JICTECH LCD (HONGKONG) CO.,LTD
DONGGUAN JICTECH LCD CO.,LTD
PROFESSIONAL LCM SUPPLIER

DONG GUAN JICTECH LCD CO., LTD.

Product Specification For TFT-LCD Module

Model No.: RT028TR5T-F01B

Specification Ver.: 01

☐APPROVAL FOR SPECIFICATIONS ONLY

■APPROVAL FOR SPECIFICATIONS AND SAMPLE

CUSTOMER:	**APPROVED BY:**
DATA:	**DATA:**

If JICTECH samples are recognized by the customer，Please return 1 copy for your confirmation with your signature and comments. Thanks!

JICTECH LCM R&D CENTER		
APPROVED BY	**CHECKED BY**	**PREPARED BY**
LUO	**YANG**	**LOONG**
2022.01.14	**2022.01.14**	**2022.01.14**

REVISION RECORD

Rev NO.	Date	Revision Contents	Note
01	2022-01-14	First release	Initial sample

CONTENTS

1. GENERAL SPECIFICATION

1.1 Introduction

The RT028TR5T-F01B is a color active matrix Thin Film Transistor (TFT) Liquid Crystal Display (LCD) that uses amorphous silicon (a-Si) TFT as a switching device. This model is composed of a single 2.8 inches transmissive type main TFT-LCD panel. The resolution of the panel is 240x320 pixels and can display up to 262K color.

1.2 Feature

- TN type main TFT-LCD panel.
- Structure FOG+BL+RTP.
- 80MCU 16bit interface, Power saving mode.

1.3 Application

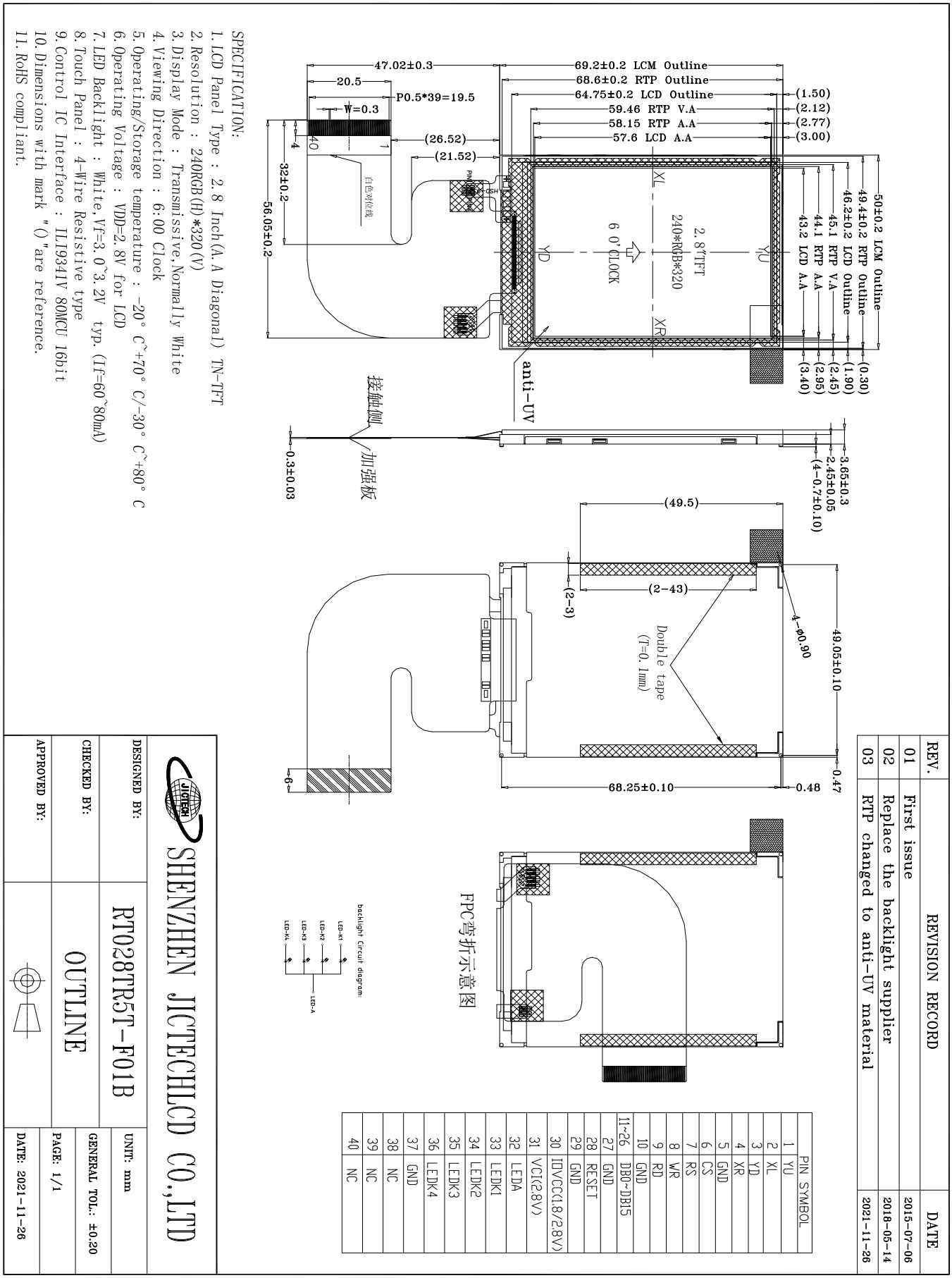
- Display terminals for digital products. Industrial control Etc.

