

# 0SPECIFICATION

[     ] Preliminary Specification

[   ✓   ] Final Specification

**Description**
**6.5" 640xRGBx480 TFT-LCD Module**
**Part Number**
**P0650VGF1MA00**

|            |                                                                    |               |           |
|------------|--------------------------------------------------------------------|---------------|-----------|
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\* This cover page is for your Comments and Signatures back to TIANMA.

## REVISION HISTORY

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## 1. Summary

### 1.1 General Description

This is a 6.5 inch a-Si TFT-LCD module with Normal- White technology. It is composed of a TFT-LCD panel, a driver circuit, PCB, and a LED backlight unit.

### 1.2 Features

- Ultra-wide viewing angle (Super Fine TFT (SFT) )
- High luminance
- 100Khrs Long LED life time
- Wide temperature range
- Interface: 1 port LVDS
- Without LED driver
- Anti- vibration
- AG Surface treatment
- Acquisition product for UL62368-1/CSA C22.2 No.62368-1-03 (File number: E170632)
- Compliant with the European RoHS Directive (2011/65/EU) and Delegated Directive (2015/863/EU, Amending Annex II of 2011/65/EU)

## 2. General Specifications

|                                   | Feature             | Spec                                   | Unit              |
|-----------------------------------|---------------------|----------------------------------------|-------------------|
| <b>Display Spec</b>               | Size                | 6.5 inches                             |                   |
|                                   | Resolution          | 640(RGB)x480                           |                   |
|                                   | Pixel Pitch         | 0.207 (H) x 0.207(V)                   | mm                |
|                                   | TFT Active Area     | 132.48×99.36                           | mm                |
|                                   | Technology Type     | a-Si                                   |                   |
|                                   | Pixel Configuration | R.G.B Vertical Stripe                  |                   |
|                                   | Display Mode        | SFT Normally black                     |                   |
|                                   | Surface Treatment   | Anti-Glare                             |                   |
|                                   | Viewing Direction   | ALL                                    |                   |
| <b>Mechanical Characteristics</b> | LCM (W x H x D)     | 154.00x 121.00 x 7.10                  | mm                |
|                                   | Weight              | 179                                    | g                 |
| <b>Optical Characteristics</b>    | Luminance           | 1200                                   | cd/m <sup>2</sup> |
|                                   | Contrast Ratio      | 900:1                                  |                   |
|                                   | NTSC                | 70                                     | %                 |
|                                   | Viewing Angle       | 88/88/88/88                            | degree            |
| <b>Electrical Characteristics</b> | Interface           | 1 port LVDS                            |                   |
|                                   | Color Depth         | 262K/16.7 M                            | color             |
|                                   | Power Consumption   | LCD:396(Typ.)<br>Backlight: 3348(Typ.) | mW                |

**Table 2.1 General TFT Specifications**

### 3. Input / Output Terminals

#### 3.1 CN1 Pin assignment (LCD Interface)

| Connector Information |                       |
|-----------------------|-----------------------|
| LCD Module connector  | FI-SE20P-HFE (JAE)    |
| Matching connector    | FI-S20S or equivalent |

**Table 3.1.1 Connector information**

| PIN | Symbol  | I/O | 8 bit input                                        | 6 bit input                | Remark |
|-----|---------|-----|----------------------------------------------------|----------------------------|--------|
| 1   | VCC     | P   | Power supply, +3.3V                                |                            |        |
| 2   | VCC     | P   | Power supply, +3.3V                                |                            |        |
| 3   | GND     | P   | GND                                                |                            |        |
| 4   | GND     | P   | GND                                                |                            |        |
| 5   | Link 0- | I   | - LVDS Signal(R0~R5,G0)                            | - LVDS Signal(R0~R5,G0)    |        |
| 6   | Link 0+ | I   | +LVDS Signal(R0~R5,G0)                             | +LVDS Signal(R0~R5,G0)     |        |
| 7   | GND     | P   | GND                                                |                            |        |
| 8   | Link 1- | I   | - LVDS Signal(G1~G5,B0~B1)                         | - LVDS Signal(G1~G5,B0~B1) |        |
| 9   | Link 1+ | I   | +LVDS Signal(G1~G5,B0~B1)                          | +LVDS Signal(G1~G5,B0~B1)  |        |
| 10  | GND     | P   | GND                                                |                            |        |
| 11  | Link 2- | I   | - LVDS Signal(B2~B5,DE)                            | - LVDS Signal(B2~B5,DE)    |        |
| 12  | Link 2+ | I   | +LVDS Signal(B2~B5,DE)                             | +LVDS Signal(B2~B5,DE)     |        |
| 13  | GND     | P   | GND                                                |                            |        |
| 14  | CLKIN-  | I   | -LVDS Clock Signal                                 | -LVDS Clock Signal         |        |
| 15  | CLKIN+  | I   | +LVDS Clock Signal                                 | +LVDS Clock Signal         |        |
| 16  | GND     | P   | GND                                                |                            |        |
| 17  | Link 3- | I   | -LVDS Signal(R6~R7,G6~G7,B6~B7)                    | --                         |        |
| 18  | Link 3+ | I   | +LVDS Signal(R6~R7,G6~G7,B6~B7)                    | --                         |        |
| 19  | Mode    | I   | H: 8bit (Default)                                  | L: 6bit                    |        |
| 20  | SC      | I   | Display direction selection(L: Normal, H: Reverse) |                            | Note3  |

**Table 3.1.2 Pin Assignment for LCD Interface**

Note1: I/O definition: I---Input, O---Output, P---Power/Ground, N---No connection

Note2: All of the GND pins should be connected to the system ground.

Note3: Scan direction is shown as below(PCB at down side):



### 3.2 CN2 Pin assignment (Back Light)

| Connector Information |                            |
|-----------------------|----------------------------|
| LCD Module connector  | JST SM06B-SHLS-TF(LF)(SN)  |
| Matching connector    | SHLP-06V-S-B or equivalent |

**Table 3.2.1 Connector information**

| No | Symbol | I/O | Description   | Remark |
|----|--------|-----|---------------|--------|
| 1  | NC     | -   | No connection |        |
| 2  | NC     | -   | No connection |        |
| 3  | LED C1 | P   | LED cathode 1 |        |
| 4  | LED A1 | P   | LED anode 1   |        |
| 5  | LED A2 | P   | LED anode 2   |        |
| 6  | LED C2 | P   | LED cathode 2 |        |

**Table 3.2.2 Pin Assignment for Back Light Interface**

Note1: I/O definition: I---Input, O---Output, P---Power/Ground, N---No connection

## 4. Absolute Maximum Ratings

GND=0V

| Item                       | Symbol           | MIN  | MAX     | Unit             | Remark       |
|----------------------------|------------------|------|---------|------------------|--------------|
| Power Supply Voltage       | VCC              | -0.3 | 5.0     | V                |              |
| Digital Input Voltage      | V <sub>I/O</sub> | -0.3 | VCC+0.3 | V                | Note1        |
| Operating Temperature      | Top              | -30  | 80      | °C               |              |
| Storage Temperature        | Tst              | -40  | 90      | °C               |              |
| Relative Humidity<br>Note2 | RH               | --   | ≤95     | %                | Ta≤40°C      |
|                            |                  | --   | ≤85     | %                | 40°C<Ta≤50°C |
|                            |                  | --   | ≤55     | %                | 50°C<Ta≤60°C |
|                            |                  | --   | ≤36     | %                | 60°C<Ta≤70°C |
|                            |                  | --   | ≤24     | %                | 70°C<Ta≤80°C |
| Absolute Humidity          | AH               | --   | ≤70     | g/m <sup>3</sup> | Ta>70°C      |

**Table 4.1 Absolute Maximum Ratings**

Note1: Digital input voltage includes MODE,SC.

