

Amorphous TFT LCD Single-Chip Driver 800(RGB) x 1280 Resolution, 16.7M-color Without Internal GRAM

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1. Introduction

The ILI9881C is a 16.7M single-chip (SOC) driver. It is comprised of a 2404-channel source driver (S1~S2400 and SDUM[3:0]), a gate-IC-less level shifter and a power supply circuit to drive a dot-matrix TFT LCD with 800 (RGB) x 1280 dots at maximum.

The ILI9881C can configure functions via the MIPI¹ DSI² Interface; transmit video data via MIPI DSI Interface. The ILI9881C supports three kinds of data types, i.e., 16-bit, 18-bit and 24-bit, for video image display in MIPI DSI interfaces. In the MIPI DSI high-speed mode, the ILI9881C also provides three user-selectable hardware structures:

- ❖ Two data lane supports up to 850Mbps on the MIPI DSI link
- ❖ Three data lanes support up to 650Mbps on the MIPI DSI link
- ❖ Four data lanes support up to 550Mbps on the MIPI DSI link

The ILI9881C can operate with 1.65V I/O interface voltage and supports a wide range of analog power supplies. The ILI9881C supports 2 colors (Idle Mode: 2-color low power mode) display and sleep mode power management functions, ideal for portable products where battery power conservation is desirable, such as digital cellular phones, smart phones, MP3 players, personal media players and similar devices with color graphics displays.

¹ MIPI: Mobile Industry Processor Interface

² DSI: Display Serial Interface

2. Features

- ◆ Display resolution options:
 - 800 (RGB) (H) x (480 + (4 x NL)) (V)
 - 768 (RGB) (H) x (480 + (4 x NL)) (V)
 - 720 (RGB) (H) x (480 + (4 x NL)) (V)
 - 640 (RGB) (H) x (480 + (4 x NL)) (V)

- ◆ Display color modes
 - Full color mode:
 - 16.7M colors (24-bit data, R: 8-bit, G: 8-bit, B: 8-bit)
 - Reduced color modes:
 - 262K colors (18-bit data, R: 6-bit, G: 6-bit, B: 6-bit)
 - 65K colors (16-bit data, R: 5-bit, G: 6-bit, B: 5-bit)
 - 2 colors (Idle Mode: 2-color low power mode)

- ◆ Display module:
 - Supports 2404 source channel outputs (S1~S2400 and SDUM[3:0])
 - Supports gate control signals to gate driver in the panel
 - Supports 1-dot , 2-dot , 4-dot , N/4-dot , N/8-dot , N/16-dot , N/32-dot , column , Zig-Zag inversion
 - Gamma correction (1 preset Gamma curve)
 - On module VCOM control
 - 800x1280-dot display RAM with data compression for 2-color low power mode

- ◆ Display interface types:
 - DSI interface (DSI version 1.01 and D-PHY version 1.00):
 - 2 data lane / maximum speed 850Mbps
 - 3 data lanes / maximum speed 650Mbps
 - 4 data lanes / maximum speed 550Mbps

- ◆ Power saving modes:
 - Sleep mode

- ◆ Other on-chip functions/Miscellaneous
 - Software programmable color depth mode
 - Oscillator for display clock generation
 - DC VCOM voltage generator and adjustment
 - CABC (Content Adaptive Brightness Control) function
 - DGC (Digital Gamma Correction) function
 - IIE (Impressive Image Enhancement) function
 - VGH/VGL voltage generator for gate control signal in panel
 - Gate control signals to gate driver in panel (GIP)
 - OTP (One-Time Programming) memory store initialization register settings
 - Provide 3 times to store DC VCOM value setting and ID1 ~ ID3
 - BIST (Built-In Self-Test Pattern) mode function

- ◆ Input power:
 - VCI = 2.5V ~ 6.0V
 - VDDI = 1.65V ~ 3.3V
 - VCC1 = 1.65V ~ 6.0V
 - VCC2 = 1.65V ~ 6.0V
 - VDDAM = 1.65V ~ 3.3V
 - VSP = 4.5V ~ 6.0V
 - VSN = -6.0V ~ -4.5V
 - OTP programming voltage (MTP_PWR): 8.5V

- ◆ Source/VCOM/Gate power supply voltage:
 - VCL-GND = -3.0V ~ -2.3V
 - DC VCOM = -4.0V ~ -0.2V (12mV/step); 0V
 - VREG1OUT = 2.9V ~ 5.5V (Positive source output voltage level)
 - VREG2OUT = -5.5V ~ -2.9V (Negative source output voltage level)
 - VGH-GND = 8V ~ 18V (Positive gate driver output voltage level)
 - VGL-GND = -7V ~ -18V (Negative gate driver output voltage level)

3. Device Overview

3.1. Block Diagram

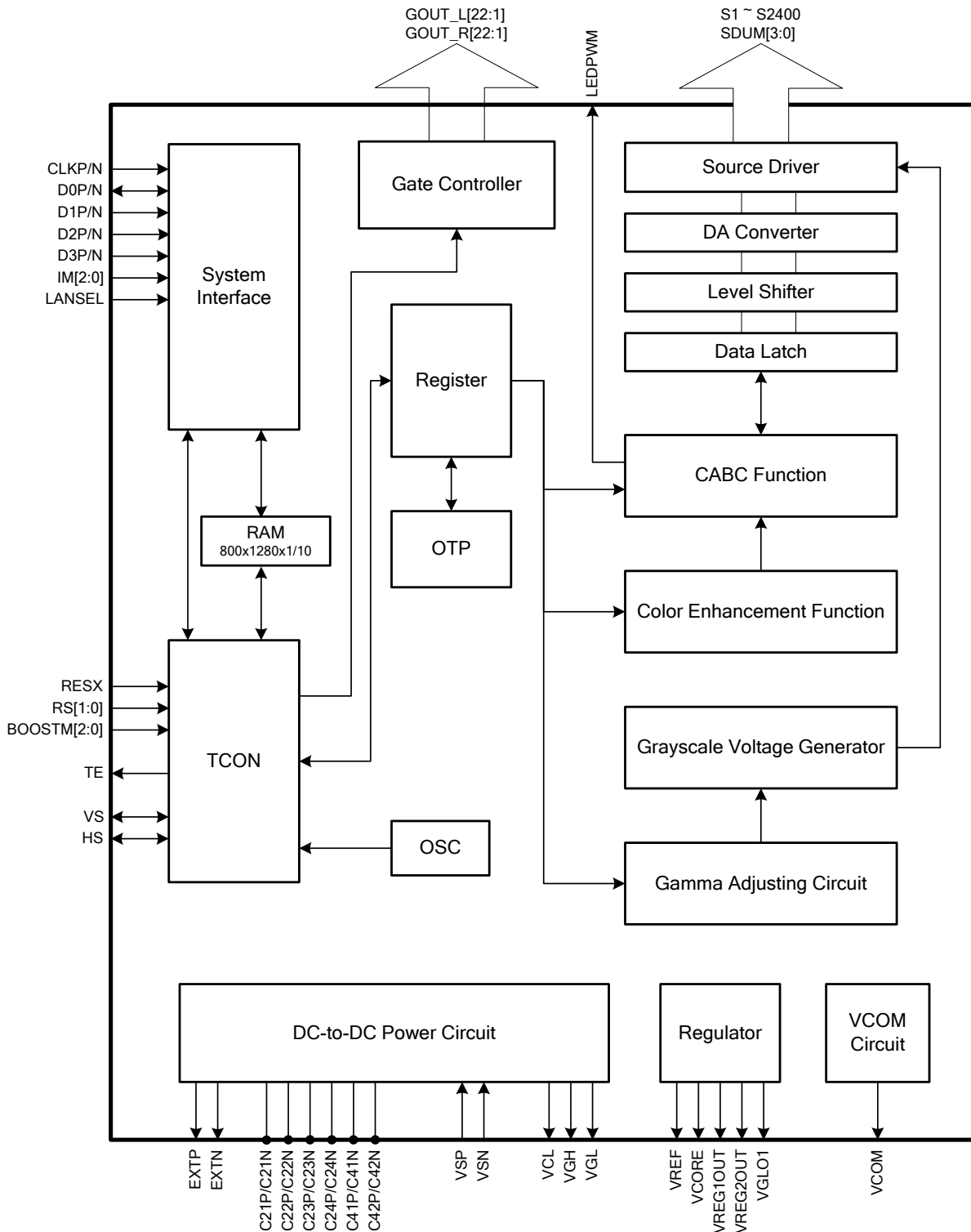


Figure 1: Block Diagram

3.2. Block Function Description

3.2.1. System Interface

The ILI9881C supports DSI interfaces. The interface mode and the lane number of DSI interface can be selected by hardware pins IM[2:0], LANSEL and control register MIPI_LANE_SEL (Page4_R00h).

3.2.2. Grayscale Voltage Generating Circuit

The grayscale voltage generating circuit generates a liquid crystal drive voltage that corresponds to the grayscale level set in the Gamma correction register. The ILI9881C can display 16.7M colors at maximum.

3.2.3. TCON

The TCON generates timing signals for internal circuits. Timing for display operations are outputted separately so that they do not interfere with each other.

3.2.4. OSC

The ILI9881C incorporates with an RC oscillator circuit. Command settings are used to change the frame frequency.

3.2.5. RAM

The LCD driver incorporates the RAM (800x1280)/10 bits = 12800 bytes, which can store pattern data of a 800(RGB) x 1280 resolution with data compression in the Idle Mode.

3.2.6. Source Driver Circuit

The LCD display driver circuit consists of a 2404-output source driver (S1~S2400 and SDUM[3:0]). The display pattern data is latched when 800RGB pixels of data are input. The voltage is output from the source driver according to the latched data.

3.2.7. Gate Controller Circuit

The panel control circuit outputs GOUT_L/R[22:1] signals at either the VGH or VGL level.

3.2.8. DC-to-DC Power Supply Circuit

The LCD drive power supply circuit generates the voltage levels for driving a panel. Voltage levels are adjusted according to the register setting.

3.2.9. CABC (Content Adaptive Brightness Control)

The CABC (Content Adaptive Brightness Control) dynamic backlight control function is used to reduce the power consumption of the luminance source.

3.3. Pin Descriptions

Table 1: Pin Definition

| Pin Name | I/O | Type | Descriptions | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---------------------------|---------|--|---|---|------------|------------|----------------------------|------|--|---|---|--|---|-----|--|-----------|------------|--|-----------|---|---|---|---|------------|--------|-------|-------|---|---|---|-------|-------|--------|-------|-------|---|---|---|-------|-------|--------|-------|-------|---|---|---|-------|-------|--------|-------|-------|---|---|---|-------|-------|--------|-------|-------|---|---|---|-------|-------|--------|-------|-------|---|---|---|-------|-------|--------|-------|-------|---|---|---|-------|-------|--------|-------|-------|
| Global Control Pins | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| IM[2:0] | I | VDDI | <p>- Interface mode select pins. Notes: (1) IM[2:0] pins are used to configure lane sequence and polarity (2) The bottom table is an example for MIPI 4 lane setting</p> <table border="1"> <thead> <tr> <th colspan="3">External Pad Set</th> <th colspan="5">Configuration of MIPI Lane</th> </tr> <tr> <th>IM2</th> <th>IM1</th> <th>IM0</th> <th>D0P/N Pin</th> <th>D1P/N Pin</th> <th>CLKP/N Pin</th> <th>D2P/N Pin</th> <th>D3P/N Pin</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>0</td> <td>0</td> <td>D3P/N</td> <td>D2P/N</td> <td>CLKP/N</td> <td>D1P/N</td> <td>D0P/N</td> </tr> <tr> <td>0</td> <td>0</td> <td>1</td> <td>D3N/P</td> <td>D2N/P</td> <td>CLKN/P</td> <td>D1N/P</td> <td>D0N/P</td> </tr> <tr> <td>0</td> <td>1</td> <td>0</td> <td>D0P/N</td> <td>D1P/N</td> <td>CLKP/N</td> <td>D2P/N</td> <td>D3P/N</td> </tr> <tr> <td>0</td> <td>1</td> <td>1</td> <td>D0N/P</td> <td>D1N/P</td> <td>CLKN/P</td> <td>D2N/P</td> <td>D3N/P</td> </tr> <tr> <td>1</td> <td>0</td> <td>0</td> <td>D3P/N</td> <td>D0P/N</td> <td>CLKP/N</td> <td>D1P/N</td> <td>D2P/N</td> </tr> <tr> <td>1</td> <td>0</td> <td>1</td> <td>D3N/P</td> <td>D0N/P</td> <td>CLKN/P</td> <td>D1N/P</td> <td>D2N/P</td> </tr> <tr> <td>1</td> <td>1</td> <td>0</td> <td>D2P/N</td> <td>D1P/N</td> <td>CLKP/N</td> <td>D0P/N</td> <td>D3P/N</td> </tr> <tr> <td>1</td> <td>1</td> <td>1</td> <td>D2N/P</td> <td>D1N/P</td> <td>CLKN/P</td> <td>D0N/P</td> <td>D3N/P</td> </tr> </tbody> </table> | External Pad Set | | | Configuration of MIPI Lane | | | | | IM2 | IM1 | IM0 | D0P/N Pin | D1P/N Pin | CLKP/N Pin | D2P/N Pin | D3P/N Pin | 0 | 0 | 0 | D3P/N | D2P/N | CLKP/N | D1P/N | D0P/N | 0 | 0 | 1 | D3N/P | D2N/P | CLKN/P | D1N/P | D0N/P | 0 | 1 | 0 | D0P/N | D1P/N | CLKP/N | D2P/N | D3P/N | 0 | 1 | 1 | D0N/P | D1N/P | CLKN/P | D2N/P | D3N/P | 1 | 0 | 0 | D3P/N | D0P/N | CLKP/N | D1P/N | D2P/N | 1 | 0 | 1 | D3N/P | D0N/P | CLKN/P | D1N/P | D2N/P | 1 | 1 | 0 | D2P/N | D1P/N | CLKP/N | D0P/N | D3P/N | 1 | 1 | 1 | D2N/P | D1N/P | CLKN/P | D0N/P | D3N/P |
| External Pad Set | | | Configuration of MIPI Lane | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| IM2 | IM1 | IM0 | D0P/N Pin | D1P/N Pin | CLKP/N Pin | D2P/N Pin | D3P/N Pin | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0 | 0 | 0 | D3P/N | D2P/N | CLKP/N | D1P/N | D0P/N | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0 | 0 | 1 | D3N/P | D2N/P | CLKN/P | D1N/P | D0N/P | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0 | 1 | 0 | D0P/N | D1P/N | CLKP/N | D2P/N | D3P/N | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0 | 1 | 1 | D0N/P | D1N/P | CLKN/P | D2N/P | D3N/P | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | 0 | 0 | D3P/N | D0P/N | CLKP/N | D1P/N | D2P/N | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | 0 | 1 | D3N/P | D0N/P | CLKN/P | D1N/P | D2N/P | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | 1 | 0 | D2P/N | D1P/N | CLKP/N | D0P/N | D3P/N | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | 1 | 1 | D2N/P | D1N/P | CLKN/P | D0N/P | D3N/P | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| RS[1:0] | I | VDDI | <p>- Resolution selection pins.</p> <table border="1"> <thead> <tr> <th>RS1</th> <th>RS0</th> <th>Resolution</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>0</td> <td>800 (RGB) x (480 + (4 x NL)) gate line</td> </tr> <tr> <td>0</td> <td>1</td> <td>768 (RGB) x (480 + (4 x NL)) gate line</td> </tr> <tr> <td>1</td> <td>0</td> <td>720 (RGB) x (480 + (4 x NL)) gate line</td> </tr> <tr> <td>1</td> <td>1</td> <td>640 (RGB) x (480 + (4 x NL)) gate line</td> </tr> </tbody> </table> | RS1 | RS0 | Resolution | 0 | 0 | 800 (RGB) x (480 + (4 x NL)) gate line | 0 | 1 | 768 (RGB) x (480 + (4 x NL)) gate line | 1 | 0 | 720 (RGB) x (480 + (4 x NL)) gate line | 1 | 1 | 640 (RGB) x (480 + (4 x NL)) gate line | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| RS1 | RS0 | Resolution | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0 | 0 | 800 (RGB) x (480 + (4 x NL)) gate line | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0 | 1 | 768 (RGB) x (480 + (4 x NL)) gate line | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | 0 | 720 (RGB) x (480 + (4 x NL)) gate line | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | 1 | 640 (RGB) x (480 + (4 x NL)) gate line | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| LANSEL | I | VDDI | <p>- MIPI DSI Lane number selection pin LANSEL="1", MIPI DSI is 2 Lane mode LANSEL="0", MIPI DSI is 3 or 4 Lane mode <i>Note: Please reference "Table 2 DSI Interface Lane Mode Selection"</i></p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| BOOSTM[2:0] | I | VDDI | <p>- Power type selection pins</p> <table border="1"> <thead> <tr> <th>Page4_R6Eh DI_PWR_REG</th> <th>BOOSTM2</th> <th>BOOSTM1</th> <th>BOOSTM0</th> <th>NOTE</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>0</td> <td>0</td> <td>1</td> <td>Power Mode 2A External IOVCC, VSP and VSN (VCI=VSP)^{Note 1}</td> </tr> <tr> <td>1</td> <td>0</td> <td>0</td> <td>1</td> <td>Power Mode 4 External IOVCC, VCI, VSP and VSN</td> </tr> <tr> <td>X</td> <td>0</td> <td>1</td> <td>0</td> <td>Power Mode 3 External IOVCC and VCI (with ILI4003)</td> </tr> <tr> <td colspan="4" style="text-align: center;">prohibited</td> <td>-</td> </tr> </tbody> </table> <p>The default value of DI_PWR_REG is "1". <i>Note 1: VCI and VSP pads must be connected by external metal path.</i></p> | Page4_R6Eh DI_PWR_REG | BOOSTM2 | BOOSTM1 | BOOSTM0 | NOTE | 0 | 0 | 0 | 1 | Power Mode 2A External IOVCC, VSP and VSN (VCI=VSP) ^{Note 1} | 1 | 0 | 0 | 1 | Power Mode 4 External IOVCC, VCI, VSP and VSN | X | 0 | 1 | 0 | Power Mode 3 External IOVCC and VCI (with ILI4003) | prohibited | | | | - | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Page4_R6Eh DI_PWR_REG | BOOSTM2 | BOOSTM1 | BOOSTM0 | NOTE | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0 | 0 | 0 | 1 | Power Mode 2A External IOVCC, VSP and VSN (VCI=VSP) ^{Note 1} | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | 0 | 0 | 1 | Power Mode 4 External IOVCC, VCI, VSP and VSN | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| X | 0 | 1 | 0 | Power Mode 3 External IOVCC and VCI (with ILI4003) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| prohibited | | | | - | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| RESX | I | VDDI | <p>- The external reset input Initializes the chip with a low input. Be sure to execute a power-on reset after supplying power. Fix to VDDI level when not in use.</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| TE | O | VDDI | <p>- Tearing effect output pin. Leave the pin open when not in use.</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| VS | I/O | VDDI | <p>- Touch synchronization signal (VSOUT). Fix to VSS level when not in use.</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| HS | I/O | VDDI | <p>- Touch synchronization signal (HSOUT). Fix to VSS level when not in use.</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| LEDPWM | O | VDDI | <p>- LCD backlight control PWM output pin. Leave the pin open when not in use.</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| DSI Interface Signal Pins | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| CLKP CLKN | I | LVDSVDD | <p>- MIPI DSI differential clock pair Leave it open or fix to LVDSVSS level when not in use.</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| D0P D0N | I/O | LVDSVDD | <p>- MIPI DSI differential data pair. (Data lane 0) Leave it open or fix to LVDSVSS level when not in use.</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

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| D1P D1N | I | LVDSVDD | - MIPI DSI differential data pair. (Data lane 1) Leave it open or fix to LVDSVSS level when not in use. | | | | | | | | | | | | |
|--|---------------------------|--------------|---|--------------------|-----------------|-----------|------------|-----------|---------------------------|-----------|---------------------------|-----------|--------------------------|---------------------|-----------------------|
| D2P D2N | I | LVDSVDD | - MIPI DSI differential data pair. (Data lane 2) Leave it open or fix to LVDSVSS level when not in use. | | | | | | | | | | | | |
| D3P D3N | I | LVDSVDD | - MIPI DSI differential data pair. (Data lane 3) Leave it open or fix to LVDSVSS level when not in use. | | | | | | | | | | | | |
| Source / Panel Control / VCOM Signal Pins | | | | | | | | | | | | | | | |
| S[2400:1] | O | Analog | - Output source driver signals. The D/A converted 256-gray-scale analog voltage output. Source output mapping with different resolution <table border="1" style="margin-left: 20px;"> <thead> <tr> <th>Disaply resulation</th> <th>Source channels</th> </tr> </thead> <tbody> <tr> <td>800 (RGB)</td> <td>S1 ~ S2400</td> </tr> <tr> <td>768 (RGB)</td> <td>S1 ~ S1152, S1249 ~ S2400</td> </tr> <tr> <td>720 (RGB)</td> <td>S1 ~ S1080, S1321 ~ S2400</td> </tr> <tr> <td>640 (RGB)</td> <td>S1 ~ S960, S1441 ~ S2400</td> </tr> <tr> <td>800 (RGB) + Zig-Zag</td> <td>S1 ~ S2400, SDUM[2:1]</td> </tr> </tbody> </table> | Disaply resulation | Source channels | 800 (RGB) | S1 ~ S2400 | 768 (RGB) | S1 ~ S1152, S1249 ~ S2400 | 720 (RGB) | S1 ~ S1080, S1321 ~ S2400 | 640 (RGB) | S1 ~ S960, S1441 ~ S2400 | 800 (RGB) + Zig-Zag | S1 ~ S2400, SDUM[2:1] |
| Disaply resulation | Source channels | | | | | | | | | | | | | | |
| 800 (RGB) | S1 ~ S2400 | | | | | | | | | | | | | | |
| 768 (RGB) | S1 ~ S1152, S1249 ~ S2400 | | | | | | | | | | | | | | |
| 720 (RGB) | S1 ~ S1080, S1321 ~ S2400 | | | | | | | | | | | | | | |
| 640 (RGB) | S1 ~ S960, S1441 ~ S2400 | | | | | | | | | | | | | | |
| 800 (RGB) + Zig-Zag | S1 ~ S2400, SDUM[2:1] | | | | | | | | | | | | | | |
| SDUM[3:0] | O | Analog | - Dummy Source Leave the pin open when not in use. | | | | | | | | | | | | |
| GOUT_L[22:1] | O | Analog | - Gate control signals for panel in left side of IC Leave the pin open when not in use. | | | | | | | | | | | | |
| GOUT_R[22:1] | O | Analog | - Gate control signals for panel in right side of IC Leave the pin open when not in use. | | | | | | | | | | | | |
| VCOM | O | Analog | - Regulator output for common voltage of panel Connect to a stabilizing capacitor between VCOM and VSSA. | | | | | | | | | | | | |
| Power Supply Pins | | | | | | | | | | | | | | | |
| VCI | I | Power Supply | - Power supply for analog circuits. Connect to an external power supply of 2.5V to 6.0V | | | | | | | | | | | | |
| VCIREF | I | Power Supply | - Power supply for analog circuits. Connect to an external power supply of 2.5V to 6.0V | | | | | | | | | | | | |
| VDDI | I | Power Supply | - Power supply for I/O pads. Connect to an external power supply of 1.65V to 3.3V | | | | | | | | | | | | |
| VCC1 | I | Power Supply | - Power supply for internal logic regulator. Connect to an external power supply of 1.65V to 6.0V | | | | | | | | | | | | |
| VCC2 | I | Power Supply | - Power supply for internal logic regulator. Connect to an external power supply of 1.65V to 6.0V | | | | | | | | | | | | |
| VDDAM | I | Power Supply | - Power supply for MIPI DSI regulator. Connect to an external power supply of 1.65V to 3.3V | | | | | | | | | | | | |
| VSP | I | Power Supply | - Input voltage from step-up circuit. Connect to an external power supply of 4.5V to 6.0V | | | | | | | | | | | | |
| VSN | I | Power Supply | - Input voltage from step-up circuit. Connect to an external power supply of -4.5V to -6.0V. | | | | | | | | | | | | |
| VSSA | I | Ground | - System ground for the analog circuit In the case of COG, connect to GND on the FPC to prevent noise. | | | | | | | | | | | | |
| VSSREF | I | Ground | - System ground for the analog circuit In the case of COG, connect to GND on the FPC to prevent noise. | | | | | | | | | | | | |
| LVDSVSS | I | Ground | - System ground for MIPI DSI analog ground In the case of COG, connect to GND on the FPC to prevent noise. | | | | | | | | | | | | |
| VSS | I | Ground | - System ground for digital circuit In the case of COG, connect to GND on the FPC to prevent noise. | | | | | | | | | | | | |
| MTP_PWR | I | Power Supply | - Input power for OTP programming. MTP_PWR=8. 5V When not under programming, let MTP_PWR float or connect to ground. | | | | | | | | | | | | |
| DC-to-DC Circuit Pins | | | | | | | | | | | | | | | |
| VREG1OUT | O | Analog | - Regulator output voltage from VSP, It's for positive gray scale voltage. Connect to a stabilizing capacitor between GVDD and VSSA. | | | | | | | | | | | | |
| VREG2OUT | O | Analog | - Regulator output voltage from VSN, It's for negative gray scale voltage. Connect to a stabilizing capacitor between NGVDD and VSSA. | | | | | | | | | | | | |
| VCL | O | Analog | - Output voltage from step-up circuit | | | | | | | | | | | | |

| | | | |
|----------------------------|-----|-------------------|---|
| | | | Connect to a stabilizing capacitor between VCL and VSSA. |
| VGH | O | Analog | - Output voltage from step-up circuit Connect to a stabilizing capacitor between VGH and VSSA. |
| VGL | O | Analog | - Output voltage from step-up circuit Connect to a stabilizing capacitor between VGL and VSSA. |
| VGLO1 | O | Analog | - Negative power supply to panel GIP circuits If need different VGL voltage, must connect to a stabilizing capacitor between VGLO1 and VSSA. |
| EXTP | O | VCI | - Control signal output to generate VSP |
| EXTN | O | VCI | - Control signal output to generate VSN |
| LVDSVDD | O | Analog | - MIPI DSI regulator output Connect to a stabilizing capacitor between LVDSVDD and LVDSVSS. |
| VREF | O | Analog | - Reference voltage from internal band gap circuit (1.8V typical) Connect to a stabilizing capacitor between VREF and VSSA. |
| VCORE | O | Analog | - Internal logic regulator output (1.5V typical) Connect to a stabilizing capacitor between VCORE and VSSA. |
| C21P / C21N C22P / C22N | I/O | Step-up Capacitor | - Connect the charge-pumping capacitor for generating VGH level. |
| C23P / C23N C24P / C24N | I/O | Step-up Capacitor | - Connect the charge-pumping capacitor for generating VGL level. |
| C41P / C41N C42P / C42N | I/O | Step-up Capacitor | - Connect the charge-pumping capacitor for generating VCL level. |
| Test / Dummy Pins | | | |
| PCLK | I | VDDI | - Test pins Unused pins should be left open. |
| D[7:0] | I/O | VDDI | - Test pins Unused pins should be left open or connected to VSS, VDDI. |
| TEST[5:0] | I/O | VDDI | - Test pins Unused pins should be left open or connected to VSS, VDDI. |
| TOUT[3:0] | I/O | VDDI | - Test pins Unused pins should be left open or connected to VSS, VDDI. |
| VTESTOUTP | O | Analog | - Analog test output pin Let it open. |
| VTESTOUTN | O | Analog | - Analog test output pin Let it open. |
| CSX | I | VDDI | - Test pins Fix to VDDI or VSS level when not in use. |
| DCX | I | VDDI | - Test pins Fix to VDDI or VSS level when not in use. |
| SCL | I | VDDI | - Test pins Fix to VDDI or VSS level when not in use. |
| SDI | I | VDDI | - Test pins Leave the pin open when not in use. |
| SDO | O | VDDI | - Test pins Leave the pin open when not in use. |
| TE1 | O | VDDI | - Test pins. Leave the pin open when not in use. |
| C31P | - | - | - Dummy pins Let it open. |
| VCOMR | - | - | - Dummy pins Let it open. |
| VGLO2DUMMY | - | - | - Dummy pins Let it open. |
| DUMMYR1 | - | Analog | - dummy pins Propose to connect these two pads separately when use for bonding resistance measurement |
| VSSDUMMY | - | - | - Dummy pins Let it open. |

| | | | |
|-------------|---|---|------------------------------|
| DUMMY[85:3] | - | - | - Dummy pins Let it open. |
| DUMMYN | - | - | - Dummy pins Let it open. |
| DUMMYP | - | - | - Dummy pins Let it open. |

3.4. Pin Assignment

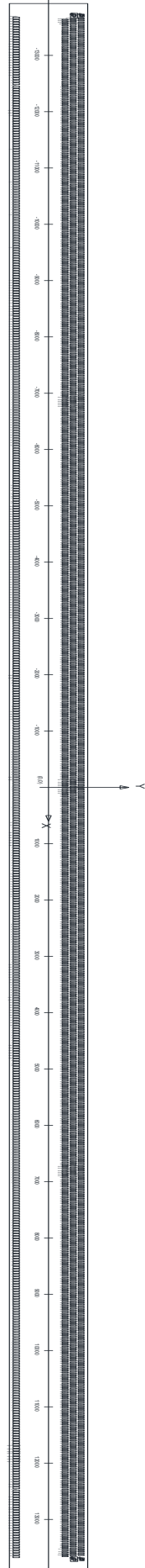
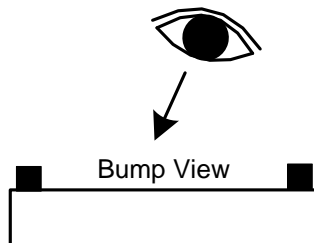
Chip Size: 27840 um x 875 um

Pad Location: Pad Center.

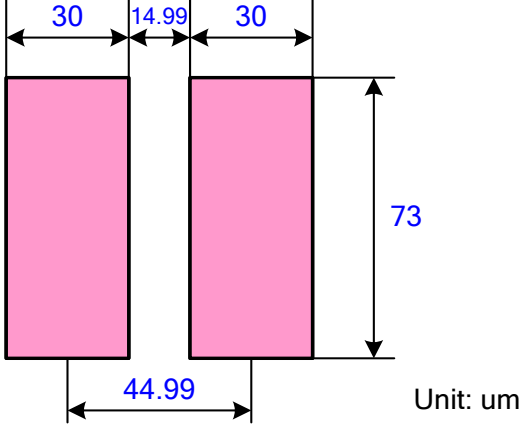
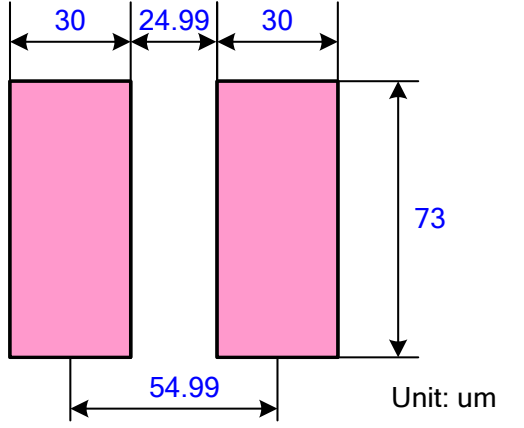
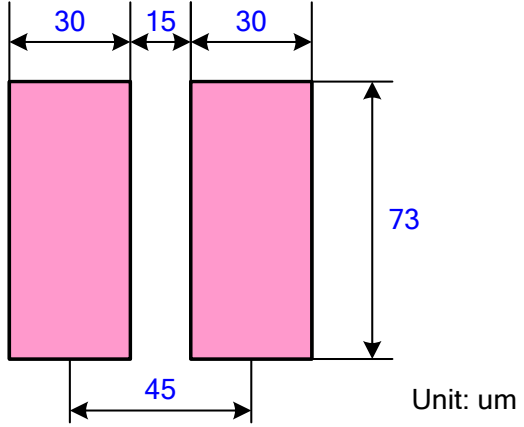
Coordinate Origin: Chip center

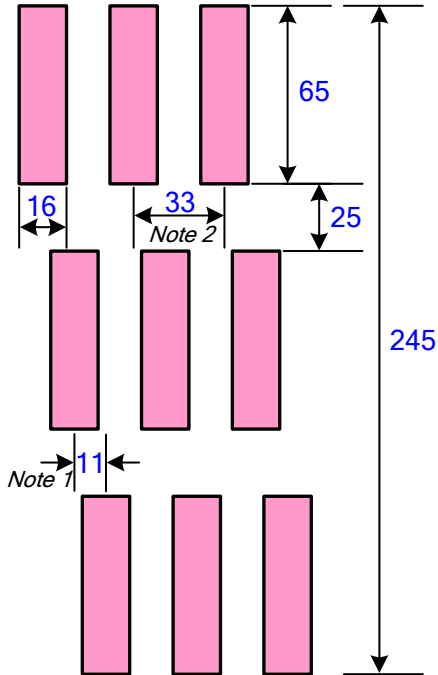
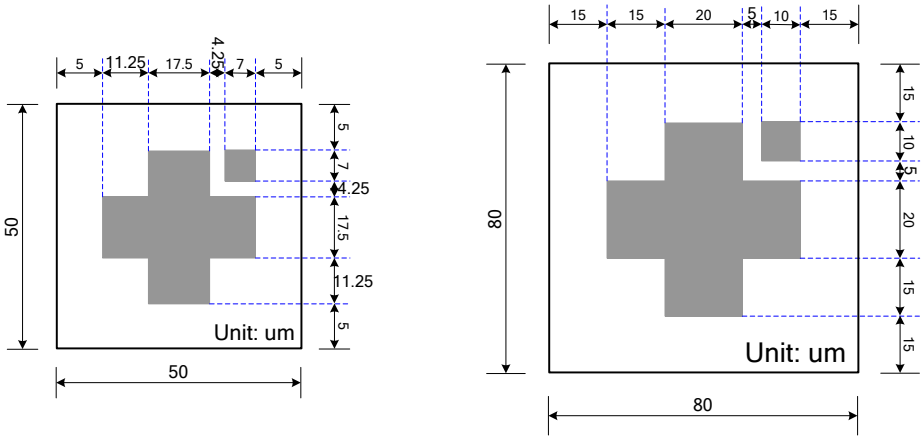
Bump Size:

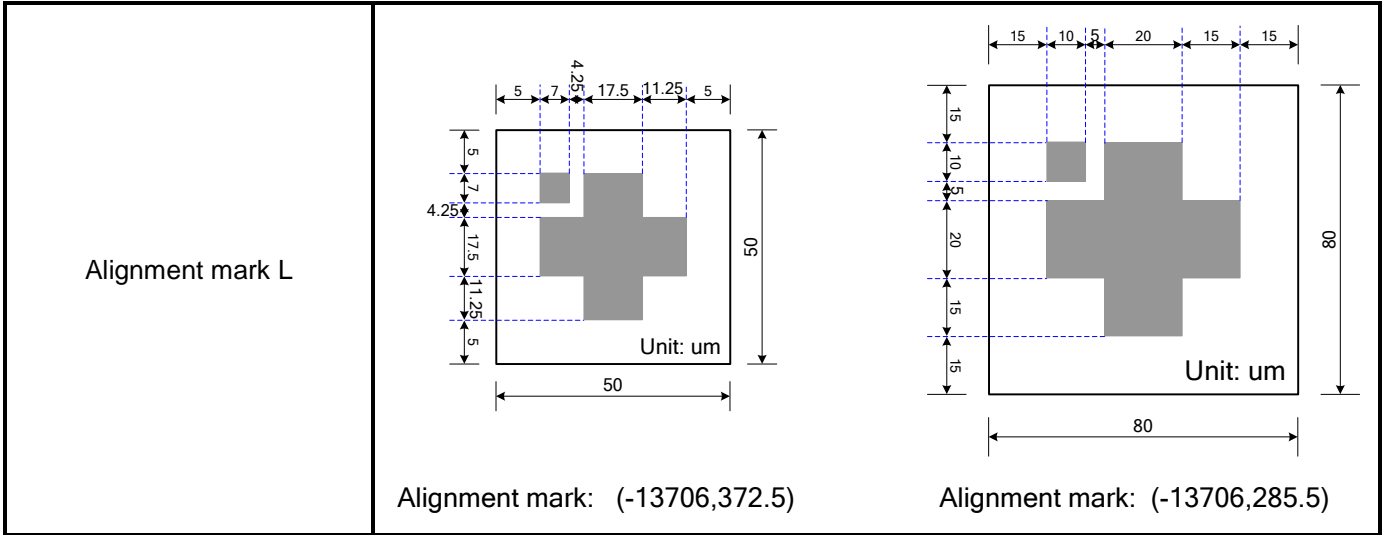
1. 30um x 73um
Pad 1 to 608.
2. 16um x 65um
Pad 609 to 3092.



3.5. Bump Arrangement

| | |
|---|--|
| <p>Input PAD (No. 1~27, 28~304, 305~581, 582~608)</p> |  <p>Unit: um</p> |
| <p>Input PAD (No. 27~28, 581~582)</p> |  <p>Unit: um</p> |
| <p>Input PAD (No. 304~305)</p> |  <p>Unit: um</p> |

| | |
|--------------------------------------|--|
| <p>Output PAD (No. 609~3092)</p> |  <p>Unit: um</p> <p>Notes:</p> <ol style="list-style-type: none"> 1. Pad has temperature compensation design, so the space may be 11um or 10.99um. 2. Pad has temperature compensation design, so the space may be 33um or 32.99um. |
| <p>Alignment mark R</p> |  <p>Alignment mark: (13706,372.5)</p> <p>Alignment mark: (13706,285.5)</p> |



3.6. Pad Coordination

| No. | Name | X | Y |
|-----|-----------|-----------|------|
| 1 | DUMMY1 | -13664.47 | -361 |
| 2 | DUMMY1 | -13619.48 | -361 |
| 3 | GOUT_L1 | -13574.49 | -361 |
| 4 | GOUT_L2 | -13529.5 | -361 |
| 5 | GOUT_L3 | -13484.51 | -361 |
| 6 | GOUT_L4 | -13439.52 | -361 |
| 7 | GOUT_L5 | -13394.53 | -361 |
| 8 | GOUT_L6 | -13349.54 | -361 |
| 9 | GOUT_L7 | -13304.55 | -361 |
| 10 | GOUT_L8 | -13259.56 | -361 |
| 11 | GOUT_L9 | -13214.57 | -361 |
| 12 | GOUT_L10 | -13169.58 | -361 |
| 13 | GOUT_L11 | -13124.59 | -361 |
| 14 | GOUT_L12 | -13079.6 | -361 |
| 15 | GOUT_L13 | -13034.61 | -361 |
| 16 | GOUT_L14 | -12989.62 | -361 |
| 17 | GOUT_L15 | -12944.63 | -361 |
| 18 | GOUT_L16 | -12899.64 | -361 |
| 19 | GOUT_L17 | -12854.65 | -361 |
| 20 | GOUT_L18 | -12809.66 | -361 |
| 21 | GOUT_L19 | -12764.67 | -361 |
| 22 | GOUT_L20 | -12719.68 | -361 |
| 23 | GOUT_L21 | -12674.69 | -361 |
| 24 | GOUT_L22 | -12629.7 | -361 |
| 25 | VCOM | -12584.71 | -361 |
| 26 | VCOM | -12539.72 | -361 |
| 27 | VCOM | -12494.73 | -361 |
| 28 | VSSA | -12449.74 | -361 |
| 29 | VSSA | -12394.75 | -361 |
| 30 | VSSA | -12349.76 | -361 |
| 31 | VSSA | -12304.77 | -361 |
| 32 | VSSA | -12259.78 | -361 |
| 33 | VSSA | -12214.79 | -361 |
| 34 | VSSA | -12169.8 | -361 |
| 35 | VSSA | -12124.81 | -361 |
| 36 | VSSA | -12079.82 | -361 |
| 37 | VSSA | -12034.83 | -361 |
| 38 | VTESTOUTP | -11989.84 | -361 |
| 39 | VTESTOUTP | -11944.85 | -361 |
| 40 | LVDSVSS | -11899.86 | -361 |
| 41 | D0N | -11854.87 | -361 |
| 42 | D0N | -11809.88 | -361 |
| 43 | D0N | -11764.89 | -361 |
| 44 | D0N | -11719.9 | -361 |
| 45 | D0N | -11674.91 | -361 |
| 46 | D0P | -11629.92 | -361 |
| 47 | D0P | -11584.93 | -361 |
| 48 | D0P | -11539.94 | -361 |
| 49 | D0P | -11494.95 | -361 |
| 50 | D0P | -11449.96 | -361 |
| 51 | D0P | -11404.97 | -361 |
| 52 | D0P | -11359.98 | -361 |
| 53 | LVDSVSS | -11314.99 | -361 |
| 54 | D1N | -11270 | -361 |
| 55 | D1N | -11225.01 | -361 |
| 56 | D1N | -11180.02 | -361 |
| 57 | D1N | -11135.03 | -361 |
| 58 | D1N | -11090.04 | -361 |
| 59 | D1N | -11045.05 | -361 |
| 60 | D1P | -11000.06 | -361 |
| 61 | D1P | -10955.07 | -361 |
| 62 | D1P | -10910.08 | -361 |
| 63 | D1P | -10865.09 | -361 |
| 64 | D1P | -10820.1 | -361 |
| 65 | D1P | -10775.11 | -361 |
| 66 | LVDSVSS | -10730.12 | -361 |
| 67 | CLKN | -10685.13 | -361 |
| 68 | CLKN | -10640.14 | -361 |
| 69 | CLKN | -10595.15 | -361 |
| 70 | CLKN | -10550.16 | -361 |
| 71 | CLKN | -10505.17 | -361 |
| 72 | CLKN | -10460.18 | -361 |
| 73 | CLKP | -10415.19 | -361 |
| 74 | CLKP | -10370.2 | -361 |
| 75 | CLKP | -10325.21 | -361 |
| 76 | CLKP | -10280.22 | -361 |
| 77 | CLKP | -10235.23 | -361 |
| 78 | CLKP | -10190.24 | -361 |
| 79 | LVDSVSS | -10145.25 | -361 |
| 80 | D2N | -10100.26 | -361 |
| 81 | D2N | -10055.27 | -361 |
| 82 | D2N | -10010.28 | -361 |
| 83 | D2N | -9965.29 | -361 |
| 84 | D2N | -9920.3 | -361 |
| 85 | D2N | -9875.31 | -361 |
| 86 | D2P | -9830.32 | -361 |
| 87 | D2P | -9785.33 | -361 |
| 88 | D2P | -9740.34 | -361 |
| 89 | D2P | -9695.35 | -361 |
| 90 | D2P | -9650.36 | -361 |
| 91 | D2P | -9605.37 | -361 |
| 92 | LVDSVSS | -9560.38 | -361 |
| 93 | D3N | -9515.39 | -361 |
| 94 | D3N | -9470.4 | -361 |
| 95 | D3N | -9425.41 | -361 |
| 96 | D3N | -9380.42 | -361 |
| 97 | D3N | -9335.43 | -361 |
| 98 | D3N | -9290.44 | -361 |
| 99 | D3P | -9245.45 | -361 |
| 100 | D3P | -9200.46 | -361 |

| No. | Name | X | Y |
|-----|---------|----------|------|
| 101 | D3P | -9155.47 | -361 |
| 102 | D3P | -9110.48 | -361 |
| 103 | D3P | -9065.49 | -361 |
| 104 | D3P | -9020.5 | -361 |
| 105 | LVDSVSS | -8975.51 | -361 |
| 106 | LVDSVSS | -8930.52 | -361 |
| 107 | LVDSVSS | -8885.53 | -361 |
| 108 | LVDSVSS | -8840.54 | -361 |
| 109 | LVDSVSS | -8795.55 | -361 |
| 110 | LVDSVSS | -8750.56 | -361 |
| 111 | LVDSVSS | -8705.57 | -361 |
| 112 | LVDSVSS | -8660.58 | -361 |
| 113 | LVDSVSS | -8615.59 | -361 |
| 114 | LVDSVSS | -8570.6 | -361 |
| 115 | LVDSVSS | -8525.61 | -361 |
| 116 | LVDSVSS | -8480.62 | -361 |
| 117 | LVDSVDD | -8435.63 | -361 |
| 118 | LVDSVDD | -8390.64 | -361 |
| 119 | LVDSVDD | -8345.65 | -361 |
| 120 | LVDSVDD | -8300.66 | -361 |
| 121 | LVDSVDD | -8255.67 | -361 |
| 122 | LVDSVDD | -8210.68 | -361 |
| 123 | LVDSVDD | -8165.69 | -361 |
| 124 | LVDSVDD | -8120.7 | -361 |
| 125 | LVDSVDD | -8075.71 | -361 |
| 126 | LVDSVDD | -8030.72 | -361 |
| 127 | LVDSVDD | -7985.73 | -361 |
| 128 | LVDSVDD | -7940.74 | -361 |
| 129 | VDDAM | -7895.75 | -361 |
| 130 | VDDAM | -7850.76 | -361 |
| 131 | VDDAM | -7805.77 | -361 |
| 132 | VDDAM | -7760.78 | -361 |
| 133 | VDDAM | -7715.79 | -361 |
| 134 | VDDAM | -7670.8 | -361 |
| 135 | VDDAM | -7625.81 | -361 |
| 136 | VDDAM | -7580.82 | -361 |
| 137 | VDDAM | -7535.83 | -361 |
| 138 | VDDAM | -7490.84 | -361 |
| 139 | VDDAM | -7445.85 | -361 |
| 140 | VDDAM | -7400.86 | -361 |
| 141 | VCC1 | -7355.87 | -361 |
| 142 | VCC1 | -7310.88 | -361 |
| 143 | VCC1 | -7265.89 | -361 |
| 144 | VCC1 | -7220.9 | -361 |
| 145 | VCC1 | -7175.91 | -361 |
| 146 | VCC1 | -7130.92 | -361 |
| 147 | VCC1 | -7085.93 | -361 |
| 148 | VCC1 | -7040.94 | -361 |
| 149 | VCC1 | -6995.95 | -361 |
| 150 | VCC1 | -6950.96 | -361 |
| 151 | VCC1 | -6905.97 | -361 |
| 152 | VCC1 | -6860.98 | -361 |
| 153 | VCC1 | -6815.99 | -361 |
| 154 | VCC1 | -6771 | -361 |
| 155 | VCC1 | -6726.01 | -361 |
| 156 | VCORE | -6681.02 | -361 |
| 157 | VCORE | -6636.03 | -361 |
| 158 | VCORE | -6591.04 | -361 |
| 159 | VCORE | -6546.05 | -361 |
| 160 | VCORE | -6501.06 | -361 |
| 161 | VCORE | -6456.07 | -361 |
| 162 | VCORE | -6411.08 | -361 |
| 163 | VCORE | -6366.09 | -361 |
| 164 | VCORE | -6321.1 | -361 |
| 165 | VCORE | -6276.11 | -361 |
| 166 | VCORE | -6231.12 | -361 |
| 167 | VCORE | -6186.13 | -361 |
| 168 | VCORE | -6141.14 | -361 |
| 169 | VCORE | -6096.15 | -361 |
| 170 | VCORE | -6051.16 | -361 |
| 171 | VSS | -6006.17 | -361 |
| 172 | VSS | -5961.18 | -361 |
| 173 | VSS | -5916.19 | -361 |
| 174 | VSS | -5871.2 | -361 |
| 175 | VSS | -5826.21 | -361 |
| 176 | VSS | -5781.22 | -361 |
| 177 | VSS | -5736.23 | -361 |
| 178 | VSS | -5691.24 | -361 |
| 179 | VSS | -5646.25 | -361 |
| 180 | VSS | -5601.26 | -361 |
| 181 | VSS | -5556.27 | -361 |
| 182 | VSS | -5511.28 | -361 |
| 183 | VSS | -5466.29 | -361 |
| 184 | VSS | -5421.3 | -361 |
| 185 | VSS | -5376.31 | -361 |
| 186 | VSS | -5331.32 | -361 |
| 187 | TOUT3 | -5286.33 | -361 |
| 188 | TOUT2 | -5241.34 | -361 |
| 189 | TOUT2 | -5196.35 | -361 |
| 190 | TOUT1 | -5151.36 | -361 |
| 191 | TOUT1 | -5106.37 | -361 |
| 192 | TOUT0 | -5061.38 | -361 |
| 193 | TOUT0 | -5016.39 | -361 |
| 194 | DUMMYP | -4971.4 | -361 |
| 195 | DUMMYP | -4926.41 | -361 |
| 196 | DUMMYP | -4881.42 | -361 |
| 197 | DUMMYP | -4836.43 | -361 |
| 198 | DUMMYP | -4791.44 | -361 |
| 199 | DUMMYP | -4746.45 | -361 |
| 200 | DUMMYP | -4701.46 | -361 |

| No. | Name | X | Y |
|-----|----------|----------|------|
| 201 | DUMMYP | -4656.47 | -361 |
| 202 | DUMMYP | -4611.48 | -361 |
| 203 | DUMMYP | -4566.49 | -361 |
| 204 | DUMMYP | -4521.5 | -361 |
| 205 | DUMMYP | -4476.51 | -361 |
| 206 | DUMMYP | -4431.52 | -361 |
| 207 | DUMMYP | -4386.53 | -361 |
| 208 | DUMMYP | -4341.54 | -361 |
| 209 | DUMMYP | -4296.55 | -361 |
| 210 | DUMMYP | -4251.56 | -361 |
| 211 | DUMMYP | -4206.57 | -361 |
| 212 | DUMMYP | -4161.58 | -361 |
| 213 | DUMMYP | -4116.59 | -361 |
| 214 | DUMMYP | -4071.6 | -361 |
| 215 | DUMMYP | -4026.61 | -361 |
| 216 | DUMMYP | -3981.62 | -361 |
| 217 | DUMMYP | -3936.63 | -361 |
| 218 | DUMMYP | -3891.64 | -361 |
| 219 | DUMMYP | -3846.65 | -361 |
| 220 | DUMMYP | -3801.66 | -361 |
| 221 | DUMMYP | -3756.67 | -361 |
| 222 | DUMMYP | -3711.68 | -361 |
| 223 | DUMMYP | -3666.69 | -361 |
| 224 | DUMMYP | -3621.7 | -361 |
| 225 | DUMMYP | -3576.71 | -361 |
| 226 | DUMMYP | -3531.72 | -361 |
| 227 | DUMMYP | -3486.73 | -361 |
| 228 | DUMMYP | -3441.74 | -361 |
| 229 | DUMMYP | -3396.75 | -361 |
| 230 | DUMMYP | -3351.76 | -361 |
| 231 | DUMMYP | -3306.77 | -361 |
| 232 | DUMMYP | -3261.78 | -361 |
| 233 | DUMMYP | -3216.79 | -361 |
| 234 | DUMMYP | -3171.8 | -361 |
| 235 | DUMMYP | -3126.81 | -361 |
| 236 | DUMMYP | -3081.82 | -361 |
| 237 | DUMMYP | -3036.83 | -361 |
| 238 | DUMMYP | -2991.84 | -361 |
| 239 | VSS | -2946.85 | -361 |
| 240 | VSS | -2901.86 | -361 |
| 241 | D7 | -2856.87 | -361 |
| 242 | D7 | -2811.88 | -361 |
| 243 | D6 | -2766.89 | -361 |
| 244 | D6 | -2721.9 | -361 |
| 245 | D5 | -2676.91 | -361 |
| 246 | D5 | -2631.92 | -361 |
| 247 | D4 | -2586.93 | -361 |
| 248 | D4 | -2541.94 | -361 |
| 249 | D3 | -2496.95 | -361 |
| 250 | D3 | -2451.96 | -361 |
| 251 | D2 | -2406.97 | -361 |
| 252 | D2 | -2361.98 | -361 |
| 253 | D1 | -2316.99 | -361 |
| 254 | D1 | -2272 | -361 |
| 255 | D0 | -2227.01 | -361 |
| 256 | D0 | -2182.02 | -361 |
| 257 | HS | -2137.03 | -361 |
| 258 | HS | -2092.04 | -361 |
| 259 | VS | -2047.05 | -361 |
| 260 | VS | -2002.06 | -361 |
| 261 | VSSDUMMY | -1957.07 | -361 |
| 262 | VSSDUMMY | -1912.08 | -361 |
| 263 | PCLK | -1867.09 | -361 |
| 264 | PCLK | -1822.1 | -361 |
| 265 | DCX | -1777.11 | -361 |
| 266 | DCX | -1732.12 | -361 |
| 267 | CSX | -1687.13 | -361 |
| 268 | CSX | -1642.14 | -361 |
| 269 | SCL | -1597.15 | -361 |
| 270 | SCL | -1552.16 | -361 |
| 271 | SDI | -1507.17 | -361 |
| 272 | SDI | -1462.18 | -361 |
| 273 | SDO | -1417.19 | -361 |
| 274 | SDO | -1372.2 | -361 |
| 275 | LEDPWM | -1327.21 | -361 |
| 276 | LEDPWM | -1282.22 | -361 |
| 277 | LEDPWM | -1237.23 | -361 |
| 278 | LEDPWM | -1192.24 | -361 |
| 279 | TE | -1147.25 | -361 |
| 280 | TE | -1102.26 | -361 |
| 281 | TE | -1057.27 | -361 |
| 282 | TE | -1012.28 | -361 |
| 283 | TE | -967.29 | -361 |
| 284 | TE | -922.3 | -361 |
| 285 | TE1 | -877.31 | -361 |
| 286 | TE1 | -832.32 | -361 |
| 287 | TE1 | -787.33 | -361 |
| 288 | TE1 | -742.34 | -361 |
| 289 | TE1 | -697.35 | -361 |
| 290 | TE1 | -652.36 | -361 |
| 291 | RESX | -607.37 | -361 |
| 292 | RESX | -562.38 | -361 |
| 293 | RESX | -517.39 | -361 |
| 294 | RESX | -472.4 | -361 |
| 295 | TEST5 | -427.41 | -361 |
| 296 | TEST4 | -382.42 | -361 |
| 297 | TEST3 | -337.43 | -361 |
| 298 | TEST2 | -292.44 | -361 |
| 299 | TEST1 | -247.45 | -361 |
| 300 | | | |

| No. | Name | X | Y |
|-----|----------|---------|------|
| 401 | VSSA | 4341.54 | -361 |
| 402 | VSSA | 4386.53 | -361 |
| 403 | VSSA | 4431.52 | -361 |
| 404 | VSSA | 4476.51 | -361 |
| 405 | VSSA | 4521.5 | -361 |
| 406 | VSSA | 4566.49 | -361 |
| 407 | VREGIOUT | 4611.48 | -361 |
| 408 | VREGIOUT | 4656.47 | -361 |
| 409 | VREGIOUT | 4701.46 | -361 |
| 410 | VREGIOUT | 4746.45 | -361 |
| 411 | VREGIOUT | 4791.44 | -361 |
| 412 | VREGIOUT | 4836.43 | -361 |
| 413 | VREF | 4881.42 | -361 |
| 414 | VREF | 4926.41 | -361 |
| 415 | VREF | 4971.4 | -361 |
| 416 | VSS | 5016.39 | -361 |
| 417 | VSS | 5061.38 | -361 |
| 418 | VSS | 5106.37 | -361 |
| 419 | VSS | 5151.36 | -361 |
| 420 | VSS | 5196.35 | -361 |
| 421 | VCI | 5241.34 | -361 |
| 422 | VCI | 5286.33 | -361 |
| 423 | VCI | 5331.32 | -361 |
| 424 | VCI | 5376.31 | -361 |
| 425 | VCI | 5421.3 | -361 |
| 426 | VCI | 5466.29 | -361 |
| 427 | VCI | 5511.28 | -361 |
| 428 | VCI | 5556.27 | -361 |
| 429 | VCI | 5601.26 | -361 |
| 430 | VCL | 5646.25 | -361 |
| 431 | VCL | 5691.24 | -361 |
| 432 | VCL | 5736.23 | -361 |
| 433 | VCL | 5781.22 | -361 |
| 434 | C41P | 5826.21 | -361 |
| 435 | C41P | 5871.2 | -361 |
| 436 | C41P | 5916.19 | -361 |
| 437 | C41P | 5961.18 | -361 |
| 438 | C41P | 6006.17 | -361 |
| 439 | C41P | 6051.16 | -361 |
| 440 | C41P | 6096.15 | -361 |
| 441 | C41N | 6141.14 | -361 |
| 442 | C41N | 6186.13 | -361 |
| 443 | C41N | 6231.12 | -361 |
| 444 | C41N | 6276.11 | -361 |
| 445 | C41N | 6321.1 | -361 |
| 446 | C41N | 6366.09 | -361 |
| 447 | C41N | 6411.08 | -361 |
| 448 | C42P | 6456.07 | -361 |
| 449 | C42P | 6501.06 | -361 |
| 450 | C42P | 6546.05 | -361 |
| 451 | C42P | 6591.04 | -361 |
| 452 | C42P | 6636.03 | -361 |
| 453 | C42P | 6681.02 | -361 |
| 454 | C42P | 6726.01 | -361 |
| 455 | C42N | 6771 | -361 |
| 456 | C42N | 6815.99 | -361 |
| 457 | C42N | 6860.98 | -361 |
| 458 | C42N | 6905.97 | -361 |
| 459 | C42N | 6950.96 | -361 |
| 460 | C42N | 6995.95 | -361 |
| 461 | C42N | 7040.94 | -361 |
| 462 | VSP | 7085.93 | -361 |
| 463 | VSP | 7130.92 | -361 |
| 464 | VSP | 7175.91 | -361 |
| 465 | VSP | 7220.9 | -361 |
| 466 | VSP | 7265.89 | -361 |
| 467 | VSP | 7310.88 | -361 |
| 468 | VSP | 7355.87 | -361 |
| 469 | VSN | 7400.86 | -361 |
| 470 | VSN | 7445.85 | -361 |
| 471 | VSN | 7490.84 | -361 |
| 472 | VSN | 7535.83 | -361 |
| 473 | VSN | 7580.82 | -361 |
| 474 | VSN | 7625.81 | -361 |
| 475 | VSN | 7670.8 | -361 |
| 476 | C21N | 7715.79 | -361 |
| 477 | C21N | 7760.78 | -361 |
| 478 | C21N | 7805.77 | -361 |
| 479 | C21N | 7850.76 | -361 |
| 480 | C21N | 7895.75 | -361 |
| 481 | C21N | 7940.74 | -361 |
| 482 | C21N | 7985.73 | -361 |
| 483 | C21P | 8030.72 | -361 |
| 484 | C21P | 8075.71 | -361 |
| 485 | C21P | 8120.7 | -361 |
| 486 | C21P | 8165.69 | -361 |
| 487 | C21P | 8210.68 | -361 |
| 488 | C21P | 8255.67 | -361 |
| 489 | C21P | 8300.66 | -361 |
| 490 | C22N | 8345.65 | -361 |
| 491 | C22N | 8390.64 | -361 |
| 492 | C22N | 8435.63 | -361 |
| 493 | C22N | 8480.62 | -361 |
| 494 | C22N | 8525.61 | -361 |
| 495 | C22N | 8570.6 | -361 |
| 496 | C22N | 8615.59 | -361 |
| 497 | C22P | 8660.58 | -361 |
| 498 | C22P | 8705.57 | -361 |
| 499 | C22P | 8750.56 | -361 |
| 500 | C22P | 8795.55 | -361 |

| No. | Name | X | Y |
|-----|------------|----------|------|
| 501 | C22P | 8840.54 | -361 |
| 502 | C22P | 8885.53 | -361 |
| 503 | C22P | 8930.52 | -361 |
| 504 | VGH | 8975.51 | -361 |
| 505 | VGH | 9020.5 | -361 |
| 506 | VGH | 9065.49 | -361 |
| 507 | VGH | 9110.48 | -361 |
| 508 | VGH | 9155.47 | -361 |
| 509 | VGH | 9200.46 | -361 |
| 510 | VCI | 9245.45 | -361 |
| 511 | VCI | 9290.44 | -361 |
| 512 | VCI | 9335.43 | -361 |
| 513 | VCI | 9380.42 | -361 |
| 514 | VCI | 9425.41 | -361 |
| 515 | VCI | 9470.4 | -361 |
| 516 | VSS | 9515.39 | -361 |
| 517 | VSS | 9560.38 | -361 |
| 518 | VSS | 9605.37 | -361 |
| 519 | VSS | 9650.36 | -361 |
| 520 | VSS | 9695.35 | -361 |
| 521 | VSS | 9740.34 | -361 |
| 522 | VSS | 9785.33 | -361 |
| 523 | VSS | 9830.32 | -361 |
| 524 | C23P | 9875.31 | -361 |
| 525 | C23P | 9920.3 | -361 |
| 526 | C23P | 9965.29 | -361 |
| 527 | C23P | 10010.28 | -361 |
| 528 | C23P | 10055.27 | -361 |
| 529 | C23P | 10100.26 | -361 |
| 530 | C23P | 10145.25 | -361 |
| 531 | C23N | 10190.24 | -361 |
| 532 | C23N | 10235.23 | -361 |
| 533 | C23N | 10280.22 | -361 |
| 534 | C23N | 10325.21 | -361 |
| 535 | C23N | 10370.2 | -361 |
| 536 | C23N | 10415.19 | -361 |
| 537 | C23N | 10460.18 | -361 |
| 538 | C24P | 10505.17 | -361 |
| 539 | C24P | 10550.16 | -361 |
| 540 | C24P | 10595.15 | -361 |
| 541 | C24P | 10640.14 | -361 |
| 542 | C24P | 10685.13 | -361 |
| 543 | C24P | 10730.12 | -361 |
| 544 | C24P | 10775.11 | -361 |
| 545 | C24N | 10820.1 | -361 |
| 546 | C24N | 10865.09 | -361 |
| 547 | C24N | 10910.08 | -361 |
| 548 | C24N | 10955.07 | -361 |
| 549 | C24N | 11000.06 | -361 |
| 550 | C24N | 11045.05 | -361 |
| 551 | C24N | 11090.04 | -361 |
| 552 | VGL | 11135.03 | -361 |
| 553 | VGL | 11180.02 | -361 |
| 554 | VGL | 11225.01 | -361 |
| 555 | VGL | 11270 | -361 |
| 556 | VGL | 11314.99 | -361 |
| 557 | VGL | 11359.98 | -361 |
| 558 | C31P | 11404.97 | -361 |
| 559 | C31P | 11449.96 | -361 |
| 560 | C31P | 11494.95 | -361 |
| 561 | C31P | 11539.94 | -361 |
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| 1861 | DUMMY51 | -115.47 | 275 |
| 1862 | DUMMY52 | -126.47 | 365 |
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| 1864 | S1199 | -148.46 | 275 |
| 1865 | S1198 | -159.46 | 365 |
| 1866 | S1197 | -170.46 | 185 |
| 1867 | S1196 | -181.46 | 275 |
| 1868 | S1195 | -192.45 | 365 |
| 1869 | S1194 | -203.45 | 185 |
| 1870 | S1193 | -214.45 | 275 |
| 1871 | S1192 | -225.45 | 365 |
| 1872 | S1191 | -236.44 | 185 |
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| 1874 | S1189 | -258.44 | 365 |
| 1875 | S1188 | -269.44 | 185 |
| 1876 | S1187 | -280.43 | 275 |
| 1877 | S1186 | -291.43 | 365 |
| 1878 | S1185 | -302.43 | 185 |
| 1879 | S1184 | -313.43 | 275 |
| 1880 | S1183 | -324.42 | 365 |
| 1881 | S1182 | -335.42 | 185 |
| 1882 | S1181 | -346.42 | 275 |
| 1883 | S1180 | -357.42 | 365</ |

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| 2016 | S1047 | -1820.08 | 185 |
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| 2019 | S1044 | -1853.08 | 185 |
| 2020 | S1043 | -1864.07 | 275 |
| 2021 | S1042 | -1875.07 | 365 |
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| 2556 | S525 | -7758.73 | 185 |
| 2557 | S524 | -7769.73 | 275 |
| 2558 | S523 | -7780.73 | 365 |
| 2559 | S522 | -7791.73 | 185 |
| 2560 | S521 | -7802.72 | 275 |
| 2561 | S520 | -7813.72 | 365 |
| 2562 | S519 | -7824.72 | 185 |
| 2563 | S518 | -7835.72 | 275 |
| 2564 | S517 | -7846.71 | 365 |
| 2565 | S516 | -7857.71 | 185 |
| 2566 | S515 | -7868.71 | 275 |
| 2567 | S514 | -7879.71 | 365 |
| 2568 | S513 | -7890.71 | 185 |
| 2569 | S512 | -7901.7 | 275 |
| 2570 | S511 | -7912.7 | 365 |
| 2571 | S510 | -7923.7 | 185 |
| 2572 | S509 | -7934.69 | 275 |
| 2573 | S508 | -7945.69 | 365 |
| 2574 | S507 | -7956.69 | 185 |
| 2575 | S506 | -7967.69 | 275 |
| 2576 | S505 | -7978.68 | 365 |
| 2577 | S504 | -7989.68 | 185 |
| 2578 | S503 | -8000.68 | 275 |
| 2579 | S502 | -8011.68 | 365 |
| 2580 | S501 | -8022.67 | 185 |
| 2581 | S500 | -8033.67 | 275 |
| 2582 | S499 | -8044.67 | 365 |
| 2583 | S498 | -8055.67 | 185 |
| 2584 | S497 | -8066.66 | 275 |
| 2585 | S496 | -8077.66 | 365 |
| 2586 | S495 | -8088.66 | 185 |
| 2587 | S494 | -8099.66 | 275 |
| 2588 | S493 | -8110.65 | 365 |
| 2589 | S492 | -8121.65 | 185 |
| 2590 | S491 | -8132.65 | 275 |
| 2591 | S490 | -8143.65 | 365 |
| 2592 | S489 | -8154.64 | 185 |
| 2593 | S488 | -8165.64 | 275 |
| 2594 | S487 | -8176.64 | 365 |
| 2595 | S486 | -8187.64 | 185 |
| 2596 | S485 | -8198.63 | 275 |
| 2597 | S484 | -8209.63 | 365 |
| 2598 | S483 | -8220.63 | 185 |
| 2599 | S482 | -8231.63 | 275 |
| 2600 | S481 | -8242.62 | 365 |

| No. | Name | X | Y |
|------|------|----------|-----|
| 2601 | S480 | -8253.62 | 185 |
| 2602 | S479 | -8264.62 | 275 |
| 2603 | S478 | -8275.62 | 365 |
| 2604 | S477 | -8286.61 | 185 |
| 2605 | S476 | -8297.61 | 275 |
| 2606 | S475 | -8308.61 | 365 |
| 2607 | S474 | -8319.61 | 185 |
| 2608 | S473 | -8330.6 | 275 |
| 2609 | S472 | -8341.6 | 365 |
| 2610 | S471 | -8352.6 | 185 |
| 2611 | S470 | -8363.6 | 275 |
| 2612 | S469 | -8374.59 | 365 |
| 2613 | S468 | -8385.59 | 185 |
| 2614 | S467 | -8396.59 | 275 |
| 2615 | S466 | -8407.59 | 365 |
| 2616 | S465 | -8418.58 | 185 |
| 2617 | S464 | -8429.58 | 275 |
| 2618 | S463 | -8440.58 | 365 |
| 2619 | S462 | -8451.58 | 185 |
| 2620 | S461 | -8462.57 | 275 |
| 2621 | S460 | -8473.57 | 365 |
| 2622 | S459 | -8484.57 | 185 |
| 2623 | S458 | -8495.57 | 275 |
| 2624 | S457 | -8506.56 | 365 |
| 2625 | S456 | -8517.56 | 185 |
| 2626 | S455 | -8528.56 | 275 |
| 2627 | S454 | -8539.56 | 365 |
| 2628 | S453 | -8550.55 | 185 |
| 2629 | S452 | -8561.55 | 275 |
| 2630 | S451 | -8572.55 | 365 |
| 2631 | S450 | -8583.55 | 185 |
| 2632 | S449 | -8594.54 | 275 |
| 2633 | S448 | -8605.54 | 365 |
| 2634 | S447 | -8616.54 | 185 |
| 2635 | S446 | -8627.54 | 275 |
| 2636 | S445 | -8638.53 | 365 |
| 2637 | S444 | -8649.53 | 185 |
| 2638 | S443 | -8660.53 | 275 |
| 2639 | S442 | -8671.53 | 365 |
| 2640 | S441 | -8682.52 | 185 |
| 2641 | S440 | -8693.52 | 275 |
| 2642 | S439 | -8704.52 | 365 |
| 2643 | S438 | -8715.52 | 185 |
| 2644 | S437 | -8726.51 | 275 |
| 2645 | S436 | -8737.51 | 365 |
| 2646 | S435 | -8748.51 | 185 |
| 2647 | S434 | -8759.51 | 275 |
| 2648 | S433 | -8770.5 | 365 |
| 2649 | S432 | -8781.5 | 185 |
| 2650 | S431 | -8792.5 | 275 |
| 2651 | S430 | -8803.5 | 365 |
| 2652 | S429 | -8814.49 | 185 |
| 2653 | S428 | -8825.49 | 275 |
| 2654 | S427 | -8836.49 | 365 |
| 2655 | S426 | -8847.49 | 185 |
| 2656 | S425 | -8858.48 | 275 |
| 2657 | S424 | -8869.48 | 365 |
| 2658 | S423 | -8880.48 | 185 |
| 2659 | S422 | -8891.48 | 275 |
| 2660 | S421 | -8902.47 | 365 |
| 2661 | S420 | -8913.47 | 185 |
| 2662 | S419 | -8924.47 | 275 |
| 2663 | S418 | -8935.47 | 365 |
| 2664 | S417 | -8946.46 | 185 |
| 2665 | S416 | -8957.46 | 275 |
| 2666 | S415 | -8968.46 | 365 |
| 2667 | S414 | -8979.46 | 185 |
| 2668 | S413 | -8990.45 | 275 |
| 2669 | S412 | -9001.45 | 365 |
| 2670 | S411 | -9012.45 | 185 |
| 2671 | S410 | -9023.45 | 275 |
| 2672 | S409 | -9034.44 | 365 |
| 2673 | S408 | -9045.44 | 185 |
| 2674 | S407 | -9056.44 | 275 |
| 2675 | S406 | -9067.44 | 365 |
| 2676 | S405 | -9078.43 | 185 |
| 2677 | S404 | -9089.43 | 275 |
| 2678 | S403 | -9100.43 | 365 |
| 2679 | S402 | -9111.43 | 185 |
| 2680 | S401 | -9122.42 | 275 |
| 2681 | S400 | -9133.42 | 365 |
| 2682 | S399 | -9144.42 | 185 |
| 2683 | S398 | -9155.42 | 275 |
| 2684 | S397 | -9166.41 | 365 |
| 2685 | S396 | -9177.41 | 185 |

| No. | Name | X | Y |
|------|------|-----------|-----|
| 2801 | S280 | -10453.12 | 365 |
| 2802 | S279 | -10464.12 | 185 |
| 2803 | S278 | -10475.12 | 275 |
| 2804 | S277 | -10486.11 | 365 |
| 2805 | S276 | -10497.11 | 185 |
| 2806 | S275 | -10508.11 | 275 |
| 2807 | S274 | -10519.11 | 365 |
| 2808 | S273 | -10530.1 | 185 |
| 2809 | S272 | -10541.1 | 275 |
| 2810 | S271 | -10552.1 | 365 |
| 2811 | S270 | -10563.1 | 185 |
| 2812 | S269 | -10574.09 | 275 |
| 2813 | S268 | -10585.09 | 365 |
| 2814 | S267 | -10596.09 | 185 |
| 2815 | S266 | -10607.09 | 275 |
| 2816 | S265 | -10618.08 | 365 |
| 2817 | S264 | -10629.08 | 185 |
| 2818 | S263 | -10640.08 | 275 |
| 2819 | S262 | -10651.08 | 365 |
| 2820 | S261 | -10662.07 | 185 |
| 2821 | S260 | -10673.07 | 275 |
| 2822 | S259 | -10684.07 | 365 |
| 2823 | S258 | -10695.07 | 185 |
| 2824 | S257 | -10706.06 | 275 |
| 2825 | S256 | -10717.06 | 365 |
| 2826 | S255 | -10728.06 | 185 |
| 2827 | S254 | -10739.06 | 275 |
| 2828 | S253 | -10750.05 | 365 |
| 2829 | S252 | -10761.05 | 185 |
| 2830 | S251 | -10772.05 | 275 |
| 2831 | S250 | -10783.05 | 365 |
| 2832 | S249 | -10794.04 | 185 |
| 2833 | S248 | -10805.04 | 275 |
| 2834 | S247 | -10816.04 | 365 |
| 2835 | S246 | -10827.04 | 185 |
| 2836 | S245 | -10838.03 | 275 |
| 2837 | S244 | -10849.03 | 365 |
| 2838 | S243 | -10860.03 | 185 |
| 2839 | S242 | -10871.03 | 275 |
| 2840 | S241 | -10882.02 | 365 |
| 2841 | S240 | -10893.02 | 185 |
| 2842 | S239 | -10904.02 | 275 |
| 2843 | S238 | -10915.02 | 365 |
| 2844 | S237 | -10926.01 | 185 |
| 2845 | S236 | -10937.01 | 275 |
| 2846 | S235 | -10948.01 | 365 |
| 2847 | S234 | -10959.01 | 185 |
| 2848 | S233 | -10970 | 275 |
| 2849 | S232 | -10981 | 365 |
| 2850 | S231 | -10992 | 185 |
| 2851 | S230 | -11003 | 275 |
| 2852 | S229 | -11013.99 | 365 |
| 2853 | S228 | -11024.99 | 185 |
| 2854 | S227 | -11035.99 | 275 |
| 2855 | S226 | -11046.99 | 365 |
| 2856 | S225 | -11057.98 | 185 |
| 2857 | S224 | -11068.98 | 275 |
| 2858 | S223 | -11079.98 | 365 |
| 2859 | S222 | -11090.98 | 185 |
| 2860 | S221 | -11101.97 | 275 |
| 2861 | S220 | -11112.97 | 365 |
| 2862 | S219 | -11123.97 | 185 |
| 2863 | S218 | -11134.97 | 275 |
| 2864 | S217 | -11145.96 | 365 |
| 2865 | S216 | -11156.96 | 185 |
| 2866 | S215 | -11167.96 | 275 |
| 2867 | S214 | -11178.96 | 365 |
| 2868 | S213 | -11189.95 | 185 |
| 2869 | S212 | -11200.95 | 275 |
| 2870 | S211 | -11211.95 | 365 |
| 2871 | S210 | -11222.95 | 185 |
| 2872 | S209 | -11233.94 | 275 |
| 2873 | S208 | -11244.94 | 365 |
| 2874 | S207 | -11255.94 | 185 |
| 2875 | S206 | -11266.94 | 275 |
| 2876 | S205 | -11277.93 | 365 |
| 2877 | S204 | -11288.93 | 185 |
| 2878 | S203 | -11299.93 | 275 |
| 2879 | S202 | -11310.93 | 365 |
| 2880 | S201 | -11321.92 | 185 |
| 2881 | S200 | -11332.92 | 275 |
| 2882 | S199 | -11343.92 | 365 |
| 2883 | S198 | -11354.92 | 185 |
| 2884 | S197 | -11365.91 | 275 |
| 2885 | S196 | -11376.91 | 365 |
| 2886 | S195 | -11387.91 | 185 |
| 2887 | S194 | -11398.91 | 275 |
| 2888 | S193 | -11409.9 | 365 |
| 2889 | S192 | -11420.9 | 185 |
| 2890 | S191 | -11431.9 | 275 |
| 2891 | S190 | -11442.9 | 365 |
| 2892 | S189 | -11453.89 | 185 |
| 2893 | S188 | -11464.89 | 275 |
| 2894 | S187 | -11475.89 | 365 |
| 2895 | S186 | -11486.89 | 185 |
| 2896 | S185 | -11497.88 | 275 |
| 2897 | S184 | -11508.88 | 365 |
| 2898 | S183 | -11519.88 | 185 |
| 2899 | S182 | -11530.88 | 275 |
| 2900 | S181 | -11541.87 | 365 |

| No. | Name | X | Y |
|------|------|-----------|-----|
| 2901 | S180 | -11552.87 | 185 |
| 2902 | S179 | -11563.87 | 275 |
| 2903 | S178 | -11574.87 | 365 |
| 2904 | S177 | -11585.86 | 185 |
| 2905 | S176 | -11596.86 | 275 |
| 2906 | S175 | -11607.86 | 365 |
| 2907 | S174 | -11618.86 | 185 |
| 2908 | S173 | -11629.85 | 275 |
| 2909 | S172 | -11640.85 | 365 |
| 2910 | S171 | -11651.85 | 185 |
| 2911 | S170 | -11662.85 | 275 |
| 2912 | S169 | -11673.84 | 365 |
| 2913 | S168 | -11684.84 | 185 |
| 2914 | S167 | -11695.84 | 275 |
| 2915 | S166 | -11706.84 | 365 |
| 2916 | S165 | -11717.83 | 185 |
| 2917 | S164 | -11728.83 | 275 |
| 2918 | S163 | -11739.83 | 365 |
| 2919 | S162 | -11750.83 | 185 |
| 2920 | S161 | -11761.82 | 275 |
| 2921 | S160 | -11772.82 | 365 |
| 2922 | S159 | -11783.82 | 185 |
| 2923 | S158 | -11794.82 | 275 |
| 2924 | S157 | -11805.81 | 365 |
| 2925 | S156 | -11816.81 | 185 |
| 2926 | S155 | -11827.81 | 275 |
| 2927 | S154 | -11838.81 | 365 |
| 2928 | S153 | -11849.8 | 185 |
| 2929 | S152 | -11860.8 | 275 |
| 2930 | S151 | -11871.8 | 365 |
| 2931 | S150 | -11882.8 | 185 |
| 2932 | S149 | -11893.79 | 275 |
| 2933 | S148 | -11904.79 | 365 |
| 2934 | S147 | -11915.79 | 185 |
| 2935 | S146 | -11926.79 | 275 |
| 2936 | S145 | -11937.78 | 365 |
| 2937 | S144 | -11948.78 | 185 |
| 2938 | S143 | -11959.78 | 275 |
| 2939 | S142 | -11970.78 | 365 |
| 2940 | S141 | -11981.77 | 185 |
| 2941 | S140 | -11992.77 | 275 |
| 2942 | S139 | -12003.77 | 365 |
| 2943 | S138 | -12014.77 | 185 |
| 2944 | S137 | -12025.76 | 275 |
| 2945 | S136 | -12036.76 | 365 |
| 2946 | S135 | -12047.76 | 185 |
| 2947 | S134 | -12058.76 | 275 |
| 2948 | S133 | -12069.75 | 365 |
| 2949 | S132 | -12080.75 | 185 |
| 2950 | S131 | -12091.75 | 275 |
| 2951 | S130 | -12102.75 | 365 |
| 2952 | S129 | -12113.74 | 185 |
| 2953 | S128 | -12124.74 | 275 |
| 2954 | S127 | -12135.74 | 365 |
| 2955 | S126 | -12146.74 | 185 |
| 2956 | S125 | -12157.73 | 275 |
| 2957 | S124 | -12168.73 | 365 |
| 2958 | S123 | -12179.73 | 185 |
| 2959 | S122 | -12190.73 | 275 |
| 2960 | S121 | -12201.72 | 365 |
| 2961 | S120 | -12212.72 | 185 |
| 2962 | S119 | -12223.72 | 275 |
| 2963 | S118 | -12234.72 | 365 |
| 2964 | S117 | -12245.71 | 185 |
| 2965 | S116 | -12256.71 | 275 |
| 2966 | S115 | -12267.71 | 365 |
| 2967 | S114 | -12278.71 | 185 |
| 2968 | S113 | -12289.7 | 275 |
| 2969 | S112 | -12300.7 | 365 |
| 2970 | S111 | -12311.7 | 185 |
| 2971 | S110 | -12322.7 | 275 |
| 2972 | S109 | -12333.69 | 365 |
| 2973 | S108 | -12344.69 | 185 |
| 2974 | S107 | -12355.69 | 275 |
| 2975 | S106 | -12366.69 | 365 |
| 2976 | S105 | -12377.68 | 185 |
| 2977 | S104 | -12388.68 | 275 |
| 2978 | S103 | -12399.68 | 365 |
| 2979 | S102 | -12410.68 | 185 |
| 2980 | S101 | -12421.67 | 275 |
| 2981 | S100 | -12432.67 | 365 |
| 2982 | S99 | -12443.67 | 185 |
| 2983 | S98 | -12454.67 | 275 |
| 2984 | S97 | -12465.66 | 365 |
| 2985 | S96 | -12476.66 | 185 |
| 2986 | S95 | -12487.66 | 275 |
| 2987 | S94 | -12498.66 | 365 |
| 2988 | S93 | -12509.65 | 185 |
| 2989 | S92 | -12520.65 | 275 |
| 2990 | S91 | -12531.65 | 365 |
| 2991 | S90 | -12542.65 | 185 |
| 2992 | S89 | -12553.64 | 275 |
| 2993 | S88 | -12564.64 | 365 |
| 2994 | S87 | -12575.64 | 185 |
| 2995 | S86 | -12586.64 | 275 |
| 2996 | S85 | -12597.63 | 365 |
| 2997 | S84 | -12608.63 | 185 |
| 2998 | S83 | -12619.63 | 275 |
| 2999 | S82 | -12630.63 | 365 |
| 3000 | S81 | -12641.62 | 185 |

| No. | Name | X | Y |
|------|-------|-----------|-----|
| 3001 | S80 | -12652.62 | 275 |
| 3002 | S79 | -12663.62 | 365 |
| 3003 | S78 | -12674.62 | 185 |
| 3004 | S77 | -12685.61 | 275 |
| 3005 | S76 | -12696.61 | 365 |
| 3006 | S75 | -12707.61 | 185 |
| 3007 | S74 | -12718.61 | 275 |
| 3008 | S73 | -12729.6 | 365 |
| 3009 | S72 | -12740.6 | 185 |
| 3010 | S71 | -12751.6 | 275 |
| 3011 | S70 | -12762.6 | 365 |
| 3012 | S69 | -12773.59 | 185 |
| 3013 | S68 | -12784.59 | 275 |
| 3014 | S67 | -12795.59 | 365 |
| 3015 | S66 | -12806.59 | 185 |
| 3016 | S65 | -12817.58 | 275 |
| 3017 | S64 | -12828.58 | 365 |
| 3018 | S63 | -12839.58 | 185 |
| 3019 | S62 | -12850.58 | 275 |
| 3020 | S61 | -12861.57 | 365 |
| 3021 | S60 | -12872.57 | 185 |
| 3022 | S59 | -12883.57 | 275 |
| 3023 | S58 | -12894.57 | 365 |
| 3024 | S57 | -12905.56 | 185 |
| 3025 | S56 | -12916.56 | 275 |
| 3026 | S55 | -12927.56 | 365 |
| 3027 | S54 | -12938.56 | 185 |
| 3028 | S53 | -12949.55 | 275 |
| 3029 | S52 | -12960.55 | 365 |
| 3030 | S51 | -12971.55 | 185 |
| 3031 | S50 | -12982.55 | 275 |
| 3032 | S49 | -12993.54 | 365 |
| 3033 | S48 | -13004.54 | 185 |
| 3034 | S47 | -13015.54 | 275 |
| 3035 | S46 | -13026.54 | 365 |
| 3036 | S45 | -13037.53 | 185 |
| 3037 | S44 | -13048.53 | 275 |
| 3038 | S43 | -13059.53 | 365 |
| 3039 | S42 | -13070.53 | 185 |
| 3040 | S41 | -13081.52 | 275 |
| 3041 | S40 | -13092.52 | 365 |
| 3042 | S39 | -13103.52 | 185 |
| 3043 | S38 | -13114.52 | 275 |
| 3044 | S37 | -13125.51 | 365 |
| 3045 | S36 | -13136.51 | 185 |
| 3046 | S35 | -13147.51 | 275 |
| 3047 | S34 | -13158.51 | 365 |
| 3048 | S33 | -13169.5 | 185 |
| 3049 | S32 | -13180.5 | 275 |
| 3050 | S31 | -13191.5 | 365 |
| 3051 | S30 | -13202.5 | 185 |
| 3052 | S29 | -13213.49 | 275 |
| 3053 | S28 | -13224.49 | 365 |
| 3054 | S27 | -13235.49 | 185 |
| 3055 | S26 | -13246.49 | 275 |
| 3056 | S25 | -13257.48 | 365 |
| 3057 | S24 | -13268.48 | 185 |
| 3058 | S23 | -13279.48 | 275 |
| 3059 | S22 | -13290.48 | 365 |
| 3060 | S21 | -13301.47 | 185 |
| 3061 | S20 | -13312.47 | 275 |
| 3062 | S19 | -13323.47 | 365 |
| 3063 | S18 | -13334.47 | 185 |
| 3064 | S17 | -13345.46 | 275 |
| 3065 | S16 | -13356.46 | 365 |
| 3066 | S15 | -13367.46 | 185 |
| 3067 | S14 | -13378.46 | 275 |
| 3068 | S13 | -13389.45 | 365 |
| 3069 | S12 | -13400.45 | 185 |
| 3070 | S11 | -13411.45 | 275 |
| 3071 | S10 | -13422.45 | 365 |
| 3072 | S9 | -13433.44 | 185 |
| 3073 | S8 | -13444.44 | 275 |
| 3074 | S7 | -13455.44 | 365 |
| 3075 | S6 | -13466.44 | 185 |
| 3076 | S5 | -13477.43 | 275 |
| 3077 | S4 | -13488.43 | 365 |
| 3078 | S3 | -13499.43 | 185 |
| 3079 | S2 | -13510.43 | 275 |
| 3080 | S1 | -13521.42 | 365 |
| 3081 | SDUM1 | -13532.42 | 185 |
| 3082 | SDUM0 | -13 | |

4. System Interface

4.1. DSI System Interface

4.1.1. General Description

The pad mapping of MIPI DSI interface is set by IM[2:0] pin, LANSEL pins and MIPI_LANE_SEL register(as below table).

Table 2: DSI Interface Lane Mode Selection

| External Pad Set | | | | Register | Configuration of MIPI Lane | | | | |
|------------------|-----|-----|-----|-----------------------------|----------------------------|-----------|---------------|-----------|-----------|
| LANSEL | IM2 | IM1 | IM0 | Page4_R00h MIPI_LANE_SEL | D0P/N Pin | D1P/N Pin | CLKP/N Pin | D2P/N Pin | D3P/N Pin |
| 0 | 0 | 0 | 0 | 1 | D3P/N | D2P/N | CLKP/N | D1P/N | D0P/N |
| 0 | 0 | 0 | 1 | 1 | D3N/P | D2N/P | CLKN/P | D1N/P | D0N/P |
| 0 | 0 | 1 | 0 | 1 | D0P/N | D1P/N | CLKP/N | D2P/N | D3P/N |
| 0 | 0 | 1 | 1 | 1 | D0N/P | D1N/P | CLKN/P | D2N/P | D3N/P |
| 0 | 1 | 0 | 0 | 1 | D3P/N | D0P/N | CLKP/N | D1P/N | D2P/N |
| 0 | 1 | 0 | 1 | 1 | D3N/P | D0N/P | CLKN/P | D1N/P | D2N/P |
| 0 | 1 | 1 | 0 | 1 | D2P/N | D1P/N | CLKP/N | D0P/N | D3P/N |
| 0 | 1 | 1 | 1 | 1 | D2N/P | D1N/P | CLKN/P | D0N/P | D3N/P |
| 1 | 0 | 0 | 0 | 1 | - | - | CLKP/N | D1P/N | D0P/N |
| 1 | 0 | 0 | 1 | 1 | - | - | CLKN/P | D1N/P | D0N/P |
| 1 | 0 | 1 | 0 | 1 | D0P/N | D1P/N | CLKP/N | - | - |
| 1 | 0 | 1 | 1 | 1 | D0N/P | D1N/P | CLKN/P | - | - |
| 1 | 1 | 0 | 0 | 1 | - | D0P/N | CLKP/N | D1P/N | - |
| 1 | 1 | 0 | 1 | 1 | - | D0N/P | CLKN/P | D1N/P | - |
| 1 | 1 | 1 | 0 | 1 | - | D1P/N | CLKP/N | D0P/N | - |
| 1 | 1 | 1 | 1 | 1 | - | D1N/P | CLKN/P | D0N/P | - |
| 0 | 0 | 0 | 0 | 0 | - | D2P/N | CLKP/N | D1P/N | D0P/N |
| 0 | 0 | 0 | 1 | 0 | - | D2N/P | CLKN/P | D1N/P | D0N/P |
| 0 | 0 | 1 | 0 | 0 | D0P/N | D1P/N | CLKP/N | D2P/N | - |
| 0 | 0 | 1 | 1 | 0 | D0N/P | D1N/P | CLKN/P | D2N/P | - |
| 0 | 1 | 0 | 0 | 0 | - | D0P/N | CLKP/N | D1P/N | D2P/N |
| 0 | 1 | 0 | 1 | 0 | - | D0N/P | CLKN/P | D1N/P | D2N/P |
| 0 | 1 | 1 | 0 | 0 | D2P/N | D1P/N | CLKP/N | D0P/N | - |
| 0 | 1 | 1 | 1 | 0 | D2N/P | D1N/P | CLKN/P | D0N/P | - |
| Others | | | | | Reserved | | | | |

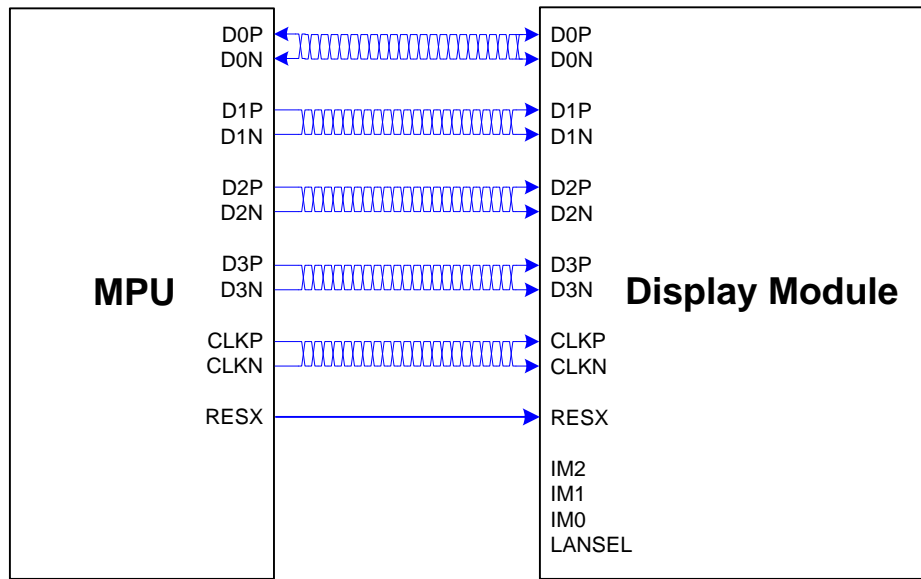


Figure 2: DSI System Interface Diagram

The communication is separated into two different levels between the MCU and the display module:

- ❖ Low level communication is done on the interface level.
- ❖ High level communication is done on the packet level.

4.1.2. Interface Level Communication

4.1.2.1. General

The display module uses data and clock lane differential pairs for DSI (DSI-2M). Both differential lane pairs can be driven to Low Power (LP) or High Speed (HS) mode.

Low Power mode means that each line of the differential pair is used in the single ended mode, a differential receiver is disable (a termination resistor of the receiver is disable), and it can be driven into a low power mode.

High Speed mode means that differential pairs (the termination resistor of the receiver is enable) are not used in the single ended mode.

Different modes and protocols are used in each mode when transferring information from the MCU to the display module and vice versa.

The State Codes of the High Speed (HS) and Low Power (LP) lane pair are defined below.

Table 3: High Speed and Low-Power Lane Pair State Codes

| Lane Pair State Code | Line DC Voltage Levels | | High Speed (HS) | Low Power | |
|----------------------|------------------------|-----------|------------------|--------------|-------------|
| | DATA_P | DATA_N | Burst Mode | Control Mode | Escape Mode |
| HS-0 | Low (HS) | High (HS) | Differential – 0 | Note 1 | Note1 |
| HS-1 | High (HS) | Low (HS) | Differential – 1 | Note 1 | Note 1 |
| LP-00 | Low (LP) | Low (LP) | Not Defined | Bridge | Space |
| LP-01 | Low (LP) | High (LP) | Not Defined | HS – Request | Mark - 0 |
| LP-10 | High (LP) | Low (LP) | Not Defined | LP - Request | Mark - 1 |
| LP-11 | High (LP) | High (LP) | Not Defined | Stop | Note 2 |

Notes:

1. Low-Power Receivers (LP-Rx) of the lane pair will check the LP-00 state code when the Lane Pair is in the High Speed (HS) mode.
2. If Low-Power Receivers (LP-Rx) of the lane pair recognizes the LP-11 state code, then the lane pair will return to LP-11 of the Control Mode.
3. $n = 0, 1, 2$ and 3 (D1P/N, D2 P/N and D3 P/N lanes only for HS-0 and HS-1)

4.1.2.2. DSI CLK Lanes

CLKP/N lanes can be driven into three different power modes: Low Power Mode (LPM), Ultra-Low Power Mode (ULPM) and High Speed Clock Mode (HSCM). Clock lane are in the single ended mode (LP = Low Power) when entering or leaving Low Power Mode (LPM) or Ultra-Low Power Mode (ULPM). Clock lane is in the single ended mode (LP = Low Power) when entering in or leaving High Speed Clock Mode (HSCM). These entering and leaving protocols use Clock lane in the single ended mode to generate an entering or leaving sequence. The principal flow chart of the different Clock lane power modes is illustrated below.

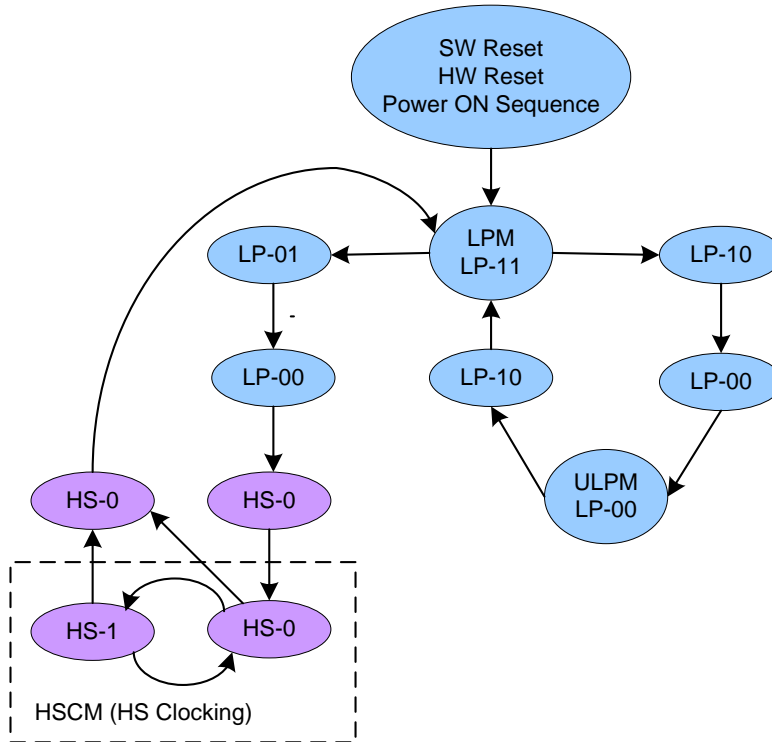


Figure 3: Clock lane Power Modes

4.1.2.2.1. Low Power Mode (LPM)

CLKP/N lanes can be driven to the Low Power Mode (LPM), when CLKP/N lanes enter LP-11 State Code, in three different ways:

- 1) After SW Reset, HW Reset or Power On Sequence => LP-11
- 2) After CLKP/N lanes leave Ultra-Low Power Mode (ULPM, LP-00 State Code) => LP-10 => LP-11 (LPM).

This sequence is illustrated below.

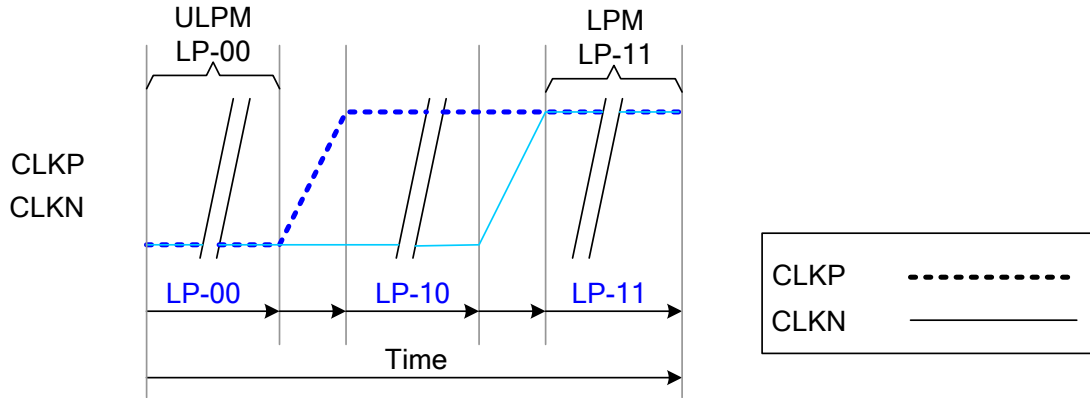


Figure 4: From ULPM to LPM

3) After CLKP/N lanes leave High Speed Clock Mode (HSCM, HS-0 or HS-1 State Code) => HS-0=> LP-11 (LPM).

This sequence is illustrated below.

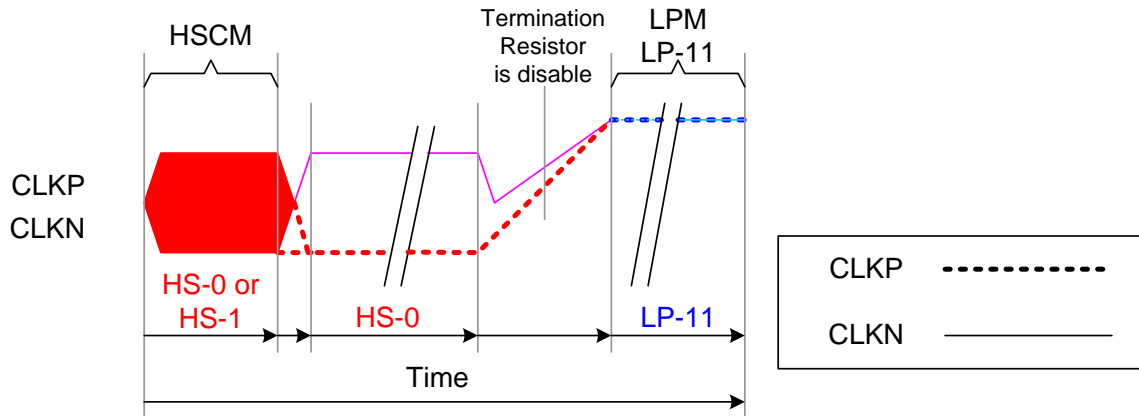


Figure 5: From High Speed Clock Mode (HSCM) to LPM

The changes of all the three modes are illustrated in the flow chart below.

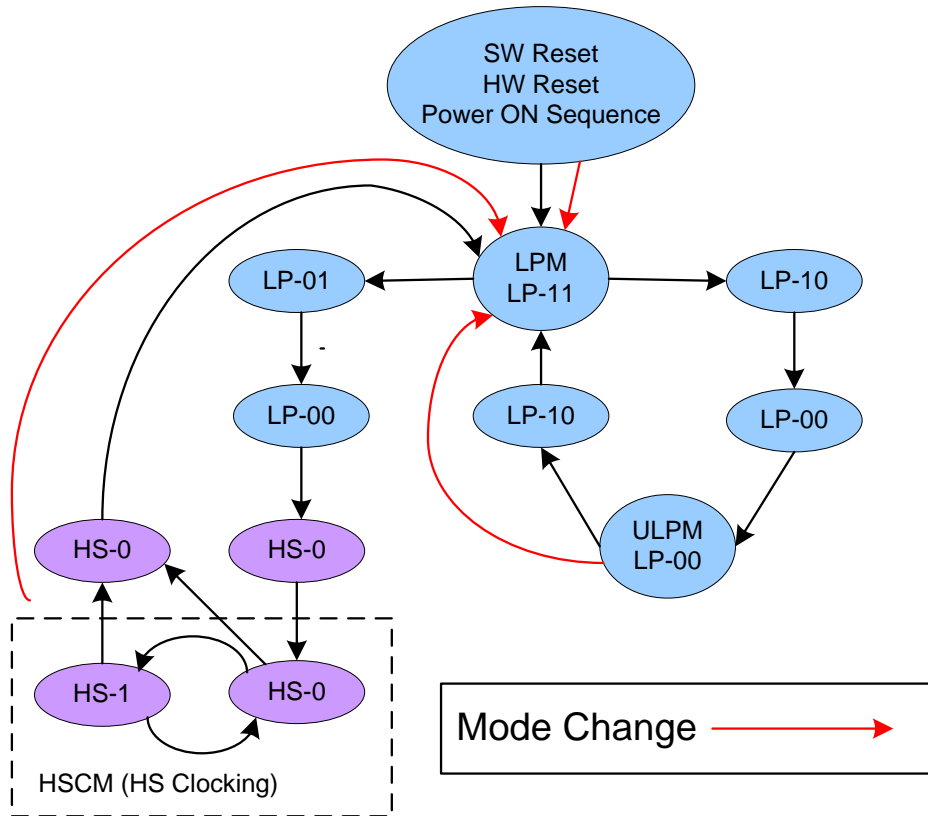


Figure 6: All Three Mode Changes to LPM

4.1.2.2.2. Ultra-Low Power Mode (ULPM)

CLKP/N lanes can be driven to the Ultra-Low power Mode (ULPM) when CLK lanes enter the LP-00 State Code. The only entering possibility is from the Low Power Mode (LPM, LP-11 State Code) => LP-10 => LP-00 (ULPM). This sequence is illustrated below.

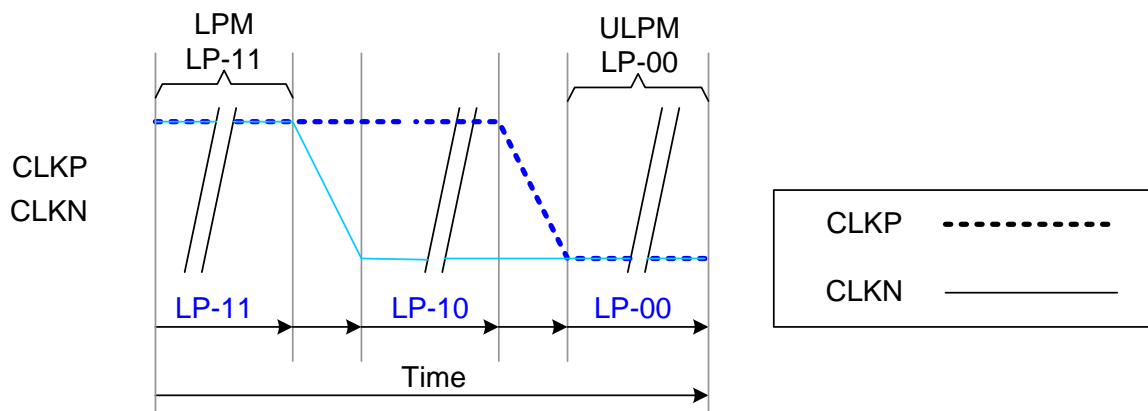


Figure 7: From LPM to ULPM

The mode change is also illustrated below.

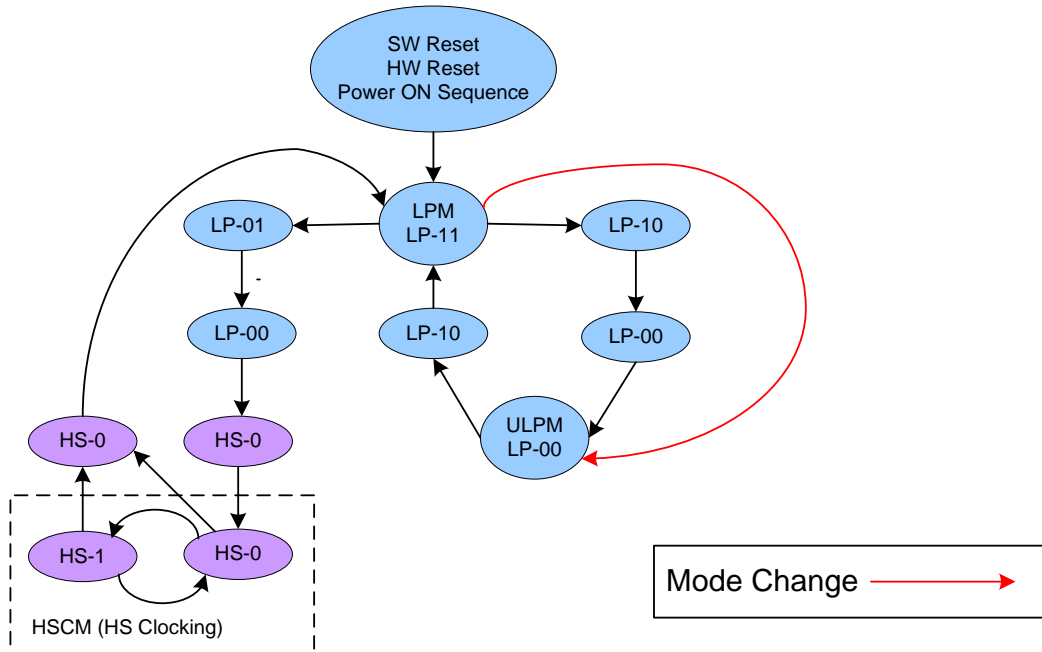


Figure 8: Mode Change from LPM to ULPM

4.1.2.2.3. High-Speed Clock Mode (HSCM)

CLKP/N lanes can be driven to the High Speed Clock Mode (HSCM) when CLK lanes start to function between HS-0 and HS-1 State Codes. The only entering possibility is from the Low Power Mode (LPM, LP-11 State Code) => LP-01 => LP-00 => HS-0 => HS-0/1 (HSCM). This sequence is illustrated below.

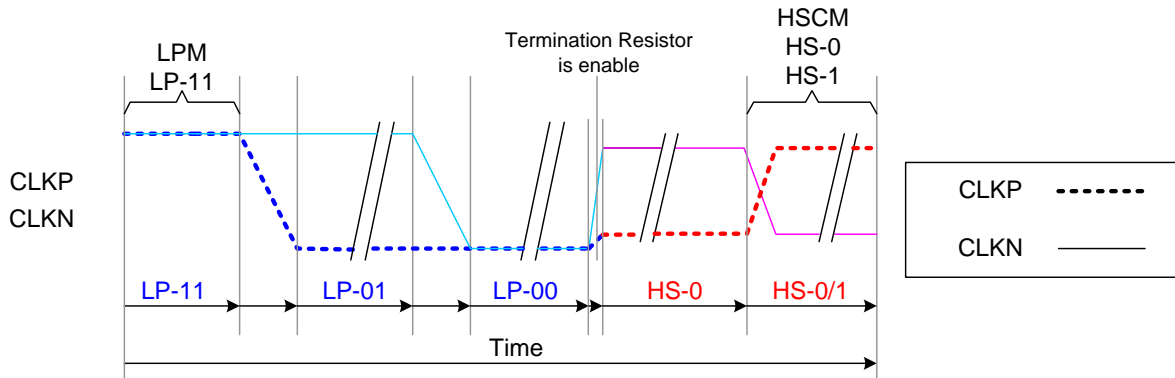


Figure 9: From LPM to HSCM

The mode change is also illustrated below.

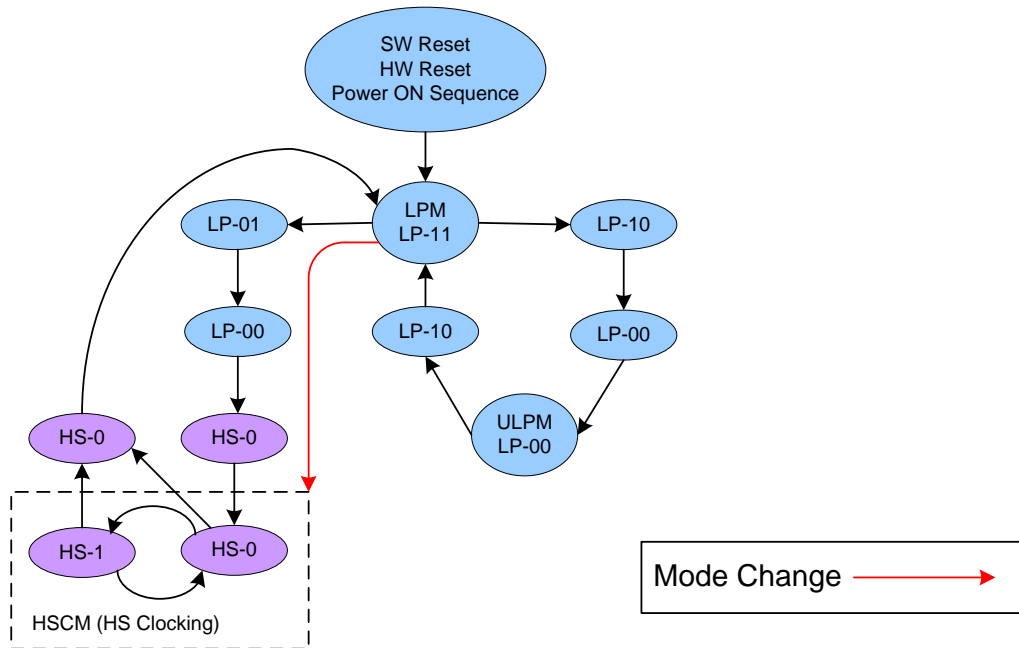


Figure 10: Mode Change from LPM to HSCM

The high speed clock (CLKP/N) starts before high speed data is sent via data lanes. The high speed clock continues clocking after the high speed data sending is stopped.

The burst of the high speed clock consists of:

- Even number of transitions
- Start state is HS-0
- End state is HS-0

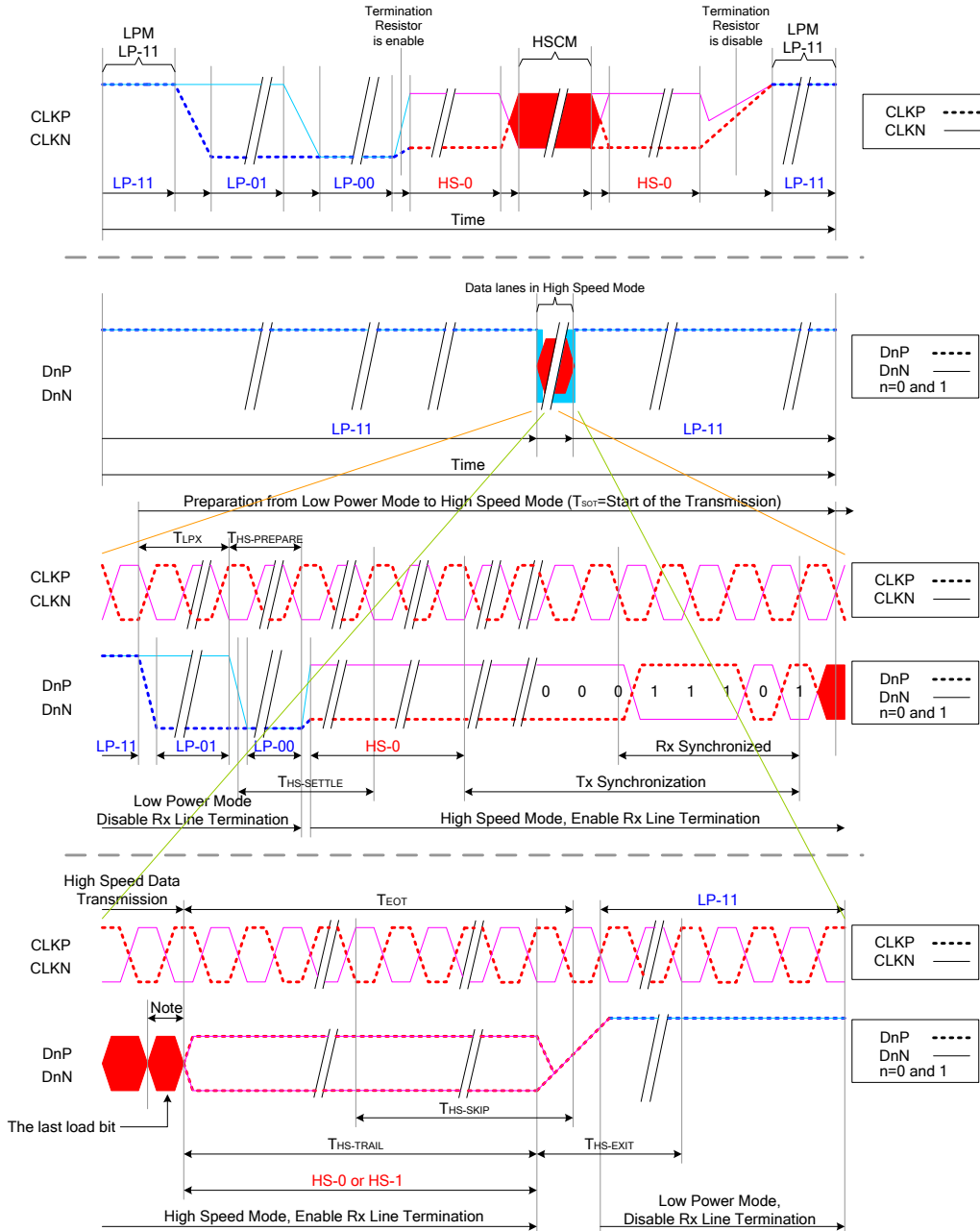


Figure 11: High Speed Clock Burst

Notes:

1. If the last load bit is HS-0, the transmitter changes from HS-0 to HS-1.
2. If the last load bit is HS-1, the transmitter changes from HS-1 to HS-0.

4.1.2.3. DSI Data Lanes

4.1.2.3.1. General

D3P/N, D2P/N, D1P/N and D0P/N Data Lanes can be driven into different modes:

- Escape Mode (Only D0P/N data lane is used)
- High-Speed Data Transmission (all data lanes are used)
- Bus Turnaround Request (Only D0P/N data lane are used)

These modes and their entering codes are defined in the following table.

Table 4: Entering and Leaving Sequences

| Mode | Entering Mode Sequence | Leaving Mode Sequence |
|---|---------------------------------------|--------------------------------|
| Escape Mode ¹ | LP-11 → LP-10 → LP-00 → LP-01 → LP-00 | LP-00 → LP-10 → LP-11 (Mark-1) |
| High-Speed Data Transmission ² | LP-11 → LP-01 → LP-00 → HS-0 | (HS-0 or HS-1) → LP-11 |
| Bus Turnaround Request ³ | LP-11 → LP-10 → LP-00 → LP-10 → LP-00 | Hi-Z |

4.1.2.3.2. Escape Modes

D0P/N data lanes can be used in different Escape Modes when data lanes are in the Low Power (LP) mode. These Escape Modes are used to:

- ◆ Send “Low-Power Data Transmission” (LPDT) from the MCU to the display module,
- ◆ Drive data lanes to “Ultra-Low Power State” (ULPS),
- ◆ Indicate “Remote Application Reset” (RAR), which can reset the display module,
- ◆ Indicate “Acknowledge” (ACK), which is used to transmit a non-error event from the display module to the MCU.

The basic sequence of the Escape Mode is as follows:

- Start: LP-11
- Escape Mode Entry (EME): LP-11 => LP-10 => LP-00 => LP-01 => LP-00
- Escape Command (EC), which is coded, when one of the data lanes changes from low-to-high-to-low then this changed data lane presents the value of the current data bit (D0P = 1, D0N= 0). When DSI-D0 changes from low-to-high-to-low, the receiver will latch a data bit, which value is logical 0. The receiver will use this low-to-high-to-low transition as its internal clock.
- A load if it is needed
- Exit Escape (Mark-1) LP-00 => LP-10 => LP-11
- End: LP-11

This basic construction is illustrated below:

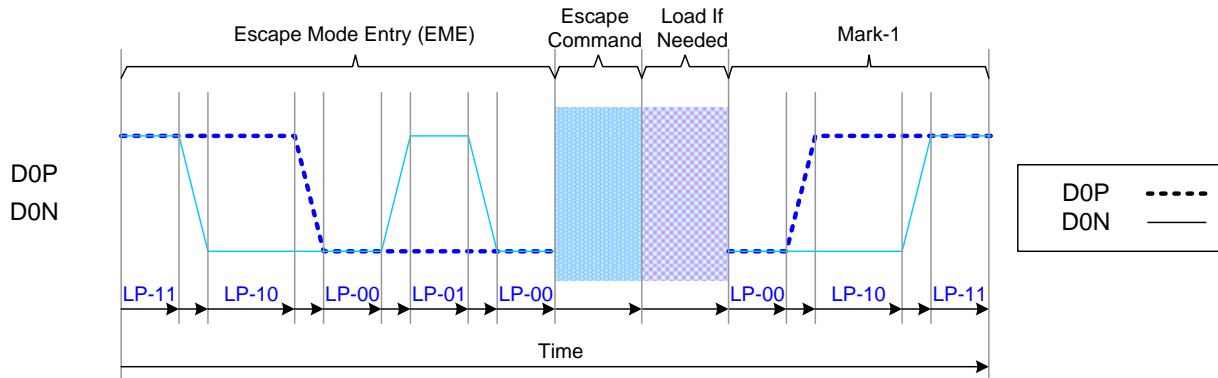


Figure 12 General Escape Mode Sequence

A total of eight Escape Commands (EC) are divided into two types: Mode and Trigger, as shown in Table 5: Escape Commands.

An example of the Mode type Escape Command is 'Ultra-Low Power Mode', where the MCU instructs the display module to enter its Ultra-Low Power Mode.

Escape commands are defined in the following table.

Table 5: Escape Commands

| Escape command | Command Type Mode/Trigger | Entry command Pattern (First Bit → Last Bit Transmitted) | Dn | D0 |
|--------------------------------|---------------------------|---|----|----|
| Low-Power Data Transmission | Mode | 1110 0001 b | - | X |
| Ultra-Low Power Mode | Mode | 0001 1110 b | X | X |
| Undefined-1, ^{Note 1} | Mode | 1001 1111 b | - | - |
| Undefined-2, ^{Note 1} | Mode | 1101 1110 b | - | - |
| Remote Application Reset | Trigger | 0110 0010 b | - | X |
| Acknowledge | Trigger | 0010 0001 b | - | X |
| Unknown-5, ^{Note 1} | Trigger | 1010 0000 b | - | - |

Notes:

1. This Escape command support is not implemented on the display module.
2. n = 1
3. x = Supported
4. - = Not Supported

4.1.2.3.2.1. Low-Power Data Transmission (LPDT)

The MCU can send data to the display module in the Low-Power Data Transmission (LPDT) mode when data lanes enter the Escape Mode and Low-Power Data Transmission (LPDT) command is sent to the display module. The display module also uses the same sequence when it sends data to the MCU. The Low Power Data Transmission (LPDT) uses the following sequence:

- Start: LP-11
- Escape Mode Entry (EME): LP-11 => LP-10 => LP-00 => LP-01 => LP-00
- Low-Power Data Transmission (LPDT) command in the Escape Mode: 1110 0001 (first to last bit)
- Load (Data):
 - ✧ One or more bytes (one byte = 8 bit)
 - ✧ Data lanes are in pause mode when data lanes are stopped (both lanes are low) between bytes
- Mark-1: LP-00 => LP-10 => LP-11
- End: LP-11

This sequence is illustrated for reference purposes below:

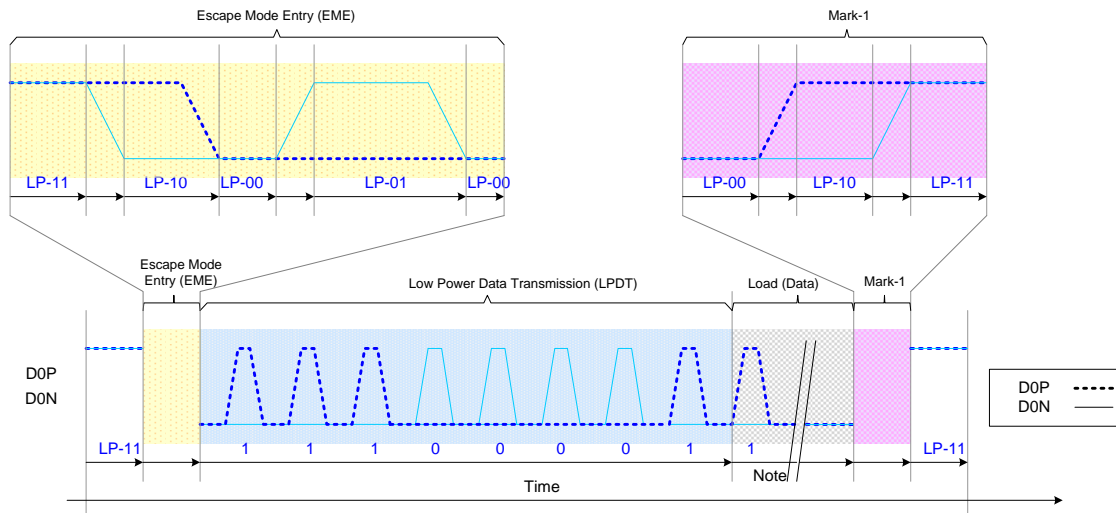


Figure 13: Low-Power Data Transmission (LPDT)

Note: Load (Data) presents that the first bit is the logical 1 in this example.

