



**WANXIN IMAGE**  
INCORPORATION

# Product Specifications

## 4.3" TFT-LCD with Touch Panel Module Model No. : WXCAT43-TG3#001

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## Records of Version

Version	Revise Date	Page	Content
1.0	2007-05-31	all	New released
1.1	2007-06-15		Modify Touch Panel
1.2	2008-05-08		Modify Touch Panel



## **1 General Description**

**WXCAT43-TG3#001** is a transmissive type a-Si TFT-LCD (amorphous silicon thin film transistor liquid crystal display) module, which is composed of a TFT-LCD panel, a driver circuit, a backlight unit, and a 4-wires analog resistive type touch panel. The panel size is 4.3 inch and the resolution is 480×272. The panel can display up to 16.7M colors and is suitable for portable device display application.

### **1.1 Features**

- ◆ High image quality a-Si TFT LCD module.
- ◆ 16:9 wide display
- ◆ 16,777,216 color number.
- ◆ 24bit RGB Interface
- ◆ High contrast, high brightness.
- ◆ Light weight, slim design.
- ◆ Low power consumption.
- ◆ Line inversion mode with stripe type.
- ◆ 4-wires analog resistive type touch panel.

### **1.2 Application**

- ◆ Display terminals for portable devices, such as
  - ✦ GPS (Global Positioning System),
  - ✦ DVB (Digital Video Broadcasting),
  - ✦ DSC (Digital Still Camera),
  - ✦ PMP (Portable Multimedia Player),
  - ✦ Other devices which require high quality displays.



### 1.3 General Specification

No	Item	Specification	Remark
1	Type	Transmissive	
2	Display Mode	Normally White	
3	Pixel Element	a-Si TFT	
4	Screen Size	4.3 inch (diagonal)	
5	Resolution	480(RGB)×272	
6	Color Number	16,777,216	
7	Active Area	95.04×53.856 (mm)	
8	Dot Pitch	183×183(μm)	
9	Color Arrangement	RGB-stripe	
10	Assembly Type	COG	
11	Back Light	LED	
12	Viewing Direction	6 o'clock	
13	Module Dimension	105.5mm×67.2mm×4.05mm	
14	Power Supply	2.25~3.6 (V)	
15	Interface	RGB 24-bit	
16	Surface Treatment	UV Cut/Anti Glare	

#### 1.3.1 Touch Panel

No	Item	Specification	Remark
1	Type	4 Wires Analog Resistive Type	
2	Input Mode	Special Stylus or Finger	
3	Surface Treatment	Anti-Glare Type	
4	Glass Thickness	0.7 (mm)	
5	Active Area	96.7 x 55.5 (mm)	
6	Viewing Area	98.70 x 57.0 (mm)	
7	Outline Dimension	104.9x66x1.15 (mm)	
8	Activation Force	≤ 80 (gf)	Finger/Stylus Within" guaranteed active area", but not on the age and Dot-Spacer.
9	Surface Hardness	≥ 3H	



## 2 Absolute Maximum Ratings

### 2.1 Electrical Absolute Maximum Ratings

#### 2.1.1 TFT-LCD Panel Absolute Maximum Ratings

Parameter	Symbol	Min.	Max.	Unit	Note
Power supply	VCC	-0.3	6.0	V	
analog voltage	AVDD	-0.3	6.0	V	
Logic input voltage	VI1	-0.3	VCC+0.3	V	
Logic output voltage	VO1	-0.3	VCC+0.3	V	

- If the LSI is used above these absolute maximum ratings, it may become permanently damaged. Using the LSI within the following electrical characteristics limit is strongly recommended for normal operation. If these electrical characteristic conditions are also exceeded, the LSI will malfunction and cause poor reliability.

#### 2.1.2 Back-Light Unit

Ta=25°C

Item	Symbol	Min	Max	Unit	Remark
Forward current	I <sub>B</sub>	--	25	mA	--

#### 2.1.3 Touch Panel

Ta=25°C

Item	Symbol	Min	Max	Unit	Remark
DC Voltage	V <sub>TP</sub>	3	15	V	DC

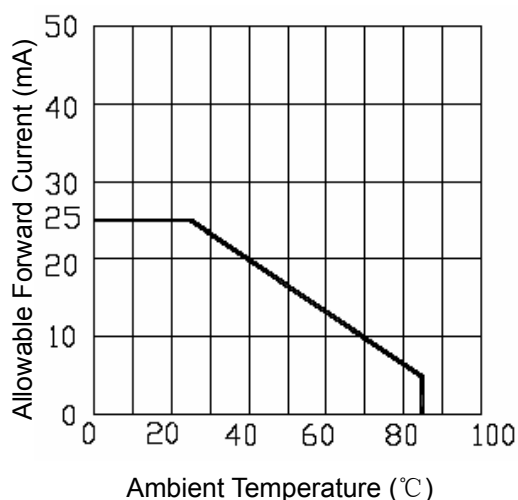


## 2.2 Environment Absolute Maximum Ratings

### 2.2.1 TFT-LCD Module

Item	Symbol	Min	Max	Unit	Remark
Operation temperature range	Top	-20	70	°C	Ambient
Storage temperature range	Tst	-30	80	°C	Ambient

- Corrosive gas environment is not acceptable.
- TFT-LCD color will change slightly depending on environment temperature. This phenomenon is reversible. Current reduction rate of LED backlight is according to the graph indicated below:



### 2.2.2 Touch Panel

Item		Symbol	Min	Max	Unit	Remark
Operation	Temperature	Top	-10	60	°C	Ambient
	Humidity	RHop	20	90	%	Maximum wet temperature is 38 °C. No dew condensation.
Storage	Temperature	Tst	-20	70	°C	Ambient
	Humidity	RHst	10	90	%	Maximum wet temperature is 38 °C. No dew condensation.



