TFT DISPLAY SPECIFICATION

WINSTAR Display Co.,Ltd.

華凌光電股份有限公司

Winstar Display Co., LTD
華凌光電股份有限公司
WEB: https://www.winstar.com.tw E-mail: sales@winstar.com.tw

SPECIFICATION

CUSTOMER : _____

MODULE NO.: WF0128BTYAA4DNF10#

APPROVED BY: **(FOR CUSTOMER USE ONLY)**	**PCB VERSION: DATA:**

SALES BY	APPROVED BY	CHECKED BY	PREPARED BY
			周园园
ISSUED DATE: 2022/08/31			

TFT Display Inspection Specification: https://www.winstar.com.tw/technology/download.html
Precaution in use of TFT module: https://www.winstar.com.tw/technology/download/declaration.html

MODLE NO：

RECORDS OF REVISION			DOC. FIRST ISSUE
VERSION	DATE	REVISED PAGE NO.	**SUMMARY**
0	2022/08/31		First issue

Contents

1.Module Classification Information

W	F	0128	B	T	Y	A	A4	D	N	F	1	0#
①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	⑪	⑫	⑬

①	Brand：WINSTAR DISPLAY CORPORATION		
②	Display Type：F→TFT Type, J→Custom TFT		
③	Display Size：1.28” TFT		
④	Model serials no.		
⑤	Backlight Type：	F→CCFL, White S→LED, High Light White	T→LED, White Z→Nichia LED, White
⑥	LCD Polarize Type/ Temperature range/ Gray Scale Inversion Direction	A→Transmissive, N.T, IPS TFT C→Transmissive, N. T, 6:00 ; F→Transmissive, N.T,12:00 ; I→Transmissive, W. T, 6:00 K→Transflective, W.T,12:00 L→Transmissive, W.T,12:00 N→Transmissive, Super W.T, 6:00	Q→Transmissive, Super W.T, 12:00 R→Transmissive, Super W.T, O-TFT V→Transmissive, Super W.T, VA TFT W→Transmissive, Super W.T, IPS TFT X→Transmissive, W.T, VA TFT Y→Transmissive, W.T, IPS TFT Z→Transmissive, W.T, O-TFT
⑦	A：TFT LCD B：TFT+SCREW HOLES+CONTROL BOARD C：TFT+ SCREW HOLES +A/D BOARD D：TFT+ SCREW HOLES +A/D BOARD+CONTROL BOARD E：TFT+ SCREW HOLES +POWER BOARD		F：TFT+CONTROL BOARD G：TFT+ SCREW HOLES H：TFT+D/V BOARD I：TFT+ SCREW HOLES +D/V BOARD J：TFT+POWER BD

⑧ Resolution:

A	128160	B	320234	C	320240	D	480234	E	480272	F	640480
G	800480	H	1024600	I	320480	J	240320	K	800600	L	240400
M	1024768	N	128128	P	1280800	Q	480800	R	640320	S	480128
T	800320	U	8001280	**V**	176220	W	1280398	X	1024250	Y	1920720
Z	800200	A4	240240								

⑨ D: Digital L：LVDS M:MIPI

⑩ Interface:

N	Without control board	A	8Bit	B	16Bit	H	HDMI
I	I2C Interface	R	RS232	S	SPI Interface	U	USB

⑪ TS:

N	Without TS	T	Resistive touch panel	C	Capacitive touch panel (G-F-F)
G	Capacitive touch panel (G-G)	C1	Capacitive touch panel (G-F-F)+OCA		
C2	Capacitive touch panel (G-F-F)+OCR	G1	Capacitive touch panel (G-G)+OCA		
G2	Capacitive touch panel (G-G)+OCR	F	Capacitive touch panel (G-F)		

⑫	Version: X:Raspberry pi	
⑬	Special Code	#:Fit in with ROHS directive regulations

2.General Specifications

Item	Dimension	Unit
Size	1.28	inch
Dot Matrix	240 x RGB x 240 (TFT)	dots
Module dimension	50.20 x 50.20 x 3.99	mm
Active area	32.40 x 32.40	mm
Dot pitch	0.043 X 0.135	mm
LCD type	TFT, Normally Black, Transmissive	
Viewing Angle	80/80/80/80	
TFT Interface	SPI	
Backlight Type	LED ,Normally White	
Driver IC	GC9A01	
CTP Driver IC	CTS816 or equivalent	
CTP FW Version	0X1	
CTP Resolution	240*240	
With /Without TP	With CTP	
Surface	Glare	

*Color tone slight changed by temperature and driving voltage.

