深圳市思迪科科技有限公司
SHENZHEN CDTECH ELECTRONICS

# Product Specification

| | |
|---|---|
| **Model Name** | S070BWS45HD-DR09 |
| **Description** | 7.0" WSVGA<br>1024(RGB)x600 Dots |
| **Date** | 2021/10/21 |
| **Version** | 1.0 |

| **Approved by/Date** | **Check by/Date** | **Prepared by/Date** |
|---|---|---|
| ZHP 2021/10/21 | HZX 2021/10/21 | ZJ 2021/10/21 |

| **Customer Approval** | |
|---|---|
| | |
| **Date** | |

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Record of Revision

| Rev | Issued Date | Description | Editor |
|---|---|---|---|
| 1.0 | 2021/10/21 | First Release. | ZJ |
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## 1. General Specifications

| Feature | | Spec |
|---|---|---|
| Characteristics | Size | 7 inch |
| | Resolution | 1024(horizontal)*600(Vertical) |
| | Interface | LVDS |
| | Connect type | Connector |
| | Display Colors | 16.7M |
| | Technology type | a-Si |
| | Pixel pitch (mm) | 0.150*0.143 |
| | Pixel Configuration | R.G.B.-Stripe |
| | Display Mode | Normally Black |
| | LCD Driver IC | EK79001HN+EK73215BCGA |
| | Viewing Direction | IPS |
| Mechanical | LCM (W x H x D) (mm) | 165.0*100.0*6.8 |
| | Active Area(mm) | 154.21 x85.92 |
| | With /Without TSP | With RTP |
| | Weight (g) | TBD |
| | LED Numbers | 30 LEDs |

Note 1: Requirements on Environmental Protection: RoHs
Note 2: LCM weight tolerance: +/- 5%

## 2. Input/Output Terminals

LCD PIN-MAP

| No. | Symbol | Description |
|---|---|---|
| 1 | VCOM | Common Voltage |
| 2 | VDD | Power Voltage for digital circuit |
| 3 | VDD | Power Voltage for digital circuit |
| 4 | NC | No connection |
| 5 | RESET | Global reset pin |
| 6 | STBYB | Standby mode Normally pulled high<br>STBYB=1,normal operation<br>STBYB=0,timing contrller,source<br>Driver will turn off,all output are High-Z |
| 7 | GND | Ground |
| 8 | RXIN0- | -LVDS differential data input |
| 9 | RXIN0+ | +LVDS differential data input |
| 10 | GND | Ground |
| 11 | RXIN1- | -LVDS differential data input |
| 12 | RXIN1+ | +LVDS differential data input |
| 13 | GND | Ground |
| 14 | RXIN2- | -LVDS differential data input |
| 15 | RXIN2+ | +LVDS differential data input |
| 16 | GND | Ground |
| 17 | RXCLKIN- | -LVDS differential clock input |
| 18 | RXCLKIN+ | +LVDS differential clock input |
| 19 | GND | Ground |
| 20 | RXIN3- | -LVDS differential data input |
| 21 | RXIN3+ | -LVDS differential data input |
| 22 | GND | Ground |
| 23 | NC | No connection |
| 24 | NC | No connection |
| 25 | GND | Ground |
| 26 | NC | No connection |
| 27 | DIMO | Backlight CABC controller signal output |
| 28 | SELB | 6bit/8bit mode select (Note 1) |

| | | |
|---|---|---|
| 29 | AVDD | Power for Analog Circuit |
| 30 | GND | Ground |
| 31 | LED- | LED Cathode |
| 32 | LED- | LED Cathode |
| 33 | L/R | Horizontal inversion (Note 2) |
| 34 | U/D | Vertical inversion (Note 2) |
| 35 | VGL | Gate oFF Voltage Power supply |
| 36 | NC | No connection |
| 37 | NC | No connection |
| 38 | VGH | Gate ON Voltage |
| 39 | LED+ | LED Anode |
| 40 | LED+ | LED Anode |

Note 2: when L/R=0 set right to left scan direction
when L/R=1 set left to right scan direction
when U/D=0 set top to bottom scan direction
when U/D=1 set bottom to top scan direction

## RTP PIN-MAP

| Pin | Signal | Description |
|---|---|---|
| 1 | XL | Touch panel left side |
| 2 | YD | Touch panel bottom side |
| 3 | XR | Touch panel right side |
| 4 | YU | Touch panel UP side |

# 3. Absolute Maximum Rating

| Item | Symbol | MIN | Typ | MAX | Unit | Remark |
|---|---|---|---|---|---|---|
| Supply Voltage | VDD | -0.3 | - | 5 | V | - |
| Operating Temperature | TOPR | -20 | - | 70 | ℃ | - |
| Storage Temperature | TSTG | -30 | - | 80 | ℃ | |
| | | | | | | |

| Item | Symbol | MIN | TYP | MAX | Unit | Remark |
|---|---|---|---|---|---|---|
| Power supply for LCD | $I_{VDD}$ | 25 | 35 | 60 | mA | |
| | $I_{AVDD}$ | 20 | 25 | 50 | mA | |
| | $I_{VGH}$ | 0.8 | 1 | 1.2 | mA | |
| | $I_{VGL}$ | 0.8 | 1 | 1.2 | mA | |
| | $I_{VCOM}$ | 6 | 8.2 | 15 | mA | |

