

SPECIFICATION

[ ☒ ] Preliminary Specification  
[    ] Final Specification

Description                      23.8” 1920xRGBx1080 TFT-LCD Module  
Part Number                      P2380FHF1MB00

|            |       |                                                                    |           |
|------------|-------|--------------------------------------------------------------------|-----------|
| Customer   |       | Industrial Product Dept, PDBU<br>Tianma Microelectronics Co., Ltd. |           |
| Signatures | Date  | Approved By                                                        | Date      |
| <hr/>      | <hr/> | Zhu Guanchen                                                       | 2025/4/30 |
| <hr/>      | <hr/> | Reviewed By                                                        |           |
|            |       | Zhu Guanchen                                                       | 2025/4/30 |
|            |       | Prepared By                                                        |           |
|            |       | Zhou Jie                                                           | 2025/4/30 |
| Comments:  |       |                                                                    |           |

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

REVISION HISTORY

| Rev | Date       | Page | Revision Items                                                                                                                                                                                       | Editor   |
|-----|------------|------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|
| 1.0 | 2024/07/12 | -    | Preliminary SPEC released.                                                                                                                                                                           | Xu Jitao |
| 1.1 | 2025/4/30  | -    | P8: IF 130mA => 260mA<br>P9: Add more information about voltage input.<br>P15: Update chromaticity.<br>P20: Update mechanical drawing.<br>P21: Update information about nameplate label and packing. | Zhou Jie |
|     |            |      |                                                                                                                                                                                                      |          |
|     |            |      |                                                                                                                                                                                                      |          |
|     |            |      |                                                                                                                                                                                                      |          |
|     |            |      |                                                                                                                                                                                                      |          |
|     |            |      |                                                                                                                                                                                                      |          |
|     |            |      |                                                                                                                                                                                                      |          |
|     |            |      |                                                                                                                                                                                                      |          |
|     |            |      |                                                                                                                                                                                                      |          |
|     |            |      |                                                                                                                                                                                                      |          |
|     |            |      |                                                                                                                                                                                                      |          |
|     |            |      |                                                                                                                                                                                                      |          |
|     |            |      |                                                                                                                                                                                                      |          |
|     |            |      |                                                                                                                                                                                                      |          |
|     |            |      |                                                                                                                                                                                                      |          |
|     |            |      |                                                                                                                                                                                                      |          |
|     |            |      |                                                                                                                                                                                                      |          |
|     |            |      |                                                                                                                                                                                                      |          |

# CONTENTS

|                                                     |           |
|-----------------------------------------------------|-----------|
| <b>1. SUMMARY .....</b>                             | <b>1</b>  |
| 1.1 General Description .....                       | 1         |
| 1.2 Features .....                                  | 1         |
| <b>2. GENERAL SPECIFICATIONS .....</b>              | <b>2</b>  |
| <b>3. INPUT / OUTPUT TERMINALS .....</b>            | <b>3</b>  |
| 3.1 CN1 Pin assignment (LCD Interface) .....        | 3         |
| 3.2 CN2 Pin assignment (Backlight) .....            | 4         |
| 3.3 Positions of socket .....                       | 4         |
| <b>4. ABSOLUTE MAXIMUM RATINGS .....</b>            | <b>5</b>  |
| <b>5. ELECTRICAL CHARACTERISTICS .....</b>          | <b>6</b>  |
| 5.1 DC Characteristics for Panel Driving .....      | 6         |
| 5.2 DC Characteristics for Backlight Driving .....  | 7         |
| 5.3 LCD Module Block Diagram .....                  | 8         |
| 5.4 Display Position .....                          | 9         |
| <b>6. INTERFACE TIMING CHARACTERISTICS .....</b>    | <b>10</b> |
| <b>7. OPTICAL CHARACTERISTICS .....</b>             | <b>13</b> |
| <b>8. RELIABILITY TEST .....</b>                    | <b>16</b> |
| <b>9. MECHANICAL DRAWING .....</b>                  | <b>17</b> |
| 9.1 Mechanical Drawing Of LCM .....                 | 17        |
| 9.2 Markings .....                                  | 18        |
| <b>10. PACKING INSTRUCTION .....</b>                | <b>18</b> |
| 10.1 Packing Box .....                              | 18        |
| <b>11. PRECAUTIONS FOR USE OF LCD MODULES .....</b> | <b>19</b> |
| 11.1 Handling Precautions .....                     | 19        |
| 11.2 Storage precautions .....                      | 19        |
| 11.3 Transportation Precautions .....               | 19        |
| 11.4 Screen saver Precautions .....                 | 19        |
| 11.5 Safety Precautions .....                       | 19        |

## 1. Summary

### 1.1 General Description

This is a 23.8 inch a-Si TFT-LCD module with normal-black technology. It is composed of a TFT-LCD panel, PCB, and a LED backlight unit.

### 1.2 Features

- Ultra-wide viewing angle
- High contrast ratio
- Interface: 2 port LVDS
- LED driver integrated
- Surface treatment: Anti-Glare
- 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                | 23.8 inches                                         |        |
|                            | Resolution          | 1920(RGB)x1080                                      |        |
|                            | Pixel Pitch         | 0.2745(H)×0.2745(V)                                 | mm     |
|                            | TFT Active Area     | 527.04(H)×296.46(V)                                 | mm     |
|                            | Technology Type     | a-Si                                                |        |
|                            | Pixel Configuration | R.G.B Vertical Stripe                               |        |
|                            | Display Mode        | SFT                                                 |        |
|                            | Surface Treatment   | AG                                                  |        |
| Mechanical Characteristics | LCM (W x H x D)     | Typ. 535.0 (W) x 313.0 (H) x 12.2 (D) mm (With PCB) | mm     |
|                            | Weight              | Typ. (2250)                                         | g      |
| Optical Characteristics    | Luminance           | Typ. 350                                            | cd/m2  |
|                            | Contrast Ratio      | Typ. 1800:1                                         |        |
|                            | NTSC                | Typ. 72                                             | %      |
|                            | Viewing Angle       | 89/89/89/89                                         | degree |
| Electrical Characteristics | Interface           | LVDS interface (2 port)                             |        |
|                            | Color Depth         | 16.7M                                               | color  |
|                            | Power Consumption   | LCD:TBD;<br>Backlight: TBD                          | W      |

**Table 2.1 General Specifications**

### 3. Input / Output Terminals

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

| Connector Information |                     |
|-----------------------|---------------------|
| LCD Module connector  | STM: MSBKT2407P30HB |