3.Absolute Maximum Ratings

Item	Symbol	Min	Typ	Max	Unit
Operating Temperature	TOP	-20	—	+70	℃
Storage Temperature	TST	-30	—	+80	℃

Note: Device is subject to be damaged permanently if stresses beyond those absolute maximum ratings listed above

1. Temp. □60℃, 90% RH MAX. Temp.＞60℃, Absolute humidity shall be less than 90% RH at 60℃

4.Electrical Characteristics

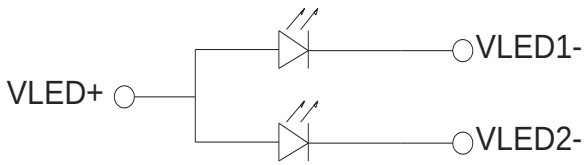
4.1. Operating conditions

Item	Symbol	Conditions	Standard Value			Unit
			Min	Typ	Max	
Power Supply Voltage for Analog	VCI	Ta= +25℃	2.65	2.8	3.3	V
Supply CTP	TP_VDD3.3	Ta= +25℃	2.65	2.8	3.3	V
	I_{CTP}	Ta= +25℃	-	3.0	4.5	mA
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

4.2. LED driving conditions

Parameter	Symbol	Min.	Typ.	Max.	Unit	Remark
LED current	-	-	40	-	mA	-
LED voltage	VLED+	3.0	3.2	3.4	V	Note 1
LED Life Time	-	-	20,000	-	Hr	Note 2,3,4

Note 1 : There are 1 Groups LED



CIRCUIT DIAGRAM

Note 2 : Ta = 25 ℃
Note 3 : Brightness to be decreased to 50% of the initial value
Note 4 : The single LED lamp case

5.Optical Characteristics

Item		Symbol	Condition.	Min	Typ.	Max.	Unit	Remark
Response time		Tr+ Tf	θ=0°、Φ=0°	-	30	-	.ms	Note 3
Contrast ratio		CR	At optimized viewing angle	-	1000	-	-	Note 4
Color Chromaticity	White	Wx	θ=0°、Φ=0	0.254	0.304	0.354	-	Note 2,5,6
		Wy		0.277	0.327	0.377	-	
Viewing angle (Gray Scale Inversion Direction)	Hor.	ΘR	CR≧10	-	80	-	Deg.	Note 1
		ΘL		-	80	-		
	Ver.	ΦT		-	80	-		
		ΦB		-	80	-		
Brightness		-	-	290	320	-	cd/m2	Center of display
Uniformity		(U)	-	75	-	-	%	Note 5

Ta=25±2℃,

Note 1: Definition of viewing angle range

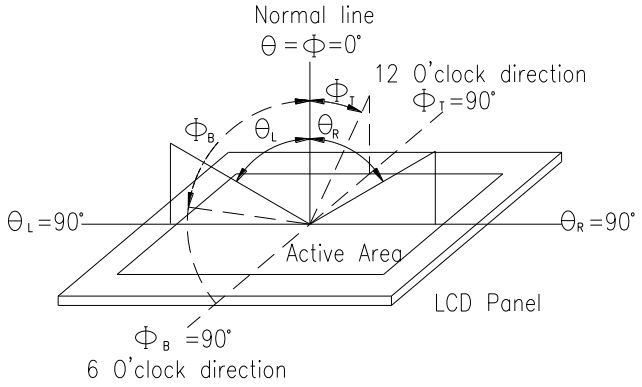


Fig. 5.1. Definition of viewing angle

Note 2: Test equipment setup:

After stabilizing and leaving the panel alone at a driven temperature for 10 minutes, the measurement should be executed. Measurement should be executed in a stable, windless, and dark room. Optical specifications are measured by Topcon BM-7orBM-5 luminance meter 1.0° field of view at a distance of 50cm and normal direction.

