

SPECIFICATION

[ ☒ ] Preliminary Specification  
[    ] Final Specification

Description                      8.0” 1024xRGBx768 TFT-LCD Module  
Part Number                      P0800XGF2MB00

|            |       |                                                                    |            |
|------------|-------|--------------------------------------------------------------------|------------|
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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 8.0 inch a-Si TFT-LCD module with Normal- Black technology. It is composed of a TFT-LCD panel, a driver circuit, FPC, and a LED backlight unit.

### 1.2 Features

- Ultra-wide viewing angle
- Interface: LVDS
- This product will comply with UL62368-1/CSA C22.2 No.62368-1-03
- This product will comply 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              |
|----------------------------|---------------------|--------------------------------|-------------------|
| Display Spec               | Size                | 8 inch                         |                   |
|                            | Resolution          | 1024(RGB)x768                  |                   |
|                            | Pixel Pitch         | 0.158x0.158                    | mm                |
|                            | TFT Active Area     | 162.05x121.54                  | mm                |
|                            | Technology Type     | a-Si                           |                   |
|                            | Pixel Configuration | R.G.B Vertical Stripe          |                   |
|                            | Display Mode        | SFT, Normally Black            |                   |
|                            | Viewing Direction   | All                            |                   |
| Mechanical Characteristics | LCM (W x H x D)     | 182.73x137.65x3.85             | mm                |
|                            | Weight              | 160                            | g                 |
| Optical Characteristics    | Luminance           | 450                            | cd/m <sup>2</sup> |
|                            | Contrast Ratio      | 1800:1                         |                   |
|                            | NTSC                | 72                             | %                 |
|                            | Viewing Angle       | 88/88/88/88                    | degree            |
| Electrical Characteristics | Interface           | LVDS                           |                   |
|                            | Color Depth         | 16.7 Million                   | color             |
|                            | Power Consumption   | LCD: 256;<br>Backlight: (1512) | mW                |

Table 2.1 General TFT Specifications

### 3. Input / Output Terminals

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

| Connector Information |                                   |
|-----------------------|-----------------------------------|
| LCD Module connector  | NA                                |
| Matching connector    | FH12A-40S-0.5SH(55) or equivalent |

Table 3.1.1 Connector information

| No | Symbol   | I/O | Description                                                                                                                                     | Comment                       |
|----|----------|-----|-------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|
| 1  | NC       | N   | No connection                                                                                                                                   |                               |
| 2  | VDD      | P   | Power Voltage for digital circuit                                                                                                               |                               |
| 3  | VDD      | P   | Power Voltage for digital circuit                                                                                                               |                               |
| 4  | NC       | N   | No connection                                                                                                                                   |                               |
| 5  | RESET    | I   | Global reset pin, active low. (Default pull High)                                                                                               |                               |
| 6  | STBYB    | I   | Standby mode selection.(Default pull High)<br>STBYB=H, Normal mode.<br>STBYB=L, Standby mode.<br>If not used, please fix this pin at VDD level. |                               |
| 7  | GND      | P   | Ground                                                                                                                                          |                               |
| 8  | RXIN0-   | I   | - LVDS differential data input                                                                                                                  |                               |
| 9  | RXIN0+   | I   | + LVDS differential data input                                                                                                                  | R[0]~G[0]                     |
| 10 | GND      | P   | Ground                                                                                                                                          |                               |
| 11 | RXIN1-   | I   | - LVDS differential data input                                                                                                                  |                               |
| 12 | RXIN1+   | I   | + LVDS differential data input                                                                                                                  | G[1]~B[1]                     |
| 13 | GND      | P   | Ground                                                                                                                                          |                               |
| 14 | RXIN2-   | I   | - LVDS differential data input                                                                                                                  |                               |
| 15 | RXIN2+   | I   | + LVDS differential data input                                                                                                                  | DE/-/<br>B[2]~B[5]            |
| 16 | GND      | P   | Ground                                                                                                                                          |                               |
| 17 | RXCLKIN- | I   | - LVDS differential clock input                                                                                                                 |                               |
| 18 | RXCLKIN+ | I   | + LVDS differential clock input                                                                                                                 |                               |
| 19 | GND      | P   | Ground                                                                                                                                          |                               |
| 20 | RXIN3-   | I   | - LVDS differential data input                                                                                                                  |                               |
| 21 | RXIN3+   | I   | + LVDS differential data input                                                                                                                  | R[6]/R[7]/G[6]/G[7]/B[6]/B[7] |
| 22 | GND      | P   | Ground                                                                                                                                          |                               |
| 23 | NC (CSB) | N   | No connection, Please Open.                                                                                                                     |                               |
| 24 | NC (SCL) | N   | No connection, Please Open.                                                                                                                     |                               |
| 25 | GND      | P   | Ground                                                                                                                                          |                               |
| 26 | NC (SDI) | N   | No connection, Please Open.                                                                                                                     |                               |
| 27 | NC       | N   | No connection                                                                                                                                   |                               |
| 28 | SELB     | I   | 6-bit / 8-bit input select for LVDS mode. (Default pull High)                                                                                   |                               |

|    |      |   |                                                                                       |  |
|----|------|---|---------------------------------------------------------------------------------------|--|
|    |      |   | "1": 8-bit (Default pull High)<br>"0": 6-bit                                          |  |
| 29 | AVDD | P | Power for Analog Circuit                                                              |  |
| 30 | GND  | P | Ground                                                                                |  |
| 31 | LED- | P | LED Cathode                                                                           |  |
| 32 | LED- | P | LED Cathode                                                                           |  |
| 33 | L/R  | I | Horizontal scan direction. (Default pull Low)<br>1: right to left<br>0: left to right |  |
| 34 | U/D  | I | Vertical scan direction. (Default pull Low)<br>1: Bottom → Top<br>0: Top → Bottom     |  |
| 35 | VGL  | P | Gate OFF Voltage                                                                      |  |
| 36 | NC   | N | No connection                                                                         |  |
| 37 | NC   | N | No connection                                                                         |  |
| 38 | VGH  | P | Gate ON Voltage                                                                       |  |
| 39 | LED+ | P | LED Anode                                                                             |  |
| 40 | LED+ | P | LED Anode                                                                             |  |

**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: This LCD module supports DE mode, the pin setting is different from each other. Please refer to the descriptions.

