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OR-20-001



Specifications for

Blanview TFT-LCD Monitor

(3.2" WVGA 480 x RGB x 800 Portrait)

Version 4.0

MODEL COM32H3N89ULC

(Please be sure to check the specifications latest version.)

Customer's Approval

Signature:

Name:

Section:

Title:

Date:

ORTUSTECH

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1. Application

This Specification is applicable to 80.5mm (3.2 inch) Blanview TFT-LCD monitor for non-military use.

- ◎ ORTUS TECHNOLOGY makes no warranty or assume no liability that use of this Product and/or any information including drawings in this Specification by Purchaser is not infringing any patent or other intellectual property rights owned by third parties, and ORTUS TECHNOLOGY shall not grant to Purchaser any right to use any patent or other intellectual property rights owned by third parties. Since this Specification contains ORTUS TECHNOLOGY's confidential information and copy right, Purchaser shall use them with high degree of care to prevent any unauthorized use, disclosure, duplication, publication or dissemination of ORTUS TECHNOLOGY'S confidential information and copy right.
- ◎ If Purchaser intends to use this Products for an application which requires higher level of reliability and/or safety in functionality and/or accuracy such as transport equipment (aircraft, train, automobile, etc.), disaster-prevention/security equipment or various safety equipment, Purchaser shall consult ORTUS TECHNOLOGY on such use in advance.
- ◎ This Product shall not be used for application which requires extremely higher level of reliability and/or safety such as aerospace equipment, telecommunication equipment for trunk lines, control equipment for nuclear facilities or life-support medical equipment.
- ◎ It must be noted as an mechanical design manner, especial attention in housing design to prevent arcuation/flexure or caused by stress to the LCD module shall be considered.
- ◎ ORTUS TECHNOLOGY assumes no liability for any damage resulting from misuse, abuse, and/or miss-operation of the Product deviating from the operating conditions and precautions described in the Specification.
- ◎ It shall be mutually conferred if nonconforming defect which result from unspecified cause in this specification arises.
- ◎ If any issue arises as to information provided in this Specification or any other information, ORTUS TECHNOLOGY and Purchaser shall discuss them in good faith and seek solution.
- ◎ ORTUS TECHNOLOGY assumes no liability for defects such as electrostatic discharge failure occurred during peeling off the protective film or Purchaser's assembly process.
- ◎ This Product is compatible for RoHS directive.

| Object substance | Maximum content [ppm] |
|--|-----------------------|
| Cadmium and its compound | 100 |
| Hexavalent Chromium Compound | 1000 |
| Lead & Lead compound | 1000 |
| Mercury & Mercury compound | 1000 |
| Polybrominated biphenyl series (PBB series) | 1000 |
| Polybrominated biphenyl ether series (PBDE series) | 1000 |

2. Outline Specifications

2.1 Features of the Product

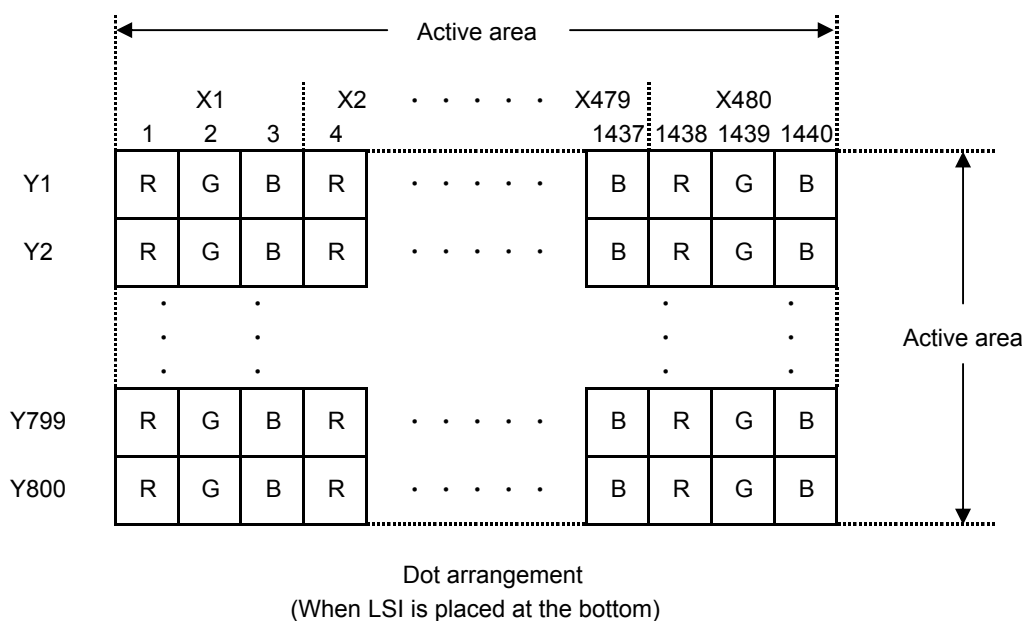
- 3.2 inch diagonal display, 1,440 [H] x 800 [V] dots.
- 8-bit 16,777,216 color display capability.
- System Interface (Register setting)
- Serial Peripheral Interface (SPI)
- RGB interface with 24-bit data bus (VSYNC, HSYNC, ENABLE, DOTCLK, D23-0)
- Internal booster for various voltage levels to drive LC

| | Indoor | | Outdoor | |
|---------------|-------------|---------------------------------|-------------|---------------------------------|
| | Readability | Power Efficiency (Battery Life) | Readability | Power Efficiency (Battery Life) |
| Transmissive | Good | Good | Fair | Poor |
| Transflective | Fair | Poor | Good | Good |
| Blanview | Good | Good | Good | Good |



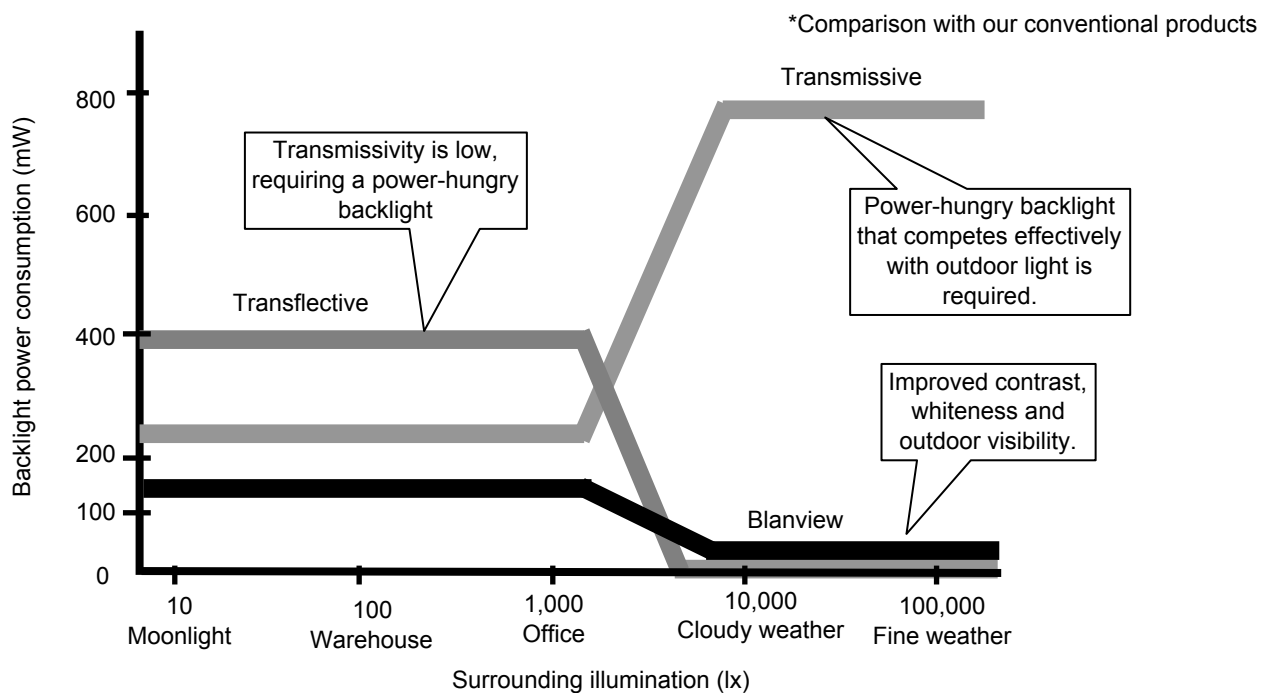
2.2 Display Method

| Items | Specifications | Remarks |
|---------------------|---|----------------------------|
| Display type | 16,777,216 colors. Blanview, Normally Black | |
| Driving method | a-Si TFT Active matrix Line-scanning, Non-interlace | |
| Dot arrangement | RGB stripe arrangement | Refer to "Dot arrangement" |
| Signal input method | Register : Serial Peripheral Interface (SPI) Data : 24 bit RGB interface | |
| Backlight type | Long life & High bright white LED. | |
| NTSC ratio | 35% | |



<Features of Blanview>

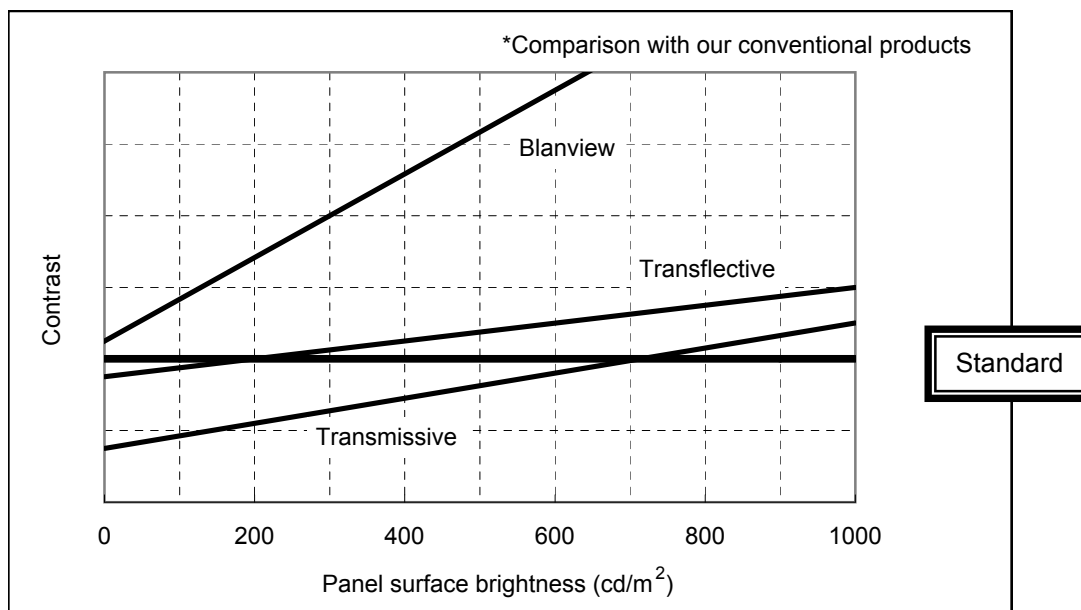
- Backlight power consumption required to assure visibility. (equivalent to 3.5"QVGA)



- Contrast characteristics under 100,000lx. (same condition as direct sunlight.)

With better contrast (higher contrast ratio), Blanview TFT-LCD has the best outdoor readability in three different types of TFT-LCD.

Below chart shows contrast value against panel surface brightness. (Horizontal: Panel surface brightness/ Vertical: Contrast value) LCD panel has enough outdoor readability above our Standard line. (ORTUS TECHNOLOGY criteria)



3. Dimensions and Shape

△ 3.1 Dimensions

| Items | Specifications | Unit | Remarks |
|-----------------------------------|-------------------------------|------|------------------------------------|
| Outline dimensions | 46.66[H] × 78.55[V] × 1.75[D] | mm | Exclude FPC cable and parts on FPC |
| Active area | 41.40[H] × 69.00[V] | mm | 80.5mm diagonal |
| Number of dots | 1440[H] × 800[V] | dot | |
| Dot pitch | 28.75[H] × 86.25[V] | μm | |
| Surface hardness of the polarizer | 3 | H | Load:2.0N |
| Weight | 14 | g | Include FPC cable |

