RAYSTAR
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RDN0007-PAN-#00

SPECIFICATION

CUSTOMER:

APPROVED BY	
PCB VERSION	
DATE	

FOR CUSTOMER USE ONLY

SALES BY	APPROVED BY	CHECKED BY	PREPARED BY

ISSUED DATE:

Contents

1. Revision History

DATE	VERSION	REVISED PAGE NO.	Note
2009/6/29	1		First issue

2. General Specification

The Features is described as follow:

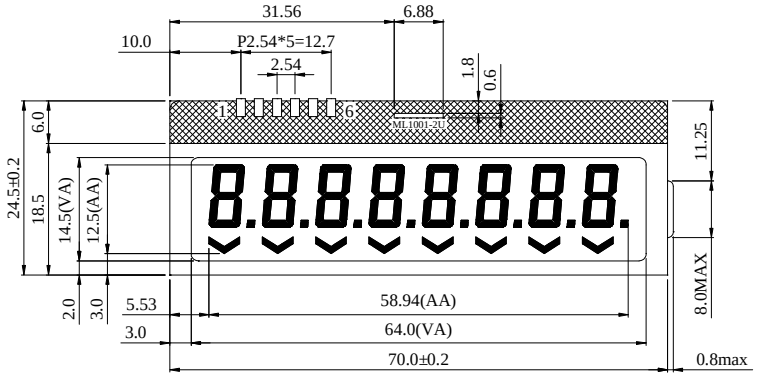
- Module dimension: 70.0 x 24.5 x 2.85 (max.) mm^3
- View area:64.0 x 14.5mm^2
- Active area: 58.94 x 12.5mm^2
- LCD type: TN Positive, Gray Reflective
- Duty: 1/1 DUTY,1/1BIAS
- View direction: 6 o'clock
- Backlight Type: Without backlight

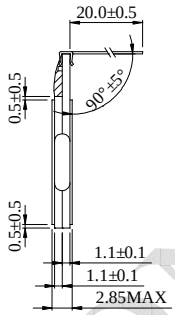
3. Module Coding System

R	D	N	0007		P	A	N		#00
1	2	3	4	-	5	6	7	-	8

Item	Description		
1	**R：Raystar Optronics Inc.**		
2	Display	**D：Custom Design.**	
		G：Graphic Type	
3	**N：Segment Type**		
4	Model serials no.0000 - ZZZZ.		
5	LCD	**P：TN Positive, Gray**	
		N：TN Negative,	
		G：STN Positive, Gray	
		Y：STN Positive, Yellow Green	
		B：STN Negative, Blue	
		F：FSTN Positive	
		T：FSTN Negative	
6	Polarizer Type, Temperature range, View direction	**A：Reflective, N.T, 6:00**	K：Transflective, W.T,12:00
		D：Reflective, N.T, 12:00	1：Transflective, U.T,6:00
		G：Reflective, W. T, 6:00	4：Transflective, U.T.12:00
		J：Reflective, W. T, 12:00	C：Transmissive, N.T,6:00
		0：Reflective, U. T, 6:00	F：Transmissive, N.T,12:00
		3：Reflective, U. T, 12:00	I：Transmissive, W. T, 6:00
		B：Transflective, N.T,6:00	L：Transmissive, W.T,12:00
		E：Transflective, N.T.12:00	2：Transmissive, U. T, 6:00
		H：Transflective, W.T,6:00	5：Transmissive, U.T,12:00
7	Backlight	**N：Without backlight**	Y：LED, Yellow Green
		P：EL, Blue green	A：LED, Amber
		T：EL, Green	W：LED, White
		D：EL, White	B：LED, Blue
		F：CCFL, White	G：LED, Green
8	Special code	#: Fit in with the ROHS directives and regulations 0:Sales Code 0:Version	

4. Outline Dimension & Block Diagram

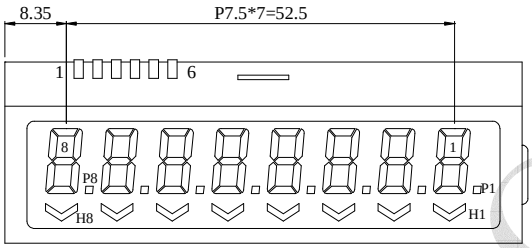


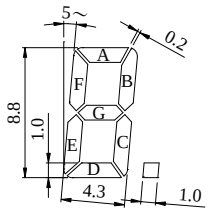


NO	SYMBOL
1	VDD
2	GND
3	LOAD
4	DIN
5	DCLK
6	CHK

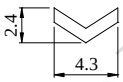
The non-specified tolerance of dimension is ±0.2mm .

