# SPECIFICATION
# FOR
# APPROVAL

**( ◆ ) Preliminary Specification**
**( ) Final Specification**

| Title | **26" WXGA TFT LCD** |
|---|---|

| BUYER | General |
|---|---|
| MODEL | |

| SUPPLIER | **LG.Philips LCD CO., Ltd.** |
|---|---|
| *MODEL | **LC260WX2** |
| SUFFIX | **SLB2** |

*When you obtain standard approval,
please use the above model name without suffix

| APPROVED BY | SIGNATURE / DATE |
|---|---|
| / | |
| / | |
| / | |

Please return 1 copy for your confirmation with your signature and comments.

| APPROVED BY | SIGNATURE / DATE |
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# RECORD OF REVISIONS

| Revision No. | Date | Page | Description |
|---|---|---|---|
| Ver 0.0 | Feb.23, 2006 | | Preliminary Specification (First draft) |

## 1. General Description

The LC260WX2 is a Color Active Matrix Liquid Crystal Display with an integral External Electrode Fluorescent Lamp(EEFL) backlight system. The matrix employs a-Si Thin Film Transistor as the active element. It is a transmissive type display operating in the normally black mode. This TFT-LCD has a 26.0 inch diagonally measured active display area with WXGA resolution (768 vertical by 1366 horizontal pixel array). Each pixel is divided into Red,Green and Blue sub-pixels or dots which are arranged in vertical stripes. Gray scale or the luminance of the sub-pixel color is determined with a 8-bit gray scale signal for each dot, thus, presenting a palette of more than 16,7M(True) colors. The LC260WX2 has been designed to apply the LVDS interface. It is intended to support LCD TV, PC TV where high brightness, super wide viewing angle, high color gamut, high color depth, and fast response time are important.

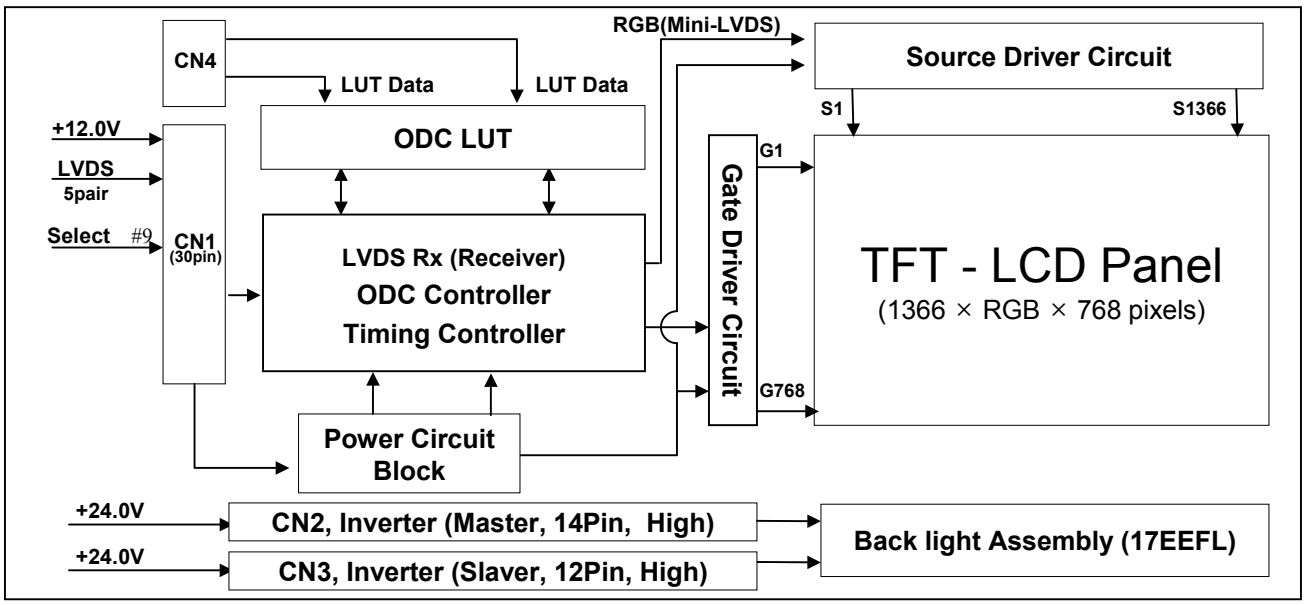



Figure 1. Block diagram

## General Features

| | |
|---|---|
| Active screen size | 26.005 inches(660.53mm) diagonal |
| Outline Dimension | 626(H) x 373(V) x 44.1(D) mm(Typ.) |
| Pixel Pitch | 140.5 um x 421.5 um x RGB |
| Pixel Format | 1366 horizontal by 768 vertical pixels. RGB stripe arrangement |
| Interface | LVDS 1port |
| Color depth | 8-bit, 16,777,216 colors |
| Luminance, white | 500 cd/m$^2$ ( Center 1 point, Typ. ) |
| Viewing Angle (CR>10) | Viewing Angle Free(R/L 178(Typ.), U/D 178(Typ.)) |
| Power Consumption | 3.5W(logic) 67.2W(Backlight) (Total 70.7W) |
| Weight | 5,000 g (Typ.) |
| Display operating mode | Transmissive mode, normally black |
| Surface treatments | Hard coating (3H), Anti-glare treatment of the front polarizer |

## 2. Absolute Maximum Ratings

Table 1. Absolute Maximum Ratings

| Parameter | Symbol | Value | | Unit | Note |
|---|---|---|---|---|---|
| | | Min | Max | | |
| Power Supply Input Voltage | VLCD | -0.3 | +14 | Vdc | At 25℃ |
| | VBL | +21.6 | +27 | Vdc | |
| On/Off Control Voltage | ON/OFF | -0.3 | +5.25 | Vdc | |
| Brightness Control Voltage | VBR-A | 0 | +3.3 | Vdc | |
| Operating Temperature | TOP | 0 | +40 | °C | 1 |
| Storage Temperature | TST | -20 | +50 | °C | 1 |
| Operating Ambient Humidity | HOP | 10 | 90 | %RH | 1 |
| Storage Humidity | HST | 10 | 90 | %RH | 1 |

Note :
1. Temperature and relative humidity range are shown in the figure below.
   Wet bulb temperature should be 39 °C Max., and no condensation.
2. Ambient illuminance should be more than 10 lux.

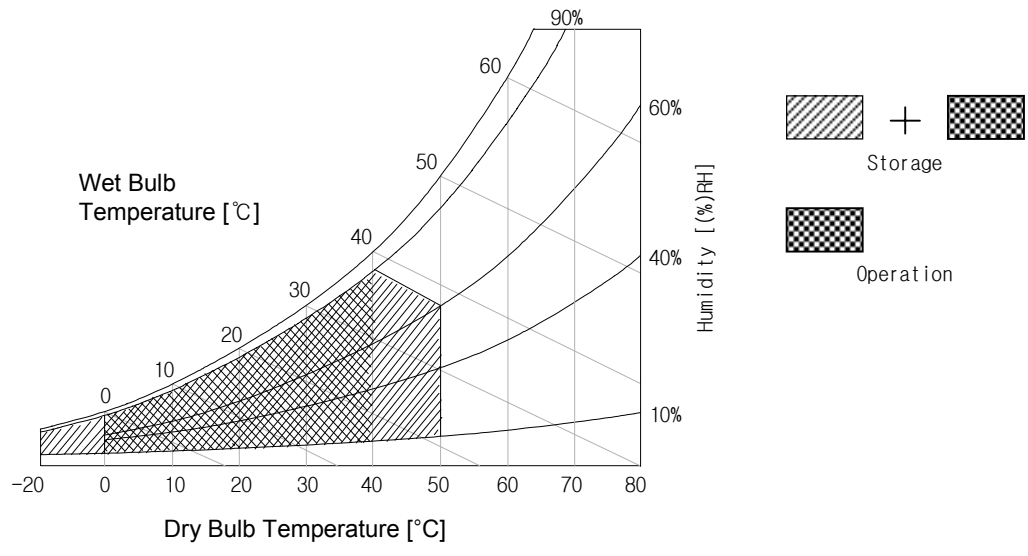



Figure 2. Temperature and relative humidity

## 3. Electrical Specifications

The LC260WX2 requires two power inputs. One is employed to power the LCD electronics and to drive the TFT array and liquid crystal. The second input power for the EEFL/Backlight, is to power the inverter.

