DONGGUAN JICTECHLCD CO.,LTD.

Product Specification For LCD Module

Model NO.: RT018T2T-C04

REVISION：4.0

□APPROVAL FOR SPECIFICATIONS ONLY

■APPROVAL FOR SPECIFICATIONS AND SAMPLE

CUSTOMER：	APPROVED BY：

LCM R&D CENTER		
APPROVED BY	**CHECKED BY**	**PREPARED BY**
REN JIKUN	QHB	QHB

Records of Revision

DATE	REF.PAGE PARAGRAPH DRAWING No.	REVISED No.	SUMMARY	REMARK
2019-12-25		A	First Issue.	

contents

1. Introduction

1.1 Scope of application

This specification applies to the Negative type TFT transmissive dot matrix LCD module that is supplied by DONGGUAN JICTECHLCD Co.,Ltd. This LCD module should be designed for mobile phone use. LCD specification: Dots 128xRGBx160. As to basic specification of the driver IC, refer to the IC (ST7735S) specification and datasheet.

1.2 Structure:

Structure: TFT LCD + FPC + BL.

1.77 inch TFT LCD size for main LCD.
One bare chip with gold bump (COG).
SPI 3 Lines interface.

1.3 Product features:

- Structure: TFT PANNEL+IC+FPC+BL.
- Transmissive Type LCD, normal white.
- 128 dot-source and 160 dot-gate outputs.
- White LED backlight.

