

## **a-Si TFT LCD Single Chip Driver 320RGBx480 Resolution and 262K color**

### **Datasheet** ***Preliminary***

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## 1. Introduction

ILI9481 is a 262,144-color single-chip SoC driver for a-TFT liquid crystal display with resolution of 320RGBx480 dots, comprising a 960-channel source driver, a 480-channel gate driver, 345,600 bytes GRAM for graphic data of 320RGBx480 dots, and power supply circuit.

The ILI9481 supports 18-/16-/9-/8-bit data bus interface (DBI) and serial peripheral interfaces (SPI). It also supplies 18-bit, 16-bit or 6-bit RGB interface (DPI) for driving video signal directly from application controller. The moving picture area can be specified in internal GRAM by window address function. The specified window area can be updated selectively, so that moving picture can be displayed simultaneously independent of still picture area.

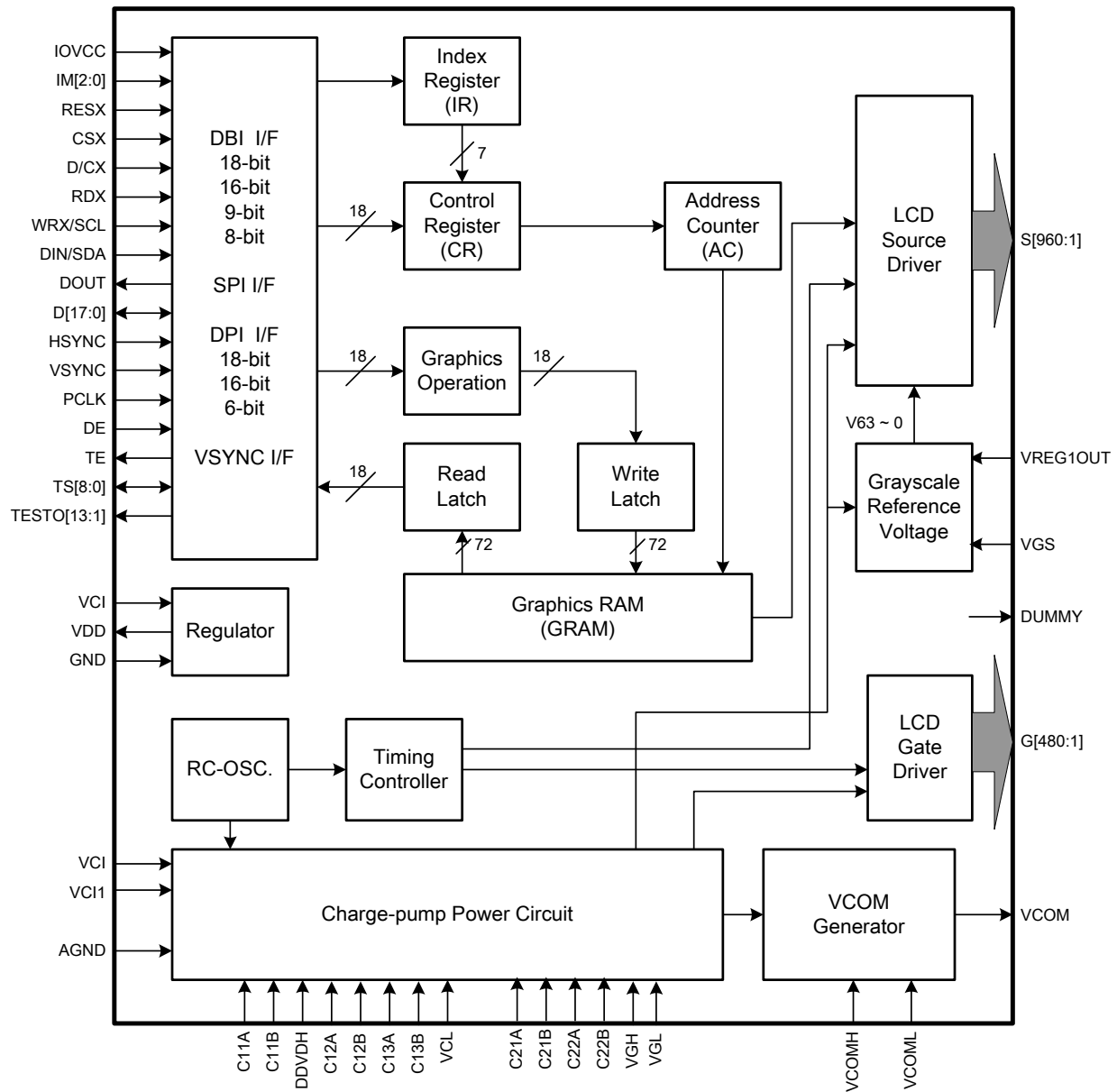
ILI9481 can operate with 1.65V I/O interface voltage, and an incorporated voltage follower circuit to generate voltage levels for driving an LCD. The ILI9481 also supports a function to display in 8 colors and a sleep mode, allowing for precise power control by software and these features make the ILI9481 an ideal LCD driver for medium or small size portable products such as digital cellular phones, smart phone, MP3 and PMP where long battery life is a major concern.

## 2. Features

- ◆ Display resolution: [320xRGB](H) x 480(V)
- ◆ Output:
  - 960 source outputs
  - 480 gate outputs
  - Common electrode output
- ◆ a-TFT LCD driver with on-chip full display RAM: 345,600 bytes
- ◆ MCU Interface
  - 8-bits, 9-bits, 16-bits, 18-bits interface with 8080-series MCU
  - 16-bits, 18-bits RGB (DPI) interface
  - MIPI DCS command Sets
  - 3-pin/4-pin serial interface
- ◆ Display mode:
  - Full color mode: 262K-colors
  - Reduced color mode: 8-colors (3-bits MSB bits mode)
- ◆ On chip functions:
  - VCOM generator and adjustment
  - Timing generator
  - Oscillator
  - DC/DC converter
  - Line/frame inversion
- ◆ MTP:
  - 16-bit ID1 and ID2
  - 7-bits for VCOM adjustment
- ◆ Low -power consumption architecture
  - Low operating power supplies:
    - IOVcc = 1.65V ~ 3.3V (interface I/O)
    - Vcc = 2.4V ~ 3.3V (internal logic)

- $V_{ci} = 2.5V \sim 3.3V$  (analog)
- ◆ LCD Voltage drive:
  - Source/VCOM power supply voltage
    - $DDVDH - GND = 4.5V \sim 6.0V$
    - $VCL - GND = -1.0V \sim -3.0V$
    - $VCI - VCL \leq 6.0V$
  - Gate driver output voltage
    - $VGH - GND = 10V \sim 18V$
    - $VGL - GND = -5V \sim -12.5V$
    - $VGH - VGL \leq 32V$
  - VCOM driver output voltage
    - $VCOMH = 3.0V \sim (DDVDH-0.5)V$
    - $VCOML = (VCL+0.5)V \sim 0V$
    - $VCOMH-VCOML \leq 6.0V$
- ◆ Operate temperature range:  $-40^{\circ}C$  to  $85^{\circ}C$

### 3. Block Diagram



## 4. Pin Descriptions

| Pin Name | I/O | Descriptions  |                    |               |          |                    |               |        |   |   |   |                   |          |      |   |   |   |                  |         |      |   |   |   |                   |          |          |   |   |   |                  |         |          |   |   |   |                    |   |   |   |   |   |                  |           |        |   |   |   |                    |   |   |   |   |   |                  |           |        |
|----------|-----|---|--------------------|---------------|----------|--------------------|---------------|--------|---|---|---|-------------------|----------|------|---|---|---|------------------|---------|------|---|---|---|-------------------|----------|----------|---|---|---|------------------|---------|----------|---|---|---|--------------------|---|---|---|---|---|------------------|-----------|--------|---|---|---|--------------------|---|---|---|---|---|------------------|-----------|--------|
| IM[2:0]  | I   | Select the MPU system interface mode<br><table border="1" style="margin-left: 20px;"> <thead> <tr> <th>IM2</th> <th>IM1</th> <th>IM0</th> <th>MPU-Interface Mode</th> <th>DB Pin in use</th> <th>Colors</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>0</td> <td>0</td> <td>DBI Type B 18-bit</td> <td>DB[17:0]</td> <td>262K</td> </tr> <tr> <td>0</td> <td>0</td> <td>1</td> <td>DBI Type B 9-bit</td> <td>DB[8:0]</td> <td>262K</td> </tr> <tr> <td>0</td> <td>1</td> <td>0</td> <td>DBI Type B 16-bit</td> <td>DB[15:0]</td> <td>65K/262K</td> </tr> <tr> <td>0</td> <td>1</td> <td>1</td> <td>DBI Type B 8-bit</td> <td>DB[7:0]</td> <td>65K/262K</td> </tr> <tr> <td>1</td> <td>0</td> <td>0</td> <td>Setting prohibited</td> <td>-</td> <td>-</td> </tr> <tr> <td>1</td> <td>0</td> <td>1</td> <td>DBI Type C 9-bit</td> <td>DIN, DOUT</td> <td>8/262K</td> </tr> <tr> <td>1</td> <td>1</td> <td>0</td> <td>Setting prohibited</td> <td>-</td> <td>-</td> </tr> <tr> <td>1</td> <td>1</td> <td>1</td> <td>DBI Type C 8-bit</td> <td>DIN, DOUT</td> <td>8/262K</td> </tr> </tbody> </table> | IM2                | IM1           | IM0      | MPU-Interface Mode | DB Pin in use | Colors | 0 | 0 | 0 | DBI Type B 18-bit | DB[17:0] | 262K | 0 | 0 | 1 | DBI Type B 9-bit | DB[8:0] | 262K | 0 | 1 | 0 | DBI Type B 16-bit | DB[15:0] | 65K/262K | 0 | 1 | 1 | DBI Type B 8-bit | DB[7:0] | 65K/262K | 1 | 0 | 0 | Setting prohibited | - | - | 1 | 0 | 1 | DBI Type C 9-bit | DIN, DOUT | 8/262K | 1 | 1 | 0 | Setting prohibited | - | - | 1 | 1 | 1 | DBI Type C 8-bit | DIN, DOUT | 8/262K |
| IM2      | IM1 | IM0   | MPU-Interface Mode | DB Pin in use | Colors   |                    |               |        |   |   |   |                   |          |      |   |   |   |                  |         |      |   |   |   |                   |          |          |   |   |   |                  |         |          |   |   |   |                    |   |   |   |   |   |                  |           |        |   |   |   |                    |   |   |   |   |   |                  |           |        |
| 0        | 0   | 0   | DBI Type B 18-bit  | DB[17:0]      | 262K     |                    |               |        |   |   |   |                   |          |      |   |   |   |                  |         |      |   |   |   |                   |          |          |   |   |   |                  |         |          |   |   |   |                    |   |   |   |   |   |                  |           |        |   |   |   |                    |   |   |   |   |   |                  |           |        |
| 0        | 0   | 1   | DBI Type B 9-bit   | DB[8:0]       | 262K     |                    |               |        |   |   |   |                   |          |      |   |   |   |                  |         |      |   |   |   |                   |          |          |   |   |   |                  |         |          |   |   |   |                    |   |   |   |   |   |                  |           |        |   |   |   |                    |   |   |   |   |   |                  |           |        |
| 0        | 1   | 0   | DBI Type B 16-bit  | DB[15:0]      | 65K/262K |                    |               |        |   |   |   |                   |          |      |   |   |   |                  |         |      |   |   |   |                   |          |          |   |   |   |                  |         |          |   |   |   |                    |   |   |   |   |   |                  |           |        |   |   |   |                    |   |   |   |   |   |                  |           |        |
| 0        | 1   | 1   | DBI Type B 8-bit   | DB[7:0]       | 65K/262K |                    |               |        |   |   |   |                   |          |      |   |   |   |                  |         |      |   |   |   |                   |          |          |   |   |   |                  |         |          |   |   |   |                    |   |   |   |   |   |                  |           |        |   |   |   |                    |   |   |   |   |   |                  |           |        |
| 1        | 0   | 0   | Setting prohibited | -             | -        |                    |               |        |   |   |   |                   |          |      |   |   |   |                  |         |      |   |   |   |                   |          |          |   |   |   |                  |         |          |   |   |   |                    |   |   |   |   |   |                  |           |        |   |   |   |                    |   |   |   |   |   |                  |           |        |
| 1        | 0   | 1   | DBI Type C 9-bit   | DIN, DOUT     | 8/262K   |                    |               |        |   |   |   |                   |          |      |   |   |   |                  |         |      |   |   |   |                   |          |          |   |   |   |                  |         |          |   |   |   |                    |   |   |   |   |   |                  |           |        |   |   |   |                    |   |   |   |   |   |                  |           |        |
| 1        | 1   | 0   | Setting prohibited | -             | -        |                    |               |        |   |   |   |                   |          |      |   |   |   |                  |         |      |   |   |   |                   |          |          |   |   |   |                  |         |          |   |   |   |                    |   |   |   |   |   |                  |           |        |   |   |   |                    |   |   |   |   |   |                  |           |        |
| 1        | 1   | 1   | DBI Type C 8-bit   | DIN, DOUT     | 8/262K   |                    |               |        |   |   |   |                   |          |      |   |   |   |                  |         |      |   |   |   |                   |          |          |   |   |   |                  |         |          |   |   |   |                    |   |   |   |   |   |                  |           |        |   |   |   |                    |   |   |   |   |   |                  |           |        |
| RESX     | I   | This signal low will reset the device and must be applied to properly initialize the chip. Signal is low active   |                    |               |          |                    |               |        |   |   |   |                   |          |      |   |   |   |                  |         |      |   |   |   |                   |          |          |   |   |   |                  |         |          |   |   |   |                    |   |   |   |   |   |                  |           |        |   |   |   |                    |   |   |   |   |   |                  |           |        |
| CSX      | I   | Chip select input pin ("Low" enable).   |                    |               |          |                    |               |        |   |   |   |                   |          |      |   |   |   |                  |         |      |   |   |   |                   |          |          |   |   |   |                  |         |          |   |   |   |                    |   |   |   |   |   |                  |           |        |   |   |   |                    |   |   |   |   |   |                  |           |        |
| D/CX     | I   | Display data / Command selection pin<br>D/CX='1': Display data.<br>D/CX='0': Command data.<br>If not used, please fix this pin at GND level.  |                    |               |          |                    |               |        |   |   |   |                   |          |      |   |   |   |                  |         |      |   |   |   |                   |          |          |   |   |   |                  |         |          |   |   |   |                    |   |   |   |   |   |                  |           |        |   |   |   |                    |   |   |   |   |   |                  |           |        |
| RDX      | I   | Read control pin for the DBI interface.<br>If not used, please connect this pin to IOVCC.   |                    |               |          |                    |               |        |   |   |   |                   |          |      |   |   |   |                  |         |      |   |   |   |                   |          |          |   |   |   |                  |         |          |   |   |   |                    |   |   |   |   |   |                  |           |        |   |   |   |                    |   |   |   |   |   |                  |           |        |
| WRX/SCL  | I   | Write control pin for the DBI interface.<br>When the DBI type C is selected, this pin is used as serial clock pin.<br>If not used, please connect this pin to IOVCC.  |                    |               |          |                    |               |        |   |   |   |                   |          |      |   |   |   |                  |         |      |   |   |   |                   |          |          |   |   |   |                  |         |          |   |   |   |                    |   |   |   |   |   |                  |           |        |   |   |   |                    |   |   |   |   |   |                  |           |        |
| DB[17:0] | I/O | These pin are data bus.<br>If not used, please connect these pins to GND.   |                    |               |          |                    |               |        |   |   |   |                   |          |      |   |   |   |                  |         |      |   |   |   |                   |          |          |   |   |   |                  |         |          |   |   |   |                    |   |   |   |   |   |                  |           |        |   |   |   |                    |   |   |   |   |   |                  |           |        |
| DIN/SDA  | I/O | Serial data input pin and used for the DBI type C mode.<br>If not used, please connect this pin to ground.  |                    |               |          |                    |               |        |   |   |   |                   |          |      |   |   |   |                  |         |      |   |   |   |                   |          |          |   |   |   |                  |         |          |   |   |   |                    |   |   |   |   |   |                  |           |        |   |   |   |                    |   |   |   |   |   |                  |           |        |
| DOUT     | O   | Serial data output pin and used for the DBI type C mode.  |                    |               |          |                    |               |        |   |   |   |                   |          |      |   |   |   |                  |         |      |   |   |   |                   |          |          |   |   |   |                  |         |          |   |   |   |                    |   |   |   |   |   |                  |           |        |   |   |   |                    |   |   |   |   |   |                  |           |        |
| TE       | O   | Tearing effect output pin to synchronies MCU to frame writing, activated by S/W command.<br>When this pin is not activated, this pin is low. If not used, please open this pin.   |                    |               |          |                    |               |        |   |   |   |                   |          |      |   |   |   |                  |         |      |   |   |   |                   |          |          |   |   |   |                  |         |          |   |   |   |                    |   |   |   |   |   |                  |           |        |   |   |   |                    |   |   |   |   |   |                  |           |        |
| PCLK     | I   | Pixel clock signal in DPI interface mode.<br>If not used, please fix this pin at GND level.   |                    |               |          |                    |               |        |   |   |   |                   |          |      |   |   |   |                  |         |      |   |   |   |                   |          |          |   |   |   |                  |         |          |   |   |   |                    |   |   |   |   |   |                  |           |        |   |   |   |                    |   |   |   |   |   |                  |           |        |
| VSYNC    | I   | Vertical sync. signal in DPI interface mode.<br>If not used, please fix this pin at GND level.  |                    |               |          |                    |               |        |   |   |   |                   |          |      |   |   |   |                  |         |      |   |   |   |                   |          |          |   |   |   |                  |         |          |   |   |   |                    |   |   |   |   |   |                  |           |        |   |   |   |                    |   |   |   |   |   |                  |           |        |
| HSYNC    | I   | Horizontal sync. signal in DPI interface mode.<br>If not used, please fix this pin at GND level.  |                    |               |          |                    |               |        |   |   |   |                   |          |      |   |   |   |                  |         |      |   |   |   |                   |          |          |   |   |   |                  |         |          |   |   |   |                    |   |   |   |   |   |                  |           |        |   |   |   |                    |   |   |   |   |   |                  |           |        |
| DE       | I   | Data enable signal in DPI interface mode.<br>If not used, please fix this pin at GND level.   |                    |               |          |                    |               |        |   |   |   |                   |          |      |   |   |   |                  |         |      |   |   |   |                   |          |          |   |   |   |                  |         |          |   |   |   |                    |   |   |   |   |   |                  |           |        |   |   |   |                    |   |   |   |   |   |                  |           |        |



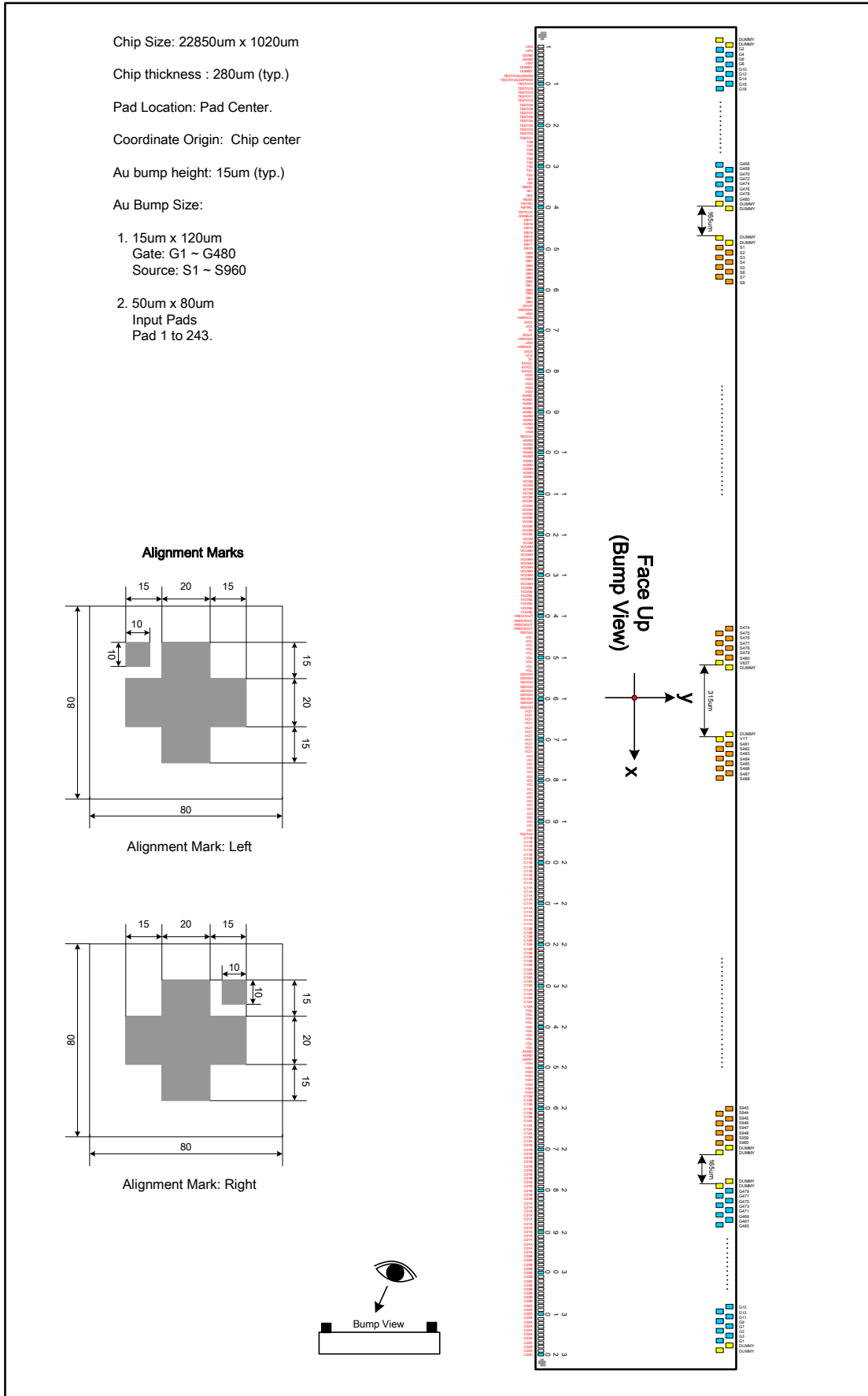
| Pin Name                                  | I/O                          | Descriptions   |                      |                   |   |                      |   |                              |
|---|------------------------------|--|----------------------|-------------------|---|----------------------|---|------------------------------|
| SD  | I                            | Control pin to shut down display, only used in the DPI interface mode.   |                      |                   |   |                      |   |                              |
|   |                              | <table border="1"> <thead> <tr> <th>SD</th> <th>Shut Down Control</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>Normal Display</td> </tr> <tr> <td>1</td> <td>Power shut down</td> </tr> </tbody> </table>   | SD                   | Shut Down Control | 0 | Normal Display       | 1 | Power shut down              |
|   |                              | SD   | Shut Down Control    |                   |   |                      |   |                              |
|   |                              | 0  | Normal Display       |                   |   |                      |   |                              |
| 1   | Power shut down              |  |                      |                   |   |                      |   |                              |
|   |                              |  |                      |                   |   |                      |   |                              |
|   |                              |  |                      |                   |   |                      |   |                              |
| CM  | I                            | Control pin for switching between normal color and reduced color mode, only used in the DPI interface mode.  |                      |                   |   |                      |   |                              |
|   |                              | <table border="1"> <thead> <tr> <th>CM</th> <th>Color Mode</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>Normal Display Color</td> </tr> <tr> <td>1</td> <td>Reduced Color Mode (8-color)</td> </tr> </tbody> </table>   | CM                   | Color Mode        | 0 | Normal Display Color | 1 | Reduced Color Mode (8-color) |
|   |                              | CM   | Color Mode           |                   |   |                      |   |                              |
|   |                              | 0  | Normal Display Color |                   |   |                      |   |                              |
| 1   | Reduced Color Mode (8-color) |  |                      |                   |   |                      |   |                              |
|   |                              |  |                      |                   |   |                      |   |                              |
|   |                              |  |                      |                   |   |                      |   |                              |
| <b>Power Input Pins</b>                   |                              |  |                      |                   |   |                      |   |                              |
| IOVCC                                     | P                            | Power supply to interface pins<br>Connect to external power supply (IOVCC= 1.65~3.3V).   |                      |                   |   |                      |   |                              |
| VCI                                       | P                            | Power supply to liquid crystal power supply analog circuit.<br>Connect to external power supply (VCI=2.5~3.3V).  |                      |                   |   |                      |   |                              |
| DGND<br>AGND                              | P                            | Power ground pin.<br>Make sure GND=0V.   |                      |                   |   |                      |   |                              |
| VPG                                       | P                            | Power supply pin for the NV memory programming.<br>Please provide 5 volt to this pin for NV memory programming.  |                      |                   |   |                      |   |                              |
| <b>LCD signals Pins</b>                   |                              |  |                      |                   |   |                      |   |                              |
| S1 ~ S960                                 | O                            | Source driver output pins.   |                      |                   |   |                      |   |                              |
| G1 ~ G480                                 | O                            | Gate driver output pins.   |                      |                   |   |                      |   |                              |
| VDD                                       | O                            | Internal logic regulator output.<br>Used as internal logic power supply. Connect to stabilizing capacitor.   |                      |                   |   |                      |   |                              |
| VCI1                                      | P                            | Reference voltage for the step-up circuit 1. Set VCI1 level so that DDVDH, VGH and VGL are within the ratings.   |                      |                   |   |                      |   |                              |
| DDVDH                                     | P                            | Power supply for the source driver and VCOM.   |                      |                   |   |                      |   |                              |
| VGH                                       | P                            | Power supply to drive liquid crystal.  |                      |                   |   |                      |   |                              |
| VGL                                       | P                            | Power supply for LCD drive.  |                      |                   |   |                      |   |                              |
| VCL                                       | P                            | Power supply to drive VCOML.   |                      |                   |   |                      |   |                              |
| C11A, C11B,<br>C12A, C12B                 | P                            | Make sure to connect to capacitor that is used in internal step-up circuit 1.  |                      |                   |   |                      |   |                              |
| C13A, C13B,<br>C21A, C21B,<br>C22A, C22B, | P                            | Make sure to connect to capacitor that is used in internal step-up circuit 2. Connect to capacitors according to the step-up factors in use.   |                      |                   |   |                      |   |                              |
| VREG1OUT                                  | P                            | Outputs voltage level generated from VRH VCILVL. The step-up factor applied to VRH VCILVL is set by VRH bits.<br>Used as source driver grayscale reference voltage VREG1OUT, reference voltage to VCOMH, and Vcom amplitude reference voltage. Connect to stabilizing capacitor when in use. |                      |                   |   |                      |   |                              |

| Pin Name         | I/O | Descriptions  |
|------------------|-----|---|
|                  |     | VREG1OUT=4.0~(DDVDH-0.500)[V]   |
| VCOM             | P   | TFT display common electrode power supply. Alternates between voltage levels between VCOMH-VCOML. Registers set the alternating cycle.<br>Registers set the alternating cycle and operate or halt VCOM. |
| VCOMH            | P   | VCOM high level. Adjust the voltage by internal electronic volume (VCM)   |
| VCOML            | P   | VCOM low level. Adjust the voltage by VDV bits.<br>$VCOML=(VCL+0.5)\sim 0[V]$   |
| VGS              | I   | Reference level for grayscale generating circuit.   |
| <b>TEST pins</b> |     |   |
| TS[8:0]          | I   | Test pins<br>These pins are internal pulled low. Please leave these pins as open.   |
| TESTO[16:1]      | O   | Test pins<br>Please leave these pins as open.   |
| TESTA1-A3        | I/O | Test pins<br>Please leave these pins as open.   |
| VWT              | -   | Test pin<br>Please leave this pin as open.  |
| DUMMY            | -   | Dummy Pins<br>These pins are floating.  |

**Liquid crystal power supply specifications Table**

| No. | Item                              | Description                      |   |
|-----|-----------------------------------|----------------------------------|---|
| 1   | TFT Source Driver                 | 960 pins (320 x RGB)             |   |
| 2   | TFT Gate Driver                   | 480 pins                         |   |
| 3   | TFT Display's Capacitor Structure | Cst structure only (Common VCOM) |   |
| 4   | Liquid Crystal Drive Output       | S1 ~ S960                        | V0 ~ V63 grayscales                           |
|     |                                   | G1 ~ G480                        | VGH - VGL                                     |
|     |                                   | VCOM                             | VCOMH - VCOML: Amplitude = electronic volumes |
| 5   | Input Voltage                     | IOVcc                            | 1.65 ~ 3.30V                                  |
|     |                                   | Vci                              | 2.50 ~ 3.30V                                  |
| 6   | Liquid Crystal Drive Voltages     | DDVDH                            | 4.5V ~ 6.0V                                   |
|     |                                   | VGH                              | 10V ~ 18V                                     |
|     |                                   | VGL                              | -5V ~ -12.5V                                  |
|     |                                   | VCL                              | -1.0V ~ -3.0V                                 |
|     |                                   | VGH - VGL                        | Max. 32V                                      |
|     |                                   | Vci - VCL                        | Max. 6.0V                                     |
| 7   | Internal Step-up Circuits         | DDVDH                            | Vci1 x2                                       |
|     |                                   | VGH                              | Vci1 x4, x5, x6                               |
|     |                                   | VGL                              | Vci1 x-3, x-4, x-5                            |
|     |                                   | VCL                              | Vci1 x-1                                      |

## 5. Pad Arrangement and Coordination



| No. | Name            | X      | Y    | No. | Name    | X     | Y    | No. | Name     | X     | Y    | No. | Name   | X    | Y    | No. | Name | X    | Y    |
|-----|-----------------|--------|------|-----|---------|-------|------|-----|----------|-------|------|-----|--------|------|------|-----|------|------|------|
| 1   | VPG             | -11165 | -409 | 51  | DB9     | -7665 | -409 | 101 | AGND     | -4165 | -409 | 151 | VCL    | -665 | -409 | 201 | C11B | 2835 | -409 |
| 2   | VPG             | -11095 | -409 | 52  | DB8     | -7595 | -409 | 102 | AGND     | -4095 | -409 | 152 | VCL    | -595 | -409 | 202 | C11B | 2905 | -409 |
| 3   | DGND            | -11025 | -409 | 53  | DB7     | -7525 | -409 | 103 | AGND     | -4025 | -409 | 153 | VCL    | -525 | -409 | 203 | C11B | 2975 | -409 |
| 4   | DGND            | -10955 | -409 | 54  | DB6     | -7455 | -409 | 104 | AGND     | -3955 | -409 | 154 | DDVDH  | -455 | -409 | 204 | C11B | 3045 | -409 |
| 5   | VWT             | -10885 | -409 | 55  | DB5     | -7385 | -409 | 105 | AGND     | -3885 | -409 | 155 | DDVDH  | -385 | -409 | 205 | C11A | 3115 | -409 |
| 6   | DUMMY           | -10815 | -409 | 56  | DB4     | -7315 | -409 | 106 | AGND     | -3815 | -409 | 156 | DDVDH  | -315 | -409 | 206 | C11A | 3185 | -409 |
| 7   | DUMMY           | -10745 | -409 | 57  | DB3     | -7245 | -409 | 107 | VCOM     | -3745 | -409 | 157 | DDVDH  | -245 | -409 | 207 | C11A | 3255 | -409 |
| 8   | TESTO16(LEDON)  | -10675 | -409 | 58  | DB2     | -7175 | -409 | 108 | VCOM     | -3675 | -409 | 158 | DDVDH  | -175 | -409 | 208 | C11A | 3325 | -409 |
| 9   | TESTO15(LEDPWM) | -10605 | -409 | 59  | DB1     | -7105 | -409 | 109 | VCOM     | -3605 | -409 | 159 | DDVDH  | -105 | -409 | 209 | C11A | 3395 | -409 |
| 10  | TESTO14         | -10535 | -409 | 60  | DB0     | -7035 | -409 | 110 | VCOM     | -3535 | -409 | 160 | DDVDH  | -35  | -409 | 210 | C11A | 3465 | -409 |
| 11  | TESTO13         | -10465 | -409 | 61  | DOUT    | -6965 | -409 | 111 | VCOM     | -3465 | -409 | 161 | DDVDH  | 35   | -409 | 211 | C11A | 3535 | -409 |
| 12  | TESTO12         | -10395 | -409 | 62  | DIN/SDA | -6895 | -409 | 112 | VCOM     | -3395 | -409 | 162 | DDVDH  | 105  | -409 | 212 | C11A | 3605 | -409 |
| 13  | TESTO11         | -10325 | -409 | 63  | nRD     | -6825 | -409 | 113 | VCOM     | -3325 | -409 | 163 | VCI1   | 175  | -409 | 213 | C11A | 3675 | -409 |
| 14  | TESTO10         | -10255 | -409 | 64  | nWR/SCL | -6755 | -409 | 114 | VCOM     | -3255 | -409 | 164 | VCI1   | 245  | -409 | 214 | C11A | 3745 | -409 |
| 15  | TESTO9          | -10185 | -409 | 65  | D/CX    | -6685 | -409 | 115 | VCOM     | -3185 | -409 | 165 | VCI1   | 315  | -409 | 215 | C11A | 3815 | -409 |
| 16  | TESTO8          | -10115 | -409 | 66  | nCS     | -6615 | -409 | 116 | VCOM     | -3115 | -409 | 166 | VCI1   | 385  | -409 | 216 | C12B | 3885 | -409 |
| 17  | TESTO7          | -10045 | -409 | 67  | TE      | -6545 | -409 | 117 | VCOM     | -3045 | -409 | 167 | VCI1   | 455  | -409 | 217 | C12B | 3955 | -409 |
| 18  | TESTO6          | -9975  | -409 | 68  | IOVCC   | -6475 | -409 | 118 | VCOM     | -2975 | -409 | 168 | VCI1   | 525  | -409 | 218 | C12B | 4025 | -409 |
| 19  | TESTO5          | -9905  | -409 | 69  | IOVCC   | -6405 | -409 | 119 | VCOM     | -2905 | -409 | 169 | VCI1   | 595  | -409 | 219 | C12B | 4095 | -409 |
| 20  | TESTO4          | -9835  | -409 | 70  | IOVCC   | -6335 | -409 | 120 | VCOM     | -2835 | -409 | 170 | VCI1   | 665  | -409 | 220 | C12B | 4165 | -409 |
| 21  | TESTO3          | -9765  | -409 | 71  | IOVCC   | -6265 | -409 | 121 | VCOM     | -2765 | -409 | 171 | VCI1   | 735  | -409 | 221 | C12B | 4235 | -409 |
| 22  | TESTO2          | -9695  | -409 | 72  | IOVCC   | -6195 | -409 | 122 | VCOM     | -2695 | -409 | 172 | VCI1   | 805  | -409 | 222 | C12B | 4305 | -409 |
| 23  | TESTO1          | -9625  | -409 | 73  | IOVCC   | -6125 | -409 | 123 | VCOMH    | -2625 | -409 | 173 | VCI1   | 875  | -409 | 223 | C12B | 4375 | -409 |
| 24  | TS8             | -9555  | -409 | 74  | IOVCC   | -6055 | -409 | 124 | VCOMH    | -2555 | -409 | 174 | VCI    | 945  | -409 | 224 | C12B | 4445 | -409 |
| 25  | TS7             | -9485  | -409 | 75  | VDD     | -5985 | -409 | 125 | VCOMH    | -2485 | -409 | 175 | VCI    | 1015 | -409 | 225 | C12B | 4515 | -409 |
| 26  | TS6             | -9415  | -409 | 76  | VDD     | -5915 | -409 | 126 | VCOMH    | -2415 | -409 | 176 | VCI    | 1085 | -409 | 226 | C12A | 4585 | -409 |
| 27  | TS5             | -9345  | -409 | 77  | VDD     | -5845 | -409 | 127 | VCOMH    | -2345 | -409 | 177 | VCI    | 1155 | -409 | 227 | C12A | 4655 | -409 |
| 28  | TS4             | -9275  | -409 | 78  | VDD     | -5775 | -409 | 128 | VCOMH    | -2275 | -409 | 178 | VCI    | 1225 | -409 | 228 | C12A | 4725 | -409 |
| 29  | TS3             | -9205  | -409 | 79  | VDD     | -5705 | -409 | 129 | VCOMH    | -2205 | -409 | 179 | VCI    | 1295 | -409 | 229 | C12A | 4795 | -409 |
| 30  | TS2             | -9135  | -409 | 80  | VDD     | -5635 | -409 | 130 | VCOMH    | -2135 | -409 | 180 | VCI    | 1365 | -409 | 230 | C12A | 4865 | -409 |
| 31  | TS1             | -9065  | -409 | 81  | VDD     | -5565 | -409 | 131 | VCOMH    | -2065 | -409 | 181 | VCI    | 1435 | -409 | 231 | C12A | 4935 | -409 |
| 32  | TS0             | -8995  | -409 | 82  | VDD     | -5495 | -409 | 132 | VCOMH    | -1995 | -409 | 182 | VCI    | 1505 | -409 | 232 | C12A | 5005 | -409 |
| 33  | SD              | -8925  | -409 | 83  | VDD     | -5425 | -409 | 133 | VCOML    | -1925 | -409 | 183 | VCI    | 1575 | -409 | 233 | C12A | 5075 | -409 |
| 34  | CM              | -8855  | -409 | 84  | VDD     | -5355 | -409 | 134 | VCOML    | -1855 | -409 | 184 | VCI    | 1645 | -409 | 234 | C12A | 5145 | -409 |
| 35  | IM0/ID          | -8785  | -409 | 85  | VDD     | -5285 | -409 | 135 | VCOML    | -1785 | -409 | 185 | VCI    | 1715 | -409 | 235 | C12A | 5215 | -409 |
| 36  | IM1             | -8715  | -409 | 86  | AGND    | -5215 | -409 | 136 | VCOML    | -1715 | -409 | 186 | VCI    | 1785 | -409 | 236 | VGL  | 5285 | -409 |
| 37  | IM2             | -8645  | -409 | 87  | AGND    | -5145 | -409 | 137 | VCOML    | -1645 | -409 | 187 | VCI    | 1855 | -409 | 237 | VGL  | 5355 | -409 |
| 38  | RESX            | -8575  | -409 | 88  | AGND    | -5075 | -409 | 138 | VCOML    | -1575 | -409 | 188 | VCI    | 1925 | -409 | 238 | VGL  | 5425 | -409 |
| 39  | VSX             | -8505  | -409 | 89  | AGND    | -5005 | -409 | 139 | VCOML    | -1505 | -409 | 189 | VCI    | 1995 | -409 | 239 | VGL  | 5495 | -409 |
| 40  | HSX             | -8435  | -409 | 90  | AGND    | -4935 | -409 | 140 | VREG1OUT | -1435 | -409 | 190 | VCI    | 2065 | -409 | 240 | VGL  | 5565 | -409 |
| 41  | DOTCLK          | -8365  | -409 | 91  | AGND    | -4865 | -409 | 141 | VREG2OUT | -1365 | -409 | 191 | VCI    | 2135 | -409 | 241 | VGL  | 5635 | -409 |
| 42  | ENABLE          | -8295  | -409 | 92  | AGND    | -4795 | -409 | 142 | VREG3OUT | -1295 | -409 | 192 | VCI    | 2205 | -409 | 242 | VGL  | 5705 | -409 |
| 43  | DB17            | -8225  | -409 | 93  | AGND    | -4725 | -409 | 143 | VREG4OUT | -1225 | -409 | 193 | TESTA3 | 2275 | -409 | 243 | VGL  | 5775 | -409 |
| 44  | DB16            | -8155  | -409 | 94  | VGS     | -4655 | -409 | 144 | TESTA2   | -1155 | -409 | 194 | C11B   | 2345 | -409 | 244 | VGL  | 5845 | -409 |
| 45  | DB15            | -8085  | -409 | 95  | VGS     | -4585 | -409 | 145 | VCL      | -1085 | -409 | 195 | C11B   | 2415 | -409 | 245 | VGL  | 5915 | -409 |
| 46  | DB14            | -8015  | -409 | 96  | TESTA1  | -4515 | -409 | 146 | VCL      | -1015 | -409 | 196 | C11B   | 2485 | -409 | 246 | AGND | 5985 | -409 |
| 47  | DB13            | -7945  | -409 | 97  | AGND    | -4445 | -409 | 147 | VCL      | -945  | -409 | 197 | C11B   | 2555 | -409 | 247 | AGND | 6055 | -409 |
| 48  | DB12            | -7875  | -409 | 98  | AGND    | -4375 | -409 | 148 | VCL      | -875  | -409 | 198 | C11B   | 2625 | -409 | 248 | AGND | 6125 | -409 |
| 49  | DB11            | -7805  | -409 | 99  | AGND    | -4305 | -409 | 149 | VCL      | -805  | -409 | 199 | C11B   | 2695 | -409 | 249 | VGH  | 6195 | -409 |
| 50  | DB10            | -7735  | -409 | 100 | AGND    | -4235 | -409 | 150 | VCL      | -735  | -409 | 200 | C11B   | 2765 | -409 | 250 | VGH  | 6265 | -409 |

| No. | Name | X    | Y    | No. | Name  | X     | Y    | No. | Name | X     | Y   | No. | Name | X     | Y   | No. | Name | X    | Y   |
|-----|------|------|------|-----|-------|-------|------|-----|------|-------|-----|-----|------|-------|-----|-----|------|------|-----|
| 251 | VGH  | 6335 | -409 | 301 | C22B  | 9835  | -409 | 351 | G57  | 10755 | 244 | 401 | G157 | 10005 | 244 | 451 | G257 | 9255 | 244 |
| 252 | VGH  | 6405 | -409 | 302 | C22B  | 9905  | -409 | 352 | G59  | 10740 | 389 | 402 | G159 | 9990  | 389 | 452 | G259 | 9240 | 389 |
| 253 | VGH  | 6475 | -409 | 303 | C22B  | 9975  | -409 | 353 | G61  | 10725 | 244 | 403 | G161 | 9975  | 244 | 453 | G261 | 9225 | 244 |
| 254 | VGH  | 6545 | -409 | 304 | C22B  | 10045 | -409 | 354 | G63  | 10710 | 389 | 404 | G163 | 9960  | 389 | 454 | G263 | 9210 | 389 |
| 255 | VGH  | 6615 | -409 | 305 | C22B  | 10115 | -409 | 355 | G65  | 10695 | 244 | 405 | G165 | 9945  | 244 | 455 | G265 | 9195 | 244 |
| 256 | VGH  | 6685 | -409 | 306 | C22B  | 10185 | -409 | 356 | G67  | 10680 | 389 | 406 | G167 | 9930  | 389 | 456 | G267 | 9180 | 389 |
| 257 | C13B | 6755 | -409 | 307 | C22B  | 10255 | -409 | 357 | G69  | 10665 | 244 | 407 | G169 | 9915  | 244 | 457 | G269 | 9165 | 244 |
| 258 | C13B | 6825 | -409 | 308 | C22A  | 10325 | -409 | 358 | G71  | 10650 | 389 | 408 | G171 | 9900  | 389 | 458 | G271 | 9150 | 389 |
| 259 | C13B | 6895 | -409 | 309 | C22A  | 10395 | -409 | 359 | G73  | 10635 | 244 | 409 | G173 | 9885  | 244 | 459 | G273 | 9135 | 244 |
| 260 | C13B | 6965 | -409 | 310 | C22A  | 10465 | -409 | 360 | G75  | 10620 | 389 | 410 | G175 | 9870  | 389 | 460 | G275 | 9120 | 389 |
| 261 | C13B | 7035 | -409 | 311 | C22A  | 10535 | -409 | 361 | G77  | 10605 | 244 | 411 | G177 | 9855  | 244 | 461 | G277 | 9105 | 244 |
| 262 | C13B | 7105 | -409 | 312 | C22A  | 10605 | -409 | 362 | G79  | 10590 | 389 | 412 | G179 | 9840  | 389 | 462 | G279 | 9090 | 389 |
| 263 | C13A | 7175 | -409 | 313 | C22A  | 10675 | -409 | 363 | G81  | 10575 | 244 | 413 | G181 | 9825  | 244 | 463 | G281 | 9075 | 244 |
| 264 | C13A | 7245 | -409 | 314 | C22A  | 10745 | -409 | 364 | G83  | 10560 | 389 | 414 | G183 | 9810  | 389 | 464 | G283 | 9060 | 389 |
| 265 | C13A | 7315 | -409 | 315 | C22A  | 10815 | -409 | 365 | G85  | 10545 | 244 | 415 | G185 | 9795  | 244 | 465 | G285 | 9045 | 244 |
| 266 | C13A | 7385 | -409 | 316 | C22A  | 10885 | -409 | 366 | G87  | 10530 | 389 | 416 | G187 | 9780  | 389 | 466 | G287 | 9030 | 389 |
| 267 | C13A | 7455 | -409 | 317 | C22A  | 10955 | -409 | 367 | G89  | 10515 | 244 | 417 | G189 | 9765  | 244 | 467 | G289 | 9015 | 244 |
| 268 | C13A | 7525 | -409 | 318 | C22A  | 11025 | -409 | 368 | G91  | 10500 | 389 | 418 | G191 | 9750  | 389 | 468 | G291 | 9000 | 389 |
| 269 | C21B | 7595 | -409 | 319 | C22A  | 11095 | -409 | 369 | G93  | 10485 | 244 | 419 | G193 | 9735  | 244 | 469 | G293 | 8985 | 244 |
| 270 | C21B | 7665 | -409 | 320 | C22A  | 11165 | -409 | 370 | G95  | 10470 | 389 | 420 | G195 | 9720  | 389 | 470 | G295 | 8970 | 389 |
| 271 | C21B | 7735 | -409 | 321 | DUMMY | 11205 | 244  | 371 | G97  | 10455 | 244 | 421 | G197 | 9705  | 244 | 471 | G297 | 8955 | 244 |
| 272 | C21B | 7805 | -409 | 322 | DUMMY | 11190 | 389  | 372 | G99  | 10440 | 389 | 422 | G199 | 9690  | 389 | 472 | G299 | 8940 | 389 |
| 273 | C21B | 7875 | -409 | 323 | G1    | 11175 | 244  | 373 | G101 | 10425 | 244 | 423 | G201 | 9675  | 244 | 473 | G301 | 8925 | 244 |
| 274 | C21B | 7945 | -409 | 324 | G3    | 11160 | 389  | 374 | G103 | 10410 | 389 | 424 | G203 | 9660  | 389 | 474 | G303 | 8910 | 389 |
| 275 | C21B | 8015 | -409 | 325 | G5    | 11145 | 244  | 375 | G105 | 10395 | 244 | 425 | G205 | 9645  | 244 | 475 | G305 | 8895 | 244 |
| 276 | C21B | 8085 | -409 | 326 | G7    | 11130 | 389  | 376 | G107 | 10380 | 389 | 426 | G207 | 9630  | 389 | 476 | G307 | 8880 | 389 |
| 277 | C21B | 8155 | -409 | 327 | G9    | 11115 | 244  | 377 | G109 | 10365 | 244 | 427 | G209 | 9615  | 244 | 477 | G309 | 8865 | 244 |
| 278 | C21B | 8225 | -409 | 328 | G11   | 11100 | 389  | 378 | G111 | 10350 | 389 | 428 | G211 | 9600  | 389 | 478 | G311 | 8850 | 389 |
| 279 | C21B | 8295 | -409 | 329 | G13   | 11085 | 244  | 379 | G113 | 10335 | 244 | 429 | G213 | 9585  | 244 | 479 | G313 | 8835 | 244 |
| 280 | C21B | 8365 | -409 | 330 | G15   | 11070 | 389  | 380 | G115 | 10320 | 389 | 430 | G215 | 9570  | 389 | 480 | G315 | 8820 | 389 |
| 281 | C21B | 8435 | -409 | 331 | G17   | 11055 | 244  | 381 | G117 | 10305 | 244 | 431 | G217 | 9555  | 244 | 481 | G317 | 8805 | 244 |
| 282 | C21B | 8505 | -409 | 332 | G19   | 11040 | 389  | 382 | G119 | 10290 | 389 | 432 | G219 | 9540  | 389 | 482 | G319 | 8790 | 389 |
| 283 | C21A | 8575 | -409 | 333 | G21   | 11025 | 244  | 383 | G121 | 10275 | 244 | 433 | G221 | 9525  | 244 | 483 | G321 | 8775 | 244 |
| 284 | C21A | 8645 | -409 | 334 | G23   | 11010 | 389  | 384 | G123 | 10260 | 389 | 434 | G223 | 9510  | 389 | 484 | G323 | 8760 | 389 |
| 285 | C21A | 8715 | -409 | 335 | G25   | 10995 | 244  | 385 | G125 | 10245 | 244 | 435 | G225 | 9495  | 244 | 485 | G325 | 8745 | 244 |
| 286 | C21A | 8785 | -409 | 336 | G27   | 10980 | 389  | 386 | G127 | 10230 | 389 | 436 | G227 | 9480  | 389 | 486 | G327 | 8730 | 389 |
| 287 | C21A | 8855 | -409 | 337 | G29   | 10965 | 244  | 387 | G129 | 10215 | 244 | 437 | G229 | 9465  | 244 | 487 | G329 | 8715 | 244 |
| 288 | C21A | 8925 | -409 | 338 | G31   | 10950 | 389  | 388 | G131 | 10200 | 389 | 438 | G231 | 9450  | 389 | 488 | G331 | 8700 | 389 |
| 289 | C21A | 8995 | -409 | 339 | G33   | 10935 | 244  | 389 | G133 | 10185 | 244 | 439 | G233 | 9435  | 244 | 489 | G333 | 8685 | 244 |
| 290 | C21A | 9065 | -409 | 340 | G35   | 10920 | 389  | 390 | G135 | 10170 | 389 | 440 | G235 | 9420  | 389 | 490 | G335 | 8670 | 389 |
| 291 | C21A | 9135 | -409 | 341 | G37   | 10905 | 244  | 391 | G137 | 10155 | 244 | 441 | G237 | 9405  | 244 | 491 | G337 | 8655 | 244 |
| 292 | C21A | 9205 | -409 | 342 | G39   | 10890 | 389  | 392 | G139 | 10140 | 389 | 442 | G239 | 9390  | 389 | 492 | G339 | 8640 | 389 |
| 293 | C21A | 9275 | -409 | 343 | G41   | 10875 | 244  | 393 | G141 | 10125 | 244 | 443 | G241 | 9375  | 244 | 493 | G341 | 8625 | 244 |
| 294 | C21A | 9345 | -409 | 344 | G43   | 10860 | 389  | 394 | G143 | 10110 | 389 | 444 | G243 | 9360  | 389 | 494 | G343 | 8610 | 389 |
| 295 | C21A | 9415 | -409 | 345 | G45   | 10845 | 244  | 395 | G145 | 10095 | 244 | 445 | G245 | 9345  | 244 | 495 | G345 | 8595 | 244 |
| 296 | C22B | 9485 | -409 | 346 | G47   | 10830 | 389  | 396 | G147 | 10080 | 389 | 446 | G247 | 9330  | 389 | 496 | G347 | 8580 | 389 |
| 297 | C22B | 9555 | -409 | 347 | G49   | 10815 | 244  | 397 | G149 | 10065 | 244 | 447 | G249 | 9315  | 244 | 497 | G349 | 8565 | 244 |
| 298 | C22B | 9625 | -409 | 348 | G51   | 10800 | 389  | 398 | G151 | 10050 | 389 | 448 | G251 | 9300  | 389 | 498 | G351 | 8550 | 389 |
| 299 | C22B | 9695 | -409 | 349 | G53   | 10785 | 244  | 399 | G153 | 10035 | 244 | 449 | G253 | 9285  | 244 | 499 | G353 | 8535 | 244 |
| 300 | C22B | 9765 | -409 | 350 | G55   | 10770 | 389  | 400 | G155 | 10020 | 389 | 450 | G255 | 9270  | 389 | 500 | G355 | 8520 | 389 |

| No. | Name | X    | Y   | No. | Name  | X    | Y   | No. | Name | X    | Y   | No. | Name | X    | Y   | No. | Name | X    | Y   |
|-----|------|------|-----|-----|-------|------|-----|-----|------|------|-----|-----|------|------|-----|-----|------|------|-----|
| 501 | G357 | 8505 | 244 | 551 | G457  | 7755 | 244 | 601 | S926 | 6855 | 244 | 651 | S876 | 6105 | 244 | 701 | S826 | 5355 | 244 |
| 502 | G359 | 8490 | 389 | 552 | G459  | 7740 | 389 | 602 | S925 | 6840 | 389 | 652 | S875 | 6090 | 389 | 702 | S825 | 5340 | 389 |
| 503 | G361 | 8475 | 244 | 553 | G461  | 7725 | 244 | 603 | S924 | 6825 | 244 | 653 | S874 | 6075 | 244 | 703 | S824 | 5325 | 244 |
| 504 | G363 | 8460 | 389 | 554 | G463  | 7710 | 389 | 604 | S923 | 6810 | 389 | 654 | S873 | 6060 | 389 | 704 | S823 | 5310 | 389 |
| 505 | G365 | 8445 | 244 | 555 | G465  | 7695 | 244 | 605 | S922 | 6795 | 244 | 655 | S872 | 6045 | 244 | 705 | S822 | 5295 | 244 |
| 506 | G367 | 8430 | 389 | 556 | G467  | 7680 | 389 | 606 | S921 | 6780 | 389 | 656 | S871 | 6030 | 389 | 706 | S821 | 5280 | 389 |
| 507 | G369 | 8415 | 244 | 557 | G469  | 7665 | 244 | 607 | S920 | 6765 | 244 | 657 | S870 | 6015 | 244 | 707 | S820 | 5265 | 244 |
| 508 | G371 | 8400 | 389 | 558 | G471  | 7650 | 389 | 608 | S919 | 6750 | 389 | 658 | S869 | 6000 | 389 | 708 | S819 | 5250 | 389 |
| 509 | G373 | 8385 | 244 | 559 | G473  | 7635 | 244 | 609 | S918 | 6735 | 244 | 659 | S868 | 5985 | 244 | 709 | S818 | 5235 | 244 |
| 510 | G375 | 8370 | 389 | 560 | G475  | 7620 | 389 | 610 | S917 | 6720 | 389 | 660 | S867 | 5970 | 389 | 710 | S817 | 5220 | 389 |
| 511 | G377 | 8355 | 244 | 561 | G477  | 7605 | 244 | 611 | S916 | 6705 | 244 | 661 | S866 | 5955 | 244 | 711 | S816 | 5205 | 244 |
| 512 | G379 | 8340 | 389 | 562 | G479  | 7590 | 389 | 612 | S915 | 6690 | 389 | 662 | S865 | 5940 | 389 | 712 | S815 | 5190 | 389 |
| 513 | G381 | 8325 | 244 | 563 | DUMMY | 7575 | 244 | 613 | S914 | 6675 | 244 | 663 | S864 | 5925 | 244 | 713 | S814 | 5175 | 244 |
| 514 | G383 | 8310 | 389 | 564 | DUMMY | 7560 | 389 | 614 | S913 | 6660 | 389 | 664 | S863 | 5910 | 389 | 714 | S813 | 5160 | 389 |
| 515 | G385 | 8295 | 244 | 565 | DUMMY | 7395 | 244 | 615 | S912 | 6645 | 244 | 665 | S862 | 5895 | 244 | 715 | S812 | 5145 | 244 |
| 516 | G387 | 8280 | 389 | 566 | DUMMY | 7380 | 389 | 616 | S911 | 6630 | 389 | 666 | S861 | 5880 | 389 | 716 | S811 | 5130 | 389 |
| 517 | G389 | 8265 | 244 | 567 | S960  | 7365 | 244 | 617 | S910 | 6615 | 244 | 667 | S860 | 5865 | 244 | 717 | S810 | 5115 | 244 |
| 518 | G391 | 8250 | 389 | 568 | S959  | 7350 | 389 | 618 | S909 | 6600 | 389 | 668 | S859 | 5850 | 389 | 718 | S809 | 5100 | 389 |
| 519 | G393 | 8235 | 244 | 569 | S958  | 7335 | 244 | 619 | S908 | 6585 | 244 | 669 | S858 | 5835 | 244 | 719 | S808 | 5085 | 244 |
| 520 | G395 | 8220 | 389 | 570 | S957  | 7320 | 389 | 620 | S907 | 6570 | 389 | 670 | S857 | 5820 | 389 | 720 | S807 | 5070 | 389 |
| 521 | G397 | 8205 | 244 | 571 | S956  | 7305 | 244 | 621 | S906 | 6555 | 244 | 671 | S856 | 5805 | 244 | 721 | S806 | 5055 | 244 |
| 522 | G399 | 8190 | 389 | 572 | S955  | 7290 | 389 | 622 | S905 | 6540 | 389 | 672 | S855 | 5790 | 389 | 722 | S805 | 5040 | 389 |
| 523 | G401 | 8175 | 244 | 573 | S954  | 7275 | 244 | 623 | S904 | 6525 | 244 | 673 | S854 | 5775 | 244 | 723 | S804 | 5025 | 244 |
| 524 | G403 | 8160 | 389 | 574 | S953  | 7260 | 389 | 624 | S903 | 6510 | 389 | 674 | S853 | 5760 | 389 | 724 | S803 | 5010 | 389 |
| 525 | G405 | 8145 | 244 | 575 | S952  | 7245 | 244 | 625 | S902 | 6495 | 244 | 675 | S852 | 5745 | 244 | 725 | S802 | 4995 | 244 |
| 526 | G407 | 8130 | 389 | 576 | S951  | 7230 | 389 | 626 | S901 | 6480 | 389 | 676 | S851 | 5730 | 389 | 726 | S801 | 4980 | 389 |
| 527 | G409 | 8115 | 244 | 577 | S950  | 7215 | 244 | 627 | S900 | 6465 | 244 | 677 | S850 | 5715 | 244 | 727 | S800 | 4965 | 244 |
| 528 | G411 | 8100 | 389 | 578 | S949  | 7200 | 389 | 628 | S899 | 6450 | 389 | 678 | S849 | 5700 | 389 | 728 | S799 | 4950 | 389 |
| 529 | G413 | 8085 | 244 | 579 | S948  | 7185 | 244 | 629 | S898 | 6435 | 244 | 679 | S848 | 5685 | 244 | 729 | S798 | 4935 | 244 |
| 530 | G415 | 8070 | 389 | 580 | S947  | 7170 | 389 | 630 | S897 | 6420 | 389 | 680 | S847 | 5670 | 389 | 730 | S797 | 4920 | 389 |
| 531 | G417 | 8055 | 244 | 581 | S946  | 7155 | 244 | 631 | S896 | 6405 | 244 | 681 | S846 | 5655 | 244 | 731 | S796 | 4905 | 244 |
| 532 | G419 | 8040 | 389 | 582 | S945  | 7140 | 389 | 632 | S895 | 6390 | 389 | 682 | S845 | 5640 | 389 | 732 | S795 | 4890 | 389 |
| 533 | G421 | 8025 | 244 | 583 | S944  | 7125 | 244 | 633 | S894 | 6375 | 244 | 683 | S844 | 5625 | 244 | 733 | S794 | 4875 | 244 |
| 534 | G423 | 8010 | 389 | 584 | S943  | 7110 | 389 | 634 | S893 | 6360 | 389 | 684 | S843 | 5610 | 389 | 734 | S793 | 4860 | 389 |
| 535 | G425 | 7995 | 244 | 585 | S942  | 7095 | 244 | 635 | S892 | 6345 | 244 | 685 | S842 | 5595 | 244 | 735 | S792 | 4845 | 244 |
| 536 | G427 | 7980 | 389 | 586 | S941  | 7080 | 389 | 636 | S891 | 6330 | 389 | 686 | S841 | 5580 | 389 | 736 | S791 | 4830 | 389 |
| 537 | G429 | 7965 | 244 | 587 | S940  | 7065 | 244 | 637 | S890 | 6315 | 244 | 687 | S840 | 5565 | 244 | 737 | S790 | 4815 | 244 |
| 538 | G431 | 7950 | 389 | 588 | S939  | 7050 | 389 | 638 | S889 | 6300 | 389 | 688 | S839 | 5550 | 389 | 738 | S789 | 4800 | 389 |
| 539 | G433 | 7935 | 244 | 589 | S938  | 7035 | 244 | 639 | S888 | 6285 | 244 | 689 | S838 | 5535 | 244 | 739 | S788 | 4785 | 244 |
| 540 | G435 | 7920 | 389 | 590 | S937  | 7020 | 389 | 640 | S887 | 6270 | 389 | 690 | S837 | 5520 | 389 | 740 | S787 | 4770 | 389 |
| 541 | G437 | 7905 | 244 | 591 | S936  | 7005 | 244 | 641 | S886 | 6255 | 244 | 691 | S836 | 5505 | 244 | 741 | S786 | 4755 | 244 |
| 542 | G439 | 7890 | 389 | 592 | S935  | 6990 | 389 | 642 | S885 | 6240 | 389 | 692 | S835 | 5490 | 389 | 742 | S785 | 4740 | 389 |
| 543 | G441 | 7875 | 244 | 593 | S934  | 6975 | 244 | 643 | S884 | 6225 | 244 | 693 | S834 | 5475 | 244 | 743 | S784 | 4725 | 244 |
| 544 | G443 | 7860 | 389 | 594 | S933  | 6960 | 389 | 644 | S883 | 6210 | 389 | 694 | S833 | 5460 | 389 | 744 | S783 | 4710 | 389 |
| 545 | G445 | 7845 | 244 | 595 | S932  | 6945 | 244 | 645 | S882 | 6195 | 244 | 695 | S832 | 5445 | 244 | 745 | S782 | 4695 | 244 |
| 546 | G447 | 7830 | 389 | 596 | S931  | 6930 | 389 | 646 | S881 | 6180 | 389 | 696 | S831 | 5430 | 389 | 746 | S781 | 4680 | 389 |
| 547 | G449 | 7815 | 244 | 597 | S930  | 6915 | 244 | 647 | S880 | 6165 | 244 | 697 | S830 | 5415 | 244 | 747 | S780 | 4665 | 244 |
| 548 | G451 | 7800 | 389 | 598 | S929  | 6900 | 389 | 648 | S879 | 6150 | 389 | 698 | S829 | 5400 | 389 | 748 | S779 | 4650 | 389 |
| 549 | G453 | 7785 | 244 | 599 | S928  | 6885 | 244 | 649 | S878 | 6135 | 244 | 699 | S828 | 5385 | 244 | 749 | S778 | 4635 | 244 |
| 550 | G455 | 7770 | 389 | 600 | S927  | 6870 | 389 | 650 | S877 | 6120 | 389 | 700 | S827 | 5370 | 389 | 750 | S777 | 4620 | 389 |



| No. | Name | X    | Y   | No. | Name | X    | Y   | No. | Name | X    | Y   | No. | Name | X    | Y   | No.  | Name | X    | Y   |
|-----|------|------|-----|-----|------|------|-----|-----|------|------|-----|-----|------|------|-----|------|------|------|-----|
| 751 | S776 | 4605 | 244 | 801 | S726 | 3855 | 244 | 851 | S676 | 3105 | 244 | 901 | S626 | 2355 | 244 | 951  | S576 | 1605 | 244 |
| 752 | S775 | 4590 | 389 | 802 | S725 | 3840 | 389 | 852 | S675 | 3090 | 389 | 902 | S625 | 2340 | 389 | 952  | S575 | 1590 | 389 |
| 753 | S774 | 4575 | 244 | 803 | S724 | 3825 | 244 | 853 | S674 | 3075 | 244 | 903 | S624 | 2325 | 244 | 953  | S574 | 1575 | 244 |
| 754 | S773 | 4560 | 389 | 804 | S723 | 3810 | 389 | 854 | S673 | 3060 | 389 | 904 | S623 | 2310 | 389 | 954  | S573 | 1560 | 389 |
| 755 | S772 | 4545 | 244 | 805 | S722 | 3795 | 244 | 855 | S672 | 3045 | 244 | 905 | S622 | 2295 | 244 | 955  | S572 | 1545 | 244 |
| 756 | S771 | 4530 | 389 | 806 | S721 | 3780 | 389 | 856 | S671 | 3030 | 389 | 906 | S621 | 2280 | 389 | 956  | S571 | 1530 | 389 |
| 757 | S770 | 4515 | 244 | 807 | S720 | 3765 | 244 | 857 | S670 | 3015 | 244 | 907 | S620 | 2265 | 244 | 957  | S570 | 1515 | 244 |
| 758 | S769 | 4500 | 389 | 808 | S719 | 3750 | 389 | 858 | S669 | 3000 | 389 | 908 | S619 | 2250 | 389 | 958  | S569 | 1500 | 389 |
| 759 | S768 | 4485 | 244 | 809 | S718 | 3735 | 244 | 859 | S668 | 2985 | 244 | 909 | S618 | 2235 | 244 | 959  | S568 | 1485 | 244 |
| 760 | S767 | 4470 | 389 | 810 | S717 | 3720 | 389 | 860 | S667 | 2970 | 389 | 910 | S617 | 2220 | 389 | 960  | S567 | 1470 | 389 |
| 761 | S766 | 4455 | 244 | 811 | S716 | 3705 | 244 | 861 | S666 | 2955 | 244 | 911 | S616 | 2205 | 244 | 961  | S566 | 1455 | 244 |
| 762 | S765 | 4440 | 389 | 812 | S715 | 3690 | 389 | 862 | S665 | 2940 | 389 | 912 | S615 | 2190 | 389 | 962  | S565 | 1440 | 389 |
| 763 | S764 | 4425 | 244 | 813 | S714 | 3675 | 244 | 863 | S664 | 2925 | 244 | 913 | S614 | 2175 | 244 | 963  | S564 | 1425 | 244 |
| 764 | S763 | 4410 | 389 | 814 | S713 | 3660 | 389 | 864 | S663 | 2910 | 389 | 914 | S613 | 2160 | 389 | 964  | S563 | 1410 | 389 |
| 765 | S762 | 4395 | 244 | 815 | S712 | 3645 | 244 | 865 | S662 | 2895 | 244 | 915 | S612 | 2145 | 244 | 965  | S562 | 1395 | 244 |
| 766 | S761 | 4380 | 389 | 816 | S711 | 3630 | 389 | 866 | S661 | 2880 | 389 | 916 | S611 | 2130 | 389 | 966  | S561 | 1380 | 389 |
| 767 | S760 | 4365 | 244 | 817 | S710 | 3615 | 244 | 867 | S660 | 2865 | 244 | 917 | S610 | 2115 | 244 | 967  | S560 | 1365 | 244 |
| 768 | S759 | 4350 | 389 | 818 | S709 | 3600 | 389 | 868 | S659 | 2850 | 389 | 918 | S609 | 2100 | 389 | 968  | S559 | 1350 | 389 |
| 769 | S758 | 4335 | 244 | 819 | S708 | 3585 | 244 | 869 | S658 | 2835 | 244 | 919 | S608 | 2085 | 244 | 969  | S558 | 1335 | 244 |
| 770 | S757 | 4320 | 389 | 820 | S707 | 3570 | 389 | 870 | S657 | 2820 | 389 | 920 | S607 | 2070 | 389 | 970  | S557 | 1320 | 389 |
| 771 | S756 | 4305 | 244 | 821 | S706 | 3555 | 244 | 871 | S656 | 2805 | 244 | 921 | S606 | 2055 | 244 | 971  | S556 | 1305 | 244 |
| 772 | S755 | 4290 | 389 | 822 | S705 | 3540 | 389 | 872 | S655 | 2790 | 389 | 922 | S605 | 2040 | 389 | 972  | S555 | 1290 | 389 |
| 773 | S754 | 4275 | 244 | 823 | S704 | 3525 | 244 | 873 | S654 | 2775 | 244 | 923 | S604 | 2025 | 244 | 973  | S554 | 1275 | 244 |
| 774 | S753 | 4260 | 389 | 824 | S703 | 3510 | 389 | 874 | S653 | 2760 | 389 | 924 | S603 | 2010 | 389 | 974  | S553 | 1260 | 389 |
| 775 | S752 | 4245 | 244 | 825 | S702 | 3495 | 244 | 875 | S652 | 2745 | 244 | 925 | S602 | 1995 | 244 | 975  | S552 | 1245 | 244 |
| 776 | S751 | 4230 | 389 | 826 | S701 | 3480 | 389 | 876 | S651 | 2730 | 389 | 926 | S601 | 1980 | 389 | 976  | S551 | 1230 | 389 |
| 777 | S750 | 4215 | 244 | 827 | S700 | 3465 | 244 | 877 | S650 | 2715 | 244 | 927 | S600 | 1965 | 244 | 977  | S550 | 1215 | 244 |
| 778 | S749 | 4200 | 389 | 828 | S699 | 3450 | 389 | 878 | S649 | 2700 | 389 | 928 | S599 | 1950 | 389 | 978  | S549 | 1200 | 389 |
| 779 | S748 | 4185 | 244 | 829 | S698 | 3435 | 244 | 879 | S648 | 2685 | 244 | 929 | S598 | 1935 | 244 | 979  | S548 | 1185 | 244 |
| 780 | S747 | 4170 | 389 | 830 | S697 | 3420 | 389 | 880 | S647 | 2670 | 389 | 930 | S597 | 1920 | 389 | 980  | S547 | 1170 | 389 |
| 781 | S746 | 4155 | 244 | 831 | S696 | 3405 | 244 | 881 | S646 | 2655 | 244 | 931 | S596 | 1905 | 244 | 981  | S546 | 1155 | 244 |
| 782 | S745 | 4140 | 389 | 832 | S695 | 3390 | 389 | 882 | S645 | 2640 | 389 | 932 | S595 | 1890 | 389 | 982  | S545 | 1140 | 389 |
| 783 | S744 | 4125 | 244 | 833 | S694 | 3375 | 244 | 883 | S644 | 2625 | 244 | 933 | S594 | 1875 | 244 | 983  | S544 | 1125 | 244 |
| 784 | S743 | 4110 | 389 | 834 | S693 | 3360 | 389 | 884 | S643 | 2610 | 389 | 934 | S593 | 1860 | 389 | 984  | S543 | 1110 | 389 |
| 785 | S742 | 4095 | 244 | 835 | S692 | 3345 | 244 | 885 | S642 | 2595 | 244 | 935 | S592 | 1845 | 244 | 985  | S542 | 1095 | 244 |
| 786 | S741 | 4080 | 389 | 836 | S691 | 3330 | 389 | 886 | S641 | 2580 | 389 | 936 | S591 | 1830 | 389 | 986  | S541 | 1080 | 389 |
| 787 | S740 | 4065 | 244 | 837 | S690 | 3315 | 244 | 887 | S640 | 2565 | 244 | 937 | S590 | 1815 | 244 | 987  | S540 | 1065 | 244 |
| 788 | S739 | 4050 | 389 | 838 | S689 | 3300 | 389 | 888 | S639 | 2550 | 389 | 938 | S589 | 1800 | 389 | 988  | S539 | 1050 | 389 |
| 789 | S738 | 4035 | 244 | 839 | S688 | 3285 | 244 | 889 | S638 | 2535 | 244 | 939 | S588 | 1785 | 244 | 989  | S538 | 1035 | 244 |
| 790 | S737 | 4020 | 389 | 840 | S687 | 3270 | 389 | 890 | S637 | 2520 | 389 | 940 | S587 | 1770 | 389 | 990  | S537 | 1020 | 389 |
| 791 | S736 | 4005 | 244 | 841 | S686 | 3255 | 244 | 891 | S636 | 2505 | 244 | 941 | S586 | 1755 | 244 | 991  | S536 | 1005 | 244 |
| 792 | S735 | 3990 | 389 | 842 | S685 | 3240 | 389 | 892 | S635 | 2490 | 389 | 942 | S585 | 1740 | 389 | 992  | S535 | 990  | 389 |
| 793 | S734 | 3975 | 244 | 843 | S684 | 3225 | 244 | 893 | S634 | 2475 | 244 | 943 | S584 | 1725 | 244 | 993  | S534 | 975  | 244 |
| 794 | S733 | 3960 | 389 | 844 | S683 | 3210 | 389 | 894 | S633 | 2460 | 389 | 944 | S583 | 1710 | 389 | 994  | S533 | 960  | 389 |
| 795 | S732 | 3945 | 244 | 845 | S682 | 3195 | 244 | 895 | S632 | 2445 | 244 | 945 | S582 | 1695 | 244 | 995  | S532 | 945  | 244 |
| 796 | S731 | 3930 | 389 | 846 | S681 | 3180 | 389 | 896 | S631 | 2430 | 389 | 946 | S581 | 1680 | 389 | 996  | S531 | 930  | 389 |
| 797 | S730 | 3915 | 244 | 847 | S680 | 3165 | 244 | 897 | S630 | 2415 | 244 | 947 | S580 | 1665 | 244 | 997  | S530 | 915  | 244 |
| 798 | S729 | 3900 | 389 | 848 | S679 | 3150 | 389 | 898 | S629 | 2400 | 389 | 948 | S579 | 1650 | 389 | 998  | S529 | 900  | 389 |
| 799 | S728 | 3885 | 244 | 849 | S678 | 3135 | 244 | 899 | S628 | 2385 | 244 | 949 | S578 | 1635 | 244 | 999  | S528 | 885  | 244 |
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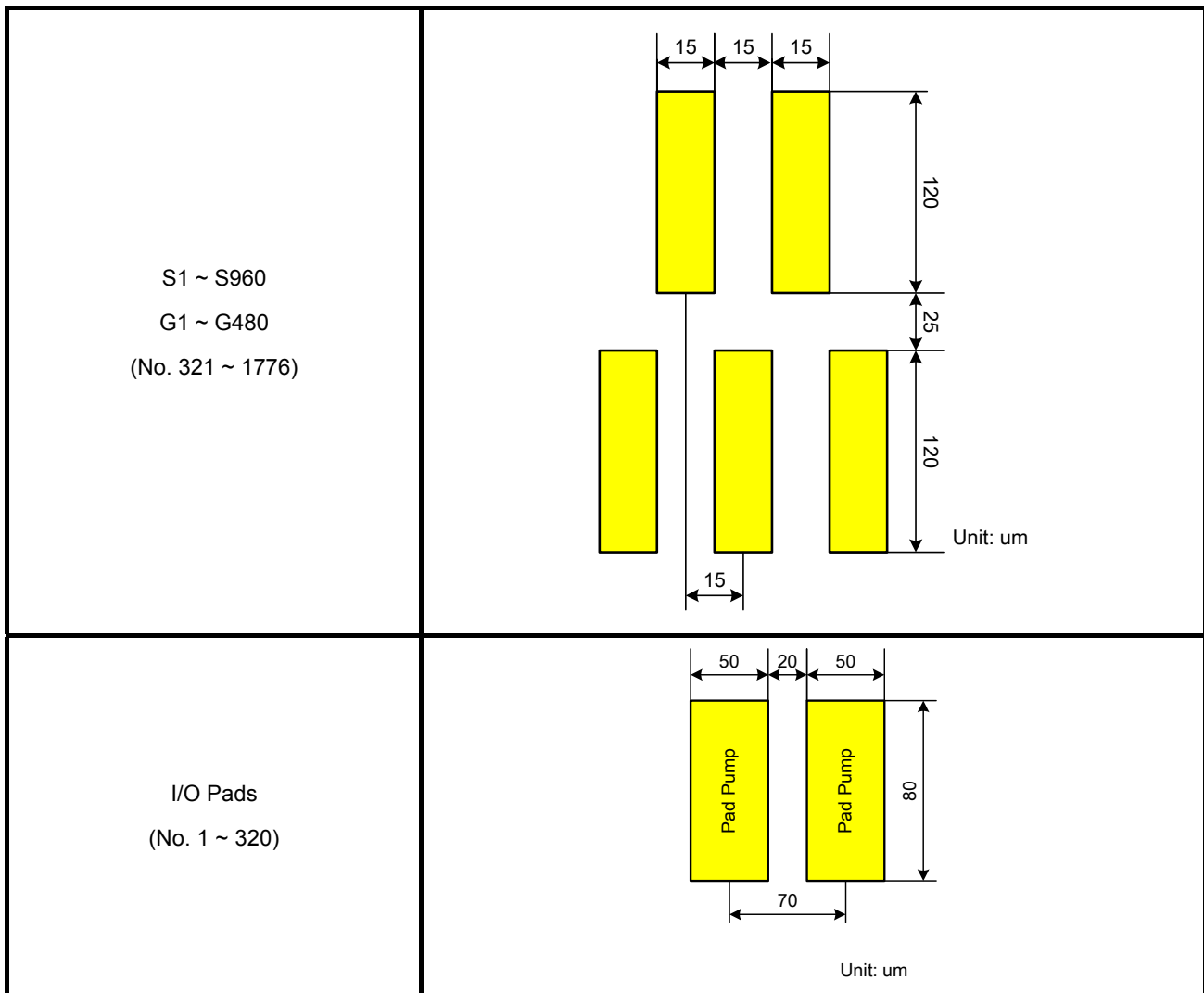
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|------|-------|------|-----|------|------|------|-----|------|------|-------|-----|------|------|-------|-----|------|------|-------|-----|
| 1001 | S526  | 855  | 244 | 1051 | S480 | -180 | 389 | 1101 | S430 | -930  | 389 | 1151 | S380 | -1680 | 389 | 1201 | S330 | -2430 | 389 |
| 1002 | S525  | 840  | 389 | 1052 | S479 | -195 | 244 | 1102 | S429 | -945  | 244 | 1152 | S379 | -1695 | 244 | 1202 | S329 | -2445 | 244 |
| 1003 | S524  | 825  | 244 | 1053 | S478 | -210 | 389 | 1103 | S428 | -960  | 389 | 1153 | S378 | -1710 | 389 | 1203 | S328 | -2460 | 389 |
| 1004 | S523  | 810  | 389 | 1054 | S477 | -225 | 244 | 1104 | S427 | -975  | 244 | 1154 | S377 | -1725 | 244 | 1204 | S327 | -2475 | 244 |
| 1005 | S522  | 795  | 244 | 1055 | S476 | -240 | 389 | 1105 | S426 | -990  | 389 | 1155 | S376 | -1740 | 389 | 1205 | S326 | -2490 | 389 |
| 1006 | S521  | 780  | 389 | 1056 | S475 | -255 | 244 | 1106 | S425 | -1005 | 244 | 1156 | S375 | -1755 | 244 | 1206 | S325 | -2505 | 244 |
| 1007 | S520  | 765  | 244 | 1057 | S474 | -270 | 389 | 1107 | S424 | -1020 | 389 | 1157 | S374 | -1770 | 389 | 1207 | S324 | -2520 | 389 |
| 1008 | S519  | 750  | 389 | 1058 | S473 | -285 | 244 | 1108 | S423 | -1035 | 244 | 1158 | S373 | -1785 | 244 | 1208 | S323 | -2535 | 244 |
| 1009 | S518  | 735  | 244 | 1059 | S472 | -300 | 389 | 1109 | S422 | -1050 | 389 | 1159 | S372 | -1800 | 389 | 1209 | S322 | -2550 | 389 |
| 1010 | S517  | 720  | 389 | 1060 | S471 | -315 | 244 | 1110 | S421 | -1065 | 244 | 1160 | S371 | -1815 | 244 | 1210 | S321 | -2565 | 244 |
| 1011 | S516  | 705  | 244 | 1061 | S470 | -330 | 389 | 1111 | S420 | -1080 | 389 | 1161 | S370 | -1830 | 389 | 1211 | S320 | -2580 | 389 |
| 1012 | S515  | 690  | 389 | 1062 | S469 | -345 | 244 | 1112 | S419 | -1095 | 244 | 1162 | S369 | -1845 | 244 | 1212 | S319 | -2595 | 244 |
| 1013 | S514  | 675  | 244 | 1063 | S468 | -360 | 389 | 1113 | S418 | -1110 | 389 | 1163 | S368 | -1860 | 389 | 1213 | S318 | -2610 | 389 |
| 1014 | S513  | 660  | 389 | 1064 | S467 | -375 | 244 | 1114 | S417 | -1125 | 244 | 1164 | S367 | -1875 | 244 | 1214 | S317 | -2625 | 244 |
| 1015 | S512  | 645  | 244 | 1065 | S466 | -390 | 389 | 1115 | S416 | -1140 | 389 | 1165 | S366 | -1890 | 389 | 1215 | S316 | -2640 | 389 |
| 1016 | S511  | 630  | 389 | 1066 | S465 | -405 | 244 | 1116 | S415 | -1155 | 244 | 1166 | S365 | -1905 | 244 | 1216 | S315 | -2655 | 244 |
| 1017 | S510  | 615  | 244 | 1067 | S464 | -420 | 389 | 1117 | S414 | -1170 | 389 | 1167 | S364 | -1920 | 389 | 1217 | S314 | -2670 | 389 |
| 1018 | S509  | 600  | 389 | 1068 | S463 | -435 | 244 | 1118 | S413 | -1185 | 244 | 1168 | S363 | -1935 | 244 | 1218 | S313 | -2685 | 244 |
| 1019 | S508  | 585  | 244 | 1069 | S462 | -450 | 389 | 1119 | S412 | -1200 | 389 | 1169 | S362 | -1950 | 389 | 1219 | S312 | -2700 | 389 |
| 1020 | S507  | 570  | 389 | 1070 | S461 | -465 | 244 | 1120 | S411 | -1215 | 244 | 1170 | S361 | -1965 | 244 | 1220 | S311 | -2715 | 244 |
| 1021 | S506  | 555  | 244 | 1071 | S460 | -480 | 389 | 1121 | S410 | -1230 | 389 | 1171 | S360 | -1980 | 389 | 1221 | S310 | -2730 | 389 |
| 1022 | S505  | 540  | 389 | 1072 | S459 | -495 | 244 | 1122 | S409 | -1245 | 244 | 1172 | S359 | -1995 | 244 | 1222 | S309 | -2745 | 244 |
| 1023 | S504  | 525  | 244 | 1073 | S458 | -510 | 389 | 1123 | S408 | -1260 | 389 | 1173 | S358 | -2010 | 389 | 1223 | S308 | -2760 | 389 |
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| 1025 | S502  | 495  | 244 | 1075 | S456 | -540 | 389 | 1125 | S406 | -1290 | 389 | 1175 | S356 | -2040 | 389 | 1225 | S306 | -2790 | 389 |
| 1026 | S501  | 480  | 389 | 1076 | S455 | -555 | 244 | 1126 | S405 | -1305 | 244 | 1176 | S355 | -2055 | 244 | 1226 | S305 | -2805 | 244 |
| 1027 | S500  | 465  | 244 | 1077 | S454 | -570 | 389 | 1127 | S404 | -1320 | 389 | 1177 | S354 | -2070 | 389 | 1227 | S304 | -2820 | 389 |
| 1028 | S499  | 450  | 389 | 1078 | S453 | -585 | 244 | 1128 | S403 | -1335 | 244 | 1178 | S353 | -2085 | 244 | 1228 | S303 | -2835 | 244 |
| 1029 | S498  | 435  | 244 | 1079 | S452 | -600 | 389 | 1129 | S402 | -1350 | 389 | 1179 | S352 | -2100 | 389 | 1229 | S302 | -2850 | 389 |
| 1030 | S497  | 420  | 389 | 1080 | S451 | -615 | 244 | 1130 | S401 | -1365 | 244 | 1180 | S351 | -2115 | 244 | 1230 | S301 | -2865 | 244 |
| 1031 | S496  | 405  | 244 | 1081 | S450 | -630 | 389 | 1131 | S400 | -1380 | 389 | 1181 | S350 | -2130 | 389 | 1231 | S300 | -2880 | 389 |
| 1032 | S495  | 390  | 389 | 1082 | S449 | -645 | 244 | 1132 | S399 | -1395 | 244 | 1182 | S349 | -2145 | 244 | 1232 | S299 | -2895 | 244 |
| 1033 | S494  | 375  | 244 | 1083 | S448 | -660 | 389 | 1133 | S398 | -1410 | 389 | 1183 | S348 | -2160 | 389 | 1233 | S298 | -2910 | 389 |
| 1034 | S493  | 360  | 389 | 1084 | S447 | -675 | 244 | 1134 | S397 | -1425 | 244 | 1184 | S347 | -2175 | 244 | 1234 | S297 | -2925 | 244 |
| 1035 | S492  | 345  | 244 | 1085 | S446 | -690 | 389 | 1135 | S396 | -1440 | 389 | 1185 | S346 | -2190 | 389 | 1235 | S296 | -2940 | 389 |
| 1036 | S491  | 330  | 389 | 1086 | S445 | -705 | 244 | 1136 | S395 | -1455 | 244 | 1186 | S345 | -2205 | 244 | 1236 | S295 | -2955 | 244 |
| 1037 | S490  | 315  | 244 | 1087 | S444 | -720 | 389 | 1137 | S394 | -1470 | 389 | 1187 | S344 | -2220 | 389 | 1237 | S294 | -2970 | 389 |
| 1038 | S489  | 300  | 389 | 1088 | S443 | -735 | 244 | 1138 | S393 | -1485 | 244 | 1188 | S343 | -2235 | 244 | 1238 | S293 | -2985 | 244 |
| 1039 | S488  | 285  | 244 | 1089 | S442 | -750 | 389 | 1139 | S392 | -1500 | 389 | 1189 | S342 | -2250 | 389 | 1239 | S292 | -3000 | 389 |
| 1040 | S487  | 270  | 389 | 1090 | S441 | -765 | 244 | 1140 | S391 | -1515 | 244 | 1190 | S341 | -2265 | 244 | 1240 | S291 | -3015 | 244 |
| 1041 | S486  | 255  | 244 | 1091 | S440 | -780 | 389 | 1141 | S390 | -1530 | 389 | 1191 | S340 | -2280 | 389 | 1241 | S290 | -3030 | 389 |
| 1042 | S485  | 240  | 389 | 1092 | S439 | -795 | 244 | 1142 | S389 | -1545 | 244 | 1192 | S339 | -2295 | 244 | 1242 | S289 | -3045 | 244 |
| 1043 | S484  | 225  | 244 | 1093 | S438 | -810 | 389 | 1143 | S388 | -1560 | 389 | 1193 | S338 | -2310 | 389 | 1243 | S288 | -3060 | 389 |
| 1044 | S483  | 210  | 389 | 1094 | S437 | -825 | 244 | 1144 | S387 | -1575 | 244 | 1194 | S337 | -2325 | 244 | 1244 | S287 | -3075 | 244 |
| 1045 | S482  | 195  | 244 | 1095 | S436 | -840 | 389 | 1145 | S386 | -1590 | 389 | 1195 | S336 | -2340 | 389 | 1245 | S286 | -3090 | 389 |
| 1046 | S481  | 180  | 389 | 1096 | S435 | -855 | 244 | 1146 | S385 | -1605 | 244 | 1196 | S335 | -2355 | 244 | 1246 | S285 | -3105 | 244 |
| 1047 | V1T   | 165  | 244 | 1097 | S434 | -870 | 389 | 1147 | S384 | -1620 | 389 | 1197 | S334 | -2370 | 389 | 1247 | S284 | -3120 | 389 |
| 1048 | DUMMY | 150  | 389 | 1098 | S433 | -885 | 244 | 1148 | S383 | -1635 | 244 | 1198 | S333 | -2385 | 244 | 1248 | S283 | -3135 | 244 |
| 1049 | DUMMY | -150 | 389 | 1099 | S432 | -900 | 389 | 1149 | S382 | -1650 | 389 | 1199 | S332 | -2400 | 389 | 1249 | S282 | -3150 | 389 |
| 1050 | V62T  | -165 | 244 | 1100 | S431 | -915 | 244 | 1150 | S381 | -1665 | 244 | 1200 | S331 | -2415 | 244 | 1250 | S281 | -3165 | 244 |

