



晶采光電科技股份有限公司  
AMPIRE CO., LTD.

## SPECIFICATIONS FOR LCD MODULE

|                          |                             |
|--------------------------|-----------------------------|
| <b>CUSTOMER</b>          |                             |
| <b>CUSTOMER PART NO.</b> |                             |
| <b>AMPIRE PART NO.</b>   | <b>AM-1024768Y7HZQW-A9H</b> |
| <b>APPROVED BY</b>       |                             |
| <b>DATE</b>              |                             |

☐ Preliminary Specification

☒ Formal Specification

Distributed by:



|             |            |              |
|-------------|------------|--------------|
| Approved by | Checked by | Organized by |
| Kokai       | Mark       | Lawlite      |

This Specification is subject to change without notice.

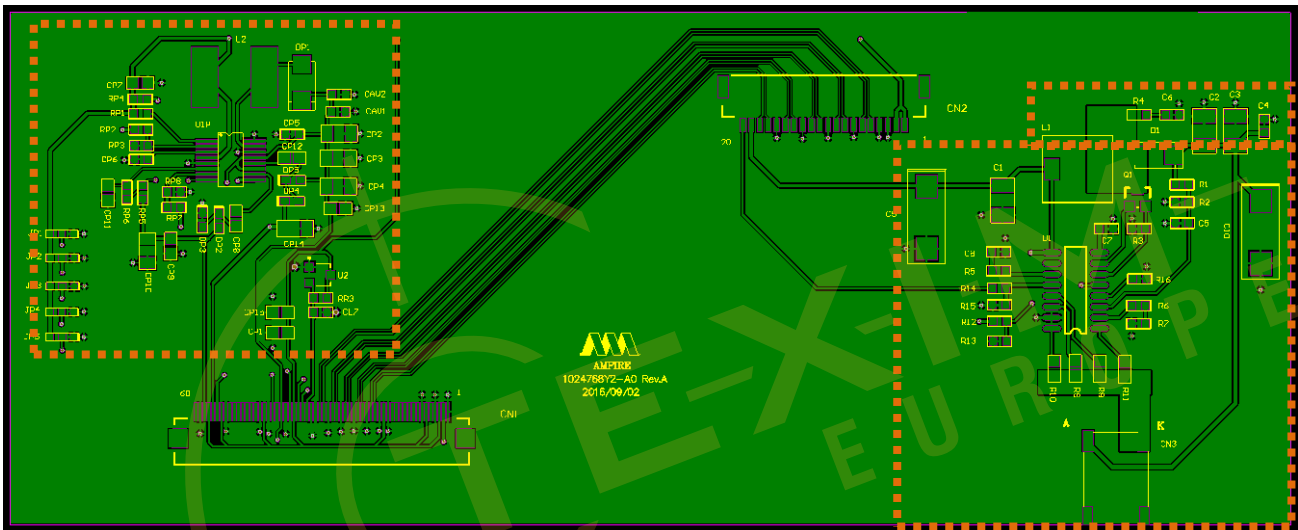
## RECORD OF REVISION

| Revision Date                                                                       | Page | Contents                                | Editor             |
|-------------------------------------------------------------------------------------|------|-----------------------------------------|--------------------|
| 2024/01/02<br>2025/08/14                                                            |      | New Release<br>Update drawing interface | Lawlite<br>Lawlite |
|  |      |                                         |                    |

## 1. General specification

AM-1024768Y7HZQW-A9H is a color active matrix thin film transistor (TFT) liquid crystal display (LCD) that uses amorphous silicon TFT as a switching device. This model is composed of a TFT LCD panel, a driving circuit and a back light system. This TFT LCD has a 10.4 inch diagonally measured active display area with HD (1024 horizontal by 768 vertical pixels) resolution.

- (1) Construction: 10.4" a-Si TFT active matrix, White LED Backlight.
- (2) Resolution (pixel): 1024(R.G.B) X 768
- (3) Number of the Colors : 16.2M (R , G , B 8 bit digital each)
- (4) LCD type : Normally black
- (5) Interface : 24 Bit LVDS interface
- (6) Without LED Driver.
- (7) PCBA with Conformal Coating: Coating Area.



- (8) New LED back-light .



**1.1 Display Characteristics**

| Item              |                              | Specification                        | Unit   |
|-------------------|------------------------------|--------------------------------------|--------|
| Outline Dimension |                              | 236 (H) x 174.3 (V) x8.56 (D) (Typ)  | mm     |
| Display area      |                              | 211.2(H) x 158.4(V) (10.4" diagonal) | mm     |
| Number of Pixel   |                              | 1024(H) x 768(V)                     | pixels |
| Pixel pitch       |                              | 0.20625(H) x 0.20625(V)              | mm     |
| Pixel arrangement |                              | RGB Vertical Stripe                  |        |
| Display mode      |                              | Normally Black                       |        |
| NTSC              |                              | 70(Typ.)                             | %      |
| Surface treatment |                              | Antiglare, Hard-Coating (3H)         |        |
| Weight            |                              | TBD                                  | g      |
| Back-light        |                              | Single LED (Side-Light type)         |        |
| Power Consumption | Logic System (White Pattern) | TBD(max) @V <sub>DVDD</sub> =3.3V    | W      |
|                   | B/L System                   | TBD                                  | W      |



## 2. Optical Characteristics

| Item                         |         | Symbol     | Condition                          | Min.  | Typ.  | Max.  | Unit              | Note                      |
|------------------------------|---------|------------|------------------------------------|-------|-------|-------|-------------------|---------------------------|
| Contrast                     |         | CR         | $\Theta=0$<br>Normal viewing angle | 600   | 900   | —     |                   | (1)(2)                    |
| Response time                | Rising  | TR+TF      |                                    | —     | 30    | 40    | msec              | (1)(3)                    |
|                              | Falling |            |                                    |       |       |       |                   |                           |
| White luminance (Center)     |         | $Y_L$      |                                    | 1200  | 1500  | —     | cd/m <sup>2</sup> | (1)(4)<br>( $I_L=450mA$ ) |
| Color chromaticity (CIE1931) | White   | $W_x$      |                                    | 0.273 | 0.313 | 0.353 |                   | (1)(4)                    |
|                              |         | $W_y$      |                                    | 0.289 | 0.329 | 0.369 |                   |                           |
|                              | Red     | $R_x$      |                                    |       | TBD   |       |                   |                           |
|                              |         | $R_y$      |                                    |       | TBD   |       |                   |                           |
|                              | Green   | $G_x$      |                                    |       | TBD   |       |                   |                           |
|                              |         | $G_y$      |                                    |       | TBD   |       |                   |                           |
|                              | Blue    | $B_x$      |                                    |       | TBD   |       |                   |                           |
|                              |         | $B_y$      |                                    |       | TBD   |       |                   |                           |
| Viewing angle                | Hor.    | $\Theta_L$ | CR>10                              | 80    | 85    | —     |                   |                           |
|                              |         | $\Theta_R$ |                                    | 80    | 85    | —     |                   |                           |
|                              | Ver.    | $\Theta_U$ |                                    | 80    | 85    | —     |                   |                           |
|                              |         | $\Theta_D$ |                                    | 80    | 85    | —     |                   |                           |
| Brightness uniformity        |         | $B_{UNI}$  | $\Theta=0$                         | 70    | 80    | —     | %                 | (5)                       |
| Optima View Direction        |         | Free       |                                    |       |       |       |                   | (6)                       |

