

TOPLAND ELECTRONICS (H.K) CO., LIMITED

PRODUCT SPECIFICATIONS

For Customer: _____

: APPROVAL FOR SPECIFICATION

Customer Model No. _____

: APPROVAL FOR SAMPLE

Module No.: TIAN-G04303-02

Date : 2019-01-11

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For Customer's Acceptance:

Approved By	Comment

PREPARED	CHECKED	VERIFIED BY QA DEPT	VERIFIED BY R&D DEPT
John	JC		

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3. General Specifications

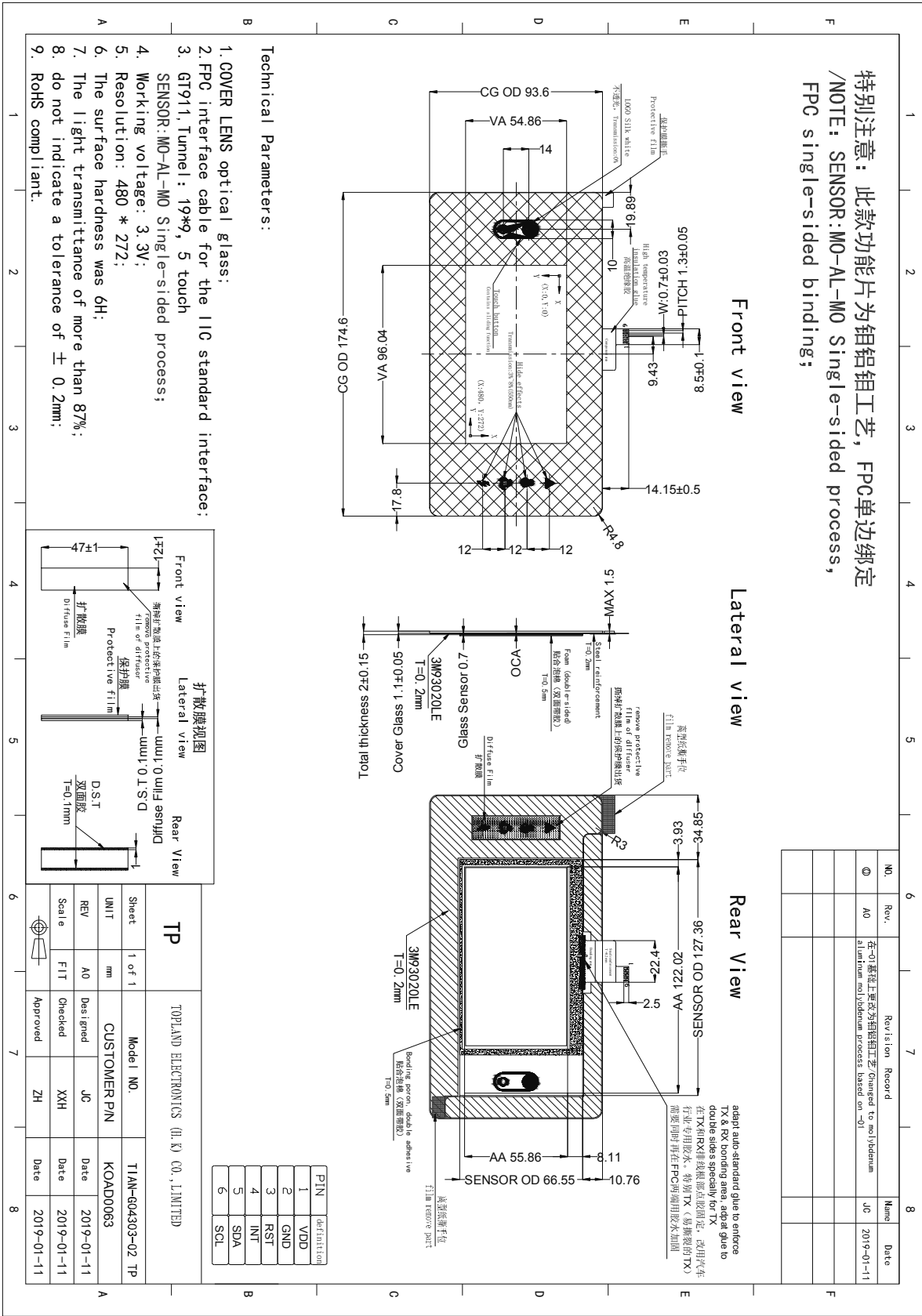
TIAN-G04303-02 is a TFT-LCD module. It is composed of a TFT-LCD panel, CTP, driver IC, FPC, a back light unit. The 4.3" display area contains 480 x 272 pixels and can display up to 16.7M colors. This product accords with RoHS environmental criterion.

Note 1: Color tune is slightly changed by temperature and driving voltage.

