

## Product Specification

|                    |                                |
|--------------------|--------------------------------|
| <b>Model Name</b>  | S050BWV44HS                    |
| <b>Description</b> | 5.0" WVGA<br>800(RGB)x480 Dots |
| <b>Date</b>        | 2021/04/26                     |
| <b>Version</b>     | 1.0                            |

|                             |                          |                             |
|-----------------------------|--------------------------|-----------------------------|
| <b>Approved<br/>by/Date</b> | <b>Check<br/>by/Date</b> | <b>Prepared<br/>by/Date</b> |
| ZHP 2021/04/26              | HL 2021/04/26            | ZWF 2021/04/26              |

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



# 深圳市思迪科科技有限公司

## SHENZHEN CDTECH ELECTRONICS

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## SHENZHEN CDTECH ELECTRONICS

### 1. Record of Revision

| Rev | Issued Date | Description | Editor |
|-----|-------------|-------------|--------|
| 1.0 | 2021/04/26  | First Issue | ZWF    |
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## 2. General Specifications

|                 | Feature              | Spec                          |
|-----------------|----------------------|-------------------------------|
| Characteristics | Size                 | 5 inch                        |
|                 | Resolution           | 800(horizontal)*480(Vertical) |
|                 | Interface            | RGB-24bit                     |
|                 | Connect type         | Connector                     |
|                 | Display Colors       | 16.7M                         |
|                 | Technology type      | a-Si                          |
|                 | Pixel pitch (mm)     | 0.135*0.135                   |
|                 | Pixel Configuration  | R.G.B.-Stripe                 |
|                 | Display Mode         | Normally Black                |
|                 | LCD Driver IC        | ST7262                        |
|                 | Viewing Direction    | Full view                     |
| Mechanical      | LCM (W x H x D) (mm) | 120.7*75.80*2.95              |
|                 | Active Area(mm)      | 108 x 64.80                   |
|                 | Weight (g)           | TBD                           |
|                 | LED Numbers          | 12 LEDs                       |

Note 1: Requirements on Environmental Protection: RoHs

Note 2: LCM weight tolerance: +/- 5%

### 3. Input/Output Terminals

| No.   | Symbol | Description                                                                                                                                         |
|-------|--------|-----------------------------------------------------------------------------------------------------------------------------------------------------|
| 1     | GND    | Ground                                                                                                                                              |
| 2     | VLED-  | Backlight LED Cathode                                                                                                                               |
| 3     | VLED+  | Backlight LED Anode.                                                                                                                                |
| 4     | GND    | Ground                                                                                                                                              |
| 5     | VDD    | Power supply                                                                                                                                        |
| 6-7   | GND    | Ground                                                                                                                                              |
| 8~15  | R0~R7  | Data bus                                                                                                                                            |
| 16    | GND    | Ground                                                                                                                                              |
| 17~24 | G0~G7  | Data bus                                                                                                                                            |
| 25    | GND    | Ground                                                                                                                                              |
| 26~33 | B0~B7  | Data bus                                                                                                                                            |
| 34    | GND    | Ground                                                                                                                                              |
| 35    | DCLK   | Dot clock signal input. Latching input data at its rising edge.                                                                                     |
| 36    | DISP   | Normally pulled high.<br>DISP="1": Normally operation (Default)<br>DISP="0": Timing controller, source driver will turn off ,all output are High-Z. |
| 37    | HSYNC  | Horizontal sync input. Negative polarity.                                                                                                           |
| 38    | VSNC   | Vertical sync input. Negative polarity..                                                                                                            |
| 39    | DE     | Data enable input. Active high to enable the input data bus under "DE Mode."                                                                        |
| 40    | GND    | Ground                                                                                                                                              |

### 4. Absolute Maximum Rating

| Item                  | Symbol | MIN  | Typ | MAX | Unit | Remark |
|-----------------------|--------|------|-----|-----|------|--------|
| Supply Voltage        | VDD    | -0.5 | -   | 5   | V    | -      |
| Operating Temperature | TOPR   | -30  | -   | 85  | °C   | -      |
| Storage Temperature   | TSTG   | -30  | -   | 85  | °C   | -      |

### 5. Electrical Characteristics

#### 5.1 ELECTRICAL CHARACTERISTICS

| Item                       | Symbol | Min. | Typ. | Max. | Unit | Conditions |
|----------------------------|--------|------|------|------|------|------------|
| Supply Voltage             | VDD    | 3.0  | 3.3  | 3.6  | V    |            |
| IO Supply Voltage          | VDDI   | 3.0  | -    | 3.6  | V    |            |
| Charge Pump Supply Voltage | PVDD   | 3.0  | 3.3  | 3.6  | V    |            |

#### 5.2 DC Characteristics for Digital Circuit

| Item                      | Symbol | Min.     | Typ. | Max.     | Unit | Conditions |
|---------------------------|--------|----------|------|----------|------|------------|
| Logic-High Input Voltage  | Vih    | 0.7VDDI  | -    | VDDI     | V    |            |
| Logic-Low Input Voltage   | Vil    | DGND     | -    | 0.3VDDI  | V    |            |
| Logic-High Output Voltage | Voh    | VDDI-0.4 | -    | VDDI     | V    |            |
| Logic-Low Output Voltage  | Vol    | DGND     | -    | DGND+0.4 | V    |            |

### 5.4 LED Driving Conditions

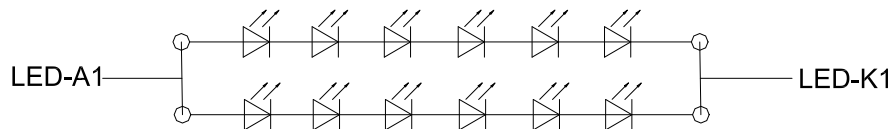
| Item                        | Symbol   | MIN  | TYP   | MAX   | Unit | Remark  |
|-----------------------------|----------|------|-------|-------|------|---------|
| Forward Current             | $I_F$    | -    | 40    | -     | mA   | Ta=+25℃ |
| Forward Voltage             | $V_F$    | 17.2 | -     | 21.2  | V    |         |
| Backlight Power consumption | $W_{BL}$ | 0.68 | -     | 0.848 | W    |         |
| LED Lifetime                |          | -    | 50000 | -     | Hrs  |         |

Note 1: Each LED:  $I_F = 20 \text{ mA}$ ,  $V_F = 2.8 \sim 3.4 \text{ V}$ .