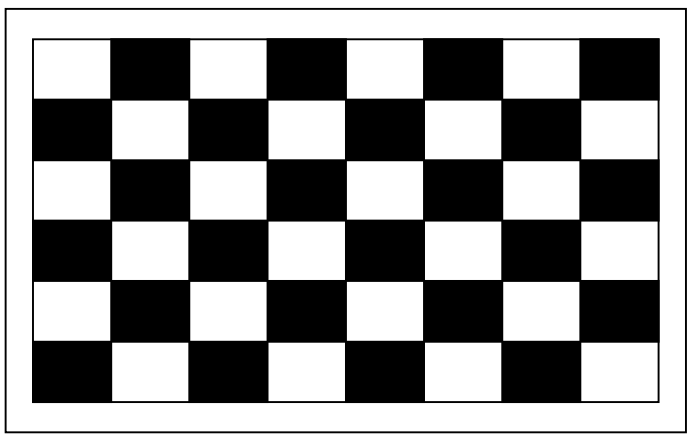
### 3-1. Electrical Characteristics

Table 2. Electrical Characteristics

| Parameter | Symbol | Value | | | Unit | Note |
|---|---|---|---|---|---|---|
| | | Min | Typ | Max | | |
| 1. Power for Panel: | | | | | | |
| Power Supply Input Voltage | $V_{LCD}$ | 11.4 | 12.0 | 12.6 | Vdc | |
| Power Supply Input Current | $I_{LCD}$ | - | 292 | 365 | mA | 1 |
| | | - | 360 | 450 | mA | 2 |
| Power Consumption | $P_{LCD}$ | - | 3.5 | 4.6 | Watt | 1 |
| Inrush Current ($V_{LCD}$ Input) | $I_{RUSH}$ | - | - | 3 | A | 3 |

Notes:

1. The specified current and power consumption are under the $V_{LCD}$=12V, 25°C, fV(frame frequency)=60Hz condition. Typical supply current is measured at the condition of 8 X 6 Mosaic pattern(white & black) shown in the [ Figure 3 ] is displayed.
2. The current is specified at the maximum current pattern.
3. The duration of rush current is about 2ms and rising time of power input is 1ms(min).



[ Figure 3 ] Mosaic pattern

## Table 3. Inverter Electrical Characteristics

| | Description | | Min | Typ | Max | Unit | Condition | Note |
|---|---|---|---|---|---|---|---|---|
| 1 | Input Voltage | VBL | 22.8 | 24.0 | 25.2 | Vdc | | |
| 2 | Input Current | IBL | - | 3.15 | 3.65 | A | ExtVbr-B = 100%<br>Vbr-A = MAX | 1, 3 |
| | | IBL | - | 2.8 | 3.3 | A | ExtVbr-B = 100%<br>Vbr-A = TYP | |
| 3 | Inrush Current | $I_{RUSH}$ | - | - | 5.0 | A | $V_{BL}$=24.0V<br>$V_{BR}$-A=MAX<br>$EXTV_{BR}$-B=100% | 6 |
| 4 | Input Power | PBL | - | 67.2 | 87.6 | W | | 1, 3 |
| 5 | ON/OFF Control | ON | 3.0 | - | 5.0 | Vdc | Lamp ON = High | |
| | | OFF | 0.0 | - | 0.8 | Vdc | Lamp OFF =Low | |
| 6 | Analog Dimming Control Voltage | Vbr-A | 0.0 | - | 3.3 | Vdc | | |
| 7 | Operating Frequency | FO | 64 | - | 68 | KHz | | |
| 8 | PWM Frequency | Fb | - | 150 | - | Hz | PAL | 7 |
| | | | - | 180 | - | Hz | NTSC | |
| 9 | PWM dimming Ratio | ExtVbr-B | 20 | - | 100 | % | Reference :<br>Onduty ratio of Output current | 5 |
| 10 | Frequency (PWM) (Burst mode) | f-B | 2.5 | - | 5.0 | $V_{DC}$ | High Level | |
| | | | 0.0 | - | 0.6 | $V_{DC}$ | Low Level | |
| 11 | Lamp Voltage (Output Voltage) | VOUT | 575 | 735 | 885 | $V_{RMS}$ | ExtVbr-B = 100%<br>Vbr-A = TYP | |
| 12 | Lamp Current | IO-MAX | 83 | 90 | 97 | $mA_{RMS}$ | ExtVbr-B = 100%<br>Vbr-A = MAX | |
| | | IO-TYP | 75 | 82 | 89 | $mA_{RMS}$ | ExtVbr-B = 100%<br>Vbr-A = TYP | |
| | | IO-MIN | 66 | 73 | 80 | $mA_{RMS}$ | ExtVbr-B = 100%<br>Vbr-A = MIN | |
| 13 | Output Power | POUT | - | 60.27 | - | W | ExtVbr-B = 100%<br>Vbr-A = TYP | |
| 14 | Lamp life time | | 50,000 | - | - | Unit | | 2 |

Notes :

1. The specified current and power consumption are under the typical supply Input voltage, 24.0V.
   The ripple voltage of the power supply input voltage is under 0.5 Vp-p.
   Inrush current of the power supply input current is under +10% of the typical current
2. Specified values are for a single lamp which is aligned horizontally.
   The life is determined as the time at which luminance of the lamp is 50% compared to that of initial value at the typical lamp current on condition of continuous operating at 25 ± 2°C.
   Specified value is when lamp is aligned horizontally.
3. Electrical characteristics are determined after the unit has been 'ON' and stable for approximately 2Hrs in a dark environment at 25 °C± 2°C.
4. The lamp life time for LCM is guaranteed minimum 50,000 hours when Vbr(Analog) and PWM(Burst) are maximum values.
5. Burst mode is controlled by TV system.
6. Rush current is determined at turning on after the unit has been 'OFF' for 2Hrs at 25 °C± 2°C.
7. Synchronize PWM by triple with Vsync signal of system.

## 3-2. Interface Connections

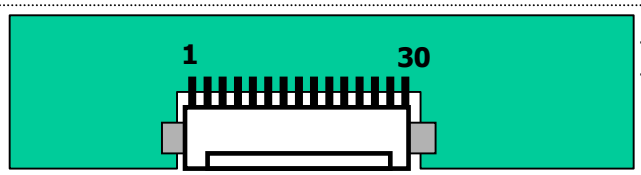
This LCD employs two kinds of interface connections. A 30 pin connector is used for LCD electronics and a 12pin connector is used for the integral backlight system.

### 3-2-1. Signal Interface

The LCD connector(CN1) : FI-X30SSL-HF (Manufactured by JAE) or Equivalent.
The pin configuration for the 30 pin connector is shown in the table below.

Table 4. 30Pin Connector pin configuration (For LCD Panel)

| Pin | Signal assignment | Note | Pin | Signal assignment | Note |
|---|---|---|---|---|---|
| 1 | $V_{LCD}$ (12V) | | 16 | LVDS SIGNAL CHANNEL 1+ | |
| 2 | $V_{LCD}$ (12V) | | 17 | GND | |
| 3 | $V_{LCD}$ (12V) | | 18 | LVDS SIGNAL CHANNEL 2- | |
| 4 | $V_{LCD}$ (12V) | | 19 | LVDS SIGNAL CHANNEL 2+ | |
| 5 | GND | | 20 | GND | |
| 6 | GND | | 21 | LVDS CLOCK C- | |
| 7 | GND | | 22 | LVDS CLOCK C+ | |
| 8 | GND | | 23 | GND | |
| 9 | Select | 1 | 24 | LVDS SIGNAL CHANNEL 3- | |
| 10 | GND | | 25 | LVDS SIGNAL CHANNEL 3+ | |
| 11 | GND | | 26 | GND | |
| 12 | LVDS SIGNAL CHANNEL 0- | | 27 | NC | |
| 13 | LVDS SIGNAL CHANNEL 0+ | | 28 | NC | |
| 14 | GND | | 29 | GND | |
| 15 | LVDS SIGNAL CHANNEL 1- | | 30 | AGP | |

