



RAYSTAR

RAYSTAR Optronics, Inc.  
曜凌光電股份有限公司



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Raystar Optronics, Inc.

42881台中市大雅區科雅路25號5樓  
5F, No. 25, Keya Road, Daya Dist., Taichung City 42881, Taiwan  
T : +886-4-2565-0761 | F : +886-4-2565-0760  
sales@raystar-optronics.com | www.raystar-optronics.com

RX12864H-FHW

SPECIFICATION

CUSTOMER:

APPROVED BY	
PCB VERSION	
DATE	

FOR CUSTOMER USE ONLY

SALES BY	APPROVED BY	CHECKED BY	PREPARED BY

Release DATE:

## Revision History

VERSION	DATE	REVISED PAGE NO.	Note
0	2011/10/26		First issue
A	2012/11/29		Modify Backlight Information
B	2014/09/11		Remove IC information
C	2016/02/25		Modify Precautions in use of LCD Modules & Static electricity test
D	2016/11/28		Add FPC bending rule
E	2019/09/29		Modify Material List of Components for RoHs
F	2019/12/20		Modify Precautions in use of LCD Modules
G	2020/06/18		Modify Contour Drawing.
H	2022/08/01		Modify IC
I	2022/10/18		Add Interface Modify Contour Drawing

# Contents

- 1.General Specification
- 2.Module Classification Information
- 3.Interface Pin Function
- 4.Contour Drawing &Block Diagram
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- 9.Reliability
- 10.Inspection specification
- 11.Precautions in use of LCD Modules
- 12.Material List of Components for RoHs
- 13.Recommendable Storage

## 1.General Specification

The Features is described as follow:

- Module dimension: 80.0 x 54.0 x 9.5 mm
- View area: 70.7 x 38.8 mm
- Active area: 66.52 x 33.24 mm
- Number of dots: 128 x 64
- Dot size: 0.48 x 0.48 mm
- Dot pitch: 0.52 x 0.52 mm
- LCD type: FSTN Positive, Transflective
- Duty: 1/65 , 1/9 Bias
- View direction: 6 o'clock
- Backlight Type: LED, White
- IC: ST7567
- Interface: 6800/8080/4-Line SPI

## 2.Module Classification Information

<u>R</u>	<u>X</u>	<u>12864</u>	<u>H</u>	—	<u>E</u>	<u>H</u>	<u>W</u>
①	②	③	④	—	⑤	⑥	⑦

Item	Description			
1	R : Raystar Optonics Inc.			
2	Display	C : Character Type,	T:TAB Type	
		G : Graphic Type	X:COG Type	
3	Display Font : 128 * 64 dot			
4	Serials code :			
5	LCD	P→TN Positive, Gray	V→FSTN Negative, Blue	
		N→TN Negative,	T→FSTN Negative, Black	
		L→VA Negative	D→FSTN Negative (Double film)	
		H→ HTN Positive, Gray	F→FSTN Positive	
		I→HTN Negative, Black	K→FSC Negative	
		U→HTN Negative, Blue	S→FSC Positive	
		B→STN Negative, Blue	E→ISTN Negative, Black	
		G→STN Positive, Gray	C→CSTN Negative, Black	
		Y→STN Positive, Yellow Green	A→ASTN Negative, Black	
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	W→LED, White	G→LED, Green
		P→EL, Blue	A→LED, Amber	S→LED, Full color
		T→EL, Green	R→LED, Red	J→DIP LED, Blue
		D→EL, White	O→LED, Orange	K→DIP LED, White
		M→EL, Yellow Green	B→LED, Blue	E→DIP LED, Yellow
		F→CCFL, White	X→LED, Dual color	L→DIP LED, Amber
		Y→LED, Yellow Green	C→LED, Full color	I→DIP LED, Red

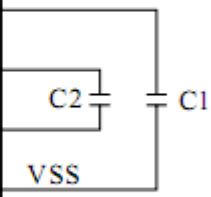
### 3.Interface Pin Function

Pin No.	Symbol	Level	Description												
1	PSB	I	PSB selects the interface type: Serial or Parallel.												
2	C86	I	C86 selects the microprocessor type in parallel interface mode.												
			<table><tr><td>PSB</td><td>C86</td><td>Selected Interface</td></tr><tr><td>“H”</td><td>“H”</td><td>Parallel 6800 Series MPU Interface</td></tr><tr><td>“H”</td><td>“L ”</td><td>Parallel 8080 Series MPU Interface</td></tr><tr><td>“L”</td><td>“X”</td><td>Serial 4-Line SPI Interface</td></tr></table>	PSB	C86	Selected Interface	“H”	“H”	Parallel 6800 Series MPU Interface	“H”	“L ”	Parallel 8080 Series MPU Interface	“L”	“X”	Serial 4-Line SPI Interface
			PSB	C86	Selected Interface										
			“H”	“H”	Parallel 6800 Series MPU Interface										
			“H”	“L ”	Parallel 8080 Series MPU Interface										
“L”	“X”	Serial 4-Line SPI Interface													
Please refer to “APPLICATION NOTES” and “Microprocessor Interface” (Section 6) for detailed connection of the selected interface.															
3	VG	Power	VG is the LCD driving voltage for segment circuits.												
4	XV0	Power	XV0 is the LCD driving voltage for common circuits at positive frame.												
5	V0	Power	V0 is the LCD driving voltage for common circuits at negative frame.												
6	VSS		This is a 0V terminal connected to the system GND.												
7	VDD		Shared with the MPU power supply terminal VDD. ( 3.3 V )												
8	D7		<b>When using 8-bit parallel interface: (6800 or 8080 mode)</b> 8-bit bi-directional data bus. Connect to the data bus of 8-bit microprocessor. When CSB is non-active (CSB=“H”), D[7:0] pins are high impedance. <b>When using serial interface: 4-LINE</b> D7=SDA : Serial data input.												
9	D6														
10	D5														
11	D4														
12	D3														
13	D2														
14	D1														