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

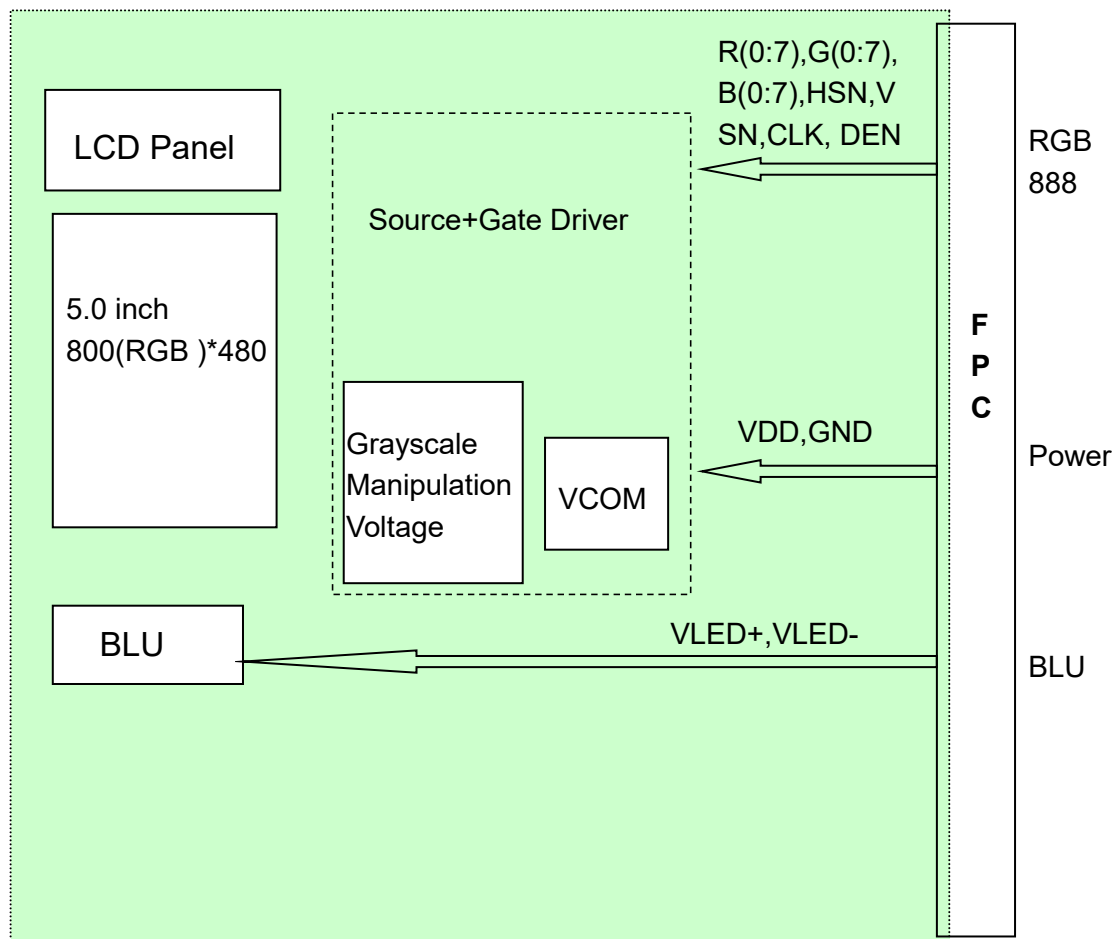
Note 3: If LED is driven by high current, high ambient temperature & humidity condition. The life Time of LED will be reduced. Operating life means brightness goes down to 50% initial brightness. Typical operating life time is estimated data.

Figure: LED connection of backlight(Constant Current)



