



FORMIKE ELECTRONIC CO.,LTD

PRDUCT SPECIFICATON

TFT LCD MODULE

MODEL NO. : KWH022ST03-F02

【 】 Preliminary Specification

【 ♦ 】 Finally Specification

CUSTOMER'S APPROVAL	
SIGNATURE:	DATE:

APPROVED BY	PM REVIEWD	PD REVIEWD	PREPARED BY
Ken	Lily	Stephen	Jack

Prepared By :

FORMIKE ELECTRONIC CO.,LTD

Address :Room A818 New Energy Building, NanHai Road, NanShan District, ShenZhen, China. 518054

TEL:(86) 755 88306921,88306931 FAX:(86) 755 88304615

Http:// www.wandisplay.com

- This specification is subject to change withouth notice.Please contact FORMIKE or it's representative before designing your product based on this specification.

Issued Date: May-29-2009



CONTENTS

1. LCD MODULE PHYSICAL DATA	2
2. OUTLINE DIMENSIONS	3
3. BLOCK DIAGRAM	4
4. ABSOLUTE MAXIMUM RATINGS	4
5. ELECTRICAL CHARACTERISTICS	5
6. ELECTRO-OPTICAL CHARACTERISTICS	6
7. INTERFACE PIN CONNECTIONS	10
8. INITIALIZED CODE	11
9. SPECIFICATION OF QUALITY ASSURANCE	12
10. RELIABILITY	17
11. PACKING	18



1 LCD MODULE PHYSICAL DATA

1.1 General Description

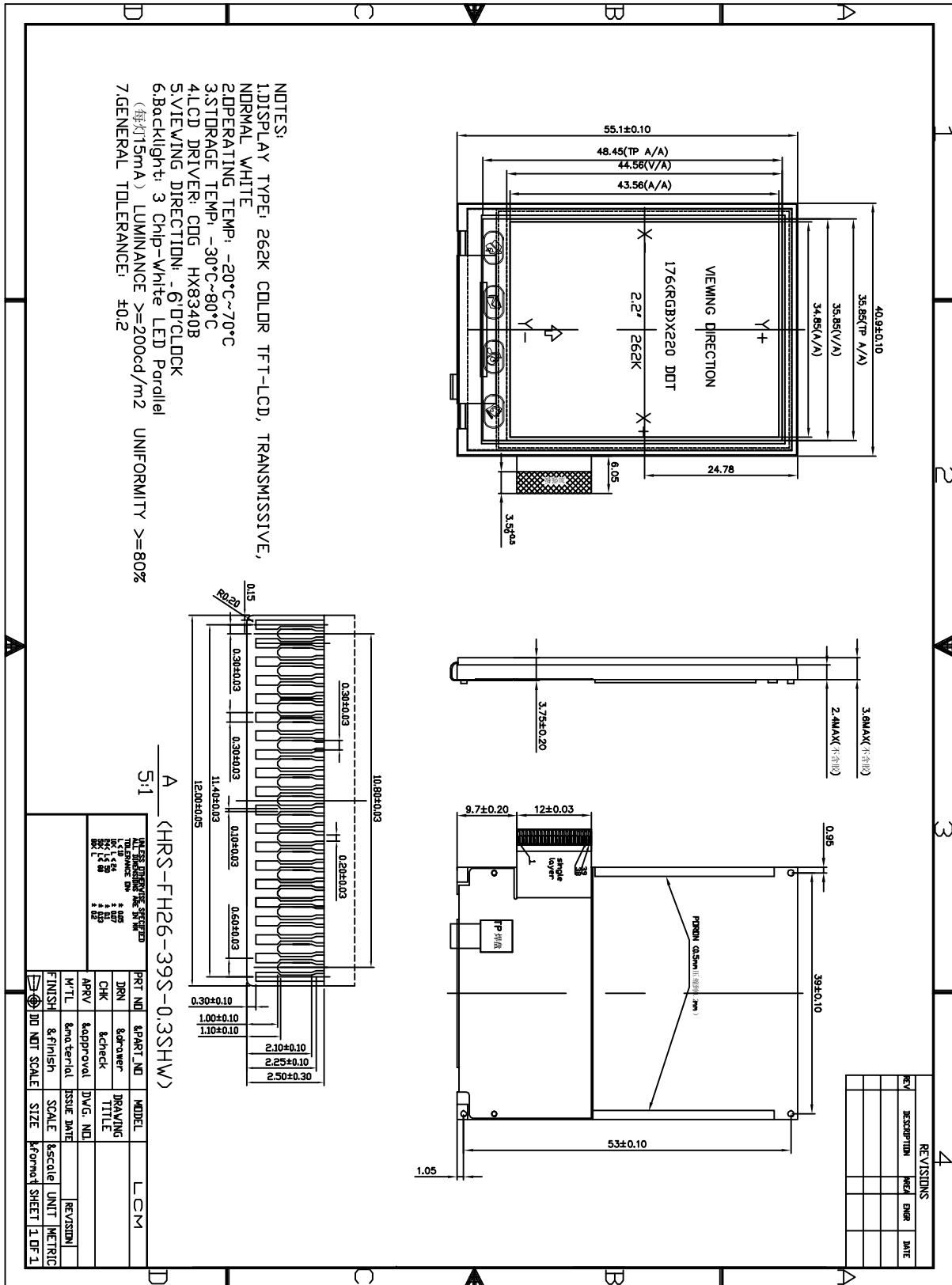
Display Type	TFT/Transmissive
Viewing Direction	6 o'clock
Connection Type	COG + FPC
Operation temperature	-20°C ~70°C
Storage temperature	-30°C ~80°C
Driving IC	HX8340B
MPU interface	16-bit /8-bit Parallel 8080 interface