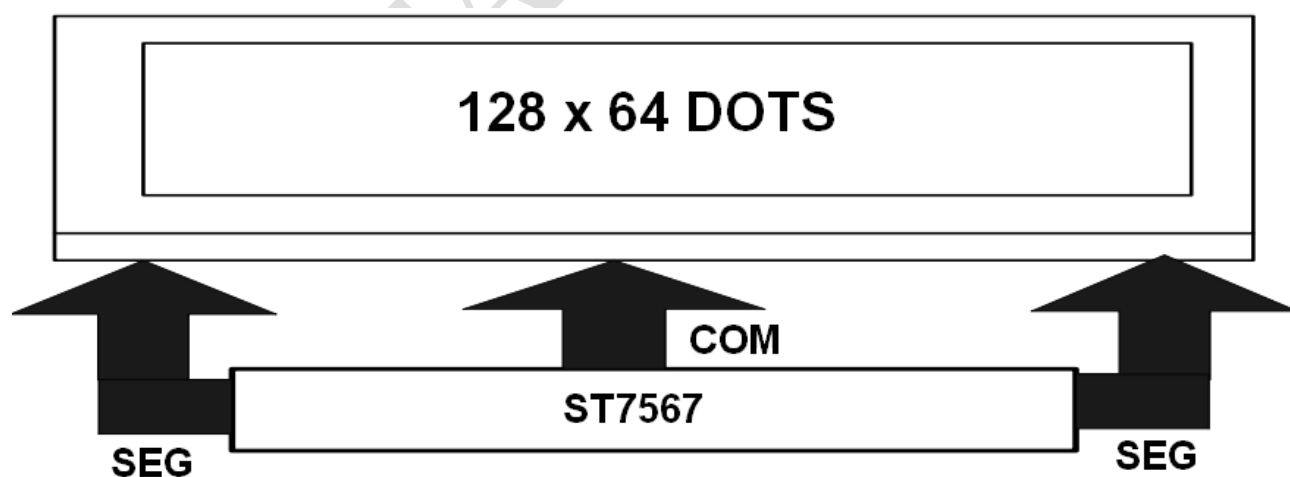
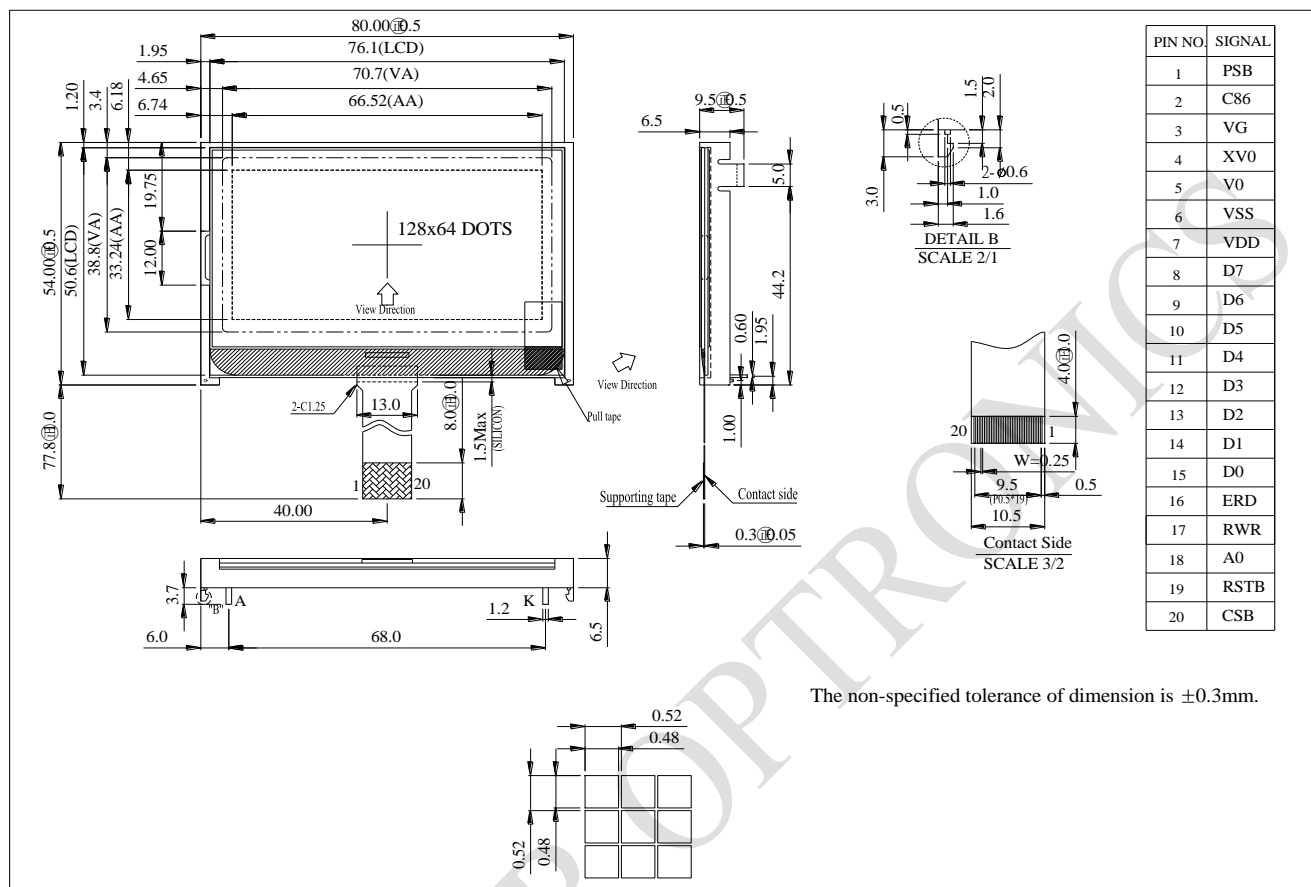
15	D0		<p>D6=SCL : Serial clock input.</p> <p>D[5:0] are not used and should connect to “H” by VDD1 or VDDH.</p> <p>When CSB is non-active (CSB=“H”), D[7:0] pins are high impedance.</p>												
16	ERD	I	<p>Read/Write execution control pin. When PSB is “H”,</p> <table border="1"> <thead> <tr> <th>C86</th><th>MPU Type</th><th>ERD</th><th>Description</th></tr> </thead> <tbody> <tr> <td>H</td><td>6800 series</td><td>E</td><td>Read/Write control input pin. R/W=“H”: When E is “H”, D[7:0] are in output mode. R/W=“L”: Signals on D[7:0] are latched at the falling edge of E signal.</td></tr> <tr> <td>L</td><td>8080 series</td><td>/RD</td><td>Read enable input pin. When /RD is “L”, D[7:0] are in output mode.</td></tr> </tbody> </table> <p>ERD is not used in serial interface and should fix to “H” by VDD1 or VDDH.</p>	C86	MPU Type	ERD	Description	H	6800 series	E	Read/Write control input pin. R/W=“H”: When E is “H”, D[7:0] are in output mode. R/W=“L”: Signals on D[7:0] are latched at the falling edge of E signal.	L	8080 series	/RD	Read enable input pin. When /RD is “L”, D[7:0] are in output mode.
C86	MPU Type	ERD	Description												
H	6800 series	E	Read/Write control input pin. R/W=“H”: When E is “H”, D[7:0] are in output mode. R/W=“L”: Signals on D[7:0] are latched at the falling edge of E signal.												
L	8080 series	/RD	Read enable input pin. When /RD is “L”, D[7:0] are in output mode.												
