



## PRODUCT SPECIFICATION

CDTECH Model: **S050HWV109EP-FC84**

CUSTOMER Model: **-**

Description: **5.0" TFT-LCD Module with CTP**

Version: **1.0**

| CDTECH    | PREPARED BY                                                                         | CHECKED BY                                                                           | APPROVED BY |
|-----------|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|-------------|
| SIGNATURE |  |  |             |
| DATE      | 2023.3.23                                                                           | 2023.3.23                                                                            | 2023.3.23   |

| CUSTOMER<br>APPROVAL | SIGNATURE | DATE |
|----------------------|-----------|------|
|                      |           |      |

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# 1. General Specifications

## 1.1 LCM General Information

| Item                  | Specification                      | Unit     |
|-----------------------|------------------------------------|----------|
| LCD Size              | 5.0                                | inch     |
| Number of Pixels      | 800 (H) RGB x 480 (V)              | pixels   |
| Display Mode          | Normally Black                     | -        |
| Viewing Direction     | Free                               | o' clock |
| Interface             | LVDS                               | -        |
| Display Colors        | 16.7M                              | colors   |
| Outline Dimension     | 147.00 (H) x 104.00 (V) x 4.86 (D) | mm       |
| Active Area           | 108.00 (H) x 64.80 (V)             | mm       |
| Pixel Pitch           | 0.135 (H) x 0.135 (V)              | mm       |
| Driver IC             | TBD                                | -        |
| Operation Temperature | -20~70                             | °C       |
| Storage Temperature   | -30~80                             | °C       |

## 1.2 Touch Panel Information

| Item                  | Specification        |
|-----------------------|----------------------|
| Touch Structure       | G+G                  |
| Bonding Type with LCM | OCA Optical Bonding  |
| Driver IC             | ILI2511              |
| Interface             | USB/I <sup>2</sup> C |
| Touch Count Max       | 5 Points             |
| Surface treatment     | -                    |
| Surface hardness      | 6H                   |
| I2C slave address     | 0x82                 |
| Origin of coordinate  | Top Left Corner      |

Note1: Requirements on environmental protection RoHS compliant.

## 2. Absolute Maximum Ratings

| Item                  | Symbol | MIN. | MAX. | Unit | Note   |
|-----------------------|--------|------|------|------|--------|
| Analog Supply voltage | VDD    | -0.3 | 5.0  | V    | Note 1 |

Note 1: Permanent damage may occur to the LCD module if beyond this specification.

Functional operation should be restricted to the conditions described under normal operating conditions.

## 3. Electrical Characteristics

### 3.1 Recommended Operating Condition for TFT LCD

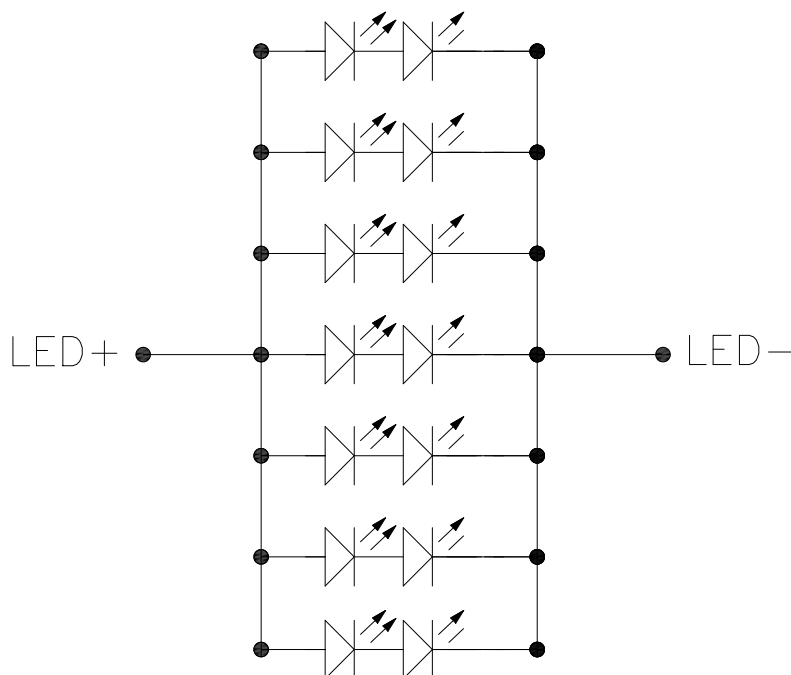
| Item                  | Symbol    | Min.     | Typ. | Max.     | Unit | Note     |
|-----------------------|-----------|----------|------|----------|------|----------|
| Analog Supply voltage | VDD       | 3.0      | 3.3  | 3.6      | V    |          |
| Analog supply current | $I_{VDD}$ | -        | TBD  | -        | mA   | VDD=3.3V |
| IO Supply Voltage     | VDDI      | 3.0      | -    | 3.6      | V    |          |
| Logic input voltage   | VIH       | 0.7*VDDI | -    | VDDI     | V    |          |
|                       | VIL       | GND      | -    | 0.3*VDDI | V    |          |

### 3.2 Recommended Driving Condition for Backlight

| Item              | Symbol   | Min.  | Typ.   | Max.  | Unit  | Note              |
|-------------------|----------|-------|--------|-------|-------|-------------------|
| Driving Current   | $I_F$    | -     | 140    | -     | mA    |                   |
| Driving Voltage   | $V_F$    | 10.8  | -      | 13.6  | V     |                   |
| Power consumption | $W_{BL}$ | 1.512 | -      | 1.904 | W     |                   |
| LED Life-Time     | N/A      | -     | 50,000 | -     | Hours | Ta=25°C<br>Note 1 |

Note 1: LED lifetime is defined as the module brightness decay 50% of original brightness at Ta=25 degree, typical current.