1.2 Mechanical Description

Item	Standard Value	Unit
Screen size	2.0	inch
Number of dots	176RGB x 220 dots	-
LCM dimension	40.90 (W) x 55.10(H) x 3.50(T)	mm
Active area	34.85(W) x 43.56(H)	mm
Dot size	--	mm
Approx. weight	TBD	g
Backlight	3 chip white LED in Parallel	

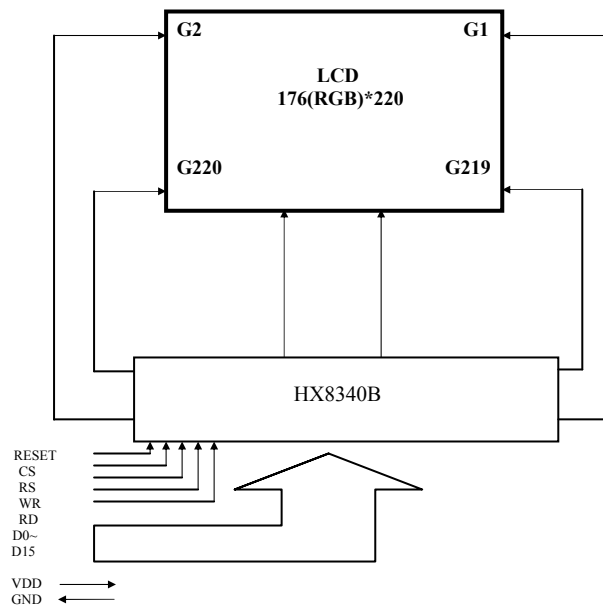


2 OUTLINE DIMENSIONS





3 BLOCK DIAGRAM



4 ABSOLUTE MAXIMUM RATINGS

ITEM	SYMBOL	CONDITION	STANDARD VALUE			UNIT
			MIN	TYP	MAX	
Power Supply Voltage(1)	VDD	Ta= +25℃		2.8	3.3	V
Power Supply Voltage(2)	Iovcc	Ta= +25℃		2.8	3.3	V
Power Supply Voltage(3)	Vci	Ta= +25℃		2.8	3.3	V
Operating Temperature	Top	---	- 20	-	+70	℃
Storage Temperature	Tst	---	- 30	-	+80	℃

NOTE:

(1). If the module is used 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). LCM should be grounded during handing LCM.

(3). VDD>GND must be maintained.



5 ELECTRICAL CHARACTERISTICS

5.1 DC Characteristics

ITEM	SYMBOL	CONDITIONS	STANDARD VALUE			UNIT
			MIN	TYP	MAX	
Power Supply Voltage for Logic	VDD-GND	Ta= +25°C	-	2.8	3.3	V
Input High Voltage for LCD	VIH	—	0.8Iovcc	—	Iovcc	V
Input Low Voltage for LCD	VIL	—	Vss	—	0.2 Iovcc	V
Output High Voltage for LCD	VOH	—	0.8Iovcc	—	Iovcc	V
Output Low Voltage for LCD	VOL	—	Vss	—	0.2 Iovcc	V

5.2 Back-Light unit

PARAMETER	SYMBOL	REMARK	STANDARD VALUE			UNIT
			MIN	TYP	MAX	
FORWARD VOLTAGE	VF	If =45mA	3.0	3.2	3.4	V
LUMINOUS INTENSITY	Iv	If =45mA	2800	3000	-	cd/m2
LUMINOUS TOLERANCE	Iv-m	(min/max)/100	-	80	-	%
CHROMATICITY COORDINATES	X	If =45mA	0.260	-	<u>0.300</u>	
	Y		0.260	-	<u>0.300</u>	
OPERATING TEMPERATURE	-20°C ~ 70°C					
STORAGE TEMPERATURE	-30°C ~ 80°C					

5.3 AC Characteristics

Refer to HX8340B IC data sheet.