17	RWR	I	<p>Read/Write execution control pin. When PSB is “H”,</p> <table border="1"> <thead> <tr> <th>C86</th><th>MPU Type</th><th>RWR</th><th>Description</th></tr> </thead> <tbody> <tr> <td>H</td><td>6800 series</td><td>R/W</td><td>Read/Write control input pin. R/W=“H”: read. R/W=“L”: write.</td></tr> <tr> <td>L</td><td>8080 series</td><td>/WR</td><td>Write enable input pin. Signals on D[7:0] will be latched at the rising edge of /WR signal.</td></tr> </tbody> </table> <p>RWR is not used in serial interface and should fix to “H” by VDD1 or VDDH.</p>	C86	MPU Type	RWR	Description	H	6800 series	R/W	Read/Write control input pin. R/W=“H”: read. R/W=“L”: write.	L	8080 series	/WR	Write enable input pin. Signals on D[7:0] will be latched at the rising edge of /WR signal.
C86	MPU Type	RWR	Description												
H	6800 series	R/W	Read/Write control input pin. R/W=“H”: read. R/W=“L”: write.												
L	8080 series	/WR	Write enable input pin. Signals on D[7:0] will be latched at the rising edge of /WR signal.												
18	A0	I	<p>It determines whether the access is related to data or command.</p> <p>A0=“H” : Indicates that signals on D[7:0] are display data.</p> <p>A0=“L” : Indicates that signals on D[7:0] are command.</p>												
19	RSTB	I	<p>Hardware reset input pin. When RSTB is “L”, internal initialization is executed and the internal registers will be initialized.</p>												
20	CSB	I	<p>Chip select input pin. Interface access is enabled when CSB is “L”.When CSB is non-active (CSB=“H”), D[7:0] pins are high impedance.</p>												