# 4. Electrical Characteristics

## 4.1 Driving TFT LCD Panel

| Item | Symbol | MIN | TYP | MAX | Unit | Remark |
|---|---|---|---|---|---|---|
| Power supply for LCD | VDD | 3.0 | 3.3 | 3.6 | V | |
| | AVDD | 9.0 | 9.8 | 10.5 | V | |
| | VGH | 16.0 | 18.0 | 20 | V | |
| | VGL | -7.5 | -6.0 | -5.0 | V | |
| | VCOM | 2.9 | 3.25 | 3.5 | V | |

## 4.2 LED Driving Conditions

| Item | Symbol | MIN | TYP | MAX | Unit | Remark |
|---|---|---|---|---|---|---|
| Forward Current | $I_F$ | - | 200 | - | mA | |
| Forward Voltage | $V_F$ | 8.1 | - | 10.2 | V | |
| Backlight Power consumption | $W_{BL}$ | 1.62 | - | 2.04 | W | |
| LED Lifetime | | - | 30000 | - | Hrs | |

Note 1: Each LED: IF =20 mA, VF =2.7~3.4V.
Note 2: Optical performance should be evaluated at Ta=25℃ 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.

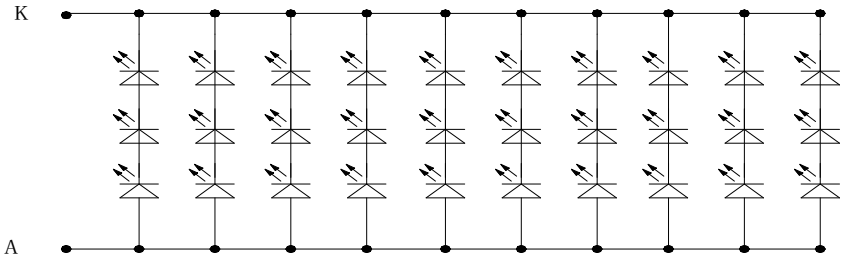
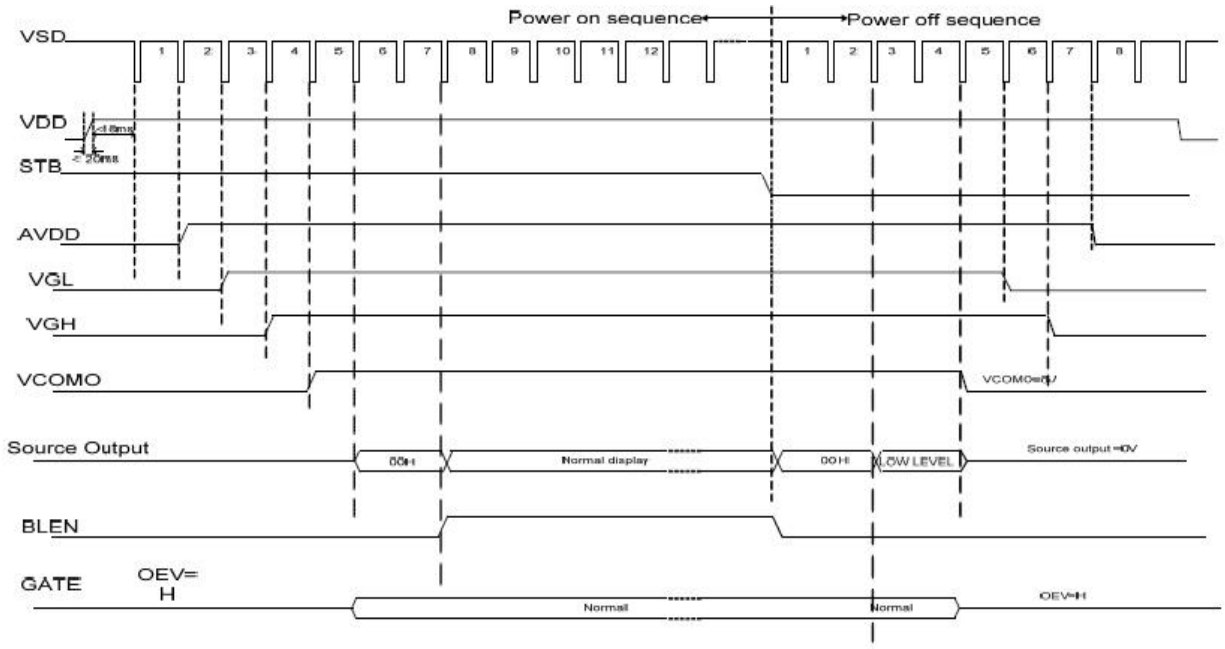


