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Specifications

TFT-LCDmodule

Model No: SX050-WVGA3-40P-01-V01

For Customer's Acceptance	
Approved by	Comment

	Signature	Date
Prepared by		
Checked by		
Approved by		

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1 General Description

SX050-WVGA3-40P-01-V01 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, The panel size is 4.95inch and thresolution is 480x854. High image quality a-Si TFT LCD module. Partial-screen display function is available. Sleep and Stand-by modes are available for power saving.

1.1 Features

No	Item	Specification	Remark
1	Display Mode	High Resolution & Wide View	
2	Screen Size	4.95inch (diagonal)	
3	Resolution	480XRGBX854	
4	Color Number	16.7M TFT	
5	Color Arrangement	RGB-stripe	
6	Driver IC	ST7701S	
7	Back Light	White LED*12	
8	Viewing Direction	ALL	
9	Interface	RGB24 + 3 line SPI	
10	Surface Treatment	UV Cut	
11	Module brightness	300 cd/m ²	

1.2 Application

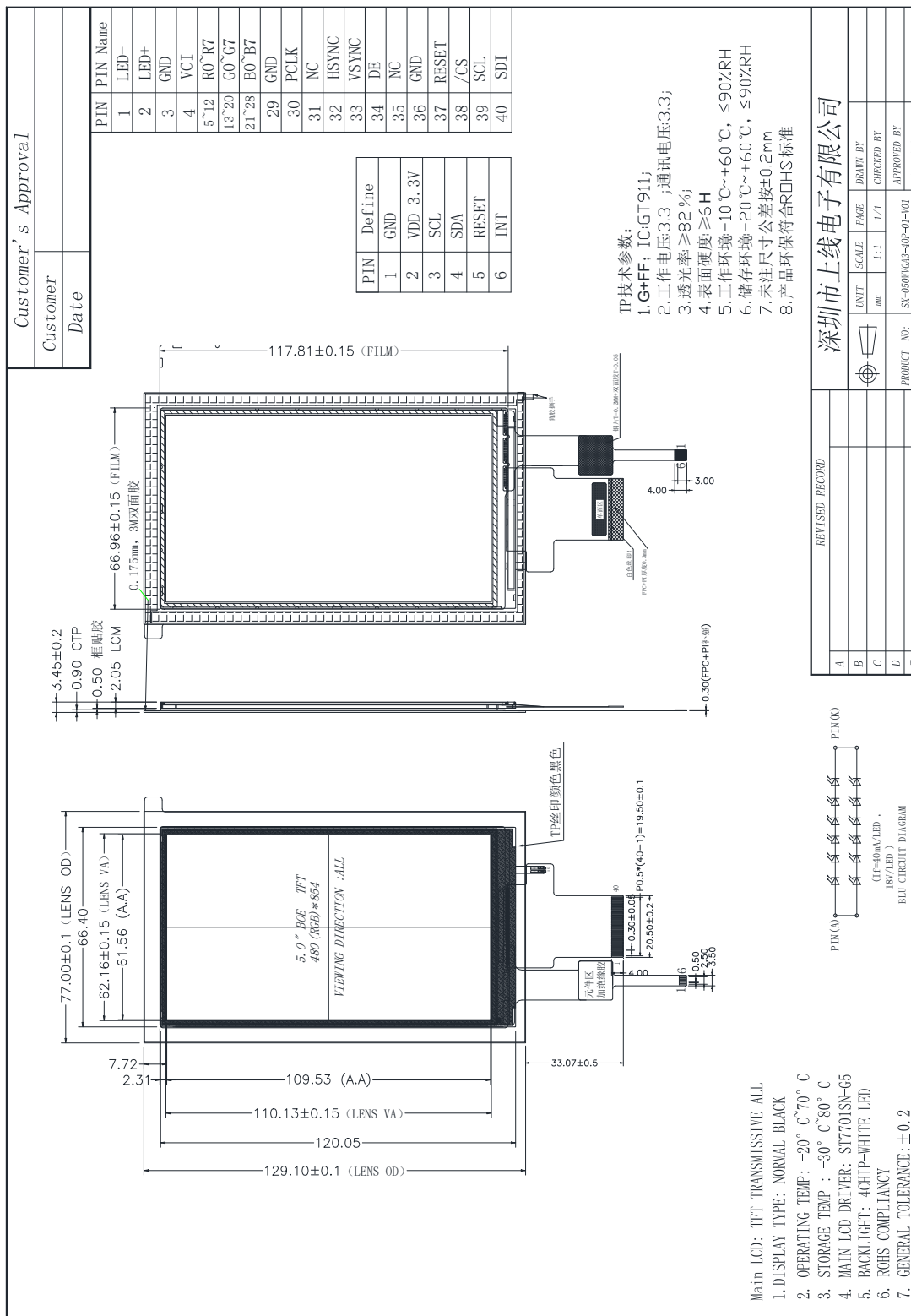
- ◆ Mobile phone.
- ◆ Portable multimedia device.

