# ZY104VGXN20-300F Product Specification Rev.P0

| ITEM | BUYER SIGNATURE | DATE |
|---|---|---|
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| ITEM | SUPPLIER SIGNATURE | DATE |
|---|---|---|
| Prepared | | |
| Reviewed | | |
| Approved | | |

| REV. | ECN No. | DESCRIPTION OF CHANGES | DATE | PREPARED |
|---|---|---|---|---|
| P0 | | Initial Release | 2024-02-21 | XK |
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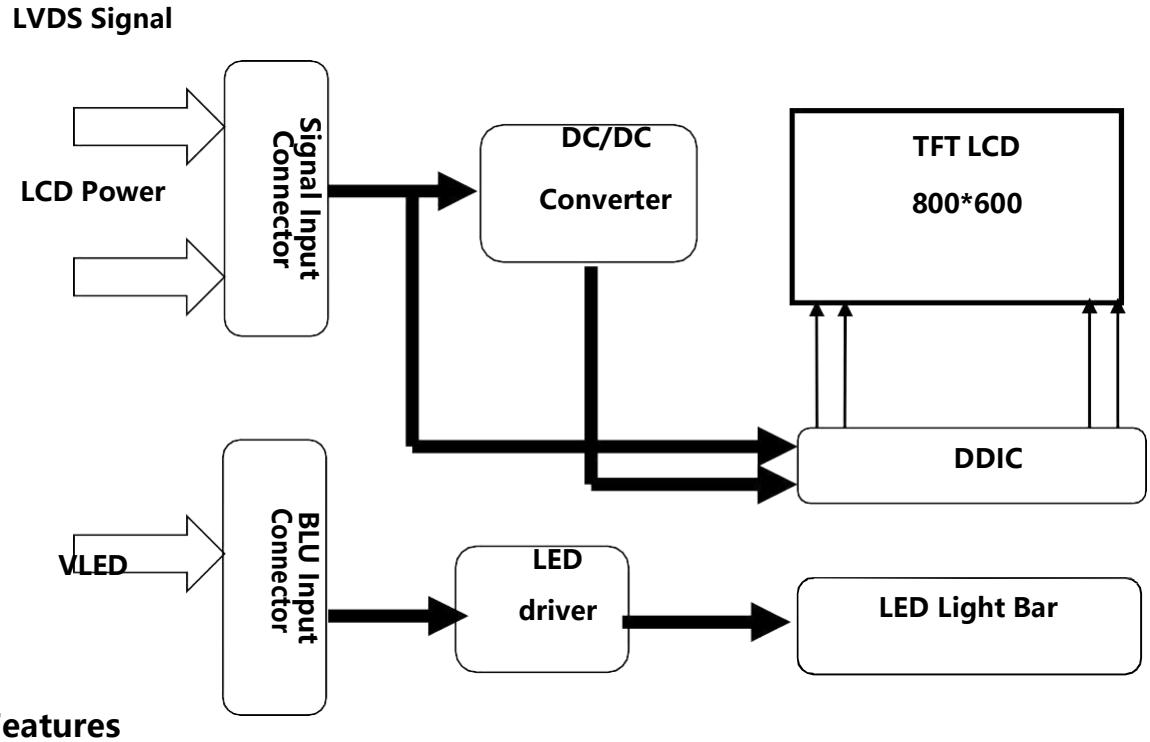
# Contents

# GENERAL DESCRIPTION

## Introduction

ZY104VGXN20-300F is a color active matrix TFT LCD module using amorphous silicon TFT 's (Thin Film Transistors) as an active switching devices. This module has a 10.4 inch diagonally measured active area with SVGA resolutions (800 horizontal by 600 vertical pixel array). Each pixel is divided into RED, GREEN, BLUE dots which are arranged in vertical stripe and this module can display 16.7M colors.




## Features

- 0.5T Glass (Single) ;
- Module Design
- 8bits LVDS data input selection
- Thin and light weight
- High luminance and contrast ratio, low reflection and wide viewing angle
- RoHS compliant

**Application**

- Medical Monitor

**General Specification**

The following are general specifications

**<Table 1. LCD Module Specifications>**

| Parameter | Specification | Unit | Remarks |
|---|---|---|---|
| Active Area | 211.2x158.4 | mm | |
| Number Of Pixels | 800*600 | pixels | |
| Pixel Pitch | 264 x264 | μm | |
| Pixel Arrangement | Pixels RGB stripe arrangement | | |
| Display Mode | TN, Normally White | | |
| Display Colors | 16.7M | colors | 6bit+2bit FRC |
| Surface Treatment | AG25 | | |
| Contrast Ratio | typ 800:1 | | |
| Viewing Angle(CR>10) | typ 70/70/60/70 | deg. | L/R/U/D |
| Response Time | typ 30, max 35 | ms | |
| Color Gamut | 55% | | |
| Brightness | min 300, typ 350 | cd/m2 | |
| Brightness Uniformity | min 70%，typ 80% | | 9point |
| Power Consumption | LCD 0.495W Typ. BLU 1.98W Typ. | W | |
| Outline Dimension | 236.0(H)×176.9(V) ×5.6(Body) | mm | |
| Weight | TBD | | |
| Display Orientation | Landscape Only | | |

## 2.0 ABSOLUTE MAXIMUM RATINGS

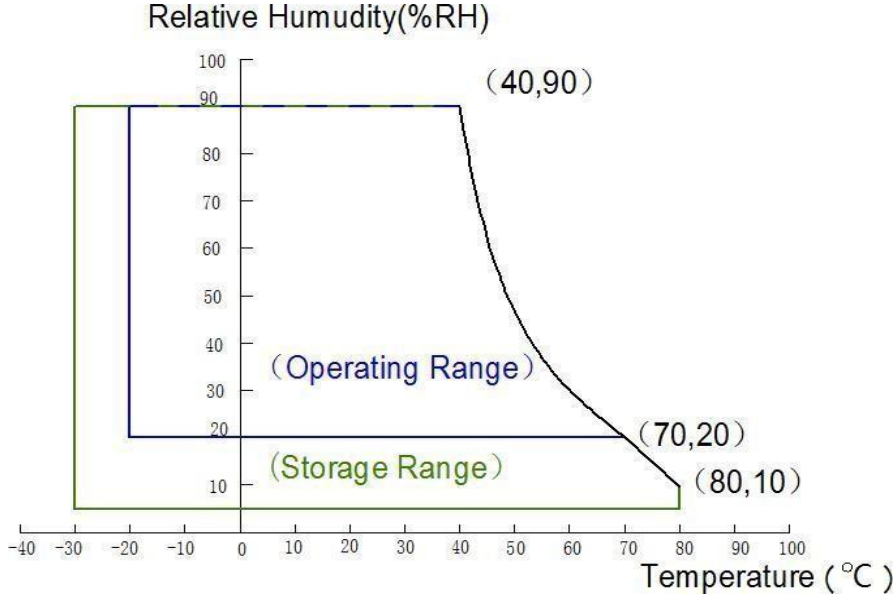
The followings are maximum values which, if exceed, may cause faulty operation or damage to the unit. The operational and non-operationalmaximum voltage and current values are listed in Table 2.