Note 2: LED circuit :



### 3.3 Touch Panel

| Item                     | Symbol         | Min.            | Typ. | Max.            | Unit | Note         |
|--------------------------|----------------|-----------------|------|-----------------|------|--------------|
| Power Supply voltage     | USB_VDD-5V     | -               | 5.0  | -               | V    |              |
| Analog supply current    | $I_{USB\_VDD}$ | -               | TBD  | -               | mA   | USB_VDD=5.0V |
| Power Supply voltage     | VDDT           | -               | 3.3  | -               |      |              |
| Analog supply current    | $I_{VDDT}$     | -               | TBD  | -               | mA   | VDDT=3.3V    |
| Input high-level voltage | $V_{IH}$       | $0.7 \cdot VDD$ | -    | VDD             | V    |              |
| Input low -level voltage | $V_{IL}$       | GND             | -    | $0.3 \cdot VDD$ | V    |              |

## 4. Interface Pin Assignment

### 4.1 LCM Pin Assignment

Recommended connector: FH12-40S-0.5SH manufactured by HIROSE

| No. | Symbol | Description                                                                                                                |
|-----|--------|----------------------------------------------------------------------------------------------------------------------------|
| 1   | LEDK   | Power for LED backlight (Cathode)                                                                                          |
| 2   | LEDK   | Power for LED backlight (Cathode)                                                                                          |
| 3   | LEDA   | Power for LED backlight (Anode)                                                                                            |
| 4   | LEDA   | Power for LED backlight (Anode)                                                                                            |
| 5   | NC     | No connection                                                                                                              |
| 6   | DISP   | DISP="1": Normally operation (Default)<br>DISP="0": Timing controller, source driver will turn off ,all output are High-Z. |
| 7   | GND    | Ground                                                                                                                     |
| 8   | VDDI   | Power Supply for I/O System                                                                                                |
| 9   | VDDI   | Power Supply for I/O System                                                                                                |
| 10  | VDD    | Power supply                                                                                                               |
| 11  | VDD    | Power supply                                                                                                               |
| 12  | SCL    | Serial clock signal                                                                                                        |
| 13  | SDA    | Serial data input/output signal                                                                                            |
| 14  | CS     | Chip select pin                                                                                                            |
| 15  | GND    | Ground                                                                                                                     |
| 16  | RXCLKN | -LVDS differential clock input                                                                                             |
| 17  | RXCLKP | +LVDS differential clock input                                                                                             |
| 18  | GND    | Ground                                                                                                                     |
| 19  | RXIN0N | - LVDS differential data input                                                                                             |
| 20  | RXIN0P | + LVDS differential data input                                                                                             |
| 21  | GND    | Ground                                                                                                                     |
| 22  | RXIN1N | - LVDS differential data input                                                                                             |
| 23  | RXIN1P | + LVDS differential data input                                                                                             |
| 24  | GND    | Ground                                                                                                                     |
| 25  | RXIN2N | - LVDS differential data input                                                                                             |
| 26  | RXIN2P | + LVDS differential data input                                                                                             |
| 27  | GND    | Ground                                                                                                                     |
| 28  | NC     | No connection                                                                                                              |
| 29  | NC     | No connection                                                                                                              |

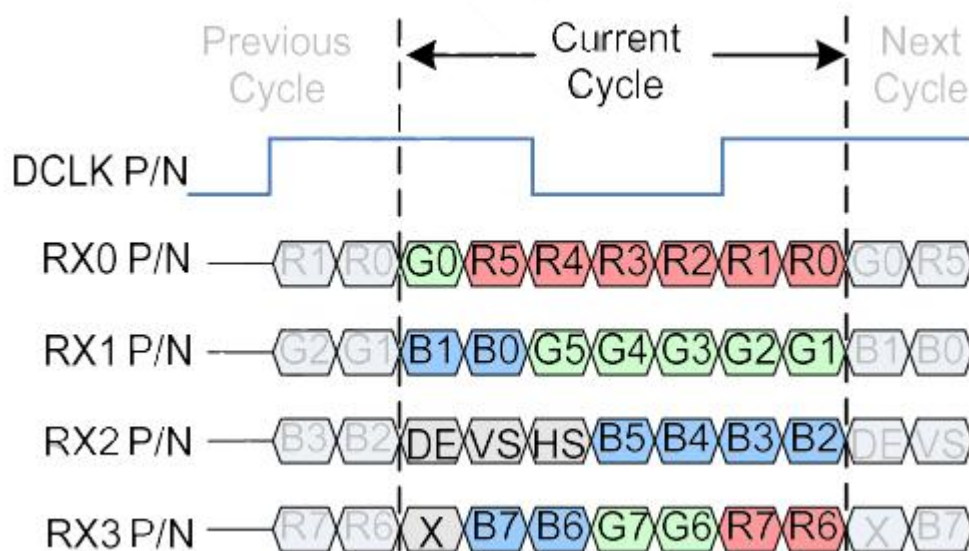
|    |        |                                                                                                                  |
|----|--------|------------------------------------------------------------------------------------------------------------------|
| 30 | GND    | Ground                                                                                                           |
| 31 | RESET  | Global reset pin                                                                                                 |
| 32 | ENPROG | OTP program control pin.                                                                                         |
| 33 | VDIR   | Vertical scan direction control pin. This pin must be connected to “H” or “L” according to system application.   |
|    |        | VDIR      Function Description                                                                                   |
|    |        | L      From down to up                                                                                           |
|    |        | H      From up to down.                                                                                          |
| 34 | HDIR   | Horizontal scan direction control pin. This pin must be connected to “H” or “L” according to system application. |
|    |        | HDIR      Function Description                                                                                   |
|    |        | L      From right to left                                                                                        |
|    |        | H      From left to right                                                                                        |
| 35 | FMT    | 8bit / 6bit select pin                                                                                           |
| 36 | GND    | Ground                                                                                                           |
| 37 | XR(NC) | No connect                                                                                                       |
| 38 | YD(NC) | No connect                                                                                                       |
| 39 | XL(NC) | No connect                                                                                                       |
| 40 | YU(NC) | No connect                                                                                                       |