2 Outline Dimension

The mechanical detail is shown in Fig. 1 and summarized in Table 1 below.

Parameter	Specifications	Unit
Outline dimensions	77.0(W) x129.1(H) x 3.45(D) (LCM,no include FPC)	mm
Active area	61.56(W) x109.53(H)	mm
Resolution	480(H)RGBx854(V)	dots

3 Module specification of the module



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4 Electrical Characteristics

4.1 TFT-LCD Module

Parameter		Symbol	Condition	Min	Typ	Max	Unit	Note
Logic Power supply		VDD	Ta=25℃	2.5	2.8	3.3	V	1
Input Voltage	H	VIH		0.8VDD	-	VDD	V	
	L	VIL		0	0	0.2VDD	V	
Output Voltage	H	VOH	IOH = -1.0mA	0.8VDD	-	-	V	
	L	VOL	IOL = +1.0mA	-	-	0.2VDD	V	
Current Consumption		ICC1	Normal mode				mA	2
		ICC2	Stand-by mode	-	-	-	mA	

Note 1: The operations are guaranteed under the recommended operating conditions only. These operations are not guaranteed if a quick voltage change occurs during operation. To prevent noise, a bypass capacitor must be inserted into the line close to the power pin.

Note 2: All the measurements should be operated with driver IC and experimental FPC.

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4.2 Back-Light Unit

Item	Symbol	Min.	Typ.	Max.	Unit	Remark
Current	IF	--	40	--	mA	IF=40mA IF=18V
Forward voltage	VF	16.8	18	19.2	V	
Chroma	X	0.250	--	0.30		
	Y	0.250	--	0.30		
Uniformity	UBL	80	--	--	%	
Number of LED	-	-	12	--	Piece	-
Backlight Color	White					

- The luminous intensity of LED is strongly dependent on the driving current.
- It is recommended the input of backlight to be constant current rather than constant voltage.

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5 TFT-LCM Interface Specification

Pin No	Symbol	Description
1	LED-K	Back light -
2	LED-A	Back light anode +
3	GND	Ground
4	VDD	Power supply 2.8~3.3V
5~12	R0~R7	RGB DATA BUS RED(R0~R7)
13~20	G0~G7	RGB DATA BUS GREEN(G0~G7)
21~28	B0~B7	RGB DATA BUS BLUE(G0~G7)
29	GND	Ground
30	PCLK	-Dot clock signal for RGB interface operation.
31	NC	NC
32	HS	Horizontal (Line) synchronizing input signal for RGB
33	VS	Vertical (Frame) synchronizing input signal for RGB
34	DE	Data enable signal for RGB interface operation
35	NC	-
36	GND	Ground
37	RESET	Reset signal
38	CS	Chip select pin
39	SCL	Write clock signal
40	SDA	Serial data input / output

