

## SPECIFICATION OF LCD MODULE

<b>CUSTOMER</b> 客户名称	
<b>PART NO.</b> 产品型号	<b>OTM921 G-W-1</b>
<b>PRODUCTS TYPE</b> 产品内容	
<b>REMARKS</b> 备注	
<b>SIGNATURE BY CUSTOMER</b> 客户签署:	

		
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## LCM System

**1 LCD Type** S - STN F - FSTN D - DFSTN**2 Viewing Angle** D - Lower 6:00 U - Upper 12:00 O - Others**3 Display Mode** Yellow Green positive Blue Negative Gray positive FSTN positive W - FSTN negative**4 Polarizer Mode** Reflective Transflective Transmissive**5 Connector** Pin Heat sealed Normal**6 Thickness of Glass** 1.1mm 0.4mm 0.55mm 0.7mm**7 Backlight Mode:** LED CCFL**8 Backlight Color** Blue Amber Yellow Green Red White Without backlight**9 Temperature Grade** Normal temperature Wide temperature Super wide temperature

**•REVISION RECORD**

<b>REV. NO.</b>	<b>REV. DATE</b>	<b>DESCRIPTION OF REVISION</b>	<b>PAGE</b>	<b>REMARK</b>
1.0	011/11/09	INITIAL RELEASE	ALL	

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## 1. FEATURES

•Display construction.....	122*32 DOTS
•Display mode.....	STN(Gray)
•Display type.....	Positive Transmissive
•Backlight.....	LED(WHITE)/5.0V
•Viewing direction.....	6 o'clock
•Operating temperature.....	- 20 to 70 °C
•Storage temperature .....	-30 to 80°C
•Driving voltage.....	Single power
•Driving method.....	1/32 duty, 1/5 bias
•Type.....	COB (Chip On Board)
•Drive IC.....	SBN1661 or Eequivalence
•Number of data line.....	6800 8-bit parallel
•Connector.....	Pin

## 2. MECHANICAL DATA

ITEM	WIDTH	HEIGHT	THICKNESS	UNIT
Module size	80.0	36.0	13.0(MAX)	mm
Viewing area	60.1	18.2	-	mm
Dot	Size	0.36	0.41	mm
	Pitch	0.4	0.45	mm
Diameter of mounting hole	Φ 2.5			mm
Weight	About 50			g

## 3. ABSOLUTE MAXIMUM RATINGS

### 3.1 Electrical Absolute Maximum Rating

(TA = 25 , Vss=0V)

Item	Symbol	MIN.	Max.	Unit
Supply Voltage (Logic)	VDD-VSS	0	7.0	V
Supply Voltage (LCD Driveer)	V <sub>LCD</sub>	VDD-12	VDD+0.3	V
Input Voltage	V <sub>IN</sub>	-0.3	VDD+0.3	V
Operating temperature	Top	-20	70	°C
Storage temperature	Tsto	-30	80	°C

### 3.2 Environmental Absolute Maximum Rating

Item	Operating		Storage		Comment
	Min.	Max.	Min.	Max.	
Ambient temp	-20	+70	-30	+80	Note(1)
Humidity	Note(2)		Note(2)		Without condensation
Vibration	--	4.9M/S <sup>2</sup>	--	19.6M/S <sup>2</sup>	XYZ direction
Shock	--	29.4M/S <sup>2</sup>	--	490M/S <sup>2</sup>	XYX direction

Note(1) Ta=0°C : 50 Hr Max.

Note(2) Ta ≤ 40°C : 90%RH Max.

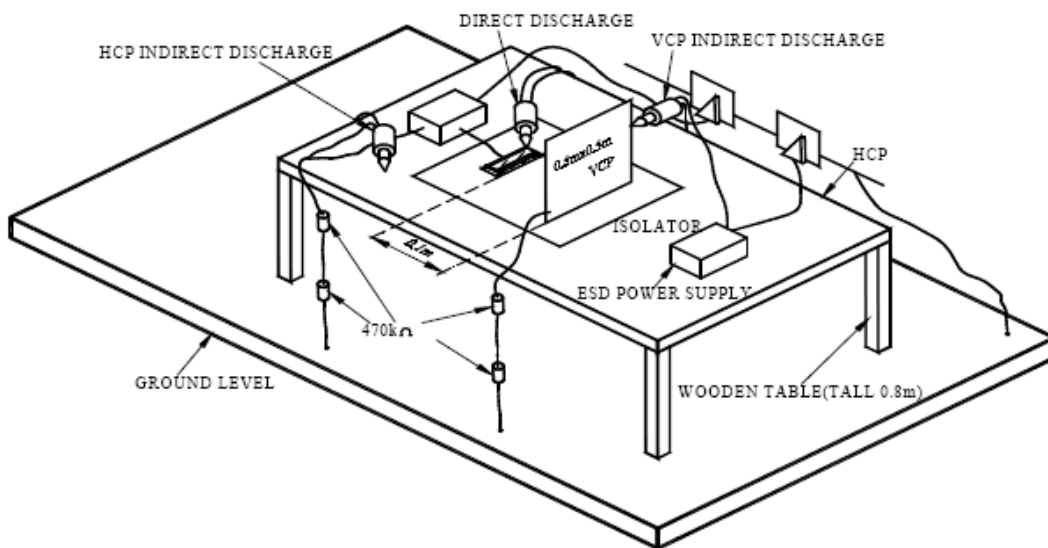
Ta ≥ 40°C : Abslue humidity must be lower than the humidity of 90%RH@40°C