PIN	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	S13	S14	S15	S16	S17	S18	S19	S20
COM1	8D	8E	8G	8F	8A	8B	8C	H8	P8	7D	7E	7G	7F	7A	7B	7C	H7	P7	6D	6E
PIN	S21	S22	S23	S24	S25	S26	S27	S28	S29	S30	S31	S32	S33	S34	S35	S36	S37	S38	S39	S40
COM1	6G	6F	6A	6B	6C	H6	P6	5D	5E	5G	5F	5A	5B	5C	H5	P5	4D	4E	4G	4F
PIN	S41	S42	S43	S44	S45	S46	S47	S48	S49	S50	S51	S52	S53	S54	S55	S56	S57	S58	S59	S60
COM1	4A	4B	4C	H4	P4	3D	3E	3G	3F	3A	3B	3C	H3	P3	2D	2E	2G	2F	2A	2B
PIN	S61	S62	S63	S64	S65	S66	S67	S68	S69	S70	S71	S72	S73	S74	S75	S76	S77	S78	S79	S80
COM1	2C	H2	P2	1D	1E	1G	1F	1A	1B	1C	H1	P1								





SCALE 3/1



SCALE 3/1

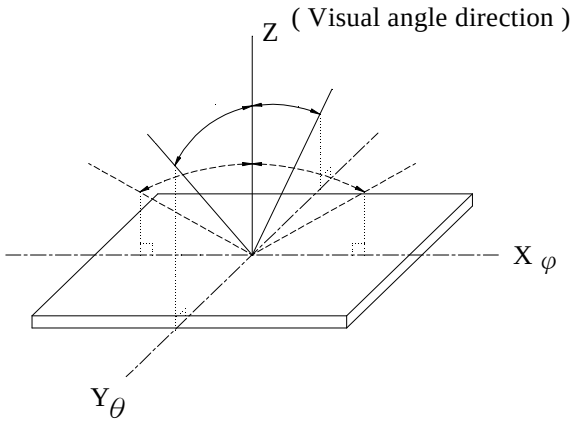
The non-specified tolerance of dimension is ±0.2mm .

5. Optical Characteristics

Item	Symbol	Condition	Min	Typ	Max	Unit
View Angle	(V) θ	CR≧2	10	—	20	deg
	(H) φ	CR≧2	-15	—	15	deg
Contrast Ratio	CR	—	—	2	—	—