### 4.2 Touch FPC Pin Assignment

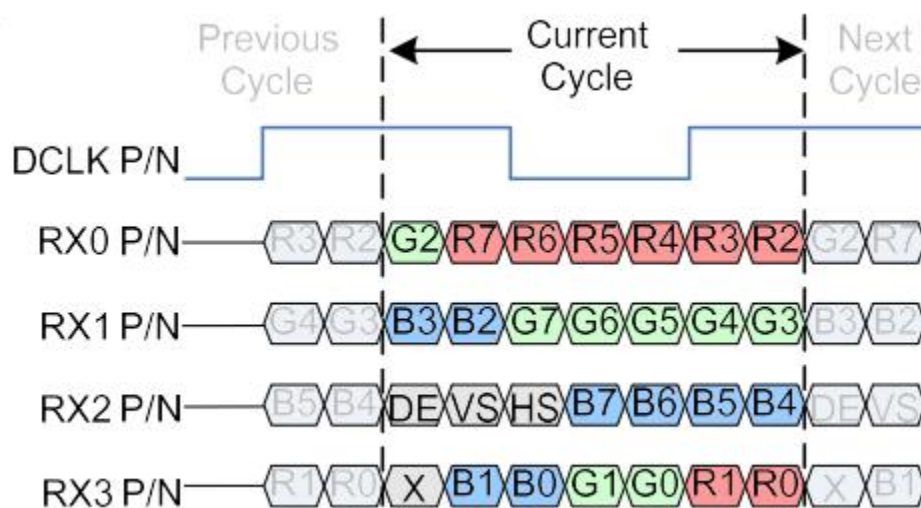
| No. | Symbol  | Description               |
|-----|---------|---------------------------|
| 1   | USB_VSS | Ground                    |
| 2   | USB_VDD | Power supply (5V)         |
| 3   | USB_D+  | Data+ input               |
| 4   | USB_D-  | Data- input               |
| 5   | VSS     | Ground                    |
| 6   | SDA     | I2C data input and output |
| 7   | SCL     | I2C clock input           |
| 8   | RST     | Reset pin                 |
| 9   | INT     | Interrupt signal from CTP |
| 10  | VDDT    | Power supply (3.3V)       |

## 5. Interface Characteristics

### 5.1 LVDS Input Pin Mapping Table

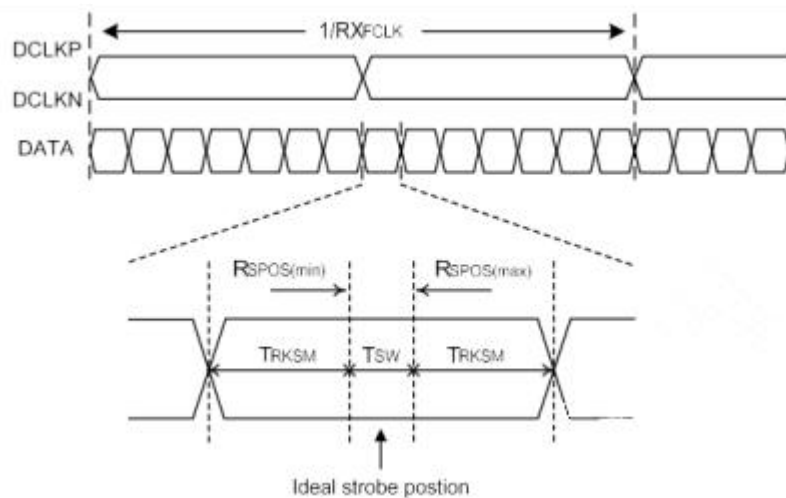
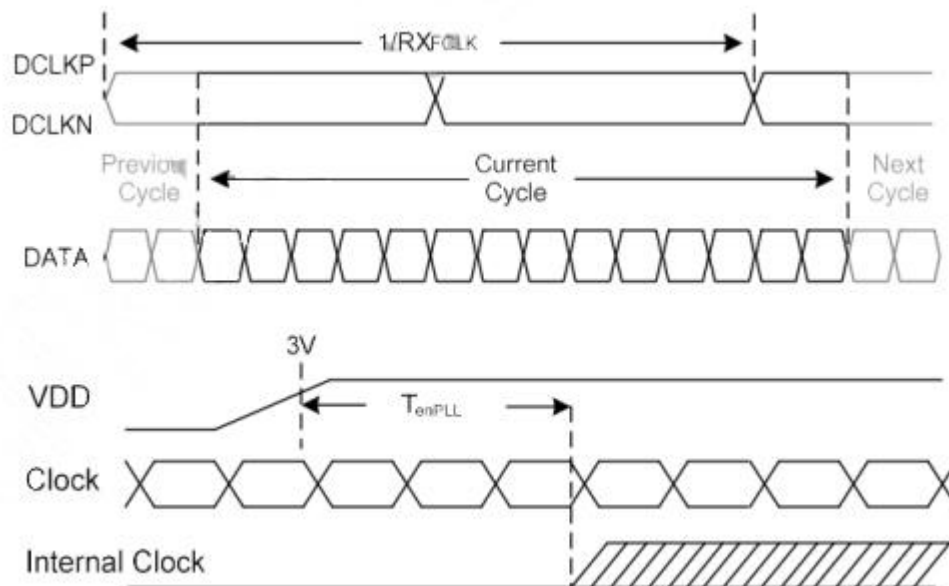


