



RAYSTAR

曜凌光電股份有限公司

住址: 42878 台中市大雅区科雅路 25 號 5F
5F., No.25, Keya Rd., Daya Dist., Taichung
City 428, Taiwan

WEB: <http://www.Raystar-Optronics.com>
E-mail: sales@raystar-optronics.com
Tel:886-4-2565-0761 Fax : 886-4-2565-0760

RX12864D3-BIW

SPECIFICATION

CUSTOMER:

APPROVED BY	
PCB VERSION	
DATE	

FOR CUSTOMER USE ONLY

SALES BY	APPROVED BY	CHECKED BY	PREPARED BY

ISSUED DATE:

Contents

	Page
1. Revision History	3
2. General Specification	4
3. Module Coding System	5
4. Interface Pin Function	6
5. Outline dimension & Block Diagram	9
6. Timing Characteristics	10
7. Optical Characteristics	11
8. Absolute Maximum Ratings	12
9. Electrical Characteristics	12
10. Backlight Information	13
11. Reliability	14
12. Inspection specification	15
13. Precautions in use of LCD Modules	19
14. Material List of Components for RoHs	20
15. Recommendable storage	20

1. Revision History

DATE	VERSION	REVISED PAGE NO.	Note
2009/10/16	1		First issue
2012/09/20	2	20	Add Recommendable storage

RAYSTAR OPTRONICS

2. General Specification

The Features of the Module is description as follow:

- Module dimension: 80.0x 54.0 x10.2 (max.) mm³
- View area: 70.7 x 38.8 mm²
- Active area: 66.52 x 33.24 mm²
- Number of Dots: 128 x 64
- Dot size: 0.48 x0.48 mm²
- Dot pitch: 0.52 x 0.52 mm²
- LCD type: STN Negative, Blue Transmissive
- Duty: 1/64
- View direction: 6 o'clock
- Backlight Type: LED White

3. Module Coding System

R	X	12864	D3	-	B	I	W
1	2	3	4	-	5	6	7

Item	Description		
1	R : Raystar Optronics Inc.		
2	Display Type: COG		
3	Number of dots : 128 x64 Dots		
4	Serials code		
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	O : LED, Orange
		F : CCFL, White	G : LED, Green