| No.  | Name | X     | Y   | No.  | Name | X     | Y   | No.  | Name | X     | Y   | No.  | Name | X     | Y   | No.  | Name | X     | Y   |
|------|------|-------|-----|------|------|-------|-----|------|------|-------|-----|------|------|-------|-----|------|------|-------|-----|
| 1251 | S280 | -3180 | 389 | 1301 | S230 | -3930 | 389 | 1351 | S180 | -4680 | 389 | 1401 | S130 | -5430 | 389 | 1451 | S80  | -6180 | 389 |
| 1252 | S279 | -3195 | 244 | 1302 | S229 | -3945 | 244 | 1352 | S179 | -4695 | 244 | 1402 | S129 | -5445 | 244 | 1452 | S79  | -6195 | 244 |
| 1253 | S278 | -3210 | 389 | 1303 | S228 | -3960 | 389 | 1353 | S178 | -4710 | 389 | 1403 | S128 | -5460 | 389 | 1453 | S78  | -6210 | 389 |
| 1254 | S277 | -3225 | 244 | 1304 | S227 | -3975 | 244 | 1354 | S177 | -4725 | 244 | 1404 | S127 | -5475 | 244 | 1454 | S77  | -6225 | 244 |
| 1255 | S276 | -3240 | 389 | 1305 | S226 | -3990 | 389 | 1355 | S176 | -4740 | 389 | 1405 | S126 | -5490 | 389 | 1455 | S76  | -6240 | 389 |
| 1256 | S275 | -3255 | 244 | 1306 | S225 | -4005 | 244 | 1356 | S175 | -4755 | 244 | 1406 | S125 | -5505 | 244 | 1456 | S75  | -6255 | 244 |
| 1257 | S274 | -3270 | 389 | 1307 | S224 | -4020 | 389 | 1357 | S174 | -4770 | 389 | 1407 | S124 | -5520 | 389 | 1457 | S74  | -6270 | 389 |
| 1258 | S273 | -3285 | 244 | 1308 | S223 | -4035 | 244 | 1358 | S173 | -4785 | 244 | 1408 | S123 | -5535 | 244 | 1458 | S73  | -6285 | 244 |
| 1259 | S272 | -3300 | 389 | 1309 | S222 | -4050 | 389 | 1359 | S172 | -4800 | 389 | 1409 | S122 | -5550 | 389 | 1459 | S72  | -6300 | 389 |
| 1260 | S271 | -3315 | 244 | 1310 | S221 | -4065 | 244 | 1360 | S171 | -4815 | 244 | 1410 | S121 | -5565 | 244 | 1460 | S71  | -6315 | 244 |
| 1261 | S270 | -3330 | 389 | 1311 | S220 | -4080 | 389 | 1361 | S170 | -4830 | 389 | 1411 | S120 | -5580 | 389 | 1461 | S70  | -6330 | 389 |
| 1262 | S269 | -3345 | 244 | 1312 | S219 | -4095 | 244 | 1362 | S169 | -4845 | 244 | 1412 | S119 | -5595 | 244 | 1462 | S69  | -6345 | 244 |
| 1263 | S268 | -3360 | 389 | 1313 | S218 | -4110 | 389 | 1363 | S168 | -4860 | 389 | 1413 | S118 | -5610 | 389 | 1463 | S68  | -6360 | 389 |
| 1264 | S267 | -3375 | 244 | 1314 | S217 | -4125 | 244 | 1364 | S167 | -4875 | 244 | 1414 | S117 | -5625 | 244 | 1464 | S67  | -6375 | 244 |
| 1265 | S266 | -3390 | 389 | 1315 | S216 | -4140 | 389 | 1365 | S166 | -4890 | 389 | 1415 | S116 | -5640 | 389 | 1465 | S66  | -6390 | 389 |
| 1266 | S265 | -3405 | 244 | 1316 | S215 | -4155 | 244 | 1366 | S165 | -4905 | 244 | 1416 | S115 | -5655 | 244 | 1466 | S65  | -6405 | 244 |
| 1267 | S264 | -3420 | 389 | 1317 | S214 | -4170 | 389 | 1367 | S164 | -4920 | 389 | 1417 | S114 | -5670 | 389 | 1467 | S64  | -6420 | 389 |
| 1268 | S263 | -3435 | 244 | 1318 | S213 | -4185 | 244 | 1368 | S163 | -4935 | 244 | 1418 | S113 | -5685 | 244 | 1468 | S63  | -6435 | 244 |
| 1269 | S262 | -3450 | 389 | 1319 | S212 | -4200 | 389 | 1369 | S162 | -4950 | 389 | 1419 | S112 | -5700 | 389 | 1469 | S62  | -6450 | 389 |
| 1270 | S261 | -3465 | 244 | 1320 | S211 | -4215 | 244 | 1370 | S161 | -4965 | 244 | 1420 | S111 | -5715 | 244 | 1470 | S61  | -6465 | 244 |
| 1271 | S260 | -3480 | 389 | 1321 | S210 | -4230 | 389 | 1371 | S160 | -4980 | 389 | 1421 | S110 | -5730 | 389 | 1471 | S60  | -6480 | 389 |
| 1272 | S259 | -3495 | 244 | 1322 | S209 | -4245 | 244 | 1372 | S159 | -4995 | 244 | 1422 | S109 | -5745 | 244 | 1472 | S59  | -6495 | 244 |
| 1273 | S258 | -3510 | 389 | 1323 | S208 | -4260 | 389 | 1373 | S158 | -5010 | 389 | 1423 | S108 | -5760 | 389 | 1473 | S58  | -6510 | 389 |
| 1274 | S257 | -3525 | 244 | 1324 | S207 | -4275 | 244 | 1374 | S157 | -5025 | 244 | 1424 | S107 | -5775 | 244 | 1474 | S57  | -6525 | 244 |
| 1275 | S256 | -3540 | 389 | 1325 | S206 | -4290 | 389 | 1375 | S156 | -5040 | 389 | 1425 | S106 | -5790 | 389 | 1475 | S56  | -6540 | 389 |
| 1276 | S255 | -3555 | 244 | 1326 | S205 | -4305 | 244 | 1376 | S155 | -5055 | 244 | 1426 | S105 | -5805 | 244 | 1476 | S55  | -6555 | 244 |
| 1277 | S254 | -3570 | 389 | 1327 | S204 | -4320 | 389 | 1377 | S154 | -5070 | 389 | 1427 | S104 | -5820 | 389 | 1477 | S54  | -6570 | 389 |
| 1278 | S253 | -3585 | 244 | 1328 | S203 | -4335 | 244 | 1378 | S153 | -5085 | 244 | 1428 | S103 | -5835 | 244 | 1478 | S53  | -6585 | 244 |
| 1279 | S252 | -3600 | 389 | 1329 | S202 | -4350 | 389 | 1379 | S152 | -5100 | 389 | 1429 | S102 | -5850 | 389 | 1479 | S52  | -6600 | 389 |
| 1280 | S251 | -3615 | 244 | 1330 | S201 | -4365 | 244 | 1380 | S151 | -5115 | 244 | 1430 | S101 | -5865 | 244 | 1480 | S51  | -6615 | 244 |
| 1281 | S250 | -3630 | 389 | 1331 | S200 | -4380 | 389 | 1381 | S150 | -5130 | 389 | 1431 | S100 | -5880 | 389 | 1481 | S50  | -6630 | 389 |
| 1282 | S249 | -3645 | 244 | 1332 | S199 | -4395 | 244 | 1382 | S149 | -5145 | 244 | 1432 | S99  | -5895 | 244 | 1482 | S49  | -6645 | 244 |
| 1283 | S248 | -3660 | 389 | 1333 | S198 | -4410 | 389 | 1383 | S148 | -5160 | 389 | 1433 | S98  | -5910 | 389 | 1483 | S48  | -6660 | 389 |
| 1284 | S247 | -3675 | 244 | 1334 | S197 | -4425 | 244 | 1384 | S147 | -5175 | 244 | 1434 | S97  | -5925 | 244 | 1484 | S47  | -6675 | 244 |
| 1285 | S246 | -3690 | 389 | 1335 | S196 | -4440 | 389 | 1385 | S146 | -5190 | 389 | 1435 | S96  | -5940 | 389 | 1485 | S46  | -6690 | 389 |
| 1286 | S245 | -3705 | 244 | 1336 | S195 | -4455 | 244 | 1386 | S145 | -5205 | 244 | 1436 | S95  | -5955 | 244 | 1486 | S45  | -6705 | 244 |
| 1287 | S244 | -3720 | 389 | 1337 | S194 | -4470 | 389 | 1387 | S144 | -5220 | 389 | 1437 | S94  | -5970 | 389 | 1487 | S44  | -6720 | 389 |
| 1288 | S243 | -3735 | 244 | 1338 | S193 | -4485 | 244 | 1388 | S143 | -5235 | 244 | 1438 | S93  | -5985 | 244 | 1488 | S43  | -6735 | 244 |
| 1289 | S242 | -3750 | 389 | 1339 | S192 | -4500 | 389 | 1389 | S142 | -5250 | 389 | 1439 | S92  | -6000 | 389 | 1489 | S42  | -6750 | 389 |
| 1290 | S241 | -3765 | 244 | 1340 | S191 | -4515 | 244 | 1390 | S141 | -5265 | 244 | 1440 | S91  | -6015 | 244 | 1490 | S41  | -6765 | 244 |
| 1291 | S240 | -3780 | 389 | 1341 | S190 | -4530 | 389 | 1391 | S140 | -5280 | 389 | 1441 | S90  | -6030 | 389 | 1491 | S40  | -6780 | 389 |
| 1292 | S239 | -3795 | 244 | 1342 | S189 | -4545 | 244 | 1392 | S139 | -5295 | 244 | 1442 | S89  | -6045 | 244 | 1492 | S39  | -6795 | 244 |
| 1293 | S238 | -3810 | 389 | 1343 | S188 | -4560 | 389 | 1393 | S138 | -5310 | 389 | 1443 | S88  | -6060 | 389 | 1493 | S38  | -6810 | 389 |
| 1294 | S237 | -3825 | 244 | 1344 | S187 | -4575 | 244 | 1394 | S137 | -5325 | 244 | 1444 | S87  | -6075 | 244 | 1494 | S37  | -6825 | 244 |
| 1295 | S236 | -3840 | 389 | 1345 | S186 | -4590 | 389 | 1395 | S136 | -5340 | 389 | 1445 | S86  | -6090 | 389 | 1495 | S36  | -6840 | 389 |
| 1296 | S235 | -3855 | 244 | 1346 | S185 | -4605 | 244 | 1396 | S135 | -5355 | 244 | 1446 | S85  | -6105 | 244 | 1496 | S35  | -6855 | 244 |
| 1297 | S234 | -3870 | 389 | 1347 | S184 | -4620 | 389 | 1397 | S134 | -5370 | 389 | 1447 | S84  | -6120 | 389 | 1497 | S34  | -6870 | 389 |
| 1298 | S233 | -3885 | 244 | 1348 | S183 | -4635 | 244 | 1398 | S133 | -5385 | 244 | 1448 | S83  | -6135 | 244 | 1498 | S33  | -6885 | 244 |
| 1299 | S232 | -3900 | 389 | 1349 | S182 | -4650 | 389 | 1399 | S132 | -5400 | 389 | 1449 | S82  | -6150 | 389 | 1499 | S32  | -6900 | 389 |
| 1300 | S231 | -3915 | 244 | 1350 | S181 | -4665 | 244 | 1400 | S131 | -5415 | 244 | 1450 | S81  | -6165 | 244 | 1500 | S31  | -6915 | 244 |

| No.  | Name  | X     | Y   | No.  | Name | X     | Y   | No.  | Name | X     | Y   | No.  | Name | X      | Y   | No.  | Name | X      | Y   |
|------|-------|-------|-----|------|------|-------|-----|------|------|-------|-----|------|------|--------|-----|------|------|--------|-----|
| 1501 | S30   | -6930 | 389 | 1551 | G448 | -7830 | 389 | 1601 | G348 | -8580 | 389 | 1651 | G248 | -9330  | 389 | 1701 | G148 | -10080 | 389 |
| 1502 | S29   | -6945 | 244 | 1552 | G446 | -7845 | 244 | 1602 | G346 | -8595 | 244 | 1652 | G246 | -9345  | 244 | 1702 | G146 | -10095 | 244 |
| 1503 | S28   | -6960 | 389 | 1553 | G444 | -7860 | 389 | 1603 | G344 | -8610 | 389 | 1653 | G244 | -9360  | 389 | 1703 | G144 | -10110 | 389 |
| 1504 | S27   | -6975 | 244 | 1554 | G442 | -7875 | 244 | 1604 | G342 | -8625 | 244 | 1654 | G242 | -9375  | 244 | 1704 | G142 | -10125 | 244 |
| 1505 | S26   | -6990 | 389 | 1555 | G440 | -7890 | 389 | 1605 | G340 | -8640 | 389 | 1655 | G240 | -9390  | 389 | 1705 | G140 | -10140 | 389 |
| 1506 | S25   | -7005 | 244 | 1556 | G438 | -7905 | 244 | 1606 | G338 | -8655 | 244 | 1656 | G238 | -9405  | 244 | 1706 | G138 | -10155 | 244 |
| 1507 | S24   | -7020 | 389 | 1557 | G436 | -7920 | 389 | 1607 | G336 | -8670 | 389 | 1657 | G236 | -9420  | 389 | 1707 | G136 | -10170 | 389 |
| 1508 | S23   | -7035 | 244 | 1558 | G434 | -7935 | 244 | 1608 | G334 | -8685 | 244 | 1658 | G234 | -9435  | 244 | 1708 | G134 | -10185 | 244 |
| 1509 | S22   | -7050 | 389 | 1559 | G432 | -7950 | 389 | 1609 | G332 | -8700 | 389 | 1659 | G232 | -9450  | 389 | 1709 | G132 | -10200 | 389 |
| 1510 | S21   | -7065 | 244 | 1560 | G430 | -7965 | 244 | 1610 | G330 | -8715 | 244 | 1660 | G230 | -9465  | 244 | 1710 | G130 | -10215 | 244 |
| 1511 | S20   | -7080 | 389 | 1561 | G428 | -7980 | 389 | 1611 | G328 | -8730 | 389 | 1661 | G228 | -9480  | 389 | 1711 | G128 | -10230 | 389 |
| 1512 | S19   | -7095 | 244 | 1562 | G426 | -7995 | 244 | 1612 | G326 | -8745 | 244 | 1662 | G226 | -9495  | 244 | 1712 | G126 | -10245 | 244 |
| 1513 | S18   | -7110 | 389 | 1563 | G424 | -8010 | 389 | 1613 | G324 | -8760 | 389 | 1663 | G224 | -9510  | 389 | 1713 | G124 | -10260 | 389 |
| 1514 | S17   | -7125 | 244 | 1564 | G422 | -8025 | 244 | 1614 | G322 | -8775 | 244 | 1664 | G222 | -9525  | 244 | 1714 | G122 | -10275 | 244 |
| 1515 | S16   | -7140 | 389 | 1565 | G420 | -8040 | 389 | 1615 | G320 | -8790 | 389 | 1665 | G220 | -9540  | 389 | 1715 | G120 | -10290 | 389 |
| 1516 | S15   | -7155 | 244 | 1566 | G418 | -8055 | 244 | 1616 | G318 | -8805 | 244 | 1666 | G218 | -9555  | 244 | 1716 | G118 | -10305 | 244 |
| 1517 | S14   | -7170 | 389 | 1567 | G416 | -8070 | 389 | 1617 | G316 | -8820 | 389 | 1667 | G216 | -9570  | 389 | 1717 | G116 | -10320 | 389 |
| 1518 | S13   | -7185 | 244 | 1568 | G414 | -8085 | 244 | 1618 | G314 | -8835 | 244 | 1668 | G214 | -9585  | 244 | 1718 | G114 | -10335 | 244 |
| 1519 | S12   | -7200 | 389 | 1569 | G412 | -8100 | 389 | 1619 | G312 | -8850 | 389 | 1669 | G212 | -9600  | 389 | 1719 | G112 | -10350 | 389 |
| 1520 | S11   | -7215 | 244 | 1570 | G410 | -8115 | 244 | 1620 | G310 | -8865 | 244 | 1670 | G210 | -9615  | 244 | 1720 | G110 | -10365 | 244 |
| 1521 | S10   | -7230 | 389 | 1571 | G408 | -8130 | 389 | 1621 | G308 | -8880 | 389 | 1671 | G208 | -9630  | 389 | 1721 | G108 | -10380 | 389 |
| 1522 | S9    | -7245 | 244 | 1572 | G406 | -8145 | 244 | 1622 | G306 | -8895 | 244 | 1672 | G206 | -9645  | 244 | 1722 | G106 | -10395 | 244 |
| 1523 | S8    | -7260 | 389 | 1573 | G404 | -8160 | 389 | 1623 | G304 | -8910 | 389 | 1673 | G204 | -9660  | 389 | 1723 | G104 | -10410 | 389 |
| 1524 | S7    | -7275 | 244 | 1574 | G402 | -8175 | 244 | 1624 | G302 | -8925 | 244 | 1674 | G202 | -9675  | 244 | 1724 | G102 | -10425 | 244 |
| 1525 | S6    | -7290 | 389 | 1575 | G400 | -8190 | 389 | 1625 | G300 | -8940 | 389 | 1675 | G200 | -9690  | 389 | 1725 | G100 | -10440 | 389 |
| 1526 | S5    | -7305 | 244 | 1576 | G398 | -8205 | 244 | 1626 | G298 | -8955 | 244 | 1676 | G198 | -9705  | 244 | 1726 | G98  | -10455 | 244 |
| 1527 | S4    | -7320 | 389 | 1577 | G396 | -8220 | 389 | 1627 | G296 | -8970 | 389 | 1677 | G196 | -9720  | 389 | 1727 | G96  | -10470 | 389 |
| 1528 | S3    | -7335 | 244 | 1578 | G394 | -8235 | 244 | 1628 | G294 | -8985 | 244 | 1678 | G194 | -9735  | 244 | 1728 | G94  | -10485 | 244 |
| 1529 | S2    | -7350 | 389 | 1579 | G392 | -8250 | 389 | 1629 | G292 | -9000 | 389 | 1679 | G192 | -9750  | 389 | 1729 | G92  | -10500 | 389 |
| 1530 | S1    | -7365 | 244 | 1580 | G390 | -8265 | 244 | 1630 | G290 | -9015 | 244 | 1680 | G190 | -9765  | 244 | 1730 | G90  | -10515 | 244 |
| 1531 | DUMMY | -7380 | 389 | 1581 | G388 | -8280 | 389 | 1631 | G288 | -9030 | 389 | 1681 | G188 | -9780  | 389 | 1731 | G88  | -10530 | 389 |
| 1532 | DUMMY | -7395 | 244 | 1582 | G386 | -8295 | 244 | 1632 | G286 | -9045 | 244 | 1682 | G186 | -9795  | 244 | 1732 | G86  | -10545 | 244 |
| 1533 | DUMMY | -7560 | 389 | 1583 | G384 | -8310 | 389 | 1633 | G284 | -9060 | 389 | 1683 | G184 | -9810  | 389 | 1733 | G84  | -10560 | 389 |
| 1534 | DUMMY | -7575 | 244 | 1584 | G382 | -8325 | 244 | 1634 | G282 | -9075 | 244 | 1684 | G182 | -9825  | 244 | 1734 | G82  | -10575 | 244 |
| 1535 | G480  | -7590 | 389 | 1585 | G380 | -8340 | 389 | 1635 | G280 | -9090 | 389 | 1685 | G180 | -9840  | 389 | 1735 | G80  | -10590 | 389 |
| 1536 | G478  | -7605 | 244 | 1586 | G378 | -8355 | 244 | 1636 | G278 | -9105 | 244 | 1686 | G178 | -9855  | 244 | 1736 | G78  | -10605 | 244 |
| 1537 | G476  | -7620 | 389 | 1587 | G376 | -8370 | 389 | 1637 | G276 | -9120 | 389 | 1687 | G176 | -9870  | 389 | 1737 | G76  | -10620 | 389 |
| 1538 | G474  | -7635 | 244 | 1588 | G374 | -8385 | 244 | 1638 | G274 | -9135 | 244 | 1688 | G174 | -9885  | 244 | 1738 | G74  | -10635 | 244 |
| 1539 | G472  | -7650 | 389 | 1589 | G372 | -8400 | 389 | 1639 | G272 | -9150 | 389 | 1689 | G172 | -9900  | 389 | 1739 | G72  | -10650 | 389 |
| 1540 | G470  | -7665 | 244 | 1590 | G370 | -8415 | 244 | 1640 | G270 | -9165 | 244 | 1690 | G170 | -9915  | 244 | 1740 | G70  | -10665 | 244 |
| 1541 | G468  | -7680 | 389 | 1591 | G368 | -8430 | 389 | 1641 | G268 | -9180 | 389 | 1691 | G168 | -9930  | 389 | 1741 | G68  | -10680 | 389 |
| 1542 | G466  | -7695 | 244 | 1592 | G366 | -8445 | 244 | 1642 | G266 | -9195 | 244 | 1692 | G166 | -9945  | 244 | 1742 | G66  | -10695 | 244 |
| 1543 | G464  | -7710 | 389 | 1593 | G364 | -8460 | 389 | 1643 | G264 | -9210 | 389 | 1693 | G164 | -9960  | 389 | 1743 | G64  | -10710 | 389 |
| 1544 | G462  | -7725 | 244 | 1594 | G362 | -8475 | 244 | 1644 | G262 | -9225 | 244 | 1694 | G162 | -9975  | 244 | 1744 | G62  | -10725 | 244 |
| 1545 | G460  | -7740 | 389 | 1595 | G360 | -8490 | 389 | 1645 | G260 | -9240 | 389 | 1695 | G160 | -9990  | 389 | 1745 | G60  | -10740 | 389 |
| 1546 | G458  | -7755 | 244 | 1596 | G358 | -8505 | 244 | 1646 | G258 | -9255 | 244 | 1696 | G158 | -10005 | 244 | 1746 | G58  | -10755 | 244 |
| 1547 | G456  | -7770 | 389 | 1597 | G356 | -8520 | 389 | 1647 | G256 | -9270 | 389 | 1697 | G156 | -10020 | 389 | 1747 | G56  | -10770 | 389 |
| 1548 | G454  | -7785 | 244 | 1598 | G354 | -8535 | 244 | 1648 | G254 | -9285 | 244 | 1698 | G154 | -10035 | 244 | 1748 | G54  | -10785 | 244 |
| 1549 | G452  | -7800 | 389 | 1599 | G352 | -8550 | 389 | 1649 | G252 | -9300 | 389 | 1699 | G152 | -10050 | 389 | 1749 | G52  | -10800 | 389 |
| 1550 | G450  | -7815 | 244 | 1600 | G350 | -8565 | 244 | 1650 | G250 | -9315 | 244 | 1700 | G150 | -10065 | 244 | 1750 | G50  | -10815 | 244 |







## 6. Block Function Description

### Interface

The ILI9481 incorporates command method 18-/16-/9-/8-bits bus display command interface, which consists of 8 bits command registers and 8 bits parameter registers. Parameter registers consist of 8 bits write data register (WDR) and 8bit read data register (RDR).

WDR stores data to be written into GRAM or parameters temporarily while RDR stores data read out from GRAM temporarily. When data is written from microcomputer to GRAM, the ILI9481 writes firstly to WDR, and then the data is written to GRAM automatically by internal operation. Because read out operation from GRAM is conducted through RDR, first read out data is invalid. Normal data is read out from 2<sup>nd</sup> read out data.

| Register selection |     |     | Operation       |
|--------------------|-----|-----|-----------------|
| DCX                | RDX | WRX |                 |
| 0                  | 1   | ↑   | Command         |
| 1                  | ↑   | 1   | Read parameter  |
| 1                  | 1   | ↑   | Write parameter |

### Address Counter (AC)

Address counter (AC) gives address to GRAM. When command setting address is written to CDR, the data is transferred from CDR to AC.

When data is written to GRAM, address counter (AC) increments by +1 or -1 automatically. AC after data is read out increments by +1 or -1 likewise. The ILI9481 writes data to only rectangular area that was specified by GRAM.

### Graphic RAM (GRAM)

The graphic RAM (GRAM) stores 345,600 byte bit pattern data using 18 bits for one pixel, enabling a maximum 320RGB x 480 dot graphic display at the maximum.

### Grayscale Voltage Generating Circuit

Grayscale voltage generating circuit generates a liquid crystal drive voltage, which corresponds to grayscale level set in the  $\gamma$  correction register. The ILI9481 displays 262,144 colors at the maximum.

### Power Supply Circuit

The power supply circuit generates supply voltages to a-TFT panel, VREG1OUT, VGH, VGL, VCOMH and VCOML.

### Timing Generating

The timing generator generates timing signals for internal circuits such as the internal GRAM. The timing for display operation such as RAM read operation and the timing for internal operation such as RAM access by MPU is outputted separately so that they do not interfere with each other.

**Oscillator**

The ILI9481 incorporates RC oscillator circuit. The frame frequency is changeable by command settings.

**Panel Driver Circuit**

The liquid crystal display driver circuit consists of 960 source drivers (S1~S960). Display pattern data is latched when 960 byte data is input. This latched data controls source drivers and outputs drive waveform.

The shift direction of 960-bit output from the source driver can be changed by setting commands.

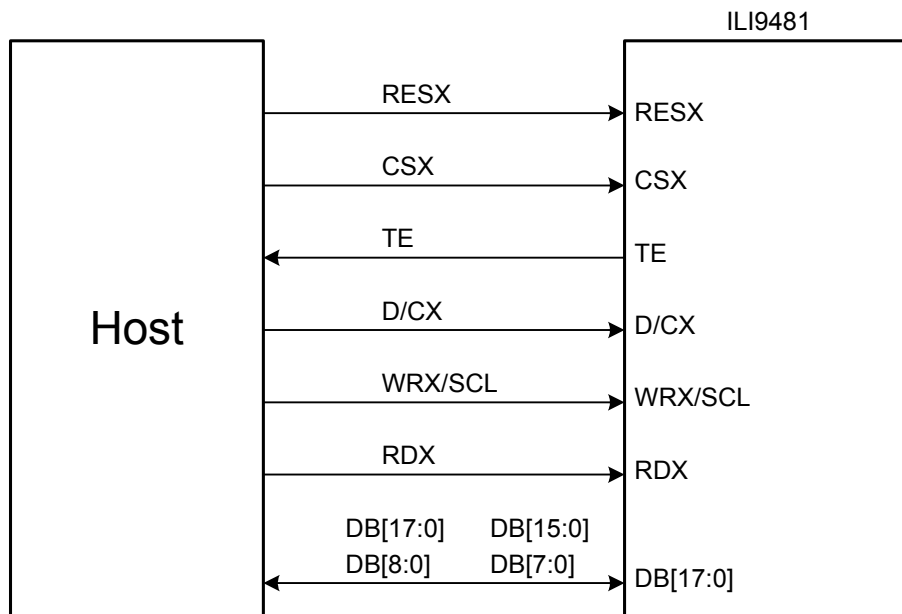
The gate driver consists of 480 gate drivers (G1~G480) and outputs either VGH or VGL level. The shift direction of gate driver is set by GS bit. Scan direction of gate driver is set by SM bit enabling users to set the ILI9481 so that it suits mounting method



## 7. Function Description

### 7.1. Display Bus Interface (DBI)

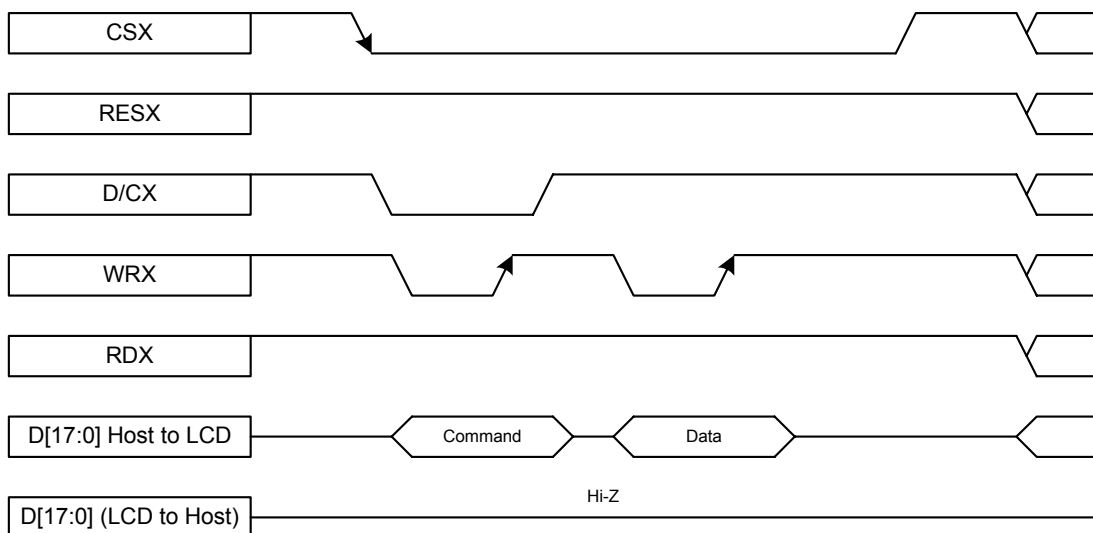
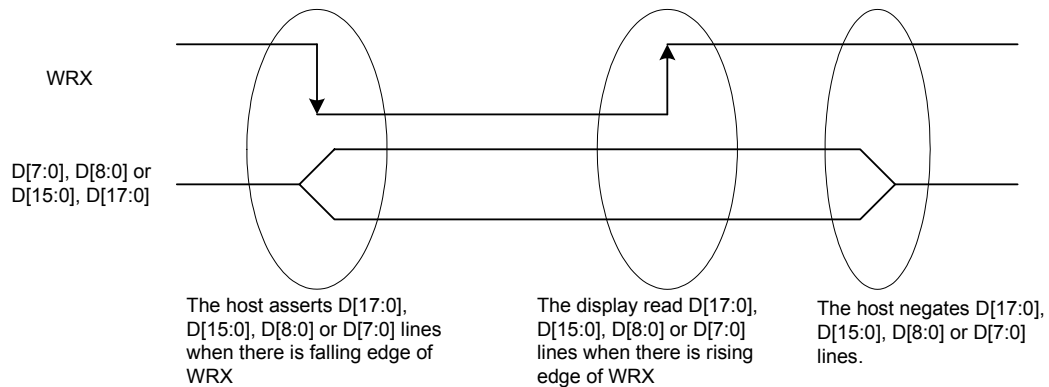
The ILI9481 uses a 22-wires 18-bit parallel interface. The chip-select CSX (active low) enables and disables the DBI interface. RESX (active low) is an external reset signal. WRX is the data write, RDX is the data read and D[17:0] is parallel DBI data. There are four 17/16/9/8-bit types interface supported for the display data transfer. The Graphics Controller Chip reads the data at the rising edge of RDX signal. The D/CX is data/command flag. When D/CX = "1", D17 to D0 bits are display RAM data or command parameters. When D/CX = "0" D7 to D0 bits are commands.



### 7.1.1. Write Cycle

During a write cycle the host processor sends data to the display module via the interface. The Type B interface utilizes D/CX, RDX and WRX signals as well as all eight (D[7:0]), nine (D[8:0]), sixteen (D[15:0]) or eighteen (D[17:0]) information signals. WRX is driven from high to low then pulled back to high during the write cycle. The host processor provides information during the write cycle while the display module reads the host processor information on the rising edge of WRX. D/CX is driven low while command information is on the interface and is pulled high when data is present.

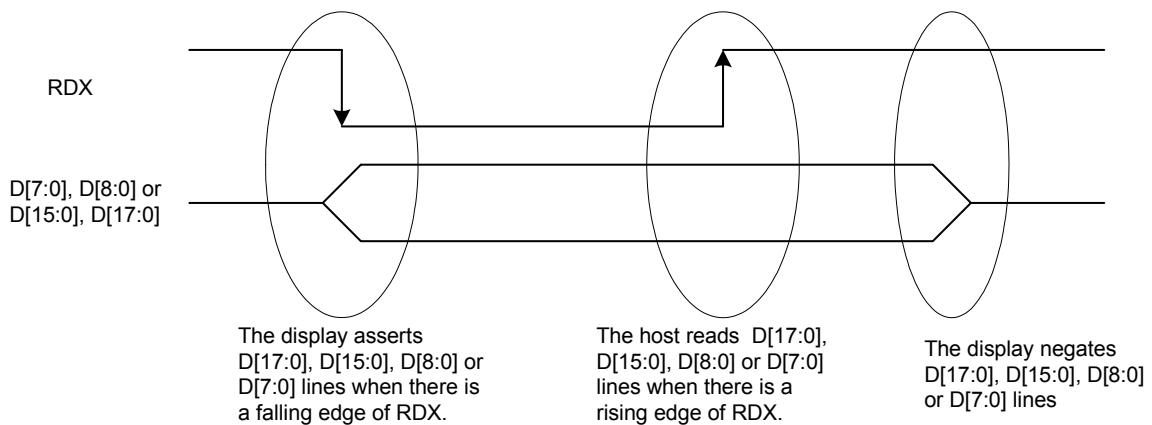
The following figure shows a write cycle for the type B interface.



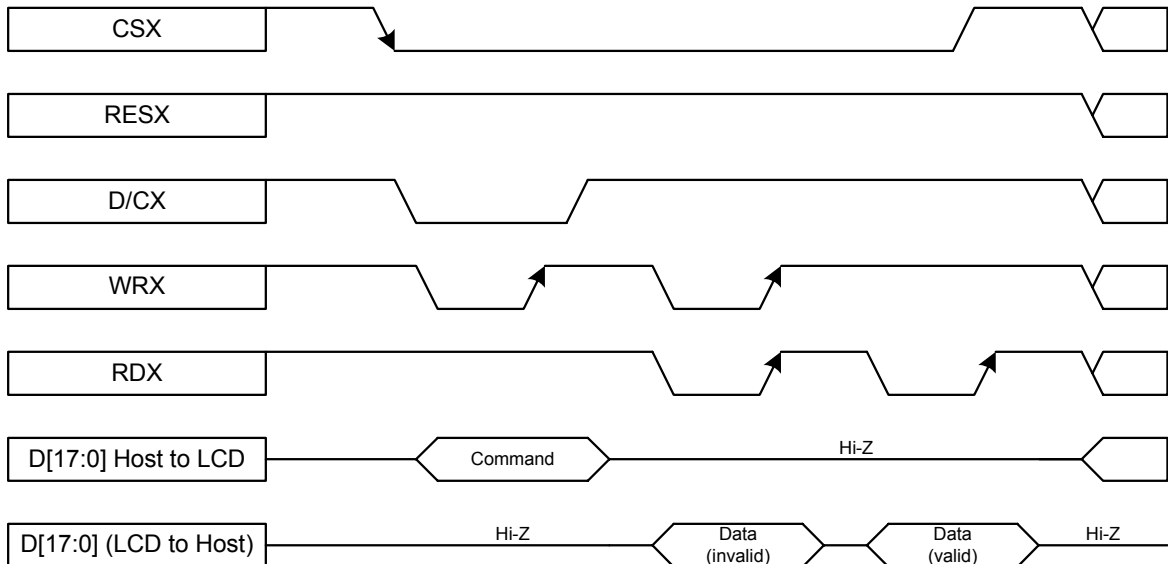
### 7.1.2. Read Cycle

During a read cycle the host processor reads data from the display module via the interface. The Type B interface utilizes D/CX, RDX and WRX signals as well as all eight (D[7:0]), nine (D[8:0]), sixteen (D[15:0]) or eighteen (D[17:0]) information signals. RDX is driven from high to low then allowed to be pulled back to high during the read cycle. The display module provides information to the host processor during the read cycle while the host processor reads the display module information on the rising edge of RDX. D/CX is driven high during the read cycle.

The following figure shows the read cycle for the type B interface.



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



Note: Read Data is only valid when the D/CX input is pulled high. If D/CX is driven low during read then the display information outputs will be High-Z.

**DBI Type B Interface**

18-bit data bus DB[17:0] interface, IM[2:0] = 000

|                         | Set_pixel_format | DFM | DB17 | DB16 | DB15 | DB14 | DB13 | DB12 | DB11 | DB10 | DB9 | DB8 | DB7  | DB6  | DB5  | DB4  | DB3  | DB2  | DB1  | DB0  |
|-------------------------|------------------|-----|------|------|------|------|------|------|------|------|-----|-----|------|------|------|------|------|------|------|------|
| Command/Parameter Write | *                | *   |      |      |      |      |      |      |      |      |     |     | D[7] | D[6] | D[5] | D[4] | D[3] | D[2] | D[1] | D[0] |
| Command/Parameter Read  | *                | *   |      |      |      |      |      |      |      |      |     |     | D[7] | D[6] | D[5] | D[4] | D[3] | D[2] | D[1] | D[0] |

|                          | Set_pixel_format | DFM | DB17 | DB16 | DB15 | DB14 | DB13 | DB12 | DB11 | DB10 | DB9  | DB8  | DB7  | DB6  | DB5  | DB4  | DB3  | DB2  | DB1  | DB0  |
|--------------------------|------------------|-----|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| 18bpp Frame Memory Write | 3'h6             | *   | R[5] | R[4] | R[3] | R[2] | R[1] | R[0] | G[5] | G[4] | G[3] | G[2] | G[1] | G[0] | B[5] | B[4] | B[3] | B[2] | B[1] | B[0] |
| Frame Memory Read        | *                | *   | r[5] | r[4] | r[3] | r[2] | r[1] | r[0] | g[5] | g[4] | g[3] | g[2] | g[1] | g[0] | b[5] | b[4] | b[3] | b[2] | b[1] | b[0] |

16-bit data bus DB[15:0] interface, IM[2:0] = 010

|                         | Set_pixel_format | DFM | DB15 | DB14 | DB13 | DB12 | DB11 | DB10 | DB9 | DB8 | DB7 | DB6  | DB5  | DB4  | DB3  | DB2  | DB1  | DB0  |      |
|-------------------------|------------------|-----|------|------|------|------|------|------|-----|-----|-----|------|------|------|------|------|------|------|------|
| Command/Parameter Write | *                | *   |      |      |      |      |      |      |     |     |     | D[7] | D[6] | D[5] | D[4] | D[3] | D[2] | D[1] | D[0] |
| Command/Parameter Read  | *                | *   |      |      |      |      |      |      |     |     |     | D[7] | D[6] | D[5] | D[4] | D[3] | D[2] | D[1] | D[0] |

|                          | Set_pixel_format | DFM | DB15 | DB14 | DB13 | DB12 | DB11 | DB10 | DB9  | DB8  | DB7  | DB6  | DB5  | DB4  | DB3  | DB2  | DB1  | DB0  |
|--------------------------|------------------|-----|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| 16bpp Frame Memory Write | 3'h5             | *   | R[4] | R[3] | R[2] | R[1] | R[0] | G[5] | G[4] | G[3] | G[2] | G[1] | G[0] | B[4] | B[3] | B[2] | B[1] | B[0] |
| Frame Memory Read        | *                | *   | r[4] | r[3] | r[2] | r[1] | r[0] | g[5] | g[4] | g[3] | g[2] | g[1] | g[0] | b[4] | b[3] | b[2] | b[1] | b[0] |

|                          | Set_pixel_format | DFM | First Transfer |         |         |         | Second Transfer |         |         |         | Third Transfer |         |         |         |         |  |         |  |  |  |
|--------------------------|------------------|-----|----------------|---------|---------|---------|-----------------|---------|---------|---------|----------------|---------|---------|---------|---------|--|---------|--|--|--|
|                          |                  |     | DB[15:10]      | DB[9:8] | DB[7:2] | DB[1:0] | DB[15:10]       | DB[9:8] | DB[7:2] | DB[1:0] | DB[15:10]      | DB[9:8] | DB[7:2] | DB[1:0] |         |  |         |  |  |  |
| 18bpp Frame Memory Write | 3'h6             | 0   | R[15:0]        |         | G[15:0] |         | B[15:0]         |         | R[25:0] |         | B[15:0]        |         | G[25:0] |         | B[25:0] |  | R[15:0] |  |  |  |
|                          |                  | 1   |                | R[15:0] |         | G[15:0] |                 | B[15:0] |         |         | R[25:0]        |         | B[15:0] |         | G[25:0] |  | B[25:0] |  |  |  |
| Frame Memory Read        | *                | 0   | r[15:0]        |         | g[15:0] |         | b[15:0]         |         | r[25:0] |         | b[15:0]        |         | g[25:0] |         | b[25:0] |  | r[15:0] |  |  |  |
|                          |                  | 1   |                | r[15:0] |         | g[15:0] |                 | b[15:0] |         |         | r[25:0]        |         | b[15:0] |         | g[25:0] |  | b[25:0] |  |  |  |

9-bit data bus DB[8:0] interface, IM[2:0] = 001

|                         | Set_pixel_format | DFM | DB8 | DB7  | DB6  | DB5  | DB4  | DB3  | DB2  | DB1  | DB0  |
|-------------------------|------------------|-----|-----|------|------|------|------|------|------|------|------|
| Command/Parameter Write | *                | *   |     | D[7] | D[6] | D[5] | D[4] | D[3] | D[2] | D[1] | D[0] |
| Command/Parameter Read  | *                | *   |     | D[7] | D[6] | D[5] | D[4] | D[3] | D[2] | D[1] | D[0] |

|                          | Set_pixel_format | DFM | First Transfer |      |      |      | Second Transfer |      |      |      |      |      |      |      |      |      |      |      |      |      |
|--------------------------|------------------|-----|----------------|------|------|------|-----------------|------|------|------|------|------|------|------|------|------|------|------|------|------|
|                          |                  |     | DB8            | DB7  | DB6  | DB5  | DB4             | DB3  | DB2  | DB1  | DB0  | DB8  | DB7  | DB6  | DB5  | DB4  | DB3  | DB2  | DB1  | DB0  |
| 18bpp Frame Memory Write | 3'h6             | *   | R[5]           | R[4] | R[3] | R[2] | R[1]            | R[0] | G[5] | G[4] | G[3] | G[2] | G[1] | G[0] | B[5] | B[4] | B[3] | B[2] | B[1] | B[0] |
| Frame Memory Read        | *                | *   | r[5]           | r[4] | r[3] | r[2] | r[1]            | r[0] | g[5] | g[4] | g[3] | g[2] | g[1] | g[0] | b[5] | b[4] | b[3] | b[2] | b[1] | b[0] |

8-bit data bus DB[7:0] interface, IM[2:0] = 011

|                         | Set_pixel_format | DFM | DB7  | DB6  | DB5  | DB4  | DB3  | DB2  | DB1  | DB0  |
|-------------------------|------------------|-----|------|------|------|------|------|------|------|------|
| Command/Parameter Write | *                | *   | D[7] | D[6] | D[5] | D[4] | D[3] | D[2] | D[1] | D[0] |
| Command/Parameter Read  | *                | *   | D[7] | D[6] | D[5] | D[4] | D[3] | D[2] | D[1] | D[0] |

|                          | Set_pixel_format | DFM | First Transfer |      |      |      | Second Transfer |      |      |      |      |      |      |      |      |      |      |      |
|--------------------------|------------------|-----|----------------|------|------|------|-----------------|------|------|------|------|------|------|------|------|------|------|------|
|                          |                  |     | DB7            | DB6  | DB5  | DB4  | DB3             | DB2  | DB1  | DB0  | DB7  | DB6  | DB5  | DB4  | DB3  | DB2  | DB1  | DB0  |
| 16bpp Frame Memory Write | 3'h5             | *   | R[4]           | R[3] | R[2] | R[1] | R[0]            | G[5] | G[4] | G[3] | G[2] | G[1] | G[0] | B[4] | B[3] | B[2] | B[1] | B[0] |
| Frame Memory Read        | *                | *   | r[4]           | r[3] | r[2] | r[1] | r[0]            | g[5] | g[4] | g[3] | g[2] | g[1] | g[0] | b[4] | b[3] | b[2] | b[1] | b[0] |

|                          | Set_pixel_format | DFM | First Transfer |      |      |      | Second Transfer |      |     |     | Third Transfer |      |      |      |      |      |     |     |      |      |      |      |      |      |
|--------------------------|------------------|-----|----------------|------|------|------|-----------------|------|-----|-----|----------------|------|------|------|------|------|-----|-----|------|------|------|------|------|------|
|                          |                  |     | DB7            | DB6  | DB5  | DB4  | DB3             | DB2  | DB1 | DB0 | DB7            | DB6  | DB5  | DB4  | DB3  | DB2  | DB1 | DB0 |      |      |      |      |      |      |
| 18bpp Frame Memory Write | 3'h6             | *   | R[5]           | R[4] | R[3] | R[2] | R[1]            | R[0] |     |     | G[5]           | G[4] | G[3] | G[2] | G[1] | G[0] |     |     | B[5] | B[4] | B[3] | B[2] | B[1] | B[0] |
| Frame Memory Read        | *                | *   | r[5]           | r[4] | r[3] | r[2] | r[1]            | r[0] |     |     | g[5]           | g[4] | g[3] | g[2] | g[1] | g[0] |     |     | b[5] | b[4] | b[3] | b[2] | b[1] | b[0] |

16-bit data extend to 18-bit

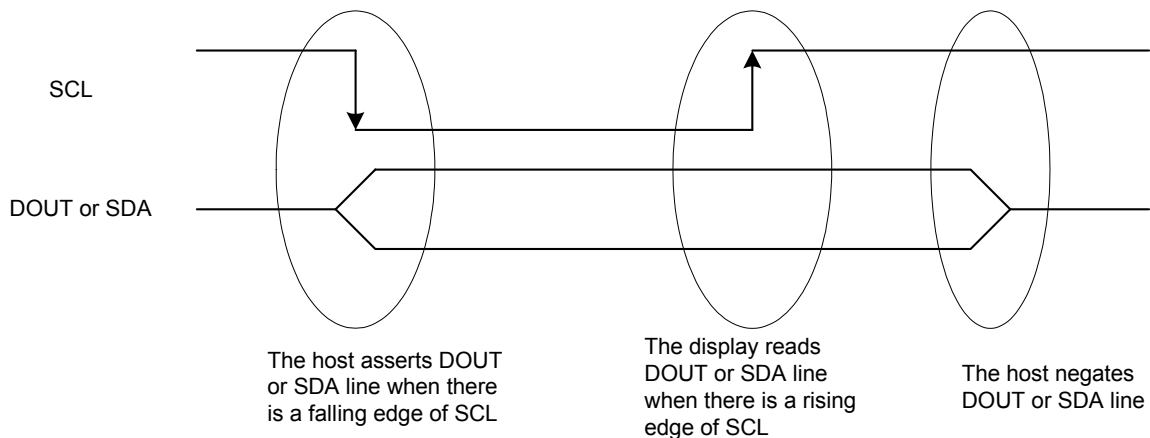
| Set_pixel_format | EPF[1:0] | Frame Memory Data (18bpp) |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |  |
|------------------|----------|---------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|--|
|                  |          | DB17                      | DB16 | DB15 | DB14 | DB13 | DB12 | DB11 | DB10 | DB9  | DB8  | DB7  | DB6  | DB5  | DB4  | DB3  | DB2  | DB1  | DB0  |  |
| 18bpp            | *        | R[5]                      | R[4] | R[3] | R[2] | R[1] | R[0] | G[5] | G[4] | G[3] | G[2] | G[1] | G[0] | B[5] | B[4] | B[3] | B[2] | B[1] | B[0] |  |
|                  | 2'h0     | R[4]                      | R[3] | R[2] | R[1] | R[0] | 0    | G[5] | G[4] | G[3] | G[2] | G[1] | G[0] | B[4] | B[3] | B[2] | B[1] | B[0] | 0    |  |
|                  | 2'h1     | R[4]                      | R[3] | R[2] | R[1] | R[0] | 1    | G[5] | G[4] | G[3] | G[2] | G[1] | G[0] | B[4] | B[3] | B[2] | B[1] | B[0] | 1    |  |
| 16bpp            | 2'h2     | R[4]                      | R[3] | R[2] | R[1] | R[0] | R[4] | G[5] | G[4] | G[3] | G[2] | G[1] | G[0] | B[4] | B[3] | B[2] | B[1] | B[0] | B[4] |  |
|                  | 2'h2     | R[4]                      | R[3] | R[2] | R[1] | R[0] | R[4] | G[5] | G[4] | G[3] | G[2] | G[1] | G[0] | B[4] | B[3] | B[2] | B[1] | B[0] | B[4] |  |

## 7.2. Serial Interface (Type C)

### 7.2.1. Write Cycle and Sequence

During a write cycle the host processor sends a single bit of data to the display module via the interface. The Type C interface utilizes CSX, SCL and SDA or DOUT signals. SCL is driven from high to low then pulled back to high during the write cycle. The host processor provides information during the write cycle while the display module reads the host processor information on the rising edge of SCL.

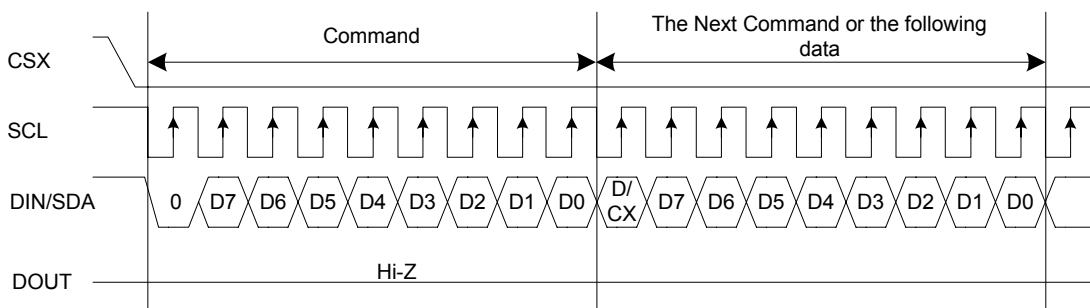
The following figure shows the write cycle for the type C interface.



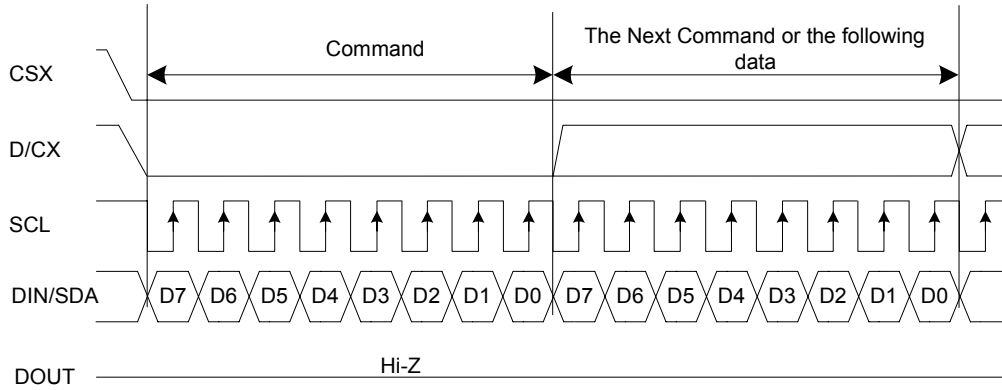
Note: SCL is an unsynchronized signal; it can be stopped.

During the write sequence the host processor writes one or more bytes of information to the display module via the interface. The write sequence is initiated when CSX is driven from high to low and ends when CSX is pulled high. Each byte is either nine or sixteen write cycles in length. If the optional D/CX signal is used a byte is eight write cycles long. D/CX is driven low while command information is on the interface and is pulled high when data is present.

The type C interface write sequences are described in the following Figure



DBI Type C Interface Write Sequence - Option 1



**DBI Type C Interface Write Sequence - Option 3**

Note:

1. D7 is MSB and D0 is LSB of byte.
2. When the Interface control register (C6h) SDA\_EN is set as '1', the DIN/SDA pin is bi-direction and DOUT pin is not used.
3. When the Interface control register (C6h) SDA\_EN is set as '0', the DIN/SDA pin is uni-direction and DIN and DOUT pins are used for data write and read.

**DBI Type C Interface IM[2:0]=101/111**

|                          | Set_pixel_format | DFM | DB7  | DB6  | DB5     | DB4     | DB3     | DB2     | DB1     | DB0     | DB7  | DB6  | DB5     | DB4     | DB3     | DB2     | DB1     | DB0     | DB7  | DB6  | DB5     | DB4     | DB3     | DB2     | DB1     | DB0     |
|--------------------------|------------------|-----|------|------|---------|---------|---------|---------|---------|---------|------|------|---------|---------|---------|---------|---------|---------|------|------|---------|---------|---------|---------|---------|---------|
| 3bpp Frame Memory Write  | 3'h1             | 0   |      |      | R[1][0] | G[1][0] | B[1][0] | R[2][0] | G[2][0] | B[2][0] |      |      | R[3][0] | G[3][0] | B[3][0] | R[4][0] | G[4][0] | B[4][0] |      |      | R[5][0] | G[5][0] | B[5][0] | R[6][0] | G[6][0] | B[6][0] |
| 18bpp Frame Memory Write | 3'h6             | *   | R[5] | R[4] | R[3]    | R[2]    | R[1]    | R[0]    |         |         | G[5] | G[4] | G[3]    | G[2]    | G[1]    | G[0]    |         |         | B[5] | B[4] | B[3]    | B[2]    | B[1]    | B[0]    |         |         |
| Frame Memory Read        | *                | *   | r[5] | r[4] | R[3]    | r[2]    | r[1]    | r[0]    |         |         | g[5] | g[4] | g[3]    | g[2]    | g[1]    | g[0]    |         |         | b[5] | b[4] | b[3]    | b[2]    | b[1]    | b[0]    |         |         |

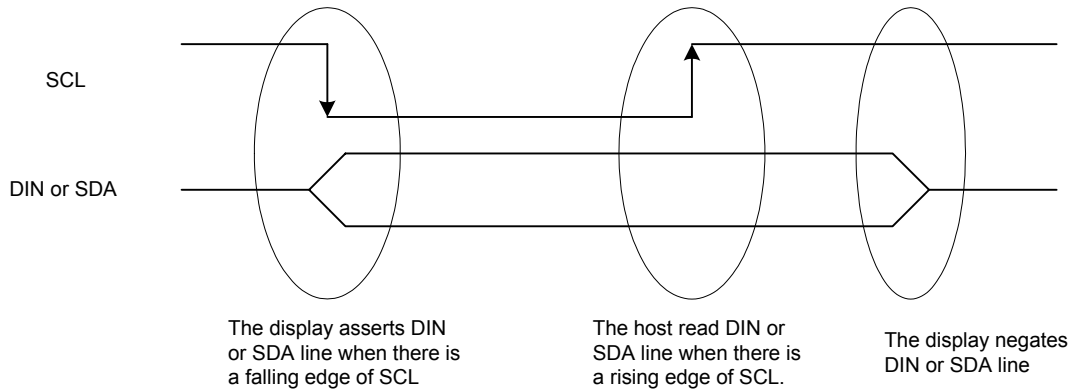
**3/16-bit data extend to 18-bit**

|       | Set_pixel_format | EPF[1:0] | Frame Memory Data (18bpp) |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |  |  |  |  |  |  |
|-------|------------------|----------|---------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|--|--|--|--|--|--|
|       |                  |          | DB17                      | DB16 | DB15 | DB14 | DB13 | DB12 | DB11 | DB10 | DB9  | DB8  | DB7  | DB6  | DB5  | DB4  | DB3  | DB2  | DB1  | DB0  |  |  |  |  |  |  |
| 18bpp | *                |          | R[5]                      | R[4] | R[3] | R[2] | R[1] | R[0] | G[5] | G[4] | G[3] | G[2] | G[1] | G[0] | B[5] | B[4] | B[3] | B[2] | B[1] | B[0] |  |  |  |  |  |  |
| 3bpp  | *                |          | R[0]                      | R[0] | R[0] | R[0] | R[0] | R[0] | G[0] | G[0] | G[0] | G[0] | G[0] | G[0] | B[0] | B[0] | B[0] | B[0] | B[0] | B[0] |  |  |  |  |  |  |

### 7.2.2. Read Cycle and Sequence

During a read cycle the host processor reads a single bit of data from the display module via the interface. The Type C interface utilizes CSX, SCL and DIN signals. SCL is driven from high to low then pulled back to high during the read cycle. The display module provides information during the read cycle while the host processor reads the display module information on the rising edge of SCL. D/CX is driven during the read cycle if it is used in option 3.

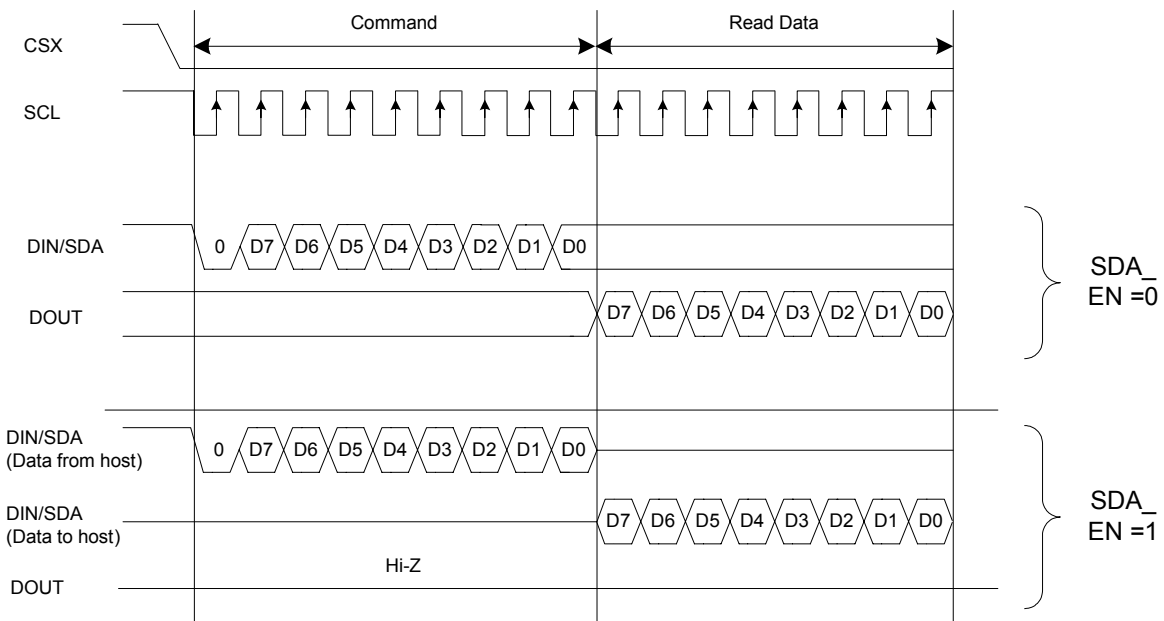
The following figure shows the read cycle for the type C interface.



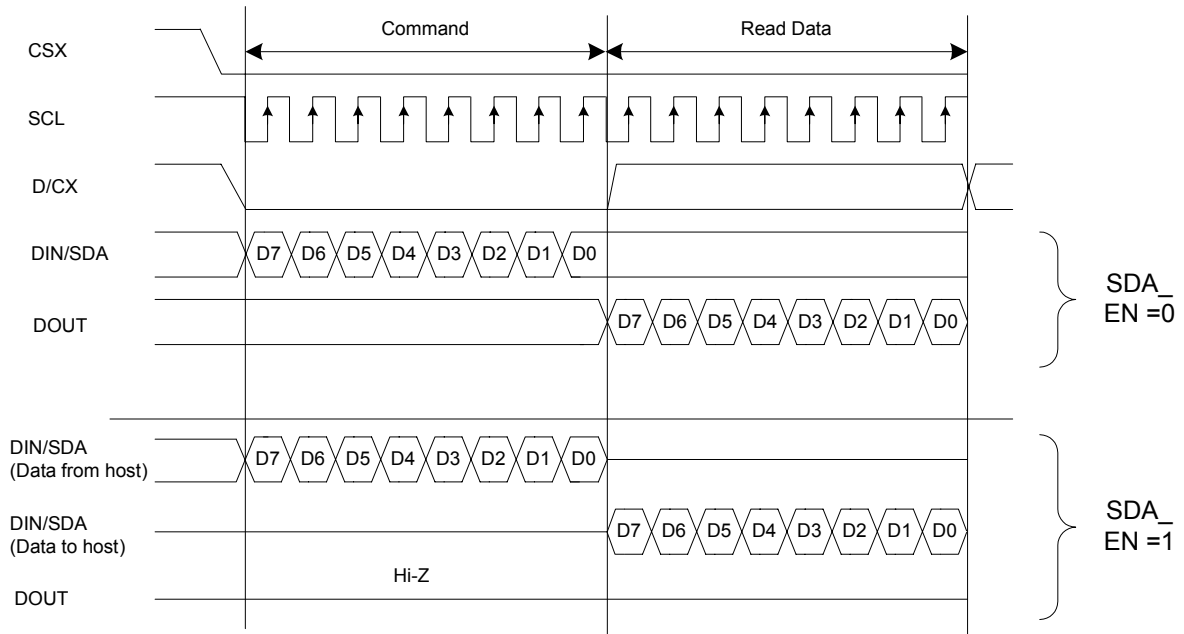
Note: SCL is an unsynchronized signal; it can be stopped.

During the read sequence the host processor reads one or more bytes of information from the display module via the interface. The read sequence is initiated when CSX is driven from high to low and ends when CSX is pulled high. Each byte is either nine or sixteen write cycles in length. If the optional D/CX signal is used a byte is eight read cycles long. D/CX is driven low while command information is on the interface and is pulled high when data is present.

The type C interface read sequences are shown in the following figures



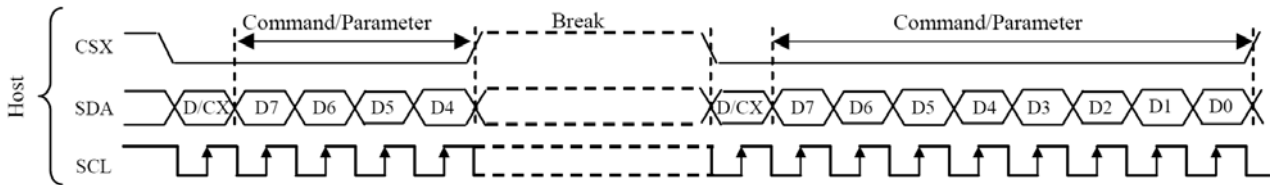
Note: D7 is MSB and D0 is LSB of byte.



### 7.2.3. Break and Pause Sequences

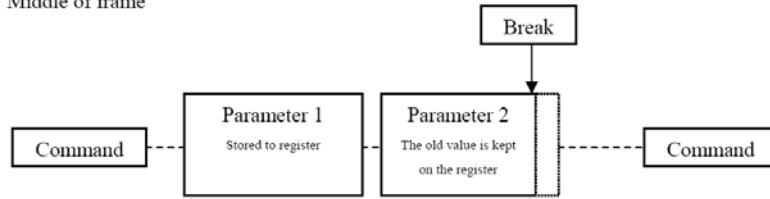
The host processor can break a read or write sequence by pulling the CSX signal high during a command or data byte. The display module shall reset its interface so it will be ready to receive the same byte when CSX is again driven low.

The host processor can pause a read or write sequence by pulling the CSX signal high between command or data bytes. The display module shall wait for the host processor to drive CSX low before continuing the read or write sequence at the point where the sequence was paused.



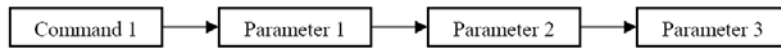


1. Middle of frame

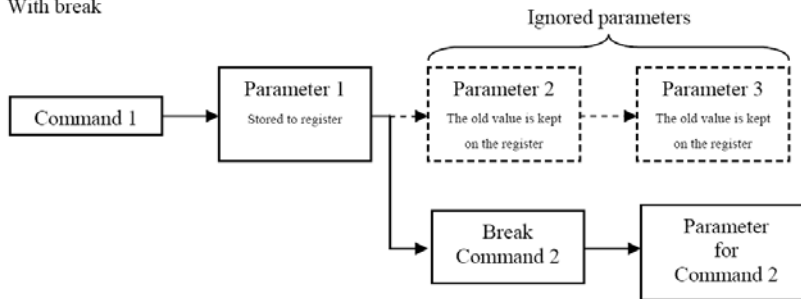


2. Between frames

Without break



With break



Break can be e.g. another command or noise pulse.

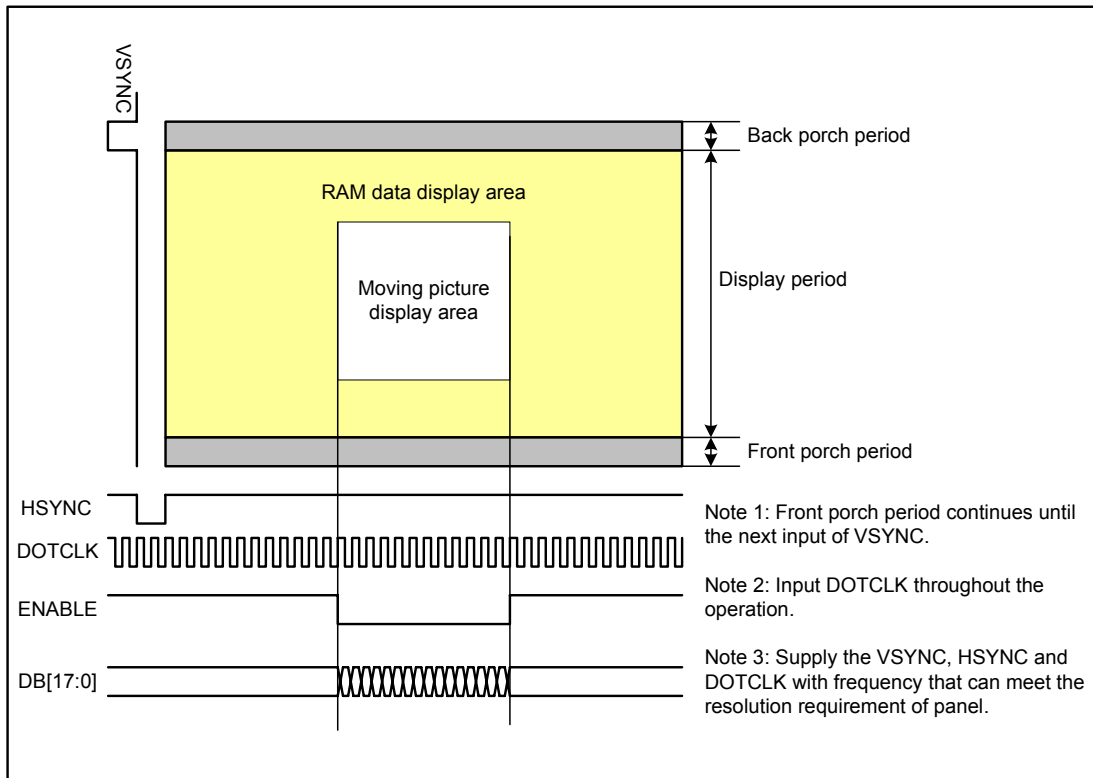
### 7.3. Display Pixel Interface (DPI)

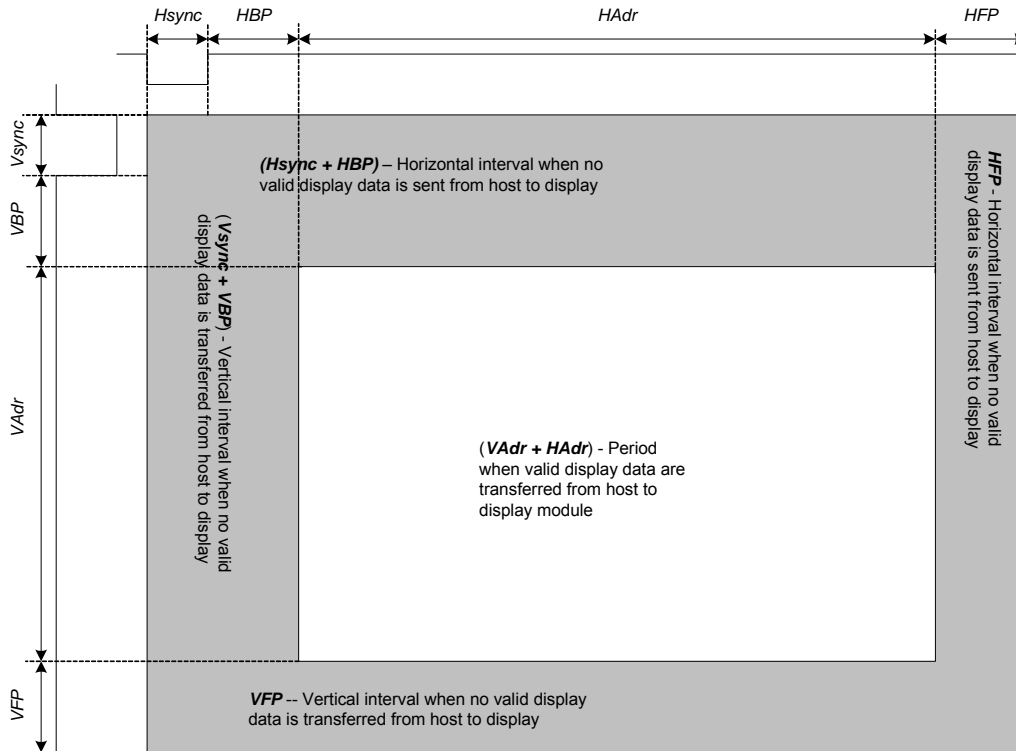
In normal operation, systems based on DPI architecture rely on the host processor to continuously provide complete frames of image data at a sufficient frame rate to avoid flicker or other visible artifacts. The displayed image, or frame, is comprised of a rectangular array of pixels. The frame is transmitted from the host processor to a display module as a sequence of pixels, with each horizontal line of the image data sent as a group of consecutive pixels.