**Table 3.1.1 Connector information**

| Pin No. | Symbol  | Signal                                      | Remarks |
|---------|---------|---------------------------------------------|---------|
| 1       | RXO0-   | Negative Transmission data of Pixel 0 (ODD) |         |
| 2       | RXO0+   | Positive Transmission data of Pixel 0 (ODD) |         |
| 3       | RXO1-   | Negative Transmission data of Pixel 1(ODD)  |         |
| 4       | RXO1+   | Positive Transmission data of Pixel 1(ODD)  |         |
| 5       | RXO2-   | Negative Transmission data of Pixel 2(ODD)  |         |
| 6       | RXO2+   | Positive Transmission data of Pixel 2(ODD)  |         |
| 7       | GND     | Power Ground                                |         |
| 8       | RXOCLK- | Negative Transmission Clock (ODD)           |         |
| 9       | RXOCLK+ | Positive Transmission Clock (ODD)           |         |
| 10      | RXO3-   | Negative Transmission data of Pixel 3(ODD)  |         |
| 11      | RXO3+   | Positive Transmission data of Pixel 3(ODD)  |         |
| 12      | RXE0-   | Negative Transmission data of Pixel 0(EVEN) |         |
| 13      | RXE0+   | Positive Transmission data of Pixel 0(EVEN) |         |
| 14      | GND     | Power Ground                                | Note1   |
| 15      | RXE1-   | Negative Transmission data of Pixel 1(EVEN) |         |
| 16      | RXE1+   | Positive Transmission data of Pixel 1(EVEN) |         |
| 17      | GND     | Power Ground                                |         |
| 18      | RXE2-   | Negative Transmission data of Pixel 2(EVEN) |         |
| 19      | RXE2+   | Positive Transmission data of Pixel 2(EVEN) |         |
| 20      | RXECLK- | Negative Transmission Clock (EVEN)          |         |
| 21      | RXECLK+ | Positive Transmission Clock (EVEN)          |         |
| 22      | RXE3-   | Negative Transmission data of Pixel 3(EVEN) |         |
| 23      | RXE3+   | Positive Transmission data of Pixel 3(EVEN) |         |
| 24      | GND     | Power Ground                                |         |
| 25      | NC      | Not connected                               |         |
| 26      | NC      | Not connected                               |         |
| 27      | NC      | Not connected                               |         |
| 28      | VCC     | Power Supply: +5V                           |         |
| 29      | VCC     |                                             |         |
| 30      | VCC     |                                             |         |

**Table 3.1.2 Pin Assignment for LCD Interface**

Note1: All of the GND pins should be connected to the system ground.

## 3.2 CN2 Pin assignment (Backlight)

| Connector Information |                        |
|-----------------------|------------------------|
| BLU Module connector  | Cvilux: CI1406M1VL0-NH |

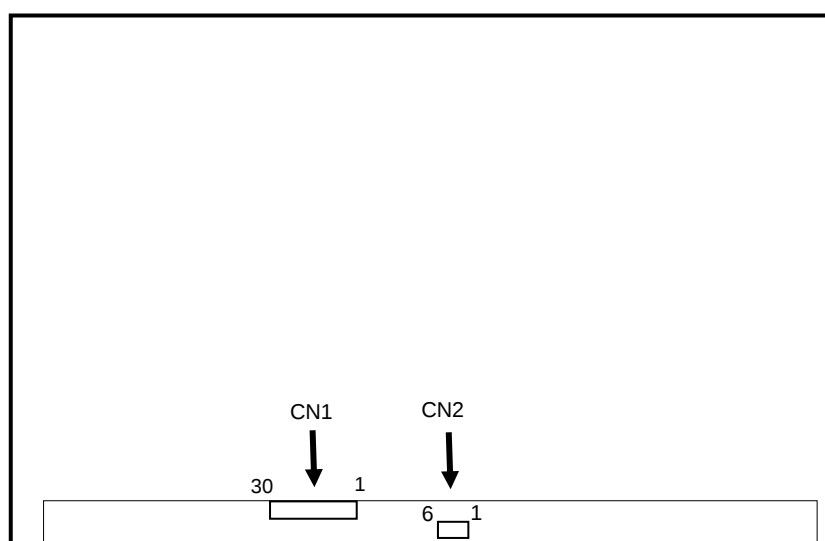
**Table 3.2.1 Connector information**

| Pin No. | Symbol | Function    | Description |
|---------|--------|-------------|-------------|
| 1       | LED_K  | LED Cathode | -           |
| 2       | LED_K  | LED Cathode | -           |
| 3       | LED_A  | LED Anode   | -           |
| 4       | LED_A  | LED Anode   | -           |
| 5       | LED_K  | LED Cathode | -           |
| 6       | LED_K  | LED Cathode | -           |

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

## 3.3 Positions of socket

Rear side



**Table 3.2 Positions of Socket**

## 4. Absolute Maximum Ratings

GND=0V

| Item                       |                          | Symbol | Rating        | Unit | Remark           |
|----------------------------|--------------------------|--------|---------------|------|------------------|
| Power supply voltage       | LCD panel                | VCC    | -0.3 to +6.0  | V    | Ta= 25°C         |
| Backlight current (total)  |                          | IF     | 260           | mA   |                  |
| Input voltage for signals  | Display signals<br>Note1 | Vi     | T.B.D.        | V    |                  |
| Storage temperature        |                          | Tst    | -20 to +60    | °C   | -                |
| Operating temperature      | Front surface            | TopF   | 0 to +50      | °C   | Note2            |
|                            | Rear surface             | TopF   | 0 to +50      | °C   | Note3            |
| Relative humidity<br>Note4 |                          | RH     | ≤ 95          | %    | Ta ≤ 40°C        |
|                            |                          |        | ≤ 85          | %    | 40°C < Ta ≤ 50°C |
|                            |                          |        | ≤ 55          | %    | 50°C < Ta ≤ 60°C |
| Absolute humidity<br>Note4 |                          | AH     | ≤ 70<br>Note5 | g/m3 | Ta= 60°C         |

**Table 4.1 Absolute Maximum Ratings**

Note1: RXOn+/-, RXEn+/-, RXOCLK+/-, RXECLK+/-,

Note2: Measured at LCD panel surface (including self-heat)

Note3: Measured at LCD module's rear shield surface (including self-heat)

Note4: No condensation

Note5: Water amount at Ta= 60°C and RH= 55%

Note6: 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

(Ta= 25°C)

| Parameter                            |            | Symbol          | Min. | Typ.   | Max.                | Unit  | Remarks                |
|--------------------------------------|------------|-----------------|------|--------|---------------------|-------|------------------------|
| Power supply voltage                 |            | VCC             | 4.5  | 5.0    | 5.5                 | V     | -                      |
| Power supply current                 |            | ICC             | -    | T.B.D. | T.B.D.              | mA    | at VCC=5.0V<br>Note1,2 |
| Permissible ripple voltage           |            | VRP             | -    | -      | 200                 | mVp-p | for VCC<br>Note3,4,5   |
| Differential input voltage           |            | VID             | 100  | -      | 600                 | mV    | Note6                  |
| Differential input common voltage    |            | RxVCM           | -    | 1.2    | 3.3-0.4-<br> VID /2 | V     | Note6                  |
| Differential input threshold voltage | Low level  | V <sub>TL</sub> | -100 | -      | -                   | mV    | Note6                  |
|                                      | High level | V <sub>TH</sub> | -    | -      | 100                 | mV    | Note6                  |
| Inrush Current                       |            | Inrush_VCC      | -    | -      | 1.5                 | A     | Rising time<br>470 μs  |

Table 5.1 LCD Module Electrical Characteristics

Note1: Write pattern [by IEC 61747-6]

Note2: Pattern for maximum current

Note3: This product works even if the ripple voltage levels are over the permissible values, but there might be noise on the display image.