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6 Timing Characteristics

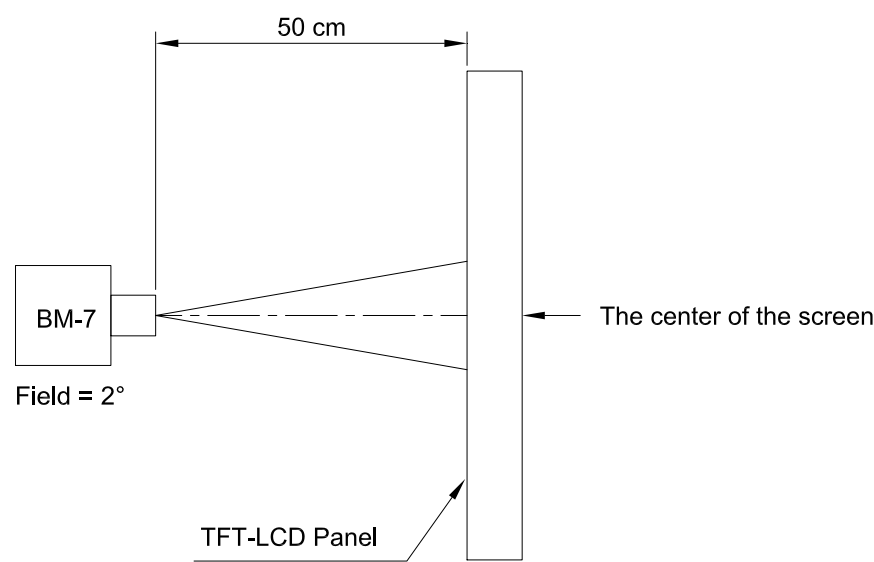
Please refer to the ST7701S specification.

7. LCD Optical Specification

Parameter		Symbol	Condition	Min.	Typ.	Max.	Unit	Remark
Viewing Angle range	Horizontal	Θ_3	CR > 10	-	80	85	Deg.	Note 1
		Θ_9		-	80	85	Deg.	
	Vertical	Θ_{12}		-	80	85	Deg.	
		Θ_6		-	80	85	Deg.	
Contrast ratio		CR	$\Theta = 0^\circ$	600	800			Note 2
Transmittance		Tr		3.8	4.5	-	%	Without APF Note 3
White Chromaticity		x_w		0.297	0.298	0.301		Note 4 CF Glass Base on C Light
		y_w		0.307	0.328	0.313		
Reproduction of color (C light)	Red	R_x		0.656	0.659	0.662		
		R_y		0.319	0.322	0.325		
	Green	G_x		0.287	0.290	0.293		
		G_y		0.585	0.588	0.591		
	Blue	B_x		0.131	0.134	0.137		
		B_y		0.121	0.124	0.127		
Response Time (Rising + Falling)		$T_r + T_f$	Ta= 25° C $\Theta = 0^\circ$	-	30	35	ms	Note 5

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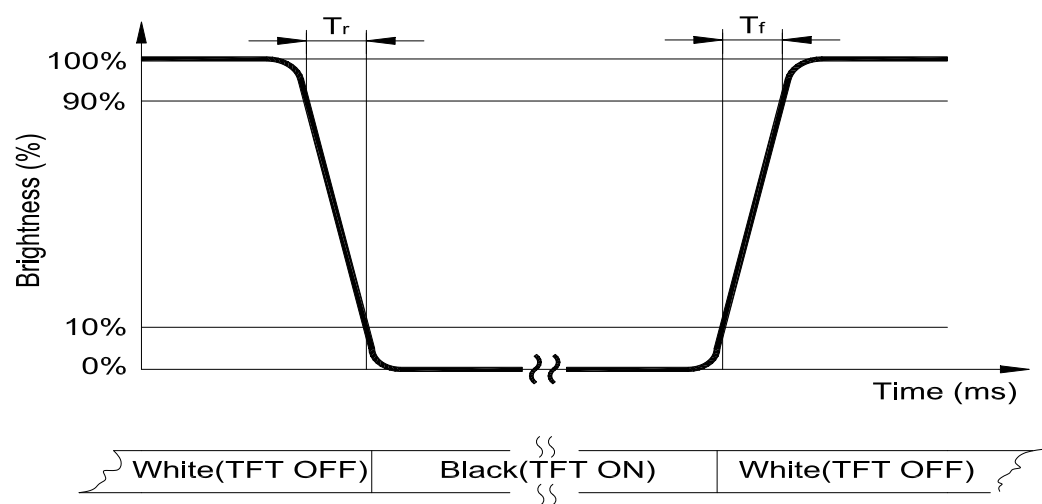
Note 1: The brightness test equipment setup
I_B=60mA, Field=2° (As measuring “black” image, field=2° is the best testing condition.)