#### 4. Absolute Maximum Ratings

| Item                       | Symbol | MIN     | MAX     | Unit | Remark          |
|----------------------------|--------|---------|---------|------|-----------------|
| Power Voltage              | VDD    | -0.3    | 3.96    | V    |                 |
| Power Supply Voltage 2     | AVDD   | -0.3    | 12      | V    |                 |
| Power Supply Voltage 3     | VGH    | -0.3    | VGL+32V | V    |                 |
| Power Supply Voltage 4     | VGL    | VGH-32V | 0.3     | V    |                 |
| Power Supply Voltage 5     | VIN    | -0.3    | 3.96    | V    | Note1           |
| Power Supply Voltage 6     | LVDS   | -0.3    | 2.5     | V    | Note2           |
| Backlight Forward current  | IF     | --      | 80      | mA   | Per one circuit |
| Operating Temperature      | Top    | -20     | 70      | °C   |                 |
| Storage Temperature        | Tst    | -30     | 80      | °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/m³ | Ta>70°C         |

Table 4.1 Absolute Maximum Ratings

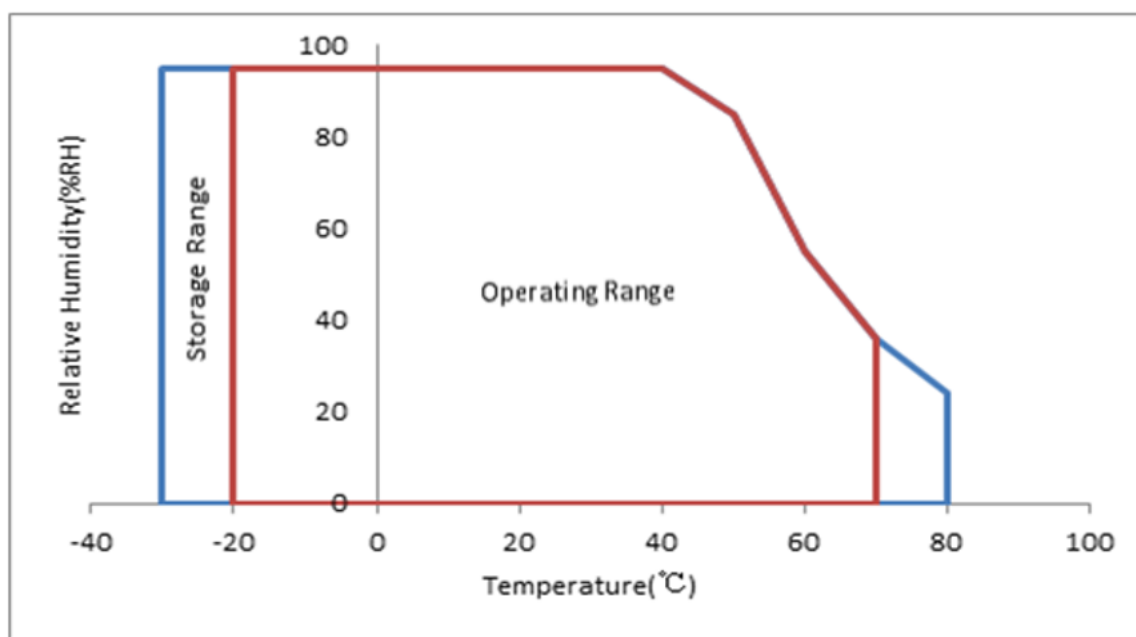


Table 4.2 Absolute Maximum Ratings chart

Note1: Input voltage include RESET、STBYB、SELB、L/R、U/D.

Note2: Input voltage include RXIN0+/-、RXIN1+/-、RXIN2+/-、RXIN3+/-、RXCLKIN+/-.

Note3: 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.

Note4: 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

AGND=GND=0V, Ta = 25°C

| Item                     | Symbol | Min     | Typ.   | Max     | Unit | Remark |
|--------------------------|--------|---------|--------|---------|------|--------|
| Digital Supply Voltage   | VDD    | 3.2     | 3.3    | 3.4     | V    | -      |
| Analog Supply Voltage    | AVDD   | (11.4)  | (11.6) | (11.8)  | V    |        |
| Gate On Voltage          | VGH    | (18)    | (19)   | (20)    | V    | -      |
| Gate Off Voltage         | VGL    | (-9.5)  | (-9)   | (-8.5)  | V    |        |
| Low level input voltage  | VIL    | VSS     | -      | 0.2*VDD | V    | Note1  |
| High level input voltage | VIH    | 0.8*VDD | -      | VDD     | V    | Note1  |

Table 5.1.1 Operating Voltages

Note1: Input voltage include RESET、STBYB、SELB、L/R、U/D.

AGND=GND=0V, Ta = 25°C

| Item                   | Symbol            | Condition  | Min | Typ. | Max | Unit | Remark |
|------------------------|-------------------|------------|-----|------|-----|------|--------|
| Digital Supply Current | I <sub>VCC</sub>  | VDD=3.3V   | -   | 21   | -   | mA   | Note1  |
| Analog Supply Current  | I <sub>AVDD</sub> | AVDD=11.6V | -   | 4    | -   | mA   | Note1  |
| Gate On Current        | I <sub>VGH</sub>  | VGH=19V    | -   | 5    | -   | mA   | Note1  |
| Gate Off Current       | I <sub>VGL</sub>  | VGL=-9V    | -   | 5    | -   | mA   | Note1  |
| Power Consumption      | P                 |            | -   | 256  |     | mW   | Note1  |

Table 5.1.2 Power Consumption

Note1: Test condition: white pattern. Actual power consumption is based on actual measurement.

### 5.2 DC Characteristics for Backlight Driving

| Item                        | Symbol          | MIN | TYP    | MAX  | Unit | Remark                                     |
|-----------------------------|-----------------|-----|--------|------|------|--------------------------------------------|
| Forward Current             | I <sub>F</sub>  | --  | (15)   | --   | mA   | (36) LEDs<br>(9 LED Serial,4 LED Parallel) |
| Forward Current Voltage     | V <sub>F</sub>  | --  | (25.2) | (27) | V    |                                            |
| Backlight Power Consumption | W <sub>BL</sub> | --  | (1512) | --   | mW   |                                            |
| LED life time               | --              | --  | 50000  | --   | Hrs  |                                            |

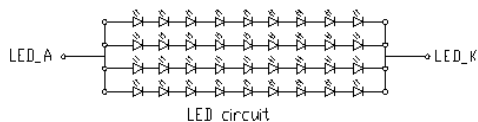
Table 5.2.1 LED Backlight Characteristics

Note1: I<sub>F</sub> is defined for each channel.

Note2: Optical performance should be evaluated at Ta=25°C only.

