

SPECIFICATION FOR TFT LCD MODULE

MODEL NO:	TM031HBZ01
CUSTOMER:	集美
CUSTOMER P/N.	
VERSION	V1.0
CUSTOMER APPROVED	

Preliminary Specification

Final Specification

PREPARED	CHECKED	VERIFIED BY QA DEPT	VERIFIED BY R&D DEPT
CAINA3/5-12			

TIANMA MICRO-ELECTRONICS CO., LTD

Address: 8F, 64th Building, Jinlong, Majialong Industrial Area, Nanshan District, Shenzhen, China

Tel: +86-755-2609-4288

Fax: +86-755-8622-5774

+86-755-8622-5772

Web: www.tianma.cn www.tianma.com

REVISION RECORD

Date	Rev.No.	Page	Revision Items	Prepared
2012.05.03	V1.0		The first release	Cai na

CONTENTS

	Page
1. General Specifications -----	1
2. Outline Drawing -----	2
3. Circuit Block Diagram -----	3
4. Absolute Maximum Ratings -----	4
5. Electrical Specifications and Instruction Code -----	5
6. Optical Characteristics -----	10
7. Reliability Test Items and Criteria -----	14
8. Quality level-----	15
9. Precautions for Use of LCD Modules -----	20
10. TP Module Inspection Standard -----	**

1. General Specifications

TM031HBZ01 is a color active matrix LCD module incorporating **amorphous silicon** TFT (Thin Film Transistor). It is composed of a color TFT-LCD panel, driver IC, FPC, a back light unit and TP (Touch Panel). The 3.1" display area contains 240 x 320 pixels and can display up to 262K colors. This product accords with RoHS environmental criterion.

Item	Contents	Unit	Note
LCD Type	TFT	-	
Display Color	65K/262K		1
LCD Duty	1/320	-	
Viewing Direction	9:00	O'Clock	
Active Area(W×H)	47.88×63.84	mm	
Number of Dots	240(RGB)×320	mm	
Dot Pitch(W×H)	0.1995×0.1995	mm	
Controller	HX8347-G	-	
V _{DD}	2.8	V	
V _{DDIO}	2.8V(TYPE)	V	
Outline Dimensions	Refer to outline drawing on next page		
Backlight	6-LEDs (white)	-	
Weight	50	g	
Interface	8/16/18 bits parallel bus	-	
Polarizer Mode	Transmissive/Positive	-	

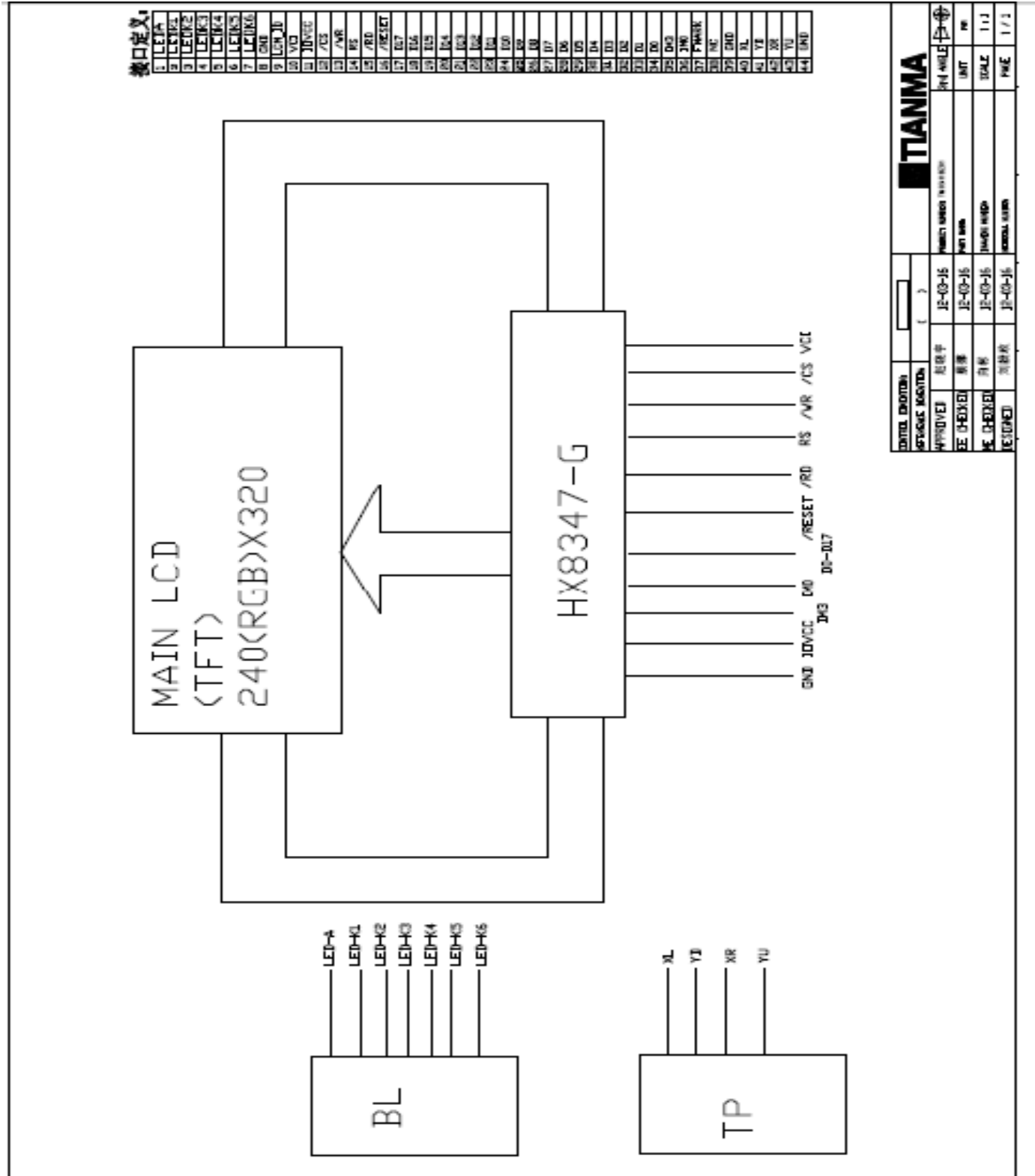
Note 1: Color tune is slightly changed by temperature and driving voltage.

