PRODUCT	: TFT MODULE	
SUPPLIER	:	
MODEL	: UT32027C2-00	Ver:1.0
DATE	: 2011-10-18	

SPECIFICATION
FOR
APPROVAL

APPROVED BY
DATE:

PREPARED BY	CHECKED BY	APPROVED BY

RECORDS OF REVISION

DATE	REF.PAGE PARAGRAPH DRAWING No.	REVISED No.	SUMMARY	REMARK
2011-10-18	ALL	1.0	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 This LCD module should be designed for mobile phone use.

LCD specification: Dots 240xRGBx400.

As to basic specification of the driver IC, refer to the IC (HX8352B-A) specification and datasheet.

1.2 Structure:

Double display structure:

TFT Module + FPC

FULL 65k or 262k Color 3.2 inch TFT LCD size for LCD;

One bare chip with gold bump (COG) TECH;

1.3 TFT features:

Structure: TFT PANNEL+IC+FPC;

Transmissive Type LCD

240 dot-source and 400 dot-gate outputs;

65k or 262k Color can be selected by software;

White LED back light;

1.4 Applications:

Mobile phone

MP4 player

Etc.

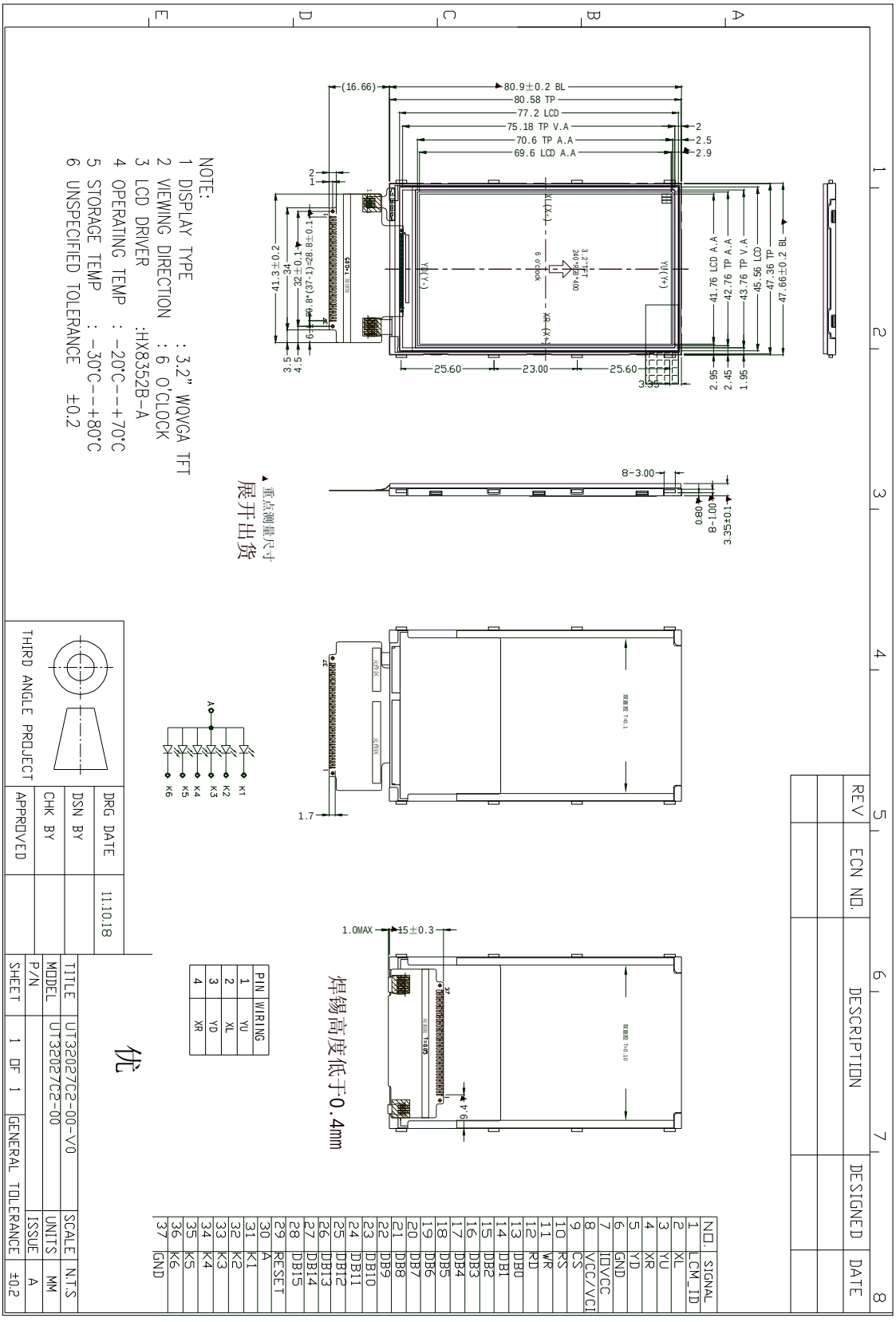
2. GENERAL DESCRIPTION

Item	Description
Display Type	3.2 inch a-Si TFT LCD Module
Display Resolution	WQVGA (240xRGBx400 Pixels)
Display Operate Mode	Transmissive, Normally black
Display View Direction	6 O'clock
Back light	6 chip white LED
Control IC	COG HX8352B-A
Interface	16-bits 80 series,
Interface Number	37 pins FPC

3. MECHANICAL SPECIFICATION

Item	Standard Value	Unit
Outline Dimension(W x H x T)	47.66*80.9*3.35	mm
Active Screen Size(Diagonal)	3.2 TFT	inch
Active Screen Area(W x H)	41.76*69.6	mm
Pixel Pitch	0.174*0.174	mm
Pixel Format	240 x RGB x 400	Pixel

4. MECHANICAL DRAWING



5. ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Min.	Max.	Unit
Supply voltage for logic	VCC	-0.3	+4.6	V
Power voltage for LCD	VLCD	-0.3	+6.6	V
Input voltage for logic	VIN	-0.3	IOVCC+0.3	V
Supply current	ILCD	- -	25	mA
Operating temperature	Top	-20	+70	°C
Storage temperature	Tst	-30	+80	°C