**< Table 3. Absolute Maximum Ratings>**

| Parameter | | Symbol | Min. | Max. | Unit | Remarks |
|---|---|---|---|---|---|---|
| Power Supply | LCD Module | VDD | 0 | 3.6 | V | Ta = 25 ℃ |
| Operating Temperature | | $T_{OP}$ | -20 | +70 | ℃ | Note 1 |
| Storage Temperature | | $T_{ST}$ | -30 | +80 | ℃ | |

Note : 1) Temperature and relative humidity range are shown in the figure below.

Wet bulb temperature should be 39 ℃ max. and no condensation of water.



# ELECTRICAL SPECIFICATIONS

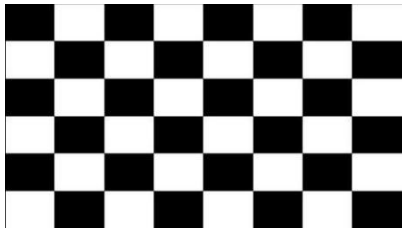
## TFT LCD Module

**< Table 4. LCD Module Electrical specifications >** [Ta =25±2 ℃]

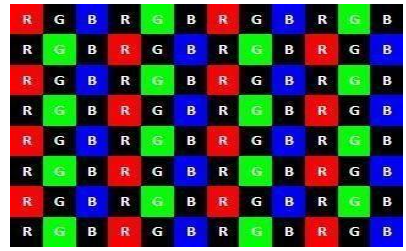
| Parameter | Symbol | Values | | | Unit | Notes |
|---|---|---|---|---|---|---|
| | | Min. | Typ. | Max. | | |
| Power Supply Voltage | VDD | 3.0 | 3.3 | 3.6 | V | Note 1 |
| Power Supply Current | IDD | 120 | 150 | 180 | mA | |
| Power Consumption | $P_D$ | 0.4 | 0.495 | 0.59 | W | Note 2 |

Notes : 1. The supply voltage is measured and specified at the interface connector of LCM.
The current draw and power consumption specified is for VBAT=3.8V, Frame rate $f_V$=60Hz and Clock frequency = 156.8MHz. Test Pattern of power supply current

- Typ : Mosaic 8 x6 Pattern(L0/L255)



b) Max : skip subPixel(L255)



2. The duration of rush current is about 2ms and rising time of Power Input is 1ms(min)

### 3.2 Back-Light Unit

**Table 4. LED Dirver Electrical Specifications >** [Ta =25±2 ℃]

| Parameter | Symbol | Values | | | Unit | Notes |
|---|---|---|---|---|---|---|
| | | Min. | Typ. | Max. | | |
| LED Supply Voltage | $V_{LED}$ | - | 18.0 | 19.8 | V | |
| LED Supply Current | $I_{LED}$ | - | 100 | - | mA | Note 1 |
| Power Consumption | $P_{LED}$ | - | 1.8 | 1.98 | W | |
| LED Quantity | QLED | - | 24 | - | EA | |
| LED Life Time | TLED | 30000 | - | - | Hrs | Note 2/3 |

Notes: 1. LED Bar:4Parallel*6String )

$P_{LED} = V_{LED} \times I_{LED}$(Without LED converter transfer efficiency)

- The life time of LED, 30,000Hrs, is determined as the time at which luminance of the LED is 50% compared to that of initial value at the typical LED current on condition of continuous operating at 25 ± 2°C.

Only under the above operating conditions could the life time of LED be guaranteed.

## INPUT TERMINAL PIN ASSIGNMENT

This LCD employs two interface connections, a 20 pin connector is used for the LCD module electronics interface and a 2 pin connector is used for the backlight system.

### Pin assignment for LCD module

Connector : MSB24013P20 _HA(STM) or equivalent

**< Table5. Pin Assignment for LCD Module Connector >**

| Pin No. | Symbol | Description | I/O |
|---|---|---|---|
| 1 | VCC | Logic Power 3.3V(Panel logic) | P |
| 2 | VCC | Logic Power 3.3V(Panel logic) | P |
| 3 | GND | Ground | - |
| 4 | SEL | VCC:8Bits;GND/NC:6Bits | I |
| 5 | RIN0- | LVDS receiver negative signal channel 0 | I |
| 6 | RIN0+ | LVDS receiver positive signal channel 0 | I |
| 7 | GND | Ground | - |
| 8 | RIN1- | LVDS receiver negative signal channel 1 | I |
| 9 | RIN1+ | LVDS receiver positive signal channel 1 | I |
| 10 | GND | Ground | - |
| 11 | RIN2- | LVDS receiver negative signal channel 2 | I |
| 12 | RIN2+ | LVDS receiver positive signal channel 2 | I |
| 13 | GND | Ground | - |
| 14 | CLKIN- | LVDS receiver negative signal clock | I |
| 15 | CLKIN+ | LVDS receiver positive signal clock | I |
| 16 | GND | Ground | - |
| 17 | RIN3- | LVDS receiver negative signal channel 3<br>(NC for 6bit LVDS input) | I |
| 18 | RIN3+ | LVDS receiver positive signal channel 3<br>(NC for 6bit LVDS input) | I |
| 19 | NC | - | - |
| 20 | NC | - | - |

### 3.3.2 Pin assignment for LED Bar

Connector : JST BHSR-02VS-1 or equivalent

**< Table6. Pin assignment for LED Bar >**

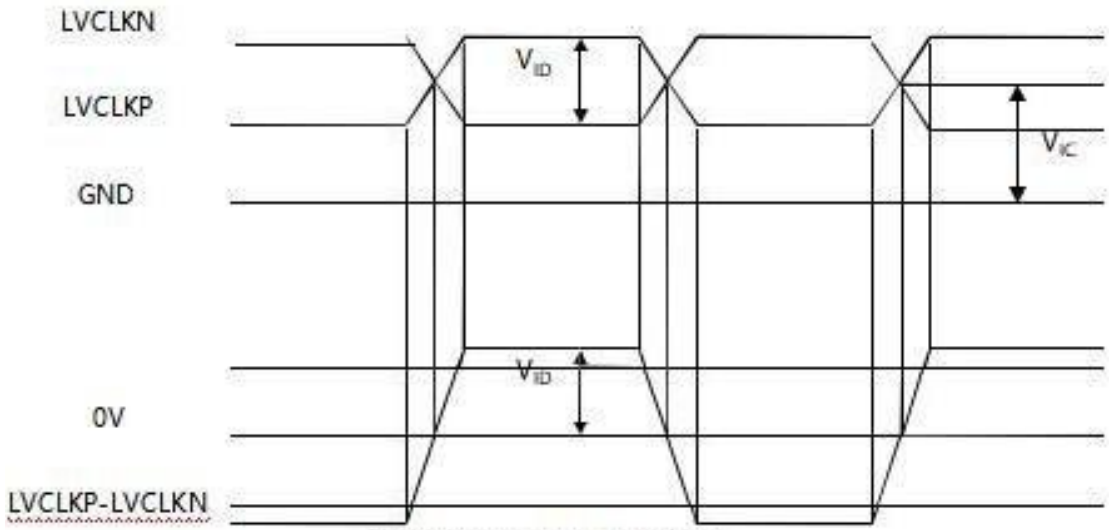
| Pin No | Symbol | Description | Remarks |
|---|---|---|---|
| 1 | VLED+ | Power supply | |
| 2 | VLED- | Power supply | |

