

# 10.4 寸 IPS 模组规格书

## SPECIFICATION

|                      |     |
|----------------------|-----|
| 承 认 印<br>Approved by |     |
| 审核:                  | 确认: |

|         |
|---------|
| 客户确认结果: |
|---------|

客 户: \_\_\_\_\_

品 名: JH104X1-01B IPS

模组外形: 228.4\*175.4\*6.5 mm

日 期: 2021.10.11

| Approved<br>核 准 | Checked<br>审 核 | Prepared<br>制 作 |
|-----------------|----------------|-----------------|
|                 |                |                 |

# 目 录

| 序号  | 内 容  | 页码    |
|-----|------|-------|
|     | 封面   | 1     |
|     | 目录   | 2     |
| 1   | 更改记录 | 3     |
| 2   | 适用范围 | 4     |
| 2.1 | 产品规格 | 4     |
| 3.1 | 模组图  | 5     |
| 3.2 | 测定条件 | 6     |
| 4   | 品质要求 | 6     |
| 4.1 | 光学特性 | 6     |
| 4.2 | 电气特性 | 7     |
| 4.3 | 产品寿命 | 7     |
| 5   | 玻璃特性 | 8~END |
|     |      |       |
|     |      |       |
|     |      |       |
|     |      |       |
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### 规格书更改记录

| 序号 | 日期       | 内 容  | 版本 | 修订者 |
|----|----------|------|----|-----|
| 1  | 21.10.11 | 首次发行 | A  |     |
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1. 适用范围

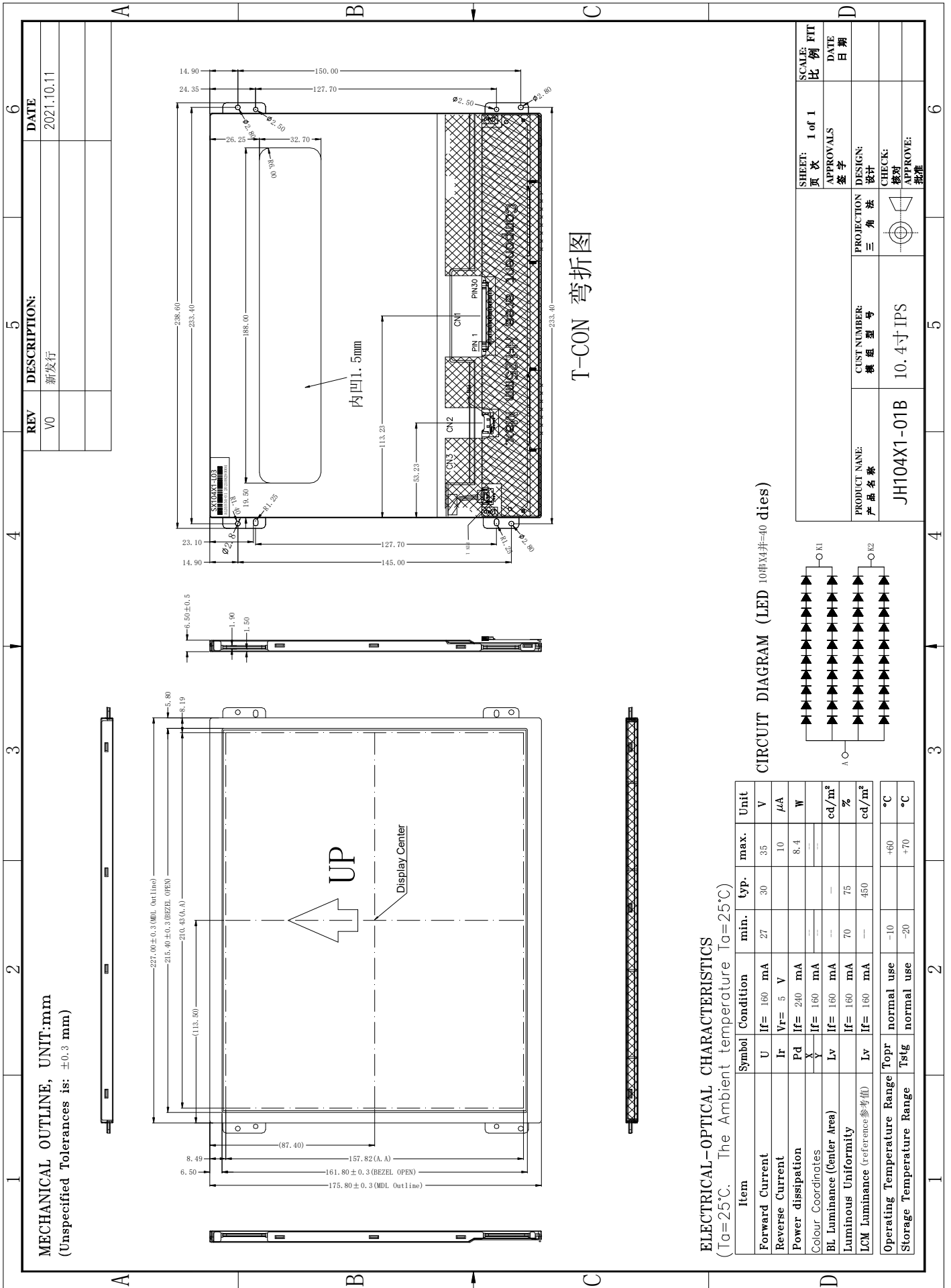
本承认书适用于有限公司生产的10.4寸模组

2. 产品规格

2.1 主要零部件构成

| 序号 | 部件名称 | 备 注           | 用量    |
|----|------|---------------|-------|
| 1  | 上框   | 不锈钢 T=0.3mm   | 1PCS  |
| 2  | 下框   | 铝材 T=0.5mm    | 1PCS  |
| 3  | 胶框   | PC(灰)         | 1PCS  |
| 4  | 导光板  | PMMA          | 1PCS  |
| 5  | 反射片  | 白反射           | 1PCS  |
| 6  | PCB  | FR-4          | 1PCS  |
| 7  | 扩散片  | 半透明           | 1PCS  |
| 8  | BEF  | 棱镜结构          | 2PCS  |
| 9  | 端子线  | UL1571+1.25端子 | 1PCS  |
| 10 | LED  | 白光发光二极管       | 40PCS |
| 11 | FOG  | 10.4寸IPS FOG  | 1PCS  |
|    |      |               |       |
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3. 1 模组图



### 3. 2测定条件

在无特别指定条件下，产品于温度  $25 \pm 2^{\circ}\text{C}$ ，湿度  $60 \pm 10\%$ 环境条件进行测试。

### 4. 品质要求

#### 4. 1 光学特性

| 项目   | 符号         | 条件   | 规格  |     |     | 单位                     | 备注 |
|------|------------|------|-----|-----|-----|------------------------|----|
|      |            |      | Min | Typ | Max |                        |    |
| 均匀度  | $\Delta I$ | 面内九点 | 70  | 75  | -   | %                      |    |
| 色度   | X          | 中心点  | --  |     | --  |                        |    |
|      | Y          | 中心点  | --  |     | --  |                        |    |
| 模组亮度 | I          | 中心点  | --  | 450 | -   | $\text{cd}/\text{m}^2$ |    |

