

**MODEL NO :** P1330FHF1MA00  
**MODEL VERSION:** A  
**SPEC VERSION :** 1.2  
**ISSUED DATE:** 2021-03-11

- Preliminary Specification  
 Final Product Specification

Customer : \_\_\_\_\_

| Approved by | Notes |
|-------------|-------|
|             |       |

TIANMA Confirmed :

| Prepared by | Checked by  | Approved by |
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This technical specification is subjected to change without notice

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**Record of Revision**

| <b>Rev</b> | <b>Issued Date</b> | <b>Description</b>                                    | <b>Editor</b> |
|------------|--------------------|---|---------------|
| 1.0        | 2020-09-02         | Preliminary release.                                  | Amin Yuan     |
| 1.1        | 2021-02-08         | Update all information                                | Amin Yuan     |
| 1.2        | 2021-03-11         | Update General Specifications and Mechanical Drawing. | Amin Yuan     |
|            |                    |   |               |
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## 1. General Specifications

| Feature                           |                          | Spec   |
|-----------------------------------|--------------------------|--|
| <b>Display Spec.</b>              | Size                     | 13.3inch   |
|                                   | Resolution               | 1920×1080  |
|                                   | Technology Type          | a-Si TFT   |
|                                   | Pixel Configuration      | R.G.B. Vertical Stripe                           |
|                                   | Pixel pitch(mm)          | 0.153*0.153                                      |
|                                   | Display Mode             | Transmissive, Normally Black                     |
|                                   | Surface Treatment        | HC   |
|                                   | Viewing Direction        | All  |
| <b>Mechanical Characteristics</b> | LCM (W x H x D) (mm)     | 308.00*186*9.20mm                                |
|                                   | Active Area(mm)          | 293.76*165.24                                    |
|                                   | With /Without TSP        | Without TSP                                      |
|                                   | Matching Connection Type | CN1: DF81-40S-0.4H<br>CN2: FH34SRJ-10S-0.5SH(50) |
|                                   | LED Numbers              | 56   |
|                                   | Weight (g)               | TBD  |
| <b>Electrical Characteristics</b> | Interface                | LVDS 2 port                                      |
|                                   | Color Depth              | 16.7 M   |
|                                   | Driver IC                | RM91M39FN*6                                      |

Note 1: Viewing direction for best image quality is different from TFT definition. There is a 180 degree shift.

Note 2: Requirements on Environmental Protection: Q/S0002+HF

Note 3: LCM weight tolerance:  $\pm 5\%$

## 2. Interface

### 2.1 Input / Output Terminals for LCD

Matching connector: DF81-40S-0.4H

| Pin No. | Symbol | I/O | Description   | Remarks |
|---------|--------|-----|---------------|---------|
| 1       | GND    | P   | Ground        | -       |
| 2       | DA0-   | I   | Pixel data A0 | -       |
| 3       | DA0+   | I   | Pixel data A0 | -       |
| 4       | GND    | P   | Ground        | -       |
| 5       | DA1-   | I   | Pixel data A1 | -       |
| 6       | DA1+   | I   | Pixel data A1 | -       |
| 7       | GND    | P   | Ground        | -       |
| 8       | DA2-   | I   | Pixel data A2 | -       |
| 9       | DA2+   | I   | Pixel data A2 | -       |
| 10      | GND    | P   | Ground        | -       |
| 11      | CKA-   | I   | Pixel clock A | -       |
| 12      | CKA+   | I   | Pixel clock A | -       |
| 13      | GND    | P   | Ground        | -       |
| 14      | DA3-   | I   | Pixel data A3 | -       |
| 15      | DA3+   | I   | Pixel data A3 | -       |
| 16      | GND    | P   | Ground        | -       |
| 17      | DB0-   | I   | Pixel data B0 | -       |
| 18      | DB0+   | I   | Pixel data B0 | -       |
| 19      | GND    | P   | Ground        | -       |
| 20      | DB1-   | I   | Pixel data B1 | -       |
| 21      | DB1+   | I   | Pixel data B1 | -       |
| 22      | GND    | P   | Ground        | -       |
| 23      | DB2-   | I   | Pixel data B2 | -       |
| 24      | DB2+   | I   | Pixel data B2 | -       |
| 25      | GND    | P   | Ground        | -       |
| 26      | CKB-   | I   | Pixel clock B | -       |
| 27      | CKB+   | I   | Pixel clock B | -       |
| 28      | GND    | P   | Ground        | -       |
| 29      | DB3-   | I   | Pixel data B3 | -       |
| 30      | DB3+   | I   | Pixel data B3 | -       |
| 31      | GND    | P   | Ground        | -       |
| 32      | GND    | P   | Ground        | -       |
| 33      | GND    | P   | Ground        | -       |
| 34      | NC     | -   | NC            | -       |
| 35      | VCC    | P   | Power supply  | -       |
| 36      | VCC    | P   | Power supply  | -       |
| 37      | VCC    | P   | Power supply  | -       |

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|    |    |   |    |   |
|----|----|---|----|---|
| 38 | NC | - | NC | - |
| 39 | NC | - | NC | - |
| 40 | NC | - | NC | - |

Note1: All GND and VCC terminals should be used without any non-connected lines.

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

Note3 : Please add the FPC connector type and matched one if necessary.