**C1=C2=1UF/0805**

PIN NO.	SIGNAL	
1	PSB	P3.6
2	C86	P3.6
3	VG	
4	XV0	
5	V0	
6	VSS	
7	VDD	VDD
8	D7	P1.7
9	D6	P1.6
10	D5	P1.5
11	D4	P1.4
12	D3	P1.3
13	D2	P1.2
14	D1	P1.1
15	D0	P1.0
16	ERD	P3.4
17	RWR	P3.7
18	A0	P3.0
19	RSTB	P3.2
20	CSB	P3.3

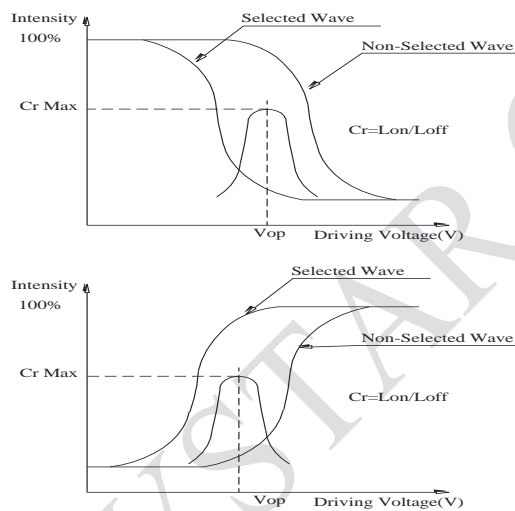
## 4. Contour Drawing & Block Diagram



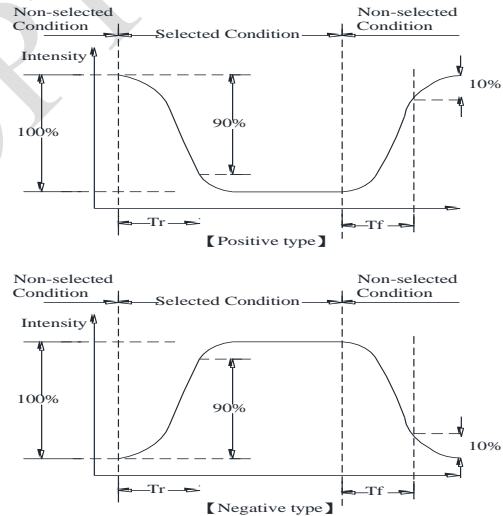
## 5.Optical Characteristics

Item	Symbol	Condition	Min	Typ	Max	Unit
View Angle	$\theta$	CR $\square$ 2	0	—	30	$\psi = 180^\circ$
	$\theta$	CR $\square$ 2	0	—	60	$\psi = 0^\circ$
	$\theta$	CR $\square$ 2	0	—	45	$\psi = 90^\circ$
	$\theta$	CR $\square$ 2	0	—	45	$\psi = 270^\circ$
Contrast Ratio	CR	—	—	5	—	—
Response Time	T rise	—	—	200	300	ms
	T fall	—	—	250	350	ms

### Definition of Operation Voltage (Vop)



### Definition of Response Time (Tr, Tf)



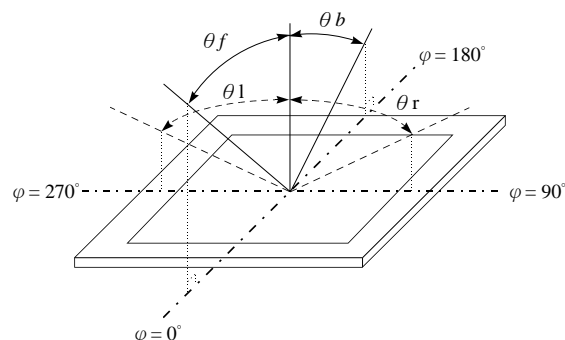
### Conditions :

Operating Voltage : Vop

Viewing Angle( $\theta$  ,  $\varphi$ ) :  $0^\circ$  ,  $0^\circ$ 

Frame Frequency : 64 HZ Driving Waveform : 1/N duty , 1/a bias

### Definition of viewing angle(CR $\square$ 2)



## 6. Absolute Maximum Ratings

Item	Symbol	Min	Typ	Max	Unit
Operating Temperature	T <sub>OP</sub>	-20	—	+70	□
Storage Temperature	T <sub>ST</sub>	-30	—	+80	□
Input Voltage	V <sub>I</sub>	-0.3	—	V <sub>DD</sub> +0.3	V
Digital Power Supply Voltage	V <sub>DD</sub> -V <sub>SS</sub>	-0.3	—	3.6	V
LCD Power supply voltage	V <sub>0</sub> -XV <sub>0</sub>	-0.3	—	16	V

## 7. Electrical Characteristics

Item	Symbol	Condition	Min	Typ	Max	Unit
Supply Voltage For Logic	$V_{DD}-V_{SS}$	—	3.0	3.3	3.6	V
Supply Voltage For LCM	$XV0-V0$	$T_a=-20^{\circ}\text{C}$	—	—	—	V
		$T_a=25^{\circ}\text{C}$	—	10.0	—	V
		$T_a=70^{\circ}\text{C}$	—	—	—	V
Input High Volt.	$V_{IH}$	—	$0.7V_{DD}$	—	$V_{DD}$	V
Input Low Volt.	$V_{IL}$	—	$V_{SS}$	—	$0.3V_{DD}$	V
Output High Volt.	$V_{OH}$	—	$0.8 V_{DD}$	—	$V_{DD}$	V
Output Low Volt.	$V_{OL}$	—	$V_{SS}$	—	$0.2V_{DD}$	V
Supply Current(No include LED Backlight)	$I_{DD}$	$V_{DD}=3.3V$	—	2.0	—	mA

Please kindly consider to design the Vop to be adjustable while programing the software to match LCD contrast tolerance.