注 1：表内测定点规格需在发光条电流(160)mA，周围环境温度  $25 \pm 2^{\circ}\text{C}$ 测试。

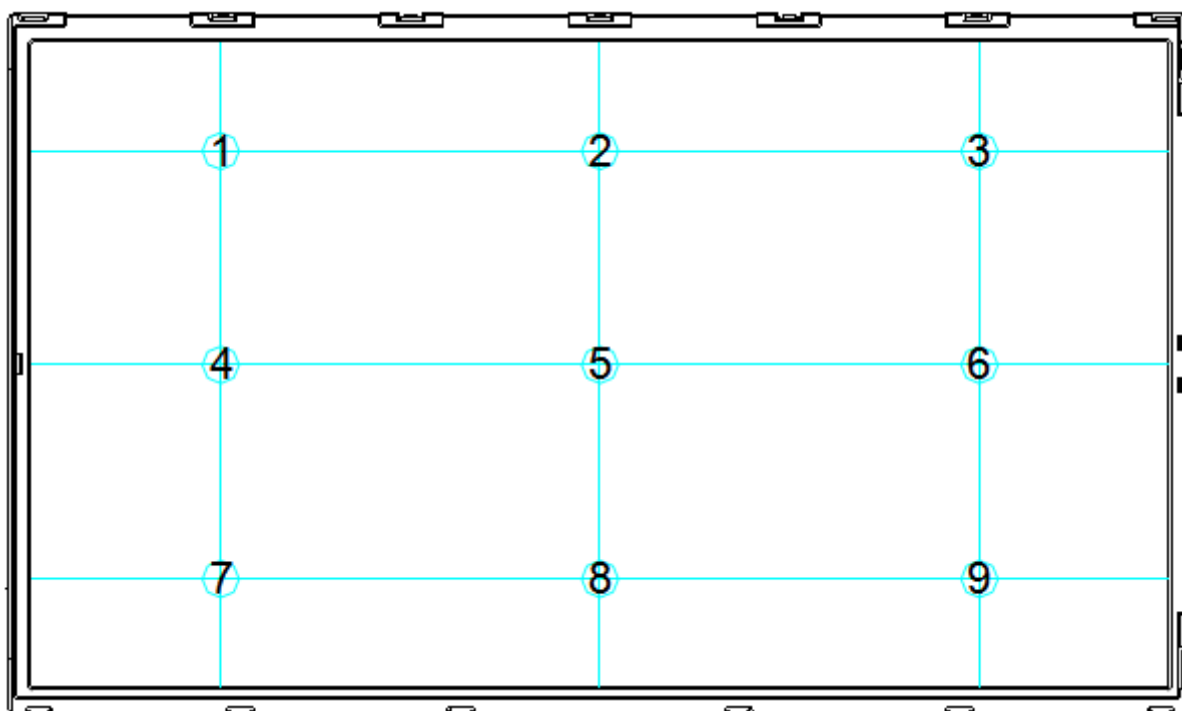
注 2：测试条件：1) 以规定的电流电压正常点亮；

2) 测试环境：暗室（10Lux 以下）

3) 辉度、色坐标测试点：见下图

4) 光学特性测试点图

注 3：均匀性  $\Delta I = (I_{\text{MIN}} \div I_{\text{MAX}}) \times 100\%$



## 4. 2 电气特性

### 4. 2. 1 LED电性规格

| 项目    | 符号 | 条件    | 规格  |     |     | 单位  | 备注      |
|-------|----|-------|-----|-----|-----|-----|---------|
|       |    |       | Min | Typ | Max |     |         |
| LED电流 | IL | 常温25℃ | -   | 40  | -   | mA  |         |
| LED电压 | VL | 常温25℃ | 2.7 | 3.0 | 3.5 | V   | IL=40mA |
| 点亮延迟到 | TD | 注2    |     |     |     | sec |         |

注1：LED点亮电流不可超过最大电流限定值，否则LED寿命和亮度将会受到严重影响。  
注2：点亮测试延迟时间：ON 30sec--OFF 30sec

### 4. 2. 2 LED灯条适用电性规格

| 项目   | 符号 | 条件    | 规格  |     |       | 单位     | 备注       |
|------|----|-------|-----|-----|-------|--------|----------|
|      |    |       | Min | Typ | Max   |        |          |
| 灯条电压 | VL | 常温25℃ | 27  | 30  | 35    | Vrms   | IL=160mA |
| 灯条电流 | IL | 常温25℃ |     | 160 |       | mA rms |          |
| 点亮功率 | WL | 常温25℃ |     |     | (8.4) | W rms- | IL=240mA |

注1：灯条点亮功率需在要求范围以内。

## 4. 3 产品寿命

周围温度+25℃±2℃，湿度 60±20%RH，以每灯 20mA 工作电流之推荐使用条件，背光源之寿命为：

辉度减半平均寿命： 30,000 小时以上

辉度减半保证寿命： 20,000 小时以上

注：辉度减半平均寿命指背光源平均辉度衰减到初期平均辉度的 50%所需时间。

## 5. 玻璃特性

# TFT LCD Specification

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

**Model Name:** JH104X1-01B

**Date:** 2019/12/12

**Version:** 1.0

**Preliminary Specification**

**Final Specification**

## For Customer's Acceptance

| Approved by | Comment |
|-------------|---------|
|             |         |



## Table of Contents

|   |           |
|---|-----------|
| <b>1. FEATURES .....</b>                                    | <b>4</b>  |
| <b>2. GENERAL SPECIFICATIONS .....</b>                      | <b>4</b>  |
| <b>3. PIN DESCRIPTION .....</b>                             | <b>5</b>  |
| <b>3.1 Connector .....</b>                                  | <b>5</b>  |
| <b>3.2 PIN assignment .....</b>                             | <b>5</b>  |
| <b>4. ABSOLUTE MAXIMUM RATING .....</b>                     | <b>7</b>  |
| <b>5. DC CHARACTERISTICS.....</b>                           | <b>8</b>  |
| <b>5.1 Parameter .....</b>                                  | <b>8</b>  |
| <b>5.2 LB power output .....</b>                            | <b>8</b>  |
| <b>5.3 Power sequence.....</b>                              | <b>9</b>  |
| <b>6. LVDS SIGNAL TIMING CHARACTERISTICS .....</b>          | <b>10</b> |
| <b>6.1AC Electrical characteristics.....</b>                | <b>10</b> |
| <b>6.2 Input clock and data timing diagram.....</b>         | <b>10</b> |
| <b>6.3 DC electrical characteristics .....</b>              | <b>11</b> |
| <b>6.4 data timing.....</b>                                 | <b>12</b> |
| <b>6.5 LVDS data input format .....</b>                     | <b>12</b> |
| <b>7. OPTICAL CHARACTERISTICS.....</b>                      | <b>14</b> |
| <b>7.1 Optical specification .....</b>                      | <b>14</b> |
| <b>8. QUALITY ASSURANCE .....</b>                           | <b>17</b> |
| <b>9. PRECAUTIONS .....</b>                                 | <b>18</b> |
| <b>9.1 ESD (Electrical Static Discharge) strategy .....</b> | <b>18</b> |
| <b>9.2 Environment .....</b>                                | <b>18</b> |
| <b>9.3 Assembly and handling precautions.....</b>           | <b>18</b> |
| <b>9.4 Lamination precautions.....</b>                      | <b>20</b> |
| <b>9.5 Safety precautions .....</b>                         | <b>20</b> |
| <b>9.6 Others .....</b>                                     | <b>20</b> |
| <b>10. MECHANICAL DRAWING .....</b>                         | <b>22</b> |
| <b>10.1 FOG drawing .....</b>                               | <b>22</b> |
| <b>10.2 FOG label serial label explanation.....</b>         | <b>23</b> |
| <b>11. PACKING DRAWING .....</b>                            | <b>24</b> |
| <b>11.1 Packaging material table .....</b>                  | <b>24</b> |
| <b>11.2 Packaging quantity .....</b>                        | <b>24</b> |
| <b>11.3 Packaging drawing.....</b>                          | <b>25</b> |

**RECORD OF REVISION**

| Version | Revise Date | Page   | Description                     |
|---------|-------------|--------|---------------------------------|
| 0.1     | 2019/10/08  | All    | Preliminary spec for reference. |
| 1.0     | 2019/12/12  | Page 4 | Add remark.                     |
|         |             | Page14 | Updated Note, INX BLU w/o DBEF  |
|         |             |        |                                 |
|         |             |        |                                 |
|         |             |        |                                 |
|         |             |        |                                 |
|         |             |        |                                 |

## 1. FEATURES

ZE104IA-03D is a transmissive type color active matrix liquid crystal display (LCD), which uses amorphous thin film transistor (TFT) as switching devices. This panel has a 10.4 inches diagonally measured active display area with resolution 1024 x 768. This product is composed of a TFT LCD panel, polarizers, driver ICs, FPC and PCBA.

Note: Air-Bonding is recommended.

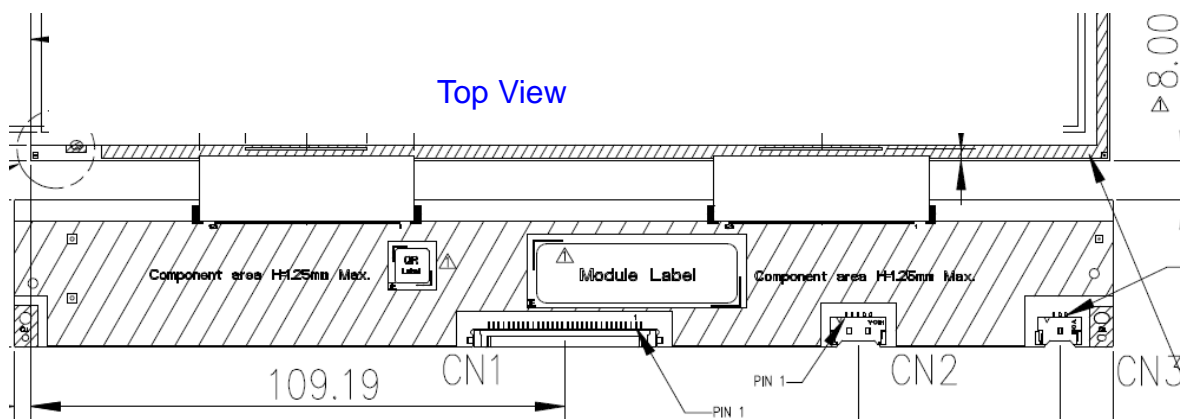
## 2. GENERAL SPECIFICATIONS

| Item                               | Description                               | Unit |
|------------------------------------|---|------|
| Display Size                       | 10.4                                      | inch |
| Display Type                       | Transmissive, a-Si                        | -    |
| Active Area (HxV)                  | 210.432 (H) x 157.824 (V)                 | mm   |
| Number of Dots (HxV)               | 1024 x RGB x 768                          | dot  |
| Pixel Pitch(HxV)                   | 0.2055 x 0.2055                           | mm   |
| Color Arrangement                  | RGB Stripe                                | -    |
| Color Numbers                      | 256K/16.7 M                               | -    |
| Outline Dimension (HxVxD)          | 220.53 (H) x 168.02 (V) x 1.04 (D)        | mm   |
| NTSC (CIE1931) (Under C light)     | 61.2 (Typ.)                               | %    |
| White Point (x,y) (Under C light)  | x:0.319,y: 0.369(Typ.)                    |      |
| Response Time                      | ≤35                                       | ms   |
| Viewing Angle (Light On) (R/U/L/D) | CR ≥ 10 @ R/L/U/D(80°/80°/80°/80°) (Min.) |      |
| Surface Treatment                  | AG  |      |
| Contrast Ratio (Light On)          | 1000:1 (Typ)                              |      |
| Operation Temperature              | -30~80                                    | °C   |
| Storage Temperature                | -30~80                                    | °C   |
| Interface                          | LVDS                                      |      |
| Weight                             | 100 (Typ)                                 | g    |
| Panel power consumption            | Max:1.4W @white pattern                   | W    |

### 3. PIN DESCRIPTION

#### 3.1 Connector

There are 3 connectors on PCBA, location & Pin1 is showed on below figure.