### 3 Electrical Characteristics

#### 3.1 TFT-LCD Module

Characteristics	Symbol	Min.	Typ.	Max.	Unit
Power supply	VCC	2.25	3.3	3.6	V
analog voltage	AVDD	4.8	-	5.2	V
Input high voltage	V <sub>IH</sub>	0.7*VCC	-	VCC	V
Input low voltage	V <sub>IL</sub>	0	-	0.3*VCC	V
Clock frequency	f <sub>CLK</sub>	-	9	15	MHz

#### 3.2 Back-Light Unit

Item	Symbol	Min.	Typ.	Max.	Unit	Remark
Current	I <sub>B</sub>	--	20	25	mA	
Forward voltage	V <sub>F</sub>	--	25.6	28.8	V	
Power Consumption	P <sub>BL</sub>	--	512	720	mW	

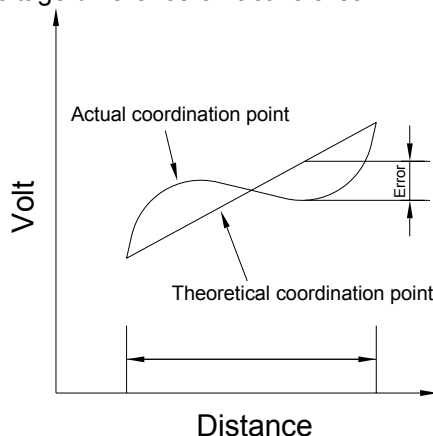
- Eight LEDs are in serial type.
- The luminous intensity of LED is strongly dependent on the driving current.

#### 3.3 Touch Panel

Item	Direction	Value	Unit	Remark
Resistance between terminals	X (Film)	200 ~ 900		
	Y (Glass)	200 ~ 900		
Linearity	X	≤ 1.5	%	Note 1
	Y	≤ 1.5		
Chattering	--	≤ 10	ms	
Insulation resistance	--	≥ 20M		DC 25V

Note 1: Measurement condition of Linearity

Difference between actual voltage & theoretical voltage is an error at any points. Linearity is the value max. Error voltage divided by voltage difference on active area.







## 4 Optical Specification

### 4.1 TFT-LCD Module

$T_a=25^{\circ}\text{C}$ ,  $V_{cc}=3.3\text{V}$ ,  $I_B=20\text{mA}$

Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Remark
Brightness		B	$\theta=0^{\circ}$	200	250	--	$\text{cd/m}^2$	with TP Note 1
				250	300			w/oTP Note 1
Contrast Ratio		CR	$\theta=0^{\circ}$	300	400	--	--	Note 2
Response Time		Rising : $T_r$	Normal viewing angle	--	25	40	ms	Note 3
		Falling : $T_f$						
Color Chromaticity (CIE 1931)	White	X	At the center of panel	0.261	0.311	0.361	--	
		Y		0.288	0.338	0.388		
	Red	X	Backlight On	0.533	0.583	0.633		
		Y		0.302	0.352	0.402		
	Green	X	Equipment: BM7 Field= $2^{\circ}$	0.292	0.342	0.392		
		Y		0.542	0.592	0.642		
	Blue	X		0.095	0.145	0.195		
		Y		0.077	0.127	0.177		
Viewing Angle	Top	$\theta_U$	$CR \geq 10$ Backlight On Equipment: BM7 Field= $2^{\circ}$	--	65	--	Degrees	Note 4
	Bottom	$\theta_D$		--	50	--		
	Left	$\theta_L$		--	60	--		
	Right	$\theta_R$		--	60	--		
Uniformity		Un	$\theta=0^{\circ}$ Normal viewing angle Backlight On Equipment: BM7 Field= $2^{\circ}$	70	80	--	%	Note 5

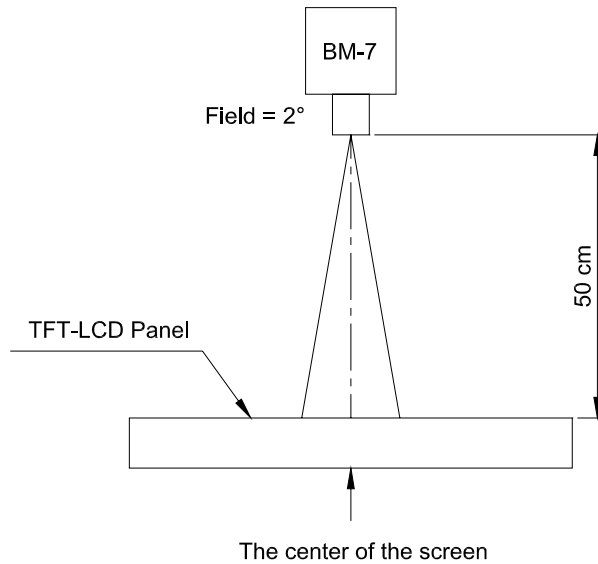
### 4.2 Touch Panel

Item	Specification	Remark
Light Transmission	$\geq (80\%)$	
Haze	$\leq (3\%)$	



**Note 1: The brightness test equipment setup**

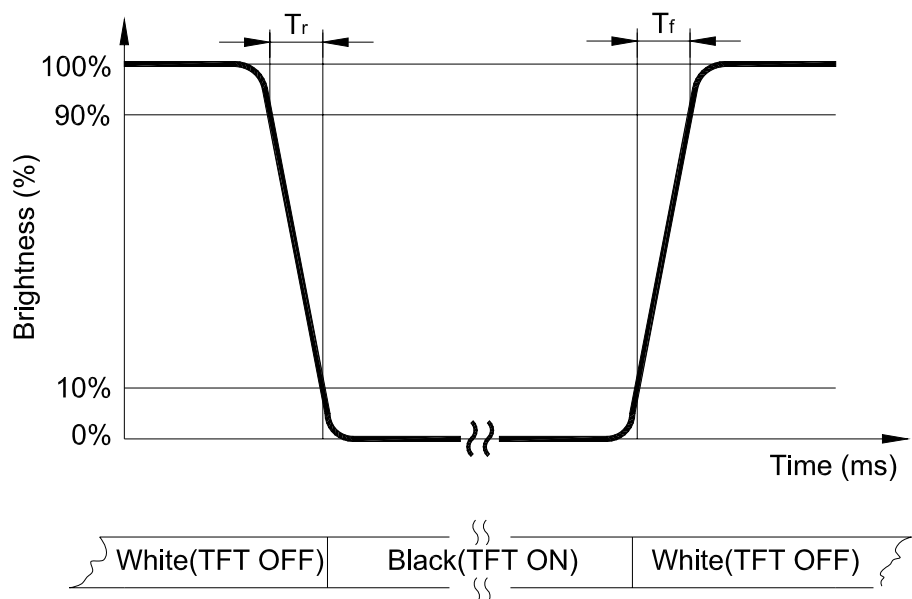
$I_B=20\text{mA}$ , Field= $2^\circ$  (As measuring "black" image, field= $2^\circ$  is the best testing condition)