6 ELECTRO-OPTICAL CHARACTERISTICS

Paramete		Symbol	Condition	Min	Typ	Max	Unit	Remark
Threshold voltage		Vsat		2.7	3.3	3.8	V	Note 1
		Vth		1.2	1.5	1.8	V	
Viewing Angle range	Horizontal	Left(9')	CR > 10	-	65	-	Deg	Not 2
		Right(3')		-	65	-	Deg	
	Vertical	Up(12')		-	45	-	Deg	
		Down(6')		-	55	-	Deg	
Contrast ratio		C/R	$\Theta = 0^\circ$	-	350	-		Not 3
Transmittance		T(%)	$\Theta = 0^\circ$	-	5.5	-		Not 4
White Chromaticity		x_w	$\Theta = 0^\circ$	0.302	0.322	0.342		Not 5 *Color Filter Glass
		y_w		0.323	0.343	0.362		
Reproduction Of color	Red	x_R	$\Theta = 0^\circ$	0.609	0.629	0.649		
		y_R		0.321	0.341	0.361		
	Green	x_G		0.291	0.311	0.331		
		y_G		0.549	0.569	0.589		
	Blue	x_B		0.121	0.141	0.161		
		y_B		0.094	0.114	0.134		
Response Time		Tr+Tf	$\Theta = 0^\circ$		30		smec	Not 6

Note :

1. The definition of V_{th} & V_{sat}

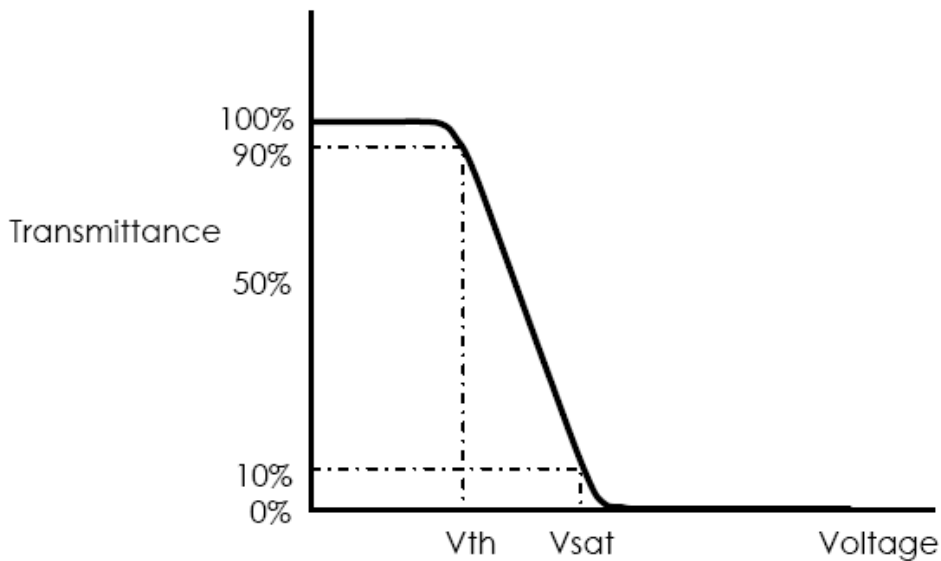


Figure 3. The definition of V_{th} & V_{sat}

2. Viewing angle is the angle at which the contrast ratio is greater than 10. The viewing are determined for the horizontal or 3, 9 o'clock direction and the vertical or 6, 12 o'clock direction with respect to the optical axis which is normal to the LCD surface.