Note 2: Without FPC and Solder.

Item	Contents	Unit	Note
LCD Type	TFT	-	
Display color	16.7M		
Viewing Direction	12	O'Clock	
Gray scale inversion direction	6	O'Clock	
Operating temperature	-20~+70	°C	
Storage temperature	-30~+80	°C	
Module size	Refer to outline drawing	mm	
Active Area(W×H)	95.04X53.86	mm	
Number of Dots	480×272	dots	
Controller	ILI6480B	-	
Power Supply Voltage	3.3	V	
Outline Dimensions	Refer to outline drawing	-	
Backlight	5X2-LEDs (white)	pcs	
Weight	---	g	
Interface	RGB888	-	
TP Outline Dimension	174.6*93.6	mm	
TP Controller	GT911	--	
Surface hardness	6H		
Transparency	87%		

4.Outline.Drawing



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5. Absolute Maximum Ratings($T_a=25^{\circ}\text{C}$)

5.1 Electrical Absolute Maximum Ratings.($V_{SS}=0\text{V}$, $T_a=25^{\circ}\text{C}$)

Item	Symbol	Min.	Max.	Unit	Note
Power Supply Voltage	VDD	-0.3	5.0	V	1, 2

Notes:

- If the module is above these absolute maximum ratings. It may become permanently damaged. Using the module within the following electrical characteristic conditions are also exceeded, the module will malfunction and cause poor reliability.
- $V_{DD} > V_{SS}$ must be maintained.
- Please be sure users are grounded when handing LCD Module.

5.2 Environmental Absolute Maximum Ratings.

Item	Storage		Operating		Note
	MIN.	MAX.	MIN.	MAX.	
Ambient Temperature	-30°C	80°C	-20°C	70°C	1,2
Humidity	-	-	-	-	3

- The response time will become lower when operated at low temperature.
- Background color changes slightly depending on ambient temperature.
The phenomenon is reversible.
- $T_a \leq 40^{\circ}\text{C}$: 85%RH MAX.

$T_a \geq 40^{\circ}\text{C}$: Absolute humidity must be lower than the humidity of 85%RH at 40°C .

5.3 CTP FPC bonding

ACF brand and model: sony CP139A2-25AJ /AK

production parameter (Longer bonding area, TX)				
Item	Range		Configuration	Measurement
Temperature	$165 \pm 15^{\circ}\text{C}$	$165 \pm 15^{\circ}\text{C}$	350	175
Stress	$4 \pm 1 \text{ Mpa}$	$9.6 \pm 2.4 \text{ kgf}$	0.135	11.3
Time	reach 150°C in 4s	10~12sec	12	12.1
Pull strength	500g/cm	$\geq 500\text{g}$		797

production parameter (Shorter bonding area, RX)				
Item	Range		Configuration	Measurement
Temperature	$165 \pm 15^{\circ}\text{C}$	$165 \pm 15^{\circ}\text{C}$	350	172
Stress	$4 \pm 1 \text{ Mpa}$	$5.6 \pm 1.4 \text{ kgf}$	0.105	6.4
Time	reach 150°C in 4s	10~12sec	12	12.1
Pull strength	500g/cm	$\geq 500\text{g}$		858

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6. Electrical Specifications and Instruction Code

6.1 Electrical characteristics($V_{SS}=0V, T_a=25^\circ C$)

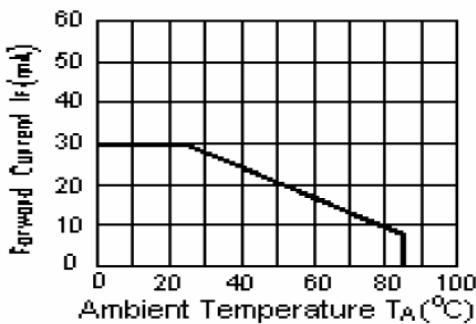
Parameter	Symbol	Condition	Min	Typ	Max	Unit	Note	
Power supply	VCC	$T_a=25^\circ C$	3.0	3.3	3.6	V		
Input voltage	'H'	V_{IH}	$V_{CC}=3.3V$	$0.7V_{CC}$	-	VCC	V	
	'L'	V_{IL}	$V_{CC}=3.3V$	0	-	$0.3V_{CC}$	V	
Current Consumption	I_{CC1}	Normal mode	-	13	20	mA	1	
	I_{CC2}	Sleep mode	-	0.1	-	mA	1	
Clock Frequency	f_{CLK}	-	5	9	12	MHz		

Note:

1: Tested in 1×1 chessboard pattern.