Note4 : I—Input, O—Output, P—Power/Ground

## 2.2 Input / Output Terminals for Backlight(CN2)

Matching connector: FH34SRJ-10S-0.5SH(50)

| Pin No. | Symbol | I/O | Description   | Remarks |
|---------|--------|-----|---------------|---------|
| 1       | A1     | P   | LED Anode1    | -       |
| 2       | A2     | P   | LED Anode2    | -       |
| 3       | A3     | P   | LED Anode3    | -       |
| 4       | A3     | P   | LED Anode4    | -       |
| 5       | NC     | N   | No connect    | -       |
| 6       | NC     | N   | No connect    | -       |
| 7       | K1     | P   | LED Cathode 1 | -       |
| 8       | K2     | P   | LED Cathode 2 | -       |
| 9       | K3     | P   | LED Cathode 3 | -       |
| 10      | K4     | P   | LED Cathode 4 | -       |

### 3. Absolute Maximum Ratings

GND=0V

| Item                  | Symbol   | MIN  | MAX | Unit | Remark |
|-----------------------|----------|------|-----|------|--------|
| Power Voltage         | VCC      | 0.3  | 4.5 | V    |        |
| BL_POWER Input        | VCC_LED+ | -0.3 | 28  | V    |        |
| Operating Temperature | Top      | -20  | 70  | °C   |        |
| Storage Temperature   | Tst      | -30  | 80  | °C   |        |

**Table 3 Absolute Maximum Ratings**

Note1:

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.

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## 4. Electrical Characteristics

### 4.1 Driving TFT LCD Panel

(Ta= 25°C)

| Parameter                              | Symbol | min. | typ. | max.            | Unit | Remarks                  |                         |
|--|--------|------|------|-----------------|------|--------------------------|-------------------------|
| Power supply voltage                   | VCC    | 3.2  | 3.3  | 3.4             | V    | -                        |                         |
| Power supply current                   | ICC    | -    | TBD  | TBD             | mA   | at VCC= 3.3V             |                         |
| Permissible ripple voltage             | VRPC   | -    | -    | 100             | mVpp | for VCC<br>Note3, Note4, |                         |
| Differential input threshold voltage   | High   | VTH  | -    | -               | 100  | mV                       | at VCM= 1.2V<br>Note5,6 |
|  | Low    | VTL  | -100 | -               | -    | mV                       |                         |
| Input differential voltage             | VID    | 100  | -    | 600             | mV   | -                        |                         |
| Differential input common mode voltage | VCM    | -    | 1.2  | VCC-0.4- VID /2 | V    | -                        |                         |
| Terminating resistance                 | RT     | -    | 100  | -               | Ω    | -                        |                         |

Note1: Checkered flag pattern [by IEC 61747-6];

Note2: Pattern for maximum current;

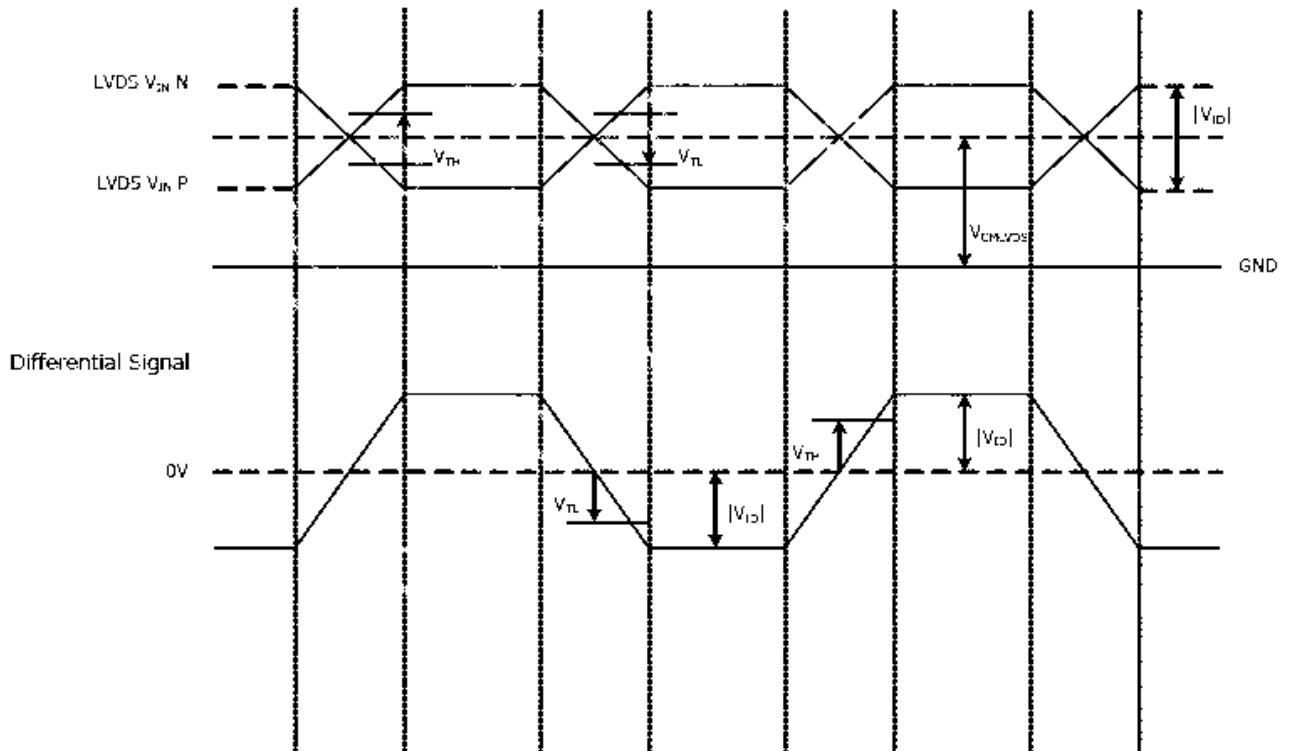
Note3: The permissible ripple voltage includes spike noise;