## 3.4 DC Specification

**< Table7. DC Specification >**

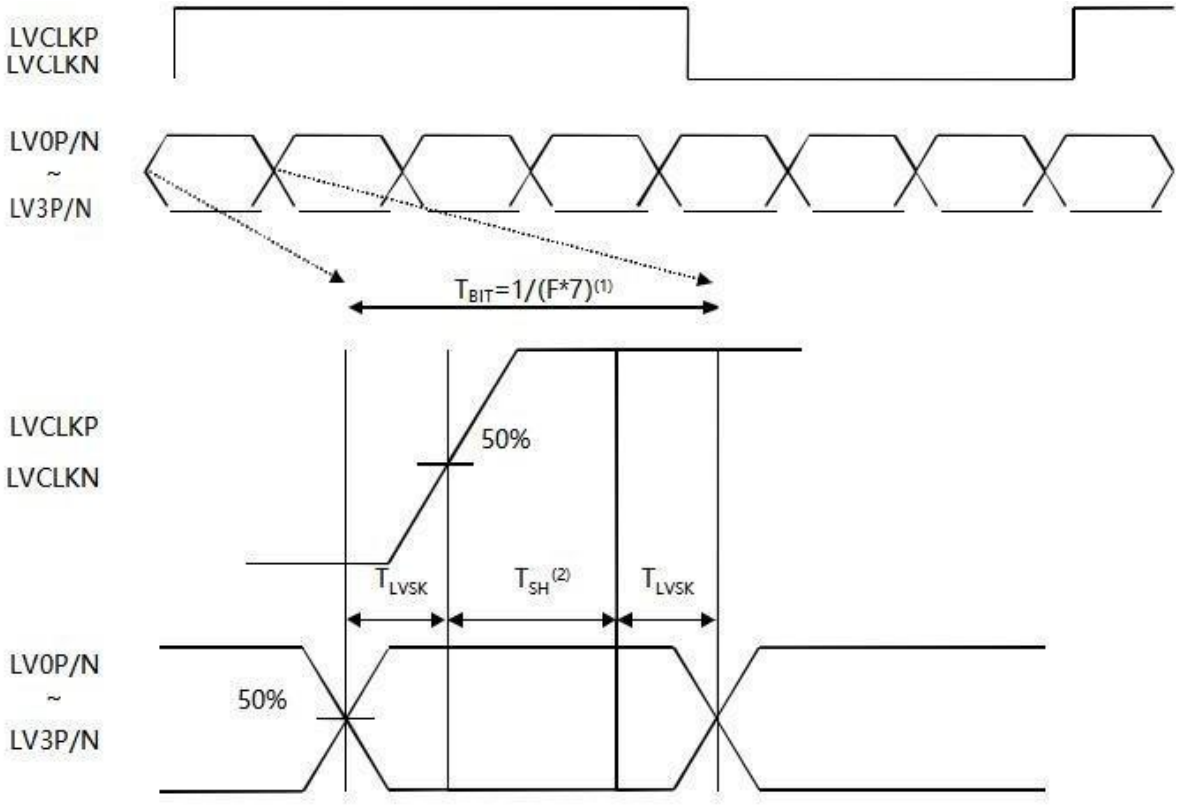
**LVDS DC specifications**

| | | | | | | |
|---|---|---|---|---|---|---|
| Differential input high threshold | $V_{TH}$ | - | - | +100 | mV | $V_{IC}$=1.2V |
| Differential input low threshold | $V_{TL}$ | -100 | - | - | mV | |
| LVDS common mode voltage | $V_{IC}$ | 0.7 | - | 1.6 | V | |
| LVDS swing voltage | $V_{ID}$ | ±100 | - | ±600 | mV | |




< LVDS $V_{ID}$ and $V_{IC}$ definition>

## 3.5 AC Specification




**Note**:
(1) $T_{BIT}$: Data period
(2) Internal CLK sampling data window

< LVDS channel to channel skew>

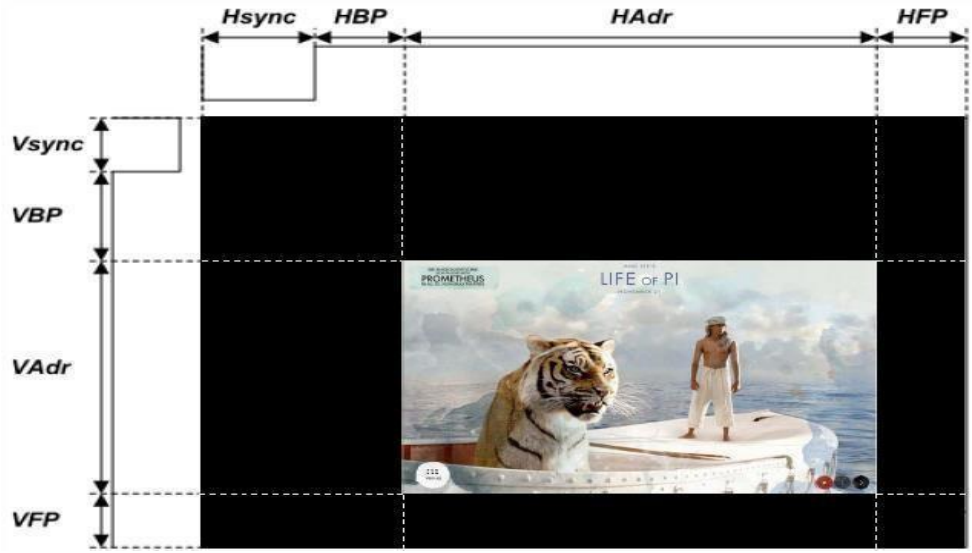
**< Table8. AC Specification >**

| Description | Symbol | Condition | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| LVDS Input frequency | F | - | 20 | - | 85 | MHz |
| LVDS channel to channel skew | $T_{LVSK}$ | F=65MHz<br>$V_{IC}$=1.2V<br>$V_{ID}$=±200mV | -600 | - | +600 | ps |