6.2 LED backlight specification($V_{SS}=0V, T_a=25^\circ C$)

Item	Symbol	Condition	Min	Typ	Max	Unit	Note
Supply voltage	V_f	$I_f=20 \times 2mA$	-	15	-	V	
Uniformity	ΔB_p	$I_f=20 \times 2mA$	75			%	
Life Time	time	$I_f=20 \times 2mA$		-		hours	1



6.3 Interface signals

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Pin No.	Symbol	I/O	Function
1	VLED-	P	LED back light(Cathode)
2	VLED+	P	LED back light(Anode)
3	GND	P	Ground.
4	VDD	P	Power supply
5-12	R0~R7	I	Red data bus
13-20	G0~G7	I	Green data bus
21-28	B0~B7	I	Blue data bus
29	GND		Ground.
30	PCLK	I	Data clock
31	DISP	I	Standby setting for testing, it should be connected to VDDIO in normal operation mode. If connected to GND, the IC is in standby mode.
32	HSYNC	I	Line sync signal
33	VSYNC	I	Frame sync signal
34	NC	I	No connection.
35	ID		ID PIN(Internal pulled high)
36	GND	P	Ground.
37	T_RST	I/O	Touch Panel Control pin(No connection)
38	T_INT	I/O	
39	T_SDA	I/O	
40	T_SCL	I/O	

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7. Optical Characteristics

Item	Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Brightness (with TP)	Bp	$\theta=0^\circ$	-	500	-	Cd/m ²	1
Uniformity	Δ Bp	$\Phi=0^\circ$	75	-	-	%	1,2
Viewing Angle	3:00	Cr \geq 10	-	60	-	Deg	3
	6:00		-	55	-		
	9:00		-	60	-		
	12:00		-	60	-		
Contrast Ratio	Cr	$\theta=0^\circ$	350	500	-	-	4
Response Time	T _r	$\Phi=0^\circ$	-	10	-	ms	5
	T _f		-	10	-	ms	
Color of CIE Coordinate	W	x		0.28		-	1,6
		y		0.33		-	
	R	x		0.51		-	
		y		0.34		-	
	G	x	$\theta=0^\circ$	0.31		-	
		y	$\Phi=0^\circ$	0.56		-	
	B	x		0.15		-	
		y		0.14		-	
NTSC Ratio	S		50	60	-	%	

Note: The parameter is slightly changed by temperature, driving voltage and material

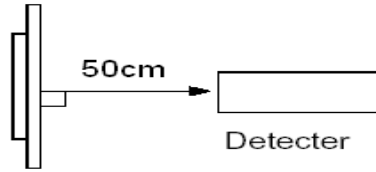
Note 1: The data are measured after LEDs are turned on for 5 minutes. LCM displays full white. The brightness is the average value of 9 measured spots. Measurement equipment PR-705 (Φ 8mm)

Measuring condition:

- Measuring surroundings: Dark room.
- Measuring temperature: Ta=25 °C.
- Adjust operating voltage to get optimum contrast at the center of the display.

Measured value at the center point of LCD panel after more than 5 minutes while backlight turning on.

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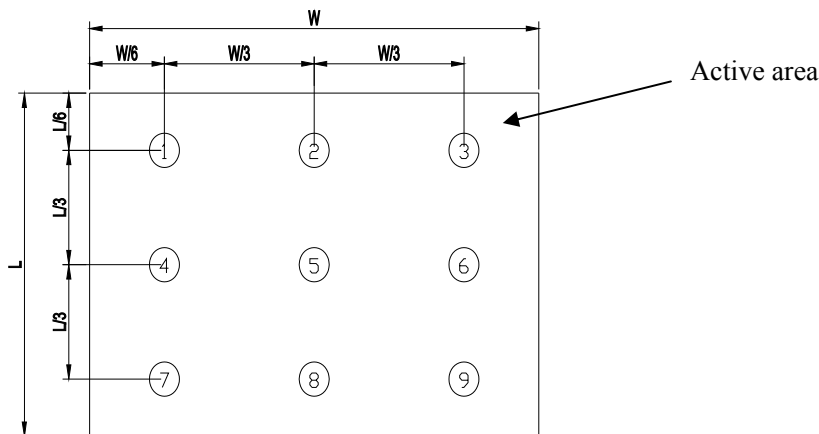


Note 2: The luminance uniformity is calculated by using following formula.