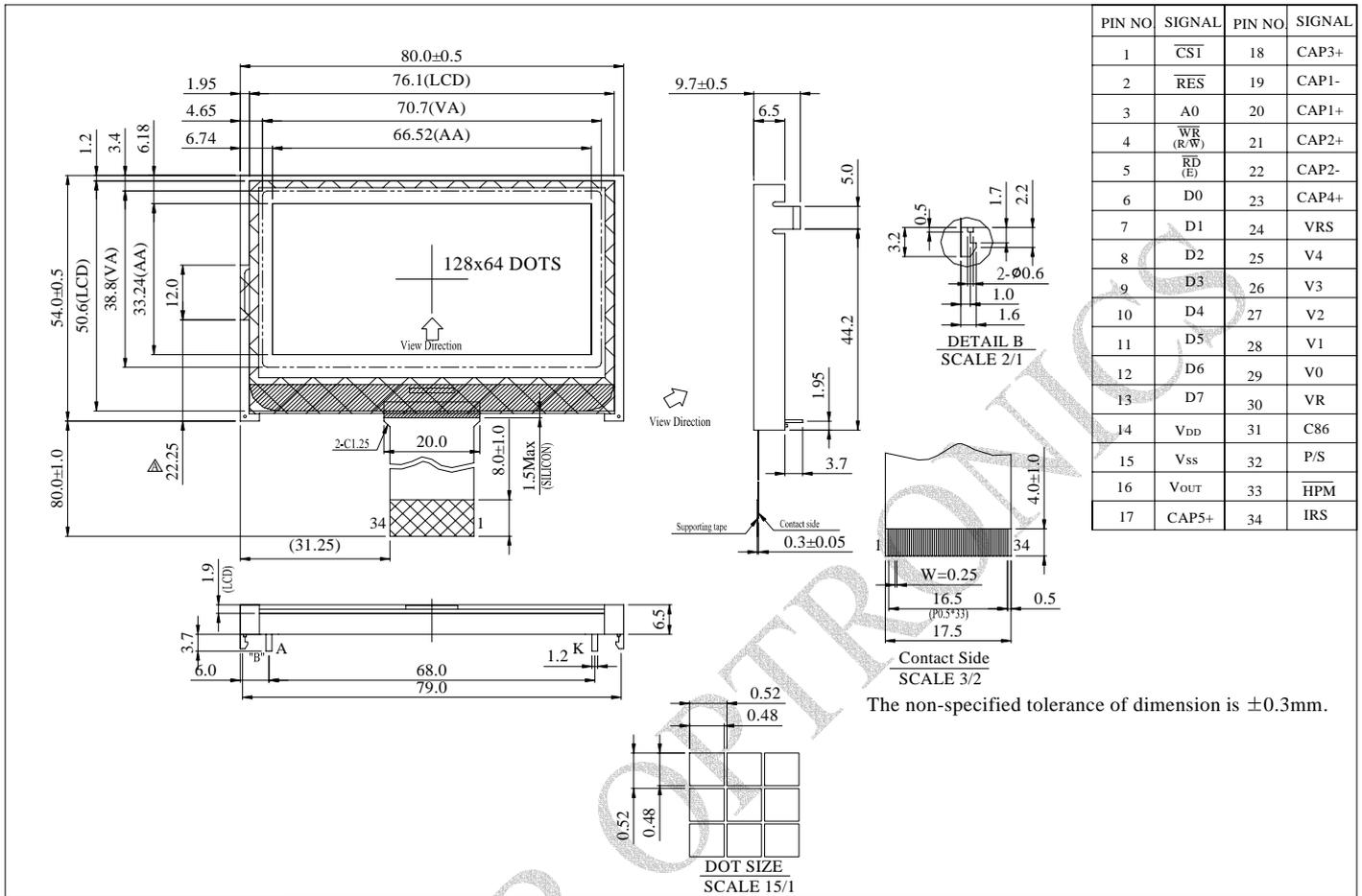
4. Interface Pin Function

Pin No.	Symbol	Level	Description
1	/CS1		This is the chip select signal. When /CS1 = "L" , then the chip select becomes active, and data/command I/O is enabled.
2	/RES		When /RES is set to "L" , the settings are initialized.
3	A0		This is connect to the least significant bit of the normal MPU address bus, and it determines whether the data bits are data or a command. A0 = "H": Indicates that D0 to D7 are display data. A0 = "L": Indicates that D0 to D7 are control data.
4	/WR(R/W)		When connected to an 8080 MPU, this is active LOW. (R/W) This terminal connects to the 8080 MPU /WR signal. The signals on the data bus are latched at the rising edge of the /WR signal. When connected to a 6800 Series MPU: This is the read/write control signal input terminal. When R/W = "H": Read. When R/W = "L": Write.
5	/RD(E)		When connected to an 8080 MPU, this is active LOW. (E) This pin is connected to the /RD signal of the 8080 MPU, and the ST7565P series data bus is in an output status when this signal is "L". When connected to a 6800 Series MPU, this is active HIGH. This is the 6800 Series MPU enable clock input terminal.
6	DB0		This is an 8-bit bi-directional data bus that connects to an 8-bit or 16-bit standard MPU data Bus.
7	DB1		
8	DB2		
9	DB3		
10	DB4		
11	DB5		
12	DB6		
13	DB7		
14	VDD		Shared with the MPU power supply terminal VDD. (3.3 V)
15	VSS		This is a 0V terminal connected to the system GND.
16	VOUT		DC/DC voltage converter. Connect a capacitor between this terminal and VSS.
17	CAP5+		DC/DC voltage converter. Connect a capacitor between this terminal and the CAP1- terminal.

