



# CDTech(H.K.)Electronics Limited

## Product Specification

<b>Model Name</b>	S070SWV94HG
<b>Description</b>	Standard LCD Module 7.0" WVGA 800(RGB)x480 Dots
<b>Date</b>	2016/11/30
<b>Version</b>	2.0

<b>Approved by/Date</b>	<b>Check by/Date</b>	<b>Prepared by/Date</b>
Sam 2016/11/30	Borger 2016/11/30	Jack Guo 2016/11/30

<b>Customer Approval</b>	
<b>Date</b>	



# CDTech(H.K.)Electronics Limited

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## 1. Record of Revision

<b>Rev</b>	<b>Issued Date</b>	<b>Description</b>	<b>Editor</b>
1.0	2015/10/28	First Release.	Rich liang
2.0	2016/11/30	Update P&N	Jack Guo



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## 2. General Specifications

	Feature	Spec
Characteristics	Size	7 inch
	Resolution	800(horizontal)*480(Vertical)
	Interface	24-bit RGB
	Connect type	Connector
	Display Colors	16.7M
	Technology type	a-Si
	Pixel pitch (mm)	0.192*0.1805
	Pixel Configuration	R.G.B.-Stripe
	Display Mode	Normally White
	LCD Driver IC	HX8264-D,HX8664-B
	Viewing Direction	12 O'clock
Mechanical	LCM (W x H x D) (mm)	164.9*100*5.70
	Active Area(mm)	154.08 x 85.92
	With /Without TSP	Without TSP
	Weight (g)	TBD
	LED Numbers	27 LEDs

Note 1: Requirements on Environmental Protection: RoHs

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

## 3. Input/Output Terminals

No.	Symbol	Description
1,2	VLED+	Power for LED backlight anode
3,4	VLED-	Power for LED backlight cathode
5	GND	Ground
6	VCOM	Common voltage
7	DVDD	Power for Digital Circuit
8	MODE	DE/SYNC mode select
9	DE	Data input Enable
10	VS	Vertical sync signal
11	HS	Horizontal sync Signal
12~19	B7~B0	Data bus
20~27	G7~G0	Data bus
28~35	R7~R0	Data bus
36	GND	Power ground
37	DCOLK	Sample clock
38	GND	Power ground
39	L/R	Left/right selection
40	U/D	Up/down selection
41	VGH	Gata on voltage
42	VGL	Gata off voltage
43	AVDD	Power for analog circuit
44	RESET	Global reset pin
45	NC	NO connection
46	VCOM	Common Voltage
47	DITHB	Dither function
48	GND	Power ground
49~50	NC	NO connection

**Note 1:DE/SYNC mode select.Normally pull high**

**When select DE mode ,MODE="1",VS and HS must high**

**When select SYNC mode ,MODE="0",DE must be grounded**

**Note 2: when input 18 bit PGB data ,the two low bit of R,G and B and must be grounded**

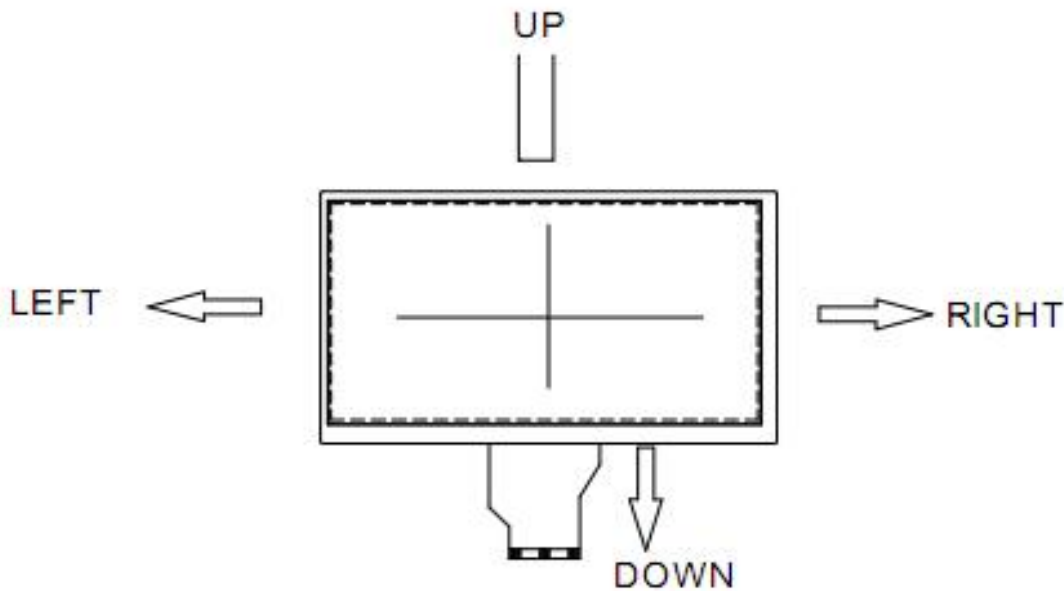
**Note 3: Data shall be latched at the falling edge of DCLK**

**Note 4: Selection of scanning mode**

Setting of scan control input		Scanning direction
U/D	L/R	
GND	DVDD	Up to down left to right
GVDD	GND	Down to up right to left
GND	GND	Up to down right to left
DVDD	DVDD	Down to up left to right