$$\Delta Bp = Bp (\text{Min.}) / Bp (\text{Max.}) \times 100 (\%)$$

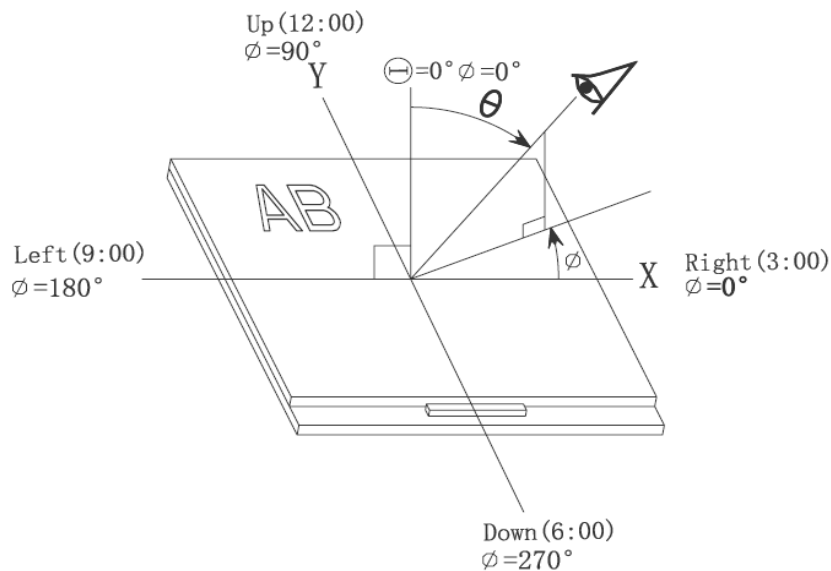
$Bp (\text{Max.})$ = Maximum brightness in 9 measured spots

$Bp (\text{Min.})$ = Minimum brightness in 9 measured spots.



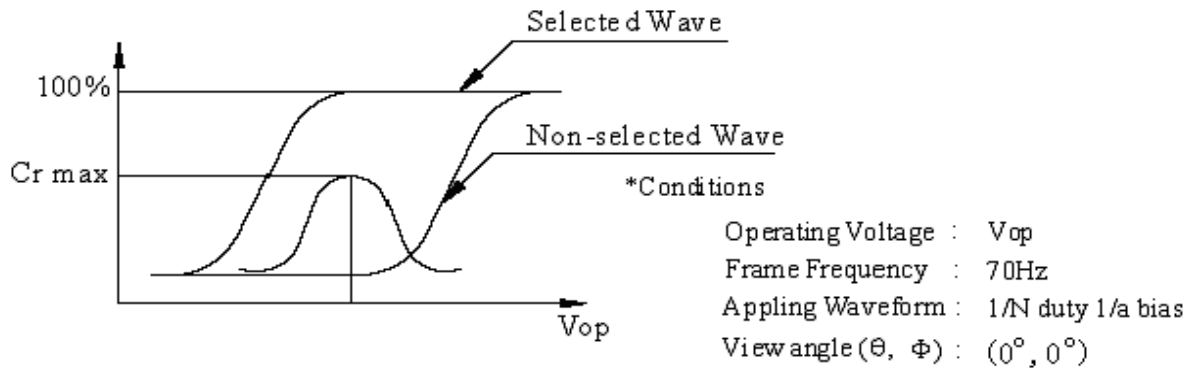
Note 3: The definition of viewing angle:

Refer to the graph below marked by ϑ and ϕ



Note 4: Definition of contrast ratio. (Test LCD using DMS501)

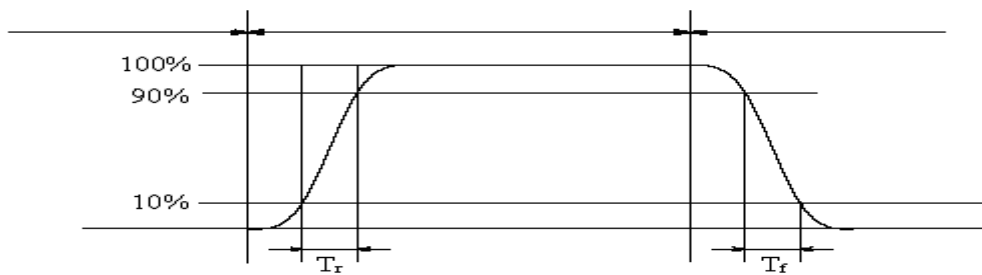
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$$\text{Contrast ratio}(Cr) = \frac{\text{Brightness of selected dots}}{\text{Brightness of non-selected dots}}$$

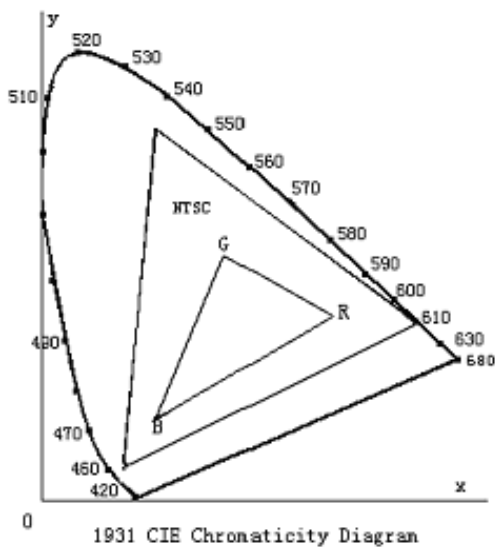
Note 5: Definition of Response time. (Test LCD using DMS501):

The output signals of photo detector are measured when the input signals are changed from "black" to "white"(falling time) and from "white" to "black"(rising time), respectively. The response time is defined as the time interval between the 10% and 90% of amplitudes. Refer to figure as below.