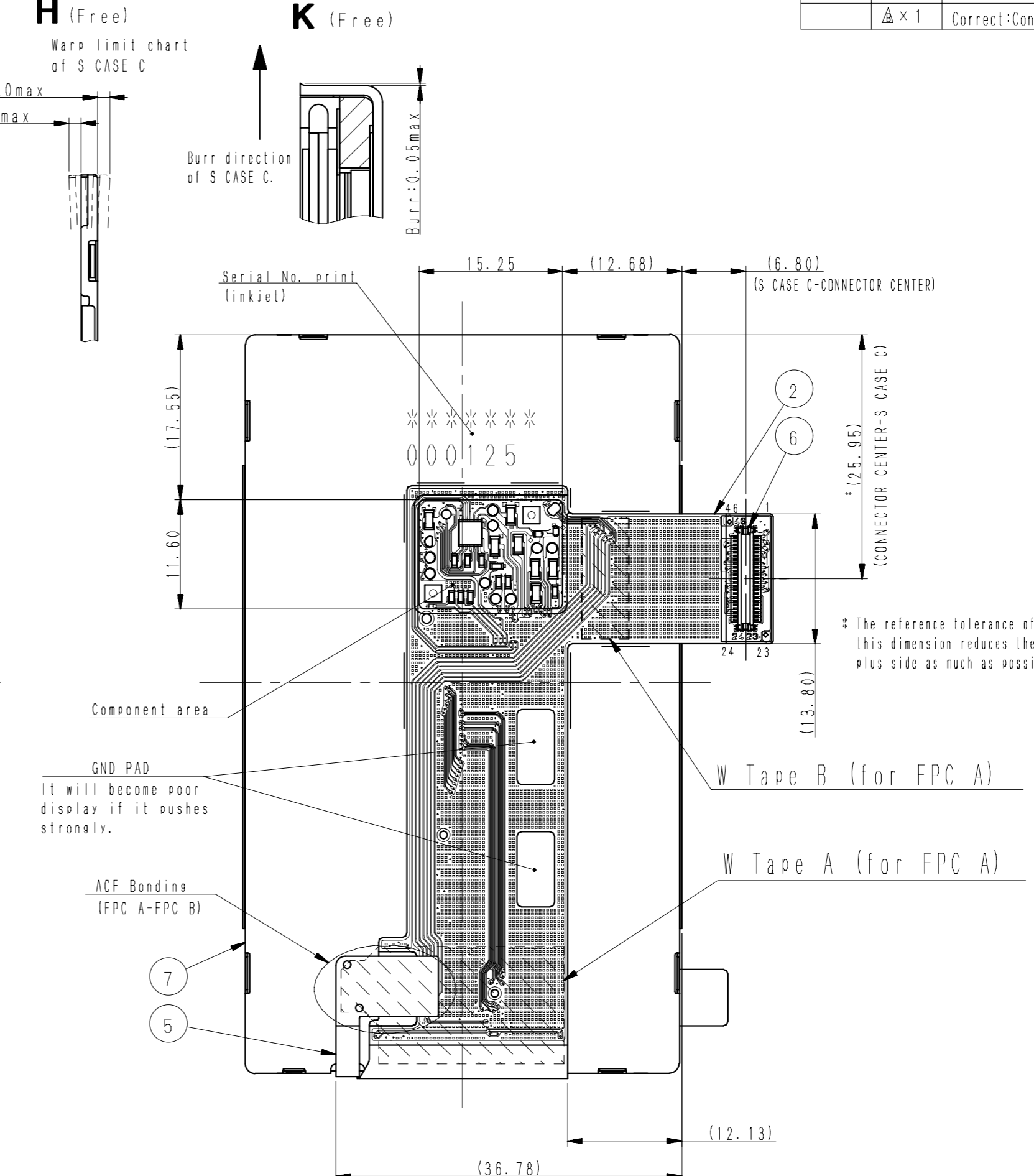
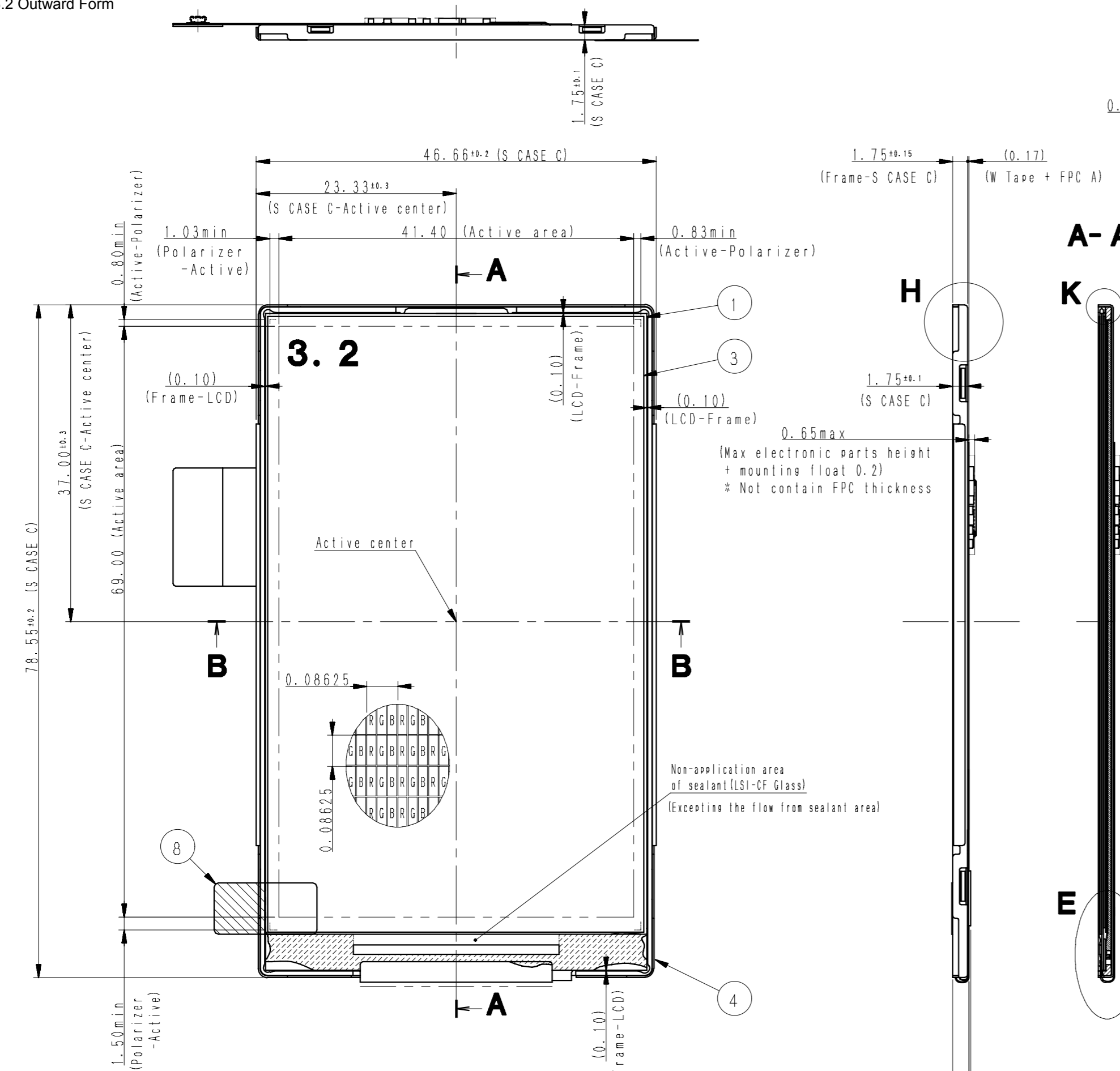
3.2 Outward Form

| | | | | | | |
|--------|----------|--------------------|----------------|----------|---------|----------|
| EC No. | REV. No. | REVISE | DATE (Y: M: D) | APPROVED | CHECKED | PREPARED |
| | A × 1 | Correct: Connector | 16:03:16 | | | |

(8/47)
15TLM003
Issue: Aug. 26, 2016

Pin-Arrangement

| | | | |
|----|--------|----|------|
| G4 | GND | G1 | GND |
| 46 | GND | 1 | LED5 |
| 45 | VCC | 2 | LED4 |
| 44 | VCC | 3 | LED3 |
| 43 | IOVCC | 4 | LED2 |
| 42 | ENABLE | 5 | LED1 |
| 41 | SD1 | 6 | VLED |
| 40 | SCL | 7 | VLED |
| 39 | CSB | 8 | DB7 |
| 38 | DOTCLK | 9 | DB6 |
| 37 | RESETB | 10 | DB5 |
| 36 | VSYNC | 11 | DB4 |
| 35 | HSYNC | 12 | DB3 |
| 34 | GND | 13 | DB2 |
| 33 | DB16 | 14 | DB1 |
| 32 | DB17 | 15 | DB0 |
| 31 | DB18 | 16 | GND |
| 30 | DB19 | 17 | DB15 |
| 29 | DB20 | 18 | DB14 |
| 28 | DB21 | 19 | DB13 |
| 27 | DB22 | 20 | DB12 |
| 26 | DB23 | 21 | DB11 |
| 25 | GND | 22 | DB10 |
| 24 | DB8 | 23 | DB9 |
| G3 | GND | G2 | GND |



- Note 1. Angular deviation of LCD cell from the TFT-LCD monitor's reference axis shall be less than $\pm 40'$.
2. Protective film is affixed on front surface of the screen. Location tolerance of the protective film shall be ± 1.5 mm to the polarizing film.
3. Protective film is affixed on front surface of the screen.
4. Constant-current circuit is required for the LED drive circuit to make full use of original visual quality of the display. When other driving method is used for the LED driving circuit, original visual quality of the display is not guaranteed.

| | 12 | | | | |
|-----------|----------|------------|-----------------|-------------------------|---------|
| | 11 | | | | |
| | 10 | | | | |
| | 9 | | | | |
| R Tape | 8 | | | | |
| S CASE C | 7 | | SUS304 (t=0.20) | | |
| Connector | 6 | A XI446124 | | PANASONIC | |
| FPC B | 5 | A XI446124 | | Use of LED | |
| Frame | 4 | | PC | | |
| Polarizer | 3 | | HC type | | |
| FPC A | 2 | | | Use of LCD | |
| TFT-LCD | 1 | | | Total t=0.40(0.20+0.20) | |
| PART NAME | Part No. | Spec. No. | Standard | Material | Remarks |

| | | | | |
|--------------------------|---------------------------------|------------------------|------------|--|
| APPROVED K. Hashizume | GENERAL TOLERANCE ± 0.3 | SCALE 2 : 1 | UNIT mm | ORTUSTECH ORTUS TECHNOLOGY CO., LTD. DO NOT DUPLICATE, CONFIDENTIAL AND PROPRIETARY |
| CHECKED J. Hiranobu | ISSUE (Y: M: D) 16 : 03 : 18 | MODEL COM32H3N89U** | | |
| CHECKED NAME | | | | |
| DESIGN J. Hiranobu | | | | |
| DRAW J. Hiranobu | | | | |
| OUTLINE-D3N89 | | | | DRAWING No. RJD526609D201 |
| | | | | REV. SHEET DIV. |

3.3 Serial № print (S-print)

1) Display Items

S-print indicates the least significant digit of manufacture year (1digit),
manufacture month with below alphabet (1letter), model code (4characters), serial number (6digits).

* Contents of Display

| | | | |
|---|---|------|-------|
| * | * | **** | ***** |
| - | - | - | - |
| a | b | c | d |

| Contents of display | | | | |
|---------------------|---|---|----------------------------------|----------------------------------|
| a | The least significant digit of manufacture year | | | |
| b | Manufacture month | Jan-A Feb-B Mar-C Apr-D | May-E Jun-F Jul-G Aug-H | Sep-I Oct-J Nov-K Dec-L |
| c | Model code | 32SC (Made in Japan) 32TC (Made in Malaysia) | | |
| d | Serial number | | | |

* Example of indication of Serial № print (S-print)

•Made in Japan

5H32SC000125

means "manufactured in August 2015, 3.2" S type, C specifications, serial number 000125"

•Made in Malaysia

5H32TC000125

means "manufactured in August 2015, 3.2" T type, C specifications, serial number 000125"

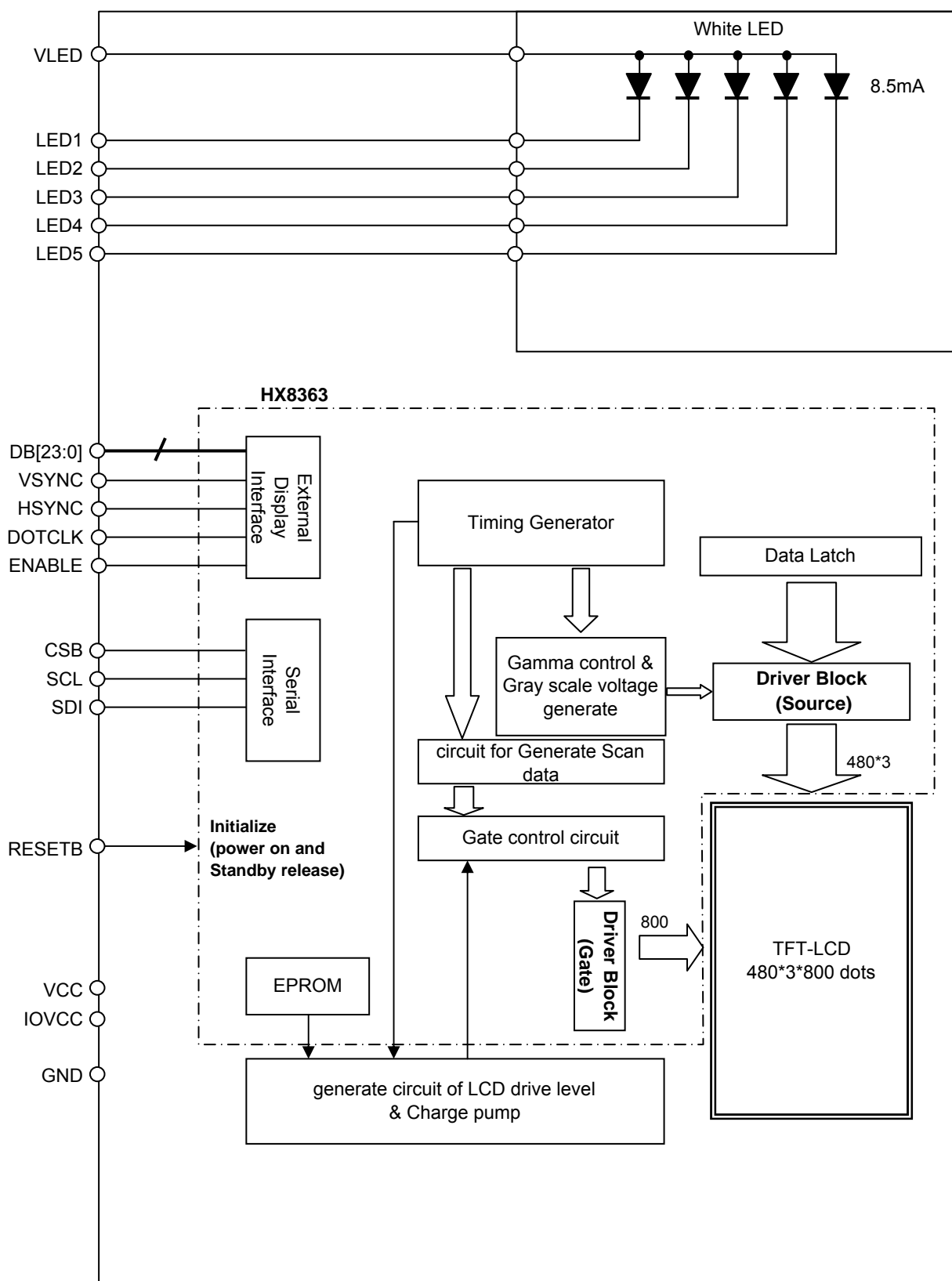
2) Location of Serial № print (S-print)

Refer to 3.2 "Outward Form".

3)Others

Please note that it is likely to disappear with an organic solvent about the Serial print.