Connectors' type:

1. CN1 : Input LVDS CONN,30pins, P-two , 187098-30091
2. CN2: Input BL power CONN,5pins, Cillux,CI4205M2HRD-NH
3. CN3: Output BL power CONN, 3pins, Cillux,CI4203M2HRD-NH

#### 3.2 PIN assignment

##### 3.2.1 Connector 1 :

A 30pin connector of P-two 187098-30091 is used for the module electronics interface.

And a special plug needed for connecting this connector, the recommended model is P-two 187130-30xx or JAE FI-X30H.

| No | Symbol | I/O | Function                                  | Remark |
|----|--------|-----|---|--------|
| 1  | NC     | I   | Reserved as BIST function for INX test    | 1      |
| 2  | GND    | P   | Ground                                    |        |
| 3  | Rin3+  | I   | Positive LVDS differential data input (+) |        |
| 4  | Rin3-  | I   | Negative LVDS differential data input (-) |        |
| 5  | GND    | P   | Ground                                    |        |
| 6  | CLK+   | I   | Clock signal (+)                          |        |
| 7  | CLK-   | I   | Clock signal (-)                          |        |
| 8  | GND    | P   | Ground                                    |        |
| 9  | Rin2+  | I   | Positive LVDS differential data input (+) |        |
| 10 | Rin2-  | I   | Negative LVDS differential data input (-) |        |
| 11 | GND    | P   | Ground                                    |        |
| 12 | Rin1+  | I   | Positive LVDS differential data input (+) |        |
| 13 | Rin1-  | I   | Negative LVDS differential data input (-) |        |
| 14 | GND    | P   | Ground                                    |        |

|    |         |   |  |   |
|----|---------|---|--|---|
| 15 | Rin0+   | I | Positive LVDS differential data input (+)  |   |
| 16 | Rin0-   | I | Negative LVDS differential data input (-)  |   |
| 17 | GND     | P | Ground   |   |
| 18 | NC      | - | No Connection  |   |
| 19 | GND     | P | Ground   |   |
| 20 | SEL6/8  | I | Selection for 6 bits/8bit LVDS data input<br>Low or NC : 8 bit input mode<br>High : 6 bit input mode | 2 |
| 21 | NC      | I | Reversed as EE_WP for OTP function   | 3 |
| 22 | NC      | I | Reversed as EE_SDA for OTP function  | 3 |
| 23 | NC      | I | Reversed as EE_SCL for OTP function  | 3 |
| 24 | Reverse | I | Reverse panel function (Display rotation)  | 4 |
| 25 | GND     | P | Ground   |   |
| 26 | GND     | P | Ground   |   |
| 27 | GND     | P | Ground   |   |
| 28 | VDD     | P | Power supply: + 3.3V   |   |
| 29 | VDD     | P | Power supply: + 3.3V   |   |
| 30 | VDD     | P | Power supply: + 3.3V   |   |

## Note:

1. Pin1 is reversed as BIST function for test, don't connect signal to this pin, keep floating.
2. SEL6/8 is used for selecting 6bit/8bit LVDS data input, L or NC: 8bit; High:6bit.
3. Pin21,22,23 are used as SPI interface for OTP function, don't connect any signal to these pin, and don't short them, keep floating.
4. Reverse pin is used for selecting scanning direction.

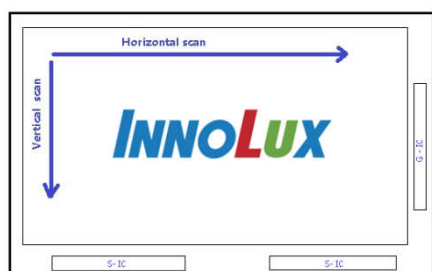


Fig. 1 Normal scan (Pin24, Reverse = Low or NC)

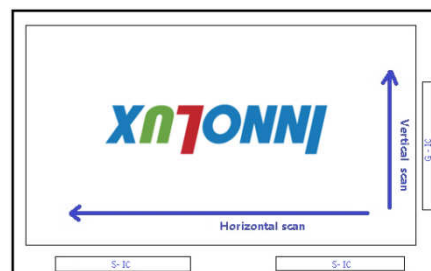


Fig. 2 Reverse scan (Pin24, Reverse = High)

### 3.2.2 Connector 2: Cillux,CI4205M2HRD-NH

5-pin connector is used for input power & control signals for BL converter power IC

| No | Symbol   | I/O | Function                                   | Remark |
|----|----------|-----|--|--------|
| 1  | LED_VCCS | P   | 12V input                                  |        |
| 2  | LED_VCCS | P   | 12V input                                  |        |
| 3  | GND      | P   | Ground                                     |        |
| 4  | LED_PWM  | I   | PWM  |        |
| 5  | LED_EN   | I   | Converter power IC Enable<br>(Active High) |        |

### 3.2.3 Connector 3: Cillux,CI4203M2HRD-NH

3-pin connector is used for output power to BL module.

| No | Symbol | I/O | Function   | Remark               |
|----|--------|-----|------------|----------------------|
| 1  | LED+   | P   | Red wire   | BL output power      |
| 2  | LED1-  | P   | White wire | BL feedback channel1 |
| 3  | LED2-  | P   | White wire | BL feedback channel2 |

## 4. ABSOLUTE MAXIMUM RATING

| Item                  | Symbol   | Min. | Max. | Unit | Remark |
|-----------------------|----------|------|------|------|--------|
| Power Supply Voltage  | VDD      | -0.3 | 3.8  | V    |        |
|                       | LED_VCCS | -0.3 | 25   | V    |        |
| Storage Temperature   | Tstg     | -30  | +80  | °C   |        |
| Operating Temperature | Topr     | -30  | +80  | °C   |        |

Note:

- (1) All of the voltages listed above are with respect to GND= 0V
- (2) Device is subject to be damaged permanently if stresses beyond those absolute maximum ratings listed above.

## 5. DC CHARACTERISTICS

### 5.1 Parameter

| Item                      | Symbol                | Values |      |        | Unit | Remark  |
|---------------------------|-----------------------|--------|------|--------|------|---|
|                           |                       | Min.   | Typ. | Max.   |      |   |
| Power voltage             | VDD                   | 3.0    | 3.3  | 3.6    | V    |   |
|                           | LED_VCCS              | 11     | 12   | 13     | V    |   |
| Input logic high voltage  | V <sub>IH</sub>       | 0.7VDD | -    | VDD    | V    | 1   |
| Input logic low voltage   | V <sub>IL</sub>       | 0      | -    | 0.3VDD | V    |   |
| Current for Power         | I <sub>VDD</sub>      |        | 385  | 424    | mA   | VDD =3.3V@frame<br>60 Hz, White pattern       |
|                           | I <sub>LED_VCCS</sub> | -      | 0.52 | -      | A    | 100% PWM Duty @<br>VLED+ =33V,<br>ILED=80mA*2 |
| LED_EN Control Level      | BL On                 | 3.0    | -    | 5      | V    |   |
|                           | BL Off                | 0      | -    | 0.3    | V    |   |
| LED_PWM Control Level     | PWM High Level        | 3.0    | -    | 5      | V    |   |
|                           | PWM Low Level         | 0      | -    | 0.3    | V    |   |
| LED_PWM Control Frequency | f <sub>PWM</sub>      | 1K     | -    | 20K    | Hz   | 2   |

Note 1: Including signal: SEL6/8 & Reverse

Note 2: LED\_PWM duty >10%.