**Note 2: Definition of contrast ratio (C.R)**

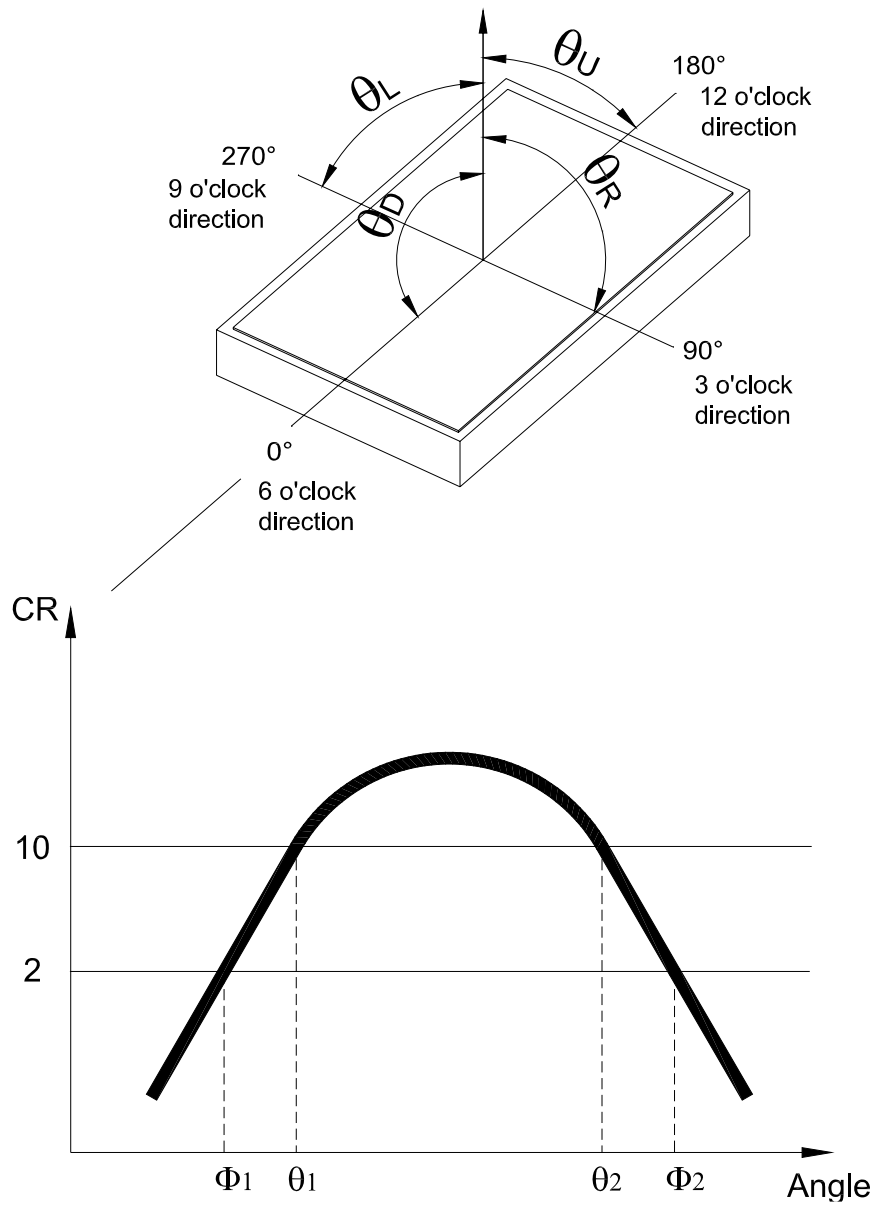
$$\text{C.R} = \frac{\text{Brightness When LCD is at "White" State}}{\text{Brightness When LCD is at "Black" State}}$$

**Note 3: Definition of response time**



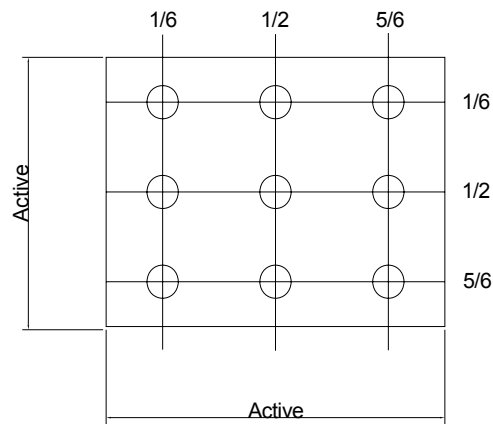


Note 4: Definition of viewing angle





Note 5: Definition of uniformity ( $U_n$ )