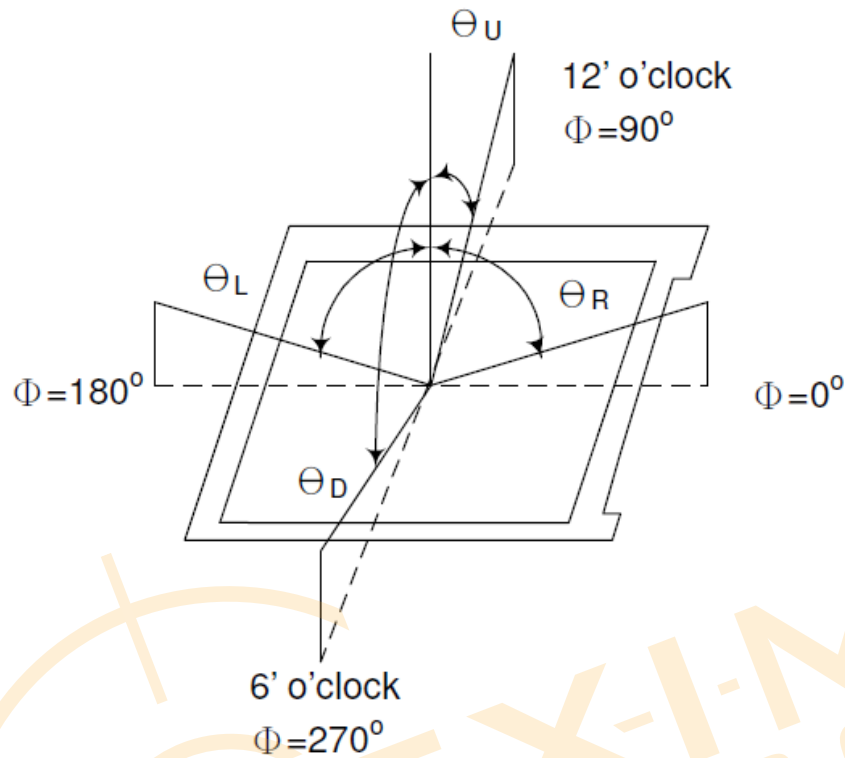
### Measuring Condition

- Measuring surrounding    dark room
- LED current  $I_L$     450mA
- Ambient temperature  
25±2°C
- 15min. warm-up time.

### Measuring Equipment

- FPM520 of Westar Display technologies, INC., which utilized SR-3 for Chromaticity and BM-5A for other optical characteristics.
- Measuring spot size : 20 ~ 21 mm

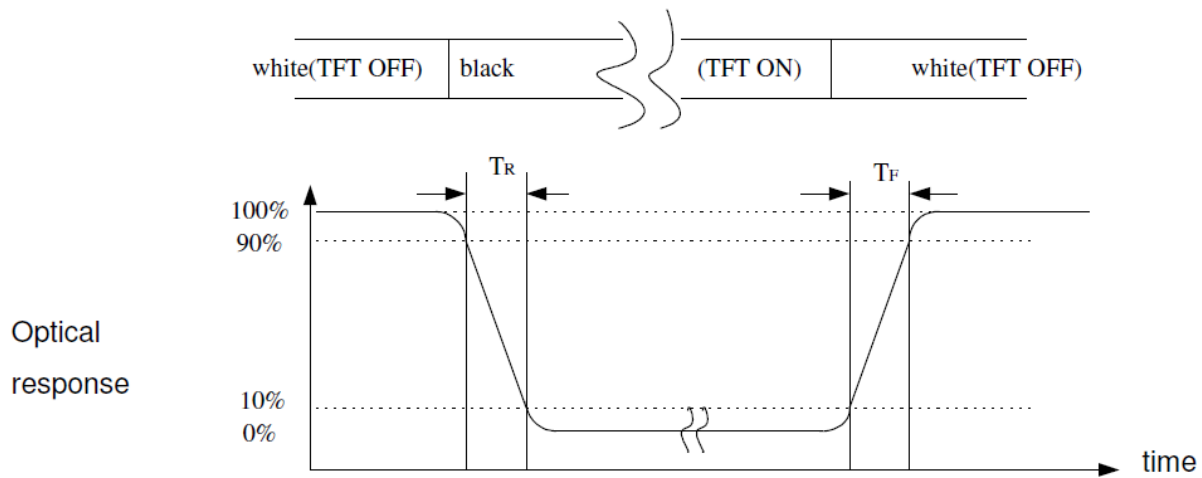
**Note (1)** Definition of Viewing Angle:



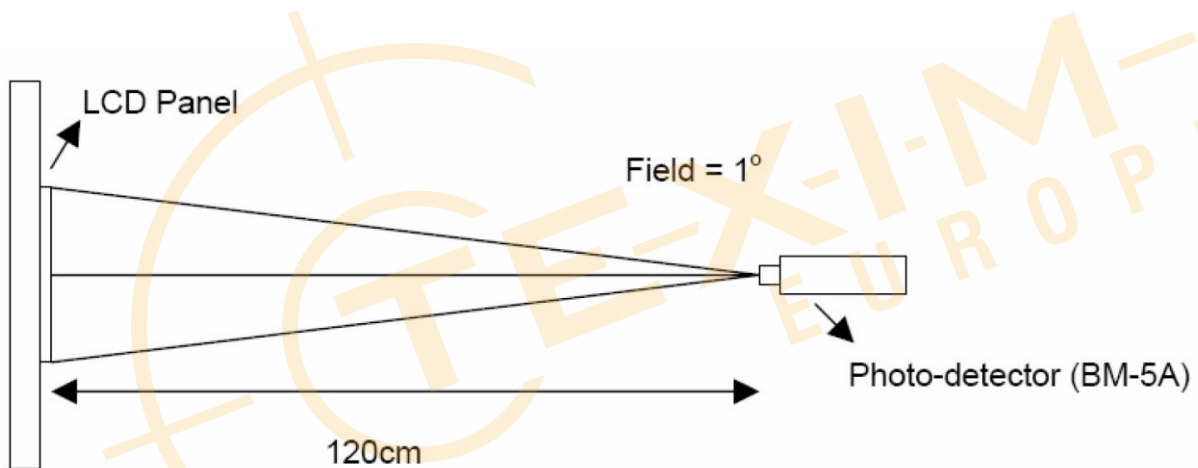
**Note (2)** Definition of Contrast Ratio (CR) :  
measured at the center point of panel

$$CR = \frac{\text{Luminance with all pixels white}}{\text{Luminance with all pixels black}}$$

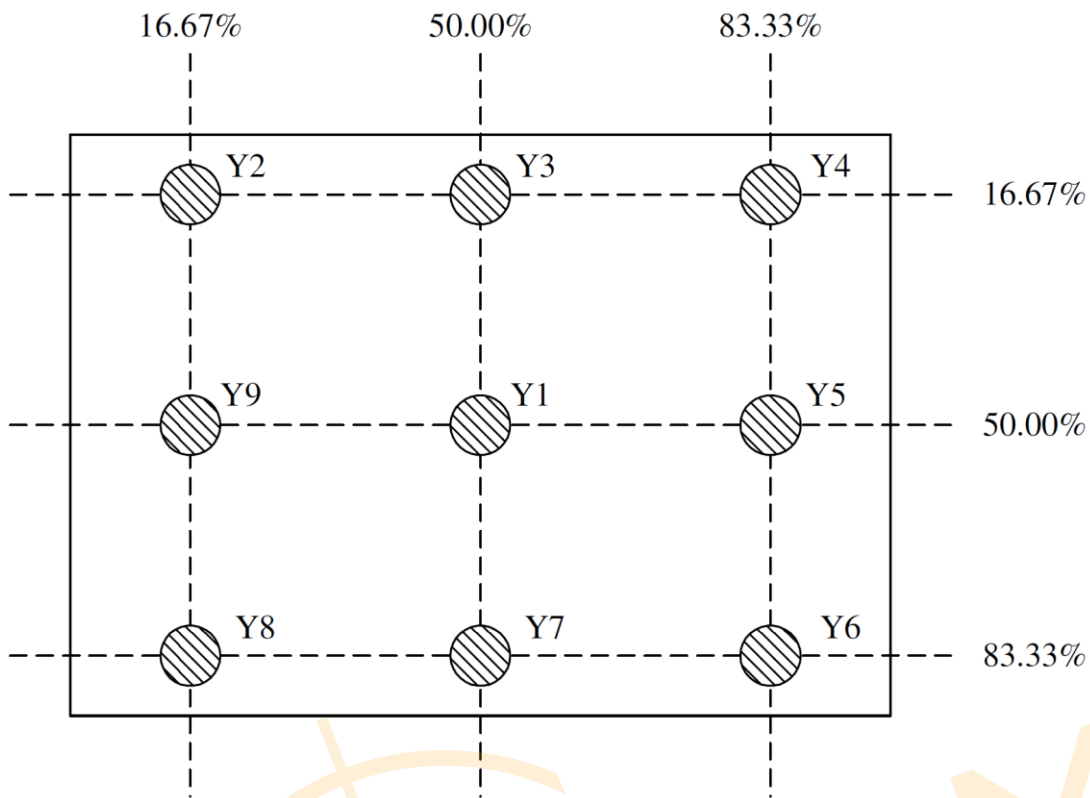
**Note (3)** Definition of Response Time : Sum of  $T_R$  and  $T_F$