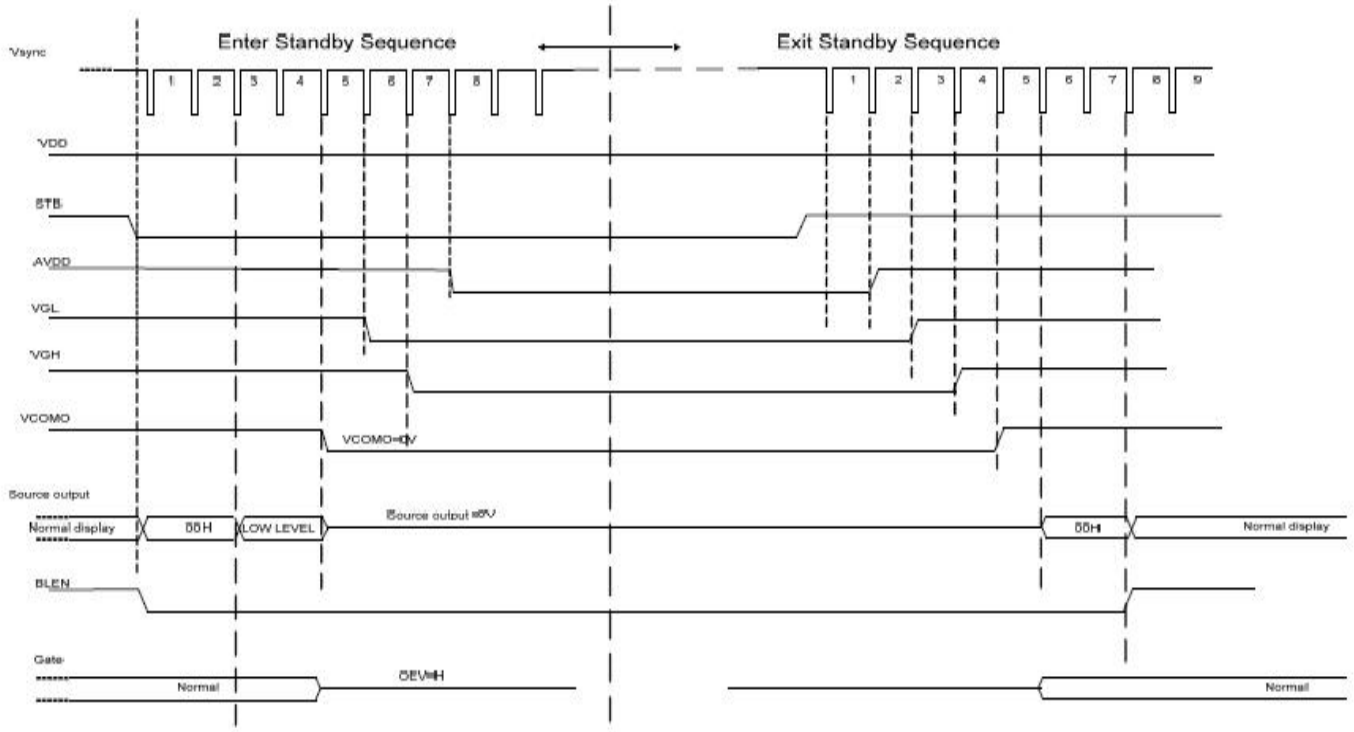

Figure: LED connection of backlight(Constant Current)