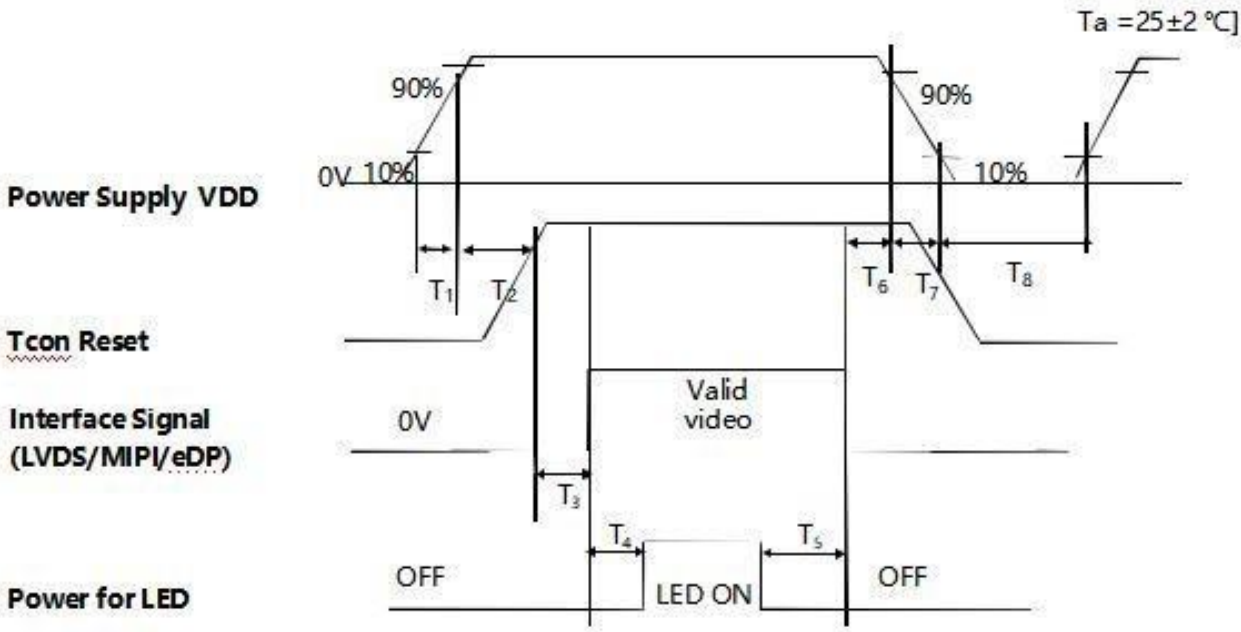
### 3.6 Interface timing Parameter

**< Table9. Timing Parameter >**

| Item | | | Symbol | min | typ | max | UNIT |
|---|---|---|---|---|---|---|---|
| LCD | Frame Rate | | - | - | 60 | - | Hz |
| | Pixels Rate | | - | 37.69 | 33 | 68.1 | MHz |
| Timing | Horizontal | Horizontal total time | tHP | - | 860 | 1300 | $t_{CLK}$ |
| | | Horizontal Active time | tHadr | | 800 | | $t_{CLK}$ |
| | | Horizontal Back Porch | tHBP | - | 30 | 255 | $t_{CLK}$ |
| | | Horizontal Front Porch | tHFP | - | 30 | 245 | $t_{CLK}$ |
| | Vertical | Vertical total time | tvp | 620 | 640 | 806 | $t_H$ |
| | | Vertical Active time | tVadr | | 600 | | $t_H$ |
| | | Vertical Back Porch | tVBP | 10 | 20 | 100 | $t_H$ |
| | | Vertical Front Porch | tVFP | 10 | 20 | 106 | $t_H$ |
| Lane | | | | - | 1 | - | Lane |



## 3.7 Power Sequence




**< Table15. Sequence Table >**

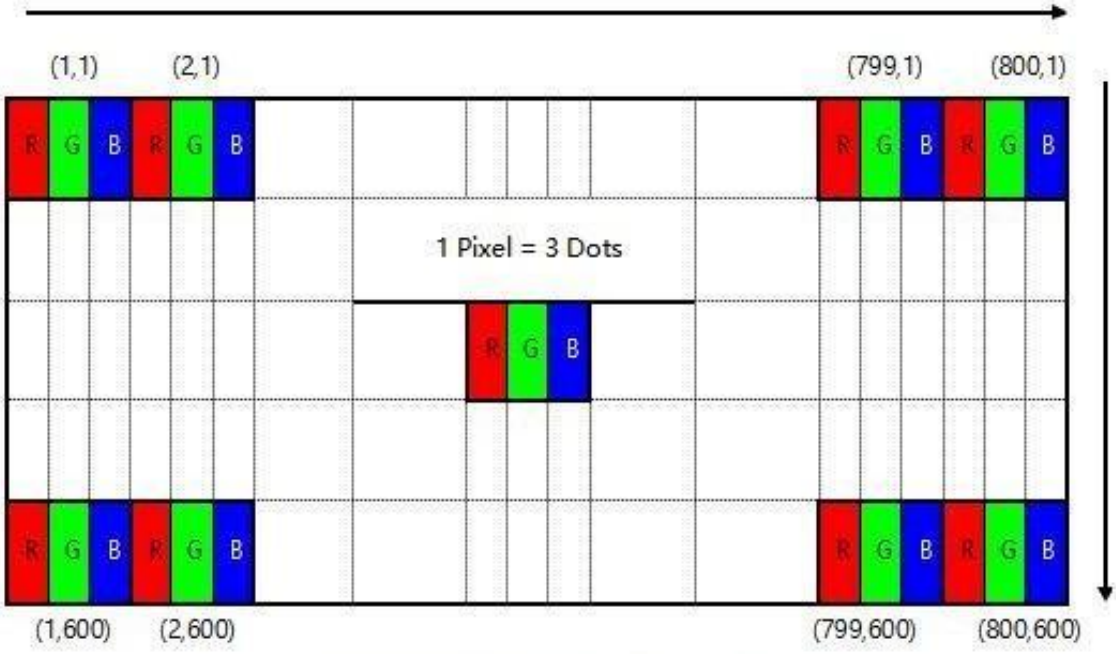
| Parameter | Value | | | Units |
|---|---|---|---|---|
| | Min. | Typ. | Max. | |
| T1 | 0.1 | - | 5 | (ms) |
| T2 | 1 | - | 30 | (ms) |
| T3 | 5 | - | 100 | (ms) |
| T4 | 200 | - | - | (ms) |
| T5 | 200 | - | - | (ms) |
| T6 | 0 | - | 50 | (ms) |
| T7 | 0 | - | 10 | (ms) |
| T8 | 500 | - | - | (ms) |

## 3.8 Input Color Data Mapping

**< Table11. Input Signal and Display Color Table >**

| Color & Gray Scale | | Input Data Signal | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Red Data | | | | | | | | Green Data | | | | | | | | Blue Data | | | | | | | |
| | | 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 Colors | Black | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Blue | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| | Green | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Cyan | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| | Red | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Magenta | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| | Yellow | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | White | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Gray Scale of Red | Black | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | ▵ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Darker | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | ▵ | ↑ | | | | | | | | ↑ | | | | | | | | ↑ | | | | | | | |
| | ▿ | ↓ | | | | | | | | ↓ | | | | | | | | ↓ | | | | | | | |
| | Brighter | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | ▿ | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Red | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Gray Scale of Green | Black | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | ▵ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Darker | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | ▵ | ↑ | | | | | | | | ↑ | | | | | | | | ↑ | | | | | | | |
| | ▿ | ↓ | | | | | | | | ↓ | | | | | | | | ↓ | | | | | | | |
| | Brighter | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | ▿ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Green | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Gray Scale of Blue | Black | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | ▵ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| | Darker | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| | ▵ | ↑ | | | | | | | | ↑ | | | | | | | | ↑ | | | | | | | |
| | ▿ | ↓ | | | | | | | | ↓ | | | | | | | | ↓ | | | | | | | |
| | Brighter | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 |
| | ▿ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 |
| | Blue | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Gray Scale of White | Black | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | ▵ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| | Darker | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| | ▵ | ↑ | | | | | | | | ↑ | | | | | | | | ↑ | | | | | | | |
| | ▿ | ↓ | | | | | | | | ↓ | | | | | | | | ↓ | | | | | | | |
| | Brighter | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 |
| | ▿ | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 |
| | White | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |