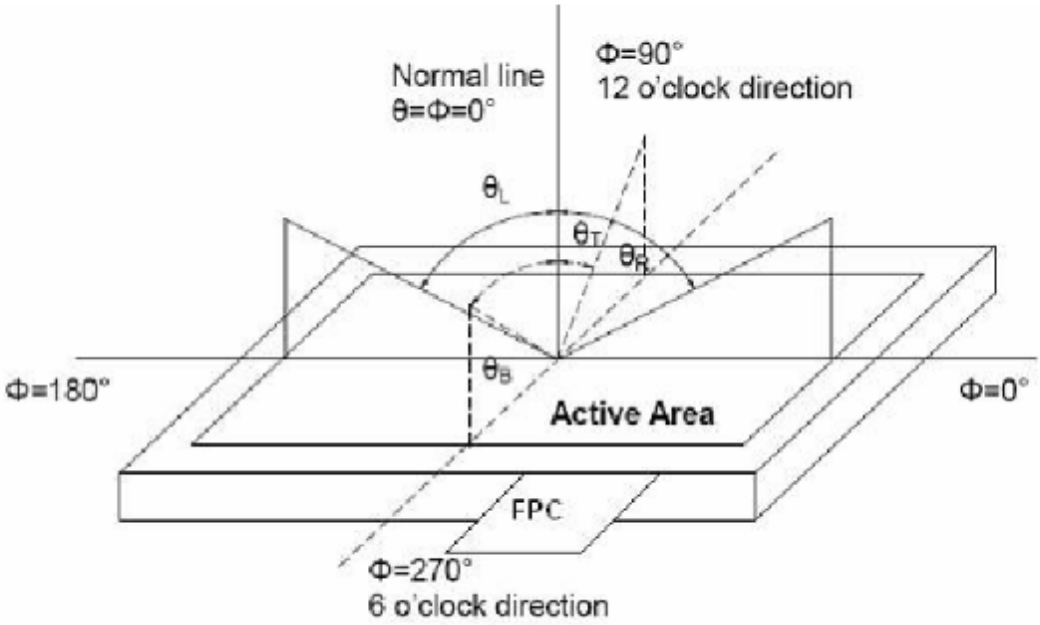
6. ELECTRICAL CHARACTERISTICS

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Supply voltage for logic	VCC	Ta = 25 ℃,	- -	2.8	- -	V
Power voltage for LCD	VLCD	Ta = 25 ℃,	- -	4.5	- -	V
Supply current for LCM	ILCD	Ta = 25 ℃ VCC = 2.8V	- -	3	12	mA
Supply voltage for back light	VLED	Ta=25℃	- -	3.2	- -	V
Supply current for back light	ILED	Ta = 25 ℃, VL = 6.6V	- -	- -	90	mA

7. OPTICAL CHARACTERISTICS

Parameter		Symbol	Conditions	Values			Unit
				Min.	Typ.	Max.	
Brightness		B		200	- -	- -	Cd/m^2
Contrast Ratio		C/R		- -	350	- -	- -
Response Time		Tr+ Tf	Ta = 25 ℃	- -	20	- -	msec
CIE Color coordinate	Red	X_R	Viewing normal angle	0.620	0.640	0.660	
		Y_R		0.300	0.320	0.340	
	Green	X_G		0.274	0.294	0.314	
		Y_G		0.558	0.578	0.598	
	Blue	X_B		0.115	0.135	0.155	
		Y_B		0.121	0.141	0.161	
	White	X_W		0.281	0.301	0.321	
		Y_W		0.333	0.353	0.373	
Viewing Angle	Hor.	θT	Center C/R>=10	- -	50	- -	Deg.
		θB		- -	20	- -	
	Ver.	θL		- -	45	- -	
		θR		- -	45	- -	

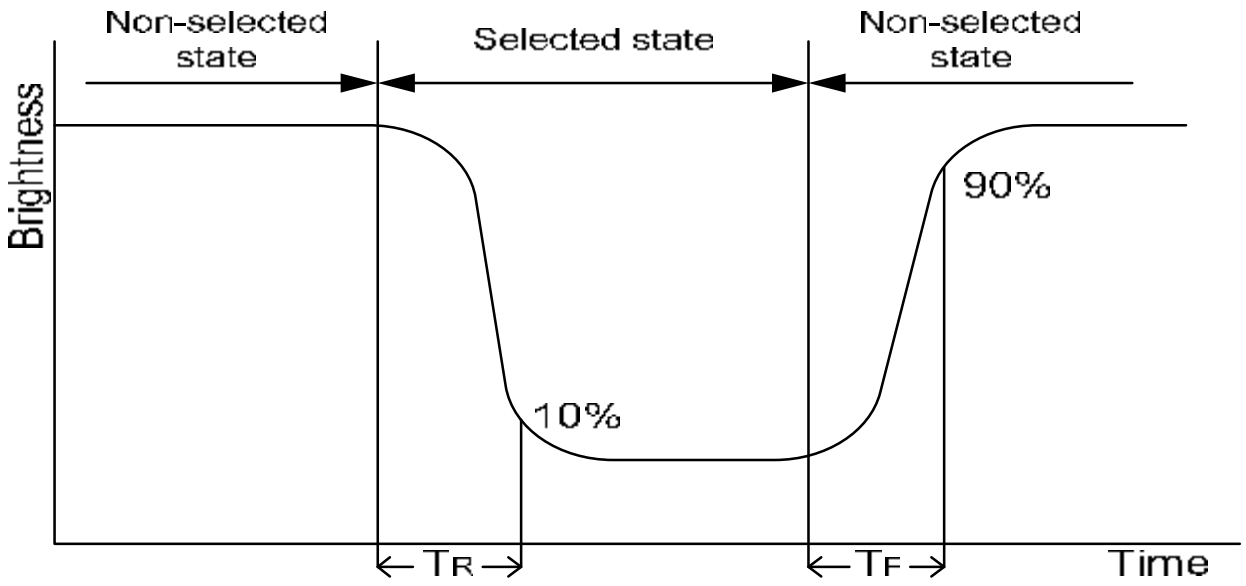
viewing angle is measured at the center point of the LCD by CONOSCOPE(ergo-80).