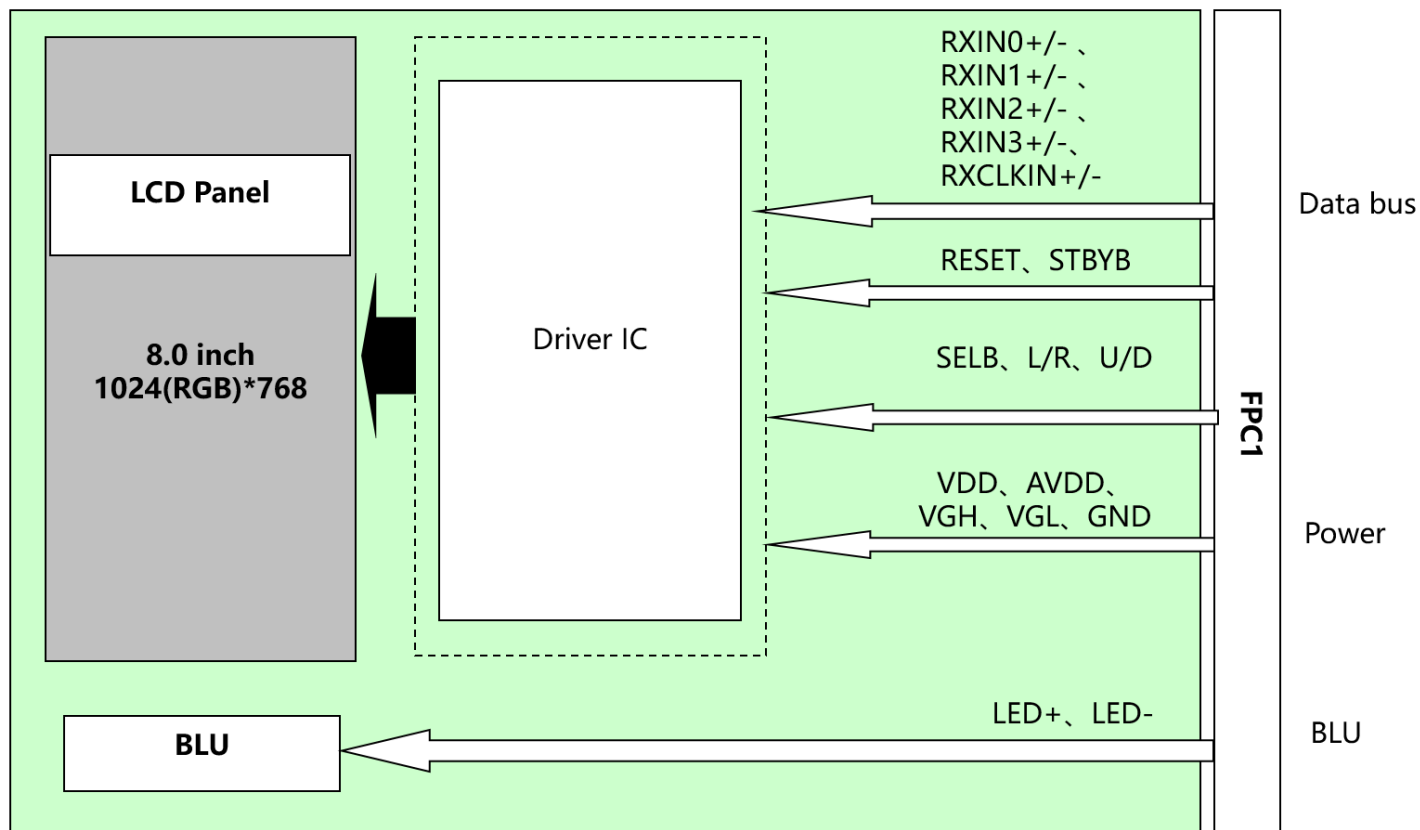
Note3: If LED is driven by high current, high ambient temperature & humidity condition, The life time of LED will be reduced.

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



Backlight Circuit Diagram  
9S-4P; 1f=15mA/LED

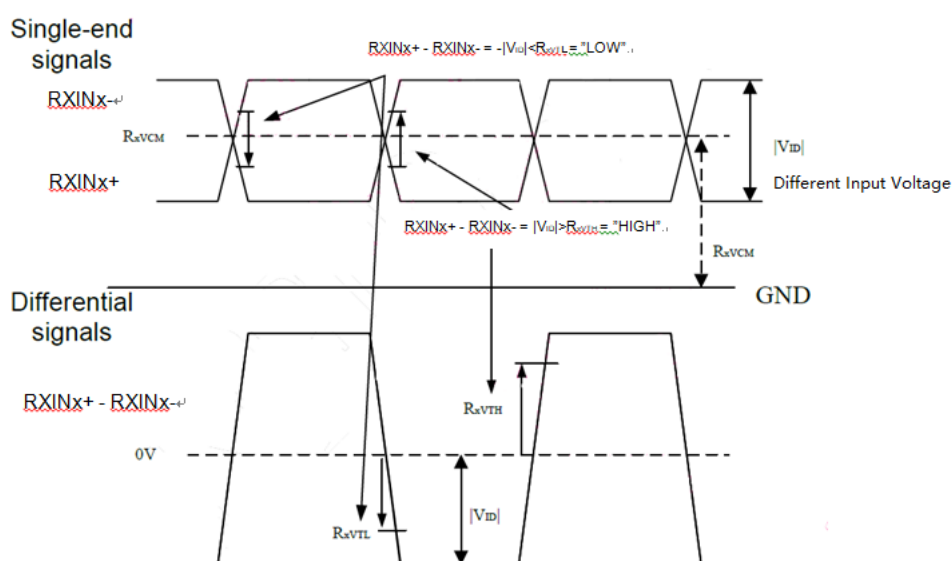
### 5.3 LCD Module Block Diagram



## 6. Interface Timing Characteristics

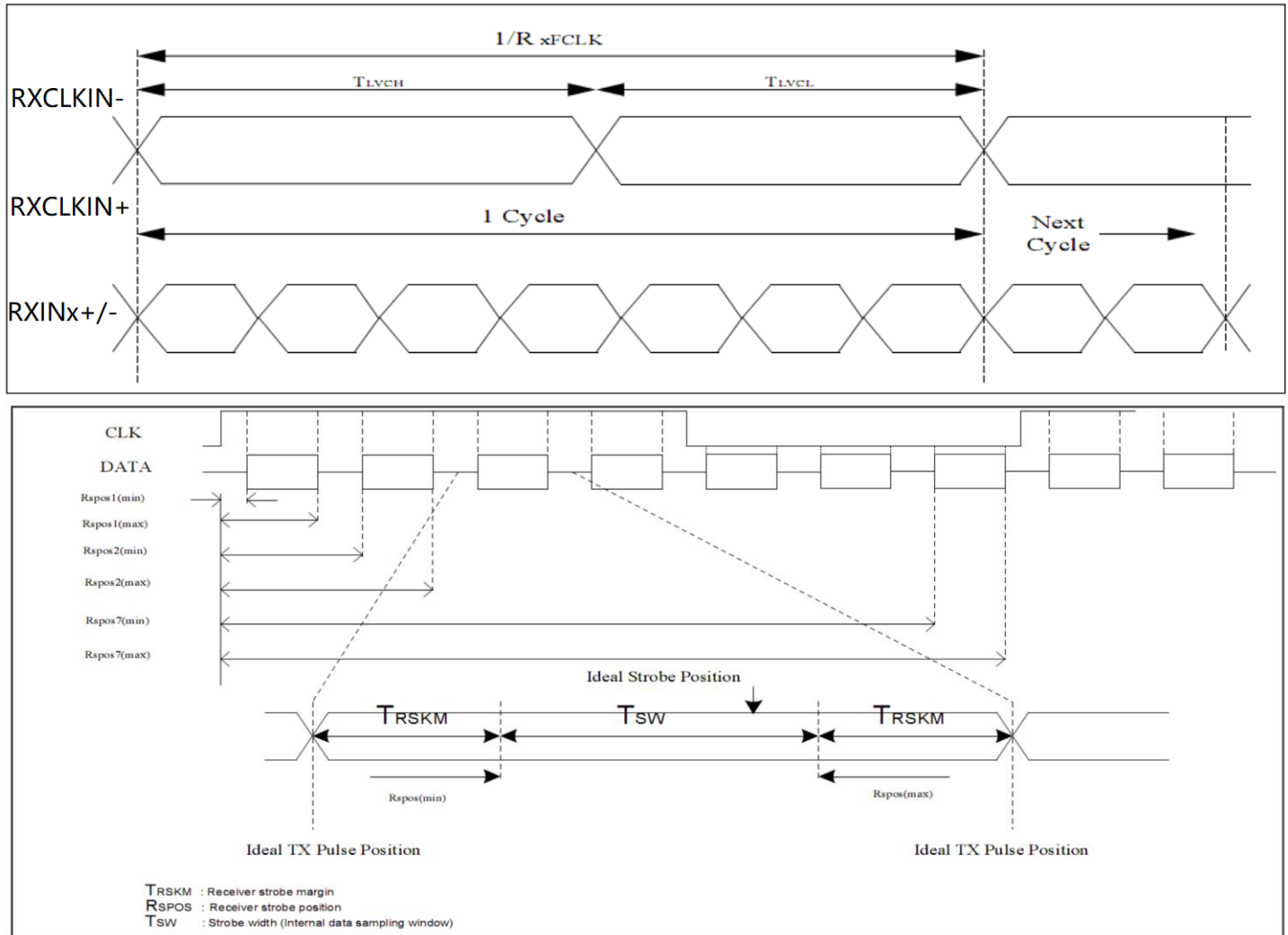
### 6.1 LVDS mode DC electrical characteristics