### 3.9 Input Color Data Mapping




Display Position of Input Data (V-H)

# OPTICAL SPECIFICATIONS

## Overview

The test of optical specifications shall be measured in a dark room (ambient luminance ≤ 1lux and temperature = 25±2℃) with the equipment of Luminance meter system (Gonio meter system and TOPCON BM-5) and test unit shall be located at an approximate distance 50cm from the LCD surface at a viewing angle of θ and Φ equal to 0°. We refer to θØ =0 (=θ3 ) as the 3 o′ clock direction (the "right" ), θØ=90 (= θ12 ) as the 12 O′ clock direction ( "upward" ), θØ=180 (= θ9 ) as the 9 O′ clock direction ( "left" ) and θØ=270(= θ6 ) as the 6 O′ clock direction ( "bottom" ). While scanning θ and/or Ø, the center of the measuring spot on the Display surface shall stay fixed.

## Optical Specifications

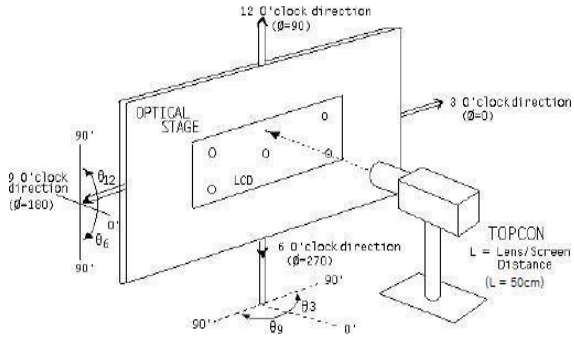
**< Table11. Optical Table >**

| Item | Symbol | Condition | Min | Typ. | Max | Unit | Note |
|---|---|---|---|---|---|---|---|
| **luminance** | Bp | θ=0° | 300 | 350 | -- | cd/m2 | Note 1 |
| **Brightness Uniformity** | △Bp | | 70 | 80 | -- | % | Note 2 |
| **Viewing Angle** | θL | Cr≥10 | 60 | 70 | -- | deg | Note 3 |
| | $\theta_R$ | | 60 | 70 | -- | | |
| | $\psi_T$ | | 50 | 60 | -- | | |
| | $\psi_B$ | | 60 | 70 | -- | | |
| **Contrast Ratio** | Cr | θ=0° FF=0° | 600 | 800 | | - | Note 4 |
| **Response Time** | Tr+Tf | | - | 30 | 35 | ms | Note 5 |
| **Color Coordinate of CIE1931** | Rx | θ=0° | | 0.605 | | - | Note 6 |
| | Ry | | | 0.321 | | | |
| | Gx | | | 0.313 | | | |
| | Gy | | | 0.607 | | | |
| | Bx | | | 0.115 | | | |
| | By | | | 0.068 | | | |
| | Wx | | | 0.270 | | | |
| | Wy | | | 0.300 | | | |
| **NTSC Ratio** | NTSC | CIE1931 | 50 | 55 | -- | % | Note 7 |
| **Polarization Direction of Front Polarizer** | PdF | | | 45° | | deg | Note 8 |
| **Polarization Direction of Rear Polarizer** | PdR | | | 45° | | Deg | |
| **Gray inversion angle** | | | | 6点钟 | | | Note 9 |

**Note1:Luminance measurement**

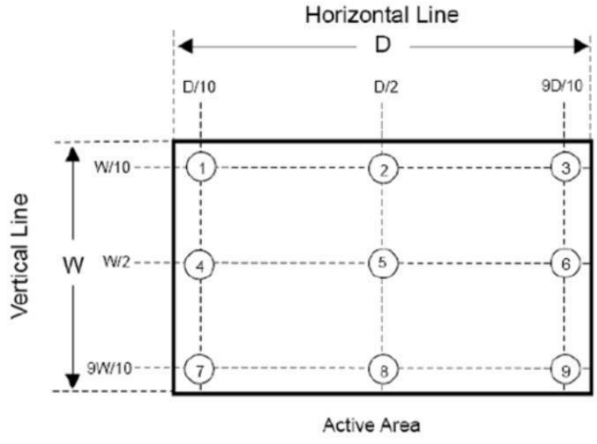
The test condition is at ILED=100mA and measured on the surface of LCD module at 25℃.

- The data are measured after LEDs are lighted on for more than 5 minutes and LCM displays are fully white. The brightness is the center of the LCD. Measurement equipment CS2000 or similar equipments (Field of view:1deg,Distance:50cm)
- Measuring surroundings: Dark room.
- Measuring temperature: Ta=25℃.
- Adjust operating voltage to get optimum contrast at the center of the display.
- Measured value at the center point of LCD panel must be after more than 5 minutes while backlight turning on.



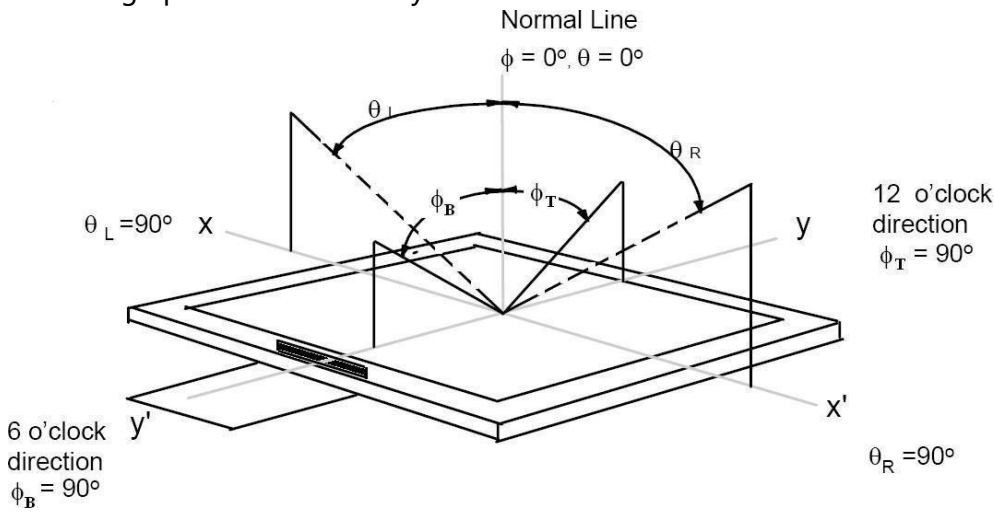

**Note2:Uniformity**

- The test condition is at ILED=150mA and measured on the surface of LCD module at 25℃.
- Measurement equipment:CS2000 or similar equipments
- The luminance uniformity is calculated by using following formula:
- ▵Bp = Bp (Min.) / Bp (Max.)×100 (%)
- Bp (Max.) = Maximum brightness in 9 measured spots
- Bp (Min.) = Minimum brightness in 9 measured spots.