Note4: The load variation influence does not include;

Note5: Common mode voltage for LVDS receiver;

Note6: DC characteristics (LVDS receiver part).

Single-End





## 4.2 Backlight Unit Driving Condition

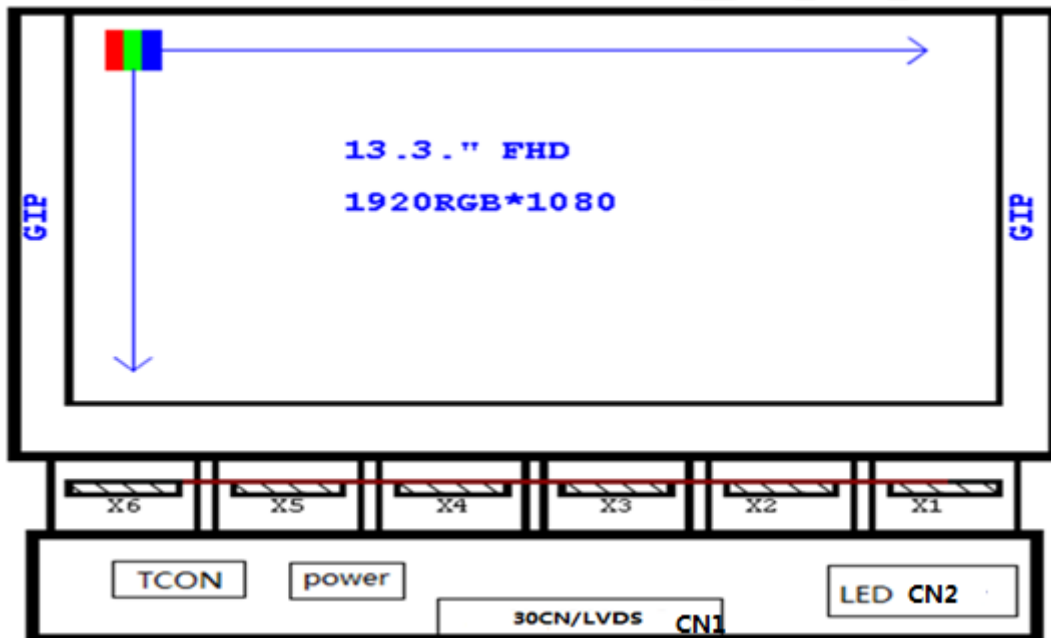
ND=0V, Ta=25°C

| Item                        | Symbol         | Min | Typ   | Max | Unit | Remark |
|-----------------------------|----------------|-----|-------|-----|------|--------|
| Forward Voltage             | VLED           |     | 20.3  |     | V    | Note 1 |
| Forward Current             | I <sub>F</sub> | -   | 640   | -   | mA   |        |
| Backlight Power Consumption | WBL            | -   |       | -   | W    |        |
| Life Time                   | -              | -   | 50000 | -   | Hrs  | Note 2 |

**Table 4.2 LED backlight characteristics**

Note 1: 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% initial brightness. Typical operating life time is estimated data.

## 4.3 BLOCK DIAGRAM



## 5. Timing Chart

### 5.1 Timing Characteristics

(Note1, Note2, Note3)

| Parameter            |                      | Symbol     | min. | typ. | max. | Unit | Remarks |   |
|----------------------|----------------------|------------|------|------|------|------|---------|---|
| CLK                  | Frequency            | 1/tc       |      | TBD  |      | MHz  |         |   |
|                      | Duty                 | -          |      |      |      | -    | -       |   |
|                      | Rise time, Fall time | -          |      |      |      | ns   | -       |   |
| DATA                 | CLK-DATA             | Setup time | -    |      |      |      | ns      | - |
|                      |                      | Hold time  | -    |      |      |      | ns      | - |
|                      | Rise time, Fall time | -          |      |      |      | ns   | -       |   |
| DE                   | Horizontal           | Cycle      | th   |      | TBD  |      | μs      |   |
|                      |                      |            |      |      | TBD  |      | CLK     |   |
|                      | Display period       | thd        | 1920 |      |      | CLK  | -       |   |
|                      |                      |            |      |      |      |      |         |   |
|                      | Vertical (One frame) | Cycle      | tv   |      | TBD  |      | ms      | - |
|                      |                      |            |      |      | TBD  |      | H       | - |
|                      | Display period       | tvd        | 1080 |      |      | H    | -       |   |
|                      |                      |            |      |      |      |      |         |   |
| CLK-DE               | Setup time           | -          |      |      |      | ns   | -       |   |
|                      | Hold time            | -          |      |      |      | ns   | -       |   |
| Rise time, Fall time | -                    |            |      |      | ns   | -    |         |   |

Note1: Definition of parameters is as follows.