Note4: The permissible ripple voltage includes spike noise.

Note5: The load variation influence does not include.

Note6: LVDS DC electrical characteristics

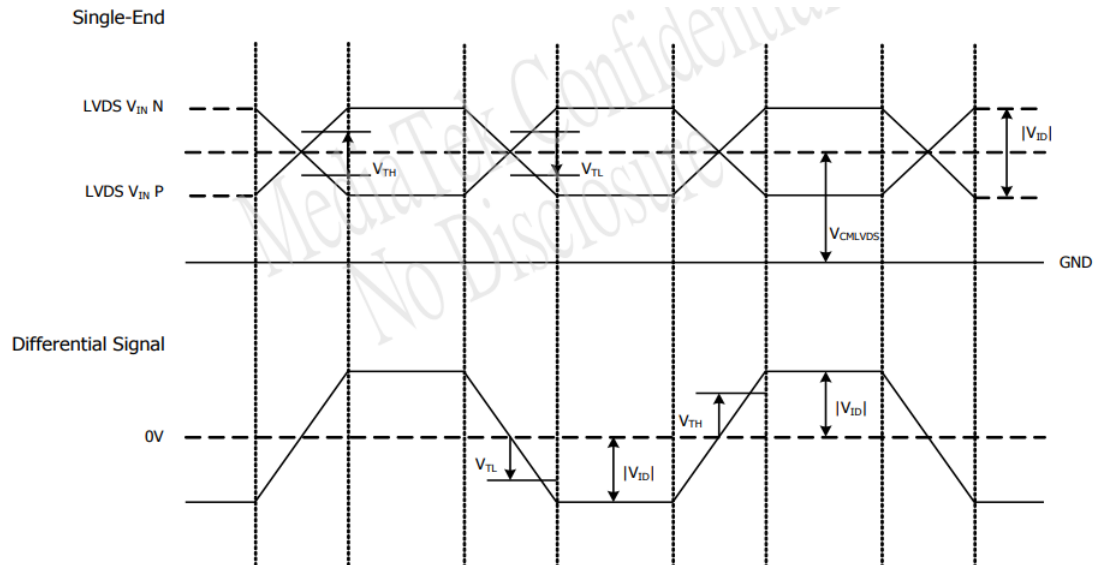


Figure 5.1 LVDS characteristics

## 5.2 DC Characteristics for Backlight Driving

| Item                        | Symbol | Min. | Typ.  | Max. | Unit | Remarks      |
|-----------------------------|--------|------|-------|------|------|--------------|
| Forward Current             | IF     | -    | 65    | -    | mA   | For each LED |
| Forward Current Voltage     | VF     | -    | 3.0   | 3.4  | V    |              |
| Backlight Power Consumption | WBL    | -    | 15.6  | 17.7 | W    |              |
| LED life time               | --     | -    | 50000 | -    | Hrs  |              |

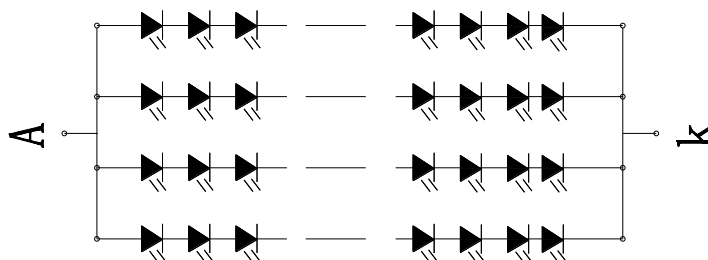
**Table 5.2.1 LED Backlight Characteristics**

Note1: I F is defined for each channel.

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

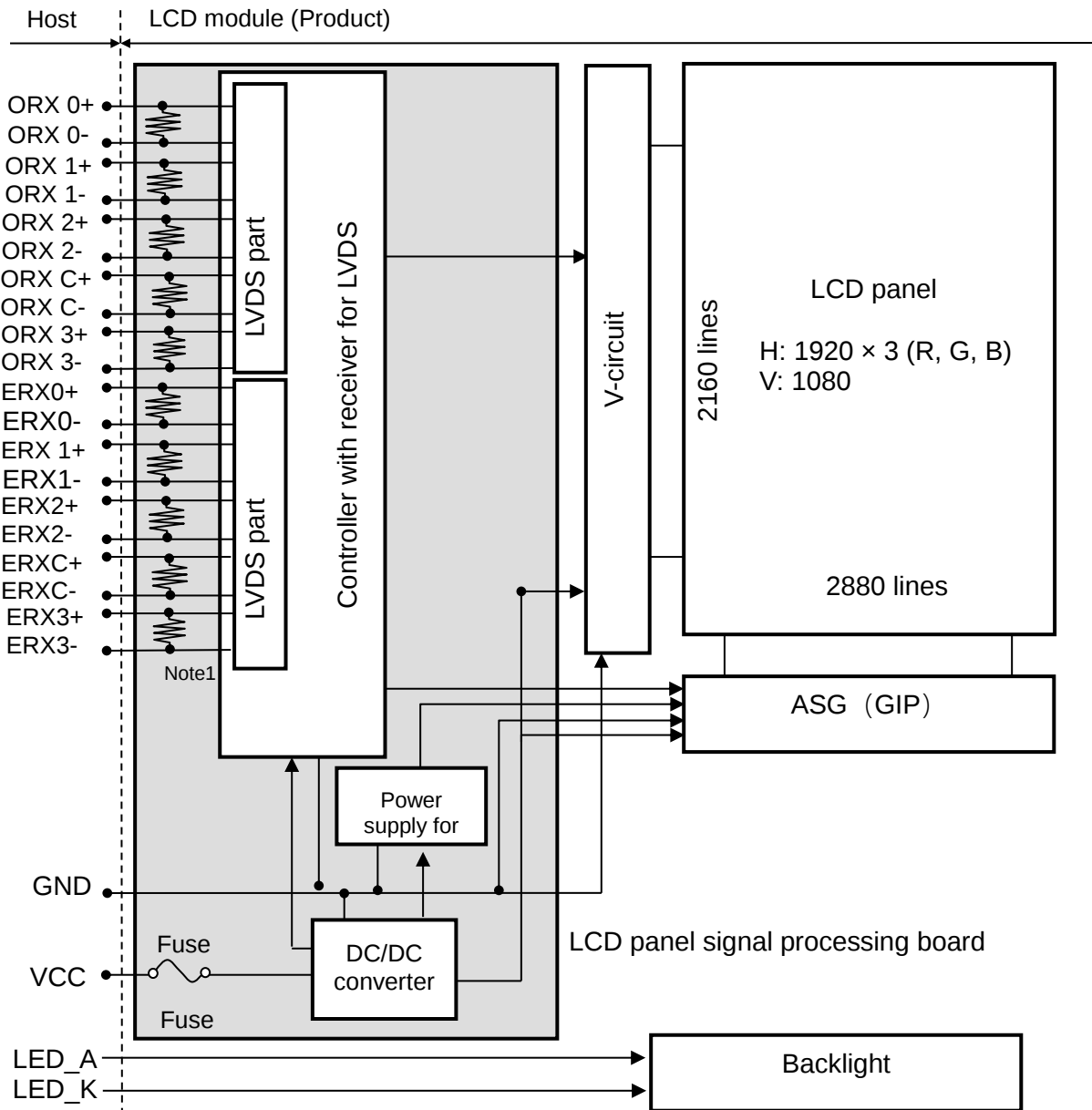
Note3: If LED is driven by high current, high ambient temperature & humidity condition, The life time of LED will be reduced.