18	CAP3+		DC/DC voltage converter. Connect a capacitor between this terminal and the CAP1- terminal.																														
19	CAP1-		DC/DC voltage converter. Connect a capacitor between this terminal and the CAP1+ terminal.																														
20	CAP1+		DC/DC voltage converter. Connect a capacitor between this terminal and the CAP1- terminal.																														
21	CAP2+		DC/DC voltage converter. Connect a capacitor between this terminal and the CAP2- terminal.																														
22	CAP2-		DC/DC voltage converter. Connect a capacitor between this terminal and the CAP2+ terminal.																														
23	CAP4+		DC/DC voltage converter. Connect a capacitor between this terminal and the CAP2- terminal.																														
24	VRS		This is the externally-input VREG power supply for the LCD power supply voltage regulator.																														
25	V4		This is a multi-level power supply for the liquid crystal drive. The voltage Supply applied is determined by the liquid crystal cell, and is changed through the use of a resistive voltage divided or through changing the impedance using an op. amp. Voltage levels are determined based on Vss, and must maintain the relative magnitudes shown below. $V0 \geq V1 \geq V2 \geq V3 \geq V4 \geq Vss$																														
26	V3																																
27	V2																																
28	V1																																
29	V0		When the power supply turns ON, the internal power supply circuits produce the V1 to V4 voltages shown below. The voltage settings are selected using the LCD bias set command.																														
			<table border="1"> <thead> <tr> <th></th> <th>1/65 DUTY</th> <th>1/49 DUTY</th> <th>1/33 DUTY</th> <th>1/55 DUTY</th> <th>1/53 DUTY</th> </tr> </thead> <tbody> <tr> <td>V1</td> <td>8/9*V0, 6/7*V0</td> <td>7/8*V0, 5/6*V0</td> <td>5/6*V0, 4/5*V0</td> <td>7/8*V0, 5/6*V0</td> <td>7/8*V0, 5/6*V0</td> </tr> <tr> <td>V2</td> <td>7/9*V0, 5/7*V0</td> <td>6/8*V0, 4/6*V0</td> <td>4/6*V0, 3/5*V0</td> <td>6/8*V0, 4/6*V0</td> <td>6/8*V0, 4/6*V0</td> </tr> <tr> <td>V3</td> <td>2/9*V0, 2/7*V0</td> <td>2/8*V0, 2/6*V0</td> <td>2/6*V0, 2/5*V0</td> <td>2/8*V0, 2/6*V0</td> <td>2/8*V0, 2/6*V0</td> </tr> <tr> <td>V4</td> <td>1/9*V0, 1/7*V0</td> <td>1/8*V0, 1/6*V0</td> <td>1/6*V0, 1/5*V0</td> <td>1/8*V0, 1/6*V0</td> <td>1/8*V0, 1/6*V0</td> </tr> </tbody> </table>		1/65 DUTY	1/49 DUTY	1/33 DUTY	1/55 DUTY	1/53 DUTY	V1	8/9*V0, 6/7*V0	7/8*V0, 5/6*V0	5/6*V0, 4/5*V0	7/8*V0, 5/6*V0	7/8*V0, 5/6*V0	V2	7/9*V0, 5/7*V0	6/8*V0, 4/6*V0	4/6*V0, 3/5*V0	6/8*V0, 4/6*V0	6/8*V0, 4/6*V0	V3	2/9*V0, 2/7*V0	2/8*V0, 2/6*V0	2/6*V0, 2/5*V0	2/8*V0, 2/6*V0	2/8*V0, 2/6*V0	V4	1/9*V0, 1/7*V0	1/8*V0, 1/6*V0	1/6*V0, 1/5*V0	1/8*V0, 1/6*V0	1/8*V0, 1/6*V0
	1/65 DUTY	1/49 DUTY	1/33 DUTY	1/55 DUTY	1/53 DUTY																												
V1	8/9*V0, 6/7*V0	7/8*V0, 5/6*V0	5/6*V0, 4/5*V0	7/8*V0, 5/6*V0	7/8*V0, 5/6*V0																												
V2	7/9*V0, 5/7*V0	6/8*V0, 4/6*V0	4/6*V0, 3/5*V0	6/8*V0, 4/6*V0	6/8*V0, 4/6*V0																												
V3	2/9*V0, 2/7*V0	2/8*V0, 2/6*V0	2/6*V0, 2/5*V0	2/8*V0, 2/6*V0	2/8*V0, 2/6*V0																												
V4	1/9*V0, 1/7*V0	1/8*V0, 1/6*V0	1/6*V0, 1/5*V0	1/8*V0, 1/6*V0	1/8*V0, 1/6*V0																												
30	VR		Output voltage regulator terminal. Provides the voltage between VDD and V5 through a resistive voltage divider. IRS = "L" : the V5 voltage regulator internal resistors are not used . IRS = "H" : the V5 voltage regulator internal resistors are used .																														
31	C86		This is the MPU interface switch terminal. C86 = "H": 6800 Series MPU interface. C86 = "L": 8080 MPU interface.																														