The definition of response time

Note 6: Definition of Color of CIE Coordinate and NTSC Ratio.



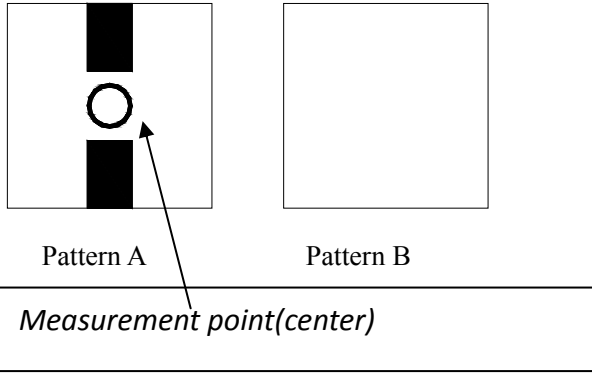
Color gamut:

$$S = \frac{\text{area of RGB triangle}}{\text{area of NTSC triangle}} \times 100\%$$

Note 7: Definition of cross talk.

$$\text{Cross talk ratio}(\%) = \frac{|\text{pattern A Brightness} - \text{pattern B Brightness}|}{\text{pattern A Brightness}} \times 100$$

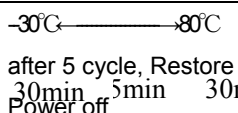
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Electric volume value=3F+/-3Hex

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8. Reliability Test Items and Criteria

No	Test Item	Test condition	Criterion
1	High Temperature Storage	80°C±2°C 96H Restore 2H at 25°C Power off	1. After testing, cosmetic and electrical defects should not happen. 2. Total current consumption should not be more than twice of initial value.
2	Low Temperature Storage	-30°C±2°C 96H Restore 2H at 25°C Power off	
3	High Temperature Operation	70°C±2°C 96H Restore 2H at 25°C Power on	
4	Low Temperature Operation	-20°C±2°C 96H Restore 4H at 25°C Power on	
5	High Temperature/Humidity Storage	60°C±2°C 90%RH 96H Power off	
6	Temperature Cycle	 after 5 cycle, Restore 2H at 25°C Power off	
7	Vibration Test	10Hz~150Hz, 100m/s ² , 120min	Not allowed cosmetic and electrical defects.
8	Shock Test	Half- sine wave,300m/s ² ,11ms	

Note: Operation: Supply 3.3V for logic system.

The inspection terms after reliability test, as below

ITEM	Inspection
Contrast	CR>50%
IDD	IDD<200%
Brightness	Brightness>60%
Color Tone	Color Tone+/-0,05

9. Appearance Inspection 外观检验

外观检查条件及方法: Conditions and methods of appearance inspection

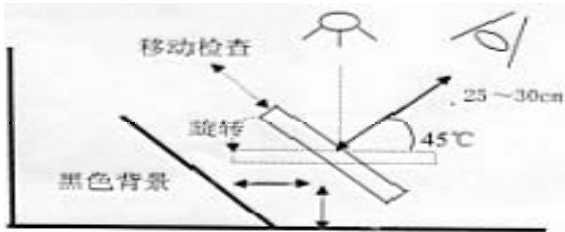
9.1、检验距离 Inspection distance: 25~30cm

9.2、灯源至产品 From lamp source to product: 250±100cm

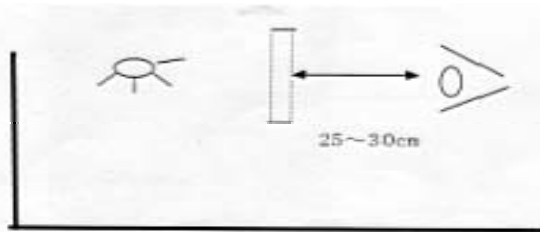
9.3、检验角度: 在黑色背景下, 1K-1.5K Lux 勒克斯 (照明单位), 正视角或斜视 45 度反光检查白点、刺伤点、脏污、毛屑、金属残留、ITO 针孔、刮伤等不良; 产品对光检查可视区的黑色点、油墨针孔、油墨刮伤等不良。

Angel of inspection: Under a black background, 1k-1.5k lux (illumination unit), reflecting inspection from front view angel and oblique view angel of 45 ° ,badness like white dot, stab wound point, smudginess, soft flock, metal remain, ITO pinhole, ink scratch etc. And beam-focusing inspection products in view area, badness like black dot, printing ink pinhole, printing ink scratch etc.