1.4 General Specification

No.	Item	Specification	Unit	Remark
1	LCD Size	2.8	inch	-
2	Panel Type	a-Si TFT active matrix	-	-
3	Resolution	240RGB(H) x 320(V)	pixel	-
4	Display Mode	TN/ Normally white/Transmissive	-	-
5	Display Number of Colors	262K	-	-
6	Viewing Direction	6 o'clock (Best View)	-	-
7	Contrast Ratio	400:1	-	-
8	Luminance	400	cd/m2	-
9	Module Size	50(W) x 69.2(H) x 3.65(T)	mm	Note

10	Active Area	43.2(W) x57.6(H)	mm	Note
11	Pixel Pitch	0.153(W) x 0.153(H)	mm	-
12	Driver IC	ILI9341V	-	-
13	Light Source	4 LEDs White	-	-
14	Interface	80MCU 16bit	-	-
15	Operating Temperature	-20~70 (Max. scope)	℃	-
16	Storage Temperature	-30~80 (Max. scope)	℃	-
17	Weight	TBD	g	-

2. EXTERNAL DIMENSIONS



3. ABSOLUTE MAXIMUM RATINGS

Parameter of absolute maximum ratings	Symbol	Min	Max	Unit
Operating temperature	Top	-20	70	℃
Storage temperature	Tst	-30	80	℃
Humidity	RH	-	90%(Max60 ℃)	RH

4. ELECTRICAL CHARACTERISTICS

4.1. DC Characteristics

Parameter of DC characteristics	Symbol	Min	Typ	Max	Unit
Supply voltage for logic	VCC/VCI	2.7	2.8	2.9	V
I/O power supply	IOVCC	1.7/2.7	1.8/2.8	1.9/2.9	V
Input Current	Idd	-	TBD	TBD	mA
Input voltage 'H' level	VIH	0.7IOVCC	-	IOVCC	V
Input voltage 'L' level	VIL	VSS	-	0.3IOVCC	V
Output voltage 'H' level	VOH	0.8IOVCC	-	IOVCC	V
Output voltage 'L' level	VOL	VSS	-	0.2IOVCC	V

4.2. Backlight Characteristics

Item of backlight characteristics	Symbol	Min.	Typ.	Max.	Unit	Condition
Forward voltage	Vf	3.0	3.2	-	V	If=4*20mA
Number of LED	-	-	4	-	Piece	-
Connection mode	P	-	Series connection	-	-	-
Chromaticity White CIE (x, y)	x	0.25	-	0.33	-	If=4*20mA
	y	0.25	-	0.33	-	

Using condition: constant current driving method I_f=80mA(+/-10%).