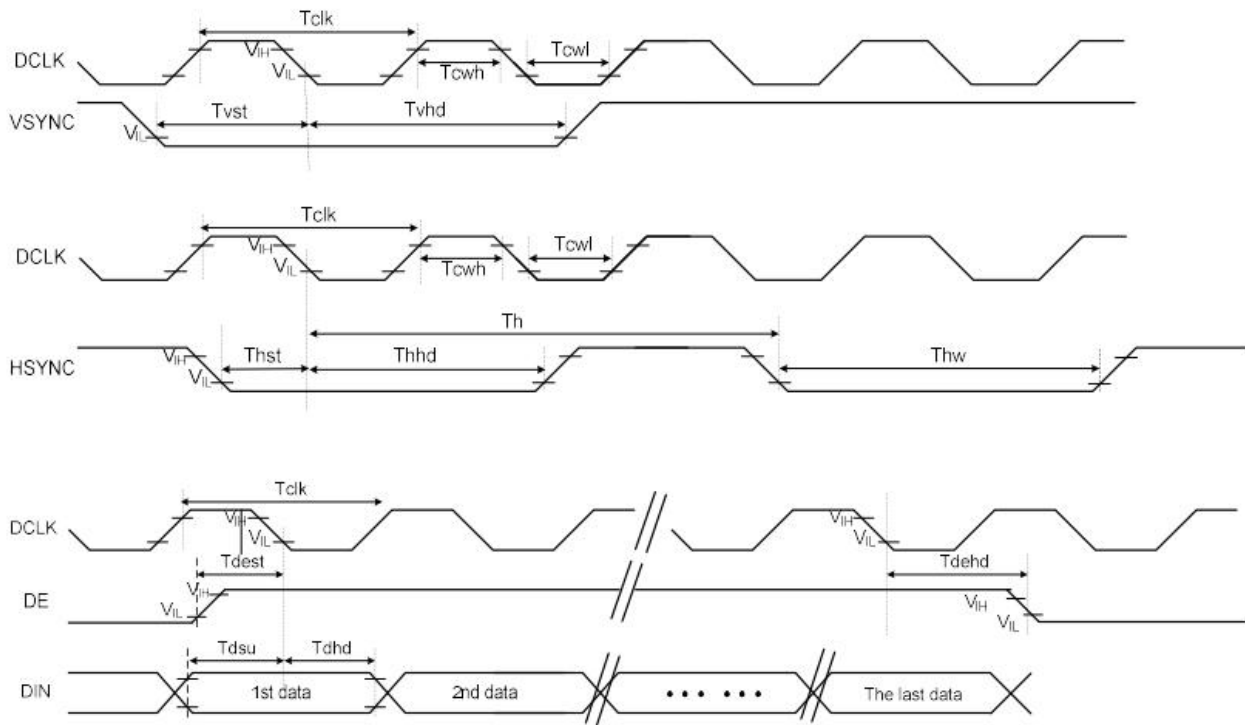
## CIRCUIT DIAGRAM

### 5.5 Block Diagram



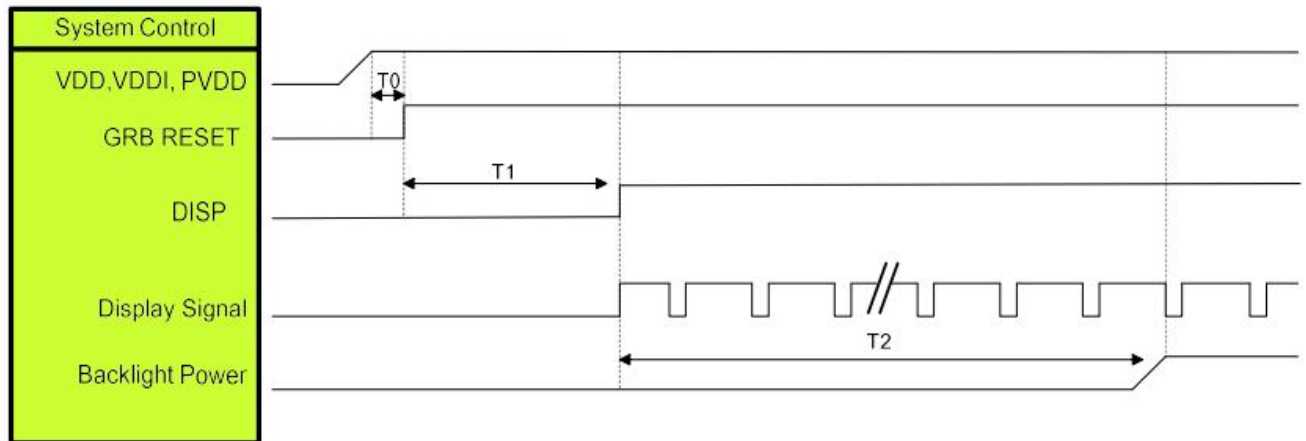
## 6. Interface Timing

### 6.1 System Bus Timing for RGB Interface



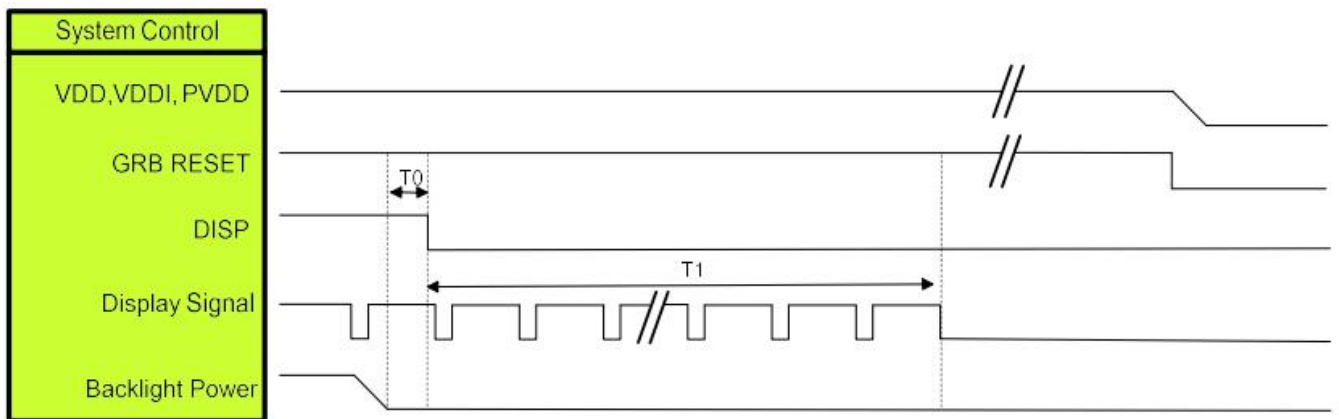
| Item             | Symbol     | Min. | Typ. | Max. | Unit | Conditions |
|------------------|------------|------|------|------|------|------------|
| CLK Pulse Duty   | $T_{cw}$   | 40   | 50   | 60   | %    |            |
| HSYNC Width      | $T_{hw}$   | 2    | -    | -    | DCLK |            |
| HSYNC Period     | $T_h$      | 55   | 60   | 65   | us   |            |
| VSYNC Setup Time | $T_{vst}$  | 12   | -    | -    | ns   |            |
| VSYNC Hold Time  | $T_{vhd}$  | 12   | -    | -    | ns   |            |
| HSYNC Setup Time | $T_{hst}$  | 12   | -    | -    | ns   |            |
| HSYNC Hold Time  | $T_{hhd}$  | 12   | -    | -    | ns   |            |
| Data Setup Time  | $T_{dsu}$  | 12   | -    | -    | ns   |            |
| Data Hold Time   | $T_{dhd}$  | 12   | -    | -    | ns   |            |
| DE Setup Time    | $T_{dest}$ | 12   | -    | -    | ns   |            |
| DE Hold Time     | $T_{dehd}$ | 12   | -    | -    | ns   |            |