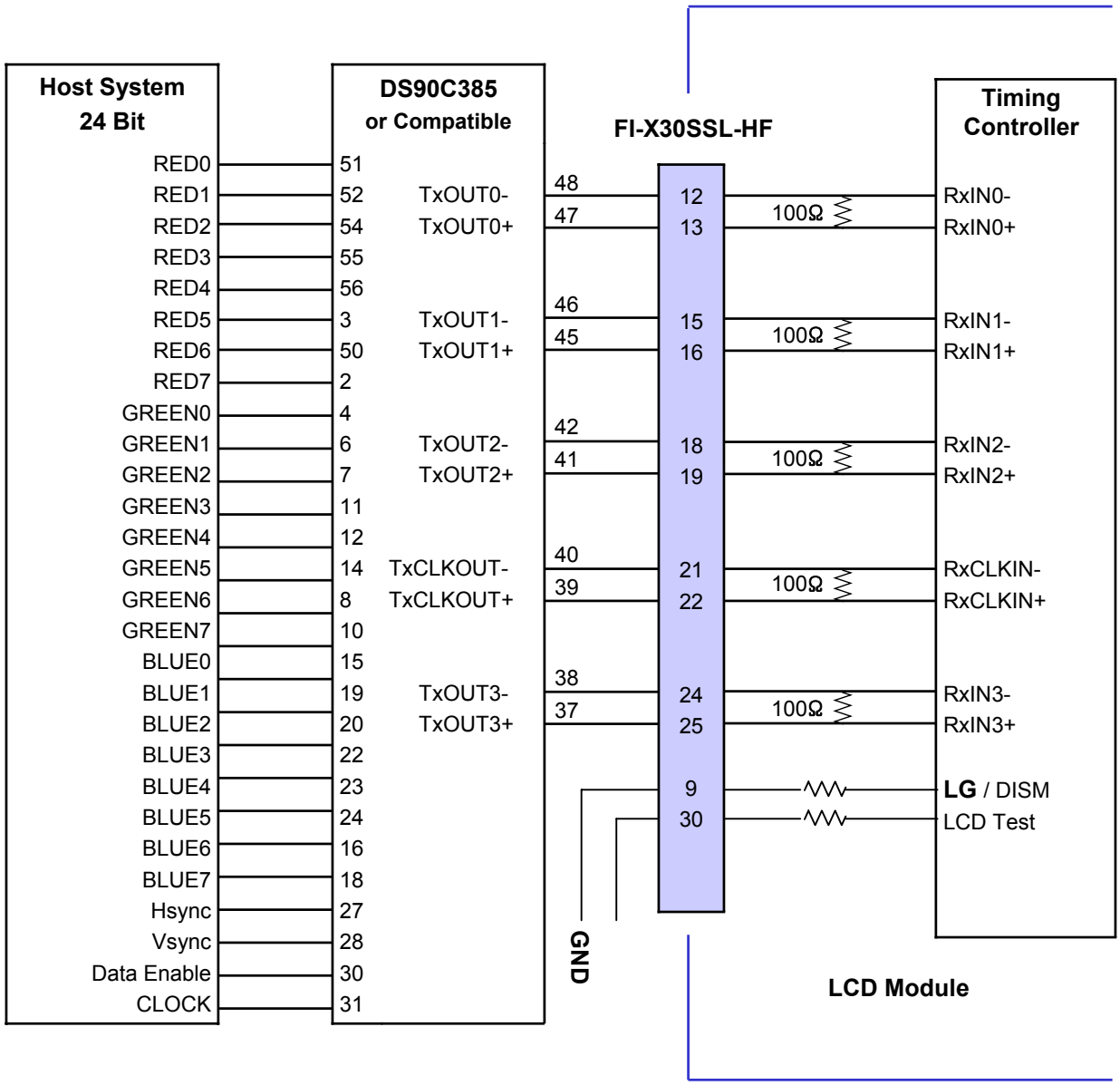


Rear view of LCM

- Part/No. : FI-X30SSL-HF(JAE)
- Mating connector : FI-30C2L
  (Manufactured by JAE) or compatible

Notes:
1. If pin9 is ground, interface format is "LG", and if pin9 is 3.3V, interface format is "DISM. (See page 9~10)
2. All GND(ground) pins should be connected together and should also be connected to the LCD's metal frame.
3. All power input pins should be connected together.
4. Input level of LVDS signal is based on the IEA664 standard.
5. If pin30 is 3.3V, no-signal is AGP pattern, and if pin30 is ground, no-signal is Black pattern

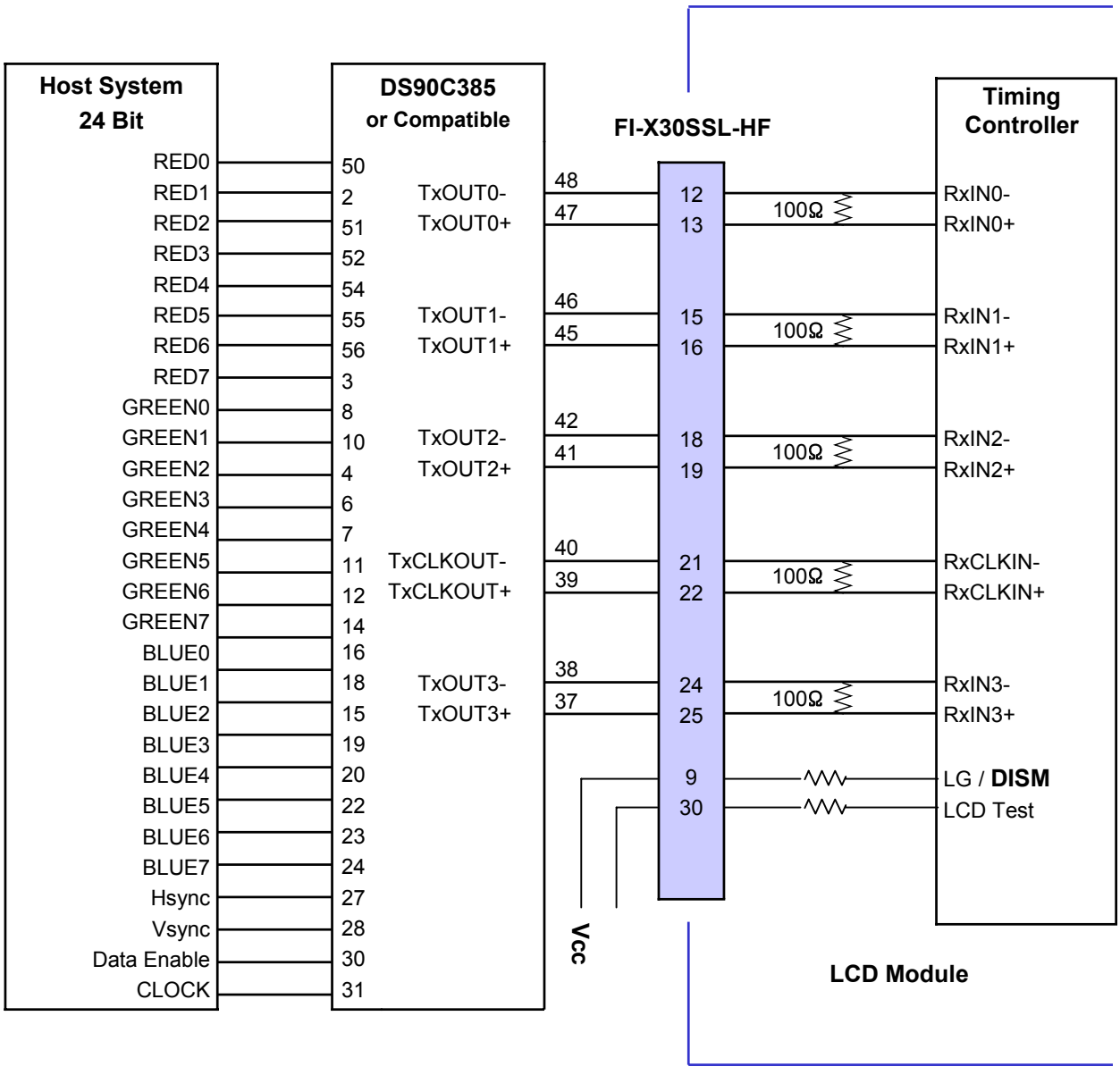
Table 5.
Required signal assignment for LVDS transmitter (Pin9 = "L" or open)




Note:

1. The LCD module uses a 100 Ohm(Ω) resistor between positive and negative lines of each receiver input.
2. Refer to LVDS transmitter data sheet for detail descriptions. (DS90C385 or Compatible)
3. '7' means MSB and '0' means LSB at R,G,B pixel data.

Table 6.
Required signal assignment for LVDS transmitter (Pin9 = "H")




Note:

1. The LCD module uses a 100 Ohm(Ω) resistor between positive and negative lines of each receiver input.
2. Refer to LVDS transmitter data sheet for detail descriptions. (DS90C385 or Compatible)
3. '7' means MSB and '0' means LSB at R,G,B pixel data.