### 3.3 Electronic Static Discharge Maximum Rating

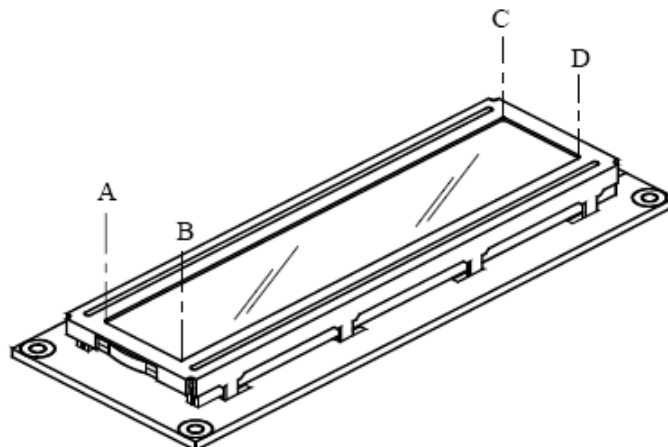
#### ESD Test Method : IEC-1000-4-2

Item	Description	
Testing environment	Ambient temperature : 15°C to 35°C Humidity : 30% to 60% LCM(E.U.T) : Power up	
Testing equipment	Manufacture : Noiseken, Model No. ESD	
Testing condition	See drawing 1	
Direct discharge	0 to ± 4KV	Discharge point, see drawing2
Indirect discharge	0 to ± 8KV	Discharge point, see drawing1
Pass condition	No malfunction of unit. Temporary malfunction of unit which can be recovered by system reset.	
Fail condition	Non. Recoverable malfunction of LCM or system.	

**FIG1 ESD Testing Equipment**



**Direct Contact Discharge / Contact Point : A,B,C,D**



## 4. ELECTRICAL CHARACTERISTICS

$V_{DD} = 5\text{ V} \pm 10\%$ ;  $V_{SS} = 0\text{ V}$ ; all voltages with respect to  $V_{SS}$ , unless otherwise specified;  $T_{amb} = -20\text{ to }+75\text{ }^{\circ}\text{C}$ .

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{DD}$	Supply voltage for logic		4.5	5.0	5.5	V
$V_{LCD}$	LCD bias voltage $V_{LCD} = V_{DD} - V_5$				13	V
$V_{IL}$	LOW level input voltage	For all inputs	0		0.8	V
$V_{IH}$	HIGH level input voltage	For all inputs	$V_{DD} - 1.2$		$V_{DD}$	V
$V_{OL}$	LOW level output voltage	For all outputs	0.0		0.3	V
$V_{OH}$	HIGH level output voltage	For all outputs	$V_{DD} - 0.3$		$V_{DD}$	V
$I_{STBY}$	Standby current at $V_5 = -5$ volts	Note 1			3.0	$\mu\text{A}$
$I_{DD(1)}$	Operating current at $V_5 = -5$ volts and $f_{CL} = 2\text{ KHz}$ , $V_{LCD} = 10$ volts	Note 2 & Note 3		2.7	5.6	$\mu\text{A}$
$I_{DD(2)}$	Operating current at $V_5 = -5$ volts and $R_f = 1\text{ M}\Omega$ , $V_{LCD} = 10$ volts			12.3	15.6	$\mu\text{A}$
$I_{DD(3)}$	Operating current at $V_5 = -5$ volts and $f_{CL} = 21.8\text{ KHz}$ , $V_{LCD} = 10$ volts			5.3	10.8	$\mu\text{A}$
$I_{DD(4)}$	Operating current at $V_5 = -5$ volts and $t_{CYC} = 100\text{ KHz}$ , $V_{LCD} = 10$ volts	Note 4		21.7	26.2	$\mu\text{A}$
$f_{osc(VDD=5V)}$ , $f_{osc(VDD=3V)}$	Please refer to Table 37, On-chip RC oscillator characteristics.					
$C_{in}$	Input capacitance of all input pins			5.0	8.0	pF
$R_{ON}$	LCD driver ON resistance	Note 5		5.0	7.5	$\text{K}\Omega$
$t_R$	Reset time	Note 6	1.0			$\mu\text{S}$

### Notes:

- Conditions for the measurement:  $OSC1 = OSC2 = V_{DD}$ , measured at the  $V_{DD}$  pin.
- These values are measured when the microcontroller does not perform any READ/WRITE operation to the chip.
- These measurements are for different members of the series:
  - $I_{DD(1)}$  are measured for the SBN1661G\_M02 and the SBN0080G\_S02,
  - $I_{DD(2)}$  are measured for the SBN1661G\_M18, and
  - $I_{DD(3)}$  are measured for the SBN0080G\_S18.
- These values are measured when the microcontroller continuously performs READ/WRITE operation to the chip.
- This measurement is for the transmission high-voltage PMOS or NMOS of COM0~15 and SEG0~60(79). Please refer to Section 18 for these driver circuit. The measurement is for the case when the voltage differential between the source and the drain of the high voltage PMOS or NMOS is 0.1 volts.
- The value is relative to the RESET pulse edge. That is, 1.0  $\mu\text{S}$  after the last RESET edge, the device is completely reset.