1.4 Applications:

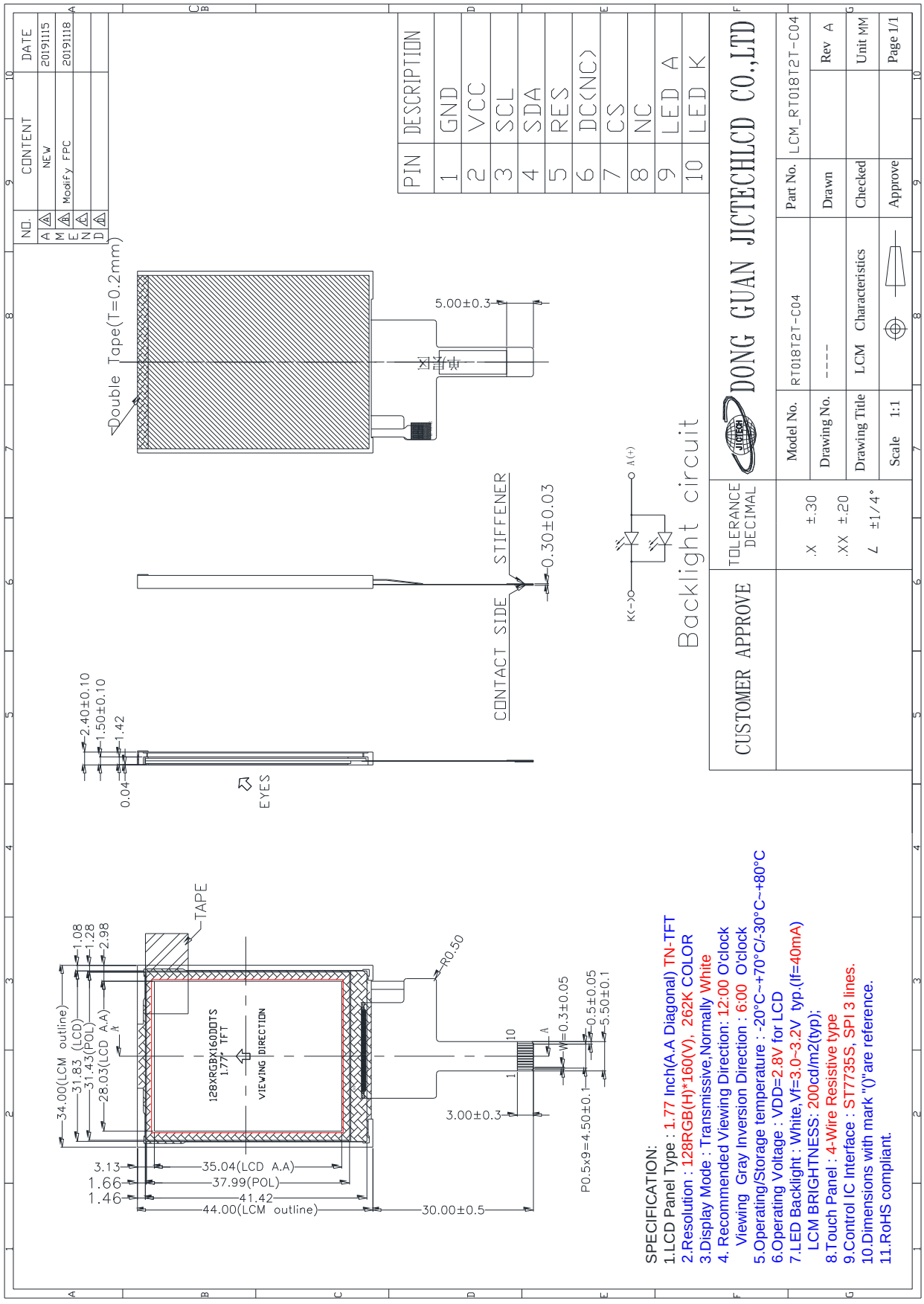
- Mobile phone
- PSP
- PDA
- GPS

2. General specification

ITEM	Standard value	UNIT
LCD Type	TFT Transmissive, normal white	-
Driver element	a-Si TFT Active matrix	
Number of dots	128*(RGB)*160	Dots
Pixel Arrangement	RGB Vertical Stripe	-
Active Area	28.03(w) *35.04(h)	mm
Viewing Direction	12 O'clock (EYES)	-
Driver IC	ST7735S	-
Module Size(W*H*T)	34.0(H)x44.0(V)x2.4(T)	mm
Approx. Weight	--	g
Back Light	2 White LED Lamps	

System interface	RGB 18BIT+SPI,3 wire Interface II (use SDI & SDO)

3. Mechanical drawing



4. ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Min	Max	Unit
Supply voltage for logic	V_{cc}	-0.3	4.6	V
Input voltage for logic	V_{IN}	-0.3	4.6	V
Supply current (One LED)	I_{LED}	-	30	mA
Operating temperature	T_{OP}	-20	+70	°C
Storage temperature	T_{ST}	-30	+80	°C

5. ELECTR CHARACTERISTICS

Item	Symbol	Min	Typ	Max	Unit	Applicable terminal
Supply voltage for logic	V_{cc}	2.5	2.8	3.3	V	V_{DD}
Input voltage	V_{IL}	-0.3	-	0.2 V_{DD}	V	
	V_{IH}	0.8 V_{cc}	-	V_{cc}	V	
Input leakage current	I_{LKG}	-	-	-	μA	
LED Forward voltage	V_f	2.7	3.2	3.4	V	--
Input backlight current	I_{LED}	-	15	20	mA	With One LED

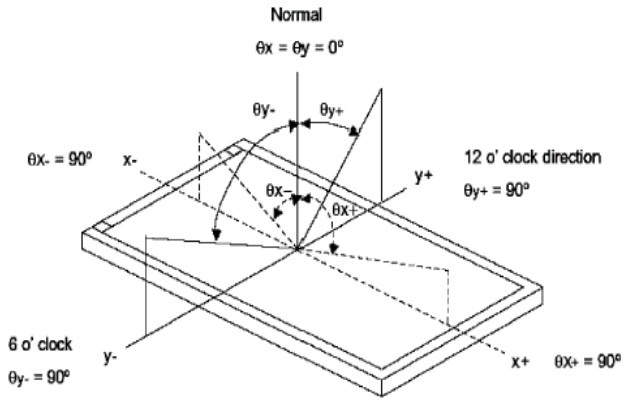
NOTE: the LED is made by Harvatek. Bin range of luminous intensity: min 350mcd, Max 400mcd, grade B.

