



Winstar Display Co., LTD

華凌光電股份有限公司



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SPECIFICATION

CUSTOMER : _____

MODULE NO.: WG320240C0-TFHVZ#000

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

SALES BY	APPROVED BY	CHECKED BY	PREPARED BY

VERSION	DATE	REVISED PAGE NO.	SUMMARY
A	2008/11/26	12	Modify backlight information.



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MODLE NO :

RECORDS OF REVISION

DOC. FIRST ISSUE

VERSION	DATE	REVISED PAGE NO.	SUMMARY
0	2006/8/23		First issue
A	2008/11/26	12	Modify backlight information.

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1. Module Classification Information

W G 3 2 0 2 4 0 C0 — T F H VZ#000

① ② ③ ④ ⑤ ⑥ ⑦ ⑧

① Brand : WINSTAR DISPLAY CORPORATION

② Display Type : H→Character Type, G→Graphic Type

③ Display Font : 320 * 240 Dots

④ Model serials number

⑤ Backlight Type :

N→Without backlight	A→LED, Amber
B→EL, Blue green	R→LED, Red
D→EL, Green	O→LED, Orange
W→EL, White	G→LED, Green
F→CCFL, White	T→LED, White
Y→LED, Yellow Green	

⑥ LCD Mode :

B→TN Positive, Gray	T→FSTN Negative
N→TN Negative,	
G→STN Positive, Gray	
Y→STN Positive, Yellow Green	
M→STN Negative, Blue	
F→FSTN Positive	

⑦ LCD Polarize Type/
Temperature range/
View direction

A→Reflective, N.T, 6:00	H→Transflective, W.T,6:00
D→Reflective, N.T, 12:00	K→Transflective, W.T,12:00
G→Reflective, W. T, 6:00	C→Transmissive, N.T,6:00
J→Reflective, W. T, 12:00	F→Transmissive, N.T,12:00
B→Transflective, N.T,6:00	I→Transmissive, W. T, 6:00
E→Transflective, N.T.12:00	L→Transmissive, W.T,12:00

⑧ Special Code

V : Build in negative voltage Z:ICNT7086

00:Sales Code ; 0: Version(TS320240BRNO#)

#: Fit in with the ROHS directives and regulations

2. Precautions in Use of LCD Module

- (1) Avoid applying excessive shocks to the module or making any alterations or modifications to it.
- (2) Don't make extra holes on the printed circuit board, modify its shape or change the components of LCD Module.
- (3) Don't disassemble the LCM.
- (4) Don't operate it above the absolute maximum rating.
- (5) Don't drop, bend or twist LCM.
- (6) Soldering: only to the I/O terminals.
- (7) Storage: please storage in anti-static electricity container and clean environment.
- (8). Winstar have the right to change the passive components
- (9). Winstar have the right to change the PCB Rev.

3. General Specification

ITEM	STANDARD VALUE	UNIT
Number of dots	320x240	dots
Outline dimension	148.02(W)x 120.24(H)x 17.3max(T)	mm
View area	120.14(W)x 92.14(H)	mm
Active area	115.18(W)x 86.38(H)	mm
Dot size	0.34(W)x 0.34(H)	mm
Dot pitch	0.36(W)x 0.36(H)	mm
LCD type	FSTN Positive , Transflective (In LCD production, It will occur slightly color difference. We can only guarantee the same color in the same batch.)	
View direction	6 o'clock	
Backlight	LED , White	

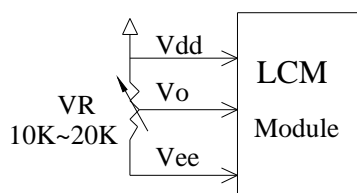
4. Absolute Maximum Ratings

ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT
Operating Temperature	T_{OP}	-20	—	+70	°C
Storage Temperature	T_{ST}	-30	—	+80	°C
Input Voltage	V_I	0	—	V_{dd}	V
Supply Voltage For Logic	V_{DD}	0	—	6.5	V
Supply Voltage For LCD	$V_{DD}-V_{EE}$	0	—	32	V