Note2: Ta means the ambient temperature. It is necessary to limit the relative humidity to the specified temperature range. Condensation on the module is not allowed.

Note3: The absolute maximum rating values of this product are not allowed to be exceeded at any times. A module should be used with any of the absolute maximum ratings exceeded, the characteristics of the module may not be recovered, or in an extreme condition, the module may be permanently destroyed

## 5. Electrical Characteristics

### 5.1 DC Characteristics for Panel Driving

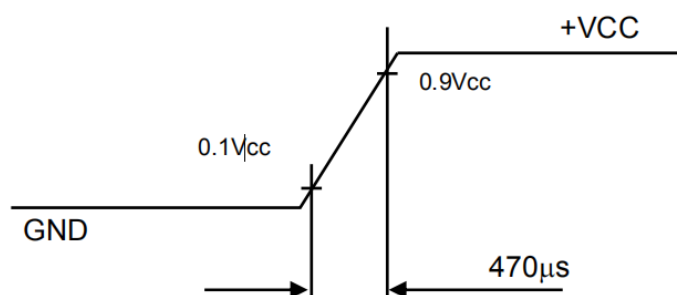
| Item                  |            | Symbol | MIN              | TYP | MAX              | Unit | Remark         |
|-----------------------|------------|--------|------------------|-----|------------------|------|----------------|
| Power supply Voltage  |            | VCC    | 3.0              | 3.3 | 3.6              | V    | Include ripple |
| Power supply current  |            | IVCC   | -                | 120 | 150              | mA   | Note1          |
| Power supply ripple   |            | Vp-p   | -                | -   | 100              | mV   |                |
| Input Signal Voltage  | Low Level  | VIL    | GND              | --  | $0.3 \times VCC$ | V    |                |
|                       | High Level | VIH    | $0.7 \times VCC$ | --  | VCC              | V    |                |
| Output Signal Voltage | Low Level  | VOL    | GND              | --  | $GND + 0.4$      | V    |                |
|                       | High Level | VOH    | $VCC - 0.4$      | --  | VCC              | V    |                |
| Inrush current        |            | Irush  | -                | -   | 1.5              | A    | Note2          |

**Table 5.1.1 DC characteristics**

Note1: To test the current dissipation, using the “white” testing pattern.

Note2: Inrush current test condition.

**Vcc rising time is 470μs**



**Figure5.1 Inrush current test condition**

## 5.2 DC Characteristics for Backlight Driving

| Item                        | Symbol   | MIN | TYP    | MAX  | Unit | Remark                                       |
|-----------------------------|----------|-----|--------|------|------|----------------------------------------------|
| Forward Current             | $I_F$    | -   | 180    | 200  | mA   | 12 LEDs<br>(6 LED Serial,<br>2 LED Parallel) |
| Forward Current Voltage     | $V_F$    | -   | 18.6   | 20.4 | V    |                                              |
| Backlight Power Consumption | $W_{BL}$ | -   | 3348   | -    | mW   |                                              |
| Operating Life Time         | --       | -   | 100000 | -    | hrs  | Note                                         |

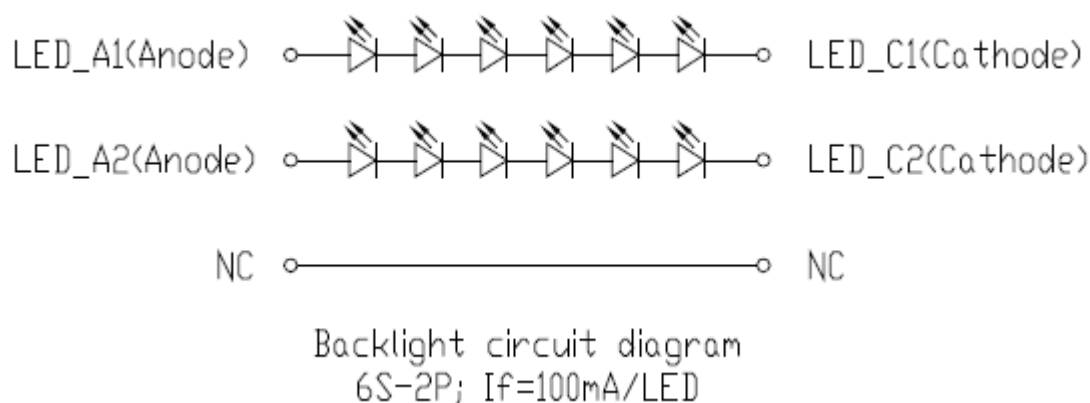
**Table 5.2.1 LED Backlight Characteristics**

Note1:  $I_F$  is defined for total LED.

Note2: Optical performance should be evaluated at  $T_a=25^{\circ}\text{C}$  only.

Note3: If LED is driven by high current, high ambient temperature & humidity condition. The life time of LED will be reduced.

Note4: Operating life means brightness goes down to 50% of initial brightness. Typical operating life time is estimated data.



### 5.3 Recommended Power ON/OFF Sequence

| Item                           | Symbol | Min  | Typ | Max | Unit | Remark |
|--------------------------------|--------|------|-----|-----|------|--------|
| VCC on to VCC stable           | TP1    | 0.5  | -   | 3   | ms   |        |
| VCC stable to LVDS signal on   | TP2    | 4.6  | -   | 100 | ms   |        |
| Signal on to LED on            | TP3    | 200  | -   | -   | ms   |        |
| VCC off time                   | TP4    | 1    | -   | 5   | ms   |        |
| VCC off to next VCC on         | TP5    | 2000 | -   | -   | ms   |        |
| LVDS Signal off before VCC off | TP6    | 123  | -   | 500 | ms   |        |
| LED off before signal off      | TP7    | 200  | -   | -   | ms   |        |

Table5.3 Power on/off sequence

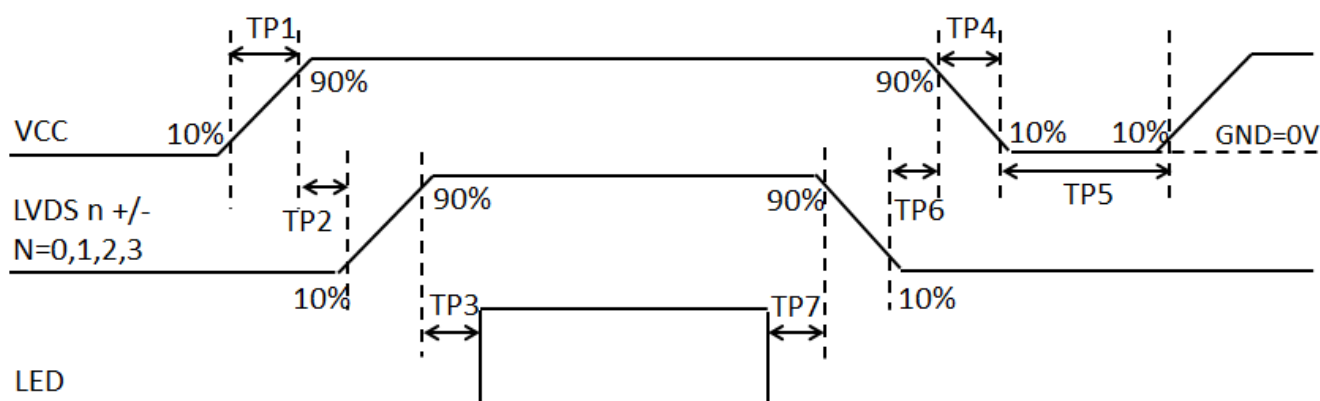


Figure 5.3 Power on/off sequence

Note1: The low level of these signals and analog powers are GND level.

