 | ST3                                                       | For Future Use             | '0'                                                         |           |                                                                                                                                                                                                                 |           |
|                 | ST2                                                       | For Future Use             | '0'                                                         |           |                                                                                                                                                                                                                 |           |
| ST1             | For Future Use                                            | '0'                        |                                                             |           |                                                                                                                                                                                                                 |           |
| ST0             | For Future Use                                            | '0'                        |                                                             |           |                                                                                                                                                                                                                 |           |
| "- " Don't care |                                                           |                            |                                                             |           |                                                                                                                                                                                                                 |           |
| Default         | Status                                                    |                            | Default Value (ST31 to ST0)                                 |           |                                                                                                                                                                                                                 |           |
|                 |                                                           |                            | ST[31-24]                                                   | ST[23-16] | ST[15-8]                                                                                                                                                                                                        | ST[7-0]   |
|                 | Power On Sequence                                         |                            | 0000-0000                                                   | 0110-0001 | 0000-0000                                                                                                                                                                                                       | 0000-0000 |
|                 | S/W Reset                                                 |                            | 0xxx0xx00                                                   | 0xxx-0001 | 0000-0000                                                                                                                                                                                                       | 0000-0000 |
|                 | H/W Reset                                                 |                            | 0000-0000                                                   | 0110-0001 | 0000-0000                                                                                                                                                                                                       | 0000-0000 |
| Flow Chart      | <p style="text-align: center;"><b>Serial I/F Mode</b></p> |                            | <p style="text-align: center;"><b>Parallel I/F Mode</b></p> |           | <p style="text-align: center;"><b>Legend</b></p> <ul style="list-style-type: none"> <li> Command</li> <li> Parameter</li> <li> Display</li> <li> Action</li> <li> Mode</li> <li> Sequential transfer</li> </ul> |           |

## 10.1.5 RDDPM (0Ah): Read Display Power Mode

| 0AH                       |      | RDDPM (Read Display Power Mode) |     |       |       |       |       |        |       |       |    |    |       |
|---------------------------|------|---------------------------------|-----|-------|-------|-------|-------|--------|-------|-------|----|----|-------|
| Inst / Para               | D/CX | WRX                             | RDX | D17-8 | D7    | D6    | D5    | D4     | D3    | D2    | D1 | D0 | HEX   |
| RDDPM                     | 0    | ↑                               | 1   | -     | 0     | 0     | 0     | 0      | 1     | 0     | 1  | 0  | (0Ah) |
| 1 <sup>st</sup> parameter | 1    | 1                               | ↑   | -     | -     | -     | -     | -      | -     | -     | -  | -  | -     |
| 2 <sup>nd</sup> parameter | 1    | 1                               | ↑   |       | BSTON | IDMON | PTLON | SLPOUT | NORON | DISON | D1 | D0 |       |

This command indicates the current status of the display as described in the table below:

“-“ Don't care

| Bit   | Description                | Value                                            |
|-------|----------------------------|--------------------------------------------------|
| BSTON | Booster Voltage Status     | '1' =Booster on,<br>'0' =Booster off             |
| IDMON | Idle Mode On/Off           | '1' = Idle Mode On,<br>'0' = Idle Mode Off       |
| PTLON | Partial Mode On/Off        | '1' = Partial Mode On,<br>'0' = Partial Mode Off |
| SLPON | Sleep In/Out               | '1' = Sleep Out,<br>'0' = Sleep In               |
| NORON | Display Normal Mode On/Off | '1' = Normal Display,<br>'0' = Partial Display   |
| DISON | Display On/Off             | '1' = Display On,<br>'0' = Display Off           |
| D1    | Not Used                   | '0'                                              |
| D0    | Not Used                   | '0'                                              |

| Status            | Default Value (D7 to D0) |
|-------------------|--------------------------|
| Power On Sequence | 0000_1000(08h)           |
| S/W Reset         | 0000_1000(08h)           |
| H/W Reset         | 0000_1000(08h)           |

Serial I/F Mode

```

graph TD
    A[RDDPM 0Ah] --> B[/Send 2nd parameter/]
            
```

Parallel I/F Mode

```

graph TD
    A[RDDPM 0Ah] --> B[/Dummy Read/]
    B --> C[/Send 2nd parameter/]
            
```

**Legend**

- Command (rectangle)
- Parameter (parallelogram)
- Display (oval)
- Action (hexagon)
- Mode (rounded rectangle)
- Sequential transfer (wavy-bottom rectangle)

## 10.1.6 RDDMADCTL (0Bh): Read Display MADCTL

| 0BH                       | RDDMADCTL (Read Display MADCTL) |     |     |       |    |    |    |    |     |    |    |    |       |
|---------------------------|---------------------------------|-----|-----|-------|----|----|----|----|-----|----|----|----|-------|
| Inst / Para               | D/CX                            | WRX | RDX | D17-8 | D7 | D6 | D5 | D4 | D3  | D2 | D1 | D0 | HEX   |
| RDDMADCTL                 | 0                               | ↑   | 1   | -     | 0  | 0  | 0  | 0  | 1   | 0  | 1  | 1  | (0Bh) |
| 1 <sup>st</sup> parameter | 1                               | 1   | ↑   | -     | -  | -  | -  | -  | -   | -  | -  | -  | -     |
| 2 <sup>nd</sup> parameter | 1                               | 1   | ↑   |       | MY | MX | MV | ML | RGB | MH | D1 | D0 |       |

This command indicates the current status of the display as described in the table below:

“-“ Don't care

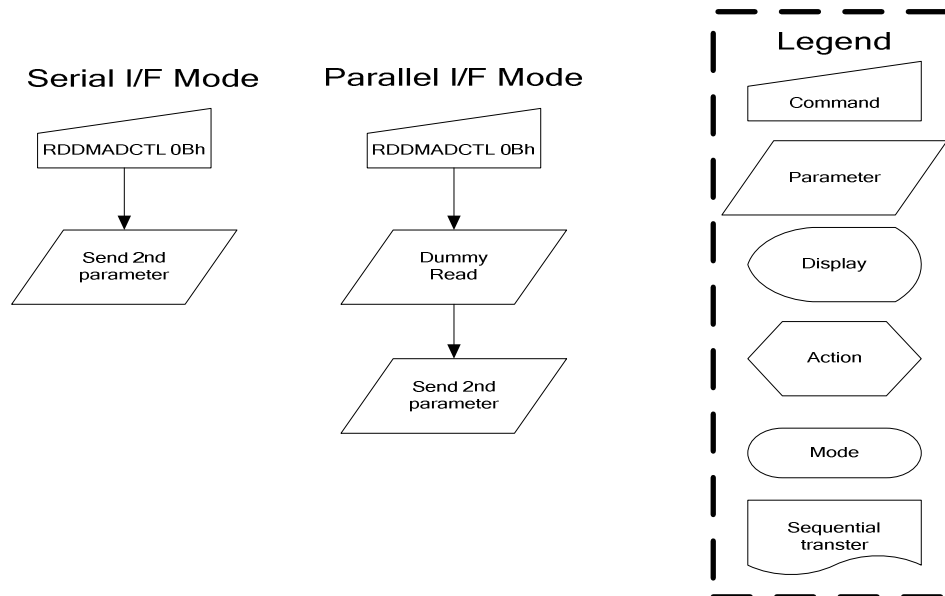
| Bit | Description              | Value                                                                                                                                |
|-----|--------------------------|--------------------------------------------------------------------------------------------------------------------------------------|
| MX  | Column Address Order     | '1' = Right to Left (When MADCTL B6='1')<br>'0' = Left to Right (When MADCTL B6='0')                                                 |
| MY  | Row Address Order        | '1' = Bottom to Top (When MADCTL B7='1')<br>'0' = Top to Bottom (When MADCTL B7='0')                                                 |
| MV  | Row/Column Order (MV)    | '1' = Row/column exchange (MV=1)<br>'0' = Normal (MV=0)                                                                              |
| ML  | Vertical Refresh Order   | '1' =LCD Refresh Bottom to Top<br>'0' =LCD Refresh Top to Bottom                                                                     |
| RGB | RGB/BGR Order            | '1' =BGR, "0"=RGB                                                                                                                    |
| MH  | Horizontal Refresh Order | LCD horizontal refresh direction control<br>'0' = LCD horizontal refresh Left to right<br>'1' = LCD horizontal refresh right to left |
| D1  | Not Used                 | '0'                                                                                                                                  |
| D0  | Not Used                 | '0'                                                                                                                                  |

Description

Default

| Status            | Default Value (D7 to D0) |
|-------------------|--------------------------|
| Power On Sequence | 0000_0000 (00h)          |
| S/W Reset         | No change                |
| H/W Reset         | 0000_0000 (00h)          |

Flow Chart



## 10.1.7 RDDCOLMOD (0Ch): Read Display Pixel Format

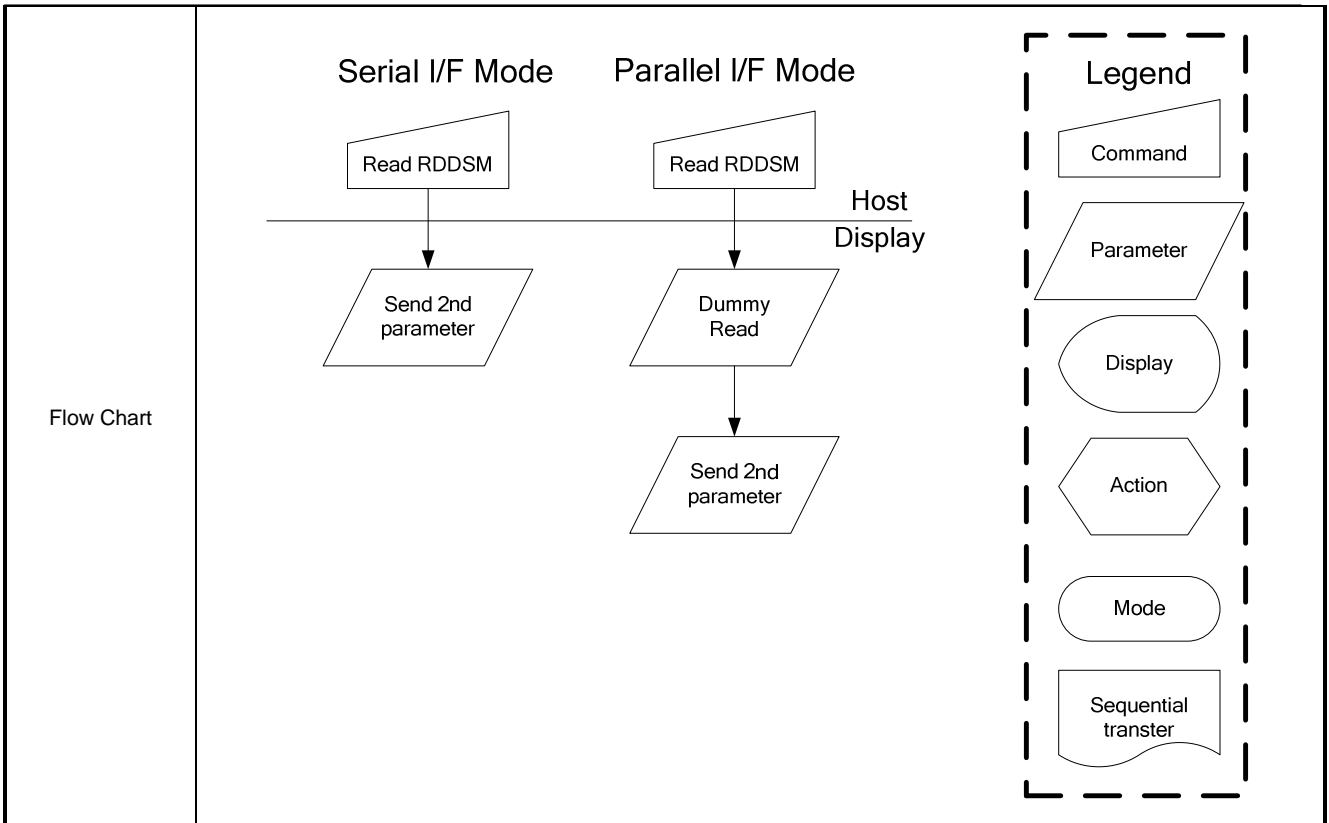
| 0Ch                                                                                                                                                                                                                                                                          | RDDCOLMOD (Read Display Pixel Format)                                                     |         |                            |       |    |    |    |    |    |       |       |       | HEX   |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------|---------|----------------------------|-------|----|----|----|----|----|-------|-------|-------|-------|
| Inst / Para                                                                                                                                                                                                                                                                  | D/CX                                                                                      | WRX     | RDX                        | D17-8 | D7 | D6 | D5 | D4 | D3 | D2    | D1    | D0    | HEX   |
| RDDCOLMOD                                                                                                                                                                                                                                                                    | 0                                                                                         | ↑       | 1                          | -     | 0  | 0  | 0  | 0  | 1  | 1     | 0     | 0     | (0Ch) |
| 1 <sup>st</sup> parameter                                                                                                                                                                                                                                                    | 1                                                                                         | 1       | ↑                          | -     | -  | -  | -  | -  | -  | -     | -     | -     | -     |
| 2 <sup>nd</sup> parameter                                                                                                                                                                                                                                                    | 1                                                                                         | 1       | ↑                          | -     | 0  | 0  | 0  | 0  | -  | IFPF2 | IFPF1 | IFPF0 |       |
| Description                                                                                                                                                                                                                                                                  | This command indicates the current status of the display as described in the table below: |         |                            |       |    |    |    |    |    |       |       |       |       |
|                                                                                                                                                                                                                                                                              | IFPF[2:0]                                                                                 |         | MCU Interface Color Format |       |    |    |    |    |    |       |       |       |       |
|                                                                                                                                                                                                                                                                              | 011                                                                                       |         | 12-bit/pixel               |       |    |    |    |    |    |       |       |       |       |
|                                                                                                                                                                                                                                                                              | 101                                                                                       |         | 16-bit/pixel               |       |    |    |    |    |    |       |       |       |       |
|                                                                                                                                                                                                                                                                              | 110                                                                                       |         | 18-bit/pixel               |       |    |    |    |    |    |       |       |       |       |
| 111                                                                                                                                                                                                                                                                          |                                                                                           | No used |                            |       |    |    |    |    |    |       |       |       |       |
| Others are no define and invalid                                                                                                                                                                                                                                             |                                                                                           |         |                            |       |    |    |    |    |    |       |       |       |       |
| “-“ Don't care                                                                                                                                                                                                                                                               |                                                                                           |         |                            |       |    |    |    |    |    |       |       |       |       |
| Default                                                                                                                                                                                                                                                                      | Status                                                                                    |         | Default Value              |       |    |    |    |    |    |       |       |       |       |
|                                                                                                                                                                                                                                                                              |                                                                                           |         | IFPF[2:0]                  |       |    |    |    |    |    |       |       |       |       |
|                                                                                                                                                                                                                                                                              | Power On Sequence                                                                         |         | 0110 (18 bits/pixel)       |       |    |    |    |    |    |       |       |       |       |
|                                                                                                                                                                                                                                                                              | S/W Reset                                                                                 |         | No Change                  |       |    |    |    |    |    |       |       |       |       |
|                                                                                                                                                                                                                                                                              | H/W Reset                                                                                 |         | 0110 (18 bits/pixel)       |       |    |    |    |    |    |       |       |       |       |
| Flow Chart                                                                                                                                                                                                                                                                   | Serial I/F Mode                                                                           |         | Parallel I/F Mode          |       |    |    |    |    |    |       |       |       |       |
|                                                                                                                                                                                                                                                                              |                                                                                           |         |                            |       |    |    |    |    |    |       |       |       |       |
| <div style="border: 1px dashed black; padding: 5px;"> <p style="text-align: center;"><b>Legend</b></p> <ul style="list-style-type: none"> <li> Command</li> <li> Parameter</li> <li> Display</li> <li> Action</li> <li> Mode</li> <li> Sequential transter</li> </ul> </div> |                                                                                           |         |                            |       |    |    |    |    |    |       |       |       |       |

## 10.1.8 RDDIM (0Dh): Read Display Image Mode

| 0DH                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | RDDIM (0Dh): Read Display Image Mode                                                      |                         |       |       |    |       |    |    |      |      |      |       |     |             |       |       |          |     |    |          |     |       |                  |                                                  |    |               |                |    |                |                |                      |                       |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------|-------------------------|-------|-------|----|-------|----|----|------|------|------|-------|-----|-------------|-------|-------|----------|-----|----|----------|-----|-------|------------------|--------------------------------------------------|----|---------------|----------------|----|----------------|----------------|----------------------|-----------------------|
| Inst / Para                                                                                                                                                                                                                                      | D/CX                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | WRX                                                                                       | RDX                     | D17-8 | D7    | D6 | D5    | D4 | D3 | D2   | D1   | D0   | HEX   |     |             |       |       |          |     |    |          |     |       |                  |                                                  |    |               |                |    |                |                |                      |                       |
| RDDIM                                                                                                                                                                                                                                            | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | ↑                                                                                         | 1                       | -     | 0     | 0  | 0     | 0  | 1  | 1    | 0    | 1    | (0Dh) |     |             |       |       |          |     |    |          |     |       |                  |                                                  |    |               |                |    |                |                |                      |                       |
| 1 <sup>st</sup> parameter                                                                                                                                                                                                                        | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 1                                                                                         | ↑                       | -     | -     | -  | -     | -  | -  | -    | -    | -    | -     |     |             |       |       |          |     |    |          |     |       |                  |                                                  |    |               |                |    |                |                |                      |                       |
| 2 <sup>nd</sup> parameter                                                                                                                                                                                                                        | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 1                                                                                         | ↑                       | -     | VSSON | D6 | INVON | D4 | D3 | GCS2 | GCS1 | GCS0 |       |     |             |       |       |          |     |    |          |     |       |                  |                                                  |    |               |                |    |                |                |                      |                       |
| Description                                                                                                                                                                                                                                      | This command indicates the current status of the display as described in the table below:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                           |                         |       |       |    |       |    |    |      |      |      |       |     |             |       |       |          |     |    |          |     |       |                  |                                                  |    |               |                |    |                |                |                      |                       |
|                                                                                                                                                                                                                                                  | <p>“-“ Don't care</p> <table border="1"> <thead> <tr> <th>Bit</th> <th>Description</th> <th>Value</th> </tr> </thead> <tbody> <tr> <td>VSSON</td> <td>Reversed</td> <td>"0"</td> </tr> <tr> <td>D6</td> <td>Reversed</td> <td>"0"</td> </tr> <tr> <td>INVON</td> <td>Inversion On/Off</td> <td>"1" = Inversion is On,<br/>"0" = Inversion is Off</td> </tr> <tr> <td>D4</td> <td>All Pixels On</td> <td>"0" (Not used)</td> </tr> <tr> <td>D3</td> <td>All Pixels Off</td> <td>"0" (Not used)</td> </tr> <tr> <td>GCS2<br/>GCS1<br/>GCS0</td> <td>Gamma Curve Selection</td> <td>"000" = GC0,<br/>"001" = GC1,<br/>"010" = GC2,<br/>"011" = GC3, "100" to "111" = Not defined</td> </tr> </tbody> </table> |                                                                                           |                         |       |       |    |       |    |    |      |      |      |       | Bit | Description | Value | VSSON | Reversed | "0" | D6 | Reversed | "0" | INVON | Inversion On/Off | "1" = Inversion is On,<br>"0" = Inversion is Off | D4 | All Pixels On | "0" (Not used) | D3 | All Pixels Off | "0" (Not used) | GCS2<br>GCS1<br>GCS0 | Gamma Curve Selection |
| Bit                                                                                                                                                                                                                                              | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Value                                                                                     |                         |       |       |    |       |    |    |      |      |      |       |     |             |       |       |          |     |    |          |     |       |                  |                                                  |    |               |                |    |                |                |                      |                       |
| VSSON                                                                                                                                                                                                                                            | Reversed                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | "0"                                                                                       |                         |       |       |    |       |    |    |      |      |      |       |     |             |       |       |          |     |    |          |     |       |                  |                                                  |    |               |                |    |                |                |                      |                       |
| D6                                                                                                                                                                                                                                               | Reversed                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | "0"                                                                                       |                         |       |       |    |       |    |    |      |      |      |       |     |             |       |       |          |     |    |          |     |       |                  |                                                  |    |               |                |    |                |                |                      |                       |
| INVON                                                                                                                                                                                                                                            | Inversion On/Off                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | "1" = Inversion is On,<br>"0" = Inversion is Off                                          |                         |       |       |    |       |    |    |      |      |      |       |     |             |       |       |          |     |    |          |     |       |                  |                                                  |    |               |                |    |                |                |                      |                       |
| D4                                                                                                                                                                                                                                               | All Pixels On                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | "0" (Not used)                                                                            |                         |       |       |    |       |    |    |      |      |      |       |     |             |       |       |          |     |    |          |     |       |                  |                                                  |    |               |                |    |                |                |                      |                       |
| D3                                                                                                                                                                                                                                               | All Pixels Off                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | "0" (Not used)                                                                            |                         |       |       |    |       |    |    |      |      |      |       |     |             |       |       |          |     |    |          |     |       |                  |                                                  |    |               |                |    |                |                |                      |                       |
| GCS2<br>GCS1<br>GCS0                                                                                                                                                                                                                             | Gamma Curve Selection                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | "000" = GC0,<br>"001" = GC1,<br>"010" = GC2,<br>"011" = GC3, "100" to "111" = Not defined |                         |       |       |    |       |    |    |      |      |      |       |     |             |       |       |          |     |    |          |     |       |                  |                                                  |    |               |                |    |                |                |                      |                       |
| Default                                                                                                                                                                                                                                          | Status                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                           | Default Value(D7 to D0) |       |       |    |       |    |    |      |      |      |       |     |             |       |       |          |     |    |          |     |       |                  |                                                  |    |               |                |    |                |                |                      |                       |
|                                                                                                                                                                                                                                                  | Power On Sequence                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                           | 0000_0000 (00h)         |       |       |    |       |    |    |      |      |      |       |     |             |       |       |          |     |    |          |     |       |                  |                                                  |    |               |                |    |                |                |                      |                       |
|                                                                                                                                                                                                                                                  | S/W Reset                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                           | 0000_0000 (00h)         |       |       |    |       |    |    |      |      |      |       |     |             |       |       |          |     |    |          |     |       |                  |                                                  |    |               |                |    |                |                |                      |                       |
|                                                                                                                                                                                                                                                  | H/W Reset                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                           | 0000_0000 (00h)         |       |       |    |       |    |    |      |      |      |       |     |             |       |       |          |     |    |          |     |       |                  |                                                  |    |               |                |    |                |                |                      |                       |
| Flow Chart                                                                                                                                                                                                                                       | Serial I/F Mode                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                           | Parallel I/F Mode       |       |       |    |       |    |    |      |      |      |       |     |             |       |       |          |     |    |          |     |       |                  |                                                  |    |               |                |    |                |                |                      |                       |
|                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                           |                         |       |       |    |       |    |    |      |      |      |       |     |             |       |       |          |     |    |          |     |       |                  |                                                  |    |               |                |    |                |                |                      |                       |
| <div style="border: 1px dashed black; padding: 5px;"> <p><b>Legend</b></p> <ul style="list-style-type: none"> <li> Command</li> <li> Parameter</li> <li> Display</li> <li> Action</li> <li> Mode</li> <li> Sequential transfer</li> </ul> </div> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                           |                         |       |       |    |       |    |    |      |      |      |       |     |             |       |       |          |     |    |          |     |       |                  |                                                  |    |               |                |    |                |                |                      |                       |

## 10.1.9 RDDSM (0Eh): Read Display Signal Mode

| 0EH                       | RDDSM (0Eh): Read Display Signal Mode                                                                       |     |                            |       |      |                      |    |    |    |                             |    |    |       |
|---------------------------|-------------------------------------------------------------------------------------------------------------|-----|----------------------------|-------|------|----------------------|----|----|----|-----------------------------|----|----|-------|
| Inst / Para               | D/CX                                                                                                        | WRX | RDX                        | D17-8 | D7   | D6                   | D5 | D4 | D3 | D2                          | D1 | D0 | HEX   |
| RDDSM                     | 0                                                                                                           | ↑   | 1                          | -     | 0    | 0                    | 0  | 0  | 1  | 1                           | 1  | 0  | (0Eh) |
| 1 <sup>st</sup> parameter | 1                                                                                                           | 1   | ↑                          | -     | -    | -                    | -  | -  | -  | -                           | -  | -  | -     |
| 2 <sup>nd</sup> parameter | 1                                                                                                           | 1   | ↑                          | -     | TEON | TEM                  | D5 | D4 | D3 | D2                          | D1 | D0 |       |
| Description               | This command indicates the current status of the display as described in the table below:<br>“-“ Don't care |     |                            |       |      |                      |    |    |    |                             |    |    |       |
|                           | Bit                                                                                                         |     | Description                |       |      |                      |    |    |    | Value                       |    |    |       |
|                           | TEON                                                                                                        |     | Tearing Effect Line On/Off |       |      |                      |    |    |    | “1” = On,<br>“0” = Off      |    |    |       |
|                           | TEM                                                                                                         |     | Tearing effect line mode   |       |      |                      |    |    |    | “1” = mode2,<br>“0” = mode1 |    |    |       |
|                           | D5                                                                                                          |     | Not Used                   |       |      |                      |    |    |    | “1” = On,<br>“0” = Off      |    |    |       |
|                           | D4                                                                                                          |     | Not Used                   |       |      |                      |    |    |    | “1” = On,<br>“0” = Off      |    |    |       |
|                           | D3                                                                                                          |     | Not Used                   |       |      |                      |    |    |    | “1” = On,<br>“0” = Off      |    |    |       |
|                           | D2                                                                                                          |     | Not Used                   |       |      |                      |    |    |    | “1” = On,<br>“0” = Off      |    |    |       |
|                           | D1                                                                                                          |     | Not Used                   |       |      |                      |    |    |    | “1” = On,<br>“0” = Off      |    |    |       |
|                           | D0                                                                                                          |     | Not Used                   |       |      |                      |    |    |    | “1” = On,<br>“0” = Off      |    |    |       |
| Default                   | Status                                                                                                      |     |                            |       |      | Default Value(D7~D0) |    |    |    |                             |    |    |       |
|                           | Power On Sequence                                                                                           |     |                            |       |      | 0000_0000 (00h)      |    |    |    |                             |    |    |       |
|                           | S/W Reset                                                                                                   |     |                            |       |      | 0000_0000 (00h)      |    |    |    |                             |    |    |       |
|                           | H/W Reset                                                                                                   |     |                            |       |      | 0000_0000 (00h)      |    |    |    |                             |    |    |       |



## 10.1.10 SLPIN (10h): Sleep In

| 10H               | SLPIN (Sleep In)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |     |     |       |    |    |    |    |    |    |    |    | HEX    |               |                   |               |           |               |           |               |   |
|-------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|-------|----|----|----|----|----|----|----|----|--------|---------------|-------------------|---------------|-----------|---------------|-----------|---------------|---|
| Inst / Para       | D/CX                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | WRX | RDX | D17-8 | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | HEX    |               |                   |               |           |               |           |               |   |
| SLPIN             | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | ↑   | 1   | -     | 0  | 0  | 0  | 1  | 0  | 0  | 0  | 0  | (10h)  |               |                   |               |           |               |           |               |   |
| Parameter         | No Parameter                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |     |     |       |    |    |    |    |    |    |    |    | -      |               |                   |               |           |               |           |               |   |
| Description       | <p>-This command causes the LCD module to enter the minimum power consumption mode.</p> <p>-In this mode the DC/DC converter is stopped, Internal display oscillator is stopped, and panel scanning is stopped.</p>                                                                                                                                                                                                                                                                                                         |     |     |       |    |    |    |    |    |    |    |    |        |               |                   |               |           |               |           |               |   |
| Restriction       | <p>-This command has no effect when module is already in Sleep In mode. Sleep In Mode can only be exit by the Sleep Out Command (11h).</p> <p>-When IC is in Sleep Out or Display On mode, it is necessary to wait 120msec before sending next command because of the stabilization timing for the supply voltages and clock circuits.</p>                                                                                                                                                                                  |     |     |       |    |    |    |    |    |    |    |    |        |               |                   |               |           |               |           |               |   |
| Default           | <table border="1"> <thead> <tr> <th>Status</th> <th>Default Value</th> </tr> </thead> <tbody> <tr> <td>Power On Sequence</td> <td>Sleep in mode</td> </tr> <tr> <td>S/W Reset</td> <td>Sleep in mode</td> </tr> <tr> <td>H/W Reset</td> <td>Sleep in mode</td> </tr> </tbody> </table>                                                                                                                                                                                                                                      |     |     |       |    |    |    |    |    |    |    |    | Status | Default Value | Power On Sequence | Sleep in mode | S/W Reset | Sleep in mode | H/W Reset | Sleep in mode | - |
| Status            | Default Value                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |     |     |       |    |    |    |    |    |    |    |    |        |               |                   |               |           |               |           |               |   |
| Power On Sequence | Sleep in mode                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |     |     |       |    |    |    |    |    |    |    |    |        |               |                   |               |           |               |           |               |   |
| S/W Reset         | Sleep in mode                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |     |     |       |    |    |    |    |    |    |    |    |        |               |                   |               |           |               |           |               |   |
| H/W Reset         | Sleep in mode                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |     |     |       |    |    |    |    |    |    |    |    |        |               |                   |               |           |               |           |               |   |
| Flow Chart        | <pre> graph TD     SLPIN[SLPIN] --&gt; Display[Display whole blank screen<br/>(Automatic No effect to DISP ON/OFF Commands)]     Display --&gt; Drain[Drain Charge From LCD Panel]     Drain --&gt; StopDCDC[Stop DC-DC Converter]     StopDCDC --&gt; StopOsc[Stop Internal Oscillator]     StopOsc --&gt; SleepIn[Sleep In Mode]     </pre> <p><b>Legend</b></p> <ul style="list-style-type: none"> <li>Command</li> <li>Parameter</li> <li>Display</li> <li>Action</li> <li>Mode</li> <li>Sequential transfer</li> </ul> |     |     |       |    |    |    |    |    |    |    |    |        |               |                   |               |           |               |           |               |   |

## 10.1.11 SLPOUT (11h): Sleep Out

| 11H               | SLPOUT (Sleep Out)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |     |     |       |    |    |    |    |    |    |    |    | HEX   |        |               |                   |               |           |               |           |               |
|-------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|-------|----|----|----|----|----|----|----|----|-------|--------|---------------|-------------------|---------------|-----------|---------------|-----------|---------------|
| Inst / Para       | D/CX                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | WRX | RDX | D17-8 | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | HEX   |        |               |                   |               |           |               |           |               |
| SLPOUT            | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | ↑   | 1   | -     | 0  | 0  | 0  | 1  | 0  | 0  | 0  | 1  | (11h) |        |               |                   |               |           |               |           |               |
| Parameter         | No Parameter                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |     |     |       |    |    |    |    |    |    |    |    | -     |        |               |                   |               |           |               |           |               |
| Description       | <p>-This command turns off sleep mode.</p> <p>-In this mode the DC/DC converter is enabled, Internal display oscillator is started, and panel scanning is started.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |     |     |       |    |    |    |    |    |    |    |    |       |        |               |                   |               |           |               |           |               |
| Restriction       | <p>-This command has no effect when module is already in sleep out mode. Sleep Out Mode can only be exit by the Sleep In Command (10h).</p> <p>-When IC is in Sleep In mode, it is necessary to wait 120msec before sending next command because of the stabilization timing for the supply voltages and clock circuits.</p> <p>-When IC is in Sleep Out or Display On mode, it is necessary to wait 120msec before sending next command due to the download of default value of registers and the execution of self-diagnostic function.</p>                                                                                                                                       |     |     |       |    |    |    |    |    |    |    |    |       |        |               |                   |               |           |               |           |               |
| Default           | <table border="1"> <thead> <tr> <th>Status</th> <th>Default Value</th> </tr> </thead> <tbody> <tr> <td>Power On Sequence</td> <td>Sleep in mode</td> </tr> <tr> <td>S/W Reset</td> <td>Sleep in mode</td> </tr> <tr> <td>H/W Reset</td> <td>Sleep in mode</td> </tr> </tbody> </table>                                                                                                                                                                                                                                                                                                                                                                                              |     |     |       |    |    |    |    |    |    |    |    |       | Status | Default Value | Power On Sequence | Sleep in mode | S/W Reset | Sleep in mode | H/W Reset | Sleep in mode |
| Status            | Default Value                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |     |     |       |    |    |    |    |    |    |    |    |       |        |               |                   |               |           |               |           |               |
| Power On Sequence | Sleep in mode                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |     |     |       |    |    |    |    |    |    |    |    |       |        |               |                   |               |           |               |           |               |
| S/W Reset         | Sleep in mode                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |     |     |       |    |    |    |    |    |    |    |    |       |        |               |                   |               |           |               |           |               |
| H/W Reset         | Sleep in mode                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |     |     |       |    |    |    |    |    |    |    |    |       |        |               |                   |               |           |               |           |               |
| Flow Chart        | <pre> graph TD     A[/SLPOUT/] --&gt; B{{Start Internal Oscillator}}     B --&gt; C{{Start up DC:DC Converter}}     C --&gt; D{{Charge Offset voltage for LCD Panel}}     D --&gt; E[Display whole blank screen for 2 firames<br/>(Automatic No effect to DISP ON/OFF Commands)]     E --&gt; F[Display Memory contents In accordance with the current command table settings]     F --&gt; G([Sleep Out mode])     </pre> <p><b>Legend</b></p> <ul style="list-style-type: none"> <li>Command: Parallelogram</li> <li>Parameter: Trapezoid</li> <li>Display: Display shape</li> <li>Action: Hexagon</li> <li>Mode: Mode shape</li> <li>Sequential transfer: Wavy bottom</li> </ul> |     |     |       |    |    |    |    |    |    |    |    |       |        |               |                   |               |           |               |           |               |

# ST7735R

## 10.1.12 PTLON (12h): Partial Display Mode On

| 12H               | PTLON (12h): Partial Display Mode On                                                                                                                                                                                                                                                      |     |     |       |    |    |    |    |    |    |    |    |       |        |               |                   |                |           |                |           |                |
|-------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|-------|----|----|----|----|----|----|----|----|-------|--------|---------------|-------------------|----------------|-----------|----------------|-----------|----------------|
| Inst / Para       | D/CX                                                                                                                                                                                                                                                                                      | WRX | RDX | D17-8 | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | HEX   |        |               |                   |                |           |                |           |                |
| PTLON             | 0                                                                                                                                                                                                                                                                                         | ↑   | 1   | -     | 0  | 0  | 0  | 1  | 0  | 0  | 1  | 0  | (12h) |        |               |                   |                |           |                |           |                |
| Parameter         | No Parameter                                                                                                                                                                                                                                                                              |     |     |       |    |    |    |    |    |    |    |    | -     |        |               |                   |                |           |                |           |                |
| Description       | <p>-This command turns on Partial mode. The partial mode window is described by the Partial Area command (30h)</p> <p>-To leave Partial mode, the Normal Display Mode On command (13h) should be written.</p> <p>“-“ Don't care</p>                                                       |     |     |       |    |    |    |    |    |    |    |    |       |        |               |                   |                |           |                |           |                |
| Default           | <table border="1"> <thead> <tr> <th>Status</th> <th>Default Value</th> </tr> </thead> <tbody> <tr> <td>Power On Sequence</td> <td>Normal Mode On</td> </tr> <tr> <td>S/W Reset</td> <td>Normal Mode On</td> </tr> <tr> <td>H/W Reset</td> <td>Normal Mode On</td> </tr> </tbody> </table> |     |     |       |    |    |    |    |    |    |    |    |       | Status | Default Value | Power On Sequence | Normal Mode On | S/W Reset | Normal Mode On | H/W Reset | Normal Mode On |
| Status            | Default Value                                                                                                                                                                                                                                                                             |     |     |       |    |    |    |    |    |    |    |    |       |        |               |                   |                |           |                |           |                |
| Power On Sequence | Normal Mode On                                                                                                                                                                                                                                                                            |     |     |       |    |    |    |    |    |    |    |    |       |        |               |                   |                |           |                |           |                |
| S/W Reset         | Normal Mode On                                                                                                                                                                                                                                                                            |     |     |       |    |    |    |    |    |    |    |    |       |        |               |                   |                |           |                |           |                |
| H/W Reset         | Normal Mode On                                                                                                                                                                                                                                                                            |     |     |       |    |    |    |    |    |    |    |    |       |        |               |                   |                |           |                |           |                |
| Flow Chart        | See Partial Area (30h)                                                                                                                                                                                                                                                                    |     |     |       |    |    |    |    |    |    |    |    |       |        |               |                   |                |           |                |           |                |

# ST7735R

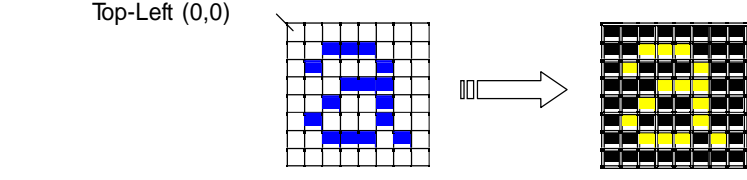
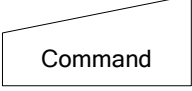
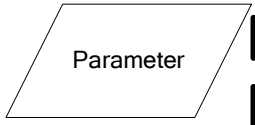
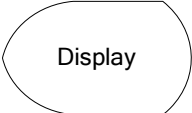

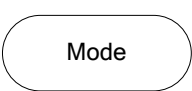
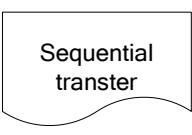
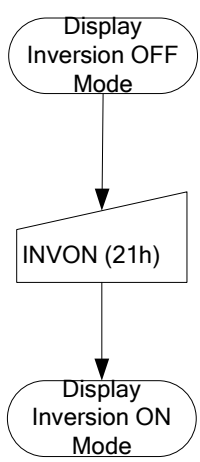
## 10.1.13 NORON (13h): Normal Display Mode On

| 13H               | NORON (Normal Display Mode On)                                                                                                                                                                                                                                                            |     |     |       |    |    |    |    |    |    |    |    |       |        |               |                   |                |           |                |           |                |
|-------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|-------|----|----|----|----|----|----|----|----|-------|--------|---------------|-------------------|----------------|-----------|----------------|-----------|----------------|
| Inst / Para       | D/CX                                                                                                                                                                                                                                                                                      | WRX | RDX | D17-8 | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | HEX   |        |               |                   |                |           |                |           |                |
| NORON             | 0                                                                                                                                                                                                                                                                                         | ↑   | 1   | -     | 0  | 0  | 0  | 1  | 0  | 0  | 1  | 1  | (13h) |        |               |                   |                |           |                |           |                |
| Parameter         | No Parameter                                                                                                                                                                                                                                                                              |     |     |       |    |    |    |    |    |    |    |    | -     |        |               |                   |                |           |                |           |                |
| Description       | <p>-This command returns the display to normal mode.</p> <p>-Normal display mode on means Partial mode off.</p> <p>-Exit from NORON by the Partial mode On command (12h)</p> <p>“-“ Don't care</p>                                                                                        |     |     |       |    |    |    |    |    |    |    |    |       |        |               |                   |                |           |                |           |                |
| Default           | <table border="1"> <thead> <tr> <th>Status</th> <th>Default Value</th> </tr> </thead> <tbody> <tr> <td>Power On Sequence</td> <td>Normal Mode On</td> </tr> <tr> <td>S/W Reset</td> <td>Normal Mode On</td> </tr> <tr> <td>H/W Reset</td> <td>Normal Mode On</td> </tr> </tbody> </table> |     |     |       |    |    |    |    |    |    |    |    |       | Status | Default Value | Power On Sequence | Normal Mode On | S/W Reset | Normal Mode On | H/W Reset | Normal Mode On |
| Status            | Default Value                                                                                                                                                                                                                                                                             |     |     |       |    |    |    |    |    |    |    |    |       |        |               |                   |                |           |                |           |                |
| Power On Sequence | Normal Mode On                                                                                                                                                                                                                                                                            |     |     |       |    |    |    |    |    |    |    |    |       |        |               |                   |                |           |                |           |                |
| S/W Reset         | Normal Mode On                                                                                                                                                                                                                                                                            |     |     |       |    |    |    |    |    |    |    |    |       |        |               |                   |                |           |                |           |                |
| H/W Reset         | Normal Mode On                                                                                                                                                                                                                                                                            |     |     |       |    |    |    |    |    |    |    |    |       |        |               |                   |                |           |                |           |                |
| Flow Chart        | See Partial Area Definition Descriptions for details of when to use this command                                                                                                                                                                                                          |     |     |       |    |    |    |    |    |    |    |    |       |        |               |                   |                |           |                |           |                |

## 10.1.14 INVOFF (20h): Display Inversion Off

| 20H               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | IVNOFF (Normal Display Mode Off) |     |       |    |    |    |    |    |    |    |    |       |        |               |                   |                       |           |                       |           |                       |
|-------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|-----|-------|----|----|----|----|----|----|----|----|-------|--------|---------------|-------------------|-----------------------|-----------|-----------------------|-----------|-----------------------|
| Inst / Para       | D/CX                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | WRX                              | RDX | D17-8 | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | HEX   |        |               |                   |                       |           |                       |           |                       |
| INVOFF            | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | ↑                                | 1   | -     | 0  | 0  | 1  | 0  | 0  | 0  | 0  | 0  | (20h) |        |               |                   |                       |           |                       |           |                       |
| Parameter         | No Parameter                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                  |     |       |    |    |    |    |    |    |    |    | -     |        |               |                   |                       |           |                       |           |                       |
| Description       | <p>-This command is used to recover from display inversion mode.</p> <p>“-“ Don't care (Example)</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;"> <p>Memory</p> <p>Top-Left (0,0)</p> </div> <div style="font-size: 2em;">→</div> <div style="text-align: center;"> <p>Display</p> </div> </div>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                  |     |       |    |    |    |    |    |    |    |    |       |        |               |                   |                       |           |                       |           |                       |
| Default           | <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Status</th> <th>Default Value</th> </tr> </thead> <tbody> <tr> <td>Power On Sequence</td> <td>Display Inversion off</td> </tr> <tr> <td>S/W Reset</td> <td>Display Inversion off</td> </tr> <tr> <td>H/W Reset</td> <td>Display Inversion off</td> </tr> </tbody> </table>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                  |     |       |    |    |    |    |    |    |    |    |       | Status | Default Value | Power On Sequence | Display Inversion off | S/W Reset | Display Inversion off | H/W Reset | Display Inversion off |
| Status            | Default Value                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                  |     |       |    |    |    |    |    |    |    |    |       |        |               |                   |                       |           |                       |           |                       |
| Power On Sequence | Display Inversion off                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                  |     |       |    |    |    |    |    |    |    |    |       |        |               |                   |                       |           |                       |           |                       |
| S/W Reset         | Display Inversion off                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                  |     |       |    |    |    |    |    |    |    |    |       |        |               |                   |                       |           |                       |           |                       |
| H/W Reset         | Display Inversion off                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                  |     |       |    |    |    |    |    |    |    |    |       |        |               |                   |                       |           |                       |           |                       |
| Flow Chart        | <div style="border: 1px dashed black; padding: 10px;"> <p style="text-align: center;"><b>Legend</b></p> <div style="display: flex; flex-direction: column; gap: 10px;"> <div style="border: 1px solid black; padding: 5px; width: 100px; height: 20px; margin: 0 auto;"></div> <p>Command</p> <div style="border: 1px solid black; padding: 5px; width: 100px; height: 40px; margin: 0 auto;"></div> <p>Parameter</p> <div style="border: 1px solid black; padding: 5px; width: 100px; height: 40px; border-radius: 15px; margin: 0 auto;"></div> <p>Display</p> <div style="border: 1px solid black; padding: 5px; width: 100px; height: 40px; margin: 0 auto;"></div> <p>Action</p> <div style="border: 1px solid black; padding: 5px; width: 100px; height: 40px; border-radius: 15px; margin: 0 auto;"></div> <p>Mode</p> <div style="border: 1px solid black; padding: 5px; width: 100px; height: 40px; margin: 0 auto;"></div> <p>Sequential transfer</p> </div> </div> <div style="margin-top: 20px; text-align: center;"> <pre> graph TD     A([Display Inversion On Mode]) --&gt; B[/INVOFF (20h)/]     B --&gt; C([Display Inversion OFF Mode])             </pre> </div> |                                  |     |       |    |    |    |    |    |    |    |    |       |        |               |                   |                       |           |                       |           |                       |

## 10.1.15 INVON (21h): Display Inversion On

| 21H               | IVNOFF (Display Inversion On)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |     |     |       |    |    |    |    |    |    |    |    | HEX   |        |               |                   |                       |           |                       |           |                       |
|-------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|-------|----|----|----|----|----|----|----|----|-------|--------|---------------|-------------------|-----------------------|-----------|-----------------------|-----------|-----------------------|
| Inst / Para       | D/CX                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | WRX | RDX | D17-8 | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | HEX   |        |               |                   |                       |           |                       |           |                       |
| INVON             | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | ↑   | 1   | -     | 0  | 0  | 1  | 0  | 0  | 0  | 0  | 1  | (21h) |        |               |                   |                       |           |                       |           |                       |
| Parameter         | No Parameter                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |     |     |       |    |    |    |    |    |    |    |    | -     |        |               |                   |                       |           |                       |           |                       |
| Description       | <p>-This command is used to enter into display inversion mode</p> <p>-To exit from Display Inversion On, the Display Inversion Off command (20h) should be written.</p> <p>“-“ Don't care</p> <p>(Example)<br/>Memory</p> <p>Top-Left (0,0)</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |     |     |       |    |    |    |    |    |    |    |    |       |        |               |                   |                       |           |                       |           |                       |
| Default           | <table border="1"> <thead> <tr> <th>Status</th> <th>Default Value</th> </tr> </thead> <tbody> <tr> <td>Power On Sequence</td> <td>Display Inversion off</td> </tr> <tr> <td>S/W Reset</td> <td>Display Inversion off</td> </tr> <tr> <td>H/W Reset</td> <td>Display Inversion off</td> </tr> </tbody> </table>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |     |     |       |    |    |    |    |    |    |    |    |       | Status | Default Value | Power On Sequence | Display Inversion off | S/W Reset | Display Inversion off | H/W Reset | Display Inversion off |
| Status            | Default Value                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |     |     |       |    |    |    |    |    |    |    |    |       |        |               |                   |                       |           |                       |           |                       |
| Power On Sequence | Display Inversion off                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |     |     |       |    |    |    |    |    |    |    |    |       |        |               |                   |                       |           |                       |           |                       |
| S/W Reset         | Display Inversion off                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |     |     |       |    |    |    |    |    |    |    |    |       |        |               |                   |                       |           |                       |           |                       |
| H/W Reset         | Display Inversion off                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |     |     |       |    |    |    |    |    |    |    |    |       |        |               |                   |                       |           |                       |           |                       |
| Flow Chart        | <div style="border: 1px dashed black; padding: 10px;"> <p><b>Legend</b></p> <ul style="list-style-type: none"> <li> Command</li> <li> Parameter</li> <li> Display</li> <li> Action</li> <li> Mode</li> <li> Sequential transfer</li> </ul> </div><br> <pre> graph TD     A([Display Inversion OFF Mode]) --&gt; B[/INVON (21h)/]     B --&gt; C([Display Inversion ON Mode])     </pre> |     |     |       |    |    |    |    |    |    |    |    |       |        |               |                   |                       |           |                       |           |                       |

## 10.1.16 GAMSET (26h): Gamma Set

| 26H         | GAMSET (Gamma Set) |     |     |       |    |    |    |    |     |     |     |     |       |
|-------------|--------------------|-----|-----|-------|----|----|----|----|-----|-----|-----|-----|-------|
| Inst / Para | D/CX               | WRX | RDX | D17-8 | D7 | D6 | D5 | D4 | D3  | D2  | D1  | D0  | HEX   |
| GAMSET      | 0                  | ↑   | 1   | -     | 0  | 0  | 1  | 0  | 0   | 1   | 1   | 0   | (26h) |
| Parameter   | 1                  | ↑   | 1   | -     | -  | -  | -  | -  | GC3 | GC2 | GC1 | GC0 |       |

-This command is used to select the desired Gamma curve for the current display. A maximum of 4 curves can be selected. The curve is selected by setting the appropriate bit in the parameter as described in the Table.

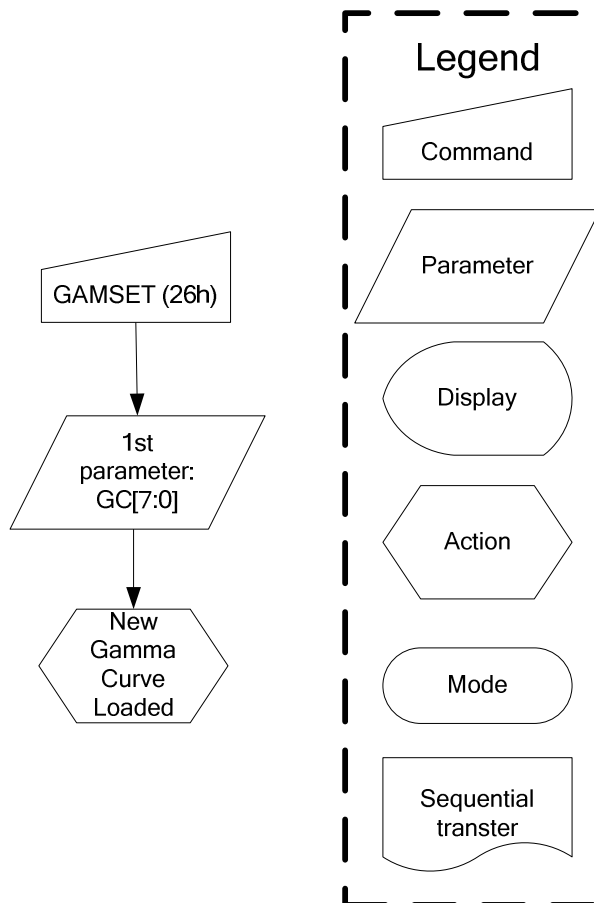
| GC [7:0] | Parameter | Curve Selected       |                      |
|----------|-----------|----------------------|----------------------|
|          |           | GS=1                 | GS=0                 |
| 01h      | GC0       | Gamma Curve 1 (G2.2) | Gamma Curve 1 (G1.0) |
| 02h      | GC1       | Gamma Curve 2 (G1.8) | Gamma Curve 2 (G2.5) |
| 04h      | GC2       | Gamma Curve 3 (G2.5) | Gamma Curve 3 (G2.2) |
| 08h      | GC3       | Gamma Curve 4 (G1.0) | Gamma Curve 4 (G1.8) |

Note: All other values are undefined.