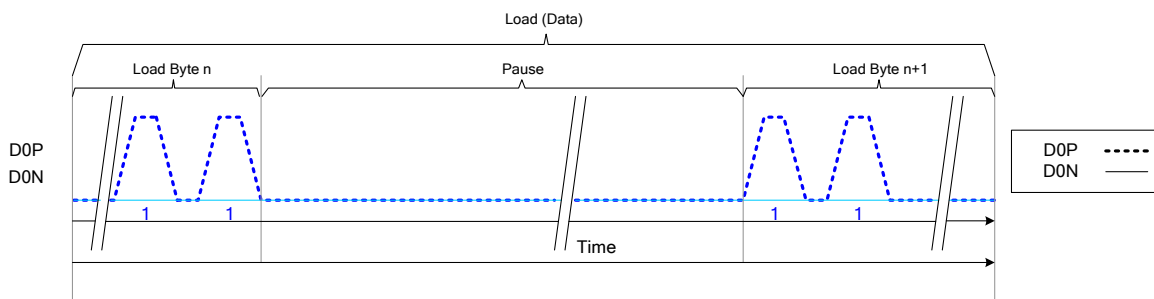


Figure 14: Pause (Example)

4.1.2.3.2.2. Ultra-Low Power State (ULPS)

The MCU can force data lanes get into the Ultra-Low Power State (ULPS) mode when data lanes enter the Escape Mode. The Ultra-Low Power State (ULPS) uses the following sequence:

- Start: LP-11
- Escape Mode Entry (EME): LP-11 => LP-10 => LP-00 => LP-01 => LP-00
- Ultra-Low Power State (ULPS) command in the Escape Mode: 0001 1110 (first to last bit)
- Ultra-Low Power State (ULPS) when the MCU keeps data lanes low
- Mark-1: LP-00 => LP-10 => LP-11
- End: LP-11 (Next command must wait 100us after data lanes leave ULPS)

This sequence is illustrated for reference purposes below:

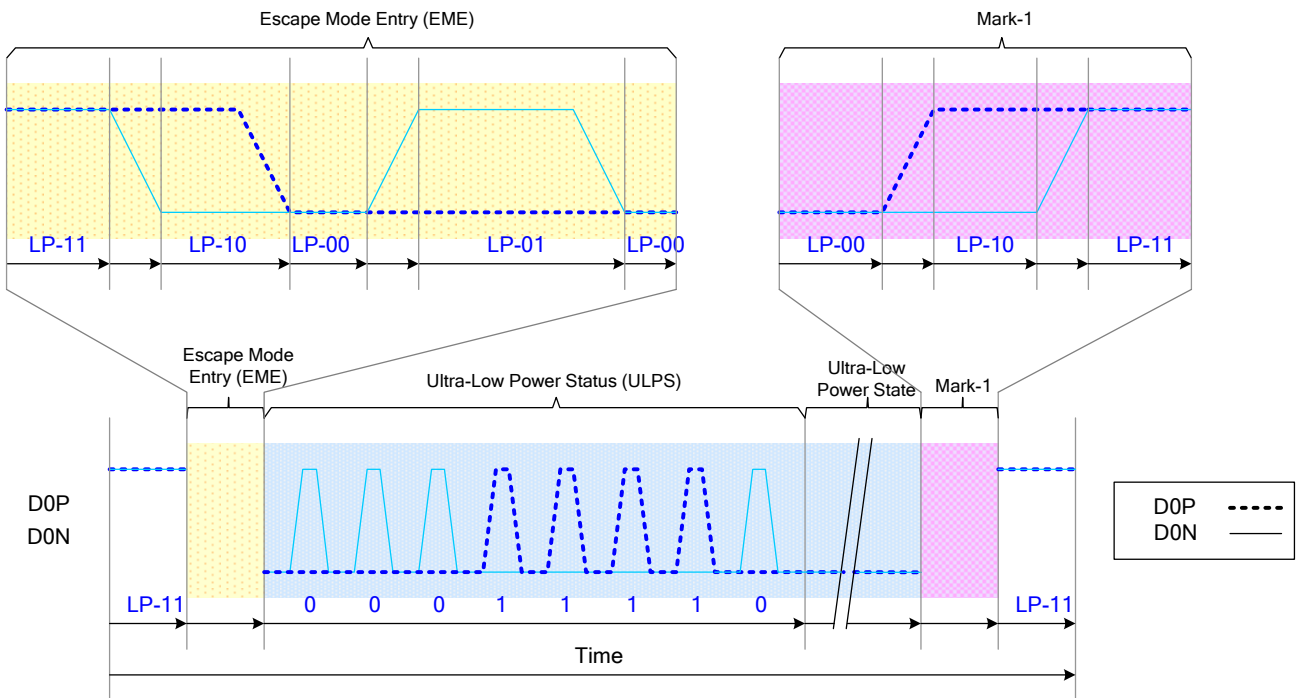


Figure 15: Ultra-Low Power State (ULPS)

4.1.2.3.2.3. Remote Application Reset (RAR)

The MCU can inform the display module that it should be reset in Remote Application Reset (RAR) trigger when data lanes enter the Escape Mode. The Remote Application Reset (RAR) uses the following sequence:

- Start: LP-11
- Escape Mode Entry (EME): LP-11 => LP-10 => LP-00 => LP-01 => LP-00
- Remote Application Reset (RAR) command in Escape Mode: 0110 0010 (first to last bit)
- Mark-1: LP-00 => LP-10 => LP-11
- End: LP-11

This sequence is illustrated for reference purposes below:

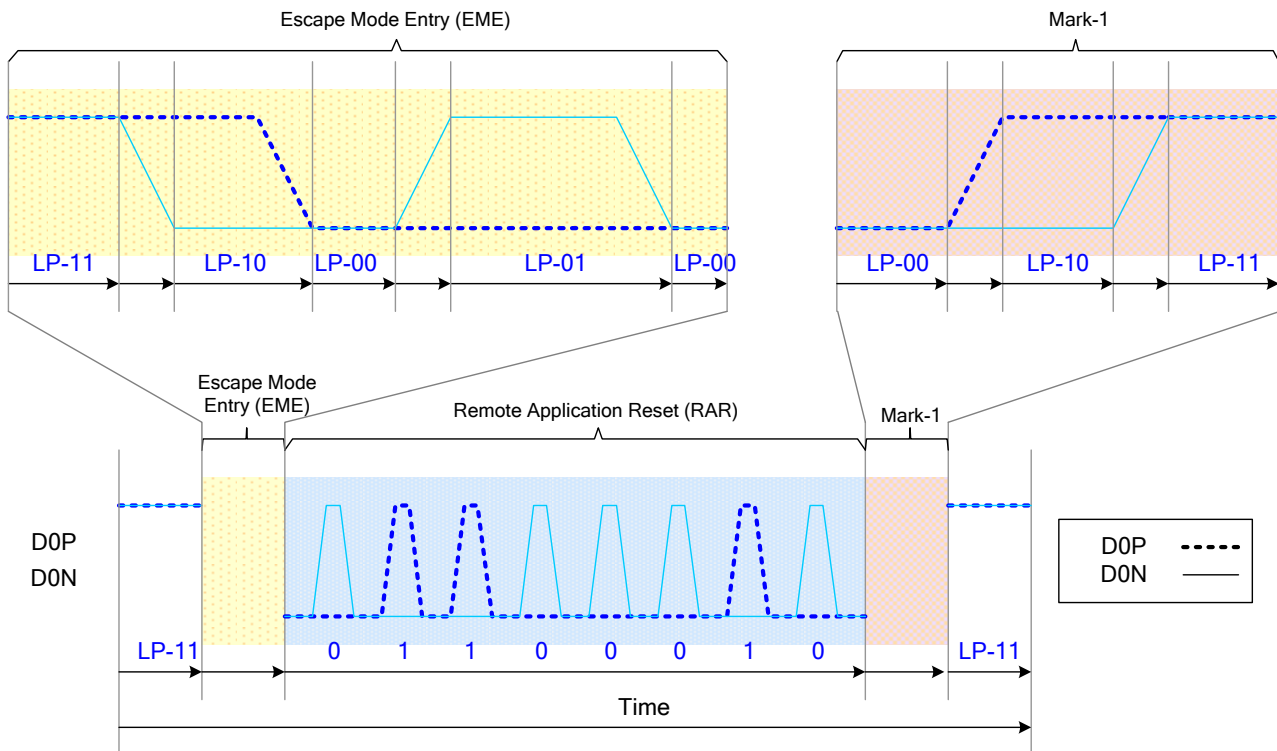


Figure 16: Remote Application Reset (RAR)

4.1.2.3.2.4. Acknowledge (ACK)

The display module can inform the MCU an error is not recognized by Acknowledge (ACK). The display module sends the Acknowledge (ACK) with the following sequence:

- Start: LP-11
- Escape Mode Entry (EME): LP-11 => LP-10 => LP-00 => LP-01 => LP-00
- Acknowledge (ACK) command in the Escape Mode: 0010 0001 (first to last bit)
- Mark-1: LP-00 => LP-10 => LP-11
- End: LP-11

This sequence is illustrated for reference purposes below:

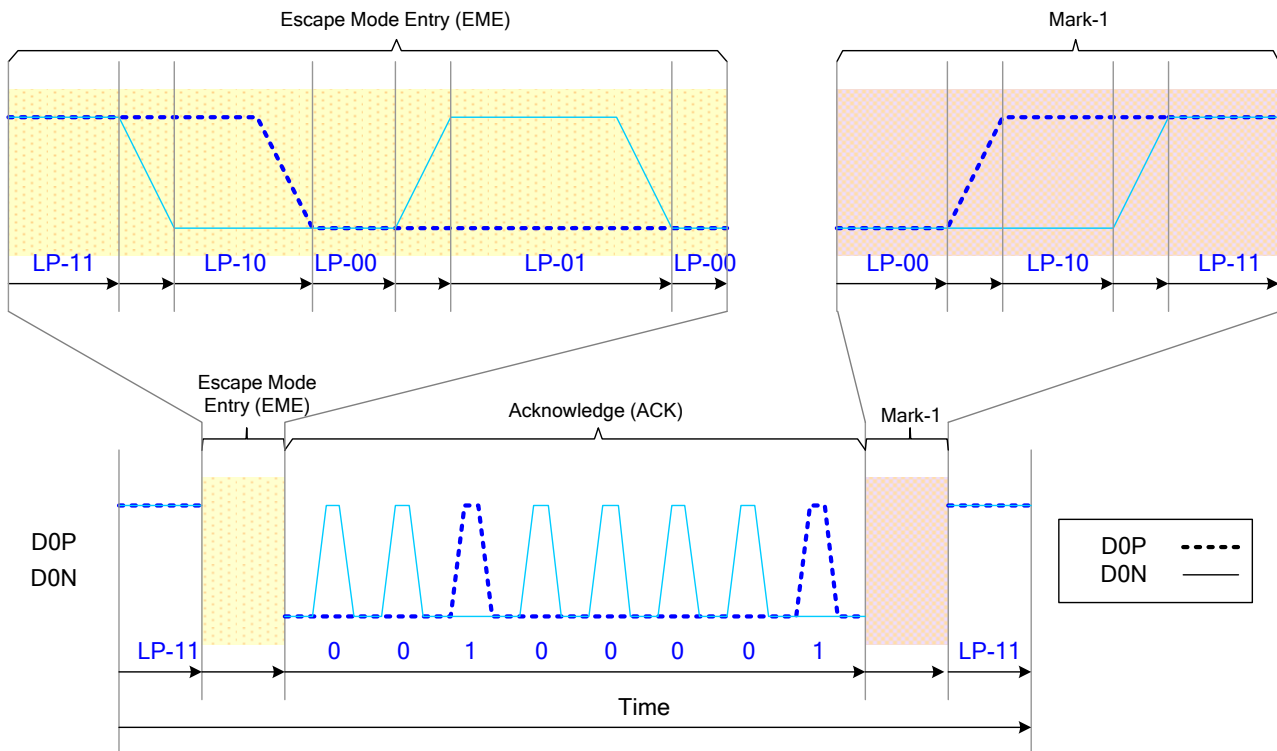


Figure 17: Acknowledge (ACK)

4.1.2.3.3. High-Speed Data Transmission (HSDT)

4.1.2.3.3.1. Entering High-Speed Data Transmission (TSOT of HSDT)

The display module enters High-Speed Data Transmission (HSDT) when Clock lane CLKP/N have already entered the High-Speed Clock Mode (HSCM) by the MCU. See more information in the section “4.1.2.2.3 High-Speed Clock Mode (HSCM)”.

Data lanes D3P/N, D2P/N, D1P/N and D0P/N of the display module enter the High-Speed Data Transmission (TSOT of HSDT) as follows:

- Start: LP-11
- HS-Request: LP-01
- HS-Settle: LP-00 => HS-0 (Rx: Lane Termination Enable)
- Rx Synchronization: 011101 (Tx (= MCU) Synchronization: 0001 1101)
- End: High-Speed Data Transmission (HSDT) – Ready to receive High-Speed Data Load

The sequence of entering High-Speed Data Transmission (TSOT of HSDT) is illustrated below:

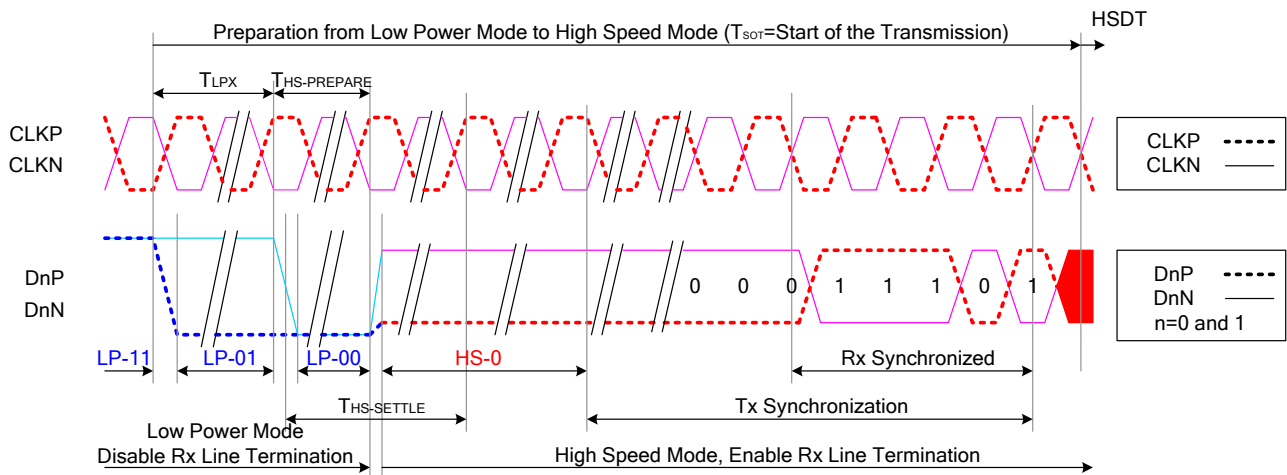


Figure 18: Entering High-Speed Data Transmission (T_{SOT} of HSDT)

4.1.2.3.3.2. Leaving High-Speed Data Transmission (TEOT of HSDT)

The display module leaves the High-Speed Data Transmission (TEOT of HSDT) when Clock lane DSICLK+/- are in the High-Speed Clock Mode (HSCM) by the MCU, and this HSCM is kept until data lanes D3P/N, D2P/N, D1P/N and D0P/N are in the LP-11 mode. See more information in the section “4.1.2.2.3 High-Speed Clock Mode (HSCM)”. Data lanes D3P/N, D2P/N, D1P/N and D0P/N of the display module leave the High-Speed Data Transmission (TEOT of HSDT) as follows:

- Start: High-Speed Data Transmission (HSDT)
- Stops High-Speed Data Transmission
 - ✧ MCU changes to HS-1, if the last load bit is HS-0
 - ✧ MCU changes to HS-0, if the last load bit is HS-1
- End: LP-11 (Rx: Lane Termination Disable)

The sequence of leaving High-Speed Data Transmission (TEOT of HSDT) is illustrated below:

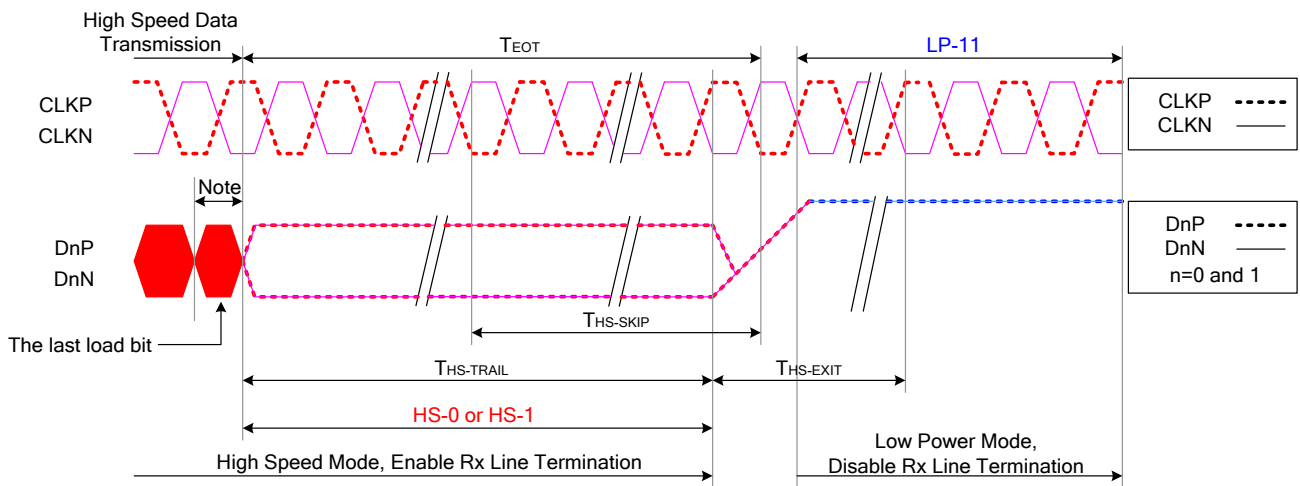


Figure 19: Leaving High-Speed Data Transmission (TEOT of HSDT)

Notes:

1. If the last load bit is HS-0, the transmitter changes from HS-0 to HS-1.
2. If the last load bit is HS-1, the transmitter changes from HS-1 to HS-0.

4.1.2.3.3.3. Burst of the High-Speed Data Transmission (HSDT)

The burst of the “High-Speed Data Transmission” (HSDT) can consist of one or several data packet(s). These data packets can be Long (LPa) or Short (SPa) packets. These packets are defined in the section “4.1.3.1 Short Packet (SPa) and Long Packet (LPa) Structures”. These different burst of the High-Speed Data Transmission (HSDT) cases are illustrated for reference purposes below.

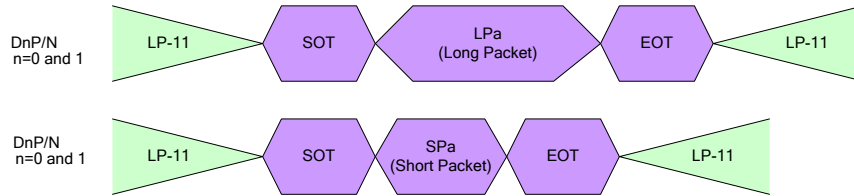


Figure 20: Single Packet in High-Speed Data Transmissions

The multiple packets in High-Speed Data Transmission are illustrated for reference purposes below:

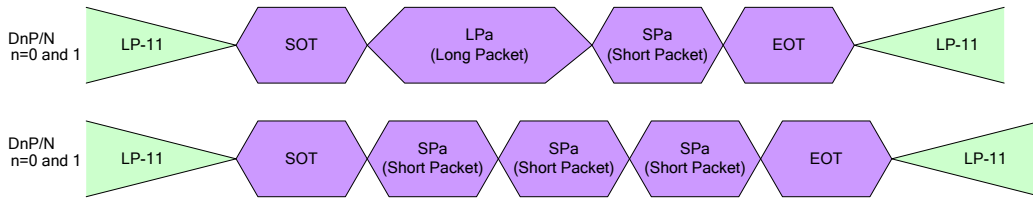


Figure 21: Multiple Packets in High-Speed Data Transmission – Examples

Table 6: Abbreviations

| Abbreviation | Explanation |
|--------------|---|
| EOT | End of the Transmission |
| LPa | Long Packet |
| LP-11 | Low Power Mode, Both of Data lanes are ‘1’s (Stop Mode) |
| SPa | Short Packet |
| SOT | Start of the Transmission |

Byte orders of the sent packet in High-Speed Data Transmission (HSDT) are as follows.

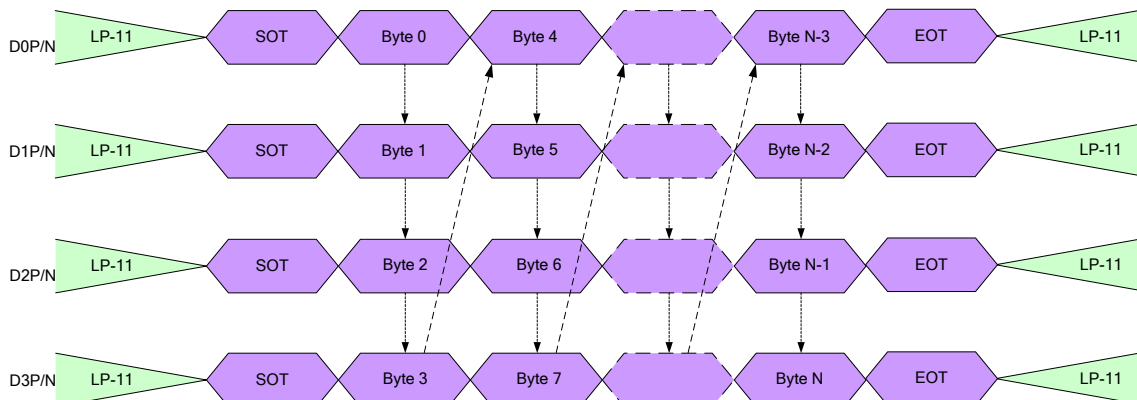


Figure 22: Number of Bytes, N, transmitted is an integer multiple of the number of lanes

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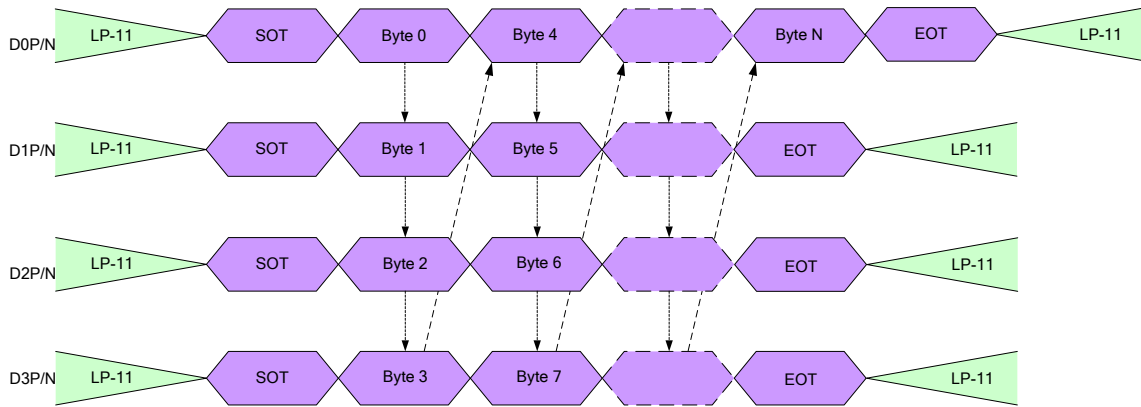


Figure 23: Number of Bytes, N, transmitted is NOT an integer multiple of the number of lanes (Example 1)

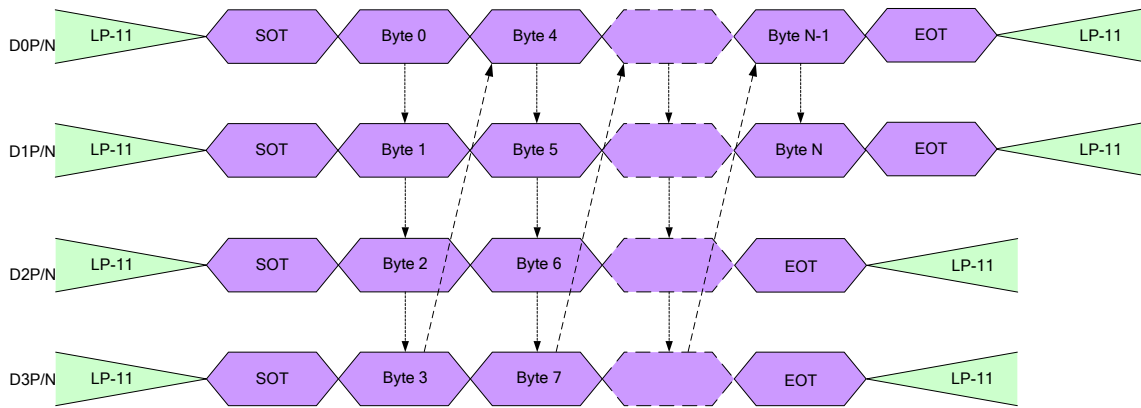


Figure 24: Number of Bytes, N, transmitted is NOT an integer multiple of the number of lanes (Example 2)

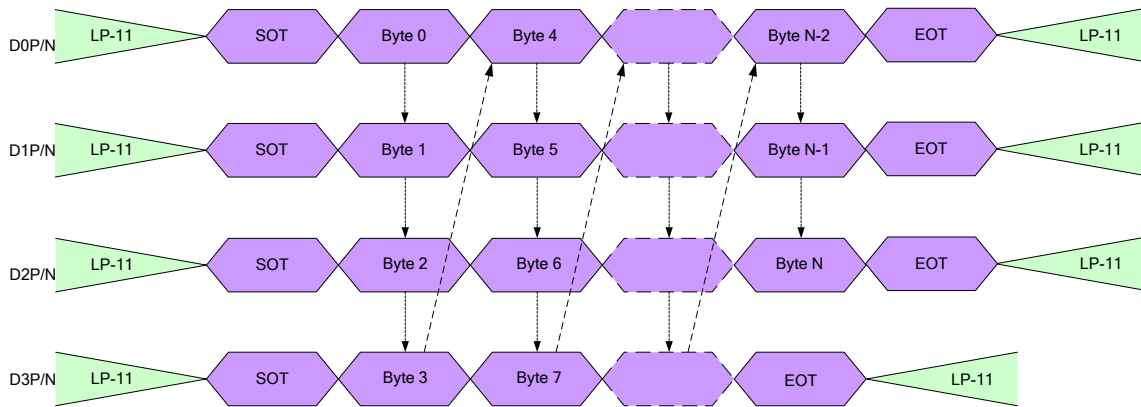


Figure 25: Number of Bytes, N, transmitted is NOT an integer multiple of the number of lanes (Example 3)

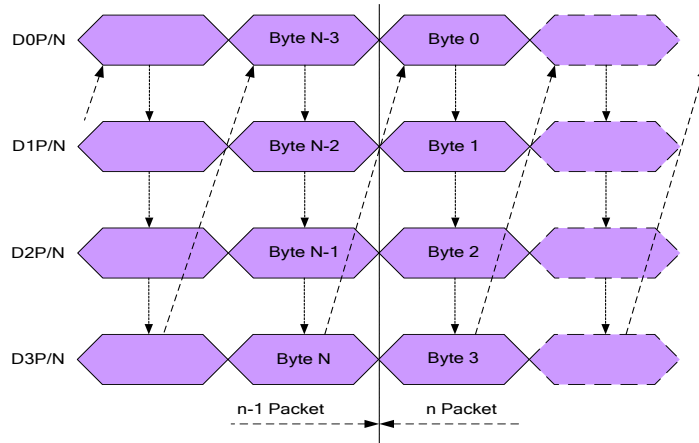


Figure 26: Continuous Multiple Packets in HSDT when Number of Bytes is Equal on Data Lanes at the End of the Packet

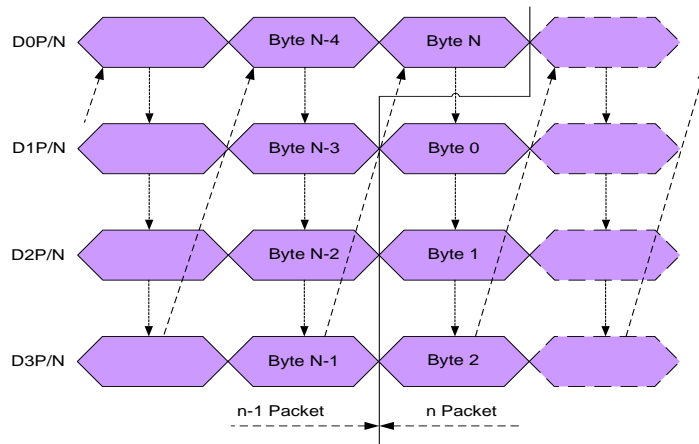


Figure 27: Continuous Multiple Packets in HSDT when Number of Bytes is not Equal on Data Lanes at the End of the Packet (Example 1)

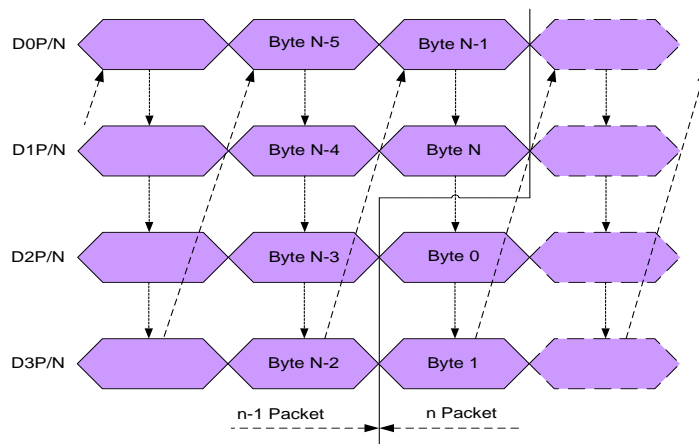


Figure 28: Continuous Multiple Packets in HSDT when Number of Bytes is not Equal on Data Lanes at the End of the Packet (Example 2)

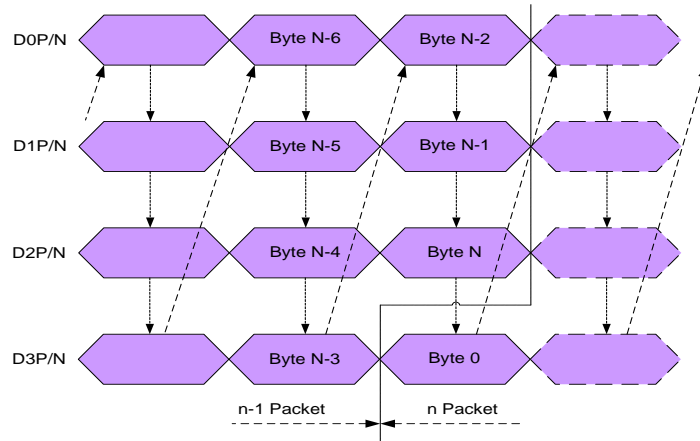


Figure 29: Continuous Multiple Packets in HSDT when Number of Bytes is not Equal on Data Lanes at the End of the Packet (Example 3)

4.1.2.3.4. Bus Turnaround (BTA)

The MCU or display module, which controls D0P/N Data Lanes, can start a bus turnaround procedure when it requires information from a receiver, which can be the MCU or display module.

The MCU and display module use the same sequence when this bus turnaround procedure is used. The sequence, when the MCU wants to do the bus turnaround procedure to the display module, is described for reference purposes as follows:

- Start (MCU): LP-11
- Turnaround Request (MCU): LP-11 => LP-10 => LP-00 => LP-10 => LP-00
- The MCU waits until the display module starts to control D0P/N data lanes and the MCU stops to control D0P/N data lanes (= High-Z)
- The display module changes to the stop mode: LP-00 => LP-10 => LP-11

The bus turnaround procedure (from the MCU to the display module) is illustrated below:

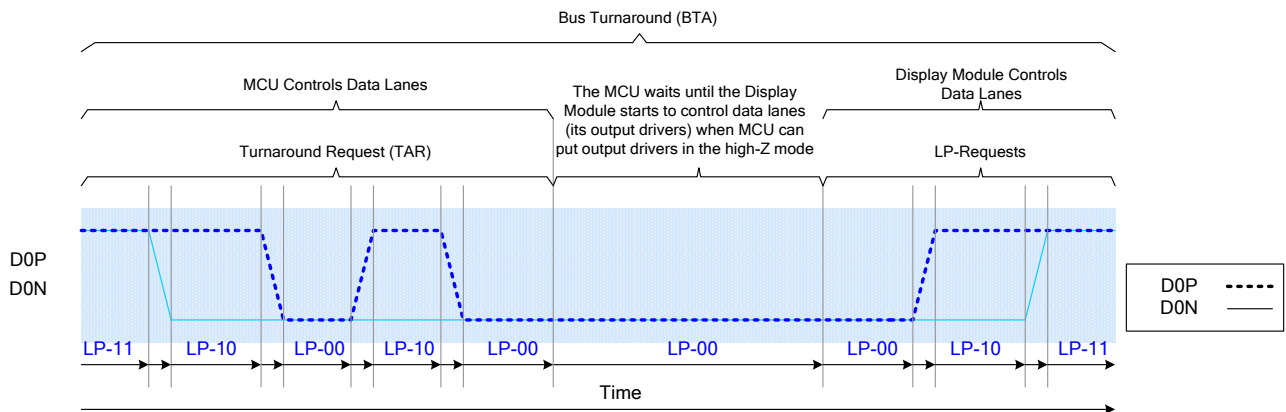


Figure 30: Bus Turnaround Procedure

MCU and display module terms can be switched in Figure 30 if the Bus Turnaround (BTA) is from the display module to the MCU.

4.1.3. Packet Level Communication

4.1.3.1. Short Packet (SPa) and Long Packet (LPa) Structures

Short Packet (SPa) and Long Packet (LPa) are always used when data transmission is done in Low Power Data Transmission (LPDT) or High-Speed Data Transmission (HSDT) modes. The lengths of the packets are:

- ❖ Short Packet (SPa): 4 bytes
- ❖ Long Packet (LPa): 6 to 65,541 bytes

The type (SPa or LPa) of the packet can be recognized from their package headers (PH).

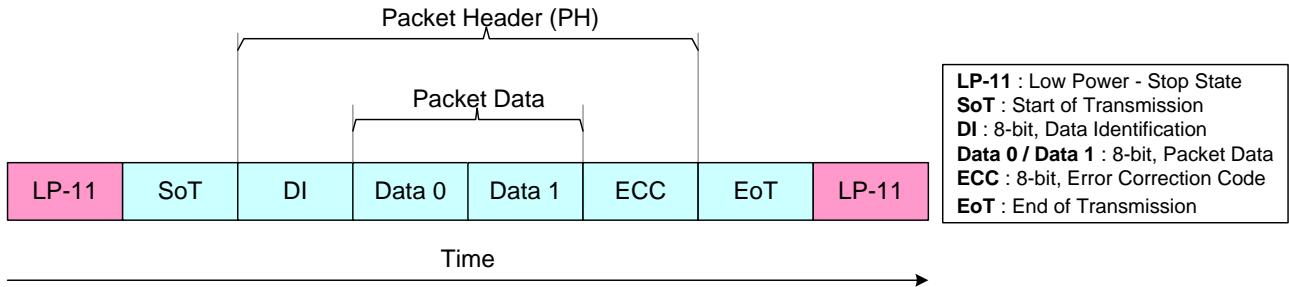


Figure 31: Short Packet (SPa) Structure

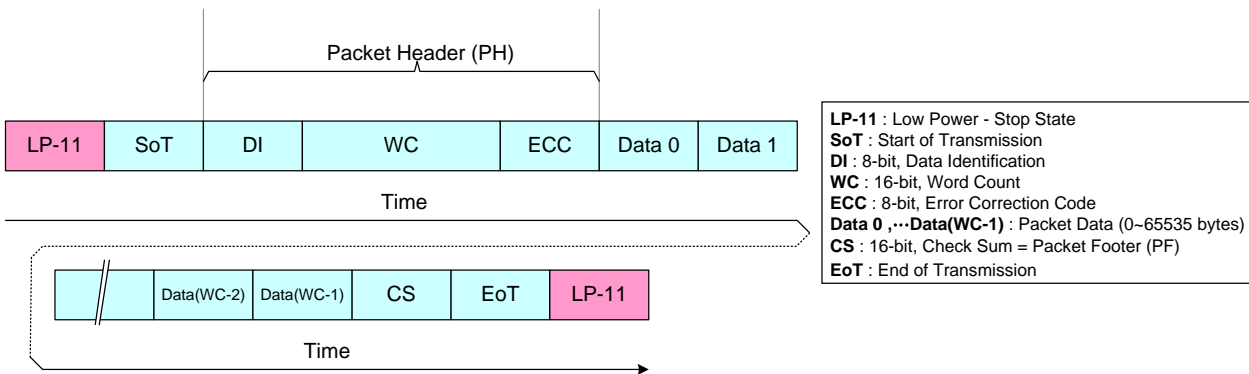


Figure 32: Long Packet (LPa) Structure

Notes:

1. Figure 31 and Figure 32 present a single packet sending (= Includes LP-11, SoT and EoT for each packet sending).
2. The other possibility is that SoT, EoT and LP-11 are not needed between packets if packets are sent in multiple packet format, e.g.
 - LP-11 => SoT => SPa => LPa => SPa => SPa => EoT => LP-11
 - LP-11 => SoT => SPa => SPa => SPa => EoT => LP-11
 - LP-11 => SoT => LPa => LPa => LPa => EoT => LP-11

4.1.3.1.1. Bit Order of the Byte on Packets

The bit order of the byte, what is used in packets, is that the Least Significant Bit (LSB) of the byte is sent first, and the Most Significant Bit (MSB) is sent last. The order is illustrated for reference purposes below.

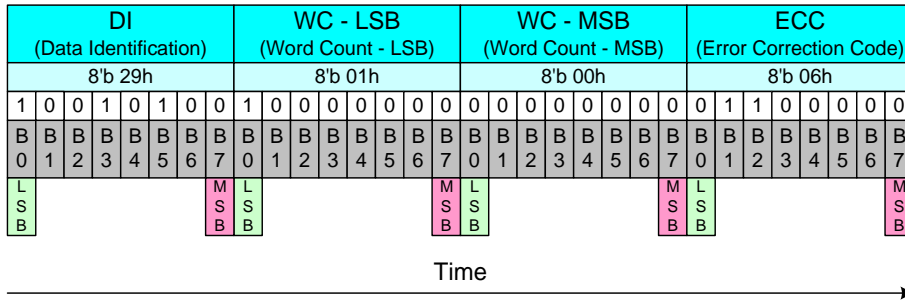


Figure 33: Bit Order of the Byte on Packets

4.1.3.1.2. Byte Order of the Multiple Byte Information on Packets

Byte order of the multiple bytes information, what is used in packets, is that the Least Significant (LS) Byte of the information is sent first and the Most Significant (MS) Byte is sent last. For example, Word Count (WC) consists of 2 bytes (= 16 bits); while the LS byte is sent first and the MS byte is sent last. The order is illustrated for reference purposes below.

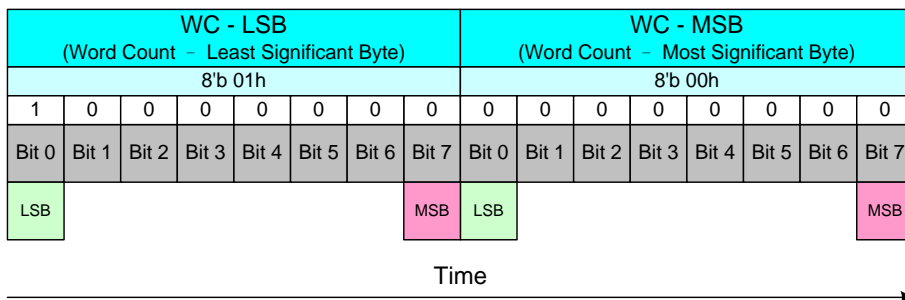


Figure 34: Byte Order of the Multiple Byte Information on Packets

4.1.3.1.3. Packet Header (PH)

The packet header always consists of 4 bytes. The content of these 4 bytes are different for Short Packet (SPa) and Long Packet (LPa).

Short Packet (SPa):

- 1st byte: Data Identification (DI) => Identify that this is a Short Packet (SPa)
- 2nd and 3rd bytes: Packet Data (PD), Data 0 and 1
- 4th byte: Error Correction Code (ECC)

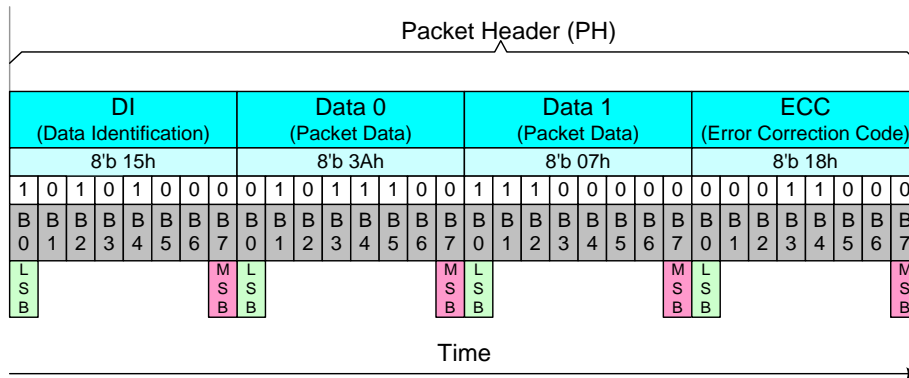


Figure 35: Packet Header (PH) in a Short Packet (SPa)

Long Packet (LPa):

- 1st byte: Data Identification (DI) => Identify that this is a Long Packet (LPa)
- 2nd and 3rd bytes: Word Count (WC)
- 4th byte: Error Correction Code (ECC)

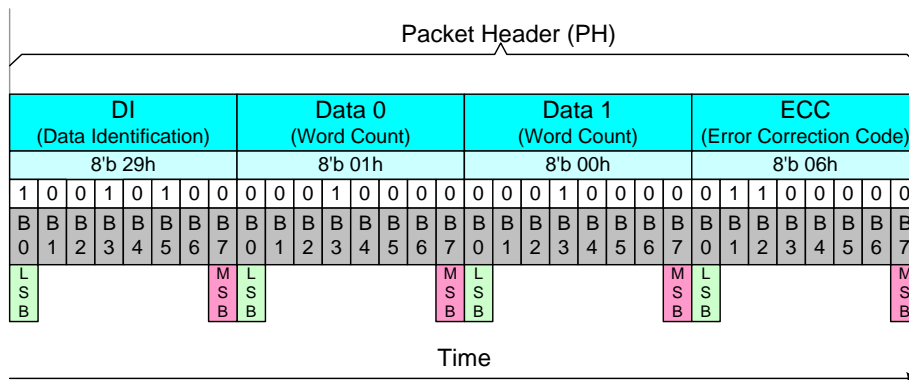


Figure 36: Packet Header (PH) in a Long Packet (LPa)

4.1.3.1.3.1. Data Identification (DI)

Data Identification (DI) is a part of the Packet Header (PH), and it consists of 2 parts:

- Virtual Channel (VC), 2 bits, DI [7...6]
- Data Type (DT), 6 bits, DI [5...0]

The Data Identification (DI) structure is illustrated, see the figure below.

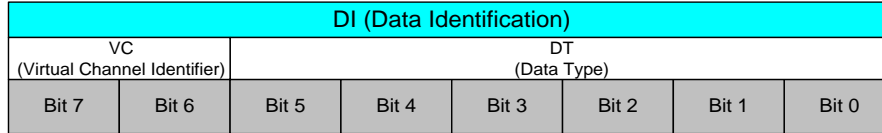


Figure 37: Data Identification (DI) Structure

Data Identification (DI) in the Packet Header (PH) is illustrated for reference purposes below.

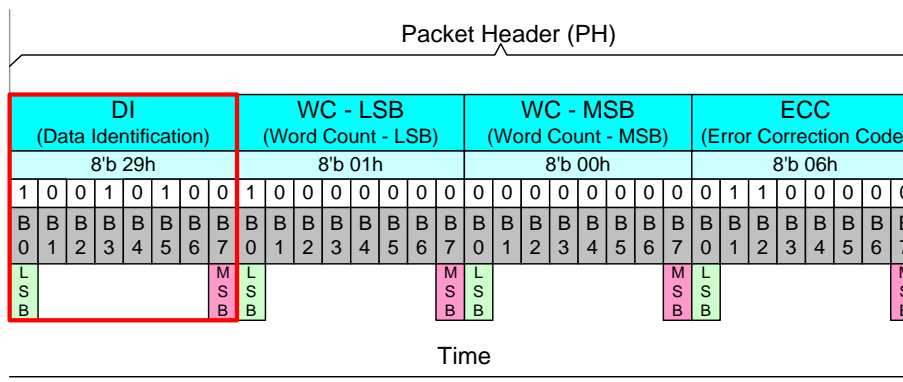


Figure 38: Data Identification (DI) on the Packet Header (PH)

4.1.3.1.3.1.1. Virtual Channel (VC)

Virtual Channel (VC) is a part of Data Identification (DI [7...6]) structure, and it is used to address where a packet is to be sent from the MCU. Bits of the Virtual Channel (VC) are illustrated for reference purposes below.

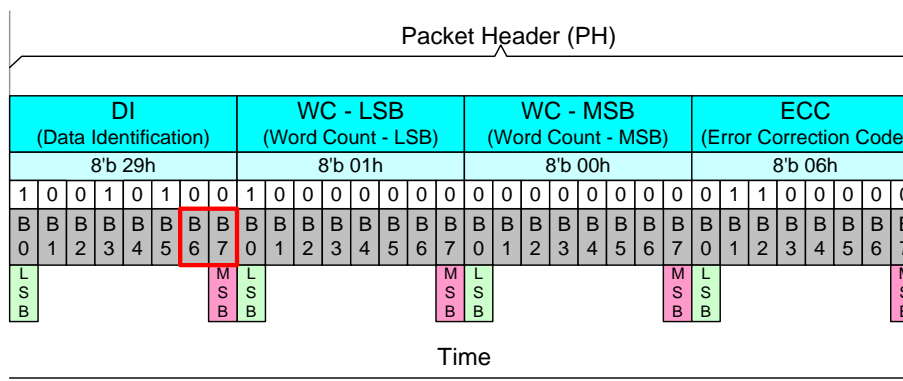


Figure 39: Virtual Channel (VC) on the Packet Header (PH)

Virtual Channel (VC) can assign 4 different channels for 4 different display modules. Devices will use the same virtual channel as which the MCU uses to send packets to them, e.g.

- ◆ The MCU uses the virtual channel 0 when it sends packets to the ILI9881C
- ◆ The ILI9881C also uses the virtual channel 0 when it sends packets to the MCU

This functionality is illustrated below.

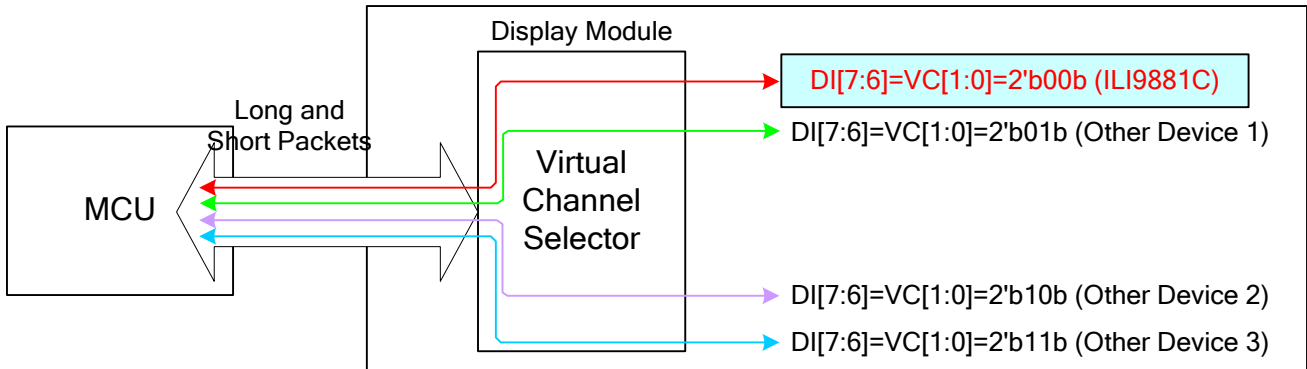


Figure 40: Virtual Channel (VC) Configuration

Virtual Channel (VC) is always 0 (DI [7..6] = VC [1..0] = 00b) when the MCU sends “End of Transmission Packet” to the display module. See the section “4.1.3.2.1.7 End of Transmission Packet (EoTP)”.

This display module does not support the virtual channel selector for other devices (1 to 3) when the only possible virtual channel (VC [1..0]) is 00b for the ILI9881C.

4.1.3.1.3.1.2. Data Type (DT)

Data Type (DT) is a part of Data Identification (DI [5...0]) structure, and it is used to define the type of the used data in a packet. Bits of the Data Type (DT) are illustrated for reference purposes below.

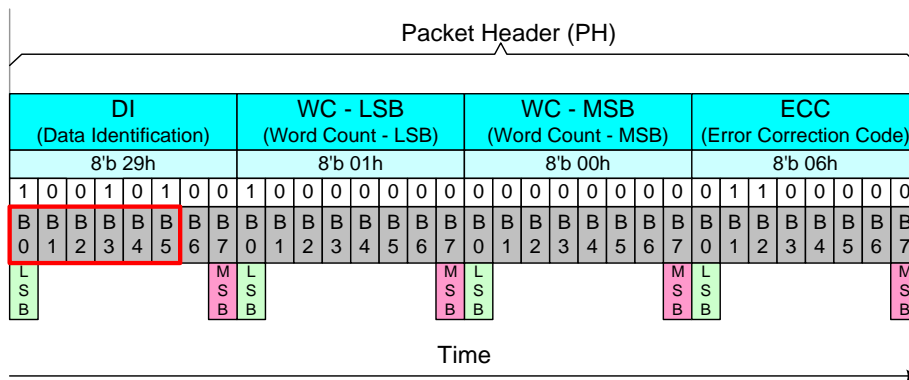


Figure 41: Data Type (DT) on the Packet Header (PH)

This Data Type (DT) also defines the used packet is a Short Packet (SPa) or a Long Packet (LPa). Data Types (DT) are different from the MCU to the display module (or other devices) and vice versa. These Data Types (DT) are defined in the tables below.

Table 7: Data Type (DT) from the MCU to the Display Module

| From the MCU to the Display Module | | | | | | | | |
|------------------------------------|------|------|------|------|------|-----|---|--------------------|
| Bit5 | Bit4 | Bit3 | Bit2 | Bit1 | Bit0 | Hex | Description | Short/Long Packet |
| 0 | 0 | 0 | 0 | 0 | 1 | 01 | Sync Event, V Sync Start | SPa (Short Packet) |
| 0 | 1 | 0 | 0 | 0 | 1 | 11 | Sync Event, V Sync End | SPa (Short Packet) |
| 1 | 0 | 0 | 0 | 0 | 1 | 21 | Sync Event, H Sync Start | SPa (Short Packet) |
| 1 | 1 | 0 | 0 | 0 | 1 | 31 | Sync Event, H Sync End | SPa (Short Packet) |
| 0 | 0 | 1 | 0 | 0 | 0 | 08 | End of Transmission Packet (EoTP) ^{Note1} | SPa (Short Packet) |
| 0 | 0 | 0 | 0 | 1 | 0 | 02 | Color Mode Off Command | SPa (Short Packet) |
| 0 | 1 | 0 | 0 | 1 | 0 | 12 | Color Mode On Command | SPa (Short Packet) |
| 1 | 0 | 0 | 0 | 1 | 0 | 22 | Shut Down Peripheral Command | SPa (Short Packet) |
| 1 | 1 | 0 | 0 | 1 | 0 | 32 | Turn On Peripheral Command | SPa (Short Packet) |
| 0 | 0 | 0 | 0 | 1 | 1 | 03 | Generic Short WRITE, no parameters | SPa (Short Packet) |
| 0 | 1 | 0 | 0 | 1 | 1 | 13 | Generic Short WRITE, 1 parameters | SPa (Short Packet) |
| 1 | 0 | 0 | 0 | 1 | 1 | 23 | Generic Short WRITE, 2 parameters | SPa (Short Packet) |
| 0 | 0 | 0 | 1 | 0 | 0 | 04 | Generic Short READ, no parameters | SPa (Short Packet) |
| 0 | 1 | 0 | 1 | 0 | 0 | 14 | Generic Short READ, 1 parameters | SPa (Short Packet) |
| 1 | 0 | 0 | 1 | 0 | 0 | 24 | Generic Short READ, 2 parameters | SPa (Short Packet) |
| 0 | 0 | 0 | 1 | 0 | 1 | 05 | DCS Write, No Parameter | SPa (Short Packet) |
| 0 | 1 | 0 | 1 | 0 | 1 | 15 | DCS Write, 1 Parameter | SPa (Short Packet) |
| 0 | 0 | 0 | 1 | 1 | 0 | 06 | DCS Read, No Parameter | SPa (Short Packet) |
| 1 | 1 | 0 | 1 | 1 | 1 | 37 | Set Maximum Return Packet Size | SPa (Short Packet) |
| 0 | 0 | 1 | 0 | 0 | 1 | 09 | Null Packet, No Data, ^{Note2} | LPa (Long Packet) |
| 0 | 1 | 1 | 0 | 0 | 1 | 19 | Blanking Packet, no data | LPa (Long Packet) |
| 1 | 0 | 1 | 0 | 0 | 1 | 29 | Generic Long Write | LPa (Long Packet) |
| 1 | 1 | 1 | 0 | 0 | 1 | 39 | DCS Write Long | LPa (Long Packet) |
| 0 | 0 | 1 | 1 | 1 | 0 | 0E | Packed Pixel Stream, 16-bit RGB, 5-6-5 Format | LPa (Long Packet) |
| 0 | 1 | 1 | 1 | 1 | 0 | 1E | Packed Pixel Stream, 18-bit RGB, 6-6-6 Format | LPa (Long Packet) |
| 1 | 0 | 1 | 1 | 1 | 0 | 2E | Loosely Packed Pixel Stream, 18-bit RGB, 6-6-6 Format | LPa (Long Packet) |
| 1 | 1 | 1 | 1 | 1 | 0 | 3E | Packed Pixel Stream, 24-bit RGB, 8-8-8 Format | LPa (Long Packet) |
| x | x | 0 | 0 | 0 | 0 | x0 | DO NOT USE | |
| x | x | 1 | 1 | 1 | 1 | xF | All unspecified codes are reserved | |

Notes:

1. This can be used when the MCU wants to make sure that it is the end of the transmission in High Speed Data Transferring (HSDDT) mode.
2. This can be used when data lanes are to be kept in High Speed Data Transferring (HSDDT) Mode.

Table 8: Data Type (DT) from the Display Module to the MCU

| From the Display Module to the MCU | | | | | | | Description | Short/Long Packet |
|------------------------------------|------|------|------|------|------|-----|--|--------------------|
| Bit5 | Bit4 | Bit3 | Bit2 | Bit1 | Bit0 | Hex | | |
| 0 | 0 | 0 | 0 | 1 | 0 | 02 | Acknowledge with Error Report | SPa (Short Packet) |
| 0 | 0 | 1 | 0 | 0 | 0 | 08 | End of Transmission Packet (EoTP) | SPa (Short Packet) |
| 0 | 1 | 0 | 0 | 0 | 1 | 11 | Generic Short READ Response, 1 byte returned | SPa (Short Packet) |
| 0 | 1 | 0 | 0 | 1 | 0 | 12 | Generic Short READ Response, 2 byte returned | SPa (Short Packet) |
| 0 | 1 | 1 | 0 | 1 | 0 | 1A | Generic Long READ Response | LPa (Long Packet) |
| 0 | 1 | 1 | 1 | 0 | 0 | 1C | DCS Read Long Response | LPa (Long Packet) |
| 1 | 0 | 0 | 0 | 0 | 1 | 21 | DCS Read Short Response, 1 byte returned | SPa (Short Packet) |
| 1 | 0 | 0 | 0 | 1 | 0 | 22 | DCS Read Short Response, 2 byte returned | SPa (Short Packet) |

The receiver will ignore other Data Types (DT) if they are not defined in Table 7 and Table 8.

4.1.3.1.3.2. Packet Data (PD) in a Short Packet (SPa)

Packet Data (PD) of the Short Packet (SPa) is placed after Data Type (DT) of the Data Identification (DI) and indicates a Short Packet (SPa) is to be sent. Packet Data (PD) of a Short Packet (SPa) consists of 2 data bytes: Data 0 and Data 1. The sending order of the Packet Data (PD) is that Data 0 is sent first and the Data 1 is sent last. Bits of Data 1 are set to 0 if the information length is 1 byte. Packet Data (PD) of a Short Packet (SPa), when the length of the information is 1 or 2 bytes and Virtual Channel (VC) is 0, are illustrated for reference purposes below.

Packet Data (PD) information:

- Data 0: 26hex (Display Command Set (DCS) with 1 Parameter => DI (Data Type (DT)) = 15hex)
- Data 1: 01hex (DCS's parameter)

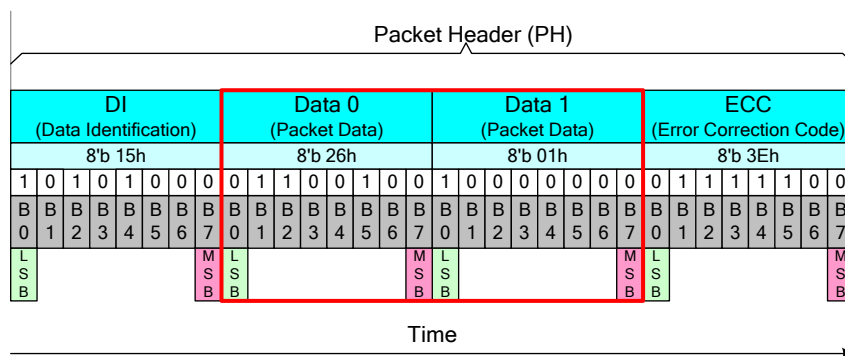


Figure 42: Packet Data (PD) for Short Packet (SPa), 2 Bytes Information

Packet Data (PD) information:

- Data 0: 10hex (DCS without parameter => DI (Data Type (DT)) = 05hex)
- Data 1: 00hex (Null)

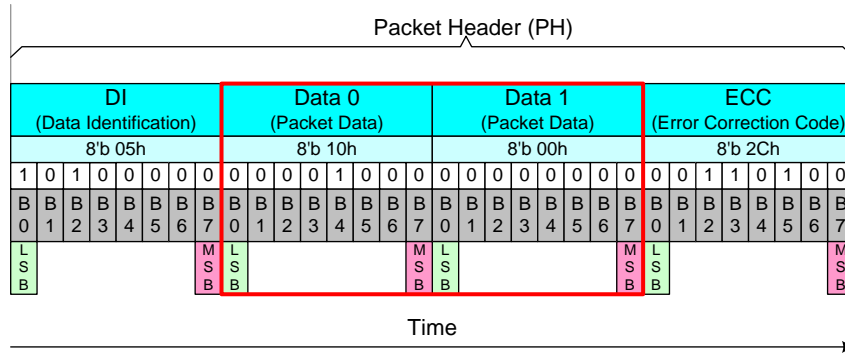


Figure 43: Packet Data (PD) for Short Packet (SPa), 1 Byte Information

4.1.3.1.3.3. Word Count (WC) in a Long Packet (LPa)

Word Count (WC) of the Long Packet (LPa) is placed after Data Type (DT) of the Data Identification (DI) and indicates that a Long Packet (LPa) is to be sent. Word Count (WC) indicates the amount of data bytes of the Packet Data (PD) that is to be sent after the Packet Header (PH). The location of the Word Count (WC) in a Long Packet is the same as which of the Packet Data (PD) in a Short Packet (SPa), as shown in Figure 45. Word Count (WC) of the Long Packet (LPa) consists of 2 bytes. The sending order of these 2 bytes of the Word Count (WC) is that the Least Significant (LS) Byte is sent first, and the Most Significant (MS) Byte is sent last. Word Count (WC) of a Long Packet (LPa) is illustrated for reference purposes below.

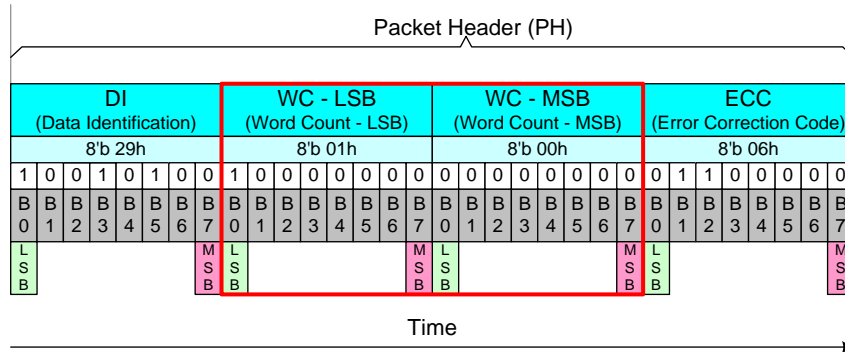


Figure 44: Word Count (WC) in a Long Packet (LPa)

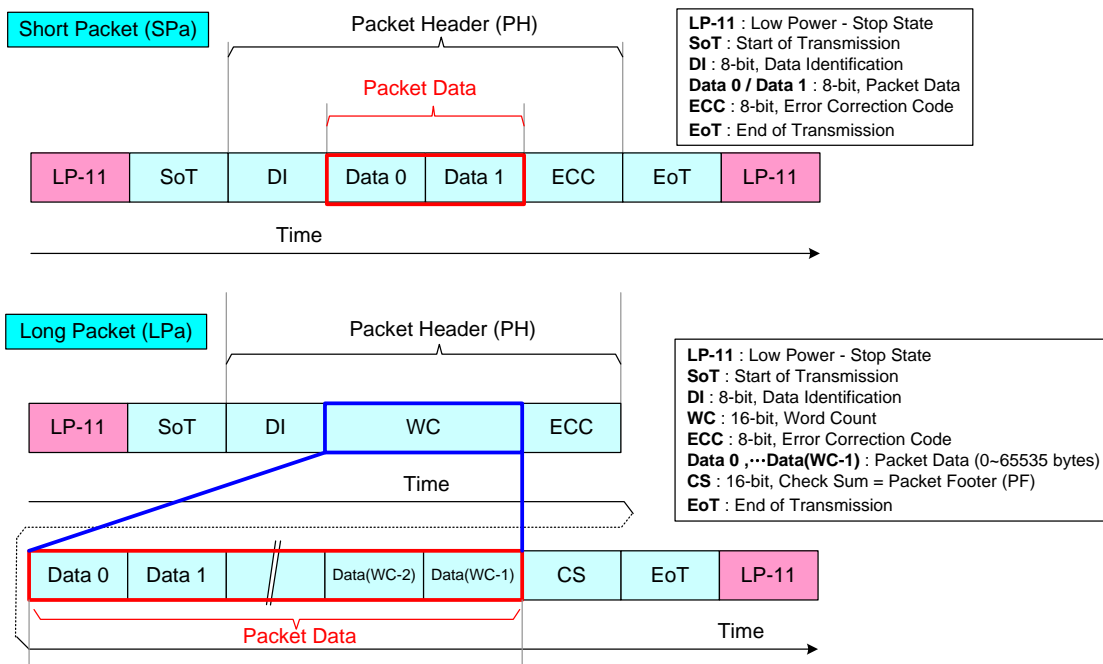


Figure 45: Packet Data in Short and Long Packets

4.1.3.1.3.4. Error Correction Code (ECC)

The Error Correction Code (ECC) is a part of Packet Header (PH) and its purpose is to identify an error or errors. The ECC protects the following fields:

- ❖ Short Packet (SPa): Data Identification (DI) byte (8 bits: D [0...7]), Packet Data (PD) bytes (16 bits: D [8...23]) and ECC (8 bits: P [0...7])
- ❖ Long Packet (LPa): Data Identification (DI) byte (8 bits: D [0...7]), Word Count (WC) bytes (16 bits: D [8...23]) and ECC (8 bits: P [0...7])

D [23...0] and P [7...0] are illustrated for reference purposes below.

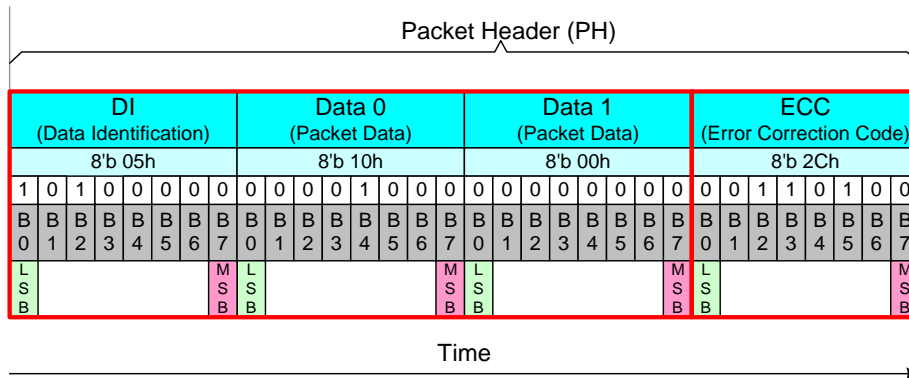


Figure 46: D [23...0] and P [7...0] in a Short Packet (SPa)

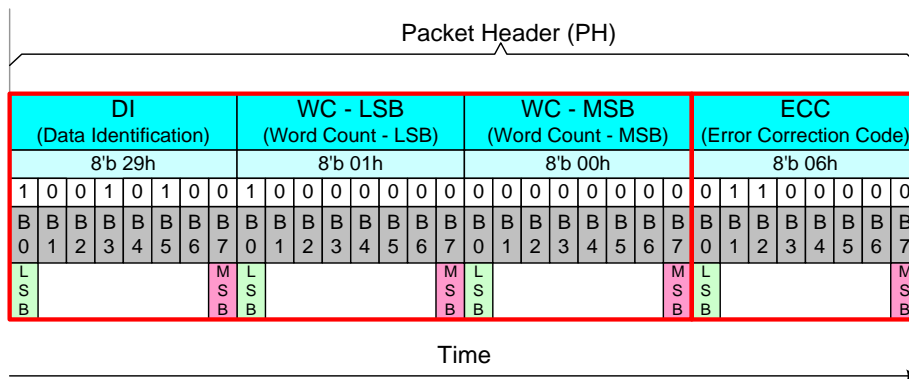


Figure 47: D [23...0] and P [7...0] in a Long Packet (LPa)

Error Correction Code (ECC) can recognize one or several error(s) and can only correct one-bit error. Bits (P [7...0]) of the Error Correction Code (ECC) are defined, where the symbol '^' presents the XOR function (Pn is 1 if there is odd number of 1, and Pn is 0 if there is even number of 1), as follows.

- P7 = 0
- P6 = 0
- P5 = D10^D11^D12^D13^D14^D15^D16^D17^D18^D19^D21^D22^D23
- P4 = D4^D5^D6^D7^D8^D9^D16^D17^D18^D19^D20^D22^D23
- P3 = D1^D2^D3^D7^D8^D9^D13^D14^D15^D19^D20^D21^D23
- P2 = D0^D2^D3^D5^D6^D9^D11^D12^D15^D18^D20^D21^D22

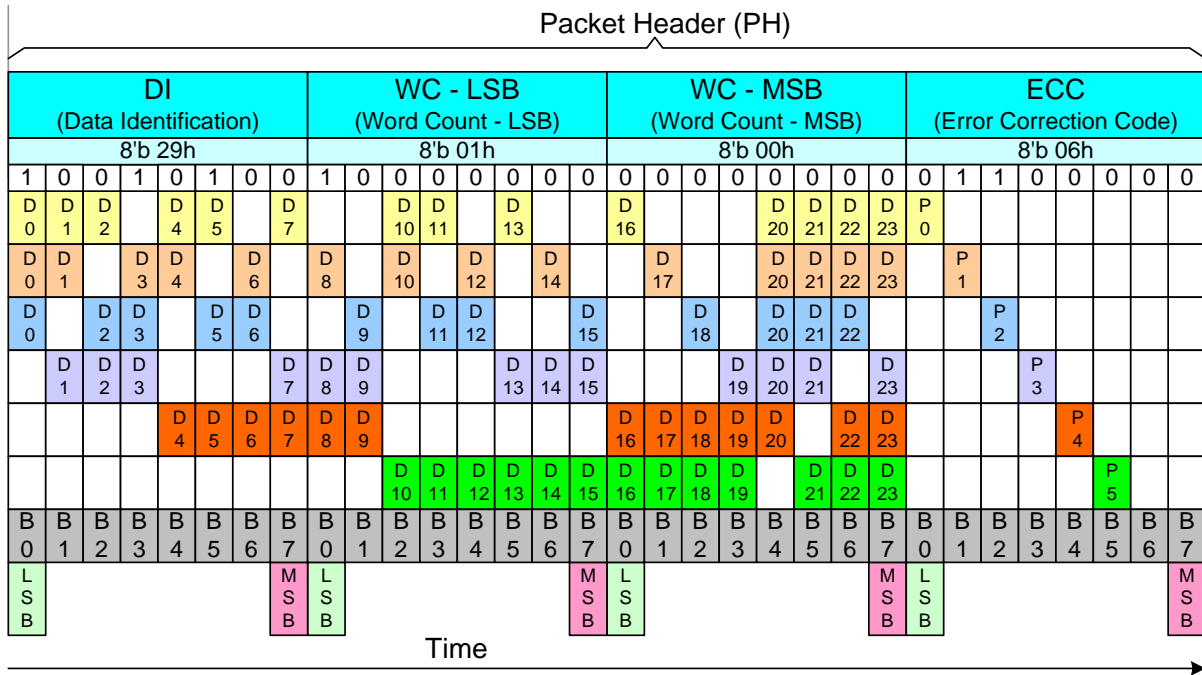


Figure 49: XOR Function on a Long Packet (LPa)

The transmitter (= the MCU or the Display Module) will send data bits D [23...0] and Error Correction Code (ECC) P [7...0]. The receiver (= the Display module or the MCU) will calculate the Internal Error Correction Code (IECC) and compare the received Error Correction Code (ECC) and the Internal Error Correction Code (IECC). This comparison is done when each power bit of ECC and IECC have performed the XOR function. The result of this function is PO [7...0]. This functionality, where the transmitter is the MCU and the receiver is the display module, is illustrated for reference purposes below.

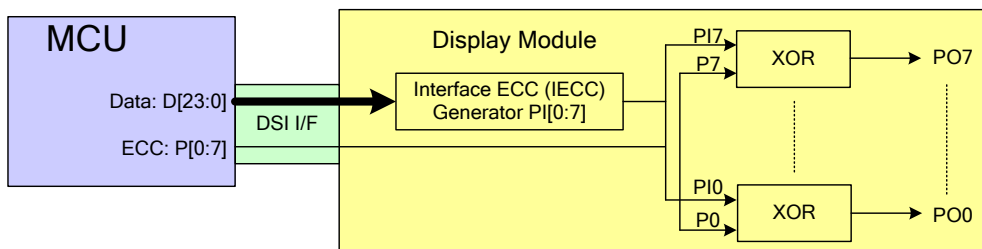


Figure 50: Internal Error Correction Code (IECC) on the Display Module (= the Receiver)

The sent data bits (D [23...0]) and ECC (P [7...0]) are correctly received if the value of the PO [7...0] is 00h. The sent data bits (D [23...0]) and ECC (P [7...0]) are not correctly received if the value of the PO [7...0] is not 00h.

| | | | | | | | | | |
|-----------------------------|---|---|---|---|---|---|---|---|-------------------|
| ECC P[7...0] | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 03h |
| IECC PI[7...0] | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 03h |
| XOR(ECC, IECC) => PO[7...0] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | = 00h => No Error |
| | L | | | | | | | M | |
| | S | | | | | | | S | |
| | B | | | | | | | B | |

Figure 51: Internal XOR Calculation between ECC and IECC Values – No Error

| | | | | | | | | | |
|-----------------------------|---|---|---|---|---|---|---|---|----------------|
| ECC P[7...0] | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 03h |
| IECC PI[7...0] | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0Fh |
| XOR(ECC, IECC) => PO[7...0] | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | = 0Ch => Error |
| | L | | | | | | | M | |
| | S | | | | | | | S | |
| | B | | | | | | | B | |

Figure 52: Internal XOR Calculation between ECC and IECC Values - Error

The received Error Correction Code (ECC) can be 00h when the Error Correction Code (ECC) function is not used for data values D [23...0] on the transmitter side. The number of the errors (one or more) can be defined when the value of the PO [7...0] is compared to the values in the following table.

Table 9: One Bit Error Value of the Error Correction Code (ECC)

| Data Bit | PO7 | PO6 | PO5 | PO4 | PO3 | PO2 | PO1 | PO0 | Hex |
|----------|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| D [0] | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 07h |
| D [1] | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 0Bh |
| D [2] | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0Dh |
| D [3] | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0Eh |
| D [4] | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 13h |
| D [5] | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 15h |
| D [6] | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 16h |
| D [7] | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 19h |
| D [8] | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 1Ah |
| D [9] | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 1Ch |
| D [10] | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 23h |
| D [11] | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 25h |
| D [12] | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 26h |
| D [13] | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 29h |
| D [14] | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 2Ah |
| D [15] | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 2Ch |
| D [16] | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 31h |
| D [17] | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 32h |
| D [18] | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 34h |
| D [19] | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 38h |
| D [20] | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1Fh |
| D [21] | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 2Fh |
| D [22] | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 1 | 37h |
| D [23] | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 3Bh |

An error is detected if the value of the PO [7...0] is in Table 9, and the receiver can correct this one bit error

because this found value also defines the location of the corrupt bit, e.g.

- ❖ PO [7...0] = 0Eh
- ❖ The bit of the data (D [23...0]), that is not correct, is D [3]

More than one error is detected if the value of the PO [7...0] is not in Table 9, for example, PO [7...0] = 0Ch.

4.1.3.1.4. Packet Data (PD) in a Long Packet (LPa)

Packet Data (PD) of a Long Packet (LPa) is placed after the Packet Header (PH) of a Long Packet (LPa). The amount of the data bytes is defined in the section “4.1.3.1.3.3 Word Count (WC) in a Long Packet (LPa)”.

4.1.3.1.5. Packet Footer (PF) in a Long Packet (LPa)

Packet Footer (PF) of a Long Packet (LPa) is placed after the Packet Data (PD) of a Long Packet (LPa). The Packet Footer (PF) is a checksum value that is calculated from the Packet Data of the Long Packet (LPa). The checksum uses a 16-bit Cyclic Redundancy Check (CRC) value which is generated by a polynomial $X^{16}+X^{12}+X^5+X^0$, as illustrated below.

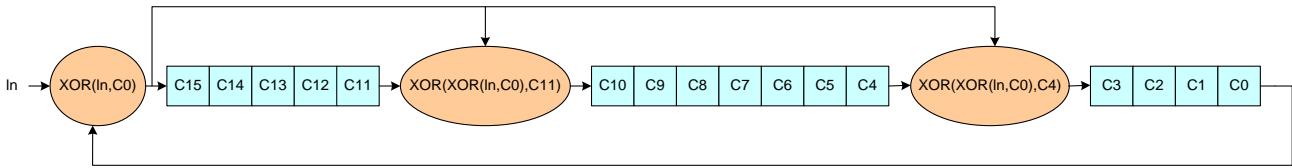


Figure 53: 16-bit Cyclic Redundancy Check (CRC) Calculation

The 16-bit Cyclic Redundancy Check (CRC) generator is initialized to FFFFh before calculations. The Most Significant Bit (MSB) of the data byte of the Packet Data (PD) is the first bit which is inputted into the 16-bit Cyclic Redundancy Check (CRC). An example of the 16-bit Cyclic Redundancy Check (CRC), where the Packet Data (PD) of a Long Packet (LPa) is 01h, is illustrated (step-by-step) below.

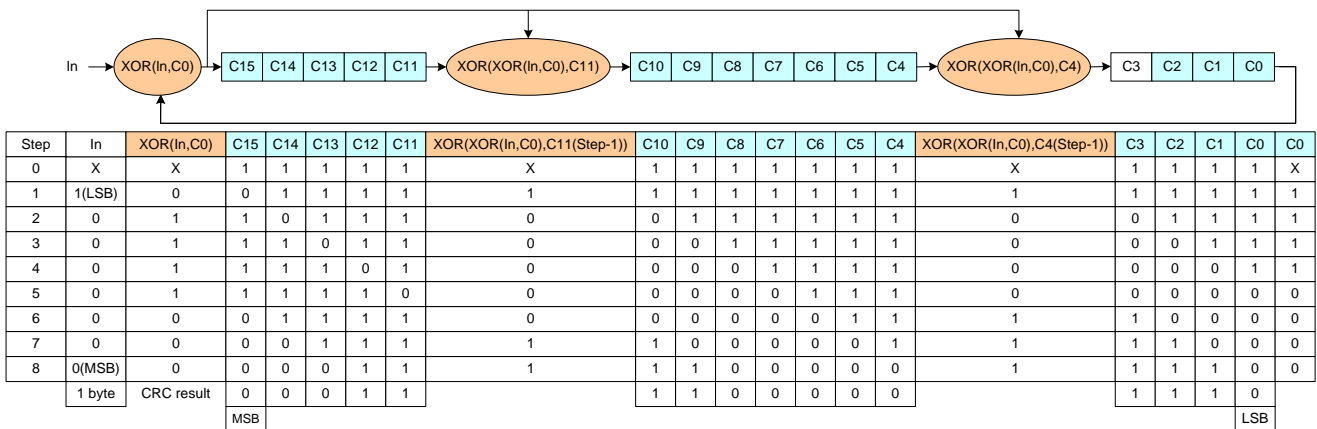


Figure 54: CRC Calculation – Packet Data (PD) is 01h

The value of the Packet Footer (PF) is 1E0Eh in this example (Command 01h has been sent), and is illustrated

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below.

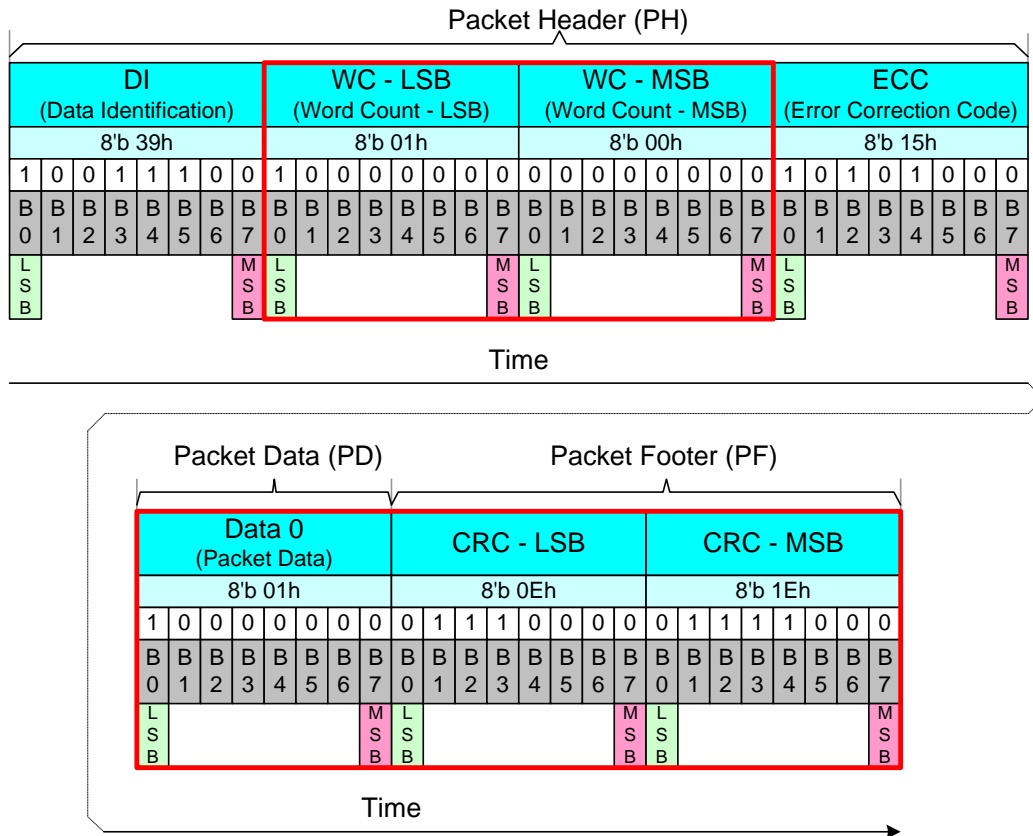


Figure 55: Packet Footer (PF) Example

The receiver calculates its checksum value from the received Packet Data (PD). The receiver compares its checksum and the Packet Footer (PF) that the transmitter has sent. The received Packet Data (PD) and Packet Footer (PF) are correct if the checksum of the receiver and Packet Footer (PF) are equal. The received Packet Data (PD) and Packet Footer (PF) are not correct if the checksum of the receiver and Packet Footer (PF) are not equal.

4.1.3.2. Packet Transmissions

4.1.3.2.1. Packet from the MCU to the Display Module

4.1.3.2.1.1. Display Command Set (DCS)

Display Command Set (DCS), defined in the section “5.3Page 0 Command Description”, is used from the MCU to the display module. This Display Command Set (DCS) is always defined in the Data 0 of the Packet Data (PD), and is included in Short Packet (SPa) and Long packet (LPa), as illustrated below.

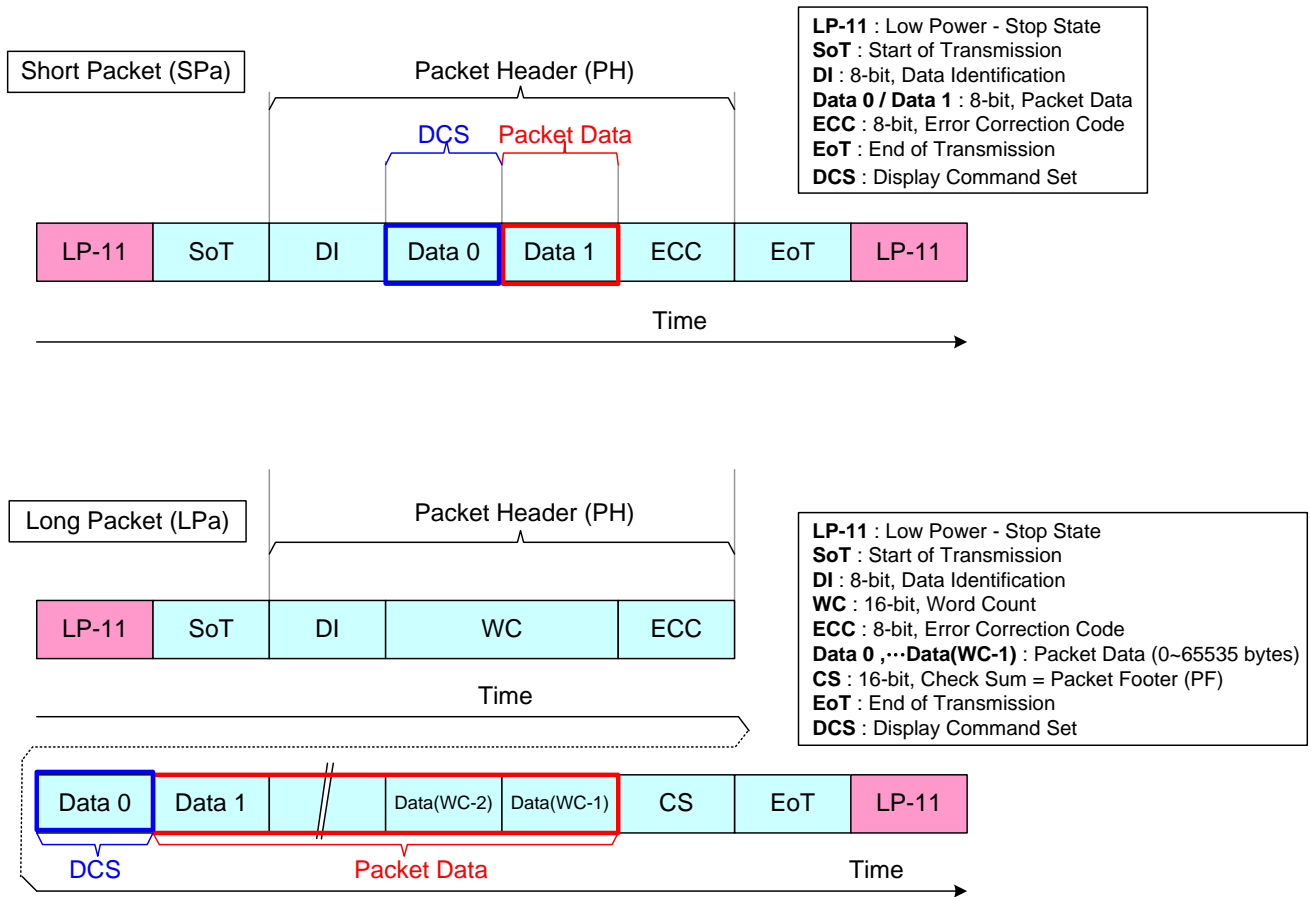


Figure 56: Display Command Set (DCS) in Short Packet (SPa) and Long Packet (LPa)

4.1.3.2.1.2. Display Command Set (DCS) Write, No Parameter (DCSWN-S)

“Display Command Set (DCS) Write, No Parameter”, which is defined in Data Type (DT, 00 0101b), is always used in a Short Packet (SPa) from the MCU to the display module. These commands are defined in a table below.

Table 10: Display Command Set (DCS) Write, No Parameters (DCSWN-S)

| Command |
|-------------------------------|
| NOP (00h) |
| Software Reset (01h) |
| Sleep In(10h) |
| Sleep Out (11h) |
| Normal Display Mode On (13h) |
| All Pixel Off (22h) |
| All Pixel On (23h) |
| Display Off (28h) |
| Display ON (29h) |
| Tearing Effect Line OFF (34h) |
| Idle Mode Off (38h) |
| Idle Mode On (39h) |
| Stop Transition (59h) |

A Short Packet (SPa) is defined as:

- Data Identification (DI)
 - ✧ Virtual Channel (VC, DI [7...6]): 00b
 - ✧ Data Type (DT, DI [5...0]): 00 0101b
- Packet Data (PD)
 - ✧ Data 0: “Sleep In (10h)”, Display Command Set (DCS)
 - ✧ Data 1: Always 00hex
- Error Correction Code (ECC)

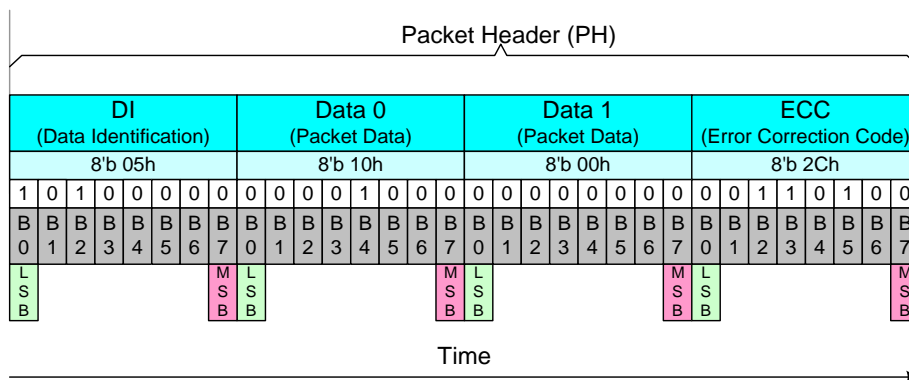


Figure 57: Display Command Set (DCS) Write, No Parameter (DCSWN-S) - Example

4.1.3.2.1.3. Display Command Set (DCS) Write, 1 Parameter (DCSW1-S)

“Display Command Set (DCS) Write, 1 Parameter” (DCSW1-S), which is defined in Data Type (DT, 01 0101b), is always used in a Short Packet (SPa) from the MCU to the display module. These commands are defined in the table below.

Table 11: Display Command Set (DCS) Write, 1 Parameter (DCSW1-S)

| Command |
|--|
| Gamma Curve Set (26h) |
| Memory Write (2Ch), ^{Note} |
| Tearing Effect Line ON(35h) |
| Memory Access Control (36h) |
| Interface Pixel Format (3Ah) |
| Memory Write Continue (3Ch), ^{Note} |
| Write Display Brightness (51h) |
| Write CTRL Display (53h) |
| Write Power Save (55h) |
| Write Idle Mode Color (80h) |

Note: One Subpixel has been written

A Short Packet (SPa) is defined as:

- Data Identification (DI)
 - ✧ Virtual Channel (VC, DI [7...6]): 00b
 - ✧ Data Type (DT, DI [5...0]): 01 0101b
- Packet Data (PD)
 - ✧ Data 0: “Gamma Set (26h)”, Display Command Set (DCS)
 - ✧ Data 1: 01hex, Parameter of the DCS
- Error Correction Code (ECC)

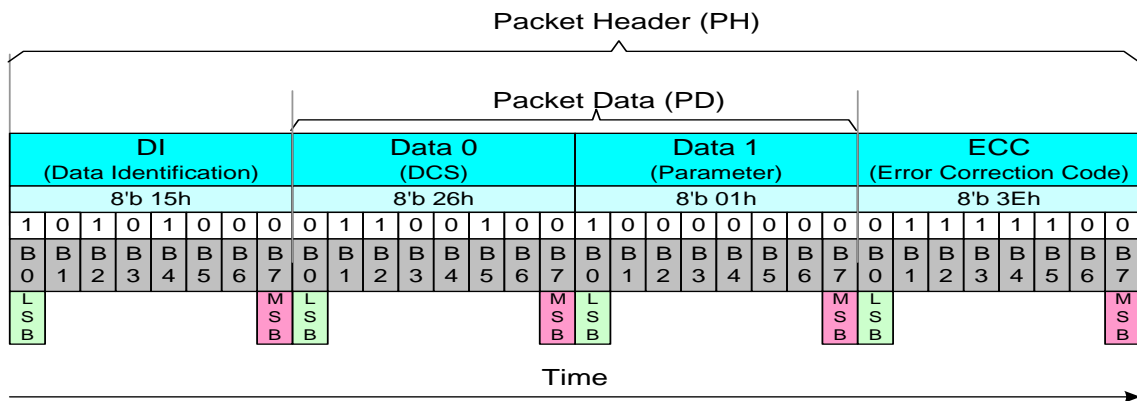


Figure 58: Display Command Set (DCS) Write, 1 Parameter (DCSW1-S) – Example

4.1.3.2.1.4. Display Command Set (DCS) Write Long (DCSW-L)

“Display Command Set (DCS) Write Long” (DCSW-L), which is defined in Data Type (DT, 11 1001b), is always used in a Long Packet (LPa) from the MCU to the display module. Command (No Parameters) and Write (1 or more parameters) are defined in a table below.

Table 12: Display Command Set (DCS) Write Long (DCSW-L)

| Command |
|--|
| NOP (00h), ^{Note 1} |
| Software Reset (01h), ^{Note 1} |
| Sleep In(10h), ^{Note 1} |
| Sleep Out (11h), ^{Note 1} |
| Normal Display Mode On (13h), ^{Note 1} |
| All Pixel Off (22h), ^{Note 1} |
| All Pixel On (23h), ^{Note 1} |
| Gamma Curve Set (26h), ^{Note 2} |
| Display Off (28h), ^{Note 1} |
| Display ON (29h), ^{Note 1} |
| Memory Write (2Ch), ^{Note 2} |
| Tearing Effect Line OFF (34h), ^{Note 1} |
| Tearing Effect Line ON (35h), ^{Note 2} |
| Memory Access Control (36h), ^{Note 2} |
| Idle Mode Off (38h), ^{Note 1} |
| Idle Mode On (39h), ^{Note 1} |
| Interface Pixel Format (3Ah), ^{Note 2} |
| Memory Write Continue (3Ch), ^{Note 2} |
| Set Tear Scan Line(44h) |
| Write Display Brightness (51h), ^{Note 2} |
| Write CTRL Display (53h), ^{Note 2} |
| Write Power Save(55h), ^{Note 2} |
| Stop Transition (59h), ^{Note 1} |
| Write CABC Minimum Brightness (5Eh), ^{Note 2} |
| Set Transition Time(68h) |
| Write Idle Mode Color (80h), ^{Note 2} |

Notes:

1. Short Packet (SPa) can also be used; See the section “4.1.3.2.1.2 Display Command Set (DCS) Write, No Parameter (DCSWN-S)”.
2. Short Packet (SPa) can also be used; See the section “4.1.3.2.1.3 Display Command Set (DCS) Write, 1 Parameter (DCSW1-S)”.

A Long Packet (LPa) with one command (No Parameter) is defined as:

- Data Identification (DI)
 - ✧ Virtual Channel (VC, DI [7...6]): 00b
 - ✧ Data Type (DT, DI [5...0]): 11 1001b
- Word Count (WC)
 - ✧ Word Count (WC): 0001h
- Error Correction Code (ECC)

- Packet Data (PD): Data 0: "Sleep In (10h)", Display Command Set (DCS)
- Packet Footer (PF)

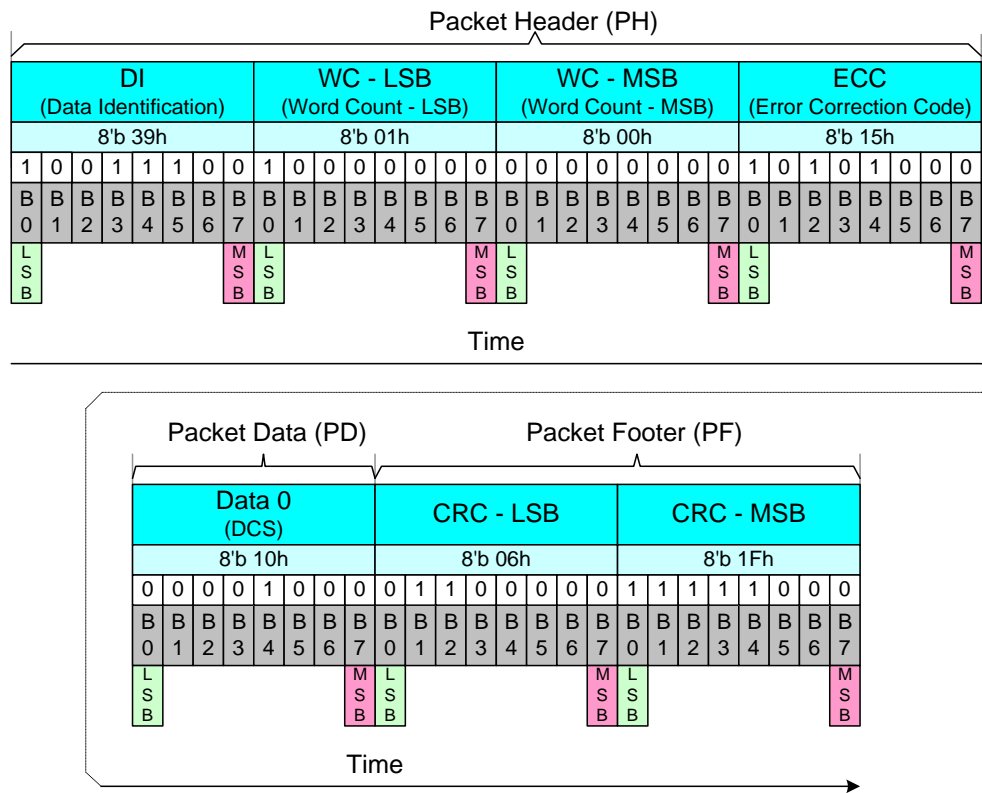


Figure 59: Display Command Set (DCS) Write Long (DCSW-L) with DCS Only - Example

A Long Packet (LPa) with one Write (1 parameter) is defined as:

- Data Identification (DI)
 - ✧ Virtual Channel (VC, DI [7...6]): 00b
 - ✧ Data Type (DT, DI [5...0]): 11 1001b
- Word Count (WC)
 - ✧ Word Count (WC): 0002h
- Error Correction Code (ECC)
- Packet Data (PD):
 - ✧ Data 0: "Gamma Set (26h)", Display Command Set (DCS)
 - ✧ Data 1: 01hex, Parameter of the DCS
- Packet Footer (PF)

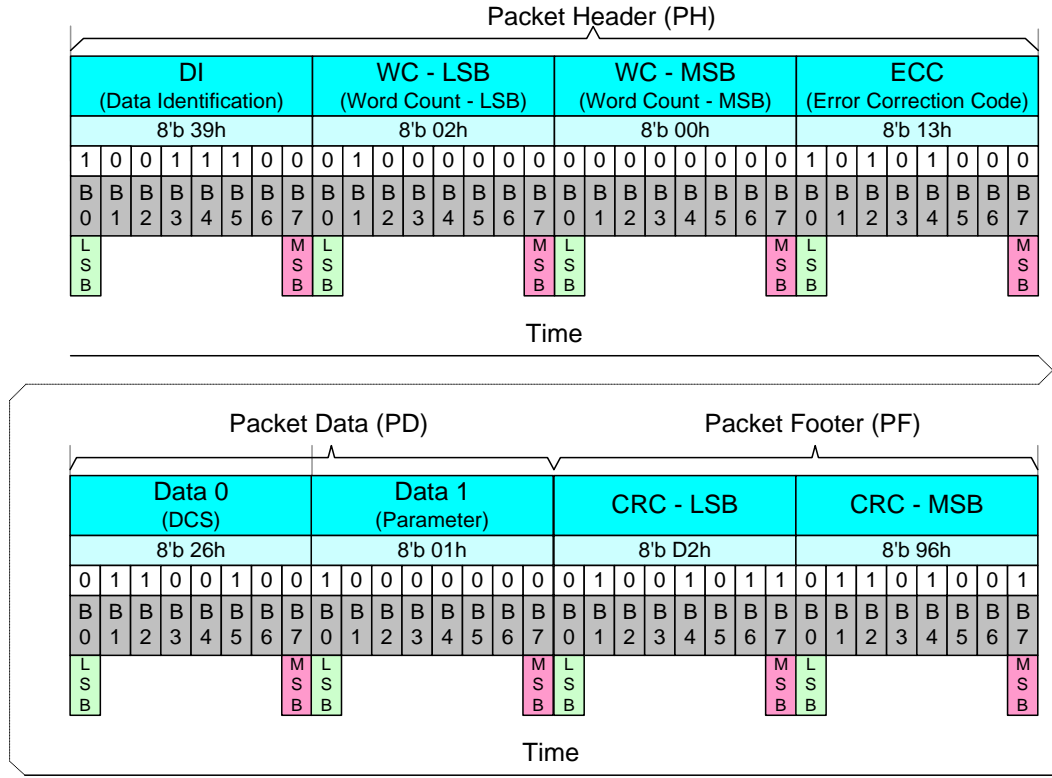


Figure 60: Display Command Set (DCS) Write Long with DCS and 1 Parameter - Example

A Long Packet (LPa) with one Write (4 parameters) is defined as:

- Data Identification (DI)
 - ✧ Virtual Channel (VC, DI [7...6]): 00b
 - ✧ Data Type (DT, DI [5...0]): 11 1001b
- Word Count (WC)
 - ✧ Word Count (WC): 0005h
- Error Correction Code (ECC)
- Packet Data (PD):
 - ✧ Data 0: "Column Address Set (2Ah)" (For example only), Display Command Set (DCS)
 - ✧ Data 1: 00hex, 1st Parameter of the DCS, Start Column SC [15...8]
 - ✧ Data 2: 12hex, 2nd Parameter of the DCS, Start Column SC [7...0]
 - ✧ Data 3: 01hex, 3rd Parameter of the DCS, End Column EC [15...8]
 - ✧ Data 4: EFhex, 4th Parameter of the DCS, End Column EC [7...0]
- Packet Footer (PF)

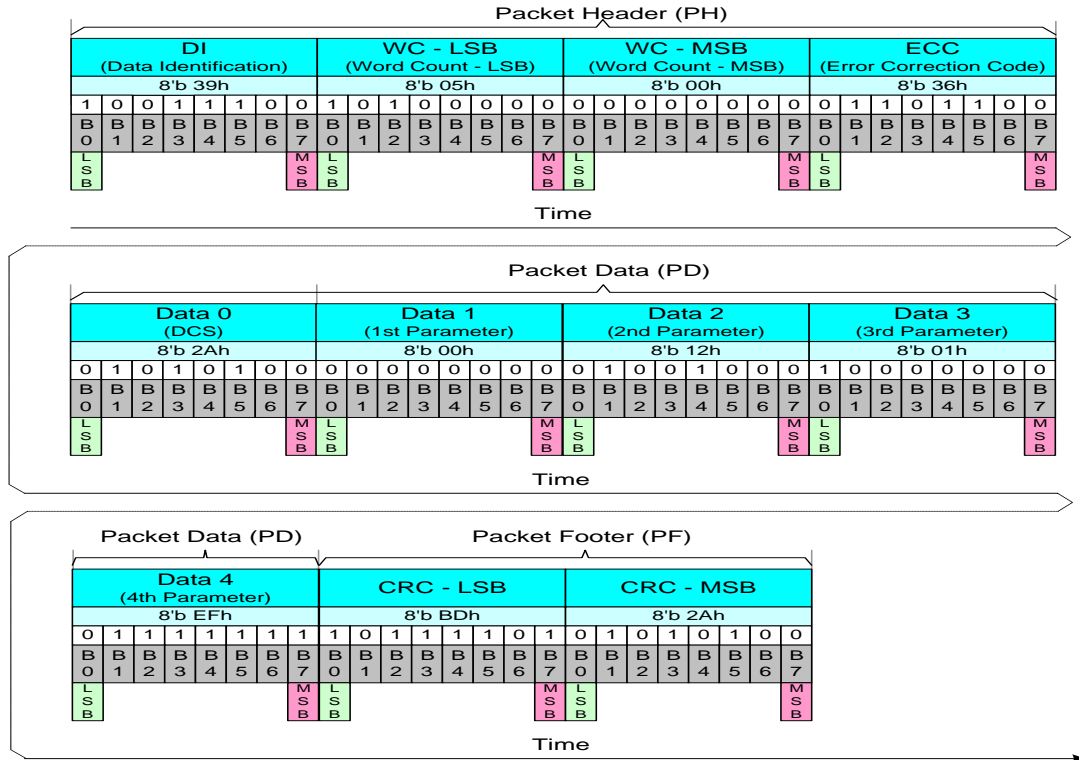


Figure 61: Display Command Set (DCS) Write Long with DCS and 4 Parameters - Example

4.1.3.2.1.5. Display Command Set (DCS) Read, No Parameter (DCSRN-S)

“Display Command Set (DCS) Read, No Parameter” (DCSRN-S), which is defined in Data Type (DT, 00 0110b), is always used in a Short Packet (SPa) from the MCU to the display module. These commands are defined in the table below.

Table 13: Display Command Set (DCS) Read, No Parameter (DCSRN-S)

| Command |
|---|
| Read Number of the Errors on DSI (05h) |
| Read Display Power Mode (0Ah) |
| Read Display MADCTL (0Bh) |
| Read Display Pixel Format (0Ch) |
| Read Display Image Mode (0Dh) |
| Read Display Signal Mode (0Eh) |
| Read Display Self-Diagnostic Result (0Fh) |
| Get Tear Scan Line(45h) |
| Read Display Brightness Value (52h) |
| Read CTRL Value Display (54h) |
| Read Power Save (56h) |
| Read CABC Minimum Brightness (5Fh) |
| Get Transition Time(69h) |
| Read Black/White Low Bits (70h) |
| Read Bkx (71h) |
| Read Bky(72h) |
| Read Wx (73h) |
| Read Wy (74h) |
| Read Red/Green Low Bits (75h) |
| Read Rx (76h) |
| Read Ry (77h) |
| Read Gx (78h) |
| Read Gy (79h) |
| Read Blue/A Color Low Bits (7Ah) |
| Read Bx (7Bh) |
| Read By (7Ch) |
| Read Ax (7Dh) |
| Read Ay (7Eh) |
| Read Idle Mode Color(81h) |
| Read DDB Start (A1h) |
| Read DDB Continue (A8h) |
| Read First Checksum(AAh) |
| Read Continue Checksum (AFh) |
| Read ID1 (DAh) |
| Read ID2 (DBh) |
| Read ID3 (DCh) |

The MCU has to define to the display module the maximum size of the returned packet. The command, which is used for this purpose, is “Set Maximum Return Packet Size” (SMRPS-S), which Data Type (DT) is 11 0111b and is used in a Short Packet (SPa) before the MCU can send “Display Command Set (DCS) Read, No Parameter” to the display module. This sequence is illustrated for reference purposes below.

Step 1:

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The MCU sends “Set Maximum Return Packet Size” (Short Packet (SPa)) (SMRPS-S) to the display module when it wants to return one byte from the display module.

- Data Identification (DI)
 - ✧ Virtual Channel (VC, DI [7...6]): 00b
 - ✧ Data Type (DT, DI [5...0]): 11 0111b
- Maximum Return Packet Size (MRPS)
 - ✧ Data 0: 01hex
 - ✧ Data 1: 00hex
- Error Correction Code (ECC)

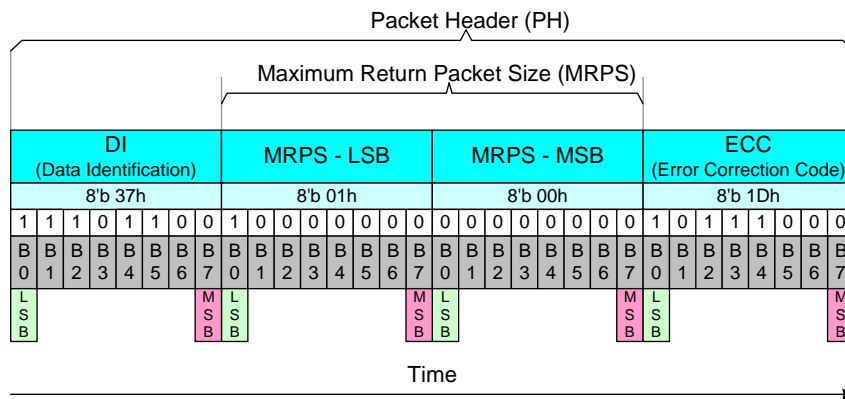


Figure 62: Set Maximum Return Packet Size (SMRPS-S) - Example

Step 2:

The MCU wants to receive the value of the “Read ID1 (DAh)” from the display module when the MCU sends “Display Command Set (DCS) Read, No Parameter” to the display module.

- Data Identification (DI)
 - ✧ Virtual Channel (VC, DI [7...6]): 00b
 - ✧ Data Type (DT, DI [5...0]): 00 0110b
- Packet Data (PD)
 - ✧ Data 0: “Read ID1 (DAh)”, Display Command Set (DCS)
 - ✧ Data 1: Always 00hex
- Error Correction Code (ECC)

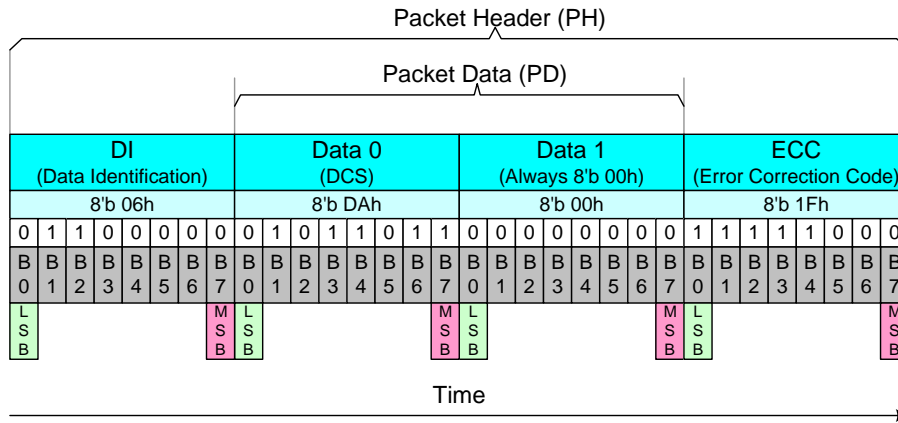


Figure 63: Display Command Set (DCS) Read, No Parameter (DCSRN-S) - Example

Step 3:

The display module can send 2 different information to the MCU after Bus Turnaround (BTA):

1. An acknowledge with Error Report (AwER), which is used in a Short Packet (SPa), if there is an error when receiving a command. See the section “4.1.3.2.2 Acknowledge with Error Report (AwER)”.
2. Information of the received command, which can be a Short Packet (SPa) or a Long Packet (LPa).

4.1.3.2.1.6. Null Packet, No Data (NP-L)

“Null Packet, No Data” (NP-L), which is defined in Data Type (DT, 001001b), is always used in a Long Packet (LPa) from the MCU to the display module. The purpose of this command is to keep data lanes in the high speed mode (HSMT) if necessary. The display module can ignore the Packet Data (PD) that the MCU sends.

A Long Packet (LPa) with 5 random data bytes of the Packet Data (PD) is defined as:

- Data Identification (DI)
 - ✧ Virtual Channel (VC, DI [7...6]): 00b
 - ✧ Data Type (DT, DI [5...0]): 00 1001b
- Word Count (WC)
 - ✧ Word Count (WC): 0005hex
- Error Correction Code (ECC)
- Packet Data (PD):
 - ✧ Data 0: 89hex (Random data)
 - ✧ Data 1: 23hex (Random data)
 - ✧ Data 2: 12hex (Random data)
 - ✧ Data 3: A2hex (Random data)
 - ✧ Data 4: E2hex (Random data)
- Packet Footer (PF)

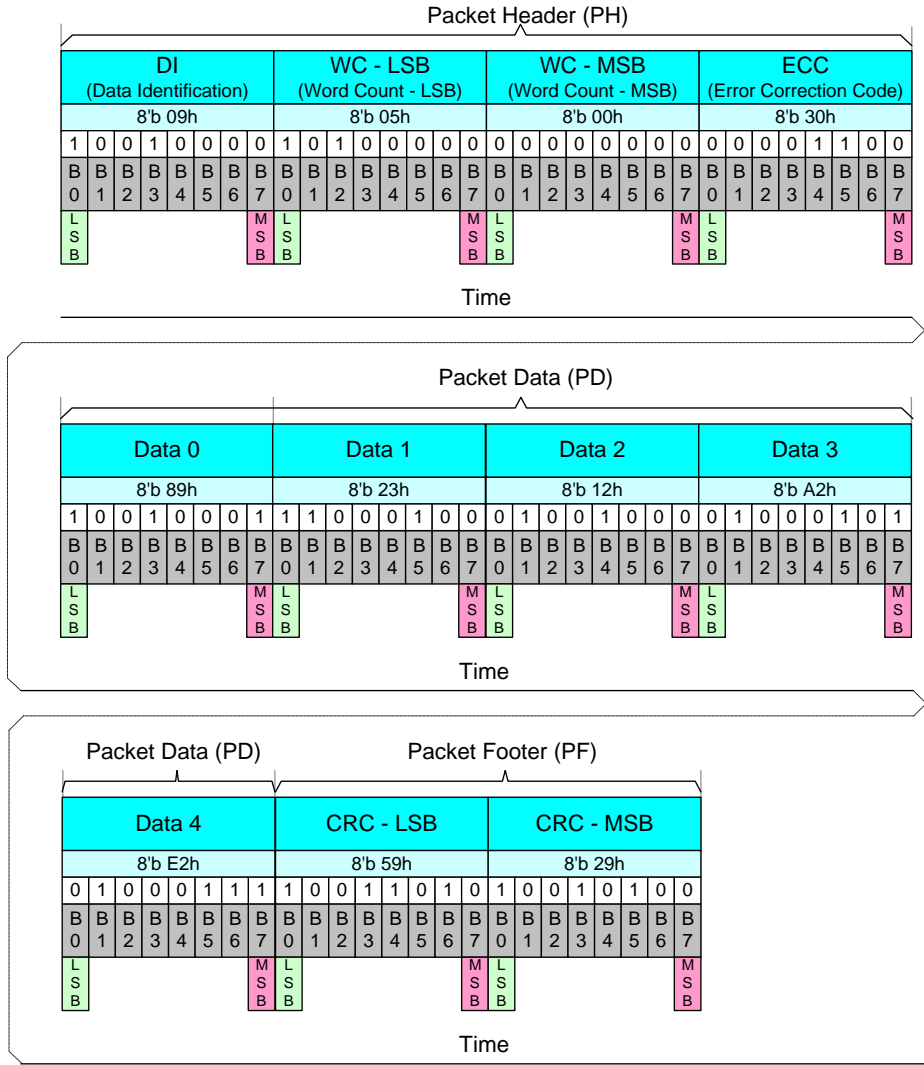


Figure 64: Null Packet, No Data (NP-L) - Example

4.1.3.2.1.7. End of Transmission Packet (EoTP)

“End of Transmission Packet” (EoTP), which is an interface level function and defined in Data Type (DT, 00 1000b), is always used in a Short Packet (SPa) from the MCU to the display module. The purpose of this command is to terminate the high Speed Data Transmission (HSDT) mode properly when EoTP is added after the last payload packet before “End of Transmission” (EoT).

The MCU can decide if it wants to use the “End of Transmission Packet” (EoTP) or not. The display shall have the capability to support both. That is, if the MCU applies the EoTP, it shall report the “DSI Protocol Violation Error” when the EoTP is not detected in the High-Speed (HS). The display module error reporting shall be enabled/disabled statistically, according to the module application.

The display module does or does not receive “End of Transmission Packet” (EoTP) from the MCU during the Low Power Data Transmission (LPDT) mode before “Mark-1” (= leaving the Escape mode) which ends the Low Power Data Transmission (LPDT) mode. The display module is not allowed to send “End of Transmission Packet” (EoTP) to the MCU during the Low Power Data Transmission (LPDT) mode. The summary of the receiving and transmitting EoTP is listed below.

Table 14: Receiving and Transmitting EoTP during LPDT

| Direction | Display Module (DM) in High Speed Data Transmission (HSDT) | Display Module (DM) in Low Power Data Transmission (LPDT) |
|-----------------------|--|---|
| MCU => Display Module | Support With and Without EoTP | Support With and Without EoTP |
| Display Module => MCU | HS Mode is not available (EoTP is not available) | EoTP cannot be sent by the Display Module (DM) |

A Short Packet (SPa) using a fixed format is as follows:

- Data Identification (DI)
 - ✧ Virtual Channel (VC, DI [7...6]): 00b
 - ✧ Data Type (DT, DI [5...0]): 00 1000b
- Packet Data (PD)
 - ✧ Data 0: 0Fhex
 - ✧ Data 1: 0Fhex
- Error Correction Code (ECC)
 - ✧ ECC: 01hex

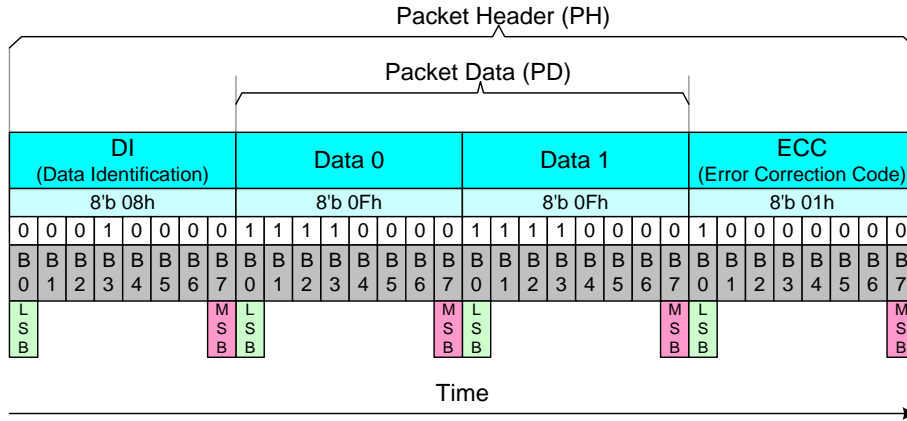


Figure 65: End of Transmission Packet (EoTP)

Some examples of the “End of Transmission Packet” (EoTP) are illustrated for reference purposes below.

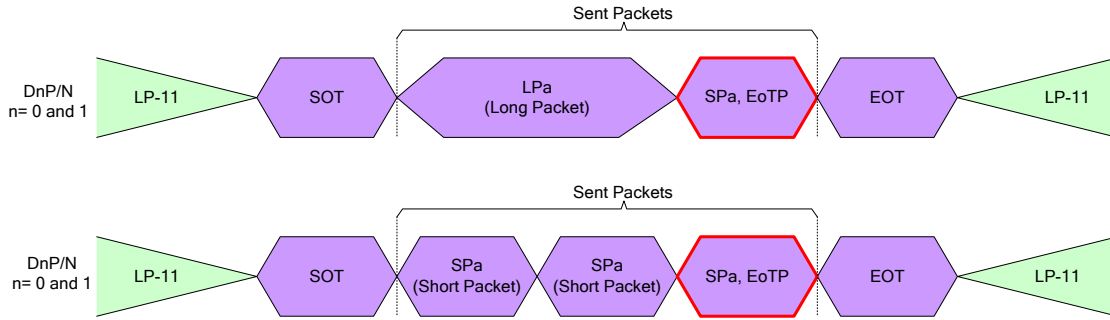


Figure 66: End of Transmission Packet (EoTP)-Examples

4.1.3.2.2. Packet from the Display Module to the MCU

4.1.3.2.2.1. Used Packet types

The display module always uses Short Packets (SPa) or Longs Packet (LPa) when returning information to the MCU after the MCU has requested information from the Display Module. This information can be a response of the Display Command Set (DCS) (See the section “4.1.3.2.1.5 Display Command Set (DCS) Read, No Parameter (DCSRN-S)”) or an Acknowledge with Error Report (See the section “4.1.3.2.2.2 Acknowledge with Error Report (AwER)”).

The used packet type is defined on Data Type (DT). See the section “4.1.3.1.3.1.2 Data Type (DT)”. If the maximum size of the Packet Data (PD) could be sent in one packet, the display module should not send returned bytes in several packets. Both cases are illustrated for reference purposes below.

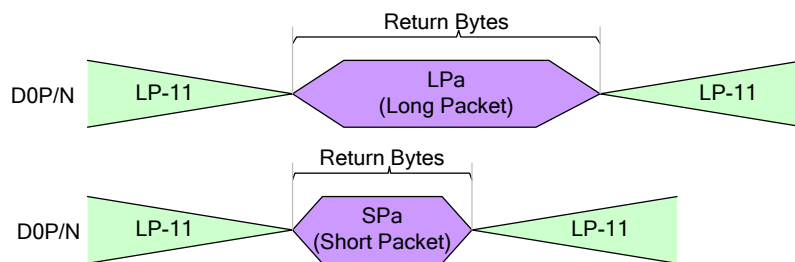


Figure 67: Return Bytes in Single Packet

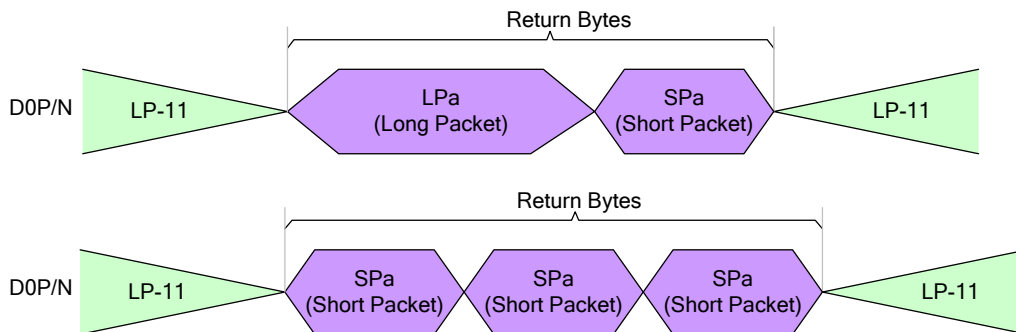


Figure 68: Return Bytes in Several Packets – Not Allowed

EXCEPTION:

The display module will return 2 packets (1st packet: Data, 2nd Packet: Acknowledge with Error Report) to the MCU when the display module receives a read command (See section “4.1.3.2.1.5 Display Command Set (DCS) Read, No Parameter (DCSRN-S)”), which is detected and corrected a single bit error by the EEC (See bit 8 in Table 15). These returned packets are illustrated for reference purposes below.

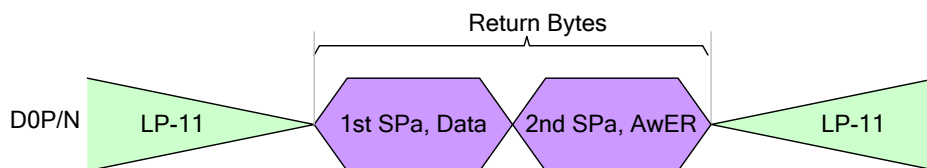


Figure 69: Exception when Returned Bytes in Several Packets

AwER = Acknowledge with Error Report

4.1.3.2.2. Acknowledge with Error Report (AwER)

“Acknowledge with Error Report” (AwER), which is defined in Data Type (DT, 00 0010b), is always used in a Short Packet (SPa) from the display module to the MCU. The Packet Data (PD) can include bits, which define the current error, when the corresponding bit is set to 1, as defined in the following table.