6. OPTICAL CHARACTERISTICS

ITEM		SYMBOL	CONDITIONS	SPECIFICATIONS			UNIT	NOTE
				MIN.	TYP.	MAX		
Brightness		B	Viewing normal angle	200	--	--	cd/m^2	All left side data are based on CT's product reference only
Contrast Ratio		CR			300	--	--	
Response Time		Tr+Tf			25		ms	
CIE Color coordinate	Red	Rx		TYP-0.15	0.610	TYP+0.15	--	
		Ry			0.329		--	
	Green	Gx			0.299		--	
		Gy			0.567		--	
	Blue	Bx			0.143		--	
		By			0.111		--	
	White	Wx			0.308		--	
		Wy			0.327		--	
Viewing Angle	Hor.	θ_{X+}	Center CR>=10		50	--	Deg.	
		θ_{X-}			60	--		
	Ver.	θ_{Y+}			45	--		

		θ_{Y-}			60			
NTSC	--	--		--	55.3	--	%	

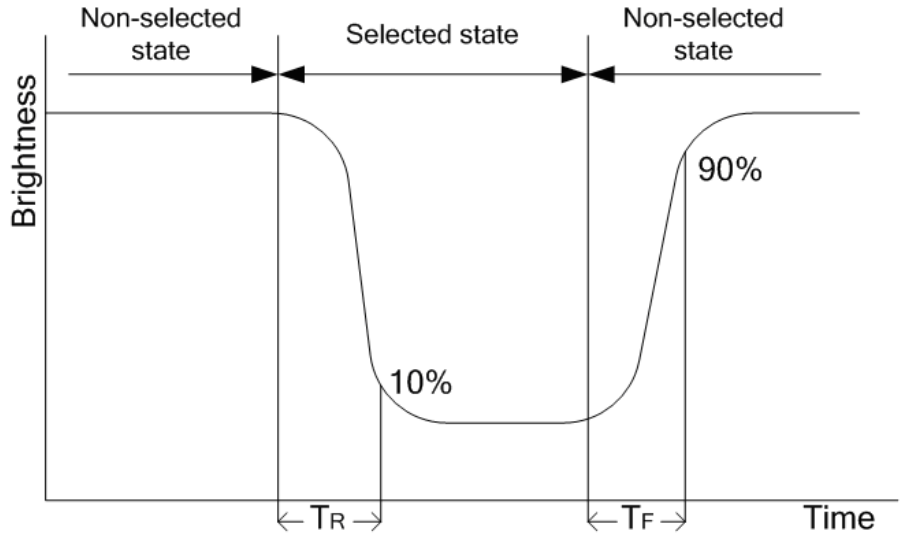
Note 1 : Definition of Viewing Angle θ_X and θ_Y :



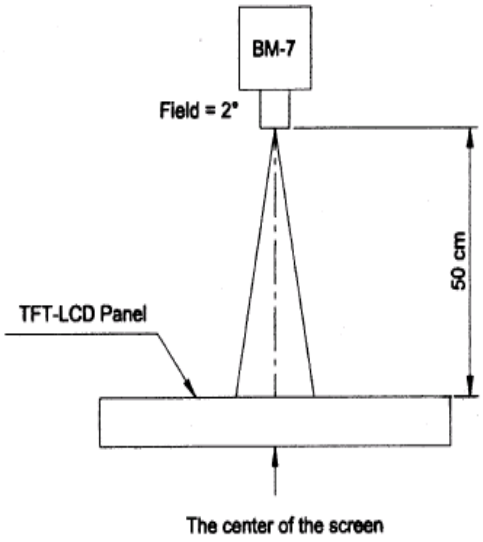
Note 2: Definition of contrast ratio CR:

$$CR = \frac{\text{Brightness of non-selected dots (white)}}{\text{Brightness of selected dots (black)}}$$

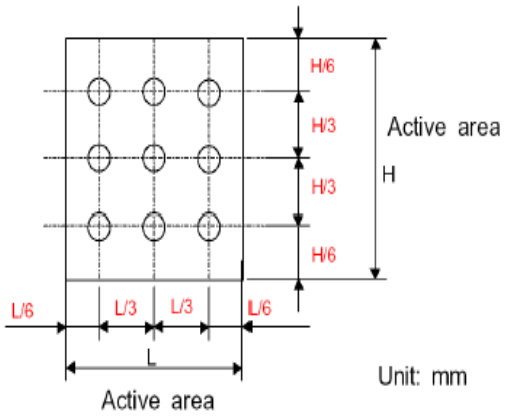
Note 3: Definition of response time (T_R, T_F)