5. INTERFACE DESCRIPTION

Pin No.	Symbol	I/O	Description	When not in use
1	YU	O	Touch panel interface	
2	XL	O	Touch panel interface	
3	YD	O	Touch panel interface	
4	XR	O	Touch panel interface	
5	GND	P	System ground	
6	CS	I	Chip select input pin	
7	RS	I	LCD registor selector	
8	WR	I	LCM write signal: Active “L”	
9	RD	I	LCM read signal: Active “L”	
10	GND	P	System ground	
11-26	DB00-DB15	I/O	Data bus	
27	GND	P	System ground	
28	/RSTB	I	Chip reset pin	
29	GND	P	System ground	
30	IOVCC	P	Power supply for analog voltage.(1.8V2.8V)	
31	VCC	P	Power supply(2.8V)	
32	LED-A	P	Power supply Anode input for backlight.	
33-36	LED-K1-K4	P	Power supply Cathode input for backlight	
37	GND	P	System ground	
38-40	NC		NC	

Note: The voltage power of the interface logic pin depend on “IOVCC” and “GND”, Such as DB_n and function pins

6. ELECTRO-OPTICAL CHARACTERISTICS

Item of electro-optical characteristics	Symbol		Condition	Min	Typ	Max	Unit	Remark
Contrast ratio	CR		Viewing normal angle $\theta = \phi = 0^\circ$ If=80mA TC=25°C	-	400	-	-	Note 1
SurfaceLuminance	Lv			350	400	-	Cd/m2	Note 2
Luminance uniformity	δ WHITE			80	-	-	%	Note 3
Response time	Tr+Tf			-	30	-	ms	Note 4
Viewing angle range	θ	3:00	Center (CR≥10)	-	70	-	degree	Note 5
		9:00		-	70	-		
		6:00		-	70	-		
		12:00		-	55	-		
Module Chromaticity CIE (x, y)	White	x	Viewing normal angle $\theta = \phi = 0^\circ$	0.25	-	0.33	-	Note6
		y		0.25	-	0.33		
	Red	x		0.60	-	0.65		
		y		0.31	-	0.35		
	Green	x		0.26	-	0.30		
		y		0.53	-	0.57		
	Blue	x		0.12	-	0.16		
		y		0.10	-	0.14		
NTSC Ratio	S		-	-	56%	-	-	Note7

*Note: All above side data are based on JICTECH following condition –

Note1. Contrast Ratio (CR) is defined mathematically by the following formula. For more information see FIG 1.

$$\text{Contrast Ratio} = \frac{\text{Average Surface Luminance with all white pixels (P1, P2, P 3, P4, P5)}}{\text{Average Surface Luminance with all black pixels (P1, P2, P 3, P4, P5)}}$$

Note2. Surface luminance is the LCD surface from the surface with all pixels displaying white. For more information see FIG 1.

Lv = Average Surface Luminance with all white pixels (P1, P2, P3, P4, P5)

Note3. The uniformity in surface luminance（ δ WHITE）is determined by measuring luminance at each test position 1 through 5, and then dividing the maximum luminance of 5 points luminance by minimum luminance of 5 points luminance. For more information see FIG 1.

$$\delta \text{ WHITE} = \frac{\text{Minimum Surface Luminance with all white pixels (P1, P2, P3, P4, P5)}}{\text{Maximum Surface Luminance with all white pixels (P1, P2, P3, P4, P5)}}$$

Note4. Response time is the time required for the display to transition from White to black(Rise Time, Tr) and from black to white(Decay Time, Tf). For additional information see FIG 2.

Note5. Viewing angle is the angle at which the contrast ratio is greater than 2. For TFT module the contrast ratio is greater than 10. The 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.

Note6. CIE (x, y) chromaticity ,The x,y value is determined by screen active area position 5. For more information see FIG 1.

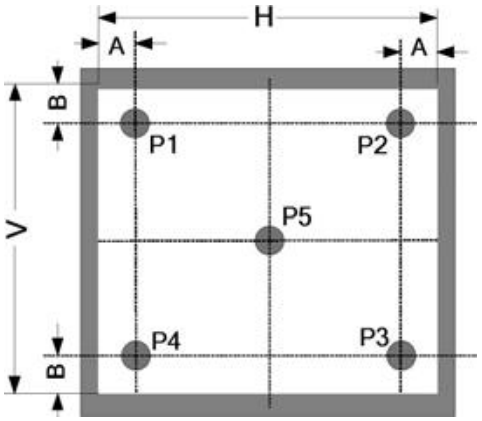
Note7: NTSC ratio：For more information see FIG 4.

$$\text{NTSC ratio} = \frac{\text{Area of RGB triangle}}{\text{Area of NTSC triangle}}$$

Note8. For Viewing angle and response time testing, the testing data is base on Autronic-Melchers's ConoScope. Series Instruments. For contrast ratio, Surface Luminance, Luminance uniformity and CIE， the testing data is base on BM-7 photo detector.