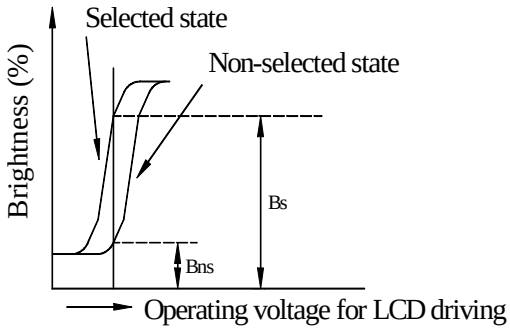
5.1 Definitions

■View Angles

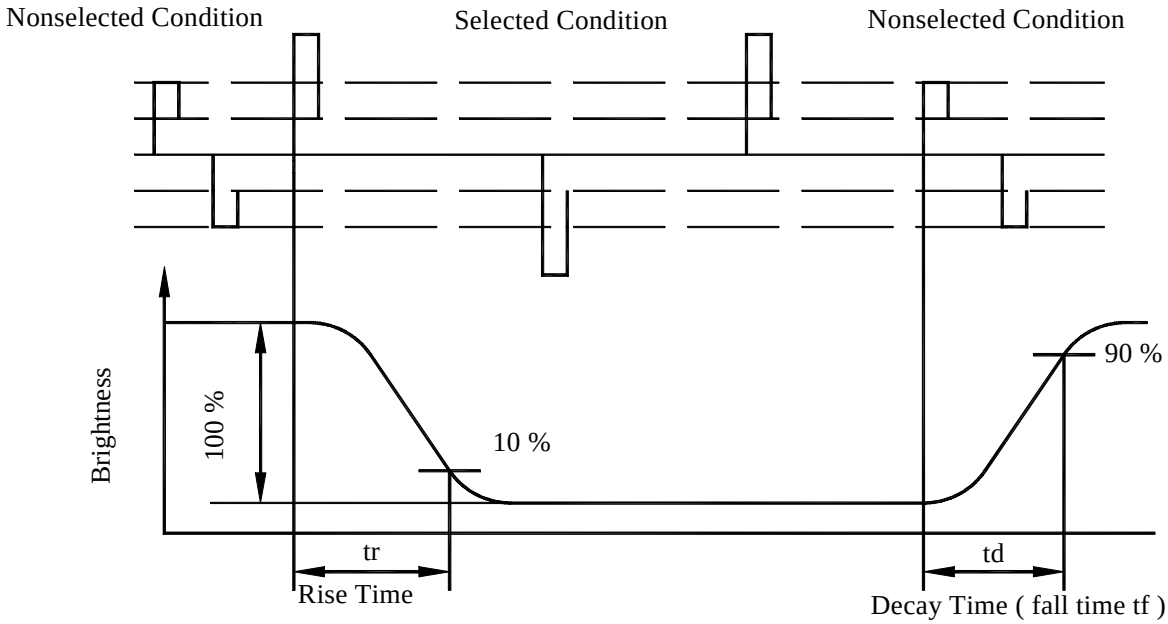


■Contrast Ratio

$$CR = \frac{\text{Brightness at selected state (BS)}}{\text{Brightness at non-selected state (Bns)}}$$



■ Response Time



6. Absolute Maximum Ratings

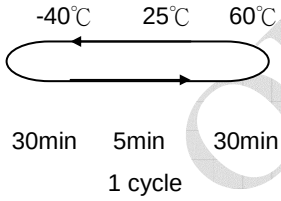
Item	Symbol	Min	Typ	Max	Unit
Operating Temperature	T_{OP}	-40	—	+60	℃
Storage Temperature	T_{ST}	-50	—	+70	℃

7. Electrical Characteristics

Item	Symbol	Condition	Min	Typ	Max	Unit
Supply Voltage For LCD	V_{DD}-V_{ss}	Ta=-40℃	—	—	—	V
		Ta=25℃	2.0	3.0	6.0	V
		Ta=+60℃	—	—	—	V

8. Reliability

Content of Reliability Test (Normal temperature, -40℃~60℃)

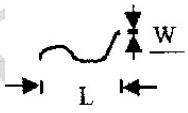
Environmental Test			
Test Item	**Content of Test**	**Condition**	**Note**
High Temperature storage	Endurance test applying the high storage temperature for a long time.	70℃ 200hrs	2
Low Temperature storage	Endurance test applying the high storage temperature for a long time.	-50℃ 200hrs	1,2
High Temperature Operation	Endurance test applying the electric stress (Voltage & Current) and the thermal stress to the element for a long time.	60℃ 200hrs	-
Low Temperature Operation	Endurance test applying the electric stress under low temperature for a long time.	-40℃ 200hrs	1
High Temperature/ Humidity Operation	The module should be allowed to stand at 40℃,90%RH max For 96hrs under no-load condition excluding the polarizer, Then taking it out and drying it at normal temperature.	40℃,90%RH 96hrs	1,2
Thermal shock resistance	The sample should be allowed stand the following 10 cycles of operation  1 cycle	-40℃/60℃ 10 cycles	-
Vibration test	Endurance test applying the vibration during transportation and using.	fixed amplitude: 15mm 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=1.5kΩ 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.

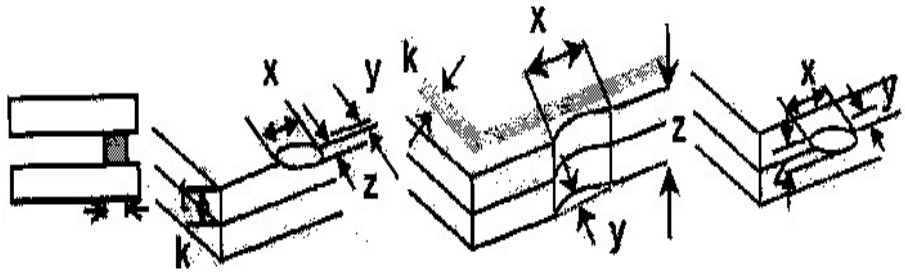
Note3: Vibration test will be conducted to the product itself without putting it in a container.

9. Inspection specification

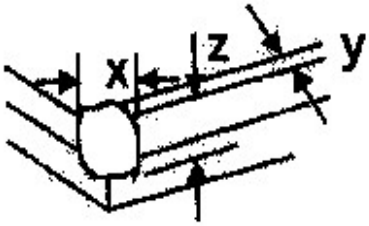
<table>
<tr><th>NO</th><th>Item</th><th>Criterion</th><th>AQL</th></tr>
<tr><td>01</td><td>Electrical Testing</td><td>1.1 Missing vertical, horizontal segment, segment contrast defect.
1.2 Missing character, dot or icon.
1.3 Display malfunction.
1.4 No function or no display.
1.5 Current consumption exceeds product specifications.
1.6 LCD viewing angle defect.
1.7 Mixed product types.
1.8 Contrast defect.</td><td>0.65</td></tr>
<tr><td>02</td><td>Black or white spots on LCD (display only)</td><td>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</td><td>2.5</td></tr>
<tr><td rowspan="2">03</td><td rowspan="2">LCD black spots, white spots, contamination (non-display)</td><td>3.1 Round type : As following drawing
Φ=(x + y) / 2</td><td>2.5</td></tr>
<tr><td>3.2 Line type : (As following drawing)
 