### 6.2 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   |

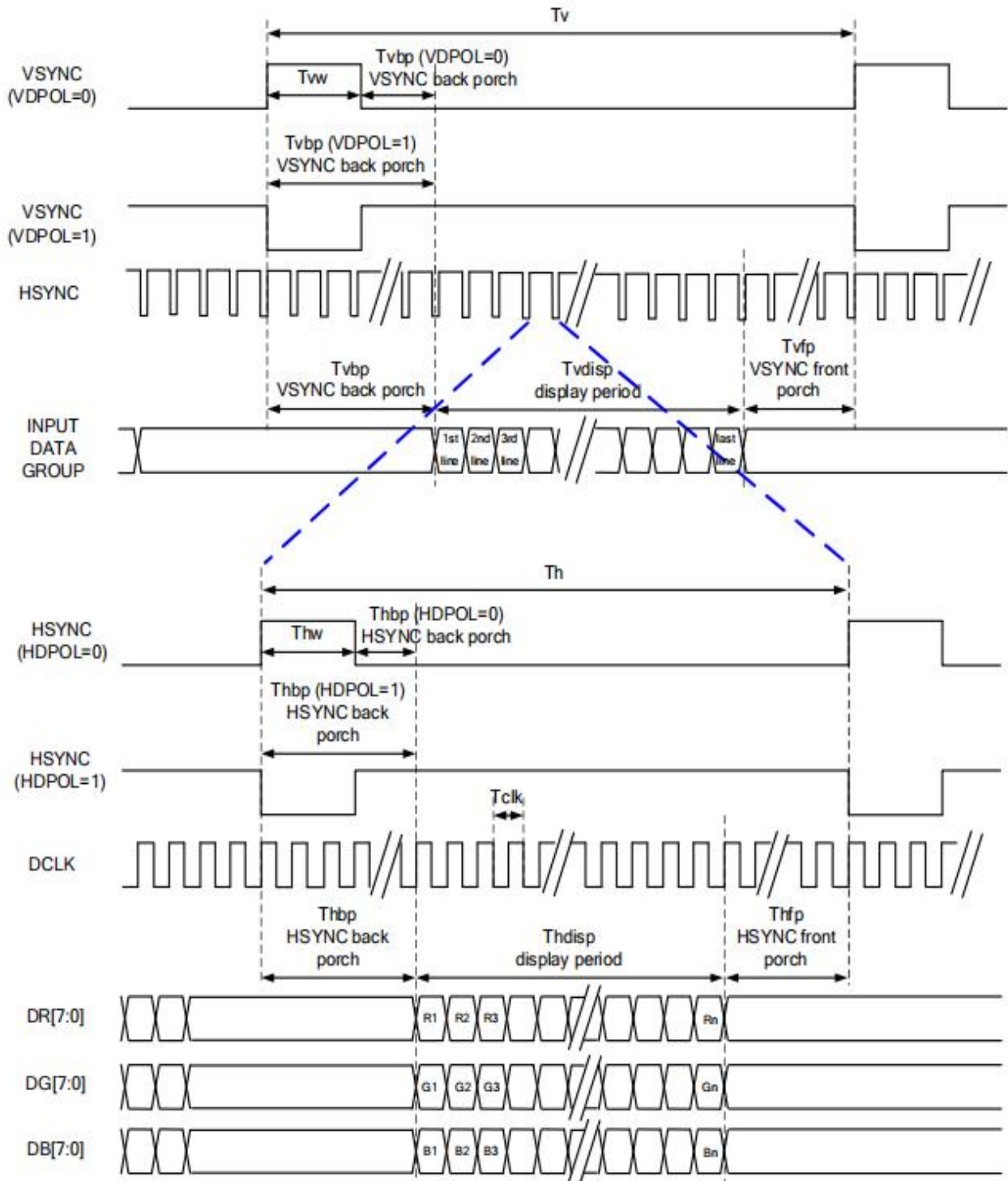
### 6.3 Power Off Sequence



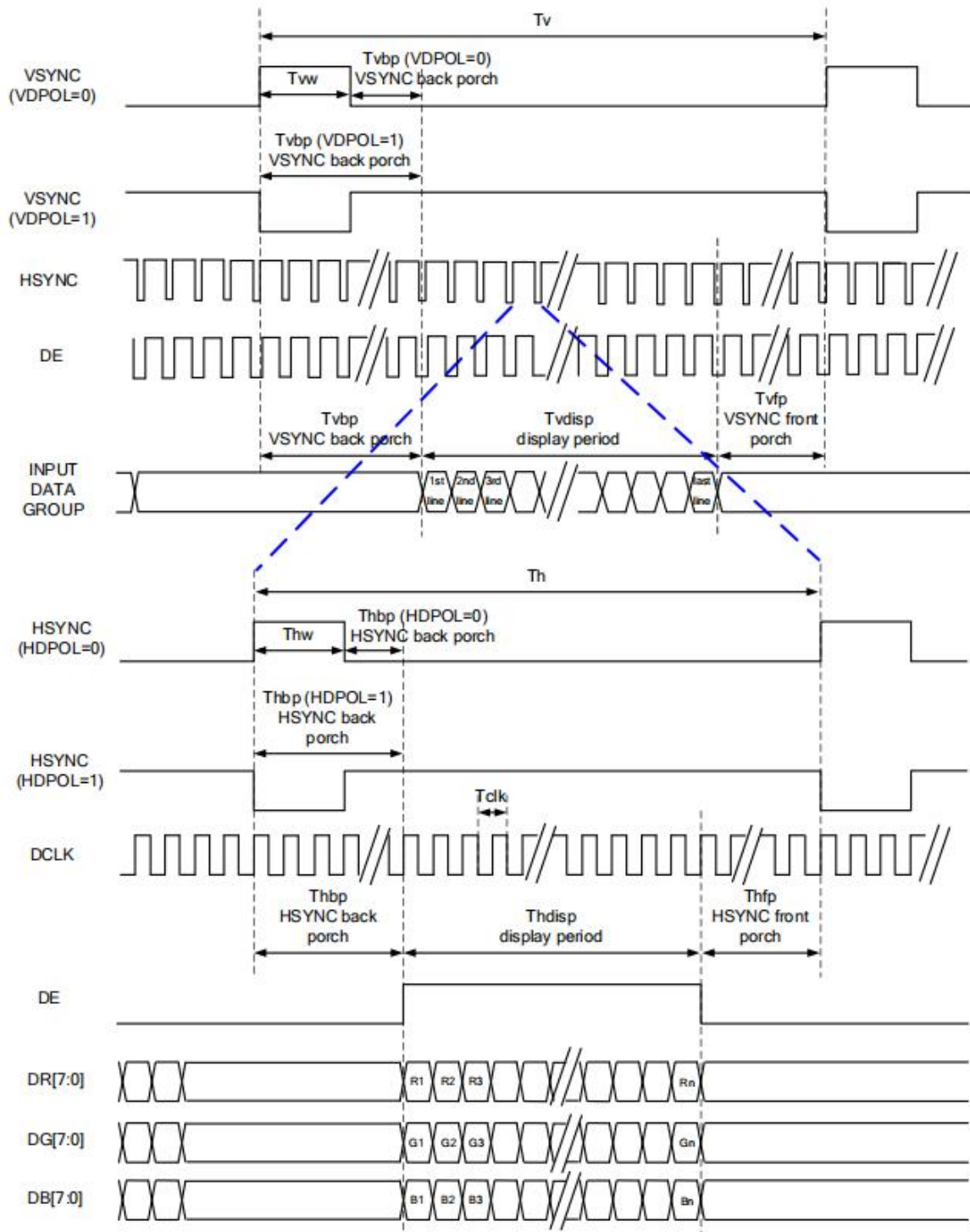
| Symbol | Description                                          | Min. Time | Unit |
|--------|------------------------------------------------------|-----------|------|
| T0     | Backlight Power off to DISP="Low"                    | 5         | ms   |
| T1     | DISP="Low" to IC internal voltage discharge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