4 Lane VESA Data Format Color Bit Map



4 Lane JEIDA Data Format Color Bit Map

### 5.2 LVDS Input Timing Table

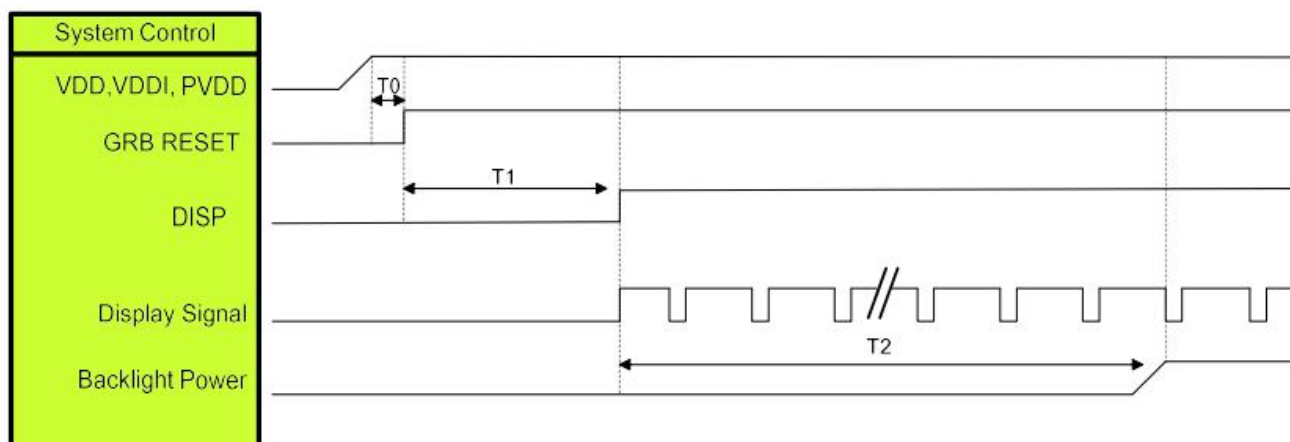


$TR_{KSM}$ : Receiver strobe margin  
 $RS_{POS}$ : Receiver strobe position  
 $TSW$ : Strobe width (internal DATA sampling window)

LVDS Input Timing (PVDD=PVDD1=VDD=VDDI= 3.3V, AGND=0V, TA=25°C)

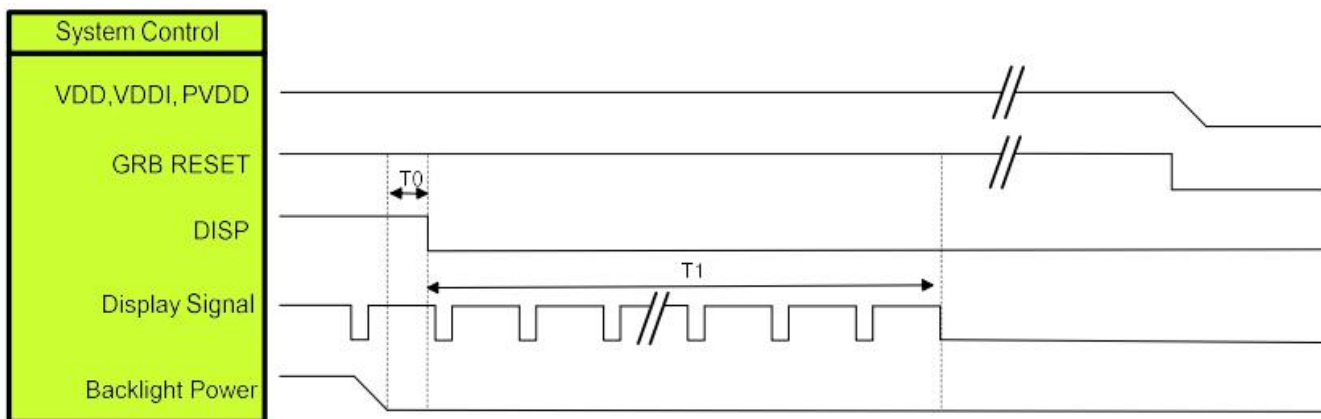
| Item                                                           | Symbol      | Min.                     | Typ. | Max. | Unit | Conditions |
|----------------------------------------------------------------|-------------|--------------------------|------|------|------|------------|
| Clock Frequency                                                | $RX_{FCLK}$ | 23                       | 25   | 27   | MHz  |            |
| Input Data Skew Margin                                         | $TR_{KSM}$  | 400                      |      |      | ps   |            |
| Clock High Time                                                | $TL_{VCH}$  | $4/(7 \times RX_{FCLK})$ |      |      | ns   |            |
| Clock Low Time                                                 | $TL_{VCL}$  | $3/(7 \times RX_{FCLK})$ |      |      | ns   |            |
| PLL Wake-up Time                                               | $T_{enPLL}$ |                          |      | 150  | us   |            |
| LVDS Spread Spectrum Clocking (SSC) Tolerance of LVDS Receiver |             |                          |      |      |      |            |
| Modulation Frequency                                           | $SSC_{MF}$  |                          |      | 100  | KHz  |            |
| Modulation Rate                                                | $SSC_{MR}$  |                          |      | +/-3 | %    |            |

