

Specification

G070Y1-T01

Version September 2007

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REVISION HISTORY

| Version | Date | Section | Description |
|---------|-------------|---------|---|
| Ver 0.0 | Aug 08 2006 | All | G070Y1-T01 Specifications was first issued. |
| Ver 1.0 | May 17 2007 | All | G070Y1-T01 Preliminary Specifications was first issued. |
| Ver 2.0 | Sep 18 2007 | All | G070Y1-T01 Approval Specifications was first issued. |

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1. GENERAL DESCRIPTION

1.1 OVERVIEW

G070Y1-T01 is a 7inch TFT Liquid Crystal Display module with a CCFL Backlight unit and a-50-pin-and-1ch-TTL interface. This module supports 800 (R.G.B)x 480 WVGA mode which main application is the Automotive Monitor and Industrial field.

1.2 FEATURES

- Wide viewing angle.
- Fast response time
- WVGA (800 x 480 pixels) resolution
- Wide operating temperature
- Reversible - scan function

1.3 APPLICATION

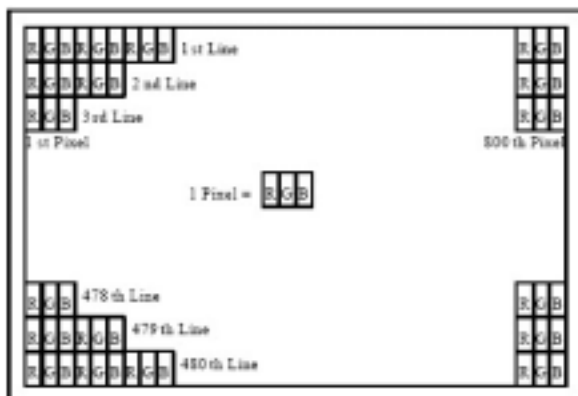
- Automotive Monitor
- Factory Application

1.4 GENERAL SPECIFICATIONS

| Item | Specification | Unit | Note |
|--------------------|---------------------------------------|-------|------|
| Diagonal Size | 177.7 (7 Inch) | mm | |
| Active Area | 152.4x91.44 | mm | (1) |
| Bezel Opening Area | 155x94.04 | mm | |
| Driver Element | a-si TFT active matrix | - | - |
| Pixel Number | 800xR.G.B.x480 | pixel | - |
| Pixel Pitch | 0.1905x0.1905 | mm | - |
| Pixel Arrangement | RGB vertical stripe | - | (2) |
| Display Colors | 262.144 (6 bits) | color | - |
| Display Mode | Normal White | - | - |
| Surface Treatment | Hard Coating (3H), AG (Haze 25 %) | - | - |
| Weight | 170(Typ) | g | |

Note (1) Please refer to the attached drawings for more information of front and back outline dimensions.

Note (2)



1.5 MECHANICAL SPECIFICATIONS

| Item | | Min. | Typ. | Max. | Unit | Note |
|-------------|---------------|-------|------|-------|------|------|
| Module Size | Horizontal(H) | 164.7 | 165 | 165.3 | mm | (1) |
| | Vertical(V) | 103.7 | 104 | 104.3 | mm | |
| | Depth(D) | - | 5.5 | 5.8 | mm | |

Note (1) Please refer to the attached drawings for more information of front and back outline dimensions.

2. ABSOLUTE MAXIMUM RATINGS

2.1 ABSOLUTE RATINGS OF ENVIRONMENT

| No. | Test Item | Test Condition | Note |
|-----|--|---|---------|
| 1 | High Temperature Storage | 90 , 240 hours | (1) (2) |
| 2 | Low Temperature Storage | -40 , 240 hours | |
| 3 | Heat Shock Operating | {{(-40 , 0.5 hour) (85 , 0.5 hour)}, 100 cycles | |
| 4 | High Temperature Operating | 85 , 240 hours | |
| 5 | Low Temperature Operating | -30 , 240 hours | |
| 6 | High Temperature & High Humidity Operating | 60 , 90%RH, 240hours | |
| 8 | Shock (Non-Operating) | 100G, 6ms, +/-XYZ 3 times | (3)(5) |
| 9 | Vibration (Non-Operating) | 3G, 10 to 200 Hz, sine wave | (4)(5) |

Note (1) There should be no condensation on the surface of panel during test.

Note (2) The temperature of panel display surface area should be 90 Max.

Note (3) 6ms, half sine wave, 3 times for +/-X, +/-Y, and +/-Z.

Note (4) 3 directions: X, Y and Z axes, 60min per each direction; 6 cycles; sweep time = 5 minutes; peak acceleration = 3G; frequency = 10 to 200 Hz; sine wave.

Note (5) At testing Vibration and Shock, the fixture in holding the module has to be hard and rigid enough so that the module would not be twisted or bent by the fixture

Note (6) In the standard conditions, there is no function failure issue occurred. All the cosmetic specification is judged before the reliability test

Note (7) During module operating test, the lamp current is 5.5 mA

2.2 ELECTRICAL ABSOLUTE RATINGS

2.2.1 TFT LCD MODULE

| Parameter | Symbol | Value | | | Unit | Note |
|----------------------|--------|---------|------|----------|------|------|
| | | Min. | Typ. | Max. | | |
| Power Supply Voltage | Vcc | -0.3 | - | 5 | V | - |
| | AVDD | -0.5 | - | 13.5 | V | - |
| | VGH | -0.3 | - | 42 | V | - |
| | VGL | VGH-42 | - | 0.3 | V | - |
| Input Signal Voltage | Vi | -0.3 | - | Vcc+0.3 | V | - |
| | V1~V5 | 0.4AVDD | - | AVDD+0.3 | V | - |
| | V6~V10 | -0.3 | - | 0.6AVDD | V | - |
| | VCOM | - | 4.58 | - | V | - |

2.2.2 BACKLIGHT UNIT

| Item | Symbol | Value | | Unit | Note |
|----------------|--------|-------|------|------------|---------------------------|
| | | Min. | Max. | | |
| Lamp Voltage | V_L | - | 2.5K | V_{RMS} | (1), (2), $I_L = (5.5)mA$ |
| Lamp Current | I_L | 3.0 | 8.0 | mA_{RMS} | (1), (2) |
| Lamp Frequency | F_L | 40 | 80 | KHZ | |

Note (1) Permanent damage to the device may occur if maximum values are exceeded. Function operation should be restricted to the conditions described under Normal Operating Conditions.

Note (2) Specified values are for lamp (Refer to 3.2 for further I_L information).

3. ELECTRICAL CHARACTERISTIC

3.1 Recommended Operation condition (GND = AVSS = 0V)

Ta = 25 ± 2 °C

| Parameter | Symbol | Value | | | Unit | Note | |
|-----------------------|------------|---------|--------|----------|--------|------|--|
| | | Min. | Typ. | Max. | | | |
| Power Supply Voltage | Vcc | 3.0 | 3.3 | 3.6 | V | | |
| | AVDD | 11.43 | 11.6 | 11.78 | V | | |
| | VGH | 17.5 | 18 | 18.5 | V | | |
| | VGL | -7.5 | -7 | -6.5 | V | | |
| Input Signal Voltage | V1~V5 | 0.4AVDD | - | AVDD-0.1 | V | (1) | |
| | V6~V10 | 0.1 | - | 0.6AVDD | V | (1) | |
| | VCOM | - | 4.584 | - | V | | |
| Digital Input Voltage | High Level | VIH | 0.7Vcc | - | Vcc | V | |
| | Low Level | VIL | 0 | - | 0.3Vcc | V | |

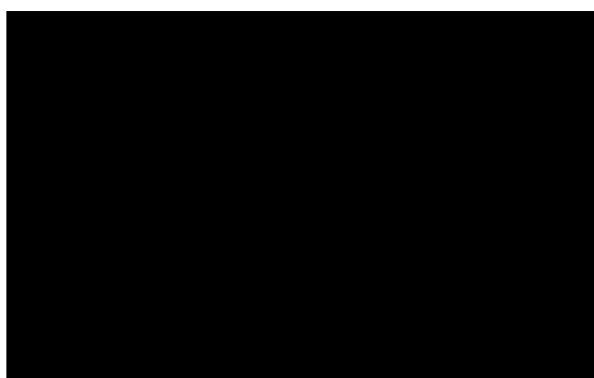
Note : (1) Please refer to application notes

3.2 Current Consumption (GND = AVSS =0V)

| Parameter | Symbol | Value | | | Unit | Note |
|---|-----------------|-------|------|------|------|------|
| | | Min. | Typ. | Max. | | |
| Supply Current for Source/Gate Driver (Digital) | I _{CC} | - | 2.78 | 3.0 | mA | (1) |
| Supply Current for Source Driver (Analog) | I _{DD} | - | 24.8 | 27.0 | mA | (1) |
| Supply Current for Gate Driver (High Level) | I _{GG} | - | 0.16 | 0.2 | mA | (1) |
| Supply Current for Gate Driver (Low Level) | I _{EE} | - | 0.16 | 0.2 | mA | (1) |

Note: (1) The specified power supply current is under the conditions at Vcc = 3.3 V, Ta = 25 ± 2 °C, f_v = 60 Hz, whereas a power dissipation check pattern below is displayed.