| Parameter                              | Symbol       | Min. | Typ. | Max. | Unit | Condition                                                                                           |
|----------------------------------------|--------------|------|------|------|------|-----------------------------------------------------------------------------------------------------|
| Input voltage range (singled-end)      | $R_{XVIN}$   | 400  | -    | 1650 | mV   | 1. $R_{XVCM} + 1/2 V_{ID}  \leq 1650\text{mV}$ .<br>2. $R_{XVCM} - 1/2 V_{ID}  \geq 400\text{mV}$ . |
| Differential input common mode voltage | $R_{XVCM}$   | 600  | 1200 | 1375 | mV   |                                                                                                     |
| Differential input voltage             | $ V_{ID} $   | 200  | -    | 400  | mV   |                                                                                                     |
| Differential input impedance           | $Z_{ID}$     | 80   | 100  | 120  | ohm  |                                                                                                     |
| Differential input leakage current     | $I_{LCLVDS}$ | -10  | -    | +10  | uA   |                                                                                                     |



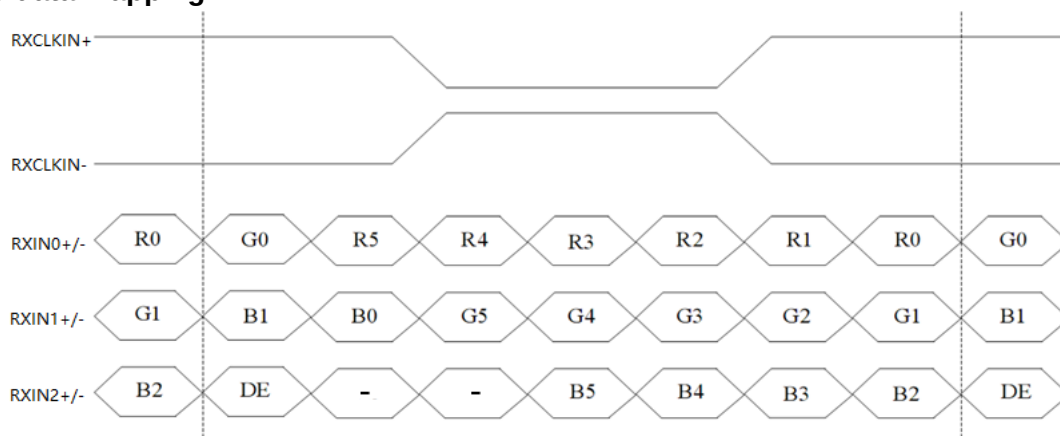
### 6.2 LVDS mode AC electrical characteristics

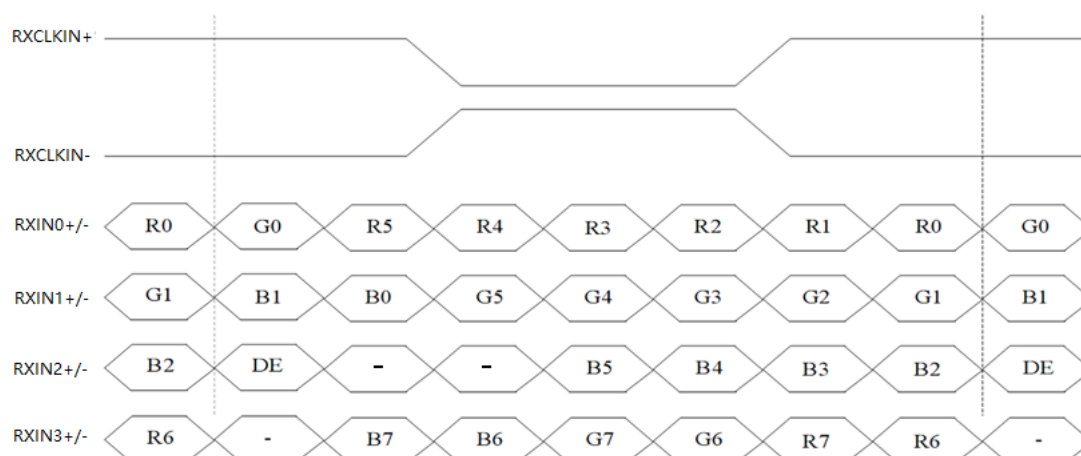
| Parameter              | Symbol     | Spec. |                     |      | Unit |
|------------------------|------------|-------|---------------------|------|------|
|                        |            | Min.  | Typ.                | Max. |      |
| Input data skew margin | $T_{RSKM}$ | -0.2  | -                   | 0.2  | UI   |
| Clock high time        | $T_{LVCH}$ | -     | $4/(7 * R_{XFCLK})$ | -    | ns   |
| Clock low time         | $T_{LVCL}$ | -     | $3/(7 * R_{XFCLK})$ | -    | ns   |