a、正视角或斜视 45 度反光检
reflecting inspection from front view angel
or oblique view angel of 45°

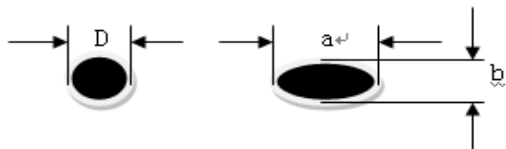


b、产品对光检查
product beam-focusing
inspection

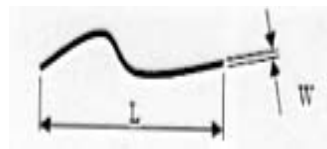


9.4、点状缺陷以点的直径 D 计算, 不规则点以: $D = (\text{长} + \text{宽}) / 2$ 计算, 目视采用 FILM 卡比对片比对, 实际大小采用显微镜测量; 条状缺陷以两端垂直长度 L 或最宽位置的宽度 W 计算。目视采用 FILM 卡比对片比对, 实际大小采用显微镜测量。

Punctate defects count by D dot diameter, irregular dot count by $D = (\text{length} + \text{width}) / 2$, visual take FILM card comparison lice, and microscope be used to measure actual size; strip defects count by L length of perpendicular between two terminal or W width of widest situation. Visual take FILM card comparison lice, and microscope be used to measure actual size.



$$D = (a + b) / 2$$



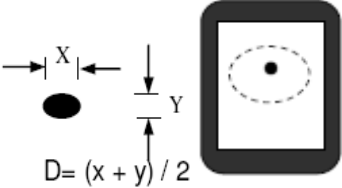

9.5、产品外观标准 products appearance standard:

不良项目 Bad item	触摸屏标准 TP standard	缺陷分类 Defects classification		判定 judge
		M A	MI	
崩角 corner breakage	$X \leq 1.0\text{mm}; Y \leq 1.0\text{mm}; Z1/2T$; 单边允许1个 $X \leq 1.0\text{mm}; Y \leq 1.0\text{mm}; Z1/2T$; unilateral allowed 1		★	OK

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	$X > 1.0\text{mm}, Y > 1.0\text{mm}$			★	NG	
<p style="text-align: center;">崩边 edge breakage</p> 	$X \leq 1.0\text{mm}; Y \leq 1.0\text{mm}, Z \leq 1/2T$; 单边允许1个 $X \leq 1.0\text{mm}; Y \leq 1.0\text{mm}, Z \leq 1/2T$; unilateral allowed 1			★	OK	
	$X > 1.0\text{mm}, Y > 1.0\text{mm}$			★	NG	
	<ul style="list-style-type: none"> - Sensor 面崩边/崩角未伤及线路且正视不可见。 Sensor surface edge/corner breakage not damage circuit and not visible from front view - Lens 面崩边、崩角以装机不影响到外观为准。 Lens surface edge/corner breakage is subject to not affect appearance 			★	OK	
	Sensor 面崩边或崩角伤及线路或正视可见。 Sensor surface edge/corner breakage damage circuit and visible from front view			★	NG	
<p>玻璃裂纹 Glass crack</p> 	任何裂纹 Any crack			★	NG	
<p>线状物（包括刮伤、纤维） Threads (including scratch, fiber)</p> 			$W \leq 0.03\text{mm}$, 忽略不计 $W \leq 0.03\text{mm}$, ignore		★	OK
			$0.03 \text{ mm} \leq W \leq 0.05 \text{ mm}, L \leq 3\text{mm}$, 允许2条, 距离在10mm以上。 $0.03 \text{ mm} \leq W \leq 0.05 \text{ mm}, L \leq 3\text{mm}$, allowed two lines, distance should above 10mm		★	OK
			$0.05 \text{ mm} \leq W \leq 0.1 \text{ mm}, L \leq 3\text{mm}$, 允许1条, 距离在10mm以上。 $0.05 \text{ mm} \leq W \leq 0.1 \text{ mm}, L \leq 3\text{mm}$, allowed one lines,		★	OK