4. Block Diagram



5.FPC Terminals

| № | Symbol | Details | Remark | IO |
|----|--------|--------------------------------|---|----|
| 1 | LED5 | Backlight LED Cathode5 | | P |
| 2 | LED4 | Backlight LED Cathode4 | | P |
| 3 | LED3 | Backlight LED Cathode3 | | P |
| 4 | LED2 | Backlight LED Cathode2 | | P |
| 5 | LED1 | Backlight LED Cathode1 | | P |
| 6 | VLED | Power supply for Backlight LED | | P |
| 7 | VLED | Power supply for Backlight LED | | P |
| 8 | DB7 | B_Data | MSB | I |
| 9 | DB6 | | | I |
| 10 | DB5 | | | I |
| 11 | DB4 | | | I |
| 12 | DB3 | | | I |
| 13 | DB2 | | | I |
| 14 | DB1 | | | I |
| 15 | DB0 | | LSB | I |
| 16 | GND | GROUND | | P |
| 17 | DB15 | G_Data | MSB | I |
| 18 | DB14 | | | I |
| 19 | DB13 | | | I |
| 20 | DB12 | | | I |
| 21 | DB11 | | | I |
| 22 | DB10 | | | I |
| 23 | DB9 | | | I |
| 24 | DB8 | | LSB | I |
| 25 | GND | GROUND | | P |
| 26 | DB23 | R_Data | MSB | I |
| 27 | DB22 | | | I |
| 28 | DB21 | | | I |
| 29 | DB20 | | | I |
| 30 | DB19 | | | I |
| 31 | DB18 | | | I |
| 32 | DB17 | | | I |
| 33 | DB16 | | LSB | I |
| 34 | GND | GROUND | | P |
| 35 | HSYNC | HSYNC | | I |
| 36 | VSYNC | VSYNC | | I |
| 37 | RESETB | LCD Reset | L:Initialize Power_ON Reset is Required when Turning on the Power | I |
| 38 | DOTCLK | DOTCLK | | I |
| 39 | CSB | 3-Wire SPI Chip Select | | I |
| 40 | SCL | 3-Wire SPI clock | | I |
| 41 | SDI | 3-Wire SPI DATA input | | I |
| 42 | ENABLE | ENABLE | | I |
| 43 | IOVCC | Power | | P |
| 44 | VCC | Power | | P |
| 45 | VCC | Power | | P |
| 46 | GND | GROUND | | P |

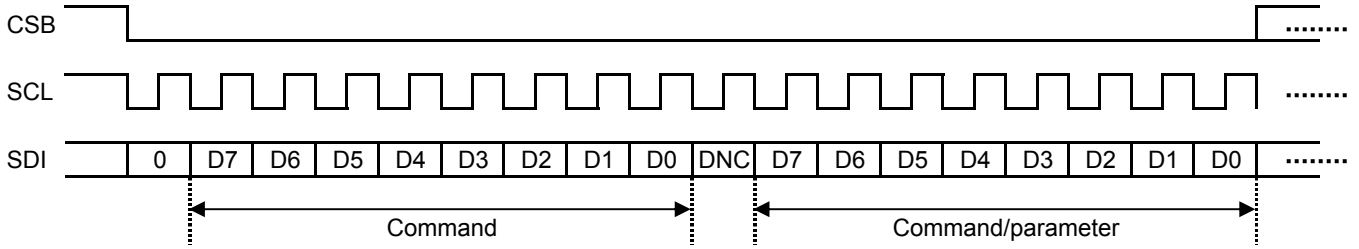
- Recommended connector: Panasonic corporation : AXT346124
- Please make sure to check a consistency between pin assignment in "3.2 Outward Form" and your connector pin assignment when designing your circuit.
Inconsistency in input signal assignment may cause a malfunction.
- Since FPC cable has gold plated terminals, gilt finish contact shoe connector is recommended.

6. Serial Data Transfer Interface

Instructions are transferred using 3 wire serial data transfer interface. The 3 wire serial bus uses chip select line (CSB), serial input data (SDI) and serial transfer clock line (SCL).

The 3 wire serial data packet is consists of control bit DNC and transmission byte. If the control bit is low, the transmission byte is command byte. If the control bit is high, the transmission byte is stored to command register. DNC should be transferred first , followed by MSB of transmission byte.

The serial interface is initialized when CSB is high, and the falling edge of CSB enables the serial interface.



7. Instruction list

(1)

| (Hex) | Register | DNC | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 |
|-------|-----------|-----|----|----|----|----|----|----|----|----|
| 00 | NOP | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | initial | - | - | - | - | - | - | - | - | - |
| | recommend | - | - | - | - | - | - | - | - | - |
| 01 | SWRESET | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| | initial | - | - | - | - | - | - | - | - | - |
| | recommend | - | - | - | - | - | - | - | - | - |
| 06 | RDRED | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 |
| | initial | - | - | - | - | - | - | - | - | - |
| | recommend | - | - | - | - | - | - | - | - | - |
| 07 | RDGREEN | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 |
| | initial | - | - | - | - | - | - | - | - | - |
| | recommend | - | - | - | - | - | - | - | - | - |
| 08 | RDBLUE | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| | initial | - | - | - | - | - | - | - | - | - |
| | recommend | - | - | - | - | - | - | - | - | - |
| 0A | RDDPM | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 |
| | initial | - | - | - | - | - | - | - | - | - |
| | recommend | - | - | - | - | - | - | - | - | - |
| 0B | RDDMADCTL | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 |
| | initial | - | - | - | - | - | - | - | - | - |
| | recommend | - | - | - | - | - | - | - | - | - |
| 0C | RDDCOLMOD | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 |
| | initial | - | - | - | - | - | - | - | - | - |
| | recommend | - | - | - | - | - | - | - | - | - |
| 0D | RDDIM | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 |
| | initial | - | - | - | - | - | - | - | - | - |
| | recommend | - | - | - | - | - | - | - | - | - |
| 0E | RDDSM | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 |
| | initial | - | - | - | - | - | - | - | - | - |
| | recommend | - | - | - | - | - | - | - | - | - |
| 0F | RDDSDR | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 |
| | initial | - | - | - | - | - | - | - | - | - |
| | recommend | - | - | - | - | - | - | - | - | - |
| 10 | SLPIN | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| | initial | - | - | - | - | - | - | - | - | - |
| | recommend | - | - | - | - | - | - | - | - | - |
| 11 | SLPOUT | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 |
| | initial | - | - | - | - | - | - | - | - | - |
| | recommend | - | - | - | - | - | - | - | - | - |
| 20 | INVOFF | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| | initial | - | - | - | - | - | - | - | - | - |
| | recommend | - | - | - | - | - | - | - | - | - |
| 21 | INVON | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 |
| | initial | - | - | - | - | - | - | - | - | - |
| | recommend | - | - | - | - | - | - | - | - | - |
| 26 | GAMSET | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 0 |
| | initial | - | - | - | - | - | - | - | - | - |
| | recommend | - | - | - | - | - | - | - | - | - |
| 28 | DISPOFF | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 |
| | initial | - | - | - | - | - | - | - | - | - |
| | recommend | - | - | - | - | - | - | - | - | - |
| 29 | DISPON | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 1 |
| | initial | - | - | - | - | - | - | - | - | - |
| | recommend | - | - | - | - | - | - | - | - | - |

(3)

| (Hex) | Register | DNC | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 |
|-----------|-------------|------------|------------|----|----|----|---------|----|----|--------|
| B4 | SETRGBIF | 0 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 |
| | | 1 | - | - | - | - | NW[1:0] | | - | - |
| | initial | - | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| | recommend | - | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 1 | SON[7:0] | | | | | | | | |
| | initial | - | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 |
| | recommend | - | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| | 1 | SOFF[7:0] | | | | | | | | |
| | initial | - | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 0 |
| | recommend | - | 0 | 1 | 0 | 1 | 0 | 1 | 1 | 0 |
| | 1 | EQS[7:0] | | | | | | | | |
| | initial | - | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 |
| | recommend | - | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 |
| | 1 | EQON[7:0] | | | | | | | | |
| | initial | - | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 |
| | recommend | - | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| | 1 | GDON[7:0] | | | | | | | | |
| | initial | - | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| | recommend | - | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| | 1 | GDOFF[7:0] | | | | | | | | |
| initial | - | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | |
| recommend | - | 0 | 1 | 0 | 0 | 1 | 1 | 1 | 0 | |
| 1 | GVSSP1[7:0] | | | | | | | | | |
| initial | - | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | |
| recommend | - | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | |
| 1 | GVSSP2[7:0] | | | | | | | | | |
| initial | - | 0 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | |
| recommend | - | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | |
| B9 | SETRGBIF | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 1 |
| | | 1 | EXTC1[7:0] | | | | | | | |
| | initial | - | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | recommend | - | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| | 1 | EXTC2[7:0] | | | | | | | | |
| | initial | - | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | recommend | - | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| | 1 | EXTC3[7:0] | | | | | | | | |
| | initial | - | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | recommend | - | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 1 |
| C1 | SETDGCLUT | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| | | 1 | - | - | - | - | - | - | - | DGC_EN |
| | initial | - | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | recommend | - | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| | 1 | D1[7:0] | | | | | | | | |
| | initial | - | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | recommend | - | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 |
| | 1 | D2[7:0] | | | | | | | | |
| | initial | - | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| | recommend | - | 1 | 1 | 0 | 1 | 0 | 1 | 1 | 1 |
| | 1 | D3[7:0] | | | | | | | | |
| | initial | - | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| | recommend | - | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 1 |
| | 1 | D4[7:0] | | | | | | | | |
| initial | - | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | |
| recommend | - | 1 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | |

(4)

| (Hex) | Register | DNC | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 |
|-----------|-----------|----------|----------|----|----|----|----|----|----|----|
| C1 | SETDGCLUT | 1 | D5[7:0] | | | | | | | |
| | initial | - | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| | recommend | - | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 0 |
| | | 1 | D6[7:0] | | | | | | | |
| | initial | - | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 |
| | recommend | - | 0 | 1 | 0 | 1 | 1 | 0 | 1 | 1 |
| | | 1 | D7[7:0] | | | | | | | |
| | initial | - | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 |
| | recommend | - | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 1 |
| | | 1 | D8[7:0] | | | | | | | |
| | initial | - | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 |
| | recommend | - | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 1 |
| | | 1 | D9[7:0] | | | | | | | |
| | initial | - | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| | recommend | - | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| | | 1 | D10[7:0] | | | | | | | |
| | initial | - | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 |
| | recommend | - | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 0 |
| | | 1 | D11[7:0] | | | | | | | |
| | initial | - | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 |
| | recommend | - | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 0 |
| | | 1 | D12[7:0] | | | | | | | |
| initial | - | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | |
| recommend | - | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | |
| | 1 | D13[7:0] | | | | | | | | |
| initial | - | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | |
| recommend | - | 1 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | |
| | 1 | D14[7:0] | | | | | | | | |
| initial | - | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | |
| recommend | - | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | |
| | 1 | D15[7:0] | | | | | | | | |
| initial | - | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | |
| recommend | - | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 1 | |
| | 1 | D16[7:0] | | | | | | | | |
| initial | - | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | |
| recommend | - | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | |
| | 1 | D17[7:0] | | | | | | | | |
| initial | - | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| recommend | - | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | |
| | 1 | D18[7:0] | | | | | | | | |
| initial | - | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | |
| recommend | - | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | |
| | 1 | D19[7:0] | | | | | | | | |
| initial | - | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | |
| recommend | - | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | |
| | 1 | D20[7:0] | | | | | | | | |
| initial | - | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | |
| recommend | - | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | |
| | 1 | D21[7:0] | | | | | | | | |
| initial | - | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | |
| recommend | - | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | |
| | 1 | D22[7:0] | | | | | | | | |
| initial | - | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | |
| recommend | - | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | |

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(5)

| (Hex) | Register | DNC | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 |
|-------|-----------|-----|----------|----|----|----|----|----|----|----|
| C1 | SETDGCLUT | 1 | D23[7:0] | | | | | | | |
| | initial | - | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 |
| | recommend | - | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 0 |
| | | 1 | D24[7:0] | | | | | | | |
| | initial | - | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 |
| | recommend | - | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 1 |
| | | 1 | D25[7:0] | | | | | | | |
| | initial | - | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| | recommend | - | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 0 |
| | | 1 | D26[7:0] | | | | | | | |
| | initial | - | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 |
| | recommend | - | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 1 |
| | | 1 | D27[7:0] | | | | | | | |
| | initial | - | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 |
| | recommend | - | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 1 |
| | | 1 | D28[7:0] | | | | | | | |
| | initial | - | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 0 |
| | recommend | - | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 0 |
| | | 1 | D29[7:0] | | | | | | | |
| | initial | - | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 |
| | recommend | - | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 1 |
| | | 1 | D30[7:0] | | | | | | | |
| | initial | - | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 |
| | recommend | - | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 0 |
| | | 1 | D31[7:0] | | | | | | | |
| | initial | - | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 |
| | recommend | - | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 |
| | | 1 | D32[7:0] | | | | | | | |
| | initial | - | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 |
| | recommend | - | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| | | 1 | D33[7:0] | | | | | | | |
| | initial | - | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| | recommend | - | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 1 | D34[7:0] | | | | | | | |
| | initial | - | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | recommend | - | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| | | 1 | D35[7:0] | | | | | | | |
| | initial | - | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | recommend | - | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| | | 1 | D36[7:0] | | | | | | | |
| | initial | - | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | recommend | - | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 0 |
| | | 1 | D37[7:0] | | | | | | | |
| | initial | - | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | recommend | - | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 |
| | | 1 | D38[7:0] | | | | | | | |
| | initial | - | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | recommend | - | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 1 |
| | | 1 | D39[7:0] | | | | | | | |
| | initial | - | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | recommend | - | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 |
| | | 1 | D40[7:0] | | | | | | | |
| | initial | - | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | recommend | - | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 |

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(6)

| (Hex) | Register | DNC | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 |
|-------|-----------|-----|----------|----|----|----|----|----|----|----|
| C1 | SETDGCLUT | 1 | D41[7:0] | | | | | | | |
| | initial | - | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | recommend | - | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 1 | D42[7:0] | | | | | | | |
| | initial | - | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | recommend | - | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 1 | D43[7:0] | | | | | | | |
| | initial | - | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | recommend | - | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 0 |
| | | 1 | D44[7:0] | | | | | | | |
| | initial | - | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| | recommend | - | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 1 |
| | | 1 | D45[7:0] | | | | | | | |
| | initial | - | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| | recommend | - | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 |
| | | 1 | D46[7:0] | | | | | | | |
| | initial | - | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 |
| | recommend | - | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| | | 1 | D47[7:0] | | | | | | | |
| | initial | - | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| | recommend | - | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 1 |
| | | 1 | D48[7:0] | | | | | | | |
| | initial | - | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 |
| | recommend | - | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 |
| | | 1 | D49[7:0] | | | | | | | |
| | initial | - | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 |
| | recommend | - | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 1 |
| | | 1 | D50[7:0] | | | | | | | |
| | initial | - | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 |
| | recommend | - | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 |
| | | 1 | D51[7:0] | | | | | | | |
| | initial | - | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| | recommend | - | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 1 | D52[7:0] | | | | | | | |
| | initial | - | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 |
| | recommend | - | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 |
| | | 1 | D53[7:0] | | | | | | | |
| | initial | - | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 |
| | recommend | - | 1 | 0 | 1 | 1 | 0 | 0 | 1 | 1 |
| | | 1 | D54[7:0] | | | | | | | |
| | initial | - | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 0 |
| | recommend | - | 1 | 0 | 0 | 1 | 0 | 1 | 1 | 1 |
| | | 1 | D55[7:0] | | | | | | | |
| | initial | - | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 |
| | recommend | - | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| | | 1 | D56[7:0] | | | | | | | |
| | initial | - | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 |
| | recommend | - | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 1 |
| | | 1 | D57[7:0] | | | | | | | |
| | initial | - | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 |
| | recommend | - | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 0 |
| | | 1 | D58[7:0] | | | | | | | |
| | initial | - | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 |
| | recommend | - | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 1 |