## 8.Backlight Information

### Specification

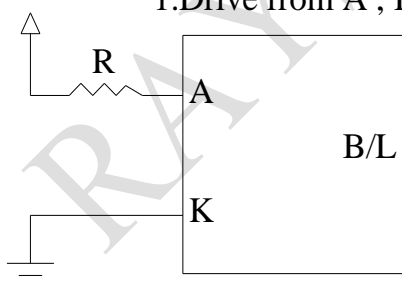
PARAMETER	SYMBOL	MIN	TYP	MAX	UNIT	TEST CONDITION
Supply Current	I <sub>LED</sub>	—	96	120	mA	V=3.5V
Supply Voltage	V	3.3	3.5	3.7	V	—
Reverse Voltage	V <sub>R</sub>	—	—	5	V	—
Luminance (Without LCD)	I <sub>V</sub>	840	1050	—	CD/M <sup>2</sup>	I <sub>LED</sub> =96mA
LED Life Time (For Reference only)	—	—	50K	—	Hr.	I <sub>LED</sub> =96mA 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.

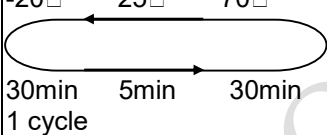
LED B\L Drive Method

1.Drive from A , K



## 9. Reliability

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

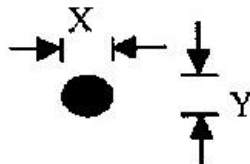
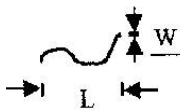
Environmental Test			
Test Item	Content of Test	Test Condition	Note
High Temperature storage	Endurance test applying the high storage temperature for a long time.	80□ 200hrs	2
Low Temperature storage	Endurance test applying the low storage temperature for a long time.	-30□ 200hrs	1,2
High Temperature 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 storage	The module should be allowed to stand at 60□,90%RH max For 96hrs under no-load condition excluding the polarizer, Then taking it out and drying it at normal temperature.	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 terminal.	VS=±600V(contact), ±800v(air), 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.**

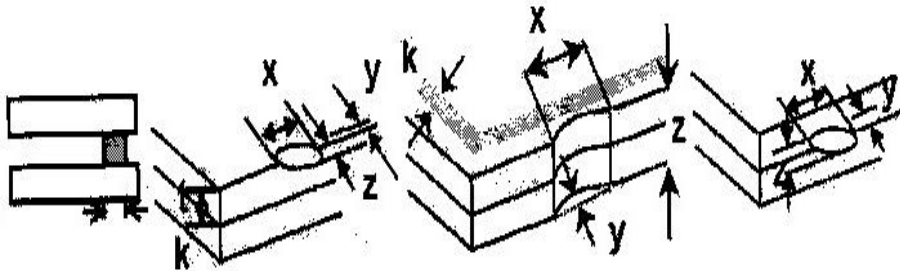
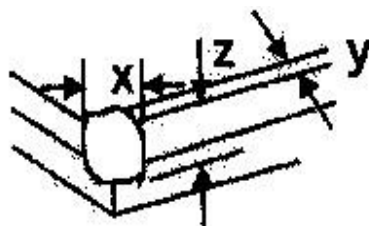
**Note3: The packing have to including into the vibration testing.**

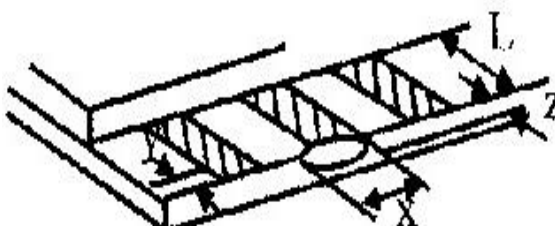
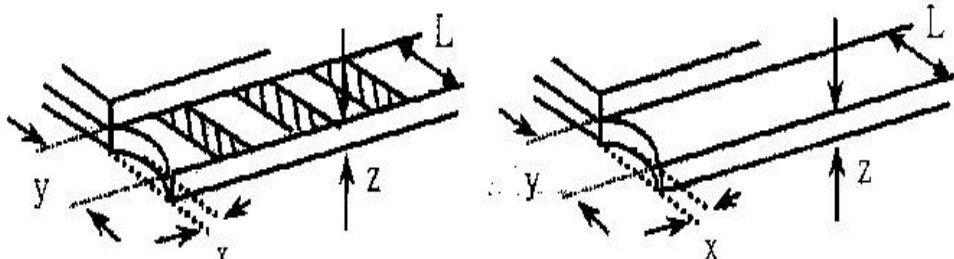
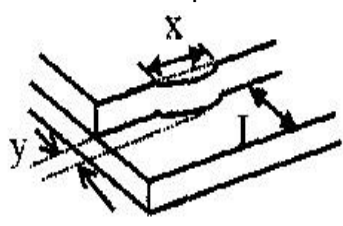
## 10. Inspection specification