**Note5: Definition of scanning direction**

Refer to the figure as below



**Note 6:** Global reset pin Active low to enter reset state Suggest to connect with an RC Reset circuit for stability Normally pull high

**Note 7:** Dithering function enable control normally pull high

When DITHB=" 1" ,Disable internal dithering function

When DITHB=" 0" ,Enable internal dithering function

**Note 8:** Reserve for LED power input

#### 4. Absolute Maximum Rating

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

Parameter	Symbol	Min	Typ	Max	Unit
Supply Voltage	VDD	3.0	3.3	3.6	V
Current of power supply	IVDD	-	4.0	10	mA
Input voltage 'H' level	VIH	0.7VDD	-	VDD	V
Input voltage 'L' level	VIL	0	-	0.3VDD	V

##### 5.2 LED Driving Conditions

Item	Symbol	MIN	TYP	MAX	Unit	Remark
Forward Current	I <sub>F</sub>	-	180	-	mA	
Forward Voltage	V <sub>F</sub>	9.0	9.6	10.2	V	
Backlight Power consumption	W <sub>BL</sub>	1.488	1.728	1.98	W	
LED Lifetime		-	25000	-	Hrs	

Note 1: Each LED: I<sub>F</sub> =20 mA, V<sub>F</sub> =3.2±0.2V.

Note 2: Optical performance should be evaluated at Ta=25°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.

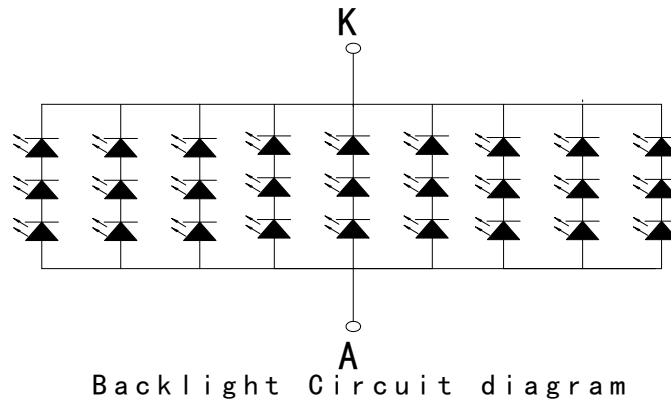


Figure: LED connection of backlight(Constant Current)

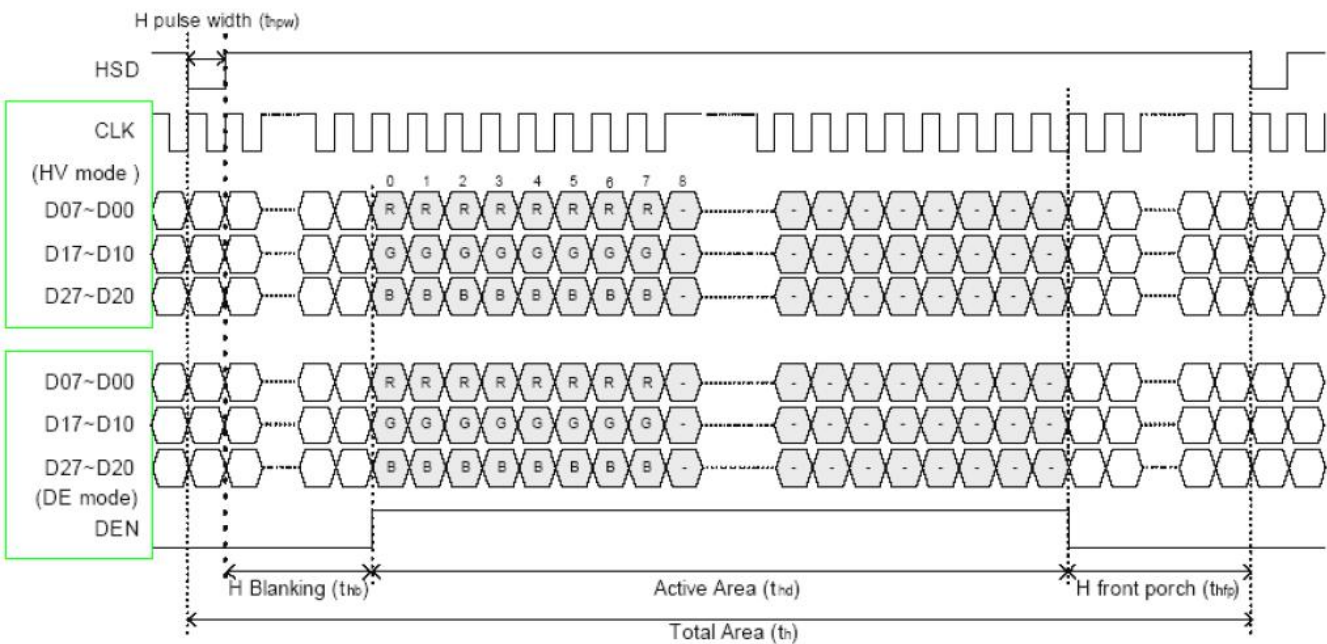
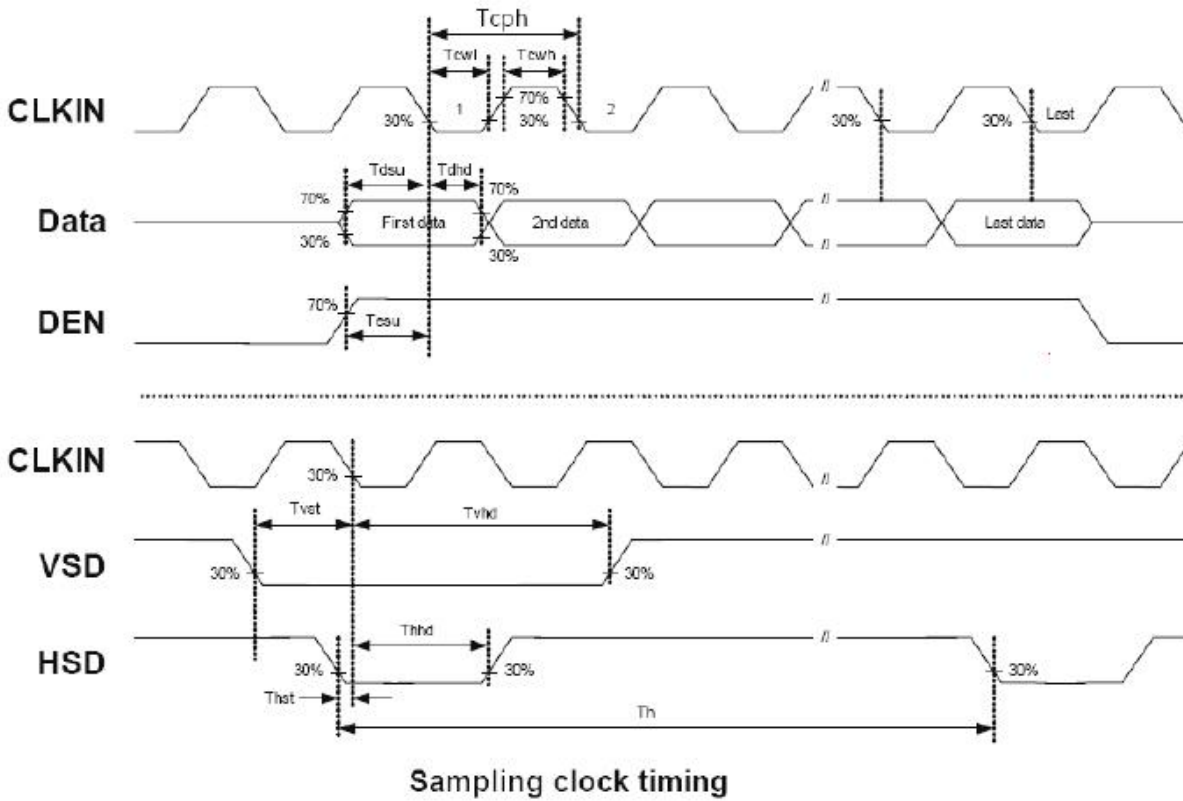