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(7)

| (Hex) | Register | DNC | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 |
|-----------|-----------|-----|----------|----|----|----|----|----|----|----|
| C1 | SETDGCLUT | 1 | D59[7:0] | | | | | | | |
| | initial | - | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | recommend | - | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 0 |
| | | 1 | D60[7:0] | | | | | | | |
| initial | - | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| recommend | - | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 |
| | | 1 | D61[7:0] | | | | | | | |
| initial | - | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| recommend | - | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| | | 1 | D62[7:0] | | | | | | | |
| initial | - | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 |
| recommend | - | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 |
| | | 1 | D63[7:0] | | | | | | | |
| initial | - | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| recommend | - | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 1 |
| | | 1 | D64[7:0] | | | | | | | |
| initial | - | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 |
| recommend | - | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 1 |
| | | 1 | D65[7:0] | | | | | | | |
| initial | - | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 |
| recommend | - | 0 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 |
| | | 1 | D66[7:0] | | | | | | | |
| initial | - | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 |
| recommend | - | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| | | 1 | D67[7:0] | | | | | | | |
| initial | - | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| recommend | - | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 0 |
| | | 1 | D68[7:0] | | | | | | | |
| initial | - | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| recommend | - | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| | | 1 | D69[7:0] | | | | | | | |
| initial | - | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| recommend | - | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 1 |
| | | 1 | D70[7:0] | | | | | | | |
| initial | - | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 |
| recommend | - | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 1 |
| | | 1 | D71[7:0] | | | | | | | |
| initial | - | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| recommend | - | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| | | 1 | D72[7:0] | | | | | | | |
| initial | - | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 |
| recommend | - | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 |
| | | 1 | D73[7:0] | | | | | | | |
| initial | - | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 |
| recommend | - | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 1 |
| | | 1 | D74[7:0] | | | | | | | |
| initial | - | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 |
| recommend | - | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| | | 1 | D75[7:0] | | | | | | | |
| initial | - | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| recommend | - | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 1 | D76[7:0] | | | | | | | |
| initial | - | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| recommend | - | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |

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(8)

| (Hex) | Register | DNC | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 |
|-------|-----------|-----|----------|----|----|----|----|----|----|----|
| C1 | SETDGCLUT | 1 | D77[7:0] | | | | | | | |
| | initial | - | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | recommend | - | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| | | 1 | D78[7:0] | | | | | | | |
| | initial | - | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | recommend | - | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 0 |
| | | 1 | D79[7:0] | | | | | | | |
| | initial | - | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | recommend | - | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 |
| | | 1 | D80[7:0] | | | | | | | |
| | initial | - | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | recommend | - | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 1 |
| | | 1 | D81[7:0] | | | | | | | |
| | initial | - | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | recommend | - | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 |
| | | 1 | D82[7:0] | | | | | | | |
| | initial | - | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | recommend | - | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 |
| | | 1 | D83[7:0] | | | | | | | |
| | initial | - | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | recommend | - | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 1 | D84[7:0] | | | | | | | |
| | initial | - | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | recommend | - | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 1 | D85[7:0] | | | | | | | |
| | initial | - | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | recommend | - | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 1 | D86[7:0] | | | | | | | |
| | initial | - | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| | recommend | - | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 1 |
| | | 1 | D87[7:0] | | | | | | | |
| | initial | - | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| | recommend | - | 1 | 0 | 0 | 1 | 1 | 1 | 0 | 0 |
| | | 1 | D88[7:0] | | | | | | | |
| | initial | - | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 |
| | recommend | - | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 1 |
| | | 1 | D89[7:0] | | | | | | | |
| | initial | - | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| | recommend | - | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 1 |
| | | 1 | D90[7:0] | | | | | | | |
| | initial | - | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 |
| | recommend | - | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 |
| | | 1 | D91[7:0] | | | | | | | |
| | initial | - | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 |
| | recommend | - | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 |
| | | 1 | D92[7:0] | | | | | | | |
| | initial | - | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 |
| | recommend | - | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 |
| | | 1 | D93[7:0] | | | | | | | |
| | initial | - | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| | recommend | - | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| | | 1 | D94[7:0] | | | | | | | |
| | initial | - | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 |
| | recommend | - | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 1 |

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(9)

| (Hex) | Register | DNC | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 |
|-------|-----------|-----|-----------|----|----|----|----|----|----|----|
| C1 | SETDGCLUT | 1 | D95[7:0] | | | | | | | |
| | initial | - | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 |
| | recommend | - | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 |
| | | 1 | D96[7:0] | | | | | | | |
| | initial | - | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 0 |
| | recommend | - | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 0 |
| | | 1 | D97[7:0] | | | | | | | |
| | initial | - | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 |
| | recommend | - | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 1 |
| | | 1 | D98[7:0] | | | | | | | |
| | initial | - | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 |
| | recommend | - | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 1 |
| | | 1 | D99[7:0] | | | | | | | |
| | initial | - | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 |
| | recommend | - | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| | | 1 | D100[7:0] | | | | | | | |
| | initial | - | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 |
| | recommend | - | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 |
| | | 1 | D101[7:0] | | | | | | | |
| | initial | - | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | recommend | - | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| | | 1 | D102[7:0] | | | | | | | |
| | initial | - | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| | recommend | - | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 0 |
| | | 1 | D103[7:0] | | | | | | | |
| | initial | - | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| | recommend | - | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 0 |
| | | 1 | D104[7:0] | | | | | | | |
| | initial | - | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 |
| | recommend | - | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 0 |
| | | 1 | D105[7:0] | | | | | | | |
| | initial | - | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| | recommend | - | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 |
| | | 1 | D106[7:0] | | | | | | | |
| | initial | - | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 |
| | recommend | - | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 1 |
| | | 1 | D107[7:0] | | | | | | | |
| | initial | - | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 |
| | recommend | - | 0 | 1 | 1 | 0 | 1 | 0 | 1 | 0 |
| | | 1 | D108[7:0] | | | | | | | |
| | initial | - | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 |
| | recommend | - | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 1 | D109[7:0] | | | | | | | |
| | initial | - | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| | recommend | - | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 1 |
| | | 1 | D110[7:0] | | | | | | | |
| | initial | - | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 |
| | recommend | - | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 1 | D111[7:0] | | | | | | | |
| | initial | - | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 |
| | recommend | - | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 |
| | | 1 | D112[7:0] | | | | | | | |
| | initial | - | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 0 |
| | recommend | - | 1 | 1 | 0 | 0 | 1 | 0 | 1 | 0 |

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(10)

| (Hex) | Register | DNC | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 |
|-----------|-----------|-----------|-----------|----|----|----------|----------|----------|-----------|-----------|
| C1 | SETDGCLUT | 1 | D113[7:0] | | | | | | | |
| | initial | - | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 |
| | recommend | - | 1 | 0 | 1 | 1 | 0 | 1 | 1 | 1 |
| | | 1 | D114[7:0] | | | | | | | |
| | initial | - | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 |
| | recommend | - | 1 | 0 | 0 | 1 | 1 | 1 | 0 | 0 |
| | | 1 | D115[7:0] | | | | | | | |
| | initial | - | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 |
| | recommend | - | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 |
| | | 1 | D116[7:0] | | | | | | | |
| | initial | - | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 |
| | recommend | - | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 |
| | | 1 | D117[7:0] | | | | | | | |
| | initial | - | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| | recommend | - | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 1 | D118[7:0] | | | | | | | |
| | initial | - | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | recommend | - | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 |
| | | 1 | D119[7:0] | | | | | | | |
| | initial | - | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | recommend | - | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 |
| | | 1 | D120[7:0] | | | | | | | |
| | initial | - | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | recommend | - | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 0 |
| | | 1 | D121[7:0] | | | | | | | |
| | initial | - | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | recommend | - | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 |
| | | 1 | D122[7:0] | | | | | | | |
| | initial | - | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | recommend | - | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 1 |
| | 1 | D123[7:0] | | | | | | | | |
| initial | - | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| recommend | - | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | |
| | 1 | D124[7:0] | | | | | | | | |
| initial | - | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| recommend | - | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | |
| | 1 | D125[7:0] | | | | | | | | |
| initial | - | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| recommend | - | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| | 1 | D126[7:0] | | | | | | | | |
| initial | - | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| recommend | - | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| CC | SETDGCLUT | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 0 |
| | | 1 | - | - | - | SM_PANEL | SS_PANEL | GS_PANEL | REV_PANEL | BGR_PANEL |
| | initial | - | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| recommend | - | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | |

(11)

| (Hex) | Register | DNC | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 |
|-------|--------------------|-----|---------------|------------|--------------|--------------|----|----|----|----|
| E0 | SET SIP READ INDEX | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 |
| | | 1 | - | - | G1_VRP0[5:0] | | | | | |
| | initial | - | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| | recommend | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| | | 1 | G1_CGMP0[1:0] | | G1_VRP1[5:0] | | | | | |
| | initial | - | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 |
| | recommend | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 |
| | | 1 | G1_CGMP1[1:0] | | G1_VRP2[5:0] | | | | | |
| | initial | - | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 1 |
| | recommend | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 1 |
| | | 1 | G1_CGMP2[1:0] | | G1_VRP3[5:0] | | | | | |
| | initial | - | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 |
| | recommend | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | 0 |
| | | 1 | G1_CGMP3[1:0] | | G1_VRP4[5:0] | | | | | |
| | initial | - | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 1 |
| | recommend | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 |
| | | 1 | G1_CGMP5 | G1_CGMP4 | G1_VRP5[5:0] | | | | | |
| | initial | - | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 1 |
| | recommend | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 0 |
| | | 1 | - | G1_PRP0[6] | - | G1_PKP0[4:0] | | | | |
| | initial | - | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 |
| | recommend | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 |
| | | 1 | G1_PRP0[5:4] | | - | G1_PKP1[4:0] | | | | |
| | initial | - | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 1 |
| | recommend | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | 0 |
| | | 1 | G1_PRP0[3:2] | | - | G1_PKP2[4:0] | | | | |
| | initial | - | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 |
| | recommend | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 |
| | | 1 | G1_PRP0[1:0] | | - | G1_PKP3[4:0] | | | | |
| | initial | - | 1 | 1 | 0 | 1 | 0 | 1 | 0 | 1 |
| | recommend | - | 1 | 1 | 0 | 1 | 0 | 1 | 0 | 1 |
| | | 1 | - | G1_PRP1[6] | - | G1_PKP4[4:0] | | | | |
| | initial | - | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 |
| | recommend | - | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 1 |
| | | 1 | G1_PRP1[5:4] | | - | G1_PKP5[4:0] | | | | |
| | initial | - | 1 | 1 | 0 | 1 | 0 | 1 | 1 | 0 |
| | recommend | - | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 1 |
| | | 1 | G1_PRP1[3:2] | | - | G1_PKP6[4:0] | | | | |
| | initial | - | 1 | 0 | 0 | 1 | 0 | 1 | 1 | 1 |
| | recommend | - | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 |
| | | 1 | G1_PRP1[1:0] | | - | G1_PKP7[4:0] | | | | |
| | initial | - | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| | recommend | - | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 0 |
| | | 1 | - | - | G1_PKP8[4:0] | | | | | |
| | initial | - | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| | recommend | - | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 |
| | | 1 | - | | | G1_VRN0[5:0] | | | | |
| | initial | - | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 |
| | recommend | - | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| | | 1 | G1_CGMN0[1:0] | | G1_VRN1[5:0] | | | | | |
| | initial | - | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 |
| | recommend | - | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 |

SET SPI READ INDEX continues to the next page.