# 5. Interface Timing

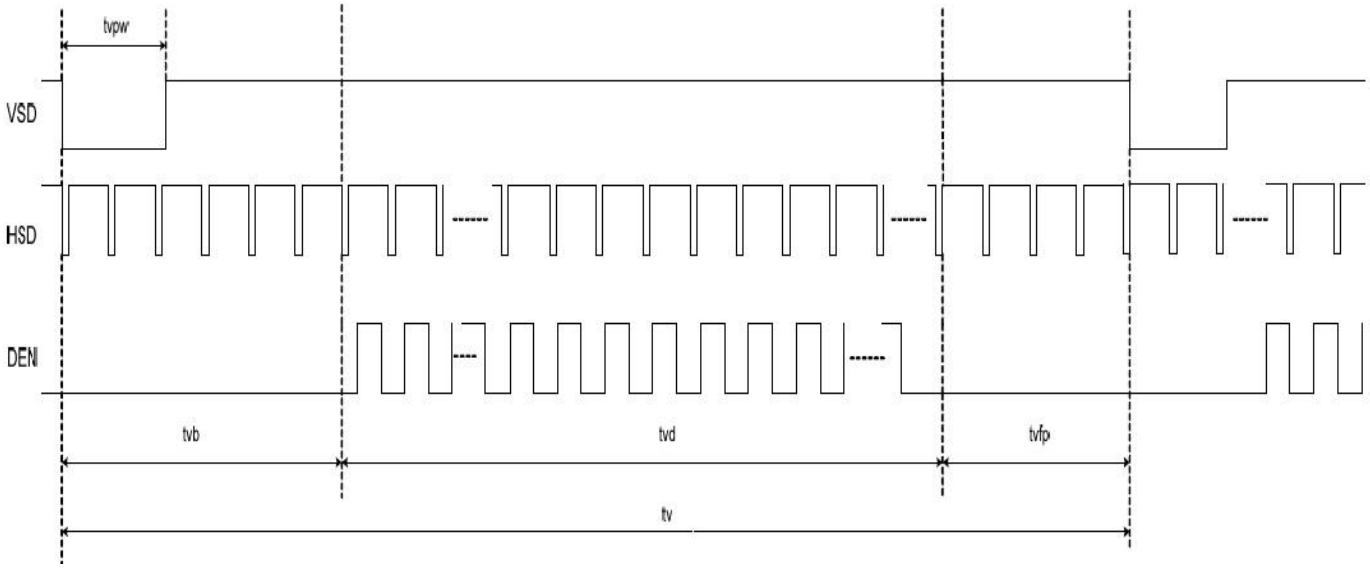
## 6.1 Power-On/Off Timing Sequence



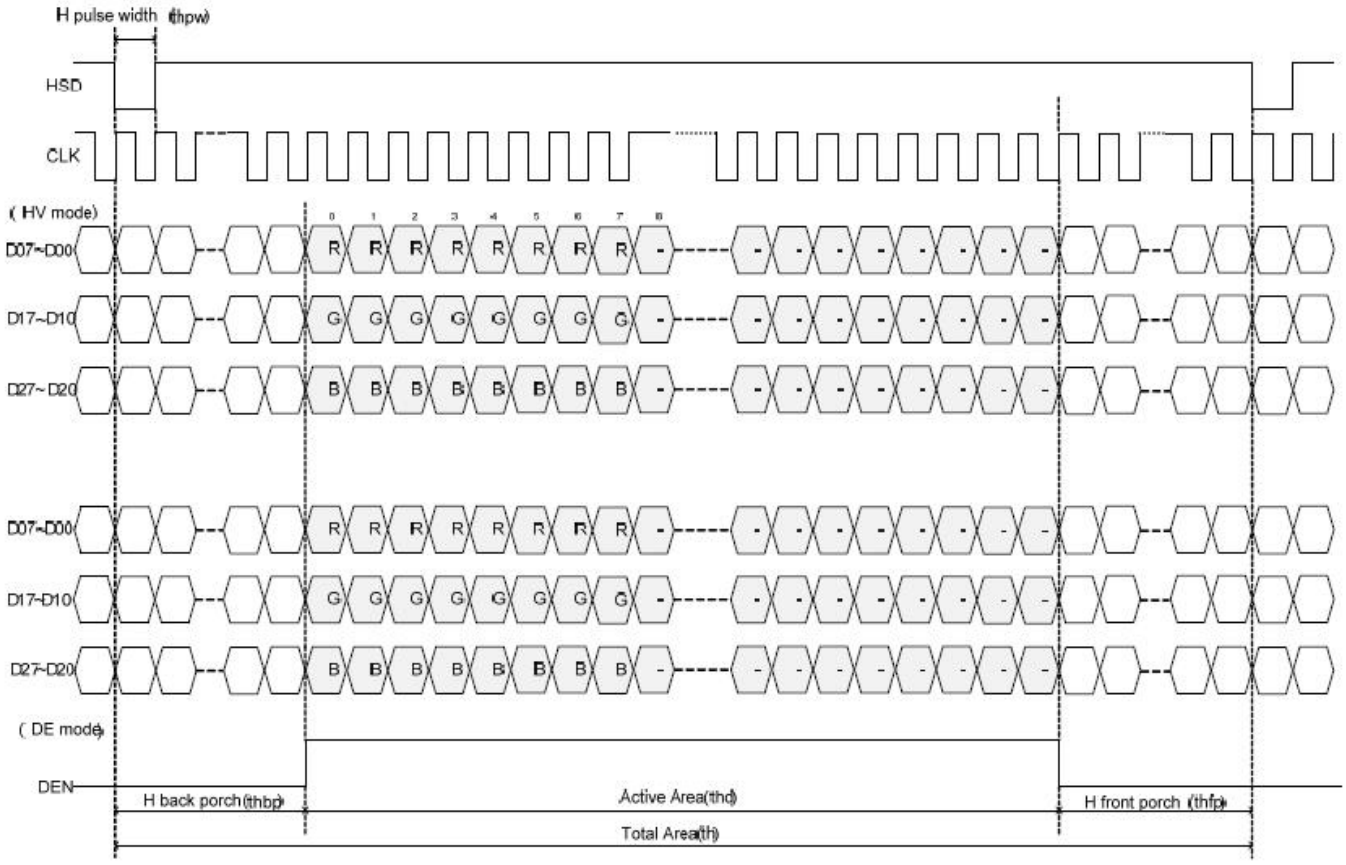

## 6.2 Power On/Off timing chart



6.3 Vertical input timing




## 6.4 Horizontal input timing



## 6.5 AC Electrical Characteristics

DE mode

DE mode

| Parameter | Symbol | Value | | | Unit |
|---|---|---|---|---|---|
| | | Min. | Typ. | Max. | |
| DCLK frequency @Frame rate=60hz | fclk | 40.8 | 51.2 | 67.2 | Mhz |
| Horizontal display area | thd | | 1024 | | DCLK |
| HSYNC period time | th | 1114 | 1344 | 1400 | DCLK |
| HSYNC blanking | thb+thfp | 90 | 320 | 376 | DCLK |
| Vertical display area | tvd | | 600 | | H |
| VSYNC period time | tv | 610 | 635 | 800 | H |
| VSYNC blanking | tvb+tvfp | 10 | 35 | 200 | H |