Note9. For TFT transmissive module, Gray scale reverse occurs in the direction of panel viewing angle

FIG.1. Measuring method for Contrast ratio,surface luminance, Luminance uniformity,CIE (x,y) chromaticity



A : 5 mm
B : 5 mm
H,V : Active Area
Light spot size =5mm, 500mm distance from the LCD surface to detector lens
measurement instrument is luminance meter BM-7.
or portable is luminance meter measurement instrument.

FIG. 2. The definition of Response Time

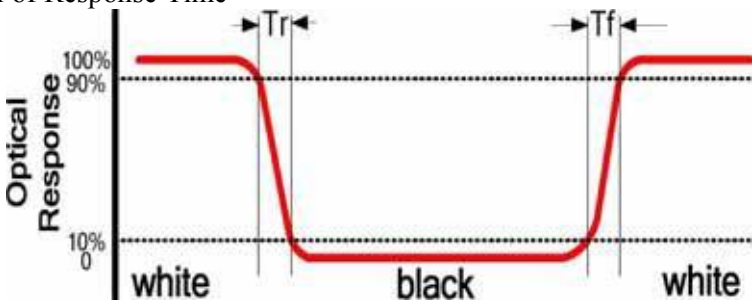
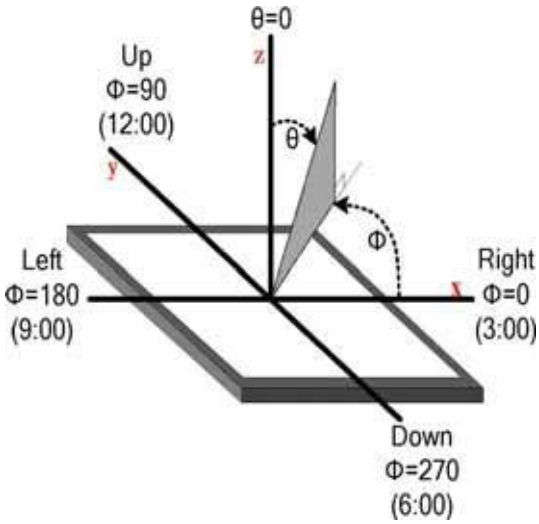


FIG. 3. The definition of viewing angle



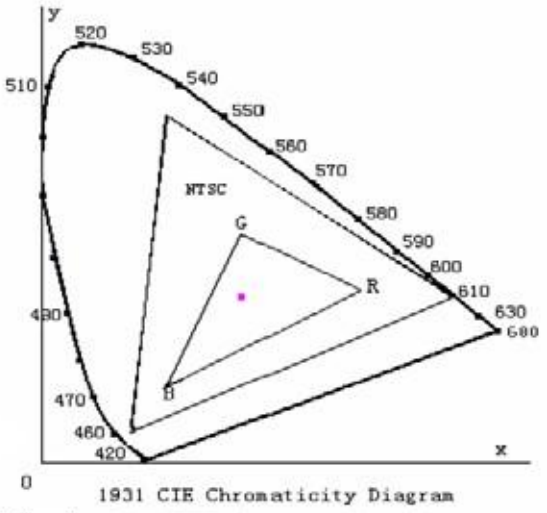


Fig.4. 1931 CIE chromaticity diagram

7. RELIABILITY TEST CONDITIONS

No.	Test Item	Test Condition	Inspection after test
1	High Temperature Storage	80±2℃/192 hours	Inspection after 2~4hours storage at room temperature, the sample shall be free from defects: 1.Air bubble in the LCD; 2.Sealleak; 3.Non-display; 4.missing segments; 5.Glass crack; 6.Current Idd is twice higher than initial value. 7.The surface shall be free from damage. 8.The electrical characteristics requirements shall be satisfied.
2	Low Temperature Storage	-30±2℃/192 hours	
3	High Temperature Operating	70±2℃/96 hours	
4	Low Temperature Operating	-20±2℃/96 hours	
5	Temperature Cycle	-20±2℃(30min.) ~25(5min.)~70(30min.) ±2℃~25(5min.) x 2 cycles	
6	Damp Proof Test	60℃±3℃×90%RH/72 hours	
7	Vibration Test	Frequency：10Hz~55Hz~10Hz Amplitude 1.5mm, X，Y，Z direction for total 0.5hours (Packing condition)	
8	Dropping test	Drop to the ground from 1.0m height, one time, every side of carton. (Packing condition)	
9	ESD test	Voltage:±4kv/±2kv R: 330Ω C: 150pF Air/Contact discharge, each 10time	

Remark:

1. The test samples should be applied to only one test item.
2. Sample size for each test item is 5~10pcs.
3. For Damp Proof Test, Pure water(Resistance＞10MΩ) should be used.
4. In case of malfunction defect caused by ESD damage, if it would be recovered to normal state after resetting, it would be judged as a good part.
5. EL evaluation should be excepted from reliability test with humidity and temperature: Some defects such as black spot/blemish can happen by natural chemical reaction with humidity and Fluorescence EL has.