5. Electrical Characteristics

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
Logic Voltage	$V_{DD}-V_{SS}$	—	4.5	5.0	5.5	V
Supply Voltage For LCD	$V_{DD}-V_O$	$T_a=-20^{\circ}\text{C}$	—	—	25.0	V
*Note		$T_a=25^{\circ}\text{C}$	—	23.8	—	V
		$T_a=70^{\circ}\text{C}$	23.0	—	—	V
Input High Volt.	V_{IH}	—	$0.5V_{DD}$	—	V_{DD}	V
Input Low Volt.	V_{IL}	—	0	—	$0.2V_{DD}$	V
Output High Volt.	V_{OH}	—	2.4	—	—	V
Output Low Volt.	V_{OL}	—	—	—	0.4	V
Supply Current	I_{DD}	—	95.0	100.0	110.0	mA

* Note: Please design the VOP adjustment circuit on customer's main board

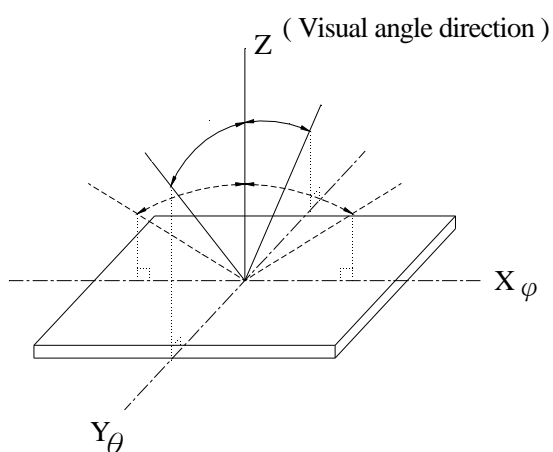


6. Optical Characteristics

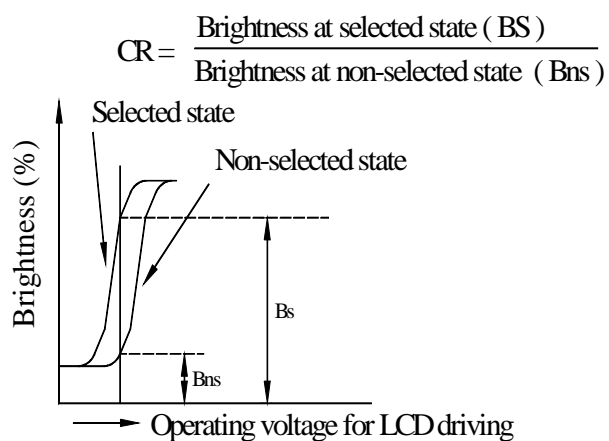
ITEM	SYMBAL	CONDITION	MIN	TYP	MAX	UNIT
View Angle	(V) θ	$CR \geq 2$	30	—	60	deg.
	(H) φ	$CR \geq 2$	-45	—	45	deg.
Contrast Ratio	CR	—	—	5	—	—
Response Time	T rise	—	—	200	300	ms
	T fall	—	—	150	200	ms