Note 2: Definition of contrast ratio CR:

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

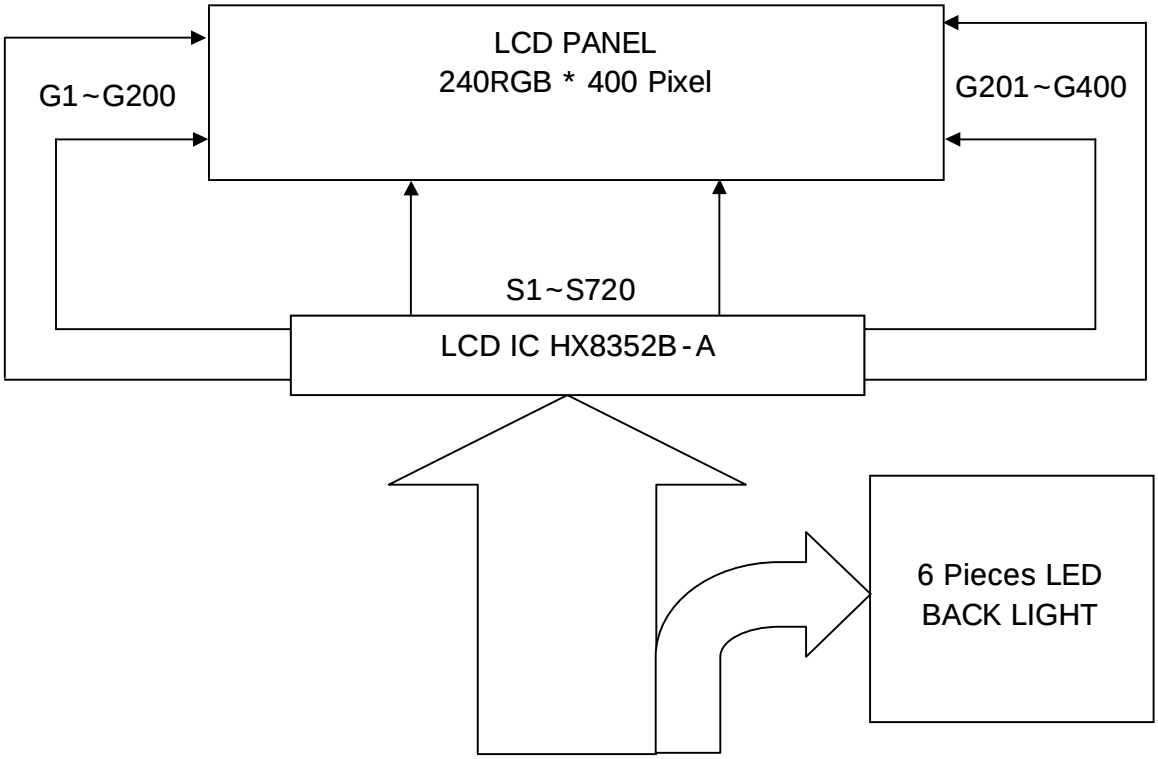
Note 3: Definition of response time (T_R, T_F)