Default

| Status            | Default Value |
|-------------------|---------------|
| Power On Sequence | 01h           |
| S/W Reset         | 01h           |
| H/W Reset         | 01h           |

Flow Chart



## 10.1.17 DISPOFF (28h): Display Off

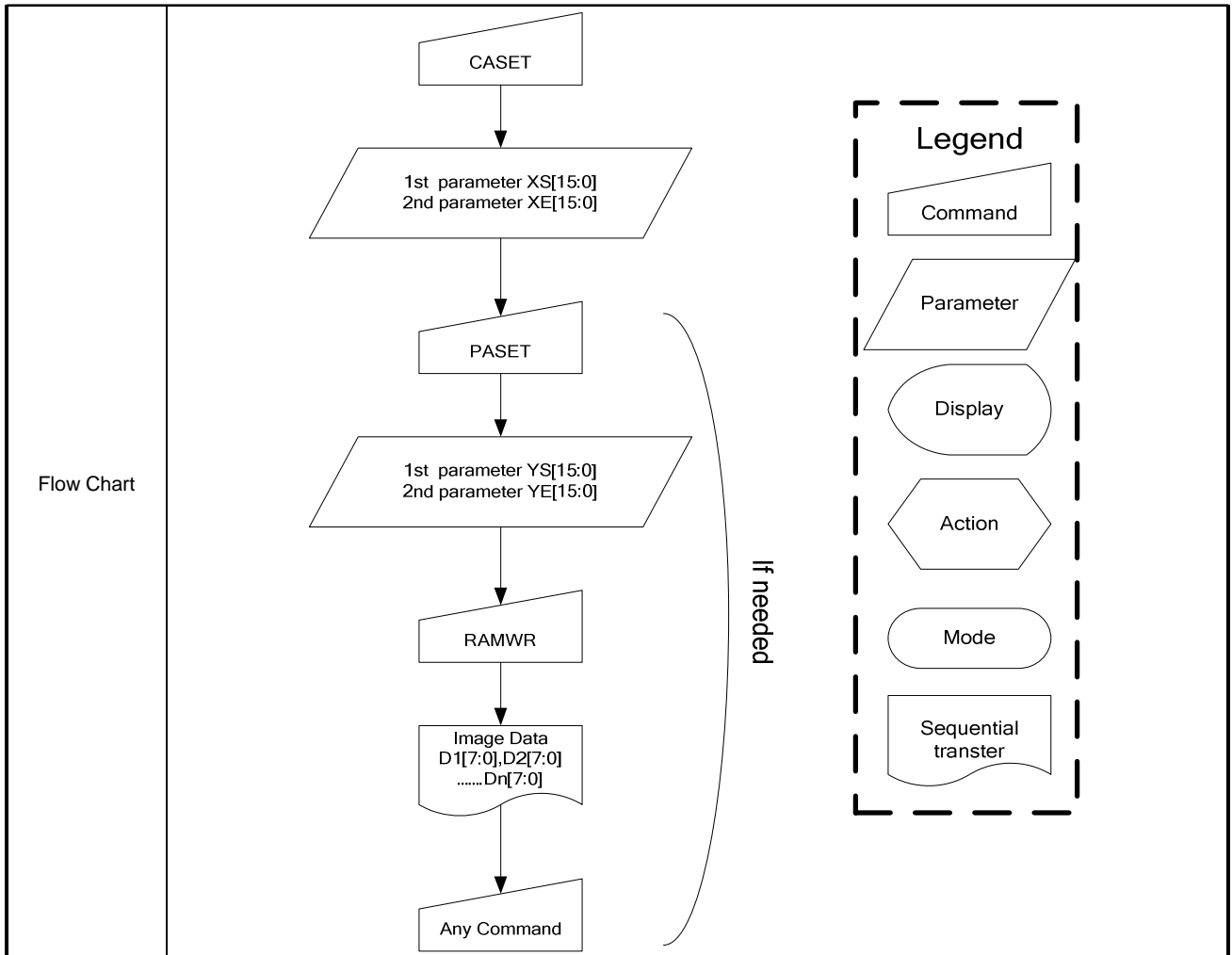
| 28H               | DISPOFF (Display Off)                                                                                                                                                                                                                                                                                                                                                                                                                                           |     |     |       |    |    |    |    |    |    |    |    | HEX   |        |               |                   |             |           |             |           |             |
|-------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|-------|----|----|----|----|----|----|----|----|-------|--------|---------------|-------------------|-------------|-----------|-------------|-----------|-------------|
| Inst / Para       | D/CX                                                                                                                                                                                                                                                                                                                                                                                                                                                            | WRX | RDX | D17-8 | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | HEX   |        |               |                   |             |           |             |           |             |
| DISPOFF           | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                               | ↑   | 1   | -     | 0  | 0  | 1  | 0  | 1  | 0  | 0  | 0  | (28h) |        |               |                   |             |           |             |           |             |
| Parameter         | No Parameter                                                                                                                                                                                                                                                                                                                                                                                                                                                    |     |     |       |    |    |    |    |    |    |    |    | -     |        |               |                   |             |           |             |           |             |
| Description       | <p>- This command is used to enter into DISPLAY OFF mode. In this mode, the output from Frame Memory is disabled and blank page inserted.</p> <p>- This command makes no change of contents of frame memory.</p> <p>- This command does not change any other status.</p> <p>- There will be no abnormal visible effect on the display.</p> <p>- Exit from this command by Display On (29h)</p> <div style="text-align: center;"> <p><b>(Example)</b></p> </div> |     |     |       |    |    |    |    |    |    |    |    |       |        |               |                   |             |           |             |           |             |
| Default           | <table border="1"> <thead> <tr> <th>Status</th> <th>Default Value</th> </tr> </thead> <tbody> <tr> <td>Power On Sequence</td> <td>Display off</td> </tr> <tr> <td>S/W Reset</td> <td>Display off</td> </tr> <tr> <td>H/W Reset</td> <td>Display off</td> </tr> </tbody> </table>                                                                                                                                                                                |     |     |       |    |    |    |    |    |    |    |    |       | Status | Default Value | Power On Sequence | Display off | S/W Reset | Display off | H/W Reset | Display off |
| Status            | Default Value                                                                                                                                                                                                                                                                                                                                                                                                                                                   |     |     |       |    |    |    |    |    |    |    |    |       |        |               |                   |             |           |             |           |             |
| Power On Sequence | Display off                                                                                                                                                                                                                                                                                                                                                                                                                                                     |     |     |       |    |    |    |    |    |    |    |    |       |        |               |                   |             |           |             |           |             |
| S/W Reset         | Display off                                                                                                                                                                                                                                                                                                                                                                                                                                                     |     |     |       |    |    |    |    |    |    |    |    |       |        |               |                   |             |           |             |           |             |
| H/W Reset         | Display off                                                                                                                                                                                                                                                                                                                                                                                                                                                     |     |     |       |    |    |    |    |    |    |    |    |       |        |               |                   |             |           |             |           |             |
| Flow Chart        | <div style="border: 1px dashed black; padding: 10px;"> <p style="text-align: center;"><b>Legend</b></p> <ul style="list-style-type: none"> <li> Command</li> <li> Parameter</li> <li> Display</li> <li> Action</li> <li> Mode</li> <li> Sequential transfer</li> </ul> </div> <div style="text-align: center; margin-top: 20px;"> <pre> graph TD     A([Display On Mode]) --&gt; B[/DISPOFF/]     B --&gt; C([Display Off Mode])             </pre> </div>      |     |     |       |    |    |    |    |    |    |    |    |       |        |               |                   |             |           |             |           |             |

## 10.1.18 DISPON (29h): Display On

| 29H               | DISPON (Display On)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |     |     |       |    |    |    |    |    |    |    |    | HEX    |               |                   |             |           |             |           |             |
|-------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|-------|----|----|----|----|----|----|----|----|--------|---------------|-------------------|-------------|-----------|-------------|-----------|-------------|
| Inst / Para       | D/CX                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | WRX | RDX | D17-8 | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 |        |               |                   |             |           |             |           |             |
| DISPON            | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | ↑   | 1   | -     | 0  | 0  | 1  | 0  | 1  | 0  | 0  | 1  | (29h)  |               |                   |             |           |             |           |             |
| Parameter         | No Parameter                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |     |     |       |    |    |    |    |    |    |    |    | -      |               |                   |             |           |             |           |             |
| Description       | <ul style="list-style-type: none"> <li>- This command is used to recover from DISPLAY OFF mode.</li> <li>- Output from the Frame Memory is enabled.</li> <li>- This command makes no change of contents of frame memory.</li> <li>- This command does not change any other status.</li> </ul> <div style="text-align: center;"> <p><b>(Example)</b></p> </div>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |     |     |       |    |    |    |    |    |    |    |    |        |               |                   |             |           |             |           |             |
| Default           | <table border="1"> <thead> <tr> <th>Status</th> <th>Default Value</th> </tr> </thead> <tbody> <tr> <td>Power On Sequence</td> <td>Display off</td> </tr> <tr> <td>S/W Reset</td> <td>Display off</td> </tr> <tr> <td>H/W Reset</td> <td>Display off</td> </tr> </tbody> </table>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |     |     |       |    |    |    |    |    |    |    |    | Status | Default Value | Power On Sequence | Display off | S/W Reset | Display off | H/W Reset | Display off |
| Status            | Default Value                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |     |     |       |    |    |    |    |    |    |    |    |        |               |                   |             |           |             |           |             |
| Power On Sequence | Display off                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |     |     |       |    |    |    |    |    |    |    |    |        |               |                   |             |           |             |           |             |
| S/W Reset         | Display off                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |     |     |       |    |    |    |    |    |    |    |    |        |               |                   |             |           |             |           |             |
| H/W Reset         | Display off                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |     |     |       |    |    |    |    |    |    |    |    |        |               |                   |             |           |             |           |             |
| Flow Chart        | <div style="border: 1px dashed black; padding: 10px;"> <p style="text-align: center;"><b>Legend</b></p> <div style="display: flex; flex-direction: column; align-items: center;"> <div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;">Command</div> <div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;">Parameter</div> <div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;">Display</div> <div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;">Action</div> <div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;">Mode</div> <div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;">Sequential transfer</div> </div> <div style="margin-top: 20px;"> <pre> graph TD     A([Display Off Mode]) --&gt; B[DISPON]     B --&gt; C([Display On Mode])             </pre> </div> </div> |     |     |       |    |    |    |    |    |    |    |    |        |               |                   |             |           |             |           |             |

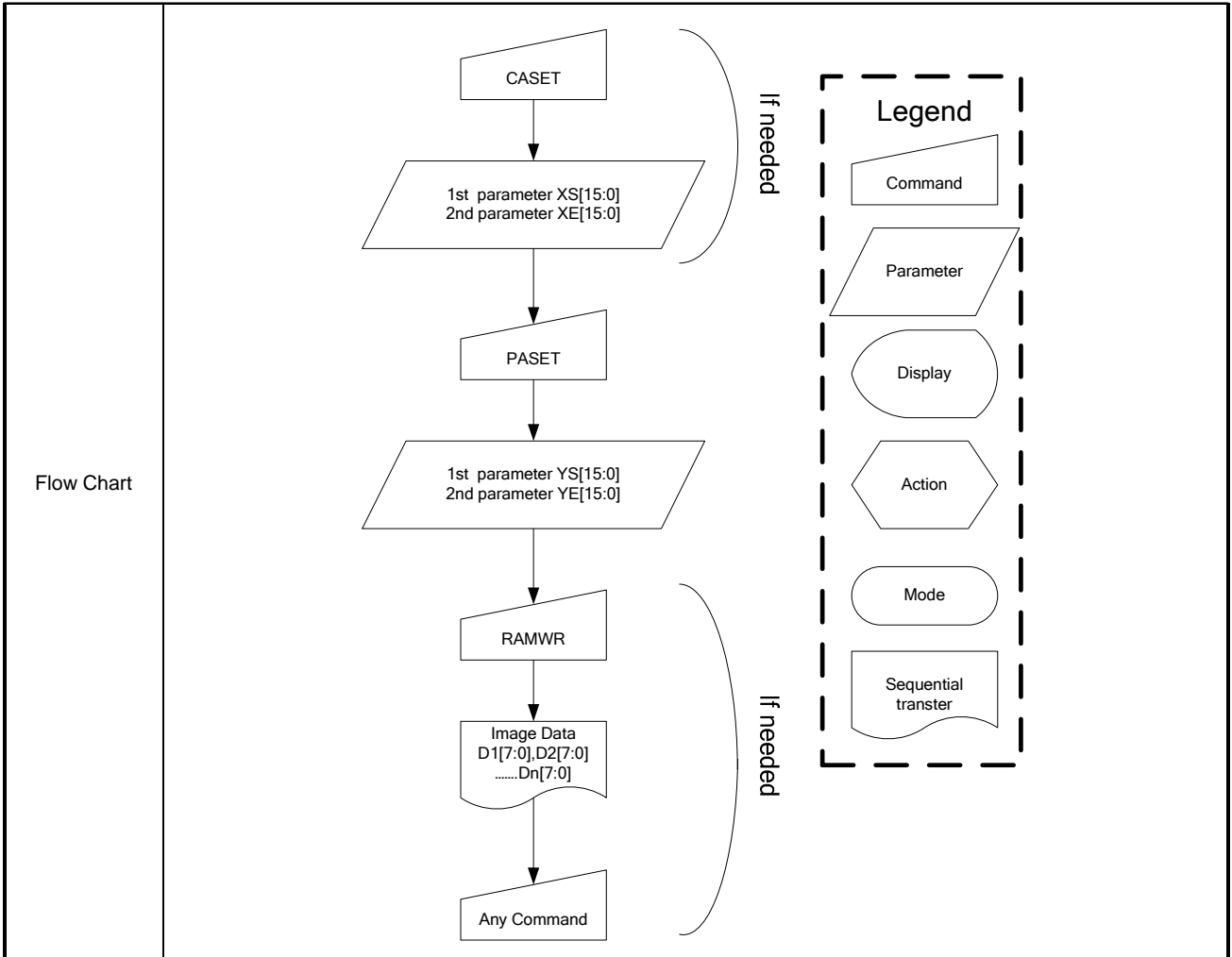
## 10.1.19 CASET (2Ah): Column Address Set

| 2AH                                 | CASET(Column Address Set)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |               |                   |                   |      |      |      |      |      |      |     |     |       |           |        |               |  |  |          |                   |                   |                                     |                      |       |             |  |           |       |             |             |           |       |             |  |                                     |                      |       |             |  |           |       |             |             |           |       |             |  |
|-------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|-------------------|-------------------|------|------|------|------|------|------|-----|-----|-------|-----------|--------|---------------|--|--|----------|-------------------|-------------------|-------------------------------------|----------------------|-------|-------------|--|-----------|-------|-------------|-------------|-----------|-------|-------------|--|-------------------------------------|----------------------|-------|-------------|--|-----------|-------|-------------|-------------|-----------|-------|-------------|--|
| Inst / Para                         | D/CX                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | WRX           | RDX               | D17-8             | D7   | D6   | D5   | D4   | D3   | D2   | D1  | D0  | HEX   |           |        |               |  |  |          |                   |                   |                                     |                      |       |             |  |           |       |             |             |           |       |             |  |                                     |                      |       |             |  |           |       |             |             |           |       |             |  |
| CASET(2Ah)                          | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | ↑             | 1                 | -                 | 0    | 0    | 1    | 0    | 1    | 0    | 1   | 0   | (2Ah) |           |        |               |  |  |          |                   |                   |                                     |                      |       |             |  |           |       |             |             |           |       |             |  |                                     |                      |       |             |  |           |       |             |             |           |       |             |  |
| 1 <sup>st</sup> parameter           | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | ↑             | 1                 | -                 | XS15 | XS14 | XS13 | XS12 | XS11 | XS10 | XS9 | XS8 |       |           |        |               |  |  |          |                   |                   |                                     |                      |       |             |  |           |       |             |             |           |       |             |  |                                     |                      |       |             |  |           |       |             |             |           |       |             |  |
| 2 <sup>nd</sup> parameter           | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | ↑             | 1                 | -                 | XS7  | XS6  | XS5  | XS4  | XS3  | XS2  | XS1 | XS0 |       |           |        |               |  |  |          |                   |                   |                                     |                      |       |             |  |           |       |             |             |           |       |             |  |                                     |                      |       |             |  |           |       |             |             |           |       |             |  |
| 3 <sup>rd</sup> parameter           | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | ↑             | 1                 | -                 | XE15 | XE14 | XE13 | XE12 | XE11 | XE10 | XE9 | XE8 |       |           |        |               |  |  |          |                   |                   |                                     |                      |       |             |  |           |       |             |             |           |       |             |  |                                     |                      |       |             |  |           |       |             |             |           |       |             |  |
| 4 <sup>th</sup> parameter           | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | ↑             | 1                 | -                 | XE7  | XE6  | XE5  | XE4  | XE3  | XE2  | XE1 | XE0 |       |           |        |               |  |  |          |                   |                   |                                     |                      |       |             |  |           |       |             |             |           |       |             |  |                                     |                      |       |             |  |           |       |             |             |           |       |             |  |
| Description                         | <p>-The value of XS [7:0] and XE [7:0] are referred when RAMWR command comes.</p> <p>-Each value represents one column line in the Frame Memory.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |               |                   |                   |      |      |      |      |      |      |     |     |       |           |        |               |  |  |          |                   |                   |                                     |                      |       |             |  |           |       |             |             |           |       |             |  |                                     |                      |       |             |  |           |       |             |             |           |       |             |  |
| Restriction                         | <p>XS [15:0] always must be equal to or less than XE [15:0]</p> <p>When XS [15:0] or XE [15:0] is greater than maximum address like below, data of out of range will be ignored.</p> <p>1. 128X160 memory base (GM = '11')</p> <p>(Parameter range: 0 &lt; XS [15:0] &lt; XE [15:0] &lt; 127 (007Fh)): MV="0"</p> <p>(Parameter range: 0 &lt; XS [15:0] &lt; XE [15:0] &lt; 159 (009Fh)): MV="1"</p> <p>2. 132X162 memory base (GM = '00')</p> <p>(Parameter range: 0 &lt; XS [15:0] &lt; XE [15:0] &lt; 131 (0083h)): MV="0"</p> <p>(Parameter range: 0 &lt; XS [15:0] &lt; XE [15:0] &lt; 161 (00A1h)): MV="1"</p>                                                                                                                                                                                                                                                                                          |               |                   |                   |      |      |      |      |      |      |     |     |       |           |        |               |  |  |          |                   |                   |                                     |                      |       |             |  |           |       |             |             |           |       |             |  |                                     |                      |       |             |  |           |       |             |             |           |       |             |  |
| Default                             | <table border="1"> <thead> <tr> <th rowspan="2">GM Status</th> <th rowspan="2">Status</th> <th colspan="3">Default Value</th> </tr> <tr> <th>XS [7:0]</th> <th>XE [7:0] (MV='0')</th> <th>XE [7:0] (MV='1')</th> </tr> </thead> <tbody> <tr> <td rowspan="3">GM='11'<br/>(128x160<br/>memory base)</td> <td>Power On<br/>Sequence</td> <td>0000h</td> <td colspan="2">007Fh (127)</td> </tr> <tr> <td>S/W Reset</td> <td>0000h</td> <td>007Fh (127)</td> <td>009Fh (159)</td> </tr> <tr> <td>H/W Reset</td> <td>0000h</td> <td colspan="2">007Fh (127)</td> </tr> <tr> <td rowspan="3">GM='00'<br/>(132x162<br/>memory base)</td> <td>Power On<br/>Sequence</td> <td>0000h</td> <td colspan="2">0083h (131)</td> </tr> <tr> <td>S/W Reset</td> <td>0000h</td> <td>0083h (131)</td> <td>00A1h (161)</td> </tr> <tr> <td>H/W Reset</td> <td>0000h</td> <td colspan="2">0083h (131)</td> </tr> </tbody> </table> |               |                   |                   |      |      |      |      |      |      |     |     |       | GM Status | Status | Default Value |  |  | XS [7:0] | XE [7:0] (MV='0') | XE [7:0] (MV='1') | GM='11'<br>(128x160<br>memory base) | Power On<br>Sequence | 0000h | 007Fh (127) |  | S/W Reset | 0000h | 007Fh (127) | 009Fh (159) | H/W Reset | 0000h | 007Fh (127) |  | GM='00'<br>(132x162<br>memory base) | Power On<br>Sequence | 0000h | 0083h (131) |  | S/W Reset | 0000h | 0083h (131) | 00A1h (161) | H/W Reset | 0000h | 0083h (131) |  |
| GM Status                           | Status                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Default Value |                   |                   |      |      |      |      |      |      |     |     |       |           |        |               |  |  |          |                   |                   |                                     |                      |       |             |  |           |       |             |             |           |       |             |  |                                     |                      |       |             |  |           |       |             |             |           |       |             |  |
|                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | XS [7:0]      | XE [7:0] (MV='0') | XE [7:0] (MV='1') |      |      |      |      |      |      |     |     |       |           |        |               |  |  |          |                   |                   |                                     |                      |       |             |  |           |       |             |             |           |       |             |  |                                     |                      |       |             |  |           |       |             |             |           |       |             |  |
| GM='11'<br>(128x160<br>memory base) | Power On<br>Sequence                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 0000h         | 007Fh (127)       |                   |      |      |      |      |      |      |     |     |       |           |        |               |  |  |          |                   |                   |                                     |                      |       |             |  |           |       |             |             |           |       |             |  |                                     |                      |       |             |  |           |       |             |             |           |       |             |  |
|                                     | S/W Reset                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 0000h         | 007Fh (127)       | 009Fh (159)       |      |      |      |      |      |      |     |     |       |           |        |               |  |  |          |                   |                   |                                     |                      |       |             |  |           |       |             |             |           |       |             |  |                                     |                      |       |             |  |           |       |             |             |           |       |             |  |
|                                     | H/W Reset                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 0000h         | 007Fh (127)       |                   |      |      |      |      |      |      |     |     |       |           |        |               |  |  |          |                   |                   |                                     |                      |       |             |  |           |       |             |             |           |       |             |  |                                     |                      |       |             |  |           |       |             |             |           |       |             |  |
| GM='00'<br>(132x162<br>memory base) | Power On<br>Sequence                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 0000h         | 0083h (131)       |                   |      |      |      |      |      |      |     |     |       |           |        |               |  |  |          |                   |                   |                                     |                      |       |             |  |           |       |             |             |           |       |             |  |                                     |                      |       |             |  |           |       |             |             |           |       |             |  |
|                                     | S/W Reset                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 0000h         | 0083h (131)       | 00A1h (161)       |      |      |      |      |      |      |     |     |       |           |        |               |  |  |          |                   |                   |                                     |                      |       |             |  |           |       |             |             |           |       |             |  |                                     |                      |       |             |  |           |       |             |             |           |       |             |  |
|                                     | H/W Reset                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 0000h         | 0083h (131)       |                   |      |      |      |      |      |      |     |     |       |           |        |               |  |  |          |                   |                   |                                     |                      |       |             |  |           |       |             |             |           |       |             |  |                                     |                      |       |             |  |           |       |             |             |           |       |             |  |



## 10.1.20 RASET (2Bh): Row Address Set

| 2BH                                 | RASET (Row Address Set)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                    |                    |      |      |      |      |      |      |     |     | HEX   |  |           |        |               |  |  |           |                    |                    |                                     |                   |       |             |  |           |       |             |             |           |       |             |  |                                     |                   |       |             |  |           |       |             |             |           |       |             |
|-------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|--------------------|------|------|------|------|------|------|-----|-----|-------|--|-----------|--------|---------------|--|--|-----------|--------------------|--------------------|-------------------------------------|-------------------|-------|-------------|--|-----------|-------|-------------|-------------|-----------|-------|-------------|--|-------------------------------------|-------------------|-------|-------------|--|-----------|-------|-------------|-------------|-----------|-------|-------------|
| Inst / Para                         | D/CX                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | WRX                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | RDX                | D17-8              | D7   | D6   | D5   | D4   | D3   | D2   | D1  | D0  |       |  |           |        |               |  |  |           |                    |                    |                                     |                   |       |             |  |           |       |             |             |           |       |             |  |                                     |                   |       |             |  |           |       |             |             |           |       |             |
| RASET (2Bh)                         | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | ↑                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 1                  | -                  | 0    | 0    | 1    | 0    | 1    | 0    | 1   | 1   | (2Bh) |  |           |        |               |  |  |           |                    |                    |                                     |                   |       |             |  |           |       |             |             |           |       |             |  |                                     |                   |       |             |  |           |       |             |             |           |       |             |
| 1 <sup>st</sup> parameter           | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | ↑                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 1                  | -                  | YS15 | YS14 | YS13 | YS12 | YS11 | YS10 | YS9 | YS8 |       |  |           |        |               |  |  |           |                    |                    |                                     |                   |       |             |  |           |       |             |             |           |       |             |  |                                     |                   |       |             |  |           |       |             |             |           |       |             |
| 2 <sup>nd</sup> parameter           | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | ↑                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 1                  | -                  | YS7  | YS6  | YS5  | YS4  | YS3  | YS2  | YS1 | YS0 |       |  |           |        |               |  |  |           |                    |                    |                                     |                   |       |             |  |           |       |             |             |           |       |             |  |                                     |                   |       |             |  |           |       |             |             |           |       |             |
| 3 <sup>rd</sup> parameter           | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | ↑                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 1                  | -                  | YE15 | YE14 | YE13 | YE12 | YE11 | YE10 | YE9 | YE8 |       |  |           |        |               |  |  |           |                    |                    |                                     |                   |       |             |  |           |       |             |             |           |       |             |  |                                     |                   |       |             |  |           |       |             |             |           |       |             |
| 4 <sup>th</sup> parameter           | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | ↑                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 1                  | -                  | YE7  | YE6  | YE5  | YE4  | YE3  | YE2  | YE1 | YE0 |       |  |           |        |               |  |  |           |                    |                    |                                     |                   |       |             |  |           |       |             |             |           |       |             |  |                                     |                   |       |             |  |           |       |             |             |           |       |             |
| Description                         | <p>The value of YS [7:0] and YE [7:0] are referred when RAMWR command comes.</p> <p>Each value represents one column line in the Frame Memory.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                    |                    |      |      |      |      |      |      |     |     |       |  |           |        |               |  |  |           |                    |                    |                                     |                   |       |             |  |           |       |             |             |           |       |             |  |                                     |                   |       |             |  |           |       |             |             |           |       |             |
|                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                    |                    |      |      |      |      |      |      |     |     |       |  |           |        |               |  |  |           |                    |                    |                                     |                   |       |             |  |           |       |             |             |           |       |             |  |                                     |                   |       |             |  |           |       |             |             |           |       |             |
| Restriction                         | <p>YS [15:0] always must be equal to or less than YE [15:0]</p> <p>When YS [15:0] or YE [15:0] are greater than maximum row address like below, data of out of range will be ignored.</p> <p>1. 128X160 memory base (GM = '11')</p> <p>(Parameter range: 0 &lt; YS [15:0] &lt; YE [15:0] &lt; 159 (009Fh)): MV="0"</p> <p>(Parameter range: 0 &lt; YS [15:0] &lt; YE [15:0] &lt; 127 (007Fh)): MV="1"</p> <p>2. 132X162 memory base (GM = '00')</p> <p>(Parameter range: 0 &lt; YS [15:0] &lt; YE [15:0] &lt; 161 (00A1h)): MV="0"</p> <p>(Parameter range: 0 &lt; YS [15:0] &lt; YE [15:0] &lt; 131 (0083h)): MV="1"</p> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                    |                    |      |      |      |      |      |      |     |     |       |  |           |        |               |  |  |           |                    |                    |                                     |                   |       |             |  |           |       |             |             |           |       |             |  |                                     |                   |       |             |  |           |       |             |             |           |       |             |
|                                     | Default                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | <table border="1"> <thead> <tr> <th rowspan="2">GM status</th> <th rowspan="2">Status</th> <th colspan="3">Default Value</th> </tr> <tr> <th>YS [15:0]</th> <th>YE [15:0] (MV='0')</th> <th>YE [15:0] (MV='1')</th> </tr> </thead> <tbody> <tr> <td rowspan="3">GM='11'<br/>(128x160<br/>memory base)</td> <td>Power On Sequence</td> <td>0000h</td> <td colspan="2">009Fh (159)</td> </tr> <tr> <td>S/W Reset</td> <td>0000h</td> <td>009Fh (159)</td> <td>007Fh (127)</td> </tr> <tr> <td>H/W Reset</td> <td>0000h</td> <td colspan="2">009Fh (159)</td> </tr> <tr> <td rowspan="3">GM='00'<br/>(132x162<br/>memory base)</td> <td>Power On Sequence</td> <td>0000h</td> <td colspan="2">00A1h (161)</td> </tr> <tr> <td>S/W Reset</td> <td>0000h</td> <td>00A1h (161)</td> <td>0083h (131)</td> </tr> <tr> <td>H/W Reset</td> <td>0000h</td> <td colspan="2">00A1h (161)</td> </tr> </tbody> </table> |                    |                    |      |      |      |      |      |      |     |     |       |  | GM status | Status | Default Value |  |  | YS [15:0] | YE [15:0] (MV='0') | YE [15:0] (MV='1') | GM='11'<br>(128x160<br>memory base) | Power On Sequence | 0000h | 009Fh (159) |  | S/W Reset | 0000h | 009Fh (159) | 007Fh (127) | H/W Reset | 0000h | 009Fh (159) |  | GM='00'<br>(132x162<br>memory base) | Power On Sequence | 0000h | 00A1h (161) |  | S/W Reset | 0000h | 00A1h (161) | 0083h (131) | H/W Reset | 0000h | 00A1h (161) |
| GM status                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Status                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Default Value      |                    |      |      |      |      |      |      |     |     |       |  |           |        |               |  |  |           |                    |                    |                                     |                   |       |             |  |           |       |             |             |           |       |             |  |                                     |                   |       |             |  |           |       |             |             |           |       |             |
|                                     | YS [15:0]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | YE [15:0] (MV='0') | YE [15:0] (MV='1') |      |      |      |      |      |      |     |     |       |  |           |        |               |  |  |           |                    |                    |                                     |                   |       |             |  |           |       |             |             |           |       |             |  |                                     |                   |       |             |  |           |       |             |             |           |       |             |
| GM='11'<br>(128x160<br>memory base) | Power On Sequence                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 0000h                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 009Fh (159)        |                    |      |      |      |      |      |      |     |     |       |  |           |        |               |  |  |           |                    |                    |                                     |                   |       |             |  |           |       |             |             |           |       |             |  |                                     |                   |       |             |  |           |       |             |             |           |       |             |
|                                     | S/W Reset                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 0000h                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 009Fh (159)        | 007Fh (127)        |      |      |      |      |      |      |     |     |       |  |           |        |               |  |  |           |                    |                    |                                     |                   |       |             |  |           |       |             |             |           |       |             |  |                                     |                   |       |             |  |           |       |             |             |           |       |             |
|                                     | H/W Reset                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 0000h                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 009Fh (159)        |                    |      |      |      |      |      |      |     |     |       |  |           |        |               |  |  |           |                    |                    |                                     |                   |       |             |  |           |       |             |             |           |       |             |  |                                     |                   |       |             |  |           |       |             |             |           |       |             |
| GM='00'<br>(132x162<br>memory base) | Power On Sequence                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 0000h                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 00A1h (161)        |                    |      |      |      |      |      |      |     |     |       |  |           |        |               |  |  |           |                    |                    |                                     |                   |       |             |  |           |       |             |             |           |       |             |  |                                     |                   |       |             |  |           |       |             |             |           |       |             |
|                                     | S/W Reset                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 0000h                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 00A1h (161)        | 0083h (131)        |      |      |      |      |      |      |     |     |       |  |           |        |               |  |  |           |                    |                    |                                     |                   |       |             |  |           |       |             |             |           |       |             |  |                                     |                   |       |             |  |           |       |             |             |           |       |             |
|                                     | H/W Reset                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 0000h                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 00A1h (161)        |                    |      |      |      |      |      |      |     |     |       |  |           |        |               |  |  |           |                    |                    |                                     |                   |       |             |  |           |       |             |             |           |       |             |  |                                     |                   |       |             |  |           |       |             |             |           |       |             |



## 10.1.21 RAMWR (2Ch): Memory Write

| 2CH               | RAMWR (Memory Write)                                                                                                                                                                                                                                                                                                                                                                                      |     |     |       |    |    |    |    |    |    |    |    |       |        |               |                   |                                    |           |                                   |           |                                   |
|-------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|-------|----|----|----|----|----|----|----|----|-------|--------|---------------|-------------------|------------------------------------|-----------|-----------------------------------|-----------|-----------------------------------|
| Inst / Para       | D/CX                                                                                                                                                                                                                                                                                                                                                                                                      | WRX | RDX | D17-8 | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | HEX   |        |               |                   |                                    |           |                                   |           |                                   |
| RAMWR             | 0                                                                                                                                                                                                                                                                                                                                                                                                         | ↑   | 1   | -     | 0  | 0  | 1  | 0  | 1  | 1  | 0  | 0  | (2Ch) |        |               |                   |                                    |           |                                   |           |                                   |
| 1st parameter     | 1                                                                                                                                                                                                                                                                                                                                                                                                         | ↑   | 1   | D17-8 | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 |       |        |               |                   |                                    |           |                                   |           |                                   |
|                   | 1                                                                                                                                                                                                                                                                                                                                                                                                         | ↑   | 1   |       |    |    |    |    |    |    |    |    |       |        |               |                   |                                    |           |                                   |           |                                   |
| Nth parameter     | 1                                                                                                                                                                                                                                                                                                                                                                                                         | ↑   | 1   | D17-8 | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 |       |        |               |                   |                                    |           |                                   |           |                                   |
| Description       | <p>In all color modes, there is no restriction on length of parameters.</p> <p>1. 128X160 memory base (GM = '11')</p> <p>128x160x18-bit memory can be written by this command</p> <p>Memory range: (0000h, 0000h) -&gt; (007Fh, 09Fh)</p> <p>2. 132x162 memory base (GM = '00')</p> <p>132x162x18-bit memory can be written on this command.</p> <p>Memory range: (0000h, 0000h) -&gt; (0083h, 00A1h)</p> |     |     |       |    |    |    |    |    |    |    |    |       |        |               |                   |                                    |           |                                   |           |                                   |
| Default           | <table border="1"> <thead> <tr> <th>Status</th> <th>Default Value</th> </tr> </thead> <tbody> <tr> <td>Power On Sequence</td> <td>Contents of memory is set randomly</td> </tr> <tr> <td>S/W Reset</td> <td>Contents of memory is not cleared</td> </tr> <tr> <td>H/W Reset</td> <td>Contents of memory is not cleared</td> </tr> </tbody> </table>                                                       |     |     |       |    |    |    |    |    |    |    |    |       | Status | Default Value | Power On Sequence | Contents of memory is set randomly | S/W Reset | Contents of memory is not cleared | H/W Reset | Contents of memory is not cleared |
| Status            | Default Value                                                                                                                                                                                                                                                                                                                                                                                             |     |     |       |    |    |    |    |    |    |    |    |       |        |               |                   |                                    |           |                                   |           |                                   |
| Power On Sequence | Contents of memory is set randomly                                                                                                                                                                                                                                                                                                                                                                        |     |     |       |    |    |    |    |    |    |    |    |       |        |               |                   |                                    |           |                                   |           |                                   |
| S/W Reset         | Contents of memory is not cleared                                                                                                                                                                                                                                                                                                                                                                         |     |     |       |    |    |    |    |    |    |    |    |       |        |               |                   |                                    |           |                                   |           |                                   |
| H/W Reset         | Contents of memory is not cleared                                                                                                                                                                                                                                                                                                                                                                         |     |     |       |    |    |    |    |    |    |    |    |       |        |               |                   |                                    |           |                                   |           |                                   |
| Flow Chart        | <pre> graph TD     A[RAMWR] --&gt; B[Image Data D1[7:0], D2[7:0] ..... Dn[7:0]]     B --&gt; C[Any Command]     </pre> <p><b>Legend</b></p> <ul style="list-style-type: none"> <li>Command</li> <li>Parameter</li> <li>Display</li> <li>Action</li> <li>Mode</li> <li>Sequential transfer</li> </ul>                                                                                                      |     |     |       |    |    |    |    |    |    |    |    |       |        |               |                   |                                    |           |                                   |           |                                   |

## 10.1.22 RGBSET (2Dh): Color Setting for 4K, 65K and 262K

| 2DH               | RGBSET (Color Set for 4K, 65K, 262K and 16.7M)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |     |     |       |    |    |        |               |                   |        |           |                                         |           |        |  |  |  |  |  |  |  |
|-------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|-------|----|----|--------|---------------|-------------------|--------|-----------|-----------------------------------------|-----------|--------|--|--|--|--|--|--|--|
| Inst / Para       | D/CX                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | WRX | RDX | D17-8 | D7 | D6 | D5     | D4            | D3                | D2     | D1        | D0                                      | HEX       |        |  |  |  |  |  |  |  |
| RGBSET            | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | ↑   | 1   | -     | 0  | 0  | 1      | 0             | 1                 | 1      | 0         | 1                                       | (2Dh)     |        |  |  |  |  |  |  |  |
| 1st parameter     | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | ↑   | 1   | -     | -  | -  | R005   | R004          | R003              | R002   | R001      | R000                                    |           |        |  |  |  |  |  |  |  |
|                   | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | ↑   | 1   | -     | -  | -  | Rnn5   | Rnn4          | Rnn3              | Rnn2   | Rnn1      | Rnn0                                    |           |        |  |  |  |  |  |  |  |
|                   | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | ↑   | 1   | -     | -  | -  | R315   | R314          | R313              | R312   | R311      | R310                                    |           |        |  |  |  |  |  |  |  |
|                   | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | ↑   | 1   | -     | -  | -  | G005   | G004          | G003              | G002   | G001      | G000                                    |           |        |  |  |  |  |  |  |  |
|                   | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | ↑   | 1   | -     | -  | -  | Gnn5   | Gnn4          | Gnn3              | Gnn2   | Gnn1      | Gnn0                                    |           |        |  |  |  |  |  |  |  |
|                   | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | ↑   | 1   | -     | -  | -  | G635   | G634          | G633              | G632   | G631      | G630                                    |           |        |  |  |  |  |  |  |  |
|                   | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | ↑   | 1   | -     | -  | -  | B005   | B004          | B003              | B002   | B001      | B000                                    |           |        |  |  |  |  |  |  |  |
|                   | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | ↑   | 1   | -     | -  | -  | Bnn5   | Bnn4          | Bnn3              | Bnn2   | Bnn1      | Bnn0                                    |           |        |  |  |  |  |  |  |  |
| 128th parameter   | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | ↑   | 1   | -     | -  | -  | B315   | B314          | B313              | B312   | B311      | B310                                    |           |        |  |  |  |  |  |  |  |
| Description       | <p>This command is used to define the LUT for 12bits-to-16bits / 16-bit-to- 18bits color depth conversations.</p> <p>128-Bytes must be written to the LUT regardless of the color mode. Only the values in Section 9.18 are referred.</p> <p>In this condition, 4K-color (4-4-4) and 65K-color(5-6-5) data input are transferred 6(R)-6(G)-6(B) through RGB LUT table.</p> <p>This command has no effect on other commands/parameters and Contents of frame memory.</p> <p>Visible change takes effect next time the Frame Memory is written to.</p> <p>Do not send any command before the last data is sent or LUT is not defined correctly.</p> |     |     |       |    |    |        |               |                   |        |           |                                         |           |        |  |  |  |  |  |  |  |
| Default           | <table border="1"> <thead> <tr> <th>Status</th> <th>Default Value</th> </tr> </thead> <tbody> <tr> <td>Power On Sequence</td> <td>Random</td> </tr> <tr> <td>S/W Reset</td> <td>Contents of the look-up table protected</td> </tr> <tr> <td>H/W Reset</td> <td>Random</td> </tr> </tbody> </table>                                                                                                                                                                                                                                                                                                                                                |     |     |       |    |    | Status | Default Value | Power On Sequence | Random | S/W Reset | Contents of the look-up table protected | H/W Reset | Random |  |  |  |  |  |  |  |
| Status            | Default Value                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |     |     |       |    |    |        |               |                   |        |           |                                         |           |        |  |  |  |  |  |  |  |
| Power On Sequence | Random                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |     |     |       |    |    |        |               |                   |        |           |                                         |           |        |  |  |  |  |  |  |  |
| S/W Reset         | Contents of the look-up table protected                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |     |     |       |    |    |        |               |                   |        |           |                                         |           |        |  |  |  |  |  |  |  |
| H/W Reset         | Random                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |     |     |       |    |    |        |               |                   |        |           |                                         |           |        |  |  |  |  |  |  |  |
| Flow Chart        | <pre> graph TD     A[RGBSET (2Dh)] --&gt; B{1st parameter:<br/> <br/>128th parameter:}     </pre> <p><b>Legend</b></p> <ul style="list-style-type: none"> <li>Command: Rectangle</li> <li>Parameter: Parallelogram</li> <li>Display: Oval</li> <li>Action: Hexagon</li> <li>Mode: Rounded rectangle</li> <li>Sequential transfer: Wavy-bottom rectangle</li> </ul>                                                                                                                                                                                                                                                                                |     |     |       |    |    |        |               |                   |        |           |                                         |           |        |  |  |  |  |  |  |  |

## 10.1.23 RAMRD (2Eh): Memory Read

| 2EH                       | RAMHD (Memory Read)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |     |     |       |    |    |    |    |    |    |    |    | HEX   |        |               |                   |                                    |           |                                   |           |                                   |
|---------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|-------|----|----|----|----|----|----|----|----|-------|--------|---------------|-------------------|------------------------------------|-----------|-----------------------------------|-----------|-----------------------------------|
| Inst / Para               | D/CX                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | WRX | RDX | D17-8 | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 |       |        |               |                   |                                    |           |                                   |           |                                   |
| RAMHD                     | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | ↑   | 1   | -     | 0  | 0  | 1  | 0  | 1  | 1  | 1  | 0  | (2Eh) |        |               |                   |                                    |           |                                   |           |                                   |
| 1 <sup>st</sup> parameter | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 1   | ↑   | -     | -  | -  | -  | -  | -  | -  | -  | -  |       |        |               |                   |                                    |           |                                   |           |                                   |
| 2 <sup>nd</sup> parameter | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 1   | ↑   | D17-8 | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 |       |        |               |                   |                                    |           |                                   |           |                                   |
|                           | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 1   | ↑   |       |    |    |    |    |    |    |    |    |       |        |               |                   |                                    |           |                                   |           |                                   |
| (N+1)th parameter         | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 1   | ↑   | D17-8 | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 |       |        |               |                   |                                    |           |                                   |           |                                   |
| Description               | <p>-This command is used to transfer data from frame memory to MCU.</p> <p>-When this command is accepted, the column register and the row register are reset to the Start Column/Start Row positions.</p> <p>-The Start Column/Start Row positions are different in accordance with MADCTL setting.</p> <p>-Then D[17:0] is read back from the frame memory and the column register and the row register incremented as section 9.10</p> <p>-Frame Read can be cancelled by sending any other command.</p> <p>-The data color coding is fixed to 18-bit in reading function. Please see section 9.8 “Data color coding” for color coding (18-bit cases), when there is used 8, 9, 16 and 18-bit data lines for image data.</p> <p>Note1: The Command 3Ah should be set to 66h when reading pixel data from frame memory. Please check the LUT in chapter 9.17 when using memory read function.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |     |     |       |    |    |    |    |    |    |    |    |       |        |               |                   |                                    |           |                                   |           |                                   |
| Default                   | <table border="1"> <thead> <tr> <th>Status</th> <th>Default Value</th> </tr> </thead> <tbody> <tr> <td>Power On Sequence</td> <td>Contents of memory is set randomly</td> </tr> <tr> <td>S/W Reset</td> <td>Contents of memory is not cleared</td> </tr> <tr> <td>H/W Reset</td> <td>Contents of memory is not cleared</td> </tr> </tbody> </table>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |     |     |       |    |    |    |    |    |    |    |    |       | Status | Default Value | Power On Sequence | Contents of memory is set randomly | S/W Reset | Contents of memory is not cleared | H/W Reset | Contents of memory is not cleared |
| Status                    | Default Value                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |     |     |       |    |    |    |    |    |    |    |    |       |        |               |                   |                                    |           |                                   |           |                                   |
| Power On Sequence         | Contents of memory is set randomly                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |     |     |       |    |    |    |    |    |    |    |    |       |        |               |                   |                                    |           |                                   |           |                                   |
| S/W Reset                 | Contents of memory is not cleared                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |     |     |       |    |    |    |    |    |    |    |    |       |        |               |                   |                                    |           |                                   |           |                                   |
| H/W Reset                 | Contents of memory is not cleared                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |     |     |       |    |    |    |    |    |    |    |    |       |        |               |                   |                                    |           |                                   |           |                                   |
| Flow Chart                | <div style="display: flex; align-items: center;"> <div style="flex: 1;"> <pre> graph TD     A[RAMRD] --&gt; B[/Dummy/]     B --&gt; C[Image Data<br/>D1[7:0], D2[7:0]<br/>.....Dn[7:0]]     C --&gt; D[Any Command]             </pre> </div> <div style="flex: 1; border: 1px dashed black; padding: 5px;"> <p><b>Legend</b></p> <ul style="list-style-type: none"> <li><span style="display: inline-block; width: 20px; height: 10px; border: 1px solid black; margin-right: 5px;"></span> Command</li> <li><span style="display: inline-block; width: 20px; height: 10px; border: 1px solid black; transform: rotate(45deg); margin-right: 5px;"></span> Parameter</li> <li><span style="display: inline-block; width: 20px; height: 10px; border: 1px solid black; border-radius: 5px; margin-right: 5px;"></span> Display</li> <li><span style="display: inline-block; width: 20px; height: 10px; border: 1px solid black; border-top: none; border-bottom: none; margin-right: 5px;"></span> Action</li> <li><span style="display: inline-block; width: 20px; height: 10px; border: 1px solid black; border-radius: 10px; margin-right: 5px;"></span> Mode</li> <li><span style="display: inline-block; width: 20px; height: 10px; border: 1px solid black; border-top: none; border-bottom: none; margin-right: 5px;"></span> Sequential transfer</li> </ul> </div> </div> |     |     |       |    |    |    |    |    |    |    |    |       |        |               |                   |                                    |           |                                   |           |                                   |

## 10.1.24 PTLAR (30h): Partial Area

| 30H           | PTLAR (Partial Area) |     |     |       |       |       |       |       |       |       |      |      | HEX   |
|---------------|----------------------|-----|-----|-------|-------|-------|-------|-------|-------|-------|------|------|-------|
| Inst / Para   | D/CX                 | WRX | RDX | D17-8 | D7    | D6    | D5    | D4    | D3    | D2    | D1   | D0   | HEX   |
| PTLAR         | 0                    | ↑   | 1   | -     | 0     | 0     | 1     | 1     | 0     | 0     | 0    | 0    | (30h) |
| 1st parameter | 1                    | ↑   | 1   | -     | PSL15 | PSL14 | PSL13 | PSL12 | PSL11 | PSL10 | PSL9 | PSL8 |       |
| 2nd parameter | 1                    | ↑   | 1   | -     | PSL7  | PSL6  | PSL5  | PSL4  | PSL3  | PSL2  | PSL1 | PSL0 |       |
| 3rd parameter | 1                    | ↑   | 1   | -     | PEL15 | PEL14 | PEL13 | PEL12 | PEL11 | PEL10 | PEL9 | PEL8 |       |
| 4th parameter | 1                    | ↑   | 1   | -     | PEL7  | PEL6  | PEL5  | PEL4  | PEL3  | PEL2  | PEL1 | PEL0 |       |

**Description**

-This command defines the partial mode's display area.

-There are 4 parameters associated with this command, the first defines the Start Row (PSL) and the second the End Row (PEL), as illustrated in the figures below. PSL and PEL refer to the Frame Memory row address counter.

