



# 深圳市思迪科科技有限公司

## SHENZHEN CDTECH ELECTRONICS

### Product Specification

|                    |                                  |
|--------------------|----------------------------------|
| <b>Model Name</b>  | S070HWX93HN                      |
| <b>Description</b> | 280(RGB)x1424 Dots<br>7" TFT LCD |
| <b>Date</b>        | 2021/08/31                       |
| <b>Revision</b>    | 2.0                              |

|                             |                          |                             |
|-----------------------------|--------------------------|-----------------------------|
| <b>Approved<br/>by/Date</b> | <b>Check<br/>by/Date</b> | <b>Prepared<br/>by/Date</b> |
| ZHP 2021/08/31              | HL 2021/08/13            | ZWF 2021/08/31              |

|                          |  |
|--------------------------|--|
| <b>Customer Approval</b> |  |
|                          |  |
| <b>Date</b>              |  |



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## SHENZHEN CDTECH ELECTRONICS

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## SHENZHEN CDTECH ELECTRONICS

### 1. Record of Revision

| Rev | Issued Date | Description       | Editor |
|-----|-------------|-------------------|--------|
| 1.0 | 2021/08/13  | First Release.    | ZWF    |
| 2.0 | 2021/08/31  | Update brightness | ZWF    |
|     |             |                   |        |
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|     |             |                   |        |

## 2 General Specifications

| Feature         |                                | Spec                           |
|-----------------|--------------------------------|--------------------------------|
| Characteristics | Size                           | 7 inch                         |
|                 | Resolution                     | 280(Horizontal)*1424(Vertical) |
|                 | Interface                      | MIPI                           |
|                 | Connect type                   | Connector                      |
|                 | Color Depth                    | 16.7M                          |
|                 | Technology type                | a-Si                           |
|                 | Display Spec. Pixel pitch (mm) | 0.12(H)*0.12(V)                |
|                 | Pixel Configuration            | R.G.B. Vertical Stripe         |
|                 | Display Mode                   | Normally Black                 |
|                 | Driver IC                      | OTA7290B                       |
|                 | CTP Driver IC                  | -                              |
|                 | Viewing Direction              | full view                      |
| Mechanical      | LCM (W x H x D) (mm)           | 38.20(W)*186.62(H)*3.50 (D)    |
|                 | Active Area(mm)                | 33.60(H)x 170.88(V)            |
|                 | With /Without TSP              | Without CTP                    |
|                 | Weight (g)                     | TBD                            |
|                 | LED Numbers                    | 16 LEDs                        |

Note 1: Viewing direction is follow the data which measured by optics equipment.

Note 2: Requirements on Environmental Protection: RoHS

Note 3: LCM weight tolerance: +/- 5%

### 3 Input/Output Terminals

#### LCD PIN-MAP

| No    | Symbol   | Description                      |
|-------|----------|----------------------------------|
| 1     | GND      | GROUND                           |
| 2     | MIPI_3N  | MIPI Negative data signal(-)     |
| 3     | MIPI_3P  | MIPI Positive data signal(+)     |
| 4     | GND      | GROUND                           |
| 5     | MIPI_D2N | MIPI Negative data signal(-)     |
| 6     | MIPI_D2P | MIPI Positive data signal(+)     |
| 7     | GND      | GROUND                           |
| 8     | MIPI_CKN | MIPI Negative clock signal(-)    |
| 9     | MIPI_CKP | MIPI Positive clock signal(+)    |
| 10    | GND      | GROUND                           |
| 11    | MIPI_D1N | MIPI Negative data signal(-)     |
| 12    | MIPI_D1P | MIPI Positive data signal(+)     |
| 13    | GND      | GROUND                           |
| 14    | MIPI_D0N | MIPI Negative data signal(-)     |
| 15    | MIPI_D0P | MIPI Positive data signal(+)     |
| 16    | GND      | GROUND                           |
| 17    | GND      | GROUND                           |
| 18    | TE       | Sync signal for touch panel      |
| 19    | RESET    | Device reset signal              |
| 20    | GND      | GROUND                           |
| 21-23 | VCI      | Power supply for logic operation |
| 24    | GND      | GROUND                           |
| 25-26 | NC       | No connect                       |
| 27-28 | LEDK     | LED Cathode                      |
| 29-30 | LEDA     | LED anode                        |

## 4 Absolute Maximum Ratings

| Item                  | Symbol | MIN  | Typ | MAX | Unit | Remark |
|-----------------------|--------|------|-----|-----|------|--------|
| Supply Voltage        | VDD    | -0.3 | -   | 5.0 | V    | -      |
| Operating Temperature | TOPR   | -20  | -   | 70  | °C   | -      |
| Storage Temperature   | TSTG   | -30  | -   | 80  | °C   |        |

## 5 Electrical Characteristics

### 5.1 Driving TFT LCD Panel

| Item                   | Symbol | MIN    | Typ | MAX    | Unit | Remark |
|------------------------|--------|--------|-----|--------|------|--------|
| Supply Voltage         | VCI    | 3.0    | 3.3 | 3.6    | V    | -      |
| Input voltage “H”level | VIH    | 0.7VDD | -   | VDD    | V    | -      |
| Input voltage “L”level | VIL    | 0      | -   | 0.3VDD | V    |        |

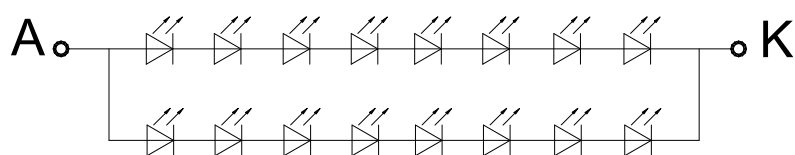
### 5.2 Driving Backlight

| Item                        | Symbol   | MIN   | TYP   | MAX  | Unit | Remark |
|-----------------------------|----------|-------|-------|------|------|--------|
| Forward Current             | $I_F$    | -     | 40    | -    | mA   |        |
| Forward Voltage             | $V_F$    | 21.6  |       | 27.2 | V    |        |
| Backlight Power consumption | $W_{BL}$ | 0.864 |       | 1.09 | W    |        |
| LED Lifetime                |          | -     | 50000 | -    | Hrs  |        |

Note 1: Each LED :  $I_F = 20\text{ mA}$ ,  $V_F = 2.7 \sim 3.4\text{V}$ .

Note 2: Optical performance should be evaluated at  $T_a = 25^\circ\text{C}$  only.

Note 3: If LED is driven by high current, high ambient temperature & humidity condition. The life time of LED will be reduced. Operating life means brightness goes down to 50% initial brightness. Typical operating life time is estimated data.