## 4.1 LED ELECTRICAL/OPTICAL CHARACTERISTICS

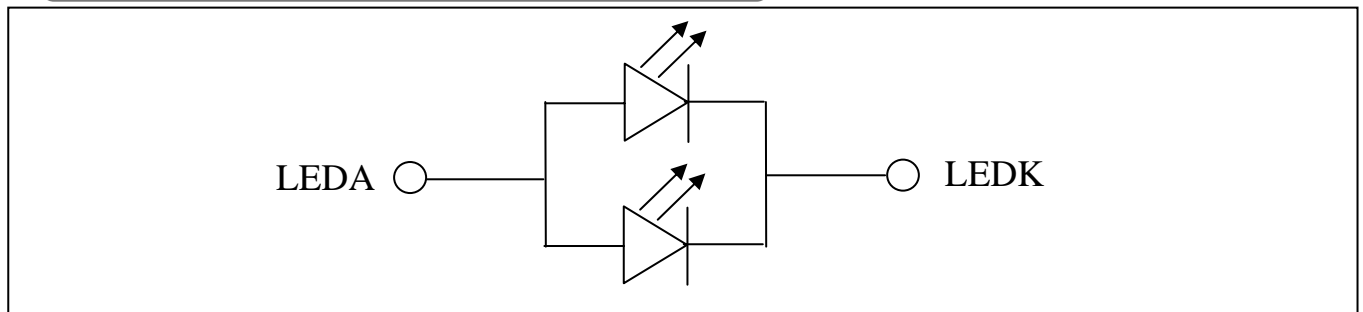
Item	Symbol	min	typ	max	Unit	Condition
Forward Voltage	V <sub>f</sub>	4.8	5.0	5.2	V	I <sub>f</sub> = 40 mA
Reverse Current	I <sub>r</sub>	-	40	-	uA	V <sub>r</sub> =5V
Dominant wave length	λ <sub>p</sub>	-	-	-	nm	I <sub>f</sub> = mA
Luminance	L <sub>v</sub>	-	150	-	cd/m <sup>2</sup>	I <sub>f</sub> = 40 mA
Chromaticity Coordinates	X Y	-	0.29 0.30	-	-	I <sub>f</sub> = 40 mA

## 4.2 LED ABSOLUTE MAXIMUM RATINGS

Item	Symbol	Condition	Rating	Unit
Reverse Voltage	V <sub>r</sub>	T <sub>a</sub> =25°C	5	V
Absolute maximum forward current	I <sub>fm</sub>	T <sub>a</sub> =25°C	50	mA
Power description	pd	T <sub>a</sub> =25°C	250	mW

### 4.2.1 LED ARRAY BLOCK DIAGRAM

( LED DICE 2 dices )



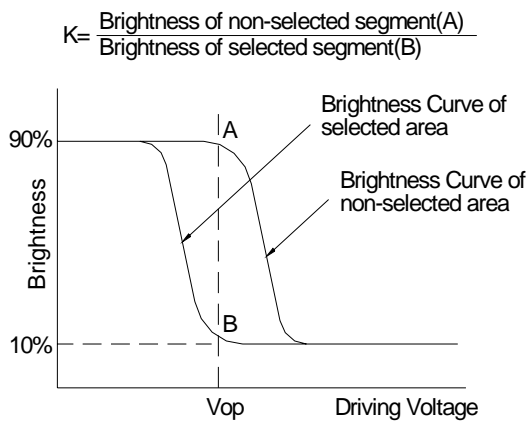
### 4.2.2 LED POWER SOURCE

LED	Option	Power source	Jumper setting
	A	17A/18K	R7、R8
	-	-	-
	-	-	-

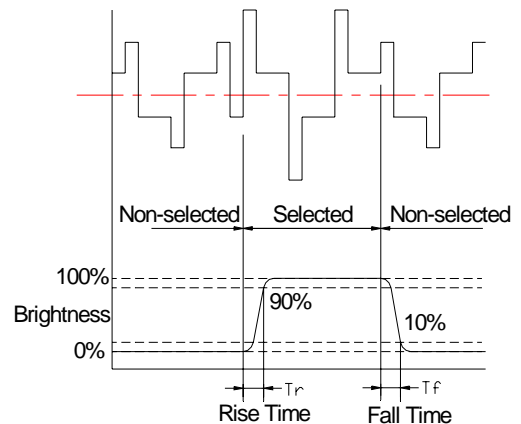
## 5. ELECTRO-OPTICAL CHARACTERISTICS

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	NOTE
Contrast ratio	K	$\varphi=0$	1.4	4	-	-	1
Response time (rise)	Tr	$\varphi=0$	-	250	300	ms	2
Response time (fall)	Tf	$\varphi=0$	-	250	350	ms	2
Viewing angle	$\varphi$	$K \geq 2.0$	-40 -- +40			deg.	3
	$\theta$		-40 -- +10				