## 6.4 RGB Interface

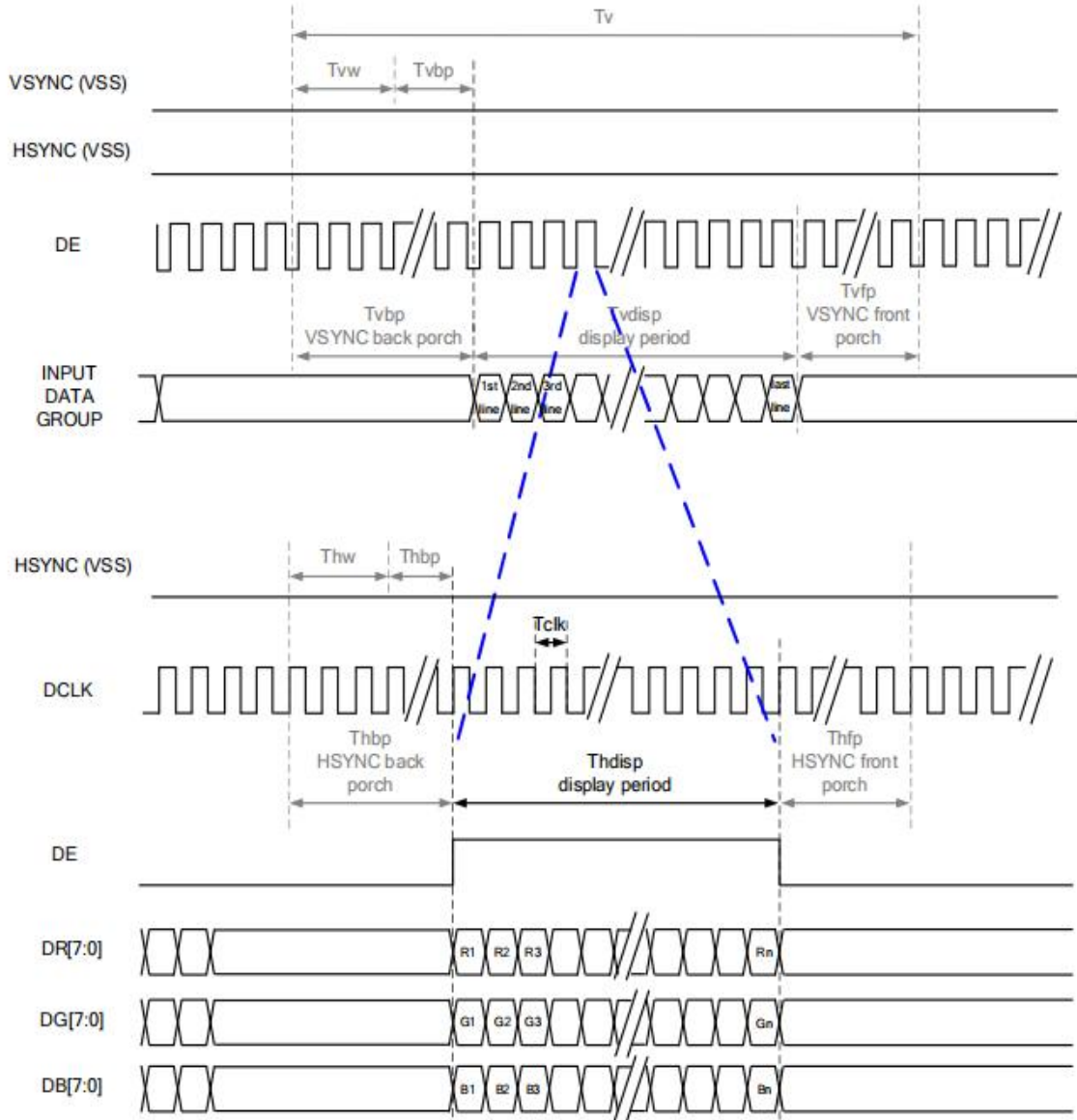
### 6.4.1 SYNC Mode



### 6.4.2 SYNC-DE Mode



### 6.4.3 DE Mode



| RGB Mode Selection Table | DCLK  | HSYNC | VSYNC | DE    |
|--------------------------|-------|-------|-------|-------|
| SYNC - DE Mode           | Input | Input | Input | Input |
| SYNC Mode                | Input | Input | Input | GND   |
| DE Mode                  | Input | GND   | GND   | Input |

Note: "Input" means these signals are driven by host side.

Parallel 24-bit RGB Input Timing (PVDD=PVDD1=VDD=VDDI= 3.3V, AGND= 0V, TA=25°C)

| Parallel 24-bit RGB Interface Timing Table |                |        |      |      |       |        |
|--------------------------------------------|----------------|--------|------|------|-------|--------|
| Item                                       | Symbol         | Min.   | Typ. | Max. | Unit  | Remark |
| DCLK Frequency                             | Fclk           | 23     | 25   | 27   | MHz   |        |
| HSYNC                                      | Period Time    | Th     | 808  | 816  | 896   | DCLK   |
|                                            | Display Period | Thdisp | 800  |      | DCLK  |        |
|                                            | Back Porch     | Thbp   | 4    | 8    | 48    | DCLK   |
|                                            | Front Porch    | Thfp   | 4    | 8    | 48    | DCLK   |
|                                            | Pulse Width    | Thw    | 2    | 4    | 8     | DCLK   |
| VSYNC                                      | Period Time    | Tv     | 492  | 496  | 504   | HSYNC  |
|                                            | Display Period | Tvdisp | 480  |      | HSYNC |        |
|                                            | Back Porch     | Tvbp   | 6    | 8    | 12    | HSYNC  |
|                                            | Front Porch    | Tvfp   | 6    | 8    | 12    | HSYNC  |
|                                            | Pulse Width    | Tww    | 2    | 4    | 8     | HSYNC  |

## 7. Optical Characteristics

| Items             |       | Symbol         | Condition                                    | Min.  | Typ.  | Max.  | Unit  | Remark           | Note  |
|-------------------|-------|----------------|----------------------------------------------|-------|-------|-------|-------|------------------|-------|
| Response time     |       | Tr+Tf          | -                                            | -     | 30    | 40    | ms    | FIG.1            | Note4 |