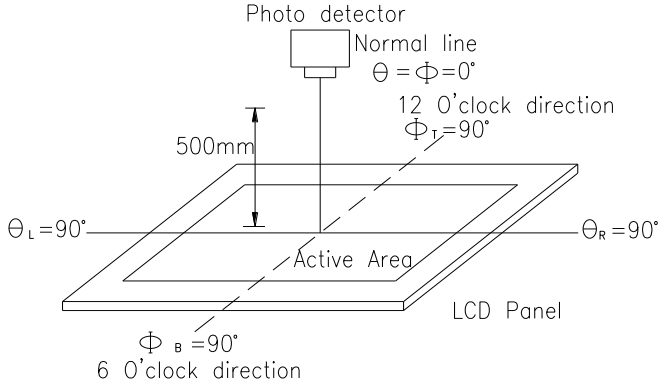
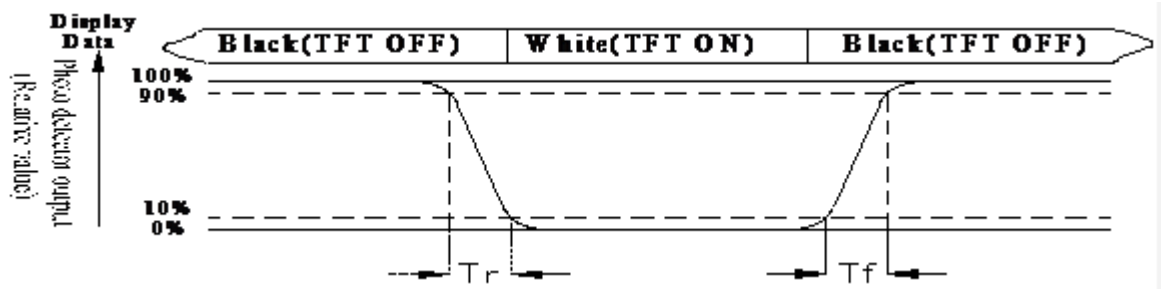


Fig. 5.2. Optical measurement system setup

Note 3: Definition of Response time:

The response time is defined as the LCD optical switching time interval between “White” state and “Black” state. Rise time, Tf, is the time between photo detector output intensity changed from 90%to 10% is Td. And fall time, Tr, is the time between photo detector output intensity changed from 10%to 90% is Tr.



Note 4: Definition of contrast ratio:

The contrast ratio is defined as the following expression.

$$\text{Contrast ratio (CR)} = \frac{\text{Luminance measured when LCD on the "White" state}}{\text{Luminance measured when LCD on the "Black" state}}$$

Note 5: Definition of Luminance Uniformity

Active area is divided into 9 measuring areas (reference the picture in below). Every measuring point is placed at the center of each measuring area.

Luminance Uniformity (U) = Lmin/Lmax x100%

L = Active area length

W = Active area width

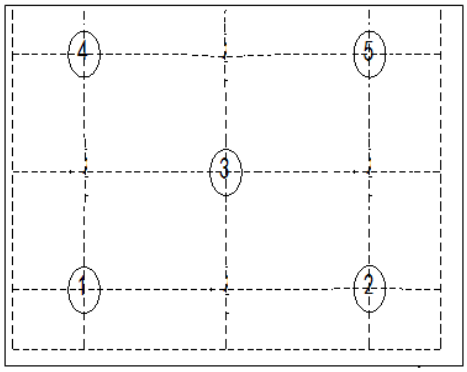


Fig5.3. Definition of uniformity

Note 6: Definition of color chromaticity (CIE 1931)

Color coordinates measured at the center point of LCD

Note 7: Measured at the center area of the panel when all the input terminals of LCD panel are electrically opened.

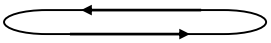
6.Interface

6.1. LCM PIN Definition

Pin	Symbol	Function	Remark
1	TP_INT	INTERUPT SIGNAL	
2	TP_SDA	IIC DATA	
3	TP_SCL	IIC CLOCK	
4	TP_RESET	TP RESET SIGNAL	
5	TP_GND	Ground	
6	TP_VDD3.3V	CTP POWER SUPPLY	
7	VLED+	Backlit positive	
8	VLED-	Backlit negative	
9	GND	Ground	
10	CS	Chip select signal	
11	SCL	Serial clock	
12	SDA	Serial data signal	
13	RS	Register select signal	
14	TE	TE signal	
15	RESET	LCD RESET Signal	
16	VCI3.3V	LCD Power supply	
17	NC	No connection	
18	GND	Ground	