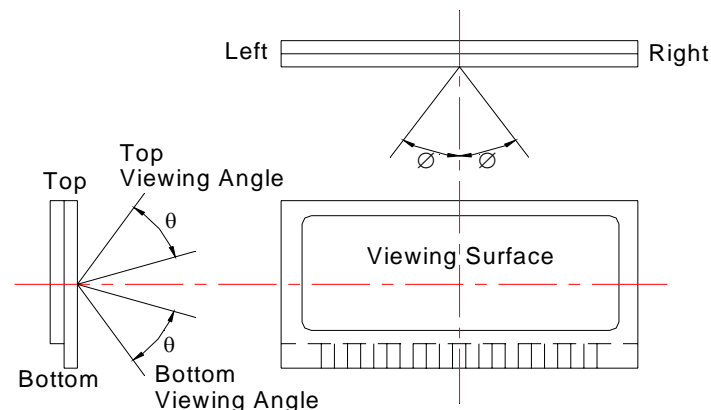
### Note 1: Definition of Contrast Ratio “K”



### Note 2: Definition of Optical Response Time

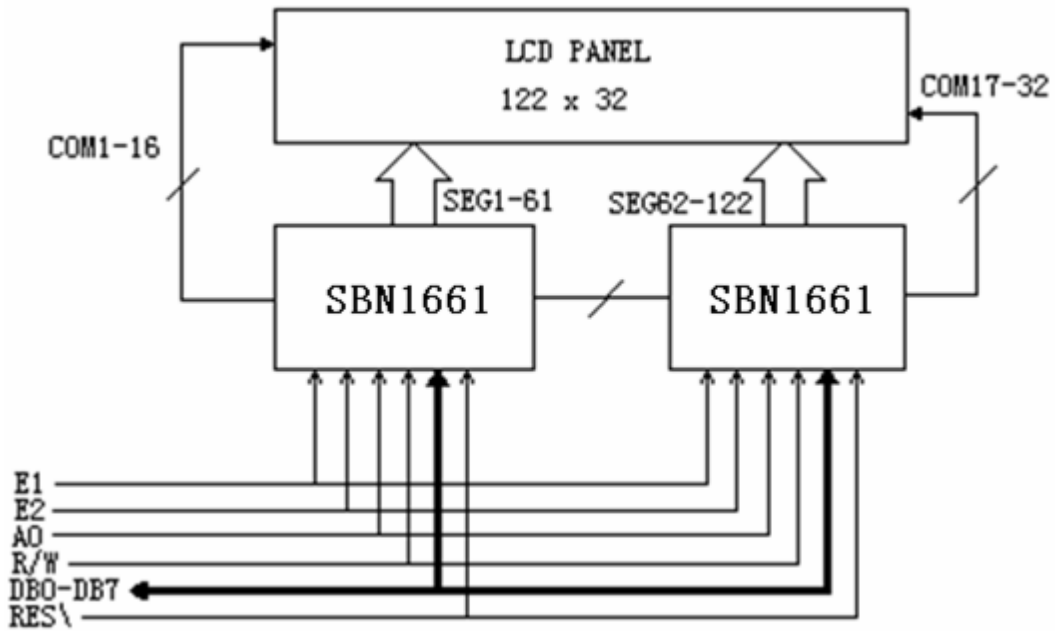


### Note 3: Definition of Viewing Angle

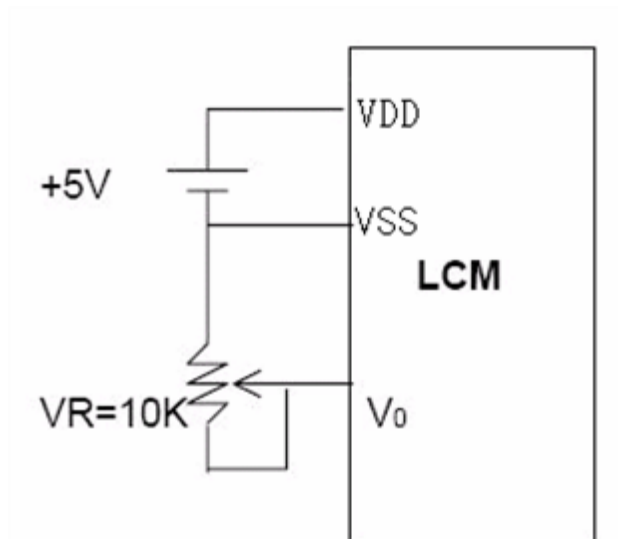


Please select either top or bottom viewing angle

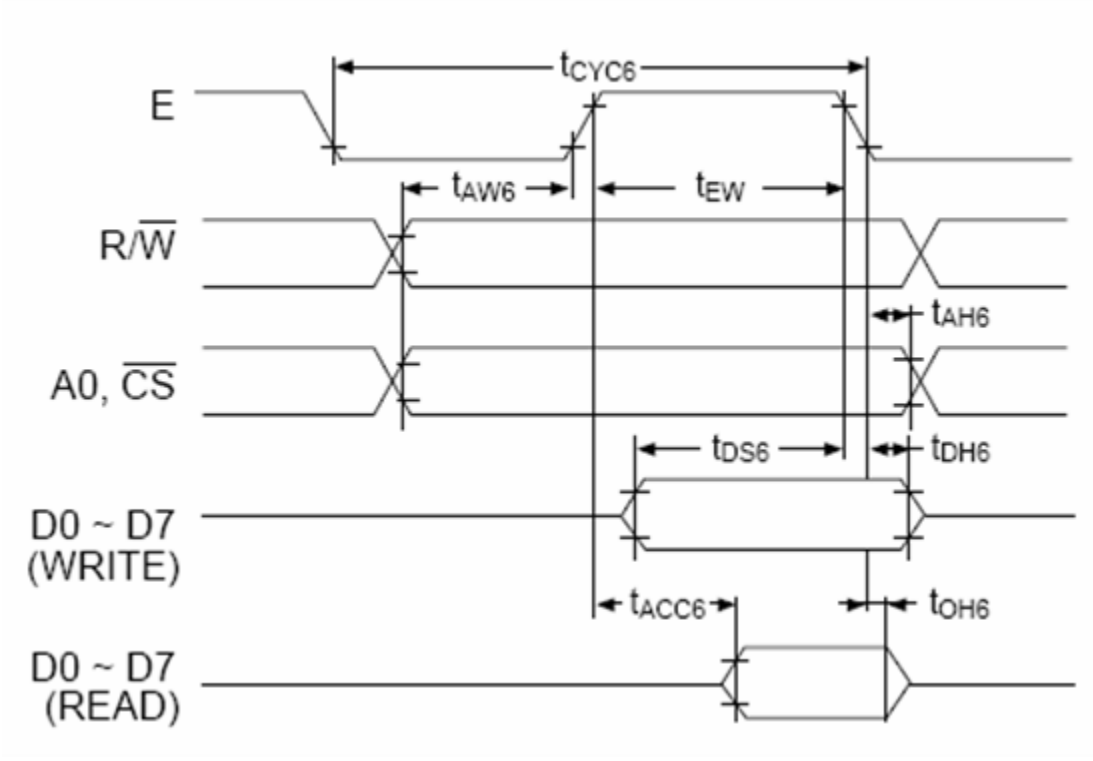
## 6. BLOCK DIAGRAM



## 7. VOLTAGE REGULATOR CIRCUITS



# 8. TIMING DIAGRAM



## 9. AC CHARACTERISTICS

Ta = -20 to 75°C, Vss = -5.0V ± 10%, Unit: ns

Signal	Symbol	Parameter	Min.	Max.	Condition
A0, $\overline{\text{CS}}$ R/ $\overline{\text{W}}$	t <sub>CYC6</sub> *1	System cycle time	1000		
	t <sub>AW6</sub>	Address setup time	20		
	t <sub>AH6</sub>	Address hold time	10		
D0-D7	t <sub>DS6</sub>	Data setup time	80		CL = 100pF
	t <sub>DH6</sub>	Data hold time	10		
	t <sub>OH6</sub>	Output disable time	10	60	
	t <sub>ACC6</sub>	Access time		90	
E	t <sub>EW</sub>	Enable pulse width	Read	100	
			Write	80	

## 10. INSTRUCTION SEQUENCE

	Command	Code										Function	
		A0	$\overline{RD}$	$\overline{WR}$	D7	D6	D5	D4	D3	D2	D1		D0
(1)	Display ON/OFF	0	1	0	1	0	1	0	1	1	1	0/1	Turns all display on or off, independently of display RAM data or internal status. 1: ON 0: OFF (Power-saving mode with static drive on)*
(2)	Display start line	0	1	0	1	1	0	Display Start Address (0-31)				Specifies RAM line corresponding to uppermost line (COM0) of display.	
(3)	Set page address	0	1	0	1	0	1	1	1	0	Page (0-3)		Sets display RAM page in page address register.