-If End Row > Start Row, when MADCTL ML='0'

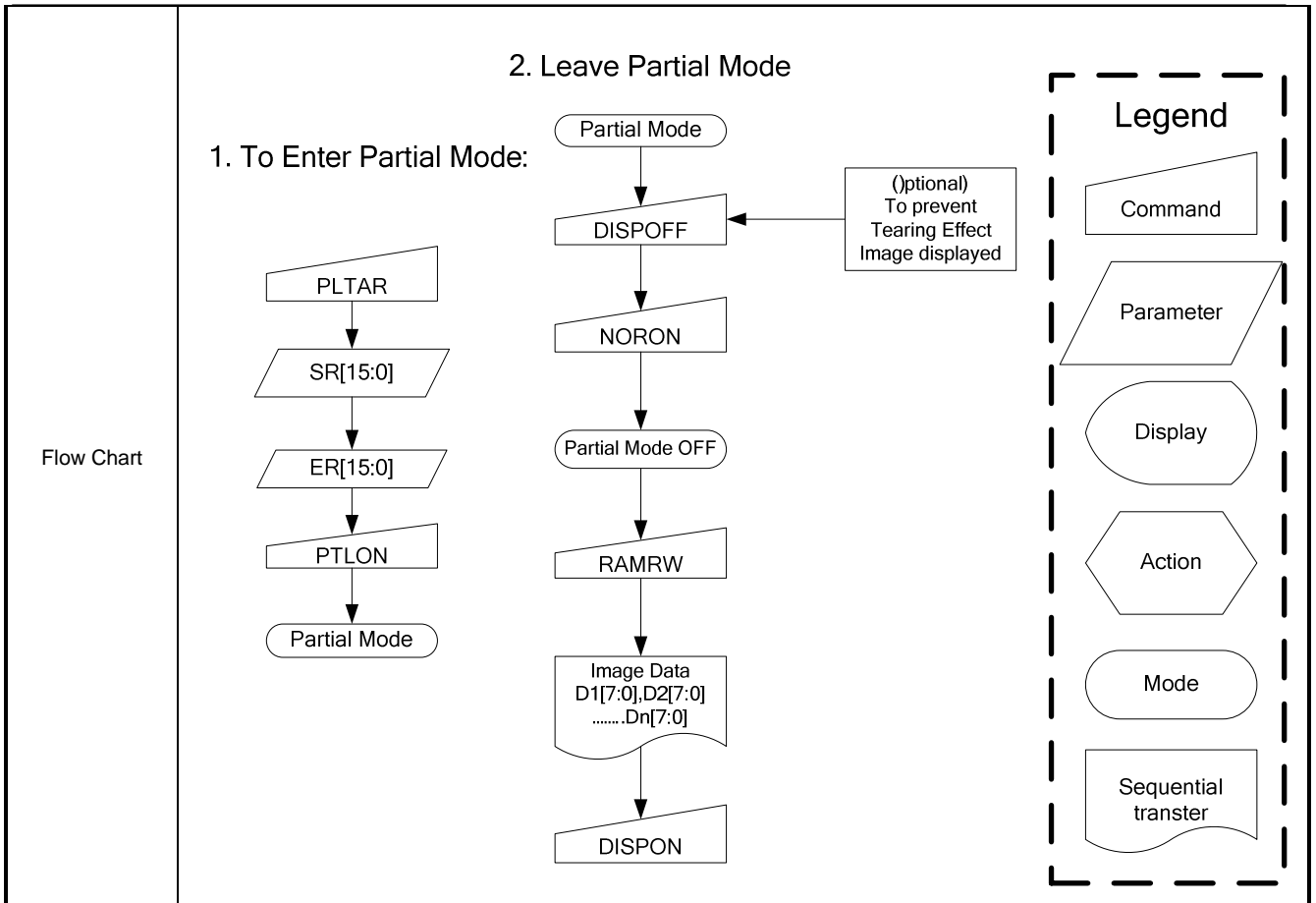
-If End Row > Start Row, when MADCTL ML='1'

-If End Row < Start Row, when MADCTL ML='0'

-If End Row = Start Row then the Partial Area will be one row deep.

| Default | Status            | Default Value |                           |
|---------|-------------------|---------------|---------------------------|
|         |                   | PSL [15:0]    | PEL [15:0]                |
|         | GM[1:0]           | "xx"          | GM[1:0]="11" GM[1:0]="00" |
|         | Power On Sequence | 0000h         | 009Fh 00A1h               |
|         | S/W Reset         | 0000h         | 009Fh 00A1h               |
|         | H/W Reset         | 0000h         | 009Fh 00A1h               |



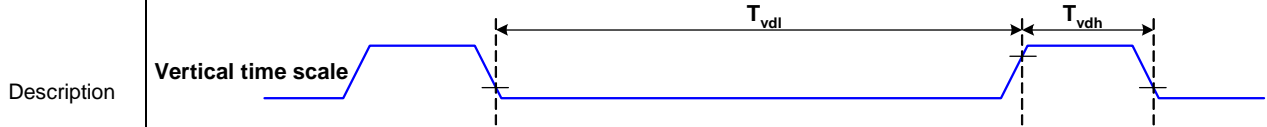
## 10.1.25 TEOFF (34h): Tearing Effect Line OFF

| 34H               | TEOFF (Tearing Effect Line OFF)                                                                                                                                                                                                                                                                                                                                                                                                                                                    |     |     |       |    |    |    |    |    |    |    |    |       |        |               |                   |     |           |     |           |     |
|-------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|-------|----|----|----|----|----|----|----|----|-------|--------|---------------|-------------------|-----|-----------|-----|-----------|-----|
| Inst / Para       | D/CX                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | WRX | RDX | D17-8 | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | HEX   |        |               |                   |     |           |     |           |     |
| TEOFF             | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | ↑   | 1   | -     | 0  | 0  | 1  | 1  | 0  | 1  | 0  | 0  | (34h) |        |               |                   |     |           |     |           |     |
| Parameter         | No Parameter                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |     |     |       |    |    |    |    |    |    |    |    | -     |        |               |                   |     |           |     |           |     |
| Description       | -This command is used to turn OFF (Active Low) the Tearing Effect output signal from the TE signal line.                                                                                                                                                                                                                                                                                                                                                                           |     |     |       |    |    |    |    |    |    |    |    |       |        |               |                   |     |           |     |           |     |
| Default           | <table border="1"> <thead> <tr> <th>Status</th> <th>Default Value</th> </tr> </thead> <tbody> <tr> <td>Power On Sequence</td> <td>OFF</td> </tr> <tr> <td>S/W Reset</td> <td>OFF</td> </tr> <tr> <td>H/W Reset</td> <td>OFF</td> </tr> </tbody> </table>                                                                                                                                                                                                                           |     |     |       |    |    |    |    |    |    |    |    |       | Status | Default Value | Power On Sequence | OFF | S/W Reset | OFF | H/W Reset | OFF |
| Status            | Default Value                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |     |     |       |    |    |    |    |    |    |    |    |       |        |               |                   |     |           |     |           |     |
| Power On Sequence | OFF                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |     |     |       |    |    |    |    |    |    |    |    |       |        |               |                   |     |           |     |           |     |
| S/W Reset         | OFF                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |     |     |       |    |    |    |    |    |    |    |    |       |        |               |                   |     |           |     |           |     |
| H/W Reset         | OFF                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |     |     |       |    |    |    |    |    |    |    |    |       |        |               |                   |     |           |     |           |     |
| Flow Chart        | <div style="display: flex; align-items: center; justify-content: center;"> <div style="text-align: center; margin-right: 20px;"> <p>TE Line Output ON</p> <p>↓</p> <p>TEOFF</p> <p>↓</p> <p>TE Line Output OFF</p> </div> <div style="border: 1px dashed black; padding: 10px;"> <p><b>Legend</b></p> <ul style="list-style-type: none"> <li> Command</li> <li> Parameter</li> <li> Display</li> <li> Action</li> <li> Mode</li> <li> Sequential transter</li> </ul> </div> </div> |     |     |       |    |    |    |    |    |    |    |    |       |        |               |                   |     |           |     |           |     |

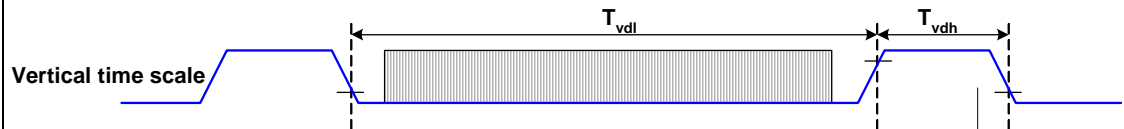
## 10.1.26 TEON (35h): Tearing Effect Line ON

| 35H         | TEON (Tearing Effect Line ON) |     |     |       |    |    |    |    |    |    |    |     | HEX   |
|-------------|-------------------------------|-----|-----|-------|----|----|----|----|----|----|----|-----|-------|
| Inst / Para | D/CX                          | WRX | RDX | D17-8 | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0  | HEX   |
| TEON        | 0                             | ↑   | 1   | -     | 0  | 0  | 1  | 1  | 0  | 1  | 0  | 1   | (35h) |
| Parameter   | 1                             | ↑   | 1   | -     | 0  | 0  | 0  | 0  | 0  | 0  | 0  | TEM |       |

- This command is used to turn ON the Tearing Effect output signal from the TE signal line.
- This output is not affected by changing MADCTL bit ML.
- The Tearing Effect Line On has one parameter, which describes the mode of the Tearing Effect Output Line:
- When TEM = '0': The Tearing Effect output line consists of V-Blanking information only



- When TEM = '1': The Tearing Effect output Line consists of both V-Blanking and H-Blanking information

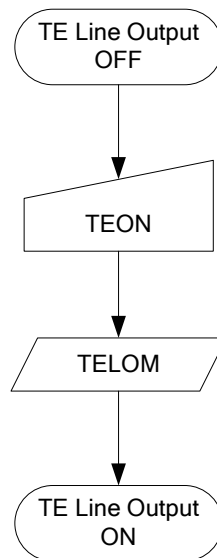


Note: During Sleep In Mode with Tearing Effect Line On, Tearing Effect Output pin will be active Low.

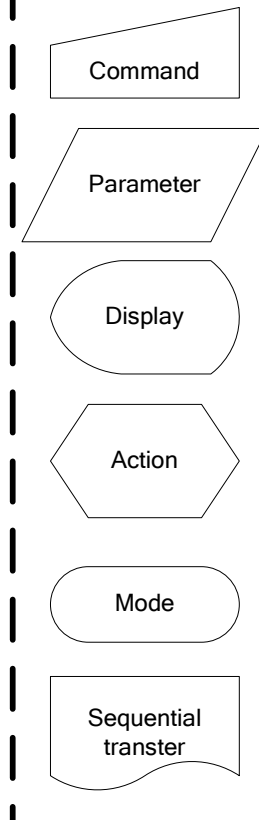
Default

| Status            | Default Value              |
|-------------------|----------------------------|
| Power On Sequence | Tearing effect off & TEM=0 |
| S/W Reset         | Tearing effect off & TEM=0 |
| H/W Reset         | Tearing effect off & TEM=0 |

Flow Chart



### Legend



## 10.1.27 MADCTL (36h): Memory Data Access Control

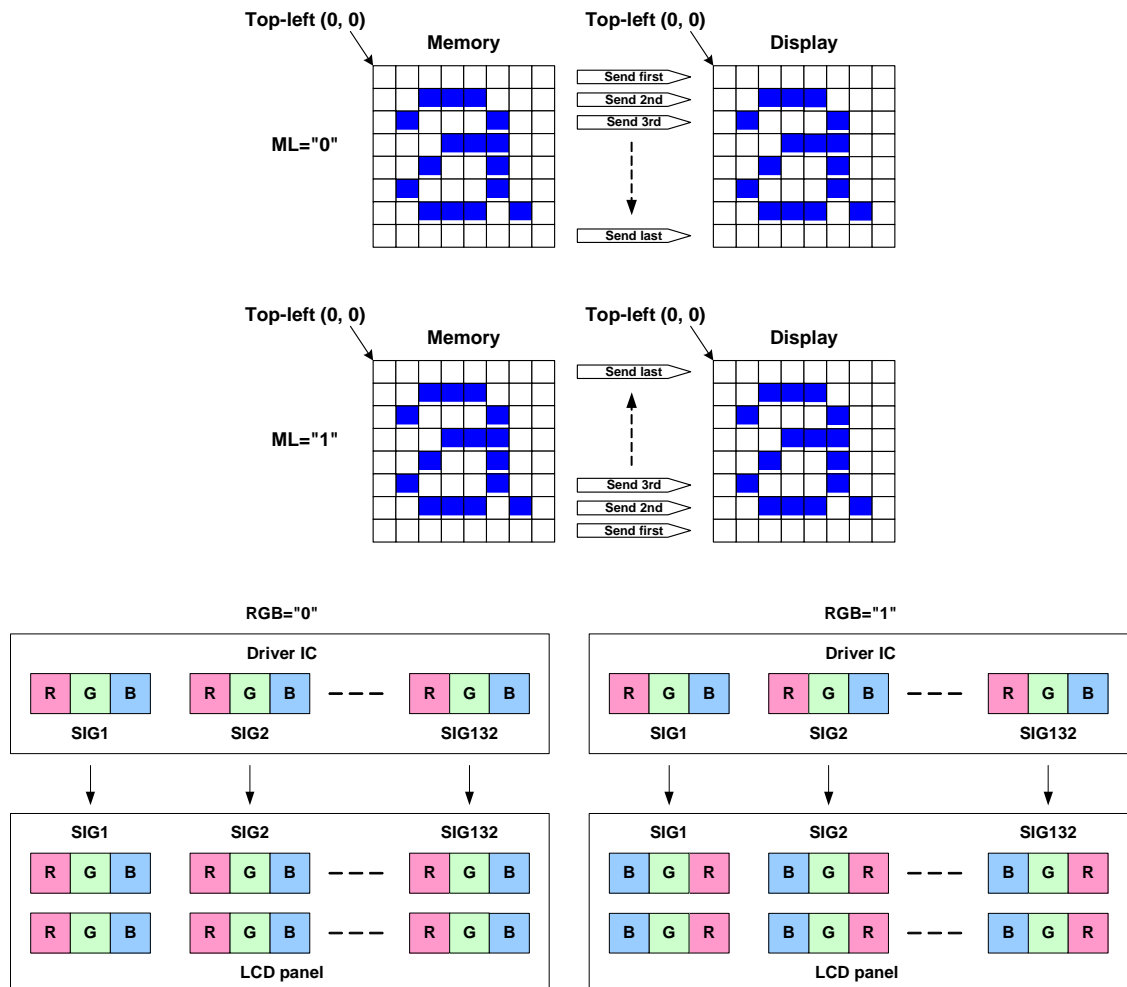
| 36H         | MADCTL (Memory Data Access Control) |     |     |       |    |    |    |    |     |    |    |    | HEX   |
|-------------|-------------------------------------|-----|-----|-------|----|----|----|----|-----|----|----|----|-------|
| Inst / Para | D/CX                                | WRX | RDX | D17-8 | D7 | D6 | D5 | D4 | D3  | D2 | D1 | D0 | HEX   |
| MADCTL      | 0                                   | ↑   | 1   | -     | 0  | 0  | 1  | 1  | 0   | 1  | 1  | 0  | (36h) |
| Parameter   | 1                                   | ↑   | 1   | -     | MY | MX | MV | ML | RGB | MH | -  | -  |       |

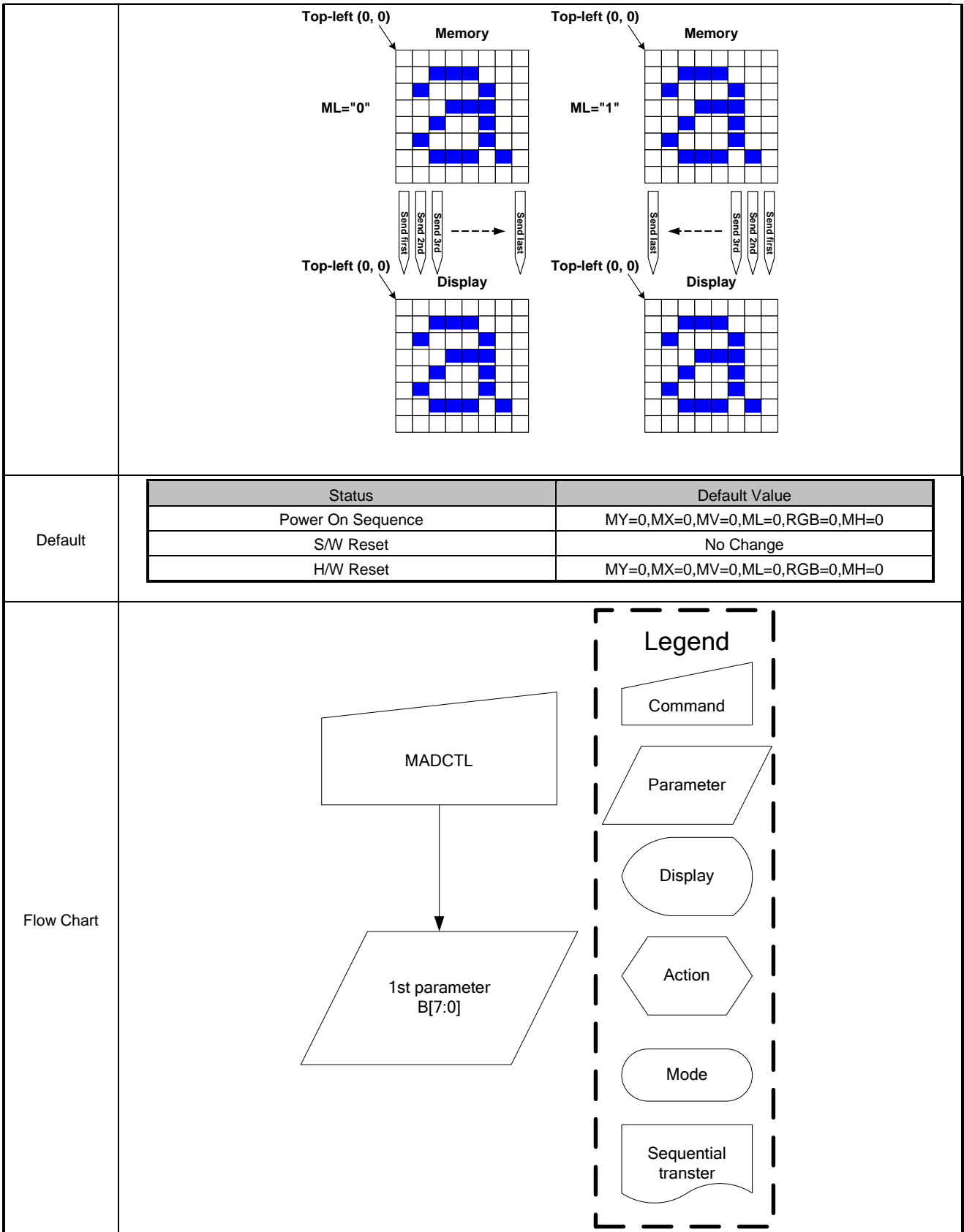
-This command defines read/ write scanning direction of frame memory.

| Bit | NAME                     | DESCRIPTION                                                                                                                          |
|-----|--------------------------|--------------------------------------------------------------------------------------------------------------------------------------|
| MY  | Row Address Order        | These 3bits controls MCU to memory write/read direction.                                                                             |
| MX  | Column Address Order     |                                                                                                                                      |
| MV  | Row/Column Exchange      |                                                                                                                                      |
| ML  | Vertical Refresh Order   | LCD vertical refresh direction control<br>'0' = LCD vertical refresh Top to Bottom<br>'1' = LCD vertical refresh Bottom to Top       |
| RGB | RGB-BGR ORDER            | Color selector switch control<br>'0' =RGB color filter panel,<br>'1' =BGR color filter panel)                                        |
| MH  | Horizontal Refresh Order | LCD horizontal refresh direction control<br>'0' = LCD horizontal refresh Left to right<br>'1' = LCD horizontal refresh right to left |

-Bit Assignment

Description



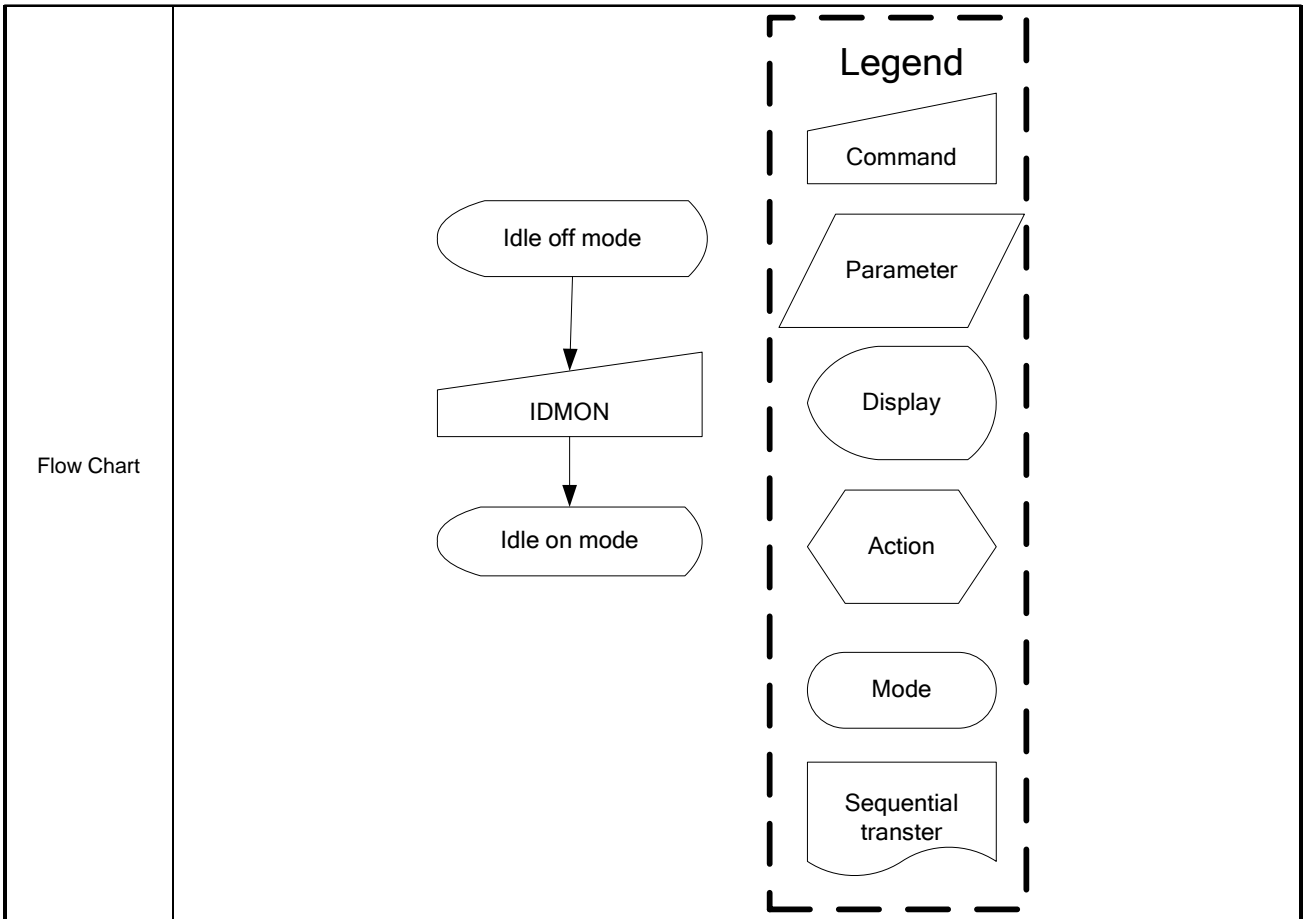


## 10.1.28 IDMOFF (38h): Idle Mode Off

| 38H               | IDMOFF (Idle Mode Off)                                                                                                                                                                                                                                                                                                                                    |     |     |       |    |    |    |    |    |    |    |    | HEX    |               |                   |               |           |               |           |               |
|-------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|-------|----|----|----|----|----|----|----|----|--------|---------------|-------------------|---------------|-----------|---------------|-----------|---------------|
| Inst / Para       | D/CX                                                                                                                                                                                                                                                                                                                                                      | WRX | RDX | D17-8 | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | HEX    |               |                   |               |           |               |           |               |
| IDMOFF            | 0                                                                                                                                                                                                                                                                                                                                                         | ↑   | 1   | -     | 0  | 0  | 1  | 1  | 1  | 0  | 0  | 0  | (38h)  |               |                   |               |           |               |           |               |
| Parameter         | No Parameter                                                                                                                                                                                                                                                                                                                                              |     |     |       |    |    |    |    |    |    |    |    | -      |               |                   |               |           |               |           |               |
| Description       | <p>-This command is used to recover from Idle mode on.</p> <p>-In the idle off mode,</p> <ol style="list-style-type: none"> <li>LCD can display 4096, 65k or 262k colors.</li> <li>Normal frame frequency is applied.</li> </ol>                                                                                                                          |     |     |       |    |    |    |    |    |    |    |    |        |               |                   |               |           |               |           |               |
| Default           | <table border="1"> <thead> <tr> <th>Status</th> <th>Default Value</th> </tr> </thead> <tbody> <tr> <td>Power On Sequence</td> <td>Idle Mode Off</td> </tr> <tr> <td>S/W Reset</td> <td>Idle Mode Off</td> </tr> <tr> <td>H/W Reset</td> <td>Idle Mode Off</td> </tr> </tbody> </table>                                                                    |     |     |       |    |    |    |    |    |    |    |    | Status | Default Value | Power On Sequence | Idle Mode Off | S/W Reset | Idle Mode Off | H/W Reset | Idle Mode Off |
| Status            | Default Value                                                                                                                                                                                                                                                                                                                                             |     |     |       |    |    |    |    |    |    |    |    |        |               |                   |               |           |               |           |               |
| Power On Sequence | Idle Mode Off                                                                                                                                                                                                                                                                                                                                             |     |     |       |    |    |    |    |    |    |    |    |        |               |                   |               |           |               |           |               |
| S/W Reset         | Idle Mode Off                                                                                                                                                                                                                                                                                                                                             |     |     |       |    |    |    |    |    |    |    |    |        |               |                   |               |           |               |           |               |
| H/W Reset         | Idle Mode Off                                                                                                                                                                                                                                                                                                                                             |     |     |       |    |    |    |    |    |    |    |    |        |               |                   |               |           |               |           |               |
| Flow Chart        | <pre> graph TD     A([Idle on mode]) --&gt; B[/IDMOFF/]     B --&gt; C([Idle off mode])     </pre> <p><b>Legend</b></p> <ul style="list-style-type: none"> <li>Command: Trapezoid</li> <li>Parameter: Parallelogram</li> <li>Display: Oval</li> <li>Action: Hexagon</li> <li>Mode: Rounded rectangle</li> <li>Sequential transfer: Wavy bottom</li> </ul> |     |     |       |    |    |    |    |    |    |    |    |        |               |                   |               |           |               |           |               |

## 10.1.29 IDMON (39h): Idle Mode On

| 39H                   | IDMON (Idle Mode On)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                   |                   |       |    |     |               |    |    |    |    |    | HEX   |       |                   |                   |                   |       |        |        |        |      |        |        |        |     |        |        |        |         |        |        |        |       |        |        |        |      |        |        |        |        |        |        |        |       |        |        |
|-----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|-------------------|-------|----|-----|---------------|----|----|----|----|----|-------|-------|-------------------|-------------------|-------------------|-------|--------|--------|--------|------|--------|--------|--------|-----|--------|--------|--------|---------|--------|--------|--------|-------|--------|--------|--------|------|--------|--------|--------|--------|--------|--------|--------|-------|--------|--------|
| Inst / Para           | D/CX                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | WRX               | RDX               | D17-8 | D7 | D6  | D5            | D4 | D3 | D2 | D1 | D0 | HEX   |       |                   |                   |                   |       |        |        |        |      |        |        |        |     |        |        |        |         |        |        |        |       |        |        |        |      |        |        |        |        |        |        |        |       |        |        |
| IDMOFF                | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | ↑                 | 1                 | -     | 0  | 0   | 1             | 1  | 1  | 0  | 0  | 1  | (39h) |       |                   |                   |                   |       |        |        |        |      |        |        |        |     |        |        |        |         |        |        |        |       |        |        |        |      |        |        |        |        |        |        |        |       |        |        |
| Parameter             | No Parameter                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                   |                   |       |    |     |               |    |    |    |    |    | -     |       |                   |                   |                   |       |        |        |        |      |        |        |        |     |        |        |        |         |        |        |        |       |        |        |        |      |        |        |        |        |        |        |        |       |        |        |
| Description           | <p>-This command is used to enter into Idle mode on.</p> <p>-There will be no abnormal visible effect on the display mode change transition.</p> <p>-In the idle on mode,</p> <ol style="list-style-type: none"> <li>Color expression is reduced. The primary and the secondary colors using MSB of each R,G and B in the Frame Memory, 8 color depth data is displayed.</li> <li>8-Color mode frame frequency is applied.</li> <li>Exit from IDMON by Idle Mode Off (38h) command</li> </ol>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                   |                   |       |    |     |               |    |    |    |    |    |       |       |                   |                   |                   |       |        |        |        |      |        |        |        |     |        |        |        |         |        |        |        |       |        |        |        |      |        |        |        |        |        |        |        |       |        |        |
|                       | <div style="display: flex; align-items: center; justify-content: center;"> <div style="text-align: center;"> <p>Top-Left (0,0)</p> </div> <div style="margin: 0 20px;"> <p>(Example) Memory</p> </div> <div style="text-align: center;"> <p>Display</p> </div> </div><br><table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr style="background-color: #ffff00;"> <th>Color</th> <th>R5 R4 R3 R2 R1 R0</th> <th>G5 G4 G3 G2 G1 G0</th> <th>B5 B4 B3 B4 B1 B0</th> </tr> </thead> <tbody> <tr> <td>Black</td> <td>0xxxxx</td> <td>0xxxxx</td> <td>0xxxxx</td> </tr> <tr> <td>Blue</td> <td>0xxxxx</td> <td>0xxxxx</td> <td>1xxxxx</td> </tr> <tr> <td>Red</td> <td>1xxxxx</td> <td>0xxxxx</td> <td>0xxxxx</td> </tr> <tr> <td>Magenta</td> <td>1xxxxx</td> <td>0xxxxx</td> <td>1xxxxx</td> </tr> <tr> <td>Green</td> <td>0xxxxx</td> <td>1xxxxx</td> <td>0xxxxx</td> </tr> <tr> <td>Cyan</td> <td>0xxxxx</td> <td>1xxxxx</td> <td>1xxxxx</td> </tr> <tr> <td>Yellow</td> <td>1xxxxx</td> <td>1xxxxx</td> <td>0xxxxx</td> </tr> <tr> <td>White</td> <td>1xxxxx</td> <td>1xxxxx</td> <td>1xxxxx</td> </tr> </tbody> </table> |                   |                   |       |    |     |               |    |    |    |    |    |       | Color | R5 R4 R3 R2 R1 R0 | G5 G4 G3 G2 G1 G0 | B5 B4 B3 B4 B1 B0 | Black | 0xxxxx | 0xxxxx | 0xxxxx | Blue | 0xxxxx | 0xxxxx | 1xxxxx | Red | 1xxxxx | 0xxxxx | 0xxxxx | Magenta | 1xxxxx | 0xxxxx | 1xxxxx | Green | 0xxxxx | 1xxxxx | 0xxxxx | Cyan | 0xxxxx | 1xxxxx | 1xxxxx | Yellow | 1xxxxx | 1xxxxx | 0xxxxx | White | 1xxxxx | 1xxxxx |
| Color                 | R5 R4 R3 R2 R1 R0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | G5 G4 G3 G2 G1 G0 | B5 B4 B3 B4 B1 B0 |       |    |     |               |    |    |    |    |    |       |       |                   |                   |                   |       |        |        |        |      |        |        |        |     |        |        |        |         |        |        |        |       |        |        |        |      |        |        |        |        |        |        |        |       |        |        |
| Black                 | 0xxxxx                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 0xxxxx            | 0xxxxx            |       |    |     |               |    |    |    |    |    |       |       |                   |                   |                   |       |        |        |        |      |        |        |        |     |        |        |        |         |        |        |        |       |        |        |        |      |        |        |        |        |        |        |        |       |        |        |
| Blue                  | 0xxxxx                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 0xxxxx            | 1xxxxx            |       |    |     |               |    |    |    |    |    |       |       |                   |                   |                   |       |        |        |        |      |        |        |        |     |        |        |        |         |        |        |        |       |        |        |        |      |        |        |        |        |        |        |        |       |        |        |
| Red                   | 1xxxxx                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 0xxxxx            | 0xxxxx            |       |    |     |               |    |    |    |    |    |       |       |                   |                   |                   |       |        |        |        |      |        |        |        |     |        |        |        |         |        |        |        |       |        |        |        |      |        |        |        |        |        |        |        |       |        |        |
| Magenta               | 1xxxxx                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 0xxxxx            | 1xxxxx            |       |    |     |               |    |    |    |    |    |       |       |                   |                   |                   |       |        |        |        |      |        |        |        |     |        |        |        |         |        |        |        |       |        |        |        |      |        |        |        |        |        |        |        |       |        |        |
| Green                 | 0xxxxx                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 1xxxxx            | 0xxxxx            |       |    |     |               |    |    |    |    |    |       |       |                   |                   |                   |       |        |        |        |      |        |        |        |     |        |        |        |         |        |        |        |       |        |        |        |      |        |        |        |        |        |        |        |       |        |        |
| Cyan                  | 0xxxxx                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 1xxxxx            | 1xxxxx            |       |    |     |               |    |    |    |    |    |       |       |                   |                   |                   |       |        |        |        |      |        |        |        |     |        |        |        |         |        |        |        |       |        |        |        |      |        |        |        |        |        |        |        |       |        |        |
| Yellow                | 1xxxxx                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 1xxxxx            | 0xxxxx            |       |    |     |               |    |    |    |    |    |       |       |                   |                   |                   |       |        |        |        |      |        |        |        |     |        |        |        |         |        |        |        |       |        |        |        |      |        |        |        |        |        |        |        |       |        |        |
| White                 | 1xxxxx                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 1xxxxx            | 1xxxxx            |       |    |     |               |    |    |    |    |    |       |       |                   |                   |                   |       |        |        |        |      |        |        |        |     |        |        |        |         |        |        |        |       |        |        |        |      |        |        |        |        |        |        |        |       |        |        |
| Register Availability | Status                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                   |                   |       |    |     | Availability  |    |    |    |    |    |       |       |                   |                   |                   |       |        |        |        |      |        |        |        |     |        |        |        |         |        |        |        |       |        |        |        |      |        |        |        |        |        |        |        |       |        |        |
|                       | Normal Mode On, Idle Mode Off, Sleep Out                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                   |                   |       |    |     | Yes           |    |    |    |    |    |       |       |                   |                   |                   |       |        |        |        |      |        |        |        |     |        |        |        |         |        |        |        |       |        |        |        |      |        |        |        |        |        |        |        |       |        |        |
|                       | Normal Mode On, Idle Mode On, Sleep Out                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                   |                   |       |    |     | Yes           |    |    |    |    |    |       |       |                   |                   |                   |       |        |        |        |      |        |        |        |     |        |        |        |         |        |        |        |       |        |        |        |      |        |        |        |        |        |        |        |       |        |        |
|                       | Partial Mode On, Idle Mode Off, Sleep Out                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                   |                   |       |    |     | No            |    |    |    |    |    |       |       |                   |                   |                   |       |        |        |        |      |        |        |        |     |        |        |        |         |        |        |        |       |        |        |        |      |        |        |        |        |        |        |        |       |        |        |
|                       | Partial Mode On, Idle Mode On, Sleep Out                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                   |                   |       |    |     | No            |    |    |    |    |    |       |       |                   |                   |                   |       |        |        |        |      |        |        |        |     |        |        |        |         |        |        |        |       |        |        |        |      |        |        |        |        |        |        |        |       |        |        |
| Sleep In              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                   |                   |       |    | Yes |               |    |    |    |    |    |       |       |                   |                   |                   |       |        |        |        |      |        |        |        |     |        |        |        |         |        |        |        |       |        |        |        |      |        |        |        |        |        |        |        |       |        |        |
| Default               | Status                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                   |                   |       |    |     | Default Value |    |    |    |    |    |       |       |                   |                   |                   |       |        |        |        |      |        |        |        |     |        |        |        |         |        |        |        |       |        |        |        |      |        |        |        |        |        |        |        |       |        |        |
|                       | Power On Sequence                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                   |                   |       |    |     | Idle Mode Off |    |    |    |    |    |       |       |                   |                   |                   |       |        |        |        |      |        |        |        |     |        |        |        |         |        |        |        |       |        |        |        |      |        |        |        |        |        |        |        |       |        |        |
|                       | S/W Reset                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                   |                   |       |    |     | Idle Mode Off |    |    |    |    |    |       |       |                   |                   |                   |       |        |        |        |      |        |        |        |     |        |        |        |         |        |        |        |       |        |        |        |      |        |        |        |        |        |        |        |       |        |        |
|                       | H/W Reset                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                   |                   |       |    |     | Idle Mode Off |    |    |    |    |    |       |       |                   |                   |                   |       |        |        |        |      |        |        |        |     |        |        |        |         |        |        |        |       |        |        |        |      |        |        |        |        |        |        |        |       |        |        |



## 10.1.30 COLMOD (3Ah): Interface Pixel Format

| 3AH                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | COLMOD (3Ah): Interface Pixel Format |                            |       |    |    |    |    |    |       |       |       |       |           |               |                                          |     |                                         |              |                                           |                    |                                          |           |           |              |           |                    |                    |
|-------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|----------------------------|-------|----|----|----|----|----|-------|-------|-------|-------|-----------|---------------|------------------------------------------|-----|-----------------------------------------|--------------|-------------------------------------------|--------------------|------------------------------------------|-----------|-----------|--------------|-----------|--------------------|--------------------|
| Inst / Para                               | D/CX                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | WRX                                  | RDX                        | D17-8 | D7 | D6 | D5 | D4 | D3 | D2    | D1    | D0    | HEX   |           |               |                                          |     |                                         |              |                                           |                    |                                          |           |           |              |           |                    |                    |
| COLMOD                                    | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | ↑                                    | 1                          | -     | 0  | 0  | 1  | 1  | 1  | 0     | 1     | 0     | (3Ah) |           |               |                                          |     |                                         |              |                                           |                    |                                          |           |           |              |           |                    |                    |
| Parameter                                 | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | ↑                                    | 1                          | -     | -  | -  | -  | -  | -  | IFPF2 | IFPF1 | IFPF0 |       |           |               |                                          |     |                                         |              |                                           |                    |                                          |           |           |              |           |                    |                    |
| Description                               | <p>This command is used to define the format of RGB picture data, which is to be transferred via the MCU interface. The formats are shown in the table:</p> <table border="1"> <thead> <tr> <th>IFPF[2:0]</th> <th></th> <th>MCU Interface Color Format</th> </tr> </thead> <tbody> <tr> <td>011</td> <td>3</td> <td>12-bit/pixel</td> </tr> <tr> <td>101</td> <td>5</td> <td>16-bit/pixel</td> </tr> <tr> <td>110</td> <td>6</td> <td>18-bit/pixel</td> </tr> <tr> <td>111</td> <td>7</td> <td>No used</td> </tr> </tbody> </table> <p><i>Note1: In 12-bit/Pixel, 16-bit/Pixel or 18-bit/Pixel mode, the LUT is applied to transfer data into the Frame Memory.</i><br/> <i>Note2: The Command 3Ah should be set at 55h when writing 16-bit/pixel data into frame memory, but 3Ah should be re-set to 66h when reading pixel data from frame memory. Please check the LUT in chapter 9.17 when using memory read function.</i></p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                      |                            |       |    |    |    |    |    |       |       |       |       | IFPF[2:0] |               | MCU Interface Color Format               | 011 | 3                                       | 12-bit/pixel | 101                                       | 5                  | 16-bit/pixel                             | 110       | 6         | 18-bit/pixel | 111       | 7                  | No used            |
|                                           | IFPF[2:0]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                      | MCU Interface Color Format |       |    |    |    |    |    |       |       |       |       |           |               |                                          |     |                                         |              |                                           |                    |                                          |           |           |              |           |                    |                    |
| 011                                       | 3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 12-bit/pixel                         |                            |       |    |    |    |    |    |       |       |       |       |           |               |                                          |     |                                         |              |                                           |                    |                                          |           |           |              |           |                    |                    |
| 101                                       | 5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 16-bit/pixel                         |                            |       |    |    |    |    |    |       |       |       |       |           |               |                                          |     |                                         |              |                                           |                    |                                          |           |           |              |           |                    |                    |
| 110                                       | 6                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 18-bit/pixel                         |                            |       |    |    |    |    |    |       |       |       |       |           |               |                                          |     |                                         |              |                                           |                    |                                          |           |           |              |           |                    |                    |
| 111                                       | 7                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | No used                              |                            |       |    |    |    |    |    |       |       |       |       |           |               |                                          |     |                                         |              |                                           |                    |                                          |           |           |              |           |                    |                    |
| Register Availability                     | <table border="1"> <thead> <tr> <th>Status</th> <th>Availability</th> </tr> </thead> <tbody> <tr> <td>Normal Mode On, Idle Mode Off, Sleep Out</td> <td>Yes</td> </tr> <tr> <td>Normal Mode On, Idle Mode On, Sleep Out</td> <td>Yes</td> </tr> <tr> <td>Partial Mode On, Idle Mode Off, Sleep Out</td> <td>No</td> </tr> <tr> <td>Partial Mode On, Idle Mode On, Sleep Out</td> <td>No</td> </tr> <tr> <td>Sleep In</td> <td>Yes</td> </tr> </tbody> </table>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                      |                            |       |    |    |    |    |    |       |       |       |       | Status    | Availability  | Normal Mode On, Idle Mode Off, Sleep Out | Yes | Normal Mode On, Idle Mode On, Sleep Out | Yes          | Partial Mode On, Idle Mode Off, Sleep Out | No                 | Partial Mode On, Idle Mode On, Sleep Out | No        | Sleep In  | Yes          |           |                    |                    |
| Status                                    | Availability                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                      |                            |       |    |    |    |    |    |       |       |       |       |           |               |                                          |     |                                         |              |                                           |                    |                                          |           |           |              |           |                    |                    |
| Normal Mode On, Idle Mode Off, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                      |                            |       |    |    |    |    |    |       |       |       |       |           |               |                                          |     |                                         |              |                                           |                    |                                          |           |           |              |           |                    |                    |
| Normal Mode On, Idle Mode On, Sleep Out   | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                      |                            |       |    |    |    |    |    |       |       |       |       |           |               |                                          |     |                                         |              |                                           |                    |                                          |           |           |              |           |                    |                    |
| Partial Mode On, Idle Mode Off, Sleep Out | No                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                      |                            |       |    |    |    |    |    |       |       |       |       |           |               |                                          |     |                                         |              |                                           |                    |                                          |           |           |              |           |                    |                    |
| Partial Mode On, Idle Mode On, Sleep Out  | No                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                      |                            |       |    |    |    |    |    |       |       |       |       |           |               |                                          |     |                                         |              |                                           |                    |                                          |           |           |              |           |                    |                    |
| Sleep In                                  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                      |                            |       |    |    |    |    |    |       |       |       |       |           |               |                                          |     |                                         |              |                                           |                    |                                          |           |           |              |           |                    |                    |
| Default                                   | <table border="1"> <thead> <tr> <th>Status</th> <th colspan="2">Default Value</th> </tr> </thead> <tbody> <tr> <td></td> <td>IFPF[2:0]</td> <td>VIPF[3:0]</td> </tr> <tr> <td>Power On Sequence</td> <td>0110(18-bit/Pixel)</td> <td>0110(18-bit/Pixel)</td> </tr> <tr> <td>S/W Reset</td> <td>No Change</td> <td>No Change</td> </tr> <tr> <td>H/W Reset</td> <td>0110(18-bit/Pixel)</td> <td>0110(18-bit/Pixel)</td> </tr> </tbody> </table>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                      |                            |       |    |    |    |    |    |       |       |       |       | Status    | Default Value |                                          |     | IFPF[2:0]                               | VIPF[3:0]    | Power On Sequence                         | 0110(18-bit/Pixel) | 0110(18-bit/Pixel)                       | S/W Reset | No Change | No Change    | H/W Reset | 0110(18-bit/Pixel) | 0110(18-bit/Pixel) |
| Status                                    | Default Value                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                      |                            |       |    |    |    |    |    |       |       |       |       |           |               |                                          |     |                                         |              |                                           |                    |                                          |           |           |              |           |                    |                    |
|                                           | IFPF[2:0]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | VIPF[3:0]                            |                            |       |    |    |    |    |    |       |       |       |       |           |               |                                          |     |                                         |              |                                           |                    |                                          |           |           |              |           |                    |                    |
| Power On Sequence                         | 0110(18-bit/Pixel)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 0110(18-bit/Pixel)                   |                            |       |    |    |    |    |    |       |       |       |       |           |               |                                          |     |                                         |              |                                           |                    |                                          |           |           |              |           |                    |                    |
| S/W Reset                                 | No Change                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | No Change                            |                            |       |    |    |    |    |    |       |       |       |       |           |               |                                          |     |                                         |              |                                           |                    |                                          |           |           |              |           |                    |                    |
| H/W Reset                                 | 0110(18-bit/Pixel)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 0110(18-bit/Pixel)                   |                            |       |    |    |    |    |    |       |       |       |       |           |               |                                          |     |                                         |              |                                           |                    |                                          |           |           |              |           |                    |                    |
| Flow Chart                                | <div style="display: flex; align-items: center;"> <div style="flex: 1;"> <pre> graph TD     A([18-bit/Pixel Mode]) --&gt; B[/COLMOD/]     B --&gt; C[/1st Parameter/]     C --&gt; D([16-bit/Pixel Mode])                     </pre> </div> <div style="flex: 1; border: 1px dashed black; padding: 5px;"> <p><b>Legend</b></p> <ul style="list-style-type: none"> <li><span style="display: inline-block; width: 20px; height: 10px; border: 1px solid black; margin-right: 5px;"></span> Command</li> <li><span style="display: inline-block; width: 20px; height: 10px; border: 1px solid black; transform: rotate(45deg); margin-right: 5px;"></span> Parameter</li> <li><span style="display: inline-block; width: 20px; height: 10px; border: 1px solid black; border-radius: 5px; margin-right: 5px;"></span> Display</li> <li><span style="display: inline-block; width: 20px; height: 10px; border: 1px solid black; border-top: none; border-bottom: none; margin-right: 5px;"></span> Action</li> <li><span style="display: inline-block; width: 20px; height: 10px; border: 1px solid black; border-radius: 10px; margin-right: 5px;"></span> Mode</li> <li><span style="display: inline-block; width: 20px; height: 10px; border: 1px solid black; border-radius: 10px; border-top: none; border-bottom: none; margin-right: 5px;"></span> Sequential transfer</li> </ul> </div> </div> |                                      |                            |       |    |    |    |    |    |       |       |       |       |           |               |                                          |     |                                         |              |                                           |                    |                                          |           |           |              |           |                    |                    |

## 10.1.31 RDID1 (DAh): Read ID1 Value

| DAH                                       | RDID1 (Read ID1 Value)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |     |     |       |      |      |      |      |      |      |      |      |       |        |               |                                          |     |                                         |     |                                           |    |                                          |    |          |     |
|-------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|-------|------|------|------|------|------|------|------|------|-------|--------|---------------|------------------------------------------|-----|-----------------------------------------|-----|-------------------------------------------|----|------------------------------------------|----|----------|-----|
| Inst / Para                               | D/CX                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | WRX | RDX | D17-8 | D7   | D6   | D5   | D4   | D3   | D2   | D1   | D0   | HEX   |        |               |                                          |     |                                         |     |                                           |    |                                          |    |          |     |
| RDID1                                     | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | ↑   | 1   | -     | 1    | 1    | 0    | 1    | 1    | 0    | 1    | 0    | (DAh) |        |               |                                          |     |                                         |     |                                           |    |                                          |    |          |     |
| 1st parameter                             | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 1   | ↑   | -     | -    | -    | -    | -    | -    | -    | -    | -    | -     |        |               |                                          |     |                                         |     |                                           |    |                                          |    |          |     |
| 2nd parameter                             | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 1   | ↑   | -     | ID17 | ID16 | ID15 | ID14 | ID13 | ID12 | ID11 | ID10 |       |        |               |                                          |     |                                         |     |                                           |    |                                          |    |          |     |
| Description                               | -This read byte returns 8-bit LCD module's manufacturer ID<br>-The 1st parameter is dummy data<br>-The 2nd parameter (ID17 to ID10): LCD module's manufacturer ID.<br>NOTE: See command RDDID (04h), 2nd parameter.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |     |     |       |      |      |      |      |      |      |      |      |       |        |               |                                          |     |                                         |     |                                           |    |                                          |    |          |     |
| Register Availability                     | <table border="1"> <thead> <tr> <th>Status</th> <th>Availability</th> </tr> </thead> <tbody> <tr> <td>Normal Mode On, Idle Mode Off, Sleep Out</td> <td>Yes</td> </tr> <tr> <td>Normal Mode On, Idle Mode On, Sleep Out</td> <td>Yes</td> </tr> <tr> <td>Partial Mode On, Idle Mode Off, Sleep Out</td> <td>No</td> </tr> <tr> <td>Partial Mode On, Idle Mode On, Sleep Out</td> <td>No</td> </tr> <tr> <td>Sleep In</td> <td>Yes</td> </tr> </tbody> </table>                                                                                                                                                                                                                                        |     |     |       |      |      |      |      |      |      |      |      |       | Status | Availability  | Normal Mode On, Idle Mode Off, Sleep Out | Yes | Normal Mode On, Idle Mode On, Sleep Out | Yes | Partial Mode On, Idle Mode Off, Sleep Out | No | Partial Mode On, Idle Mode On, Sleep Out | No | Sleep In | Yes |
| Status                                    | Availability                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |     |     |       |      |      |      |      |      |      |      |      |       |        |               |                                          |     |                                         |     |                                           |    |                                          |    |          |     |
| Normal Mode On, Idle Mode Off, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |     |     |       |      |      |      |      |      |      |      |      |       |        |               |                                          |     |                                         |     |                                           |    |                                          |    |          |     |
| Normal Mode On, Idle Mode On, Sleep Out   | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |     |     |       |      |      |      |      |      |      |      |      |       |        |               |                                          |     |                                         |     |                                           |    |                                          |    |          |     |
| Partial Mode On, Idle Mode Off, Sleep Out | No                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |     |     |       |      |      |      |      |      |      |      |      |       |        |               |                                          |     |                                         |     |                                           |    |                                          |    |          |     |
| Partial Mode On, Idle Mode On, Sleep Out  | No                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |     |     |       |      |      |      |      |      |      |      |      |       |        |               |                                          |     |                                         |     |                                           |    |                                          |    |          |     |
| Sleep In                                  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |     |     |       |      |      |      |      |      |      |      |      |       |        |               |                                          |     |                                         |     |                                           |    |                                          |    |          |     |
| Default                                   | <table border="1"> <thead> <tr> <th>Status</th> <th>Default Value</th> </tr> </thead> <tbody> <tr> <td>Power On Sequence</td> <td>-</td> </tr> <tr> <td>S/W Reset</td> <td>-</td> </tr> <tr> <td>H/W Reset</td> <td>-</td> </tr> </tbody> </table>                                                                                                                                                                                                                                                                                                                                                                                                                                                    |     |     |       |      |      |      |      |      |      |      |      |       | Status | Default Value | Power On Sequence                        | -   | S/W Reset                               | -   | H/W Reset                                 | -  |                                          |    |          |     |
| Status                                    | Default Value                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |     |     |       |      |      |      |      |      |      |      |      |       |        |               |                                          |     |                                         |     |                                           |    |                                          |    |          |     |
| Power On Sequence                         | -                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |     |     |       |      |      |      |      |      |      |      |      |       |        |               |                                          |     |                                         |     |                                           |    |                                          |    |          |     |
| S/W Reset                                 | -                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |     |     |       |      |      |      |      |      |      |      |      |       |        |               |                                          |     |                                         |     |                                           |    |                                          |    |          |     |
| H/W Reset                                 | -                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |     |     |       |      |      |      |      |      |      |      |      |       |        |               |                                          |     |                                         |     |                                           |    |                                          |    |          |     |
| Flow Chart                                | <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p><b>Serial I/F Mode</b></p> <pre> graph TD     A[Read ID1] --&gt; B[/Send 2nd parameter/]                     </pre> </div> <div style="text-align: center;"> <p><b>Parallel I/F Mode</b></p> <pre> graph TD     A[Read ID1] --&gt; B[/Dummy Read/]     B --&gt; C[/Send 2nd parameter/]                     </pre> </div> </div> <div style="border: 1px dashed black; padding: 10px; margin-top: 20px;"> <p><b>Legend</b></p> <ul style="list-style-type: none"> <li> Command</li> <li> Parameter</li> <li> Display</li> <li> Action</li> <li> Mode</li> <li> Sequential transfer</li> </ul> </div> |     |     |       |      |      |      |      |      |      |      |      |       |        |               |                                          |     |                                         |     |                                           |    |                                          |    |          |     |