Note4: Optical performance should be evaluated at Ta=25°C. Only If LED is driven by high current, high ambient temperature & humidity condition. The life time of LED will be reduced. Operating life means brightness goes down to 50% of initial brightness. Typical operating life time is an estimated data.



BLU Circuit:20S-4P

### 5.3 LCD Module Block Diagram



5.4 Display Position

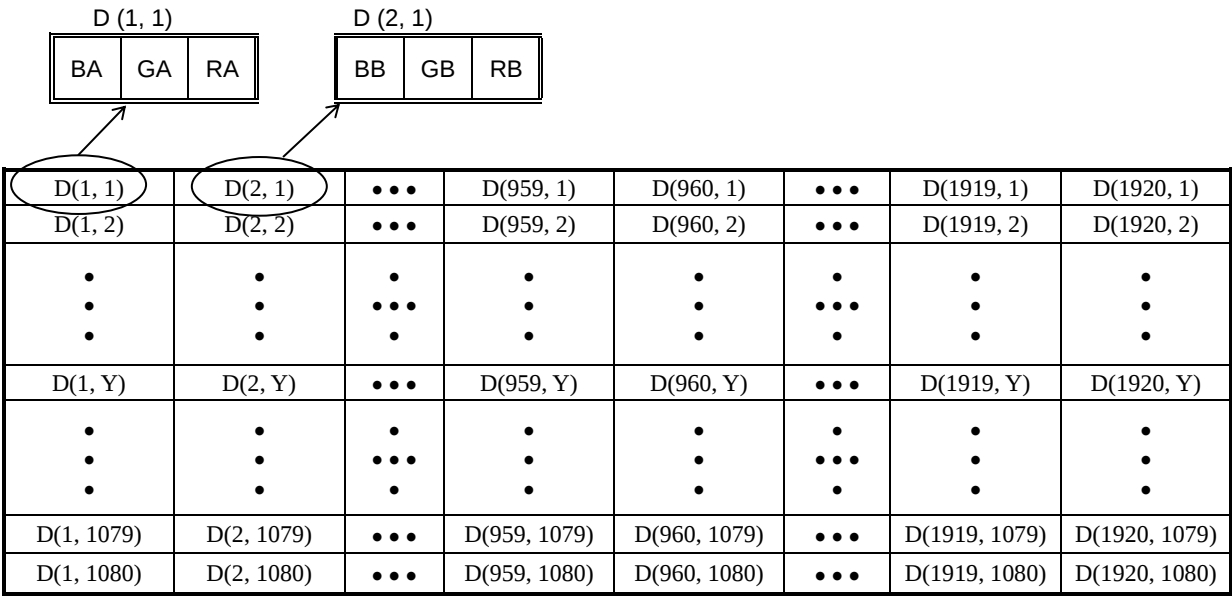
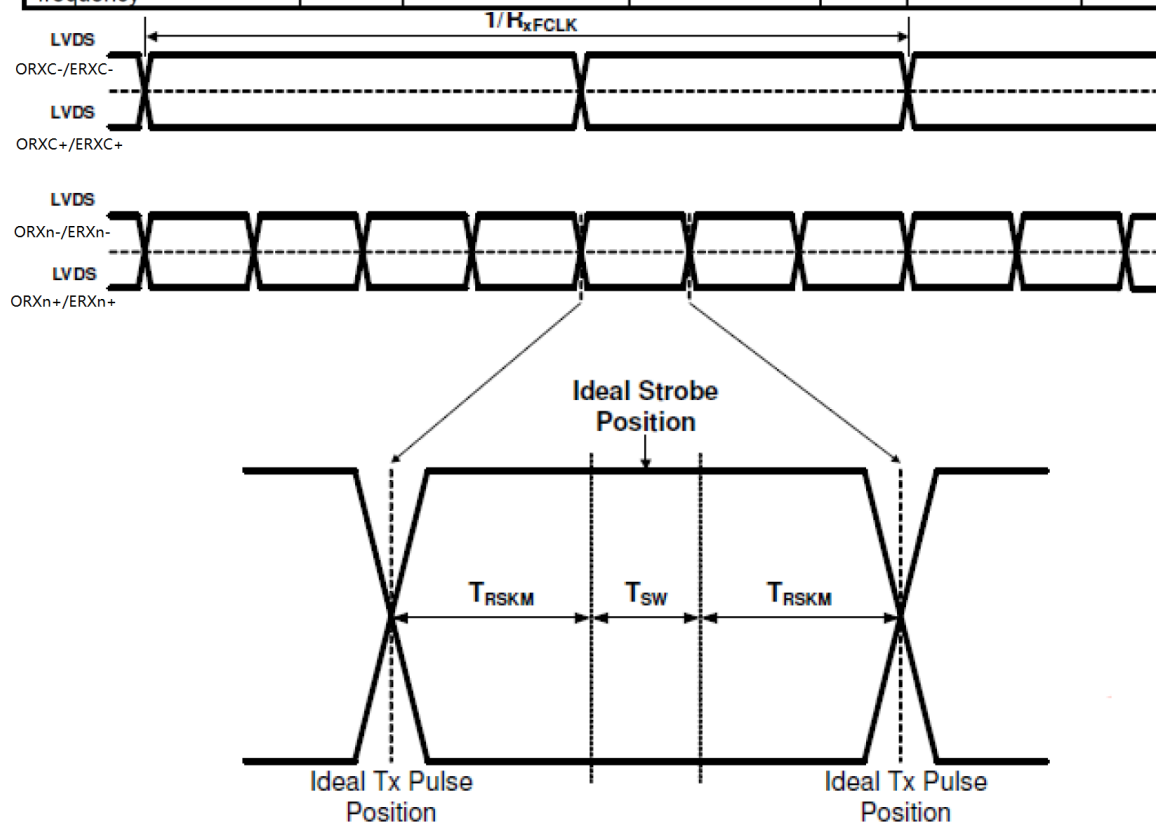