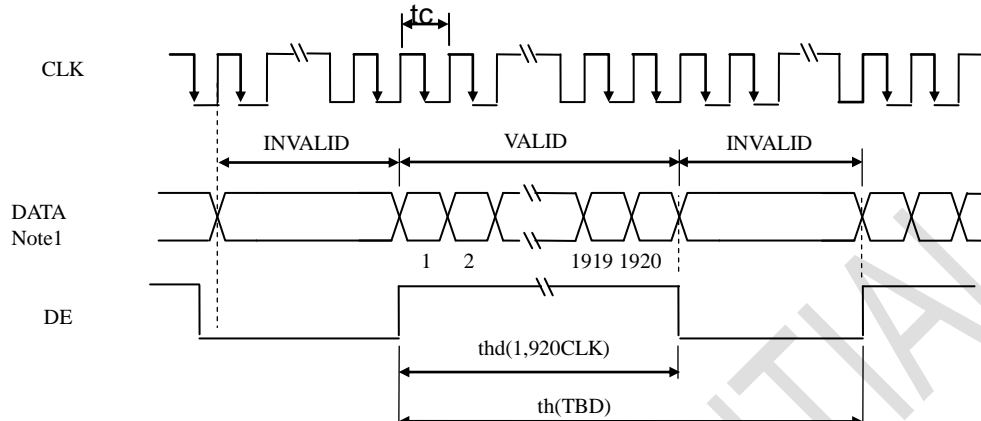
tc= 1CLK, th= 1H

Note2: See the data sheet of LVDS transmitter.

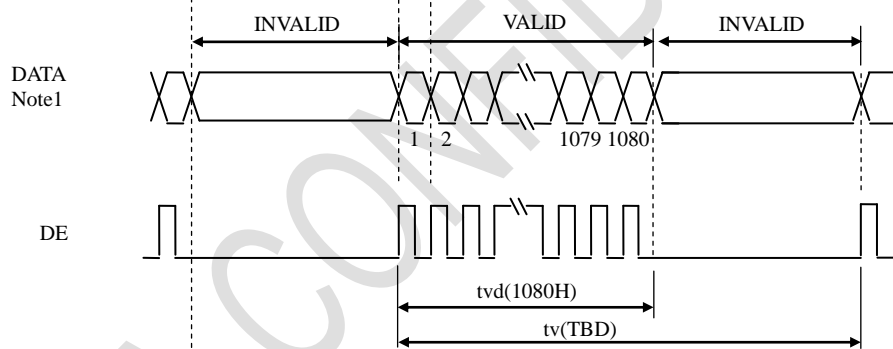
Note3: Vertical cycle (tv) should be specified in integral multiple of Horizontal cycle (th).