: The brightness test equipment setup
20mA Field=2° (As measuring "black" image, field=2° is the best testing condition)



Note 4 :



7. Interface Pin Function

. Table 2: Pin assignment

Pin No.	Symbol	Description
1	GND	Ground.
2	VCC	Power supply(2.8V)
3	SCL	Serial interface clock
4	SDI/SDA	Serial data input
5	RES	Reset(Low active)
6	DC(NC)	No connect.
7	CS	A chip select signal.
8	DC(NC)	No connect.
9	LEDA	Anode of LED backlight.
10	LEDK	Cathode of LED backlight.

8. Standard Specification for Reliability

8.1 Standard Specifications for Reliability of LCD Module

No	Item	Description
01	High temperature operation	The sample should be allowed to stand at 70℃ for 96 hours under driving condition and then returning it to normal temperature condition, and allowing it stand for 2 hours.
02	Low temperature operation	The sample should be allowed to stand at -20℃ for 96 hours under driving condition and then returning it to normal temperature condition, and allowing it stand for 2 hours.
03	High temperature storage	The sample should be allowed to stand at 80℃ for 96 hours under no-load condition, and then returning it to normal temperature condition, and allowing it stand for 2 hours.
04	Low temperature storage	The sample should be allowed to stand at -30℃ for 96 hours under no-load condition, then returning it to normal temperature condition, and allowing it stand for 2 hours.
05	Moisture storage	The sample should be allowed to stand at 60℃,90%RH MAX for 96 hours under no-load condition, then taking it out and drying it at normal temperature for 2 hours.
06	Thermal shock storage	The sample should be allowed to stand the following 10 cycles : -30℃ for 30 minutes → normal temperature for 5 minutes → +80℃ for 30 minutes → normal temperature for 5 minutes, as one cycle.
07	Packing vibration	Frequency range : 10Hz ~ 55Hz Amplitude of vibration : 1.5mm Sweep time: 12 min X,Y,Z 2 hours for each direction.
08	Packing drop test	According to ASTM-D-5327.
09	Electrical Static Discharge	Air: ±4KV 150pF/330Ω 5 times
		Contact: ±2KV 150pF/330Ω 5 time

*Sample size for each test item is 3~5pcs

8.2 Testing Conditions and Inspection Criteria

For the final test the testing sample must be stored at room temperature for 24 hours, after the tests listed in Table 9.2, Standard specifications for Reliability have been executed in order to ensure stability.

No	Item	Test Model	In section Criteria
01	Current Consumption	Refer To Specification	The current consumption should conform to the product specification.
02	Contrast	Refer To Specification	After the tests have been executed, the contrast must be larger than half of its initial value prior to the tests.
03	Appearance	Visual inspection	Defect free.

8.3 MTBF

MTBF	Functions, performance, appearance, etc. shall be free from remarkable deterioration within 50,000 hours under ordinary operating and storage conditions room temperature (25±5℃), normal humidity (50±10% RH), and in area not exposed to direct sun light.

9. Specification of Quality Assurance:

9.1 Purpose

This standard for Quality Assurance should affirm the quality of LCD module products to supply to purchaser by JIC TECHLCD

9.2 Standard for Quality Test

a. Inspection:
Before delivering, the supplier should take the following tests, and affirm the quality of product.
b. Electro-Optical Characteristics:
According to the individual specification to test the product.
c. Test of Appearance Characteristics:
According to the individual specification to test the product.
d. Test of Reliability Characteristics:
According to the definition of reliability on the specification for testing products.
e. Delivery Test:
Before delivering, the supplier should take the delivery test.
(i) Test method: According to MIL-STD105E.General Inspection Level Ⅱ take a single time.
(ii) The defects classify of AQL as following:
Major defect: AQL = 0.65
Minor defect: AQL = 2.5
Total defects: AQL = 2.5

9.3 Non- conforming Analysis & Deal With Manners

a. Non- conforming Analysis:

(i) Purchaser should supply the detail data of non- conforming sample and the non- conforming.
(ii) After accepting the detail data from purchaser, the analysis of non- conforming should be finished in two weeks.
(iii) If supplier can not finish analysis on time, must announce purchaser before 3 days.

b. Disposition of non- conforming:
(i) If find any product defect of supplier during assembly time, supplier must change the good product for every defect after recognition.
(ii) Both supplier and customer should analyze the reason and discuss the disposition of non- conforming when the reason of nonconforming is not sure.