Note 2: Requirements on Environmental Protection:RoHS

Note 3: Customer should do assembly according to our FPC bending sketch in the outline drawing.

Note 4: Please approve our spec before placing mass production order. Otherwise we will regard customer has approved the spec when we receive the first 2Kpcs or above order from customer.

3. Circuit Block Diagram



4. Absolute Maximum Ratings(Ta=25°C)

Item	Symbol	Min.	Max.	Unit	Note
Power Supply Voltage	V _{CI}	-0.3	3.3	V	1, 2
Logic Signal Input /Output Voltage	V _{I/OVCC}	-0.3	V _{DD} +0.3	V	
Operating Temperature	Top	-20	+70	°C	
Storage Temperature	Tst	-30	+80	°C	

Notes:

1. 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.
2. V_{DD} > V_{SS} must be maintained.

5. Electrical Specifications and Instruction Code

6. 5.1 Electrical characteristics($V_{SS}=0V$, $T_a=25^{\circ}C$)

Parameter	Symbol	Condition	Min	Typ	Max	Unit	Note	
Input voltage	'H'	V_{IH}	$V_{CI}=2.8V$	$0.8V_{DD}$	-	V_{CI}	V	
	'L'	V_{IL}	$V_{CI}=2.8V$	V_{SS}	-	$0.2V_{CI}$	V	
Output Voltage	'H'	V_{OH}	-	$0.8V_{CI}$	-	V_{CI}	V	
	'L'	V_{OL}	-	V_{SS}	-	$0.2V_{CI}$	V	
Current Consumption	I_{CC1}	Normal mode	-	-	-	mA	1,3	
	I_{CC2}	Standby mode	-	-	-	mA	2	

Note:

1: Display full white. Backlight on state.

2: IC on standby mode.

3: the default voltage is 3.2V, for N lights in series, the power is that the current multiply N.

5.2 LED backlight specification(V_{ss}=0V ,T_a=25°C)

Item	Symbol	Condition	Min	Typ	Max	Unit	Note
Supply voltage	-	-	-	-	-	V	
Supply current	I _f	V _f =3.2V	-	120	-	mA	
Reverse voltage	V _r	-	-	-	-	V	
Forward current	I _{pn}	6-chip			mA		
	I _{pd}	I _{pd}					
Reverse Current	I _r	-	-	-	-	μA	
Uniformity	ΔBp		80%				
Color coordinate*	X	I _f =120mA	0.26	-	0.315	-	
	Y		0.26	-	0.315	-	

5.3 Interface Signals

5.3 Interface Signals(continued)

Pin No.	Symbol	I/O	Function	Huawei Request	Remark
1	LEDA	POWER	Anode for LED backlighting	Anode for LED backlighting	
2	LEDK1	POWER	Cathode for LED backlighting	Cathode for LED backlighting	
3	LEDK2	POWER	Cathode for LED backlighting	Cathode for LED backlighting	
4	LEDK3	POWER	Cathode for LED backlighting	Cathode for LED backlighting	
5	LEDK4	POWER	Cathode for LED backlighting	Cathode for LED backlighting	
6	LEDK5	I	Cathode for LED backlighting	Cathode for LED backlighting	
7	LEDK6	POWER	Cathode for LED backlighting	Cathode for LED backlighting	
8	GND	POWER	Ground	Ground	
9	LCM_ID	O	ID PIN to identify different provider	ID PIN to identify different provider	
10	VCI	POWER	Analog power, 2.6V typ	Analog power, 2.6V typ	
11	IOVCC	POWER	Logic power, 1.8V typ	Logic power, 1.8V typ	
12	CS	I	Chip select signal	Chip select signal	
13	/WR	I	Write signal	Write signal	
14	RS	I	DisplayData/Command	DisplayData/Command	
15	/RD	I	Read signal	Read signal	
16	/RESET	I	Reset signal	Reset signal	
17	D17	O	Data bus	Data bus	
18	D16	O	Data bus	Data bus	
19	D15	O	Data bus	Data bus	
20	D14	I	Data bus	Data bus	
21	D13	I	Data bus	Data bus	
22	D12	I	Data bus	Data bus	

23	D11	I	Data bus	Data bus	
24	D10	I	Data bus	Data bus	
25	D9	I	Data bus	Data bus	
26	D8	I	Data bus	Data bus	
27	D7	I	Data bus	Data bus	
28	D6	I	Data bus	Data bus	
29	D5	I	Data bus	Data bus	
30	D4	I	Data bus	Data bus	
31	D3	I	Data bus	Data bus	
32	D2	I	Data bus	Data bus	
33	D1	I	Data bus	Data bus	
34	D0	I	Data bus	Data bus	
35	IM3	I	System interface select.	System interface select.	
36	IM0	I	System interface select.	System interface select.	
37	FMARK	I			
38	NC	I	NOT CONECT	NOT CONECT	
39	GND	POWER	Ground	Ground	
40	XL		Touch panel pin	Touch panel pin	
41	YD		Touch panel pin	Touch panel pin	
42	XR		Touch panel pin	Touch panel pin	
43	YU		Touch panel pin		
44	GND	POWER	Ground	Ground	

5.4 Interface Timing Chart

Note: Please refer to [HX8347-G](#) data sheet for more details.