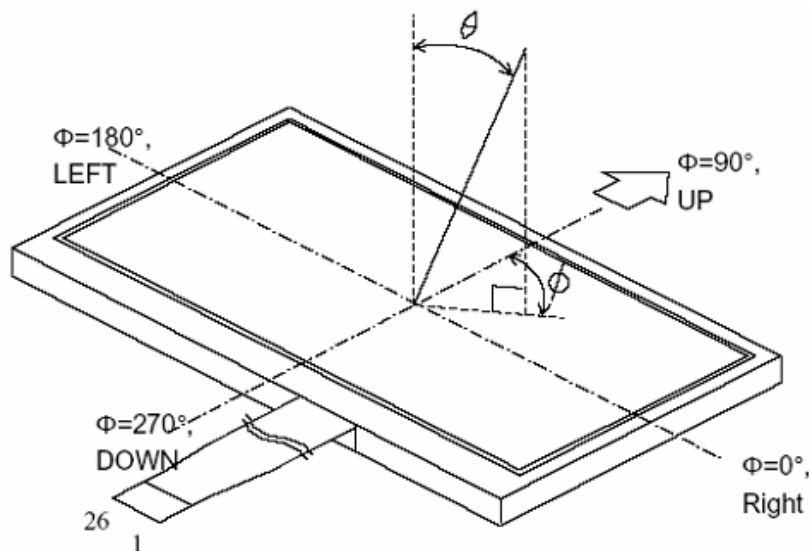


Figure 4. Definition of viewing angle

3. Contrast measurements shall be made at viewing angle of $\Theta = 0^\circ$ and at the center of the LCD surface. Luminance shall be measured with all pixels in the view field set first to white, then to the dark (black) state.

$$CR = \frac{\text{Luminance when displaying a white raster}}{\text{Luminance when displaying a black raster}}$$

- 4. Transmittance is the value with Polarizer.
- 5. The color chromaticity coordinates specified in Table 6. shall be calculated from the spectral data measured with all pixels first in red, green, blue and white. Measurements shall be made at the center of the C/F. Measurement condition is C - light source & Halogen Lamp.

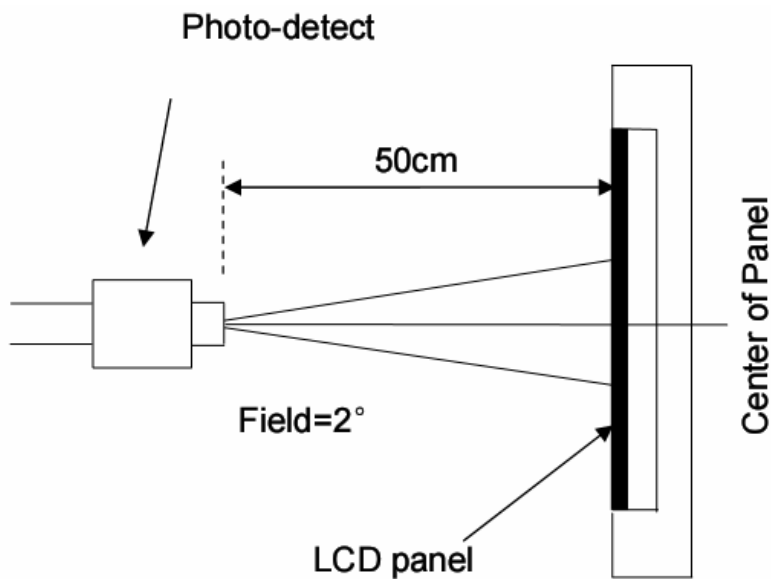


Figure 5 Optical test equipment.

- 6. The electro-optical response time measurements shall be made as FIGURE 3 shown in Appendix by switching the “data” input signal ON and OFF. The times needed for the luminance to change from 10% to 90% is T_r , and 90% to 10% is T_d