8. LCD MODULE INTERFACE DEFINE

NO.	SYMBOL	DISCRIPTION	NC
1	ID	NC	NC
2	XL	Touch Panel PAD	NC
3	YU	Touch Panel PAD	NC
4	XR	Touch Panel PAD	NC
5	YD	Touch Panel PAD	NC
6	GND	Ground	POWER SUPPLY
7	IOVCC	TYP: 1.8V/2.8 V	POWER SUPPLY
8	VCC	TYP: 2.8 V	POWER SUPPLY
9	CS	Chip Selection	I
10	RS	Data or Command Selection	I
11	WR	Write Enable	I
12	RD	Read Enable	I
13-28	DB0-DB15	Data bus	I/O
29	RESET	SYSTEM RESET	I
30	A	Anode pin of backlight	BL POWER SUPPLY
31-36	K1-K6	Cathode pin OF backlight	BL POWER SUPPLY
37	GND	Ground	POWER SUPPLY

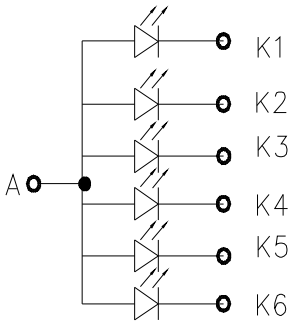
9. BLOCK DIAGRAM



LCM 37 PINS INTERFACE

Back light

IF=90mA



Circuit Diagram

10. LCM QUALITY CRITERIA

10.1 VISUAL & FUNCTION INSPECTION STANDARD

10.1.1 Inspection conditions

Inspection performed under the following conditions is recommended.

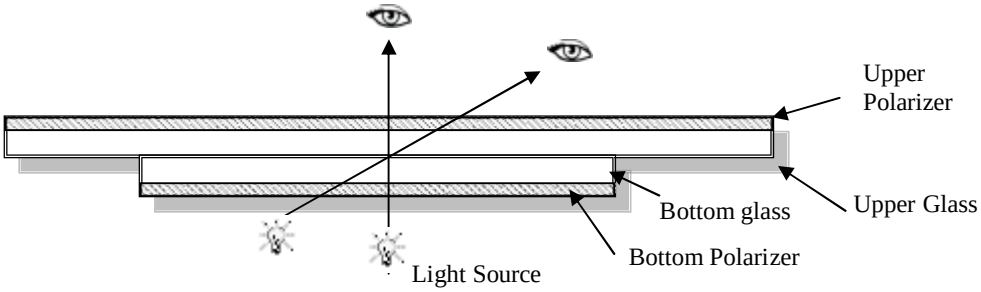
Temperature : 25±5℃

Humidity : 65%±10%RH

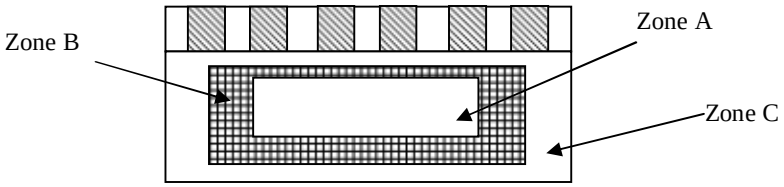
Viewing Angle : Normal viewing Angle.

Illumination: Single fluorescent lamp (300 to 700Lux)

Viewing distance:30-50cm



10.1.2 Definition



Zone A : Effective Viewing Area(Character or Digit can be seen)

Zone B : Viewing Area except Zone A

Zone C : Outside (Zone A+Zone B) which can not be seen after assembly by customer .)

Note:

As a general rule ,visual defects in Zone C can be ignored when it doesn't effect product function

or appearance after assembly by customer.