Note2: All of the power and signals should be kept at GND level before power on. If there are residual voltages on them, the LCD might not work properly.

Note3: Keep backlight turned off until the display has stabilized.

### 5.4 LCD Module Block Diagram

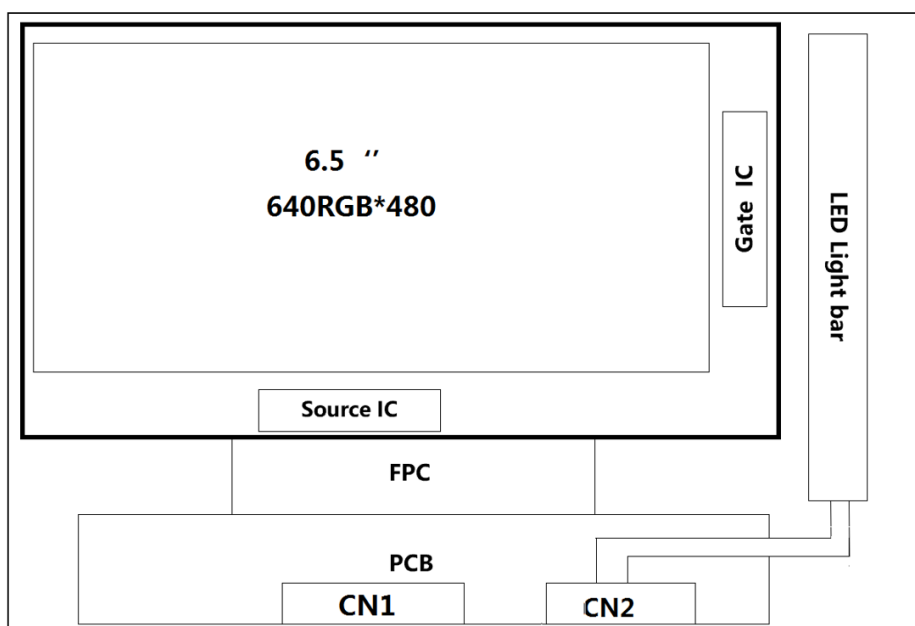


Figure 5.4 LCD Module Block Diagram

## 6. Timing Characteristics

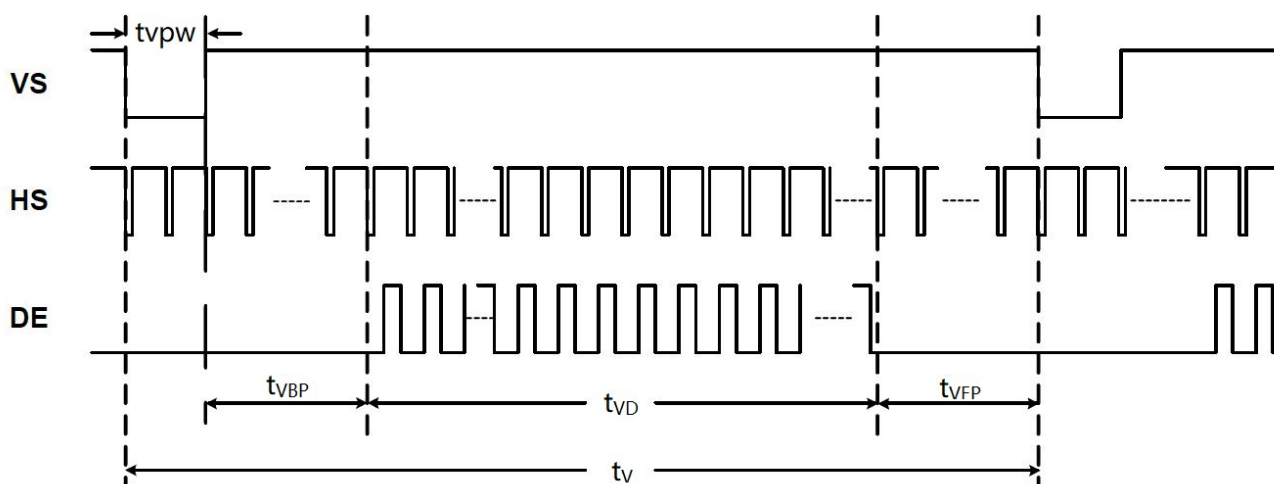
### 6.1 Data Input Timing Parameter Setting

VCC=3.3V, GND=0V, Ta=25°C

| Parameter                | Symbol           | Min | Typ   | Max  | Unit             | Remark |
|--------------------------|------------------|-----|-------|------|------------------|--------|
| CLKIN+/- frequency       | t <sub>CLK</sub> | -   | 20.71 | 51.1 | MHz              |        |
| Horizontal blanking time | t <sub>HBT</sub> | 26  | 34    | 506  | t <sub>clk</sub> |        |
| Horizontal display area  | t <sub>HD</sub>  | -   | 640   | -    | t <sub>clk</sub> |        |
| Horizontal period        | t <sub>H</sub>   | 666 | 674   | 1146 | t <sub>clk</sub> |        |
| Vertical blanking time   | t <sub>VBT</sub> | 13  | 32    | 206  | t <sub>H</sub>   |        |
| Vertical display area    | t <sub>VD</sub>  | -   | 480   | -    | t <sub>H</sub>   |        |
| Vertical period          | t <sub>V</sub>   | 493 | 512   | 686  | t <sub>H</sub>   |        |
| Frame Rate               | F                | -   | 60    | -    | HZ               |        |