[HX8347-G](#) INTERFACE PROTOCOL

Inter 80 system CPU interface

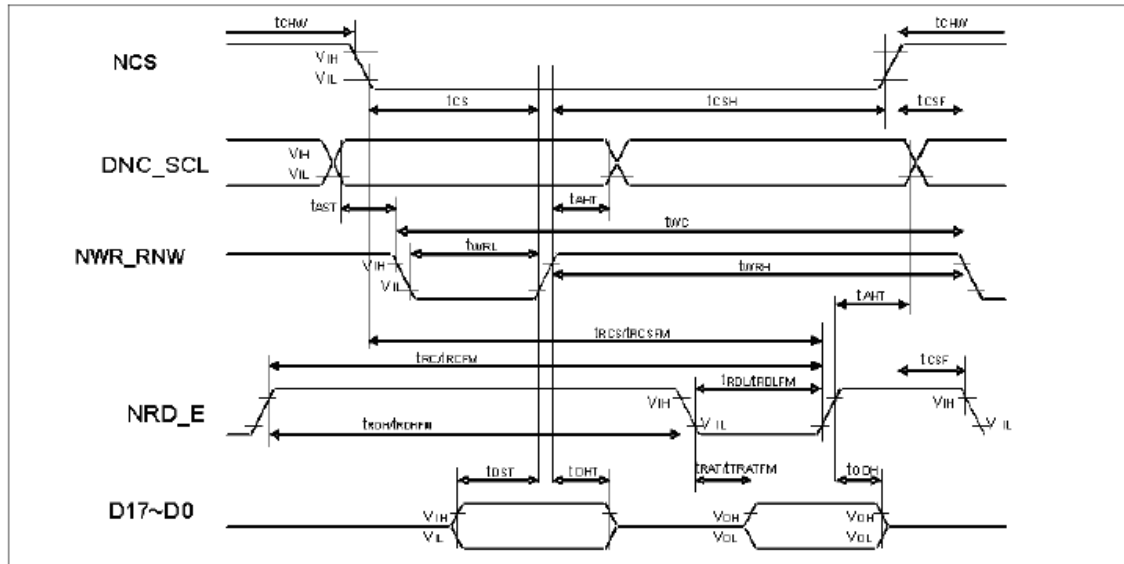


Figure 8.1: Parallel interface characteristics (8080-series MPU)

NSTRUCTION DESCRIPTION(HX8347-G)

(VSSA=0V, IOVCC=1.65V to 3.3V, VCI=2.3V to 3.3V, TA = -30 to 70°C)

Signal	Symbol	Parameter	Spec.			Unit	Description
			Min.	Typ	Max.		
DNC_SCL	tAST	Address setup time	0	-	-	ns	-
	tAHT	Address hold time (Write/Read)	10	-	-		
NCS	tCHW	Chip select "H" pulse width	0	-	-	ns	-
	tCS	Chip select setup time (Write)	15	-	-		
	tRCS	Chip select setup time (Read ID)	45	-	-		
	tRCSFM	Chip select setup time (Read FM)	355	-	-		
	tCSF	Chip select wait time (Write/Read)	10	-	-		
NWR_SCL	tWC	Write cycle (1 pixel for one write)	100	-	-	ns	-
	tWC	Write cycle (1 pixel for 2 or 3 write)	50	-	-		
NWR_SCL	tWRH	Control pulse "H" duration	15	-	-	ns	-
	tWRL	Control pulse "L" duration	15	-	-		
NRD_E (ID)	tRC	Read cycle (ID)	160	-	-	ns	When read ID data
	tRDH	Control pulse "H" duration (ID)	90	-	-		
	tRDL	Control pulse "L" duration (ID)	45	-	-		
NRD_E (FM)	tRCFM	Read cycle (FM)	450	-	-	ns	When read from frame memory
	tRDHFM	Control pulse "H" duration (FM)	90	-	-		
	tRDLFM	Control pulse "L" duration (FM)	355	-	-		
D15 to D0	tDST	Data setup time	10	-	-	ns	For maximum CL=30pF For minimum CL=8pF
	tDHT	Data hold time	10	-	-		
	tRAT	Read access time (ID)	-	-	40		
	tRATFM	Read access time (FM)	-	-	340		
	tDDH	Output disable time	20	-	80		

Note: The input signal rise time and fall time (tr, tf) is specified at 15 ns or less.

Logic high and low levels are specified as 30% and 70% of IOVCC for Input signals.

6. Optical Characteristics

6.1 Optical Specification

Light Sourc:C-light(With NV Polarizer)Ta=25°C

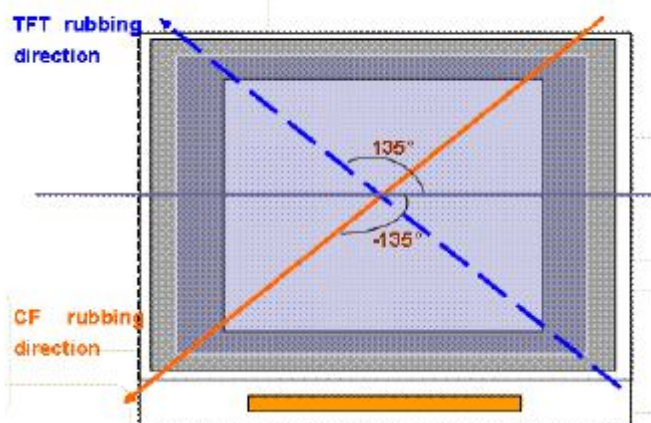
Item	Symbol	Condition	Min	Typ	Max	Unit	Remark
View Angles	θT	CR \geq 10	60	70	-	Degree	Note 2
	θB		50	60	-		
	θL		60	70	-		
	θR		60	70	-		
Contrast Ratio	CR	$\theta=0^\circ$	400	500	-		Note1 Note3
Response Time	T _{ON}	25°C	-	20	30	ms	Note1
	T _{OFF}						Note4
Chromaticity	White	C-light	x	0.253	0.303	0.353	Note5 Note1
			y	0.315	0.365	0.415	
	Red		x	0.585	0.635	0.685	
			y	0.270	0.320	0.370	
	Green		x	0.257	0.307	0.357	
			y	0.489	0.539	0.589	
	Blue		x	0.084	0.134	0.184	
			y	0.125	0.175	0.225	
NTSC	-	-	-	50	-	%	Note 5
Transmittance	T	-	5.8	6.3	-	%	Note1 Note7