### 3-2-2. Inverter Connector for Backlight

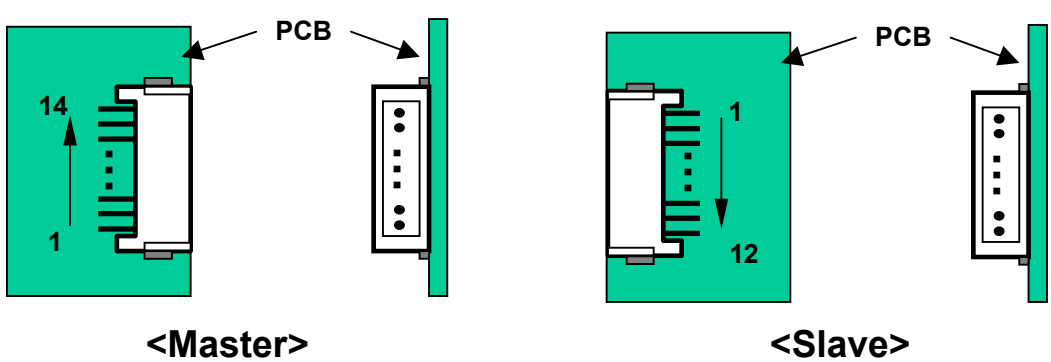
- Inverter Connector : S14B-PH-SM3 Side entry type (Manufactured by JST) or Equivalent
  S12B-PH-SM3 Side entry type (Manufactured by JST) or Equivalent
-Mating Connector : PHR-14(Manufactured by JST) or Equivalent
  PHR-12(Manufactured by JST) or Equivalent

Table 7. INVERTER CONNECTOR PIN CONFIGULATION

| Pin No | Symbol | Description | | Remarks |
|---|---|---|---|---|
| | | Master | Slave | |
| 1 | VBL | Power Supply +24V | Power Supply +24V | |
| 2 | VBL | Power Supply +24V | Power Supply +24V | |
| 3 | VBL | Power Supply +24V | Power Supply +24V | |
| 4 | VBL | Power Supply +24V | Power Supply +24V | |
| 5 | VBL | Power Supply +24V | Power Supply +24V | |
| 6 | GND | Backlight Ground | Backlight Ground | Note 1 |
| 7 | GND | Backlight Ground | Backlight Ground | |
| 8 | GND | Backlight Ground | Backlight Ground | |
| 9 | GND | Backlight Ground | Backlight Ground | |
| 10 | GND | Backlight Ground | Backlight Ground | |
| 11 | Vbr-A | Analog dimming | Don't care | Open for Typ. Lum. |
| 12 | VON/OFF | Backlight On/off Signal | Don't care | Open/High for BL On as default |
| 13 | ExtVbr-B | External PWM signal | | Open/High for Max. Lum. |
| 14 | GND | Signal Ground | | |

Notes : 1. Pin 1~10 should connect to master and slave connector
2. GND is connected to the LCD's metal frame.

## ◆ Rear view of LCM



## 3-3. Signal Timing Specifications

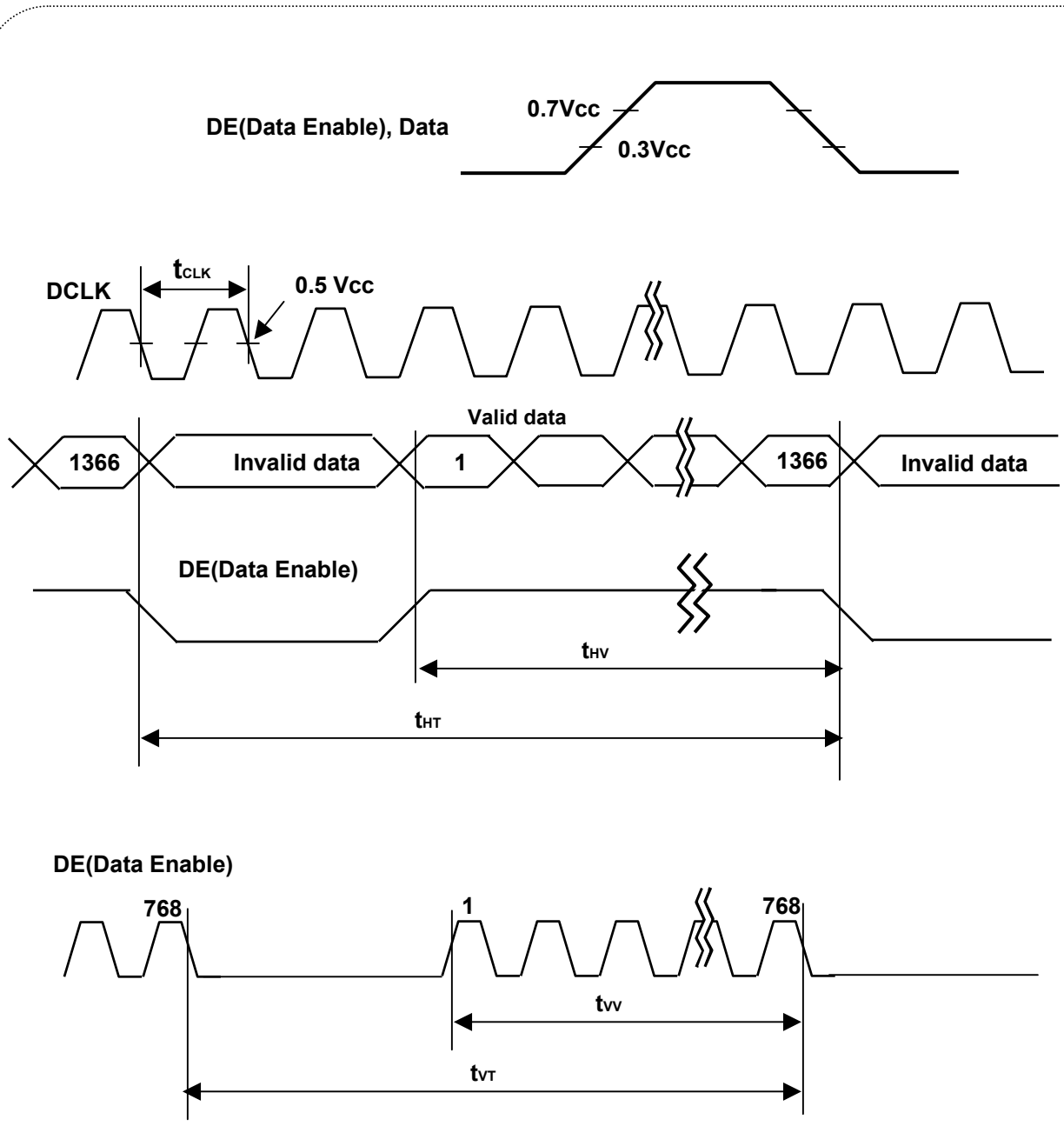
This is the signal timing required at the input of the LVDS transmitter. All of the interface signal timing should be satisfied with the following specifications for it's proper operation.

Table 8. Timing Table

| ITEM | | SYMBOL | Min. | Typ. | Max. | Unit | Note |
|---|---|---|---|---|---|---|---|
| Clock | Period | $t_{CLK}$ | 12.5 | 13.8 | 14.7 | ns | |
| | Frequency | $f_{CLK}$ | 68 | 72.3 | 80 | MHz | |
| Hsync | Frequency | $f_H$ | 45 | 47.4 | 50 | KHZ | |
| | Display Valid | $t_{HV}$ | 1366 | 1366 | 1366 | Clks | |
| | Blank | $t_{HT}$-$t_{HV}$ | 90 | 162 | 410 | Clks | |
| | Total | $t_{HT}$ | 1456 | 1528 | 1776 | Clks | |
| Vsync | Frequency | $f_V$ | 47 | 60 | 63 | HZ | PAL : 47~53Hz, NTSC : 57~63Hz |
| | Display Valid | $t_{VV}$ | 768 | 768 | 768 | Lines | |
| | Blank | $t_{VT}$-$t_{VV}$ | 8 | 22 | 295 | Lines | |
| | Total | $t_{VT}$ | 776 | 790 | 1063 | Lines | |

Notes:
1. The performance of the electro-optical characteristics are may be influenced by variance of the vertical refresh rates.
2. Above timing table is only valid for DE Mode.

## 3-4. Signal Timing Waveforms



## 3-5. Color Input Data Reference

The brightness of each primary color (red,green and blue) is based on the 8-bit gray scale data input for the color ; the higher the binary input, the brighter the color.
The table below provides a reference for color versus data input.