Table 15: Error Report (AwER) Bit Definitions

| Bit | Description |
|-----|--|
| 0 | SoT Error |
| 1 | SoT Sync Error |
| 2 | EoT Sync Error |
| 3 | Escape Mode Entry Command Error |
| 4 | Low-Power Transmit Sync Error |
| 5 | Any Protocol Timer Time-Out |
| 6 | False Control Error |
| 7 | Contention is Detected on the Display Module |
| 8 | ECC Error, single-bit (detected and corrected) |
| 9 | ECC Error, multi-bit (detected, not corrected) |
| 10 | Checksum Error (Long Packet only) |
| 11 | DSI Data Type (DT) Not Recognized |
| 12 | DSI Virtual Channel (VC) ID Invalid |
| 13 | Invalid Transmission Length |
| 14 | Reserved, Set to 0 internally |
| 15 | DSI Protocol Violation |

These errors are included in all packages that have been received from the MCU to the display module before the Bus Turnaround (BTA). The display module ignores the received packet which includes error or errors.

Acknowledge with Error Report (AwER) of a Short Packet (SPa) is defined as:

- Data Identification (DI)
 - ✧ Virtual Channel (VC, DI [7...6]): 00b
 - ✧ Data Type (DT, DI [5...0]): 00 0010b
- Packet Data (PD)
 - ✧ Bit 8: ECC Error, single-bit (detected and corrected)
 - ✧ AwER: 0100h
- Error Correction Code (ECC)

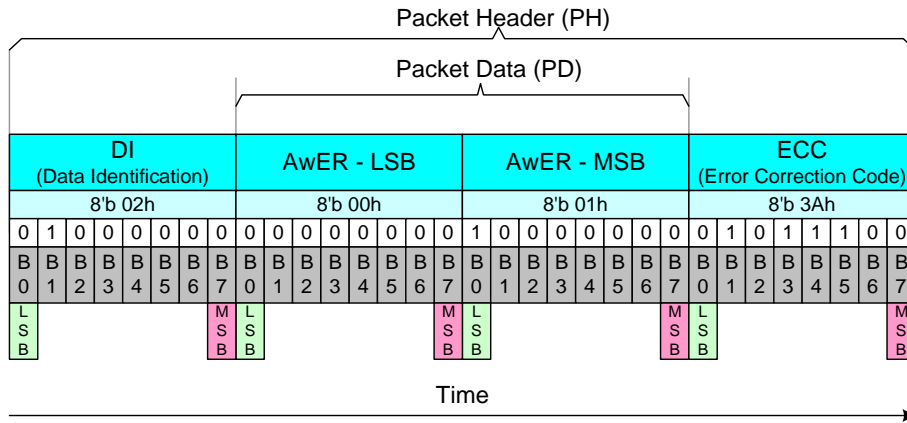


Figure 70: Acknowledge with Error Report (AwER) – Example

It is possible that the display module receives several packets, which include errors, from the MCU before the MCU performs the Bus Turnaround (BTA). Some examples are illustrated for reference purposes below.

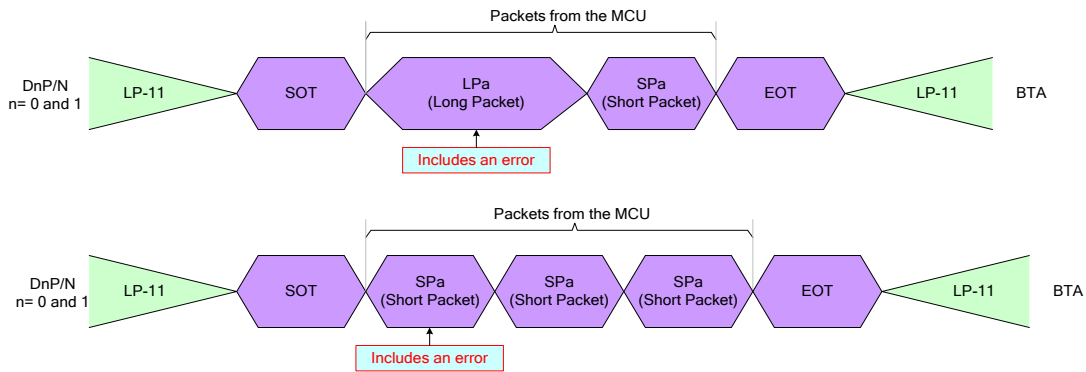


Figure 71: Errors Packets

Therefore, a method is needed to check if there are errors in the previous packets. These errors of the previous packets can be detected by “Read Display Signal Mode (0Eh)” and “Read Number of the Errors on DSI (05h)” commands. The bit D0 of the “Read Display Signal LPa Mode (0Eh)” command will be set to 1 if a received packet includes an error.

The amount of packets, which include an **ECC** or **CRC** error, is calculated in the RDNUMED register, which can read “Read Number of the Errors on DSI (05h)” command. This command also sets the RDNUMED register to 00h and set the bit D0 of the “Read Display Signal Mode (0Eh)” command to 0 after the MCU has read the RDNUMED register from the display module. The functionality of the RDNUMED register is illustrated for reference purposes below.

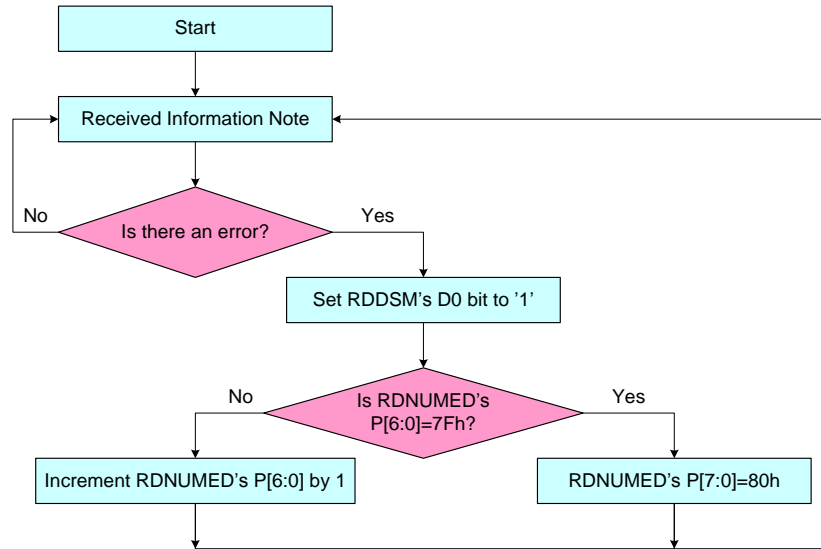


Figure 72: Flow Chart for Errors on DSI

Notes:

1. This information can be Interface or Packet Level Communication, but it is always from the MCU to the display module.
2. CRC or ECC error

4.1.3.2.2.3. DCS Read Long Response (DCSRR-L)

“DCS Read Long Response” (DCSRR-L), which is defined in Data Type (DT, 011100b), is always used in a Long Packet (LPa) from the display module to the MCU. “DCS Read Long Response” (DCSRR-L) is used when the display module wants to respond to a DCS Read command, which the MCU has sent to the display module.

A Long Packet (LPa), which includes 5 data bytes of the Packet Data (PD), is defined as:

- Data Identification (DI)
 - ✧ Virtual Channel (VC, DI [7...6]): 00b
 - ✧ Data Type (DT, DI [5...0]): 01 1100b
- Word Count (WC)
 - ✧ Word Count (WC): 0005hex
- Error Correction Code (ECC)
- Packet Data (PD):
 - ✧ Data 0: 89hex
 - ✧ Data 1: 23hex
 - ✧ Data 2: 12hex
 - ✧ Data 3: A2hex
 - ✧ Data 4: E2hex
- Packet Footer (PF)

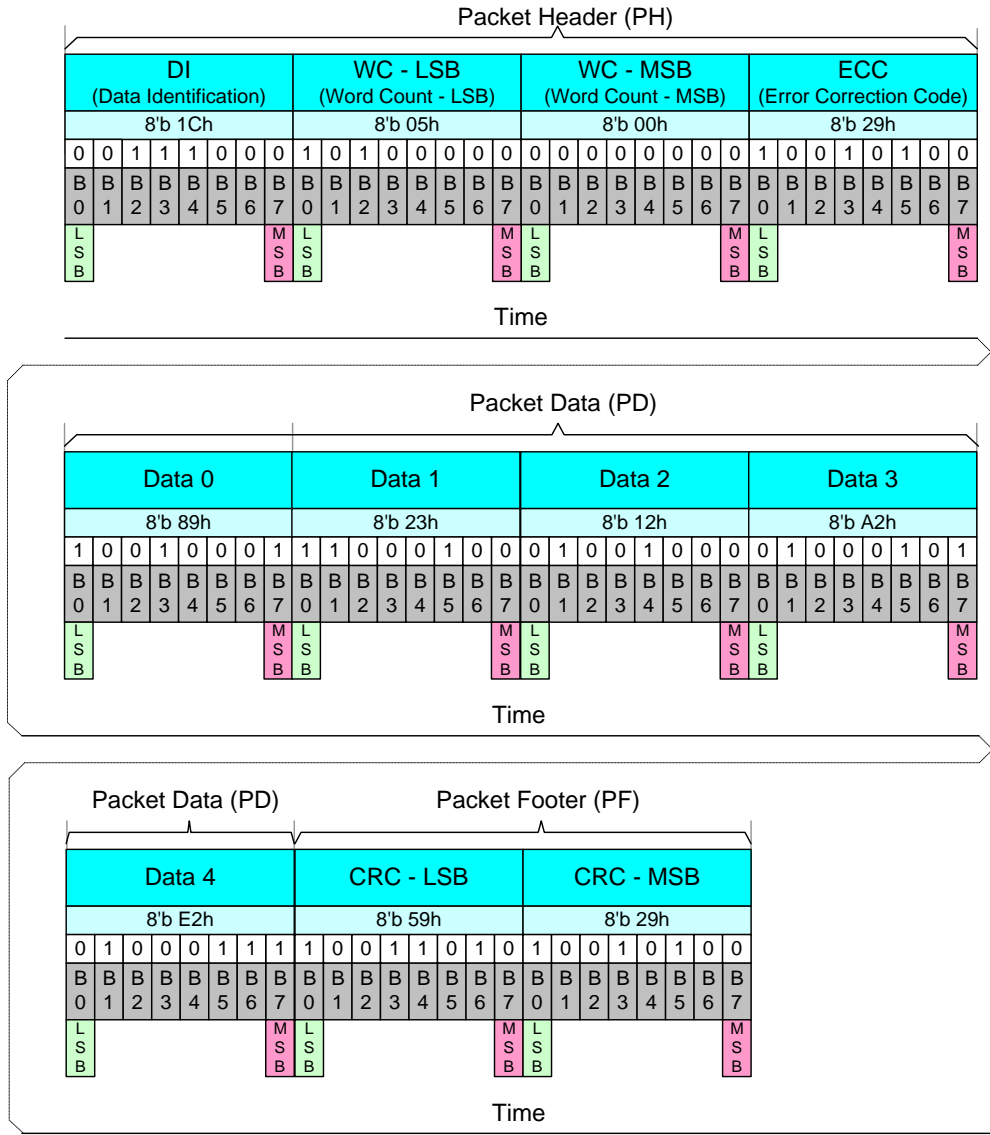


Figure 73: DCS Read Long Response (DCSRR-L) - Example

4.1.3.2.2.4. DCS Read Short Response, 1 Byte Returned (DCSRR1-S)

“DCS Read Short Response, 1 Byte Returned” (DCSRR1-S), which is defined in Data Type (DT, 10 0001b), is always used in a Short Packet (SPa) from the display module to the MCU. “DCS Read Short Response, 1 Byte Returned (DCSRR1-S) is used when the display module wants to respond to a DCS Read command, which the MCU has sent to the display module.

A Short Packet (SPa) is defined as:

- Data Identification (DI)
 - ✧ Virtual Channel (VC, DI [7...6]): 00b
 - ✧ Data Type (DT, DI [5...0]): 10 0001b
- Packet Data (PD)
 - ✧ Data 0: 45hex
 - ✧ Data 1: 00hex (Always)
- Error Correction Code (ECC)

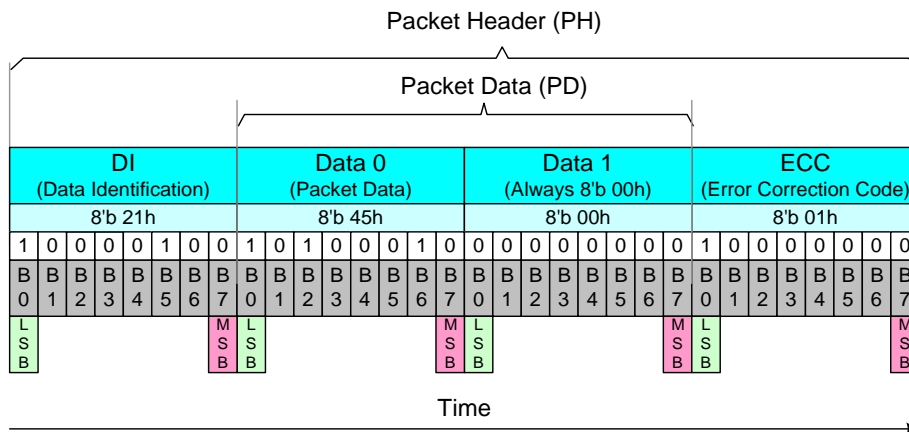


Figure 74: DCS Read Short Response, 1 Byte Returned (DCSRR1-S) - Example

4.1.3.2.2.5. DCS Read Short Response, 2 Bytes Returned (DCSRR2-S)

“DCS Read Short Response, 2 Bytes Returned” (DCSRR2-S), which is defined in Data Type (DT, 10 0010b), is always used in a Short Packet (SPa) from the display module to the MCU. “DCS Read Short Response, 2 Bytes Returned” (DCSRR2-S) is used when the display module wants to respond to a DCS Read command, which the MCU has sent to the display module.

A Short Packet (SPa) is defined as:

- Data Identification (DI)
 - ✧ Virtual Channel (VC, DI [7...6]): 00b
 - ✧ Data Type (DT, DI [5...0]): 10 0010b
- Packet Data (PD)
 - ✧ Data 0: 45hex
 - ✧ Data 1: 32hex
- Error Correction Code (ECC)

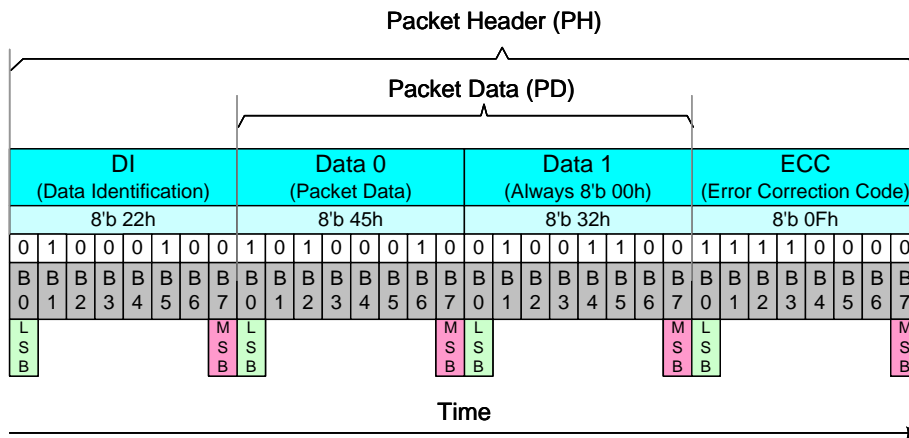


Figure 75: DCS Read Short Response, 2 Bytes Returned (DCSRR2-S) - Example

4.1.3.3. Communication Sequences

4.1.3.3.1. General

The communication sequences can be done on interface or packet levels between the MCU and the display module. See sections “4.1.2 Interface Level Communication” and “4.1.3 Packet Level Communication”. This communication sequence description is for DSI data lanes (D3P/N, D2P/N, D1P/N and D0P/N), and it is assumed that the needed low level communication is done on DSI Clock lane (CLKP/N) automatically. See the section “4.1.2.2 DSI CLK Lanes”. Functions of the interface level communication are described in the following table.

Table 16: Interface Level Communication

| Interface Mode | Abbreviation | Interface Action Description |
|----------------|--------------|------------------------------|
| Low Power | LP-11 | Stop State |
| | LPDT | Low Power Data Transmission |
| | ULPS | Ultra-Low Power State |
| | RAR | Remote Application Reset |
| | ACK | Acknowledge (No Error) |
| | BTA | Bus Turnaround |
| High Speed | HSDT | High speed Data Transmission |

Functions of the packet level communication are described in the following table.

Table 17: Packet Level Communication for MCU-sourced Packets

| Interface Mode | Abbreviation | Packet Size | Interface Action Description |
|----------------|--------------|--------------|---|
| MCU | VSS | Short Packet | Sync Event, V Sync Start |
| | VSE | Short Packet | Sync Event, V Sync End |
| | HSS | Short Packet | Sync Event, H Sync Start |
| | HSE | Short Packet | Sync Event, H Sync End |
| | EoTP | Short Packet | End of Transmission Packet (EoTP) ^{Note1} |
| | CMOFF | Short Packet | Color Mode Off Command |
| | CMON | Short Packet | Color Mode On Command |
| | SDNP | Short Packet | Shut Down Peripheral Command |
| | TONP | Short Packet | Turn On Peripheral Command |
| | GENWN-S | Short Packet | Generic Short WRITE, no parameters |
| | GENW1-S | Short Packet | Generic Short WRITE, 1 parameters |
| | GENW2-S | Short Packet | Generic Short WRITE, 2 parameters |
| | GENRN-S | Short Packet | Generic Short READ, no parameters |
| | GENR1-S | Short Packet | Generic Short READ, 1 parameters |
| | GENR2-S | Short Packet | Generic Short READ, 2 parameters |
| | DCSWN-S | Short Packet | DCS Write, No Parameter |
| | DCSW1-S | Short Packet | DCS Write, 1 Parameter |
| | DCSRN-S | Short Packet | DCS Read, No Parameter |
| | SMRPS-S | Short Packet | Set Maximum Return Packet Size |
| | NP-L | Long Packet | Null Packet, No Data, ^{Note2} |
| | BLK-L | Long Packet | Blanking Packet, no data |
| | GENW-L | Long Packet | Generic Long Write |
| | DCSW-L | Long Packet | DCS Write Long |
| | PKPS16 | Long Packet | Packed Pixel Stream, 16-bit RGB, 5-6-5 Format |
| | PKPS18 | Long Packet | Packed Pixel Stream, 18-bit RGB, 6-6-6 Format |
| | LPKPS18 | Long Packet | Loosely Packed Pixel Stream, 18-bit RGB, 6-6-6 Format |
| | PKPS24 | Long Packet | Packed Pixel Stream, 24-bit RGB, 8-8-8 Format |

Table 18: Packet Level Communication for Peripheral-sourced packets

| Interface Mode | Abbreviation | Packet Size | Interface Action Description |
|------------------------------|--------------|--------------|--|
| Display Module (ILI9881C) | AwER | Short Packet | Acknowledge with Error Report |
| | EoTP | Short Packet | End of Transmission Packet |
| | GENRR1-S | Short Packet | Generic Short READ Response, 1 byte returned |
| | GENRR2-S | Short Packet | Generic Short READ Response, 2 byte returned |
| | GENRR-L | Long Packet | Generic Long READ Response |
| | DCSRR-L | Long Packet | DCS Read Long Response |
| | DCSRR1-S | Short Packet | DCS Read Short Response, 1 byte returned |
| | DCSRR2-S | Short Packet | DCS Read Short Response, 2 byte returned |

4.1.3.3.2. Sequences

4.1.3.3.2.1. DCS Write, 1 Parameter Sequence

A Short Packet (SPa) of “Display Command Set (DCS) Write, 1 Parameter (DCSW1-S)” is defined in the section “4.1.3.2.1.3 Display Command Set (DCS) Write, 1 Parameter (DCSW1-S)” and example sequences on how this packet is used are described in following tables.

Table 19: DCS Write, 1 Parameter Sequence – Example 1

| DCS Write, 1 Parameter Sequence – Example 1 | | | | | | |
|---|---------------|------------------------|-----------------------|---------------------------|---------------|---------|
| Line | MCU | | Information Direction | Display Module (ILI9881C) | | Comment |
| | Packet Sender | Interface Mode Control | | Interface Mode Control | Packet Sender | |
| 1 | -- | LP-11 | → | -- | -- | Start |
| 2 | DCSW1-S | LPDT | → | -- | -- | |
| 3 | -- | LP-11 | → | -- | -- | End |

Table 20: DCS Write, 1 Parameter Sequence – Example 2

| DCS Write, 1 Parameter Sequence – Example 2 | | | | | | |
|---|---------------|------------------------|-----------------------|---------------------------|---------------|----------------------------|
| Line | MCU | | Information Direction | Display Module (ILI9881C) | | Comment |
| | Packet Sender | Interface Mode Control | | Interface Mode Control | Packet Sender | |
| 1 | -- | LP-11 | → | -- | -- | Start |
| 2 | DCSW1-S | HSDT | → | -- | -- | |
| 3 | EoTP | HSDT | → | -- | -- | End of Transmission Packet |
| 4 | -- | LP-11 | → | -- | -- | End |

Table 21: DCS Write, 1 Parameter Sequence – Example 3

| DCS Write, 1 Parameter Sequence – Example 3 | | | | | | |
|---|---------------|------------------------|-----------------------|---------------------------|---------------|---|
| Line | MCU | | Information Direction | Display Module (ILI9881C) | | Comment |
| | Packet Sender | Interface Mode Control | | Interface Mode Control | Packet Sender | |
| 1 | -- | LP-11 | → | -- | -- | Start |
| 2 | DCSW1-S | HSDT | → | -- | -- | |
| 3 | EoTP | HSDT | → | -- | -- | End of Transmission Packet |
| 4 | -- | LP-11 | → | -- | -- | |
| 5 | -- | BTA | ↔ | BTA | -- | Interface Control Change from MCU to the display module |
| 6 | -- | -- | ← | LP-11 | -- | If No Error → Go to Line 8 If Error Occurs → Go to Line 13 |
| 7 | | | | | | |
| 8 | -- | -- | ← | ACK | -- | No Error |
| 9 | -- | -- | ← | LP-11 | -- | |
| 10 | -- | BTA | ↔ | BTA | -- | Interface Control Change from the display module to MCU |
| 11 | -- | LP-11 | → | -- | -- | End |
| 12 | | | | | | |
| 13 | -- | -- | ← | LPDT | AwER | Error Report |
| 14 | -- | -- | ← | LP-11 | -- | |
| 15 | -- | BTA | ↔ | BTA | -- | |
| 16 | -- | LP-11 | → | -- | -- | End |

4.1.3.3.2.2. DCS Write, No Parameter Sequence

A Short Packet (SPa) of “Display Command Set (DCS) Write, No Parameter (DCSWN-S)” is defined in the section “4.1.3.2.1.2 Display Command Set (DCS) Write, No Parameter (DCSWN-S)” and example sequences on how this packet is used are described in following tables.

Table 22: DCS Write, No Parameter Sequence – Example 1

| DCS Write, No Parameter Sequence – Example 1 | | | | | | |
|--|---------------|------------------------|-----------------------|---------------------------|---------------|---------|
| Line | MCU | | Information Direction | Display Module (ILI9881C) | | Comment |
| | Packet Sender | Interface Mode Control | | Interface Mode Control | Packet Sender | |
| 1 | -- | LP-11 | → | -- | -- | Start |
| 2 | DCSWN-S | LPDT | → | -- | -- | |
| 3 | -- | LP-11 | → | -- | -- | End |

Table 23: DCS Write, No Parameter Sequence – Example 2

| DCS Write, No Parameter Sequence – Example 2 | | | | | | |
|--|---------------|------------------------|-----------------------|---------------------------|---------------|----------------------------|
| Line | MCU | | Information Direction | Display Module (ILI9881C) | | Comment |
| | Packet Sender | Interface Mode Control | | Interface Mode Control | Packet Sender | |
| 1 | -- | LP-11 | → | -- | -- | Start |
| 2 | DCSWN-S | HSDT | → | -- | -- | |
| 3 | EoTP | HSDT | → | -- | -- | End of Transmission Packet |
| 4 | -- | LP-11 | → | -- | -- | End |

Table 24: DCS Write, No Parameter Sequence – Example 3

| DCS Write, 1 Parameter Sequence – Example 3 | | | | | | |
|---|---------------|------------------------|-----------------------|---------------------------|---------------|---|
| Line | MCU | | Information Direction | Display Module (ILI9881C) | | Comment |
| | Packet Sender | Interface Mode Control | | Interface Mode Control | Packet Sender | |
| 1 | -- | LP-11 | → | -- | -- | Start |
| 2 | DCSWN-S | HSDT | → | -- | -- | |
| 3 | EoTP | HSDT | → | -- | -- | End of Transmission Packet |
| 4 | -- | LP-11 | → | -- | -- | |
| 5 | -- | BTA | ↔ | BTA | -- | Interface Control Change from MCU to the display module |
| 6 | -- | -- | ← | LP-11 | -- | If No Error → Go to Line 8 If Error Occurs → Go to Line 13 |
| 7 | | | | | | |
| 8 | -- | -- | ← | ACK | -- | No Error |
| 9 | -- | -- | ← | LP-11 | -- | |
| 10 | -- | BTA | ↔ | BTA | -- | Interface Control Change from the display module to MCU |
| 11 | -- | LP-11 | → | -- | -- | End |
| 12 | | | | | | |
| 13 | -- | -- | ← | LPDT | AwER | Error Report |
| 14 | -- | -- | ← | LP-11 | -- | |
| 15 | -- | BTA | ↔ | BTA | -- | |
| 16 | -- | LP-11 | → | -- | -- | End |

4.1.3.3.2.3. DCS Write Long Sequence

A Long Packet (LPa) of “Display Command Set (DCS) Write Long (DCSW-L)” is defined in the section “4.1.3.2.1.4 Display Command Set (DCS) Write Long (DCSW-L)” and example sequences on how this packet is used are described in following tables.

Table 25: DCS Write Long Sequence – Example 1

| DCS Write Long Sequence – Example 1 | | | | | | |
|-------------------------------------|---------------|------------------------|-----------------------|---------------------------|---------------|---------|
| Line | MCU | | Information Direction | Display Module (ILI9881C) | | Comment |
| | Packet Sender | Interface Mode Control | | Interface Mode Control | Packet Sender | |
| 1 | -- | LP-11 | → | -- | -- | Start |
| 2 | DCSW-L | LPDT | → | -- | -- | |
| 3 | -- | LP-11 | → | -- | -- | End |

Table 26: DCS Write Long Sequence – Example 2

| DCS Write Long Sequence – Example 2 | | | | | | |
|-------------------------------------|---------------|------------------------|-----------------------|---------------------------|---------------|----------------------------|
| Line | MCU | | Information Direction | Display Module (ILI9881C) | | Comment |
| | Packet Sender | Interface Mode Control | | Interface Mode Control | Packet Sender | |
| 1 | -- | LP-11 | → | -- | -- | Start |
| 2 | DCSW-L | HSDT | → | -- | -- | |
| 3 | EoTP | HSDT | → | -- | -- | End of Transmission Packet |
| 4 | -- | LP-11 | → | -- | -- | End |

Table 27: DCS Write Long Sequence – Example 3

| DCS Write Long Sequence – Example 3 | | | | | | |
|-------------------------------------|---------------|------------------------|-----------------------|---------------------------|---------------|---|
| Line | MCU | | Information Direction | Display Module (ILI9881C) | | Comment |
| | Packet Sender | Interface Mode Control | | Interface Mode Control | Packet Sender | |
| 1 | -- | LP-11 | → | -- | -- | Start |
| 2 | DCSW-L | HSDT | → | -- | -- | |
| 3 | EoTP | HSDT | → | -- | -- | End of Transmission Packet |
| 4 | -- | LP-11 | → | -- | -- | |
| 5 | -- | BTA | ↔ | BTA | -- | Interface Control Change from MCU to the display module |
| 6 | -- | -- | ← | LP-11 | -- | If No Error → Go to Line 8 If Error Occurs → Go to Line 13 |
| 7 | | | | | | |
| 8 | -- | -- | ← | ACK | -- | No Error |
| 9 | -- | -- | ← | LP-11 | -- | |
| 10 | -- | BTA | ↔ | BTA | -- | Interface Control Change from the display module to MCU |
| 11 | -- | LP-11 | → | -- | -- | End |
| 12 | | | | | | |
| 13 | -- | -- | ← | LPDT | AwER | Error Report |
| 14 | -- | -- | ← | LP-11 | -- | |
| 15 | -- | BTA | ↔ | BTA | -- | |
| 16 | -- | LP-11 | → | -- | -- | End |

4.1.3.3.2.4. DCS Read, No Parameter Sequence

A Short Packet (SPa) of “Display Command Set (DCS) Read, No Parameter (DCSRN-S)” is defined in the section “4.1.3.2.1.5 Display Command Set (DCS) Read, No Parameter (DCSRN-S)” and example sequences on how this packet is used are described in following tables.

Table 28: DCS Read, No Parameter Sequence – Example 1

| DCS Read, No Parameter Sequence – Example 1 | | | | | | |
|---|---------------|------------------------|-----------------------|---------------------------|---------------|---|
| Line | MCU | | Information Direction | Display Module (ILI9881C) | | Comment |
| | Packet Sender | Interface Mode Control | | Interface Mode Control | Packet Sender | |
| 1 | -- | LP-11 | → | -- | -- | Start |
| 2 | SMRPS-S | HSDT | → | -- | -- | Defined how many data byte is wanted to read : 1 byte |
| 3 | DCSRN-S | HSDT | → | -- | -- | Wanted to get a response ID1 (DAh) |
| 4 | EoTP | HSDT | → | -- | -- | End of Transmission Packet |
| 5 | -- | LP-11 | → | -- | -- | |
| 6 | -- | BTA | ↔ | BTA | -- | Interface Control Change from MCU to the display module |
| 7 | -- | -- | ← | LP-11 | -- | If No Error → Go to Line 9 If Error Occurs → Go to Line 14 If Error is Corrected by ECC → Go to Line 19 |
| 8 | | | | | | |
| 9 | -- | -- | ← | LPDT | DCSRR1-S | Response 1 byte return |
| 10 | -- | -- | ← | LP-11 | -- | |
| 11 | -- | BTA | ↔ | BTA | -- | Interface Control Change from the display module to MCU |
| 12 | -- | LP-11 | → | -- | -- | End |
| 13 | | | | | | |
| 14 | -- | -- | ← | LPDT | AwER | Error Report |
| 15 | -- | -- | ← | LP-11 | -- | |
| 16 | -- | BTA | ↔ | BTA | -- | Interface Control Change from the display module to MCU |
| 17 | -- | LP-11 | → | -- | -- | End |
| 18 | | | | | | |
| 19 | -- | -- | ← | LPDT | DCSRR1-S | Response 1 byte return |
| 20 | -- | -- | ← | LPDT | AwER | Error Report (Error is corrected by ECC) |
| 21 | | | ← | LP-11 | -- | |
| 22 | -- | BTA | ↔ | BTA | -- | Interface Control Change from the display module to MCU |
| 23 | -- | LP-11 | → | -- | -- | End |

Table 29: DCS Read, No Parameter Sequence – Example 2

| DCS Read, No Parameter Sequence – Example 2 | | | | | | |
|---|---------------|------------------------|-----------------------|---------------------------|---------------|---|
| Line | MCU | | Information Direction | Display Module (ILI9881C) | | Comment |
| | Packet Sender | Interface Mode Control | | Interface Mode Control | Packet Sender | |
| 1 | -- | LP-11 | ➔ | -- | -- | Start |
| 2 | SMRPS-S | HSDT | ➔ | -- | -- | Defined how many data byte is wanted to read : 200 bytes |
| 3 | DCSRN-S | HSDT | ➔ | -- | -- | Wanted to get a response |
| 4 | EoTP | HSDT | ➔ | -- | -- | End of Transmission Packet |
| 5 | -- | LP-11 | ➔ | -- | -- | |
| 6 | -- | BTA | ↔ | BTA | -- | Interface Control Change from MCU to the display module |
| 7 | -- | -- | ← | LP-11 | -- | If No Error ➔ Go to Line 9 If Error Occurs ➔ Go to Line 14 If Error is Corrected by ECC ➔ Go to Line 19 |
| 8 | | | | | | |
| 9 | -- | -- | ← | LPDT | DCSRR-L | Response 200 byte return |
| 10 | -- | -- | ← | LP-11 | -- | |
| 11 | -- | BTA | ↔ | BTA | -- | Interface Control Change from the display module to MCU |
| 12 | -- | LP-11 | ➔ | -- | -- | End |
| 13 | | | | | | |
| 14 | -- | -- | ← | LPDT | AwER | Error Report |
| 15 | -- | -- | ← | LP-11 | -- | |
| 16 | -- | BTA | ↔ | BTA | -- | Interface Control Change from the display module to MCU |
| 17 | -- | LP-11 | ➔ | -- | -- | End |
| 18 | | | | | | |
| 19 | -- | -- | ← | LPDT | DCSRR-S | Response 200 byte return |
| 20 | -- | -- | ← | LPDT | AwER | Error Report (Error is corrected by ECC) |
| 21 | | | ← | LP-11 | -- | |
| 22 | -- | BTA | ↔ | BTA | -- | Interface Control Change from the display module to MCU |
| 23 | -- | LP-11 | ➔ | -- | -- | End |

4.1.3.3.2.5. Null Packet, No Data Sequence

A Long Packet (LPa) of “Null Packet, No Data (NP-L)” is defined in the section “4.1.3.2.1.6 Null Packet, No Data (NP-L)”, and an example sequence on how this packet is used is described in the following table.

Table 30: Null Packet, No Data Sequence - Example

| Null Packet, No Data Sequence – Example | | | | | | |
|---|---------------|------------------------|-----------------------|---------------------------|---------------|---|
| Line | MCU | | Information Direction | Display Module (ILI9881C) | | Comment |
| | Packet Sender | Interface Mode Control | | Interface Mode Control | Packet Sender | |
| 1 | -- | LP-11 | ➔ | -- | -- | Start |
| 2 | NP-L | HSDT | ➔ | -- | -- | Only High Speed Data Transmission is used |
| 3 | EoTP | HSDT | ➔ | -- | -- | End of Transmission Packet |
| 4 | -- | LP-11 | ➔ | -- | -- | End |

4.1.3.3.2.6. End of Transmission Packet

A Short Packet (SPa) of “End of Transmission (EoTP)” is defined in the section “4.1.3.2.1.7 End of Transmission Packet (EoTP)”, and an example sequence on how this packet is used is described in the following table.

Table 31: End of Transmission Packet – Example

| End of Transmission Packet – Example | | | | | | |
|--------------------------------------|---------------|------------------------|-----------------------|---------------------------|---------------|---|
| Line | MCU | | Information Direction | Display Module (ILI9881C) | | Comment |
| | Packet Sender | Interface Mode Control | | Interface Mode Control | Packet Sender | |
| 1 | -- | LP-11 | ➔ | -- | -- | Start |
| 2 | NP-L | HSDT | ➔ | -- | -- | Only High Speed Data Transmission is used |
| 3 | EoTP | HSDT | ➔ | -- | -- | End of Transmission Packet |
| 4 | -- | LP-11 | ➔ | -- | -- | End |

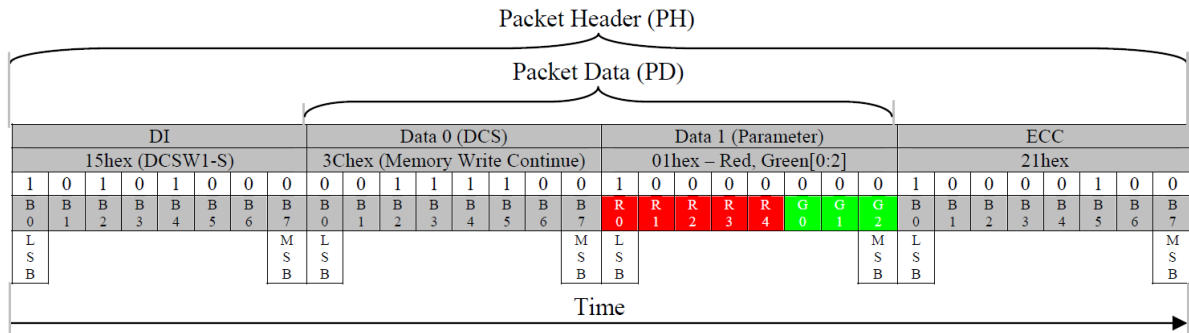


Figure 78: Red / Green [0:2] Subpixel Write (DCSW1-S) – Example 2

Note: DCS (Data 0) can also be “Memory Write” (2Ch) command

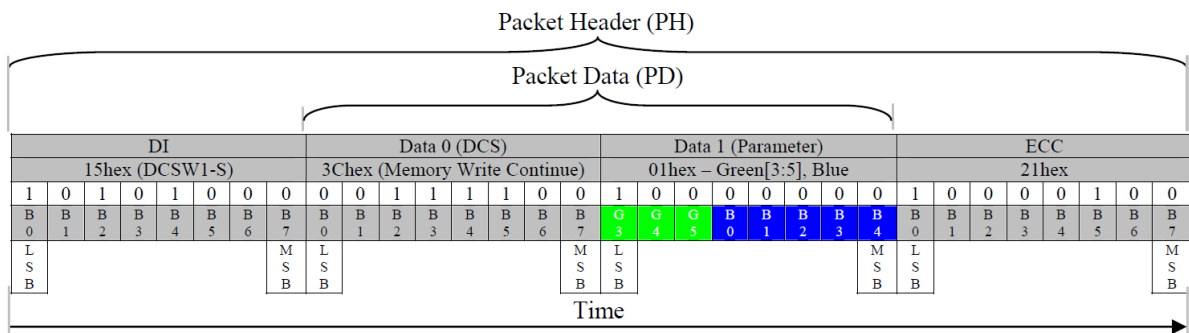


Figure 79: Green [3:5] / Blue Subpixel Write (DCSW1-S) – Example 3

Notes:

1. DCS (Data 0) cannot be “Memory Write” (2Ch) command. It must always be “Memory Write Continue” (3Ch)
2. Previous data byte was R[0:4]G[0:2]

4.1.3.5. 24 bit/pixel Writing

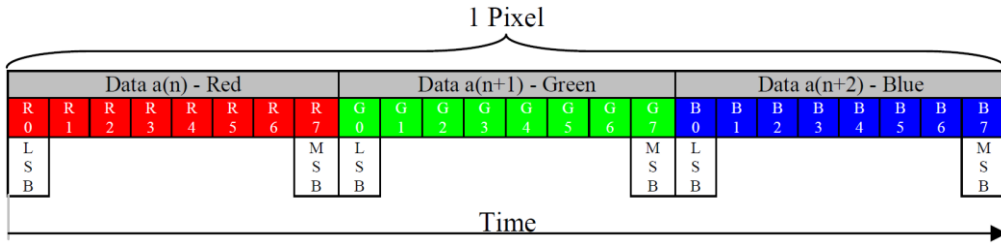


Figure 80: One Pixel Bit and Color Write Orders

The MCU can send to the display module a following packet.

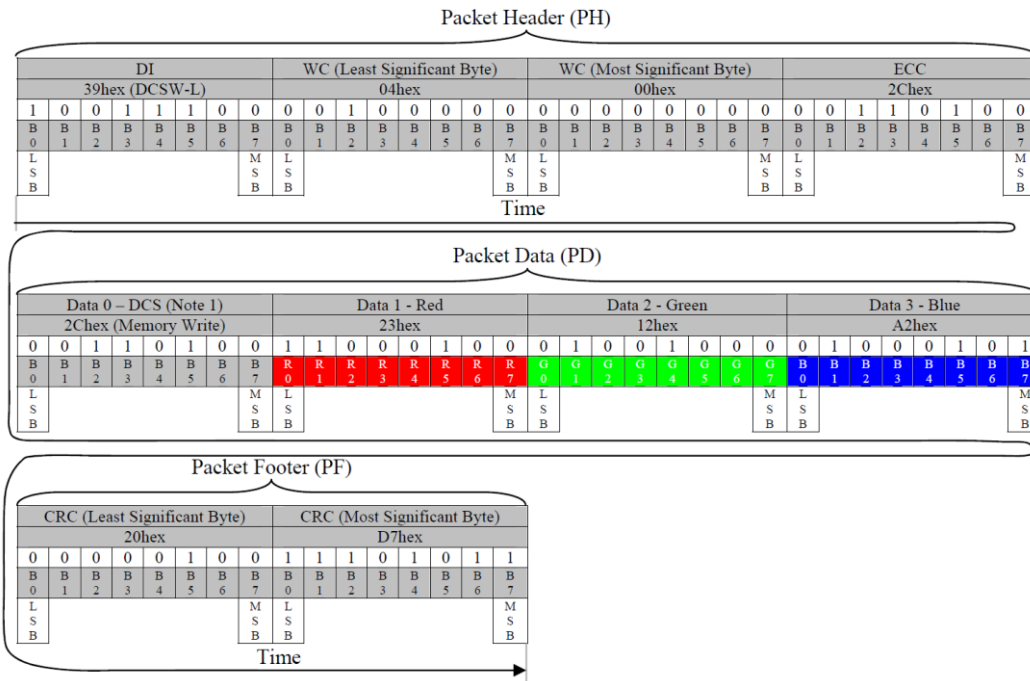


Figure 81: One Pixel Write (DCSW-L) – Example

Notes:

1. Memory Write (2Ch) or Memory Write Continue (3Ch)
2. It is possible that one pixel information is split in two or three different packets which are ending and starting as follows:
 - R – GB (2 packets)
 - RG – B (2 packets)
 - R – G – B (3 packets)
3. Packet can include several pixels (Not only one pixel as in this example)

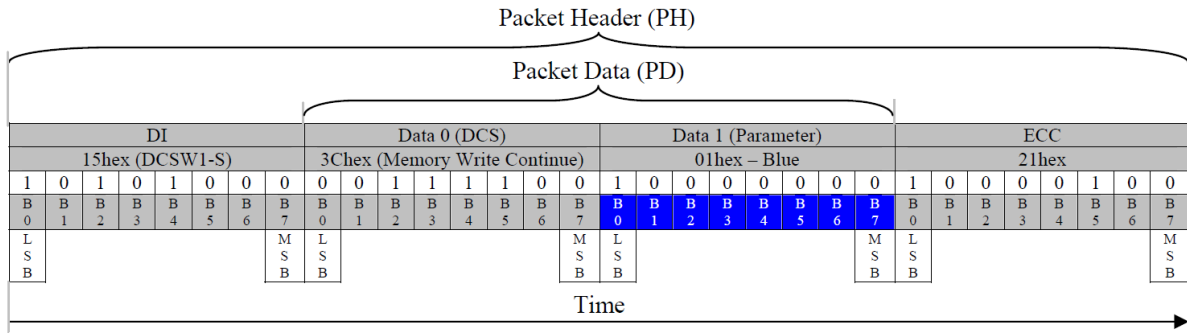


Figure 82: Blue Subpixel Write (DCSW1-S) – Example 2

Notes:

1. DCS (Data 0) cannot be “Memory Write” (2Ch) command. It must always be “Memory Write Continue” (3Ch)
2. Previous data byte was G[0:7]

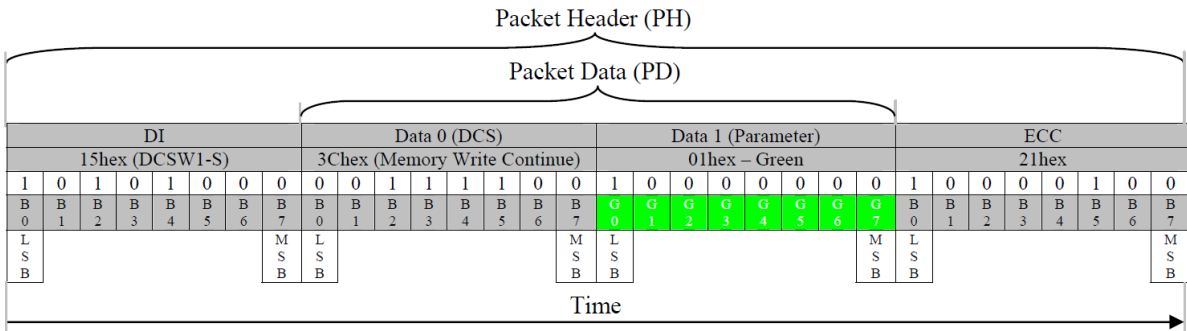


Figure 83: Green Subpixel Write (DCSW1-S) – Example 3

Notes:

1. DCS (Data 0) cannot be “Memory Write” (2Ch) command. It must always be “Memory Write Continue” (3Ch)
2. Previous data byte was R[0:7]

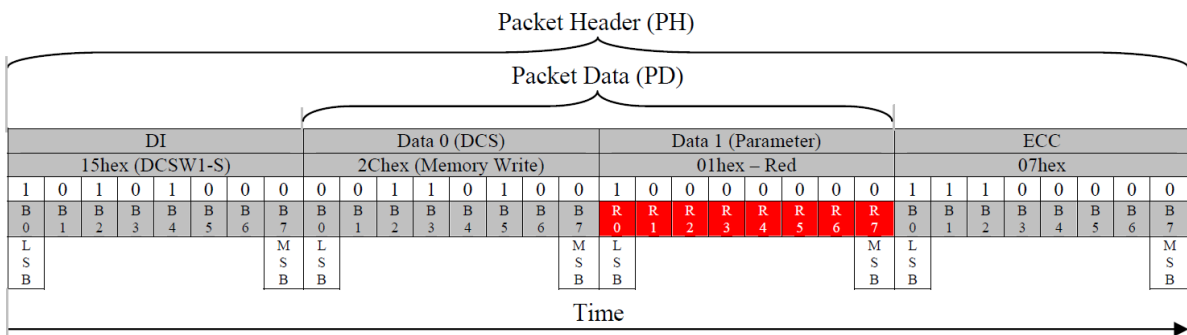


Figure 84: Red Subpixel Write (DCSW1-S) – Example 4

Notes:

1. DCS (Data 0) can also be “Memory Write Continue” (3Ch) command
2. Previous data byte was B[0:7]

4.2. Display Data Format

4.2.1. DSI Transmission Data Format

4.2.1.1. 16-bit per Pixel, Long Packet, Data Type 00 1110 (0Eh)

Packed Pixel Stream 16-Bit Format is a Long Packet used to transmit image data formatted as 16-bit pixels to a Video Mode display module. The packet consists of the DI byte, a two-byte WC, an ECC byte, a payload of length WC bytes and a two-byte checksum. Pixel format is red (5 bits), green (6 bits), and blue (5 bits), in that order. Note that the Green component is split across two bytes. Within a color component, the LSB is sent first, the MSB last. With this format, pixel boundaries align with byte boundaries every two bytes. The total line width (displayed plus non-displayed pixels) should be a multiple of two bytes.

Normally, the ILI9881C has no frame buffer of its own, so all image data shall be supplied by the host processor at a sufficiently high rate to avoid flicker or other visible artifact.

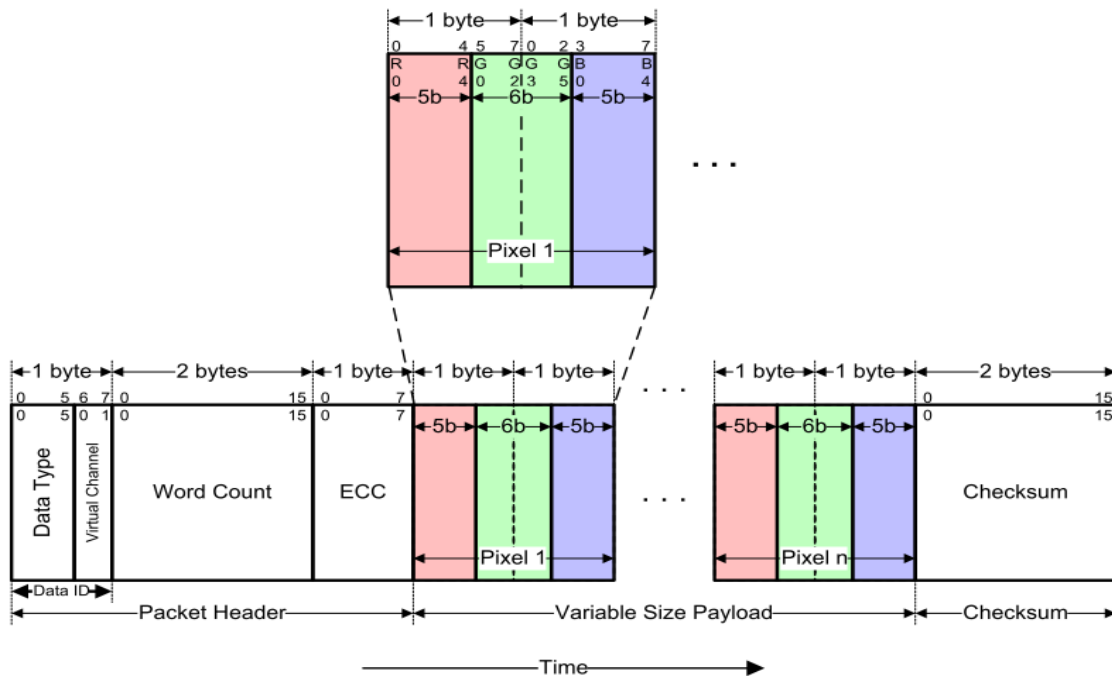


Figure 85: 16-bit per Pixel, Data Type 00 1110 (0Eh)

4.2.1.2. 18-bit per Pixel, Long Packet, Data Type = 01 1110 (1Eh)

Packed Pixel Stream 18-Bit Format (Packed) is a Long packet. It is used to transmit RGB image data formatted as pixels to a Video Mode display module that displays 18-bit pixels. The packet consists of the DI byte, a two-byte WC, an ECC byte, a payload of length WC bytes, and a two-byte Checksum. Pixel format is red (6 bits), green (6 bits) and blue (6 bits), in that order. Within a color component, the LSB is sent first, the MSB last.

Note that pixel boundaries only align with byte boundaries every four pixels (nine bytes). Preferably, display modules employing this format have a horizontal extent (width in pixels) evenly divisible by four, so no partial bytes remain at the end of the display line data. If the active (displayed) horizontal width is not a multiple of four pixels, the transmitter shall send additional filled pixels at the end of the display line to make the transmitted width a

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multiple of four pixels. The receiving peripheral shall not display the filled pixels when refreshing the display device. For example, if a display device has an active display width of 399 pixels, the transmitter should send 400 pixels in one or more packets. The receiver should display the first 399 pixels and discard the last pixel of the transmission. With this format, the total line width (displayed and non-displayed pixels) should be a multiple of four pixels (nine bytes).

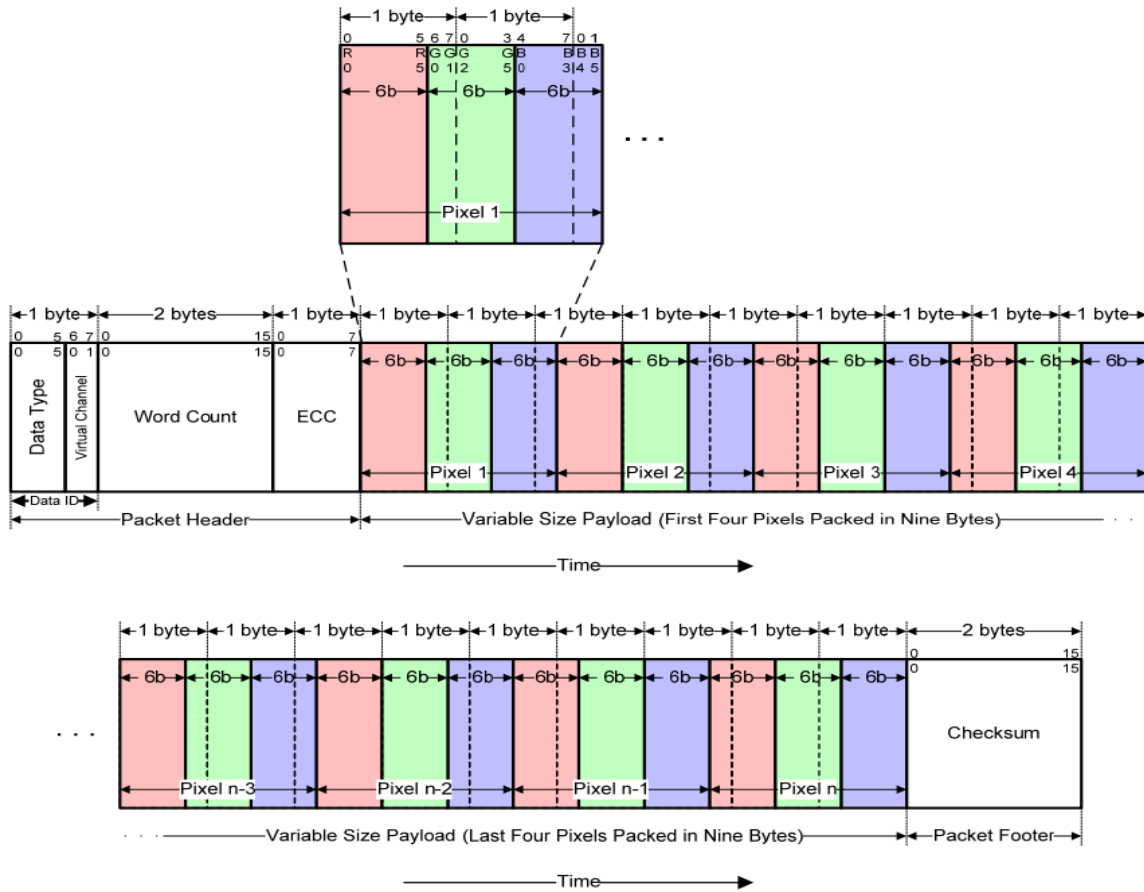


Figure 86: 18-bit per Pixel, Data Type = 01 1110 (1Eh)

4.2.1.3. 18-bit per Pixel, Long Packet, Data Type = 10 1110 (2Eh)

In the 18-bit Pixel Loosely Packed format, each R, G, or B color component is six bits but is shifted to the upper bits of the byte, such that the valid pixel bits occupy bits [7:2] of each byte. Bits [1:0] of each payload byte representing active pixels are ignored. As a result, each pixel requires three bytes as it is transmitted across the link. This requires more bandwidth than the “packed” format, but requires less shifting and multiplexing logic in the packing and unpacking functions on each end of the Link.

This format is used to transmit RGB image data formatted as pixels to a Video Mode display module that displays 18-bit pixels. The packet consists of the DI byte, a two-byte WC, an ECC byte, a payload of length WC bytes and a two-byte Checksum. The pixel format is red (6 bits), green (6 bits) and blue (6 bits) in that order. Within a color component, the LSB is sent first, the MSB last.

With this format, pixel boundaries align with byte boundaries every three bytes. The total line width (displayed and non-displayed pixels) should be a multiple of three bytes.

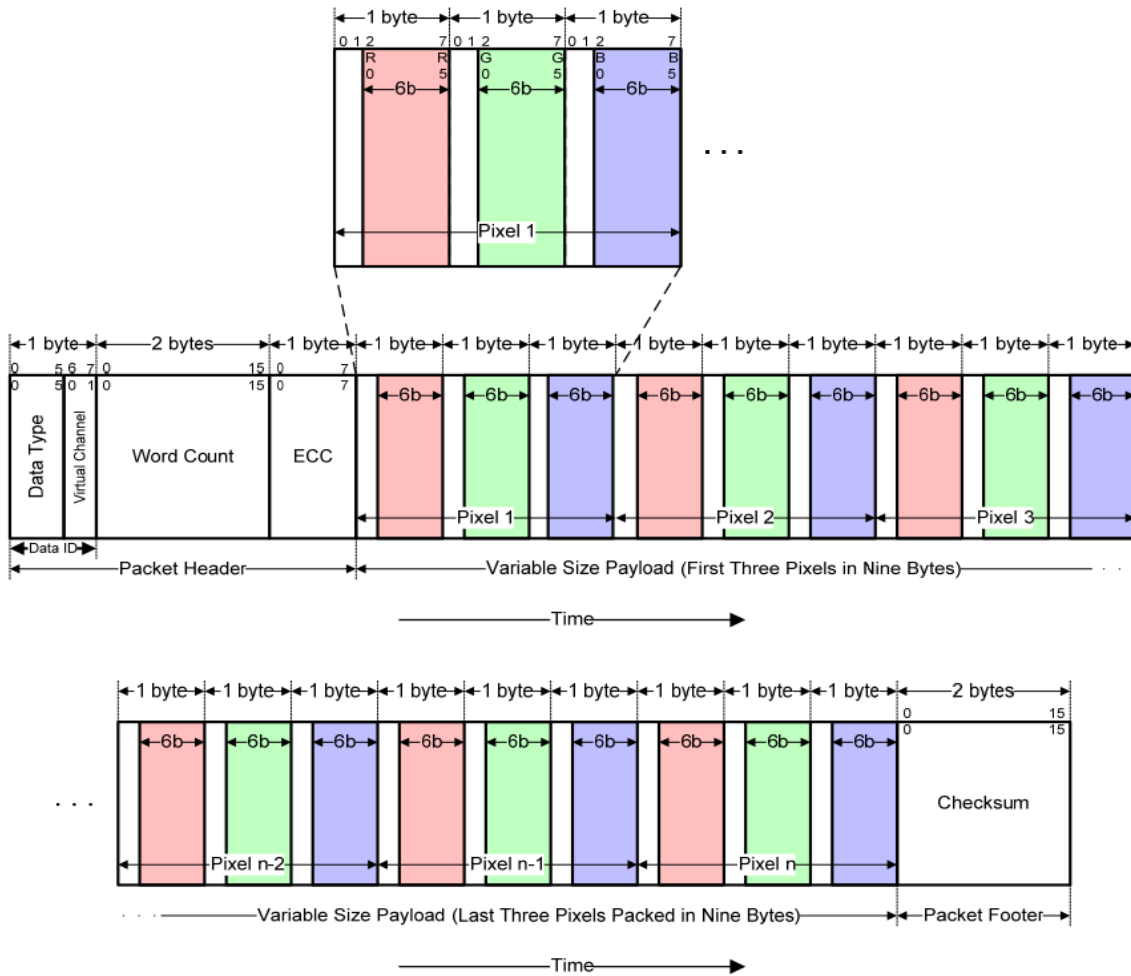


Figure 87: 18-bit per Pixel, Data Type = 10 1110 (2Eh)

4.2.1.4. 24-bit per Pixel, Long Packet, Data Type = 11 1110 (3Eh)

Packed Pixel Stream 24-Bit Format is a Long packet. It is used to transmit image data formatted as 24-bit pixels to a Video Mode display module. The packet consists of the DI byte, a two-byte WC, an ECC byte, a payload of length WC bytes and a two-byte Checksum. The pixel format is red (8 bits), green (8 bits) and blue (8 bits), in that order. Each color component occupies one byte in the pixel stream; no components are split across byte boundaries. Within a color component, the LSB is sent first, the MSB last.

With this format, pixel boundaries align with byte boundaries every three bytes. The total line width (displayed and non-displayed pixels) should be a multiple of three bytes.

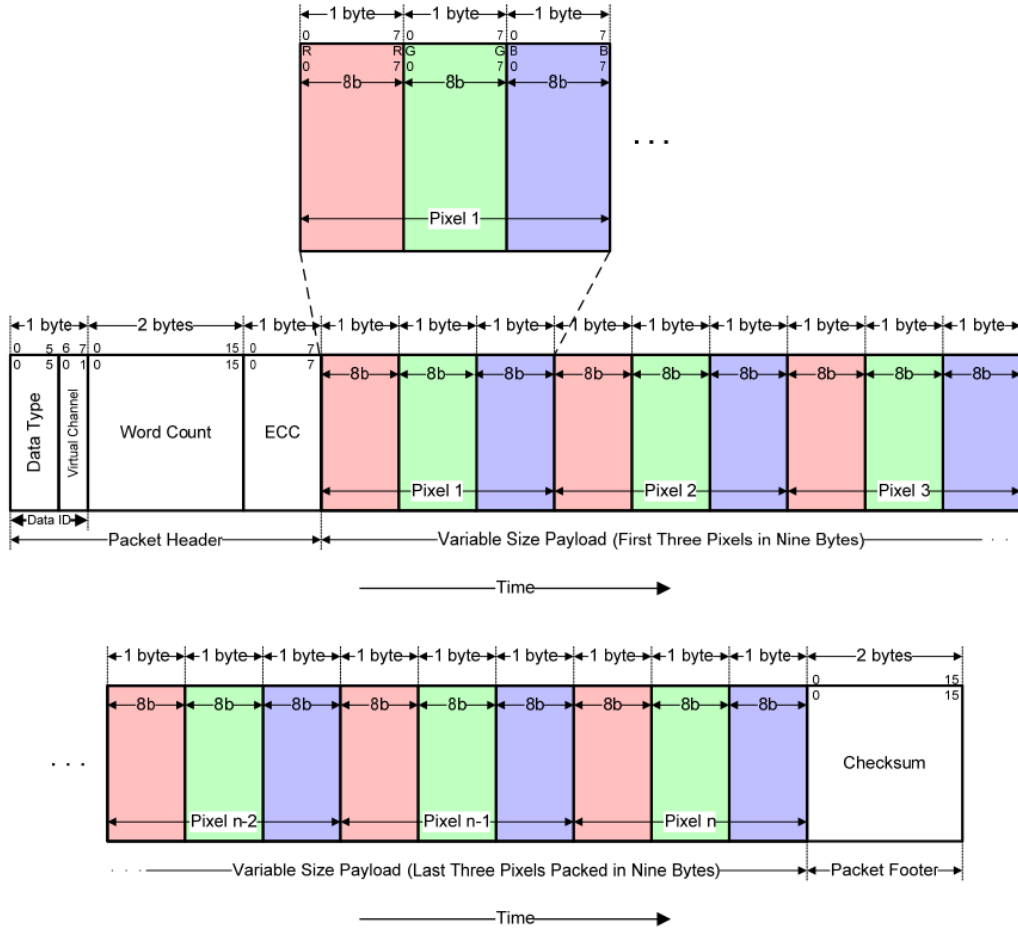


Figure 88: 24-bit per Pixel, Data Type = 11 1110 (3Eh)

4.2.2. 16/18-bit Color Data Mapping to 24-bit Pixel Data Operation

Table 32 below lists settings for 24-bit data mapping. Set the EPF[1:0] bits function, which defines three types of data formats for 24-bit data (pixel data r, g, b) mapping.

Table 32: 16/18-bit Color Data Mapping to 24-bit Pixel Data Operation

| EPF[1:0] | Expand 16-bit color data (R,G,B) to 24-bit subpixel data (r, g, b) | Expand 18-bit color data (R,G,B) to 24-bit subpixel data (r, g, b) |
|----------|--|--|
| 00 | 0 is written to the LSB. 8 bits subpixel, data r [7:0] = {16-bit color data R [4:0], 3'h0} 8 bits subpixel, data g [7:0] = {16-bit color data G [5:0], 2'h0} 8 bits subpixel, data b [7:0] = {16-bit color data B [4:0], 3'h0} (Note3): that the data are converted as follows. 16-bit color data R [4:0] = 5'h1F, G [5:0] = 6'h3F, B [4:0] = 5'h1F → 24-bit pixel data r, g, b [7:0] = 24'hFFFFFF | 0 is written to the LSB. 8 bits subpixel, data r [7:0] = {18-bit color data R [5:0], 2'h0} 8 bits subpixel, data g [7:0] = {18-bit color data G [5:0], 2'h0} 8 bits subpixel, data b [7:0] = {18-bit color data B [5:0], 2'h0} (Note1): that the data are converted as follows. 18-bit color data R [5:0] = 6'h3F, G [5:0] = 6'h3F, B [5:0] = 6'h3F → 24-bit pixel data r, g, b [7:0] = 24'hFFFFFF |
| 01 | 1 is written to the LSB. 8 bits subpixel, data r [7:0] = {16-bit color data R [4:0], 3'h7} 8 bits subpixel, data g [7:0] = {16-bit color data G [5:0], 2'h3} 8 bits subpixel, data b [7:0] = {16-bit color data B [4:0], 3'h7} (Note4): that the data are converted as follows. 16-bit color data R [4:0] = 5'h0, G [5:0] = 6'h0, B [4:0] = 5'h0 →24-bit pixel data r, g, b [7:0] = 24'h000000 | 1 is written to the LSB. 8 bits subpixel, data r [7:0] = {18-bit color data R [5:0], 2'h3} 8 bits subpixel, data g [7:0] = {18-bit color data G [5:0], 2'h3} 8 bits subpixel, data b [7:0] = {18-bit color data B [5:0], 2'h3} (Note2): that the data are converted as follows. 18-bit color data R [5:0] = 6'h0, G [5:0] = 6'h0, B [5:0] = 6'h0 →24-bit pixel data r, g, b [7:0] = 24'h000000 |
| 10 | The MSB value is written to the LSB. 8 bits subpixel, data r [7:0] = {16-bit color data R [4:0], R [4:2]} 8 bits subpixel, data g [7:0] = {16-bit color data G [5:0], G [5:4]} 8 bits subpixel, data b [7:0] = {16-bit color data B [4:0], B [4:2]} | The MSB value is written to the LSB. 8 bits subpixel, data r [7:0] = {18-bit color data R [5:0], R [5:4]} 8 bits subpixel, data g [7:0] = {18-bit color data G [5:0], G [5:4]} 8 bits subpixel, data b [7:0] = {18-bit color data B [5:0], B [5:4]} |
| 11 | Same as setting "EPF [1:0] = 10" | Same as setting "EPF [1:0] = 10" |

| | Display image data (24 bits) | | | | | | | | | | | | | | | | | | | | | | | |
|-----------------------------------|------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| | R7 | R6 | R5 | R4 | R3 | R2 | R1 | R0 | G7 | G6 | G5 | G4 | G3 | G2 | G1 | G0 | B7 | B6 | B5 | B4 | B3 | B2 | B1 | B0 |
| 24-bit | R[7] | R[6] | R[5] | R[4] | R[3] | R[2] | R[1] | R[0] | G[7] | G[6] | G[5] | G[4] | G[3] | G[2] | G[1] | G[0] | B[7] | B[6] | B[5] | B[4] | B[3] | B[2] | B[1] | B[0] |
| 18-bit EPF[1:0]=00 (Note 1) | R[5] | R[4] | R[3] | R[2] | R[1] | R[0] | 0 | 0 | G[5] | G[4] | G[3] | G[2] | G[1] | G[0] | 0 | 0 | B[5] | B[4] | B[3] | B[2] | B[1] | B[0] | 0 | 0 |
| 18-bit EPF[1:0]=01 (Note 2) | R[5] | R[4] | R[3] | R[2] | R[1] | R[0] | 1 | 1 | G[5] | G[4] | G[3] | G[2] | G[1] | G[0] | 1 | 1 | B[5] | B[4] | B[3] | B[2] | B[1] | B[0] | 1 | 1 |
| 18-bit EPF[1:0]=10 | R[5] | R[4] | R[3] | R[2] | R[1] | R[0] | R[5] | R[4] | G[5] | G[4] | G[3] | G[2] | G[1] | G[0] | G[5] | G[4] | B[5] | B[4] | B[3] | B[2] | B[1] | B[0] | B[5] | B[4] |
| 16-bit EPF[1:0]=00 (Note 3) | R[4] | R[3] | R[2] | R[1] | R[0] | 0 | 0 | 0 | G[5] | G[4] | G[3] | G[2] | G[1] | G[0] | 0 | 0 | B[4] | B[3] | B[2] | B[1] | B[0] | 0 | 0 | 0 |
| 16-bit EPF[1:0]=01 (Note 4) | R[4] | R[3] | R[2] | R[1] | R[0] | 1 | 1 | 1 | G[5] | G[4] | G[3] | G[2] | G[1] | G[0] | 1 | 1 | B[4] | B[3] | B[2] | B[1] | B[0] | 1 | 1 | 1 |
| 16-bit EPF[1:0]=10 | R[4] | R[3] | R[2] | R[1] | R[0] | R[4] | R[3] | R[2] | G[5] | G[4] | G[3] | G[2] | G[1] | G[0] | G[5] | G[4] | B[4] | B[3] | B[2] | B[1] | B[0] | B[4] | B[3] | B[2] |

Example 1: 16-bit data mapping to 24-bit, EPF[1:0] = 10

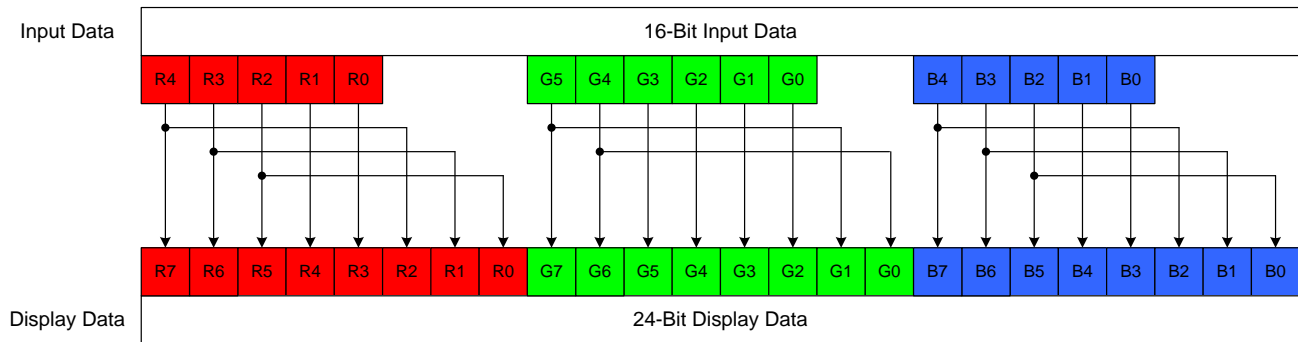


Figure 89: EPF[1:0] = 10, 16-bit Data Mapping to 24-bit

Example 2: 18-bit data mapping to 24-bit, EPF[1:0] = 10

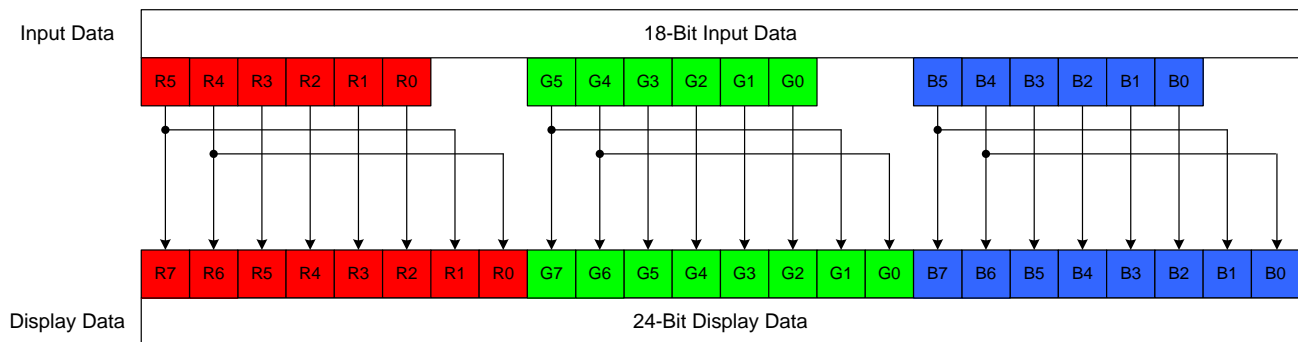


Figure 90: EPF[1:0] = 10, 18-bit Data Mapping to 24-bit

5. Command

5.1. Command Flow

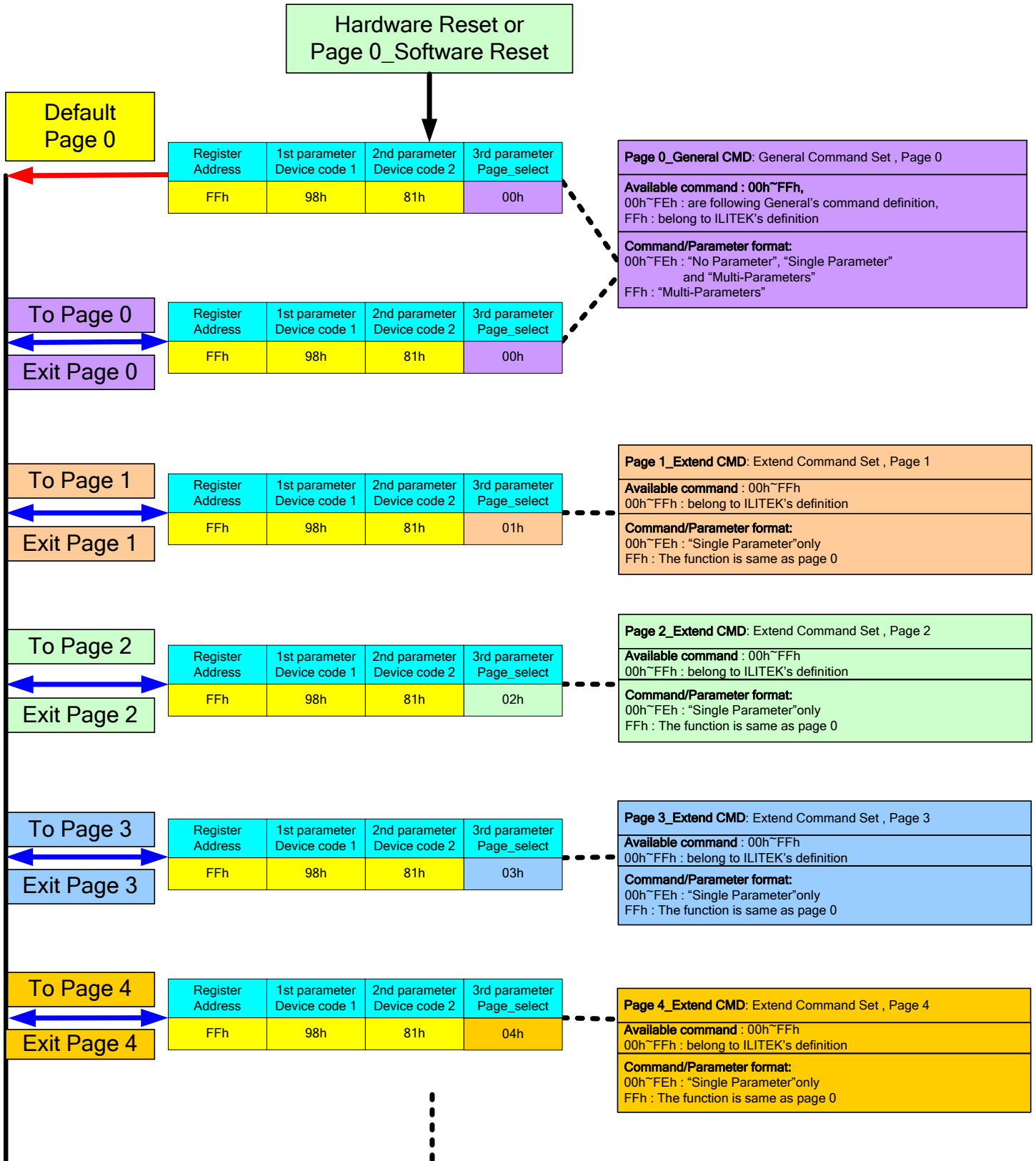


Figure 91: Command Flow

5.2. Command List

5.2.1. Page 0 Command Set

| Command | | | W/R | Function | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default (hex) | MTP (times) |
|---------|---------|--------------|-----|-------------------------------------|--------------|----|----------|----|-----------|---------------|---------|-----|---------------|-------------|
| Page | Address | Parameter | | | | | | | | | | | | |
| P0 | 00h | - | W | NOP | No Argument | | | | | | | | - | - |
| P0 | 01h | - | W | Software Reset | No Argument | | | | | | | | - | - |
| P0 | 05h | 1st | R | Read Number of the Errors on DSI | P[7:0] | | | | | | | | 00h | - |
| P0 | 0Ah | 1st | R | Read Display Power Mode | D7 | D6 | 0 | D4 | D3 | D2 | 0 | 0 | 08h | - |
| P0 | 0Bh | 1st | R | Read Display MADCTL | 0 | 0 | 0 | 0 | D3 | 0 | D1 | D0 | 00h | - |
| P0 | 0Ch | 1st | R | Read Pixel Format | 0 | 0 | 0 | 0 | 0 | D2 | D1 | D0 | 07h | - |
| P0 | 0Dh | 1st | R | Read Display Mode | 0 | 0 | 0 | D4 | D3 | D2 | D1 | D0 | 00h | - |
| P0 | 0Eh | 1st | R | Read Display signal Mode | D7 | D6 | 0 | 0 | 0 | 0 | 0 | D0 | 00h | - |
| P0 | 0Fh | 1st | R | Read Display Self-Diagnostic Result | D7 | D6 | 0 | 0 | 0 | 0 | 0 | D0 | 00h | - |
| P0 | 10h | - | W | Sleep In | No Argument | | | | | | | | - | - |
| P0 | 11h | - | W | Sleep Out | No Argument | | | | | | | | - | - |
| P0 | 13h | - | W | Normal Display Mode On | No Argument | | | | | | | | - | - |
| P0 | 22h | - | W | All Pixel Off | No Argument | | | | | | | | - | - |
| P0 | 23h | - | W | All Pixel On | No Argument | | | | | | | | - | - |
| P0 | 26h | 1st | W | Gamma Curve Set | 0 | 0 | 0 | 0 | GC[3:0] | | | 01h | - | |
| P0 | 28h | - | W | Display Off | No Argument | | | | | | | | - | - |
| P0 | 29h | - | W | Display ON | No Argument | | | | | | | | - | - |
| P0 | 2Ch | Nth | W | Memory Write | - | | | | | | | | - | - |
| P0 | 34h | - | W | TE OFF | No Argument | | | | | | | | - | - |
| P0 | 35h | 1st | W | TE ON | 0 | 0 | 0 | 0 | 0 | 0 | 0 | M | 00h | - |
| P0 | 36h | 1st | W | Memory Access | 0 | 0 | 0 | 0 | BGR | 0 | SS | GS | 00h | - |
| P0 | 38h | - | W | Idle Mode Off | No Argument | | | | | | | | - | - |
| P0 | 39h | - | W | Idle Mode On | No Argument | | | | | | | | - | - |
| P0 | 3Ah | 1st | W | Interface Pixel Format | 0 | 0 | 0 | 0 | 0 | DBI[2:0] | | | 07h | - |
| P0 | 3Ch | Nth | W | Memory Write Continue | - | | | | | | | | - | - |
| P0 | 44h | 1st | W | Set tear scan line | 0 | 0 | 0 | 0 | 0 | TE_LINE[10:8] | | | 00h | - |
| | 2nd | TE_LINE[7:0] | | | | | | | | 00h | - | | | |
| P0 | 45h | 1st | R | Get tear scan line | 0 | 0 | 0 | 0 | 0 | TE_LINE[10:8] | | | 00h | - |
| | 2nd | TE_LINE[7:0] | | | | | | | | 00h | - | | | |
| P0 | 51h | 1st | W | Write Display Brightness | 0 | 0 | 0 | 0 | DBV[11:8] | | | 00h | - | |
| | 2nd | DBV[7:0] | | | | | | | | 00h | - | | | |
| P0 | 52h | 1st | R | Read Display Brightness Value | 0 | 0 | 0 | 0 | DBV[11:8] | | | 00h | - | |
| | 2nd | DBV[7:0] | | | | | | | | 00h | - | | | |
| P0 | 53h | 1st | W | Write CTRL Display | 0 | 0 | BCTRL | 0 | DD | BL | 0 | 0 | 00h | - |
| P0 | 54h | 1st | R | Read CTRL Display | 0 | 0 | BCTRL | 0 | DD | BL | 0 | 0 | 00h | - |
| P0 | 55h | 1st | W | Write Power Save | PWRSAVE[7:0] | | | | | | | | 00h | - |
| P0 | 56h | 1st | R | Read Power Save | PWRSAVE[7:0] | | | | | | | | 00h | - |
| P0 | 59h | - | W | Stop Transition | No Argument | | | | | | | | - | - |
| P0 | 5Eh | 1st | W | Write CABG Minimum Brightness | 0 | 0 | 0 | 0 | CMB[11:8] | | | 00h | - | |
| | 2nd | CMB[7:0] | | | | | | | | 00h | - | | | |
| P0 | 5Fh | 1st | R | Read CABG Minimum Brightness | 0 | 0 | 0 | 0 | CMB[11:8] | | | 00h | - | |
| | 2nd | CMB[7:0] | | | | | | | | 00h | - | | | |
| P0 | 68h | 1st | W | Set Transition Time | TT_STP[7:0] | | | | | | | | 00h | - |
| | 2nd | ST_TIM[7:0] | | | | | | | | 00h | - | | | |
| P0 | 69h | 1st | R | Get Transition Time | TT_STP[7:0] | | | | | | | | 00h | - |
| | 2nd | ST_TIM[7:0] | | | | | | | | 00h | - | | | |
| P0 | 70h | 1st | R | Read Black/White Low Bits | BKx[1:0] | | BKy[1:0] | | Wx[1:0] | | Wy[1:0] | | 00h | 1 |
| P0 | 71h | 1st | R | Read Bkx | BKx[9:2] | | | | | | | | 00h | 1 |
| P0 | 72h | 1st | R | Read Bky | BKy[9:2] | | | | | | | | 00h | 1 |

| Command | | | W/R | Function | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default (hex) | MTP (times) |
|---------|---------|-----------|-----|--|------------|---------|----|---------|----|---------|----|-----|---------------|-------------|
| Page | Address | Parameter | | | | | | | | | | | | |
| P0 | 73h | 1st | R | Read Wx | Wx[9:2] | | | | | | | 00h | 1 | |
| P0 | 74h | 1st | R | Read Wy | Wy[9:2] | | | | | | | 00h | 1 | |
| P0 | 75h | 1st | R | Read Red/Green Low bits | Rx[1:0] | Ry[1:0] | | Gx[1:0] | | Gy[1:0] | | | 00h | 1 |
| P0 | 76h | 1st | R | Read Rx | Rx[9:2] | | | | | | | 00h | 1 | |
| P0 | 77h | 1st | R | Read Ry | Ry[9:2] | | | | | | | 00h | 1 | |
| P0 | 78h | 1st | R | Read Gx | Gx[9:2] | | | | | | | 00h | 1 | |
| P0 | 79h | 1st | R | Read Gy | Gy[9:2] | | | | | | | 00h | 1 | |
| P0 | 7Ah | 1st | R | Read Blue/AColour Low Bits | Bx[1:0] | By[1:0] | | Ax[1:0] | | Ay[1:0] | | | 00h | 1 |
| P0 | 7Bh | 1st | R | Read Bx | Bx[9:2] | | | | | | | 00h | 1 | |
| P0 | 7Ch | 1st | R | Read By | By[9:2] | | | | | | | 00h | 1 | |
| P0 | 7Dh | 1st | R | Read Ax | Ax[9:2] | | | | | | | 00h | 1 | |
| P0 | 7Eh | 1st | R | Read Ay | Ay[9:2] | | | | | | | 00h | 1 | |
| P0 | 80h | 1st | W | Write Idle Mode | 0 | 0 | 0 | 0 | 0 | R | G | B | 07h | - |
| P0 | 81h | 1st | R | Read Idle Mode Color | 0 | 0 | 0 | 0 | 0 | R | G | B | 07h | - |
| P0 | A1h | 1st | R | Read the DDB from the provided location | SID[7:0] | | | | | | | 00h | 1 | |
| | | 2nd | | | SID[15:8] | | | | | | | 00h | 1 | |
| | | 3rd | | | MRID[7:0] | | | | | | | 00h | 1 | |
| | | 4th | | | MRID[15:8] | | | | | | | 00h | 1 | |
| | | 5th | | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | FFh | - |
| P0 | A8h | 1st | R | Continue reading the DDB from the last read location | D1[7:0] | | | | | | | 00h | - | |
| | | 2nd | | | D2[7:0] | | | | | | | 00h | - | |
| | | : | | | : | | | | | | | 00h | - | |
| | | nth | | | Dn[7:0] | | | | | | | 00h | - | |
| P0 | AAh | 1st | R | Read First Checksum | FCS[7:0] | | | | | | | 00h | - | |
| P0 | AFh | 1st | R | Read Continue Checksum | CCS[7:0] | | | | | | | 00h | - | |
| P0 | DAh | 1st | R | Read ID1 | ID1[7:0] | | | | | | | 00h | 3 | |
| P0 | DBh | 1st | R | Read ID2 | ID2[6:0] | | | | | | | 00h | 3 | |
| P0 | DCh | 1st | R | Read ID3 | ID3[7:0] | | | | | | | 00h | 3 | |
| P0 | FFh | 1st | W | EXTC Command Set Enable Register | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 98h | - |
| | | 2nd | W | | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 81h | - | |
| | | 3rd | W | | PAGE[7:0] | | | | | | | 00h | - | |

Notes:

1. Undefined commands are treated as NOP (00h) command.
2. Commands 10h, 13h, 22h, 23h, 26h, 28h, 29h, 36h, 38h, 39h, 51h, 53h, 55h, 5Eh, 68h and 80h are updated during V-SYNC when Module is in Sleep Out Mode to avoid abnormal visual effects. During Sleep In mode, these commands are updated immediately. Commands 05h, 0Ah, 0Bh, 0Ch, 0Dh, 0Eh, 0Fh, 45h, 52h, 54h, 56h, 5Fh, 69h, 81h, A1h, A8h of these commands is updated immediately both in Sleep In mode and Sleep Out mode.

5.2.2. Page 1 Command Set

| Command | | | W/R | Function | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default (hex) | MTP (times) | |
|---------|---------|-----------|-----|--|-------------|-----------------------|------------|------------|-----------------------|-----------|------------|--------------|---------------|-------------|---|
| Page | Address | Parameter | | | | | | | | | | | | | |
| P1 | 00h | 1st | R | Read ID4 | ID4[23:16] | | | | | | | 98h | - | | |
| P1 | 01h | 1st | R | | ID4[15:8] | | | | | | | 81h | - | | |
| P1 | 02h | 1st | R | | ID4[7:0] | | | | | | | 00h | - | | |
| P1 | 22h | 1st | W/R | Set Panel Operation Mode and Data Complement Setting | 0 | 0 | EPF[1:0] | BGR_PA NEL | REV_PA NEL | SS_PANE L | GS_PAN EL | 30h | 1 | | |
| P1 | 25h | 1st | W/R | Blanking Porch Control | VFP[7:0] | | | | | | | 14h | - | | |
| P1 | 26h | 1st | W/R | | VBP[7:0] | | | | | | | 14h | - | | |
| P1 | 29h | 1st | W/R | Touch | 0 | 0 | 0 | 0 | 0 | 0 | 0 | TOUCH_ | 00h | - | |
| P1 | 2Eh | 1st | W/R | Gate Number | NL[7:0] | | | | | | | C8h | 1 | | |
| P1 | 31h | 1st | W/R | Display Inversion | 0 | 0 | 0 | 0 | DINV[3:0] | | | 00h | 1 | | |
| P1 | 34h | 1st | W/R | Dithering Enable | 0 | 0 | 0 | 0 | 0 | 0 | 0 | DITH_EN | 00h | 1 | |
| P1 | 40h | 1st | W/R | Pump Clock Adjustment | 0 | EXT_CPCK_SEL[1:0] | 1 | 0 | 0 | VCL_CLK | VGHL_CL | 33h | 1 | | |
| P1 | 41h | 1st | W/R | | 0 | VCL_CLK_SELA[2:0] | | 0 | VCL_CLK_SELB[2:0] | | 33h | 1 | | | |
| P1 | 42h | 1st | W/R | | 0 | VGHL_CLK_SELA[2:0] | | 0 | VGHL_CLK_SELB[2:0] | | 44h | 1 | | | |
| P1 | 43h | 1st | W/R | | 0 | 4002_RATIO_FREQA[2:0] | | 0 | 4002_RATIO_FREQB[2:0] | | 55h | 1 | | | |
| P1 | 50h | 1st | W/R | Power Control 1 | VREG1[7:0] | | | | | | | 95h | 1 | | |
| P1 | 51h | 1st | W/R | | VREG2[7:0] | | | | | | | 95h | 1 | | |
| P1 | 52h | 1st | W/R | VCOM Control 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | VCM1[8] | 00h | 3 | |
| P1 | 53h | 1st | W/R | | VCM1[7:0] | | | | | | | 7Bh | 3 | | |
| P1 | 54h | 1st | W/R | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | VCM2[8] | 00h | 3 | |
| P1 | 55h | 1st | W/R | | VCM2[7:0] | | | | | | | 7Bh | 3 | | |
| P1 | 56h | 1st | W/R | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | NVM1 | 00h | - | |
| P1 | 58h | 1st | W/R | Entry Mode Set | LVD_EN | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 00h | 1 |
| P1 | 60h | 1st | W/R | Source Timing Adjust | 0 | 0 | SDT[5:0] | | | | 14h | 1 | | | |
| P1 | 61h | 1st | W/R | | 0 | 0 | CRT[5:0] | | | | 00h | 1 | | | |
| P1 | 62h | 1st | W/R | | 0 | 0 | EQT[5:0] | | | | 19h | 1 | | | |
| P1 | 63h | 1st | W/R | | 0 | 0 | PCT[5:0] | | | | 10h | 1 | | | |
| P1 | A0h | 1st | W/R | Positive Gamma Correction | 0 | 0 | VP0[5:0] | | | | 00h | 1 | | | |
| P1 | A1h | 1st | W/R | | 0 | VP4[6:0] | | | | 0Dh | 1 | | | | |
| P1 | A2h | 1st | W/R | | 0 | VP8[6:0] | | | | 1Dh | 1 | | | | |
| P1 | A3h | 1st | W/R | | 0 | 0 | VP12[5:0] | | | | 11h | 1 | | | |
| P1 | A4h | 1st | W/R | | 0 | 0 | VP16[5:0] | | | | 0Ch | 1 | | | |
| P1 | A5h | 1st | W/R | | 0 | VP24[6:0] | | | | 23h | 1 | | | | |
| P1 | A6h | 1st | W/R | | 0 | 0 | VP36[5:0] | | | | 17h | 1 | | | |
| P1 | A7h | 1st | W/R | | 0 | 0 | VP52[5:0] | | | | 1Ch | 1 | | | |
| P1 | A8h | 1st | W/R | | VP80[7:0] | | | | 82h | 1 | | | | | |
| P1 | A9h | 1st | W/R | | 0 | 0 | VP111[5:0] | | | | 21h | 1 | | | |
| P1 | AAh | 1st | W/R | | 0 | 0 | VP144[5:0] | | | | 2Ah | 1 | | | |
| P1 | ABh | 1st | W/R | | VP175[7:0] | | | | 6Bh | 1 | | | | | |
| P1 | ACh | 1st | W/R | | 0 | 0 | VP203[5:0] | | | | 19h | 1 | | | |
| P1 | ADh | 1st | W/R | | 0 | 0 | VP219[5:0] | | | | 14h | 1 | | | |
| P1 | A Eh | 1st | W/R | | VP231[6:0] | | | | 45h | 1 | | | | | |
| P1 | AFh | 1st | W/R | | 0 | 0 | VP239[5:0] | | | | 1Dh | 1 | | | |
| P1 | B0h | 1st | W/R | | 0 | 0 | VP243[5:0] | | | | 23h | 1 | | | |
| P1 | B1h | 1st | W/R | | VP247[6:0] | | | | 52h | 1 | | | | | |
| P1 | B2h | 1st | W/R | | VP251[6:0] | | | | 63h | 1 | | | | | |
| P1 | B3h | 1st | W/R | | 0 | 0 | VP255[5:0] | | | | 39h | 1 | | | |
| P1 | B6h | 1st | W/R | | Pad Control | IM_SW_EN | IM_SW[2:0] | | RS_SW_EN | 0 | RS_SW[1:0] | | 00h | 1 | |
| P1 | B7h | 1st | W/R | | | 0 | 0 | 0 | 0 | 0 | 0 | LANSEL_SW_EN | LANSEL_SW | 00h | 1 |

| Command | | | W/R | Function | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default (hex) | MTP (times) |
|---------|---------|-----------|-----|----------------------------------|--------------------------|---------------|--------------|----|-------------|--------------|-----|-----|---------------|-------------|
| Page | Address | Parameter | | | | | | | | | | | | |
| P1 | C0h | 1st | W/R | Negative Gamma Correction | 0 | 0 | VN0[5:0] | | | | | 00h | 1 | |
| P1 | C1h | 1st | W/R | | 0 | VN4[6:0] | | | | | 0Dh | 1 | | |
| P1 | C2h | 1st | W/R | | 0 | VN8[6:0] | | | | | 1Dh | 1 | | |
| P1 | C3h | 1st | W/R | | 0 | 0 | VN12[5:0] | | | | | 11h | 1 | |
| P1 | C4h | 1st | W/R | | 0 | 0 | VN16[5:0] | | | | | 0Ch | 1 | |
| P1 | C5h | 1st | W/R | | 0 | VN24[6:0] | | | | | 23h | 1 | | |
| P1 | C6h | 1st | W/R | | 0 | 0 | VN36[5:0] | | | | | 17h | 1 | |
| P1 | C7h | 1st | W/R | | 0 | 0 | VN52[5:0] | | | | | 1Ch | 1 | |
| P1 | C8h | 1st | W/R | | VN80[7:0] | | | | | 82h | 1 | | | |
| P1 | C9h | 1st | W/R | | 0 | 0 | VN111[5:0] | | | | | 21h | 1 | |
| P1 | CAh | 1st | W/R | | 0 | 0 | VN144[5:0] | | | | | 2Ah | 1 | |
| P1 | CBh | 1st | W/R | | VN175[7:0] | | | | | 6Bh | 1 | | | |
| P1 | CCh | 1st | W/R | | 0 | 0 | VN203[5:0] | | | | | 19h | 1 | |
| P1 | CDh | 1st | W/R | | 0 | 0 | VN219[5:0] | | | | | 14h | 1 | |
| P1 | CEh | 1st | W/R | | 0 | VN231[6:0] | | | | | 45h | 1 | | |
| P1 | CFh | 1st | W/R | | 0 | 0 | VN239[5:0] | | | | | 1Dh | 1 | |
| P1 | D0h | 1st | W/R | | 0 | 0 | VN243[5:0] | | | | | 23h | 1 | |
| P1 | D1h | 1st | W/R | | 0 | VN247[6:0] | | | | | 52h | 1 | | |
| P1 | D2h | 1st | W/R | | 0 | VN251[6:0] | | | | | 63h | 1 | | |
| P1 | D3h | 1st | W/R | | 0 | 0 | VN255[5:0] | | | | | 39h | 1 | |
| P1 | E0h | 1st | W/R | | NV Memory Write | PGM_DATA[7:0] | | | | | 00h | - | | |
| P1 | E1h | 1st | W/R | | | PGM_ADR[7:0] | | | | | 00h | - | | |
| P1 | E2h | 1st | W/R | | | PGM_ADR[15:8] | | | | | 00h | - | | |
| P1 | E3h | 1st | W/R | | NV Memory Protection Key | KEY[23:16] | | | | | 00h | - | | |
| P1 | E4h | 1st | W/R | | | KEY[15:8] | | | | | 00h | - | | |
| P1 | E5h | 1st | W/R | | | KEY[7:0] | | | | | 00h | - | | |
| P1 | E6h | 1st | R | NV Memory Status Read | 0 | ID2_MK[2:0] | | | 0 | ID1_MK[2:0] | | | 00h | - |
| P1 | E7h | 1st | R | | 0 | 0 | 0 | 0 | ID3_MK[2:0] | | | 00h | - | |
| P1 | E8h | 1st | R | | GAMMA_P_MK | GAMMA_N_MK | VCM2_MK[2:0] | | | VCM1_MK[2:0] | | | 00h | - |
| P1 | E9h | 1st | R | | OTP_BUSY | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 00h | - |
| P1 | F0h | 1st | W/R | Time Stamp | Time_Stamp_Week[7:0] | | | | | | | 00h | 1 | |
| P1 | F1h | 1st | W/R | | Time_Stamp_Year[7:0] | | | | | | | 00h | 1 | |
| P1 | FFh | 1st | W | EXTC Command Set Enable Register | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 98h | - |
| | | 2nd | W | | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 81h | - |
| | | 3rd | W | | PAGE[7:0] | | | | | | | 01h | - | |

5.2.3. Page 2 Command Set

| Command | | | W/R | Function | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default (hex) | MTP (times) | |
|---------|---------|-----------|-----|-----------------------------------|--------------------------------------|-------------------------|-----------------|-----------------|---------------------------|------------|---------|-----|---------------|-------------|---|
| Page | Address | Parameter | | | | | | | | | | | | | |
| P2 | 03h | 1st | W/R | Dynamic Backlight Control 1 | 0 | TT_STP_MED[2:0] | | 1 | TT_STP_LOW[2:0] | | 29h | | 1 | | |
| P2 | 04h | 1st | W/R | | 0 | ST_TIM_LOW[2:0] | | 0 | TT_STP_HIGH[2:0] | | 14h | | 1 | | |
| P2 | 05h | 1st | W/R | | 0 | ST_TIM_HIGH[2:0] | | 0 | ST_TIM_MED[2:0] | | 32h | | 1 | | |
| P2 | 06h | 1st | W/R | Dynamic Backlight Control 2 | 0 | PWM_DUTY_PRECISION[2:0] | | 0 | LEDPW_M_POL | LEDON_POL | LEDON | | 00h | 1 | |
| P2 | 07h | 1st | W/R | | PWM_DIV[7:0] | | | | | | | | 0Eh | 1 | |
| P2 | 10h | 1st | W/R | IIE Function Control | 0 | 0 | 0 | AXIS_EN | 0 | PRT_EN | SKIN_EN | 0 | 06h | 1 | |
| P2 | 11h | 1st | W/R | | 0 | AUTO_M_EAN | 0 | 0 | CN_EN | CN_INV | SHP_EN | 0 | 00h | 1 | |
| P2 | 12h | 1st | W/R | | 0 | 0 | 0 | 0 | 0 | CN_LV[1:0] | | 02h | | 1 | |
| P2 | 13h | 1st | W/R | | 0 | 0 | SHP_LV[1:0] | | SRE_MIDIV_LV[1:0] | | 0 | 0 | 20h | | 1 |
| P2 | 15h | 1st | W/R | | RGB_MEAN[7:0] | | | | | | | | 80h | | 1 |
| P2 | 16h | 1st | W/R | | SRE_HYS_TERESIS_EN | 0 | 0 | SRE_DIM_EN | SRE_SC_EN | SRE_CE_EN | 0 | 0 | 1Ch | | 1 |
| P2 | 17h | 1st | W/R | | 0 | SRE_OFFS[2:0] | | 0 | SRE_DIM_STP[2:0] | | 01h | | 1 | | |
| P2 | 18h | 1st | W/R | | SRE_DIM_FRAME[7:0] | | | | | | | | 08h | | 1 |
| P2 | 19h | 1st | W/R | | SRE_SC_GAIN_ADJ[2:0] | | | | SRE_HYSTERESIS_LIMIT[4:0] | | | | C0h | | 1 |
| P2 | 1Ah | 1st | W/R | | IIE Saturation Enhancement Control 1 | | 0 | 0 | SE_RATIO_L[5:0] | | | | 07h | | 1 |
| P2 | 1Bh | 1st | W/R | 0 | | 0 | SE_RATIO_M[5:0] | | | | 09h | | 1 | | |
| P2 | 1Ch | 1st | W/R | 0 | | 0 | SE_RATIO_H[5:0] | | | | 0Ch | | 1 | | |
| P2 | 40h | 1st | W/R | IIE Saturation Protection Control | 0 | 0 | 0 | LEVEL0_SR[4:0] | | | | 02h | | 1 | |
| P2 | 41h | 1st | W/R | | 0 | | 0 | LEVEL1_SR[4:0] | | | | 04h | | 1 | |
| P2 | 42h | 1st | W/R | | 0 | | 0 | LEVEL2_SR[4:0] | | | | 06h | | 1 | |
| P2 | 43h | 1st | W/R | | 0 | | 0 | LEVEL3_SR[4:0] | | | | 08h | | 1 | |
| P2 | 44h | 1st | W/R | | 0 | | 0 | LEVEL4_SR[4:0] | | | | 0Ah | | 1 | |
| P2 | 45h | 1st | W/R | | 0 | | 0 | LEVEL5_SR[4:0] | | | | 0Ch | | 1 | |
| P2 | 46h | 1st | W/R | | 0 | | 0 | LEVEL6_SR[4:0] | | | | 0Eh | | 1 | |
| P2 | 47h | 1st | W/R | | 0 | | 0 | LEVEL7_SR[4:0] | | | | 0Eh | | 1 | |
| P2 | 48h | 1st | W/R | | 0 | | 0 | LEVEL8_SR[4:0] | | | | 0Ch | | 1 | |
| P2 | 49h | 1st | W/R | | 0 | | 0 | LEVEL9_SR[4:0] | | | | 0Ah | | 1 | |
| P2 | 4Ah | 1st | W/R | | 0 | | 0 | LEVEL10_SR[4:0] | | | | 08h | | 1 | |
| P2 | 4Bh | 1st | W/R | | 0 | | 0 | LEVEL11_SR[4:0] | | | | 06h | | 1 | |
| P2 | 4Ch | 1st | W/R | | 0 | | 0 | LEVEL12_SR[4:0] | | | | 04h | | 1 | |
| P2 | 4Dh | 1st | W/R | | 0 | | 0 | LEVEL13_SR[4:0] | | | | 03h | | 1 | |
| P2 | 4Eh | 1st | W/R | | 0 | | 0 | LEVEL14_SR[4:0] | | | | 02h | | 1 | |
| P2 | 4Fh | 1st | W/R | 0 | | 0 | LEVEL15_SR[4:0] | | | | 00h | | 1 | | |
| P2 | 5Ah | 1st | W/R | IIE Sharpness Enhancement Control | 0 | 0 | 0 | SHP_RATIO[4:0] | | | | 18h | | 1 | |
| P2 | 5Bh | 1st | W/R | | SHP_THR_H[7:0] | | | | | | | | 64h | | 1 |
| P2 | 5Ch | 1st | W/R | | SHP_THR_L[7:0] | | | | | | | | 1Eh | | 1 |
| P2 | 60h | 1st | W/R | IIE Contrast Enhancement Control | 0 | 0 | CN_00[5:0] | | | | 0Eh | | 1 | | |
| P2 | 61h | 1st | W/R | | 0 | | 0 | CN_01[5:0] | | | | 18h | | 1 | |
| P2 | 62h | 1st | W/R | | 0 | | 0 | CN_02[5:0] | | | | 24h | | 1 | |
| P2 | 63h | 1st | W/R | | 0 | | 0 | CN_03[5:0] | | | | 28h | | 1 | |
| P2 | 64h | 1st | W/R | | 0 | | 0 | CN_04[5:0] | | | | 24h | | 1 | |
| P2 | 65h | 1st | W/R | | 0 | | 0 | CN_05[5:0] | | | | 18h | | 1 | |
| P2 | 66h | 1st | W/R | | 0 | | 0 | CN_06[5:0] | | | | 0Eh | | 1 | |
| P2 | FFh | 1st | W | EXTC Command Set Enable Register | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 98h | - | |
| | | 2nd | W | | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 81h | - | |
| | | 3rd | W | | PAGE[7:0] | | | | | | | | 02h | | - |

5.2.4. Page 3 Command Set

| Command | | | W/R | Function | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default (hex) | MTP (times) |
|---------|---------|-----------|-----|----------------------------------|----|----|----|----|----|----|----|----|---------------|-------------|
| Page | Address | Parameter | | | | | | | | | | | | |
| P3 | FFh | 1st | W | EXTC Command Set Enable Register | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 98h | - |
| | | 2nd | W | | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 81h | - |
| | | 3rd | W | PAGE[7:0] | | | | | | | | | | 03h |

5.2.5. Page 4 Command Set

| Command | | | W/R | Function | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default (hex) | MTP (times) | |
|---------|---------|-----------|-----|-------------------------------------|-----------------------|----------------------------|-------------------|--------------------|-------------------|-----------------|------------|-------------------|---------------|-------------|---|
| Page | Address | Parameter | | | | | | | | | | | | | |
| P4 | 00h | 1st | W/R | DSI Lanes Control | MIPI_LANE_SEL | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 80h | 1 | |
| P4 | 0Bh | 1st | W/R | SSC Function | SSC_DIG_EN | SSC_DIG_STEP[2:0] | | | 0 | 0 | 0 | 0 | 00h | - | |
| P4 | 0Eh | 1st | W/R | | SSC_DIG_CNT[7:0] | | | | | | | | 00h | - | |
| P4 | 21h | 1st | W/R | Charge-Pump Setting | DMY_PUMP | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 80h | 1 | |
| P4 | 23h | 1st | W/R | Idle Mode Frame Rate | RTNB[7:0] | | | | | | | | 2Dh | 1 | |
| P4 | 26h | 1st | W/R | Internal SD Timing Control | DET_TOLERANCE_OP[3:0] | | | | 0 | 1 | 1 | 0 | 76h | 1 | |
| P4 | 27h | 1st | W/R | Touch Synchronization Timing Adjust | TOUCH_OPT[1:0] | | VSOD[1:0] | | HSOM[1:0] | | HFP_HP_OPT | VS_PW_OPT | 00h | 1 | |
| P4 | 28h | 1st | W/R | | HSOD[7:0] | | | | | | | | 05h | 1 | |
| P4 | 29h | 1st | W/R | | HSOHW[7:0] | | | | | | | | 19h | 1 | |
| P4 | 2Ah | 1st | W/R | | VS_OUT_EN | HS_OUT_EN | VS_OUT_POL | HS_OUT_POL | 0 | 0 | STB_EN | 0 | F0h | 1 | |
| P4 | 2Dh | 1st | W/R | BIST Mode Function | FRM_PT[7:0] | | | | | | | | FFh | 1 | |
| P4 | 2Fh | 1st | W/R | | 0 | 0 | FRM_CYC[1:0] | | 0 | 0 | 0 | FRM_EN | 00h | 1 | |
| P4 | 35h | 1st | W/R | Source Timing Setting | 0 | 0 | 0 | 1 | HZ_OPT | 1 | 1 | 1 | 17h | 1 | |
| P4 | 3Ah | 1st | W/R | Power Saving Control | PS_EN | PCST[6:0] | | | | | | | | A4h | 1 |
| P4 | 69h | 1st | W/R | Power Control 1 | 1 | CP_VCL_CLP_OPTION_PRE[2:0] | | | 0 | 1 | 1 | 1 | D7h | - | |
| P4 | 6Ch | 1st | W/R | VCORE Setting | 0 | 0 | 0 | 1 | DI_VCORE_SEL[3:0] | | | | 15h | 1 | |
| P4 | 6Eh | 1st | W/R | Power Control 2 | 0 | DI_PWR_REG | REG1_VRH_CP[5:0] | | | | | 6Ah | 1 | | |
| P4 | 6Fh | 1st | W/R | Power Control 3 | VGLREG_EN_GO | DI_CP_VGH_BH[2:0] | | | DI_CP_VGL_BL[2:0] | | | DI_CP_VCL_REG_SEL | 34h | 1 | |
| P4 | 7Ah | 1st | W/R | VREG1/2 Setting | 0 | 0 | 0 | DI_REG_REG1_EN_CAP | 0 | 0 | 0 | 0 | 00h | 1 | |
| P4 | 87h | 1st | W/R | LVD Function 1 | DI_LVD_CTL[3:0] | | | | 1 | 0 | 1 | 0 | BAh | 1 | |
| P4 | 88h | 1st | W/R | LVD Function 2 | DIS_LVD_CHK | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 8Bh | 1 | |
| P4 | 8Bh | 1st | W/R | VCOM Control 2 | 1 | 1 | 1 | 0 | DI_VCM_SELO_E | 0 | 1 | 1 | E3h | 1 | |
| P4 | 8Ch | 1st | W/R | Power Control 4 | 0 | DI_VCOM_REG_VGLREG[6:0] | | | | | | 03h | 1 | | |
| P4 | 8Dh | 1st | W/R | | 0 | DI_VCOM_CP_VGLCLP[6:0] | | | | | | 14h | 1 | | |
| P4 | B2h | 1st | W/R | Reload Gamma Setting | RELOAD_GMA_EN | RELOAD_GMA_L | 0 | 1 | 0 | 0 | 0 | 1 | D1h | 1 | |
| P4 | B5h | 1st | W/R | Gamma Bias Level | 0 | 0 | 0 | 0 | 0 | DI_GMA_GAP[2:0] | | | 02h | 1 | |
| P4 | BBh | 1st | W/R | TS_CTRL 1 | EN_TEMP_PROC | 0 | CP_VGH_TAP_C[5:0] | | | | | 1Eh | 1 | | |
| P4 | BCh | 1st | W/R | | 0 | 0 | CP_VGH_TAP_L[5:0] | | | | | 1Eh | 1 | | |
| P4 | BDh | 1st | W/R | | 0 | 0 | CP_VGH_TAP_M[5:0] | | | | | 1Eh | 1 | | |
| P4 | BEh | 1st | W/R | | 0 | 0 | CP_VGH_TAP_H[5:0] | | | | | 1Eh | 1 | | |
| P4 | BFh | 1st | W/R | | VCOM_C[7:0] | | | | | | | | 4Ch | 1 | |
| P4 | C0h | 1st | W/R | | VCOM_L[7:0] | | | | | | | | 4Ch | 1 | |
| P4 | C1h | 1st | W/R | | VCOM_M[7:0] | | | | | | | | 4Ch | 1 | |
| P4 | C2h | 1st | W/R | | VCOM_H[7:0] | | | | | | | | 4Ch | 1 | |
| P4 | C4h | 1st | R | Read VCOM OTP Data | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | OTP_VCM1[8] | 00h | - |
| P4 | C5h | 1st | R | | OTP_VCM1[7:0] | | | | | | | | 7Bh | - | |
| P4 | C6h | 1st | R | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | OTP_VCM2[8] | 00h | - |
| P4 | C7h | 1st | R | | OTP_VCM2[7:0] | | | | | | | | 7Bh | - | |

| Command | | | W/R | Function | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default (hex) | MTP (times) | |
|---------|---------|-----------|-----|----------------------------------|------------------|-------------|-------------|------------------|------------|---------------|----|-----|---------------|-------------|-----|
| Page | Address | Parameter | | | | | | | | | | | | | |
| P4 | C8h | 1st | W/R | TS_CTRL 2 | TS_TH0[7:0] | | | | | | | 00h | - | | |
| P4 | C9h | 1st | W/R | | TS_TH1[7:0] | | | | | | | 00h | - | | |
| P4 | CAh | 1st | W/R | | TS_TH2[7:0] | | | | | | | 00h | - | | |
| P4 | CBh | 1st | W/R | | TS_TH3[7:0] | | | | | | | 00h | - | | |
| P4 | CCh | 1st | W/R | | TS_TH0[9:8] | TS_TH1[9:8] | TS_TH2[9:8] | TS_TH3[9:8] | | | | 00h | 1 | | |
| P4 | CDh | 1st | W/R | | TS_DEBT_OPT[3:0] | | | TS_HYST_OPT[3:0] | | | | | | 02h | 1 |
| P4 | CEh | 1st | W/R | | EN_TS | VCOM_C [8] | VCOM_L [8] | VCOM_M [8] | VCOM_H [8] | 1 | 0 | 0 | 04h | 1 | |
| P4 | D7h | 1st | W/R | | OTP Control | 0 | 0 | 0 | OTP_PA TH | PROG_SEL[1:0] | | 0 | 0 | 1C | - |
| P4 | FFh | 1st | W | EXTC Command Set Enable Register | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 98h | - | |
| | | 2nd | W | | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 81h | - | |
| | | 3rd | W | | PAGE[7:0] | | | | | | | | | | 04h |

5.2.6. Page 5 Command Set

| Command | | | W/R | Function | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default (hex) | MTP (times) |
|---------|---------|-----------|-----|----------------------------------|------------------------|----|----|----|----|----|----|-----|---------------|-------------|
| Page | Address | Parameter | | | | | | | | | | | | |
| P5 | 00h | 1st | W | Fine Digital Gamma Control 1 | RDIN0[7:0] | | | | | | | 00h | - | |
| P5 | 01h | 1st | W | | RDIN1[7:0] | | | | | | | 00h | - | |
| P5 | 02h | 1st | W | | RDIN2[7:0] | | | | | | | 00h | - | |
| P5 | 03h | 1st | W | | RDIN3[7:0] | | | | | | | 00h | - | |
| P5 | 04h | 1st | W | | RDIN4[7:0] | | | | | | | 00h | - | |
| P5 | 05h | 1st | W | | RDIN5[7:0] | | | | | | | 00h | - | |
| P5 | : | 1st | W | | : | | | | | | | 00h | - | |
| P5 | 7Ah | 1st | W | | RDIN122[7:0] | | | | | | | 00h | - | |
| P5 | 7Bh | 1st | W | | RDIN123[7:0] | | | | | | | 00h | - | |
| P5 | 7Ch | 1st | W | | RDIN124[7:0] | | | | | | | 00h | - | |
| P5 | 7Dh | 1st | W | | RDIN125[7:0] | | | | | | | 00h | - | |
| P5 | 7Eh | 1st | W | | RDIN126[7:0] | | | | | | | 00h | - | |
| P5 | 7Fh | 1st | W | | RDIN127[7:0] | | | | | | | 00h | - | |
| P5 | 80h | 1st | W/R | | Digital 3 Gamma Enable | 0 | 0 | 0 | 0 | 0 | 0 | 0 | EN_3G | 00h |
| P5 | FFh | 1st | W | EXTC Command Set Enable Register | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 98h | - |
| | | 2nd | W | | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 81h | - | |
| | | 3rd | W | | PAGE[7:0] | | | | | | | 05h | - | |

5.2.7. Page 6 Command Set

| Command | | | W/R | Function | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default (hex) | MTP (times) |
|---------|---------|-----------|-----|------------------------------|----------------------------------|----|----|----|----|----|-----|-----|---------------|-------------|
| Page | Address | Parameter | | | | | | | | | | | | |
| P6 | 00h | 1st | W | Fine Digital Gamma Control 2 | RDIN128[7:0] | | | | | | | 00h | - | |
| P6 | 01h | 1st | W | | RDIN129[7:0] | | | | | | | 00h | - | |
| P6 | 02h | 1st | W | | RDIN130[7:0] | | | | | | | 00h | - | |
| P6 | 03h | 1st | W | | RDIN131[7:0] | | | | | | | 00h | - | |
| P6 | 04h | 1st | W | | RDIN132[7:0] | | | | | | | 00h | - | |
| P6 | 05h | 1st | W | | RDIN133[7:0] | | | | | | | 00h | - | |
| P6 | : | 1st | W | | : | | | | | | | 00h | - | |
| P6 | 7Ah | 1st | W | | RDIN250[7:0] | | | | | | | 00h | - | |
| P6 | 7Bh | 1st | W | | RDIN251[7:0] | | | | | | | 00h | - | |
| P6 | 7Ch | 1st | W | | RDIN252[7:0] | | | | | | | 00h | - | |
| P6 | 7Dh | 1st | W | | RDIN253[7:0] | | | | | | | 00h | - | |
| P6 | 7Eh | 1st | W | | RDIN254[7:0] | | | | | | | 00h | - | |
| P6 | 7Fh | 1st | W | | RDIN255[7:0] | | | | | | | 00h | - | |
| P6 | FFh | 1st | W | | EXTC Command Set Enable Register | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 98h |
| | | 2nd | W | 1 | | 0 | 0 | 0 | 0 | 0 | 1 | 81h | - | |
| | | 3rd | W | PAGE[7:0] | | | | | | | 06h | - | | |

5.2.8. Page 7 Command Set

| Command | | | W/R | Function | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default (hex) | MTP (times) |
|---------|---------|-----------|-----|------------------------------|--------------|----|----|----|----|----|----|-----|---------------|-------------|
| Page | Address | Parameter | | | | | | | | | | | | |
| P7 | 00h | 1st | W | Fine Digital Gamma Control 3 | GDIN0[7:0] | | | | | | | 00h | - | |
| P7 | 01h | 1st | W | | GDIN1[7:0] | | | | | | | 00h | - | |
| P7 | 02h | 1st | W | | GDIN2[7:0] | | | | | | | 00h | - | |
| P7 | 03h | 1st | W | | GDIN3[7:0] | | | | | | | 00h | - | |
| P7 | 04h | 1st | W | | GDIN4[7:0] | | | | | | | 00h | - | |
| P7 | 05h | 1st | W | | GDIN5[7:0] | | | | | | | 00h | - | |
| P7 | : | 1st | W | | : | | | | | | | 00h | - | |
| P7 | 7Ah | 1st | W | | GDIN122[7:0] | | | | | | | 00h | - | |
| P7 | 7Bh | 1st | W | | GDIN123[7:0] | | | | | | | 00h | - | |
| P7 | 7Ch | 1st | W | | GDIN124[7:0] | | | | | | | 00h | - | |
| P7 | 7Dh | 1st | W | | GDIN125[7:0] | | | | | | | 00h | - | |
| P7 | 7Eh | 1st | W | | GDIN126[7:0] | | | | | | | 00h | - | |
| P7 | 7Fh | 1st | W | | GDIN127[7:0] | | | | | | | 00h | - | |
| P7 | FFh | 1st | W | EXTC Command Set | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 98h | - |
| | | 2nd | W | Enable Register | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 81h | - |
| | | 3rd | W | | PAGE[7:0] | | | | | | | 07h | - | |

5.2.9. Page 8 Command Set

| Command | | | W/R | Function | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default (hex) | MTP (times) |
|---------|---------|-----------|-----|------------------------------|--------------|----|----|----|----|----|----|-----|---------------|-------------|
| Page | Address | Parameter | | | | | | | | | | | | |
| P8 | 00h | 1st | W | Fine Digital Gamma Control 4 | GDIN128[7:0] | | | | | | | 00h | - | |
| P8 | 01h | 1st | W | | GDIN129[7:0] | | | | | | | 00h | - | |
| P8 | 02h | 1st | W | | GDIN130[7:0] | | | | | | | 00h | - | |
| P8 | 03h | 1st | W | | GDIN131[7:0] | | | | | | | 00h | - | |
| P8 | 04h | 1st | W | | GDIN132[7:0] | | | | | | | 00h | - | |
| P8 | 05h | 1st | W | | GDIN133[7:0] | | | | | | | 00h | - | |
| P8 | : | 1st | W | | : | | | | | | | 00h | - | |
| P8 | 7Ah | 1st | W | | GDIN250[7:0] | | | | | | | 00h | - | |
| P8 | 7Bh | 1st | W | | GDIN251[7:0] | | | | | | | 00h | - | |
| P8 | 7Ch | 1st | W | | GDIN252[7:0] | | | | | | | 00h | - | |
| P8 | 7Dh | 1st | W | | GDIN253[7:0] | | | | | | | 00h | - | |
| P8 | 7Eh | 1st | W | | GDIN254[7:0] | | | | | | | 00h | - | |
| P8 | 7Fh | 1st | W | | GDIN255[7:0] | | | | | | | 00h | - | |
| P8 | FFh | 1st | W | EXTC Command Set | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 98h | - |
| | | 2nd | W | Enable Register | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 81h | - |
| | | 3rd | W | | PAGE[7:0] | | | | | | | 08h | - | |

5.2.10. Page 9 Command Set

| Command | | | W/R | Function | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default (hex) | MTP (times) |
|---------|---------|-----------|-----|------------------------------|----------------------------------|----|----|----|----|----|-----|-----|---------------|-------------|
| Page | Address | Parameter | | | | | | | | | | | | |
| P9 | 00h | 1st | W | Fine Digital Gamma Control 5 | BDIN0[7:0] | | | | | | | 00h | - | |
| P9 | 01h | 1st | W | | BDIN1[7:0] | | | | | | | 00h | - | |
| P9 | 02h | 1st | W | | BDIN2[7:0] | | | | | | | 00h | - | |
| P9 | 03h | 1st | W | | BDIN3[7:0] | | | | | | | 00h | - | |
| P9 | 04h | 1st | W | | BDIN4[7:0] | | | | | | | 00h | - | |
| P9 | 05h | 1st | W | | BDIN5[7:0] | | | | | | | 00h | - | |
| P9 | : | 1st | W | | : | | | | | | | 00h | - | |
| P9 | 7Ah | 1st | W | | BDIN122[7:0] | | | | | | | 00h | - | |
| P9 | 7Bh | 1st | W | | BDIN123[7:0] | | | | | | | 00h | - | |
| P9 | 7Ch | 1st | W | | BDIN124[7:0] | | | | | | | 00h | - | |
| P9 | 7Dh | 1st | W | | BDIN125[7:0] | | | | | | | 00h | - | |
| P9 | 7Eh | 1st | W | | BDIN126[7:0] | | | | | | | 00h | - | |
| P9 | 7Fh | 1st | W | | BDIN127[7:0] | | | | | | | 00h | - | |
| P9 | FFh | 1st | W | | EXTC Command Set Enable Register | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 98h |
| | | 2nd | W | 1 | | 0 | 0 | 0 | 0 | 0 | 1 | 81h | - | |
| | | 3rd | W | PAGE[7:0] | | | | | | | 09h | - | | |

