TFT LCD MODULE

7" 1200*RGB*1920 DOTS

MODULE NO.: RT70FHD003A

REVISION:

Customer Approved		
Machinery	Display	Approved

Designer	Checked	Approved

Document Revision History

Revision	Data	Page	Description	Changed BY
A01	2022/11/08	--	First issue	

Contents

1. LCM Specification

1.1 Description

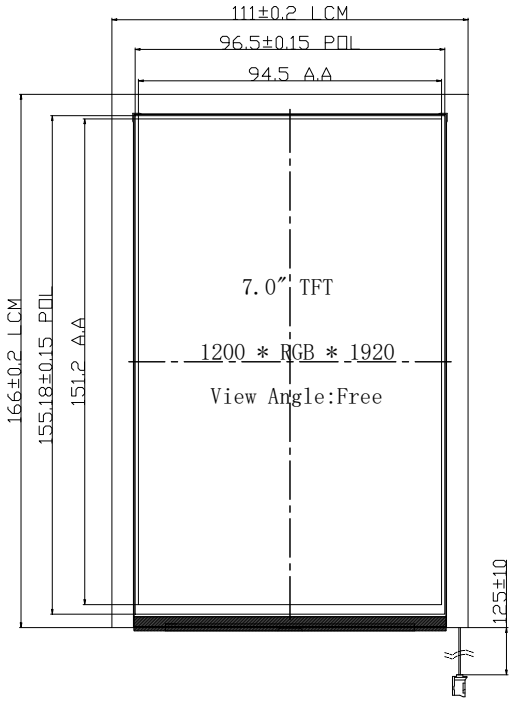
RT70FHD003A is a color active matrix TFT-LCD Model using amorphous silicon TFT's (Thin Film Transistors) as an active switching devices. This model is composed of a TFT-LCD Panel and a driving circuit. It is a transmissive type display operating in the normal black. This TFT-LCD has a 7.02 inch diagonally measured active area with 1200 horizontal by 1920 vertical pixel array. Each pixel is divided into Red, Green, Blue dots which are arranged in vertical stripe and this panel can display 1.07B colors.

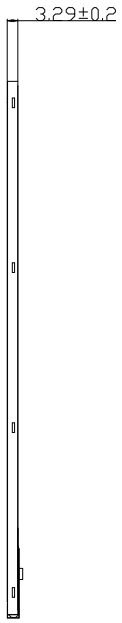
1.2 Functions & Features

Parameter	Value	Unit
LCD Mode	a-Si TFT/transmissive	-
Color	1.07B	8+2Bit
Display Resolution	1200*3(RGB)*1920	pixels
Outline Dimension	111.0(H) *166.0(V) *3.29(T)	mm
Active Area(A.A)	94.5*(H) * 151.2(V)	mm
Pixel Arrangement	RGB-stripe	-
Viewing Direction	80/80/80/80	-
Display Mode	Normally Black	-
IC Package Type	COG	-
Surface Treatment	Hard coating	-
Interface	MIPI	

2. Mechanical Specification

Reversion	Dispcription	Date	Signed
V0	更换新背光	2022.11.03	LZJ





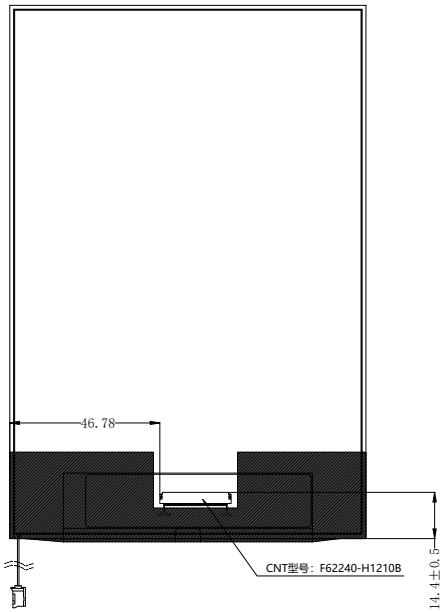
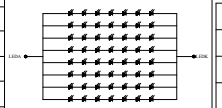