32	P/S	<p>This is the parallel data input/serial data input switch terminal.</p> <p>P/S = "H": Parallel data input. P/S = "L": Serial data input.</p> <p>The following applies depending on the P/S status:</p> <table border="1" data-bbox="611 414 1214 546"> <thead> <tr> <th>P/S</th> <th>Data/Command</th> <th>Data</th> <th>Read/Write</th> <th>Serial Clock</th> </tr> </thead> <tbody> <tr> <td>"H"</td> <td>A0</td> <td>D0 to D7</td> <td>\overline{RD}, \overline{WR}</td> <td>X</td> </tr> <tr> <td>"L"</td> <td>A0</td> <td>SI (D7)</td> <td>Write only</td> <td>SCL (D6)</td> </tr> </tbody> </table> <p>When P/S = "L", D0 to D5 may be "H", "L" or Open. RD (E) and WR (R/W) are fixed to either "H" or "L". With serial data input, It is impossible read data from RAM .</p>	P/S	Data/Command	Data	Read/Write	Serial Clock	"H"	A0	D0 to D7	\overline{RD} , \overline{WR}	X	"L"	A0	SI (D7)	Write only	SCL (D6)
P/S	Data/Command	Data	Read/Write	Serial Clock													
"H"	A0	D0 to D7	\overline{RD} , \overline{WR}	X													
"L"	A0	SI (D7)	Write only	SCL (D6)													
33	/HPM	<p>This is the power control terminal for the power supply circuit for liquid crystal drive.</p> <p>HPM = "H": Normal mode HPM = "L": High power mode</p>															
34	IRS	<p>This terminal selects the resistors for the V5 voltage level adjustment.</p> <p>IRS = "H": Use the internal resistors IRS = "L": Do not use the internal resistors. The V5 voltage level is regulated by an external resistive voltage divider attached to the VR terminal</p>															

5. Outline Dimension & Block Diagram



6. Timing Characteristics

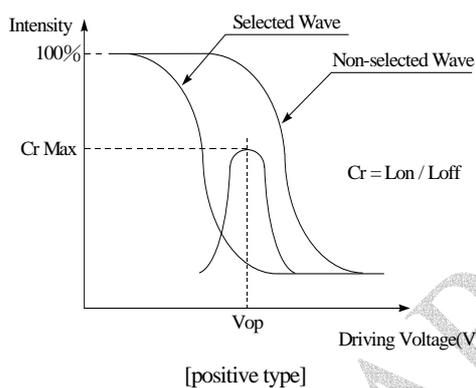
Reference to Sitronix [ST7565P.pdf](#)

RAYSTAR OPTRONICS

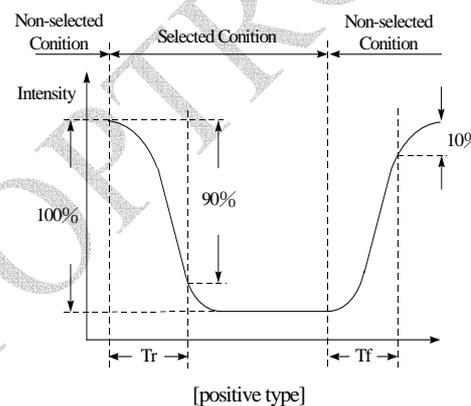
7. Optical Characteristics

Item	Symbol	Condition	Min	Typ	Max	Unit
View Angle	$(V)\theta$	$CR \geq 2$	20	—	40	deg
	$(H)\varphi$	$CR \geq 2$	-30	—	30	deg
Contrast Ratio	CR	—	—	3	—	—
Response Time	T rise	—	—	200	300	ms
	T fall	—	—	250	350	ms

Definition of Operation Voltage, V_{op} .



Definition of Response Time, T_r and T_f .



Conditions:

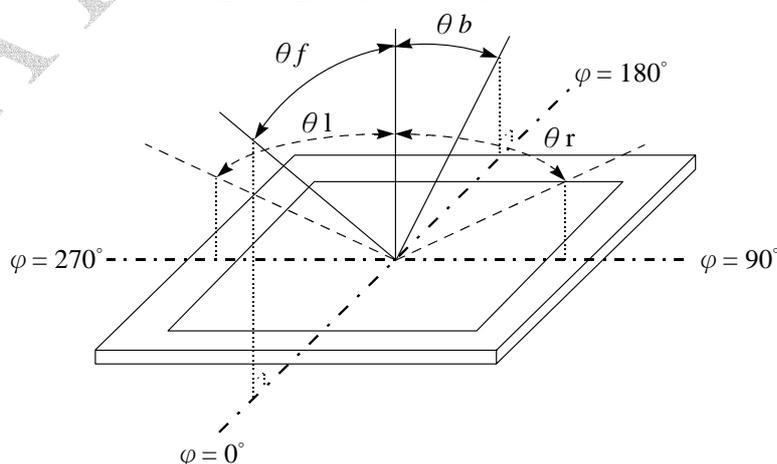
Operating Voltage : V_{op}

Viewing Angle(θ , φ) : 0° , 0°

Frame Frequency: 64 HZ

Driving Waveform: 1/N duty, 1/a bias

Definition of viewing angle ($CR \geq 2$)