HV mode(1)

HV mode
Horizontal input timing

| Parameter | | Symbol | Value | | | Unit |
|---|---|---|---|---|---|---|
| Horizontal display area | | thd | | 1024 | | DCLK |
| DCLK frequency@ Frame rate=60hz | | fclk | Min. | Typ. | Max. | |
| | | | 44.9 | 51.2 | 63 | Mhz |
| 1 Horizontal Line | | th | 1200 | 1344 | 1400 | DCLK |
| HSYNC pulse width | Min. | thpw | 1 | | | |
| | Typ. | | — | | | |
| | Max. | | 140 | | | |
| HSYNC back porch | | thbp | 160 | 160 | 160 | |
| HSYNC front porch | | thfp | 16 | 160 | 216 | |

HV mode(2)

Vertical input timing

| Parameter | Symbol | Value | | | Unit |
|---|---|---|---|---|---|
| | | Min. | Typ. | Max. | |
| Vertical display area | tvd | | 600 | | H |
| VSYNC period time | tv | 624 | 635 | 750 | H |
| VSYNC pulse width | tvpw | 1 | — | 20 | H |
| VSYNC back porch | tvb | 23 | 23 | 23 | H |
| VSYNC front porch | tvfp | 1 | 12 | 127 | H |

## 6. Optical Characteristics

| Items | | Symbol | Condition | Min. | Typ. | Max. | Unit | Remark | Note |
|---|---|---|---|---|---|---|---|---|---|
| Response time | | Tr+Tf | - | - | 30 | 40 | ms | FIG.1 | Note4 |
| Contrast Ratio | | CR | | 500 | 800 | - | - | FIG.2 | Note1 |
| Surface luminance | | LV | θ =0° | 300 | 350 | - | cd/m2 | FIG.2 | Note2 |
| Luminance uniformity | | Yu | θ =0° | 70 | 80 | - | % | FIG.2 | Note3 |
| NTSC | | - | θ =0° | - | 50 | - | % | FIG.2 | Note5 |
| Viewing angle | | $\theta_T$ | Center CR≥10 | - | 85 | - | deg | FIG.3 | Note6 |
| | | $\theta_B$ | | - | 85 | - | deg | FIG.3 | |
| | | $\theta_L$ | | - | 85 | - | deg | FIG.3 | |
| | | $\theta_R$ | | - | 85 | - | deg | FIG.3 | |
| Chromaticity | Red | $R_X$ | θ =0° ∅ =0° Ta=25° | 0.549 | 0.599 | 0.649 | - | FIG.2 CIE1931 | Note5 |
| | | $R_Y$ | | 0.288 | 0.338 | 0.388 | - | | |
| | Green | $G_X$ | | 0.249 | 0.299 | 0.349 | - | | |
| | | $G_Y$ | | 0.500 | 0.550 | 0.600 | - | | |
| | Blue | $B_X$ | | 0.089 | 0.139 | 0.189 | - | | |
| | | $B_Y$ | | 0.081 | 0.131 | 0.183 | - | | |
| | White | $W_X$ | | 0.275 | 0.325 | 0.375 | - | | |
| | | $W_Y$ | | 0.310 | 0.360 | 0.410 | - | | |

**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.

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

**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 (Tr) is the time between photo detector output intensity changed from 90% to 10%. And fall time (Tf) 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**

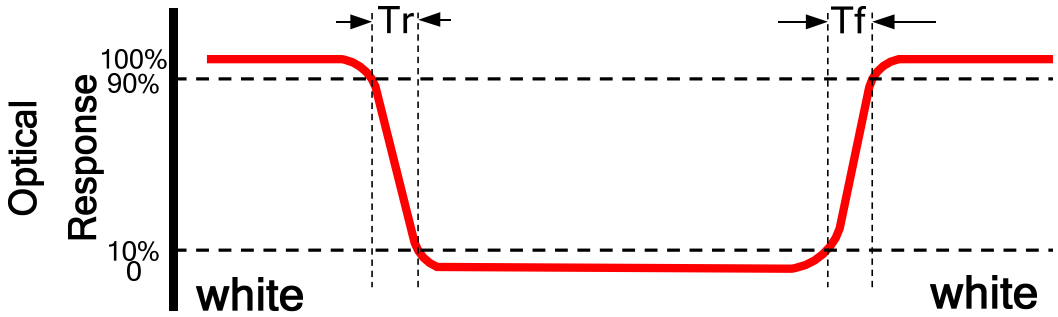



**FIG.2. Measuring method for contrast ratio, surface luminance, luminance uniformity, CIE (x,y) chromaticity**

Size : S≤5”(see Figure a) A : 5 mm B : 5 mm
H,V : Active area
Light spot size ∅=5mm(BM-5) or ∅=7.7mm (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).