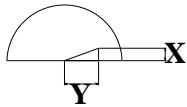
NO	Item	Criterion	AQL																								
01	Electrical Testing	1.1 Missing vertical, horizontal segment, segment contrast defect. 1.2 Missing character , dot or icon. 1.3 Display malfunction. 1.4 No function or no display. 1.5 Current consumption exceeds product specifications. 1.6 LCD viewing angle 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 $\leq 0.25\text{mm}$ , 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)	<div>3.1 Round type : As following drawing <math>\Phi=(x+y)/2</math><table><tr><th>SIZE</th><th>Acceptable Q TY</th></tr><tr><td><math>\Phi\leq 0.10</math></td><td>Accept no dense</td></tr><tr><td><math>0.10&lt;\Phi\leq 0.20</math></td><td>2</td></tr><tr><td><math>0.20&lt;\Phi\leq 0.25</math></td><td>1</td></tr><tr><td><math>0.25&lt;\Phi</math></td><td>0</td></tr></table></div> <div>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><math>W\leq 0.02</math></td><td>Accept no dense</td></tr><tr><td><math>L\leq 3.0</math></td><td><math>0.02&lt;W\leq 0.03</math></td><td rowspan="2">2</td></tr><tr><td><math>L\leq 2.5</math></td><td><math>0.03&lt;W\leq 0.05</math></td></tr><tr><td>---</td><td><math>0.05&lt;W</math></td><td>As round type</td></tr></table></div>	SIZE	Acceptable Q TY	$\Phi\leq 0.10$	Accept no dense	$0.10<\Phi\leq 0.20$	2	$0.20<\Phi\leq 0.25$	1	$0.25<\Phi$	0	Length	Width	Acceptable Q TY	---	$W\leq 0.02$	Accept no dense	$L\leq 3.0$	$0.02<W\leq 0.03$	2	$L\leq 2.5$	$0.03<W\leq 0.05$	---	$0.05<W$	As round type	2.5
SIZE	Acceptable Q TY																										
$\Phi\leq 0.10$	Accept no dense																										
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$0.20<\Phi\leq 0.25$	1																										
$0.25<\Phi$	0																										
Length	Width	Acceptable Q TY																									
---	$W\leq 0.02$	Accept no dense																									
$L\leq 3.0$	$0.02<W\leq 0.03$	2																									
$L\leq 2.5$	$0.03<W\leq 0.05$																										
---	$0.05<W$	As round type																									



04	Polarizer bubbles	If bubbles are visible, judge using black spot specifications, not easy to find, must check in specify direction.	Size $\Phi$	Acceptable Q TY	2.5
			$\Phi \leq 0.20$	Accept no dense	
			$0.20 < \Phi \leq 0.50$	3	
			$0.50 < \Phi \leq 1.00$	2	
			$1.00 < \Phi$	0	
			Total Q TY	3	

NO	Item	Criterion	AQL																		
05	Scratches	Follow NO.3 LCD black spots, white spots, contamination																			
06	Chipped glass	<div> <div> <div>Symbols Define:</div> <div> <div>x: Chip length</div> <div>y: Chip width</div> <div>z: Chip thickness</div> <div>k: Seal width</div> <div>t: Glass thickness</div> <div>a: LCD side length</div> <div>L: Electrode pad length:</div> </div> </div> <div> <div>6.1 General glass chip :</div> <div>6.1.1 Chip on panel surface and crack between panels:</div> <div>  </div> <div> <table> <tr> <th>z: Chip thickness</th> <th>y: Chip width</th> <th>x: Chip length</th> </tr> <tr> <td><math>Z \leq 1/2t</math></td> <td>Not over viewing area</td> <td><math>x \leq 1/8a</math></td> </tr> <tr> <td><math>1/2t &lt; z \leq 2t</math></td> <td>Not exceed 1/3k</td> <td><math>x \leq 1/8a</math></td> </tr> </table> <div> <div>⊙ If there are 2 or more chips, x is total length of each chip.</div> <div>6.1.2 Corner crack:</div> <div>  </div> <div> <table> <tr> <th>z: Chip thickness</th> <th>y: Chip width</th> <th>x: Chip length</th> </tr> <tr> <td><math>Z \leq 1/2t</math></td> <td>Not over viewing area</td> <td><math>x \leq 1/8a</math></td> </tr> <tr> <td><math>1/2t &lt; z \leq 2t</math></td> <td>Not exceed 1/3k</td> <td><math>x \leq 1/8a</math></td> </tr> </table> <div> <div>⊙ If there are 2 or more chips, x is the total length of each chip.</div> </div> </div> </div> </div> </div></div>	z: Chip thickness	y: Chip width	x: Chip length	$Z \leq 1/2t$	Not over viewing area	$x \leq 1/8a$	$1/2t < z \leq 2t$	Not exceed 1/3k	$x \leq 1/8a$	z: Chip thickness	y: Chip width	x: Chip length	$Z \leq 1/2t$	Not over viewing area	$x \leq 1/8a$	$1/2t < z \leq 2t$	Not exceed 1/3k	$x \leq 1/8a$	2.5
z: Chip thickness	y: Chip width	x: Chip length																			
$Z \leq 1/2t$	Not over viewing area	$x \leq 1/8a$																			
$1/2t < z \leq 2t$	Not exceed 1/3k	$x \leq 1/8a$																			
z: Chip thickness	y: Chip width	x: Chip length																			
$Z \leq 1/2t$	Not over viewing area	$x \leq 1/8a$																			
$1/2t < z \leq 2t$	Not exceed 1/3k	$x \leq 1/8a$																			