Black Pattern



Active Area

3.3 BACKLIGHT UNIT

Ta = 25 ± 2 °C

| Parameter | Symbol | Value | | | Unit | Note |
|----------------------|-----------------|-------|------|--------------|-------------------|--------------------------------|
| | | Min. | Typ. | Max. | | |
| Lamp Input Voltage | V _L | 740 | 630 | 550 | V _{RMS} | (1), I _L = (5.5) mA |
| Lamp Current | I _L | 3.0 | 5.5 | 8.0 | mA _{RMS} | (1) |
| Lamp Turn On Voltage | V _S | - | - | 970 (25 °C) | V _{RMS} | (2) |
| | | - | - | 1260 (0 °C) | V _{RMS} | (2) |
| | | - | - | 1460 (-35°C) | V _{RMS} | (2) |
| Operating Frequency | F _L | 40 | - | 80 | KHz | (3) |
| Lamp Life Time | L _{BL} | 35000 | - | - | Hrs | (5) |
| Power Consumption | P _L | - | 3.46 | - | W | (4), I _L = (5.5) mA |

Note (1) I_L means the lamp current of one lamp.

Note (2) The voltage that must be larger than V_S should be applied to the lamp for more than 1 second after startup. Otherwise the lamp may not be turned on.

Note (3) The lamp frequency may produce interference with horizontal synchronous frequency from the display, and this may cause line flow on the display. In order to avoid interference, the lamp frequency should be detached from the horizontal synchronous frequency and its harmonics as far as possible.

Note (4) P_L = I_L × V_L

Note (5) The lifetime of lamp can be defined as the time in which it continues to operate under the condition Ta = 25 ± 2 °C and I_L = (5.5) mA_{RMS} until one of the following events occurs:

- (a) When the brightness becomes or lower than 50% of its original value.
- (b) When the effective ignition length becomes or lower than 80% of its original value. (Effective ignition length is defined as an area that has less than 70% brightness compared to the brightness in the center point.)

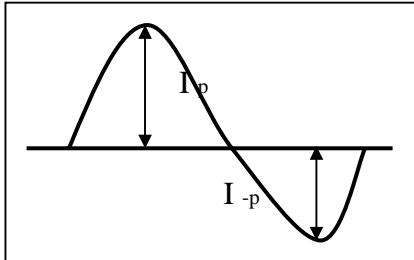
Note (6) The waveform of the voltage output of inverter must be area-symmetric and the design of the inverter must have specifications for the modularized lamp. The performance of the Backlight, such as lifetime or brightness, is greatly influenced by the characteristics of the DC-AC inverter for the lamp. All the parameters of an inverter should be carefully designed to avoid producing too much current leakage from high voltage output of the inverter. When designing or ordering the inverter please make sure that a poor lighting caused by the mismatch of the Backlight and the inverter (miss-lighting, flicker, etc.) never occurs. If the above situation is confirmed, the module should be operated in the same manners when it is installed in your instrument.

The output of the inverter must have symmetrical (negative and positive) voltage waveform and symmetrical current waveform. (Unsymmetrical ratio is less than 10%) Please do not use the inverter which has unsymmetrical voltage and unsymmetrical current and spike wave. Lamp frequency may produce interface with horizontal synchronous frequency and as a result this may cause beat on the display. Therefore lamp frequency shall be as away possible from the horizontal synchronous frequency and from its harmonics in order to prevent interference.

Requirements for a system inverter design, which is intended to have a better display performance, a better power efficiency and a more reliable lamp. It shall help increase the lamp lifetime and reduce its

leakage current.

- The asymmetry rate of the inverter waveform should be 10% below;
- The distortion rate of the waveform should be within $2 \pm 10\%$;
- The ideal sine wave form shall be symmetric in positive and negative polarities.



* Asymmetry rate:

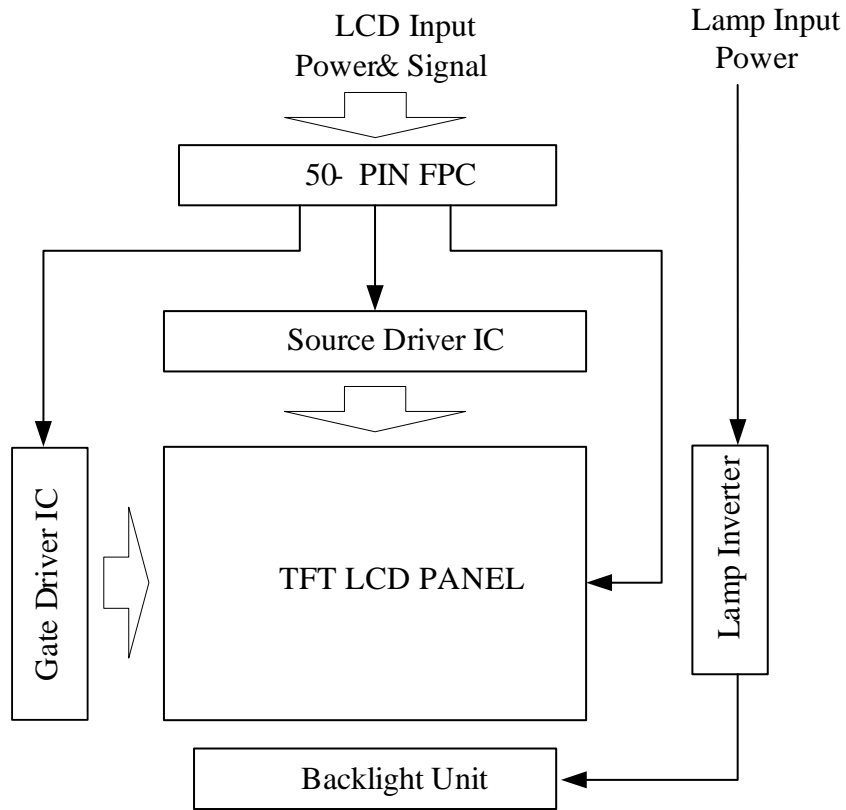
$$| I_p - I_{-p} | / I_{rms} * 100\%$$

* Distortion rate

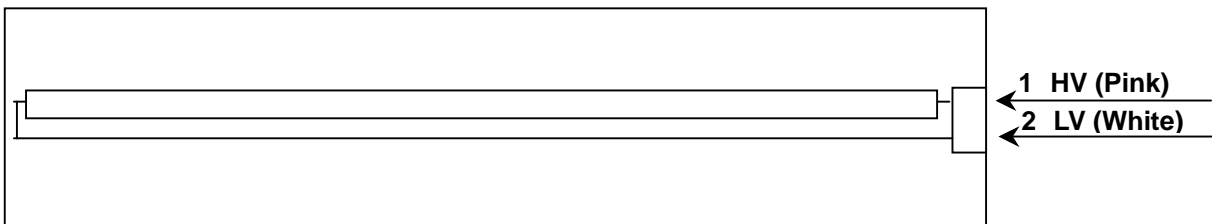
$$I_p \text{ (or } I_{-p}) / I_{rms}$$

4. BLOCK DIAGRAM

4.1 TFT LCD MODULE



4.2 BACKLIGHT UNIT



5. INPUT TERMINAL PIN ASSIGNMENT

5.1 FPC I/O Pin Assignment

| Pin | Name | I/O | Description |
|-----|-------|-----|--|
| 1 | GND | I | Ground |
| 2 | Vcc | I | Digital Voltage |
| 3 | VGL | I | TFT Low Voltage |
| 4 | VGH | I | TFT High Voltage |
| 5 | STVD | I/O | Start Pulse Signal Input / Output (Vertical) |
| 6 | STVU | I/O | Start Pulse Signal Input / Output (Vertical) |
| 7 | CKV | I | Gate Driver Shift Clock Input |
| 8 | U/D | I | Up / Down Scan Selection |
| 9 | OE | I | Gate Driver Output Enable Control |
| 10 | VCOM | I | VCOM Voltage |
| 11 | DIO1 | I/O | Start Pulse Signal Input / Output (Horizontal) |
| 12 | AVDD | I | Source Driver Analog Voltage |
| 13 | GND | I | Ground |
| 14 | GND | I | Ground |
| 15 | Vcc | I | Digital Voltage |
| 16 | EDGSL | I | Source Driver Clock Edge Select Input |
| 17 | CLK | I | Source Driver Shift Clock Input |
| 18 | SHL | I | Source Driver Shift Direction Control Input |
| 19 | R0 | I | Red Data |
| 20 | R1 | I | Red Data |
| 21 | R2 | I | Red Data |
| 22 | R3 | I | Red Data |
| 23 | R4 | I | Red Data |
| 24 | R5 | I | Red Data |
| 25 | G0 | I | Green Data |
| 26 | G1 | I | Green Data |
| 27 | G2 | I | Green Data |
| 28 | G3 | I | Green Data |
| 29 | G4 | I | Green Data |
| 30 | G5 | I | Green Data |
| 31 | V1 | I | Gamma Voltage 1 |
| 32 | V2 | I | Gamma Voltage 2 |
| 33 | V3 | I | Gamma Voltage 3 |
| 34 | V4 | I | Gamma Voltage 4 |
| 35 | V5 | I | Gamma Voltage 5 |
| 36 | V6 | I | Gamma Voltage 6 |
| 37 | V7 | I | Gamma Voltage 7 |
| 38 | V8 | I | Gamma Voltage 8 |
| 39 | V9 | I | Gamma Voltage 9 |
| 40 | V10 | I | Gamma Voltage 10 |

| | | | |
|----|------|-----|--|
| 41 | B0 | I | Blue Data |
| 42 | B1 | I | Blue Data |
| 43 | B2 | I | Blue Data |
| 44 | B3 | I | Blue Data |
| 45 | B4 | I | Blue Data |
| 46 | B5 | I | Blue Data |
| 47 | LD | I | Latching and Data Switching input |
| 48 | REV | I | Data Inversion Input |
| 49 | POL | I | Polarity Inverting Input |
| 50 | DIO2 | I/O | Start Pulse Signal Input / Output (Horizontal) |

Note (1) User's connector Part No: (FH12-50S-0.5 (Hiroses)) or equivalent

5.2 SCANNING DIRECTION

The following figures are seen from a front view and the arrow shows the direction of scan.