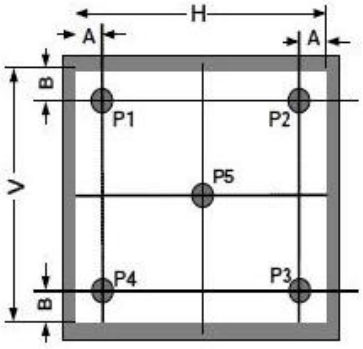



Figure a

Size : 5”＜S≤12.3”(see Figure b) H,V : Active area
Light spot size ∅=5mm(BM-5) or ∅=7.7mm (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).

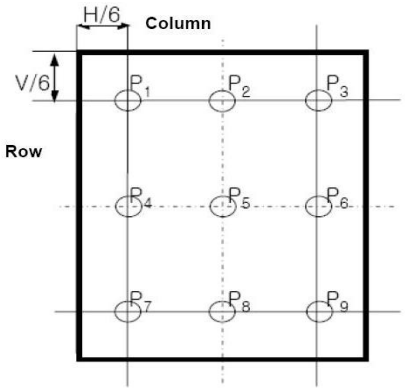



Figure b

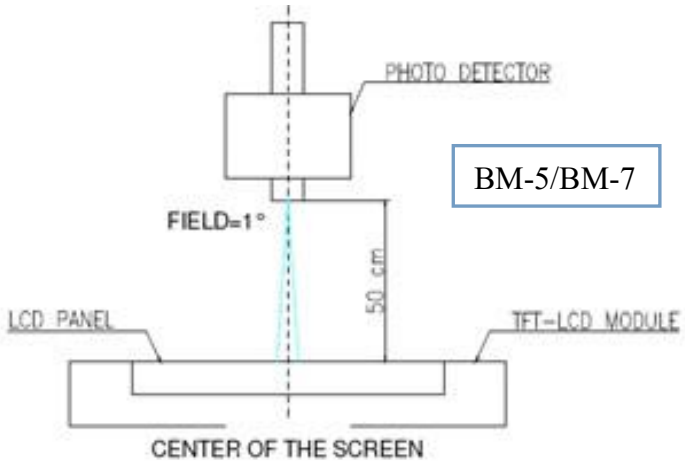
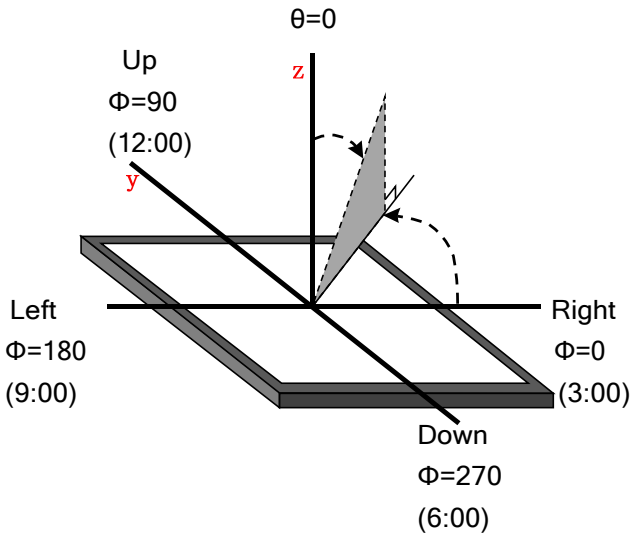