## 6.3 Data input format

### 6.3.1 LVDS data mapping

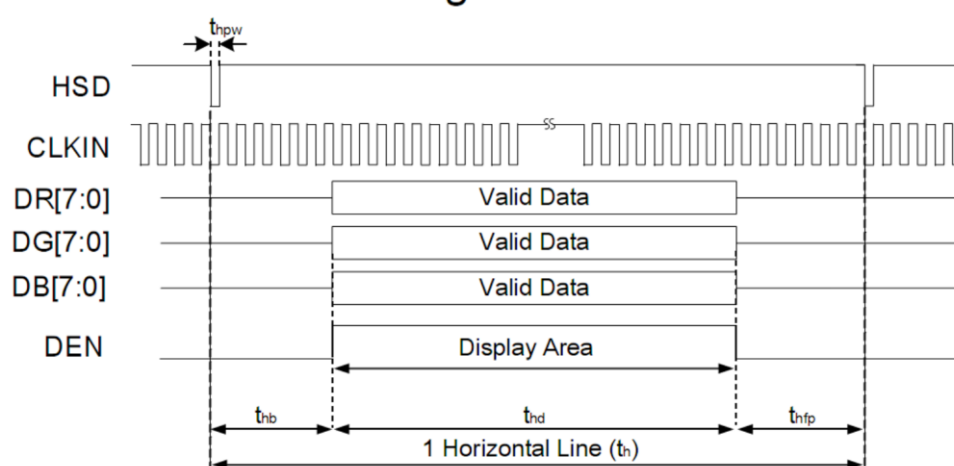




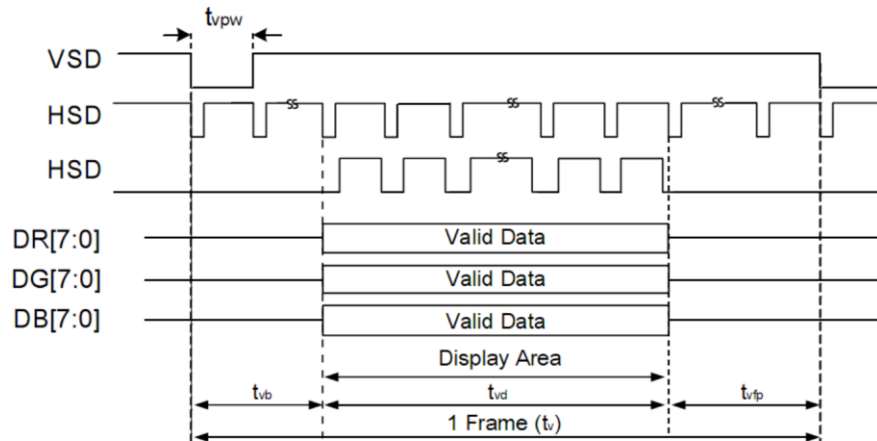
### 6.3.2 Parallel RGB input timing table

| LVDS Input Timing Parameter | Symbol | MIN  | Typ  | MAX  | Unit | Remark        |
|-----------------------------|--------|------|------|------|------|---------------|
| DCLK frequency              | tclk   | 58.8 | 65   | 67.9 | MHz  |               |
| Horizontal display area     | thd    | 1024 |      |      | tclk |               |
| Horizontal Blanking time    | thbt   | 205  | 320  | 348  | tclk | Thbt=thb+thfp |
| HSYNC period                | th     | 1229 | 1344 | 1372 | tclk |               |
| Vertical display area       | tvd    | 768  |      |      | th   |               |
| Vertical Blanking time      | tvbt   | 29   | 38   | 57   | th   | Tvbt=tvb+tvfp |
| VSD period                  | tv     | 797  | 806  | 825  | th   |               |
| Frame rate                  | FR     | 60   | 60   | 60   | Hz   |               |