7.Reliability

Content of Reliability Test (Wide temperature, -20℃~70℃)

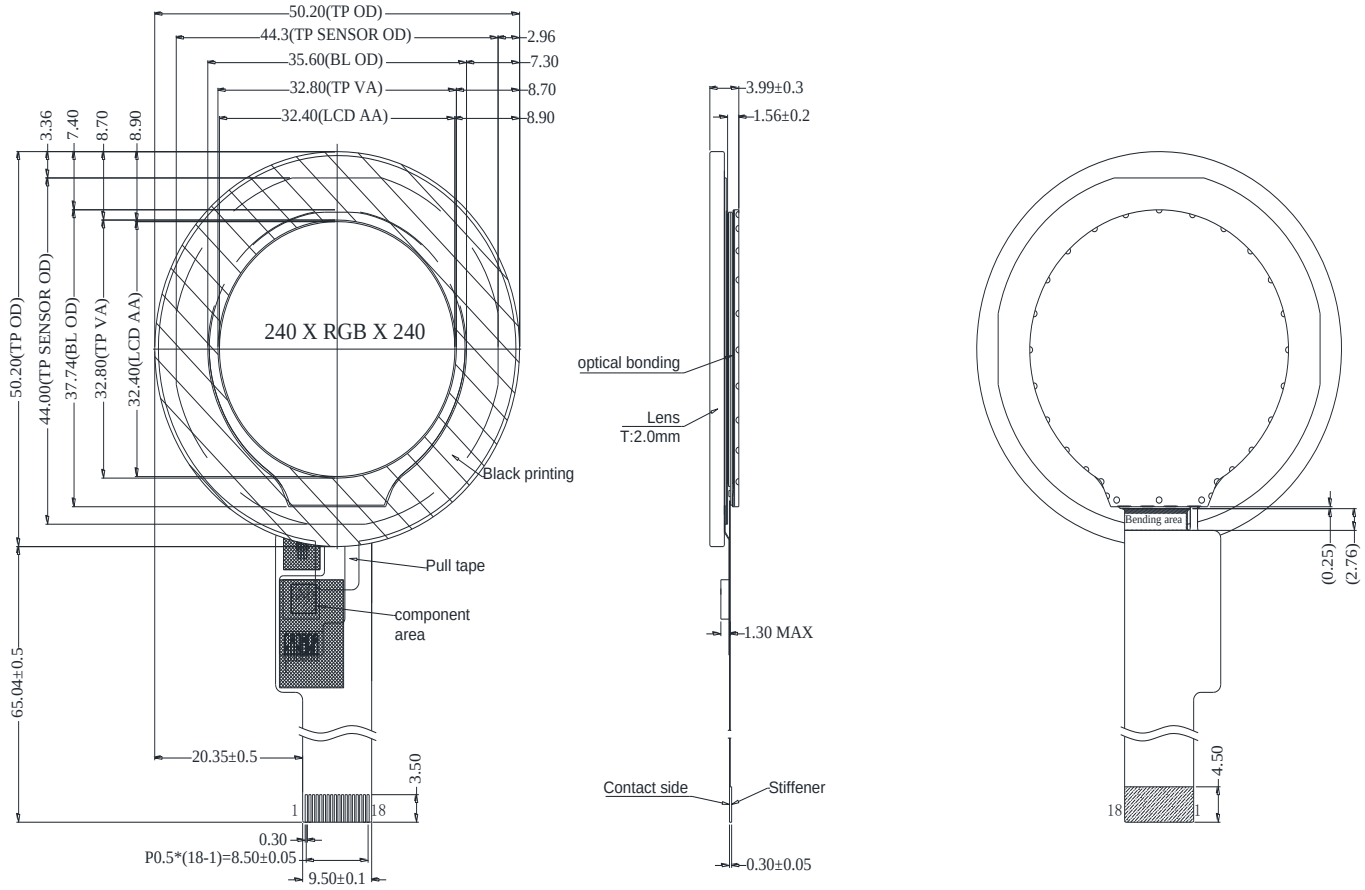
Environmental Test			
Test Item	**Content of Test**	**Test Condition**	**Note**
High Temperature storage	Endurance test applying the high storage temperature for a long time.	80℃ 200hrs	2
Low Temperature storage	Endurance test applying the low storage temperature for a long time.	-30℃ 200hrs	1,2
High Temperature Operation	Endurance test applying the electric stress (Voltage & Current) and the thermal stress to the element for a long time.	70℃ 200hrs	——
Low Temperature Operation	Endurance test applying the electric stress under low temperature for a long time.	-20℃ 200hrs	1
High Temperature/ Humidity Operation	The module should be allowed to stand at 60℃,90%RH max	60℃,90%RH 96hrs	1,2
Thermal shock resistance	The sample should be allowed stand the following 10 cycles of operation -20℃ 25℃ 70℃  30min 5min 30min 1 cycle	-20℃/70℃ 10 cycles	——
Vibration test	Endurance test applying the vibration during transportation and using.	Total fixed amplitude : 1.5mm Vibration Frequency : 10~55Hz One cycle 60 seconds to 3 directions of X,Y,Z for Each 15 minutes	3
Static electricity test	Endurance test applying the electric stress to the finished product housing.	Contact discharge: ±2KV~4KV Air discharge: ±2KV~8KV 10times RS=330Ω CS=150pF 10 times	