### 5.2 LB power output

| Item                      | Symbol      | Values |      |      | Unit | Remark |
|---------------------------|-------------|--------|------|------|------|--------|
|                           |             | Min.   | Typ. | Max. |      |        |
| Voltage for LED backlight | LED+        | 31     | 33   | 35   | V    | 1      |
| Current for LED backlight | LED1-/LED2- | 78     | 80   | 82   | mA   | 2      |

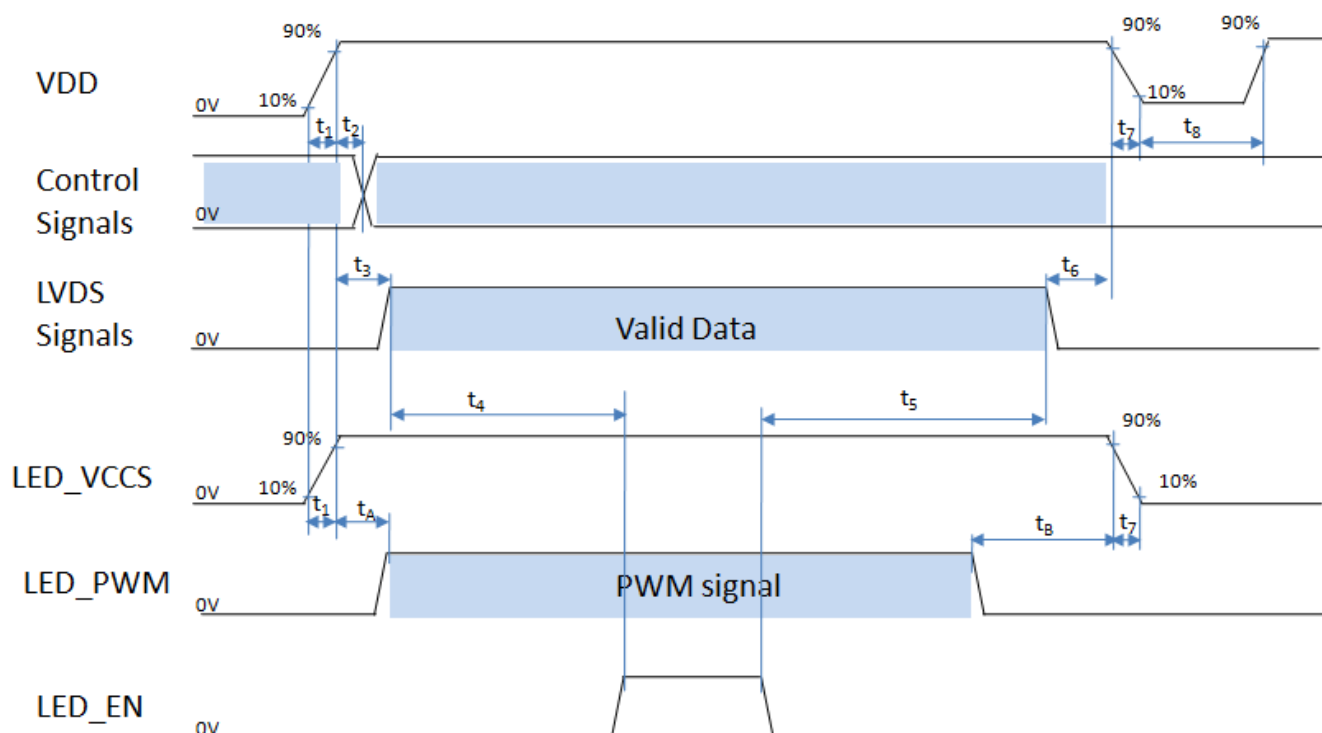
Note 1: output power LED+ OVP is 40V.

Note 2: Set BL feedback 2 channels, each channel feedback current is 80mA

### 5.3 Power sequence

The power sequence specifications are shown as the following table and diagram.

| Symbol | Value |      | Unit |
|--------|-------|------|------|
|        | Min.  | Max. |      |
| $t_1$  | 1     | 20   | ms   |
| $t_2$  | 1     | 5    | ms   |
| $t_3$  | 10    | 50   | ms   |
| $t_4$  | 200   | 500  | ms   |
| $t_5$  | 200   | 500  | ms   |
| $t_6$  | 50    | 200  | ms   |
| $t_7$  | 0     | 20   | ms   |
| $t_8$  | 500   | -    | ms   |
| $t_A$  | 0     | 50   | ms   |
| $t_B$  | 0     | 50   | ms   |



Note 1: Please don't plug the interface cable of on when system is turned on.

Note 2: Please avoid floating state of the interface signal during signal invalid period.

Note 3: It is recommended that the backlight power must be turned on after the power supply for LCD and the interface signal is valid.

Note 4: Control signals include SEL6/8 & Reverse.

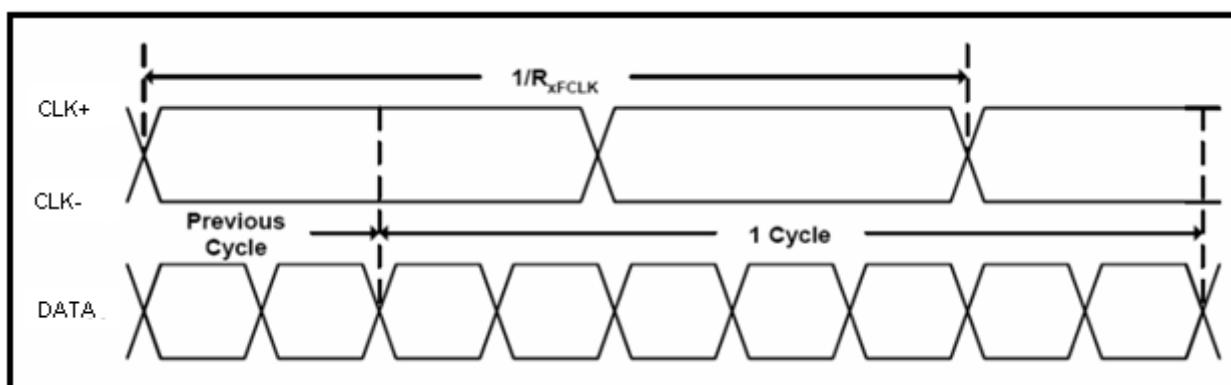


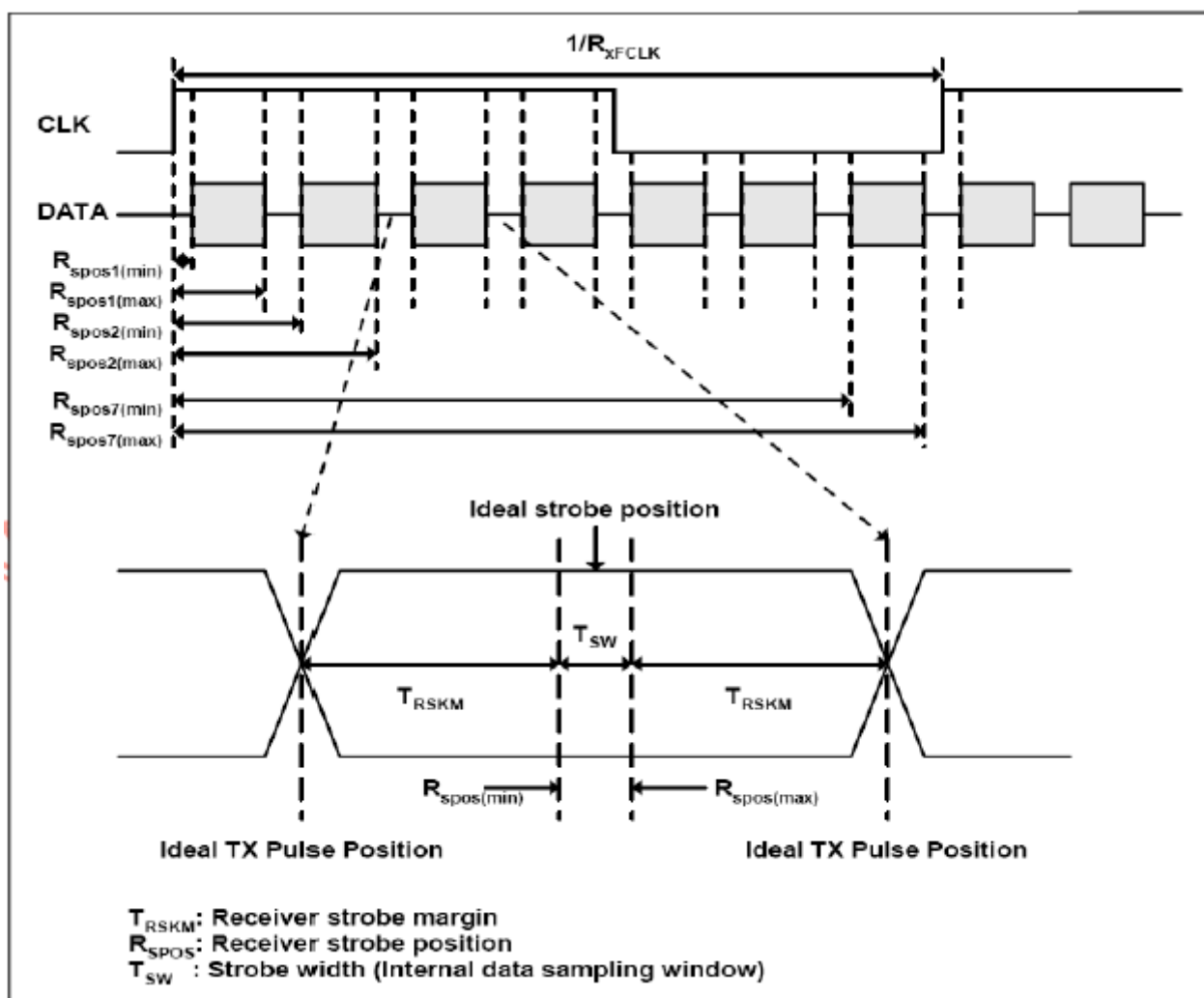
## 6. LVDS SIGNAL TIMING CHARACTERISTICS