Figure c

**FIG.3.The definition of viewing angle**

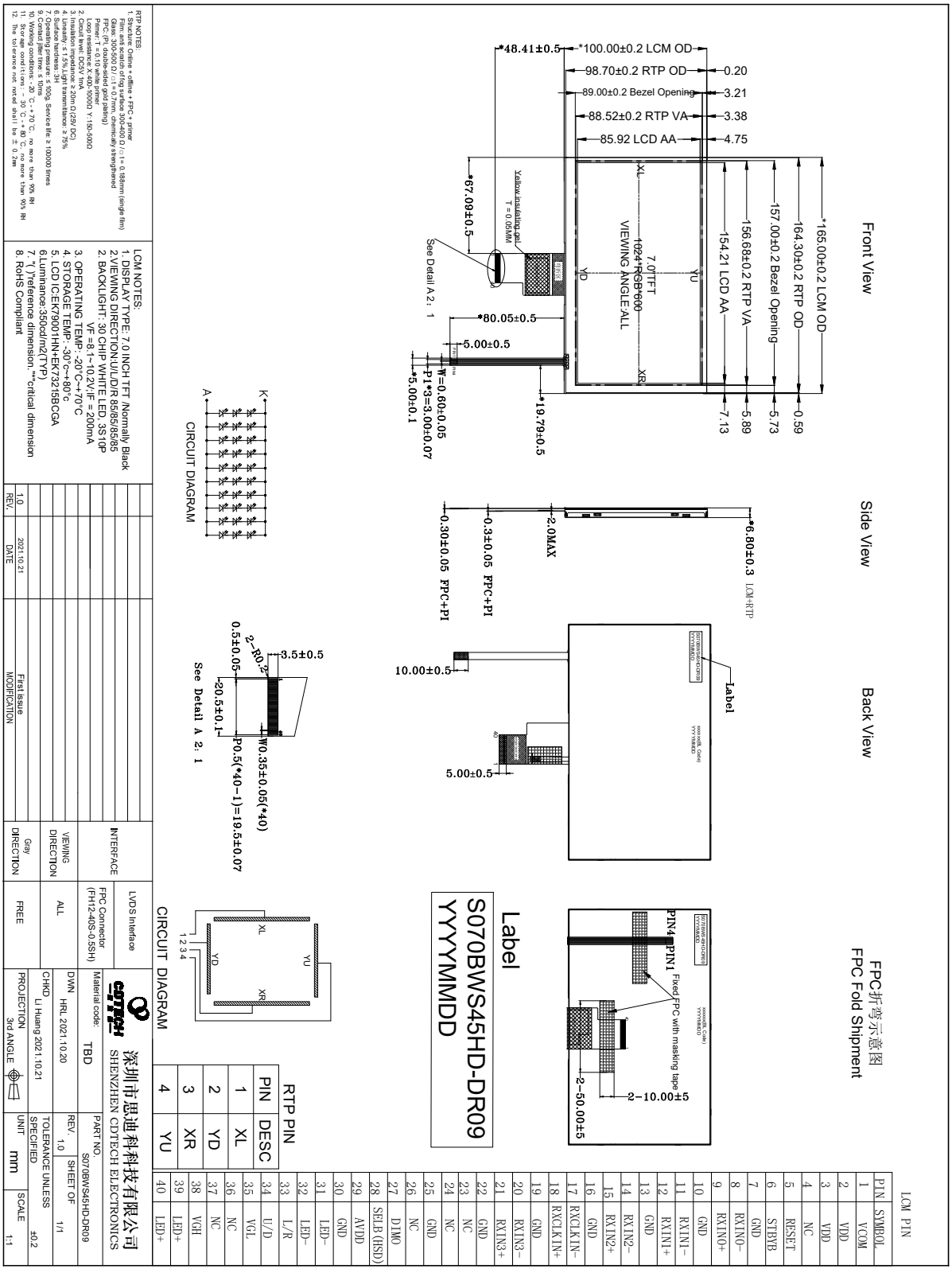


## 7. Environmental / Reliability Tests

| 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,96 hours | IIEC60068-2-78:2001<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, 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 |

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.

# 8. Mechanical Drawing




RTP NOTES:
1. Structure:Online + offline + FPC + primer
Glass: 300×500 (t:1.8±0.07mm, chemically strengthened)
FPC: (PI, double-sided gold plating)
Primer: T = 0.10 white primer
2. Circuit level: DC5V 1mA
3. Insulation impedance: ≥ 20m Ω (25V DC)
4. Linearity: ≤ 1.5% ;Light transmittance: ≥ 75%
5. Touch life: ≥ 1 million times; Service life: ≥ 100Q, Service life: ≥ 100000 times
6. Surface hardness: 3H
7. Operating pressure: ≤ 100g
8. Contact jitter time: ≤ 10ms
9. Contact jitter: ≤ 10ms
10. Working conditions: -20 ℃ ~ +70 ℃ no more than 90% RH
11. Storage conditions: -30 ℃ ~ +80 ℃ no more than 90% RH
12. The tolerance not noted shall be ± 0.2mm

LCM NOTES:
1. DISPLAY TYPE: 7.0 INCH TFT /Normally Black
2. VIEWING DIRECTION:U/L/D/R 85/85/85/85
2. BACKLIGHT: 30 CHIP WHITE LED, 3S 10P
VF=8.1~10.2V,IF=200mA
3. OPERATING TEMP: -20°C~+70°C
4. STORAGE TEMP: -30°C~+80°C
5. LCD IC:EK79001HN+EK73215BCGA
6.Luminance:350cd/m2(TYP)
7. "( )"reference dimension,"*"critical dimension
8. RoHS Compliant

| REV. | DATE | MODIFICATION |
|---|---|---|
| 1.0 | 2021.10.21 | First Issue |

| | |
|---|---|
| INTERFACE | LVDS Interface |
| | FPC Connector (FH12-40S-0.5SH) |
| VIEWING DIRECTION | ALL |
| | Gray |
| DIRECTION | FREE |