5.2.11. Page 10 Command Set

| Command | | | W/R | Function | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default (hex) | MTP (times) |
|---------|---------|-----------|-----|------------------------------|----------------------------------|----|----|----|----|----|-----|-----|---------------|-------------|
| Page | Address | Parameter | | | | | | | | | | | | |
| P10 | 00h | 1st | W | Fine Digital Gamma Control 6 | BDIN128[7:0] | | | | | | | 00h | - | |
| P10 | 01h | 1st | W | | BDIN129[7:0] | | | | | | | 00h | - | |
| P10 | 02h | 1st | W | | BDIN130[7:0] | | | | | | | 00h | - | |
| P10 | 03h | 1st | W | | BDIN131[7:0] | | | | | | | 00h | - | |
| P10 | 04h | 1st | W | | BDIN132[7:0] | | | | | | | 00h | - | |
| P10 | 05h | 1st | W | | BDIN133[7:0] | | | | | | | 00h | - | |
| P10 | : | 1st | W | | : | | | | | | | 00h | - | |
| P10 | 7Ah | 1st | W | | BDIN250[7:0] | | | | | | | 00h | - | |
| P10 | 7Bh | 1st | W | | BDIN251[7:0] | | | | | | | 00h | - | |
| P10 | 7Ch | 1st | W | | BDIN252[7:0] | | | | | | | 00h | - | |
| P10 | 7Dh | 1st | W | | BDIN253[7:0] | | | | | | | 00h | - | |
| P10 | 7Eh | 1st | W | | BDIN254[7:0] | | | | | | | 00h | - | |
| P10 | 7Fh | 1st | W | | BDIN255[7:0] | | | | | | | 00h | - | |
| P10 | FFh | 1st | W | | EXTC Command Set Enable Register | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 98h |
| | | 2nd | W | 1 | | 0 | 0 | 0 | 0 | 0 | 1 | 81h | - | |
| | | 3rd | W | PAGE[7:0] | | | | | | | 0Ah | - | | |

5.3. Page 0 Command Description

5.3.1. NOP (00h)

| Command Page | | | Page 0 | | | | | | | | | | | | | | | | |
|--|---|-----|-------------|----|----|----|----|----|----|----|---------|--------|---------------|--|-----|---|-----|-----------|-----|
| Address | Parameter | W/R | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default | | | | | | | | |
| 00h | - | W | No Argument | | | | | | | | - | | | | | | | | |
| Description | <p>00h: NOP (No Operation).</p> <p>This command is an empty command. It does not have any effect on the ILI9881C.</p> <p>However, it can be used to terminate Memory Write or Memory Write Continue as described in RAMWR (Memory Write) and RAMWRC (Memory Write Continue) Commands.</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>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 | Sleep In | Yes |
| Status | Availability | | | | | | | | | | | | | | | | | | |
| Normal Mode On, Idle Mode Off, Sleep Out | Yes | | | | | | | | | | | | | | | | | | |
| Normal 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>S/W Reset</td> <td>N/A</td> </tr> <tr> <td>H/W Reset</td> <td>N/A</td> </tr> </tbody> </table> | | | | | | | | | | | Status | Default Value | Power On Sequence | N/A | S/W Reset | N/A | H/W Reset | N/A |
| Status | Default Value | | | | | | | | | | | | | | | | | | |
| Power On Sequence | N/A | | | | | | | | | | | | | | | | | | |
| S/W Reset | N/A | | | | | | | | | | | | | | | | | | |
| H/W Reset | N/A | | | | | | | | | | | | | | | | | | |
| Flow Chart | | | | | | | | | | | | | | | | | | | |

5.3.2. Software Reset (01h)

| Command Page | | | Page 0 | | | | | | | | | | | | | | | | |
|--|--|-----|-------------|----|----|----|----|----|----|----|---------|--------|---------------|--|-----|---|-----|-----------|-----|
| Address | Parameter | W/R | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default | | | | | | | | |
| 01h | - | W | No Argument | | | | | | | | | - | | | | | | | |
| Description | <p>01h: SWRESET (Software Reset).</p> <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>The display is blank immediately.</p> <p><i>Note: The Frame Memory content is kept or not by this command</i></p> | | | | | | | | | | | | | | | | | | |
| Restriction | <p>It is necessary to wait 5msec before sending a new command after software reset. The display module loads all factory default values of the display supplier to the registers during this 5msec. If Software Reset is applied during the Sleep Out mode, it will be necessary to wait 120msec for Sleep In sequence before sending the Sleep Out command.</p> <p>The Software Reset Command cannot be sent during the Sleep Out sequence.</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>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 | Sleep In | Yes |
| Status | Availability | | | | | | | | | | | | | | | | | | |
| Normal Mode On, Idle Mode Off, Sleep Out | Yes | | | | | | | | | | | | | | | | | | |
| Normal 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>S/W Reset</td> <td>N/A</td> </tr> <tr> <td>H/W Reset</td> <td>N/A</td> </tr> </tbody> </table> | | | | | | | | | | | Status | Default Value | Power On Sequence | N/A | S/W Reset | N/A | H/W Reset | N/A |
| Status | Default Value | | | | | | | | | | | | | | | | | | |
| Power On Sequence | N/A | | | | | | | | | | | | | | | | | | |
| S/W Reset | N/A | | | | | | | | | | | | | | | | | | |
| H/W Reset | N/A | | | | | | | | | | | | | | | | | | |
| Flow Chart | <pre> graph TD A[SWRESET] --> B[Display whole blank screen] B --> C[Set Commands to S/W Default Value] C --> D[Sleep In Mode] </pre> <p>Legend</p> <ul style="list-style-type: none"> Command: [SWRESET] Parameter: [Parameter] Display: [Display whole blank screen] Action: [Set Commands to S/W Default Value] Mode: [Sleep In Mode] Sequential transfer: [Sequential transfer] | | | | | | | | | | | | | | | | | | |

5.3.3. Read Number of the Errors on DSI (05h)

| Command Page | | | Page 0 | | | | | | | | | | | | | | | | |
|--|--|-----|--------|----|----|----|----|----|----|----|---------|--------|---------------|--|-----|---|-----|-----------|-----|
| Address | Parameter | W/R | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default | | | | | | | | |
| 05h | 1st | R | P[7:0] | | | | | | | | | 00h | | | | | | | |
| Description | <p>05h: RDNUMED (Read Number of the Errors on DSI).</p> <p>The parameter indicates the amount of errors on the DSI. The more detailed description of the bits is below.</p> <p>P[6..0] bits indicate the amount of the error.</p> <p>P[7] is set to 1 if there is overflow with P[6..0] bits.</p> <p>P[7..0] bits are set to 0 (and RDDSM (0Eh)'s D0 is set 0 at the same time) after the parameter information is sent (= the read function is completed).</p> <p>See also sections: "4.1.3.2.2.2 Acknowledge with Error Report (AwER)" and "5.3.8 Read Display Signal Mode (0Eh)".</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>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 | Sleep In | Yes |
| Status | Availability | | | | | | | | | | | | | | | | | | |
| Normal Mode On, Idle Mode Off, Sleep Out | Yes | | | | | | | | | | | | | | | | | | |
| Normal 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>00h</td> </tr> <tr> <td>S/W Reset</td> <td>00h</td> </tr> <tr> <td>H/W Reset</td> <td>00h</td> </tr> </tbody> </table> | | | | | | | | | | | Status | Default Value | Power On Sequence | 00h | S/W Reset | 00h | H/W Reset | 00h |
| Status | Default Value | | | | | | | | | | | | | | | | | | |
| Power On Sequence | 00h | | | | | | | | | | | | | | | | | | |
| S/W Reset | 00h | | | | | | | | | | | | | | | | | | |
| H/W Reset | 00h | | | | | | | | | | | | | | | | | | |
| Flow Chart | <pre> graph TD A[Read Number of the Corrupted Errors] -- Host --> B{P[7..0] = 00h RDDSM(0Eh)'s D0 = '0''} B --- C[Display] </pre> <p>Legend:</p> <ul style="list-style-type: none"> Command: [] Parameter: / Display: () Action: < Mode: () Sequential transfer: () | | | | | | | | | | | | | | | | | | |

5.3.4. Read Display Power Mode (0Ah)

| Command Page | | Page 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|---|--------|-----------------------------|----|----|----|----|----|----|----|---------|--------|---------------|--|--------|---|------------------------|-----------|-----------------------------|---|---------------------------|----|------------------|---|---------------|---|--------------|----|--------------|---|---------------|---|----------------|----|----------------------------|---|-------------------------|---|------------------------|----|----------------|---|----------------|---|
| Address | Parameter | W/R | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0Ah | 1st | R | D7 | D6 | 0 | D4 | D3 | D2 | 0 | 0 | 08h | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Description | 0A: RDDPM (Read Display Power Mode). 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> <th>Value</th> <th>Status</th> </tr> </thead> <tbody> <tr> <td rowspan="2">D7</td> <td rowspan="2">Booster Voltage Status</td> <td>0</td> <td>Booster Off or has a fault.</td> </tr> <tr> <td>1</td> <td>Booster On and working OK</td> </tr> <tr> <td rowspan="2">D6</td> <td rowspan="2">Idle Mode On/Off</td> <td>0</td> <td>Idle Mode Off</td> </tr> <tr> <td>1</td> <td>Idle Mode On</td> </tr> <tr> <td rowspan="2">D4</td> <td rowspan="2">Sleep In/Out</td> <td>0</td> <td>Sleep In Mode</td> </tr> <tr> <td>1</td> <td>Sleep Out Mode</td> </tr> <tr> <td rowspan="2">D3</td> <td rowspan="2">Display Normal Mode On/Off</td> <td>0</td> <td>Display Normal Mode Off</td> </tr> <tr> <td>1</td> <td>Display Normal Mode On</td> </tr> <tr> <td rowspan="2">D2</td> <td rowspan="2">Display On/Off</td> <td>0</td> <td>Display is Off</td> </tr> <tr> <td>1</td> <td>Display is On</td> </tr> </tbody> </table> | | | | | | | | | | | Bit | Description | Value | Status | D7 | Booster Voltage Status | 0 | Booster Off or has a fault. | 1 | Booster On and working OK | D6 | Idle Mode On/Off | 0 | Idle Mode Off | 1 | Idle Mode On | D4 | Sleep In/Out | 0 | Sleep In Mode | 1 | Sleep Out Mode | D3 | Display Normal Mode On/Off | 0 | Display Normal Mode Off | 1 | Display Normal Mode On | D2 | Display On/Off | 0 | Display is Off | 1 |
| Bit | Description | Value | Status | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| D7 | Booster Voltage Status | 0 | Booster Off or has a fault. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 1 | Booster On and working OK | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| D6 | Idle Mode On/Off | 0 | Idle Mode Off | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 1 | Idle Mode On | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| D4 | Sleep In/Out | 0 | Sleep In Mode | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 1 | Sleep Out Mode | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| D3 | Display Normal Mode On/Off | 0 | Display Normal Mode Off | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 1 | Display Normal Mode On | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| D2 | Display On/Off | 0 | Display is Off | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 1 | Display is On | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 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>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 | Sleep In | Yes | | | | | | | | | | | | | | | | | | | | | | | | | |
| Status | Availability | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Normal Mode On, Idle Mode Off, Sleep Out | Yes | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Normal 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>08h</td> </tr> <tr> <td>S/W Reset</td> <td>08h</td> </tr> <tr> <td>H/W Reset</td> <td>08h</td> </tr> </tbody> </table> | | | | | | | | | | | Status | Default Value | Power On Sequence | 08h | S/W Reset | 08h | H/W Reset | 08h | | | | | | | | | | | | | | | | | | | | | | | | | |
| Status | Default Value | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Power On Sequence | 08h | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| S/W Reset | 08h | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| H/W Reset | 08h | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Flow Chart | <pre> graph TD subgraph Host C[Read RDDPM] end subgraph Display P[/Send Parameter/] end C --> P </pre> <p>Legend:</p> <ul style="list-style-type: none"> Command: Rectangle Parameter: Parallelogram Display: Rounded rectangle Action: Arrow Mode: Oval Sequential transfer: Oval with tail | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

5.3.5. Read Display MADCTL (0Bh)

| Command Page | | Page 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|--|--------|--|----|----|----|----|----|----|----|---------|--------|---------------|--|--------|---|---------------------|-----------|--------------------------|---|--------------------------|----|---------------------------|---|--|---|--|----|-------------------------|---|--|---|
| Address | Parameter | W/R | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default | | | | | | | | | | | | | | | | | | | | | |
| 0Bh | 1st | R | 0 | 0 | 0 | 0 | D3 | 0 | D1 | D0 | 00h | | | | | | | | | | | | | | | | | | | | | |
| Description | 0B: RDDMADCTL (Read Display MADCTL). 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> <th>Value</th> <th>Status</th> </tr> </thead> <tbody> <tr> <td rowspan="2">D3</td> <td rowspan="2">RGB/BGR Order (RGB)</td> <td>0</td> <td>RGB (When MADCTL D3='0')</td> </tr> <tr> <td>1</td> <td>BGR (When MADCTL D3='1')</td> </tr> <tr> <td rowspan="2">D1</td> <td rowspan="2">Source scan sequence (SS)</td> <td>0</td> <td>Source output Left to Right (When MADCTL D1 = '0')</td> </tr> <tr> <td>1</td> <td>Source output Right to Left (When MADCTL D1 = '1')</td> </tr> <tr> <td rowspan="2">D0</td> <td rowspan="2">Gate scan sequence (GS)</td> <td>0</td> <td>Gate output Top to Bottom (When MADCTL D0 = '0')</td> </tr> <tr> <td>1</td> <td>Gate output Bottom to Top (When MADCTL D0 = '1')</td> </tr> </tbody> </table> <p><i>Note: For Bits D3, D1 and D0 also refer to 5.3.21Memory Access Control (36h).</i></p> | | | | | | | | | | | Bit | Description | Value | Status | D3 | RGB/BGR Order (RGB) | 0 | RGB (When MADCTL D3='0') | 1 | BGR (When MADCTL D3='1') | D1 | Source scan sequence (SS) | 0 | Source output Left to Right (When MADCTL D1 = '0') | 1 | Source output Right to Left (When MADCTL D1 = '1') | D0 | Gate scan sequence (GS) | 0 | Gate output Top to Bottom (When MADCTL D0 = '0') | 1 |
| Bit | Description | Value | Status | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| D3 | RGB/BGR Order (RGB) | 0 | RGB (When MADCTL D3='0') | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 1 | BGR (When MADCTL D3='1') | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| D1 | Source scan sequence (SS) | 0 | Source output Left to Right (When MADCTL D1 = '0') | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 1 | Source output Right to Left (When MADCTL D1 = '1') | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| D0 | Gate scan sequence (GS) | 0 | Gate output Top to Bottom (When MADCTL D0 = '0') | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 1 | Gate output Bottom to Top (When MADCTL D0 = '1') | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 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>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 | Sleep In | Yes | | | | | | | | | | | | | |
| Status | Availability | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Normal Mode On, Idle Mode Off, Sleep Out | Yes | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Normal 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>00h</td> </tr> <tr> <td>S/W Reset</td> <td>00h</td> </tr> <tr> <td>H/W Reset</td> <td>00h</td> </tr> </tbody> </table> | | | | | | | | | | | Status | Default Value | Power On Sequence | 00h | S/W Reset | 00h | H/W Reset | 00h | | | | | | | | | | | | | |
| Status | Default Value | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Power On Sequence | 00h | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| S/W Reset | 00h | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| H/W Reset | 00h | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Flow Chart | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

5.3.6. Read Display Pixel Format (0Ch)

| Command Page | | Page 0 | | | | | | | | | | | | | | | | | | |
|--|---|--------|----|----|----|----|----|----|--------|----|---------|----------|------------------------|--|--------------|---|--------------|-----------|--------------|--------|
| Address | Parameter | W/R | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default | | | | | | | | | |
| 0Ch | 1st | R | 0 | 0 | 0 | 0 | 0 | | D[2:0] | | 07h | | | | | | | | | |
| Description | 0Ch: RDDCOLMOD (Read Display COLMOD). 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>DBI[2:0]</th> <th>Interface Pixel Format</th> </tr> </thead> <tbody> <tr> <td>101</td> <td>16 bit/pixel</td> </tr> <tr> <td>110</td> <td>18 bit/pixel</td> </tr> <tr> <td>111</td> <td>24 bit/pixel</td> </tr> <tr> <td>Others</td> <td>Not defined</td> </tr> </tbody> </table> <p><i>Note: For D[2:0] also refer to 5.3.24 Interface Pixel Format (3Ah).</i></p> | | | | | | | | | | | DBI[2:0] | Interface Pixel Format | 101 | 16 bit/pixel | 110 | 18 bit/pixel | 111 | 24 bit/pixel | Others |
| DBI[2:0] | Interface Pixel Format | | | | | | | | | | | | | | | | | | | |
| 101 | 16 bit/pixel | | | | | | | | | | | | | | | | | | | |
| 110 | 18 bit/pixel | | | | | | | | | | | | | | | | | | | |
| 111 | 24 bit/pixel | | | | | | | | | | | | | | | | | | | |
| Others | Not defined | | | | | | | | | | | | | | | | | | | |
| Restriction | None | | | | | | | | | | | | | | | | | | | |
| 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>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 | Sleep In | Yes | |
| Status | Availability | | | | | | | | | | | | | | | | | | | |
| Normal Mode On, Idle Mode Off, Sleep Out | Yes | | | | | | | | | | | | | | | | | | | |
| Normal 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>07h</td> </tr> <tr> <td>S/W Reset</td> <td>07h</td> </tr> <tr> <td>H/W Reset</td> <td>07h</td> </tr> </tbody> </table> | | | | | | | | | | | Status | Default Value | Power On Sequence | 07h | S/W Reset | 07h | H/W Reset | 07h | |
| Status | Default Value | | | | | | | | | | | | | | | | | | | |
| Power On Sequence | 07h | | | | | | | | | | | | | | | | | | | |
| S/W Reset | 07h | | | | | | | | | | | | | | | | | | | |
| H/W Reset | 07h | | | | | | | | | | | | | | | | | | | |
| Flow Chart | <div style="display: flex; align-items: center; justify-content: center;"> <div style="text-align: center; margin-right: 20px;"> <div style="border: 1px solid black; padding: 2px 10px; display: inline-block;">Read RDDCOLMOD</div> ↓ <div style="border: 1px solid black; padding: 2px 10px; display: inline-block;">Send Parameter</div> </div> <div style="text-align: center; margin-left: 20px;"> Host ----- Display </div> </div> <div style="margin-left: 20px;"> <div style="border: 1px dashed black; padding: 5px;"> <p style="text-align: center;">Legend</p> <div style="display: flex; flex-direction: column; gap: 5px;"> <div style="border: 1px solid black; padding: 2px 5px; display: inline-block;">Command</div> <div style="border: 1px solid black; padding: 2px 5px; display: inline-block; transform: rotate(-15deg);">Parameter</div> <div style="border: 1px solid black; padding: 2px 5px; display: inline-block; transform: rotate(-15deg); border-radius: 15px;">Display</div> <div style="border: 1px solid black; padding: 2px 5px; display: inline-block; transform: rotate(-15deg); border-radius: 15px;">Action</div> <div style="border: 1px solid black; padding: 2px 5px; display: inline-block; border-radius: 15px;">Mode</div> <div style="border: 1px solid black; padding: 2px 5px; display: inline-block; border-radius: 15px; font-size: small;">Sequential transfer</div> </div> </div> </div> | | | | | | | | | | | | | | | | | | | |

5.3.7. Read Display Image Mode (0Dh)

| Command Page | | Page 0 | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|--|-------------|----------------|--------|----|----|----|--------|----|----|---------|----------------------|---------------|--|--------|---|---------------|-----------|----------------|---|---------------|----|----------------|---|----------------|---|---------------|
| Address | Parameter | W/R | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default | | | | | | | | | | | | | | | | |
| 0Dh | 1st | R | 0 | 0 | 0 | D4 | D3 | D[2:0] | | | 00h | | | | | | | | | | | | | | | | |
| Description | 0D: RDDIM (Read Display Image Mode). This command indicates the Image Mode status of the display, as described in the Tables below: | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | <table border="1"> <thead> <tr> <th>Bit</th> <th>Description</th> <th>Value</th> <th>Status</th> </tr> </thead> <tbody> <tr> <td rowspan="2">D4</td> <td rowspan="2">All Pixels On</td> <td>0</td> <td>Normal Display</td> </tr> <tr> <td>1</td> <td>White Display</td> </tr> <tr> <td rowspan="2">D3</td> <td rowspan="2">All Pixels Off</td> <td>0</td> <td>Normal Display</td> </tr> <tr> <td>1</td> <td>Black Display</td> </tr> </tbody> </table> | | | | | | | | | | | Bit | Description | Value | Status | D4 | All Pixels On | 0 | Normal Display | 1 | White Display | D3 | All Pixels Off | 0 | Normal Display | 1 | Black Display |
| | Bit | Description | Value | Status | | | | | | | | | | | | | | | | | | | | | | | |
| D4 | All Pixels On | 0 | Normal Display | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 1 | White Display | | | | | | | | | | | | | | | | | | | | | | | | |
| D3 | All Pixels Off | 0 | Normal Display | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 1 | Black Display | | | | | | | | | | | | | | | | | | | | | | | | |
| <table border="1"> <thead> <tr> <th>D[2:0]</th> <th>Gamma Cure Selection</th> </tr> </thead> <tbody> <tr> <td>000</td> <td>Gamma curve 1</td> </tr> <tr> <td>Others</td> <td>Not defined</td> </tr> </tbody> </table> <p><i>Note: For D[2:0] also refer to "5.3.15 Gamma Set (26h)"</i></p> | | | | | | | | | | | D[2:0] | Gamma Cure Selection | 000 | Gamma curve 1 | Others | Not defined | | | | | | | | | | | |
| D[2:0] | Gamma Cure Selection | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 000 | Gamma curve 1 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Others | Not defined | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 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>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 | Sleep In | Yes | | | | | | | | |
| Status | Availability | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Normal Mode On, Idle Mode Off, Sleep Out | Yes | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Normal 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>00h</td> </tr> <tr> <td>S/W Reset</td> <td>00h</td> </tr> <tr> <td>H/W Reset</td> <td>00h</td> </tr> </tbody> </table> | | | | | | | | | | | Status | Default Value | Power On Sequence | 00h | S/W Reset | 00h | H/W Reset | 00h | | | | | | | | |
| Status | Default Value | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Power On Sequence | 00h | | | | | | | | | | | | | | | | | | | | | | | | | | |
| S/W Reset | 00h | | | | | | | | | | | | | | | | | | | | | | | | | | |
| H/W Reset | 00h | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Flow Chart | | | | | | | | | | | | | | | | | | | | | | | | | | | |


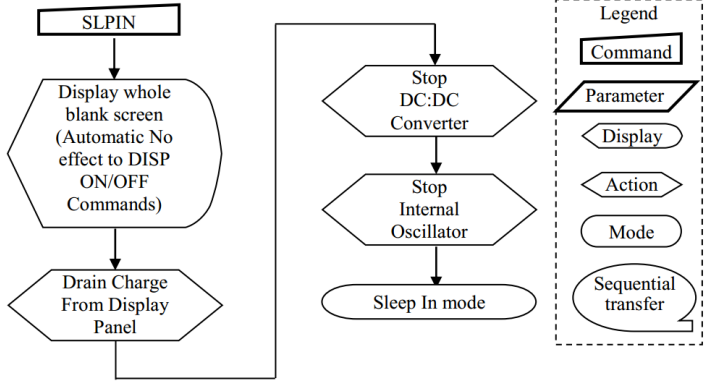
5.3.8. Read Display Signal Mode (0Eh)

| Command Page | | Page 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|---|----------------------------|----------------------------|-------------------------|----|----|----|----|----|----|---------|--------|---------------|--|--------|---|----------------------------|-----------|-------------------------|---|-------------------|----|---------------------------------|---|----------------------------|---|----------------------------|-----|-------------|-------|--------|----|--------------|---|-----------------|---|--------------|
| Address | Parameter | W/R | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0Eh | 1st | R | D7 | D6 | 0 | 0 | 0 | 0 | 0 | D0 | 00h | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Description | <p>0E: RDDSM (Read Display Signal Mode).</p> <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>Value</th> <th>Status</th> </tr> </thead> <tbody> <tr> <td rowspan="2">D7</td> <td rowspan="2">Tearing Effect Line On/Off</td> <td>0</td> <td>Tearing Effect Line Off</td> </tr> <tr> <td>1</td> <td>Tearing Effect On</td> </tr> <tr> <td rowspan="2">D6</td> <td rowspan="2">Tearing Effect Line Output Mode</td> <td>0</td> <td>Tearing Effect Line Mode 1</td> </tr> <tr> <td>1</td> <td>Tearing Effect Line Mode 2</td> </tr> </tbody> </table> <table border="1"> <thead> <tr> <th>Bit</th> <th>Description</th> <th>Value</th> <th>Status</th> </tr> </thead> <tbody> <tr> <td rowspan="2">D0</td> <td rowspan="2">Error on DSI</td> <td>0</td> <td>No Error on DSI</td> </tr> <tr> <td>1</td> <td>Error on DSI</td> </tr> </tbody> </table> <p>See also sections: "4.1.3.2.2 Acknowledge with Error Report (AwER)" and "5.3.3 Read Number of the Errors on DSI (05h)".</p> <p><i>Note: For Bit D6, also refer to 5.3.20 Tearing Effect Line On (35h).</i></p> | | | | | | | | | | | Bit | Description | Value | Status | D7 | Tearing Effect Line On/Off | 0 | Tearing Effect Line Off | 1 | Tearing Effect On | D6 | Tearing Effect Line Output Mode | 0 | Tearing Effect Line Mode 1 | 1 | Tearing Effect Line Mode 2 | Bit | Description | Value | Status | D0 | Error on DSI | 0 | No Error on DSI | 1 | Error on DSI |
| | Bit | Description | Value | Status | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | D7 | Tearing Effect Line On/Off | 0 | Tearing Effect Line Off | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | | | Tearing Effect On | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| D6 | Tearing Effect Line Output Mode | 0 | Tearing Effect Line Mode 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 1 | Tearing Effect Line Mode 2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Bit | Description | Value | Status | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| D0 | Error on DSI | 0 | No Error on DSI | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 1 | Error on DSI | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 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>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 | Sleep In | Yes | | | | | | | | | | | | | | | | | | |
| Status | Availability | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Normal Mode On, Idle Mode Off, Sleep Out | Yes | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Normal 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>00h</td> </tr> <tr> <td>S/W Reset</td> <td>00h</td> </tr> <tr> <td>H/W Reset</td> <td>00h</td> </tr> </tbody> </table> | | | | | | | | | | | Status | Default Value | Power On Sequence | 00h | S/W Reset | 00h | H/W Reset | 00h | | | | | | | | | | | | | | | | | | |
| Status | Default Value | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Power On Sequence | 00h | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| S/W Reset | 00h | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| H/W Reset | 00h | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Flow Chart | <pre> graph TD subgraph Host C[Read RDDSM] end subgraph Display P[/Send Parameter/] end C --> P </pre> <p>Legend:</p> <ul style="list-style-type: none"> Command: Rectangle Parameter: Parallelogram Display: Oval Action: Arrow Mode: Rounded Rectangle Sequential transfer: Oval with tail | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

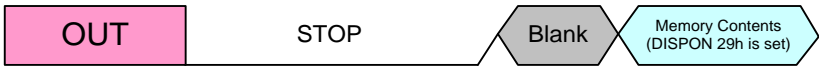
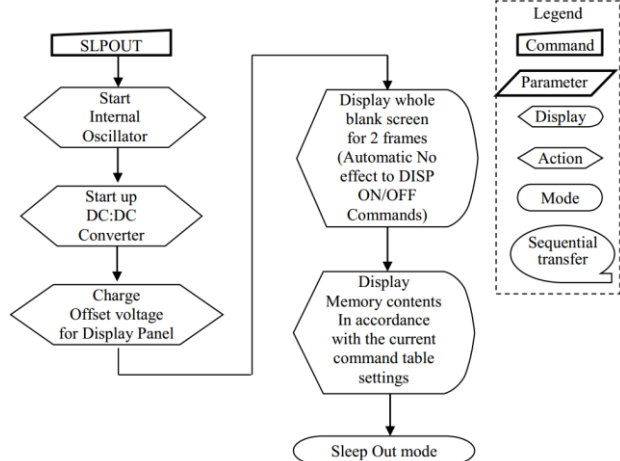
5.3.9. Read Display Self-Diagnostic Result (0Fh)

| Command Page | | Page 0 | | | | | | | | | | | | | | | | | | | | | |
|--|---|--|--------|----|----|----|----|----|----|----|---------|--------|---------------|--|-----|---|---|-----------|-------------------------|--|----|----------------------|--|
| Address | Parameter | W/R | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default | | | | | | | | | | | | |
| 0Fh | 1st | R | D7 | D6 | 0 | 0 | 0 | 0 | 0 | D0 | 00h | | | | | | | | | | | | |
| Description | <p>0F: RDDSDR (Read Display Self-Diagnostic Result).</p> <p>This command indicates the status of the display self-diagnostic results after the Sleep Out command, as described in the table below:</p> <table border="1"> <thead> <tr> <th>Bit</th> <th>Description</th> <th>Action</th> </tr> </thead> <tbody> <tr> <td>D7</td> <td>Register Loading Detection</td> <td>Invert the D7 bit when the EEPROM and register values are the same.</td> </tr> <tr> <td>D6</td> <td>Functionality Detection</td> <td>Invert the D6 bit when the chip meets user's functionality requirements.</td> </tr> <tr> <td>D0</td> <td>Checksums Comparison</td> <td>0 = Checksums are the same 1 = Checksums are not the same</td> </tr> </tbody> </table> | | | | | | | | | | | Bit | Description | Action | D7 | Register Loading Detection | Invert the D7 bit when the EEPROM and register values are the same. | D6 | Functionality Detection | Invert the D6 bit when the chip meets user's functionality requirements. | D0 | Checksums Comparison | 0 = Checksums are the same 1 = Checksums are not the same |
| | Bit | Description | Action | | | | | | | | | | | | | | | | | | | | |
| D7 | Register Loading Detection | Invert the D7 bit when the EEPROM and register values are the same. | | | | | | | | | | | | | | | | | | | | | |
| D6 | Functionality Detection | Invert the D6 bit when the chip meets user's functionality requirements. | | | | | | | | | | | | | | | | | | | | | |
| D0 | Checksums Comparison | 0 = Checksums are the same 1 = Checksums are not the same | | | | | | | | | | | | | | | | | | | | | |
| Restriction | It will be necessary to wait 300ms after there is the last write access on Page 0 area registers before there can read Bit D0 value. | | | | | | | | | | | | | | | | | | | | | | |
| 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>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 | Sleep In | Yes | | | | |
| Status | Availability | | | | | | | | | | | | | | | | | | | | | | |
| Normal Mode On, Idle Mode Off, Sleep Out | Yes | | | | | | | | | | | | | | | | | | | | | | |
| Normal 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>00h</td> </tr> <tr> <td>S/W Reset</td> <td>00h</td> </tr> <tr> <td>H/W Reset</td> <td>00h</td> </tr> </tbody> </table> | | | | | | | | | | | Status | Default Value | Power On Sequence | 00h | S/W Reset | 00h | H/W Reset | 00h | | | | |
| Status | Default Value | | | | | | | | | | | | | | | | | | | | | | |
| Power On Sequence | 00h | | | | | | | | | | | | | | | | | | | | | | |
| S/W Reset | 00h | | | | | | | | | | | | | | | | | | | | | | |
| H/W Reset | 00h | | | | | | | | | | | | | | | | | | | | | | |
| Flow Chart | <pre> sequenceDiagram participant Host participant Display Host->>Display: Read RDDSDR Display-->Host: Send Parameter </pre> <p>Legend</p> <ul style="list-style-type: none"> Command: Rectangle Parameter: Parallelogram Display: Hexagon Action: Diamond Mode: Oval Sequential transfer: Oval with arrow | | | | | | | | | | | | | | | | | | | | | | |

5.3.10. Sleep In (10h)

| Command Page | | | Page 0 | | | | | | | | | | | | | | | | |
|--|---|-----|-------------|----|----|----|----|----|----|----|---------|--------|---------------|--|---------------|---|---------------|-----------|---------------|
| Address | Parameter | W/R | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default | | | | | | | | |
| 10h | - | W | No Argument | | | | | | | | | - | | | | | | | |
| Description | <p>10h: SLPIN (Sleep In). This command causes the ILI9881C to enter the minimum power consumption mode. In this mode, the DC/DC converter, Internal oscillator, and panel scanning are all stopped.</p>  <p>MCU interface and memory are still working and the memory can keep its contents. Ambient light based control is off. Backlights and display are off. Dimming function does not work when there is changing mode from Sleep Out to Sleep In.</p> | | | | | | | | | | | | | | | | | | |
| Restriction | <p>This command has no effect when the module is already in the Sleep In mode. To leave the Sleep In Mode, only the Sleep Out Command (11h) is workable. It is necessary to wait 5msec before sending the next command; this is to allow time for the supply voltages and clock circuits to become stable. It is necessary to wait 120msec after sending the Sleep Out command (when in the Sleep In Mode) before the Sleep In command can be sent.</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>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 | Sleep In | Yes |
| Status | Availability | | | | | | | | | | | | | | | | | | |
| Normal Mode On, Idle Mode Off, Sleep Out | Yes | | | | | | | | | | | | | | | | | | |
| Normal 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>S/W Reset</td> <td>Sleep In Mode</td> </tr> <tr> <td>H/W Reset</td> <td>Sleep In Mode</td> </tr> </tbody> </table> | | | | | | | | | | | Status | Default Value | Power On Sequence | Sleep In Mode | S/W Reset | Sleep In Mode | H/W Reset | Sleep In Mode |
| Status | Default Value | | | | | | | | | | | | | | | | | | |
| Power On Sequence | Sleep In Mode | | | | | | | | | | | | | | | | | | |
| S/W Reset | Sleep In Mode | | | | | | | | | | | | | | | | | | |
| H/W Reset | Sleep In Mode | | | | | | | | | | | | | | | | | | |
| Flow Chart | <p>It takes 120msec to get into Sleep In mode after SLPIN command issued.</p>  <div style="border: 1px dashed black; padding: 5px; margin-top: 10px;"> <p>Legend</p> <ul style="list-style-type: none"> Command Parameter Display Action Mode Sequential transfer </div> | | | | | | | | | | | | | | | | | | |

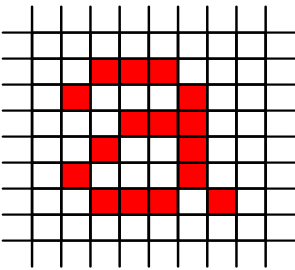
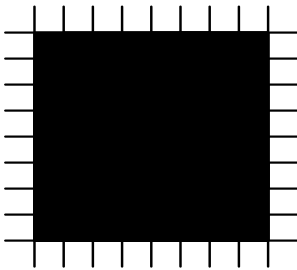
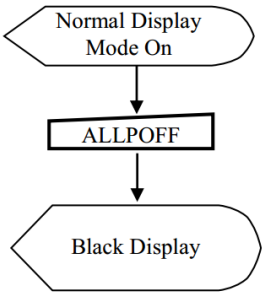
5.3.11. Sleep Out (11h)

| Command Page | | | Page 0 | | | | | | | | | | | | | | | | |
|--|--|-----|-------------|----|----|----|----|----|----|----|---------|--------|---------------|--|---------------|---|---------------|-----------|---------------|
| Address | Parameter | W/R | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default | | | | | | | | |
| 11h | - | W | No Argument | | | | | | | | | - | | | | | | | |
| Description | <p>11h: SLPOUT (Sleep Out). This command turns off the sleep mode. In this mode, the DC/DC converter is enabled, the Internal oscillator is started, and the panel scanning is started.</p>  | | | | | | | | | | | | | | | | | | |
| Restriction | <p>This command has no effect when the module is already in the Sleep Out mode. To leave the Sleep Out mode, only the Sleep In command (10h), SW Reset Command (01h) or HW Reset are workable. It is necessary to wait 5msec before sending the next command; this is to allow time for the supply voltages and clock circuits to become stable. The Driver IC loads all display supplier's factory default values to the registers during this 5msec. There cannot be any abnormal visual effect on the display image if factory default and register values are the same when this load is done and when the Driver IC is already in the Sleep Out mode. During this 5msec, the Driver IC also performs self-diagnostic functions. It is necessary to wait 120msec after sending the Sleep In command (when in the Sleep Out mode) before the Sleep Out command can be sent.</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>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 | Sleep In | Yes |
| Status | Availability | | | | | | | | | | | | | | | | | | |
| Normal Mode On, Idle Mode Off, Sleep Out | Yes | | | | | | | | | | | | | | | | | | |
| Normal 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>S/W Reset</td> <td>Sleep In Mode</td> </tr> <tr> <td>H/W Reset</td> <td>Sleep In Mode</td> </tr> </tbody> </table> | | | | | | | | | | | Status | Default Value | Power On Sequence | Sleep In Mode | S/W Reset | Sleep In Mode | H/W Reset | Sleep In Mode |
| Status | Default Value | | | | | | | | | | | | | | | | | | |
| Power On Sequence | Sleep In Mode | | | | | | | | | | | | | | | | | | |
| S/W Reset | Sleep In Mode | | | | | | | | | | | | | | | | | | |
| H/W Reset | Sleep In Mode | | | | | | | | | | | | | | | | | | |
| Flow Chart | <p>It takes 120msec to become Sleep Out mode after SLPOUT command issued.</p>  | | | | | | | | | | | | | | | | | | |

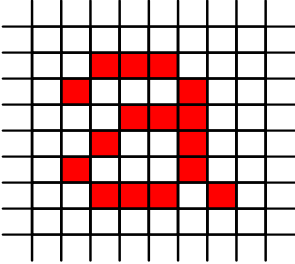
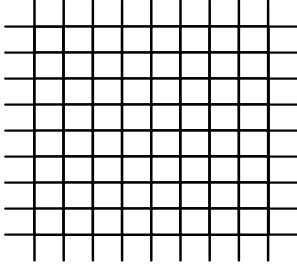
5.3.12. Normal Display Mode On (13h)

| Command Page | | | Page 0 | | | | | | | | | | | | | | | | |
|--|------------------------|---|-------------|----|----|----|----|----|----|----|---------|--------|---------------|--|------------------------|---|------------------------|-----------|------------------------|
| Address | Parameter | W/R | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default | | | | | | | | |
| 13h | - | W | No Argument | | | | | | | | | - | | | | | | | |
| Description | | 13h: NORON (Normal Display Mode On). This command returns the display to normal mode. | | | | | | | | | | | | | | | | | |
| Restriction | | This command has no effect when the Normal Display Mode is 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>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 | Sleep In | Yes |
| Status | Availability | | | | | | | | | | | | | | | | | | |
| Normal Mode On, Idle Mode Off, Sleep Out | Yes | | | | | | | | | | | | | | | | | | |
| Normal 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>S/W Reset</td> <td>Normal Display Mode On</td> </tr> <tr> <td>H/W Reset</td> <td>Normal Display Mode On</td> </tr> </tbody> </table> | | | | | | | | | | Status | Default Value | Power On Sequence | Normal Display Mode On | S/W Reset | Normal Display Mode On | H/W Reset | Normal Display Mode On |
| Status | Default Value | | | | | | | | | | | | | | | | | | |
| Power On Sequence | Normal Display Mode On | | | | | | | | | | | | | | | | | | |
| S/W Reset | Normal Display Mode On | | | | | | | | | | | | | | | | | | |
| H/W Reset | Normal Display Mode On | | | | | | | | | | | | | | | | | | |
| Flow Chart | | | | | | | | | | | | | | | | | | | |

5.3.13. All Pixel Off (22h)

| Command Page | | | Page 0 | | | | | | | | | | | | | | | | |
|--|---|---|-------------|----|----|----|----|----|----|----|---------|--------|---------------|--|-----|---|-----|-----------|-----|
| Address | Parameter | W/R | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default | | | | | | | | |
| 22h | - | W | No Argument | | | | | | | | | - | | | | | | | |
| Description | <p>22h: ALLPOFF (All Pixels Off).</p> <p>This command turns the display panel black in 'Sleep Out' mode and a status bit of the 'Read Display Image Mode' register (0Dh) can be read.</p> <p>This command makes no change of contents of the input data (or frame memory). This command does not change any other status.</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;"> <p>Input Data/ Memory</p>  </div> <div style="font-size: 2em;">→</div> <div style="text-align: center;"> <p>Display Panel</p>  </div> </div> <p>'All Pixels On' or 'Normal Display Mode On' commands are used to leave this mode. When ILI9881C works in 'Idle Mode On' and 'Sleep Out' state, the display panel is showing the content of the frame memory after 'Normal Display Mode On' commands.</p> | | | | | | | | | | | | | | | | | | |
| | Restriction | This command has no effect when module is already in all pixels off mode. | | | | | | | | | | | | | | | | | |
| 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>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 | Sleep In | Yes |
| Status | Availability | | | | | | | | | | | | | | | | | | |
| Normal Mode On, Idle Mode Off, Sleep Out | Yes | | | | | | | | | | | | | | | | | | |
| Normal 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>OFF</td> </tr> <tr> <td>S/W Reset</td> <td>OFF</td> </tr> <tr> <td>H/W Reset</td> <td>OFF</td> </tr> </tbody> </table> | | | | | | | | | | | Status | Default Value | Power On Sequence | OFF | S/W Reset | OFF | H/W Reset | OFF |
| Status | Default Value | | | | | | | | | | | | | | | | | | |
| Power On Sequence | OFF | | | | | | | | | | | | | | | | | | |
| S/W Reset | OFF | | | | | | | | | | | | | | | | | | |
| H/W Reset | OFF | | | | | | | | | | | | | | | | | | |
| Flow Chart | <div style="display: flex; justify-content: space-between; align-items: center;"> <div style="text-align: center;">  </div> <div style="border: 1px dashed black; padding: 5px;"> <p>Legend</p> <ul style="list-style-type: none"> Command Parameter Display Action Mode Sequential transfer </div> </div> | | | | | | | | | | | | | | | | | | |

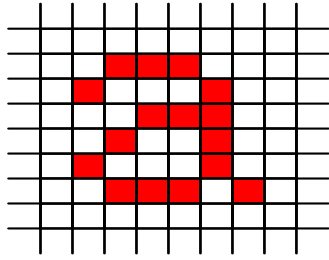
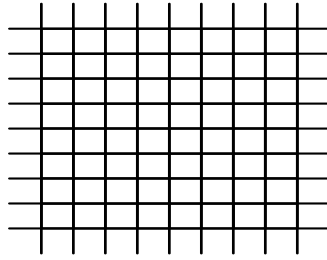
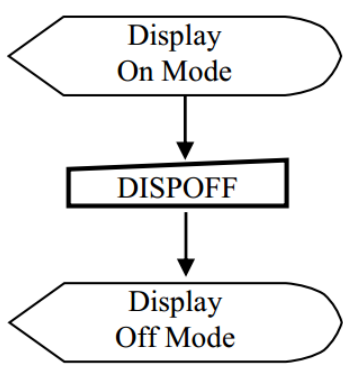
5.3.14. All Pixel On (23h)

| Command Page | | | Page 0 | | | | | | | | | | | | | | | | |
|--|---|--|-------------|----|----|----|----|----|----|----|---------|--------|---------------|--|-----|---|-----|-----------|-----|
| Address | Parameter | W/R | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default | | | | | | | | |
| 23h | - | W | No Argument | | | | | | | | | - | | | | | | | |
| Description | <p>23h: ALLPON (All Pixels On).</p> <p>This command turns the display panel white in 'Sleep out' mode and a status bit of the 'Read Display Image Mode' register (0Dh) can be read.</p> <p>This command makes no change of contents of the input data (or frame memory). This command does not change any other status.</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;"> <p>Input Data/ Memory</p>  </div> <div style="font-size: 2em; margin: 0 20px;">→</div> <div style="text-align: center;"> <p>Display Panel</p>  </div> </div> <p>'All Pixels Off' or 'Normal Display Mode On' commands are used to leave this mode.</p> <p>When ILI9881C works in 'Idle Mode On' and 'Sleep Out' state, the display panel is showing the content of the frame memory after 'Normal Display Mode On' commands.</p> | | | | | | | | | | | | | | | | | | |
| | Restriction | This command has no effect when module is already in all pixels on mode. | | | | | | | | | | | | | | | | | |
| 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>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 | Sleep In | Yes |
| Status | Availability | | | | | | | | | | | | | | | | | | |
| Normal Mode On, Idle Mode Off, Sleep Out | Yes | | | | | | | | | | | | | | | | | | |
| Normal 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>OFF</td> </tr> <tr> <td>S/W Reset</td> <td>OFF</td> </tr> <tr> <td>H/W Reset</td> <td>OFF</td> </tr> </tbody> </table> | | | | | | | | | | | Status | Default Value | Power On Sequence | OFF | S/W Reset | OFF | H/W Reset | OFF |
| Status | Default Value | | | | | | | | | | | | | | | | | | |
| Power On Sequence | OFF | | | | | | | | | | | | | | | | | | |
| S/W Reset | OFF | | | | | | | | | | | | | | | | | | |
| H/W Reset | OFF | | | | | | | | | | | | | | | | | | |
| Flow Chart | <div style="display: flex; align-items: center;"> <div style="flex: 1;"> <pre> graph TD A([Normal Display Mode On]) --> B[ALLPON] B --> C([White Display]) </pre> </div> <div style="border: 1px dashed black; padding: 5px; margin-left: 20px;"> <p>Legend</p> <ul style="list-style-type: none"> Command Parameter Display Action Mode Sequential transfer </div> </div> | | | | | | | | | | | | | | | | | | |

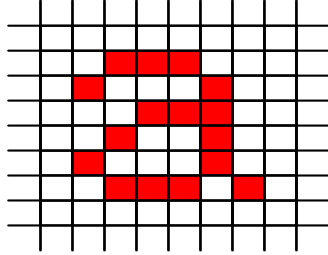
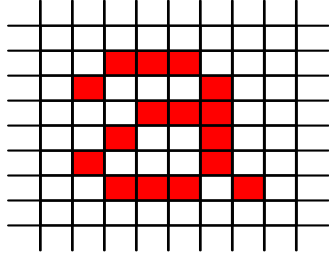
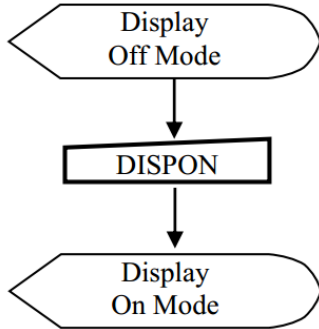
5.3.15. Gamma Set (26h)

| Command Page | | Page 0 | | | | | | | | | | | | | | | | | |
|--|---|--------|----|----|----|----|----------|----|----|----|---------|----------|----------------|--|---------------|---|----------|-----------|-----|
| Address | Parameter | W/R | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default | | | | | | | | |
| 26h | 1st | W | 0 | 0 | 0 | 0 | GC [3:0] | | | | 01h | | | | | | | | |
| Description | 26h: GAMSET (Gamma Set). This command is used to select the desired Gamma curve for the current display. A maximum of 1 fixed Gamma curves can be selected. The curve is selected by setting the appropriate bit in the parameter as described in the Table below: | | | | | | | | | | | | | | | | | | |
| | <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>GC [3:0]</th> <th>Curve Selected</th> </tr> </thead> <tbody> <tr> <td>1h</td> <td>Gamma curve 1</td> </tr> <tr> <td>Other</td> <td>Reserved</td> </tr> </tbody> </table> <p><i>Note: All others value are undefined.</i></p> | | | | | | | | | | | GC [3:0] | Curve Selected | 1h | Gamma curve 1 | Other | Reserved | | |
| GC [3:0] | Curve Selected | | | | | | | | | | | | | | | | | | |
| 1h | Gamma curve 1 | | | | | | | | | | | | | | | | | | |
| Other | Reserved | | | | | | | | | | | | | | | | | | |
| Restriction | Values of GC [3:0] not shown in the table above are invalid and will not change the current selected Gamma curve until a valid value is received. | | | | | | | | | | | | | | | | | | |
| 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>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 | Sleep In | Yes |
| Status | Availability | | | | | | | | | | | | | | | | | | |
| Normal Mode On, Idle Mode Off, Sleep Out | Yes | | | | | | | | | | | | | | | | | | |
| Normal 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>01h</td> </tr> <tr> <td>S/W Reset</td> <td>01h</td> </tr> <tr> <td>H/W Reset</td> <td>01h</td> </tr> </tbody> </table> | | | | | | | | | | | Status | Default Value | Power On Sequence | 01h | S/W Reset | 01h | H/W Reset | 01h |
| Status | Default Value | | | | | | | | | | | | | | | | | | |
| Power On Sequence | 01h | | | | | | | | | | | | | | | | | | |
| S/W Reset | 01h | | | | | | | | | | | | | | | | | | |
| H/W Reset | 01h | | | | | | | | | | | | | | | | | | |
| Flow Chart | <div style="display: flex; align-items: center;"> <div style="flex: 1;"> <pre> graph TD A[GAMSET] --> B[/GC[7..0]/] B --> C[/New Gamma Curve Loaded/] </pre> </div> <div style="flex: 1; border: 1px dashed black; padding: 5px;"> <p style="text-align: center;">Legend</p> <ul style="list-style-type: none"> Command Parameter Display Action Mode Sequential transfer </div> </div> | | | | | | | | | | | | | | | | | | |

5.3.16. Display Off (28h)

| Command Page | | Page 0 | | | | | | | | | | | | | | | | | |
|--|---|--------|-------------|----|----|----|----|----|----|----|---------|--------|---------------|--|-------------|---|-------------|-----------|-------------|
| Address | Parameter | W/R | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default | | | | | | | | |
| 28h | - | W | No Argument | | | | | | | | | - | | | | | | | |
| Description | <p>28h: DISPOFF (Display Off)</p> <p>This command is used to enter into the Display Off mode. Output from the input data (or frame memory) is disabled and a blank page inserted. This command makes no change of contents of the input data (or frame memory) and does not change any other status. There will be no abnormal visible effect on the display.</p> | | | | | | | | | | | | | | | | | | |
| | <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;"> <p>Input Data/ 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 the module is already in the Display Off mode. | | | | | | | | | | | | | | | | | | |
| 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>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 | Sleep In | Yes |
| Status | Availability | | | | | | | | | | | | | | | | | | |
| Normal Mode On, Idle Mode Off, Sleep Out | Yes | | | | | | | | | | | | | | | | | | |
| Normal 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>Display Off</td> </tr> <tr> <td>S/W Reset</td> <td>Display Off</td> </tr> <tr> <td>H/W Reset</td> <td>Display Off</td> </tr> </tbody> </table> | | | | | | | | | | | Status | Default Value | Power On Sequence | Display Off | S/W Reset | Display Off | H/W Reset | Display Off |
| Status | Default Value | | | | | | | | | | | | | | | | | | |
| Power On Sequence | Display Off | | | | | | | | | | | | | | | | | | |
| S/W Reset | Display Off | | | | | | | | | | | | | | | | | | |
| H/W Reset | Display Off | | | | | | | | | | | | | | | | | | |
| Flow Chart | <div style="display: flex; align-items: center;"> <div style="flex: 1;">  </div> <div style="flex: 1; border: 1px dashed black; padding: 5px;"> <p>Legend</p> <ul style="list-style-type: none"> Command Parameter Display Action Mode Sequential transfer </div> </div> | | | | | | | | | | | | | | | | | | |

5.3.17. Display ON (29h)

| Command Page | | Page 0 | | | | | | | | | | | | | | | | | |
|--|---|--------|-------------|----|----|----|----|----|----|----|---------|--------|---------------|--|-------------|---|-------------|-----------|-------------|
| Address | Parameter | W/R | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default | | | | | | | | |
| 29h | - | W | No Argument | | | | | | | | | - | | | | | | | |
| Description | <p>29h: DISPON (Display On).</p> <p>This command is used to recover from the Display Off mode. Output from the input data (or frame memory) is enabled. This command makes no change of contents of the input data (or frame memory) and does not change any other status.</p> | | | | | | | | | | | | | | | | | | |
| | <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;"> <p>Input Data/ 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 the ILI9881C is already in the Display On mode. | | | | | | | | | | | | | | | | | | |
| 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>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 | Sleep In | Yes |
| Status | Availability | | | | | | | | | | | | | | | | | | |
| Normal Mode On, Idle Mode Off, Sleep Out | Yes | | | | | | | | | | | | | | | | | | |
| Normal 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>Display Off</td> </tr> <tr> <td>S/W Reset</td> <td>Display Off</td> </tr> <tr> <td>H/W Reset</td> <td>Display Off</td> </tr> </tbody> </table> | | | | | | | | | | | Status | Default Value | Power On Sequence | Display Off | S/W Reset | Display Off | H/W Reset | Display Off |
| Status | Default Value | | | | | | | | | | | | | | | | | | |
| Power On Sequence | Display Off | | | | | | | | | | | | | | | | | | |
| S/W Reset | Display Off | | | | | | | | | | | | | | | | | | |
| H/W Reset | Display Off | | | | | | | | | | | | | | | | | | |
| Flow Chart | <div style="display: flex; align-items: center;"> <div style="flex: 1;">  <pre> graph TD A[Display Off Mode] --> B[DISPON] B --> C[Display On Mode] </pre> </div> <div style="border: 1px dashed black; padding: 5px; margin-left: 20px;"> <p>Legend</p> <ul style="list-style-type: none"> Command Parameter Display Action Mode Sequential transfer </div> </div> | | | | | | | | | | | | | | | | | | |


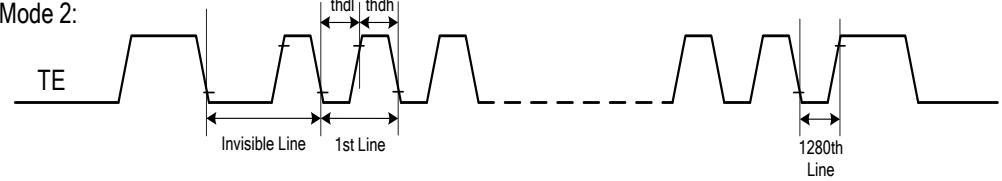
5.3.18. Memory Write (2Ch)

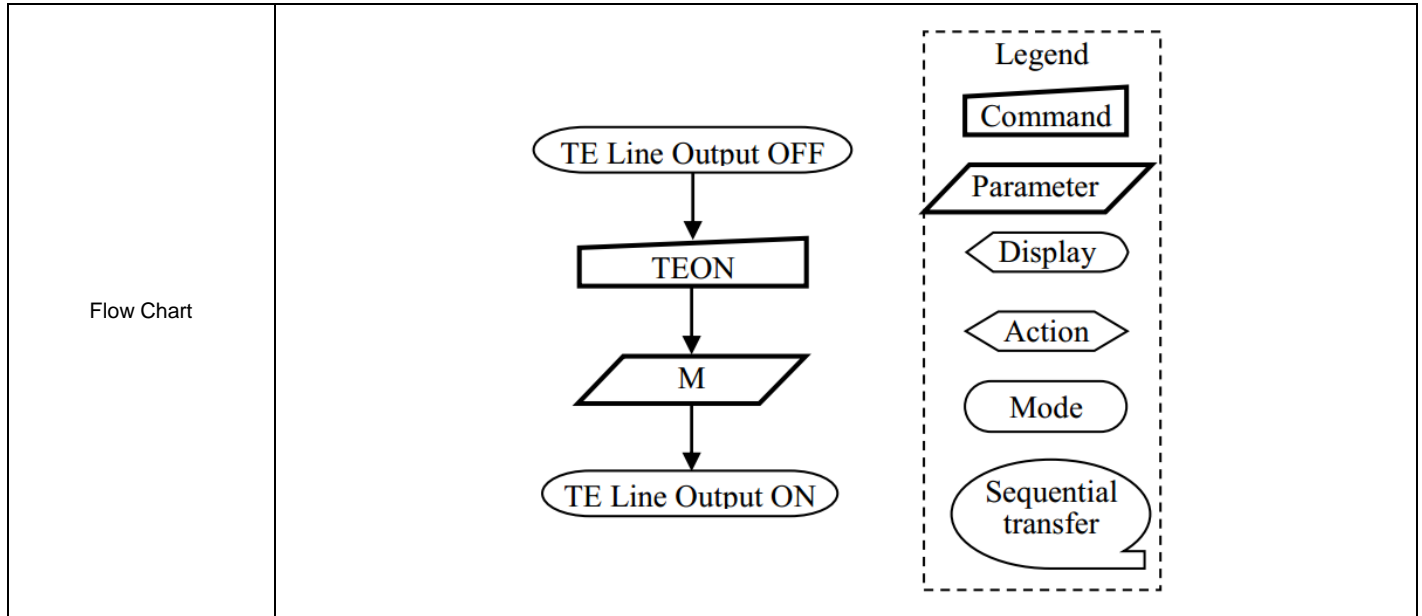
| Command Page | | | Page 0 | | | | | | | | | | | | | | | | |
|--|--|-----|-----------|----|----|----|----|----|----|----|---------|--------|---------------|--|------------------------------------|---|------------------------------------|-----------|------------------------------------|
| Address | Parameter | W/R | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default | | | | | | | | |
| 2Ch | 1st | W | D1[23:16] | | | | | | | | 00~FFh | | | | | | | | |
| | 2nd | W | D1[15:8] | | | | | | | | 00~FFh | | | | | | | | |
| | 3rd | W | D1[7:0] | | | | | | | | 00~FFh | | | | | | | | |
| | ... | W | ... | | | | | | | | 00~FFh | | | | | | | | |
| | Nth | W | Dn[7:0] | | | | | | | | 00~FFh | | | | | | | | |
| Description | <p>2Ch: RAMWR (Memory Write).</p> <p>This command transfers data from the MCU to the Frame Memory. This command makes no change to the other driver status. When this command is accepted, the column register and the page register are reset to zero. Then D[23:0] is stored in the Frame Memory and the column register and the page register incremented at the same time. Sending any other command can stop frame Write.</p> | | | | | | | | | | | | | | | | | | |
| Restriction | <p>This command's parameter length must be based on 2 pixel data length (6 bytes) (N=3 x n, N is multiple of 6).</p> <p>When ILI9881C's work state is "Normal Mode On, Idle Mode On and Sleep Out", full-resolution frame data must be send by Memory Write (2Ch) and Memory Write Continue (3Ch) command.</p> <p>Transmission sequences: LP_00 → HS for R2Ch → LP_00 → HS for R3Ch → LP_00 → HS for CMD → LP_00</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>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 | Sleep In | Yes |
| Status | Availability | | | | | | | | | | | | | | | | | | |
| Normal Mode On, Idle Mode Off, Sleep Out | Yes | | | | | | | | | | | | | | | | | | |
| Normal 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>S/W Reset</td> <td>Contents of memory is set randomly</td> </tr> <tr> <td>H/W Reset</td> <td>Contents of memory is set randomly</td> </tr> </tbody> </table> | | | | | | | | | | | Status | Default Value | Power On Sequence | Contents of memory is set randomly | S/W Reset | Contents of memory is set randomly | H/W Reset | Contents of memory is set randomly |
| Status | Default Value | | | | | | | | | | | | | | | | | | |
| Power On Sequence | Contents of memory is set randomly | | | | | | | | | | | | | | | | | | |
| S/W Reset | Contents of memory is set randomly | | | | | | | | | | | | | | | | | | |
| H/W Reset | Contents of memory is set randomly | | | | | | | | | | | | | | | | | | |
| Flow Chart | <pre> graph TD RAMWR[RAMWR] --> ImageData[/Image Data D1[23:0], D2[23:0], ..., Dn[23:0]/] ImageData --> AnyCommand[Any Command] </pre> <p>Legend</p> <ul style="list-style-type: none"> Command: [] Parameter: //] Display: () Action: >] Mode: [] Sequential transfer: () | | | | | | | | | | | | | | | | | | |

5.3.19. Tearing Effect Line Off (34h)

| Command Page | | | Page 0 | | | | | | | | | | | | | | | | |
|--|---|-----|-------------|----|----|----|----|----|----|----|---------|--------|---------------|--|-----|---|-----|-----------|-----|
| Address | Parameter | W/R | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default | | | | | | | | |
| 34h | - | W | No Argument | | | | | | | | | - | | | | | | | |
| Description | <p>34h: TEOFF (Tearing Effect Line OFF). This command is used to turn off the Display module's Tearing Effect output signal from the TE signal line.</p> | | | | | | | | | | | | | | | | | | |
| 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>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 | Sleep In | Yes |
| Status | Availability | | | | | | | | | | | | | | | | | | |
| Normal Mode On, Idle Mode Off, Sleep Out | Yes | | | | | | | | | | | | | | | | | | |
| Normal 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>S/W Reset</td> <td>Off</td> </tr> <tr> <td>H/W Reset</td> <td>Off</td> </tr> </tbody> </table> | | | | | | | | | | | Status | Default Value | Power On Sequence | Off | S/W Reset | Off | H/W Reset | Off |
| Status | Default Value | | | | | | | | | | | | | | | | | | |
| Power On Sequence | Off | | | | | | | | | | | | | | | | | | |
| S/W Reset | Off | | | | | | | | | | | | | | | | | | |
| H/W Reset | Off | | | | | | | | | | | | | | | | | | |
| Flow Chart | <div style="display: flex; align-items: center;"> <div style="flex: 1;"> <pre> graph TD A([TE Line Output ON]) --> B[TEOFF] B --> C([TE Line Output OFF]) </pre> </div> <div style="flex: 1; border: 1px dashed black; padding: 5px;"> <p>Legend</p> <ul style="list-style-type: none"> Command Parameter Display Action Mode Sequential transfer </div> </div> | | | | | | | | | | | | | | | | | | |

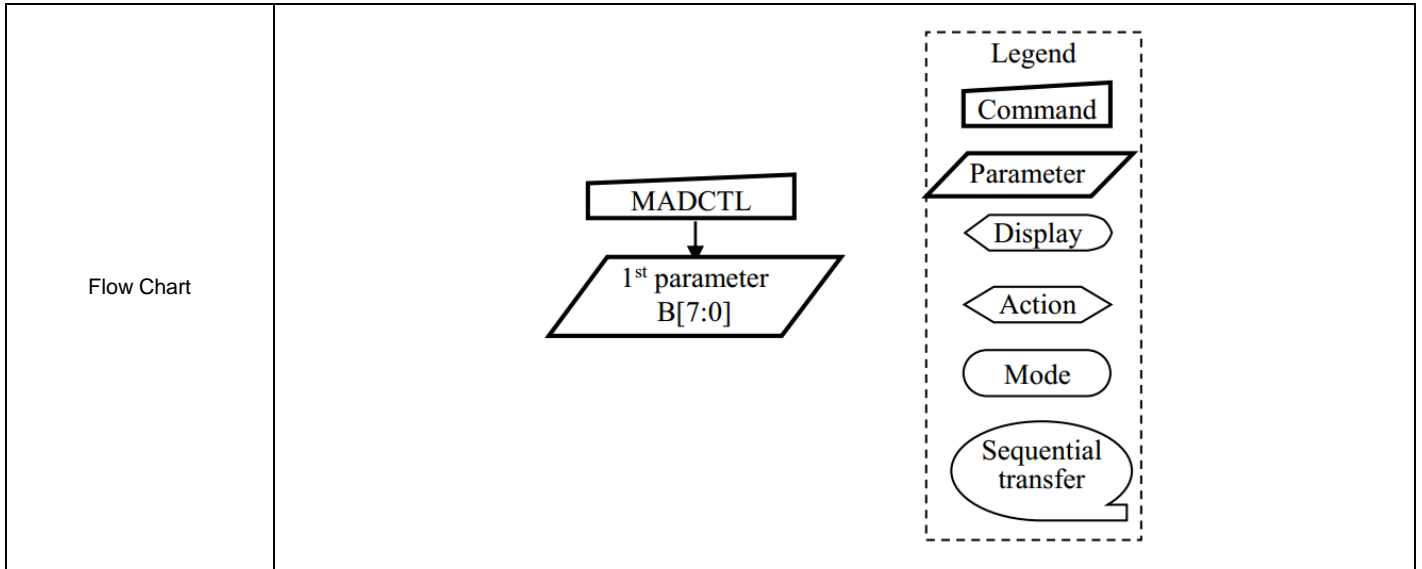
5.3.20. Tearing Effect Line On (35h)

| Command Page | | Page 0 | | | | | | | | | | | | | | | | | |
|--|--|--|----|----|----|----|----|----|----|----|---------|--------|---------------|--|-----|---|-----|-----------|-----|
| Address | Parameter | W/R | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default | | | | | | | | |
| 35h | 1st | W | 0 | 0 | 0 | 0 | 0 | 0 | 0 | M | 00 | | | | | | | | |
| Description | <p>35h: TEON (Tearing Effect Line ON).</p> <p>This command is used to turn on the Tearing Effect output signal from the TE signal line. The Tearing Effect Line On has one parameter which describes the mode of the Tearing Effect Output Line.</p> <p>When M=0: The Tearing Effect Output line consists of V-Blanking information only:</p> <p>Mode 1:</p>  <p>When M=1: The Tearing Effect Output Line consists of both V-Blanking and H-Blanking information:</p> <p>Mode 2:</p>  <p><i>Note : The Tearing Effect Output line shall be low when the display module is in Sleep mode</i></p> | | | | | | | | | | | | | | | | | | |
| | Restriction | This command has no effect when the 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>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 | Sleep In | Yes |
| Status | Availability | | | | | | | | | | | | | | | | | | |
| Normal Mode On, Idle Mode Off, Sleep Out | Yes | | | | | | | | | | | | | | | | | | |
| Normal 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>S/W Reset</td> <td>Off</td> </tr> <tr> <td>H/W Reset</td> <td>Off</td> </tr> </tbody> </table> | | | | | | | | | | | Status | Default Value | Power On Sequence | Off | S/W Reset | Off | H/W Reset | Off |
| Status | Default Value | | | | | | | | | | | | | | | | | | |
| Power On Sequence | Off | | | | | | | | | | | | | | | | | | |
| S/W Reset | Off | | | | | | | | | | | | | | | | | | |
| H/W Reset | Off | | | | | | | | | | | | | | | | | | |



5.3.21. Memory Access Control (36h)

| Command Page | | Page 0 | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|---|---|--------|----------------------|--|----|-------------------------------------|----|----|----|---------|--------|---------------|--|-------------|---|-----|---------------|--|----|----|----------------------|---|----|----|--------------------|---|
| Address | Parameter | W/R | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default | | | | | | | | | | | | | | | | |
| 36h | 1st | W | 0 | 0 | 0 | 0 | BGR | 0 | SS | GS | 00h | | | | | | | | | | | | | | | | |
| Description | | 36h: MADCTL (Memory Access Control). | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | This command makes no change on the other status of the driver. | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | <table border="1"> <thead> <tr> <th>Bit</th> <th>Symbol</th> <th>Name</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>D3</td> <td>BGR</td> <td>RGB/BGR Order</td> <td>Color selector switch control (0=RGB color filter panel, 1=BGR color filter panel)</td> </tr> <tr> <td>D1</td> <td>SS</td> <td>Flip Horizontal (SS)</td> <td>Select the Source driver scan direction on the panel module</td> </tr> <tr> <td>D0</td> <td>GS</td> <td>Flip Vertical (GS)</td> <td>Select the Gate driver scan direction on the panel module</td> </tr> </tbody> </table> | | | | | | | | | | Bit | Symbol | Name | Description | D3 | BGR | RGB/BGR Order | Color selector switch control (0=RGB color filter panel, 1=BGR color filter panel) | D1 | SS | Flip Horizontal (SS) | Select the Source driver scan direction on the panel module | D0 | GS | Flip Vertical (GS) | Select the Gate driver scan direction on the panel module |
| | | Bit | Symbol | Name | Description | | | | | | | | | | | | | | | | | | | | | | |
| | | D3 | BGR | RGB/BGR Order | Color selector switch control (0=RGB color filter panel, 1=BGR color filter panel) | | | | | | | | | | | | | | | | | | | | | | |
| | | D1 | SS | Flip Horizontal (SS) | Select the Source driver scan direction on the panel module | | | | | | | | | | | | | | | | | | | | | | |
| | | D0 | GS | Flip Vertical (GS) | Select the Gate driver scan direction on the panel module | | | | | | | | | | | | | | | | | | | | | | |
| | | BGR (RGB-BGR Order control bit)="0" | | | | | BGR (RGB-BGR Order control bit)="1" | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | SS (Source Scan sequence)="0" | | | | | SS (Source Scan sequence)="1" | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| GS (Gate Scan sequence)="0" | | | | | GS (Gate Scan sequence)="1" | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 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>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 | Sleep In | Yes | | | | | | | | |
| Status | Availability | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Normal Mode On, Idle Mode Off, Sleep Out | Yes | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Normal 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>00h</td> </tr> <tr> <td>S/W Reset</td> <td>00h</td> </tr> <tr> <td>H/W Reset</td> <td>00h</td> </tr> </tbody> </table> | | | | | | | | | | | Status | Default Value | Power On Sequence | 00h | S/W Reset | 00h | H/W Reset | 00h | | | | | | | | |
| Status | Default Value | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Power On Sequence | 00h | | | | | | | | | | | | | | | | | | | | | | | | | | |
| S/W Reset | 00h | | | | | | | | | | | | | | | | | | | | | | | | | | |
| H/W Reset | 00h | | | | | | | | | | | | | | | | | | | | | | | | | | |



5.3.22. Idle Mode Off (38h)

| Command Page | | | Page 0 | | | | | | | | | | | | | | | | |
|--|---|-----|-------------|----|----|----|----|----|----|----|---------|--------|---------------|--|---------------|---|---------------|-----------|---------------|
| Address | Parameter | W/R | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default | | | | | | | | |
| 38h | - | W | No Argument | | | | | | | | | - | | | | | | | |
| Description | 38h: IDMOFF (Idle mode off). This command causes the Display module to exit the Idle mode. In the Idle Mode Off, the display panel can display a maximum of 16.7M colors. | | | | | | | | | | | | | | | | | | |
| Restriction | This command has no effect when the module is already in the Idle Mode 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>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 | Sleep In | Yes |
| Status | Availability | | | | | | | | | | | | | | | | | | |
| Normal Mode On, Idle Mode Off, Sleep Out | Yes | | | | | | | | | | | | | | | | | | |
| Normal 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>S/W Reset</td> <td>Idle Mode Off</td> </tr> <tr> <td>H/W Reset</td> <td>Idle Mode Off</td> </tr> </tbody> </table> | | | | | | | | | | | Status | Default Value | Power On Sequence | Idle Mode Off | S/W Reset | Idle Mode Off | H/W Reset | Idle Mode Off |
| Status | Default Value | | | | | | | | | | | | | | | | | | |
| Power On Sequence | Idle Mode Off | | | | | | | | | | | | | | | | | | |
| S/W Reset | Idle Mode Off | | | | | | | | | | | | | | | | | | |
| H/W Reset | Idle Mode Off | | | | | | | | | | | | | | | | | | |
| Flow Chart | <pre> graph TD A[Idle on mode] -- Action --> B[Command: IDMOFF] B -- Action --> C[Idle off mode] </pre> <p>The flow chart illustrates the process of exiting Idle mode. It starts with 'Idle on mode' (a hexagonal display symbol), followed by an arrow (Action) pointing to a rectangular box labeled 'IDMOFF' (Command). A second arrow (Action) points from 'IDMOFF' to another hexagonal display symbol labeled 'Idle off mode'. A legend on the right defines the symbols: a rectangle for 'Command', a parallelogram for 'Parameter', a hexagon for 'Display', an arrow for 'Action', an oval for 'Mode', and a speech bubble for 'Sequential transfer'.</p> | | | | | | | | | | | | | | | | | | |

5.3.23. Idle Mode On (39h)

| Command Page | | | Page 0 | | | | | | | | | | | | | | | | |
|--|--|-----|-------------|----|----|----|----|----|----|----|---------|--------|---------------|--|---------------|---|---------------|-----------|---------------|
| Address | Parameter | W/R | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default | | | | | | | | |
| 39h | - | W | No Argument | | | | | | | | | - | | | | | | | |
| Description | <p>39h: IDMON (Idle mode on).</p> <p>This command is used to enter into the Idle Mode On. In the Idle Mode On, color expression is reduced. The display panel shows de-compressed content of frame memory in the Idle Mode On and Sleep Out states. The primary color of "Normal Black" panel is black, the secondary color is defined by "Write Idle Mode Color" (80h) command.</p> | | | | | | | | | | | | | | | | | | |
| Restriction | This command has no effect when the module is already in the Idle Mode 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>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 | Sleep In | Yes |
| Status | Availability | | | | | | | | | | | | | | | | | | |
| Normal Mode On, Idle Mode Off, Sleep Out | Yes | | | | | | | | | | | | | | | | | | |
| Normal 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>S/W Reset</td> <td>Idle Mode Off</td> </tr> <tr> <td>H/W Reset</td> <td>Idle Mode Off</td> </tr> </tbody> </table> | | | | | | | | | | | Status | Default Value | Power On Sequence | Idle Mode Off | S/W Reset | Idle Mode Off | H/W Reset | Idle Mode Off |
| Status | Default Value | | | | | | | | | | | | | | | | | | |
| Power On Sequence | Idle Mode Off | | | | | | | | | | | | | | | | | | |
| S/W Reset | Idle Mode Off | | | | | | | | | | | | | | | | | | |
| H/W Reset | Idle Mode Off | | | | | | | | | | | | | | | | | | |
| Flow Chart | <pre> graph TD A([Idle off mode]) --> B[IDMON] B --> C([Idle on mode]) </pre> <p>Legend:</p> <ul style="list-style-type: none"> Command: Rectangle Parameter: Parallelogram Display: Oval Action: Diamond Mode: Rounded rectangle Sequential transfer: Loop arrow | | | | | | | | | | | | | | | | | | |

5.3.24. Interface Pixel Format (3Ah)

| Command Page | | Page 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|---|----------|----|----|----|----|----|----------|----|----|---------|------------------|---------------|--|-----|---|-----|-------------|-----|-------------|-----|-------------|-----|--------------|-----|--------------|-----|--------------|-----|
| Address | Parameter | W/R | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default | | | | | | | | | | | | | | | | | | |
| 3Ah | 1st | W | 0 | 0 | 0 | 0 | 0 | DBI[2:0] | | | 07h | | | | | | | | | | | | | | | | | | |
| Description | <p>3A: COLMOD (Interface Pixel Format).</p> <p>This command is used to define the format of RGB picture data, which is to be transferred via the MIPI DSI Command Mode. The formats are shown in the table:</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Interface Format</th> <th>DBI[2:0]</th> </tr> </thead> <tbody> <tr><td>Not Defined</td><td>000</td></tr> <tr><td>Not Defined</td><td>001</td></tr> <tr><td>Not Defined</td><td>010</td></tr> <tr><td>Not Defined</td><td>011</td></tr> <tr><td>Not Defined</td><td>100</td></tr> <tr><td>16 bit/pixel</td><td>101</td></tr> <tr><td>18 bit/pixel</td><td>110</td></tr> <tr><td>24 bit/pixel</td><td>111</td></tr> </tbody> </table> | | | | | | | | | | | Interface Format | DBI[2:0] | Not Defined | 000 | Not Defined | 001 | Not Defined | 010 | Not Defined | 011 | Not Defined | 100 | 16 bit/pixel | 101 | 18 bit/pixel | 110 | 24 bit/pixel | 111 |
| | Interface Format | DBI[2:0] | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Not Defined | 000 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Not Defined | 001 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Not Defined | 010 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Not Defined | 011 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Not Defined | 100 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 16 bit/pixel | 101 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 18 bit/pixel | 110 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 24 bit/pixel | 111 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Restriction | There is no visible effect until the Frame Memory is written to. | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 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>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 | Sleep In | Yes | | | | | | | | | | |
| Status | Availability | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Normal Mode On, Idle Mode Off, Sleep Out | Yes | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Normal 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>07h</td> </tr> <tr> <td>S/W Reset</td> <td>07h</td> </tr> <tr> <td>H/W Reset</td> <td>07h</td> </tr> </tbody> </table> | | | | | | | | | | | Status | Default Value | Power On Sequence | 07h | S/W Reset | 07h | H/W Reset | 07h | | | | | | | | | | |
| Status | Default Value | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Power On Sequence | 07h | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| S/W Reset | 07h | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| H/W Reset | 07h | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Flow Chart | <div style="display: flex; align-items: center;"> <div style="flex: 1;"> <pre> graph TD A([16 Bit/Pixel Mode]) --> B[COLMOD] B --> C[/111/] C --> D([24 Bit/Pixel Mode]) </pre> </div> <div style="flex: 1; border: 1px dashed black; padding: 5px;"> <p>Legend</p> <ul style="list-style-type: none"> Command Parameter Display Action Mode Sequential transfer </div> </div> | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

5.3.25. Memory Write Continue (3Ch)

| Command Page | | | Page 0 | | | | | | | | | | | | | | | | |
|--|---|-----|-----------|----|----|----|----|----|----|----|---------|--------|---------------|--|------------------------------------|---|------------------------------------|-----------|------------------------------------|
| Address | Parameter | W/R | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default | | | | | | | | |
| 3Ch | 1st | W | D1[23:16] | | | | | | | | 00~FFh | | | | | | | | |
| | 2nd | W | D1[15:8] | | | | | | | | 00~FFh | | | | | | | | |
| | 3rd | W | D1[7:0] | | | | | | | | 00~FFh | | | | | | | | |
| | ... | W | ... | | | | | | | | 00~FFh | | | | | | | | |
| | Nth | W | Dn[7:0] | | | | | | | | 00~FFh | | | | | | | | |
| Description | <p>3Ch: RAMWRC (Memory Write Continue).</p> <p>This command is used to transfer data from the MCU to the Frame Memory, if want to continue the Frame Memory write after the “Memory Write (2Ch)” command. This command makes no change to the status of the other driver. When this command is accepted, the column register and the page register are not reset to zero since it has been done on “Memory Write (2Ch)” command.</p> <p>Sending any other command can stop frame Write.</p> | | | | | | | | | | | | | | | | | | |
| Restriction | <p>This command’s parameter length must be based on 2 pixel data length (6 bytes) (N=3 x n, N is multiple of 6).</p> <p>Transmission sequences: LP_00 → HS for R2Ch → LP_00 → HS for R3Ch → LP_00 → HS for CMD → LP_00</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>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 | Sleep In | Yes |
| Status | Availability | | | | | | | | | | | | | | | | | | |
| Normal Mode On, Idle Mode Off, Sleep Out | Yes | | | | | | | | | | | | | | | | | | |
| Normal 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>S/W Reset</td> <td>Contents of memory is set randomly</td> </tr> <tr> <td>H/W Reset</td> <td>Contents of memory is set randomly</td> </tr> </tbody> </table> | | | | | | | | | | | Status | Default Value | Power On Sequence | Contents of memory is set randomly | S/W Reset | Contents of memory is set randomly | H/W Reset | Contents of memory is set randomly |
| Status | Default Value | | | | | | | | | | | | | | | | | | |
| Power On Sequence | Contents of memory is set randomly | | | | | | | | | | | | | | | | | | |
| S/W Reset | Contents of memory is set randomly | | | | | | | | | | | | | | | | | | |
| H/W Reset | Contents of memory is set randomly | | | | | | | | | | | | | | | | | | |
| Flow Chart | <pre> graph TD A[RAMWRC] --> B(Image Data D1[23:0], D2[23:0], ..., Dn[23:0]) B --> C[Any Command] </pre> <p>Legend</p> <ul style="list-style-type: none"> Command: Rectangle Parameter: Parallelogram Display: Trapezoid Action: Arrow Mode: Rounded Rectangle Sequential transfer: Oval | | | | | | | | | | | | | | | | | | |

5.3.26. Set_Tear_Scanline (44h)

| Command Page | | | Page 0 | | | | | | | | | | | | | | | | |
|--|---------------|--|--------------|----|----|----|----|---------------|----|----|---------|--------|---------------|--|-----|---|-----|-----------|-----|
| Address | Parameter | W/R | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default | | | | | | | | |
| 44h | 1st | W | 0 | 0 | 0 | 0 | 0 | TE_LINE[10:8] | | | 00h | | | | | | | | |
| | 2nd | W | TE_LINE[7:0] | | | | | | | | | 00h | | | | | | | |
| Description | | <p>44h: SET_TEAR_SCANLINE.</p> <p>This command turns on the display module's Tearing Effect output signal on the TE signal line when the display module reaches line N.</p> <p>The Tearing Effect Line On has one parameter that describes the Tearing Effect Output Line mode. After issuing a set_tear_scanline command to the display module, the Tearing Effect output signal, e.g. as in DBI-2 systems, shall be a delayed version of V-Blanking information as illustrated by below figure.</p> <p>In other words, the TE pulse width needs to be identical with normal mode Vsync related TE pulse.</p> <div style="text-align: center;"> </div> <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 | | <p>This command takes affect on the frame following the current frame.</p> <p>Therefore, if the Tear Effect (TE) output is already ON, the TE output shall continue to operate as programmed by the previous set_tear_on, or set_tear_scanline, command until the end of the frame.</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>Sleep In</td> <td>No</td> </tr> </tbody> </table> | | | | | | | | | | Status | Availability | Normal Mode On, Idle Mode Off, Sleep Out | Yes | Normal Mode On, Idle Mode On, Sleep Out | Yes | Sleep In | No |
| Status | Availability | | | | | | | | | | | | | | | | | | |
| Normal Mode On, Idle Mode Off, Sleep Out | Yes | | | | | | | | | | | | | | | | | | |
| Normal Mode On, Idle Mode On, Sleep Out | Yes | | | | | | | | | | | | | | | | | | |
| Sleep In | No | | | | | | | | | | | | | | | | | | |
| Default | | <table border="1"> <thead> <tr> <th>Status</th> <th>Default Value</th> </tr> </thead> <tbody> <tr> <td>Power On Sequence</td> <td>N=0</td> </tr> <tr> <td>S/W Reset</td> <td>N=0</td> </tr> <tr> <td>H/W Reset</td> <td>N=0</td> </tr> </tbody> </table> | | | | | | | | | | Status | Default Value | Power On Sequence | N=0 | S/W Reset | N=0 | H/W Reset | N=0 |
| Status | Default Value | | | | | | | | | | | | | | | | | | |
| Power On Sequence | N=0 | | | | | | | | | | | | | | | | | | |
| S/W Reset | N=0 | | | | | | | | | | | | | | | | | | |
| H/W Reset | N=0 | | | | | | | | | | | | | | | | | | |
| Flow Chart | | <div style="display: flex; align-items: center;"> <div style="flex: 1;"> <pre> graph TD A[SET TEAR SCANLINE] --> B[/Line N (MSB)/] B --> C[/Line N (LSB)/] C --> D[/New Refresh Rate Control setting/] </pre> </div> <div style="flex: 1; border: 1px dashed black; padding: 5px;"> <p>Legend</p> <ul style="list-style-type: none"> Command: [Rectangle] Parameter: [Parallelogram] Display: [Oval] Action: [Hexagon] Mode: [Rounded Rectangle] Sequential transfer: [Speech Bubble] </div> </div> | | | | | | | | | | | | | | | | | |

5.3.27. Get_Tear_Scanline (45h)

| Command Page | | | Page 0 | | | | | | | | | | | | | | | | |
|--|---------------|---|--------------|----|----|----|----|---------------|----|----|---------|--------|---------------|--|-----|---|-----|-----------|-----|
| Address | Parameter | W/R | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default | | | | | | | | |
| 45h | 1st | R | 0 | 0 | 0 | 0 | 0 | TE_LINE[10:8] | | | 00h | | | | | | | | |
| | 2nd | R | TE_LINE[7:0] | | | | | | | | 00h | | | | | | | | |
| Description | | 45h: GET_TEAR_SCANLINE. This command returns setting value of Set_Tear_Scanline command (44h). | | | | | | | | | | | | | | | | | |
| 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>Sleep In</td> <td>No</td> </tr> </tbody> </table> | | | | | | | | | | Status | Availability | Normal Mode On, Idle Mode Off, Sleep Out | Yes | Normal Mode On, Idle Mode On, Sleep Out | Yes | Sleep In | No |
| Status | Availability | | | | | | | | | | | | | | | | | | |
| Normal Mode On, Idle Mode Off, Sleep Out | Yes | | | | | | | | | | | | | | | | | | |
| Normal Mode On, Idle Mode On, Sleep Out | Yes | | | | | | | | | | | | | | | | | | |
| Sleep In | No | | | | | | | | | | | | | | | | | | |
| Default | | <table border="1"> <thead> <tr> <th>Status</th> <th>Default Value</th> </tr> </thead> <tbody> <tr> <td>Power On Sequence</td> <td>N=0</td> </tr> <tr> <td>S/W Reset</td> <td>N=0</td> </tr> <tr> <td>H/W Reset</td> <td>N=0</td> </tr> </tbody> </table> | | | | | | | | | | Status | Default Value | Power On Sequence | N=0 | S/W Reset | N=0 | H/W Reset | N=0 |
| Status | Default Value | | | | | | | | | | | | | | | | | | |
| Power On Sequence | N=0 | | | | | | | | | | | | | | | | | | |
| S/W Reset | N=0 | | | | | | | | | | | | | | | | | | |
| H/W Reset | N=0 | | | | | | | | | | | | | | | | | | |
| Flow Chart | | <pre> graph TD Host[Host] --> Read[Read GET_TEAR_SCANLINE] Read --> Send1[/Send 1st Parameter/] Send1 --> Send2[/Send 2nd Parameter/] Send2 --> Display[Display] </pre> | | | | | | | | | | | | | | | | | |

5.3.28. Write Display Brightness Value (51h)

| Command Page | | | Page 0 | | | | | | | | | | | | | | | | |
|--|---------------|--|----------|----|----|----|-----------|----|----|----|---------|--------|---------------|--|---------|---|---------|-----------|---------|
| Address | Parameter | W/R | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default | | | | | | | | |
| 51h | 1st | W | 0 | 0 | 0 | 0 | DBV[11:8] | | | | 00h | | | | | | | | |
| | 2nd | W | DBV[7:0] | | | | | | | | 00h | | | | | | | | |
| Description | | <p>51h: WRDISBV (Write Display Brightness).</p> <p>This command is used to adjust the brightness value of the display.</p> <p>DBV[11:0]: 12 bit, for display brightness of manual brightness setting and the CABC in the ILI9881C. PWM output signal and LEDPWM pin will control the LED driver IC in order to control the display brightness. In principle relationship is that 0000h value means the lowest brightness and 0FFFh value means the highest brightness.</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>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 | Sleep In | Yes |
| Status | Availability | | | | | | | | | | | | | | | | | | |
| Normal Mode On, Idle Mode Off, Sleep Out | Yes | | | | | | | | | | | | | | | | | | |
| Normal 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>00h_00h</td> </tr> <tr> <td>S/W Reset</td> <td>00h_00h</td> </tr> <tr> <td>H/W Reset</td> <td>00h_00h</td> </tr> </tbody> </table> | | | | | | | | | | Status | Default Value | Power On Sequence | 00h_00h | S/W Reset | 00h_00h | H/W Reset | 00h_00h |
| Status | Default Value | | | | | | | | | | | | | | | | | | |
| Power On Sequence | 00h_00h | | | | | | | | | | | | | | | | | | |
| S/W Reset | 00h_00h | | | | | | | | | | | | | | | | | | |
| H/W Reset | 00h_00h | | | | | | | | | | | | | | | | | | |
| Flow Chart | | <pre> graph TD A[WRDISBV] --> B[/DBV (MSB)/] B --> C[/DBV (LSB)/] C --> D{{New Display Brightness Value Loaded}} </pre> <p>Legend:</p> <ul style="list-style-type: none"> Command: [WRDISBV] Parameter: [/DBV (MSB)/, /DBV (LSB)/] Display: [None] Action: {{New Display Brightness Value Loaded}} Mode: [None] Sequential transfer: [None] | | | | | | | | | | | | | | | | | |

5.3.29. Read Display Brightness Value (52h)

| Command Page | | | Page 0 | | | | | | | | | | | | | | | | |
|--|---|-----|----------|----|----|----|-----------|----|----|----|---------|--------|---------------|--|---------|---|---------|-----------|---------|
| Address | Parameter | W/R | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default | | | | | | | | |
| 52h | 1st | R | 0 | 0 | 0 | 0 | DBV[11:8] | | | | 00h | | | | | | | | |
| | 2nd | R | DBV[7:0] | | | | | | | | 00h | | | | | | | | |
| Description | <p>52h: RDDISBV (Read Display Brightness Value).</p> <p>This command returns the brightness value of the display. It should be checked what the relationship between this returned value and output brightness of the display. This relationship is defined on the display module specification.</p> <p>In principle the relationship is that 0000h value means the lowest brightness and 0FFFh value means the highest brightness.</p> <p>DBV[11:0] is reset when display is in sleep-in mode.</p> <p>DBV[11:0] is '0' when bit BCTRL of "5.3.30Write CTRL Display Value (53h)" command is '0'.</p> <p>DBV[11:0] is manual set brightness specified with "5.3.30Write CTRL Display Value (53h)" command when bit BCTRL is '1'.</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>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 | Sleep In | Yes |
| Status | Availability | | | | | | | | | | | | | | | | | | |
| Normal Mode On, Idle Mode Off, Sleep Out | Yes | | | | | | | | | | | | | | | | | | |
| Normal 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>00h_00h</td> </tr> <tr> <td>S/W Reset</td> <td>00h_00h</td> </tr> <tr> <td>H/W Reset</td> <td>00h_00h</td> </tr> </tbody> </table> | | | | | | | | | | | Status | Default Value | Power On Sequence | 00h_00h | S/W Reset | 00h_00h | H/W Reset | 00h_00h |
| Status | Default Value | | | | | | | | | | | | | | | | | | |
| Power On Sequence | 00h_00h | | | | | | | | | | | | | | | | | | |
| S/W Reset | 00h_00h | | | | | | | | | | | | | | | | | | |
| H/W Reset | 00h_00h | | | | | | | | | | | | | | | | | | |
| Flow Chart | <pre> graph TD subgraph Host C[Read RDDISBV] end subgraph Display P1[/Send 1st Parameter/] P2[/Send 2nd Parameter/] end C --> P1 P1 --> P2 </pre> <p>Legend:</p> <ul style="list-style-type: none"> Command: Rectangle Parameter: Parallelogram Display: Oval Action: Arrow Mode: Rounded Rectangle Sequential transfer: Cloud shape | | | | | | | | | | | | | | | | | | |

5.3.30. Write CTRL Display Value (53h)

| Command Page | | Page 0 | | | | | | | | | | | | | | | | | |
|--|---|---|----|----|-------|----|----|----|----|----|---------|-------------|---------------|--|--|---|---|-----------|-----|
| Address | Parameter | W/R | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default | | | | | | | | |
| 53h | 1st | W | 0 | 0 | BCTRL | 0 | DD | BL | 0 | 0 | 00h | | | | | | | | |
| Description | 53h: WRCTRLD (Write Control Display). This command is used to control the display brightness. BCTRL : Brightness Control Block On/Off. This bit is always used to switch brightness for display. | | | | | | | | | | | | | | | | | | |
| | <table border="1"> <thead> <tr> <th>BCTRL</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>Brightness Control Block Off (DBV[11:0] = 0000h)</td> </tr> <tr> <td>1</td> <td>Brightness Control Block On (DBV[11:0] is active)</td> </tr> </tbody> </table> | | | | | | | | | | | BCTRL | Description | 0 | Brightness Control Block Off (DBV[11:0] = 0000h) | 1 | Brightness Control Block On (DBV[11:0] is active) | | |
| | BCTRL | Description | | | | | | | | | | | | | | | | | |
| | 0 | Brightness Control Block Off (DBV[11:0] = 0000h) | | | | | | | | | | | | | | | | | |
| | 1 | Brightness Control Block On (DBV[11:0] is active) | | | | | | | | | | | | | | | | | |
| DD : Display Dimming Control. | | | | | | | | | | | | | | | | | | | |
| <table border="1"> <thead> <tr> <th>DD</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>Display Dimming Off</td> </tr> <tr> <td>1</td> <td>Display Dimming On</td> </tr> </tbody> </table> | | | | | | | | | | | DD | Description | 0 | Display Dimming Off | 1 | Display Dimming On | | | |
| DD | Description | | | | | | | | | | | | | | | | | | |
| 0 | Display Dimming Off | | | | | | | | | | | | | | | | | | |
| 1 | Display Dimming On | | | | | | | | | | | | | | | | | | |
| BL : Backlight Control On/Off | | | | | | | | | | | | | | | | | | | |
| <table border="1"> <thead> <tr> <th>BL</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>Backlight Control Off</td> </tr> <tr> <td>1</td> <td>Backlight Control On</td> </tr> </tbody> </table> | | | | | | | | | | | BL | Description | 0 | Backlight Control Off | 1 | Backlight Control On | | | |
| BL | Description | | | | | | | | | | | | | | | | | | |
| 0 | Backlight Control Off | | | | | | | | | | | | | | | | | | |
| 1 | Backlight Control On | | | | | | | | | | | | | | | | | | |
| Dimming function is adapted to the brightness registers for display when the bit BCTRL is changed at DD = 1, e.g. BCTRL: 0-> 1 or 1-> 0. When the BL bit changes from 'ON' to 'OFF', backlight is turned off without gradual dimming, even if Display Dimming On (DD = 1) are selected. | | | | | | | | | | | | | | | | | | | |
| 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>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 | Sleep In | Yes |
| Status | Availability | | | | | | | | | | | | | | | | | | |
| Normal Mode On, Idle Mode Off, Sleep Out | Yes | | | | | | | | | | | | | | | | | | |
| Normal 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>00h</td> </tr> <tr> <td>S/W Reset</td> <td>00h</td> </tr> <tr> <td>H/W Reset</td> <td>00h</td> </tr> </tbody> </table> | | | | | | | | | | | Status | Default Value | Power On Sequence | 00h | S/W Reset | 00h | H/W Reset | 00h |
| Status | Default Value | | | | | | | | | | | | | | | | | | |
| Power On Sequence | 00h | | | | | | | | | | | | | | | | | | |
| S/W Reset | 00h | | | | | | | | | | | | | | | | | | |
| H/W Reset | 00h | | | | | | | | | | | | | | | | | | |
| Flow Chart | <pre> graph TD A[WRCTRLD] --> B[/HBM, BCTRL, DD, BL/] B --> C{{New Control Value Loaded}} </pre> | | | | | | | | | | | | | | | | | | |

5.3.31. Read CTRL Display Value (54h)

| Command Page | | Page 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|--|---|----|----|-------|----|----|----|----|----|---------|--------|---------------|--|--|---|---|-----------|-------------|---|---------------------|---|--------------------|----|-------------|---|-----------------------|---|----------------------|
| Address | Parameter | W/R | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default | | | | | | | | | | | | | | | | | | |
| 54h | 1st | R | 0 | 0 | BCTRL | 0 | DD | BL | 0 | 0 | 00h | | | | | | | | | | | | | | | | | | |
| Description | <p>54h: RDCTRLD (Read Control Value Display).</p> <p>This command returns the display brightness control values.</p> <p>BCTRL: Brightness Control Block On/Off. This bit is always used to switch brightness for display.</p> <table border="1"> <thead> <tr> <th>BCTRL</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>Brightness Control Block Off (DBV[11:0] = 0000h)</td> </tr> <tr> <td>1</td> <td>Brightness Control Block On (DBV[11:0] is active)</td> </tr> </tbody> </table> <p>DD: Display Dimming Control.</p> <table border="1"> <thead> <tr> <th>DD</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>Display Dimming Off</td> </tr> <tr> <td>1</td> <td>Display Dimming On</td> </tr> </tbody> </table> <p>BL: Backlight Control On/Off</p> <table border="1"> <thead> <tr> <th>BL</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>Backlight Control Off</td> </tr> <tr> <td>1</td> <td>Backlight Control On</td> </tr> </tbody> </table> <p>Dimming function is adapted to the brightness registers for display when the bit BCTRL is changed at DD = 1, e.g. BCTRL: 0-> 1 or 1-> 0.</p> <p>When the BL bit changes from 'ON' to 'OFF', backlight is turned off without gradual dimming, even if Display Dimming On (DD = 1) are selected.</p> | | | | | | | | | | | BCTRL | Description | 0 | Brightness Control Block Off (DBV[11:0] = 0000h) | 1 | Brightness Control Block On (DBV[11:0] is active) | DD | Description | 0 | Display Dimming Off | 1 | Display Dimming On | BL | Description | 0 | Backlight Control Off | 1 | Backlight Control On |
| | BCTRL | Description | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 0 | Brightness Control Block Off (DBV[11:0] = 0000h) | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 1 | Brightness Control Block On (DBV[11:0] is active) | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| DD | Description | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0 | Display Dimming Off | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | Display Dimming On | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| BL | Description | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0 | Backlight Control Off | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | Backlight Control On | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 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>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 | Sleep In | Yes | | | | | | | | | | |
| Status | Availability | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Normal Mode On, Idle Mode Off, Sleep Out | Yes | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Normal 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>00h</td> </tr> <tr> <td>S/W Reset</td> <td>00h</td> </tr> <tr> <td>H/W Reset</td> <td>00h</td> </tr> </tbody> </table> | | | | | | | | | | | Status | Default Value | Power On Sequence | 00h | S/W Reset | 00h | H/W Reset | 00h | | | | | | | | | | |
| Status | Default Value | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Power On Sequence | 00h | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| S/W Reset | 00h | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| H/W Reset | 00h | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Flow Chart | <div style="border: 1px dashed black; padding: 10px;"> <p style="text-align: center;">Legend</p> <p>Command</p> <p>Parameter</p> <p>Display</p> <p>Action</p> <p>Mode</p> <p>Sequential transfer</p> </div> <pre> graph TD subgraph Host A[Read RDCTRLD] end subgraph Display B[/Send Parameter/] end A --> B </pre> | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

5.3.32. Write Power Save (55h)

| Command Page | | | Page 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|--|----------------------------------|-----------------------------------|----|----|----|----|----|----|----|---------|--------------|---------------|--|----------|---|-----|-----------|----------------|-----------------------------------|----------|-------------------|-----------------------------|----------|-----------------|---------------------------------|----------|-------------|------------------------|----------|----------------|---------------------------|----------|--------------|-------------------------|----------|-----------|----------------------------------|----------|--------------|----------------------------------|----------|------------|----------------------------------|--|--------|----------|---|
| Address | Parameter | W/R | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 55h | 1st | W | PWRSAVE[7:0] | | | | | | | | | 00h | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Description | <p>55h: PWRSAVE (Write Power Save).</p> <p>This command is used to write the settings for power save control functionalities.</p> <table border="1"> <thead> <tr> <th>PWRSAVE[7:0]</th> <th>Function</th> <th>Note</th> </tr> </thead> <tbody> <tr> <td>00000000</td> <td>Power Save Off</td> <td>-</td> </tr> <tr> <td>00000001</td> <td>Power Save Low</td> <td>Conservative Setting of CABC/DBLC</td> </tr> <tr> <td>00000010</td> <td>Power Save Medium</td> <td>Medium Setting of CABC/DBLC</td> </tr> <tr> <td>00000011</td> <td>Power Save High</td> <td>Aggressive Setting of CABC/DBLC</td> </tr> <tr> <td>1000XXXX</td> <td>IE On – Low</td> <td>Low Enhancement of LCD</td> </tr> <tr> <td>1001XXXX</td> <td>IE On – Medium</td> <td>Medium Enhancement of LCD</td> </tr> <tr> <td>1011XXXX</td> <td>IE On – High</td> <td>High Enhancement of LCD</td> </tr> <tr> <td>0100XXXX</td> <td>SRE - Low</td> <td>Sunlight readability enhancement</td> </tr> <tr> <td>0101XXXX</td> <td>SRE - Medium</td> <td>Sunlight readability enhancement</td> </tr> <tr> <td>0110XXXX</td> <td>SRE - High</td> <td>Sunlight readability enhancement</td> </tr> <tr> <td></td> <td>Others</td> <td>Reserved</td> <td>-</td> </tr> </tbody> </table> <p>CABC = Content Adaptive Brightness Control DBLC = Dynamic Backlight Control IE = Image Enhancement</p> | | | | | | | | | | | PWRSAVE[7:0] | Function | Note | 00000000 | Power Save Off | - | 00000001 | Power Save Low | Conservative Setting of CABC/DBLC | 00000010 | Power Save Medium | Medium Setting of CABC/DBLC | 00000011 | Power Save High | Aggressive Setting of CABC/DBLC | 1000XXXX | IE On – Low | Low Enhancement of LCD | 1001XXXX | IE On – Medium | Medium Enhancement of LCD | 1011XXXX | IE On – High | High Enhancement of LCD | 0100XXXX | SRE - Low | Sunlight readability enhancement | 0101XXXX | SRE - Medium | Sunlight readability enhancement | 0110XXXX | SRE - High | Sunlight readability enhancement | | Others | Reserved | - |
| | PWRSAVE[7:0] | Function | Note | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 00000000 | Power Save Off | - | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 00000001 | Power Save Low | Conservative Setting of CABC/DBLC | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 00000010 | Power Save Medium | Medium Setting of CABC/DBLC | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 00000011 | Power Save High | Aggressive Setting of CABC/DBLC | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 1000XXXX | IE On – Low | Low Enhancement of LCD | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 1001XXXX | IE On – Medium | Medium Enhancement of LCD | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 1011XXXX | IE On – High | High Enhancement of LCD | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 0100XXXX | SRE - Low | Sunlight readability enhancement | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0101XXXX | SRE - Medium | Sunlight readability enhancement | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0110XXXX | SRE - High | Sunlight readability enhancement | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Others | Reserved | - | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 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>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 | Sleep In | Yes | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Status | Availability | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Normal Mode On, Idle Mode Off, Sleep Out | Yes | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Normal 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>00h</td> </tr> <tr> <td>S/W Reset</td> <td>00h</td> </tr> <tr> <td>H/W Reset</td> <td>00h</td> </tr> </tbody> </table> | | | | | | | | | | | Status | Default Value | Power On Sequence | 00h | S/W Reset | 00h | H/W Reset | 00h | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Status | Default Value | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Power On Sequence | 00h | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| S/W Reset | 00h | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| H/W Reset | 00h | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Flow Chart | <div style="display: flex; align-items: center;"> <div style="flex: 1;"> <pre> graph TD WRPWRSAVE[WRPWRSAVE] --> Parameter[/Parameter/] Parameter --> NewPowerSaveMode{{New Power Save Mode}} </pre> </div> <div style="flex: 1; border: 1px dashed black; padding: 5px;"> <p>Legend</p> <ul style="list-style-type: none"> Command: [WRPWRSAVE] Parameter: /Parameter/ Display: [Display] Action: [Action] Mode: [Mode] Sequential transfer: [Sequential transfer] </div> </div> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

5.3.33. Read Power Save (56h)

| Command Page | | | Page 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|--|----------------------------------|-----------------------------------|----|----|----|----|----|----|----|---------|----------------|----------------|--|----------|---|-----|-----------|----------------|-----------------------------------|----------|-------------------|-----------------------------|----------|-----------------|---------------------------------|----------|-------------|------------------------|----------|----------------|---------------------------|----------|--------------|-------------------------|----------|-----------|----------------------------------|----------|--------------|----------------------------------|----------|------------|----------------------------------|--------|----------|---|
| Address | Parameter | W/R | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 56h | 1st | R | PWRSAVE[7:0] | | | | | | | | | 00h | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Description | 56h: RDPWRSAVE (Read Power Save). This command is used to read the settings for power save control functionalities. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | <table border="1"> <thead> <tr> <th>PWRSAVE[7:0]</th> <th>Function</th> <th>Note</th> </tr> </thead> <tbody> <tr> <td>00000000</td> <td>Power Save Off</td> <td>-</td> </tr> <tr> <td>00000001</td> <td>Power Save Low</td> <td>Conservative Setting of CABC/DBLC</td> </tr> <tr> <td>00000010</td> <td>Power Save Medium</td> <td>Medium Setting of CABC/DBLC</td> </tr> <tr> <td>00000011</td> <td>Power Save High</td> <td>Aggressive Setting of CABC/DBLC</td> </tr> <tr> <td>1000XXXX</td> <td>IE On – Low</td> <td>Low Enhancement of LCD</td> </tr> <tr> <td>1001XXXX</td> <td>IE On – Medium</td> <td>Medium Enhancement of LCD</td> </tr> <tr> <td>1011XXXX</td> <td>IE On – High</td> <td>High Enhancement of LCD</td> </tr> <tr> <td>0100XXXX</td> <td>SRE - Low</td> <td>Sunlight readability enhancement</td> </tr> <tr> <td>0101XXXX</td> <td>SRE - Medium</td> <td>Sunlight readability enhancement</td> </tr> <tr> <td>0110XXXX</td> <td>SRE - High</td> <td>Sunlight readability enhancement</td> </tr> <tr> <td>Others</td> <td>Reserved</td> <td>-</td> </tr> </tbody> </table> | | | | | | | | | | | PWRSAVE[7:0] | Function | Note | 00000000 | Power Save Off | - | 00000001 | Power Save Low | Conservative Setting of CABC/DBLC | 00000010 | Power Save Medium | Medium Setting of CABC/DBLC | 00000011 | Power Save High | Aggressive Setting of CABC/DBLC | 1000XXXX | IE On – Low | Low Enhancement of LCD | 1001XXXX | IE On – Medium | Medium Enhancement of LCD | 1011XXXX | IE On – High | High Enhancement of LCD | 0100XXXX | SRE - Low | Sunlight readability enhancement | 0101XXXX | SRE - Medium | Sunlight readability enhancement | 0110XXXX | SRE - High | Sunlight readability enhancement | Others | Reserved | - |
| | PWRSAVE[7:0] | Function | Note | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 00000000 | Power Save Off | - | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 00000001 | Power Save Low | Conservative Setting of CABC/DBLC | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 00000010 | Power Save Medium | Medium Setting of CABC/DBLC | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 00000011 | Power Save High | Aggressive Setting of CABC/DBLC | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 1000XXXX | IE On – Low | Low Enhancement of LCD | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 1001XXXX | IE On – Medium | Medium Enhancement of LCD | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 1011XXXX | IE On – High | High Enhancement of LCD | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0100XXXX | SRE - Low | Sunlight readability enhancement | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0101XXXX | SRE - Medium | Sunlight readability enhancement | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0110XXXX | SRE - High | Sunlight readability enhancement | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Others | Reserved | - | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| CABC = Content Adaptive Brightness Control DBLC = Dynamic Backlight Control IE = Image Enhancement | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 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>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 | Sleep In | Yes | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Status | Availability | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Normal Mode On, Idle Mode Off, Sleep Out | Yes | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Normal 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>00h</td> </tr> <tr> <td>S/W Reset</td> <td>00h</td> </tr> <tr> <td>H/W Reset</td> <td>00h</td> </tr> </tbody> </table> | | | | | | | | | | | Status | Default Value | Power On Sequence | 00h | S/W Reset | 00h | H/W Reset | 00h | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Status | Default Value | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Power On Sequence | 00h | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| S/W Reset | 00h | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| H/W Reset | 00h | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Flow Chart | <div style="display: flex; align-items: center;"> <div style="text-align: center; margin-right: 20px;"> <table border="1" style="margin-bottom: 5px;"> <tr><td>Read RDPWRSAVE</td></tr> </table> ↓ <table border="1" style="margin-top: 5px;"> <tr><td>Send Parameter</td></tr> </table> </div> <div style="text-align: center;"> <p>Host Display</p> </div> <div style="border: 1px dashed black; padding: 10px; margin-left: 20px;"> <p>Legend</p> <ul style="list-style-type: none"> Command Parameter Display Action Mode Sequential transfer </div> </div> | | | | | | | | | | | Read RDPWRSAVE | Send Parameter | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Read RDPWRSAVE | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Send Parameter | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

5.3.34. Stop Transition (59h)

| Command Page | | | Page 0 | | | | | | | | | | | | | | | | |
|--|---|-----|-------------|----|----|----|----|----|----|----|---------|--------|---------------|--|-----|---|-----|-----------|-----|
| Address | Parameter | W/R | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default | | | | | | | | |
| 59h | - | W | No Argument | | | | | | | | | - | | | | | | | |
| Description | <p>59h: STOP_TR (Stop Transition).</p> <p>When DD bit status of "5.3.30Write CTRL Display Value (53h)" register is '1', applying this command instantly stops the ongoing transition of Display Dimming.</p> <p>When display module receives this command, the current output value stays active.</p> | | | | | | | | | | | | | | | | | | |
| Restriction | This command has no effect when Display Dimming transition is not 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>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 | Sleep In | Yes |
| Status | Availability | | | | | | | | | | | | | | | | | | |
| Normal Mode On, Idle Mode Off, Sleep Out | Yes | | | | | | | | | | | | | | | | | | |
| Normal 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>S/W Reset</td> <td>Off</td> </tr> <tr> <td>H/W Reset</td> <td>Off</td> </tr> </tbody> </table> | | | | | | | | | | | Status | Default Value | Power On Sequence | Off | S/W Reset | Off | H/W Reset | Off |
| Status | Default Value | | | | | | | | | | | | | | | | | | |
| Power On Sequence | Off | | | | | | | | | | | | | | | | | | |
| S/W Reset | Off | | | | | | | | | | | | | | | | | | |
| H/W Reset | Off | | | | | | | | | | | | | | | | | | |
| Flow Chart | <pre> graph TD A[Display Dimming transition is active] --> B[STOP TR] B --> C[Stop ongoing transition] </pre> <p>Legend</p> <ul style="list-style-type: none"> Command: Rectangle Parameter: Parallelogram Display: Display shape Action: Action shape Mode: Oval Sequential transfer: Oval with arrow | | | | | | | | | | | | | | | | | | |

5.3.35. Write CABC Minimum Brightness (5Eh)

| Command Page | | | Page 0 | | | | | | | | | | | | | | | | |
|--|---------------|--|----------|----|----|----|-----------|----|----|----|---------|--------|---------------|--|---------|---|---------|-----------|---------|
| Address | Parameter | W/R | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default | | | | | | | | |
| 5Eh | 1st | W | 0 | 0 | 0 | 0 | CMB[11:8] | | | | 00h | | | | | | | | |
| | 2nd | W | CMB[7:0] | | | | | | | | | 00h | | | | | | | |
| Description | | <p>5Eh: WRCABCMB (Write CABC minimum brightness).</p> <p>This command is used to set the minimum brightness value of the display for CABC function.</p> <p>In principle relationship is that 0000h value means the lowest brightness for CABC and 0FFFh value means the highest brightness for CABC.</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>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 | Sleep In | Yes |
| Status | Availability | | | | | | | | | | | | | | | | | | |
| Normal Mode On, Idle Mode Off, Sleep Out | Yes | | | | | | | | | | | | | | | | | | |
| Normal 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>00h_00h</td> </tr> <tr> <td>S/W Reset</td> <td>00h_00h</td> </tr> <tr> <td>H/W Reset</td> <td>00h_00h</td> </tr> </tbody> </table> | | | | | | | | | | Status | Default Value | Power On Sequence | 00h_00h | S/W Reset | 00h_00h | H/W Reset | 00h_00h |
| Status | Default Value | | | | | | | | | | | | | | | | | | |
| Power On Sequence | 00h_00h | | | | | | | | | | | | | | | | | | |
| S/W Reset | 00h_00h | | | | | | | | | | | | | | | | | | |
| H/W Reset | 00h_00h | | | | | | | | | | | | | | | | | | |
| Flow Chart | | <pre> graph TD WRCABCMB[WRCABCMB] --> CMB[CMB[7..0]] CMB --> Action[New Display Luminance Value Loaded] </pre> <p>Legend</p> <ul style="list-style-type: none"> Command: Rectangle Parameter: Parallelogram Display: Hexagon Action: Arrow Mode: Oval Sequential transfer: Dashed box | | | | | | | | | | | | | | | | | |

5.3.36. Read CABC Minimum Brightness (5Fh)

| Command Page | | | Page 0 | | | | | | | | | | | | | | | | |
|--|---------------|--|----------|----|----|----|-----------|----|----|----|---------|--------|---------------|--|---------|---|---------|-----------|---------|
| Address | Parameter | W/R | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default | | | | | | | | |
| 5Eh | 1st | R | 0 | 0 | 0 | 0 | CMB[11:8] | | | | 00h | | | | | | | | |
| | 2nd | R | CMB[7:0] | | | | | | | | 00h | | | | | | | | |
| Description | | <p>5Fh: RDCABCMB (Read CABC Minimum Brightness). This command returns the minimum brightness value of CABC function. In principle the relationship is that 0000h value means the lowest brightness and 0FFFh value means the highest brightness. CMB[11:0] is CABC minimum brightness specified by the Write CABC minimum brightness (5Eh) command.</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>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 | Sleep In | Yes |
| Status | Availability | | | | | | | | | | | | | | | | | | |
| Normal Mode On, Idle Mode Off, Sleep Out | Yes | | | | | | | | | | | | | | | | | | |
| Normal 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>00h_00h</td> </tr> <tr> <td>S/W Reset</td> <td>00h_00h</td> </tr> <tr> <td>H/W Reset</td> <td>00h_00h</td> </tr> </tbody> </table> | | | | | | | | | | Status | Default Value | Power On Sequence | 00h_00h | S/W Reset | 00h_00h | H/W Reset | 00h_00h |
| Status | Default Value | | | | | | | | | | | | | | | | | | |
| Power On Sequence | 00h_00h | | | | | | | | | | | | | | | | | | |
| S/W Reset | 00h_00h | | | | | | | | | | | | | | | | | | |
| H/W Reset | 00h_00h | | | | | | | | | | | | | | | | | | |
| Flow Chart | | <pre> graph TD subgraph Host C[Read RDCABCMB] end subgraph Display P[/Send Parameter/] end C --> P </pre> <p>Legend: Command: Rectangle Parameter: Parallelogram Display: Oval Action: Arrow Mode: Rounded Rectangle Sequential transfer: Speech Bubble</p> | | | | | | | | | | | | | | | | | |

5.3.37. Set Transition Time (68h)

| Command Page | | | Page 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|--|-------------|-------------|----|----|----|----|----|----|----|---------|--------------|--------------|--|--------|---|--------|----------|--------|-----|--------|-----|---------|-----|---------|-----|---------|-----|----------|-----|----------|-----|----------|-----|-----------|-----|-----------|-----|-----------|--------|----------|--------------|-------------|-----|---------|-----|---------|-----|---------|-----|---------|-----|---------|-----|---------|---|---|---|---|-----|-----------|-----|-----------|-----|-----------|-----|-----------|-----|-----------|
| Address | Parameter | W/R | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 68h | 1st | W | TT_STP[7:0] | | | | | | | | 00h | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 2nd | W | ST_TIM[7:0] | | | | | | | | 00h | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Description | <p>68h: SET_TT (Set Transition Time).</p> <p>This command controls the total transition time of Display Dimming function.</p> <p>Transition time is adjusted with two parameters, defining as follows:</p> <p>1st Parameter TT_STP [7:0] defines the number of dimming steps for transition.</p> <table border="1"> <thead> <tr> <th>TT_STP [7:0]</th> <th>Description</th> </tr> </thead> <tbody> <tr><td>00h</td><td>1 step</td></tr> <tr><td>01h</td><td>2 step</td></tr> <tr><td>02h</td><td>4 step</td></tr> <tr><td>03h</td><td>8 step</td></tr> <tr><td>04h</td><td>16 step</td></tr> <tr><td>05h</td><td>32 step</td></tr> <tr><td>06h</td><td>64 step</td></tr> <tr><td>07h</td><td>128 step</td></tr> <tr><td>08h</td><td>256 step</td></tr> <tr><td>09h</td><td>512 step</td></tr> <tr><td>0Ah</td><td>1024 step</td></tr> <tr><td>0Bh</td><td>2048 step</td></tr> <tr><td>0Ch</td><td>4096 step</td></tr> <tr><td>Others</td><td>Reserved</td></tr> </tbody> </table> <p>2nd Parameter ST_TIM [7:0] defines the step time as frame units for each dimming step.</p> <table border="1"> <thead> <tr> <th>ST_TIM [7:0]</th> <th>Description</th> </tr> </thead> <tbody> <tr><td>00h</td><td>1 frame</td></tr> <tr><td>01h</td><td>1 frame</td></tr> <tr><td>02h</td><td>2 frame</td></tr> <tr><td>03h</td><td>3 frame</td></tr> <tr><td>04h</td><td>4 frame</td></tr> <tr><td>05h</td><td>5 frame</td></tr> <tr><td>:</td><td>:</td></tr> <tr><td>:</td><td>:</td></tr> <tr><td>FBh</td><td>251 frame</td></tr> <tr><td>FCh</td><td>252 frame</td></tr> <tr><td>FDh</td><td>253 frame</td></tr> <tr><td>FEh</td><td>254 frame</td></tr> <tr><td>FFh</td><td>255 frame</td></tr> </tbody> </table> <p>Thereby, total transition time for dimming can be calculated as follows:</p> <p>TT_STP [7:0] * ST_TIM [7:0] = TT, where TT unit is frame. Value 0000h means the transition is instant</p> | | | | | | | | | | | TT_STP [7:0] | Description | 00h | 1 step | 01h | 2 step | 02h | 4 step | 03h | 8 step | 04h | 16 step | 05h | 32 step | 06h | 64 step | 07h | 128 step | 08h | 256 step | 09h | 512 step | 0Ah | 1024 step | 0Bh | 2048 step | 0Ch | 4096 step | Others | Reserved | ST_TIM [7:0] | Description | 00h | 1 frame | 01h | 1 frame | 02h | 2 frame | 03h | 3 frame | 04h | 4 frame | 05h | 5 frame | : | : | : | : | FBh | 251 frame | FCh | 252 frame | FDh | 253 frame | FEh | 254 frame | FFh | 255 frame |
| | TT_STP [7:0] | Description | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 00h | 1 step | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 01h | 2 step | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 02h | 4 step | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 03h | 8 step | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 04h | 16 step | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 05h | 32 step | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 06h | 64 step | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 07h | 128 step | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 08h | 256 step | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 09h | 512 step | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0Ah | 1024 step | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0Bh | 2048 step | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0Ch | 4096 step | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Others | Reserved | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ST_TIM [7:0] | Description | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 00h | 1 frame | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 01h | 1 frame | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 02h | 2 frame | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 03h | 3 frame | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 04h | 4 frame | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 05h | 5 frame | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| FBh | 251 frame | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| FCh | 252 frame | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| FDh | 253 frame | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| FEh | 254 frame | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| FFh | 255 frame | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 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>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 | Sleep In | Yes | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Status | Availability | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Normal Mode On, Idle Mode Off, Sleep Out | Yes | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Normal Mode On, Idle Mode On, Sleep Out | Yes | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Sleep In | Yes | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

| <p>Default</p> | <table border="1"> <thead> <tr> <th>Status</th> <th>Default Value</th> </tr> </thead> <tbody> <tr> <td>Power On Sequence</td> <td>00h_00h</td> </tr> <tr> <td>S/W Reset</td> <td>00h_00h</td> </tr> <tr> <td>H/W Reset</td> <td>00h_00h</td> </tr> </tbody> </table> | Status | Default Value | Power On Sequence | 00h_00h | S/W Reset | 00h_00h | H/W Reset | 00h_00h |
|-------------------|--|--------|---------------|-------------------|---------|-----------|---------|-----------|---------|
| Status | Default Value | | | | | | | | |
| Power On Sequence | 00h_00h | | | | | | | | |
| S/W Reset | 00h_00h | | | | | | | | |
| H/W Reset | 00h_00h | | | | | | | | |
| <p>Flow Chart</p> | <pre> graph TD A[SET TT] --> B[/TT_STP/] B --> C[/ST_TIM/] C --> D{{New TT setting loaded}} </pre> <p>Legend</p> <ul style="list-style-type: none"> Command Parameter Display Action Mode Sequential transfer | | | | | | | | |