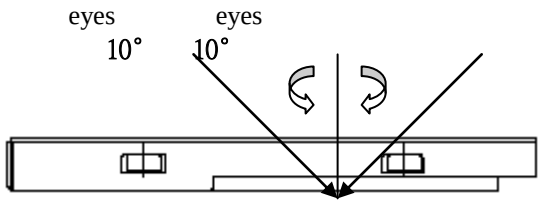
9.4 Agreement items

Both sides should discuss together when the following problems happen.

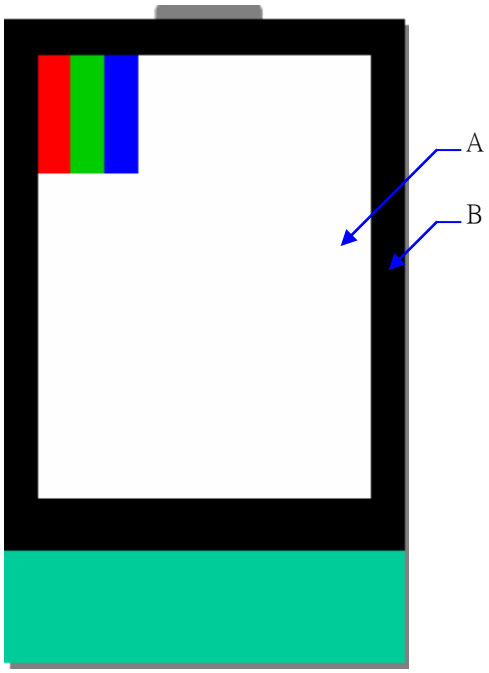
a. There is any problem of standard of quality assurance, and both sides should think that must be modified.
b. There is any argument item which does not record in the standard of quality assurance.
c. Any other special problem.

9.5 Standard of The Product Appearance Test

a. Manner of appearance test:
(i) The test must be under 20W ×2 or 40W fluorescent light, and the distance of view must be at 30±5cm.
(ii) When test the model of transmissive product must add the reflective plate.
(iii)The test direction is base on around 10 °of vertical line.
(iiii)Temperature: 25±5℃ Humidity: 60±10%RH



(iv) Definition of area:

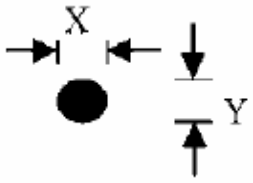


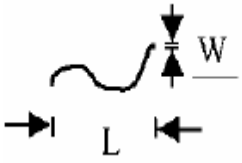
A. Area: Viewing area.
B. Area: Out of viewing area.
(Outside viewing area)

b. Basic principle:
(i) It will accord to the AQL when the standard can not be described.
(ii) The sample of the lowest acceptable quality level must be discussed by both supplier and customer when any dispute happened.
(iii) Must add new item on time when it is necessary.