(4)	Set column (segment) address	0	1	0	0	Column Address (0-79)						Sets display RAM column address in column address register.	
(5)	Read status	0	0	1	Busy	ADC	ON/OFF	RESET	0	0	0	0	Reads the following status: BUSY     1: Internal operation, 0: Ready ADC       1: CW output (forward), 0: CCW output (reverse) ON/OFF    1: Display off, 0: Display on RESET     1: Being reset, 0: Normal
(6)	Write display data	1	1	0	Write Data							Writes data from data bus into display RAM.	Display RAM location whose address has been preset is accessed. After access, the column address is incremented by 1.
(7)	Read display data	1	0	1	Read Data							Reads data from display RAM onto data bus.	
(8)	Select ADC	0	1	0	1	0	1	0	0	0	0	0/1	Used to invert relationship of assignment between display RAM column addresses and segment driver outputs. 0: CW output (forward) 1: CCW output (reverse)
(9)	Static drive ON/OFF	0	1	0	1	0	1	0	0	1	0	0/1	Selects normal display or static driving operation. 1: Static drive (power-saving mode) 0: Normal driving
(10)	Select duty	0	1	0	1	0	1	0	1	0	0	0/1	Selects LCD cell driving duty. 1: 1/32 0: 1/16
(11)	Read modify write	0	1	0	1	1	1	0	0	0	0	0	Increments column address counter by 1 when display data is written. (This is not done when data is read.)
(12)	End	0	1	0	1	1	1	0	1	1	1	0	Clears read modify write mode.
(13)	Reset	0	1	0	1	1	1	0	0	0	1	0	Sets display start line register on the first line. Also sets column address counter and page address counter to 0.