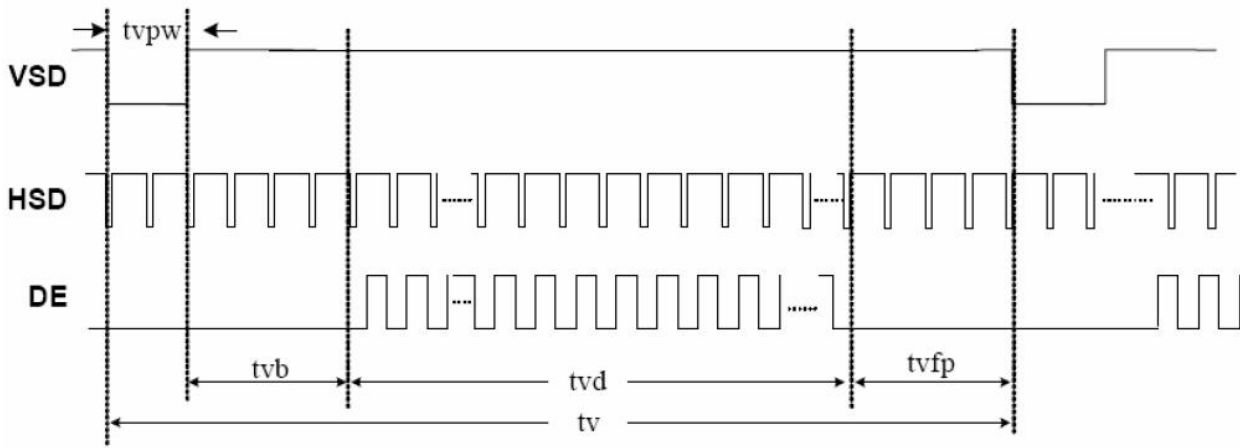
## 6. Interface Timing

### 6.1 Timing

Item	Symbol	Min.	Typ.	Max.	Unit	Note
DCLK cycle time	Tcph	25			ns	
DCLK frequency	fclk		30	40	MHz	
DCLK pulse duty	Tcwh	40	50	60	%	
VSD setup time	Tvst	8			ns	
VSD hold time	Tvhd	8			ns	
HSD setup time	Thst	8			ns	
HSD hold time	Thhd	8			ns	
Data setup time	Tdsu	8			ns	
Data hold time	Tdhd	8			ns	
DE setup time	Tesu	8			ns	
DE hold time	Tehd	8			ns	
Horizontal display area	thd		800		Tcph	
HSD period time	th		928		Tcph	
HSD pulse width	thpw	1	48		Tcph	
HSD back porch	thb		40		Tcph	
HSD front porch	thfp		40		Tcph	
Vertical display area	tvd		480		th	
VSD period time	tv		525		th	
VSD pulse width	tvpw		3		th	
VSD back porch	tvb		29		th	
VSD front porch	tvfp		13		th	