6.1 Definitions

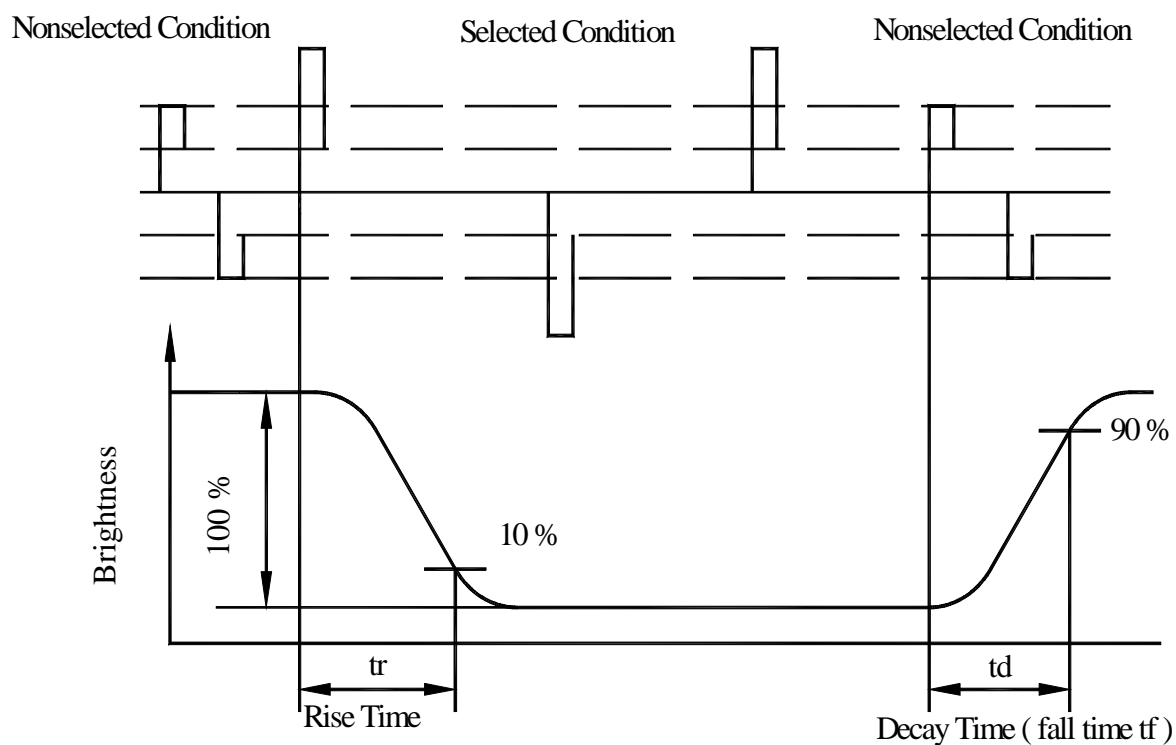
■ View Angles



■ Contrast Ratio



■ Response time

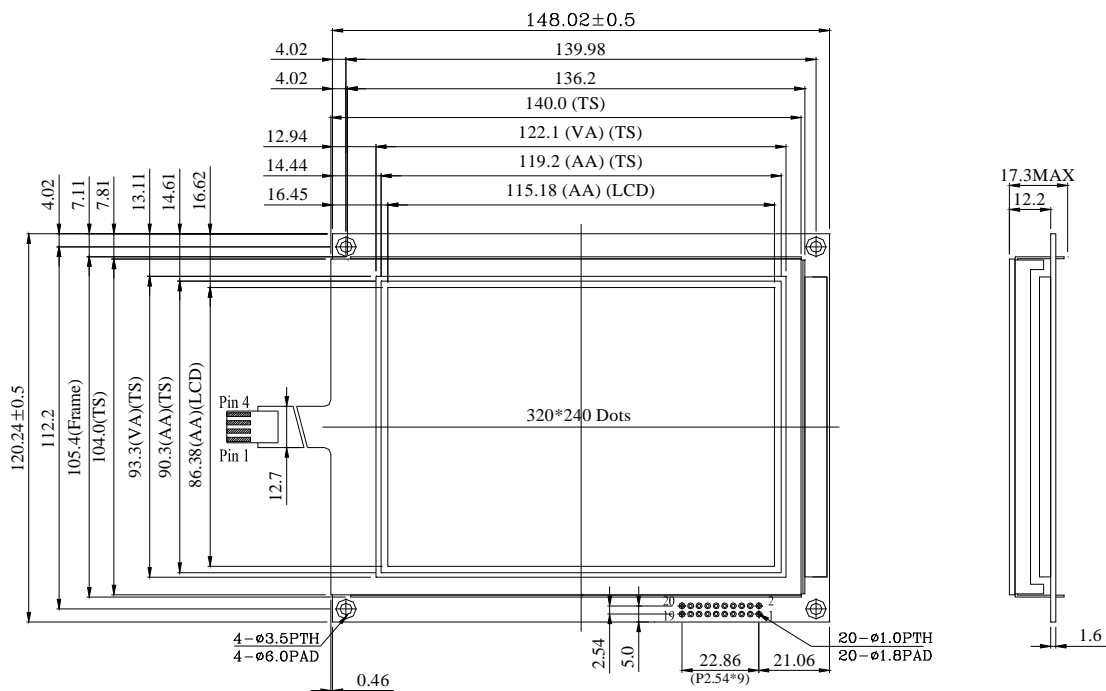


7. Interface Description

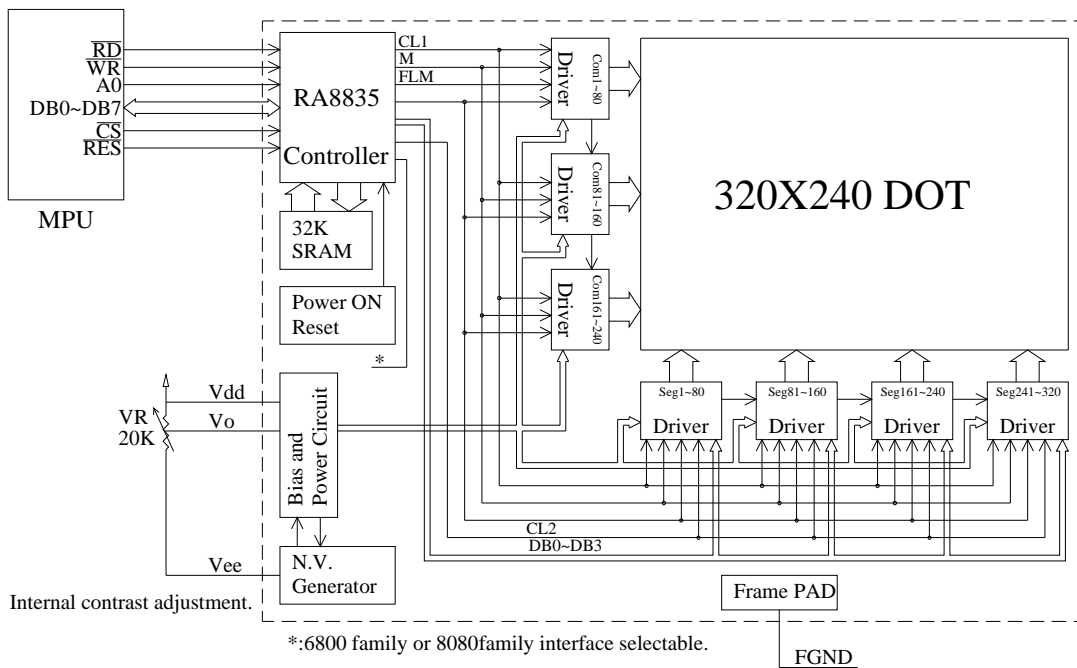
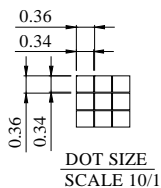
JM (right) short , for 6800 MPU family

Pin No.	Symbol	Level	Description
1	V _{SS}	0V	Ground
2	V _{DD}	5.0V	Power supply for Logic
3	V _O	(Variable)	Driving voltage for LCD
4	E	H/L	Start enable signal to read or write the data
5	R/W	H/L	R/W signal input is used to select the read/write mode High = Read mode , Low = Write mode
6	A0	H/L	R/W=L, A0=H: Command Write A0=L: Data Write R/W=H, A0=H: Status Read A0=L: Data Read
7~14	DB0~DB7	H/L	Data bus
15	$\overline{\text{CS}}$	H/L	Chip select ,Active L
16	$\overline{\text{RES}}$	H/L	Controller reset signal, Active L
17	V _{EE}	-25V	Negative voltage output (Optional)
18	FGND		Frame Ground
19	NC		No connection
20	NC		No connection