Figure 5.5 Display Position

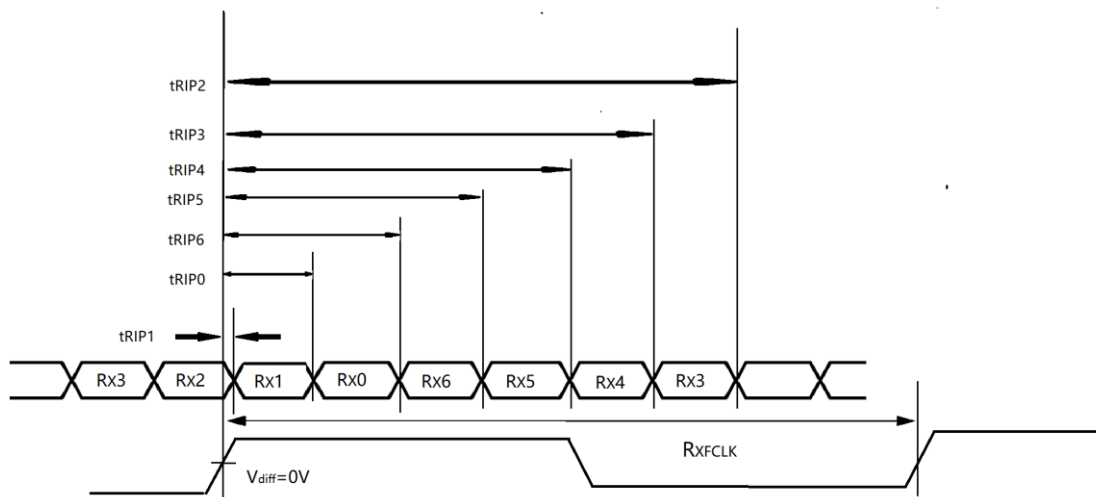
## 6. Interface Timing Characteristics

### 6.1 LVDS AC Electrical Characteristics

| Parameter                   | Symbol     | Condition                                                         | Min.               | Typ.   | Max.               | Unit |
|-----------------------------|------------|-------------------------------------------------------------------|--------------------|--------|--------------------|------|
| Clock frequency             | $R_{xCLK}$ |                                                                   |                    | 74.25  |                    | MHz  |
| Input data Position0        | $t_{RIP1}$ |                                                                   | $- t_{RMG} $       | 0.0    | $ t_{RMG} $        | ns   |
| Input data Position1        | $t_{RIP0}$ |                                                                   | $T/7 -  t_{RMG} $  | $T/7$  | $T/7 +  t_{RMG} $  | ns   |
| Input data Position2        | $t_{RIP6}$ |                                                                   | $2T/7 -  t_{RMG} $ | $2T/7$ | $2T/7 +  t_{RMG} $ | ns   |
| Input data Position3        | $t_{RIP5}$ |                                                                   | $3T/7 -  t_{RMG} $ | $3T/7$ | $3T/7 +  t_{RMG} $ | ns   |
| Input data Position4        | $t_{RIP4}$ |                                                                   | $4T/7 -  t_{RMG} $ | $4T/7$ | $4T/7 +  t_{RMG} $ | ns   |
| Input data Position5        | $t_{RIP3}$ |                                                                   | $5T/7 -  t_{RMG} $ | $5T/7$ | $5T/7 +  t_{RMG} $ | ns   |
| Input data Position6        | $t_{RIP2}$ |                                                                   | $6T/7 -  t_{RMG} $ | $6T/7$ | $6T/7 +  t_{RMG} $ | ns   |
| Input data skew margin      | $T_{RSKM}$ | $R_{xCLK} = 85\text{MHz}$<br>$R_{xVTH} - R_{xVTL} = 200\text{mV}$ | -450               | -      | +450               | ps   |
| Input spread spectrum ratio | SSR        |                                                                   | -                  | -      | +/-3               | %    |
| Input modulation frequency  | $F_M$      |                                                                   | -                  | -      | 200k               | Hz   |



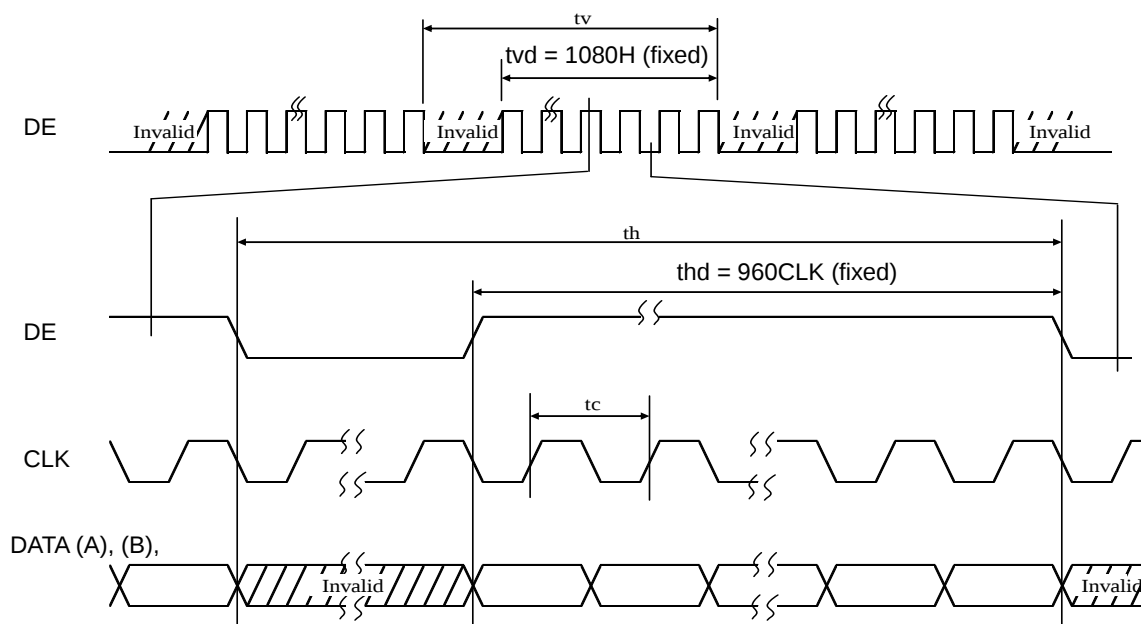
Note 1:  $T_{SW}$  : Strobe width (LVDS IP internal data sampling window)