10.1.3 Sampling Plan

According to GB/T 2828-2003 ; , normal inspection, Class II

AQL:

Major defect	Minor defect
0.65	1.5

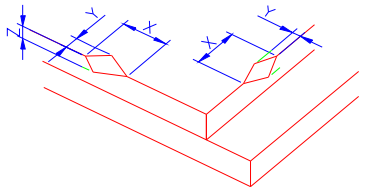
LCD: Liquid Crystal Display , TP: Touch Panel , LCM: Liquid Crystal Module

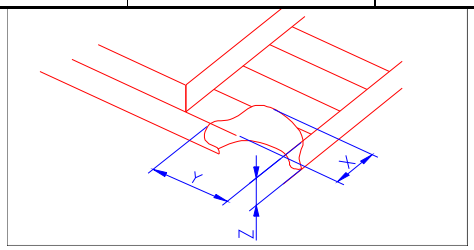
No	Items to be inspected	Criteria	Classification of defects
1	Functional defects	1) No display, Open or miss line 2) Display abnormally, Short 3) Backlight no lighting, abnormal lighting. 4) TP no function	Major

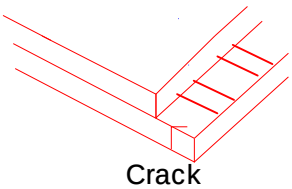
2	Missing	Missing component	
3	Outline dimension	Overall outline dimension beyond the drawing is not allowed	
4	Color tone	Color unevenness, refer to limited sample	Minor
5	Soldering appearance	Good soldering , Peeling off is not allowed.	
6	LCD/Polarizer/TP	Black/White spot/line, scratch, crack, etc.	

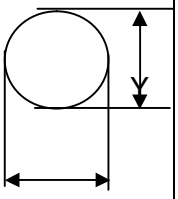
10.1.4 Criteria (Visual)

<table>
<tr><th>Number</th><th>Items</th><th>Criteria(mm)</th></tr>
<tr><td rowspan="3">1.0 LCD Crack/Broken

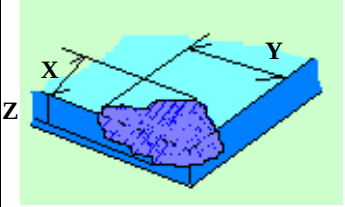
NOTE:
X: Length
Y: Width
Z: Height
L: Length of ITO,
T: Height of LCD</td><td>(1) The edge of LCD broken</td><td> 

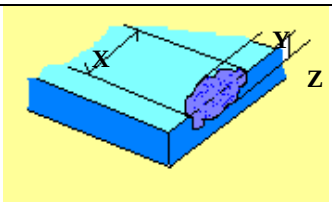
<table>
<tr><th>X</th><th>Y</th><th>Z</th></tr>
<tr><td>≤3.0mm</td><td><Inner border line of the seal</td><td>≤T</td></tr>
</table></td></tr>
<tr><td>(2)LCD corner broken</td><td> 

<table>
<tr><th>X</th><th>Y</th><th>Z</th></tr>
<tr><td>≤3.0mm</td><td>≤L</td><td>≤T</td></tr>
</table></td></tr>
<tr><td>(3) LCD crack</td><td> 
Crack
Not allowed</td></tr>
</table>

<table>
<tr><th>Number</th><th>Items</th><th>Criteria (mm)</th></tr>
<tr><td>2.0</td><td>Spot defect
 