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

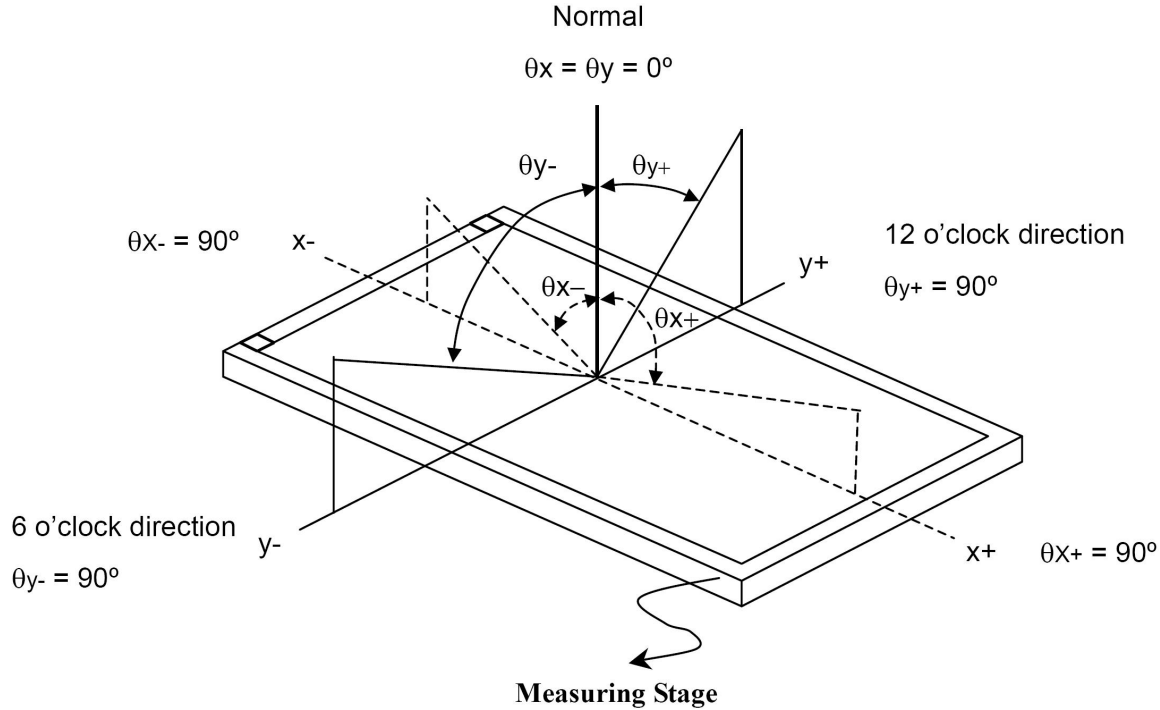
$$C.R = \frac{\text{Brightness When LCD is at "White" State}}{\text{Brightness When LCD is at "Black" State}}$$

Note 3: Definition of response
time

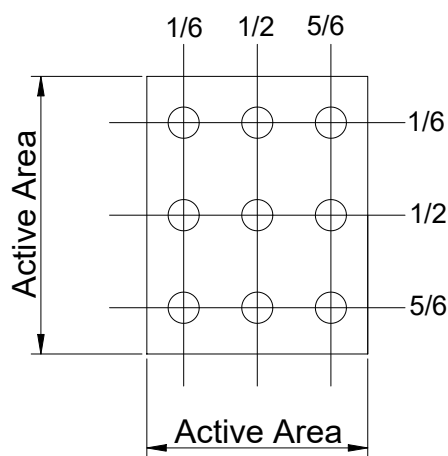


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Note 4: Definition of viewing angle