8. 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	-0.3	—	$V_{DD}+0.3$	V
Supply Voltage For Logic	$V_{DD}-V_{SS}$	-0.3		5.0	V
LCD Driver Supply Voltage	V_{OUT}	4		13	V

9. 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	$V_{DD}-V_5$	$T_a=-20^{\circ}\text{C}$	10.2	10.4	10.6	V
		$T_a=25^{\circ}\text{C}$	9.8	10.0	10.2	V
		$T_a=70^{\circ}\text{C}$	9.2	9.4	9.6	V
Input High Volt.	V_{IH}	—	$0.8 V_{DD}$	—	V_{DD}	V
Input Low Volt.	V_{IL}	—	V_{SS}	—	$0.2 V_{DD}$	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}	$V_{DD}=3.3\text{V}$		0.6	1	mA

10. Backlight Information

Specification

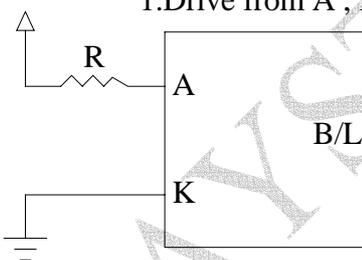
PARAMETER	SYMBOL	MIN	TYP	MAX	UNIT	TEST CONDITION
Supply Current	I _{LED}	86.4	96	144	mA	V= 3.5 V
Supply Voltage	V	3.4	3.5	3.6	V	—
Reverse Voltage	V _R	—	—	5	V	—
Luminous Intensity (Without LCD)	I _V	672.8	755	—	CD/M ²	I _{LED} = 96 mA
LED Life Time (For Reference only)	—		50K		Hr.	I _{LED} ≅ 96 mA 25°C, 50-60%RH, (Note 1)
Color	White					

Note: The LED of B/L is drive by current only ; driving voltage is only for reference
To make driving current in safety area (waste current between minimum and maximum).

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

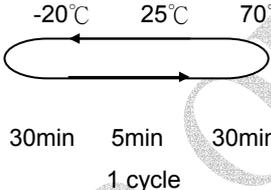
LED B\L Drive Method

1. Drive from A , K



11. Reliability

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

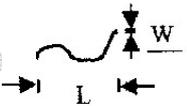
Environmental Test			
Test Item	Content of Test	Condition	Note
High Temperature storage	Endurance test applying the high storage temperature for a long time.	80°C 200hrs	2
Low Temperature storage	Endurance test applying the high storage temperature for a long time.	-30°C 200hrs	1,2
High Temperature Operation	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	<p>The sample should be allowed stand the following 10 cycles of operation</p>  <p style="text-align: center;">-20°C 25°C 70°C</p> <p style="text-align: center;">30min 5min 30min</p> <p style="text-align: center;">1 cycle</p>	-20°C/70°C 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	—

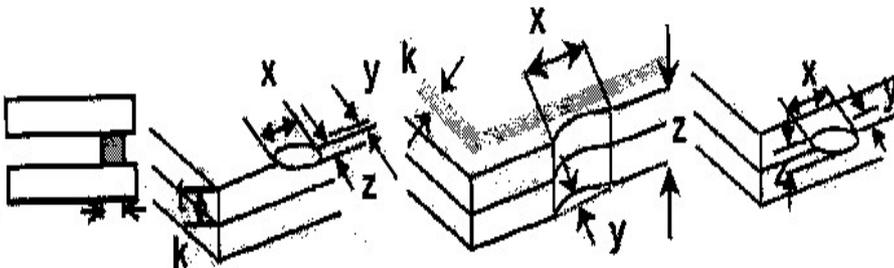
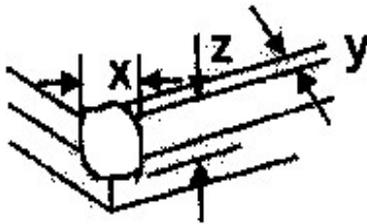
Note1: No dew condensation to be observed.