Test Conditions:

1. The ambient temperature is 25°C.
2. The test systems refer to Note1 and Note2.

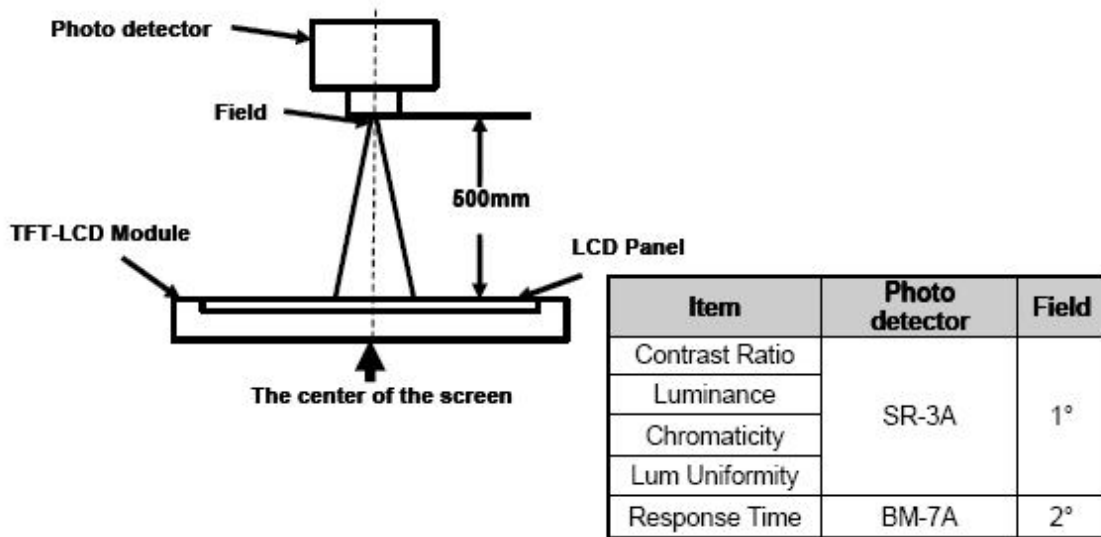
7.

6.2 Rubbing Direction



Note 1: Definition of optical measurement system.

The optical characteristics should be measured in dark room. After 5 minutes operation, the optical properties are measured at the center point of the LCD screen. All input terminals LCD panel must be ground when measuring the center area of the panel.



Note 2: Definition of viewing angle range and measurement system.

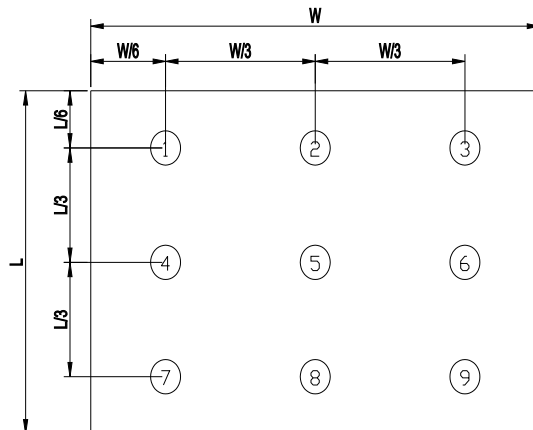
viewing angle is measured at the center point of the LCD by CONOSCOPE(ergo-80).

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

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

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

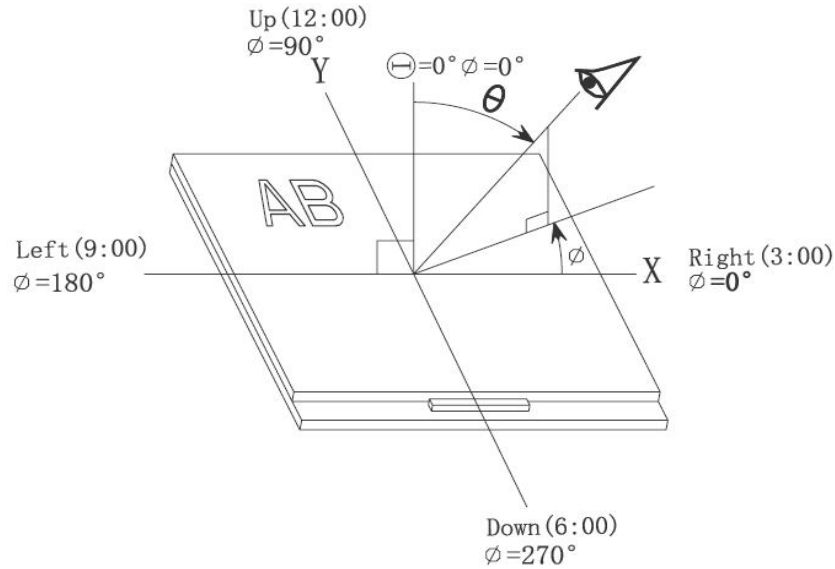
$B_p (\text{Min.})$ = Minimum brightness in 9 measured spots.