**Note (4)** Definition of optical measurement setup



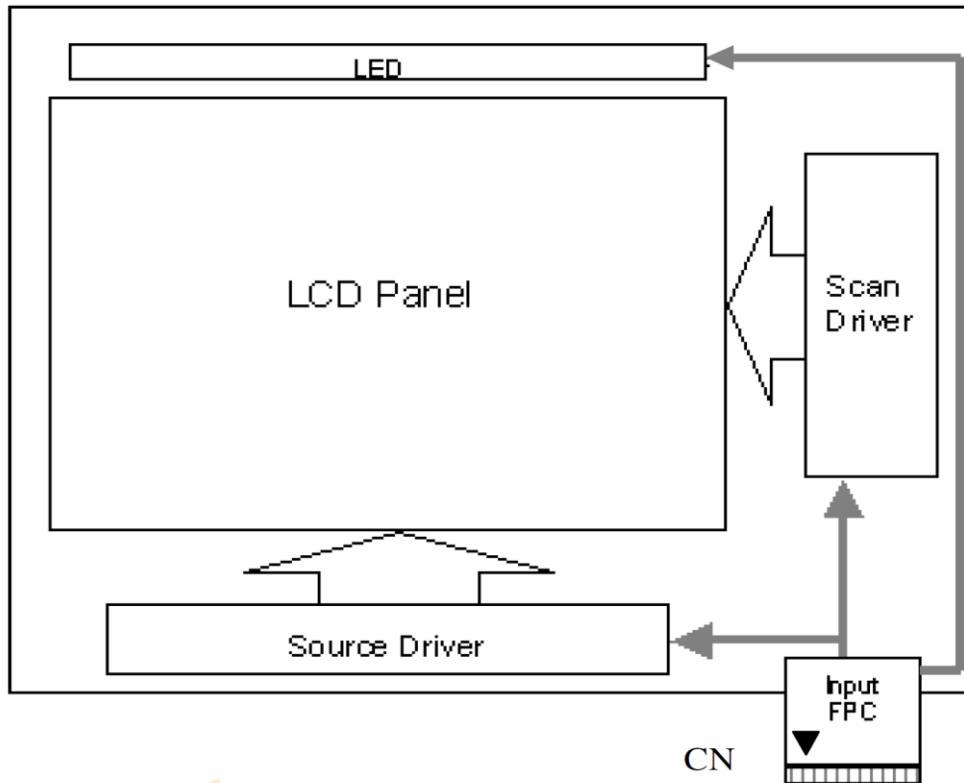
**Note (5)** Definition of brightness uniformity



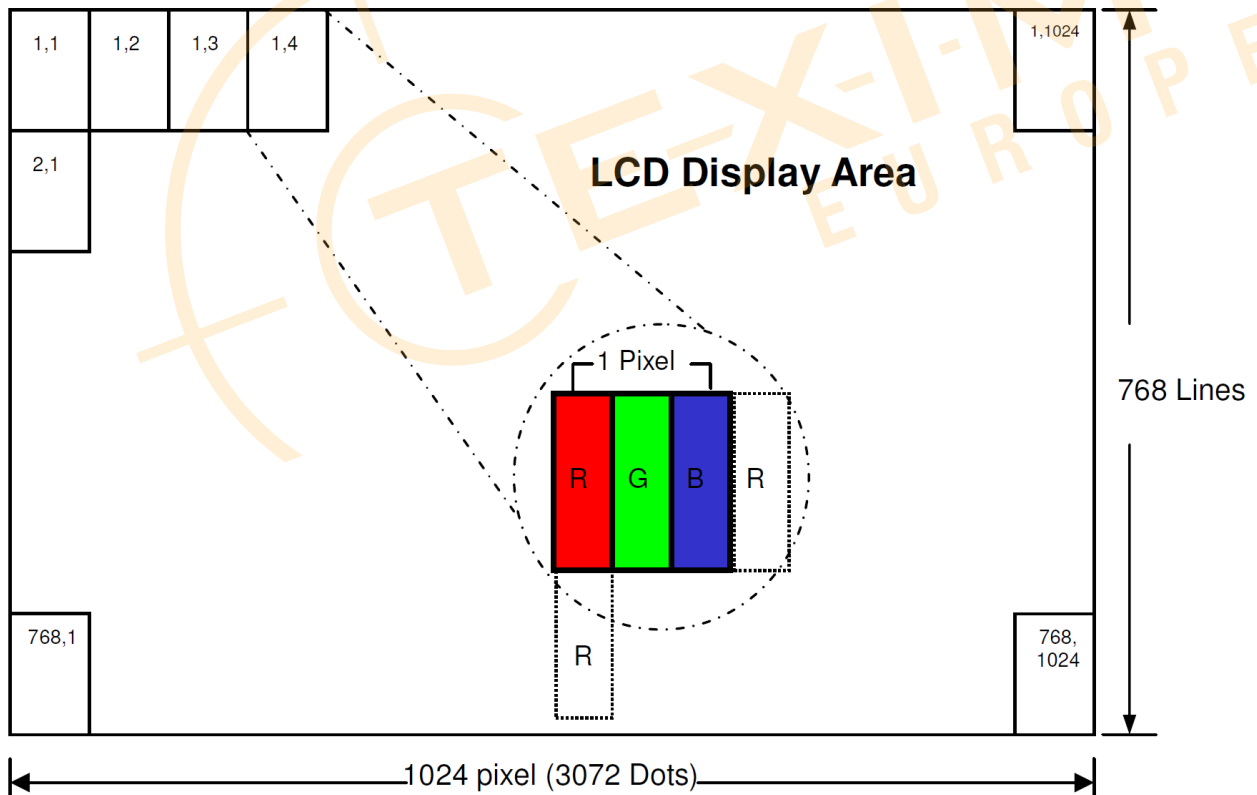
$$\text{Luminance uniformity} = \frac{(\text{Min Luminance of 9 points})}{(\text{Max Luminance of 9 points})} \times 100\%$$