## 10.1.32 RDID2 (DBh): Read ID2 Value

| DBH                                           | RDID2 (Read ID2 Value)                                                                                                                                                                                                                                                                                                                                                                                                                                         |               |         |       |    |      |      |      |      |      |      |      |       |              |               |                                          |          |                                         |          |                                           |          |                                          |     |          |     |     |  |  |
|-----------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|---------|-------|----|------|------|------|------|------|------|------|-------|--------------|---------------|------------------------------------------|----------|-----------------------------------------|----------|-------------------------------------------|----------|------------------------------------------|-----|----------|-----|-----|--|--|
| Inst / Para                                   | D/CX                                                                                                                                                                                                                                                                                                                                                                                                                                                           | WRX           | RDX     | D17-8 | D7 | D6   | D5   | D4   | D3   | D2   | D1   | D0   | HEX   |              |               |                                          |          |                                         |          |                                           |          |                                          |     |          |     |     |  |  |
| RDID2                                         | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                              | ↑             | 1       | -     | 1  | 1    | 0    | 1    | 1    | 0    | 1    | 1    | (DBh) |              |               |                                          |          |                                         |          |                                           |          |                                          |     |          |     |     |  |  |
| 1 <sup>st</sup> parameter                     | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 1             | ↑       | -     | -  | -    | -    | -    | -    | -    | -    | -    | -     |              |               |                                          |          |                                         |          |                                           |          |                                          |     |          |     |     |  |  |
| 2 <sup>nd</sup> parameter                     | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 1             | ↑       | -     | 1  | ID26 | ID25 | ID24 | ID23 | ID22 | ID21 | ID20 |       |              |               |                                          |          |                                         |          |                                           |          |                                          |     |          |     |     |  |  |
| Description                                   | -This read byte returns 8-bit LCD module/driver version ID<br>-The 1st parameter is dummy data<br>-The 2nd parameter (ID26 to ID20): LCD module/driver version ID<br>-Parameter Range: ID=80h to FFh                                                                                                                                                                                                                                                           |               |         |       |    |      |      |      |      |      |      |      |       |              |               |                                          |          |                                         |          |                                           |          |                                          |     |          |     |     |  |  |
|                                               | <table border="1"> <thead> <tr> <th>ID26 to ID20</th> <th>Version</th> <th>Changes</th> </tr> </thead> <tbody> <tr> <td>80h</td> <td></td> <td></td> </tr> <tr> <td>81h</td> <td></td> <td></td> </tr> <tr> <td>82h</td> <td></td> <td></td> </tr> <tr> <td>83h</td> <td></td> <td></td> </tr> </tbody> </table>                                                                                                                                               |               |         |       |    |      |      |      |      |      |      |      |       | ID26 to ID20 | Version       | Changes                                  | 80h      |                                         |          | 81h                                       |          |                                          | 82h |          |     | 83h |  |  |
|                                               | ID26 to ID20                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Version       | Changes |       |    |      |      |      |      |      |      |      |       |              |               |                                          |          |                                         |          |                                           |          |                                          |     |          |     |     |  |  |
|                                               | 80h                                                                                                                                                                                                                                                                                                                                                                                                                                                            |               |         |       |    |      |      |      |      |      |      |      |       |              |               |                                          |          |                                         |          |                                           |          |                                          |     |          |     |     |  |  |
|                                               | 81h                                                                                                                                                                                                                                                                                                                                                                                                                                                            |               |         |       |    |      |      |      |      |      |      |      |       |              |               |                                          |          |                                         |          |                                           |          |                                          |     |          |     |     |  |  |
| 82h                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                |               |         |       |    |      |      |      |      |      |      |      |       |              |               |                                          |          |                                         |          |                                           |          |                                          |     |          |     |     |  |  |
| 83h                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                |               |         |       |    |      |      |      |      |      |      |      |       |              |               |                                          |          |                                         |          |                                           |          |                                          |     |          |     |     |  |  |
| NOTE: See command RDDID (04h), 3rd parameter. |                                                                                                                                                                                                                                                                                                                                                                                                                                                                |               |         |       |    |      |      |      |      |      |      |      |       |              |               |                                          |          |                                         |          |                                           |          |                                          |     |          |     |     |  |  |
| Register Availability                         | <table border="1"> <thead> <tr> <th>Status</th> <th>Availability</th> </tr> </thead> <tbody> <tr> <td>Normal Mode On, Idle Mode Off, Sleep Out</td> <td>Yes</td> </tr> <tr> <td>Normal Mode On, Idle Mode On, Sleep Out</td> <td>Yes</td> </tr> <tr> <td>Partial Mode On, Idle Mode Off, Sleep Out</td> <td>No</td> </tr> <tr> <td>Partial Mode On, Idle Mode On, Sleep Out</td> <td>No</td> </tr> <tr> <td>Sleep In</td> <td>Yes</td> </tr> </tbody> </table> |               |         |       |    |      |      |      |      |      |      |      |       | Status       | Availability  | Normal Mode On, Idle Mode Off, Sleep Out | Yes      | Normal Mode On, Idle Mode On, Sleep Out | Yes      | Partial Mode On, Idle Mode Off, Sleep Out | No       | Partial Mode On, Idle Mode On, Sleep Out | No  | Sleep In | Yes |     |  |  |
|                                               | Status                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Availability  |         |       |    |      |      |      |      |      |      |      |       |              |               |                                          |          |                                         |          |                                           |          |                                          |     |          |     |     |  |  |
|                                               | Normal Mode On, Idle Mode Off, Sleep Out                                                                                                                                                                                                                                                                                                                                                                                                                       | Yes           |         |       |    |      |      |      |      |      |      |      |       |              |               |                                          |          |                                         |          |                                           |          |                                          |     |          |     |     |  |  |
|                                               | Normal Mode On, Idle Mode On, Sleep Out                                                                                                                                                                                                                                                                                                                                                                                                                        | Yes           |         |       |    |      |      |      |      |      |      |      |       |              |               |                                          |          |                                         |          |                                           |          |                                          |     |          |     |     |  |  |
|                                               | Partial Mode On, Idle Mode Off, Sleep Out                                                                                                                                                                                                                                                                                                                                                                                                                      | No            |         |       |    |      |      |      |      |      |      |      |       |              |               |                                          |          |                                         |          |                                           |          |                                          |     |          |     |     |  |  |
| Partial Mode On, Idle Mode On, Sleep Out      | No                                                                                                                                                                                                                                                                                                                                                                                                                                                             |               |         |       |    |      |      |      |      |      |      |      |       |              |               |                                          |          |                                         |          |                                           |          |                                          |     |          |     |     |  |  |
| Sleep In                                      | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                            |               |         |       |    |      |      |      |      |      |      |      |       |              |               |                                          |          |                                         |          |                                           |          |                                          |     |          |     |     |  |  |
| Default                                       | <table border="1"> <thead> <tr> <th>Status</th> <th>Default Value</th> </tr> </thead> <tbody> <tr> <td>Power On Sequence</td> <td>NV Value</td> </tr> <tr> <td>S/W Reset</td> <td>NV Value</td> </tr> <tr> <td>H/W Reset</td> <td>NV Value</td> </tr> </tbody> </table>                                                                                                                                                                                        |               |         |       |    |      |      |      |      |      |      |      |       | Status       | Default Value | Power On Sequence                        | NV Value | S/W Reset                               | NV Value | H/W Reset                                 | NV Value |                                          |     |          |     |     |  |  |
|                                               | Status                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Default Value |         |       |    |      |      |      |      |      |      |      |       |              |               |                                          |          |                                         |          |                                           |          |                                          |     |          |     |     |  |  |
|                                               | Power On Sequence                                                                                                                                                                                                                                                                                                                                                                                                                                              | NV Value      |         |       |    |      |      |      |      |      |      |      |       |              |               |                                          |          |                                         |          |                                           |          |                                          |     |          |     |     |  |  |
|                                               | S/W Reset                                                                                                                                                                                                                                                                                                                                                                                                                                                      | NV Value      |         |       |    |      |      |      |      |      |      |      |       |              |               |                                          |          |                                         |          |                                           |          |                                          |     |          |     |     |  |  |
| H/W Reset                                     | NV Value                                                                                                                                                                                                                                                                                                                                                                                                                                                       |               |         |       |    |      |      |      |      |      |      |      |       |              |               |                                          |          |                                         |          |                                           |          |                                          |     |          |     |     |  |  |
| Flow Chart                                    | <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p><b>Serial I/F Mode</b></p> </div> <div style="text-align: center;"> <p><b>Parallel I/F Mode</b></p> </div> </div> <p style="text-align: center;">Host Display</p>                                                                                                                                                                                             |               |         |       |    |      |      |      |      |      |      |      |       |              |               |                                          |          |                                         |          |                                           |          |                                          |     |          |     |     |  |  |
|                                               | <div style="border: 1px dashed black; padding: 5px;"> <p style="text-align: center;"><b>Legend</b></p> <ul style="list-style-type: none"> <li> Command</li> <li> Parameter</li> <li> Display</li> <li> Action</li> <li> Mode</li> <li> Sequential transfer</li> </ul> </div>                                                                                                                                                                                   |               |         |       |    |      |      |      |      |      |      |      |       |              |               |                                          |          |                                         |          |                                           |          |                                          |     |          |     |     |  |  |

## 10.1.33 RDID3 (DCh): Read ID3 Value

| DCH                                       | RDID3 (Read ID2 Value)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |     |     |       |      |      |      |      |      |      |      |      |       |        |               |                                          |          |                                         |          |                                           |          |                                          |    |          |     |
|-------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|-------|------|------|------|------|------|------|------|------|-------|--------|---------------|------------------------------------------|----------|-----------------------------------------|----------|-------------------------------------------|----------|------------------------------------------|----|----------|-----|
| Inst / Para                               | D/CX                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | WRX | RDX | D17-8 | D7   | D6   | D5   | D4   | D3   | D2   | D1   | D0   | HEX   |        |               |                                          |          |                                         |          |                                           |          |                                          |    |          |     |
| RDID3                                     | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | ↑   | 1   | -     | 1    | 1    | 0    | 1    | 1    | 1    | 0    | 0    | (DCh) |        |               |                                          |          |                                         |          |                                           |          |                                          |    |          |     |
| 1 <sup>st</sup> parameter                 | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 1   | ↑   | -     | -    | -    | -    | -    | -    | -    | -    | -    | -     |        |               |                                          |          |                                         |          |                                           |          |                                          |    |          |     |
| 2 <sup>nd</sup> parameter                 | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 1   | ↑   | -     | ID37 | ID36 | ID35 | ID34 | ID33 | ID32 | ID31 | ID30 |       |        |               |                                          |          |                                         |          |                                           |          |                                          |    |          |     |
| Description                               | -This read byte returns 8-bit LCD module/driver ID.<br>-The 1st parameter is dummy data<br>-The 2nd parameter (ID37 to ID30): LCD module/driver ID.<br>NOTE: See command RDDID (04h), 4th parameter.                                                                                                                                                                                                                                                                                                                                                                          |     |     |       |      |      |      |      |      |      |      |      |       |        |               |                                          |          |                                         |          |                                           |          |                                          |    |          |     |
| Register Availability                     | <table border="1"> <thead> <tr> <th>Status</th> <th>Availability</th> </tr> </thead> <tbody> <tr> <td>Normal Mode On, Idle Mode Off, Sleep Out</td> <td>Yes</td> </tr> <tr> <td>Normal Mode On, Idle Mode On, Sleep Out</td> <td>Yes</td> </tr> <tr> <td>Partial Mode On, Idle Mode Off, Sleep Out</td> <td>No</td> </tr> <tr> <td>Partial Mode On, Idle Mode On, Sleep Out</td> <td>No</td> </tr> <tr> <td>Sleep In</td> <td>Yes</td> </tr> </tbody> </table>                                                                                                                |     |     |       |      |      |      |      |      |      |      |      |       | Status | Availability  | Normal Mode On, Idle Mode Off, Sleep Out | Yes      | Normal Mode On, Idle Mode On, Sleep Out | Yes      | Partial Mode On, Idle Mode Off, Sleep Out | No       | Partial Mode On, Idle Mode On, Sleep Out | No | Sleep In | Yes |
| Status                                    | Availability                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |     |     |       |      |      |      |      |      |      |      |      |       |        |               |                                          |          |                                         |          |                                           |          |                                          |    |          |     |
| Normal Mode On, Idle Mode Off, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |     |     |       |      |      |      |      |      |      |      |      |       |        |               |                                          |          |                                         |          |                                           |          |                                          |    |          |     |
| Normal Mode On, Idle Mode On, Sleep Out   | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |     |     |       |      |      |      |      |      |      |      |      |       |        |               |                                          |          |                                         |          |                                           |          |                                          |    |          |     |
| Partial Mode On, Idle Mode Off, Sleep Out | No                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |     |     |       |      |      |      |      |      |      |      |      |       |        |               |                                          |          |                                         |          |                                           |          |                                          |    |          |     |
| Partial Mode On, Idle Mode On, Sleep Out  | No                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |     |     |       |      |      |      |      |      |      |      |      |       |        |               |                                          |          |                                         |          |                                           |          |                                          |    |          |     |
| Sleep In                                  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |     |     |       |      |      |      |      |      |      |      |      |       |        |               |                                          |          |                                         |          |                                           |          |                                          |    |          |     |
| Default                                   | <table border="1"> <thead> <tr> <th>Status</th> <th>Default Value</th> </tr> </thead> <tbody> <tr> <td>Power On Sequence</td> <td>NV Value</td> </tr> <tr> <td>SW Reset</td> <td>NV Value</td> </tr> <tr> <td>H/W Reset</td> <td>NV Value</td> </tr> </tbody> </table>                                                                                                                                                                                                                                                                                                        |     |     |       |      |      |      |      |      |      |      |      |       | Status | Default Value | Power On Sequence                        | NV Value | SW Reset                                | NV Value | H/W Reset                                 | NV Value |                                          |    |          |     |
| Status                                    | Default Value                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |     |     |       |      |      |      |      |      |      |      |      |       |        |               |                                          |          |                                         |          |                                           |          |                                          |    |          |     |
| Power On Sequence                         | NV Value                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |     |     |       |      |      |      |      |      |      |      |      |       |        |               |                                          |          |                                         |          |                                           |          |                                          |    |          |     |
| SW Reset                                  | NV Value                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |     |     |       |      |      |      |      |      |      |      |      |       |        |               |                                          |          |                                         |          |                                           |          |                                          |    |          |     |
| H/W Reset                                 | NV Value                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |     |     |       |      |      |      |      |      |      |      |      |       |        |               |                                          |          |                                         |          |                                           |          |                                          |    |          |     |
| Flow Chart                                | <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p><b>Serial I/F Mode</b></p> </div> <div style="text-align: center;"> <p><b>Parallel I/F Mode</b></p> </div> </div> <div style="margin-top: 20px;"> <p style="text-align: center;">Host Display</p> </div> <div style="border: 1px dashed black; padding: 10px; margin-top: 20px;"> <p><b>Legend</b></p> <ul style="list-style-type: none"> <li> Command</li> <li> Parameter</li> <li> Display</li> <li> Action</li> <li> Mode</li> <li> Sequential transfer</li> </ul> </div> |     |     |       |      |      |      |      |      |      |      |      |       |        |               |                                          |          |                                         |          |                                           |          |                                          |    |          |     |

## 10.2 Panel Function Command List and Description

Table 10.2.1 Panel Function Command List (1)

| Instruction | Refer  | D/CX | WRX | RDX | D23-8 | D7 | D6 | D5   | D4   | D3    | D2    | D1    | D0    | Hex   | Function                                                                    |
|-------------|--------|------|-----|-----|-------|----|----|------|------|-------|-------|-------|-------|-------|-----------------------------------------------------------------------------|
| FRMCTR1     | 10.2.1 | 0    | ↑   | 1   | -     | 1  | 0  | 1    | 1    | 0     | 0     | 0     | 1     | (B1h) | In normal mode (Full colors)                                                |
|             |        | 1    | ↑   | 1   | -     |    |    |      |      | RTNA3 | RTNA2 | RTNA1 | RTNA0 |       | RTNA set 1-line period<br>FPA: front porch<br>BPA: back porch               |
|             |        | 1    | ↑   | 1   | -     |    |    | FPA5 | FPA4 | FPA3  | FPA2  | FPA1  | FPA0  |       |                                                                             |
|             |        | 1    | ↑   | 1   | -     |    |    | BPA5 | BPA4 | BPA3  | BPA2  | BPA1  | BPA0  |       |                                                                             |
| FRMCTR2     | 10.2.2 | 0    | ↑   | 1   | -     | 1  | 0  | 1    | 1    | 0     | 0     | 1     | 0     | (B2h) | In Idle mode (8-colors)                                                     |
|             |        | 1    | ↑   | 1   | -     |    |    |      |      | RTNB3 | RTNB2 | RTNB1 | RTNB0 |       | RTNB: set 1-line period<br>FPB: front porch<br>BPB: back porch              |
|             |        | 1    | ↑   | 1   | -     |    |    | FPB5 | FPB4 | FPB3  | FPB2  | FPB1  | FPB0  |       |                                                                             |
|             |        | 1    | ↑   | 1   | -     |    |    | BPB5 | BPB4 | BPB3  | BPB2  | BPB1  | BPB0  |       |                                                                             |
| FRMCTR3     | 10.2.3 | 0    | ↑   | 1   | -     | 1  | 0  | 1    | 1    | 0     | 0     | 1     | 1     | (B3h) | In partial mode + Full colors                                               |
|             |        | 1    | ↑   | 1   | -     |    |    |      |      | RTNC3 | RTNC2 | RTNC1 | RTNC0 |       | RTNC,RTND: set 1-line period<br>FPC,FPD: front porch<br>BPC,BPD: back porch |
|             |        | 1    | ↑   | 1   | -     |    |    | FPC5 | FPC4 | FPC3  | FPC2  | FPC1  | FPC0  |       |                                                                             |
|             |        | 1    | ↑   | 1   | -     |    |    | BPC5 | BPC4 | BPC3  | BPC2  | BPC1  | BPC0  |       |                                                                             |
|             |        | 1    | ↑   | 1   | -     |    |    |      |      | RTND3 | RTND2 | RTND1 | RTND0 |       |                                                                             |
|             |        | 1    | ↑   | 1   | -     |    |    | FPD5 | FPD4 | FPD3  | FPD2  | FPD1  | FPD0  |       |                                                                             |
|             |        | 1    | ↑   | 1   | -     |    |    | BPD5 | BPD4 | BPD3  | BPD2  | BPD1  | BPD0  |       |                                                                             |
| INVCTR      | 10.2.4 | 0    | ↑   | 1   | -     | 1  | 0  | 1    | 1    | 0     | 1     | 0     | 0     | (B4h) | Display inversion control                                                   |
|             |        | 1    | ↑   | 1   | -     | 0  | 0  | 0    | 0    | 0     | NLA   | NLB   | NLC   |       | NLA,NLB,NLC set inversion                                                   |

# ST7735R

Table 10.2.2 Panel Function Command List (2)

| Instruction | Refer   | D/CX | WRX | RDX | D17-8 | D7       | D6       | D5      | D4     | D3        | D2        | D1       | D0       | Hex   | Function                                                                               |
|-------------|---------|------|-----|-----|-------|----------|----------|---------|--------|-----------|-----------|----------|----------|-------|----------------------------------------------------------------------------------------|
| PWCTR1      | 10.2.5  | 0    | ↑   | 1   | -     | 1        | 1        | 0       | 0      | 0         | 0         | 0        | 0        | (C0h) | Power control setting                                                                  |
|             |         | 1    | ↑   | 1   | -     | AVDD[2]  | AVDD[1]  | AVDD[0] | VRHP4  | VRHP3     | VRHP2     | VRHP1    | VRHP0    |       | VRH: Set the GVDD voltage                                                              |
|             |         | 1    | ↑   | 1   | -     | 0        | 0        | 0       | VRHN4  | VRHN3     | VRHN2     | VRHN1    | VRHN0    |       |                                                                                        |
|             |         | 1    | ↑   | 1   |       | MODE[1]  | MODE[0]  | 0       | 0      | 0         | 1         | 0        | 0        |       |                                                                                        |
| PWCTR2      | 10.2.6  | 0    | ↑   | 1   | -     | 1        | 1        | 0       | 0      | 0         | 0         | 0        | 1        | (C1h) | Power control setting                                                                  |
|             |         | 1    | ↑   | 1   | -     | VGH25[1] | VGH25[0] | -       | -      | VGLSEL[1] | VGLSEL[0] | VGHBT[1] | VGHBT[0] |       | BT: set VGH/ VGL voltage                                                               |
| PWCTR3      | 10.2.7  | 0    | ↑   | 1   | -     | 1        | 1        | 0       | 0      | 0         | 0         | 1        | 0        | (C2h) | In normal mode (Full colors)                                                           |
|             |         | 1    | ↑   | 1   | -     | DCA9     | DCA8     | SAPA2   | SAPA1  | SAPA0     | APA2      | APA1     | APA0     |       | APA: adjust the operational amplifier<br>DCA: adjust the booster Voltage               |
| PWCTR4      | 10.2.8  | 0    | ↑   | 1   | -     | 1        | 1        | 0       | 0      | 0         | 0         | 1        | 1        | (C3h) | In Idle mode (8-colors)                                                                |
|             |         | 1    | ↑   | 1   | -     | DCB9     | DCB8     | SAPB2   | SAPB1  | SAPB0     | APB2      | APB1     | APB0     |       | APB: adjust the operational amplifier<br>DCB: adjust the booster Voltage               |
| PWCTR5      | 10.2.9  | 0    | ↑   | 1   | -     | 1        | 1        | 0       | 0      | 0         | 1         | 0        | 0        | (C4h) | In partial mode + Full                                                                 |
|             |         | 1    | ↑   | 1   | -     | DCC9     | DCC8     | SAPC2   | SAPC1  | SAPC0     | APC2      | APC1     | APC0     |       | APC: adjust the operational amplifier<br>DCC: adjust the booster circuit for Idle mode |
|             |         | 1    | ↑   | 1   | -     | DCC7     | DCC6     | DCC5    | DCC4   | DCC3      | DCC2      | DCC1     | DCC0     |       |                                                                                        |
| VMCTR1      | 10.2.10 | 0    | ↑   | 1   | -     | 1        | 1        | 0       | 0      | 0         | 1         | 0        | 1        | (C5h) | VCOM control 1                                                                         |
|             |         | 1    | ↑   | 1   | -     | -        | -        | VCOMS5  | VCOMS4 | VCOMS3    | VCOMS2    | VCOMS1   | VCOMS0   |       | VCOM voltage control                                                                   |
| VMOFCTR     | 10.2.11 | 0    | ↑   | 1   | -     | 1        | 1        | 0       | 0      | 0         | 1         | 1        | 1        | (C7h) | Set VCOM offset control                                                                |
|             |         | 1    | ↑   | 1   | -     | -        | -        | -       | VMF4   | VMF3      | VMF2      | VMF1     | VMF0     |       |                                                                                        |
| WRID2       | 10.2.12 | 0    | ↑   | 1   | -     | 1        | 1        | 0       | 1      | 0         | 0         | 0        | 1        | (D1h) | Set LCM version code                                                                   |
|             |         | 1    | ↑   | 1   | -     | -        | ID2[6]   | ID2[5]  | ID2[4] | ID2[3]    | ID2[2]    | ID2[1]   | ID2[0]   |       |                                                                                        |

"-": Don't care

Note 1: C0h to C7h are fixed for about power controller

# ST7735R

Table 10.2.3 Panel Function Command List (3)

| Instruction | Refer   | D/CX | WRX | RDX | D17-8 | D7       | D6       | D5       | D4       | D3       | D2       | D1       | D0       | Hex   | Function                    |
|-------------|---------|------|-----|-----|-------|----------|----------|----------|----------|----------|----------|----------|----------|-------|-----------------------------|
| WRID3       | 10.2.13 | 0    | ↑   | 1   | -     | 1        | 1        | 0        | 1        | 0        | 0        | 1        | 0        | (D2h) | Customer Project code       |
|             |         | 1    | ↑   | 1   | -     | ID37     | ID36     | ID35     | ID34     | ID33     | ID32     | ID31     | ID30     |       | Set the project code at ID3 |
| NVCTR1      | 10.2.14 | 0    | ↑   | 1   | -     | 1        | 1        | 0        | 1        | 1        | 0        | 0        | 1        | (D9)  | NVM control status          |
|             |         | 1    | ↑   | 1   | -     | 0        | VMF_EN   | ID2_EN   | 0        | 0        | 0        | 0        | EXT_R    |       |                             |
| NVCTR2      | 10.2.15 | 0    | ↑   | 1   | -     | 1        | 1        | 0        | 1        | 1        | 1        | 1        | 0        | (DEh) | NVM Read Command            |
|             |         | 1    | ↑   | 1   | -     | 1        | 0        | 1        | 0        | 0        | 1        | 0        | 1        | A5    | Action code                 |
| NVCTR3      | 10.2.16 | 0    | ↑   | 1   | -     | 1        | 1        | 0        | 1        | 1        | 1        | 1        | 1        | (DFh) | NVM Write Command           |
|             |         | 1    | ↑   | 1   | -     | NVM_IB7  | NVM_IB6  | NVM_IB5  | NVM_IB4  | NVM_IB3  | NVM_IB2  | NVM_IB1  | NVM_IB0  |       |                             |
|             |         | 1    | ↑   | 1   | -     | NVM_CMD7 | NVM_CMD6 | NVM_CMD5 | NVM_CMD4 | NVM_CMD3 | NVM_CMD2 | NVM_CMD1 | NVM_CMD0 |       |                             |
|             |         | 1    | ↑   | 1   | -     | 1        | 0        | 1        | 0        | 0        | 1        | 0        | 1        | A5    |                             |

"-": Don't care

Note 1: The D1h to D3h registers are fixed for about ID code setting.

Note 2: The D9h, DEh and DFh registers are used for NV Memory function controller. (Ex: write, clear, etc.)

# ST7735R

Table 10.2.4 Panel Function Command List (4)

| Instruction | Refer   | D/CX | WRX | RDX | D17-8 | D7         | D6         | D5         | D4         | D3         | D2         | D1        | D0        | Hex                           | Function |
|-------------|---------|------|-----|-----|-------|------------|------------|------------|------------|------------|------------|-----------|-----------|-------------------------------|----------|
| GAMCTRP1    | 10.2.17 | 0    | ↑   | 1   | -     | 1          | 1          | 1          | 0          | 0          | 0          | 0         | 0         | (E0h)                         | Set      |
|             |         | 1    | ↑   | 1   | -     | ---        | ---        | VRFP[5]    | VRFP[4]    | VRFP[3]    | VRFP[2]    | VRFP[1]   | VRFP[0]   | Gamma adjustment (+ polarity) |          |
|             |         | 1    | ↑   | 1   | -     | ---        | ---        | VOS0P[5]   | VOS0P[4]   | VOS0P[3]   | VOS0P[2]   | VOS0P[1]  | VOS0P[0]  |                               |          |
|             |         | 1    | ↑   | 1   | -     | ---        | ---        | PKP0[5]    | PKP0[4]    | PKP0[3]    | PKP0[2]    | PKP0[1]   | PKP0[0]   |                               |          |
|             |         | 1    | ↑   | 1   | -     | ---        | ---        | PKP1[5]    | PKP1[4]    | PKP1[3]    | PKP1[2]    | PKP1[1]   | PKP1[0]   |                               |          |
|             |         | 1    | ↑   | 1   | -     | ---        | ---        | PKP2[5]    | PKP2[4]    | PKP2[3]    | PKP2[2]    | PKP2[1]   | PKP2[0]   |                               |          |
|             |         | 1    | ↑   | 1   | -     | ---        | ---        | PKP3[5]    | PKP3[4]    | PKP3[3]    | PKP3[2]    | PKP3[1]   | PKP3[0]   |                               |          |
|             |         | 1    | ↑   | 1   | -     | ---        | ---        | PKP4[5]    | PKP4[4]    | PKP4[3]    | PKP4[2]    | PKP4[1]   | PKP4[0]   |                               |          |
|             |         | 1    | ↑   | 1   | -     | ---        | ---        | PKP5[5]    | PKP5[4]    | PKP5[3]    | PKP5[2]    | PKP5[1]   | PKP5[0]   |                               |          |
|             |         | 1    | ↑   | 1   | -     | ---        | ---        | PKP6[5]    | PKP6[4]    | PKP6[3]    | PKP6[2]    | PKP6[1]   | PKP6[0]   |                               |          |
|             |         | 1    | ↑   | 1   | -     | ---        | ---        | PKP7[5]    | PKP7[4]    | PKP7[3]    | PKP7[2]    | PKP7[1]   | PKP7[0]   |                               |          |
|             |         | 1    | ↑   | 1   | -     | ---        | ---        | PKP8[5]    | PKP8[4]    | PKP8[3]    | PKP8[2]    | PKP8[1]   | PKP8[0]   |                               |          |
|             |         | 1    | ↑   | 1   | -     | ---        | ---        | PKP9[5]    | PKP9[4]    | PKP9[3]    | PKP9[2]    | PKP9[1]   | PKP9[0]   |                               |          |
|             |         | 1    | ↑   | 1   | -     | ---        | ---        | SELV0P[5]  | SELV0P[4]  | SELV0P[3]  | SELV0P[2]  | SELV0P[1] | SELV0P[0] |                               |          |
|             |         | 1    | ↑   | 1   | -     | ---        | ---        | SELV1P[5]  | SELV1P[4]  | SELV1P[3]  | SELV1P[2]  | SELV1P[1] | SELV1P[0] |                               |          |
| 1           | ↑       | 1    | -   | --- | ---   | SELV62P[5] | SELV62P[4] | SELV62P[3] | SELV62P[2] | SELV62P[1] | SELV62P[0] |           |           |                               |          |
| 1           | ↑       | 1    | -   | --- | ---   | SELV63P[5] | SELV63P[4] | SELV63P[3] | SELV63P[2] | SELV63P[1] | SELV63P[0] |           |           |                               |          |
| GAMCTRN1    | 10.2.18 | 0    | ↑   | 1   | -     | 1          | 1          | 1          | 0          | 0          | 0          | 0         | 1         | (E1h)                         | Set      |
|             |         | 1    | ↑   | 1   | -     | ---        | ---        | VRF0N[5]   | VRF0N[4]   | VRF0N[3]   | VRF0N[2]   | VRF0N[1]  | VRF0N[0]  | Gamma adjustment (- polarity) |          |
|             |         | 1    | ↑   | 1   | -     | ---        | ---        | VOS0N[5]   | VOS0N[4]   | VOS0N[3]   | VOS0N[2]   | VOS0N[1]  | VOS0N[0]  |                               |          |
|             |         | 1    | ↑   | 1   | -     | ---        | ---        | PKN0[5]    | PKN0[4]    | PKN0[3]    | PKN0[2]    | PKN0[1]   | PKN0[0]   |                               |          |
|             |         | 1    | ↑   | 1   | -     | ---        | ---        | PKN1[5]    | PKN1[4]    | PKN1[3]    | PKN1[2]    | PKN1[1]   | PKN1[0]   |                               |          |
|             |         | 1    | ↑   | 1   | -     | ---        | ---        | PKN2[5]    | PKN2[4]    | PKN2[3]    | PKN2[2]    | PKN2[1]   | PKN2[0]   |                               |          |
|             |         | 1    | ↑   | 1   | -     | ---        | ---        | PKN3[5]    | PKN3[4]    | PKN3[3]    | PKN3[2]    | PKN3[1]   | PKN3[0]   |                               |          |
|             |         | 1    | ↑   | 1   | -     | ---        | ---        | PKN4[5]    | PKN4[4]    | PKN4[3]    | PKN4[2]    | PKN4[1]   | PKN4[0]   |                               |          |
|             |         | 1    | ↑   | 1   | -     | ---        | ---        | PKN5[5]    | PKN5[4]    | PKN5[3]    | PKN5[2]    | PKN5[1]   | PKN5[0]   |                               |          |
|             |         | 1    | ↑   | 1   | -     | ---        | ---        | PKN6[5]    | PKN6[4]    | PKN6[3]    | PKN6[2]    | PKN6[1]   | PKN6[0]   |                               |          |
|             |         | 1    | ↑   | 1   | -     | ---        | ---        | PKN7[5]    | PKN7[4]    | PKN7[3]    | PKN7[2]    | PKN7[1]   | PKN7[0]   |                               |          |
|             |         | 1    | ↑   | 1   | -     | ---        | ---        | PKN8[5]    | PKN8[4]    | PKN8[3]    | PKN8[2]    | PKN8[1]   | PKN8[0]   |                               |          |
|             |         | 1    | ↑   | 1   | -     | ---        | ---        | PKN9[5]    | PKN9[4]    | PKN9[3]    | PKN9[2]    | PKN9[1]   | PKN9[0]   |                               |          |
|             |         | 1    | ↑   | 1   | -     | ---        | ---        | SELV0N[5]  | SELV0N[4]  | SELV0N[3]  | SELV0N[2]  | SELV0N[1] | SELV0N[0] |                               |          |
|             |         | 1    | ↑   | 1   | -     | ---        | ---        | SELV1N[5]  | SELV1N[4]  | SELV1N[3]  | SELV1N[2]  | SELV1N[1] | SELV1N[0] |                               |          |
| 1           | ↑       | 1    | -   | --- | ---   | SELV62N[5] | SELV62N[4] | SELV62N[3] | SELV62N[2] | SELV62N[1] | SELV62N[0] |           |           |                               |          |
| 1           | ↑       | 1    | -   | --- | ---   | SELV63N[5] | SELV63N[4] | SELV63N[3] | SELV63N[2] | SELV63N[1] | SELV63N[0] |           |           |                               |          |

“-”: Don't care

Note 1: E0-E1 registers are fixed for adjusting Gamma

## 10.2.1 FRMCTR1 (B1h): Frame Rate Control (In normal mode/ Full colors)

| B1H                       | FRMCTR1 (Frame Rate Control)                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                |     |       |    |    |      |      |       |       |       |       |       |        |               |  |  |                |                |                   |             |             |           |             |             |           |             |             |
|---------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|-----|-------|----|----|------|------|-------|-------|-------|-------|-------|--------|---------------|--|--|----------------|----------------|-------------------|-------------|-------------|-----------|-------------|-------------|-----------|-------------|-------------|
| Inst / Para               | D/CX                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | WRX            | RDX | D17-8 | D7 | D6 | D5   | D4   | D3    | D2    | D1    | D0    | HEX   |        |               |  |  |                |                |                   |             |             |           |             |             |           |             |             |
| FRMCTR1                   | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | ↑              | 1   | -     | 1  | 0  | 1    | 1    | 0     | 0     | 0     | 1     | (B1h) |        |               |  |  |                |                |                   |             |             |           |             |             |           |             |             |
| 1 <sup>st</sup> parameter | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | ↑              | 1   | -     | -  | -  | -    | -    | RTNA3 | RTNA2 | RTNA1 | RTNA0 |       |        |               |  |  |                |                |                   |             |             |           |             |             |           |             |             |
| 2 <sup>nd</sup> parameter | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | ↑              | 1   | -     | -  | -  | FPA5 | FPA4 | FPA3  | FPA2  | FPA1  | FPA0  |       |        |               |  |  |                |                |                   |             |             |           |             |             |           |             |             |
| 3 <sup>rd</sup> parameter | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | ↑              | 1   | -     | -  | -  | BPA5 | BPA4 | BPA3  | BPA2  | BPA1  | BPA0  |       |        |               |  |  |                |                |                   |             |             |           |             |             |           |             |             |
| Description               | -Set the frame frequency of the full colors normal mode.<br>- Frame rate=fosc/((RTNA x 2 + 40) x (LINE + FPA + BPA))<br>-fosc = 625kHz                                                                                                                                                                                                                                                                                                                                                                |                |     |       |    |    |      |      |       |       |       |       |       |        |               |  |  |                |                |                   |             |             |           |             |             |           |             |             |
| Default                   | <table border="1"> <thead> <tr> <th>Status</th> <th colspan="2">Default Value</th> </tr> </thead> <tbody> <tr> <td></td> <td>GM[1:0] = "00"</td> <td>GM[1:0] = "11"</td> </tr> <tr> <td>Power On Sequence</td> <td>01h/2Ch/2Dh</td> <td>01h/2Ch/2Bh</td> </tr> <tr> <td>S/W Reset</td> <td>01h/2Ch/2Dh</td> <td>01h/2Ch/2Bh</td> </tr> <tr> <td>H/W Reset</td> <td>01h/2Ch/2Dh</td> <td>01h/2Ch/2Bh</td> </tr> </tbody> </table>                                                                      |                |     |       |    |    |      |      |       |       |       |       |       | Status | Default Value |  |  | GM[1:0] = "00" | GM[1:0] = "11" | Power On Sequence | 01h/2Ch/2Dh | 01h/2Ch/2Bh | S/W Reset | 01h/2Ch/2Dh | 01h/2Ch/2Bh | H/W Reset | 01h/2Ch/2Dh | 01h/2Ch/2Bh |
| Status                    | Default Value                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                |     |       |    |    |      |      |       |       |       |       |       |        |               |  |  |                |                |                   |             |             |           |             |             |           |             |             |
|                           | GM[1:0] = "00"                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | GM[1:0] = "11" |     |       |    |    |      |      |       |       |       |       |       |        |               |  |  |                |                |                   |             |             |           |             |             |           |             |             |
| Power On Sequence         | 01h/2Ch/2Dh                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 01h/2Ch/2Bh    |     |       |    |    |      |      |       |       |       |       |       |        |               |  |  |                |                |                   |             |             |           |             |             |           |             |             |
| S/W Reset                 | 01h/2Ch/2Dh                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 01h/2Ch/2Bh    |     |       |    |    |      |      |       |       |       |       |       |        |               |  |  |                |                |                   |             |             |           |             |             |           |             |             |
| H/W Reset                 | 01h/2Ch/2Dh                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 01h/2Ch/2Bh    |     |       |    |    |      |      |       |       |       |       |       |        |               |  |  |                |                |                   |             |             |           |             |             |           |             |             |
| Flow Chart                | <div style="display: flex; align-items: center; justify-content: center;"> <div style="text-align: center; margin-right: 20px;"> <pre> graph TD     A[FRMCTR1] --&gt; B[/1st Parameter<br/>2nd parameter/]                     </pre> </div> <div style="border: 1px dashed black; padding: 10px;"> <p><b>Legend</b></p> <ul style="list-style-type: none"> <li> Command</li> <li> Parameter</li> <li> Display</li> <li> Action</li> <li> Mode</li> <li> Sequential transter</li> </ul> </div> </div> |                |     |       |    |    |      |      |       |       |       |       |       |        |               |  |  |                |                |                   |             |             |           |             |             |           |             |             |

## 10.2.2 FRMCTR2 (B2h): Frame Rate Control (In Idle mode/ 8-colors)

| B2H                       | FRMCTR2 (Frame Rate Control)                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                |     |       |    |    |      |      |       |       |       |       | HEX   |        |               |  |  |                |                |                   |             |             |           |             |             |           |             |             |
|---------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|-----|-------|----|----|------|------|-------|-------|-------|-------|-------|--------|---------------|--|--|----------------|----------------|-------------------|-------------|-------------|-----------|-------------|-------------|-----------|-------------|-------------|
| Inst / Para               | D/CX                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | WRX            | RDX | D17-8 | D7 | D6 | D5   | D4   | D3    | D2    | D1    | D0    |       |        |               |  |  |                |                |                   |             |             |           |             |             |           |             |             |
| FRMCTR2                   | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | ↑              | 1   | -     | 1  | 0  | 1    | 1    | 0     | 0     | 1     | 0     | (B2h) |        |               |  |  |                |                |                   |             |             |           |             |             |           |             |             |
| 1 <sup>st</sup> parameter | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | ↑              | 1   | -     | -  | -  | -    | -    | RTNB3 | RTNB2 | RTNB1 | RTNB0 |       |        |               |  |  |                |                |                   |             |             |           |             |             |           |             |             |
| 2 <sup>nd</sup> parameter | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | ↑              | 1   | -     | -  | -  | FPB5 | FPB4 | FPB3  | FPB2  | FPB1  | FPB0  |       |        |               |  |  |                |                |                   |             |             |           |             |             |           |             |             |
| 3 <sup>rd</sup> parameter | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | ↑              | 1   | -     | -  | -  | BPB5 | BPB4 | BPB3  | BPB2  | BPB1  | BPB0  |       |        |               |  |  |                |                |                   |             |             |           |             |             |           |             |             |
| Description               | -Set the frame frequency of the Idle mode.<br>- Frame rate=fosc/((RTNB x 2 + 40) x (LINE + FPB + BPB))<br>-fosc = 625kHz                                                                                                                                                                                                                                                                                                                                                                              |                |     |       |    |    |      |      |       |       |       |       |       |        |               |  |  |                |                |                   |             |             |           |             |             |           |             |             |
| Default                   | <table border="1"> <thead> <tr> <th>Status</th> <th colspan="2">Default Value</th> </tr> </thead> <tbody> <tr> <td></td> <td>GM[1:0] = "00"</td> <td>GM[1:0] = "11"</td> </tr> <tr> <td>Power On Sequence</td> <td>01h/2Ch/2Dh</td> <td>01h/2Ch/2Bh</td> </tr> <tr> <td>S/W Reset</td> <td>01h/2Ch/2Dh</td> <td>01h/2Ch/2Bh</td> </tr> <tr> <td>H/W Reset</td> <td>01h/2Ch/2Dh</td> <td>01h/2Ch/2Bh</td> </tr> </tbody> </table>                                                                      |                |     |       |    |    |      |      |       |       |       |       |       | Status | Default Value |  |  | GM[1:0] = "00" | GM[1:0] = "11" | Power On Sequence | 01h/2Ch/2Dh | 01h/2Ch/2Bh | S/W Reset | 01h/2Ch/2Dh | 01h/2Ch/2Bh | H/W Reset | 01h/2Ch/2Dh | 01h/2Ch/2Bh |
| Status                    | Default Value                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                |     |       |    |    |      |      |       |       |       |       |       |        |               |  |  |                |                |                   |             |             |           |             |             |           |             |             |
|                           | GM[1:0] = "00"                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | GM[1:0] = "11" |     |       |    |    |      |      |       |       |       |       |       |        |               |  |  |                |                |                   |             |             |           |             |             |           |             |             |
| Power On Sequence         | 01h/2Ch/2Dh                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 01h/2Ch/2Bh    |     |       |    |    |      |      |       |       |       |       |       |        |               |  |  |                |                |                   |             |             |           |             |             |           |             |             |
| S/W Reset                 | 01h/2Ch/2Dh                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 01h/2Ch/2Bh    |     |       |    |    |      |      |       |       |       |       |       |        |               |  |  |                |                |                   |             |             |           |             |             |           |             |             |
| H/W Reset                 | 01h/2Ch/2Dh                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 01h/2Ch/2Bh    |     |       |    |    |      |      |       |       |       |       |       |        |               |  |  |                |                |                   |             |             |           |             |             |           |             |             |
| Flow Chart                | <div style="display: flex; align-items: center; justify-content: center;"> <div style="text-align: center; margin-right: 20px;"> <pre> graph TD     A[FRMCTR2] --&gt; B[/1st Parameter<br/>2nd parameter/]                     </pre> </div> <div style="border: 1px dashed black; padding: 10px;"> <p><b>Legend</b></p> <ul style="list-style-type: none"> <li> Command</li> <li> Parameter</li> <li> Display</li> <li> Action</li> <li> Mode</li> <li> Sequential transter</li> </ul> </div> </div> |                |     |       |    |    |      |      |       |       |       |       |       |        |               |  |  |                |                |                   |             |             |           |             |             |           |             |             |