Vsync indicates the beginning of each frame of the displayed image.

Hsync signals the beginning of each horizontal line of pixels.

Each pixel value (16 or 18-bit data) is transferred from the host processor to the display module during one pixel period. The rising edge of PCLK is used by the display module to capture pixel data. Since PCLK runs continuously, control signal DE is required to indicate when valid pixel data is being transmitted on the pixel data signals.





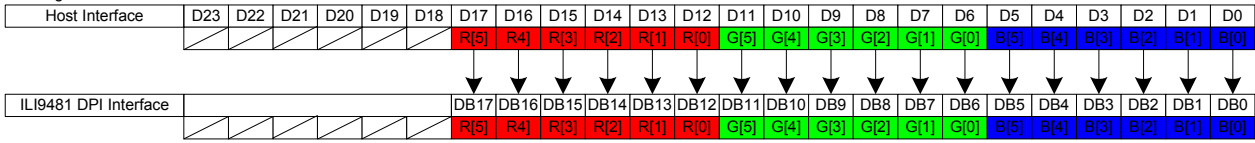
| Parameters                 | Symbols | Condition | Min. | Typ.     | Max. | Units |
|----------------------------|---------|-----------|------|----------|------|-------|
| PCLK Cycle                 | PCLKCYC |           | -    | 88       | -    | ns    |
| Horizontal Synchronization | Hsync   |           | -    | 10       | -    | PCLK  |
| Horizontal Back Porch      | HBP     |           | -    | 20       | -    | PCLK  |
| Horizontal Address         | HAdr    |           | -    | 320      | -    | PCLK  |
| Horizontal Front Porch     | HFP     |           | -    | 40       | -    | PCLK  |
| Vertical Synchronization   | Vsync   |           | -    | 2        | -    | Line  |
| Vertical Back Porch        | VBP     |           | -    | 2        | -    | Line  |
| Vertical Address           | VAdr    |           | -    | 480      | -    | Line  |
| Vertical Front Porch       | VFP     |           | -    | 4        | -    | Line  |
| Vsync setup time           | VSST    |           |      |          | -    | Hz    |
| Vsync hold time            | VSHT    |           |      |          | -    | Hz    |
| Hsync setup time           | HSST    |           |      |          | -    | Hz    |
| Hsync hold time            | HSHT    |           |      |          | -    | Hz    |
| Data setup time            | DST     |           |      |          | -    | Hz    |
| Data hold time             | DHT     |           |      |          | -    | Hz    |
| Vertical Frequency(*)      |         |           |      | 60       | -    | Hz    |
| Horizontal Frequency(*)    |         |           | -    | 29.282   | -    | KHz   |
| PCLK Frequency(*)          |         |           | -    | 11.42Mhz | -    | MHz   |

Notes:

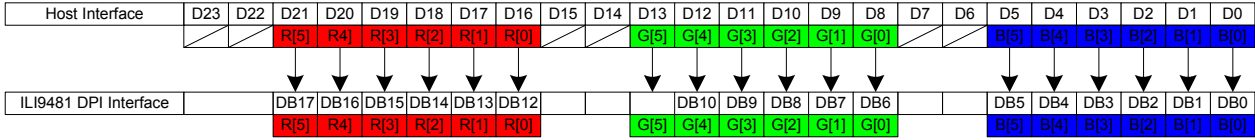
1. Vertical period (one frame) shall be equal to the sum of Vsync + VBP + VAdr + VFP.
2. Horizontal period (one line) shall be equal to the sum of Hsync + HBP + HAdr + HFP.
3. Control signals PCLK and Hsync shall be transmitted as specified at all times while valid pixels are transferred between the host processor and the display module.

**18bit DPI Interface Connection: set\_pixel\_format D[6:4]=3'h6 : 18bpp**

Configuration 1

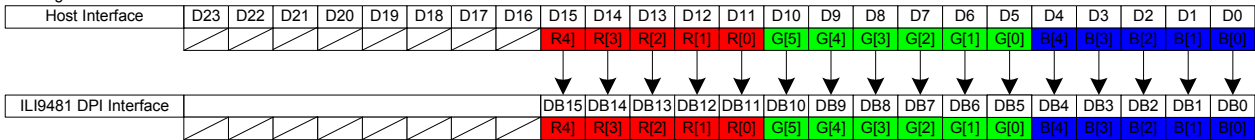


Configuration 2

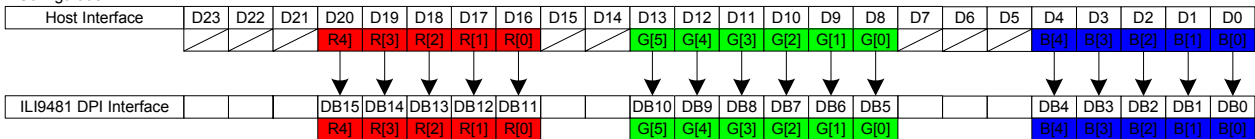


**16bit DPI Interface Connection: set\_pixel\_format D[6:4]=3'h5 : 16bpp**

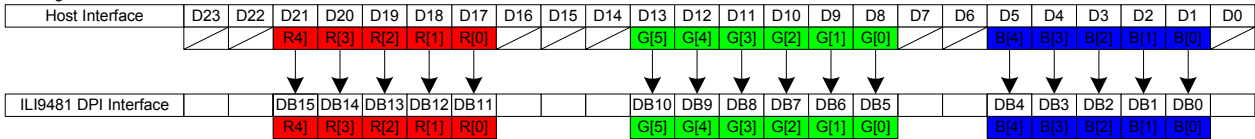
Configuration 1



Configuration 2



Configuration 3



**16-bit data extend to 18-bit**

|                  |          | Frame Memory Data (18bpp) |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |  |  |  |  |  |  |
|------------------|----------|---------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|--|--|--|--|--|--|
| Set_pixel_format | EPF[1:0] | DB17                      | DB16 | DB15 | DB14 | DB13 | DB12 | DB11 | DB10 | DB9  | DB8  | DB7  | DB6  | DB5  | DB4  | DB3  | DB2  | DB1  | DB0  |  |  |  |  |  |  |
| 18bpp            | *        | R[5]                      | R[4] | R[3] | R[2] | R[1] | R[0] | G[5] | G[4] | G[3] | G[2] | G[1] | G[0] | B[5] | B[4] | B[3] | B[2] | B[1] | B[0] |  |  |  |  |  |  |
| 16bpp            | 2'h0     | R4                        | R[3] | R[2] | R[1] | R[0] | 0    | G[5] | G[4] | G[3] | G[2] | G[1] | G[0] | B[4] | B[3] | B[2] | B[1] | B[0] | 0    |  |  |  |  |  |  |
|                  | 2'h1     | R4                        | R[3] | R[2] | R[1] | R[0] | 1    | G[5] | G[4] | G[3] | G[2] | G[1] | G[0] | B[4] | B[3] | B[2] | B[1] | B[0] | 1    |  |  |  |  |  |  |
|                  | 2'h2     | R4                        | R[3] | R[2] | R[1] | R[0] | R4   | G[5] | G[4] | G[3] | G[2] | G[1] | G[0] | B[4] | B[3] | B[2] | B[1] | B[0] | B[4] |  |  |  |  |  |  |

## 8. Command

### 8.1. Command List

| Operational Code (Hex) | Command               | Command(C) /Read(R) /Write(W) | Number Of Parameter | MIPI DCS Type1 Requirement        | ILI9418 Implementation        |
|------------------------|-----------------------|-------------------------------|---------------------|-----------------------------------|-------------------------------|
| 00h                    | nop                   | C                             | 0                   | Yes                               | Yes                           |
| 01h                    | soft_reset            | C                             | 0                   | Yes                               | Yes                           |
| 06h                    | get_red_channel       | R                             | 1                   | No                                | No                            |
| 07h                    | get_green_channel     | R                             | 1                   | No                                | No                            |
| 08h                    | get_blue_channel      | R                             | 1                   | No                                | No                            |
| 0Ah                    | get_power_mode        | R                             | 1                   | Yes                               | Yes                           |
| 0Bh                    | get_address_mode      | R                             | 1                   | Yes (Bit[7:0])                    | Yes (Bit[7:3]) , Only         |
| 0Ch                    | get_pixel_format      | R                             | 1                   | Yes                               | Yes                           |
| 0Dh                    | get_display_mode      | R                             | 1                   | Yes                               | Yes                           |
| 0Eh                    | get_signal_mode       | R                             | 1                   | Yes                               | Yes                           |
| 0Fh                    | get_diagnostic_result | R                             | 1                   | Bit7/6 : Yes<br>Bit5/4 : Optional | Yes (Bit7/6 Only)             |
| 10h                    | enter_sleep_mode      | C                             | 0                   | Yes                               | Yes                           |
| 11h                    | exit_sleep_mode       | C                             | 0                   | Yes                               | Yes                           |
| 12h                    | enter_partial_mode    | C                             | 0                   | Yes                               | Yes                           |
| 13h                    | enter_normal_mode     | C                             | 0                   | Yes                               | Yes                           |
| 20h                    | exit_invert_mode      | C                             | 0                   | Yes                               | Yes                           |
| 21h                    | enter_invert_mode     | C                             | 0                   | Yes                               | Yes                           |
| 26h                    | set_gamma_curve       | W                             | 1                   | Yes                               | No                            |
| 28h                    | set_display_off       | C                             | 0                   | Yes                               | Yes                           |
| 29h                    | set_display_on        | C                             | 0                   | Yes                               | Yes                           |
| 2Ah                    | set_column_address    | W                             | 4                   | Yes                               | Yes                           |
| 2Bh                    | set_page_address      | W                             | 4                   | Yes                               | Yes                           |
| 2Ch                    | write_memory_start    | W                             | Variable            | Yes                               | Yes                           |
| 2Dh                    | wite LUT              | W                             | Variable            | Optional                          | No                            |
| 2Eh                    | read_memory_start     | R                             | Variable            | Yes                               | Yes                           |
| 30h                    | set_partial_area      | W                             | 4                   | Yes                               | Yes                           |
| 33h                    | set_scroll_area       | W                             | 6                   | Yes                               | Yes                           |
| 34h                    | set_tear_off          | C                             | 0                   | Yes                               | Yes                           |
| 35h                    | set_tear_on           | W                             | 1                   | Yes                               | Yes                           |
| 36h                    | set_address_mode      | W                             | 1                   | Yes (Bit7-0)                      | Yes (Bit[7:3], Bit[1:0] Only) |
| 37h                    | set_scroll_start      | W                             | 2                   | Yes                               | Yes                           |
| 38h                    | exit_idle_mode        | C                             | 0                   | Yes                               | Yes                           |
| 39h                    | enter_idle_mode       | C                             | 0                   | Yes                               | Yes                           |
| 3Ah                    | set_pixel_format      | W                             | 1                   | Yes                               | Yes                           |
| 3Ch                    | write_memory_continue | W                             | Variable            | Yes                               | Yes                           |
| 3Eh                    | read_memory_continue  | R                             | Variable            | Yes                               | Yes                           |
| 44h                    | set_tear_scanline     | W                             | 2                   | Yes                               | Yes                           |
| 45h                    | get_scanline          | R                             | 2                   | Yes                               | Yes                           |
| A1h                    | read_DDB_start        | R                             | 5                   | Yes                               | Yes                           |
| A8h                    | read_DDB_continue     | R                             | Variable            | Yes                               | Yes                           |

| Operational Code (Hex)     | Function   | Command(C)<br>Read(R)/Write(W) | Number Of<br>Parameter |
|----------------------------|--|--------------------------------|------------------------|
| B0h                        | Command Access Protect                           | W/R                            | 1                      |
| B1h                        | Low Power Mode Control                           | W/R                            | 1                      |
| B3h                        | Frame Memory Access and Interface setting        | W/R                            | 5                      |
| B4h                        | Display Mode and Frame Memory Write Mode setting | W/R                            | 1                      |
| BFh                        | Device code Read                                 | R                              | 4                      |
| C0h                        | Panel Driving Setting                            | W/R                            | 7                      |
| C1h                        | Display Timing Setting for Normal Mode           | W/R                            | 3                      |
| C2h                        | Display Timing Setting for Partial Mode          | W/R                            | 3                      |
| C3h                        | Display Timing Setting for Idle Mode             | W/R                            | 3                      |
| C5h                        | Frame rate and Inversion Control                 | W/R                            | 1                      |
| C6h                        | Interface Control                                | W/R                            | 1                      |
| C8h                        | Gamma Setting                                    | W/R                            | 12                     |
| D0h                        | Power Setting                                    | W/R                            | 3                      |
| D1h                        | VCOM Control                                     | W/R                            | 3                      |
| D2h                        | Power Setting for Normal Mode                    | W/R                            | 2                      |
| D3h                        | Power Setting for Partial Mode                   | W/R                            | 2                      |
| D4h                        | Power Setting for Idle Mode                      | W/R                            | 2                      |
| E0h                        | NV Memory Write                                  | W/R                            | 1                      |
| E1h                        | NV Memory Control                                | W/R                            | 1                      |
| E2h                        | NV Memory Status                                 | W/R                            | 3                      |
| E3h                        | NV Memory Protection                             | W/R                            | 2                      |
| E8h                        | EEPROM Write Enable                              | C                              | 0                      |
| E9h                        | EEPROM Write Disable                             | C                              | 0                      |
| EAh                        | EEPROM Word Write                                | W/R                            | 2                      |
| EBh                        | EEPROM Word Read                                 | R                              | 3                      |
| ECh                        | EEPROM Address Set                               | W/R                            | 1                      |
| EDh                        | EEPROM Erase                                     | W/R                            | 1                      |
| EEh                        | EEPROM Erase All                                 | C                              | 0                      |
| B0~FF Except above command | LSI TEST Registers                               | W/R                            | Variable               |

## 8.2. Command Description

### 8.2.1. NOP (00h)

| 00H                                       | NOP (No Operation)   |     |     |        |    |    |    |    |    |    |    |    |     |        |               |  |     |   |     |   |     |  |     |          |     |
|---|--|-----|-----|--------|----|----|----|----|----|----|----|----|-----|--------|---------------|--|-----|---|-----|---|-----|--|-----|----------|-----|
|   | D/CX   | RDX | WRX | D17-D8 | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | HEX |        |               |  |     |   |     |   |     |  |     |          |     |
| Command                                   | 0  | 1   | ↑   | X      | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 00  |        |               |  |     |   |     |   |     |  |     |          |     |
| Parameter                                 | NO PARAMETER   |     |     |        |    |    |    |    |    |    |    |    |     |        |               |  |     |   |     |   |     |  |     |          |     |
| Description                               | This command is an empty command; it does not have any effect on the display module. However it can be used to terminate Frame Memory Write or Read as described in RAMWR (Memory Write) and RAMRD (Memory Read) Commands.<br>X = Don't care.  |     |     |        |    |    |    |    |    |    |    |    |     |        |               |  |     |   |     |   |     |  |     |          |     |
| Restriction                               | None   |     |     |        |    |    |    |    |    |    |    |    |     |        |               |  |     |   |     |   |     |  |     |          |     |
| 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>Power On Sequence</td> <td>N/A</td> </tr> <tr> <td>SW Reset</td> <td>N/A</td> </tr> <tr> <td>HW Reset</td> <td>N/A</td> </tr> </tbody> </table>   |     |     |        |    |    |    |    |    |    |    |    |     | Status | Default Value | Power On Sequence                        | N/A | SW Reset                                | N/A | HW Reset                                  | N/A |  |     |          |     |
| Status                                    | Default Value  |     |     |        |    |    |    |    |    |    |    |    |     |        |               |  |     |   |     |   |     |  |     |          |     |
| Power On Sequence                         | N/A  |     |     |        |    |    |    |    |    |    |    |    |     |        |               |  |     |   |     |   |     |  |     |          |     |
| SW Reset                                  | N/A  |     |     |        |    |    |    |    |    |    |    |    |     |        |               |  |     |   |     |   |     |  |     |          |     |
| HW Reset                                  | N/A  |     |     |        |    |    |    |    |    |    |    |    |     |        |               |  |     |   |     |   |     |  |     |          |     |
| Flow Chart                                | None   |     |     |        |    |    |    |    |    |    |    |    |     |        |               |  |     |   |     |   |     |  |     |          |     |

### 8.2.2. Soft\_reset (01h)

| 01H                                       | Soft_reset   |     |     |        |    |    |    |    |    |    |    |    |     |        |               |  |     |   |     |   |     |  |     |          |     |
|---|--|-----|-----|--------|----|----|----|----|----|----|----|----|-----|--------|---------------|--|-----|---|-----|---|-----|--|-----|----------|-----|
|   | D/CX   | RDX | WRX | D17-D8 | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | HEX |        |               |  |     |   |     |   |     |  |     |          |     |
| Command                                   | 0  | 1   | ↑   | X      | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 1  | 01  |        |               |  |     |   |     |   |     |  |     |          |     |
| Parameter                                 | NO PARAMETER   |     |     |        |    |    |    |    |    |    |    |    |     |        |               |  |     |   |     |   |     |  |     |          |     |
| Description                               | <p>When the Software Reset command is written, it causes software reset. It resets the commands and parameters to their S/W Reset default values. (See default tables in each command description.)</p> <p>Note: The Frame Memory contents are affected by this command.</p> <p>X = Don't care</p>   |     |     |        |    |    |    |    |    |    |    |    |     |        |               |  |     |   |     |   |     |  |     |          |     |
| Restriction                               | <p>Software Reset Command cannot be sent during Sleep Out sequence.</p> <p>Any new command is cannot be sent for 10-frame period until the ILI9481 enters Sleep-In mode. Do not send any command.</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>Power On Sequence</td> <td>N/A</td> </tr> <tr> <td>SW Reset</td> <td>N/A</td> </tr> <tr> <td>HW Reset</td> <td>N/A</td> </tr> </tbody> </table>   |     |     |        |    |    |    |    |    |    |    |    |     | Status | Default Value | Power On Sequence                        | N/A | SW Reset                                | N/A | HW Reset                                  | N/A |  |     |          |     |
| Status                                    | Default Value  |     |     |        |    |    |    |    |    |    |    |    |     |        |               |  |     |   |     |   |     |  |     |          |     |
| Power On Sequence                         | N/A  |     |     |        |    |    |    |    |    |    |    |    |     |        |               |  |     |   |     |   |     |  |     |          |     |
| SW Reset                                  | N/A  |     |     |        |    |    |    |    |    |    |    |    |     |        |               |  |     |   |     |   |     |  |     |          |     |
| HW Reset                                  | N/A  |     |     |        |    |    |    |    |    |    |    |    |     |        |               |  |     |   |     |   |     |  |     |          |     |
| Flow Chart                                | <pre> graph TD     SWRESET[SWRESET] --&gt; Display[Display whole blank screen]     Display --&gt; Set[Set Commands to S/W Default Value]     Set --&gt; Sleep[Sleep In Mode]     </pre> <p>Legend:</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>  |     |     |        |    |    |    |    |    |    |    |    |     |        |               |  |     |   |     |   |     |  |     |          |     |



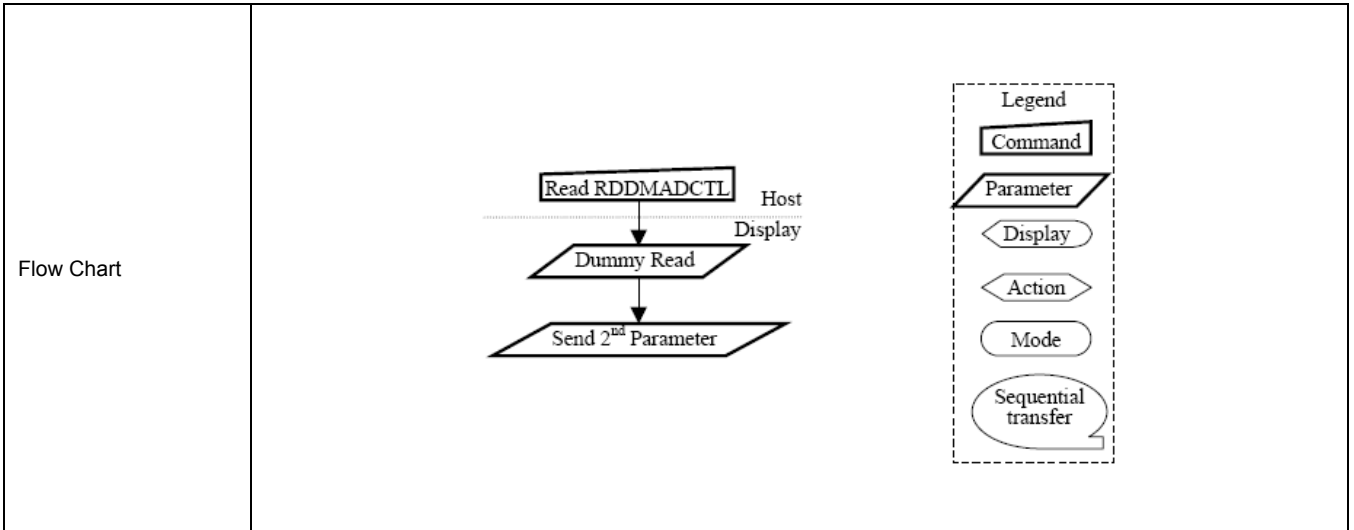
### 8.2.3. Get\_power\_mode (0Ah)

| 0AH                       | Get_power_mode   |                            |            |       |    |    |    |    |    |    |    |    |     |     |             |         |    |             |            |    |                  |  |    |                     |  |    |              |  |    |                            |  |    |                |  |    |             |            |    |             |            |
|---------------------------|--|----------------------------|------------|-------|----|----|----|----|----|----|----|----|-----|-----|-------------|---------|----|-------------|------------|----|------------------|--|----|---------------------|--|----|--------------|--|----|----------------------------|--|----|----------------|--|----|-------------|------------|----|-------------|------------|
|                           | D/CX   | RDX                        | WRX        | D17-8 | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | HEX |     |             |         |    |             |            |    |                  |  |    |                     |  |    |              |  |    |                            |  |    |                |  |    |             |            |    |             |            |
| Command                   | 0  | 1                          | ↑          | x     | 0  | 0  | 0  | 0  | 1  | 0  | 1  | 0  | 0A  |     |             |         |    |             |            |    |                  |  |    |                     |  |    |              |  |    |                            |  |    |                |  |    |             |            |    |             |            |
| 1 <sup>st</sup> Parameter | 1  | ↑                          | 1          | x     | x  | x  | x  | x  | x  | x  | x  | x  | x   |     |             |         |    |             |            |    |                  |  |    |                     |  |    |              |  |    |                            |  |    |                |  |    |             |            |    |             |            |
| 2 <sup>nd</sup> Parameter | 1  | ↑                          | 1          | x     | D7 | D6 | D5 | D4 | D3 | D2 | 0  | 0  | xx  |     |             |         |    |             |            |    |                  |  |    |                     |  |    |              |  |    |                            |  |    |                |  |    |             |            |    |             |            |
| Description               | <p>This command indicates the current status of the display as described in the table below:</p> <table border="1"> <thead> <tr> <th>Bit</th> <th>Description</th> <th>Comment</th> </tr> </thead> <tbody> <tr> <td>D7</td> <td>Not Defined</td> <td>Set to '0'</td> </tr> <tr> <td>D6</td> <td>Idle Mode On/Off</td> <td></td> </tr> <tr> <td>D5</td> <td>Partial Mode On/Off</td> <td></td> </tr> <tr> <td>D4</td> <td>Sleep In/Out</td> <td></td> </tr> <tr> <td>D3</td> <td>Display Normal Mode On/Off</td> <td></td> </tr> <tr> <td>D2</td> <td>Display On/Off</td> <td></td> </tr> <tr> <td>D1</td> <td>Not Defined</td> <td>Set to '0'</td> </tr> <tr> <td>D0</td> <td>Not Defined</td> <td>Set to '0'</td> </tr> </tbody> </table> <p>Bit D7 – Booster Voltage Status<br/>           '0' = Booster Off or has a fault.<br/>           '1' = Booster On and working OK (Meets Nokia's optical requirements).</p> <p>Bit D6 - Idle Mode On/Off<br/>           '0' = Idle Mode Off.<br/>           '1' = Idle Mode On.</p> <p>Bit D5 – Partial Mode On/Off<br/>           '0' = Partial Mode Off.<br/>           '1' = Partial Mode On.</p> <p>Bit D4 – Sleep In/Out<br/>           '0' = Sleep In Mode.<br/>           '1' = Sleep Out Mode.</p> <p>Bit D3 – Display Normal Mode On/Off<br/>           '0' = Display Normal Mode Off.<br/>           '1' = Display Normal Mode On.</p> <p>Bit D2 – Display On/Off<br/>           '0' = Display is Off.<br/>           '1' = Display is On.</p> <p>Bit D1 – Not Defined<br/>           'This bit is not applicable for this project, so it is set to '0'</p> <p>Bit D0 – Not Defined<br/>           'This bit is not applicable for this project, so it is set to '0'</p> <p>X = Don't care</p> |                            |            |       |    |    |    |    |    |    |    |    |     | Bit | Description | Comment | D7 | Not Defined | Set to '0' | D6 | Idle Mode On/Off |  | D5 | Partial Mode On/Off |  | D4 | Sleep In/Out |  | D3 | Display Normal Mode On/Off |  | D2 | Display On/Off |  | D1 | Not Defined | Set to '0' | D0 | Not Defined | Set to '0' |
|                           | Bit  | Description                | Comment    |       |    |    |    |    |    |    |    |    |     |     |             |         |    |             |            |    |                  |  |    |                     |  |    |              |  |    |                            |  |    |                |  |    |             |            |    |             |            |
|                           | D7   | Not Defined                | Set to '0' |       |    |    |    |    |    |    |    |    |     |     |             |         |    |             |            |    |                  |  |    |                     |  |    |              |  |    |                            |  |    |                |  |    |             |            |    |             |            |
|                           | D6   | Idle Mode On/Off           |            |       |    |    |    |    |    |    |    |    |     |     |             |         |    |             |            |    |                  |  |    |                     |  |    |              |  |    |                            |  |    |                |  |    |             |            |    |             |            |
|                           | D5   | Partial Mode On/Off        |            |       |    |    |    |    |    |    |    |    |     |     |             |         |    |             |            |    |                  |  |    |                     |  |    |              |  |    |                            |  |    |                |  |    |             |            |    |             |            |
|                           | D4   | Sleep In/Out               |            |       |    |    |    |    |    |    |    |    |     |     |             |         |    |             |            |    |                  |  |    |                     |  |    |              |  |    |                            |  |    |                |  |    |             |            |    |             |            |
|                           | D3   | Display Normal Mode On/Off |            |       |    |    |    |    |    |    |    |    |     |     |             |         |    |             |            |    |                  |  |    |                     |  |    |              |  |    |                            |  |    |                |  |    |             |            |    |             |            |
|                           | D2   | Display On/Off             |            |       |    |    |    |    |    |    |    |    |     |     |             |         |    |             |            |    |                  |  |    |                     |  |    |              |  |    |                            |  |    |                |  |    |             |            |    |             |            |
|                           | D1   | Not Defined                | Set to '0' |       |    |    |    |    |    |    |    |    |     |     |             |         |    |             |            |    |                  |  |    |                     |  |    |              |  |    |                            |  |    |                |  |    |             |            |    |             |            |
|                           | D0   | Not Defined                | Set to '0' |       |    |    |    |    |    |    |    |    |     |     |             |         |    |             |            |    |                  |  |    |                     |  |    |              |  |    |                            |  |    |                |  |    |             |            |    |             |            |

| 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>Power On Sequence</td> <td>08<sub>HEX</sub></td> </tr> <tr> <td>SW Reset</td> <td>08<sub>HEX</sub></td> </tr> <tr> <td>HW Reset</td> <td>08<sub>HEX</sub></td> </tr> </tbody> </table>  | Status | Default Value | Power On Sequence                        | 08 <sub>HEX</sub> | SW Reset                                | 08 <sub>HEX</sub> | HW Reset                                  | 08 <sub>HEX</sub> |  |     |          |     |
| Status                                    | Default Value  |        |               |  |                   |   |                   |   |                   |  |     |          |     |
| Power On Sequence                         | 08 <sub>HEX</sub>  |        |               |  |                   |   |                   |   |                   |  |     |          |     |
| SW Reset                                  | 08 <sub>HEX</sub>  |        |               |  |                   |   |                   |   |                   |  |     |          |     |
| HW Reset                                  | 08 <sub>HEX</sub>  |        |               |  |                   |   |                   |   |                   |  |     |          |     |
| Flow Chart                                | <div style="display: flex; align-items: center;"> <div style="flex: 1;"> <pre> graph TD     subgraph Host         A[Read RDDPM] --&gt; B[/Dummy Read/]         B --&gt; C[/Send 2nd Parameter/]     end     </pre> </div> <div style="flex: 0.5; border: 1px dashed black; padding: 5px; margin-left: 10px;"> <p><b>Legend</b></p> <ul style="list-style-type: none"> <li><span style="border: 1px solid black; padding: 2px;">Command</span></li> <li><span style="border: 1px solid black; transform: rotate(-45deg); padding: 2px;">Parameter</span></li> <li><span style="border: 1px solid black; border-radius: 15px; padding: 2px;">Display</span></li> <li><span style="border: 1px solid black; border-radius: 15px; padding: 2px;">Action</span></li> <li><span style="border: 1px solid black; border-radius: 15px; padding: 2px;">Mode</span></li> <li><span style="border: 1px solid black; border-radius: 15px; padding: 2px;">Sequential transfer</span></li> </ul> </div> </div> |        |               |  |                   |   |                   |   |                   |  |     |          |     |

### 8.2.4. Get\_address\_mode (0Bh)

| 0BH                                       | Get_address_mode   |            |     |       |    |    |    |    |    |    |    |    |     |        |               |  |                   |   |                  |   |                      |  |     |                   |     |    |                    |  |    |               |  |    |          |            |    |          |            |    |          |
|---|--|------------|-----|-------|----|----|----|----|----|----|----|----|-----|--------|---------------|--|-------------------|---|------------------|---|----------------------|--|-----|-------------------|-----|----|--------------------|--|----|---------------|--|----|----------|------------|----|----------|------------|----|----------|
|   | D/CX   | RDX        | WRX | D17-0 | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | HEX |        |               |  |                   |   |                  |   |                      |  |     |                   |     |    |                    |  |    |               |  |    |          |            |    |          |            |    |          |
| Command                                   | 0  | 1          | ↑   | x     | 0  | 0  | 0  | 0  | 1  | 0  | 1  | 1  | 0B  |        |               |  |                   |   |                  |   |                      |  |     |                   |     |    |                    |  |    |               |  |    |          |            |    |          |            |    |          |
| 1 <sup>st</sup> Parameter                 | 1  | ↑          | 1   | x     | x  | x  | x  | x  | x  | x  | x  | x  | x   |        |               |  |                   |   |                  |   |                      |  |     |                   |     |    |                    |  |    |               |  |    |          |            |    |          |            |    |          |
| 2 <sup>nd</sup> Parameter                 | 1  | ↑          | 1   | x     | D7 | D6 | D5 | D4 | D3 | 0  | 0  | 0  | xx  |        |               |  |                   |   |                  |   |                      |  |     |                   |     |    |                    |  |    |               |  |    |          |            |    |          |            |    |          |
| Description                               | This command indicates the current status of the display as described in the table below:  |            |     |       |    |    |    |    |    |    |    |    |     |        |               |  |                   |   |                  |   |                      |  |     |                   |     |    |                    |  |    |               |  |    |          |            |    |          |            |    |          |
|   | <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Bit</th> <th>Description</th> <th>Comment</th> </tr> </thead> <tbody> <tr> <td>D7</td> <td>Page Address Order</td> <td></td> </tr> <tr> <td>D6</td> <td>Column Address Order</td> <td></td> </tr> <tr> <td>D5</td> <td>Page/Column Order</td> <td></td> </tr> <tr> <td>D4</td> <td>Line Address Order</td> <td></td> </tr> <tr> <td>D3</td> <td>RGB/BGR Order</td> <td></td> </tr> <tr> <td>D2</td> <td>Reserved</td> <td>Set to '0'</td> </tr> <tr> <td>D1</td> <td>Reserved</td> <td>Set to '0'</td> </tr> <tr> <td>D0</td> <td>Reserved</td> <td>Set to '0'</td> </tr> </tbody> </table> <ul style="list-style-type: none"> <li>◆ Bit D7 – Page Address Order<br/>‘0’ = Top to Bottom<br/>‘1’ = Bottom to Top</li> <li>◆ Bit D6 – Column Address Order<br/>‘0’ = Left to Right<br/>‘1’ = Right to Left</li> <li>◆ Bit D5 - Page/Column Order<br/>‘0’ = Normal Mode<br/>‘1’ = Reverse Mode<br/>Note: For Bits D7 to D5, also refer to Section 8.2.3 MCU to memory write/read direction.</li> <li>◆ Bit D4 – Line Address Order<br/>‘0’ = LCD Refresh Top to Bottom<br/>‘1’ = LCD Refresh Bottom to Top</li> <li>◆ Bit D3 – RGB/BGR Order<br/>‘0’ = RGB<br/>‘1’ = BGR</li> </ul> |            |     |       |    |    |    |    |    |    |    |    |     | Bit    | Description   | Comment                                  | D7                | Page Address Order                      |                  | D6  | Column Address Order |  | D5  | Page/Column Order |     | D4 | Line Address Order |  | D3 | RGB/BGR Order |  | D2 | Reserved | Set to '0' | D1 | Reserved | Set to '0' | D0 | Reserved |
| Bit                                       | Description  | Comment    |     |       |    |    |    |    |    |    |    |    |     |        |               |  |                   |   |                  |   |                      |  |     |                   |     |    |                    |  |    |               |  |    |          |            |    |          |            |    |          |
| D7  | Page Address Order   |            |     |       |    |    |    |    |    |    |    |    |     |        |               |  |                   |   |                  |   |                      |  |     |                   |     |    |                    |  |    |               |  |    |          |            |    |          |            |    |          |
| D6  | Column Address Order   |            |     |       |    |    |    |    |    |    |    |    |     |        |               |  |                   |   |                  |   |                      |  |     |                   |     |    |                    |  |    |               |  |    |          |            |    |          |            |    |          |
| D5  | Page/Column Order  |            |     |       |    |    |    |    |    |    |    |    |     |        |               |  |                   |   |                  |   |                      |  |     |                   |     |    |                    |  |    |               |  |    |          |            |    |          |            |    |          |
| D4  | Line Address Order   |            |     |       |    |    |    |    |    |    |    |    |     |        |               |  |                   |   |                  |   |                      |  |     |                   |     |    |                    |  |    |               |  |    |          |            |    |          |            |    |          |
| D3  | RGB/BGR Order  |            |     |       |    |    |    |    |    |    |    |    |     |        |               |  |                   |   |                  |   |                      |  |     |                   |     |    |                    |  |    |               |  |    |          |            |    |          |            |    |          |
| D2  | Reserved   | Set to '0' |     |       |    |    |    |    |    |    |    |    |     |        |               |  |                   |   |                  |   |                      |  |     |                   |     |    |                    |  |    |               |  |    |          |            |    |          |            |    |          |
| D1  | Reserved   | Set to '0' |     |       |    |    |    |    |    |    |    |    |     |        |               |  |                   |   |                  |   |                      |  |     |                   |     |    |                    |  |    |               |  |    |          |            |    |          |            |    |          |
| D0  | Reserved   | Set to '0' |     |       |    |    |    |    |    |    |    |    |     |        |               |  |                   |   |                  |   |                      |  |     |                   |     |    |                    |  |    |               |  |    |          |            |    |          |            |    |          |
| Register Availability                     | <table border="1" style="margin-left: auto; margin-right: auto;"> <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" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Status</th> <th>Default Value</th> </tr> </thead> <tbody> <tr> <td>Power On Sequence</td> <td>00<sub>HEX</sub></td> </tr> <tr> <td>SW Reset</td> <td><b>No Change</b></td> </tr> <tr> <td>HW Reset</td> <td>00<sub>HEX</sub></td> </tr> </tbody> </table>   |            |     |       |    |    |    |    |    |    |    |    |     | Status | Default Value | Power On Sequence                        | 00 <sub>HEX</sub> | SW Reset                                | <b>No Change</b> | HW Reset                                  | 00 <sub>HEX</sub>    |  |     |                   |     |    |                    |  |    |               |  |    |          |            |    |          |            |    |          |
| Status                                    | Default Value  |            |     |       |    |    |    |    |    |    |    |    |     |        |               |  |                   |   |                  |   |                      |  |     |                   |     |    |                    |  |    |               |  |    |          |            |    |          |            |    |          |
| Power On Sequence                         | 00 <sub>HEX</sub>  |            |     |       |    |    |    |    |    |    |    |    |     |        |               |  |                   |   |                  |   |                      |  |     |                   |     |    |                    |  |    |               |  |    |          |            |    |          |            |    |          |
| SW Reset                                  | <b>No Change</b>   |            |     |       |    |    |    |    |    |    |    |    |     |        |               |  |                   |   |                  |   |                      |  |     |                   |     |    |                    |  |    |               |  |    |          |            |    |          |            |    |          |
| HW Reset                                  | 00 <sub>HEX</sub>  |            |     |       |    |    |    |    |    |    |    |    |     |        |               |  |                   |   |                  |   |                      |  |     |                   |     |    |                    |  |    |               |  |    |          |            |    |          |            |    |          |

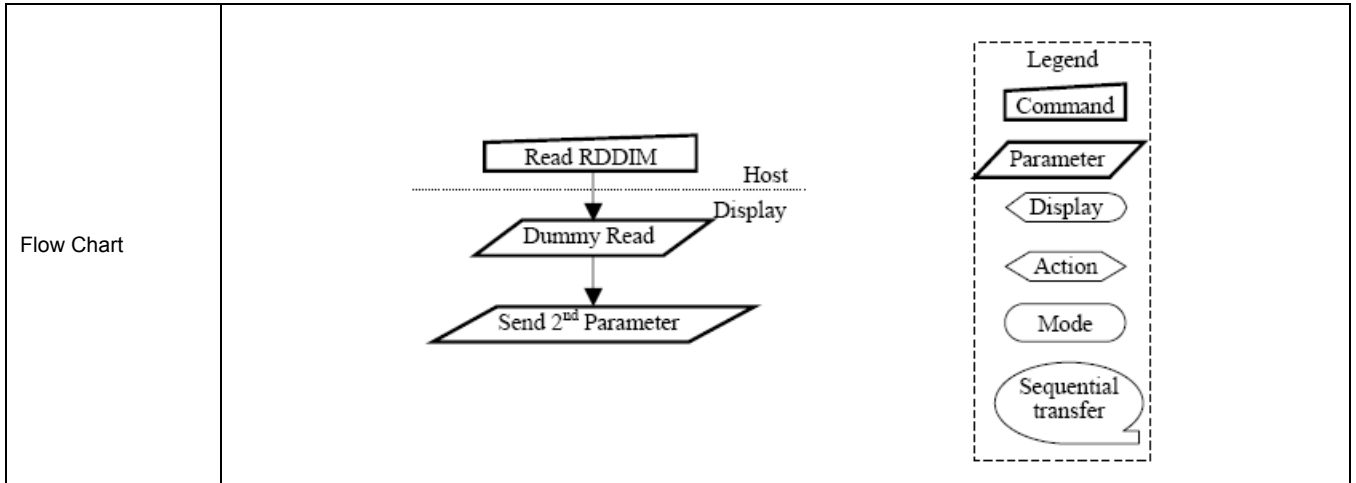


**8.2.5. Get\_pixel\_format (0Ch)**

| 0CH                                       | Get_pixel_format  |       |       |       |    |    |    |    |    |    |    |    |     |        |              |  |  |   |     |   |     |  |     |          |     |              |       |       |       |          |   |   |   |                |   |   |   |          |   |   |   |          |   |   |   |          |   |   |   |                 |   |   |   |                 |   |   |   |          |   |   |
|---|---|-------|-------|-------|----|----|----|----|----|----|----|----|-----|--------|--------------|--|--|---|-----|---|-----|--|-----|----------|-----|--------------|-------|-------|-------|----------|---|---|---|----------------|---|---|---|----------|---|---|---|----------|---|---|---|----------|---|---|---|-----------------|---|---|---|-----------------|---|---|---|----------|---|---|
|   | D/CX  | RDX   | WRX   | D17-8 | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | HEX |        |              |  |  |   |     |   |     |  |     |          |     |              |       |       |       |          |   |   |   |                |   |   |   |          |   |   |   |          |   |   |   |          |   |   |   |                 |   |   |   |                 |   |   |   |          |   |   |
| Command                                   | 0   | 1     | ↑     | x     | 0  | 0  | 0  | 0  | 1  | 1  | 0  | 0  | 0C  |        |              |  |  |   |     |   |     |  |     |          |     |              |       |       |       |          |   |   |   |                |   |   |   |          |   |   |   |          |   |   |   |          |   |   |   |                 |   |   |   |                 |   |   |   |          |   |   |
| 1 <sup>st</sup> Parameter                 | 1   | ↑     | 1     | x     | x  | x  | x  | x  | x  | x  | x  | x  | x   |        |              |  |  |   |     |   |     |  |     |          |     |              |       |       |       |          |   |   |   |                |   |   |   |          |   |   |   |          |   |   |   |          |   |   |   |                 |   |   |   |                 |   |   |   |          |   |   |
| 2 <sup>nd</sup> Parameter                 | 1   | ↑     | 1     | x     | 0  | D6 | D5 | D4 | 0  | D2 | D1 | D0 | xx  |        |              |  |  |   |     |   |     |  |     |          |     |              |       |       |       |          |   |   |   |                |   |   |   |          |   |   |   |          |   |   |   |          |   |   |   |                 |   |   |   |                 |   |   |   |          |   |   |
| Description                               | This command indicates the current status of the display as described in the table below:   |       |       |       |    |    |    |    |    |    |    |    |     |        |              |  |  |   |     |   |     |  |     |          |     |              |       |       |       |          |   |   |   |                |   |   |   |          |   |   |   |          |   |   |   |          |   |   |   |                 |   |   |   |                 |   |   |   |          |   |   |
|   | <table border="1"> <thead> <tr> <th>Bit</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>D7</td> <td rowspan="4">DPI Pixel Format<br/>(RGB Interface Color Format)</td> </tr> <tr> <td>D6</td> </tr> <tr> <td>D5</td> </tr> <tr> <td>D4</td> </tr> <tr> <td>D3</td> <td rowspan="4">DBI Pixel Format<br/>(Control Interface Color Format)</td> </tr> <tr> <td>D2</td> </tr> <tr> <td>D1</td> </tr> <tr> <td>D0</td> </tr> </tbody> </table><br><table border="1"> <thead> <tr> <th>Pixel Format</th> <th>D6/D2</th> <th>D5/D1</th> <th>D4/D0</th> </tr> </thead> <tbody> <tr> <td>Reserved</td> <td>0</td> <td>0</td> <td>0</td> </tr> <tr> <td>3 bits / pixel</td> <td>0</td> <td>0</td> <td>1</td> </tr> <tr> <td>Reserved</td> <td>0</td> <td>1</td> <td>0</td> </tr> <tr> <td>Reserved</td> <td>0</td> <td>1</td> <td>1</td> </tr> <tr> <td>Reserved</td> <td>1</td> <td>0</td> <td>0</td> </tr> <tr> <td>16 bits / pixel</td> <td>1</td> <td>0</td> <td>1</td> </tr> <tr> <td>18 bits / pixel</td> <td>1</td> <td>1</td> <td>0</td> </tr> <tr> <td>Reserved</td> <td>1</td> <td>1</td> <td>1</td> </tr> </tbody> </table> |       |       |       |    |    |    |    |    |    |    |    |     | Bit    | Description  | D7                                       | DPI Pixel Format<br>(RGB Interface Color Format) | D6                                      | D5  | D4  | D3  | DBI Pixel Format<br>(Control Interface Color Format) | D2  | D1       | D0  | Pixel Format | D6/D2 | D5/D1 | D4/D0 | Reserved | 0 | 0 | 0 | 3 bits / pixel | 0 | 0 | 1 | Reserved | 0 | 1 | 0 | Reserved | 0 | 1 | 1 | Reserved | 1 | 0 | 0 | 16 bits / pixel | 1 | 0 | 1 | 18 bits / pixel | 1 | 1 | 0 | Reserved | 1 | 1 |
| Bit                                       | Description   |       |       |       |    |    |    |    |    |    |    |    |     |        |              |  |  |   |     |   |     |  |     |          |     |              |       |       |       |          |   |   |   |                |   |   |   |          |   |   |   |          |   |   |   |          |   |   |   |                 |   |   |   |                 |   |   |   |          |   |   |
| D7  | DPI Pixel Format<br>(RGB Interface Color Format)  |       |       |       |    |    |    |    |    |    |    |    |     |        |              |  |  |   |     |   |     |  |     |          |     |              |       |       |       |          |   |   |   |                |   |   |   |          |   |   |   |          |   |   |   |          |   |   |   |                 |   |   |   |                 |   |   |   |          |   |   |
| D6  |   |       |       |       |    |    |    |    |    |    |    |    |     |        |              |  |  |   |     |   |     |  |     |          |     |              |       |       |       |          |   |   |   |                |   |   |   |          |   |   |   |          |   |   |   |          |   |   |   |                 |   |   |   |                 |   |   |   |          |   |   |
| D5  |   |       |       |       |    |    |    |    |    |    |    |    |     |        |              |  |  |   |     |   |     |  |     |          |     |              |       |       |       |          |   |   |   |                |   |   |   |          |   |   |   |          |   |   |   |          |   |   |   |                 |   |   |   |                 |   |   |   |          |   |   |
| D4  |   |       |       |       |    |    |    |    |    |    |    |    |     |        |              |  |  |   |     |   |     |  |     |          |     |              |       |       |       |          |   |   |   |                |   |   |   |          |   |   |   |          |   |   |   |          |   |   |   |                 |   |   |   |                 |   |   |   |          |   |   |
| D3  | DBI Pixel Format<br>(Control Interface Color Format)  |       |       |       |    |    |    |    |    |    |    |    |     |        |              |  |  |   |     |   |     |  |     |          |     |              |       |       |       |          |   |   |   |                |   |   |   |          |   |   |   |          |   |   |   |          |   |   |   |                 |   |   |   |                 |   |   |   |          |   |   |
| D2  |   |       |       |       |    |    |    |    |    |    |    |    |     |        |              |  |  |   |     |   |     |  |     |          |     |              |       |       |       |          |   |   |   |                |   |   |   |          |   |   |   |          |   |   |   |          |   |   |   |                 |   |   |   |                 |   |   |   |          |   |   |
| D1  |   |       |       |       |    |    |    |    |    |    |    |    |     |        |              |  |  |   |     |   |     |  |     |          |     |              |       |       |       |          |   |   |   |                |   |   |   |          |   |   |   |          |   |   |   |          |   |   |   |                 |   |   |   |                 |   |   |   |          |   |   |
| D0  |   |       |       |       |    |    |    |    |    |    |    |    |     |        |              |  |  |   |     |   |     |  |     |          |     |              |       |       |       |          |   |   |   |                |   |   |   |          |   |   |   |          |   |   |   |          |   |   |   |                 |   |   |   |                 |   |   |   |          |   |   |
| Pixel Format                              | D6/D2   | D5/D1 | D4/D0 |       |    |    |    |    |    |    |    |    |     |        |              |  |  |   |     |   |     |  |     |          |     |              |       |       |       |          |   |   |   |                |   |   |   |          |   |   |   |          |   |   |   |          |   |   |   |                 |   |   |   |                 |   |   |   |          |   |   |
| Reserved                                  | 0   | 0     | 0     |       |    |    |    |    |    |    |    |    |     |        |              |  |  |   |     |   |     |  |     |          |     |              |       |       |       |          |   |   |   |                |   |   |   |          |   |   |   |          |   |   |   |          |   |   |   |                 |   |   |   |                 |   |   |   |          |   |   |
| 3 bits / pixel                            | 0   | 0     | 1     |       |    |    |    |    |    |    |    |    |     |        |              |  |  |   |     |   |     |  |     |          |     |              |       |       |       |          |   |   |   |                |   |   |   |          |   |   |   |          |   |   |   |          |   |   |   |                 |   |   |   |                 |   |   |   |          |   |   |
| Reserved                                  | 0   | 1     | 0     |       |    |    |    |    |    |    |    |    |     |        |              |  |  |   |     |   |     |  |     |          |     |              |       |       |       |          |   |   |   |                |   |   |   |          |   |   |   |          |   |   |   |          |   |   |   |                 |   |   |   |                 |   |   |   |          |   |   |
| Reserved                                  | 0   | 1     | 1     |       |    |    |    |    |    |    |    |    |     |        |              |  |  |   |     |   |     |  |     |          |     |              |       |       |       |          |   |   |   |                |   |   |   |          |   |   |   |          |   |   |   |          |   |   |   |                 |   |   |   |                 |   |   |   |          |   |   |
| Reserved                                  | 1   | 0     | 0     |       |    |    |    |    |    |    |    |    |     |        |              |  |  |   |     |   |     |  |     |          |     |              |       |       |       |          |   |   |   |                |   |   |   |          |   |   |   |          |   |   |   |          |   |   |   |                 |   |   |   |                 |   |   |   |          |   |   |
| 16 bits / pixel                           | 1   | 0     | 1     |       |    |    |    |    |    |    |    |    |     |        |              |  |  |   |     |   |     |  |     |          |     |              |       |       |       |          |   |   |   |                |   |   |   |          |   |   |   |          |   |   |   |          |   |   |   |                 |   |   |   |                 |   |   |   |          |   |   |
| 18 bits / pixel                           | 1   | 1     | 0     |       |    |    |    |    |    |    |    |    |     |        |              |  |  |   |     |   |     |  |     |          |     |              |       |       |       |          |   |   |   |                |   |   |   |          |   |   |   |          |   |   |   |          |   |   |   |                 |   |   |   |                 |   |   |   |          |   |   |
| Reserved                                  | 1   | 1     | 1     |       |    |    |    |    |    |    |    |    |     |        |              |  |  |   |     |   |     |  |     |          |     |              |       |       |       |          |   |   |   |                |   |   |   |          |   |   |   |          |   |   |   |          |   |   |   |                 |   |   |   |                 |   |   |   |          |   |   |
| 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   |       |       |       |    |    |    |    |    |    |    |    |     |        |              |  |  |   |     |   |     |  |     |          |     |              |       |       |       |          |   |   |   |                |   |   |   |          |   |   |   |          |   |   |   |          |   |   |   |                 |   |   |   |                 |   |   |   |          |   |   |
| Flow Chart                                | <div style="border: 1px dashed black; padding: 10px;"> <p>Legend</p> <ul style="list-style-type: none"> <li><span style="border: 1px solid black; padding: 2px;">Command</span></li> <li><span style="border: 1px solid black; padding: 2px;">Parameter</span></li> <li><span style="border: 1px solid black; padding: 2px;">Display</span></li> <li><span style="border: 1px solid black; padding: 2px;">Action</span></li> <li><span style="border: 1px solid black; padding: 2px;">Mode</span></li> <li><span style="border: 1px solid black; padding: 2px;">Sequential transfer</span></li> </ul> </div><br><pre> graph TD     subgraph Host         A[Read RDDCOLMOD]     end     subgraph Display         B[/Dummy Read/]         C[/Send 2nd Parameter/]     end     A --&gt; B     B --&gt; C     </pre>  |       |       |       |    |    |    |    |    |    |    |    |     |        |              |  |  |   |     |   |     |  |     |          |     |              |       |       |       |          |   |   |   |                |   |   |   |          |   |   |   |          |   |   |   |          |   |   |   |                 |   |   |   |                 |   |   |   |          |   |   |

### 8.2.6. Get\_display\_mode (0Dh)

| 0DH                                       | Get_display_mode  |          |     |       |    |    |    |    |    |    |    |    |     |        |              |  |     |   |       |   |          |  |     |                  |          |    |          |  |    |          |  |    |                       |  |    |                       |  |    |                       |
|---|---|----------|-----|-------|----|----|----|----|----|----|----|----|-----|--------|--------------|--|-----|---|-------|---|----------|--|-----|------------------|----------|----|----------|--|----|----------|--|----|-----------------------|--|----|-----------------------|--|----|-----------------------|
|   | D/CX  | RDX      | WRX | D17-8 | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | HEX |        |              |  |     |   |       |   |          |  |     |                  |          |    |          |  |    |          |  |    |                       |  |    |                       |  |    |                       |
| Command                                   | 0   | 1        | ↑   | x     | 0  | 0  | 0  | 0  | 1  | 1  | 0  | 1  | 0D  |        |              |  |     |   |       |   |          |  |     |                  |          |    |          |  |    |          |  |    |                       |  |    |                       |  |    |                       |
| 1 <sup>st</sup> Parameter                 | 1   | ↑        | 1   | x     | x  | x  | x  | x  | x  | x  | x  | x  | x   |        |              |  |     |   |       |   |          |  |     |                  |          |    |          |  |    |          |  |    |                       |  |    |                       |  |    |                       |
| 2 <sup>nd</sup> Parameter                 | 1   | ↑        | 1   | x     | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | xx  |        |              |  |     |   |       |   |          |  |     |                  |          |    |          |  |    |          |  |    |                       |  |    |                       |  |    |                       |
| Description                               | The display module returns the Display Image Mode status.   |          |     |       |    |    |    |    |    |    |    |    |     |        |              |  |     |   |       |   |          |  |     |                  |          |    |          |  |    |          |  |    |                       |  |    |                       |  |    |                       |
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| Bit                                       | Description   | Symbol   |     |       |    |    |    |    |    |    |    |    |     |        |              |  |     |   |       |   |          |  |     |                  |          |    |          |  |    |          |  |    |                       |  |    |                       |  |    |                       |
| D7  | Vertical Scrolling Status   | VSSON    |     |       |    |    |    |    |    |    |    |    |     |        |              |  |     |   |       |   |          |  |     |                  |          |    |          |  |    |          |  |    |                       |  |    |                       |  |    |                       |
| D6  | Reserved  |          |     |       |    |    |    |    |    |    |    |    |     |        |              |  |     |   |       |   |          |  |     |                  |          |    |          |  |    |          |  |    |                       |  |    |                       |  |    |                       |
| D5  | Inversion On/Off  | DSPINVON |     |       |    |    |    |    |    |    |    |    |     |        |              |  |     |   |       |   |          |  |     |                  |          |    |          |  |    |          |  |    |                       |  |    |                       |  |    |                       |
| D4  | Reserved  |          |     |       |    |    |    |    |    |    |    |    |     |        |              |  |     |   |       |   |          |  |     |                  |          |    |          |  |    |          |  |    |                       |  |    |                       |  |    |                       |
| D3  | Reserved  |          |     |       |    |    |    |    |    |    |    |    |     |        |              |  |     |   |       |   |          |  |     |                  |          |    |          |  |    |          |  |    |                       |  |    |                       |  |    |                       |
| D2  | Gamma Curve Selection   |          |     |       |    |    |    |    |    |    |    |    |     |        |              |  |     |   |       |   |          |  |     |                  |          |    |          |  |    |          |  |    |                       |  |    |                       |  |    |                       |
| D1  | Gamma Curve Selection   |          |     |       |    |    |    |    |    |    |    |    |     |        |              |  |     |   |       |   |          |  |     |                  |          |    |          |  |    |          |  |    |                       |  |    |                       |  |    |                       |
| D0  | Gamma Curve Selection   |          |     |       |    |    |    |    |    |    |    |    |     |        |              |  |     |   |       |   |          |  |     |                  |          |    |          |  |    |          |  |    |                       |  |    |                       |  |    |                       |
| Register Availability                     | <table border="1" style="margin-left: auto; margin-right: auto;"> <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   |          |     |       |    |    |    |    |    |    |    |    |     |        |              |  |     |   |       |   |          |  |     |                  |          |    |          |  |    |          |  |    |                       |  |    |                       |  |    |                       |



### 8.2.7. Get\_signal\_mode (0Eh)

| 0EH                                       | RDDSM (Read Display Signal Mode)  |        |     |       |    |    |    |    |    |    |    |    |     |        |              |  |     |   |      |   |                                 |  |     |          |     |    |          |  |    |          |  |    |          |  |    |          |  |    |          |
|---|---|--------|-----|-------|----|----|----|----|----|----|----|----|-----|--------|--------------|--|-----|---|------|---|---------------------------------|--|-----|----------|-----|----|----------|--|----|----------|--|----|----------|--|----|----------|--|----|----------|
|   | D/CX  | RDX    | WRX | D17-8 | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | HEX |        |              |  |     |   |      |   |                                 |  |     |          |     |    |          |  |    |          |  |    |          |  |    |          |  |    |          |
| Command                                   | 0   | 1      | ↑   | x     | 0  | 0  | 0  | 0  | 1  | 1  | 1  | 0  | 0E  |        |              |  |     |   |      |   |                                 |  |     |          |     |    |          |  |    |          |  |    |          |  |    |          |  |    |          |
| 1 <sup>st</sup> Parameter                 | 1   | ↑      | 1   | x     | x  | x  | x  | x  | x  | x  | x  | x  | x   |        |              |  |     |   |      |   |                                 |  |     |          |     |    |          |  |    |          |  |    |          |  |    |          |  |    |          |
| 2 <sup>nd</sup> Parameter                 | 1   | ↑      | 1   | x     | D7 | D6 | 0  | 0  | 0  | 0  | 0  | 0  | xx  |        |              |  |     |   |      |   |                                 |  |     |          |     |    |          |  |    |          |  |    |          |  |    |          |  |    |          |
| Description                               | The display module returns the Display Signal Mode.   |        |     |       |    |    |    |    |    |    |    |    |     |        |              |  |     |   |      |   |                                 |  |     |          |     |    |          |  |    |          |  |    |          |  |    |          |  |    |          |
|   | <table border="1"> <thead> <tr> <th>Bit</th> <th>Description</th> <th>Symbol</th> </tr> </thead> <tbody> <tr> <td>D7</td> <td>Tearing Effect Line On/Off</td> <td>TEON</td> </tr> <tr> <td>D6</td> <td>Tearing Effect Line Output Mode</td> <td>TELOM</td> </tr> <tr> <td>D5</td> <td>Reserved</td> <td></td> </tr> <tr> <td>D4</td> <td>Reserved</td> <td></td> </tr> <tr> <td>D3</td> <td>Reserved</td> <td></td> </tr> <tr> <td>D2</td> <td>Reserved</td> <td></td> </tr> <tr> <td>D1</td> <td>Reserved</td> <td></td> </tr> <tr> <td>D0</td> <td>Reserved</td> <td></td> </tr> </tbody> </table> <p>This command indicates the current status of the display as described in the table below:</p> <ul style="list-style-type: none"> <li>◆ Bit D7 – Tearing Effect Line On/Off<br/>'0' = Tearing Effect Line Off.<br/>'1' = Tearing Effect On.</li> <li>◆ Bit D6 – Tearing Effect Line Output Mode, see section 8.3 for mode definitions.<br/>'0' = Mode 1.<br/>'1' = Mode 2.</li> <li>◆ Bit D[5:0] – Reserved</li> </ul> |        |     |       |    |    |    |    |    |    |    |    |     | Bit    | Description  | Symbol                                   | D7  | Tearing Effect Line On/Off              | TEON | D6  | Tearing Effect Line Output Mode | TELOM                                    | D5  | Reserved |     | D4 | Reserved |  | D3 | Reserved |  | D2 | Reserved |  | D1 | Reserved |  | D0 | Reserved |
| Bit                                       | Description   | Symbol |     |       |    |    |    |    |    |    |    |    |     |        |              |  |     |   |      |   |                                 |  |     |          |     |    |          |  |    |          |  |    |          |  |    |          |  |    |          |
| D7  | Tearing Effect Line On/Off  | TEON   |     |       |    |    |    |    |    |    |    |    |     |        |              |  |     |   |      |   |                                 |  |     |          |     |    |          |  |    |          |  |    |          |  |    |          |  |    |          |
| D6  | Tearing Effect Line Output Mode   | TELOM  |     |       |    |    |    |    |    |    |    |    |     |        |              |  |     |   |      |   |                                 |  |     |          |     |    |          |  |    |          |  |    |          |  |    |          |  |    |          |
| D5  | Reserved  |        |     |       |    |    |    |    |    |    |    |    |     |        |              |  |     |   |      |   |                                 |  |     |          |     |    |          |  |    |          |  |    |          |  |    |          |  |    |          |
| D4  | Reserved  |        |     |       |    |    |    |    |    |    |    |    |     |        |              |  |     |   |      |   |                                 |  |     |          |     |    |          |  |    |          |  |    |          |  |    |          |  |    |          |
| D3  | Reserved  |        |     |       |    |    |    |    |    |    |    |    |     |        |              |  |     |   |      |   |                                 |  |     |          |     |    |          |  |    |          |  |    |          |  |    |          |  |    |          |
| D2  | Reserved  |        |     |       |    |    |    |    |    |    |    |    |     |        |              |  |     |   |      |   |                                 |  |     |          |     |    |          |  |    |          |  |    |          |  |    |          |  |    |          |
| D1  | Reserved  |        |     |       |    |    |    |    |    |    |    |    |     |        |              |  |     |   |      |   |                                 |  |     |          |     |    |          |  |    |          |  |    |          |  |    |          |  |    |          |
| D0  | Reserved  |        |     |       |    |    |    |    |    |    |    |    |     |        |              |  |     |   |      |   |                                 |  |     |          |     |    |          |  |    |          |  |    |          |  |    |          |  |    |          |
| 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   |        |     |       |    |    |    |    |    |    |    |    |     |        |              |  |     |   |      |   |                                 |  |     |          |     |    |          |  |    |          |  |    |          |  |    |          |  |    |          |
| Flow Chart                                | <pre> graph TD     subgraph Host         C[Read RDDIM]     end     subgraph Display         D[/Dummy Read/]         P[/Send 2nd Parameter/]     end     C --&gt; D     D --&gt; P     </pre> <p>Legend:</p> <ul style="list-style-type: none"> <li>Command: Rectangle</li> <li>Parameter: Parallelogram</li> <li>Display: Oval</li> <li>Action: Diamond</li> <li>Mode: Circle</li> <li>Sequential transfer: Curved arrow</li> </ul>   |        |     |       |    |    |    |    |    |    |    |    |     |        |              |  |     |   |      |   |                                 |  |     |          |     |    |          |  |    |          |  |    |          |  |    |          |  |    |          |

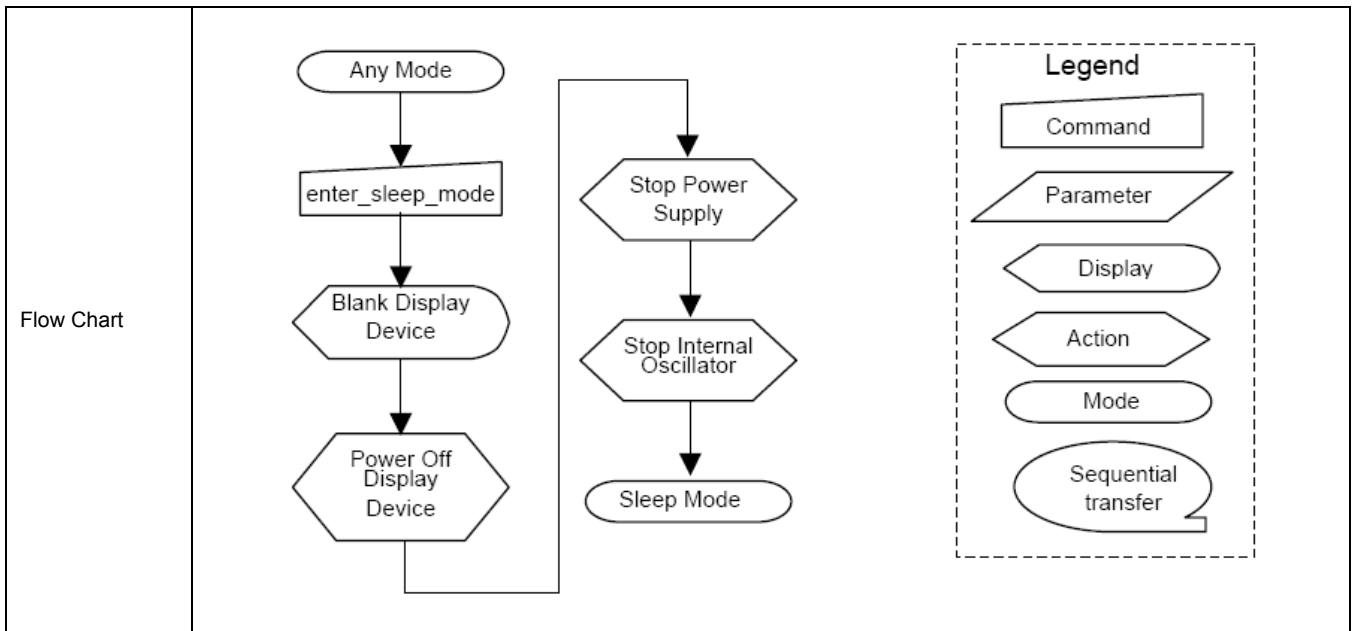


**8.2.8. Get\_diagnostic\_result (0Fh)**

| 0FH                                       | Get_diagnostic_result  |         |     |       |    |    |    |    |    |    |    |    |     |        |              |  |     |   |     |   |                         |  |     |                           |         |    |                               |         |    |          |         |    |          |         |    |          |         |    |          |
|---|--|---------|-----|-------|----|----|----|----|----|----|----|----|-----|--------|--------------|--|-----|---|-----|---|-------------------------|--|-----|---------------------------|---------|----|-------------------------------|---------|----|----------|---------|----|----------|---------|----|----------|---------|----|----------|
|   | D/CX   | RDX     | WRX | D17-8 | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | HEX |        |              |  |     |   |     |   |                         |  |     |                           |         |    |                               |         |    |          |         |    |          |         |    |          |         |    |          |
| Command                                   | 0  | 1       | ↑   | x     | 0  | 0  | 0  | 0  | 1  | 1  | 1  | 1  | 0F  |        |              |  |     |   |     |   |                         |  |     |                           |         |    |                               |         |    |          |         |    |          |         |    |          |         |    |          |
| 1 <sup>st</sup> Parameter                 | 1  | ↑       | 1   | x     | x  | x  | x  | x  | x  | x  | x  | x  | x   |        |              |  |     |   |     |   |                         |  |     |                           |         |    |                               |         |    |          |         |    |          |         |    |          |         |    |          |
| 2 <sup>nd</sup> Parameter                 | 1  | ↑       | 1   | x     | D7 | D6 | 0  | 0  | 0  | 0  | 0  | 0  | xx  |        |              |  |     |   |     |   |                         |  |     |                           |         |    |                               |         |    |          |         |    |          |         |    |          |         |    |          |
| Description                               | The display module returns the self-diagnostic results following a Sleep Out command.  |         |     |       |    |    |    |    |    |    |    |    |     |        |              |  |     |   |     |   |                         |  |     |                           |         |    |                               |         |    |          |         |    |          |         |    |          |         |    |          |
|   | <table border="1"> <thead> <tr> <th>Bit</th> <th>Description</th> <th>Symbol</th> </tr> </thead> <tbody> <tr> <td>D7</td> <td>Register Loading Detection</td> <td>SDR</td> </tr> <tr> <td>D6</td> <td>Functionality Detection</td> <td>FUNCD</td> </tr> <tr> <td>D5</td> <td>Chip attachment Detection</td> <td>Set '0'</td> </tr> <tr> <td>D4</td> <td>Display Glass Break Detection</td> <td>Set '0'</td> </tr> <tr> <td>D3</td> <td>Reserved</td> <td>Set '0'</td> </tr> <tr> <td>D2</td> <td>Reserved</td> <td>Set '0'</td> </tr> <tr> <td>D1</td> <td>Reserved</td> <td>Set '0'</td> </tr> <tr> <td>D0</td> <td>Reserved</td> <td>Set '0'</td> </tr> </tbody> </table> <p>Bit D7 – Register Loading Detection</p> <p>Bit D6 – Functionality Detection</p> <p>Bit D5 – Chip Attachment Detection<br/>Set to '0' if feature unimplemented.</p> <p>Bit D4 – Display Glass Break Detection<br/>Set to '0' if feature unimplemented.</p> <p>Bits D[3:0] – Reserved<br/>Set to '0'.</p> |         |     |       |    |    |    |    |    |    |    |    |     | Bit    | Description  | Symbol                                   | D7  | Register Loading Detection              | SDR | D6  | Functionality Detection | FUNCD                                    | D5  | Chip attachment Detection | Set '0' | D4 | Display Glass Break Detection | Set '0' | D3 | Reserved | Set '0' | D2 | Reserved | Set '0' | D1 | Reserved | Set '0' | D0 | Reserved |
| Bit                                       | Description  | Symbol  |     |       |    |    |    |    |    |    |    |    |     |        |              |  |     |   |     |   |                         |  |     |                           |         |    |                               |         |    |          |         |    |          |         |    |          |         |    |          |
| D7  | Register Loading Detection   | SDR     |     |       |    |    |    |    |    |    |    |    |     |        |              |  |     |   |     |   |                         |  |     |                           |         |    |                               |         |    |          |         |    |          |         |    |          |         |    |          |
| D6  | Functionality Detection  | FUNCD   |     |       |    |    |    |    |    |    |    |    |     |        |              |  |     |   |     |   |                         |  |     |                           |         |    |                               |         |    |          |         |    |          |         |    |          |         |    |          |
| D5  | Chip attachment Detection  | Set '0' |     |       |    |    |    |    |    |    |    |    |     |        |              |  |     |   |     |   |                         |  |     |                           |         |    |                               |         |    |          |         |    |          |         |    |          |         |    |          |
| D4  | Display Glass Break Detection  | Set '0' |     |       |    |    |    |    |    |    |    |    |     |        |              |  |     |   |     |   |                         |  |     |                           |         |    |                               |         |    |          |         |    |          |         |    |          |         |    |          |
| D3  | Reserved   | Set '0' |     |       |    |    |    |    |    |    |    |    |     |        |              |  |     |   |     |   |                         |  |     |                           |         |    |                               |         |    |          |         |    |          |         |    |          |         |    |          |
| D2  | Reserved   | Set '0' |     |       |    |    |    |    |    |    |    |    |     |        |              |  |     |   |     |   |                         |  |     |                           |         |    |                               |         |    |          |         |    |          |         |    |          |         |    |          |
| D1  | Reserved   | Set '0' |     |       |    |    |    |    |    |    |    |    |     |        |              |  |     |   |     |   |                         |  |     |                           |         |    |                               |         |    |          |         |    |          |         |    |          |         |    |          |
| D0  | Reserved   | Set '0' |     |       |    |    |    |    |    |    |    |    |     |        |              |  |     |   |     |   |                         |  |     |                           |         |    |                               |         |    |          |         |    |          |         |    |          |         |    |          |
| 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  |         |     |       |    |    |    |    |    |    |    |    |     |        |              |  |     |   |     |   |                         |  |     |                           |         |    |                               |         |    |          |         |    |          |         |    |          |         |    |          |
| Flow Chart                                | <pre> graph TD     subgraph Host         A[Read RDDIM]     end     subgraph Display         B[/Dummy Read/]         C[/Send 2nd Parameter/]     end     A --&gt; B     B --&gt; C     </pre> <p>Legend</p> <ul style="list-style-type: none"> <li>Command: [ ]</li> <li>Parameter: / /</li> <li>Display: &lt;&gt;</li> <li>Action: &lt;&gt;</li> <li>Mode: ( )</li> <li>Sequential transfer: ( )</li> </ul>  |         |     |       |    |    |    |    |    |    |    |    |     |        |              |  |     |   |     |   |                         |  |     |                           |         |    |                               |         |    |          |         |    |          |         |    |          |         |    |          |

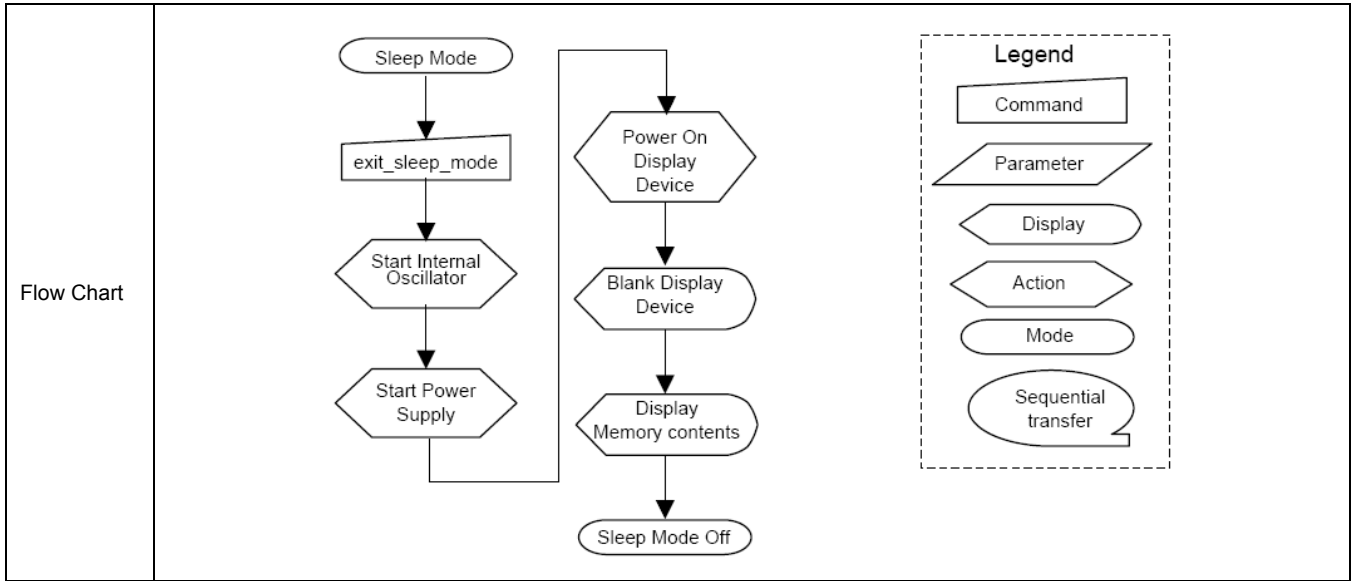
### 8.2.9. Enter\_sleep\_mode (10h)

| 10H                                       | Enter_sleep_mode   |     |     |       |    |    |    |    |    |    |    |    |     |        |               |  |               |   |               |   |               |  |     |          |     |
|---|--|-----|-----|-------|----|----|----|----|----|----|----|----|-----|--------|---------------|--|---------------|---|---------------|---|---------------|--|-----|----------|-----|
|   | D/CX   | RDX | WRX | D17-8 | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | HEX |        |               |  |               |   |               |   |               |  |     |          |     |
| Command                                   | 0  | 1   | ↑   | x     | 0  | 0  | 0  | 1  | 0  | 0  | 0  | 0  | 10  |        |               |  |               |   |               |   |               |  |     |          |     |
| Parameter                                 | No Parameter   |     |     |       |    |    |    |    |    |    |    |    |     |        |               |  |               |   |               |   |               |  |     |          |     |
| Description                               | <p>This command causes the display module to enter the Sleep mode.</p> <p>This command causes the LCD module to enter the Sleep mode. In this mode, the DC/DC converter, internal oscillator and panel scanning stop.</p> <p>DBI or DSI Command Mode remains operational and the frame memory maintains its contents. The host processor continues to send PCLK, HS and VS information to Type 2 and Type 3 display modules for two frames after this command is sent when the display module is in Normal mode.</p> |     |     |       |    |    |    |    |    |    |    |    |     |        |               |  |               |   |               |   |               |  |     |          |     |
| Restriction                               | <p>This command has no effect when the display module is already in Sleep mode.</p> <p>The host processor must wait five milliseconds before sending any new commands to a display module following this command to allow time for the supply voltages and clock circuits to stabilize.</p> <p>The host processor must wait 120 milliseconds after sending an exit_sleep_mode command before sending an enter_sleep_mode command.</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>Power On Sequence</td> <td>Sleep In Mode</td> </tr> <tr> <td>SW Reset</td> <td>Sleep In Mode</td> </tr> <tr> <td>HW Reset</td> <td>Sleep In Mode</td> </tr> </tbody> </table>   |     |     |       |    |    |    |    |    |    |    |    |     | Status | Default Value | Power On Sequence                        | Sleep In Mode | SW Reset                                | Sleep In Mode | HW Reset                                  | Sleep In Mode |  |     |          |     |
| Status                                    | Default Value  |     |     |       |    |    |    |    |    |    |    |    |     |        |               |  |               |   |               |   |               |  |     |          |     |
| Power On Sequence                         | Sleep In Mode  |     |     |       |    |    |    |    |    |    |    |    |     |        |               |  |               |   |               |   |               |  |     |          |     |
| SW Reset                                  | Sleep In Mode  |     |     |       |    |    |    |    |    |    |    |    |     |        |               |  |               |   |               |   |               |  |     |          |     |
| HW Reset                                  | Sleep In Mode  |     |     |       |    |    |    |    |    |    |    |    |     |        |               |  |               |   |               |   |               |  |     |          |     |