**Note (6)** : Rubbing Direction (The different Rubbing Direction will cause the different optima view direction.)

### 3. Functional Block Diagram



#### Pixel Format



### 3.1 Relationship between Displayed Color and Input

|                                   | Display                 | MSB                      LSB |    |    |    |    |    |    |    | MSB                      LSB |    |    |    |    |    |    |    | MSB                      LSB |    |    |    |    |    |    |    | Gray scale<br>Level |
|-----------------------------------|-------------------------|------------------------------|----|----|----|----|----|----|----|------------------------------|----|----|----|----|----|----|----|------------------------------|----|----|----|----|----|----|----|---------------------|
|                                   |                         | R7                           | R6 | R5 | R4 | R3 | R2 | R1 | R0 | G7                           | G6 | G5 | G4 | G3 | G2 | G1 | G0 | B7                           | B6 | B5 | B4 | B3 | B2 | B1 | B0 |                     |
| Basic<br>color                    | Black                   | L                            | L  | L  | L  | L  | L  | L  | L  | L                            | L  | L  | L  | L  | L  | L  | L  | L                            | L  | L  | L  | L  | L  | L  | L  | -                   |
|                                   | Blue                    | L                            | L  | L  | L  | L  | L  | L  | L  | L                            | L  | L  | L  | L  | L  | L  | L  | H                            | H  | H  | H  | H  | H  | H  | H  | -                   |
|                                   | Green                   | L                            | L  | L  | L  | L  | L  | L  | L  | H                            | H  | H  | H  | H  | H  | H  | H  | L                            | L  | L  | L  | L  | L  | L  | L  | -                   |
|                                   | Light Blue              | L                            | L  | L  | L  | L  | L  | L  | L  | H                            | H  | H  | H  | H  | H  | H  | H  | H                            | H  | H  | H  | H  | H  | H  | H  | -                   |
|                                   | Red                     | H                            | H  | H  | H  | H  | H  | H  | H  | L                            | L  | L  | L  | L  | L  | L  | L  | L                            | L  | L  | L  | L  | L  | L  | L  | -                   |
|                                   | Purple                  | H                            | H  | H  | H  | H  | H  | H  | H  | L                            | L  | L  | L  | L  | L  | L  | L  | H                            | H  | H  | H  | H  | H  | H  | H  | -                   |
|                                   | Yellow                  | H                            | H  | H  | H  | H  | H  | H  | H  | H                            | H  | H  | H  | H  | H  | H  | H  | L                            | L  | L  | L  | L  | L  | L  | L  | -                   |
|                                   | White                   | H                            | H  | H  | H  | H  | H  | H  | H  | H                            | H  | H  | H  | H  | H  | H  | H  | H                            | H  | H  | H  | H  | H  | H  | H  | -                   |
| Gray scale<br>of Red              | Black                   | L                            | L  | L  | L  | L  | L  | L  | L  | L                            | L  | L  | L  | L  | L  | L  | L  | L                            | L  | L  | L  | L  | L  | L  | L  | L0                  |
|                                   | Dark<br>↑<br>↓<br>Light | L                            | L  | L  | L  | L  | L  | L  | H  | L                            | L  | L  | L  | L  | L  | L  | L  | L                            | L  | L  | L  | L  | L  | L  | L  | L1                  |
|                                   |                         | L                            | L  | L  | L  | L  | L  | H  | L  | L                            | L  | L  | L  | L  | L  | L  | L  | L                            | L  | L  | L  | L  | L  | L  | L  | L2                  |
|                                   |                         | :                            |    |    |    |    |    |    |    | :                            |    |    |    |    |    |    |    | :                            |    |    |    |    |    |    |    | L3...L251           |
|                                   |                         | H                            | H  | H  | H  | H  | H  | L  | L  | L                            | L  | L  | L  | L  | L  | L  | L  | L                            | L  | L  | L  | L  | L  | L  | L  | L252                |
|                                   |                         | H                            | H  | H  | H  | H  | H  | L  | H  | L                            | L  | L  | L  | L  | L  | L  | L  | L                            | L  | L  | L  | L  | L  | L  | L  | L253                |
|                                   |                         | H                            | H  | H  | H  | H  | H  | H  | L  | L                            | L  | L  | L  | L  | L  | L  | L  | L                            | L  | L  | L  | L  | L  | L  | L  | L254                |
|                                   | Red                     | H                            | H  | H  | H  | H  | H  | H  | H  | L                            | L  | L  | L  | L  | L  | L  | L  | L                            | L  | L  | L  | L  | L  | L  | L  | Red L255            |
| Gray scale<br>of Green            | Black                   | L                            | L  | L  | L  | L  | L  | L  | L  | L                            | L  | L  | L  | L  | L  | L  | L  | L                            | L  | L  | L  | L  | L  | L  | L  | L0                  |
|                                   | Dark<br>↑<br>↓<br>Light | L                            | L  | L  | L  | L  | L  | L  | L  | L                            | L  | L  | L  | L  | L  | L  | H  | L                            | L  | L  | L  | L  | L  | L  | L  | L1                  |
|                                   |                         | L                            | L  | L  | L  | L  | L  | L  | L  | L                            | L  | L  | L  | L  | L  | H  | L  | L                            | L  | L  | L  | L  | L  | L  | L  | L2                  |
|                                   |                         | :                            |    |    |    |    |    |    |    | :                            |    |    |    |    |    |    |    | :                            |    |    |    |    |    |    |    | L3...L251           |
|                                   |                         | L                            | L  | L  | L  | L  | L  | L  | L  | H                            | H  | H  | H  | H  | H  | L  | L  | L                            | L  | L  | L  | L  | L  | L  | L  | L252                |
|                                   |                         | L                            | L  | L  | L  | L  | L  | L  | L  | H                            | H  | H  | H  | H  | H  | L  | H  | L                            | L  | L  | L  | L  | L  | L  | L  | L253                |
|                                   |                         | L                            | L  | L  | L  | L  | L  | L  | L  | H                            | H  | H  | H  | H  | H  | H  | L  | L                            | L  | L  | L  | L  | L  | L  | L  | L254                |
|                                   | Green                   | L                            | L  | L  | L  | L  | L  | L  | L  | H                            | H  | H  | H  | H  | H  | H  | H  | L                            | L  | L  | L  | L  | L  | L  | L  | Green L255          |
| Gray scale<br>of Blue             | Black                   | L                            | L  | L  | L  | L  | L  | L  | L  | L                            | L  | L  | L  | L  | L  | L  | L  | L                            | L  | L  | L  | L  | L  | L  | L  | L0                  |
|                                   | Dark<br>↑<br>↓<br>Light | L                            | L  | L  | L  | L  | L  | L  | L  | L                            | L  | L  | L  | L  | L  | L  | L  | L                            | L  | L  | L  | L  | L  | H  | L  | L1                  |
|                                   |                         | L                            | L  | L  | L  | L  | L  | L  | L  | L                            | L  | L  | L  | L  | L  | L  | L  | L                            | L  | L  | L  | L  | H  | L  | L  | L2                  |
|                                   |                         | :                            |    |    |    |    |    |    |    | :                            |    |    |    |    |    |    |    | :                            |    |    |    |    |    |    |    | L3...L251           |
|                                   |                         | L                            | L  | L  | L  | L  | L  | L  | L  | L                            | L  | L  | L  | L  | L  | L  | L  | H                            | H  | H  | H  | H  | H  | L  | L  | L252                |
|                                   |                         | L                            | L  | L  | L  | L  | L  | L  | L  | L                            | L  | L  | L  | L  | L  | L  | L  | H                            | H  | H  | H  | H  | H  | L  | H  | L253                |
|                                   |                         | L                            | L  | L  | L  | L  | L  | L  | L  | L                            | L  | L  | L  | L  | L  | L  | L  | H                            | H  | H  | H  | H  | H  | L  | H  | L254                |
|                                   | Blue                    | L                            | L  | L  | L  | L  | L  | L  | L  | L                            | L  | L  | L  | L  | L  | L  | L  | H                            | H  | H  | H  | H  | H  | H  | H  | Blue L255           |
| Gray scale<br>of White &<br>Black | Black                   | L                            | L  | L  | L  | L  | L  | L  | L  | L                            | L  | L  | L  | L  | L  | L  | L  | L                            | L  | L  | L  | L  | L  | L  | L  | L0                  |
|                                   | Dark<br>↑<br>↓<br>Light | L                            | L  | L  | L  | L  | L  | L  | H  | L                            | L  | L  | L  | L  | L  | L  | H  | L                            | L  | L  | L  | L  | L  | H  | L  | L1                  |
|                                   |                         | L                            | L  | L  | L  | L  | L  | H  | L  | L                            | L  | L  | L  | L  | H  | L  | L  | L                            | L  | L  | L  | H  | L  | L  | L  | L2                  |
|                                   |                         | :                            |    |    |    |    |    |    |    | :                            |    |    |    |    |    |    |    | :                            |    |    |    |    |    |    |    | L3...L251           |
|                                   |                         | H                            | H  | H  | H  | H  | H  | L  | L  | H                            | H  | H  | H  | H  | H  | L  | L  | H                            | H  | H  | H  | H  | H  | L  | L  | L252                |
|                                   |                         | H                            | H  | H  | H  | H  | H  | L  | H  | H                            | H  | H  | H  | H  | L  | H  | H  | H                            | H  | H  | H  | H  | L  | H  | L  | L253                |
|                                   |                         | H                            | H  | H  | H  | H  | H  | H  | L  | H                            | H  | H  | H  | H  | H  | L  | H  | H                            | H  | H  | H  | H  | H  | L  | L  | L254                |
|                                   | White                   | H                            | H  | H  | H  | H  | H  | H  | H  | H                            | H  | H  | H  | H  | H  | H  | H  | H                            | H  | H  | H  | H  | H  | H  | H  | White L255          |