(12)

| (Hex) | Register | DNC | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 |
|-------|--------------------|-----|----------------|------------|--------------|--------------|----|----|----|----|
| | | 1 | G1_CGMN1[1:0] | | G1_VRN2[5:0] | | | | | |
| | initial | - | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 1 |
| | recommend | - | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 1 |
| | | 1 | G1_CGMN2[1:0] | | G1_VRN3[5:0] | | | | | |
| | initial | - | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 |
| | recommend | - | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 |
| | | 1 | G1_CGMN3[1:0] | | G1_VRN4[5:0] | | | | | |
| | initial | - | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 1 |
| | recommend | - | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 1 |
| | | 1 | G1_CGMN5 | G1_CGMN4 | G1_VRN5[5:0] | | | | | |
| | initial | - | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 1 |
| | recommend | - | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 |
| | | 1 | - | G1_PRN0[6] | - | G1_PKN0[4:0] | | | | |
| | initial | - | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 |
| | recommend | - | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 |
| | | 1 | G1_PRN0[5:4] | | - | G1_PKN1[4:0] | | | | |
| | initial | - | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 1 |
| | recommend | - | 0 | 1 | 0 | 0 | 1 | 1 | 1 | 0 |
| | | 1 | G1_PRN0[3:2] | | - | G1_PKN2[4:0] | | | | |
| | initial | - | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 |
| | recommend | - | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 1 |
| | | 1 | G1_PRN0[1:0] | | - | G1_PKN3[4:0] | | | | |
| | initial | - | 1 | 1 | 0 | 1 | 0 | 1 | 0 | 1 |
| | recommend | - | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 1 |
| | | 1 | - | G1_PRN1[6] | - | G1_PKN4[4:0] | | | | |
| | initial | - | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 0 |
| | recommend | - | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 1 |
| | | 1 | G1_PRN1[5:4] | | - | G1_PKN5[4:0] | | | | |
| | initial | - | 1 | 1 | 0 | 1 | 0 | 1 | 1 | 0 |
| | recommend | - | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 1 |
| | | 1 | G1_PRN1[3:2] | | - | G1_PKN6[4:0] | | | | |
| | initial | - | 1 | 0 | 0 | 1 | 0 | 1 | 1 | 1 |
| | recommend | - | 1 | 0 | 0 | 1 | 0 | 1 | 1 | 0 |
| | | 1 | G1_PRN1[1:0] | | - | G1_PKN7[4:0] | | | | |
| | initial | - | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| | recommend | - | 0 | 1 | 0 | 0 | 1 | 1 | 1 | 0 |
| | | 1 | - | - | - | G1_PKN8[4:0] | | | | |
| | initial | - | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| | recommend | - | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 |
| FE | SET SPI READ INDEX | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 |
| | | 1 | CMD_ADD[7:0] | | | | | | | |
| | initial | - | - | - | - | - | - | - | - | - |
| | recommend | - | - | - | - | - | - | - | - | - |
| FF | SPIREAD | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| | | 1 | CMD_DATA1[7:0] | | | | | | | |
| | initial | - | - | - | - | - | - | - | - | - |
| | recommend | - | - | - | - | - | - | - | - | - |
| | | 1 | ... | | | | | | | |
| | initial | - | - | - | - | - | - | - | - | - |
| | recommend | - | - | - | - | - | - | - | - | - |
| | | 1 | CMD_DATAN[7:0] | | | | | | | |
| | initial | - | - | - | - | - | - | - | - | - |
| | recommend | - | - | - | - | - | - | - | - | - |

8. Sequence

Power on sequence

| № | | Function | DNC | Command/Parameter |
|---|------------------------------------|------------------------------------|-----|-------------------|
| | | RESETB=0 | | |
| | Wait | wait 1 msec or more | | |
| | Power on | IOVCC, VCC on | | |
| | Wait | wait 10 msec or more | | |
| | | RESETB=1 | | |
| | Wait | wait 10 msec or more | | |
| | RGB signals | RGB signals start | | |
| | Wait | wait 2 frames or more | | |
| 1 | Enable extended commands | Enable extended commands | 0 | B9h |
| | | Parameter 1 | 1 | FFh |
| | | Parameter 2 | 1 | 83h |
| | | Parameter 3 | 1 | 63h |
| 2 | Set power | Set power | 0 | B1h |
| | | Parameter 1 | 1 | 81h |
| | | Parameter 2 | 1 | 24h |
| | | Parameter 3 | 1 | 04h |
| | | Parameter 4 | 1 | 02h |
| | | Parameter 5 | 1 | 02h |
| | | Parameter 6 | 1 | 03h |
| | | Parameter 7 | 1 | 10h |
| | | Parameter 8 | 1 | 10h |
| | | Parameter 9 | 1 | 34h |
| | | Parameter 10 | 1 | 3Ch |
| | | Parameter 11 | 1 | 3Fh |
| | | Parameter 12 | 1 | 3Fh |
| 3 | Sleep out | Sleep out | 0 | 11h |
| | Wait | wait 5 msec or more | | |
| 4 | Display inversion off | Display inversion off | 0 | 20h |
| 5 | Memory access control | Memory access control | 0 | 36h |
| | | Parameter 1 | 1 | 00h |
| 6 | Interface pixel format | Interface pixel format | 0 | 3Ah |
| | | Parameter 1 | 1 | 70h |
| | Wait | wait 120 msec or more | | |
| 7 | Set power | Set power | 0 | B1h |
| | | Parameter 1 | 1 | 78h |
| | | Parameter 2 | 1 | 24h |
| | | Parameter 3 | 1 | 04h |
| | | Parameter 4 | 1 | 02h |
| | | Parameter 5 | 1 | 02h |
| | | Parameter 6 | 1 | 03h |
| | | Parameter 7 | 1 | 10h |
| | | Parameter 8 | 1 | 10h |
| | | Parameter 9 | 1 | 34h |
| | | Parameter 10 | 1 | 3Ch |
| | | Parameter 11 | 1 | 3Fh |
| | | Parameter 12 | 1 | 3Fh |
| 8 | Set RGB interface related register | Set RGB interface related register | 0 | B3h |
| | | Parameter 1 | 1 | 01h |
| 9 | Set display waveform cycle | Set display waveform cycle | 1 | B4h |
| | | Parameter 1 | 1 | 00h |
| | | Parameter 2 | 1 | 08h |
| | | Parameter 3 | 1 | 56h |
| | | Parameter 4 | 1 | 07h |
| | | Parameter 5 | 1 | 01h |
| | | Parameter 6 | 1 | 01h |
| | | Parameter 7 | 1 | 4Dh |
| | | Parameter 8 | 1 | 01h |
| | | Parameter 9 | 1 | 42h |

| № | | Function | DNC | Command/Parameter |
|----|---------------------------------|---------------------------------|-----|-------------------|
| 10 | Set panel | Set panel | 0 | CCh |
| | | Parameter 1 | 1 | 0Bh |
| 11 | Set gamma curve related setting | Set gamma curve related setting | 0 | E0h |
| | | Parameter 1 | 1 | 01h |
| | | Parameter 2 | 1 | 48h |
| | | Parameter 3 | 1 | 4Dh |
| | | Parameter 4 | 1 | 4Eh |
| | | Parameter 5 | 1 | 58h |
| | | Parameter 6 | 1 | F6h |
| | | Parameter 7 | 1 | 0Bh |
| | | Parameter 8 | 1 | 4Eh |
| | | Parameter 9 | 1 | 12h |
| | | Parameter 10 | 1 | D5h |
| | | Parameter 11 | 1 | 15h |
| | | Parameter 12 | 1 | 95h |
| | | Parameter 13 | 1 | 55h |
| | | Parameter 14 | 1 | 8Eh |
| | | Parameter 15 | 1 | 11h |
| | | Parameter 16 | 1 | 01h |
| | | Parameter 17 | 1 | 48h |
| | | Parameter 18 | 1 | 4Dh |
| | | Parameter 19 | 1 | 55h |
| | | Parameter 20 | 1 | 5Fh |
| | | Parameter 21 | 1 | FDh |
| | | Parameter 22 | 1 | 0Ah |
| | | Parameter 23 | 1 | 4Eh |
| | | Parameter 24 | 1 | 51h |
| | | Parameter 25 | 1 | D3h |
| | | Parameter 26 | 1 | 17h |
| | | Parameter 27 | 1 | 95h |
| | | Parameter 28 | 1 | 96h |
| | | Parameter 29 | 1 | 4Eh |
| | | Parameter 30 | 1 | 11h |
| | Wait | wait 5 msec or more | | |
| 12 | Display on | Display on | 0 | 29h |

Power off sequence

| No | | Function | DNC | Command/Parameter |
|----|-------------|-----------------------|-----|-------------------|
| 1 | Display off | Display off | 0 | 28h |
| | Wait | wait 5 msec or more | | |
| 2 | Sleep in | Sleep in | 0 | 10h |
| | Wait | wait 2 frames or more | | |
| 3 | RGB signals | RGB signals stop | | |



Power off

Sleep sequence

| No | | Function | DNC | Command/Parameter |
|----|-------------|-----------------------|-----|-------------------|
| 1 | Sleep in | Sleep in | 0 | 10h |
| | Wait | wait 2 frames or more | | |
| 2 | RGB signals | RGB signals stop | | |

Sleep release sequence

| No | | Function | DNC | Command/Parameter |
|----|-------------|-----------------------|-----|-------------------|
| 1 | RGB signals | RGB signals start | | |
| | Wait | wait 2 frames or more | | |
| 2 | Sleep out | Sleep out | 0 | 11h |

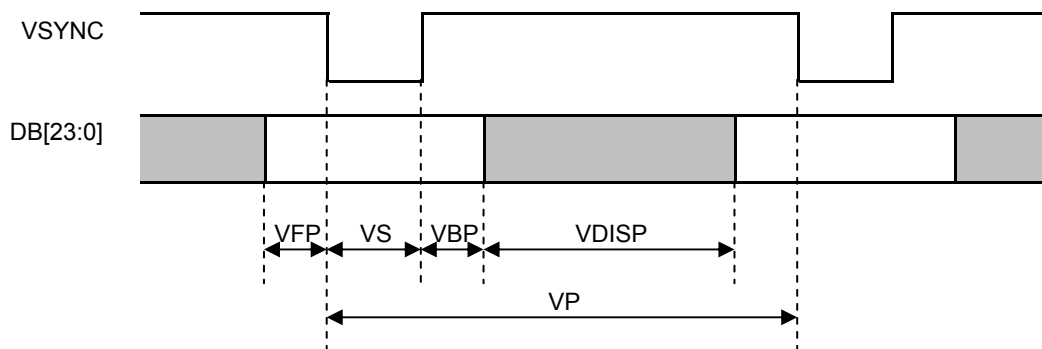


9. RGB Interface

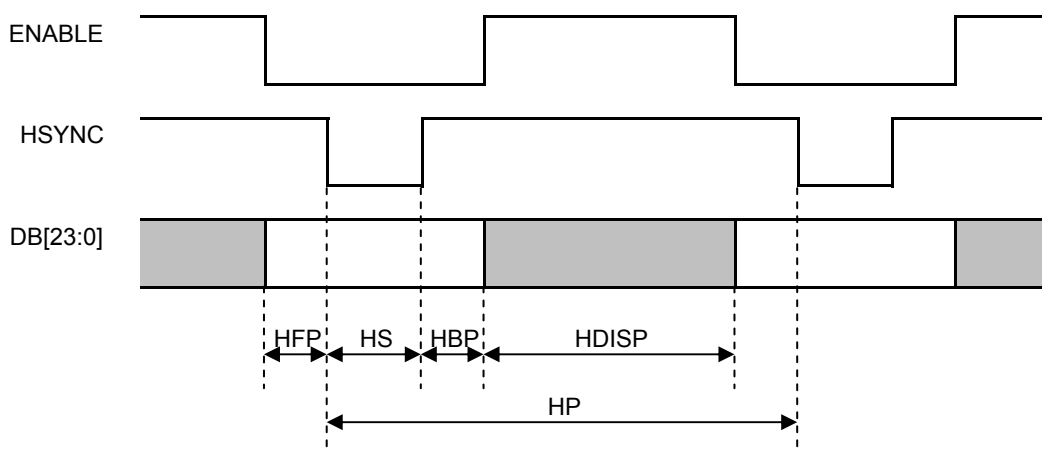
Recommended RGB interface timing

| Item | Symbol | Recommended | Unit |
|--------------------------|--------|-------------|--------|
| Vertical cycle | VP | 806 | Line |
| Vertical low pulse width | VS | 2 | Line |
| Vertical front porch | VFP | 2 | Line |
| Vertical back porch | VBP | 2 | Line |
| Vertical active area | VDISP | 800 | Line |
| Vertical refresh rate | VRR | 60 | Hz |
| HS cycle | HP | 508 | DOTCLK |
| HS low pulse width | HS | 10 | DOTCLK |
| Horizontal back porch | HBP | 10 | DOTCLK |
| Horizontal front porch | HFP | 8 | DOTCLK |
| Horizontal active area | HDISP | 480 | DOTCLK |
| Pixel clock frequency | DCK | 24.57 | MHz |

Vertical timing



Horizontal timing





10. Absolute Maximum Rating

| Item | Symbol | Condition | Rating | | Unit | Terminal |
|------------------------|--------|-----------|--------|-----------|------|---|
| | | | MIN | MAX | | |
| Power supply voltage | VCC | | -0.3 | 4.6 | V | VCC |
| IO logic voltage | IOVCC | | -0.3 | 4.6 | V | IOVCC |
| Input voltage | VI | | -0.3 | IOVCC+0.3 | V | RESETB, SDI, SCL, CSB, VSYNC, HSYNC, DOTCLK, ENABLE, DB[23:0] |
| LED Forward current | IL25 | Ta=25°C | — | 30 | mA | VLED – LEDn |
| | IL70 | Ta=70°C | — | 14 | mA | |
| Storage temperature | Tstg | | -30 | +80 | °C | |

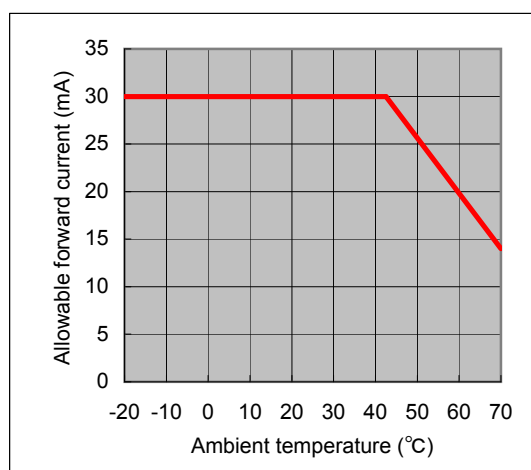


11. Recommended Operating Conditions

| Item | Symbol | Rating | | | Unit | Terminal | |
|--------------------------------------|----------------------|--------|-----|-----|------|---|-------------|
| | | MIN | TYP | MAX | | | |
| Supply voltage | VCC | 2.6 | 2.7 | 2.9 | V | VCC | |
| IO logic voltage | IOVCC | 1.7 | 1.8 | 1.9 | V | IOVCC (VCC ≥ IOVCC) | |
| Operation temperature | Top | -20 | +25 | +70 | °C | Temperature at the surface of the display | |
| LED *1 Forward current | Ta=25 °C | IL25 | — | 8.5 | 30 | mA | VLED – LEDn |
| | Ta=70 °C | IL70 | — | — | 14 | mA | |
| Forward voltage (Reference value) | Ta=25 °C IL=8.5mA | VL | — | 2.8 | 3.16 | V | |

*1: The maximum value of LED Forward current "IL", do not exceed the following allowable current value.

- The lifetime of the LED is defined as a period till the brightness of the LED decreases to the half of its initial value.
- This figure is estimated for an LED operating alone.
As the performance of an LED may differ when assembled as a monitor together with a TFT panel due to different environmental temperature.
- Estimated lifetime could vary on a different temperature and usually higher temperature could reduce the life significantly.