## 10.2.3 FRMCTR3 (B3h): Frame Rate Control (In Partial mode/ full colors)

| B3H                       | FRMCTR3 (Frame Rate Control)                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                         |     |       |    |    |      |      |      |      |      |      |     |        |               |  |  |                |                |                   |                         |                         |           |                         |                         |           |                         |                         |
|---------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|-----|-------|----|----|------|------|------|------|------|------|-----|--------|---------------|--|--|----------------|----------------|-------------------|-------------------------|-------------------------|-----------|-------------------------|-------------------------|-----------|-------------------------|-------------------------|
| Inst / Para               | D/CX                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | WRX                     | RDX | D17-8 | D7 | D6 | D5   | D4   | D3   | D2   | D1   | D0   | HE  |        |               |  |  |                |                |                   |                         |                         |           |                         |                         |           |                         |                         |
| FRMCTR3                   | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | ↑                       | 1   | -     | 1  | 0  | 1    | 1    | 0    | 0    | 1    | 1    | (B3 |        |               |  |  |                |                |                   |                         |                         |           |                         |                         |           |                         |                         |
| 1 <sup>st</sup> parameter | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | ↑                       | 1   | -     | -  | -  | -    | -    | RTNC | RTNC | RTNC | RTNC |     |        |               |  |  |                |                |                   |                         |                         |           |                         |                         |           |                         |                         |
| 2 <sup>nd</sup> parameter | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | ↑                       | 1   | -     | -  | -  | FPC5 | FPC4 | FPC3 | FPC2 | FPC1 | FPC0 |     |        |               |  |  |                |                |                   |                         |                         |           |                         |                         |           |                         |                         |
| 3 <sup>rd</sup> parameter | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | ↑                       | 1   | -     | -  | -  | BPC5 | BPC4 | BPC3 | BPC2 | BPC1 | BPC0 |     |        |               |  |  |                |                |                   |                         |                         |           |                         |                         |           |                         |                         |
| 4 <sup>th</sup> parameter | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | ↑                       | 1   | -     | -  | -  | -    | -    | RTND | RTND | RTND | RTND |     |        |               |  |  |                |                |                   |                         |                         |           |                         |                         |           |                         |                         |
| 5 <sup>th</sup> parameter | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | ↑                       | 1   | -     | -  | -  | FPD5 | FPD4 | FPD3 | FPD2 | FPD1 | FPD0 |     |        |               |  |  |                |                |                   |                         |                         |           |                         |                         |           |                         |                         |
| 6 <sup>th</sup> parameter | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | ↑                       | 1   | -     | -  | -  | BPD5 | BPD4 | BPD3 | BPD2 | BPD1 | BPD0 |     |        |               |  |  |                |                |                   |                         |                         |           |                         |                         |           |                         |                         |
| Description               | <p>-Set the frame frequency of the Partial mode/ full colors.</p> <p>- 1st parameter to 3rd parameter are used in dot inversion mode.</p> <p>- 4th parameter to 6th parameter are used in line inversion mode.</p> <p>- Frame rate=fosc/((RTNC x 2 + 40) x (LINE + FPC + BPC))</p> <p>-fosc = 625kHz</p>                                                                                                                                                                                                 |                         |     |       |    |    |      |      |      |      |      |      |     |        |               |  |  |                |                |                   |                         |                         |           |                         |                         |           |                         |                         |
| Default                   | <table border="1"> <thead> <tr> <th>Status</th> <th colspan="2">Default Value</th> </tr> </thead> <tbody> <tr> <td></td> <td>GM[1:0] = "00"</td> <td>GM[1:0] = "11"</td> </tr> <tr> <td>Power On Sequence</td> <td>01h/2Ch/2Dh/01h/2Ch/2Dh</td> <td>01h/2Ch/2Bh/01h/2Ch/2Bh</td> </tr> <tr> <td>S/W Reset</td> <td>01h/2Ch/2Dh/01h/2Ch/2Dh</td> <td>01h/2Ch/2Bh/01h/2Ch/2Bh</td> </tr> <tr> <td>H/W Reset</td> <td>01h/2Ch/2Dh/01h/2Ch/2Dh</td> <td>01h/2Ch/2Bh/01h/2Ch/2Bh</td> </tr> </tbody> </table> |                         |     |       |    |    |      |      |      |      |      |      |     | Status | Default Value |  |  | GM[1:0] = "00" | GM[1:0] = "11" | Power On Sequence | 01h/2Ch/2Dh/01h/2Ch/2Dh | 01h/2Ch/2Bh/01h/2Ch/2Bh | S/W Reset | 01h/2Ch/2Dh/01h/2Ch/2Dh | 01h/2Ch/2Bh/01h/2Ch/2Bh | H/W Reset | 01h/2Ch/2Dh/01h/2Ch/2Dh | 01h/2Ch/2Bh/01h/2Ch/2Bh |
| Status                    | Default Value                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                         |     |       |    |    |      |      |      |      |      |      |     |        |               |  |  |                |                |                   |                         |                         |           |                         |                         |           |                         |                         |
|                           | GM[1:0] = "00"                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | GM[1:0] = "11"          |     |       |    |    |      |      |      |      |      |      |     |        |               |  |  |                |                |                   |                         |                         |           |                         |                         |           |                         |                         |
| Power On Sequence         | 01h/2Ch/2Dh/01h/2Ch/2Dh                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 01h/2Ch/2Bh/01h/2Ch/2Bh |     |       |    |    |      |      |      |      |      |      |     |        |               |  |  |                |                |                   |                         |                         |           |                         |                         |           |                         |                         |
| S/W Reset                 | 01h/2Ch/2Dh/01h/2Ch/2Dh                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 01h/2Ch/2Bh/01h/2Ch/2Bh |     |       |    |    |      |      |      |      |      |      |     |        |               |  |  |                |                |                   |                         |                         |           |                         |                         |           |                         |                         |
| H/W Reset                 | 01h/2Ch/2Dh/01h/2Ch/2Dh                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 01h/2Ch/2Bh/01h/2Ch/2Bh |     |       |    |    |      |      |      |      |      |      |     |        |               |  |  |                |                |                   |                         |                         |           |                         |                         |           |                         |                         |
| Flow Chart                | <div style="border: 1px dashed black; padding: 10px;"> <div style="text-align: center;"> <pre> graph TD     A[FRMCTR3] --&gt; B[1st Parameter<br/> <br/>6nd parameter]             </pre> </div> <div style="float: right; border: 1px dashed black; padding: 5px; margin-top: 10px;"> <p><b>Legend</b></p> <ul style="list-style-type: none"> <li> Command</li> <li> Parameter</li> <li> Display</li> <li> Action</li> <li> Mode</li> <li> Sequential transfer</li> </ul> </div> </div>                 |                         |     |       |    |    |      |      |      |      |      |      |     |        |               |  |  |                |                |                   |                         |                         |           |                         |                         |           |                         |                         |

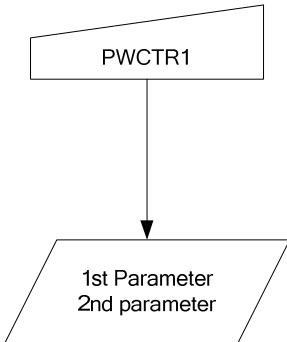
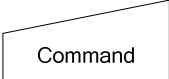

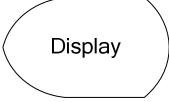

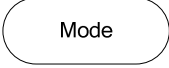
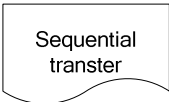
## 10.2.4 INVCTR (B4h): Display Inversion Control

| B4H         |                                                                                                                                                                                                                                                  | INVCTR (Display Inversion Control)            |                                              |       |    |    |    |    |    |     |     |     |       |
|-------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------|----------------------------------------------|-------|----|----|----|----|----|-----|-----|-----|-------|
| Inst / Para | D/CX                                                                                                                                                                                                                                             | WRX                                           | RDX                                          | D17-8 | D7 | D6 | D5 | D4 | D3 | D2  | D1  | D0  | HEX   |
| INVCTR      | 0                                                                                                                                                                                                                                                | ↑                                             | 1                                            | -     | 1  | 0  | 1  | 1  | 0  | 1   | 0   | 0   | (B4h) |
| Parameter   | 1                                                                                                                                                                                                                                                | ↑                                             | 1                                            | -     | 0  | 0  | 0  | 0  | 0  | NLA | NLB | NLC |       |
| Description | -Display Inversion mode control                                                                                                                                                                                                                  |                                               |                                              |       |    |    |    |    |    |     |     |     |       |
|             | -NLA: Inversion setting in full colors normal mode (Normal mode on)                                                                                                                                                                              |                                               |                                              |       |    |    |    |    |    |     |     |     |       |
|             | NLA                                                                                                                                                                                                                                              |                                               | Inversion setting in full Colors normal mode |       |    |    |    |    |    |     |     |     |       |
|             | 0                                                                                                                                                                                                                                                |                                               | Dot Inversion                                |       |    |    |    |    |    |     |     |     |       |
|             | 1                                                                                                                                                                                                                                                |                                               | Line Inversion                               |       |    |    |    |    |    |     |     |     |       |
|             | -NLB: Inversion setting in Idle mode (Idle mode on)                                                                                                                                                                                              |                                               |                                              |       |    |    |    |    |    |     |     |     |       |
|             | NLB                                                                                                                                                                                                                                              |                                               | Inversion setting in Idle mode               |       |    |    |    |    |    |     |     |     |       |
|             | 0                                                                                                                                                                                                                                                |                                               | Dot Inversion                                |       |    |    |    |    |    |     |     |     |       |
|             | 1                                                                                                                                                                                                                                                |                                               | Line Inversion                               |       |    |    |    |    |    |     |     |     |       |
|             | -NLC: Inversion setting in full colors partial mode (Partial mode on / Idle mode off)                                                                                                                                                            |                                               |                                              |       |    |    |    |    |    |     |     |     |       |
| NLC         |                                                                                                                                                                                                                                                  | Inversion setting in full Colors partial mode |                                              |       |    |    |    |    |    |     |     |     |       |
| 0           |                                                                                                                                                                                                                                                  | Dot Inversion                                 |                                              |       |    |    |    |    |    |     |     |     |       |
| 1           |                                                                                                                                                                                                                                                  | Line Inversion                                |                                              |       |    |    |    |    |    |     |     |     |       |
| Default     | Status                                                                                                                                                                                                                                           |                                               | Default Value                                |       |    |    |    |    |    |     |     |     |       |
|             |                                                                                                                                                                                                                                                  |                                               | B4h                                          |       |    |    |    |    |    |     |     |     |       |
|             |                                                                                                                                                                                                                                                  |                                               | Power On Sequence                            |       |    |    |    |    |    |     |     |     |       |
|             |                                                                                                                                                                                                                                                  |                                               | S/W Reset                                    |       |    |    |    |    |    |     |     |     |       |
|             |                                                                                                                                                                                                                                                  |                                               | H/W Reset                                    |       |    |    |    |    |    |     |     |     |       |
| Flow Chart  | <pre> graph TD     INVCTR[INVCTR] --&gt; Param[/1st Parameter/]     </pre>                                                                                                                                                                       |                                               |                                              |       |    |    |    |    |    |     |     |     |       |
|             | <div style="border: 2px dashed black; padding: 5px;"> <p><b>Legend</b></p> <ul style="list-style-type: none"> <li> Command</li> <li> Parameter</li> <li> Display</li> <li> Action</li> <li> Mode</li> <li> Sequential transfer</li> </ul> </div> |                                               |                                              |       |    |    |    |    |    |     |     |     |       |

## 10.2.5 PWCTR1 (C0h): Power Control 1

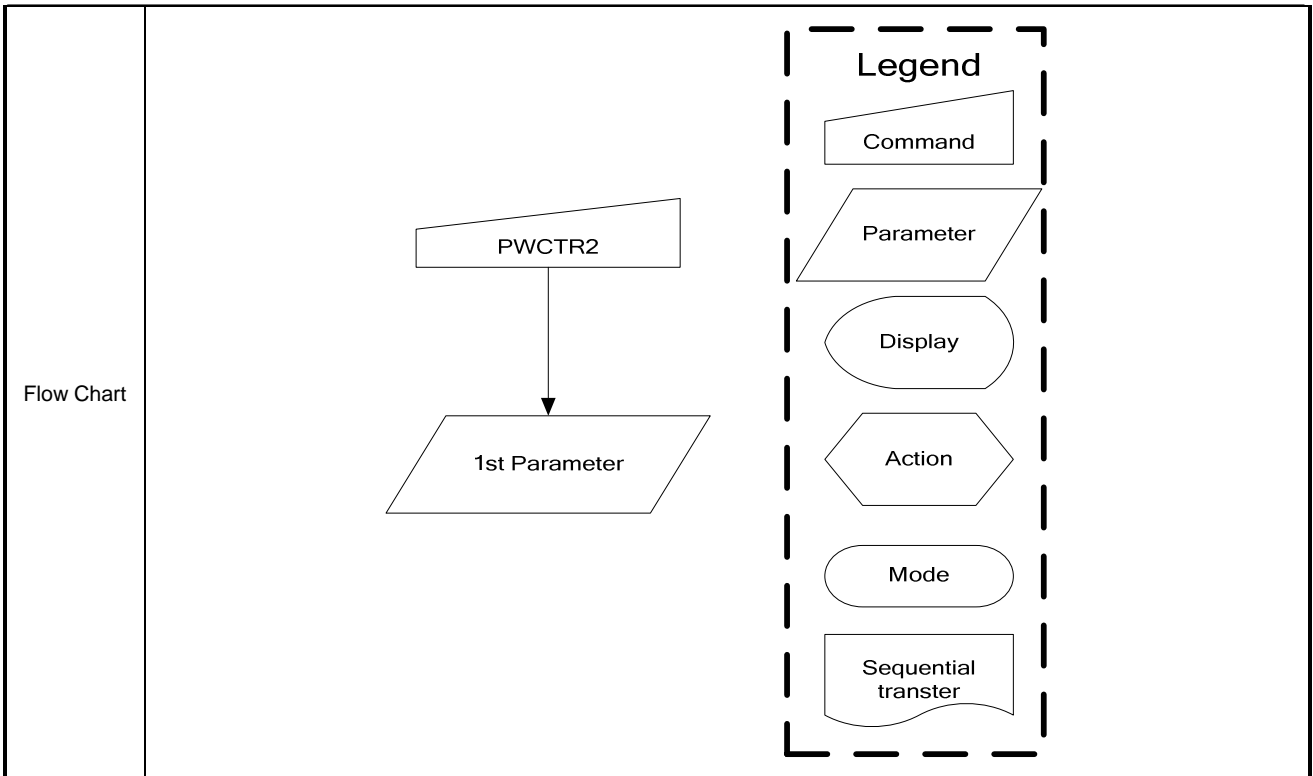
| C0H                       | PWCTR1 (Power Control 1) |      |                                              |       |         |           |         |          |       |       |       |       | HEX   |
|---------------------------|--------------------------|------|----------------------------------------------|-------|---------|-----------|---------|----------|-------|-------|-------|-------|-------|
| Inst / Para               | D/CX                     | WRX  | RDX                                          | D17-8 | D7      | D6        | D5      | D4       | D3    | D2    | D1    | D0    |       |
| PWCTR1                    | 0                        | ↑    | 1                                            | -     | 1       | 1         | 0       | 0        | 0     | 0     | 0     | 0     | (C0h) |
| 1 <sup>st</sup> parameter | 1                        | ↑    | 1                                            | -     | AVDD[2] | AVDD[1]   | AVDD[0] | VRHP4    | VRHP3 | VRHP2 | VRHP1 | VRHP0 |       |
| 2 <sup>nd</sup> parameter | 1                        | ↑    | 1                                            | -     | 0       | 0         | 0       | VRHN4    | VRHN3 | VRHN2 | VRHN1 | VRHN0 |       |
| 3 <sup>rd</sup> parameter | 1                        | ↑    | 1                                            | -     | MODE[1] | MODE[0]   | 0       | 0        | 0     | 1     | 0     | 0     |       |
| Description               | AVDD[2:0]                |      | AVDD                                         |       |         | MODE[1:0] |         | FUNCTION |       |       |       |       |       |
|                           | 000                      |      | 4.5                                          |       |         | 00        |         | 2X       |       |       |       |       |       |
|                           | 001                      |      | 4.6                                          |       |         | 01        |         | 3X       |       |       |       |       |       |
|                           | 010                      |      | 4.7                                          |       |         | 10        |         | AUTO     |       |       |       |       |       |
|                           | 011                      |      | 4.8                                          |       |         | 11        |         | 3X       |       |       |       |       |       |
|                           | 100                      |      | 4.9                                          |       |         |           |         |          |       |       |       |       |       |
|                           | 101                      |      | 5                                            |       |         |           |         |          |       |       |       |       |       |
|                           | 110                      |      | 5.1                                          |       |         |           |         |          |       |       |       |       |       |
|                           | 111                      |      | Don't use this setting, reserve for testing. |       |         |           |         |          |       |       |       |       |       |
|                           | VRHP[4:0]                |      | GVDD                                         |       |         | VRHN[4:0] |         | GVCL     |       |       |       |       |       |
|                           | 00000                    |      | 4.7                                          |       |         | 00000     |         | -4.7     |       |       |       |       |       |
|                           | 00001                    |      | 4.65                                         |       |         | 00001     |         | -4.65    |       |       |       |       |       |
|                           | 00010                    |      | 4.6                                          |       |         | 00010     |         | -4.6     |       |       |       |       |       |
|                           | 00011                    |      | 4.55                                         |       |         | 00011     |         | -4.55    |       |       |       |       |       |
|                           | 00100                    |      | 4.5                                          |       |         | 00100     |         | -4.5     |       |       |       |       |       |
|                           | 00101                    |      | 4.45                                         |       |         | 00101     |         | -4.45    |       |       |       |       |       |
|                           | 00110                    |      | 4.4                                          |       |         | 00110     |         | -4.4     |       |       |       |       |       |
|                           | 00111                    |      | 4.35                                         |       |         | 00111     |         | -4.35    |       |       |       |       |       |
|                           | 01000                    |      | 4.3                                          |       |         | 01000     |         | -4.3     |       |       |       |       |       |
|                           | 01001                    |      | 4.25                                         |       |         | 01001     |         | -4.25    |       |       |       |       |       |
|                           | 01010                    |      | 4.2                                          |       |         | 01010     |         | -4.2     |       |       |       |       |       |
|                           | 01011                    |      | 4.15                                         |       |         | 01011     |         | -4.15    |       |       |       |       |       |
|                           | 01100                    |      | 4.1                                          |       |         | 01100     |         | -4.1     |       |       |       |       |       |
|                           | 01101                    |      | 4.05                                         |       |         | 01101     |         | -4.05    |       |       |       |       |       |
|                           | 01110                    |      | 4                                            |       |         | 01110     |         | -4       |       |       |       |       |       |
|                           | 01111                    |      | 3.95                                         |       |         | 01111     |         | -3.95    |       |       |       |       |       |
|                           | 10000                    |      | 3.9                                          |       |         | 10000     |         | -3.9     |       |       |       |       |       |
|                           | 10001                    |      | 3.85                                         |       |         | 10001     |         | -3.85    |       |       |       |       |       |
|                           | 10010                    |      | 3.8                                          |       |         | 10010     |         | -3.8     |       |       |       |       |       |
|                           | 10011                    |      | 3.75                                         |       |         | 10011     |         | -3.75    |       |       |       |       |       |
|                           | 10100                    |      | 3.7                                          |       |         | 10100     |         | -3.7     |       |       |       |       |       |
|                           | 10101                    |      | 3.65                                         |       |         | 10101     |         | -3.65    |       |       |       |       |       |
|                           | 10110                    |      | 3.6                                          |       |         | 10110     |         | -3.6     |       |       |       |       |       |
| 10111                     |                          | 3.55 |                                              |       | 10111   |           | -3.55   |          |       |       |       |       |       |
| 11000                     |                          | 3.5  |                                              |       | 11000   |           | -3.5    |          |       |       |       |       |       |
| 11001                     |                          | 3.45 |                                              |       | 11001   |           | -3.45   |          |       |       |       |       |       |
| 11010                     |                          | 3.4  |                                              |       | 11010   |           | -3.4    |          |       |       |       |       |       |
| 11011                     |                          | 3.35 |                                              |       | 11011   |           | -3.35   |          |       |       |       |       |       |
| 11100                     |                          | 3.3  |                                              |       | 11100   |           | -3.3    |          |       |       |       |       |       |
| 11101                     |                          | 3.25 |                                              |       | 11101   |           | -3.25   |          |       |       |       |       |       |
| 11110                     |                          | 3.2  |                                              |       | 11110   |           | -3.2    |          |       |       |       |       |       |
| 11111                     |                          | 3.15 |                                              |       | 11111   |           | -3.15   |          |       |       |       |       |       |

# ST7735R

| Register Availability                     | <table border="1"> <thead> <tr> <th>Status</th> <th>Availability</th> </tr> </thead> <tbody> <tr> <td>Normal Mode On, Idle Mode Off, Sleep Out</td> <td>Yes</td> </tr> <tr> <td>Normal Mode On, Idle Mode On, Sleep Out</td> <td>Yes</td> </tr> <tr> <td>Partial Mode On, Idle Mode Off, Sleep Out</td> <td>Yes</td> </tr> <tr> <td>Partial Mode On, Idle Mode On, Sleep Out</td> <td>Yes</td> </tr> <tr> <td>Sleep In</td> <td>Yes</td> </tr> </tbody> </table>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Status | Availability  | Normal Mode On, Idle Mode Off, Sleep Out | Yes | Normal Mode On, Idle Mode On, Sleep Out | Yes         | Partial Mode On, Idle Mode Off, Sleep Out | Yes         | Partial Mode On, Idle Mode On, Sleep Out | Yes         | Sleep In | Yes |
|-------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|---------------|------------------------------------------|-----|-----------------------------------------|-------------|-------------------------------------------|-------------|------------------------------------------|-------------|----------|-----|
| Status                                    | Availability                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |        |               |                                          |     |                                         |             |                                           |             |                                          |             |          |     |
| Normal Mode On, Idle Mode Off, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |        |               |                                          |     |                                         |             |                                           |             |                                          |             |          |     |
| Normal Mode On, Idle Mode On, Sleep Out   | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |        |               |                                          |     |                                         |             |                                           |             |                                          |             |          |     |
| Partial Mode On, Idle Mode Off, Sleep Out | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |        |               |                                          |     |                                         |             |                                           |             |                                          |             |          |     |
| Partial Mode On, Idle Mode On, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |        |               |                                          |     |                                         |             |                                           |             |                                          |             |          |     |
| Sleep In                                  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |        |               |                                          |     |                                         |             |                                           |             |                                          |             |          |     |
| Default                                   | <table border="1"> <thead> <tr> <th>Status</th> <th>Default Value</th> </tr> </thead> <tbody> <tr> <td></td> <td>C0h</td> </tr> <tr> <td>Power On Sequence</td> <td>82h/02h/84h</td> </tr> <tr> <td>S/W Reset</td> <td>82h/02h/84h</td> </tr> <tr> <td>H/W Reset</td> <td>82h/02h/84h</td> </tr> </tbody> </table>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Status | Default Value |                                          | C0h | Power On Sequence                       | 82h/02h/84h | S/W Reset                                 | 82h/02h/84h | H/W Reset                                | 82h/02h/84h |          |     |
| Status                                    | Default Value                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |        |               |                                          |     |                                         |             |                                           |             |                                          |             |          |     |
|                                           | C0h                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |        |               |                                          |     |                                         |             |                                           |             |                                          |             |          |     |
| Power On Sequence                         | 82h/02h/84h                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |        |               |                                          |     |                                         |             |                                           |             |                                          |             |          |     |
| S/W Reset                                 | 82h/02h/84h                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |        |               |                                          |     |                                         |             |                                           |             |                                          |             |          |     |
| H/W Reset                                 | 82h/02h/84h                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |        |               |                                          |     |                                         |             |                                           |             |                                          |             |          |     |
| Flow Chart                                | <div style="display: flex; align-items: center; justify-content: center;"> <div style="text-align: center; margin-right: 20px;">  <pre> graph TD     PWCTR1[/PWCTR1/] --&gt; Param[/1st Parameter&lt;br/&gt;2nd parameter/]             </pre> </div> <div style="border: 1px dashed black; padding: 10px;"> <p><b>Legend</b></p> <ul style="list-style-type: none"> <li> Command</li> <li> Parameter</li> <li> Display</li> <li> Action</li> <li> Mode</li> <li> Sequential transfer</li> </ul> </div> </div> |        |               |                                          |     |                                         |             |                                           |             |                                          |             |          |     |

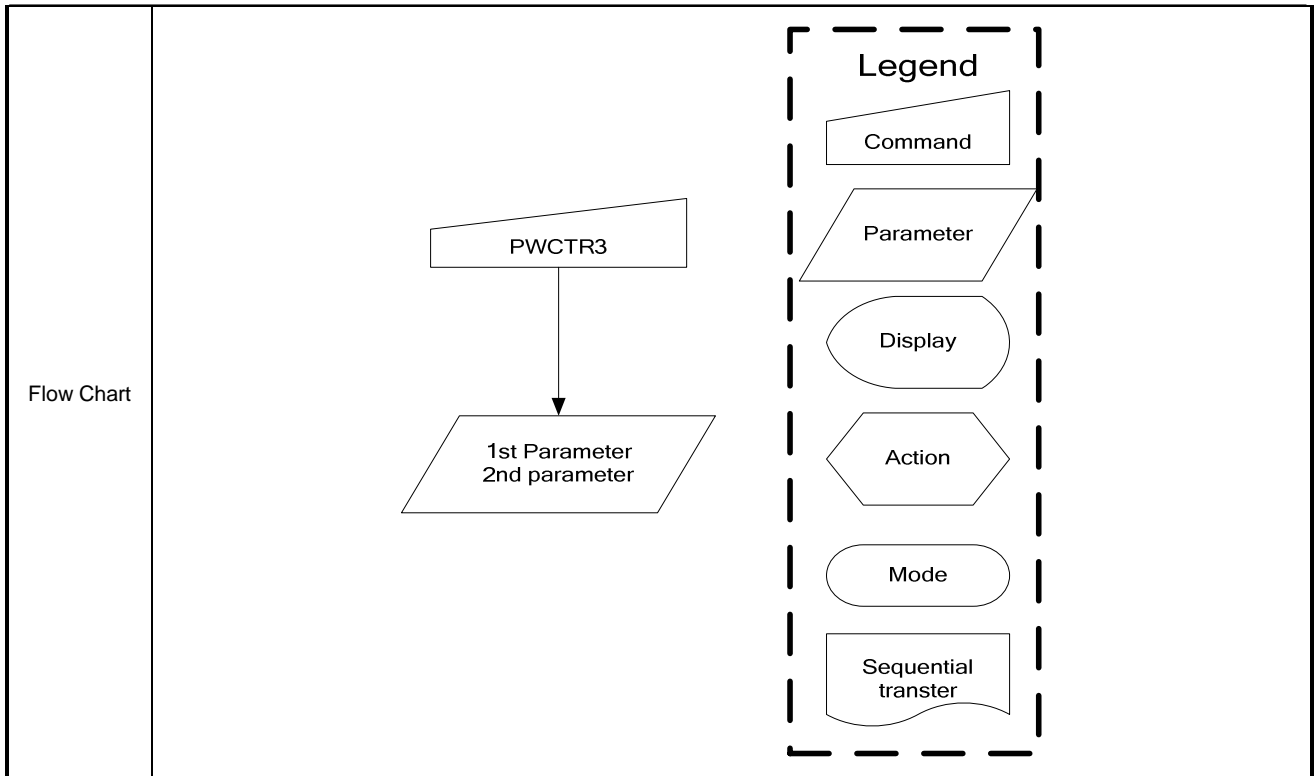
## 10.2.6 PWCTR2 (C1h): Power Control 2

| C1H                                                                                                                                                                                                                                                                                                                     | PWCTR2 (Power Control 2)                                                                                                                                                                                                                                                                                                                                                                                                                                         |     |     |       |          |          |    |    |           |           |          |          |             |            |               |                                          |     |                                         |     |                                           |     |                                              |     |          |     |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|-------|----------|----------|----|----|-----------|-----------|----------|----------|-------------|------------|---------------|------------------------------------------|-----|-----------------------------------------|-----|-------------------------------------------|-----|----------------------------------------------|-----|----------|-----|
| Inst / Para                                                                                                                                                                                                                                                                                                             | D/CX                                                                                                                                                                                                                                                                                                                                                                                                                                                             | WRX | RDX | D17-8 | D7       | D6       | D5 | D4 | D3        | D2        | D1       | D0       | HEX         |            |               |                                          |     |                                         |     |                                           |     |                                              |     |          |     |
| PWCTR2                                                                                                                                                                                                                                                                                                                  | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                | ↑   | 1   | -     | 1        | 1        | 0  | 0  | 0         | 0         | 0        | 1        | (C1h)       |            |               |                                          |     |                                         |     |                                           |     |                                              |     |          |     |
| 1 <sup>st</sup> parameter                                                                                                                                                                                                                                                                                               | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                | ↑   | 1   |       | VGH25[1] | VGH25[0] | -  | -  | VGLSEL[1] | VGLSEL[0] | VGHBT[1] | VGHBT[0] |             |            |               |                                          |     |                                         |     |                                           |     |                                              |     |          |     |
| Description                                                                                                                                                                                                                                                                                                             | -Set the VGH and VGL supply power level                                                                                                                                                                                                                                                                                                                                                                                                                          |     |     |       |          |          |    |    |           |           |          |          |             |            |               |                                          |     |                                         |     |                                           |     |                                              |     |          |     |
|                                                                                                                                                                                                                                                                                                                         | <table border="1"> <thead> <tr> <th>VGH25[1:0]</th> <th>V25</th> </tr> </thead> <tbody> <tr> <td>00</td> <td>2.1</td> </tr> <tr> <td>01</td> <td>2.2</td> </tr> <tr> <td>10</td> <td>2.3</td> </tr> <tr> <td>11</td> <td>2.4</td> </tr> </tbody> </table>                                                                                                                                                                                                        |     |     |       |          |          |    |    |           |           |          |          |             | VGH25[1:0] | V25           | 00                                       | 2.1 | 01                                      | 2.2 | 10                                        | 2.3 | 11                                           | 2.4 |          |     |
|                                                                                                                                                                                                                                                                                                                         | VGH25[1:0]                                                                                                                                                                                                                                                                                                                                                                                                                                                       | V25 |     |       |          |          |    |    |           |           |          |          |             |            |               |                                          |     |                                         |     |                                           |     |                                              |     |          |     |
|                                                                                                                                                                                                                                                                                                                         | 00                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 2.1 |     |       |          |          |    |    |           |           |          |          |             |            |               |                                          |     |                                         |     |                                           |     |                                              |     |          |     |
| 01                                                                                                                                                                                                                                                                                                                      | 2.2                                                                                                                                                                                                                                                                                                                                                                                                                                                              |     |     |       |          |          |    |    |           |           |          |          |             |            |               |                                          |     |                                         |     |                                           |     |                                              |     |          |     |
| 10                                                                                                                                                                                                                                                                                                                      | 2.3                                                                                                                                                                                                                                                                                                                                                                                                                                                              |     |     |       |          |          |    |    |           |           |          |          |             |            |               |                                          |     |                                         |     |                                           |     |                                              |     |          |     |
| 11                                                                                                                                                                                                                                                                                                                      | 2.4                                                                                                                                                                                                                                                                                                                                                                                                                                                              |     |     |       |          |          |    |    |           |           |          |          |             |            |               |                                          |     |                                         |     |                                           |     |                                              |     |          |     |
| <table border="1"> <thead> <tr> <th>VGHBT[1:0]</th> <th>VGH</th> </tr> </thead> <tbody> <tr> <td>00</td> <td>2*AVDD+VGH25</td> </tr> <tr> <td>01</td> <td>3*AVDD</td> </tr> <tr> <td>10</td> <td>3*AVDD+VGH25</td> </tr> <tr> <td>11</td> <td>Don't use this setting, reserve for testing.</td> </tr> </tbody> </table> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |     |     |       |          |          |    |    |           |           |          |          | VGHBT[1:0]  | VGH        | 00            | 2*AVDD+VGH25                             | 01  | 3*AVDD                                  | 10  | 3*AVDD+VGH25                              | 11  | Don't use this setting, reserve for testing. |     |          |     |
| VGHBT[1:0]                                                                                                                                                                                                                                                                                                              | VGH                                                                                                                                                                                                                                                                                                                                                                                                                                                              |     |     |       |          |          |    |    |           |           |          |          |             |            |               |                                          |     |                                         |     |                                           |     |                                              |     |          |     |
| 00                                                                                                                                                                                                                                                                                                                      | 2*AVDD+VGH25                                                                                                                                                                                                                                                                                                                                                                                                                                                     |     |     |       |          |          |    |    |           |           |          |          |             |            |               |                                          |     |                                         |     |                                           |     |                                              |     |          |     |
| 01                                                                                                                                                                                                                                                                                                                      | 3*AVDD                                                                                                                                                                                                                                                                                                                                                                                                                                                           |     |     |       |          |          |    |    |           |           |          |          |             |            |               |                                          |     |                                         |     |                                           |     |                                              |     |          |     |
| 10                                                                                                                                                                                                                                                                                                                      | 3*AVDD+VGH25                                                                                                                                                                                                                                                                                                                                                                                                                                                     |     |     |       |          |          |    |    |           |           |          |          |             |            |               |                                          |     |                                         |     |                                           |     |                                              |     |          |     |
| 11                                                                                                                                                                                                                                                                                                                      | Don't use this setting, reserve for testing.                                                                                                                                                                                                                                                                                                                                                                                                                     |     |     |       |          |          |    |    |           |           |          |          |             |            |               |                                          |     |                                         |     |                                           |     |                                              |     |          |     |
| <table border="1"> <thead> <tr> <th>VGLSEL[1:0]</th> <th>VGL</th> </tr> </thead> <tbody> <tr> <td>00</td> <td>-7.5</td> </tr> <tr> <td>01</td> <td>-10</td> </tr> <tr> <td>10</td> <td>-12.5</td> </tr> <tr> <td>11</td> <td>-13</td> </tr> </tbody> </table>                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |     |     |       |          |          |    |    |           |           |          |          | VGLSEL[1:0] | VGL        | 00            | -7.5                                     | 01  | -10                                     | 10  | -12.5                                     | 11  | -13                                          |     |          |     |
| VGLSEL[1:0]                                                                                                                                                                                                                                                                                                             | VGL                                                                                                                                                                                                                                                                                                                                                                                                                                                              |     |     |       |          |          |    |    |           |           |          |          |             |            |               |                                          |     |                                         |     |                                           |     |                                              |     |          |     |
| 00                                                                                                                                                                                                                                                                                                                      | -7.5                                                                                                                                                                                                                                                                                                                                                                                                                                                             |     |     |       |          |          |    |    |           |           |          |          |             |            |               |                                          |     |                                         |     |                                           |     |                                              |     |          |     |
| 01                                                                                                                                                                                                                                                                                                                      | -10                                                                                                                                                                                                                                                                                                                                                                                                                                                              |     |     |       |          |          |    |    |           |           |          |          |             |            |               |                                          |     |                                         |     |                                           |     |                                              |     |          |     |
| 10                                                                                                                                                                                                                                                                                                                      | -12.5                                                                                                                                                                                                                                                                                                                                                                                                                                                            |     |     |       |          |          |    |    |           |           |          |          |             |            |               |                                          |     |                                         |     |                                           |     |                                              |     |          |     |
| 11                                                                                                                                                                                                                                                                                                                      | -13                                                                                                                                                                                                                                                                                                                                                                                                                                                              |     |     |       |          |          |    |    |           |           |          |          |             |            |               |                                          |     |                                         |     |                                           |     |                                              |     |          |     |
| Restriction                                                                                                                                                                                                                                                                                                             | -The deviation value of VGH/ VGL between with Measurement and Specification: Max <= 1V<br>-VGH-VGL <= 32V                                                                                                                                                                                                                                                                                                                                                        |     |     |       |          |          |    |    |           |           |          |          |             |            |               |                                          |     |                                         |     |                                           |     |                                              |     |          |     |
| Register Availability                                                                                                                                                                                                                                                                                                   | <table border="1"> <thead> <tr> <th>Status</th> <th>Availability</th> </tr> </thead> <tbody> <tr> <td>Normal Mode On, Idle Mode Off, Sleep Out</td> <td>Yes</td> </tr> <tr> <td>Normal Mode On, Idle Mode On, Sleep Out</td> <td>Yes</td> </tr> <tr> <td>Partial Mode On, Idle Mode Off, Sleep Out</td> <td>Yes</td> </tr> <tr> <td>Partial Mode On, Idle Mode On, Sleep Out</td> <td>Yes</td> </tr> <tr> <td>Sleep In</td> <td>Yes</td> </tr> </tbody> </table> |     |     |       |          |          |    |    |           |           |          |          |             | Status     | Availability  | Normal Mode On, Idle Mode Off, Sleep Out | Yes | Normal Mode On, Idle Mode On, Sleep Out | Yes | Partial Mode On, Idle Mode Off, Sleep Out | Yes | Partial Mode On, Idle Mode On, Sleep Out     | Yes | Sleep In | Yes |
| Status                                                                                                                                                                                                                                                                                                                  | Availability                                                                                                                                                                                                                                                                                                                                                                                                                                                     |     |     |       |          |          |    |    |           |           |          |          |             |            |               |                                          |     |                                         |     |                                           |     |                                              |     |          |     |
| Normal Mode On, Idle Mode Off, Sleep Out                                                                                                                                                                                                                                                                                | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                              |     |     |       |          |          |    |    |           |           |          |          |             |            |               |                                          |     |                                         |     |                                           |     |                                              |     |          |     |
| Normal Mode On, Idle Mode On, Sleep Out                                                                                                                                                                                                                                                                                 | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                              |     |     |       |          |          |    |    |           |           |          |          |             |            |               |                                          |     |                                         |     |                                           |     |                                              |     |          |     |
| Partial Mode On, Idle Mode Off, Sleep Out                                                                                                                                                                                                                                                                               | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                              |     |     |       |          |          |    |    |           |           |          |          |             |            |               |                                          |     |                                         |     |                                           |     |                                              |     |          |     |
| Partial Mode On, Idle Mode On, Sleep Out                                                                                                                                                                                                                                                                                | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                              |     |     |       |          |          |    |    |           |           |          |          |             |            |               |                                          |     |                                         |     |                                           |     |                                              |     |          |     |
| Sleep In                                                                                                                                                                                                                                                                                                                | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                              |     |     |       |          |          |    |    |           |           |          |          |             |            |               |                                          |     |                                         |     |                                           |     |                                              |     |          |     |
| Default                                                                                                                                                                                                                                                                                                                 | <table border="1"> <thead> <tr> <th>Status</th> <th>Default Value</th> </tr> </thead> <tbody> <tr> <td></td> <td>C1h</td> </tr> <tr> <td>Power On Sequence</td> <td>C5h</td> </tr> <tr> <td>S/W Reset</td> <td>C5h</td> </tr> <tr> <td>H/W Reset</td> <td>C5h</td> </tr> </tbody> </table>                                                                                                                                                                       |     |     |       |          |          |    |    |           |           |          |          |             | Status     | Default Value |                                          | C1h | Power On Sequence                       | C5h | S/W Reset                                 | C5h | H/W Reset                                    | C5h |          |     |
| Status                                                                                                                                                                                                                                                                                                                  | Default Value                                                                                                                                                                                                                                                                                                                                                                                                                                                    |     |     |       |          |          |    |    |           |           |          |          |             |            |               |                                          |     |                                         |     |                                           |     |                                              |     |          |     |
|                                                                                                                                                                                                                                                                                                                         | C1h                                                                                                                                                                                                                                                                                                                                                                                                                                                              |     |     |       |          |          |    |    |           |           |          |          |             |            |               |                                          |     |                                         |     |                                           |     |                                              |     |          |     |
| Power On Sequence                                                                                                                                                                                                                                                                                                       | C5h                                                                                                                                                                                                                                                                                                                                                                                                                                                              |     |     |       |          |          |    |    |           |           |          |          |             |            |               |                                          |     |                                         |     |                                           |     |                                              |     |          |     |
| S/W Reset                                                                                                                                                                                                                                                                                                               | C5h                                                                                                                                                                                                                                                                                                                                                                                                                                                              |     |     |       |          |          |    |    |           |           |          |          |             |            |               |                                          |     |                                         |     |                                           |     |                                              |     |          |     |
| H/W Reset                                                                                                                                                                                                                                                                                                               | C5h                                                                                                                                                                                                                                                                                                                                                                                                                                                              |     |     |       |          |          |    |    |           |           |          |          |             |            |               |                                          |     |                                         |     |                                           |     |                                              |     |          |     |



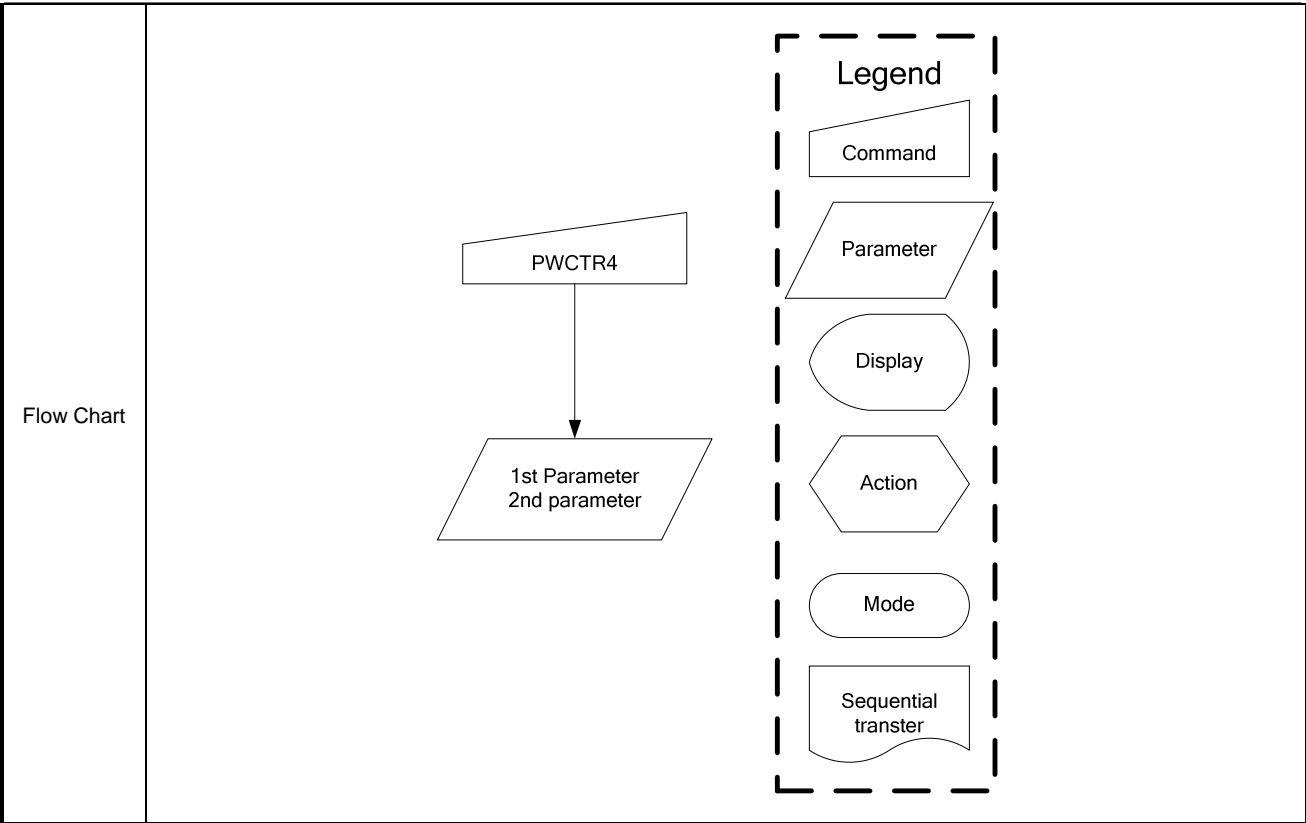
## 10.2.7 PWCTR3 (C2h): Power Control 3 (in Normal mode/ Full colors)