### 8.2.10. Exit\_sleep\_mode (11h)

| 11H                                       | Exit_sleep_mode  |     |     |       |    |    |    |    |    |    |    |    |     |        |               |  |               |   |               |   |               |  |     |          |     |
|---|--|-----|-----|-------|----|----|----|----|----|----|----|----|-----|--------|---------------|--|---------------|---|---------------|---|---------------|--|-----|----------|-----|
|   | D/CX   | RDX | WRX | D17-8 | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | HEX |        |               |  |               |   |               |   |               |  |     |          |     |
| Command                                   | 0  | 1   | ↑   | x     | 0  | 0  | 0  | 1  | 0  | 0  | 0  | 1  | 11  |        |               |  |               |   |               |   |               |  |     |          |     |
| Parameter                                 | No Parameter   |     |     |       |    |    |    |    |    |    |    |    |     |        |               |  |               |   |               |   |               |  |     |          |     |
| Description                               | This command causes the display module to exit Sleep mode. All blocks inside the display module are enabled. The host processor sends PCLK, HS and VS information to Type 2 and Type 3 display modules two frames before this command is sent when the display module is in Normal Mode.   |     |     |       |    |    |    |    |    |    |    |    |     |        |               |  |               |   |               |   |               |  |     |          |     |
| Restriction                               | <p>This command shall not cause any visible effect on the display device when the display module is not in Sleep mode.</p> <p>The host processor must wait five milliseconds after sending this command before sending another command. This delay allows the supply voltages and clock circuits to stabilize.</p> <p>The host processor must wait 120 milliseconds after sending an exit_sleep_mode command before sending an enter_sleep_mode command.</p> <p>The display module loads the display module's default values to the registers when exiting the Sleep mode.</p> <p>There shall not be any abnormal visual effect on the display device when loading the registers if the factory default and register values are the same or when the display module is not in Sleep mode.</p> <p>The display module runs the self-diagnostic functions after this command is received. See section 5.3 for a description of the self-diagnostic functions.</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>Power On Sequence</td> <td>Sleep In Mode</td> </tr> <tr> <td>SW Reset</td> <td>Sleep In Mode</td> </tr> <tr> <td>HW Reset</td> <td>Sleep In Mode</td> </tr> </tbody> </table>   |     |     |       |    |    |    |    |    |    |    |    |     | Status | Default Value | Power On Sequence                        | Sleep In Mode | SW Reset                                | Sleep In Mode | HW Reset                                  | Sleep In Mode |  |     |          |     |
| Status                                    | Default Value  |     |     |       |    |    |    |    |    |    |    |    |     |        |               |  |               |   |               |   |               |  |     |          |     |
| Power On Sequence                         | Sleep In Mode  |     |     |       |    |    |    |    |    |    |    |    |     |        |               |  |               |   |               |   |               |  |     |          |     |
| SW Reset                                  | Sleep In Mode  |     |     |       |    |    |    |    |    |    |    |    |     |        |               |  |               |   |               |   |               |  |     |          |     |
| HW Reset                                  | Sleep In Mode  |     |     |       |    |    |    |    |    |    |    |    |     |        |               |  |               |   |               |   |               |  |     |          |     |



### 8.2.11. Enter\_Partial\_mode (12h)

| 12H                                       | Enter_Partial_mode   |     |     |       |    |    |    |    |    |    |    |    |     |        |               |  |                        |   |                        |   |                        |  |     |          |     |
|---|--|-----|-----|-------|----|----|----|----|----|----|----|----|-----|--------|---------------|--|------------------------|---|------------------------|---|------------------------|--|-----|----------|-----|
|   | D/CX   | RDX | WRX | D17-8 | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | HEX |        |               |  |                        |   |                        |   |                        |  |     |          |     |
| Command                                   | 0  | 1   | ↑   | x     | 0  | 0  | 0  | 1  | 0  | 0  | 1  | 0  | 12  |        |               |  |                        |   |                        |   |                        |  |     |          |     |
| Parameter                                 | No Parameter   |     |     |       |    |    |    |    |    |    |    |    |     |        |               |  |                        |   |                        |   |                        |  |     |          |     |
| Description                               | <p>This command causes the display module to enter the Partial Display Mode. The Partial Display Mode window is described by the set_partial_area (30h) command.</p> <p>To leave Partial Display Mode, the enter_normal_mode (13h) command should be written.</p> <p>The host processor continues to send PCLK, HS and VS information to Type 2 display modules for two frames after this command is sent when the display module is in Normal Display Mode.</p> |     |     |       |    |    |    |    |    |    |    |    |     |        |               |  |                        |   |                        |   |                        |  |     |          |     |
| Restriction                               | This command has no effect when Partial Display Mode is already active.  |     |     |       |    |    |    |    |    |    |    |    |     |        |               |  |                        |   |                        |   |                        |  |     |          |     |
| 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>Power On Sequence</td> <td>Normal Display Mode On</td> </tr> <tr> <td>SW Reset</td> <td>Normal Display Mode On</td> </tr> <tr> <td>HW Reset</td> <td>Normal Display Mode On</td> </tr> </tbody> </table>  |     |     |       |    |    |    |    |    |    |    |    |     | Status | Default Value | Power On Sequence                        | Normal Display Mode On | SW Reset                                | Normal Display Mode On | HW Reset                                  | Normal Display Mode On |  |     |          |     |
| Status                                    | Default Value  |     |     |       |    |    |    |    |    |    |    |    |     |        |               |  |                        |   |                        |   |                        |  |     |          |     |
| Power On Sequence                         | Normal Display Mode On   |     |     |       |    |    |    |    |    |    |    |    |     |        |               |  |                        |   |                        |   |                        |  |     |          |     |
| SW Reset                                  | Normal Display Mode On   |     |     |       |    |    |    |    |    |    |    |    |     |        |               |  |                        |   |                        |   |                        |  |     |          |     |
| HW Reset                                  | Normal Display Mode On   |     |     |       |    |    |    |    |    |    |    |    |     |        |               |  |                        |   |                        |   |                        |  |     |          |     |
| Flow Chart                                | Refer to Partial Area (30h)  |     |     |       |    |    |    |    |    |    |    |    |     |        |               |  |                        |   |                        |   |                        |  |     |          |     |

### 8.2.12. Enter\_normal\_mode (13h)

| 13H                                       | Enter_normal_mode  |     |     |       |    |    |    |    |    |    |    |    |     |        |               |  |                        |   |                        |   |                        |  |     |          |     |
|---|--|-----|-----|-------|----|----|----|----|----|----|----|----|-----|--------|---------------|--|------------------------|---|------------------------|---|------------------------|--|-----|----------|-----|
|   | D/CX   | RDX | WRX | D17-8 | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | HEX |        |               |  |                        |   |                        |   |                        |  |     |          |     |
| Command                                   | 0  | 1   | ↑   | x     | 0  | 0  | 0  | 1  | 0  | 0  | 1  | 1  | 13  |        |               |  |                        |   |                        |   |                        |  |     |          |     |
| Parameter                                 | No Parameter   |     |     |       |    |    |    |    |    |    |    |    |     |        |               |  |                        |   |                        |   |                        |  |     |          |     |
| Description                               | <p>This command causes the display module to enter the Normal mode.</p> <p>Normal Mode is defined as Partial Display mode and Scroll mode are off.</p> <p>The host processor sends PCLK, HS and VS information to Type 2 display modules two frames before this command is sent when the display module is in Partial Display Mode.</p>  |     |     |       |    |    |    |    |    |    |    |    |     |        |               |  |                        |   |                        |   |                        |  |     |          |     |
| Restriction                               | This command has no effect when Normal Display mode is already active.   |     |     |       |    |    |    |    |    |    |    |    |     |        |               |  |                        |   |                        |   |                        |  |     |          |     |
| 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>Power On Sequence</td> <td>Normal Display Mode On</td> </tr> <tr> <td>SW Reset</td> <td>Normal Display Mode On</td> </tr> <tr> <td>HW Reset</td> <td>Normal Display Mode On</td> </tr> </tbody> </table>  |     |     |       |    |    |    |    |    |    |    |    |     | Status | Default Value | Power On Sequence                        | Normal Display Mode On | SW Reset                                | Normal Display Mode On | HW Reset                                  | Normal Display Mode On |  |     |          |     |
| Status                                    | Default Value  |     |     |       |    |    |    |    |    |    |    |    |     |        |               |  |                        |   |                        |   |                        |  |     |          |     |
| Power On Sequence                         | Normal Display Mode On   |     |     |       |    |    |    |    |    |    |    |    |     |        |               |  |                        |   |                        |   |                        |  |     |          |     |
| SW Reset                                  | Normal Display Mode On   |     |     |       |    |    |    |    |    |    |    |    |     |        |               |  |                        |   |                        |   |                        |  |     |          |     |
| HW Reset                                  | Normal Display Mode On   |     |     |       |    |    |    |    |    |    |    |    |     |        |               |  |                        |   |                        |   |                        |  |     |          |     |
| Flow Chart                                | Refer to the description of set_partial_area(30h) and set_scroll_area(33h)   |     |     |       |    |    |    |    |    |    |    |    |     |        |               |  |                        |   |                        |   |                        |  |     |          |     |

**8.2.13. Exit\_invert\_mode (20h)**

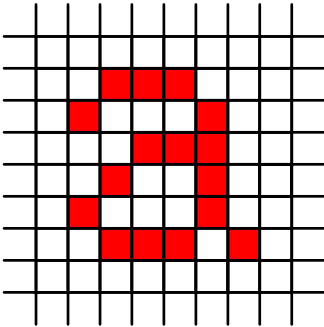
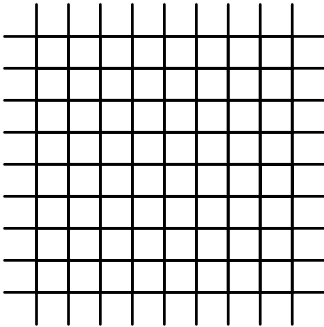
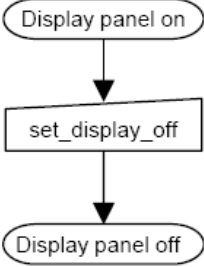
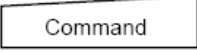


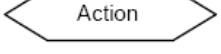
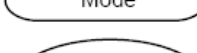
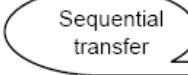
| 20H                                       | Exit_invert_mode  |     |     |       |    |    |    |    |    |    |    |    |     |        |               |  |                  |   |                  |   |                  |  |     |          |     |
|---|---|-----|-----|-------|----|----|----|----|----|----|----|----|-----|--------|---------------|--|------------------|---|------------------|---|------------------|--|-----|----------|-----|
|   | D/CX  | RDX | WRX | D17-8 | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | HEX |        |               |  |                  |   |                  |   |                  |  |     |          |     |
| Command                                   | 0   | 1   | ↑   | x     | 0  | 0  | 1  | 0  | 0  | 0  | 0  | 0  | 20  |        |               |  |                  |   |                  |   |                  |  |     |          |     |
| Parameter                                 | No Parameter  |     |     |       |    |    |    |    |    |    |    |    |     |        |               |  |                  |   |                  |   |                  |  |     |          |     |
| Description                               | <p>This command causes the display module to stop inverting the image data on the display device. The frame memory contents remain unchanged. No status bits are changed.</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;"> <p>Memory</p> </div> <div style="text-align: center;"> <p>Display Panel</p> </div> </div>  |     |     |       |    |    |    |    |    |    |    |    |     |        |               |  |                  |   |                  |   |                  |  |     |          |     |
| Restriction                               | This command has no effect when the display module is not inverting the display image.  |     |     |       |    |    |    |    |    |    |    |    |     |        |               |  |                  |   |                  |   |                  |  |     |          |     |
| Register Availability                     | <table border="1" style="width: 100%; border-collapse: collapse;"> <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" 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>Exit_invert_mode</td> </tr> <tr> <td>SW Reset</td> <td>Exit_invert_mode</td> </tr> <tr> <td>HW Reset</td> <td>Exit_invert_mode</td> </tr> </tbody> </table>   |     |     |       |    |    |    |    |    |    |    |    |     | Status | Default Value | Power On Sequence                        | Exit_invert_mode | SW Reset                                | Exit_invert_mode | HW Reset                                  | Exit_invert_mode |  |     |          |     |
| Status                                    | Default Value   |     |     |       |    |    |    |    |    |    |    |    |     |        |               |  |                  |   |                  |   |                  |  |     |          |     |
| Power On Sequence                         | Exit_invert_mode  |     |     |       |    |    |    |    |    |    |    |    |     |        |               |  |                  |   |                  |   |                  |  |     |          |     |
| SW Reset                                  | Exit_invert_mode  |     |     |       |    |    |    |    |    |    |    |    |     |        |               |  |                  |   |                  |   |                  |  |     |          |     |
| HW Reset                                  | Exit_invert_mode  |     |     |       |    |    |    |    |    |    |    |    |     |        |               |  |                  |   |                  |   |                  |  |     |          |     |
| Flow Chart                                | <div style="display: flex; align-items: center;"> <div style="flex: 1;"> <pre> graph TD     A([Invert mode on]) --&gt; B[exit_invert_mode]     B --&gt; C([Invert mode off])             </pre> </div> <div style="flex: 1; border: 1px dashed black; padding: 5px;"> <p><b>Legend</b></p> <ul style="list-style-type: none"> <li>Command: [Rectangle]</li> <li>Parameter: [Parallelogram]</li> <li>Display: [Horizontal Arrow]</li> <li>Action: [Right Arrow]</li> <li>Mode: [Oval]</li> <li>Sequential transfer: [Speech bubble]</li> </ul> </div> </div> |     |     |       |    |    |    |    |    |    |    |    |     |        |               |  |                  |   |                  |   |                  |  |     |          |     |



### 8.2.14. Enter\_invert\_mode (21h)

| 21H                                       | Enter_invert_mode  |     |     |       |    |    |    |    |    |    |    |    |     |        |               |  |                  |   |                  |   |                  |  |     |          |     |
|---|--|-----|-----|-------|----|----|----|----|----|----|----|----|-----|--------|---------------|--|------------------|---|------------------|---|------------------|--|-----|----------|-----|
|   | D/CX   | RDX | WRX | D17-8 | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | HEX |        |               |  |                  |   |                  |   |                  |  |     |          |     |
| Command                                   | 0  | 1   | ↑   | x     | 0  | 0  | 1  | 0  | 0  | 0  | 0  | 1  | 21  |        |               |  |                  |   |                  |   |                  |  |     |          |     |
| Parameter                                 | No Parameter   |     |     |       |    |    |    |    |    |    |    |    |     |        |               |  |                  |   |                  |   |                  |  |     |          |     |
| Description                               | <p>This command causes the display module to invert the image data only on the display device. The frame memory contents remain unchanged. No status bits are changed.</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;"> <p>Memory</p> </div> <div style="font-size: 2em; margin: 0 20px;">→</div> <div style="text-align: center;"> <p>Display Panel</p> </div> </div>   |     |     |       |    |    |    |    |    |    |    |    |     |        |               |  |                  |   |                  |   |                  |  |     |          |     |
| Restriction                               | This command has no effect when module is already in inversion on mode.  |     |     |       |    |    |    |    |    |    |    |    |     |        |               |  |                  |   |                  |   |                  |  |     |          |     |
| Register Availability                     | <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%;">Status</th> <th style="width: 50%;">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" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%;">Status</th> <th style="width: 50%;">Default Value</th> </tr> </thead> <tbody> <tr> <td>Power On Sequence</td> <td>Exit_invert_mode</td> </tr> <tr> <td>SW Reset</td> <td>Exit_invert_mode</td> </tr> <tr> <td>HW Reset</td> <td>Exit_invert_mode</td> </tr> </tbody> </table>  |     |     |       |    |    |    |    |    |    |    |    |     | Status | Default Value | Power On Sequence                        | Exit_invert_mode | SW Reset                                | Exit_invert_mode | HW Reset                                  | Exit_invert_mode |  |     |          |     |
| Status                                    | Default Value  |     |     |       |    |    |    |    |    |    |    |    |     |        |               |  |                  |   |                  |   |                  |  |     |          |     |
| Power On Sequence                         | Exit_invert_mode   |     |     |       |    |    |    |    |    |    |    |    |     |        |               |  |                  |   |                  |   |                  |  |     |          |     |
| SW Reset                                  | Exit_invert_mode   |     |     |       |    |    |    |    |    |    |    |    |     |        |               |  |                  |   |                  |   |                  |  |     |          |     |
| HW Reset                                  | Exit_invert_mode   |     |     |       |    |    |    |    |    |    |    |    |     |        |               |  |                  |   |                  |   |                  |  |     |          |     |
| Flow Chart                                | <div style="display: flex; align-items: center;"> <div style="flex: 1;"> <pre> graph TD     A([Invert mode off]) --&gt; B[enter_invert_mode]     B --&gt; C([Invert mode on])             </pre> </div> <div style="flex: 1; border: 1px dashed black; padding: 5px;"> <p><b>Legend</b></p> <ul style="list-style-type: none"> <li>Command: [ ]</li> <li>Parameter: /&gt;</li> <li>Display: &gt;</li> <li>Action: &gt;</li> <li>Mode: &gt;</li> <li>Sequential transfer: &gt;</li> </ul> </div> </div>   |     |     |       |    |    |    |    |    |    |    |    |     |        |               |  |                  |   |                  |   |                  |  |     |          |     |

**8.2.15. Set\_display\_off (28h)**

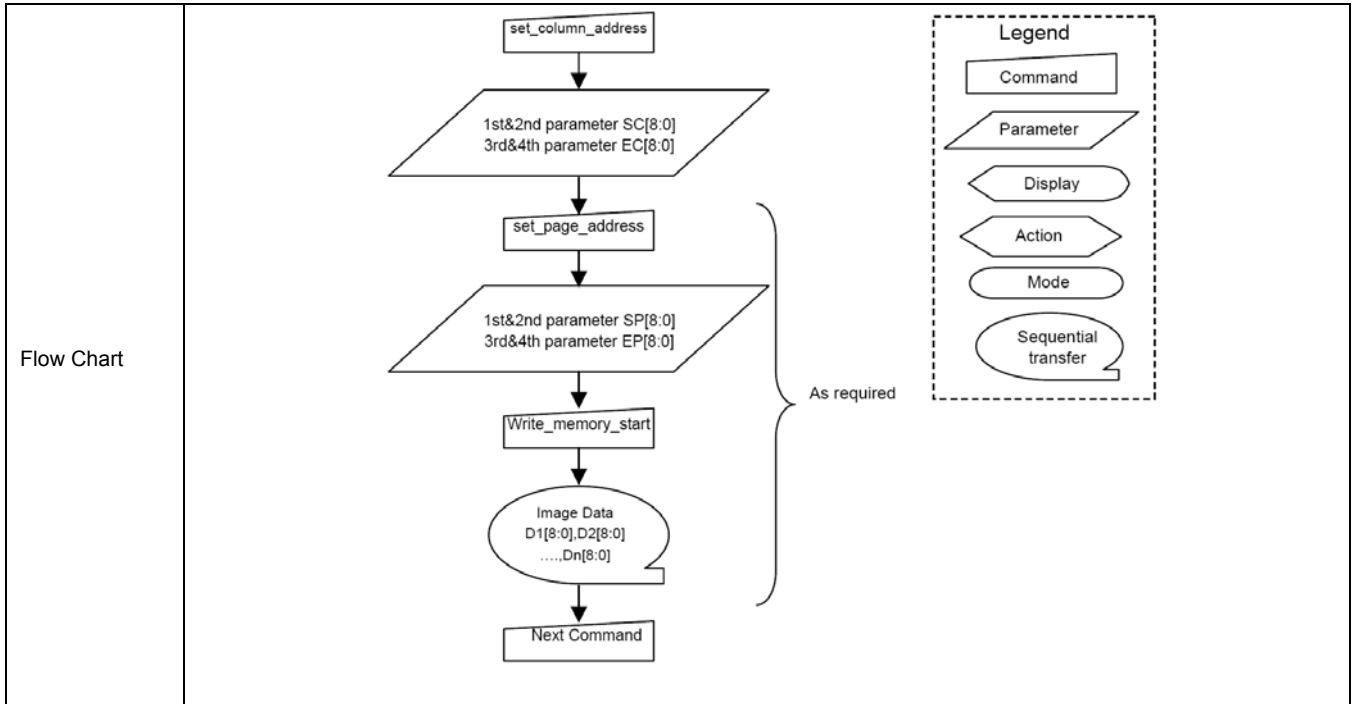
| 28H                                       | Set_display_off  |     |     |       |    |    |    |    |    |    |    |    |     |        |               |  |             |   |             |   |             |  |     |          |     |
|---|--|-----|-----|-------|----|----|----|----|----|----|----|----|-----|--------|---------------|--|-------------|---|-------------|---|-------------|--|-----|----------|-----|
|   | D/CX   | RDX | WRX | D17-8 | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | HEX |        |               |  |             |   |             |   |             |  |     |          |     |
| Command                                   | 0  | 1   | ↑   | x     | 0  | 0  | 1  | 0  | 1  | 0  | 0  | 0  | 28  |        |               |  |             |   |             |   |             |  |     |          |     |
| Parameter                                 | No Parameter   |     |     |       |    |    |    |    |    |    |    |    |     |        |               |  |             |   |             |   |             |  |     |          |     |
| Description                               | <p>This command causes the display module to stop displaying the image data on the display device. The frame memory contents remain unchanged. No status bits are changed.</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;"> <p>Memory</p>  </div> <div style="font-size: 2em; margin: 0 20px;">→</div> <div style="text-align: center;"> <p>Display Panel</p>  </div> </div>   |     |     |       |    |    |    |    |    |    |    |    |     |        |               |  |             |   |             |   |             |  |     |          |     |
| Restriction                               | This command has no effect when module is already in display off mode.   |     |     |       |    |    |    |    |    |    |    |    |     |        |               |  |             |   |             |   |             |  |     |          |     |
| Register Availability                     | <table border="1" style="width: 100%; border-collapse: collapse;"> <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" 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 Off</td> </tr> <tr> <td>SW Reset</td> <td>Display Off</td> </tr> <tr> <td>HW Reset</td> <td>Display Off</td> </tr> </tbody> </table>   |     |     |       |    |    |    |    |    |    |    |    |     | Status | Default Value | Power On Sequence                        | Display Off | SW Reset                                | Display Off | HW Reset                                  | Display Off |  |     |          |     |
| Status                                    | Default Value  |     |     |       |    |    |    |    |    |    |    |    |     |        |               |  |             |   |             |   |             |  |     |          |     |
| Power On Sequence                         | Display Off  |     |     |       |    |    |    |    |    |    |    |    |     |        |               |  |             |   |             |   |             |  |     |          |     |
| SW Reset                                  | Display Off  |     |     |       |    |    |    |    |    |    |    |    |     |        |               |  |             |   |             |   |             |  |     |          |     |
| HW Reset                                  | Display Off  |     |     |       |    |    |    |    |    |    |    |    |     |        |               |  |             |   |             |   |             |  |     |          |     |
| Flow Chart                                | <div style="display: flex; align-items: center;"> <div style="flex: 1;">  </div> <div style="flex: 1; 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> </div> |     |     |       |    |    |    |    |    |    |    |    |     |        |               |  |             |   |             |   |             |  |     |          |     |

**8.2.16. Set\_display\_on (29h)**

| 29H                                       | Set_display_on   |     |     |       |    |    |    |    |    |    |    |    |     |        |               |  |             |   |             |   |             |  |     |          |     |
|---|--|-----|-----|-------|----|----|----|----|----|----|----|----|-----|--------|---------------|--|-------------|---|-------------|---|-------------|--|-----|----------|-----|
|   | D/CX   | RDX | WRX | D17-8 | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | HEX |        |               |  |             |   |             |   |             |  |     |          |     |
| Command                                   | 0  | 1   | ↑   | x     | 0  | 0  | 1  | 0  | 1  | 0  | 0  | 1  | 29  |        |               |  |             |   |             |   |             |  |     |          |     |
| Parameter                                 | No Parameter   |     |     |       |    |    |    |    |    |    |    |    |     |        |               |  |             |   |             |   |             |  |     |          |     |
| Description                               | <p>This command causes the display module to start displaying the image data on the display device. The frame memory contents remain unchanged. No status bits are changed.</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;"> <p>Memory</p> </div> <div style="font-size: 2em;">→</div> <div style="text-align: center;"> <p>Display Panel</p> </div> </div>  |     |     |       |    |    |    |    |    |    |    |    |     |        |               |  |             |   |             |   |             |  |     |          |     |
| Restriction                               | This command has no effect when module is already in display on mode.  |     |     |       |    |    |    |    |    |    |    |    |     |        |               |  |             |   |             |   |             |  |     |          |     |
| Register Availability                     | <table border="1" style="width: 100%; border-collapse: collapse;"> <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" 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 Off</td> </tr> <tr> <td>SW Reset</td> <td>Display Off</td> </tr> <tr> <td>HW Reset</td> <td>Display Off</td> </tr> </tbody> </table>   |     |     |       |    |    |    |    |    |    |    |    |     | Status | Default Value | Power On Sequence                        | Display Off | SW Reset                                | Display Off | HW Reset                                  | Display Off |  |     |          |     |
| Status                                    | Default Value  |     |     |       |    |    |    |    |    |    |    |    |     |        |               |  |             |   |             |   |             |  |     |          |     |
| Power On Sequence                         | Display Off  |     |     |       |    |    |    |    |    |    |    |    |     |        |               |  |             |   |             |   |             |  |     |          |     |
| SW Reset                                  | Display Off  |     |     |       |    |    |    |    |    |    |    |    |     |        |               |  |             |   |             |   |             |  |     |          |     |
| HW Reset                                  | Display Off  |     |     |       |    |    |    |    |    |    |    |    |     |        |               |  |             |   |             |   |             |  |     |          |     |
| Flow Chart                                | <div style="display: flex; align-items: center;"> <div style="flex: 1;"> <pre> graph TD     A([Display panel off]) --&gt; B[set_display_on]     B --&gt; C([Display panel on])             </pre> </div> <div style="flex: 1; border: 1px dashed black; padding: 5px;"> <p><b>Legend</b></p> <ul style="list-style-type: none"> <li>Command: [ ]</li> <li>Parameter: /&gt;</li> <li>Display: &gt;</li> <li>Action: &gt;</li> <li>Mode: &gt;</li> <li>Sequential transfer: &gt;</li> </ul> </div> </div>          |     |     |       |    |    |    |    |    |    |    |    |     |        |               |  |             |   |             |   |             |  |     |          |     |

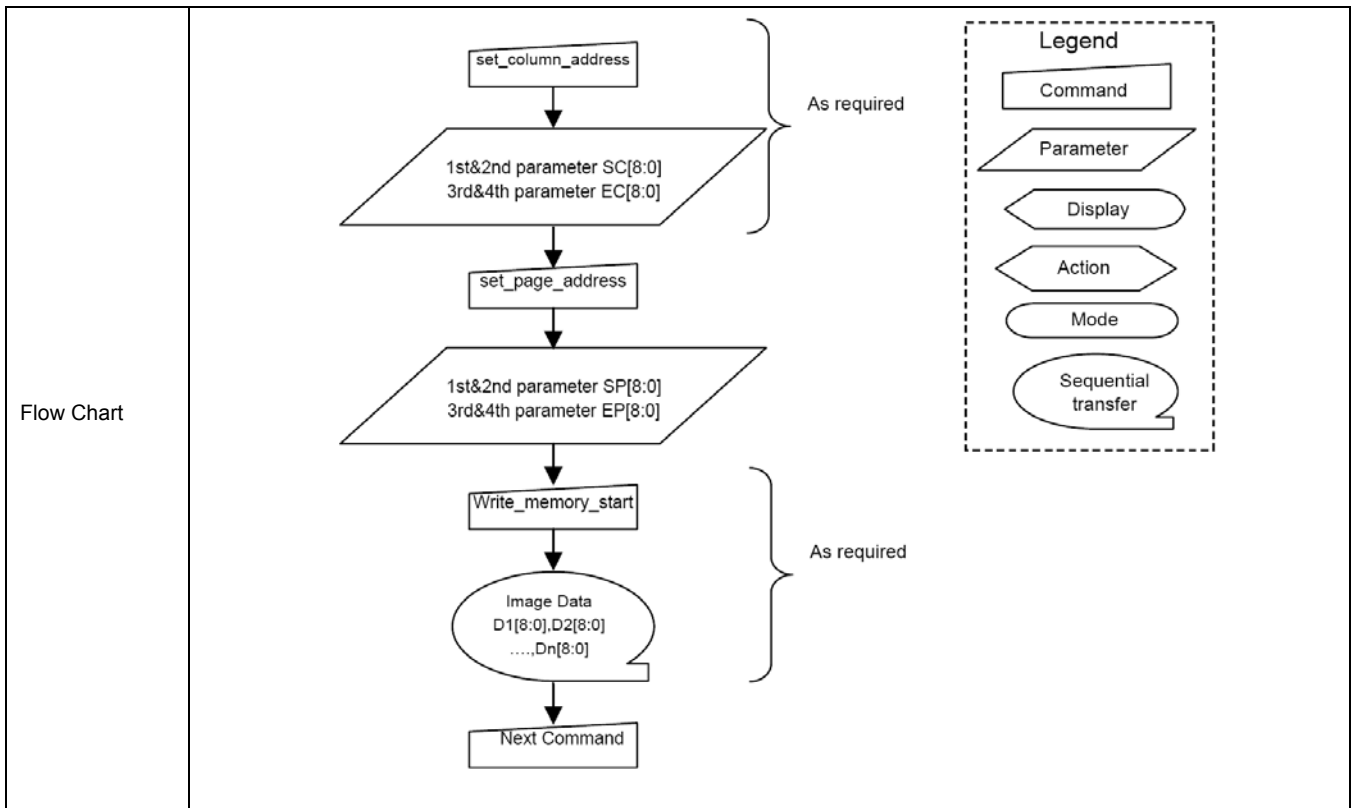
**8.2.17. Set\_column\_address (2Ah)**

| 2AH                                       | Set_column_address   |   |     |       |     |     |     |     |     |     |     |     |      |        |               |  |                   |   |  |   |                              |  |          |                              |  |
|---|--|---|-----|-------|-----|-----|-----|-----|-----|-----|-----|-----|------|--------|---------------|--|-------------------|---|--|---|------------------------------|--|----------|------------------------------|--|
|   | D/CX   | RDX   | WRX | D17-8 | D7  | D6  | D5  | D4  | D3  | D2  | D1  | D0  | HEX  |        |               |  |                   |   |  |   |                              |  |          |                              |  |
| Command                                   | 0  | 1   | ↑   | x     | 0   | 0   | 1   | 0   | 1   | 0   | 1   | 0   | 2A   |        |               |  |                   |   |  |   |                              |  |          |                              |  |
| 1 <sup>st</sup> Parameter                 | 1  | 1   | ↑   | x     | 0   | 0   | 0   | 0   | 0   | 0   | 0   | SC8 | Note |        |               |  |                   |   |  |   |                              |  |          |                              |  |
| 2 <sup>nd</sup> Parameter                 | 1  | 1   | ↑   | x     | SC7 | SC6 | SC5 | SC4 | SC3 | SC2 | SC1 | SC0 | 1    |        |               |  |                   |   |  |   |                              |  |          |                              |  |
| 3 <sup>rd</sup> Parameter                 | 1  | 1   | ↑   | x     | 0   | 0   | 0   | 0   | 0   | 0   | 0   | EC8 | Note |        |               |  |                   |   |  |   |                              |  |          |                              |  |
| 4 <sup>th</sup> Parameter                 | 1  | 1   | ↑   | x     | EC7 | EC6 | EC5 | EC4 | EC3 | EC2 | EC1 | EC0 | 2    |        |               |  |                   |   |  |   |                              |  |          |                              |  |
| Description                               | <p>This command defines the column extent of the frame memory accessed by the host processor with the read_memory_continue and write_memory_continue commands. No status bits are changed.</p> <div style="text-align: center;"> </div>  |   |     |       |     |     |     |     |     |     |     |     |      |        |               |  |                   |   |  |   |                              |  |          |                              |  |
|   | Restriction  | <p>SC [8:0] always must be equal to or less than EC[8:0]. If SC[8:0] or EC[8:0] is greater than the available frame memory then the parameter is not updated.</p> |     |       |     |     |     |     |     |     |     |     |      |        |               |  |                   |   |  |   |                              |  |          |                              |  |
| Register Availability                     | <table border="1" style="margin-left: auto; margin-right: auto;"> <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" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Status</th> <th colspan="2">Default Value</th> </tr> </thead> <tbody> <tr> <td>Power On Sequence</td> <td>SC[15:0]=0000<sub>HEX</sub></td> <td>SC[8:0]=000<sub>HEX</sub> SE[8:0]=013F<sub>HEX</sub></td> </tr> <tr> <td>SW Reset</td> <td>SC[15:0]=0000<sub>HEX</sub></td> <td>If Set_address_mode(36h) B5=0 : EC[8:0]=013F<sub>HEX</sub><br/>If Set_address_mode(36h) B5=1 : EC[8:0]=01DF<sub>HEX</sub></td> </tr> <tr> <td>HW Reset</td> <td>SC[15:0]=0000<sub>HEX</sub></td> <td>SC[8:0]=000<sub>HEX</sub> SE[8:0]=013F<sub>HEX</sub></td> </tr> </tbody> </table> |   |     |       |     |     |     |     |     |     |     |     |      | Status | Default Value |  | Power On Sequence | SC[15:0]=0000 <sub>HEX</sub>            | SC[8:0]=000 <sub>HEX</sub> SE[8:0]=013F <sub>HEX</sub> | SW Reset                                  | SC[15:0]=0000 <sub>HEX</sub> | If Set_address_mode(36h) B5=0 : EC[8:0]=013F <sub>HEX</sub><br>If Set_address_mode(36h) B5=1 : EC[8:0]=01DF <sub>HEX</sub> | HW Reset | SC[15:0]=0000 <sub>HEX</sub> | SC[8:0]=000 <sub>HEX</sub> SE[8:0]=013F <sub>HEX</sub> |
| Status                                    | Default Value  |   |     |       |     |     |     |     |     |     |     |     |      |        |               |  |                   |   |  |   |                              |  |          |                              |  |
| Power On Sequence                         | SC[15:0]=0000 <sub>HEX</sub>   | SC[8:0]=000 <sub>HEX</sub> SE[8:0]=013F <sub>HEX</sub>  |     |       |     |     |     |     |     |     |     |     |      |        |               |  |                   |   |  |   |                              |  |          |                              |  |
| SW Reset                                  | SC[15:0]=0000 <sub>HEX</sub>   | If Set_address_mode(36h) B5=0 : EC[8:0]=013F <sub>HEX</sub><br>If Set_address_mode(36h) B5=1 : EC[8:0]=01DF <sub>HEX</sub>  |     |       |     |     |     |     |     |     |     |     |      |        |               |  |                   |   |  |   |                              |  |          |                              |  |
| HW Reset                                  | SC[15:0]=0000 <sub>HEX</sub>   | SC[8:0]=000 <sub>HEX</sub> SE[8:0]=013F <sub>HEX</sub>  |     |       |     |     |     |     |     |     |     |     |      |        |               |  |                   |   |  |   |                              |  |          |                              |  |



**8.2.18. Set\_page\_address (2Bh)**

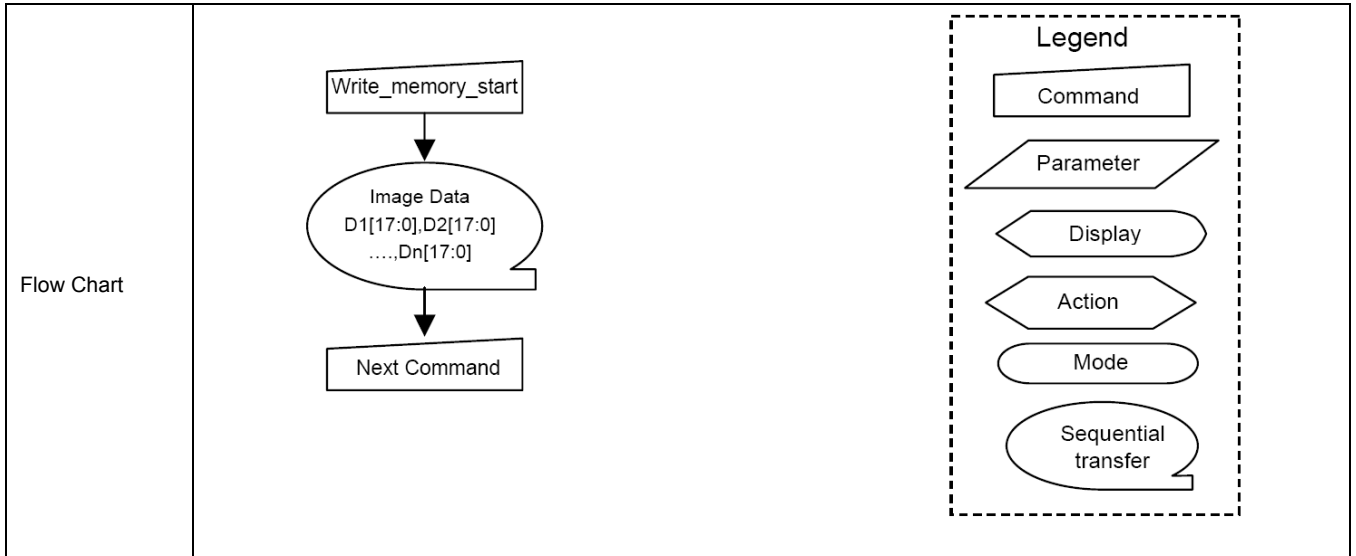
| 2BH                                       | Set_page_address   |  |     |       |     |     |     |     |     |     |     |     |     |        |               |  |                   |   |                              |   |                              |  |          |                              |                              |
|---|--|--|-----|-------|-----|-----|-----|-----|-----|-----|-----|-----|-----|--------|---------------|--|-------------------|---|------------------------------|---|------------------------------|--|----------|------------------------------|------------------------------|
|   | D/CX   | RDX  | WRX | D17-8 | D7  | D6  | D5  | D4  | D3  | D2  | D1  | D0  | HEX |        |               |  |                   |   |                              |   |                              |  |          |                              |                              |
| Command                                   | 0  | 1  | ↑   | x     | 0   | 0   | 1   | 0   | 1   | 0   | 1   | 1   | 2B  |        |               |  |                   |   |                              |   |                              |  |          |                              |                              |
| 1 <sup>st</sup> Parameter                 | 1  | 1  | ↑   | x     | 0   | 0   | 0   | 0   | 0   | 0   | 0   | SP8 | xxx |        |               |  |                   |   |                              |   |                              |  |          |                              |                              |
| 2 <sup>nd</sup> Parameter                 | 1  | 1  | ↑   | x     | SP7 | SP6 | SP5 | SP4 | SP3 | SP2 | SP1 | SP0 |     |        |               |  |                   |   |                              |   |                              |  |          |                              |                              |
| 3 <sup>rd</sup> Parameter                 | 1  | 1  | ↑   | x     | 0   | 0   | 0   | 0   | 0   | 0   | 0   | EP8 | xxx |        |               |  |                   |   |                              |   |                              |  |          |                              |                              |
| 4 <sup>th</sup> Parameter                 | 1  | 1  | ↑   | x     | EP7 | EP6 | EP5 | EP4 | EP3 | EP2 | EP1 | EP0 |     |        |               |  |                   |   |                              |   |                              |  |          |                              |                              |
| Description                               | <p>This command defines the page extent of the frame memory accessed by the host processor with the write_memory_continue and read_memory_continue command. No status bits are changed.</p> <div style="text-align: center;"> </div>   |  |     |       |     |     |     |     |     |     |     |     |     |        |               |  |                   |   |                              |   |                              |  |          |                              |                              |
| Restriction                               | <p>SP [8:0] always must be equal to or less than EP [8:0].<br/>If SP[8:0] or EP[8:0] is greater than the available frame memory then the parameter is not updated.</p>   |  |     |       |     |     |     |     |     |     |     |     |     |        |               |  |                   |   |                              |   |                              |  |          |                              |                              |
| Register Availability                     | <table border="1" style="margin-left: auto; margin-right: auto;"> <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" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Status</th> <th colspan="2">Default Value</th> </tr> </thead> <tbody> <tr> <td>Power On Sequence</td> <td>SP[15:0]=0000<sub>HEX</sub></td> <td>EP[15:0]=01DF<sub>HEX</sub></td> </tr> <tr> <td>SW Reset</td> <td>SP[15:0]=0000<sub>HEX</sub></td> <td>If Set_address_mode(36h) B5=0 : EP[8:0]=01DF<sub>HEX</sub><br/>If Set_address_mode(36h) B5=1 : EP[8:0]=013F<sub>HEX</sub></td> </tr> <tr> <td>HW Reset</td> <td>SP[15:0]=0000<sub>HEX</sub></td> <td>EP[15:0]=01DF<sub>HEX</sub></td> </tr> </tbody> </table> |  |     |       |     |     |     |     |     |     |     |     |     | Status | Default Value |  | Power On Sequence | SP[15:0]=0000 <sub>HEX</sub>            | EP[15:0]=01DF <sub>HEX</sub> | SW Reset                                  | SP[15:0]=0000 <sub>HEX</sub> | If Set_address_mode(36h) B5=0 : EP[8:0]=01DF <sub>HEX</sub><br>If Set_address_mode(36h) B5=1 : EP[8:0]=013F <sub>HEX</sub> | HW Reset | SP[15:0]=0000 <sub>HEX</sub> | EP[15:0]=01DF <sub>HEX</sub> |
| Status                                    | Default Value  |  |     |       |     |     |     |     |     |     |     |     |     |        |               |  |                   |   |                              |   |                              |  |          |                              |                              |
| Power On Sequence                         | SP[15:0]=0000 <sub>HEX</sub>   | EP[15:0]=01DF <sub>HEX</sub>   |     |       |     |     |     |     |     |     |     |     |     |        |               |  |                   |   |                              |   |                              |  |          |                              |                              |
| SW Reset                                  | SP[15:0]=0000 <sub>HEX</sub>   | If Set_address_mode(36h) B5=0 : EP[8:0]=01DF <sub>HEX</sub><br>If Set_address_mode(36h) B5=1 : EP[8:0]=013F <sub>HEX</sub> |     |       |     |     |     |     |     |     |     |     |     |        |               |  |                   |   |                              |   |                              |  |          |                              |                              |
| HW Reset                                  | SP[15:0]=0000 <sub>HEX</sub>   | EP[15:0]=01DF <sub>HEX</sub>   |     |       |     |     |     |     |     |     |     |     |     |        |               |  |                   |   |                              |   |                              |  |          |                              |                              |



### 8.2.19. Write\_memory\_start (2Ch)

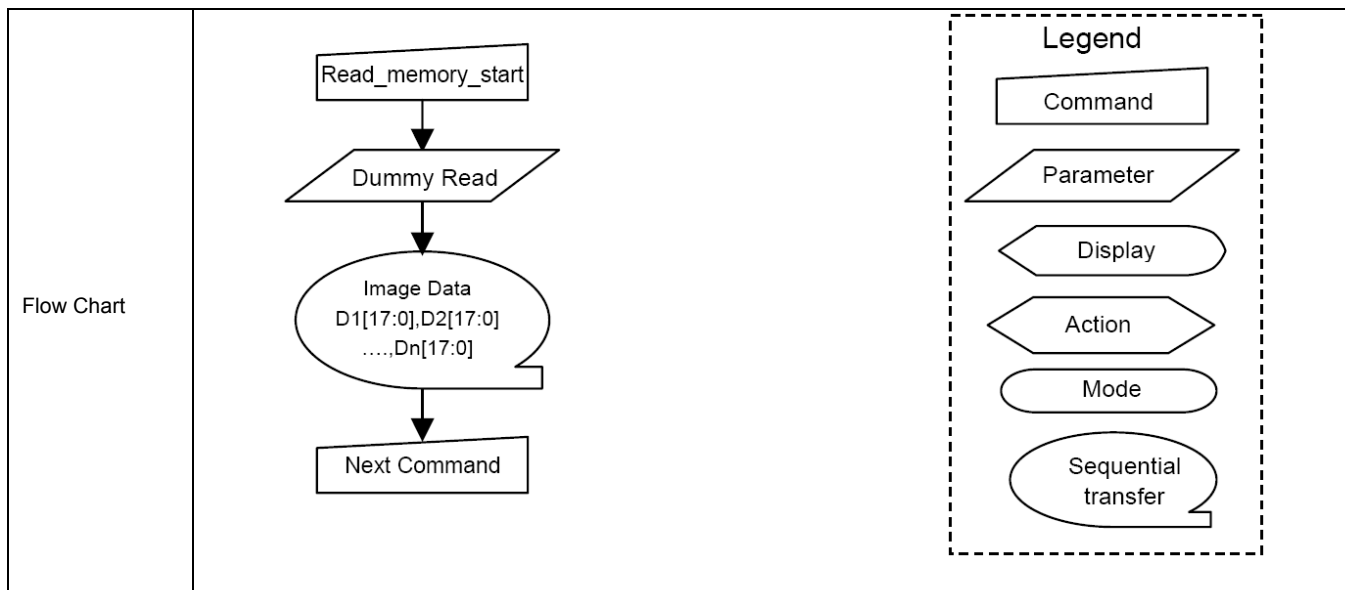
| 2CH                                       | Write_memory_start  |     |     |               |         |         |         |         |         |         |         |         | HEX         |        |               |  |                                    |   |                                   |   |                                   |  |     |          |     |
|---|---|-----|-----|---------------|---------|---------|---------|---------|---------|---------|---------|---------|-------------|--------|---------------|--|------------------------------------|---|-----------------------------------|---|-----------------------------------|--|-----|----------|-----|
|   | D/CX  | RDX | WRX | D17-8         | D7      | D6      | D5      | D4      | D3      | D2      | D1      | D0      |             |        |               |  |                                    |   |                                   |   |                                   |  |     |          |     |
| Command                                   | 0   | 1   | ↑   | xx            | 0       | 0       | 1       | 0       | 1       | 1       | 0       | 0       | 2C          |        |               |  |                                    |   |                                   |   |                                   |  |     |          |     |
| 1 <sup>st</sup> pixel data                | 1   | 1   | ↑   | D1<br>[17..8] | D1<br>7 | D1<br>6 | D1<br>5 | D1<br>4 | D1<br>3 | D1<br>2 | D1<br>1 | D1<br>0 | 00000..3FFF |        |               |  |                                    |   |                                   |   |                                   |  |     |          |     |
| :   | 1   | 1   | ↑   | Dx<br>[17..8] | Dx<br>7 | Dx<br>6 | Dx<br>5 | Dx<br>4 | Dx<br>3 | Dx<br>2 | Dx<br>1 | Dx<br>0 | 00000..3FFF |        |               |  |                                    |   |                                   |   |                                   |  |     |          |     |
| N <sup>TH</sup> pixel data                | 1   | 1   | ↑   | Dn<br>[17..8] | Dn<br>7 | Dn<br>6 | Dn<br>5 | Dn<br>4 | Dn<br>3 | Dn<br>2 | Dn<br>1 | Dn<br>0 | 00000..3FFF |        |               |  |                                    |   |                                   |   |                                   |  |     |          |     |
| Description                               | <p>This command transfers image data from the host processor to the display module's frame memory starting at the pixel location specified by preceding set_column_address (2Ah) and set_page_address (2Bh) commands.</p> <p><b>If set_address_mode (36h) B5 = 0:</b></p> <p>The column and page registers are reset to the Start Column (SC) and Start Page (SP), respectively. Pixel Data 1 is stored in frame memory at (SC, SP). The column register is then incremented and pixels are written to the frame memory until the column register equals the End Column (EC) value. The column register is then reset to SC and the page register is incremented. Pixels are written to the frame memory until the page register equals the End Page (EP) value or the host processor sends another command. If the number of pixels exceeds (EC – SC + 1) * (EP – SP + 1) the extra pixels are ignored.</p> <p><b>If set_address_mode (36h) B5 = 1:</b></p> <p>The column and page registers are reset to the Start Column (SC) and Start Page (SP), respectively. Pixel Data 1 is stored in frame memory at (SC, SP). The page register is then incremented and pixels are written to the frame memory until the page register equals the End Page (EP) value. The page register is then reset to SP and the column register is incremented. Pixels are written to the frame memory until the column register equals the End column (EC) value or the host processor sends another command. If the number of pixels exceeds (EC – SC + 1) * (EP – SP + 1) the extra pixels are ignored.</p> |     |     |               |         |         |         |         |         |         |         |         |             |        |               |  |                                    |   |                                   |   |                                   |  |     |          |     |
| Restriction                               | A write_memory_start should follow a set_column_address, set_page_address or set_address_mode to define the write location. Otherwise, data written with write_memory_start and any following write_memory_continue commands is written to undefined locations..  |     |     |               |         |         |         |         |         |         |         |         |             |        |               |  |                                    |   |                                   |   |                                   |  |     |          |     |
| 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>Power On Sequence</td> <td>Contents of memory is set randomly</td> </tr> <tr> <td>SW Reset</td> <td>Contents of memory is not cleared</td> </tr> <tr> <td>HW 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 | SW Reset                                | Contents of memory is not cleared | HW Reset                                  | Contents of memory is not cleared |  |     |          |     |
| Status                                    | Default Value   |     |     |               |         |         |         |         |         |         |         |         |             |        |               |  |                                    |   |                                   |   |                                   |  |     |          |     |
| Power On Sequence                         | Contents of memory is set randomly  |     |     |               |         |         |         |         |         |         |         |         |             |        |               |  |                                    |   |                                   |   |                                   |  |     |          |     |
| SW Reset                                  | Contents of memory is not cleared   |     |     |               |         |         |         |         |         |         |         |         |             |        |               |  |                                    |   |                                   |   |                                   |  |     |          |     |
| HW Reset                                  | Contents of memory is not cleared   |     |     |               |         |         |         |         |         |         |         |         |             |        |               |  |                                    |   |                                   |   |                                   |  |     |          |     |





### 8.2.20. Read\_memory\_start (2Eh)

| 2EH                                       | RAMRD (Memory Read)   |     |     |               |         |         |         |         |         |         |         |         | HEX       |        |               |  |                                    |   |                                   |   |                                   |  |     |          |     |
|---|---|-----|-----|---------------|---------|---------|---------|---------|---------|---------|---------|---------|-----------|--------|---------------|--|------------------------------------|---|-----------------------------------|---|-----------------------------------|--|-----|----------|-----|
|   | D/CX  | RDX | WRX | D17-8         | D7      | D6      | D5      | D4      | D3      | D2      | D1      | D0      |           |        |               |  |                                    |   |                                   |   |                                   |  |     |          |     |
| Command                                   | 0   | 1   | ↑   | x             | 0       | 0       | 1       | 0       | 1       | 1       | 1       | 0       | 2E        |        |               |  |                                    |   |                                   |   |                                   |  |     |          |     |
| 1 <sup>st</sup> Parameter                 | 1   | ↑   | 1   | x             | x       | x       | x       | x       | x       | x       | x       | x       | x         |        |               |  |                                    |   |                                   |   |                                   |  |     |          |     |
| 2 <sup>nd</sup> Parameter                 | 1   | ↑   | 1   | D1<br>[17..8] | D1<br>7 | D1<br>6 | D1<br>5 | D1<br>4 | D1<br>3 | D1<br>2 | D1<br>1 | D1<br>0 | 0000..3FF |        |               |  |                                    |   |                                   |   |                                   |  |     |          |     |
| :   | 1   | ↑   | 1   | Dx<br>[17..8] | Dx<br>7 | Dx<br>6 | Dx<br>5 | Dx<br>4 | Dx<br>3 | Dx<br>2 | Dx<br>1 | Dx<br>0 | 0000..3FF |        |               |  |                                    |   |                                   |   |                                   |  |     |          |     |
| (N+1) <sup>TH</sup> Parameter             | 1   | ↑   | 1   | Dn<br>[17..8] | Dn<br>7 | Dn<br>6 | Dn<br>5 | Dn<br>4 | Dn<br>3 | Dn<br>2 | Dn<br>1 | Dn<br>0 | 0000..3FF |        |               |  |                                    |   |                                   |   |                                   |  |     |          |     |
| Description                               | <p>This command transfers image data from the display module's frame memory to the host processor starting at the pixel location specified by preceding set_column_address and set_page_address commands.</p> <p><b>If set_address_mode B5 = 0:</b></p> <p>The column and page registers are reset to the Start Column (SC) and Start Page (SP), respectively. Pixels are read from frame memory at (SC, SP). The column register is then incremented and pixels read from the frame memory until the column register equals the End Column (EC) value. The column register is then reset to SC and the page register is incremented. Pixels are read from the frame memory until the page register equals the End Page (EP) value or the host processor sends another command.</p> <p><b>If set_address_mode B5 = 1:</b></p> <p>The column and page registers are reset to the Start Column (SC) and Start Page (SP), respectively. Pixels are read from frame memory at (SC, SP). The page register is then incremented and pixels read from the frame memory until the page register equals the End Page (EP) value. The page register is then reset to SP and the column register is incremented. Pixels are read from the frame memory until the column register equals the End Column (EC) value or the host processor sends another command.</p> |     |     |               |         |         |         |         |         |         |         |         |           |        |               |  |                                    |   |                                   |   |                                   |  |     |          |     |
| Restriction                               | Regardless of the color mode set in set_pixel_format, the pixel format returned by read_memory_continue is always 24-bit so there is no restriction on the length of data.  |     |     |               |         |         |         |         |         |         |         |         |           |        |               |  |                                    |   |                                   |   |                                   |  |     |          |     |
| 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>Power On Sequence</td> <td>Contents of memory is set randomly</td> </tr> <tr> <td>SW Reset</td> <td>Contents of memory is not cleared</td> </tr> <tr> <td>HW 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 | SW Reset                                | Contents of memory is not cleared | HW Reset                                  | Contents of memory is not cleared |  |     |          |     |
| Status                                    | Default Value   |     |     |               |         |         |         |         |         |         |         |         |           |        |               |  |                                    |   |                                   |   |                                   |  |     |          |     |
| Power On Sequence                         | Contents of memory is set randomly  |     |     |               |         |         |         |         |         |         |         |         |           |        |               |  |                                    |   |                                   |   |                                   |  |     |          |     |
| SW Reset                                  | Contents of memory is not cleared   |     |     |               |         |         |         |         |         |         |         |         |           |        |               |  |                                    |   |                                   |   |                                   |  |     |          |     |
| HW Reset                                  | Contents of memory is not cleared   |     |     |               |         |         |         |         |         |         |         |         |           |        |               |  |                                    |   |                                   |   |                                   |  |     |          |     |

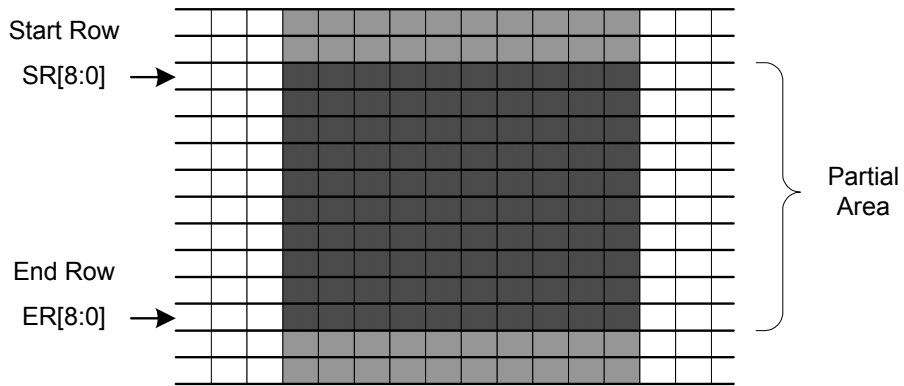


**8.2.21. Set\_partial\_area (30h)**

| 30H                       | Set_partial_area |     |     |       |     |     |     |     |     |     |     |     | HEX       |
|---------------------------|------------------|-----|-----|-------|-----|-----|-----|-----|-----|-----|-----|-----|-----------|
|                           | D/CX             | RDX | WRX | D17-8 | D7  | D6  | D5  | D4  | D3  | D2  | D1  | D0  |           |
| Command                   | 0                | 1   | ↑   | x     | 0   | 0   | 1   | 1   | 0   | 0   | 0   | 0   | 30        |
| 1 <sup>st</sup> Parameter | 1                | 1   | ↑   | x     | 0   | 0   | 0   | 0   | 0   | 0   | 0   | SR8 | 000..1DFh |
| 2 <sup>nd</sup> Parameter | 1                | 1   | ↑   | x     | SR7 | SR6 | SR5 | SR4 | SR3 | SR2 | SR1 | SR0 |           |
| 3 <sup>rd</sup> Parameter | 1                | 1   | ↑   | x     | 0   | 0   | 0   | 0   | 0   | 0   | 0   | ER8 | 000..1DFh |
| 4 <sup>th</sup> Parameter | 1                | 1   | ↑   | x     | ER7 | ER6 | ER5 | ER4 | ER3 | ER2 | ER1 | ER0 |           |

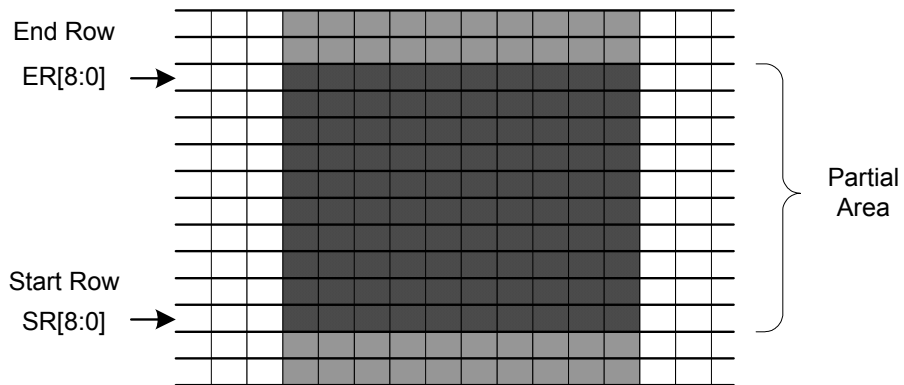
This command defines the Partial Display mode's display area. There are two parameters associated with this command, the first defines the Start Row (SR) and the second the End Row (ER), as illustrated in the following figure. SR and ER refer to the Frame Memory

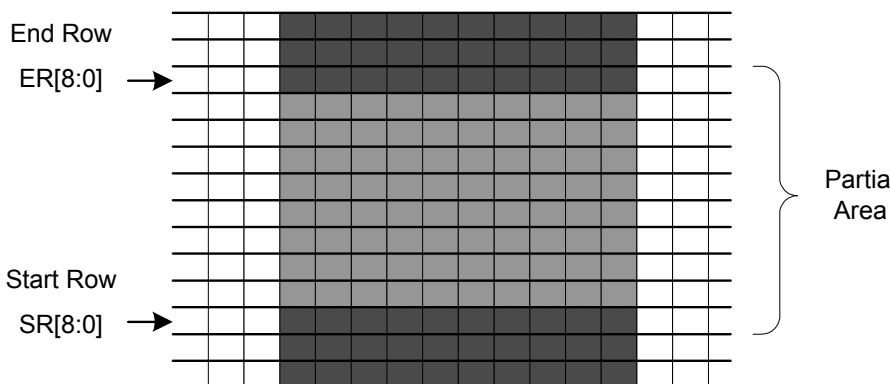

If End Row > Start Row and set\_address\_mode B4 = 0:

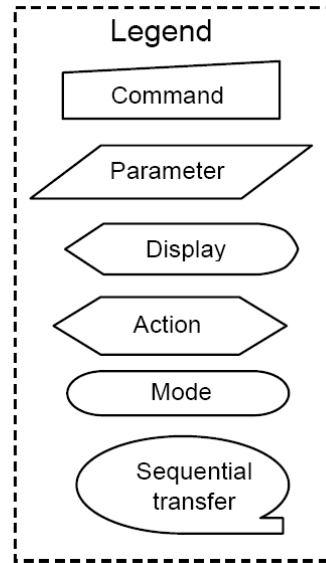
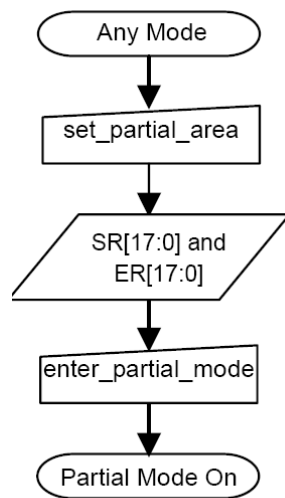


Description

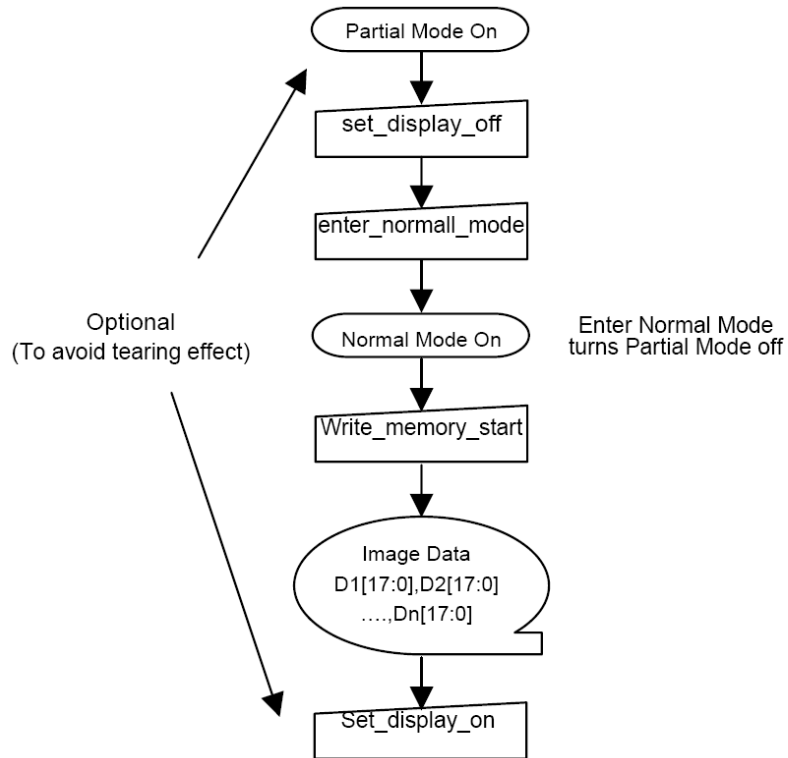
If End Row > Start Row and set\_address\_mode B4 = 1:



|   | <p>End Row &lt; Start Row (set_address_mode(36h) B4=0)</p>  <p>End Row &lt; Start Row (set_address_mode(36h) B4=1)</p>  <p>If End Row = Start Row then the Partial Area will be one row deep.</p>  |                              |               |  |                   |   |                              |   |                              |  |          |                              |                              |
|---|---|------------------------------|---------------|--|-------------------|---|------------------------------|---|------------------------------|--|----------|------------------------------|------------------------------|
| Restriction                               | SR[15:0] and ER[15:0] cannot be 0000h nor exceed the last vertical line number (01DFh).   |                              |               |  |                   |   |                              |   |                              |  |          |                              |                              |
| 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 colspan="2">Default Value</th> </tr> </thead> <tbody> <tr> <td>Power On Sequence</td> <td>SR[15:0]=0000<sub>HEX</sub></td> <td>ER[15:0]=01DF<sub>HEX</sub></td> </tr> <tr> <td>SW Reset</td> <td>SR[15:0]=0000<sub>HEX</sub></td> <td>ER[15:0]=01DF<sub>HEX</sub></td> </tr> <tr> <td>HW Reset</td> <td>SR[15:0]=0000<sub>HEX</sub></td> <td>ER[15:0]=01DF<sub>HEX</sub></td> </tr> </tbody> </table>        | Status                       | Default Value |  | Power On Sequence | SR[15:0]=0000 <sub>HEX</sub>            | ER[15:0]=01DF <sub>HEX</sub> | SW Reset                                  | SR[15:0]=0000 <sub>HEX</sub> | ER[15:0]=01DF <sub>HEX</sub>             | HW Reset | SR[15:0]=0000 <sub>HEX</sub> | ER[15:0]=01DF <sub>HEX</sub> |
| Status                                    | Default Value   |                              |               |  |                   |   |                              |   |                              |  |          |                              |                              |
| Power On Sequence                         | SR[15:0]=0000 <sub>HEX</sub>  | ER[15:0]=01DF <sub>HEX</sub> |               |  |                   |   |                              |   |                              |  |          |                              |                              |
| SW Reset                                  | SR[15:0]=0000 <sub>HEX</sub>  | ER[15:0]=01DF <sub>HEX</sub> |               |  |                   |   |                              |   |                              |  |          |                              |                              |
| HW Reset                                  | SR[15:0]=0000 <sub>HEX</sub>  | ER[15:0]=01DF <sub>HEX</sub> |               |  |                   |   |                              |   |                              |  |          |                              |                              |
| Flow Chart                                | 1. To Enter Partial Mode  |                              |               |  |                   |   |                              |   |                              |  |          |                              |                              |



2. To Leave Partial Mode



**8.2.22. Set\_scroll\_area (33h)**

| 33H                       | Set_scroll_area |     |     |       |         |         |         |         |         |         |         |         | HEX         |
|---------------------------|-----------------|-----|-----|-------|---------|---------|---------|---------|---------|---------|---------|---------|-------------|
|                           | D/CX            | RDX | WRX | D17-8 | D7      | D6      | D5      | D4      | D3      | D2      | D1      | D0      |             |
| Command                   | 0               | 1   | ↑   | x     | 0       | 0       | 1       | 1       | 0       | 0       | 1       | 1       | 33          |
| 1 <sup>st</sup> Parameter | 1               | 1   | ↑   | x     | 0       | 0       | 0       | 0       | 0       | 0       | 0       | TFA [8] | 0000        |
| 2 <sup>nd</sup> Parameter | 1               | 1   | ↑   | x     | TFA [7] | TFA [6] | TFA [5] | TFA [4] | TFA [3] | TFA [2] | TFA [1] | TFA [0] | ...<br>01E0 |
| 3 <sup>rd</sup> Parameter | 1               | 1   | ↑   | x     | 0       | 0       | 0       | 0       | 0       | 0       | 0       | VSA [8] | 0000        |
| 4 <sup>th</sup> Parameter | 1               | 1   | ↑   | x     | VSA [7] | VSA [6] | VSA [5] | VSA [4] | VSA [3] | VSA [2] | VSA [1] | VSA [0] | ...<br>01E0 |
| 5 <sup>th</sup> Parameter | 1               | 1   | ↑   | x     | 0       | 0       | 0       | 0       | 0       | 0       | 0       | BFA [8] | 0000        |
| 6 <sup>th</sup> Parameter | 1               | 1   | ↑   | x     | BFA [7] | BFA [6] | BFA [5] | BFA [4] | BFA [3] | BFA [2] | BFA [1] | BFA [0] | ...<br>01E0 |

This command defines the display vertical scrolling area.

**set\_address\_mode (36h) B4 = 0:**

The 1st & 2nd parameter, TFA[8:0], describes the Top Fixed Area in number of lines from the top of the frame memory. The top of the frame memory and top of the display device are aligned. The 3rd & 4th parameter, VSA[8:0], describes the height of the Vertical Scrolling Area in number of lines of frame memory from the Vertical Scrolling Start Address. The first line of the Vertical Scrolling Area starts immediately after the bottom most line of the Top Fixed Area. The last line of the Vertical Scrolling Area ends immediately before the top most line of the Bottom Fixed Area.

The 5th & 6th parameter, BFA[8:0], describes the Bottom Fixed Area in number of lines from the bottom of the frame memory. The bottom of the frame memory and bottom of the display device are aligned.

TFA, VSA and BFA refer to the Frame Memory Line Pointer.



**set\_scroll\_area set\_address\_mode B4 = 1 Example**

**set\_address\_mode (36h) B4 = 1:**

The 1st & 2nd parameter, TFA[8:0], describes the Top Fixed Area in number of lines from the bottom of the frame memory. The bottom of the frame memory and bottom of the display device are aligned.

The 3rd & 4th parameter, VSA[8:0], describes the height of the Vertical Scrolling Area in number of lines of frame memory from the Vertical Scrolling Start Address. The first line of the Vertical Scrolling Area starts immediately after the top most line of the Top Fixed Area. The last line of the Vertical Scrolling Area ends immediately before the bottom most line of the Bottom Fixed Area.

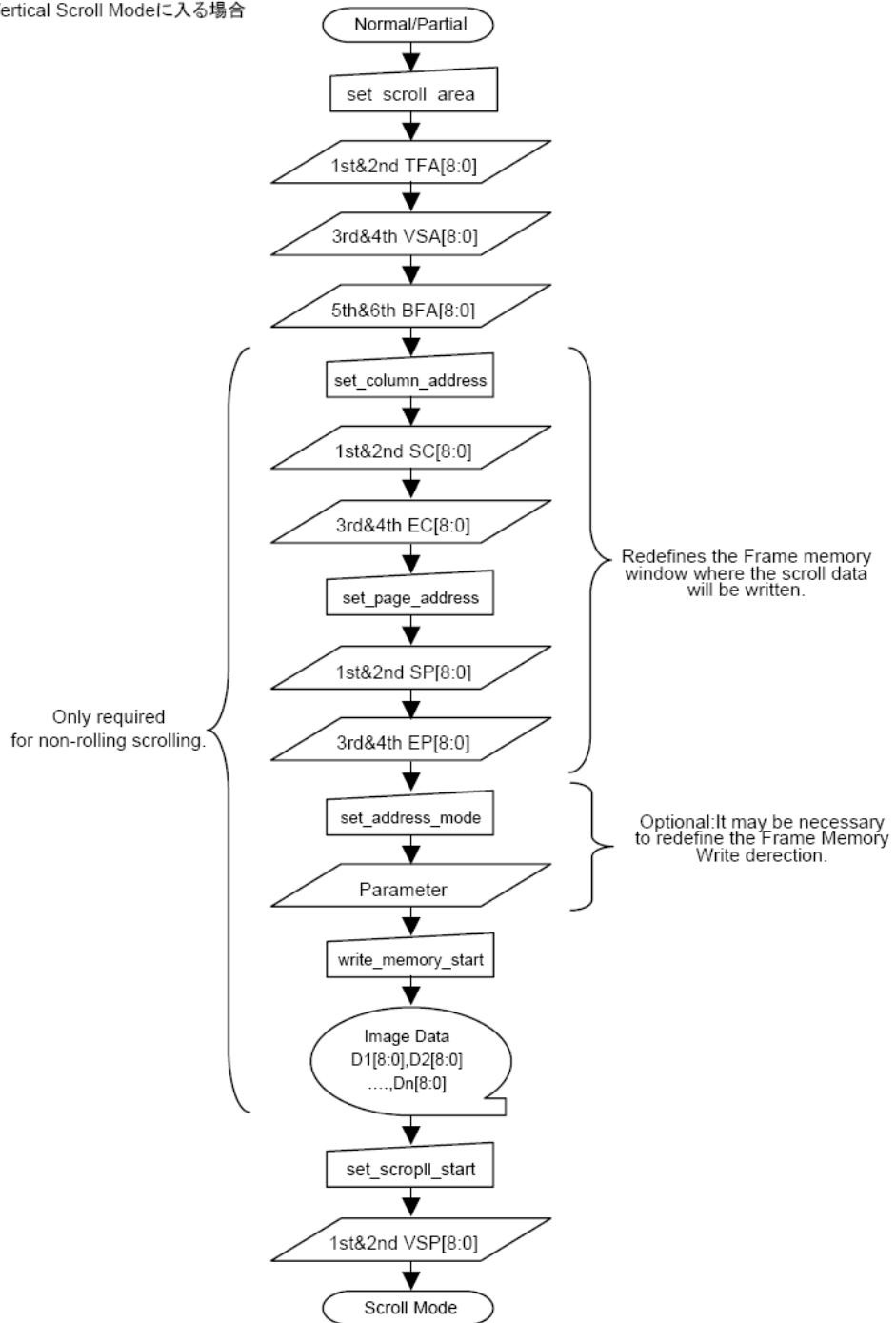
The 5th & 6th parameter, BFA[8:0], describes the Bottom Fixed Area in number of lines from the top of the frame memory. The top of the frame memory and top of the display device are aligned.

TFA, VSA and BFA refer to the Frame Memory Line Pointer.

|   | <p style="text-align: center;"><b>set_scroll_area set_address_mode B4 = 1 Example</b></p>  |                               |                               |  |     |   |                               |   |                               |  |                                |                               |                               |          |                                |                               |                               |
|---|--|-------------------------------|-------------------------------|--|-----|---|-------------------------------|---|-------------------------------|--|--------------------------------|-------------------------------|-------------------------------|----------|--------------------------------|-------------------------------|-------------------------------|
| Restriction                               | <p>The sum of TFA, VSA and BFA must equal the number of the display device's horizontal lines (pages), otherwise Scrolling mode is undefined. In Vertical Scroll Mode, set_address_mode B5 should be set to '0' – this only affects the Frame Memory Write.</p>  |                               |                               |  |     |   |                               |   |                               |  |                                |                               |                               |          |                                |                               |                               |
| Register Availability                     | <table border="1" style="margin-left: auto; margin-right: auto;"> <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" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Status</th> <th colspan="3">Default Value</th> </tr> </thead> <tbody> <tr> <td>Power On Sequence</td> <td>TFA[15:0]=0000<sub>HEX</sub></td> <td>VSA[15:0]=01E0<sub>HEX</sub></td> <td>BFA[15:0]=0000<sub>HEX</sub></td> </tr> <tr> <td>SW Reset</td> <td>TFA [15:0]=0000<sub>HEX</sub></td> <td>VSA[15:0]=01E0<sub>HEX</sub></td> <td>BFA[15:0]=0000<sub>HEX</sub></td> </tr> <tr> <td>HW Reset</td> <td>TFA [15:0]=0000<sub>HEX</sub></td> <td>VSA[15:0]=01E0<sub>HEX</sub></td> <td>BFA[15:0]=0000<sub>HEX</sub></td> </tr> </tbody> </table> | Status                        | Default Value                 |  |     | Power On Sequence                       | TFA[15:0]=0000 <sub>HEX</sub> | VSA[15:0]=01E0 <sub>HEX</sub>             | BFA[15:0]=0000 <sub>HEX</sub> | SW Reset                                 | TFA [15:0]=0000 <sub>HEX</sub> | VSA[15:0]=01E0 <sub>HEX</sub> | BFA[15:0]=0000 <sub>HEX</sub> | HW Reset | TFA [15:0]=0000 <sub>HEX</sub> | VSA[15:0]=01E0 <sub>HEX</sub> | BFA[15:0]=0000 <sub>HEX</sub> |
| Status                                    | Default Value  |                               |                               |  |     |   |                               |   |                               |  |                                |                               |                               |          |                                |                               |                               |
| Power On Sequence                         | TFA[15:0]=0000 <sub>HEX</sub>  | VSA[15:0]=01E0 <sub>HEX</sub> | BFA[15:0]=0000 <sub>HEX</sub> |  |     |   |                               |   |                               |  |                                |                               |                               |          |                                |                               |                               |
| SW Reset                                  | TFA [15:0]=0000 <sub>HEX</sub>   | VSA[15:0]=01E0 <sub>HEX</sub> | BFA[15:0]=0000 <sub>HEX</sub> |  |     |   |                               |   |                               |  |                                |                               |                               |          |                                |                               |                               |
| HW Reset                                  | TFA [15:0]=0000 <sub>HEX</sub>   | VSA[15:0]=01E0 <sub>HEX</sub> | BFA[15:0]=0000 <sub>HEX</sub> |  |     |   |                               |   |                               |  |                                |                               |                               |          |                                |                               |                               |
| Flow Chart                                |  |                               |                               |  |     |   |                               |   |                               |  |                                |                               |                               |          |                                |                               |                               |

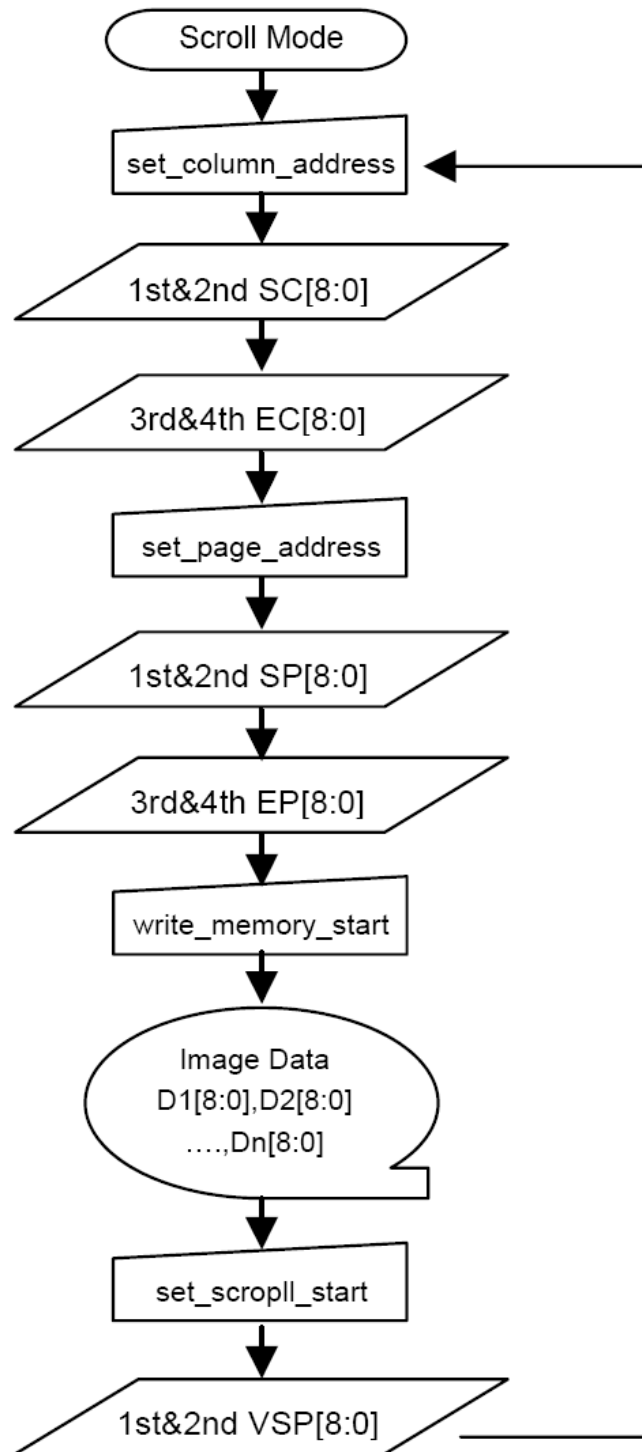


1. To enter Vertical Scroll Mode:  
/ertical Scroll Mode)に入る場合

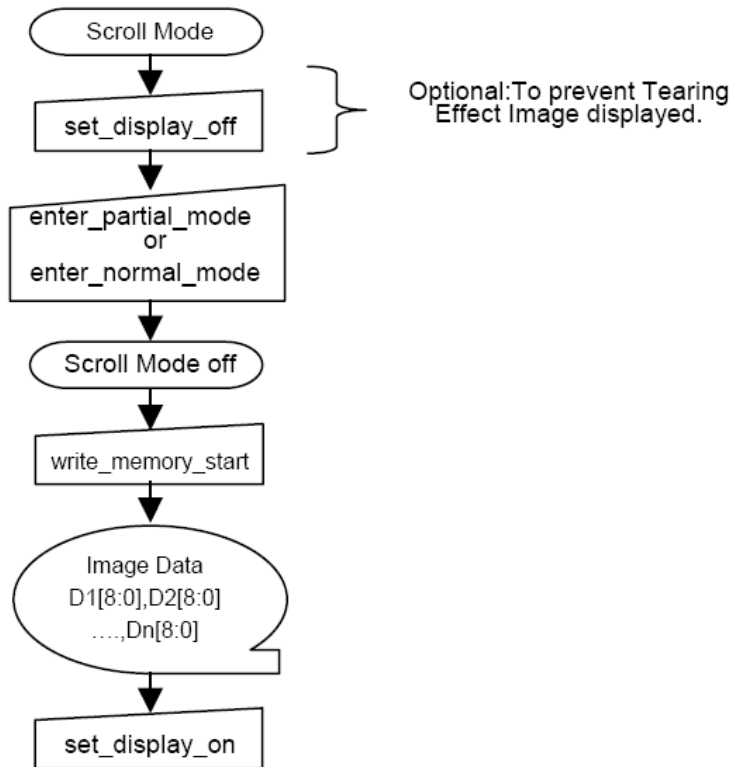


Since the value of the Vertical Scrolling Start Address is absolute with reference to the Frame Memory, it must not enter the fixed area; otherwise an undesirable image may be shown on the Display Panel.