## 5.3 Power On Sequence



| Symbol | Description                                 | Min. Time | Unit |
|--------|---------------------------------------------|-----------|------|
| T0     | System power stability to GRB RESET signal  | 0         | ms   |
| T1     | GRB RESET= "High" to DISP="High"            | 10        | ms   |
| T2     | Display Signal output to Backlight Power on | 250       | ms   |

## 5.4 Power Off Sequence



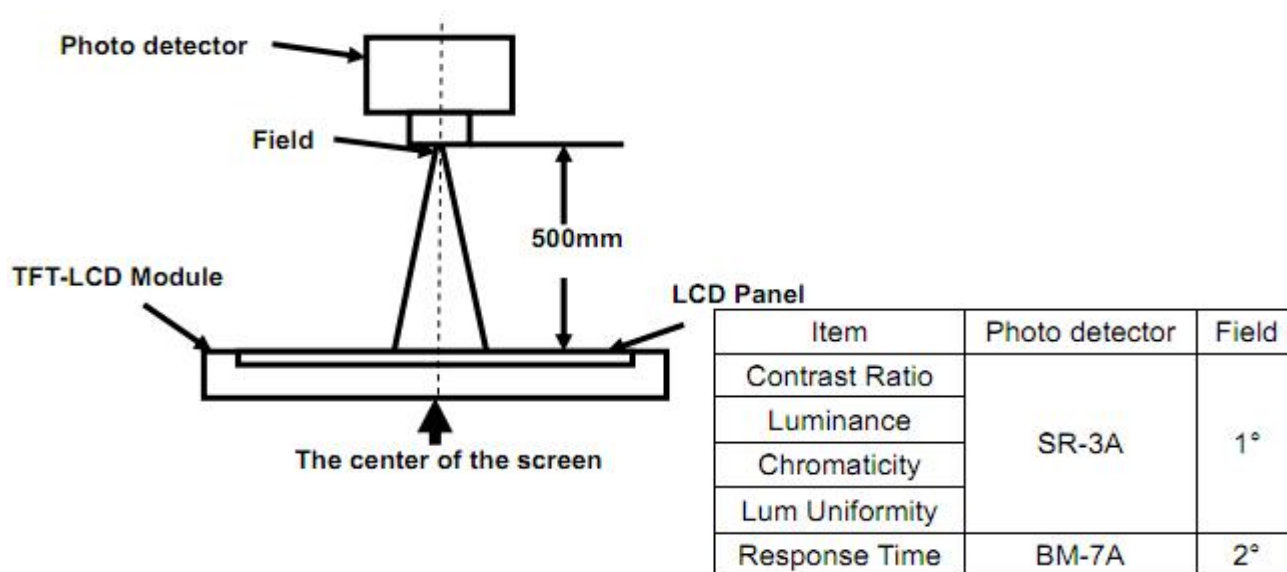
| Symbol | Description                                          | Min. Time | Unit |
|--------|------------------------------------------------------|-----------|------|
| T0     | Backlight Power off to DISP="Low"                    | 5         | ms   |
| T1     | DISP="Low" to IC internal voltage discharge complete | 80        | ms   |