| C2H                       | PWCTR3 (Power Control 3)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                              |          |          |          |      |       |       |       |      |      |      |        |               |                                            |          |                                              |          |                                           |          |                                          |          |          |        |             |     |          |          |          |          |          |          |                                            |        |                                              |        |        |     |            |        |        |        |             |     |       |     |          |     |          |
|---------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------|----------|----------|----------|------|-------|-------|-------|------|------|------|--------|---------------|--------------------------------------------|----------|----------------------------------------------|----------|-------------------------------------------|----------|------------------------------------------|----------|----------|--------|-------------|-----|----------|----------|----------|----------|----------|----------|--------------------------------------------|--------|----------------------------------------------|--------|--------|-----|------------|--------|--------|--------|-------------|-----|-------|-----|----------|-----|----------|
| Inst / Para               | D/CX                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | WRX                                          | RDX      | D17-8    | D7       | D6   | D5    | D4    | D3    | D2   | D1   | D0   | HEX    |               |                                            |          |                                              |          |                                           |          |                                          |          |          |        |             |     |          |          |          |          |          |          |                                            |        |                                              |        |        |     |            |        |        |        |             |     |       |     |          |     |          |
| PWCTR3                    | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | ↑                                            | 1        | -        | 1        | 1    | 0     | 0     | 0     | 0    | 1    | 0    | (C2h)  |               |                                            |          |                                              |          |                                           |          |                                          |          |          |        |             |     |          |          |          |          |          |          |                                            |        |                                              |        |        |     |            |        |        |        |             |     |       |     |          |     |          |
| 1 <sup>st</sup> parameter | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | ↑                                            | 1        | -        | DCA9     | DCA8 | SAPA2 | SAPA1 | SAPA0 | APA2 | APA1 | APA0 |        |               |                                            |          |                                              |          |                                           |          |                                          |          |          |        |             |     |          |          |          |          |          |          |                                            |        |                                              |        |        |     |            |        |        |        |             |     |       |     |          |     |          |
| 2 <sup>nd</sup> parameter | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | ↑                                            | 1        | -        | DCA7     | DCA6 | DCA5  | DCA4  | DCA3  | DCA2 | DCA1 | DCA0 |        |               |                                            |          |                                              |          |                                           |          |                                          |          |          |        |             |     |          |          |          |          |          |          |                                            |        |                                              |        |        |     |            |        |        |        |             |     |       |     |          |     |          |
| Description               | <p>-Set the amount of current in Operational amplifier in normal mode/full colors.<br/>                     -Adjust the amount of fixed current from the fixed current source in the operational amplifier for the source driver.</p> <table border="1"> <thead> <tr> <th>AP[2:0]</th> <th>Amount of Current in Operational Amplifier</th> </tr> </thead> <tbody> <tr><td>000</td><td>Operation of the operational amplifier stops</td></tr> <tr><td>001</td><td>Small</td></tr> <tr><td>010</td><td>Medium Low</td></tr> <tr><td>011</td><td>Medium</td></tr> <tr><td>100</td><td>Medium High</td></tr> <tr><td>101</td><td>Large</td></tr> <tr><td>110</td><td>Reserved</td></tr> <tr><td>111</td><td>Reserved</td></tr> </tbody> </table><br><table border="1"> <thead> <tr> <th>SAP[2:0]</th> <th>Amount of Current in Operational Amplifier</th> </tr> </thead> <tbody> <tr><td>000</td><td>Operation of the operational amplifier stops</td></tr> <tr><td>001</td><td>Small</td></tr> <tr><td>010</td><td>Medium Low</td></tr> <tr><td>011</td><td>Medium</td></tr> <tr><td>100</td><td>Medium High</td></tr> <tr><td>101</td><td>Large</td></tr> <tr><td>110</td><td>Reserved</td></tr> <tr><td>111</td><td>Reserved</td></tr> </tbody> </table> |                                              |          |          |          |      |       |       |       |      |      |      |        | AP[2:0]       | Amount of Current in Operational Amplifier | 000      | Operation of the operational amplifier stops | 001      | Small                                     | 010      | Medium Low                               | 011      | Medium   | 100    | Medium High | 101 | Large    | 110      | Reserved | 111      | Reserved | SAP[2:0] | Amount of Current in Operational Amplifier | 000    | Operation of the operational amplifier stops | 001    | Small  | 010 | Medium Low | 011    | Medium | 100    | Medium High | 101 | Large | 110 | Reserved | 111 | Reserved |
|                           | AP[2:0]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Amount of Current in Operational Amplifier   |          |          |          |      |       |       |       |      |      |      |        |               |                                            |          |                                              |          |                                           |          |                                          |          |          |        |             |     |          |          |          |          |          |          |                                            |        |                                              |        |        |     |            |        |        |        |             |     |       |     |          |     |          |
|                           | 000                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Operation of the operational amplifier stops |          |          |          |      |       |       |       |      |      |      |        |               |                                            |          |                                              |          |                                           |          |                                          |          |          |        |             |     |          |          |          |          |          |          |                                            |        |                                              |        |        |     |            |        |        |        |             |     |       |     |          |     |          |
| 001                       | Small                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                              |          |          |          |      |       |       |       |      |      |      |        |               |                                            |          |                                              |          |                                           |          |                                          |          |          |        |             |     |          |          |          |          |          |          |                                            |        |                                              |        |        |     |            |        |        |        |             |     |       |     |          |     |          |
| 010                       | Medium Low                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                              |          |          |          |      |       |       |       |      |      |      |        |               |                                            |          |                                              |          |                                           |          |                                          |          |          |        |             |     |          |          |          |          |          |          |                                            |        |                                              |        |        |     |            |        |        |        |             |     |       |     |          |     |          |
| 011                       | Medium                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                              |          |          |          |      |       |       |       |      |      |      |        |               |                                            |          |                                              |          |                                           |          |                                          |          |          |        |             |     |          |          |          |          |          |          |                                            |        |                                              |        |        |     |            |        |        |        |             |     |       |     |          |     |          |
| 100                       | Medium High                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                              |          |          |          |      |       |       |       |      |      |      |        |               |                                            |          |                                              |          |                                           |          |                                          |          |          |        |             |     |          |          |          |          |          |          |                                            |        |                                              |        |        |     |            |        |        |        |             |     |       |     |          |     |          |
| 101                       | Large                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                              |          |          |          |      |       |       |       |      |      |      |        |               |                                            |          |                                              |          |                                           |          |                                          |          |          |        |             |     |          |          |          |          |          |          |                                            |        |                                              |        |        |     |            |        |        |        |             |     |       |     |          |     |          |
| 110                       | Reserved                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                              |          |          |          |      |       |       |       |      |      |      |        |               |                                            |          |                                              |          |                                           |          |                                          |          |          |        |             |     |          |          |          |          |          |          |                                            |        |                                              |        |        |     |            |        |        |        |             |     |       |     |          |     |          |
| 111                       | Reserved                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                              |          |          |          |      |       |       |       |      |      |      |        |               |                                            |          |                                              |          |                                           |          |                                          |          |          |        |             |     |          |          |          |          |          |          |                                            |        |                                              |        |        |     |            |        |        |        |             |     |       |     |          |     |          |
| SAP[2:0]                  | Amount of Current in Operational Amplifier                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                              |          |          |          |      |       |       |       |      |      |      |        |               |                                            |          |                                              |          |                                           |          |                                          |          |          |        |             |     |          |          |          |          |          |          |                                            |        |                                              |        |        |     |            |        |        |        |             |     |       |     |          |     |          |
| 000                       | Operation of the operational amplifier stops                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                              |          |          |          |      |       |       |       |      |      |      |        |               |                                            |          |                                              |          |                                           |          |                                          |          |          |        |             |     |          |          |          |          |          |          |                                            |        |                                              |        |        |     |            |        |        |        |             |     |       |     |          |     |          |
| 001                       | Small                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                              |          |          |          |      |       |       |       |      |      |      |        |               |                                            |          |                                              |          |                                           |          |                                          |          |          |        |             |     |          |          |          |          |          |          |                                            |        |                                              |        |        |     |            |        |        |        |             |     |       |     |          |     |          |
| 010                       | Medium Low                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                              |          |          |          |      |       |       |       |      |      |      |        |               |                                            |          |                                              |          |                                           |          |                                          |          |          |        |             |     |          |          |          |          |          |          |                                            |        |                                              |        |        |     |            |        |        |        |             |     |       |     |          |     |          |
| 011                       | Medium                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                              |          |          |          |      |       |       |       |      |      |      |        |               |                                            |          |                                              |          |                                           |          |                                          |          |          |        |             |     |          |          |          |          |          |          |                                            |        |                                              |        |        |     |            |        |        |        |             |     |       |     |          |     |          |
| 100                       | Medium High                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                              |          |          |          |      |       |       |       |      |      |      |        |               |                                            |          |                                              |          |                                           |          |                                          |          |          |        |             |     |          |          |          |          |          |          |                                            |        |                                              |        |        |     |            |        |        |        |             |     |       |     |          |     |          |
| 101                       | Large                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                              |          |          |          |      |       |       |       |      |      |      |        |               |                                            |          |                                              |          |                                           |          |                                          |          |          |        |             |     |          |          |          |          |          |          |                                            |        |                                              |        |        |     |            |        |        |        |             |     |       |     |          |     |          |
| 110                       | Reserved                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                              |          |          |          |      |       |       |       |      |      |      |        |               |                                            |          |                                              |          |                                           |          |                                          |          |          |        |             |     |          |          |          |          |          |          |                                            |        |                                              |        |        |     |            |        |        |        |             |     |       |     |          |     |          |
| 111                       | Reserved                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                              |          |          |          |      |       |       |       |      |      |      |        |               |                                            |          |                                              |          |                                           |          |                                          |          |          |        |             |     |          |          |          |          |          |          |                                            |        |                                              |        |        |     |            |        |        |        |             |     |       |     |          |     |          |
|                           | <p>-Set the Booster circuit Step-up cycle in Normal mode/ full colors.</p> <table border="1"> <thead> <tr> <th></th> <th>DCA[9:8]</th> <th>DCA[7:6]</th> <th>DCA[5:4]</th> <th>DCA[3:2]</th> <th>DCA[1:0]</th> </tr> </thead> <tbody> <tr><td>00</td><td>BCLK/1</td><td>BCLK/1</td><td>BCLK/1</td><td>BCLK/1</td><td>BCLK/1</td></tr> <tr><td>01</td><td>BCLK/1.5</td><td>BCLK/1.5</td><td>BCLK/1.5</td><td>BCLK/1.5</td><td>BCLK/1.5</td></tr> <tr><td>10</td><td>BCLK/2</td><td>BCLK/2</td><td>BCLK/2</td><td>BCLK/2</td><td>BCLK/2</td></tr> <tr><td>11</td><td>BCLK/4</td><td>BCLK/4</td><td>BCLK/4</td><td>BCLK/4</td><td>BCLK/4</td></tr> </tbody> </table>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                              |          |          |          |      |       |       |       |      |      |      |        |               | DCA[9:8]                                   | DCA[7:6] | DCA[5:4]                                     | DCA[3:2] | DCA[1:0]                                  | 00       | BCLK/1                                   | BCLK/1   | BCLK/1   | BCLK/1 | BCLK/1      | 01  | BCLK/1.5 | BCLK/1.5 | BCLK/1.5 | BCLK/1.5 | BCLK/1.5 | 10       | BCLK/2                                     | BCLK/2 | BCLK/2                                       | BCLK/2 | BCLK/2 | 11  | BCLK/4     | BCLK/4 | BCLK/4 | BCLK/4 | BCLK/4      |     |       |     |          |     |          |
|                           | DCA[9:8]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | DCA[7:6]                                     | DCA[5:4] | DCA[3:2] | DCA[1:0] |      |       |       |       |      |      |      |        |               |                                            |          |                                              |          |                                           |          |                                          |          |          |        |             |     |          |          |          |          |          |          |                                            |        |                                              |        |        |     |            |        |        |        |             |     |       |     |          |     |          |
| 00                        | BCLK/1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | BCLK/1                                       | BCLK/1   | BCLK/1   | BCLK/1   |      |       |       |       |      |      |      |        |               |                                            |          |                                              |          |                                           |          |                                          |          |          |        |             |     |          |          |          |          |          |          |                                            |        |                                              |        |        |     |            |        |        |        |             |     |       |     |          |     |          |
| 01                        | BCLK/1.5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | BCLK/1.5                                     | BCLK/1.5 | BCLK/1.5 | BCLK/1.5 |      |       |       |       |      |      |      |        |               |                                            |          |                                              |          |                                           |          |                                          |          |          |        |             |     |          |          |          |          |          |          |                                            |        |                                              |        |        |     |            |        |        |        |             |     |       |     |          |     |          |
| 10                        | BCLK/2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | BCLK/2                                       | BCLK/2   | BCLK/2   | BCLK/2   |      |       |       |       |      |      |      |        |               |                                            |          |                                              |          |                                           |          |                                          |          |          |        |             |     |          |          |          |          |          |          |                                            |        |                                              |        |        |     |            |        |        |        |             |     |       |     |          |     |          |
| 11                        | BCLK/4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | BCLK/4                                       | BCLK/4   | BCLK/4   | BCLK/4   |      |       |       |       |      |      |      |        |               |                                            |          |                                              |          |                                           |          |                                          |          |          |        |             |     |          |          |          |          |          |          |                                            |        |                                              |        |        |     |            |        |        |        |             |     |       |     |          |     |          |
|                           | <p>Note: BCLK is Clock frequency for Booster circuit</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                              |          |          |          |      |       |       |       |      |      |      |        |               |                                            |          |                                              |          |                                           |          |                                          |          |          |        |             |     |          |          |          |          |          |          |                                            |        |                                              |        |        |     |            |        |        |        |             |     |       |     |          |     |          |
| Register Availability     | <table border="1"> <thead> <tr> <th>Status</th> <th>Availability</th> </tr> </thead> <tbody> <tr><td>Normal Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr> <tr><td>Normal Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr> <tr><td>Partial Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr> <tr><td>Partial Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr> <tr><td>Sleep In</td><td>Yes</td></tr> </tbody> </table>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                              |          |          |          |      |       |       |       |      |      |      | Status | Availability  | Normal Mode On, Idle Mode Off, Sleep Out   | Yes      | Normal Mode On, Idle Mode On, Sleep Out      | Yes      | Partial Mode On, Idle Mode Off, Sleep Out | Yes      | Partial Mode On, Idle Mode On, Sleep Out | Yes      | Sleep In | Yes    |             |     |          |          |          |          |          |          |                                            |        |                                              |        |        |     |            |        |        |        |             |     |       |     |          |     |          |
|                           | Status                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Availability                                 |          |          |          |      |       |       |       |      |      |      |        |               |                                            |          |                                              |          |                                           |          |                                          |          |          |        |             |     |          |          |          |          |          |          |                                            |        |                                              |        |        |     |            |        |        |        |             |     |       |     |          |     |          |
|                           | Normal Mode On, Idle Mode Off, Sleep Out                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Yes                                          |          |          |          |      |       |       |       |      |      |      |        |               |                                            |          |                                              |          |                                           |          |                                          |          |          |        |             |     |          |          |          |          |          |          |                                            |        |                                              |        |        |     |            |        |        |        |             |     |       |     |          |     |          |
|                           | Normal Mode On, Idle Mode On, Sleep Out                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Yes                                          |          |          |          |      |       |       |       |      |      |      |        |               |                                            |          |                                              |          |                                           |          |                                          |          |          |        |             |     |          |          |          |          |          |          |                                            |        |                                              |        |        |     |            |        |        |        |             |     |       |     |          |     |          |
|                           | Partial Mode On, Idle Mode Off, Sleep Out                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Yes                                          |          |          |          |      |       |       |       |      |      |      |        |               |                                            |          |                                              |          |                                           |          |                                          |          |          |        |             |     |          |          |          |          |          |          |                                            |        |                                              |        |        |     |            |        |        |        |             |     |       |     |          |     |          |
|                           | Partial Mode On, Idle Mode On, Sleep Out                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Yes                                          |          |          |          |      |       |       |       |      |      |      |        |               |                                            |          |                                              |          |                                           |          |                                          |          |          |        |             |     |          |          |          |          |          |          |                                            |        |                                              |        |        |     |            |        |        |        |             |     |       |     |          |     |          |
| Sleep In                  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                              |          |          |          |      |       |       |       |      |      |      |        |               |                                            |          |                                              |          |                                           |          |                                          |          |          |        |             |     |          |          |          |          |          |          |                                            |        |                                              |        |        |     |            |        |        |        |             |     |       |     |          |     |          |
| Default                   | <table border="1"> <thead> <tr> <th>Status</th> <th>Default Value</th> </tr> </thead> <tbody> <tr><td></td><td>C2h</td></tr> <tr><td>Power On Sequence</td><td>0Ah/00h</td></tr> <tr><td>S/W Reset</td><td>0A h/00h</td></tr> <tr><td>H/W Reset</td><td>0A h/00h</td></tr> </tbody> </table>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                              |          |          |          |      |       |       |       |      |      |      | Status | Default Value |                                            | C2h      | Power On Sequence                            | 0Ah/00h  | S/W Reset                                 | 0A h/00h | H/W Reset                                | 0A h/00h |          |        |             |     |          |          |          |          |          |          |                                            |        |                                              |        |        |     |            |        |        |        |             |     |       |     |          |     |          |
|                           | Status                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Default Value                                |          |          |          |      |       |       |       |      |      |      |        |               |                                            |          |                                              |          |                                           |          |                                          |          |          |        |             |     |          |          |          |          |          |          |                                            |        |                                              |        |        |     |            |        |        |        |             |     |       |     |          |     |          |
|                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | C2h                                          |          |          |          |      |       |       |       |      |      |      |        |               |                                            |          |                                              |          |                                           |          |                                          |          |          |        |             |     |          |          |          |          |          |          |                                            |        |                                              |        |        |     |            |        |        |        |             |     |       |     |          |     |          |
|                           | Power On Sequence                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 0Ah/00h                                      |          |          |          |      |       |       |       |      |      |      |        |               |                                            |          |                                              |          |                                           |          |                                          |          |          |        |             |     |          |          |          |          |          |          |                                            |        |                                              |        |        |     |            |        |        |        |             |     |       |     |          |     |          |
|                           | S/W Reset                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 0A h/00h                                     |          |          |          |      |       |       |       |      |      |      |        |               |                                            |          |                                              |          |                                           |          |                                          |          |          |        |             |     |          |          |          |          |          |          |                                            |        |                                              |        |        |     |            |        |        |        |             |     |       |     |          |     |          |
| H/W Reset                 | 0A h/00h                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                              |          |          |          |      |       |       |       |      |      |      |        |               |                                            |          |                                              |          |                                           |          |                                          |          |          |        |             |     |          |          |          |          |          |          |                                            |        |                                              |        |        |     |            |        |        |        |             |     |       |     |          |     |          |



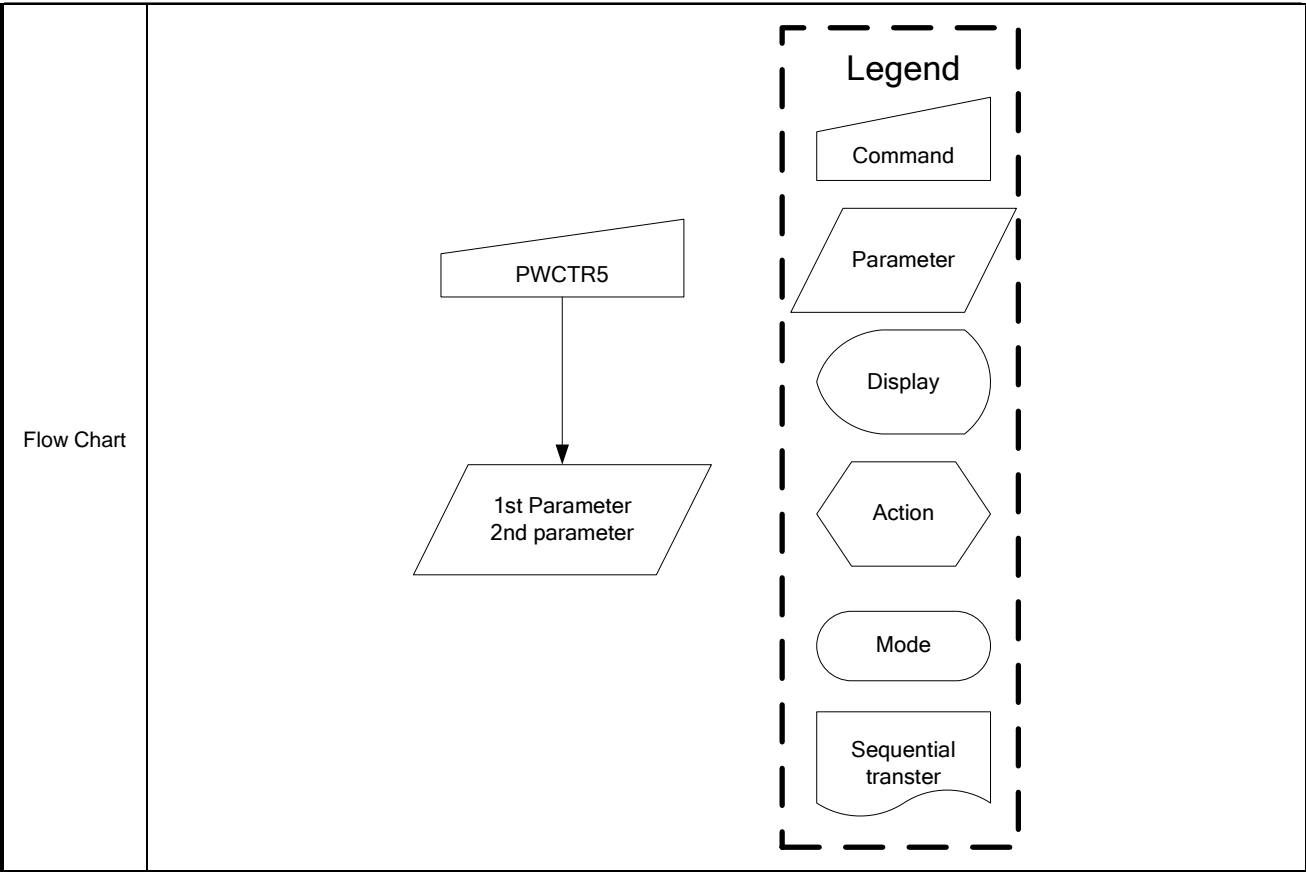
## 10.2.8 PWCTR4 (C3h): Power Control 4 (in Idle mode/ 8-colors)

| C3H                                       | PWCTR4 (Power Control 4)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                            |          |          |          |      |       |       |       |      |      |      |       |         |                                            |                                          |                                              |                                         |          |                                           |            |                                          |         |          |             |     |          |          |          |          |          |          |                                            |        |                                              |        |        |     |            |        |        |        |             |     |       |     |          |     |          |
|-------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------|----------|----------|----------|------|-------|-------|-------|------|------|------|-------|---------|--------------------------------------------|------------------------------------------|----------------------------------------------|-----------------------------------------|----------|-------------------------------------------|------------|------------------------------------------|---------|----------|-------------|-----|----------|----------|----------|----------|----------|----------|--------------------------------------------|--------|----------------------------------------------|--------|--------|-----|------------|--------|--------|--------|-------------|-----|-------|-----|----------|-----|----------|
| Inst / Para                               | D/CX                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | WRX                                        | RDX      | D17-8    | D7       | D6   | D5    | D4    | D3    | D2   | D1   | D0   | HEX   |         |                                            |                                          |                                              |                                         |          |                                           |            |                                          |         |          |             |     |          |          |          |          |          |          |                                            |        |                                              |        |        |     |            |        |        |        |             |     |       |     |          |     |          |
| PWCTR4                                    | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | ↑                                          | 1        | -        | 1        | 1    | 0     | 0     | 0     | 0    | 1    | 1    | (C3h) |         |                                            |                                          |                                              |                                         |          |                                           |            |                                          |         |          |             |     |          |          |          |          |          |          |                                            |        |                                              |        |        |     |            |        |        |        |             |     |       |     |          |     |          |
| 1 <sup>st</sup> parameter                 | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | ↑                                          | 1        | -        | DCB9     | DCB8 | SAPB2 | SAPB1 | SAPB0 | APB2 | APB1 | APB0 |       |         |                                            |                                          |                                              |                                         |          |                                           |            |                                          |         |          |             |     |          |          |          |          |          |          |                                            |        |                                              |        |        |     |            |        |        |        |             |     |       |     |          |     |          |
| 2 <sup>nd</sup> parameter                 | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | ↑                                          | 1        | -        | DCB7     | DCB6 | DCB5  | DCB4  | DCB3  | DCB2 | DCB1 | DCB0 |       |         |                                            |                                          |                                              |                                         |          |                                           |            |                                          |         |          |             |     |          |          |          |          |          |          |                                            |        |                                              |        |        |     |            |        |        |        |             |     |       |     |          |     |          |
| Description                               | <p>-Set the amount of current in Operational amplifier in Idle mode/8 colors.<br/>                     -Adjust the amount of fixed current from the fixed current source in the operational amplifier for the source driver.</p> <table border="1"> <thead> <tr> <th>AP[2:0]</th> <th>Amount of Current in Operational Amplifier</th> </tr> </thead> <tbody> <tr><td>000</td><td>Operation of the operational amplifier stops</td></tr> <tr><td>001</td><td>Small</td></tr> <tr><td>010</td><td>Medium Low</td></tr> <tr><td>011</td><td>Medium</td></tr> <tr><td>100</td><td>Medium High</td></tr> <tr><td>101</td><td>Large</td></tr> <tr><td>110</td><td>Reserved</td></tr> <tr><td>111</td><td>Reserved</td></tr> </tbody> </table><br><table border="1"> <thead> <tr> <th>SAP[2:0]</th> <th>Amount of Current in Operational Amplifier</th> </tr> </thead> <tbody> <tr><td>000</td><td>Operation of the operational amplifier stops</td></tr> <tr><td>001</td><td>Small</td></tr> <tr><td>010</td><td>Medium Low</td></tr> <tr><td>011</td><td>Medium</td></tr> <tr><td>100</td><td>Medium High</td></tr> <tr><td>101</td><td>Large</td></tr> <tr><td>110</td><td>Reserved</td></tr> <tr><td>111</td><td>Reserved</td></tr> </tbody> </table> |                                            |          |          |          |      |       |       |       |      |      |      |       | AP[2:0] | Amount of Current in Operational Amplifier | 000                                      | Operation of the operational amplifier stops | 001                                     | Small    | 010                                       | Medium Low | 011                                      | Medium  | 100      | Medium High | 101 | Large    | 110      | Reserved | 111      | Reserved | SAP[2:0] | Amount of Current in Operational Amplifier | 000    | Operation of the operational amplifier stops | 001    | Small  | 010 | Medium Low | 011    | Medium | 100    | Medium High | 101 | Large | 110 | Reserved | 111 | Reserved |
|                                           | AP[2:0]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Amount of Current in Operational Amplifier |          |          |          |      |       |       |       |      |      |      |       |         |                                            |                                          |                                              |                                         |          |                                           |            |                                          |         |          |             |     |          |          |          |          |          |          |                                            |        |                                              |        |        |     |            |        |        |        |             |     |       |     |          |     |          |
| 000                                       | Operation of the operational amplifier stops                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                            |          |          |          |      |       |       |       |      |      |      |       |         |                                            |                                          |                                              |                                         |          |                                           |            |                                          |         |          |             |     |          |          |          |          |          |          |                                            |        |                                              |        |        |     |            |        |        |        |             |     |       |     |          |     |          |
| 001                                       | Small                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                            |          |          |          |      |       |       |       |      |      |      |       |         |                                            |                                          |                                              |                                         |          |                                           |            |                                          |         |          |             |     |          |          |          |          |          |          |                                            |        |                                              |        |        |     |            |        |        |        |             |     |       |     |          |     |          |
| 010                                       | Medium Low                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                            |          |          |          |      |       |       |       |      |      |      |       |         |                                            |                                          |                                              |                                         |          |                                           |            |                                          |         |          |             |     |          |          |          |          |          |          |                                            |        |                                              |        |        |     |            |        |        |        |             |     |       |     |          |     |          |
| 011                                       | Medium                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                            |          |          |          |      |       |       |       |      |      |      |       |         |                                            |                                          |                                              |                                         |          |                                           |            |                                          |         |          |             |     |          |          |          |          |          |          |                                            |        |                                              |        |        |     |            |        |        |        |             |     |       |     |          |     |          |
| 100                                       | Medium High                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                            |          |          |          |      |       |       |       |      |      |      |       |         |                                            |                                          |                                              |                                         |          |                                           |            |                                          |         |          |             |     |          |          |          |          |          |          |                                            |        |                                              |        |        |     |            |        |        |        |             |     |       |     |          |     |          |
| 101                                       | Large                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                            |          |          |          |      |       |       |       |      |      |      |       |         |                                            |                                          |                                              |                                         |          |                                           |            |                                          |         |          |             |     |          |          |          |          |          |          |                                            |        |                                              |        |        |     |            |        |        |        |             |     |       |     |          |     |          |
| 110                                       | Reserved                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                            |          |          |          |      |       |       |       |      |      |      |       |         |                                            |                                          |                                              |                                         |          |                                           |            |                                          |         |          |             |     |          |          |          |          |          |          |                                            |        |                                              |        |        |     |            |        |        |        |             |     |       |     |          |     |          |
| 111                                       | Reserved                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                            |          |          |          |      |       |       |       |      |      |      |       |         |                                            |                                          |                                              |                                         |          |                                           |            |                                          |         |          |             |     |          |          |          |          |          |          |                                            |        |                                              |        |        |     |            |        |        |        |             |     |       |     |          |     |          |
| SAP[2:0]                                  | Amount of Current in Operational Amplifier                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                            |          |          |          |      |       |       |       |      |      |      |       |         |                                            |                                          |                                              |                                         |          |                                           |            |                                          |         |          |             |     |          |          |          |          |          |          |                                            |        |                                              |        |        |     |            |        |        |        |             |     |       |     |          |     |          |
| 000                                       | Operation of the operational amplifier stops                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                            |          |          |          |      |       |       |       |      |      |      |       |         |                                            |                                          |                                              |                                         |          |                                           |            |                                          |         |          |             |     |          |          |          |          |          |          |                                            |        |                                              |        |        |     |            |        |        |        |             |     |       |     |          |     |          |
| 001                                       | Small                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                            |          |          |          |      |       |       |       |      |      |      |       |         |                                            |                                          |                                              |                                         |          |                                           |            |                                          |         |          |             |     |          |          |          |          |          |          |                                            |        |                                              |        |        |     |            |        |        |        |             |     |       |     |          |     |          |
| 010                                       | Medium Low                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                            |          |          |          |      |       |       |       |      |      |      |       |         |                                            |                                          |                                              |                                         |          |                                           |            |                                          |         |          |             |     |          |          |          |          |          |          |                                            |        |                                              |        |        |     |            |        |        |        |             |     |       |     |          |     |          |
| 011                                       | Medium                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                            |          |          |          |      |       |       |       |      |      |      |       |         |                                            |                                          |                                              |                                         |          |                                           |            |                                          |         |          |             |     |          |          |          |          |          |          |                                            |        |                                              |        |        |     |            |        |        |        |             |     |       |     |          |     |          |
| 100                                       | Medium High                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                            |          |          |          |      |       |       |       |      |      |      |       |         |                                            |                                          |                                              |                                         |          |                                           |            |                                          |         |          |             |     |          |          |          |          |          |          |                                            |        |                                              |        |        |     |            |        |        |        |             |     |       |     |          |     |          |
| 101                                       | Large                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                            |          |          |          |      |       |       |       |      |      |      |       |         |                                            |                                          |                                              |                                         |          |                                           |            |                                          |         |          |             |     |          |          |          |          |          |          |                                            |        |                                              |        |        |     |            |        |        |        |             |     |       |     |          |     |          |
| 110                                       | Reserved                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                            |          |          |          |      |       |       |       |      |      |      |       |         |                                            |                                          |                                              |                                         |          |                                           |            |                                          |         |          |             |     |          |          |          |          |          |          |                                            |        |                                              |        |        |     |            |        |        |        |             |     |       |     |          |     |          |
| 111                                       | Reserved                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                            |          |          |          |      |       |       |       |      |      |      |       |         |                                            |                                          |                                              |                                         |          |                                           |            |                                          |         |          |             |     |          |          |          |          |          |          |                                            |        |                                              |        |        |     |            |        |        |        |             |     |       |     |          |     |          |
|                                           | <p>-Set the Booster circuit Step-up cycle in Idle mode/8 colors.</p> <table border="1"> <thead> <tr> <th></th> <th>DCB[9:8]</th> <th>DCB[7:6]</th> <th>DCB[5:4]</th> <th>DCB[3:2]</th> <th>DCB[1:0]</th> </tr> </thead> <tbody> <tr><td>00</td><td>BCLK/1</td><td>BCLK/1</td><td>BCLK/1</td><td>BCLK/1</td><td>BCLK/1</td></tr> <tr><td>01</td><td>BCLK/1.5</td><td>BCLK/1.5</td><td>BCLK/1.5</td><td>BCLK/1.5</td><td>BCLK/1.5</td></tr> <tr><td>10</td><td>BCLK/2</td><td>BCLK/2</td><td>BCLK/2</td><td>BCLK/2</td><td>BCLK/2</td></tr> <tr><td>11</td><td>BCLK/4</td><td>BCLK/4</td><td>BCLK/4</td><td>BCLK/4</td><td>BCLK/4</td></tr> </tbody> </table> <p>Note: BCLK is Clock frequency for Booster circuit</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                            |          |          |          |      |       |       |       |      |      |      |       |         | DCB[9:8]                                   | DCB[7:6]                                 | DCB[5:4]                                     | DCB[3:2]                                | DCB[1:0] | 00                                        | BCLK/1     | BCLK/1                                   | BCLK/1  | BCLK/1   | BCLK/1      | 01  | BCLK/1.5 | BCLK/1.5 | BCLK/1.5 | BCLK/1.5 | BCLK/1.5 | 10       | BCLK/2                                     | BCLK/2 | BCLK/2                                       | BCLK/2 | BCLK/2 | 11  | BCLK/4     | BCLK/4 | BCLK/4 | BCLK/4 | BCLK/4      |     |       |     |          |     |          |
|                                           | DCB[9:8]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | DCB[7:6]                                   | DCB[5:4] | DCB[3:2] | DCB[1:0] |      |       |       |       |      |      |      |       |         |                                            |                                          |                                              |                                         |          |                                           |            |                                          |         |          |             |     |          |          |          |          |          |          |                                            |        |                                              |        |        |     |            |        |        |        |             |     |       |     |          |     |          |
| 00                                        | BCLK/1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | BCLK/1                                     | BCLK/1   | BCLK/1   | BCLK/1   |      |       |       |       |      |      |      |       |         |                                            |                                          |                                              |                                         |          |                                           |            |                                          |         |          |             |     |          |          |          |          |          |          |                                            |        |                                              |        |        |     |            |        |        |        |             |     |       |     |          |     |          |
| 01                                        | BCLK/1.5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | BCLK/1.5                                   | BCLK/1.5 | BCLK/1.5 | BCLK/1.5 |      |       |       |       |      |      |      |       |         |                                            |                                          |                                              |                                         |          |                                           |            |                                          |         |          |             |     |          |          |          |          |          |          |                                            |        |                                              |        |        |     |            |        |        |        |             |     |       |     |          |     |          |
| 10                                        | BCLK/2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | BCLK/2                                     | BCLK/2   | BCLK/2   | BCLK/2   |      |       |       |       |      |      |      |       |         |                                            |                                          |                                              |                                         |          |                                           |            |                                          |         |          |             |     |          |          |          |          |          |          |                                            |        |                                              |        |        |     |            |        |        |        |             |     |       |     |          |     |          |
| 11                                        | BCLK/4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | BCLK/4                                     | BCLK/4   | BCLK/4   | BCLK/4   |      |       |       |       |      |      |      |       |         |                                            |                                          |                                              |                                         |          |                                           |            |                                          |         |          |             |     |          |          |          |          |          |          |                                            |        |                                              |        |        |     |            |        |        |        |             |     |       |     |          |     |          |
| Register Availability                     | <table border="1"> <thead> <tr> <th>Status</th> <th>Availability</th> </tr> </thead> <tbody> <tr><td>Normal Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr> <tr><td>Normal Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr> <tr><td>Partial Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr> <tr><td>Partial Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr> <tr><td>Sleep In</td><td>Yes</td></tr> </tbody> </table>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                            |          |          |          |      |       |       |       |      |      |      |       | Status  | Availability                               | Normal Mode On, Idle Mode Off, Sleep Out | Yes                                          | Normal Mode On, Idle Mode On, Sleep Out | Yes      | Partial Mode On, Idle Mode Off, Sleep Out | Yes        | Partial Mode On, Idle Mode On, Sleep Out | Yes     | Sleep In | Yes         |     |          |          |          |          |          |          |                                            |        |                                              |        |        |     |            |        |        |        |             |     |       |     |          |     |          |
| Status                                    | Availability                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                            |          |          |          |      |       |       |       |      |      |      |       |         |                                            |                                          |                                              |                                         |          |                                           |            |                                          |         |          |             |     |          |          |          |          |          |          |                                            |        |                                              |        |        |     |            |        |        |        |             |     |       |     |          |     |          |
| Normal Mode On, Idle Mode Off, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                            |          |          |          |      |       |       |       |      |      |      |       |         |                                            |                                          |                                              |                                         |          |                                           |            |                                          |         |          |             |     |          |          |          |          |          |          |                                            |        |                                              |        |        |     |            |        |        |        |             |     |       |     |          |     |          |
| Normal Mode On, Idle Mode On, Sleep Out   | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                            |          |          |          |      |       |       |       |      |      |      |       |         |                                            |                                          |                                              |                                         |          |                                           |            |                                          |         |          |             |     |          |          |          |          |          |          |                                            |        |                                              |        |        |     |            |        |        |        |             |     |       |     |          |     |          |
| Partial Mode On, Idle Mode Off, Sleep Out | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                            |          |          |          |      |       |       |       |      |      |      |       |         |                                            |                                          |                                              |                                         |          |                                           |            |                                          |         |          |             |     |          |          |          |          |          |          |                                            |        |                                              |        |        |     |            |        |        |        |             |     |       |     |          |     |          |
| Partial Mode On, Idle Mode On, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                            |          |          |          |      |       |       |       |      |      |      |       |         |                                            |                                          |                                              |                                         |          |                                           |            |                                          |         |          |             |     |          |          |          |          |          |          |                                            |        |                                              |        |        |     |            |        |        |        |             |     |       |     |          |     |          |
| Sleep In                                  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                            |          |          |          |      |       |       |       |      |      |      |       |         |                                            |                                          |                                              |                                         |          |                                           |            |                                          |         |          |             |     |          |          |          |          |          |          |                                            |        |                                              |        |        |     |            |        |        |        |             |     |       |     |          |     |          |
| Default                                   | <table border="1"> <thead> <tr> <th>Status</th> <th>Default Value</th> </tr> </thead> <tbody> <tr><td></td><td>C3h</td></tr> <tr><td>Power On Sequence</td><td>8Ah/2Eh</td></tr> <tr><td>S/W Reset</td><td>8Ah/2Eh</td></tr> <tr><td>H/W Reset</td><td>8Ah/2Eh</td></tr> </tbody> </table>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                            |          |          |          |      |       |       |       |      |      |      |       | Status  | Default Value                              |                                          | C3h                                          | Power On Sequence                       | 8Ah/2Eh  | S/W Reset                                 | 8Ah/2Eh    | H/W Reset                                | 8Ah/2Eh |          |             |     |          |          |          |          |          |          |                                            |        |                                              |        |        |     |            |        |        |        |             |     |       |     |          |     |          |
| Status                                    | Default Value                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                            |          |          |          |      |       |       |       |      |      |      |       |         |                                            |                                          |                                              |                                         |          |                                           |            |                                          |         |          |             |     |          |          |          |          |          |          |                                            |        |                                              |        |        |     |            |        |        |        |             |     |       |     |          |     |          |
|                                           | C3h                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                            |          |          |          |      |       |       |       |      |      |      |       |         |                                            |                                          |                                              |                                         |          |                                           |            |                                          |         |          |             |     |          |          |          |          |          |          |                                            |        |                                              |        |        |     |            |        |        |        |             |     |       |     |          |     |          |
| Power On Sequence                         | 8Ah/2Eh                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                            |          |          |          |      |       |       |       |      |      |      |       |         |                                            |                                          |                                              |                                         |          |                                           |            |                                          |         |          |             |     |          |          |          |          |          |          |                                            |        |                                              |        |        |     |            |        |        |        |             |     |       |     |          |     |          |
| S/W Reset                                 | 8Ah/2Eh                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                            |          |          |          |      |       |       |       |      |      |      |       |         |                                            |                                          |                                              |                                         |          |                                           |            |                                          |         |          |             |     |          |          |          |          |          |          |                                            |        |                                              |        |        |     |            |        |        |        |             |     |       |     |          |     |          |
| H/W Reset                                 | 8Ah/2Eh                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                            |          |          |          |      |       |       |       |      |      |      |       |         |                                            |                                          |                                              |                                         |          |                                           |            |                                          |         |          |             |     |          |          |          |          |          |          |                                            |        |                                              |        |        |     |            |        |        |        |             |     |       |     |          |     |          |



## 10.2.9 PWCTR5 (C4h): Power Control 5 (in Partial mode/ full-colors)

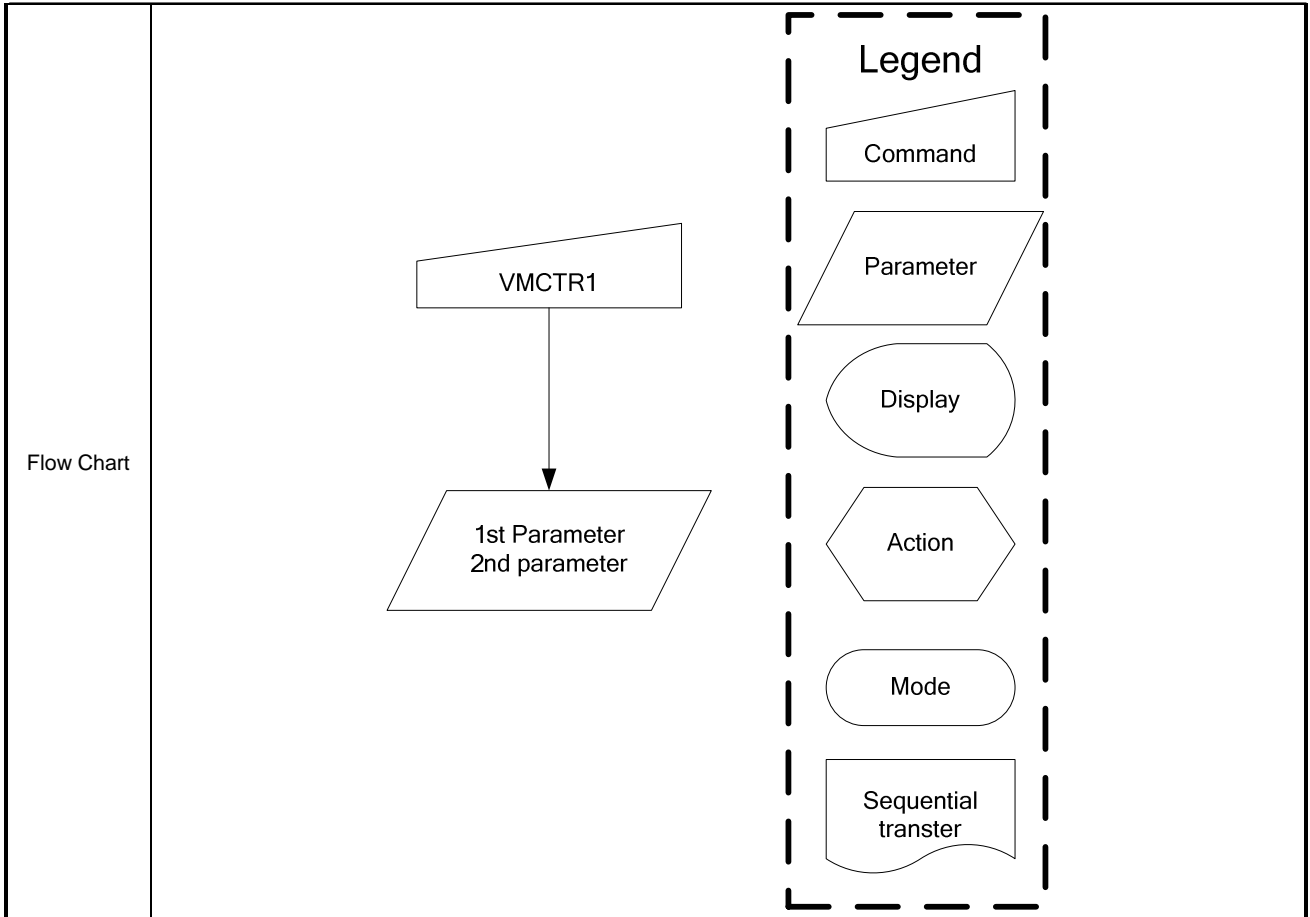
| C4H                                       | PWCTR5 (Power Control 5)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                            |          |          |          |      |       |       |       |      |      |      |       |         |                                            |                                          |                                              |                                         |          |                                           |            |                                          |        |          |             |     |          |          |          |          |          |          |                                            |        |                                              |        |        |     |            |        |        |        |             |     |       |     |          |     |          |
|-------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------|----------|----------|----------|------|-------|-------|-------|------|------|------|-------|---------|--------------------------------------------|------------------------------------------|----------------------------------------------|-----------------------------------------|----------|-------------------------------------------|------------|------------------------------------------|--------|----------|-------------|-----|----------|----------|----------|----------|----------|----------|--------------------------------------------|--------|----------------------------------------------|--------|--------|-----|------------|--------|--------|--------|-------------|-----|-------|-----|----------|-----|----------|
| Inst / Para                               | D/CX                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | WRX                                        | RDX      | D17-8    | D7       | D6   | D5    | D4    | D3    | D2   | D1   | D0   | HEX   |         |                                            |                                          |                                              |                                         |          |                                           |            |                                          |        |          |             |     |          |          |          |          |          |          |                                            |        |                                              |        |        |     |            |        |        |        |             |     |       |     |          |     |          |
| PWCTR5                                    | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | ↑                                          | 1        | -        | 1        | 1    | 0     | 0     | 0     | 1    | 0    | 0    | (C4h) |         |                                            |                                          |                                              |                                         |          |                                           |            |                                          |        |          |             |     |          |          |          |          |          |          |                                            |        |                                              |        |        |     |            |        |        |        |             |     |       |     |          |     |          |
| 1 <sup>st</sup> parameter                 | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | ↑                                          | 1        | -        | DCC9     | DCC8 | SAPC2 | SAPC1 | SAPC0 | APC2 | APC1 | APC0 |       |         |                                            |                                          |                                              |                                         |          |                                           |            |                                          |        |          |             |     |          |          |          |          |          |          |                                            |        |                                              |        |        |     |            |        |        |        |             |     |       |     |          |     |          |
| 2 <sup>nd</sup> parameter                 | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | ↑                                          | 1        | -        | DCC7     | DCC6 | DCC5  | DCC4  | DCC3  | DCC2 | DCC1 | DCC0 |       |         |                                            |                                          |                                              |                                         |          |                                           |            |                                          |        |          |             |     |          |          |          |          |          |          |                                            |        |                                              |        |        |     |            |        |        |        |             |     |       |     |          |     |          |
| Description                               | <p>-Set the amount of current in Operational amplifier in Partial mode/ full-colors.<br/>                     -Adjust the amount of fixed current from the fixed current source in the operational amplifier for the source driver.</p> <table border="1"> <thead> <tr> <th>AP[2:0]</th> <th>Amount of Current in Operational Amplifier</th> </tr> </thead> <tbody> <tr><td>000</td><td>Operation of the operational amplifier stops</td></tr> <tr><td>001</td><td>Small</td></tr> <tr><td>010</td><td>Medium Low</td></tr> <tr><td>011</td><td>Medium</td></tr> <tr><td>100</td><td>Medium High</td></tr> <tr><td>101</td><td>Large</td></tr> <tr><td>110</td><td>Reserved</td></tr> <tr><td>111</td><td>Reserved</td></tr> </tbody> </table><br><table border="1"> <thead> <tr> <th>SAP[2:0]</th> <th>Amount of Current in Operational Amplifier</th> </tr> </thead> <tbody> <tr><td>000</td><td>Operation of the operational amplifier stops</td></tr> <tr><td>001</td><td>Small</td></tr> <tr><td>010</td><td>Medium Low</td></tr> <tr><td>011</td><td>Medium</td></tr> <tr><td>100</td><td>Medium High</td></tr> <tr><td>101</td><td>Large</td></tr> <tr><td>110</td><td>Reserved</td></tr> <tr><td>111</td><td>Reserved</td></tr> </tbody> </table> |                                            |          |          |          |      |       |       |       |      |      |      |       | AP[2:0] | Amount of Current in Operational Amplifier | 000                                      | Operation of the operational amplifier stops | 001                                     | Small    | 010                                       | Medium Low | 011                                      | Medium | 100      | Medium High | 101 | Large    | 110      | Reserved | 111      | Reserved | SAP[2:0] | Amount of Current in Operational Amplifier | 000    | Operation of the operational amplifier stops | 001    | Small  | 010 | Medium Low | 011    | Medium | 100    | Medium High | 101 | Large | 110 | Reserved | 111 | Reserved |
|                                           | AP[2:0]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Amount of Current in Operational Amplifier |          |          |          |      |       |       |       |      |      |      |       |         |                                            |                                          |                                              |                                         |          |                                           |            |                                          |        |          |             |     |          |          |          |          |          |          |                                            |        |                                              |        |        |     |            |        |        |        |             |     |       |     |          |     |          |
| 000                                       | Operation of the operational amplifier stops                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                            |          |          |          |      |       |       |       |      |      |      |       |         |                                            |                                          |                                              |                                         |          |                                           |            |                                          |        |          |             |     |          |          |          |          |          |          |                                            |        |                                              |        |        |     |            |        |        |        |             |     |       |     |          |     |          |
| 001                                       | Small                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                            |          |          |          |      |       |       |       |      |      |      |       |         |                                            |                                          |                                              |                                         |          |                                           |            |                                          |        |          |             |     |          |          |          |          |          |          |                                            |        |                                              |        |        |     |            |        |        |        |             |     |       |     |          |     |          |
| 010                                       | Medium Low                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                            |          |          |          |      |       |       |       |      |      |      |       |         |                                            |                                          |                                              |                                         |          |                                           |            |                                          |        |          |             |     |          |          |          |          |          |          |                                            |        |                                              |        |        |     |            |        |        |        |             |     |       |     |          |     |          |
| 011                                       | Medium                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                            |          |          |          |      |       |       |       |      |      |      |       |         |                                            |                                          |                                              |                                         |          |                                           |            |                                          |        |          |             |     |          |          |          |          |          |          |                                            |        |                                              |        |        |     |            |        |        |        |             |     |       |     |          |     |          |
| 100                                       | Medium High                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                            |          |          |          |      |       |       |       |      |      |      |       |         |                                            |                                          |                                              |                                         |          |                                           |            |                                          |        |          |             |     |          |          |          |          |          |          |                                            |        |                                              |        |        |     |            |        |        |        |             |     |       |     |          |     |          |
| 101                                       | Large                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                            |          |          |          |      |       |       |       |      |      |      |       |         |                                            |                                          |                                              |                                         |          |                                           |            |                                          |        |          |             |     |          |          |          |          |          |          |                                            |        |                                              |        |        |     |            |        |        |        |             |     |       |     |          |     |          |
| 110                                       | Reserved                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                            |          |          |          |      |       |       |       |      |      |      |       |         |                                            |                                          |                                              |                                         |          |                                           |            |                                          |        |          |             |     |          |          |          |          |          |          |                                            |        |                                              |        |        |     |            |        |        |        |             |     |       |     |          |     |          |
| 111                                       | Reserved                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                            |          |          |          |      |       |       |       |      |      |      |       |         |                                            |                                          |                                              |                                         |          |                                           |            |                                          |        |          |             |     |          |          |          |          |          |          |                                            |        |                                              |        |        |     |            |        |        |        |             |     |       |     |          |     |          |
| SAP[2:0]                                  | Amount of Current in Operational Amplifier                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                            |          |          |          |      |       |       |       |      |      |      |       |         |                                            |                                          |                                              |                                         |          |                                           |            |                                          |        |          |             |     |          |          |          |          |          |          |                                            |        |                                              |        |        |     |            |        |        |        |             |     |       |     |          |     |          |
| 000                                       | Operation of the operational amplifier stops                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                            |          |          |          |      |       |       |       |      |      |      |       |         |                                            |                                          |                                              |                                         |          |                                           |            |                                          |        |          |             |     |          |          |          |          |          |          |                                            |        |                                              |        |        |     |            |        |        |        |             |     |       |     |          |     |          |
| 001                                       | Small                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                            |          |          |          |      |       |       |       |      |      |      |       |         |                                            |                                          |                                              |                                         |          |                                           |            |                                          |        |          |             |     |          |          |          |          |          |          |                                            |        |                                              |        |        |     |            |        |        |        |             |     |       |     |          |     |          |
| 010                                       | Medium Low                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                            |          |          |          |      |       |       |       |      |      |      |       |         |                                            |                                          |                                              |                                         |          |                                           |            |                                          |        |          |             |     |          |          |          |          |          |          |                                            |        |                                              |        |        |     |            |        |        |        |             |     |       |     |          |     |          |
| 011                                       | Medium                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                            |          |          |          |      |       |       |       |      |      |      |       |         |                                            |                                          |                                              |                                         |          |                                           |            |                                          |        |          |             |     |          |          |          |          |          |          |                                            |        |                                              |        |        |     |            |        |        |        |             |     |       |     |          |     |          |
| 100                                       | Medium High                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                            |          |          |          |      |       |       |       |      |      |      |       |         |                                            |                                          |                                              |                                         |          |                                           |            |                                          |        |          |             |     |          |          |          |          |          |          |                                            |        |                                              |        |        |     |            |        |        |        |             |     |       |     |          |     |          |
| 101                                       | Large                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                            |          |          |          |      |       |       |       |      |      |      |       |         |                                            |                                          |                                              |                                         |          |                                           |            |                                          |        |          |             |     |          |          |          |          |          |          |                                            |        |                                              |        |        |     |            |        |        |        |             |     |       |     |          |     |          |
| 110                                       | Reserved                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                            |          |          |          |      |       |       |       |      |      |      |       |         |                                            |                                          |                                              |                                         |          |                                           |            |                                          |        |          |             |     |          |          |          |          |          |          |                                            |        |                                              |        |        |     |            |        |        |        |             |     |       |     |          |     |          |
| 111                                       | Reserved                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                            |          |          |          |      |       |       |       |      |      |      |       |         |                                            |                                          |                                              |                                         |          |                                           |            |                                          |        |          |             |     |          |          |          |          |          |          |                                            |        |                                              |        |        |     |            |        |        |        |             |     |       |     |          |     |          |
|                                           | <p>-Set the Booster circuit Step-up cycle in Partial mode/ full-colors.</p> <table border="1"> <thead> <tr> <th></th> <th>DCC[9:8]</th> <th>DCC[7:6]</th> <th>DCC[5:4]</th> <th>DCC[3:2]</th> <th>DCC[1:0]</th> </tr> </thead> <tbody> <tr><td>00</td><td>BCLK/1</td><td>BCLK/1</td><td>BCLK/1</td><td>BCLK/1</td><td>BCLK/1</td></tr> <tr><td>01</td><td>BCLK/1.5</td><td>BCLK/1.5</td><td>BCLK/1.5</td><td>BCLK/1.5</td><td>BCLK/1.5</td></tr> <tr><td>10</td><td>BCLK/2</td><td>BCLK/2</td><td>BCLK/2</td><td>BCLK/2</td><td>BCLK/2</td></tr> <tr><td>11</td><td>BCLK/4</td><td>BCLK/4</td><td>BCLK/4</td><td>BCLK/4</td><td>BCLK/4</td></tr> </tbody> </table> <p>Note: BCLK is Clock frequency for Booster circuit</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                            |          |          |          |      |       |       |       |      |      |      |       |         | DCC[9:8]                                   | DCC[7:6]                                 | DCC[5:4]                                     | DCC[3:2]                                | DCC[1:0] | 00                                        | BCLK/1     | BCLK/1                                   | BCLK/1 | BCLK/1   | BCLK/1      | 01  | BCLK/1.5 | BCLK/1.5 | BCLK/1.5 | BCLK/1.5 | BCLK/1.5 | 10       | BCLK/2                                     | BCLK/2 | BCLK/2                                       | BCLK/2 | BCLK/2 | 11  | BCLK/4     | BCLK/4 | BCLK/4 | BCLK/4 | BCLK/4      |     |       |     |          |     |          |
|                                           | DCC[9:8]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | DCC[7:6]                                   | DCC[5:4] | DCC[3:2] | DCC[1:0] |      |       |       |       |      |      |      |       |         |                                            |                                          |                                              |                                         |          |                                           |            |                                          |        |          |             |     |          |          |          |          |          |          |                                            |        |                                              |        |        |     |            |        |        |        |             |     |       |     |          |     |          |
| 00                                        | BCLK/1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | BCLK/1                                     | BCLK/1   | BCLK/1   | BCLK/1   |      |       |       |       |      |      |      |       |         |                                            |                                          |                                              |                                         |          |                                           |            |                                          |        |          |             |     |          |          |          |          |          |          |                                            |        |                                              |        |        |     |            |        |        |        |             |     |       |     |          |     |          |
| 01                                        | BCLK/1.5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | BCLK/1.5                                   | BCLK/1.5 | BCLK/1.5 | BCLK/1.5 |      |       |       |       |      |      |      |       |         |                                            |                                          |                                              |                                         |          |                                           |            |                                          |        |          |             |     |          |          |          |          |          |          |                                            |        |                                              |        |        |     |            |        |        |        |             |     |       |     |          |     |          |
| 10                                        | BCLK/2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | BCLK/2                                     | BCLK/2   | BCLK/2   | BCLK/2   |      |       |       |       |      |      |      |       |         |                                            |                                          |                                              |                                         |          |                                           |            |                                          |        |          |             |     |          |          |          |          |          |          |                                            |        |                                              |        |        |     |            |        |        |        |             |     |       |     |          |     |          |
| 11                                        | BCLK/4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | BCLK/4                                     | BCLK/4   | BCLK/4   | BCLK/4   |      |       |       |       |      |      |      |       |         |                                            |                                          |                                              |                                         |          |                                           |            |                                          |        |          |             |     |          |          |          |          |          |          |                                            |        |                                              |        |        |     |            |        |        |        |             |     |       |     |          |     |          |
| Register Availability                     | <table border="1"> <thead> <tr> <th>Status</th> <th>Availability</th> </tr> </thead> <tbody> <tr><td>Normal Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr> <tr><td>Normal Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr> <tr><td>Partial Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr> <tr><td>Partial Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr> <tr><td>Sleep In</td><td>Yes</td></tr> </tbody> </table>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                            |          |          |          |      |       |       |       |      |      |      |       | Status  | Availability                               | Normal Mode On, Idle Mode Off, Sleep Out | Yes                                          | Normal Mode On, Idle Mode On, Sleep Out | Yes      | Partial Mode On, Idle Mode Off, Sleep Out | Yes        | Partial Mode On, Idle Mode On, Sleep Out | Yes    | Sleep In | Yes         |     |          |          |          |          |          |          |                                            |        |                                              |        |        |     |            |        |        |        |             |     |       |     |          |     |          |
| Status                                    | Availability                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                            |          |          |          |      |       |       |       |      |      |      |       |         |                                            |                                          |                                              |                                         |          |                                           |            |                                          |        |          |             |     |          |          |          |          |          |          |                                            |        |                                              |        |        |     |            |        |        |        |             |     |       |     |          |     |          |
| Normal Mode On, Idle Mode Off, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                            |          |          |          |      |       |       |       |      |      |      |       |         |                                            |                                          |                                              |                                         |          |                                           |            |                                          |        |          |             |     |          |          |          |          |          |          |                                            |        |                                              |        |        |     |            |        |        |        |             |     |       |     |          |     |          |
| Normal Mode On, Idle Mode On, Sleep Out   | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                            |          |          |          |      |       |       |       |      |      |      |       |         |                                            |                                          |                                              |                                         |          |                                           |            |                                          |        |          |             |     |          |          |          |          |          |          |                                            |        |                                              |        |        |     |            |        |        |        |             |     |       |     |          |     |          |
| Partial Mode On, Idle Mode Off, Sleep Out | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                            |          |          |          |      |       |       |       |      |      |      |       |         |                                            |                                          |                                              |                                         |          |                                           |            |                                          |        |          |             |     |          |          |          |          |          |          |                                            |        |                                              |        |        |     |            |        |        |        |             |     |       |     |          |     |          |
| Partial Mode On, Idle Mode On, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                            |          |          |          |      |       |       |       |      |      |      |       |         |                                            |                                          |                                              |                                         |          |                                           |            |                                          |        |          |             |     |          |          |          |          |          |          |                                            |        |                                              |        |        |     |            |        |        |        |             |     |       |     |          |     |          |
| Sleep In                                  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                            |          |          |          |      |       |       |       |      |      |      |       |         |                                            |                                          |                                              |                                         |          |                                           |            |                                          |        |          |             |     |          |          |          |          |          |          |                                            |        |                                              |        |        |     |            |        |        |        |             |     |       |     |          |     |          |
| Default                                   | <table border="1"> <thead> <tr> <th>Status</th> <th>Default Value</th> </tr> </thead> <tbody> <tr><td></td><td>C4h</td></tr> <tr><td>Power On Sequence</td><td>8Ah/Ah</td></tr> <tr><td>S/W Reset</td><td>8Ah/Ah</td></tr> <tr><td>H/W Reset</td><td>8Ah/Ah</td></tr> </tbody> </table>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                            |          |          |          |      |       |       |       |      |      |      |       | Status  | Default Value                              |                                          | C4h                                          | Power On Sequence                       | 8Ah/Ah   | S/W Reset                                 | 8Ah/Ah     | H/W Reset                                | 8Ah/Ah |          |             |     |          |          |          |          |          |          |                                            |        |                                              |        |        |     |            |        |        |        |             |     |       |     |          |     |          |
| Status                                    | Default Value                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                            |          |          |          |      |       |       |       |      |      |      |       |         |                                            |                                          |                                              |                                         |          |                                           |            |                                          |        |          |             |     |          |          |          |          |          |          |                                            |        |                                              |        |        |     |            |        |        |        |             |     |       |     |          |     |          |
|                                           | C4h                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                            |          |          |          |      |       |       |       |      |      |      |       |         |                                            |                                          |                                              |                                         |          |                                           |            |                                          |        |          |             |     |          |          |          |          |          |          |                                            |        |                                              |        |        |     |            |        |        |        |             |     |       |     |          |     |          |
| Power On Sequence                         | 8Ah/Ah                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                            |          |          |          |      |       |       |       |      |      |      |       |         |                                            |                                          |                                              |                                         |          |                                           |            |                                          |        |          |             |     |          |          |          |          |          |          |                                            |        |                                              |        |        |     |            |        |        |        |             |     |       |     |          |     |          |
| S/W Reset                                 | 8Ah/Ah                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                            |          |          |          |      |       |       |       |      |      |      |       |         |                                            |                                          |                                              |                                         |          |                                           |            |                                          |        |          |             |     |          |          |          |          |          |          |                                            |        |                                              |        |        |     |            |        |        |        |             |     |       |     |          |     |          |
| H/W Reset                                 | 8Ah/Ah                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                            |          |          |          |      |       |       |       |      |      |      |       |         |                                            |                                          |                                              |                                         |          |                                           |            |                                          |        |          |             |     |          |          |          |          |          |          |                                            |        |                                              |        |        |     |            |        |        |        |             |     |       |     |          |     |          |