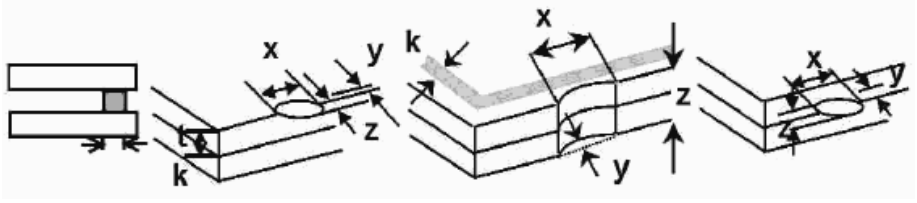
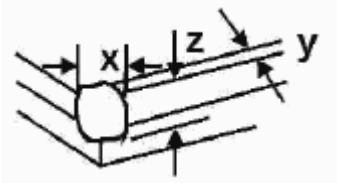
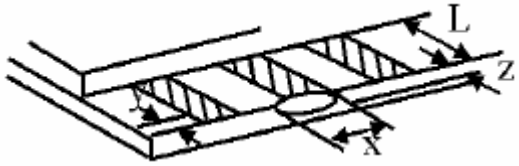
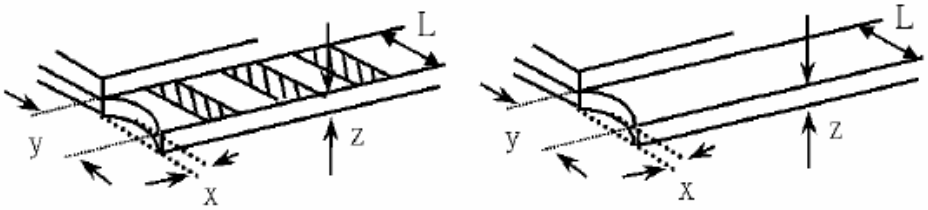
c. Standard of inspection: (Unit: mm)

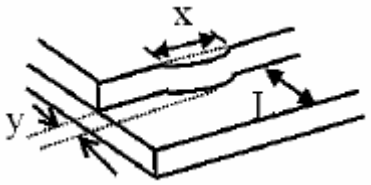
9.6 Inspection specification

<table>
<tr><th>NO</th><th>Item</th><th>Criterion</th><th>AQL</th></tr>
<tr><td>01</td><td>Electrical Testing</td><td>1.1 Missing vertical, horizontal segment, segment contrast defect.
1.2 Missing character, dot or icon.
1.3 Display malfunction.
1.4 No function or no display.
1.5 Current consumption exceeds product specifications.
1.6 LCD viewing angle defect.
1.7 Mixed product types.
1.8 Flicker</td><td>0.65</td></tr>
<tr><td>02</td><td>Black or White spots or Bright spots or Color spots on LCD (Display only)</td><td>2.1 White and black or color spots on display ≦ 0.25mm, no more than Five spots.
2.2 Densely spaced: No more than three spots within 3mm.</td><td>2.5</td></tr>
<tr><td>03</td><td rowspan="2">LCD and Touch Panel black spots, white spots, contamination (non – display)</td><td>3.1 Round type: As following drawing
Φ = (X+Y) / 2
 

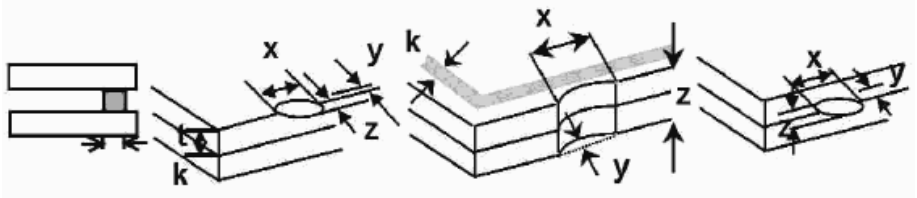
<table><tr><th>Size(mm)</th><th>Acceptable Q'ty</th></tr><tr><td>Φ≦0.10</td><td>Accept no dense</td></tr><tr><td>0.10< Φ≦0.20</td><td>2</td></tr><tr><td>0.20< Φ≦0.25</td><td>2</td></tr><tr><td>0.25< Φ≦0.30</td><td>1</td></tr><tr><td>0.30< Φ</td><td>0</td></tr></table>* Densely spaced: No more than two spots within 3mm.</td><td>2.5</td></tr>
<tr><td>3.2 Line type: (As following drawing)
 