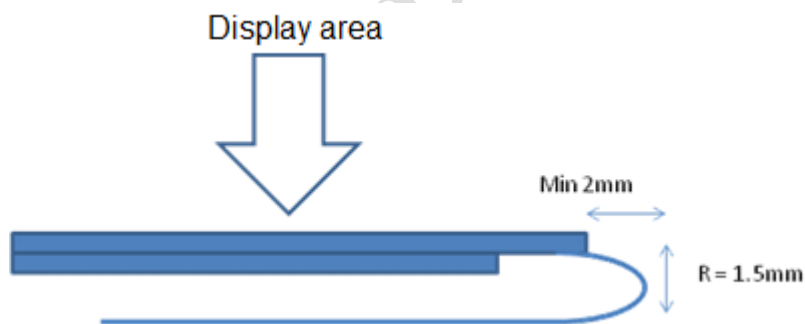
NO	Item	Criterion	AQL																
06	Glass crack	<p>Symbols :</p> <p>x: Chip length      y: Chip width      z: Chip thickness</p> <p>k: Seal width      t: Glass thickness      a: LCD side length</p> <p>L: Electrode pad length</p> <p>6.2 Protrusion over terminal :</p> <p>6.2.1 Chip on electrode pad :</p> <div>  <table> <tr> <td>y: Chip width</td> <td>x: Chip length</td> <td>z: Chip thickness</td> </tr> <tr> <td><math>y \leq 0.5\text{mm}</math></td> <td><math>x \leq 1/8a</math></td> <td><math>0 &lt; z \leq t</math></td> </tr> </table> </div> <p>6.2.2 Non-conductive portion:</p> <div>  <table> <tr> <td>y: Chip width</td> <td>x: Chip length</td> <td>z: Chip thickness</td> </tr> <tr> <td><math>y \leq L</math></td> <td><math>x \leq 1/8a</math></td> <td><math>0 &lt; z \leq t</math></td> </tr> </table> <div> <p>⊙ If the chipped area touches the ITO terminal, over 2/3 of the ITO must remain and be inspected according to electrode terminal specifications.</p> <p>⊙ If the product will be heat sealed by the customer, the alignment mark not be damaged.</p> </div> </div> <p>6.2.3 Substrate protuberance and internal crack.</p> <div>  <table> <tr> <td>y: width</td> <td>x: length</td> </tr> <tr> <td><math>y \leq 1/3L</math></td> <td><math>x \leq a</math></td> </tr> </table> </div>	y: Chip width	x: Chip length	z: Chip thickness	$y \leq 0.5\text{mm}$	$x \leq 1/8a$	$0 < z \leq t$	y: Chip width	x: Chip length	z: Chip thickness	$y \leq L$	$x \leq 1/8a$	$0 < z \leq t$	y: width	x: length	$y \leq 1/3L$	$x \leq a$	2.5
		y: Chip width	x: Chip length	z: Chip thickness															
		$y \leq 0.5\text{mm}$	$x \leq 1/8a$	$0 < z \leq t$															
		y: Chip width	x: Chip length	z: Chip thickness															
$y \leq L$	$x \leq 1/8a$	$0 < z \leq t$																	
y: width	x: length																		
$y \leq 1/3L$	$x \leq a$																		

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  $X * Y \leq 2\text{mm}^2$	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.	2.5
		12.2 No cracks on interface pin (OLB) of TCP.	0.65
		12.3 No contamination, solder residue or solder balls on product.	2.5
		12.4 The IC on the TCP may not be damaged, circuits.	2.5
		12.5 The uppermost edge of the protective strip on the interface pin must be present or look as if it cause the interface pin to sever.	2.5
		12.6 The residual rosin or tin oil of soldering (component or chip component) is not burned into brown or black color.	2.5
		12.7 Sealant on top of the ITO circuit has not hardened.	0.65
		12.8 Pin type must match type in specification sheet.	0.65
		12.9 LCD pin loose or missing pins.	0.65
		12.10 Product packaging must the same as specified on packaging specification sheet.	0.65
		12.11 Product dimension and structure must conform to product specification sheet.	0.65
		12.12 Visual defect outside of VA is not considered to be rejection.	0.65

## 11. 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.
- (8) Raystar have the right to change the passive components, including R3, R6 & backlight adjust resistors. (Resistors, capacitors and other passive components will have different appearance and color caused by the different supplier.)
- (9) Raystar have the right to change the PCB Rev. (In order to satisfy the supplying stability, management optimization and the best product performance...etc, under the premise of not affecting the electrical characteristics and external dimensions, Raystar have the right to modify the version.)
- (10) To ensure the stability of the display screen, please apply screen saver after showing 30 mins of fixed display content.
- (11) The limitation of FPC bending



- (12) Please heat up a little the tape sticking on the components when removing it; otherwise the components might be damaged.