Table 9. Color Data Reference

| Color | | Input Color Data | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Red | | | | | | | | Green | | | | | | | | Blue | | | | | | | |
| | | MSB | | | | | | | LSB | MSB | | | | | | | LSB | MSB | | | | | | | LSB |
| | | R7 | R6 | R5 | R4 | R3 | R2 | R1 | R0 | G7 | G6 | G5 | G4 | G3 | G2 | G1 | G0 | B7 | B6 | B5 | B4 | B3 | B2 | B1 | B0 |
| Basic Color | Black | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Red (255) | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Green (255) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Blue (255) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| | Cyan | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| | Magenta | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| | Yellow | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 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 | 1 | 1 | 1 | 1 | 1 | 1 |
| Red | Red(000) Dark | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Red(001) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Red(002) | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | - - - - - - - - - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | - - - - - - - - - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | Red(253) | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Red(254) | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Red(255) Bright | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Green | Green(000) Dark | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Green(001) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Green(002) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | - - - - - - - - - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | - - - - - - - - - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | Green(253) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Green(254) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Green(255) Bright | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Blue | Blue(000) Dark | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Blue(001) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| | Blue(002) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| | - - - - - - - - - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | - - - - - - - - - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | Blue(253) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 |
| | Blue(254) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 |
| | Blue(255) Bright | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |

## 3-6. Power Sequence

### 3-6-1. Sequence for LCD Module

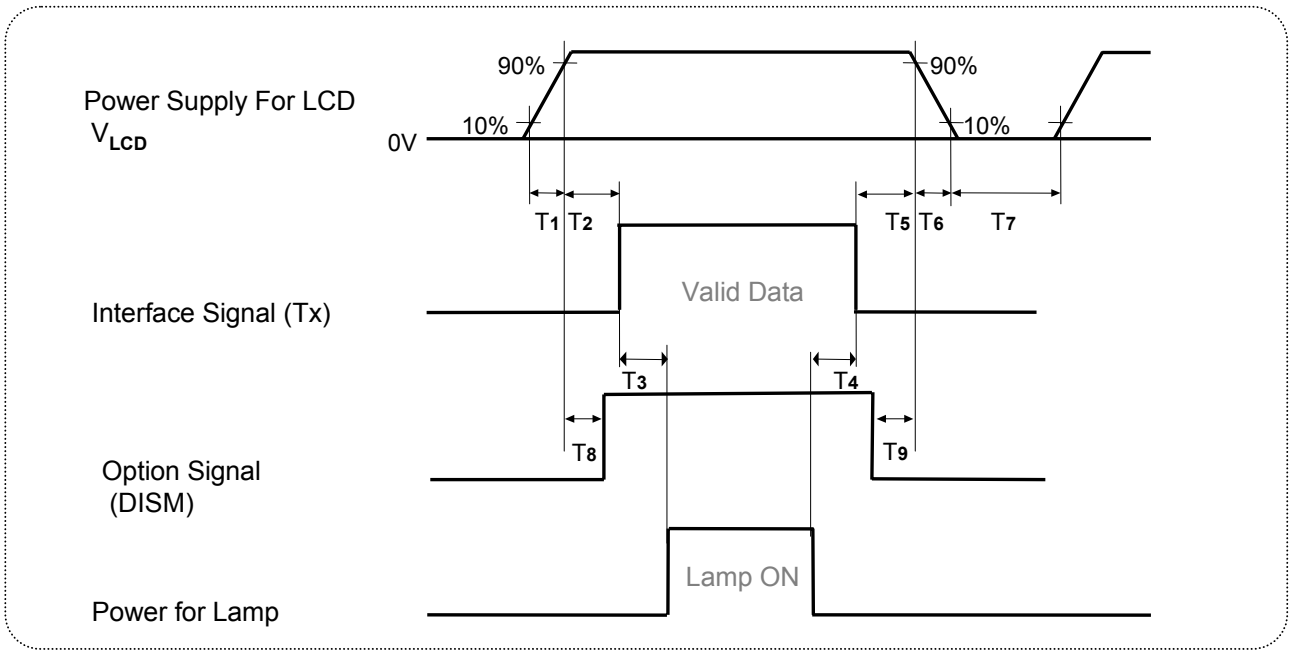


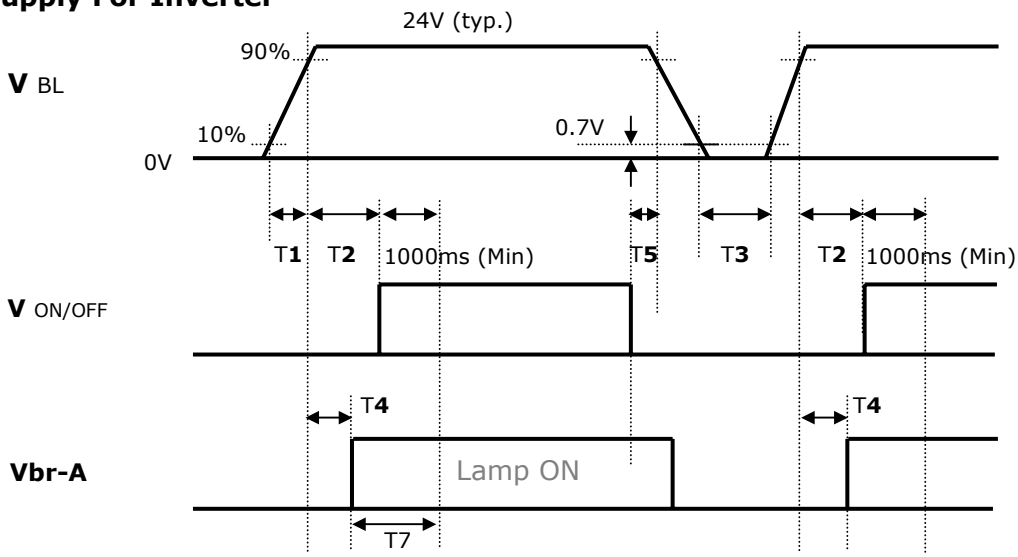

Table 10. Power Sequence for LCM

| Parameter | Value | | | Unit |
|---|---|---|---|---|
| | Min | Typ | Max | |
| T1 | 0.01 | - | 20 | ms |
| T2 | 0.01 | - | 50 | ms |
| T3 | 200 | - | - | ms |
| T4 | 200 | - | - | ms |
| T5 | 0.5 | - | 50 | ms |
| T6 | - | - | 300 | ms |
| T7 | 2.0 | - | - | s |
| T8 | 0 < T8 < T2 | | | ms |
| T9 | 0 < T9 < T5 | | | ms |

Note : 1. Please avoid floating state of interface signal at invalid period.
2. When the interface signal is invalid, be sure to pull down the power supply $V_{LCD}$ to 0V.
3. The case when the T2/T5 exceed maximum specification, it operates protection pattern(Black pattern) till valid signal inputted. There is no reliability problem.
4. The T3/T4 is recommended value, the case when failed to meet a minimum specification, abnormal display would be shown. There is no reliability problem.

### 3-6-2. Sequence for Inverter

**Power Supply For Inverter**




**Ext Vbr-B** : 1. Lamp ON at PWM Rising Edge and Lamp OFF at PWM Falling Edge.
2. EXTVBR-B has Same sequence with Vbr-A

### 3-6-3. Deep condition for Inverter

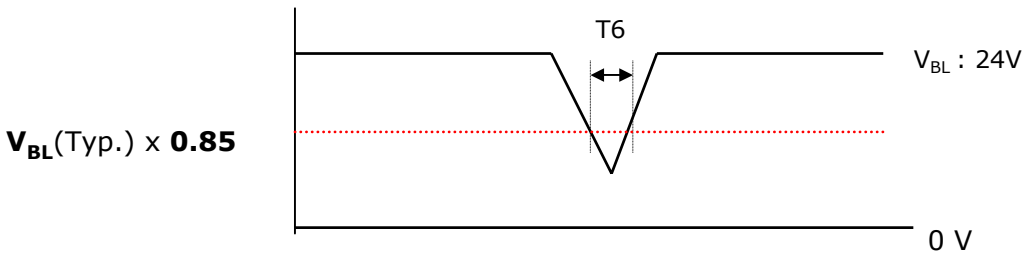


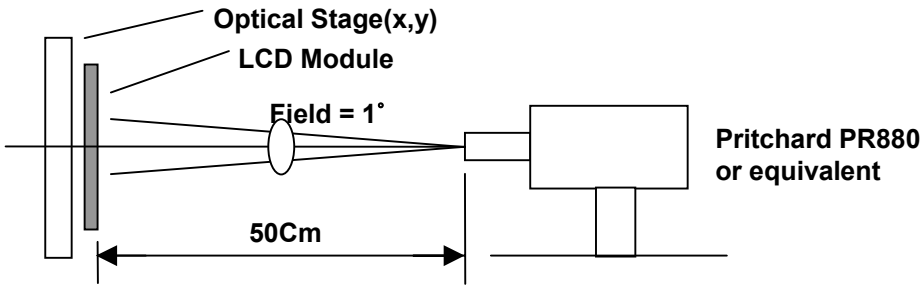

Table 11. Power Sequence for Inverter

| Parameter | Values | | | Units | Remarks |
|---|---|---|---|---|---|
| | Min | Typ | Max | | |
| T1 | 20 | - | - | ms | 1 |
| T2 | 500 | - | - | ms | |
| T3 | 200 | - | - | ms | 2 |
| T4 | 0 | | - | ms | 4, 5 |
| T5 | 10 | - | - | ms | |
| T6 | - | - | 10 | ms | $V_{BL}$(Typ) x **0.85** |
| T7 | 1000 | - | - | ms | |