### ●Horizontal timing

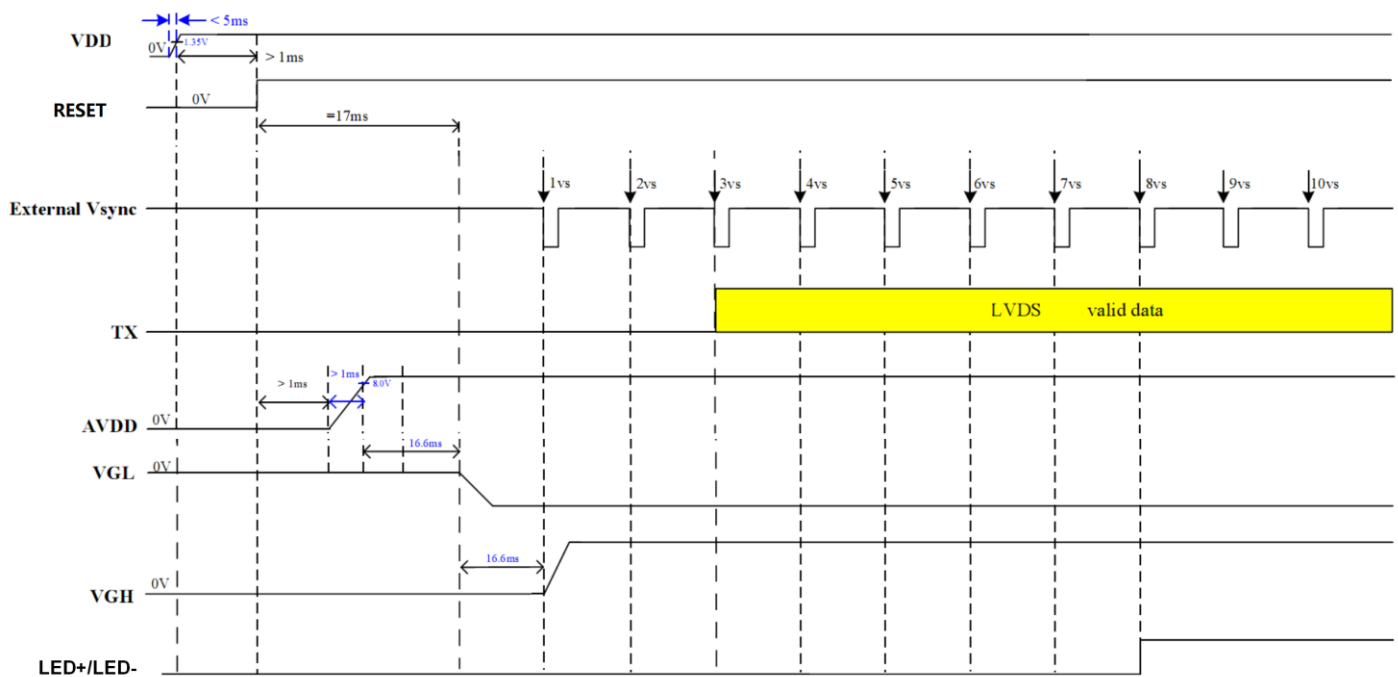


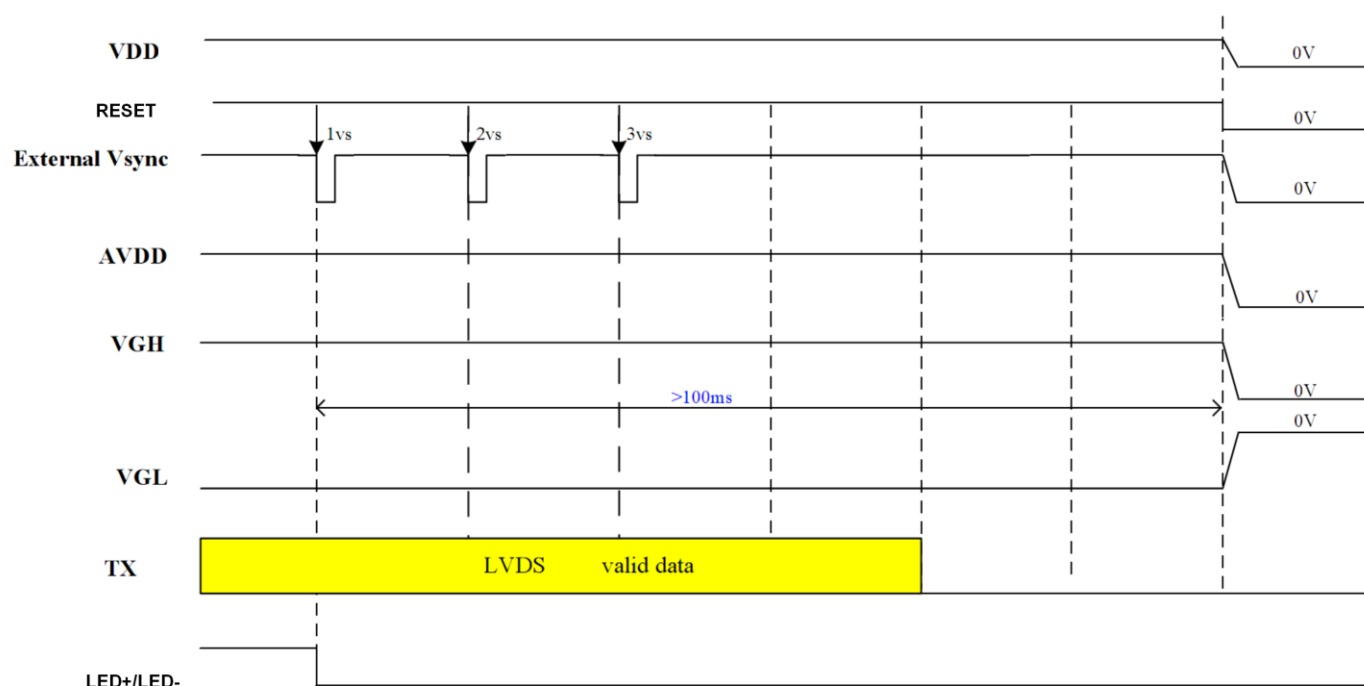
## ● Vertical timing



**Note1:** Module is DE MODE, HSD and VSD are not used.

## 6.4 Power ON/OFF Sequence





### Note1: VDD power on slew time

Be sure that VDD input can't result automatically in power on sequence.

| Parameter              | Symbol    | Conditions       | Spec. |      |     | Unit |
|------------------------|-----------|------------------|-------|------|-----|------|
|                        |           |                  | Min.  | Typ. | Max |      |
| VDD power on skew time | $T_{POR}$ | From 0V to 1.35V | 0.1   | -    | 5   | ms   |

### Note2: Timing requirements for RESET

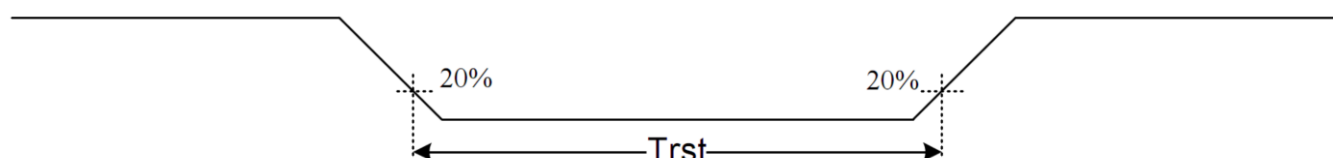
When RESET of the reset pin equals to Low, it will be in the condition of reset.

When it is in the condition of reset, it will make the device recover the initial set.

However, in order to avoid the reset noise cause reset, there is a mechanism to judge about whether the reset is needed or not.

The closed interval of Low can be shown as the following.

| Parameter             | Symbol    | Conditions | Spec. |      |     | Unit    |
|-----------------------|-----------|------------|-------|------|-----|---------|
|                       |           |            | Min.  | Typ. | Max |         |
| Reset low pulse width | $T_{rst}$ |            | 6     | -    | -   | $\mu s$ |



## 7. Optical Characteristics

| Item           |       | Symbol           | Condition       | Min     | Typ     | Max     | Unit              | Remark   |
|----------------|-------|------------------|-----------------|---------|---------|---------|-------------------|----------|
| View Angles    |       | θT               | CR ≥ 10         | 80      | 88      | -       | degree            | Note2,3  |
|                |       | θB               |                 | 80      | 88      | -       |                   |          |
|                |       | θL               |                 | 80      | 88      | -       |                   |          |
|                |       | θR               |                 | 80      | 88      | -       |                   |          |
| Contrast Ratio |       | CR               | θ=0°            | 1200    | 1800    | -       |                   | Note 3   |
| Response Time  |       | T <sub>ON</sub>  | 25℃             | --      | 35      | 45      | ms                | Note 4   |
|                |       | T <sub>OFF</sub> |                 |         |         |         |                   |          |
| Chromaticity   | White | x                | Backlight is on | (0.258) | (0.308) | (0.358) |                   | Note 1,5 |
|                |       | y                |                 | (0.285) | (0.335) | (0.385) |                   |          |
|                | Red   | x                |                 | (0.594) | (0.644) | (0.694) |                   | Note 1,5 |
|                |       | y                |                 | (0.288) | (0.338) | (0.388) |                   |          |
|                | Green | x                |                 | (0.274) | (0.324) | (0.374) |                   | Note 1,5 |
|                |       | y                |                 | (0.559) | (0.609) | (0.659) |                   |          |
|                | Blue  | x                |                 | (0.100) | (0.150) | (0.200) |                   | Note 1,5 |
|                |       | y                |                 | (0.002) | (0.052) | (0.102) |                   |          |
| Uniformity     |       | U                |                 | 80      | 85      | -       | %                 | Note 6   |
| NTSC           |       | -                |                 | 67      | 72      | -       | %                 | Note 5   |
| Luminance      |       | L                |                 | 360     | 450     | -       | cd/m <sup>2</sup> | Note 7   |

Table 7.1 Optical Parameters

Test Conditions:

1.  $I_F = (15)$  mA, and the ambient temperature is 25℃.
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.