## 6. Optical Specifications

| Item                               | Symbol     | Condition                    | Min.  | Typ.  | Max.  | Unit              | Note           |
|------------------------------------|------------|------------------------------|-------|-------|-------|-------------------|----------------|
| Viewing Angle<br>(CR≥10)<br>B/L ON | $\theta_T$ | $\Phi=90^\circ$ (12 o'clock) | 70    | 80    | -     | deg               | Note2          |
|                                    | $\theta_B$ | $\Phi=270^\circ$ (6 o'clock) | 70    | 80    | -     | deg               | Note2          |
|                                    | $\theta_L$ | $\Phi=180^\circ$ (9 o'clock) | 70    | 80    | -     | deg               | Note2          |
|                                    | $\theta_R$ | $\Phi=0^\circ$ (3 o'clock)   | 70    | 80    | -     | deg               | Note2          |
| Response Time                      | $T_{ON}$   | Normal $\theta=\Phi=0^\circ$ | -     | 15    | 20    | msec              | Note4          |
|                                    | $T_{OFF}$  |                              | -     | 15    | 20    | msec              | Note4          |
| Contrast Ratio                     | CR         |                              | 800   | 1000  | -     | -                 | Note1<br>Note3 |
| Color Chromaticity                 | $W_X$      |                              | 0.270 | 0.320 | 0.370 | -                 | Note1<br>Note5 |
|                                    | $W_Y$      |                              | 0.295 | 0.345 | 0.395 | -                 | Note1<br>Note5 |
| Luminance                          | L          |                              | 700   | 800   | -     | cd/m <sup>2</sup> | Note1<br>Note7 |
| Luminance<br>Uniformity            | $Y_U$      |                              | 75    | 80    | -     | %                 | Note1<br>Note6 |
| NTSC                               | -          |                              | 45    | 50    | -     | %                 | -              |

Note 1:Definition of optical measurement system

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



Note 2: Definition of viewing angle range and measurement system

Viewing angle is measured at the center point of the LCD by CONOSCOPE(ergo-80).

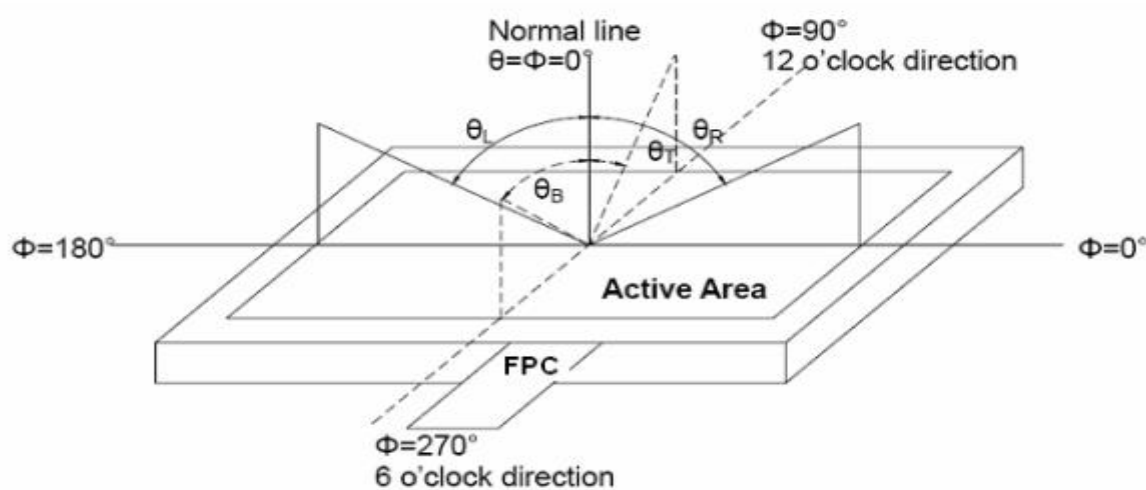


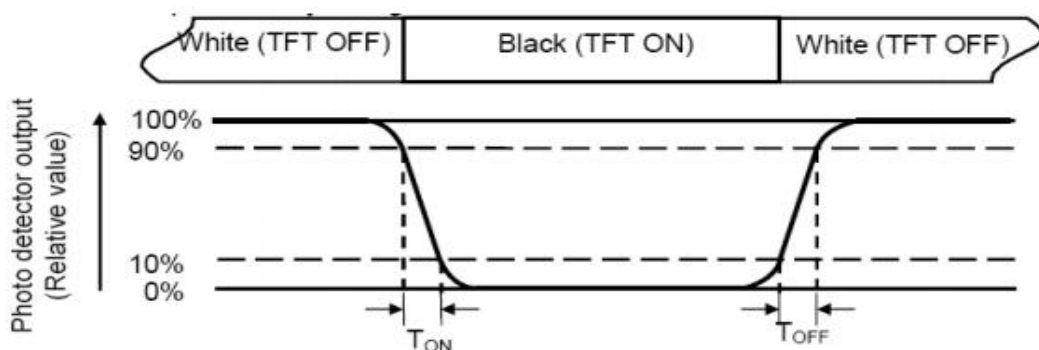
Fig. 1 Definition of viewing angle

Note 3: Definition of contrast ratio

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

### Note 4: Definition of Response time

The response time is defined as the LCD optical switching time interval between “White” state and “Black” state. Rise time (TON) is the time between photo detector output intensity changed from 90% to 10%. And fall time (TOFF) is the time between photo detector output intensity changed from 10% to 90%.



### Note 5: Definition of color chromaticity (CIE1931)

Color coordinates measured at center point of LCD.

### Note 6: Definition of Luminance Uniformity

The luminance uniformity in surface luminance is determined by measuring luminance at each test position 1 through n, and then dividing the maximum luminance of n points luminance by minimum luminance of n points luminance. For more information see FIG.2.