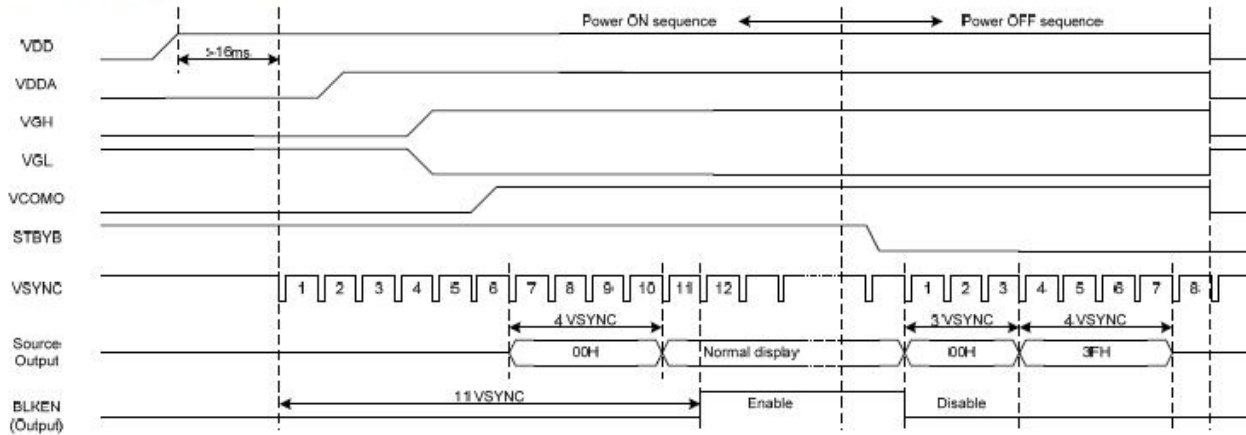
$I_f = 40\text{mA}$  ,  $V = 21.6 \sim 27.2\text{V}$

Figure : LED connection of backlight

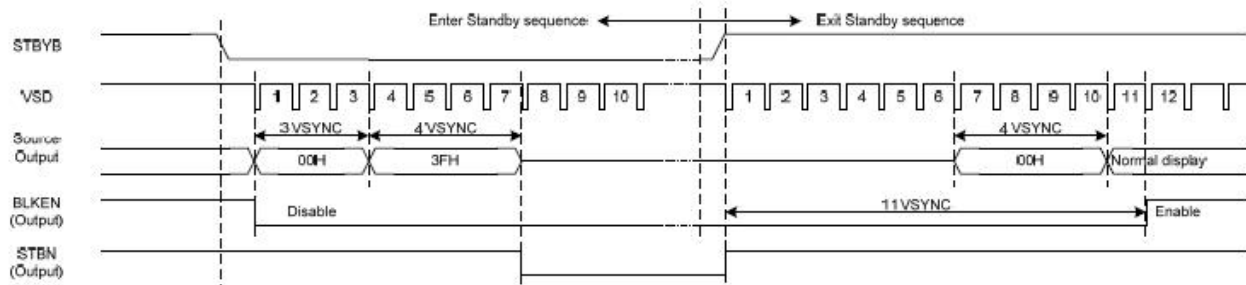
### 5.3 POWER ON/OFF SEQUENCE

In order to prevent IC from power on reset fail, the rising time ( $T_{POR}$ ) of the digital power supply VDD should be maintained within the given specifications. Refer to "AC Characteristics" for more detail on timing.

Power-On/Off Timing Sequence:

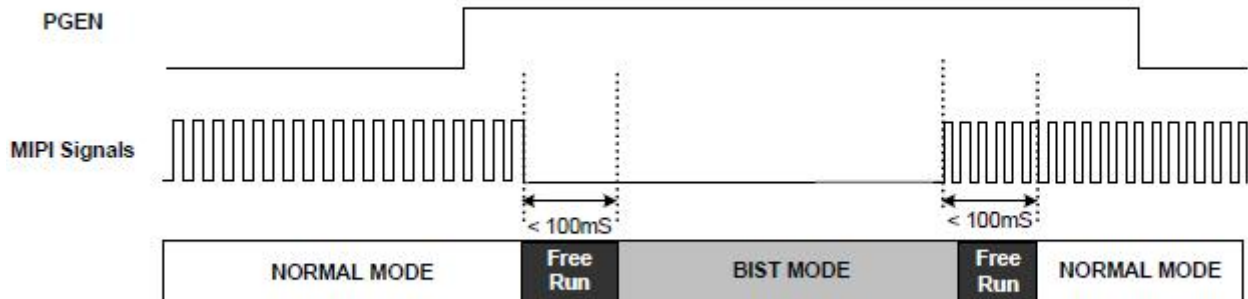
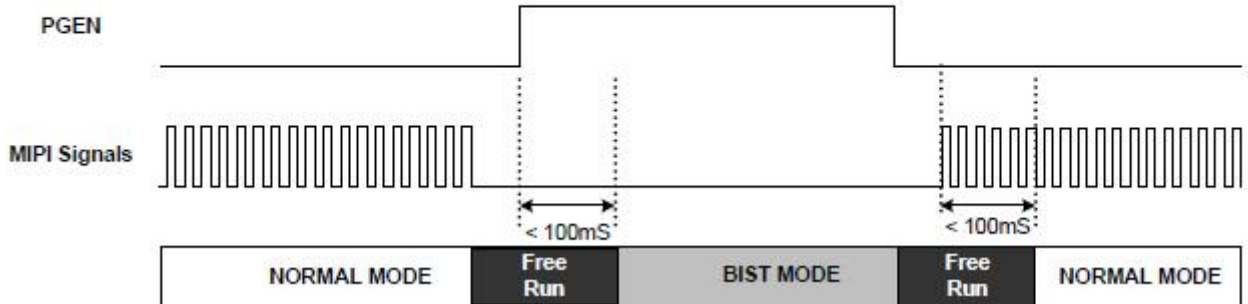


Enter and Exit Standby Mode Sequence:



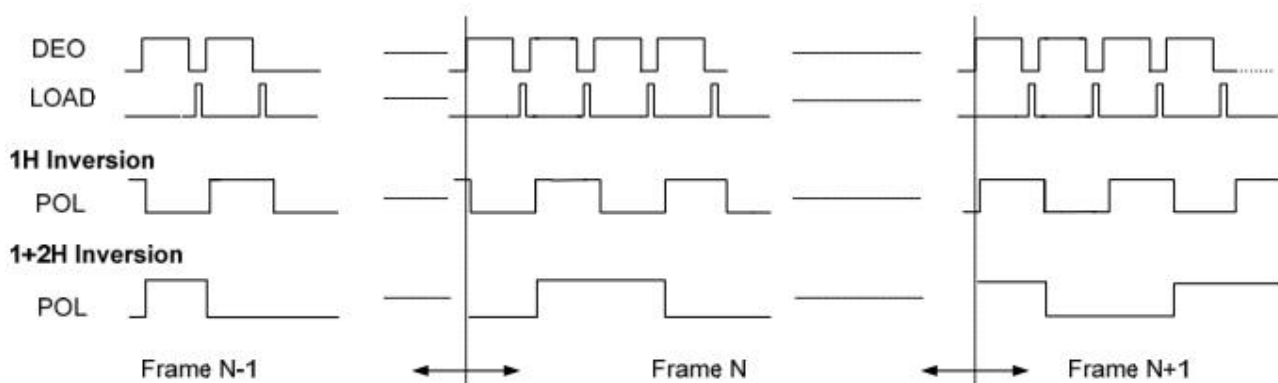
### 5.4 RESET TIMING CHARACTERISTICS

#### BIST Timing

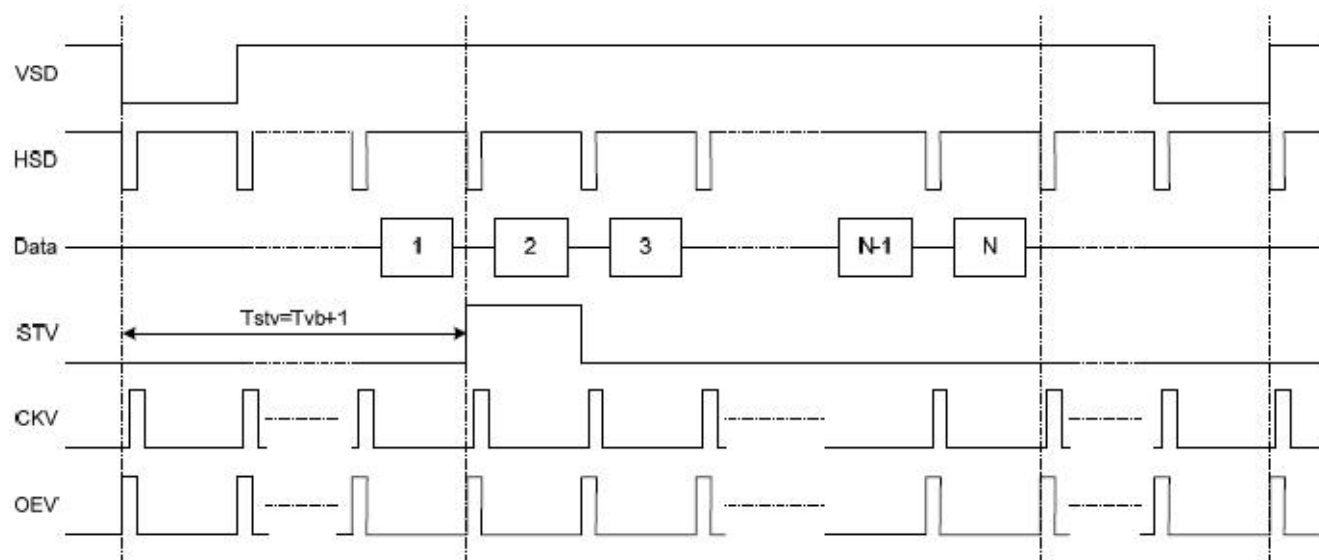


#### TCON Timing

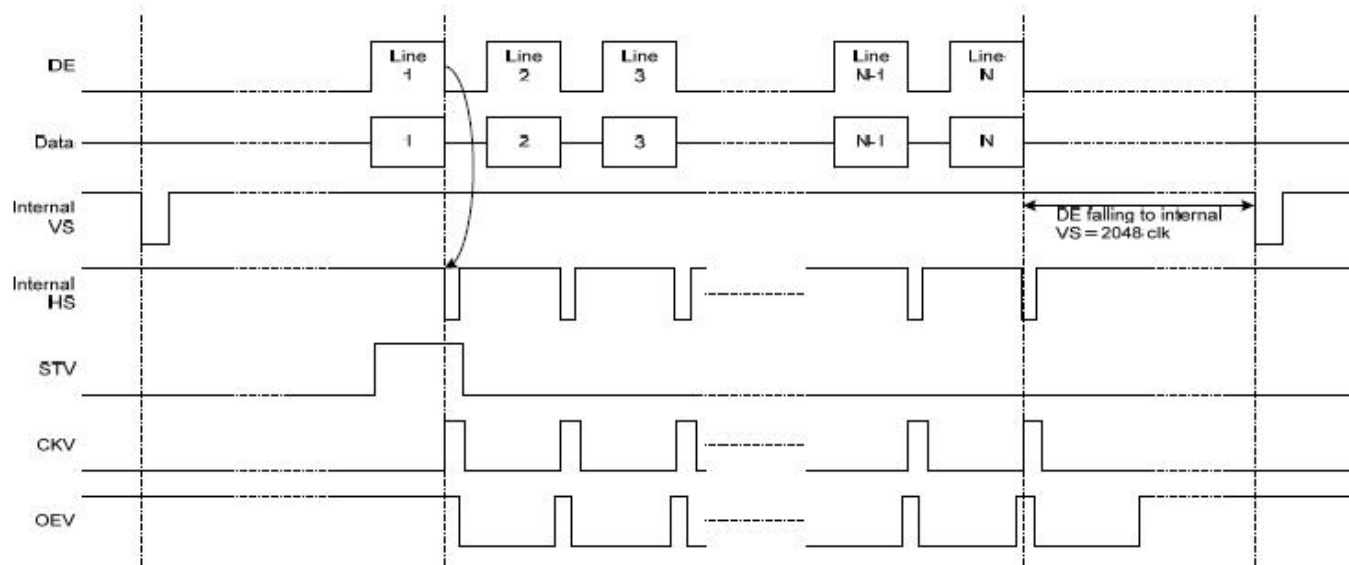
##### Polarity Control



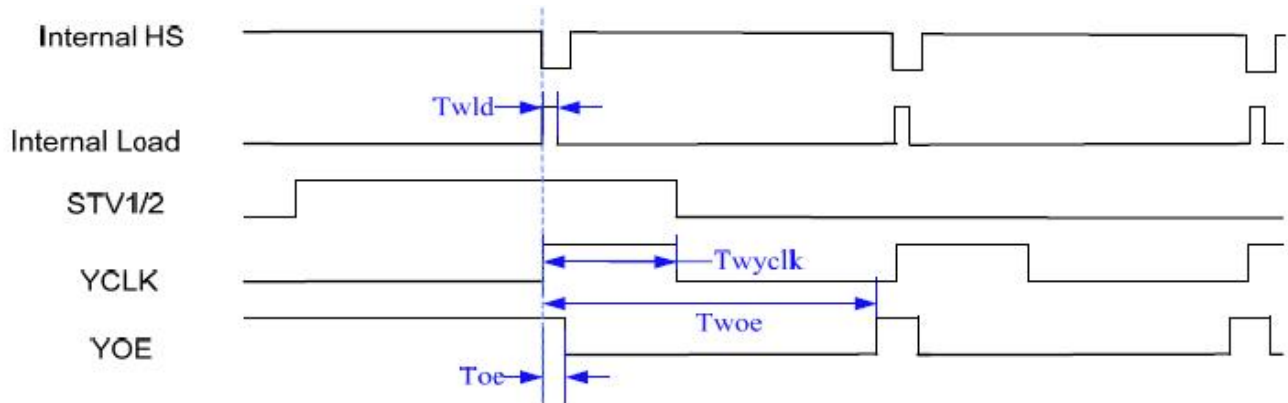
### Vertical Timing Diagram HV (Cascade)