## 10.2.10 VMCTR1 (C5h): VCOM Control 1

| C5H                       |                                           | VMCTR1 (VCOM Control 1) |               |        |             |        |        |             |         |         |             |         |       |
|---------------------------|-------------------------------------------|-------------------------|---------------|--------|-------------|--------|--------|-------------|---------|---------|-------------|---------|-------|
| Inst / Para               | D/CX                                      | WRX                     | RDX           | D17-8  | D7          | D6     | D5     | D4          | D3      | D2      | D1          | D0      | HEX   |
| VMCTR1                    | 0                                         | ↑                       | 1             | -      | 1           | 1      | 0      | 0           | 0       | 1       | 0           | 1       | (C5h) |
| 1 <sup>st</sup> parameter | 1                                         | ↑                       | 1             | -      | -           | -      | VCOMS5 | VCOMS 4     | VCOMS 3 | VCOMS 2 | VCOMS 1     | VCOMS 0 |       |
| Description               | VCOM voltage setting.                     |                         |               |        |             |        |        |             |         |         |             |         |       |
|                           |                                           | VCOMS [5:0]             | VCOM          |        | VCOMS [5:0] | VCOM   |        | VCOMS [5:0] | VCOM    |         | VCOMS [5:0] | VCOM    |       |
|                           | 0                                         | 000000                  | -0.425        | 16     | 010000      | -0.825 | 32     | 100000      | -1.225  | 48      | 110000      | -1.625  |       |
|                           | 1                                         | 000001                  | -0.45         | 17     | 010001      | -0.85  | 33     | 100001      | -1.25   | 49      | 110001      | -1.65   |       |
|                           | 2                                         | 000010                  | -0.475        | 18     | 010010      | -0.875 | 34     | 100010      | -1.275  | 50      | 110010      | -1.675  |       |
|                           | 3                                         | 000011                  | -0.5          | 19     | 010011      | -0.9   | 35     | 100011      | -1.3    | 51      | 110011      | -1.7    |       |
|                           | 4                                         | 000100                  | -0.525        | 20     | 010100      | -0.925 | 36     | 100100      | -1.325  | 52      | 110100      | -1.725  |       |
|                           | 5                                         | 000101                  | -0.55         | 21     | 010101      | -0.95  | 37     | 100101      | -1.35   | 53      | 110101      | -1.75   |       |
|                           | 6                                         | 000110                  | -0.575        | 22     | 010110      | -0.975 | 38     | 100110      | -1.375  | 54      | 110110      | -1.775  |       |
|                           | 7                                         | 000111                  | -0.6          | 23     | 010111      | -1     | 39     | 100111      | -1.4    | 55      | 110111      | -1.8    |       |
|                           | 8                                         | 001000                  | -0.625        | 24     | 011000      | -1.025 | 40     | 101000      | -1.425  | 56      | 111000      | -1.825  |       |
|                           | 9                                         | 001001                  | -0.65         | 25     | 011001      | -1.05  | 41     | 101001      | -1.45   | 57      | 111001      | -1.85   |       |
|                           | 10                                        | 001010                  | -0.675        | 26     | 011010      | -1.075 | 42     | 101010      | -1.475  | 58      | 111010      | -1.875  |       |
|                           | 11                                        | 001011                  | -0.7          | 27     | 011011      | -1.1   | 43     | 101011      | -1.5    | 59      | 111011      | -1.9    |       |
|                           | 12                                        | 001100                  | -0.725        | 28     | 011100      | -1.125 | 44     | 101100      | -1.525  | 60      | 111100      | -1.925  |       |
|                           | 13                                        | 001101                  | -0.75         | 29     | 011101      | -1.15  | 45     | 101101      | -1.55   | 61      | 111101      | -1.95   |       |
|                           | 14                                        | 001110                  | -0.775        | 30     | 011110      | -1.175 | 46     | 101110      | -1.575  | 62      | 111110      | -1.975  |       |
| 15                        | 001111                                    | -0.8                    | 31            | 011111 | -1.2        | 47     | 101111 | -1.6        | 63      | 111111  | -2          |         |       |
| Register Availability     | Status                                    |                         | Availability  |        |             |        |        |             |         |         |             |         |       |
|                           | Normal Mode On, Idle Mode Off, Sleep Out  |                         | Yes           |        |             |        |        |             |         |         |             |         |       |
|                           | Normal Mode On, Idle Mode On, Sleep Out   |                         | Yes           |        |             |        |        |             |         |         |             |         |       |
|                           | Partial Mode On, Idle Mode Off, Sleep Out |                         | Yes           |        |             |        |        |             |         |         |             |         |       |
|                           | Partial Mode On, Idle Mode On, Sleep Out  |                         | Yes           |        |             |        |        |             |         |         |             |         |       |
|                           | Sleep In                                  |                         | Yes           |        |             |        |        |             |         |         |             |         |       |
| Default                   | Status                                    |                         | Default Value |        |             |        |        |             |         |         |             |         |       |
|                           |                                           |                         | C5h           |        |             |        |        |             |         |         |             |         |       |
|                           | Power On Sequence                         |                         | 04h           |        |             |        |        |             |         |         |             |         |       |
|                           | S/W Reset                                 |                         | 04h           |        |             |        |        |             |         |         |             |         |       |
|                           | H/W Reset                                 |                         | 04h           |        |             |        |        |             |         |         |             |         |       |

# ST7735R



## 10.2.11 VMOFCTR (C7h): VCOM Offset Control

| C7H                                      | VMOFCTR (VCOM Offset Control)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |               |                   |       |    |    |    |      |      |      |      |      |        |               |                                          |                   |                                         |      |                                           |     |                                          |             |          |     |  |   |      |            |   |      |            |   |      |         |   |      |            |   |      |            |   |  |  |   |      |             |   |      |             |
|------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|-------------------|-------|----|----|----|------|------|------|------|------|--------|---------------|------------------------------------------|-------------------|-----------------------------------------|------|-------------------------------------------|-----|------------------------------------------|-------------|----------|-----|--|---|------|------------|---|------|------------|---|------|---------|---|------|------------|---|------|------------|---|--|--|---|------|-------------|---|------|-------------|
| Inst / Para                              | D/CX                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | WRX           | RDX               | D17-8 | D7 | D6 | D5 | D4   | D3   | D2   | D1   | D0   | HEX    |               |                                          |                   |                                         |      |                                           |     |                                          |             |          |     |  |   |      |            |   |      |            |   |      |         |   |      |            |   |      |            |   |  |  |   |      |             |   |      |             |
| VMOFCTR                                  | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | ↑             | 1                 | -     | 1  | 1  | 0  | 0    | 0    | 1    | 1    | 1    | (C7h)  |               |                                          |                   |                                         |      |                                           |     |                                          |             |          |     |  |   |      |            |   |      |            |   |      |         |   |      |            |   |      |            |   |  |  |   |      |             |   |      |             |
| Parameter                                | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | ↑             | 1                 | -     | -  | -  | -  | VMF4 | VMF3 | VMF2 | VMF1 | VMF0 |        |               |                                          |                   |                                         |      |                                           |     |                                          |             |          |     |  |   |      |            |   |      |            |   |      |         |   |      |            |   |      |            |   |  |  |   |      |             |   |      |             |
| Description                              | -Set VCOM Voltage level for reduce the flicker issue<br>-Before use command 0xC7, the bit VMF_EN of command 0xD9 must be enabled (set to 1).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |               |                   |       |    |    |    |      |      |      |      |      |        |               |                                          |                   |                                         |      |                                           |     |                                          |             |          |     |  |   |      |            |   |      |            |   |      |         |   |      |            |   |      |            |   |  |  |   |      |             |   |      |             |
|                                          | <table border="1"> <thead> <tr> <th>VMF[4]</th> <th>VMF[3:0]</th> <th>VCOM Output Level</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>0000</td> <td>"VCOMS"-16d</td> </tr> <tr> <td>0</td> <td>0001</td> <td>"VCOMS"-15d</td> </tr> <tr> <td>0</td> <td> </td> <td> </td> </tr> <tr> <td>0</td> <td>1110</td> <td>"VCOMS"-2d</td> </tr> <tr> <td>0</td> <td>1111</td> <td>"VCOMS"-1d</td> </tr> <tr> <td>1</td> <td>0000</td> <td>"VCOMS"</td> </tr> <tr> <td>1</td> <td>0001</td> <td>"VCOMS"+1d</td> </tr> <tr> <td>1</td> <td>0010</td> <td>"VCOMS"+2d</td> </tr> <tr> <td>1</td> <td> </td> <td> </td> </tr> <tr> <td>1</td> <td>1110</td> <td>"VCOMS"+14d</td> </tr> <tr> <td>1</td> <td>1111</td> <td>"VCOMS"+15d</td> </tr> </tbody> </table> |               |                   |       |    |    |    |      |      |      |      |      |        | VMF[4]        | VMF[3:0]                                 | VCOM Output Level | 0                                       | 0000 | "VCOMS"-16d                               | 0   | 0001                                     | "VCOMS"-15d | 0        |     |  | 0 | 1110 | "VCOMS"-2d | 0 | 1111 | "VCOMS"-1d | 1 | 0000 | "VCOMS" | 1 | 0001 | "VCOMS"+1d | 1 | 0010 | "VCOMS"+2d | 1 |  |  | 1 | 1110 | "VCOMS"+14d | 1 | 1111 | "VCOMS"+15d |
|                                          | VMF[4]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | VMF[3:0]      | VCOM Output Level |       |    |    |    |      |      |      |      |      |        |               |                                          |                   |                                         |      |                                           |     |                                          |             |          |     |  |   |      |            |   |      |            |   |      |         |   |      |            |   |      |            |   |  |  |   |      |             |   |      |             |
|                                          | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 0000          | "VCOMS"-16d       |       |    |    |    |      |      |      |      |      |        |               |                                          |                   |                                         |      |                                           |     |                                          |             |          |     |  |   |      |            |   |      |            |   |      |         |   |      |            |   |      |            |   |  |  |   |      |             |   |      |             |
|                                          | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 0001          | "VCOMS"-15d       |       |    |    |    |      |      |      |      |      |        |               |                                          |                   |                                         |      |                                           |     |                                          |             |          |     |  |   |      |            |   |      |            |   |      |         |   |      |            |   |      |            |   |  |  |   |      |             |   |      |             |
|                                          | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |               |                   |       |    |    |    |      |      |      |      |      |        |               |                                          |                   |                                         |      |                                           |     |                                          |             |          |     |  |   |      |            |   |      |            |   |      |         |   |      |            |   |      |            |   |  |  |   |      |             |   |      |             |
|                                          | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 1110          | "VCOMS"-2d        |       |    |    |    |      |      |      |      |      |        |               |                                          |                   |                                         |      |                                           |     |                                          |             |          |     |  |   |      |            |   |      |            |   |      |         |   |      |            |   |      |            |   |  |  |   |      |             |   |      |             |
|                                          | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 1111          | "VCOMS"-1d        |       |    |    |    |      |      |      |      |      |        |               |                                          |                   |                                         |      |                                           |     |                                          |             |          |     |  |   |      |            |   |      |            |   |      |         |   |      |            |   |      |            |   |  |  |   |      |             |   |      |             |
|                                          | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 0000          | "VCOMS"           |       |    |    |    |      |      |      |      |      |        |               |                                          |                   |                                         |      |                                           |     |                                          |             |          |     |  |   |      |            |   |      |            |   |      |         |   |      |            |   |      |            |   |  |  |   |      |             |   |      |             |
|                                          | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 0001          | "VCOMS"+1d        |       |    |    |    |      |      |      |      |      |        |               |                                          |                   |                                         |      |                                           |     |                                          |             |          |     |  |   |      |            |   |      |            |   |      |         |   |      |            |   |      |            |   |  |  |   |      |             |   |      |             |
|                                          | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 0010          | "VCOMS"+2d        |       |    |    |    |      |      |      |      |      |        |               |                                          |                   |                                         |      |                                           |     |                                          |             |          |     |  |   |      |            |   |      |            |   |      |         |   |      |            |   |      |            |   |  |  |   |      |             |   |      |             |
|                                          | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |               |                   |       |    |    |    |      |      |      |      |      |        |               |                                          |                   |                                         |      |                                           |     |                                          |             |          |     |  |   |      |            |   |      |            |   |      |         |   |      |            |   |      |            |   |  |  |   |      |             |   |      |             |
| 1                                        | 1110                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | "VCOMS"+14d   |                   |       |    |    |    |      |      |      |      |      |        |               |                                          |                   |                                         |      |                                           |     |                                          |             |          |     |  |   |      |            |   |      |            |   |      |         |   |      |            |   |      |            |   |  |  |   |      |             |   |      |             |
| 1                                        | 1111                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | "VCOMS"+15d   |                   |       |    |    |    |      |      |      |      |      |        |               |                                          |                   |                                         |      |                                           |     |                                          |             |          |     |  |   |      |            |   |      |            |   |      |         |   |      |            |   |      |            |   |  |  |   |      |             |   |      |             |
| - 1d=25mV, 2d=50mV 3d=75mv....           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |               |                   |       |    |    |    |      |      |      |      |      |        |               |                                          |                   |                                         |      |                                           |     |                                          |             |          |     |  |   |      |            |   |      |            |   |      |         |   |      |            |   |      |            |   |  |  |   |      |             |   |      |             |
| Register Availability                    | <table border="1"> <thead> <tr> <th>Status</th> <th>Availability</th> </tr> </thead> <tbody> <tr> <td>Normal Mode On, Idle Mode Off, Sleep Out</td> <td>Yes</td> </tr> <tr> <td>Normal Mode On, Idle Mode On, Sleep Out</td> <td>Yes</td> </tr> <tr> <td>Partial Mode On, Idle Mode Off, Sleep Out</td> <td>Yes</td> </tr> <tr> <td>Partial Mode On, Idle Mode On, Sleep Out</td> <td>Yes</td> </tr> <tr> <td>Sleep In</td> <td>Yes</td> </tr> </tbody> </table>                                                                                                                                                                                                                                                                                       |               |                   |       |    |    |    |      |      |      |      |      | Status | Availability  | Normal Mode On, Idle Mode Off, Sleep Out | Yes               | Normal Mode On, Idle Mode On, Sleep Out | Yes  | Partial Mode On, Idle Mode Off, Sleep Out | Yes | Partial Mode On, Idle Mode On, Sleep Out | Yes         | Sleep In | Yes |  |   |      |            |   |      |            |   |      |         |   |      |            |   |      |            |   |  |  |   |      |             |   |      |             |
|                                          | Status                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Availability  |                   |       |    |    |    |      |      |      |      |      |        |               |                                          |                   |                                         |      |                                           |     |                                          |             |          |     |  |   |      |            |   |      |            |   |      |         |   |      |            |   |      |            |   |  |  |   |      |             |   |      |             |
|                                          | Normal Mode On, Idle Mode Off, Sleep Out                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Yes           |                   |       |    |    |    |      |      |      |      |      |        |               |                                          |                   |                                         |      |                                           |     |                                          |             |          |     |  |   |      |            |   |      |            |   |      |         |   |      |            |   |      |            |   |  |  |   |      |             |   |      |             |
|                                          | Normal Mode On, Idle Mode On, Sleep Out                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Yes           |                   |       |    |    |    |      |      |      |      |      |        |               |                                          |                   |                                         |      |                                           |     |                                          |             |          |     |  |   |      |            |   |      |            |   |      |         |   |      |            |   |      |            |   |  |  |   |      |             |   |      |             |
|                                          | Partial Mode On, Idle Mode Off, Sleep Out                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Yes           |                   |       |    |    |    |      |      |      |      |      |        |               |                                          |                   |                                         |      |                                           |     |                                          |             |          |     |  |   |      |            |   |      |            |   |      |         |   |      |            |   |      |            |   |  |  |   |      |             |   |      |             |
| Partial Mode On, Idle Mode On, Sleep Out | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |               |                   |       |    |    |    |      |      |      |      |      |        |               |                                          |                   |                                         |      |                                           |     |                                          |             |          |     |  |   |      |            |   |      |            |   |      |         |   |      |            |   |      |            |   |  |  |   |      |             |   |      |             |
| Sleep In                                 | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |               |                   |       |    |    |    |      |      |      |      |      |        |               |                                          |                   |                                         |      |                                           |     |                                          |             |          |     |  |   |      |            |   |      |            |   |      |         |   |      |            |   |      |            |   |  |  |   |      |             |   |      |             |
| Default                                  | <table border="1"> <thead> <tr> <th>Status</th> <th>Default Value</th> </tr> </thead> <tbody> <tr> <td></td> <td>C7h</td> </tr> <tr> <td>Power On Sequence</td> <td>10h</td> </tr> <tr> <td>S/W Reset</td> <td>10h</td> </tr> <tr> <td>H/W Reset</td> <td>10h</td> </tr> </tbody> </table>                                                                                                                                                                                                                                                                                                                                                                                                                                                             |               |                   |       |    |    |    |      |      |      |      |      | Status | Default Value |                                          | C7h               | Power On Sequence                       | 10h  | S/W Reset                                 | 10h | H/W Reset                                | 10h         |          |     |  |   |      |            |   |      |            |   |      |         |   |      |            |   |      |            |   |  |  |   |      |             |   |      |             |
|                                          | Status                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Default Value |                   |       |    |    |    |      |      |      |      |      |        |               |                                          |                   |                                         |      |                                           |     |                                          |             |          |     |  |   |      |            |   |      |            |   |      |         |   |      |            |   |      |            |   |  |  |   |      |             |   |      |             |
|                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | C7h           |                   |       |    |    |    |      |      |      |      |      |        |               |                                          |                   |                                         |      |                                           |     |                                          |             |          |     |  |   |      |            |   |      |            |   |      |         |   |      |            |   |      |            |   |  |  |   |      |             |   |      |             |
|                                          | Power On Sequence                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 10h           |                   |       |    |    |    |      |      |      |      |      |        |               |                                          |                   |                                         |      |                                           |     |                                          |             |          |     |  |   |      |            |   |      |            |   |      |         |   |      |            |   |      |            |   |  |  |   |      |             |   |      |             |
| S/W Reset                                | 10h                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |               |                   |       |    |    |    |      |      |      |      |      |        |               |                                          |                   |                                         |      |                                           |     |                                          |             |          |     |  |   |      |            |   |      |            |   |      |         |   |      |            |   |      |            |   |  |  |   |      |             |   |      |             |
| H/W Reset                                | 10h                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |               |                   |       |    |    |    |      |      |      |      |      |        |               |                                          |                   |                                         |      |                                           |     |                                          |             |          |     |  |   |      |            |   |      |            |   |      |         |   |      |            |   |      |            |   |  |  |   |      |             |   |      |             |
| Flow Chart                               | <pre> graph TD     A[VMOFCTR (C7h)] --&gt; B[/VMF[4:0] Enable<br/>CMD D9h<br/>Para 40h/]     B --&gt; C[/Modify VMF[4:0] register<br/>CMD C7h<br/>Para XXh/]     C --&gt; D[/VMF[4:0] disable<br/>CMD D9h<br/>Para 00h/]     D --&gt; E[/EEPROM Prog flow/]     </pre>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |               |                   |       |    |    |    |      |      |      |      |      |        |               |                                          |                   |                                         |      |                                           |     |                                          |             |          |     |  |   |      |            |   |      |            |   |      |         |   |      |            |   |      |            |   |  |  |   |      |             |   |      |             |

## 10.2.12 WRID2 (D1h): Write ID2 Value

| D1H         | WRID2 (Write ID2 Value)                                                                                                                                                                                                                                                                                                                                                                     |     |     |       |    |      |      |      |      |      |      |      |       |
|-------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|-------|----|------|------|------|------|------|------|------|-------|
| Inst / Para | D/CX                                                                                                                                                                                                                                                                                                                                                                                        | WRX | RDX | D17-8 | D7 | D6   | D5   | D4   | D3   | D2   | D1   | D0   | HEX   |
| WRID2       | 0                                                                                                                                                                                                                                                                                                                                                                                           | ↑   | 1   | -     | 1  | 1    | 0    | 1    | 0    | 0    | 0    | 1    | (D1h) |
| Parameter   | 1                                                                                                                                                                                                                                                                                                                                                                                           | ↑   | 1   | -     | -  | ID26 | ID25 | ID24 | ID23 | ID22 | ID21 | ID20 | -     |
| Description | -Write 7-bit data of LCD module version to save it to NVM.<br>-The parameter ID2[6:0] is LCD Module version ID.                                                                                                                                                                                                                                                                             |     |     |       |    |      |      |      |      |      |      |      |       |
| Flow Chart  | <pre>                     graph TD                         A[/NVCTR3 (D1h)/] --&gt; B[/ID2[6:0] Enable<br/>CMD D9h<br/>Para 10h/]                         B --&gt; C[/Modify ID2[6:0] register<br/>CMD D1h<br/>Para XXh/]                         C --&gt; D[/ID2[6:0] disable<br/>CMD D9h<br/>Para 00h/]                         D --&gt; E[/EEPROM Prog flow/]                     </pre> |     |     |       |    |      |      |      |      |      |      |      |       |

## 10.2.13 WRID3 (D2h): Write ID3 Value

| D2H         | WRID3 (Write ID3 Value)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |     |     |       |      |      |      |      |      |      |      |      |       |
|-------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|-------|------|------|------|------|------|------|------|------|-------|
| Inst / Para | D/CX                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | WRX | RDX | D17-8 | D7   | D6   | D5   | D4   | D3   | D2   | D1   | D0   | HEX   |
| WRID3       | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | ↑   | 1   | -     | 1    | 1    | 0    | 1    | 0    | 0    | 1    | 0    | (D2h) |
| Parameter   | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | ↑   | 1   | -     | ID37 | ID36 | ID35 | ID34 | ID33 | ID32 | ID31 | ID30 | -     |
| Description | -Write 8-bit data of project code module to save it to NVM.<br>-The parameter ID3[7:0] is product project ID.                                                                                                                                                                                                                                                                                                                                                                                                              |     |     |       |      |      |      |      |      |      |      |      |       |
| Flow Chart  | <p>The flow chart illustrates the execution of the WRID3 (D2h) command. It starts with a trapezoidal shape labeled 'WRID3 (D2h)', which is connected by a downward arrow to a parallelogram labeled '1st Parameter'. To the right of the flow chart is a legend enclosed in a dashed box, defining the symbols used: a trapezoid for 'Command', a parallelogram for 'Parameter', an oval for 'Display', a hexagon for 'Action', a rounded rectangle for 'Mode', and a wavy-bottom rectangle for 'Sequential transfer'.</p> |     |     |       |      |      |      |      |      |      |      |      |       |

## 10.2.14 NVFCTR1 (D9h): NVM Control Status

| D9H         | NVFCTR1 (NV Memory Function Controller 1)                                                                                                                                                                                                           |                                                                                       |                                                      |       |    |        |        |    |    |    |    |       |       |
|-------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|------------------------------------------------------|-------|----|--------|--------|----|----|----|----|-------|-------|
| Inst / Para | D/CX                                                                                                                                                                                                                                                | WRX                                                                                   | RDX                                                  | D17-8 | D7 | D6     | D5     | D4 | D3 | D2 | D1 | D0    | HEX   |
| NVFCTR1     | 0                                                                                                                                                                                                                                                   | ↑                                                                                     | 1                                                    | -     | 1  | 1      | 0      | 0  | 1  | 0  | 0  | 1     | (D9h) |
| parameter   | 1                                                                                                                                                                                                                                                   | 1                                                                                     | ↑                                                    | -     | 0  | VMF_EN | ID2_EN | 0  | 0  | 0  | 0  | EXT_R |       |
| Description | -NVM control status                                                                                                                                                                                                                                 |                                                                                       |                                                      |       |    |        |        |    |    |    |    |       |       |
|             | Bit                                                                                                                                                                                                                                                 |                                                                                       | Value                                                |       |    |        |        |    |    |    |    |       |       |
|             | VMF_EN                                                                                                                                                                                                                                              |                                                                                       | "1" = Command C7h enable ; "0" = Command C7h disable |       |    |        |        |    |    |    |    |       |       |
|             | ID2_EN                                                                                                                                                                                                                                              |                                                                                       | "1" = Command D1h enable ; "0" = Command D1h disable |       |    |        |        |    |    |    |    |       |       |
| EXT_R       |                                                                                                                                                                                                                                                     | Read: extension command status, "1" for enable, "0" for disable.<br>Write: Don't care |                                                      |       |    |        |        |    |    |    |    |       |       |
| Default     | Status                                                                                                                                                                                                                                              |                                                                                       | Default Value                                        |       |    |        |        |    |    |    |    |       |       |
|             |                                                                                                                                                                                                                                                     |                                                                                       | D9h                                                  |       |    |        |        |    |    |    |    |       |       |
|             | Power On Sequence                                                                                                                                                                                                                                   |                                                                                       | 00h                                                  |       |    |        |        |    |    |    |    |       |       |
|             | S/W Reset                                                                                                                                                                                                                                           |                                                                                       | 00h                                                  |       |    |        |        |    |    |    |    |       |       |
| H/W Reset   |                                                                                                                                                                                                                                                     | 00h                                                                                   |                                                      |       |    |        |        |    |    |    |    |       |       |
| Flow Chart  | <pre> graph TD     A[NVFCTR (D9h)] --&gt; B[1st Parameter]     </pre> <p><b>Legend</b></p> <ul style="list-style-type: none"> <li>Command</li> <li>Parameter</li> <li>Display</li> <li>Action</li> <li>Mode</li> <li>Sequential transfer</li> </ul> |                                                                                       |                                                      |       |    |        |        |    |    |    |    |       |       |

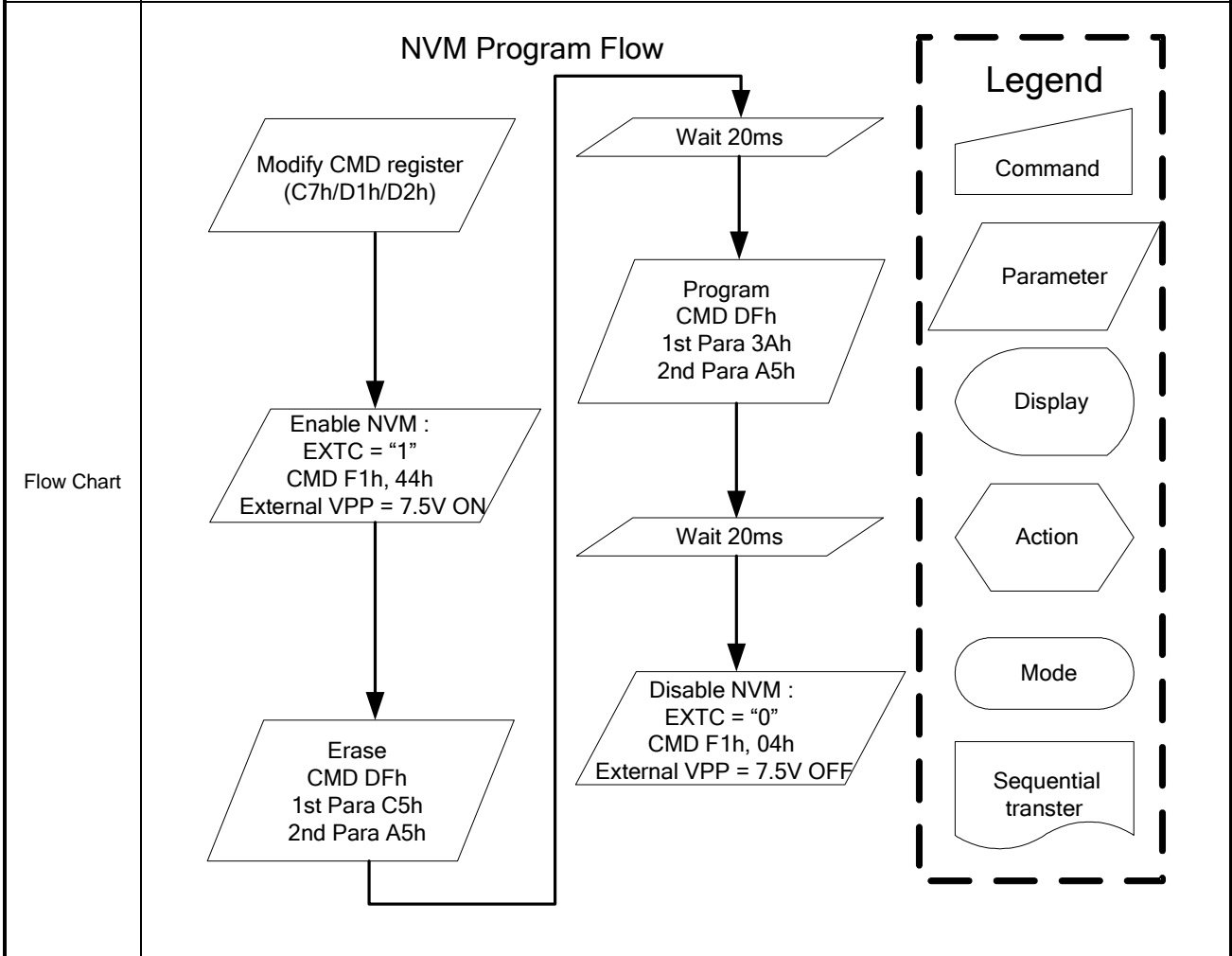
## 10.2.15 NVFCTR2 (DEh): NVM Read Command

| DEH                       | NVFCTR1 (NV Memory Function Controller 2)                                                                                                                                                                                                                                                                                                                                                                                                                                                               |     |     |       |    |    |    |    |    |    |    |    |       |
|---------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|-------|----|----|----|----|----|----|----|----|-------|
| Inst / Para               | D/CX                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | WRX | RDX | D17-8 | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | HEX   |
| NVFCTR2                   | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | ↑   | 1   | -     | 1  | 1  | 0  | 1  | 1  | 1  | 1  | 0  | (DEh) |
| 1 <sup>st</sup> parameter | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | ↑   | 1   |       | 1  | 1  | 1  | 1  | 0  | 1  | 0  | 1  | F5    |
| 2 <sup>nd</sup> parameter | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | ↑   | 1   |       | 1  | 0  | 1  | 0  | 0  | 1  | 0  | 1  | A5    |
| Description               | NVM Read Command<br>NOTE: "-" Don't care                                                                                                                                                                                                                                                                                                                                                                                                                                                                |     |     |       |    |    |    |    |    |    |    |    |       |
| Flow Chart                | <p>The flow chart illustrates the execution of the NVFCTR2 command. It starts with a trapezoidal shape labeled 'NVFCTR2', which points down to a parallelogram shape containing the text '1st Para : F5h' and '2nd Para : A5h'. To the right of the flow chart is a legend box with a dashed border, containing six items: 'Command' (trapezoid), 'Parameter' (parallelogram), 'Display' (oval), 'Action' (hexagon), 'Mode' (rounded rectangle), and 'Sequential transfer' (wavy-bottom rectangle).</p> |     |     |       |    |    |    |    |    |    |    |    |       |

## 10.2.16 NVFCTR3 (DFh): NVM Write Command

| DFH                       | NVFCTR1 (NV Memory Function Controller 3) |     |     |       |          |          |          |          |          |          |          |          |       |
|---------------------------|-------------------------------------------|-----|-----|-------|----------|----------|----------|----------|----------|----------|----------|----------|-------|
| Inst / Para               | D/CX                                      | WRX | RDX | D17-8 | D7       | D6       | D5       | D4       | D3       | D2       | D1       | D0       | HEX   |
| NVFCTR1                   | 0                                         | ↑   | 1   | -     | 1        | 1        | 0        | 1        | 1        | 1        | 1        | 1        | (DFh) |
| 1 <sup>st</sup> parameter | 1                                         | ↑   | 1   |       | NVM_CMD7 | NVM_CMD6 | NVM_CMD5 | NVM_CMD4 | NVM_CMD3 | NVM_CMD2 | NVM_CMD1 | NVM_CMD0 |       |
| 2 <sup>nd</sup> parameter | 1                                         | ↑   | 1   |       | 1        | 0        | 1        | 0        | 0        | 1        | 0        | 1        | A5    |

Description: -NVM Write Command  
 -NVM\_CMD[7:0] : Select to Program/Erase ; Program command : 3Ah ; Erase command : C5h  
 NOTE: “-“ Don't care

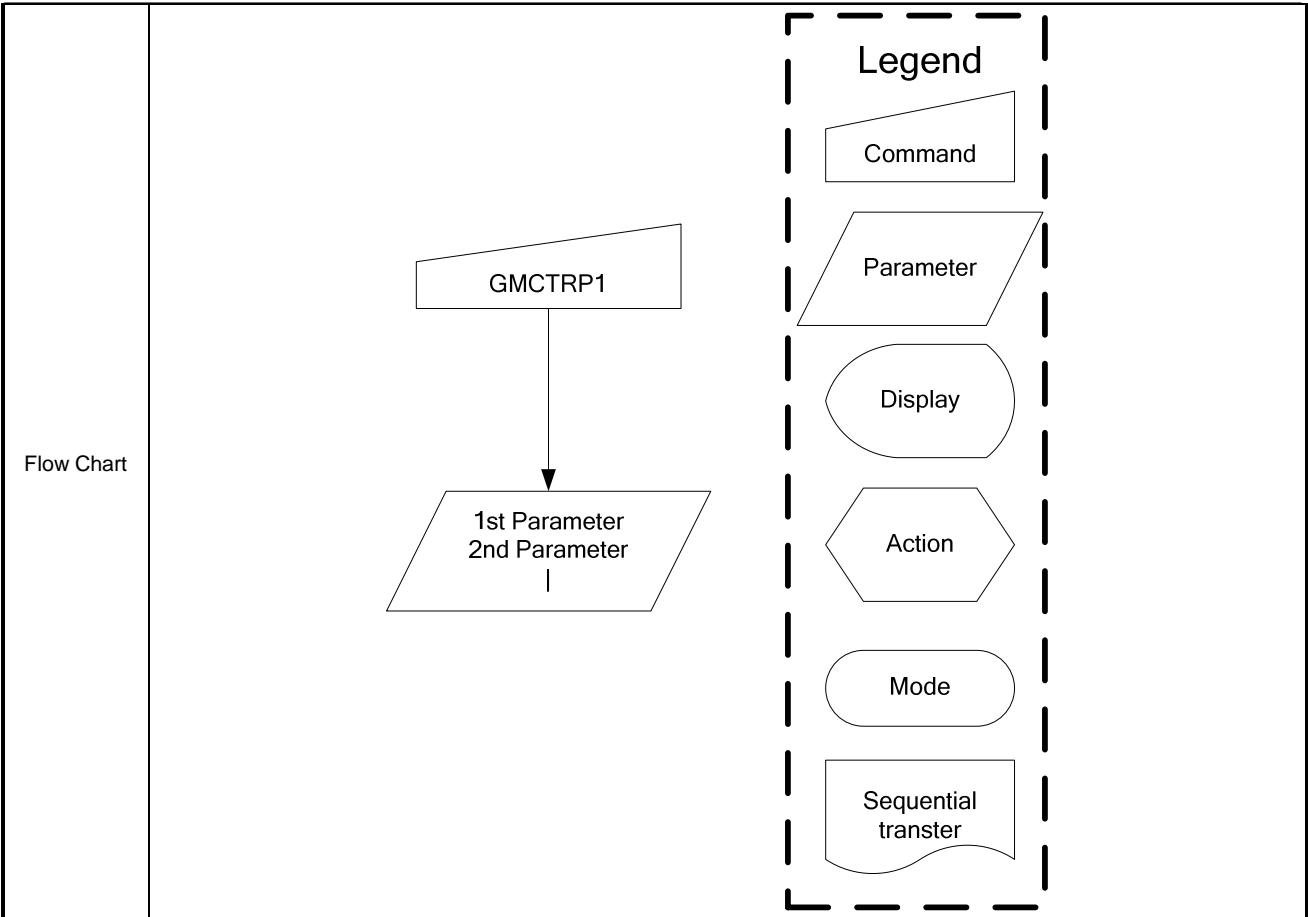


## 10.2.17 GMCTRP1 (E0h): Gamma ('+'polarity) Correction Characteristics Setting

| E0H                        | GMCTRP0 (Gamma '+'polarity Correction Characteristics Setting) |     |     |       |    |    |            |            |            |            |            |            | HEX   |
|----------------------------|----------------------------------------------------------------|-----|-----|-------|----|----|------------|------------|------------|------------|------------|------------|-------|
| Inst / Para                | D/CX                                                           | WRX | RDX | D17-8 | D7 | D6 | D5         | D4         | D3         | D2         | D1         | D0         |       |
| GMCTRP1                    | 0                                                              | ↑   | 1   | -     | 1  | 1  | 1          | 0          | 0          | 0          | 0          | 0          | (E0h) |
| 1 <sup>st</sup> parameter  | 1                                                              | ↑   | 1   | -     | -  | -  | VRF0P[5]   | VRF0P[4]   | VF0P[3]    | VRF0P[2]   | VRF0P[1]   | VRF0P[0]   |       |
| 2 <sup>nd</sup> parameter  | 1                                                              | ↑   | 1   | -     | -  | -  | VOS0P[5]   | VOS0P[4]   | VOS0P[3]   | VOS0P[2]   | VOS0P[1]   | VOS0P[0]   |       |
| 3 <sup>rd</sup> parameter  | 1                                                              | ↑   | 1   | -     | -  | -  | PK0P[5]    | PK0P[4]    | PK0P[3]    | PK0P[2]    | PK0P[1]    | PK0P[0]    |       |
| 4 <sup>th</sup> parameter  | 1                                                              | ↑   | 1   | -     | -  | -  | PK1P[5]    | PK1P[4]    | PK1P[3]    | PK1P[2]    | PK1P[1]    | PK1P[0]    |       |
| 5 <sup>th</sup> parameter  | 1                                                              | ↑   | 1   | -     | -  | -  | PK2P[5]    | PK2P[4]    | PK2P[3]    | PK2P[2]    | PK2P[1]    | PK2P[0]    |       |
| 6 <sup>th</sup> parameter  | 1                                                              | ↑   | 1   | -     | -  | -  | PK3P[5]    | PK3P[4]    | PK3P[3]    | PK3P[2]    | PK3P[1]    | PK3P[0]    |       |
| 7 <sup>th</sup> parameter  | 1                                                              | ↑   | 1   | -     | -  | -  | PK4P[5]    | PK4P[4]    | PK4P[3]    | PK4P[2]    | PK4P[1]    | PK4P[0]    |       |
| 8 <sup>th</sup> parameter  | 1                                                              | ↑   | 1   | -     | -  | -  | PK5P[5]    | PK5P[4]    | PK5P[3]    | PK5P[2]    | PK5P[1]    | PK5P[0]    |       |
| 9 <sup>th</sup> parameter  | 1                                                              | ↑   | 1   | -     | -  | -  | PK6P[5]    | PK6P[4]    | PK6P[3]    | PK6P[2]    | PK6P[1]    | PK6P[0]    |       |
| 10 <sup>th</sup> parameter | 1                                                              | ↑   | 1   | -     | -  | -  | PK7P[5]    | PK7P[4]    | PK7P[3]    | PK7P[2]    | PK7P[1]    | PK7P[0]    |       |
| 11 <sup>th</sup> parameter | 1                                                              | ↑   | 1   | -     | -  | -  | PK8P[5]    | PK8P[4]    | PK8P[3]    | PK8P[2]    | PK8P[1]    | PK8P[0]    |       |
| 12 <sup>th</sup> parameter | 1                                                              | ↑   | 1   | -     | -  | -  | PK9P[5]    | PK9P[4]    | PK9P[3]    | PK9P[2]    | PK9P[1]    | PK9P[0]    |       |
| 13 <sup>th</sup> parameter | 1                                                              | ↑   | 1   | -     | -  | -  | SELV0P[5]  | SELV0P[4]  | SELV0P[3]  | SELV0P[2]  | SELV0P[1]  | SELV0P[0]  |       |
| 14 <sup>th</sup> parameter | 1                                                              | ↑   | 1   | -     | -  | -  | SELV1P[5]  | SELV1P[4]  | SELV1P[3]  | SELV1P[2]  | SELV1P[1]  | SELV1P[0]  |       |
| 15 <sup>th</sup> parameter | 1                                                              | ↑   | 1   | -     | -  | -  | SELV62P[5] | SELV62P[4] | SELV62P[3] | SELV62P[2] | SELV62P[1] | SELV62P[0] |       |
| 16 <sup>th</sup> parameter | 1                                                              | ↑   | 1   | -     | -  | -  | SELV63P[5] | SELV63P[4] | SELV63P[3] | SELV63P[2] | SELV63P[1] | SELV63P[0] |       |

| Register Group        | Positive Polarity                                                | Set-up Contents                                                  |
|-----------------------|------------------------------------------------------------------|------------------------------------------------------------------|
| High level adjustment | VRF0P[5:0]                                                       | Variable resistor VRHP                                           |
| Mid level adjustment  | SELV0P[5:0]                                                      | The voltage of V0 grayscale is selected by the 64 to 1 selector  |
|                       | SELV1P[5:0]                                                      | The voltage of V1 grayscale is selected by the 64 to 1 selector  |
|                       | PK0P[5:0]                                                        | The voltage of V3 grayscale is selected by the 64 to 1 selector  |
|                       | PK1P[5:0]                                                        | The voltage of V4 grayscale is selected by the 64 to 1 selector  |
|                       | PK2P[5:0]                                                        | The voltage of V12 grayscale is selected by the 64 to 1 selector |
|                       | PK3P[5:0]                                                        | The voltage of V20 grayscale is selected by the 64 to 1 selector |
|                       | PK4P[5:0]                                                        | The voltage of V28 grayscale is selected by the 64 to 1 selector |
|                       | PK5P[5:0]                                                        | The voltage of V36 grayscale is selected by the 64 to 1 selector |
|                       | PK6P[5:0]                                                        | The voltage of V44 grayscale is selected by the 64 to 1 selector |
|                       | PK7P[5:0]                                                        | The voltage of V52 grayscale is selected by the 64 to 1 selector |
|                       | PK8P[5:0]                                                        | The voltage of V56 grayscale is selected by the 64 to 1 selector |
|                       | PK9P[5:0]                                                        | The voltage of V60 grayscale is selected by the 64 to 1 selector |
|                       | SELV62P[5:0]                                                     | The voltage of V62 grayscale is selected by the 64 to 1 selector |
| SELV63P[5:0]          | The voltage of V63 grayscale is selected by the 64 to 1 selector |                                                                  |
| Low level adjustment  | VOS0P[5:0]                                                       | Variable resistor VRLP                                           |