TABLE 1FPC PIN MAP

1	NC
2	IOVCC
3	IOVCC
4	GND
5	RST
6	NC
7	GND
8	MIPI_0N
9	MIPI_0P
10	GND
11	MIPI_1N
12	MIPI_1P
13	GND
14	MIPI_CKN
15	MIPI_CKP
16	GND
17	MIPI_2N
18	MIPI_2P
19	GND
20	MIPI_3N
21	MIPI_3P
22	GND
23	HS
24	VS
25	GND
26	NC
27	NC
28	NC
29	NC
30	GND
31	LED-
32	LED-
33	NC
34	VSN
35	VSN
36	NC
37	VSP
38	VSP
39	LED+
40	LED+

Display Type:	7.0" TFT	LCD NO:	7.02WUXGA
BL LED or Color:	56-CHIP WHITE LED	IC NO:	HX8279
BL INPUT CURRENT:	200MA 22.4V	BL NO:	
Operating Voltage:	3.2V	TP NO:	无
Operation TEMP:	-20° C TO 70° C	上偏光片:	光片/细油砂
Storage TEMP:	-30° C TO 80° C	下偏光片:	增亮片
COMPLIABLY:	RoHS	模组亮度:	TYP:1000cd/m^2



Custumer Ref.	Model No.		Drawing Title	---			Characteristics

Part No.	Approve		Material	Unmarked Tolerance	Unit	Scale	Page
---	Checked			±0.2	mm	1:1	of
Drawing No.							
---	Draw		Date		Rev ---		

3. Interface Description

PIN	PIN NAME	DESCRIPTION	Remark
1	NC	No connection	
2,3	IOVCC	Power Supply 1.8V	
4	GND	Ground	
5	RST	RESET PIN	
6	NC	No connection	
7	GND	Ground	
8	D0N	-MIPI Differential Data Input	
9	D0P	+MIPI Differential Data Input	
10	GND	Ground	
11	D1N	-MIPI Differential Data Input	
12	D1P	+MIPI Differential Data Input	
13	GND	Ground	
14	CLKP	-MIPI Differential Data Input	
15	CLKN	+MIPI Differential Data Input	
16	GND	Ground	
17	D2N	-MIPI Differential Clock Input	
18	D2P	+MIPI Differential Clock Input	
19	GND	Ground	
20	D3N	-MIPI Differential Data Input	
21	D3P	+MIPI Differential Data Input	
22	GND	Ground	
23	NC	No connection	
24	NC	No connection	
25	GND	Ground	
26	NC/TE	Sync signal for touch panel. Float it if not used.	
27	NC/PWMO	PWM control signal for LED driver	
28	NC/BIST	Enable the Test Image Generation function, ifconnect to ground. Float it if not used.	
29	NC	No connection	
30	GND	Ground	
31,32	LED-	Backlight LED-	
33	NC	No connection	
34,35	VSN	Analog supply negative voltage VSN=-5.8V	
36	NC	No connection	
37,38	VSP	Analog supply negative voltage VSP=5.8V	
39,40	LED+	Backlight LED+	

4. Electrical Characteristics

4.1 Absolute Maximum Ratings

Item	Symbol	Min.	Max.	Unit	Remark
Digital Supply Voltage	VDD	-0.3	2.1	V	
VIN Voltage	VLED	-0.3	6.6	V	
Operating Temperature	TOP	-20	70	°C	
Storage Temperature	TST	-30	80	°C	

4.2 DC characteristics

Item	Symbol	Unit	Value			Note
			Min	Typ	Max	
Power voltage	VDDI	V	1.7	1.8	2.0	
	VSP	V	4.5	5.8	6.0	
	VSN	V	-6.0	-5.8	-4.5	-