8. Contour Drawing & Block diagram



PIN NO.	SYMBOL
1	Vss
2	Vdd
3	Vo
4	RD
5	WR
6	A0
7	DB0
8	DB1
9	DB2
10	DB3
11	DB4
12	DB5
13	DB6
14	DB7
15	CS
16	RES
17	Vee
18	FGND
19	NC
20	NC

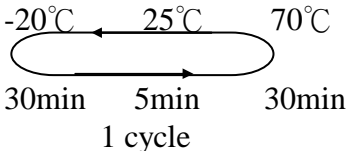


9.Display Control Instruction

PLEASE TO CONSUL RA8835 SPEC

10. RELIABILITY

Content of Reliability Test (wide temperature, -20°C~70°C)

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°C 200hrs	2
Low Temperature storage	Endurance test applying the high storage temperature for a long time.	-30°C 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°C 200hrs	—
Low Temperature Operation	Endurance test applying the electric stress under low temperature for a long time.	-20°C 200hrs	1
High Temperature/ Humidity Operation	The module should be allowed to stand at 60 °C,90%RH max For 96hrs under no-load condition excluding the polarizer, Then taking it out and drying it at normal temperature.	60°C,90%RH 96hrs	1,2
Thermal shock resistance	The sample should be allowed stand the following 10 cycles of operation 	-20°C/70°C 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 terminal.	VS=800V,RS=1.5k CS=100pF 1 time	—

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: Vibration test will be conducted to the product itself without putting it in a container.

11. Backlight Information

Specification

PARAMETER	SYMBOL	MIN	TYP	MAX	UNIT	TEST CONDITION
Supply Current	I _{LED}	115.2	128	200	mA	V=3.5V
Supply Voltage	V	3.4	3.5	3.6	V	—
Reverse Voltage	V _R	—	—	8	V	—
Luminous Intensity	I _V	260	280		CD/M ²	I _{LED} =128mA
Wave Length	p	—	—	—	nm	I _{LED} =128mA
LED Life Time (For Reference only)	—	—	50K	—	Hr.	I _{LED} =128mA 25°C,50-60%RH, (Note 1)
Color	White					

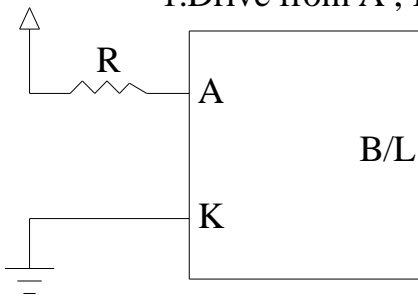
Note: The LED of B/L is drive by current only, drive voltage is for reference only.

drive voltage can make driving current under safety area (current between minimum and maximum).