8. INSPECTION CRITERION

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

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

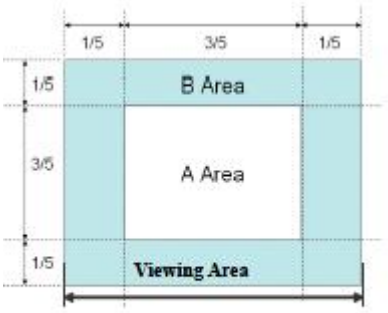


Figure 1

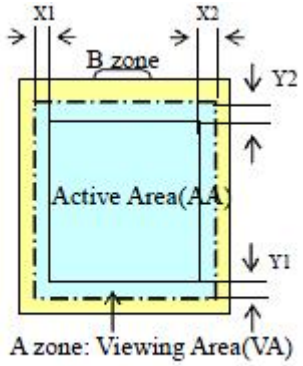


Figure 2

8.3 Inspection items and general notes

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
General notes	1.Should any defects which are not specified in this standard happen, additional standard shall be determined by mutual agreement between customer and JICTECH. 2.Viewing area should be the area which JICTECH guarantees. 3.Limit sample should be prior to this Inspection standard. 4.Viewing judgment should be under static pattern. 5.Inspection conditions Inspection distance : 250 mm (from the sample) Temperature : 25±5 ºC	

8.4 Outgoing Inspection level

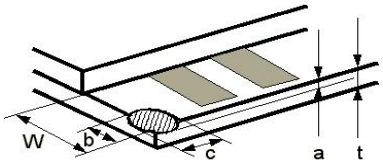
Outgoing Inspection standard	Inspection conditions	Inspection				
		Min.	Max.	Unit	IL	AQL
Major Defects	See 8.3 general notes	See 8.5			II	0.25
Minor Defects	See 8.3 general notes	See 8.5			II	0.65
Note：Sampling standard conforms to GB2828						

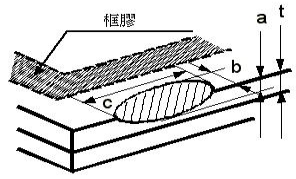
8.5 Inspection Items and Criteria

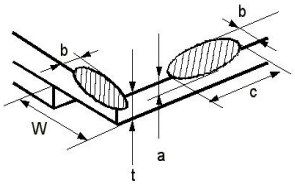
<table>
<tr><td rowspan="2"></td><td rowspan="2">检验项目 Inspection items</td><td rowspan="2">检验内容 Inspect content</td><td colspan="2">缺陷级别 Defect levels</td></tr>
<tr><td>主缺 main deficiency</td><td>轻缺 less deficiency</td></tr>
<tr><td>1</td><td></td><td>
点状不良超规格不可：Spotty defects over specification can not:
黑点、白点、红点、绿点、蓝点等。凹凸点\异物 (点状)
Black spots, white spots, red spots, green spots, blue spots, etc. Bump points \ foreign bodies (dots)
<table>
<tr><th>大小(D)MM (D) MM size</th><th>允许的个数 allowed qty</th></tr>
<tr><td>D< 0.1</td><td>不计（密集不可）Not count (dense not allowed)</td></tr>
<tr><td>0.1 ≤D≤0.15</td><td>2</td></tr>
<tr><td>0.15≤D≤0.2</td><td>1</td></tr>
<tr><td>0.2<D</td><td>0</td></tr>
</table>
</td><td></td><td>√</td></tr>
<tr><td></td><td></td><td>
线状不良超规格不可：
<table>
<tr><th>长 L(mm)</th><th>宽 W (mm)</th><th>允许数量 allowed qty</th></tr>
<tr><td>不计</td><td>W≤0.02</td><td>不计(密集不可) Not count (dense not allowed)</td></tr>
<tr><td>L≤3.0</td><td>0.02＜W≤0.03</td><td>2</td></tr>
<tr><td>L≤2.0</td><td>0.03＜W≤0.05</td><td>1</td></tr>
<tr><td>————</td><td>W＞0.05</td><td>0</td></tr>
</table>
</td><td></td><td>√</td></tr>
</table>