<table>
<tr><th>Length</th><th>Width</th><th>Acceptable Q TY</th></tr>
<tr><td>---</td><td>W 0.02</td><td>Accept no dense</td></tr>
<tr><td>L 3.0</td><td>0.02 W 0.03</td><td rowspan="2">2</td></tr>
<tr><td>L 2.5</td><td>0.03 W 0.05</td></tr>
<tr><td>---</td><td>0.05 W</td><td>As round type</td></tr>
</table></td><td>2.5</td></tr>
<tr><td>04</td><td>Polarizer bubbles</td><td>If bubbles are visible, judge using black spot specifications, not easy to find, must check in specify direction.
<table>
<tr><th colspan="2">Size Φ</th><th>Acceptable Q TY</th></tr>
<tr><td colspan="2">Φ 0.20</td><td>Accept no dense</td></tr>
<tr><td>0.20 Φ 0.50</td><td></td><td>3</td></tr>
<tr><td>0.50 Φ 1.00</td><td></td><td>2</td></tr>
<tr><td>1.00 Φ</td><td></td><td>0</td></tr>
<tr><td colspan="2">Total Q TY</td><td>3</td></tr>
</table></td><td>2.5</td></tr>
</table>

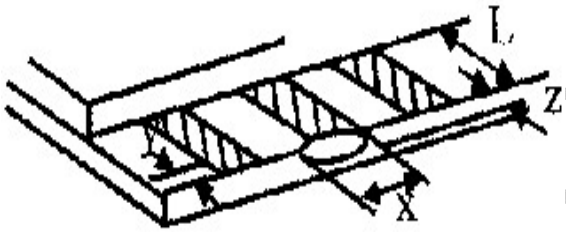
<table>
<tr><th>NO</th><th>Item</th><th>Criterion</th><th>AQL</th></tr>
<tr><td>05</td><td>Scratches</td><td>Follow NO.3 LCD black spots, white spots, contamination</td><td></td></tr>
<tr><td>06</td><td>Chipped glass</td><td>
Symbols Define:
x: Chip length y: Chip width z: Chip thickness
k: Seal width t: Glass thickness a: LCD side length
L: Electrode pad length:

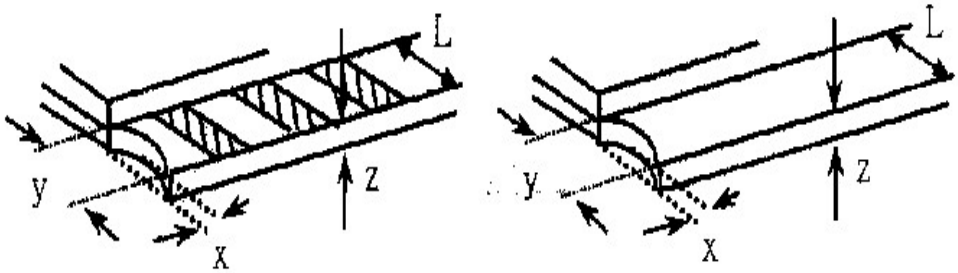
6.1 General glass chip :
6.1.1 Chip on panel surface and crack between panels:


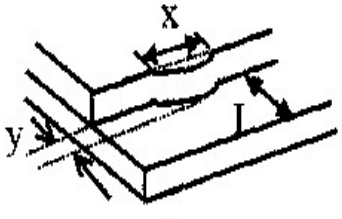
<table>
<tr><th>z: Chip thickness</th><th>y: Chip width</th><th>x: Chip length</th></tr>
<tr><td>Z 1/2t</td><td>Not over viewing area</td><td>x 1/8a</td></tr>
<tr><td>1/2t z 2t</td><td>Not exceed 1/3k</td><td>x 1/8a</td></tr>
</table>
If there are 2 or more chips, x is total length of each chip.