5.3.38. Get Transition Time (69h)

| Command Page | | | Page 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|--|-------------|-------------|----|----|----|----|----|----|----|---------|--------------|--------------|--|--------|---|--------|----------|--------|-----|--------|-----|---------|-----|---------|-----|---------|-----|----------|-----|----------|-----|----------|-----|-----------|-----|-----------|-----|-----------|--------|----------|--------------|-------------|-----|---------|-----|---------|-----|---------|-----|---------|-----|---------|-----|---------|---|---|---|---|-----|-----------|-----|-----------|-----|-----------|-----|-----------|-----|-----------|
| Address | Parameter | W/R | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 69h | 1st | R | TT_STP[7:0] | | | | | | | | 00h | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 2nd | R | ST_TIM[7:0] | | | | | | | | 00h | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Description | <p>69h: GET_TT (Get Transition Time Value).</p> <p>This readout returns the Transition Time value of Display Dimming function, described in section "5.3.37Set Transition Time (68h)".</p> <p>Transition time is adjusted with two parameters, defining as follows:</p> <p>1st Parameter TT_STP [7:0] defines the number of dimming steps for transition.</p> <table border="1"> <thead> <tr> <th>TT_STP [7:0]</th> <th>Description</th> </tr> </thead> <tbody> <tr><td>00h</td><td>1 step</td></tr> <tr><td>01h</td><td>2 step</td></tr> <tr><td>02h</td><td>4 step</td></tr> <tr><td>03h</td><td>8 step</td></tr> <tr><td>04h</td><td>16 step</td></tr> <tr><td>05h</td><td>32 step</td></tr> <tr><td>06h</td><td>64 step</td></tr> <tr><td>07h</td><td>128 step</td></tr> <tr><td>08h</td><td>256 step</td></tr> <tr><td>09h</td><td>512 step</td></tr> <tr><td>0Ah</td><td>1024 step</td></tr> <tr><td>0Bh</td><td>2048 step</td></tr> <tr><td>0Ch</td><td>4096 step</td></tr> <tr><td>Others</td><td>Reserved</td></tr> </tbody> </table> <p>2nd Parameter ST_TIM [7:0] defines the step time as frame units for each dimming step.</p> <table border="1"> <thead> <tr> <th>ST_TIM [7:0]</th> <th>Description</th> </tr> </thead> <tbody> <tr><td>00h</td><td>1 frame</td></tr> <tr><td>01h</td><td>1 frame</td></tr> <tr><td>02h</td><td>2 frame</td></tr> <tr><td>03h</td><td>3 frame</td></tr> <tr><td>04h</td><td>4 frame</td></tr> <tr><td>05h</td><td>5 frame</td></tr> <tr><td>:</td><td>:</td></tr> <tr><td>:</td><td>:</td></tr> <tr><td>FBh</td><td>251 frame</td></tr> <tr><td>FCh</td><td>252 frame</td></tr> <tr><td>FDh</td><td>253 frame</td></tr> <tr><td>FEh</td><td>254 frame</td></tr> <tr><td>FFh</td><td>255 frame</td></tr> </tbody> </table> | | | | | | | | | | | TT_STP [7:0] | Description | 00h | 1 step | 01h | 2 step | 02h | 4 step | 03h | 8 step | 04h | 16 step | 05h | 32 step | 06h | 64 step | 07h | 128 step | 08h | 256 step | 09h | 512 step | 0Ah | 1024 step | 0Bh | 2048 step | 0Ch | 4096 step | Others | Reserved | ST_TIM [7:0] | Description | 00h | 1 frame | 01h | 1 frame | 02h | 2 frame | 03h | 3 frame | 04h | 4 frame | 05h | 5 frame | : | : | : | : | FBh | 251 frame | FCh | 252 frame | FDh | 253 frame | FEh | 254 frame | FFh | 255 frame |
| | TT_STP [7:0] | Description | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 00h | 1 step | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 01h | 2 step | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 02h | 4 step | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 03h | 8 step | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 04h | 16 step | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 05h | 32 step | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 06h | 64 step | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 07h | 128 step | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 08h | 256 step | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 09h | 512 step | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0Ah | 1024 step | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0Bh | 2048 step | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0Ch | 4096 step | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Others | Reserved | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ST_TIM [7:0] | Description | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 00h | 1 frame | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 01h | 1 frame | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 02h | 2 frame | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 03h | 3 frame | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 04h | 4 frame | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 05h | 5 frame | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| FBh | 251 frame | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| FCh | 252 frame | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| FDh | 253 frame | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| FEh | 254 frame | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| FFh | 255 frame | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 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>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 | Sleep In | Yes | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Status | Availability | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Normal Mode On, Idle Mode Off, Sleep Out | Yes | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Normal Mode On, Idle Mode On, Sleep Out | Yes | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Sleep In | Yes | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

| <p>Default</p> | <table border="1"> <thead> <tr> <th>Status</th> <th>Default Value</th> </tr> </thead> <tbody> <tr> <td>Power On Sequence</td> <td>00h_00h</td> </tr> <tr> <td>S/W Reset</td> <td>00h_00h</td> </tr> <tr> <td>H/W Reset</td> <td>00h_00h</td> </tr> </tbody> </table> | Status | Default Value | Power On Sequence | 00h_00h | S/W Reset | 00h_00h | H/W Reset | 00h_00h |
|-------------------|---|--------|---------------|-------------------|---------|-----------|---------|-----------|---------|
| Status | Default Value | | | | | | | | |
| Power On Sequence | 00h_00h | | | | | | | | |
| S/W Reset | 00h_00h | | | | | | | | |
| H/W Reset | 00h_00h | | | | | | | | |
| <p>Flow Chart</p> | <pre> graph TD subgraph Host C1[Read GET_TT] end subgraph Display P1[/Send 1st Parameter/] P2[/Send 2nd Parameter/] end C1 --> P1 P1 --> P2 </pre> <p>Legend</p> <ul style="list-style-type: none"> Command Parameter Display Action Mode Sequential transfer | | | | | | | | |

5.3.39. Read Black/White Low Bits (70h)

| Command Page | | | Page 0 | | | | | | | | | | | | | | | | |
|--|---|-----|----------|----|----------|----|---------|----|---------|----|---------|--------|---------------|--|-----|---|-----|-----------|-----|
| Address | Parameter | W/R | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default | | | | | | | | |
| 70h | 1st | R | Bkx[1:0] | | Bky[1:0] | | Wx[1:0] | | Wy[1:0] | | 00h | | | | | | | | |
| Description | <p>70h: RDBWLB (Read Black/White Low Bits).</p> <p>This command returns the lowest bits of black and white color characteristics.</p> <p>Black: Bkx and Bky</p> <p>White: Wx and Wy</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>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 | Sleep In | Yes |
| Status | Availability | | | | | | | | | | | | | | | | | | |
| Normal Mode On, Idle Mode Off, Sleep Out | Yes | | | | | | | | | | | | | | | | | | |
| Normal 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>00h</td> </tr> <tr> <td>S/W Reset</td> <td>00h</td> </tr> <tr> <td>H/W Reset</td> <td>00h</td> </tr> </tbody> </table> | | | | | | | | | | | Status | Default Value | Power On Sequence | 00h | S/W Reset | 00h | H/W Reset | 00h |
| Status | Default Value | | | | | | | | | | | | | | | | | | |
| Power On Sequence | 00h | | | | | | | | | | | | | | | | | | |
| S/W Reset | 00h | | | | | | | | | | | | | | | | | | |
| H/W Reset | 00h | | | | | | | | | | | | | | | | | | |
| Flow Chart | | | | | | | | | | | | | | | | | | | |

5.3.40. Read Bkx (71h)

| Command Page | | | Page 0 | | | | | | | | | | | | | | | | |
|--|---------------|---|----------|----|----|----|----|----|----|----|---------|--------|---------------|--|-----|---|-----|-----------|-----|
| Address | Parameter | W/R | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default | | | | | | | | |
| 71h | 1st | R | Bkx[9:2] | | | | | | | | 00h | | | | | | | | |
| Description | | 71h: RDBkx (Read Bkx). This command reads the Bkx bits (Bkx[9:2]) of black color characteristics. | | | | | | | | | | | | | | | | | |
| 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>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 | Sleep In | Yes |
| Status | Availability | | | | | | | | | | | | | | | | | | |
| Normal Mode On, Idle Mode Off, Sleep Out | Yes | | | | | | | | | | | | | | | | | | |
| Normal 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>00h</td> </tr> <tr> <td>S/W Reset</td> <td>00h</td> </tr> <tr> <td>H/W Reset</td> <td>00h</td> </tr> </tbody> </table> | | | | | | | | | | Status | Default Value | Power On Sequence | 00h | S/W Reset | 00h | H/W Reset | 00h |
| Status | Default Value | | | | | | | | | | | | | | | | | | |
| Power On Sequence | 00h | | | | | | | | | | | | | | | | | | |
| S/W Reset | 00h | | | | | | | | | | | | | | | | | | |
| H/W Reset | 00h | | | | | | | | | | | | | | | | | | |
| Flow Chart | | | | | | | | | | | | | | | | | | | |

5.3.41. Read Bky (72h)

| Command Page | | | Page 0 | | | | | | | | | | | | | | | | |
|--|---------------|---|----------|----|----|----|----|----|----|----|---------|--------|---------------|--|-----|---|-----|-----------|-----|
| Address | Parameter | W/R | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default | | | | | | | | |
| 72h | 1st | R | Bky[9:2] | | | | | | | | 00h | | | | | | | | |
| Description | | 72h: RDBky (Read Bky). This command reads the Bky bits (Bky[9:2]) of black color characteristics. | | | | | | | | | | | | | | | | | |
| 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>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 | Sleep In | Yes |
| Status | Availability | | | | | | | | | | | | | | | | | | |
| Normal Mode On, Idle Mode Off, Sleep Out | Yes | | | | | | | | | | | | | | | | | | |
| Normal 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>00h</td> </tr> <tr> <td>S/W Reset</td> <td>00h</td> </tr> <tr> <td>H/W Reset</td> <td>00h</td> </tr> </tbody> </table> | | | | | | | | | | Status | Default Value | Power On Sequence | 00h | S/W Reset | 00h | H/W Reset | 00h |
| Status | Default Value | | | | | | | | | | | | | | | | | | |
| Power On Sequence | 00h | | | | | | | | | | | | | | | | | | |
| S/W Reset | 00h | | | | | | | | | | | | | | | | | | |
| H/W Reset | 00h | | | | | | | | | | | | | | | | | | |
| Flow Chart | | | | | | | | | | | | | | | | | | | |

5.3.42. Read Wx (73h)

| Command Page | | | Page 0 | | | | | | | | | | | | | | | | |
|--|---|-----|---------|----|----|----|----|----|----|----|---------|--------|---------------|--|-----|---|-----|-----------|-----|
| Address | Parameter | W/R | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default | | | | | | | | |
| 73h | 1st | R | Wx[9:2] | | | | | | | | 00h | | | | | | | | |
| Description | 73h: RDWx (Read Wx). This command reads the Wx bits (Wx[9:2]) of white color characteristics. | | | | | | | | | | | | | | | | | | |
| 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>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 | Sleep In | Yes |
| Status | Availability | | | | | | | | | | | | | | | | | | |
| Normal Mode On, Idle Mode Off, Sleep Out | Yes | | | | | | | | | | | | | | | | | | |
| Normal 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>00h</td> </tr> <tr> <td>S/W Reset</td> <td>00h</td> </tr> <tr> <td>H/W Reset</td> <td>00h</td> </tr> </tbody> </table> | | | | | | | | | | | Status | Default Value | Power On Sequence | 00h | S/W Reset | 00h | H/W Reset | 00h |
| Status | Default Value | | | | | | | | | | | | | | | | | | |
| Power On Sequence | 00h | | | | | | | | | | | | | | | | | | |
| S/W Reset | 00h | | | | | | | | | | | | | | | | | | |
| H/W Reset | 00h | | | | | | | | | | | | | | | | | | |
| Flow Chart | | | | | | | | | | | | | | | | | | | |

5.3.43. Read Wy (74h)

| Command Page | | | Page 0 | | | | | | | | | | | | | | | | |
|--|---------------|---|---------|----|----|----|----|----|----|----|---------|--------|---------------|--|-----|---|-----|-----------|-----|
| Address | Parameter | W/R | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default | | | | | | | | |
| 74h | 1st | R | Wy[9:2] | | | | | | | | 00h | | | | | | | | |
| Description | | 74h: RDWy (Read Wy). This command reads the Wy bits (Wy[9:2]) of white color characteristics. | | | | | | | | | | | | | | | | | |
| 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>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 | Sleep In | Yes |
| Status | Availability | | | | | | | | | | | | | | | | | | |
| Normal Mode On, Idle Mode Off, Sleep Out | Yes | | | | | | | | | | | | | | | | | | |
| Normal 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>00h</td> </tr> <tr> <td>S/W Reset</td> <td>00h</td> </tr> <tr> <td>H/W Reset</td> <td>00h</td> </tr> </tbody> </table> | | | | | | | | | | Status | Default Value | Power On Sequence | 00h | S/W Reset | 00h | H/W Reset | 00h |
| Status | Default Value | | | | | | | | | | | | | | | | | | |
| Power On Sequence | 00h | | | | | | | | | | | | | | | | | | |
| S/W Reset | 00h | | | | | | | | | | | | | | | | | | |
| H/W Reset | 00h | | | | | | | | | | | | | | | | | | |
| Flow Chart | | | | | | | | | | | | | | | | | | | |

5.3.44. Read Red/Green Low Bits (75h)

| Command Page | | | Page 0 | | | | | | | | | | | | | | | | |
|--|---------------|---|---------|----|---------|----|---------|----|---------|----|---------|--------|---------------|--|-----|---|-----|-----------|-----|
| Address | Parameter | W/R | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default | | | | | | | | |
| 75h | 1st | R | Rx[1:0] | | Ry[1:0] | | Gx[1:0] | | Gy[1:0] | | 00h | | | | | | | | |
| Description | | <p>75h: RDRGLB (Read Red/Green Low Bits).</p> <p>This command returns the lowest bits of red and green color characteristics.</p> <p>Red: Rx and Ry</p> <p>Green: Gx and Gy</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>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 | Sleep In | Yes |
| Status | Availability | | | | | | | | | | | | | | | | | | |
| Normal Mode On, Idle Mode Off, Sleep Out | Yes | | | | | | | | | | | | | | | | | | |
| Normal 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>00h</td> </tr> <tr> <td>S/W Reset</td> <td>00h</td> </tr> <tr> <td>H/W Reset</td> <td>00h</td> </tr> </tbody> </table> | | | | | | | | | | Status | Default Value | Power On Sequence | 00h | S/W Reset | 00h | H/W Reset | 00h |
| Status | Default Value | | | | | | | | | | | | | | | | | | |
| Power On Sequence | 00h | | | | | | | | | | | | | | | | | | |
| S/W Reset | 00h | | | | | | | | | | | | | | | | | | |
| H/W Reset | 00h | | | | | | | | | | | | | | | | | | |
| Flow Chart | | | | | | | | | | | | | | | | | | | |

5.3.45. Read Rx (76h)

| Command Page | | | Page 0 | | | | | | | | | | | | | | | | |
|--|---------------|---|---------|----|----|----|----|----|----|----|---------|--------|---------------|--|-----|---|-----|-----------|-----|
| Address | Parameter | W/R | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default | | | | | | | | |
| 76h | 1st | R | Rx[9:2] | | | | | | | | 00h | | | | | | | | |
| Description | | 76h: RDRx (Read Rx). This command reads the Rx bits (Rx[9:2]) of red color characteristics. | | | | | | | | | | | | | | | | | |
| 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>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 | Sleep In | Yes |
| Status | Availability | | | | | | | | | | | | | | | | | | |
| Normal Mode On, Idle Mode Off, Sleep Out | Yes | | | | | | | | | | | | | | | | | | |
| Normal 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>00h</td> </tr> <tr> <td>S/W Reset</td> <td>00h</td> </tr> <tr> <td>H/W Reset</td> <td>00h</td> </tr> </tbody> </table> | | | | | | | | | | Status | Default Value | Power On Sequence | 00h | S/W Reset | 00h | H/W Reset | 00h |
| Status | Default Value | | | | | | | | | | | | | | | | | | |
| Power On Sequence | 00h | | | | | | | | | | | | | | | | | | |
| S/W Reset | 00h | | | | | | | | | | | | | | | | | | |
| H/W Reset | 00h | | | | | | | | | | | | | | | | | | |
| Flow Chart | | | | | | | | | | | | | | | | | | | |

5.3.46. Read Ry (77h)

| Command Page | | | Page 0 | | | | | | | | | | | | | | | | |
|--|---------------|---|---------|----|----|----|----|----|----|----|---------|--------|---------------|--|-----|---|-----|-----------|-----|
| Address | Parameter | W/R | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default | | | | | | | | |
| 77h | 1st | R | Ry[9:2] | | | | | | | | 00h | | | | | | | | |
| Description | | 77h: RDRy (Read Ry). This command reads the Ry bits (Ry[9:2]) of red color characteristics. | | | | | | | | | | | | | | | | | |
| 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>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 | Sleep In | Yes |
| Status | Availability | | | | | | | | | | | | | | | | | | |
| Normal Mode On, Idle Mode Off, Sleep Out | Yes | | | | | | | | | | | | | | | | | | |
| Normal 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>00h</td> </tr> <tr> <td>S/W Reset</td> <td>00h</td> </tr> <tr> <td>H/W Reset</td> <td>00h</td> </tr> </tbody> </table> | | | | | | | | | | Status | Default Value | Power On Sequence | 00h | S/W Reset | 00h | H/W Reset | 00h |
| Status | Default Value | | | | | | | | | | | | | | | | | | |
| Power On Sequence | 00h | | | | | | | | | | | | | | | | | | |
| S/W Reset | 00h | | | | | | | | | | | | | | | | | | |
| H/W Reset | 00h | | | | | | | | | | | | | | | | | | |
| Flow Chart | | | | | | | | | | | | | | | | | | | |

5.3.47. Read Gx (78h)

| Command Page | | | Page 0 | | | | | | | | | | | | | | | | |
|--|---------------|---|---------|----|----|----|----|----|----|----|---------|--------|---------------|--|-----|---|-----|-----------|-----|
| Address | Parameter | W/R | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default | | | | | | | | |
| 78h | 1st | R | Gx[9:2] | | | | | | | | 00h | | | | | | | | |
| Description | | 78h: RDGx (Read Gx). This command reads the Gx bits (Gx[9:2]) of green color characteristics. | | | | | | | | | | | | | | | | | |
| 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>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 | Sleep In | Yes |
| Status | Availability | | | | | | | | | | | | | | | | | | |
| Normal Mode On, Idle Mode Off, Sleep Out | Yes | | | | | | | | | | | | | | | | | | |
| Normal 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>00h</td> </tr> <tr> <td>S/W Reset</td> <td>00h</td> </tr> <tr> <td>H/W Reset</td> <td>00h</td> </tr> </tbody> </table> | | | | | | | | | | Status | Default Value | Power On Sequence | 00h | S/W Reset | 00h | H/W Reset | 00h |
| Status | Default Value | | | | | | | | | | | | | | | | | | |
| Power On Sequence | 00h | | | | | | | | | | | | | | | | | | |
| S/W Reset | 00h | | | | | | | | | | | | | | | | | | |
| H/W Reset | 00h | | | | | | | | | | | | | | | | | | |
| Flow Chart | | | | | | | | | | | | | | | | | | | |

5.3.48. Read Gy (79h)

| Command Page | | | Page 0 | | | | | | | | | | | | | | | | |
|--|---------------|---|---------|----|----|----|----|----|----|----|---------|--------|---------------|--|-----|---|-----|-----------|-----|
| Address | Parameter | W/R | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default | | | | | | | | |
| 79h | 1st | R | Gy[9:2] | | | | | | | | 00h | | | | | | | | |
| Description | | 79h: RDGy (Read Gy). This command reads the Gy bits (Gy[9:2]) of green color characteristics. | | | | | | | | | | | | | | | | | |
| 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>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 | Sleep In | Yes |
| Status | Availability | | | | | | | | | | | | | | | | | | |
| Normal Mode On, Idle Mode Off, Sleep Out | Yes | | | | | | | | | | | | | | | | | | |
| Normal 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>00h</td> </tr> <tr> <td>S/W Reset</td> <td>00h</td> </tr> <tr> <td>H/W Reset</td> <td>00h</td> </tr> </tbody> </table> | | | | | | | | | | Status | Default Value | Power On Sequence | 00h | S/W Reset | 00h | H/W Reset | 00h |
| Status | Default Value | | | | | | | | | | | | | | | | | | |
| Power On Sequence | 00h | | | | | | | | | | | | | | | | | | |
| S/W Reset | 00h | | | | | | | | | | | | | | | | | | |
| H/W Reset | 00h | | | | | | | | | | | | | | | | | | |
| Flow Chart | | | | | | | | | | | | | | | | | | | |

5.3.49. Read Blue/A Color Low Bits (7Ah)

| Command Page | | | Page 0 | | | | | | | | | | | | | | | | |
|--|---------------|---|---------|----|---------|----|---------|----|---------|----|---------|--------|---------------|--|-----|---|-----|-----------|-----|
| Address | Parameter | W/R | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default | | | | | | | | |
| 7Ah | 1st | R | Bx[1:0] | | By[1:0] | | Ax[1:0] | | Ay[1:0] | | 00h | | | | | | | | |
| Description | | <p>7Ah: RDBALB (Read Blue/A Color Low Bits).</p> <p>This command returns the lowest bits of blue and A color characteristics.</p> <p>Blue: Bx and By</p> <p>A: Ax and Ay</p> <p>If A is not used Ax[1:0] and Ay[1:0] bits are set to '0's.</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>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 | Sleep In | Yes |
| Status | Availability | | | | | | | | | | | | | | | | | | |
| Normal Mode On, Idle Mode Off, Sleep Out | Yes | | | | | | | | | | | | | | | | | | |
| Normal 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>00h</td> </tr> <tr> <td>S/W Reset</td> <td>00h</td> </tr> <tr> <td>H/W Reset</td> <td>00h</td> </tr> </tbody> </table> | | | | | | | | | | Status | Default Value | Power On Sequence | 00h | S/W Reset | 00h | H/W Reset | 00h |
| Status | Default Value | | | | | | | | | | | | | | | | | | |
| Power On Sequence | 00h | | | | | | | | | | | | | | | | | | |
| S/W Reset | 00h | | | | | | | | | | | | | | | | | | |
| H/W Reset | 00h | | | | | | | | | | | | | | | | | | |
| Flow Chart | | | | | | | | | | | | | | | | | | | |

5.3.50. Read Bx (7Bh)

| Command Page | | | Page 0 | | | | | | | | | | | | | | | | |
|--|---------------|---|---------|----|----|----|----|----|----|----|---------|--------|---------------|--|-----|---|-----|-----------|-----|
| Address | Parameter | W/R | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default | | | | | | | | |
| 7Bh | 1st | R | Bx[9:2] | | | | | | | | 00h | | | | | | | | |
| Description | | 7Bh: RDBx (Read Bx). This command reads the Bx bits (Bx[9:2]) of blue color characteristics. | | | | | | | | | | | | | | | | | |
| 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>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 | Sleep In | Yes |
| Status | Availability | | | | | | | | | | | | | | | | | | |
| Normal Mode On, Idle Mode Off, Sleep Out | Yes | | | | | | | | | | | | | | | | | | |
| Normal 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>00h</td> </tr> <tr> <td>S/W Reset</td> <td>00h</td> </tr> <tr> <td>H/W Reset</td> <td>00h</td> </tr> </tbody> </table> | | | | | | | | | | Status | Default Value | Power On Sequence | 00h | S/W Reset | 00h | H/W Reset | 00h |
| Status | Default Value | | | | | | | | | | | | | | | | | | |
| Power On Sequence | 00h | | | | | | | | | | | | | | | | | | |
| S/W Reset | 00h | | | | | | | | | | | | | | | | | | |
| H/W Reset | 00h | | | | | | | | | | | | | | | | | | |
| Flow Chart | | | | | | | | | | | | | | | | | | | |

5.3.51. Read By (7Ch)

| Command Page | | | Page 0 | | | | | | | | | | | | | | | | |
|--|---------------|---|---------|----|----|----|----|----|----|----|---------|--------|---------------|--|-----|---|-----|-----------|-----|
| Address | Parameter | W/R | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default | | | | | | | | |
| 7Ch | 1st | R | By[9:2] | | | | | | | | 00h | | | | | | | | |
| Description | | 7Ch: RDBy (Read By). This command reads the By bits (By[9:2]) of blue color characteristics. | | | | | | | | | | | | | | | | | |
| 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>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 | Sleep In | Yes |
| Status | Availability | | | | | | | | | | | | | | | | | | |
| Normal Mode On, Idle Mode Off, Sleep Out | Yes | | | | | | | | | | | | | | | | | | |
| Normal 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>00h</td> </tr> <tr> <td>S/W Reset</td> <td>00h</td> </tr> <tr> <td>H/W Reset</td> <td>00h</td> </tr> </tbody> </table> | | | | | | | | | | Status | Default Value | Power On Sequence | 00h | S/W Reset | 00h | H/W Reset | 00h |
| Status | Default Value | | | | | | | | | | | | | | | | | | |
| Power On Sequence | 00h | | | | | | | | | | | | | | | | | | |
| S/W Reset | 00h | | | | | | | | | | | | | | | | | | |
| H/W Reset | 00h | | | | | | | | | | | | | | | | | | |
| Flow Chart | | | | | | | | | | | | | | | | | | | |

5.3.52. Read Ax (7Dh)

| Command Page | | | Page 0 | | | | | | | | | | | | | | | | |
|--|--|-----|---------|----|----|----|----|----|----|----|---------|--------|---------------|--|-----|---|-----|-----------|-----|
| Address | Parameter | W/R | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default | | | | | | | | |
| 7Dh | 1st | R | Ax[9:2] | | | | | | | | 00h | | | | | | | | |
| Description | 7Dh: RDAx (Read Ax). This command reads the Ax bits (Ax[9:2]) of A Color characteristics. Ax[9:2] are set to 0 if they are not used. | | | | | | | | | | | | | | | | | | |
| Restriction | None | | | | | | | | | | | | | | | | | | |
| 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>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 | Sleep In | Yes |
| Status | Availability | | | | | | | | | | | | | | | | | | |
| Normal Mode On, Idle Mode Off, Sleep Out | Yes | | | | | | | | | | | | | | | | | | |
| Normal 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>00h</td> </tr> <tr> <td>S/W Reset</td> <td>00h</td> </tr> <tr> <td>H/W Reset</td> <td>00h</td> </tr> </tbody> </table> | | | | | | | | | | | Status | Default Value | Power On Sequence | 00h | S/W Reset | 00h | H/W Reset | 00h |
| Status | Default Value | | | | | | | | | | | | | | | | | | |
| Power On Sequence | 00h | | | | | | | | | | | | | | | | | | |
| S/W Reset | 00h | | | | | | | | | | | | | | | | | | |
| H/W Reset | 00h | | | | | | | | | | | | | | | | | | |
| Flow Chart | <div style="display: flex; align-items: center; justify-content: center;"> <div style="text-align: center; margin-right: 20px;"> <div style="border: 1px solid black; padding: 2px 10px; display: inline-block;">RDAx</div> ↓ <div style="border: 1px solid black; padding: 2px 10px; display: inline-block; transform: rotate(-15deg); transform-origin: center;">Send Parameter</div> </div> <div style="text-align: center; margin-left: 20px;"> Host ----- Display </div> </div> <div style="margin-left: 20px; border: 1px dashed black; padding: 5px;"> <p>Legend</p> <ul style="list-style-type: none"> Command Parameter Display Action Mode Sequential transfer </div> | | | | | | | | | | | | | | | | | | |

5.3.53. Read Ay (7Eh)

| Command Page | | | Page 0 | | | | | | | | | | | | | | | | |
|--|---|-----|---------|----|----|----|----|----|----|----|---------|--------|---------------|--|-----|---|-----|-----------|-----|
| Address | Parameter | W/R | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default | | | | | | | | |
| 7Eh | 1st | R | Ay[9:2] | | | | | | | | 00h | | | | | | | | |
| Description | <p>7Eh: RDAy (Read Ay). This command reads the Ay bits (Ay[9:2]) of A Color characteristics. Ay[9:2] are set to 0 if they are not used.</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>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 | Sleep In | Yes |
| Status | Availability | | | | | | | | | | | | | | | | | | |
| Normal Mode On, Idle Mode Off, Sleep Out | Yes | | | | | | | | | | | | | | | | | | |
| Normal 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>00h</td> </tr> <tr> <td>S/W Reset</td> <td>00h</td> </tr> <tr> <td>H/W Reset</td> <td>00h</td> </tr> </tbody> </table> | | | | | | | | | | | Status | Default Value | Power On Sequence | 00h | S/W Reset | 00h | H/W Reset | 00h |
| Status | Default Value | | | | | | | | | | | | | | | | | | |
| Power On Sequence | 00h | | | | | | | | | | | | | | | | | | |
| S/W Reset | 00h | | | | | | | | | | | | | | | | | | |
| H/W Reset | 00h | | | | | | | | | | | | | | | | | | |
| Flow Chart | | | | | | | | | | | | | | | | | | | |

5.3.54. Write Idle Mode Color (80h)

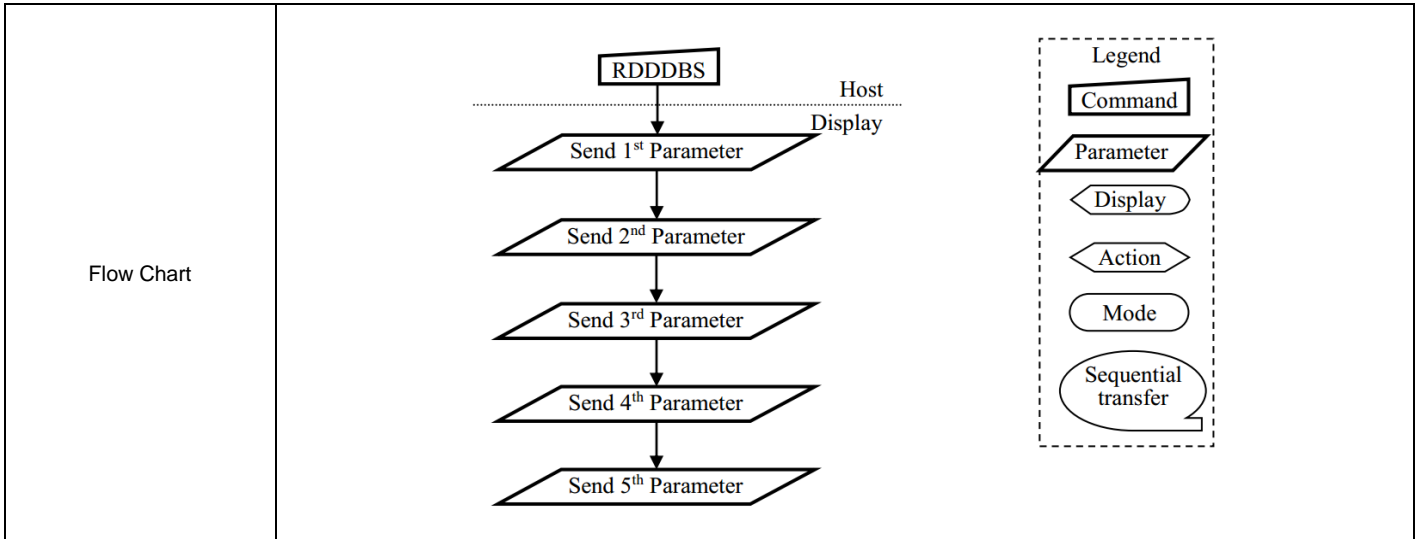
| Command Page | | Page 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|---|--------|----|----|----|----|----|----|----|----|---------|---------------------------|---------------|--|-----|---|-----|-----------|-----|-------------|---|---|---|--------------|---|---|---|-------------|---|---|---|------------|---|---|---|----------------|---|---|---|---------------|---|---|---|--------------|---|---|---|
| Address | Parameter | W/R | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 80h | 1st | W | 0 | 0 | 0 | 0 | 0 | R | G | B | 07h | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Description | <p>80h: WRIMCOL.</p> <p>This command can be used to select color for Idle Mode.</p> <p>Color selection is defined in the following table:</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Idle Mode Color Selection</th> <th>R</th> <th>G</th> <th>B</th> </tr> </thead> <tbody> <tr> <td>Black</td> <td>0</td> <td>0</td> <td>0</td> </tr> <tr> <td>Blue</td> <td>0</td> <td>0</td> <td>1</td> </tr> <tr> <td>Green</td> <td>0</td> <td>1</td> <td>0</td> </tr> <tr> <td>Cyan</td> <td>0</td> <td>1</td> <td>1</td> </tr> <tr> <td>Red</td> <td>1</td> <td>0</td> <td>0</td> </tr> <tr> <td>Magenta</td> <td>1</td> <td>0</td> <td>1</td> </tr> <tr> <td>Yellow</td> <td>1</td> <td>1</td> <td>0</td> </tr> <tr> <td>White</td> <td>1</td> <td>1</td> <td>1</td> </tr> </tbody> </table> <p>Default setting for color selection for "Normal Black" panel is 'White'; R=G=B:'1'.</p> | | | | | | | | | | | Idle Mode Color Selection | R | G | B | Black | 0 | 0 | 0 | Blue | 0 | 0 | 1 | Green | 0 | 1 | 0 | Cyan | 0 | 1 | 1 | Red | 1 | 0 | 0 | Magenta | 1 | 0 | 1 | Yellow | 1 | 1 | 0 | White | 1 | 1 | 1 |
| | Idle Mode Color Selection | R | G | B | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Black | 0 | 0 | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Blue | 0 | 0 | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Green | 0 | 1 | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Cyan | 0 | 1 | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Red | 1 | 0 | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Magenta | 1 | 0 | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Yellow | 1 | 1 | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| White | 1 | 1 | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Restriction | None | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 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>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 | Sleep In | Yes | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Status | Availability | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Normal Mode On, Idle Mode Off, Sleep Out | Yes | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Normal 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>07h</td> </tr> <tr> <td>S/W Reset</td> <td>07h</td> </tr> <tr> <td>H/W Reset</td> <td>07h</td> </tr> </tbody> </table> | | | | | | | | | | | Status | Default Value | Power On Sequence | 07h | S/W Reset | 07h | H/W Reset | 07h | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Status | Default Value | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Power On Sequence | 07h | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| S/W Reset | 07h | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| H/W Reset | 07h | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Flow Chart | <div style="display: flex; justify-content: space-between; align-items: center;"> <div style="text-align: center;"> <pre> graph TD A([Idle Mode Color: White]) --> B[/WRIMCOL(80h)/] B --> C[/Parameter 011/] C --> D([Idle Mode Color: Cyan]) </pre> </div> <div style="border: 1px dashed black; padding: 5px;"> <p>Legend</p> <ul style="list-style-type: none"> Command Parameter Display Action Mode Sequential transfer </div> </div> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

5.3.55. Read Idle Mode Color (81h)

| Command Page | | Page 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|--|--------|----|----|----|----|----|----|----|----|---------|---------------------------|---------------|--|-----|---|-----|-----------|-----|-------------|---|---|---|--------------|---|---|---|-------------|---|---|---|------------|---|---|---|----------------|---|---|---|---------------|---|---|---|--------------|---|---|---|
| Address | Parameter | W/R | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 81h | 1st | R | 0 | 0 | 0 | 0 | 0 | R | G | B | 07h | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Description | <p>81h: RDIMCOL.</p> <p>This command returns the current color selection of Idle Mode, see section "Write Idle Mode Color (80h)".</p> <p>Color selection is defined in the following table:</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Idle Mode Color Selection</th> <th>R</th> <th>G</th> <th>B</th> </tr> </thead> <tbody> <tr> <td>Black</td> <td>0</td> <td>0</td> <td>0</td> </tr> <tr> <td>Blue</td> <td>0</td> <td>0</td> <td>1</td> </tr> <tr> <td>Green</td> <td>0</td> <td>1</td> <td>0</td> </tr> <tr> <td>Cyan</td> <td>0</td> <td>1</td> <td>1</td> </tr> <tr> <td>Red</td> <td>1</td> <td>0</td> <td>0</td> </tr> <tr> <td>Magenta</td> <td>1</td> <td>0</td> <td>1</td> </tr> <tr> <td>Yellow</td> <td>1</td> <td>1</td> <td>0</td> </tr> <tr> <td>White</td> <td>1</td> <td>1</td> <td>1</td> </tr> </tbody> </table> <p>Default setting for color selection for "Normal Black" panel is 'White'; R=G=B:'1'.</p> | | | | | | | | | | | Idle Mode Color Selection | R | G | B | Black | 0 | 0 | 0 | Blue | 0 | 0 | 1 | Green | 0 | 1 | 0 | Cyan | 0 | 1 | 1 | Red | 1 | 0 | 0 | Magenta | 1 | 0 | 1 | Yellow | 1 | 1 | 0 | White | 1 | 1 | 1 |
| | Idle Mode Color Selection | R | G | B | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Black | 0 | 0 | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Blue | 0 | 0 | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Green | 0 | 1 | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Cyan | 0 | 1 | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Red | 1 | 0 | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Magenta | 1 | 0 | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Yellow | 1 | 1 | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| White | 1 | 1 | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Restriction | None | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 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>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 | Sleep In | Yes | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Status | Availability | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Normal Mode On, Idle Mode Off, Sleep Out | Yes | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Normal 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>07h</td> </tr> <tr> <td>S/W Reset</td> <td>07h</td> </tr> <tr> <td>H/W Reset</td> <td>07h</td> </tr> </tbody> </table> | | | | | | | | | | | Status | Default Value | Power On Sequence | 07h | S/W Reset | 07h | H/W Reset | 07h | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Status | Default Value | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Power On Sequence | 07h | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| S/W Reset | 07h | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| H/W Reset | 07h | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Flow Chart | <div style="display: flex; align-items: center; justify-content: center;"> <div style="text-align: center; margin-right: 20px;"> <div style="border: 1px solid black; padding: 2px 10px; margin-bottom: 5px;">Read RDIMCOL</div> <div style="font-size: 12px;">↓</div> <div style="border: 1px solid black; padding: 2px 10px; margin-bottom: 5px;">Send Parameter</div> </div> <div style="text-align: center; margin-right: 20px;"> <div style="font-size: 12px;">Host</div> <div style="font-size: 12px;">-----</div> <div style="font-size: 12px;">Display</div> </div> </div> <div style="border: 1px dashed black; padding: 5px; margin-top: 20px;"> <p style="text-align: center; margin: 0;">Legend</p> <div style="display: flex; flex-direction: column; gap: 5px;"> <div style="border: 1px solid black; padding: 2px 5px; width: 50px; margin: 0 auto;">Command</div> <div style="border: 1px solid black; padding: 2px 5px; width: 50px; margin: 0 auto;">Parameter</div> <div style="border: 1px solid black; padding: 2px 5px; width: 50px; margin: 0 auto;">Display</div> <div style="border: 1px solid black; padding: 2px 5px; width: 50px; margin: 0 auto;">Action</div> <div style="border: 1px solid black; padding: 2px 5px; width: 50px; margin: 0 auto;">Mode</div> <div style="border: 1px solid black; padding: 2px 5px; width: 50px; margin: 0 auto;">Sequential transfer</div> </div> </div> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

5.3.56. Read DDB Start (A1h)

| Command Page | | | Page 0 | | | | | | | | | | | | | | | | |
|--|--|-----|------------|----|----|----|----|----|----|----|---------|--------|---------------|--|---------------------|---|---------------------|-----------|---------------------|
| Address | Parameter | W/R | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default | | | | | | | | |
| A1h | 1st | R | SID[7:0] | | | | | | | | 0000h | | | | | | | | |
| | 2nd | R | SID[15:8] | | | | | | | | | | | | | | | | |
| | 3rd | R | MRID[7:0] | | | | | | | | 0000h | | | | | | | | |
| | 4th | R | MRID[15:8] | | | | | | | | | | | | | | | | |
| | 5th | R | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | FFh | | | | | | | |
| Description | <p>A1h: RDDDBS (Read DDB Start).</p> <p>This command reads the supplier identification and display module mode/revision information.</p> <p><i>Note: This information is not the same as which "Read ID1 (DAh)", "Read ID2 (DBh)" and "Read ID3 (DCh)" commands return.</i></p> <p>Parameter 1: SID[7:0] LCD module's manufacturer ID.</p> <p>Parameter 2: SID[15:8] LCD module/driver version ID.</p> <p>Parameter 3: MRID[7:0] LCD module/driver ID.</p> <p>Parameter 4: MRID[15:8] IC version code.</p> <p>Parameter 5: FFh - Exit code – there is no more data in the Descriptor Block</p> <p>This read sequence can be interrupted by any command and it can be continued by the Read DDB Continue (A8h) command. For example, RDDDBS => 1st parameter has been sent => 2nd parameter has been sent => interrupt => RDDDBC => 3rd parameter of the RDDDBS has been sent.</p> <p><i>Note: Maximum DDB data length is 4 bytes with OTP program.</i></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>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 | Sleep In | Yes |
| Status | Availability | | | | | | | | | | | | | | | | | | |
| Normal Mode On, Idle Mode Off, Sleep Out | Yes | | | | | | | | | | | | | | | | | | |
| Normal 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>00h_00h_00h_00h_FFh</td> </tr> <tr> <td>S/W Reset</td> <td>00h_00h_00h_00h_FFh</td> </tr> <tr> <td>H/W Reset</td> <td>00h_00h_00h_00h_FFh</td> </tr> </tbody> </table> | | | | | | | | | | | Status | Default Value | Power On Sequence | 00h_00h_00h_00h_FFh | S/W Reset | 00h_00h_00h_00h_FFh | H/W Reset | 00h_00h_00h_00h_FFh |
| Status | Default Value | | | | | | | | | | | | | | | | | | |
| Power On Sequence | 00h_00h_00h_00h_FFh | | | | | | | | | | | | | | | | | | |
| S/W Reset | 00h_00h_00h_00h_FFh | | | | | | | | | | | | | | | | | | |
| H/W Reset | 00h_00h_00h_00h_FFh | | | | | | | | | | | | | | | | | | |



5.3.57. Read DDB Continue (A8h)

| Command Page | | | Page 0 | | | | | | | | | | | | | | | | |
|--|---------------|---|---------|----|----|----|----|----|----|----|---------|--------|---------------|--|-----|---|-----|-----------|-----|
| Address | Parameter | W/R | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default | | | | | | | | |
| A8h | 1st | R | D1[7:0] | | | | | | | | | 00h | | | | | | | |
| | 2nd | R | D2[7:0] | | | | | | | | | 00h | | | | | | | |
| | : | R | : | | | | | | | | | 00h | | | | | | | |
| | Nth | R | Dn[7:0] | | | | | | | | | 00h | | | | | | | |
| Description | | A8h: RDDDBC (Read DDB Continue). This command is used to read the supplier's identification and revision information from the point where RDDDBS (A1h) was interrupted by another command | | | | | | | | | | | | | | | | | |
| 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>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 | Sleep In | Yes |
| Status | Availability | | | | | | | | | | | | | | | | | | |
| Normal Mode On, Idle Mode Off, Sleep Out | Yes | | | | | | | | | | | | | | | | | | |
| Normal 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>00h</td> </tr> <tr> <td>S/W Reset</td> <td>00h</td> </tr> <tr> <td>H/W Reset</td> <td>00h</td> </tr> </tbody> </table> | | | | | | | | | | Status | Default Value | Power On Sequence | 00h | S/W Reset | 00h | H/W Reset | 00h |
| Status | Default Value | | | | | | | | | | | | | | | | | | |
| Power On Sequence | 00h | | | | | | | | | | | | | | | | | | |
| S/W Reset | 00h | | | | | | | | | | | | | | | | | | |
| H/W Reset | 00h | | | | | | | | | | | | | | | | | | |
| Flow Chart | | | | | | | | | | | | | | | | | | | |

5.3.58. Read First Checksum (AAh)

| Command Page | | | Page 0 | | | | | | | | | | | | | | | | |
|--|--|-----|----------|----|----|----|----|----|----|----|---------|--------|---------------|--|-----|---|-----|-----------|-----|
| Address | Parameter | W/R | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default | | | | | | | | |
| AAh | 1st | R | FCS[7:0] | | | | | | | | | 00h | | | | | | | |
| Description | AAh: RDFCS (Read First Checksum). This command returns the first checksum what has been calculated from Page 0 area registers after the write access to those registers has been done. | | | | | | | | | | | | | | | | | | |
| Restriction | It will be necessary to wait 150ms after there is the last write access on Page 0 area registers before there can read this checksum value. | | | | | | | | | | | | | | | | | | |
| 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>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 | Sleep In | Yes |
| Status | Availability | | | | | | | | | | | | | | | | | | |
| Normal Mode On, Idle Mode Off, Sleep Out | Yes | | | | | | | | | | | | | | | | | | |
| Normal 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>00h</td> </tr> <tr> <td>S/W Reset</td> <td>00h</td> </tr> <tr> <td>H/W Reset</td> <td>00h</td> </tr> </tbody> </table> | | | | | | | | | | | Status | Default Value | Power On Sequence | 00h | S/W Reset | 00h | H/W Reset | 00h |
| Status | Default Value | | | | | | | | | | | | | | | | | | |
| Power On Sequence | 00h | | | | | | | | | | | | | | | | | | |
| S/W Reset | 00h | | | | | | | | | | | | | | | | | | |
| H/W Reset | 00h | | | | | | | | | | | | | | | | | | |
| Flow Chart | <div style="display: flex; align-items: center; justify-content: center;"> <div style="text-align: center; margin-right: 20px;"> <div style="border: 1px solid black; padding: 2px 5px; display: inline-block;">RDFCS</div> ↓ </div> <div style="text-align: center; margin-right: 20px;"> <hr style="border-top: 1px dashed black;"/> <div style="border: 1px solid black; padding: 2px 5px; display: inline-block;">Send FCS[7:0]</div> </div> <div style="text-align: center;"> Host ↑ Display </div> </div> <div style="margin-top: 20px;"> <p>Legend</p> <ul style="list-style-type: none"> Command Parameter Display Action Mode Sequential transfer </div> | | | | | | | | | | | | | | | | | | |

5.3.59. Read Continue Checksum (AFh)

| Command Page | | | Page 0 | | | | | | | | | | | | | | | | |
|--|--|-----|----------|----|----|----|----|----|----|----|---------|--------|---------------|--|-----|---|-----|-----------|-----|
| Address | Parameter | W/R | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default | | | | | | | | |
| AFh | 1st | R | CCS[7:0] | | | | | | | | | 00h | | | | | | | |
| Description | AFh: RDCCS (Read Continue Checksum). This command returns the continue checksum what has been calculated continuously after the first checksum has calculated from Page 0 area registers after the write access to those registers has been done. | | | | | | | | | | | | | | | | | | |
| Restriction | It will be necessary to wait 300ms after there is the last write access on Page 0 area registers before there can read this checksum value in the first time. | | | | | | | | | | | | | | | | | | |
| 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>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 | Sleep In | Yes |
| Status | Availability | | | | | | | | | | | | | | | | | | |
| Normal Mode On, Idle Mode Off, Sleep Out | Yes | | | | | | | | | | | | | | | | | | |
| Normal 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>00h</td> </tr> <tr> <td>S/W Reset</td> <td>00h</td> </tr> <tr> <td>H/W Reset</td> <td>00h</td> </tr> </tbody> </table> | | | | | | | | | | | Status | Default Value | Power On Sequence | 00h | S/W Reset | 00h | H/W Reset | 00h |
| Status | Default Value | | | | | | | | | | | | | | | | | | |
| Power On Sequence | 00h | | | | | | | | | | | | | | | | | | |
| S/W Reset | 00h | | | | | | | | | | | | | | | | | | |
| H/W Reset | 00h | | | | | | | | | | | | | | | | | | |
| Flow Chart | <div style="display: flex; align-items: center; justify-content: center;"> <div style="text-align: center;"> <div style="border: 1px solid black; padding: 2px 10px; margin-bottom: 5px;">RDCCS</div> <div style="font-size: 20px;">↓</div> <div style="border: 1px solid black; padding: 2px 10px; display: inline-block;">Send CCS[7:0]</div> </div> <div style="margin-left: 20px; text-align: center;"> <div style="border-top: 1px dashed black; width: 100px; height: 1px; margin-bottom: 5px;"></div> <div style="font-size: 12px;">Host</div> <div style="font-size: 12px;">Display</div> </div> </div> <div style="margin-top: 20px; border: 1px dashed black; padding: 5px;"> <p style="text-align: center; margin: 0;">Legend</p> <div style="display: flex; flex-direction: column; gap: 5px;"> <div style="border: 1px solid black; padding: 2px 5px; width: 50px; margin: 0 auto;">Command</div> <div style="border: 1px solid black; padding: 2px 5px; width: 50px; margin: 0 auto; transform: rotate(-15deg);">Parameter</div> <div style="border: 1px solid black; padding: 2px 5px; width: 50px; margin: 0 auto; border-radius: 15px;">Display</div> <div style="border: 1px solid black; padding: 2px 5px; width: 50px; margin: 0 auto; border-radius: 15px;">Action</div> <div style="border: 1px solid black; padding: 2px 5px; width: 50px; margin: 0 auto; border-radius: 15px;">Mode</div> <div style="border: 1px solid black; padding: 2px 5px; width: 50px; margin: 0 auto; border-radius: 15px;">Sequential transfer</div> </div> </div> | | | | | | | | | | | | | | | | | | |

5.3.60. Read ID1 (DAh)

| Command Page | | | Page 0 | | | | | | | | | | | | | | | | |
|--|---|-----|----------|----|----|----|----|----|----|----|---------|--------|---------------|--|-----|---|-----|-----------|-----|
| Address | Parameter | W/R | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default | | | | | | | | |
| DAh | 1st | R | ID1[7:0] | | | | | | | | 00h | | | | | | | | |
| Description | Dah: RDID1 (Read ID1). This read byte identifies the display module's manufacturer. The ID1[7:0] is programmed by the OTP function. | | | | | | | | | | | | | | | | | | |
| Restriction | None | | | | | | | | | | | | | | | | | | |
| 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>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 | Sleep In | Yes |
| Status | Availability | | | | | | | | | | | | | | | | | | |
| Normal Mode On, Idle Mode Off, Sleep Out | Yes | | | | | | | | | | | | | | | | | | |
| Normal 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>00h</td> </tr> <tr> <td>S/W Reset</td> <td>00h</td> </tr> <tr> <td>H/W Reset</td> <td>00h</td> </tr> </tbody> </table> | | | | | | | | | | | Status | Default Value | Power On Sequence | 00h | S/W Reset | 00h | H/W Reset | 00h |
| Status | Default Value | | | | | | | | | | | | | | | | | | |
| Power On Sequence | 00h | | | | | | | | | | | | | | | | | | |
| S/W Reset | 00h | | | | | | | | | | | | | | | | | | |
| H/W Reset | 00h | | | | | | | | | | | | | | | | | | |
| Flow Chart | <div style="display: flex; align-items: center; justify-content: center;"> <div style="text-align: center; margin-right: 20px;"> <div style="border: 1px solid black; padding: 2px 5px; display: inline-block;">Read ID1</div> ↓ <div style="border: 1px solid black; padding: 2px 5px; display: inline-block;">Send Parameter</div> </div> <div style="border-left: 1px dashed black; border-right: 1px dashed black; height: 100px; margin: 0 10px;"></div> <div style="text-align: center;"> <p>Host</p> <hr style="border: 0.5px dashed black;"/> <p>Display</p> </div> </div> <div style="margin-left: 20px;"> <p>Legend</p> <div style="border: 1px dashed black; padding: 5px; width: fit-content;"> <div style="border: 1px solid black; padding: 2px 5px; display: inline-block; margin-bottom: 5px;">Command</div> <div style="border: 1px solid black; padding: 2px 5px; display: inline-block; margin-bottom: 5px;">Parameter</div> <div style="border: 1px solid black; padding: 2px 5px; display: inline-block; margin-bottom: 5px;">Display</div> <div style="border: 1px solid black; padding: 2px 5px; display: inline-block; margin-bottom: 5px;">Action</div> <div style="border: 1px solid black; padding: 2px 5px; display: inline-block; margin-bottom: 5px;">Mode</div> <div style="border: 1px solid black; padding: 2px 5px; display: inline-block; margin-bottom: 5px;">Sequential transfer</div> </div> </div> | | | | | | | | | | | | | | | | | | |

5.3.61. Read ID2 (DBh)

| Command Page | | | Page 0 | | | | | | | | | | | | | | | | |
|--|--|-----|----------|----|----|----|----|----|----|----|---------|--------|---------------|--|-----|---|-----|-----------|-----|
| Address | Parameter | W/R | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default | | | | | | | | |
| DBh | 1st | R | ID2[7:0] | | | | | | | | 00h | | | | | | | | |
| Description | <p>DBh: RDID2 (Read ID2).</p> <p>This read byte is used to track the display module/driver version. It is defined by display supplier (with User's agreement) and changes each time a revision is made to the display, material or construction specifications.</p> <p>The ID2[7:0] is programmed by the OTP function.</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>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 | Sleep In | Yes |
| Status | Availability | | | | | | | | | | | | | | | | | | |
| Normal Mode On, Idle Mode Off, Sleep Out | Yes | | | | | | | | | | | | | | | | | | |
| Normal 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>00h</td> </tr> <tr> <td>S/W Reset</td> <td>00h</td> </tr> <tr> <td>H/W Reset</td> <td>00h</td> </tr> </tbody> </table> | | | | | | | | | | | Status | Default Value | Power On Sequence | 00h | S/W Reset | 00h | H/W Reset | 00h |
| Status | Default Value | | | | | | | | | | | | | | | | | | |
| Power On Sequence | 00h | | | | | | | | | | | | | | | | | | |
| S/W Reset | 00h | | | | | | | | | | | | | | | | | | |
| H/W Reset | 00h | | | | | | | | | | | | | | | | | | |
| Flow Chart | <pre> sequenceDiagram participant Host participant Display Host->>Display: Read ID2 Display-->Host: Send Parameter </pre> | | | | | | | | | | | | | | | | | | |

5.3.62. Read ID3 (DCh)

| Command Page | | | Page 0 | | | | | | | | | | | | | | | | |
|--|---|-----|----------|----|----|----|----|----|----|----|---------|--------|---------------|--|-----|---|-----|-----------|-----|
| Address | Parameter | W/R | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default | | | | | | | | |
| DCh | 1st | R | ID3[7:0] | | | | | | | | 00h | | | | | | | | |
| Description | DCh: RDID3 (Read ID3). This read byte identifies the display module/driver. The ID3[7:0] is programmed by the OTP function. | | | | | | | | | | | | | | | | | | |
| Restriction | None | | | | | | | | | | | | | | | | | | |
| 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>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 | Sleep In | Yes |
| Status | Availability | | | | | | | | | | | | | | | | | | |
| Normal Mode On, Idle Mode Off, Sleep Out | Yes | | | | | | | | | | | | | | | | | | |
| Normal 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>00h</td> </tr> <tr> <td>S/W Reset</td> <td>00h</td> </tr> <tr> <td>H/W Reset</td> <td>00h</td> </tr> </tbody> </table> | | | | | | | | | | | Status | Default Value | Power On Sequence | 00h | S/W Reset | 00h | H/W Reset | 00h |
| Status | Default Value | | | | | | | | | | | | | | | | | | |
| Power On Sequence | 00h | | | | | | | | | | | | | | | | | | |
| S/W Reset | 00h | | | | | | | | | | | | | | | | | | |
| H/W Reset | 00h | | | | | | | | | | | | | | | | | | |
| Flow Chart | <div style="display: flex; align-items: center; justify-content: center;"> <div style="text-align: center; margin-right: 20px;"> <div style="border: 1px solid black; padding: 2px 5px; display: inline-block;">Read ID3</div> ↓ <div style="border: 1px solid black; padding: 2px 5px; display: inline-block;">Send Parameter</div> </div> <div style="text-align: center; margin-left: 20px;"> Host ----- Display </div> </div> <div style="margin-left: 20px; border: 1px dashed black; padding: 5px;"> <p>Legend</p> <ul style="list-style-type: none"> Command Parameter Display Action Mode Sequential transfer </div> | | | | | | | | | | | | | | | | | | |

5.3.63. EXTC Command Set Enable Register (FFh)

| Command Page | | | Page 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|---|--------------|-----------|----|----|----|----|----|----|----|---------|-----------|---------------|--|--------|---|--------|-----------|--------|-----|--------|-----|--------|-----|--------|-----|--------|-----|--------|-----|--------|-----|--------|-----|---------|--------|----------|
| Address | Parameter | W/R | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default | | | | | | | | | | | | | | | | | | | | | | | | | | |
| FFh | 1st | W | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 98h | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 2nd | W | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 81h | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 3rd | W | PAGE[7:0] | | | | | | | | 00h | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Description | <p>PAGE[7:0]: Set the command page.</p> <table border="1"> <thead> <tr> <th>PAGE[7:0]</th> <th>Command Page</th> </tr> </thead> <tbody> <tr><td>00h</td><td>Page 0</td></tr> <tr><td>01h</td><td>Page 1</td></tr> <tr><td>02h</td><td>Page 2</td></tr> <tr><td>03h</td><td>Page 3</td></tr> <tr><td>04h</td><td>Page 4</td></tr> <tr><td>05h</td><td>Page 5</td></tr> <tr><td>06h</td><td>Page 6</td></tr> <tr><td>07h</td><td>Page 7</td></tr> <tr><td>08h</td><td>Page 8</td></tr> <tr><td>09h</td><td>Page 9</td></tr> <tr><td>0Ah</td><td>Page 10</td></tr> <tr><td>Others</td><td>Reserved</td></tr> </tbody> </table> <p>Set the register, 1st Parameter = 98h, 2nd Parameter = 81h, 3rd Parameter = Page value to enable "Page command set" available</p> <p>See section "5.1 Command Flow".</p> | | | | | | | | | | | PAGE[7:0] | Command Page | 00h | Page 0 | 01h | Page 1 | 02h | Page 2 | 03h | Page 3 | 04h | Page 4 | 05h | Page 5 | 06h | Page 6 | 07h | Page 7 | 08h | Page 8 | 09h | Page 9 | 0Ah | Page 10 | Others | Reserved |
| | PAGE[7:0] | Command Page | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 00h | Page 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 01h | Page 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 02h | Page 2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 03h | Page 3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 04h | Page 4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 05h | Page 5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 06h | Page 6 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 07h | Page 7 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 08h | Page 8 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 09h | Page 9 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 0Ah | Page 10 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Others | Reserved | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 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>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 | Sleep In | Yes | | | | | | | | | | | | | | | | | | |
| Status | Availability | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Normal Mode On, Idle Mode Off, Sleep Out | Yes | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Normal 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>00h</td> </tr> <tr> <td>S/W Reset</td> <td>00h</td> </tr> <tr> <td>H/W Reset</td> <td>00h</td> </tr> </tbody> </table> | | | | | | | | | | | Status | Default Value | Power On Sequence | 00h | S/W Reset | 00h | H/W Reset | 00h | | | | | | | | | | | | | | | | | | |
| Status | Default Value | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Power On Sequence | 00h | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| S/W Reset | 00h | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| H/W Reset | 00h | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

5.4. Page 1 Command Description

5.4.1. Read ID4 (00h~02h)

| Command Page | | | Page 1 | | | | | | | | | | | | | | | | |
|--|---------------|---|------------|----|----|----|----|----|----|----|---------|--------|---------------|--|-------------|---|-------------|-----------|-------------|
| Address | Parameter | W/R | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default | | | | | | | | |
| 00h | 1st | R | ID4[23:16] | | | | | | | | | 98h | | | | | | | |
| 01h | 1st | R | ID4[15:8] | | | | | | | | | 81h | | | | | | | |
| 02h | 1st | R | ID4[7:0] | | | | | | | | | 00h | | | | | | | |
| Description | | ID4[23:0] : mean the IC model name. | | | | | | | | | | | | | | | | | |
| 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>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 | Sleep In | Yes |
| Status | Availability | | | | | | | | | | | | | | | | | | |
| Normal Mode On, Idle Mode Off, Sleep Out | Yes | | | | | | | | | | | | | | | | | | |
| Normal 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>98h_81h_00h</td> </tr> <tr> <td>S/W Reset</td> <td>98h_81h_00h</td> </tr> <tr> <td>H/W Reset</td> <td>98h_81h_00h</td> </tr> </tbody> </table> | | | | | | | | | | Status | Default Value | Power On Sequence | 98h_81h_00h | S/W Reset | 98h_81h_00h | H/W Reset | 98h_81h_00h |
| Status | Default Value | | | | | | | | | | | | | | | | | | |
| Power On Sequence | 98h_81h_00h | | | | | | | | | | | | | | | | | | |
| S/W Reset | 98h_81h_00h | | | | | | | | | | | | | | | | | | |
| H/W Reset | 98h_81h_00h | | | | | | | | | | | | | | | | | | |

5.4.2. Set Panel Operation Mode and Data Complement Setting (22h)

| Command Page | | Page 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|---|---|-------------|------------------------|----------|----|---------------|---------------|--------------|--------------|---------|--------|---------------------------------------|--|-----------|---|---|-----------|-------|------|-------|--------|---|----------------|------|-------|------------------------|------|-------|-----------------------|---|----------------|------|-------|-----------------------|------|-------|------------------------|----------|------------------------------|---|---------|---|----------|----------|----------------------------|---|--------------|---|--------------|
| Address | Parameter | W/R | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 22h | 1st | W/R | 0 | 0 | EPF[1:0] | | BGR_PA NEL | REV_PA NEL | SS_PAN EL | GS_PAN EL | 30h | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Description | <p>This command defines the panel operation mode</p> <p>EPF[1:0]: Set the data format from 16/18-bit (R,G,B) to 24-bit (r, g, b) that is mapping into the internal circuit. See section “4.2.2 16/18-bit Color Data Mapping to 24-bit Pixel Data Operation” for detail description.</p> <p>BGR_PANEL:</p> <table border="1"> <thead> <tr> <th>Symbol</th> <th>Name</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>BGR_PANEL</td> <td>Panel RGB-BGR Order</td> <td>Color selector switch control (0=RGB color filter panel, 1=BGR color filter panel)</td> </tr> </tbody> </table> <p>REV_PANEL: Normally white or normally black panel select.</p> <table border="1"> <thead> <tr> <th>REV_PANEL</th> <th>Panel</th> <th>Data</th> <th>Color</th> <th>Source</th> </tr> </thead> <tbody> <tr> <td rowspan="2">0</td> <td rowspan="2">Normally black</td> <td>0x00</td> <td>Black</td> <td>Smallest gamma voltage</td> </tr> <tr> <td>0xFF</td> <td>White</td> <td>Largest gamma voltage</td> </tr> <tr> <td rowspan="2">1</td> <td rowspan="2">normally white</td> <td>0x00</td> <td>Black</td> <td>Largest gamma voltage</td> </tr> <tr> <td>0xFF</td> <td>White</td> <td>Smallest gamma voltage</td> </tr> </tbody> </table> <p>SS_PANEL: Select the shift direction of outputs from the source driver.</p> <table border="1"> <thead> <tr> <th>SS_PANEL</th> <th>Source Output Scan Direction</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>Forward</td> </tr> <tr> <td>1</td> <td>Backward</td> </tr> </tbody> </table> <p>GS_PANEL: Select the shift direction of outputs from the gate driver.</p> <table border="1"> <thead> <tr> <th>GS_PANEL</th> <th>Gate Output Scan Direction</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>Top → Bottom</td> </tr> <tr> <td>1</td> <td>Bottom → Top</td> </tr> </tbody> </table> | | | | | | | | | | | Symbol | Name | Description | BGR_PANEL | Panel RGB-BGR Order | Color selector switch control (0=RGB color filter panel, 1=BGR color filter panel) | REV_PANEL | Panel | Data | Color | Source | 0 | Normally black | 0x00 | Black | Smallest gamma voltage | 0xFF | White | Largest gamma voltage | 1 | normally white | 0x00 | Black | Largest gamma voltage | 0xFF | White | Smallest gamma voltage | SS_PANEL | Source Output Scan Direction | 0 | Forward | 1 | Backward | GS_PANEL | Gate Output Scan Direction | 0 | Top → Bottom | 1 | Bottom → Top |
| | Symbol | Name | Description | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| BGR_PANEL | Panel RGB-BGR Order | Color selector switch control (0=RGB color filter panel, 1=BGR color filter panel) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| REV_PANEL | Panel | Data | Color | Source | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0 | Normally black | 0x00 | Black | Smallest gamma voltage | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 0xFF | White | Largest gamma voltage | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | normally white | 0x00 | Black | Largest gamma voltage | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 0xFF | White | Smallest gamma voltage | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| SS_PANEL | Source Output Scan Direction | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0 | Forward | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | Backward | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| GS_PANEL | Gate Output Scan Direction | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0 | Top → Bottom | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | Bottom → Top | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 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>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 | Sleep In | Yes | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Status | Availability | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Normal Mode On, Idle Mode Off, Sleep Out | Yes | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Normal Mode On, Idle Mode On, Sleep Out | Yes | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Sleep In | Yes | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Default | <table border="1"> <thead> <tr> <th>Status</th> <th>Default Value (Before OTP program)</th> </tr> </thead> <tbody> <tr> <td>Power On Sequence</td> <td>30h</td> </tr> <tr> <td>S/W Reset</td> <td>30h</td> </tr> <tr> <td>H/W Reset</td> <td>30h</td> </tr> </tbody> </table> | | | | | | | | | | | Status | Default Value (Before OTP program) | Power On Sequence | 30h | S/W Reset | 30h | H/W Reset | 30h | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Status | Default Value (Before OTP program) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Power On Sequence | 30h | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| S/W Reset | 30h | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| H/W Reset | 30h | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

5.4.3. Blanking Porch Control (25h~26h)

| Command Page | | | Page 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|---|--|----------|----|----|----|----|----|----|----|---------|----------------------|--|--|--------------------|---|--------------------|-----------|-----------------|----------|---|---|---|----------|---------------------------------|---|---|---------|-----|---------|-----|---------|-----|
| Address | Parameter | W/R | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default | | | | | | | | | | | | | | | | | | | | | | |
| 25h | 1st | W/R | VFP[7:0] | | | | | | | | 14h | | | | | | | | | | | | | | | | | | | | | | |
| 26h | 1st | W/R | VBP[7:0] | | | | | | | | 14h | | | | | | | | | | | | | | | | | | | | | | |
| Description | <p>VFP[7:0] / VBP[7:0]: The VFP[7:0] and VBP[7:0] bits specify the line number of vertical front and back porch period respectively in the Idle Mode.</p> <table border="1"> <thead> <tr> <th>VFP[7:0] VBP[7:0]</th> <th>Number of HSYNC of front/back porch (Dec.)</th> </tr> </thead> <tbody> <tr> <td>00000000</td> <td>Setting prohibited</td> </tr> <tr> <td>00000001</td> <td>Setting prohibited</td> </tr> <tr> <td>00000010</td> <td>2</td> </tr> <tr> <td>00000011</td> <td>3</td> </tr> <tr> <td>:</td> <td>:</td> </tr> <tr> <td>00001110</td> <td>14 (VFP[7:0] /VBP[7:0] default)</td> </tr> <tr> <td>:</td> <td>:</td> </tr> <tr> <td>1111101</td> <td>253</td> </tr> <tr> <td>1111110</td> <td>254</td> </tr> <tr> <td>1111111</td> <td>255</td> </tr> </tbody> </table> | | | | | | | | | | | VFP[7:0] VBP[7:0] | Number of HSYNC of front/back porch (Dec.) | 00000000 | Setting prohibited | 00000001 | Setting prohibited | 00000010 | 2 | 00000011 | 3 | : | : | 00001110 | 14 (VFP[7:0] /VBP[7:0] default) | : | : | 1111101 | 253 | 1111110 | 254 | 1111111 | 255 |
| | VFP[7:0] VBP[7:0] | Number of HSYNC of front/back porch (Dec.) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 00000000 | Setting prohibited | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 00000001 | Setting prohibited | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 00000010 | 2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 00000011 | 3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | : | : | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 00001110 | 14 (VFP[7:0] /VBP[7:0] default) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | : | : | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 1111101 | 253 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 1111110 | 254 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 1111111 | 255 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 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>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 | Sleep In | Yes | | | | | | | | | | | | | | |
| Status | Availability | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Normal Mode On, Idle Mode Off, Sleep Out | Yes | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Normal 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>14h_14h_05h_00h</td> </tr> <tr> <td>S/W Reset</td> <td>14h_14h_05h_00h</td> </tr> <tr> <td>H/W Reset</td> <td>14h_14h_05h_00h</td> </tr> </tbody> </table> | | | | | | | | | | | Status | Default Value | Power On Sequence | 14h_14h_05h_00h | S/W Reset | 14h_14h_05h_00h | H/W Reset | 14h_14h_05h_00h | | | | | | | | | | | | | | |
| Status | Default Value | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Power On Sequence | 14h_14h_05h_00h | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| S/W Reset | 14h_14h_05h_00h | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| H/W Reset | 14h_14h_05h_00h | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

5.4.4. Touch Synchronization Control (29h)

| Command Page | | | Page 1 | | | | | | | | | | | | | | | | |
|--|---------------|---|--------|----|----|----|----|----|----|--------------|---------|--------|---------------|--|-----|---|-----|-----------|-----|
| Address | Parameter | W/R | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default | | | | | | | | |
| 29h | 1st | W/R | 0 | 0 | 0 | 0 | 0 | 0 | 0 | TOUCH_VHSYNC | 00h | | | | | | | | |
| Description | | TOUCH_VHSYNC: Enable VSOUT / HSOUT signal output. | | | | | | | | | | | | | | | | | |
| 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>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 | Sleep In | Yes |
| Status | Availability | | | | | | | | | | | | | | | | | | |
| Normal Mode On, Idle Mode Off, Sleep Out | Yes | | | | | | | | | | | | | | | | | | |
| Normal 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>00h</td> </tr> <tr> <td>S/W Reset</td> <td>00h</td> </tr> <tr> <td>H/W Reset</td> <td>00h</td> </tr> </tbody> </table> | | | | | | | | | | Status | Default Value | Power On Sequence | 00h | S/W Reset | 00h | H/W Reset | 00h |
| Status | Default Value | | | | | | | | | | | | | | | | | | |
| Power On Sequence | 00h | | | | | | | | | | | | | | | | | | |
| S/W Reset | 00h | | | | | | | | | | | | | | | | | | |
| H/W Reset | 00h | | | | | | | | | | | | | | | | | | |

5.4.5. Gate Number (2Eh)

| Command Page | | | Page 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|---|----------------------------|---------|----|----|----|----|----|----|----|---------|---------|----------------------------|--|-----|---|-----|-----------|-----|-----|-----|---|---|-----|------|-----|------|-----|------|-----|------|--------|----------|
| Address | Parameter | W/R | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default | | | | | | | | | | | | | | | | | | | | | | |
| 2Eh | 1st | W/R | NL[7:0] | | | | | | | | C8h | | | | | | | | | | | | | | | | | | | | | | |
| Description | <p>NL[7:0]: Set the number of lines to drive the LCD at an interval of 4 lines. The number of lines must be the same or more than the number of lines necessary for the size of the LCD panel.</p> <table border="1"> <thead> <tr> <th>NL[7:0]</th> <th>The Line Number of the LCD</th> </tr> </thead> <tbody> <tr><td>00h</td><td>480</td></tr> <tr><td>01h</td><td>484</td></tr> <tr><td>02h</td><td>488</td></tr> <tr><td>03h</td><td>492</td></tr> <tr><td>:</td><td>:</td></tr> <tr><td>C5h</td><td>1268</td></tr> <tr><td>C6h</td><td>1272</td></tr> <tr><td>C7h</td><td>1276</td></tr> <tr><td>C8h</td><td>1280</td></tr> <tr><td>Others</td><td>Reserved</td></tr> </tbody> </table> | | | | | | | | | | | NL[7:0] | The Line Number of the LCD | 00h | 480 | 01h | 484 | 02h | 488 | 03h | 492 | : | : | C5h | 1268 | C6h | 1272 | C7h | 1276 | C8h | 1280 | Others | Reserved |
| | NL[7:0] | The Line Number of the LCD | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 00h | 480 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 01h | 484 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 02h | 488 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 03h | 492 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | : | : | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | C5h | 1268 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | C6h | 1272 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | C7h | 1276 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| C8h | 1280 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Others | Reserved | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 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>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 | Sleep In | Yes | | | | | | | | | | | | | | |
| Status | Availability | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Normal Mode On, Idle Mode Off, Sleep Out | Yes | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Normal 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>C8h</td> </tr> <tr> <td>S/W Reset</td> <td>C8h</td> </tr> <tr> <td>H/W Reset</td> <td>C8h</td> </tr> </tbody> </table> | | | | | | | | | | | Status | Default Value | Power On Sequence | C8h | S/W Reset | C8h | H/W Reset | C8h | | | | | | | | | | | | | | |
| Status | Default Value | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Power On Sequence | C8h | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| S/W Reset | C8h | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| H/W Reset | C8h | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

5.4.6. Display Inversion Control (31h)

| Command Page | | Page 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--------------|--|------------------------------------|----|----|----|----|-----------|----|----|----|---------|----------|-----------|----|------------------|----|-----------------|----|-----------------|----|-----------------|----|-----------------|----|-----------------------------------|----|-----------------------------------|----|------------------------------------|----|------------------------------------|----|--------------------------|----|--------------------------|----|--------------------------|----|--------------------------|--------|----------|--------|---|---|---|---|---|---|--------|---|---|---|---|---|---|--------|---|---|---|---|---|---|--------|---|---|---|---|---|---|--------|---|---|---|---|---|---|--------|---|---|---|---|---|---|--------|---|---|---|---|---|---|--------|---|---|---|---|---|---|--------|---|---|---|---|---|---|--------|---|---|---|---|---|---|--------|---|---|---|---|---|---|--------|---|---|---|---|---|---|--------|---|---|---|---|---|---|--------|---|---|---|---|---|---|--------|---|---|---|---|---|---|--------|---|---|---|---|---|---|--------|---|---|---|---|---|---|--------|---|---|---|---|---|---|--------|---|---|---|---|---|---|--------|---|---|---|---|---|---|--------|---|---|---|---|---|---|--------|---|---|---|---|---|---|--------|---|---|---|---|---|---|--------|---|---|---|---|---|---|
| Address | Parameter | W/R | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 31h | 1st | W/R | 0 | 0 | 0 | 0 | DINV[3:0] | | | | 00h | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Description | DINV[3:0]: Set Inversion mode <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>NLA[3:0]</th> <th>Inversion</th> </tr> </thead> <tbody> <tr><td>0h</td><td>Column inversion</td></tr> <tr><td>1h</td><td>1-dot inversion</td></tr> <tr><td>2h</td><td>2-dot inversion</td></tr> <tr><td>3h</td><td>3-dot inversion</td></tr> <tr><td>4h</td><td>4-dot inversion</td></tr> <tr><td>5h</td><td>N/4-dot inversion ^{Note}</td></tr> <tr><td>6h</td><td>N/8-dot inversion ^{Note}</td></tr> <tr><td>7h</td><td>N/16-dot inversion ^{Note}</td></tr> <tr><td>8h</td><td>N/32-dot inversion ^{Note}</td></tr> <tr><td>9h</td><td>Zig-Zag inversion Type 1</td></tr> <tr><td>Ah</td><td>Zig-Zag inversion Type 2</td></tr> <tr><td>Bh</td><td>Zig-Zag inversion Type 3</td></tr> <tr><td>Ch</td><td>Zig-Zag inversion Type 4</td></tr> <tr><td>Others</td><td>Reserved</td></tr> </tbody> </table> <p style="text-align: center;"><i>Note : N=The line number of the LCD (setting by NL[7:0])</i></p> <div style="text-align: center;"> <p>Column Inversion</p> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>1st frame</p> <table border="1"> <tr><td>1 line</td><td>+</td><td>-</td><td>+</td><td>-</td><td>+</td><td>-</td></tr> <tr><td>2 line</td><td>+</td><td>-</td><td>+</td><td>-</td><td>+</td><td>-</td></tr> <tr><td>3 line</td><td>+</td><td>-</td><td>+</td><td>-</td><td>+</td><td>-</td></tr> <tr><td>4 line</td><td>+</td><td>-</td><td>+</td><td>-</td><td>+</td><td>-</td></tr> </table> </div> <div style="font-size: 2em;">→</div> <div style="text-align: center;"> <p>2nd frame</p> <table border="1"> <tr><td>1 line</td><td>-</td><td>+</td><td>-</td><td>+</td><td>-</td><td>+</td></tr> <tr><td>2 line</td><td>-</td><td>+</td><td>-</td><td>+</td><td>-</td><td>+</td></tr> <tr><td>3 line</td><td>-</td><td>+</td><td>-</td><td>+</td><td>-</td><td>+</td></tr> <tr><td>4 line</td><td>-</td><td>+</td><td>-</td><td>+</td><td>-</td><td>+</td></tr> </table> </div> </div> </div> <div style="text-align: center; margin-top: 20px;"> <p>1-Dot Inversion</p> <div style="display: flex; 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justify-content: space-around;"> <div style="text-align: center;"> <p>1st frame</p> <table border="1"> <tr><td>1 line</td><td>+</td><td>-</td><td>+</td><td>-</td><td>+</td><td>-</td></tr> <tr><td>2 line</td><td>+</td><td>-</td><td>+</td><td>-</td><td>+</td><td>-</td></tr> <tr><td>3 line</td><td>-</td><td>+</td><td>-</td><td>+</td><td>-</td><td>+</td></tr> <tr><td>4 line</td><td>-</td><td>+</td><td>-</td><td>+</td><td>-</td><td>+</td></tr> </table> </div> <div style="font-size: 2em;">→</div> <div style="text-align: center;"> <p>2nd frame</p> <table border="1"> <tr><td>1 line</td><td>-</td><td>+</td><td>-</td><td>+</td><td>-</td><td>+</td></tr> <tr><td>2 line</td><td>-</td><td>+</td><td>-</td><td>+</td><td>-</td><td>+</td></tr> <tr><td>3 line</td><td>+</td><td>-</td><td>+</td><td>-</td><td>+</td><td>-</td></tr> <tr><td>4 line</td><td>+</td><td>-</td><td>+</td><td>-</td><td>+</td><td>-</td></tr> </table> </div> </div> </div> | | | | | | | | | | | NLA[3:0] | Inversion | 0h | Column inversion | 1h | 1-dot inversion | 2h | 2-dot inversion | 3h | 3-dot inversion | 4h | 4-dot inversion | 5h | N/4-dot inversion ^{Note} | 6h | N/8-dot inversion ^{Note} | 7h | N/16-dot inversion ^{Note} | 8h | N/32-dot inversion ^{Note} | 9h | Zig-Zag inversion Type 1 | Ah | Zig-Zag inversion Type 2 | Bh | Zig-Zag inversion Type 3 | Ch | Zig-Zag inversion Type 4 | Others | Reserved | 1 line | + | - | + | - | + | - | 2 line | + | - | + | - | + | - | 3 line | + | - | + | - | + | - | 4 line | + | - | + | - | + | - | 1 line | - | + | - | + | - | + | 2 line | - | + | - | + | - | + | 3 line | - | + | - | + | - | + | 4 line | - | + | - | + | - | + | 1 line | + | - | + | - | + | - | 2 line | - | + | - | + | - | + | 3 line | + | - | + | - | + | - | 4 line | - | + | - | + | - | + | 1 line | - | + | - | + | - | + | 2 line | + | - | + | - | + | - | 3 line | - | + | - | + | - | + | 4 line | + | - | + | - | + | - | 1 line | + | - | + | - | + | - | 2 line | + | - | + | - | + | - | 3 line | - | + | - | + | - | + | 4 line | - | + | - | + | - | + | 1 line | - | + | - | + | - | + | 2 line | - | + | - | + | - | + | 3 line | + | - | + | - | + | - | 4 line | + | - | + | - | + | - |
| | NLA[3:0] | Inversion | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 0h | Column inversion | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 1h | 1-dot inversion | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 2h | 2-dot inversion | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 3h | 3-dot inversion | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 4h | 4-dot inversion | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 5h | N/4-dot inversion ^{Note} | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 6h | N/8-dot inversion ^{Note} | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 7h | N/16-dot inversion ^{Note} | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 8h | N/32-dot inversion ^{Note} | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 9h | Zig-Zag inversion Type 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Ah | Zig-Zag inversion Type 2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Bh | Zig-Zag inversion Type 3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Ch | Zig-Zag inversion Type 4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Others | Reserved | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 line | + | - | + | - | + | - | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 line | + | - | + | - | + | - | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| 1 line | - | + | - | + | - | + | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| Restriction | None | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 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>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 | Sleep In | Yes | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| 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>00h</td> </tr> <tr> <td>S/W Reset</td> <td>00h</td> </tr> <tr> <td>H/W Reset</td> <td>00h</td> </tr> </tbody> </table> | Status | Default Value | Power On Sequence | 00h | S/W Reset | 00h | H/W Reset | 00h | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| Power On Sequence | 00h | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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5.4.7. Dithering Enable (34h)

| Command Page | | | Page 1 | | | | | | | | | | | | | | | | |
|--|---|-----|--------|----|----|----|----|----|----|---------|---------|--------|---------------|--|-----|---|-----|-----------|-----|
| Address | Parameter | W/R | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default | | | | | | | | |
| 34h | 1st | W/R | 0 | 0 | 0 | 0 | 0 | 0 | 0 | DITH_EN | 00h | | | | | | | | |
| Description | DITH_EN: 0 : dithering function disable 1 : dithering function enable | | | | | | | | | | | | | | | | | | |
| 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>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 | Sleep In | Yes |
| Status | Availability | | | | | | | | | | | | | | | | | | |
| Normal Mode On, Idle Mode Off, Sleep Out | Yes | | | | | | | | | | | | | | | | | | |
| Normal 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>00h</td> </tr> <tr> <td>S/W Reset</td> <td>00h</td> </tr> <tr> <td>H/W Reset</td> <td>00h</td> </tr> </tbody> </table> | | | | | | | | | | | Status | Default Value | Power On Sequence | 00h | S/W Reset | 00h | H/W Reset | 00h |
| Status | Default Value | | | | | | | | | | | | | | | | | | |
| Power On Sequence | 00h | | | | | | | | | | | | | | | | | | |
| S/W Reset | 00h | | | | | | | | | | | | | | | | | | |
| H/W Reset | 00h | | | | | | | | | | | | | | | | | | |

5.4.8. Pump Clock Adjustment (40h~43h)

| Command Page | | Page 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|--|-------------------------|----|-----------------------|----|----|----|-----------------------|--------------|-------------|---------|-------------------|--------------------|----|-----------------------|----|---------------------|----|---------------------|----|-------------------------|--|---------------|----|-----|----|----|----|----|----|----|----|----|----|------|--------|----------|--|---------------|----|-----|----|----|----|----|----|----|----|----|----|------|----|------|----|------|
| Address | Parameter | W/R | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 40h | 1st | W/R | 0 | EXT_CPCK_SEL[1:0] | | 1 | 0 | 0 | VCL_CLK_K_EN | VGHL_CLK_EN | 33h | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 41h | 1st | W/R | 0 | VCL_CLK_SELA[2:0] | | | 0 | VCL_CLK_SELB[2:0] | | | 33h | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 42h | 1st | W/R | 0 | VGHL_CLK_SELA[2:0] | | | 0 | VGHL_CLK_SELB[2:0] | | | 44h | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 43h | 1st | W/R | 0 | 4002_RATIO_FREQA[2:0] | | | 0 | 4002_RATIO_FREQB[2:0] | | | 55h | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Description | <p>EXT_CPCK_SEL[1:0]: Pumping clock control signals selection to external control IC (ILI4003). Set the register before Sleep Out(R11h), when external pumping control be used.</p> <table border="1" style="margin-left: 40px;"> <thead> <tr> <th>EXT_CPCK_SEL[1:0]</th> <th>EXTP & EXTN Output</th> </tr> </thead> <tbody> <tr> <td>0h</td> <td>Output x 1.5 waveform</td> </tr> <tr> <td>1h</td> <td>Output x 2 waveform</td> </tr> <tr> <td>2h</td> <td>Output x 3 waveform</td> </tr> <tr> <td>3h</td> <td>Output Low (power down)</td> </tr> </tbody> </table> <p>VCL_CLK_EN: Enable the pumping cycle of step-up circuit of VCL.</p> <p>VGHL_CLK_EN: Enable the pumping cycle of step-up circuit of VGH and VGL.</p> <p>VCL_CLK_SELA[2:0]: Selects the pumping cycle of step-up circuit of VCL in the Normal Mode.</p> <p>VCL_CLK_SELB[2:0]: Selects the pumping cycle of step-up circuit of VCL in the Idle Mode.</p> <p>VGHL_CLK_SELA[2:0]: Selects the pumping cycle of step-up circuit of VGH and VGL in the Normal Mode.</p> <p>VGHL_CLK_SELB[2:0]: Selects the pumping cycle of step-up circuit of VGH and VGL in the Idle Mode.</p> <p>4002_RATIO_FREQA[2:0]: Selects the pumping cycle of step-up circuit of external control IC (ILI4003) in the Normal Mode.</p> <p>4002_RATIO_FREQB[2:0]: Selects the pumping cycle of step-up circuit of external control IC (ILI4003) in the Idle Mode.</p> <p>Select the optimal step-up factor for the operating voltage. To reduce power consumption, set a smaller factor.</p> <table border="1" style="margin-left: 40px;"> <thead> <tr> <th>VGHL_CLK_SELA[2:0], VGHL_CLK_SELB[2:0] VCL_CLK_SELA[2:0], VCL_CLK_SELB[2:0]</th> <th>Pumping cycle</th> </tr> </thead> <tbody> <tr> <td>0h</td> <td>16H</td> </tr> <tr> <td>1h</td> <td>8H</td> </tr> <tr> <td>2h</td> <td>4H</td> </tr> <tr> <td>3h</td> <td>2H</td> </tr> <tr> <td>4h</td> <td>1H</td> </tr> <tr> <td>5h</td> <td>1/2H</td> </tr> <tr> <td>Others</td> <td>Reserved</td> </tr> </tbody> </table> <table border="1" style="margin-left: 40px;"> <thead> <tr> <th>4002_RATIO_FREQA[2:0], 4002_RATIO_FREQB[2:0]</th> <th>Pumping cycle</th> </tr> </thead> <tbody> <tr> <td>0h</td> <td>16H</td> </tr> <tr> <td>1h</td> <td>8H</td> </tr> <tr> <td>2h</td> <td>4H</td> </tr> <tr> <td>3h</td> <td>2H</td> </tr> <tr> <td>4h</td> <td>1H</td> </tr> <tr> <td>5h</td> <td>1/2H</td> </tr> <tr> <td>6h</td> <td>1/4H</td> </tr> <tr> <td>7h</td> <td>1/8H</td> </tr> </tbody> </table> | | | | | | | | | | | EXT_CPCK_SEL[1:0] | EXTP & EXTN Output | 0h | Output x 1.5 waveform | 1h | Output x 2 waveform | 2h | Output x 3 waveform | 3h | Output Low (power down) | VGHL_CLK_SELA[2:0], VGHL_CLK_SELB[2:0] VCL_CLK_SELA[2:0], VCL_CLK_SELB[2:0] | Pumping cycle | 0h | 16H | 1h | 8H | 2h | 4H | 3h | 2H | 4h | 1H | 5h | 1/2H | Others | Reserved | 4002_RATIO_FREQA[2:0], 4002_RATIO_FREQB[2:0] | Pumping cycle | 0h | 16H | 1h | 8H | 2h | 4H | 3h | 2H | 4h | 1H | 5h | 1/2H | 6h | 1/4H | 7h | 1/8H |
| | EXT_CPCK_SEL[1:0] | EXTP & EXTN Output | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 0h | Output x 1.5 waveform | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 1h | Output x 2 waveform | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 2h | Output x 3 waveform | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 3h | Output Low (power down) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | VGHL_CLK_SELA[2:0], VGHL_CLK_SELB[2:0] VCL_CLK_SELA[2:0], VCL_CLK_SELB[2:0] | Pumping cycle | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 0h | 16H | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 1h | 8H | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 2h | 4H | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3h | 2H | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4h | 1H | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5h | 1/2H | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Others | Reserved | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4002_RATIO_FREQA[2:0], 4002_RATIO_FREQB[2:0] | Pumping cycle | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0h | 16H | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1h | 8H | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2h | 4H | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3h | 2H | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4h | 1H | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5h | 1/2H | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6h | 1/4H | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7h | 1/8H | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Restriction | None | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

| <p>Register Availability</p> | <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>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 | Sleep In | Yes |
|--|---|--------|---------------|--|-----------------|---|-----------------|-----------|-----------------|
| Status | Availability | | | | | | | | |
| Normal Mode On, Idle Mode Off, Sleep Out | Yes | | | | | | | | |
| Normal Mode On, Idle Mode On, Sleep Out | Yes | | | | | | | | |
| Sleep In | Yes | | | | | | | | |
| <p>Default</p> | <table border="1"> <thead> <tr> <th>Status</th> <th>Default Value</th> </tr> </thead> <tbody> <tr> <td>Power On Sequence</td> <td>33h_33h_44h_55h</td> </tr> <tr> <td>S/W Reset</td> <td>33h_33h_44h_55h</td> </tr> <tr> <td>H/W Reset</td> <td>33h_33h_44h_55h</td> </tr> </tbody> </table> | Status | Default Value | Power On Sequence | 33h_33h_44h_55h | S/W Reset | 33h_33h_44h_55h | H/W Reset | 33h_33h_44h_55h |
| Status | Default Value | | | | | | | | |
| Power On Sequence | 33h_33h_44h_55h | | | | | | | | |
| S/W Reset | 33h_33h_44h_55h | | | | | | | | |
| H/W Reset | 33h_33h_44h_55h | | | | | | | | |

5.4.9. Power Control 1 (50h~51h)

| Command Page | | | Page 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|--|-----|------------|----|----|----|----|----|----|----|---------|------------|----------------------|--|--------|---|--------|----------|--------|-----|--------|-----|-------|-----|--------|---|---|-----|--------|-----|--------|-----|------|---|---|-----|--------|-----|--------|-----|--------|-------|
| Address | Parameter | W/R | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 50h | 1st | W/R | VREG1[7:0] | | | | | | | | | 95h | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 51h | 1st | W/R | VREG2[7:0] | | | | | | | | | 95h | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Description | VREG1[7:0]: Set the VREG1OUT voltage for positive Gamma. (12mV/step) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | <table border="1"> <thead> <tr> <th>VREG1[7:0]</th> <th>VREG1OUT voltage (V)</th> </tr> </thead> <tbody> <tr><td>10h</td><td>2.892</td></tr> <tr><td>11h</td><td>2.904</td></tr> <tr><td>12h</td><td>2.916</td></tr> <tr><td>13h</td><td>2.928</td></tr> <tr><td>14h</td><td>2.94</td></tr> <tr><td>15h</td><td>2.952</td></tr> <tr><td>:</td><td>:</td></tr> <tr><td>94h</td><td>4.476</td></tr> <tr><td>95h</td><td>4.488</td></tr> <tr><td>96h</td><td>4.5</td></tr> <tr><td>:</td><td>:</td></tr> <tr><td>E8h</td><td>5.484</td></tr> <tr><td>E9h</td><td>5.496</td></tr> <tr><td>EAh</td><td>5.508</td></tr> <tr><td>Other</td><td>Reserved</td></tr> </tbody> </table> | | | | | | | | | | | VREG1[7:0] | VREG1OUT voltage (V) | 10h | 2.892 | 11h | 2.904 | 12h | 2.916 | 13h | 2.928 | 14h | 2.94 | 15h | 2.952 | : | : | 94h | 4.476 | 95h | 4.488 | 96h | 4.5 | : | : | E8h | 5.484 | E9h | 5.496 | EAh | 5.508 | Other |
| VREG1[7:0] | VREG1OUT voltage (V) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10h | 2.892 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 11h | 2.904 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 12h | 2.916 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 13h | 2.928 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 14h | 2.94 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 15h | 2.952 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| : | : | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 94h | 4.476 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 95h | 4.488 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 96h | 4.5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| : | : | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| E8h | 5.484 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| E9h | 5.496 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| EAh | 5.508 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Other | Reserved | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Description | VREG2[7:0]: Set the VREG2OUT voltage for negative Gamma. (12mV/step) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | <table border="1"> <thead> <tr> <th>VREG2[7:0]</th> <th>VREG2OUT voltage (V)</th> </tr> </thead> <tbody> <tr><td>10h</td><td>-2.892</td></tr> <tr><td>11h</td><td>-2.904</td></tr> <tr><td>12h</td><td>-2.916</td></tr> <tr><td>13h</td><td>-2.928</td></tr> <tr><td>14h</td><td>-2.94</td></tr> <tr><td>15h</td><td>-2.952</td></tr> <tr><td>:</td><td>:</td></tr> <tr><td>94h</td><td>-4.476</td></tr> <tr><td>95h</td><td>-4.488</td></tr> <tr><td>96h</td><td>-4.5</td></tr> <tr><td>:</td><td>:</td></tr> <tr><td>E8h</td><td>-5.484</td></tr> <tr><td>E9h</td><td>-5.496</td></tr> <tr><td>EAh</td><td>-5.508</td></tr> <tr><td>Other</td><td>Reserved</td></tr> </tbody> </table> | | | | | | | | | | | VREG2[7:0] | VREG2OUT voltage (V) | 10h | -2.892 | 11h | -2.904 | 12h | -2.916 | 13h | -2.928 | 14h | -2.94 | 15h | -2.952 | : | : | 94h | -4.476 | 95h | -4.488 | 96h | -4.5 | : | : | E8h | -5.484 | E9h | -5.496 | EAh | -5.508 | Other |
| VREG2[7:0] | VREG2OUT voltage (V) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10h | -2.892 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 11h | -2.904 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 12h | -2.916 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 13h | -2.928 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 14h | -2.94 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 15h | -2.952 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| : | : | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 94h | -4.476 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 95h | -4.488 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 96h | -4.5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| : | : | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| E8h | -5.484 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| E9h | -5.496 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| EAh | -5.508 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Other | Reserved | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 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>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 | Sleep In | Yes | | | | | | | | | | | | | | | | | | | | | | | |
| Status | Availability | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Normal Mode On, Idle Mode Off, Sleep Out | Yes | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Normal Mode On, Idle Mode On, Sleep Out | Yes | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Sleep In | Yes | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

| | |
|---------|--|
| Default | |
| | |
| | |
| | |

| Status | Default Value |
|-------------------|---------------|
| Power On Sequence | 95h_95h |
| S/W Reset | 95h_95h |
| H/W Reset | 95h_95h |

5.4.10. VCOM Control 1 (52h~56h)

| Command Page | | | Page 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|--|------------------|-----------|----|----|------|----|----|----|---------|---------|------------------------|------------------|--|--------|---|--------|----------|--------|------|-------|------|--------|------|--------|---|---|------|--------|------|--------|------|------|---|---|------|-------|------|--------|------|--------|------|--------|------|--------|--------|----------|
| Address | Parameter | W/R | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 52h | 1st | W/R | 0 | 0 | 0 | 0 | 0 | 0 | 0 | VCM1[8] | 00h | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 53h | 1st | W/R | VCM1[7:0] | | | | | | | | | 7Bh | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 54h | 1st | W/R | 0 | 0 | 0 | 0 | 0 | 0 | 0 | VCM2[8] | 00h | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 55h | 1st | W/R | VCM2[7:0] | | | | | | | | | 7Bh | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 56h | 1st | R | 0 | 0 | 0 | NVM2 | 0 | 0 | 0 | NVM1 | 00h | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Description | <p>VCM1[8:0]: Set the VCOM level used for vertical forward scan (GS_PANEL= 1'b0), when NV memory isn't programmed. (12mV/step)</p> <p>VCM2[8:0]: Set the VCOM level used for vertical backward scan (GS_PANEL= 1'b1), when NV memory isn't programmed. (12mV/step)</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>VCM1[8:0] VCM2[8:0]</th> <th>VCOM voltage (V)</th> </tr> </thead> <tbody> <tr><td>010h</td><td>-0.204</td></tr> <tr><td>011h</td><td>-0.216</td></tr> <tr><td>012h</td><td>-0.228</td></tr> <tr><td>013h</td><td>-0.24</td></tr> <tr><td>014h</td><td>-0.252</td></tr> <tr><td>015h</td><td>-0.264</td></tr> <tr><td>:</td><td>:</td></tr> <tr><td>07Ah</td><td>-1.476</td></tr> <tr><td>07Bh</td><td>-1.488</td></tr> <tr><td>07Ch</td><td>-1.5</td></tr> <tr><td>:</td><td>:</td></tr> <tr><td>149h</td><td>-3.96</td></tr> <tr><td>14Ah</td><td>-3.972</td></tr> <tr><td>14Bh</td><td>-3.984</td></tr> <tr><td>14Ch</td><td>-3.996</td></tr> <tr><td>14Dh</td><td>-4.008</td></tr> <tr><td>Others</td><td>Reserved</td></tr> </tbody> </table> <p style="margin-left: 40px;"><i>Note: VCOM ≥ VSN + 0.5V</i></p> <p>NVM1 : Selection of the VCM source setting used for vertical forward scan (GS_PANEL= 1'b0). When the NV memory is programmed, the NVM1 will be set as '1' automatically.</p> <p style="margin-left: 40px;">0 : Register Page 1 R52h and R53h for VCM setting</p> <p style="margin-left: 40px;">1 : Register Page 4 RC4h and RC5h for VCM setting</p> <p>NVM2 : Selection of the VCM source setting used for vertical backward scan (GS_PANEL= 1'b1). When the NV memory is programmed, the NVM2 will be set as '1' automatically.</p> <p style="margin-left: 40px;">0 : Register 54h and 55h for VCM setting</p> <p style="margin-left: 40px;">1 : Register Page 4 RC6h and RC7h for VCM setting</p> | | | | | | | | | | | VCM1[8:0] VCM2[8:0] | VCOM voltage (V) | 010h | -0.204 | 011h | -0.216 | 012h | -0.228 | 013h | -0.24 | 014h | -0.252 | 015h | -0.264 | : | : | 07Ah | -1.476 | 07Bh | -1.488 | 07Ch | -1.5 | : | : | 149h | -3.96 | 14Ah | -3.972 | 14Bh | -3.984 | 14Ch | -3.996 | 14Dh | -4.008 | Others | Reserved |
| | VCM1[8:0] VCM2[8:0] | VCOM voltage (V) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 010h | -0.204 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 011h | -0.216 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 012h | -0.228 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 013h | -0.24 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 014h | -0.252 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 015h | -0.264 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | : | : | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 07Ah | -1.476 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 07Bh | -1.488 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 07Ch | -1.5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | : | : | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 149h | -3.96 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 14Ah | -3.972 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 14Bh | -3.984 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 14Ch | -3.996 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 14Dh | -4.008 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Others | Reserved | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Restriction | None | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 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>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 | Sleep In | Yes | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Status | Availability | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Normal Mode On, Idle Mode Off, Sleep Out | Yes | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Normal 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>00h_7Bh_00h_7Bh_00h</td></tr><tr><td>S/W Reset</td><td>00h_7Bh_00h_7Bh_00h</td></tr><tr><td>H/W Reset</td><td>00h_7Bh_00h_7Bh_00h</td></tr></tbody></table> | Status | Default Value | Power On Sequence | 00h_7Bh_00h_7Bh_00h | S/W Reset | 00h_7Bh_00h_7Bh_00h | H/W Reset | 00h_7Bh_00h_7Bh_00h |
|-----------|---|---------------------|---------------|-------------------|---------------------|-----------|---------------------|-----------|---------------------|
| | Status | Default Value | | | | | | | |
| | Power On Sequence | 00h_7Bh_00h_7Bh_00h | | | | | | | |
| | S/W Reset | 00h_7Bh_00h_7Bh_00h | | | | | | | |
| H/W Reset | 00h_7Bh_00h_7Bh_00h | | | | | | | | |

5.4.11. Entry Mode Set (58h)

| Command Page | | | Page 1 | | | | | | | | | | | | | | | | |
|--|---|-----|--------|----|----|----|----|----|----|----|---------|--------|-----------------------|--|--------|---|---------|-----------|-----|
| Address | Parameter | W/R | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default | | | | | | | | |
| 58h | 1st | W/R | LVD_EN | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 00h | | | | | | | | |
| Description | LVD_EN: Low voltage detection control. | | | | | | | | | | | | | | | | | | |
| | <table border="1"> <thead> <tr> <th>LVD</th> <th>Low voltage detection</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>Enable</td> </tr> <tr> <td>1</td> <td>Disable</td> </tr> </tbody> </table> | | | | | | | | | | | LVD | Low voltage detection | 0 | Enable | 1 | Disable | | |
| LVD | Low voltage detection | | | | | | | | | | | | | | | | | | |
| 0 | Enable | | | | | | | | | | | | | | | | | | |
| 1 | Disable | | | | | | | | | | | | | | | | | | |
| 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>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 | Sleep In | Yes |
| Status | Availability | | | | | | | | | | | | | | | | | | |
| Normal Mode On, Idle Mode Off, Sleep Out | Yes | | | | | | | | | | | | | | | | | | |
| Normal 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>00h</td> </tr> <tr> <td>S/W Reset</td> <td>00h</td> </tr> <tr> <td>H/W Reset</td> <td>00h</td> </tr> </tbody> </table> | | | | | | | | | | | Status | Default Value | Power On Sequence | 00h | S/W Reset | 00h | H/W Reset | 00h |
| Status | Default Value | | | | | | | | | | | | | | | | | | |
| Power On Sequence | 00h | | | | | | | | | | | | | | | | | | |
| S/W Reset | 00h | | | | | | | | | | | | | | | | | | |
| H/W Reset | 00h | | | | | | | | | | | | | | | | | | |

5.4.12. Source Timing Adjust (60h~63h)

| Command Page | | | Page 1 | | | | | | | | | | | | | | | | |
|--|--|-----|--------|----|----------|----|----|----|----|----|---------|--------|---------------|--|-----------------|---|-----------------|-----------|-----------------|
| Address | Parameter | W/R | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default | | | | | | | | |
| 60h | 1st | W/R | 0 | 0 | SDT[5:0] | | | | | | 14h | | | | | | | | |
| 61h | 1st | W/R | 0 | 0 | CRT[5:0] | | | | | | 00h | | | | | | | | |
| 62h | 1st | W/R | 0 | 0 | EQT[5:0] | | | | | | 19h | | | | | | | | |
| 63h | 1st | W/R | 0 | 0 | PCT[5:0] | | | | | | 10h | | | | | | | | |
| Description | <p>SDT[5:0]: Source SD timing adjustment (time scale: internal T_{OP_CLK}). The timing can be adjusted 0 to 63 time scales.</p> <p>CRT[5:0]: Source CR timing adjustment (time scale: internal T_{OP_CLK}). The timing can be adjusted 0 to 63 time scales.</p> <p>EQT[5:0]: Source EQ timing adjustment (time scale: internal T_{OP_CLK}). The timing can be adjusted 8 to 71 time scales.</p> <p>PCT[5:0]: Source PC timing adjustment (time scale: internal T_{OP_CLK}). The timing can be adjusted 0 to 63 time scales.</p> <p><i>Note:</i> T_{OP_CLK}: 62.5ns</p> | | | | | | | | | | | | | | | | | | |
| | <p>Restriction: None</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>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 | Sleep In | Yes |
| Status | Availability | | | | | | | | | | | | | | | | | | |
| Normal Mode On, Idle Mode Off, Sleep Out | Yes | | | | | | | | | | | | | | | | | | |
| Normal 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>14h_00h_19h_10h</td> </tr> <tr> <td>S/W Reset</td> <td>14h_00h_19h_10h</td> </tr> <tr> <td>H/W Reset</td> <td>14h_00h_19h_10h</td> </tr> </tbody> </table> | | | | | | | | | | | Status | Default Value | Power On Sequence | 14h_00h_19h_10h | S/W Reset | 14h_00h_19h_10h | H/W Reset | 14h_00h_19h_10h |
| Status | Default Value | | | | | | | | | | | | | | | | | | |
| Power On Sequence | 14h_00h_19h_10h | | | | | | | | | | | | | | | | | | |
| S/W Reset | 14h_00h_19h_10h | | | | | | | | | | | | | | | | | | |
| H/W Reset | 14h_00h_19h_10h | | | | | | | | | | | | | | | | | | |

5.4.13. Positive Gamma Correction (A0h~B3h)

| Command Page | | | Page 1 | | | | | | | | | | | | | | | | |
|--|---|--|------------|------------|------------|----|----|----|-----|-----|---------|--------|---------------|--|---|---|---|-----------|---|
| Address | Parameter | W/R | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default | | | | | | | | |
| A0h | 1st | W/R | 0 | 0 | VP0[5:0] | | | | | | 00h | | | | | | | | |
| A1h | 1st | W/R | 0 | VP4[6:0] | | | | | | 0Dh | | | | | | | | | |
| A2h | 1st | W/R | 0 | VP8[6:0] | | | | | | 1Dh | | | | | | | | | |
| A3h | 1st | W/R | 0 | 0 | VP12[5:0] | | | | | | 11h | | | | | | | | |
| A4h | 1st | W/R | 0 | 0 | VP16[5:0] | | | | | | 0Ch | | | | | | | | |
| A5h | 1st | W/R | 0 | VP24[6:0] | | | | | | 23h | | | | | | | | | |
| A6h | 1st | W/R | 0 | 0 | VP36[5:0] | | | | | | 17h | | | | | | | | |
| A7h | 1st | W/R | 0 | 0 | VP52[5:0] | | | | | | 1Ch | | | | | | | | |
| A8h | 1st | W/R | VP80[7:0] | | | | | | 82h | | | | | | | | | | |
| A9h | 1st | W/R | 0 | 0 | VP111[5:0] | | | | | | 21h | | | | | | | | |
| AAh | 1st | W/R | 0 | 0 | VP144[5:0] | | | | | | 2Ah | | | | | | | | |
| ABh | 1st | W/R | VP175[7:0] | | | | | | 6Bh | | | | | | | | | | |
| ACh | 1st | W/R | 0 | 0 | VP203[5:0] | | | | | | 19h | | | | | | | | |
| ADh | 1st | W/R | 0 | 0 | VP219[5:0] | | | | | | 14h | | | | | | | | |
| A Eh | 1st | W/R | 0 | VP231[6:0] | | | | | | 45h | | | | | | | | | |
| AFh | 1st | W/R | 0 | 0 | VP239[5:0] | | | | | | 1Dh | | | | | | | | |
| B0h | 1st | W/R | 0 | 0 | VP243[5:0] | | | | | | 23h | | | | | | | | |
| B1h | 1st | W/R | 0 | VP247[6:0] | | | | | | 52h | | | | | | | | | |
| B2h | 1st | W/R | 0 | VP251[6:0] | | | | | | 63h | | | | | | | | | |
| B3h | 1st | W/R | 0 | 0 | VP255[5:0] | | | | | | 39h | | | | | | | | |
| Description | | Set the gray scale voltage to adjust the Gamma characteristics of the TFT panel. | | | | | | | | | | | | | | | | | |
| 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>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 | Sleep In | Yes |
| Status | Availability | | | | | | | | | | | | | | | | | | |
| Normal Mode On, Idle Mode Off, Sleep Out | Yes | | | | | | | | | | | | | | | | | | |
| Normal 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>00h_0Dh_1Dh_11h_0Ch_23h_17h_1Ch_82h_21h_2Ah_6Bh_19h_14h_45h_1Dh_23h_52h_63h_39h</td> </tr> <tr> <td>S/W Reset</td> <td>00h_0Dh_1Dh_11h_0Ch_23h_17h_1Ch_82h_21h_2Ah_6Bh_19h_14h_45h_1Dh_23h_52h_63h_39h</td> </tr> <tr> <td>H/W Reset</td> <td>00h_0Dh_1Dh_11h_0Ch_23h_17h_1Ch_82h_21h_2Ah_6Bh_19h_14h_45h_1Dh_23h_52h_63h_39h</td> </tr> </tbody> </table> | | | | | | | | | | Status | Default Value | Power On Sequence | 00h_0Dh_1Dh_11h_0Ch_23h_17h_1Ch_82h_21h_2Ah_6Bh_19h_14h_45h_1Dh_23h_52h_63h_39h | S/W Reset | 00h_0Dh_1Dh_11h_0Ch_23h_17h_1Ch_82h_21h_2Ah_6Bh_19h_14h_45h_1Dh_23h_52h_63h_39h | H/W Reset | 00h_0Dh_1Dh_11h_0Ch_23h_17h_1Ch_82h_21h_2Ah_6Bh_19h_14h_45h_1Dh_23h_52h_63h_39h |
| Status | Default Value | | | | | | | | | | | | | | | | | | |
| Power On Sequence | 00h_0Dh_1Dh_11h_0Ch_23h_17h_1Ch_82h_21h_2Ah_6Bh_19h_14h_45h_1Dh_23h_52h_63h_39h | | | | | | | | | | | | | | | | | | |
| S/W Reset | 00h_0Dh_1Dh_11h_0Ch_23h_17h_1Ch_82h_21h_2Ah_6Bh_19h_14h_45h_1Dh_23h_52h_63h_39h | | | | | | | | | | | | | | | | | | |
| H/W Reset | 00h_0Dh_1Dh_11h_0Ch_23h_17h_1Ch_82h_21h_2Ah_6Bh_19h_14h_45h_1Dh_23h_52h_63h_39h | | | | | | | | | | | | | | | | | | |

5.4.14. Pad Control (B6h~B7h)

| Command Page | | | Page 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|--|--|----------|----------------------------|-----------|------------|-----------|-----------|--------------|-----------|---------|----------------------|---------------|--|----------------------------|---|---------|-----------|---------|--------|--------|--------|-----------|-----------|------------|-----------|-----------|---|---|---|-------|-------|--------|-------|-------|---|---|---|-------|-------|--------|-------|-------|---|---|---|-------|-------|--------|-------|-------|---|---|---|-------|-------|--------|-------|-------|---|---|---|-------|-------|--------|-------|-------|---|---|---|-------|-------|--------|-------|-------|---|---|---|-------|-------|--------|-------|-------|---|---|---|-------|-------|--------|-------|-------|--------|--------|------------|---|---|--|---|---|--|---|---|--|---|---|--|
| Address | Parameter | W/R | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| B6h | 1st | W/R | IM_SW_EN | IM_SW[2:0] | | | RS_SW_EN | 0 | RS_SW[1:0] | | 00h | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| B7h | 1st | W/R | 0 | 0 | 0 | 0 | 0 | 0 | LANSEL_SW_EN | LANSEL_SW | 00h | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Description | <p>IM_SW_EN: Enable/Disable the lane sequence and polarity from internal command setting. The external hardware pin IM[2:0] has no effect when IM_SW_EN is "1".</p> <p>IM_SW[2:0]: Set the configuration of lane sequence and polarity. (The bottom table is an example for MIPI 4 lane setting)</p> <table border="1" style="margin-left: 40px;"> <thead> <tr> <th colspan="3">Internal Pad Control</th> <th colspan="5">Configuration of MIPI Lane</th> </tr> <tr> <th>IM_SW2</th> <th>IM_SW1</th> <th>IM_SW0</th> <th>D0P/N Pin</th> <th>D1P/N Pin</th> <th>CLKP/N Pin</th> <th>D2P/N Pin</th> <th>D3P/N Pin</th> </tr> </thead> <tbody> <tr><td>0</td><td>0</td><td>0</td><td>D3P/N</td><td>D2P/N</td><td>CLKP/N</td><td>D1P/N</td><td>D0P/N</td></tr> <tr><td>0</td><td>0</td><td>1</td><td>D3N/P</td><td>D2N/P</td><td>CLKN/P</td><td>D1N/P</td><td>D0N/P</td></tr> <tr><td>0</td><td>1</td><td>0</td><td>D0P/N</td><td>D1P/N</td><td>CLKP/N</td><td>D2P/N</td><td>D3P/N</td></tr> <tr><td>0</td><td>1</td><td>1</td><td>D0N/P</td><td>D1N/P</td><td>CLKN/P</td><td>D2N/P</td><td>D3N/P</td></tr> <tr><td>1</td><td>0</td><td>0</td><td>D3P/N</td><td>D0P/N</td><td>CLKP/N</td><td>D1P/N</td><td>D2P/N</td></tr> <tr><td>1</td><td>0</td><td>1</td><td>D3N/P</td><td>D0N/P</td><td>CLKN/P</td><td>D1N/P</td><td>D2P/N</td></tr> <tr><td>1</td><td>1</td><td>0</td><td>D2P/N</td><td>D1P/N</td><td>CLKP/N</td><td>D0P/N</td><td>D3P/N</td></tr> <tr><td>1</td><td>1</td><td>1</td><td>D2N/P</td><td>D1N/P</td><td>CLKN/P</td><td>D0N/P</td><td>D3N/P</td></tr> </tbody> </table> <p>RS_SW_EN: Enable/Disable the resolution from internal command setting. The external hardware pin RS[1:0] has no effect when RS_SW_EN is "1".</p> <p>RS_SW[1:0]: Set the resolution.</p> <table border="1" style="margin-left: 40px;"> <thead> <tr> <th>RS_SW1</th> <th>RS_SW0</th> <th>Resolution</th> </tr> </thead> <tbody> <tr><td>0</td><td>0</td><td>800 (RGB) x (480 + (4 x NL)) gate line</td></tr> <tr><td>0</td><td>1</td><td>768 (RGB) x (480 + (4 x NL)) gate line</td></tr> <tr><td>1</td><td>0</td><td>720 (RGB) x (480 + (4 x NL)) gate line</td></tr> <tr><td>1</td><td>1</td><td>640 (RGB) x (480 + (4 x NL)) gate line</td></tr> </tbody> </table> <p>LANSEL_SW_EN: Enable/Disable the lane number from internal command setting. The external hardware pin LANSEL has no effect when LANSEL_SW_EN is "1".</p> <p>LANSEL_SW: Set the lane number. LANSEL_SW="1", MIPI DSI is 2 Lane mode LANSEL_SW="0", MIPI DSI is 3 or 4 Lane mode</p> <p><i>Note: Please reference "Table 2: DSI Interface Lane Mode Selection"</i></p> | | | | | | | | | | | Internal Pad Control | | | Configuration of MIPI Lane | | | | | IM_SW2 | IM_SW1 | IM_SW0 | D0P/N Pin | D1P/N Pin | CLKP/N Pin | D2P/N Pin | D3P/N Pin | 0 | 0 | 0 | D3P/N | D2P/N | CLKP/N | D1P/N | D0P/N | 0 | 0 | 1 | D3N/P | D2N/P | CLKN/P | D1N/P | D0N/P | 0 | 1 | 0 | D0P/N | D1P/N | CLKP/N | D2P/N | D3P/N | 0 | 1 | 1 | D0N/P | D1N/P | CLKN/P | D2N/P | D3N/P | 1 | 0 | 0 | D3P/N | D0P/N | CLKP/N | D1P/N | D2P/N | 1 | 0 | 1 | D3N/P | D0N/P | CLKN/P | D1N/P | D2P/N | 1 | 1 | 0 | D2P/N | D1P/N | CLKP/N | D0P/N | D3P/N | 1 | 1 | 1 | D2N/P | D1N/P | CLKN/P | D0N/P | D3N/P | RS_SW1 | RS_SW0 | Resolution | 0 | 0 | 800 (RGB) x (480 + (4 x NL)) gate line | 0 | 1 | 768 (RGB) x (480 + (4 x NL)) gate line | 1 | 0 | 720 (RGB) x (480 + (4 x NL)) gate line | 1 | 1 | 640 (RGB) x (480 + (4 x NL)) gate line |
| | Internal Pad Control | | | Configuration of MIPI Lane | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | IM_SW2 | IM_SW1 | IM_SW0 | D0P/N Pin | D1P/N Pin | CLKP/N Pin | D2P/N Pin | D3P/N Pin | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 0 | 0 | 0 | D3P/N | D2P/N | CLKP/N | D1P/N | D0P/N | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 0 | 0 | 1 | D3N/P | D2N/P | CLKN/P | D1N/P | D0N/P | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 0 | 1 | 0 | D0P/N | D1P/N | CLKP/N | D2P/N | D3P/N | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 0 | 1 | 1 | D0N/P | D1N/P | CLKN/P | D2N/P | D3N/P | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 1 | 0 | 0 | D3P/N | D0P/N | CLKP/N | D1P/N | D2P/N | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 1 | 0 | 1 | D3N/P | D0N/P | CLKN/P | D1N/P | D2P/N | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 1 | 1 | 0 | D2P/N | D1P/N | CLKP/N | D0P/N | D3P/N | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | 1 | 1 | D2N/P | D1N/P | CLKN/P | D0N/P | D3N/P | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| RS_SW1 | RS_SW0 | Resolution | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0 | 0 | 800 (RGB) x (480 + (4 x NL)) gate line | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0 | 1 | 768 (RGB) x (480 + (4 x NL)) gate line | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | 0 | 720 (RGB) x (480 + (4 x NL)) gate line | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | 1 | 640 (RGB) x (480 + (4 x NL)) gate line | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Restriction | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Register Availability | <table border="1" style="margin-left: 40px;"> <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>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 | Sleep In | Yes | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Status | Availability | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Normal Mode On, Idle Mode Off, Sleep Out | Yes | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Normal Mode On, Idle Mode On, Sleep Out | Yes | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Sleep In | Yes | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Default | <table border="1" style="margin-left: 40px;"> <thead> <tr> <th>Status</th> <th>Default Value</th> </tr> </thead> <tbody> <tr><td>Power On Sequence</td><td>00h_00h</td></tr> <tr><td>S/W Reset</td><td>00h_00h</td></tr> <tr><td>H/W Reset</td><td>00h_00h</td></tr> </tbody> </table> | | | | | | | | | | | Status | Default Value | Power On Sequence | 00h_00h | S/W Reset | 00h_00h | H/W Reset | 00h_00h | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Status | Default Value | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Power On Sequence | 00h_00h | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| S/W Reset | 00h_00h | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| H/W Reset | 00h_00h | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

5.4.15. Negative Gamma Correction (C0h~D3h)

| Command Page | | | Page 1 | | | | | | | | | | | | | | | | |
|--|---|--|------------|------------|------------|----|----|----|-----|-----|---------|--------|---------------|--|---|---|---|-----------|---|
| Address | Parameter | W/R | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default | | | | | | | | |
| C0h | 1st | W/R | 0 | 0 | VN0[5:0] | | | | | | 00h | | | | | | | | |
| C1h | 1st | W/R | 0 | VN4[6:0] | | | | | | 0Dh | | | | | | | | | |
| C2h | 1st | W/R | 0 | VN8[6:0] | | | | | | 1Dh | | | | | | | | | |
| C3h | 1st | W/R | 0 | 0 | VN12[5:0] | | | | | | 11h | | | | | | | | |
| C4h | 1st | W/R | 0 | 0 | VN16[5:0] | | | | | | 0Ch | | | | | | | | |
| C5h | 1st | W/R | 0 | VN24[6:0] | | | | | | 23h | | | | | | | | | |
| C6h | 1st | W/R | 0 | 0 | VN36[5:0] | | | | | | 17h | | | | | | | | |
| C7h | 1st | W/R | 0 | 0 | VN52[5:0] | | | | | | 1Ch | | | | | | | | |
| C8h | 1st | W/R | VN80[7:0] | | | | | | 82h | | | | | | | | | | |
| C9h | 1st | W/R | 0 | 0 | VN111[5:0] | | | | | | 21h | | | | | | | | |
| CAh | 1st | W/R | 0 | 0 | VN144[5:0] | | | | | | 2Ah | | | | | | | | |
| CBh | 1st | W/R | VN175[7:0] | | | | | | 6Bh | | | | | | | | | | |
| CCh | 1st | W/R | 0 | 0 | VN203[5:0] | | | | | | 19h | | | | | | | | |
| CDh | 1st | W/R | 0 | 0 | VN219[5:0] | | | | | | 14h | | | | | | | | |
| CEh | 1st | W/R | 0 | VN231[6:0] | | | | | | 45h | | | | | | | | | |
| CFh | 1st | W/R | 0 | 0 | VN239[5:0] | | | | | | 1Dh | | | | | | | | |
| D0h | 1st | W/R | 0 | 0 | VN243[5:0] | | | | | | 23h | | | | | | | | |
| D1h | 1st | W/R | 0 | VN247[6:0] | | | | | | 52h | | | | | | | | | |
| D2h | 1st | W/R | 0 | VN251[6:0] | | | | | | 63h | | | | | | | | | |
| D3h | 1st | W/R | 0 | 0 | VN255[5:0] | | | | | | 39h | | | | | | | | |
| Description | | Set the gray scale voltage to adjust the Gamma characteristics of the TFT panel. | | | | | | | | | | | | | | | | | |
| 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>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 | Sleep In | Yes |
| Status | Availability | | | | | | | | | | | | | | | | | | |
| Normal Mode On, Idle Mode Off, Sleep Out | Yes | | | | | | | | | | | | | | | | | | |
| Normal 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>00h_0Dh_1Dh_11h_0Ch_23h_17h_1Ch_82h_21h_2Ah_6Bh_19h_14h_45h_1Dh_23h_52h_63h_39h</td> </tr> <tr> <td>S/W Reset</td> <td>00h_0Dh_1Dh_11h_0Ch_23h_17h_1Ch_82h_21h_2Ah_6Bh_19h_14h_45h_1Dh_23h_52h_63h_39h</td> </tr> <tr> <td>H/W Reset</td> <td>00h_0Dh_1Dh_11h_0Ch_23h_17h_1Ch_82h_21h_2Ah_6Bh_19h_14h_45h_1Dh_23h_52h_63h_39h</td> </tr> </tbody> </table> | | | | | | | | | | Status | Default Value | Power On Sequence | 00h_0Dh_1Dh_11h_0Ch_23h_17h_1Ch_82h_21h_2Ah_6Bh_19h_14h_45h_1Dh_23h_52h_63h_39h | S/W Reset | 00h_0Dh_1Dh_11h_0Ch_23h_17h_1Ch_82h_21h_2Ah_6Bh_19h_14h_45h_1Dh_23h_52h_63h_39h | H/W Reset | 00h_0Dh_1Dh_11h_0Ch_23h_17h_1Ch_82h_21h_2Ah_6Bh_19h_14h_45h_1Dh_23h_52h_63h_39h |
| Status | Default Value | | | | | | | | | | | | | | | | | | |
| Power On Sequence | 00h_0Dh_1Dh_11h_0Ch_23h_17h_1Ch_82h_21h_2Ah_6Bh_19h_14h_45h_1Dh_23h_52h_63h_39h | | | | | | | | | | | | | | | | | | |
| S/W Reset | 00h_0Dh_1Dh_11h_0Ch_23h_17h_1Ch_82h_21h_2Ah_6Bh_19h_14h_45h_1Dh_23h_52h_63h_39h | | | | | | | | | | | | | | | | | | |
| H/W Reset | 00h_0Dh_1Dh_11h_0Ch_23h_17h_1Ch_82h_21h_2Ah_6Bh_19h_14h_45h_1Dh_23h_52h_63h_39h | | | | | | | | | | | | | | | | | | |

5.4.16. NV Memory Write (E0h~E2h)

| Command Page | | | Page 1 | | | | | | | | | | |
|-----------------------|--|-----|---------------|--|----------------------|----------------------|----|---------------|----|----|---------|--|--|
| Address | Parameter | W/R | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default | | |
| E0h | 1st | W/R | PGM_DATA[7:0] | | | | | | | | 00h | | |
| E1h | 1st | W/R | PGM_ADR[7:0] | | | | | | | | 00h | | |
| E2h | 1st | W/R | PGM_ADR[15:8] | | | | | | | | 00h | | |
| Description | <p>This command is used to program or read the NV memory data.</p> <p>After a successful OTP operation, the information of PGM_DATA[7:0] will be programmed to the NV memory.</p> <p>PGM_DATA[7:0]: The programmed data.</p> <p>PGM_ADR[15:0]: Set the address of the NV memory for programming data. See chapter 15 “NV Memory Programming Flow”.</p> | | | | | | | | | | | | |
| | | | | PGM_ADR[15:0] | | Programming data | | | | | | | |
| | | | | 1h | | ID1 | | | | | | | |
| | | | | 2h | | ID2 | | | | | | | |
| | | | | 3h | | ID3 | | | | | | | |
| | | | | 4h | | VCM1[8] | | | | | | | |
| | | | | 5h | | VCM1[7:0] | | | | | | | |
| | | | | 6h | | VCM2[8] | | | | | | | |
| | | | | 7h | | VCM2[7:0] | | | | | | | |
| | | | | 8h | | VREG1[7:0] | | | | | | | |
| | | | | 9h | | VREG2[7:0] | | | | | | | |
| | | | | 68h~7Bh | | REGAM0_P~ REGAM255_P | | | | | | | |
| | | | 7Ch~8Fh | | REGAM0_N~ REGAM255_N | | | | | | | | |
| Restriction | None | | | | | | | | | | | | |
| Register Availability | | | | Status | | | | Availability | | | | | |
| | | | | Normal Mode On, Idle Mode Off, Sleep Out | | | | Yes | | | | | |
| | | | | Normal Mode On, Idle Mode On, Sleep Out | | | | Yes | | | | | |
| | | | | Sleep In | | | | Yes | | | | | |
| Default | | | | Status | | | | Default Value | | | | | |
| | | | | Power On Sequence | | | | 00h_00h_00h | | | | | |
| | | | | S/W Reset | | | | 00h_00h_00h | | | | | |
| | | | | H/W Reset | | | | 00h_00h_00h | | | | | |