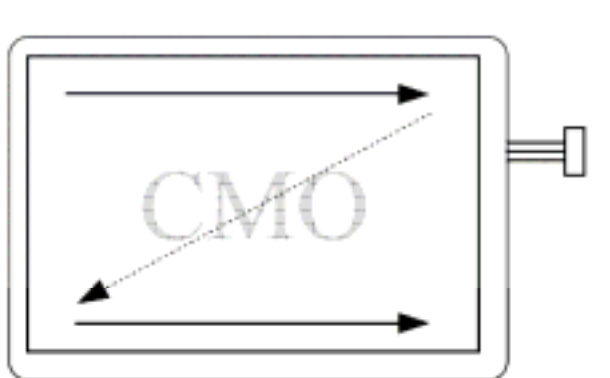


Figure1.Normal scan

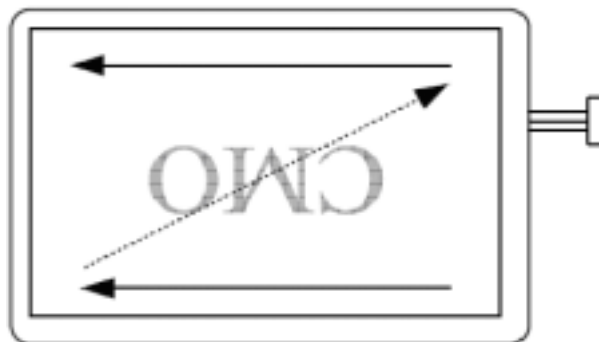


Figure 2. Reverse scan

Note : (1) Normal Scan

| SHL | U/D | DIO1 | DIO2 | STVU | STVD | Shift |
|-----|-----|-------|--------|-------|--------|-----------------------------|
| 1 | 0 | Input | Output | Input | Output | Up to down Left to right |

(2) Reverse Scan

| SHL | U/D | DIO1 | DIO2 | STVU | STVD | Shift |
|-----|-----|--------|-------|--------|-------|-----------------------------|
| 0 | 1 | Output | Input | Output | Input | Down to Up Right to left |

5.3 BACKLIGHT UNIT

| Pin | Symbol | Description | Remark |
|-----|--------|--------------|--------|
| 1 | HV1 | High Voltage | Pink |
| 2 | N/A | N/A | N/A |
| 3 | LV | Low Voltage | White- |

Note (1) Connector Part No.: BHR-03VS-1 (J.S.T Mfg,Co,Ltd)

5.4 COLOR DATA INPUT ASSIGNMENT

The brightness of each primary color (red, green and blue) is based on the 6-bit gray scale data input for the color. The higher the binary input, the brighter the color. The table below provides the assignment of color versus data input.

| Color | | Data Signal | | | | | | | | | | | | | | | | | |
|---------------------|-----------------|-------------|----|----|----|----|----|-------|----|----|----|----|----|------|----|----|----|----|----|
| | | Red | | | | | | Green | | | | | | Blue | | | | | |
| | | R5 | R4 | R3 | R2 | R1 | R0 | G5 | G4 | G3 | G2 | G1 | G0 | B5 | B4 | B3 | B2 | B1 | B0 |
| Basic Colors | Black | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Red | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Green | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Blue | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 |
| | Cyan | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| | Magenta | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 |
| | Yellow | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| | White | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Gray Scale Of Red | Red(0) / Dark | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Red(1) | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Red(2) | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ |
| | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ |
| | Red(61) | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Red(62) | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Red(63) | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Gray Scale Of Green | Green(0) / Dark | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Green(1) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Green(2) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ |
| | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ |
| | Green(61) | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Green(62) | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Green(63) | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| Gray Scale Of Blue | Blue(0) / Dark | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Blue(1) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| | Blue(2) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ |
| | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ |
| | Blue(61) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 1 |
| | Blue(62) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 |
| | Blue(63) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 |