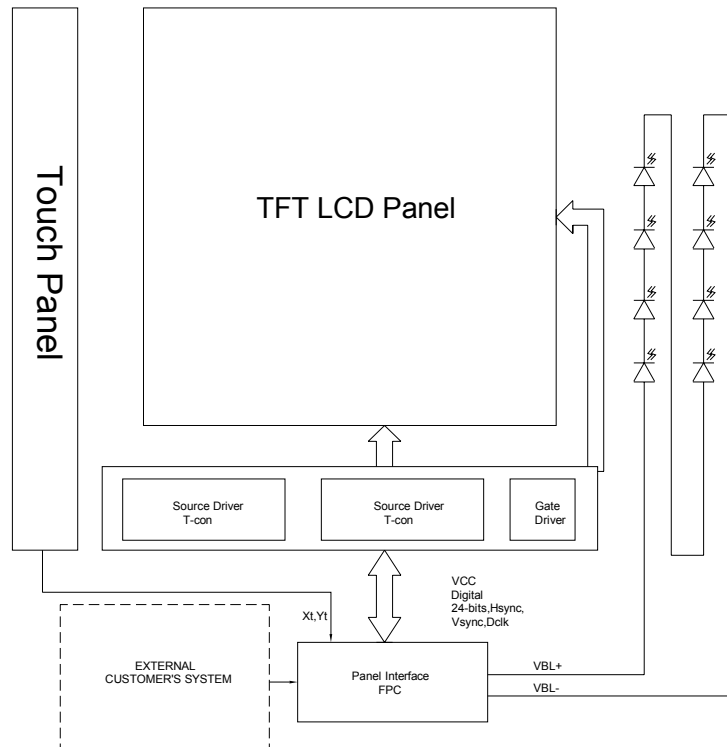


$$U_n = \frac{B_{\min}}{B_{\max}} \times 100\%$$

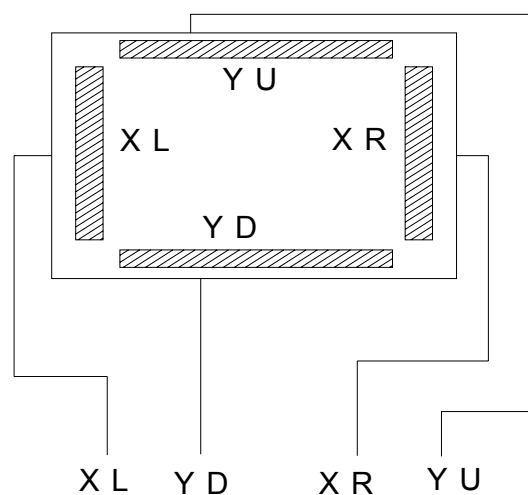


## 5 Block Diagram

### 5.1 TFT-LCD Module



### 5.2 Touch Screen Panel





## 6 Interface Specification

Pin No	Symbol	Description	Input/Output	Note
1	VLED-	Backlight Cathode	I	
2	VLED+	Backlight Anode	I	
3	VCC/VSS	Power Supply (3.3V)/ Power Ground	I	
4	VCC	Power Supply (3.3V)	I	
5	R0	Data 0	I	
6	R1	Data 1	I	
7	R2	Data 2	I	
8	R3	Data 3	I	
9	R4	Data 4	I	
10	R5	Data 5	I	
11	R6	Data 6	I	
12	R7	Data 7	I	
13	G0	Data 8	I	
14	G1	Data 9	I	
15	G2	Data 10	I	
16	G3	Data 11	I	
17	G4	Data 12	I	
18	G5	Data 13	I	
19	G6	Data 14	I	
20	G7	Data 15	I	
21	B0	Data 16	I	
22	B1	Data 17	I	
23	B2	Data 18	I	
24	B3	Data 19	I	
25	B4	Data 20	I	
26	B5	Data 21	I	
27	B6	Data 22	I	
28	B7	Data 23	I	
29	VSS	Power Ground	I	
30	DCLK	Dot Clock Signal	I	
31	DISP	Display On/off Mode Control	I	
32	HSYNC	Horizontal Synchronization Signal	I	
33	VSYNC	Vertical Synchronization Signal	I	
34	DE	Input Data Enable Control	I	



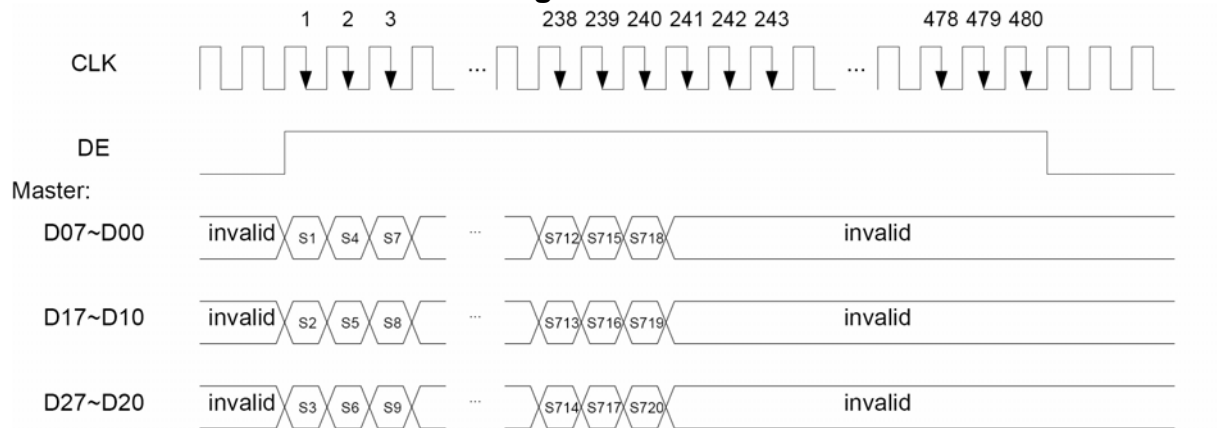
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35	VDD	Power Supply	I	
36	VDD /VSS	Power Supply /Power Ground	I	
37	XR	Touch Panel Glass Terminal	I	
38	YD	Touch Panel Film Terminal	I	
39	XL	Touch Panel Glass Terminal	I	
40	YU	Touch Panel Film Terminal	I	