Note1: No dew condensation to be observed.

Note2: The function test shall be conducted after 4 hours storage at the normal Temperature and humidity after remove from the test chamber.

Note3: The packing have to including into the vibration testing.

8.Contour Drawing



PIN NO.	SYMBOL
1	TP_INT
2	TP_SDA
3	TP_SCL
4	TP_RESET
5	TP_GND
6	TP_VDD3.3V
7	VLED+
8	VLED-
9	GND
10	CS
11	SCL
12	SDA
13	RS
14	TE
15	RESET
16	VCI3.3V
17	NC
18	GND

The non-specified tolerance of dimension is ±0.3 mm .

9.檢驗規範(Inspection Specification)

SPECIFICATION OF OUALITY ASSURANCE

9.1 Summary

The customer should check and accept the products of Winstar within one month after reception This standard for Quality Assurance should affirm the quality of LCD products to supply to purchase r by Winstar Group CoLtd 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 shoul d 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 nonconfor ming 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 at30±5 cm.

(2)When test the model of Transmissive product must add the reflective plate.

(3) Definition of Area:

A Area: Active area

B Area: Viewing area

C Area: Out of viewing area

D Area: Seal area

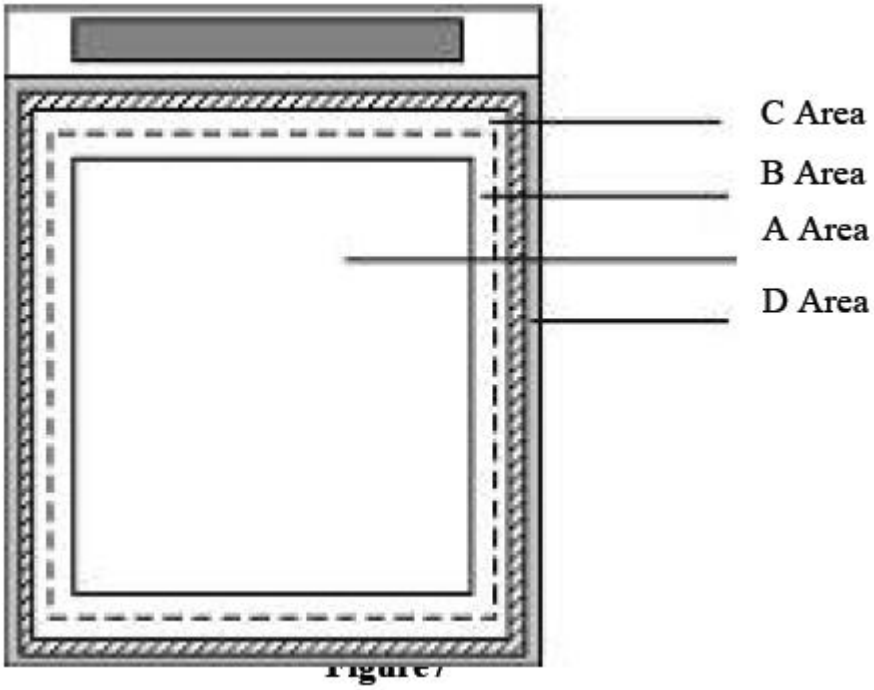


Figure7

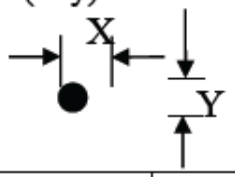
9.5.2 Basic principle

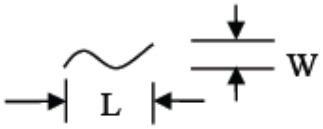
(1)It will accord to the AQL when the standard can not be described

(2)The sample of the lowest acceptable quality level must be discussed by both supplier and customer when any dispute happened.

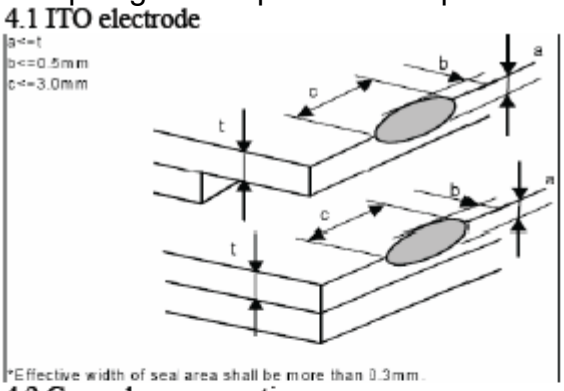