**6.2 Timing Diagram of Interface Signal**





Vertical timing

## 7. Optical Characteristics

Items	Symbol	Condition	Min.	Typ.	Max.	Unit	Remark	Note	
Response time	Tr+Tf	-	-	25	35	ms	FIG.1	Note4	
Contrast Ratio	CR		400	500	-	-	FIG.2	Note1	
Surface luminance	LV	$\theta = 0^\circ$	450	500	-	cd/m <sup>2</sup>	FIG.2	Note2	
Luminance uniformity	Yu	$\theta = 0^\circ$	-	70	-	%	FIG.2	Note3	
NTSC	-	$\theta = 0^\circ$	-	50	-	%	FIG.2	Note5	
Viewing angle	$\theta_T$	Center CR $\geq$ 10	40	50	-	deg	FIG.3	Note6	
	$\theta_B$		60	70	-	deg	FIG.3		
	$\theta_L$		60	70	-	deg	FIG.3		
	$\theta_R$		60	70	-	deg	FIG.3		
Chromaticity	Red	$R_X$	TBD	TBD	TBD	-	FIG.2 CIE1931	Note5	
		$R_Y$	TBD	TBD	TBD	-			
	Green	$G_X$	$\theta = 0^\circ$	TBD	TBD	TBD			-
		$G_Y$	$\phi = 0^\circ$	TBD	TBD	TBD			-
	Blue	$B_X$	$T_a = 25^\circ$	TBD	TBD	TBD			-
		$B_Y$		TBD	TBD	TBD			-
	White	$W_X$		TBD	TBD	TBD			-
		$W_Y$		TBD	TBD	TBD			-

**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)**

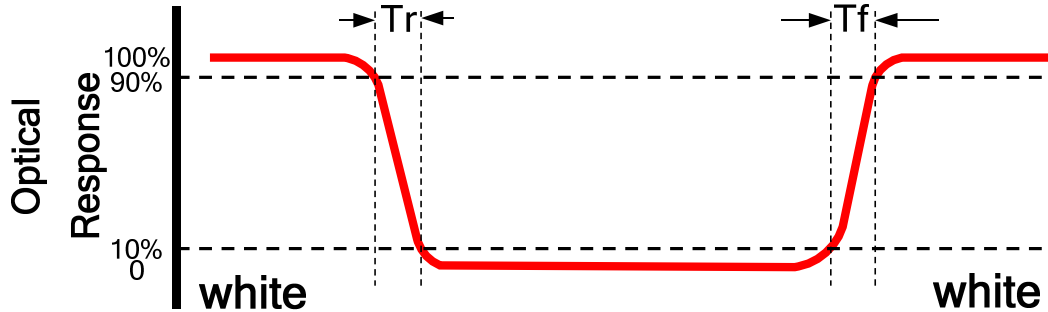
CIE (x,y) chromaticity,The x,y value is determined by screen active area center position P5.For more information see FIG.2.

**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 :  $S \leq 5''$  (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).

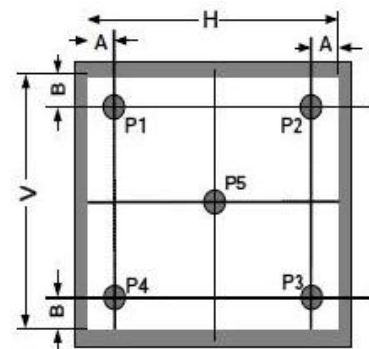


Figure a

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).