Table 6.1.1 Data Input Timing Parameters

#### Vertical input timing



#### Horizontal input timing

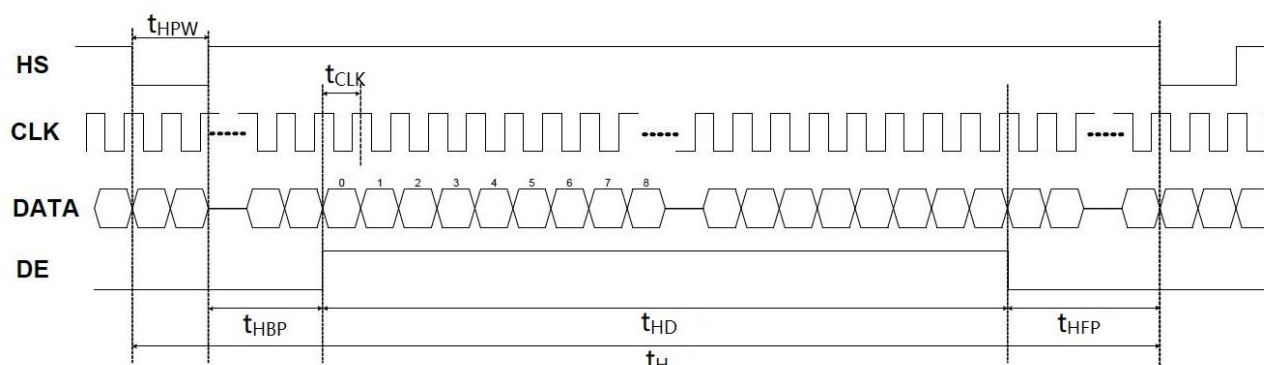


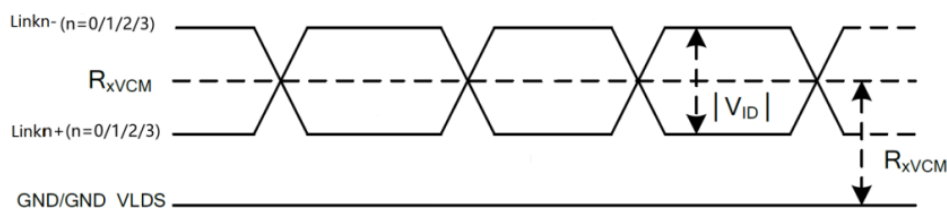
Figure 6.1.1 Data Input Timing

## 6.2 LVDS DC Electrical Characteristics

| Parameter                                 | Symbol       | Min. | Typ. | Max.             | Unit    | Remark                                                         |
|-------------------------------------------|--------------|------|------|------------------|---------|----------------------------------------------------------------|
| Differential input high Threshold voltage | $R_{XVTH}$   | -    | -    | 0.1              | V       | $R_{XVCM}=1.2V$                                                |
| Differential input Low Threshold voltage  | $R_{XVTL}$   | -0.1 | -    | -                | V       |                                                                |
| Input voltage range(single-end)           | $R_{XVIN}$   | 0    | -    | $VCC-1.0$        | V       |                                                                |
| Differential input common Mode voltage    | $R_{XVCM}$   | 0.6  | 1.2  | $2.4- V_{ID} /2$ | V       |                                                                |
| Differential input voltage                | $ V_{ID} $   | 0.2  | 0.4  | 0.6              | V       |                                                                |
| Differential input leakage current        | $R_{VxIz}$   | -10  | -    | 10               | $\mu A$ |                                                                |
| LVDS Digital Operating Current            | $IVDD\_LVDS$ | -    | 30   | 45               | mA      | FCLK=65 MHz ,<br>VCC=3.3V<br>Data pattern=55/H<br>→ AA/H(loop) |

Table 6.2.1 LVDS DC Electrical Characteristics

### Single end signals



### Differential signals

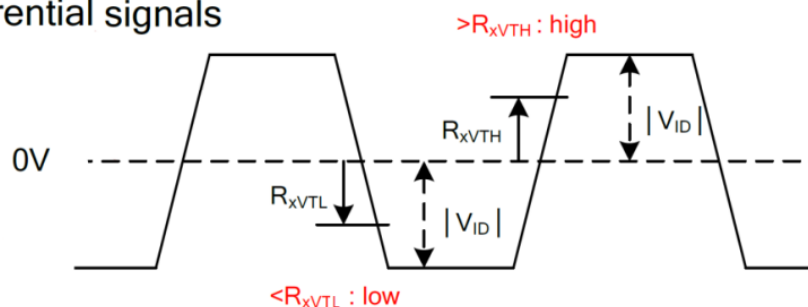


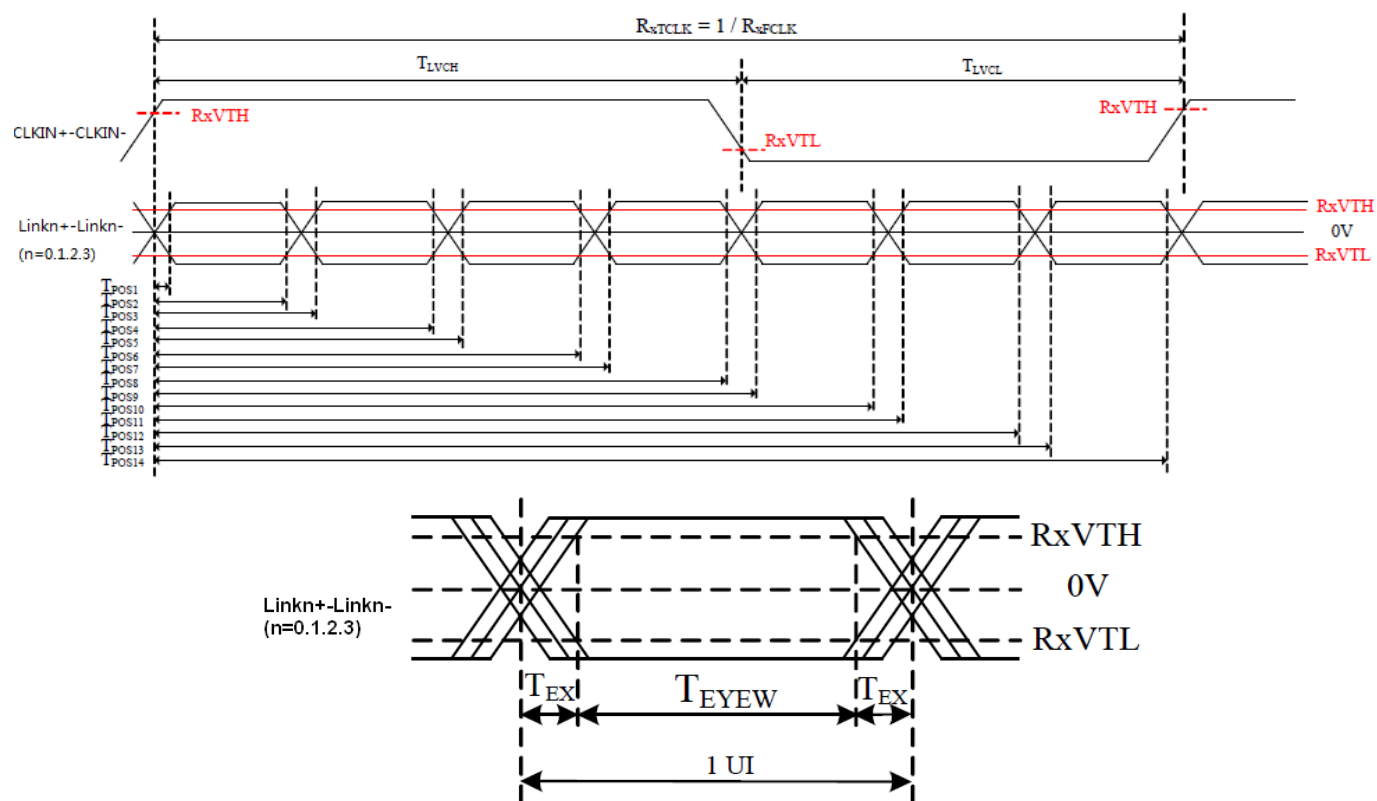
Figure 6.2.1 LVDS DC Electrical Characteristics