Measurement equipment PR-705 (Φ8mm)

Note 3: The definition of viewing angle:

Refer to the graph below marked by θ and ϕ



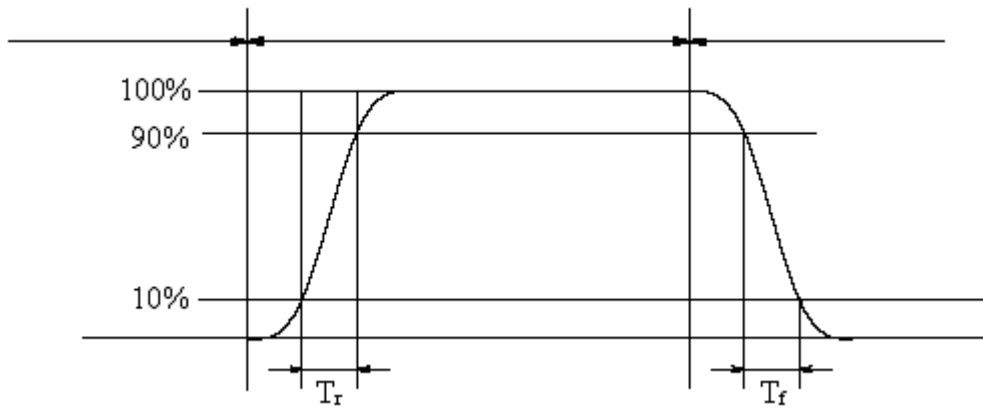
Note 4: The definition of contrast ratio (Test LCM using PR-705):

$$\text{Contrast Ratio(CR)} = \frac{\text{Luminance When LCD is at "White" state}}{\text{Luminance When LCD is at "Black" state}}$$

(Contrast Ratio is measured in optimum common electrode voltage)

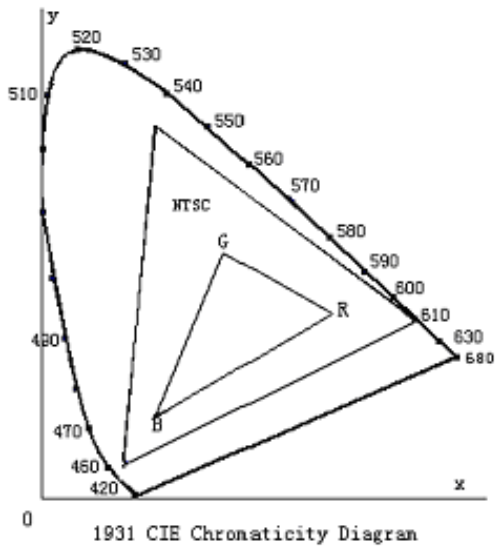
Note 5: Definition of Response time. (Test LCD using DMS501):

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:

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

7. 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	After testing, cosmetic and electrical defects should not happen.
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 Operation	60°C±2°C 90%RH 96H Power on	
6	Temperature Cycle	-30°C←→25°C←→80°C 30min 5min 30min after 10cycle, Restore 2H at 25°C Power off	
7	Vibration Test	10Hz~150Hz, 100m/s ² , 120min	
8	Shock Test	Half-sine wave,300m/s ² ,11ms	
9	Drop Test(package state)	800mm, concrete floor,1corner, 3edges, 6 sides each time	1.After testing, cosmetic and electrical defects should not happen. 2.the product should remain at initial place 3.Product uncovered or package broken is not permitted.

Note:Additional test Item proposed by customer shall be determined by mutual agreement between customer and Tianma

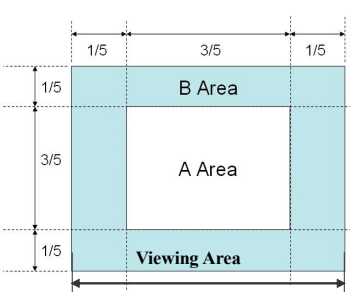
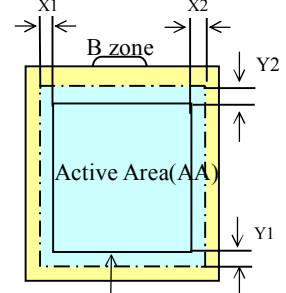
8 Quality level

8.1 Classification of defects

Major defects (MA): A major defect refers to a defect that may substantially degrade usability for product applications, including all functional defects(such as no display, abnormal display, open or missing segment, short circuit, missing component), outline dimension beyond the drawing, progressive defects and those affecting reliability.

Minor defects (MI): A minor defect refers to a defect which is not considered to be able to substantially degrade the product application or a defect that deviates from existing standards almost unrelated to the effective use of the product or its operation, such as black spot, white spot, bright spot, pinhole, black line, white line, contrast variation, glass defect, polarizer defect, etc.

8.2 Definition of inspection range

<p>For dot defect of TFT LCD which is not smaller than 3 inches, dividing three areas to make a judgment (according to figure 1).</p> <p>A area : center of viewing area B area : periphery of viewing area C area : Outside viewing area</p> <p>For other defects, dividing two areas to make a judgment (according to figure 2).</p> <p>A zone : Inside Viewing area B zone : Outside Viewing area</p> <p>X1(A.A~V.A): 0mm X2(A.A~V.A): 0mm Y1(A.A~V.A): 0mm Y2(A.A~V.A): 0mm</p>	 <p>Figure 1</p>  <p>Figure 2</p>
---	--

8.3 Inspection items and general notes

General notes	<p>① Should any defects which are not specified in this standard happen, additional standard shall be determined by mutual agreement between customer and TIANMA.</p> <p>② Viewing area should be the area which TIANMA guarantees.</p> <p>③ Limit sample should be prior to this Inspection standard.</p> <p>④ Viewing judgment should be under static pattern.</p> <p>⑤ Inspection conditions Inspection distance: 250 mm (from the sample) Temperature : 25±5 °C Inspection angle : 45 degrees in 12 o'clock direction (all defects in viewing area should be inspected from this direction)</p>	
Inspection items	Pinhole, Bright spot, Black spot, White spot, Black line, White Line, Foreign particle, Bubble	The color of a small area is different from the remainder. The phenomenon doesn't change with voltage
	Contrast variation	The color of a small area is different from the remainder. The phenomenon changes with voltage
	Polarizer defect	Scratch, Dirt, Particle, Bubble on polarizer or between polarizer and glass
	Dot defect (TFT LCD)	The pixel appears bright or dark abnormally when display