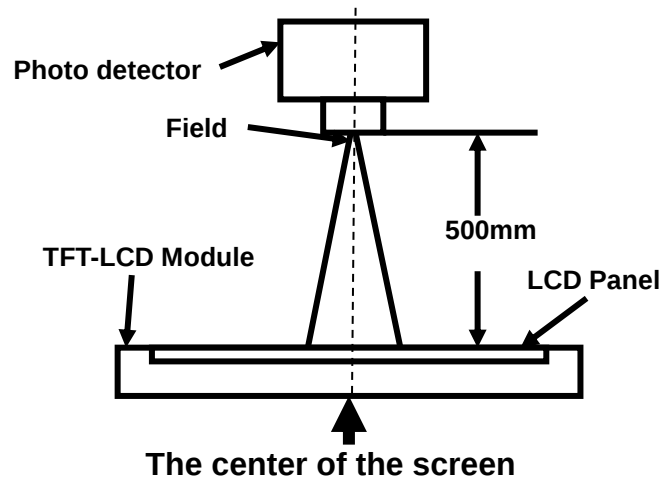


Fig1.Measurement Set Up

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

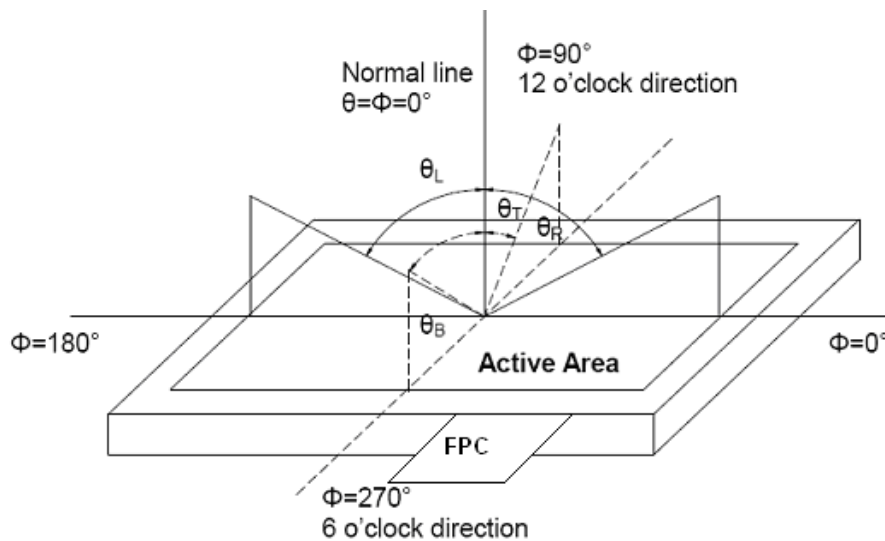


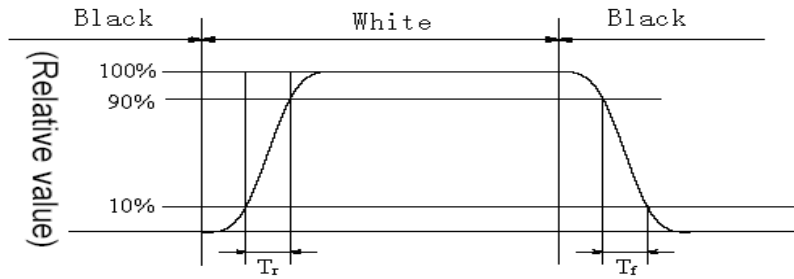
Fig2. Measurement viewing angle

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

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%.



**Fig3. Response Time Testing**

Note5: Definition of color chromaticity (CIE1931)

Color coordinates measured at center point of LCD.

Note6: Definition of Luminance Uniformity

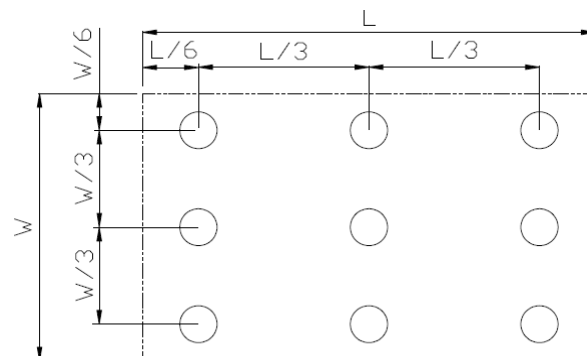
Active area is divided into 9 measuring areas (Refer Fig.5). Every measuring point is placed at the center of each measuring area.

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



**Fig4. 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                              | +70℃ , 240H                                                                                                                                    | IEC60068-2-1:2007<br>GB2423.2-2008                                                              |
| 2  | Low Temperature Operation                               | -20℃ , 240H                                                                                                                                    | IEC60068-2-1:2007<br>GB2423.1-2008                                                              |
| 3  | High Temperature Storage                                | +80℃ , 240H                                                                                                                                    | IEC60068-2-1:2007<br>GB2423.2-2008                                                              |
| 4  | Low Temperature Storage                                 | -30℃ , 240H                                                                                                                                    | IEC60068-2-1:2007<br>GB2423.1-2008                                                              |
| 5  | Storage at High Temperature and Humidity(non-operation) | +60℃ , 90%RH , 240H                                                                                                                            | IEC60068-2-78 :2001<br>GB/T2423.3—2006                                                          |
| 6  | Thermal Shock (non-operation)                           | -30℃ , 30min~80℃ , 30min , change time : 5min , 100cycle                                                                                       | Start with cold temperature,<br>End with high temperature,<br>IEC60068-2-14:1984,GB2423.22-2002 |
| 7  | ESD                                                     | C=150pF , R=330Ω , 5point/panel<br>Air : ±8kv , 5times ;<br>Contact : ±4kv , 5times ;<br>( Environment : 15℃~35℃ ,<br>30%~60% , 86Kpa~106Kpa ) | IEC61000-4-2:2001<br>GB/T17626.2-2006                                                           |
| 8  | Vibration Test                                          | 5Hz~20Hz~200Hz ,<br>0.01g2/Hz~0.01g2/Hz~0.001g2/Hz ,<br>X/Y/Z 30min                                                                            | GB/T 4857.23-2012                                                                               |
| 9  | Package Drop Test                                       | Height: X cm,1 corner, 3edges, 6 surfaces<br>Note : X > 10Kg:60cm ; ≤10Kg:80cm                                                                 | IEC60068-2-32:1990<br>GB/T2423.8—1995                                                           |

**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 24 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 guaranted, but not for all of the cosmetic specification.