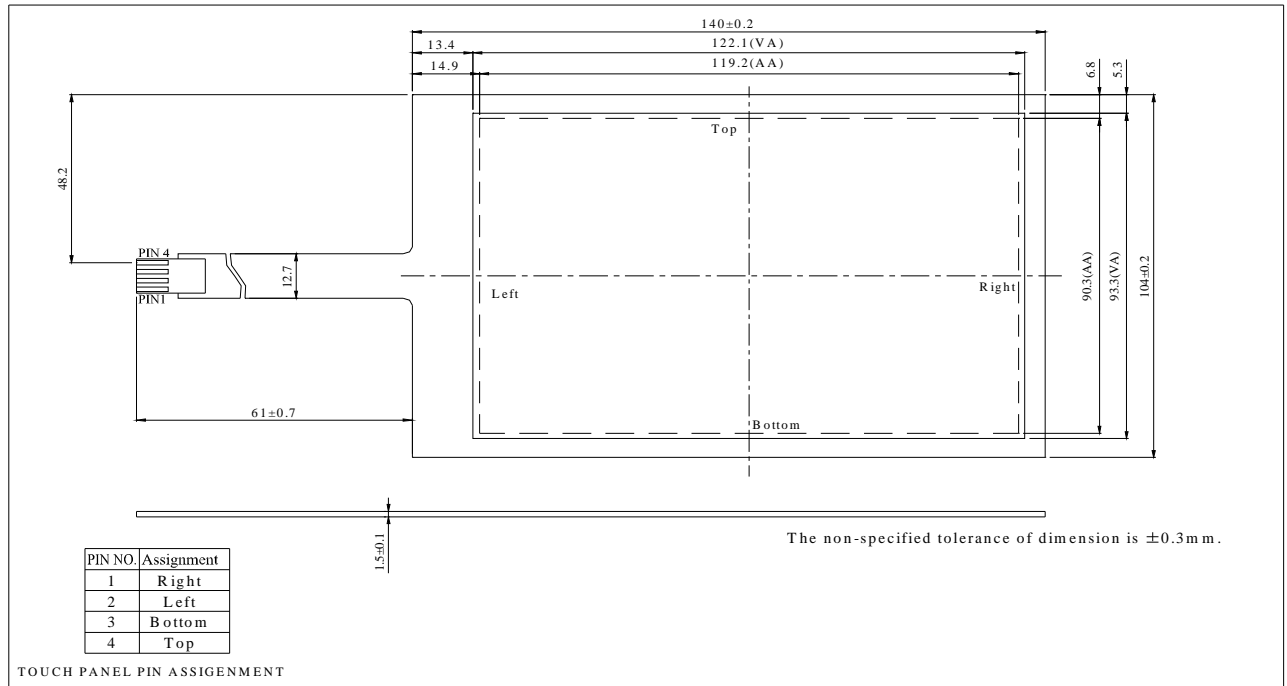
Note 1:50K hours is only an estimate for reference.

LED B\L Drive Method

1.Drive from A , K



12. Touch panel Information



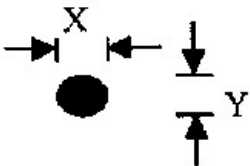
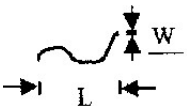
ELECTRICAL SPECIFICATIONS

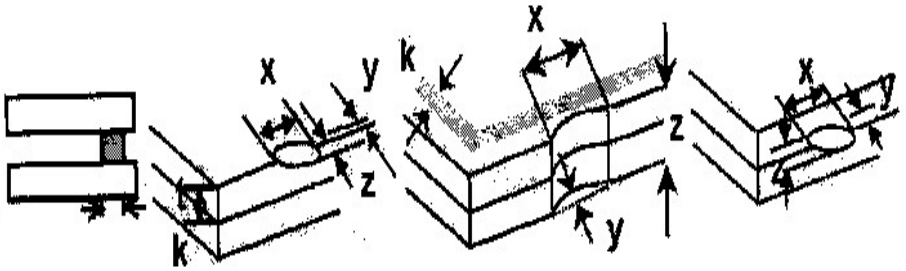
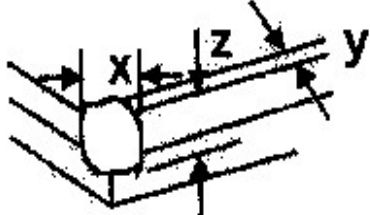
ITEM	SPECIFICATION	CONDITION
ON RESISTANCE	350 1000	DIRECTION:X
	200 650	DIRECTION:Y
INSULATION RESISTANCE	MORE THAN 20M	DC 25V
CHATTERING TIME	LESS THAN 15 msec	100K
LINEARITY	1.5	X AXIS
	1.5	Y AXIS