| Contrast Ratio    |       | CR             |                                              | 1000  | 1500  | -     | -     | FIG.2            | Note1 |
| Surface luminance |       | LV             | $\theta=0^\circ$                             | 380   | 450   | -     | cd/m2 | FIG.2            | Note2 |
| NTSC              |       | -              | $\theta=0^\circ$                             | 55    | 60    | -     | %     | FIG.2            | Note5 |
| Viewing angle     |       | $\theta_T$     | Center<br>CR $\geq 10$                       | 80    | 85    | -     | deg   | FIG.3            | Note6 |
|                   |       | $\theta_B$     |                                              | 80    | 85    | -     | deg   | FIG.3            |       |
|                   |       | $\theta_L$     |                                              | 80    | 85    | -     | deg   | FIG.3            |       |
|                   |       | $\theta_R$     |                                              | 80    | 85    | -     | deg   | FIG.3            |       |
| Chromaticity      | Red   | R <sub>X</sub> | $\theta=0^\circ$<br>$\phi=0^\circ$<br>Ta=25° | 0.588 | 0.638 | 0.688 | -     | FIG.2<br>CIE1931 | Note5 |
|                   |       | R <sub>Y</sub> |                                              | 0.288 | 0.338 | 0.388 | -     |                  |       |
|                   | Green | G <sub>X</sub> |                                              | 0.250 | 0.296 | 0.350 | -     |                  |       |
|                   |       | G <sub>Y</sub> |                                              | 0.525 | 0.575 | 0.625 | -     |                  |       |
|                   | Blue  | B <sub>X</sub> |                                              | 0.087 | 0.137 | 0.187 | -     |                  |       |
|                   |       | B <sub>Y</sub> |                                              | 0.074 | 0.124 | 0.174 | -     |                  |       |
|                   | White | W <sub>X</sub> |                                              | 0.270 | 0.320 | 0.370 | -     |                  |       |
|                   |       | W <sub>Y</sub> |                                              | 0.280 | 0.330 | 0.380 | -     |                  |       |

### Note1. Definition of contrast ratio

Contrast ratio(Cr) is defined mathematically by the following formula. For more information see FIG.2.

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

For contrast ratio, Surface Luminance, Luminance uniformity and CIE,the testing data is base on TOPCON's BM-5 or BM-7 photo detector or compatible.