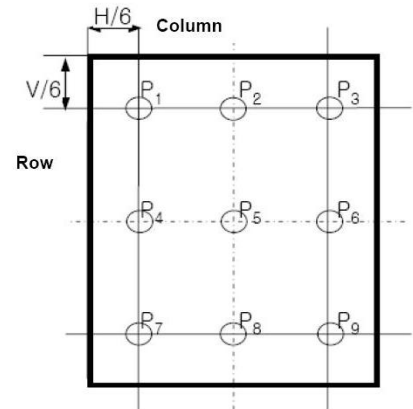


Figure b

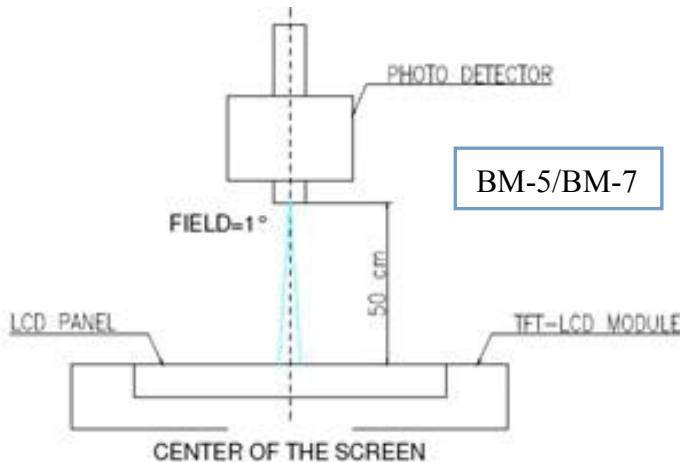
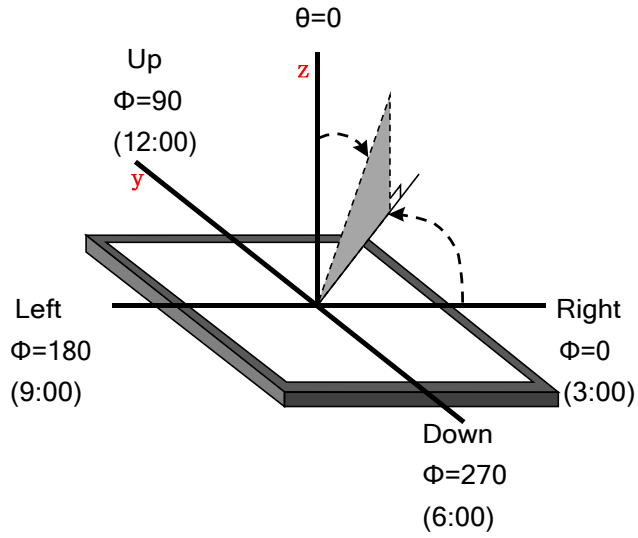