### 6.3 LVDS AC characteristics

VCC=3.3V, GND=0V, Ta=25°C

| Parameter        | Symbol      | Min.  | Typ. | Max. | Unit        | Conditions |
|------------------|-------------|-------|------|------|-------------|------------|
| Clock Frequency  | $R_{xCLK}$  | 20    | -    | 80   | MHz         |            |
| Clock Period     | $R_{xTCLK}$ | 12.5  | -    | 50   | ns          |            |
| 1 data bit time  | UI          | -     | 1/7  | -    | $R_{xTCLK}$ |            |
| Clock high time  | $T_{LVCH}$  | -     | 4    | -    | UI          |            |
| Clock low time   | $T_{LVCL}$  | -     | 3    | -    | UI          |            |
| Position 1       | $T_{POS1}$  | -0.25 | 0    | 0.25 | UI          |            |
| Position 2       | $T_{POS2}$  | 0.75  | -    | 1.25 | UI          |            |
| Position 3       | $T_{POS3}$  | 0.75  | 1    | 1.25 | UI          |            |
| Position 4       | $T_{POS4}$  | 1.75  | -    | 2.25 | UI          |            |
| Position 5       | $T_{POS5}$  | 1.75  | 2    | 2.25 | UI          |            |
| Position 6       | $T_{POS6}$  | 2.75  | -    | 3.25 | UI          |            |
| Position 7       | $T_{POS7}$  | 2.75  | 3    | 3.25 | UI          |            |
| Position 8       | $T_{POS8}$  | 3.75  | -    | 4.25 | UI          |            |
| Position 9       | $T_{POS9}$  | 3.75  | 4    | 4.25 | UI          |            |
| Position 10      | $T_{POS10}$ | 4.75  | -    | 5.25 | UI          |            |
| Position 11      | $T_{POS11}$ | 4.75  | 5    | 5.25 | UI          |            |
| Position 12      | $T_{POS12}$ | 5.75  | -    | 6.25 | UI          |            |
| Position 13      | $T_{POS13}$ | 5.75  | 6    | 6.25 | UI          |            |
| Position 14      | $T_{POS14}$ | 6.75  | -    | 7.25 | UI          |            |
| Input eye width  | $T_{EYEW}$  | 0.5   | -    | -    | UI          |            |
| Input eye border | $T_{EX}$    | -     | -    | 0.25 | UI          |            |

**Table 6.3.1 LVDS AC characteristics**



**Figure 6.3.1 LVDS AC Electrical Characteristics**

## 6.4 LVDS data mapping

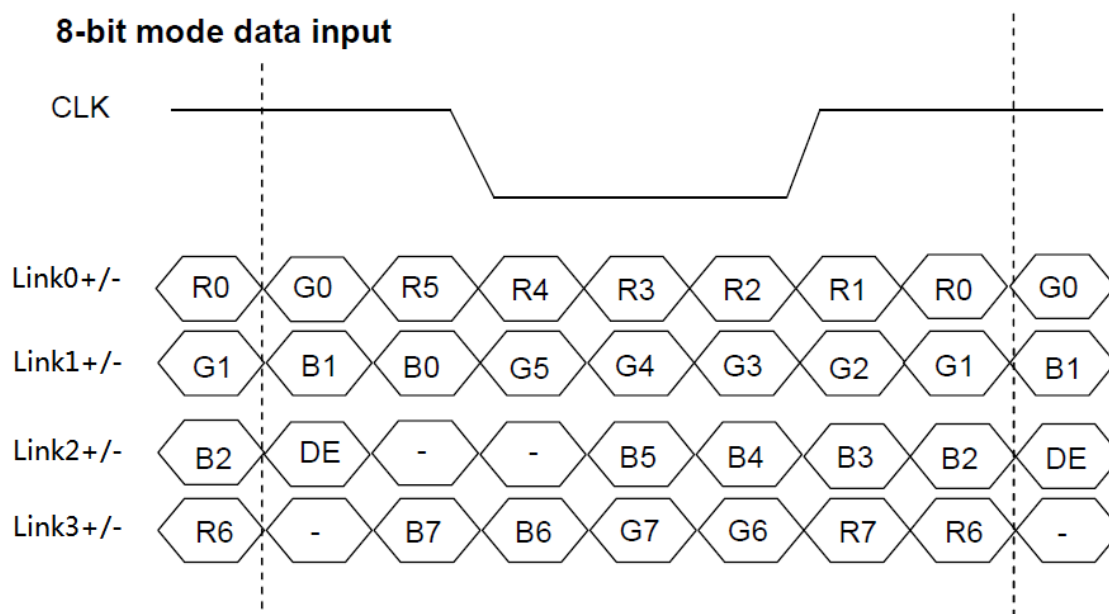


Figure 6.4.1 LVDS 8bit (Mode=H)

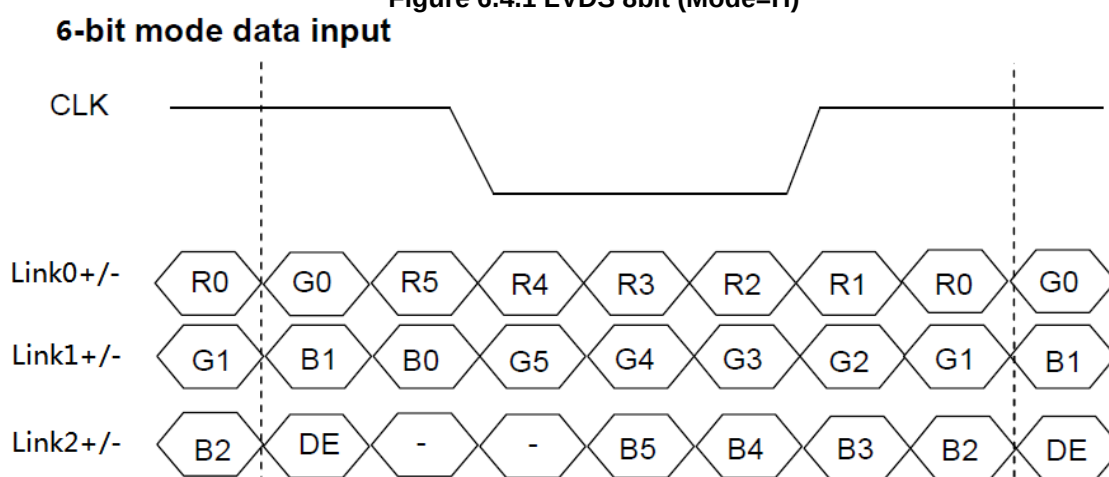


Figure 6.4.2 LVDS 6bit(Mode=L)