Note 5: Definition of uniformity (Un)



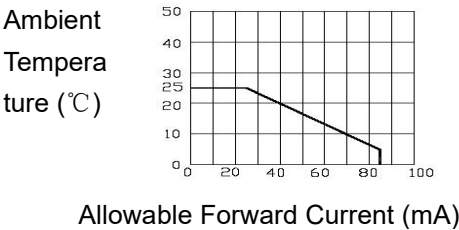
$$Un = \frac{Bmin}{Bmax} \times 100\%$$

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8 Environment Absolute Maximum Ratings

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



9 Reliability Test Items

Item	Test Condition		Criterion
High Temperature Storage	80 ℃, 240 hrs		There should be no change which might affect the practical display function when the display quality test is conducted under normal operating condition.
Low Temperature Storage	-30 ℃, 240 hrs		
High Temp. & High Humidity Storage	60 ℃, 90% RH, 240 hrs		
Vibration Test (Non-operating)	Freq.:10~55~10 Hz, Amp.:1.5mm 1 hr for each direction of X, Y, Z		
Electrostatic Discharge Test (Non-operating)	Terminals	150 pF, 0 Ω, ±300 V, Contact	
	Panel	150 pF, 330 Ω, ±8 KV, Air	
Thermal Shock (Static)	-30℃, 30 min /80℃, 30 min, 20 cycles		
High Temperature Operation	70 ℃, 240 hrs		
Low temperature Operation	-20 ℃, 240 hrs		
High Temperature & High Humidity (Operating)	50 ℃, 90% RH, 240 hrs		
FPC Peeling Strength Test	Pull speed: 50 mm/min, +90°,		> 400gf/cm

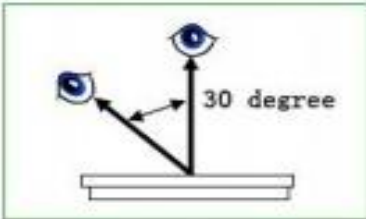
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10 Inspaction Standard

This standard apply to TFT module specification.

1. Inspection condition:

Under daylight lamp 20~40W, product distance inspector'eye 30cm.incline degree 30°