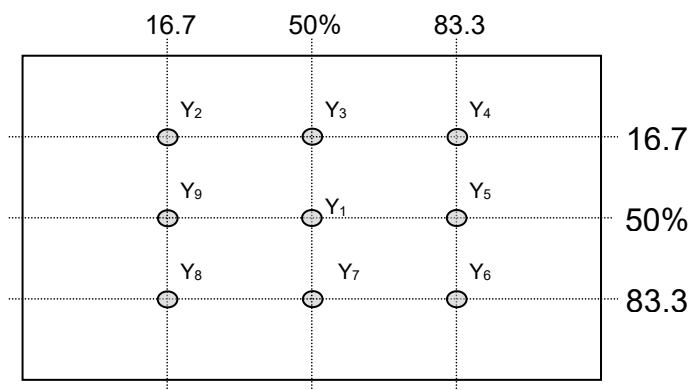


Fig. 2 Definition of points

### Note 7: Definition of Luminance (Refer Fig. 2)

Surface luminance is the luminance with all pixels displaying white.

$L_v$  = Average Surface Luminance with all white pixels( $P_1, P_2, P_3, \dots, P_n$ ).

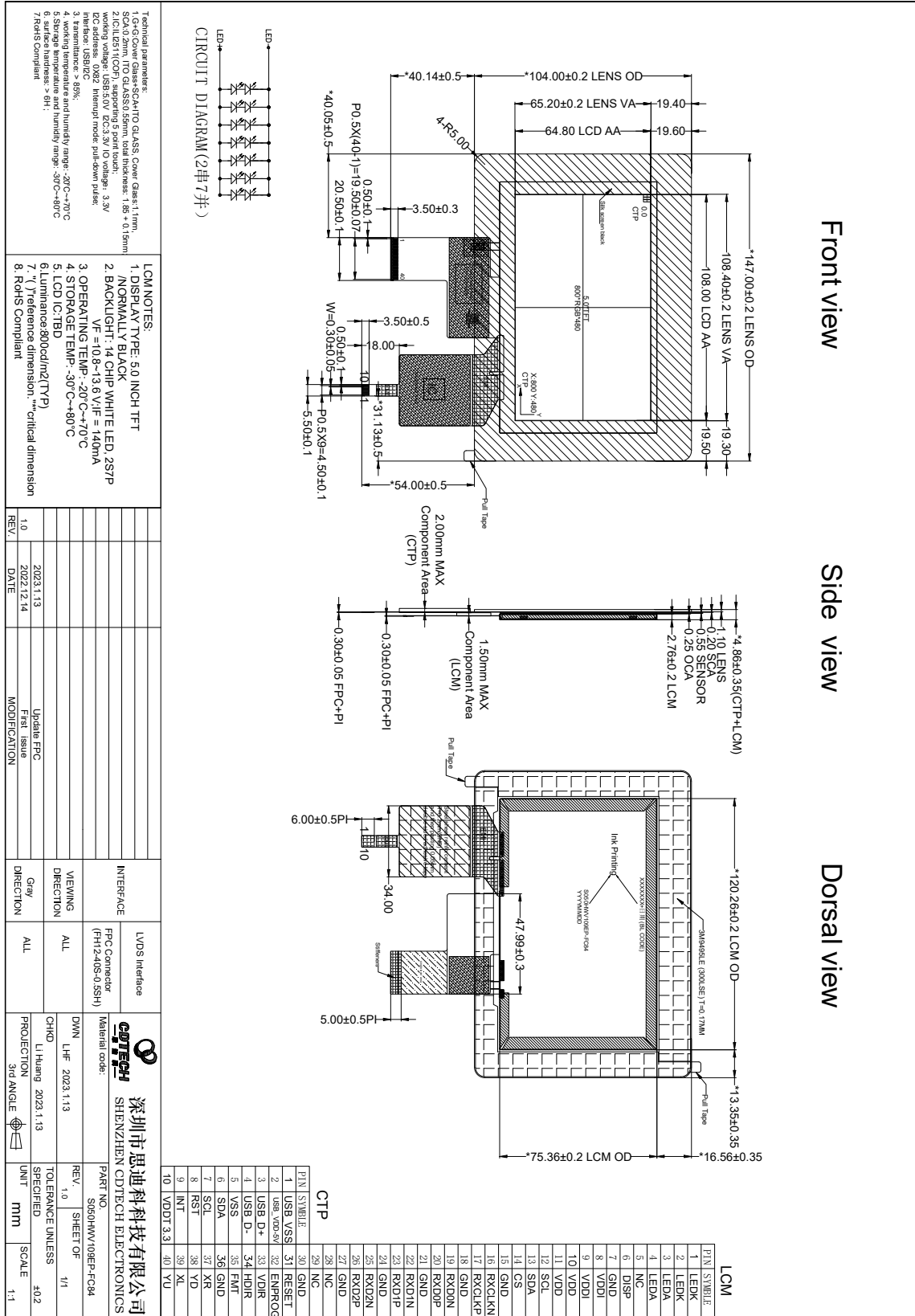
## 7. Reliability Test Items

| Test Item                             | Test Conditions                                                                                     |
|---------------------------------------|-----------------------------------------------------------------------------------------------------|
| High Temperature Storage              | Ta= +80℃ 96hrs                                                                                      |
| Low Temperature Storage               | Ta= -30℃ 96hrs                                                                                      |
| High Temperature Operation            | Ta= +70℃ 96hrs                                                                                      |
| Low Temperature Operation             | Ta= -20℃ 96hrs                                                                                      |
| High Temperature and Humidity Storage | Ta= +60℃, 90% RH 96hrs                                                                              |
| Thermal Shock<br>(Non-operation)      | -30℃/30 min ~ +80℃/30 min for 20 cycles<br>Start with cold temperature<br>end with high temperature |
| Electro Static Discharge              | Contact = ± 4 kV, class B<br>Air = ± 8 kV, class B<br>R=330Ω,C=150pF                                |
| Vibration                             | Sweep: 10Hz~55Hz~10Hz<br>Stroke: 1.5mm<br>2 hrs for each direction of X .Y. Z.                      |
| Mechanical Shock                      | 60G 6ms,±X,±Y,±Z<br>3 times for each direction                                                      |
| Package Drop Test                     | Height: 60 cm<br>1 corner, 3 edges, 6 surfaces                                                      |