## 4. ABSOLUTE MAXIMUM RATINGS

### 4.1 Absolute Ratings of TFT LCD Module

| Item                     | Symbol                         | Min. | Max. | Unit | Note |
|--------------------------|--------------------------------|------|------|------|------|
| Power supply voltage     | VDD                            | -0.3 | 5    | V    |      |
| Logic Signal Input Level | $V_{DVDD}$<br>$V_{DVDD\_LVDS}$ | -0.3 | 5    | V    |      |



## 5. ELECTRICAL CHARACTERISTICS

### 5.1 TFT LCD Module

| Item                 | Symbol | Min.    | Typ. | Max.   | Unit | Note |
|----------------------|--------|---------|------|--------|------|------|
| Supply Voltage       | VDD    | 3       | 3.3  | 3.6    | V    |      |
| Input signal voltage | ViH    | 0.8 VDD |      | VLED   | V    |      |
|                      | ViL    | 0       |      | 0.2VDD | V    |      |

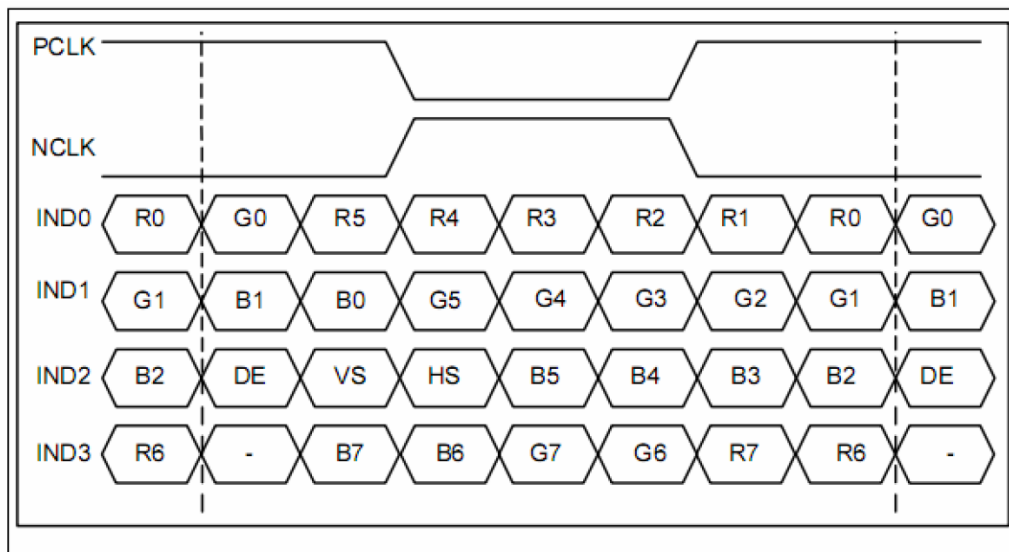
### 5.2 Switching Characteristics for LVDS Receiver

| Item                              | Symbol     | Min. | Typ. | Max. | Unit    | Conditions    |
|-----------------------------------|------------|------|------|------|---------|---------------|
| Differential Input High Threshold | Vth        |      |      | 100  | mV      | $V_{CM}=1.2V$ |
| Differential Input Low Threshold  | Vtl        | -100 |      |      | mV      |               |
| Input Current                     | $I_{IN}$   | -10  |      | 10   | $\mu A$ |               |
| Differential input Voltage        | $ V_{ID} $ | 0.1  |      | 0.6  | V       |               |
| Common Mode Voltage Offset        | $V_{CM}$   | 0.7  | 1.2  | 1.6  | V       |               |



### 5.3 Bit LVDS input

8Bit LVDS input

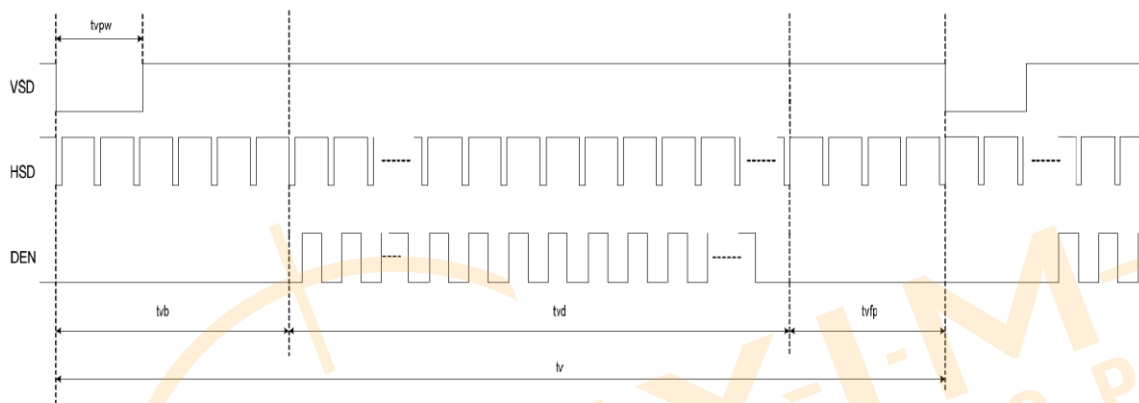


## 5.4 Interface Timing (DE mode)

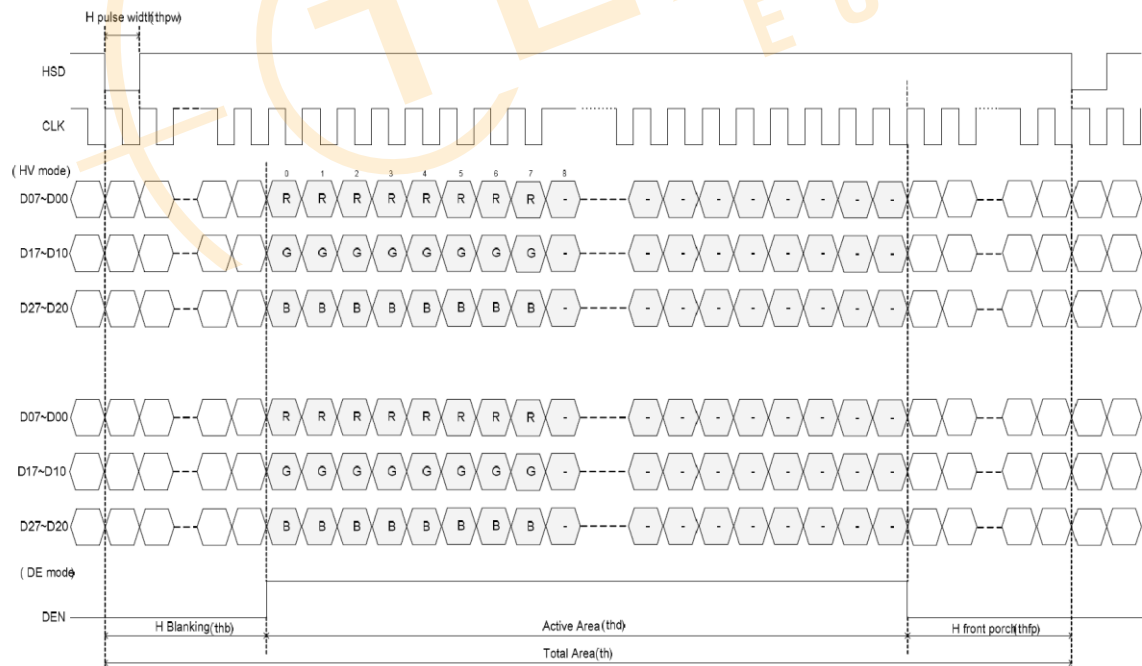
| DE mode                         |          |       |      |      |      |
|---------------------------------|----------|-------|------|------|------|
| Parameter                       | Symbol   | Value |      |      | Unit |
|                                 |          | Min.  | Typ. | Max. |      |
| DCLK frequency @Frame rate=60hz | fclk     | 52    | 65   | 71   | Mhz  |
| Horizontal display area         | thd      | 1024  |      |      | DCLK |
| HSYNC period time               | th       | 1114  | 1344 | 1400 | DCLK |
| HSYNC blanking                  | thb+thfp | 90    | 320  | 376  | DCLK |
| Vertical display area           | tvd      | 768   |      |      | H    |
| VSYNC period time               | tv       | 778   | 806  | 845  | H    |
| VSYNC blanking                  | tvb+tvfp | 10    | 38   | 77   | H    |