2. Continuous Scroll:



3. To Leave Vertical Scroll Mode:

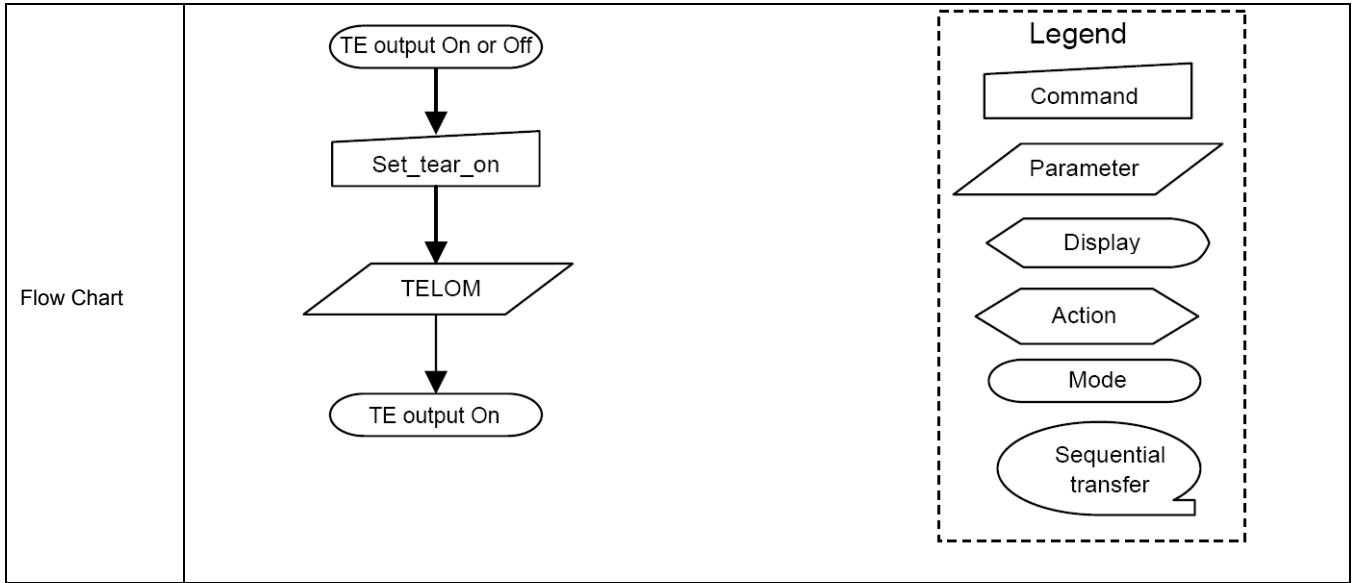


**8.2.23. Set\_tear\_off (34h)**

| 34H                                       | Set_tear_off   |     |     |       |    |    |    |    |    |    |    |    |     |        |               |  |     |   |     |   |     |  |     |          |     |
|---|--|-----|-----|-------|----|----|----|----|----|----|----|----|-----|--------|---------------|--|-----|---|-----|---|-----|--|-----|----------|-----|
|   | D/CX   | RDX | WRX | D17-8 | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | HEX |        |               |  |     |   |     |   |     |  |     |          |     |
| Command                                   | 0  | 1   | ↑   | x     | 0  | 0  | 1  | 1  | 0  | 1  | 0  | 0  | 34  |        |               |  |     |   |     |   |     |  |     |          |     |
| Parameter                                 | NO PARAMETER   |     |     |       |    |    |    |    |    |    |    |    |     |        |               |  |     |   |     |   |     |  |     |          |     |
| Description                               | This command turns off the display module's Tearing Effect output signal on the TE signal line.  |     |     |       |    |    |    |    |    |    |    |    |     |        |               |  |     |   |     |   |     |  |     |          |     |
| Restriction                               | This command has no effect when the Tearing Effect output is already off.  |     |     |       |    |    |    |    |    |    |    |    |     |        |               |  |     |   |     |   |     |  |     |          |     |
| 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>Power On Sequence</td> <td>OFF</td> </tr> <tr> <td>SW Reset</td> <td>OFF</td> </tr> <tr> <td>HW Reset</td> <td>OFF</td> </tr> </tbody> </table>   |     |     |       |    |    |    |    |    |    |    |    |     | Status | Default Value | Power On Sequence                        | OFF | SW Reset                                | OFF | HW Reset                                  | OFF |  |     |          |     |
| Status                                    | Default Value  |     |     |       |    |    |    |    |    |    |    |    |     |        |               |  |     |   |     |   |     |  |     |          |     |
| Power On Sequence                         | OFF  |     |     |       |    |    |    |    |    |    |    |    |     |        |               |  |     |   |     |   |     |  |     |          |     |
| SW Reset                                  | OFF  |     |     |       |    |    |    |    |    |    |    |    |     |        |               |  |     |   |     |   |     |  |     |          |     |
| HW Reset                                  | OFF  |     |     |       |    |    |    |    |    |    |    |    |     |        |               |  |     |   |     |   |     |  |     |          |     |
| Flow Chart                                | <pre> graph TD     A([TE output On or Off]) --&gt; B[Set_tear_off]     B --&gt; C([TE output off])     </pre> <p><b>Legend</b></p> <ul style="list-style-type: none"> <li>Command: Rectangle</li> <li>Parameter: Parallelogram</li> <li>Display: Rounded rectangle</li> <li>Action: Pointed rectangle</li> <li>Mode: Oval</li> <li>Sequential transfer: Oval with tail</li> </ul>  |     |     |       |    |    |    |    |    |    |    |    |     |        |               |  |     |   |     |   |     |  |     |          |     |

**8.2.24. Set\_tear\_on (35h)**

| 35H                                       | Set_tear_on  |  |     |       |    |    |    |    |    |    |    |       | HEX |        |               |  |     |   |     |   |     |  |     |          |     |
|---|--|--|-----|-------|----|----|----|----|----|----|----|-------|-----|--------|---------------|--|-----|---|-----|---|-----|--|-----|----------|-----|
|   | D/CX   | RDX  | WRX | D17-8 | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0    |     |        |               |  |     |   |     |   |     |  |     |          |     |
| Command                                   | 0  | 1  | ↑   | x     | 0  | 0  | 1  | 1  | 0  | 1  | 0  | 1     | 35  |        |               |  |     |   |     |   |     |  |     |          |     |
| 1 <sup>st</sup> Parameter                 | 1  | 1  | ↑   | x     | x  | x  | x  | x  | x  | x  | x  | TELOM | xx  |        |               |  |     |   |     |   |     |  |     |          |     |
| Description                               | <p>This command turns on the tearing Effect output signal on the TE signal line. The TE signal is not affected by changing set_address_mode (36h) bit B4 (Line Address Order).</p> <p>The Tearing Effect Line On has one parameter that describes the Tearing Effect Output Line mode.</p> <p>If TELOM = 0:<br/>The Tearing Effect Output line consists of V-Blanking information only.</p> <p>If TELOM = 1:<br/>The Tearing Effect Output Line consists of both V-Blanking and H-Blanking information.</p> <p><b>The Tearing Effect Output line shall be active low when the display module is in Sleep mode.</b></p> |  |     |       |    |    |    |    |    |    |    |       |     |        |               |  |     |   |     |   |     |  |     |          |     |
|   | Restriction  | This command has no effect when Tearing Effect output is already ON. |     |       |    |    |    |    |    |    |    |       |     |        |               |  |     |   |     |   |     |  |     |          |     |
| 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>Power On Sequence</td> <td>OFF</td> </tr> <tr> <td>SW Reset</td> <td>OFF</td> </tr> <tr> <td>HW Reset</td> <td>OFF</td> </tr> </tbody> </table>   |  |     |       |    |    |    |    |    |    |    |       |     | Status | Default Value | Power On Sequence                        | OFF | SW Reset                                | OFF | HW Reset                                  | OFF |  |     |          |     |
| Status                                    | Default Value  |  |     |       |    |    |    |    |    |    |    |       |     |        |               |  |     |   |     |   |     |  |     |          |     |
| Power On Sequence                         | OFF  |  |     |       |    |    |    |    |    |    |    |       |     |        |               |  |     |   |     |   |     |  |     |          |     |
| SW Reset                                  | OFF  |  |     |       |    |    |    |    |    |    |    |       |     |        |               |  |     |   |     |   |     |  |     |          |     |
| HW Reset                                  | OFF  |  |     |       |    |    |    |    |    |    |    |       |     |        |               |  |     |   |     |   |     |  |     |          |     |



### 8.2.25. Set\_address\_mode (36h)

| 36H                       | Set_address_mode  |            |     |       |    |    |    |    |    |    |    |    |     |     |             |         |    |                    |  |    |                      |  |    |                       |  |    |                |  |    |               |  |    |                               |            |    |                 |  |    |               |
|---------------------------|---|------------|-----|-------|----|----|----|----|----|----|----|----|-----|-----|-------------|---------|----|--------------------|--|----|----------------------|--|----|-----------------------|--|----|----------------|--|----|---------------|--|----|-------------------------------|------------|----|-----------------|--|----|---------------|
|                           | D/CX  | RDX        | WRX | D17-8 | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | HEX |     |             |         |    |                    |  |    |                      |  |    |                       |  |    |                |  |    |               |  |    |                               |            |    |                 |  |    |               |
| Command                   | 0   | 1          | ↑   | x     | 0  | 0  | 1  | 1  | 0  | 1  | 1  | 0  | 36  |     |             |         |    |                    |  |    |                      |  |    |                       |  |    |                |  |    |               |  |    |                               |            |    |                 |  |    |               |
| 1 <sup>st</sup> Parameter | 1   | 1          | ↑   | x     | B7 | B6 | B5 | B4 | B3 | 0  | B1 | B0 | xx  |     |             |         |    |                    |  |    |                      |  |    |                       |  |    |                |  |    |               |  |    |                               |            |    |                 |  |    |               |
| Description               | <p>This command defines read/write scanning direction of frame memory.</p> <p>This command makes no change on the other driver status.</p>  |            |     |       |    |    |    |    |    |    |    |    |     |     |             |         |    |                    |  |    |                      |  |    |                       |  |    |                |  |    |               |  |    |                               |            |    |                 |  |    |               |
|                           | <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Bit</th> <th>Description</th> <th>Comment</th> </tr> </thead> <tbody> <tr> <td>B7</td> <td>Page Address Order</td> <td></td> </tr> <tr> <td>B6</td> <td>Column Address Order</td> <td></td> </tr> <tr> <td>B5</td> <td>Page/Column Selection</td> <td></td> </tr> <tr> <td>B4</td> <td>Vertical Order</td> <td></td> </tr> <tr> <td>B3</td> <td>RGB/BGR Order</td> <td></td> </tr> <tr> <td>B2</td> <td>Display data latch data order</td> <td>Set to '0'</td> </tr> <tr> <td>B1</td> <td>Horizontal Flip</td> <td></td> </tr> <tr> <td>B0</td> <td>Vertical Flip</td> <td></td> </tr> </tbody> </table> <ul style="list-style-type: none"> <li>• Bit B7 – Page Address Order <ul style="list-style-type: none"> <li>'0' = Top to Bottom</li> <li>'1' = Bottom to Top</li> </ul> </li> <li>• Bit B6 – Column Address Order <ul style="list-style-type: none"> <li>'0' = Left to Right</li> <li>'1' = Right to Left</li> </ul> </li> <li>• Bit B5 – Page/Column Order <ul style="list-style-type: none"> <li>'0' = Normal Mode</li> <li>'1' = Reverse Mode</li> </ul> </li> <li>• Bit B4 –Line Address Order <ul style="list-style-type: none"> <li>'0' = LCD Refresh Top to Bottom</li> <li>'1' = LCD Refresh Bottom to Top</li> </ul> </li> <li>• Bit B3 – RGB/BGR Order <ul style="list-style-type: none"> <li>'0' = Pixels sent in RGB order</li> <li>'1' = Pixels sent in BGR order</li> </ul> </li> <li>• Bit B2 –Display Data Latch Data Order <ul style="list-style-type: none"> <li>This bit is not applicable for this project, so it is set to '0'. (Not supported)</li> </ul> </li> <li>• Bit B1 – Horizontal Flip <ul style="list-style-type: none"> <li>'0' = Normal display</li> <li>'1' = Flipped display</li> </ul> </li> <li>• Bit B0 – Vertical Flip <ul style="list-style-type: none"> <li>'0' = Normal display</li> <li>'1' = Flipped display</li> </ul> </li> </ul> <p>X = Don't care</p> |            |     |       |    |    |    |    |    |    |    |    |     | Bit | Description | Comment | B7 | Page Address Order |  | B6 | Column Address Order |  | B5 | Page/Column Selection |  | B4 | Vertical Order |  | B3 | RGB/BGR Order |  | B2 | Display data latch data order | Set to '0' | B1 | Horizontal Flip |  | B0 | Vertical Flip |
| Bit                       | Description   | Comment    |     |       |    |    |    |    |    |    |    |    |     |     |             |         |    |                    |  |    |                      |  |    |                       |  |    |                |  |    |               |  |    |                               |            |    |                 |  |    |               |
| B7                        | Page Address Order  |            |     |       |    |    |    |    |    |    |    |    |     |     |             |         |    |                    |  |    |                      |  |    |                       |  |    |                |  |    |               |  |    |                               |            |    |                 |  |    |               |
| B6                        | Column Address Order  |            |     |       |    |    |    |    |    |    |    |    |     |     |             |         |    |                    |  |    |                      |  |    |                       |  |    |                |  |    |               |  |    |                               |            |    |                 |  |    |               |
| B5                        | Page/Column Selection   |            |     |       |    |    |    |    |    |    |    |    |     |     |             |         |    |                    |  |    |                      |  |    |                       |  |    |                |  |    |               |  |    |                               |            |    |                 |  |    |               |
| B4                        | Vertical Order  |            |     |       |    |    |    |    |    |    |    |    |     |     |             |         |    |                    |  |    |                      |  |    |                       |  |    |                |  |    |               |  |    |                               |            |    |                 |  |    |               |
| B3                        | RGB/BGR Order   |            |     |       |    |    |    |    |    |    |    |    |     |     |             |         |    |                    |  |    |                      |  |    |                       |  |    |                |  |    |               |  |    |                               |            |    |                 |  |    |               |
| B2                        | Display data latch data order   | Set to '0' |     |       |    |    |    |    |    |    |    |    |     |     |             |         |    |                    |  |    |                      |  |    |                       |  |    |                |  |    |               |  |    |                               |            |    |                 |  |    |               |
| B1                        | Horizontal Flip   |            |     |       |    |    |    |    |    |    |    |    |     |     |             |         |    |                    |  |    |                      |  |    |                       |  |    |                |  |    |               |  |    |                               |            |    |                 |  |    |               |
| B0                        | Vertical Flip   |            |     |       |    |    |    |    |    |    |    |    |     |     |             |         |    |                    |  |    |                      |  |    |                       |  |    |                |  |    |               |  |    |                               |            |    |                 |  |    |               |

| B5 | B6 | B7 | Image in Frame Memory | B5 | B6 | B7 | Image in Frame Memory |
|----|----|----|-----------------------|----|----|----|-----------------------|
| 0  | 0  | 0  |                       | 1  | 0  | 0  |                       |
| 0  | 0  | 1  |                       | 1  | 0  | 1  |                       |
| 0  | 1  | 0  |                       | 1  | 1  | 0  |                       |
| 0  | 1  | 1  |                       | 1  | 1  | 1  |                       |

B3 = 0



B3 = 1



Restriction



| 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>Power On Sequence</td> <td>0000 0000<sub>HEX</sub></td> </tr> <tr> <td>SW Reset</td> <td>No Change</td> </tr> <tr> <td>HW Reset</td> <td>0000 0000<sub>HEX</sub></td> </tr> </tbody> </table>   | Status | Default Value | Power On Sequence                        | 0000 0000 <sub>HEX</sub> | SW Reset                                | No Change | HW Reset                                  | 0000 0000 <sub>HEX</sub> |  |     |          |     |
| Status                                    | Default Value  |        |               |  |                          |   |           |   |                          |  |     |          |     |
| Power On Sequence                         | 0000 0000 <sub>HEX</sub>   |        |               |  |                          |   |           |   |                          |  |     |          |     |
| SW Reset                                  | No Change  |        |               |  |                          |   |           |   |                          |  |     |          |     |
| HW Reset                                  | 0000 0000 <sub>HEX</sub>   |        |               |  |                          |   |           |   |                          |  |     |          |     |
| Flow Chart                                | <pre> graph TD     A([Address mode]) --&gt; B[Set_address_mode]     B --&gt; C[/B7,B6,B5,B4,B0/]     C --&gt; D([New Address 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>   |        |               |  |                          |   |           |   |                          |  |     |          |     |

**8.2.26. Set\_scroll\_start (37h)**

| 37H                       | Set_scroll_start |     |     |       |          |          |          |          |          |          |          |          | HEX |
|---------------------------|------------------|-----|-----|-------|----------|----------|----------|----------|----------|----------|----------|----------|-----|
|                           | D/CX             | RDX | WRX | D17-8 | D7       | D6       | D5       | D4       | D3       | D2       | D1       | D0       |     |
| Command                   | 0                | 1   | ↑   | x     | 0        | 0        | 1        | 1        | 0        | 1        | 1        | 1        | 37  |
| 1 <sup>st</sup> Parameter | 1                | 1   | ↑   | x     | 0        | 0        | 0        | 0        | 0        | 0        | 0        | VSP<br>8 | xx  |
| 2 <sup>nd</sup> Parameter | 1                | 1   | ↑   | x     | VSP<br>7 | VSP<br>6 | VSP<br>5 | VSP<br>4 | VSP<br>3 | VSP<br>2 | VSP<br>1 | VSP<br>0 | xx  |

This command sets the start of the vertical scrolling area in the frame memory. The vertical scrolling area is fully defined when this command is used with the set\_scroll\_area command

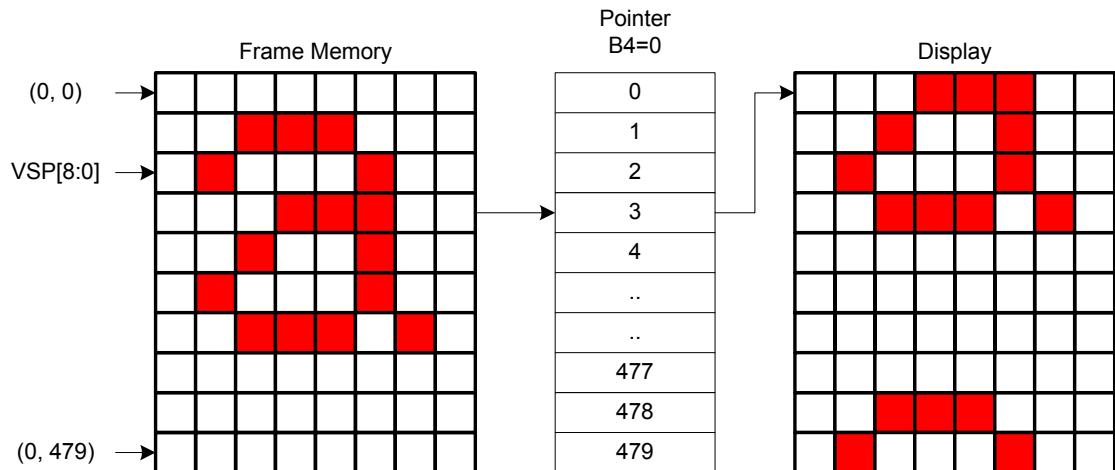
The set\_scroll\_start command has one parameter, the Vertical Scroll Pointer. The VSP defines the line in the frame memory that is written to the display device as the first line of the vertical scroll area.

The displayed image also depends on the setting of the Line Address Order bit, B4, in the set\_address\_mode register. See the examples below.

**If set\_address\_mode (R36h) B4 = 0:**

Example:

When Top Fixed Area = Bottom Fixed Area = 0, Vertical Scrolling Area = 480 and VSP = 3.

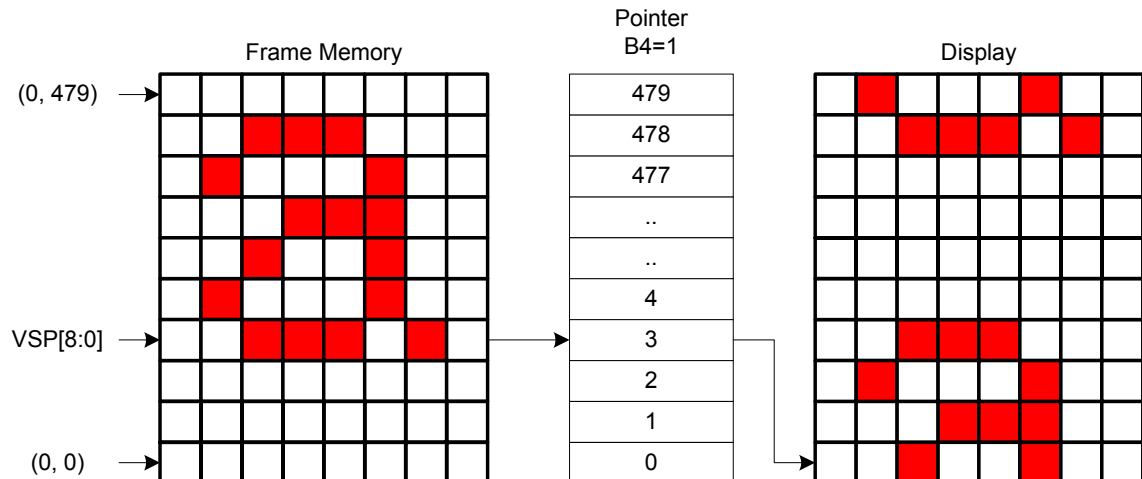


Description

**If set\_address\_mode (R36h) B4 = 1:**

Example:

When Top Fixed Area = Bottom Fixed Area = 00, Vertical Scrolling Area = 480 and VSP='3'.



Note: When new Pointer position and Picture Data are sent, the result on the display will happen at the next Panel Scan to avoid

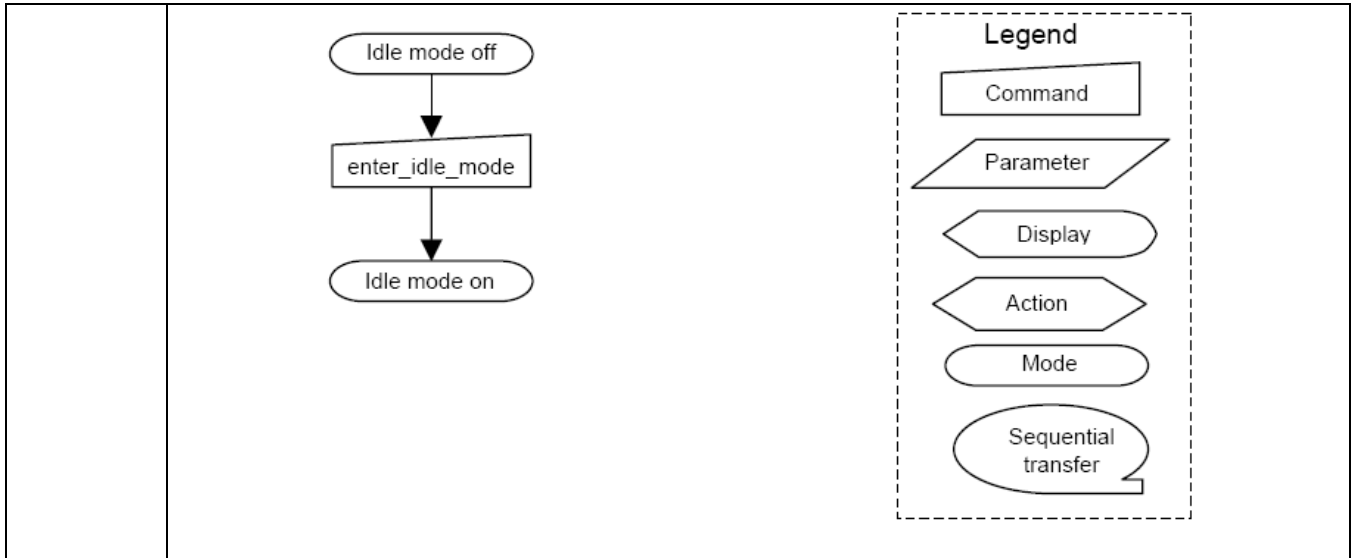
|   | tearing effect. VSP refers to the Frame Memory line Pointer.   |        |               |  |                     |   |                     |   |                     |  |     |          |     |
|---|--|--------|---------------|--|---------------------|---|---------------------|---|---------------------|--|-----|----------|-----|
| Restriction                               | Since the value of the Vertical Scrolling Start Address is absolute (with reference to the Frame Memory), it must not enter the fixed area (defined by Vertical Scrolling Definition (33h) – otherwise undesirable image will be displayed on the Panel.   |        |               |  |                     |   |                     |   |                     |  |     |          |     |
| 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>Power On Sequence</td> <td>0000<sub>HEX</sub></td> </tr> <tr> <td>SW Reset</td> <td>0000<sub>HEX</sub></td> </tr> <tr> <td>HW Reset</td> <td>0000<sub>HEX</sub></td> </tr> </tbody> </table>  | Status | Default Value | Power On Sequence                        | 0000 <sub>HEX</sub> | SW Reset                                | 0000 <sub>HEX</sub> | HW Reset                                  | 0000 <sub>HEX</sub> |  |     |          |     |
| Status                                    | Default Value  |        |               |  |                     |   |                     |   |                     |  |     |          |     |
| Power On Sequence                         | 0000 <sub>HEX</sub>  |        |               |  |                     |   |                     |   |                     |  |     |          |     |
| SW Reset                                  | 0000 <sub>HEX</sub>  |        |               |  |                     |   |                     |   |                     |  |     |          |     |
| HW Reset                                  | 0000 <sub>HEX</sub>  |        |               |  |                     |   |                     |   |                     |  |     |          |     |
| Flow Chart                                | Refer to the description set_scroll_area (33h)   |        |               |  |                     |   |                     |   |                     |  |     |          |     |

**8.2.27. Exit\_idle\_mode (38h)**

| 38H                                       | Exit_idle_mode   |     |     |       |    |    |    |    |    |    |    |    |     |        |               |  |               |   |               |   |               |  |     |          |     |
|---|--|-----|-----|-------|----|----|----|----|----|----|----|----|-----|--------|---------------|--|---------------|---|---------------|---|---------------|--|-----|----------|-----|
|   | D/CX   | RDX | WRX | D17-8 | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | HEX |        |               |  |               |   |               |   |               |  |     |          |     |
| Command                                   | 0  | 1   | ↑   | x     | 0  | 0  | 1  | 1  | 1  | 0  | 0  | 0  | 38  |        |               |  |               |   |               |   |               |  |     |          |     |
| Parameter                                 | NO PARAMETER   |     |     |       |    |    |    |    |    |    |    |    |     |        |               |  |               |   |               |   |               |  |     |          |     |
| Description                               | This command causes the display module to exit Idle mode.  |     |     |       |    |    |    |    |    |    |    |    |     |        |               |  |               |   |               |   |               |  |     |          |     |
| Restriction                               | This command has no effect when the display module is not in Idle mode.  |     |     |       |    |    |    |    |    |    |    |    |     |        |               |  |               |   |               |   |               |  |     |          |     |
| 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>Power On Sequence</td> <td>Idle Mode Off</td> </tr> <tr> <td>SW Reset</td> <td>Idle Mode Off</td> </tr> <tr> <td>HW Reset</td> <td>Idle Mode Off</td> </tr> </tbody> </table>   |     |     |       |    |    |    |    |    |    |    |    |     | Status | Default Value | Power On Sequence                        | Idle Mode Off | SW Reset                                | Idle Mode Off | HW Reset                                  | Idle Mode Off |  |     |          |     |
| Status                                    | Default Value  |     |     |       |    |    |    |    |    |    |    |    |     |        |               |  |               |   |               |   |               |  |     |          |     |
| Power On Sequence                         | Idle Mode Off  |     |     |       |    |    |    |    |    |    |    |    |     |        |               |  |               |   |               |   |               |  |     |          |     |
| SW Reset                                  | Idle Mode Off  |     |     |       |    |    |    |    |    |    |    |    |     |        |               |  |               |   |               |   |               |  |     |          |     |
| HW Reset                                  | Idle Mode Off  |     |     |       |    |    |    |    |    |    |    |    |     |        |               |  |               |   |               |   |               |  |     |          |     |
| Flow Chart                                | <pre> graph TD     A([Idle mode on]) --&gt; B[Exit_idle_mode]     B --&gt; C([Idle mode off])     </pre> <p><b>Legend</b></p> <ul style="list-style-type: none"> <li>Command: Rectangle</li> <li>Parameter: Parallelogram</li> <li>Display: Rounded rectangle</li> <li>Action: Arrowhead</li> <li>Mode: Oval</li> <li>Sequential transfer: Oval with tail</li> </ul>   |     |     |       |    |    |    |    |    |    |    |    |     |        |               |  |               |   |               |   |               |  |     |          |     |

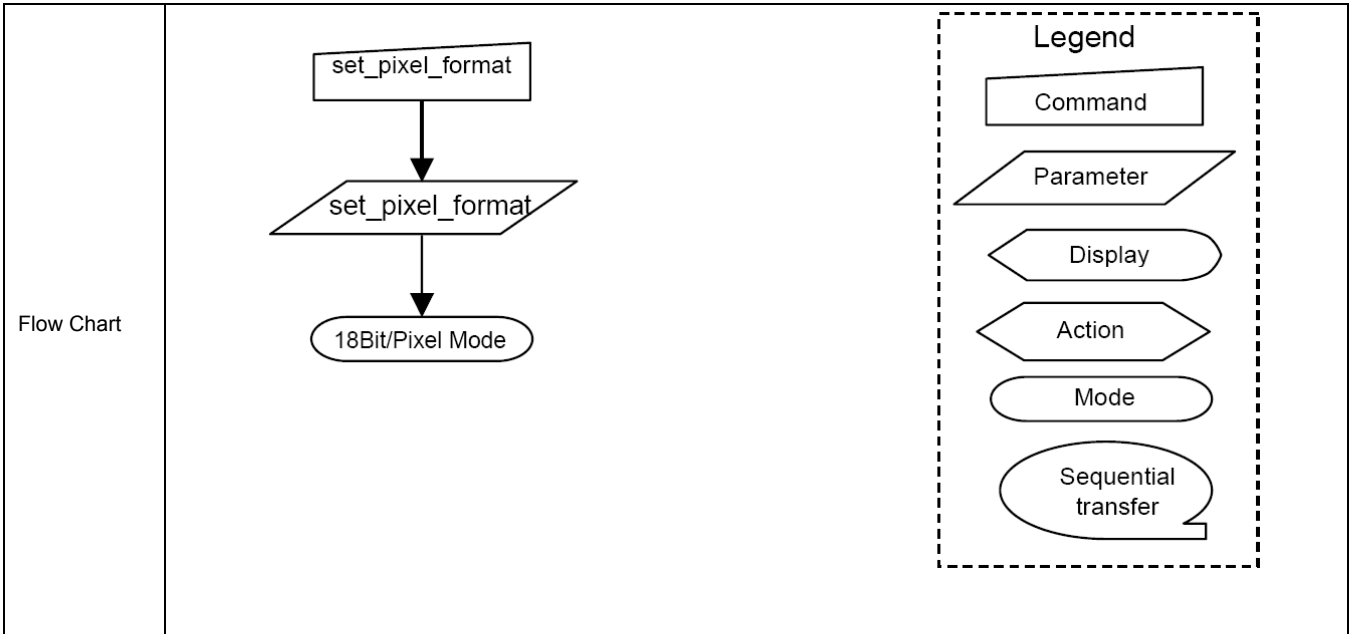
**8.2.28. Enter\_idle\_mode (39h)**

| 39H                                       | Enter_idle_mode  |                   |                   |                   |    |    |    |    |    |    |    |    |     |        |                   |  |                   |   |               |   |               |  |        |          |        |     |        |        |        |         |        |        |        |       |        |        |        |      |        |        |        |        |        |        |        |       |        |        |        |
|---|--|-------------------|-------------------|-------------------|----|----|----|----|----|----|----|----|-----|--------|-------------------|--|-------------------|---|---------------|---|---------------|--|--------|----------|--------|-----|--------|--------|--------|---------|--------|--------|--------|-------|--------|--------|--------|------|--------|--------|--------|--------|--------|--------|--------|-------|--------|--------|--------|
|   | D/CX   | RDX               | WRX               | D17-8             | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | HEX |        |                   |  |                   |   |               |   |               |  |        |          |        |     |        |        |        |         |        |        |        |       |        |        |        |      |        |        |        |        |        |        |        |       |        |        |        |
| Command                                   | 0  | 1                 | ↑                 | x                 | 0  | 0  | 1  | 1  | 1  | 0  | 0  | 1  | 39  |        |                   |  |                   |   |               |   |               |  |        |          |        |     |        |        |        |         |        |        |        |       |        |        |        |      |        |        |        |        |        |        |        |       |        |        |        |
| Parameter                                 | NO PARAMETER   |                   |                   |                   |    |    |    |    |    |    |    |    |     |        |                   |  |                   |   |               |   |               |  |        |          |        |     |        |        |        |         |        |        |        |       |        |        |        |      |        |        |        |        |        |        |        |       |        |        |        |
| Description                               | <p>This command causes the display module to enter Idle Mode.</p> <p>In Idle Mode, color expression is reduced. Colors are shown on the display device using the MSB of each of the R, G and B color components in the frame memory.</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;"> <p>Memory</p> </div> <div style="font-size: 2em;">→</div> <div style="text-align: center;"> <p>Panel Display</p> </div> </div> <table border="1" style="margin-top: 10px; width: 100%; text-align: center;"> <thead> <tr> <th></th> <th>R5 R4 R3 R2 R1 R0</th> <th>G5 G4 G3 G2 G1 G0</th> <th>B5 B4 B3 B2 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> |                   |                   |                   |    |    |    |    |    |    |    |    |     |        | R5 R4 R3 R2 R1 R0 | G5 G4 G3 G2 G1 G0                        | B5 B4 B3 B2 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 |
|   |  | R5 R4 R3 R2 R1 R0 | G5 G4 G3 G2 G1 G0 | B5 B4 B3 B2 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            |                   |    |    |    |    |    |    |    |    |     |        |                   |  |                   |   |               |   |               |  |        |          |        |     |        |        |        |         |        |        |        |       |        |        |        |      |        |        |        |        |        |        |        |       |        |        |        |
| Restriction                               | This command has no effect when module is already in idle on mode.   |                   |                   |                   |    |    |    |    |    |    |    |    |     |        |                   |  |                   |   |               |   |               |  |        |          |        |     |        |        |        |         |        |        |        |       |        |        |        |      |        |        |        |        |        |        |        |       |        |        |        |
| Register Availability                     | <table border="1" style="width: 100%; text-align: center;"> <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" style="width: 100%; text-align: center;"> <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>SW Reset</td> <td>Idle Mode Off</td> </tr> <tr> <td>HW Reset</td> <td>Idle Mode Off</td> </tr> </tbody> </table>  |                   |                   |                   |    |    |    |    |    |    |    |    |     | Status | Default Value     | Power On Sequence                        | Idle Mode Off     | SW Reset                                | Idle Mode Off | HW Reset                                  | Idle Mode Off |  |        |          |        |     |        |        |        |         |        |        |        |       |        |        |        |      |        |        |        |        |        |        |        |       |        |        |        |
| Status                                    | Default Value  |                   |                   |                   |    |    |    |    |    |    |    |    |     |        |                   |  |                   |   |               |   |               |  |        |          |        |     |        |        |        |         |        |        |        |       |        |        |        |      |        |        |        |        |        |        |        |       |        |        |        |
| Power On Sequence                         | Idle Mode Off  |                   |                   |                   |    |    |    |    |    |    |    |    |     |        |                   |  |                   |   |               |   |               |  |        |          |        |     |        |        |        |         |        |        |        |       |        |        |        |      |        |        |        |        |        |        |        |       |        |        |        |
| SW Reset                                  | Idle Mode Off  |                   |                   |                   |    |    |    |    |    |    |    |    |     |        |                   |  |                   |   |               |   |               |  |        |          |        |     |        |        |        |         |        |        |        |       |        |        |        |      |        |        |        |        |        |        |        |       |        |        |        |
| HW Reset                                  | Idle Mode Off  |                   |                   |                   |    |    |    |    |    |    |    |    |     |        |                   |  |                   |   |               |   |               |  |        |          |        |     |        |        |        |         |        |        |        |       |        |        |        |      |        |        |        |        |        |        |        |       |        |        |        |
| Flow Chart                                |  |                   |                   |                   |    |    |    |    |    |    |    |    |     |        |                   |  |                   |   |               |   |               |  |        |          |        |     |        |        |        |         |        |        |        |       |        |        |        |      |        |        |        |        |        |        |        |       |        |        |        |



### 8.2.29. Set\_pixel\_format (3Ah)

| 3AH                            | Set_pixel_format  |               |       |       |    |    |                                |    |       |       |       |             |        |               |  |             |   |           |   |             |  |             |          |     |   |   |             |  |   |   |   |             |  |   |   |   |                             |  |   |   |   |                              |  |   |   |   |             |  |   |   |   |  |  |  |  |  |  |
|--------------------------------|---|---------------|-------|-------|----|----|--------------------------------|----|-------|-------|-------|-------------|--------|---------------|--|-------------|---|-----------|---|-------------|--|-------------|----------|-----|---|---|-------------|--|---|---|---|-------------|--|---|---|---|-----------------------------|--|---|---|---|------------------------------|--|---|---|---|-------------|--|---|---|---|--|--|--|--|--|--|
|                                | D/CX  | RDX           | WRX   | D17-8 | D7 | D6 | D5                             | D4 | D3    | D2    | D1    | D0          | HEX    |               |  |             |   |           |   |             |  |             |          |     |   |   |             |  |   |   |   |             |  |   |   |   |                             |  |   |   |   |                              |  |   |   |   |             |  |   |   |   |  |  |  |  |  |  |
| Command                        | 0   | 1             | ↑     | x     | 0  | 0  | 1                              | 1  | 1     | 0     | 1     | 0           | 3A     |               |  |             |   |           |   |             |  |             |          |     |   |   |             |  |   |   |   |             |  |   |   |   |                             |  |   |   |   |                              |  |   |   |   |             |  |   |   |   |  |  |  |  |  |  |
| 1 <sup>st</sup> Parameter      | 1   | 1             | ↑     | x     | x  | D6 | D5                             | D4 | x     | D2    | D1    | D0          | 3A     |               |  |             |   |           |   |             |  |             |          |     |   |   |             |  |   |   |   |             |  |   |   |   |                             |  |   |   |   |                              |  |   |   |   |             |  |   |   |   |  |  |  |  |  |  |
| Description                    | <p>This command sets the pixel format for the RGB image data used by the interface.</p> <p>Bits D[6:4] – DPI Pixel Format Definition</p> <p>Bits D[2:0] – DBI Pixel Format Definition</p> <p>Bits D7 and D3 are not used.</p> <p>If a particular interface, either DBI or DPI, is not used then the corresponding bits in the parameter are ignored.</p>  |               |       |       |    |    |                                |    |       |       |       |             |        |               |  |             |   |           |   |             |  |             |          |     |   |   |             |  |   |   |   |             |  |   |   |   |                             |  |   |   |   |                              |  |   |   |   |             |  |   |   |   |  |  |  |  |  |  |
|                                | <table border="1"> <thead> <tr> <th colspan="2">Control Interface Color Format</th> <th>D6/D2</th> <th>D5/D1</th> <th>D4/D0</th> </tr> </thead> <tbody> <tr> <td colspan="2">Not defined</td> <td>0</td> <td>0</td> <td>0</td> </tr> <tr> <td colspan="2">3bit/pixel (8 color)</td> <td>0</td> <td>0</td> <td>1</td> </tr> <tr> <td colspan="2">Not defined</td> <td>0</td> <td>1</td> <td>0</td> </tr> <tr> <td colspan="2">Not defined</td> <td>0</td> <td>1</td> <td>1</td> </tr> <tr> <td colspan="2">Not defined</td> <td>1</td> <td>0</td> <td>0</td> </tr> <tr> <td colspan="2">16bit/pixel (65,536 colors)</td> <td>1</td> <td>0</td> <td>1</td> </tr> <tr> <td colspan="2">18bit/pixel (262,144 colors)</td> <td>1</td> <td>1</td> <td>0</td> </tr> <tr> <td colspan="2">Not defined</td> <td>1</td> <td>1</td> <td>1</td> </tr> </tbody> </table> |               |       |       |    |    | Control Interface Color Format |    | D6/D2 | D5/D1 | D4/D0 | Not defined |        | 0             | 0  | 0           | 3bit/pixel (8 color)                    |           | 0   | 0           | 1  | Not defined |          | 0   | 1 | 0 | Not defined |  | 0 | 1 | 1 | Not defined |  | 1 | 0 | 0 | 16bit/pixel (65,536 colors) |  | 1 | 0 | 1 | 18bit/pixel (262,144 colors) |  | 1 | 1 | 0 | Not defined |  | 1 | 1 | 1 |  |  |  |  |  |  |
| Control Interface Color Format |   | D6/D2         | D5/D1 | D4/D0 |    |    |                                |    |       |       |       |             |        |               |  |             |   |           |   |             |  |             |          |     |   |   |             |  |   |   |   |             |  |   |   |   |                             |  |   |   |   |                              |  |   |   |   |             |  |   |   |   |  |  |  |  |  |  |
| Not defined                    |   | 0             | 0     | 0     |    |    |                                |    |       |       |       |             |        |               |  |             |   |           |   |             |  |             |          |     |   |   |             |  |   |   |   |             |  |   |   |   |                             |  |   |   |   |                              |  |   |   |   |             |  |   |   |   |  |  |  |  |  |  |
| 3bit/pixel (8 color)           |   | 0             | 0     | 1     |    |    |                                |    |       |       |       |             |        |               |  |             |   |           |   |             |  |             |          |     |   |   |             |  |   |   |   |             |  |   |   |   |                             |  |   |   |   |                              |  |   |   |   |             |  |   |   |   |  |  |  |  |  |  |
| Not defined                    |   | 0             | 1     | 0     |    |    |                                |    |       |       |       |             |        |               |  |             |   |           |   |             |  |             |          |     |   |   |             |  |   |   |   |             |  |   |   |   |                             |  |   |   |   |                              |  |   |   |   |             |  |   |   |   |  |  |  |  |  |  |
| Not defined                    |   | 0             | 1     | 1     |    |    |                                |    |       |       |       |             |        |               |  |             |   |           |   |             |  |             |          |     |   |   |             |  |   |   |   |             |  |   |   |   |                             |  |   |   |   |                              |  |   |   |   |             |  |   |   |   |  |  |  |  |  |  |
| Not defined                    |   | 1             | 0     | 0     |    |    |                                |    |       |       |       |             |        |               |  |             |   |           |   |             |  |             |          |     |   |   |             |  |   |   |   |             |  |   |   |   |                             |  |   |   |   |                              |  |   |   |   |             |  |   |   |   |  |  |  |  |  |  |
| 16bit/pixel (65,536 colors)    |   | 1             | 0     | 1     |    |    |                                |    |       |       |       |             |        |               |  |             |   |           |   |             |  |             |          |     |   |   |             |  |   |   |   |             |  |   |   |   |                             |  |   |   |   |                              |  |   |   |   |             |  |   |   |   |  |  |  |  |  |  |
| 18bit/pixel (262,144 colors)   |   | 1             | 1     | 0     |    |    |                                |    |       |       |       |             |        |               |  |             |   |           |   |             |  |             |          |     |   |   |             |  |   |   |   |             |  |   |   |   |                             |  |   |   |   |                              |  |   |   |   |             |  |   |   |   |  |  |  |  |  |  |
| Not defined                    |   | 1             | 1     | 1     |    |    |                                |    |       |       |       |             |        |               |  |             |   |           |   |             |  |             |          |     |   |   |             |  |   |   |   |             |  |   |   |   |                             |  |   |   |   |                              |  |   |   |   |             |  |   |   |   |  |  |  |  |  |  |
| Restriction                    | There is no visible effect until the Frame Memory is written to.  |               |       |       |    |    |                                |    |       |       |       |             |        |               |  |             |   |           |   |             |  |             |          |     |   |   |             |  |   |   |   |             |  |   |   |   |                             |  |   |   |   |                              |  |   |   |   |             |  |   |   |   |  |  |  |  |  |  |
| 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>Power On Sequence</td> <td>18bit/pixel</td> </tr> <tr> <td>SW Reset</td> <td>No change</td> </tr> <tr> <td>HW Reset</td> <td>18bit/pixel</td> </tr> </tbody> </table>  |               |       |       |    |    |                                |    |       |       |       |             | Status | Default Value | Power On Sequence                        | 18bit/pixel | SW Reset                                | No change | HW Reset                                  | 18bit/pixel |  |             |          |     |   |   |             |  |   |   |   |             |  |   |   |   |                             |  |   |   |   |                              |  |   |   |   |             |  |   |   |   |  |  |  |  |  |  |
|                                | Status  | Default Value |       |       |    |    |                                |    |       |       |       |             |        |               |  |             |   |           |   |             |  |             |          |     |   |   |             |  |   |   |   |             |  |   |   |   |                             |  |   |   |   |                              |  |   |   |   |             |  |   |   |   |  |  |  |  |  |  |
|                                | Power On Sequence   | 18bit/pixel   |       |       |    |    |                                |    |       |       |       |             |        |               |  |             |   |           |   |             |  |             |          |     |   |   |             |  |   |   |   |             |  |   |   |   |                             |  |   |   |   |                              |  |   |   |   |             |  |   |   |   |  |  |  |  |  |  |
|                                | SW Reset  | No change     |       |       |    |    |                                |    |       |       |       |             |        |               |  |             |   |           |   |             |  |             |          |     |   |   |             |  |   |   |   |             |  |   |   |   |                             |  |   |   |   |                              |  |   |   |   |             |  |   |   |   |  |  |  |  |  |  |
| HW Reset                       | 18bit/pixel   |               |       |       |    |    |                                |    |       |       |       |             |        |               |  |             |   |           |   |             |  |             |          |     |   |   |             |  |   |   |   |             |  |   |   |   |                             |  |   |   |   |                              |  |   |   |   |             |  |   |   |   |  |  |  |  |  |  |
|                                |   |               |       |       |    |    |                                |    |       |       |       |             |        |               |  |             |   |           |   |             |  |             |          |     |   |   |             |  |   |   |   |             |  |   |   |   |                             |  |   |   |   |                              |  |   |   |   |             |  |   |   |   |  |  |  |  |  |  |
|                                |   |               |       |       |    |    |                                |    |       |       |       |             |        |               |  |             |   |           |   |             |  |             |          |     |   |   |             |  |   |   |   |             |  |   |   |   |                             |  |   |   |   |                              |  |   |   |   |             |  |   |   |   |  |  |  |  |  |  |





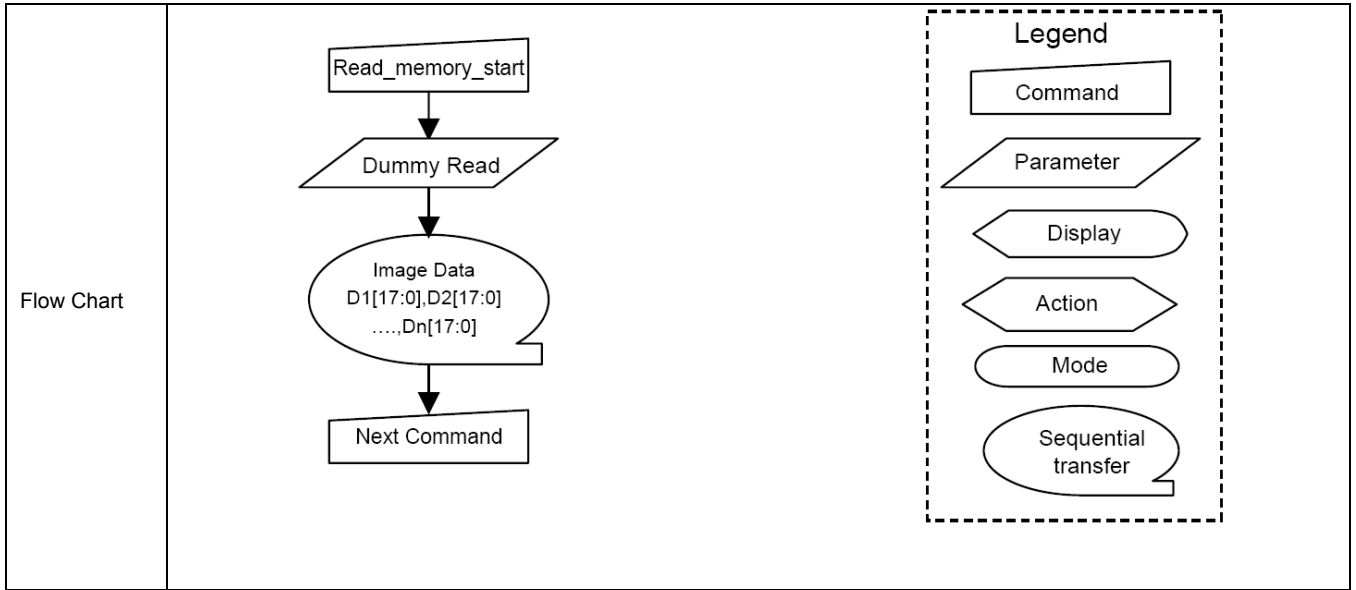
### 8.2.30. Write\_Memory\_Continue (3Ch)

| 3CH                                       | Write_Memory_Continue   |     |     |               |           |           |           |           |           |           |           |           |            |        |              |  |     |   |     |   |     |  |     |          |     |
|---|---|-----|-----|---------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|------------|--------|--------------|--|-----|---|-----|---|-----|--|-----|----------|-----|
|   | D/CX  | RDX | WRX | D17-8         | D7        | D6        | D5        | D4        | D3        | D2        | D1        | D0        | HEX        |        |              |  |     |   |     |   |     |  |     |          |     |
| Command                                   | 0   | 1   | ↑   | x             | 0         | 0         | 1         | 1         | 1         | 1         | 0         | 0         | 3C         |        |              |  |     |   |     |   |     |  |     |          |     |
| 1 <sup>st</sup> Parameter                 | 1   | 1   | ↑   | D1<br>[17..8] | D1<br>[7] | D1<br>[6] | D1<br>[5] | D1<br>[4] | D1<br>[3] | D1<br>[2] | D1<br>[1] | D1<br>[0] | 000<br>3FF |        |              |  |     |   |     |   |     |  |     |          |     |
| x <sup>st</sup> Parameter                 | 1   | 1   | ↑   | Dx<br>[17..8] | Dx<br>[7] | Dx<br>[6] | Dx<br>[5] | Dx<br>[4] | Dx<br>[3] | Dx<br>[2] | Dx<br>[1] | Dx<br>[0] | 000<br>3FF |        |              |  |     |   |     |   |     |  |     |          |     |
| N <sup>st</sup> Parameter                 | 1   | 1   | ↑   | Dn<br>[17..8] | Dn<br>[7] | Dn<br>[6] | Dn<br>[5] | Dn<br>[4] | Dn<br>[3] | Dn<br>[2] | Dn<br>[1] | Dn<br>[0] | 000<br>3FF |        |              |  |     |   |     |   |     |  |     |          |     |
| Description                               | <p>This command transfers image data from the host processor to the display module's frame memory continuing from the pixel location following the previous write_memory_continue or write_memory_start command.</p> <p><b>If set_address_mode B5 = 0:</b></p> <p>Data is written continuing from the pixel location after the write range of the previous write_memory_start or write_memory_continue. The column register is then incremented and pixels are written to the frame memory until the column register equals the End Column (EC) value. The column register is then reset to SC and the page register is incremented. Pixels are written to the frame memory until the page register equals the End Page (EP) value or the host processor sends another command. If the number of pixels exceeds (EC – SC + 1) * (EP – SP + 1) the extra pixels are ignored.</p> <p><b>If set_address_mode B5 = 1:</b></p> <p>Data is written continuing from the pixel location after the write range of the previous write_memory_start or write_memory_continue. The page register is then incremented and pixels are written to the frame memory until the page register equals the End Page (EP) value. The page register is then reset to SP and the column register is incremented. Pixels are written to the frame memory until the column register equals the End column (EC) value or the host processor sends another command. If the number of pixels exceeds (EC – SC + 1) * (EP – SP + 1) the extra pixels are ignored.</p> <p>Frame Memory Access and Interface setting (B3h), WEMODE=0</p> <p>When the transfer number of data exceeds (EC-SC+1)*(EP-SP+1), the exceeding data will be ignored.</p> <p>Frame Memory Access and Interface setting (B3h), WEMODE=1</p> <p>When the transfer number of data exceeds (EC-SC+1)*(EP-SP+1), the column and page number will be reset, and the exceeding data will be written into the following column and page.</p> |     |     |               |           |           |           |           |           |           |           |           |            |        |              |  |     |   |     |   |     |  |     |          |     |
| Restriction                               | A write_memory_start should follow a set_column_address, set_page_address or set_address_mode to define the write address. Otherwise, data written with write_memory_continue is written to undefined addresses.  |     |     |               |           |           |           |           |           |           |           |           |            |        |              |  |     |   |     |   |     |  |     |          |     |
| 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   |     |     |               |           |           |           |           |           |           |           |           |            |        |              |  |     |   |     |   |     |  |     |          |     |


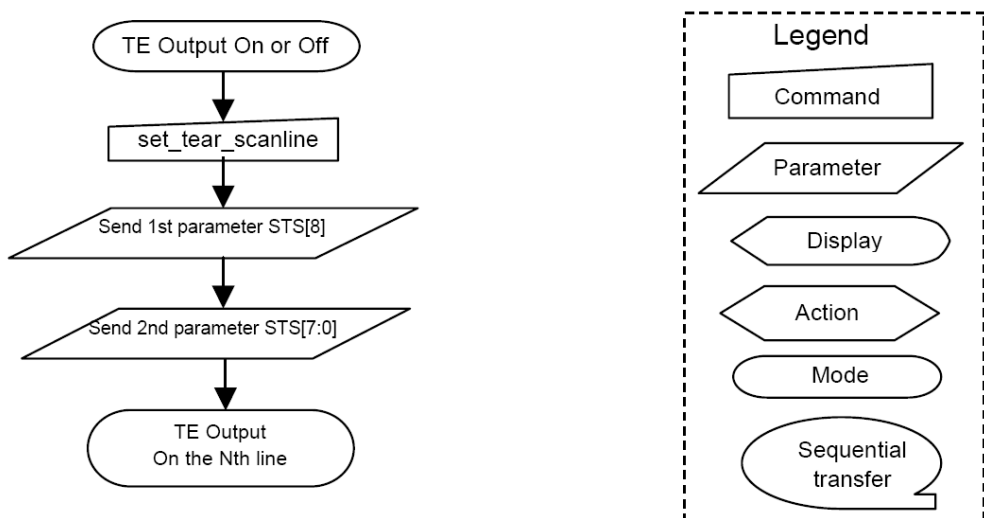
| Default           | <table border="1"> <thead> <tr> <th>Status</th> <th>Default Value</th> </tr> </thead> <tbody> <tr> <td>Power On Sequence</td> <td>All zero</td> </tr> <tr> <td>SW Reset</td> <td>No change</td> </tr> <tr> <td>HW Reset</td> <td>All zero</td> </tr> </tbody> </table>   | Status | Default Value | Power On Sequence | All zero | SW Reset | No change | HW Reset | All zero |
|-------------------|--|--------|---------------|-------------------|----------|----------|-----------|----------|----------|
| Status            | Default Value  |        |               |                   |          |          |           |          |          |
| Power On Sequence | All zero   |        |               |                   |          |          |           |          |          |
| SW Reset          | No change  |        |               |                   |          |          |           |          |          |
| HW Reset          | All zero   |        |               |                   |          |          |           |          |          |
| Flow Chart        | <pre> graph TD     A[Write_memory_continue] --&gt; B((Image Data<br/>D1[17:0],D2[17:0]<br/>.....,Dn[17:0]))     B --&gt; C[Next Command]     </pre> <p><b>Legend</b></p> <ul style="list-style-type: none"> <li>Command: Rectangle</li> <li>Parameter: Parallelogram</li> <li>Display: Pointed rectangle (right)</li> <li>Action: Pointed rectangle (left)</li> <li>Mode: Oval</li> <li>Sequential transfer: Oval with tail</li> </ul> |        |               |                   |          |          |           |          |          |

### 8.2.31. Read\_Memory\_Continue (3Eh)

| 3EH                                       | Read_Memory_Continue   |     |     |               |           |           |           |           |           |           |           |           | HEX        |        |               |  |             |   |           |   |             |  |     |          |     |
|---|--|-----|-----|---------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|------------|--------|---------------|--|-------------|---|-----------|---|-------------|--|-----|----------|-----|
|   | D/CX   | RDX | WRX | D17-8         | D7        | D6        | D5        | D4        | D3        | D2        | D1        | D0        |            |        |               |  |             |   |           |   |             |  |     |          |     |
| Command                                   | 0  | 1   | ↑   | x             | 0         | 0         | 1         | 1         | 1         | 1         | 1         | 0         | 3E         |        |               |  |             |   |           |   |             |  |     |          |     |
| 1 <sup>st</sup> Parameter                 | 1  | ↑   | 1   | x             | x         | x         | x         | x         | x         | x         | x         | x         | x          |        |               |  |             |   |           |   |             |  |     |          |     |
| 2 <sup>nd</sup> Parameter                 | 1  | ↑   | 1   | D1<br>[17..8] | D1<br>[7] | D1<br>[6] | D1<br>[5] | D1<br>[4] | D1<br>[3] | D1<br>[2] | D1<br>[1] | D1<br>[0] | 000<br>3FF |        |               |  |             |   |           |   |             |  |     |          |     |
| x <sup>st</sup> Parameter                 | 1  | ↑   | 1   | Dx<br>[17..8] | Dx<br>[7] | Dx<br>[6] | Dx<br>[5] | Dx<br>[4] | Dx<br>[3] | Dx<br>[2] | Dx<br>[1] | Dx<br>[0] | 000<br>3FF |        |               |  |             |   |           |   |             |  |     |          |     |
| N <sup>st</sup> Parameter                 | 1  | ↑   | 1   | Dn<br>[17..8] | Dn<br>[7] | Dn<br>[6] | Dn<br>[5] | Dn<br>[4] | Dn<br>[3] | Dn<br>[2] | Dn<br>[1] | Dn<br>[0] | 000<br>3FF |        |               |  |             |   |           |   |             |  |     |          |     |
| Description                               | <p>This command transfers image data from the display module's frame memory to the host processor continuing from the location following the previous read_memory_continue or read_memory_start command.</p> <p><b>If set_address_mode B5 = 0:</b></p> <p>Pixels are read continuing from the pixel location after the read range of the previous read_memory_start or read_memory_continue. The column register is then incremented and pixels are read from the frame memory until the column register equals the End Column (EC) value. The column register is then reset to SC and the page register is incremented. Pixels are read from the frame memory until the page register equals the End Page (EP) value or the host processor sends another command.</p> <p><b>If set_address_mode B5 = 1:</b></p> <p>Pixels are read continuing from the pixel location after the read range of the previous read_memory_start or read_memory_continue. The page register is then incremented and pixels are read from the frame memory until the page register equals the End Page (EP) value. The page register is then reset to SP and the column register is incremented. Pixels are read from the frame memory until the column register equals the End Column (EC) value or the host processor sends another command.</p> |     |     |               |           |           |           |           |           |           |           |           |            |        |               |  |             |   |           |   |             |  |     |          |     |
| Restriction                               | <p>Regardless of the color mode set in set_pixel_format, the pixel format returned by read_memory_continue is always 24-bit so there is no restriction on the length of data.</p> <p>A read_memory_start should follow a set_column_address, set_page_address or set_address_mode to define the read location. Otherwise, data read with read_memory_continue is undefined.</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>Power On Sequence</td> <td>Random data</td> </tr> <tr> <td>SW Reset</td> <td>No change</td> </tr> <tr> <td>HW Reset</td> <td>Random data</td> </tr> </tbody> </table>   |     |     |               |           |           |           |           |           |           |           |           |            | Status | Default Value | Power On Sequence                        | Random data | SW Reset                                | No change | HW Reset                                  | Random data |  |     |          |     |
| Status                                    | Default Value  |     |     |               |           |           |           |           |           |           |           |           |            |        |               |  |             |   |           |   |             |  |     |          |     |
| Power On Sequence                         | Random data  |     |     |               |           |           |           |           |           |           |           |           |            |        |               |  |             |   |           |   |             |  |     |          |     |
| SW Reset                                  | No change  |     |     |               |           |           |           |           |           |           |           |           |            |        |               |  |             |   |           |   |             |  |     |          |     |
| HW Reset                                  | Random data  |     |     |               |           |           |           |           |           |           |           |           |            |        |               |  |             |   |           |   |             |  |     |          |     |



**8.2.32. Set\_Tear\_Scanline (44h)**

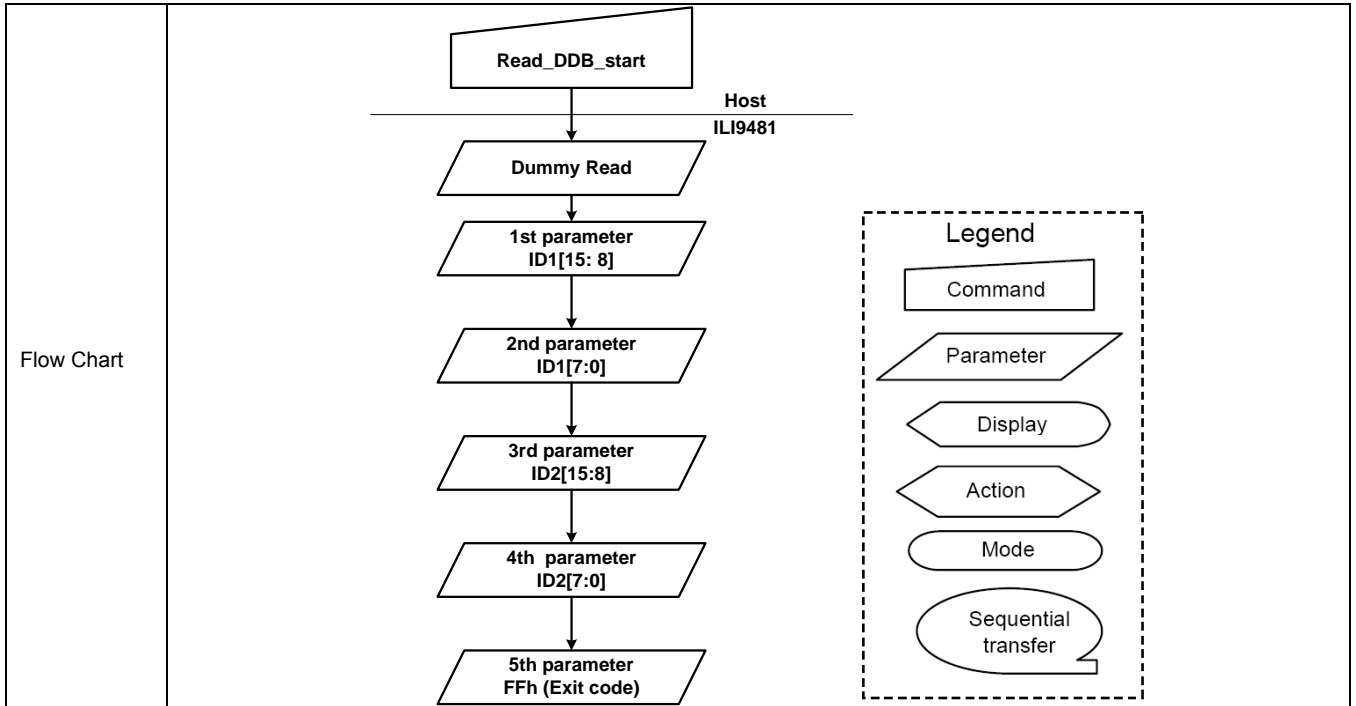
| 44H                                       | Set_Tear_Scanline  |     |     |       |         |         |         |         |         |         |         |         |     |        |               |  |                  |   |           |   |                  |  |     |          |     |
|---|--|-----|-----|-------|---------|---------|---------|---------|---------|---------|---------|---------|-----|--------|---------------|--|------------------|---|-----------|---|------------------|--|-----|----------|-----|
|   | D/CX   | RDX | WRX | D17-8 | D7      | D6      | D5      | D4      | D3      | D2      | D1      | D0      | HEX |        |               |  |                  |   |           |   |                  |  |     |          |     |
| Command                                   | 0  | 1   | ↑   | x     | 0       | 1       | 0       | 0       | 0       | 0       | 1       | 0       | 0   | 44     |               |  |                  |   |           |   |                  |  |     |          |     |
| 1 <sup>st</sup> Parameter                 | 1  | 1   | ↑   | xx    | 0       | 0       | 0       | 0       | 0       | 0       | 0       | STS [8] | 0x  |        |               |  |                  |   |           |   |                  |  |     |          |     |
| 2 <sup>nd</sup> Parameter                 | 1  | 1   | ↑   | xx    | STS [7] | STS [6] | STS [5] | STS [4] | STS [3] | STS [2] | STS [1] | STS [0] | xx  |        |               |  |                  |   |           |   |                  |  |     |          |     |
| Description                               | <p>This command turns on the display Tearing Effect output signal on the TE signal line when the display reaches line N. The TE signal is not affected by changing set_address_mode bit B4. The Tearing Effect Line On has one parameter that describes the Tearing Effect Output Line mode. The Tearing Effect Output line consists of V-Blanking information only.</p>  <p>Note that set_tear_scanline with N = 0 is equivalent to set_tear_on with M = 0.</p> <p>The Tearing Effect Output line shall be active low when the display module is in Sleep mode.</p> |     |     |       |         |         |         |         |         |         |         |         |     |        |               |  |                  |   |           |   |                  |  |     |          |     |
| Restriction                               | This command has no effect when Tearing Effect output is already ON.   |     |     |       |         |         |         |         |         |         |         |         |     |        |               |  |                  |   |           |   |                  |  |     |          |     |
| 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>Power On Sequence</td> <td>STS[8:0]=8'h0000</td> </tr> <tr> <td>SW Reset</td> <td>No change</td> </tr> <tr> <td>HW Reset</td> <td>STS[8:0]=8'h0000</td> </tr> </tbody> </table>   |     |     |       |         |         |         |         |         |         |         |         |     | Status | Default Value | Power On Sequence                        | STS[8:0]=8'h0000 | SW Reset                                | No change | HW Reset                                  | STS[8:0]=8'h0000 |  |     |          |     |
| Status                                    | Default Value  |     |     |       |         |         |         |         |         |         |         |         |     |        |               |  |                  |   |           |   |                  |  |     |          |     |
| Power On Sequence                         | STS[8:0]=8'h0000   |     |     |       |         |         |         |         |         |         |         |         |     |        |               |  |                  |   |           |   |                  |  |     |          |     |
| SW Reset                                  | No change  |     |     |       |         |         |         |         |         |         |         |         |     |        |               |  |                  |   |           |   |                  |  |     |          |     |
| HW Reset                                  | STS[8:0]=8'h0000   |     |     |       |         |         |         |         |         |         |         |         |     |        |               |  |                  |   |           |   |                  |  |     |          |     |
| Flow Chart                                |    |     |     |       |         |         |         |         |         |         |         |         |     |        |               |  |                  |   |           |   |                  |  |     |          |     |

**8.2.33. Get\_Scanline (45h)**

| 45H                                       | Get_Scanline   |     |     |       |         |         |         |         |         |         |         |         |     |        |              |  |     |   |     |   |     |  |     |          |     |
|---|--|-----|-----|-------|---------|---------|---------|---------|---------|---------|---------|---------|-----|--------|--------------|--|-----|---|-----|---|-----|--|-----|----------|-----|
|   | D/CX   | RDX | WRX | D17-8 | D7      | D6      | D5      | D4      | D3      | D2      | D1      | D0      | HEX |        |              |  |     |   |     |   |     |  |     |          |     |
| Command                                   | 0  | 1   | ↑   | x     | 0       | 1       | 0       | 0       | 0       | 1       | 0       | 1       | 45  |        |              |  |     |   |     |   |     |  |     |          |     |
| 1 <sup>st</sup> Parameter                 | 1  | ↑   | 1   | x     | x       | x       | x       | x       | x       | x       | x       | x       | x   |        |              |  |     |   |     |   |     |  |     |          |     |
| 2 <sup>nd</sup> Parameter                 | 1  | ↑   | 1   | xx    | 0       | 0       | 0       | 0       | 0       | 0       | 0       | GTS [8] | 0x  |        |              |  |     |   |     |   |     |  |     |          |     |
| 3 <sup>rd</sup> Parameter                 | 1  | ↑   | 1   | xx    | GTS [7] | GTS [6] | GTS [5] | GTS [4] | GTS [3] | GTS [2] | GTS [1] | GTS [0] | xx  |        |              |  |     |   |     |   |     |  |     |          |     |
| Description                               | <p>The display returns the current scan line, N, used to update the display device. The total number of scan lines on a display device is defined as VSYNC + VBP + VACT + VFP. The first scan line is defined as the first line of V-Sync and is denoted as Line 0.</p> <p>When in Sleep Mode, the value returned by get_scanline is undefined.</p>  |     |     |       |         |         |         |         |         |         |         |         |     |        |              |  |     |   |     |   |     |  |     |          |     |
| Restriction                               | None   |     |     |       |         |         |         |         |         |         |         |         |     |        |              |  |     |   |     |   |     |  |     |          |     |
| 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  |     |     |       |         |         |         |         |         |         |         |         |     |        |              |  |     |   |     |   |     |  |     |          |     |
| Flow Chart                                | <pre> graph TD     A[get_scanline] --&gt; B[Wait 3us]     B --&gt; C[/Dummy Read/]     C --&gt; D[/Send 1st parameter GTS[9:8]/]     D --&gt; E[/Send 2nd parameter GTS[7:0]/]     </pre>  |     |     |       |         |         |         |         |         |         |         |         |     |        |              |  |     |   |     |   |     |  |     |          |     |

**8.2.34. Read\_DDB\_Start (A1h)**

| A1H                                       | Read_DDB_Start   |     |     |       |             |             |             |             |             |             |            |            |     |        |              |  |     |   |     |   |     |  |     |          |     |
|---|--|-----|-----|-------|-------------|-------------|-------------|-------------|-------------|-------------|------------|------------|-----|--------|--------------|--|-----|---|-----|---|-----|--|-----|----------|-----|
|   | D/CX   | RDX | WRX | D17-8 | D7          | D6          | D5          | D4          | D3          | D2          | D1         | D0         | HEX |        |              |  |     |   |     |   |     |  |     |          |     |
| Command                                   | 0  | 1   | ↑   | x     | 1           | 0           | 1           | 0           | 0           | 0           | 0          | 1          | A1  |        |              |  |     |   |     |   |     |  |     |          |     |
| 1 <sup>st</sup> Parameter                 | 1  | ↑   | 1   | x     | x           | x           | x           | x           | x           | x           | x          | x          | x   |        |              |  |     |   |     |   |     |  |     |          |     |
| 2 <sup>nd</sup> Parameter                 | 1  | ↑   | 1   | xx    | ID1<br>[15] | ID1<br>[14] | ID1<br>[13] | ID1<br>[12] | ID1<br>[11] | ID1<br>[10] | ID1<br>[9] | ID1<br>[8] | xx  |        |              |  |     |   |     |   |     |  |     |          |     |
| 3 <sup>rd</sup> Parameter                 | 1  | ↑   | 1   | xx    | ID1<br>[7]  | ID1<br>[6]  | ID1<br>[5]  | ID1<br>[4]  | ID1<br>[3]  | ID1<br>[2]  | ID1<br>[1] | ID1<br>[0] | xx  |        |              |  |     |   |     |   |     |  |     |          |     |
| 4 <sup>th</sup> Parameter                 | 1  | ↑   | 1   | xx    | ID0<br>[15] | ID0<br>[14] | ID0<br>[13] | ID0<br>[12] | ID0<br>[11] | ID0<br>[10] | ID0<br>[9] | ID0<br>[8] | xx  |        |              |  |     |   |     |   |     |  |     |          |     |
| 5 <sup>th</sup> Parameter                 | 1  | ↑   | 1   | xx    | ID0<br>[7]  | ID0<br>[6]  | ID0<br>[5]  | ID0<br>[4]  | ID0<br>[3]  | ID0<br>[2]  | ID0<br>[1] | ID0<br>[0] | xx  |        |              |  |     |   |     |   |     |  |     |          |     |
| 6 <sup>th</sup> Parameter                 | 1  | ↑   | 1   | xx    | 1           | 1           | 1           | 1           | 1           | 1           | 1          | 1          | FF  |        |              |  |     |   |     |   |     |  |     |          |     |
| Description                               | <p>1<sup>st</sup> parameter: Dummy read<br/>           2<sup>nd</sup> parameter: Supplier ID code ID1[15:8]<br/>           3<sup>rd</sup> parameter: Supplier ID code ID1[7:0]<br/>           4<sup>th</sup> parameter: Supplier Elective Data ID21[15:8]<br/>           5<sup>th</sup> parameter: Supplier Elective Data ID2[7:0]<br/>           6<sup>th</sup> Exit code (FFh).</p> <p>When using the external EEPROM (EEPROM=high), the Supplier ID code ID1 and Supplier Elective Data are read back from EEPROM.</p> <p>When using the internal NV memory (EEPROM=Low), the Supplier ID code ID1 and Supplier Elective Data are read back from NV memory.</p> |     |     |       |             |             |             |             |             |             |            |            |     |        |              |  |     |   |     |   |     |  |     |          |     |
| Restriction                               |  |     |     |       |             |             |             |             |             |             |            |            |     |        |              |  |     |   |     |   |     |  |     |          |     |
| 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  |     |     |       |             |             |             |             |             |             |            |            |     |        |              |  |     |   |     |   |     |  |     |          |     |