Note (1) 0: Low Level Voltage, 1: High Level Voltage

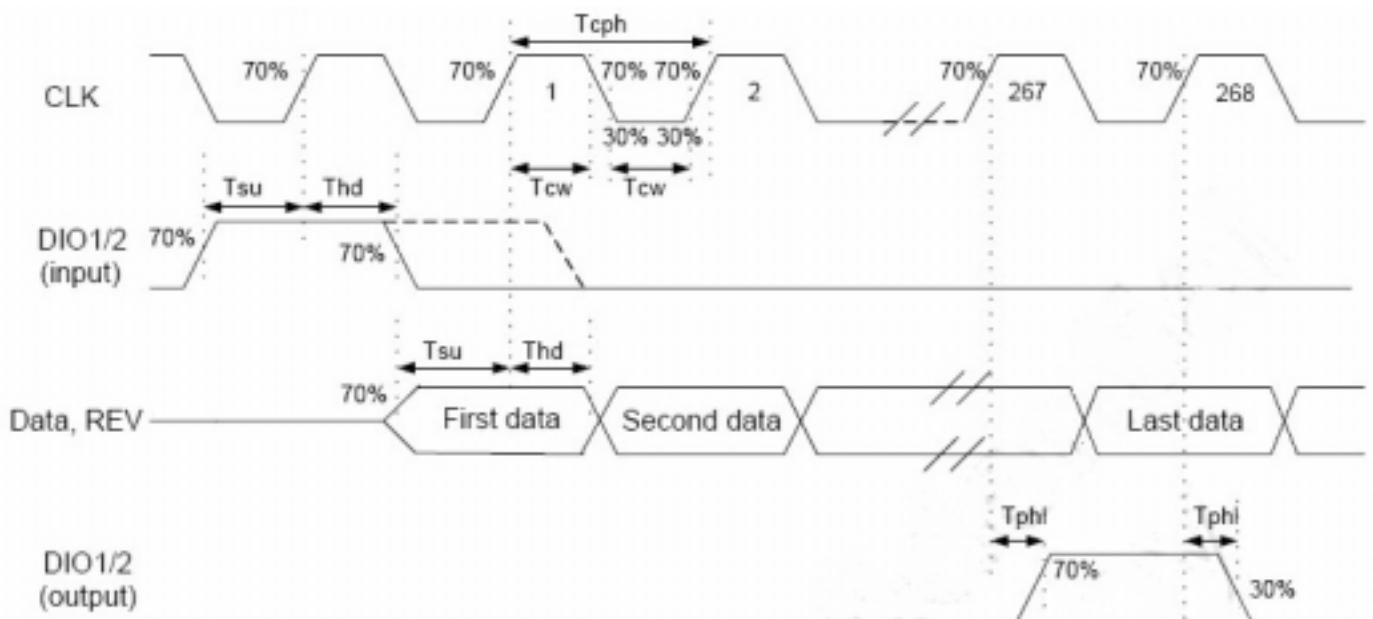
6. INTERFACE TIMING

6.1 AC Electrical Characteristics (Vcc = 3.3V, AVDD = 8.4V, AVSS = GND = 0V, Ta = 25)

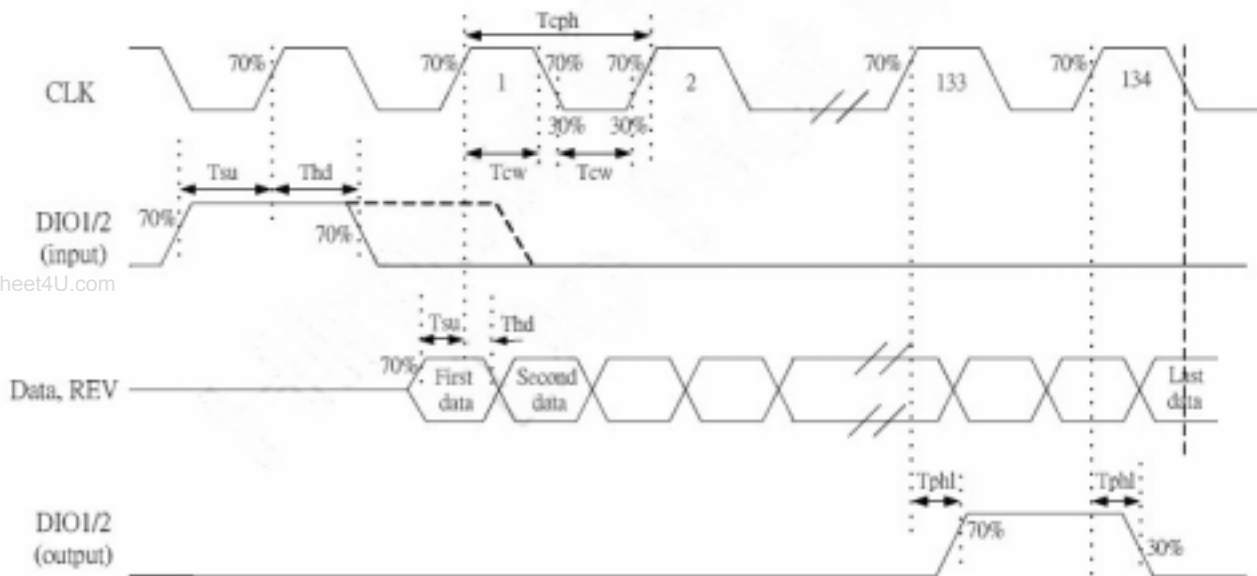
| Parameter | Symbol | Value | | | Unit | Condition |
|-------------------------------|---------------------------------------|-------|------|------|------|---|
| | | Min. | Typ. | Max. | | |
| CLK frequency | Fclk | - | 40 | 47 | MHz | - |
| CLK Pulse width | Tcw | 6 | - | - | ns | - |
| Data setup time | Tsu | 4 | - | - | ns | D00~D55, REV and DIO1/2 to CLK |
| Data hold time | Thd | 2 | - | - | ns | D00~D55, REV and DIO1/2 to CLK |
| Propagation delay of DIO2/1 | Tphi | 6 | 10 | 15 | ns | CL = 25pF (Output) |
| Time that the last data to LD | Tld | 1 | - | - | Tcph | - |
| Pulse width of LD | Twld | 2 | - | - | Tcph | - |
| Time that LD to DIO1/2 | Tlds | 5 | - | - | Tcph | - |
| POL setup time | Tpsu | 6 | - | - | ns | POL to LD |
| POL hold time | Tphd | 6 | - | - | ns | POL to LD |
| Output stable time | Tst | - | - | 12 | us | 10% or 90% target voltage, CL = 60pF, R = 2KΩ |
| CKV period | t _{CPV} | 5 | - | - | us | - |
| CKV pulse width | t _{CPVH} , t _{CPVL} | 2.5 | - | - | us | 50% duty cycle |
| OE pulse width | t _{WOE} | 1 | - | - | us | - |
| STV setup time | t _{SU} | 700 | - | - | ns | - |
| STV hold time | t _{HD} | 700 | - | - | ns | - |

■ Timing Diagram 1

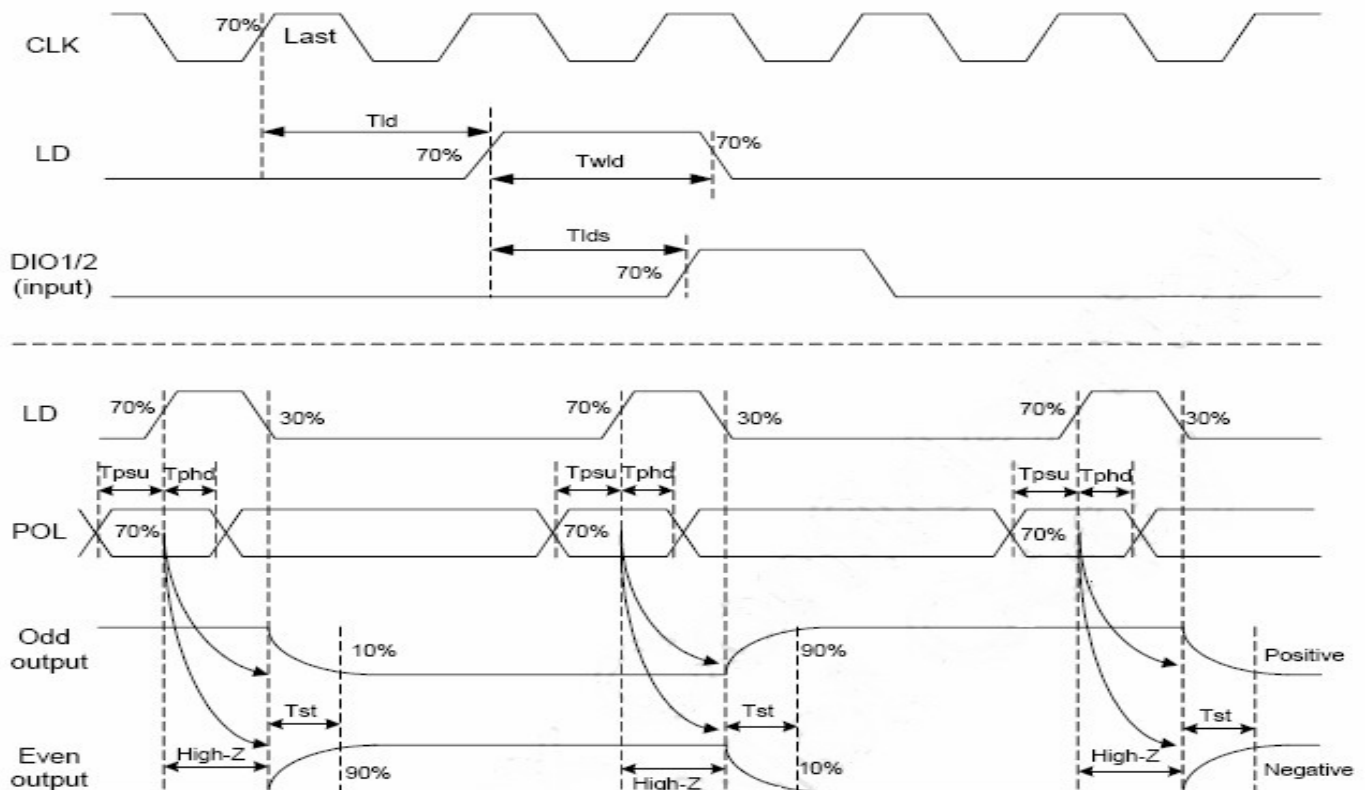
- EDGSL = "0" or open



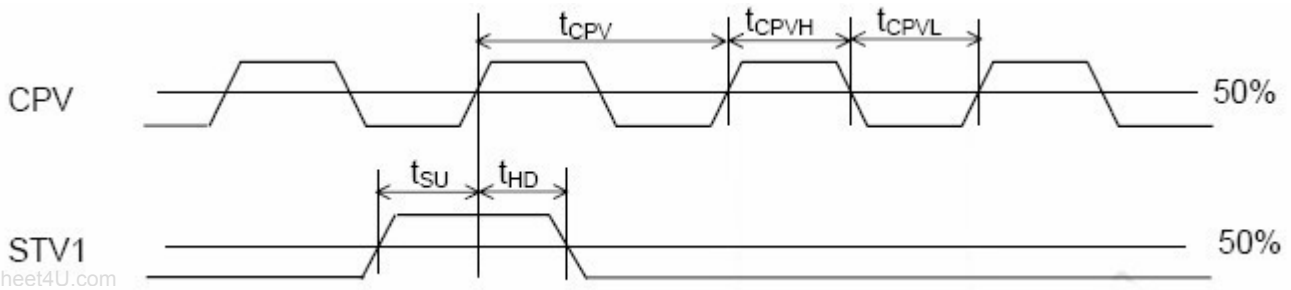
● EDGSL = "1"



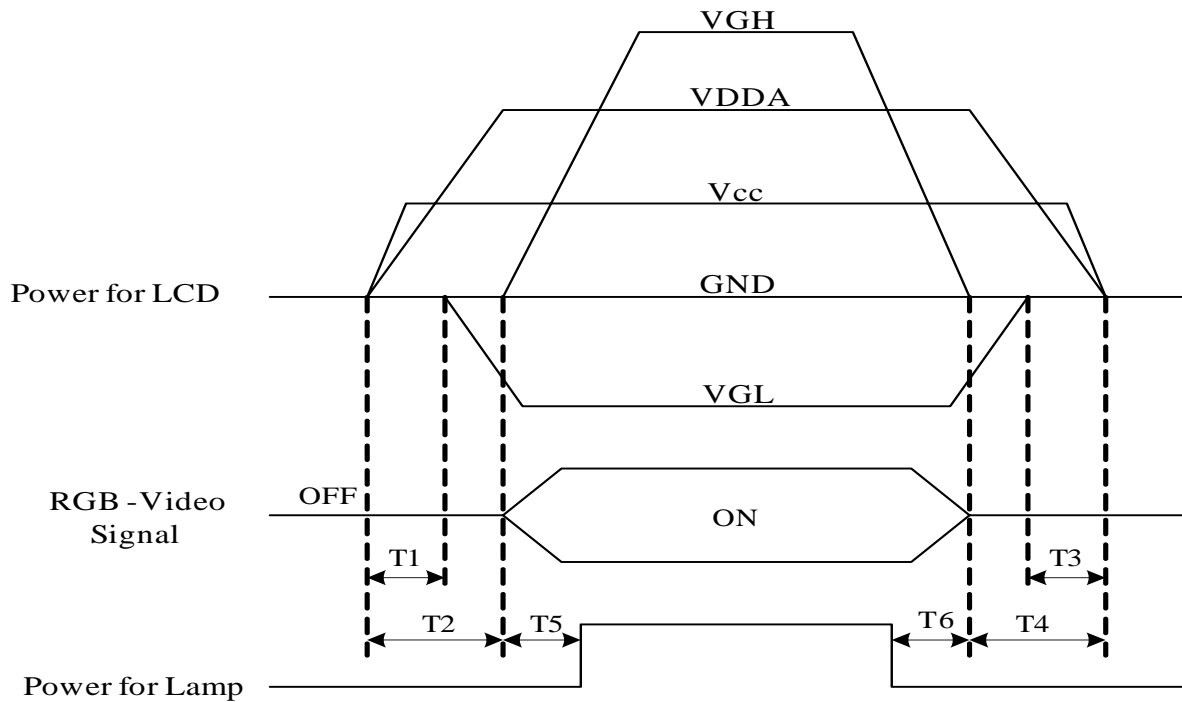
■ Timing Diagram 2



■ Timing Diagram 3



6.2 POWER ON/OFF SEQUENCE



Timing Specifications:

0ms $T1 < T2$

0ms $< T3 < T4$

0ms $T5$

0ms $T6$

7. OPTICAL CHARACTERISTICS

7.1 TEST CONDITIONS

| Item | Symbol | Value | Unit |
|------------------------------|---|-------|-------------------|
| Ambient Temperature | Ta | 25±2 | °C |
| Ambient Humidity | Ha | 50±10 | %RH |
| Supply Voltage | V _{CC} | 3.3 | V |
| Input Signal | According to typical value in "3. ELECTRICAL CHARACTERISTICS" | | |
| Lamp Current | I _L | 5.5 | mA _{RMS} |
| Inverter Operating Frequency | F _L | 61 | KHz |
| Inverter | (Sumida IV40090T/B2) | | |

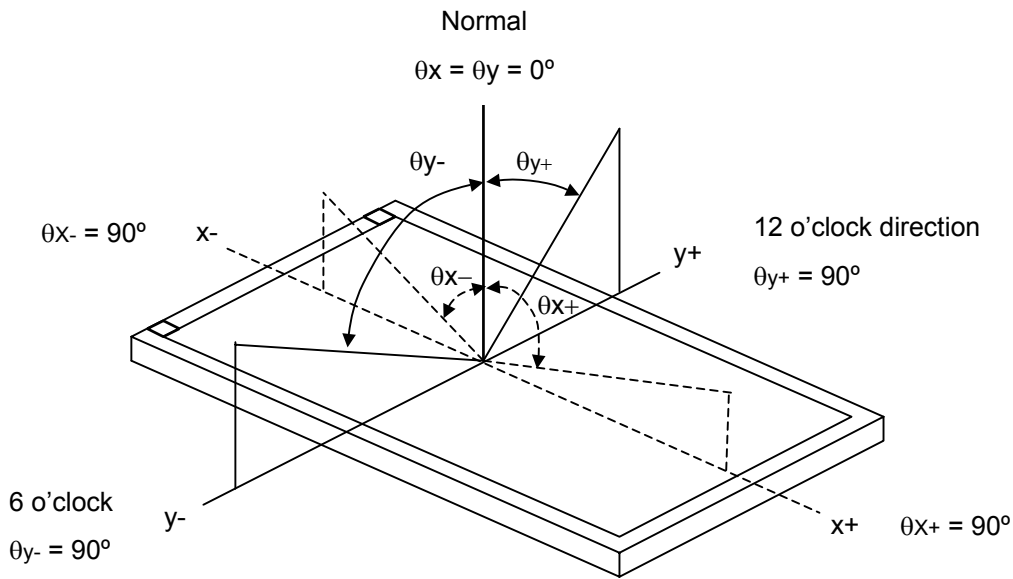
Note (1) I_L means the lamp current of one lamp.

7.2 OPTICAL SPECIFICATIONS

The relative measurement methods of optical characteristics are shown in 7.2. The following items should be measured under the test conditions described in 7.1 and stable environment shown in Note (6).

| Item | Symbol | Condition | Min. | Typ. | Max. | Unit | Note | | |
|---------------------------|----------------|--|------------|-----------------|------------|-------------------|----------|----------|---|
| Color Chromaticity | Red | $\theta_x=0^\circ, \theta_y=0^\circ$ Viewing Normal Angle | Typ - 0.03 | 0.607 | Typ + 0.03 | | (1), (6) | | |
| | | | | Ry | | | | 0.342 | |
| | Green | | | Gx | | | | 0.316 | |
| | | | | Gy | | | | 0.550 | |
| | Blue | | | Bx | | | | 0.150 | |
| | | | | By | | | | 0.124 | |
| | White | | | Wx | | | | 0.313 | |
| | | | | Wy | | | | 0.329 | |
| Center Luminance of White | L _C | | 330 | 450 | - | cd/m ² | (4), (6) | | |
| Contrast Ratio | CR | | 350 | 500 | - | - | (2), (6) | | |
| Response Time | T _R | | - | 5 | 10 | Ms | (3) | | |
| | T _F | | - | 11 | 16 | Ms | | | |
| White Variation | δW | | - | 1.25 | 1.4 | - | (5), (6) | | |
| Viewing Angle | Horizontal | CR 10 | | 60 | 70 | - | Deg. | (1), (6) | |
| | | | | θ _{x-} | 60 | 70 | | | - |
| | Vertical | | | θ _{y+} | 50 | 60 | | | - |
| | | | | θ _{y-} | 50 | 60 | | | - |

Note (1) Definition of Viewing Angle (θ_x, θ_y):



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Note (2) Definition of Contrast Ratio (CR):

The contrast ratio can be calculated by the following expression.

$$\text{Contrast Ratio (CR)} = L_{63} / L_0$$

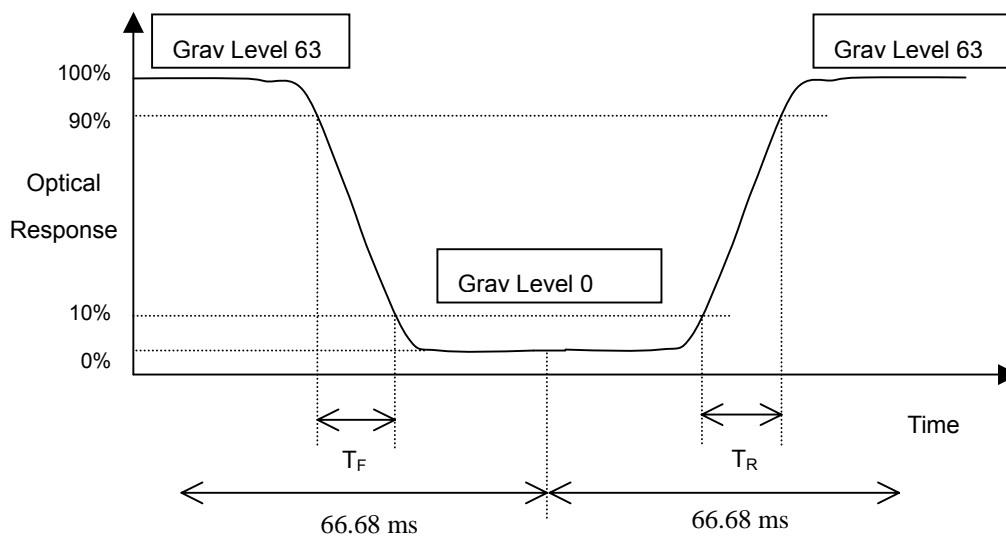
L63: Luminance of gray level 63

L 0: Luminance of gray level 0

$$CR = CR (5)$$

CR (X) is corresponding to the Contrast Ratio of the point X at Figure in Note (5).

Note (3) Definition of Response Time (T_R, T_F) and measurement method:



Note (4) Definition of Luminance of White (L_C):

Measure the luminance of gray level 63 at center point

$$L_C = L(5)$$

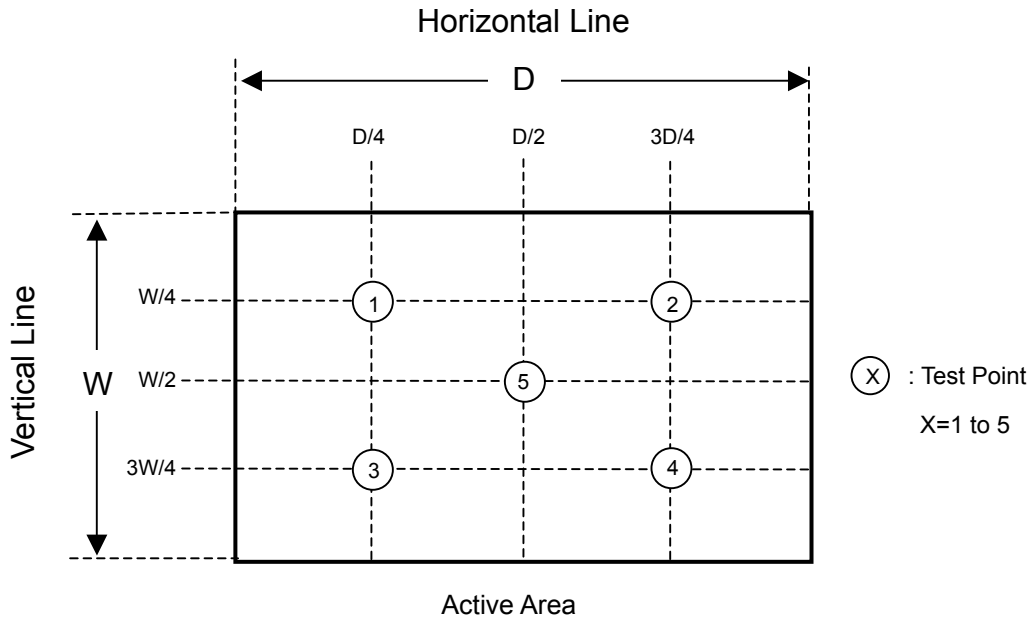
$L(x)$ is corresponding to the luminance of the point X at Figure in Note (5).