| PIN | DESC |
|---|---|
| 1 | XL |
| 2 | YD |
| 3 | XR |
| 4 | YU |

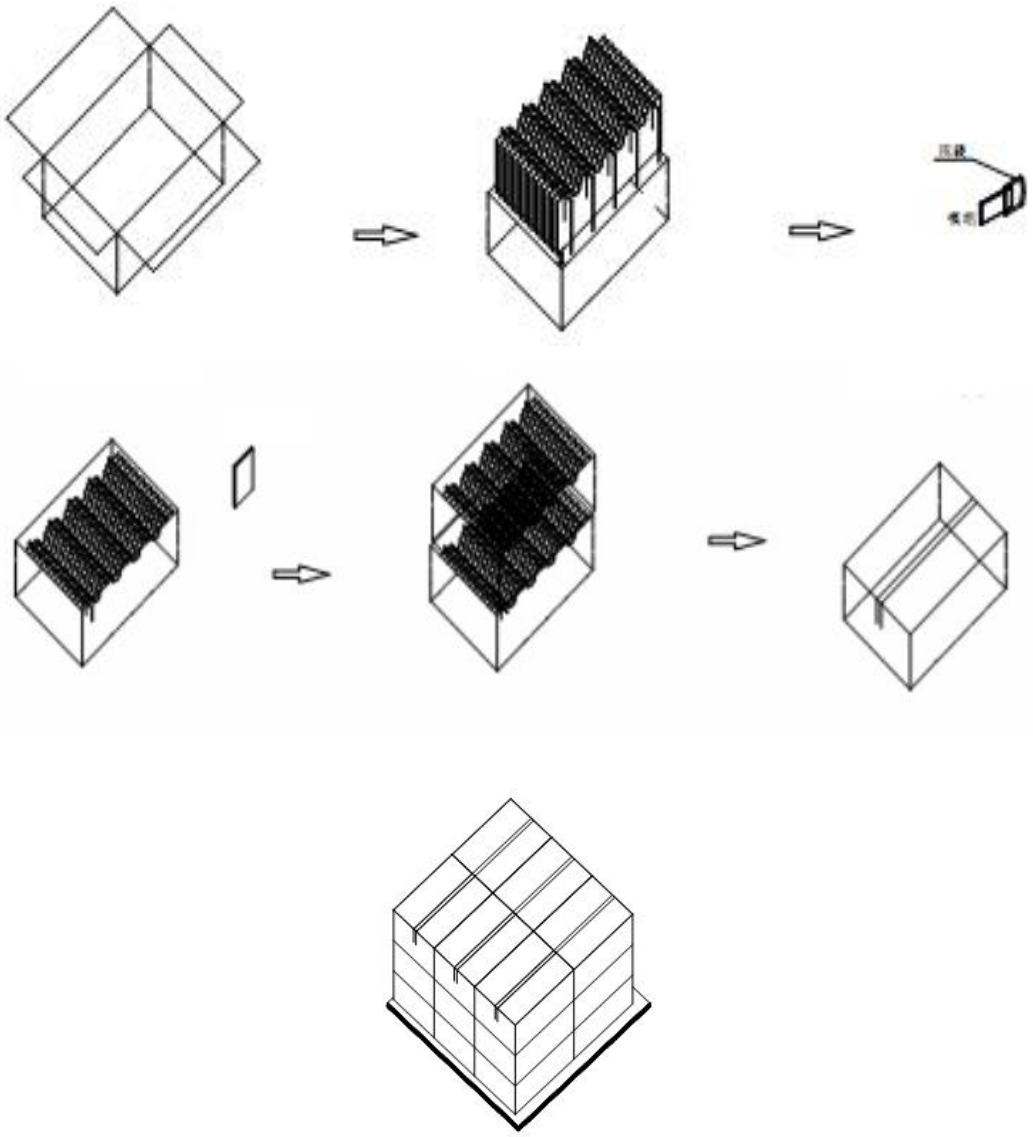
| PIN | SYMBOL | LCM PIN |
|---|---|---|
| 1 | VCOM | |
| 2 | VDD | |
| 3 | VDD | |
| 4 | NC | |
| 5 | RESET | |
| 6 | STBYB | |
| 7 | GND | |
| 8 | RXIN0- | |
| 9 | RXIN0+ | |
| 10 | GND | |
| 11 | RXIN1- | |
| 12 | RXIN1+ | |
| 13 | GND | |
| 14 | RXIN2- | |
| 15 | RXIN2+ | |
| 16 | GND | |
| 17 | RXCLKIN- | |
| 18 | RXCLKIN+ | |
| 19 | GND | |
| 20 | RXIN3- | |
| 21 | RXIN3+ | |
| 22 | GND | |
| 23 | NC | |
| 24 | NC | |
| 25 | GND | |
| 26 | NC | |
| 27 | DIMO | |
| 28 | SELB (HSD) | |
| 29 | AVDD | |
| 30 | GND | |
| 31 | LED- | |
| 32 | LED- | |
| 33 | L/R | |
| 34 | U/D | |
| 35 | VGL | |
| 36 | NC | |
| 37 | NC | |
| 38 | VGH | |
| 39 | LED+ | |
| 40 | LED+ | |

深圳市思迪科科技有限公司
SHENZHEN CDTECH ELECTRONICS

| | | | |
|---|---|---|---|
| Material code: | TBD | PART NO. | S070BWS45HD-DR09 |
| DWN | HRL 2021.10.20 | REV. 1.0 | SHEET OF 1/1 |
| CHKD | Li Huang 2021.10.21 | TOLERANCE UNLESS SPECIFIED | ±0.2 |
| PROJECTION | 3rd ANGLE | UNIT mm | SCALE 1:1 |

## 9. Packing

**Packing Method**



# 10. 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

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.

## 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.