X

Φ=(X+Y)/2</td><td>① light dot（LCD/TP/Polarizer black/white spot , light dot, pinhole, dent, stain）
<table>
<tr><th rowspan="2">Zone
Size (mm)</th><th colspan="3">Acceptable Qty</th></tr>
<tr><th>A</th><th>B</th><th>C</th></tr>
<tr><td>Φ≤0.10</td><td colspan="2">Ignore</td><td rowspan="4">Ignore</td></tr>
<tr><td>0.10<Φ≤0.15</td><td colspan="2">3(distance≧10mm)</td></tr>
<tr><td>0.15<Φ≤0.2</td><td colspan="2">1</td></tr>
<tr><td>0.2<Φ</td><td colspan="2">0</td></tr>
</table>
②Dim spot（LCD/TP/Polarizer dim dot, light leakage、dark spot）
<table>
<tr><th rowspan="2">Zone
Size (mm)</th><th colspan="3">Acceptable Qty</th></tr>
<tr><th>A</th><th>B</th><th>C</th></tr>
<tr><td>Φ≤0.1</td><td colspan="2">Ignore</td><td rowspan="4">Ignore</td></tr>
<tr><td>0.1<Φ≤0.2</td><td colspan="2">2(distance≧10mm)</td></tr>
<tr><td>0.2<Φ≤0.3</td><td colspan="2">1</td></tr>
<tr><td>Φ＞0.3</td><td colspan="2">0</td></tr>
</table>
③ Polarizer accidented spot
<table>
<tr><th rowspan="2">Zone
Size (mm)</th><th colspan="3">Acceptable Qty</th></tr>
<tr><th>A</th><th>B</th><th>C</th></tr>
<tr><td>Φ≤0.2</td><td colspan="2">Ignore</td><td rowspan="3">Ignore</td></tr>
<tr><td>0.2<Φ≤0.5</td><td colspan="2">2(distance≧10mm)</td></tr>
<tr><td>Φ>0.5</td><td colspan="2">0</td></tr>
</table></td></tr>
<tr><td></td><td>Line defect (LCD/TP /Polarizer black/white line, scratch, stain)</td><td>
<table>
<tr><th rowspan="2">Width(mm)</th><th rowspan="2">Length(mm)</th><th colspan="3">Acceptable Qty</th></tr>
<tr><th>A</th><th>B</th><th>C</th></tr>
<tr><td>Φ≤0.03</td><td>Ignore</td><td colspan="2">Ignore</td><td rowspan="3">Ignore</td></tr>
<tr><td>0.03<W≤0.05</td><td>L≤3.0</td><td colspan="2">N≤2</td></tr>
<tr><td>0.05<W≤0.08</td><td>L≤2.0</td><td colspan="2">N≤2</td></tr>
<tr><td>0.08<W</td><td colspan="4">Define as spot defect</td></tr>
</table></td></tr>
</table>

<table>
<tr><td>3.0</td><td>Polarizer Bubble</td><td>
<table>
<tr><td rowspan="2">Zone
Size (mm)</td><td colspan="3">Acceptable Qty</td></tr>
<tr><td>A</td><td>B</td><td>C</td></tr>
<tr><td>Φ≤0.2</td><td colspan="2">Ignore</td><td rowspan="4">Ignore</td></tr>
<tr><td>0.2<Φ≤0.4</td><td colspan="2">2(distance≧10mm)</td></tr>
<tr><td>0.4<Φ≤0.6</td><td colspan="2">1</td></tr>
<tr><td>0.6<Φ</td><td colspan="2">0</td></tr>
</table>
</td></tr>
<tr><td>4.0</td><td>SMT</td><td>According to IPC-A-610C class Ⅱ standard . Function defect and missing part are major defect ,the others are minor defect.</td></tr>
<tr><td rowspan="4">5.0</td><td rowspan="4">TP Related</td><td>TP bubble/ accidented spot</td><td>
<table>
<tr><td rowspan="2">Size Φ(mm)</td><td colspan="3">Acceptable Qty</td></tr>
<tr><td>A</td><td>B</td><td>C</td></tr>
<tr><td>Φ≤0.1</td><td colspan="2">Ignore</td><td rowspan="4">Ignore</td></tr>
<tr><td>0.1<Φ≤0.2</td><td colspan="2">2</td></tr>
<tr><td>0.2<Φ≤0.3</td><td colspan="2">1</td></tr>
<tr><td>0.3<Φ</td><td colspan="2">0</td></tr>
</table>
</td></tr>
<tr><td>Assembly deflection</td><td>beyond the edge of backlight ≤0.15mm</td></tr>
<tr><td>Newton Ring</td><td>Newton Ring area>1/3 TP area NG
Newton Ring area≤1/3 TP area OK</td><td>  </td></tr>
<tr><td>TP corner broken
X：length
Y：width
Z：height</td><td>
<table>
<tr><td>X</td><td>Y</td><td>Z</td></tr>
<tr><td>X≤3.0mm</td><td>Y≤3.0mm</td><td>Z<LCD thickness</td></tr>
</table>
*Circuitry broken is not</td><td>  </td></tr>
</table>