### 8.2.35. Command Access Protect (B0h)

| B0H                       | Command Access Protect   |                |                 |                      |         |         |    |    |    |    |         |         |     |           |               |  |                      |   |           |   |                |  |         |          |      |     |     |     |     |     |      |     |     |     |     |    |      |     |     |     |    |    |      |     |     |    |    |    |
|---------------------------|--|----------------|-----------------|----------------------|---------|---------|----|----|----|----|---------|---------|-----|-----------|---------------|--|----------------------|---|-----------|---|----------------|--|---------|----------|------|-----|-----|-----|-----|-----|------|-----|-----|-----|-----|----|------|-----|-----|-----|----|----|------|-----|-----|----|----|----|
|                           | D/CX   | RDX            | WRX             | D17-8                | D7      | D6      | D5 | D4 | D3 | D2 | D1      | D0      | HEX |           |               |  |                      |   |           |   |                |  |         |          |      |     |     |     |     |     |      |     |     |     |     |    |      |     |     |     |    |    |      |     |     |    |    |    |
| Command                   | 0  | 1              | ↑               | xx                   | 1       | 0       | 1  | 1  | 0  | 0  | 0       | 0       | B0  |           |               |  |                      |   |           |   |                |  |         |          |      |     |     |     |     |     |      |     |     |     |     |    |      |     |     |     |    |    |      |     |     |    |    |    |
| 1 <sup>st</sup> parameter | 0  | 1              | ↑               | xx                   | 0       | 0       | 0  | 0  | 0  | 0  | MCAP[1] | MCAP[0] | xx  |           |               |  |                      |   |           |   |                |  |         |          |      |     |     |     |     |     |      |     |     |     |     |    |      |     |     |     |    |    |      |     |     |    |    |    |
| Description               | <table border="1"> <thead> <tr> <th rowspan="2">MCAP[1:0]</th> <th>User Command</th> <th>Protect command</th> <th colspan="3">Manufacturer Command</th> </tr> <tr> <th>00h ~ AFh</th> <th>B0h</th> <th>B1h ~ DFh</th> <th>E0h~EFh</th> <th>F0h~FFh</th> </tr> </thead> <tbody> <tr> <td>2'h0</td> <td>Yes</td> <td>Yes</td> <td>Yes</td> <td>Yes</td> <td>Yes</td> </tr> <tr> <td>2'h1</td> <td>Yes</td> <td>Yes</td> <td>Yes</td> <td>Yes</td> <td>No</td> </tr> <tr> <td>2'h2</td> <td>Yes</td> <td>Yes</td> <td>Yes</td> <td>No</td> <td>No</td> </tr> <tr> <td>2'h3</td> <td>Yes</td> <td>Yes</td> <td>No</td> <td>No</td> <td>No</td> </tr> </tbody> </table> |                |                 |                      |         |         |    |    |    |    |         |         |     | MCAP[1:0] | User Command  | Protect command                          | Manufacturer Command |   |           | 00h ~ AFh                                 | B0h            | B1h ~ DFh                                | E0h~EFh | F0h~FFh  | 2'h0 | Yes | Yes | Yes | Yes | Yes | 2'h1 | Yes | Yes | Yes | Yes | No | 2'h2 | Yes | Yes | Yes | No | No | 2'h3 | Yes | Yes | No | No | No |
|                           | MCAP[1:0]  | User Command   | Protect command | Manufacturer Command |         |         |    |    |    |    |         |         |     |           |               |  |                      |   |           |   |                |  |         |          |      |     |     |     |     |     |      |     |     |     |     |    |      |     |     |     |    |    |      |     |     |    |    |    |
|                           |  | 00h ~ AFh      | B0h             | B1h ~ DFh            | E0h~EFh | F0h~FFh |    |    |    |    |         |         |     |           |               |  |                      |   |           |   |                |  |         |          |      |     |     |     |     |     |      |     |     |     |     |    |      |     |     |     |    |    |      |     |     |    |    |    |
|                           | 2'h0   | Yes            | Yes             | Yes                  | Yes     | Yes     |    |    |    |    |         |         |     |           |               |  |                      |   |           |   |                |  |         |          |      |     |     |     |     |     |      |     |     |     |     |    |      |     |     |     |    |    |      |     |     |    |    |    |
|                           | 2'h1   | Yes            | Yes             | Yes                  | Yes     | No      |    |    |    |    |         |         |     |           |               |  |                      |   |           |   |                |  |         |          |      |     |     |     |     |     |      |     |     |     |     |    |      |     |     |     |    |    |      |     |     |    |    |    |
|                           | 2'h2   | Yes            | Yes             | Yes                  | No      | No      |    |    |    |    |         |         |     |           |               |  |                      |   |           |   |                |  |         |          |      |     |     |     |     |     |      |     |     |     |     |    |      |     |     |     |    |    |      |     |     |    |    |    |
| 2'h3                      | Yes  | Yes            | No              | No                   | No      |         |    |    |    |    |         |         |     |           |               |  |                      |   |           |   |                |  |         |          |      |     |     |     |     |     |      |     |     |     |     |    |      |     |     |     |    |    |      |     |     |    |    |    |
| 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>Power On Sequence</td> <td>MCAP[1:0]=2'h0</td> </tr> <tr> <td>SW Reset</td> <td>No change</td> </tr> <tr> <td>HW Reset</td> <td>MCAP[1:0]=2'h0</td> </tr> </tbody> </table>   |                |                 |                      |         |         |    |    |    |    |         |         |     | Status    | Default Value | Power On Sequence                        | MCAP[1:0]=2'h0       | SW Reset                                | No change | HW Reset                                  | MCAP[1:0]=2'h0 |  |         |          |      |     |     |     |     |     |      |     |     |     |     |    |      |     |     |     |    |    |      |     |     |    |    |    |
|                           | Status   | Default Value  |                 |                      |         |         |    |    |    |    |         |         |     |           |               |  |                      |   |           |   |                |  |         |          |      |     |     |     |     |     |      |     |     |     |     |    |      |     |     |     |    |    |      |     |     |    |    |    |
|                           | Power On Sequence  | MCAP[1:0]=2'h0 |                 |                      |         |         |    |    |    |    |         |         |     |           |               |  |                      |   |           |   |                |  |         |          |      |     |     |     |     |     |      |     |     |     |     |    |      |     |     |     |    |    |      |     |     |    |    |    |
|                           | SW Reset   | No change      |                 |                      |         |         |    |    |    |    |         |         |     |           |               |  |                      |   |           |   |                |  |         |          |      |     |     |     |     |     |      |     |     |     |     |    |      |     |     |     |    |    |      |     |     |    |    |    |
| HW Reset                  | MCAP[1:0]=2'h0   |                |                 |                      |         |         |    |    |    |    |         |         |     |           |               |  |                      |   |           |   |                |  |         |          |      |     |     |     |     |     |      |     |     |     |     |    |      |     |     |     |    |    |      |     |     |    |    |    |
| Flow Chart                | <pre> graph TD     A([Sleep Mode]) --&gt; B[Low Power Mode Control]     B --&gt; C[/DSTB=1/]     C --&gt; D([Deepstandby Mode])     </pre>   |                |                 |                      |         |         |    |    |    |    |         |         |     |           |               |  |                      |   |           |   |                |  |         |          |      |     |     |     |     |     |      |     |     |     |     |    |      |     |     |     |    |    |      |     |     |    |    |    |

### 8.2.36. Low Power Mode Control (B1h)

| B1H                                       | Low Power Mode Control   |     |     |       |    |    |    |    |    |    |    |      |     |        |               |  |        |   |           |   |        |  |     |          |     |
|---|--|-----|-----|-------|----|----|----|----|----|----|----|------|-----|--------|---------------|--|--------|---|-----------|---|--------|--|-----|----------|-----|
|   | D/CX   | RDX | WRX | D17-8 | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0   | HEX |        |               |  |        |   |           |   |        |  |     |          |     |
| Command                                   | 0  | 1   | ↑   | xx    | 1  | 0  | 1  | 1  | 0  | 0  | 0  | 1    | B1  |        |               |  |        |   |           |   |        |  |     |          |     |
| 1 <sup>st</sup> parameter                 | 0  | 1   | ↑   | xx    | 0  | 0  | 0  | 0  | 0  | 0  | 0  | DSTB | xx  |        |               |  |        |   |           |   |        |  |     |          |     |
| Description                               | <p>Deep standby mode control.</p> <p>The driver enters the Deep Standby Mode when DSTB=1. Internal logic power supply circuit (VDD) is turned down enabling low power consumption. In the Deep Standby mode, data stored in the Frame Memory and the Instructions are not retained. Rewrite them after the Deep Standby mode is exited.</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>Power On Sequence</td> <td>DSTB=0</td> </tr> <tr> <td>SW Reset</td> <td>No change</td> </tr> <tr> <td>HW Reset</td> <td>DSTB=0</td> </tr> </tbody> </table>   |     |     |       |    |    |    |    |    |    |    |      |     | Status | Default Value | Power On Sequence                        | DSTB=0 | SW Reset                                | No change | HW Reset                                  | DSTB=0 |  |     |          |     |
| Status                                    | Default Value  |     |     |       |    |    |    |    |    |    |    |      |     |        |               |  |        |   |           |   |        |  |     |          |     |
| Power On Sequence                         | DSTB=0   |     |     |       |    |    |    |    |    |    |    |      |     |        |               |  |        |   |           |   |        |  |     |          |     |
| SW Reset                                  | No change  |     |     |       |    |    |    |    |    |    |    |      |     |        |               |  |        |   |           |   |        |  |     |          |     |
| HW Reset                                  | DSTB=0   |     |     |       |    |    |    |    |    |    |    |      |     |        |               |  |        |   |           |   |        |  |     |          |     |
| Flow Chart                                | <pre> graph TD     A([Sleep Mode]) --&gt; B[Low Power Mode Control]     B --&gt; C[/DSTB=1/]     C --&gt; D([Deepstandby Mode])     </pre> <p><b>Legend</b></p> <ul style="list-style-type: none"> <li>Command: Rectangle</li> <li>Parameter: Parallelogram</li> <li>Display: Horizontal Oval</li> <li>Action: Horizontal Arrow</li> <li>Mode: Vertical Oval</li> <li>Sequential transfer: Oval with tail</li> </ul>   |     |     |       |    |    |    |    |    |    |    |      |     |        |               |  |        |   |           |   |        |  |     |          |     |

### 8.2.37. Frame Memory Access and Interface Setting (B3h)

| B3H                       | Frame Memory Access and Interface Setting   |                                  |     |       |    |    |        |        |    |         |         |         |     |          |                 |     |         |     |         |     |         |     |         |        |                    |           |                                  |     |         |     |          |     |          |     |          |     |          |     |          |     |          |     |          |          |  |    |   |    |   |    |  |
|---------------------------|---|----------------------------------|-----|-------|----|----|--------|--------|----|---------|---------|---------|-----|----------|-----------------|-----|---------|-----|---------|-----|---------|-----|---------|--------|--------------------|-----------|----------------------------------|-----|---------|-----|----------|-----|----------|-----|----------|-----|----------|-----|----------|-----|----------|-----|----------|----------|--|----|---|----|---|----|--|
|                           | D/CX  | RDX                              | WRX | D17-8 | D7 | D6 | D5     | D4     | D3 | D2      | D1      | D0      | HEX |          |                 |     |         |     |         |     |         |     |         |        |                    |           |                                  |     |         |     |          |     |          |     |          |     |          |     |          |     |          |     |          |          |  |    |   |    |   |    |  |
| Command                   | 0   | 1                                | ↑   | xx    | 1  | 0  | 1      | 1      | 0  | 0       | 1       | 1       | B3  |          |                 |     |         |     |         |     |         |     |         |        |                    |           |                                  |     |         |     |          |     |          |     |          |     |          |     |          |     |          |     |          |          |  |    |   |    |   |    |  |
| 1 <sup>st</sup> parameter | 0   | 1                                | ↑   | xx    | 0  | 0  | 0      | 0      | 0  | 0       | WEMODE  | 0       | xx  |          |                 |     |         |     |         |     |         |     |         |        |                    |           |                                  |     |         |     |          |     |          |     |          |     |          |     |          |     |          |     |          |          |  |    |   |    |   |    |  |
| 1 <sup>st</sup> parameter | 0   | 1                                | ↑   | xx    | 0  | 0  | 0      | 0      | 0  | TEI[2]  | TEI[10] | TEI[0]  | xx  |          |                 |     |         |     |         |     |         |     |         |        |                    |           |                                  |     |         |     |          |     |          |     |          |     |          |     |          |     |          |     |          |          |  |    |   |    |   |    |  |
| 2 <sup>nd</sup> parameter | 0   | 1                                | ↑   | xx    | 0  | 0  | 0      | 0      | 0  | DENC[2] | DENC[1] | DENC[0] | xx  |          |                 |     |         |     |         |     |         |     |         |        |                    |           |                                  |     |         |     |          |     |          |     |          |     |          |     |          |     |          |     |          |          |  |    |   |    |   |    |  |
| 4 <sup>th</sup> parameter | 0   | 1                                | ↑   | xx    | 0  | 0  | EPF[1] | EPF[0] | 0  | 0       | 0       | DFM     | xx  |          |                 |     |         |     |         |     |         |     |         |        |                    |           |                                  |     |         |     |          |     |          |     |          |     |          |     |          |     |          |     |          |          |  |    |   |    |   |    |  |
| Description               | <p><b>WEMODE:</b> Memory write control</p> <p>WEMODE=0: When the transfer number of data exceeds (EC-SC+1)*(EP-SP+1), the exceeding data will be ignored.</p> <p>WEMODE=1: When the transfer number of data exceeds (EC-SC+1)*(EP-SP+1), the column and page number will be reset, and the exceeding data will be written into the following column and page.</p> <p><b>TEI[2:0]:</b> ILI9481 starts to output TE signal in the output interval set by TEI[2:0] bits.</p> <table border="1"> <thead> <tr> <th>TEI[2:0]</th> <th>Output Interval</th> </tr> </thead> <tbody> <tr> <td>000</td> <td>1 frame</td> </tr> <tr> <td>001</td> <td>2 frame</td> </tr> <tr> <td>011</td> <td>4 frame</td> </tr> <tr> <td>101</td> <td>6 frame</td> </tr> <tr> <td>Others</td> <td>Setting Prohibited</td> </tr> </tbody> </table> <p><b>DENC[2:0]:</b> Set the GRAM write cycle through the RGB interface</p> <table border="1"> <thead> <tr> <th>DENC[2:0]</th> <th>GRAM Write Cycle (Frame periods)</th> </tr> </thead> <tbody> <tr> <td>000</td> <td>1 Frame</td> </tr> <tr> <td>001</td> <td>2 Frames</td> </tr> <tr> <td>010</td> <td>3 Frames</td> </tr> <tr> <td>011</td> <td>4 Frames</td> </tr> <tr> <td>100</td> <td>5 Frames</td> </tr> <tr> <td>101</td> <td>6 Frames</td> </tr> <tr> <td>110</td> <td>7 Frames</td> </tr> <tr> <td>111</td> <td>8 Frames</td> </tr> </tbody> </table> <p><b>DFM:</b> The bit is used to define image data write/read format to the Frame Memory in DBI Type B (16bit bus interface) and DBI Type C serial interface operation.</p> <p><b>EPF[1:0]</b> Set the data format when 16bbp (R,G,B) to 18 bbp (r, g, b) is stored in the internal GRAM.</p> <table border="1"> <thead> <tr> <th>EPF[1:0]</th> <th>Expand 16bbp (R,G,B) to 18 bbp (R, G, B)</th> </tr> </thead> <tbody> <tr> <td>00</td> <td>MSB is inputted to LSB<br/>r[5:0] = {R[4:0], R[4]}<br/>g[5:0] = {G[5:0]}<br/>b[5:0] = {B[4:0], B[4]}</td> </tr> <tr> <td>01</td> <td>"0" is inputted to LSB<br/>r[5:0] = {R[4:0], 0}<br/>g[5:0] = {G[5:0]}<br/>b[5:0] = {B[4:0], 0}</td> </tr> <tr> <td>10</td> <td>"1" is inputted to LSB<br/>r[5:0] = {R[4:0], 1}</td> </tr> </tbody> </table> |                                  |     |       |    |    |        |        |    |         |         |         |     | TEI[2:0] | Output Interval | 000 | 1 frame | 001 | 2 frame | 011 | 4 frame | 101 | 6 frame | Others | Setting Prohibited | DENC[2:0] | GRAM Write Cycle (Frame periods) | 000 | 1 Frame | 001 | 2 Frames | 010 | 3 Frames | 011 | 4 Frames | 100 | 5 Frames | 101 | 6 Frames | 110 | 7 Frames | 111 | 8 Frames | EPF[1:0] | Expand 16bbp (R,G,B) to 18 bbp (R, G, B) | 00 | MSB is inputted to LSB<br>r[5:0] = {R[4:0], R[4]}<br>g[5:0] = {G[5:0]}<br>b[5:0] = {B[4:0], B[4]} | 01 | "0" is inputted to LSB<br>r[5:0] = {R[4:0], 0}<br>g[5:0] = {G[5:0]}<br>b[5:0] = {B[4:0], 0} | 10 | "1" is inputted to LSB<br>r[5:0] = {R[4:0], 1} |
|                           | TEI[2:0]  | Output Interval                  |     |       |    |    |        |        |    |         |         |         |     |          |                 |     |         |     |         |     |         |     |         |        |                    |           |                                  |     |         |     |          |     |          |     |          |     |          |     |          |     |          |     |          |          |  |    |   |    |   |    |  |
|                           | 000   | 1 frame                          |     |       |    |    |        |        |    |         |         |         |     |          |                 |     |         |     |         |     |         |     |         |        |                    |           |                                  |     |         |     |          |     |          |     |          |     |          |     |          |     |          |     |          |          |  |    |   |    |   |    |  |
|                           | 001   | 2 frame                          |     |       |    |    |        |        |    |         |         |         |     |          |                 |     |         |     |         |     |         |     |         |        |                    |           |                                  |     |         |     |          |     |          |     |          |     |          |     |          |     |          |     |          |          |  |    |   |    |   |    |  |
|                           | 011   | 4 frame                          |     |       |    |    |        |        |    |         |         |         |     |          |                 |     |         |     |         |     |         |     |         |        |                    |           |                                  |     |         |     |          |     |          |     |          |     |          |     |          |     |          |     |          |          |  |    |   |    |   |    |  |
|                           | 101   | 6 frame                          |     |       |    |    |        |        |    |         |         |         |     |          |                 |     |         |     |         |     |         |     |         |        |                    |           |                                  |     |         |     |          |     |          |     |          |     |          |     |          |     |          |     |          |          |  |    |   |    |   |    |  |
|                           | Others  | Setting Prohibited               |     |       |    |    |        |        |    |         |         |         |     |          |                 |     |         |     |         |     |         |     |         |        |                    |           |                                  |     |         |     |          |     |          |     |          |     |          |     |          |     |          |     |          |          |  |    |   |    |   |    |  |
|                           | DENC[2:0]   | GRAM Write Cycle (Frame periods) |     |       |    |    |        |        |    |         |         |         |     |          |                 |     |         |     |         |     |         |     |         |        |                    |           |                                  |     |         |     |          |     |          |     |          |     |          |     |          |     |          |     |          |          |  |    |   |    |   |    |  |
|                           | 000   | 1 Frame                          |     |       |    |    |        |        |    |         |         |         |     |          |                 |     |         |     |         |     |         |     |         |        |                    |           |                                  |     |         |     |          |     |          |     |          |     |          |     |          |     |          |     |          |          |  |    |   |    |   |    |  |
|                           | 001   | 2 Frames                         |     |       |    |    |        |        |    |         |         |         |     |          |                 |     |         |     |         |     |         |     |         |        |                    |           |                                  |     |         |     |          |     |          |     |          |     |          |     |          |     |          |     |          |          |  |    |   |    |   |    |  |
| 010                       | 3 Frames  |                                  |     |       |    |    |        |        |    |         |         |         |     |          |                 |     |         |     |         |     |         |     |         |        |                    |           |                                  |     |         |     |          |     |          |     |          |     |          |     |          |     |          |     |          |          |  |    |   |    |   |    |  |
| 011                       | 4 Frames  |                                  |     |       |    |    |        |        |    |         |         |         |     |          |                 |     |         |     |         |     |         |     |         |        |                    |           |                                  |     |         |     |          |     |          |     |          |     |          |     |          |     |          |     |          |          |  |    |   |    |   |    |  |
| 100                       | 5 Frames  |                                  |     |       |    |    |        |        |    |         |         |         |     |          |                 |     |         |     |         |     |         |     |         |        |                    |           |                                  |     |         |     |          |     |          |     |          |     |          |     |          |     |          |     |          |          |  |    |   |    |   |    |  |
| 101                       | 6 Frames  |                                  |     |       |    |    |        |        |    |         |         |         |     |          |                 |     |         |     |         |     |         |     |         |        |                    |           |                                  |     |         |     |          |     |          |     |          |     |          |     |          |     |          |     |          |          |  |    |   |    |   |    |  |
| 110                       | 7 Frames  |                                  |     |       |    |    |        |        |    |         |         |         |     |          |                 |     |         |     |         |     |         |     |         |        |                    |           |                                  |     |         |     |          |     |          |     |          |     |          |     |          |     |          |     |          |          |  |    |   |    |   |    |  |
| 111                       | 8 Frames  |                                  |     |       |    |    |        |        |    |         |         |         |     |          |                 |     |         |     |         |     |         |     |         |        |                    |           |                                  |     |         |     |          |     |          |     |          |     |          |     |          |     |          |     |          |          |  |    |   |    |   |    |  |
| EPF[1:0]                  | Expand 16bbp (R,G,B) to 18 bbp (R, G, B)  |                                  |     |       |    |    |        |        |    |         |         |         |     |          |                 |     |         |     |         |     |         |     |         |        |                    |           |                                  |     |         |     |          |     |          |     |          |     |          |     |          |     |          |     |          |          |  |    |   |    |   |    |  |
| 00                        | MSB is inputted to LSB<br>r[5:0] = {R[4:0], R[4]}<br>g[5:0] = {G[5:0]}<br>b[5:0] = {B[4:0], B[4]}   |                                  |     |       |    |    |        |        |    |         |         |         |     |          |                 |     |         |     |         |     |         |     |         |        |                    |           |                                  |     |         |     |          |     |          |     |          |     |          |     |          |     |          |     |          |          |  |    |   |    |   |    |  |
| 01                        | "0" is inputted to LSB<br>r[5:0] = {R[4:0], 0}<br>g[5:0] = {G[5:0]}<br>b[5:0] = {B[4:0], 0}   |                                  |     |       |    |    |        |        |    |         |         |         |     |          |                 |     |         |     |         |     |         |     |         |        |                    |           |                                  |     |         |     |          |     |          |     |          |     |          |     |          |     |          |     |          |          |  |    |   |    |   |    |  |
| 10                        | "1" is inputted to LSB<br>r[5:0] = {R[4:0], 1}  |                                  |     |       |    |    |        |        |    |         |         |         |     |          |                 |     |         |     |         |     |         |     |         |        |                    |           |                                  |     |         |     |          |     |          |     |          |     |          |     |          |     |          |     |          |          |  |    |   |    |   |    |  |

|   |  | <p>g[5:0] = {G[5:0]}<br/>b[5:0] = {B[4:0], 1}</p> <p>Exception:<br/>R[4:0], B[4:0]=5'h00 → r[5:0], b[5:0] = 6'h00</p> |        |               |  |  |   |           |   |   |  |     |          |     |
|---|--|---|--------|---------------|--|--|---|-----------|---|---|--|-----|----------|-----|
|   | 11   | Setting disabled  |        |               |  |  |   |           |   |   |  |     |          |     |
| 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>Power On Sequence</td> <td>WEMODE=0, TEI[2:0]=3'h0, DENC[2:0]=3'h0, DFM=1'h0, EPF[1:0]=2'h0</td> </tr> <tr> <td>SW Reset</td> <td>No change</td> </tr> <tr> <td>HW Reset</td> <td>WEMODE:=0, TEI[2:0]=3'h0, DENC[2:0]=3'h0, DFM=1'h0, EPF[1:0]=2'h0</td> </tr> </tbody> </table>  |   | Status | Default Value | Power On Sequence                        | WEMODE=0, TEI[2:0]=3'h0, DENC[2:0]=3'h0, DFM=1'h0, EPF[1:0]=2'h0 | SW Reset                                | No change | HW Reset                                  | WEMODE:=0, TEI[2:0]=3'h0, DENC[2:0]=3'h0, DFM=1'h0, EPF[1:0]=2'h0 |  |     |          |     |
| Status                                    | Default Value  |   |        |               |  |  |   |           |   |   |  |     |          |     |
| Power On Sequence                         | WEMODE=0, TEI[2:0]=3'h0, DENC[2:0]=3'h0, DFM=1'h0, EPF[1:0]=2'h0   |   |        |               |  |  |   |           |   |   |  |     |          |     |
| SW Reset                                  | No change  |   |        |               |  |  |   |           |   |   |  |     |          |     |
| HW Reset                                  | WEMODE:=0, TEI[2:0]=3'h0, DENC[2:0]=3'h0, DFM=1'h0, EPF[1:0]=2'h0  |   |        |               |  |  |   |           |   |   |  |     |          |     |

### 8.2.38. Display Mode and Frame Memory Write Mode Setting (B4h)

| B4H   | Display Mode and Frame Memory Write Mode Setting  |                              |                                      |       |    |    |    |    |    |    |    |    |               |                |  |                                  |   |                          |   |                                      |  |                   |                           |                           |   |               |                              |                           |
|---|---|------------------------------|--------------------------------------|-------|----|----|----|----|----|----|----|----|---------------|----------------|--|----------------------------------|---|--------------------------|---|--------------------------------------|--|-------------------|---------------------------|---------------------------|---|---------------|------------------------------|---------------------------|
|   | D/CX  | RDX                          | WRX                                  | D17-8 | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | HEX           |                |  |                                  |   |                          |   |                                      |  |                   |                           |                           |   |               |                              |                           |
| Command   | 0   | 1                            | ↑                                    | xx    | 1  | 0  | 1  | 1  | 0  | 1  | 0  | 0  | B4            |                |  |                                  |   |                          |   |                                      |  |                   |                           |                           |   |               |                              |                           |
| 1 <sup>st</sup> parameter   | 0   | 1                            | ↑                                    | xx    | 0  | 0  | 0  | RM | 0  | 0  | 0  | DM | xx            |                |  |                                  |   |                          |   |                                      |  |                   |                           |                           |   |               |                              |                           |
| Description   | <p><b>DM</b> Select the display operation mode.</p> <table border="1"> <thead> <tr> <th>DM0</th> <th>Display Interface</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>Internal system clock</td> </tr> <tr> <td>1</td> <td>DPI (RGB) interface</td> </tr> </tbody> </table> <p>The DM[1:0] setting allows switching between internal clock operation mode and external display interface operation mode.</p> <p><b>RM</b> Select the interface to access the GRAM.</p> <p>Set RM to "1" when writing display data by the RGB interface.</p> <table border="1"> <thead> <tr> <th>RM</th> <th>Interface for RAM Access</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>DBI Interface (CPU)</td> </tr> <tr> <td>1</td> <td>DPI Interface (RGB)</td> </tr> </tbody> </table> |                              |                                      |       |    |    |    |    |    |    |    |    |               | DM0            | Display Interface                        | 0                                | Internal system clock                   | 1                        | DPI (RGB) interface                       | RM                                   | Interface for RAM Access                 | 0                 | DBI Interface (CPU)       | 1                         | DPI Interface (RGB)   |               |                              |                           |
|   | DM0   | Display Interface            |                                      |       |    |    |    |    |    |    |    |    |               |                |  |                                  |   |                          |   |                                      |  |                   |                           |                           |   |               |                              |                           |
| 0   | Internal system clock   |                              |                                      |       |    |    |    |    |    |    |    |    |               |                |  |                                  |   |                          |   |                                      |  |                   |                           |                           |   |               |                              |                           |
| 1   | DPI (RGB) interface   |                              |                                      |       |    |    |    |    |    |    |    |    |               |                |  |                                  |   |                          |   |                                      |  |                   |                           |                           |   |               |                              |                           |
| RM  | Interface for RAM Access  |                              |                                      |       |    |    |    |    |    |    |    |    |               |                |  |                                  |   |                          |   |                                      |  |                   |                           |                           |   |               |                              |                           |
| 0   | DBI Interface (CPU)   |                              |                                      |       |    |    |    |    |    |    |    |    |               |                |  |                                  |   |                          |   |                                      |  |                   |                           |                           |   |               |                              |                           |
| 1   | DPI Interface (RGB)   |                              |                                      |       |    |    |    |    |    |    |    |    |               |                |  |                                  |   |                          |   |                                      |  |                   |                           |                           |   |               |                              |                           |
| <table border="1"> <thead> <tr> <th>Display State</th> <th>Operation Mode</th> <th>RAM Access (RM)</th> <th>Display Operation Mode (DM[1:0])</th> </tr> </thead> <tbody> <tr> <td>Still pictures</td> <td>Internal clock operation</td> <td>System interface<br/>(RM = 0)</td> <td>Internal clock operation<br/>(DM = 0)</td> </tr> <tr> <td>Moving pictures</td> <td>RGB interface (1)</td> <td>RGB interface<br/>(RM = 1)</td> <td>RGB interface<br/>(DM = 1)</td> </tr> <tr> <td>Rewrite still picture area while<br/>Displaying moving pictures.</td> <td>RGB interface</td> <td>System interface<br/>(RM = 0)</td> <td>RGB interface<br/>(DM = 1)</td> </tr> </tbody> </table> <p><i>Note 1: Registers are set only via the system interface or SPI interface.</i></p> <p><i>Note 2: Refer to the flowcharts of "RGB Input Interface" section for the mode switch.</i></p> |   |                              |                                      |       |    |    |    |    |    |    |    |    | Display State | Operation Mode | RAM Access (RM)                          | Display Operation Mode (DM[1:0]) | Still pictures                          | Internal clock operation | System interface<br>(RM = 0)              | Internal clock operation<br>(DM = 0) | Moving pictures                          | RGB interface (1) | RGB interface<br>(RM = 1) | RGB interface<br>(DM = 1) | Rewrite still picture area while<br>Displaying moving pictures. | RGB interface | System interface<br>(RM = 0) | RGB interface<br>(DM = 1) |
| Display State   | Operation Mode  | RAM Access (RM)              | Display Operation Mode (DM[1:0])     |       |    |    |    |    |    |    |    |    |               |                |  |                                  |   |                          |   |                                      |  |                   |                           |                           |   |               |                              |                           |
| Still pictures  | Internal clock operation  | System interface<br>(RM = 0) | Internal clock operation<br>(DM = 0) |       |    |    |    |    |    |    |    |    |               |                |  |                                  |   |                          |   |                                      |  |                   |                           |                           |   |               |                              |                           |
| Moving pictures   | RGB interface (1)   | RGB interface<br>(RM = 1)    | RGB interface<br>(DM = 1)            |       |    |    |    |    |    |    |    |    |               |                |  |                                  |   |                          |   |                                      |  |                   |                           |                           |   |               |                              |                           |
| Rewrite still picture area while<br>Displaying moving pictures.   | RGB interface   | System interface<br>(RM = 0) | RGB interface<br>(DM = 1)            |       |    |    |    |    |    |    |    |    |               |                |  |                                  |   |                          |   |                                      |  |                   |                           |                           |   |               |                              |                           |
| 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>Power On Sequence</td> <td>DM=0, RM=0</td> </tr> <tr> <td>SW Reset</td> <td>No change</td> </tr> <tr> <td>HW Reset</td> <td>DM=0, RM=0</td> </tr> </tbody> </table>  |                              |                                      |       |    |    |    |    |    |    |    |    | Status        | Default Value  | Power On Sequence                        | DM=0, RM=0                       | SW Reset                                | No change                | HW Reset                                  | DM=0, RM=0                           |  |                   |                           |                           |   |               |                              |                           |
| Status  | Default Value   |                              |                                      |       |    |    |    |    |    |    |    |    |               |                |  |                                  |   |                          |   |                                      |  |                   |                           |                           |   |               |                              |                           |
| Power On Sequence   | DM=0, RM=0  |                              |                                      |       |    |    |    |    |    |    |    |    |               |                |  |                                  |   |                          |   |                                      |  |                   |                           |                           |   |               |                              |                           |
| SW Reset  | No change   |                              |                                      |       |    |    |    |    |    |    |    |    |               |                |  |                                  |   |                          |   |                                      |  |                   |                           |                           |   |               |                              |                           |
| HW Reset  | DM=0, RM=0  |                              |                                      |       |    |    |    |    |    |    |    |    |               |                |  |                                  |   |                          |   |                                      |  |                   |                           |                           |   |               |                              |                           |

**8.2.39. Device Code Read (BFh)**

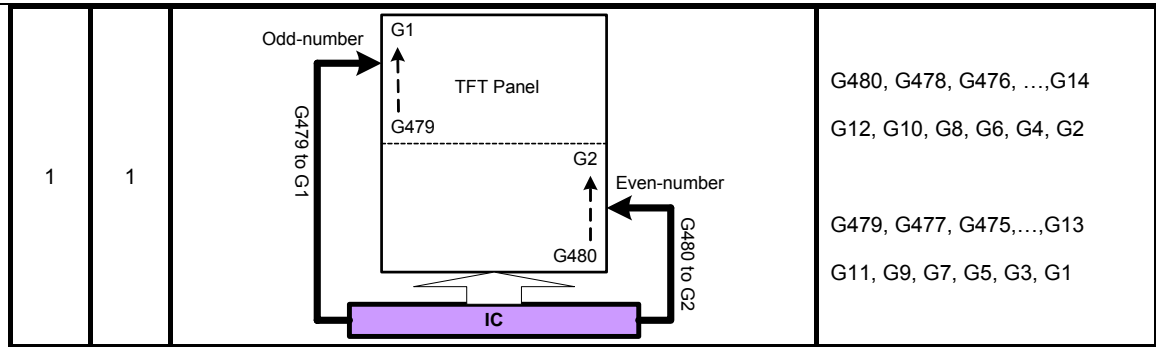
| BFH                                       | Device Code Read   |     |     |       |    |    |    |    |    |    |    |    |     |        |               |  |     |   |           |   |     |  |     |          |     |
|---|--|-----|-----|-------|----|----|----|----|----|----|----|----|-----|--------|---------------|--|-----|---|-----------|---|-----|--|-----|----------|-----|
|   | D/CX   | RDX | WRX | D17-8 | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | HEX |        |               |  |     |   |           |   |     |  |     |          |     |
| Command                                   | 0  | 1   | ↑   | xx    | 1  | 0  | 1  | 1  | 1  | 1  | 1  | 1  | BF  |        |               |  |     |   |           |   |     |  |     |          |     |
| 1 <sup>st</sup> parameter                 | 0  | ↑   | 1   | x     | x  | x  | x  | x  | x  | x  | x  | x  | x   |        |               |  |     |   |           |   |     |  |     |          |     |
| 2 <sup>nd</sup> parameter                 | 0  | ↑   | 1   | xx    | 0  | 0  | 0  | 0  | 0  | 0  | 1  | 0  | 02  |        |               |  |     |   |           |   |     |  |     |          |     |
| 3 <sup>rd</sup> parameter                 | 0  | ↑   | 1   | xx    | 0  | 0  | 0  | 0  | 0  | 1  | 0  | 0  | 04  |        |               |  |     |   |           |   |     |  |     |          |     |
| 4 <sup>th</sup> parameter                 | 0  | ↑   | 1   | xx    | 1  | 0  | 0  | 1  | 0  | 1  | 0  | 0  | 94  |        |               |  |     |   |           |   |     |  |     |          |     |
| 5 <sup>th</sup> parameter                 | 0  | ↑   | 1   | xx    | 1  | 0  | 0  | 0  | 0  | 0  | 0  | 1  | 81  |        |               |  |     |   |           |   |     |  |     |          |     |
| 6 <sup>th</sup> parameter                 | 0  | ↑   | 1   | xx    | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | FF  |        |               |  |     |   |           |   |     |  |     |          |     |
| Description                               | 1 <sup>st</sup> parameter : dummy read<br>2 <sup>nd</sup> parameter : MIPI Alliance code<br>3 <sup>rd</sup> parameter : MIPI Alliance code<br>4 <sup>th</sup> parameter : Device ID code of ILI9481<br>5 <sup>th</sup> parameter : Device ID code of ILI9481<br>6 <sup>th</sup> parameter : Exit code (FFh)  |     |     |       |    |    |    |    |    |    |    |    |     |        |               |  |     |   |           |   |     |  |     |          |     |
| 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>Power On Sequence</td> <td></td> </tr> <tr> <td>SW Reset</td> <td>No change</td> </tr> <tr> <td>HW Reset</td> <td></td> </tr> </tbody> </table>   |     |     |       |    |    |    |    |    |    |    |    |     | Status | Default Value | Power On Sequence                        |     | SW Reset                                | No change | HW Reset                                  |     |  |     |          |     |
| Status                                    | Default Value  |     |     |       |    |    |    |    |    |    |    |    |     |        |               |  |     |   |           |   |     |  |     |          |     |
| Power On Sequence                         |  |     |     |       |    |    |    |    |    |    |    |    |     |        |               |  |     |   |           |   |     |  |     |          |     |
| SW Reset                                  | No change  |     |     |       |    |    |    |    |    |    |    |    |     |        |               |  |     |   |           |   |     |  |     |          |     |
| HW Reset                                  |  |     |     |       |    |    |    |    |    |    |    |    |     |        |               |  |     |   |           |   |     |  |     |          |     |

**8.2.40. Panel Driving Setting (C0h)**

| C0H                       | Panel Driving Setting |     |     |       |    |            |            |            |            |            |            |            |     |
|---------------------------|-----------------------|-----|-----|-------|----|------------|------------|------------|------------|------------|------------|------------|-----|
|                           | D/CX                  | RDX | WRX | D17-8 | D7 | D6         | D5         | D4         | D3         | D2         | D1         | D0         | HEX |
| Command                   | 0                     | 1   | ↑   | x     | 1  | 1          | 0          | 0          | 0          | 0          | 0          | 0          | C0  |
| 1 <sup>st</sup> Parameter | 1                     | 1   | ↑   | 0     | 0  | 0          | 0          | REV        | SM         | 0          | 0          | 0          | x   |
| 2 <sup>nd</sup> Parameter | 1                     | 1   | ↑   | 0     | 0  | NL<br>[6]  | NL<br>[5]  | NL<br>[4]  | NL<br>[3]  | NL<br>[2]  | NL<br>[1]  | NL<br>[0]  | xx  |
| 3 <sup>rd</sup> Parameter | 1                     | 1   | ↑   | 0     | 0  | SCN<br>[6] | SCN<br>[5] | SCN<br>[4] | SCN<br>[3] | SCN<br>[2] | SCN<br>[1] | SCN<br>[0] | xxx |
| 4 <sup>th</sup> Parameter | 1                     | 1   | ↑   | 0     | 0  | 0          | 0          | 0          | 0          | 0          | 0          | PTV        | xxx |
| 5 <sup>th</sup> Parameter | 1                     | 1   | ↑   | 0     | 0  | 0          | 0          | NDL        | 0          | PTS<br>[2] | PTS<br>[1] | PTS<br>[0] | xxx |
| 6 <sup>th</sup> Parameter | 1                     | 1   | ↑   | 0     | 0  | 0          | 0          | PTG        | ISC<br>[3] | ISC<br>[2] | ISC<br>[1] | ISC<br>[0] | xxx |

**SM:** Sets the gate driver pin arrangement in combination with the GS bit to select the optimal scan mode for the module.

| Description | SM | GS | Scan Direction | Gate Output Sequence   |
|-------------|----|----|----------------|--|
|             | 0  | 0  |                | G1, G2, G3, G4, ..., G476<br>G477, G478, G479, G480  |
|             | 0  | 1  |                | G480, G479, G478, ..., G9<br>G7, G5, G4, G3, G2, G1  |
|             | 1  | 0  |                | G1, G3, G5, G7, ..., G471<br>G473, G475, G477, G479<br>G2, G4, G6, G8, ..., G472<br>G474, G476, G478, G480 |



G480, G478, G476, ..., G14  
G12, G10, G8, G6, G4, G2  
G479, G477, G475, ..., G13  
G11, G9, G7, G5, G3, G1

**REV:** Enables the grayscale inversion of the image by setting REV=1.

| REV | GRAM Data | Source Output in Display Area |                   |
|-----|-----------|-------------------------------|-------------------|
|     |           | Positive polarity             | negative polarity |
| 0   | 18'h00000 | V63                           | V0                |
|     | :         | :                             | :                 |
|     | 18'h3FFFF | V0                            | V63               |
| 1   | 18'h00000 | V0                            | V63               |
|     | :         | :                             | :                 |
|     | 18'h3FFFF | V63                           | V0                |

**NL[6:0]:** Sets the number of lines to drive the LCD at an interval of 8 lines. The GRAM address mapping is not affected by the number of lines set by NL[6:0]. The number of lines must be the same or more than the number of lines necessary for the size of the liquid crystal panel.

| NL[6:0]       | LCD Drive Line        |
|---------------|-----------------------|
| 7'h00 ~ 7'h3B | 8 * (NL[6:0]+1) lines |
| Others        | Setting inhibited     |

| SCN[6:0]  | Scanning Start Position |                       |                         |                             |
|-----------|-------------------------|-----------------------|-------------------------|-----------------------------|
|           | SM=0                    |                       | SM=1                    |                             |
|           | GS=0                    | GS=1                  | GS=0                    | GS=1                        |
| 00h ~ 3Bh | $G[1+SCN[6:0]*4]$       | $G[480 - SCN[6:0]*4]$ | $G[1+SCN[6:0]*8]$       | $G[480 - SCN[6:0]*8]$       |
| 3Ch ~ 77h | $G[1+SCN[6:0]*4]$       | $G[480 - SCN[6:0]*4]$ | $G[2+(SCN[6:0]-3Ch)*8]$ | $G[479 - (SCN[6:0]-3Ch)*8]$ |
| Others    | Setting disabled        | Setting disabled      | Setting disabled        | Setting disabled            |

**PTV:** Sets the Vcom output in non-display area drive period.

| PTV | Vcom operation in non-display drive period |
|-----|--|
| 0   | Normal Operation                           |
| 1   | Halts VCOM Operation                       |

**NDL:** Sets the source output level in non-display area. Settings are different to normally black panels and normally white panels.

| NDL | Non-display Area |          |
|-----|------------------|----------|
|     | Positive         | Negative |
| 0   | V63              | V0       |
| 1   | V0               | V63      |

**PTG:** Sets the scan mode in non-display area. Select frame-inversion AC drive when interval-scan is selected.

| PTG | Scan Mode in non-display area |
|-----|-------------------------------|
| 0   | Normal Scan                   |



1 Interval Scan

**ICS[3:0]:** Set the scan cycle when PTG selects interval scan in non-display area drive period. The scan cycle is defined by n frame periods, where n is an odd number from 3 to 31. The polarity of liquid crystal drive voltage from the gate driver is inverted in the same timing as the interval scan cycle.

| ICS[3:0] | Scan cycle        | (f <sub>FRAME</sub> )=60Hz |
|----------|-------------------|----------------------------|
| 4'h0     | Setting inhibited | –                          |
| 4'h1     | 3 frames          | 50ms                       |
| 4'h2     | 5 frames          | 84ms                       |
| 4'h3     | 7 frames          | 117ms                      |
| 4'h4     | 9 frames          | 150ms                      |
| 4'h5     | 11 frames         | 184ms                      |
| 4'h6     | 13 frames         | 217ms                      |
| 4'h7     | 15 frames         | 251ms                      |
| 4'h8     | 17 frames         | 284ms                      |
| 4'h9     | 19 frames         | 317ms                      |
| 4'hA     | 21 frames         | 351ms                      |
| 4'hB     | 23 frames         | 384ms                      |
| 4'hC     | 25 frames         | 418ms                      |
| 4'hD     | 27 frames         | 451ms                      |
| 4'hE     | 29 frames         | 484ms                      |
| 4'hF     | 31 frames         | 518ms                      |

**PTS[2:0]:**

Set the source output level in non-display area drive period (front/back porch period and blank area between partial displays).

When PTS[2] = 1, the operation of amplifiers which generates the grayscales other than V0 and V63 are halted and the step-up clock frequency becomes half the normal frequency in non-display drive period in order to reduce power consumption.

| PTS[2:0] | Source output level |                    | Grayscale amplifier in operation | Step-up clock frequency           |
|----------|---------------------|--------------------|----------------------------------|-----------------------------------|
|          | Positive polarity   | Negative polarity  |                                  |                                   |
| 000      | V63                 | V0                 | V63 to V0                        | Register Setting(DC1, DC0)        |
| 001      | Setting Prohibited  | Setting Prohibited | -                                | -                                 |
| 010      | GND                 | GND                | V63 to V0                        | Register Setting(DC1, DC0)        |
| 011      | Hi-Z                | Hi-Z               | V63 to V0                        | Register Setting(DC1, DC0)        |
| 100      | V63                 | V0                 | V63 and V0                       | 1/2 frequency setting by DC1, DC0 |
| 101      | Setting Prohibited  | Setting Prohibited | -                                | -                                 |
| 110      | GND                 | GND                | V63 and V0                       | 1/2 frequency setting by DC1, DC0 |
| 111      | Hi-Z                | Hi-Z               | V63 and V0                       | 1/2 frequency setting by DC1, DC0 |

Notes: 1. The power efficiency can be improved by halting grayscale amplifiers and slowing down the step-up clock frequency only in non-display drive period.

2. The gate output level in non-lit display area drive period is determined by PTG[1:0].

Restriction

| 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>Power On Sequence</td> <td>SM=0, REV=0, NL[6:0]=7'h3B, PTV=0, NDL=0, PTG=0, ISC[3:0]=4'h1, PTS[2:0]=3'h0</td> </tr> <tr> <td>SW Reset</td> <td>No change</td> </tr> <tr> <td>HW Reset</td> <td>SM=0, REV=0, NL[6:0]=7'h3B, PTV=0, BLS=0, PTG=0, ISC[3:0]=4'h1, PTS[2:0]=3'h0</td> </tr> </tbody> </table>   | Status | Default Value | Power On Sequence                        | SM=0, REV=0, NL[6:0]=7'h3B, PTV=0, NDL=0, PTG=0, ISC[3:0]=4'h1, PTS[2:0]=3'h0 | SW Reset                                | No change | HW Reset                                  | SM=0, REV=0, NL[6:0]=7'h3B, PTV=0, BLS=0, PTG=0, ISC[3:0]=4'h1, PTS[2:0]=3'h0 |  |     |          |     |
| Status                                    | Default Value  |        |               |  |   |   |           |   |   |  |     |          |     |
| Power On Sequence                         | SM=0, REV=0, NL[6:0]=7'h3B, PTV=0, NDL=0, PTG=0, ISC[3:0]=4'h1, PTS[2:0]=3'h0  |        |               |  |   |   |           |   |   |  |     |          |     |
| SW Reset                                  | No change  |        |               |  |   |   |           |   |   |  |     |          |     |
| HW Reset                                  | SM=0, REV=0, NL[6:0]=7'h3B, PTV=0, BLS=0, PTG=0, ISC[3:0]=4'h1, PTS[2:0]=3'h0  |        |               |  |   |   |           |   |   |  |     |          |     |

### 8.2.41. Display\_Timing\_Setting for Normal Mode (C1h)

| C1H                       | Display_Timing_Setting for Normal Mode |     |     |       |        |        |        |         |         |         |         |         |     |
|---------------------------|--|-----|-----|-------|--------|--------|--------|---------|---------|---------|---------|---------|-----|
|                           | D/CX                                   | RDX | WRX | D17-8 | D7     | D6     | D5     | D4      | D3      | D2      | D1      | D0      | HEX |
| Command                   | 0                                      | 1   | ↑   | x     | 1      | 1      | 0      | 0       | 0       | 0       | 0       | 1       | C1  |
| 1 <sup>st</sup> Parameter | 1                                      | 1   | ↑   | 0     | 0      | 0      | 0      | BC0     | 0       | 0       | DIV0[1] | DIV0[0] | x   |
| 2 <sup>nd</sup> Parameter | 1                                      | 1   | ↑   | 0     | 0      | 0      | 0      | RTN0[4] | RTN0[3] | RTN0[2] | RTN0[1] | RTN0[0] | xx  |
| 3 <sup>rd</sup> Parameter | 1                                      | 1   | ↑   | 0     | FP0[3] | FP0[2] | FP0[1] | FP0[0]  | BP0[3]  | BP0[2]  | BP0[1]  | BP0[0]  | xxx |

| Description | <p><b>BC0:</b> BC0 is used to select VCOM liquid crystal drive waveform.</p> <p>BC0 = 0: Frame inversion waveform is selected.</p> <p>BC0 = 1: Line inversion waveform is selected.</p> <p><b>DIV0[1:0]:</b> DIV0[1:0] is used to set division ratio of internal clock frequency.</p> <p>The internal operation is synchronized with the frequency divided internal clock. When DIV0 setting is changed, the width of the reference clock for liquid crystal control signals is changed.</p> <p>The frame frequency can be adjusted by register setting (RTN and DIV bits). When number of lines to drive is changed, adjust the frame frequency too.</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>DIV0[1:0]</th> <th>Division Ratio</th> </tr> </thead> <tbody> <tr> <td>2'h0</td> <td>1/1</td> </tr> <tr> <td>2'h1</td> <td>1/2</td> </tr> <tr> <td>2'h2</td> <td>1/4</td> </tr> <tr> <td>2'h3</td> <td>1/8</td> </tr> </tbody> </table> <p>Frame Frequency = <math>f_{osc} / [\text{Clocks per line} \times \text{division ratio} \times (\text{Line} + \text{BP} + \text{FP})]</math></p> <p><math>f_{osc}</math> : internal oscillator frequency</p> <p>clocks per line : RTNn setting</p> <p>division ratio: DIVn setting</p> <p>Line: total driving line number</p> <p>BP: back porch line number</p> <p>FP: front porch line number</p> <p><b>RTN0[4:0]:</b> RTN0[4:0] is used to set 1H (line) period.</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>RTN[4:0]</th> <th>Clocks per line</th> <th>RTN[4:0]</th> <th>Clocks per line</th> <th>RTN[4:0]</th> <th>Clocks per line</th> </tr> </thead> <tbody> <tr> <td>5'h00~0F</td> <td>Setting prohibited</td> <td>5'h15</td> <td>21 clocks</td> <td>5'h1B</td> <td>27 clocks</td> </tr> <tr> <td>5'h10</td> <td>16 clocks</td> <td>5'h16</td> <td>22 clocks</td> <td>5'h1C</td> <td>28 clocks</td> </tr> <tr> <td>5'h11</td> <td>17 clocks</td> <td>5'h17</td> <td>23 clocks</td> <td>5'h1D</td> <td>29 clocks</td> </tr> <tr> <td>5'h12</td> <td>18 clocks</td> <td>5'h18</td> <td>24 clocks</td> <td>5'h1E</td> <td>30 clocks</td> </tr> <tr> <td>5'h13</td> <td>19 clocks</td> <td>5'h19</td> <td>25 clocks</td> <td>5'h1F</td> <td>31 clocks</td> </tr> <tr> <td>5'h14</td> <td>20 clocks</td> <td>5'h1A</td> <td>26 clocks</td> <td></td> <td></td> </tr> </tbody> </table> <p><b>FP0[3:0], BP0[3:0]</b></p> <p><b>FP0[3:0]</b> is used to set the number of lines for a front porch period (a blank period following the end of display).</p> <p><b>BP0[3:0]</b> is used to set the number of lines for a back porch period (a blank period made before the beginning of</p> |                |                 |          |                 |  |  |  |  |  |  |  |  | DIV0[1:0] | Division Ratio | 2'h0 | 1/1 | 2'h1 | 1/2 | 2'h2 | 1/4 | 2'h3 | 1/8 | RTN[4:0] | Clocks per line | RTN[4:0] | Clocks per line | RTN[4:0] | Clocks per line | 5'h00~0F | Setting prohibited | 5'h15 | 21 clocks | 5'h1B | 27 clocks | 5'h10 | 16 clocks | 5'h16 | 22 clocks | 5'h1C | 28 clocks | 5'h11 | 17 clocks | 5'h17 | 23 clocks | 5'h1D | 29 clocks | 5'h12 | 18 clocks | 5'h18 | 24 clocks | 5'h1E | 30 clocks | 5'h13 | 19 clocks | 5'h19 | 25 clocks | 5'h1F | 31 clocks | 5'h14 | 20 clocks | 5'h1A | 26 clocks |  |  |
|-------------|--|----------------|-----------------|----------|-----------------|--|--|--|--|--|--|--|--|-----------|----------------|------|-----|------|-----|------|-----|------|-----|----------|-----------------|----------|-----------------|----------|-----------------|----------|--------------------|-------|-----------|-------|-----------|-------|-----------|-------|-----------|-------|-----------|-------|-----------|-------|-----------|-------|-----------|-------|-----------|-------|-----------|-------|-----------|-------|-----------|-------|-----------|-------|-----------|-------|-----------|-------|-----------|--|--|
|             | DIV0[1:0]  | Division Ratio |                 |          |                 |  |  |  |  |  |  |  |  |           |                |      |     |      |     |      |     |      |     |          |                 |          |                 |          |                 |          |                    |       |           |       |           |       |           |       |           |       |           |       |           |       |           |       |           |       |           |       |           |       |           |       |           |       |           |       |           |       |           |       |           |  |  |
| 2'h0        | 1/1  |                |                 |          |                 |  |  |  |  |  |  |  |  |           |                |      |     |      |     |      |     |      |     |          |                 |          |                 |          |                 |          |                    |       |           |       |           |       |           |       |           |       |           |       |           |       |           |       |           |       |           |       |           |       |           |       |           |       |           |       |           |       |           |       |           |  |  |
| 2'h1        | 1/2  |                |                 |          |                 |  |  |  |  |  |  |  |  |           |                |      |     |      |     |      |     |      |     |          |                 |          |                 |          |                 |          |                    |       |           |       |           |       |           |       |           |       |           |       |           |       |           |       |           |       |           |       |           |       |           |       |           |       |           |       |           |       |           |       |           |  |  |
| 2'h2        | 1/4  |                |                 |          |                 |  |  |  |  |  |  |  |  |           |                |      |     |      |     |      |     |      |     |          |                 |          |                 |          |                 |          |                    |       |           |       |           |       |           |       |           |       |           |       |           |       |           |       |           |       |           |       |           |       |           |       |           |       |           |       |           |       |           |       |           |  |  |
| 2'h3        | 1/8  |                |                 |          |                 |  |  |  |  |  |  |  |  |           |                |      |     |      |     |      |     |      |     |          |                 |          |                 |          |                 |          |                    |       |           |       |           |       |           |       |           |       |           |       |           |       |           |       |           |       |           |       |           |       |           |       |           |       |           |       |           |       |           |       |           |  |  |
| RTN[4:0]    | Clocks per line  | RTN[4:0]       | Clocks per line | RTN[4:0] | Clocks per line |  |  |  |  |  |  |  |  |           |                |      |     |      |     |      |     |      |     |          |                 |          |                 |          |                 |          |                    |       |           |       |           |       |           |       |           |       |           |       |           |       |           |       |           |       |           |       |           |       |           |       |           |       |           |       |           |       |           |       |           |  |  |
| 5'h00~0F    | Setting prohibited   | 5'h15          | 21 clocks       | 5'h1B    | 27 clocks       |  |  |  |  |  |  |  |  |           |                |      |     |      |     |      |     |      |     |          |                 |          |                 |          |                 |          |                    |       |           |       |           |       |           |       |           |       |           |       |           |       |           |       |           |       |           |       |           |       |           |       |           |       |           |       |           |       |           |       |           |  |  |
| 5'h10       | 16 clocks  | 5'h16          | 22 clocks       | 5'h1C    | 28 clocks       |  |  |  |  |  |  |  |  |           |                |      |     |      |     |      |     |      |     |          |                 |          |                 |          |                 |          |                    |       |           |       |           |       |           |       |           |       |           |       |           |       |           |       |           |       |           |       |           |       |           |       |           |       |           |       |           |       |           |       |           |  |  |
| 5'h11       | 17 clocks  | 5'h17          | 23 clocks       | 5'h1D    | 29 clocks       |  |  |  |  |  |  |  |  |           |                |      |     |      |     |      |     |      |     |          |                 |          |                 |          |                 |          |                    |       |           |       |           |       |           |       |           |       |           |       |           |       |           |       |           |       |           |       |           |       |           |       |           |       |           |       |           |       |           |       |           |  |  |
| 5'h12       | 18 clocks  | 5'h18          | 24 clocks       | 5'h1E    | 30 clocks       |  |  |  |  |  |  |  |  |           |                |      |     |      |     |      |     |      |     |          |                 |          |                 |          |                 |          |                    |       |           |       |           |       |           |       |           |       |           |       |           |       |           |       |           |       |           |       |           |       |           |       |           |       |           |       |           |       |           |       |           |  |  |
| 5'h13       | 19 clocks  | 5'h19          | 25 clocks       | 5'h1F    | 31 clocks       |  |  |  |  |  |  |  |  |           |                |      |     |      |     |      |     |      |     |          |                 |          |                 |          |                 |          |                    |       |           |       |           |       |           |       |           |       |           |       |           |       |           |       |           |       |           |       |           |       |           |       |           |       |           |       |           |       |           |       |           |  |  |
| 5'h14       | 20 clocks  | 5'h1A          | 26 clocks       |          |                 |  |  |  |  |  |  |  |  |           |                |      |     |      |     |      |     |      |     |          |                 |          |                 |          |                 |          |                    |       |           |       |           |       |           |       |           |       |           |       |           |       |           |       |           |       |           |       |           |       |           |       |           |       |           |       |           |       |           |       |           |  |  |

|   | <p>display).</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">FP[3:0]<br/>BP[3:0]</th> <th style="text-align: left;">Front and back<br/>porch period (line period)</th> <th style="text-align: left;">FP[3:0]<br/>BP[3:0]</th> <th style="text-align: left;">Front and back<br/>porch period (line period)</th> </tr> </thead> <tbody> <tr><td>4'h0</td><td>Setting prohibited</td><td>4'h8</td><td>8 lines</td></tr> <tr><td>4'h1</td><td>Setting prohibited</td><td>4'h9</td><td>9 lines</td></tr> <tr><td>4'h2</td><td>2 lines</td><td>4'hA</td><td>10 lines</td></tr> <tr><td>4'h3</td><td>3 lines</td><td>4'hB</td><td>11 lines</td></tr> <tr><td>4'h4</td><td>4 lines</td><td>4'hC</td><td>12 lines</td></tr> <tr><td>4'h5</td><td>5 lines</td><td>4'hD</td><td>13 lines</td></tr> <tr><td>4'h6</td><td>6 lines</td><td>4'hE</td><td>14 lines</td></tr> <tr><td>4'h7</td><td>7 lines</td><td>4'hF</td><td>15 lines</td></tr> </tbody> </table> <p><b>Note to Setting BP and FP</b></p> <p>The condition in setting BP and FP bits are: <math>BP \geq 2</math> lines <math>FP \geq 2</math> lines <math>FP+BP \leq 16</math> lines</p> | FP[3:0]<br>BP[3:0] | Front and back<br>porch period (line period) | FP[3:0]<br>BP[3:0]                       | Front and back<br>porch period (line period)       | 4'h0                                    | Setting prohibited | 4'h8                                      | 8 lines   | 4'h1                                     | Setting prohibited | 4'h9     | 9 lines | 4'h2 | 2 lines | 4'hA | 10 lines | 4'h3 | 3 lines | 4'hB | 11 lines | 4'h4 | 4 lines | 4'hC | 12 lines | 4'h5 | 5 lines | 4'hD | 13 lines | 4'h6 | 6 lines | 4'hE | 14 lines | 4'h7 | 7 lines | 4'hF | 15 lines |
|---|--|--------------------|--|--|--|---|--------------------|---|---|--|--------------------|----------|---------|------|---------|------|----------|------|---------|------|----------|------|---------|------|----------|------|---------|------|----------|------|---------|------|----------|------|---------|------|----------|
| FP[3:0]<br>BP[3:0]                        | Front and back<br>porch period (line period)   | FP[3:0]<br>BP[3:0] | Front and back<br>porch period (line period) |  |  |   |                    |   |   |  |                    |          |         |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |
| 4'h0                                      | Setting prohibited   | 4'h8               | 8 lines                                      |  |  |   |                    |   |   |  |                    |          |         |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |
| 4'h1                                      | Setting prohibited   | 4'h9               | 9 lines                                      |  |  |   |                    |   |   |  |                    |          |         |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |
| 4'h2                                      | 2 lines  | 4'hA               | 10 lines                                     |  |  |   |                    |   |   |  |                    |          |         |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |
| 4'h3                                      | 3 lines  | 4'hB               | 11 lines                                     |  |  |   |                    |   |   |  |                    |          |         |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |
| 4'h4                                      | 4 lines  | 4'hC               | 12 lines                                     |  |  |   |                    |   |   |  |                    |          |         |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |
| 4'h5                                      | 5 lines  | 4'hD               | 13 lines                                     |  |  |   |                    |   |   |  |                    |          |         |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |
| 4'h6                                      | 6 lines  | 4'hE               | 14 lines                                     |  |  |   |                    |   |   |  |                    |          |         |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |
| 4'h7                                      | 7 lines  | 4'hF               | 15 lines                                     |  |  |   |                    |   |   |  |                    |          |         |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |
| Restriction                               |  |                    |  |  |  |   |                    |   |   |  |                    |          |         |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |
| Register Availability                     | <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Status</th> <th style="text-align: left;">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" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Status</th> <th style="text-align: left;">Default Value</th> </tr> </thead> <tbody> <tr><td>Power On Sequence</td><td>BC0=1'h1, DIV0=2'h0, RTN0=5'h10, FP0=4'h8, BP=4'h8</td></tr> <tr><td>SW Reset</td><td>No change</td></tr> <tr><td>HW Reset</td><td>BC0=1'h1, DIV0=2'h0, RTN0=5'h10, FP0=4'h8, BP0=4'h8</td></tr> </tbody> </table>   | Status             | Default Value                                | Power On Sequence                        | BC0=1'h1, DIV0=2'h0, RTN0=5'h10, FP0=4'h8, BP=4'h8 | SW Reset                                | No change          | HW Reset                                  | BC0=1'h1, DIV0=2'h0, RTN0=5'h10, FP0=4'h8, BP0=4'h8 |  |                    |          |         |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |
| Status                                    | Default Value  |                    |  |  |  |   |                    |   |   |  |                    |          |         |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |
| Power On Sequence                         | BC0=1'h1, DIV0=2'h0, RTN0=5'h10, FP0=4'h8, BP=4'h8   |                    |  |  |  |   |                    |   |   |  |                    |          |         |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |
| SW Reset                                  | No change  |                    |  |  |  |   |                    |   |   |  |                    |          |         |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |
| HW Reset                                  | BC0=1'h1, DIV0=2'h0, RTN0=5'h10, FP0=4'h8, BP0=4'h8  |                    |  |  |  |   |                    |   |   |  |                    |          |         |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |

### 8.2.42. Display\_Timing\_Setting for Partial Mode (C2h)

| C2H                       | Display_Timing_Setting for Partial Mode |     |     |       |        |        |        |         |         |         |         |         |     |
|---------------------------|---|-----|-----|-------|--------|--------|--------|---------|---------|---------|---------|---------|-----|
|                           | D/CX                                    | RDX | WRX | D17-8 | D7     | D6     | D5     | D4      | D3      | D2      | D1      | D0      | HEX |
| Command                   | 0                                       | 1   | ↑   | x     | 1      | 1      | 0      | 0       | 0       | 0       | 1       | 0       | C2  |
| 1 <sup>st</sup> Parameter | 1                                       | 1   | ↑   | 0     | 0      | 0      | 0      | BC1     | 0       | 0       | DIV1[1] | DIV1[0] | x   |
| 2 <sup>nd</sup> Parameter | 1                                       | 1   | ↑   | 0     | 0      | 0      | 0      | RTN1[4] | RTN1[3] | RTN1[2] | RTN1[1] | RTN1[0] | xx  |
| 3 <sup>rd</sup> Parameter | 1                                       | 1   | ↑   | 0     | FP1[3] | FP1[2] | FP1[1] | FP1[0]  | BP1[3]  | BP1[2]  | BP1[1]  | BP1[0]  | xxx |

**BC1:** BC1 is used to select VCOM liquid crystal drive waveform.

BC1 = 0: Frame inversion waveform is selected.

BC1 = 1: Line inversion waveform is selected.

**DIV1[1:0]:** DIV1[1:0] is used to set division ratio of internal clock frequency.

The internal operation is synchronized with the frequency divided internal clock. When DIV0 setting is changed, the width of the reference clock for liquid crystal control signals is changed.

The frame frequency can be adjusted by register setting (RTN and DIV bits). When number of lines to drive is changed, adjust the frame frequency too.

| DIV1[1:0] | Division Ratio |
|-----------|----------------|
| 2'h0      | 1/1            |
| 2'h1      | 1/2            |
| 2'h2      | 1/4            |
| 2'h3      | 1/8            |

Frame Frequency =  $f_{osc} / [\text{Clocks per line} \times \text{division ratio} \times (\text{Line} + \text{BP} + \text{FP})]$

fosc. : internal oscillator frequency

clocks per line : RTNn setting

division ratio: DIVn setting

Line: total driving line number

BP: back porch line number

FP: front porch line number

Description

**RTN1[4:0]:** RTN0[4:0] is used to set 1H (line) period.

| RTN1[4:0] | Clocks per line    | RTN1[4:0] | Clocks per line | RTN1[4:0] | Clocks per line |
|-----------|--------------------|-----------|-----------------|-----------|-----------------|
| 5'h00~0F  | Setting prohibited | 5'h15     | 21 clocks       | 5'h1B     | 27 clocks       |
| 5'h10     | 16 clocks          | 5'h16     | 22 clocks       | 5'h1C     | 28 clocks       |
| 5'h11     | 17 clocks          | 5'h17     | 23 clocks       | 5'h1D     | 29 clocks       |
| 5'h12     | 18 clocks          | 5'h18     | 24 clocks       | 5'h1E     | 30 clocks       |
| 5'h13     | 19 clocks          | 5'h19     | 25 clocks       | 5'h1F     | 31 clocks       |
| 5'h14     | 20 clocks          | 5'h1A     | 26 clocks       |           |                 |

**FP1[3:0], BP1[3:0]**

**FP1[3:0]** is used to set the number of lines for a front porch period (a blank period following the end of display).

**BP1[3:0]** is used to set the number of lines for a back porch period (a blank period made before the beginning of

|   | <p>display).</p> <table border="1"> <thead> <tr> <th><b>FP1[3:0]</b></th> <th><b>Front and back</b></th> <th><b>FP1[3:0]</b></th> <th><b>Front and back</b></th> </tr> <tr> <th><b>BP1[3:0]</b></th> <th><b>porch period (line period)</b></th> <th><b>BP1[3:0]</b></th> <th><b>porch period (line period)</b></th> </tr> </thead> <tbody> <tr><td>4'h0</td><td>Setting prohibited</td><td>4'h8</td><td>8 lines</td></tr> <tr><td>4'h1</td><td>Setting prohibited</td><td>4'h9</td><td>9 lines</td></tr> <tr><td>4'h2</td><td>2 lines</td><td>4'hA</td><td>10 lines</td></tr> <tr><td>4'h3</td><td>3 lines</td><td>4'hB</td><td>11 lines</td></tr> <tr><td>4'h4</td><td>4 lines</td><td>4'hC</td><td>12 lines</td></tr> <tr><td>4'h5</td><td>5 lines</td><td>4'hD</td><td>13 lines</td></tr> <tr><td>4'h6</td><td>6 lines</td><td>4'hE</td><td>14 lines</td></tr> <tr><td>4'h7</td><td>7 lines</td><td>4'hF</td><td>15 lines</td></tr> </tbody> </table> <p><b>Note to Setting BP and FP</b></p> <p>The condition in setting BP and FP bits are: <math>BP \geq 2</math> lines <math>FP \geq 2</math> lines <math>FP+BP \leq 16</math> lines</p> | <b>FP1[3:0]</b> | <b>Front and back</b>             | <b>FP1[3:0]</b>                          | <b>Front and back</b>                               | <b>BP1[3:0]</b>                         | <b>porch period (line period)</b> | <b>BP1[3:0]</b>                           | <b>porch period (line period)</b>                   | 4'h0                                     | Setting prohibited | 4'h8     | 8 lines | 4'h1 | Setting prohibited | 4'h9 | 9 lines | 4'h2 | 2 lines | 4'hA | 10 lines | 4'h3 | 3 lines | 4'hB | 11 lines | 4'h4 | 4 lines | 4'hC | 12 lines | 4'h5 | 5 lines | 4'hD | 13 lines | 4'h6 | 6 lines | 4'hE | 14 lines | 4'h7 | 7 lines | 4'hF | 15 lines |
|---|--|-----------------|-----------------------------------|--|---|---|-----------------------------------|---|---|--|--------------------|----------|---------|------|--------------------|------|---------|------|---------|------|----------|------|---------|------|----------|------|---------|------|----------|------|---------|------|----------|------|---------|------|----------|------|---------|------|----------|
| <b>FP1[3:0]</b>                           | <b>Front and back</b>  | <b>FP1[3:0]</b> | <b>Front and back</b>             |  |   |   |                                   |   |   |  |                    |          |         |      |                    |      |         |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |
| <b>BP1[3:0]</b>                           | <b>porch period (line period)</b>  | <b>BP1[3:0]</b> | <b>porch period (line period)</b> |  |   |   |                                   |   |   |  |                    |          |         |      |                    |      |         |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |
| 4'h0                                      | Setting prohibited   | 4'h8            | 8 lines                           |  |   |   |                                   |   |   |  |                    |          |         |      |                    |      |         |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |
| 4'h1                                      | Setting prohibited   | 4'h9            | 9 lines                           |  |   |   |                                   |   |   |  |                    |          |         |      |                    |      |         |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |
| 4'h2                                      | 2 lines  | 4'hA            | 10 lines                          |  |   |   |                                   |   |   |  |                    |          |         |      |                    |      |         |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |
| 4'h3                                      | 3 lines  | 4'hB            | 11 lines                          |  |   |   |                                   |   |   |  |                    |          |         |      |                    |      |         |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |
| 4'h4                                      | 4 lines  | 4'hC            | 12 lines                          |  |   |   |                                   |   |   |  |                    |          |         |      |                    |      |         |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |
| 4'h5                                      | 5 lines  | 4'hD            | 13 lines                          |  |   |   |                                   |   |   |  |                    |          |         |      |                    |      |         |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |
| 4'h6                                      | 6 lines  | 4'hE            | 14 lines                          |  |   |   |                                   |   |   |  |                    |          |         |      |                    |      |         |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |
| 4'h7                                      | 7 lines  | 4'hF            | 15 lines                          |  |   |   |                                   |   |   |  |                    |          |         |      |                    |      |         |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |
| Restriction                               |  |                 |                                   |  |   |   |                                   |   |   |  |                    |          |         |      |                    |      |         |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |
| Register Availability                     | <table border="1"> <thead> <tr> <th><b>Status</b></th> <th><b>Availability</b></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>   | <b>Status</b>   | <b>Availability</b>               | 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     |      |                    |      |         |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |
| <b>Status</b>                             | <b>Availability</b>  |                 |                                   |  |   |   |                                   |   |   |  |                    |          |         |      |                    |      |         |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |
| 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><b>Status</b></th> <th><b>Default Value</b></th> </tr> </thead> <tbody> <tr><td>Power On Sequence</td><td>BC1=1'h1, DIV1=2'h0, RTN1=5'h10, FP1=4'h8, BP1=4'h8</td></tr> <tr><td>SW Reset</td><td>No change</td></tr> <tr><td>HW Reset</td><td>BC1=1'h1, DIV1=2'h0, RTN1=5'h10, FP1=4'h8, BP1=4'h8</td></tr> </tbody> </table>   | <b>Status</b>   | <b>Default Value</b>              | Power On Sequence                        | BC1=1'h1, DIV1=2'h0, RTN1=5'h10, FP1=4'h8, BP1=4'h8 | SW Reset                                | No change                         | HW Reset                                  | BC1=1'h1, DIV1=2'h0, RTN1=5'h10, FP1=4'h8, BP1=4'h8 |  |                    |          |         |      |                    |      |         |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |
| <b>Status</b>                             | <b>Default Value</b>   |                 |                                   |  |   |   |                                   |   |   |  |                    |          |         |      |                    |      |         |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |
| Power On Sequence                         | BC1=1'h1, DIV1=2'h0, RTN1=5'h10, FP1=4'h8, BP1=4'h8  |                 |                                   |  |   |   |                                   |   |   |  |                    |          |         |      |                    |      |         |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |
| SW Reset                                  | No change  |                 |                                   |  |   |   |                                   |   |   |  |                    |          |         |      |                    |      |         |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |
| HW Reset                                  | BC1=1'h1, DIV1=2'h0, RTN1=5'h10, FP1=4'h8, BP1=4'h8  |                 |                                   |  |   |   |                                   |   |   |  |                    |          |         |      |                    |      |         |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |

### 8.2.43. Display\_Timing\_Setting for Idle Mode (C3h)

| C3H                       | Display_Timing_Setting for Idle Mode |     |     |       |        |        |        |         |         |         |         |         |     |
|---------------------------|--------------------------------------|-----|-----|-------|--------|--------|--------|---------|---------|---------|---------|---------|-----|
|                           | D/CX                                 | RDX | WRX | D17-8 | D7     | D6     | D5     | D4      | D3      | D2      | D1      | D0      | HEX |
| Command                   | 0                                    | 1   | ↑   | x     | 1      | 1      | 0      | 0       | 0       | 0       | 1       | 1       | C3  |
| 1 <sup>st</sup> Parameter | 1                                    | 1   | ↑   | 0     | 0      | 0      | 0      | BC2     | 0       | 0       | DIV2[1] | DIV2[0] | x   |
| 2 <sup>nd</sup> Parameter | 1                                    | 1   | ↑   | 0     | 0      | 0      | 0      | RTN2[4] | RTN2[3] | RTN2[2] | RTN2[1] | RTN2[0] | xx  |
| 3 <sup>rd</sup> Parameter | 1                                    | 1   | ↑   | 0     | FP2[3] | FP2[2] | FP2[1] | FP2[0]  | BP2[3]  | BP2[2]  | BP2[1]  | BP2[0]  | xxx |

**BC2:** BC1 is used to select VCOM liquid crystal drive waveform.

BC1 = 0: Frame inversion waveform is selected.

BC1 = 1: Line inversion waveform is selected.

**DIV2[1:0]:** DIV1[1:0] is used to set division ratio of internal clock frequency.

The internal operation is synchronized with the frequency divided internal clock. When DIV0 setting is changed, the width of the reference clock for liquid crystal control signals is changed.