**11. INSTRUCTION SET**

INIT:

```
MOV A,#0E2H
LCALL WC1
LCALL WC2
MOV A,#0AEH
LCALL WC1
LCALL WC2
MOV A,#0A4H
LCALL WC1
LCALL WC2
MOV A,#0A9H
LCALL WC1
LCALL WC2
MOV A,#0EEH
LCALL WC1
LCALL WC2
MOV A,#00H
LCALL WC1
LCALL WC2
MOV A,#0C0H
LCALL WC1
LCALL WC2
MOV A,#0AFH
LCALL WC1
LCALL WC2
RET
```

## 12. QUALITY ASSURANCE

### 12.1.1 Temperature and Humidity(Ambient Temperature)

Temperature :  $20 \pm 5^{\circ} \text{C}$

Humidity :  $65 \pm 5\%$

### 12.1.1.2 Operation

Unless specified otherwise, test will be conducted under function state.

### 12.1.1.3 Container

Unless specified otherwise, vibration test will be conducted to the product itself without putting it in a container.

### 12.1.1.4 Test Frequency

In case of related to deterioration such as shock test.It will be conducted only once.

### 12.1.5 Test Method

No.	Parameter	Conditions	Regulations
1	High Temperature Operating	$70 \pm 2^{\circ}\text{C}$	Note 3
2	Low Temperature Operating	$-20 \pm 2^{\circ}\text{C}$	Note 3
3	High Temperature Storage	$80 \pm 2^{\circ}\text{C}$	Note 3
4	Low Temperature Storage	$-30 \pm 2^{\circ}\text{C}$	Note 3
5	Vibration Test (Non-operation state)	Total fixed amplitude : 1.5mm Vibration Frequency : 10 ~ 55Hz One cycle 60 seconds to 3 directions of X.Y.Z. for each 15 minutes	Note 3
6	Damp Proof Test (Non-operation state)	$40^{\circ}\text{C} \pm 2^{\circ}\text{C}$ , 90~95%RH, 96h	Note 1,2
7	Shock Test (Non-operation state)	To be measured after dropping from 60cm high once concrete surface in packing state	Note 3

Note 1: Returned under normal temperature and humidity for 4 hrs.

Note 2: No dew condensation to be observed.

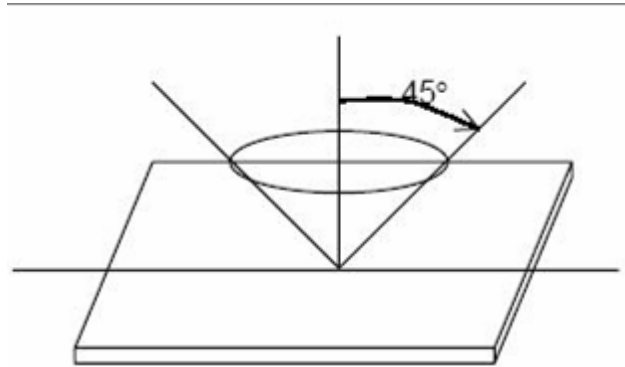
Note 3: No change on display and in operation under the test condition



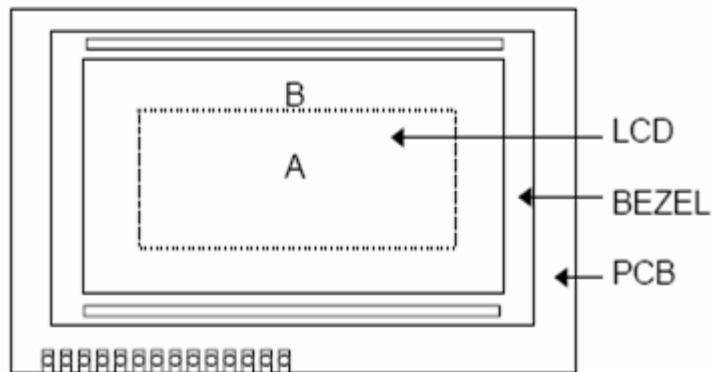
## 12.2 Inspection condition

### 12.2.1 Inspection conditions

The LCD shall be inspected under 40W white fluorescent light.