## 7. Optical Characteristics

| Item                     |       | Symbol           | Condition       | Min   | Typ   | Max   | Unit              | Remark         |
|--------------------------|-------|------------------|-----------------|-------|-------|-------|-------------------|----------------|
| View Angles              |       | θT               | CR≧10           | 78    | 88    | -     | Degree            | Note 2         |
|                          |       | θB               |                 | 78    | 88    | -     |                   |                |
|                          |       | θL               |                 | 78    | 88    | -     |                   |                |
|                          |       | θR               |                 | 78    | 88    | -     |                   |                |
| Contrast Ratio           |       | CR               | θ=0°            | 700   | 900   | -     |                   | Note1<br>Note3 |
| Response Time            |       | T <sub>ON</sub>  | 25℃             | -     | 30    | 35    | ms                | Note1<br>Note4 |
|                          |       | T <sub>OFF</sub> |                 |       |       |       |                   |                |
| Chromaticity             | White | x                | Backlight is on | 0.299 | 0.302 | 0.307 |                   | Note1<br>Note5 |
|                          |       | y                |                 | 0.317 | 0.320 | 0.325 |                   |                |
|                          | Red   | x                |                 | 0.624 | 0.627 | 0.629 |                   |                |
|                          |       | y                |                 | 0.321 | 0.322 | 0.323 |                   |                |
|                          | Green | x                |                 | 0.309 | 0.311 | 0.312 |                   |                |
|                          |       | y                |                 | 0.628 | 0.630 | 0.635 |                   |                |
|                          | Blue  | x                |                 | 0.154 | 0.155 | 0.157 |                   |                |
|                          |       | y                |                 | 0.051 | 0.055 | 0.057 |                   |                |
| Uniformity               |       | U                |                 | 75    | 80    | -     | %                 | Note1<br>Note6 |
| NTSC                     |       |                  |                 | 65    | 70    | -     | %                 | Note 5         |
| Luminance ( Without TP ) |       | L                |                 | 900   | 1200  | -     | cd/m <sup>2</sup> | Note1<br>Note7 |

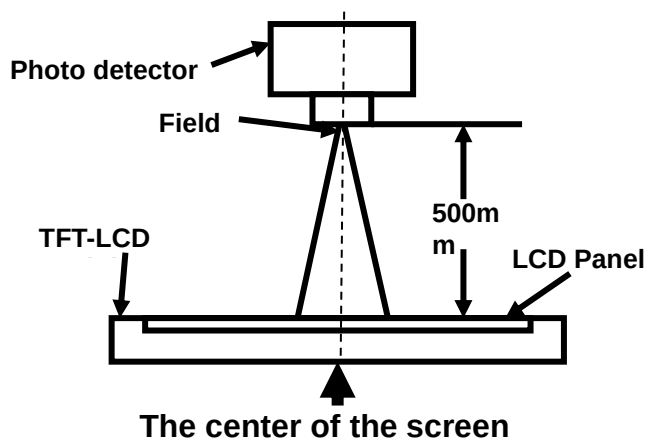
**Table 7.1 Optical Parameters**

Test Conditions:

1.  $I_F = 180\text{mA}$ , and the ambient temperature is  $25^\circ\text{C} \pm 2^\circ\text{C}$ , humidity is  $65 \pm 7\%$ .
2. The test systems refer to Note1 and Note2.

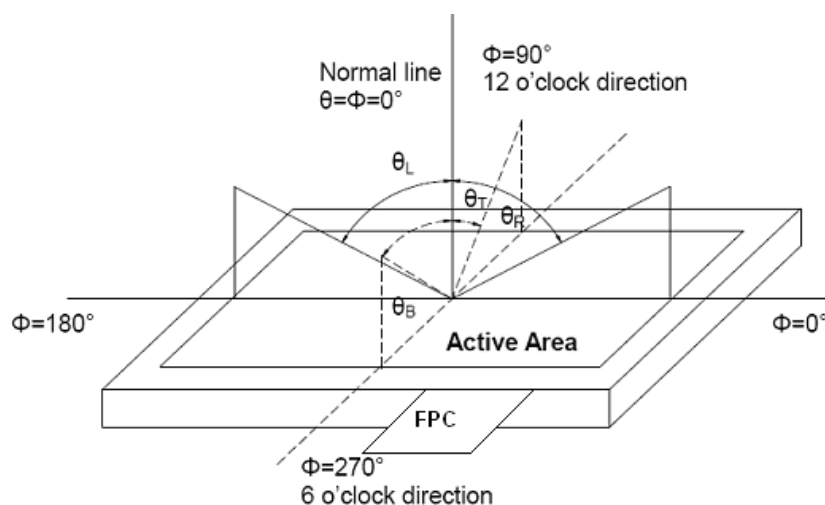
Note1: Definition of optical measurement system.

The optical characteristics should be measured in dark room. After 5 Minutes operation, the optical characteristics are measured at the center point of the LCD screen.



**Fig1. Measurement Set Up**

Note2: Definition of viewing angle range and measurement system. Viewing angle is measured at the center point of the LCD .



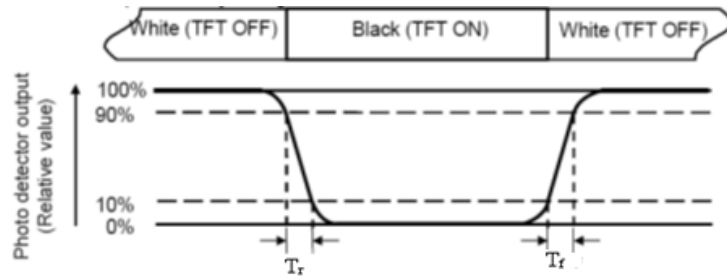
**Fig2. Measurement viewing angle**

Note3: Definition of contrast ratio

$$\text{Contrast ratio (CR)} = \frac{\text{Luminance measured when LCD is on the "White" state}}{\text{Luminance measured when LCD is on the "Black" state}}$$

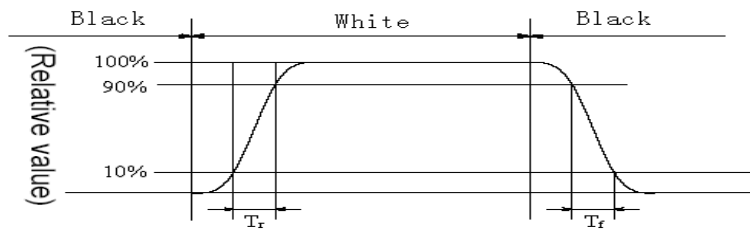
Note4: Definition of Response time

For TN LCM, the response time is defined as the LCD optical switching time interval between "White" state and "Black" state. Rise time ( $T_r$ ) is the time between photo detector output intensity changed from 90% to 10%. And fall time ( $T_f$ ) is the time between photo detector output intensity changed from 10% to 90%.



**Fig3. Response Time Testing(TN)**

For SFT LCM, the response time is defined as the LCD optical switching time interval between "White" state and "Black" state. Rise time ( $T_r$ ) is the time between photo detector output intensity changed from 10% to 90%. And fall time ( $T_f$ ) is the time between photo detector output intensity changed from 90% to 10%.



**Fig4. Response Time Testing(SFT)**

Note5: Definition of color chromaticity (CIE1931)

Color coordinates measured at center point of LCD.

Note6: Definition of Luminance Uniformity

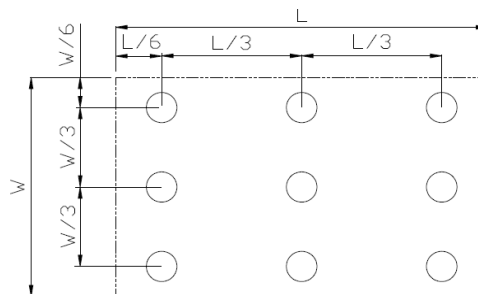
Active area is divided into 9 measuring areas (Refer Fig.5). Every measuring point is placed at the center of each measuring area.

Luminance Uniformity ( $U$ ) =  $L_{min} / L_{max}$

$L_{max}$ : The measured Maximum luminance of all measurement position.

$L_{min}$ : The measured Minimum luminance of all measurement position.