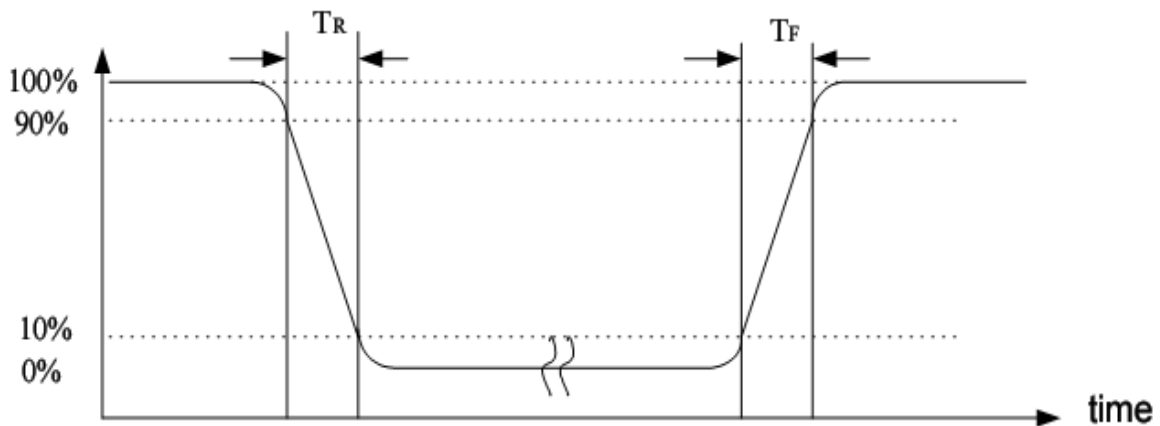


Figure 6. Definition of response time: T_r+T_f



7 INTERFACE PIN CONNECTIONS

Pin	Definition	Description	16bit Interface	8bit Interface	Signal type (see from LCD)
1	GND	Ground			Ground
2	/CS_MAIN	LCD driver IC chip selection, active LOW			Input
3	RS	Command/Data			Input
4	/WR	LCD Write , active LOW			Input
5	/RD	LCD Read , active LOW			Input
6-13	DB[00: 07]	LCD data	Data[00: 07]	GND	Input/output
14-21	DB[08: 15]		Data[08: 15]	Data[00: 07]	Input/output
22	IM0	LCD interface selection	GND	IOVCC	Input
23	FLM	Frame head pulse signal	GPIO	GPIO	Output
24	/LCD_RST	LCD driver IC reset, active LOW			Input
25	GND	Ground			Ground
26	X+	Touch panel X+ position			Output
27	Y+	Touch panel Y+ position			Output
28	X-	Touch panel X- position			Output
29	Y-	Touch panel Y- position			Output
30	GND	Ground			Ground
31	IOVCC	Interface I/O power supply (1.65V ~ 3.3V)			Power
32	VDD	Logic regulator power supply (2.5V ~ 3.3V)			Power
33	LED1+	LED1 positive			Input
34	LED2+	LED2 positive			Input
35	LED3+	LED3 positive			Input
36	NC	NC			NC
37	NC	NC			NC
38	NC	NC			NC
39	LED-	LED- ground			Ground

8 INITIALIZED CODE

Please contact us for details (DRIVER IC: HX8340B : LCD: CMO 2.2").



9 SPECIFICATION OF QUALITY ASSURANCE

9.1 Summary

The customer should check and accept the products of FAIR within one month after reception. This standard for Quality Assurance should affirm the quality of LCD products to supply to purchaser by FORMIKE CO.,LTD. Entire process is controlled according to QS9000.

9.2 Standard for quality test

(1) Inspection

Before delivering, the supplier should take the following tests, and affirm the quality of product.

(2) Electro-Optical Characteristics

According to the individual specification to test the product.

(3) Test of Appearance Characteristics:

According to the individual specification to test the product.

(4) Test of Reliability Characteristics

According to the definition of reliability on specification for test product.

(5) Delivery Test

Before delivering, the supplier should take the delivery test

(6) Sampling Method: GB/T2828.1-2003, Level II

(7) The defects classify of AQL as following

Major defect: AQL=0.65

Minor defect: AQL=1.5

9.3 Nonconforming Analysis & Deal With Manners

☆Nonconforming Analysis

(1) Purchaser should supply the detail data of nonconforming sample and the non-suitable state.

(2) After accepting the detail data from purchaser, the analysis of nonconforming should be finished in two weeks.

(3) If supplier can not finish analysis on time, must announce purchaser before two weeks.

☆Disposition of nonconforming

(1) If find any supplier defect during assembly line, supplier must change the good product for every defect after recognition.

(2) Both supplier and customer should analysis the reason and discuss the disposition of nonconforming when the reason of nonconforming is not sure.