**Note 3**:**The definition of Viewing Angle**

Refer to the graph below marked by θ and Φ.



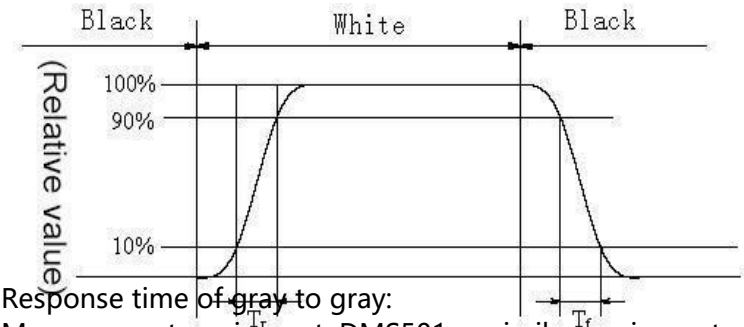

**Note4**:**ThedefinitionofContrastRatio** (Test LCM using CS2000 or similar equipments):

$$\text{Contrast Ratio(CR)} = \frac{\text{Luminance When LCD is at "White" state}}{\text{Luminance When LCD is at "Black" state}}$$

(Contrast Ratio is measured in optimum common electrode voltage)

**Note5**:**DefinitionofResponse time.**(Test LCD using DMS501 or similar equipments):

The output sign also photo detector are measured when the input sign also are changed from "black " to "white" (Voltage falling time)and from "white" to "black" (Voltage rising time), respectively . The response time is defined as the time interval between the 10% and 90% of amplitudes . Refer to fi gures below.




| | L0 | L1 | L2 | L3 | L4 | L5 | L6 | L7 |
|---|---|---|---|---|---|---|---|---|
| L0 | ■ | | | | | | | |
| L1 | | ■ | | | | | | |
| L2 | | | ■ | | | | | |
| L3 | | | | ■ | | | | |
| L4 | | | | | ■ | | | |
| L5 | | | | | | ■ | | |
| L6 | | | | | | | ■ | |
| L7 | | | | | | | | ■ |

Response time of gray to gray:

Measurement equipment: DMS501 or similar equipments.

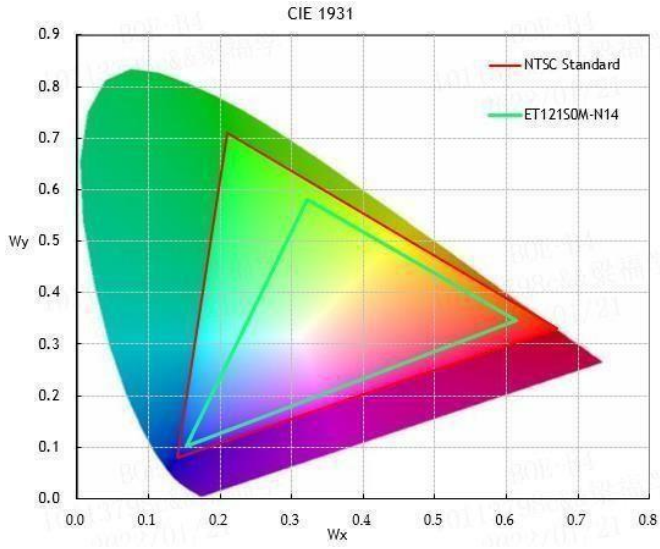
Test method: we define 8 grays L0-L7,the grays of L0-L7 were defined as:0,36,73, 109, 146, 182, 219, 25 5. Theoutputsignalsofphotodetectoraremeasuredwhentheinputsignalsarechanged from "Lx" to "Ly" ,x, y= [0, 7]. The response time is defined as the time interval between the 10% and 90% of amplitudes. The result of the test can be noted as below:

**Note 6: Color Coordinates of CIE 1931**
The test condition is at ILED=100mA and measured on the surface of LCD module at 25℃.
Measurement equipment:CS2000 or similar equipments

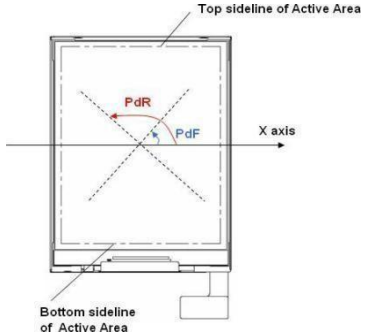
The Color Coordinate (CIE 1931) is the measurement of the center of the display shown in below figure.

**Note 7: Definition of Color of CIE Coordinate and NTSC Ratio.**

$$S = \frac{\text{area of RGB triangle}}{\text{area of NTSC triangle}} \times 100\%$$

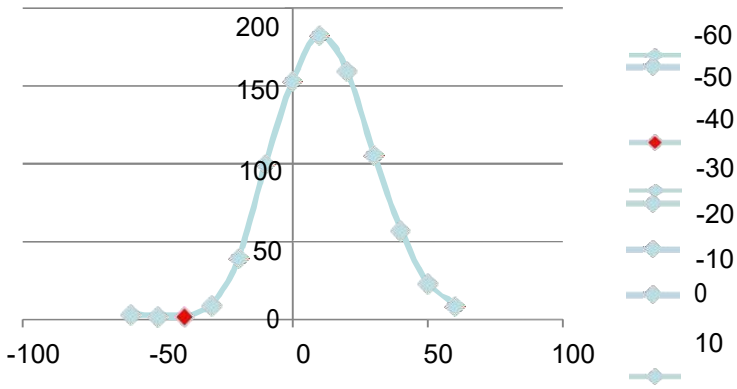



**Note 8: Polarization Direction Definition**
- Viewing direction is normal user viewing direction which is vertical to the display surface
- The polarizer which is closer to viewer is defined as Front Polarizer
- The polarizer which is on the rear side of viewer is defined as Rear Polarizer
- The X axis is defined as parallel line to top & bottom sidelines of the Active Area
- PdF which is marked in blue arrow is polarization degree of Front polarizer
- PdB which is marked in red arrow is polarization degree of Back polarizer
- The polarization degree parameter must be indicated in range of 0deg to 180deg according to above definition



**Note 9**: **Definition of gray inversion angle**

- Refer to the graph of note 9.
- Using luminance test method.
- Test pattern : 128 gray
- If the viewing direction is 12 o' clock ,then test the luminance while θ=-60°,θ=-50°, θ=-40°, θ=-30°, θ=-20°, θ=-10°, θ=0°, θ=10°, θ=20°, θ=30°, θ=40°, θ=-50°, θ=60°. The luminance test as figure below:



## 5.0 RELIABLITY TEST

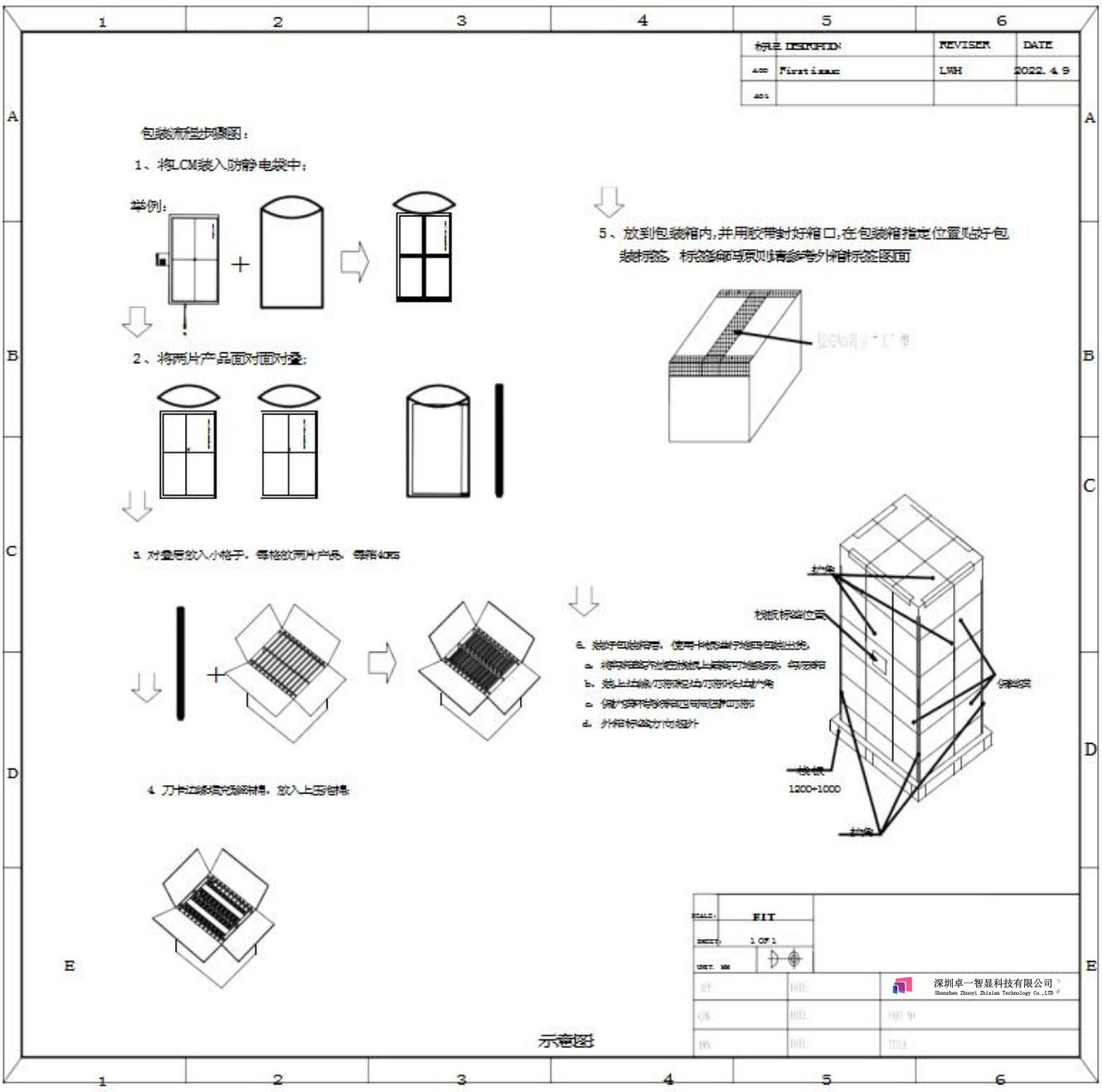
The Reliability test items and its conditions are shown inbelow.

**<Table 12. Reliability Test Parameters >**

| No | Test Items | Conditions |
|---|---|---|
| 1 | High temperature & high humidity (storage test) | 60℃，90%RH，240hr |
| 2 | High temperature storage test | 80℃，240hr |
| 3 | Low temperature storage test | -30℃，240hr |
| 4 | High temperature & high humidity (operation test) | 60℃，90%RH，240hr |
| 5 | Low temperature operation test | -20℃，240hr |
| 6 | High temperature operation test | 70℃，240hr |
| 7 | Thermal Shock Test | -30℃~80℃，1hr/cycle，100cycle |
| 8 | ESD | 150pF，330Ω，±6kV(Contact)，±8kV（Air） |
| 9 | Packing VIB | 1.47G，1-200hz，X，Y，±Z，30min/Axis |

Remark : Vertical line appear when the temperature is below 10℃

## PACKING INFORMATION(产品形态：LCM )



## Handling & Cautions

Please pay attention to the followings when you use this TFT LCD Module.

**Mounting Method**

- Use finger-stalls with soft gloves in order to keep display clean during the incoming inspection and assembly process.
- You must mount a module using specified mounting holes (Details refertothe drawings).
- You should consider the mounting structure so that uneven force (ex. Twistedstress, Concentrated stress)is not applied to the module. And the case on which a module is mounted should have sufficient strength so that external force is not transmitted directly to the module.
- Do not apply mechanical stress or static pressure on module; Abnormal display cause by pressing some parts of module during assembly process , do not belong to product failure, the press should be agreed by twosides.
- Determine the optimum mounting angle, refer to the viewing angle range in the specification for each model.
- Do not apply mechanical stress or static pressure on module , and avoid impact, vibration and falling.
- Acetic acid type and chlorine type materials for the cover case are notdesirable because the former generates corrosive gas of attacking the polarizer at high temperature and the latter causes circuit break byelectro-chemicalreaction.
- Protection film for polarizer on the module should be slowly peeled off before display.
- Be careful to prevent water & chemicals contact the module surface.
- You should adopt radiation structure to satisfy the temperaturespecification.
- Do not touch, push or rub the exposed polarizers with glass, tweezers or anything harder than HB pencil lead. And please do not rub with dust clotheswith chemical treatment.
  Do not touch the surface of polarizer for bare hand or greasy cloth.(Somecosmetics are detrimental to the polarizer.)
- When the surface becomes dusty, please wipe gently with absorbent cotton or other soft materials like chamois soaks with petroleum benzine. Normal-hexane & alcohol is recommended for cleaning the adhesives used to attach front / rear polarizers. Do not use acetone, toluene , because they cause chemical damage to the polarizer.
- Wipe off saliva or water drops as soon as possible. Their long time contact with polarizer causes deformations and color fading.
- This module has its circuitry PCB' s on the rear side and Driver IC, should behandled carefully in order not to be stressed.
- Avoid impose stress on PCB and Driver IC during assembly process ,Do notdrawing, bending, COF package & wire.
- Do not disassemble the module.