$L$ -----Active area length;  $W$ ----- Active area width



**Fig5. Luminance Uniformity Measurement Locations(9 points)**

Note7: Definition of Luminance:

Measure the luminance of white state at center point.

## 8. Reliability Test

| No | Test Item                               | Condition                                                                                                                                                                                                                                                                        | Remarks                                                                               |
|----|-----------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| 1  | High Temperature Operation              | Ta = +80℃, 500 hours                                                                                                                                                                                                                                                             | IEC60068-2-1<br>GB2423.2                                                              |
| 2  | Low Temperature Operation               | Ta = -30℃, 500 hours                                                                                                                                                                                                                                                             | IEC60068-2-1<br>GB2423.1                                                              |
| 3  | High Temperature Storage                | Ta = +90℃, 500 hours                                                                                                                                                                                                                                                             | IEC60068-2-1<br>GB2423.2                                                              |
| 4  | Low Temperature Storage                 | Ta = -40℃, 500 hours                                                                                                                                                                                                                                                             | IEC60068-2-1<br>GB2423.1                                                              |
| 5  | High Temperature and Humidity Operation | Ta = +60℃, 90% RH<br>max,500hours                                                                                                                                                                                                                                                | IEC60068-2-78<br>GB/T2423.3                                                           |
| 6  | Thermal Shock (non-operation)           | -30℃ 30 min~+80℃ 30 min,<br>Change time:5min, 100 Cycle                                                                                                                                                                                                                          | Start with cold temperature,<br>End with high temperature,<br>IEC60068-2-14,GB2423.22 |
| 7  | ESD                                     | C=150pF,R=330Ω,5point/panel<br>Air:±15Kv,5times;<br>Contact:±8Kv,5times<br>(Environment:15℃~35℃,<br>30%~60%.86Kpa~106Kpa)                                                                                                                                                        | IEC61000-4-2<br>GB/T17626.2                                                           |
| 8  | Vibration Test (non-operation)          | vibration level :9.8m/s <sup>2</sup> (1G)<br>waveform: sinusoidal<br>Frequency range: 5 to 500Hz<br>Frequency sweep rate:0.5<br>octave/min<br>Duration : one sweep from 5 to<br>500Hz in each of three mutually<br>perpendicular axis(each x,y,z<br>axis: 1hour, total 3 hours ) | GB/T 2423.10-2008 ;<br>GB/T 2423.56-2006                                              |
| 9  | Shock Test                              | Shock level:1470m/s <sup>2</sup> (150G)<br>Waveform: half sinusoidal<br>wave,2ms<br>Number of shocks: one shock<br>input in each direction of three<br>mutually perpendicular axis for<br>a total of six shock inputs                                                            | GB/T 2423.5-1995                                                                      |
| 10 | Package Drop Test                       | Height:60cm,<br>1corner,3edges,6surfaces                                                                                                                                                                                                                                         | GB/T 4857.5-1992                                                                      |
| 11 | Package Vibration                       | Frequency : 5-20-200HZ , PSD :<br>0.01-0.01-0.001<br>Total:0.781g <sup>2</sup> /HZ, x/y/z axis per<br>30min )                                                                                                                                                                    | GB/T 4857.23-2012                                                                     |

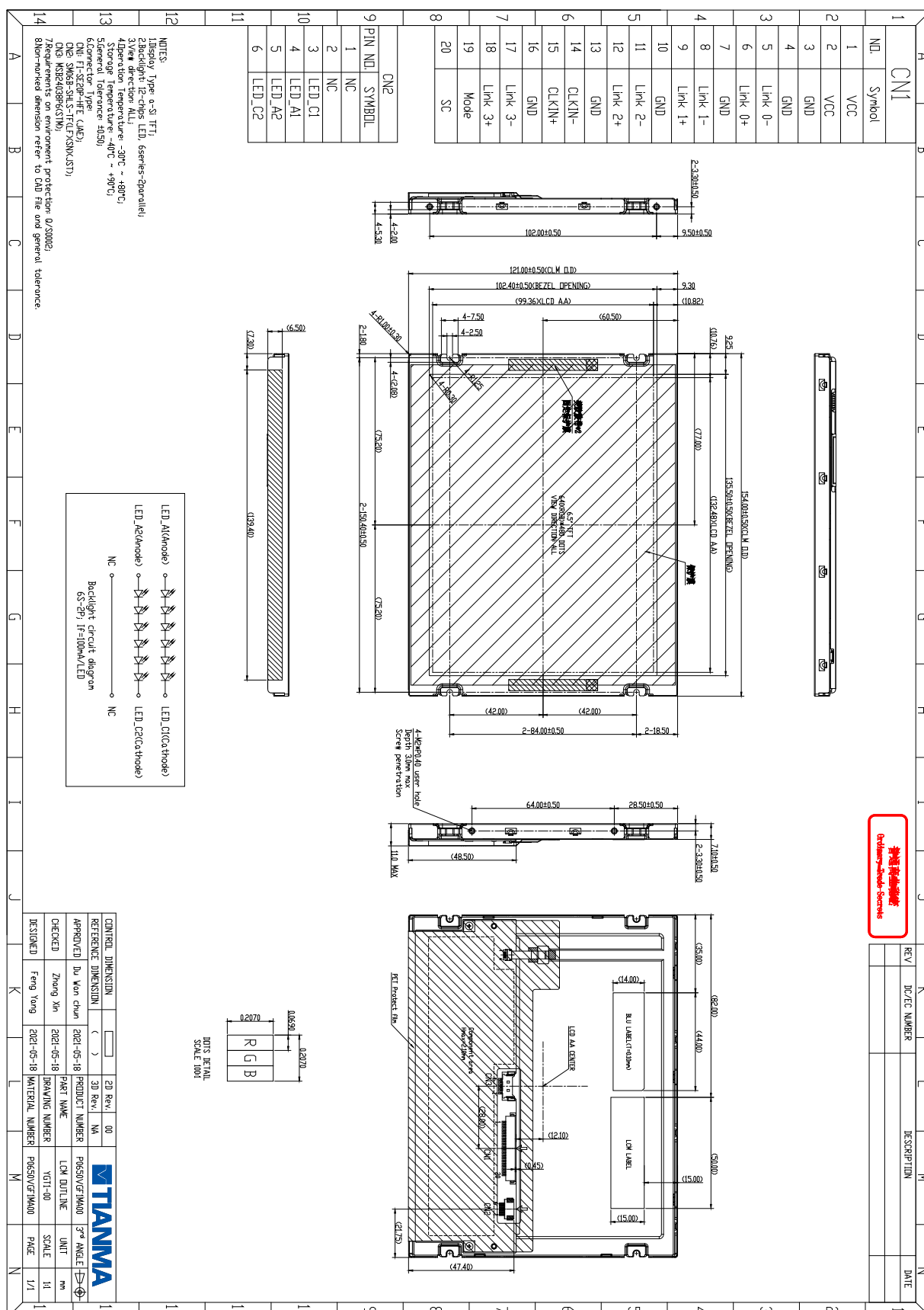
**Table 8.1 RA test condition**

Note1: Temperature is the ambient temperature of sample

Note2: Before cosmetic and function test, the product must have enough recovery time, at least 2 hours at room temperature.

Note3: In the standard condition, there shall be no practical problem that may affect the display function. After the reliability test, the product's function only be guaranteed, but not for all of the cosmetic specification.