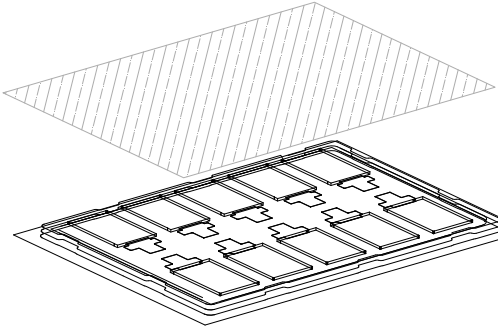
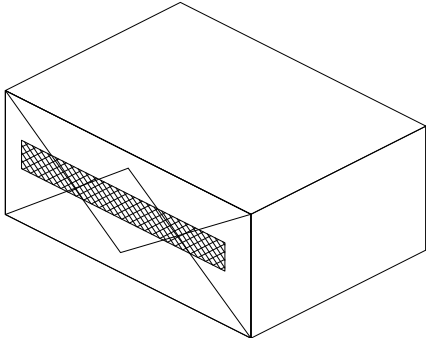
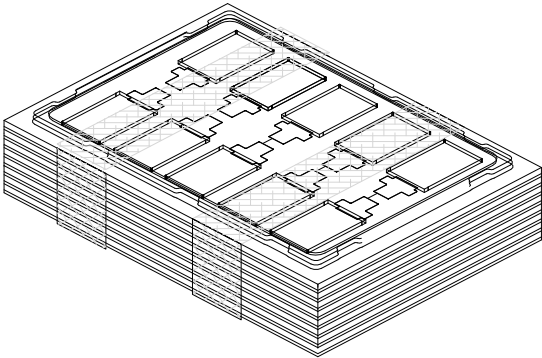
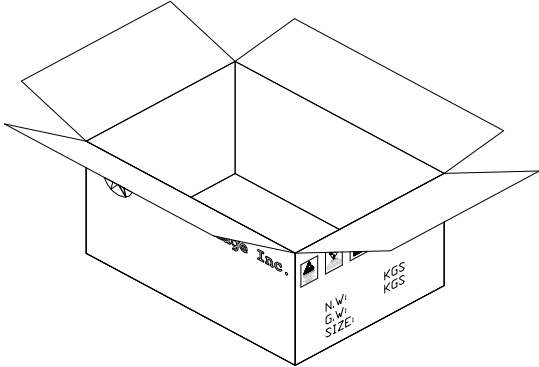
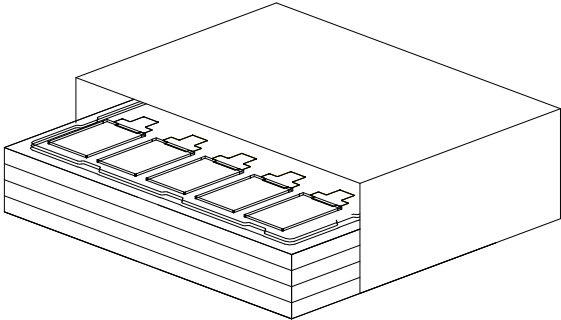
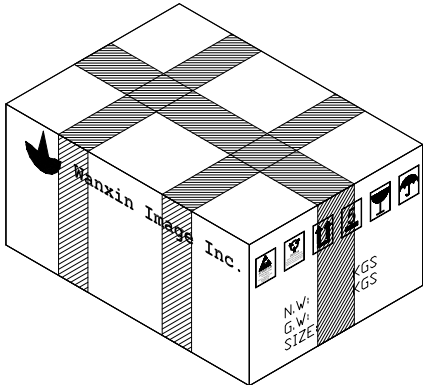


2. Inspection standard

NO.	Item	Inspection standard	Rate															
2.1	Dot	Case of Dot defect is below ① Bright Dot (whit spot) : "0" ② Dark Dot (black spot) : "0" (In case of Dark Dot on Main TFT LCD) - NG if there's full Dot defect. - Damaged less than the size of sub-pixel is not counted as defect - Dots darker than the size of sub-pixel are not defined as bright dot defect <table><tr><th>area size (mm)</th><th>Acceptable number</th></tr><tr><td>$\Phi \leq 0.10$</td><td>ignore</td></tr><tr><td>$0.10 < \Phi \leq 0.15$</td><td>3</td></tr><tr><td>$0.15 < \Phi \leq 0.20$</td><td>2</td></tr><tr><td>$0.25 < \Phi \leq 0.25$</td><td>1</td></tr><tr><td>$0.25 < \Phi$</td><td>0</td></tr></table>	area size (mm)	Acceptable number	$\Phi \leq 0.10$	ignore	$0.10 < \Phi \leq 0.15$	3	$0.15 < \Phi \leq 0.20$	2	$0.25 < \Phi \leq 0.25$	1	$0.25 < \Phi$	0	minor			
area size (mm)	Acceptable number																	
$\Phi \leq 0.10$	ignore																	
$0.10 < \Phi \leq 0.15$	3																	
$0.15 < \Phi \leq 0.20$	2																	
$0.25 < \Phi \leq 0.25$	1																	
$0.25 < \Phi$	0																	
2.2	line	<table><tr><th colspan="2">Size (mm)</th><th>Acceptable number</th></tr><tr><td>ignore</td><td>$W \leq 0.03$</td><td>ignore</td></tr><tr><td>$L \leq 4.0$</td><td>$0.03 < W \leq 0.04$</td><td>2</td></tr><tr><td>$L \leq 4.0$</td><td>$0.04 < W \leq 0.05$</td><td>1</td></tr><tr><td></td><td>$0.05 < W$</td><td>Treat with dot non-conformance</td></tr></table>	Size (mm)		Acceptable number	ignore	$W \leq 0.03$	ignore	$L \leq 4.0$	$0.03 < W \leq 0.04$	2	$L \leq 4.0$	$0.04 < W \leq 0.05$	1		$0.05 < W$	Treat with dot non-conformance	
Size (mm)		Acceptable number																
ignore	$W \leq 0.03$	ignore																
$L \leq 4.0$	$0.03 < W \leq 0.04$	2																
$L \leq 4.0$	$0.04 < W \leq 0.05$	1																
	$0.05 < W$	Treat with dot non-conformance																