(3) Must add new item on time when it is necessary.

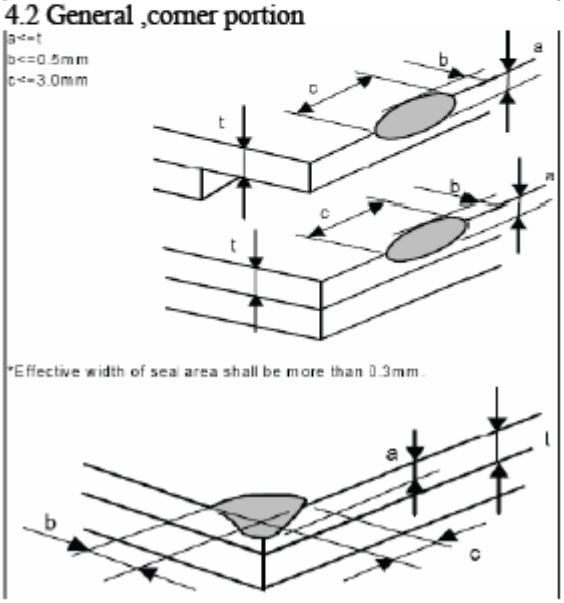
9.6 Inspection specification

<table>
<tr><th>No.</th><th>Item</th><th>Criterion</th><th>AOL</th></tr>
<tr><td>01</td><td>Electrical Testing</td><td>1.1 Missing vertical,horizontal segment, segment contrast d efect.
1.2 Missing character, dot or icon.
1.3 Display malfunction.
1.4No function or no display
1.5 Current consumption exceeds product specifications.
1.6 LCD viewing angle defect.
1.7 Contrast defect</td><td>0.65</td></tr>
<tr><td>02</td><td>LCD black spots , white spots, col or spots, contamination, scratches (display/non-display)</td><td>2.1Round type: As following drawing
φ=(x+y)/2
 

<table>
<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>
<tr><td>φ≦0.10</td><td>Ignore</td><td>Ignore</td><td rowspan="6">No more than two spots within 5mm</td></tr>
<tr><td>0.10<φ≦0.15</td><td>2</td><td>3</td></tr>
<tr><td>0.15≦φ≦0.20</td><td>1</td><td>2</td></tr>
<tr><td>0.20<φ</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>
</table>
2.2 Line Type: (As following drawing)
 

<table>
<tr><th>Length</th><th>Width</th><th colspan="2">Acceptable QTY</th><th>Remark</th></tr>
<tr><td></td><td></td><td>A.A</td><td>V.A</td><td></td></tr>
<tr><td>---</td><td>W≦0.03</td><td>Ignore</td><td>Ignore</td><td></td></tr>
<tr><td>L≦2.5</td><td>0.03< W≦0.05</td><td rowspan="2">2</td><td rowspan="2">3</td><td rowspan="2">No more than two lines within 5mm</td></tr>
<tr><td>L≦1.5</td><td>0.05< W≦0.08</td></tr>
<tr><td>---</td><td>0.08< W</td><td>0</td><td>0</td><td></td></tr>
</table></td><td>1.5</td></tr>
</table>