12. Electrical Characteristics

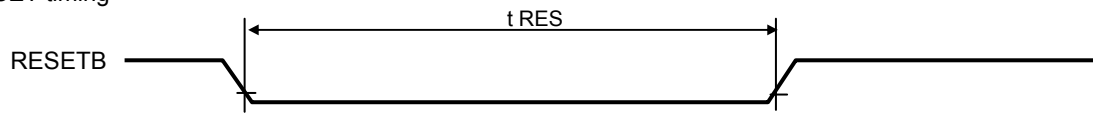
12.1 DC Characteristics

| Items | Symbol | Condition | Rating | | | Unit | Terminal |
|--------------------------|--------|---------------------------------------|-----------|------|-----------|------|---|
| | | | MIN | TYP | MAX | | |
| High level input voltage | VIH1 | | 0.7 IOVCC | | IOVCC | V | RESETB, SDI, SCL, CSB, VSYNC, HSYNC, |
| Low level input voltage | VIL1 | | 0 | | 0.3 IOVCC | V | DOTCLK, ENABLE, DB[23:0] |
| Current Consumption | ICC1 | VCC=2.7V, IOVCC=1.8V Still image * | | 12.0 | | mA | VCC |
| | ICC2 | VCC=2.7V, IOVCC=1.8V stand by | | 10.0 | | μA | |
| | IOICC1 | VCC=2.7V, IOVCC=1.8V Still image * | | 12.0 | | μA | IOVCC |
| | IOICC2 | VCC=2.7V, IOVCC=1.8V stand by | | 1.0 | | μA | |

* A still image (color bar) on display, when accessing to the driver by RGB interface mode.

12.2 AC Characteristics

RESET timing



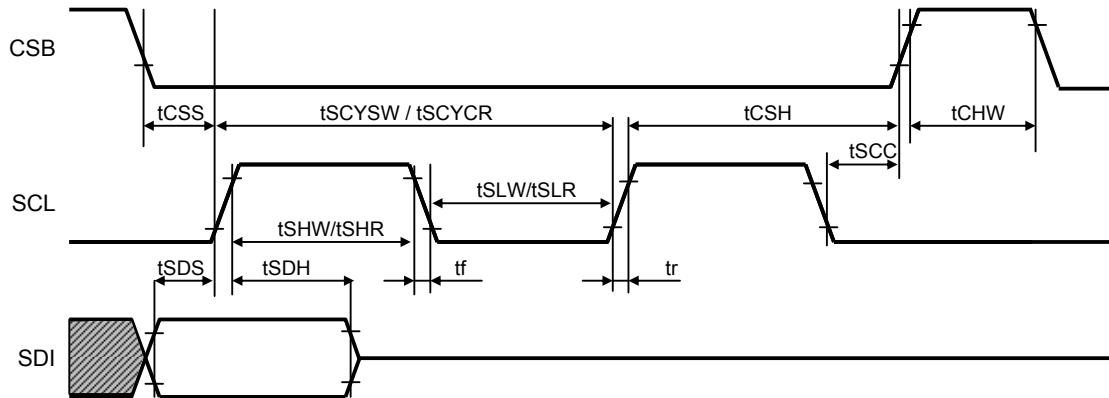
Reset low pulse width shorter than 10us do not make reset. It means undesired short pulse such as glitch, bouncing noise or electrostatic discharge do not cause irregular system reset. Please refer to the table below.

RESET timing spec

| Item | Symbol | Condition | Rating | | | Unit |
|-----------------------|--------|-----------|--------|-----|-----|------|
| | | | MIN | TYP | MAX | |
| Reset low pulse width | tRES | | 10 | - | - | μs |

| tRES Pulse | Action |
|----------------------|----------------|
| Shorter than 5μs | No reset |
| Longer than 10μs | Reset |
| Between 5μs and 10μs | Not determined |

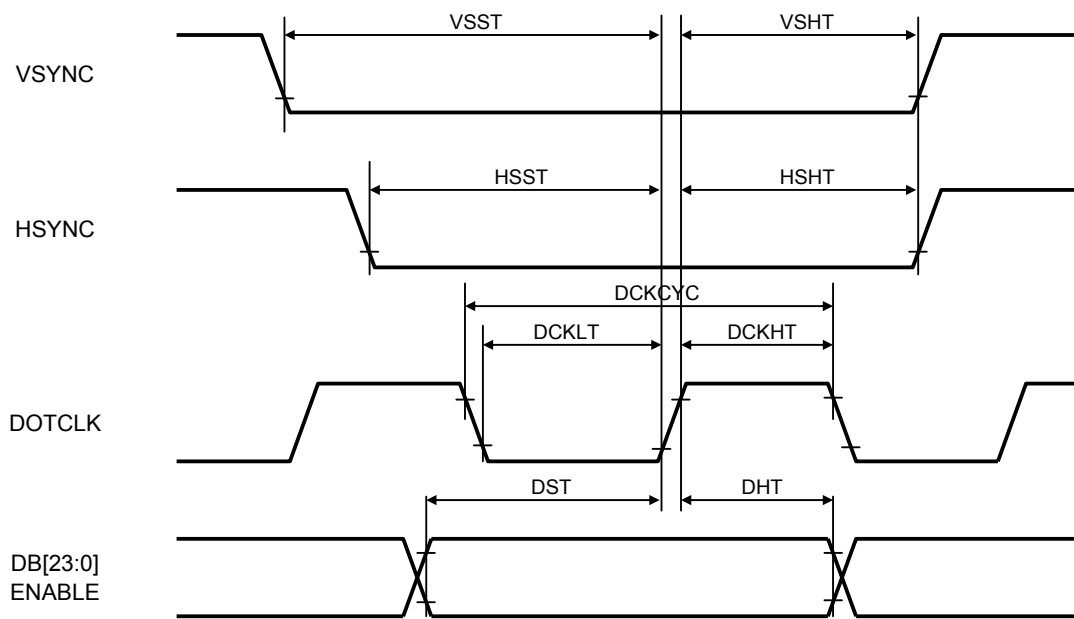
Serial Peripheral Interface(SPI)



| Item | Symbol | Condition | Rating | | | Unit |
|---------------------------|--------|-----------|--------|-----|-----|------|
| | | | MIN | TYP | MAX | |
| Serial Clock Write Cycle | tSCYCW | | 100 | | - | ns |
| Serial Clock Read Cycle | tSCYCR | | 200 | | - | ns |
| Pulse Width High at Write | tSHW | | 50 | | - | ns |
| Pulse Width High at Read | tSHR | | 100 | | - | ns |
| Pulse Width Low at Write | tSLW | | 50 | | - | ns |
| Pulse Width Low at Read | tSLR | | 100 | | - | ns |
| CSB Setup Time at Write | tCSS | | 50 | | - | ns |
| CSB Setup Time at Read | tCSS | | 100 | | - | ns |
| CSB Hold Time at Write | tSCH | | 50 | | - | ns |
| CSB Hold Time at Read | tSCH | | 100 | | - | ns |
| SDI Setup Time | tSDS | | 50 | | - | ns |
| SDI Hold Time | tSDH | | 50 | | - | ns |
| Rising/Falling Time | tR, tF | | - | | 10 | ns |

Remarks 1. All timing data is specified at 30 to 70% of VCCIO.

24 bit RGB interface



| Item | Symbol | Condition | Rating | | | Unit |
|------------------------------|--------|---------------------------------|--------|-----|------|------|
| | | | MIN | TYP | MAX | |
| VSYNC Setup Time | VSST | | 10 | - | - | ns |
| VSYNC Hold Time | VSHT | | 10 | - | - | ns |
| HSYNC Setup Time | HSST | | 10 | - | - | ns |
| HSYNC Hold Time | HSHT | | 10 | - | - | ns |
| DOTCLK Clock Cycle | DCKCYC | Frame Frequency= 50 to 70 Hz | 31 | - | 49.2 | ns |
| DOTCLK Low Time | DCKLT | | 10 | - | - | ns |
| DOTCLK High Time | DCKHT | | 10 | - | - | ns |
| Data Setup Time for DB[23:0] | DST | | 10 | - | - | ns |
| Data Hold Time for DB[23:0] | DHT | | 10 | - | - | ns |

Note: (1) Signal rise and fall times are equal to or less than 20 ns.

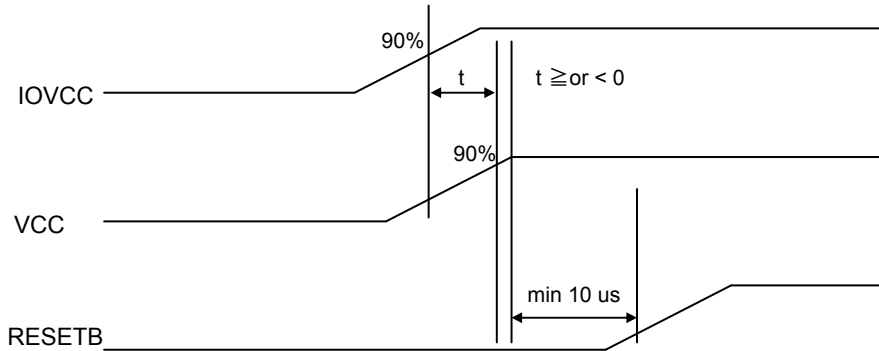
(2) Input signals are measured by $0.30 \times IOVCC$ for low state and $0.70 \times IOVCC$ for high state.

13. External Power on / off Sequence

13.1 External Power On sequence

VCC and IOVCC can be applied in any order.

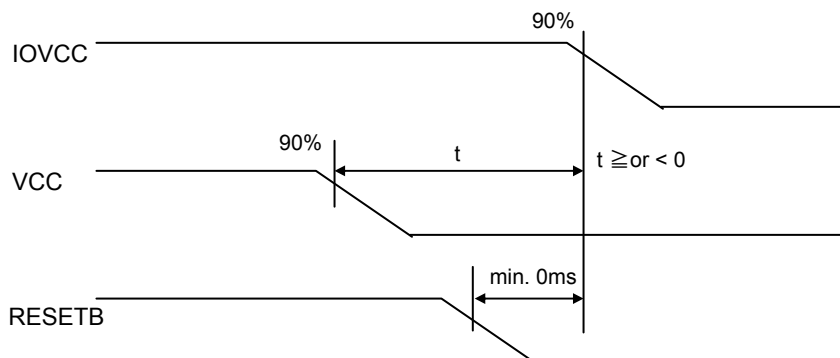
RESETB must be kept low for minimum 10 usec after both VCC and IOVCC have reached it's target voltage.



13.2 External Power Off sequence

VCC and IOVCC can be powered down in any order.

If the module is in "Sleep In" mode, IOVCC and VCC can be powered down minimum 0 msec after RESETB has been released.



14. Characteristics

14.1 Optical Characteristics

< Measurement Condition >

Measuring instruments: CS1000 (KONICA MINOLTA) , LCD7200(OTSUKA ELECTRONICS) ,
EZcontrast160D (ELDIM)

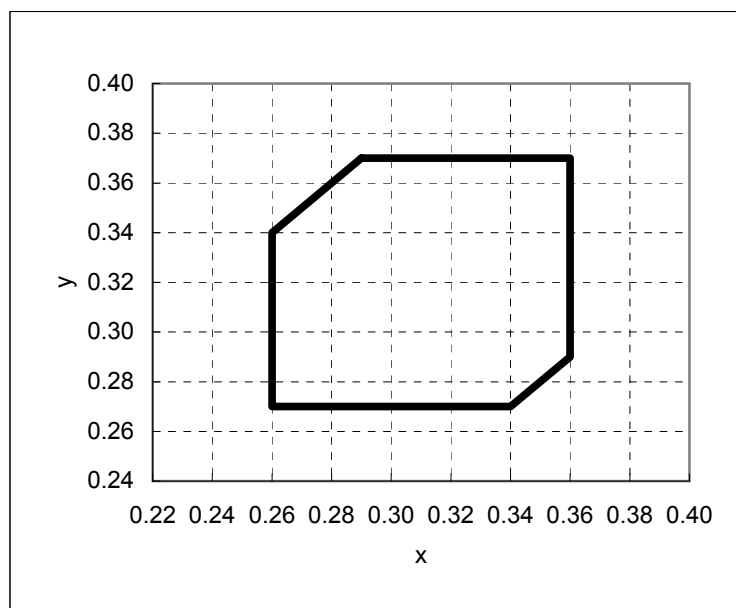
Driving condition: VCC=2.7V, IOVCC=1.8V
Optimized VCOMDC

Backlight: IL=8.5mA

Measured temperature: Ta=25° C

| Item | | Symbol | Condition | MIN | TYP | MAX | Unit | Note No. | Remark |
|-------------------------|---------------|------------|---------------------------------|---|------|-----|-------------------|----------|--------|
| Response time | Rise time | TON | [Data]= 00h → FFh | — | — | 40 | ms | 1 | |
| | Fall time | TOFF | [Data]= FFh → 00h | — | — | 60 | ms | | |
| Contrast ratio | Backlight ON | CR | [Data]= FFh / 00h | 600 | 1000 | — | | 2 | |
| | Backlight OFF | | | — | 2.9 | — | | | |
| Viewing angle | Left | θL | [Data]= FFh / 00h CR ≥ 10 | 80 | — | — | deg | 3 | |
| | Right | θR | | 80 | — | — | deg | | |
| | Up | φU | | 80 | — | — | deg | | |
| | Down | φD | | 80 | — | — | deg | | |
| White Chromaticity | x | [Data]=FFh | White chromaticity range | | | | | 4 | |
| | y | | | | | | | | |
| Burn-in | | | | No noticeable burn-in image should be observed after 2 hours of window pattern display. | | | | 5 | |
| Center brightness | | | [Data]=FFh | 240 | 380 | — | cd/m ² | 6 | |
| Brightness distribution | | | [Data]=FFh | 70 | — | — | % | 7 | |

* Note number 1 to 7: Refer to the APPENDIX of "Reference Method for Measuring Optical Characteristics".