### 6.1AC Electrical characteristics

| Parameter              | Symbol | Min  | Typ                  | Max                  | Units | Condition   |
|------------------------|--------|------|----------------------|----------------------|-------|---|
| Clock frequency        | RxFCLK | 26.2 | 51.2                 | 71                   | MHz   |   |
| Input data skew margin | TRSKM  | 500  | 500                  | $1/(2 \cdot RxFCLK)$ | ps    | Typical value for 1024*600 resolution   |
| Clock high time        | TLVCH  |      | $4/(7 \cdot RxFCLK)$ |                      | ns    | $ VID =400\text{mv}$<br>$RxVCM=1.2\text{V}$<br>$RxFCLK=71\text{MHz}$<br>$VDD\_LVDS=3.3\text{V}$ |
| Clock low time         | TLVCL  |      | $3/(7 \cdot RxFCLK)$ |                      | ns    |   |
| VSD setup time         | TenPLL | 0    | TenPLL               | 150                  | us    |   |

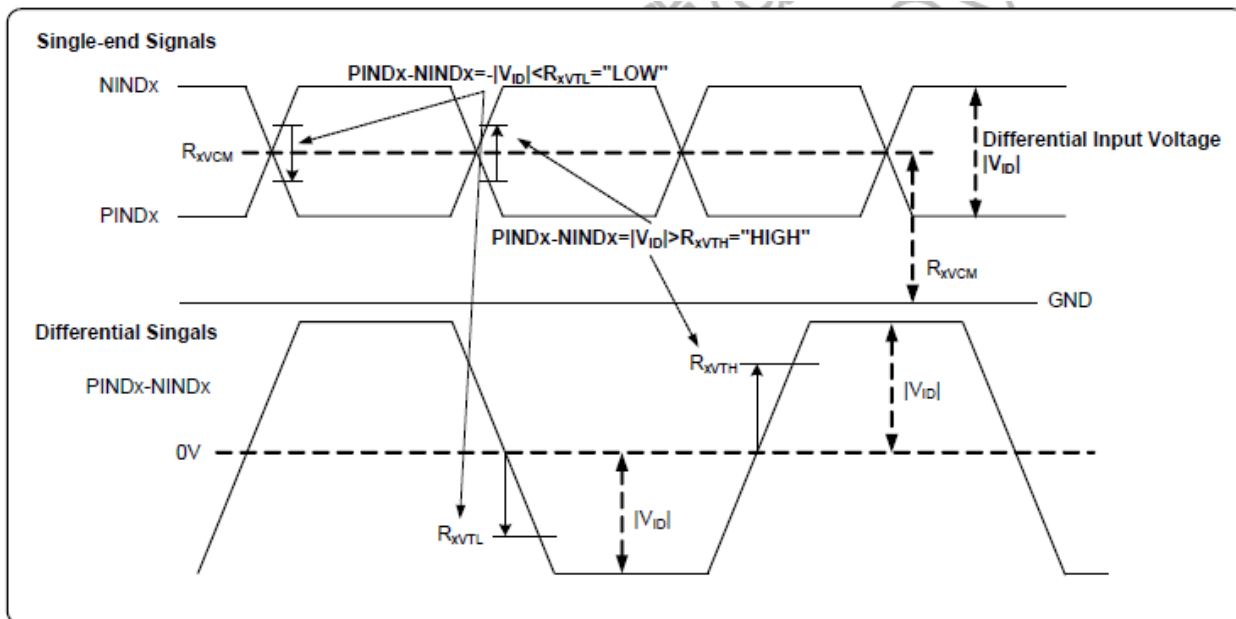
### 6.2 Input clock and data timing diagram





### 6.3 DC electrical characteristics

| Parameter                                      | Symbol     | Values       |      |                      | Unit | Remark          |
|--|------------|--------------|------|----------------------|------|-----------------|
|  |            | Min.         | Typ. | Max.                 |      |                 |
| LVDS Differential input high Threshold voltage | $R_{xVTH}$ | -            | -    | +100                 | mV   | $R_{xVCM}=1.2V$ |
| LVDS Differential input low Threshold voltage  | $R_{xVTL}$ | -100         | -    | -                    | mV   |                 |
| Input Voltage range (Singled-end)              | $R_{xVIN}$ | 0            | -    | $VDD-1.2+ V_{ID} /2$ | V    |                 |
| LVDS Differential input common mode voltage    | $R_{xVCM}$ | $ V_{ID} /2$ | -    | $VDD-1.2$            | V    |                 |
| LVDS Differential voltage                      | $ V_{ID} $ | 0.2          | -    | 0.6                  | V    |                 |

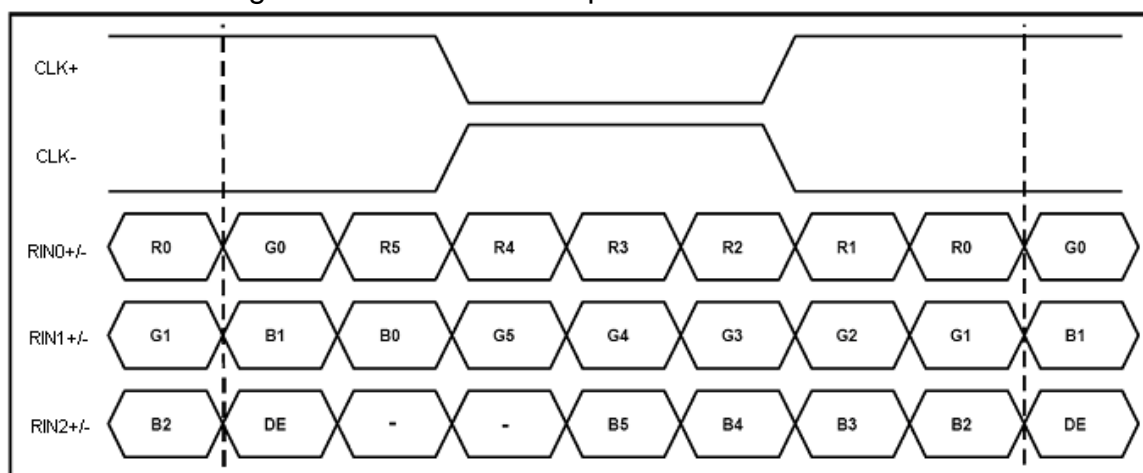


### 6.4 data timing

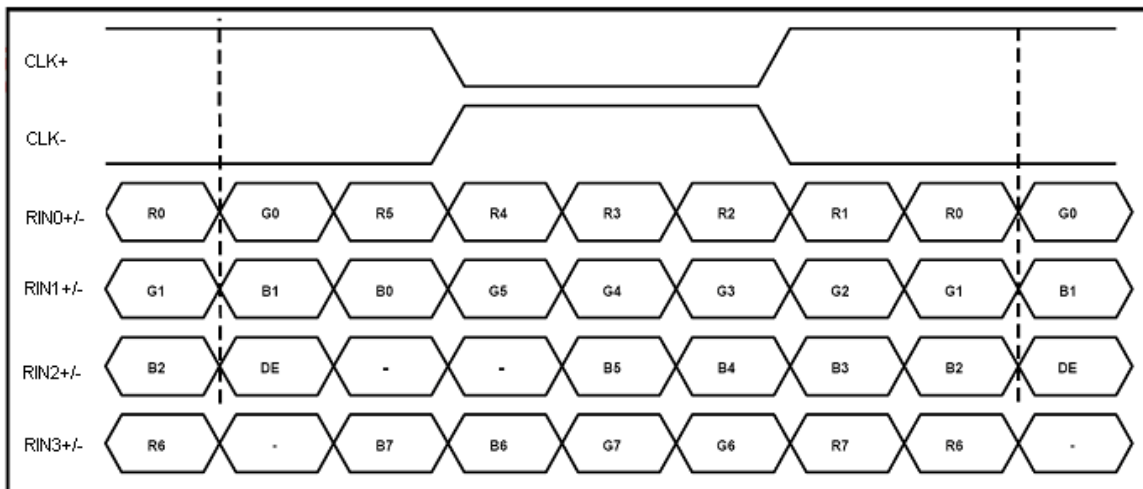
| Parameter               | Symbol    | Spec. |      |      | Unit  |
|-------------------------|-----------|-------|------|------|-------|
|                         |           | Min.  | Typ. | Max. |       |
| DCLK frequency          | fclk      | 52    | 65   | 71   | MHz   |
| Horizontal display area | thd       | 1024  |      |      | DCLK  |
| HSD period              | th        | 1114  | 1344 | 1400 | DCLK  |
| HSD blanking            | thb+thfp  | 90    | 320  | 376  | DCLK  |
| Vertical display area   | tvd       | 768   |      |      | $T_H$ |
| VSD period              | tv        | 778   | 806  | 845  | $T_H$ |
| VSD blanking            | tvbp+tvfp | 10    | 38   | 77   | $T_H$ |