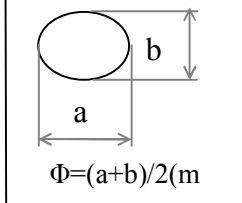
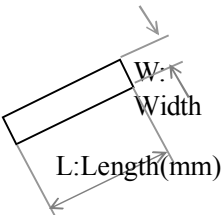
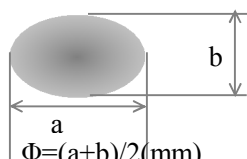
Functional defect	No display, Abnormal display, Open or missing segment, Short circuit, False viewing direction
Glass defect	Glass crack, Shaved corner of glass, Surplus glass
PCB defect	Components assembly defect

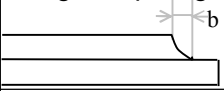
8.4 Outgoing Inspection level

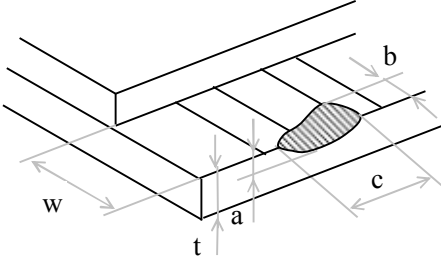
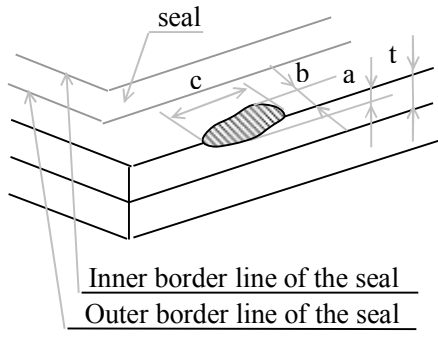
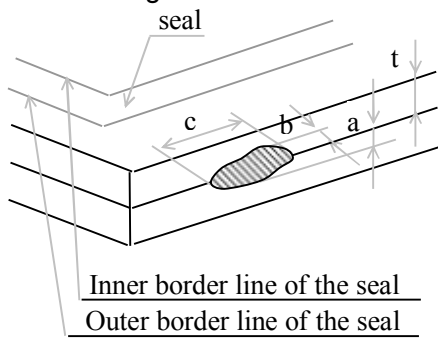
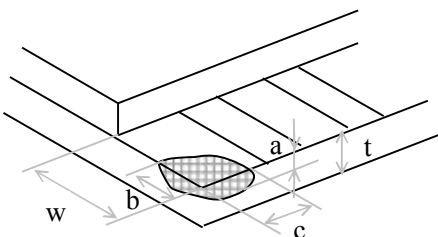
Outgoing Inspection standard	Inspection conditions	Inspection				
		Min.	Max.	Unit	IL	AQL
Major Defects	See 8.3 general notes	See 8.5			II	0.65
Minor Defects	See 8.3 general notes	See 8.5			II	1.5

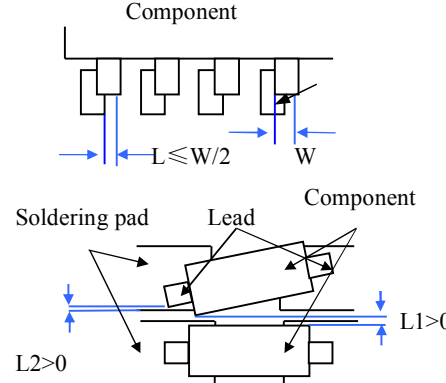
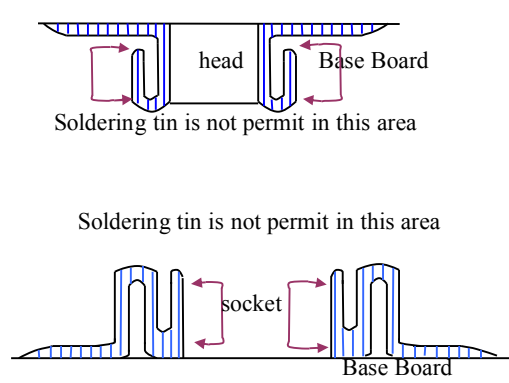
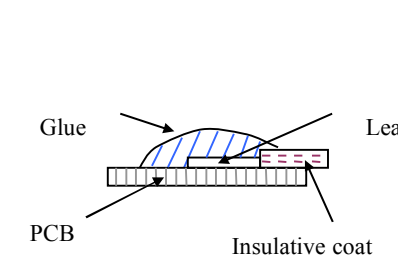
Note: Sampling standard conforms to GB2828

8.5 Inspection Items and Criteria

Inspection items			Judgment standard				
			Category		Acceptable number		
					A zone	B zone	
1	Black spot, White spot, Bright Spot, Pinhole, Foreign Particle, Particle in or on glass, Scratch on glass		A	$\Phi \leq 0.10$	Neglected		
			B	$0.10 < \Phi \leq 0.15$	2		
			C	$0.15 < \Phi \leq 0.20$	1		
			D	$0.20 < \Phi$	0		
			Total defective point(B,C)		3		Neglected
2	Black line, White line, and Particle Between Polarizer and glass, Scratch on glass		A	$W \leq 0.01$	Neglected		
			B	$0.01 < W \leq 0.03$ $L \leq 3.0$	2		
			C	$0.03 < W \leq 0.05$ $L \leq 3.0$	1		
			D	$0.05 < W$	0		
			Total defective point(B,C)		3		Neglected
3	Contrast variation		A	$\Phi \leq 0.2$	Neglected		
			B	$0.2 < \Phi \leq 0.3$	2		
			C	$0.3 < \Phi \leq 0.4$	1		
			D	$0.4 < \Phi$	0		
			Total defective point(B,C)		3		Neglected