Figure c

FIG.3.The definition of viewing angle



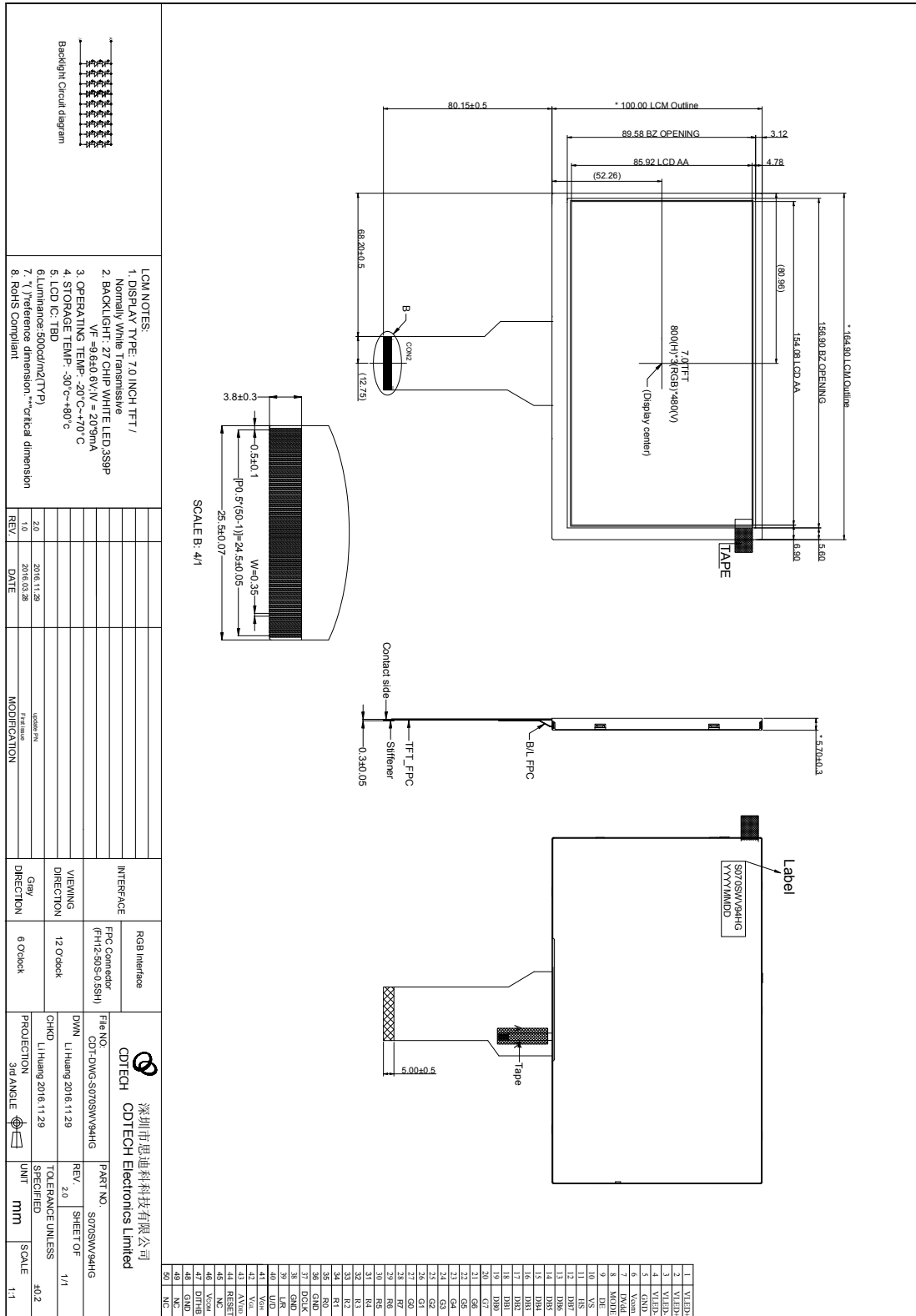
## 8. Environmental / Reliability Tests

No	Test Item	Condition	Remarks
1	High Temperature Operation	Ts= +70°C, 96hrs	Note 1 IEC60068-2-2, GB2423. 2-89
2	Low Temperature Operation	Ta= -20°C, 96hrs	Note 2 IEC60068-2-1 GB2423.1-89
3	High Temperature Storage	Ta= +80°C, 120hrs	IEC60068-2-2 GB2423. 2-89
4	Low Temperature Storage	Ta= -30°C, 120hrs	IEC60068-2-1 GB/T2423.1-89
5	High Temperature & Humidity Storage	Ta= +60°C, 90% RH max,120 hours	IEC60068-2-3 GB/T2423.3-2006
6	Thermal Shock (Non-operation)	-20°C 30 min ~ +60°C 30 min Change time: 5min, 30 Cycle	Start with cold temperature, end with high temperature IEC60068-2-14, GB2423.22-87
7	Electro Discharge (Operation) Static	C=150pF, R=330 Ω, 5 points/panel Air:±8KV, 5 times; Contact: ±4KV, 5 times; (Environment: 15°C ~ 35°C, 30% ~ 60%, 86Kpa ~ 106Kpa)	IEC61000-4-2 GB/T17626.2-1998
8	Vibration (Non-operation)	Frequency range: 10~55Hz, Stroke: 1.mm Sweep: 10Hz~55Hz~10Hz 2 hours for each direction of X .Y. Z. (package condition)	IEC60068-2-6 GB/T2423.5-1995
9	Shock (Non-operation)	60G 6ms, ± X, ±Y , ± Z 3 times for each direction	IEC60068-2-27 GB/T2423.5-1995
10	Package Drop Test	Height: 80 cm, 1 corner, 3 edges, 6 surfaces	IEC60068-2-32 GB/T2423.8-1995

- Note: 1. Ts is the temperature of panel's surface.  
 2. Ta is the ambient temperature of sample.  
 3. The size of sample is 5pcs.

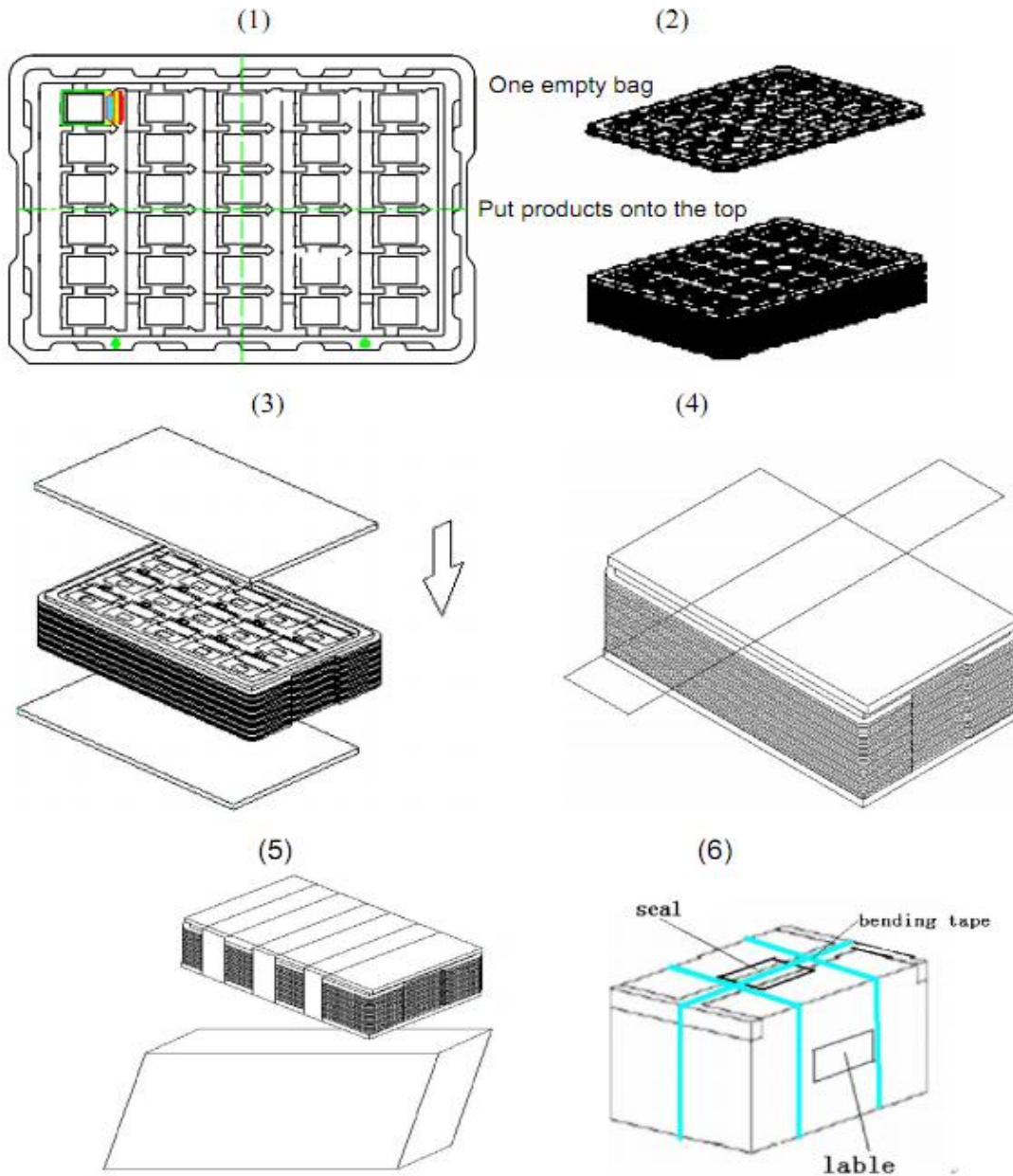


## 9. Mechanical Drawing



## 10. Packing

### Packing Method



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.