## 9. Mechanical Drawing



## 10. Packing Instruction

| No | Item           | Model (Material) | Dimensions(mm)        | Unit Weight(Kg) | Quantity | Remark |
|----|----------------|------------------|-----------------------|-----------------|----------|--------|
| 1  | LCM            | P0650VGF1MA00    | 154.00x 121.00 x 7.10 | 179             | 40       |        |
| 2  | Tray           | PET              | 485×330×21.5          | 0.260           | 12       |        |
| 3  | Dust-proof Bag | PE               | 700×545×0.05          | 0.021           | 1        |        |
| 4  | Carton         | Corrugated Paper | 544×365×250           | 1.01            | 1        |        |
| 5  | BOX            | Corrugated Paper | 520×345×74            | 0.38            | 2        |        |
| 6  | EPE            | EPE              | 485×330×5             | 0.016           | 2        |        |
| 7  | Label          | Paper            | 100×52                | 0.001           | 1        |        |
| 8  | Total weight   | 12.1±5% Kg       |                       |                 |          |        |

Table 10.1 Packing Instruction

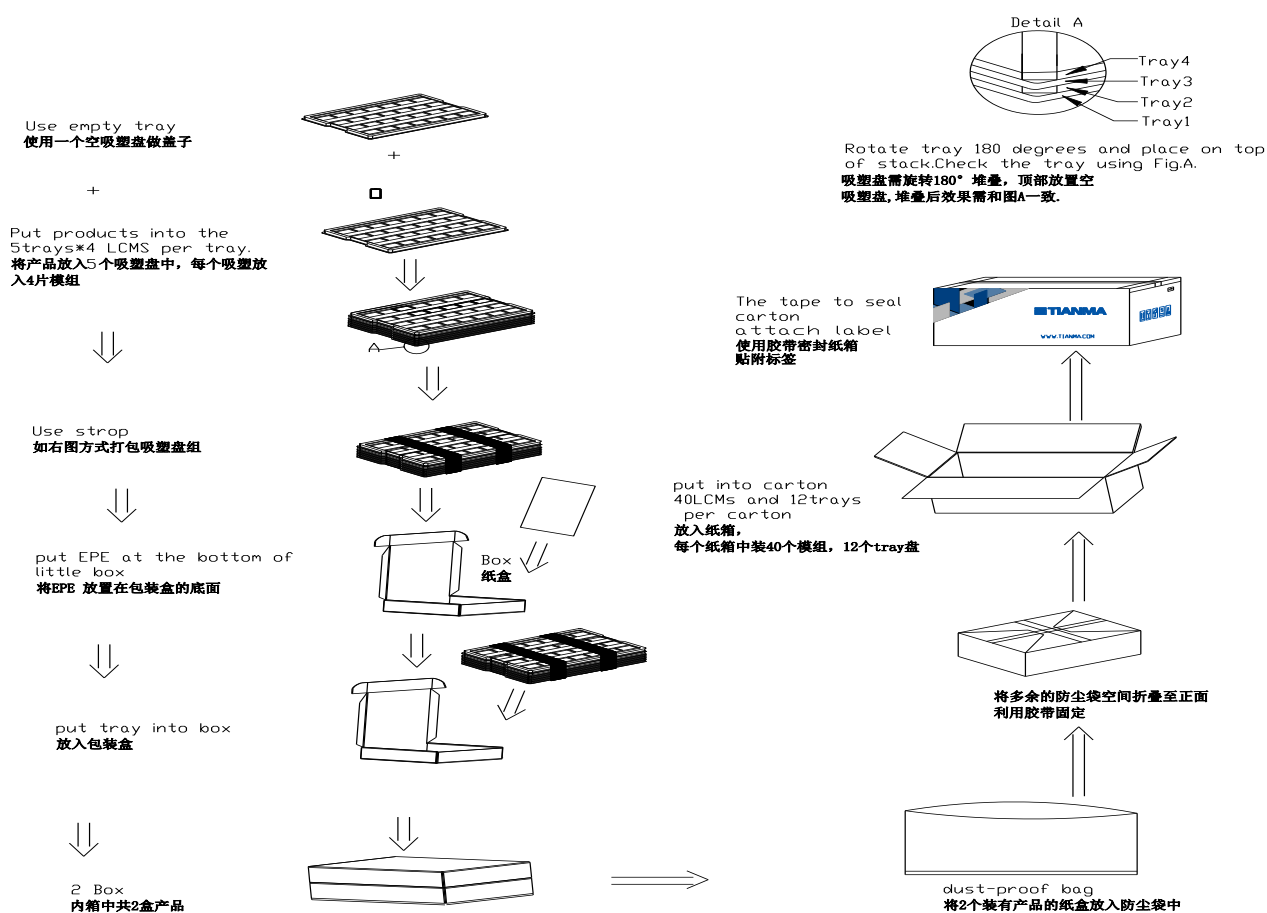


Figure 10.1 Packing Instruction

## 11. Precautions for Use of LCD Modules

### 11.1 Handling Precautions

- (1) The display panel is made of glass. Do not subject it to mechanical shock by dropping it, etc.
- (2) If the display panel is damaged and the liquid crystal fluid inside it leaks out be sure not to get any in your mouth. If the fluid comes into contact with your skin or clothes promptly wash it off using soap and water.
- (3) Do not apply excessive force to the display surface or the bezel since this may cause the color tone to vary.
- (4) The polarizer covering the display surface of the LCD module is soft and easily scratched. Handle the polarizer carefully.
- (5) If the display surface is contaminated, breathe on the surface and gently wipe it with a soft dry cloth. If it is still not completely clear use a moist cloth with one of the following solvents:
  - Isopropyl alcohol
  - Ethyl alcohol
 Solvents other than those mentioned above may damage the polarizer. Specifically, do not use the following:
  - Water
  - Ketone
  - Aromatic solvents
- (6) Do not disassemble the LCD Module.
- (7) If powered off, do not apply the input signals.
- (8) To prevent destruction of the module by static electricity, be careful to maintain an optimum work environment.
- (9) Be sure to ground your body when handling the LCD Modules.
- (10) Tools used for assembly, must be properly grounded.
- (11) To reduce the amount of static electricity generated, do not conduct assembly or other work under very low humidity conditions.
- (12) The LCD Module is covered with a film to protect the display surface, remove film slowly under the ionizer.

### 11.2 Storage precautions

- (1) When storing the LCD modules avoid exposure to direct sunlight or to the light of fluorescent lamps.
- (2) The LCD modules should be stored within the rated storage temperature range. The recommend condition is: Temperature: 0 ~ 35 °C at normal humidity.
- (3) The LCD modules should be stored in a room without acid, alkali or other harmful gas.

### 11.3 Transportation Precautions

The LCD modules should not be dropped or subject to violent mechanical shock during transportation. Also they should avoid excessive pressure, water, high humidity and direct sunlight.

### 11.4 Screen saver Precautions

Not display the fixed pattern for a long time. Use a screen saver, if the fixed pattern is displayed on the screen

### 11.5 Safety Precautions

- (1) When you waste damaged or unnecessary LCDs, it is recommended to crush LCDs into pieces and wash them off with solvents such as acetone and ethanol, which should later be burned
- (2) Be sure to turn off the power supply when inserting or disconnecting the LED backlight cable.
- (3) LED driver should be designed to limit or stop its function when over current is detected on the LED.