4	Dot defect (if TFT LCD is used)	TFT LCD is smaller than 3 inches	LCD Class	Defect	A area		B area
		TFT LCD between 3~10.4 inches	B	Bright dot	2		Neglected
				Dark dot	3		
				Total	4		
LCD Class	Defect	A area	B area	C area			
B	Bright dot	2	2	Neglected			
	Dark dot	2	3				
	Total	6					
<p>Notes: Bright dot: in R、G、B or dark display figure, the pixel appears bright. Dark dot: in R、G、B or white display figure, the pixel appears dark. Defect area must be less than an half size of the dot.</p>							
5	Bubble inside cell	any size		none		none	
6	Polarizer defect (if Polarizer is used)	Scratch ,damage on polarizer, Particle on polarizer or between polarizer and glass.	Refer to item 1 and item 2.				
		Bubble, dent and convex	A	$\Phi \leq 0.3$	Neglected		Neglected
		B	$0.3 < \Phi \leq 0.7$	2			
		C	$0.7 < \Phi$	0			
7	Surplus glass	Stage surplus glass	 $b \leq 0.3\text{mm}$				
		Surrounding surplus glass					
8	Open segment or open common	Not permitted					
9	Short circuit	Not permitted					
10	False viewing direction	Not permitted					
11	Contrast ratio uneven	According to the limit specimen					
12	Crosstalk	According to the limit specimen					
13	Black /White spot(display)	Refer to item 1					
14	Black /White line(display)	Refer to item 2					

Inspection items		Judgment standard		Acceptable number	
		Category(application: B zone)			
15	Glass defect crack	①The front of lead terminals		<p>A $a \leq t, b \leq 1/5W, c \leq 3\text{mm}$</p> <p>B Crack at two sides of lead terminals should not cover patterns and alignment mark</p>	Max.3 defects allowed
		②Surrounding crack—non-contact side	 <p>$b < \text{Inner border line of the seal}$</p>		
		③ Surrounding crack— contact side	 <p>$b < \text{Outer border line of the seal}$</p>		
		④Corner		<p>A $a \leq t, b \leq 3.0, c \leq 3.0$</p> <p>B Glass crack should not cover patterns u and alignment mark and patterns.</p>	

Inspection items		Judgment standard	
		Category(application: B zone)	
16	PCB defect	<p>Component soldering: No cold soldering、short、open circuit、burr、tin ball The flat encapsulation component position deviation must be less than 1/3 width of the pin (Pic.1); the sheet component deviation: Pin deviates from the pad and contact with the near components is not permitted (Pic.2)</p>	
		<p>lead defect: The lead lack must be less than 1/3 of its width; The lead burr must be less than 1/3 of the seam; Impurities connect with the near leads is not permitted</p>	
		<p>Connector soldering: Soldering tin is at contact position of the plug and socket is not permitted No foundation is scald Serious cave distortion on plug and socket contact pin is not permitted</p>	
<p>Glue on root of the speaker receiver and motor lead: The insulative coat of the lead must join into the PCB; the protected glue must envelop to the insulative coat.</p>			

9. Precautions for Use of LCD Modules

9.1 Handling Precautions

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

9.1.2 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.

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

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

9.1.5 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

9.1.6 Do not attempt to disassemble the LCD Module.

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

9.1.8 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 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.

9.2 Storage precautions

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

9.2.2 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%

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

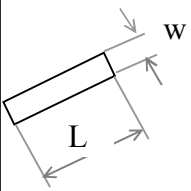
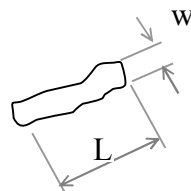
9.3 The LCD modules should be no falling and violent shocking during transportation, and also should avoid excessive press, water, damp and sunshine.

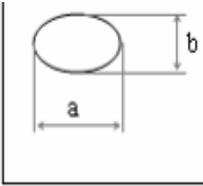
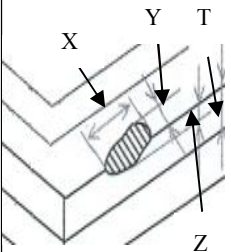
10. TP Module Inspection Standard

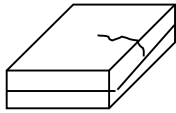
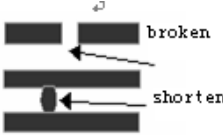
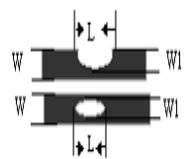
10.1 Scope:

The standard is applied to all customers who has no license tag.