### 6.5 LVDS data input format

SEL6/8 = "High" for 6 bits LVDS Input



SEL6/8 = "Low" or "NC" for 8 bits LVDS Input



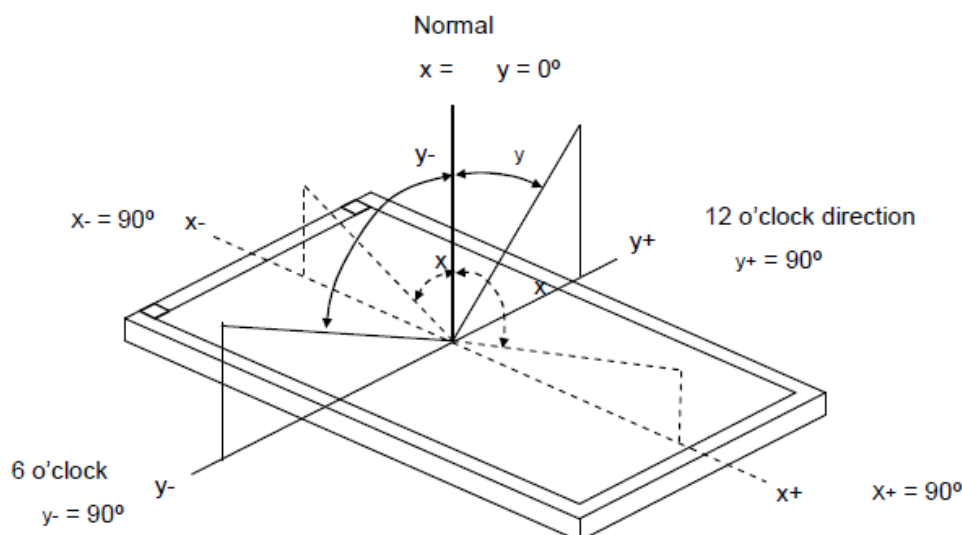
## 7. OPTICAL CHARACTERISTICS

### 7.1 Optical specification

The relative measurement methods of optical characteristics are shown

| Item  | Symbol                       | Condition                            | Min.          | Typ.  | Max.          | Unit | Note                         |         |
|---|------------------------------|--------------------------------------|---------------|-------|---------------|------|------------------------------|---------|
| Color Chromaticity (CIE 1931) FOG Only with C-light | Red                          | Rx                                   | Typ -<br>0.02 | 0.645 | Typ +<br>0.02 | -    | C Light Source (5) (7),(8)   |         |
|   |                              | Ry                                   |               | 0.334 |               |      |                              |         |
|   | Green                        | Gx                                   |               | 0.284 |               |      |                              |         |
|   |                              | Gy                                   |               | 0.564 |               |      |                              |         |
|   | Blue                         | Bx                                   |               | 0.137 |               |      |                              |         |
|   |                              | By                                   |               | 0.121 |               |      |                              |         |
|   | White                        | Wx                                   |               | 0.319 |               |      |                              |         |
|   |                              | Wy                                   |               | 0.369 |               |      |                              |         |
| Color gamut   | C.G                          |                                      | 55            | 61.2  | -             | %    |                              |         |
| Center Transmittance                                | T%                           |                                      | 5.16          | 5.64  | -             | %    | INX BLU w/o DBEF (1),(4),(6) |         |
| Contrast Ratio                                      | CR                           |                                      | 800           | 1000  | -             | -    | (2)                          |         |
| Response Time                                       | T <sub>R+T<sub>F</sub></sub> | $\theta_x=0^\circ, \theta_y=0^\circ$ | -             | 25    | 35            | ms   | (3)                          |         |
| Viewing Angle                                       | Horizontal                   | x +                                  | CR ≥ 10       | 80    | -             | -    | Deg.                         | (1),(5) |
|   |                              | x -                                  |               | 80    | -             | -    |                              |         |
|   | Vertical                     | y +                                  |               | 80    | -             | -    |                              |         |
|   |                              | y -                                  |               | 80    | -             | -    |                              |         |

Note (1) Definition of Viewing Angle ( $\_x, \_y$ ):



Note (2) Definition of Contrast Ratio (CR):

The contrast ratio can be calculated by the following expression.

$$\text{Contrast Ratio (CR)} = L_{255} / L_0$$

L255: Luminance of gray level 255

L 0: Luminance of gray level 0

CR = CR (5)

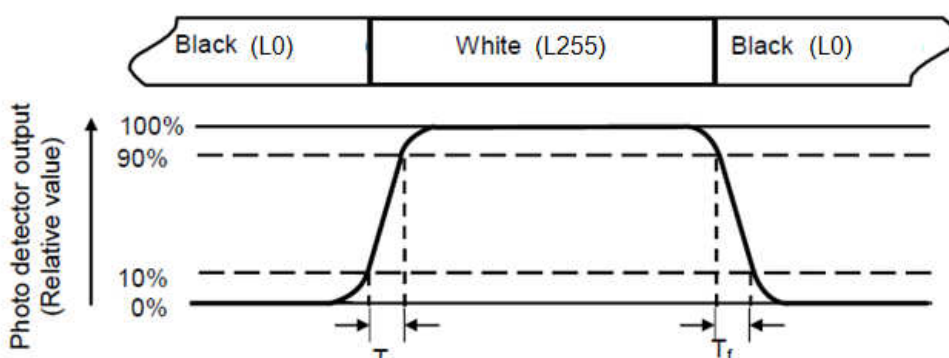
CR (X) is corresponding to the Contrast Ratio of the point X at Figure in Note (6).

Note (3) 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%.

RT = RT (5)

RT (X) is corresponding to the Response Time of the point X at Figure in Note (6).



Note (4) Definition of Luminance of White ( $L_c$ ):

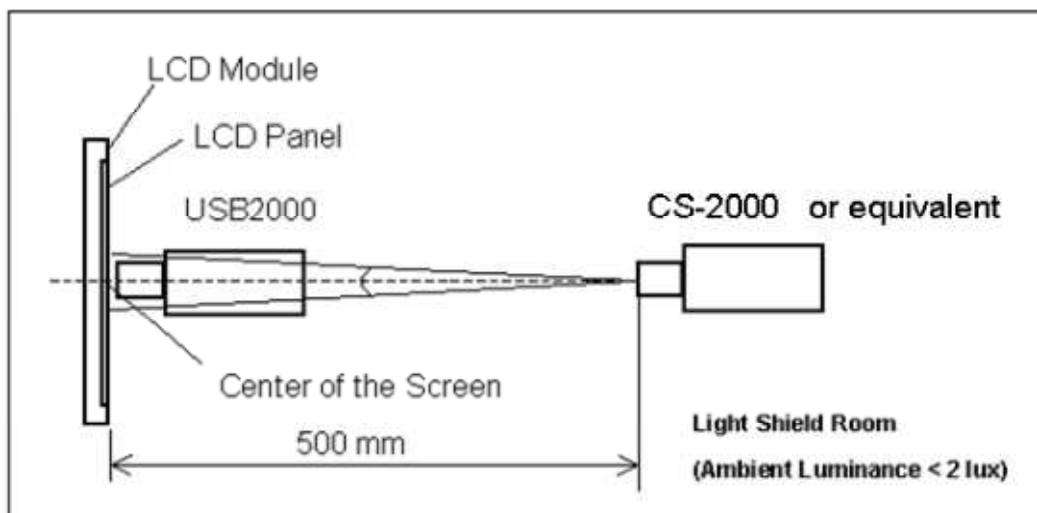
Measure the luminance of gray level 255 at center point

$LC = L$  (5)

$L(x)$  is corresponding to the luminance of the point X at Figure in Note (6).