White Chromaticity Range

【White Chromaticity Range】

| x | y |
|------|------|
| 0.29 | 0.37 |
| 0.26 | 0.34 |
| 0.26 | 0.27 |
| 0.34 | 0.27 |
| 0.36 | 0.29 |
| 0.36 | 0.37 |



14.2 Temperature Characteristics

< Measurement Condition >

Measuring instruments: CS1000 (KONICA MINOLTA) , LCD7200(OTSUKA ELECTRONICS)

Driving condition: VCC=2.7V, IOVCC=1.8V

Optimized VCOMDC

Backlight: IL=8.5mA

| Item | | Specification | | Remark | |
|-----------------|-----------|---|------------------|-----------------|--|
| | | Ta = -10 °C | Ta = 70 °C | | |
| Contrast ratio | CR | 40 or more | 40 or more | Backlight ON | |
| Response time | Rise time | TON | 200 msec or less | 30 msec or less | |
| | Fall time | TOFF | 300 msec or less | 50 msec or less | |
| Display Quality | | No noticeable display defect or nonuniformity should be observed. | | | |

15. Criteria of Judgment

△ 15.1 Defective Display and Screen Quality

Test Condition: Observed TFT-LCD monitor from front during operation with the following conditions

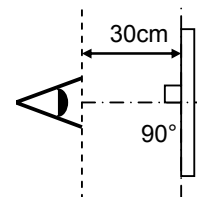
Driving Signal Raster Patter (RGB in monochrome, white, black)

Signal condition [Data] = FFh, BCh, 00h (3steps)

Observation distance 30 cm

Illuminance 200 to 350 lx

Backlight IL=8.5mA



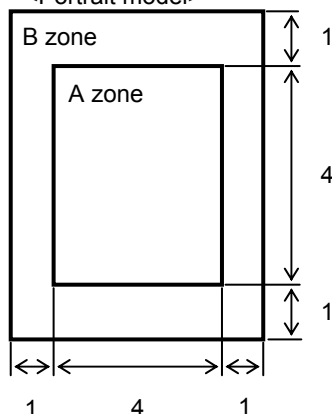
| Defect item | Defect content | | Criteria | |
|-----------------|------------------|---|--|------------|
| Display Quality | Line defect | Black, white or color line, 3 or more neighboring defective dots | Not exists | |
| | Dot defect | Uneven brightness on dot-by-dot base due to defective TFT or CF, or dust is counted as dot defect (brighter dot, darker dot) | Refer to table 1 | |
| | | High bright dot: Visible through 2% ND filter at [Data]=00h | Acceptable | |
| | | Low bright dot: Visible through 5% ND filter at [Data]=00h Dark dot: Appear dark through white display at [Data]=BCh Invisible through 5% ND filter at [Data]=00h | | |
| Screen Quality | Dirt | Uneven brightness (white stain, black stain etc) | Invisible through 5% ND filter at Black screen. Invisible through 1% ND filter at other screen. | |
| | Foreign particle | Point-like | $0.25\text{mm} < \varphi$ | N=0 |
| | | | $0.20\text{mm} < \varphi \leq 0.25\text{mm}$ | $N \leq 2$ |
| | | | $\varphi \leq 0.20\text{mm}$ | Acceptable |
| | Liner | $3.0\text{mm} < \text{length and } 0.08\text{mm} < \text{width}$ | N=0 | |
| | | $\text{length} \leq 3.0\text{mm}$ or $\text{width} \leq 0.08\text{mm}$ | Acceptable | |
| Others | | Use boundary sample for judgment when necessary | | |

φ (mm): Average diameter = (major axis + minor axis)/2
Permissible number: N

Table 1

| Area | High bright dot | Low bright dot | Dark dot | Total | Criteria |
|-------|-----------------|----------------|----------|-------|---|
| A | 0 | 2 | 2 | 3 | Permissible distance between same color bright dots (includes neighboring dots): 3 mm or more Permissible distance between same color high bright dots (includes neighboring dots): 5 mm or more |
| B | 2 | 4 | 4 | 6 | |
| Total | 2 | 4 | 4 | 6 | |

<Portrait model>



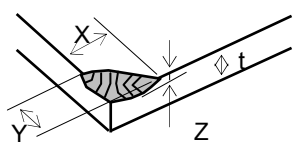
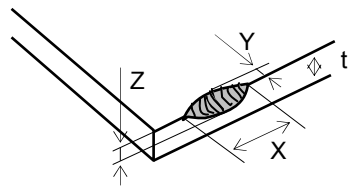
Division of A and B areas
B area: Active area
Dimensional ratio between A and B areas: 1: 4: 1 (Refer to the left figure)

15.2 Screen and Other Appearance

Testing conditions

| | |
|----------------------|--------------|
| Observation distance | 30cm |
| Illuminance | 1200~2000 lx |

| Item | Criteria | Remark |
|--|---|--|
| Polarizer Flaw Stain Bubble Dust Dent | Ignore invisible defect when the backlight is on. | Applicable area: Active area only (Refer to the section 3.2 "Outward form") |
| S-case | No functional defect occurs | |
| FPC cable | No functional defect occurs | |

| Item | Appearance | Criteria |
|-------------------|--|---|
| Glass Chipping | Corner area  | Unit: mm $X \leq 3$ $Y \leq 3$ $Z \leq t$ (t:glass thickness) $X, Y \leq 0.5$ is ignored. |
| | Others  | Unit: mm $X \leq 5$ $Y \leq 1$ $Z \leq t$ (t:glass thickness) $X, Y \leq 0.5$ is ignored. |
| | Progressive crack | None |

16. Reliability Test

| Test item | | Test condition | | number of failures /number of examinations |
|-------------------------------|---|---|------------|---|
| Durability test | High temperature storage | Ta=80° C | 240H | 0/3 |
| | Low temperature storage | Ta=-30° C | 240H | 0/3 |
| | High temperature & high humidity storage | Ta=60° C, RH=90% non condensing | 240H | 0/3 |
| | High temperature operation | Tp=70° C | 240H | 0/3 |
| | Low temperature operation | Tp=-20° C | 240H | 0/3 |
| | High temp & humid operation | Tp=40° C, RH=90% non condensing | 240H | 0/3 |
| | Thermal shock storage | -30←→80° C(30min/30min) | 100 cycles | 0/3 |
| Mechanical environmental test | Electrostatic discharge test (Non operation) | Confirms to EIAJ ED-4701/300 C=200pF,R=0Ω,V=±200V Each 3 times of discharge on and power supply and other terminals. | | 0/3 |
| | Surface discharge test (Non operation) | C=250pF, R=100Ω, V=±6kV Each 5 times of discharge in both polarities on the center of screen with the case grounded. | | 0/3 |
| | Vibration test | Total amplitude 1.5mm, f=10~55Hz, X,Y,Z directions for each 2 hours | | 0/3 |
| | Impact test | Use ORTUS TECHNOLOGY original jig (see next page)and make an impact with peak acceleration of 1000m/s ² for 6 msec with half sine-curve at 3 times to each X, Y, Z directions in conformance with JIS C 60068-2-27-2011. | | 0/3 |
| Packing test | Packing vibration-proof test | Acceleration of 19.6m/s ² with frequency of 10→55→10Hz, X,Y, Zdirection for each 30 minutes | | 0/1 Packing |
| | Packing drop test | Drop from 75cm high. 1 time to each 6 surfaces, 3 edges, 1 corner | | 0/1 Packing |

Note: Ta=ambient temperature Tp=Panel temperature

※ The profile of high temperature/humidity storage and High Temperature/humidity operation (Pure water of over 10MΩ·cm shall be used.)

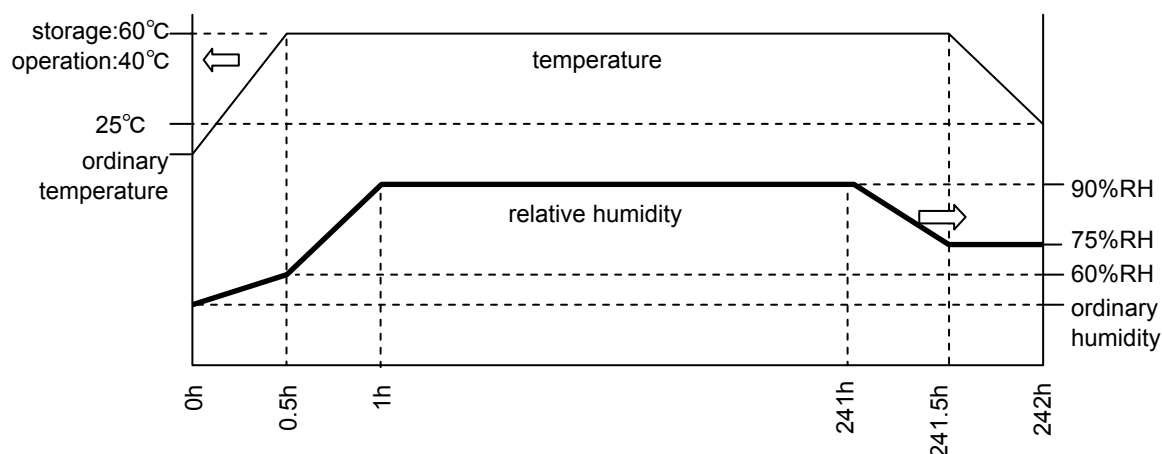
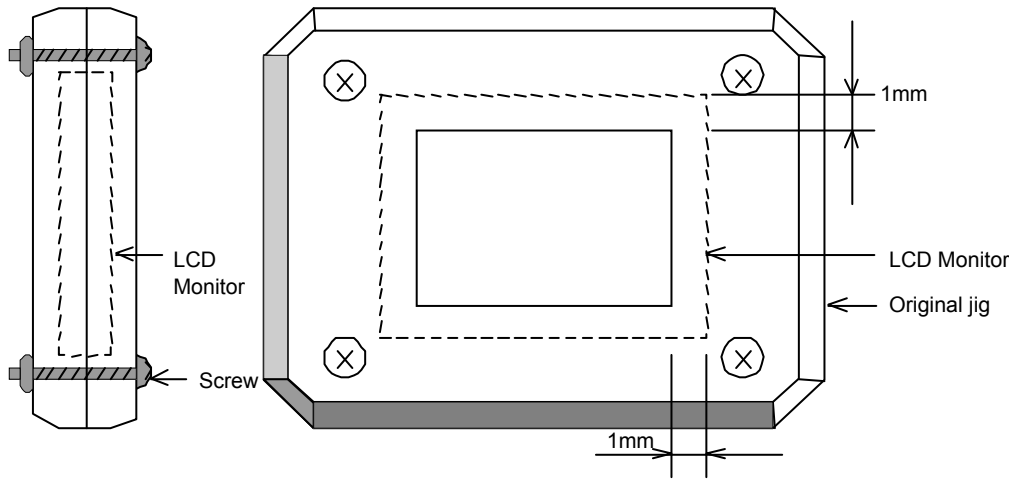


Table2.Reliability Criteria

The parameters should be measured after leaving the monitor at the ordinary temperature for 24 hours or more after the test completion.

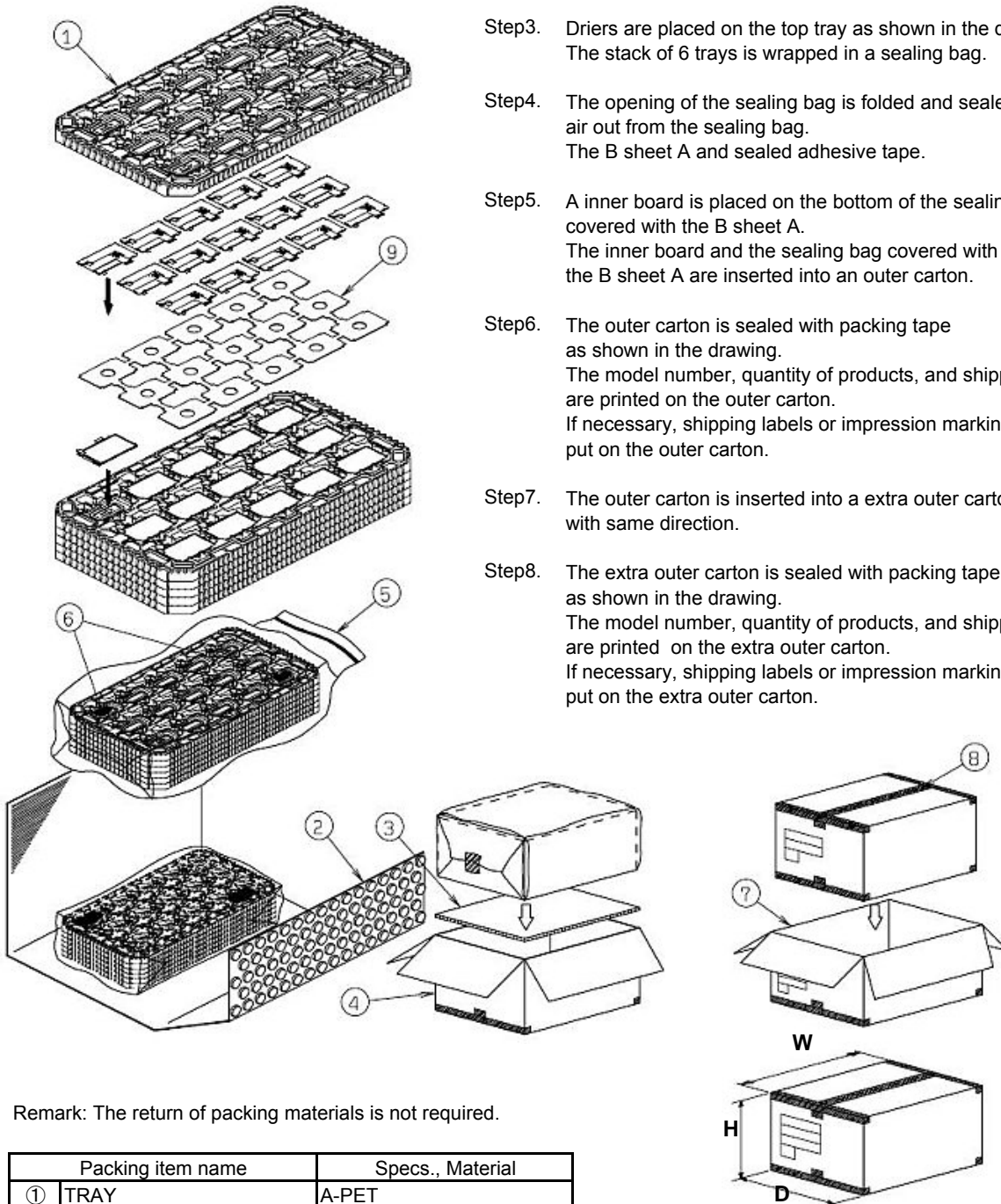
| item | Standard | Remarks |
|-----------------|---------------------------------------|--------------|
| Display quality | No visible abnormality shall be seen. | |
| Contrast ratio | 40 or more | Backlight ON |

ORTUS TECHNOLOGY Original Jig



17. Packing Specifications

- Step1. Each lower product is placed in one of the cut-outs of the tray with the LCD surface facing upward, and foam sheet is put on products, and upper products are placed facing downward.
(30 pieces / 1 tray)
- Step2. 5 trays containing products are stacked.
One empty tray is put on the top of the stack of 5 trays.
- Step3. Driers are placed on the top tray as shown in the drawing.
The stack of 6 trays is wrapped in a sealing bag.
- Step4. The opening of the sealing bag is folded and sealed with air out from the sealing bag.
The B sheet A and sealed adhesive tape.
- Step5. A inner board is placed on the bottom of the sealing bag covered with the B sheet A.
The inner board and the sealing bag covered with the B sheet A are inserted into an outer carton.
- Step6. The outer carton is sealed with packing tape as shown in the drawing.
The model number, quantity of products, and shipping date are printed on the outer carton.
If necessary, shipping labels or impression markings are put on the outer carton.
- Step7. The outer carton is inserted into a extra outer carton with same direction.
- Step8. The extra outer carton is sealed with packing tape as shown in the drawing.
The model number, quantity of products, and shipping date are printed on the extra outer carton.
If necessary, shipping labels or impression markings are put on the extra outer carton.