Note : 1. T1 describes rising time of 0V to 24V and is not applied at restarting time.
2. When the Inverter is shut-down by ARC protection, T3 need 3.3sec
3. When $V_{BL}$ (24V) is supplied always, there is no reliability problem.
4. T4(max) is less than T2.
5. In T7 section, ExtVbr-B should be duty 100% and Vbr-A is recommended 1.65V.

## 4. Optical Specification

Optical characteristics are determined after the unit has been 'ON' for 30Min in a dark environment at 25±2°C. The values specified are at an approximate distance 50cm from the LCD surface at a viewing angle of Φ and θ equal to 0 °.
FIG. 4 presents additional information concerning the measurement equipment and method.




[Figure 4] Optical characteristic measurement equipment and method

Table 12. Optical characteristics (Ta=25±2°C, $V_{LCD}$=12V, $f_V$=60Hz, CLK=72.3MHz,Vbr=1.65V)

| Parameter | | Symbol | Value | | | Unit | Note |
|---|---|---|---|---|---|---|---|
| | | | Min | Typ | Max | | |
| Contrast Ratio | | CR | 500 | 700 | | | 1 |
| Surface Luminance, white | | $L_{WH}$ | 400 | 500 | | cd/m$^2$ | 2 |
| Luminance Variation | | $\delta_{WHITE}$ | | - | 1.3 | | 3 |
| Response Time | Rise Time | TrR | | 9 | 16 | ms | |
| | Decay Time | TrD | | 9 | 16 | ms | |
| | Gray to Gray | | | 8 | 16 | ms | 4 |
| Color Coordinates | | | | | | | |
| Color Coordinates [CIE 1931] | RED | RX | Typ – 0.03 | 0.630 | Typ +0.03 | | |
| | | RY | | 0.338 | | | |
| | GREEN | GX | | 0.283 | | | |
| | | GY | | 0.607 | | | |
| | BLUE | BX | | 0.147 | | | |
| | | BY | | 0.064 | | | |
| | WHITE | WX | | 0.275 | | | |
| | | WY | | 0.279 | | | |
| Viewing Angle (CR>10) | | | | | | | |
| x axis, right(ϕ=0°) | | θr | 85 | 89 | - | degree | 5 |
| x axis, left (ϕ=180°) | | θl | 85 | 89 | - | | |
| y axis, up (ϕ=90°) | | θu | 85 | 89 | - | | |
| y axis, down (ϕ=270°) | | θd | 85 | 89 | - | | |
| Gray scale | | | | 2.2 | | | 6 |

Note :

1. Contrast ratio(CR) is defined mathematically as :

$$\text{Contrast ratio} = \frac{\text{Surface luminance with all white pixels}}{\text{Surface luminance with all black pixels}}$$

It is measured at center point(1)

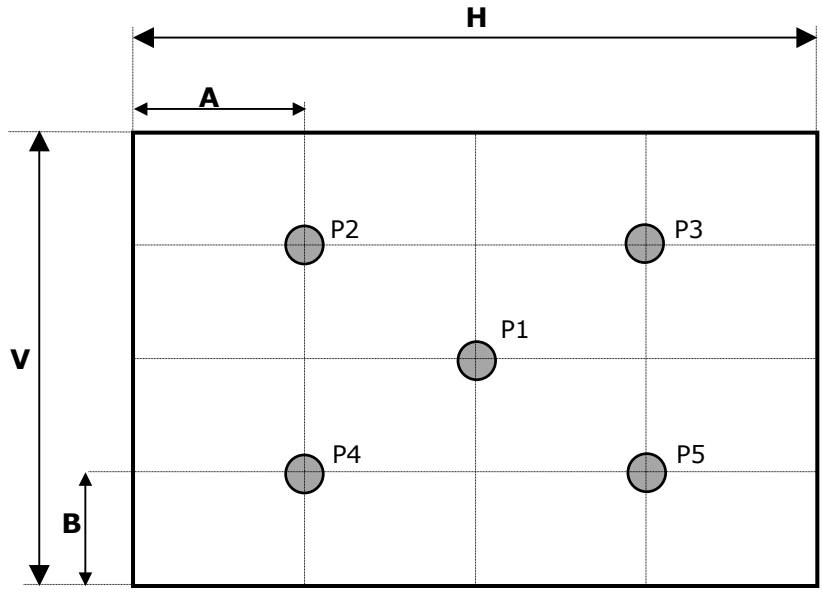
2. Surface luminance($L_{WH)}$ is luminance value at center point (P1) across the LCD surface 50cm from the surface with all pixels displaying white.
For more information see FIG 5.

3. The variation in surface luminance , $\delta_{WHITE}$ is defined as

$$\delta \text{ WHITE} = \text{Maximum (P1,P2, .....,P5)} / \text{ Minimum (P1,P2, .....,P5)}$$

For more information see [ Figure 5 ].

<Measuring point for surface luminance and luminance variation>




A : H / 4 mm
B : V / 4 mm
H : 575.769 mm
V : 323.712mm
@ H X V : Active Area

Figure 5. Luminance measuring point

4. Response time is defined as the following figure and shall be measured by switching the input signal for "Gray(N)" and "Gray(M)".

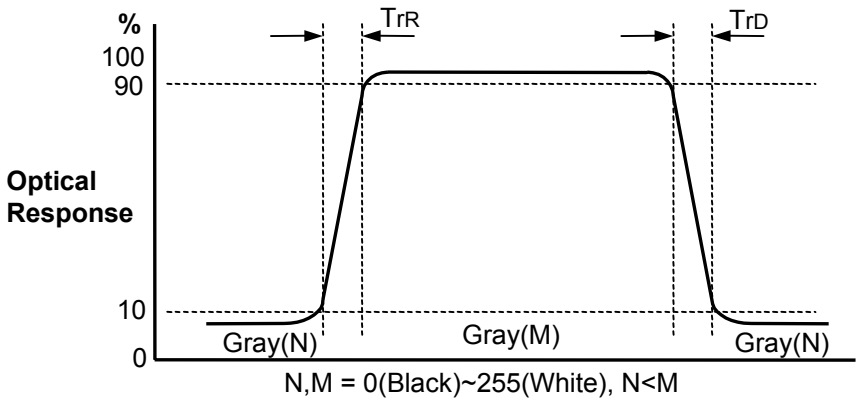



Figure 6. Response time

5. Viewing angle is the angle at which the contrast ratio is greater than 10. The angles are determined for the horizontal or x axis and the vertical or y axis with respect to the z axis which is normal to the LCD surface. For more information see Figure 7 .