6.1.2 Corner crack:


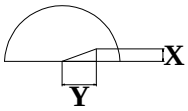
<table>
<tr><th>z: Chip thickness</th><th>y: Chip width</th><th>x: Chip length</th></tr>
<tr><td>Z 1/2t</td><td>Not over viewing area</td><td>x 1/8a</td></tr>
<tr><td>1/2t z 2t</td><td>Not exceed 1/3k</td><td>x 1/8a</td></tr>
</table>
If there are 2 or more chips, x is the total length of each chip.
</td><td>2.5</td></tr>
</table>

<table>
<tr><th>NO</th><th>Item</th><th>Criterion</th><th>AQL</th></tr>
<tr><td>06</td><td>Glass crack</td><td>
Symbols :
x: Chip length y: Chip width z: Chip thickness
k: Seal width t: Glass thickness a: LCD side length
L: Electrode pad length
6.2 Protrusion over terminal :
6.2.1 Chip on electrode pad :


<table>
<tr><th>y: Chip width</th><th>x: Chip length</th><th>z: Chip thickness</th></tr>
<tr><td>y 0.5mm</td><td>x 1/8a</td><td>0 z t</td></tr>
</table>
6.2.2 Non-conductive portion:


<table>
<tr><th>y: Chip width</th><th>x: Chip length</th><th>z: Chip thickness</th></tr>
<tr><td>y L</td><td>x 1/8a</td><td>0 z t</td></tr>
</table>
If the chipped area touches the ITO terminal, over 2/3 of the ITO must remain and be inspected according to electrode terminal specifications.
If the product will be heat sealed by the customer, the alignment mark not be damaged.
6.2.3 Substrate protuberance and internal crack.


<table>
<tr><th>y: width</th><th>x: length</th></tr>
<tr><td>y 1/3L</td><td>x a</td></tr>
</table>
</td><td>2.5</td></tr>
</table>

NO	Item	Criterion	AQL
07	Cracked glass	The LCD with extensive crack is not acceptable.	2.5
08	Backlight elements	8.1 Illumination source flickers when lit. 8.2 Spots or scratched that appear when lit must be judged. Using LCD spot, lines and contamination standards. 8.3 Backlight doesn't light or color wrong.	0.65 2.5 0.65
09	Bezel	9.1 Bezel may not have rust, be deformed or have fingerprints, stains or other contamination. 9.2 Bezel must comply with job specifications.	2.5 0.65
10	PCB COB	10.1 COB seal may not have pinholes larger than 0.2mm or contamination. 10.2 COB seal surface may not have pinholes through to the IC. 10.3 The height of the COB should not exceed the height indicated in the assembly diagram. 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. 10.5 No oxidation or contamination PCB terminals. 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. 10.7 The jumper on the PCB should conform to the product characteristic chart. 10.8 If solder gets on bezel tab pads, LED pad, zebra pad or screw hold pad, make sure it is smoothed down. 10.9 The Scraping testing standard for Copper Coating of PCB  **X * Y<=2mm^2**	2.5 2.5 0.65 2.5 2.5 0.65 0.65 2.5 2.5
11	Soldering	11.1 No un-melted solder paste may be present on the PCB. 11.2 No cold solder joints, missing solder connections, oxidation or icicle. 11.3 No residue or solder balls on PCB. 11.4 No short circuits in components on PCB.	2.5 2.5 2.5 0.65

NO	Item	Criterion	AQL
12	General appearance	12.1 No oxidation, contamination, curves or, bends on interface Pin (OLB) of TCP. 12.2 No cracks on interface pin (OLB) of TCP. 12.3 No contamination, solder residue or solder balls on product. 12.4 The IC on the TCP may not be damaged, circuits. 12.5 The uppermost edge of the protective strip on the interface pin must be present or look as if it causes the interface pin to sever. 12.6 The residual rosin or tin oil of soldering (component or chip component) is not burned into brown or black color. 12.7 Sealant on top of the ITO circuit has not hardened. 12.8 Pin type must match type in specification sheet. 12.9 LCD pin loose or missing pins. 12.10 Product packaging must the same as specified on packaging specification sheet. 12.11 Product dimension and structure must conform to product specification sheet.	2.5 0.65 2.5 2.5 2.5 2.5 2.5 0.65 0.65 0.65 0.65

10. Precautions in use of LCD Modules

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.

11. Material List of Components for RoHs

1. RAYSTAR Optronics Co., Ltd. hereby declares that all of or part of products, 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℃, 30 seconds Max.
   Connector soldering wave or hand soldering：320℃, 10 seconds max.
   (3) Temp. curve of reflow, max. Temp.：235±5℃
   Recommended customer's soldering temp. of connector：280℃, 3 seconds.

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 Specification：		
1. PCB Size：	□ Pass	□ NG ,_____
2.Frame Size：	□ Pass	□ NG ,_____
3.Materal 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：_____

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**： / /