		Bad pixel <table><tr><td>Item</td><td>Criteria</td><td>Total</td></tr><tr><td>Bright dot</td><td>N≤2</td><td rowspan="2">≤3</td></tr><tr><td>Dark dot</td><td>N≤1</td></tr><tr><td>Bright adjacent dots</td><td>N≤2</td><td>2</td></tr><tr><td>Dark adjacent dots</td><td>N≤2</td><td>2</td></tr><tr><td>Adjacent bright and dark dots</td><td>N≤2</td><td>2</td></tr></table>		√

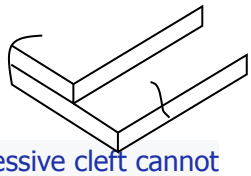
外观部分：Appearance:

<table>
<tr><th rowspan="2">NO</th><th rowspan="2">检验项目
Inspection items</th><th rowspan="2">检验内容 Inspection content</th><th colspan="2">缺陷级别
Defect levels</th><th rowspan="2">检验方法及工具
Inspection methods and tools</th></tr>
<tr><th>主缺
main defici ency</th><th>轻缺
less defici ency</th></tr>
<tr><td rowspan="2">1</td><td rowspan="2">LCD 外观
LCD appearance</td><td>角边破损超规格不可：Corner damage is not acceptable
 

<table><tr><td>c（长度）</td><td>b（宽度）</td><td>t（厚度）</td></tr><tr><td>≤2.0MM</td><td>≤W</td><td>不计</td></tr></table></td><td></td><td>√</td><td rowspan="2">目视、
比对卡、
放大镜、
塞规
Visual,
The comparison,
A magnifying glass, Plug gauge</td></tr>
<tr><td>非端子部破损：Non-terminal damage:
 

<table><tr><td>c（长度）</td></tr><tr><td>≤3.0MM</td></tr><tr><td>b（宽度）</td></tr><tr><td>不可触到框胶</td></tr><tr><td>t（厚度）</td></tr><tr><td>不计</td></tr></table>
 

<table><tr><td>c（长度）</td></tr><tr><td>≤3.0MM</td></tr><tr><td>b（宽度）</td></tr><tr><td>≤W/3</td></tr><tr><td>t（厚度）</td></tr><tr><td>不计</td></tr></table></td><td></td><td>√</td></tr>
</table>

NO	检验项目 **Inspection items**	检验内容 **Inspection content**	缺陷级别 Defect levels		检验方法及工具 **Inspection methods and tools**
			主缺 **main deficiency**	轻缺 less **deficiency**	
2	LCD 外观 **LCD appearance**	裂 crack  有进行性裂不可 progressive cleft cannot		√	目视、比对卡、放大镜、塞规 Visual, The comparison, A magnifying glass, Plug gauge
		偏光片裂痕：VA 区域内不论大小不可存在 Polaroid crack: no matter the size of the VA area does not exist	√		
		偏光片偏移（凹、凸）不可超出图纸要求 Polarizer offset (concave, convex) should not exceed the requirements of the drawing		√	
		封口胶不良(脱落、尺寸不符) Poor sealing glue (falling off, size inconsistent)		√	
		气泡：气泡不能横跨 2 条线路，且不可超过 2 个 Bubbles: No more than two bubbles can span two lines		√	

9. PRECAUTIONS FOR USING LCD MODULES

9.1. Handing Precautions

9.1.1 The display panel is made of glass and polarizer. As glass is fragile. It tends to become or chipped during handling especially on the edges. Please avoid dropping or jarring. Do not subject it to a mechanical shock by dropping it or impact.

9.1.2 If the display panel is damaged and the liquid crystal substance leaks out, be sure not to get any in your mouth. If the substance contacts your skin or clothes, 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. Do not touch the display with bare hands. This will stain the display area and degraded insulation between terminals (some cosmetics are determined to the polarizer).

9.1.4 The polarizer covering the display surface of the LCD module is soft and easily scratched. Handle this polarizer carefully. Do not touch, push or rub the exposed polarizers with anything harder than an HB pencil lead (glass, tweezers, etc.). Do not put or attach anything on the display area to avoid leaving marks on it. Condensation on the surface and contact with terminals due to cold will damage, stain or dirty the polarizer. After products are tested at low temperature they must be warmed up in a container before coming in to contact with room temperature air.