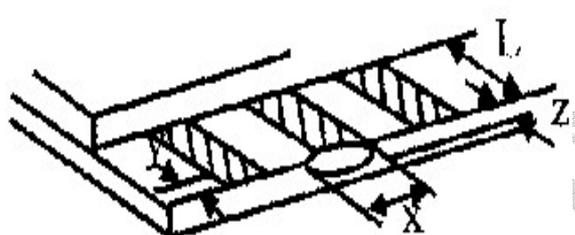
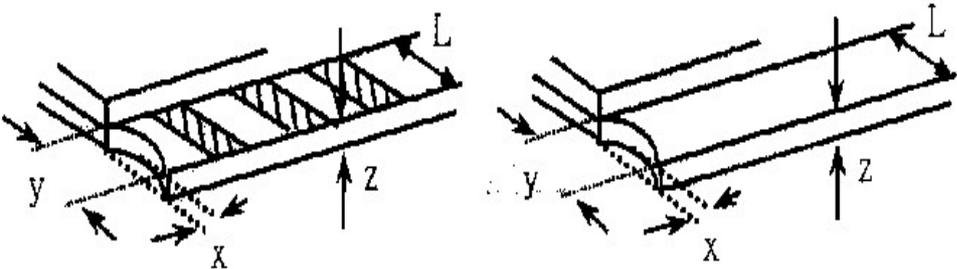
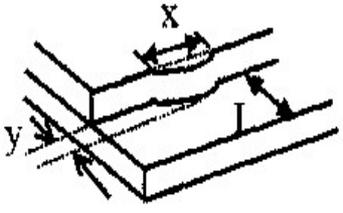
Note2: The function test shall be conducted after 4 hours storage at the normal temperature and humidity after remove from the test chamber.

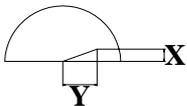
Note3: The packing have to including into the vibration testing.

12. 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)	3.1 Round type : As following drawing $\Phi = (x + y) / 2$	2.5												
		3.2 Line type : (As following drawing)  <table border="1"> <thead> <tr> <th>Length</th> <th>Width</th> <th>Acceptable QTY</th> </tr> </thead> <tbody> <tr> <td>---</td> <td>$W \leq 0.02$</td> <td>Accept no dense</td> </tr> <tr> <td>$L \leq 3.0$</td> <td>$0.02 < W \leq 0.03$</td> <td rowspan="2">2</td> </tr> <tr> <td>$L \leq 2.5$</td> <td>$0.03 < W \leq 0.05$</td> </tr> <tr> <td>---</td> <td>$0.05 < W$</td> <td>As round type</td> </tr> </tbody> </table>	Length	Width	Acceptable QTY	---	$W \leq 0.02$	Accept no dense	$L \leq 3.0$	$0.02 < W \leq 0.03$	2	$L \leq 2.5$	$0.03 < W \leq 0.05$	---	$0.05 < W$
Length	Width	Acceptable QTY													
---	$W \leq 0.02$	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. <table border="1"> <thead> <tr> <th>Size Φ</th> <th>Acceptable QTY</th> </tr> </thead> <tbody> <tr> <td>$\Phi \leq 0.20$</td> <td>Accept no dense</td> </tr> <tr> <td>$0.20 < \Phi \leq 0.50$</td> <td>3</td> </tr> <tr> <td>$0.50 < \Phi \leq 1.00$</td> <td>2</td> </tr> <tr> <td>$1.00 < \Phi$</td> <td>0</td> </tr> <tr> <td>Total QTY</td> <td>3</td> </tr> </tbody> </table>	Size Φ	Acceptable QTY	$\Phi \leq 0.20$	Accept no dense	$0.20 < \Phi \leq 0.50$	3	$0.50 < \Phi \leq 1.00$	2	$1.00 < \Phi$	0	Total QTY	3	2.5
Size Φ	Acceptable QTY														
$\Phi \leq 0.20$	Accept no dense														
$0.20 < \Phi \leq 0.50$	3														
$0.50 < \Phi \leq 1.00$	2														
$1.00 < \Phi$	0														
Total QTY	3														