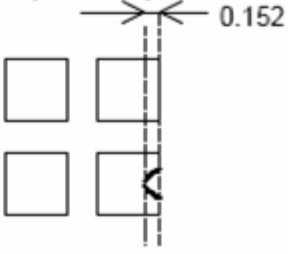


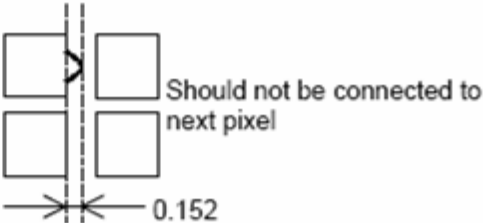
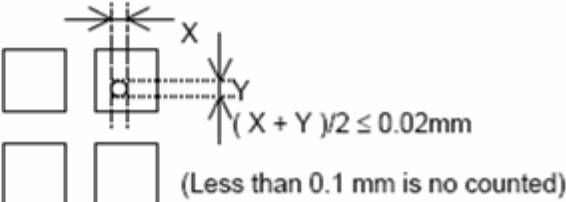
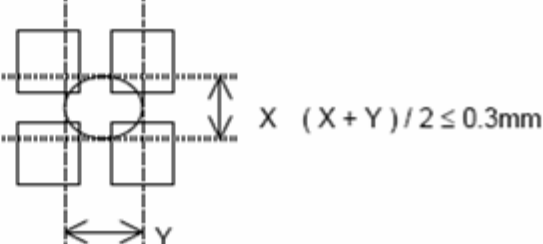
### 12.2.2 Definition of applicable Zones