## 7.2 Operating Precautions

- Do not connector or disconnect the cable to/from the Module at the "Power On" Condition.
- When the module is operating, do not lose CLK, ENAB signals. If any one ofthese signals is lost, the module would be damaged.
- Obey the supply voltage sequence. If wrong sequence is applied, the module would be damaged.
- Do not allow to adjust the adjustable resistance orswitch.
- The electrochemical reaction caused by DC voltage will lead to LCD module degradation, so DC drive should beavoided.
- The LCD modules use C-MOS LSI drivers, so customers are recommended that any unused input terminal would be connected to Vdd or Vss, do not input any signals before power is turn on, and ground you body, work/assembly area, assembly equipment to protect against static electricity.
- Do not exceed the absolute maximum rating value. (supply voltage variation, input voltage variation, variation in part contents and environmental temperature, and so on) Otherwise the Module may be damaged.
- Module has high frequency circuits. Sufficient suppression to the electromagnetic interference shall be done by system manufacturers. Grounding and shielding methods may be important to minimized the interference.
- The cables should be as short as possible between System Board and PCB interface.
- Connectors are precision devices to transmit electrical signals, and operators should plug in parallel.
- Be careful for condensation at sudden temperature change. Condensation makes damage to polarizer or electrical contacted parts. And after fading condensation, smear or spot will occur.

## 7.3 Electrostatic Discharge Precautions

- Avoid the use work clothing made of synthetic fibers. We recommend cotton clothing or other conductivity-treated fibers.
- Since a module is composed of electronic circuits, it is not strong to electrostatic discharge. Make certain that treatment persons are connected to groundthrough wrist band etc.
- Do not close to static electricity to avoid product damage.
- Do not touch interface pin directly.

## 7.4 Precautions for Strong Light Exposure

Do not leave the module operation or storage in Strong light . Strong light exposure causes degradation of polarizer and color filter.

## Precautions for Storage

A. Atmosphere Requirement

| ITEM | UNIT | MIN | MAX |
|---|---|---|---|
| Storage Temperature | (℃) | 5 | 40 |
| Storage Humidity | (%rH) | 40 | 75 |
| Storage Life | 6 months | | |
| Storage Condition | • The storage room should be equipped with a dark and good ventilation facility.<br>• Prevent products from being exposed to the direct sunlight, moisture and water.<br>• The product need to keep away from organic solvent and corrosive gas.<br>• Be careful for condensation at sudden temperature change.<br>• Storage condition is guaranteed under packing conditions. | | |

B. Package Requirement

- The product should be placed in a sealed polythene bag.
- Product Should be placed on the pallet, Which is away from the floor, Be cautions not to pile the product up.
- The polarizer surface should not come in contact with any other object. It is recommended that they be stored in the container in which they were shipped.
- As the original protective film, do not use the adhesive protective film to avoid change of Pol color and characteristic.

## 7.6 Precautions for protection film

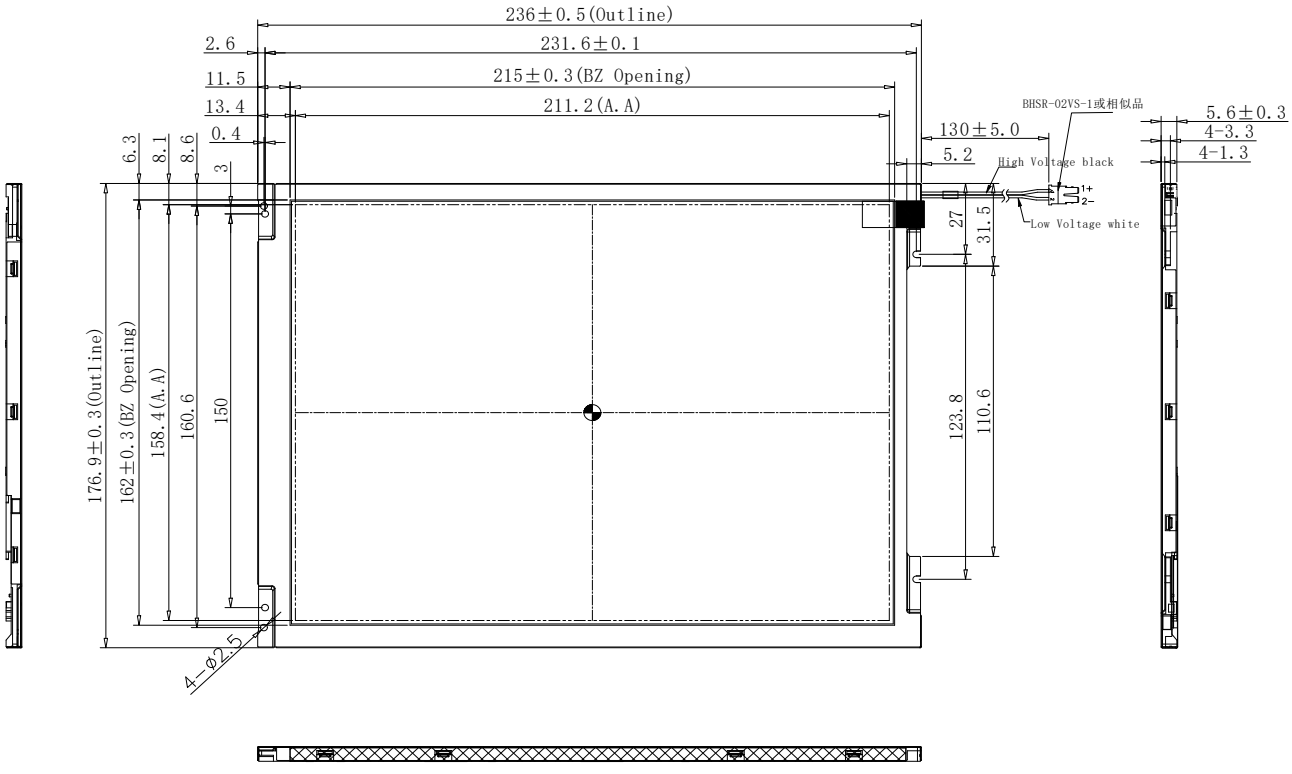
- Remove the protective film slowly, keeping the removing direction approximate 30-degree not vertical from panel surface, If possible, under ESD control device like ion blower, and the humidity of working room should be kept over 50%RH to reduce the risk of static charge.

People who peeled off the protection film should wear anti-static strap and grounded well.

# 8.0 Mechanical Specification

## Mechanical Drawing

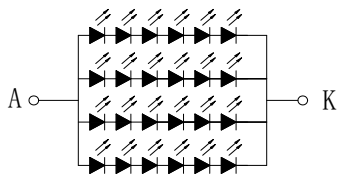
Drawing Attachment: Front




Backlight LED 6串4并24颗 Circuit

IF:25mA*4=100mA

VF: 18.0V TYP, 19.8V MAX



## Mechanical Drawing

Drawing Attachment: BACK