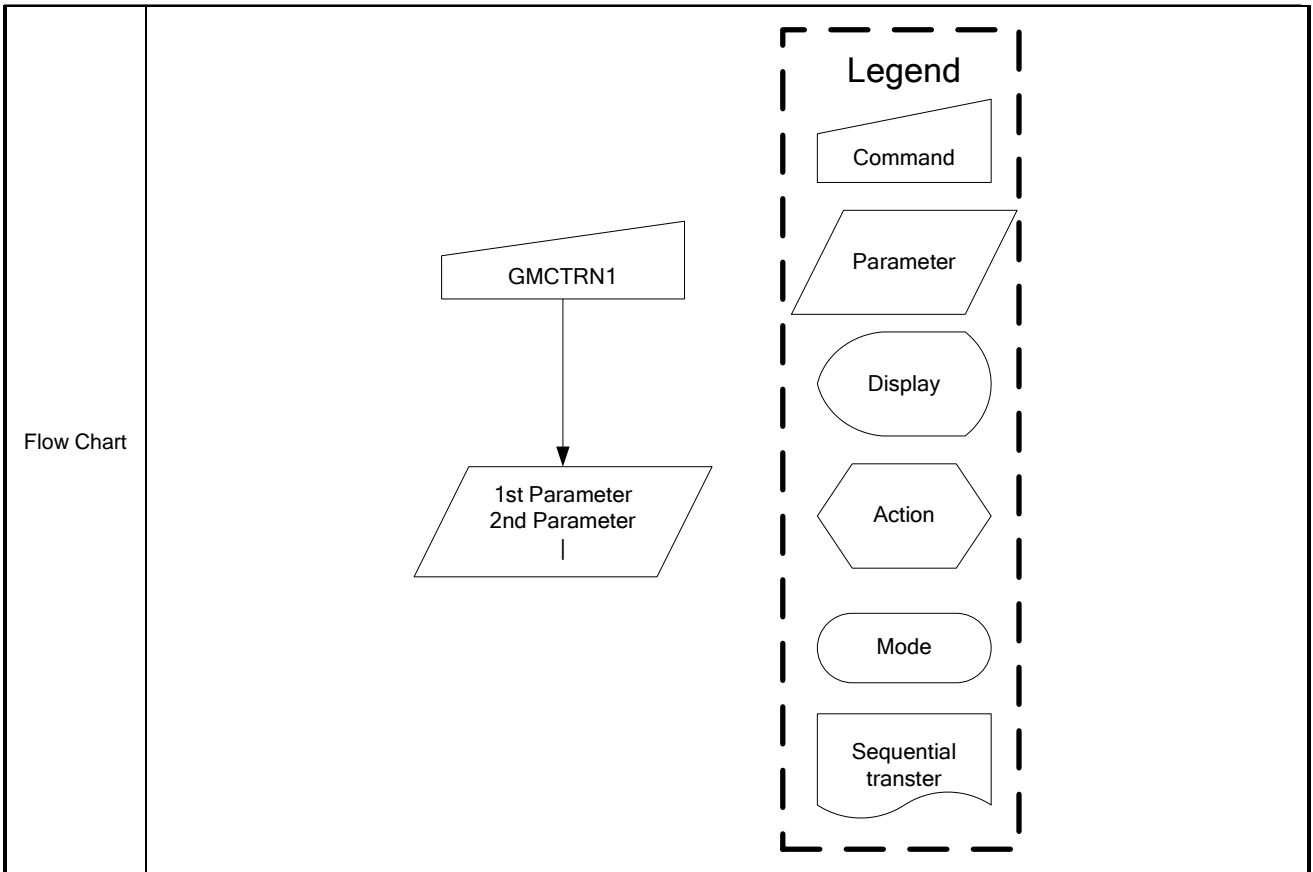


## 10.2.18 GMCTRN1 (E1h): Gamma '+' polarity Correction Characteristics Setting

| E1H                        | GMCTRP0 (Gamma '+' polarity Correction Characteristics Setting) |     |     |       |    |    |            |            |            |            |            |            |       |
|----------------------------|-----------------------------------------------------------------|-----|-----|-------|----|----|------------|------------|------------|------------|------------|------------|-------|
| Inst / Para                | D/CX                                                            | WRX | RDX | D17-8 | D7 | D6 | D5         | D4         | D3         | D2         | D1         | D0         | HEX   |
| GMCTRP1                    | 0                                                               | ↑   | 1   | -     | 1  | 1  | 1          | 0          | 0          | 0          | 0          | 1          | (E1h) |
| 1 <sup>st</sup> parameter  | 1                                                               | ↑   | 1   | -     | -  | -  | VRF0N[5]   | VRF0N[4]   | VF0N[3]    | VRF0N[2]   | VRF0N[1]   | VRF0N[0]   |       |
| 2 <sup>nd</sup> parameter  | 1                                                               | ↑   | 1   | -     | -  | -  | VOS0N[5]   | VOS0N[4]   | VOS0N[3]   | VOS0N[2]   | VOS0N[1]   | VOS0N[0]   |       |
| 3 <sup>rd</sup> parameter  | 1                                                               | ↑   | 1   | -     | -  | -  | PK0N[5]    | PK0N[4]    | PK0N[3]    | PK0N[2]    | PK0N[1]    | PK0N[0]    |       |
| 4 <sup>th</sup> parameter  | 1                                                               | ↑   | 1   | -     | -  | -  | PK1N[5]    | PK1N[4]    | PK1N[3]    | PK1N[2]    | PK1N[1]    | PK1N[0]    |       |
| 5 <sup>th</sup> parameter  | 1                                                               | ↑   | 1   | -     | -  | -  | PK2N[5]    | PK2N[4]    | PK2N[3]    | PK2N[2]    | PK2N[1]    | PK2N[0]    |       |
| 6 <sup>th</sup> parameter  | 1                                                               | ↑   | 1   | -     | -  | -  | PK3N[5]    | PK3N[4]    | PK3N[3]    | PK3N[2]    | PK3N[1]    | PK3N[0]    |       |
| 7 <sup>th</sup> parameter  | 1                                                               | ↑   | 1   | -     | -  | -  | PK4N[5]    | PK4N[4]    | PK4N[3]    | PK4N[2]    | PK4N[1]    | PK4N[0]    |       |
| 8 <sup>th</sup> parameter  | 1                                                               | ↑   | 1   | -     | -  | -  | PK5N[5]    | PK5N[4]    | PK5N[3]    | PK5N[2]    | PK5N[1]    | PK5N[0]    |       |
| 9 <sup>th</sup> parameter  | 1                                                               | ↑   | 1   | -     | -  | -  | PK6N[5]    | PK6N[4]    | PK6N[3]    | PK6N[2]    | PK6N[1]    | PK6N[0]    |       |
| 10 <sup>th</sup> parameter | 1                                                               | ↑   | 1   | -     | -  | -  | PK7N[5]    | PK7N[4]    | PK7N[3]    | PK7N[2]    | PK7N[1]    | PK7N[0]    |       |
| 11 <sup>th</sup> parameter | 1                                                               | ↑   | 1   | -     | -  | -  | PK8N[5]    | PK8N[4]    | PK8N[3]    | PK8N[2]    | PK8N[1]    | PK8N[0]    |       |
| 12 <sup>th</sup> parameter | 1                                                               | ↑   | 1   | -     | -  | -  | PK9N[5]    | PK9N[4]    | PK9N[3]    | PK9N[2]    | PK9N[1]    | PK9N[0]    |       |
| 13 <sup>th</sup> parameter | 1                                                               | ↑   | 1   | -     | -  | -  | SELV0N[5]  | SELV0N[4]  | SELV0N[3]  | SELV0N[2]  | SELV0N[1]  | SELV0N[0]  |       |
| 14 <sup>th</sup> parameter | 1                                                               | ↑   | 1   | -     | -  | -  | SELV1N[5]  | SELV1N[4]  | SELV1N[3]  | SELV1N[2]  | SELV1N[1]  | SELV1N[0]  |       |
| 15 <sup>th</sup> parameter | 1                                                               | ↑   | 1   | -     | -  | -  | SELV62N[5] | SELV62N[4] | SELV62N[3] | SELV62N[2] | SELV62N[1] | SELV62N[0] |       |
| 16 <sup>th</sup> parameter | 1                                                               | ↑   | 1   | -     | -  | -  | SELV63N[5] | SELV63N[4] | SELV63N[3] | SELV63N[2] | SELV63N[1] | SELV63N[0] |       |

|                      |                                                                  |                                                                  |                                                                  |  |
|----------------------|------------------------------------------------------------------|------------------------------------------------------------------|------------------------------------------------------------------|--|
| Description          | <b>Register Group</b>                                            | <b>Negative Polarity</b>                                         | <b>Set-up Contents</b>                                           |  |
|                      | High level adjustment                                            | VRF0N[5:0]                                                       | Variable resistor VRHN                                           |  |
|                      | Mid level adjustment                                             | SELV0N[5:0]                                                      | The voltage of V0 grayscale is selected by the 64 to 1 selector  |  |
|                      |                                                                  | SELV1N[5:0]                                                      | The voltage of V1 grayscale is selected by the 64 to 1 selector  |  |
|                      |                                                                  | PK0N[5:0]                                                        | The voltage of V3 grayscale is selected by the 64 to 1 selector  |  |
|                      |                                                                  | PK1N[5:0]                                                        | The voltage of V4 grayscale is selected by the 64 to 1 selector  |  |
|                      |                                                                  | PK2N[5:0]                                                        | The voltage of V12 grayscale is selected by the 64 to 1 selector |  |
|                      |                                                                  | PK3N[5:0]                                                        | The voltage of V20 grayscale is selected by the 64 to 1 selector |  |
|                      |                                                                  | PK4N[5:0]                                                        | The voltage of V28 grayscale is selected by the 64 to 1 selector |  |
|                      |                                                                  | PK5N[5:0]                                                        | The voltage of V36 grayscale is selected by the 64 to 1 selector |  |
|                      |                                                                  | PK6N[5:0]                                                        | The voltage of V44 grayscale is selected by the 64 to 1 selector |  |
|                      |                                                                  | PK7N[5:0]                                                        | The voltage of V52 grayscale is selected by the 64 to 1 selector |  |
|                      | PK8N[5:0]                                                        | The voltage of V56 grayscale is selected by the 64 to 1 selector |                                                                  |  |
|                      | PK9N[5:0]                                                        | The voltage of V60 grayscale is selected by the 64 to 1 selector |                                                                  |  |
|                      | SELV62N[5:0]                                                     | The voltage of V62 grayscale is selected by the 64 to 1 selector |                                                                  |  |
| SELV63N[5:0]         | The voltage of V63 grayscale is selected by the 64 to 1 selector |                                                                  |                                                                  |  |
| Low level adjustment | VOS0N[5:0]                                                       | Variable resistor VRLN                                           |                                                                  |  |



# ST7735R

## 11 Power Structure

### 11.1 Driver IC Operating Voltage Specification

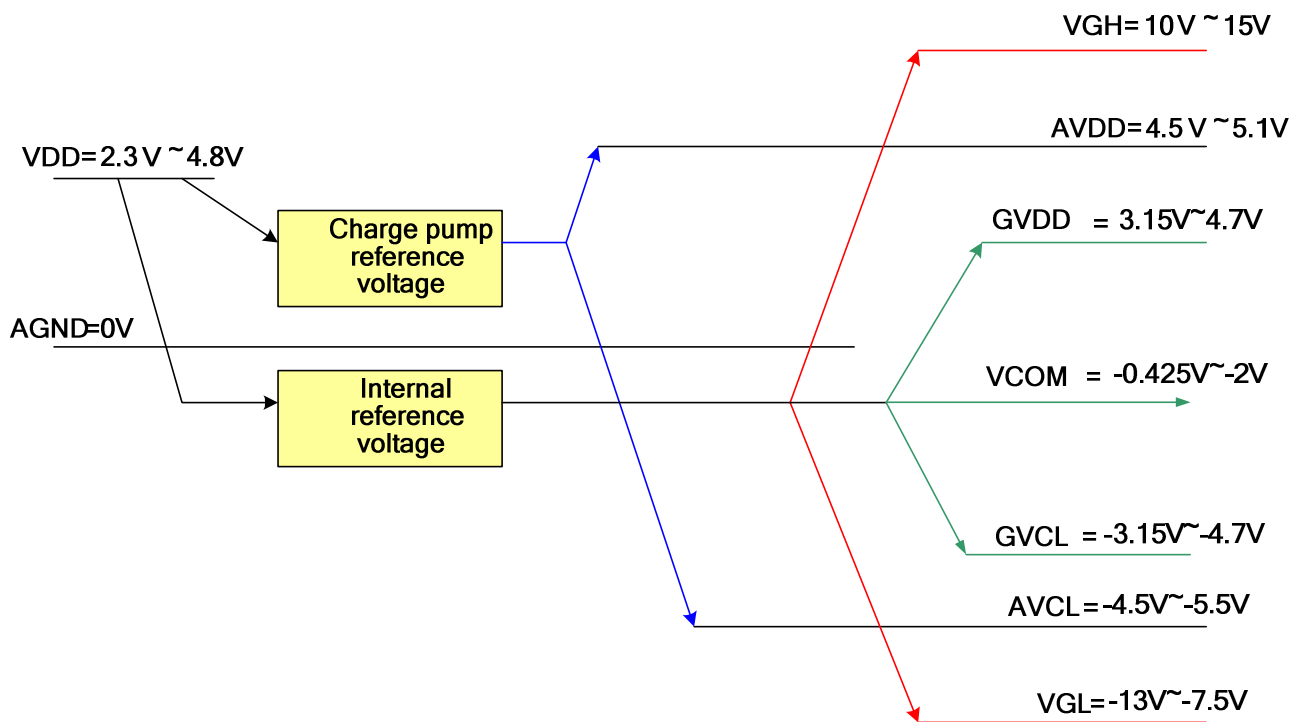
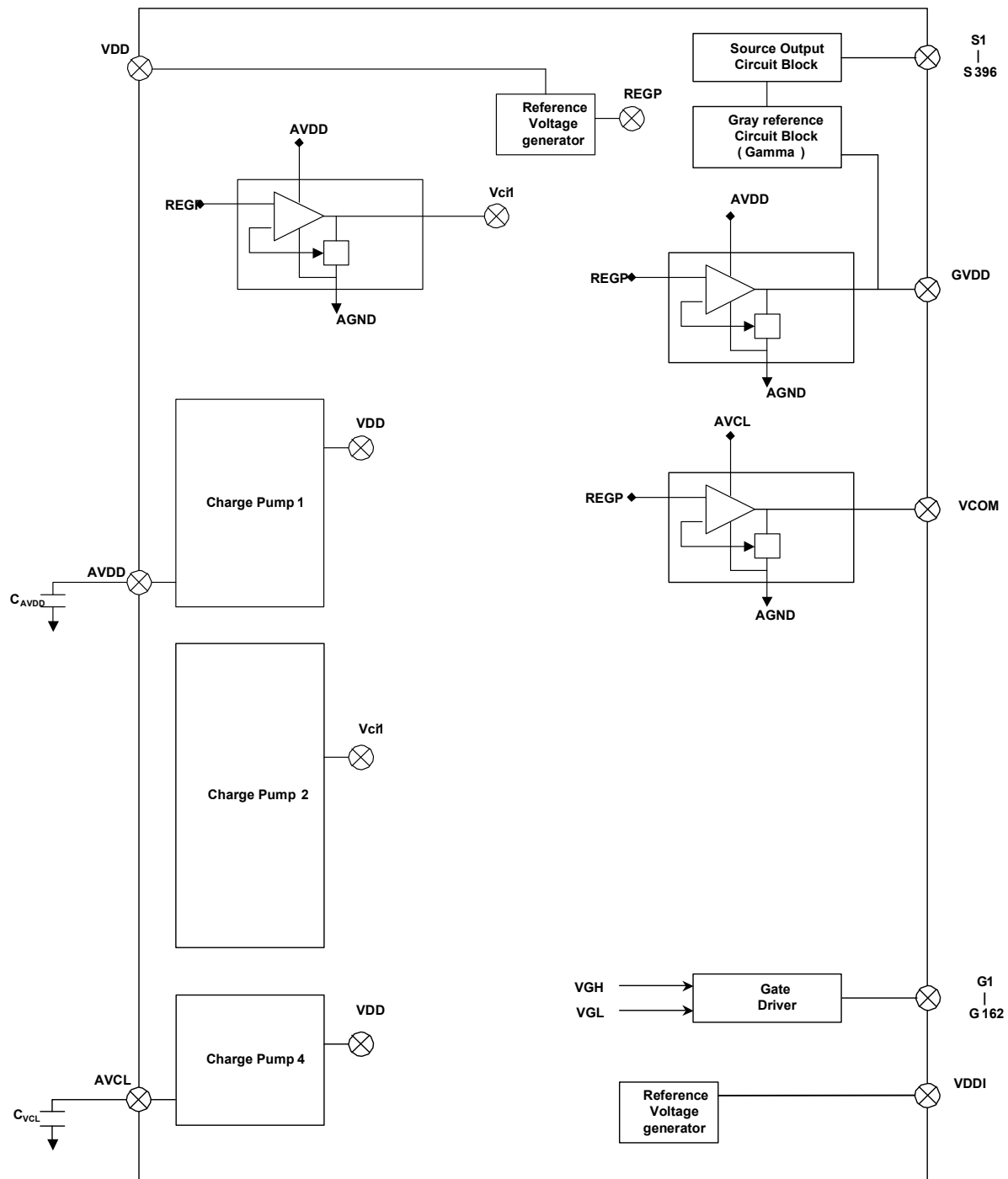


Fig 11.1.1 Power Booster Level

## 11.2 Power Booster Circuit



## 11.2.1 EXTERNAL COMPONENTS CONNECTION

| Pad Name | Connection                                  | Rated (Min)<br>Voltage | Typical<br>capacitance value |
|----------|---------------------------------------------|------------------------|------------------------------|
| AVDD     | Connect to Capacitor: AVDD -----  ----- GND | 6.3V                   | 1.0 uF                       |
| AVCL     | Connect to Capacitor: AVCL -----  ----- GND | 6.3V                   | 1.0 uF                       |

## 12 Gamma structure

### 12.1 STRUCTURE OF GRAYSCALE AMPLIFIER

16 voltage levels (VIN0-VIN15) between GVDD and VSS are determined by the high/ mid/ low level adjustment registers. Each mid-adjustment level is split into 64 levels again by the internal ladder resistor network. As a result, grayscale amplifier generates 64 voltage levels ranging from V0 to V63 and outputs one of 64 levels.

### 12.2 Gamma Voltage Formula (Positive/ Negative Polarity)

| Gray Level | Voltage Formula (Positive) | Voltage Formula (Negative) |
|------------|----------------------------|----------------------------|
| 0          | VINP0                      | VINP0                      |
| 1          | VINP1                      | VINP1                      |
| 2          | VINP2                      | VINP2                      |
| 3          | VINP3                      | VINP3                      |
| 4          | VINP4                      | VINP4                      |
| 5          | $V4-(V4-V12)*(4/32)$       | $V4-(V4-V12)*(4/32)$       |
| 6          | $V4-(V4-V12)*(8/32)$       | $V4-(V4-V12)*(8/32)$       |
| 7          | $V4-(V4-V12)*(12/32)$      | $V4-(V4-V12)*(12/32)$      |
| 8          | $V4-(V4-V12)*(16/32)$      | $V4-(V4-V12)*(16/32)$      |
| 9          | $V4-(V4-V12)*(20/32)$      | $V4-(V4-V12)*(20/32)$      |
| 10         | $V4-(V4-V12)*(24/32)$      | $V4-(V4-V12)*(24/32)$      |
| 11         | $V4-(V4-V12)*(28/32)$      | $V4-(V4-V12)*(28/32)$      |
| 12         | VINP5                      | VINP5                      |
| 13         | $V12-(V12-V20)*(4/32)$     | $V12-(V12-V20)*(4/32)$     |
| 14         | $V12-(V12-V20)*(8/32)$     | $V12-(V12-V20)*(8/32)$     |
| 15         | $V12-(V12-V20)*(12/32)$    | $V12-(V12-V20)*(12/32)$    |
| 16         | $V12-(V12-V20)*(16/32)$    | $V12-(V12-V20)*(16/32)$    |
| 17         | $V12-(V12-V20)*(20/32)$    | $V12-(V12-V20)*(20/32)$    |
| 18         | $V12-(V12-V20)*(24/32)$    | $V12-(V12-V20)*(24/32)$    |
| 19         | $V12-(V12-V20)*(28/32)$    | $V12-(V12-V20)*(28/32)$    |
| 20         | VINP6                      | VINP6                      |
| 21         | $V20-(V20-V28)*(4/32)$     | $V20-(V20-V28)*(4/32)$     |
| 22         | $V20-(V20-V28)*(8/32)$     | $V20-(V20-V28)*(8/32)$     |
| 23         | $V20-(V20-V28)*(12/32)$    | $V20-(V20-V28)*(12/32)$    |
| 24         | $V20-(V20-V28)*(16/32)$    | $V20-(V20-V28)*(16/32)$    |
| 25         | $V20-(V20-V28)*(20/32)$    | $V20-(V20-V28)*(20/32)$    |
| 26         | $V20-(V20-V28)*(24/32)$    | $V20-(V20-V28)*(24/32)$    |
| 27         | $V20-(V20-V28)*(28/32)$    | $V20-(V20-V28)*(28/32)$    |
| 28         | VINP7                      | VINP7                      |
| 29         | $V28-(V28-V36)*(4/32)$     | $V28-(V28-V36)*(4/32)$     |
| 30         | $V28-(V28-V36)*(8/32)$     | $V28-(V28-V36)*(8/32)$     |
| 31         | $V28-(V28-V36)*(12/32)$    | $V28-(V28-V36)*(12/32)$    |
| 32         | $V28-(V28-V36)*(16/32)$    | $V28-(V28-V36)*(16/32)$    |
| 33         | $V28-(V28-V36)*(20/32)$    | $V28-(V28-V36)*(20/32)$    |
| 34         | $V28-(V28-V36)*(24/32)$    | $V28-(V28-V36)*(24/32)$    |
| 35         | $V28-(V28-V36)*(28/32)$    | $V28-(V28-V36)*(28/32)$    |

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|    |                       |                       |
|----|-----------------------|-----------------------|
| 36 | VINP8                 | VINP8                 |
| 37 | V36-(V36-V44)*(4/32)  | V36-(V36-V44)*(4/32)  |
| 38 | V36-(V36-V44)*(8/32)  | V36-(V36-V44)*(8/32)  |
| 39 | V36-(V36-V44)*(12/32) | V36-(V36-V44)*(12/32) |
| 40 | V36-(V36-V44)*(16/32) | V36-(V36-V44)*(16/32) |
| 41 | V36-(V36-V44)*(20/32) | V36-(V36-V44)*(20/32) |
| 42 | V36-(V36-V44)*(24/32) | V36-(V36-V44)*(24/32) |
| 43 | V36-(V36-V44)*(28/32) | V36-(V36-V44)*(28/32) |
| 44 | VINP9                 | VINP9                 |
| 45 | V44-(V44-V52)*(4/32)  | V44-(V44-V52)*(4/32)  |
| 46 | V44-(V44-V52)*(8/32)  | V44-(V44-V52)*(8/32)  |
| 47 | V44-(V44-V52)*(12/32) | V44-(V44-V52)*(12/32) |
| 48 | V44-(V44-V52)*(16/32) | V44-(V44-V52)*(16/32) |
| 49 | V44-(V44-V52)*(20/32) | V44-(V44-V52)*(20/32) |
| 50 | V44-(V44-V52)*(24/32) | V44-(V44-V52)*(24/32) |
| 51 | V44-(V44-V52)*(28/32) | V44-(V44-V52)*(28/32) |
| 52 | VINP10                | VINP10                |
| 53 | V52-(V52-V56)*(1/4)   | V52-(V52-V56)*(1/4)   |
| 54 | V52-(V52-V56)*(2/4)   | V52-(V52-V56)*(2/4)   |
| 55 | V52-(V52-V56)*(3/4)   | V52-(V52-V56)*(3/4)   |
| 56 | VINP11                | VINP11                |
| 57 | V56-(V56-V60)*(1/4)   | V56-(V56-V60)*(1/4)   |
| 58 | V56-(V56-V60)*(2/4)   | V56-(V56-V60)*(2/4)   |
| 59 | V56-(V56-V60)*(3/4)   | V56-(V56-V60)*(3/4)   |
| 60 | VINP12                | VINP12                |
| 61 | VINP13                | VINP13                |
| 62 | VINP14                | VINP14                |
| 63 | VINP15                | VINP15                |

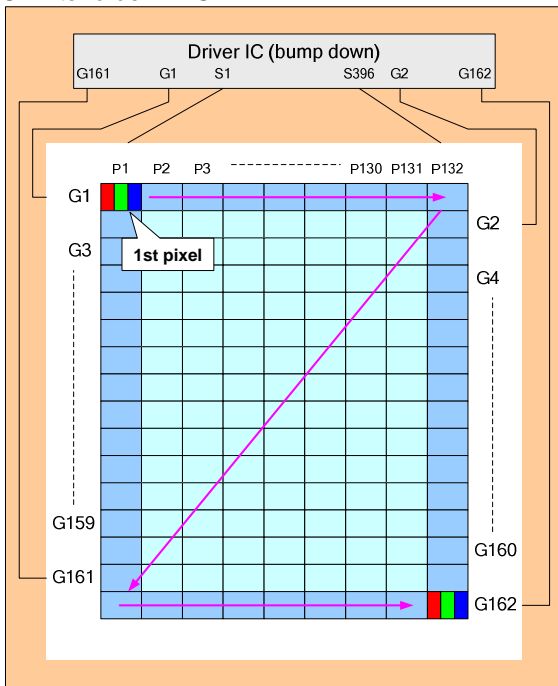
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## 13 Example Connection with Panel direction and Different Resolution

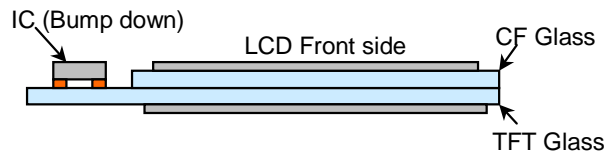
### 13.1 Application of connection with panel direction

Case 1: (This is default case)

- 1<sup>st</sup> Pixel is at Left Top of the panel
- RGB filter order = RGB

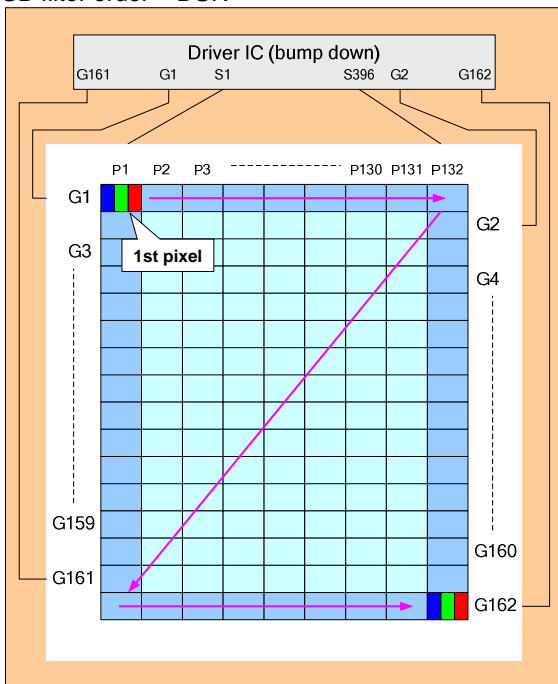


- Direction default setting (H/W)
- SMX = '0'
- SMY = '0'
- SRGB = '0'
- S1 = Filter R
- S2 = Filter G
- S3 = Filter B
- Display direction control (S/W)
- X-Mirror control by MX
- Y-Mirror control by MY
- XY-Exchange control by MV

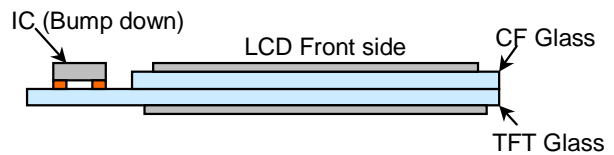


Case 2:

- 1<sup>st</sup> Pixel is at Left Top of the panel
- RGB filter order = BGR



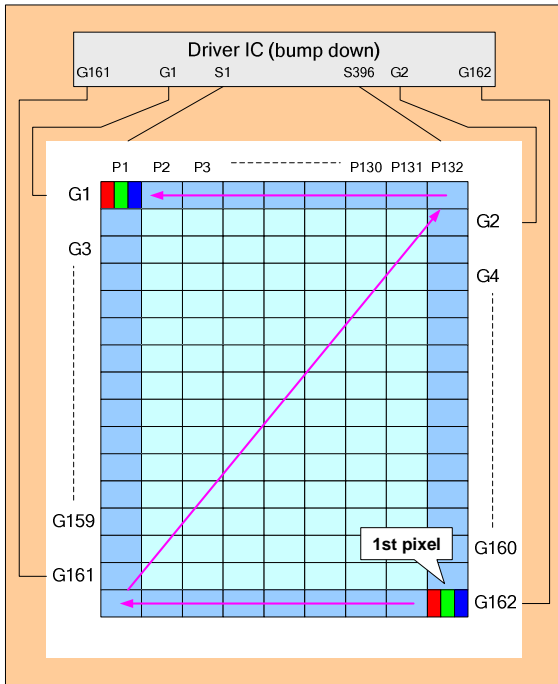
- Direction default setting (H/W)
- SMX = '0'
- SMY = '0'
- SRGB = '1'
- S1 = Filter B
- S2 = Filter G
- S3 = Filter R
- Display direction control (S/W)
- X-Mirror control by MX
- Y-Mirror control by MY
- XY-Exchange control by MV



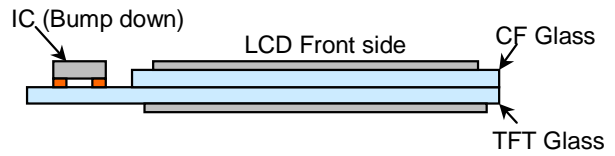
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## Case 3:

- 1<sup>st</sup> Pixel is at Right Bottom of the panel
- RGB filter order = RGB

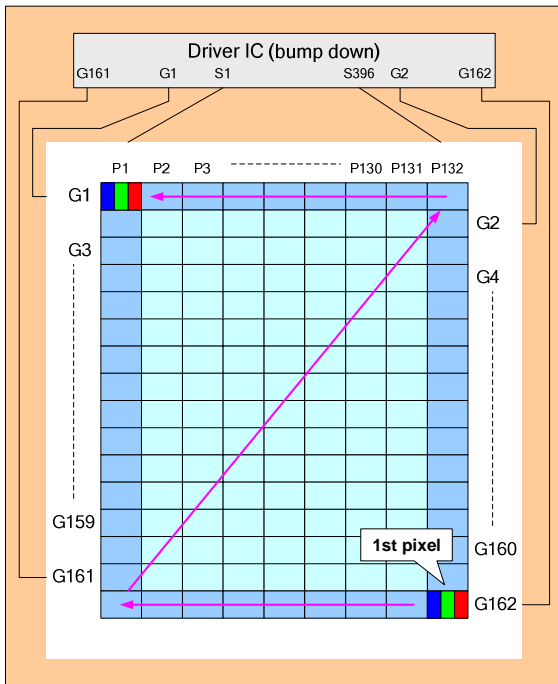


- Direction default setting (H/W)
- SMX = '1'
- SMY = '1'
- SRGB = '0'
- S1 = Filter R
- S2 = Filter G
- S3 = Filter B
- Display direction control (SW)
- X-Mirror control by MX
- Y-Mirror control by MY
- XY-Exchange control by MV

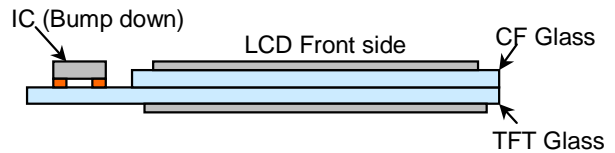


## Case 4:

- 1<sup>st</sup> Pixel is at Right Bottom of the panel
- RGB filter order = BGR



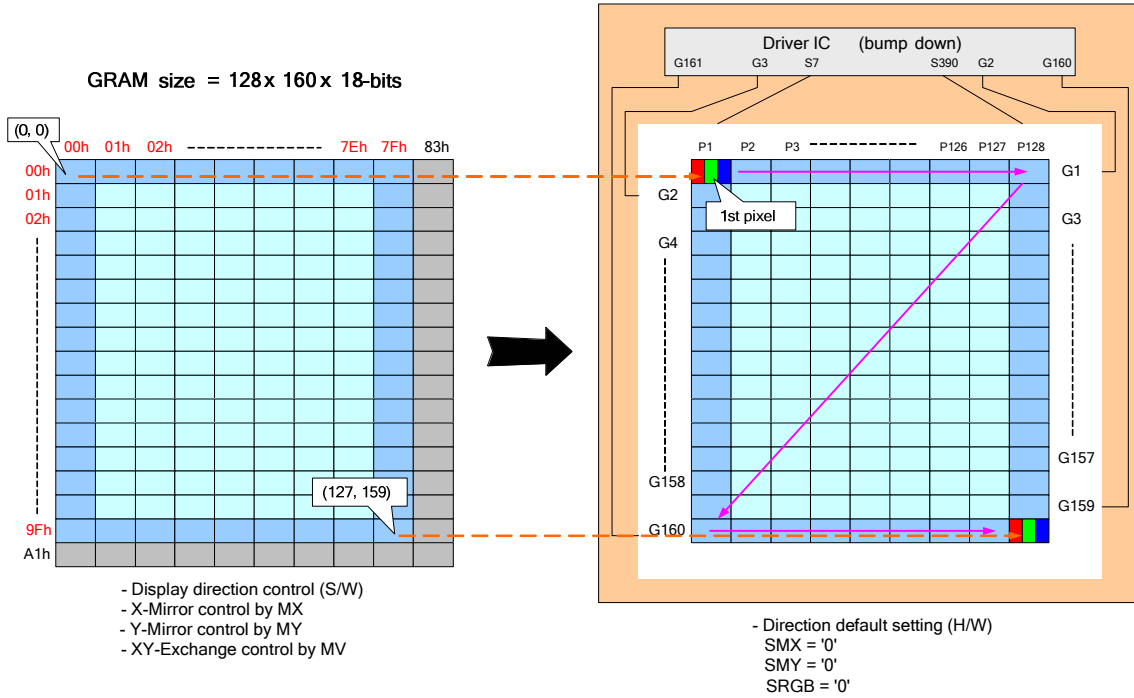
- Direction default setting (H/W)
- SMX = '1'
- SMY = '1'
- SRGB = '1'
- S1 = Filter B
- S2 = Filter G
- S3 = Filter R
- Display direction control (SW)
- X-Mirror control by MX
- Y-Mirror control by MY
- XY-Exchange control by MV



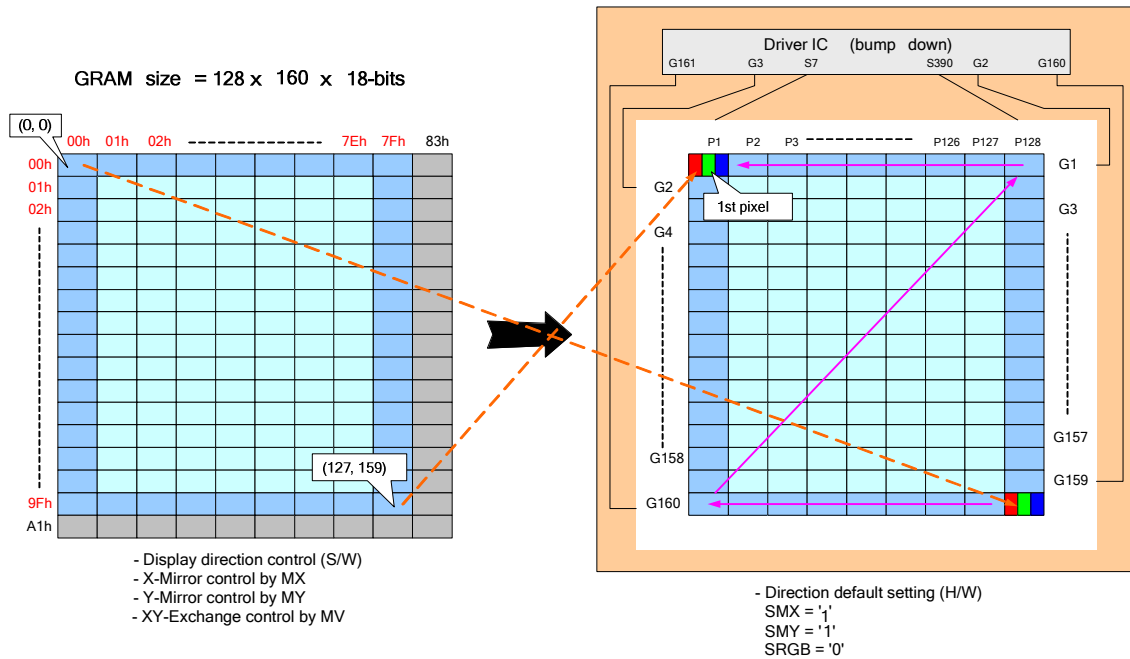
## 13.2 Application of connection with Different resolution

Case1 of Resolution (128RGB x 160) (GM[1:0] = "11")  
 RAM size=128 x 160 x 18-bit (Used)  
 Display size = 128RGB x 160

1). Example for SMX=SMY='0'



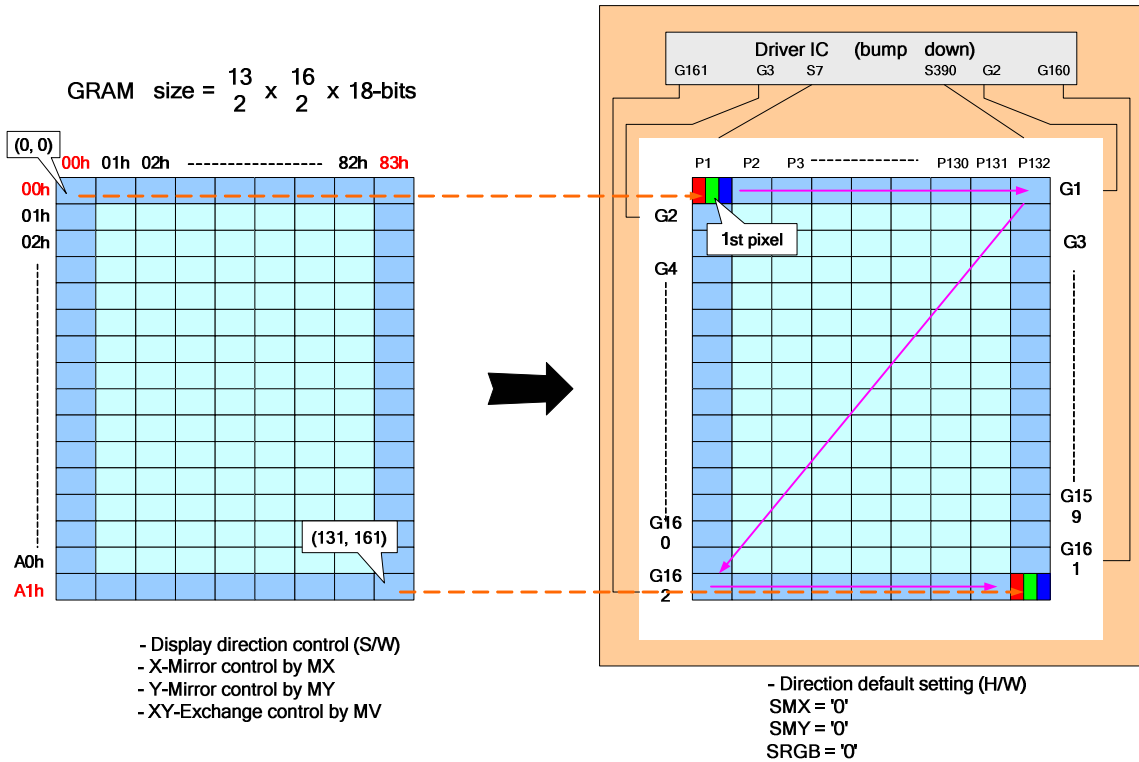
2). Example for SMX=SMY='1'



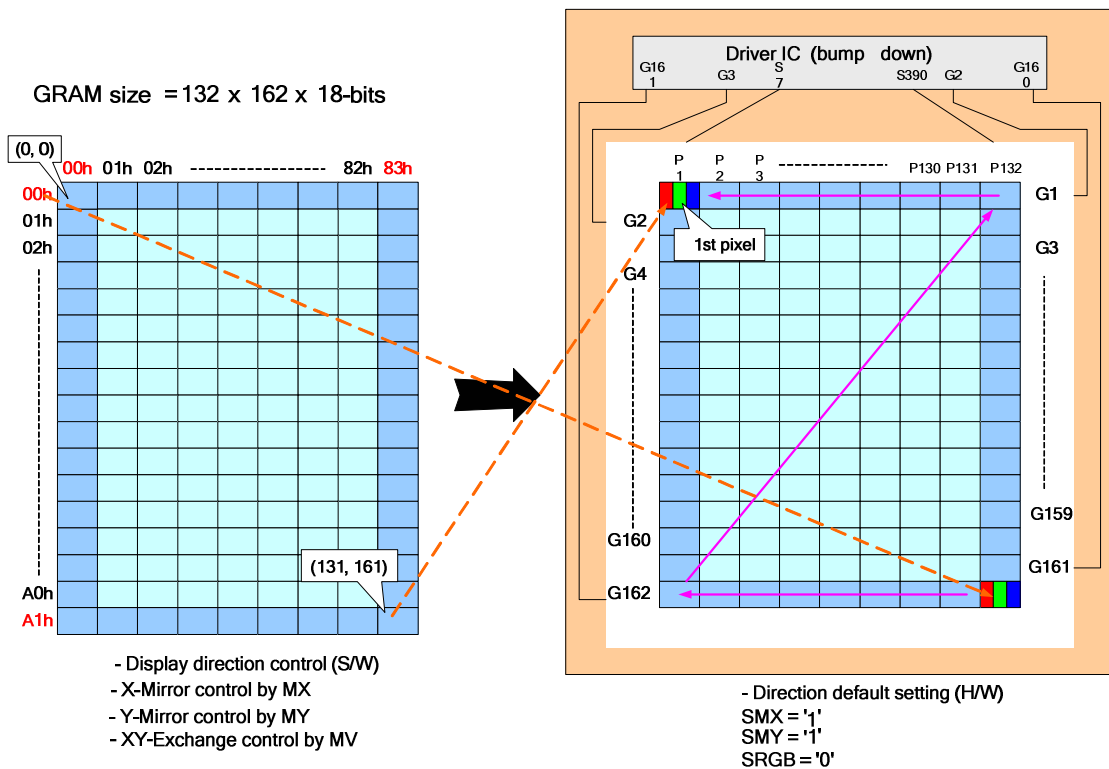
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Case2 of Resolution (132RGB x 162) (GM[1:0] = "00")  
 RAM size=132 x 162 x 18-bit (Used)  
 Display size = 132RGB x 162

1). Example for SMX=SMY='0'



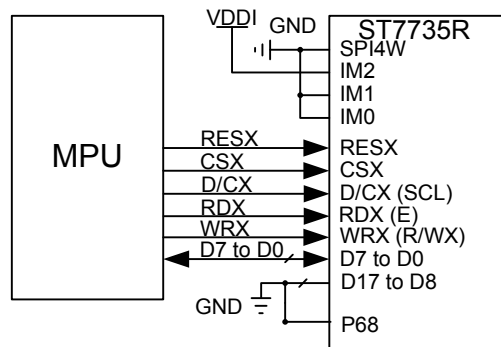
2). Example for SMX=SMY='1'



## 13.3 Microprocessor Interface applications

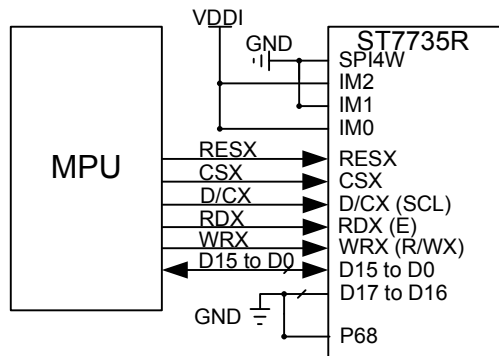
### 13.3.1 8080-Series MCU Interface for 8-bit data bus (P68=0, IM2, IM1, IM0="100")

#### 80 Serial MPU 8-Bit Bus



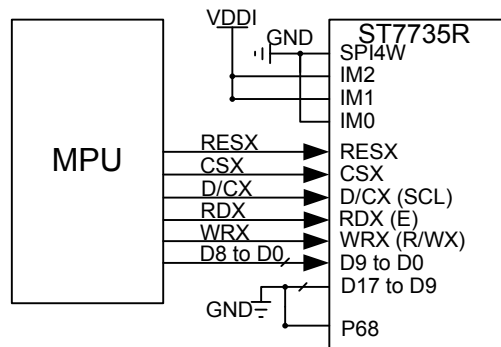
### 13.3.2 8080-Series MCU Interface for 16-bit data bus (P68=0, IM2, IM1, IM0="101")

#### 80 Serial MPU 16-Bit Bus



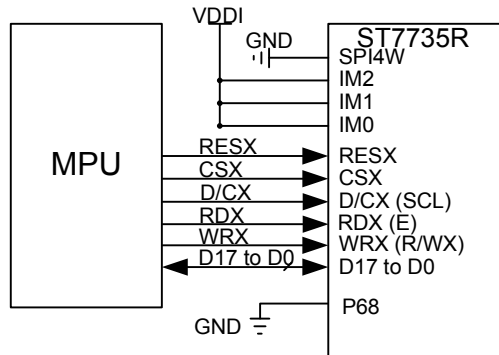
### 13.3.3 8080-Series MCU Interface for 9-bit data bus (P68=0, IM2, IM1, IM0="110")

#### 80 Serial MPU 9-Bit Bus



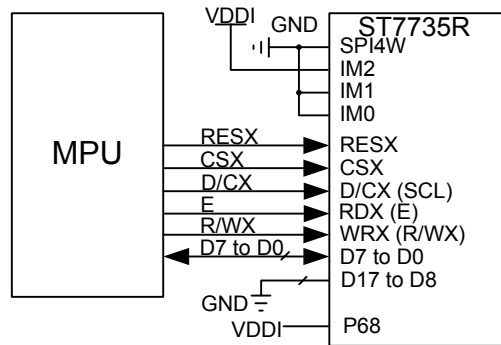
## 13.3.4 8080-Series MCU Interface for 18-bit data bus (P68=0, IM2, IM1, IM0="111")

### 80 Serial MPU 18-Bit Bus



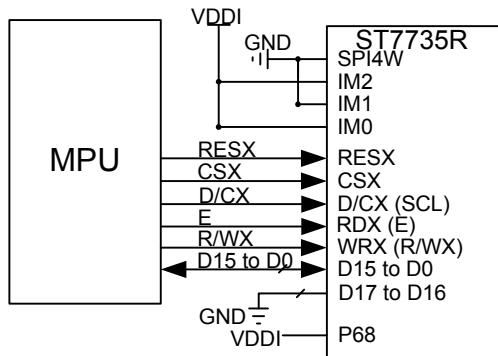
## 13.3.5 6800-Series MCU Interface for 8-bit data bus (P68=1, IM2, IM1, IM0="100")

### 68 Serial MPU 8-Bit Bus



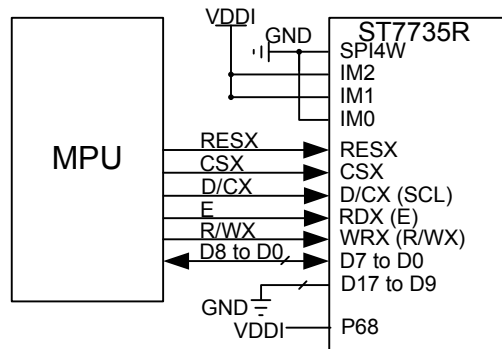
## 13.3.6 6800-Series MCU Interface for 16-bit data bus (P68=1, IM2, IM1, IM0="101")

### 68 Serial MPU 16-Bit Bus



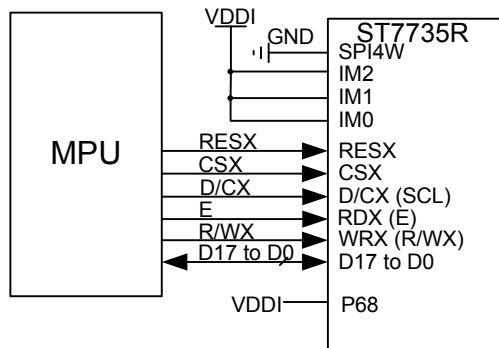
## 13.3.7 6800-Series MCU Interface for 9-bit data bus (P68=1, IM2, IM1, IM0="110")

### 68 Serial MPU 9-Bit Bus



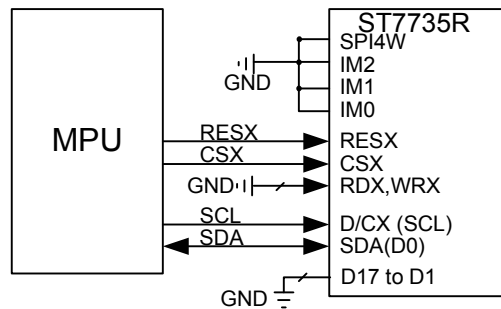
## 13.3.8 6800-Series MCU Interface for 18-bit data bus (P68=1, IM2, IM1, IM0="111")

### 68 Serial MPU 18-Bit Bus



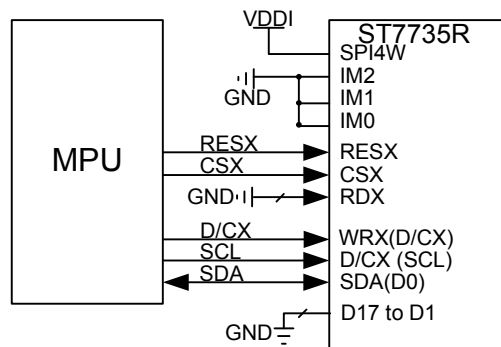
## 13.3.9 3-Line serial MCU Interface (IM2, IM1, IM0="000", SPI4W=0)

### 3-Pin Serial Mode



## 13.3.10 4-Line serial MCU Interface (IM2, IM1, IM0="000", SPI4W=1)

### 4-Pin Serial Mode



## 14 Revision History

| ST7735R Specification Revision History |            |                                                                                                                                        |
|----------------------------------------|------------|----------------------------------------------------------------------------------------------------------------------------------------|
| Version                                | Date       | Description                                                                                                                            |
| V0.1                                   | 2009/07/10 | First issue.                                                                                                                           |
| V0.2                                   | 2009/08/05 | Modify VGH, VGL PAD location (P7)<br>Add TESEL pin description. (P16)<br>Modify command DFh (P147)<br>Modify AVDD range 4.5~5.1 (P152) |