<table><tr><th>Length(mm)</th><th>Width(mm)</th><th>Acceptable Q'ty</th></tr><tr><td>---</td><td>W≦0.02</td><td>Accept no dense</td></tr><tr><td>L≦3.0</td><td>0.02<W≦0.05</td><td rowspan="2">2</td></tr><tr><td>L≦2.5</td><td>0.03<W≦0.08</td></tr><tr><td>---</td><td>0.08<W</td><td>Rejection</td></tr></table>* Densely spaced: No more than two lines within 3mm.</td><td>2.5</td></tr>
<tr><td>04</td><td>Polarizer bubbles</td><td>If bubbles are visible, judge using black spot specifications, not easy to find, must check in specify direction
<table><tr><th>Size Φ(mm)</th><th>Acceptable Q'ty</th></tr><tr><td>Φ≦0.20</td><td>Accept no dense</td></tr><tr><td>0.20< Φ≦0.50</td><td>3</td></tr><tr><td>0.50< Φ≦1.00</td><td>2</td></tr><tr><td>1.00< Φ</td><td>0</td></tr><tr><td>Total Q’ty</td><td>3</td></tr></table></td><td>2.5</td></tr>
<tr><td>05</td><td>Scratches</td><td>Follow NO.3 -2 Line Type.</td><td></td></tr>
<tr><td>06</td><td>Chipped glass</td><td>Symbols:
x: Chip length y: Chip width z: Chip thickness
k: Seal width t: Glass thickness a: LCD side length
L: Electrode pad length
6.1 General glass chip:
6.1.1 Chip on panel surface and crack between panels:</td><td>2.5</td></tr>
</table>

		 z: Chip thickness / y: Chip width / x: Chip length Z≦1/2t / Not over viewing area / x≦1/8a 1/2t< z≦2t / Not exceed 1/3k / x≦1/8a ⊙ Unit: mm ⊙ If there are 2 or more chips, x is the total length of each chip 6.1.2 Corner crack:  z: Chip thickness / y: Chip width / x: Chip length Z≦1/2t / Not over viewing area / x≦1/8a 1/2t< z≦2t / Not exceed 1/3k / x≦1/8a ⊙ Unit: mm ⊙ If there are 2 or more chips, x is the total length of each chip	
07	Glass crack	Symbols: x: Chip length y: Chip width z: Chip thickness k: Seal width t: Glass thickness a: LCD side length L: Electrode pad length 7.2 Protrusion over terminal: 7.2.1 Chip on electrode pad:  y: Chip width / x: Chip length / z: Chip thickness y≦0.5mm / x≦1/8a / 0< z≦t 7.2.2 Non-conductive portion:  y: Chip width / x: Chip length / z: Chip thickness y≦L / x≦1/8a / 0< z≦t	2.5

<table>
<tr><td></td><td></td><td>⊙ If there chipped area touches the ITO terminal, over 2/3 of the ITO must remain and be inspected according to electrode terminal specifications.
⊙ If the product will be heat sealed by the customer, the alignment mark must mot be damaged.
7.2.3 Substrate protuberance and internal crack
 

<table><tr><td>y: width</td><td>x: length</td></tr><tr><td>y≦1/3L</td><td>X≦a</td></tr></table></td><td></td></tr>
<tr><td>08</td><td>Cracked glass</td><td>The LCD with extensive crack is not acceptable.</td><td>2.5</td></tr>
<tr><td>09</td><td>Backlight elements</td><td>9.1 Illumination source flickers when lit.
9.2 Spots or scratches that appear when lit must be judged.
Using LCD spot, lines and contamination standards.
9.3 Backlight doesn’t light or color is wrong.</td><td>2.5
2.5
0.65</td></tr>
<tr><td>10</td><td>Bezel</td><td>Bezel must comply with product specifications.</td><td>2.5</td></tr>
<tr><td>11</td><td>PCB、COB</td><td>11.1 COB seal may not have pinholes larger than 0.2mm or contamination.
11.2 COB seal surface may not have pinholes through to the IC.
11.3 The height of the COB should not exceed the height indicated in the assembly diagram.
11.4 There may not be more than 2mm of sealant outside the seal area on PCB. And there should be no more than three places.
11.5 Parts on PCB must be the same as on the production characteristic chart, There should be no wrong parts, missing parts or excess parts.
11.6 The jumper on the PCB should conform to the product characteristic chart.</td><td>2.5
2.5
2.5
2.5
0.65
0.65</td></tr>
<tr><td>12</td><td>FPC</td><td>12.1 FPC terminal damage ≦ 1/2 FPC terminal width and can not affect the function , we judge accept.
12.2 FPC alignment hole damage ≦ 1/2 alignment area and can not affect the function , we judge accept.</td><td>2.5
2.5</td></tr>
<tr><td>13</td><td>Soldering</td><td>13.1 No cold solder joints, missing solder connections, oxidation or icicle.
13.2 No short circuits in components on PCB or FPC.</td><td>2.5
0.65</td></tr>
<tr><td>14</td><td>Touch Panel Chipped glass</td><td>Symbols:
x: Chip length y: Chip width z: Chip thickness
k: Seal width t: Touch Panel Total thickness a: LCD side length
L: Electrode pad length
14.1 General glass chip:</td><td>2.5</td></tr>
</table>