<table>
<tr><th>No.</th><th>Item</th><th>Criterion</th><th>AOL</th></tr>
<tr><td>03</td><td>Polarizer bubbles Ignore</td><td>If bubbles are visible,judge using black spot specification,not easy to find,must check in specify direction.
<table>
<tr><th>Size</th><th colspan="2">Acceptable QTY</th></tr>
<tr><td></td><td>A. A</td><td>V. A</td></tr>
<tr><td>φ≦0.15</td><td>Ignore</td><td>Ignore</td></tr>
<tr><td>0.15<φ≦0.2</td><td>2</td><td>3</td></tr>
<tr><td></td><td>0</td><td>0</td></tr>
</table></td><td>1.5</td></tr>
<tr><td>04</td><td>Chipped glass</td><td>Symbols:
a:Chiplength b:Chip width c:Chip thickness t:Glass thickness
4.1 ITO electrode
 

4.2 General ,corner portion
 

</td><td>1.5</td></tr>
</table>

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

winstar

LCM Sample Estimate Feedback Sheet

Module Number： _____

1、Panel Specification：

1.	Panel Type：	□ Pass	□ NG ,_____
2.	View Direction：	□ Pass	□ NG ,_____
3.	Numbers of Dots：	□ Pass	□ NG ,_____
4.	View Area：	□ Pass	□ NG ,_____
5.	Active Area：	□ Pass	□ NG ,_____
6.	Operating Temperature：	□ Pass	□ NG ,_____
7.	Storage Temperature：	□ Pass	□ NG ,_____
8.	Others：_____		

2、Mechanical

1.	PCB Size：	□ Pass	□ NG ,_____
2.	Frame Size：	□ Pass	□ NG ,_____
3.	Material of Frame：	□ Pass	□ NG ,_____
4.	Connector Position：	□ Pass	□ NG ,_____
5.	Fix Hole Position：	□ Pass	□ NG ,_____
6.	Backlight Position：	□ Pass	□ NG ,_____
7.	Thickness of PCB：	□ Pass	□ NG ,_____
8.	Height of Frame to PCB：	□ Pass	□ NG ,_____
9.	Height of Module：	□ Pass	□ NG ,_____
10.	Others：	□ Pass	□ NG ,_____

3、Relative Hole Size：

1.	Pitch of Connector：	□ Pass	□ NG ,_____
2.	Hole size of Connector：	□ Pass	□ NG ,_____
3.	Mounting Hole size：	□ Pass	□ NG ,_____
4.	Mounting Hole Type：	□ Pass	□ NG ,_____
5.	Others：	□ Pass	□ NG ,_____

4、Backlight Specification：

1.	B/L Type：	□ Pass	□ NG ,_____
2.	B/L Color：	□ Pass	□ NG ,_____
3.	B/L Driving Voltage (Reference for LED Type)：	□ Pass	□ NG ,_____
4.	B/L Driving Current：	□ Pass	□ NG ,_____
5.	Brightness of B/L：	□ Pass	□ NG ,_____
6.	B/L Solder Method：	□ Pass	□ NG ,_____
7.	Others：	□ Pass	□ NG ,_____

>> **Go to page 2** <<

5、Electronic Characteristics of Module：

1. Input Voltage： □ Pass □ NG ,_____
2. Supply Current： □ Pass □ NG ,_____
3. Driving Voltage for LCD： □ Pass □ NG ,_____
4. Contrast for LCD： □ Pass □ NG ,_____
5. B/L Driving Method： □ Pass □ NG ,_____
6. Negative Voltage Output： □ Pass □ NG ,_____
7. Interface Function： □ Pass □ NG ,_____
8. LCD Uniformity： □ Pass □ NG ,_____
9. ESD test： □ Pass □ NG ,_____
10. Others： □ Pass □ NG ,_____

6、Summary：

Sales signature：_____

Customer Signature：_____ **Date：** / /