Note (5) Definition of White Variation (δW):

Measure the luminance of gray level 63 at 5 points

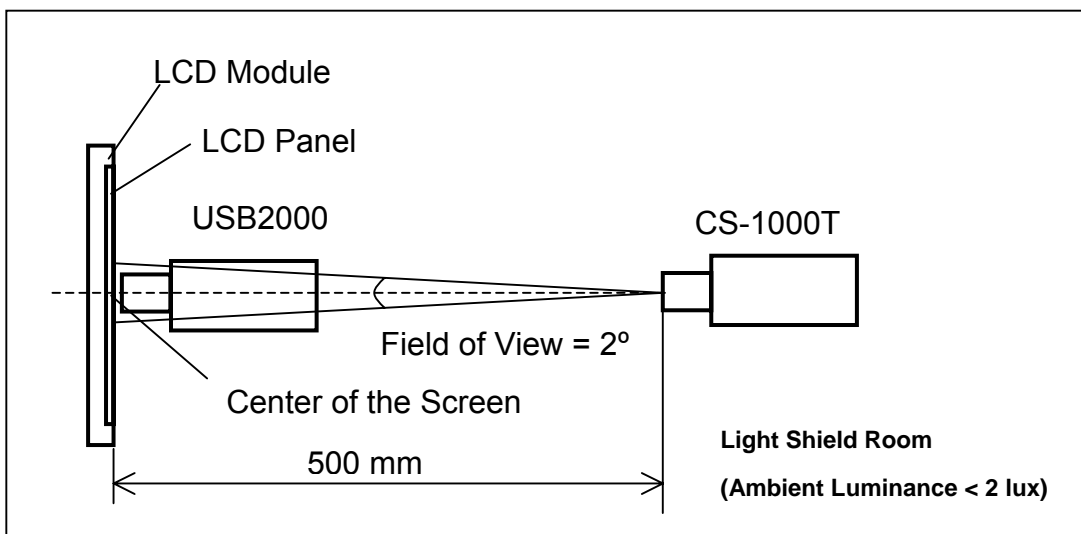
$$\delta W = \text{Maximum} [L(1), L(2), L(3), L(4), L(5)] / \text{Minimum} [L(1), L(2), L(3), L(4), L(5)]$$

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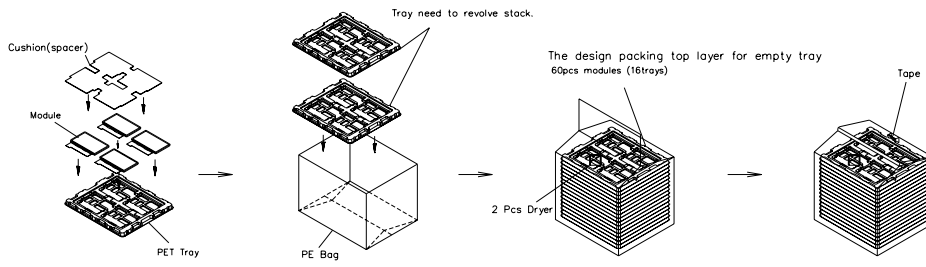


Note (6) Measurement Setup:

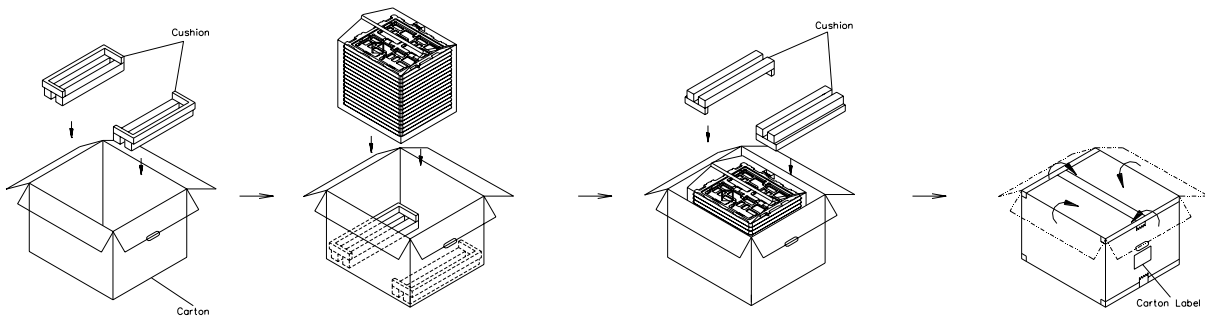
The LCD module should be stabilized at given temperature for 20 minutes to avoid abrupt temperature change during measuring. In order to stabilize the luminance, the measurement should be executed after lighting Backlight for 20 minutes in a windless room.



8. PACKAGING

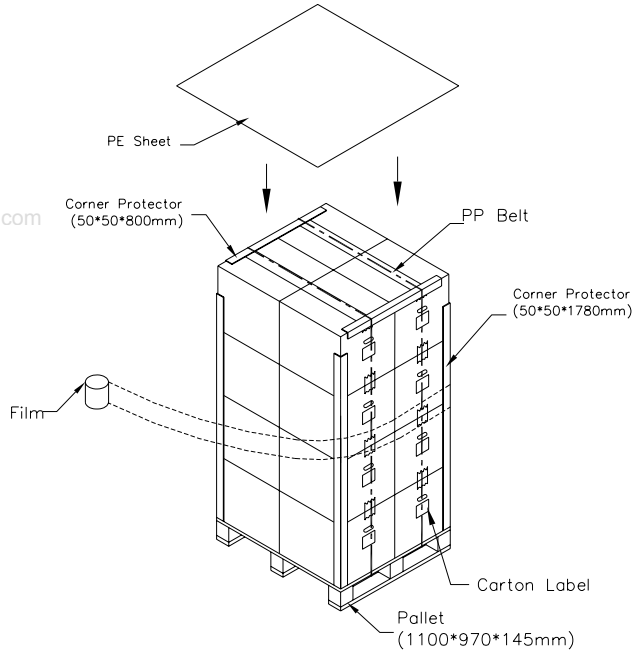


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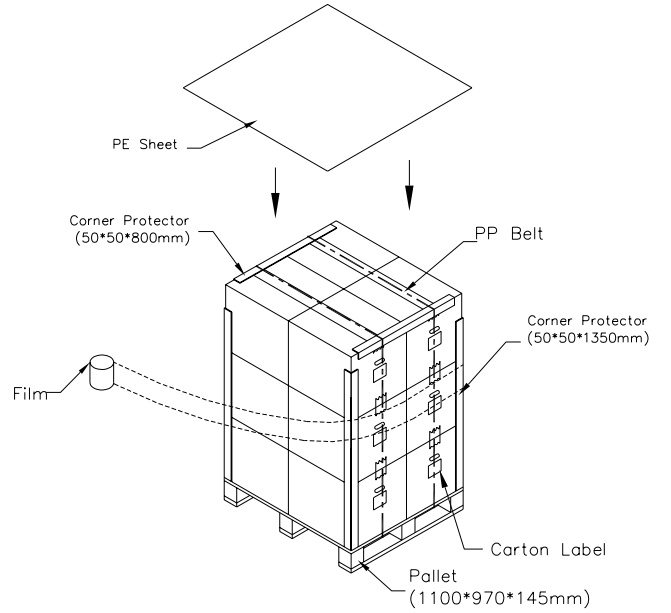


- (1) 60 LCM Modules/1 box
- (2) Carton dimensions : 545(L)x480(W)x485(H)mm
- (3) Weight : approximately 16.2 kg(60 modules per Carton).