### Timing Diagram of Interface Signal (DE mode)

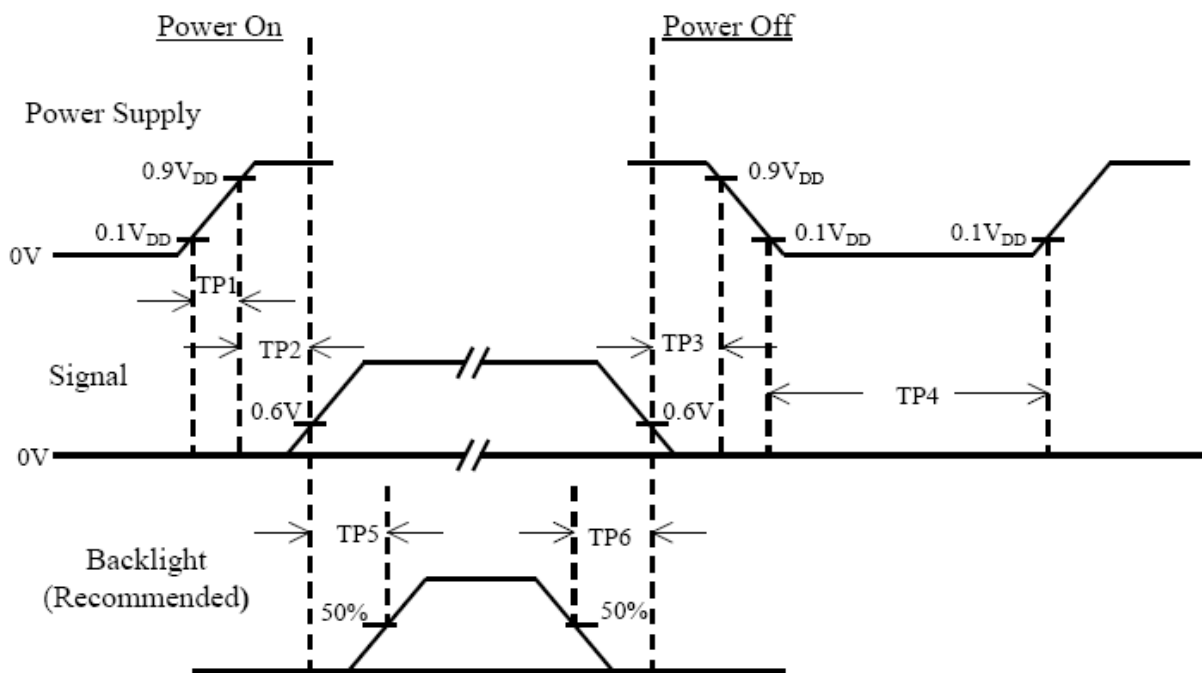
#### (1). Vertical input timing



#### (2). Horizontal input timing



## 5.5 Power On / Off Sequence



| Item | Min. | Typ. | Max. | Unit | Remark |
|------|------|------|------|------|--------|
| TP1  | 0.5  | --   | 10   | msec |        |
| TP2  | 0    | --   | 50   | msec |        |
| TP3  | 0    | --   | 50   | msec |        |
| TP4  | 500  | --   | --   | msec |        |
| TP5  | 200  | --   | --   | msec |        |
| TP6  | 200  | --   | --   | msec |        |

Note :

- (1) The supply voltage of the external system for the module input should be the same as the definition of VDD.
- (2) Apply the lamp voltage within the LCD operation range. When the back-light turns on before the LCD operation or the LCD turns off before the back-light turns off, the display may momentarily become white.
- (3) In case of VDD = off level, please keep the level of input signal on the low or keep a high impedance.
- (4) TP4 should be measured after the module has been fully discharged between power off and on period.
- (5) Interface signal shall not be kept at high impedance when the power is on.

**5.6 Backlight Unit**

| Parameter     | Symbol | Min    | Typ  | Max | Units | Condition                                    |
|---------------|--------|--------|------|-----|-------|----------------------------------------------|
| LED Current   | $I_L$  | --     | 450  | --  | mA    | Ta=25°C                                      |
| LED Voltage   | $V_L$  | --     | 19.5 |     | Volt  | Ta=25°C                                      |
| LED Life-Time | N/A    | 30,000 | --   | --  | Hour  | Ta=25°C<br>I <sub>F</sub> =450mA<br>Note (2) |

Note (1) LED life time (Hr) can be defined as the time in which it continues to operate under the condition: Ta=25±3oC, typical IL value indicated in the above table until the brightness becomes less than 50%.

Note (2) The “LED life time” is defined as the module brightness decrease to 50% original brightness at Ta=25°C and IL=450mA. The LED lifetime could be decreased if operating IL is larger than 450mA. The constant current driving method is suggested.



**6. INTERFACE PIN CONNECTION**

CN2 LVDS connector: P1.0 20pin/CP100-S20G-H16

| Pin No. | Symbol  | I/O | Description                        | Note |
|---------|---------|-----|------------------------------------|------|
| 1       | VDD     | P   | Power Voltage for Logic: 3.3V      |      |
| 2       | VDD     | P   | Power Voltage for Logic: 3.3V      |      |
| 3       | GND     | P   | Ground                             |      |
| 4       | GND     | P   | Ground                             |      |
| 5       | IN0-    | I   | - LVDS differential data input     |      |
| 6       | IN0+    | I   | + LVDS differential data input     |      |
| 7       | GND     | P   | Ground                             |      |
| 8       | IN1-    | I   | - LVDS differential data input     |      |
| 9       | IN1+    | I   | + LVDS differential data input     |      |
| 10      | GND     | P   | Ground                             |      |
| 11      | IN2-    | I   | - LVDS differential data input     |      |
| 12      | IN2+    | I   | + LVDS differential data input     |      |
| 13      | GND     | P   | Ground                             |      |
| 14      | CLK-    | I   | - LVDS differential data input     |      |
| 15      | CLK+    | I   | + LVDS differential data input     |      |
| 16      | GND     | P   | Ground                             |      |
| 17      | IN3-    | I   | - LVDS differential data input     |      |
| 18      | IN3+    | I   | + LVDS differential data input     |      |
| 19      | VLED/NC | -   | No connection (Without LED Driver) |      |
| 20      | ADJ/NC  | -   | No connection (Without LED Driver) |      |

**7. RELIABILITY TEST CRITERIA**

| Test Item                                | Test Conditions                                                                                                                | Note |
|------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------|------|
| High Temperature Operation               | 80±3°C , t=240 hrs                                                                                                             |      |
| Low Temperature Operation                | -30±3°C , t=240 hrs                                                                                                            |      |
| High Temperature Storage                 | 80±3°C , t=240 hrs                                                                                                             | 1,2  |
| Low Temperature Storage                  | -30±3°C , t=240 hrs                                                                                                            | 1,2  |
| Storage at High Temperature and Humidity | 60°C, 90% RH , 240 hrs                                                                                                         | 1,2  |
| Thermal Shock Test                       | -20°C (30min) ~ 70°C (30min)<br>100 cycles                                                                                     | 1,2  |
| Vibration Test (Packing)                 | Sweep frequency : 10 ~ 55 ~ 10<br>Hz/1min<br>Amplitude : 0.75mm<br>Test direction : X.Y.Z/3 axis<br>Duration : 30min/each axis | 2    |

Note(1) Condensation of water is not permitted on the module.