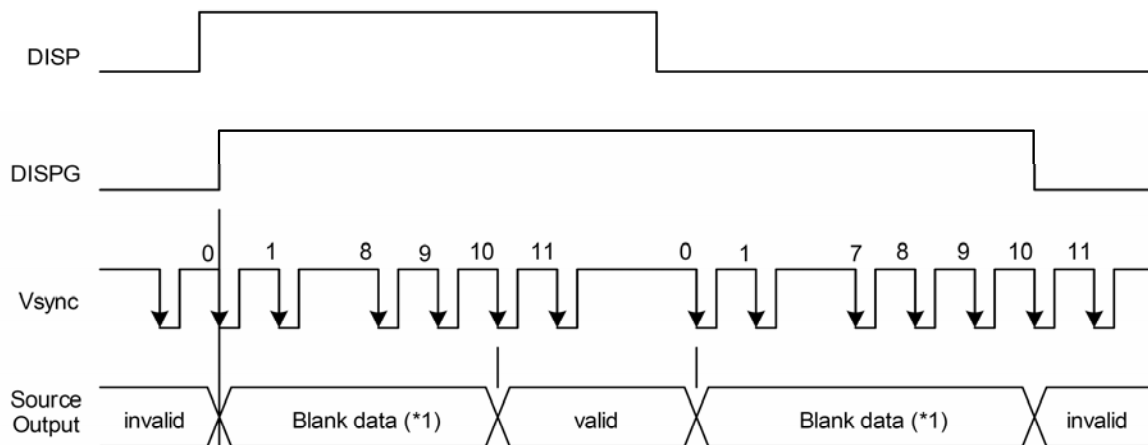
## 7 Interface Introduction

### 7.1 24-bit RGB interface timing



### 7.2 Power ON/OFF Control

When DISP pin is pulled “H”, blank data is outputted for 10-frames first, from the falling edge of the following VSYNC signal. Similarly, when DISP is pulled “L”, 10-frames of blank data will be outputted from the falling edge of the following VSYNC, too. The blank data would be gray level 255.







### 7.3 DC Characteristics

(TA =25°C, VCC=2.25V to 3.6V)

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Input low leakage current	I <sub>IL</sub>	No pull-up or pull-down	-1	-	1	A
Input high leakage current	I <sub>IH</sub>	No pull-up or pull-down	-1	-	1	A
Output low voltage	V <sub>OL</sub>	I <sub>OL</sub> =1mA	0	-	0.4	V
Output high voltage	V <sub>OH</sub>	I <sub>OH</sub> =-1mA	VCC-0.4	-	VCC	V
Gamma resistor	R <sub>GMA</sub>	AVDD=5V, TA =25°C, V <sub>O</sub> to V <sub>n</sub> =4V	-	17.1	-	kΩ
Driver output current	I <sub>VOL</sub>	AVDD=5V, V <sub>O</sub> =0.2V, V <sub>IN</sub> =0.7V	-	-	80	A
	I <sub>VOH</sub>	AVDD=5V, V <sub>O</sub> =4.8V, V <sub>IN</sub> =4.3V	80	-	-	A
Average output deviation (chip to chip)	ΔV <sub>d</sub>	Center gray level	-	-	10	mV
Output deviation	ΔV <sub>O1</sub>	V <sub>O</sub> =1.5V to AVDD-1.5V	-	±10	±15	mV
Output deviation	ΔV <sub>O2</sub>	V <sub>O</sub> < 1.5V or >AVDD-1.5V	-	±20	±40	mV
Logic dynamic current	I <sub>DD1</sub>	DVDD	-	1.0	2.0	mA
Driver dynamic current	I <sub>DD2</sub>	AVDD	-	8.75	10	mA
Input pull up/down resistance	R <sub>I</sub>	V <sub>IL</sub> = 0V or V <sub>IH</sub> = DVDD	150	-	-	kΩ



## 7.4 AC Characteristics

### 7.4.1 Switching characteristics

(TA =25°C, VCC=2.25V to 3.6V)

Parameter	Symbol	Min.	Typ.	Max.	Unit
Logic output delay time	$T_{PLH}^{(1)}$	-	-	50	ns
Driver output delay time	$T_{PLH2}^{(2)}$	-	-	10	s
	$T_{PLH3}^{(3)}$	-	-	12	s
	$T_{PHL2}^{(2)}$	-	-	10	s
	$T_{PHL3}^{(3)}$	-	-	12	s
Input Capacitance	$C_{I1}$	-	-	10	pF

**Note:**

(1) CLK edge to CKV, STV, OEV and COMSIG pins, CL = 15pF

(2) Specified when driver voltage reaches 10% or 90% of the target level. RL=17 kΩ, CL=40pF, VCC=3.3V.