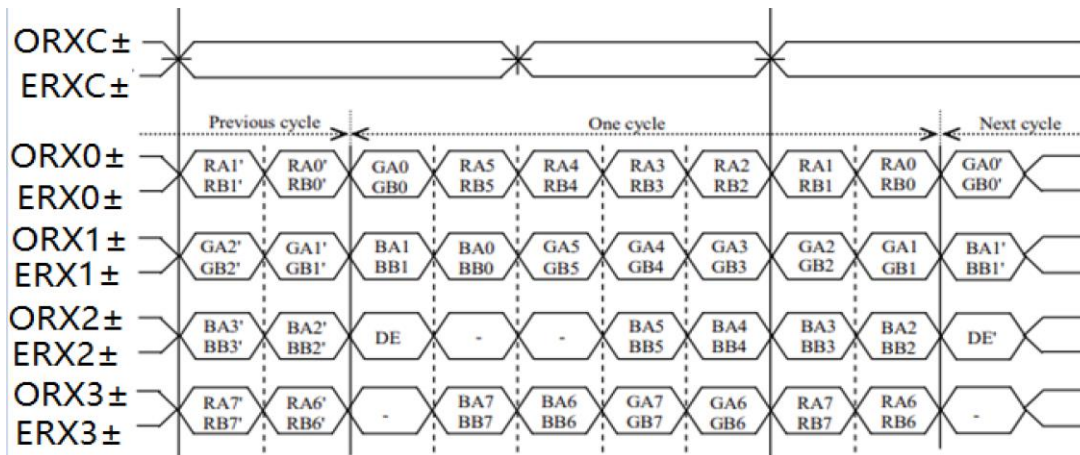
## 6.2 Timing Characteristics

| Parameter                | Symbol | Min  | Typ    | Max | Unit | Remark |
|--------------------------|--------|------|--------|-----|------|--------|
| CLK frequency            | tclk   | TBD  | 74.25  | TBD | MHz  |        |
| Horizontal display area  | thd    | 960  |        |     | tclk |        |
| Horizontal Blanking time | thbt   | TBD  | (140)  | TBD | tclk |        |
| HSYNC period             | th     | TBD  | (1100) | TBD | tclk |        |
| Vertical display area    | tvd    | 1080 |        |     | th   |        |
| Vertical Blanking time   | tvbt   | TBD  | (45)   | TBD | th   |        |
| VSD period               | tv     | TBD  | (1125) | TBD | th   |        |
| Frame rate               | FR     | 60   |        |     | Hz   |        |

## 6.3 Input Signal Timing Chart



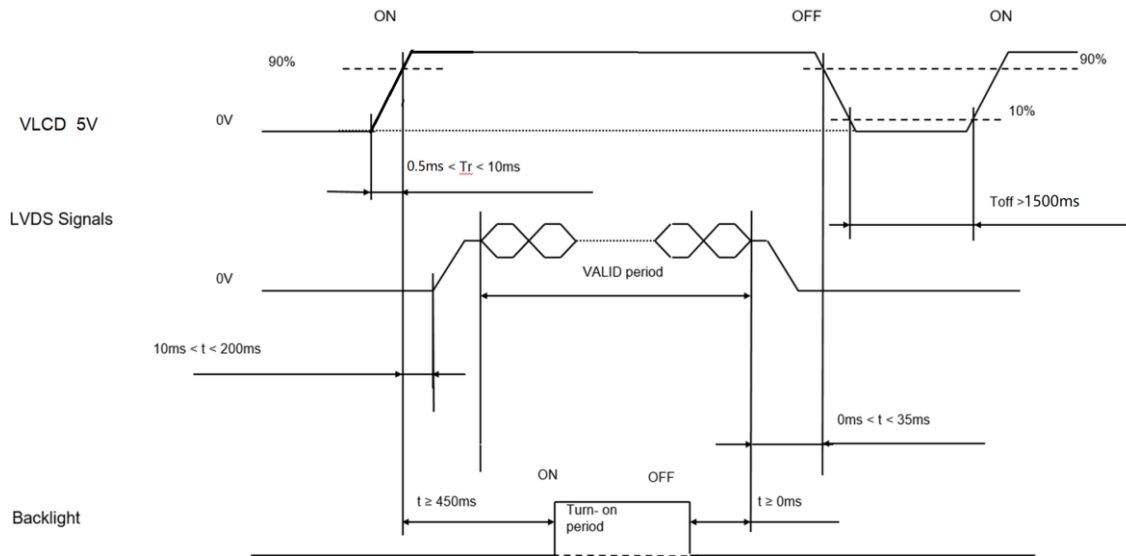
## 6.4 Input Data Mapping



Note1: LSB (Least Significant Bit) – R0, G0, B0 MSB (Most Significant Bit) – R7, G7, B7

Note2: Twist pair wires with 100Ω (Characteristic impedance) should be used between LCD panel signal processing board and LVDS transmitter.

## 6.5 Power On/Off Sequence



## 7. Optical Characteristics

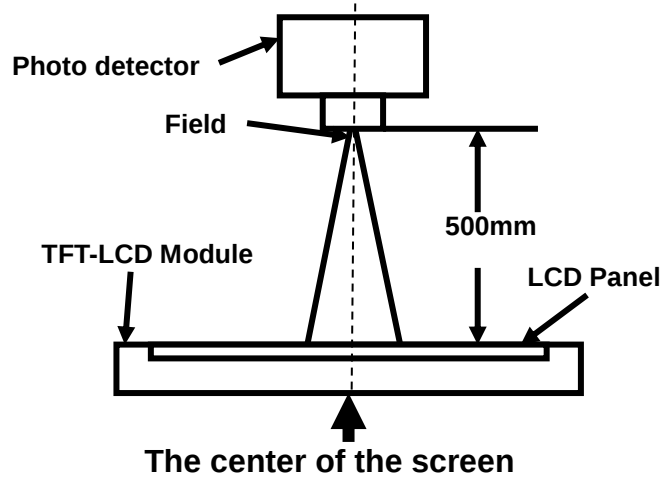
| Item           |       | Symbol           | Condition      | Min   | Typ   | Max   | Unit              | Remark   |
|----------------|-------|------------------|----------------|-------|-------|-------|-------------------|----------|
| View Angles    |       | θT               | CR≥10          | 80    | 89    | -     | Degree            | Note2,3  |
|                |       | θB               |                | 80    | 89    | -     |                   |          |
|                |       | θL               |                | 80    | 89    | -     |                   |          |
|                |       | θR               |                | 80    | 89    | -     |                   |          |
| Contrast Ratio |       | CR               | θ=0°           | 1300  | 1800  | -     | -                 | Note 3   |
| Response Time  |       | T <sub>ON</sub>  | 25℃            | -     | 30    | 40    | ms                | Note 4   |
|                |       | T <sub>OFF</sub> |                |       |       |       |                   |          |
| Chromaticity   | White | x                | θ=0°<br>Ta=25℃ | 0.264 | 0.294 | 0.324 | -                 | Note 1,5 |
|                |       | y                |                | 0.277 | 0.307 | 0.337 |                   |          |
|                | Red   | x                |                | 0.622 | 0.652 | 0.682 | -                 | Note 1,5 |
|                |       | y                |                | 0.301 | 0.331 | 0.361 |                   |          |
|                | Green | x                |                | 0.282 | 0.312 | 0.342 | -                 | Note 1,5 |
|                |       | y                |                | 0.590 | 0.620 | 0.650 |                   |          |
|                | Blue  | x                |                | 0.123 | 0.153 | 0.183 | -                 | Note 1,5 |
|                |       | y                |                | 0.016 | 0.046 | 0.076 |                   |          |
| Uniformity     |       | U                | -              | 75    | 80    | -     | %                 | Note 6   |
| NTSC           |       | N                |                | 67    | 72    | -     | %                 | Note 5   |
| Luminance      |       | L                | -              | 280   | 350   |       | cd/m <sup>2</sup> | Note 7   |

Test Conditions:

1.  $I_F = 65$  mA, and the ambient temperature is 25°C.
2. The test systems refer to Note 1 and Note 2.