Sea Transportation



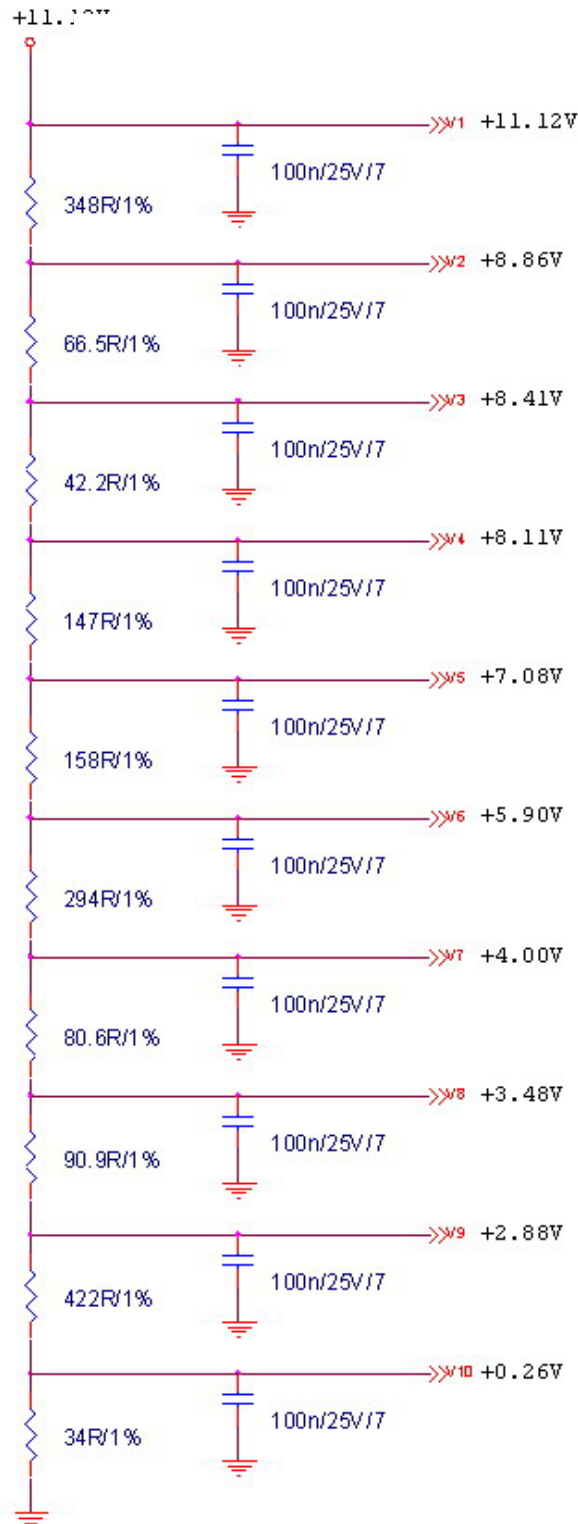
Air Transportation



11. APPLICATION NOTES

11.1 GAMMA CIRCUIT

| | |
|------|-------|
| AVDD | 11.60 |
| V1 | 11.12 |
| V2 | 8.86 |
| V3 | 8.41 |
| V4 | 8.11 |
| V5 | 7.08 |
| V6 | 5.90 |
| V7 | 4.00 |
| V8 | 3.48 |
| V9 | 2.88 |
| V10 | 0.26 |
| VCOM | 4.584 |



10. PRECAUTIONS

10.1 ASSEMBLY AND HANDLING PRECAUTIONS

- (1) Do not apply rough force such as bending or twisting to the module during assembly.
- (2) To assemble or install module into user's system can be only in clean working areas. The dust and oil may cause electrical short or worsen the polarizer.
- (3) It's not permitted to have pressure or impulse on the module because the LCD panel and Backlight will be damaged.
- (4) Always follow the correct power sequence when LCD module is connecting and operating. This can prevent damage to the CMOS LSI chips during latch-up.
- (5) Do not pull the I/F connector in or out while the module is operating.
- (6) Do not disassemble the module.
- (7) Use a soft dry cloth without chemicals for cleaning, because the surface of polarizer is very soft and easily scratched.
- (8) It is dangerous that moisture come into or contacted the LCD module, because moisture may damage LCD module when it is operating.
- (9) High temperature or humidity may reduce the performance of module. Please store LCD module within the specified storage conditions.
- (10) When ambient temperature is lower than 10°C may reduce the display quality. For example, the response time will become slowly, and the starting voltage of CCFL will be higher than room temperature.

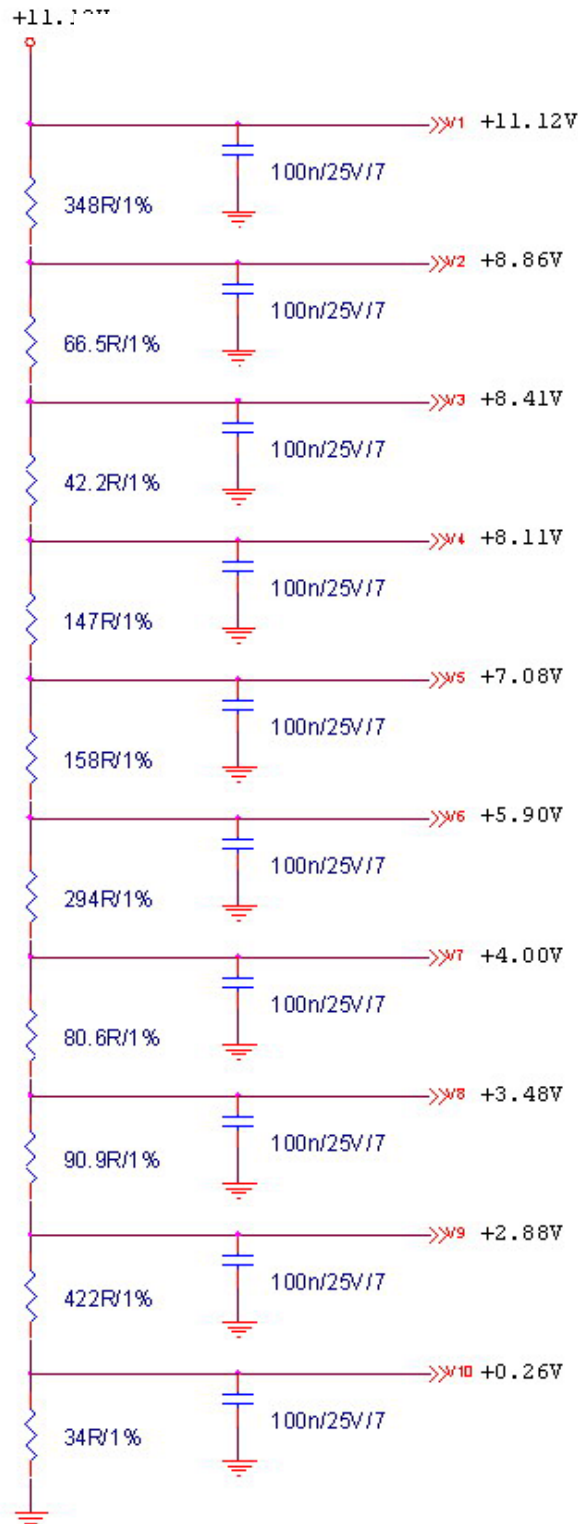
10.2 SAFETY PRECAUTIONS

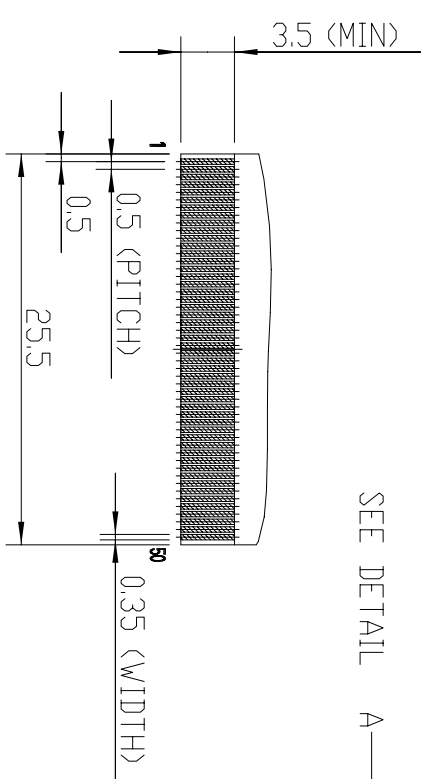
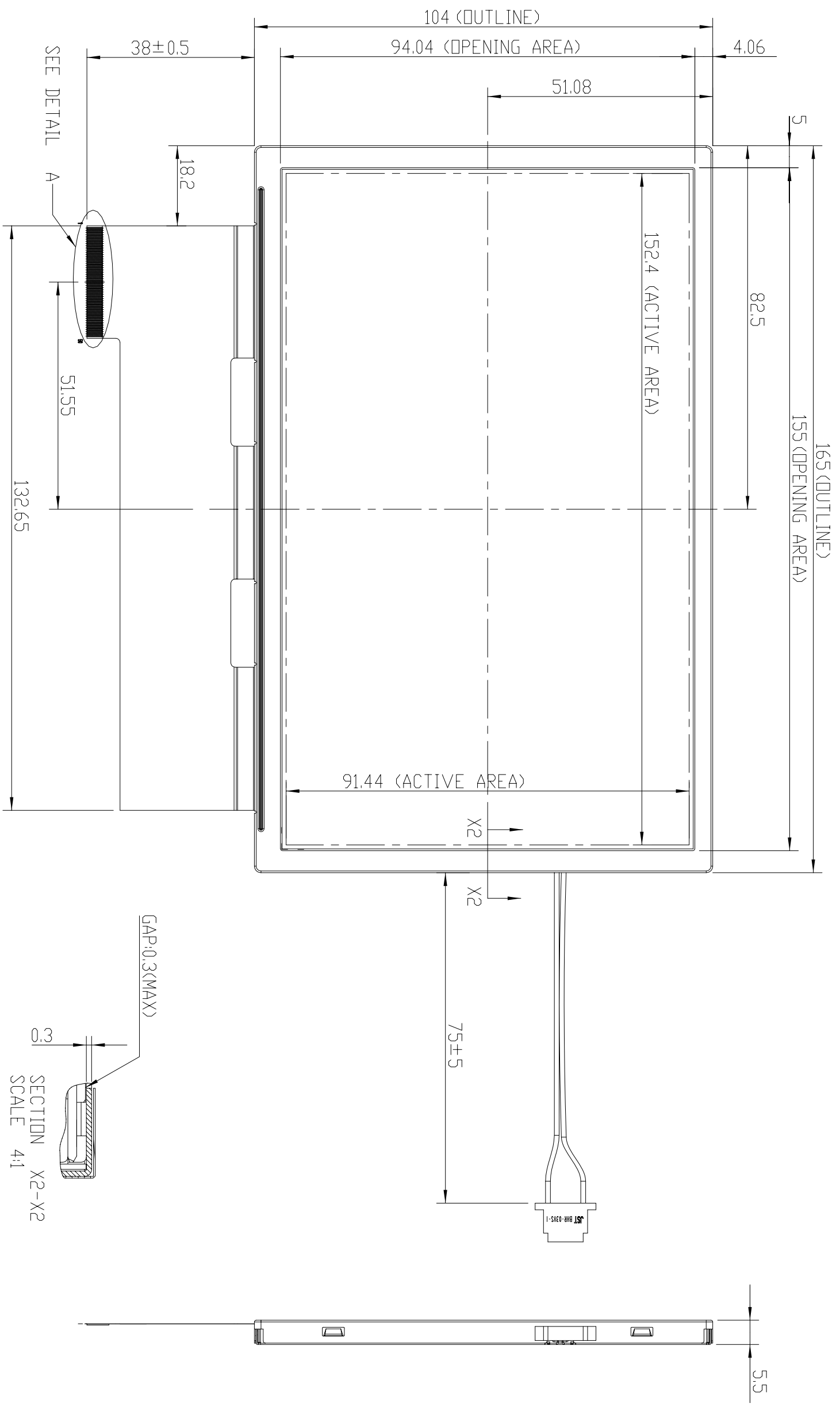
- (1) The startup voltage of Backlight is approximately 1000 Volts. It may cause electrical shock while assembling with inverter. Do not disassemble the module or insert anything into the Backlight unit.
- (2) If the liquid crystal material leaks from the panel, it should be kept away from the eyes or mouth. In case of contact with hands, skin or clothes, it has to be washed away thoroughly with soap.
- (3) After the module's end of life, it is not harmful in case of normal operation and storage.