5.4.17. NV Memory Protection Key (E3h~E5h)

| Command Page | | | Page 1 | | | | | | | | | | | | | | | | |
|--|---|-----|------------|----|----|----|----|----|----|----|---------|--------|---------------|--|-------------|---|-------------|-----------|-------------|
| Address | Parameter | W/R | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default | | | | | | | | |
| E3h | 1st | W/R | KEY[23:16] | | | | | | | | | 00h | | | | | | | |
| E4h | 1st | W/R | KEY[15:8] | | | | | | | | | 00h | | | | | | | |
| E5h | 1st | W/R | KEY[7:0] | | | | | | | | | 00h | | | | | | | |
| Description | <p>KEY[23:0]: NV memory programming protection key.</p> <p>Write an OTP data to PGM_DATA[7:0], this KEY[23:0] must set 0x55AA66h to enable OTP programming. If the KEY[23:0] is not 0x55AA66h, the NV Memory program will be aborted.</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>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 | Sleep In | Yes |
| Status | Availability | | | | | | | | | | | | | | | | | | |
| Normal Mode On, Idle Mode Off, Sleep Out | Yes | | | | | | | | | | | | | | | | | | |
| Normal 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>00h_00h_00h</td> </tr> <tr> <td>S/W Reset</td> <td>00h_00h_00h</td> </tr> <tr> <td>H/W Reset</td> <td>00h_00h_00h</td> </tr> </tbody> </table> | | | | | | | | | | | Status | Default Value | Power On Sequence | 00h_00h_00h | S/W Reset | 00h_00h_00h | H/W Reset | 00h_00h_00h |
| Status | Default Value | | | | | | | | | | | | | | | | | | |
| Power On Sequence | 00h_00h_00h | | | | | | | | | | | | | | | | | | |
| S/W Reset | 00h_00h_00h | | | | | | | | | | | | | | | | | | |
| H/W Reset | 00h_00h_00h | | | | | | | | | | | | | | | | | | |

5.4.18. NV Memory Status Read (E6h~E9h)

| Command Page | | | Page 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|---|-----|----------------------------|----------------------------|--------------|----|----|--------------|----|----|---------|---------------------------|--------------|--|-------------|---|-----|----------|---------------|---|---|---|---------------------------|---|---|---|----------------------------|---|---|---|----------------------------|-------------|--|--|-------------|---|---|---|---------------|---|---|---|---------------------------|---|---|---|----------------------------|---|---|---|----------------------------|-----------------------------|--|--|-------------|---|---|---|---------------|---|---|---|---------------------------|---|---|---|----------------------------|---|---|---|----------------------------|-------------------|-------------|---|---------------|---|---------------------------|----------|-------------------------|---|------|---|------|
| Address | Parameter | W/R | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| E6h | 1st | R | 0 | ID2_MK[2:0] | | | 0 | ID1_MK[2:0] | | | 00h | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| E7h | 1st | R | 0 | 0 | 0 | 0 | 0 | ID3_MK[2:0] | | | 00h | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| E8h | 1st | R | GAMMA P_MK | GAMMA N_MK | VCM2_MK[2:0] | | | VCM1_MK[2:0] | | | 00h | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| E9h | 1st | R | OTP_BU SY | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 00h | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Description | <p>These registers uses a mark to record the NV memory programmed time. The bits are increase "+1" automatically after writing the PGM_DATA [7:0] to the NV memory.</p> <p>ID1_MK[2:0]/ID2_MK[2:0]:</p> <table border="1"> <thead> <tr> <th colspan="3">ID1_MK[2:0] / ID2_MK[2:0]</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>0</td> <td>0</td> <td>No Programmed</td> </tr> <tr> <td>0</td> <td>0</td> <td>1</td> <td>Programmed 1 time already</td> </tr> <tr> <td>0</td> <td>1</td> <td>1</td> <td>Programmed 2 times already</td> </tr> <tr> <td>1</td> <td>1</td> <td>1</td> <td>Programmed 3 times already</td> </tr> </tbody> </table> <p>ID3_MK[2:0]:</p> <table border="1"> <thead> <tr> <th colspan="3">ID3_MK[2:0]</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>0</td> <td>0</td> <td>No Programmed</td> </tr> <tr> <td>0</td> <td>0</td> <td>1</td> <td>Programmed 1 time already</td> </tr> <tr> <td>0</td> <td>1</td> <td>1</td> <td>Programmed 2 times already</td> </tr> <tr> <td>1</td> <td>1</td> <td>1</td> <td>Programmed 3 times already</td> </tr> </tbody> </table> <p>VCM1_MK[2:0] / VCM2_MK[2:0]:</p> <table border="1"> <thead> <tr> <th colspan="3">VCM1_MK[2:0] / VCM2_MK[2:0]</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>0</td> <td>0</td> <td>No Programmed</td> </tr> <tr> <td>0</td> <td>0</td> <td>1</td> <td>Programmed 1 time already</td> </tr> <tr> <td>0</td> <td>1</td> <td>1</td> <td>Programmed 2 times already</td> </tr> <tr> <td>1</td> <td>1</td> <td>1</td> <td>Programmed 3 times already</td> </tr> </tbody> </table> <p>GAMP_MK / GAMN_MK :</p> <table border="1"> <thead> <tr> <th>GAMP_MK / GAMN_MK</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>No Programmed</td> </tr> <tr> <td>1</td> <td>Programmed 1 time already</td> </tr> </tbody> </table> <p>OTP BUSY: The status bit of the NV memory programming.</p> <table border="1"> <thead> <tr> <th>OTP_BUSY</th> <th>The Status of NV Memory</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>Idle</td> </tr> <tr> <td>1</td> <td>Busy</td> </tr> </tbody> </table> | | | | | | | | | | | ID1_MK[2:0] / ID2_MK[2:0] | | | Description | 0 | 0 | 0 | No Programmed | 0 | 0 | 1 | Programmed 1 time already | 0 | 1 | 1 | Programmed 2 times already | 1 | 1 | 1 | Programmed 3 times already | ID3_MK[2:0] | | | Description | 0 | 0 | 0 | No Programmed | 0 | 0 | 1 | Programmed 1 time already | 0 | 1 | 1 | Programmed 2 times already | 1 | 1 | 1 | Programmed 3 times already | VCM1_MK[2:0] / VCM2_MK[2:0] | | | Description | 0 | 0 | 0 | No Programmed | 0 | 0 | 1 | Programmed 1 time already | 0 | 1 | 1 | Programmed 2 times already | 1 | 1 | 1 | Programmed 3 times already | GAMP_MK / GAMN_MK | Description | 0 | No Programmed | 1 | Programmed 1 time already | OTP_BUSY | The Status of NV Memory | 0 | Idle | 1 | Busy |
| | ID1_MK[2:0] / ID2_MK[2:0] | | | Description | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 0 | 0 | 0 | No Programmed | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 0 | 0 | 1 | Programmed 1 time already | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 0 | 1 | 1 | Programmed 2 times already | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 1 | 1 | 1 | Programmed 3 times already | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | ID3_MK[2:0] | | | Description | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 0 | 0 | 0 | No Programmed | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 0 | 0 | 1 | Programmed 1 time already | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 0 | 1 | 1 | Programmed 2 times already | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | 1 | 1 | Programmed 3 times already | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| VCM1_MK[2:0] / VCM2_MK[2:0] | | | Description | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0 | 0 | 0 | No Programmed | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0 | 0 | 1 | Programmed 1 time already | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0 | 1 | 1 | Programmed 2 times already | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | 1 | 1 | Programmed 3 times already | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| GAMP_MK / GAMN_MK | Description | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0 | No Programmed | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | Programmed 1 time already | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| OTP_BUSY | The Status of NV Memory | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0 | Idle | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | Busy | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 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>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 | Sleep In | Yes | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Status | Availability | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Normal Mode On, Idle Mode Off, Sleep Out | Yes | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Normal 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>00h_00h_00h_00h</td></tr><tr><td>S/W Reset</td><td>00h_00h_00h_00h</td></tr><tr><td>H/W Reset</td><td>00h_00h_00h_00h</td></tr></tbody></table> | Status | Default Value | Power On Sequence | 00h_00h_00h_00h | S/W Reset | 00h_00h_00h_00h | H/W Reset | 00h_00h_00h_00h |
|-----------|---|-----------------|---------------|-------------------|-----------------|-----------|-----------------|-----------|-----------------|
| | Status | Default Value | | | | | | | |
| | Power On Sequence | 00h_00h_00h_00h | | | | | | | |
| | S/W Reset | 00h_00h_00h_00h | | | | | | | |
| H/W Reset | 00h_00h_00h_00h | | | | | | | | |

5.4.19. Time Stamp (F0h~F1h)

| Command Page | | | Page 1 | | | | | | | | | | | | | | | | |
|--|---|-----|----------------------|----|----|----|----|----|----|----|---------|--------|---------------|--|---------|---|---------|-----------|---------|
| Address | Parameter | W/R | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default | | | | | | | | |
| F0h | 1st | W/R | Time_Stamp_Week[7:0] | | | | | | | | 00h | | | | | | | | |
| F1h | 1st | W/R | Time_Stamp_Year[7:0] | | | | | | | | 00h | | | | | | | | |
| Description | <p>This command identifies the display module's manufacture date</p> <p>Time_Stamp_Week[7:0]: Week of manufacture.</p> <p>Time_Stamp_Year[7:0]: Year of manufacture.</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>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 | Sleep In | Yes |
| Status | Availability | | | | | | | | | | | | | | | | | | |
| Normal Mode On, Idle Mode Off, Sleep Out | Yes | | | | | | | | | | | | | | | | | | |
| Normal 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>00h_00h</td> </tr> <tr> <td>S/W Reset</td> <td>00h_00h</td> </tr> <tr> <td>H/W Reset</td> <td>00h_00h</td> </tr> </tbody> </table> | | | | | | | | | | | Status | Default Value | Power On Sequence | 00h_00h | S/W Reset | 00h_00h | H/W Reset | 00h_00h |
| Status | Default Value | | | | | | | | | | | | | | | | | | |
| Power On Sequence | 00h_00h | | | | | | | | | | | | | | | | | | |
| S/W Reset | 00h_00h | | | | | | | | | | | | | | | | | | |
| H/W Reset | 00h_00h | | | | | | | | | | | | | | | | | | |

5.4.20. EXTC Command Set Enable Register (FFh)

| Command Page | | | Page 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|---|--------------|-----------|----|----|----|----|----|----|----|---------|-----------|---------------|--|--------|---|--------|-----------|--------|-----|--------|-----|--------|-----|--------|-----|--------|-----|--------|-----|--------|-----|--------|-----|---------|--------|----------|
| Address | Parameter | W/R | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default | | | | | | | | | | | | | | | | | | | | | | | | | | |
| FFh | 1st | W | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 98h | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 2nd | W | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 81h | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 3rd | W | PAGE[7:0] | | | | | | | | 01h | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Description | <p>PAGE[7:0]: Set the command page.</p> <table border="1"> <thead> <tr> <th>PAGE[7:0]</th> <th>Command Page</th> </tr> </thead> <tbody> <tr><td>00h</td><td>Page 0</td></tr> <tr><td>01h</td><td>Page 1</td></tr> <tr><td>02h</td><td>Page 2</td></tr> <tr><td>03h</td><td>Page 3</td></tr> <tr><td>04h</td><td>Page 4</td></tr> <tr><td>05h</td><td>Page 5</td></tr> <tr><td>06h</td><td>Page 6</td></tr> <tr><td>07h</td><td>Page 7</td></tr> <tr><td>08h</td><td>Page 8</td></tr> <tr><td>09h</td><td>Page 9</td></tr> <tr><td>0Ah</td><td>Page 10</td></tr> <tr><td>Others</td><td>Reserved</td></tr> </tbody> </table> <p>Set the register, 1st Parameter = 98h, 2nd Parameter = 81h, 3rd Parameter = Page value to enable "Page command set" available</p> <p>See section "5.1 Command Flow".</p> | | | | | | | | | | | PAGE[7:0] | Command Page | 00h | Page 0 | 01h | Page 1 | 02h | Page 2 | 03h | Page 3 | 04h | Page 4 | 05h | Page 5 | 06h | Page 6 | 07h | Page 7 | 08h | Page 8 | 09h | Page 9 | 0Ah | Page 10 | Others | Reserved |
| | PAGE[7:0] | Command Page | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 00h | Page 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 01h | Page 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 02h | Page 2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 03h | Page 3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 04h | Page 4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 05h | Page 5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 06h | Page 6 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 07h | Page 7 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 08h | Page 8 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 09h | Page 9 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 0Ah | Page 10 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Others | Reserved | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 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>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 | Sleep In | Yes | | | | | | | | | | | | | | | | | | |
| Status | Availability | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Normal Mode On, Idle Mode Off, Sleep Out | Yes | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Normal 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>01h</td> </tr> <tr> <td>S/W Reset</td> <td>01h</td> </tr> <tr> <td>H/W Reset</td> <td>01h</td> </tr> </tbody> </table> | | | | | | | | | | | Status | Default Value | Power On Sequence | 01h | S/W Reset | 01h | H/W Reset | 01h | | | | | | | | | | | | | | | | | | |
| Status | Default Value | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Power On Sequence | 01h | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| S/W Reset | 01h | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| H/W Reset | 01h | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

5.5. Page 2 Command Description

5.5.1. Dynamic Backlight Control 1 (03h~05h)

| Command Page | | | Page 2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|--|-------------|--------|------------------|----|----|----|------------------|----|----|---------|--|---------------|--|-------------|---|-------------|-----------|-------------|----|--------|----|---------|----|---------|----|---------|----|----------|--|-------------|----|---------|----|---------|----|---------|----|---------|----|----------|----|----------|----|----------|----|-----------|
| Address | Parameter | W/R | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 03h | 1st | W/R | 0 | TT_STP_MED[2:0] | | | 1 | TT_STP_LOW[2:0] | | | 29h | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 04h | 1st | W/R | 0 | ST_TIM_LOW[2:0] | | | 0 | TT_STP_HIGH[2:0] | | | 14h | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 05h | 1st | W/R | 0 | ST_TIM_HIGH[2:0] | | | 0 | ST_TIM_MED[2:0] | | | 32h | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Description | <p>TT_STP_HIGH[2:0]: This parameter is used set the dimming transition step for CABC high enhancement.</p> <p>TT_STP_MED[2:0]: This parameter is used set the dimming transition step for CABC medium enhancement.</p> <p>TT_STP_LOW[2:0]: This parameter is used set the dimming transition step for CABC low enhancement.</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>TT_STP_HIGH[2:0] TT_STP_MED[2:0] TT_STP_LOW[2:0]</th> <th>Description</th> </tr> </thead> <tbody> <tr><td>0h</td><td>1 step</td></tr> <tr><td>1h</td><td>2 step</td></tr> <tr><td>2h</td><td>4 step</td></tr> <tr><td>3h</td><td>8 step</td></tr> <tr><td>4h</td><td>16 step</td></tr> <tr><td>5h</td><td>32 step</td></tr> <tr><td>6h</td><td>64 step</td></tr> <tr><td>7h</td><td>128 step</td></tr> </tbody> </table> <p>ST_TIM_HIGH[2:0]: This parameter is used set the dimming time for CABC high enhancement.</p> <p>ST_TIM_MED[2:0]: This parameter is used set the dimming time for CABC medium enhancement.</p> <p>ST_TIM_LOW[2:0]: This parameter is used set the dimming time for CABC low enhancement.</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>ST_TIM_HIGH[2:0] ST_TIM_MED[2:0] ST_TIM_LOW[2:0]</th> <th>Description</th> </tr> </thead> <tbody> <tr><td>0h</td><td>1 frame</td></tr> <tr><td>1h</td><td>2 frame</td></tr> <tr><td>2h</td><td>4 frame</td></tr> <tr><td>3h</td><td>8 frame</td></tr> <tr><td>4h</td><td>16 frame</td></tr> <tr><td>5h</td><td>32 frame</td></tr> <tr><td>6h</td><td>64 frame</td></tr> <tr><td>7h</td><td>128 frame</td></tr> </tbody> </table> | | | | | | | | | | | TT_STP_HIGH[2:0] TT_STP_MED[2:0] TT_STP_LOW[2:0] | Description | 0h | 1 step | 1h | 2 step | 2h | 4 step | 3h | 8 step | 4h | 16 step | 5h | 32 step | 6h | 64 step | 7h | 128 step | ST_TIM_HIGH[2:0] ST_TIM_MED[2:0] ST_TIM_LOW[2:0] | Description | 0h | 1 frame | 1h | 2 frame | 2h | 4 frame | 3h | 8 frame | 4h | 16 frame | 5h | 32 frame | 6h | 64 frame | 7h | 128 frame |
| | TT_STP_HIGH[2:0] TT_STP_MED[2:0] TT_STP_LOW[2:0] | Description | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0h | 1 step | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1h | 2 step | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2h | 4 step | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3h | 8 step | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4h | 16 step | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5h | 32 step | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6h | 64 step | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7h | 128 step | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ST_TIM_HIGH[2:0] ST_TIM_MED[2:0] ST_TIM_LOW[2:0] | Description | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0h | 1 frame | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1h | 2 frame | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2h | 4 frame | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3h | 8 frame | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4h | 16 frame | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5h | 32 frame | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6h | 64 frame | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7h | 128 frame | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 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>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 | Sleep In | Yes | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Status | Availability | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Normal Mode On, Idle Mode Off, Sleep Out | Yes | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Normal 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>29h_14h_32h</td> </tr> <tr> <td>S/W Reset</td> <td>29h_14h_32h</td> </tr> <tr> <td>H/W Reset</td> <td>29h_14h_32h</td> </tr> </tbody> </table> | | | | | | | | | | | Status | Default Value | Power On Sequence | 29h_14h_32h | S/W Reset | 29h_14h_32h | H/W Reset | 29h_14h_32h | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Status | Default Value | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Power On Sequence | 29h_14h_32h | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| S/W Reset | 29h_14h_32h | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| H/W Reset | 29h_14h_32h | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

5.5.2. Dynamic Backlight Control 2 (06h~07h)

| Command Page | | Page 2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|--|--------------------|---|---|----|----|----|-------------|-----------|-------|---------|--------|---------------|--|---------|---|------------|-----------|---------|-------------|---|---|------------------------------------|---|---|------------------------------------|-------------------------|--------------------|---|---|----|------|---------|-------|----|------|----------|-------|----|------|----------|--------|----|-----|----------|--------|----|-----|---------|--------|-------|----------|---|---|
| Address | Parameter | W/R | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 06h | 1st | W/R | 0 | PWM_DUTY_PRECISION[2:0] | | | 0 | LEDPW_M_POL | LEDON_POL | LEDON | 00h | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 07h | 1st | W/R | PWM_DIV[7:0] | | | | | | | | 0Eh | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Description | <p>LEDON: The bit is used to define LEDON enable.</p> <p>LEDON_POL: The bit is used to define polarity of LEDON.</p> <p>LEDPWM_POL: The bit is used to define polarity of LEDPWM signal.</p> <table border="1"> <thead> <tr> <th>BL</th> <th>LEDPWM_POL</th> <th>LEDPWM pin</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>0</td> <td>Always low</td> </tr> <tr> <td>0</td> <td>1</td> <td>Always high</td> </tr> <tr> <td>1</td> <td>0</td> <td>Original polarity of LEDPWM signal</td> </tr> <tr> <td>1</td> <td>1</td> <td>Inversed polarity of LEDPWM signal</td> </tr> </tbody> </table> <p>PWM_DUTY_PRECISION[2:0] / PWM_DIV[7:0]: LEDPWM output period control. This command is used to adjust the PWM waveform period of PWM_OUT. The PWM period is calculated using the following equation.</p> $f_{LEDPWM} = \frac{32 \text{ MHz}}{(PWM_DIV[7:0] + 1) \times PWM_DUTY_PRECISION}$ <table border="1"> <thead> <tr> <th>PWM_DUTY_PRECISION[2:0]</th> <th>PWM_DUTY_PRECISION</th> <th>f_{LEDPWM} (MAX) (PWM_DIV[7:0]=0)</th> <th>f_{LEDPWM} (min) (PWM_DIV[7:0]=255)</th> </tr> </thead> <tbody> <tr> <td>0h</td> <td>4096</td> <td>7.8 KHz</td> <td>31 Hz</td> </tr> <tr> <td>1h</td> <td>2048</td> <td>15.6 KHz</td> <td>61 Hz</td> </tr> <tr> <td>2h</td> <td>1024</td> <td>31.2 KHz</td> <td>122 Hz</td> </tr> <tr> <td>3h</td> <td>512</td> <td>62.5 KHz</td> <td>244 Hz</td> </tr> <tr> <td>4h</td> <td>256</td> <td>125 KHz</td> <td>488 Hz</td> </tr> <tr> <td>5h~7h</td> <td>Reserved</td> <td>X</td> <td>X</td> </tr> </tbody> </table> <p>Note : The output frequency tolerance of internal frequency divider in CABC is ±10%</p> <p>X = void.</p> | | | | | | | | | | | BL | LEDPWM_POL | LEDPWM pin | 0 | 0 | Always low | 0 | 1 | Always high | 1 | 0 | Original polarity of LEDPWM signal | 1 | 1 | Inversed polarity of LEDPWM signal | PWM_DUTY_PRECISION[2:0] | PWM_DUTY_PRECISION | f _{LEDPWM} (MAX) (PWM_DIV[7:0]=0) | f _{LEDPWM} (min) (PWM_DIV[7:0]=255) | 0h | 4096 | 7.8 KHz | 31 Hz | 1h | 2048 | 15.6 KHz | 61 Hz | 2h | 1024 | 31.2 KHz | 122 Hz | 3h | 512 | 62.5 KHz | 244 Hz | 4h | 256 | 125 KHz | 488 Hz | 5h~7h | Reserved | X | X |
| | BL | LEDPWM_POL | LEDPWM pin | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 0 | 0 | Always low | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 0 | 1 | Always high | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 1 | 0 | Original polarity of LEDPWM signal | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 1 | 1 | Inversed polarity of LEDPWM signal | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | PWM_DUTY_PRECISION[2:0] | PWM_DUTY_PRECISION | f _{LEDPWM} (MAX) (PWM_DIV[7:0]=0) | f _{LEDPWM} (min) (PWM_DIV[7:0]=255) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 0h | 4096 | 7.8 KHz | 31 Hz | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 1h | 2048 | 15.6 KHz | 61 Hz | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 2h | 1024 | 31.2 KHz | 122 Hz | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3h | 512 | 62.5 KHz | 244 Hz | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4h | 256 | 125 KHz | 488 Hz | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5h~7h | Reserved | X | X | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 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>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 | Sleep In | Yes | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Status | Availability | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Normal Mode On, Idle Mode Off, Sleep Out | Yes | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Normal 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>00h_0Eh</td> </tr> <tr> <td>S/W Reset</td> <td>00h_0Eh</td> </tr> <tr> <td>H/W Reset</td> <td>00h_0Eh</td> </tr> </tbody> </table> | | | | | | | | | | | Status | Default Value | Power On Sequence | 00h_0Eh | S/W Reset | 00h_0Eh | H/W Reset | 00h_0Eh | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Status | Default Value | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Power On Sequence | 00h_0Eh | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| S/W Reset | 00h_0Eh | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| H/W Reset | 00h_0Eh | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

5.5.3. IIE Function Control (10h~19h)

| Command Page | | | Page 2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---------------------------|---|-----|----------------------|------------------|-------------|---------------------------|-------------------|------------------|------------|-----|---------|--------|-------------------|---|-------------------|---|-------------------|-------------------|-------------------|-----------|---------|-----|---------|-----|---------|---------------------------|-------------------|----|---------|----|---------|----|---------|------------------|-------------|----|--------|----|--------|
| Address | Parameter | W/R | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10h | 1st | W/R | 0 | 0 | 0 | AXIS_EN | 0 | PRT_EN | SKIN_EN | 0 | 06h | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 11h | 1st | W/R | 0 | AUTO_MEAN | 0 | 0 | CN_EN | CN_INV | SHP_EN | 0 | 00h | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 12h | 1st | W/R | 0 | 0 | 0 | 0 | 0 | 0 | CN_LV[1:0] | | 02h | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 13h | 1st | W/R | 0 | 0 | SHP_LV[1:0] | | SRE_MIDIV_LV[1:0] | | 0 | 0 | 20h | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 15h | 1st | W/R | RGB_MEAN[7:0] | | | | | | | | 80h | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 16h | 1st | W/R | SRE_HYSTERESIS_EN | 0 | 0 | SRE_DIM_EN | SRE_SC_EN | SRE_CE_EN | 0 | 0 | 1Ch | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 17h | 1st | W/R | 0 | SRE_OFFSETS[2:0] | | | 0 | SRE_DIM_STP[2:0] | | | 01h | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 18h | 1st | W/R | SRE_DIM_FRAME[7:0] | | | | | | | | 08h | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 19h | 1st | W/R | SRE_SC_GAIN_ADJ[2:0] | | | SRE_HYSTERESIS_LIMIT[4:0] | | | | C0h | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Description | <p>AXIS_EN: Enable the 24-axis adjustment of saturation enhancement.</p> <p>PRT_EN: Enable the over-saturation protection of saturation enhancement.</p> <p>SKIN_EN: Enable the skin-tone protection of saturation enhancement.</p> <p>AUTO_MEAN: Enable auto image mean calculation RGB_MEAN[7:0] is not available when AUTO_MEAN=1h.</p> <p>CN_EN: Enable contrast enhancement.</p> <p>CN_INV: Select contrast enhancement Function.</p> <table border="1"> <thead> <tr> <th>CN_INV</th> <th>Contrast Function</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>Contrast increase</td> </tr> <tr> <td>1</td> <td>Contrast decrease</td> </tr> </tbody> </table> <p>SHP_EN: Enable sharpness enhancement.</p> <p>CN_LV[1:0] : Define contrast enhancement level.</p> <p>SRE_MIDIV_LV[1:0] : Define SRE medium level enhancement select.</p> <table border="1"> <thead> <tr> <th>SRE_MIDIV_LV[1:0]</th> <th>Enhancement level</th> </tr> </thead> <tbody> <tr> <td>00h / 11h</td> <td>Level_M</td> </tr> <tr> <td>01h</td> <td>Level_H</td> </tr> <tr> <td>10h</td> <td>Level_L</td> </tr> </tbody> </table> <p>SHP_LV[1:0] : Define sharpness enhancement level.</p> <table border="1"> <thead> <tr> <th>CN_LV[1:0] SHP_LV[1:0]</th> <th>Enhancement level</th> </tr> </thead> <tbody> <tr> <td>0h</td> <td>Level_L</td> </tr> <tr> <td>1h</td> <td>Level_M</td> </tr> <tr> <td>2h</td> <td>Level_H</td> </tr> </tbody> </table> <p>RGB_MEAN[7:0]: Setting image mean value, available when AUTO_MEAN=0h.</p> <p>SRE_HYSTERESIS_EN: SRE hysteresis mode enable signal.</p> <p>SRE_DIM_EN: SRE dimming function enable signal.</p> <p>SRE_SC_EN: SRE saturation compensation enable.</p> <p>SRE_CE_EN: SRE contrast enhancement enable.</p> <p>SRE_OFFSETS[2:0]: SRE offset value</p> <p>SRE_DIM_STP[2:0]: Setting the number of dimming steps for transition</p> <table border="1"> <thead> <tr> <th>SRE_DIM_STP[2:0]</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>0h</td> <td>2 step</td> </tr> <tr> <td>1h</td> <td>4 step</td> </tr> </tbody> </table> | | | | | | | | | | | CN_INV | Contrast Function | 0 | Contrast increase | 1 | Contrast decrease | SRE_MIDIV_LV[1:0] | Enhancement level | 00h / 11h | Level_M | 01h | Level_H | 10h | Level_L | CN_LV[1:0] SHP_LV[1:0] | Enhancement level | 0h | Level_L | 1h | Level_M | 2h | Level_H | SRE_DIM_STP[2:0] | Description | 0h | 2 step | 1h | 4 step |
| CN_INV | Contrast Function | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0 | Contrast increase | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | Contrast decrease | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| SRE_MIDIV_LV[1:0] | Enhancement level | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 00h / 11h | Level_M | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 01h | Level_H | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10h | Level_L | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| CN_LV[1:0] SHP_LV[1:0] | Enhancement level | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0h | Level_L | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1h | Level_M | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2h | Level_H | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| SRE_DIM_STP[2:0] | Description | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0h | 2 step | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1h | 4 step | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

| | <table border="1"> <tr><td>2h</td><td>8 step</td></tr> <tr><td>3h</td><td>16 step</td></tr> <tr><td>4h</td><td>32 step</td></tr> <tr><td>5h</td><td>64 step</td></tr> <tr><td>6h</td><td>128 step</td></tr> <tr><td>7h</td><td>256 step</td></tr> </table> <p>SRE_DIM_FRAME[7:0]: Setting the step time as frame units for each dimming step</p> <table border="1"> <thead> <tr> <th>SRE_DIM_FRAME[7:0]</th> <th>Description</th> </tr> </thead> <tbody> <tr><td>0h~2h</td><td>2 frame</td></tr> <tr><td>3</td><td>4 frame</td></tr> <tr><td>4</td><td>4 frame</td></tr> <tr><td>5</td><td>5 frame</td></tr> <tr><td>6</td><td>6 frame</td></tr> <tr><td>:</td><td>:</td></tr> <tr><td>:</td><td>:</td></tr> <tr><td>254</td><td>254 frame</td></tr> <tr><td>255</td><td>255 frame</td></tr> </tbody> </table> <p>SRE_SC_GAIN_ADJ[2:0]: SRE saturation compensation gain value</p> <p>SRE_HYSTERESIS_LIMIT[4:0]: SRE hysteresis limit value when hysteresis mode on</p> | 2h | 8 step | 3h | 16 step | 4h | 32 step | 5h | 64 step | 6h | 128 step | 7h | 256 step | SRE_DIM_FRAME[7:0] | Description | 0h~2h | 2 frame | 3 | 4 frame | 4 | 4 frame | 5 | 5 frame | 6 | 6 frame | : | : | : | : | 254 | 254 frame | 255 | 255 frame |
|--|--|--------|---------------|--|-------------------------------------|---|-------------------------------------|-----------|-------------------------------------|----|----------|----|----------|--------------------|-------------|-------|---------|---|---------|---|---------|---|---------|---|---------|---|---|---|---|-----|-----------|-----|-----------|
| 2h | 8 step | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3h | 16 step | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4h | 32 step | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5h | 64 step | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6h | 128 step | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7h | 256 step | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| SRE_DIM_FRAME[7:0] | Description | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0h~2h | 2 frame | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3 | 4 frame | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4 | 4 frame | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5 | 5 frame | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6 | 6 frame | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| : | : | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| : | : | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 254 | 254 frame | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 255 | 255 frame | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 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>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 | Sleep In | Yes | | | | | | | | | | | | | | | | | | | | | | | | |
| Status | Availability | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Normal Mode On, Idle Mode Off, Sleep Out | Yes | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Normal 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>06h_00h_02h_20h_80h_1Ch_01h_08h_C0h</td> </tr> <tr> <td>S/W Reset</td> <td>06h_00h_02h_20h_80h_1Ch_01h_08h_C0h</td> </tr> <tr> <td>H/W Reset</td> <td>06h_00h_02h_20h_80h_1Ch_01h_08h_C0h</td> </tr> </tbody> </table> | Status | Default Value | Power On Sequence | 06h_00h_02h_20h_80h_1Ch_01h_08h_C0h | S/W Reset | 06h_00h_02h_20h_80h_1Ch_01h_08h_C0h | H/W Reset | 06h_00h_02h_20h_80h_1Ch_01h_08h_C0h | | | | | | | | | | | | | | | | | | | | | | | | |
| Status | Default Value | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Power On Sequence | 06h_00h_02h_20h_80h_1Ch_01h_08h_C0h | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| S/W Reset | 06h_00h_02h_20h_80h_1Ch_01h_08h_C0h | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| H/W Reset | 06h_00h_02h_20h_80h_1Ch_01h_08h_C0h | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

5.5.4. IIE Saturation Enhancement Control 1 (1Ah~1Ch)

| Command Page | | | Page 2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|---|-------------|---|-------------|-----------------|----|----|----|----|----|---------|---|---------------|---|-------------|---|-------------|-----------|-------------|-----|--------|-----|--------|-----|-------|-----|-------|-----|--------|-----|--------|-----|------|-----|------|-----|--------|-----|--------|-----|-------|-----|-------|-----|--------|-----|--------|-----|-----|-----|-----|-----|--------|-----|--------|-----|-------|-----|-------|-----|--------|-----|--------|-----|------|-----|------|-----|--------|-----|--------|-----|-------|-----|-------|-----|--------|-----|--------|
| Address | Parameter | W/R | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1Ah | 1st | W/R | 0 | 0 | SE_RATIO_L[5:0] | | | | | | 07h | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1Bh | 1st | W/R | 0 | 0 | SE_RATIO_M[5:0] | | | | | | 09h | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1Ch | 1st | W/R | 0 | 0 | SE_RATIO_H[5:0] | | | | | | 0Ch | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Description | <p>SE_RATIO_L[5:0]: Define low saturation enhancement level of User Command 55h (Page0_R55h).</p> <p>SE_RATIO_M[5:0]: Define medium saturation enhancement level of User Command 55h (Page0_R55h).</p> <p>SE_RATIO_H[5:0]: Define high saturation enhancement level of User Command 55h (Page0_R55h).</p> <p style="text-align: center;">$Saturation_{enhanced} = Saturation_{original} + (Saturation_{original} \times SE_RATIO)$</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>SE_RATIO_L[5:0] SE_RATIO_M[5:0] SE_RATIO_H[5:0]</th> <th>Ratio (Dec)</th> <th>SE_RATIO_L[5:0] SE_RATIO_M[5:0] SE_RATIO_H[5:0]</th> <th>Ratio (Dec)</th> </tr> </thead> <tbody> <tr><td>00h</td><td>0.0</td><td>10h</td><td>1.0</td></tr> <tr><td>01h</td><td>0.0625</td><td>11h</td><td>1.0625</td></tr> <tr><td>02h</td><td>0.125</td><td>12h</td><td>1.125</td></tr> <tr><td>03h</td><td>0.1875</td><td>13h</td><td>1.1875</td></tr> <tr><td>04h</td><td>0.25</td><td>14h</td><td>1.25</td></tr> <tr><td>05h</td><td>0.3125</td><td>15h</td><td>1.3125</td></tr> <tr><td>06h</td><td>0.375</td><td>16h</td><td>1.375</td></tr> <tr><td>07h</td><td>0.4375</td><td>17h</td><td>1.4375</td></tr> <tr><td>08h</td><td>0.5</td><td>18h</td><td>1.5</td></tr> <tr><td>09h</td><td>0.5625</td><td>19h</td><td>1.5625</td></tr> <tr><td>0Ah</td><td>0.625</td><td>1Ah</td><td>1.625</td></tr> <tr><td>0Bh</td><td>0.6875</td><td>1Bh</td><td>1.6875</td></tr> <tr><td>0Ch</td><td>0.75</td><td>1Ch</td><td>1.75</td></tr> <tr><td>0Dh</td><td>0.8125</td><td>1Dh</td><td>1.8125</td></tr> <tr><td>0Eh</td><td>0.875</td><td>1Eh</td><td>1.875</td></tr> <tr><td>0Fh</td><td>0.9375</td><td>1Fh</td><td>1.9375</td></tr> </tbody> </table> | | | | | | | | | | | SE_RATIO_L[5:0] SE_RATIO_M[5:0] SE_RATIO_H[5:0] | Ratio (Dec) | SE_RATIO_L[5:0] SE_RATIO_M[5:0] SE_RATIO_H[5:0] | Ratio (Dec) | 00h | 0.0 | 10h | 1.0 | 01h | 0.0625 | 11h | 1.0625 | 02h | 0.125 | 12h | 1.125 | 03h | 0.1875 | 13h | 1.1875 | 04h | 0.25 | 14h | 1.25 | 05h | 0.3125 | 15h | 1.3125 | 06h | 0.375 | 16h | 1.375 | 07h | 0.4375 | 17h | 1.4375 | 08h | 0.5 | 18h | 1.5 | 09h | 0.5625 | 19h | 1.5625 | 0Ah | 0.625 | 1Ah | 1.625 | 0Bh | 0.6875 | 1Bh | 1.6875 | 0Ch | 0.75 | 1Ch | 1.75 | 0Dh | 0.8125 | 1Dh | 1.8125 | 0Eh | 0.875 | 1Eh | 1.875 | 0Fh | 0.9375 | 1Fh | 1.9375 |
| | SE_RATIO_L[5:0] SE_RATIO_M[5:0] SE_RATIO_H[5:0] | Ratio (Dec) | SE_RATIO_L[5:0] SE_RATIO_M[5:0] SE_RATIO_H[5:0] | Ratio (Dec) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 00h | 0.0 | 10h | 1.0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 01h | 0.0625 | 11h | 1.0625 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 02h | 0.125 | 12h | 1.125 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 03h | 0.1875 | 13h | 1.1875 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 04h | 0.25 | 14h | 1.25 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 05h | 0.3125 | 15h | 1.3125 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 06h | 0.375 | 16h | 1.375 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 07h | 0.4375 | 17h | 1.4375 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 08h | 0.5 | 18h | 1.5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 09h | 0.5625 | 19h | 1.5625 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 0Ah | 0.625 | 1Ah | 1.625 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 0Bh | 0.6875 | 1Bh | 1.6875 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 0Ch | 0.75 | 1Ch | 1.75 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 0Dh | 0.8125 | 1Dh | 1.8125 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 0Eh | 0.875 | 1Eh | 1.875 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0Fh | 0.9375 | 1Fh | 1.9375 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Restriction | None | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 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>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 | Sleep In | Yes | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Status | Availability | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Normal Mode On, Idle Mode Off, Sleep Out | Yes | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Normal 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>07h_09h_0Ch</td> </tr> <tr> <td>S/W Reset</td> <td>07h_09h_0Ch</td> </tr> <tr> <td>H/W Reset</td> <td>07h_09h_0Ch</td> </tr> </tbody> </table> | | | | | | | | | | | Status | Default Value | Power On Sequence | 07h_09h_0Ch | S/W Reset | 07h_09h_0Ch | H/W Reset | 07h_09h_0Ch | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Status | Default Value | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Power On Sequence | 07h_09h_0Ch | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| S/W Reset | 07h_09h_0Ch | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| H/W Reset | 07h_09h_0Ch | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

5.5.5. IIE Saturation Protection Control (40h~4Fh)

| Command Page | | | Page 2 | | | | | | | | |
|--------------|-----------|-----|--------|----|----|-----------------|----|----|----|-----|---------|
| Address | Parameter | W/R | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default |
| 40h | 1st | W/R | 0 | 0 | 0 | LEVEL0_SR[4:0] | | | | 02h | |
| 41h | 1st | W/R | 0 | 0 | 0 | LEVEL1_SR[4:0] | | | | 04h | |
| 42h | 1st | W/R | 0 | 0 | 0 | LEVEL2_SR[4:0] | | | | 06h | |
| 43h | 1st | W/R | 0 | 0 | 0 | LEVEL3_SR[4:0] | | | | 08h | |
| 44h | 1st | W/R | 0 | 0 | 0 | LEVEL4_SR[4:0] | | | | 0Ah | |
| 45h | 1st | W/R | 0 | 0 | 0 | LEVEL5_SR[4:0] | | | | 0Ch | |
| 46h | 1st | W/R | 0 | 0 | 0 | LEVEL6_SR[4:0] | | | | 0Eh | |
| 47h | 1st | W/R | 0 | 0 | 0 | LEVEL7_SR[4:0] | | | | 0Eh | |
| 48h | 1st | W/R | 0 | 0 | 0 | LEVEL8_SR[4:0] | | | | 0Ch | |
| 49h | 1st | W/R | 0 | 0 | 0 | LEVEL9_SR[4:0] | | | | 0Ah | |
| 4Ah | 1st | W/R | 0 | 0 | 0 | LEVEL10_SR[4:0] | | | | 08h | |
| 4Bh | 1st | W/R | 0 | 0 | 0 | LEVEL11_SR[4:0] | | | | 06h | |
| 4Ch | 1st | W/R | 0 | 0 | 0 | LEVEL12_SR[4:0] | | | | 04h | |
| 4Dh | 1st | W/R | 0 | 0 | 0 | LEVEL13_SR[4:0] | | | | 03h | |
| 4Eh | 1st | W/R | 0 | 0 | 0 | LEVEL14_SR[4:0] | | | | 02h | |
| 4Fh | 1st | W/R | 0 | 0 | 0 | LEVEL15_SR[4:0] | | | | 00h | |

| | |
|-------------|--|
| Description | <p>This register is used to restrict the enhancement gain of saturation enhancement. This function is able to use when PRT_EN=1.</p> <p>LEVEL0_SR[4:0]: Adjust the weight value of saturation steps 0~15.</p> <p>LEVEL1_SR[4:0]: Adjust the weight value of saturation steps 16~31.</p> <p>LEVEL2_SR[4:0]: Adjust the weight value of saturation steps 32~47.</p> <p>LEVEL3_SR[4:0]: Adjust the weight value of saturation steps 48~63.</p> <p>LEVEL4_SR[4:0]: Adjust the weight value of saturation steps 64~79.</p> <p>LEVEL5_SR[4:0]: Adjust the weight value of saturation steps 80~95.</p> <p>LEVEL6_SR[4:0]: Adjust the weight value of saturation steps 96~111.</p> <p>LEVEL7_SR[4:0]: Adjust the weight value of saturation steps 128~143.</p> <p>LEVEL8_SR[4:0]: Adjust the weight value of saturation steps 144~159.</p> <p>LEVEL9_SR[4:0]: Adjust the weight value of saturation steps 160~175.</p> <p>LEVEL10_SR[4:0]: Adjust the weight value of saturation steps 176~191.</p> <p>LEVEL11_SR[4:0]: Adjust the weight value of saturation steps 192~207.</p> <p>LEVEL12_SR[4:0]: Adjust the weight value of saturation steps 208~223.</p> <p>LEVEL13_SR[4:0]: Adjust the weight value of saturation steps 224~239.</p> <p>LEVEL14_SR[4:0]: Adjust the weight value of saturation steps 240~255.</p> <p>LEVEL15_SR[4:0]: Adjust the weight value of saturation steps 256.</p> $\text{Saturation}_{\text{enhanced}} = \text{Saturation}_{\text{original}} + (\text{Saturation}_{\text{original}} \times SE_RATIO \times PRT_RATIO)$ <p style="text-align: right;">$PRT_RATIO = 0 \sim 1.0$</p> |
|-------------|--|

| | <p>The graph shows the relationship between the grayscale ratio (prt_ratio) and the reference saturation (saturation_{reference}). The curve is parabolic, starting at 0 for level00_sr and reaching a peak of 1.0 at level07_sr. The x-axis is marked at 0, 16, 48, 80, 112, 144, 176, 208, and 240. The y-axis is marked at 0 and 1.0.</p> | | | | | | | | |
|--|---|--------|---------------|--|---|---|---|-----------|---|
| <p>Restriction</p> | <p>None</p> | | | | | | | | |
| <p>Register Availability</p> | <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>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 | Sleep In | Yes |
| Status | Availability | | | | | | | | |
| Normal Mode On, Idle Mode Off, Sleep Out | Yes | | | | | | | | |
| Normal Mode On, Idle Mode On, Sleep Out | Yes | | | | | | | | |
| Sleep In | Yes | | | | | | | | |
| <p>Default</p> | <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>02h_04h_06h_08h_0Ah_0Ch_0Eh_0Eh_0Ch_0Ah_08h_06h_04h_03h_02h_00h</td> </tr> <tr> <td>S/W Reset</td> <td>02h_04h_06h_08h_0Ah_0Ch_0Eh_0Eh_0Ch_0Ah_08h_06h_04h_03h_02h_00h</td> </tr> <tr> <td>H/W Reset</td> <td>02h_04h_06h_08h_0Ah_0Ch_0Eh_0Eh_0Ch_0Ah_08h_06h_04h_03h_02h_00h</td> </tr> </tbody> </table> | Status | Default Value | Power On Sequence | 02h_04h_06h_08h_0Ah_0Ch_0Eh_0Eh_0Ch_0Ah_08h_06h_04h_03h_02h_00h | S/W Reset | 02h_04h_06h_08h_0Ah_0Ch_0Eh_0Eh_0Ch_0Ah_08h_06h_04h_03h_02h_00h | H/W Reset | 02h_04h_06h_08h_0Ah_0Ch_0Eh_0Eh_0Ch_0Ah_08h_06h_04h_03h_02h_00h |
| Status | Default Value | | | | | | | | |
| Power On Sequence | 02h_04h_06h_08h_0Ah_0Ch_0Eh_0Eh_0Ch_0Ah_08h_06h_04h_03h_02h_00h | | | | | | | | |
| S/W Reset | 02h_04h_06h_08h_0Ah_0Ch_0Eh_0Eh_0Ch_0Ah_08h_06h_04h_03h_02h_00h | | | | | | | | |
| H/W Reset | 02h_04h_06h_08h_0Ah_0Ch_0Eh_0Eh_0Ch_0Ah_08h_06h_04h_03h_02h_00h | | | | | | | | |

5.5.6. IIE Sharpness Enhancement Control (5Ah~5Ch)

| Command Page | | | Page 2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|---|-------------|----------------|-------------|----|----------------|----|----|----|-----|---------|----------------|---------------|--|-------------|---|-------------|-----------|-------------|-----|-------|-----|-------|-----|------|-----|------|-----|-------|-----|-------|-----|-----|-----|-----|-----|-------|-----|-------|-----|------|-----|------|-----|-------|-----|-------|-----|-----|-----|-----|-----|-------|-----|-------|-----|------|-----|------|-----|-------|-----|-------|-----|-----|-----|-----|-----|-------|-----|-------|-----|------|-----|------|-----|-------|-----|-------|
| Address | Parameter | W/R | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5Ah | 1st | W/R | 0 | 0 | 0 | SHP_RATIO[4:0] | | | | 18h | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5Bh | 1st | W/R | SHP_THR_H[7:0] | | | | | | | | 64h | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5Ch | 1st | W/R | SHP_THR_L[7:0] | | | | | | | | 1Eh | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Description | <p>This register sets the enhancement level of the sharpness enhancement. This function is able to use when SHP_EN=1</p> <p>SHP_RATIO[4:0]: Adjust the ratio of sharpness enhancement.</p> $Y_{enh} = Y_{org} + (Y_{org} - blur(Y_{org})) \times SHP_RATIO$ <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>SHP_RATIO[4:0]</th> <th>Ratio (Dec)</th> <th>SHP_RATIO[4:0]</th> <th>Ratio (Dec)</th> </tr> </thead> <tbody> <tr><td>00h</td><td>0.0</td><td>10h</td><td>2.0</td></tr> <tr><td>01h</td><td>0.125</td><td>11h</td><td>2.125</td></tr> <tr><td>02h</td><td>0.25</td><td>12h</td><td>2.25</td></tr> <tr><td>03h</td><td>0.375</td><td>13h</td><td>2.375</td></tr> <tr><td>04h</td><td>0.5</td><td>14h</td><td>2.5</td></tr> <tr><td>05h</td><td>0.625</td><td>15h</td><td>2.625</td></tr> <tr><td>06h</td><td>0.75</td><td>16h</td><td>2.75</td></tr> <tr><td>07h</td><td>0.875</td><td>17h</td><td>2.875</td></tr> <tr><td>08h</td><td>1.0</td><td>18h</td><td>3.0</td></tr> <tr><td>09h</td><td>1.125</td><td>19h</td><td>3.125</td></tr> <tr><td>0Ah</td><td>1.25</td><td>1Ah</td><td>3.25</td></tr> <tr><td>0Bh</td><td>1.375</td><td>1Bh</td><td>3.375</td></tr> <tr><td>0Ch</td><td>1.5</td><td>1Ch</td><td>3.5</td></tr> <tr><td>0Dh</td><td>1.625</td><td>1Dh</td><td>3.625</td></tr> <tr><td>0Eh</td><td>1.75</td><td>1Eh</td><td>3.75</td></tr> <tr><td>0Fh</td><td>1.875</td><td>1Fh</td><td>3.875</td></tr> </tbody> </table> <p>SHP_THR_H[7:0]: Define Sharpness enhancement upper bound threshold.</p> <p>SHP_THR_L[7:0]: Define Sharpness enhancement lower bound threshold.</p> | | | | | | | | | | | SHP_RATIO[4:0] | Ratio (Dec) | SHP_RATIO[4:0] | Ratio (Dec) | 00h | 0.0 | 10h | 2.0 | 01h | 0.125 | 11h | 2.125 | 02h | 0.25 | 12h | 2.25 | 03h | 0.375 | 13h | 2.375 | 04h | 0.5 | 14h | 2.5 | 05h | 0.625 | 15h | 2.625 | 06h | 0.75 | 16h | 2.75 | 07h | 0.875 | 17h | 2.875 | 08h | 1.0 | 18h | 3.0 | 09h | 1.125 | 19h | 3.125 | 0Ah | 1.25 | 1Ah | 3.25 | 0Bh | 1.375 | 1Bh | 3.375 | 0Ch | 1.5 | 1Ch | 3.5 | 0Dh | 1.625 | 1Dh | 3.625 | 0Eh | 1.75 | 1Eh | 3.75 | 0Fh | 1.875 | 1Fh | 3.875 |
| | SHP_RATIO[4:0] | Ratio (Dec) | SHP_RATIO[4:0] | Ratio (Dec) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 00h | 0.0 | 10h | 2.0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 01h | 0.125 | 11h | 2.125 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 02h | 0.25 | 12h | 2.25 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 03h | 0.375 | 13h | 2.375 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 04h | 0.5 | 14h | 2.5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 05h | 0.625 | 15h | 2.625 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 06h | 0.75 | 16h | 2.75 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 07h | 0.875 | 17h | 2.875 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 08h | 1.0 | 18h | 3.0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 09h | 1.125 | 19h | 3.125 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 0Ah | 1.25 | 1Ah | 3.25 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 0Bh | 1.375 | 1Bh | 3.375 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 0Ch | 1.5 | 1Ch | 3.5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0Dh | 1.625 | 1Dh | 3.625 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0Eh | 1.75 | 1Eh | 3.75 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0Fh | 1.875 | 1Fh | 3.875 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Restriction | None | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 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>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 | Sleep In | Yes | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Status | Availability | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Normal Mode On, Idle Mode Off, Sleep Out | Yes | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Normal 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>18h_64h_1Eh</td> </tr> <tr> <td>S/W Reset</td> <td>18h_64h_1Eh</td> </tr> <tr> <td>H/W Reset</td> <td>18h_64h_1Eh</td> </tr> </tbody> </table> | | | | | | | | | | | Status | Default Value | Power On Sequence | 18h_64h_1Eh | S/W Reset | 18h_64h_1Eh | H/W Reset | 18h_64h_1Eh | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Status | Default Value | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Power On Sequence | 18h_64h_1Eh | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| S/W Reset | 18h_64h_1Eh | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| H/W Reset | 18h_64h_1Eh | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

5.5.7. IIE Contrast Enhancement Control (60h~66h)

| Command Page | | | Page 2 | | | | | | | | | | | | | | | | |
|--|-----------------------------|---|--------|----|------------|----|----|----|----|----|---------|--------|---------------|--|-----------------------------|---|-----------------------------|-----------|-----------------------------|
| Address | Parameter | W/R | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default | | | | | | | | |
| 60h | 1st | W/R | 0 | 0 | CN_00[5:0] | | | | | | 0Eh | | | | | | | | |
| 61h | 1st | W/R | 0 | 0 | CN_01[5:0] | | | | | | 18h | | | | | | | | |
| 62h | 1st | W/R | 0 | 0 | CN_02[5:0] | | | | | | 24h | | | | | | | | |
| 63h | 1st | W/R | 0 | 0 | CN_03[5:0] | | | | | | 28h | | | | | | | | |
| 64h | 1st | W/R | 0 | 0 | CN_04[5:0] | | | | | | 24h | | | | | | | | |
| 65h | 1st | W/R | 0 | 0 | CN_05[5:0] | | | | | | 18h | | | | | | | | |
| 66h | 1st | W/R | 0 | 0 | CN_06[5:0] | | | | | | 0Eh | | | | | | | | |
| Description | | <p>This register sets the weight value of the turning point of contrast gain cure. This function is able to use when CN_EN=1</p> <p>CN_00[5:0]: Adjust the weight of S curve ratio of turning point 1. CN_01[5:0]: Adjust the weight of S curve ratio of turning point 2. CN_02[5:0]: Adjust the weight of S curve ratio of turning point 3. CN_03[5:0]: Adjust the weight of S curve ratio of turning point 4. CN_04[5:0]: Adjust the weight of S curve ratio of turning point 5. CN_05[5:0]: Adjust the weight of S curve ratio of turning point 6. CN_06[5:0]: Adjust the weight of S curve ratio of turning point 7.</p> $Y_{enh} = Y_{org} + Y_{delta}$ | | | | | | | | | | | | | | | | | |
| 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>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 | Sleep In | Yes |
| Status | Availability | | | | | | | | | | | | | | | | | | |
| Normal Mode On, Idle Mode Off, Sleep Out | Yes | | | | | | | | | | | | | | | | | | |
| Normal 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>0Eh_18h_24h_28h_24h_18h_0Eh</td> </tr> <tr> <td>S/W Reset</td> <td>0Eh_18h_24h_28h_24h_18h_0Eh</td> </tr> <tr> <td>H/W Reset</td> <td>0Eh_18h_24h_28h_24h_18h_0Eh</td> </tr> </tbody> </table> | | | | | | | | | | Status | Default Value | Power On Sequence | 0Eh_18h_24h_28h_24h_18h_0Eh | S/W Reset | 0Eh_18h_24h_28h_24h_18h_0Eh | H/W Reset | 0Eh_18h_24h_28h_24h_18h_0Eh |
| Status | Default Value | | | | | | | | | | | | | | | | | | |
| Power On Sequence | 0Eh_18h_24h_28h_24h_18h_0Eh | | | | | | | | | | | | | | | | | | |
| S/W Reset | 0Eh_18h_24h_28h_24h_18h_0Eh | | | | | | | | | | | | | | | | | | |
| H/W Reset | 0Eh_18h_24h_28h_24h_18h_0Eh | | | | | | | | | | | | | | | | | | |

5.5.8. EXTC Command Set Enable Register (FFh)

| Command Page | | | Page 2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|---|--------------|-----------|----|----|----|----|----|----|----|---------|-----------|---------------|--|--------|---|--------|-----------|--------|-----|--------|-----|--------|-----|--------|-----|--------|-----|--------|-----|--------|-----|--------|-----|---------|--------|----------|
| Address | Parameter | W/R | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default | | | | | | | | | | | | | | | | | | | | | | | | | | |
| FFh | 1st | W | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 98h | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 2nd | W | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 81h | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 3rd | W | PAGE[7:0] | | | | | | | | 02h | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Description | <p>PAGE[7:0]: Set the command page.</p> <table border="1"> <thead> <tr> <th>PAGE[7:0]</th> <th>Command Page</th> </tr> </thead> <tbody> <tr><td>00h</td><td>Page 0</td></tr> <tr><td>01h</td><td>Page 1</td></tr> <tr><td>02h</td><td>Page 2</td></tr> <tr><td>03h</td><td>Page 3</td></tr> <tr><td>04h</td><td>Page 4</td></tr> <tr><td>05h</td><td>Page 5</td></tr> <tr><td>06h</td><td>Page 6</td></tr> <tr><td>07h</td><td>Page 7</td></tr> <tr><td>08h</td><td>Page 8</td></tr> <tr><td>09h</td><td>Page 9</td></tr> <tr><td>0Ah</td><td>Page 10</td></tr> <tr><td>Others</td><td>Reserved</td></tr> </tbody> </table> <p>Set the register, 1st Parameter = 98h, 2nd Parameter = 81h, 3rd Parameter = Page value to enable "Page command set" available</p> <p>See section "5.1 Command Flow".</p> | | | | | | | | | | | PAGE[7:0] | Command Page | 00h | Page 0 | 01h | Page 1 | 02h | Page 2 | 03h | Page 3 | 04h | Page 4 | 05h | Page 5 | 06h | Page 6 | 07h | Page 7 | 08h | Page 8 | 09h | Page 9 | 0Ah | Page 10 | Others | Reserved |
| | PAGE[7:0] | Command Page | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 00h | Page 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 01h | Page 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 02h | Page 2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 03h | Page 3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 04h | Page 4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 05h | Page 5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 06h | Page 6 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 07h | Page 7 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 08h | Page 8 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 09h | Page 9 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 0Ah | Page 10 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Others | Reserved | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 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>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 | Sleep In | Yes | | | | | | | | | | | | | | | | | | |
| Status | Availability | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Normal Mode On, Idle Mode Off, Sleep Out | Yes | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Normal 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>02h</td> </tr> <tr> <td>S/W Reset</td> <td>02h</td> </tr> <tr> <td>H/W Reset</td> <td>02h</td> </tr> </tbody> </table> | | | | | | | | | | | Status | Default Value | Power On Sequence | 02h | S/W Reset | 02h | H/W Reset | 02h | | | | | | | | | | | | | | | | | | |
| Status | Default Value | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Power On Sequence | 02h | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| S/W Reset | 02h | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| H/W Reset | 02h | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

5.6. Page 3 Command Description

5.6.1. EXTC Command Set Enable Register (FFh)

| Command Page | | | Page 3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|---|--------------|-----------|----|----|----|----|----|----|----|---------|-----------|---------------|--|--------|---|--------|-----------|--------|-----|--------|-----|--------|-----|--------|-----|--------|-----|--------|-----|--------|-----|--------|-----|---------|--------|----------|
| Address | Parameter | W/R | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default | | | | | | | | | | | | | | | | | | | | | | | | | | |
| FFh | 1st | W | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 98h | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 2nd | W | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 81h | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 3rd | W | PAGE[7:0] | | | | | | | | 03h | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Description | <p>PAGE[7:0]: Set the command page.</p> <table border="1"> <thead> <tr> <th>PAGE[7:0]</th> <th>Command Page</th> </tr> </thead> <tbody> <tr><td>00h</td><td>Page 0</td></tr> <tr><td>01h</td><td>Page 1</td></tr> <tr><td>02h</td><td>Page 2</td></tr> <tr><td>03h</td><td>Page 3</td></tr> <tr><td>04h</td><td>Page 4</td></tr> <tr><td>05h</td><td>Page 5</td></tr> <tr><td>06h</td><td>Page 6</td></tr> <tr><td>07h</td><td>Page 7</td></tr> <tr><td>08h</td><td>Page 8</td></tr> <tr><td>09h</td><td>Page 9</td></tr> <tr><td>0Ah</td><td>Page 10</td></tr> <tr><td>Others</td><td>Reserved</td></tr> </tbody> </table> <p>Set the register, 1st Parameter = 98h, 2nd Parameter = 81h, 3rd Parameter = Page value to enable "Page command set" available</p> <p>See section "5.1 Command Flow".</p> | | | | | | | | | | | PAGE[7:0] | Command Page | 00h | Page 0 | 01h | Page 1 | 02h | Page 2 | 03h | Page 3 | 04h | Page 4 | 05h | Page 5 | 06h | Page 6 | 07h | Page 7 | 08h | Page 8 | 09h | Page 9 | 0Ah | Page 10 | Others | Reserved |
| | PAGE[7:0] | Command Page | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 00h | Page 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 01h | Page 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 02h | Page 2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 03h | Page 3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 04h | Page 4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 05h | Page 5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 06h | Page 6 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 07h | Page 7 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 08h | Page 8 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 09h | Page 9 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 0Ah | Page 10 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Others | Reserved | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 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>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 | Sleep In | Yes | | | | | | | | | | | | | | | | | | |
| Status | Availability | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Normal Mode On, Idle Mode Off, Sleep Out | Yes | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Normal 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>03h</td> </tr> <tr> <td>S/W Reset</td> <td>03h</td> </tr> <tr> <td>H/W Reset</td> <td>03h</td> </tr> </tbody> </table> | | | | | | | | | | | Status | Default Value | Power On Sequence | 03h | S/W Reset | 03h | H/W Reset | 03h | | | | | | | | | | | | | | | | | | |
| Status | Default Value | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Power On Sequence | 03h | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| S/W Reset | 03h | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| H/W Reset | 03h | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

5.7. Page 4 Command Description

5.7.1. DSI Lanes Control (00h)

| Command Page | | | Page 4 | | | | | | | | | | | | | | | | |
|--|---------------|--|---------------|----|----|----|----|----|----|----|---------|--------|---------------|--|-----|---|-----|-----------|-----|
| Address | Parameter | W/R | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default | | | | | | | | |
| 00h | 1st | W/R | MIPI_LANE_SEL | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 80h | | | | | | | | |
| Description | | MIPI_LANE_SEL : MIPI DSI lane number selection <i>Note: When use this setting, please reference to chapter 4.1 "DSI System Interface".</i> | | | | | | | | | | | | | | | | | |
| Restriction | | None | | | | | | | | | | | | | | | | | |
| 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>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 | Sleep In | Yes |
| Status | Availability | | | | | | | | | | | | | | | | | | |
| Normal Mode On, Idle Mode Off, Sleep Out | Yes | | | | | | | | | | | | | | | | | | |
| Normal 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>80h</td> </tr> <tr> <td>S/W Reset</td> <td>80h</td> </tr> <tr> <td>H/W Reset</td> <td>80h</td> </tr> </tbody> </table> | | | | | | | | | | Status | Default Value | Power On Sequence | 80h | S/W Reset | 80h | H/W Reset | 80h |
| Status | Default Value | | | | | | | | | | | | | | | | | | |
| Power On Sequence | 80h | | | | | | | | | | | | | | | | | | |
| S/W Reset | 80h | | | | | | | | | | | | | | | | | | |
| H/W Reset | 80h | | | | | | | | | | | | | | | | | | |

5.7.2. SSC Function (0Bh,0Eh)

| Command Page | | | Page 4 | | | | | | | | | | | | | | | | | | | | |
|--|---|-------------|------------------|-------------------|----|----|----|----|----|----|---------|--------|---------------|--|---------|---|---------|-----------|---------|-----|--------|----------|----------|
| Address | Parameter | W/R | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default | | | | | | | | | | | | |
| 0Bh | 1st | W/R | SSC_DIG_EN | SSC_DIG_STEP[2:0] | | | 0 | 0 | 0 | 0 | 00h | | | | | | | | | | | | |
| 0Eh | 1st | W/R | SSC_DIG_CNT[7:0] | | | | | | | | 00h | | | | | | | | | | | | |
| Description | <p>SSC_DIG_EN : Enable/disable the SSC(Spread Spectrum Clock) function.</p> <p>SSC_DIG_STEP[2:0] : Set SSC parameter.</p> <p>SSC_DIG_CNT[7:0] : Set SSC parameter.</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>SSC</th> <th>Address 0Bh</th> <th>Address 0Eh</th> </tr> </thead> <tbody> <tr> <td>±1%</td> <td>80h</td> <td>17h</td> </tr> <tr> <td>±2%</td> <td>90h</td> <td>0Bh</td> </tr> <tr> <td>Others</td> <td>Reserved</td> <td>Reserved</td> </tr> </tbody> </table> | | | | | | | | | | | SSC | Address 0Bh | Address 0Eh | ±1% | 80h | 17h | ±2% | 90h | 0Bh | Others | Reserved | Reserved |
| | SSC | Address 0Bh | Address 0Eh | | | | | | | | | | | | | | | | | | | | |
| ±1% | 80h | 17h | | | | | | | | | | | | | | | | | | | | | |
| ±2% | 90h | 0Bh | | | | | | | | | | | | | | | | | | | | | |
| Others | Reserved | Reserved | | | | | | | | | | | | | | | | | | | | | |
| Restriction | None | | | | | | | | | | | | | | | | | | | | | | |
| 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>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 | Sleep In | Yes | | | | |
| Status | Availability | | | | | | | | | | | | | | | | | | | | | | |
| Normal Mode On, Idle Mode Off, Sleep Out | Yes | | | | | | | | | | | | | | | | | | | | | | |
| Normal 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>00h_00h</td> </tr> <tr> <td>S/W Reset</td> <td>00h_00h</td> </tr> <tr> <td>H/W Reset</td> <td>00h_00h</td> </tr> </tbody> </table> | | | | | | | | | | | Status | Default Value | Power On Sequence | 00h_00h | S/W Reset | 00h_00h | H/W Reset | 00h_00h | | | | |
| Status | Default Value | | | | | | | | | | | | | | | | | | | | | | |
| Power On Sequence | 00h_00h | | | | | | | | | | | | | | | | | | | | | | |
| S/W Reset | 00h_00h | | | | | | | | | | | | | | | | | | | | | | |
| H/W Reset | 00h_00h | | | | | | | | | | | | | | | | | | | | | | |

5.7.3. Charge-Pump Setting (21h)

| Command Page | | | Page 4 | | | | | | | | |
|-----------------------|---|---|---------------|----|----|----|----|----|----|----|---------|
| Address | Parameter | W/R | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default |
| 21h | 1st | W/R | DMY_PU MP | 0 | 1 | 1 | 0 | 0 | 0 | 0 | B0h |
| Description | DMY_PUMP : Control the driver behavior when host stop transferring video data. | | | | | | | | | | |
| | DMY_PUMP | | Description | | | | | | | | |
| | 0 | Charge-Pump VGH/VGL keep pumping and display shows smallest gamma voltage | | | | | | | | | |
| 1 | Charge-Pump VGH/VGL keep pumping | | | | | | | | | | |
| Restriction | None | | | | | | | | | | |
| Register Availability | Status | | Availability | | | | | | | | |
| | Normal Mode On, Idle Mode Off, Sleep Out | | Yes | | | | | | | | |
| | Normal Mode On, Idle Mode On, Sleep Out | | Yes | | | | | | | | |
| | Sleep In | | Yes | | | | | | | | |
| Default | Status | | Default Value | | | | | | | | |
| | Power On Sequence | | B0h | | | | | | | | |
| | S/W Reset | | B0h | | | | | | | | |
| | H/W Reset | | B0h | | | | | | | | |

5.7.4. Idle Mode Frame Rate (23h)

| Command Page | | | Page 4 | | | | | | | | | | | | | | | | |
|--|--|-----|-----------|----|----|----|----|----|----|----|---------|--------|---------------|--|-----|---|-----|-----------|-----|
| Address | Parameter | W/R | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default | | | | | | | | |
| 23h | 1st | W/R | RTNB[7:0] | | | | | | | | 2Dh | | | | | | | | |
| Description | <p>RTNB[7:0]: Used for adjusting frame rate of idle mode by the following rule:</p> <p>One idle frame time = (VACT + VFP + VBP) * (62.5ns * RTNB)</p> <p>VACT (the line number of the LCD) is defined at "5.4.5 Gate Number (2Eh)".</p> <p>VFP and VBP are defined at "5.4.3 Blanking Porch Control (25h~26h)".</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>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 | Sleep In | Yes |
| Status | Availability | | | | | | | | | | | | | | | | | | |
| Normal Mode On, Idle Mode Off, Sleep Out | Yes | | | | | | | | | | | | | | | | | | |
| Normal 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>2Dh</td> </tr> <tr> <td>S/W Reset</td> <td>2Dh</td> </tr> <tr> <td>H/W Reset</td> <td>2Dh</td> </tr> </tbody> </table> | | | | | | | | | | | Status | Default Value | Power On Sequence | 2Dh | S/W Reset | 2Dh | H/W Reset | 2Dh |
| Status | Default Value | | | | | | | | | | | | | | | | | | |
| Power On Sequence | 2Dh | | | | | | | | | | | | | | | | | | |
| S/W Reset | 2Dh | | | | | | | | | | | | | | | | | | |
| H/W Reset | 2Dh | | | | | | | | | | | | | | | | | | |

5.7.5. Internal SD Timing Control (26h)

| Command Page | | Page 4 | | | | | | | | | |
|-----------------------|---|--------|-----------------------|----|---------------|----|----|----|----|----|---------|
| Address | Parameter | W/R | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default |
| 26h | 1st | W/R | DET_TOLERANCE_OP[3:0] | | | | 0 | 1 | 1 | 0 | 76h |
| Description | DET_TOLERANCE_OP[3:0]: Control internal SD timing between latch1 load into latch2. | | | | | | | | | | |
| | DET_TOLERANCE_OP[3:0] | | | | Description | | | | | | |
| | 0000 | | | | 62.5ns x 1 | | | | | | |
| | 0001 | | | | 62.5ns x 2 | | | | | | |
| | 1111 | | | | 62.5ns x 16 | | | | | | |
| Restriction | None | | | | | | | | | | |
| Register Availability | Status | | | | Availability | | | | | | |
| | Normal Mode On, Idle Mode Off, Sleep Out | | | | Yes | | | | | | |
| | Normal Mode On, Idle Mode On, Sleep Out | | | | Yes | | | | | | |
| | Sleep In | | | | Yes | | | | | | |
| Default | Status | | | | Default Value | | | | | | |
| | Power On Sequence | | | | 76h | | | | | | |
| | S/W Reset | | | | 76h | | | | | | |
| | H/W Reset | | | | 76h | | | | | | |

5.7.6. Touch Synchronization Timing Adjust (27h~2Ah)

| Command Page | | | Page 4 | | | | | | | | | |
|--------------|-----------|-----|----------------|-----------|------------|------------|-----------|----|--------------|-----------|---------|-----|
| Address | Parameter | W/R | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default | |
| 27h | 1st | W/R | TOUCH_OPT[1:0] | | VSOD[1:0] | | HSOM[1:0] | | HFP_HB_P_OPT | VS_PW_OPT | 00h | |
| 28h | 1st | W/R | HSOD[7:0] | | | | | | | | | 05h |
| 29h | 1st | W/R | HSOHW[7:0] | | | | | | | | | 19h |
| 2Ah | 1st | W/R | VS_OUT_EN | HS_OUT_EN | VS_OUT_POL | HS_OUT_POL | 0 | 0 | STB_EN | 0 | F0h | |

| | | | | | | | | | | | | | |
|--|--|-------------|----------------|--|--|--|--|--|--|--|--|--|--|
| Description | This command controls the synchronization output. This function is able to use when Page1_R29h=01h. | | | | | | | | | | | | |
| | TOUCH_OPT[1:0]: Select the Output Mode of synchronization (time scale: internal T _{OP_CLK}) | | | | | | | | | | | | |
| | | | TOUCH_OPT[1:0] | | Description | | | | | | | | |
| | | | 0h | | Off | | | | | | | | |
| | | | 1h | | VFP+VBP | | | | | | | | |
| | | | 2h | | Adjustable for VSOUT / HSOUT ^(Note 2) | | | | | | | | |
| | | | 3h | | VFP+VBP / HFP+HBP | | | | | | | | |
| | VSOD[1:0]: Set the VSOUT delay timing (time scale: internal T _{OP_CLK}) | | | | | | | | | | | | |
| | | | VSOD[1:0] | | Description | | | | | | | | |
| | | | 0h | | 0 line (First line of back porch) | | | | | | | | |
| | | | 1h | | 1 line | | | | | | | | |
| | | | 2h | | 2 line | | | | | | | | |
| | | | 3h | | 3 line | | | | | | | | |
| | HSOM[1:0]: Set the HSOUT active period (time scale: internal T _{OP_CLK}) | | | | | | | | | | | | |
| | | | HSOM[1:0] | | Description | | | | | | | | |
| | | 0h | | VACT Period + VFP + VBP | | | | | | | | | |
| | | 1h | | VACT Period | | | | | | | | | |
| | | 2h | | VFP+VBP | | | | | | | | | |
| | | 3h | | Reserved | | | | | | | | | |
| HFP_HBP_OPT: Select the output source for HSOUT | | | | | | | | | | | | | |
| | | HFP_HBP_OPT | | Description | | | | | | | | | |
| | | 0 | | Prebuf-Source | | | | | | | | | |
| | | 1 | | HSOUT ^(Note 2) | | | | | | | | | |
| VS_PW_OPT: Set the pulse width of VSOUT | | | | | | | | | | | | | |
| | | VS_PW_OPT | | Description | | | | | | | | | |
| | | 0 | | pulse width = 1H | | | | | | | | | |
| | | 1 | | During transition from display off to display on : pulse width = 3H During transition from display on to display off : pulse width = 2H Otherwise : pulse width = 1H | | | | | | | | | |
| HSOD[7:0]: Set HSOUT delay timing (time scale: internal T _{OP_CLK}) | | | | | | | | | | | | | |
| | | HSOD[1:0] | | Description | | | | | | | | | |
| | | 0h | | 0clk | | | | | | | | | |
| | | 1h | | 1clk | | | | | | | | | |
| | | 2h | | 2clk | | | | | | | | | |
| | | : | | : | | | | | | | | | |
| | | FDh | | 253clk | | | | | | | | | |
| | | FEh | | 254clk | | | | | | | | | |
| | | FFh | | 255clk | | | | | | | | | |

| | <p>HSOHW[7:0]: Set the high width of HSOUT (time scale: internal T_{OP_CLK})</p> <table border="1"> <thead> <tr> <th>HSOHW[1:0]</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>0h</td> <td>Reserved</td> </tr> <tr> <td>1h</td> <td>1clk</td> </tr> <tr> <td>2h</td> <td>2clk</td> </tr> <tr> <td>:</td> <td>:</td> </tr> <tr> <td>FDh</td> <td>253clk</td> </tr> <tr> <td>FEh</td> <td>254clk</td> </tr> <tr> <td>FFh</td> <td>255clk</td> </tr> </tbody> </table> <p>VS_OUT_EN: VS signal output enable (1: enable, 0: disable)</p> <p>HS_OUT_EN: HS signal output enable (1: enable, 0: disable)</p> <p>VS_OUT_POL: VS signal polarity (1: non-inversion, 0: inversion)</p> <p>HS_OUT_POL: HS signal polarity (1: non-inversion, 0: inversion)</p> <p>STB_EN: touch option</p> <p><i>Note 1: T_{OP_CLK}: 32ns</i></p> <p><i>Note 2: When use this setting, please reference to chapter 17 "Touch Synchronization Signal".</i></p> | HSOHW[1:0] | Description | 0h | Reserved | 1h | 1clk | 2h | 2clk | : | : | FDh | 253clk | FEh | 254clk | FFh | 255clk |
|--|--|------------|---------------|--|-----------------|---|-----------------|-----------|-----------------|---|---|-----|--------|-----|--------|-----|--------|
| HSOHW[1:0] | Description | | | | | | | | | | | | | | | | |
| 0h | Reserved | | | | | | | | | | | | | | | | |
| 1h | 1clk | | | | | | | | | | | | | | | | |
| 2h | 2clk | | | | | | | | | | | | | | | | |
| : | : | | | | | | | | | | | | | | | | |
| FDh | 253clk | | | | | | | | | | | | | | | | |
| FEh | 254clk | | | | | | | | | | | | | | | | |
| FFh | 255clk | | | | | | | | | | | | | | | | |
| 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>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 | Sleep In | Yes | | | | | | | | |
| Status | Availability | | | | | | | | | | | | | | | | |
| Normal Mode On, Idle Mode Off, Sleep Out | Yes | | | | | | | | | | | | | | | | |
| Normal 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>00h_05h_19h_F0h</td> </tr> <tr> <td>S/W Reset</td> <td>00h_05h_19h_F0h</td> </tr> <tr> <td>H/W Reset</td> <td>00h_05h_19h_F0h</td> </tr> </tbody> </table> | Status | Default Value | Power On Sequence | 00h_05h_19h_F0h | S/W Reset | 00h_05h_19h_F0h | H/W Reset | 00h_05h_19h_F0h | | | | | | | | |
| Status | Default Value | | | | | | | | | | | | | | | | |
| Power On Sequence | 00h_05h_19h_F0h | | | | | | | | | | | | | | | | |
| S/W Reset | 00h_05h_19h_F0h | | | | | | | | | | | | | | | | |
| H/W Reset | 00h_05h_19h_F0h | | | | | | | | | | | | | | | | |

5.7.7. BIST Mode Function (2Dh,2Fh)

| Command Page | | | Page 4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|---|---------|-------------|----|--------------|----|----|----|----|--------|---------|--------------|---------------|--|-------------|---|-------------|-----------|-------------|-----------|-------|-----------|------|-----------|---------|-----------|---------|-----------|-------------|--------------|-------------|----|-----------|----|------------|----|------------|----|------------|--------|-------------|---|----------------|---|------------------|
| Address | Parameter | W/R | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2Dh | 1st | W/R | FRM_PT[7:0] | | | | | | | | FFh | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2Fh | 1st | W/R | 0 | 0 | FRM_CYC[1:0] | 0 | 0 | 0 | 0 | FRM_EN | 00h | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Description | <p>FRM_PT[15:0]: Enable/disable the pattern</p> <table border="1"> <thead> <tr> <th>FRM_PT[15:0]</th> <th>Pattern</th> </tr> </thead> <tbody> <tr><td>FRM_PT[0]</td><td>White</td></tr> <tr><td>FRM_PT[1]</td><td>Black</td></tr> <tr><td>FRM_PT[2]</td><td>Red</td></tr> <tr><td>FRM_PT[3]</td><td>Green</td></tr> <tr><td>FRM_PT[4]</td><td>Blue</td></tr> <tr><td>FRM_PT[5]</td><td>Gray128</td></tr> <tr><td>FRM_PT[6]</td><td>Gray127</td></tr> <tr><td>FRM_PT[7]</td><td>V-Color bar</td></tr> </tbody> </table> <p>See also sections: "8 BIST Mode Function "</p> <p>FRM_CYC[1:0]: Set scan cycle of each pattern</p> <table border="1"> <thead> <tr> <th>FRM_CYC[1:0]</th> <th>Description</th> </tr> </thead> <tbody> <tr><td>0h</td><td>64 frames</td></tr> <tr><td>1h</td><td>128 frames</td></tr> <tr><td>2h</td><td>256 frames</td></tr> <tr><td>3h</td><td>512 frames</td></tr> </tbody> </table> <p>FRM_EN: Enable/disable BIST mode function</p> <table border="1"> <thead> <tr> <th>FRM_EN</th> <th>Description</th> </tr> </thead> <tbody> <tr><td>0</td><td>Normal display</td></tr> <tr><td>1</td><td>Enable BIST mode</td></tr> </tbody> </table> | | | | | | | | | | | FRM_PT[15:0] | Pattern | FRM_PT[0] | White | FRM_PT[1] | Black | FRM_PT[2] | Red | FRM_PT[3] | Green | FRM_PT[4] | Blue | FRM_PT[5] | Gray128 | FRM_PT[6] | Gray127 | FRM_PT[7] | V-Color bar | FRM_CYC[1:0] | Description | 0h | 64 frames | 1h | 128 frames | 2h | 256 frames | 3h | 512 frames | FRM_EN | Description | 0 | Normal display | 1 | Enable BIST mode |
| | FRM_PT[15:0] | Pattern | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | FRM_PT[0] | White | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | FRM_PT[1] | Black | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| FRM_PT[2] | Red | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| FRM_PT[3] | Green | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| FRM_PT[4] | Blue | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| FRM_PT[5] | Gray128 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| FRM_PT[6] | Gray127 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| FRM_PT[7] | V-Color bar | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| FRM_CYC[1:0] | Description | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0h | 64 frames | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1h | 128 frames | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2h | 256 frames | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3h | 512 frames | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| FRM_EN | Description | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0 | Normal display | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | Enable BIST mode | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 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>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 | Sleep In | Yes | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Status | Availability | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Normal Mode On, Idle Mode Off, Sleep Out | Yes | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Normal 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>FFh_FFh_00h</td></tr> <tr><td>S/W Reset</td><td>FFh_FFh_00h</td></tr> <tr><td>H/W Reset</td><td>FFh_FFh_00h</td></tr> </tbody> </table> | | | | | | | | | | | Status | Default Value | Power On Sequence | FFh_FFh_00h | S/W Reset | FFh_FFh_00h | H/W Reset | FFh_FFh_00h | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Status | Default Value | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Power On Sequence | FFh_FFh_00h | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| S/W Reset | FFh_FFh_00h | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| H/W Reset | FFh_FFh_00h | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

5.7.8. Source Timing Setting (35h)

| Command Page | | | Page 4 | | | | | | | | | | | | | | | | |
|--|---|---------------|--------|----|----|----|--------|----|----|----|---------|--------|---------------|--|---------|---|--|-----------|-----|
| Address | Parameter | W/R | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default | | | | | | | | |
| 35h | 1st | W/R | 0 | 0 | 0 | 1 | HZ_OPT | 1 | 1 | 1 | 17h | | | | | | | | |
| Description | <p>HZ_OPT: Maximum source OP drive time.</p> <table border="1"> <thead> <tr> <th>HZ_OPT</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>Disable</td> </tr> <tr> <td>1</td> <td>Enable (Before enable this function , set Page4_R3Ah_D[7]=0)</td> </tr> </tbody> </table> | | | | | | | | | | | HZ_OPT | Description | 0 | Disable | 1 | Enable (Before enable this function , set Page4_R3Ah_D[7]=0) | | |
| | HZ_OPT | Description | | | | | | | | | | | | | | | | | |
| 0 | Disable | | | | | | | | | | | | | | | | | | |
| 1 | Enable (Before enable this function , set Page4_R3Ah_D[7]=0) | | | | | | | | | | | | | | | | | | |
| 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>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 | Sleep In | Yes |
| | Status | Availability | | | | | | | | | | | | | | | | | |
| Normal Mode On, Idle Mode Off, Sleep Out | Yes | | | | | | | | | | | | | | | | | | |
| Normal 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>17h</td> </tr> <tr> <td>S/W Reset</td> <td>17h</td> </tr> <tr> <td>H/W Reset</td> <td>17h</td> </tr> </tbody> </table> | | | | | | | | | | | Status | Default Value | Power On Sequence | 17h | S/W Reset | 17h | H/W Reset | 17h |
| | Status | Default Value | | | | | | | | | | | | | | | | | |
| Power On Sequence | 17h | | | | | | | | | | | | | | | | | | |
| S/W Reset | 17h | | | | | | | | | | | | | | | | | | |
| H/W Reset | 17h | | | | | | | | | | | | | | | | | | |

5.7.9. Power Saving Control (3Ah)

| Command Page | | Page 4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|---|-------------|-------|-----------|----|----|----|----|----|----|---------|--------|---------------|--|---------|---|--------|-----------|-------------|---------|------------|---------|------------|---------|------------|-----|-----|---------|-------------|--------|-----------|
| Address | Parameter | W/R | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default | | | | | | | | | | | | | | | | | | | | |
| 3Ah | 1st | W/R | PS_EN | PCST[6:0] | | | | | | | A4h | | | | | | | | | | | | | | | | | | | | |
| Description | <p>PS_EN: Source power saving enable</p> <table border="1"> <thead> <tr> <th>PS_EN</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>Disable</td> </tr> <tr> <td>1</td> <td>Enable</td> </tr> </tbody> </table> <p>PCST[6:0]: Control power saving period</p> <table border="1"> <thead> <tr> <th>PCST[6:0]</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>0000000</td> <td>62.5ns x 1</td> </tr> <tr> <td>0000001</td> <td>62.5ns x 2</td> </tr> <tr> <td>0000010</td> <td>62.5ns x 3</td> </tr> <tr> <td>...</td> <td>...</td> </tr> <tr> <td>0100100</td> <td>62.5ns x 37</td> </tr> <tr> <td>Others</td> <td>Inhibited</td> </tr> </tbody> </table> | | | | | | | | | | | PS_EN | Description | 0 | Disable | 1 | Enable | PCST[6:0] | Description | 0000000 | 62.5ns x 1 | 0000001 | 62.5ns x 2 | 0000010 | 62.5ns x 3 | ... | ... | 0100100 | 62.5ns x 37 | Others | Inhibited |
| | PS_EN | Description | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0 | Disable | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | Enable | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| PCST[6:0] | Description | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0000000 | 62.5ns x 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0000001 | 62.5ns x 2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0000010 | 62.5ns x 3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ... | ... | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0100100 | 62.5ns x 37 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Others | Inhibited | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 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>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 | Sleep In | Yes | | | | | | | | | | | | |
| Status | Availability | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Normal Mode On, Idle Mode Off, Sleep Out | Yes | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Normal 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>A4h</td> </tr> <tr> <td>S/W Reset</td> <td>A4h</td> </tr> <tr> <td>H/W Reset</td> <td>A4h</td> </tr> </tbody> </table> | | | | | | | | | | | Status | Default Value | Power On Sequence | A4h | S/W Reset | A4h | H/W Reset | A4h | | | | | | | | | | | | |
| Status | Default Value | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Power On Sequence | A4h | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| S/W Reset | A4h | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| H/W Reset | A4h | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

5.7.10. Power Control 1 (69h)

| Command Page | | | Page 4 | | | | | | | | | | | | | | | | |
|--|---|-----|--------|----------------------------|----|----|---------------------|----|----|----|---------|--------|---------------|--|-----|---|-----|-----------|-----|
| Address | Parameter | W/R | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default | | | | | | | | |
| 69h | 1st | W/R | 1 | CP_VCL_CLP_OPTION_PRE[2:0] | | | 0 | 1 | 1 | 1 | D7h | | | | | | | | |
| Description | CP_VCL_CLP_OPTION_PRE[2:0]: Set VCL clamp level. | | | | | | | | | | | | | | | | | | |
| | CP_VCL_CLP_OPTION_PRE[2:0] | | | | | | VCL clamp level (V) | | | | | | | | | | | | |
| | 0h | | | | | | -3.0V | | | | | | | | | | | | |
| | 1h | | | | | | -2.9V | | | | | | | | | | | | |
| | 2h | | | | | | -2.8V | | | | | | | | | | | | |
| | 3h | | | | | | -2.7V | | | | | | | | | | | | |
| | 4h | | | | | | -2.6V | | | | | | | | | | | | |
| | 5h | | | | | | -2.5V | | | | | | | | | | | | |
| | 6h | | | | | | -2.4V | | | | | | | | | | | | |
| | 7h | | | | | | -2.3V | | | | | | | | | | | | |
| 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>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 | Sleep In | Yes |
| Status | Availability | | | | | | | | | | | | | | | | | | |
| Normal Mode On, Idle Mode Off, Sleep Out | Yes | | | | | | | | | | | | | | | | | | |
| Normal 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>D7h</td> </tr> <tr> <td>S/W Reset</td> <td>D7h</td> </tr> <tr> <td>H/W Reset</td> <td>D7h</td> </tr> </tbody> </table> | | | | | | | | | | | Status | Default Value | Power On Sequence | D7h | S/W Reset | D7h | H/W Reset | D7h |
| Status | Default Value | | | | | | | | | | | | | | | | | | |
| Power On Sequence | D7h | | | | | | | | | | | | | | | | | | |
| S/W Reset | D7h | | | | | | | | | | | | | | | | | | |
| H/W Reset | D7h | | | | | | | | | | | | | | | | | | |

5.7.11. VCORE Setting (6Ch)

| Command Page | | | Page 4 | | | | | | | | | | | | | | | | |
|--|---|-----|--------|----|----|--------|-------------------|----------|-------------------|----|---------|--------|---------------|--|-----|---|-----|-----------|-----|
| Address | Parameter | W/R | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default | | | | | | | | |
| 6Ch | 1st | W/R | 0 | 0 | 0 | 1 | DI_VCORE_SEL[3:0] | | | | 15h | | | | | | | | |
| Description | DI_VCORE_SEL[3:0]: Set VCORE voltage adjustment. | | | | | | | | | | | | | | | | | | |
| | | | | | | | DI_VCORE_SEL[3:0] | | VCORE voltage (V) | | | | | | | | | | |
| | | | | | | | 0h | | 1.25 | | | | | | | | | | |
| | | | | | | | 1h | | 1.30 | | | | | | | | | | |
| | | | | | | | 2h | | 1.35 | | | | | | | | | | |
| | | | | | | | 3h | | 1.40 | | | | | | | | | | |
| | | | | | | | 4h | | 1.45 | | | | | | | | | | |
| | | | | | | | 5h | | 1.50 | | | | | | | | | | |
| | | | | | | | 6h | | 1.55 | | | | | | | | | | |
| | | | | | | | 7h | | 1.60 | | | | | | | | | | |
| | | | | | | 8h | | 1.65 | | | | | | | | | | | |
| | | | | | | 9h | | 1.70 | | | | | | | | | | | |
| | | | | | | Others | | Reserved | | | | | | | | | | | |
| 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>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 | Sleep In | Yes |
| Status | Availability | | | | | | | | | | | | | | | | | | |
| Normal Mode On, Idle Mode Off, Sleep Out | Yes | | | | | | | | | | | | | | | | | | |
| Normal 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>15h</td> </tr> <tr> <td>S/W Reset</td> <td>15h</td> </tr> <tr> <td>H/W Reset</td> <td>15h</td> </tr> </tbody> </table> | | | | | | | | | | | Status | Default Value | Power On Sequence | 15h | S/W Reset | 15h | H/W Reset | 15h |
| Status | Default Value | | | | | | | | | | | | | | | | | | |
| Power On Sequence | 15h | | | | | | | | | | | | | | | | | | |
| S/W Reset | 15h | | | | | | | | | | | | | | | | | | |
| H/W Reset | 15h | | | | | | | | | | | | | | | | | | |

5.7.12. Power Control 2 (6Eh)

| Command Page | | Page 4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|---|---------------------|---------|------------|---|----|----|----|----|----|---------|------------|---------------|--|---------|---|-----|-----------|-----|---|---|---|---|---|---|--|---|---|---|---|--|------------|--|--|--|---|------------------|---------------------|-----|------|-----|------|-----|------|-----|------|-----|-----|-----|------|---|---|-----|-------|-----|----|-----|-------|---|---|-----|------|-----|-------|-----|-------|-------|----------|
| Address | Parameter | W/R | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6Eh | 1st | W/R | 0 | DI_PWR_REG | REG1_VRH_CP[5:0] | | | | | | 6Ah | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Description | <p>DI_PWR_REG: Select the input power mode.</p> <table border="1"> <thead> <tr> <th>DI_PWR_REG</th> <th>BOOSTM2</th> <th>BOOSTM1</th> <th>BOOSTM0</th> <th>Note</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>0</td> <td>0</td> <td>1</td> <td>Power Mode 2A External IOVCC, VSP and VSN (VCI=VSP) ^{Note 1}</td> </tr> <tr> <td>1</td> <td>0</td> <td>0</td> <td>1</td> <td>Power Mode 4 External IOVCC, VCI, VSP and VSN</td> </tr> <tr> <td>X</td> <td>0</td> <td>1</td> <td>0</td> <td>Power Mode 3 External IOVCC and VCI (ILI4003)</td> </tr> <tr> <td colspan="4">prohibited</td> <td>-</td> </tr> </tbody> </table> <p><i>Note 1: VCI and VSP pads must be connected by external metal path.</i></p> <p>REG1_VRH_CP[5:0]: Set VGH clamp level. (0.18V/step)</p> <table border="1"> <thead> <tr> <th>REG1_VRH_CP[5:0]</th> <th>VGH clamp level (V)</th> </tr> </thead> <tbody> <tr><td>03h</td><td>7.98</td></tr> <tr><td>04h</td><td>8.16</td></tr> <tr><td>05h</td><td>8.34</td></tr> <tr><td>06h</td><td>8.52</td></tr> <tr><td>07h</td><td>8.7</td></tr> <tr><td>08h</td><td>8.88</td></tr> <tr><td>:</td><td>:</td></tr> <tr><td>29h</td><td>14.82</td></tr> <tr><td>2Ah</td><td>15</td></tr> <tr><td>2Bh</td><td>15.18</td></tr> <tr><td>:</td><td>:</td></tr> <tr><td>39h</td><td>17.7</td></tr> <tr><td>3Ah</td><td>17.88</td></tr> <tr><td>3Bh</td><td>18.06</td></tr> <tr><td>Other</td><td>Reserved</td></tr> </tbody> </table> | | | | | | | | | | | DI_PWR_REG | BOOSTM2 | BOOSTM1 | BOOSTM0 | Note | 0 | 0 | 0 | 1 | Power Mode 2A External IOVCC, VSP and VSN (VCI=VSP) ^{Note 1} | 1 | 0 | 0 | 1 | Power Mode 4 External IOVCC, VCI, VSP and VSN | X | 0 | 1 | 0 | Power Mode 3 External IOVCC and VCI (ILI4003) | prohibited | | | | - | REG1_VRH_CP[5:0] | VGH clamp level (V) | 03h | 7.98 | 04h | 8.16 | 05h | 8.34 | 06h | 8.52 | 07h | 8.7 | 08h | 8.88 | : | : | 29h | 14.82 | 2Ah | 15 | 2Bh | 15.18 | : | : | 39h | 17.7 | 3Ah | 17.88 | 3Bh | 18.06 | Other | Reserved |
| | DI_PWR_REG | BOOSTM2 | BOOSTM1 | BOOSTM0 | Note | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 0 | 0 | 0 | 1 | Power Mode 2A External IOVCC, VSP and VSN (VCI=VSP) ^{Note 1} | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 1 | 0 | 0 | 1 | Power Mode 4 External IOVCC, VCI, VSP and VSN | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | X | 0 | 1 | 0 | Power Mode 3 External IOVCC and VCI (ILI4003) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | prohibited | | | | - | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | REG1_VRH_CP[5:0] | VGH clamp level (V) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 03h | 7.98 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 04h | 8.16 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 05h | 8.34 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 06h | 8.52 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 07h | 8.7 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 08h | 8.88 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| : | : | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 29h | 14.82 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2Ah | 15 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2Bh | 15.18 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| : | : | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 39h | 17.7 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3Ah | 17.88 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3Bh | 18.06 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Other | Reserved | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 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>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 | Sleep In | Yes | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Status | Availability | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Normal Mode On, Idle Mode Off, Sleep Out | Yes | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Normal 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>6Ah</td> </tr> <tr> <td>S/W Reset</td> <td>6Ah</td> </tr> <tr> <td>H/W Reset</td> <td>6Ah</td> </tr> </tbody> </table> | | | | | | | | | | | Status | Default Value | Power On Sequence | 6Ah | S/W Reset | 6Ah | H/W Reset | 6Ah | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Status | Default Value | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Power On Sequence | 6Ah | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| S/W Reset | 6Ah | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| H/W Reset | 6Ah | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

5.7.13. Power Control 3 (6Fh)

| Command Page | | | Page 4 | | | | | | | | |
|--------------|-----------|-----|--------------|-------------------|----|-------------------|----|----|-------------------|-----|---------|
| Address | Parameter | W/R | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default |
| 6Fh | 1st | W/R | VGLREG_EN_GO | DI_CP_VGH_BH[2:0] | | DI_CP_VGL_BL[2:0] | | | DI_CP_VCL_REG_SEL | 34h | |

Description

VGLREG_EN_GO: Enable/Disable VGL regulator circuit (VGL01).

| VGLREG_EN_GO | VGL regulator |
|--------------|---------------|
| 0 | Disable |
| 1 | Enable |

DI_CP_VGH_BH[2:0]: Set the factor used in the step-up circuits for VGH.

Select the optimal step-up factor for the operating voltage. To reduce power consumption, set a smaller factor.

| DI_CP_VGH_BH[2:0] | VGH Output (power mode 3, 4) | VGH Output (power mode 2) | Flying Capacitor |
|-------------------|------------------------------|---------------------------|--------------------------|
| 0h | Reserved | Reserved | - |
| 1h | 2*VSP | 2*VSP | C21P/N + C22P/N (option) |
| 2h | 2.5*VSP | 3*VSP | C21P/N + C22P/N (option) |
| 3h | 3*VSP | 3*VSP | C21P/N + C22P/N (option) |
| 4h | 3.5*VSP | 4*VSP | C21P/N + C22P/N |
| 5h | 4*VSP | 4*VSP | C21P/N + C22P/N |
| 6h | 4.5*VSP | 5*VSP | C21P/N + C22P/N |
| 7h | 5*VSP | 5*VSP | C21P/N + C22P/N |

DI_CP_VGL_BL[2:0]: Set the factor used in the step-up circuits for VGL. Select the optimal step-up factor for the operating voltage. To reduce power consumption, set a smaller factor.

| DI_CP_VGL_BL[2:0] | VGL Output (power mode 3, 4) | VGL Output (power mode 2) | Flying Capacitor |
|-------------------|------------------------------|---------------------------|--------------------------|
| 0h | -1.5*VSP | -2*VSP | C23P/N + C24P/N (option) |
| 1h | -2*VSP | -2*VSP | C23P/N + C24P/N (option) |
| 2h | -2.5*VSP | -3*VSP | C23P/N + C24P/N (option) |
| 3h | -3*VSP | -3*VSP | C23P/N + C24P/N (option) |
| 4h | -3.5*VSP | -4*VSP | C23P/N + C24P/N |
| 5h | -4*VSP | -4*VSP | C23P/N + C24P/N |
| 6h | -4.5*VSP | -5*VSP | C23P/N + C24P/N |
| 7h | -5*VSP | -5*VSP | C23P/N + C24P/N |

DI_CP_VCL_REG_SEL: Set VCL power source.

| DI_CP_VCL_REG_SEL | VCL power source |
|-------------------|---|
| 0 | Charge-pumping circuit (Connect the C41P/C41N and C42P/C42N capacitor) |
| 1 | Regulator circuit (Disconnect the C41P/C41N and C42P/C42N capacitor) |

Restriction

None

Register Availability

| Status | Availability |
|--|--------------|
| Normal Mode On, Idle Mode Off, Sleep Out | Yes |
| Normal 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>34h</td></tr><tr><td>S/W Reset</td><td>34h</td></tr><tr><td>H/W Reset</td><td>34h</td></tr></tbody></table> | Status | Default Value | Power On Sequence | 34h | S/W Reset | 34h | H/W Reset | 34h |
|-----------|---|---------------|---------------|-------------------|-----|-----------|-----|-----------|-----|
| | Status | Default Value | | | | | | | |
| | Power On Sequence | 34h | | | | | | | |
| | S/W Reset | 34h | | | | | | | |
| H/W Reset | 34h | | | | | | | | |

5.7.14. VREG1/2 Setting (7Ah)

| Command Page | | | Page 4 | | | | | | | | |
|-----------------------|---|-----|--------|----|----|---|----------------------------------|----|----|----|---------|
| Address | Parameter | W/R | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default |
| 7Ah | 1st | W/R | 0 | 0 | 0 | DI_REG_ REG1_E N_CAP | 0 | 0 | 0 | 0 | 00h |
| Description | DI_REG_REG1_EN_CAP: Using VREG1/2 external caps(1uF) enable | | | | | | | | | | |
| | DI_REG_REG1_EN_CAP | | | | | | Description | | | | |
| | 1 | | | | | | IC uses VREG1/2 caps(1uF) at FPC | | | | |
| 0 | | | | | | IC doesn't use VREG1/2 caps(1uF) at FPC | | | | | |
| Restriction | None | | | | | | | | | | |
| Register Availability | Status | | | | | | Availability | | | | |
| | Normal Mode On, Idle Mode Off, Sleep Out | | | | | | Yes | | | | |
| | Normal Mode On, Idle Mode On, Sleep Out | | | | | | Yes | | | | |
| | Sleep In | | | | | | Yes | | | | |
| Default | Status | | | | | | Default Value | | | | |
| | Power On Sequence | | | | | | 00h | | | | |
| | S/W Reset | | | | | | 00h | | | | |
| | H/W Reset | | | | | | 00h | | | | |

5.7.15. LVD Function 1 (87h)

| Command Page | | | Page 4 | | | | | | | | | | | | | | | | | | | | |
|--|---|---------------|-----------------|----|----|----|----|----|----|----|---------|-----------------|---------------|--|------------------|---|--------------------|-----------|-----------------|------|-------------------|--------|-----------|
| Address | Parameter | W/R | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default | | | | | | | | | | | | |
| 87h | 1st | W/R | DI_LVD_CTL[3:0] | | | | 1 | 0 | 1 | 0 | BAh | | | | | | | | | | | | |
| Description | <p>DI_LVD_CTL[3:0]: The sensitivity adjustment of detecting when battery is removed and power voltage is low.</p> <table border="1"> <thead> <tr> <th>DI_LVD_CTL[3:0]</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>1111</td> <td>sensitivity high</td> </tr> <tr> <td>1011</td> <td>sensitivity medium</td> </tr> <tr> <td>0010</td> <td>sensitivity low</td> </tr> <tr> <td>0000</td> <td>disable detecting</td> </tr> <tr> <td>Others</td> <td>Inhibited</td> </tr> </tbody> </table> | | | | | | | | | | | DI_LVD_CTL[3:0] | Description | 1111 | sensitivity high | 1011 | sensitivity medium | 0010 | sensitivity low | 0000 | disable detecting | Others | Inhibited |
| | DI_LVD_CTL[3:0] | Description | | | | | | | | | | | | | | | | | | | | | |
| 1111 | sensitivity high | | | | | | | | | | | | | | | | | | | | | | |
| 1011 | sensitivity medium | | | | | | | | | | | | | | | | | | | | | | |
| 0010 | sensitivity low | | | | | | | | | | | | | | | | | | | | | | |
| 0000 | disable detecting | | | | | | | | | | | | | | | | | | | | | | |
| Others | Inhibited | | | | | | | | | | | | | | | | | | | | | | |
| 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>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 | Sleep In | Yes | | | | |
| | Status | Availability | | | | | | | | | | | | | | | | | | | | | |
| Normal Mode On, Idle Mode Off, Sleep Out | Yes | | | | | | | | | | | | | | | | | | | | | | |
| Normal 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>BAh</td> </tr> <tr> <td>S/W Reset</td> <td>BAh</td> </tr> <tr> <td>H/W Reset</td> <td>BAh</td> </tr> </tbody> </table> | | | | | | | | | | | Status | Default Value | Power On Sequence | BAh | S/W Reset | BAh | H/W Reset | BAh | | | | |
| | Status | Default Value | | | | | | | | | | | | | | | | | | | | | |
| Power On Sequence | BAh | | | | | | | | | | | | | | | | | | | | | | |
| S/W Reset | BAh | | | | | | | | | | | | | | | | | | | | | | |
| H/W Reset | BAh | | | | | | | | | | | | | | | | | | | | | | |

5.7.16. LVD Function 2 (88h)

| Command Page | | | Page 4 | | | | | | | | | | | | | | | | |
|--|---|--|-------------|----|----|----|----|----|----|----|---------|-------------|---------------|--|--|---|--|-----------|-----|
| Address | Parameter | W/R | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default | | | | | | | | |
| 88h | 1st | W/R | DIS_LVD_CHK | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 8Bh | | | | | | | | |
| Description | <p>DIS_LVD_CHK: LVD check function control.</p> <table border="1"> <thead> <tr> <th>DIS_LVD_CHK</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>When LVD is detected, IC will directly turn off pump power and go into sleep in sequence</td> </tr> <tr> <td>1</td> <td>When LVD is detected, IC will go into normal power-off/sleep in sequence</td> </tr> </tbody> </table> | | | | | | | | | | | DIS_LVD_CHK | Description | 0 | When LVD is detected, IC will directly turn off pump power and go into sleep in sequence | 1 | When LVD is detected, IC will go into normal power-off/sleep in sequence | | |
| | DIS_LVD_CHK | Description | | | | | | | | | | | | | | | | | |
| | 0 | When LVD is detected, IC will directly turn off pump power and go into sleep in sequence | | | | | | | | | | | | | | | | | |
| 1 | When LVD is detected, IC will go into normal power-off/sleep in sequence | | | | | | | | | | | | | | | | | | |
| 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>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 | Sleep In | Yes |
| | Status | Availability | | | | | | | | | | | | | | | | | |
| Normal Mode On, Idle Mode Off, Sleep Out | Yes | | | | | | | | | | | | | | | | | | |
| Normal 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>8Bh</td> </tr> <tr> <td>S/W Reset</td> <td>8Bh</td> </tr> <tr> <td>H/W Reset</td> <td>8Bh</td> </tr> </tbody> </table> | | | | | | | | | | | Status | Default Value | Power On Sequence | 8Bh | S/W Reset | 8Bh | H/W Reset | 8Bh |
| | Status | Default Value | | | | | | | | | | | | | | | | | |
| | Power On Sequence | 8Bh | | | | | | | | | | | | | | | | | |
| | S/W Reset | 8Bh | | | | | | | | | | | | | | | | | |
| H/W Reset | 8Bh | | | | | | | | | | | | | | | | | | |

5.7.17. VCOM Control (8Bh)

| Command Page | | | Page 4 | | | | | | | | | | | | | | | | | | | | | | | |
|--|--------------------------|--|--------|----|----|----|------------------------|----|----|----|---------|----------------|--------------------------|--|-----|---|-----------------------------|-----------|-----|-----------------------------|---|---|-----------|---|---|-----------|
| Address | Parameter | W/R | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default | | | | | | | | | | | | | | | |
| 8Bh | 1st | W/R | 1 | 1 | 1 | 0 | DI_VCM _SELO_E N | 0 | 1 | 1 | E3h | | | | | | | | | | | | | | | |
| Description | | <p>DI_VCM_SELO_EN: Set the VCOM output mode.</p> <table border="1"> <thead> <tr> <th>DI_VCM_SELO_EN</th> <th>GS_PANEL ^{Note}</th> <th>VCOM output mode</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>0</td> <td>Set VCOM level by VCM1[8:0]</td> </tr> <tr> <td>0</td> <td>1</td> <td>Set VCOM level by VCM2[8:0]</td> </tr> <tr> <td>1</td> <td>0</td> <td>VCOM = 0V</td> </tr> <tr> <td>1</td> <td>1</td> <td>VCOM = 0V</td> </tr> </tbody> </table> <p><i>Note: Please reference "5.4.2 Set Panel Operation Mode and Data Complement Setting (22h)"</i></p> | | | | | | | | | | DI_VCM_SELO_EN | GS_PANEL ^{Note} | VCOM output mode | 0 | 0 | Set VCOM level by VCM1[8:0] | 0 | 1 | Set VCOM level by VCM2[8:0] | 1 | 0 | VCOM = 0V | 1 | 1 | VCOM = 0V |
| DI_VCM_SELO_EN | GS_PANEL ^{Note} | VCOM output mode | | | | | | | | | | | | | | | | | | | | | | | | |
| 0 | 0 | Set VCOM level by VCM1[8:0] | | | | | | | | | | | | | | | | | | | | | | | | |
| 0 | 1 | Set VCOM level by VCM2[8:0] | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | 0 | VCOM = 0V | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | 1 | VCOM = 0V | | | | | | | | | | | | | | | | | | | | | | | | |
| 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>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 | Sleep In | Yes | | | | | | | |
| Status | Availability | | | | | | | | | | | | | | | | | | | | | | | | | |
| Normal Mode On, Idle Mode Off, Sleep Out | Yes | | | | | | | | | | | | | | | | | | | | | | | | | |
| Normal 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>E3h</td> </tr> <tr> <td>S/W Reset</td> <td>E3h</td> </tr> <tr> <td>H/W Reset</td> <td>E3h</td> </tr> </tbody> </table> | | | | | | | | | | Status | Default Value | Power On Sequence | E3h | S/W Reset | E3h | H/W Reset | E3h | | | | | | | |
| Status | Default Value | | | | | | | | | | | | | | | | | | | | | | | | | |
| Power On Sequence | E3h | | | | | | | | | | | | | | | | | | | | | | | | | |
| S/W Reset | E3h | | | | | | | | | | | | | | | | | | | | | | | | | |
| H/W Reset | E3h | | | | | | | | | | | | | | | | | | | | | | | | | |

5.7.18. Power Control 4 (8Ch~8Dh)

| Command Page | | Page 4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|---|-------------------|----|-------------------------|----|----|----|----|----|----|------------------------|-------------------------|-------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|--------|-----|--------|---|---|-----|--------|-----|--------|-----|--------|--------|----------|
| Address | Parameter | W/R | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 8Ch | 1st | W/R | 0 | DI_VCOM_REG_VGLREG[6:0] | | | | | | | 03h | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 8Dh | 1st | W/R | 0 | DI_VCOM_CP_VGLCLP[6:0] | | | | | | | 14h | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Description | DI_VCOM_REG_VGLREG[6:0]: Set VGLO1 voltage adjustment. (0.18V/step) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | <table border="1"> <thead> <tr> <th>DI_VCOM_REG_VGLREG[6:0]</th> <th>VGLO1 voltage (V)</th> </tr> </thead> <tbody> <tr><td>03h</td><td>-6.99</td></tr> <tr><td>04h</td><td>-7.17</td></tr> <tr><td>05h</td><td>-7.35</td></tr> <tr><td>06h</td><td>-7.53</td></tr> <tr><td>07h</td><td>-7.71</td></tr> <tr><td>08h</td><td>-7.89</td></tr> <tr><td>09h</td><td>-8.07</td></tr> <tr><td>0Ah</td><td>-8.25</td></tr> <tr><td>0Bh</td><td>-8.43</td></tr> <tr><td>0Ch</td><td>-8.61</td></tr> <tr><td>0Dh</td><td>-8.79</td></tr> <tr><td>0Eh</td><td>-8.97</td></tr> <tr><td>0Fh</td><td>-9.15</td></tr> <tr><td>10h</td><td>-9.33</td></tr> <tr><td>11h</td><td>-9.51</td></tr> <tr><td>12h</td><td>-9.69</td></tr> <tr><td>13h</td><td>-9.87</td></tr> <tr><td>14h</td><td>-10.05</td></tr> <tr><td>15h</td><td>-10.23</td></tr> <tr><td>:</td><td>:</td></tr> <tr><td>3Fh</td><td>-17.79</td></tr> <tr><td>40h</td><td>-17.97</td></tr> <tr><td>41h</td><td>-18.15</td></tr> <tr><td>Others</td><td>Reserved</td></tr> </tbody> </table> | | | | | | | | | | | DI_VCOM_REG_VGLREG[6:0] | VGLO1 voltage (V) | 03h | -6.99 | 04h | -7.17 | 05h | -7.35 | 06h | -7.53 | 07h | -7.71 | 08h | -7.89 | 09h | -8.07 | 0Ah | -8.25 | 0Bh | -8.43 | 0Ch | -8.61 | 0Dh | -8.79 | 0Eh | -8.97 | 0Fh | -9.15 | 10h | -9.33 | 11h | -9.51 | 12h | -9.69 | 13h | -9.87 | 14h | -10.05 | 15h | -10.23 | : | : | 3Fh | -17.79 | 40h | -17.97 | 41h | -18.15 | Others | Reserved |
| | DI_VCOM_REG_VGLREG[6:0] | VGLO1 voltage (V) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 03h | -6.99 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 04h | -7.17 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 05h | -7.35 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 06h | -7.53 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 07h | -7.71 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 08h | -7.89 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 09h | -8.07 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 0Ah | -8.25 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 0Bh | -8.43 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 0Ch | -8.61 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 0Dh | -8.79 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 0Eh | -8.97 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 0Fh | -9.15 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 10h | -9.33 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 11h | -9.51 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 12h | -9.69 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 13h | -9.87 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 14h | -10.05 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 15h | -10.23 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | : | : | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 3Fh | -17.79 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 40h | -17.97 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 41h | -18.15 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Others | Reserved | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | DI_VCOM_CP_VGLCLP[6:0]: Set VGL clamp level. (0.18V/step) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <table border="1"> <thead> <tr> <th>DI_VCOM_CP_VGLCLP[6:0]</th> <th>VGL clamp level (V)</th> </tr> </thead> <tbody> <tr><td>03h</td><td>-6.99</td></tr> <tr><td>04h</td><td>-7.17</td></tr> <tr><td>05h</td><td>-7.35</td></tr> <tr><td>06h</td><td>-7.53</td></tr> <tr><td>07h</td><td>-7.71</td></tr> <tr><td>08h</td><td>-7.89</td></tr> <tr><td>09h</td><td>-8.07</td></tr> <tr><td>0Ah</td><td>-8.25</td></tr> <tr><td>0Bh</td><td>-8.43</td></tr> <tr><td>0Ch</td><td>-8.61</td></tr> <tr><td>0Dh</td><td>-8.79</td></tr> <tr><td>0Eh</td><td>-8.97</td></tr> <tr><td>0Fh</td><td>-9.15</td></tr> <tr><td>10h</td><td>-9.33</td></tr> <tr><td>11h</td><td>-9.51</td></tr> <tr><td>12h</td><td>-9.69</td></tr> <tr><td>13h</td><td>-9.87</td></tr> <tr><td>14h</td><td>-10.05</td></tr> </tbody> </table> | | | | | | | | | | | DI_VCOM_CP_VGLCLP[6:0] | VGL clamp level (V) | 03h | -6.99 | 04h | -7.17 | 05h | -7.35 | 06h | -7.53 | 07h | -7.71 | 08h | -7.89 | 09h | -8.07 | 0Ah | -8.25 | 0Bh | -8.43 | 0Ch | -8.61 | 0Dh | -8.79 | 0Eh | -8.97 | 0Fh | -9.15 | 10h | -9.33 | 11h | -9.51 | 12h | -9.69 | 13h | -9.87 | 14h | -10.05 | | | | | | | | | | | | | |
| DI_VCOM_CP_VGLCLP[6:0] | VGL clamp level (V) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 03h | -6.99 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 04h | -7.17 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 05h | -7.35 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 06h | -7.53 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 07h | -7.71 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 08h | -7.89 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 09h | -8.07 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0Ah | -8.25 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0Bh | -8.43 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0Ch | -8.61 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0Dh | -8.79 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0Eh | -8.97 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0Fh | -9.15 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10h | -9.33 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 11h | -9.51 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 12h | -9.69 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 13h | -9.87 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 14h | -10.05 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

| | | <table border="1"> <tr><td>15h</td><td>-10.23</td></tr> <tr><td>:</td><td>:</td></tr> <tr><td>3Fh</td><td>-17.79</td></tr> <tr><td>40h</td><td>-17.97</td></tr> <tr><td>41h</td><td>-18.15</td></tr> <tr><td>Others</td><td>Reserved</td></tr> </table> | 15h | -10.23 | : | : | 3Fh | -17.79 | 40h | -17.97 | 41h | -18.15 | Others | Reserved |
|--|---|---|--------|---------------|--|---------|---|---------|-----------|---------|-----|--------|--------|----------|
| 15h | -10.23 | | | | | | | | | | | | | |
| : | : | | | | | | | | | | | | | |
| 3Fh | -17.79 | | | | | | | | | | | | | |
| 40h | -17.97 | | | | | | | | | | | | | |
| 41h | -18.15 | | | | | | | | | | | | | |
| Others | Reserved | | | | | | | | | | | | | |
| 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>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 | Sleep In | Yes | | | | |
| Status | Availability | | | | | | | | | | | | | |
| Normal Mode On, Idle Mode Off, Sleep Out | Yes | | | | | | | | | | | | | |
| Normal 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>03h_14h</td></tr> <tr><td>S/W Reset</td><td>03h_14h</td></tr> <tr><td>H/W Reset</td><td>03h_14h</td></tr> </tbody> </table> | | Status | Default Value | Power On Sequence | 03h_14h | S/W Reset | 03h_14h | H/W Reset | 03h_14h | | | | |
| Status | Default Value | | | | | | | | | | | | | |
| Power On Sequence | 03h_14h | | | | | | | | | | | | | |
| S/W Reset | 03h_14h | | | | | | | | | | | | | |
| H/W Reset | 03h_14h | | | | | | | | | | | | | |

5.7.19. Reload Gamma Setting (B2h)

| Command Page | | | Page 4 | | | | | | | | | | | | | | | | | | | | |
|--|--|-------------|-----------------------|-----------------------------|----|----|----|----|----|----|---------|---------------|---------------|--|---------|---|--------|---------------------|-------------|---|---------|---|--------|
| Address | Parameter | W/R | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default | | | | | | | | | | | | |
| B2h | 1st | W/R | RELOAD _GMA_E N | RELOAD _GMA_LI NE8_EN | 0 | 1 | 0 | 0 | 0 | 1 | D1h | | | | | | | | | | | | |
| Description | <p>RELOAD_GMA_EN: Gamma setting reload enable when IC operates at sleep-out state.</p> <table border="1"> <thead> <tr> <th>RELOAD_GMA_EN</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>Disable</td> </tr> <tr> <td>1</td> <td>Enable</td> </tr> </tbody> </table> <p>RELOAD_GMA_LINE8_EN: Gamma setting reload at the period of 8 line when IC operates at sleep-out state.</p> <table border="1"> <thead> <tr> <th>RELOAD_GMA_LINE8_EN</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>Disable</td> </tr> <tr> <td>1</td> <td>Enable</td> </tr> </tbody> </table> | | | | | | | | | | | RELOAD_GMA_EN | Description | 0 | Disable | 1 | Enable | RELOAD_GMA_LINE8_EN | Description | 0 | Disable | 1 | Enable |
| | RELOAD_GMA_EN | Description | | | | | | | | | | | | | | | | | | | | | |
| 0 | Disable | | | | | | | | | | | | | | | | | | | | | | |
| 1 | Enable | | | | | | | | | | | | | | | | | | | | | | |
| RELOAD_GMA_LINE8_EN | Description | | | | | | | | | | | | | | | | | | | | | | |
| 0 | Disable | | | | | | | | | | | | | | | | | | | | | | |
| 1 | Enable | | | | | | | | | | | | | | | | | | | | | | |
| 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>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 | Sleep In | Yes | | | | |
| Status | Availability | | | | | | | | | | | | | | | | | | | | | | |
| Normal Mode On, Idle Mode Off, Sleep Out | Yes | | | | | | | | | | | | | | | | | | | | | | |
| Normal 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>D1h</td> </tr> <tr> <td>S/W Reset</td> <td>D1h</td> </tr> <tr> <td>H/W Reset</td> <td>D1h</td> </tr> </tbody> </table> | | | | | | | | | | | Status | Default Value | Power On Sequence | D1h | S/W Reset | D1h | H/W Reset | D1h | | | | |
| Status | Default Value | | | | | | | | | | | | | | | | | | | | | | |
| Power On Sequence | D1h | | | | | | | | | | | | | | | | | | | | | | |
| S/W Reset | D1h | | | | | | | | | | | | | | | | | | | | | | |
| H/W Reset | D1h | | | | | | | | | | | | | | | | | | | | | | |

5.7.20. Gamma Bias Level (B5h)

| Command Page | | | Page 4 | | | | | | | | | | | | | | | | | | |
|--|---|---------------|--------|----|----|----|----|-----------------|----|----|---------|-----------------|---------------|--|------|---|-------------|-----------|---------------|--------|-----------|
| Address | Parameter | W/R | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default | | | | | | | | | | |
| B5h | 1st | W/R | 0 | 0 | 0 | 0 | 0 | DI_GMA_GAP[2:0] | | | 02h | | | | | | | | | | |
| Description | <p>DI_GMA_GAP[2:0]: Control the gamma bias level.</p> <table border="1"> <thead> <tr> <th>DI_GMA_GAP[2:0]</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>111</td> <td>High</td> </tr> <tr> <td>110</td> <td>Medium High</td> </tr> <tr> <td>010</td> <td>Default value</td> </tr> <tr> <td>Others</td> <td>inhibited</td> </tr> </tbody> </table> | | | | | | | | | | | DI_GMA_GAP[2:0] | Description | 111 | High | 110 | Medium High | 010 | Default value | Others | inhibited |
| | DI_GMA_GAP[2:0] | Description | | | | | | | | | | | | | | | | | | | |
| 111 | High | | | | | | | | | | | | | | | | | | | | |
| 110 | Medium High | | | | | | | | | | | | | | | | | | | | |
| 010 | Default value | | | | | | | | | | | | | | | | | | | | |
| Others | inhibited | | | | | | | | | | | | | | | | | | | | |
| 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>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 | Sleep In | Yes | | |
| | Status | Availability | | | | | | | | | | | | | | | | | | | |
| Normal Mode On, Idle Mode Off, Sleep Out | Yes | | | | | | | | | | | | | | | | | | | | |
| Normal 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>02h</td> </tr> <tr> <td>S/W Reset</td> <td>02h</td> </tr> <tr> <td>H/W Reset</td> <td>02h</td> </tr> </tbody> </table> | | | | | | | | | | | Status | Default Value | Power On Sequence | 02h | S/W Reset | 02h | H/W Reset | 02h | | |
| | Status | Default Value | | | | | | | | | | | | | | | | | | | |
| Power On Sequence | 02h | | | | | | | | | | | | | | | | | | | | |
| S/W Reset | 02h | | | | | | | | | | | | | | | | | | | | |
| H/W Reset | 02h | | | | | | | | | | | | | | | | | | | | |