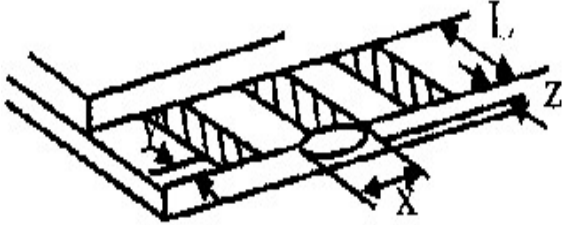
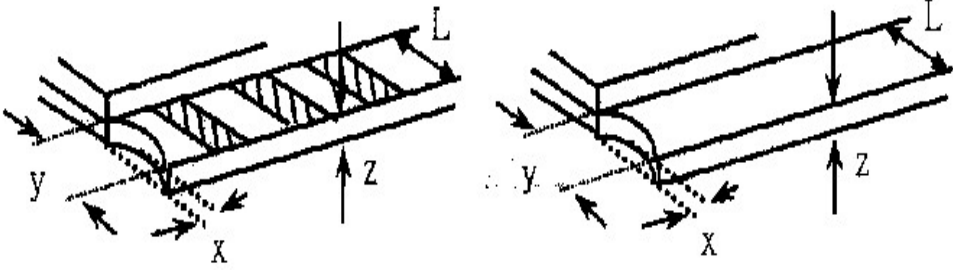
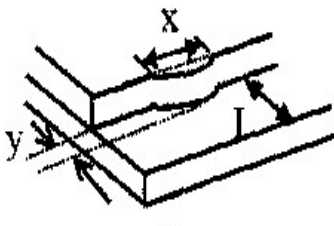
MACHINE SPECIFICATIONS

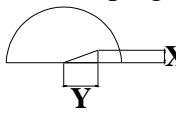
ITEM	SPECIFICATION	CONDITION
OPERATING FORCE	LESS THAN 80g	R8.0 HS 40 SILICON RUBBER OR R0.8 POLYACETAL PEN
SURFACE HARDNESS	MORE THAN 2H	PENCIL TEST
LIGHT TRANSMISSION	MORE THAN 80	@550nm HITACHI U3300
DURABILITY FOR PEN SELECTIONS	MORE THAN 1,200,000 TIMES	FORCE:250g SPEED:2cm/sec

13. 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 Mixed product types. 1.8 Contrast defect.	0.65												
02	Black or white spots on LCD (display only)	2.1 White and black spots on display 0.25mm, no more than three white or black spots present. 2.2 Densely spaced: No more than two spots or lines within 3mm	2.5												
03	LCD black spots, white spots, contamination (non-display)	3.1 Round type : As following drawing  <table border="1" data-bbox="842 898 1348 1115"> <tr><td></td><td></td></tr> <tr><td></td><td></td></tr> <tr><td></td><td></td></tr> <tr><td></td><td></td></tr> <tr><td></td><td></td></tr> </table>											2.5		
3.2 Line type : (As following drawing)  <table border="1" data-bbox="671 1178 1348 1391"> <thead> <tr> <th>Length</th> <th>Width</th> <th>Acceptable Q TY</th> </tr> </thead> <tbody> <tr> <td>---</td> <td>W</td> <td>Accept no dense</td> </tr> <tr> <td>L</td> <td>0.02 W</td> <td rowspan="2">2</td> </tr> <tr> <td>L</td> <td>0.03 W</td> </tr> <tr> <td>---</td> <td>0.05 W</td> <td>As round type</td> </tr> </tbody> </table>	Length	Width	Acceptable Q TY	---	W	Accept no dense	L	0.02 W	2	L	0.03 W	---	0.05 W	As round type	2.5
Length	Width	Acceptable Q TY													
---	W	Accept no dense													
L	0.02 W	2													
L	0.03 W														
---	0.05 W	As round type													
04	Polarizer bubbles	If bubbles are visible, judge using black spot specifications, not easy to find, must check in specify direction. <table border="1" data-bbox="810 1447 1348 1809"> <thead> <tr> <th>Size</th> <th>Acceptable Q TY</th> </tr> </thead> <tbody> <tr> <td></td> <td>Accept no dense</td> </tr> <tr> <td></td> <td>3</td> </tr> <tr> <td></td> <td>2</td> </tr> <tr> <td></td> <td>0</td> </tr> <tr> <td>Total Q TY</td> <td>3</td> </tr> </tbody> </table>	Size	Acceptable Q TY		Accept no dense		3		2		0	Total Q TY	3	2.5
Size	Acceptable Q TY														
	Accept no dense														
	3														
	2														
	0														
Total Q TY	3														