11. APPLICATION NOTES

11.1 GAMMA CIRCUIT

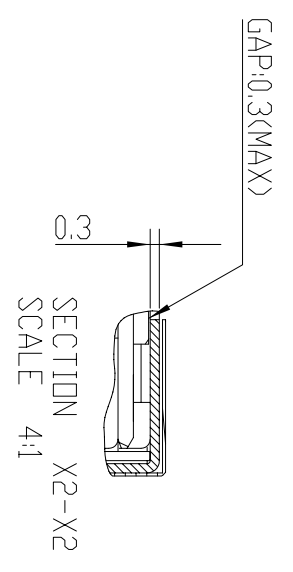
| | |
|------|-------|
| AVDD | 11.60 |
| V1 | 11.12 |
| V2 | 8.86 |
| V3 | 8.41 |
| V4 | 8.11 |
| V5 | 7.08 |
| V6 | 5.90 |
| V7 | 4.00 |
| V8 | 3.48 |
| V9 | 2.88 |
| V10 | 0.26 |
| VCOM | 4.584 |





DETAIL A
SCALE 2:1

- NOTES:
 1. OUTLINE TOLERANCE: ±0.3mm,
 2. LAMP CONNECTOR: BHR-03V-1(JST)
 3. FPC MATING CONNECTOR :
 FH12-50S-0.5SH(K55) (HIRROSE)



| | | | |
|----------|------------------------|------------------------|--------------|
| TITLE | ASSY_MODULE_G070Y1-T01 | | 2D REV. 1 |
| Approved | BILL_SHEU | Drawing No. G070141011 | 3D REV. 1,3+ |
| Checked | JEMY CHANG | Part No. TBD | |
| Drawer | TIGER_CHANG | Material TBD | |
| Designer | TIGER_CHANG | Date 23-Aug-2006 | Scale 1:1 |

| | | |
|-------|-------|----|
| Sheet | 1 / 2 | A3 |
| Unit | mm | |

DATA MODUL

| | | | | | | | | |
|-------------|---|---|---|---|---|---|---|---|
| Mark | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| Description | | | | | | | | |
| Date | | | | | | | | |
| Changed_By | | | | | | | | |
| Approved_By | | | | | | | | |
| ECN No. | | | | | | | | |
| Remark | | | | | | | | |

1 2 3 4 5 6 7 8

A

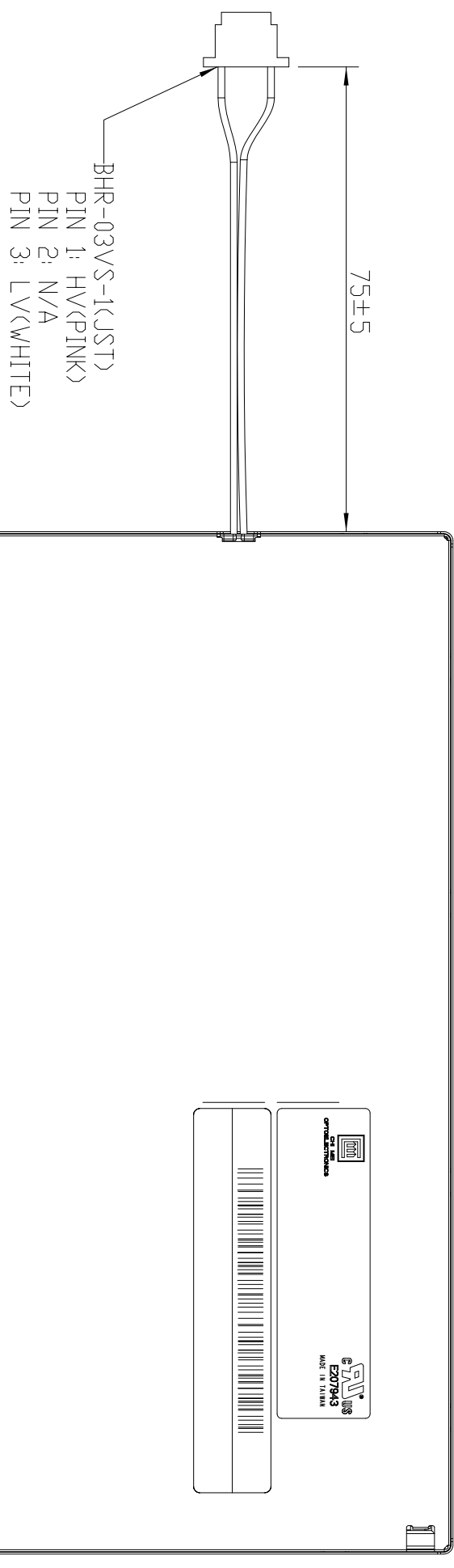
B

C

D

E

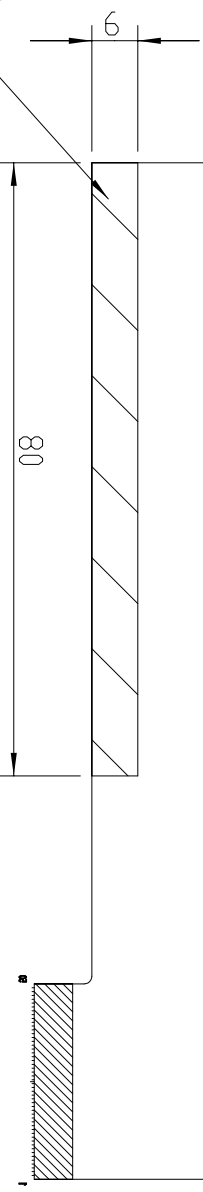
F



DOUBLE SIDED TAPE

75±5

BHR-03VS-1(JST)
 PIN 1: HV(PINK)
 PIN 2: N/A
 PIN 3: LV(WHITE)



| | | | | | |
|----------|------------------------|-------------|------------|---------|------|
| TITLE | ASSY_MODULE_G070Y1-T01 | | 2D REV. | 1 | |
| Approved | BILL_SHEU | Drawing No. | G070141011 | 3D REV. | 1,3+ |

| | | | |
|---------|-------------|----------|-----|
| Checked | JEMMY_CHANG | Part No. | TBD |
| Drawer | TIGER_CHANG | Material | TBD |

| | | | | | | | | |
|----------|-------------|------|-------------|-------|-----|-------|-------|----|
| Designer | TIGER_CHANG | Date | 23-Aug-2006 | Scale | 1:1 | Sheet | 2 / 2 | A3 |
|----------|-------------|------|-------------|-------|-----|-------|-------|----|

DATA MODUL

| | | | | | | | | | | | | | | |
|------|---|-------------|---|------|---|------------|---|-------------|---|---------|---|--------|---|---|
| Mark | 1 | Description | 2 | Date | 3 | Changed_By | 4 | Approved_By | 5 | ECN No. | 6 | Remark | 7 | 8 |
| | | | | | | | | | | | | | | |



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