Note(2) The module should be inspected after 1 hour storage in normal conditions (15-35°C, 45-65%RH)

Note(3) The module shouldn't be tested over one condition, and all the tests are independent.

Note(4) All reliability tests should be done without the protective film.

Definitions of life end point:

- Current drain should be smaller than the specific value.
- Function of the module should be maintained.
- Appearance and display quality should not have degraded noticeably.
- Contrast ratio should be greater than 50% of the initial value.

## 8. USE PRECAUTIONS

### 8.1 Handling precautions

- 1) The polarizing plate may break easily so be careful when handling it. Do not touch, press or rub it with a hard-material tool like tweezers.
- 2) Do not touch the polarizing plate surface with bare hands so as not to make it dirty. If the surface or other related part of the polarizing plate is dirty, soak a soft cotton cloth or chamois leather in benzine and wipe off with it. Do not use chemical liquids such as acetone, toluene and isopropyl alcohol. Failure to do so may bring chemical reaction phenomena and deteriorations.
- 3) Remove any spit or water immediately. If it is left for hours, the suffered part may deform or decolorize.
- 4) If the LCD element breaks and any LC stuff leaks, do not suck or lick it. Also if LC stuff is stuck on your skin or clothing, wash thoroughly with soap and water immediately.

### 8.2 Installing precautions

- 1) The PCB has many ICs that may be damaged easily by static electricity. To prevent breaking by static electricity from the human body and clothing, earth the human body properly using the high resistance and discharge static electricity during the operation. In this case, however, the resistance value should be approx.  $1\text{M}\Omega$  and the resistance should be placed near the human body rather than the ground surface. When the indoor space is dry, static electricity may occur easily so be careful. We recommend the indoor space should be kept with humidity of 60% or more. When a soldering iron or other similar tool is used for assembly, be sure to earth it.
- 2) When installing the module and ICs, do not bend or twist them. Failure to do so may crack LC element and cause circuit failure.
- 3) To protect LC element, especially polarizing plate, use a transparent protective plate (e.g., acrylic plate, glass etc) for the product case.
- 4) Do not use an adhesive like a both-side adhesive tape to make LCD surface (polarizing plate) and product case stick together. Failure to do so may cause the polarizing plate to peel off.

### **8.3 Storage precautions**

- 1) Avoid a high temperature and humidity area. Keep the temperature between 0°C and 35°C and also the humidity under 60%.
- 2) Choose the dark spaces where the product is not exposed to direct sunlight or fluorescent light.
- 3) Store the products as they are put in the boxes provided from us or in the same conditions as we recommend.

### **8.4 Operating precautions**

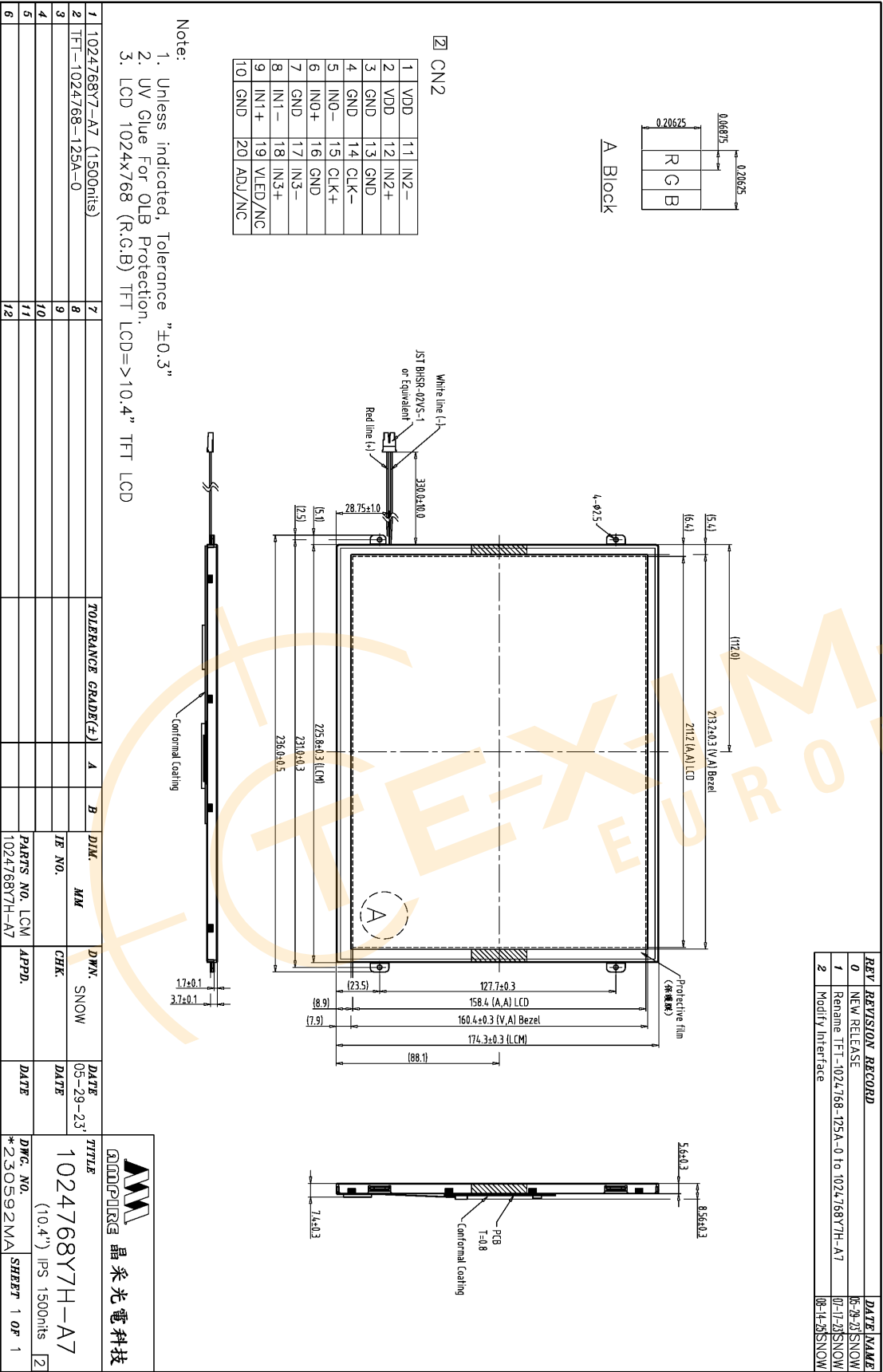
- 1) Do not boost the applied drive voltage abnormally. Failure to do so may break ICs. When applying power voltage, check the electrical features beforehand and be careful. Always turn off the power to the LC module controller before removing or inserting the LC module input connector. If the input connector is removed or inserted while the power is turned on, the LC module internal circuit may break.
- 2) The display response may be late if the operating temperature is under the normal standard, and the display may be out of order if it is above the normal standard. But this is not a failure; this will be restored if it is within the normal standard.
- 3) The LCD contrast varies depending on the visual angle, ambient temperature, power voltage etc. Obtain the optimum contrast by adjusting the LC drive voltage.
- 4) When carrying out the test, do not take the module out of the low-temperature space suddenly. Failure to do so will cause the module condensing, leading to malfunctions.
- 5) Make certain that each signal noise level is within the standard (L level: 0.2V<sub>dd</sub> or less and H level: 0.8V<sub>dd</sub> or more) even if the module has functioned properly. If it is beyond the standard, the module may often malfunction. In addition, always connect the module when making noise level measurements.
- 6) The CMOS ICs are incorporated in the module and the pull-up and pull-down function is not adopted for the input so avoid putting the input signal open while the power is ON.
- 7) The characteristic of the semiconductor element changes when it is exposed to light emissions, therefore ICs on the LCD may malfunction if they receive light emissions. To prevent these malfunctions, design and assemble ICs so that they are shielded from light emissions.
- 8) Crosstalk occurs because of characteristics of the LCD. In general, crosstalk occurs when the regularized display is maintained. Also, crosstalk is affected by the LC drive voltage. Design the contents of the display, considering crosstalk.