5.Back-light Specification

5.1 Back-light characteristics

Item	Symbol	Conditions	Min.	Typ.	Max.	Unit
Supply Voltage	VF	Only Backlight	21	21.7	22.4	V
Supply Current	IF			200		mA
Average Brightness(BL+LCD)	IV	Backlight Current IF=200mA	-	1000	-	Cd/m2
CIE Color Coordinate	X	Backlight Current IF=200mA				-
	Y					
Uniformity	B	Backlight Current IF=200mA	80	85	-	(%)
Color	White					

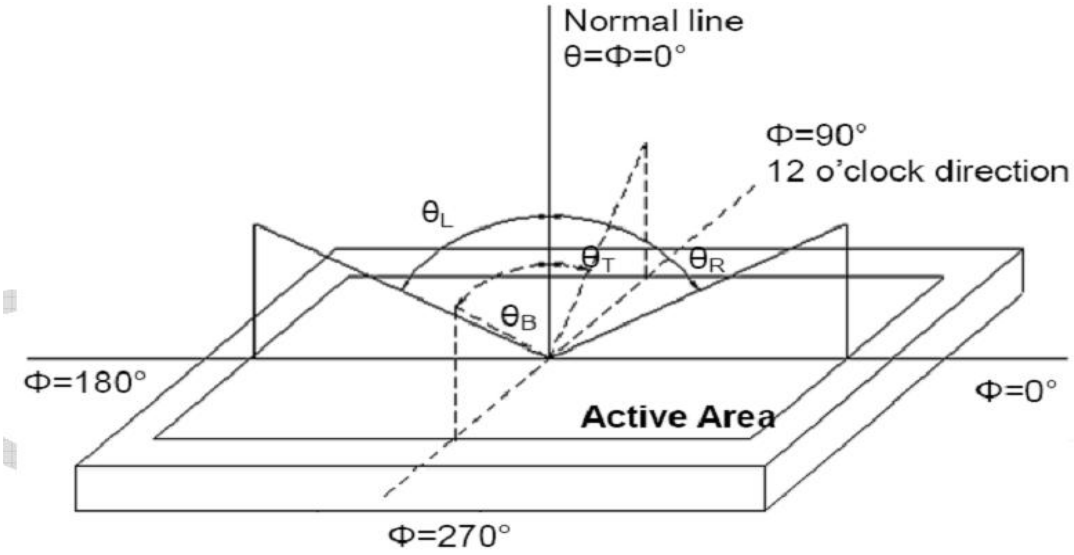
6. Timing Characteristics

TBD

7. Optical Specifications

Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Transmittance (With PZ)		T		3.05	3.6	—	%	
Contrast		CR	Θ=0 Normal viewing angle	1000	1200	—		(1)(2)
Response time		Tr+Tf		—	30	40	msec	(1)(3)
NTSC		S		75	80	—	%	C light
Color chromaticity (CIE1931)	White	Wx		-	0.285	-		(1)(4) CF Glass C light
		Wy		-	0.319	-		
	Red	Rx		-	0.672	-		
		Ry		-	0.320	-		
	Green	Gx		-	0.233	-		
		Gy		-	0.607	-		
	Blue	Bx		-	0.141	-		
		By		-	0.106	-		
Viewing angle	Hor.	θL	CR>10	75	80	—		
		θR		75	80	—		
	Ver.	θU		75	80			
		θD		75	80			

Note (1) Definition of Viewing Angle:

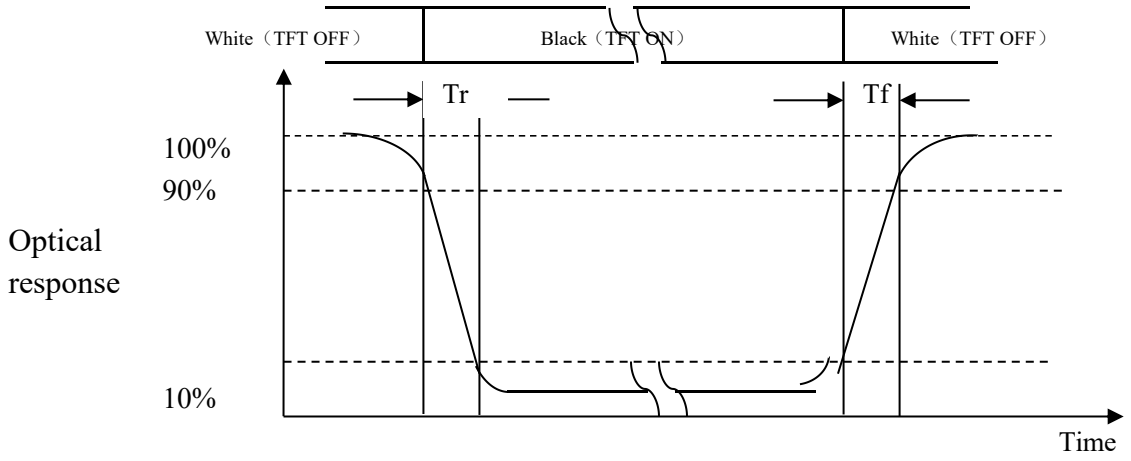


Note (2) Definition of Contrast Ratio (CR):

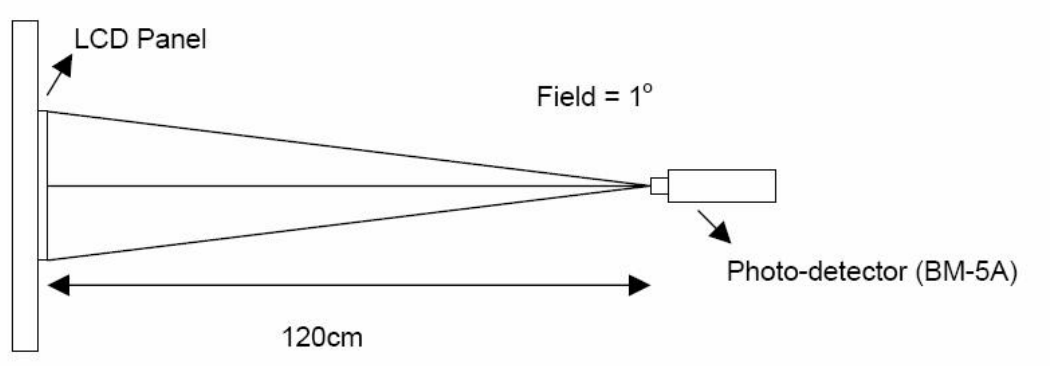
measured at the center point of pane

$$CR = \frac{\text{Luminance with all pixels white}}{\text{Luminance with all pixels black}}$$

Note (3) Definition of Response Time: Sum of T_R and T_F

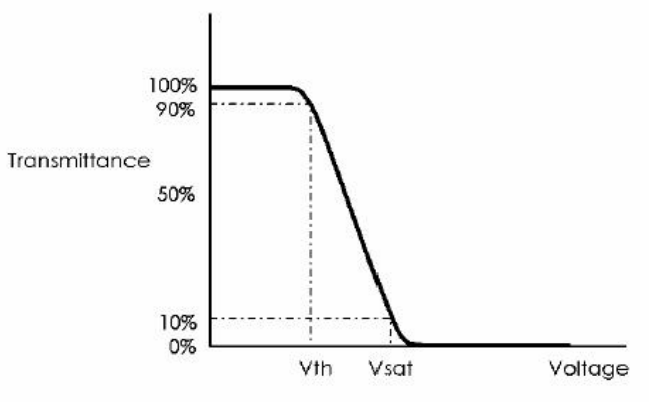


Note (4) Definition of optical measurement setup



Note (5) Rubbing Direction (The different Rubbing Direction will cause the different optimal view direction.