<Dimension of viewing angle range>

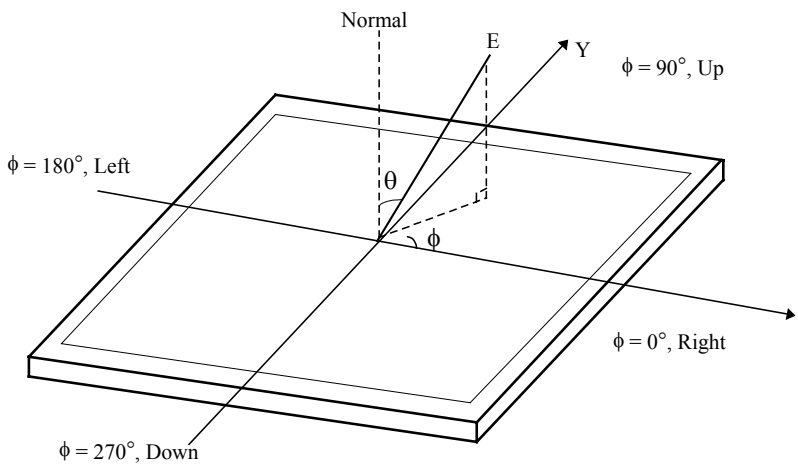



Figure 7. Viewing angle

6. Gray scale specification

Table 13. Gray scale

| Gray Level | Luminance [%] (Typ) |
|---|---|
| L0 | 0.15 |
| L15 | 0.27 |
| L31 | 1.00 |
| L47 | 2.40 |
| L63 | 4.60 |
| L79 | 7.60 |
| L95 | 11.4 |
| L111 | 16.0 |
| L127 | 21.6 |
| L143 | 28.0 |
| L159 | 35.4 |
| L175 | 43.7 |
| L191 | 53.0 |
| L207 | 63.2 |
| L223 | 74.5 |
| L239 | 88.0 |
| L255 | 100 |

## 5. Mechanical Characteristics

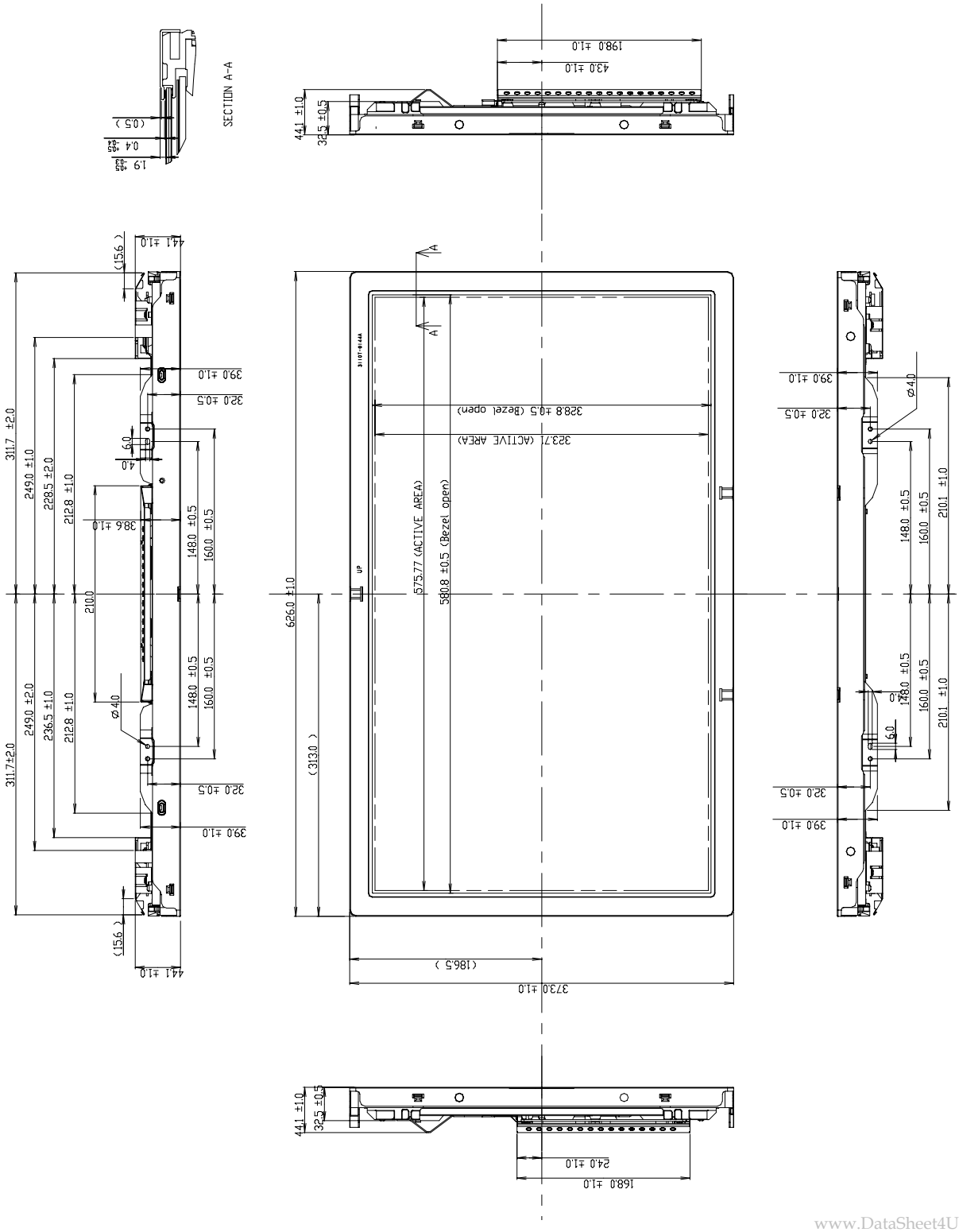
Table 14. provides general mechanical characteristics for the model LC260WX2. In addition, the figures in the next page are detailed mechanical drawing of the LCD.

Table 14. Mechanical characteristics

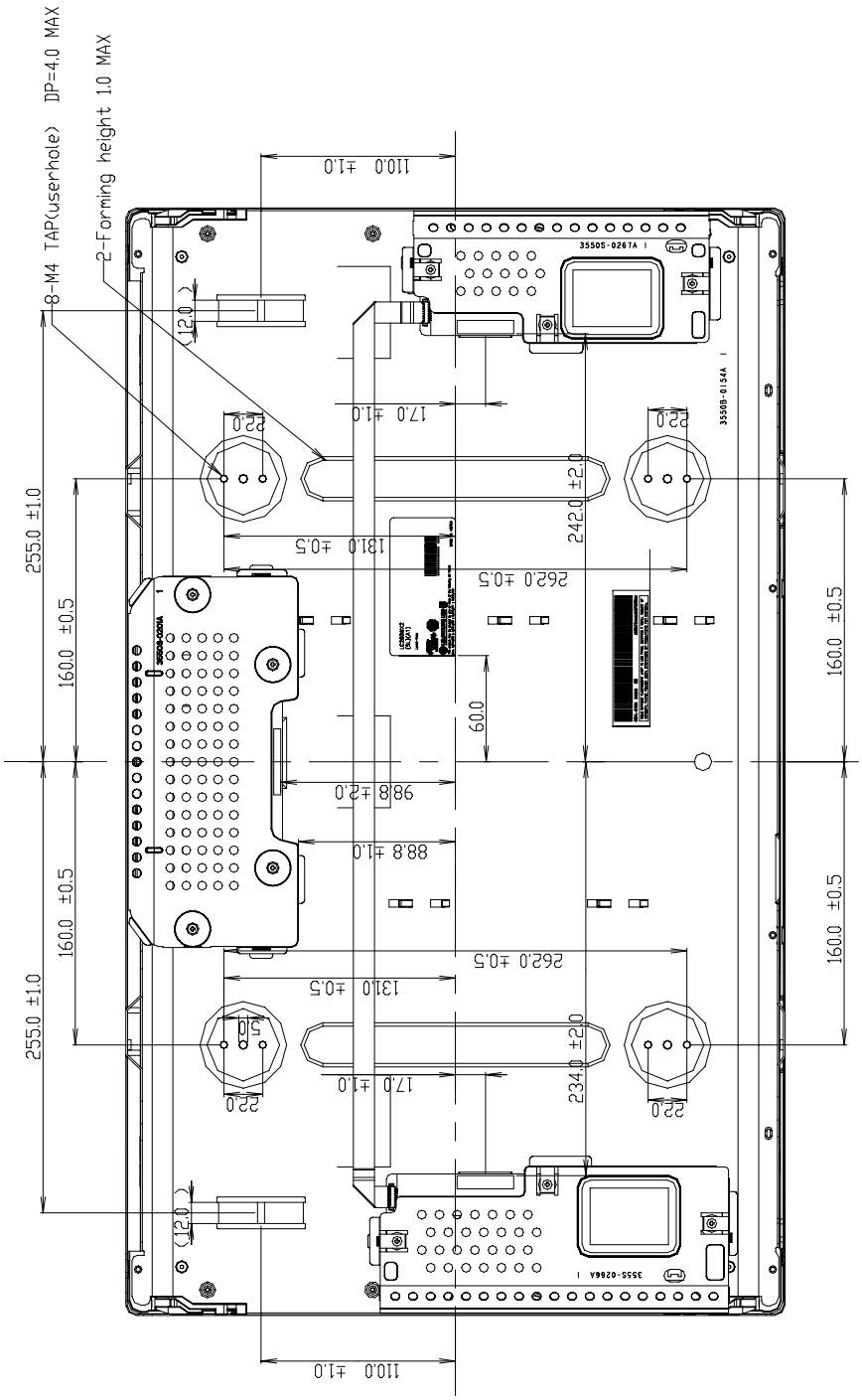
| | | |
|---|---|---|
| Outline Dimension | Horizontal | 626 mm |
| | Vertical | 373 mm |
| | Depth | 44.1 mm |
| Bezel Area | Horizontal | 580.8mm |
| | Vertical | 328.8mm |
| Active Display Area | Horizontal | 575.769 mm |
| | Vertical | 323.712 mm |
| Weight | 5000 g (Typ.), 5200 g (Max.) | |
| Surface Treatment | Hard coating(3H)<br>Anti-glare treatment of the front polarizer | |

Note : Please refer to a mechanic drawing in terms of tolerance at the next page.