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<p>W:宽度width L:长度length</p>		<p>distance should above 10mm</p>			
		<p style="text-align: center;">$W > 0.1\text{mm}, L > 3\text{mm}$</p>	★		NG
<p>点状物（异色点，包括白点、黑点、气泡） D 代表直径 Punctual substances (heterochrome dot, including white dot, black dot, air bubble, D stands for diameter)</p> 		<p>$D \leq 0.1\text{ mm}$,忽略不计，整面及密集点不允许。 $D \leq 0.1\text{ mm}$, ignore,high density of such dots is not allowed</p>		★	OK
		<p>$0.1\text{mm} < D \leq 0.25\text{ mm}$, 允许 2 个, 距离在 10mm 以上。 $0.1\text{ mm} < D \leq 0.25\text{ mm}$, allowed two dots, between which distance should be above 10mm</p>		★	OK
		<p>$0.25\text{mm} < D \leq 0.3\text{mm}$, 允许 1 个, 距离在 10mm 以上。 $0.25\text{ mm} < D \leq 0.3\text{ mm}$, allowed one dot, distance between dots should be above 10mm</p>		★	OK
		<p style="text-align: center;">$D > 0.3\text{mm}$</p>	★		NG
<p>点状（同色点） Punctiform (the same color dot)</p> 		<p>$D \leq 0.1\text{ mm}$, 忽略不计，整面及密集点不允许。 $D \leq 0.1\text{ mm}$, ignore,the whole surface and dense dots not allowed.</p>		★	OK
		<p>$0.1\text{ mm} < D \leq 0.25\text{mm}$, 允许 2 个, 距离在 10mm 以上。 $0.1\text{ mm} < D \leq 0.25\text{mm}$,allowed two dots, distance between dots should be above 10mm.</p>		★	OK
		<p>$0.25\text{ mm} < D \leq 0.3\text{mm}$, 允许 1 个, 距离在 10mm 以上。 $0.25\text{ mm} < D \leq 0.3\text{mm}$,allow one dot, distance should be above 10mm.</p>		★	OK
		<p style="text-align: center;">$D > 0.3\text{mm}$</p>	★		NG
<p>油墨漏光 Printing ink leak light</p>		<p style="text-align: center;">边沿区域漏光宽度$\leq 0.25\text{mm}$ Light leak area of cover edge $\leq 0.25\text{mm}$</p>		★	OK

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	<p style="text-align: center;">边沿区域漏光宽度>0.25mm Light leak area of cover edge >0.25mm</p>	★		NG
	<p>可以清洁的脏污,在>万级区域检查单批数量≤20%; 在≤万级区域检查单批数量≤10% 备注: 该不良比例不与普通不良抽检的AQL 混和统计 Smudginess can be cleaned, inspect ≤20% quantity of single lot in >10000 non-dust area; inspect ≤10% quantity of single lot in ≤10000 non-dust area</p>		★	OK
<p>表面脏污 Surface smudginess</p>	<p style="text-align: center;">无法清洁的脏污按点状不良判定 Smudginess can not be cleaned be identified as punctiform defects</p>		★	OK
	<p style="text-align: center;">凹痕, 针孔 $a \leq w/3$ Sink mark, pinhole $a \leq w/3$</p>		★	OK
<p>FPC 缺陷 FPC defects</p> 	<p style="text-align: center;">开路/划伤线路/裂开 Open circuit/scratch circuit/cracking</p>	★		NG
	<p style="text-align: center;">氧化, 污染 Oxidation, contamination</p>	★		NG
	<p style="text-align: center;">FPC 折伤/压伤 FPC folded /extruded</p>	★		NG
<p>FPC 折伤, 翘曲, 折痕, 黑白点 FPC warped, bend, Crease, black and white point</p> 	<p>FPC 翘曲, 折痕, 黑白点, 不影响功能、不伤及线路可接受 FPC bend, Crease, black and white point, no defect nor cuicirt damage is acceptable</p>		★	OK
<p>本压偏位</p>	<p>FPC PIN 脚和 SENSOR 银浆 pin 脚偏移量 ≤1/3 允收</p>		★	OK

<p>气泡 bubble</p>	<p>可视区不允许; Following issues are not allowed in Viewing Area</p>	★		NG
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	非可视区正面不可见; Area beyond Viewing Area is not allowed to be seen from front view		★	OK
丝印字符 silk printed text, 	LOGO 字体需清晰, 点缺陷 $\phi \leq 0.15\text{mm}$, $N \leq 1$; LOGOs and printed texts should be clear for viewing, dot defect should follow $\phi \leq 0.15\text{mm}$, $N \leq 1$		★	OK
	按键丝印点状缺陷 $\phi \leq 0.15\text{mm}$, $N \leq 1$; Dot defect for press button silk print should follow $\phi \leq 0.15\text{mm}$, $N \leq 1$		★	OK
	按键丝印有线状缺陷; Line defect is not allowed	★		NG
锯齿 Serrated silk print	TP 屏边缘有锯齿状, 锯齿应 $\leq 0.2\text{mm}$ Serrated silk print on cover edge should be $\leq 0.2\text{mm}$		★	OK
色差 color difference	以颜色确认样品为基准, 用色差仪测试差异值 $\Delta \leq 2.0$ use sample color as standard color, new products' color difference should be $\Delta \leq 2.0$		★	OK
功能片切割不良	不影响产品组装		★	OK
油墨区域	点状漏光, $D \leq 0.15$, $N \leq 1$		★	OK
	积油、线状漏光, 不允许;	★		NG
摄像孔黑白点	5 秒内, 30cm 距离看不到黑白点/刮伤即可; 丝印锯齿: $\phi \leq 0.15$, $N \leq 2$.		★	OK
IR 孔黑白点	5 秒内, 30cm 距离看不到黑白点/刮伤即可; 丝印锯齿: $\phi \leq 0.15$, $N \leq 2$		★	OK
IR 孔针孔	$\phi \leq 0.20$, $N \leq 2$ (漏印, 无色透明点)		★	OK