9.4 Agreement items.

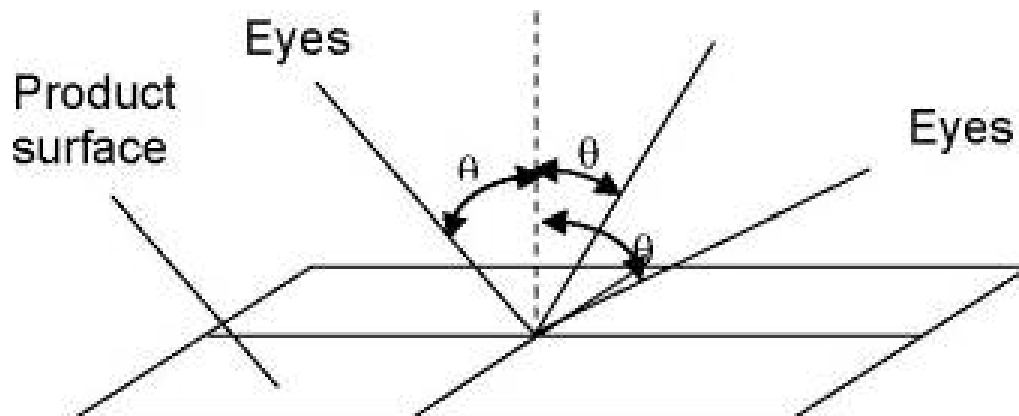
Both sides should discuss together when the following problems happen:

- (1) There is any problem of standard of quality assurance ,and both sides think that must be modifier.
- (2) There is any argument item which does not record in the quality assurance.
- (3) Any other special problem.

9.5 Standard of the Product Appearance Test

9.5.1 Manner of appearance test

- (1) The test must be under 20W*2 or 40W fluorescent light ,and the distance of view must be at 30 ± 5 cm.
- (2) When test the model of Transmissive product must add the reflective plate.
- (3) The test direction is base on about around 30 degree(within θ range)of vertical line.





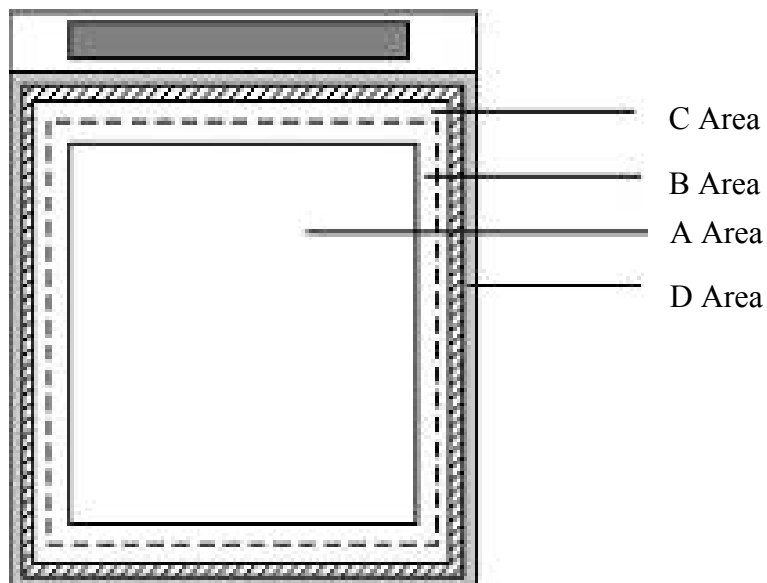
(4) Definition of Area:

A Area: Active area

B Area: Viewing area

C Area: Out of viewing area

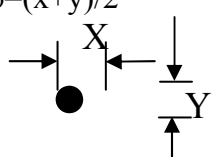
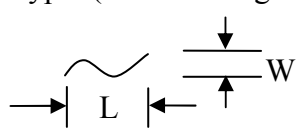
D Area: Seal area

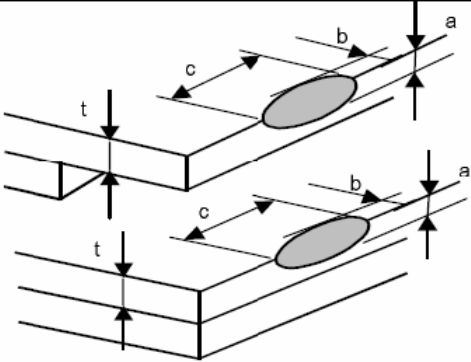
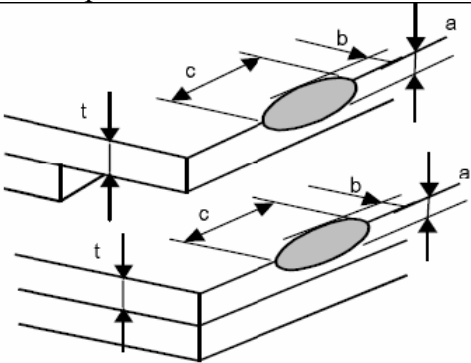
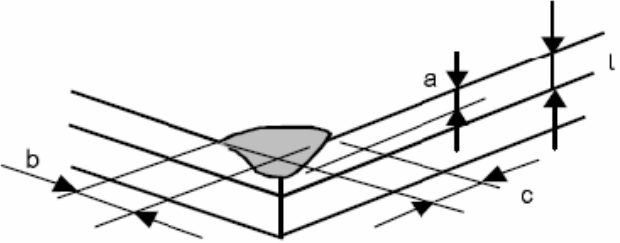


9.5.2 Basic principle:

- (1) It will accord to the AQL when the standard can not be described.
- (2) The sample of the lowest acceptable quality level must be discussed by both supplier and customer when any dispute happened.
- (3) Must add new item on time when it is necessary.