NO	Item	Criterion	AQL																		
05	Scratches	Follow NO.3 LCD black spots, white spots, contamination																			
06	Chipped glass	<p>Symbols Define:</p> <p>x: Chip length y: Chip width z: Chip thickness</p> <p>k: Seal width t: Glass thickness a: LCD side length</p> <p>L: Electrode pad length:</p> <p>6.1 General glass chip :</p> <p>6.1.1 Chip on panel surface and crack between panels:</p>  <table border="1" data-bbox="427 1077 1342 1272"> <tr><td></td><td></td><td></td></tr> <tr><td></td><td></td><td></td></tr> <tr><td></td><td></td><td></td></tr> </table>  <table border="1" data-bbox="427 1753 1342 1948"> <tr><td></td><td></td><td></td></tr> <tr><td></td><td></td><td></td></tr> <tr><td></td><td></td><td></td></tr> </table>																			2.5

NO	Item	Criterion	AQL						
06	Glass crack	<p>x: Chip length y: Chip width z: Chip thickness k: Seal width t: Glass thickness a: LCD side length L: Electrode pad length</p> <p>6.2 Protrusion over terminal : 6.2.1 Chip on electrode pad :</p>  <table border="1" data-bbox="368 712 1331 801"> <tr> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> </tr> </table>							2.5
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NO	Item	Criterion	AQL
07	Cracked glass		2.5
08	Backlight elements		0.65 2.5 0.65
09	Bezel		2.5 0.65
10	PCB COB	<p>The height of the COB should not exceed the height indicated in the assembly diagram.</p> <p>10.4 There may not be more than 2mm of sealant outside the seal area on the PCB. And there should be no more than three places.</p> <p>10.5 No oxidation or contamination PCB terminals.</p> <p>10.6 Parts on PCB must be the same as on the production characteristic chart. There should be no wrong parts, missing parts or excess parts.</p> <p>10.7 The jumper on the PCB should conform to the product characteristic chart.</p> <p>10.8 If solder gets on bezel tab pads, LED pad, zebra pad or screw hold pad, make sure it is smoothed down.</p> <p>The Scraping testing standard for Copper Coating of PCB</p>  <p>$X * Y \leq 2\text{mm}^2$</p>	2.5 2.5 0.65 2.5 0.65 0.65 2.5 2.5
11	Soldering		2.5 2.5 2.5 0.65

NO	Item	Criterion	AQL
12	General appearance		2.5
			0.65
			2.5
			2.5
			2.5
			2.5
			2.5
			0.65
			0.65
			0.65

14. Material List of Components for RoHs

1. WINSTAR Display Co., Ltd hereby declares that all of or part of products (with the mark “#”in code), including, but not limited to, the LCM, accessories or packages, manufactured and/or delivered to your company (including your subsidiaries and affiliated company) directly or indirectly by our company (including our subsidiaries or affiliated companies) do not intentionally contain any of the substances listed in all applicable EU directives and regulations, including the following substances.

Exhibit A : The Harmful Material List

Material	(Cd)	(Pb)	(Hg)	(Cr6+)	PBBs	PBDEs
Limited Value	100 ppm	1000 ppm	1000 ppm	1000 ppm	1000 ppm	1000 ppm
Above limited value is set up according to RoHS.						

2.Process for RoHS requirement :

- (1) Use the Sn/Ag/Cu soldering surface the surface of Pb-free solder is rougher than we used before.
- (2) Heat-resistance temp. :
Reflow : 250°C ,30 seconds Max.
Connector soldering wave or hand soldering : 320°C , 10 seconds max.
- (3) Temp. curve of reflow, max. Temp. : 235±5°C
Recommended customer’s soldering temp. of connector : 280°C , 3 seconds.



Module Number : _____

Page: 1

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 Specification :

- 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

Module Number : _____

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 : ____ / ____ / ____