注：保护膜保质期为 6~12 个月

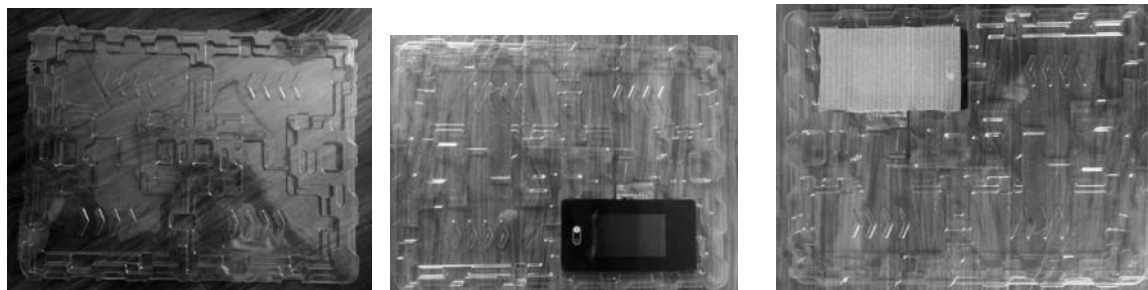
10. Package 包装方式

10.1 采用专用防静电 PET 吸塑盘，每盘装 4 片，16 层为一包（最上层为盖板）

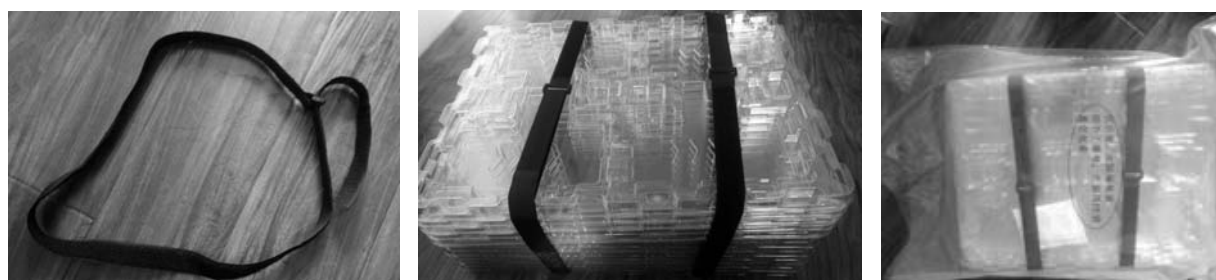
数量：15 层 x 4 = 60 个/包，每个纸箱装一包。

10.2 包装示意

① 一个专用防静电 PET 吸塑盒装 4 片产品，产品表面盖一层珍珠棉。



② 每 16 盘错位摆放成一垛，其中最上面一个吸塑盘为盖子，实际装产品数量为 $15 \times 4 = 60$ 个/垛。每垛用两条魔术贴捆带捆绑好，放干燥包，再套防静电袋用真空机吸真空包装。

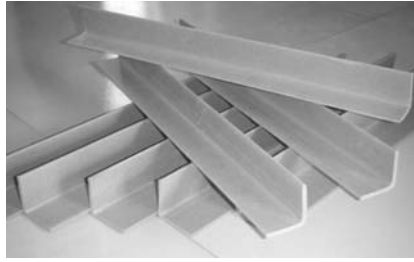


③ 抽真空后将其装入专用纸箱，装纸箱之前需在纸箱底部放一层 20mm 厚度的专用泡棉挡板，再放入真空吸塑盘包；然后在用专用 10mm 厚度泡棉挡板插入四周间隙；再在表面盖上一片 20mm 厚度的泡棉盖。最后用封箱胶密封纸箱



④ 打卡板，采用标准塑胶卡板，叠放层数不超过 6 层，总高度（含卡板高度）不超过 1.8m。四周边角用包边纸护角保护后用透明拉伸膜四周拉紧包裹固定

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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 — Ketone — 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.*

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

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

c. To reduce the amount of static electricity generated, do not conduct assembly and other work

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under dry conditions.

d. 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 : 10 °C ~ 30 °C

Relatively humidity: 40% ~70%

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

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

END