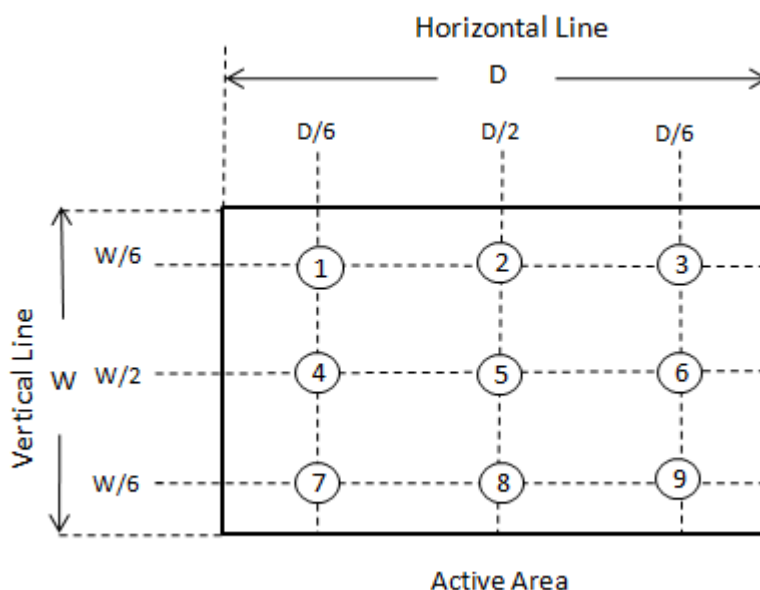
Note (5) Measurement Setup:

The LCD module should be stabilized at given temperature for 40 minutes to avoid abrupt temperature change during measuring. In order to stabilize the luminance, the measurement should be executed after lighting Backlight for 40 minutes in a windless room.



Note (6) Definition of White Variation ( $\Delta W$ ):

Measure the luminance of gray level 255 at 9 points



Note (7) The listed optical specifications refer to the initial value of manufacture, but the condition of the specifications after long-term operation will not be warranted.

Note (8) Definition of color gamut (C.G%):

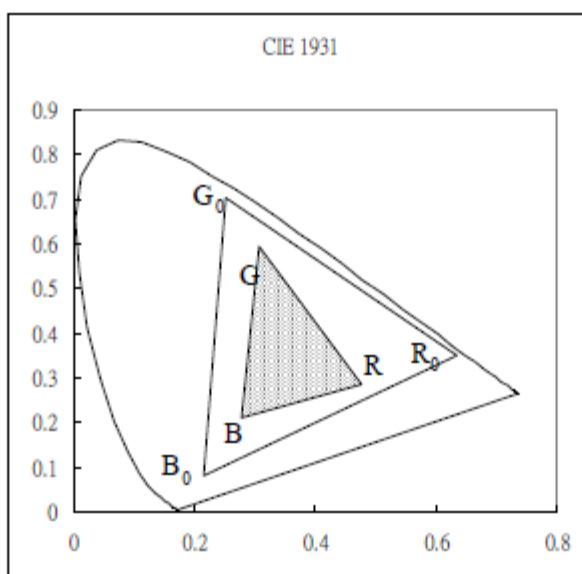
$$C.G\% = \frac{R G B}{R_0 G_0 B_0} \cdot 100\%$$

$R_0, G_0, B_0$  : color coordinates of red, green, and blue defined by NTSC, respectively.

$R, G, B$  : color coordinates of module on 255 gray levels of red, green, and blue, respectively.

$R_0 G_0 B_0$  : area of triangle defined by  $R_0, G_0, B_0$

$R G B$  : area of triangle defined by  $R, G, B$



## 8. QUALITY ASSURANCE

| No. | Test Items                                 | Test Condition  | Note      |
|-----|--|---|-----------|
| 1   | High Temperature Storage                   | 80°C, 240hrs  | Note 1, 2 |
| 2   | Low Temperature Storage                    | -30°C, 240hrs   | Note 1, 2 |
| 3   | High Temperature Operation                 | 80°C, 240hrs  | Note 1, 2 |
| 4   | Low Temperature Operation                  | -30°C, 240hrs   | Note 1, 2 |
| 5   | High Temperature and High Humidity Storage | 60°C, 90%RH, 240hrs   | Note 1, 2 |
| 6   | Thermal Shock                              | -30°C/0.5h ~ +80°C/0.5h for a total 100 cycles  | Note 1, 2 |
| 7   | Electro Static Discharge                   | C=150pF,R=330Ω, 5point/panel<br>Air:±4Kv, 5times  | Note 2    |
| 8   | Package Drop Test                          | Drop in 1 corner,3 edges,6 surfaces,<br>1 time/direction<br>Height follow ISTA(1A)<br>0kg ≤ W < 10kg : 76cm,<br>10kg ≤ W < 19kg : 61cm,<br>19kg ≤ W < 28kg : 46cm,<br>28kg ≤ W < 45kg : 31cm,<br>45kg ≤ W ≤ 68kg : 20cm | Note 2    |

Note 1: The test samples have recovery time for 2 hours at room temperature before the function check. In the standard conditions, there is no display function NG issue occurred.

Note 2: After the reliability test, the product only guarantees operation, but don't guarantee all of the cosmetic specification.



## 9. PRECAUTIONS

### 9.1 ESD (Electrical Static Discharge) strategy

- [ 1 ] ESD will cause serious damage of the panel, ESD strategy is very important in handling. Following items are the recommended ESD strategy
- [ 2 ] In handling LCD panel, please wear gloves with non-charged material. Using the conduction ring connects wrist to the earth and the conducting shoes to the earth necessary is.
- [ 3 ] The machine and working table for the panel should have ESD protection strategy.
- [ 4 ] In handling the panel, ionized airflow decreases the charge in the environment is necessary.
- [ 5 ] In the process of assemble module, shield case should connect to the ground.

### 9.2 Environment

- [ 1 ] Working environment of the panel should be in the clean room.
- [ 2 ] Because touch panel has protective film on the surface, please remove the protection film slowly with ionized air to prevent the electrostatic discharge.

### 9.3 Assembly and handling precautions

- [ 1 ] Do not apply improper or unbalanced force such as bending or twisting to open cells during assembly.
- [ 2 ] It is recommended to assemble or to install an open cell into a customer's product in clean working areas. The dust and oil may cause electrical short to an open cell or worsen polarizers on an open cell.
- [ 3 ] Do not apply pressure or impulse to an open cell to prevent the damage.
- [ 4 ] Always follow the correct power-on sequence when an open cell is assembled and turned on. This can prevent the damage and latch-up of the CMOS LSI chips.
- [ 5 ] Do not design sharp-pointed structure / parting line / tooling gate on the plastic part of a COF (Chip on film), because the burr will scrape the COF.
- [ 6 ] If COF would be bended in assemble process, do not place IC on the bending corner.
- [ 7 ] The gap between COF IC and any structure of BLU must be bigger than 2 mm. This can prevent the damage of COF IC.
- [ 8 ] The bezel opening must have no burr and be smooth to prevent the surface of an open cell scraped.
- [ 9 ] The bezel of a module or a TV set can not contact with force on the surface of an open cell. It might cause light leakage or scrape.
- [ 10 ] In the case of no FFC or FPC attached with open cells, customers can refer the FFC / FPC drawing and buy them by self.

- [ 11 ] It is important to keep enough clearance between customers' front bezel/backlight and an open cell. Without enough clearance, the unexpected force during module assembly procedure may damage an open cell.
- [ 12 ] Do not plug in or unplug an I/F (interface) connector while an assembled open cell is in operation.
- [ 13 ] Use a soft dry cloth without chemicals for cleaning, because the surface of the polarizer is very soft and easily scratched.
- [ 14 ] Moisture can easily penetrate into an open cell and may cause the damage during operation.
- [ 15 ] When storing open cells as spares for a long time, the following precaution is necessary.
  - [ 15.1 ] Do not leave open cells in high temperature and high humidity for a long time. It is highly recommended to store open cells in the temperature range from 0 to 35°C at normal humidity without condensation.
  - [ 15.2 ] Open cells shall be stored in dark place. Do not store open cells in direct sunlight or fluorescent light environment.
- [ 16 ] When ambient temperature is lower than 10°C, the display quality might be reduced.
- [ 17 ] Unpacking (Cartons/Tray plates) in order to prevent open cells broken:
  - [ 17.1 ] Moving tray plates by one operator may cause tray plates bent which may induce open cells broken. Two operators carry one carton with their two hands. Do not throw cartons/tray plates, avoid any impact on cartons/tray plates, and put down & pile cartons/tray plates gently.
  - [ 17.2 ] A tray plate handled with unbalanced force may cause an open cell damaged. Trays should be completely put on a flat platform.
  - [ 17.3 ] To prevent open cells broken, tray plates should be moved one by one from a plastic bag.
  - [ 17.4 ] Please follow the packing design instruction, such as the maximum number of tray stacking to prevent the deformation of tray plates which may cause open cells broken.
  - [ 17.5 ] To prevent an open cell broken or a COF damaged on a tray, please follow the instructions below:
    - [17.5.1] Do not peel a polarizer protection film of an open cell off on a tray
    - [17.5.2] Do not install FFC or LVDS cables of an open cell on a tray
    - [17.5.3] Do not press the surface of an open cell on a tray.
    - [17.5.4] Do not pull X-board when an open cell placed on a tray.
- [ 18 ] Unpacking (Hard Box) in order to prevent open cells broken:
  - [ 18.1 ] Moving hard boxes by one operator may cause hard boxes fell down and open cells broken by abnormal methods. Two operators carry one hard box with

their two hands. Do handle hard boxes carefully, such as avoiding impact, putting down, and piling up gently.

[ 18.2 ] To prevent hard boxes sliding from carts and falling down, hard boxes should be placed on a surface with resistance.