## 5.2 Input Signal Timing Chart

Horizontal timing



Vertical timing

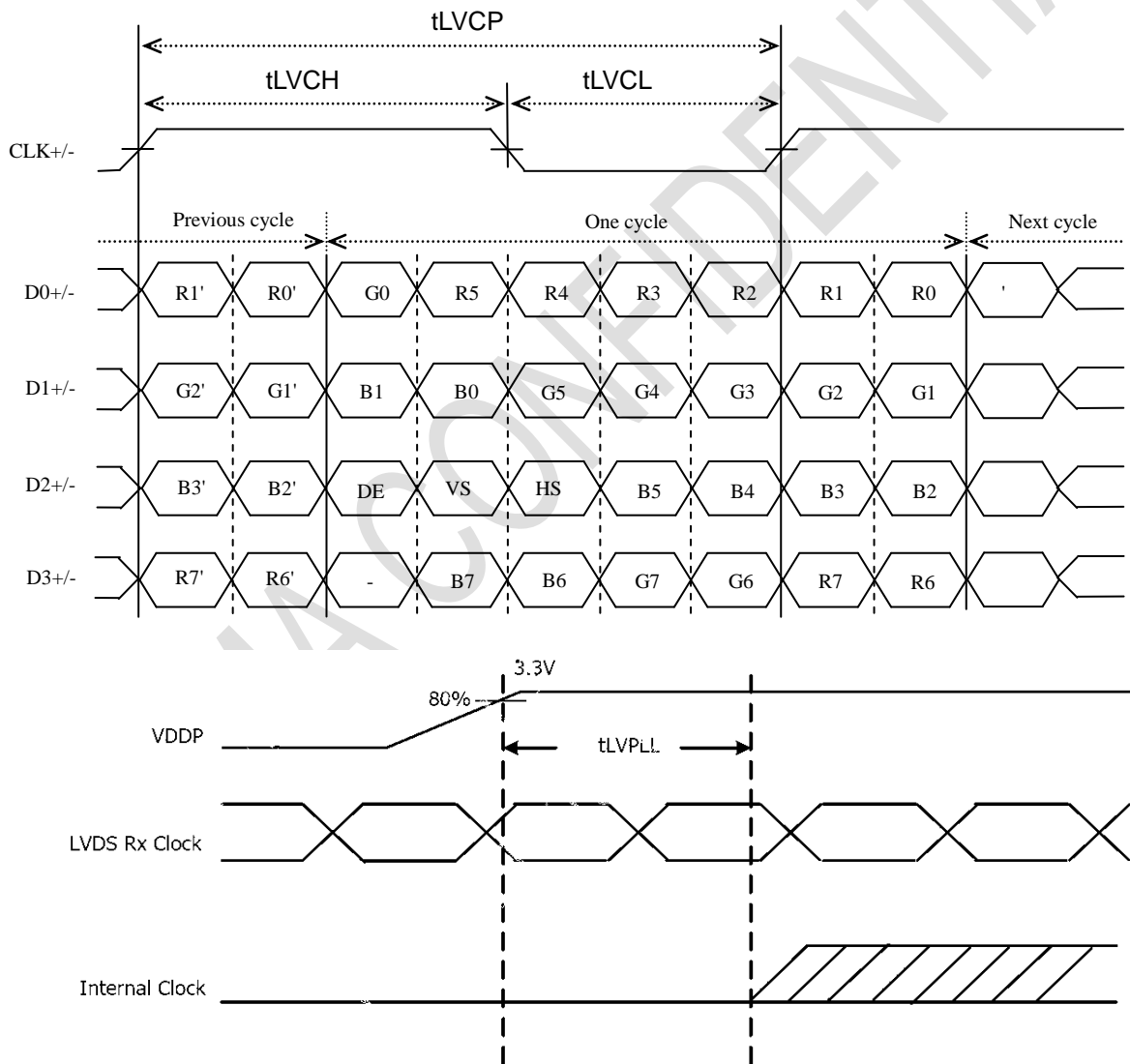


Note1: DATA = R0-R7, G0-G7, B0-B7

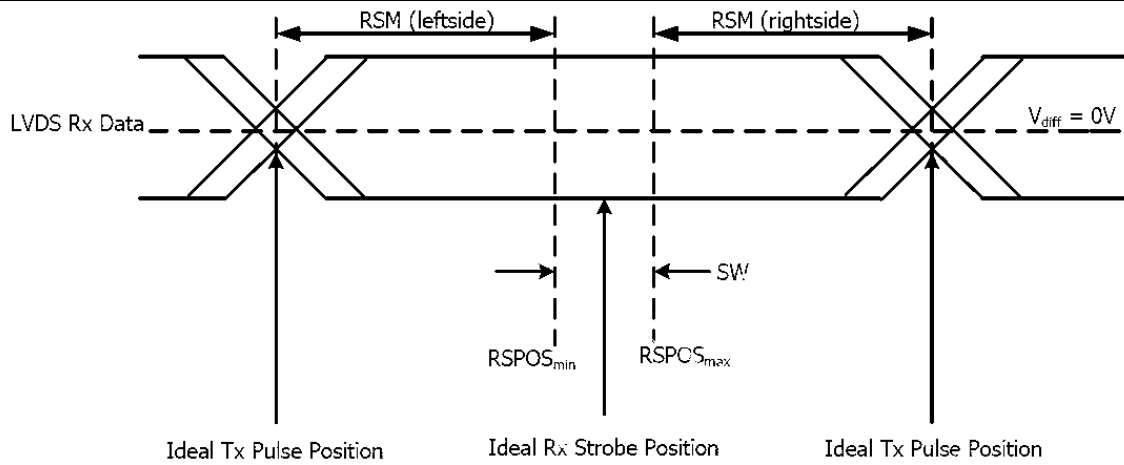
### 5.3 Input Data Mapping

Input data signal: 8-bit

| Parameter              | Symbol  | Conditions                       | min | typ  | max | Unit |
|------------------------|---------|----------------------------------|-----|------|-----|------|
| Clock Period           | tLVCP   |                                  | 9.5 | T    | 25  | ns   |
| Clock Frequency        | 1/tLVCP |                                  | 40  |      | 105 | MHz  |
| Clock High Time        | tLVCH   |                                  |     | 4T/7 |     | ns   |
| Clock Low Time         | tLVCL   |                                  |     | 3T/7 |     | ns   |
| PLL Wake-Up Time       | tLVPLL  |                                  |     |      | 1   | ms   |
| Strobe Width           | tSW     | VCM=1.2<br> VID =400mV<br>@65MHz | 200 |      |     | ps   |
| Receiver Strobe Margin | tRSM    |                                  | 400 |      |     | ps   |



LVDS Receiver Phase-Locked Loop Wake-UP Time



**Definitions:**

- RSM** Receiver Skew Margin
- RSPOS** Receiver Strobe Position
- SW** Strobe Width (Setup and Hold Time; Internal data sampling window)