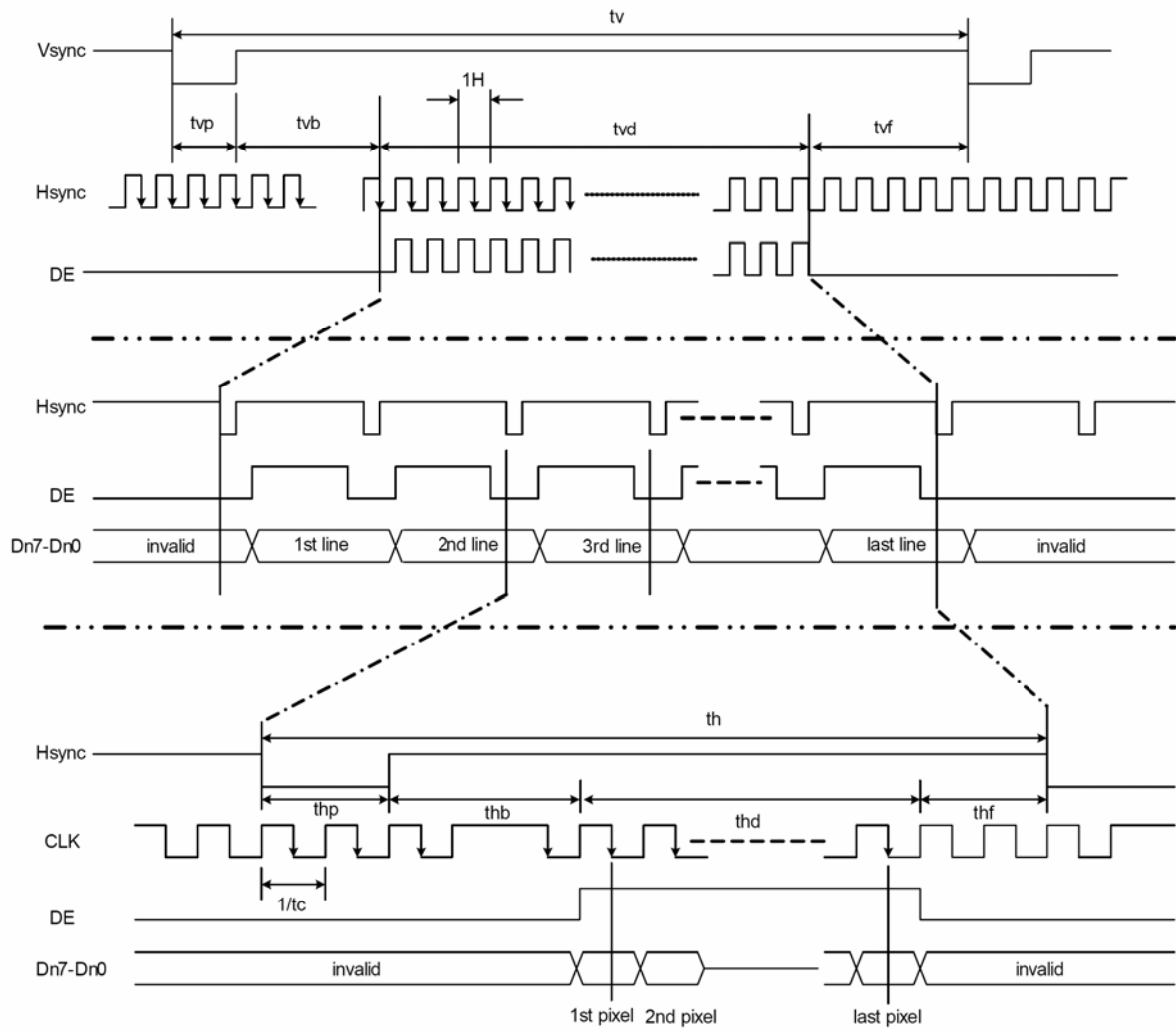
(3) Specified when driver voltage reaches 6-bit accuracy of the target level. RL=17 kΩ, CL=40pF, VCC=3.3V.

### 7.4.2 Timing Requirement 1

Parameter	Symbol	Min.	Typ.	Max.	Unit
Clock cycle	$f_{CLK}$	-	9	15	MHz
Hsync cycle	1/th	-	17.14	-	KHz
Vsync cycle	1/tv	-	59.94	-	Hz
Horizontal Signal					
Horizontal cycle	$th^{(1)}$	-	525	-	CLK
Horizontal display period	thd	-	480	-	CLK
Horizontal front porch	thf	2	-	-	CLK
Horizontal pulse width	thp	2	41	-	CLK
Horizontal back porch	thb	2	2	-	CLK
Vertical Signal					
Vertical cycle	tv	-	286	-	H
Vertical display period	tvd	-	272	-	H
Vertical front porch	tvf	1	2	-	H
Vertical pulse width	tvp	1	10	-	H
Vertical back porch	tvb	1	2	-	H

**Note:**

(1) thd=480CLK, thf=2CLK, thp=41CLK, thb=2CLK, thf + thp + thb > 44CLK. (CLK=1/ fCLK ,H=th)