### Vertical Timing Diagram DE (Cascade)



Gate output timing diagram (Cascade)



### MIPI DC Characteristics

#### HS Receiver DC Specification

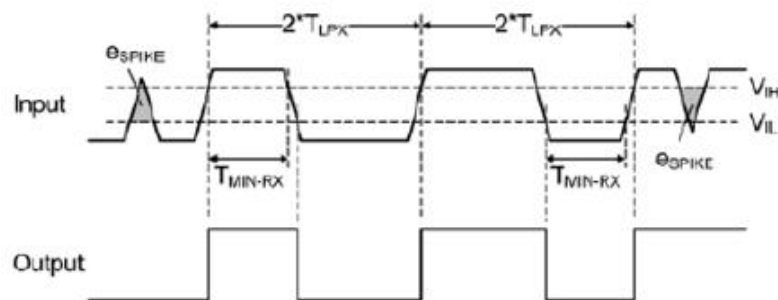
| Parameter                                         | Symbol                 | Rating  |     |         | Unit | Note                                                                                                                                                                                                                              |
|---------------------------------------------------|------------------------|---------|-----|---------|------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                   |                        | Min     | Typ | Max     |      |                                                                                                                                                                                                                                   |
| Operation Voltage                                 | VDD                    | 1.5-10% | 1.5 | 1.5+10% | mV   |                                                                                                                                                                                                                                   |
| Differential Input Voltage                        | VID                    | 70      | 200 | 260     | mV   |                                                                                                                                                                                                                                   |
| Common Mode Voltage                               | V <sub>CMRX(DC)</sub>  | 70      | -   | 330     | mV   |                                                                                                                                                                                                                                   |
| Differential Input High Threshold Voltage         | V <sub>TH</sub>        | -       | -   | 70      | mV   |                                                                                                                                                                                                                                   |
| Differential Input Low Threshold Voltage          | V <sub>TL</sub>        | -70     | -   | -       | mV   |                                                                                                                                                                                                                                   |
| Singled-ended input high voltage                  | V <sub>IHS</sub>       | -       | -   | 460     | mV   |                                                                                                                                                                                                                                   |
| Singled-ended input low voltage                   | V <sub>ILHS</sub>      | -40     | -   | -       | mV   |                                                                                                                                                                                                                                   |
| Singled-ended threshold for HS termination enable | V <sub>TERM-EN</sub>   | -       | -   | 450     | mV   |                                                                                                                                                                                                                                   |
| Differential input impedance                      | Z <sub>ID</sub>        | 80      | 100 | 125     | ohm  |                                                                                                                                                                                                                                   |
| Pin leakage current                               | I <sub>LEAK</sub>      | -10     | -   | 10      | uA   |                                                                                                                                                                                                                                   |
| Common-mode interference beyond 450MHz            | ΔV <sub>CMRX(HF)</sub> | -       | -   | 100     | mV   |                                                                                                                                                                                                                                   |
| Common-mode interference 50MHz - 450MHz           | ΔV <sub>CMRX(LF)</sub> | -50     | -   | 50      | mV   |                                                                                                                                                                                                                                   |
| Common-mode termination                           | C <sub>CM</sub>        | -       | -   | 60      | pF   |                                                                                                                                                                                                                                   |
| Embedded Termination                              | R <sub>T</sub>         | 90      | 100 | 110     | ohm  | 2bits RT_SEL[1: 0] for termination resistor selection<br>00 → 200ohm<br>10 , 01 → 150ohm<br>11 → 100ohm (default)<br><br>1bit ERMEN for termination resistor enable<br>TERMEN=0, termr disable R=(OPEN)<br>TERMEN=1, termr enable |

#### Note:

- (1) Excluding possible additional RF interference of 100mV peak sine wave beyond 450MHz.
- (2) This table value includes a ground difference of 50mV between the transmitter and the receiver, the static common-mode level tolerance and variations below 450MHz.

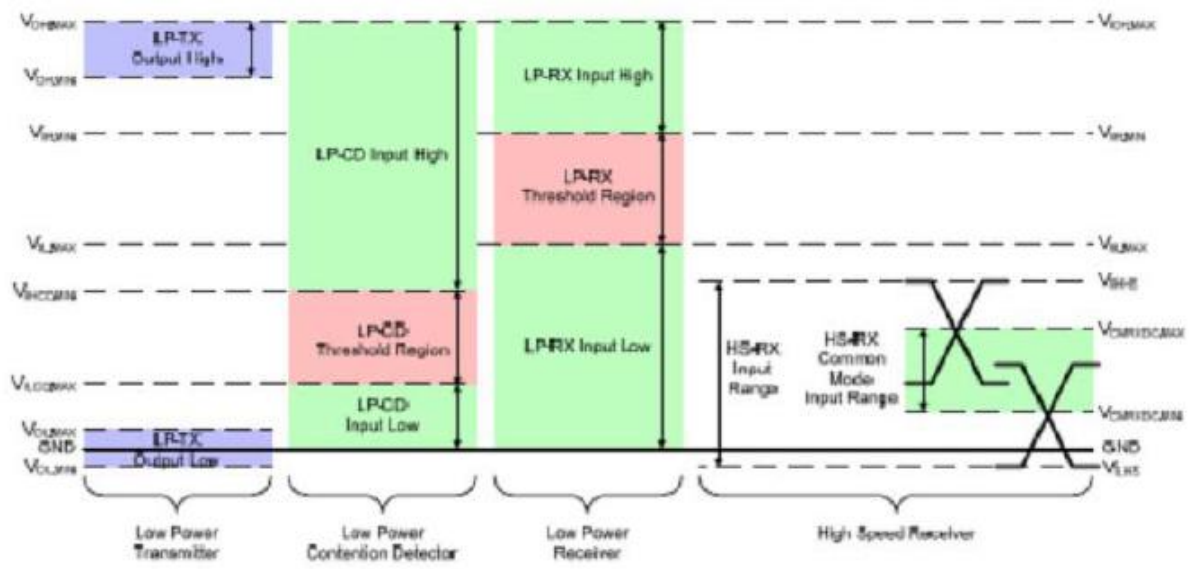
### LP Receiver DC Specification

| Parameter                               | Symbol     | Rating |     |     | Unit | Note |
|-----------------------------------------|------------|--------|-----|-----|------|------|
|                                         |            | Min    | Typ | Max |      |      |
| Logic 1 input voltage                   | $V_{IH}$   | 880    | -   | -   | mV   |      |
| Logic 0 input voltage, not in ULP State | $V_{IL}$   | -      | -   | 550 | mV   |      |
| Input hysteresis                        | $V_{HYST}$ | 25     | -   | -   | mV   |      |