Notes: The test result shall be evaluated after the sample has been left at room temperature and humidity for 2 hours without load. No condensation shall be accepted. The sample will not be accepted if appear these defects:

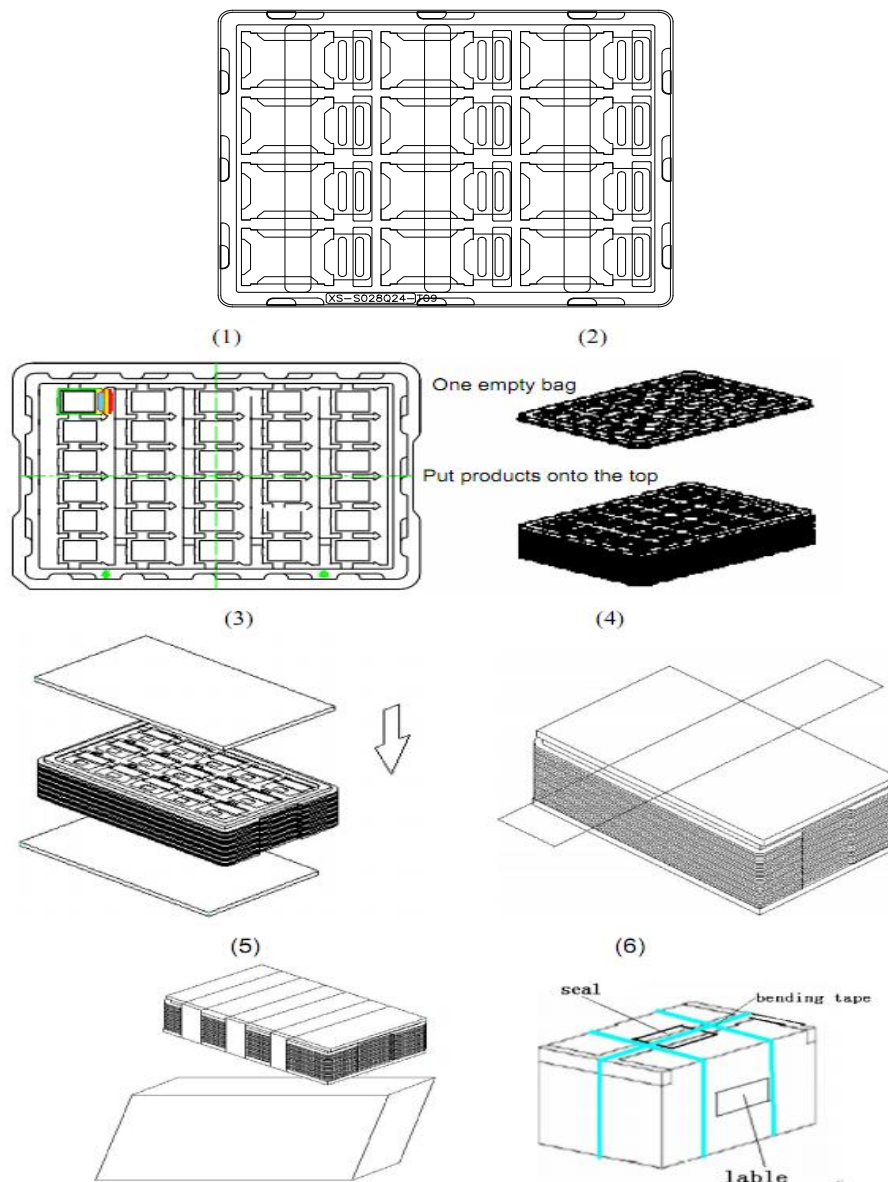
- 1). Air bubble in the LCD
- 2). Seal leak or Glass crack
- 3). Non display or abnormal display
- 4). Brightness reduction >50%

## 8. Mechanical Drawing



## 9. Packing

### Packing Method



Steps:

1. Put module into tray cavity
2. Tray stacking
3. Put 1 cardboard under the tray stack and 1 cardboard above
4. Fix the cardboard to the tray stack with adhesive tape
5. Put the tray stack into carton
6. Carton sealing with adhesive tape

## **10. Precautions for Use of LCD modules**

### **10.1 Handling Precautions**

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

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

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

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

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

- Isopropyl alcohol
- Ethyl alcohol

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

- Water
- Ketene
- Aromatic solvents

10.1.6. Do not attempt to disassemble the LCD Module.

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

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

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

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

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

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

### **10.2 Storage Precautions**

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

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

Temperature : 0℃ ~40℃    Relatively humidity: ≤80%

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

### **10.3 Transportation Precautions**

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