9.1.5 If the display surface becomes contaminated, breathe on the surface and gently wipe it with a soft dry cloth. If it is heavily contaminated, moisten cloth with one of the following solvents

-Isopropyl alcohol
-Ethyl alcohol

Do not scrub hard to avoid damaging the display surface.

9.1.6 Solvents other than those above-mentioned may damage the polarizer. Especially, do not use the following.

-Water
-Ketone
-Aromatic solvents

Wipe off saliva or water drops immediately, contact with water over a long period of time may

9.1.7 Exercise care to minimize corrosion of the electrode. Corrosion of the electrodes is accelerated by water droplets, moisture condensation or a current flow in a high-humidity environment.

9.1.8 Install the LCD Module by using the mounting holes. When mounting the LCD module make sure it is free of twisting, warping and distortion. In particular, do not forcibly pull or bend the I/O cable or the backlight cable.

9.1.9 Do not attempt to disassemble or process the LCD module.

9.1.10 NC terminal should be open. Do not connect anything.

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

9.1.12 Electro-Static Discharge Control Since this module uses a CMOS LSI, the same careful attention should be paid to electrostatic discharge as for an ordinary CMOS IC. To prevent destruction of the elements by static electricity, be careful to maintain an optimum work environment.

-Before removing LCM from its packing case or incorporating it into a set, be sure the module and your body have the same electric potential. Be sure to ground the body when handling the LCD modules.

-Tools required for assembling, such as soldering irons, must be properly grounded. Make certain the AC power source for the soldering iron does not leak. When using an electric screwdriver to attach LCM, the screwdriver should be of ground potentiality to minimize as much as possible any transmission of electromagnetic waves produced sparks coming from the commutator of the motor.

-To reduce the amount of static electricity generated, do not conduct assembling and other work under dry conditions. To reduce the generation of static electricity be careful that the air in the work is not too dry. A relative humidity of 50%-60% is recommended. As far as possible make the electric potential of your work clothes and that of the work bench the ground potential.

-The LCD module is coated with a film to protect the display surface. Exercise care when peeling off this protective film since static electricity may be generated.

9.1.13 Since LCM has been assembled and adjusted with a high degree of precision, avoid applying excessive shocks to the module or making any alterations or modifications to it.

-Do not alter, modify or change the shape of the tab on the metal frame.

-Do not make extra holes on the printed circuit board, modify its shape or change the positions of components to be attached.

-Do not damage or modify the pattern writing on the printed circuit board.

-Absolutely do not modify the zebra rubber strip (conductive rubber) or heat seal connector.

-Except for soldering the interface, do not make any alterations or modifications with a soldering iron.

-Do not drop, bend or twist the LCM.

9.2. Handing Precautions for LCM

9.2.1 LCM is easy to be damaged. Please note below and be careful for handling

9.2.2 Correct handling;

9.2.2.1 Store them in a dark place. Do not expose to sunlight or fluorescent light, keep the temperature between 0°C and 35°C, and keep the relative humidity between 40%RH and 60%RH.

9.2.2.2 The polarizer surface should not come in contact with any other objects (We advise you to store them in the anti-static electricity container in which they were shipped).

9.2.3 Others

9.2.3.1 Liquid crystals solidify under low temperature (below the storage temperature range) leading to defective orientation or the generation of air bubbles (black or white). Air bubbles may also be generated if the module is subject to a low temperature.

9.2.3.2 If the LCD modules have been operating for a long time showing the same display patterns, the display patterns may remain on the screen as ghost images and a slight contrast irregularity may also appear. A normal operating status can be regained by suspending use for some time. It should be noted that this phenomenon does not adversely affect performance reliability.

9.2.3.3 To minimize the performance degradation of the LCD modules resulting from destruction caused by static electricity etc., exercise care to avoid holding the following sections when handling the modules.

- Exposed area of the printed circuit board.

-Terminal electrode sections.

9.3. Using LCD modules

9.3.1 Installing LCD Modules

The hole in the printed circuit board is used to fix LCM as shown in the picture below. Attend to the following items when installing the LCM.

9.3.1.1 Cover the surface with a transparent protective plate to protect the polarizer and LC cell.

9.3.1.2 If soldering flux is used, be sure to remove any remaining flux after finishing to soldering operation (This does not apply in the of a non-halogen type of flux). It is recommended that you protect the LCD surfaccase e with a cover during soldering to prevent any damage due to flux spatters.