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## 11. TFT-LCD Module Inspection Criteria

### 11.1 Scope

The incoming inspection standards shall be applied to TFT - LCD Modules (hereinafter Called "Modules") that supplied by CDTech Technology LTD.

### 11.2 Incoming Inspection

The customer shall inspect the modules within twenty calendar days of the delivery date (the "inspection period") at its own cost. The result of the inspection (acceptance or rejection) shall be recorded in writing, and a copy of this writing will be promptly sent to The seller, If the results of the inspecting from buyer does not send to the seller within twenty Calendar days of the delivery date. The modules shall be regards as acceptance. Should the customer fail to notify the seller within the inspection period, the buyers Right to reject the modules shall be lapsed and the modules shall be deemed to have Been accepted by the buyer

### 11.3 Inspection Sampling

- 3.1. Lot size: Quantity per shipment lot per model
  - 3.2. Sampling type: Normal inspection, Single sampling
  - 3.3. Inspection level: II
  - 3.4. Sampling table: MIL-STD-105E
  - 3.5. Acceptable quality level (AQL )
- Major defect: AQL=0.65 Minor defect: AQL=1.00

### 11.4 Inspection Conditions

#### 4.1 Ambient conditions:

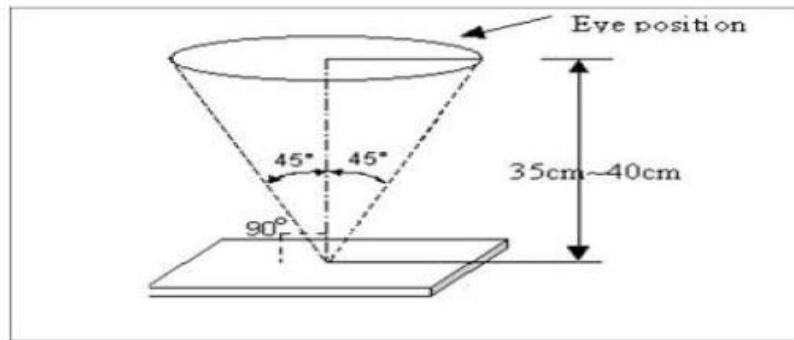
- a. Temperature: Room temperature  $25 \pm 5^{\circ}\text{C}$
- b. Humidity:  $(60 \pm 10) \% \text{RH}$
- c. Illumination: Single fluorescent lamp non-directive (300 to 700 Lux)

#### 4.2 Viewing distance

The distance between the LCD and the inspector's eyes shall be at least  $35 \pm 5$  cm.

#### 4.3 Viewing Angle

U/D:  $45^{\circ} / 45^{\circ}$  , L/R:  $45^{\circ} / 45^{\circ}$



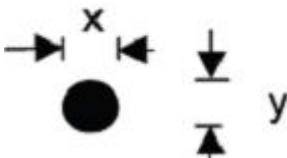
## 11.5 Inspection Criteria

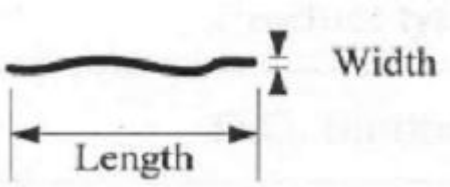
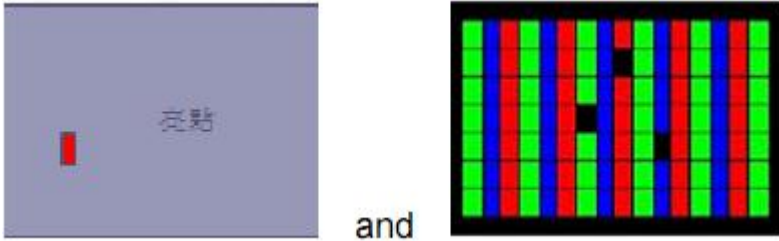
Defects are classified as major defects and minor defects according to the degree of Defectiveness defined herein.

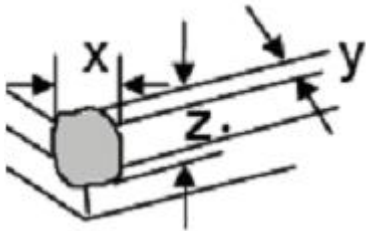
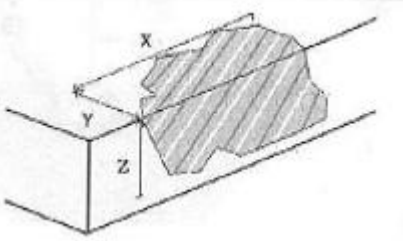
### 11.5.1 Major defect