### Note2. Definition of surface luminance.

Surface luminance is the luminance with all pixels displaying white. For more information see FIG.2.

Lv = Average Surface Luminance with all white pixels(P1,P2,P3, .....,Pn)

### Note3. 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.

$$YU = \frac{\text{Minimum surface luminance with all white pixels (P1,P2,P3,.....,Pn)}}{\text{Maximum surface luminance with all white pixels (P1,P2,P3,.....,Pn)}}$$

Maximum surface luminance with all white pixels (P1,P2,P3,.....,Pn)

#### Note4. Definition of response time

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

For additional information see FIG1.

#### Note5. Definition of color chromaticity (CIE1931)

CIE (x,y) chromaticity, The x,y value is determined by screen active area center position P5. For more information see FIG.2.

#### Note6. Definition of viewing angle

Viewing angle is the angle at which the contrast ratio is greater than 10. Angles are determined for the horizontal or x axis and the vertical or y axis with respect to the z axis which is normal to the LCD surface. For more information see FIG.3.

For viewing angle and response time testing, the testing data is base on Autronic-Melchers’s ConoScope or DMS series Instruments or compatible.

FIG.1. The definition of response Time

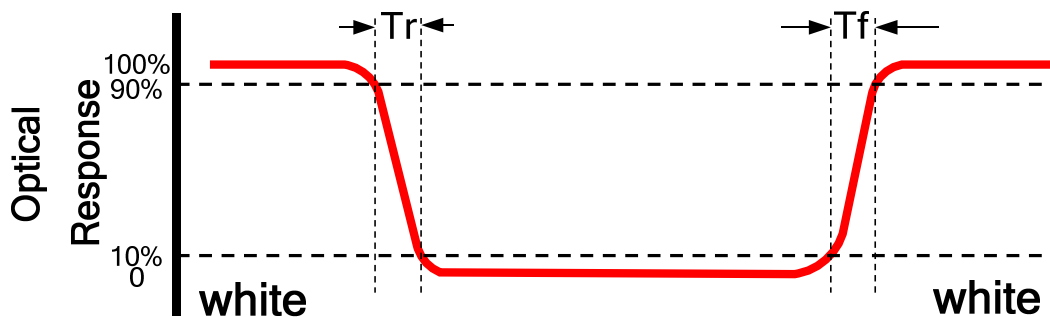


FIG.2. Measuring method for contrast ratio, surface luminance,

#### luminance uniformity, CIE (x,y) chromaticity

Size :  $S \leq 5"$  (see Figure a) A : 5 mm B : 5 mm

H,V : Active area

Light spot size  $\varnothing = 5\text{mm}$  (BM-5) or  $\varnothing = 7.7\text{mm}$  (BM-7) 50cm distance or compatible distance from the LCD surface to detector lens.

test spot position : see Figure a.

measurement instrument : TOPCON’s luminance meter BM-5 or BM-7 or compatible (see Figure c).

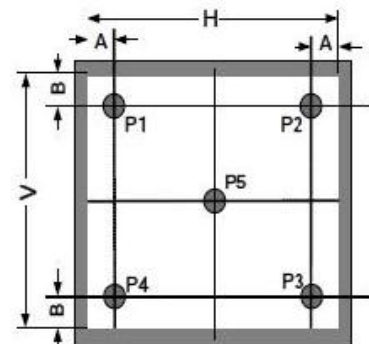


Figure a

Size :  $5'' < S \leq 12.3''$  (see Figure b) H,V : Active area

Light spot size  $\varnothing = 5\text{mm}$  (BM-5) or  $\varnothing = 7.7\text{mm}$  (BM-7) 50cm distance or compatible distance from the LCD surface to detector lens.

test spot position : see Figure b.

measurement instrument : TOPCON's luminance meter BM-5 or BM-7 or compatible (see Figure c).

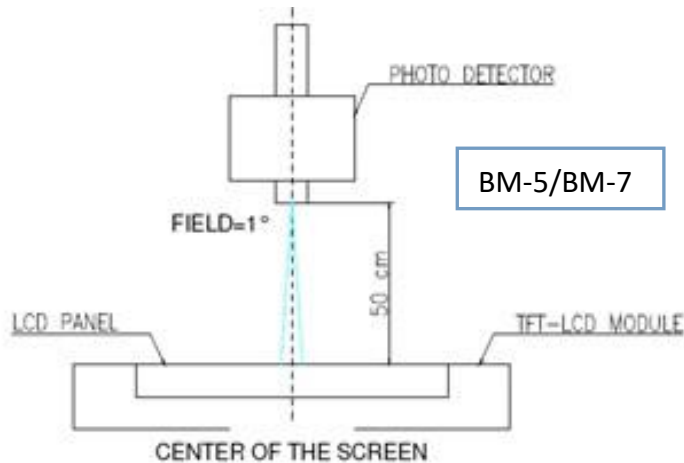


Figure c

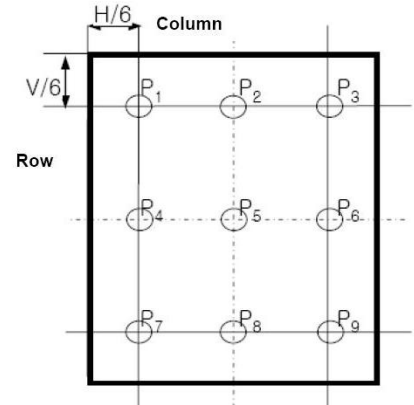
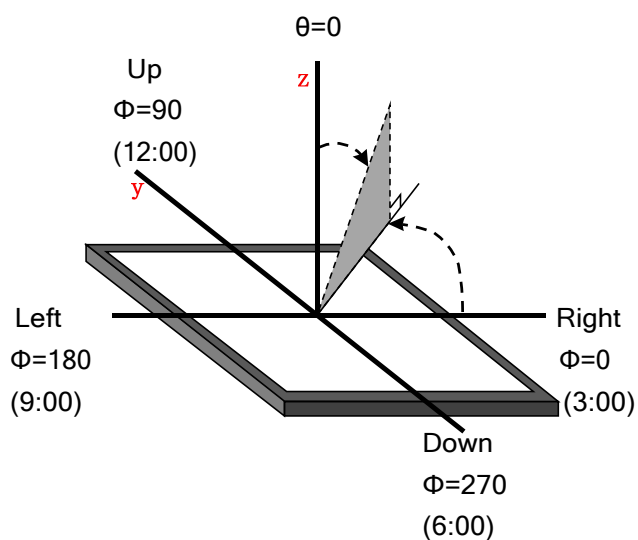