### Line Contention Detection

| Parameter                    | Symbol     | Rating |     |     | Unit | Note |
|------------------------------|------------|--------|-----|-----|------|------|
|                              |            | Min    | Typ | Max |      |      |
| Logic 1 contention threshold | $V_{IHCD}$ | 450    | -   | -   | mV   |      |
| Logic 0 contention threshold | $V_{ILCD}$ | -      | -   | 200 | mV   |      |



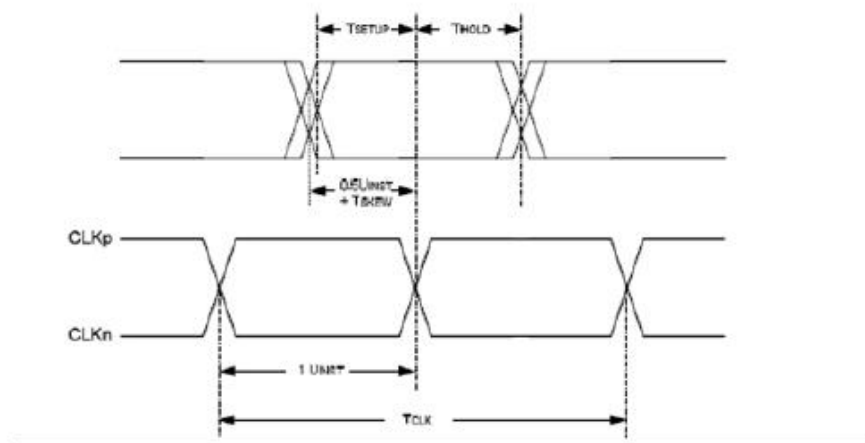
### MIPI AC Characteristics

#### HS Receiver AC Timing Characteristics

| Parameter                              | Symbol                | Rating |     |               | Unit       | Note                                                                                            |
|----------------------------------------|-----------------------|--------|-----|---------------|------------|-------------------------------------------------------------------------------------------------|
|                                        |                       | Min    | Typ | Max           |            |                                                                                                 |
| Bandwidth per lane                     | -                     | -      | -   | 1000          | Mbps       | Bandwidth selected by register 'speedup'<br>Speedup=0 → Max=550Mbps<br>Speedup=1 → Max=1000Mbps |
| Operation frequency                    | -                     | -      | -   | 500           | MHz        |                                                                                                 |
| UI instantaneous                       | $U_{INST}$            | 1      | -   | 12.5          | ns         | 1                                                                                               |
| Data to Clock Skew                     | $T_{skew}$            | -0.15  | -   | 0.15          | $U_{INST}$ |                                                                                                 |
| Inter-lane static skew                 | $T_{skew-lane}$       | -      | -   | $U_{INST}/50$ | $U_{INST}$ |                                                                                                 |
| Data to Clock Setup Time               | $T_{SETUP}$           | 0.25   | -   | -             | $U_{INST}$ | 2                                                                                               |
| Data to Clock Hold Time                | $T_{HOLD}$            | 0.25   | -   | -             | $U_{INST}$ |                                                                                                 |
| Common-mode interference beyond 450MHz | $\Delta V_{CMRX(HF)}$ | -      | -   | 100           | mV         | 4                                                                                               |
| Common-mode interference 50MHz- 450MHz | $\Delta V_{CMRX(LF)}$ | -50    | -   | 50            | mV         | 3,6                                                                                             |
| Common-mode termination                | $C_{CM}$              | -      | -   | 60            | pF         | 5                                                                                               |

Note:

- (1) Total silicon and package delay budget of  $0.3 \cdot U_{INST}$
- (2) Total setup and hold window for receiver of  $0.3 \cdot U_{INST}$
- (3) Excluding 'static' ground shift of 50mV
- (4)  $\Delta V_{CMRX(HF)}$  is the peak amplitude of a sine wave superimposed on the receiver input
- (5) For higher bit rates a 14pF capacitor will be needed to meet the common-mode return loss specification.
- (6) Voltage difference compared to the DC average common-mode potential.