<table>
<tr><td></td><td></td><td></td><td>allowed.</td><td></td></tr>
<tr><td></td><td></td><td>TP edge broken
X：length
Y：width
Z：height</td><td><table><tr><td>X</td><td>Y</td><td>Z</td></tr><tr><td>X≤6.0mm</td><td>Y≤2.0mm</td><td>Z<LCD thickness</td></tr></table>* Circuitry broken is not allowed.</td><td> 
</td></tr>
</table>

Criteria (functional items)

Number	Items	Criteria (mm)
1	No display	Not allowed
2	Missing segment	Not allowed
3	Short	Not allowed
4	Backlight no lighting	Not allowed
5	TP no function	Not allowed

11. HANDLING LCD MODULES

11.1 Mechanical Considerations

LCM's are assembled and adjusted with a high degree of precision. Avoid excessive shocks and do not make any alterations or modifications. The following should be noted:

A) Do not tamper in any way with the tabs on the frame.

B) Do not modify the PCB by drilling extra holes, changing its outline, moving its components or modifying its pattern.

C) Do not touch the FPC connector, especially when inserting a backlight panel.

D) When mounting a LCM make sure that the PCB is not under any stress such as bending or twisting FPC contacts are very delicate and missing pixels could results from slight dislocation of any of the elements.

E) Pressing the connector slight, otherwise the connector could be deformed and lose contact resulting in no display or missing display.

11.2 Static Electricity

LCM contains CMOS LSI's and the same precaution for such devices should apply namely:

A) The operator should be grounded whenever he 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 part of the human body.

B) The modules should be kept in antistatic bags or other containers resistant to static for storage.

C) Only properly grounded soldering irons should be used.

D) If an electric screwdriver is used it should be well grounded and shielded from commutator sparks.

E) The normal static prevention measures should be observed for work clothes and working benches for the latter conductive (rubber) mat is recommended.

11.3 Soldering

A) Solder only to the I /O terminals.

B) Use only soldering irons with proper grounding and no leakage.

C) Soldering temperature is 280℃ ± 10℃.

D) Soldering time: 3 to 4 seconds

E) Use eutectic solder with resin flux fill.

F) If flux is used, the LCD surface should be covered to avoid flux spatters. Flux residue should be removed afterwards.

G) Use proper de-soldering methods (e.g. suction type desoldering irons) to remove lead wires from the I/O terminals when necessary. Do not repeat the soldering desoldering process more than three times as the pads and planted through holds may be damaged.

11.4 Operation

A) The viewing angle can be adjusted by varying the LCD driving voltage Vo.

B) Driving voltage should be kept within specified range, excess voltage shortens display life.

C) Display may not function properly at temperatures above its operational range.

D) Mechanical disturbance during operation (such as pressing on the viewing area) may cause the segments to appear fractured.

E) Condensation at terminals will cause malfunction and possible electrochemical reaction. Relative humidity of the environment should therefore be kept below 60%.

11.5 Storage

A) LCD's should be kept in sealed polyethylene bags while LCM should use antistatic ones. If properly sealed, there is no need for desiccant.

B) Store in dark places and do not expose to sunlight or fluorescent light. Keep the temperature between 0℃ and 35℃ and the relative humidity low. Please consult WaveTop for other storage requirements.

11.6 Safety instructions

If any fluid leaks out of a damaged glass cell, wash off any human part that comes into contact with soap and water. Never WaveTop the fluid. The toxicity is extremely low but caution should be exercised at all times.