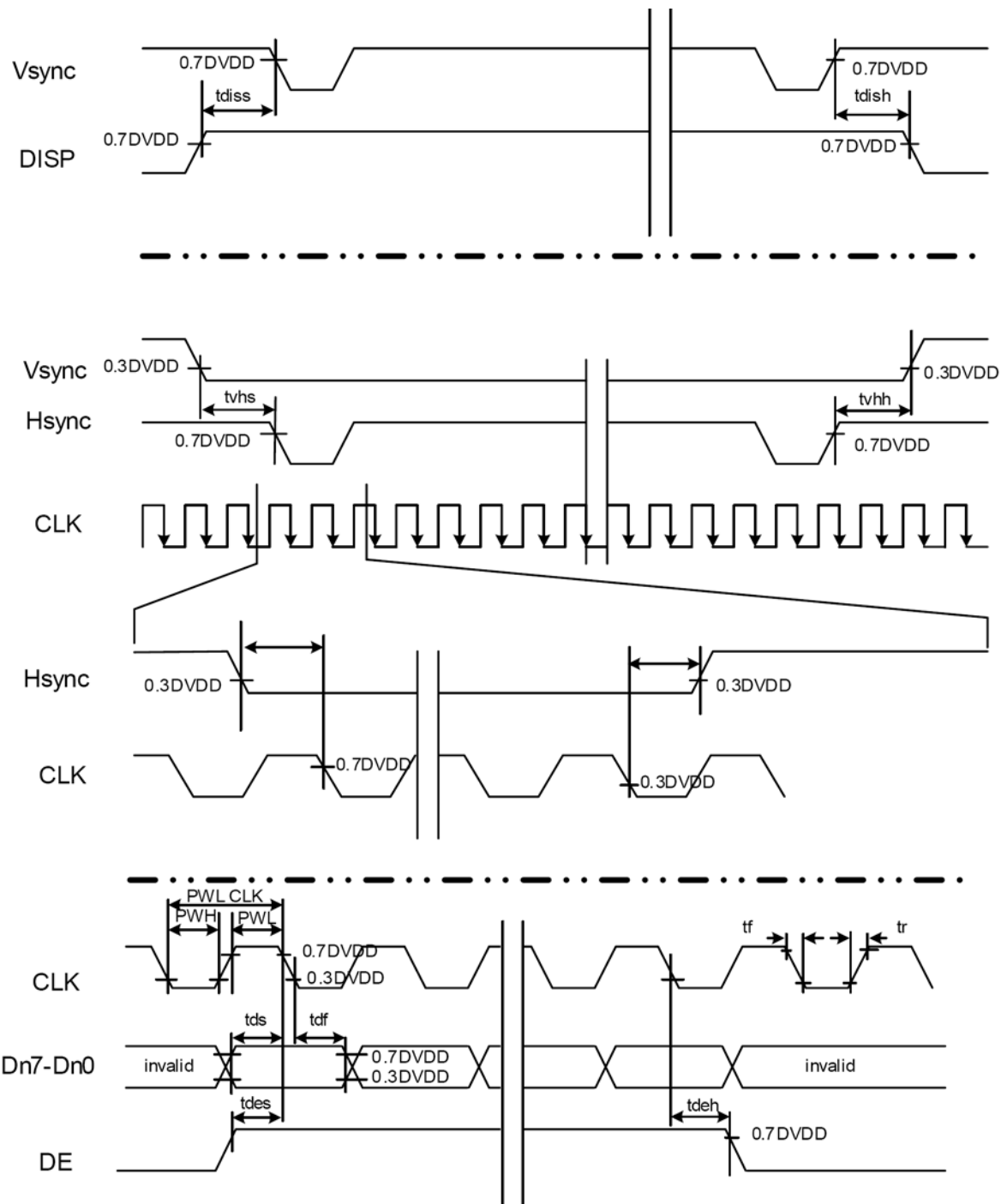




### 7.4.3 Timing Requirement 2

Parameter	Symbol	Min.	Typ.	Max.	Unit
DISP setup time	tdiss	10	-	-	ns
DISP hold time	tdish	10	-	-	ns
Clock period	P <sub>WCLK</sub>	66.7	-	-	ns
Clock pulse high period	P <sub>WH</sub>	26.7	-	-	ns
Clock pulse low period	P <sub>WL</sub>	26.7	-	-	ns
Hsync setup time	ths	10	-	-	ns
Hsync hold time	thh	10	-	-	ns
Data setup time	tds	10	-	-	ns
Data hold time	tdh	10	-	-	ns
DE setup time	tdes	10	-	-	ns
DE hold time	tdeh	10	-	-	ns
Vsync setup time	tvhs	10	-	-	ns
Vsync hold time	tvhh	10	-	-	ns

**Note:** (1) tr, tf is defined 10% to 90% of signal amplitude.





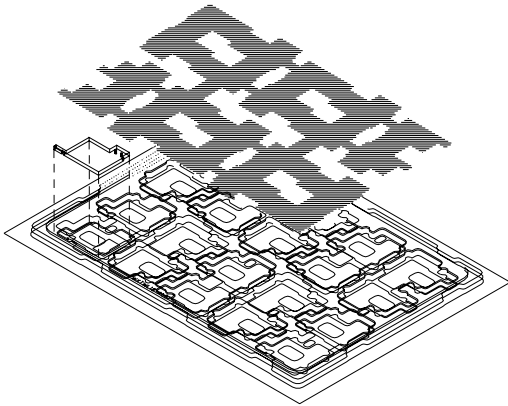
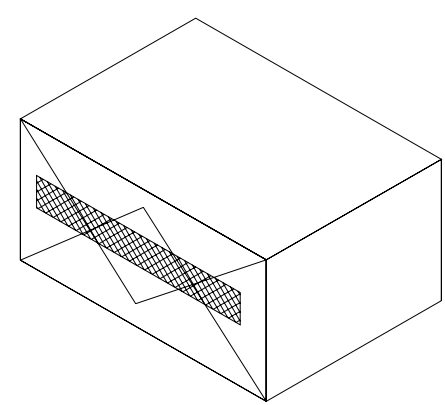
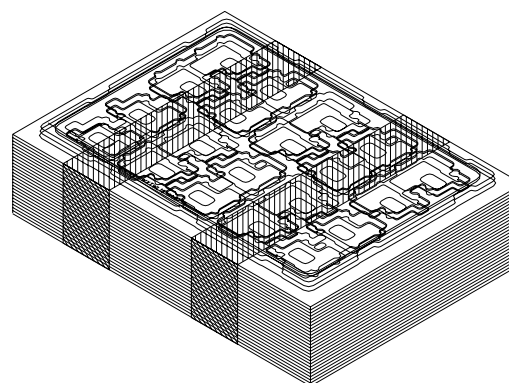
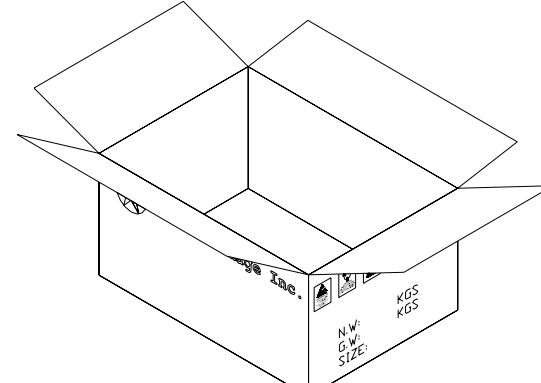
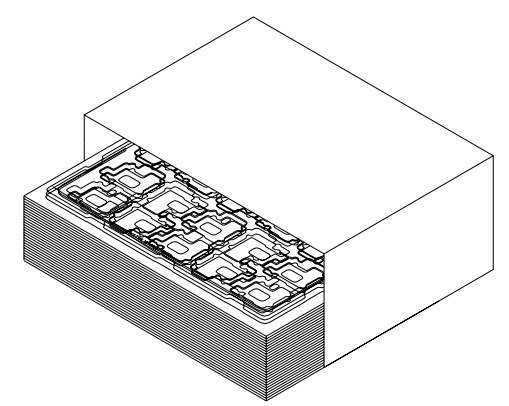
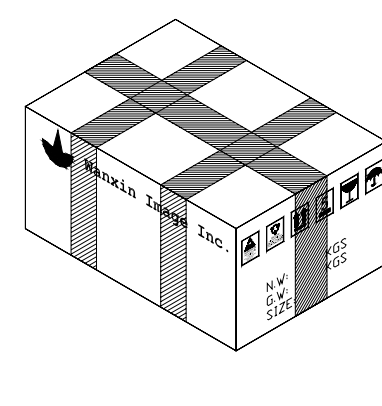
## **8 Outline Dimension**

See next page.