The frame frequency can be adjusted by register setting (RTN and DIV bits). When number of lines to drive is changed, adjust the frame frequency too.

| DIV2[1:0] | Division Ratio |
|-----------|----------------|
| 2'h0      | 1/1            |
| 2'h1      | 1/2            |
| 2'h2      | 1/4            |
| 2'h3      | 1/8            |

Frame Frequency =  $f_{osc} / [\text{Clocks per line} \times \text{division ratio} \times (\text{Line} + \text{BP} + \text{FP})]$

$f_{osc}$  : internal oscillator frequency

clocks per line : RTNn setting

division ratio: DIVn setting

Line: total driving line number

BP: back porch line number

FP: front porch line number

**RTN2[4:0]:** RTN0[4:0] is used to set 1H (line) period.

| RTN2[4:0] | Clocks per line    | RTN2[4:0] | Clocks per line | RTN2[4:0] | Clocks per line |
|-----------|--------------------|-----------|-----------------|-----------|-----------------|
| 5'h00~0F  | Setting prohibited | 5'h15     | 21 clocks       | 5'h1B     | 27 clocks       |
| 5'h10     | 16 clocks          | 5'h16     | 22 clocks       | 5'h1C     | 28 clocks       |
| 5'h11     | 17 clocks          | 5'h17     | 23 clocks       | 5'h1D     | 29 clocks       |
| 5'h12     | 18 clocks          | 5'h18     | 24 clocks       | 5'h1E     | 30 clocks       |
| 5'h13     | 19 clocks          | 5'h19     | 25 clocks       | 5'h1F     | 31 clocks       |
| 5'h14     | 20 clocks          | 5'h1A     | 26 clocks       |           |                 |

**FP2[3:0], BP2[3:0]**

**FP2[3:0]** is used to set the number of lines for a front porch period (a blank period following the end of display).

**BP2[3:0]** is used to set the number of lines for a back porch period (a blank period made before the beginning of

|   | <p>display).</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">FP2[3:0]<br/>BP2[3:0]</th> <th style="text-align: center;">Front and back<br/>porch period (line period)</th> <th style="text-align: center;">FP2[3:0]<br/>BP2[3:0]</th> <th style="text-align: center;">Front and back<br/>porch period (line period)</th> </tr> </thead> <tbody> <tr><td style="text-align: center;">4'h0</td><td style="text-align: center;">Setting prohibited</td><td style="text-align: center;">4'h8</td><td style="text-align: center;">8 lines</td></tr> <tr><td style="text-align: center;">4'h1</td><td style="text-align: center;">Setting prohibited</td><td style="text-align: center;">4'h9</td><td style="text-align: center;">9 lines</td></tr> <tr><td style="text-align: center;">4'h2</td><td style="text-align: center;">2 lines</td><td style="text-align: center;">4'hA</td><td style="text-align: center;">10 lines</td></tr> <tr><td style="text-align: center;">4'h3</td><td style="text-align: center;">3 lines</td><td style="text-align: center;">4'hB</td><td style="text-align: center;">11 lines</td></tr> <tr><td style="text-align: center;">4'h4</td><td style="text-align: center;">4 lines</td><td style="text-align: center;">4'hC</td><td style="text-align: center;">12 lines</td></tr> <tr><td style="text-align: center;">4'h5</td><td style="text-align: center;">5 lines</td><td style="text-align: center;">4'hD</td><td style="text-align: center;">13 lines</td></tr> <tr><td style="text-align: center;">4'h6</td><td style="text-align: center;">6 lines</td><td style="text-align: center;">4'hE</td><td style="text-align: center;">14 lines</td></tr> <tr><td style="text-align: center;">4'h7</td><td style="text-align: center;">7 lines</td><td style="text-align: center;">4'hF</td><td style="text-align: center;">15 lines</td></tr> </tbody> </table> <p><b>Note to Setting BP and FP</b></p> <p>The condition in setting BP and FP bits are: <math>BP \geq 2</math> lines <math>FP \geq 2</math> lines <math>FP+BP \leq 16</math> lines</p> | FP2[3:0]<br>BP2[3:0] | Front and back<br>porch period (line period) | FP2[3:0]<br>BP2[3:0]                     | Front and back<br>porch period (line period)        | 4'h0                                    | Setting prohibited | 4'h8                                      | 8 lines   | 4'h1                                     | Setting prohibited | 4'h9     | 9 lines | 4'h2 | 2 lines | 4'hA | 10 lines | 4'h3 | 3 lines | 4'hB | 11 lines | 4'h4 | 4 lines | 4'hC | 12 lines | 4'h5 | 5 lines | 4'hD | 13 lines | 4'h6 | 6 lines | 4'hE | 14 lines | 4'h7 | 7 lines | 4'hF | 15 lines |
|---|--|----------------------|--|--|---|---|--------------------|---|---|--|--------------------|----------|---------|------|---------|------|----------|------|---------|------|----------|------|---------|------|----------|------|---------|------|----------|------|---------|------|----------|------|---------|------|----------|
| FP2[3:0]<br>BP2[3:0]                      | Front and back<br>porch period (line period)   | FP2[3:0]<br>BP2[3:0] | Front and back<br>porch period (line period) |  |   |   |                    |   |   |  |                    |          |         |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |
| 4'h0                                      | Setting prohibited   | 4'h8                 | 8 lines                                      |  |   |   |                    |   |   |  |                    |          |         |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |
| 4'h1                                      | Setting prohibited   | 4'h9                 | 9 lines                                      |  |   |   |                    |   |   |  |                    |          |         |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |
| 4'h2                                      | 2 lines  | 4'hA                 | 10 lines                                     |  |   |   |                    |   |   |  |                    |          |         |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |
| 4'h3                                      | 3 lines  | 4'hB                 | 11 lines                                     |  |   |   |                    |   |   |  |                    |          |         |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |
| 4'h4                                      | 4 lines  | 4'hC                 | 12 lines                                     |  |   |   |                    |   |   |  |                    |          |         |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |
| 4'h5                                      | 5 lines  | 4'hD                 | 13 lines                                     |  |   |   |                    |   |   |  |                    |          |         |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |
| 4'h6                                      | 6 lines  | 4'hE                 | 14 lines                                     |  |   |   |                    |   |   |  |                    |          |         |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |
| 4'h7                                      | 7 lines  | 4'hF                 | 15 lines                                     |  |   |   |                    |   |   |  |                    |          |         |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |
| Restriction                               |  |                      |  |  |   |   |                    |   |   |  |                    |          |         |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |
| Register Availability                     | <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Status</th> <th style="text-align: center;">Availability</th> </tr> </thead> <tbody> <tr><td style="text-align: center;">Normal Mode On, Idle Mode Off, Sleep Out</td><td style="text-align: center;">Yes</td></tr> <tr><td style="text-align: center;">Normal Mode On, Idle Mode On, Sleep Out</td><td style="text-align: center;">Yes</td></tr> <tr><td style="text-align: center;">Partial Mode On, Idle Mode Off, Sleep Out</td><td style="text-align: center;">Yes</td></tr> <tr><td style="text-align: center;">Partial Mode On, Idle Mode On, Sleep Out</td><td style="text-align: center;">Yes</td></tr> <tr><td style="text-align: center;">Sleep In</td><td style="text-align: center;">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" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Status</th> <th style="text-align: center;">Default Value</th> </tr> </thead> <tbody> <tr><td style="text-align: center;">Power On Sequence</td><td style="text-align: center;">BC2=1'h1, DIV2=2'h0, RTN2=5'h10, FP2=4'h8, BP2=4'h8</td></tr> <tr><td style="text-align: center;">SW Reset</td><td style="text-align: center;">No change</td></tr> <tr><td style="text-align: center;">HW Reset</td><td style="text-align: center;">BC2=1'h1, DIV2=2'h0, RTN2=5'h10, FP2=4'h8, BP2=4'h8</td></tr> </tbody> </table>  | Status               | Default Value                                | Power On Sequence                        | BC2=1'h1, DIV2=2'h0, RTN2=5'h10, FP2=4'h8, BP2=4'h8 | SW Reset                                | No change          | HW Reset                                  | BC2=1'h1, DIV2=2'h0, RTN2=5'h10, FP2=4'h8, BP2=4'h8 |  |                    |          |         |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |
| Status                                    | Default Value  |                      |  |  |   |   |                    |   |   |  |                    |          |         |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |
| Power On Sequence                         | BC2=1'h1, DIV2=2'h0, RTN2=5'h10, FP2=4'h8, BP2=4'h8  |                      |  |  |   |   |                    |   |   |  |                    |          |         |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |
| SW Reset                                  | No change  |                      |  |  |   |   |                    |   |   |  |                    |          |         |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |
| HW Reset                                  | BC2=1'h1, DIV2=2'h0, RTN2=5'h10, FP2=4'h8, BP2=4'h8  |                      |  |  |   |   |                    |   |   |  |                    |          |         |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |      |         |      |          |



**8.2.44. Frame Rate and Inversion Control (C5h)**

| C5H                       | Frame Rate Control                                      |     |                        |       |    |     |    |    |     |        |        |        |     |
|---------------------------|---|-----|------------------------|-------|----|-----|----|----|-----|--------|--------|--------|-----|
|                           | D/CX  | RDX | WRX                    | D17-8 | D7 | D6  | D5 | D4 | D3  | D2     | D1     | D0     | HEX |
| Command                   | 0   | 1   | ↑                      | 1     | 1  | 1   | 0  | 0  | 0   | 1      | 0      | 1      | C5  |
| 1 <sup>st</sup> Parameter | 1   | 1   | ↑                      | 0     | 0  | 0   | 0  | 0  | 0   | FRA[2] | FRA[1] | FRA[0] | -   |
| Description               | Set the frame frequency of the full colors normal mode. |     |                        |       |    |     |    |    |     |        |        |        |     |
|                           | The frame frequency needs to meet 80Hz±5% in this mode. |     |                        |       |    |     |    |    |     |        |        |        |     |
| Description               | <b>FRA[2:0]</b>   |     | <b>Frame Rate (Hz)</b> |       |    |     |    |    |     |        |        |        |     |
|                           | 000   |     | 125                    |       |    |     |    |    |     |        |        |        |     |
|                           | 001   |     | 100                    |       |    |     |    |    |     |        |        |        |     |
|                           | 010   |     | <b>85 (default)</b>    |       |    |     |    |    |     |        |        |        |     |
|                           | 011   |     | 72                     |       |    |     |    |    |     |        |        |        |     |
|                           | 100   |     | 56                     |       |    |     |    |    |     |        |        |        |     |
|                           | 101   |     | 50                     |       |    |     |    |    |     |        |        |        |     |
|                           | 110   |     | 45                     |       |    |     |    |    |     |        |        |        |     |
|                           | 111   |     | 42                     |       |    |     |    |    |     |        |        |        |     |
|                           | Restriction   |     |                        |       |    |     |    |    |     |        |        |        |     |
| Register Availability     | <b>Status</b>   |     | <b>Availability</b>    |       |    |     |    |    |     |        |        |        |     |
|                           | 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                   | <b>Status</b>   |     | <b>Default Value</b>   |       |    |     |    |    |     |        |        |        |     |
|                           |   |     | FRA[3:0]               |       |    |     |    |    |     |        |        |        |     |
|                           | Power On Sequence                                       |     | 4'b0100                |       |    |     |    |    |     |        |        |        |     |
|                           | SW Reset  |     | 4'b0100                |       |    |     |    |    |     |        |        |        |     |
|                           | HW Reset  |     | 4'b0100                |       |    |     |    |    |     |        |        |        |     |
|                           | <b>Status</b>   |     | <b>Default Value</b>   |       |    |     |    |    |     |        |        |        |     |
|                           |   |     | NLA                    |       |    | NLB |    |    | NLC |        |        |        |     |
|                           | Power On Sequence                                       |     | 0                      |       |    | 0   |    |    | 1   |        |        |        |     |
|                           | SW Reset  |     | 0                      |       |    | 0   |    |    | 1   |        |        |        |     |
|                           | HW Reset  |     | 0                      |       |    | 0   |    |    | 1   |        |        |        |     |

### 8.2.45. Interface Control (C6h)

| C6H                                       | Interface Control   |     |     |       |        |    |    |      |      |    |     |     |     |        |               |  |   |   |           |   |   |  |     |          |     |
|---|---|-----|-----|-------|--------|----|----|------|------|----|-----|-----|-----|--------|---------------|--|---|---|-----------|---|---|--|-----|----------|-----|
|   | D/CX  | RDX | WRX | D17-8 | D7     | D6 | D5 | D4   | D3   | D2 | D1  | D0  | HEX |        |               |  |   |   |           |   |   |  |     |          |     |
| Command                                   | 0   | 1   | ↑   | x     | 1      | 1  | 0  | 0    | 0    | 1  | 1   | 0   | C6  |        |               |  |   |   |           |   |   |  |     |          |     |
| 1 <sup>st</sup> Parameter                 | 1   | 1   | ↑   | x     | SDA_EN | 0  | 0  | VSPL | HSPL | 0  | EPL | DPL | xx  |        |               |  |   |   |           |   |   |  |     |          |     |
| Description                               | <p><b>DPL:</b> Sets the signal polarity of the PCLK pin.</p> <p>DPL = "0" The data is input on the rising edge of PCLK.</p> <p>DPL = "1" The data is input on the falling edge of PCLK.</p> <p><b>EPL:</b> Sets the signal polarity of the ENABLE pin.</p> <p>EPL = "0" The data DB[17:0] is written when ENABLE = "0".</p> <p>EPL = "1" The data DB[17:0] is written when ENABLE = "1".</p> <p><b>HSPL:</b> Sets the signal polarity of the HSYNC pin.</p> <p>HSPL = "0" Low active</p> <p>HSPL = "1" High active</p> <p><b>VSPL:</b> Sets the signal polarity of the VSYNC pin.</p> <p>VSPL = "0" Low active</p> <p>VSPL = "1" High active</p> <p><b>SDA_EN:</b> DBI type C interface selection</p> <p>SDA_EN = "0", DIN and DOUT pins are used for DBI type C interface mode.</p> <p>SDA_EN = "1", DIN/SDA pin is used for DBI type C interface mode and DOUT pin is not used.</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>Power On Sequence</td> <td>DPL=1'h0, EPL=1'h1, VSPL=1'h0, HSPL=:1'h0,SDA_EN=1'h0</td> </tr> <tr> <td>SW Reset</td> <td>No change</td> </tr> <tr> <td>HW Reset</td> <td>DPL=1'h0, EPL=1'h1, VSPL=1'h0, HSPL=:1'h0,SDA_EN=1'h0</td> </tr> </tbody> </table>  |     |     |       |        |    |    |      |      |    |     |     |     | Status | Default Value | Power On Sequence                        | DPL=1'h0, EPL=1'h1, VSPL=1'h0, HSPL=:1'h0,SDA_EN=1'h0 | SW Reset                                | No change | HW Reset                                  | DPL=1'h0, EPL=1'h1, VSPL=1'h0, HSPL=:1'h0,SDA_EN=1'h0 |  |     |          |     |
| Status                                    | Default Value   |     |     |       |        |    |    |      |      |    |     |     |     |        |               |  |   |   |           |   |   |  |     |          |     |
| Power On Sequence                         | DPL=1'h0, EPL=1'h1, VSPL=1'h0, HSPL=:1'h0,SDA_EN=1'h0   |     |     |       |        |    |    |      |      |    |     |     |     |        |               |  |   |   |           |   |   |  |     |          |     |
| SW Reset                                  | No change   |     |     |       |        |    |    |      |      |    |     |     |     |        |               |  |   |   |           |   |   |  |     |          |     |
| HW Reset                                  | DPL=1'h0, EPL=1'h1, VSPL=1'h0, HSPL=:1'h0,SDA_EN=1'h0   |     |     |       |        |    |    |      |      |    |     |     |     |        |               |  |   |   |           |   |   |  |     |          |     |

### 8.2.46. Gamma Setting (C8h)

| C8H                                       | Gamma Setting  |     |     |       |    |        |        |         |         |         |         |         |     |        |               |  |                            |   |           |   |                            |  |     |          |     |
|---|--|-----|-----|-------|----|--------|--------|---------|---------|---------|---------|---------|-----|--------|---------------|--|----------------------------|---|-----------|---|----------------------------|--|-----|----------|-----|
|   | D/CX   | RDX | WRX | D17-8 | D7 | D6     | D5     | D4      | D3      | D2      | D1      | D0      | HEX |        |               |  |                            |   |           |   |                            |  |     |          |     |
| Command                                   | 0  | 1   | ↑   | x     | 1  | 1      | 0      | 0       | 1       | 0       | 0       | 0       | C8  |        |               |  |                            |   |           |   |                            |  |     |          |     |
| 1 <sup>st</sup> Parameter                 | 1  | 1   | ↑   | x     | 0  | KP1[2] | KP1[1] | KP1[0]  | 0       | KP0[2]  | KP0[1]  | KP0[0]  | xx  |        |               |  |                            |   |           |   |                            |  |     |          |     |
| 2 <sup>nd</sup> Parameter                 | 1  | 1   | ↑   | x     | 0  | KP3[2] | KP3[1] | KP3[0]  | 0       | KP2[2]  | KP2[1]  | KP2[0]  | xx  |        |               |  |                            |   |           |   |                            |  |     |          |     |
| 3 <sup>rd</sup> Parameter                 | 1  | 1   | ↑   | x     | 0  | KP5[2] | KP5[1] | KP5[0]  | 0       | KP4[2]  | KP4[1]  | KP4[0]  | xx  |        |               |  |                            |   |           |   |                            |  |     |          |     |
| 4 <sup>th</sup> Parameter                 | 1  | 1   | ↑   | x     | 0  | RP1[2] | RP1[1] | RP1[0]  | 0       | RP0[2]  | RP0[1]  | RP0[0]  | xx  |        |               |  |                            |   |           |   |                            |  |     |          |     |
| 5 <sup>th</sup> Parameter                 | 1  | 1   | ↑   | x     | 0  | 0      | 0      | 0       | VRP0[3] | VRP0[2] | VRP0[1] | VRP0[0] | xx  |        |               |  |                            |   |           |   |                            |  |     |          |     |
| 6 <sup>th</sup> Parameter                 | 1  | 1   | ↑   | x     | 0  | 0      | 0      | VRP1[4] | VRP1[3] | VRP1[2] | VRP1[1] | VRP1[0] | xx  |        |               |  |                            |   |           |   |                            |  |     |          |     |
| 7 <sup>th</sup> Parameter                 | 1  | 1   | ↑   | x     | 0  | KN1[2] | KN1[1] | KN1[0]  | 0       | KN0[2]  | KN0[1]  | KN0[0]  | xx  |        |               |  |                            |   |           |   |                            |  |     |          |     |
| 8 <sup>th</sup> Parameter                 | 1  | 1   | ↑   | x     | 0  | KN3[2] | KN3[1] | KN3[0]  | 0       | KN2[2]  | KN2[1]  | KN2[0]  | xx  |        |               |  |                            |   |           |   |                            |  |     |          |     |
| 9 <sup>th</sup> Parameter                 | 1  | 1   | ↑   | x     | 0  | KN5[2] | KN5[1] | KN5[0]  | 0       | KN4[2]  | KN4[1]  | KN4[0]  | xx  |        |               |  |                            |   |           |   |                            |  |     |          |     |
| 10 <sup>th</sup> Parameter                | 1  | 1   | ↑   | x     | 0  | RN1[2] | RN1[1] | RN1[0]  | 0       | RN0[2]  | RN0[1]  | RN0[0]  | xx  |        |               |  |                            |   |           |   |                            |  |     |          |     |
| 11 <sup>th</sup> Parameter                | 1  | 1   | ↑   | x     | 0  | 0      | 0      | 0       | VRN0[3] | VRN0[2] | VRN0[1] | VRN0[0] | xx  |        |               |  |                            |   |           |   |                            |  |     |          |     |
| 12 <sup>th</sup> Parameter                | 1  | 1   | ↑   | x     | 0  | 0      | 0      | VRN1[4] | VRN1[3] | VRN1[2] | VRN1[1] | VRN1[0] | xx  |        |               |  |                            |   |           |   |                            |  |     |          |     |
| Description                               | KP5-0[2:0] : yfine adjustment register for positive polarity<br>RP1-0[2:0] : ygradient adjustment register for positive polarity<br>VRP1-0[4:0] : yamplitude adjustment register for positive polarity<br>KN5-0[2:0] : yfine adjustment register for negative polarity<br>RN1-0[2:0] : ygradient adjustment register for negative polarity<br>VRN1-0[4:0] : yamplitude adjustment register for negative polarity   |     |     |       |    |        |        |         |         |         |         |         |     |        |               |  |                            |   |           |   |                            |  |     |          |     |
| 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>Power On Sequence</td> <td>All the parameters are 00h</td> </tr> <tr> <td>SW Reset</td> <td>No change</td> </tr> <tr> <td>HW Reset</td> <td>All the parameters are 00h</td> </tr> </tbody> </table>   |     |     |       |    |        |        |         |         |         |         |         |     | Status | Default Value | Power On Sequence                        | All the parameters are 00h | SW Reset                                | No change | HW Reset                                  | All the parameters are 00h |  |     |          |     |
| Status                                    | Default Value  |     |     |       |    |        |        |         |         |         |         |         |     |        |               |  |                            |   |           |   |                            |  |     |          |     |
| Power On Sequence                         | All the parameters are 00h   |     |     |       |    |        |        |         |         |         |         |         |     |        |               |  |                            |   |           |   |                            |  |     |          |     |
| SW Reset                                  | No change  |     |     |       |    |        |        |         |         |         |         |         |     |        |               |  |                            |   |           |   |                            |  |     |          |     |
| HW Reset                                  | All the parameters are 00h   |     |     |       |    |        |        |         |         |         |         |         |     |        |               |  |                            |   |           |   |                            |  |     |          |     |

**8.2.47. Power\_Setting (D0h)**

| D0h                       | Power_Setting  |              |          |            |    |     |    |       |        |        |        |        |     |         |              |      |             |      |            |      |            |      |            |      |            |      |            |      |            |      |           |         |       |     |     |     |      |          |        |          |            |      |          |        |            |      |            |      |          |        |          |            |      |            |      |            |      |          |        |          |           |      |           |         |  |          |                                 |
|---------------------------|--|--------------|----------|------------|----|-----|----|-------|--------|--------|--------|--------|-----|---------|--------------|------|-------------|------|------------|------|------------|------|------------|------|------------|------|------------|------|------------|------|-----------|---------|-------|-----|-----|-----|------|----------|--------|----------|------------|------|----------|--------|------------|------|------------|------|----------|--------|----------|------------|------|------------|------|------------|------|----------|--------|----------|-----------|------|-----------|---------|--|----------|---------------------------------|
|                           | D/CX   | RDX          | WRX      | D17-8      | D7 | D6  | D5 | D4    | D3     | D2     | D1     | D0     | HEX |         |              |      |             |      |            |      |            |      |            |      |            |      |            |      |            |      |           |         |       |     |     |     |      |          |        |          |            |      |          |        |            |      |            |      |          |        |          |            |      |            |      |            |      |          |        |          |           |      |           |         |  |          |                                 |
| Command                   | 0  | 1            | ↑        | x          | 1  | 1   | 0  | 1     | 0      | 0      | 0      | 0      | D0  |         |              |      |             |      |            |      |            |      |            |      |            |      |            |      |            |      |           |         |       |     |     |     |      |          |        |          |            |      |          |        |            |      |            |      |          |        |          |            |      |            |      |            |      |          |        |          |           |      |           |         |  |          |                                 |
| 1 <sup>st</sup> Parameter | 1  | 1            | ↑        | x          | 0  | 0   | 0  | 0     | 0      | VC[2]  | VC[1]  | VC[0]  | xx  |         |              |      |             |      |            |      |            |      |            |      |            |      |            |      |            |      |           |         |       |     |     |     |      |          |        |          |            |      |          |        |            |      |            |      |          |        |          |            |      |            |      |            |      |          |        |          |           |      |           |         |  |          |                                 |
| 2 <sup>nd</sup> Parameter | 1  | 1            | ↑        | x          | 0  | PON | 0  | 0     | 0      | BT[2]  | BT[1]  | BT[0]  | xx  |         |              |      |             |      |            |      |            |      |            |      |            |      |            |      |            |      |           |         |       |     |     |     |      |          |        |          |            |      |          |        |            |      |            |      |          |        |          |            |      |            |      |            |      |          |        |          |           |      |           |         |  |          |                                 |
| 3 <sup>rd</sup> Parameter | 1  | 1            | ↑        | x          | 0  | 0   | 0  | VCIRE | VRH[3] | VRH[2] | VRH[1] | VRH[0] | xx  |         |              |      |             |      |            |      |            |      |            |      |            |      |            |      |            |      |           |         |       |     |     |     |      |          |        |          |            |      |          |        |            |      |            |      |          |        |          |            |      |            |      |            |      |          |        |          |           |      |           |         |  |          |                                 |
| Description               | <p><b>VC[2:0]</b> Sets the ratio factor of Vci to generate the reference voltages Vci1.</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>VC[2:0]</th> <th>Vci1 voltage</th> </tr> </thead> <tbody> <tr> <td>3'h0</td> <td>Stop Output</td> </tr> <tr> <td>3'h1</td> <td>0.70 x Vci</td> </tr> <tr> <td>3'h2</td> <td>0.75 x Vci</td> </tr> <tr> <td>3'h3</td> <td>0.80 x Vci</td> </tr> <tr> <td>3'h4</td> <td>0.85 x Vci</td> </tr> <tr> <td>3'h5</td> <td>0.90 x Vci</td> </tr> <tr> <td>3'h6</td> <td>0.95 x Vci</td> </tr> <tr> <td>3'h7</td> <td>1.0 x Vci</td> </tr> </tbody> </table> <p><b>BT[2:0]</b> Sets the Step up factor and output voltage level from the reference voltages Vci1.</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>BT[2:0]</th> <th>DDVDH</th> <th>VCL</th> <th>VGH</th> <th>VGL</th> </tr> </thead> <tbody> <tr> <td>3'h0</td> <td>Vci1 x 2</td> <td>- Vci1</td> <td rowspan="3">Vci1 x 6</td> <td>- Vci1 x 5</td> </tr> <tr> <td>3'h1</td> <td rowspan="2">Vci1 x 2</td> <td rowspan="2">- Vci1</td> <td>- Vci1 x 4</td> </tr> <tr> <td>3'h2</td> <td>- Vci1 x 3</td> </tr> <tr> <td>3'h3</td> <td rowspan="3">Vci1 x 2</td> <td rowspan="3">- Vci1</td> <td rowspan="3">Vci1 x 5</td> <td>- Vci1 x 5</td> </tr> <tr> <td>3'h4</td> <td>- Vci1 x 4</td> </tr> <tr> <td>3'h5</td> <td>- Vci1 x 3</td> </tr> <tr> <td>3'h6</td> <td rowspan="2">Vci1 x 2</td> <td rowspan="2">- Vci1</td> <td rowspan="2">Vci1 x 4</td> <td>- Vci1 x4</td> </tr> <tr> <td>3'h7</td> <td>- Vci1 x3</td> </tr> </tbody> </table> <p>Note 1: Connect capacitors where required when using DDVDH, VGH, VGL and VCL voltages.<br/>           Note 2: Set following voltages within the respective ranges:<br/>           DDVDH = 6.0V (max)<br/>           VGH = 18.0V (max)<br/>           VGL= -12.5V (max)<br/>           VCL= -3.0V (max).</p> <p><b>PON</b> is used to control the operation to generate VLOUT3.</p> <p>PON=0: Halts the step-up operation to generate VLOUT3.<br/>           PON=1: Starts the step-up operation to generate VLOUT3.</p> <p><b>VRH[3:0]</b>: Sets the factor to generate VREG1OUT from VCILVL.</p> <p><b>VCIRE</b>: Select the external reference voltage Vci or internal reference voltage VCIR.</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>VCIRE=0</td> <td>External reference voltage Vci (default)</td> </tr> <tr> <td>VCIRE =1</td> <td>Internal reference voltage 2.5V</td> </tr> </table> <div style="display: flex; justify-content: space-around; margin-top: 10px;"> <div style="border-top: 1px solid black; width: 40%; text-align: center;">VCIRE =0</div> <div style="border-top: 1px solid black; width: 40%; text-align: center;">VCIR1 =E</div> </div> |              |          |            |    |     |    |       |        |        |        |        |     | VC[2:0] | Vci1 voltage | 3'h0 | Stop Output | 3'h1 | 0.70 x Vci | 3'h2 | 0.75 x Vci | 3'h3 | 0.80 x Vci | 3'h4 | 0.85 x Vci | 3'h5 | 0.90 x Vci | 3'h6 | 0.95 x Vci | 3'h7 | 1.0 x Vci | BT[2:0] | DDVDH | VCL | VGH | VGL | 3'h0 | Vci1 x 2 | - Vci1 | Vci1 x 6 | - Vci1 x 5 | 3'h1 | Vci1 x 2 | - Vci1 | - Vci1 x 4 | 3'h2 | - Vci1 x 3 | 3'h3 | Vci1 x 2 | - Vci1 | Vci1 x 5 | - Vci1 x 5 | 3'h4 | - Vci1 x 4 | 3'h5 | - Vci1 x 3 | 3'h6 | Vci1 x 2 | - Vci1 | Vci1 x 4 | - Vci1 x4 | 3'h7 | - Vci1 x3 | VCIRE=0 | External reference voltage Vci (default) | VCIRE =1 | Internal reference voltage 2.5V |
|                           | VC[2:0]  | Vci1 voltage |          |            |    |     |    |       |        |        |        |        |     |         |              |      |             |      |            |      |            |      |            |      |            |      |            |      |            |      |           |         |       |     |     |     |      |          |        |          |            |      |          |        |            |      |            |      |          |        |          |            |      |            |      |            |      |          |        |          |           |      |           |         |  |          |                                 |
|                           | 3'h0   | Stop Output  |          |            |    |     |    |       |        |        |        |        |     |         |              |      |             |      |            |      |            |      |            |      |            |      |            |      |            |      |           |         |       |     |     |     |      |          |        |          |            |      |          |        |            |      |            |      |          |        |          |            |      |            |      |            |      |          |        |          |           |      |           |         |  |          |                                 |
|                           | 3'h1   | 0.70 x Vci   |          |            |    |     |    |       |        |        |        |        |     |         |              |      |             |      |            |      |            |      |            |      |            |      |            |      |            |      |           |         |       |     |     |     |      |          |        |          |            |      |          |        |            |      |            |      |          |        |          |            |      |            |      |            |      |          |        |          |           |      |           |         |  |          |                                 |
|                           | 3'h2   | 0.75 x Vci   |          |            |    |     |    |       |        |        |        |        |     |         |              |      |             |      |            |      |            |      |            |      |            |      |            |      |            |      |           |         |       |     |     |     |      |          |        |          |            |      |          |        |            |      |            |      |          |        |          |            |      |            |      |            |      |          |        |          |           |      |           |         |  |          |                                 |
|                           | 3'h3   | 0.80 x Vci   |          |            |    |     |    |       |        |        |        |        |     |         |              |      |             |      |            |      |            |      |            |      |            |      |            |      |            |      |           |         |       |     |     |     |      |          |        |          |            |      |          |        |            |      |            |      |          |        |          |            |      |            |      |            |      |          |        |          |           |      |           |         |  |          |                                 |
|                           | 3'h4   | 0.85 x Vci   |          |            |    |     |    |       |        |        |        |        |     |         |              |      |             |      |            |      |            |      |            |      |            |      |            |      |            |      |           |         |       |     |     |     |      |          |        |          |            |      |          |        |            |      |            |      |          |        |          |            |      |            |      |            |      |          |        |          |           |      |           |         |  |          |                                 |
|                           | 3'h5   | 0.90 x Vci   |          |            |    |     |    |       |        |        |        |        |     |         |              |      |             |      |            |      |            |      |            |      |            |      |            |      |            |      |           |         |       |     |     |     |      |          |        |          |            |      |          |        |            |      |            |      |          |        |          |            |      |            |      |            |      |          |        |          |           |      |           |         |  |          |                                 |
|                           | 3'h6   | 0.95 x Vci   |          |            |    |     |    |       |        |        |        |        |     |         |              |      |             |      |            |      |            |      |            |      |            |      |            |      |            |      |           |         |       |     |     |     |      |          |        |          |            |      |          |        |            |      |            |      |          |        |          |            |      |            |      |            |      |          |        |          |           |      |           |         |  |          |                                 |
|                           | 3'h7   | 1.0 x Vci    |          |            |    |     |    |       |        |        |        |        |     |         |              |      |             |      |            |      |            |      |            |      |            |      |            |      |            |      |           |         |       |     |     |     |      |          |        |          |            |      |          |        |            |      |            |      |          |        |          |            |      |            |      |            |      |          |        |          |           |      |           |         |  |          |                                 |
| BT[2:0]                   | DDVDH  | VCL          | VGH      | VGL        |    |     |    |       |        |        |        |        |     |         |              |      |             |      |            |      |            |      |            |      |            |      |            |      |            |      |           |         |       |     |     |     |      |          |        |          |            |      |          |        |            |      |            |      |          |        |          |            |      |            |      |            |      |          |        |          |           |      |           |         |  |          |                                 |
| 3'h0                      | Vci1 x 2   | - Vci1       | Vci1 x 6 | - Vci1 x 5 |    |     |    |       |        |        |        |        |     |         |              |      |             |      |            |      |            |      |            |      |            |      |            |      |            |      |           |         |       |     |     |     |      |          |        |          |            |      |          |        |            |      |            |      |          |        |          |            |      |            |      |            |      |          |        |          |           |      |           |         |  |          |                                 |
| 3'h1                      | Vci1 x 2   | - Vci1       |          | - Vci1 x 4 |    |     |    |       |        |        |        |        |     |         |              |      |             |      |            |      |            |      |            |      |            |      |            |      |            |      |           |         |       |     |     |     |      |          |        |          |            |      |          |        |            |      |            |      |          |        |          |            |      |            |      |            |      |          |        |          |           |      |           |         |  |          |                                 |
| 3'h2                      |  |              |          | - Vci1 x 3 |    |     |    |       |        |        |        |        |     |         |              |      |             |      |            |      |            |      |            |      |            |      |            |      |            |      |           |         |       |     |     |     |      |          |        |          |            |      |          |        |            |      |            |      |          |        |          |            |      |            |      |            |      |          |        |          |           |      |           |         |  |          |                                 |
| 3'h3                      | Vci1 x 2   | - Vci1       | Vci1 x 5 | - Vci1 x 5 |    |     |    |       |        |        |        |        |     |         |              |      |             |      |            |      |            |      |            |      |            |      |            |      |            |      |           |         |       |     |     |     |      |          |        |          |            |      |          |        |            |      |            |      |          |        |          |            |      |            |      |            |      |          |        |          |           |      |           |         |  |          |                                 |
| 3'h4                      |  |              |          | - Vci1 x 4 |    |     |    |       |        |        |        |        |     |         |              |      |             |      |            |      |            |      |            |      |            |      |            |      |            |      |           |         |       |     |     |     |      |          |        |          |            |      |          |        |            |      |            |      |          |        |          |            |      |            |      |            |      |          |        |          |           |      |           |         |  |          |                                 |
| 3'h5                      |  |              |          | - Vci1 x 3 |    |     |    |       |        |        |        |        |     |         |              |      |             |      |            |      |            |      |            |      |            |      |            |      |            |      |           |         |       |     |     |     |      |          |        |          |            |      |          |        |            |      |            |      |          |        |          |            |      |            |      |            |      |          |        |          |           |      |           |         |  |          |                                 |
| 3'h6                      | Vci1 x 2   | - Vci1       | Vci1 x 4 | - Vci1 x4  |    |     |    |       |        |        |        |        |     |         |              |      |             |      |            |      |            |      |            |      |            |      |            |      |            |      |           |         |       |     |     |     |      |          |        |          |            |      |          |        |            |      |            |      |          |        |          |            |      |            |      |            |      |          |        |          |           |      |           |         |  |          |                                 |
| 3'h7                      |  |              |          | - Vci1 x3  |    |     |    |       |        |        |        |        |     |         |              |      |             |      |            |      |            |      |            |      |            |      |            |      |            |      |           |         |       |     |     |     |      |          |        |          |            |      |          |        |            |      |            |      |          |        |          |            |      |            |      |            |      |          |        |          |           |      |           |         |  |          |                                 |
| VCIRE=0                   | External reference voltage Vci (default)   |              |          |            |    |     |    |       |        |        |        |        |     |         |              |      |             |      |            |      |            |      |            |      |            |      |            |      |            |      |           |         |       |     |     |     |      |          |        |          |            |      |          |        |            |      |            |      |          |        |          |            |      |            |      |            |      |          |        |          |           |      |           |         |  |          |                                 |
| VCIRE =1                  | Internal reference voltage 2.5V  |              |          |            |    |     |    |       |        |        |        |        |     |         |              |      |             |      |            |      |            |      |            |      |            |      |            |      |            |      |           |         |       |     |     |     |      |          |        |          |            |      |          |        |            |      |            |      |          |        |          |            |      |            |      |            |      |          |        |          |           |      |           |         |  |          |                                 |

|  | VRH3 | VRH2 | VRH1 | VRH0 | VREG1OUT   | VRH3 | VRH2 | VRH1 | VRH0 | VREG1OUT             |
|--|------|------|------|------|------------|------|------|------|------|----------------------|
|  | 0    | 0    | 0    | 0    | Halt       | 0    | 0    | 0    | 0    | Halt                 |
|  | 0    | 0    | 0    | 1    | Vci x 1.60 | 0    | 0    | 0    | 1    | 2.5V x 1.60 = 4.000V |
|  | 0    | 0    | 1    | 0    | Vci x 1.65 | 0    | 0    | 1    | 0    | 2.5V x 1.65 = 4.125V |
|  | 0    | 0    | 1    | 1    | Vci x 1.70 | 0    | 0    | 1    | 1    | 2.5V x 1.70 = 4.250V |
|  | 0    | 1    | 0    | 0    | Vci x 1.75 | 0    | 1    | 0    | 0    | 2.5V x 1.75 = 4.375V |
|  | 0    | 1    | 0    | 1    | Vci x 1.80 | 0    | 1    | 0    | 1    | 2.5V x 1.80 = 4.500V |
|  | 0    | 1    | 1    | 0    | Vci x 1.85 | 0    | 1    | 1    | 0    | 2.5V x 1.85 = 4.625V |
|  | 0    | 1    | 1    | 1    | Vci x 1.90 | 0    | 1    | 1    | 1    | 2.5V x 1.90 = 4.750V |
|  | 1    | 0    | 0    | 0    | Vci x 1.95 | 1    | 0    | 0    | 0    | 2.5V x 1.95 = 4.875V |
|  | 1    | 0    | 0    | 1    | Vci x 2.00 | 1    | 0    | 0    | 1    | 2.5V x 2.00 = 5.000V |
|  | 1    | 0    | 1    | 0    | Vci x 2.05 | 1    | 0    | 1    | 0    | 2.5V x 2.05 = 5.125V |
|  | 1    | 0    | 1    | 1    | Vci x 2.10 | 1    | 0    | 1    | 1    | 2.5V x 2.10 = 5.250V |
|  | 1    | 1    | 0    | 0    | Vci x 2.20 | 1    | 1    | 0    | 0    | 2.5V x 2.20 = 5.500V |
|  | 1    | 1    | 0    | 1    | Vci x 2.30 | 1    | 1    | 0    | 1    | 2.5V x 2.30 = 5.750V |
|  | 1    | 1    | 1    | 0    | Vci x 2.40 | 1    | 1    | 1    | 0    | 2.5V x 2.40 = 6.000V |
|  | 1    | 1    | 1    | 1    | Vci x 2.40 | 1    | 1    | 1    | 1    | 2.5V x 2.40 = 6.000V |

When VCI<2.5V, Internal reference voltage will be same as VCI.

Make sure that VC[2:0] and VRH[3:0] setting restriction: VREG1OUT ≤ (DDVDH - 0.25)V.

| 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  |
|----------|--|--|
|          | Power On Sequence  | VC[2:0]=3'h0, BT[2:0]=3'h5, VCOMG=1'h0, PON=1'h0; VRH[3:0]=4'h0, VCIRE=1'h0, |
|          | SW Reset   | No change  |
| HW Reset | VC[2:0]=3'h0, BT[2:0]=3'h5, VCOMG=1'h0, PON=1'h0; VRH[3:0]=4'h0, VCIRE=1'h0, |  |

**8.2.48. VCOM Control (D1h)**

| D1H                       | VCOM Control |     |     |       |    |    |        |        |        |        |        |                |     |
|---------------------------|--------------|-----|-----|-------|----|----|--------|--------|--------|--------|--------|----------------|-----|
|                           | D/CX         | RDX | WRX | D17-8 | D7 | D6 | D5     | D4     | D3     | D2     | D1     | D0             | HEX |
| Command                   | 0            | 1   | ↑   | x     | 1  | 1  | 0      | 1      | 0      | 0      | 0      | 1              | D1  |
| 1 <sup>st</sup> Parameter | 1            | 1   | ↑   | x     | 0  | 0  | 0      | 0      | 0      | 0      | 0      | <b>SEL VCM</b> | xx  |
| 2 <sup>nd</sup> Parameter | 1            | 1   | ↑   | x     | 0  | 0  | VCM[5] | VCM[4] | VCM[3] | VCM[2] | VCM[1] | VCM[0]         | xx  |
| 3 <sup>rd</sup> Parameter | 1            | 1   | ↑   | x     | 0  | 0  | 0      | VDV[4] | VDV[3] | VDV[2] | VDV[1] | VDV[0]         | xx  |

**VCM [6:0]** is used to set factor to generate VCOMH voltage from the reference voltage VREG1OUT.

| VCM   | VCOMH Voltage    | VCM   | VCOMH Voltage    |
|-------|------------------|-------|------------------|
| 6'h00 | VREG1OUT x 0.685 | 6'h20 | VREG1OUT x 0.845 |
| 6'h01 | VREG1OUT x 0.690 | 6'h21 | VREG1OUT x 0.850 |
| 6'h02 | VREG1OUT x 0.695 | 6'h22 | VREG1OUT x 0.855 |
| 6'h03 | VREG1OUT x 0.700 | 6'h23 | VREG1OUT x 0.860 |
| 6'h04 | VREG1OUT x 0.705 | 6'h24 | VREG1OUT x 0.865 |
| 6'h05 | VREG1OUT x 0.710 | 6'h25 | VREG1OUT x 0.870 |
| 6'h06 | VREG1OUT x 0.715 | 6'h26 | VREG1OUT x 0.875 |
| 6'h07 | VREG1OUT x 0.720 | 6'h27 | VREG1OUT x 0.880 |
| 6'h08 | VREG1OUT x 0.725 | 6'h28 | VREG1OUT x 0.885 |
| 6'h09 | VREG1OUT x 0.730 | 6'h29 | VREG1OUT x 0.890 |
| 6'h0A | VREG1OUT x 0.735 | 6'h2A | VREG1OUT x 0.895 |
| 6'h0B | VREG1OUT x 0.740 | 6'h2B | VREG1OUT x 0.900 |
| 6'h0C | VREG1OUT x 0.745 | 6'h2C | VREG1OUT x 0.905 |
| 6'h0D | VREG1OUT x 0.750 | 6'h2D | VREG1OUT x 0.910 |
| 6'h0E | VREG1OUT x 0.755 | 6'h2E | VREG1OUT x 0.915 |
| 6'h0F | VREG1OUT x 0.760 | 6'h2F | VREG1OUT x 0.920 |
| 6'h10 | VREG1OUT x 0.765 | 6'h30 | VREG1OUT x 0.925 |
| 6'h11 | VREG1OUT x 0.770 | 6'h31 | VREG1OUT x 0.930 |
| 6'h12 | VREG1OUT x 0.775 | 6'h32 | VREG1OUT x 0.935 |
| 6'h13 | VREG1OUT x 0.780 | 6'h33 | VREG1OUT x 0.940 |
| 6'h14 | VREG1OUT x 0.785 | 6'h34 | VREG1OUT x 0.945 |
| 6'h15 | VREG1OUT x 0.790 | 6'h35 | VREG1OUT x 0.950 |
| 6'h16 | VREG1OUT x 0.795 | 6'h36 | VREG1OUT x 0.955 |
| 6'h17 | VREG1OUT x 0.800 | 6'h37 | VREG1OUT x 0.960 |
| 6'h18 | VREG1OUT x 0.805 | 6'h38 | VREG1OUT x 0.965 |
| 6'h19 | VREG1OUT x 0.810 | 6'h39 | VREG1OUT x 0.970 |
| 6'h1A | VREG1OUT x 0.815 | 6'h3A | VREG1OUT x 0.975 |
| 6'h1B | VREG1OUT x 0.820 | 6'h3B | VREG1OUT x 0.980 |
| 6'h1C | VREG1OUT x 0.825 | 6'h3C | VREG1OUT x 0.985 |
| 6'h1D | VREG1OUT x 0.830 | 6'h3D | VREG1OUT x 0.990 |
| 6'h1E | VREG1OUT x 0.835 | 6'h3E | VREG1OUT x 0.995 |
| 6'h1F | VREG1OUT x 0.840 | 6'h3F | VREG1OUT x 1.000 |

**VDV[4:0]** is used to set the VCOM alternating amplitude in the range of VREG1OUT x 0.70 to VREG1OUT x 1.32.

| VDV[4:0] | VCOM amplitude  | VDV[4:0] | VCOM amplitude  |
|----------|-----------------|----------|-----------------|
| 5'h00    | VREG1OUT x 0.70 | 5'h10    | VREG1OUT x 1.02 |
| 5'h01    | VREG1OUT x 0.72 | 5'h11    | VREG1OUT x 1.04 |
| 5'h02    | VREG1OUT x 0.74 | 5'h12    | VREG1OUT x 1.06 |
| 5'h03    | VREG1OUT x 0.76 | 5'h13    | VREG1OUT x 1.08 |
| 5'h04    | VREG1OUT x 0.78 | 5'h14    | VREG1OUT x 1.10 |
| 5'h05    | VREG1OUT x 0.80 | 5'h15    | VREG1OUT x 1.12 |

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|   | <table border="1"> <tr><td>5'h06</td><td>VREG1OUT x 0.82</td><td>5'h16</td><td>VREG1OUT x 1.14</td></tr> <tr><td>5'h07</td><td>VREG1OUT x 0.84</td><td>5'h17</td><td>VREG1OUT x 1.16</td></tr> <tr><td>5'h08</td><td>VREG1OUT x 0.86</td><td>5'h18</td><td>VREG1OUT x 1.18</td></tr> <tr><td>5'h09</td><td>VREG1OUT x 0.88</td><td>5'h19</td><td>VREG1OUT x 1.20</td></tr> <tr><td>5'h0A</td><td>VREG1OUT x 0.90</td><td>5'h1A</td><td>VREG1OUT x 1.22</td></tr> <tr><td>5'h0B</td><td>VREG1OUT x 0.92</td><td>5'h1B</td><td>VREG1OUT x 1.24</td></tr> <tr><td>5'h0C</td><td>VREG1OUT x 0.94</td><td>5'h1C</td><td>VREG1OUT x 1.26</td></tr> <tr><td>5'h0D</td><td>VREG1OUT x 0.96</td><td>5'h1D</td><td>VREG1OUT x 1.28</td></tr> <tr><td>5'h0E</td><td>VREG1OUT x 0.98</td><td>5'h1E</td><td>VREG1OUT x 1.30</td></tr> <tr><td>5'h0F</td><td>VREG1OUT x 1.00</td><td>5'h1F</td><td>VREG1OUT x 1.32</td></tr> </table> <p style="text-align: center;"><b>Set VDV[4:0] to let VCOM amplitude less than 6V.</b></p> <p><b>SELVCM:</b> Selection the VCM setting.</p> <table border="1"> <tr><td>SELVCM =0</td><td>Register D1h for VCM setting</td></tr> <tr><td>SELVCM =1</td><td>NV Memory selected for VCM setting</td></tr> </table> | 5'h06  | VREG1OUT x 0.82 | 5'h16                                    | VREG1OUT x 1.14                             | 5'h07                                   | VREG1OUT x 0.84 | 5'h17                                     | VREG1OUT x 1.16                             | 5'h08                                    | VREG1OUT x 0.86 | 5'h18    | VREG1OUT x 1.18 | 5'h09 | VREG1OUT x 0.88 | 5'h19 | VREG1OUT x 1.20 | 5'h0A | VREG1OUT x 0.90 | 5'h1A | VREG1OUT x 1.22 | 5'h0B | VREG1OUT x 0.92 | 5'h1B | VREG1OUT x 1.24 | 5'h0C | VREG1OUT x 0.94 | 5'h1C | VREG1OUT x 1.26 | 5'h0D | VREG1OUT x 0.96 | 5'h1D | VREG1OUT x 1.28 | 5'h0E | VREG1OUT x 0.98 | 5'h1E | VREG1OUT x 1.30 | 5'h0F | VREG1OUT x 1.00 | 5'h1F | VREG1OUT x 1.32 | SELVCM =0 | Register D1h for VCM setting | SELVCM =1 | NV Memory selected for VCM setting |
|---|---|--------|-----------------|--|---|---|-----------------|---|---|--|-----------------|----------|-----------------|-------|-----------------|-------|-----------------|-------|-----------------|-------|-----------------|-------|-----------------|-------|-----------------|-------|-----------------|-------|-----------------|-------|-----------------|-------|-----------------|-------|-----------------|-------|-----------------|-------|-----------------|-------|-----------------|-----------|------------------------------|-----------|------------------------------------|
| 5'h06                                     | VREG1OUT x 0.82   | 5'h16  | VREG1OUT x 1.14 |  |   |   |                 |   |   |  |                 |          |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |           |                              |           |                                    |
| 5'h07                                     | VREG1OUT x 0.84   | 5'h17  | VREG1OUT x 1.16 |  |   |   |                 |   |   |  |                 |          |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |           |                              |           |                                    |
| 5'h08                                     | VREG1OUT x 0.86   | 5'h18  | VREG1OUT x 1.18 |  |   |   |                 |   |   |  |                 |          |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |           |                              |           |                                    |
| 5'h09                                     | VREG1OUT x 0.88   | 5'h19  | VREG1OUT x 1.20 |  |   |   |                 |   |   |  |                 |          |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |           |                              |           |                                    |
| 5'h0A                                     | VREG1OUT x 0.90   | 5'h1A  | VREG1OUT x 1.22 |  |   |   |                 |   |   |  |                 |          |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |           |                              |           |                                    |
| 5'h0B                                     | VREG1OUT x 0.92   | 5'h1B  | VREG1OUT x 1.24 |  |   |   |                 |   |   |  |                 |          |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |           |                              |           |                                    |
| 5'h0C                                     | VREG1OUT x 0.94   | 5'h1C  | VREG1OUT x 1.26 |  |   |   |                 |   |   |  |                 |          |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |           |                              |           |                                    |
| 5'h0D                                     | VREG1OUT x 0.96   | 5'h1D  | VREG1OUT x 1.28 |  |   |   |                 |   |   |  |                 |          |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |           |                              |           |                                    |
| 5'h0E                                     | VREG1OUT x 0.98   | 5'h1E  | VREG1OUT x 1.30 |  |   |   |                 |   |   |  |                 |          |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |           |                              |           |                                    |
| 5'h0F                                     | VREG1OUT x 1.00   | 5'h1F  | VREG1OUT x 1.32 |  |   |   |                 |   |   |  |                 |          |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |           |                              |           |                                    |
| SELVCM =0                                 | Register D1h for VCM setting  |        |                 |  |   |   |                 |   |   |  |                 |          |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |           |                              |           |                                    |
| SELVCM =1                                 | NV Memory selected for VCM setting  |        |                 |  |   |   |                 |   |   |  |                 |          |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |           |                              |           |                                    |
| 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>Power On Sequence</td><td>VCM[6:0]=7'h00, VDV[4:0]=5'h00, SELVCM=1'h0</td></tr> <tr><td>SW Reset</td><td>No change</td></tr> <tr><td>HW Reset</td><td>VCM[6:0]=7'h00, VDV[4:0]=5'h00, SELVCM=1'h0</td></tr> </tbody> </table> <p><i>Note: When the VCM NV memory had been programmed, the default value of SELVCM will be set as '1'.</i></p>  | Status | Default Value   | Power On Sequence                        | VCM[6:0]=7'h00, VDV[4:0]=5'h00, SELVCM=1'h0 | SW Reset                                | No change       | HW Reset                                  | VCM[6:0]=7'h00, VDV[4:0]=5'h00, SELVCM=1'h0 |  |                 |          |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |           |                              |           |                                    |
| Status                                    | Default Value   |        |                 |  |   |   |                 |   |   |  |                 |          |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |           |                              |           |                                    |
| Power On Sequence                         | VCM[6:0]=7'h00, VDV[4:0]=5'h00, SELVCM=1'h0   |        |                 |  |   |   |                 |   |   |  |                 |          |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |           |                              |           |                                    |
| SW Reset                                  | No change   |        |                 |  |   |   |                 |   |   |  |                 |          |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |           |                              |           |                                    |
| HW Reset                                  | VCM[6:0]=7'h00, VDV[4:0]=5'h00, SELVCM=1'h0   |        |                 |  |   |   |                 |   |   |  |                 |          |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |           |                              |           |                                    |

### 8.2.49. Power\_Setting for Normal Mode (D2h)

| D2H                       | Power_Setting for Normal Mode  |                        |                         |       |    |         |         |         |    |         |         |         |     |          |                        |  |      |   |                |   |      |  |      |          |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |  |      |      |      |          |      |          |      |          |      |           |      |           |      |           |      |                        |           |  |      |           |      |           |      |           |      |            |      |            |      |            |      |                   |      |                        |
|---------------------------|--|------------------------|-------------------------|-------|----|---------|---------|---------|----|---------|---------|---------|-----|----------|------------------------|--|------|---|----------------|---|------|--|------|----------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----------|--|------|------|------|----------|------|----------|------|----------|------|-----------|------|-----------|------|-----------|------|------------------------|-----------|--|------|-----------|------|-----------|------|-----------|------|------------|------|------------|------|------------|------|-------------------|------|------------------------|
|                           | D/CX   | RDX                    | WRX                     | D17-8 | D7 | D6      | D5      | D4      | D3 | D2      | D1      | D0      | HEX |          |                        |  |      |   |                |   |      |  |      |          |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |  |      |      |      |          |      |          |      |          |      |           |      |           |      |           |      |                        |           |  |      |           |      |           |      |           |      |            |      |            |      |            |      |                   |      |                        |
| Command                   | 0  | 1                      | ↑                       | x     | 1  | 1       | 0       | 1       | 0  | 0       | 1       | 0       | D2  |          |                        |  |      |   |                |   |      |  |      |          |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |  |      |      |      |          |      |          |      |          |      |           |      |           |      |           |      |                        |           |  |      |           |      |           |      |           |      |            |      |            |      |            |      |                   |      |                        |
| 1 <sup>st</sup> Parameter | 1  | 1                      | ↑                       | x     | 0  | 0       | 0       | 0       | 0  | AP0[2]  | AP0[1]  | AP0[0]  | xx  |          |                        |  |      |   |                |   |      |  |      |          |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |  |      |      |      |          |      |          |      |          |      |           |      |           |      |           |      |                        |           |  |      |           |      |           |      |           |      |            |      |            |      |            |      |                   |      |                        |
| 2 <sup>nd</sup> Parameter | 1  | 1                      | ↑                       | x     | 0  | DC10[2] | DC10[1] | DC10[0] | 0  | DC00[2] | DC00[1] | DC00[0] | xx  |          |                        |  |      |   |                |   |      |  |      |          |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |  |      |      |      |          |      |          |      |          |      |           |      |           |      |           |      |                        |           |  |      |           |      |           |      |           |      |            |      |            |      |            |      |                   |      |                        |
| Description               | <p><b>AP0[2:0]</b></p> <p>AP0 bit is used to adjust the constant current in the operational amplifier circuit in the LCD power supply circuit. Larger constant current enhances the drivability of the LCD, but it also increases the current consumption. Adjust the constant current taking the trade-off between the display quality and the current consumption into account. In no-display period, set AP=3'h0 to halt the operational amplifier circuit and the step-up circuits to reduce current consumption.</p> <table border="1"> <thead> <tr> <th>AP0[2:0]</th> <th>Gamma Driver Amplifier</th> <th>Source Driver Amplifier</th> </tr> </thead> <tbody> <tr><td>3'h0</td><td>Halt operation</td><td>Halt operation</td></tr> <tr><td>3'h1</td><td>1.00</td><td>1.00</td></tr> <tr><td>3'h2</td><td>1.00</td><td>0.75</td></tr> <tr><td>3'h3</td><td>1.00</td><td>0.50</td></tr> <tr><td>3'h4</td><td>0.75</td><td>1.00</td></tr> <tr><td>3'h5</td><td>0.75</td><td>0.75</td></tr> <tr><td>3'h6</td><td>0.75</td><td>0.50</td></tr> <tr><td>3'h7</td><td>0.50</td><td>0.50</td></tr> </tbody> </table> <p><b>DC00[2:0], DC10[2:0]</b></p> <p>DC00/DC10 are used to select the charge-pump frequency of circuit and circuit2.</p> <table border="1"> <thead> <tr> <th>DC00[1:0]</th> <th>Step-up circuit 1 clock frequency (fDCDC1)</th> </tr> </thead> <tbody> <tr><td>2'h0</td><td>Fosc</td></tr> <tr><td>2'h1</td><td>Fosc / 2</td></tr> <tr><td>2'h2</td><td>Fosc / 4</td></tr> <tr><td>2'h3</td><td>Fosc / 8</td></tr> <tr><td>2'h4</td><td>Fosc / 16</td></tr> <tr><td>2'h5</td><td>Fosc / 32</td></tr> <tr><td>2'h6</td><td>Fosc / 64</td></tr> <tr><td>2'h7</td><td>Halt step-up circuit 1</td></tr> </tbody> </table> <table border="1"> <thead> <tr> <th>DC10[1:0]</th> <th>Step-up circuit 2 clock frequency (fDCDC2)</th> </tr> </thead> <tbody> <tr><td>2'h0</td><td>Fosc / 16</td></tr> <tr><td>2'h1</td><td>Fosc / 32</td></tr> <tr><td>2'h2</td><td>Fosc / 64</td></tr> <tr><td>2'h3</td><td>Fosc / 128</td></tr> <tr><td>2'h4</td><td>Fosc / 256</td></tr> <tr><td>2'h5</td><td>Fosc / 512</td></tr> <tr><td>2'h6</td><td>Setting inhibited</td></tr> <tr><td>2'h7</td><td>Halt step-up circuit 2</td></tr> </tbody> </table> |                        |                         |       |    |         |         |         |    |         |         |         |     | AP0[2:0] | Gamma Driver Amplifier | Source Driver Amplifier                  | 3'h0 | Halt operation                          | Halt operation | 3'h1                                      | 1.00 | 1.00                                     | 3'h2 | 1.00     | 0.75 | 3'h3 | 1.00 | 0.50 | 3'h4 | 0.75 | 1.00 | 3'h5 | 0.75 | 0.75 | 3'h6 | 0.75 | 0.50 | 3'h7 | 0.50 | 0.50 | DC00[1:0] | Step-up circuit 1 clock frequency (fDCDC1) | 2'h0 | Fosc | 2'h1 | Fosc / 2 | 2'h2 | Fosc / 4 | 2'h3 | Fosc / 8 | 2'h4 | Fosc / 16 | 2'h5 | Fosc / 32 | 2'h6 | Fosc / 64 | 2'h7 | Halt step-up circuit 1 | DC10[1:0] | Step-up circuit 2 clock frequency (fDCDC2) | 2'h0 | Fosc / 16 | 2'h1 | Fosc / 32 | 2'h2 | Fosc / 64 | 2'h3 | Fosc / 128 | 2'h4 | Fosc / 256 | 2'h5 | Fosc / 512 | 2'h6 | Setting inhibited | 2'h7 | Halt step-up circuit 2 |
|                           | AP0[2:0]   | Gamma Driver Amplifier | Source Driver Amplifier |       |    |         |         |         |    |         |         |         |     |          |                        |  |      |   |                |   |      |  |      |          |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |  |      |      |      |          |      |          |      |          |      |           |      |           |      |           |      |                        |           |  |      |           |      |           |      |           |      |            |      |            |      |            |      |                   |      |                        |
|                           | 3'h0   | Halt operation         | Halt operation          |       |    |         |         |         |    |         |         |         |     |          |                        |  |      |   |                |   |      |  |      |          |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |  |      |      |      |          |      |          |      |          |      |           |      |           |      |           |      |                        |           |  |      |           |      |           |      |           |      |            |      |            |      |            |      |                   |      |                        |
|                           | 3'h1   | 1.00                   | 1.00                    |       |    |         |         |         |    |         |         |         |     |          |                        |  |      |   |                |   |      |  |      |          |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |  |      |      |      |          |      |          |      |          |      |           |      |           |      |           |      |                        |           |  |      |           |      |           |      |           |      |            |      |            |      |            |      |                   |      |                        |
| 3'h2                      | 1.00   | 0.75                   |                         |       |    |         |         |         |    |         |         |         |     |          |                        |  |      |   |                |   |      |  |      |          |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |  |      |      |      |          |      |          |      |          |      |           |      |           |      |           |      |                        |           |  |      |           |      |           |      |           |      |            |      |            |      |            |      |                   |      |                        |
| 3'h3                      | 1.00   | 0.50                   |                         |       |    |         |         |         |    |         |         |         |     |          |                        |  |      |   |                |   |      |  |      |          |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |  |      |      |      |          |      |          |      |          |      |           |      |           |      |           |      |                        |           |  |      |           |      |           |      |           |      |            |      |            |      |            |      |                   |      |                        |
| 3'h4                      | 0.75   | 1.00                   |                         |       |    |         |         |         |    |         |         |         |     |          |                        |  |      |   |                |   |      |  |      |          |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |  |      |      |      |          |      |          |      |          |      |           |      |           |      |           |      |                        |           |  |      |           |      |           |      |           |      |            |      |            |      |            |      |                   |      |                        |
| 3'h5                      | 0.75   | 0.75                   |                         |       |    |         |         |         |    |         |         |         |     |          |                        |  |      |   |                |   |      |  |      |          |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |  |      |      |      |          |      |          |      |          |      |           |      |           |      |           |      |                        |           |  |      |           |      |           |      |           |      |            |      |            |      |            |      |                   |      |                        |
| 3'h6                      | 0.75   | 0.50                   |                         |       |    |         |         |         |    |         |         |         |     |          |                        |  |      |   |                |   |      |  |      |          |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |  |      |      |      |          |      |          |      |          |      |           |      |           |      |           |      |                        |           |  |      |           |      |           |      |           |      |            |      |            |      |            |      |                   |      |                        |
| 3'h7                      | 0.50   | 0.50                   |                         |       |    |         |         |         |    |         |         |         |     |          |                        |  |      |   |                |   |      |  |      |          |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |  |      |      |      |          |      |          |      |          |      |           |      |           |      |           |      |                        |           |  |      |           |      |           |      |           |      |            |      |            |      |            |      |                   |      |                        |
| DC00[1:0]                 | Step-up circuit 1 clock frequency (fDCDC1)   |                        |                         |       |    |         |         |         |    |         |         |         |     |          |                        |  |      |   |                |   |      |  |      |          |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |  |      |      |      |          |      |          |      |          |      |           |      |           |      |           |      |                        |           |  |      |           |      |           |      |           |      |            |      |            |      |            |      |                   |      |                        |
| 2'h0                      | Fosc   |                        |                         |       |    |         |         |         |    |         |         |         |     |          |                        |  |      |   |                |   |      |  |      |          |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |  |      |      |      |          |      |          |      |          |      |           |      |           |      |           |      |                        |           |  |      |           |      |           |      |           |      |            |      |            |      |            |      |                   |      |                        |
| 2'h1                      | Fosc / 2   |                        |                         |       |    |         |         |         |    |         |         |         |     |          |                        |  |      |   |                |   |      |  |      |          |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |  |      |      |      |          |      |          |      |          |      |           |      |           |      |           |      |                        |           |  |      |           |      |           |      |           |      |            |      |            |      |            |      |                   |      |                        |
| 2'h2                      | Fosc / 4   |                        |                         |       |    |         |         |         |    |         |         |         |     |          |                        |  |      |   |                |   |      |  |      |          |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |  |      |      |      |          |      |          |      |          |      |           |      |           |      |           |      |                        |           |  |      |           |      |           |      |           |      |            |      |            |      |            |      |                   |      |                        |
| 2'h3                      | Fosc / 8   |                        |                         |       |    |         |         |         |    |         |         |         |     |          |                        |  |      |   |                |   |      |  |      |          |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |  |      |      |      |          |      |          |      |          |      |           |      |           |      |           |      |                        |           |  |      |           |      |           |      |           |      |            |      |            |      |            |      |                   |      |                        |
| 2'h4                      | Fosc / 16  |                        |                         |       |    |         |         |         |    |         |         |         |     |          |                        |  |      |   |                |   |      |  |      |          |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |  |      |      |      |          |      |          |      |          |      |           |      |           |      |           |      |                        |           |  |      |           |      |           |      |           |      |            |      |            |      |            |      |                   |      |                        |
| 2'h5                      | Fosc / 32  |                        |                         |       |    |         |         |         |    |         |         |         |     |          |                        |  |      |   |                |   |      |  |      |          |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |  |      |      |      |          |      |          |      |          |      |           |      |           |      |           |      |                        |           |  |      |           |      |           |      |           |      |            |      |            |      |            |      |                   |      |                        |
| 2'h6                      | Fosc / 64  |                        |                         |       |    |         |         |         |    |         |         |         |     |          |                        |  |      |   |                |   |      |  |      |          |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |  |      |      |      |          |      |          |      |          |      |           |      |           |      |           |      |                        |           |  |      |           |      |           |      |           |      |            |      |            |      |            |      |                   |      |                        |
| 2'h7                      | Halt step-up circuit 1   |                        |                         |       |    |         |         |         |    |         |         |         |     |          |                        |  |      |   |                |   |      |  |      |          |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |  |      |      |      |          |      |          |      |          |      |           |      |           |      |           |      |                        |           |  |      |           |      |           |      |           |      |            |      |            |      |            |      |                   |      |                        |
| DC10[1:0]                 | Step-up circuit 2 clock frequency (fDCDC2)   |                        |                         |       |    |         |         |         |    |         |         |         |     |          |                        |  |      |   |                |   |      |  |      |          |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |  |      |      |      |          |      |          |      |          |      |           |      |           |      |           |      |                        |           |  |      |           |      |           |      |           |      |            |      |            |      |            |      |                   |      |                        |
| 2'h0                      | Fosc / 16  |                        |                         |       |    |         |         |         |    |         |         |         |     |          |                        |  |      |   |                |   |      |  |      |          |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |  |      |      |      |          |      |          |      |          |      |           |      |           |      |           |      |                        |           |  |      |           |      |           |      |           |      |            |      |            |      |            |      |                   |      |                        |
| 2'h1                      | Fosc / 32  |                        |                         |       |    |         |         |         |    |         |         |         |     |          |                        |  |      |   |                |   |      |  |      |          |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |  |      |      |      |          |      |          |      |          |      |           |      |           |      |           |      |                        |           |  |      |           |      |           |      |           |      |            |      |            |      |            |      |                   |      |                        |
| 2'h2                      | Fosc / 64  |                        |                         |       |    |         |         |         |    |         |         |         |     |          |                        |  |      |   |                |   |      |  |      |          |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |  |      |      |      |          |      |          |      |          |      |           |      |           |      |           |      |                        |           |  |      |           |      |           |      |           |      |            |      |            |      |            |      |                   |      |                        |
| 2'h3                      | Fosc / 128   |                        |                         |       |    |         |         |         |    |         |         |         |     |          |                        |  |      |   |                |   |      |  |      |          |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |  |      |      |      |          |      |          |      |          |      |           |      |           |      |           |      |                        |           |  |      |           |      |           |      |           |      |            |      |            |      |            |      |                   |      |                        |
| 2'h4                      | Fosc / 256   |                        |                         |       |    |         |         |         |    |         |         |         |     |          |                        |  |      |   |                |   |      |  |      |          |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |  |      |      |      |          |      |          |      |          |      |           |      |           |      |           |      |                        |           |  |      |           |      |           |      |           |      |            |      |            |      |            |      |                   |      |                        |
| 2'h5                      | Fosc / 512   |                        |                         |       |    |         |         |         |    |         |         |         |     |          |                        |  |      |   |                |   |      |  |      |          |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |  |      |      |      |          |      |          |      |          |      |           |      |           |      |           |      |                        |           |  |      |           |      |           |      |           |      |            |      |            |      |            |      |                   |      |                        |
| 2'h6                      | Setting inhibited  |                        |                         |       |    |         |         |         |    |         |         |         |     |          |                        |  |      |   |                |   |      |  |      |          |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |  |      |      |      |          |      |          |      |          |      |           |      |           |      |           |      |                        |           |  |      |           |      |           |      |           |      |            |      |            |      |            |      |                   |      |                        |
| 2'h7                      | Halt step-up circuit 2   |                        |                         |       |    |         |         |         |    |         |         |         |     |          |                        |  |      |   |                |   |      |  |      |          |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |  |      |      |      |          |      |          |      |          |      |           |      |           |      |           |      |                        |           |  |      |           |      |           |      |           |      |            |      |            |      |            |      |                   |      |                        |
| 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  |                        |                         |       |    |         |         |         |    |         |         |         |     |          |                        |  |      |   |                |   |      |  |      |          |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |  |      |      |      |          |      |          |      |          |      |           |      |           |      |           |      |                        |           |  |      |           |      |           |      |           |      |            |      |            |      |            |      |                   |      |                        |

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|         |                   |   |
|---------|-------------------|---|
| Default | <b>Status</b>     | <b>Default Value</b>                          |
|         | Power On Sequence | AP0[2:0]=3'h0, DC10[2:0]=3'h7, DC00[2:0]=3'h7 |
|         | SW Reset          | No change                                     |
|         | HW Reset          | AP0[2:0]=3'h0, DC10[2:0]=3'h7, DC00[2:0]=3'h7 |

### 8.2.50. Power\_Setting for Partial Mode (D3h)

| D3H                       | Power_Setting for Partial Mode  |                        |                         |       |    |         |         |         |    |         |         |         |     |          |                        |  |      |   |                |   |      |  |      |          |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |  |      |      |      |          |      |          |      |          |      |           |      |           |      |           |      |                        |           |  |      |           |      |           |      |           |      |            |      |            |      |            |      |                   |      |                        |
|---------------------------|---|------------------------|-------------------------|-------|----|---------|---------|---------|----|---------|---------|---------|-----|----------|------------------------|--|------|---|----------------|---|------|--|------|----------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----------|--|------|------|------|----------|------|----------|------|----------|------|-----------|------|-----------|------|-----------|------|------------------------|-----------|--|------|-----------|------|-----------|------|-----------|------|------------|------|------------|------|------------|------|-------------------|------|------------------------|
|                           | D/CX  | RDX                    | WRX                     | D17-8 | D7 | D6      | D5      | D4      | D3 | D2      | D1      | D0      | HEX |          |                        |  |      |   |                |   |      |  |      |          |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |  |      |      |      |          |      |          |      |          |      |           |      |           |      |           |      |                        |           |  |      |           |      |           |      |           |      |            |      |            |      |            |      |                   |      |                        |
| Command                   | 0   | 1                      | ↑                       | x     | 1  | 1       | 0       | 1       | 0  | 0       | 1       | 1       | D3  |          |                        |  |      |   |                |   |      |  |      |          |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |  |      |      |      |          |      |          |      |          |      |           |      |           |      |           |      |                        |           |  |      |           |      |           |      |           |      |            |      |            |      |            |      |                   |      |                        |
| 1 <sup>st</sup> Parameter | 1   | 1                      | ↑                       | x     | 0  | 0       | 0       | 0       | 0  | AP1[2]  | AP1[1]  | AP1[0]  | xx  |          |                        |  |      |   |                |   |      |  |      |          |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |  |      |      |      |          |      |          |      |          |      |           |      |           |      |           |      |                        |           |  |      |           |      |           |      |           |      |            |      |            |      |            |      |                   |      |                        |
| 2 <sup>nd</sup> Parameter | 1   | 1                      | ↑                       | x     | 0  | DC11[2] | DC11[1] | DC11[0] | 0  | DC01[2] | DC01[1] | DC01[0] | xx  |          |                        |  |      |   |                |   |      |  |      |          |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |  |      |      |      |          |      |          |      |          |      |           |      |           |      |           |      |                        |           |  |      |           |      |           |      |           |      |            |      |            |      |            |      |                   |      |                        |
| Description               | <p><b>AP1[2:0]</b></p> <p>AP1 bit is used to adjust the constant current in the operational amplifier circuit in the LCD power supply circuit. Larger constant current enhances the drivability of the LCD, but it also increases the current consumption. Adjust the constant current taking the trade-off between the display quality and the current consumption into account. In no-display period, set AP1=3'h0 to halt the operational amplifier circuit and the step-up circuits to reduce current consumption.</p> <table border="1"> <thead> <tr> <th>AP1[2:0]</th> <th>Gamma Driver Amplifier</th> <th>Source Driver Amplifier</th> </tr> </thead> <tbody> <tr><td>3'h0</td><td>Halt operation</td><td>Halt operation</td></tr> <tr><td>3'h1</td><td>1.00</td><td>1.00</td></tr> <tr><td>3'h2</td><td>1.00</td><td>0.75</td></tr> <tr><td>3'h3</td><td>1.00</td><td>0.50</td></tr> <tr><td>3'h4</td><td>0.75</td><td>1.00</td></tr> <tr><td>3'h5</td><td>0.75</td><td>0.75</td></tr> <tr><td>3'h6</td><td>0.75</td><td>0.50</td></tr> <tr><td>3'h7</td><td>0.50</td><td>0.50</td></tr> </tbody> </table> <p><b>DC01[2:0], DC11[2:0]</b></p> <p>DC01/DC11 are used to select the charge-pump frequency of circuit and circuit2.</p> <table border="1"> <thead> <tr> <th>DC01[1:0]</th> <th>Step-up circuit 1 clock frequency (fDCDC1)</th> </tr> </thead> <tbody> <tr><td>2'h0</td><td>Fosc</td></tr> <tr><td>2'h1</td><td>Fosc / 2</td></tr> <tr><td>2'h2</td><td>Fosc / 4</td></tr> <tr><td>2'h3</td><td>Fosc / 8</td></tr> <tr><td>2'h4</td><td>Fosc / 16</td></tr> <tr><td>2'h5</td><td>Fosc / 32</td></tr> <tr><td>2'h6</td><td>Fosc / 64</td></tr> <tr><td>2'h7</td><td>Halt step-up circuit 1</td></tr> </tbody> </table> <table border="1"> <thead> <tr> <th>DC11[1:0]</th> <th>Step-up circuit 2 clock frequency (fDCDC2)</th> </tr> </thead> <tbody> <tr><td>2'h0</td><td>Fosc / 16</td></tr> <tr><td>2'h1</td><td>Fosc / 32</td></tr> <tr><td>2'h2</td><td>Fosc / 64</td></tr> <tr><td>2'h3</td><td>Fosc / 128</td></tr> <tr><td>2'h4</td><td>Fosc / 256</td></tr> <tr><td>2'h5</td><td>Fosc / 512</td></tr> <tr><td>2'h6</td><td>Setting inhibited</td></tr> <tr><td>2'h7</td><td>Halt step-up circuit 2</td></tr> </tbody> </table> |                        |                         |       |    |         |         |         |    |         |         |         |     | AP1[2:0] | Gamma Driver Amplifier | Source Driver Amplifier                  | 3'h0 | Halt operation                          | Halt operation | 3'h1                                      | 1.00 | 1.00                                     | 3'h2 | 1.00     | 0.75 | 3'h3 | 1.00 | 0.50 | 3'h4 | 0.75 | 1.00 | 3'h5 | 0.75 | 0.75 | 3'h6 | 0.75 | 0.50 | 3'h7 | 0.50 | 0.50 | DC01[1:0] | Step-up circuit 1 clock frequency (fDCDC1) | 2'h0 | Fosc | 2'h1 | Fosc / 2 | 2'h2 | Fosc / 4 | 2'h3 | Fosc / 8 | 2'h4 | Fosc / 16 | 2'h5 | Fosc / 32 | 2'h6 | Fosc / 64 | 2'h7 | Halt step-up circuit 1 | DC11[1:0] | Step-up circuit 2 clock frequency (fDCDC2) | 2'h0 | Fosc / 16 | 2'h1 | Fosc / 32 | 2'h2 | Fosc / 64 | 2'h3 | Fosc / 128 | 2'h4 | Fosc / 256 | 2'h5 | Fosc / 512 | 2'h6 | Setting inhibited | 2'h7 | Halt step-up circuit 2 |
|                           | AP1[2:0]  | Gamma Driver Amplifier | Source Driver Amplifier |       |    |         |         |         |    |         |         |         |     |          |                        |  |      |   |                |   |      |  |      |          |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |  |      |      |      |          |      |          |      |          |      |           |      |           |      |           |      |                        |           |  |      |           |      |           |      |           |      |            |      |            |      |            |      |                   |      |                        |
|                           | 3'h0  | Halt operation         | Halt operation          |       |    |         |         |         |    |         |         |         |     |          |                        |  |      |   |                |   |      |  |      |          |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |  |      |      |      |          |      |          |      |          |      |           |      |           |      |           |      |                        |           |  |      |           |      |           |      |           |      |            |      |            |      |            |      |                   |      |                        |
|                           | 3'h1  | 1.00                   | 1.00                    |       |    |         |         |         |    |         |         |         |     |          |                        |  |      |   |                |   |      |  |      |          |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |  |      |      |      |          |      |          |      |          |      |           |      |           |      |           |      |                        |           |  |      |           |      |           |      |           |      |            |      |            |      |            |      |                   |      |                        |
| 3'h2                      | 1.00  | 0.75                   |                         |       |    |         |         |         |    |         |         |         |     |          |                        |  |      |   |                |   |      |  |      |          |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |  |      |      |      |          |      |          |      |          |      |           |      |           |      |           |      |                        |           |  |      |           |      |           |      |           |      |            |      |            |      |            |      |                   |      |                        |
| 3'h3                      | 1.00  | 0.50                   |                         |       |    |         |         |         |    |         |         |         |     |          |                        |  |      |   |                |   |      |  |      |          |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |  |      |      |      |          |      |          |      |          |      |           |      |           |      |           |      |                        |           |  |      |           |      |           |      |           |      |            |      |            |      |            |      |                   |      |                        |
| 3'h4                      | 0.75  | 1.00                   |                         |       |    |         |         |         |    |         |         |         |     |          |                        |  |      |   |                |   |      |  |      |          |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |  |      |      |      |          |      |          |      |          |      |           |      |           |      |           |      |                        |           |  |      |           |      |           |      |           |      |            |      |            |      |            |      |                   |      |                        |
| 3'h5                      | 0.75  | 0.75                   |                         |       |    |         |         |         |    |         |         |         |     |          |                        |  |      |   |                |   |      |  |      |          |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |  |      |      |      |          |      |          |      |          |      |           |      |           |      |           |      |                        |           |  |      |           |      |           |      |           |      |            |      |            |      |            |      |                   |      |                        |
| 3'h6                      | 0.75  | 0.50                   |                         |       |    |         |         |         |    |         |         |         |     |          |                        |  |      |   |                |   |      |  |      |          |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |  |      |      |      |          |      |          |      |          |      |           |      |           |      |           |      |                        |           |  |      |           |      |           |      |           |      |            |      |            |      |            |      |                   |      |                        |
| 3'h7                      | 0.50  | 0.50                   |                         |       |    |         |         |         |    |         |         |         |     |          |                        |  |      |   |                |   |      |  |      |          |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |  |      |      |      |          |      |          |      |          |      |           |      |           |      |           |      |                        |           |  |      |           |      |           |      |           |      |            |      |            |      |            |      |                   |      |                        |
| DC01[1:0]                 | Step-up circuit 1 clock frequency (fDCDC1)  |                        |                         |       |    |         |         |         |    |         |         |         |     |          |                        |  |      |   |                |   |      |  |      |          |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |  |      |      |      |          |      |          |      |          |      |           |      |           |      |           |      |                        |           |  |      |           |      |           |      |           |      |            |      |            |      |            |      |                   |      |                        |
| 2'h0                      | Fosc  |                        |                         |       |    |         |         |         |    |         |         |         |     |          |                        |  |      |   |                |   |      |  |      |          |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |  |      |      |      |          |      |          |      |          |      |           |      |           |      |           |      |                        |           |  |      |           |      |           |      |           |      |            |      |            |      |            |      |                   |      |                        |
| 2'h1                      | Fosc / 2  |                        |                         |       |    |         |         |         |    |         |         |         |     |          |                        |  |      |   |                |   |      |  |      |          |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |  |      |      |      |          |      |          |      |          |      |           |      |           |      |           |      |                        |           |  |      |           |      |           |      |           |      |            |      |            |      |            |      |                   |      |                        |
| 2'h2                      | Fosc / 4  |                        |                         |       |    |         |         |         |    |         |         |         |     |          |                        |  |      |   |                |   |      |  |      |          |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |  |      |      |      |          |      |          |      |          |      |           |      |           |      |           |      |                        |           |  |      |           |      |           |      |           |      |            |      |            |      |            |      |                   |      |                        |
| 2'h3                      | Fosc / 8  |                        |                         |       |    |         |         |         |    |         |         |         |     |          |                        |  |      |   |                |   |      |  |      |          |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |  |      |      |      |          |      |          |      |          |      |           |      |           |      |           |      |                        |           |  |      |           |      |           |      |           |      |            |      |            |      |            |      |                   |      |                        |
| 2'h4                      | Fosc / 16   |                        |                         |       |    |         |         |         |    |         |         |         |     |          |                        |  |      |   |                |   |      |  |      |          |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |  |      |      |      |          |      |          |      |          |      |           |      |           |      |           |      |                        |           |  |      |           |      |           |      |           |      |            |      |            |      |            |      |                   |      |                        |
| 2'h5                      | Fosc / 32   |                        |                         |       |    |         |         |         |    |         |         |         |     |          |                        |  |      |   |                |   |      |  |      |          |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |  |      |      |      |          |      |          |      |          |      |           |      |           |      |           |      |                        |           |  |      |           |      |           |      |           |      |            |      |            |      |            |      |                   |      |                        |
| 2'h6                      | Fosc / 64   |                        |                         |       |    |         |         |         |    |         |         |         |     |          |                        |  |      |   |                |   |      |  |      |          |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |  |      |      |      |          |      |          |      |          |      |           |      |           |      |           |      |                        |           |  |      |           |      |           |      |           |      |            |      |            |      |            |      |                   |      |                        |
| 2'h7                      | Halt step-up circuit 1  |                        |                         |       |    |         |         |         |    |         |         |         |     |          |                        |  |      |   |                |   |      |  |      |          |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |  |      |      |      |          |      |          |      |          |      |           |      |           |      |           |      |                        |           |  |      |           |      |           |      |           |      |            |      |            |      |            |      |                   |      |                        |
| DC11[1:0]                 | Step-up circuit 2 clock frequency (fDCDC2)  |                        |                         |       |    |         |         |         |    |         |         |         |     |          |                        |  |      |   |                |   |      |  |      |          |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |  |      |      |      |          |      |          |      |          |      |           |      |           |      |           |      |                        |           |  |      |           |      |           |      |           |      |            |      |            |      |            |      |                   |      |                        |
| 2'h0                      | Fosc / 16   |                        |                         |       |    |         |         |         |    |         |         |         |     |          |                        |  |      |   |                |   |      |  |      |          |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |  |      |      |      |          |      |          |      |          |      |           |      |           |      |           |      |                        |           |  |      |           |      |           |      |           |      |            |      |            |      |            |      |                   |      |                        |
| 2'h1                      | Fosc / 32   |                        |                         |       |    |         |         |         |    |         |         |         |     |          |                        |  |      |   |                |   |      |  |      |          |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |  |      |      |      |          |      |          |      |          |      |           |      |           |      |           |      |                        |           |  |      |           |      |           |      |           |      |            |      |            |      |            |      |                   |      |                        |
| 2'h2                      | Fosc / 64   |                        |                         |       |    |         |         |         |    |         |         |         |     |          |                        |  |      |   |                |   |      |  |      |          |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |  |      |      |      |          |      |          |      |          |      |           |      |           |      |           |      |                        |           |  |      |           |      |           |      |           |      |            |      |            |      |            |      |                   |      |                        |
| 2'h3                      | Fosc / 128  |                        |                         |       |    |         |         |         |    |         |         |         |     |          |                        |  |      |   |                |   |      |  |      |          |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |  |      |      |      |          |      |          |      |          |      |           |      |           |      |           |      |                        |           |  |      |           |      |           |      |           |      |            |      |            |      |            |      |                   |      |                        |
| 2'h4                      | Fosc / 256  |                        |                         |       |    |         |         |         |    |         |         |         |     |          |                        |  |      |   |                |   |      |  |      |          |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |  |      |      |      |          |      |          |      |          |      |           |      |           |      |           |      |                        |           |  |      |           |      |           |      |           |      |            |      |            |      |            |      |                   |      |                        |
| 2'h5                      | Fosc / 512  |                        |                         |       |    |         |         |         |    |         |         |         |     |          |                        |  |      |   |                |   |      |  |      |          |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |  |      |      |      |          |      |          |      |          |      |           |      |           |      |           |      |                        |           |  |      |           |      |           |      |           |      |            |      |            |      |            |      |                   |      |                        |
| 2'h6                      | Setting inhibited   |                        |                         |       |    |         |         |         |    |         |         |         |     |          |                        |  |      |   |                |   |      |  |      |          |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |  |      |      |      |          |      |          |      |          |      |           |      |           |      |           |      |                        |           |  |      |           |      |           |      |           |      |            |      |            |      |            |      |                   |      |                        |
| 2'h7                      | Halt step-up circuit 2  |                        |                         |       |    |         |         |         |    |         |         |         |     |          |                        |  |      |   |                |   |      |  |      |          |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |  |      |      |      |          |      |          |      |          |      |           |      |           |      |           |      |                        |           |  |      |           |      |           |      |           |      |            |      |            |      |            |      |                   |      |                        |
| 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 | <b>Status</b>     | <b>Default Value</b>                          |
|         | Power On Sequence | AP1[2:0]=3'h0, DC11[2:0]=3'h7, DC01[2:0]=3'h7 |
|         | SW Reset          | No change                                     |
|         | HW Reset          | AP1[2:0]=3'h0, DC11[2:0]=3'h7, DC01[2:0]=3'h7 |