Figure b

FIG.3.The definition of viewing angle



## 8. Environmental / Reliability Tests

| No | Test Item                             | Condition                                                                                                                                   | Remarks                                                                                            |
|----|---------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|
| 1  | High Temperature Operation            | Ts= +85℃, 96hrs                                                                                                                             | IEC60068-2-1:2007<br>GB2423. 2-2008                                                                |
| 2  | Low Temperature Operation             | Ta= -30℃, 96hrs                                                                                                                             | IEC60068-2-1:2007<br>GB2423.1-2008                                                                 |
| 3  | High Temperature Storage              | Ta= +85℃, 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, 96 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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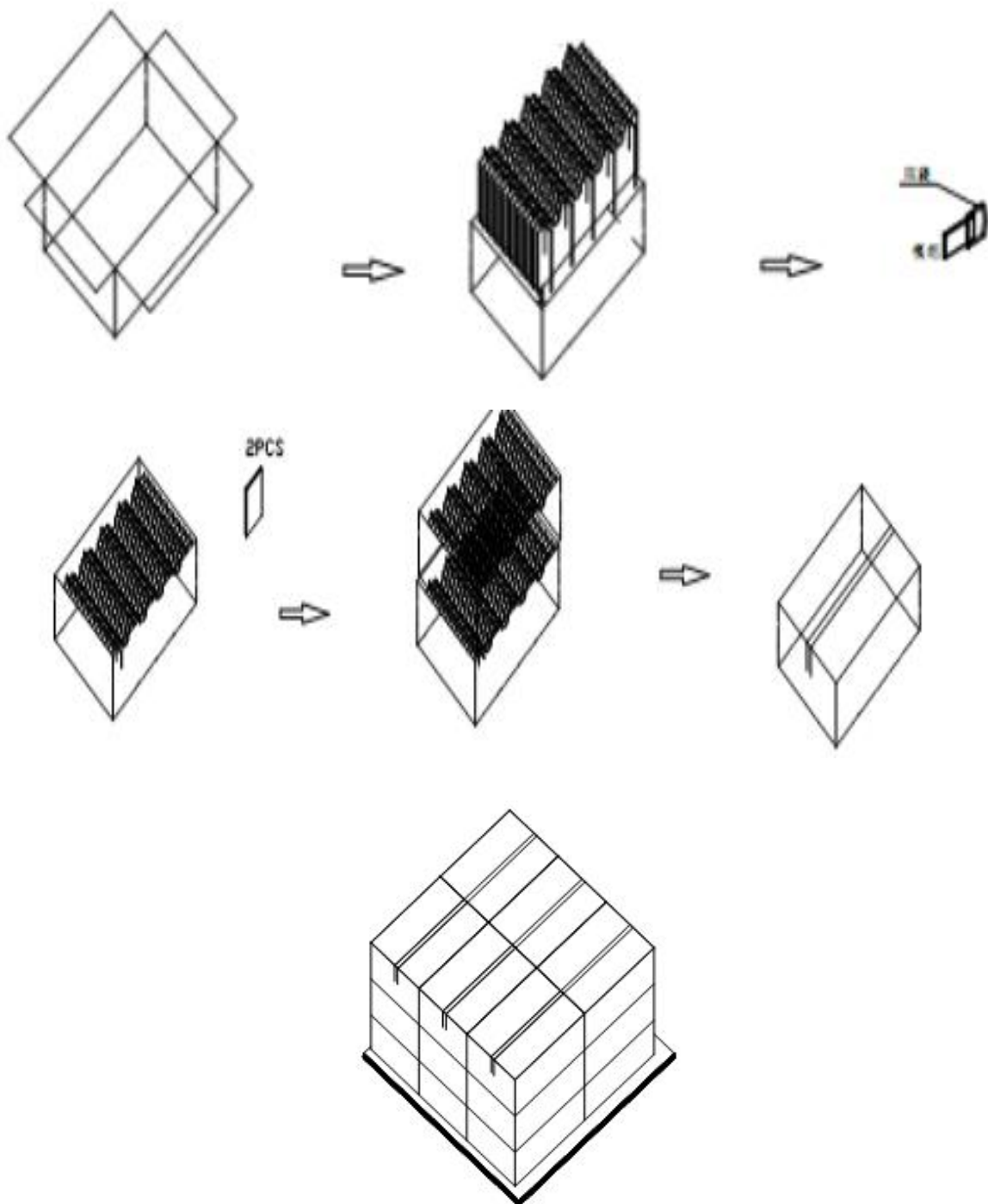
### Notes:

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.≤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.



## 10. Packing

### Packing Method



## 11. Precautions for Use of LCD modules

### 11.1 Handling Precautions

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

11.1.2. 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.

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

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

11.1.5. 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

11.1.6. Do not attempt to disassemble the LCD Module.

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

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

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

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

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

11.1.8.4. 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.

### 11.2 Storage Precautions

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

11.2.2. 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%

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



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### 11.3 Transportation Precautions

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