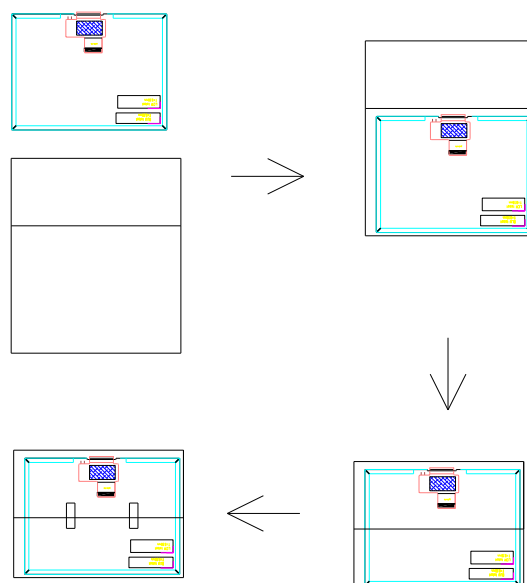


## 10. Packing Instruction

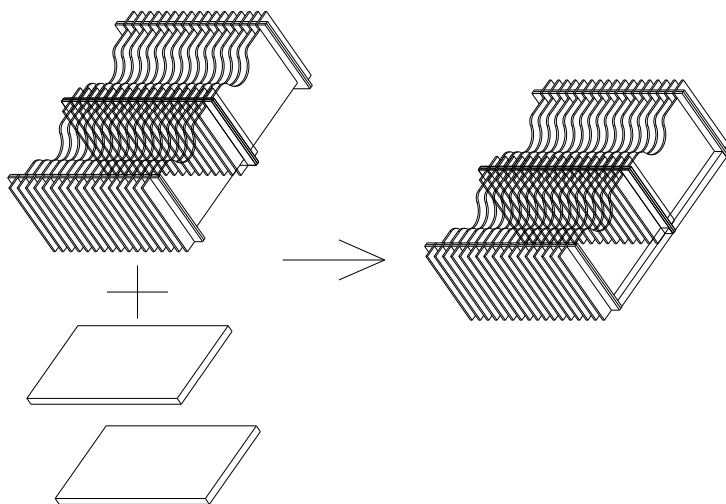
| No | Item                   | Model (Material) | Dimensions(mm)     | Unit Weight(Kg) | Quantity | Remark |
|----|------------------------|------------------|--------------------|-----------------|----------|--------|
| 1  | LCM module             | P0800XGF2MB00    | 182.73x137.65x3.85 | 0.16            | 26       |        |
| 2  | Partition              | Corrugated paper | 527X348X220        | 1.20            | 1        |        |
| 3  | Anti-static bubble Bag | PE               | 231X200X6          | 0.020           | 26       |        |
| 4  | Dust-Proof Bag         | PE               | 700X545            | 0.050           | 1        |        |
| 5  | Paper holder           | Corrugated Paper | 348×194×39         | 0.055           | 2        |        |
| 6  | Carton                 | Corrugated paper | 544X365X250        | 1.01            | 1        |        |
| 7  | EPE                    | EPE              | 346×193×25         | 0.033           | 2        |        |
| 8  | Lable                  | Lable            | 100×52             | 0.001           | 1        |        |
| 9  | Beauty-grain           | Tape             | 30×10              | 0.001           | 52       |        |
| 10 | Total weight           | 7.169 Kg±10%     |                    |                 |          |        |

### Packing flow chart

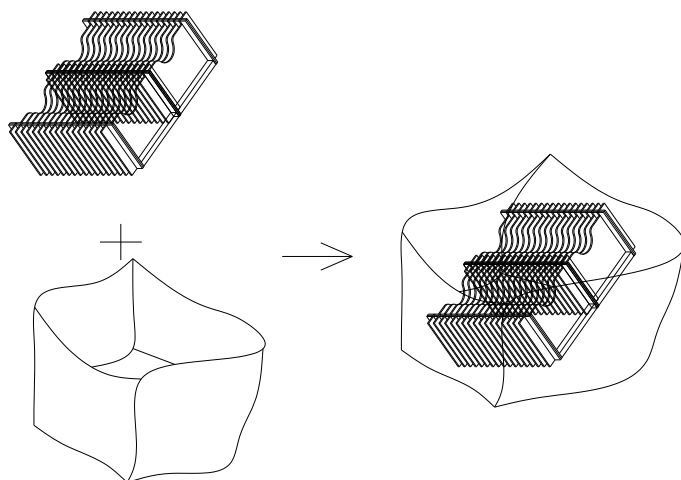
1. Load the module into an electrostatic bubble bag as shown in the figure below, fold the bubble bag, and fix it with masking tape



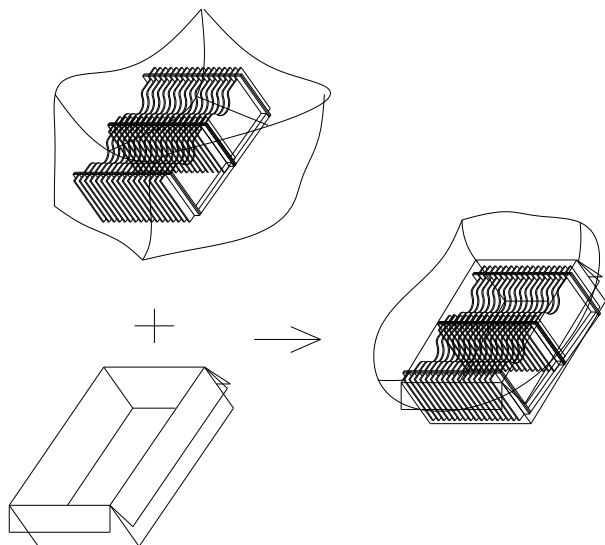
2. Load the EPE under the paper card (the surface of the paper card without a semi-circular arc), as shown in the following figure:



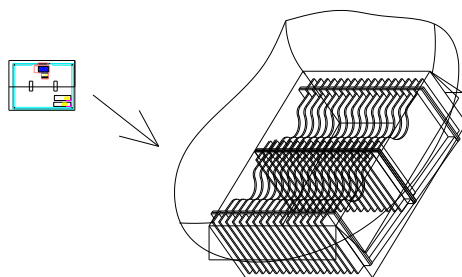
3. Put the combination of step 2 into a dust bag



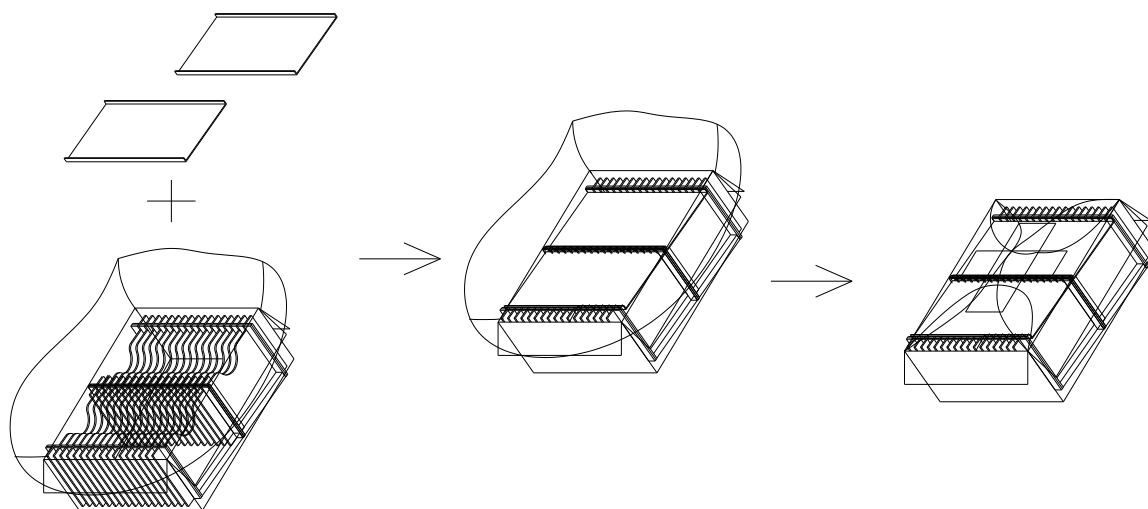
4. Put the assembled parts of STEP 3 into the carton



5. Put the modules into the carton in turn (the edges of the modules with missing corners are facing downward, and the modules can be facing the same direction in the paper card of the carton) The carton is loaded with 26 modules



6. Put the paper holder on top of the paper card, fold the excess part of the dust bag in half, and seal the dust bag with tape:



7. Seal the carton and attach the label



## 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 carefully to limit or stop its function when over current is detected on the LED.