Remark: The return of packing materials is not required.

| | Packing item name | Specs., Material |
|---|--------------------|------------------------------|
| ① | TRAY | A-PET |
| ② | B SHEET A | Anti-static air bubble sheet |
| ③ | INNER BOARD | Corrugated cardboard |
| ④ | OUTER CARTON | Corrugated cardboard |
| ⑤ | SEALING BAG | |
| ⑥ | Drier | Moisture absorber |
| ⑦ | EXTRA OUTER CARTON | Corrugated cardboard |
| ⑧ | SEALING BAG | |
| ⑨ | FOAM SHEET | Anti-static polyethylene |

| Dimension of extra outer carton | |
|--|---------|
| D : Approx. | (337mm) |
| W : Approx. | (618mm) |
| H : Approx. | (179mm) |
| Quantity of products packed in one carton: | 150 |
| Gross weight : Approx. | 5.0kg |

18. Handling Instruction

18.1 Cautions for Handling LCD panels

**Caution**

- (1) Do not make an impact on the LCD panel glass because it may break and you may get injured from it.
- (2) If the glass breaks, do not touch it with bare hands.
(Fragment of broken glass may stick you or you cut yourself on it.)
- (3) If you get injured, receive adequate first aid and consult a medial doctor.
- (4) Do not let liquid crystal get into your mouth.
(If the LCD panel glass breaks, try not let liquid crystal get into your mouth even toxic property of liquid crystal has not been confirmed.)
- (5) If liquid crystal adheres, rinse it out thoroughly.
(If liquid crystal adheres to your cloth or skin, wipe it off with rubbing alcohol or wash it thoroughly with soap. If liquid crystal gets into eyes, rinse it with clean water for at least 15 minutes and consult an eye doctor.)
- (6) If you scrap this products, follow a disposal standard of industrial waste that is legally valid in the community, country or territory where you reside.
- (7) Do not connect or disconnect this product while its application products is powered on.
- (8) Do not attempt to disassemble or modify this product as it is precision component.
- (9) If a part of soldering part has been exposed, and avoid contact (short-circuit) with a metallic part of the case etc. about FPC of this model, please.
Please insulate it with the insulating tape etc. if necessary.
The defective operation is caused, and there is a possibility to generation of heat and the ignition.
- (10) Since excess current protection circuit is not built in this TFT module, there is the possibility that LCD module or peripheral circuit become feverish and burned in case abnormal operation is generated.
We recommend you to add excess current protection circuit to power supply.
- (11) The devices on the FPC are damageable to electrostatic discharge, because the terminals of the devices are exposed.
Wear grounded wrist-straps and use electrostatic neutralization blowers to prevent static charge and discharge when handling the TFT monitors.
Designate an appropriate operating area, and set equipment, tools, and machines properly when handling this product.

**Caution**

This mark is used to indicate a precaution or an instruction which, if not correctly observed, may result in bodily injury, or material damages alone.

18.2 Precautions for Handling

- 1) Wear finger tips at incoming inspection and for handling the TFT monitors to keep display quality and keep the working area clean.
Do not touch the surface of the monitor as it is easily scratched.
- 2) Wear grounded wrist-straps and use electrostatic neutralization blowers to prevent static charge and discharge when handling the TFT monitors as the LED in this TFT monitors is damageable to electrostatic discharge.
Designate an appropriate operating area, and set equipment, tools, and machines properly when handling this product.
- 3) Avoid strong mechanical shock including knocking, hitting or dropping to the TFT monitors for protecting their glass parts. Do not use the TFT monitors that have been experienced dropping or strong mechanical shock.
- 4) Do not use or storage the TFT monitors at high temperature and high humidity environment. Particularly, never use or storage the TFT monitors at a location where condensation builds up.
- 5) Avoid using and storing TFT monitors at a location where they are exposed to direct sunlight or ultraviolet rays to prevent the LCD panels from deterioration by ultraviolet rays.
- 6) Do not stain or damage the contacts of the FPC cable .
FPC cable needs to be inserted until it can reach to the end of connector slot.
During insertion, make sure to keep the cable in a horizontal position to avoid an oblique insertion.
Otherwise, it may cause poor contact or deteriorate reliability of the FPC cable.
- 7) The FPC cable is a design very weak to the bend and the pull as it is fixed with the tape.
Do not bend or pull the FPC cable or carry the TFT monitor by holding the FPC cable.
- 8) Peel off the protective film on the TFT monitors during mounting process.
Refer to the section 18.5 on how to peel off the protective film.
We are not responsible for electrostatic discharge failures or other defects occur when peeling off the protective film.
- 9) Please make it to the structure to suppress surroundings of the front polarizer for the display irregularity prevention.

18.3 Precautions for Operation

- 1) Since this TFT monitors are not equipped with light shielding for the driver IC, do not expose the driver IC to strong lights during operation as it may cause functional failures.
- 2) In case of powering up or powering off this LCD module, be sure to comply the sequence as instructed in this specification.
- 3) Optimize VCOMDC within recommended operating conditions.
* When VCOMDC is not an optimal value, flicker and image sticking will be occurred.
- 4) Do not plug in or out the FPC cable while power supply is switch on.
Plug the FPC cable in and out while power supply is switched off.
- 5) Do not operate the TFT monitors in the strong magnetic field. It may break the TFT monitors.
- 6) Do not display a fixed image on the screen for a long time.
Use a screen-saver or other measures to avoid a fixed image displayed on the screen for a long time.
Otherwise, it may cause burn-in image on the screen due the characteristics of liquid crystal.

18.4 Storage Condition for Shipping Cartons

Storage environment

- Temperature 0 to 40° C
- Humidity 60%RH or less
No-condensing occurs under low temperature with high humidity condition.
- Atmosphere No poisonous gas that can erode electronic components and/or wiring materials should be detected.
- Time period 3 months
- Unpacking To prevent damages caused by static electricity, anti-static precautionary measures (e.g. earthing, anti-static mat) should be implemented.
After unpack, keep product in the appropriate condition, otherwise bubble seal of Protective film may be printed on Polarizer.
- Maximum piling up 7 cartons

*Conditions to storage after unpacking

Storage environment

- Temperature 0 to 40° C
- Humidity 60%RH or less
No-condensing occurs under low temperature with high humidity condition.
- Atmosphere No poisonous gas that can erode electronic components and/or wiring materials should be detected.
- Time period 1 year (Shelf life)
- Others Keep/ store away from direct sunlight
Storage goods on original tray made by ORTUS.

⚠ 18.5 Precautions for Peeling off the Protective film

The followings work environment and work method are recommended to prevent the TFT monitors from static damage or adhesion of dust when peeling off the protective films.

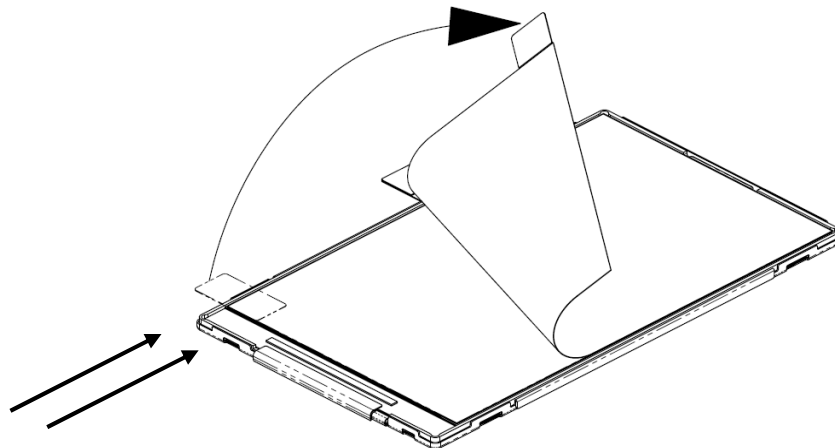
A) Work Environment

- a) Humidity: 50 to 70 %RH, Temperature 15 to 27 ° C
- b) Operators should wear conductive shoes, conductive clothes, conductive finger tips and grounded wrist-straps.
Use an electrostatic neutralization blower.
Anti-static treatment should be implemented to work area's floor.
- c) Use a room shielded against outside dust with sticky floor mat laid at the entrance to eliminate dirt.

B) Work Method

The following procedures should taken to prevent the driver ICs from charging and discharging.

- a) Use an electrostatic neutralization blower to blow air on the TFT monitors to its lower left when LSI is placed at the bottom.
Optimize direction of the blowing air and the distance between the TFT monitors and the electrostatic neutralization blower.
- b) Peel off the tab slowly (spending more than 2 secs to complete) by pulling it to opposite direction.



Direction of blowing air
(Optimize air direction and the distance)

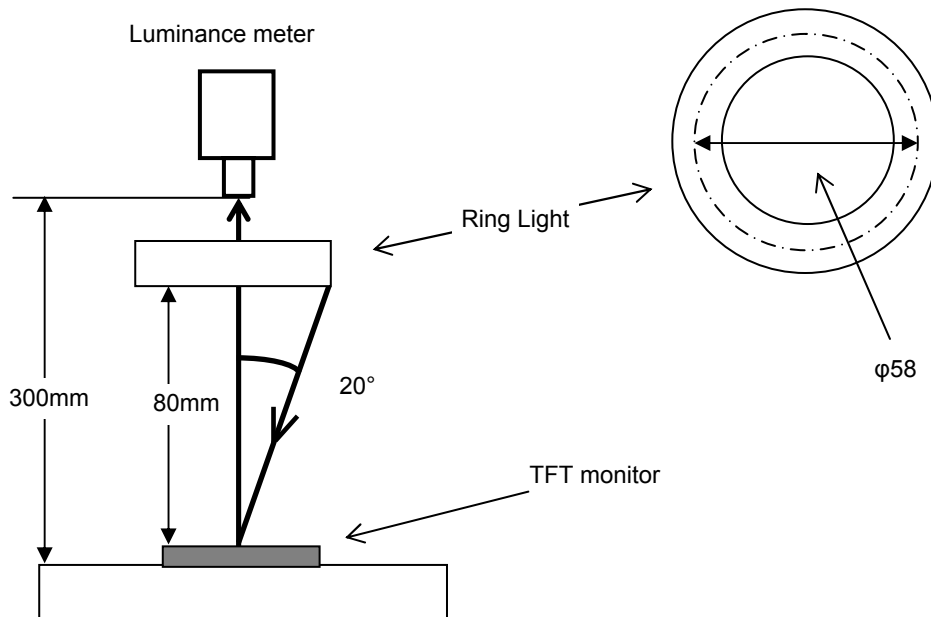
⚠ 18.6 Warranty

ORTUS is only liable to defective goods which is stored and used under the condition complying with this specifications and returned within 1 (one) year.

Warranty caused by manufacturing defect shall be conducted by replacement of goods or refundment at unit price.

Measurement Condition (Contrast ratio Backlight OFF only)

- Measuring instruments: LCD7200(OTSUKA ELECTRONICS),Ring Light(40,000 lx, ϕ 58)
- Driving condition: Refer to the section "Optical Characteristics"
- Measured temperature: 25° C unless specified
- Measurement system: See the chart below.
- Measurement point: At the center of the screen.



2. Test Method

| Notice | Item | Test method | Measuring instrument | Remark |
|--------|---|---|----------------------|---|
| 1 | Response time | <p>Measure output signal waveform by the luminance meter when raster of window pattern is changed from white to black and from black to white.</p> | LCD7200 | <p>Black display [Data]=00h White display [Data]=FFh TON Rise time TOFF Fall time</p> |
| 2 | Contrast ratio | <p>Measure maximum luminance Y1([Data]=FFh) and minimum luminance Y2([Data]=00h) at the center of the screen by displaying raster or window pattern. Then calculate the ratio between these two values.</p> <p>Contrast ratio = Y1/Y2 Diameter of measuring point: 8mmϕ</p> | CS1000 LCD7200 | Backlight ON Backlight OFF |
| 3 | Viewing angle Horizontal θ Vertical ϕ | Move the luminance meter from right to left and up and down and determine the angles where contrast ratio is 10. | EZcontrast160D | |
| 4 | White chromaticity | <p>Measure chromaticity coordinates x and y of CIE1931 colorimetric system at [Data] = FFh Color matching faction: 2°view</p> | CS1000 | |
| 5 | Burn-in | Visually check burn-in image on the screen after 2 hours of "window display" ([Data]=00h/FFh). | | |
| 6 | Center brightness | Measure the brightness at the center of the screen. | CS1000 | |
| 7 | Brightness distribution | <p>(Brightness distribution) = 100 x B/A % A : max. brightness of the 9 points B : min. brightness of the 9 points</p> | CS1000 | |

Version History

| Ver. | Date | Page | Description | |
|------|---------------------------|---|---|---|
| 1.0 | Feb. 18, 2015 | - | - | First issue |
| 2.0 | May. 13, 2015 △ x1 | P.35 | Change | 14.1 Optical Characteristics White chromaticity range |
| 3.0 | Mar. 31, 2016 △ x1 | P.8 | Correct | 3.2 Outward Form Error correct (Connector model number) |
| 4.0 | Aug. 26, 2016 △ x14 | P.1 P.2 P.3 P.4 P.7 P.27 P.28 P.34 P.35 P.36 P.43 P.44 | Add Change Correct Add Change Correct Add Delete Delete Add Correct Add Delete Delete Add Correct Add Correct Add | Cover Model outline Contents Page number 1. Application Note 2.2 Display Method NTSC ratio 3.1 Dimensions Remarks (Active area: cm ⇒ mm) 9. RGB Interface Recommended(Vertical refresh rate/ Pixel clock frequency) 10. Absolute Maximum Rating LED Forward current 11. Recommended Operating Conditions LED Forward current Forward voltage / Note 14.1 Optical Characteristics Note 14.2 Temperature Characteristics Note 15.1 Defective Display and Screen Quality Reference diagram Criteria (Dirt) 18.4 Storage Condition for Shipping Cartons Conditions to storage after unpacking 18.5 Precautions for Peeling off the Protective film Work Environment 18.6 Warranty Content |
| | | | | |

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