## 6 Optical Characteristics

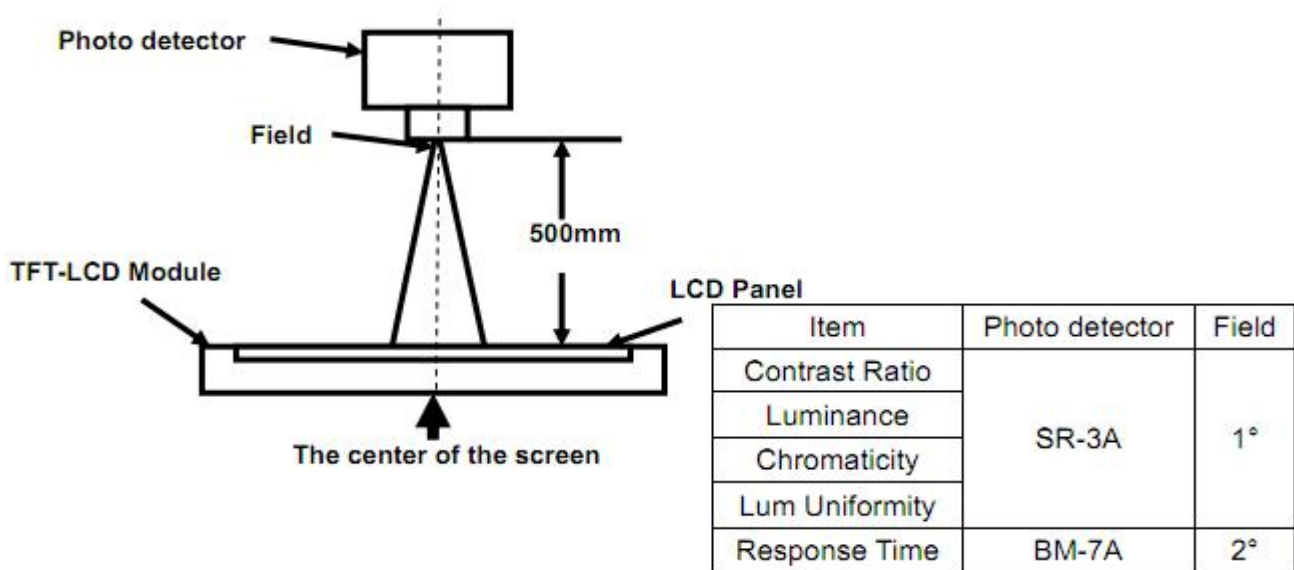
| Items                |       | Symbol           | Condition          | Min.  | Typ.  | Max.  | Unit    | Remark          |
|----------------------|-------|------------------|--------------------|-------|-------|-------|---------|-----------------|
| Viewing angles       |       | $\theta_T$       | Center<br>CR≥10    | 75    | 80    | -     | Degree. | Note2           |
|                      |       | $\theta_B$       |                    | 75    | 80    | -     |         |                 |
|                      |       | $\theta_L$       |                    | 75    | 80    | -     |         |                 |
|                      |       | $\theta_R$       |                    | 75    | 80    | -     |         |                 |
| Contrast Ratio       |       | CR               | $\Theta =0$        | 800   | 1000  | -     | -       | Note1,<br>Note3 |
| Response Time        |       | T <sub>ON</sub>  | 25°C               | -     | 30    | 40    | ms      | Note1,<br>Note4 |
|                      |       | T <sub>OFF</sub> |                    |       |       |       |         |                 |
| Chromaticity         | White | X <sub>W</sub>   | Backlight<br>is on | TBD   | TBD   | TBD   | -       | Note1,<br>Note5 |
|                      |       | Y <sub>W</sub>   |                    | TBD   | TBD   | TBD   | -       |                 |
|                      | Red   | X <sub>R</sub>   |                    | 0.594 | 0.644 | 0.694 | -       |                 |
|                      |       | Y <sub>R</sub>   |                    | 0.282 | 0.332 | 0.382 | -       |                 |
|                      | Green | X <sub>G</sub>   |                    | 0.274 | 0.324 | 0.374 | -       |                 |
|                      |       | Y <sub>G</sub>   |                    | 0.516 | 0.566 | 0.612 | -       |                 |
|                      | Blue  | X <sub>B</sub>   |                    | 0.087 | 0.137 | 0.187 | -       |                 |
|                      |       | Y <sub>B</sub>   |                    | 0.075 | 0.125 | 0.175 | -       |                 |
| Luminance Uniformity |       | LU               |                    | 70    | 75    | -     | %       | Note1,<br>Note6 |
| Luminance            |       | L                |                    | 450   | 550   |       | cd/m2   | Note1,<br>Note7 |

Test Conditions:

1. IF= 20mA(one channel),the ambient temperature is 25°C.
2. The test systems refer to Note 1 and Note 2.

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).

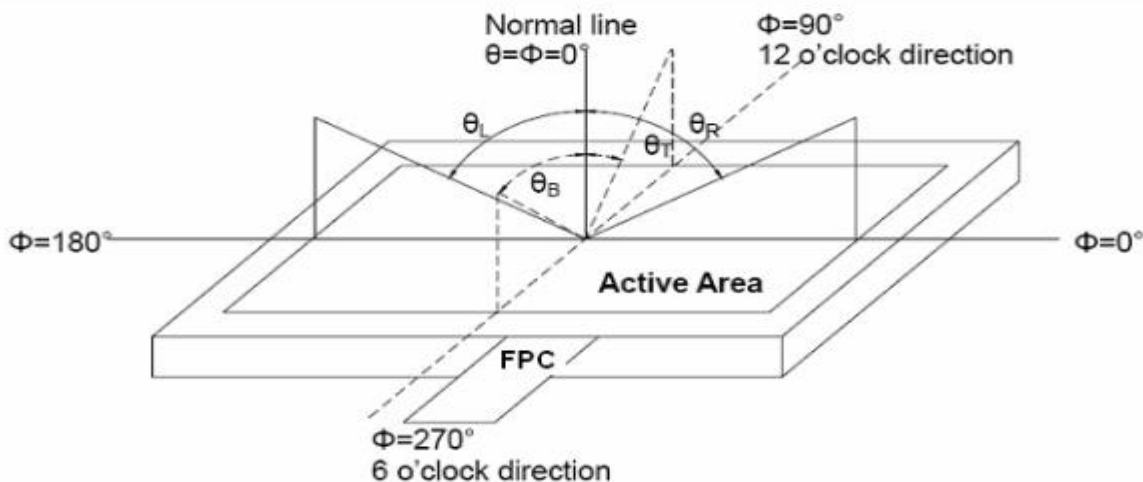


Fig. 1 Definition of viewing angle

Note 3: Definition of contrast ratio

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

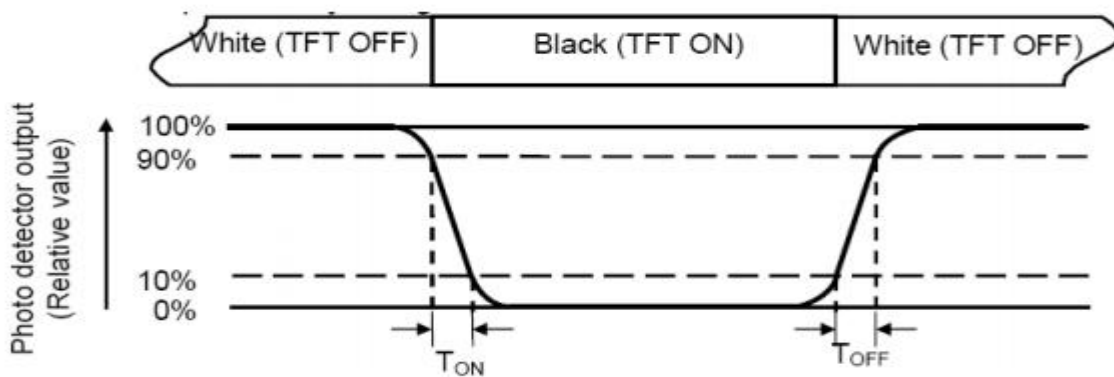
“White state”: The state is that the LCD should driven by  $V_{white}$ .

“Black state”: The state is that the LCD should driven by  $V_{black}$ .

$V_{white}$ : To be determined       $V_{black}$ : To be determined.