<table>
<tr>
<td></td>
<td></td>
<td>14.1.1 Chip on panel surface and crack between panels:
 

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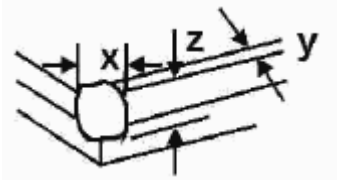
<tr><td>z: Chip thickness</td><td>y: Chip width</td><td>x: Chip length</td></tr>
<tr><td>Z≦t</td><td>≦1/2 k and not over viewing area</td><td>x≦1/8a</td></tr>
</table>
⊙ Unit: mm
⊙ If there are 2 or more chips, x is the total length of each chip
14.1.2 Corner crack:
 

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<tr><td>z≦t</td><td>≦1/2 k and not over viewing area</td><td>x≦1/8a</td></tr>
</table>
⊙ Unit: mm
⊙ If there are 2 or more chips, x is the total length of each chip</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>Touch Panel Newton ring</td>
<td>Newton ring dimension ≦ 1/2 touch panel area and not affect font and line distortion(≦2.5%) , it is acceptable.</td>
<td>2.5</td>
</tr>
<tr>
<td>17</td>
<td>Touch Panel Linearity</td>
<td>Less than 2.5% is acceptable.</td>
<td>2.5</td>
</tr>
<tr>
<td>18</td>
<td>LCD Ripple</td>
<td>Touch the touch panel , can not see the LCD ripple.
Pen: R 1.0mm silicon rubber.
Operation Force: 80g</td>
<td>2.5</td>
</tr>
<tr>
<td>19</td>
<td>General appearance</td>
<td>19.1 Pin type must match type in specification sheet.
19.2 LCD pin loose or missing pins.
19.3 Product packaging must the same as specified on packaging specification sheet.
19.4 Product dimension and structure must conform to product specification sheet.</td>
<td>0.65
0.65
0.65
0.65</td>
</tr>
</table>

10. Handling Precaution:

11-1 Handling of LCM

- Don't give external shock.
- Don't apply excessive force on the surface.
- Liquid in LCD is hazardous substance. Must not lick and swallow. when the liquid is attach to your hand, skin, cloth etc. Wash it out thoroughly and immediately.
- Don't operate it above the absolute maximum rating.
- Don't disassemble the LCM.
- The operators should be grounded whenever he/she comes into contact with the module. Never touch any of the conductive parts such as the LSI pads,the copper leads on the PCB and the interface terminals with any parts of the human body.
- The modules should be kept in antistatic bags or other containers resistant to static for storage.
- The 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

- Store in an ambient temperature of 25±10℃, and in a relative humidity of 50±10%RH. Don't expose to sunlight or fluorescent light.
- Storage in a clean environment, free from dust, active gas, and solvent.
- Store in anti-static electricity container.
- Store without any physical load.

11-3 Soldering

- Use only soldering irons with proper grounding and no leakage.
- Iron: No higher than 280±10℃ and less than 3 sec during Hand soldering.
- Rewiring: no more than 2 times.

11. Packing method (undetermined)

12-1 Package description

A large box has *** PCS, A small box has *** PCS, A large box has 24 trays, A small box has 8 trays, A tray of *** PCS. The thickness of 0.8MM is tray.

12-2 Package diagram