Note (6) Definition of Vsat and Vth (at 20^0C



8. Reliability Test Items

<table>
<tr><th>No.</th><th>Item</th><th>Conditions</th><th>Remark</th></tr>
<tr><td>1</td><td>High Temperature Storage</td><td>Ta=+80±2℃, 48hrs</td><td>Note 1, Note 2</td></tr>
<tr><td>2</td><td>Low Temperature Storage</td><td>Ta=-30±2℃, 48hrs</td><td>Note 1, Note 2</td></tr>
<tr><td>3</td><td>High Temperature Operation</td><td>Ta=+70±2℃, 48hrs</td><td>Note 1, Note 2</td></tr>
<tr><td>4</td><td>Low Temperature Operation</td><td>Ta=-20±2℃, 48hrs</td><td>Note 1, Note 2</td></tr>
<tr><td>5</td><td>High Temperature and High Humidity(operation)</td><td>Ta=+50℃, 90%RH, 48hrs</td><td>Note 1, Note 2</td></tr>
<tr><td>6</td><td>Thermal Cycling Test (non operation)</td><td>-30℃(30min) → +25℃(5min)→+80℃(30min)→ +25℃(5min), 10cycles</td><td>Note 1, Note 2</td></tr>
<tr><td rowspan="2">7</td><td rowspan="2">Electrostatic Discharge</td><td>Contact:150pF±10%,330Ω±10%,Apply ±4KV with 5times, class B
Air:150pF±10%,330Ω±10%,Apply ±8KV with 5 times, class B</td><td rowspan="2">Note 2</td></tr>
<tr><td>1. Temperature ambiance: 15℃-35℃
2. Humidity relative: 30% - 60%</td></tr>
<tr><td>8</td><td>Vibration</td><td>1. Sine wave 10-55 Hz frequency (1 min)
2. The amplitude of vibration:1.5 mm
3. Each direction (X、Y、Z) duration for 2hrs</td><td>Note 2</td></tr>
<tr><td>9</td><td>Drop (with carton)</td><td><table><tr><th>Packing weight(Kg)</th><th>Drop height(cm)</th></tr><tr><td>0 - 45.4</td><td>122</td></tr><tr><td>45.4 - 90.8</td><td>76</td></tr><tr><td>90.8 - 454</td><td>61</td></tr><tr><td>Over 454</td><td>46</td></tr></table>1 corner, 3 edges, 6 surfaces , 1times</td><td>Note 2</td></tr>
</table>

Note 1: Surrounding temperature, then storage at normal condition 4hrs.

Note2: There is no display function NG issue occurred, all the cosmetic specification is judged before the reliability stress.

9. Handling Precautions

9.1 Safety

The liquid crystal in the LCD is poisonous. Keep away from your mouth and eyes. If the liquid crystal contacts with your skin, mouse or clothes, use soap to wash it off immediately.

9.2 Handling

i. The LCD panel is made by thin glass. Prevent the panel from mechanical shock or putting excessive force on its surface.
ii. The polarizer attached on the display is very easy to be damaged, handle it with special attention.
iii. To avoid contamination on the display surface, do not touch the display surface with bare hands.
iv. The transparent electrodes may be disconnected if you use the LCD panel under dew-condensing environment.
v. The characteristics of the semiconductor devices may be affected when they are exposed to light, possibly resulting in malfunctioning of the ICs. To prevent such malfunctioning of the ICs, make sure the application and the mounting of the panel are designed so that the IC is not exposed to light.

9.3 Static Electricity

Ground soldering iron tips, tools and testers when you operate. Also ground your body when handling the products and store the products in an anti-electrostatic container.

9.4 Storage

Store the products in a dark place where the temperature is within the range of 25±10 and with low humidity (65%RH or less). Do not store the LCD product in an atmosphere containing organic solvents or corrosive gases.

9.5 Cleaning

Do not wipe the polarizer with dry cloth, as it might cause scratching. Wipe the polarizer with a soft cloth soaked with petroleum IPA. Other chemical might damage the panel.