*LVDS Receiver Input Skew Margin*

**5.4 POWER ON/OFF SEQUENCE**

TBD

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## 6. Optical Characteristics

| Item           | Symbol     | Condition         | Min | Typ   | Max   | Unit   | Remark  |   |
|----------------|------------|-------------------|-----|-------|-------|--------|---------|---|
| View Angles    | $\theta T$ | $CR \geq 10$      |     | 88    | -     | Degree | Note2   |   |
|                | $\theta B$ |                   |     | 88    | -     |        |         |   |
|                | $\theta L$ |                   |     | 88    | -     |        |         |   |
|                | $\theta R$ |                   |     | 88    | -     |        |         |   |
| Contrast Ratio | CR         | $\theta=25^\circ$ |     | 1000  | -     | -      | Note1,3 |   |
| Response Time  | $T_{ON}$   | 25°C              | -   | 25    | 35    | ms     | Note 4  |   |
|                | $T_{OFF}$  |                   |     |       |       |        |         |   |
| Chromaticity   | White      | Backlight is on   | x   | 0.242 | 0.292 | 0.342  | -       | - |
|                |            |                   | y   | 0.250 | 0.300 | 0.350  |         |   |
|                | Red        |                   | x   | 0.593 | 0.643 | 0.693  | -       |   |
|                |            |                   | y   | 0.293 | 0.343 | 0.393  |         |   |
|                | Green      |                   | x   | 0.269 | 0.319 | 0.369  | -       |   |
|                |            |                   | y   | 0.576 | 0.626 | 0.676  |         |   |
|                | Blue       |                   | x   | 0.099 | 0.149 | 0.199  | -       |   |
|                |            |                   | y   | 0.019 | 0.069 | 0.119  |         |   |
| Uniformity     | U          | -                 | 75  |       | -     | %      | Note1,5 |   |
| NTSC           | -          | -                 | -   | 72    | -     | %      |         |   |
| Luminance      | -          | -                 |     | 1000  |       |        |         |   |

Test Conditions:

1. The ambient temperature is 25°C.
2. The test systems refer to Note 1 (Excluding viewing angle and response time test ).
3. Viewing Angle and Response Time test method follow the normal LCD test method.

Note 1: (1) Definition of optical measurement system.

The optical characteristics should be measured in dark room. After 5 minutes operation, the optical properties are measured at the center point of the LCD screen (Excluding Uniformity test). All input terminals LCD panel must be ground when measuring the center area of the panel.

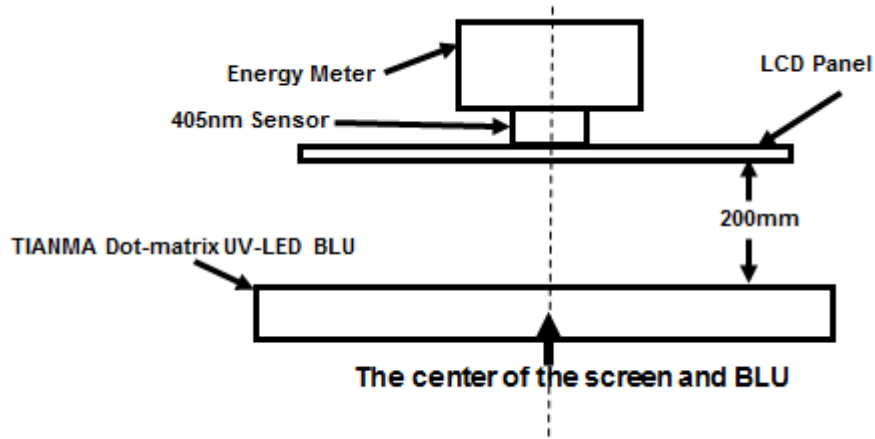


Fig.1

(2) Test instrument and recipe.

As shown in the Fig.1, all optics are measured under a collimating dot-matrix LED backlight, which emitting a wave of 405nm. Energy meter AccuMAX™ –XS-405 is used to measure the following mentioned energy value, the LCD panel is 200mm away from the UV-LED surface. The transmissive energy value of LCD at white state is 2mW/cm<sup>2</sup>.(Fig.1)

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

viewing angle is measured at the center point of the LCD.(Fig.2)

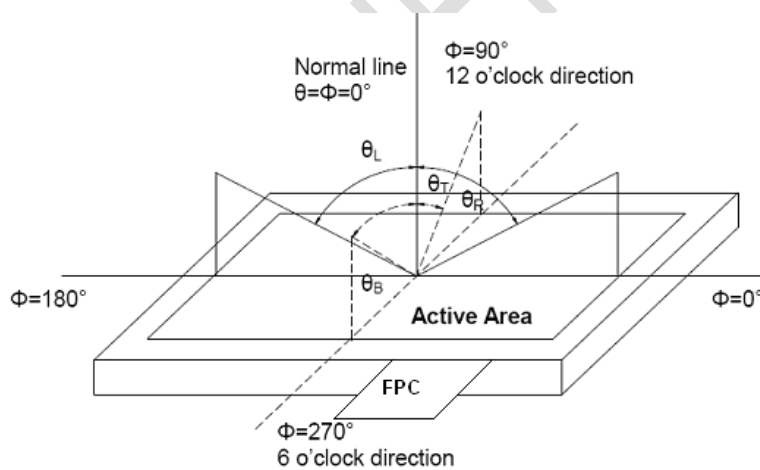


Fig.2

Note 3: Definition of contrast ratio

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

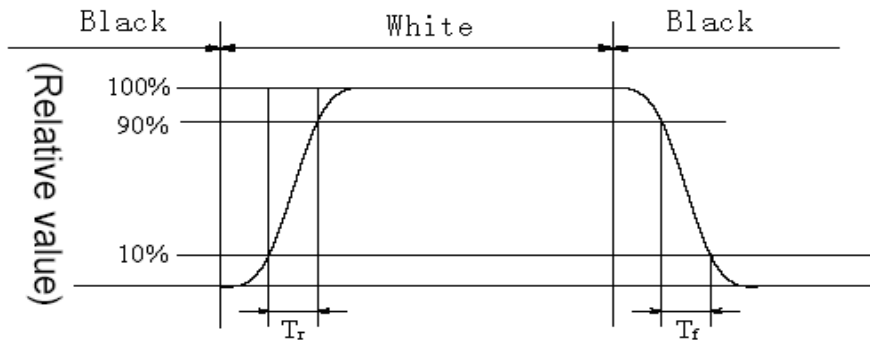
“White state “: The state is that the LCD should be driven by Vwhite.