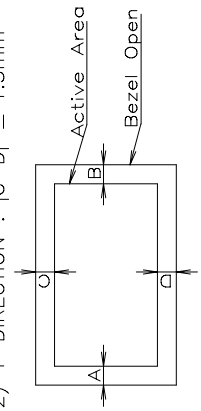
<FRONT VIEW>



<REAR VIEW>




NOTES
1. UNSPECIFIED TOLERANCES ARE ±0.5mm
2. TILT AND A PARTIAL DISPOSITION TOLERANCE OF DISPLAY AREA ARE AS FOLLOW
   1) X-DIRECTION : |A−B| ≤ 1.5mm
   2) Y-DIRECTION : |C−D| ≤ 1.5mm



## 6. Reliability

Table 15. ENVIRONMENT TEST CONDITION

| No. | Test Item | Condition |
|---|---|---|
| 1 | High temperature storage test | Ta= 50°C 240h |
| 2 | Low temperature storage test | Ta= -20°C 240h |
| 3 | High temperature operation test | Ta= 50°C 50%RH 240h |
| 4 | Low temperature operation test | Ta= 0°C 240h |
| 5 | Vibration test<br>(non-operating) | Wave form : random<br>Vibration level : 1.0G RMS<br>Bandwidth : 10-500Hz<br>Duration : X,Y,Z, 10 min<br>One time each direction |
| 6 | Shock test<br>(non-operating) | Shock level : 100G<br>Waveform : half sine wave, 2ms<br>Direction : ±X, ±Y, ±Z<br>One time each direction |
| 7 | Humidity condition Operation | Ta= 40 °C, 90%RH |
| 8 | Altitude operating<br>storage / shipment | 0 - 14,000 feet(4267.2m)<br>0 - 40,000 feet(12192m) |

# 7. International Standards

## 7-1. Safety

a) UL 60950-1:2003, First Edition, Underwriters Laboratories, Inc.,
Standard for Safety of Information Technology Equipment.
b) CAN/CSA C22.2, No. 60950-1-03 1st Ed. April 1, 2003, Canadian Standards Association,
Standard for Safety of Information Technology Equipment.
c) EN 60950-1:2001, First Edition,
European Committee for Electrotechnical Standardization(CENELEC)
European Standard for Safety of Information Technology Equipment.

## 7-2. EMC

a) ANSI C63.4 "Methods of Measurement of Radio-Noise Emissions from
Low-Voltage Electrical and Electrical Equipment in the Range of 9kHZ to 40GHz."
American National Standards Institute(ANSI), 1992
b) C.I.S.P.R. "Limits and Methods of Measurement of Radio Interface Characteristics of Information
Technology Equipment." International Special Committee on Radio Interference.
c) EN 55022 "Limits and Methods of Measurement of Radio Interface Characteristics of Information
Technology Equipment."
European Committee for Electrotechnical Standardization.(CENELEC), 1998( Including A1: 2000 )

# 8. Packing

## 8-1. Designation of Lot Mark

| A | B | C | D | E | F | G | H | I | J | K | L | M |
|---|---|---|---|---|---|---|---|---|---|---|---|---|

A,B,C : SIZE(INCH)
D : YEAR
E : MONTH
F : FACTORY CODE
G : ASSEMBLY CODE
H ~ M : SERIAL NO.

Note

1. YEAR

| Year | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 |
|---|---|---|---|---|---|---|---|---|---|---|
| Mark | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 0 |

2. MONTH

| Month | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mark | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | A | B | C |

3. FACTORY CODE

| Factory Code | LPL Gumi | LPL Nanjing | HEESUNG |
|---|---|---|---|
| Mark | K | C | D |

4. SERIAL NO.

| Mark | 100001~199999, 200001~299999, 300001~399999, …., A00001~A99999, ….., Z00001~Z99999 |
|---|---|

b) Location of Lot Mark

Serial No. is printed on the label. The label is attached to the backside of the LCD module.
This is subject to change without prior notice.

## 8-2. Packing Form

a) Package quantity in one box : 6 pcs

b) Box size : 754mm(W) X 508mm(D) X 498mm(H)

# 9. Precautions

Please pay attention to the following when you use this TFT LCD module.

## 9-1. Mounting Precautions

(1) You must mount a module using holes arranged in rear and side.
(2) You should consider the mounting structure so that uneven force(ex. twisted stress) is not applied to the module. And the case on which a module is mounted should have sufficient strength so that external force is not transmitted directly to the module.
(3) Please attach a transparent protective plate to the surface in order to protect the polarizer. Transparent protective plate should have sufficient strength in order to the resist external force.
(4) You should adopt radiation structure to satisfy the temperature specification.
(5) Acetic acid type and chlorine type materials for the cover case are not describe because the former generates corrosive gas of attacking the polarizer at high temperature and the latter causes circuit break by electro-chemical reaction.
(6) Do not touch, push or rub the exposed polarizers with glass, tweezers or anything harder than HB pencil lead. And please do not rub with dust clothes with chemical treatment. Do not touch the surface of polarizer with bare hand or greasy cloth. (Some cosmetics are determined to the polarizer.)
(7) When the surface becomes dusty, please wipe gently with absorbent cotton or other soft materials like chamois soaks with petroleum benzine. Normal-hexane is recommended for cleaning the adhesives used to attach front / rear polarizers. Do not use acetone, toluene and alcohol because they cause chemical damage to the polarizer.
(8) Wipe off saliva or water drops as soon as possible. Their long time contact with polarizer causes deformations and color fading.
(9) Do not open the case because inside circuits do not have sufficient strength.

## 9-2. Operating Precautions

(1) The spike noise causes the mis-operation of circuits. It should be lower than following voltage : V=±200mV(Over and under shoot voltage)
(2) Response time depends on the temperature.(In lower temperature, it becomes longer.)
(3) Brightness depends on the temperature. (In lower temperature, it becomes lower.) And in lower temperature, response time(required time that brightness is stable after turned on)becomes longer.
(4) Be careful for condensation at sudden temperature change. Condensation makes damage to polarizer or electrical contacted parts. And after fading condensation, smear or spot will occur.
(5) When fixed patterns are displayed for a long time, remnant image is likely to occur.
(6) Module has high frequency circuits. Sufficient suppression to the electromagnetic interference shall be done by system manufacturers. Grounding and shielding methods may be important to minimized the interference.
(7) Please do not give any mechanical and/or acoustical impact to LCM. Otherwise, LCM can not be operated its full characteristics perfectly.
(8) A screw which is fastened up the steels should be a machine screw (if not, it causes metal foreign material and deals LCM a fatal blow)
(9) Please do not set LCD on its edge.

## 9-3. Electrostatic Discharge Control

Since a module is composed of electronic circuits, it is not strong to electrostatic discharge. Make certain that treatment persons are connected to ground through wrist band etc. And don't touch interface pin directly.

## 9-4. Precautions for Strong Light Exposure

Strong light exposure causes degradation of polarizer and color filter.

## 9-5. Storage

When storing modules as spares for a long time, the following precautions are necessary.
(1) Store them in a dark place. Do not expose the module to sunlight or fluorescent light. Keep the temperature between 5°C and 35°C at normal humidity.
(2) The polarizer surface should not come in contact with any other object.
It is recommended that they be stored in the container in which they were shipped.

## 9-6. Handling Precautions for Protection Film

(1) The protection film is attached to the bezel with a small masking tape.
When the protection film is peeled off, static electricity is generated between the film and polarizer.
This should be peeled off slowly and carefully by people who are electrically grounded and with well ion-blown equipment or in such a condition, etc.
(2) When the module with protection film attached is stored for a long time, sometimes there remains a very small amount of glue still on the Bezel after the protection film is peeled off.
(3) You can remove the glue easily. When the glue remains on the Bezel or its vestige is recognized,
please wipe them off with absorbent cotton waste or other soft material like chamois soaked with normal-hexane.