10. Inspection Criterion

TITLE:FUNCTIONAL TEST & INSPECTION CRITERIA	LCM Product

This specification is made to be used as the standard acceptance/rejection criteria for Color mobile phone LCM with touch panel.

1 Sample plan

Sampling plan according to GB/T2828.1-2003/ISO 2859-1：1999, normal level 2 and based on:

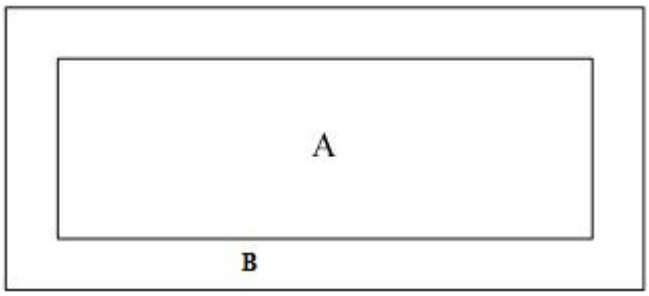
Major defect: AQL 0.65

Minor defect: AQL 1.5

2 Inspection condition

Viewing distance for cosmetic inspection is about 30 cm with bare eyes, and under an environment of 20~40W light intensity, all directions for inspecting the sample should be within 45° against perpendicular line.

3 Definition of inspection zone in LCD



Zone A: character/Digit area

Zone B: viewing area except Zone A (Zone A + Zone B=minimum Viewing area)

Zone C: Outside viewing area (invisible area after assembly in customer's product)

Fig.1 Inspection zones in an LCD.

Note: As a general rule, visual defects in Zone C are permissible, when it is no trouble for quality and assembly of customer's product.

TITLE:FUNCTIONAL TEST & INSPECTION CRITERIA	LCM Product

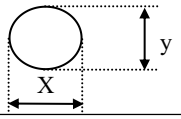
4 Inspection standards

4.1 Major Defect

Item NO.	Items to be Classification	Inspection Standard	Classificatio of defects
4.1.1	All functiona defects	1) No display 2) Display abnormally 3) Missing vertical，horizontal segment defects 4) Short circuit 5) Back-light no lighting, flickering and abnormal lighting.	Major
4.1.2	Missing	Component Missing	
4.1.3	Outline dimension	Overall outline dimension beyond the drawing is not allowed.	
4.1.4	linearity	No more than 1.5%	

4.2 Cosmetic Defect

4.2.1 Spots defect

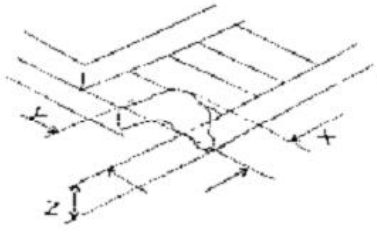
<table>
<tr><th>Item NO</th><th>Items to be Classification</th><th>Inspection Standard</th><th>Classificatio of defects</th></tr>
<tr><td rowspan="2">4.2.1</td><td rowspan="2">Clear Spots
Black and White dot,scratch, Contamination</td><td>For dark/white spot, size Φ is define as：
Φ=（X+Y）/2
 
</td><td rowspan="2">Minor</td></tr>
<tr><td>1.
<table>
<tr><th rowspan="2">Zone
Size（mm）</th><th colspan="2">Acceptable Qty</th></tr>
<tr><th>A</th><th>B</th></tr>
<tr><td>Φ≤0.2</td><td>Ignore</td><td rowspan="4">Ignore</td></tr>
<tr><td>0.2<Φ≤0.4</td><td>3</td></tr>
<tr><td>0.4<Φ</td><td>0</td></tr>
<tr><td>Total</td><td>3</td></tr>
</table></td></tr>
<tr><td></td><td></td><td></td></tr>
</table>