#### Note 4: Definition of Response time

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

Active area is divided into 9 measuring areas (Refer Fig. 2). Every measuring point is placed at the center of each measuring area.

$$\text{Luminance Uniformity}(U) = L_{min} / L_{max} \times 100\%$$

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

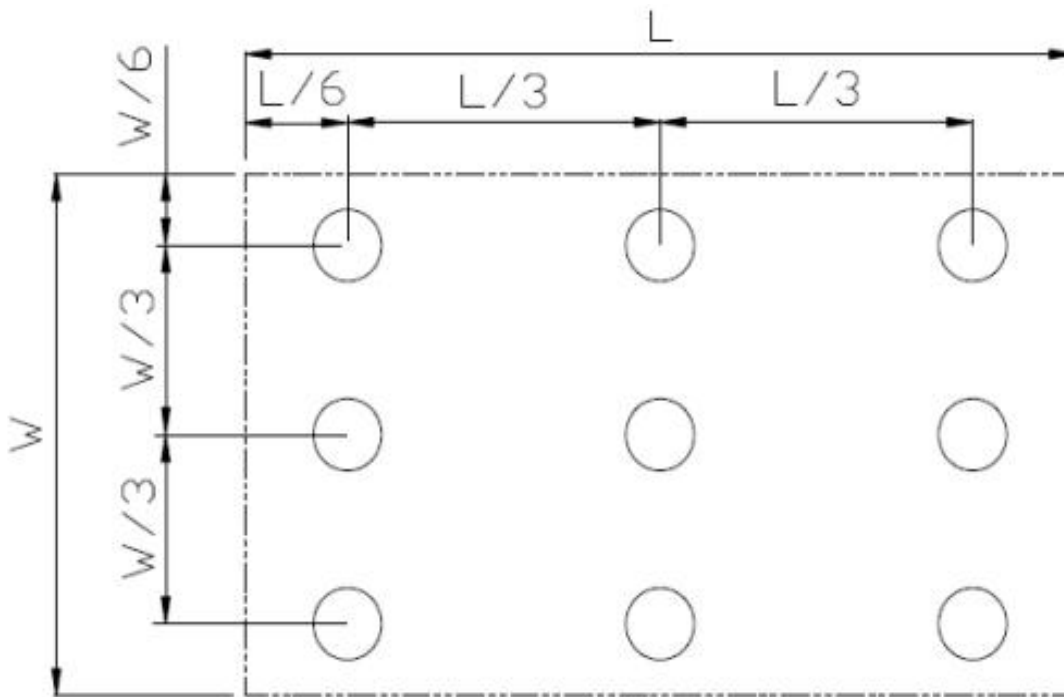


Fig. 2 Definition of uniformity

Lmax: The measured maximum luminance of all measurement position.

Lmin: The measured minimum luminance of all measurement position.

Note 7: Definition of Luminance :

Measure the luminance of white state at center point.

## 7 Environmental / Reliability Tests

| No | Test Item                             | Condition                                                                                                                                   | Remarks                                                                                            |
|----|---------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|
| 1  | High Temperature Operation            | Ts= +70℃, 96hrs                                                                                                                             | IEC60068-2-1:2007<br>GB2423. 2-2008                                                                |
| 2  | Low Temperature Operation             | Ta= -20℃, 96hrs                                                                                                                             | IEC60068-2-1:2007<br>GB2423.1-2008                                                                 |
| 3  | High Temperature Storage              | Ta= +80℃, 96hrs                                                                                                                             | IEC60068-2-1:2007<br>GB2423. 2-2008                                                                |
| 4  | Low Temperature Storage               | Ta= -30℃, 96hrs                                                                                                                             | IEC60068-2-1:2007<br>GB2423.1-2008                                                                 |
| 5  | High Temperature & Humidity Operation | Ta= +60℃, 90% RH max, 240 hours                                                                                                             | IEC60068-2-78:2001<br>GB/T2423.3-2006                                                              |
| 6  | Thermal Shock (Non-operation)         | -30℃ 30 min ~ +80℃ 30 min<br>Change time: 5min, 20 Cycle                                                                                    | Start with cold temperature,<br>end with high temperature<br>IEC60068-2-14:1984,<br>GB2423.22-2002 |
| 7  | ESD                                   | C=150pF, R=330 Ω,<br>5 points/panel ,<br>Air:±8KV, 5 times<br>Contact: ±4KV, 5 times<br>(Environment: 15℃ ~ 35℃, 30% ~ 60%, 86Kpa ~ 106Kpa) | IEC61000-4-2:2001<br>GB/T17626.2-2006                                                              |
| 8  | Vibration (Non-operation)             | Frequency range: 10~55Hz,<br>Stroke: 1.5mm ,<br>Sweep: 10Hz~55Hz~10Hz<br>2 hours for each direction of X .Y. Z.<br>(6 hours for total)      | IEC60068-2-6:1982<br>GB/T2423.10-1995                                                              |
| 9  | Mechanical Shock (Non-operation)      | Half Sine Wave<br>60G ,6ms,±X,±Y,±Z<br>3times for each direction                                                                            | IEC60068-2-27:1987<br>GB/T2423.5—1995                                                              |
| 10 | Package Drop Test                     | Height: 60 cm,<br>1 corner, 3 edges, 6 surfaces                                                                                             | IEC60068-2-32:1990<br>GB/T2423.8-1995                                                              |



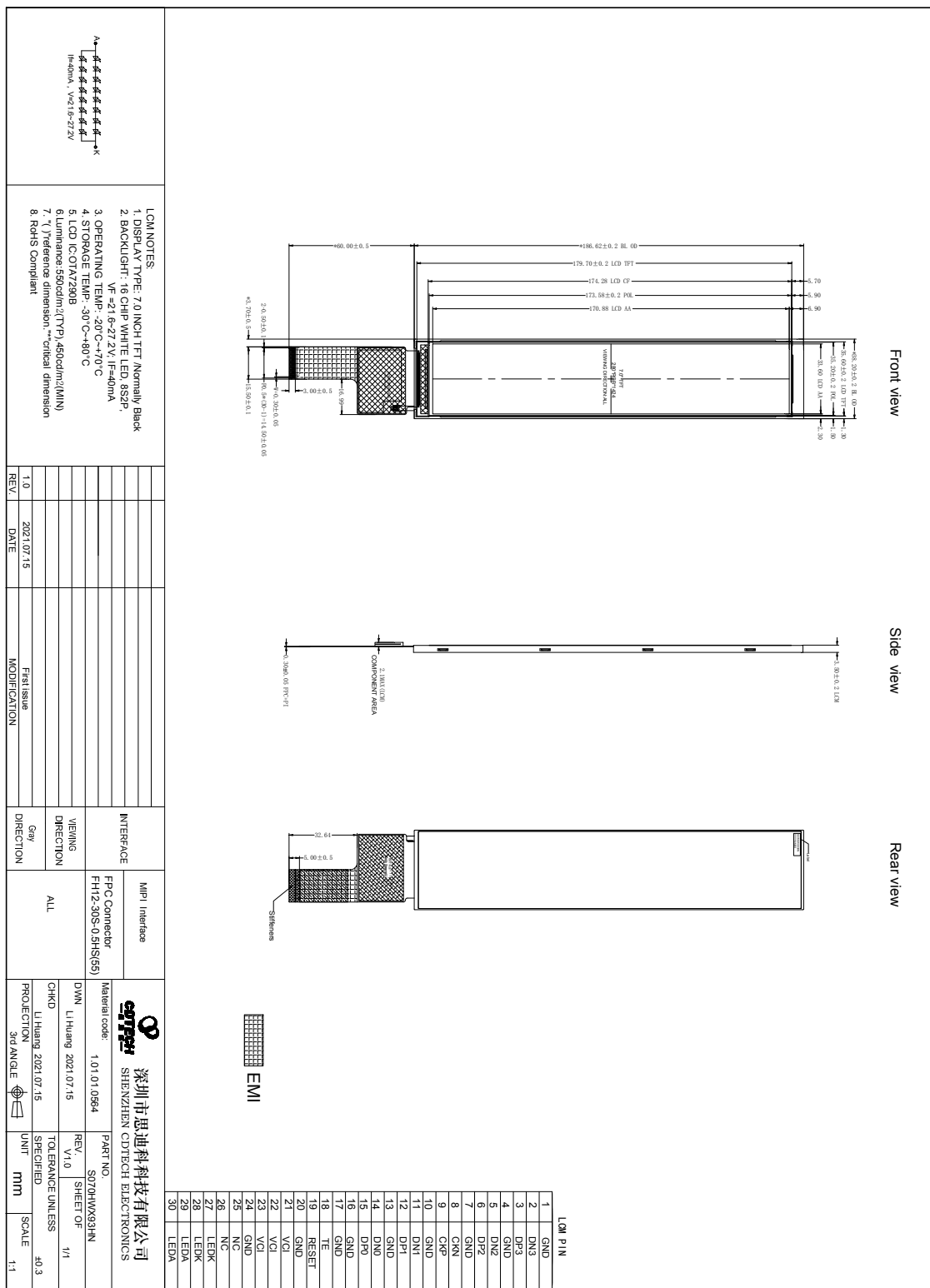
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## SHENZHEN CDTECH ELECTRONICS