[ 18.3 ] To prevent an open cell broken or a COF damaged in a hard box, please follow the instructions below:

[18.3.1] Do not peel a polarizer protection film of an open cell off in a hard box.

[18.3.2] Do not install FFC or LVDS cables of an open cell in a hard box.

[18.3.3] Do not press the surface of an open cell in a hard box.

[18.3.4] Do not pull X-board when an open cell placed in a hard box.

[ 19 ] Handling – In order to prevent open cells, COFs , and components damaged:

[ 19.1 ] The forced displacement between open cells and X-board may cause a COF damaged. Use a fixture tool for handling an open cell to avoid X-board vibrating and interfering with other components on a PCBA & a COF.

[ 19.2 ] To prevent open cells and COFs damaged by taking out from hard boxes, using vacuum jigs to take out open cells horizontally is recommended.

[ 19.3 ] Improper installation procedure may cause COFs of an open cell over bent which causes damages. As installing an open cell on a backlight or a test jig, place the bottom side of the open cell first on the backlight or the test jig and make sure no interference before fitting the open cell into the backlight/the test jig.

[ 19.4 ] Handle open cells one by one.

[ 20 ] Avoid any metal or conductive material to contact PCB components, because it could cause electrical damage or defect.

#### **9.4 Lamination precautions**

[ 1 ] Air-Bonding the touch panel or cover is recommended instead of OCA/OCR full lamination.

#### **9.5 Safety precautions**

[ 1 ] If the liquid crystal material leaks from the open cell, it should be kept away from the eyes or mouth. In case of contact with hands, skin or clothes, it has to be washed away thoroughly with soap.

[ 2 ] After the end of life, open cells are not harmful in case of normal operation and storage.

#### **9.6 Others**

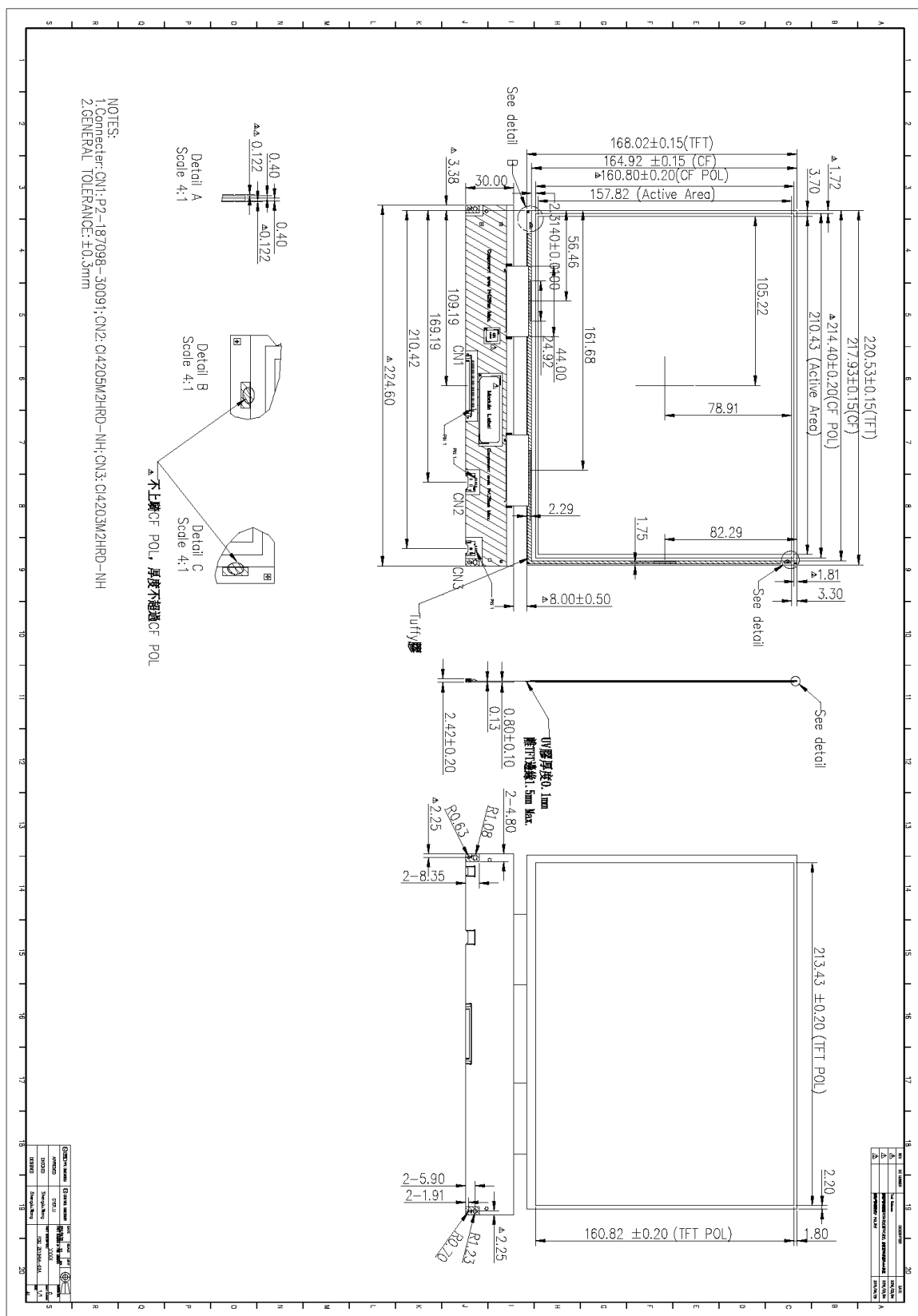
[ 1 ] Turn off the power supply before connecting and disconnecting signal input cable.

[ 2 ] Because the connection area of FPC and panel is not so strong, do not handle panel only by FPC or bend FPC.

- [ 3 ] Water drop on the surface or condensation as panel power on will corrode panel electrode.
- [ 4 ] As the packing bag open, watch out the environment of the panel storage. High temperature and high humidity environment is prohibited.
- [ 5 ] In the case the TFT LCD module is broken, please watch out whether liquid crystal leaks out or not. If your hand touches liquid crystal, wash your hands cleanly with water and soap as soon as possible.

# 10. MECHANICAL DRAWING

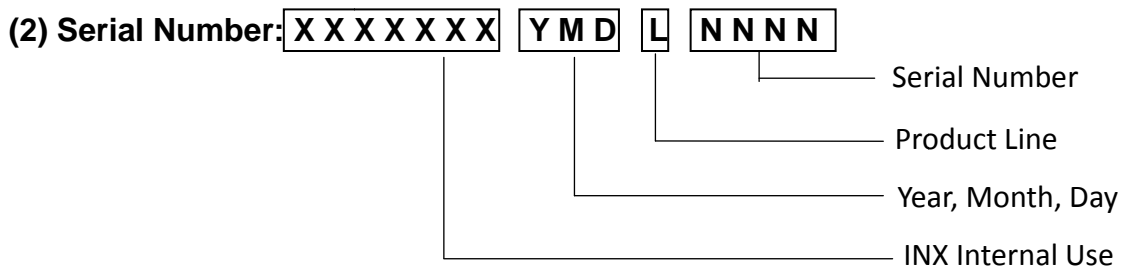
## 10.1 FOG drawing



10.2 FOG label serial label explanation



(1) Model Name: Z JH104X1-01B



Serial number included the information as below

(a) Manufactured Date: Year 0~9, 2010~2019

Month 1~9 means Jan. ~Sep.

A~C means Oct.~Dec.

Day 1~9 means 1<sup>st</sup> ~9<sup>th</sup>

A~Z means 10<sup>th</sup>~31<sup>th</sup>

(b) Production Line: 1 means Line1, 2 means Line2...etc

(c) Serial Number: Manufactured sequence of production

## 11. PACKING DRAWING

### 11.1 Packaging material table

| No | Item           | Model (Material) | Dimensions(mm)     | Unit Weight (Kg) | Quantity (pcs) | Remark |
|----|----------------|------------------|--------------------|------------------|----------------|--------|
| 1  | FOG module     | ZE1014A-03D      | 220.53x168.02x1.04 | 0.1              | 28             |        |
| 2  | Dust-Proof Bag | LDPE             | 700 x 530x0.05     | 0.0595           | 1              |        |
| 3  | Tray           | Tray, PET        | 472x360x15.6       | 0.192            | 15             |        |
| 4  | Spacer         | EPE              | 347x217x3.2        | 0.006            | 28             |        |
| 5  | Cushion        | EPE              | 518x356x115        | 0.0185           | 2              |        |
| 6  | Drier          | Exsiccator       | 105 x 80 x 8       | 0.035            | 2              |        |
| 7  | Carton         | Corrugated paper | 530x367x260        | 0.95             | 1              |        |
| 8  | Total weight   | <b>7kg</b>       |                    |                  |                |        |

### 11.2 Packaging quantity

Total Panel quantity of per Carton:  $2\text{ pcs/ tray} \times 14 (15-1) \text{ tray} / \text{ Carton} = 28 \text{ pcs}$

11.3 Packaging drawing