9.6 Inspection specification

NO	Item	Criterion	AQL																																																		
01	Electrical Testing	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 Contrast defect	0.65																																																		
02	LCD black spots, white spots, color spots, contamination, scratches (display/non-display)	<p>2.1 Round type: As following drawing</p> $\phi = (x+y)/2$  <table border="1" data-bbox="523 952 1228 1361"> <thead> <tr> <th rowspan="2">Size</th> <th colspan="2">Acceptable QTY</th> <th rowspan="2">Remark</th> </tr> <tr> <th>A.A</th> <th>V.A</th> </tr> </thead> <tbody> <tr> <td>$\phi \leq 0.20$</td> <td>Ignore</td> <td>Ignore</td> <td rowspan="6">No more than two spots within 5mm</td> </tr> <tr> <td>$0.20 < \phi \leq 0.25$</td> <td>2</td> <td>3</td> </tr> <tr> <td>$0.25 < \phi \leq 0.30$</td> <td>1</td> <td>2</td> </tr> <tr> <td>$0.30 < \phi$</td> <td>0</td> <td>0</td> </tr> <tr> <td>Total</td> <td>3</td> <td>5</td> </tr> <tr> <td></td> <td></td> <td></td> </tr> </tbody> </table> <p>2.2 Line Type: (As following drawing)</p>  <table border="1" data-bbox="523 1590 1273 1892"> <thead> <tr> <th rowspan="2">Length</th> <th rowspan="2">Width</th> <th colspan="2">Acceptable QTY</th> <th rowspan="2">Remark</th> </tr> <tr> <th>A.A</th> <th>V.A</th> </tr> </thead> <tbody> <tr> <td>---</td> <td>$W \leq 0.03$</td> <td>Ignore</td> <td>Ignore</td> <td rowspan="3">No more than two lines within 5mm</td> </tr> <tr> <td>$L \leq 2.5$</td> <td>$0.03 < W \leq 0.05$</td> <td>2</td> <td>3</td> </tr> <tr> <td>$L \leq 1.5$</td> <td>$0.05 < W \leq 0.08$</td> <td></td> <td></td> </tr> <tr> <td>---</td> <td>$0.08 < W$</td> <td>0</td> <td>0</td> <td></td> </tr> </tbody> </table>	Size	Acceptable QTY		Remark	A.A	V.A	$\phi \leq 0.20$	Ignore	Ignore	No more than two spots within 5mm	$0.20 < \phi \leq 0.25$	2	3	$0.25 < \phi \leq 0.30$	1	2	$0.30 < \phi$	0	0	Total	3	5				Length	Width	Acceptable QTY		Remark	A.A	V.A	---	$W \leq 0.03$	Ignore	Ignore	No more than two lines within 5mm	$L \leq 2.5$	$0.03 < W \leq 0.05$	2	3	$L \leq 1.5$	$0.05 < W \leq 0.08$			---	$0.08 < W$	0	0		1.5
Size	Acceptable QTY			Remark																																																	
	A.A	V.A																																																			
$\phi \leq 0.20$	Ignore	Ignore	No more than two spots within 5mm																																																		
$0.20 < \phi \leq 0.25$	2	3																																																			
$0.25 < \phi \leq 0.30$	1	2																																																			
$0.30 < \phi$	0	0																																																			
Total	3	5																																																			
Length	Width	Acceptable QTY		Remark																																																	
		A.A	V.A																																																		
---	$W \leq 0.03$	Ignore	Ignore	No more than two lines within 5mm																																																	
$L \leq 2.5$	$0.03 < W \leq 0.05$	2	3																																																		
$L \leq 1.5$	$0.05 < W \leq 0.08$																																																				
---	$0.08 < W$	0	0																																																		