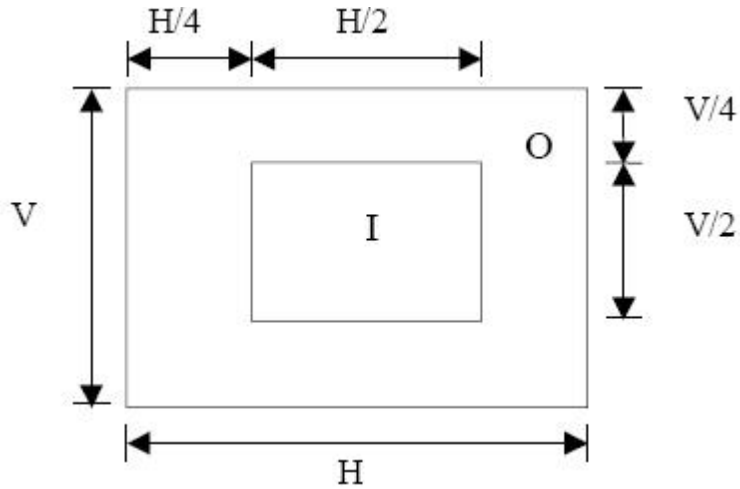
Item No	Items to be inspected	Inspection Standard
5.1.1	All functional defects	1) No display 2) Display abnormally 3) Short circuit 4) line defect
5.1.2	Missing	Missing function component
5.1.3	Crack	Glass Crack

### 11.5.2 Minor defect

Item No	Items to be inspected	Inspection standard								
5.2.1	Spot Defect Including Black spot White spot Pinhole Foreign particle Polarizer dirt	For dark/white spot is defined $\phi = (x+y) / 2$ 								
		<table border="1"> <thead> <tr> <th>Size <math>\phi</math>(mm)</th> <th>Acceptable Quantity</th> </tr> </thead> <tbody> <tr> <td><math>\phi \leq 0.2</math></td> <td>Ignore</td> </tr> <tr> <td><math>0.2 &lt; \phi \leq 0.5</math></td> <td>3</td> </tr> <tr> <td><math>0.5 &lt; \phi</math></td> <td>Not allowed</td> </tr> </tbody> </table>	Size $\phi$ (mm)	Acceptable Quantity	$\phi \leq 0.2$	Ignore	$0.2 < \phi \leq 0.5$	3	$0.5 < \phi$	Not allowed
		Size $\phi$ (mm)	Acceptable Quantity							
		$\phi \leq 0.2$	Ignore							
$0.2 < \phi \leq 0.5$	3									
$0.5 < \phi$	Not allowed									
Size $\phi$ (mm)	Acceptable Quantity									
$\phi \leq 0.2$	Ignore									
$0.2 < \phi \leq 0.5$	3									
$0.5 < \phi$	Not allowed									

5.2.2	Line Defect Including Black line White line Scratch	Define:			
					
		Width(mm) Length(mm)		Acceptable Quantity	
		$W \leq 0.03$		Ignore	
		$0.03 < W \leq 0.04$ $L \leq 5.0$		4	
$0.04 < W$ , or $L > 5.0$		Not allowed			
5.2.3	Polarizer Dent/Bubble	Size $\phi$ (mm)		Acceptable Quantity	
		$\phi \leq 0.25$		Ignore	
		$0.25 < \phi \leq 0.5$		3	
		$0.5 < \phi$		Not allowed	
		Total QTY		3	
5.2.4	Electrical Dot Defect	Bright and Black dot define:			
					
		Two Adjacent Dot			
		Inspection pattern: Full white, Full black, Red, green and blue screens			
		Item	Acceptable Quantity		
			I	O	Total
		Black dot defect	2	3	4
Bright dot defect	0	3	3		
Total Dot	2	4	5		
3% Bright Dot is allowed					

5.2.5	Glass defect		
		<b>1. Corner Fragment:</b>	
		<b>Size(mm)</b>	<b>Acceptable Quantity</b>
		$X \leq 3\text{mm}$ $Y \leq 1\text{mm}$ $Z \leq T$	<b>Ignore</b> <b>T: Glass thickness</b> <b>X: Length</b> <b>Y: Width</b> <b>Z: thickness</b>
		<b>2. Side Fragment:</b> 	
		<b>Size(mm)</b>	<b>Acceptable Quantity</b>
$X \leq 5.0\text{mm}$ $Y \leq 1\text{mm}$ $Z \leq T$	<b>T: Glass thickness</b> <b>X: Length</b> <b>Y: Width</b> <b>Z: thickness</b>		



## I area & O area

- Note:
- 1). Dot defect is defined as the defective area of the dot area is larger than 50% of the dot area.
  - 2). The distance between two bright dot defects (red, green, blue, and white) should be larger than 15mm.
  - 3). The distance between black dot defects or black and bright dot defects should be more than 5mm apart.
  - 4). Polarizer bubble is defined as the bubble appears on active display area. The defect of polarizer bubble shall be ignored if the polarizer bubble appears on the outside of active display area.

## 11.6 Mechanics specification

As for the outside dimension, weight of the modules, please refer to product specification  
For more details

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

### **12.1 Handling Precautions**

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

12.1.2. 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.

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

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

12.1.5. 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

12.1.6. Do not attempt to disassemble the LCD Module.

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

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

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

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

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

12.1.8.4. 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.

### **12.2 Storage Precautions**

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

12.2.2. 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°C ~ 40°C      Relatively humidity: ≤80%

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





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## **12.3 Transportation Precautions**

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