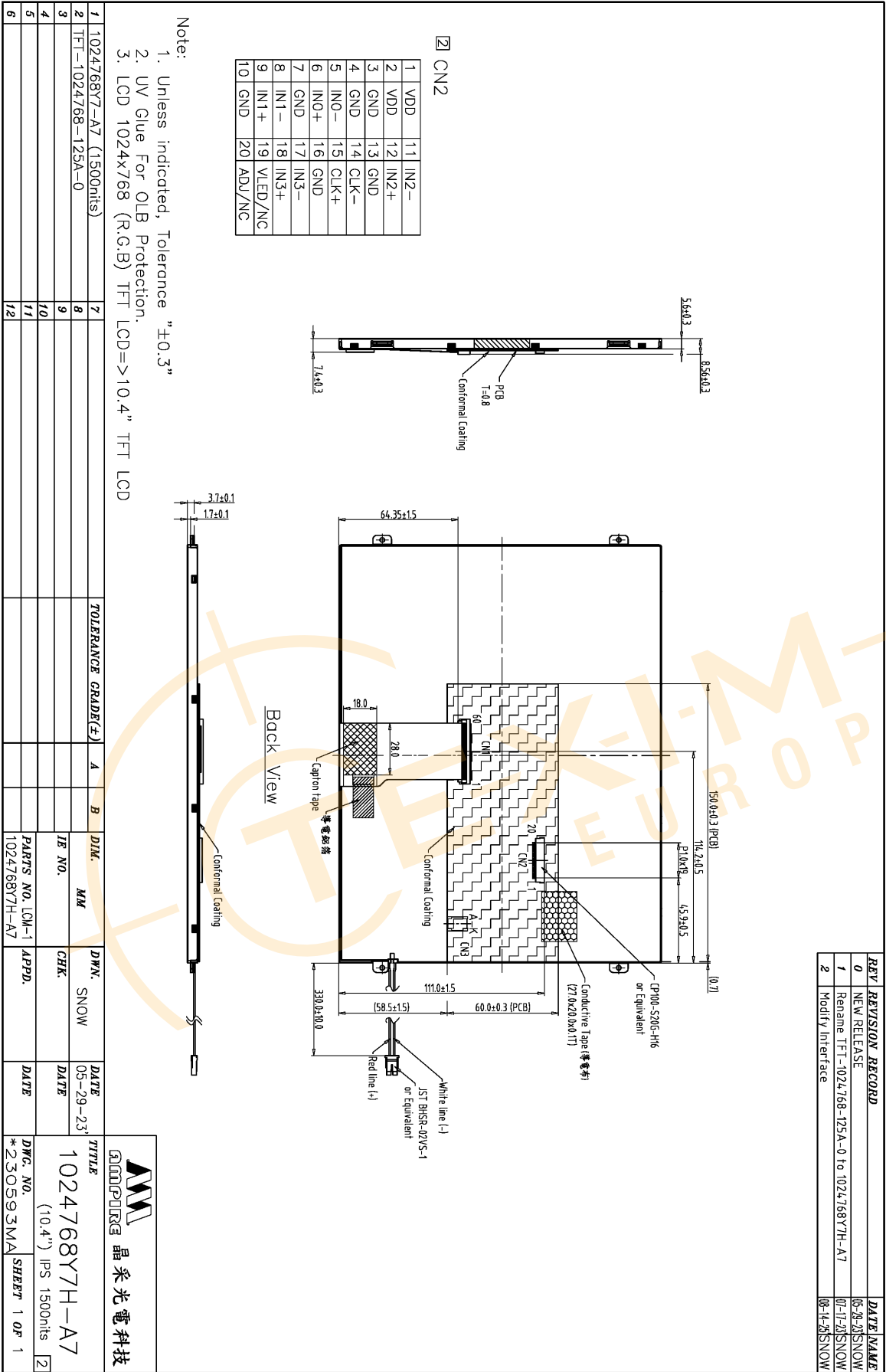
### **8.5 Other**

- 1) Do not disassemble or take the LC module into pieces. The LC modules once disassembled or taken into pieces are not the guarantee articles.
- 2) Do not keep the LCD at the same display pattern continually. The residual image will happen and it will damage the LCD. Please use screen saver.
- 3) AMIPRE will provide one year warranty for all products and three months warrantee for all repairing products.



9. OUTLINEDIMENSION





[illegible]

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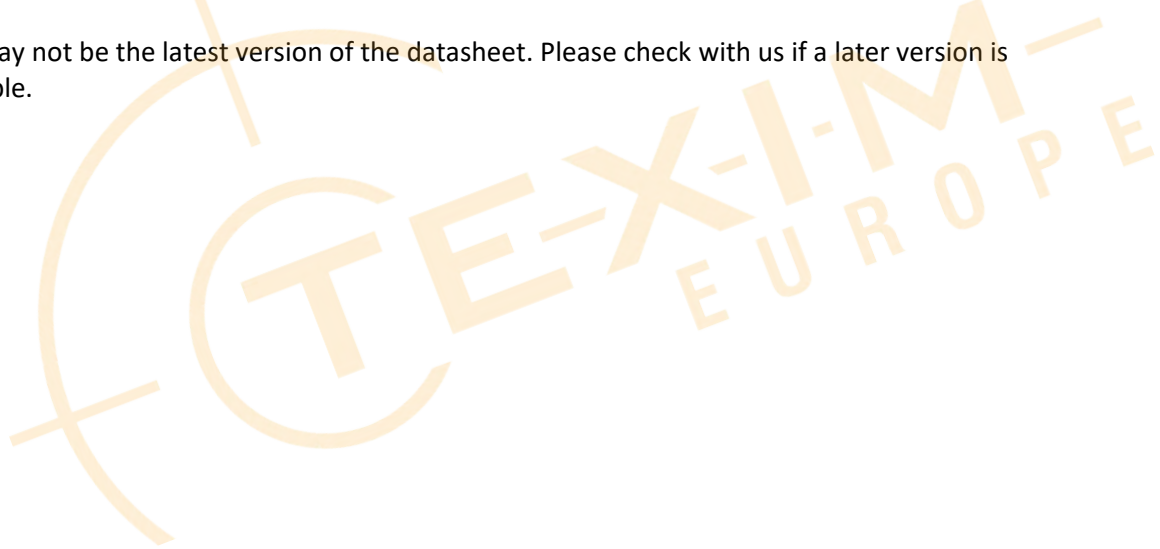
It is the customer's responsibility to validate that a particular product with the properties described in the product specification is suitable for use in a particular application.

Parameters provided in datasheets and / or specifications may vary in different applications and performance may vary over time.

All operating parameters, including typical parameters, must be validated for each customer application by the customer's technical experts.

Please contact us if you have any questions about the contents of the datasheet.

This may not be the latest version of the datasheet. Please check with us if a later version is available.





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