<p>03</p>	<p>Polarizer bubbles Ignore</p>	<p>If bubbles are visible, judge using black spot specification, not easy to find, must check in specify direction.</p> <table border="1" data-bbox="528 309 1182 501"> <thead> <tr> <th rowspan="2">Size</th> <th colspan="2">Acceptable QTY</th> </tr> <tr> <th>A. A</th> <th>V. A</th> </tr> </thead> <tbody> <tr> <td>$\varphi \leq 0.30$</td> <td>Ignore</td> <td>Ignore</td> </tr> <tr> <td>$0.30 < \varphi \leq 0.60$</td> <td>2</td> <td>3</td> </tr> <tr> <td></td> <td>0</td> <td>0</td> </tr> </tbody> </table>	Size	Acceptable QTY		A. A	V. A	$\varphi \leq 0.30$	Ignore	Ignore	$0.30 < \varphi \leq 0.60$	2	3		0	0	<p>1.5</p>
Size	Acceptable QTY																
	A. A	V. A															
$\varphi \leq 0.30$	Ignore	Ignore															
$0.30 < \varphi \leq 0.60$	2	3															
	0	0															
<p>04</p>	<p>Chipped glass</p>	<p>Symbols: a: Chip length b: Chip width c: Chip thickness t: Glass thickness</p> <p>4.1 ITO electrode</p> <p>$a \leq t$ $b \leq 0.5\text{mm}$ $c \leq 3.0\text{mm}$</p>  <p>*Effective width of seal area shall be more than 0.3mm.</p> <p>4.2 General ,corner portion</p> <p>$a \leq t$ $b \leq 0.5\text{mm}$ $c \leq 3.0\text{mm}$</p>  <p>*Effective width of seal area shall be more than 0.3mm.</p> 	<p>1.5</p>														



05	Cracked glass	The LCD with extensive crack is not acceptable.	0.65
06	Backlight elements	6.1 Illumination source flickers when lit.	0.65
		6.2 Spots or scratches that appear when lit must be judged using LCD spot, lines and contamination standards.	1.5
		6.3 Backlight doesn't light or color is wrong	0.65
07	Soldering	7.1 No unmelted solder paste may be present on the PCB.	1.5
		7.2 No cold solder joints, missing solder connections, oxidation or icicle.	1.5
		7.3 No residue or solder balls on PCB.	1.5
		7.4 No short circuits in components on PCB.	0.65
08	General appearance	8.1 No oxidation, contamination, curves or, bends on interface pin (OLB) of TCP.	1.5
		8.2 No cracks on interface pin(OLB) of TCP	0.65
		8.3 NO contamination, solder residue or solder balls on product.	1.5
		8.4 The IC on the TCP may not be damaged, circuits.	0.65
		8.5 The residual rosin or tin oil of soldering (component or chip component) is not burned into brown or black color. 8.6	1.5
		Sealant on top of the ITO circuit has not hardened	1.5
		8.7 Pin type must match type in specification sheet.	0.65
		8.8 LCD pin loose or missing pins.	0.65
		8.9 Product packaging must the same as specified on packaging specification sheet.	0.65
		8.10 Product dimension and structure must conform to product specification sheet.	0.65

**10 RELIABILITY**

NO..	Test Item	Description	Test Condition
1	High temperature storage	Endurance test applying the high storage temperature for a long time	70°C,240 H
2	Low temperature storage	Endurance test applying the low storage temperature for a long time	-20°C,240H
3	High temperature operation	Endurance test applying the electric stress under high temperature for a long time	60°C,96H
4	Low temperature operation	Endurance test applying the electric stress under low temperature for a long time	-10°C,96H
5	High temperature /humidity storage	Endurance test applying the high temperature and high humidity storage for a long time	50°C, 90% R.H 240H
6	High temperature /humidity operation	Endurance test applying electric stress under high temperature and high humidity for a long time	40°C 90% R.H 96H
7	Temperature Cycle	Endurance test applying the low and high temperature cycle -20°C → 25°C → 70°C →25°C 30min 5min 30min 5min one cycle	-20°C/70°C 10 cycles
8	Vibration test	Endurance test applying the vibration during transportation and using	10Hz~50Hz Swing:0.75mm time:30min
9	Fall test	Endurance test dropping the LCM from a high place	600mm height
10	Static electricity test	Endurance test applying static electric stress to terminal	Contact discharge: ±2KV~4KV Air discharge: ±2KV~10KV

NOTE: TEST CONDITION

- (1) Temperature and humidity: If no specification, temp. set at 25±2°C, humidity set at 60±5%RH.
- (2) Operating state: Samples subject to the test shall be in “operating” condition.



11 PACKING

TBD