“Black state”: The state is that the LCD should be driven by Vblack.

Vwhite: To be determined    Vblack: To be determined.

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 ( $T_{ON}$ ) is the time between photo detector output intensity changed from 10% to 90%. And fall time ( $T_{OFF}$ ) is the time between photo detector output intensity changed from 90% to 10%.

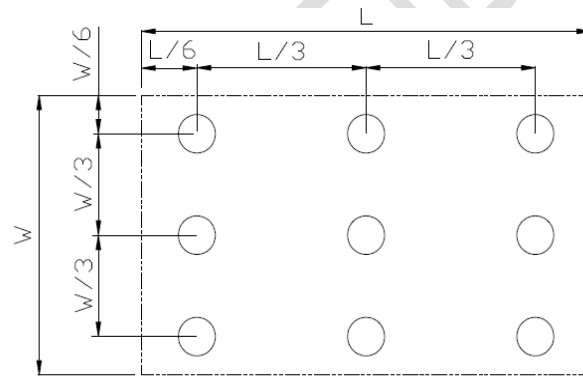


**Note 5: Definition of Energy Uniformity**

Active area is divided into 9 measuring areas (Fig. 4). Every measuring point is placed at the center of BLU center.

Energy Uniformity (U) =  $E_{min} / E_{max}$

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



$E_{max}$ : The measured Maximum Energy value of all the measurement positions.

$E_{min}$ : The measured Minimum Energy value of all the measurement positions.

**Note 6: Definition of transmittance:**

$$\text{Transmittance} = \frac{\text{Energy value measured when LCD is on the "White" state}}{\text{Energy value measured from BLU}}$$



## 7. Environmental / Reliability Test

| No | Test Item                                  | Condition  | Remarks                             |
|----|--|--|-------------------------------------|
| 1  | High Temperature Operation                 | T <sub>s</sub> =70°C,240H  | IEC60068-2-1:2007,GB 2423.2-2008    |
| 2  | Low Temperature Operation                  | T <sub>a</sub> =-20°C,240H   | IEC60068-2-1:2007 GB2423.1-2008     |
| 3  | High Temperature Storage                   | T <sub>a</sub> =80°C,240H  | IEC60068-2-1:2007 GB2423.2-2008     |
| 4  | Low Temperature Storage                    | T <sub>a</sub> =-30°C,240H   | IEC60068-2-1:2007 GB2423.1-2008     |
| 5  | Operation at High Temperature and Humidity | 60°C90%RH/240H   | IEC60068-2-78 :2001 GB/T2423.3—2006 |
| 6  | Thermal Shock (non-operation)              | '-20°C/30min、70°C/30min<br>100cycles、1H/Cycle, 5min  | IEC60068-2-14:1984,G B2423.22-2002  |
| 7  | Electro Static Discharge (operation)       | C=150pF,R=330Ω;<br>Contact:±4Kv, 5times;<br>Air:±8KV,5times;   | IEC61000-4-2:2001 GB/T17626.2-2006  |
| 8  | Vibration (non-operation)                  | Frequency range:10~55Hz,<br>Stroke:1.5mm<br>Sweep:10Hz ~ 55Hz ~ 10Hz<br>2hours for each direction of X.Y.Z (6 hours total) | IEC60068-2-6:1982 GB/T2423.10—1995  |
| 9  | Shock (non-operation)                      | 60G 6ms, ±X,±Y,±Z 3 times<br>for each direction  | IEC60068-2-27:1987 GB/T2423.5—1995  |