## 9 Package

<p>1</p>  <p>8 pcs per tray + 1 cover (EPE)</p>	<p>4</p>  <p>Packing bag</p>
<p>2</p>  <p>25trays + 1 dummy tray = 200 pcs Packing 26 trays with sealing tape</p>	<p>5</p>  <p>Putting bag into carton Protected by 6 pieces of cushion EPE sheet</p>
<p>3</p>  <p>Putting trays into anti-electrostatic bag</p>	<p>6</p>  <p>Packing carton with sealing tape Carton outline size: 417×310×262 (mm)</p>





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## **10 Precautions**

Please pay attentions to the followings as using the LCD module.

### **10.1 Handling**

- (a) Do not apply strong mechanical stress like drop, shock or any force to LCD module. It may cause improper operation, even damage.
- (b) Because the polarizer is very fragile and easy to be damaged, do not hit, press or rub the display surface with hard materials.
- (c) Do not put heavy or hard material on the display surface, and do not stack LCD modules.
- (d) If the display surface is dirty, please wipe the surface softly with cotton swab or clean cloth.
- (e) Avoid using Ketone type materials (e.g. Acetone), Toluene, Ethyl acid or Methyl chloride to clean the display surface. It might damage the polarizer permanently. The recommended solvents are water and Isopropyl alcohol.
- (f) Wipe off water droplets or oil immediately.
- (g) Protect the LCD module from ESD. It will damage the LSI and the electronic circuit.
- (h) Do not touch the output pins directly with bare hands.
- (i) Do not disassemble the LCD module.

### **10.2 Storage**

- (a) Do not leave the LCD modules in high temperature, especially in high humidity for a long time.
- (b) Do not expose the LCD modules to sunlight directly.
- (c) The liquid crystal is deteriorated by ultraviolet. Do not leave it in strong ultraviolet ray for a long time.
- (d) Avoid condensation of water. It may cause improper operation.
- (e) Please stack only up to the number stated on carton box for storage and transportation. Excessive weight will cause deformation and damage of carton box.

### **10.3 Operation**

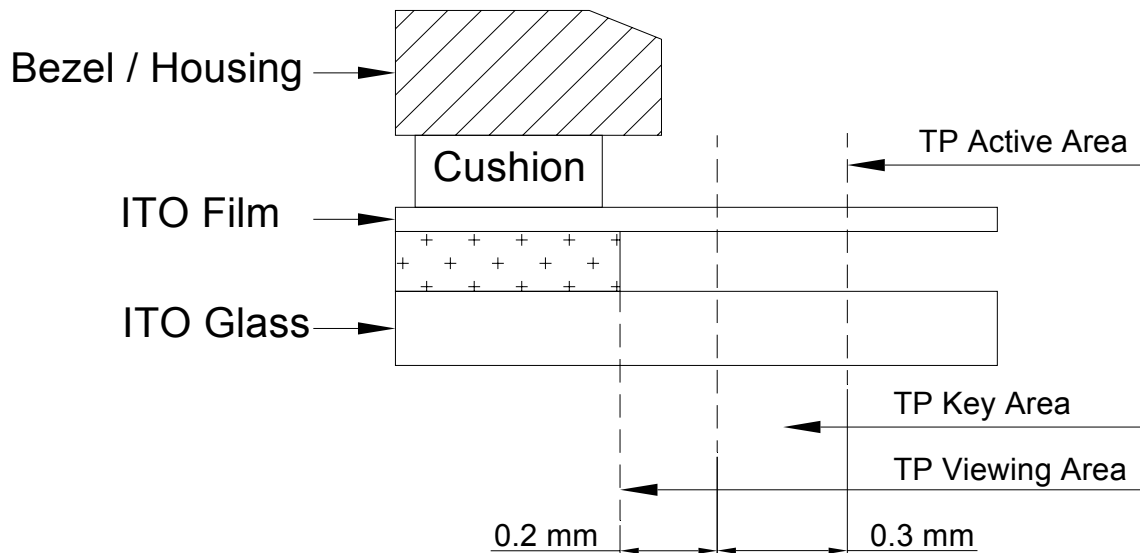
- (a) When mounting or dismounting the LCD modules, turn the power off.
- (b) Protect the LCD modules from electric shock.



- (c) The Driver IC control algorithms stated in chapter 8 should always be obeyed to avoid damaging the LSI and electronic circuit.
- (d) Be careful to avoid mixing up the polarity of power supply for backlight.
- (e) Absolute maximum rating specified above has to be always kept in any case. Exceeding it may cause non-recoverable damage of electronic components or, nevertheless, burning.
- (f) When a static image is displayed for a long time, remnant image is likely to occur.
- (g) Be sure to avoid bending the FPC to an acute shape, it might break FPC.

#### 10.4 Touch Panel Mounting Notes

- (a) If a cushion is used between bezel/housing and film must be chosen as free as enough to absorb the expansion and contraction to avoid the distortion of film.
- (b) The cushion must be placed out of the Viewing Area.
- (c) Bezel/Housing edge must be positioned between Key Area and Viewing Area. The edge entering the Key Area may cause unexpected input if the gap is too narrow or foreign particles like dusts exist between Bezel/Housing and ITO film.
- (d) Mounting example:





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The corner part has conductivity. Do not touch any metal part after mounting.

### **10.5 Others**

- (a) If the liquid crystal leaks from the panel, it should be kept away from the eyes or mouth.
- (b) For the fragility of polarizer, it is recommended to attach a transparent protective plate over the display surface.
- (c) It is recommended to peel off the protection film on the polarizer slowly so that the electrostatic charge can be minimized.



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