Note 1: Definition of optical measurement system.

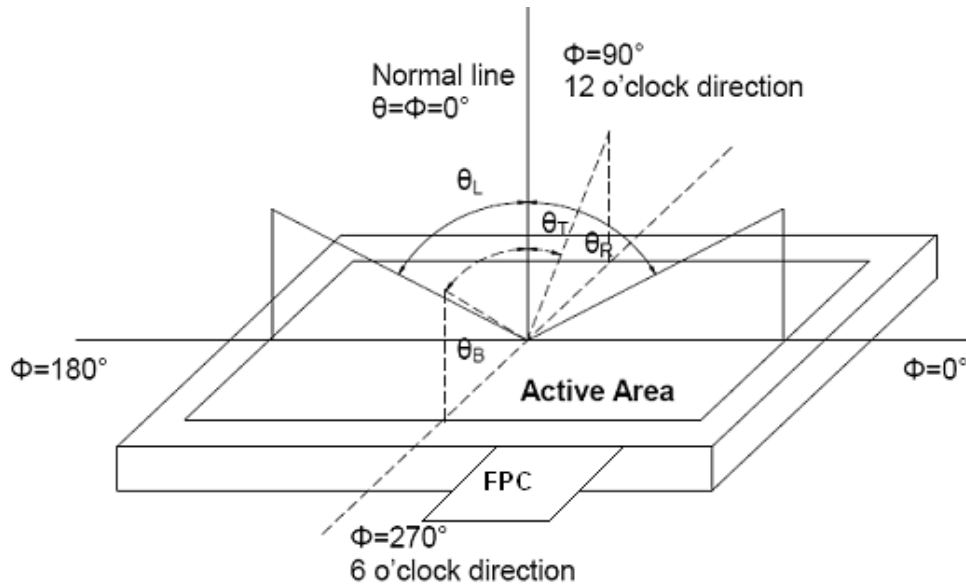
The optical characteristics should be measured in dark room. After 20 Minutes operation, the optical characteristics are measured at the center point of the LCD screen.



**Figure 7.1 Measurement Set Up**

Note 2: Definition of viewing angle range and measurement system.

Viewing angle is measured at the center point of the LCD by EZ-Contrast.



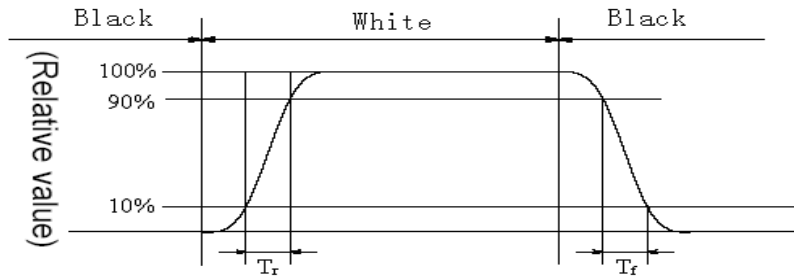
**Figure 7.2 Measurement viewing angle**

Note 3: Definition of contrast ratio

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

Note 4: 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%.



**Figure 7.3 Response Time Testing**

Note 5: Definition of color chromaticity (CIE1931)

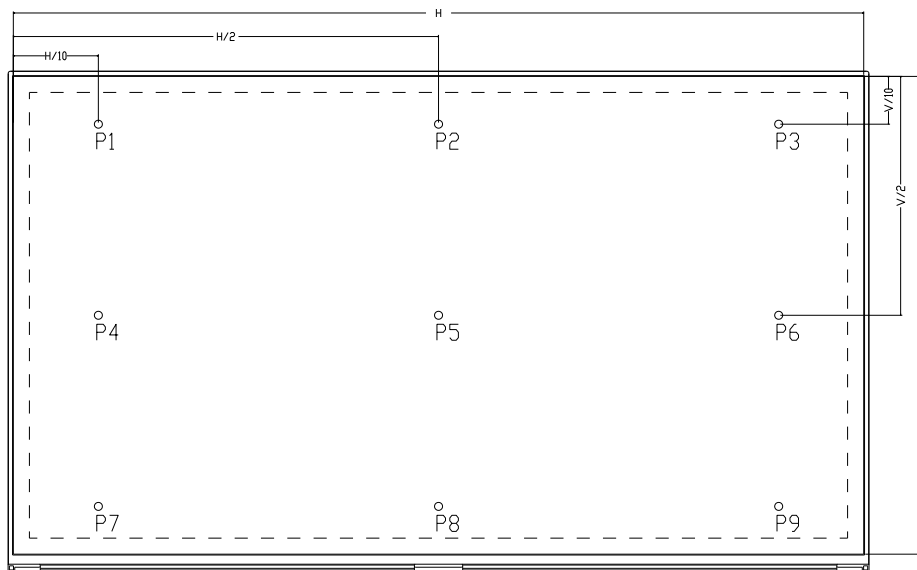
Color coordinates measured at center point of LCD.

Note 6: Definition of Luminance Uniformity

Active area is divided into 9 measuring areas (Refer Fig. 2). Every measuring point is placed at the center of each measuring area.

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

L-----Active area length W----- Active area width



**Figure 7.4 Luminance Uniformity Measurement Locations (9 points)**

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

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

Note 7: Definition of Luminance:

Measure the luminance of white state at center point.

## 8. Reliability Test

| No | Test Item                                               | Condition                                                                                                                                         | Remarks                                                                                                  |
|----|---------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------|
| 1  | High Temperature Operation                              | +50℃ , 240H                                                                                                                                       | IEC60068-2-1:2007<br>GB/T 2423.2-2008                                                                    |
| 2  | Low Temperature Operation                               | 0℃ , 240H                                                                                                                                         | IEC60068-2-1:2007<br>GB/T 2423.1-2008                                                                    |
| 3  | High Temperature Storage                                | +60℃ , 240H                                                                                                                                       | IEC60068-2-1:2007<br>GB/T 2423.2-2008                                                                    |
| 4  | Low Temperature Storage                                 | -20℃ , 240H                                                                                                                                       | IEC60068-2-1:2007<br>GB/T 2423.1-2008                                                                    |
| 5  | Storage at High Temperature and Humidity(non-operation) | 50℃ , 80%RH , 240H                                                                                                                                | IEC60068-2-78 :2001<br>GB/T2423.3—2006                                                                   |
| 6  | Thermal Shock (non-operation)                           | -20℃/30min , ~60℃/30min , change time : 5min , 100cycle                                                                                           | Start with cold temperature,<br>End with high temperature,<br>IEC60068-2-14:1984<br>GB/T 2423.22-2012-Na |
| 7  | ESD                                                     | C=150pF , R=330Ω , 9point/panel<br>Air : ±15kv , 10times ;<br>Contact : ±8kv , 10times ;<br>( Environment : 15℃~35℃ ,<br>30%~60% , 86Kpa~106Kpa ) | IEC61000-4-2:2001<br>GB/T 17626.2-2018                                                                   |
| 8  | Package Vibration                                       | 5-20-200HZ , PSD : 0.01-0.01-0.001<br>Total: 0.781g2/HZ,x/y/z 30min                                                                               | -                                                                                                        |

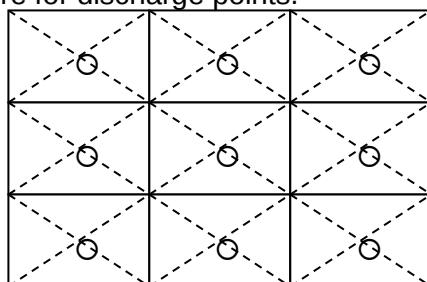
**Table 9.1 Reliability test**

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 guaranteed, but not for all of the cosmetic specification.