### Notes:

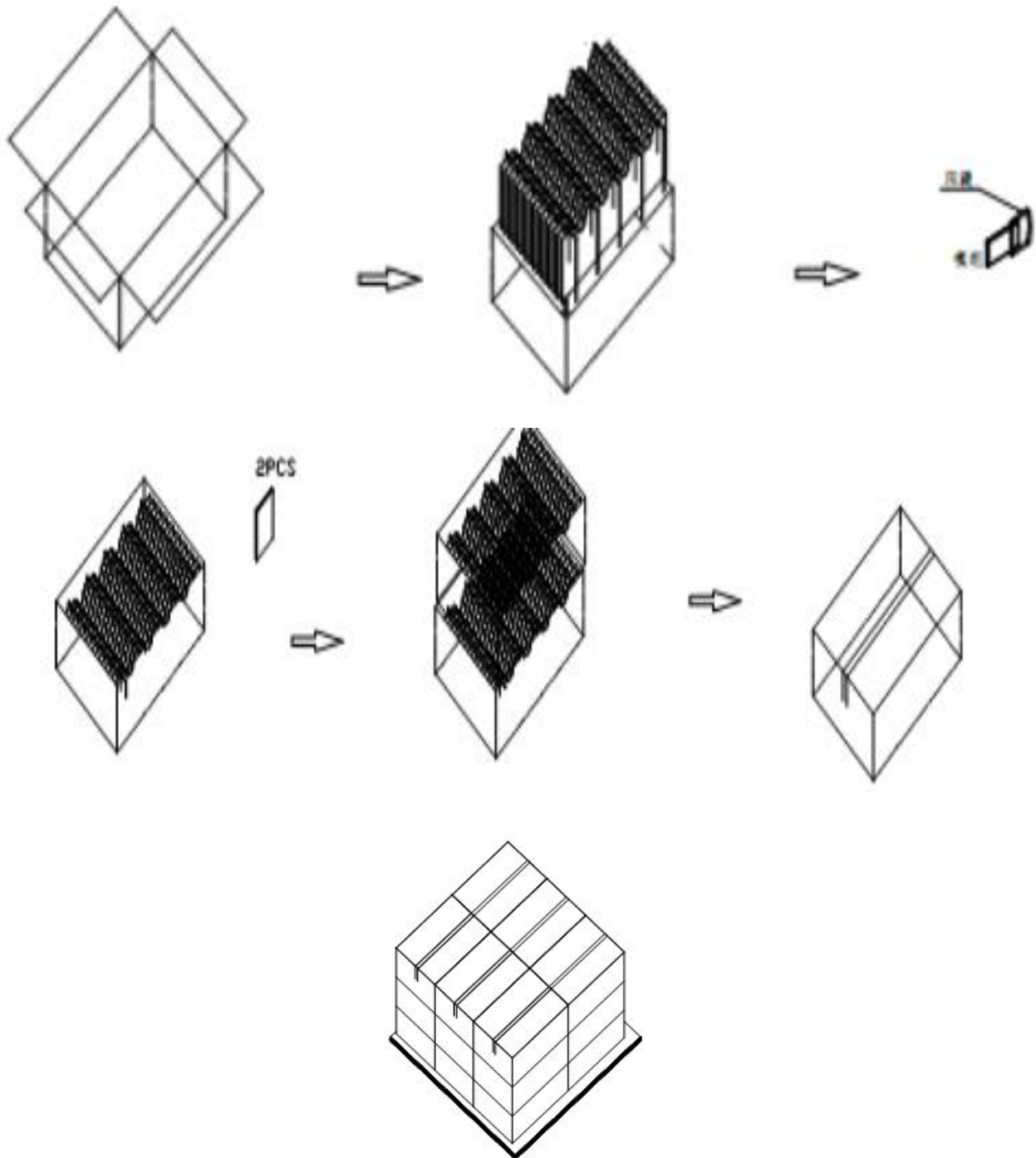
1. The test result shall be evaluated after the sample has been left at room temperature and humidity for 2 hours without load. No condensation shall be accepted. The sample will not be accepted if appear these defects:
  - 1).Air bubble in the LCD;
  - 2).Seal leak
  - 3).Non-display
  - 4).missing segments
  - 5).Glass crack
  - 6).CR reduction >40%
  - 7).IDD increase >100%
  - 8).Brightness reduction >50%
  - 9).Color coordinate tolerance >0.05
2.  $\leq 7.0$  inch: The size of sample is 5pcs;  
     $> 7.0$  inch: The size of sample is 2pcs;
3. One test sample must complete each test item;
4. In case of malfunction defect caused by ESD damage, if it would be recovered to normal state after resetting, it would be judge as a good part.
5. In the test of High Temperature Operation and High Temperature & Humidity Operation ,the operation temperature is the surface temperature of module.

## 8 Mechanical Drawing



## 9 Packing

### Packing Method



## 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

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.



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## 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.