9.3.1.3 When soldering the electroluminescent panel and PC board, the panel and board should not be detached more than three times. This maximum number is determined by the temperature and time conditions mentioned above, though there may be some variance depending on the temperature of the soldering iron.

9.3.1.4 When remove the electroluminescent panel from the PC board, be sure the solder has completely melted, the soldered pad on the PC board could be damaged.

9.3.2 Precautions for Operation

9.3.2.1 Viewing angle varies with the change of liquid crystal driving voltage (VLCD). Adjust VLCD to show the best contrast.

9.3.2.2 It is an indispensable condition to drive LCD's within the specified voltage limit since the higher voltage then the limit cause the shorter LCD life. An electrochemical reaction due to direct current causes LCD's undesirable deterioration, so that the use of direct current drive should be avoided.

9.3.2.3 Response time will be extremely delayed at lower temperature than the operating temperature range and on the other hand at higher temperature LCD's show dark color in them. However those phenomena do not mean malfunction or out of order with LCD's, which will come back in the specified operating temperature.

9.3.2.4 If the display area is pushed hard during operation, the display will become abnormal. However, it will return to normal if it is turned off and then back on.

9.3.2.5 A slight dew depositing on terminals is a cause for electro-chemical reaction resulting in terminal open circuit. Usage under the maximum operating temperature, 50%RH or less is required.

9.3.2.6 Input logic voltage before apply analog high voltage such as LCD driving voltage when power on. Remove analog high voltage before logic voltage when power off the module. Input each signal after the positive/negative voltage becomes stable.

9.3.2.7 Please keep the temperature within the specified range for use and storage. Polarization degradation, bubble generation or polarizer peel-off may occur with high temperature and high humidity.

9.3.3 Safety

9.4.5.1 It is recommended to crush damaged or unnecessary LCDs into pieces and wash them off with solvents such as acetone and ethanol, which should later be burned.

9.4.5.2 If any liquid leaks out of a damaged glass cell and comes in contact with the hands, wash off thoroughly with soap and water.

9.3.4 Return LCM under warranty

9.3.4.1 No warranty can be granted if the precautions stated above have been disregarded. The typical examples of violations are :

-Broken LCD glass.

-PCB eyelet is damaged or modified.

-PCB conductors damaged.

-Circuit modified in any way, including addition of components.

-PCB tampered with by grinding, engraving or painting varnish.

-Soldering to or modifying the bezel in any manner.

9.3.4.2Module repairs will be invoiced to the customer upon mutual agreement. Modules must be returned with sufficient description of the failures or defects. Any connectors or cable installed by the customer must be removed completely without damaging the PCB eyelet, conductors and terminals.

9.4. Storage Precautions

9.4.1 When storing the LCD modules, the following precaution are necessary.

9.4.1.1 Store them in a sealed polyethylene bag. If properly sealed, there is no need for the desiccant.

9.4.1.2 Store them in a dark place. Do not expose to sunlight or fluorescent light, keep the temperature between 0°C and 35°C, and keep the relative humidity between 40%RH and 60%RH.

9.4.1.3 The polarizer surface should not come in contact with any other objects (We advise you to store them in the anti-static electricity container in which they were shipped).

9.4.2 Others

9.4.2.1 Liquid crystals solidify under low temperature (below the storage temperature range) leading to defective orientation or the generation of air bubbles (black or white). Air bubbles may also be generated if the module is subject to a low temperature.

9.4.2.2 If the LCD modules have been operating for a long time showing the same display patterns, the display patterns may remain on the screen as ghost images and a slight contrast irregularity may also appear. A normal operating status can be regained by suspending use for some time. It should be noted that this phenomenon does not adversely affect performance reliability.

9.4.2.3 To minimize the performance degradation of the LCD modules resulting from destruction caused by static electricity etc., exercise care to avoid holding the following sections when handling the modules.

- Exposed area of the printed circuit board.

-Terminal electrode sections.

10. PRIOR CONSULT MATTER

1. For OEM products, if any changes are needed which may affect the product property, we will consult with our customer in advance.
2. If you have special requirement about reliability condition, please let us know before you start the design on our samples.
3. For JICTECH standard products, we keep the right to change material, process ... for improving the product property without prior notice to our customer.
4. JICTECH company commitment to product quality assurance period for 1 year.