5.7.21. Temperature Detecting Setting 1 (BBh~C2h)

| Command Page | | | Page 4 | | | | | | | | |
|--------------|-----------|-----|-------------------------|----|-------------------|----|----|-----|----|-----|---------|
| Address | Parameter | W/R | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default |
| BBh | 1st | W/R | EN_TEM P_PROC ESS | 0 | CP_VGH_TAP_C[5:0] | | | | | 1Eh | |
| BCh | 1st | W/R | 0 | 0 | CP_VGH_TAP_L[5:0] | | | | | 1Eh | |
| BDh | 1st | W/R | 0 | 0 | CP_VGH_TAP_M[5:0] | | | | | 1Eh | |
| BEh | 1st | W/R | 0 | 0 | CP_VGH_TAP_H[5:0] | | | | | 1Eh | |
| BFh | 1st | W/R | VCOM_C[7:0] | | | | | 4Ch | | | |
| C0h | 1st | W/R | VCOM_L[7:0] | | | | | 4Ch | | | |
| C1h | 1st | W/R | VCOM_M[7:0] | | | | | 4Ch | | | |
| C2h | 1st | W/R | VCOM_H[7:0] | | | | | 4Ch | | | |

| Description | EN_TEMP_PROCESS / EN_TS: Enable/Disable Temperature Detecting function. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|---|--|---------------------|-------|----------|-----|------|---------|------|-----|--------|-------|-----|----------|------|---|---|-----|-------|-----|-------|-----|----|-----|-------|-----|-------|---|---|-----|-------|-----|-------|-----|------|-----|-------|-----|-------|-------|----------|
| | <table border="1"> <thead> <tr> <th>EN_TEMP_PROCESS</th> <th>EN_TS</th> <th>Function</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>0</td> <td>Disable</td> </tr> <tr> <td>1</td> <td>1</td> <td>Enable</td> </tr> <tr> <td colspan="2">Other</td> <td>Reserved</td> </tr> </tbody> </table> | | EN_TEMP_PROCESS | EN_TS | Function | 0 | 0 | Disable | 1 | 1 | Enable | Other | | Reserved | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | EN_TEMP_PROCESS | EN_TS | Function | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 0 | 0 | Disable | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 1 | 1 | Enable | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Other | | Reserved | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | CP_VGH_TAP_C[5:0]: Set VGH clamp level for Temp_Cold. (0.18V/step) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | CP_VGH_TAP_L[5:0]: Set VGH clamp level for Temp_Low. (0.18V/step) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | CP_VGH_TAP_M[5:0]: Set VGH clamp level for Temp_Middle. (0.18V/step) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | CP_VGH_TAP_H[5:0]: Set VGH clamp level for Temp_High. (0.18V/step) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <table border="1"> <thead> <tr> <th>CP_VGH_TAP_C[5:0] CP_VGH_TAP_L[5:0] CP_VGH_TAP_M[5:0] CP_VGH_TAP_H[5:0]</th> <th>VGH clamp level (V)</th> </tr> </thead> <tbody> <tr><td>03h</td><td>7.98</td></tr> <tr><td>04h</td><td>8.16</td></tr> <tr><td>05h</td><td>8.34</td></tr> <tr><td>06h</td><td>8.52</td></tr> <tr><td>07h</td><td>8.7</td></tr> <tr><td>08h</td><td>8.88</td></tr> <tr><td>:</td><td>:</td></tr> <tr><td>28h</td><td>14.64</td></tr> <tr><td>29h</td><td>14.82</td></tr> <tr><td>2Ah</td><td>15</td></tr> <tr><td>2Bh</td><td>15.18</td></tr> <tr><td>2Ch</td><td>15.36</td></tr> <tr><td>:</td><td>:</td></tr> <tr><td>37h</td><td>17.34</td></tr> <tr><td>38h</td><td>17.52</td></tr> <tr><td>39h</td><td>17.7</td></tr> <tr><td>3Ah</td><td>17.88</td></tr> <tr><td>3Bh</td><td>18.06</td></tr> <tr><td>Other</td><td>Reserved</td></tr> </tbody> </table> | | CP_VGH_TAP_C[5:0] CP_VGH_TAP_L[5:0] CP_VGH_TAP_M[5:0] CP_VGH_TAP_H[5:0] | VGH clamp level (V) | 03h | 7.98 | 04h | 8.16 | 05h | 8.34 | 06h | 8.52 | 07h | 8.7 | 08h | 8.88 | : | : | 28h | 14.64 | 29h | 14.82 | 2Ah | 15 | 2Bh | 15.18 | 2Ch | 15.36 | : | : | 37h | 17.34 | 38h | 17.52 | 39h | 17.7 | 3Ah | 17.88 | 3Bh | 18.06 | Other | Reserved |
| CP_VGH_TAP_C[5:0] CP_VGH_TAP_L[5:0] CP_VGH_TAP_M[5:0] CP_VGH_TAP_H[5:0] | VGH clamp level (V) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 03h | 7.98 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 04h | 8.16 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 05h | 8.34 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 06h | 8.52 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 07h | 8.7 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 08h | 8.88 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| : | : | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 28h | 14.64 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 29h | 14.82 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2Ah | 15 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2Bh | 15.18 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2Ch | 15.36 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| : | : | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 37h | 17.34 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 38h | 17.52 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 39h | 17.7 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3Ah | 17.88 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3Bh | 18.06 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Other | Reserved | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| VCOM_C[8:0]: Set the VCOM level for Temp_Cold. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| VCOM_L[8:0]: Set the VCOM level for Temp_Low. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

| | <p>VCOM_M[8:0]: Set the VCOM level for Temp_Middle.</p> <p>VCOM_H[8:0]: Set the VCOM level for Temp_High.</p> <table border="1"> <thead> <tr> <th>VCOM_C[8:0] VCOM_L[8:0] VCOM_M[8:0] VCOM_H[8:0]</th> <th>VCOM voltage (V)</th> </tr> </thead> <tbody> <tr><td>010h</td><td>-0.204</td></tr> <tr><td>011h</td><td>-0.216</td></tr> <tr><td>012h</td><td>-0.228</td></tr> <tr><td>013h</td><td>-0.24</td></tr> <tr><td>014h</td><td>-0.252</td></tr> <tr><td>015h</td><td>-0.264</td></tr> <tr><td>:</td><td>:</td></tr> <tr><td>07Ah</td><td>-1.476</td></tr> <tr><td>07Bh</td><td>-1.488</td></tr> <tr><td>07Ch</td><td>-1.5</td></tr> <tr><td>:</td><td>:</td></tr> <tr><td>149h</td><td>-3.96</td></tr> <tr><td>14Ah</td><td>-3.972</td></tr> <tr><td>14Bh</td><td>-3.984</td></tr> <tr><td>14Ch</td><td>-3.996</td></tr> <tr><td>14Dh</td><td>-4.008</td></tr> <tr><td>Others</td><td>Reserved</td></tr> </tbody> </table> | VCOM_C[8:0] VCOM_L[8:0] VCOM_M[8:0] VCOM_H[8:0] | VCOM voltage (V) | 010h | -0.204 | 011h | -0.216 | 012h | -0.228 | 013h | -0.24 | 014h | -0.252 | 015h | -0.264 | : | : | 07Ah | -1.476 | 07Bh | -1.488 | 07Ch | -1.5 | : | : | 149h | -3.96 | 14Ah | -3.972 | 14Bh | -3.984 | 14Ch | -3.996 | 14Dh | -4.008 | Others | Reserved |
|--|---|--|------------------|--|---------------------------------|---|---------------------------------|-----------|---------------------------------|------|-------|------|--------|------|--------|---|---|------|--------|------|--------|------|------|---|---|------|-------|------|--------|------|--------|------|--------|------|--------|--------|----------|
| VCOM_C[8:0] VCOM_L[8:0] VCOM_M[8:0] VCOM_H[8:0] | VCOM voltage (V) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 010h | -0.204 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 011h | -0.216 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 012h | -0.228 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 013h | -0.24 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 014h | -0.252 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 015h | -0.264 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| : | : | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 07Ah | -1.476 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 07Bh | -1.488 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 07Ch | -1.5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| : | : | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 149h | -3.96 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 14Ah | -3.972 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 14Bh | -3.984 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 14Ch | -3.996 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 14Dh | -4.008 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Others | Reserved | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 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>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 | Sleep In | Yes | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Status | Availability | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Normal Mode On, Idle Mode Off, Sleep Out | Yes | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Normal 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>1Eh_1Eh_1Eh_1Eh_4Ch_4Ch_4Ch_4Ch</td> </tr> <tr> <td>S/W Reset</td> <td>1Eh_1Eh_1Eh_1Eh_4Ch_4Ch_4Ch_4Ch</td> </tr> <tr> <td>H/W Reset</td> <td>1Eh_1Eh_1Eh_1Eh_4Ch_4Ch_4Ch_4Ch</td> </tr> </tbody> </table> | Status | Default Value | Power On Sequence | 1Eh_1Eh_1Eh_1Eh_4Ch_4Ch_4Ch_4Ch | S/W Reset | 1Eh_1Eh_1Eh_1Eh_4Ch_4Ch_4Ch_4Ch | H/W Reset | 1Eh_1Eh_1Eh_1Eh_4Ch_4Ch_4Ch_4Ch | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Status | Default Value | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Power On Sequence | 1Eh_1Eh_1Eh_1Eh_4Ch_4Ch_4Ch_4Ch | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| S/W Reset | 1Eh_1Eh_1Eh_1Eh_4Ch_4Ch_4Ch_4Ch | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| H/W Reset | 1Eh_1Eh_1Eh_1Eh_4Ch_4Ch_4Ch_4Ch | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

5.7.22. Read VCOM OTP Data (C4h~C7h)

| Command Page | | | Page 4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|---|------------------|---------------|----|----|----|----|----|----|-------------|---------|--------------------------------|------------------|--|-----------------|--|-----------------|-----------|-----------------|------|-------|------|--------|------|--------|---|---|------|--------|------|--------|------|------|---|---|------|-------|------|--------|------|--------|------|--------|------|--------|--------|----------|
| Address | Parameter | W/R | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| C4h | 1st | R | 0 | 0 | 0 | 0 | 0 | 0 | 0 | OTP_VCM1[8] | 00h | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| C5h | 1st | R | OTP_VCM1[7:0] | | | | | | | | 7Bh | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| C6h | 1st | R | 0 | 0 | 0 | 0 | 0 | 0 | 0 | OTP_VCM2[8] | 00h | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| C7h | 1st | R | OTP_VCM2[7:0] | | | | | | | | 7Bh | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Description | <p>OTP_VCM1[8:0]: Read the VCOM1 OTP data used for vertical forward scan (GS_PANEL= 1'b0), when NV memory is programmed. (12mV/step)</p> <p>OTP_VCM2[8:0]: Read the VCOM2 OTP data used for vertical backward scan (GS_PANEL= 1'b1), when NV memory is programmed. (12mV/step)</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>OTP_VCM1[8:0] OTP_VCM2[8:0]</th> <th>VCOM voltage (V)</th> </tr> </thead> <tbody> <tr><td>010h</td><td>-0.204</td></tr> <tr><td>011h</td><td>-0.216</td></tr> <tr><td>012h</td><td>-0.228</td></tr> <tr><td>013h</td><td>-0.24</td></tr> <tr><td>014h</td><td>-0.252</td></tr> <tr><td>015h</td><td>-0.264</td></tr> <tr><td>:</td><td>:</td></tr> <tr><td>07Ah</td><td>-1.476</td></tr> <tr><td>07Bh</td><td>-1.488</td></tr> <tr><td>07Ch</td><td>-1.5</td></tr> <tr><td>:</td><td>:</td></tr> <tr><td>149h</td><td>-3.96</td></tr> <tr><td>14Ah</td><td>-3.972</td></tr> <tr><td>14Bh</td><td>-3.984</td></tr> <tr><td>14Ch</td><td>-3.996</td></tr> <tr><td>14Dh</td><td>-4.008</td></tr> <tr><td>Others</td><td>Reserved</td></tr> </tbody> </table> <p style="text-align: center;"><i>Note: VCOM ≥ VSN + 0.5V</i></p> | | | | | | | | | | | OTP_VCM1[8:0] OTP_VCM2[8:0] | VCOM voltage (V) | 010h | -0.204 | 011h | -0.216 | 012h | -0.228 | 013h | -0.24 | 014h | -0.252 | 015h | -0.264 | : | : | 07Ah | -1.476 | 07Bh | -1.488 | 07Ch | -1.5 | : | : | 149h | -3.96 | 14Ah | -3.972 | 14Bh | -3.984 | 14Ch | -3.996 | 14Dh | -4.008 | Others | Reserved |
| | OTP_VCM1[8:0] OTP_VCM2[8:0] | VCOM voltage (V) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 010h | -0.204 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 011h | -0.216 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 012h | -0.228 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 013h | -0.24 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 014h | -0.252 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 015h | -0.264 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | : | : | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 07Ah | -1.476 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 07Bh | -1.488 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 07Ch | -1.5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | : | : | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 149h | -3.96 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 14Ah | -3.972 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 14Bh | -3.984 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 14Ch | -3.996 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 14Dh | -4.008 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Others | Reserved | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Restriction | None | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 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>ormal 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 | ormal Mode On, Idle Mode On, Sleep Out | Yes | Sleep In | Yes | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Status | Availability | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Normal Mode On, Idle Mode Off, Sleep Out | Yes | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ormal 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>De ault Value</th> </tr> </thead> <tbody> <tr> <td>Power On Sequence</td> <td>00h_7Bh_00h_7Bh</td> </tr> <tr> <td>S/W Res t</td> <td>00h_7Bh_00h_7Bh</td> </tr> <tr> <td>H/W Reset</td> <td>00h_7Bh_00h_7Bh</td> </tr> </tbody> </table> | | | | | | | | | | | Status | De ault Value | Power On Sequence | 00h_7Bh_00h_7Bh | S/W Res t | 00h_7Bh_00h_7Bh | H/W Reset | 00h_7Bh_00h_7Bh | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Status | De ault Value | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Power On Sequence | 00h_7Bh_00h_7Bh | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| S/W Res t | 00h_7Bh_00h_7Bh | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| H/W Reset | 00h_7Bh_00h_7Bh | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

5.7.23. Temperature Detecting Setting 2 (C8h~CEh)

| Command Page | | | Page 4 | | | | | | | | | | | | | | | | |
|--|---|-----|------------------|-----------|-------------|-----------|------------------|----|-------------|----|---------|--------|---------------|--|-----------------------------|---|-----------------------------|-----------|-----------------------------|
| Address | Parameter | W/R | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default | | | | | | | | |
| C8h | 1st | W/R | TS_TH0[7:0] | | | | | | | | | 00h | | | | | | | |
| C9h | 1st | W/R | TS_TH1[7:0] | | | | | | | | | 00h | | | | | | | |
| CAh | 1st | W/R | TS_TH2[7:0] | | | | | | | | | 00h | | | | | | | |
| CBh | 1st | W/R | TS_TH3[7:0] | | | | | | | | | 00h | | | | | | | |
| CCh | 1st | W/R | TS_TH0[9:8] | | TS_TH1[9:8] | | TS_TH2[9:8] | | TS_TH3[9:8] | | 00h | | | | | | | | |
| CDh | 1st | W/R | TS_DEBT_OPT[3:0] | | | | TS_HYST_OPT[3:0] | | | | 02h | | | | | | | | |
| CEh | 1st | W/R | EN_TS | VCOM_C[8] | VCOM_L[8] | VCOM_M[8] | VCOM_H[8] | 1 | 0 | 0 | 04h | | | | | | | | |
| Description | <p>TS_TH0[9:0]: Set the temperature detecting range threshold for Temp_Cold.</p> <p>TS_TH1[9:0]: Set the temperature detecting range threshold for Temp_Low.</p> <p>TS_TH2[9:0]: Set the temperature detecting range threshold for Temp_Middle.</p> <p>TS_TH3[9:0]: Set the temperature detecting range threshold for Temp_High.</p> <p>TS_DEBT_OPT[3:0]: Set the de-bounce of temperature detecting range.</p> <p>TS_HYST_OPT[3:0]: Set the hysteresis of temperature detecting range.</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>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 | Sleep In | Yes |
| Status | Availability | | | | | | | | | | | | | | | | | | |
| Normal Mode On, Idle Mode Off, Sleep Out | Yes | | | | | | | | | | | | | | | | | | |
| Normal 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>00h_00h_00h_00h_00h_02h_04h</td> </tr> <tr> <td>S/W Reset</td> <td>00h_00h_00h_00h_00h_02h_04h</td> </tr> <tr> <td>H/W Reset</td> <td>00h_00h_00h_00h_00h_02h_04h</td> </tr> </tbody> </table> | | | | | | | | | | | Status | Default Value | Power On Sequence | 00h_00h_00h_00h_00h_02h_04h | S/W Reset | 00h_00h_00h_00h_00h_02h_04h | H/W Reset | 00h_00h_00h_00h_00h_02h_04h |
| Status | Default Value | | | | | | | | | | | | | | | | | | |
| Power On Sequence | 00h_00h_00h_00h_00h_02h_04h | | | | | | | | | | | | | | | | | | |
| S/W Reset | 00h_00h_00h_00h_00h_02h_04h | | | | | | | | | | | | | | | | | | |
| H/W Reset | 00h_00h_00h_00h_00h_02h_04h | | | | | | | | | | | | | | | | | | |

5.7.24. OTP Control (D7h)

| Command Page | | Page 4 | | | | | | | | | | | | | | | | | | |
|--|--|-------------|----|----|----|--------------|---------------|----|----|----|---------------|-------------|---------------|--|--------------------------|---|------------------------------|-----------|-----|--|
| Address | Parameter | W/R | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default | | | | | | | | | |
| D7h | 1st | W/R | 0 | 0 | 0 | OTP_PA TH | PROG_SEL[1:0] | | 0 | 0 | 1Ch | | | | | | | | | |
| Description | OTP_PATH: <table border="1" style="margin-left: 40px;"> <thead> <tr> <th>OTP_PATH</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>Internal VGH Programming</td> </tr> <tr> <td>1</td> <td>External MTP_PWR Programming</td> </tr> </tbody> </table> | | | | | | | | | | | OTP_PATH | Description | 0 | Internal VGH Programming | 1 | External MTP_PWR Programming | | | |
| | OTP_PATH | Description | | | | | | | | | | | | | | | | | | |
| 0 | Internal VGH Programming | | | | | | | | | | | | | | | | | | | |
| 1 | External MTP_PWR Programming | | | | | | | | | | | | | | | | | | | |
| PROG_SEL[1:0]: <table border="1" style="margin-left: 40px;"> <thead> <tr> <th>PROG_SEL[1:0]</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>0h</td> <td>Inhibited</td> </tr> <tr> <td>1h</td> <td>Internal Programming Setting (Best Setting)</td> </tr> <tr> <td>2h</td> <td>Inhibited</td> </tr> <tr> <td>3h</td> <td>Internal Programming Setting (Default)</td> </tr> </tbody> </table> | | | | | | | | | | | PROG_SEL[1:0] | Description | 0h | Inhibited | 1h | Internal Programming Setting (Best Setting) | 2h | Inhibited | 3h | Internal Programming Setting (Default) |
| PROG_SEL[1:0] | Description | | | | | | | | | | | | | | | | | | | |
| 0h | Inhibited | | | | | | | | | | | | | | | | | | | |
| 1h | Internal Programming Setting (Best Setting) | | | | | | | | | | | | | | | | | | | |
| 2h | Inhibited | | | | | | | | | | | | | | | | | | | |
| 3h | Internal Programming Setting (Default) | | | | | | | | | | | | | | | | | | | |
| Restriction | None | | | | | | | | | | | | | | | | | | | |
| Register Availability | <table border="1" style="margin-left: 40px;"> <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>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 | Sleep In | Yes | |
| Status | Availability | | | | | | | | | | | | | | | | | | | |
| Normal Mode On, Idle Mode Off, Sleep Out | Yes | | | | | | | | | | | | | | | | | | | |
| Normal Mode On, Idle Mode On, Sleep Out | Yes | | | | | | | | | | | | | | | | | | | |
| Sleep In | Yes | | | | | | | | | | | | | | | | | | | |
| Default | <table border="1" style="margin-left: 40px;"> <thead> <tr> <th>Status</th> <th>Default Value</th> </tr> </thead> <tbody> <tr> <td>Power On Sequence</td> <td>1Ch</td> </tr> <tr> <td>S/W Reset</td> <td>1Ch</td> </tr> <tr> <td>H/W Reset</td> <td>1Ch</td> </tr> </tbody> </table> | | | | | | | | | | | Status | Default Value | Power On Sequence | 1Ch | S/W Reset | 1Ch | H/W Reset | 1Ch | |
| Status | Default Value | | | | | | | | | | | | | | | | | | | |
| Power On Sequence | 1Ch | | | | | | | | | | | | | | | | | | | |
| S/W Reset | 1Ch | | | | | | | | | | | | | | | | | | | |
| H/W Reset | 1Ch | | | | | | | | | | | | | | | | | | | |

5.7.25. EXTC Command Set Enable Register (FFh)

| Command Page | | | Page 4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|---|--------------|-----------|----|----|----|----|----|----|----|---------|-----------|---------------|--|--------|---|--------|-----------|--------|-----|--------|-----|--------|-----|--------|-----|--------|-----|--------|-----|--------|-----|--------|-----|---------|--------|----------|
| Address | Parameter | W/R | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default | | | | | | | | | | | | | | | | | | | | | | | | | | |
| FFh | 1st | W | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 98h | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 2nd | W | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 81h | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 3rd | W | PAGE[7:0] | | | | | | | | 04h | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Description | <p>PAGE[7:0]: Set the command page.</p> <table border="1"> <thead> <tr> <th>PAGE[7:0]</th> <th>Command Page</th> </tr> </thead> <tbody> <tr><td>00h</td><td>Page 0</td></tr> <tr><td>01h</td><td>Page 1</td></tr> <tr><td>02h</td><td>Page 2</td></tr> <tr><td>03h</td><td>Page 3</td></tr> <tr><td>04h</td><td>Page 4</td></tr> <tr><td>05h</td><td>Page 5</td></tr> <tr><td>06h</td><td>Page 6</td></tr> <tr><td>07h</td><td>Page 7</td></tr> <tr><td>08h</td><td>Page 8</td></tr> <tr><td>09h</td><td>Page 9</td></tr> <tr><td>0Ah</td><td>Page 10</td></tr> <tr><td>Others</td><td>Reserved</td></tr> </tbody> </table> <p>Set the register, 1st Parameter = 98h, 2nd Parameter = 81h, 3rd Parameter = Page value to enable "Page command set" available</p> <p>See section "5.1 Command Flow".</p> | | | | | | | | | | | PAGE[7:0] | Command Page | 00h | Page 0 | 01h | Page 1 | 02h | Page 2 | 03h | Page 3 | 04h | Page 4 | 05h | Page 5 | 06h | Page 6 | 07h | Page 7 | 08h | Page 8 | 09h | Page 9 | 0Ah | Page 10 | Others | Reserved |
| | PAGE[7:0] | Command Page | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 00h | Page 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 01h | Page 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 02h | Page 2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 03h | Page 3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 04h | Page 4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 05h | Page 5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 06h | Page 6 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 07h | Page 7 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 08h | Page 8 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 09h | Page 9 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 0Ah | Page 10 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Others | Reserved | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 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>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 | Sleep In | Yes | | | | | | | | | | | | | | | | | | |
| Status | Availability | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Normal Mode On, Idle Mode Off, Sleep Out | Yes | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Normal 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>04h</td> </tr> <tr> <td>S/W Reset</td> <td>04h</td> </tr> <tr> <td>H/W Reset</td> <td>04h</td> </tr> </tbody> </table> | | | | | | | | | | | Status | Default Value | Power On Sequence | 04h | S/W Reset | 04h | H/W Reset | 04h | | | | | | | | | | | | | | | | | | |
| Status | Default Value | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Power On Sequence | 04h | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| S/W Reset | 04h | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| H/W Reset | 04h | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

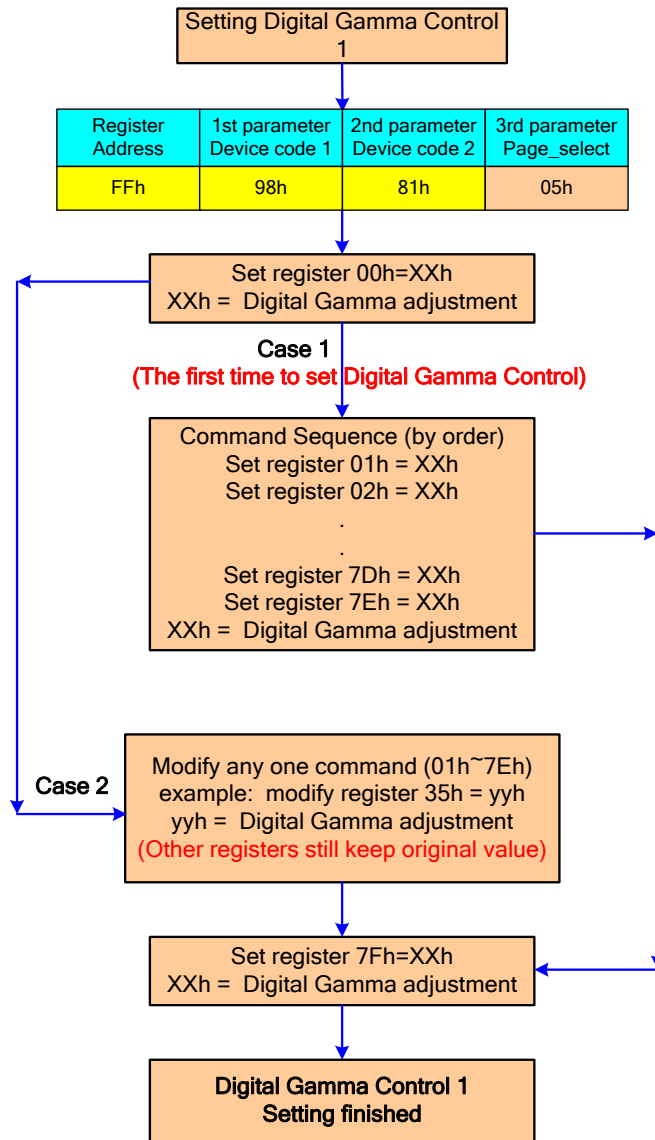
5.8. Page 5 Command Description

5.8.1. Fine Digital Gamma Control 1 (00h~7Fh)

| Command Page | | | Page 5 | | | | | | | | |
|--------------|-----------|-----|--------------|----|----|----|----|----|----|----|---------|
| Address | Parameter | W/R | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default |
| 00h | 1st | W | RDIN0[7:0] | | | | | | | | 00h |
| 01h | 1st | W | RDIN1[7:0] | | | | | | | | 00h |
| 02h | 1st | W | RDIN2[7:0] | | | | | | | | 00h |
| 03h | 1st | W | RDIN3[7:0] | | | | | | | | 00h |
| 04h | 1st | W | RDIN4[7:0] | | | | | | | | 00h |
| 05h | 1st | W | RDIN5[7:0] | | | | | | | | 00h |
| : | 1st | W | : | | | | | | | | 00h |
| 7Ah | 1st | W | RDIN122[7:0] | | | | | | | | 00h |
| 7Bh | 1st | W | RDIN123[7:0] | | | | | | | | 00h |
| 7Ch | 1st | W | RDIN124[7:0] | | | | | | | | 00h |
| 7Dh | 1st | W | RDIN125[7:0] | | | | | | | | 00h |
| 7Eh | 1st | W | RDIN126[7:0] | | | | | | | | 00h |
| 7Fh | 1st | W | RDIN127[7:0] | | | | | | | | 00h |

RDINx[7:0]: Digital Gamma Macro-adjustment registers for red gamma curve.

Description



Restriction

None

| <p>Register Availability</p> | <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>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 | Sleep In | Yes |
|--|---|--------|---------------|--|--------------------|---|--------------------|-----------|--------------------|
| Status | Availability | | | | | | | | |
| Normal Mode On, Idle Mode Off, Sleep Out | Yes | | | | | | | | |
| Normal Mode On, Idle Mode On, Sleep Out | Yes | | | | | | | | |
| Sleep In | Yes | | | | | | | | |
| <p>Default</p> | <table border="1"> <thead> <tr> <th>Status</th> <th>Default Value</th> </tr> </thead> <tbody> <tr> <td>Power On Sequence</td> <td>00h_00h_...00h_00h</td> </tr> <tr> <td>S/W Reset</td> <td>00h_00h_...00h_00h</td> </tr> <tr> <td>H/W Reset</td> <td>00h_00h_...00h_00h</td> </tr> </tbody> </table> | Status | Default Value | Power On Sequence | 00h_00h_...00h_00h | S/W Reset | 00h_00h_...00h_00h | H/W Reset | 00h_00h_...00h_00h |
| Status | Default Value | | | | | | | | |
| Power On Sequence | 00h_00h_...00h_00h | | | | | | | | |
| S/W Reset | 00h_00h_...00h_00h | | | | | | | | |
| H/W Reset | 00h_00h_...00h_00h | | | | | | | | |

5.8.2. Digital 3 Gamma Enable (80h)

| Command Page | | | Page 5 | | | | | | | | | | | | | | | | |
|--|---|-----|--------|----|----|----|----|----|----|-------|---------|--------|---------------------------------------|--|-----|---|-----|-----------|-----|
| Address | Parameter | W/R | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default | | | | | | | | |
| 80h | 1st | W/R | 0 | 0 | 0 | 0 | 0 | 0 | 0 | EN_3G | 00h | | | | | | | | |
| Description | En_3G: 0 : digital 3 gamma disable 1 : digital 3 gamma enable | | | | | | | | | | | | | | | | | | |
| 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>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 | Sleep In | Yes |
| Status | Availability | | | | | | | | | | | | | | | | | | |
| Normal Mode On, Idle Mode Off, Sleep Out | Yes | | | | | | | | | | | | | | | | | | |
| Normal Mode On, Idle Mode On, Sleep Out | Yes | | | | | | | | | | | | | | | | | | |
| Sleep In | Yes | | | | | | | | | | | | | | | | | | |
| Default | <table border="1"> <thead> <tr> <th>Status</th> <th>Default Value (Before OTP program)</th> </tr> </thead> <tbody> <tr> <td>Power On Sequence</td> <td>00h</td> </tr> <tr> <td>S/W Reset</td> <td>00h</td> </tr> <tr> <td>H/W Reset</td> <td>00h</td> </tr> </tbody> </table> | | | | | | | | | | | Status | Default Value (Before OTP program) | Power On Sequence | 00h | S/W Reset | 00h | H/W Reset | 00h |
| Status | Default Value (Before OTP program) | | | | | | | | | | | | | | | | | | |
| Power On Sequence | 00h | | | | | | | | | | | | | | | | | | |
| S/W Reset | 00h | | | | | | | | | | | | | | | | | | |
| H/W Reset | 00h | | | | | | | | | | | | | | | | | | |

5.8.3. EXT Command Set Enable Register (FFh)

| Command Page | | | Page 5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|---|--------------|-----------|----|----|----|----|----|----|----|---------|-----------|---------------|--|--------|---|--------|-----------|--------|-----|--------|-----|--------|-----|--------|-----|--------|-----|--------|-----|--------|-----|--------|-----|---------|--------|----------|
| Address | Parameter | W/R | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default | | | | | | | | | | | | | | | | | | | | | | | | | | |
| FFh | 1st | W | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 98h | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 2nd | W | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 81h | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 3rd | W | PAGE[7:0] | | | | | | | | 05h | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Description | <p>PAGE[7:0]: Set the command page.</p> <table border="1"> <thead> <tr> <th>PAGE[7:0]</th> <th>Command Page</th> </tr> </thead> <tbody> <tr><td>00h</td><td>Page 0</td></tr> <tr><td>01h</td><td>Page 1</td></tr> <tr><td>02h</td><td>Page 2</td></tr> <tr><td>03h</td><td>Page 3</td></tr> <tr><td>04h</td><td>Page 4</td></tr> <tr><td>05h</td><td>Page 5</td></tr> <tr><td>06h</td><td>Page 6</td></tr> <tr><td>07h</td><td>Page 7</td></tr> <tr><td>08h</td><td>Page 8</td></tr> <tr><td>09h</td><td>Page 9</td></tr> <tr><td>0Ah</td><td>Page 10</td></tr> <tr><td>Others</td><td>Reserved</td></tr> </tbody> </table> <p>Set the register, 1st Parameter = 98h, 2nd Parameter = 81h, 3rd Parameter = Page value to enable "Page command set" available</p> <p>See section "5.1 Command Flow".</p> | | | | | | | | | | | PAGE[7:0] | Command Page | 00h | Page 0 | 01h | Page 1 | 02h | Page 2 | 03h | Page 3 | 04h | Page 4 | 05h | Page 5 | 06h | Page 6 | 07h | Page 7 | 08h | Page 8 | 09h | Page 9 | 0Ah | Page 10 | Others | Reserved |
| | PAGE[7:0] | Command Page | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 00h | Page 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 01h | Page 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 02h | Page 2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 03h | Page 3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 04h | Page 4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 05h | Page 5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 06h | Page 6 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 07h | Page 7 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 08h | Page 8 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 09h | Page 9 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 0Ah | Page 10 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Others | Reserved | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 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>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 | Sleep In | Yes | | | | | | | | | | | | | | | | | | |
| Status | Availability | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Normal Mode On, Idle Mode Off, Sleep Out | Yes | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Normal 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>05h</td> </tr> <tr> <td>S/W Reset</td> <td>05h</td> </tr> <tr> <td>H/W Reset</td> <td>05h</td> </tr> </tbody> </table> | | | | | | | | | | | Status | Default Value | Power On Sequence | 05h | S/W Reset | 05h | H/W Reset | 05h | | | | | | | | | | | | | | | | | | |
| Status | Default Value | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Power On Sequence | 05h | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| S/W Reset | 05h | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| H/W Reset | 05h | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

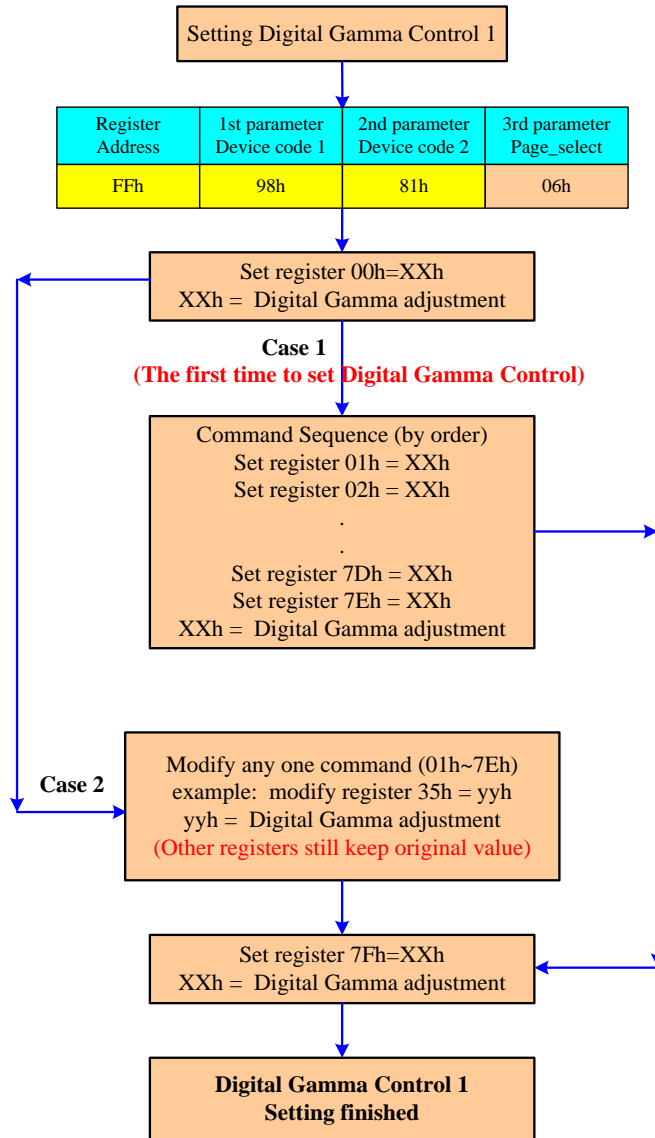
5.9. Page 6 Command Description

5.9.1. Fine Digital Gamma Control 2 (00h~7Fh)

| Command Page | | | Page 6 | | | | | | | | |
|--------------|-----------|-----|--------------|----|----|----|----|----|----|----|---------|
| Address | Parameter | W/R | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default |
| 00h | 1st | W | RDIN128[7:0] | | | | | | | | 00h |
| 01h | 1st | W | RDIN129[7:0] | | | | | | | | 00h |
| 02h | 1st | W | RDIN130[7:0] | | | | | | | | 00h |
| 03h | 1st | W | RDIN131[7:0] | | | | | | | | 00h |
| 04h | 1st | W | RDIN132[7:0] | | | | | | | | 00h |
| 05h | 1st | W | RDIN133[7:0] | | | | | | | | 00h |
| : | 1st | W | : | | | | | | | | 00h |
| 7Ah | 1st | W | RDIN250[7:0] | | | | | | | | 00h |
| 7Bh | 1st | W | RDIN251[7:0] | | | | | | | | 00h |
| 7Ch | 1st | W | RDIN252[7:0] | | | | | | | | 00h |
| 7Dh | 1st | W | RDIN253[7:0] | | | | | | | | 00h |
| 7Eh | 1st | W | RDIN254[7:0] | | | | | | | | 00h |
| 7Fh | 1st | W | RDIN255[7:0] | | | | | | | | 00h |

RDINx[7:0]: Digital Gamma Macro-adjustment registers for red gamma curve.

Description



Restriction

None

| <p>Register Availability</p> | <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>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 | Sleep In | Yes |
|--|---|--------|---------------|--|--------------------|---|--------------------|-----------|--------------------|
| Status | Availability | | | | | | | | |
| Normal Mode On, Idle Mode Off, Sleep Out | Yes | | | | | | | | |
| Normal Mode On, Idle Mode On, Sleep Out | Yes | | | | | | | | |
| Sleep In | Yes | | | | | | | | |
| <p>Default</p> | <table border="1"> <thead> <tr> <th>Status</th> <th>Default Value</th> </tr> </thead> <tbody> <tr> <td>Power On Sequence</td> <td>00h_00h_...00h_00h</td> </tr> <tr> <td>S/W Reset</td> <td>00h_00h_...00h_00h</td> </tr> <tr> <td>H/W Reset</td> <td>00h_00h_...00h_00h</td> </tr> </tbody> </table> | Status | Default Value | Power On Sequence | 00h_00h_...00h_00h | S/W Reset | 00h_00h_...00h_00h | H/W Reset | 00h_00h_...00h_00h |
| Status | Default Value | | | | | | | | |
| Power On Sequence | 00h_00h_...00h_00h | | | | | | | | |
| S/W Reset | 00h_00h_...00h_00h | | | | | | | | |
| H/W Reset | 00h_00h_...00h_00h | | | | | | | | |

5.9.2. EXTC Command Set Enable Register (FFh)

| Command Page | | | Page 6 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|---|--------------|-----------|----|----|----|----|----|----|----|---------|-----------|---------------|--|--------|---|--------|-----------|--------|-----|--------|-----|--------|-----|--------|-----|--------|-----|--------|-----|--------|-----|--------|-----|---------|--------|----------|
| Address | Parameter | W/R | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default | | | | | | | | | | | | | | | | | | | | | | | | | | |
| FFh | 1st | W | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 98h | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 2nd | W | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 81h | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 3rd | W | PAGE[7:0] | | | | | | | | 06h | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Description | <p>PAGE[7:0]: Set the command page.</p> <table border="1"> <thead> <tr> <th>PAGE[7:0]</th> <th>Command Page</th> </tr> </thead> <tbody> <tr><td>00h</td><td>Page 0</td></tr> <tr><td>01h</td><td>Page 1</td></tr> <tr><td>02h</td><td>Page 2</td></tr> <tr><td>03h</td><td>Page 3</td></tr> <tr><td>04h</td><td>Page 4</td></tr> <tr><td>05h</td><td>Page 5</td></tr> <tr><td>06h</td><td>Page 6</td></tr> <tr><td>07h</td><td>Page 7</td></tr> <tr><td>08h</td><td>Page 8</td></tr> <tr><td>09h</td><td>Page 9</td></tr> <tr><td>0Ah</td><td>Page 10</td></tr> <tr><td>Others</td><td>Reserved</td></tr> </tbody> </table> <p>Set the register, 1st Parameter = 98h, 2nd Parameter = 81h, 3rd Parameter = Page value to enable "Page command set" available</p> <p>See section "5.1 Command Flow".</p> | | | | | | | | | | | PAGE[7:0] | Command Page | 00h | Page 0 | 01h | Page 1 | 02h | Page 2 | 03h | Page 3 | 04h | Page 4 | 05h | Page 5 | 06h | Page 6 | 07h | Page 7 | 08h | Page 8 | 09h | Page 9 | 0Ah | Page 10 | Others | Reserved |
| | PAGE[7:0] | Command Page | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 00h | Page 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 01h | Page 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 02h | Page 2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 03h | Page 3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 04h | Page 4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 05h | Page 5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 06h | Page 6 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 07h | Page 7 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 08h | Page 8 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 09h | Page 9 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 0Ah | Page 10 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Others | Reserved | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 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>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 | Sleep In | Yes | | | | | | | | | | | | | | | | | | |
| Status | Availability | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Normal Mode On, Idle Mode Off, Sleep Out | Yes | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Normal 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>06h</td> </tr> <tr> <td>S/W Reset</td> <td>06h</td> </tr> <tr> <td>H/W Reset</td> <td>06h</td> </tr> </tbody> </table> | | | | | | | | | | | Status | Default Value | Power On Sequence | 06h | S/W Reset | 06h | H/W Reset | 06h | | | | | | | | | | | | | | | | | | |
| Status | Default Value | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Power On Sequence | 06h | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| S/W Reset | 06h | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| H/W Reset | 06h | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

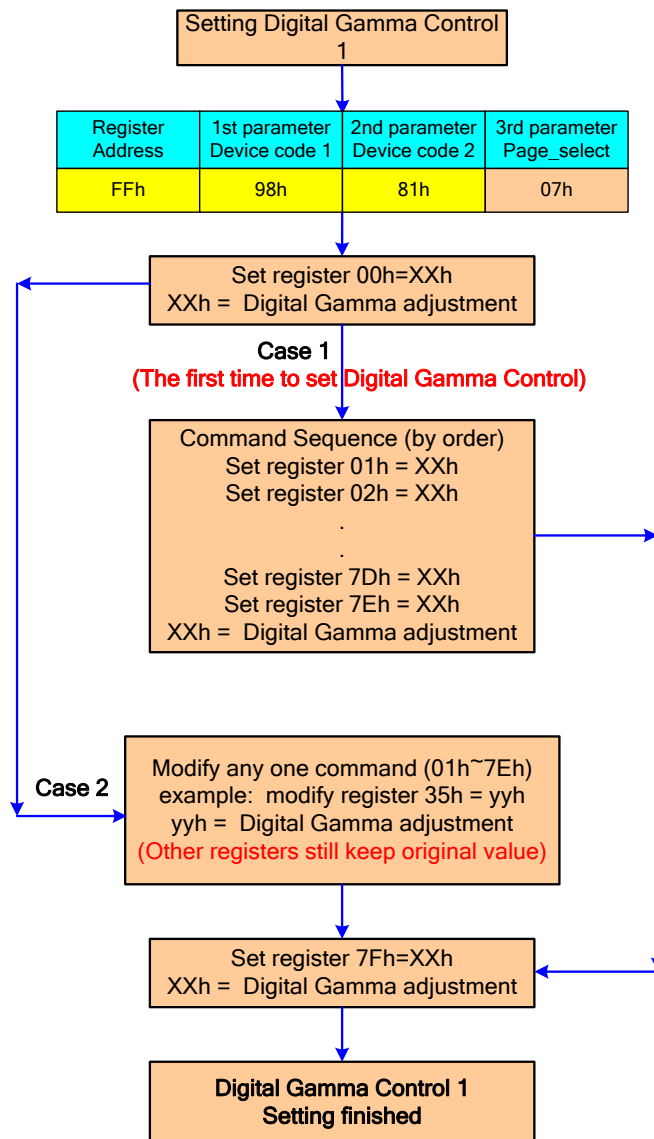
5.10. Page 7 Command Description

5.10.1. Fine Digital Gamma Control 3 (00h~7Fh)

| Command Page | | | Page 7 | | | | | | | | |
|--------------|-----------|-----|--------------|----|----|----|----|----|----|----|---------|
| Address | Parameter | W/R | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default |
| 00h | 1st | W | GDIN0[7:0] | | | | | | | | 00h |
| 01h | 1st | W | GDIN1[7:0] | | | | | | | | 00h |
| 02h | 1st | W | GDIN2[7:0] | | | | | | | | 00h |
| 03h | 1st | W | GDIN3[7:0] | | | | | | | | 00h |
| 04h | 1st | W | GDIN4[7:0] | | | | | | | | 00h |
| 05h | 1st | W | GDIN5[7:0] | | | | | | | | 00h |
| : | 1st | W | : | | | | | | | | 00h |
| 7Ah | 1st | W | GDIN122[7:0] | | | | | | | | 00h |
| 7Bh | 1st | W | GDIN123[7:0] | | | | | | | | 00h |
| 7Ch | 1st | W | GDIN124[7:0] | | | | | | | | 00h |
| 7Dh | 1st | W | GDIN125[7:0] | | | | | | | | 00h |
| 7Eh | 1st | W | GDIN126[7:0] | | | | | | | | 00h |
| 7Fh | 1st | W | GDIN127[7:0] | | | | | | | | 00h |

GDINx[7:0]: Digital Gamma Macro-adjustment registers for green gamma curve.

Description



Restriction

None

| <p>Register Availability</p> | <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>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 | Sleep In | Yes |
|--|---|--------|---------------|--|-------------------|---|-------------------|-----------|-------------------|
| Status | Availability | | | | | | | | |
| Normal Mode On, Idle Mode Off, Sleep Out | Yes | | | | | | | | |
| Normal Mode On, Idle Mode On, Sleep Out | Yes | | | | | | | | |
| Sleep In | Yes | | | | | | | | |
| <p>Default</p> | <table border="1"> <thead> <tr> <th>Status</th> <th>Default Value</th> </tr> </thead> <tbody> <tr> <td>Power On Sequence</td> <td>00h_00h...00h_00h</td> </tr> <tr> <td>S/W Reset</td> <td>00h_00h...00h_00h</td> </tr> <tr> <td>H/W Reset</td> <td>00h_00h...00h_00h</td> </tr> </tbody> </table> | Status | Default Value | Power On Sequence | 00h_00h...00h_00h | S/W Reset | 00h_00h...00h_00h | H/W Reset | 00h_00h...00h_00h |
| Status | Default Value | | | | | | | | |
| Power On Sequence | 00h_00h...00h_00h | | | | | | | | |
| S/W Reset | 00h_00h...00h_00h | | | | | | | | |
| H/W Reset | 00h_00h...00h_00h | | | | | | | | |

5.10.2. EXTC Command Set Enable Register (FFh)

| Command Page | | | Page 7 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|---|--------------|-----------|----|----|----|----|----|----|----|---------|-----------|---------------|--|--------|---|--------|-----------|--------|-----|--------|-----|--------|-----|--------|-----|--------|-----|--------|-----|--------|-----|--------|-----|---------|--------|----------|
| Address | Parameter | W/R | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default | | | | | | | | | | | | | | | | | | | | | | | | | | |
| FFh | 1st | W | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 98h | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 2nd | W | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 81h | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 3rd | W | PAGE[7:0] | | | | | | | | 07h | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Description | <p>PAGE[7:0]: Set the command page.</p> <table border="1"> <thead> <tr> <th>PAGE[7:0]</th> <th>Command Page</th> </tr> </thead> <tbody> <tr><td>00h</td><td>Page 0</td></tr> <tr><td>01h</td><td>Page 1</td></tr> <tr><td>02h</td><td>Page 2</td></tr> <tr><td>03h</td><td>Page 3</td></tr> <tr><td>04h</td><td>Page 4</td></tr> <tr><td>05h</td><td>Page 5</td></tr> <tr><td>06h</td><td>Page 6</td></tr> <tr><td>07h</td><td>Page 7</td></tr> <tr><td>08h</td><td>Page 8</td></tr> <tr><td>09h</td><td>Page 9</td></tr> <tr><td>0Ah</td><td>Page 10</td></tr> <tr><td>Others</td><td>Reserved</td></tr> </tbody> </table> <p>Set the register, 1st Parameter = 98h, 2nd Parameter = 81h, 3rd Parameter = Page value to enable "Page command set" available</p> <p>See section "5.1 Command Flow".</p> | | | | | | | | | | | PAGE[7:0] | Command Page | 00h | Page 0 | 01h | Page 1 | 02h | Page 2 | 03h | Page 3 | 04h | Page 4 | 05h | Page 5 | 06h | Page 6 | 07h | Page 7 | 08h | Page 8 | 09h | Page 9 | 0Ah | Page 10 | Others | Reserved |
| | PAGE[7:0] | Command Page | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 00h | Page 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 01h | Page 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 02h | Page 2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 03h | Page 3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 04h | Page 4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 05h | Page 5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 06h | Page 6 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 07h | Page 7 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 08h | Page 8 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 09h | Page 9 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 0Ah | Page 10 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Others | Reserved | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 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>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 | Sleep In | Yes | | | | | | | | | | | | | | | | | | |
| Status | Availability | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Normal Mode On, Idle Mode Off, Sleep Out | Yes | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Normal 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>07h</td> </tr> <tr> <td>S/W Reset</td> <td>07h</td> </tr> <tr> <td>H/W Reset</td> <td>07h</td> </tr> </tbody> </table> | | | | | | | | | | | Status | Default Value | Power On Sequence | 07h | S/W Reset | 07h | H/W Reset | 07h | | | | | | | | | | | | | | | | | | |
| Status | Default Value | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Power On Sequence | 07h | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| S/W Reset | 07h | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| H/W Reset | 07h | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

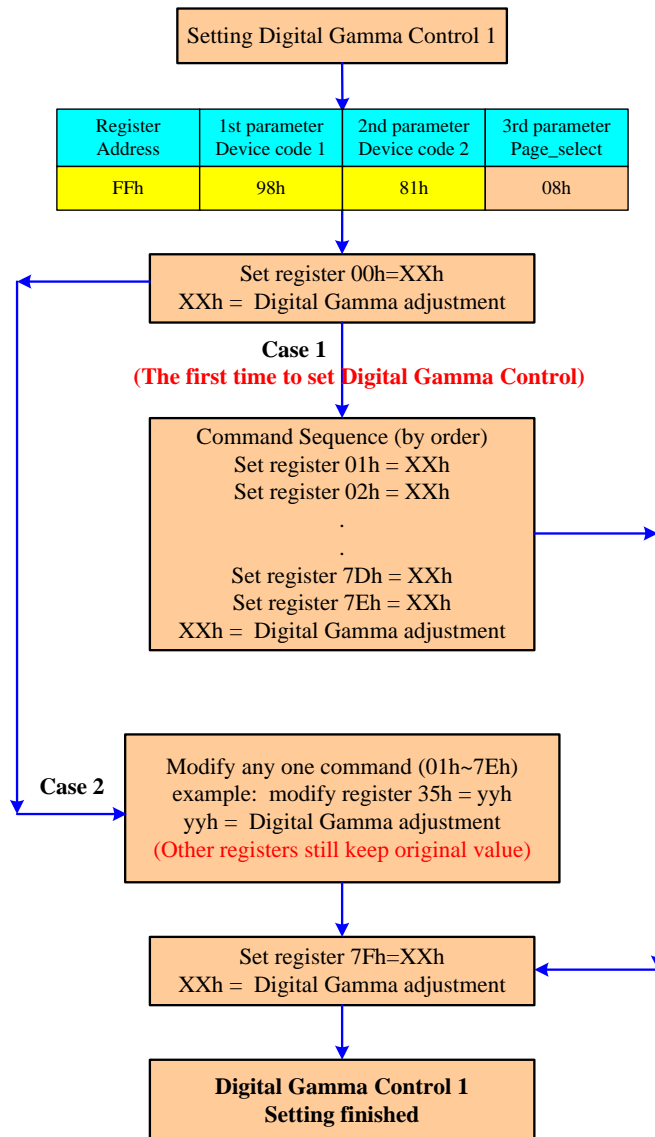
5.11. Page 8 Command Description

5.11.1. Fine Digital Gamma Control 4 (00h~7Fh)

| Command Page | | | Page 8 | | | | | | | | |
|--------------|-----------|-----|--------------|----|----|----|----|----|----|----|---------|
| Address | Parameter | W/R | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default |
| 00h | 1st | W | GDIN128[7:0] | | | | | | | | 00h |
| 01h | 1st | W | GDIN129[7:0] | | | | | | | | 00h |
| 02h | 1st | W | GDIN130[7:0] | | | | | | | | 00h |
| 03h | 1st | W | GDIN131[7:0] | | | | | | | | 00h |
| 04h | 1st | W | GDIN132[7:0] | | | | | | | | 00h |
| 05h | 1st | W | GDIN133[7:0] | | | | | | | | 00h |
| : | 1st | W | : | | | | | | | | 00h |
| 7Ah | 1st | W | GDIN250[7:0] | | | | | | | | 00h |
| 7Bh | 1st | W | GDIN251[7:0] | | | | | | | | 00h |
| 7Ch | 1st | W | GDIN252[7:0] | | | | | | | | 00h |
| 7Dh | 1st | W | GDIN253[7:0] | | | | | | | | 00h |
| 7Eh | 1st | W | GDIN254[7:0] | | | | | | | | 00h |
| 7Fh | 1st | W | GDIN255[7:0] | | | | | | | | 00h |

GDINx[7:0]: Digital Gamma Macro-adjustment registers for green gamma curve.

Description



Restriction

None

| <p>Register Availability</p> | <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>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 | Sleep In | Yes |
|--|---|--------|---------------|--|-------------------|---|-------------------|-----------|-------------------|
| Status | Availability | | | | | | | | |
| Normal Mode On, Idle Mode Off, Sleep Out | Yes | | | | | | | | |
| Normal Mode On, Idle Mode On, Sleep Out | Yes | | | | | | | | |
| Sleep In | Yes | | | | | | | | |
| <p>Default</p> | <table border="1"> <thead> <tr> <th>Status</th> <th>Default Value</th> </tr> </thead> <tbody> <tr> <td>Power On Sequence</td> <td>00h_00h...00h_00h</td> </tr> <tr> <td>S/W Reset</td> <td>00h_00h...00h_00h</td> </tr> <tr> <td>H/W Reset</td> <td>00h_00h...00h_00h</td> </tr> </tbody> </table> | Status | Default Value | Power On Sequence | 00h_00h...00h_00h | S/W Reset | 00h_00h...00h_00h | H/W Reset | 00h_00h...00h_00h |
| Status | Default Value | | | | | | | | |
| Power On Sequence | 00h_00h...00h_00h | | | | | | | | |
| S/W Reset | 00h_00h...00h_00h | | | | | | | | |
| H/W Reset | 00h_00h...00h_00h | | | | | | | | |

5.11.2. EXTC Command Set Enable Register (FFh)

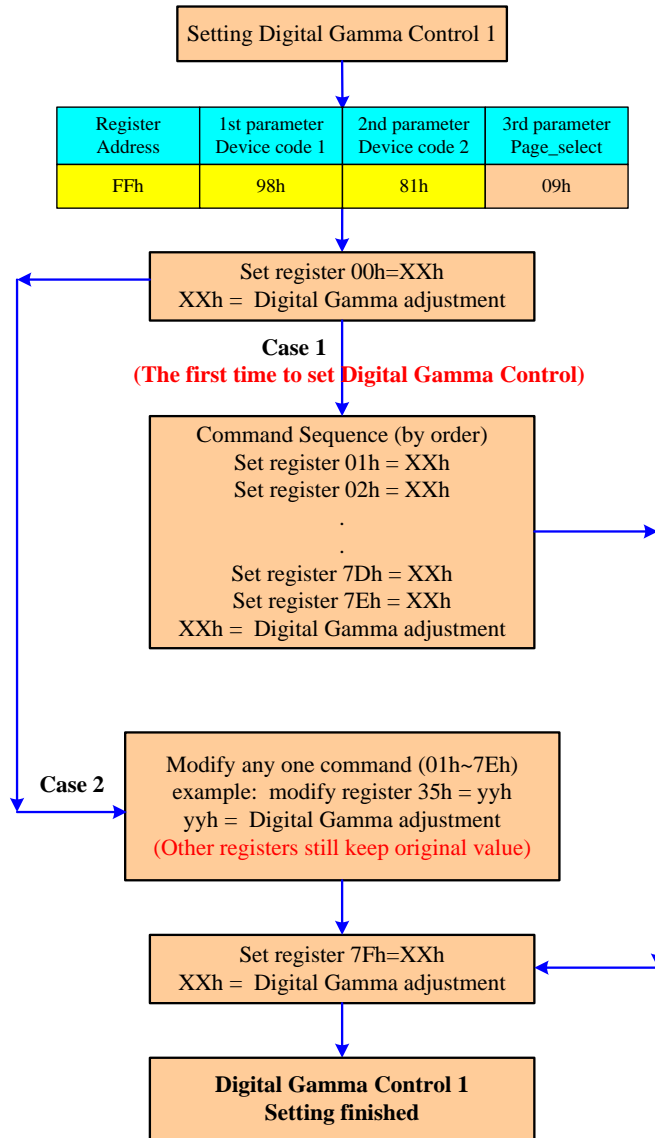
| Command Page | | | Page 8 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|---|--------------|-----------|----|----|----|----|----|----|----|---------|-----------|---------------|--|--------|---|--------|-----------|--------|-----|--------|-----|--------|-----|--------|-----|--------|-----|--------|-----|--------|-----|--------|-----|---------|--------|----------|
| Address | Parameter | W/R | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default | | | | | | | | | | | | | | | | | | | | | | | | | | |
| FFh | 1st | W | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 98h | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 2nd | W | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 81h | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 3rd | W | PAGE[7:0] | | | | | | | | 08h | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Description | <p>PAGE[7:0]: Set the command page.</p> <table border="1"> <thead> <tr> <th>PAGE[7:0]</th> <th>Command Page</th> </tr> </thead> <tbody> <tr><td>00h</td><td>Page 0</td></tr> <tr><td>01h</td><td>Page 1</td></tr> <tr><td>02h</td><td>Page 2</td></tr> <tr><td>03h</td><td>Page 3</td></tr> <tr><td>04h</td><td>Page 4</td></tr> <tr><td>05h</td><td>Page 5</td></tr> <tr><td>06h</td><td>Page 6</td></tr> <tr><td>07h</td><td>Page 7</td></tr> <tr><td>08h</td><td>Page 8</td></tr> <tr><td>09h</td><td>Page 9</td></tr> <tr><td>0Ah</td><td>Page 10</td></tr> <tr><td>Others</td><td>Reserved</td></tr> </tbody> </table> <p>Set the register, 1st Parameter = 98h, 2nd Parameter = 81h, 3rd Parameter = Page value to enable "Page command set" available</p> <p>See section "5.1 Command Flow".</p> | | | | | | | | | | | PAGE[7:0] | Command Page | 00h | Page 0 | 01h | Page 1 | 02h | Page 2 | 03h | Page 3 | 04h | Page 4 | 05h | Page 5 | 06h | Page 6 | 07h | Page 7 | 08h | Page 8 | 09h | Page 9 | 0Ah | Page 10 | Others | Reserved |
| | PAGE[7:0] | Command Page | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 00h | Page 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 01h | Page 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 02h | Page 2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 03h | Page 3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 04h | Page 4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 05h | Page 5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 06h | Page 6 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 07h | Page 7 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 08h | Page 8 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 09h | Page 9 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 0Ah | Page 10 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Others | Reserved | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 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>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 | Sleep In | Yes | | | | | | | | | | | | | | | | | | |
| Status | Availability | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Normal Mode On, Idle Mode Off, Sleep Out | Yes | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Normal 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>08h</td> </tr> <tr> <td>S/W Reset</td> <td>08h</td> </tr> <tr> <td>H/W Reset</td> <td>08h</td> </tr> </tbody> </table> | | | | | | | | | | | Status | Default Value | Power On Sequence | 08h | S/W Reset | 08h | H/W Reset | 08h | | | | | | | | | | | | | | | | | | |
| Status | Default Value | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Power On Sequence | 08h | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| S/W Reset | 08h | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| H/W Reset | 08h | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

5.12. Page 9 Command Description
5.12.1. Fine Digital Gamma Control 5 (00h~7Fh)

| Command Page | | | Page 9 | | | | | | | | |
|--------------|-----------|-----|--------------|----|----|----|----|----|----|----|---------|
| Address | Parameter | W/R | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default |
| 00h | 1st | W | BDIN0[7:0] | | | | | | | | 00h |
| 01h | 1st | W | BDIN1[7:0] | | | | | | | | 00h |
| 02h | 1st | W | BDIN2[7:0] | | | | | | | | 00h |
| 03h | 1st | W | BDIN3[7:0] | | | | | | | | 00h |
| 04h | 1st | W | BDIN4[7:0] | | | | | | | | 00h |
| 05h | 1st | W | BDIN5[7:0] | | | | | | | | 00h |
| : | 1st | W | : | | | | | | | | 00h |
| 7Ah | 1st | W | BDIN122[7:0] | | | | | | | | 00h |
| 7Bh | 1st | W | BDIN123[7:0] | | | | | | | | 00h |
| 7Ch | 1st | W | BDIN124[7:0] | | | | | | | | 00h |
| 7Dh | 1st | W | BDIN125[7:0] | | | | | | | | 00h |
| 7Eh | 1st | W | BDIN126[7:0] | | | | | | | | 00h |
| 7Fh | 1st | W | BDIN127[7:0] | | | | | | | | 00h |

BDINx[7:0]: Digital Gamma Macro-adjustment registers for blue gamma curve.

Description



Restriction None

| <p>Register Availability</p> | <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>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 | Sleep In | Yes |
|--|--|--------|---------------|--|-------------------|---|-------------------|-----------|-------------------|
| Status | Availability | | | | | | | | |
| Normal Mode On, Idle Mode Off, Sleep Out | Yes | | | | | | | | |
| Normal Mode On, Idle Mode On, Sleep Out | Yes | | | | | | | | |
| Sleep In | Yes | | | | | | | | |
| <p>Default</p> | <table border="1"> <thead> <tr> <th>Status</th> <th>Default Value</th> </tr> </thead> <tbody> <tr> <td>Power On Sequence</td> <td>00h_00h...00h_00h</td> </tr> <tr> <td>S/W Reset</td> <td>00h_00h...00h_00h</td> </tr> <tr> <td>H/W Reset</td> <td>00h_00h...00h_00h</td> </tr> </tbody> </table> | Status | Default Value | Power On Sequence | 00h_00h...00h_00h | S/W Reset | 00h_00h...00h_00h | H/W Reset | 00h_00h...00h_00h |
| Status | Default Value | | | | | | | | |
| Power On Sequence | 00h_00h...00h_00h | | | | | | | | |
| S/W Reset | 00h_00h...00h_00h | | | | | | | | |
| H/W Reset | 00h_00h...00h_00h | | | | | | | | |

5.12.2. EXTC Command Set Enable Register (FFh)

| Command Page | | | Page 9 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|---|--------------|-----------|----|----|----|----|----|----|----|---------|-----------|---------------|--|--------|---|--------|-----------|--------|-----|--------|-----|--------|-----|--------|-----|--------|-----|--------|-----|--------|-----|--------|-----|---------|--------|----------|
| Address | Parameter | W/R | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default | | | | | | | | | | | | | | | | | | | | | | | | | | |
| FFh | 1st | W | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 98h | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 2nd | W | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 81h | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 3rd | W | PAGE[7:0] | | | | | | | | 09h | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Description | <p>PAGE[7:0]: Set the command page.</p> <table border="1"> <thead> <tr> <th>PAGE[7:0]</th> <th>Command Page</th> </tr> </thead> <tbody> <tr><td>00h</td><td>Page 0</td></tr> <tr><td>01h</td><td>Page 1</td></tr> <tr><td>02h</td><td>Page 2</td></tr> <tr><td>03h</td><td>Page 3</td></tr> <tr><td>04h</td><td>Page 4</td></tr> <tr><td>05h</td><td>Page 5</td></tr> <tr><td>06h</td><td>Page 6</td></tr> <tr><td>07h</td><td>Page 7</td></tr> <tr><td>08h</td><td>Page 8</td></tr> <tr><td>09h</td><td>Page 9</td></tr> <tr><td>0Ah</td><td>Page 10</td></tr> <tr><td>Others</td><td>Reserved</td></tr> </tbody> </table> <p>Set the register, 1st Parameter = 98h, 2nd Parameter = 81h, 3rd Parameter = Page value to enable "Page command set" available</p> <p>See section "5.1 Command Flow".</p> | | | | | | | | | | | PAGE[7:0] | Command Page | 00h | Page 0 | 01h | Page 1 | 02h | Page 2 | 03h | Page 3 | 04h | Page 4 | 05h | Page 5 | 06h | Page 6 | 07h | Page 7 | 08h | Page 8 | 09h | Page 9 | 0Ah | Page 10 | Others | Reserved |
| | PAGE[7:0] | Command Page | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 00h | Page 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 01h | Page 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 02h | Page 2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 03h | Page 3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 04h | Page 4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 05h | Page 5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 06h | Page 6 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 07h | Page 7 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 08h | Page 8 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 09h | Page 9 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 0Ah | Page 10 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Others | Reserved | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 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>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 | Sleep In | Yes | | | | | | | | | | | | | | | | | | |
| Status | Availability | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Normal Mode On, Idle Mode Off, Sleep Out | Yes | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Normal 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>09h</td> </tr> <tr> <td>S/W Reset</td> <td>09h</td> </tr> <tr> <td>H/W Reset</td> <td>09h</td> </tr> </tbody> </table> | | | | | | | | | | | Status | Default Value | Power On Sequence | 09h | S/W Reset | 09h | H/W Reset | 09h | | | | | | | | | | | | | | | | | | |
| Status | Default Value | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Power On Sequence | 09h | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| S/W Reset | 09h | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| H/W Reset | 09h | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

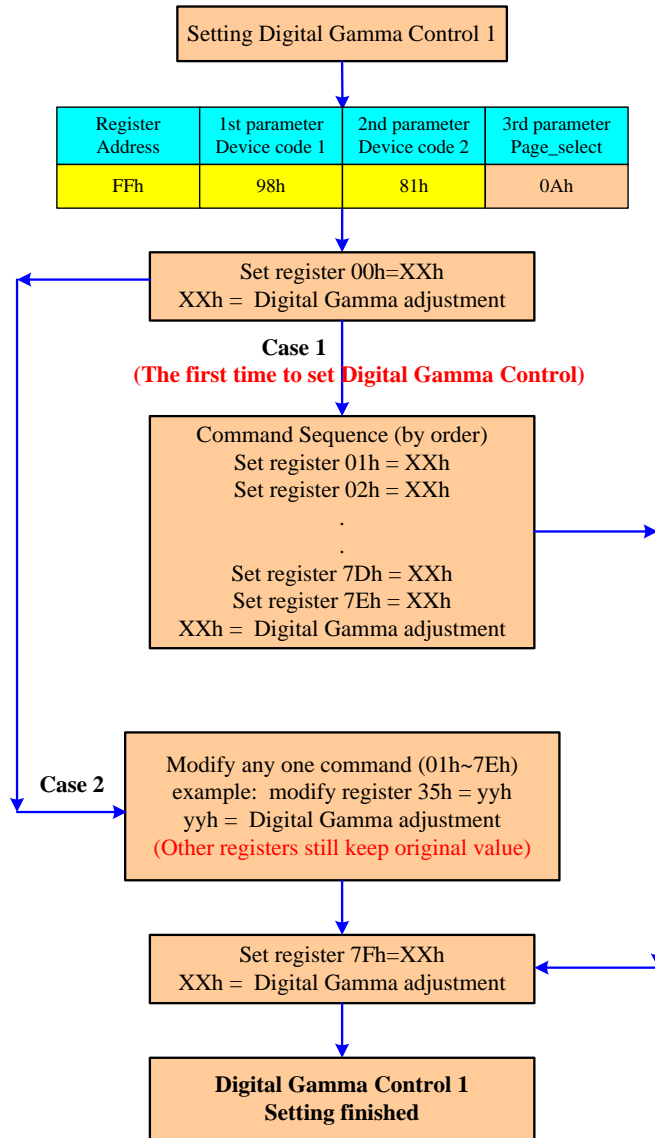
5.13. Page 10 Command Description

5.13.1. Fine Digital Gamma Control 6 (00h~7Fh)

| Command Page | | | Page 10 | | | | | | | | |
|--------------|-----------|-----|--------------|----|----|----|----|----|----|----|---------|
| Address | Parameter | W/R | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default |
| 00h | 1st | W | BDIN128[7:0] | | | | | | | | 00h |
| 01h | 1st | W | BDIN129[7:0] | | | | | | | | 00h |
| 02h | 1st | W | BDIN130[7:0] | | | | | | | | 00h |
| 03h | 1st | W | BDIN131[7:0] | | | | | | | | 00h |
| 04h | 1st | W | BDIN132[7:0] | | | | | | | | 00h |
| 05h | 1st | W | BDIN133[7:0] | | | | | | | | 00h |
| : | 1st | W | : | | | | | | | | 00h |
| 7Ah | 1st | W | BDIN250[7:0] | | | | | | | | 00h |
| 7Bh | 1st | W | BDIN251[7:0] | | | | | | | | 00h |
| 7Ch | 1st | W | BDIN252[7:0] | | | | | | | | 00h |
| 7Dh | 1st | W | BDIN253[7:0] | | | | | | | | 00h |
| 7Eh | 1st | W | BDIN254[7:0] | | | | | | | | 00h |
| 7Fh | 1st | W | BDIN255[7:0] | | | | | | | | 00h |

BDINx[7:0]: Digital Gamma Macro-adjustment registers for blue gamma curve.

Description



Restriction

None

| <p>Register Availability</p> | <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>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 | Sleep In | Yes |
|--|---|--------|---------------|--|-------------------|---|-------------------|-----------|-------------------|
| Status | Availability | | | | | | | | |
| Normal Mode On, Idle Mode Off, Sleep Out | Yes | | | | | | | | |
| Normal Mode On, Idle Mode On, Sleep Out | Yes | | | | | | | | |
| Sleep In | Yes | | | | | | | | |
| <p>Default</p> | <table border="1"> <thead> <tr> <th>Status</th> <th>Default Value</th> </tr> </thead> <tbody> <tr> <td>Power On Sequence</td> <td>00h_00h...00h_00h</td> </tr> <tr> <td>S/W Reset</td> <td>00h_00h...00h_00h</td> </tr> <tr> <td>H/W Reset</td> <td>00h_00h...00h_00h</td> </tr> </tbody> </table> | Status | Default Value | Power On Sequence | 00h_00h...00h_00h | S/W Reset | 00h_00h...00h_00h | H/W Reset | 00h_00h...00h_00h |
| Status | Default Value | | | | | | | | |
| Power On Sequence | 00h_00h...00h_00h | | | | | | | | |
| S/W Reset | 00h_00h...00h_00h | | | | | | | | |
| H/W Reset | 00h_00h...00h_00h | | | | | | | | |

5.13.2. EXTC Command Set Enable Register (FFh)

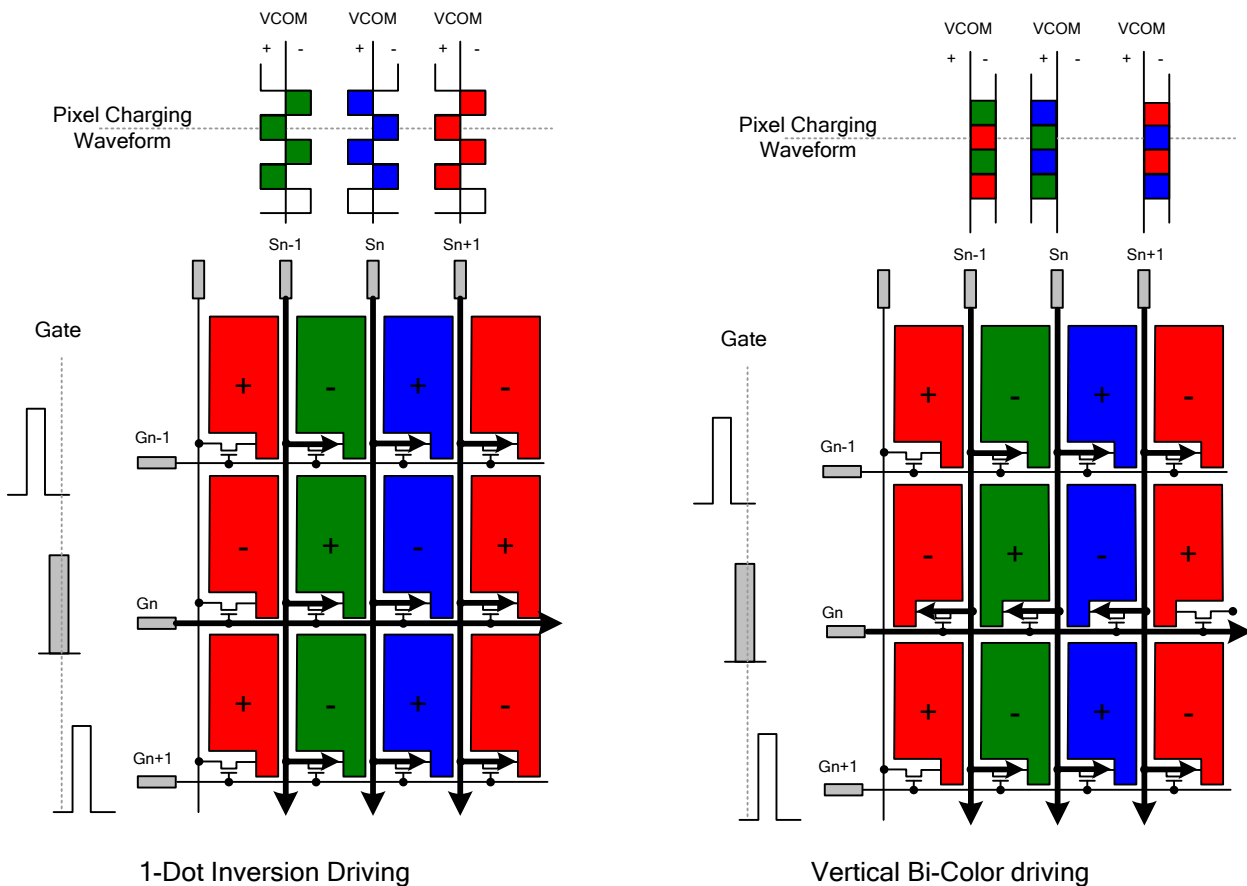
| Command Page | | | Page 10 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|---|--------------|-----------|----|----|----|----|----|----|----|---------|-----------|---------------|--|--------|---|--------|-----------|--------|-----|--------|-----|--------|-----|--------|-----|--------|-----|--------|-----|--------|-----|--------|-----|---------|--------|----------|
| Address | Parameter | W/R | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default | | | | | | | | | | | | | | | | | | | | | | | | | | |
| FFh | 1st | W | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 98h | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 2nd | W | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 81h | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 3rd | W | PAGE[7:0] | | | | | | | | 0Ah | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Description | <p>PAGE[7:0]: Set the command page.</p> <table border="1"> <thead> <tr> <th>PAGE[7:0]</th> <th>Command Page</th> </tr> </thead> <tbody> <tr><td>00h</td><td>Page 0</td></tr> <tr><td>01h</td><td>Page 1</td></tr> <tr><td>02h</td><td>Page 2</td></tr> <tr><td>03h</td><td>Page 3</td></tr> <tr><td>04h</td><td>Page 4</td></tr> <tr><td>05h</td><td>Page 5</td></tr> <tr><td>06h</td><td>Page 6</td></tr> <tr><td>07h</td><td>Page 7</td></tr> <tr><td>08h</td><td>Page 8</td></tr> <tr><td>09h</td><td>Page 9</td></tr> <tr><td>0Ah</td><td>Page 10</td></tr> <tr><td>Others</td><td>Reserved</td></tr> </tbody> </table> <p>Set the register, 1st Parameter = 98h, 2nd Parameter = 81h, 3rd Parameter = Page value to enable "Page command set" available</p> <p>See section "5.1 Command Flow".</p> | | | | | | | | | | | PAGE[7:0] | Command Page | 00h | Page 0 | 01h | Page 1 | 02h | Page 2 | 03h | Page 3 | 04h | Page 4 | 05h | Page 5 | 06h | Page 6 | 07h | Page 7 | 08h | Page 8 | 09h | Page 9 | 0Ah | Page 10 | Others | Reserved |
| | PAGE[7:0] | Command Page | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 00h | Page 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 01h | Page 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 02h | Page 2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 03h | Page 3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 04h | Page 4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 05h | Page 5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 06h | Page 6 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 07h | Page 7 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 08h | Page 8 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 09h | Page 9 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 0Ah | Page 10 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Others | Reserved | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 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>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 | Sleep In | Yes | | | | | | | | | | | | | | | | | | |
| Status | Availability | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Normal Mode On, Idle Mode Off, Sleep Out | Yes | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Normal 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>0Ah</td> </tr> <tr> <td>S/W Reset</td> <td>0Ah</td> </tr> <tr> <td>H/W Reset</td> <td>0Ah</td> </tr> </tbody> </table> | | | | | | | | | | | Status | Default Value | Power On Sequence | 0Ah | S/W Reset | 0Ah | H/W Reset | 0Ah | | | | | | | | | | | | | | | | | | |
| Status | Default Value | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Power On Sequence | 0Ah | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| S/W Reset | 0Ah | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| H/W Reset | 0Ah | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

6. Source Driver

The source driver uses 2402 channels (S1~S2400 and SDUM[2:1] channels) for the Zig-zag function used for driving the source line of the TFT LCD panel. The source driver converts the digital data into the analog voltage and generates corresponding gray scale voltage output, enabling up to 16.7M colors to be displayed simultaneously. The output circuit of this source driver incorporates an operational amplifier, so that a positive and a negative voltage can be alternately outputted from each channel.

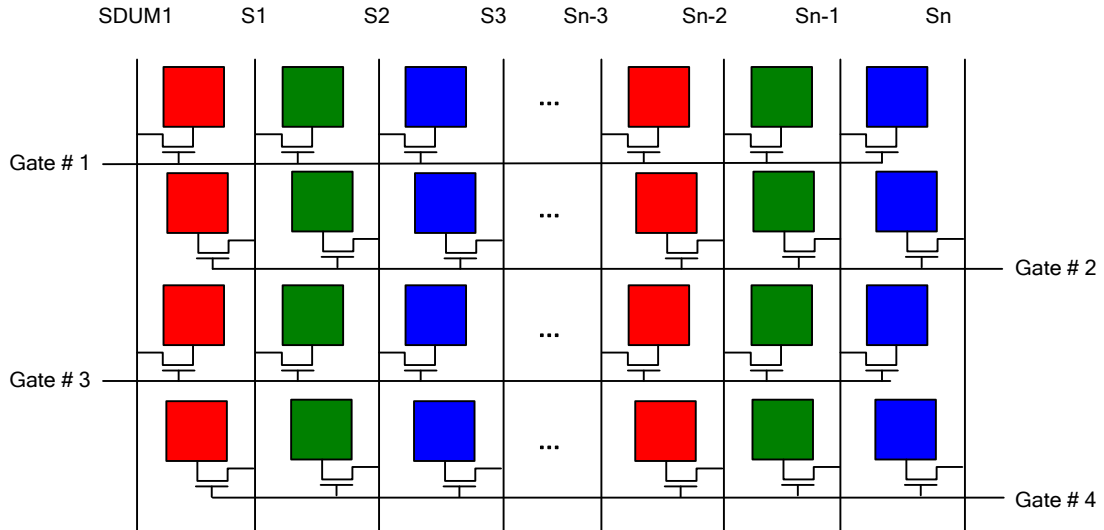
6.1. Zig-zag Inversion

Zig-zag Inversion is used to reduce the power consumption. The Zig-zag inversion decreases the switching frequency of the source related to the magnitude of power consumption. This method will have an addendum data line, SDUM.

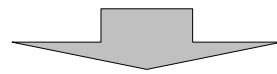
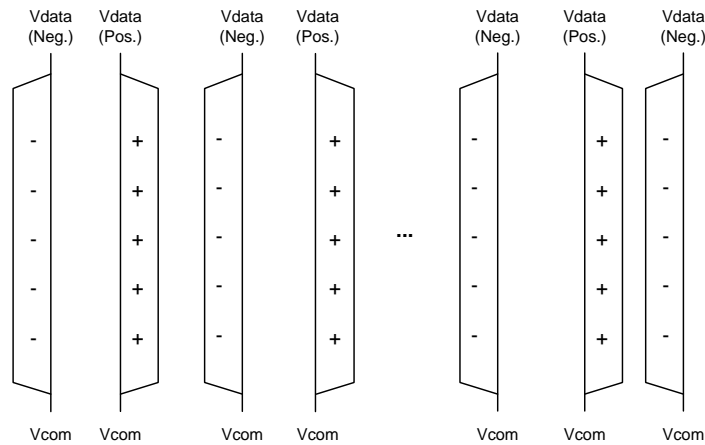


6.2. Zig-zag Inversion Concept

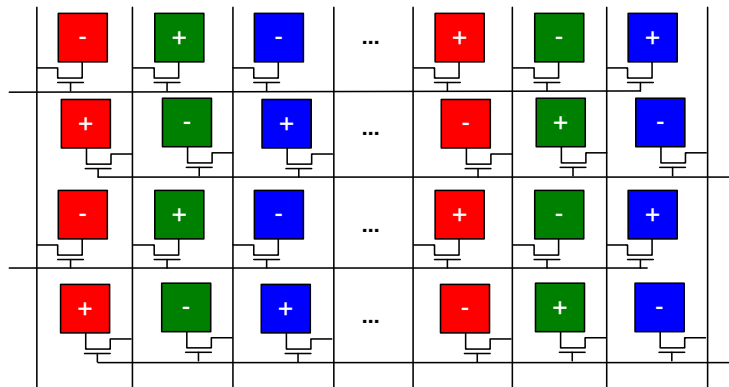
The Zig-zag method uses the same polarity of data line of the column inversion to show the 1-dot inversion.



Column Inversion



1-Dot Inversion



6.3. Zig-zag Inversion Source Output Method

The driving panel display method adds one sub-pixel at the Gate_Even to shift the data output.
(At the Gate_Even line, an additional data line is utilized.)

Red Pattern

| | SDUM1 | S1 | S2 | S3 | S4 | S5 |
|-----------|-------|----|----|----|----|----|
| Gate_Odd | R1 | G1 | B1 | R2 | G2 | B2 |
| Gate_Even | | R1 | G1 | B1 | R2 | G2 |
| Gate_Odd | R1 | G1 | B1 | R2 | G2 | B2 |
| Gate_Even | | R1 | G1 | B1 | R2 | G2 |
| Gate_Odd | R1 | G1 | B1 | R2 | G2 | B2 |
| Gate_Even | | R1 | G1 | B1 | R2 | G2 |

| | Sn-5 | Sn-4 | Sn-3 | Sn-2 | Sn-1 | Sn |
|------|------|------|------|------|------|----|
| Gx-1 | Bx-1 | Rx | Gx | Bx | | |
| Rx-1 | Gx-1 | Bx-1 | Rx | Gx | Bx | |
| Gx-1 | Bx-1 | Rx | Gx | Bx | | |
| Rx-1 | Gx-1 | Bx-1 | Rx | Gx | Bx | |
| Gx-1 | Bx-1 | Rx | Gx | Bx | | |
| Rx-1 | Gx-1 | Bx-1 | Rx | Gx | Bx | |

Green Pattern

| | SDUM1 | S1 | S2 | S3 | S4 | S5 |
|-----------|-------|----|----|----|----|----|
| Gate_Odd | R1 | G1 | B1 | R2 | G2 | B2 |
| Gate_Even | | R1 | G1 | B1 | R2 | G2 |
| Gate_Odd | R1 | G1 | B1 | R2 | G2 | B2 |
| Gate_Even | | R1 | G1 | B1 | R2 | G2 |
| Gate_Odd | R1 | G1 | B1 | R2 | G2 | B2 |
| Gate_Even | | R1 | G1 | B1 | R2 | G2 |

| | Sn-5 | Sn-4 | Sn-3 | Sn-2 | Sn-1 | Sn |
|------|------|------|------|------|------|----|
| Gx-1 | Bx-1 | Rx | Gx | Bx | | |
| Rx-1 | Gx-1 | Bx-1 | Rx | Gx | Bx | |
| Gx-1 | Bx-1 | Rx | Gx | Bx | | |
| Rx-1 | Gx-1 | Bx-1 | Rx | Gx | Bx | |
| Gx-1 | Bx-1 | Rx | Gx | Bx | | |
| Rx-1 | Gx-1 | Bx-1 | Rx | Gx | Bx | |

Blue Pattern

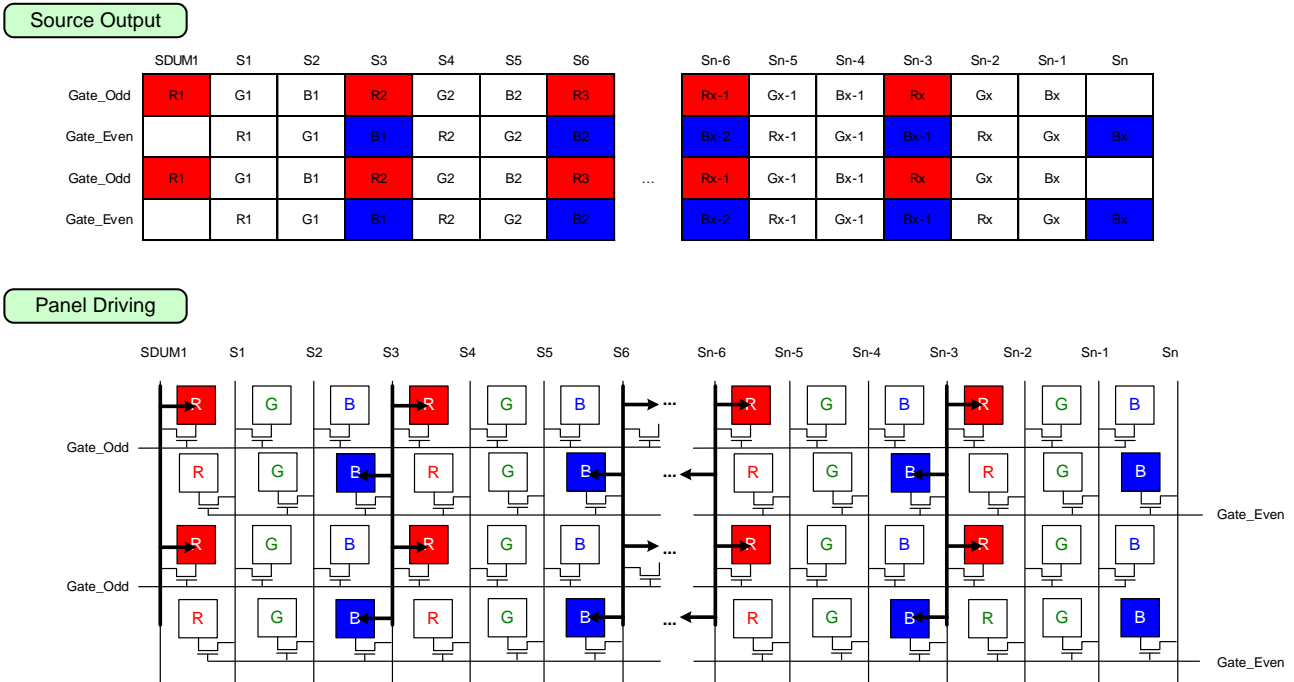
| | SDUM1 | S1 | S2 | S3 | S4 | S5 |
|-----------|-------|----|----|----|----|----|
| Gate_Odd | R1 | G1 | B1 | R2 | G2 | B2 |
| Gate_Even | | R1 | G1 | B1 | R2 | G2 |
| Gate_Odd | R1 | G1 | B1 | R2 | G2 | B2 |
| Gate_Even | | R1 | G1 | B1 | R2 | G2 |
| Gate_Odd | R1 | G1 | B1 | R2 | G2 | B2 |
| Gate_Even | | R1 | G1 | B1 | R2 | G2 |

| | Sn-5 | Sn-4 | Sn-3 | Sn-2 | Sn-1 | Sn |
|------|------|------|------|------|------|----|
| Gx-1 | Bx-1 | Rx | Gx | Bx | | |
| Rx-1 | Gx-1 | Bx-1 | Rx | Gx | Bx | |
| Gx-1 | Bx-1 | Rx | Gx | Bx | | |
| Rx-1 | Gx-1 | Bx-1 | Rx | Gx | Bx | |
| Gx-1 | Bx-1 | Rx | Gx | Bx | | |
| Rx-1 | Gx-1 | Bx-1 | Rx | Gx | Bx | |

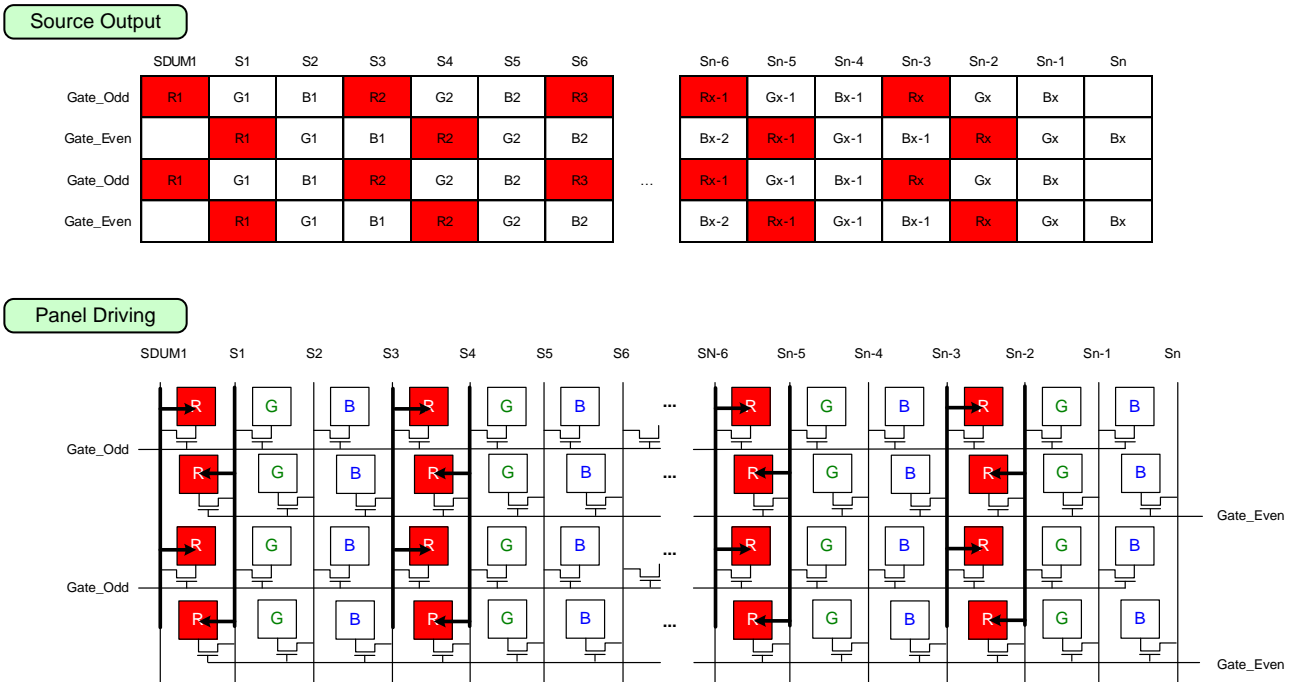
6.4. Zig-zag Inversion RED Data Display

The figure below illustrates the Zig-zag inversion panel driving method for Red data input.

When driving a Red pattern, the Red and Blue sub-pixels will light up line by line according to the data signal input.



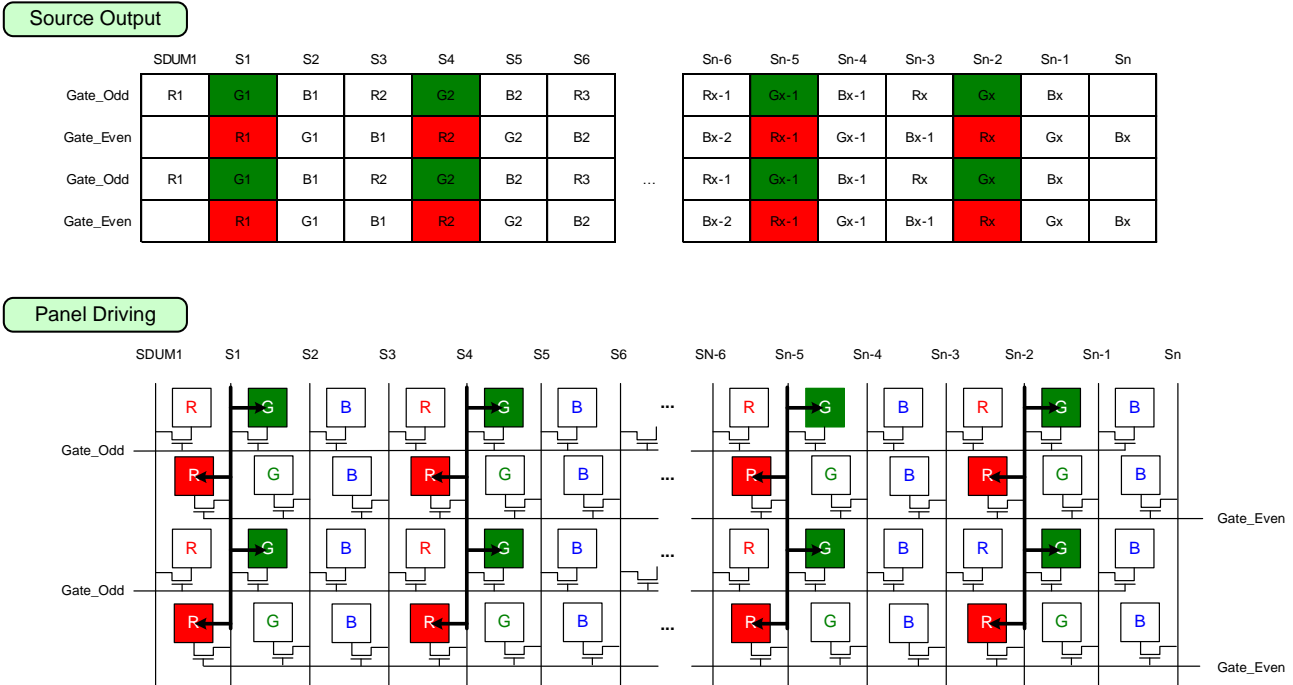
The figure below is the Zig-zag inversion panel driving method. The panel will be driven by the Red data input of the Gate_Odd and the Green data input of the Gate_Even.



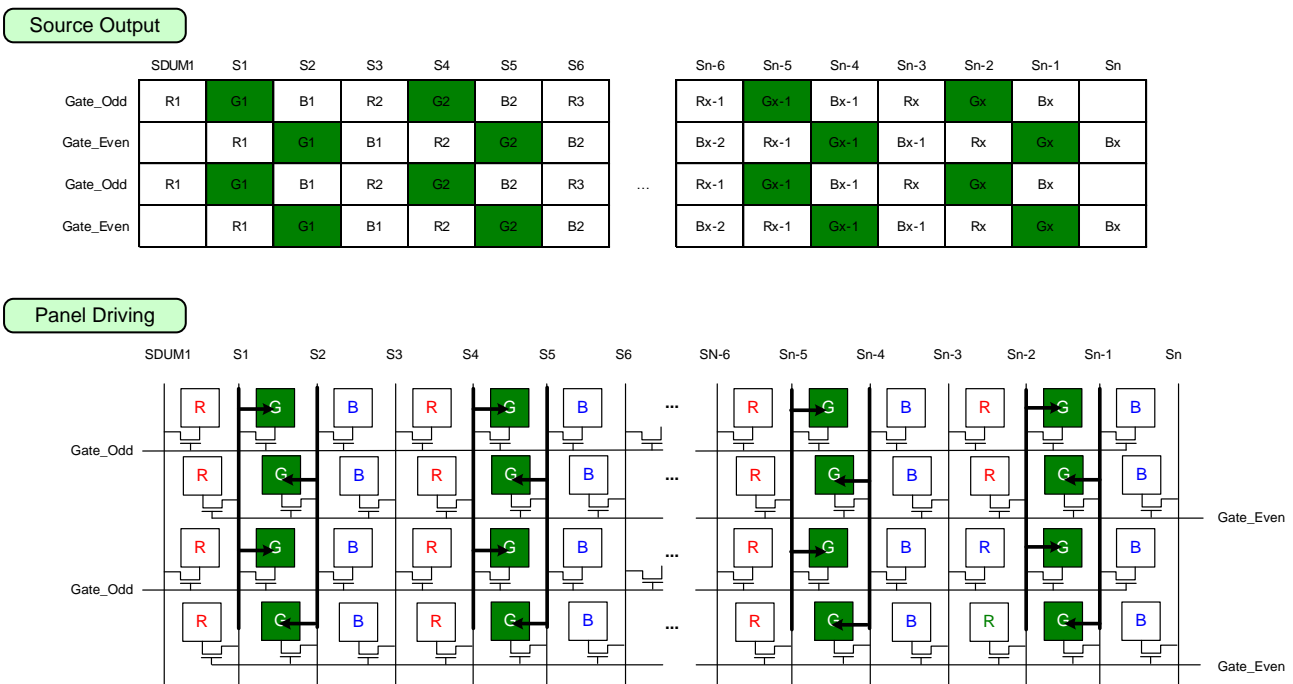
6.5. Zig-zag Inversion GREEN Data Display

The figure below illustrates the Zig-zag inversion panel driving method for Green data input.

When driving a Green pattern, the Green and Red sub-pixels will light up line by line according to the data signal input.



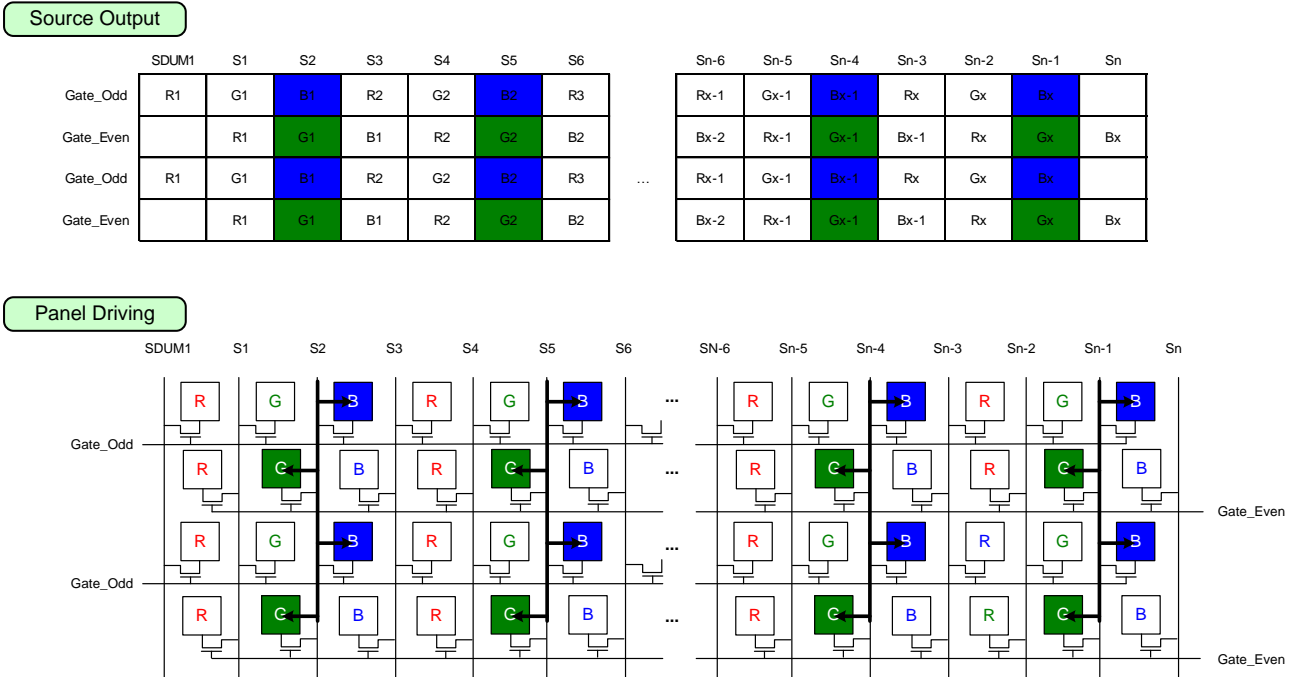
The figure below is the Zig-zag inversion panel driving method. The panel will be driven by the Green data input of the Gate_Odd and the Blue data input of the Gate_Even.



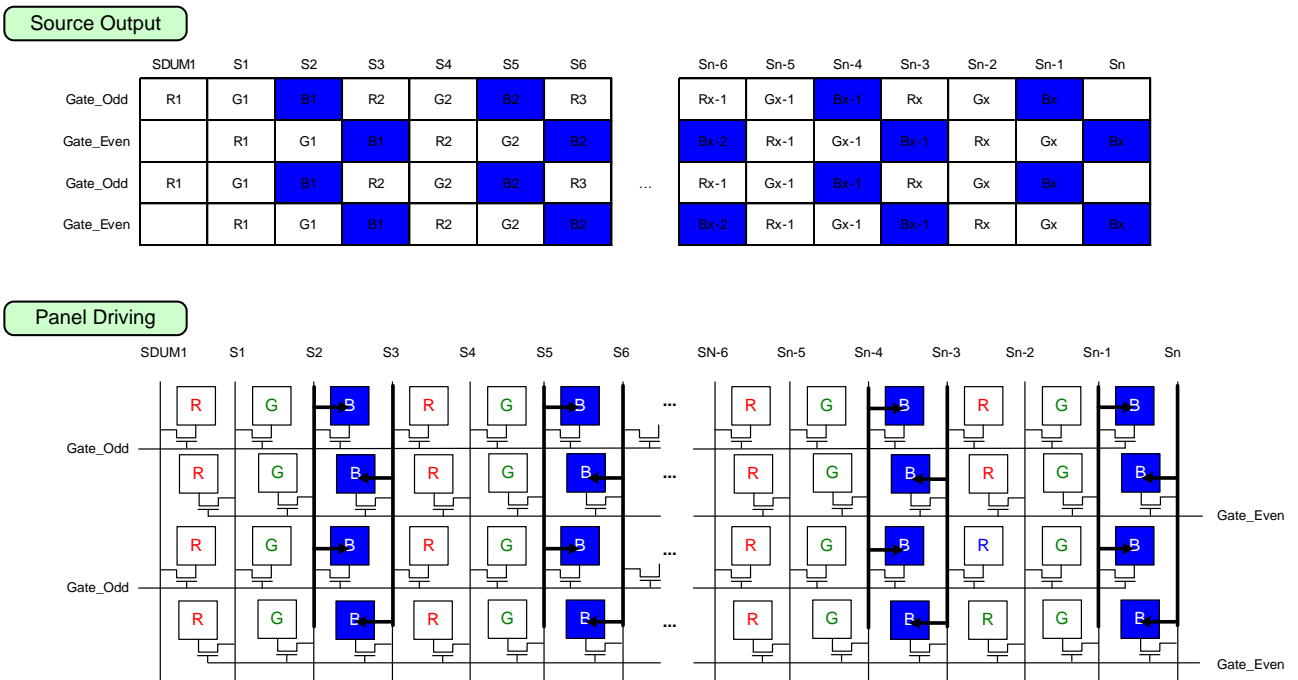
6.6. Zig-zag Inversion BLUE Data Display

The figure below illustrates the Zig-zag inversion panel driving method for Blue data input.

When driving a Blue pattern, the Blue and Green sub-pixels will light up line by line according to the data signal input.

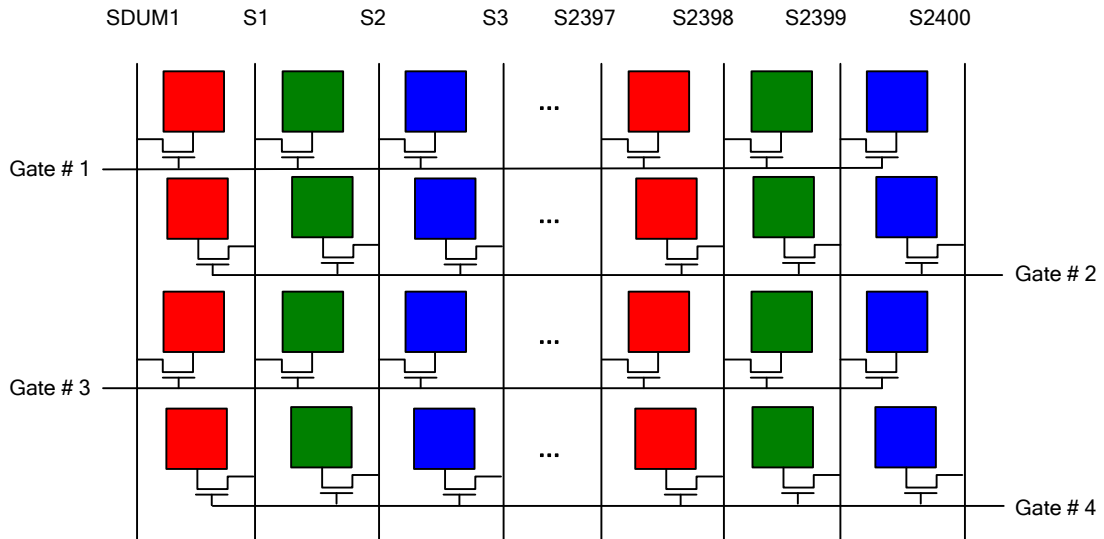


The figure below is the Zig-zag inversion panel driving method. The panel will be driven by the Blue data input of the Gate_Odd and the Red data input of the Gate_Even.

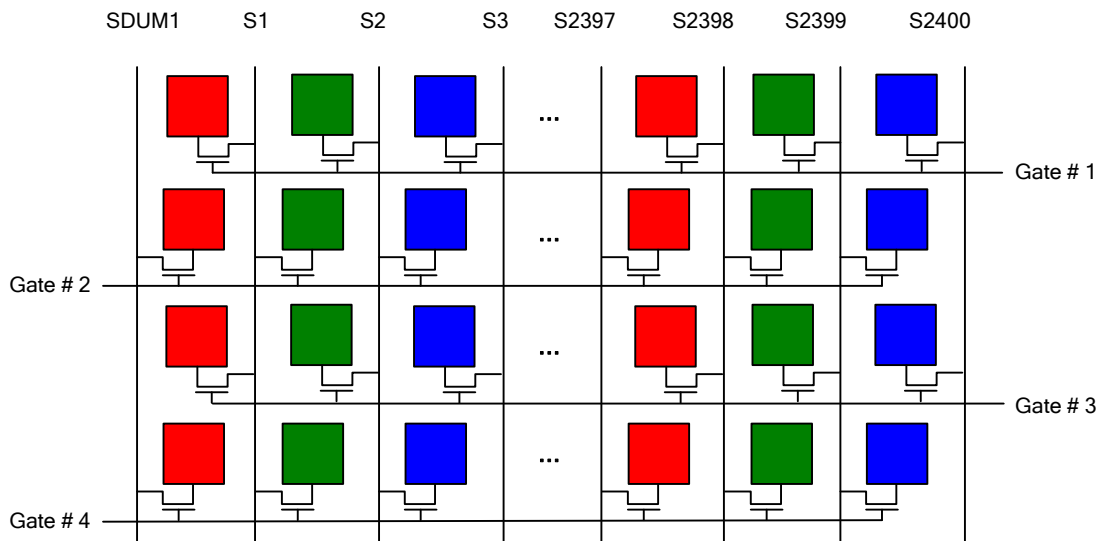


6.7. Different Zig-zag Type Panel

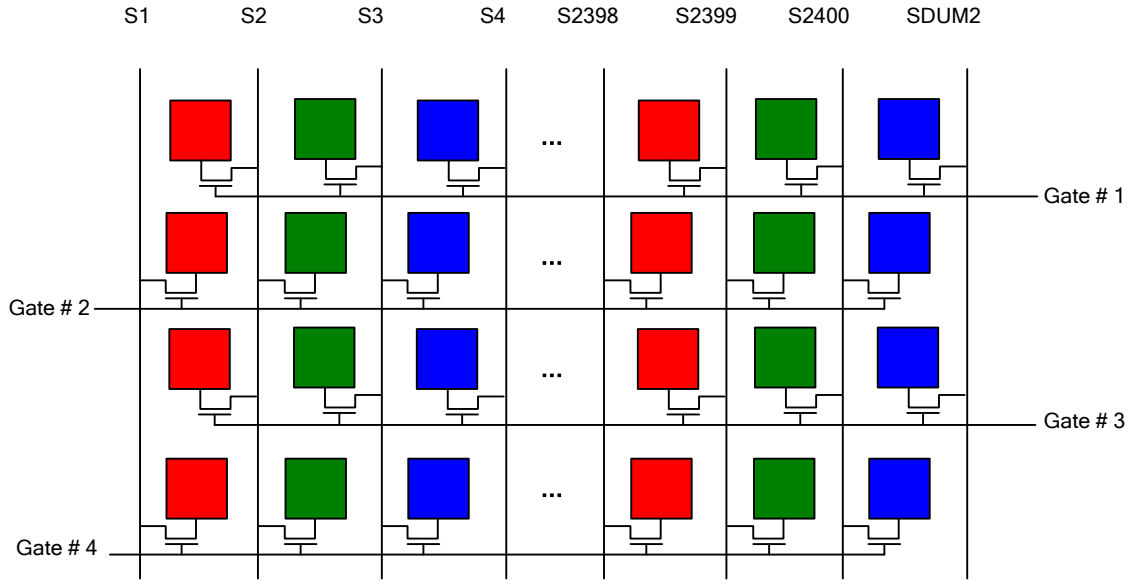
Zig-zag Type 1 (NLA[3:0] = 9h)



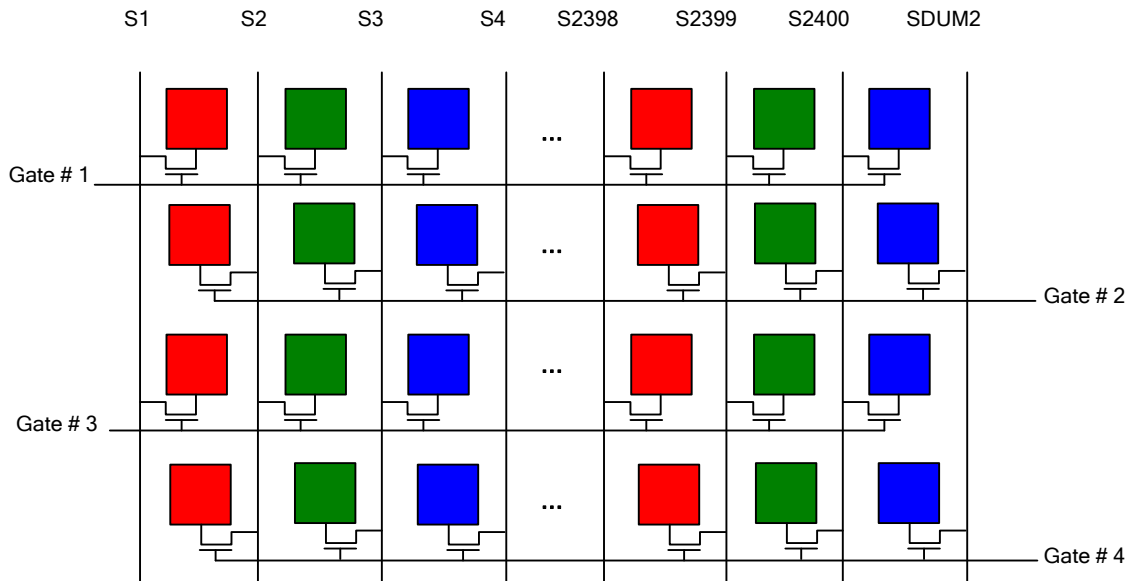
Zig-zag Type 2 (NLA[3:0] = Ah)



Zig-zag Type 3 (NLA[3:0] = Bh)



Zig-zag Type 4 (NLA[3:0] = Ch)



7. Enter/Exit Idle Mode Flow

7.1. Enter/Exit Idle Mode Flow

Input data format in Idle Mode shall use uncompressed 24 bit/pixel Writing and full-frame pixel data are carried in command mode using Memory Write Start and Memory Write Continue commands.

Following figure describes sequence to enter Idle Mode .

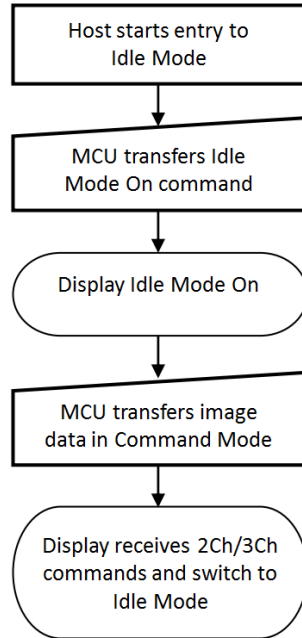


Figure 92: Enter Idle Mode Flow

Following figure describes sequence to exit Idle Mode and switch back to Video Mode operation.

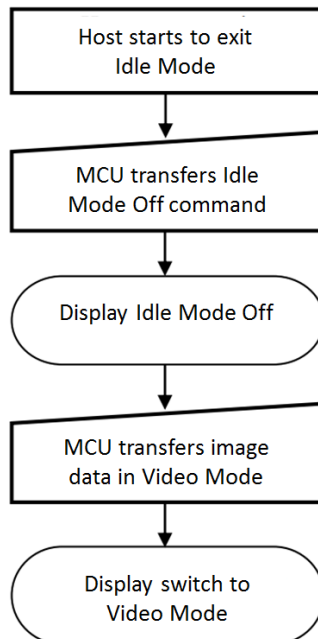


Figure 93: Exit Idle Mode Flow

7.2. Enter/Exit Idle Mode sequence

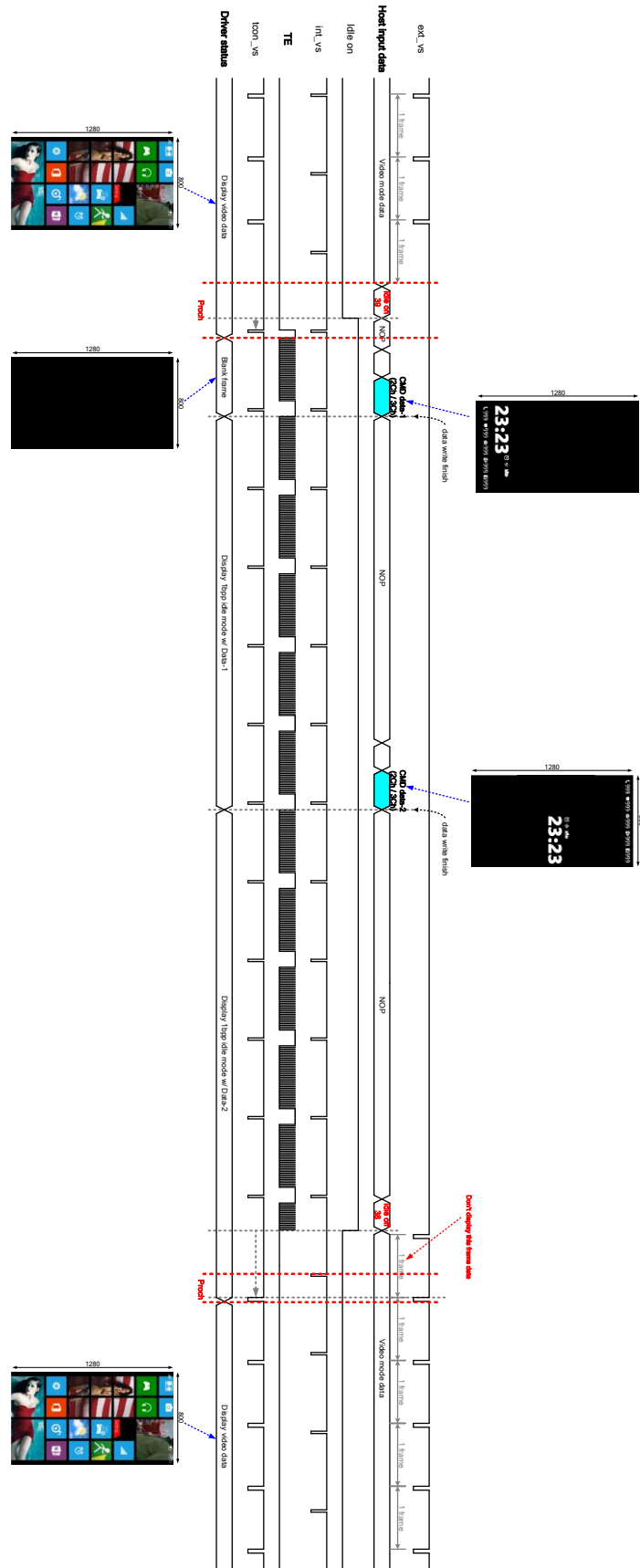
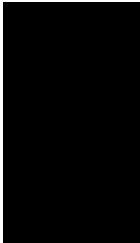
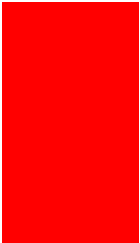
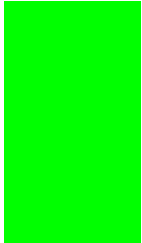
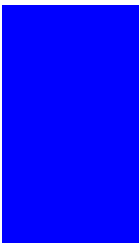
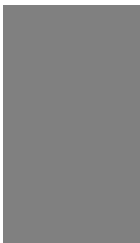

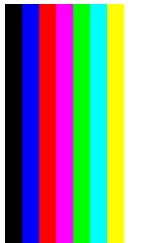


Figure 94: Enter/Exit Idle Mode Sequence

8. BIST Mode Function

8.1. BIST Mode Pattern

Table 33: BIST Mode Pattern

| | | | |
|--|---|--|---|
| FRM_PT[0] White | FRM_PT[1]  Black | FRM_PT[2]  Red | FRM_PT[3]  Green |
| FRM_PT[4]  Blue | FRM_PT[5]  Gray128 | FRM_PT[6]  Gray127 | FRM_PT[7]  V-Color bar |

9. Content Adaptive Brightness Control (CABC) Function

The CABC, a dynamic backlight control function, drastically reduces the power consumption of the luminance source. The ILI9881C will refer the gray scale content of the display image to output in PWM waveform then to the LED driver for backlight brightness control. The content of gray scale can be increased while simultaneously lowering the brightness of the backlight to achieve the same perceived brightness. The adjusted gray level scale and the power consumption reduction depend on the content of the image.

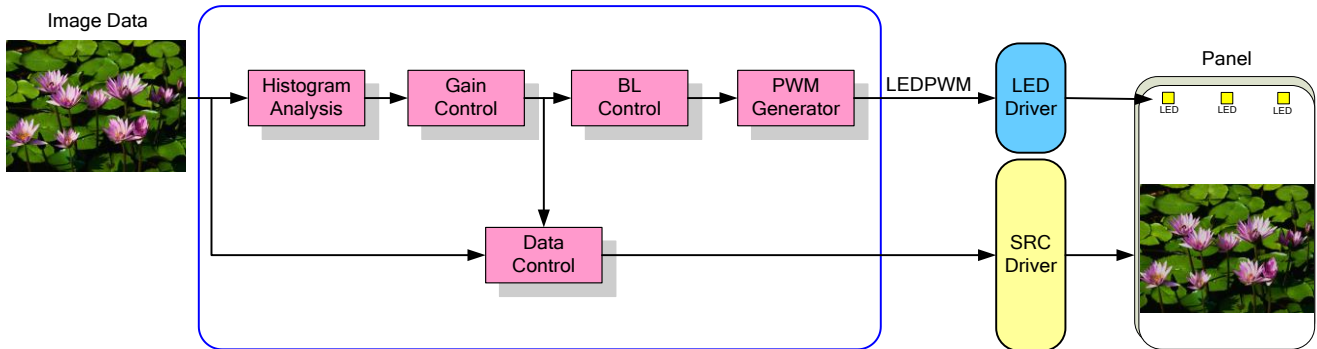


Figure 95: CABC Block Diagram

The ILI9881C can calculate the backlight brightness level and send a PWM_OUT pulse to the LED driver via LEDPWM pin for backlight brightness control purposes. The PWM frequency can be adjusted by PWM_DIV parameters, and the calculating equation is shown below:

$$f_{LEDPWM} = \frac{32 \text{ MHz}}{(\text{PWM_DIV}[7:0] + 1) \times \text{PWM_DUTY_PRECISION}}$$

Figure 96 is the basic timing diagram which is applied from the ILI9881C in order to control the LED driver.

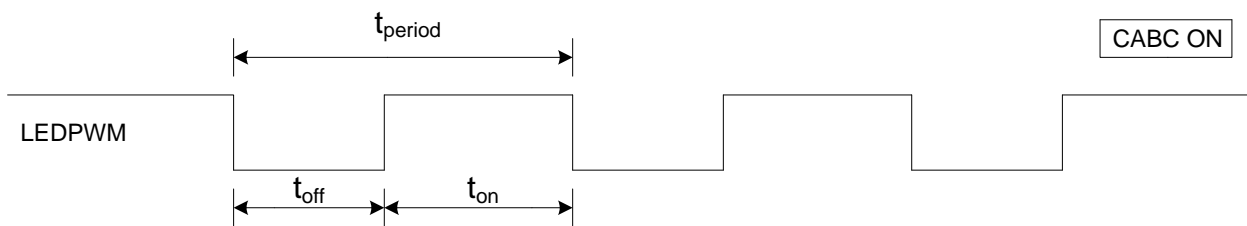


Figure 96: PWM OUT On/Off Period

10. Color Enhancement Function

10.1. Saturation Enhancement

The ILI9881C provides the saturation enhancement to make the image content more vivid. The main concept in this feature is to enhance the color information on HSL domain, which includes the saturation information of each different color, show as Figure 97(a). The user can simply adjust the saturation enhancement level by setting command 55h. In this design, it also provides the saturation enhancement for each different color-axis, show as Figure 97(b).