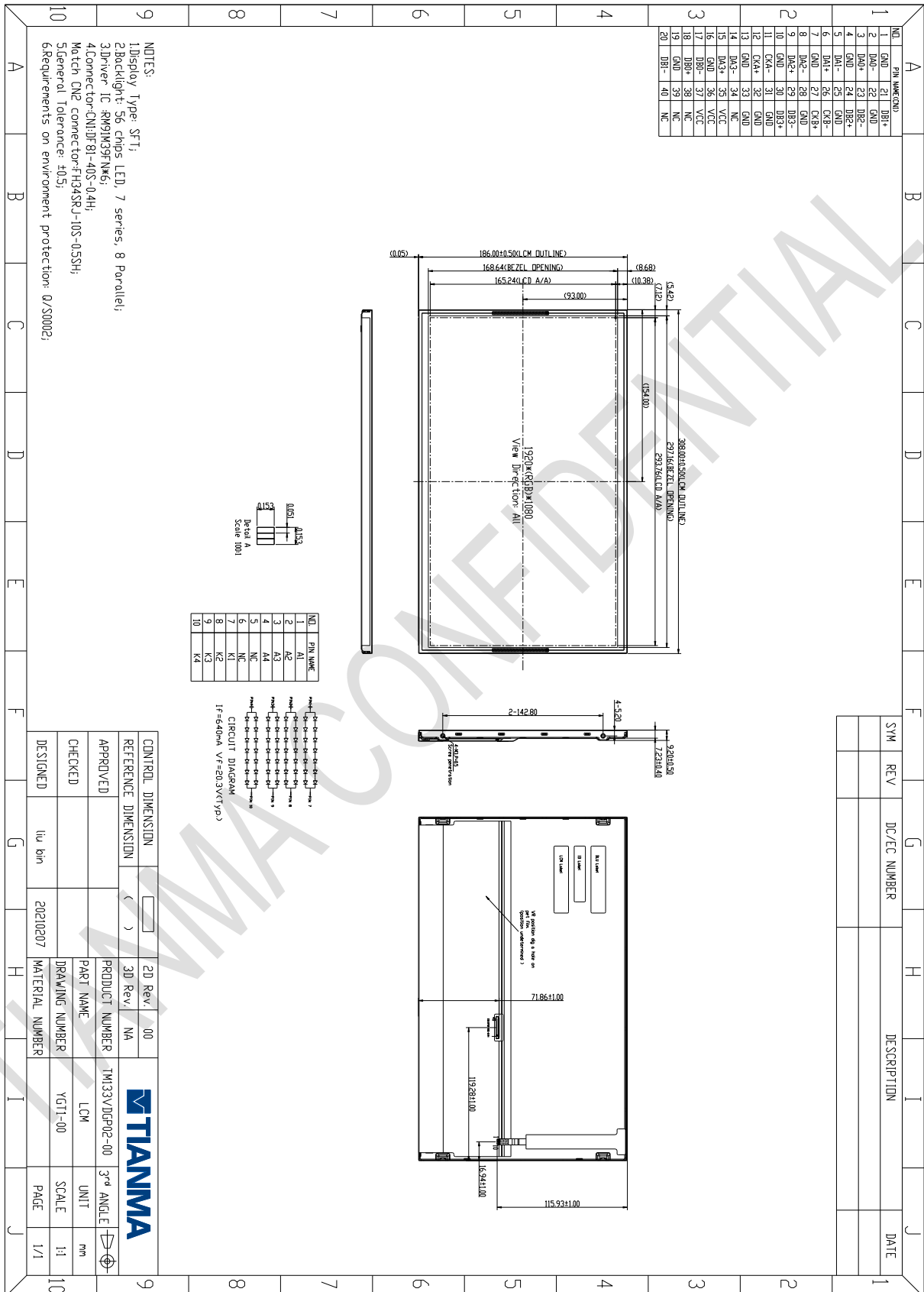
Note1: T<sub>s</sub> is the temperature of panel's surface.

Note2: T<sub>a</sub> is the ambient temperature of sample.

Note3: Before cosmetic and function test, the product must have enough recovery time, at least 24 hours at room temperature.

Note4: In the standard condition, there shall be no practical problem that may affect the display function. After the reliability test, the product only guarantees operation, but don't guarantee all of the cosmetic specification.

### 8. Mechanical Drawing



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## 9. Packing Drawing

TBD

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## 10. Precautions for Use of LCD Modules

### 1.1 Handling Precautions

1.1.1 The display panel is made of glass. Do not subject it to a mechanical shock by dropping it from a high place, etc.

1.1.2 If the display panel is damaged and the liquid crystal substance inside it leaks out, be sure not to get any in your mouth, if the substance comes into contact with your skin or clothes, promptly wash it off using soap and water.

1.1.3 Do not apply excessive force to the display surface or the adjoining areas since this may cause the color tone to vary.

1.1.4 The polarizer covering the display surface of the LCD module is soft and easily scratched. Handle this polarizer carefully.

1.1.5 If the display surface is contaminated, breathe on the surface and gently wipe it with a soft dry cloth. If still not completely clear, moisten cloth with one of the following solvents:

- Isopropyl alcohol
- Ethyl alcohol

Solvents other than those mentioned above may damage the polarizer. Especially, do not use the following:

- Water
- Ketone
- Aromatic solvents

1.1.6 Do not attempt to disassemble the LCD Module.

1.1.7 If the logic circuit power is off, do not apply the input signals.

1.1.8 To prevent destruction of the elements by static electricity, be careful to maintain an optimum work environment.

10.1.8.1 Be sure to ground the body when handling the LCD Modules.

10.1.8.2 Tools required for assembly, such as soldering irons, must be properly ground.

10.1.8.3 To reduce the amount of static electricity generated, do not conduct assembly and other work under dry conditions.

10.1.8.4 The LCD Module is coated with a film to protect the display surface. Be care when peeling off this protective film since static electricity may be generated.

### 1.2 Storage precautions

1.2.1 When storing the LCD modules, avoid exposure to direct sunlight or to the light of fluorescent lamps.

1.2.2 The LCD modules should be stored under the storage temperature range. If the LCD modules will be stored for a long time, the recommend condition is:

Temperature : 0°C ~ 40°C Relatively humidity: ≤80%

1.2.3 The LCD modules should be stored in the room without acid, alkali and harmful gas.

### 1.3 Transportation Precautions

1.3.1 The LCD modules should be no falling and violent shocking during transportation, and also should avoid excessive press, water, damp and sunshine.