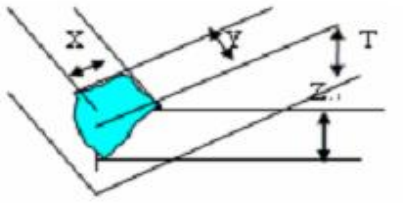
4.2.2 Line defect

<table>
<tr><th>Item NO</th><th>Items to be Classification</th><th>Inspection Standard</th><th>Classificatio of defects</th></tr>
<tr><td>4.2.2</td><td>Line type</td><td>
<table>
<tr><th colspan="2">size(mm)</th><th colspan="2">Acceptable Qty</th></tr>
<tr><th rowspan="2">L(Length)</th><th rowspan="2">W(Width)</th><th colspan="2">zone</th></tr>
<tr><th>A</th><th>B</th></tr>
<tr><td>Ignore</td><td>W≤0.03</td><td>Ignore</td><td rowspan="4">Ignore</td></tr>
<tr><td>L≤10.0</td><td>0.03＜W≤0.05</td><td>4</td></tr>
<tr><td>L≤5.0</td><td>0.05＜W≤0.10</td><td>2</td></tr>
<tr><td></td><td>0.1＜W</td><td>Define as spot defect</td></tr>
<tr><td colspan="2">Total</td><td>6</td><td></td></tr>
</table>
</td><td>Minor</td></tr>
</table>

<table>
<tr><td>4.2.4</td><td>Polarize
Air bubble</td><td>
<table>
<tr><th>Zone
Size（mm）</th><th>Acceptable Qty</th><th></th></tr>
<tr><th></th><th>A</th><th>B</th></tr>
<tr><td>Φ≤0.25</td><td>Ignore</td><td rowspan="4">Ignore</td></tr>
<tr><td>0.25<Φ≤0.50</td><td>3</td></tr>
<tr><td>0.50<Φ</td><td>0</td></tr>
<tr><td>Total</td><td>3</td></tr>
</table>
</td><td>Minor</td></tr>
</table>

4.2.3 LCD chip defect

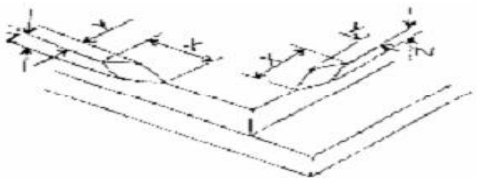
<table>
<tr><th>Item NO</th><th>Items to be Classification</th><th>Inspection Standard</th><th>Classificatio of defects</th></tr>
<tr><td>4.2.5</td><td>Glass defect</td><td>
Notes: X:The length of crack, Y:The width of crack,
Z:The thickness of crack , S:contact pad length ,
(i) Chips on corner
A:LCD Glass defect

<table>
<tr><th>X（mm）</th><th>Y（mm）</th><th>Z（mm）</th></tr>
<tr><td>≤2.0</td><td>≤S</td><td>Disregard</td></tr>
</table>
Chips on the corner of terminal shall not be allowed to extend into the ITO pad or expose perimeter seal.
</td><td>Minor</td></tr>
</table>



X（mm）	Y（mm）	Z（mm）
≤3.0	≤3.0	Disregard

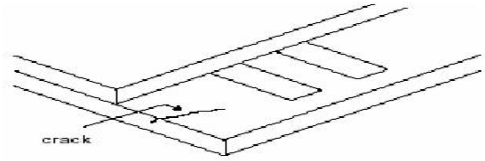
(ii)Usual surface cracks

A:LCD Glass defect



(iii) Crack

Cracks tend to break are not allowed.



Major

4.3 Parts Defect

Item NO	Items to be Classification	Inspection Standard	Classificatio of defects
4.3.1	Parts contra position	1、Not allow IC and FPC/heat-seal lead width is more than 50% beyond lead pattern. 2、Not allow chip or solder component is off center more than 50% of the pad outline.	Major
4.3.2	SMT	According to the <Acceptability of electronic assemblies> IPC-A-610C class 2 standard. Component missing or function defect are Major defect, the others are Minor defect.	