10.2 Appearance defects inspection item and limit criteria (unit: mm) :

Inspection item	Detail content	criteria			remark		
Outline dimension	Length, Width, Thickness	Outline should meet the drawing			Vernier caliper; ruler		
LOGO inclined, color, icon, grounding		LOGO inclined :not allowed			Eyeballing		
Surface scratch		(1) $W \leq 0.05$ mm, allowed (2) $0.05 \text{ mm} < W \leq 0.10$, $L \leq 10$ mm, defects space 20mm at least 2 defects are allowed, $L > 10$ mm, not allowed (3) $W > 0.1$ mm, not allowed			Eyeballing		
Linear foreign matter		TP product under 3.5"	A	$W \leq 0.05$ mm, $L \leq 10$ mm	Neglected	Eyeballing	
			B	$0.05 \text{mm} < W \leq 0.10 \text{mm}$, $L \leq 10 \text{mm}$,	2		
			C	$L > 10 \text{mm}$ or $W > 0.10 \text{mm}$	0		
			Total defects (B)		2		
			Distance: $D \geq 10 \text{mm}$, out of V,A is neglected				
			TP product between 3.5" and 4.3"	A	$W \leq 0.05$ mm, $L \leq 10$ mm		Neglected
		B		$0.05 \text{mm} < W \leq 0.10 \text{mm}$, $L \leq 5 \text{mm}$,	3		
		C		$0.05 \text{mm} < W \leq 0.10 \text{mm}$, $5 \text{mm} < L \leq 10 \text{mm}$,	2		
		D		$L > 10 \text{mm}$ or $W > 0.1 \text{mm}$	0		
		Total defects(B,C)		3			
		Distance: $D \geq 15 \text{mm}$, out of V,A is neglected					
		TP product over 4.3"	A	$W \leq 0.05$ mm, $L \leq 10$ mm	Neglected		
			B	$0.05 \text{mm} < W \leq 0.1 \text{mm}$, $L \leq 5 \text{mm}$,	4		
			C	$0.05 \text{mm} < W \leq 0.1 \text{mm}$, $5 \text{mm} < L \leq 10 \text{mm}$,	3		
			D	$L > 10 \text{mm}$ or $W > 0.1 \text{mm}$	0		
Total defects(B,C)			3				
Distance: $D \geq 20 \text{mm}$, out of V,A is neglected							

Inspection item	Detail content	criteria			remark	
Bright spot, Black spot, White spot, Pinhole, Black line, White Line, Foreign matter, air bubble	 $\Phi=(a+b)/2$	TP product under 3.5"	A	$\Phi \leq 0.15$	Neglected	Eyeballing
			B	$0.15 < \Phi \leq 0.20$	2	
			C	$0.20 < \Phi \leq 0.3$	1	
			D	$\Phi > 0.3$	0	
			Total defects(B,C)		2	
			distance	$D \geq 10\text{mm}$	Out of V,A is neglected	
		TP product between 3.5" and 4.3"	A	$\Phi \leq 0.15$	Neglected	
			B	$0.15 < \Phi \leq 0.35$	2	
			C	$0.35 < \Phi \leq 0.45$	1	
			D	$\Phi > 0.40$	0	
			Total defects(B,C)		2	
			distance	$D \geq 15\text{mm}$	Out of V,A is neglected	
		TP product over 4.3"	A	$\Phi \leq 0.15$	Neglected	
			B	$0.15 < \Phi \leq 0.40$	3	
			C	$0.40 < \Phi \leq 0.60$	2	
			D	$\Phi > 0.60$	0	
			Total defects(B,C)		3	
			distance	$D \geq 20\text{mm}$	Out of V,A is neglected	
Glass chip and crack		Side: $x(\text{length}) \geq 2\text{mm}$ $z(\text{deepness}) = T$: not allowed $y(\text{width}) \geq 2\text{mm}$ $z(\text{deepness}) = T$: not allowed Corner: $x, y \geq 2\text{mm}$ or $z = T$: not allowed (T: glass thickness)			Eyeballing	
Newton ring		$D < 1/2$ long side ,allowed $D \geq 1/2$ long side, not allowed			Eyeballing with the lamplight	
rainbow		Check in the range of viewing angle or press the TP LOGO by the finger, the rainbow is not allowed.			Eyeballing	

Inspection item	Detail content	criteria	remark
TP white border		The insulation tape meet the LOGO is not allowed	Eyeballing
Glass crack		Not allowed	Eyeballing
TP surface dirty matter		Dirty which have to cleaned by chemic impregnant: not allowed	Eyeballing
TP pressing mark	The mark between the TP and LCD	in the V,A(see limited sample):not allowed	Eyeballing
FPC brim teared, shorten,broken, trace mended		Not allowed	Eyeballing with the lamplight
FPC damage		(1)W1 < 1/3 trace width W, 2 lines are allowed (2)W1 ≥ 1/3 routing line width W, the damage length L ≥ W, not allowed	Eyeballing with the lamplight
FPC pressing mark /folding mark		(1)hot pressing side and connecting side: not allowed(make limited sample if necessary) (2)around the hole: not allowed (3)routing line: mark width ≤ 1/3 trace width, The mark length ≤ 1mm is allowed (4)big ground area: neglected (5)no see base material because of the mark.	Eyeballing with the lamplight
FPC trace reveal copper, Electrode oxidated, scratch		Revealing copper is not allowed; Palm oxidation is allowed; black oxidation is allowed; protect cover is forbad scratched and damaged	Eyeballing with the lamplight
TP inclined		Obvious incline is not allowed. No affect the machine assembly first.	eyeballing
Bezel defect		Scratch: length ≤ 10mm, width ≤ 0.4mm and 3 defects at most; rust and distortion is not allowed	eyeballing
Spray Code defect		According to the content specified by the customer font illegible and wrong position is not allowed	eyeballing
Note: other appearance inspection standards which not mentioned in it ,please refer to 《LCM raw materia inspection standard》 (Q/DDG212-2005)			

10.3 TP function inspection

Inspection item	Detail content	Limit criteria
Linearity defect (including distortion and drawing back)	x,y axial linearity > 1.5% : not allowed	Special test jig +computer
Line broken	Exceed 4mm : not allowed	
Terminal resistance	The resistance between X1 and X2 or Y1 and Y2 exceed the design value: not allowed	Test it when it is required during Designing the drawing
insulation resistance	Resistance between X1 and Y1: not allowed	

10.4 Display defects inspection item and limit criteria

About display defects inspection item and limit criteria ,please refer to the content of 《LCM-TFT liquid display module》 (Q/DDG199-2007) and 《liquid display module display defects inspection standard》 (Q/DDG439-1999)。