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11 Package

1	4
	
10 pcs per tray + 1 cover (EPE)	Packing bag
2	5
	
15 trays + 1 dummy tray = 150 ps	Putting bag into carton Protected by 2 pieces of cushion EPE sheet
3	6
	
Putting trays into anti-electrostatic bag	Packing carton with sealing tape Carton outline size: 400×295×145 (mm)

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12 Precautions

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

12.1 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 touch panel surface 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.
- (j) Do not lift the FPC of Touch Panel.

12.2 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.

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- (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.

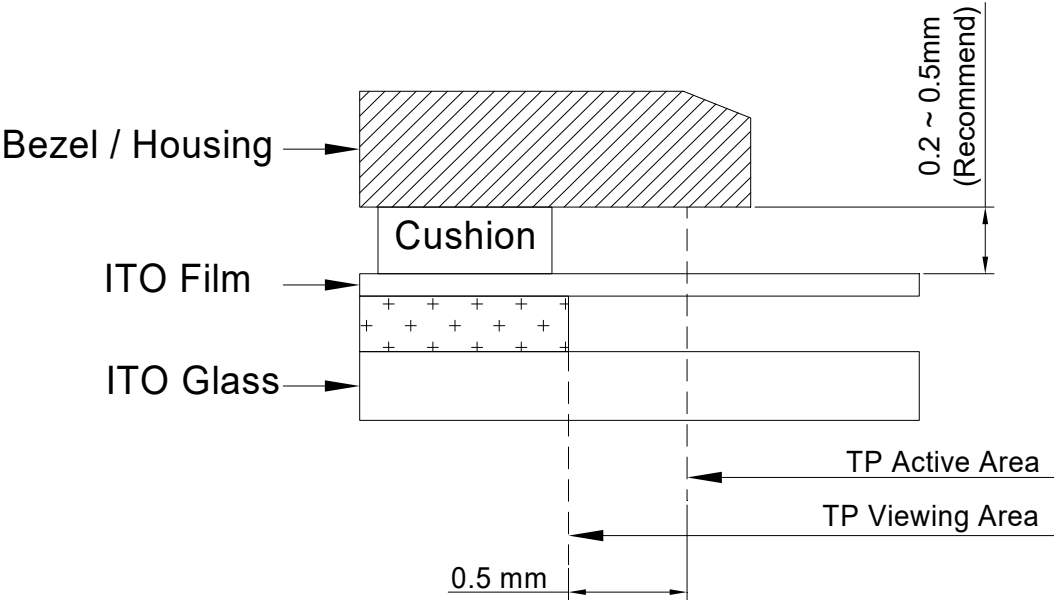
12.3 Operation

- (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 above should always 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.
- (h) Most of the touch screens have air vent to equalize the inside air pressure to the outside one. The air vent must be open and liquid contact must be avoided as the liquid may be absorbed if the liquid is accumulated near the air vent.
- (i) For the fragility of ITO film, it should avoid to use too tapering pen as the input material.

12.4 Touch Panel Mounting Notes

- (a) If a cushion is used between bezel/housing and film must be choose 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 posited between Key Area and Viewing Area. The edge enters 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.

12.5 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.