**8.2.51. Power\_Setting for Idle Mode (D4h)**

| D4H                       | Power_Setting for Idle Mode   |                        |                         |       |    |         |         |         |    |         |         |         |     |          |                        |  |      |   |                |   |      |  |      |          |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |  |      |      |      |          |      |          |      |          |      |           |      |           |      |           |      |                        |           |  |      |           |      |           |      |           |      |            |      |            |      |            |      |                   |      |                        |
|---------------------------|---|------------------------|-------------------------|-------|----|---------|---------|---------|----|---------|---------|---------|-----|----------|------------------------|--|------|---|----------------|---|------|--|------|----------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----------|--|------|------|------|----------|------|----------|------|----------|------|-----------|------|-----------|------|-----------|------|------------------------|-----------|--|------|-----------|------|-----------|------|-----------|------|------------|------|------------|------|------------|------|-------------------|------|------------------------|
|                           | D/CX  | RDX                    | WRX                     | D17-8 | D7 | D6      | D5      | D4      | D3 | D2      | D1      | D0      | HEX |          |                        |  |      |   |                |   |      |  |      |          |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |  |      |      |      |          |      |          |      |          |      |           |      |           |      |           |      |                        |           |  |      |           |      |           |      |           |      |            |      |            |      |            |      |                   |      |                        |
| Command                   | 0   | 1                      | ↑                       | x     | 1  | 1       | 0       | 1       | 0  | 1       | 0       | 0       | D4  |          |                        |  |      |   |                |   |      |  |      |          |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |  |      |      |      |          |      |          |      |          |      |           |      |           |      |           |      |                        |           |  |      |           |      |           |      |           |      |            |      |            |      |            |      |                   |      |                        |
| 1 <sup>st</sup> Parameter | 1   | 1                      | ↑                       | x     | 0  | 0       | 0       | 0       | 0  | AP2[2]  | AP2[1]  | AP2[0]  | xx  |          |                        |  |      |   |                |   |      |  |      |          |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |  |      |      |      |          |      |          |      |          |      |           |      |           |      |           |      |                        |           |  |      |           |      |           |      |           |      |            |      |            |      |            |      |                   |      |                        |
| 2 <sup>nd</sup> Parameter | 1   | 1                      | ↑                       | x     | 0  | DC12[2] | DC12[1] | DC12[0] | 0  | DC02[2] | DC02[1] | DC02[0] | xx  |          |                        |  |      |   |                |   |      |  |      |          |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |  |      |      |      |          |      |          |      |          |      |           |      |           |      |           |      |                        |           |  |      |           |      |           |      |           |      |            |      |            |      |            |      |                   |      |                        |
| Description               | <p><b>AP2[2:0]</b></p> <p>AP2 bit is used to adjust the constant current in the operational amplifier circuit in the LCD power supply circuit. Larger constant current enhances the drivability of the LCD, but it also increases the current consumption. Adjust the constant current taking the trade-off between the display quality and the current consumption into account. In no-display period, set AP2=3'h0 to halt the operational amplifier circuit and the step-up circuits to reduce current consumption.</p> <table border="1"> <thead> <tr> <th>AP2[2:0]</th> <th>Gamma Driver Amplifier</th> <th>Source Driver Amplifier</th> </tr> </thead> <tbody> <tr><td>3'h0</td><td>Halt operation</td><td>Halt operation</td></tr> <tr><td>3'h1</td><td>1.00</td><td>1.00</td></tr> <tr><td>3'h2</td><td>1.00</td><td>0.75</td></tr> <tr><td>3'h3</td><td>1.00</td><td>0.50</td></tr> <tr><td>3'h4</td><td>0.75</td><td>1.00</td></tr> <tr><td>3'h5</td><td>0.75</td><td>0.75</td></tr> <tr><td>3'h6</td><td>0.75</td><td>0.50</td></tr> <tr><td>3'h7</td><td>0.50</td><td>0.50</td></tr> </tbody> </table> <p><b>DC02[2:0], DC12[2:0]</b></p> <p>DC01/DC11 are used to select the charge-pump frequency of circuit and circuit2.</p> <table border="1"> <thead> <tr> <th>DC02[1:0]</th> <th>Step-up circuit 1 clock frequency (fDCDC1)</th> </tr> </thead> <tbody> <tr><td>2'h0</td><td>Fosc</td></tr> <tr><td>2'h1</td><td>Fosc / 2</td></tr> <tr><td>2'h2</td><td>Fosc / 4</td></tr> <tr><td>2'h3</td><td>Fosc / 8</td></tr> <tr><td>2'h4</td><td>Fosc / 16</td></tr> <tr><td>2'h5</td><td>Fosc / 32</td></tr> <tr><td>2'h6</td><td>Fosc / 64</td></tr> <tr><td>2'h7</td><td>Halt step-up circuit 1</td></tr> </tbody> </table> <table border="1"> <thead> <tr> <th>DC12[1:0]</th> <th>Step-up circuit 2 clock frequency (fDCDC2)</th> </tr> </thead> <tbody> <tr><td>2'h0</td><td>Fosc / 16</td></tr> <tr><td>2'h1</td><td>Fosc / 32</td></tr> <tr><td>2'h2</td><td>Fosc / 64</td></tr> <tr><td>2'h3</td><td>Fosc / 128</td></tr> <tr><td>2'h4</td><td>Fosc / 256</td></tr> <tr><td>2'h5</td><td>Fosc / 512</td></tr> <tr><td>2'h6</td><td>Setting inhibited</td></tr> <tr><td>2'h7</td><td>Halt step-up circuit 2</td></tr> </tbody> </table> |                        |                         |       |    |         |         |         |    |         |         |         |     | AP2[2:0] | Gamma Driver Amplifier | Source Driver Amplifier                  | 3'h0 | Halt operation                          | Halt operation | 3'h1                                      | 1.00 | 1.00                                     | 3'h2 | 1.00     | 0.75 | 3'h3 | 1.00 | 0.50 | 3'h4 | 0.75 | 1.00 | 3'h5 | 0.75 | 0.75 | 3'h6 | 0.75 | 0.50 | 3'h7 | 0.50 | 0.50 | DC02[1:0] | Step-up circuit 1 clock frequency (fDCDC1) | 2'h0 | Fosc | 2'h1 | Fosc / 2 | 2'h2 | Fosc / 4 | 2'h3 | Fosc / 8 | 2'h4 | Fosc / 16 | 2'h5 | Fosc / 32 | 2'h6 | Fosc / 64 | 2'h7 | Halt step-up circuit 1 | DC12[1:0] | Step-up circuit 2 clock frequency (fDCDC2) | 2'h0 | Fosc / 16 | 2'h1 | Fosc / 32 | 2'h2 | Fosc / 64 | 2'h3 | Fosc / 128 | 2'h4 | Fosc / 256 | 2'h5 | Fosc / 512 | 2'h6 | Setting inhibited | 2'h7 | Halt step-up circuit 2 |
|                           | AP2[2:0]  | Gamma Driver Amplifier | Source Driver Amplifier |       |    |         |         |         |    |         |         |         |     |          |                        |  |      |   |                |   |      |  |      |          |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |  |      |      |      |          |      |          |      |          |      |           |      |           |      |           |      |                        |           |  |      |           |      |           |      |           |      |            |      |            |      |            |      |                   |      |                        |
|                           | 3'h0  | Halt operation         | Halt operation          |       |    |         |         |         |    |         |         |         |     |          |                        |  |      |   |                |   |      |  |      |          |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |  |      |      |      |          |      |          |      |          |      |           |      |           |      |           |      |                        |           |  |      |           |      |           |      |           |      |            |      |            |      |            |      |                   |      |                        |
|                           | 3'h1  | 1.00                   | 1.00                    |       |    |         |         |         |    |         |         |         |     |          |                        |  |      |   |                |   |      |  |      |          |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |  |      |      |      |          |      |          |      |          |      |           |      |           |      |           |      |                        |           |  |      |           |      |           |      |           |      |            |      |            |      |            |      |                   |      |                        |
| 3'h2                      | 1.00  | 0.75                   |                         |       |    |         |         |         |    |         |         |         |     |          |                        |  |      |   |                |   |      |  |      |          |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |  |      |      |      |          |      |          |      |          |      |           |      |           |      |           |      |                        |           |  |      |           |      |           |      |           |      |            |      |            |      |            |      |                   |      |                        |
| 3'h3                      | 1.00  | 0.50                   |                         |       |    |         |         |         |    |         |         |         |     |          |                        |  |      |   |                |   |      |  |      |          |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |  |      |      |      |          |      |          |      |          |      |           |      |           |      |           |      |                        |           |  |      |           |      |           |      |           |      |            |      |            |      |            |      |                   |      |                        |
| 3'h4                      | 0.75  | 1.00                   |                         |       |    |         |         |         |    |         |         |         |     |          |                        |  |      |   |                |   |      |  |      |          |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |  |      |      |      |          |      |          |      |          |      |           |      |           |      |           |      |                        |           |  |      |           |      |           |      |           |      |            |      |            |      |            |      |                   |      |                        |
| 3'h5                      | 0.75  | 0.75                   |                         |       |    |         |         |         |    |         |         |         |     |          |                        |  |      |   |                |   |      |  |      |          |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |  |      |      |      |          |      |          |      |          |      |           |      |           |      |           |      |                        |           |  |      |           |      |           |      |           |      |            |      |            |      |            |      |                   |      |                        |
| 3'h6                      | 0.75  | 0.50                   |                         |       |    |         |         |         |    |         |         |         |     |          |                        |  |      |   |                |   |      |  |      |          |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |  |      |      |      |          |      |          |      |          |      |           |      |           |      |           |      |                        |           |  |      |           |      |           |      |           |      |            |      |            |      |            |      |                   |      |                        |
| 3'h7                      | 0.50  | 0.50                   |                         |       |    |         |         |         |    |         |         |         |     |          |                        |  |      |   |                |   |      |  |      |          |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |  |      |      |      |          |      |          |      |          |      |           |      |           |      |           |      |                        |           |  |      |           |      |           |      |           |      |            |      |            |      |            |      |                   |      |                        |
| DC02[1:0]                 | Step-up circuit 1 clock frequency (fDCDC1)  |                        |                         |       |    |         |         |         |    |         |         |         |     |          |                        |  |      |   |                |   |      |  |      |          |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |  |      |      |      |          |      |          |      |          |      |           |      |           |      |           |      |                        |           |  |      |           |      |           |      |           |      |            |      |            |      |            |      |                   |      |                        |
| 2'h0                      | Fosc  |                        |                         |       |    |         |         |         |    |         |         |         |     |          |                        |  |      |   |                |   |      |  |      |          |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |  |      |      |      |          |      |          |      |          |      |           |      |           |      |           |      |                        |           |  |      |           |      |           |      |           |      |            |      |            |      |            |      |                   |      |                        |
| 2'h1                      | Fosc / 2  |                        |                         |       |    |         |         |         |    |         |         |         |     |          |                        |  |      |   |                |   |      |  |      |          |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |  |      |      |      |          |      |          |      |          |      |           |      |           |      |           |      |                        |           |  |      |           |      |           |      |           |      |            |      |            |      |            |      |                   |      |                        |
| 2'h2                      | Fosc / 4  |                        |                         |       |    |         |         |         |    |         |         |         |     |          |                        |  |      |   |                |   |      |  |      |          |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |  |      |      |      |          |      |          |      |          |      |           |      |           |      |           |      |                        |           |  |      |           |      |           |      |           |      |            |      |            |      |            |      |                   |      |                        |
| 2'h3                      | Fosc / 8  |                        |                         |       |    |         |         |         |    |         |         |         |     |          |                        |  |      |   |                |   |      |  |      |          |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |  |      |      |      |          |      |          |      |          |      |           |      |           |      |           |      |                        |           |  |      |           |      |           |      |           |      |            |      |            |      |            |      |                   |      |                        |
| 2'h4                      | Fosc / 16   |                        |                         |       |    |         |         |         |    |         |         |         |     |          |                        |  |      |   |                |   |      |  |      |          |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |  |      |      |      |          |      |          |      |          |      |           |      |           |      |           |      |                        |           |  |      |           |      |           |      |           |      |            |      |            |      |            |      |                   |      |                        |
| 2'h5                      | Fosc / 32   |                        |                         |       |    |         |         |         |    |         |         |         |     |          |                        |  |      |   |                |   |      |  |      |          |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |  |      |      |      |          |      |          |      |          |      |           |      |           |      |           |      |                        |           |  |      |           |      |           |      |           |      |            |      |            |      |            |      |                   |      |                        |
| 2'h6                      | Fosc / 64   |                        |                         |       |    |         |         |         |    |         |         |         |     |          |                        |  |      |   |                |   |      |  |      |          |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |  |      |      |      |          |      |          |      |          |      |           |      |           |      |           |      |                        |           |  |      |           |      |           |      |           |      |            |      |            |      |            |      |                   |      |                        |
| 2'h7                      | Halt step-up circuit 1  |                        |                         |       |    |         |         |         |    |         |         |         |     |          |                        |  |      |   |                |   |      |  |      |          |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |  |      |      |      |          |      |          |      |          |      |           |      |           |      |           |      |                        |           |  |      |           |      |           |      |           |      |            |      |            |      |            |      |                   |      |                        |
| DC12[1:0]                 | Step-up circuit 2 clock frequency (fDCDC2)  |                        |                         |       |    |         |         |         |    |         |         |         |     |          |                        |  |      |   |                |   |      |  |      |          |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |  |      |      |      |          |      |          |      |          |      |           |      |           |      |           |      |                        |           |  |      |           |      |           |      |           |      |            |      |            |      |            |      |                   |      |                        |
| 2'h0                      | Fosc / 16   |                        |                         |       |    |         |         |         |    |         |         |         |     |          |                        |  |      |   |                |   |      |  |      |          |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |  |      |      |      |          |      |          |      |          |      |           |      |           |      |           |      |                        |           |  |      |           |      |           |      |           |      |            |      |            |      |            |      |                   |      |                        |
| 2'h1                      | Fosc / 32   |                        |                         |       |    |         |         |         |    |         |         |         |     |          |                        |  |      |   |                |   |      |  |      |          |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |  |      |      |      |          |      |          |      |          |      |           |      |           |      |           |      |                        |           |  |      |           |      |           |      |           |      |            |      |            |      |            |      |                   |      |                        |
| 2'h2                      | Fosc / 64   |                        |                         |       |    |         |         |         |    |         |         |         |     |          |                        |  |      |   |                |   |      |  |      |          |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |  |      |      |      |          |      |          |      |          |      |           |      |           |      |           |      |                        |           |  |      |           |      |           |      |           |      |            |      |            |      |            |      |                   |      |                        |
| 2'h3                      | Fosc / 128  |                        |                         |       |    |         |         |         |    |         |         |         |     |          |                        |  |      |   |                |   |      |  |      |          |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |  |      |      |      |          |      |          |      |          |      |           |      |           |      |           |      |                        |           |  |      |           |      |           |      |           |      |            |      |            |      |            |      |                   |      |                        |
| 2'h4                      | Fosc / 256  |                        |                         |       |    |         |         |         |    |         |         |         |     |          |                        |  |      |   |                |   |      |  |      |          |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |  |      |      |      |          |      |          |      |          |      |           |      |           |      |           |      |                        |           |  |      |           |      |           |      |           |      |            |      |            |      |            |      |                   |      |                        |
| 2'h5                      | Fosc / 512  |                        |                         |       |    |         |         |         |    |         |         |         |     |          |                        |  |      |   |                |   |      |  |      |          |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |  |      |      |      |          |      |          |      |          |      |           |      |           |      |           |      |                        |           |  |      |           |      |           |      |           |      |            |      |            |      |            |      |                   |      |                        |
| 2'h6                      | Setting inhibited   |                        |                         |       |    |         |         |         |    |         |         |         |     |          |                        |  |      |   |                |   |      |  |      |          |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |  |      |      |      |          |      |          |      |          |      |           |      |           |      |           |      |                        |           |  |      |           |      |           |      |           |      |            |      |            |      |            |      |                   |      |                        |
| 2'h7                      | Halt step-up circuit 2  |                        |                         |       |    |         |         |         |    |         |         |         |     |          |                        |  |      |   |                |   |      |  |      |          |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |  |      |      |      |          |      |          |      |          |      |           |      |           |      |           |      |                        |           |  |      |           |      |           |      |           |      |            |      |            |      |            |      |                   |      |                        |
| 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   |                        |                         |       |    |         |         |         |    |         |         |         |     |          |                        |  |      |   |                |   |      |  |      |          |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |  |      |      |      |          |      |          |      |          |      |           |      |           |      |           |      |                        |           |  |      |           |      |           |      |           |      |            |      |            |      |            |      |                   |      |                        |

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|         |                   |   |
|---------|-------------------|---|
| Default | <b>Status</b>     | <b>Default Value</b>                          |
|         | Power On Sequence | AP2[2:0]=3'h0, DC12[2:0]=3'h7, DC02[2:0]=3'h7 |
|         | SW Reset          | No change                                     |
|         | HW Reset          | AP2[2:0]=3'h0, DC11[2:0]=3'h7, DC02[2:0]=3'h7 |

### 8.2.52. NV Memory Write (E0h)

| E0H                                       | NV Memory Write  |     |     |       |             |             |             |             |             |             |             |             |     |        |               |  |                 |   |           |   |                 |  |     |          |     |
|---|--|-----|-----|-------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-----|--------|---------------|--|-----------------|---|-----------|---|-----------------|--|-----|----------|-----|
|   | D/CX   | RDX | WRX | D17-8 | D7          | D6          | D5          | D4          | D3          | D2          | D1          | D0          | HEX |        |               |  |                 |   |           |   |                 |  |     |          |     |
| Command                                   | 0  | 1   | ↑   | x     | 1           | 1           | 1           | 0           | 0           | 0           | 0           | 0           | E0  |        |               |  |                 |   |           |   |                 |  |     |          |     |
| 1 <sup>st</sup> Parameter                 | 1  | 1   | ↑   | x     | VM_D<br>[7] | VM_D<br>[6] | VM_D<br>[5] | VM_D<br>[4] | VM_D<br>[3] | VM_D<br>[2] | VM_D<br>[1] | VM_D<br>[0] | xx  |        |               |  |                 |   |           |   |                 |  |     |          |     |
| Description                               | <p>This command is used to program the NV memory data.</p> <p><b>VM_D[7:0]:</b> Use to write the data (including VCM and ID code) into the NV memory data.</p>   |     |     |       |             |             |             |             |             |             |             |             |     |        |               |  |                 |   |           |   |                 |  |     |          |     |
| Restriction                               |  |     |     |       |             |             |             |             |             |             |             |             |     |        |               |  |                 |   |           |   |                 |  |     |          |     |
| 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>Power On Sequence</td> <td>VM_D[7:0]=8'h00</td> </tr> <tr> <td>SW Reset</td> <td>No change</td> </tr> <tr> <td>HW Reset</td> <td>VM_D[7:0]=8'h00</td> </tr> </tbody> </table>   |     |     |       |             |             |             |             |             |             |             |             |     | Status | Default Value | Power On Sequence                        | VM_D[7:0]=8'h00 | SW Reset                                | No change | HW Reset                                  | VM_D[7:0]=8'h00 |  |     |          |     |
| Status                                    | Default Value  |     |     |       |             |             |             |             |             |             |             |             |     |        |               |  |                 |   |           |   |                 |  |     |          |     |
| Power On Sequence                         | VM_D[7:0]=8'h00  |     |     |       |             |             |             |             |             |             |             |             |     |        |               |  |                 |   |           |   |                 |  |     |          |     |
| SW Reset                                  | No change  |     |     |       |             |             |             |             |             |             |             |             |     |        |               |  |                 |   |           |   |                 |  |     |          |     |
| HW Reset                                  | VM_D[7:0]=8'h00  |     |     |       |             |             |             |             |             |             |             |             |     |        |               |  |                 |   |           |   |                 |  |     |          |     |

### 8.2.53. NV Memory Control (E1h)

| E1H                                       | NV Memory Control  |  |     |       |    |    |           |            |    |    |           |           |     |             |                  |  |  |   |                 |   |  |  |                 |           |            |                           |   |   |                                |   |   |  |   |   |                                      |   |   |                    |
|---|--|--|-----|-------|----|----|-----------|------------|----|----|-----------|-----------|-----|-------------|------------------|--|--|---|-----------------|---|--|--|-----------------|-----------|------------|---------------------------|---|---|--------------------------------|---|---|--|---|---|--------------------------------------|---|---|--------------------|
|   | D/CX   | RDX                                      | WRX | D17-8 | D7 | D6 | D5        | D4         | D3 | D2 | D1        | D0        | HEX |             |                  |  |  |   |                 |   |  |  |                 |           |            |                           |   |   |                                |   |   |  |   |   |                                      |   |   |                    |
| Command                                   | 0  | 1  | ↑   | x     | 1  | 1  | 1         | 0          | 0  | 0  | 0         | 1         | E1  |             |                  |  |  |   |                 |   |  |  |                 |           |            |                           |   |   |                                |   |   |  |   |   |                                      |   |   |                    |
| 1 <sup>st</sup> Parameter                 | 1  | 1  | ↑   | x     | 0  | 0  | ID_PGM_EN | VCM_PGM_EN | 0  | 0  | ID_SEL[1] | ID_SEL[0] | xx  |             |                  |  |  |   |                 |   |  |  |                 |           |            |                           |   |   |                                |   |   |  |   |   |                                      |   |   |                    |
| Description                               | <p>This command is used to control the NV memory programming.</p> <p><b>ID_SEL[1:0]:</b> ID NV memory selection</p> <table border="1"> <thead> <tr> <th>ID_SEL[1:0]</th> <th>ID OTP Selection</th> </tr> </thead> <tbody> <tr> <td>00</td> <td>ID code 1 [15:8]</td> </tr> <tr> <td>01</td> <td>ID code 1 [7:0]</td> </tr> <tr> <td>10</td> <td>ID code 2 [15:8]</td> </tr> <tr> <td>11</td> <td>ID code 2 [7:0]</td> </tr> </tbody> </table> <p><b>VCM_PGM_EN:</b> VCM OTP programming enable. When writing the VCOMH NV memory, the bit must be set as '1'.</p> <p><b>ID_PGM_EN:</b> ID OTP programming enable. When writing the ID code NV memory, the bit must be set as '1'.</p> <table border="1"> <thead> <tr> <th>ID_PGM_EN</th> <th>VCM_PGM_EN</th> <th>OTP Programming Selection</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>0</td> <td>NV Memory programming disabled</td> </tr> <tr> <td>0</td> <td>1</td> <td>VCM (VCOMH) NV Memory programming enable</td> </tr> <tr> <td>1</td> <td>0</td> <td>ID code NV Memory programming enable</td> </tr> <tr> <td>1</td> <td>1</td> <td>Setting Prohibited</td> </tr> </tbody> </table> |  |     |       |    |    |           |            |    |    |           |           |     | ID_SEL[1:0] | ID OTP Selection | 00                                       | ID code 1 [15:8]                                 | 01                                      | ID code 1 [7:0] | 10  | ID code 2 [15:8]                                 | 11                                       | ID code 2 [7:0] | ID_PGM_EN | VCM_PGM_EN | OTP Programming Selection | 0 | 0 | NV Memory programming disabled | 0 | 1 | VCM (VCOMH) NV Memory programming enable | 1 | 0 | ID code NV Memory programming enable | 1 | 1 | Setting Prohibited |
|   | ID_SEL[1:0]  | ID OTP Selection                         |     |       |    |    |           |            |    |    |           |           |     |             |                  |  |  |   |                 |   |  |  |                 |           |            |                           |   |   |                                |   |   |  |   |   |                                      |   |   |                    |
| 00  | ID code 1 [15:8]   |  |     |       |    |    |           |            |    |    |           |           |     |             |                  |  |  |   |                 |   |  |  |                 |           |            |                           |   |   |                                |   |   |  |   |   |                                      |   |   |                    |
| 01  | ID code 1 [7:0]  |  |     |       |    |    |           |            |    |    |           |           |     |             |                  |  |  |   |                 |   |  |  |                 |           |            |                           |   |   |                                |   |   |  |   |   |                                      |   |   |                    |
| 10  | ID code 2 [15:8]   |  |     |       |    |    |           |            |    |    |           |           |     |             |                  |  |  |   |                 |   |  |  |                 |           |            |                           |   |   |                                |   |   |  |   |   |                                      |   |   |                    |
| 11  | ID code 2 [7:0]  |  |     |       |    |    |           |            |    |    |           |           |     |             |                  |  |  |   |                 |   |  |  |                 |           |            |                           |   |   |                                |   |   |  |   |   |                                      |   |   |                    |
| ID_PGM_EN                                 | VCM_PGM_EN   | OTP Programming Selection                |     |       |    |    |           |            |    |    |           |           |     |             |                  |  |  |   |                 |   |  |  |                 |           |            |                           |   |   |                                |   |   |  |   |   |                                      |   |   |                    |
| 0   | 0  | NV Memory programming disabled           |     |       |    |    |           |            |    |    |           |           |     |             |                  |  |  |   |                 |   |  |  |                 |           |            |                           |   |   |                                |   |   |  |   |   |                                      |   |   |                    |
| 0   | 1  | VCM (VCOMH) NV Memory programming enable |     |       |    |    |           |            |    |    |           |           |     |             |                  |  |  |   |                 |   |  |  |                 |           |            |                           |   |   |                                |   |   |  |   |   |                                      |   |   |                    |
| 1   | 0  | ID code NV Memory programming enable     |     |       |    |    |           |            |    |    |           |           |     |             |                  |  |  |   |                 |   |  |  |                 |           |            |                           |   |   |                                |   |   |  |   |   |                                      |   |   |                    |
| 1   | 1  | Setting Prohibited                       |     |       |    |    |           |            |    |    |           |           |     |             |                  |  |  |   |                 |   |  |  |                 |           |            |                           |   |   |                                |   |   |  |   |   |                                      |   |   |                    |
| Restriction                               |  |  |     |       |    |    |           |            |    |    |           |           |     |             |                  |  |  |   |                 |   |  |  |                 |           |            |                           |   |   |                                |   |   |  |   |   |                                      |   |   |                    |
| 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>Power On Sequence</td> <td>ID_PGM_EN=1'h0; VCM_PGM_EN=1'h0; ID_AP[1:0]=2'h0</td> </tr> <tr> <td>SW Reset</td> <td>No change</td> </tr> <tr> <td>HW Reset</td> <td>ID_PGM_EN=1'h0; VCM_PGM_EN=1'h0; ID_AP[1:0]=2'h0</td> </tr> </tbody> </table>   |  |     |       |    |    |           |            |    |    |           |           |     | Status      | Default Value    | Power On Sequence                        | ID_PGM_EN=1'h0; VCM_PGM_EN=1'h0; ID_AP[1:0]=2'h0 | SW Reset                                | No change       | HW Reset                                  | ID_PGM_EN=1'h0; VCM_PGM_EN=1'h0; ID_AP[1:0]=2'h0 |  |                 |           |            |                           |   |   |                                |   |   |  |   |   |                                      |   |   |                    |
| Status                                    | Default Value  |  |     |       |    |    |           |            |    |    |           |           |     |             |                  |  |  |   |                 |   |  |  |                 |           |            |                           |   |   |                                |   |   |  |   |   |                                      |   |   |                    |
| Power On Sequence                         | ID_PGM_EN=1'h0; VCM_PGM_EN=1'h0; ID_AP[1:0]=2'h0   |  |     |       |    |    |           |            |    |    |           |           |     |             |                  |  |  |   |                 |   |  |  |                 |           |            |                           |   |   |                                |   |   |  |   |   |                                      |   |   |                    |
| SW Reset                                  | No change  |  |     |       |    |    |           |            |    |    |           |           |     |             |                  |  |  |   |                 |   |  |  |                 |           |            |                           |   |   |                                |   |   |  |   |   |                                      |   |   |                    |
| HW Reset                                  | ID_PGM_EN=1'h0; VCM_PGM_EN=1'h0; ID_AP[1:0]=2'h0   |  |     |       |    |    |           |            |    |    |           |           |     |             |                  |  |  |   |                 |   |  |  |                 |           |            |                           |   |   |                                |   |   |  |   |   |                                      |   |   |                    |

### 8.2.54. NV Memory Status Read (E2h)

| E2H                                      | NV Memory Status Read   |              |     |       |    |    |           |           |           |           |           |           |     |              |              |  |                 |   |                             |   |                              |  |     |          |     |
|--|---|--------------|-----|-------|----|----|-----------|-----------|-----------|-----------|-----------|-----------|-----|--------------|--------------|--|-----------------|---|-----------------------------|---|------------------------------|--|-----|----------|-----|
|  | D/CX  | RDX          | WRX | D17-8 | D7 | D6 | D5        | D4        | D3        | D2        | D1        | D0        | HEX |              |              |  |                 |   |                             |   |                              |  |     |          |     |
| Command                                  | 0   | 1            | ↑   | x     | 1  | 1  | 1         | 0         | 0         | 0         | 1         | 0         | E2  |              |              |  |                 |   |                             |   |                              |  |     |          |     |
| 1 <sup>st</sup> Parameter                | 1   | ↑            | 1   | x     | x  | x  | x         | x         | x         | x         | x         | x         | x   |              |              |  |                 |   |                             |   |                              |  |     |          |     |
| 2 <sup>nd</sup> Parameter                | 1   | ↑            | 1   | x     | 0  | 0  | 0         | 0         | 0         | 0         | PGM_CNT1  | PGM_CNT0  | xx  |              |              |  |                 |   |                             |   |                              |  |     |          |     |
| 3 <sup>rd</sup> Parameter                | 1   | ↑            | 1   | x     | 0  | 0  | NV_VCM[5] | NV_VCM[4] | NV_VCM[3] | NV_VCM[2] | NV_VCM[1] | NV_VCM[0] | xx  |              |              |  |                 |   |                             |   |                              |  |     |          |     |
| Description                              | <p><b>PGM_CNT[1:0]:</b> NV memory programmed record. The bit will increase "+1" automatically when writing the NV_VCM [5:0].</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>PGM_CNT[1:0]</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>00</td> <td>NV Memory clean</td> </tr> <tr> <td>01</td> <td>NV Memory programmed 1 time</td> </tr> <tr> <td>10</td> <td>NV Memory programmed 2 times</td> </tr> </tbody> </table> <p style="text-align: center;"><b>These bits are read only.</b></p> <p><b>NV_VCM [5:0]:</b> NV memory VCM data read value. These bits are read only.</p> |              |     |       |    |    |           |           |           |           |           |           |     | PGM_CNT[1:0] | Description  | 00                                       | NV Memory clean | 01                                      | NV Memory programmed 1 time | 10  | NV Memory programmed 2 times |  |     |          |     |
|  | PGM_CNT[1:0]  | Description  |     |       |    |    |           |           |           |           |           |           |     |              |              |  |                 |   |                             |   |                              |  |     |          |     |
| 00                                       | NV Memory clean   |              |     |       |    |    |           |           |           |           |           |           |     |              |              |  |                 |   |                             |   |                              |  |     |          |     |
| 01                                       | NV Memory programmed 1 time   |              |     |       |    |    |           |           |           |           |           |           |     |              |              |  |                 |   |                             |   |                              |  |     |          |     |
| 10                                       | NV Memory programmed 2 times  |              |     |       |    |    |           |           |           |           |           |           |     |              |              |  |                 |   |                             |   |                              |  |     |          |     |
| Restriction                              |   |              |     |       |    |    |           |           |           |           |           |           |     |              |              |  |                 |   |                             |   |                              |  |     |          |     |
| Register Availability                    | <table border="1" style="margin-left: auto; margin-right: auto;"> <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   |              |     |       |    |    |           |           |           |           |           |           |     |              |              |  |                 |   |                             |   |                              |  |     |          |     |



### 8.2.55. NV Memory Protection (E3h)

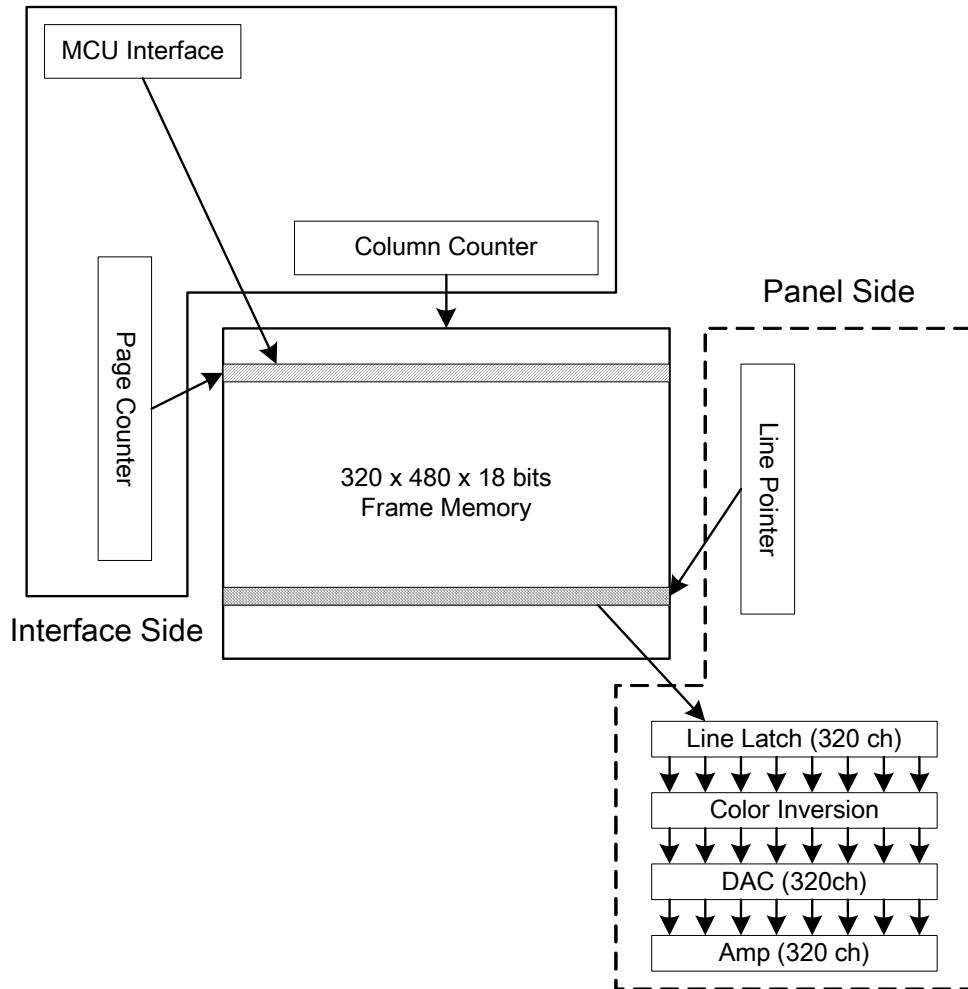
| E3H                                       | NV Memory Protection   |     |     |       |          |          |          |          |          |          |         |         |     |        |               |  |                    |   |           |   |                    |  |     |          |     |
|---|--|-----|-----|-------|----------|----------|----------|----------|----------|----------|---------|---------|-----|--------|---------------|--|--------------------|---|-----------|---|--------------------|--|-----|----------|-----|
|   | D/CX   | RDX | WRX | D17-8 | D7       | D6       | D5       | D4       | D3       | D2       | D1      | D0      | HEX |        |               |  |                    |   |           |   |                    |  |     |          |     |
| Command                                   | 0  | 1   | ↑   | --    | 1        | 1        | 1        | 0        | 0        | 0        | 1       | 1       | E3  |        |               |  |                    |   |           |   |                    |  |     |          |     |
| 1 <sup>st</sup> Parameter                 | 1  | 1   | ↑   | --    | KEY [15] | KEY [14] | KEY [13] | KEY [12] | KEY [11] | KEY [10] | KEY [9] | KEY [8] | xx  |        |               |  |                    |   |           |   |                    |  |     |          |     |
| 2 <sup>nd</sup> Parameter                 | 1  | 1   | ↑   | --    | KEY [7]  | KEY [6]  | KEY [5]  | KEY [4]  | KEY [3]  | KEY [2]  | KEY [1] | KEY [0] | xx  |        |               |  |                    |   |           |   |                    |  |     |          |     |
| Description                               | <b>KEY[15:0]:</b> NV memory programming protection key. When writing OTP data C8h, this register must be set as 0xAA55 to enable OTP programming. If C8h register is not written with 0xAA55, NV Memory programming will fail.   |     |     |       |          |          |          |          |          |          |         |         |     |        |               |  |                    |   |           |   |                    |  |     |          |     |
| Restriction                               |  |     |     |       |          |          |          |          |          |          |         |         |     |        |               |  |                    |   |           |   |                    |  |     |          |     |
| 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>Power On Sequence</td> <td>KEY[15:0]=16'h0000</td> </tr> <tr> <td>SW Reset</td> <td>No change</td> </tr> <tr> <td>HW Reset</td> <td>KEY[15:0]=16'h0000</td> </tr> </tbody> </table>   |     |     |       |          |          |          |          |          |          |         |         |     | Status | Default Value | Power On Sequence                        | KEY[15:0]=16'h0000 | SW Reset                                | No change | HW Reset                                  | KEY[15:0]=16'h0000 |  |     |          |     |
| Status                                    | Default Value  |     |     |       |          |          |          |          |          |          |         |         |     |        |               |  |                    |   |           |   |                    |  |     |          |     |
| Power On Sequence                         | KEY[15:0]=16'h0000   |     |     |       |          |          |          |          |          |          |         |         |     |        |               |  |                    |   |           |   |                    |  |     |          |     |
| SW Reset                                  | No change  |     |     |       |          |          |          |          |          |          |         |         |     |        |               |  |                    |   |           |   |                    |  |     |          |     |
| HW Reset                                  | KEY[15:0]=16'h0000   |     |     |       |          |          |          |          |          |          |         |         |     |        |               |  |                    |   |           |   |                    |  |     |          |     |

## 9. Display Data RAM

### 9.1. Configuration

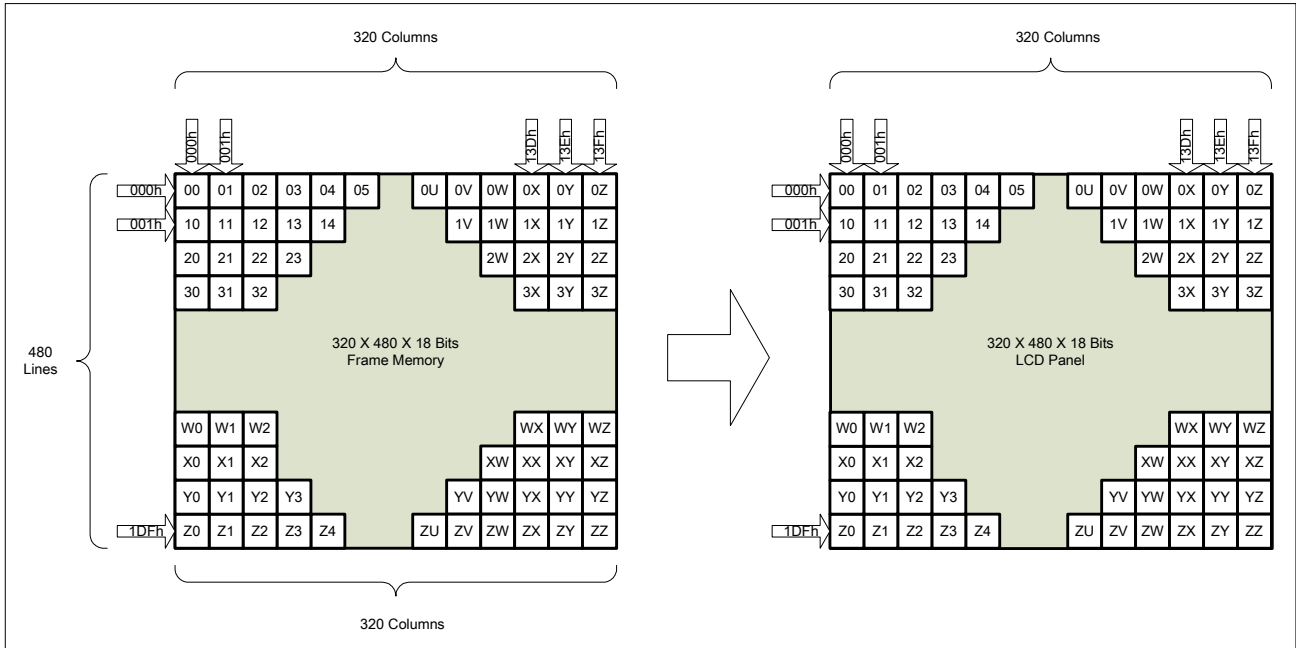
The display data RAM stores display dots and consists of 2,764,800bits (320 x 18 x 480 bits). There is no restriction on access to the RAM even when the display data on the same address is loaded to DAC.

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.



## 9.2. Memory to Display Address Mapping

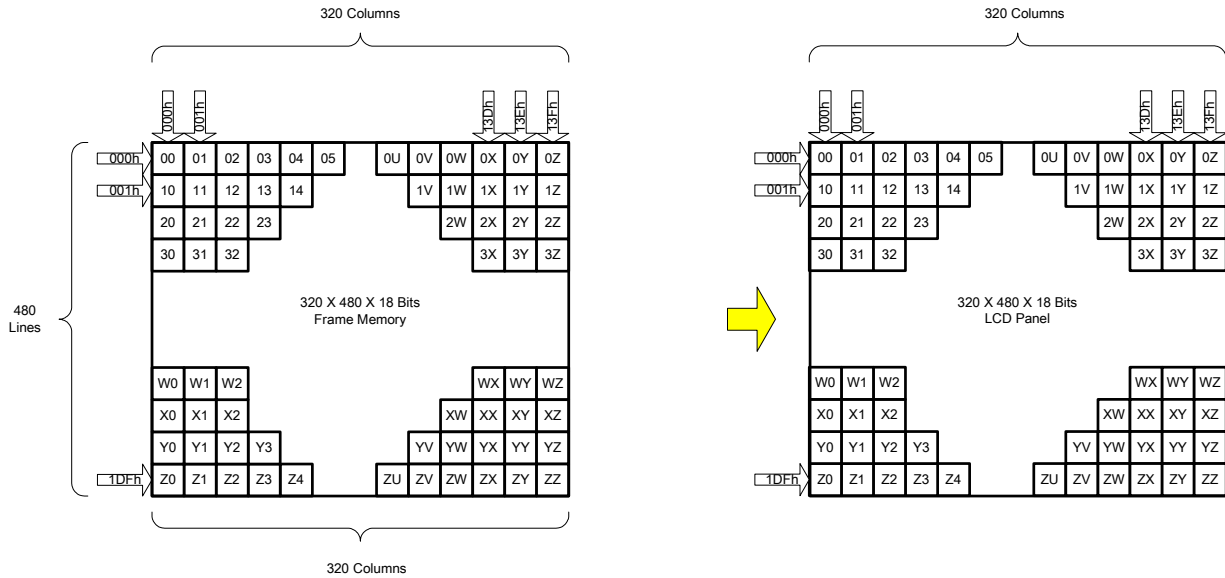
In this mode, content of the frame memory within an area where column pointer is 0000h to 013Fh and page pointer 0000h to 01DFh is displayed. To display a dot on leftmost top corner, store the dot data at (column pointer, page pointer) = (0, 0).



### 9.3. Vertical Scroll Mode

There is a vertical scrolling mode, which is described by the commands “set\_scroll\_area”(33h) and “set\_scroll\_start”(37h).

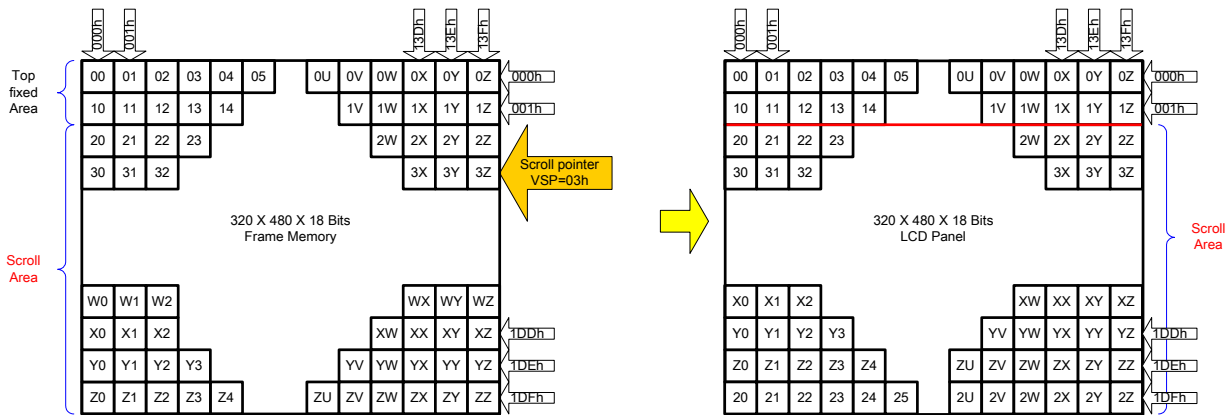
(1) Normal Display On or Partial Mode On, Vertical Scroll Off



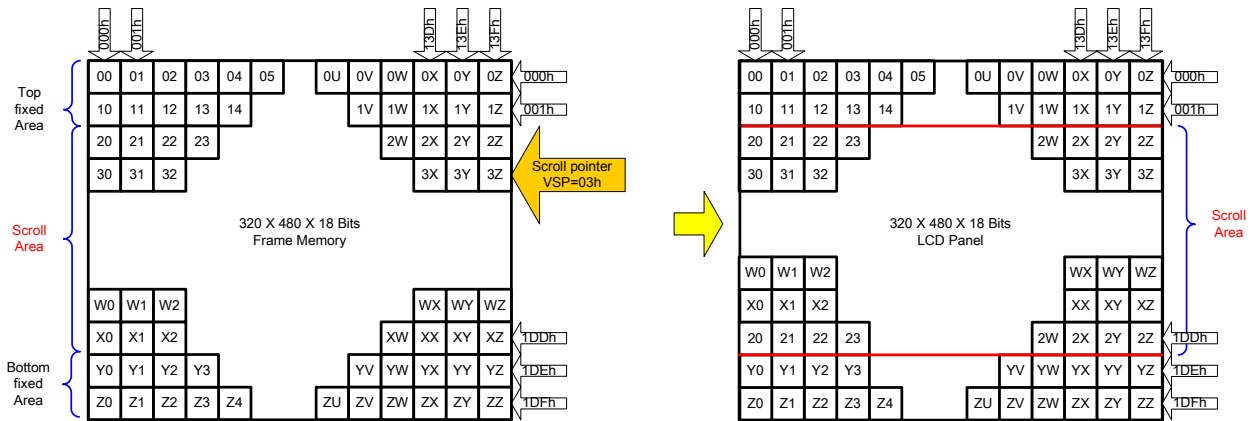
(2) Vertical Scroll Mode

“set\_scroll\_area(33h)” and “set\_scroll\_start(37h)” setting define the scroll area.

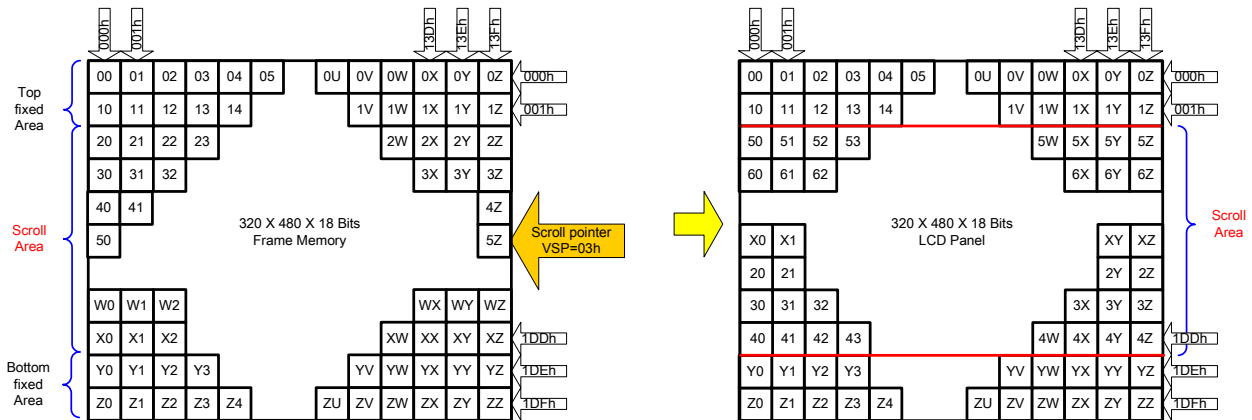
Example1: TFA=2, VSA=478, BFA=0 (set\_address\_mode(36h) B4=0), VSP=3



Example2: TFA=2, VSA=476, BFA=2 (set\_address\_mode(36h) B4=0), VSP=3



Example3: TFA=2,VSA=476,BFA=2 (set\_address\_mode(36h) B4=0), VSP=5



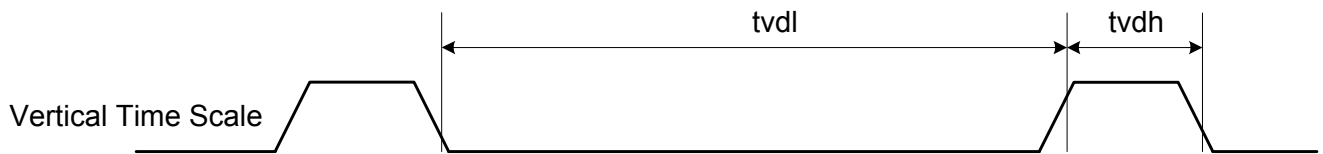
## 10. Tearing Effect Output

The tearing effect output line supplies to the MCU a Panel synchronization signal. This signal can be enabled or disabled by the `set_tear_off` (34h) and `set_tear_on` (35h) commands. The mode of the tearing effect signal is defined by the parameter of the `set_tear_on` (35h) and `set_tear_scanline`(44h) commands.

The signal can be used by the MCU to synchronize Frame Memory Writing when displaying video images.

### 10.1. Tearing Effect Line Modes

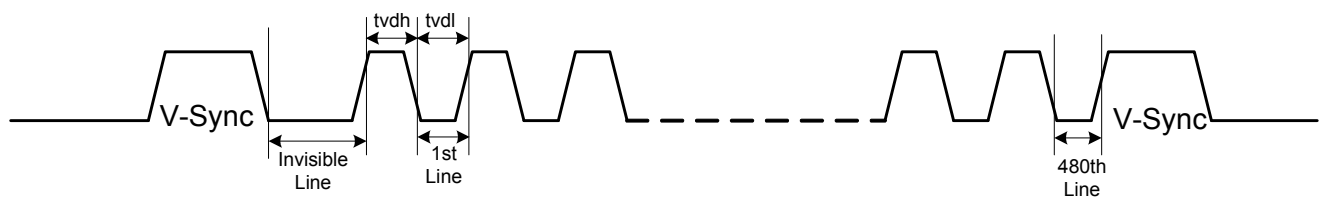
**Mode 1** (`set_tear_on`, `TELOM=0`), the Tearing Effect Output signal consists of V-Sync information only:



tvdh = The LCD display is not updated from the Frame Memory.

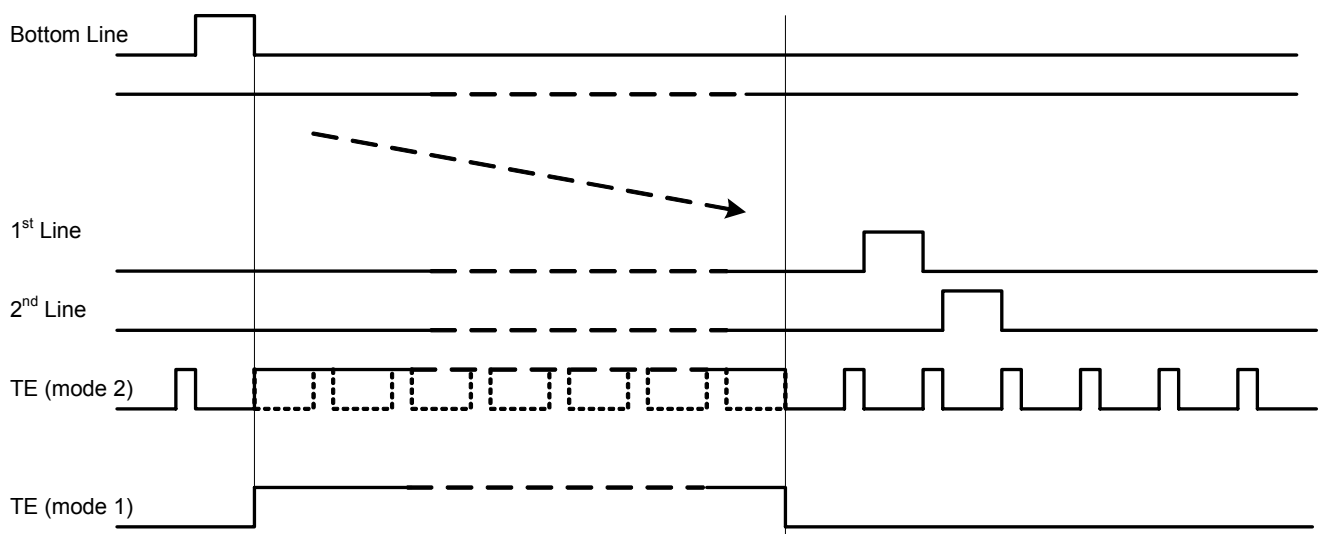
tvdl = The LCD display is updated from the Frame Memory (except Invisible Line – see below).

**Mode 2** (`set_tear_on`, `TELOM=1`), the tearing effect output signal consists of V-Sync and H-Sync information; there is one V-sync and 480 H-sync pulses per field:



tvdh = The LCD display is not updated from the Frame Memory.

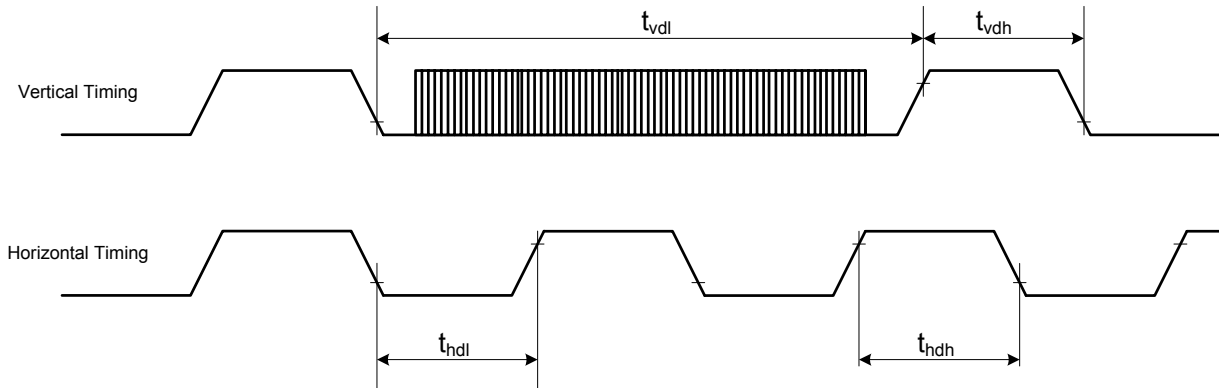
tvdl = The LCD display is updated from the Frame Memory (except Invisible Line – see above).



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

## 10.2. Tearing Effect Line Timings

The tearing effect signal is described below:

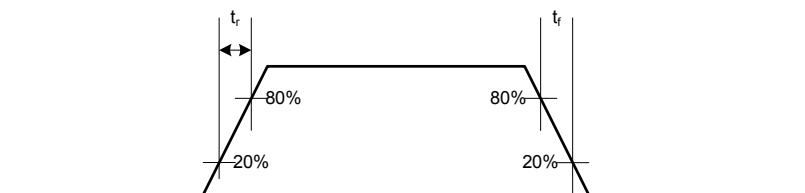


AC characteristics of Tearing Effect Signal (Frame Rate = 60.5Hz)

| Symbol    | Parameter                       | Min. | Max. | Unit | Description |
|-----------|---------------------------------|------|------|------|-------------|
| $t_{vdl}$ | Vertical timing low duration    | TBD  |      | ms   |             |
| $t_{vdh}$ | Vertical timing high duration   | TBD  |      | us   |             |
| $t_{hdl}$ | Horizontal timing low duration  | TBD  |      | us   |             |
| $t_{hdh}$ | Horizontal timing high duration | TBD  |      | us   |             |

Notes:

1. The timings in Table 8.3.1 apply when MADCTL B4=0 and B4=1
2. The signal's rise and fall times ( $t_f$ ,  $t_r$ ) are stipulated to be equal to or less than 15ns.

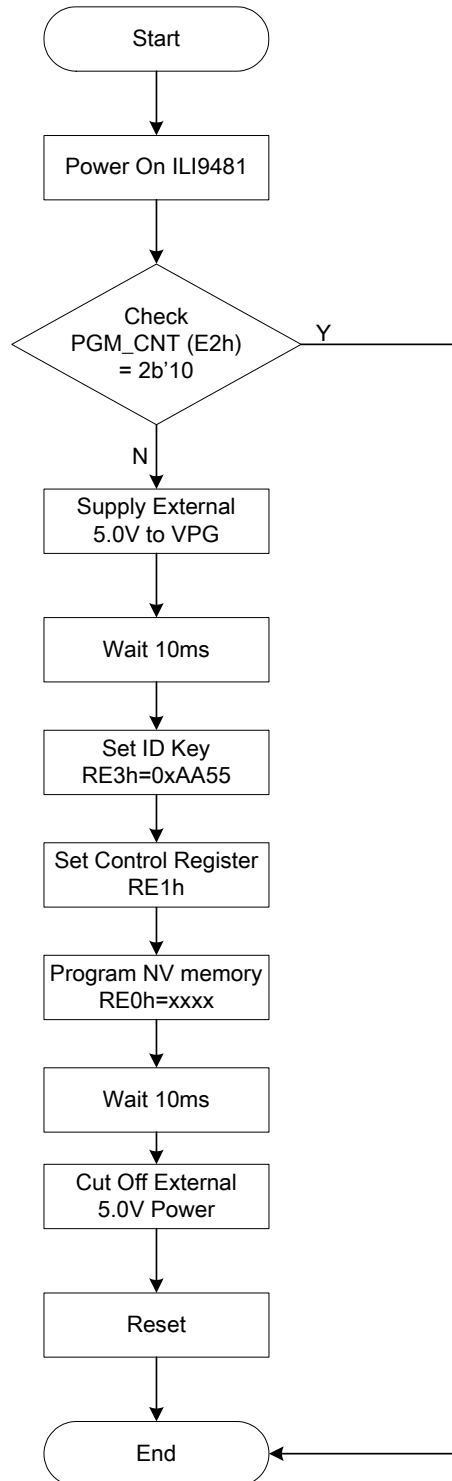


The Tearing Effect Output Line is fed back to the MCU and should be used as shown below to avoid Tearing Effect:

The Tearing Effect output line supplies to the MCU a Panel synchronization signal. This signal can be enabled or disabled by the set\_tear\_off(34h), set\_tear\_on(35h) 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 MCU to synchronize Frame Memory Writing when displaying video images.

| TEON (35h) | TELOM (35h, 1 <sup>st</sup> bit) | TE signal Output |
|------------|----------------------------------|------------------|
| 0          | *                                | GND              |
| 1          | 0                                | TE (Mode 1)      |
| 1          | 1                                | TE (Mode 2)      |

## 11. NV Memory Programming Flow





## 12. Gamma Correction

ILI9481 incorporates the  $\gamma$ -correction function to display 262,144 colors for the LCD panel. The  $\gamma$ -correction is performed with 3 groups of registers determining eight reference grayscale levels, which are gradient adjustment, amplitude adjustment and fine-adjustment registers for positive and negative polarities, to make ILI9481 available with liquid crystal panels of various characteristics.

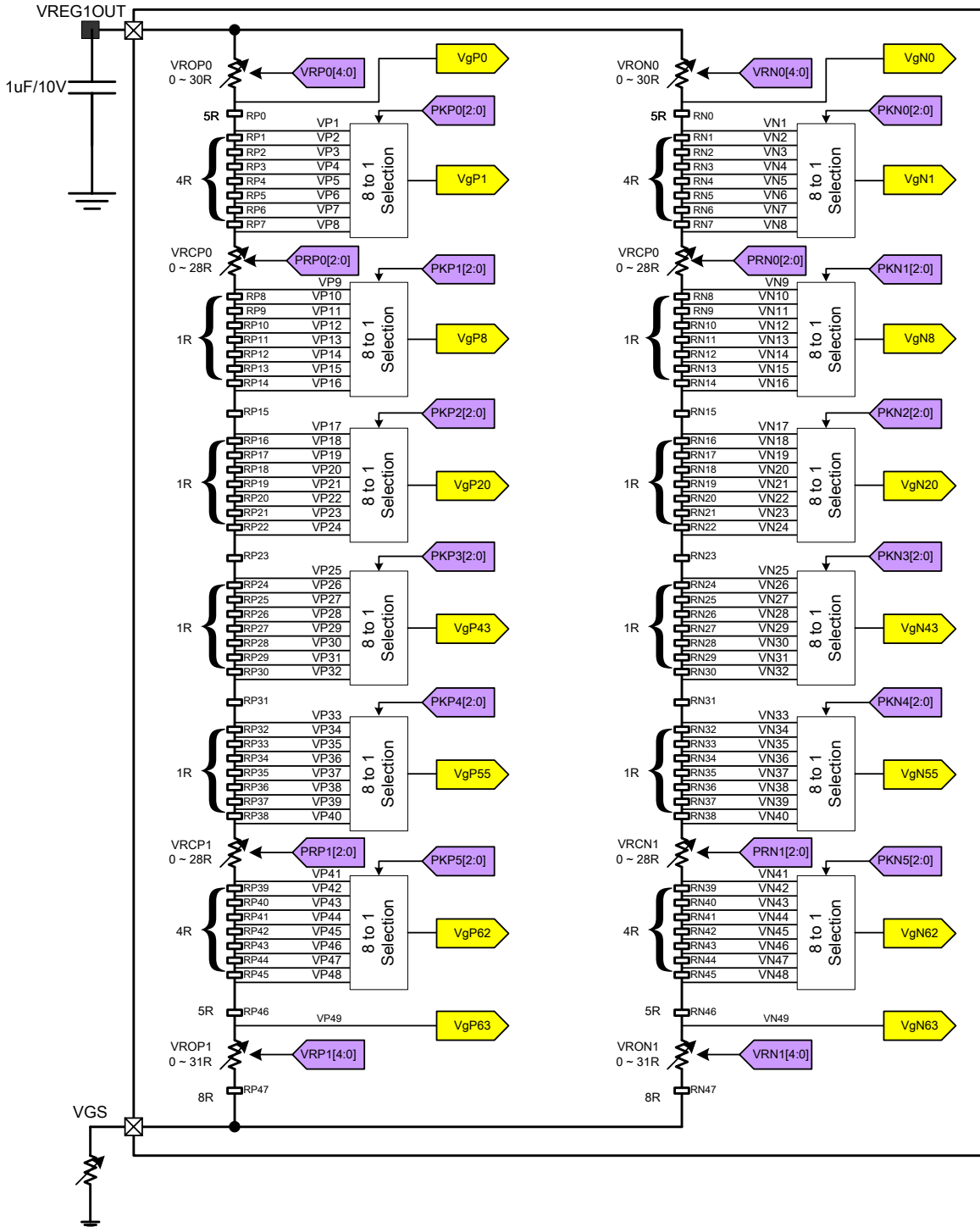


Figure 1 Grayscale Voltage Adjustment

## 13. Electrical Characteristics

### 13.1. Absolute Maximum Ratings

The absolute maximum rating is listed on following table. When ILI9481 is used out of the absolute maximum ratings, the ILI9481 may be permanently damaged. To use the ILI9481 within the following electrical characteristics limit is strongly recommended for normal operation. If these electrical characteristic conditions are exceeded during normal operation, the ILI9481 will malfunction and cause poor reliability.

| Item                     | Symbol      | Unit | Value           | Note |
|--------------------------|-------------|------|-----------------|------|
| Power supply voltage (1) | VCC, IOVCC  | V    | -0.3 ~ + 4.6    | 1, 2 |
| Power supply voltage (1) | VCI - GND   | V    | -0.3 ~ + 4.6    | 1, 4 |
| Power supply voltage (1) | DDVDH - GND | V    | -0.3 ~ + 6.0    | 1, 4 |
| Power supply voltage (1) | GND -VCL    | V    | -0.3 ~ + 4.6    | 1    |
| Power supply voltage (1) | DDVDH - VCL | V    | -0.3 ~ + 9.0    | 1, 5 |
| Power supply voltage (1) | VGH - GND   | V    | -0.3 ~ + 18.5   | 1, 5 |
| Power supply voltage (1) | GND - VGL   | V    | -0.3 ~ + 18.5   | 1, 6 |
| Input voltage            | Vt          | V    | -0.3 ~ VCC+ 0.3 | 1    |
| Operating temperature    | Topr        | °C   | -40 ~ + 85      | 8, 9 |
| Storage temperature      | Tstg        | °C   | -55 ~ + 110     | 8, 9 |

Notes:

1. VCC,DGND must be maintained
2. (High) (VCC = VCC) ≥ DGND (Low), (High) IOVCC ≥ DGND (Low).
3. Make sure (High) VCI ≥ DGND (Low).
4. Make sure (High) DDVDH ≥ ASSD (Low).
5. Make sure (High) DDVDH ≥ VCL (Low).
6. Make sure (High) VGH ≥ ASSD (Low).
7. Make sure (High) ASSD ≥ VGL (Low).
8. For die and wafer products, specified up to 85°C.
9. This temperature specifications apply to the TCP package

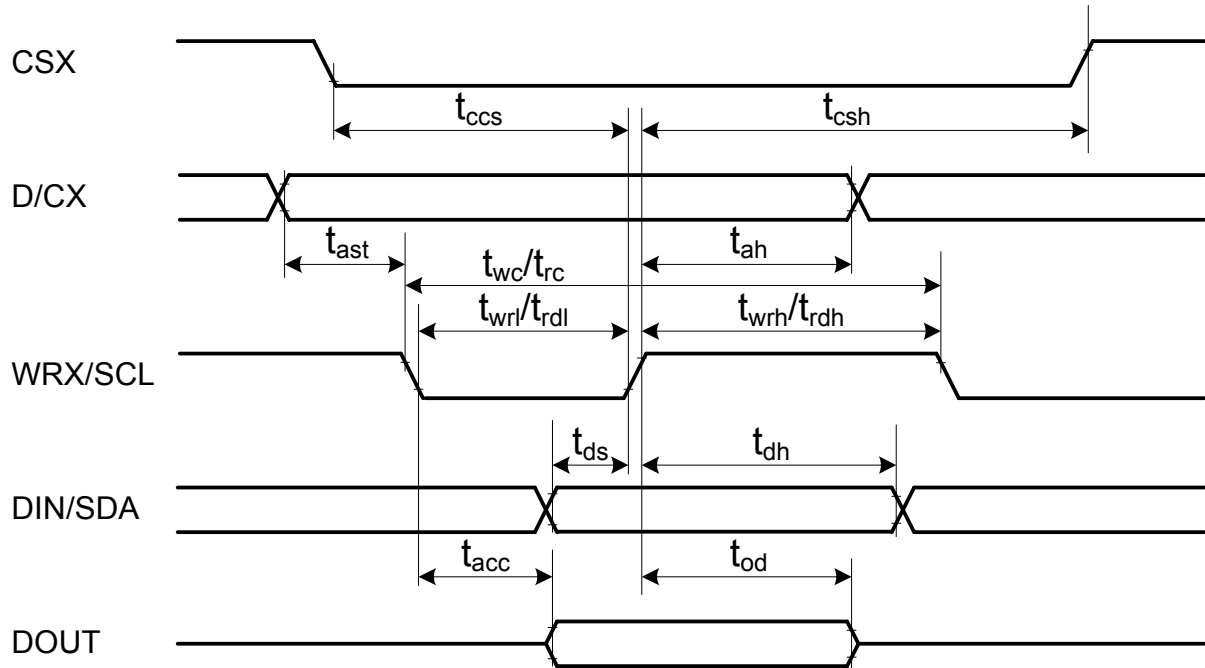


|   |       |                               |     |     |    |   |
|---|-------|-------------------------------|-----|-----|----|---|
|   | trdh  | Read Control pulse H duration | 250 | -   | ns |   |
|   | trdl  | Read Control pulse L duration | 170 | -   | ns |   |
| DB[17:0],<br>DB[15:0],<br>DB[8:0],<br>DB[7:0] | twds  | Write data setup time         | 15  | -   | ns | For maximum CL=30pF<br>For minimum CL=8pF |
|   | twdh  | Write data hold time          | 25  | -   | ns |   |
|   | tracc | Read access time              | 10  | 340 | ns |   |
|   | trod  | Read output disable time      | 10  | -   | ns |   |

Note: Logic high and low levels are specified as 30% and 70% of IOVCC for Input signals.

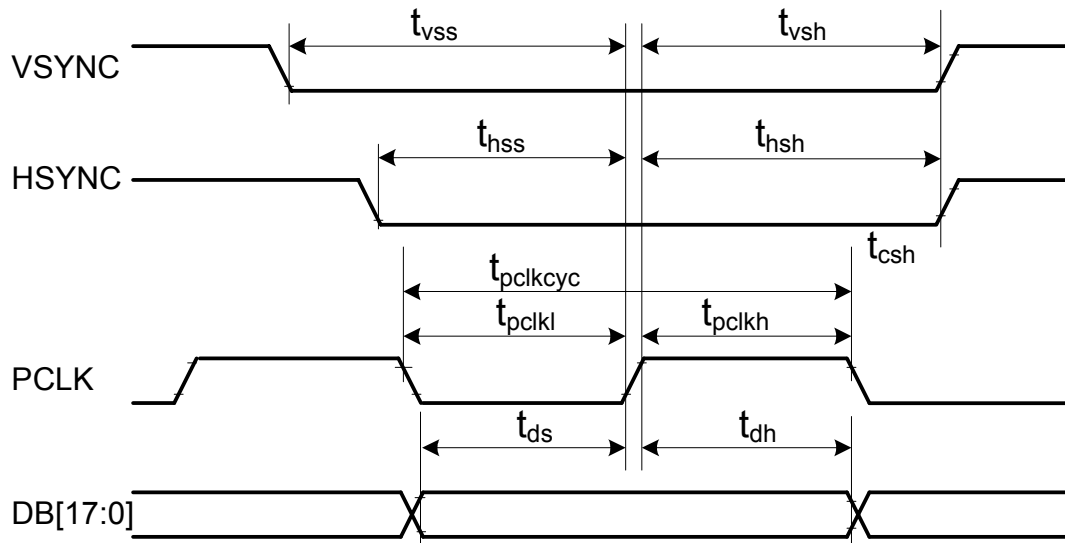
Note: Ta = -30 to 70 °C, IOVCC=1.65V to 3.3V, VDD=2.5V to 3.0V, GND=0V

### 13.3.2. DBI Type C Interface Timing Characteristics



| Signal                 | Symbol    | Parameter                      | Min. | Max. | Unit | Description |
|------------------------|-----------|--------------------------------|------|------|------|-------------|
| CSX                    | $t_{css}$ | Chip select setup time (Write) | 40   | -    | ns   |             |
|                        | $t_{csh}$ | Chip select hold time (Write)  | 40   | -    | ns   |             |
| D/CX                   | $t_{as}$  | Address setup time             | 10   |      | ns   |             |
|                        | $t_{ah}$  | Address hold time (Write/Read) | 10   |      | ns   |             |
| WRX/SCL<br>(Write)     | $t_{wc}$  | Write cycle                    | 100  |      | ns   |             |
|                        | $t_{wrh}$ | SCL High duration (write)      | 40   |      | ns   |             |
|                        | $t_{wrl}$ | SCL Low duration (write)       | 40   |      | ns   |             |
| WRX/SCL<br>(Read)      | $t_{rc}$  | Read cycle                     | 300  |      | ns   |             |
|                        | $t_{rdh}$ | SCL High duration (read)       | 120  |      | ns   |             |
|                        | $t_{rdl}$ | SCL Low duration (read)        | 120  |      | ns   |             |
| DIN/SDA<br>(Driver IC) | $t_{ds}$  | Data setup time                | 30   |      | ns   |             |
|                        | $t_{dh}$  | Data hold time                 | 30   |      | ns   |             |
| DOUT<br>(Driver IC)    | $t_{acc}$ | Access time                    | -    | 110  | ns   |             |
|                        | $t_{od}$  | Output disable time            | 10   |      | ns   |             |

### 13.3.3. DPI Interface Timing Characteristics



| Parameter                 | Symbol        | Condition | Min. | Max. | Unit |
|---------------------------|---------------|-----------|------|------|------|
| Vsync Setup Time          | $t_{vss}$     |           | 15   | -    | ns   |
| Vsync Hold Time           | $t_{vsh}$     |           | 15   | -    | ns   |
| Hsync Setup Time          | $t_{hss}$     |           | 15   | -    | ns   |
| Hsync Hold Time           | $t_{hsh}$     |           | 15   | -    | ns   |
| Pixel Clock Duty Cycle    | $t_{pclkcyd}$ |           | 33   | 67   | %    |
| Pixel Clock Low Duration  | $t_{pckl}$    |           | 15   | -    | ns   |
| Pixel Clock High Duration | $t_{pckh}$    |           | 15   | -    | ns   |
| Data Setup Time           | $t_{ds}$      |           | 15   | -    | ns   |
| Data Hold Time            | $t_{dh}$      |           | 15   | -    | ns   |

## 14. Revision History

| Version No. | Date      | Page | Description |
|-------------|-----------|------|-------------|
| V.01        | 2006/4/17 |      | New Created |
|             |           |      |             |
|             |           |      |             |
|             |           |      |             |
|             |           |      |             |
|             |           |      |             |
|             |           |      |             |
|             |           |      |             |
|             |           |      |             |