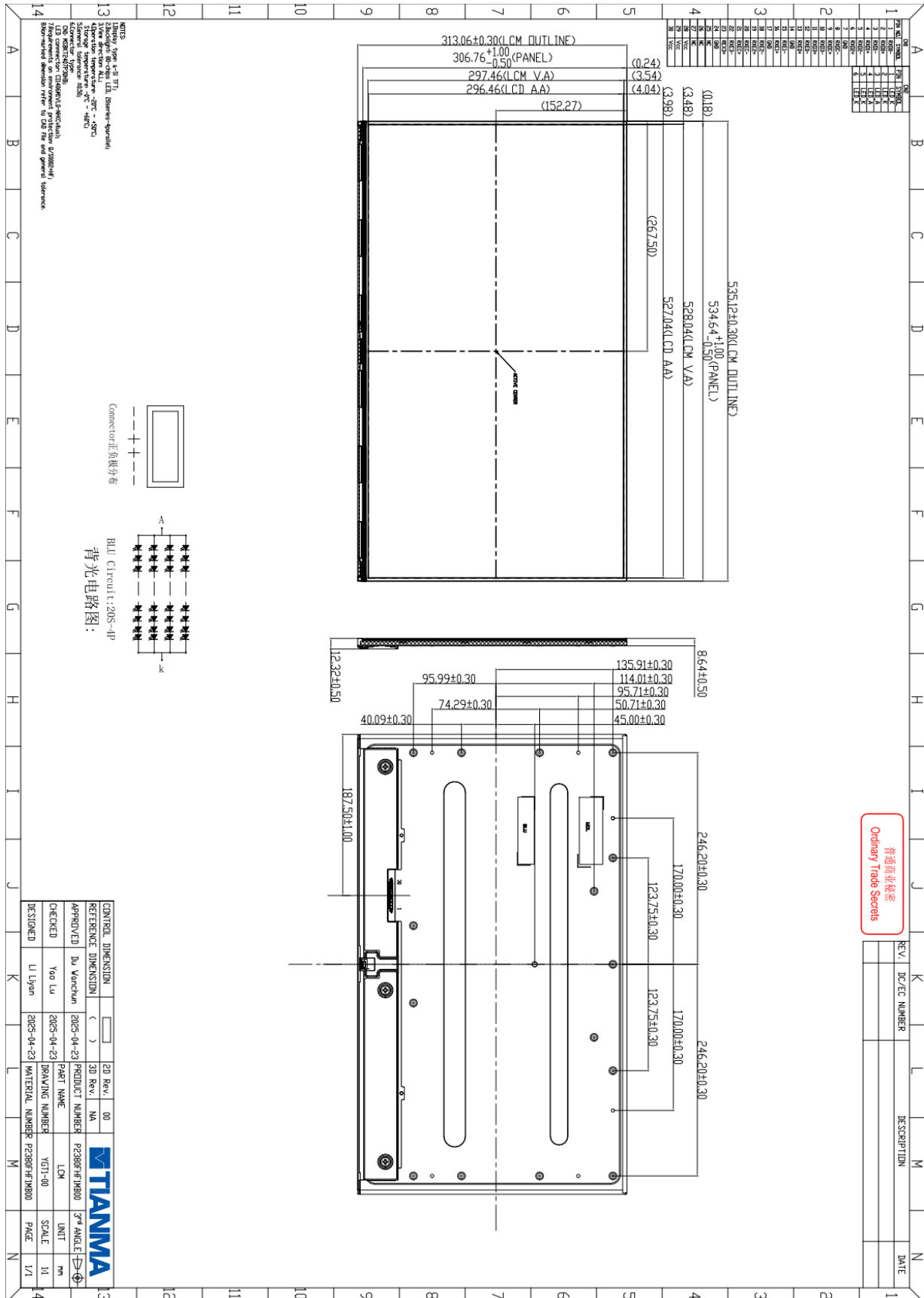
Note4: See the following figure for discharge points.



**Figure 8.1 ESD position**

## 9. Mechanical drawing

### 9.1 Mechanical Drawing Of LCM



## 9.2 Markings

The marking is attached to this product.

### 9.2.1 Nameplate label



## 10. Packing Instruction

Tianma will pack products to deliver to customer in accordance with Tianma 's packing specifications, and will deliver products to customer in such a condition that products will not suffer from a damage during transportation. The delivery conditions are as follows.

| Parameter    | Packing box type                  | Unit |
|--------------|-----------------------------------|------|
| Size         | 590(W) x 265 (H) x 420 (D) (typ.) | mm   |
| Weight       | TBD(typ.)                         | kg   |
| Total weight | TBD(typ.)<br>(with TBD products)  | kg   |

### 10.1 Packing Box

5 products are packed as the maximum in an packing box. The type name and quantity are shown on outside of the packing box, either labeling or printing. In case the packing box with products is dropped from a height of 40cm or more, there is a risk of damage to products.

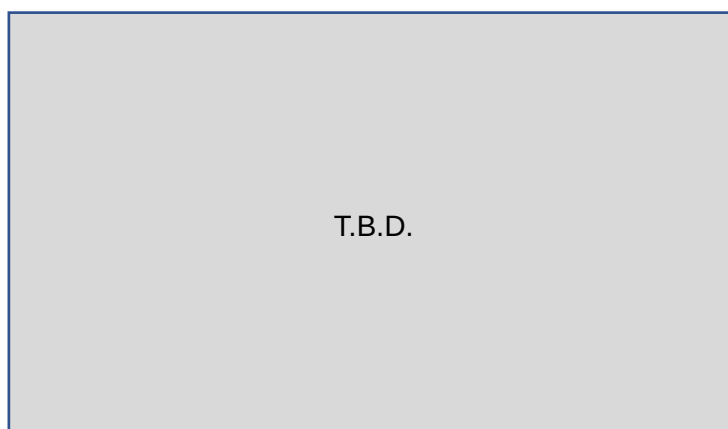


Figure 10.1 Outline Figure for Packing

## 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 t

- hem 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.