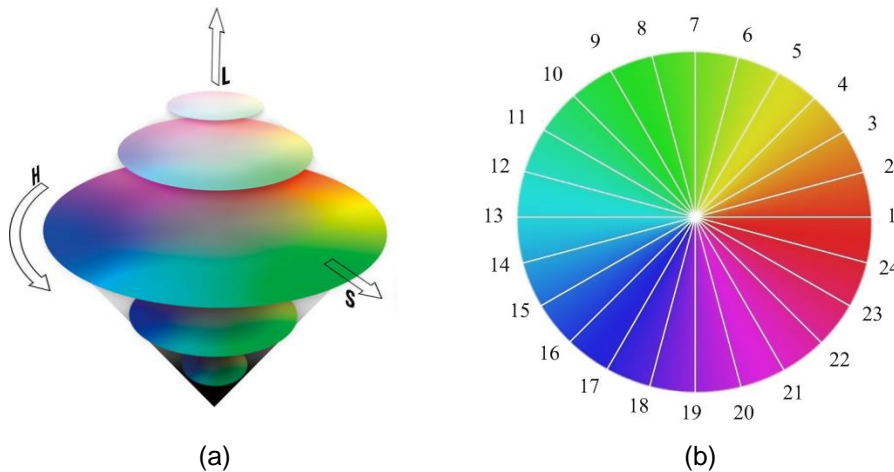


Figure 97: Saturation Enhancement (a) HSL model, (b) the definition of 24 color-axis.

The user can define the saturation enhancement level for each color-axis through the command, such as red, yellow, green, cyan, blue, magenta (24 color-axis), the example of enhancement application shows in Figure 98

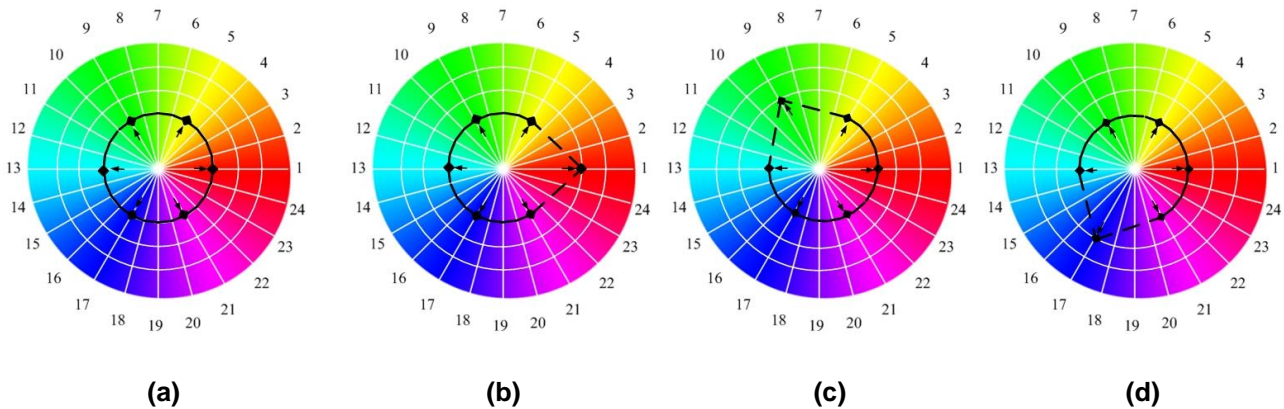


Figure 98: Saturation Enhancement (a) All color-axis with same level, (b) higher level in red-axis, (c) higher level in green-axis (d) higher level in blue-axis.

In Figure 99, there is an example for saturation enhancement. Different enhancement levels being applied in this example.



Figure 99: Saturation Enhancement Image (a) Original, (b) Low Level, (c) Medium Level, (d) High Level.

10.2. Contrast Enhancement

The contrast between the dark and light, indicate the clarity of the image content. In this design, it provides contrast enhancement to increase the difference between dark and light to achieve the high contrast image. The user can select the enhancement level by setting command, the example shows below.

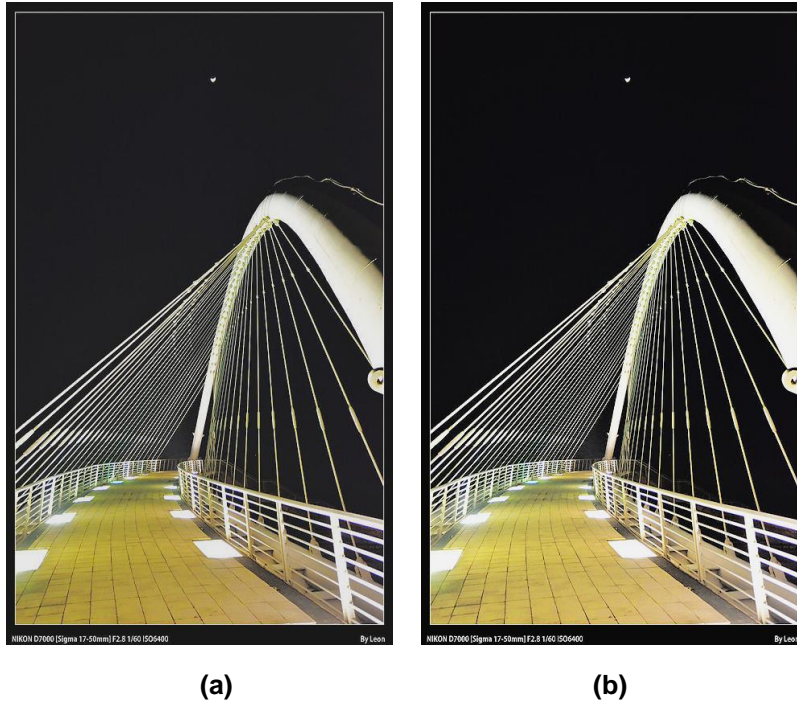


Figure 100: Contrast Enhancement Image (a) Original, (b) After enhancement

10.3. Sharpness Enhancement

Sharpness enhancement is provided to enhance the image visibility. Unlike contrast enhancement, sharpness enhancement is to strengthen the object's edge to make the object more clearly. The user can select the enhancement level by setting command, the example shows below.



Figure 101: Sharpness Enhancement Image (a) Original, (b) After enhancement

10.4. Sunlight Readability

The sunlight readability is in order to achieve high visibility in daylight or other bright light condition. Figure 102 shows the main concept of the influence of ambient light to the LCD displayer and the solution in the high ambient light condition. In this design, it changes the image content to achieve the high visibility in the ambient light condition as shows in Figure 102(b).

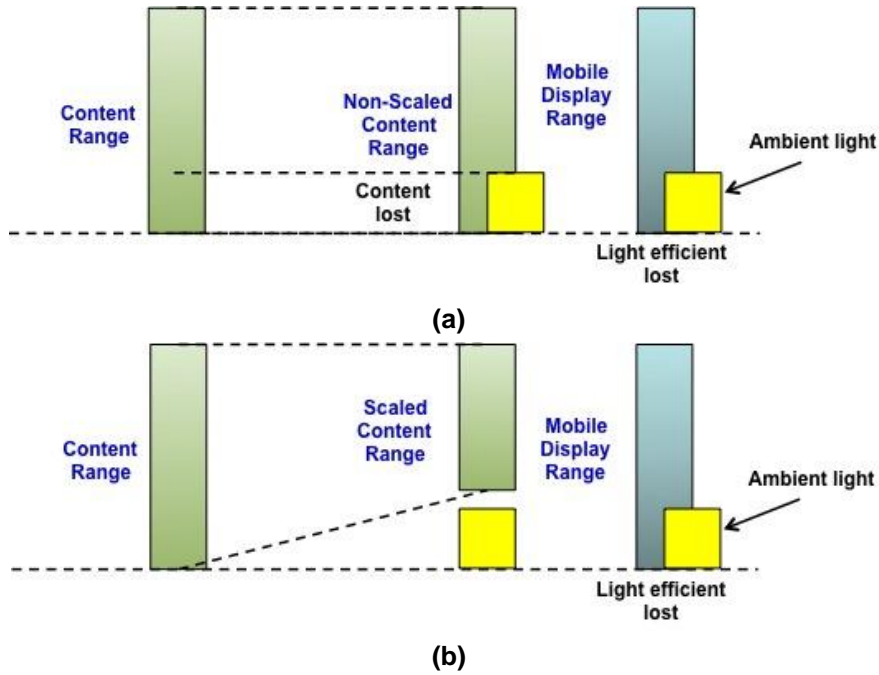


Figure 102: Sunlight Readability Concept (a) Backlight efficiency is consumed by ambient light, (b) Enhance the image content to avoid the influence.

11. Sleep Out Command and Self-Diagnostic Functions

11.1. Register Loading Detection

Sleep Out command (See Sleep Out (11h)) is a trigger for an internal function of the display module, which indicates, if the display module loading function of factory default values from EEPROM (or similar device) to registers of the display controller works properly.

The display controller will compare factory values of the EEPROM and register values of the display controller (1st step: compare register and EEPROM values; 2nd step: load EEPROM value to the register). If those two values (EEPROM and register values) are the same, a bit is inverted (= increased by 1), which is defined in command Read Display Self-Diagnostic Result (0Fh) (= RDDSDR) (The used bit of this command is D7). If those values are not the same, this bit (D7) is not inverted (= not increased by 1). The flow chart for this internal function is as follows:

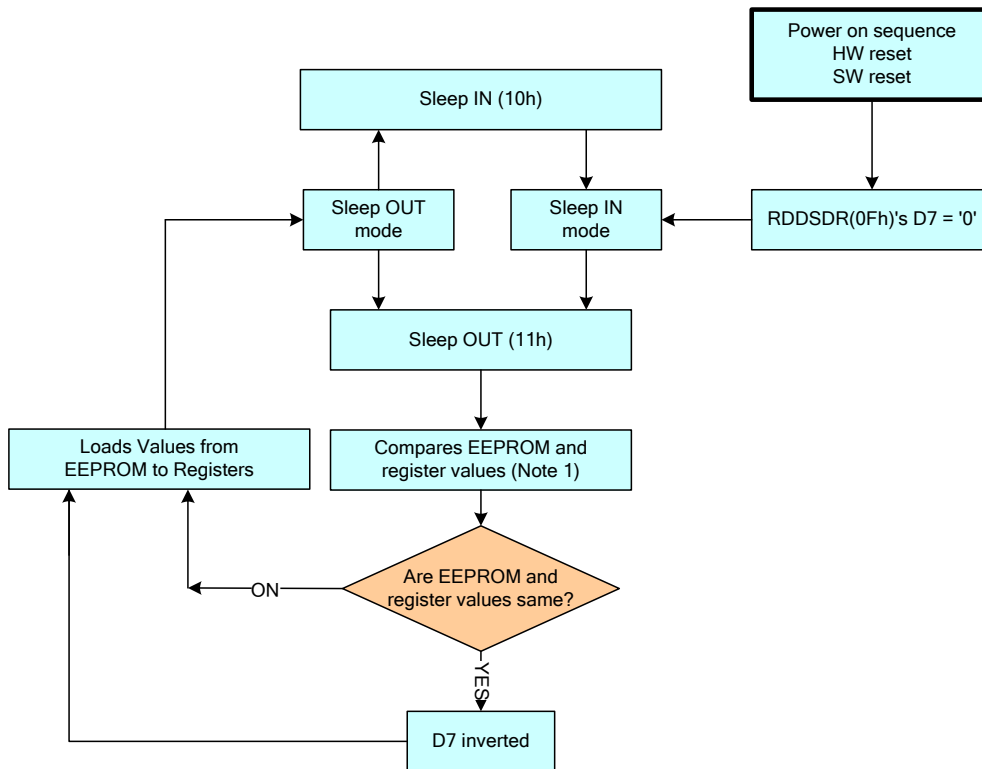


Figure 103: Register Loading Detection

Notes: If the EEPROM and loaded register values are not compared, then they can be changed by 00h to AFh and DAh to DDh commands.

11.2. Functionality Detection

The Sleep Out command (See Sleep Out (11h)) is a trigger for an internal function of the display module. It indicates if the display module is still running and meets functionality requirements. The internal function (the display controller) is compared to check if the display module still meets functionality requirements (e.g. booster voltage levels, timings, etc.). If functionality requirements are met, a bit is inverted (= increased by 1), defined in the command Read Display Self-Diagnostic Result (0Fh) (RDDSDR) (The used bit of this command is D6). If functionality requirement is not the same, this bit (D6) is not inverted (= not increased by 1). The flow chart for this internal function is as follows:

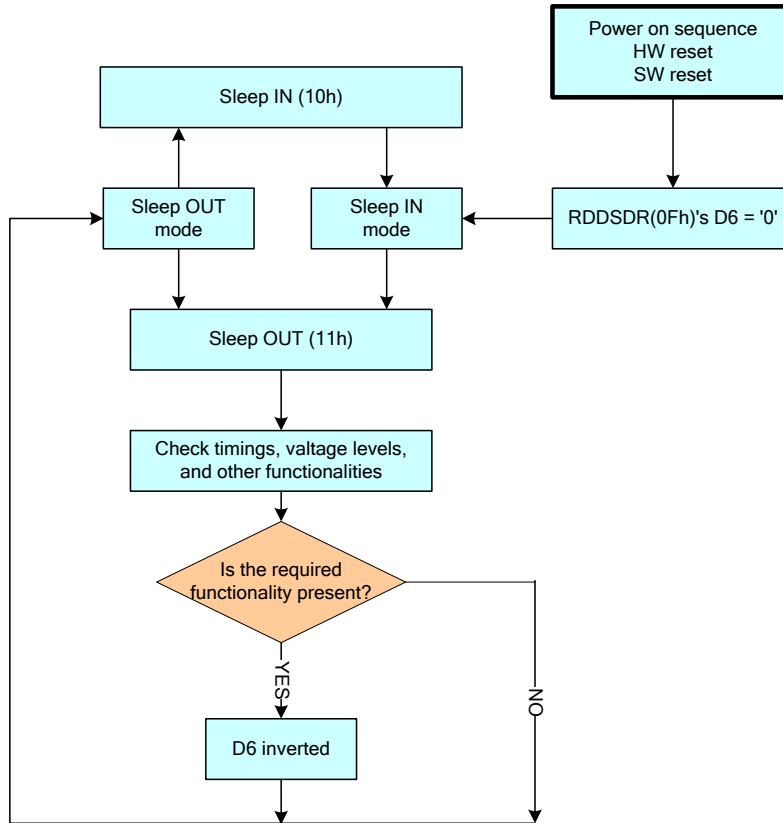


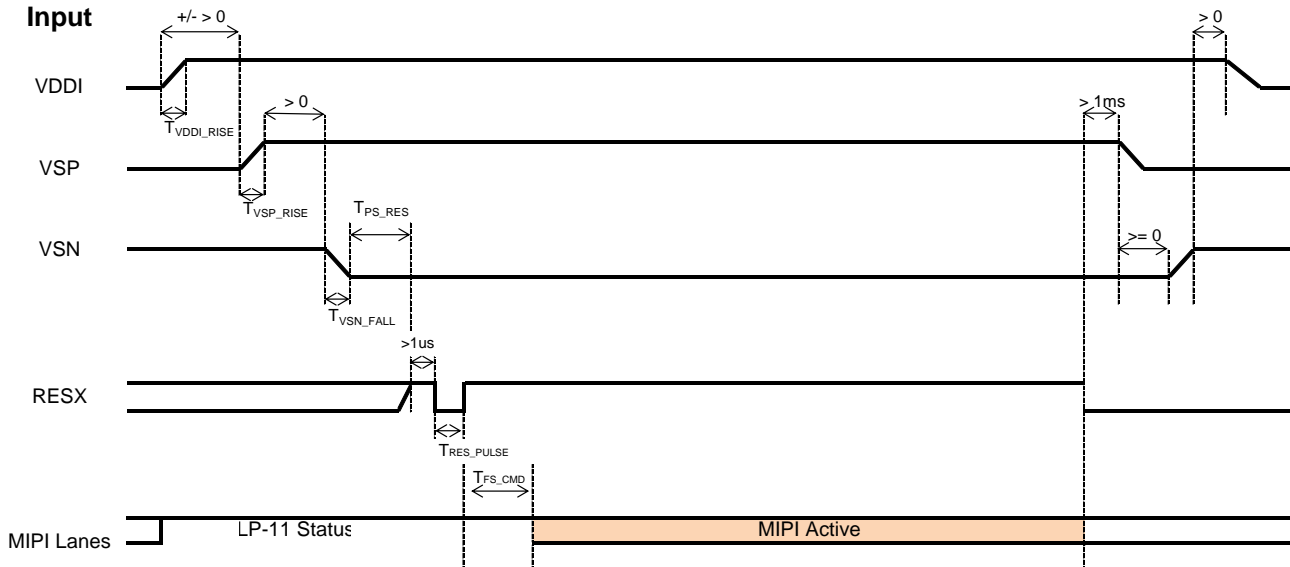
Figure 104: Functionality Detection

Notes: When changing from the Sleep In mode to Sleep Out mode, 120msec are needed after the Sleep Out command before it is able to check if functionality requirements are met and a value of RDDSDR's D6 is valid. Otherwise, there will be 5msec delay for the D6's value to be valid when the Sleep Out command is sent in the Sleep Out mode.

12. Power on/off Sequence

12.1. Power on/off sequence

12.1.1. Power Mode 2A

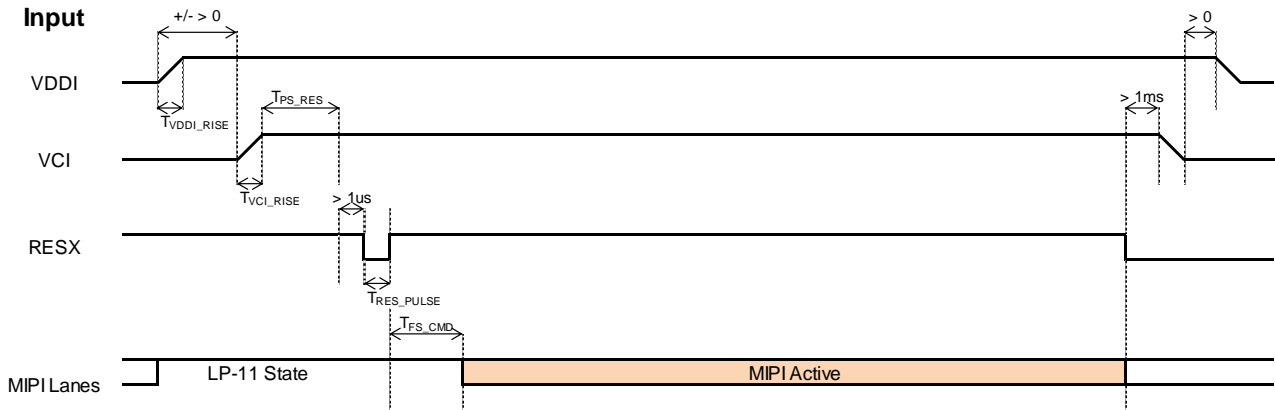


| Symbol | Characteristics | Min. | Typ. | Max. | Units |
|------------------|---------------------------|------|------|------|-------|
| T_{VDDI_RISE} | VDDI Rise time | 20 | - | - | us |
| T_{VSP_RISE} | VSP Rise time | 200 | - | - | us |
| T_{VSN_FALL} | VSN Fall time | 200 | - | - | us |
| T_{PS_RES} | VDDI/VSP on to Reset high | 5 | - | - | ms |
| T_{RES_PULSE} | Reset low pulse time | 10 | - | - | us |
| T_{FS_CMD} | Reset to first command | 10 | - | - | ms |

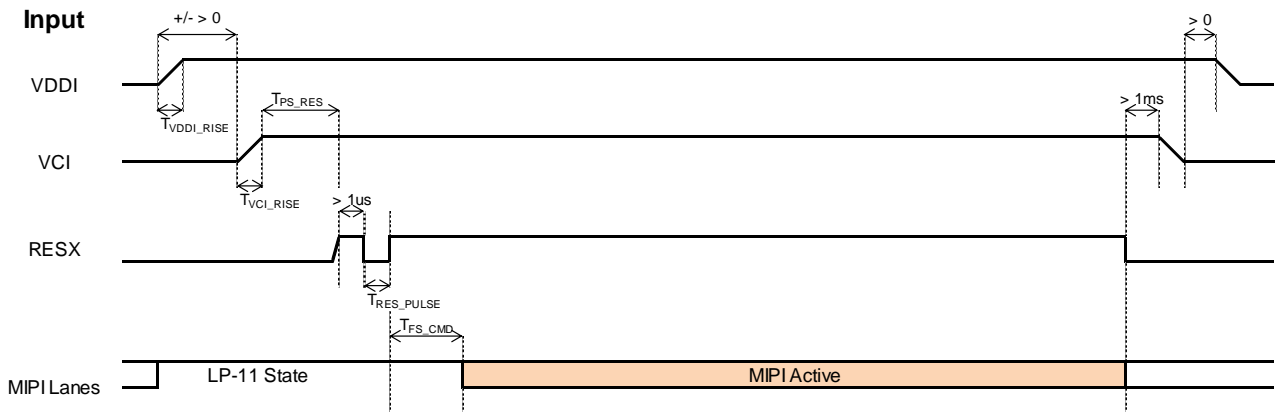
Figure 105: Power on/off sequence with Power Mode 2A

12.1.2. Power Mode 3

Case A:



Case B:

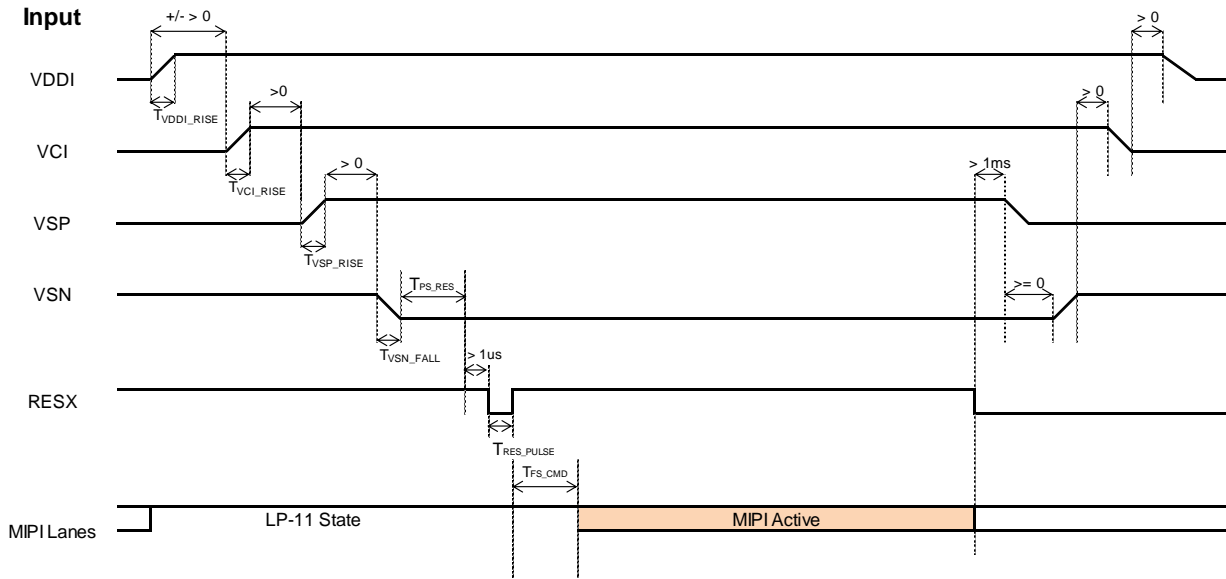


| Symbol | Characteristics | Min. | Typ. | Max. | Units |
|------------------|---------------------------|------|------|------|-------|
| T_{VDDI_RISE} | VDDI Rise time | 20 | - | - | us |
| T_{VCI_RISE} | Case A: VCI Rise time | 200 | - | - | us |
| | Case B: VCI Rise time | 40 | | | |
| T_{PS_RES} | VDDI/VCI on to Reset high | 5 | - | - | ms |
| T_{RES_PULSE} | Reset low pulse time | 10 | - | - | us |
| T_{FS_CMD} | Reset to first command | 10 | - | - | ms |

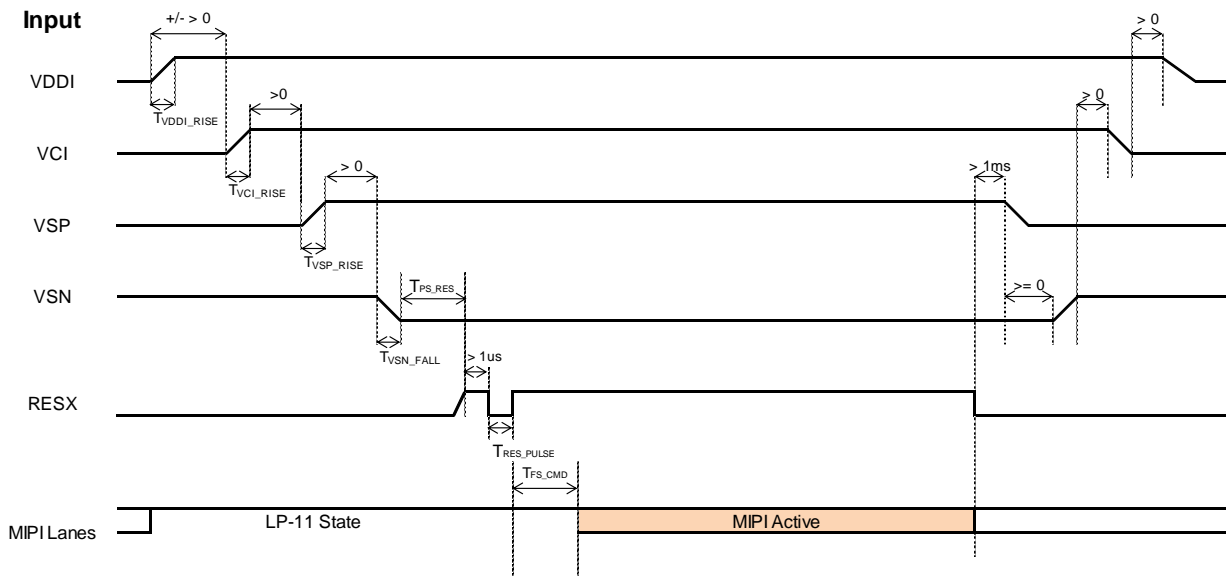
Figure 106: Power on/off sequence with Power Mode 3

12.1.3. Power Mode 4

Case A



Case B



| Symbol | Characteristics | Min. | Typ. | Max. | Units |
|------------------|---------------------------|------|------|------|-------|
| T_{VDDI_RISE} | VDDI Rise time | 20 | - | - | us |
| T_{VCI_RISE} | Case A: VCI Rise time | 200 | - | - | us |
| | Case B: VCI Rise time | 40 | - | - | us |
| T_{VSP_RISE} | VSP Rise time | 200 | - | - | us |
| T_{VSN_FALL} | VSN Fall time | 200 | - | - | us |
| T_{PS_RES} | VDDI/VCI on to Reset high | 5 | - | - | ms |
| T_{RES_PULSE} | Reset low pulse time | 10 | - | - | us |
| T_{FS_CMD} | Reset to first command | 10 | - | - | ms |

Figure 107: Power on/off sequence with Power Mode 4

12.2. Uncontrolled Power Off

The uncontrolled power off means a situation when a battery is removed without the controlled power off sequence. There will not be any damages for the display module, or the display module will not cause any damages for the host or lines of the interface. At an uncontrolled power off event, the ILI9881C will force the display to become blank and will not have any abnormal visible effects within 1 second on the display and remains blank until the Power On Sequence powers it up.

13. Power Level Definition

13.1. Power Levels

4 level modes are defined in order from Maximum to Minimum Power consumption:

1. Normal Mode On (full display), Sleep Out, Idle Mode Off.
In this mode, the display is able to show a maximum of 16.7M colors.
2. Normal Mode On (full display), Sleep Out, Idle Mode On.
In this mode, the display is able to show a maximum of 2 colors.
3. Sleep In Mode.
In this mode, the DC/DC converter, internal oscillator and panel driver circuit are stopped.
4. Power Off Mode.
In this mode, all input powers are removed.

Transition between modes 1-3 is controllable by MCU commands. Mode 4 is entered only when both Power supplies are removed.

13.2. Power Flow Chart

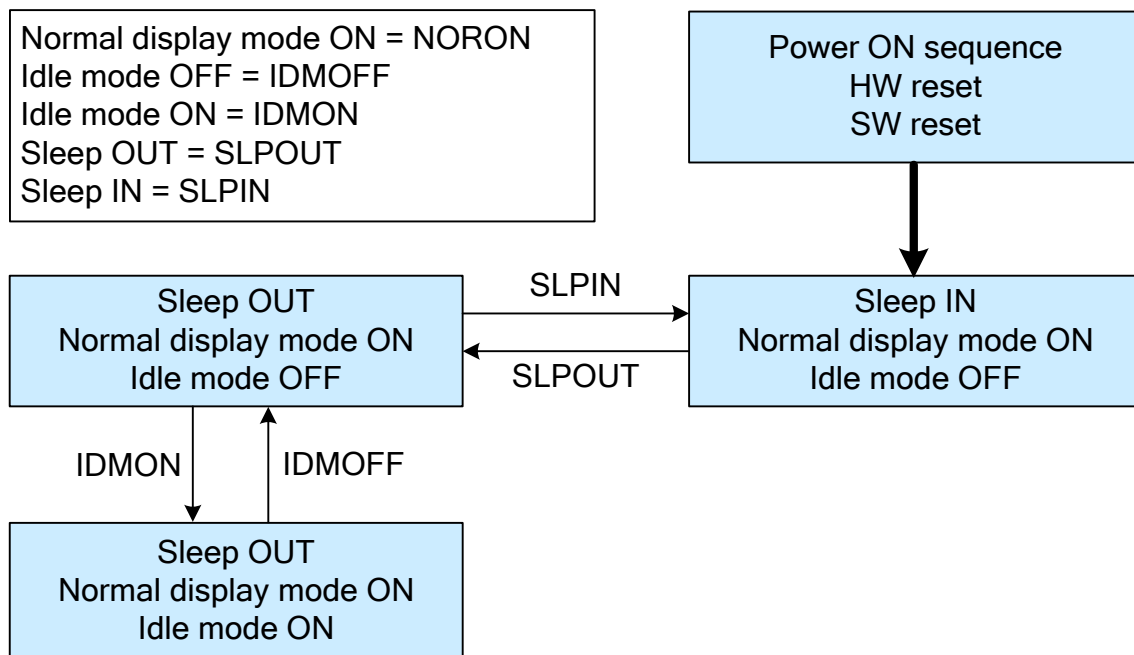


Figure 1085: Power Mode Flow Chart

Notes:

1. There is not any abnormal visual effect when one power mode changes to another power mode.
2. There is not any limitation, which is not specified by User, when one power mode changes to another power mode.

14. Characteristics of I/O

14.1. Output or Bi-directional (I/O) Pins

Table 34: Characteristics of Output or Bi-directional (I/O) Pins

| Pin/Line | After Power ON | After Hardware Reset | After Software Reset |
|----------|-----------------|----------------------|----------------------|
| D0P | Hi-Z (Inactive) | Hi-Z (Inactive) | Hi-Z (Inactive) |
| D0N | Hi-Z (Inactive) | Hi-Z (Inactive) | Hi-Z (Inactive) |
| VS | Hi-Z (Inactive) | Hi-Z (Inactive) | Hi-Z (Inactive) |
| HS | Hi-Z (Inactive) | Hi-Z (Inactive) | Hi-Z (Inactive) |
| LEDPWM | Low | Low | Low |
| TE | Low | Low | Low |

Note: There will be no output from D0P, D0N, VS, HS, LEDPWM and TE during Power ON/OFF sequence, hardware reset, and software reset.

14.2. Input Pins

Table 35: Input Pins

| Pin/Line | During Power ON Process | After Power ON | After Hardware Reset | After Software Reset | During Power OFF Process |
|-------------|-------------------------|----------------|----------------------|----------------------|--------------------------|
| RESX | See chapter 12 | Input valid | Input valid | Input valid | See chapter 12 |
| IM[2:0] | Input invalid | Input valid | Input valid | Input valid | Input invalid |
| LANSEL | Input invalid | Input valid | Input valid | Input valid | Input invalid |
| RS[1:0] | Input invalid | Input valid | Input valid | Input valid | Input invalid |
| BOOSTM[2:0] | Input invalid | Input valid | Input valid | Input valid | Input invalid |
| CLKP | Input invalid | Input valid | Input valid | Input valid | Input invalid |
| CLKN | Input invalid | Input valid | Input valid | Input valid | Input invalid |
| D0P | Input invalid | Input valid | Input valid | Input valid | Input invalid |
| D0N | Input invalid | Input valid | Input valid | Input valid | Input invalid |
| D1P | Input invalid | Input valid | Input valid | Input valid | Input invalid |
| D1N | Input invalid | Input valid | Input valid | Input valid | Input invalid |
| D2P | Input invalid | Input valid | Input valid | Input valid | Input invalid |
| D2N | Input invalid | Input valid | Input valid | Input valid | Input invalid |
| D3P | Input invalid | Input valid | Input valid | Input valid | Input invalid |
| D3N | Input invalid | Input valid | Input valid | Input valid | Input invalid |

15. NV Memory Programming Flow

15.1. External MTP_PWR Programming Flow

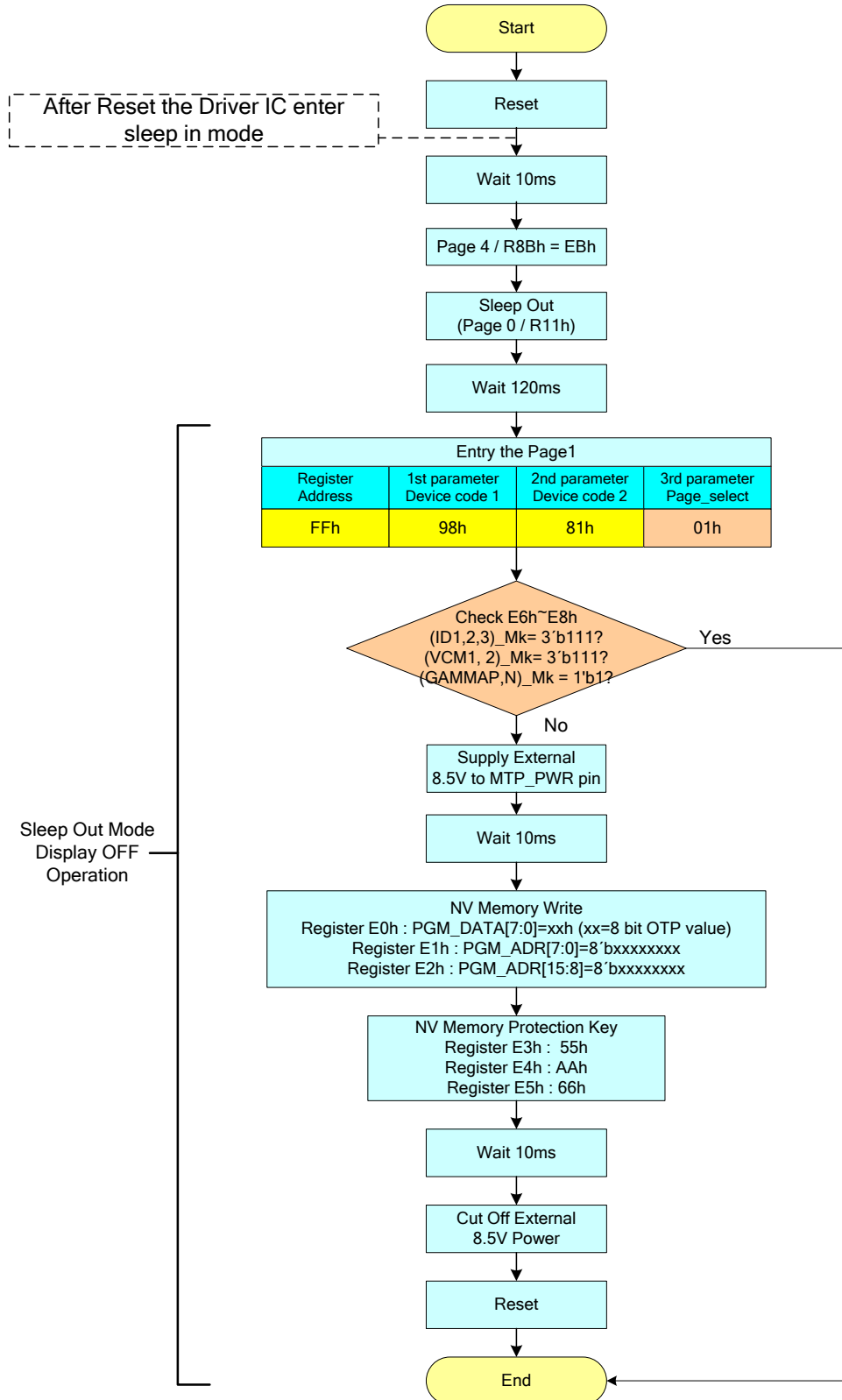
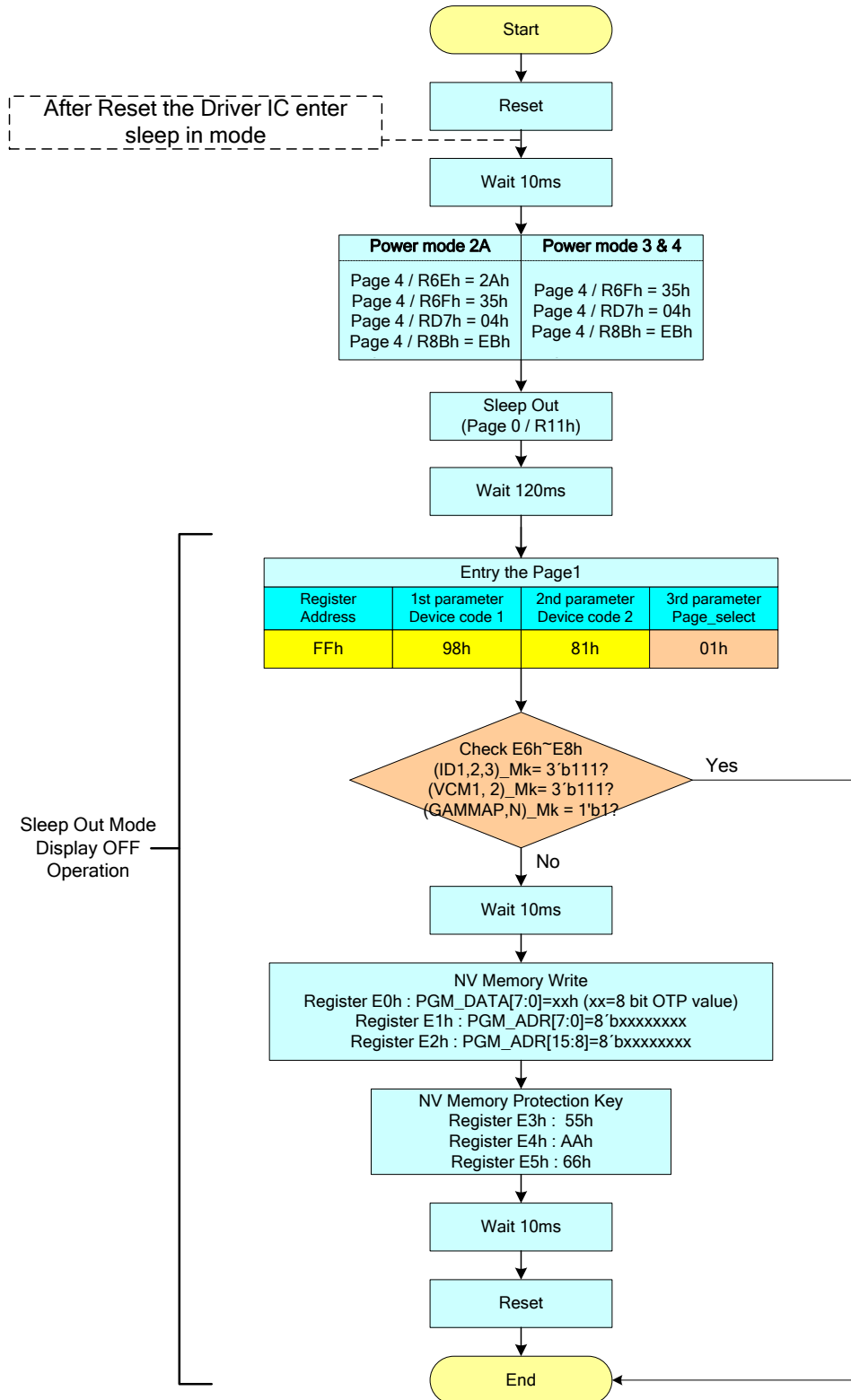


Figure 109: External MTP_PWR Programming Flow

15.2. Internal VGH Programming Flow



Note: Internal VGH Programming must operate in the Low Power mode.

Figure 110: Internal VGH Programming Flow

16. Gamma Correction

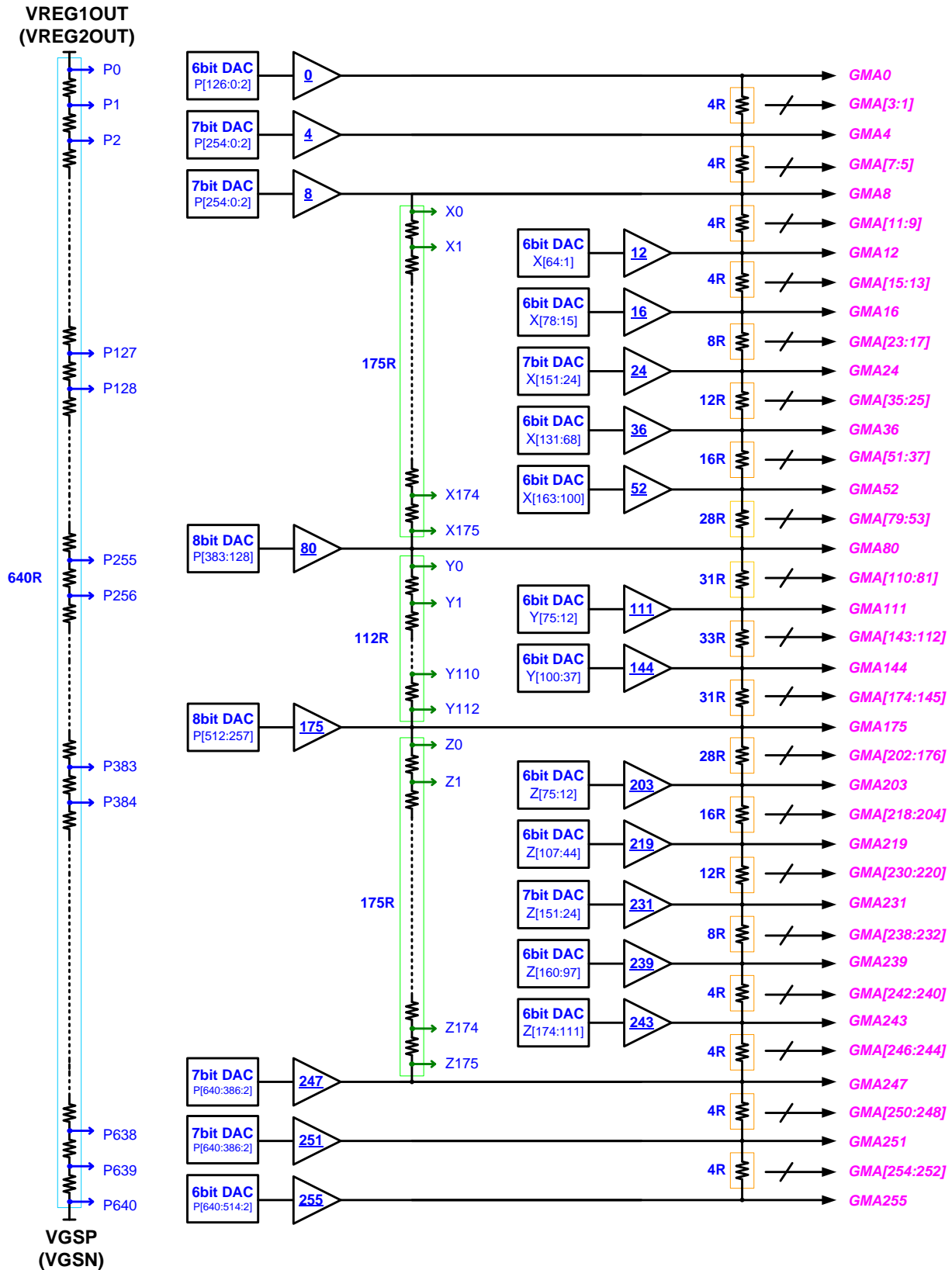


Figure 111: Gamma Architecture

17. Touch Synchronization Signal

The VS and HS pad of ILI9881C can output the synchronization signals to touch sensing signal for touch panel controller. To use these signals, touch panel controller can receive touch sensing signal while avoiding display changing noise.

These signals consist of vertical synchronization signal: VSOUT and horizontal synchronization signal: HSOUT. The level of output voltage is IOVCC to GND. Each signal can adjust output timing for internal synchronization signal. The high level width of VSOUT is 1 line, and it is adjustable. VSOUT is outputted always, but HSOUT is outputted during displaying only.

(1) VSOUT output Timing

VSOUT output means internal VSYNC is starting point. VSOUT output timing can be adjusted by VSOD register. Unit is 1H.

(2) HSOUT output Timing

HSOUT output means internal source output timing is starting point. HSOUT output timing can be adjusted by HSOD register. And HSOUT high level width can be adjusted by HSOHW register.

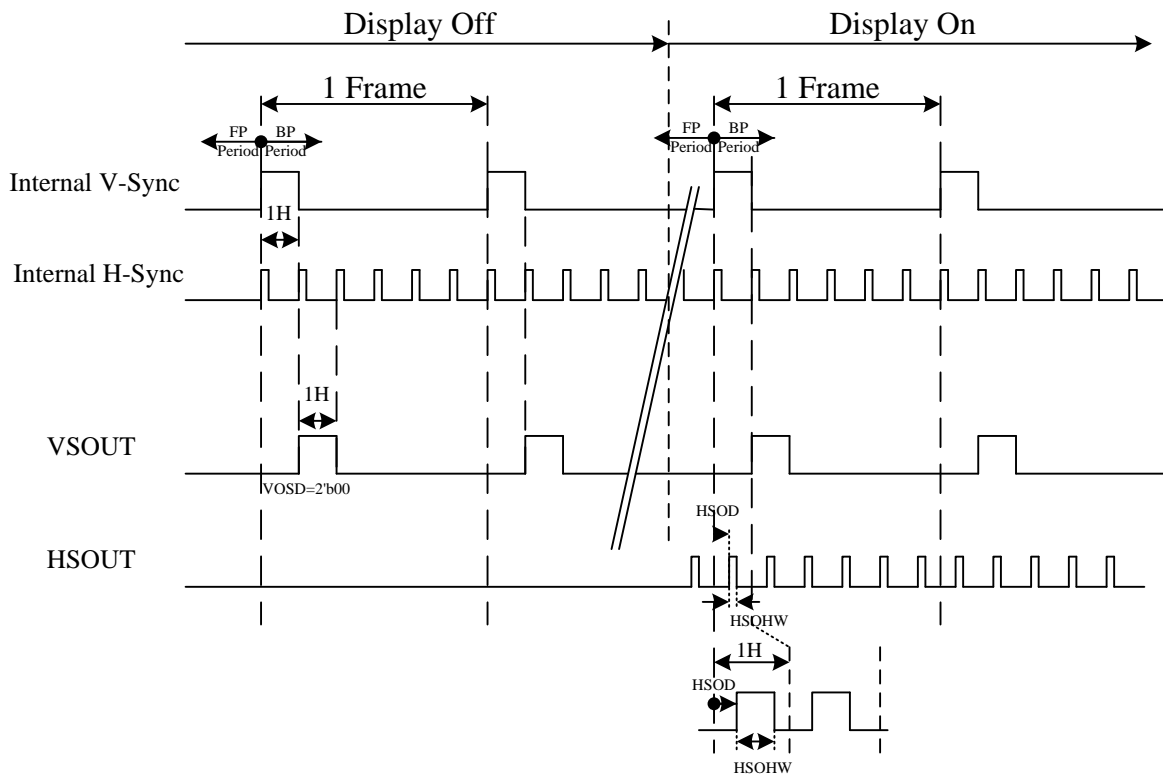


Figure 112: Touch Synchronization Signal

18. Electrical Characteristics

18.1. Absolute Maximum Ratings

The absolute maximum rating is listed in Table 36. When the ILI9881C is used out of the absolute maximum ratings, it may be permanently damaged. To use the ILI9881C within the following electrical characteristics limit is strongly recommended for normal operation. If these electrical characteristic conditions are exceeded during normal operation, the ILI9881C will malfunction and cause poor reliability.

Table 36: Absolute Maximum Ratings

| Item | Symbol | Unit | Value |
|---------------------------|---------------|------|-------------------|
| Analog Operating Voltage | VCI ~ GND | V | -0.3 ~ +6.5 |
| Analog Operating Voltage | VCIREF ~ GND | V | -0.3 ~ +6.5 |
| Digital Operating Voltage | VDDI ~ GND | V | -0.3 ~ +3.6 |
| Digital Operating Voltage | VCC1 ~ GND | V | -0.3 ~ +6.5 |
| Digital Operating Voltage | VCC2 ~ GND | V | -0.3 ~ +6.5 |
| DSI Operating Voltage | VDDAM ~ GND | V | -0.3 ~ +3.6 |
| OTP Supply Voltage | MTP_PWR ~ GND | V | -0.3 ~ +9.0 |
| Supply Voltage | VSP ~ GND | V | -0.3 ~ +6.5 |
| Supply Voltage | VSN ~ GND | V | 0.3 ~ -6.5 |
| Gate Driver High Voltage | VGH ~ GND | V | -0.3 ~ +18 |
| Gate Driver Low Voltage | VGL ~ GND | V | 0.3 ~ -18 |
| Driver Supply Voltage | VCI - VCL | V | ≤ 6.0V |
| Driver Supply Voltage | VGH - VGL | V | ≤ 32.0V |
| Input Voltage | VIN | V | -0.3 ~ VDDI + 0.3 |
| HS Input Voltage | VHSIN | V | -0.3 ~ + 1.65 |
| Operating Temperature | Topr | °C | -30 ~ +70 |
| Storage Temperature | Tstg | °C | -55 ~ +110 |

Note: Even if the absolute maximum rating of one of the above parameters is exceeded only for a short while, the quality of the product may be degraded. Therefore, be sure to use the product within the range of the absolute maximum ratings.

18.2. DC Characteristics for Panel Driving

| Item | Symbol | Condition | Min. | Typ. | Max. | Unit | Note |
|---|-------------------|-------------------------------------|------------------|------|--------------|------|---------|
| Power & Operation Voltage | | | | | | | |
| Analog operating voltage | VCI | - | 2.5 | 2.8 | 6.0 | V | |
| Analog operating voltage | VCIREF | | 2.5 | 2.8 | 6.0 | | |
| Digital operating voltage | VDDI | - | 1.65 | 2.8 | 3.3 | V | |
| Digital operating voltage | VCC1 | | 1.65 | 2.8 | 6.0 | V | |
| Digital operating voltage | VCC2 | | 1.65 | 2.8 | 6.0 | V | |
| DSI operating voltage | VDDAM | - | 1.65 | 1.8 | 3.3 | V | |
| OTP Supply voltage | MTP_PWR | - | 8.4 | 8.5 | 8.6 | V | |
| Analog operating voltage | VSP | - | 4.5 | | 6 | V | |
| Analog operating voltage | VSN | - | -6 | | -4.5 | V | |
| Logic High level input voltage | VIH | - | 0.7*VDDI | | VDDI | V | Note1 |
| Logic Low level input voltage | VIL | - | -0.3 | | 0.3*VDDI | V | Note1 |
| Logic High level output voltage TE , LEDPWM | VOH | IOH = -1.0mA | 0.8*VDDI | | VDDI | V | Note1 |
| Logic Low level output voltage TE , LEDPWM | VOL | IOL = +1.0mA | 0 | | 0.2*VDDI | V | Note1 |
| Gate Driver High Voltage | VGH | - | 8.0 | - | 18 | V | |
| Gate Driver Low Voltage | VGL | - | -18.0 | - | -7.0 | V | |
| Driver Supply Voltage | - | VGH-VGL | 15 | - | 32 | V | |
| VCOM Operation | | | | | | | |
| DC VCOM Amplitude Voltage | VCOM | - | -4.0 | - | 0 | V | Note3 |
| Source Driver | | | | | | | |
| Source Output Range | VSOUT(+) | - | 0.3 | - | VREG1OUT-0.1 | V | Note4 |
| | VSOUT(-) | - | VREG2OUT +0.1 | - | -0.3 | V | Note4 |
| Positive Gamma Reference Voltage | VREG1OUT | - | 2.9 | - | VSP-0.5 | V | |
| Negative Gamma Reference Voltage | VREG2OUT | - | VSN+0.5 | - | -2.9 | V | |
| Source Output Setting Time | Tr | Below with 99% precision | - | 10 | - | uS | Note3.4 |
| Output Deviation Voltage (Source Output channel) | Vdev | Sout>=4.2V | - | - | 20 | mV | Note3 |
| | | 4.2V>Sout>0.8V | - | - | 15 | mV | |
| Output Offset Voltage | VOFFSET | - | - | - | 35 | mV | Note3 |
| Standby mode current consumption | | | | | | | |
| Sleep In mode | I(VDDI SLP IN) | Ta = 25 °C VCI=2.8V VDDI=1.8V | - | 35 | - | uA | |
| | I(VCI SLP IN) | | - | 25 | - | uA | |

Notes:

1. Ta = -30 to 70 °C (to 85 °C no damage) , VCI = 2.5V to 6.0V, VDDI = 1.65V to 3.3V
2. Supply digital VDDI voltage equal or less than analog VCI voltage.
3. Source channel loading = 9KΩ, 70pF/channel
4. The maximum value is between with Note 3 and Gamma setting value

18.3. DSI DC Characteristics

The DSI uses different state codes which depend on DC voltage levels of the clock and data lanes. The meaning of the state codes is defined in the following table.

| State Code | Line DC Voltage Levels | |
|------------|------------------------|-------------------|
| | CLOCK_P or DATA_P | CLOCK_N or DATA_N |
| HS-0 | Low (HS) | High (HS) |
| HS-1 | High (HS) | Low (HS) |
| LP-00 | Low (LP) | Low (LP) |
| LP-01 | Low (LP) | High (LP) |
| LP-10 | High (LP) | Low (LP) |
| LP-11 | High (LP) | High (LP) |

Note: $T_a = -30^{\circ}\text{C}$ to 70°C (to $+85^{\circ}\text{C}$ no damage)

18.3.1. DC Characteristics for DSI LP Mode

DC levels of the LP-00, LP-01, LP-10 and LP-11 are defined in the table below: DC Characteristics for the DSI LP mode when LP-RX, LP-CD or LP-TX is mentioned in the condition column. Other logical levels in the table are for MCU interface.

| Parameter | Symbol | Condition | Specification | | | Unit |
|------------------------|-----------------|-----------------------------|---------------|------|------|------|
| | | | Min. | Typ. | Max. | |
| Logic 1 input voltage | V_{IHLPD} | LP-CD | 450 | - | 1350 | mV |
| Logic 0 input voltage | V_{ILLPCD} | LP-CD | 0.0 | - | 200 | mV |
| Logic 1 input voltage | V_{IHLPRX} | LP-RX (CLK, D0, D1, D2, D3) | 880 | - | 1350 | mV |
| Logic 0 input voltage | V_{ILLPRX} | LP-RX (CLK, D0, D1, D2, D3) | 0.0 | - | 550 | mV |
| Logic 0 input voltage | $V_{ILLPRXULP}$ | LP-RX (CLK ULP mode) | 0.0 | - | 300 | mV |
| Logic 1 output voltage | V_{OHLPTX} | LP-TX (D0) | 1.1 | - | 1.3 | V |
| Logic 0 output voltage | V_{OLLPTX} | LP-TX (D0) | -50 | - | 50 | mV |
| Logic 1 input current | I_{IH} | LP-CD, LP-RX | - | - | 10 | uA |
| Logic 0 input current | I_{IL} | LP-CD, LP-RX | -10 | - | - | uA |

Notes:

- $T_a = -30^{\circ}\text{C}$ to 70°C (to $+85^{\circ}\text{C}$ no damage)
- DSI High Speed mode is off.

18.3.2. Spike/Glitch Rejection

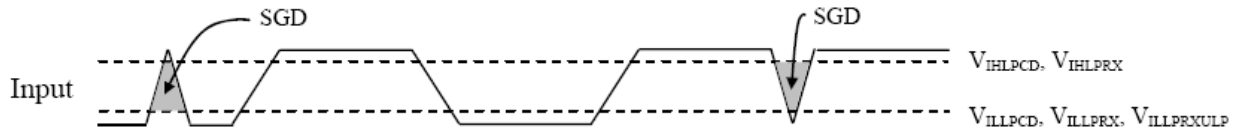


Figure 113: Spike/Glitch Rejection

Notes:

1. A spike/glitch can be rejected when the Peak Interference Amplitude is 200mV (at maximum) and Interference Frequency is 450MHz (at the very least).
2. $n = 0$ and 1.

Table 37: Spike/Glitch Rejection

| Spike/Glitch Rejection – DSI | | | | | |
|------------------------------|--------|-------------------------------|-----|-----|------|
| Signal | Symbol | Parameter | Min | Max | Unit |
| CLKP/N, DnP/N | SGD | Input pulse rejection for DSI | - | 300 | Vps |

18.3.3. DC Characteristics for DSI HS mode

| Parameter | Symbol | Condition | Specification | | | Unit |
|--|-------------------|---------------------------------|---------------|-----|-----|----------|
| | | | | | | |
| Input Common Mode Voltage for Clock | V_{CMCLK} | CLKP/N Note 2, Note 3 | 70 | - | 330 | mV |
| Input Common Mode Voltage for Data | V_{CMDATA} | DnP/N Note 2, Note 3, Note 5 | 70 | - | 330 | mV |
| Common Mode Ripple for Clock Equal or Less than 450MHz | $V_{CMRCLKL450}$ | CLKP/N Note 4 | -50 | - | 50 | mV |
| Common Mode Ripple for Data Equal or Less than 450MHz | $V_{CMRDATAL450}$ | DnP/N Note 4, Note 5 | -50 | - | 50 | mV |
| Common Mode Ripple for Clock More than 450MHz (peak sine wave) | $V_{CMRCLKM450}$ | CLKP/N | - | - | 100 | mV |
| Common Mode Ripple for Data More than 450MHz (peak sine wave) | $V_{CMRDATAM450}$ | DnP/N Note 5 | - | - | 100 | mV |
| Differential Input Low Level Threshold Voltage for Clock | $V_{THLCLK-}$ | CLKP/N | -70 | - | - | mV |
| Differential Input Low Level Threshold Voltage for Data | $V_{THLDATA-}$ | DnP/N Note 5 | -70 | - | - | mV |
| Differential Input High Level Threshold Voltage for Clock | $V_{THHCLK+}$ | CLKP/N | - | - | 70 | mV |
| Differential Input High Level Threshold Voltage for Data | $V_{THHDATA+}$ | DnP/N Note 5 | - | - | 70 | mV |
| Single-ended Input Low Voltage | V_{ILHS} | CLKP/N, DnP/N Note 3, Note 5 | -40 | - | - | mV |
| Single-ended Input High Voltage | V_{IHHS} | CLKP/N, DnP/N Note 3, Note 5 | - | - | 460 | mV |
| Differential Termination Resistor | R_{TERM} | CLKP/N, DnP/N Note 5 | 80 | 100 | 125 | Ω |
| Single-ended Threshold Voltage for Termination Enable | $V_{TERM-EN}$ | CLKP/N, DnP/N Note 5 | - | - | 450 | mV |
| Termination Capacitor | C_{TERM} | CLKP/N, DnP/N Note 5, Note 6 | - | - | 60 | pF |

Notes:

1. $T_a = -30^{\circ}C$ to $70^{\circ}C$ (to $+85^{\circ}C$ no damage), $V_{CI} = 2.5V$ to $6.0V$, $V_{DDI} = 1.65V$ to $3.3V$
2. Includes $50mV$ ($-50mV$ to $50mV$) ground difference
3. Without $V_{CMRCLKM450}/V_{CMRDATAM450}$
4. Without $50mV$ ($-50mV$ to $50mV$) ground difference
5. $n = 0$ and 1
6. For higher bit rates, a $14pF$ capacitor will be needed to meet the common-mode return loss specification.

The DSI receiver (HS mode) understands that there is logical 1 (= HS-1) when a differential voltage is more than V_{THH} (CLKP/DnP). The DSI receiver (HS mode) understands that there is logical 0 (= HS-0) when a differential voltage is more than V_{THL} (CLKN/DnN). There is undefined state if the differential voltage is less than V_{THH} (CLKP/DnP) and less than V_{THL} (CLKN/DnN). A reference figure is below.

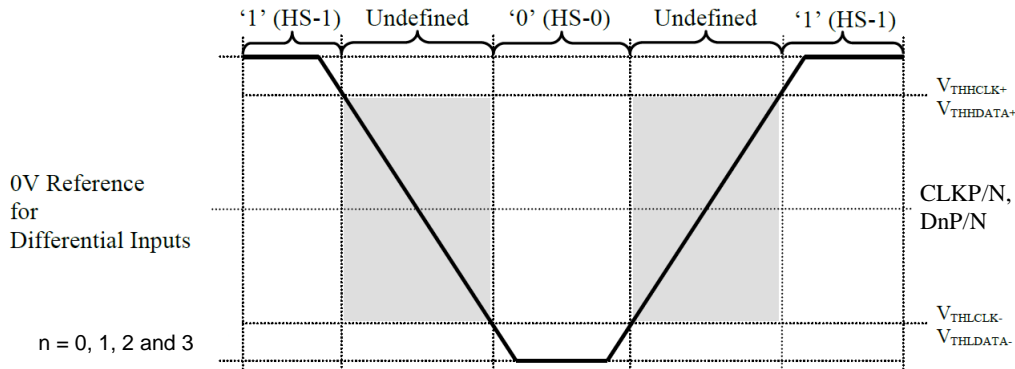
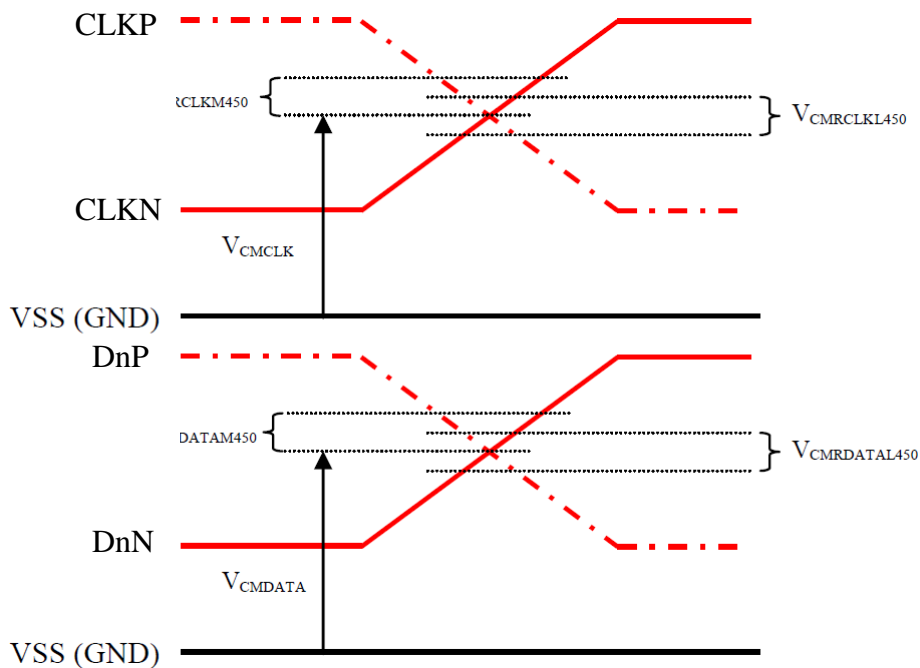


Figure 114: Differential Inputs Logical 0 and 1, Threshold High/Low, Differential Voltage Range



Note: $n = 0, 1, 2$ and 3

Figure 115: Common Mode Voltage on Clock and Data Channels

The termination resistor (R_{TERM}) of the differential DSI receiver can be driven to two different states by the receiver:

- ❖ Low Power (LP) mode when the termination resistor is not connected between differential inputs (CLKP \Leftrightarrow CLKN or D0P \Leftrightarrow D0N or D1P \Leftrightarrow D2N or D2P \Leftrightarrow D3N or D1P \Leftrightarrow D3N)
- ❖ High Speed (HS) mode when the termination resistor is connected between differential inputs (CLKP \Leftrightarrow CLKN or D0P \Leftrightarrow D0N or D1P \Leftrightarrow D2N or D2P \Leftrightarrow D3N or D1P \Leftrightarrow D3N)

The termination switch (HS/LP), when the termination resistor is not connected, is illustrated below.

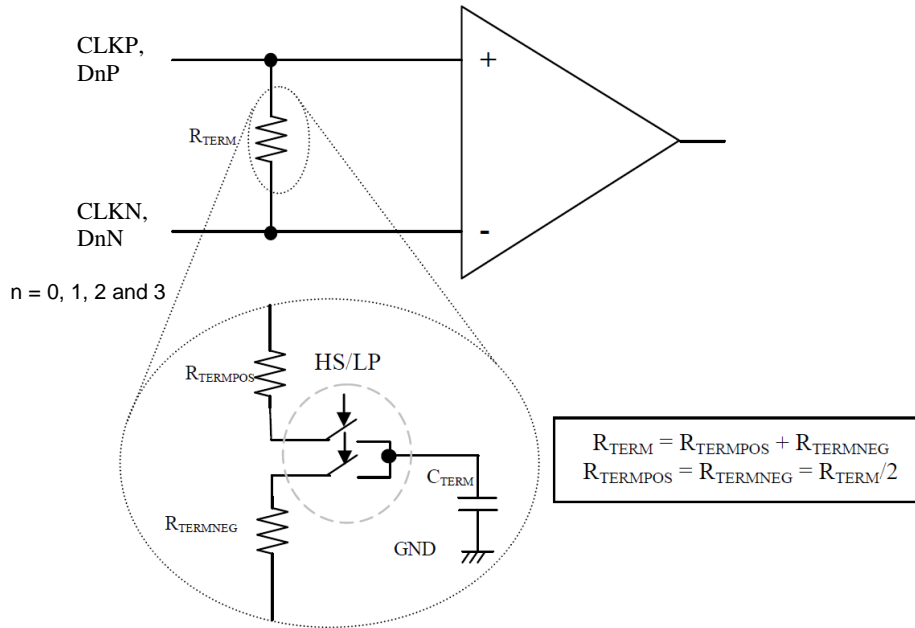


Figure 116: Differential Pair Termination Resistor on the Receiver Side

18.4. AC Characteristics

18.4.1. DSI Timing Characteristics

18.4.2. High Speed Mode – Clock Channel Timing

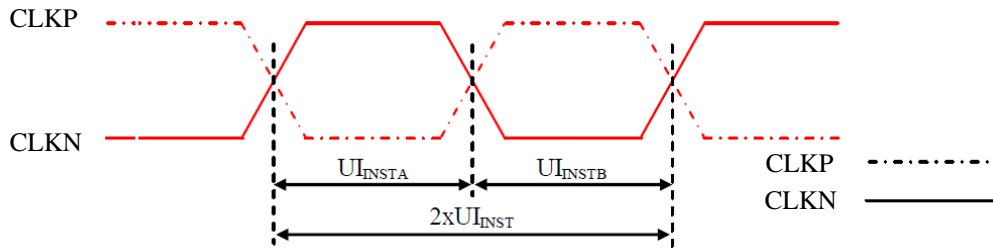


Figure 117: DSI Clock Channel Timing

Table 38: DSI Clock Channel Timing

| Signal | Symbol | Parameter | Min | Max | Unit |
|--------|--------------------------------------|-------------------------|---------------|------|------|
| CLKP/N | $2xUI_{INST}$ | Double UI instantaneous | 4 | 25 | ns |
| CLKP/N | UI_{INSTA}, UI_{INSTB} (Note 1) | UI instantaneous Half | 2 (Note 2) | 12.5 | ns |

Notes:

1. $UI = UI_{INSTA} = UI_{INSTB}$
2. Define the minimum value of 24 UI per Pixel, see Table 39.

Table 39: Limited Clock Channel Speed

| Data type | Two Lanes speed | Three Lanes speed | Four Lanes speed |
|---|-----------------|-------------------|------------------|
| Data Type = 00 1110 (0Eh), RGB 565, 16 UI per Pixel | 566 Mbps | 433 Mbps | 366 Mbps |
| Data Type = 01 1110 (1Eh), RGB 666, 18 UI per Pixel | 637 Mbps | 487 Mbps | 412 Mbps |
| Data Type = 10 1110 (2Eh), RGB 666 Loosely, 24 UI per Pixel | 850 Mbps | 650 Mbps | 550 Mbps |
| Data Type = 11 1110 (3Eh), RGB 888, 24 UI per Pixel | 850 Mbps | 650 Mbps | 550 Mbps |

18.4.3. High Speed Mode – Data Clock Channel Timing

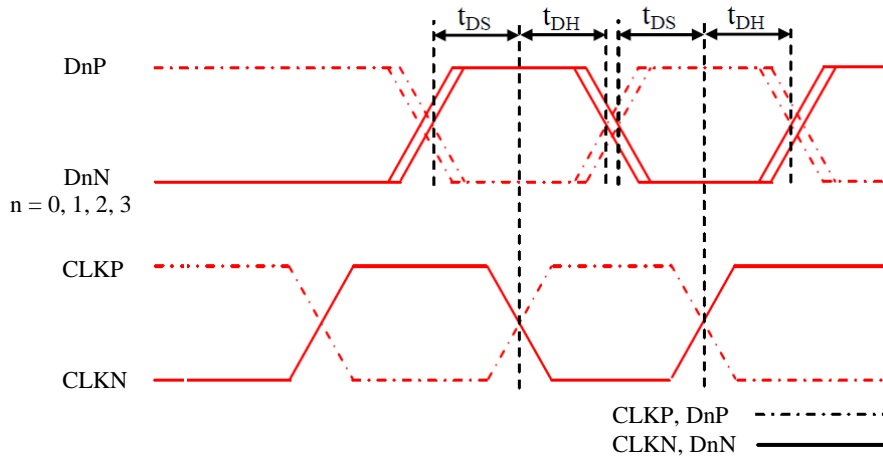


Figure 118: DSI Data to Clock Channel Timings

Table 40: DSI Data to Clock Channel Timings

| Signal | Symbol | Parameter | Min | Max |
|-------------------|----------|--------------------------|---------|-----|
| DnP/N , n=0 and 1 | t_{DS} | Data to Clock Setup time | 0.15xUI | - |
| | t_{DH} | Clock to Data Hold Time | 0.15xUI | - |

18.4.4. High Speed Mode – Rising and Falling Timings

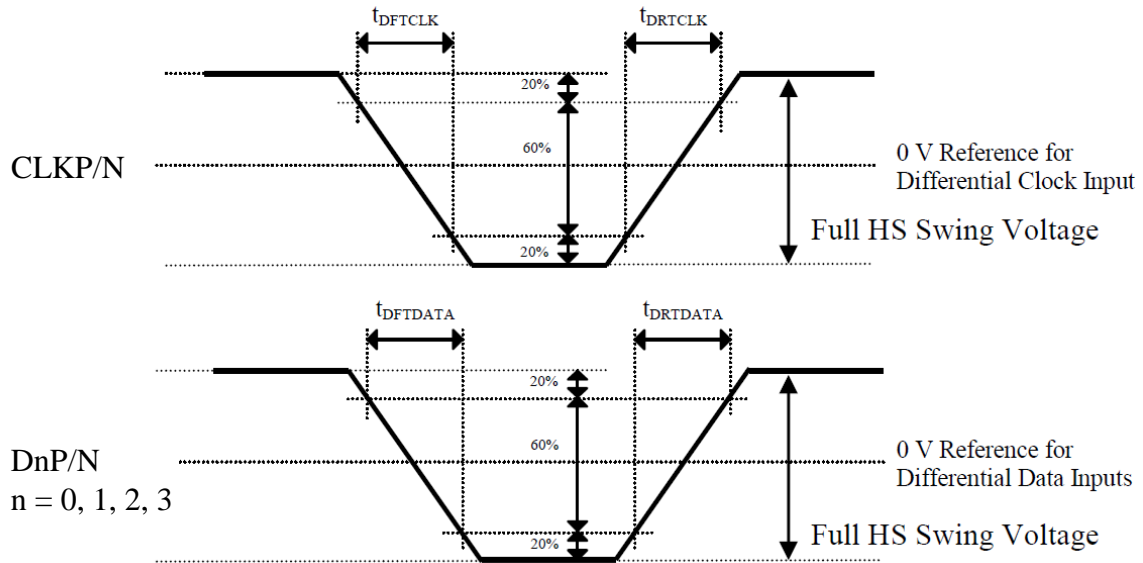


Figure 119: Rising and Falling Timings on Clock and Data Channels

Table 41: Rise and Fall Timings on Clock and Data Channels

| Parameter | Symbol | Condition | Specification | | |
|----------------------------------|---------------|--------------------|---------------|-----|-----------------|
| | | | Min | Typ | Max |
| Differential Rise Time for Clock | t_{DRTCLK} | CLKP/N | 150 ps | - | 0.3UI (Note) |
| Differential Rise Time for Data | $t_{DRTDATA}$ | DnP/N n=0 and 1 | 150 ps | - | 0.3UI (Note) |
| Differential Fall Time for Clock | t_{DFTCLK} | CLKP/N | 150 ps | - | 0.3UI (Note) |
| Differential Fall Time for Data | $t_{DFTDATA}$ | DnP/N n=0 and 1 | 150 ps | - | 0.3UI (Note) |

Note: The display module has to meet timing requirements, which are defined for the transmitter (MCU) on MIPI D-Phy standard.

18.4.5. Low Speed Mode – Bus Turn Around

Lower Power Mode and its State Periods on the Bus Turnaround (BTA) from the MCU to the Display Module (ILI9881C) are illustrated for reference purposes below.

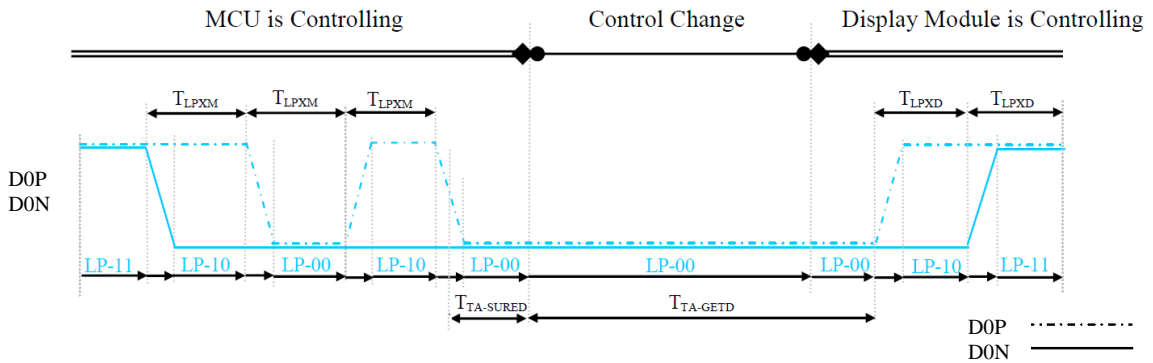


Figure 120: BTA from the MCU to the Display Module

Lower Power Mode and its State Periods on the Bus Turnaround (BTA) from the Display Module (ILI9881C) to the MCU are illustrated for reference purposes below.

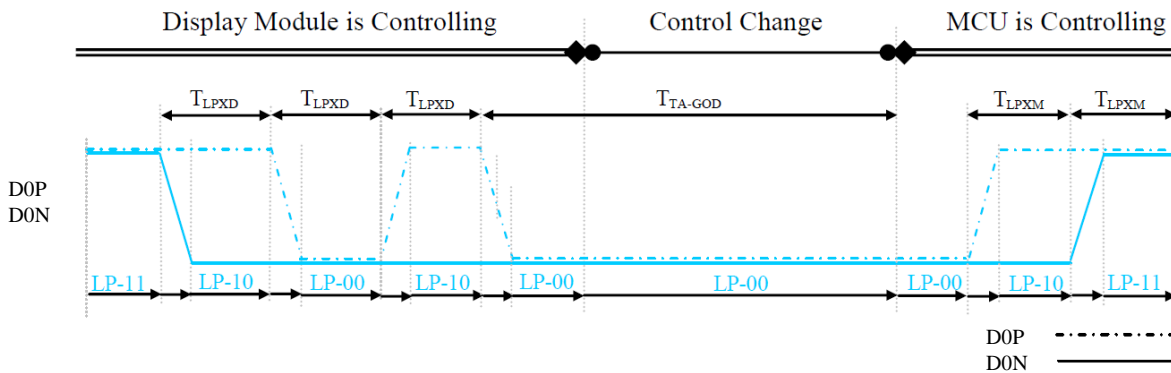


Figure 121: BTA from the Display Module to the MCU

Table 42: Low Power State Period Timings – A

| Signal | Symbol | Description | Min | Max | Unit |
|--------|----------------|---|------------|---------------------|------|
| D0P/N | T_{LPXM} | Length of LP-00, LP-01, LP-10 or LP-11 periods MCU → Display Module (ILI9881C) | 50 | 75 | ns |
| D0P/N | T_{LPXD} | Length of LP-00, LP-01, LP-10 or LP-11 periods Display Module (ILI9881C) → MCU | 50 | 75 | ns |
| D0P/N | $T_{TA-SURED}$ | Time-out before the Display Module (ILI9881C) starts driving | T_{LPXD} | $2 \times T_{LPXD}$ | ns |

Table 43: Low Power State Period Timings – B

| Signal | Symbol | Description | Time | Unit |
|--------|---------------|--|---------------------|------|
| D0P/N | $T_{TA-GETD}$ | Time to drive LP-00 by Display Module (ILI9881C) | $5 \times T_{LPXD}$ | ns |
| D0P/N | T_{TA-GOD} | Time to drive LP-00 after turnaround request - MCU | $4 \times T_{LPXD}$ | ns |

18.4.6. Data Lanes from Low Power Mode to High Speed Mode

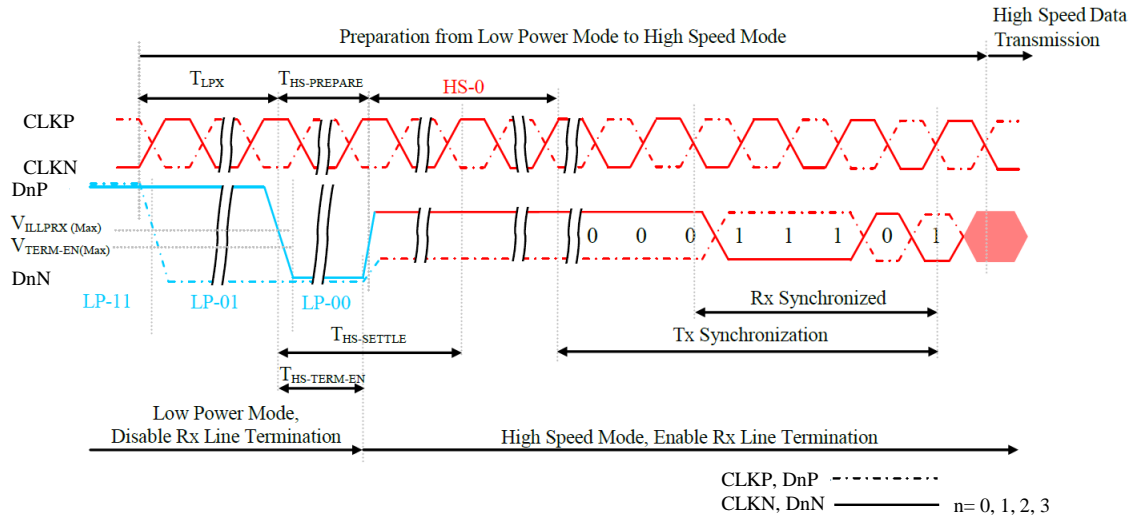


Figure 122: Data Lanes - Low Power Mode to High Speed Mode Timings

Table 44: Data Lanes - Low Power Mode to High Speed Mode Timings

| Signal | Symbol | Description | Min | Max | Unit |
|--------------------|------------------|---|-----------|-----------|------|
| DnP/N, n = 0 and 1 | T_{LPX} | Length of any Low Power State Period | 50 | - | ns |
| DnP/N, n = 0 and 1 | $T_{HS-PREPARE}$ | Time to drive LP-00 to prepare for HS Transmission | $40+4xUI$ | $85+6xUI$ | ns |
| DnP/N, n = 0 and 1 | $T_{HS-TERM-EN}$ | Time to enable Data Lane Receiver line termination measured from when Dn crosses VILMAX | - | $35+4xUI$ | ns |

18.4.7. Data Lanes from High Speed Mode to Low Power Mode

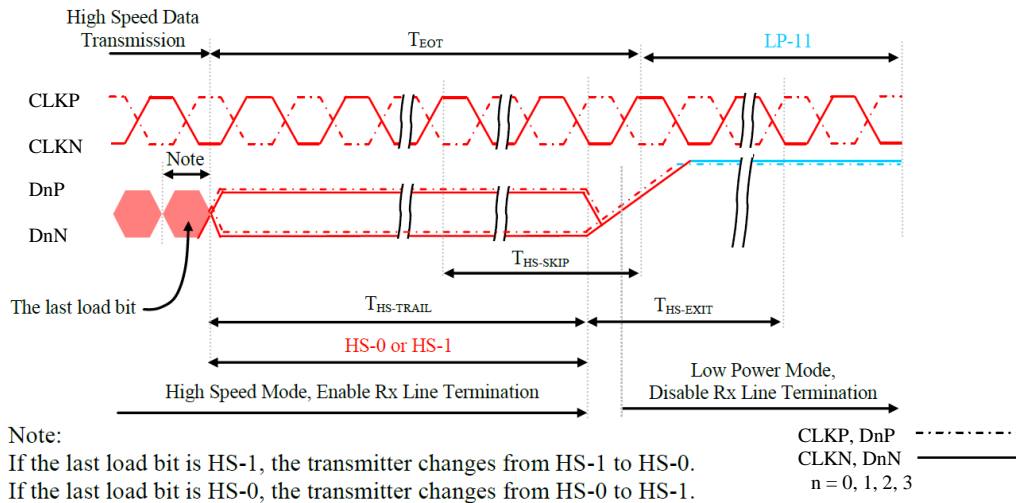


Figure 123: Data Lanes - High Speed Mode to Low Power Mode Timings

Table 45: Data Lanes - High Speed Mode to Low Power Mode Timings

| Signal | Symbol | Description | Min | Max | Unit |
|--------------------|---------------|--|-----|---------|------|
| DnP/N, n = 0 and 1 | $T_{HS-SKIP}$ | Time-Out at Display Module (ILI9881C) to ignore transition period of EoT | 40 | 55+4xUI | ns |
| DnP/N, n = 0 and 1 | $T_{HS-EXIT}$ | Time to driver LP-11 after HS burst | 100 | - | ns |

18.4.8. DSI Clock Burst – High Speed Mode to/from Low Power Mode

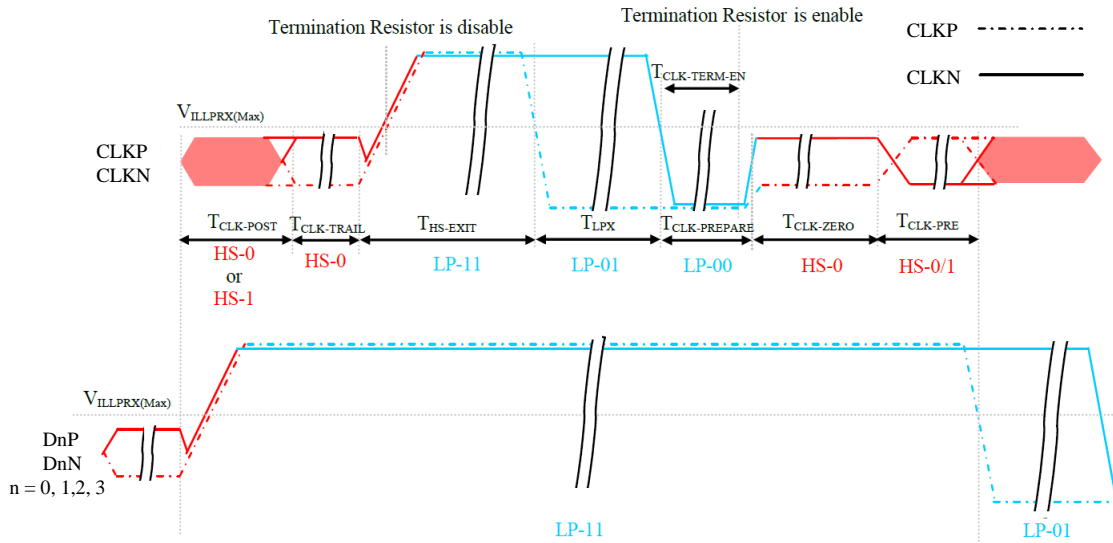
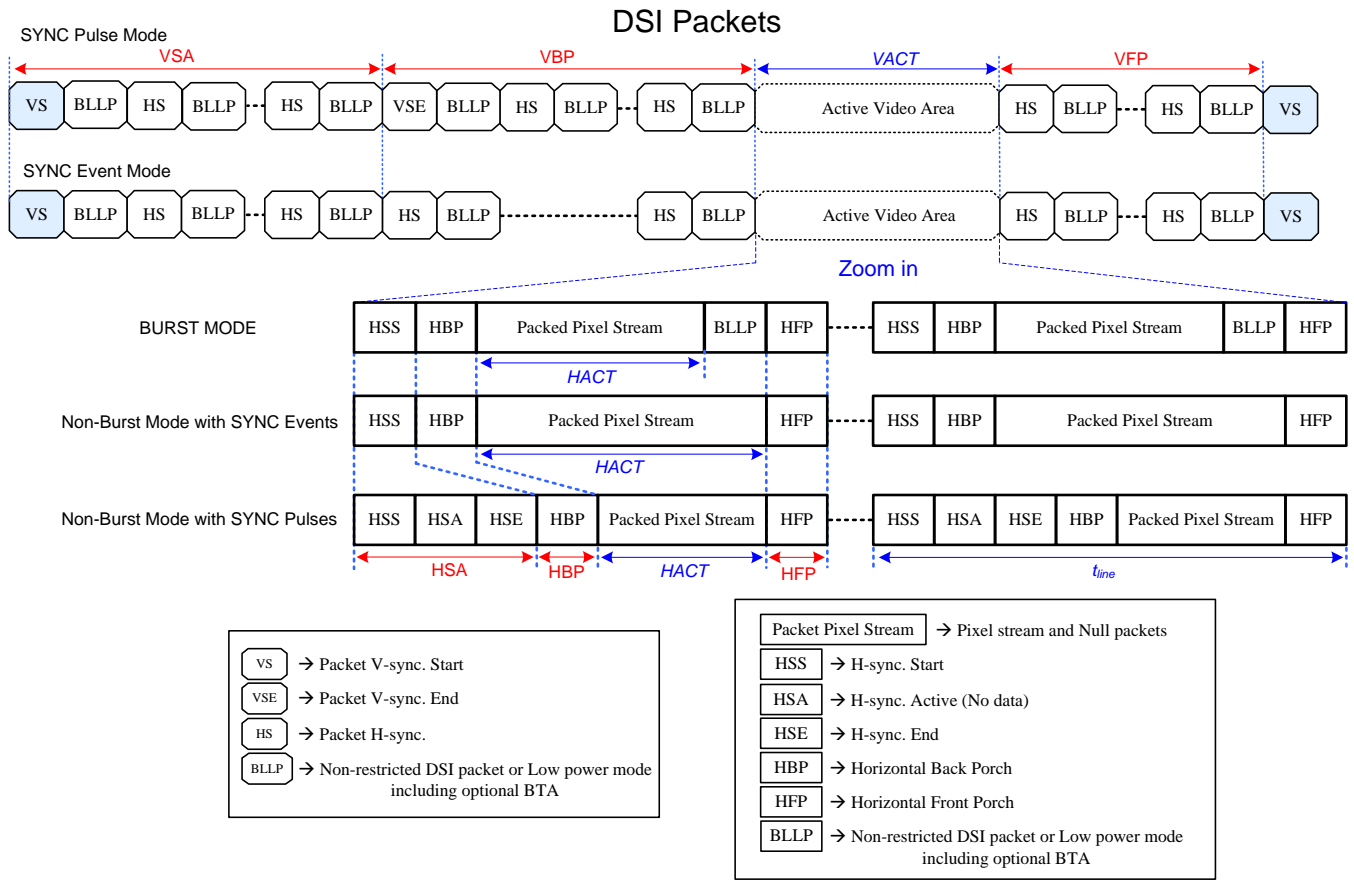


Figure 124: Clock Lanes - High Speed Mode to/from Low Power Mode Timings

Table 46: Clock Lanes - High Speed Mode to/from Low Power Mode Timings

| Signal | Symbol | Description | Min | Max | Unit |
|--------|----------------------------------|--|----------|-----|------|
| CLKP/N | $T_{CLK-POST}$ | Time that the MCU shall continue sending HS clock after the last associated Data Lanes has transitioned to LP mode | 60+52xUI | - | ns |
| CLKP/N | $T_{CLK-TRAIL}$ | Time to drive HS differential state after last payload clock bit of a HS transmission burst | 60 | - | ns |
| CLKP/N | $T_{HS-EXIT}$ | Time to drive LP-11 after HS burst | 100 | - | ns |
| CLKP/N | $T_{CLK-PREPARE}$ | Time to drive LP-00 to prepare for HS transmission | 38 | 95 | ns |
| CLKP/N | $T_{CLK-TERM-EN}$ | Time-out at Clock Lane to enable HS termination | - | 38 | ns |
| CLKP/N | $T_{CLK-PREPARE} + T_{CLK-ZERO}$ | Minimum lead HS-0 drive period before starting Clock | 300 | - | ns |
| CLKP/N | $T_{CLK-PRE}$ | Time that the HS clock shall be driven prior to any associated Data Lane beginning the transition from LP to HS mode | 8xUI | - | ns |

18.4.9. Timing for DSI video mode



| Parameters | Symbols | Min. | Typ. | Max. | Units |
|-------------------------|-------------------|------|------|--------|-----------|
| Vertical sync. active | VSA | 2 | - | - | Line |
| Vertical Back Porch | VBP | 18 | - | - | Line |
| Vertical Front Porch | VFP | 8 | - | - | Line |
| Active lines per frame | VACT | - | 1280 | - | Line |
| Horizontal sync. active | HSA | 2 | - | - | Pixel |
| Horizontal Back Porch | HSA + HBP | 1.88 | - | - | us |
| Horizontal Front Porch | HFP | 0.94 | - | - | us |
| Active pixels per line | HACT | - | 720 | - | Pixel |
| Bit rate | BR _{bps} | 435 | | Note 5 | Mbps/lane |

1 UI=1/Bit rate

$$HAS(\text{pixel}) = (tHSA \times \text{lane number}) / (UI \times \text{pixel format})$$

$$HBP(\text{pixel}) = (tHBP \times \text{lane number}) / (UI \times \text{pixel format})$$

$$HFP(\text{pixel}) = (tHFP \times \text{lane number}) / (UI \times \text{pixel format})$$

$$\text{Frame Rate} = \frac{BR_{\text{bps}} \times \text{Lane}_{\text{num}}}{(VACT + VSA + VBP + VFP) \times (HACT + HSA + HBP + HFP) \times \text{Pixel Format}}$$

Example : BR_{bps} = 457Mbps/lane, 1UI=2.1883ns, Frame rate=60Hz, VACT=1280, VSA=2, VBP=30, VFP=20, HACT=720, HSA=33, HBP=100, HFP=100, Lane_{num}=4(lane), Pixel Format=24(bit).

Note:

1. Lane_{num}: Date lane of MIPI-DSI.
2. Pixel Format: Please reference to “4.1DSI System Interface”.
3. The formula exists slightly error because of the host-transmission way.
4. The best frame rate setting : 2 data lanes : 50~60 Hz / 3 data lanes : 50~70 Hz / 4 data lanes : 50~70 Hz.
5. Please reference to “Table 39: Limited Clock Channel Speed”

18.4.10. Reset Timing

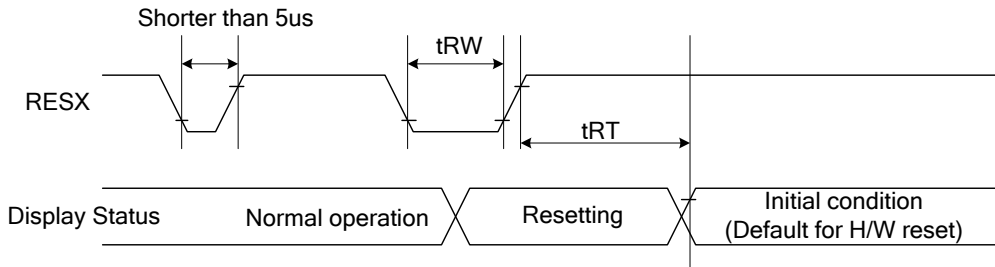


Figure 125: Reset Timing

Table 47: Reset Timing

| Signal | Symbol | Parameter | Min | Max | Unit |
|--------|--------|----------------------|-----|----------------------------------|------|
| RESX | tRW | Reset pulse duration | 10 | | µS |
| | tRT | Reset cancel | | 5 (note 1,5) 120 (note 1,6,7) | mS |

Notes:

1. The reset cancel also includes required time for loading ID bytes, VCOM setting and other settings from EEPROM to registers. This loading is done every time when there is H/W reset cancel time (tRT) within 5 ms after a rising edge of RESX.
2. Spike due to an electrostatic discharge on RESX line does not cause irregular system reset according to the Table 48.

Table 48: Reset Descript

| RESX Pulse | Action |
|----------------------|----------------|
| Shorter than 5us | Reset Rejected |
| Longer than 10us | Reset |
| Between 5us and 10us | Reset starts |

3. During the Resetting period, the display will be blanked (The display enters the blanking sequence, which maximum time is 120 ms, when Reset Starts in the Sleep Out mode. The display remains the blank state in the Sleep In mode.) and then return to Default condition for Hardware Reset.
4. Spike Rejection can also be applied during a valid reset pulse, as shown below:

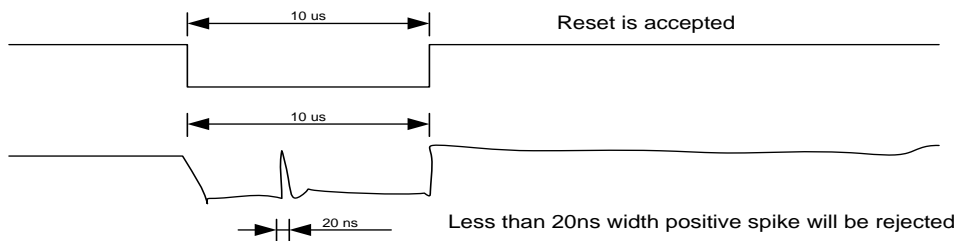


Figure 126: Positive Noise Pulse during Reset Low

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

19. Panel Application

19.1. Input Power Type

ILI9881C supports 3 kinds of input power type as shown below.

Table 49: Different Input Power Type

| Setting | Input Power Type |
|--|------------------|
| <p>Power Mode 2A</p> <p>BOOSTM[2:0] = 1h DI_PWR_REG = 0h</p> | |
| <p>Power Mode 3</p> <p>BOOSTM[2:0] = 2h DI_PWR_REG = don't care</p> | |
| <p>Power Mode 4</p> <p>BOOSTM[2:0] = 1h DI_PWR_REG = 1h</p> | |

19.2. Power Mode 2A (BOOSTM[2:0] = 1h, DI_PWR_REG = 0h)

19.2.1. Power Structure

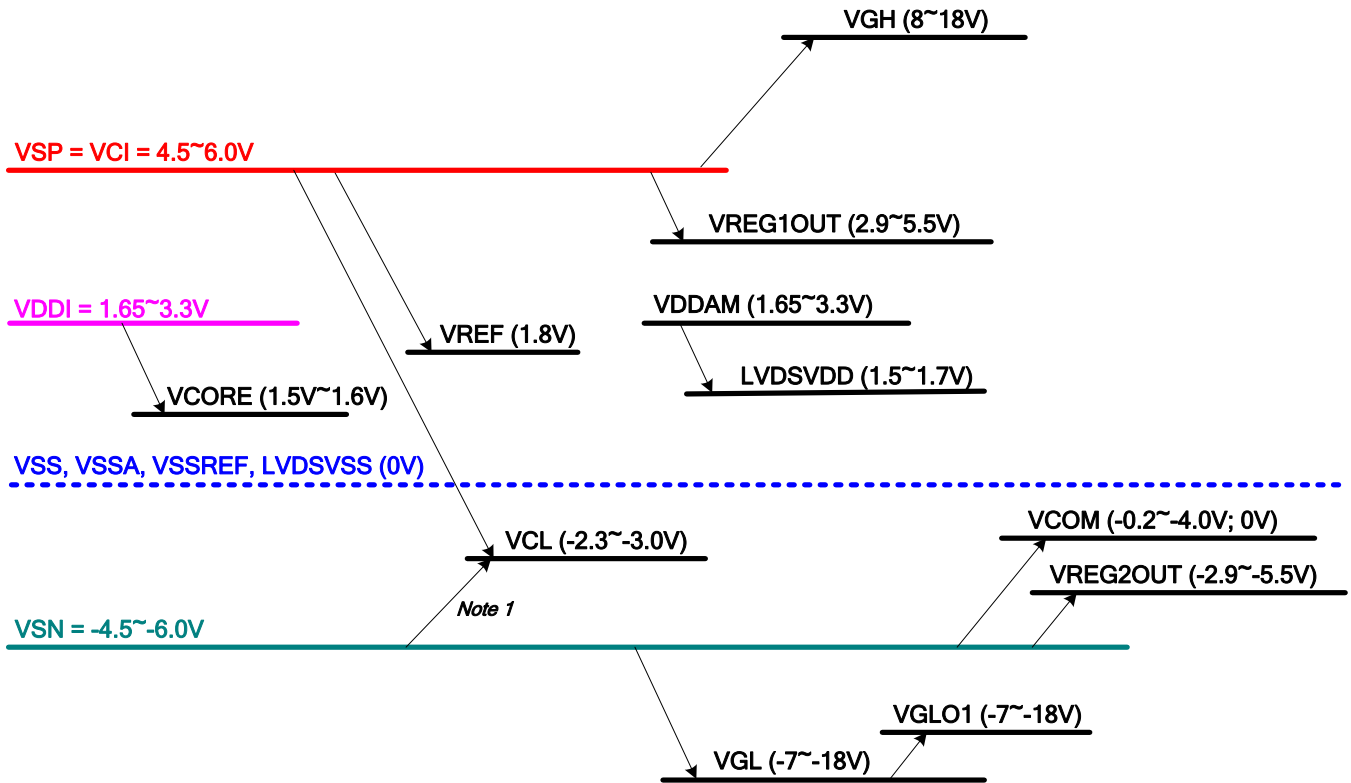


Figure 127: Power Structure of Power Mode 2A

Notes:

1. Please refer to "5.7.13 Power Control 3 (6Fh)".
2. The VREG1OUT, VREG2OUT, VCOM, VGH, VGL and VCL output voltage levels are lower than their theoretical levels (Ideal voltage levels) due to the current consumption at respective outputs.

19.2.3. External Component

Table 50: External Component table of Power Mode 2A

| N0. | Pad Name | Typical Value | Note |
|-----|-----------|--|---------------------------|
| 1 | VDDI | 1.0uF / 4V | I/O and Digital Power |
| 2 | VSP | 2.2~4.7uF / 10V | Analog Power |
| 3 | VSN | 2.2~4.7uF / 10V | Analog Power |
| 4 | LVDSVDD | 1.0uF / 4V | |
| 5 | VCORE | 2.2uF / 4V | |
| 6 | VREF | 1.0uF / 4V | Optional |
| 7 | VCL | 1.0uF / 6.3V | |
| 8 | REG1OUT | 1.0uF / 6.3V | Optional |
| 9 | REG2OUT | 1.0uF / 6.3V | Optional |
| 10 | VCOM | 2.2uF / 4V | |
| 11 | VGH | 1.0uF / 25V | |
| 12 | VGL | 1.0uF / 25V | |
| 13 | VGLO1 | 1.0uF / 25V | Optional (if not used) |
| 14 | C21P/C21N | 1.0uF / 25V | |
| 15 | C22P/C22N | 1.0uF / 25V | Optional |
| 16 | C23P/C23N | 1.0uF / 25V | |
| 17 | C24P/C24N | 1.0uF / 25V | Optional |
| 18 | C41P/C41N | 1.0uF / 6.3V | Optional |
| 19 | C42P/C42N | 1.0uF / 6.3V | Optional |
| 20 | D1 | Schottky Diode VF ≤ 0.4V/20mA at 25°C, VR ≥ 30V | |

19.3. Power Mode 3 (BOOSTM[2:0] = 2h, DI_PWR_REG = don't care)

19.3.1. Power Structure

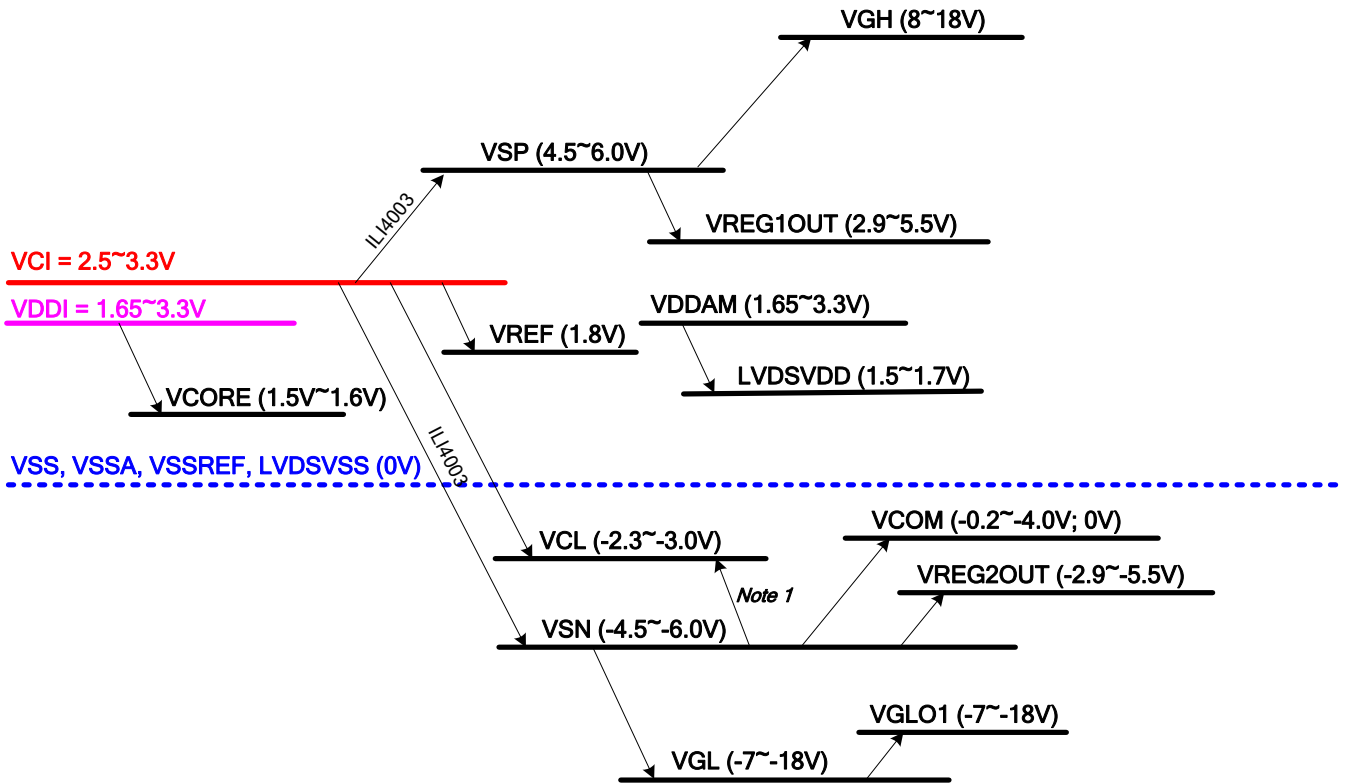


Figure 129: Power Structure of Power Mode 3

Notes:

1. Please refer to "5.7.13 Power Control 3 (6Fh)".
2. The VSP, VSN, VREG1OUT, VREG2OUT, VCOM, VGH, VGL and VCL output voltage levels are lower than their theoretical levels (Ideal voltage levels) due to the current consumption at respective outputs.

19.3.3. External Component

Table 51: External Component table of Power Mode 3

| N0. | Pad Name | Typical Value | Note |
|-----|-----------|--|---------------------------|
| 1 | VCI | 1.0uF / 6.3V | Analog Power |
| 2 | VDDI | 1.0uF / 4V | I/O and Digital Power |
| 3 | VSP | 2.2~4.7uF / 6.3V | |
| 4 | VSN | 2.2~4.7uF / 6.3V | |
| 5 | LVDSVDD | 1.0uF / 4V | |
| 6 | VCORE | 2.2uF / 4V | |
| 7 | VREF | 1.0uF / 4V | Optional |
| 8 | VCL | 1.0uF / 6.3V | |
| 9 | REG1OUT | 1.0uF / 6.3V | Optional |
| 10 | REG2OUT | 1.0uF / 6.3V | Optional |
| 11 | VCOM | 2.2uF / 4V | |
| 12 | VGH | 1.0uF / 25V | |
| 13 | VGL | 1.0uF / 25V | |
| 14 | VGLO1 | 1.0uF / 25V | Optional (if not used) |
| 15 | C21P/C21N | 1.0uF / 25V | |
| 16 | C22P/C22N | 1.0uF / 25V | Optional |
| 17 | C23P/C23N | 1.0uF / 25V | |
| 18 | C24P/C24N | 1.0uF / 25V | Optional |
| 19 | C41P/C41N | 1.0uF / 6.3V | Optional |
| 20 | C42P/C42N | 1.0uF / 6.3V | Optional |
| 21 | Q1 | | ILI4003 |
| 22 | C1P/C1N | 2.2uF / 6.3V | |
| 23 | C2P/C2N | 2.2uF / 6.3V | |
| 24 | C3P/C3N | 2.2uF / 6.3V | |
| 25 | D1 | Schottky Diode VF ≤ 0.4V/20mA at 25°C, VR ≥ 30V | |

19.4. Power Mode 4 (BOOSTM[2:0] = 1h, DI_PWR_REG = 1h)

19.4.1. Power Structure

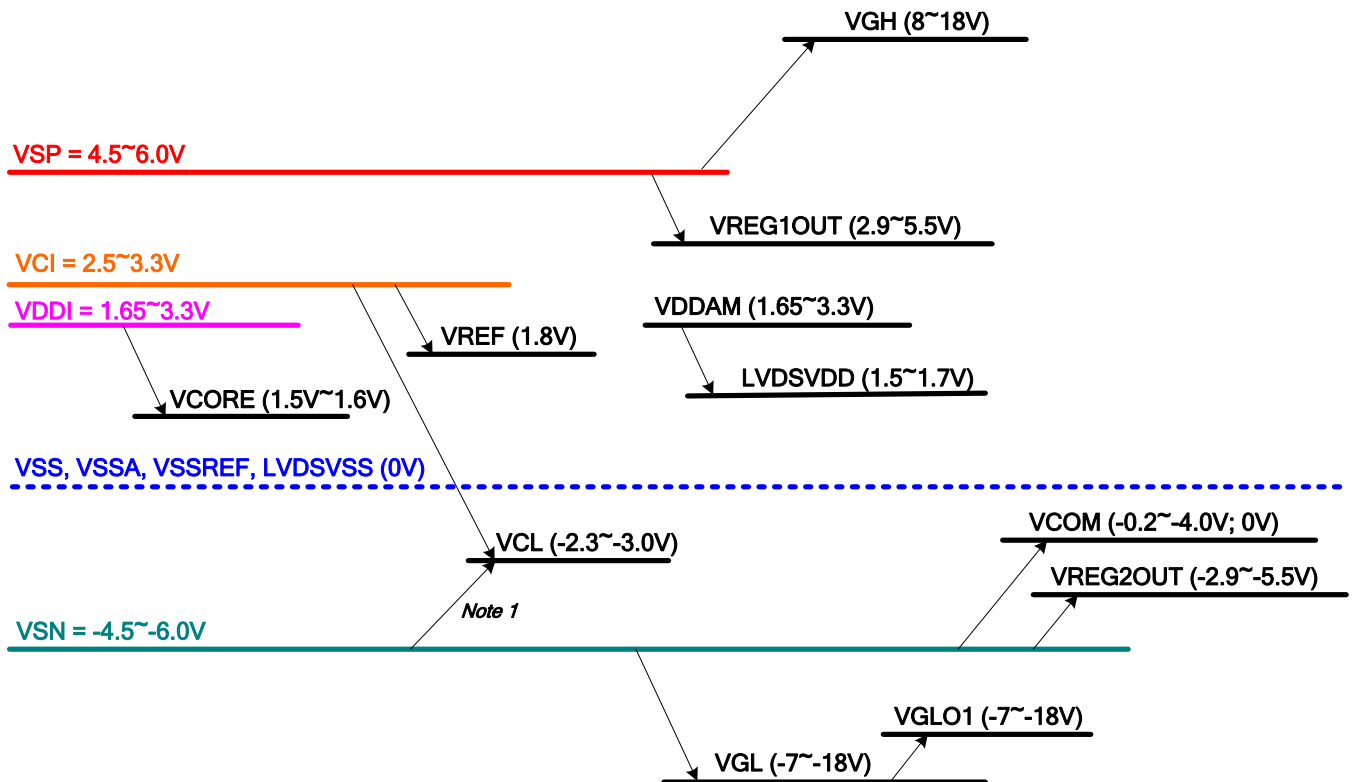


Figure 131: Power Structure of Power Mode 4

Notes:

1. Please refer to "5.7.13 Power Control 3 (6Fh)".
2. The VREG1OUT, VREG2OUT, VCOM, VGH, VGL and VCL output voltage levels are lower than their theoretical levels (Ideal voltage levels) due to the current consumption at respective outputs.

19.4.2. Reference Circuit

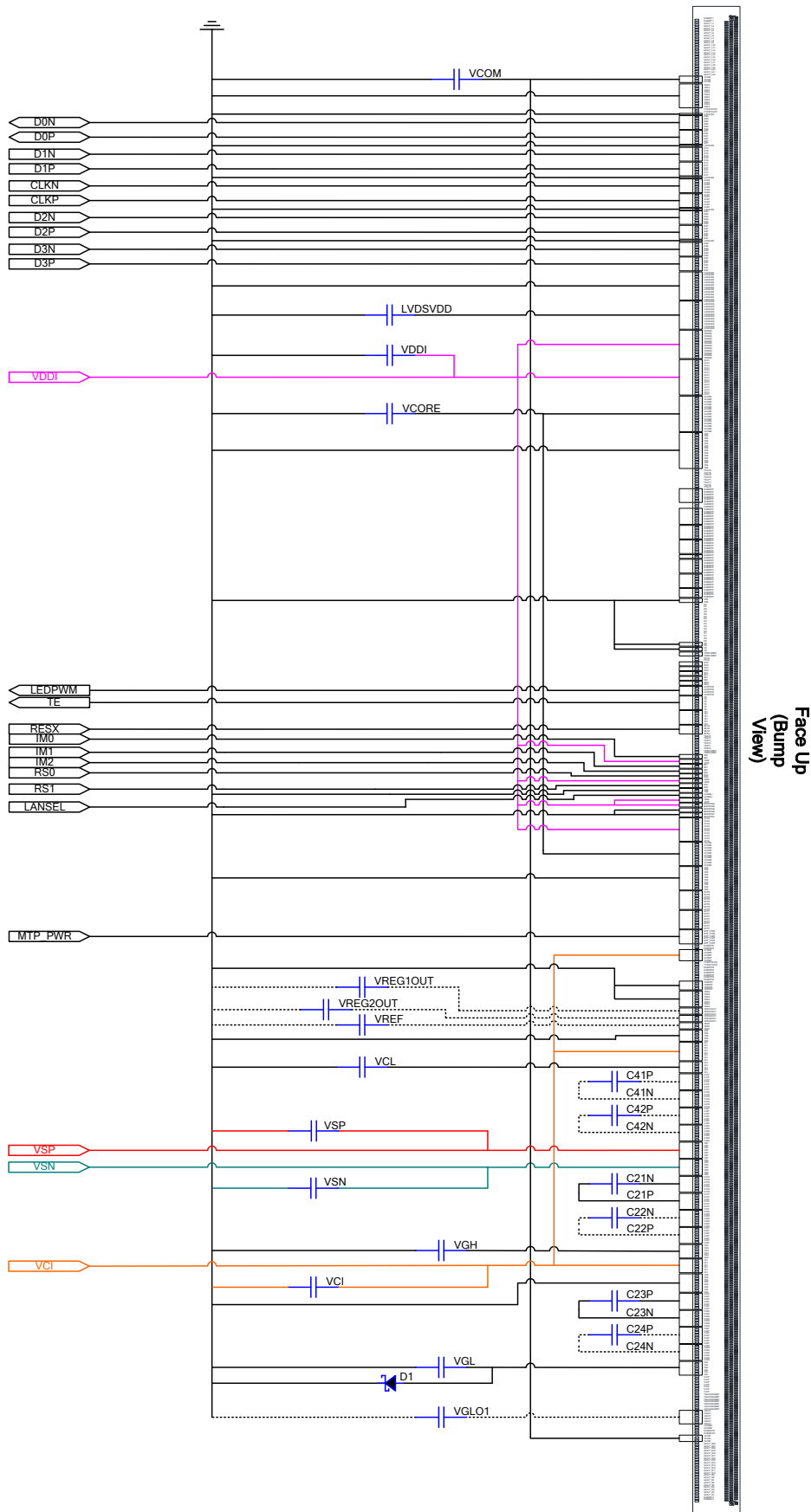


Figure 132: Reference Circuit of Power Mode 4

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19.4.3. External Component

Table 52: External Component table of Power Mode 4

| N0. | Pad Name | Typical Value | Note |
|------------|-----------------|--|---------------------------|
| 1 | VDDI | 1.0uF / 4V | I/O and Digital Power |
| 2 | VCI | 1.0uF / 6.3V | Analog Power |
| 3 | VSP | 2.2~4.7uF / 10V | Analog Power |
| 4 | VSN | 2.2~4.7uF / 10V | Analog Power |
| 5 | LVDSVDD | 1.0uF / 4V | |
| 6 | VCORE | 2.2uF / 4V | |
| 7 | VREF | 1.0uF / 4V | Optional |
| 8 | VCL | 1.0uF / 6.3V | |
| 9 | REG1OUT | 1.0uF / 6.3V | Optional |
| 10 | REG2OUT | 1.0uF / 6.3V | Optional |
| 11 | VCOM | 2.2uF / 4V | |
| 12 | VGH | 1.0uF / 25V | |
| 13 | VGL | 1.0uF / 25V | |
| 14 | VGLO1 | 1.0uF / 25V | Optional (if not used) |
| 15 | C21P/C21N | 1.0uF / 25V | |
| 16 | C22P/C22N | 1.0uF / 25V | Optional |
| 17 | C23P/C23N | 1.0uF / 25V | |
| 18 | C24P/C24N | 1.0uF / 25V | Optional |
| 19 | C41P/C41N | 1.0uF / 6.3V | Optional |
| 20 | C42P/C42N | 1.0uF / 6.3V | Optional |
| 21 | D1 | Schottky Diode VF ≤ 0.4V/20mA at 25°C, VR ≥ 30V | |

19.5. Maximum Layout Resistance

Table 53: Maximum Layout Resistance

| Pad Name | Type | Maximum series resistance | Unit |
|--|-------------------|---------------------------|------|
| VCI | Power Supply | 5 | Ω |
| VCIREF | Power Supply | 10 | Ω |
| VDDI | Power Supply | 5 | Ω |
| VCC1 | Power Supply | 5 | Ω |
| VCC2 | Power Supply | 5 | Ω |
| VDDAM | Power Supply | 5 | Ω |
| VSP | Power Supply | 5 | Ω |
| VSN | Power Supply | 5 | Ω |
| VSSA | Ground | 5 | Ω |
| VSSREF | Ground | 10 | Ω |
| LVDSVSS | Ground | 50 | Ω |
| VSS | Ground | 5 | Ω |
| MTP_PWR | Power Supply | 5 | Ω |
| VREG1OUT | Analog | 20 | Ω |
| VERG2OUT | Analog | 20 | Ω |
| VCL | Analog | 5 | Ω |
| VGH | Analog | 10 | Ω |
| VGL | Analog | 10 | Ω |
| VGLO1 | Analog | 10 | Ω |
| EXTP | Output | 10 | Ω |
| EXTN | Output | 10 | Ω |
| LVDSVDD | Analog | 5 | Ω |
| VREF | Analog | 20 | Ω |
| VCORE | Analog | 5 | Ω |
| C21P, C21N, C22P, C22N C23P, C23N, C24P, C24N C41P, C41N, C42P, C42N | Step-up Capacitor | 5 | Ω |
| IM[2:0], RS[1:0] LANSEL, BOOSTM[2:0] | Input | 100 | Ω |
| RESX | Input | 100 | Ω |
| TE, TE1, LEDPWM | Output | 50 | Ω |
| CLKP, CLKN D1P, D1N D2P, D2N D3P, D3N | Input | 5 | Ω |
| D0P, D0N | Input + Output | 5 | Ω |
| CSX, DCX, SCL, SDI | Input | 100 | Ω |
| SDO | Output | 100 | Ω |
| GOUT_L[22:1] GOUT_R[22:1] | Output | 10 | Ω |
| VCOM | Analog | 5 | Ω |
| VTESTOUTP | Analog | 100 | Ω |
| VTESTOUTN | Analog | 100 | Ω |
| TOUT[3:0] | Input + Output | 100 | Ω |
| TEST[5:0] | Input + Output | 100 | Ω |
| VS, HS | Input + Output | 100 | Ω |
| PCLK | Input | 100 | Ω |
| D[7:0] | Input + Output | 50 | Ω |

20. Liquid Crystal Power Supply Specifications

Table 54: Liquid Crystal Power Supply Specifications

| Item | | Description |
|-----------------------------------|----------------------|---|
| TFT Source Driver | | 2404 pins , 800(RGB) |
| TFT Gate Driver Control Signal | | 44 pins |
| TFT Display's Capacitor Structure | | Cst structure only (Cs on Common) |
| Liquid Crystal Drive Output | S1 ~ 2400, SDUM[3:0] | V0 ~ V255 grayscales |
| | GOUT_L/R[22:1] | VGH – VGL |
| | VCOM | -4.2 ~ -0.2V; 0V |
| Input Power Voltage | VCI | 2.50 ~ 6.0V |
| | VCIREF | 2.50 ~ 6.0V |
| | VDDI | 1.65 ~ 3.3V |
| | VCC1 | 1.65 ~ 6.0V |
| | VCC2 | 1.65 ~ 6.0V |
| | VDDAM | 1.65 ~ 3.3V |
| | VSP | 4.5 ~ 6V |
| | VSN | -6 ~ -4.5V |
| Liquid Crystal Drive Voltages | VGH | 8.0V ~ 18.0V |
| | VGL | -18.0V ~ -7.0V |
| | VCL | -3.0V ~ -2.3V |
| | VGH – VGL | Max. 32.0V |
| Internal Step-up Circuits | VGH | 2xVSP or 2.5xVSP or 3*VSP or 3.5*VSP or 4*VSP or 4.5*VSP or 5*VSP |
| | VGL | -1.5xVSP or -2xVSP or -2.5xVSP or -3xVSP or -3.5xVSP or -4xVSP or -4.5xVSP or -5xVSP |

21. Revision History

| Version No. | Date | Page | Description |
|-------------|------------|--|--|
| V090 | 2015/02/05 | All | New created |
| V091 | 2015/02/12 | 30 303 | Modify the dummy pad Modify the External MTP_PWR Programming Flow |
| V092 | 2015/03/18 | 231 232 233 234 238 239 242 245 246 247 249 251 252 253 297 308 | Modify SSC description Add Page4_R21h description Add Page4_R23h description Add Page4_R26h description Add Page4_R35h description Add Page4_R3Ah description Modify VGH clamp level description Add Page4_R7Ah description Add Page4_R87h description Add Page4_R88h description Modify VGL clamp level description Add Page4_RB2h description Add Page4_RB5h description Modify VGH clamp level description Modify VDDI rise time Modify DC Characteristics |
| V093 | 2015/03/31 | 297 | Modify VDDI/VCI Rise time |
| | | | |
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