NO	Item	Criterion	AQL												
05	Scratches	Follow NO.3 LCD black spots, white spots, contamination													
06	Chipped glass	<p>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:</p> <p>6.1 General glass chip : 6.1.1 Chip on panel surface and crack between panels:</p>  <table border="1" data-bbox="443 1093 1353 1249"> <tr> <td>z: Chip thickness $Z \leq 1/2t$</td> <td>y: Chip width Not over viewing area</td> <td>x: Chip length $x \leq 1/8a$</td> </tr> <tr> <td>$1/2t < z \leq 2t$</td> <td>Not exceed 1/3k</td> <td>$x \leq 1/8a$</td> </tr> </table> <p>⊙ If there are 2 or more chips, x is total length of each chip.</p> <p>6.1.2 Corner crack:</p>  <table border="1" data-bbox="443 1630 1353 1787"> <tr> <td>z: Chip thickness $Z \leq 1/2t$</td> <td>y: Chip width Not over viewing area</td> <td>x: Chip length $x \leq 1/8a$</td> </tr> <tr> <td>$1/2t < z \leq 2t$</td> <td>Not exceed 1/3k</td> <td>$x \leq 1/8a$</td> </tr> </table> <p>⊙ If there are 2 or more chips, x is the total length of each chip.</p>	z: Chip thickness $Z \leq 1/2t$	y: Chip width Not over viewing area	x: Chip length $x \leq 1/8a$	$1/2t < z \leq 2t$	Not exceed 1/3k	$x \leq 1/8a$	z: Chip thickness $Z \leq 1/2t$	y: Chip width Not over viewing area	x: Chip length $x \leq 1/8a$	$1/2t < z \leq 2t$	Not exceed 1/3k	$x \leq 1/8a$	2.5
z: Chip thickness $Z \leq 1/2t$	y: Chip width Not over viewing area	x: Chip length $x \leq 1/8a$													
$1/2t < z \leq 2t$	Not exceed 1/3k	$x \leq 1/8a$													
z: Chip thickness $Z \leq 1/2t$	y: Chip width Not over viewing area	x: Chip length $x \leq 1/8a$													
$1/2t < z \leq 2t$	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 k: Seal width t: Glass thickness a: LCD side length L: Electrode pad length</p> <p>6.2 Protrusion over terminal :</p> <p>6.2.1 Chip on electrode pad :</p>  <table border="1" data-bbox="336 891 1262 974"> <thead> <tr> <th>y: Chip width</th> <th>x: Chip length</th> <th>z: Chip thickness</th> </tr> </thead> <tbody> <tr> <td>$y \leq 0.5\text{mm}$</td> <td>$x \leq 1/8a$</td> <td>$0 < z \leq t$</td> </tr> </tbody> </table>	y: Chip width	x: Chip length	z: Chip thickness	$y \leq 0.5\text{mm}$	$x \leq 1/8a$	$0 < z \leq t$	2.5
		y: Chip width	x: Chip length	z: Chip thickness					
		$y \leq 0.5\text{mm}$	$x \leq 1/8a$	$0 < z \leq t$					
		<p>6.2.2 Non-conductive portion:</p>  <table border="1" data-bbox="408 1303 1262 1422"> <thead> <tr> <th>y: Chip width</th> <th>x: Chip length</th> <th>z: Chip thickness</th> </tr> </thead> <tbody> <tr> <td>$y \leq L$</td> <td>$x \leq 1/8a$</td> <td>$0 < z \leq t$</td> </tr> </tbody> </table>	y: Chip width	x: Chip length	z: Chip thickness	$y \leq L$	$x \leq 1/8a$	$0 < z \leq t$	
y: Chip width	x: Chip length	z: Chip thickness							
$y \leq L$	$x \leq 1/8a$	$0 < z \leq t$							
<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>									
<p>6.2.3 Substrate protuberance and internal crack.</p>  <table border="1" data-bbox="746 1668 1262 1751"> <thead> <tr> <th>y: width</th> <th>x: length</th> </tr> </thead> <tbody> <tr> <td>$y \leq 1/3L$</td> <td>$x \leq a$</td> </tr> </tbody> </table>	y: width	x: length	$y \leq 1/3L$	$x \leq a$					
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 causes 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

13. 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
(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.

14. 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				
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.

15. Recommendable storage

1. Place the panel or module in the temperature 25°C±5°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

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 :		
<p style="text-align: center; font-size: 2em; opacity: 0.2; transform: rotate(-30deg);">RAYSTAR OPTROINCS</p> <p>Sales signature : _____</p> <p>Customer Signature : _____ Date : / /</p>		