## 12. Material List of Components for RoHs

1. RAYSTAR Optronics. Inc. 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+	PBB	PBDE	DEHP	BBP	DBP	DIBP
Limited Value	<b>100 ppm</b>	<b>1000 ppm</b>	<b>1000 ppm</b>	<b>1000 ppm</b>	<b>1000 ppm</b>	<b>1000 ppm</b>	<b>1000 ppm</b>	<b>1000 ppm</b>	<b>1000 ppm</b>	<b>1000 ppm</b>
Above limited value is set up according to RoHS.										

### 2. Process for RoHS requirement : (only for RoHS inspection)

- (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.

## **13.Recommendable Storage**

1. Place the panel or module in the temperature  $25^{\circ}\text{C}\pm 5^{\circ}\text{C}$  and the humidity below 65% RH
2. Do not place the module near organics solvents or corrosive gases.
3. Do not crush, shake, or jolt the module.

RAYSTAR OPTRONICS



### LCM Sample Estimate Feedback Sheet

**Module Number :** \_\_\_\_\_

**1 、 Panel Specification :**

1. Panel Type :	<input type="checkbox"/> Pass	<input type="checkbox"/> NG , _____
2. View Direction :	<input type="checkbox"/> Pass	<input type="checkbox"/> NG , _____
3. Numbers of Dots :	<input type="checkbox"/> Pass	<input type="checkbox"/> NG , _____
4. View Area :	<input type="checkbox"/> Pass	<input type="checkbox"/> NG , _____
5. Active Area :	<input type="checkbox"/> Pass	<input type="checkbox"/> NG , _____
6. Operating Temperature :	<input type="checkbox"/> Pass	<input type="checkbox"/> NG , _____
7. Storage Temperature :	<input type="checkbox"/> Pass	<input type="checkbox"/> NG , _____
8. Others : _____		

**2 、 Mechanical Specification :**

1. PCB Size :	<input type="checkbox"/> Pass	<input type="checkbox"/> NG , _____
2. Frame Size :	<input type="checkbox"/> Pass	<input type="checkbox"/> NG , _____
3. Material of Frame :	<input type="checkbox"/> Pass	<input type="checkbox"/> NG , _____
4. Connector Position :	<input type="checkbox"/> Pass	<input type="checkbox"/> NG , _____
5. Fix Hole Position :	<input type="checkbox"/> Pass	<input type="checkbox"/> NG , _____
6. Backlight Position :	<input type="checkbox"/> Pass	<input type="checkbox"/> NG , _____
7. Thickness of PCB :	<input type="checkbox"/> Pass	<input type="checkbox"/> NG , _____
8. Height of Frame to PCB :	<input type="checkbox"/> Pass	<input type="checkbox"/> NG , _____
9. Height of Module :	<input type="checkbox"/> Pass	<input type="checkbox"/> NG , _____
10. Others :	<input type="checkbox"/> Pass	<input type="checkbox"/> NG , _____

**3 、 Relative Hole Size :**

1. Pitch of Connector :	<input type="checkbox"/> Pass	<input type="checkbox"/> NG , _____
2. Hole size of Connector :	<input type="checkbox"/> Pass	<input type="checkbox"/> NG , _____
3. Mounting Hole size :	<input type="checkbox"/> Pass	<input type="checkbox"/> NG , _____
4. Mounting Hole Type :	<input type="checkbox"/> Pass	<input type="checkbox"/> NG , _____
5. Others :	<input type="checkbox"/> Pass	<input type="checkbox"/> NG , _____

**4 、 Backlight Specification :**

1. B/L Type :	<input type="checkbox"/> Pass	<input type="checkbox"/> NG , _____
2. B/L Color :	<input type="checkbox"/> Pass	<input type="checkbox"/> NG , _____
3. B/L Driving Voltage (Reference for LED Type) : <input type="checkbox"/> Pass <input type="checkbox"/> NG , _____		
4. B/L Driving Current :	<input type="checkbox"/> Pass	<input type="checkbox"/> NG , _____
5. Brightness of B/L :	<input type="checkbox"/> Pass	<input type="checkbox"/> NG , _____
6. B/L Solder Method :	<input type="checkbox"/> Pass	<input type="checkbox"/> NG , _____
7. Others :	<input type="checkbox"/> Pass	<input type="checkbox"/> NG , _____

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

**Module Number :** \_\_\_\_\_

**5 、 Electronic Characteristics of Module :**

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

**6 、 Summary :**
**Sales signature :** \_\_\_\_\_

**Customer Signature :** \_\_\_\_\_

**Date :**    /    /