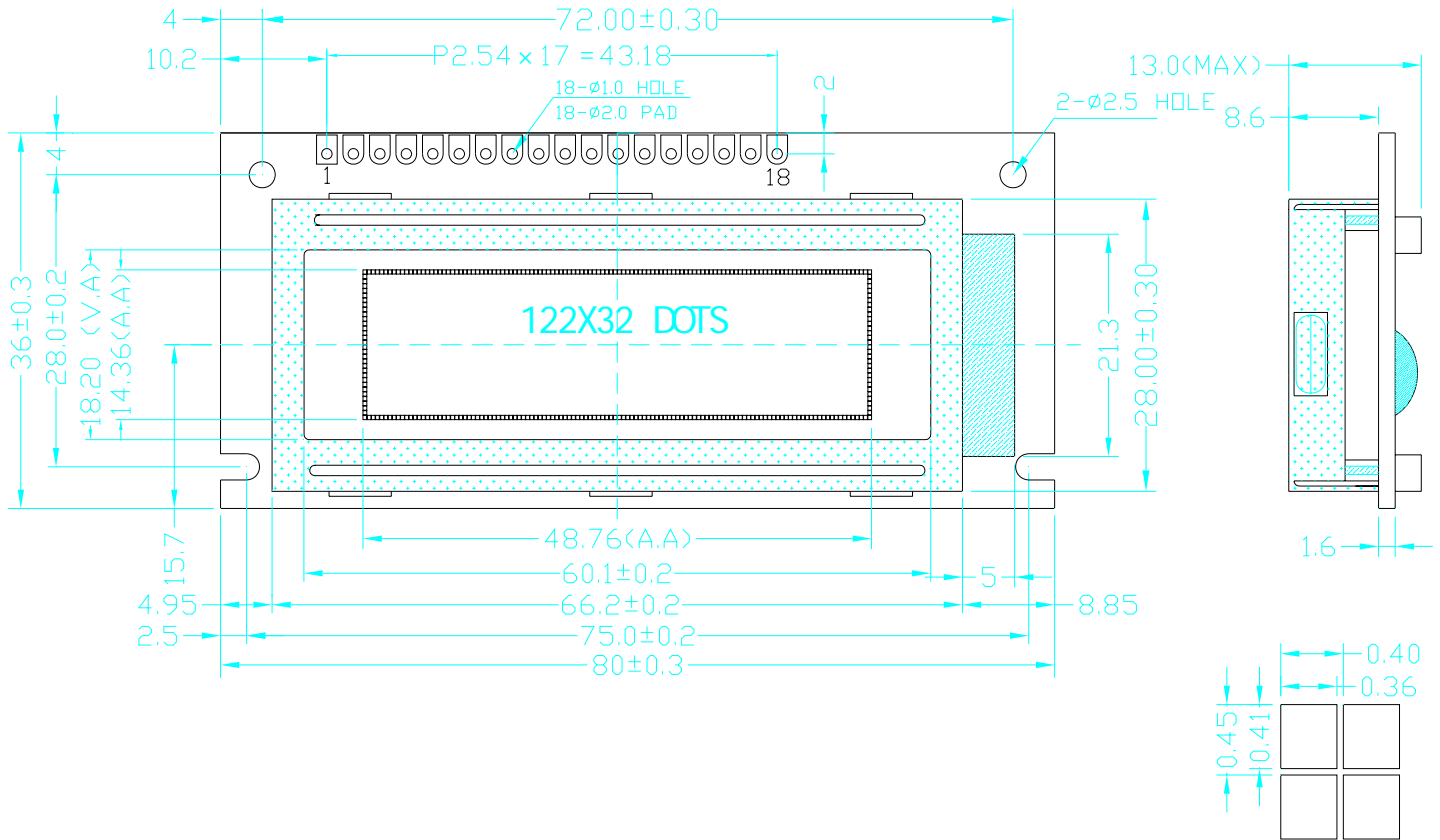
A : Display Area  
B : Non-Display Area

### 12.2.3 Inspection Parameters

No.	Parameter	Criteria																												
1	Black or White spots	<table border="1"> <thead> <tr> <th rowspan="2">Zone Dimension</th> <th colspan="2">Acceptable number</th> <th rowspan="2">Class Of Defects</th> <th rowspan="2">AQL Level</th> </tr> <tr> <th>A</th> <th>B</th> </tr> </thead> <tbody> <tr> <td>D &lt; 0.15</td> <td>*</td> <td>*</td> <td rowspan="4">Minor</td> <td rowspan="4">2.5</td> </tr> <tr> <td>0.15 ≤ D &lt; 0.2</td> <td>4</td> <td>4</td> </tr> <tr> <td>0.2 ≤ D ≤ 0.25</td> <td>2</td> <td>2</td> </tr> <tr> <td>D ≤ 0.3</td> <td>0</td> <td>1</td> </tr> </tbody> </table> <p style="text-align: center;">D = (Long + Short) / 2    * : Disregard</p>	Zone Dimension	Acceptable number		Class Of Defects	AQL Level	A	B	D < 0.15	*	*	Minor	2.5	0.15 ≤ D < 0.2	4	4	0.2 ≤ D ≤ 0.25	2	2	D ≤ 0.3	0	1							
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D ≤ 0.3	0	1																												
2	Scratch, Substances	<table border="1"> <thead> <tr> <th colspan="2">Zone</th> <th colspan="2">Acceptable number</th> <th rowspan="2">Class Of Defects</th> <th rowspan="2">AQL Level</th> </tr> <tr> <th>X (mm)</th> <th>Y (mm)</th> <th>A</th> <th>B</th> </tr> </thead> <tbody> <tr> <td>*</td> <td>0.04 ≥ W</td> <td>*</td> <td>*</td> <td rowspan="4">Minor</td> <td rowspan="4">2.5</td> </tr> <tr> <td>3.0 ≥ L</td> <td>0.06 ≥ W</td> <td>4</td> <td>4</td> </tr> <tr> <td>2.0 ≥ L</td> <td>0.08 ≥ W</td> <td>2</td> <td>3</td> </tr> <tr> <td>—</td> <td>0.1 &lt; W</td> <td>0</td> <td>1</td> </tr> </tbody> </table> <p style="text-align: center;">X : Length    Y : Width    * : Disregard Total defects should not exceed 4/module</p>	Zone		Acceptable number		Class Of Defects	AQL Level	X (mm)	Y (mm)	A	B	*	0.04 ≥ W	*	*	Minor	2.5	3.0 ≥ L	0.06 ≥ W	4	4	2.0 ≥ L	0.08 ≥ W	2	3	—	0.1 < W	0	1
Zone		Acceptable number		Class Of Defects	AQL Level																									
X (mm)	Y (mm)	A	B																											
*	0.04 ≥ W	*	*	Minor	2.5																									
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—	0.1 < W	0	1																											
3	Air Bubbles (between glass & polarizer)	<table border="1"> <thead> <tr> <th rowspan="2">Zone Dimension</th> <th colspan="2">Acceptable number</th> <th rowspan="2">Class of Defects</th> <th rowspan="2">AQL Level</th> </tr> <tr> <th>A</th> <th>B</th> </tr> </thead> <tbody> <tr> <td>D ≤ 0.15</td> <td>*</td> <td>*</td> <td rowspan="3">Minor</td> <td rowspan="3">2.5</td> </tr> <tr> <td>0.15 &lt; D ≤ 0.25</td> <td>2</td> <td>*</td> </tr> <tr> <td>0.25 &lt; D</td> <td>0</td> <td>1</td> </tr> </tbody> </table> <p style="text-align: center;">* : Disregard Total defects shall not excess 3/module.</p>	Zone Dimension	Acceptable number		Class of Defects	AQL Level	A	B	D ≤ 0.15	*	*	Minor	2.5	0.15 < D ≤ 0.25	2	*	0.25 < D	0	1										
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D ≤ 0.15	*	*	Minor	2.5																										
0.15 < D ≤ 0.25	2	*																												
0.25 < D	0	1																												
4	Uniformity of Pixel	<p>(1) Pixel shape (with Dent)</p> 																												

4	Uniformity of Pixel	<p>(2) Pixel shape ( with Projection)</p>  <p>Should not be connected to next pixel</p> <p>0.152</p>	
		<p>(3) Pin hole</p>  <p><math>(X + Y) / 2 \leq 0.02\text{mm}</math></p> <p>(Less than 0.1 mm is no counted)</p>	
		<p>(4) Deformation</p>  <p><math>(X + Y) / 2 \leq 0.3\text{mm}</math></p> <p>Total acceptable number : 1/pixel, 5/cell</p>	
Class of defects	<b>Major</b>	AQL 0.65%	<b>Definition</b>
		AQL 1.00%	It is a defect that is likely to result in failure or to reduce materially the usability of the product for the intended function.
	<b>Minor</b>	AQL 2.5%	It is a defect that is likely to assembly size and not result in functioning problem.
		It is a defect that will not result in functioning problem with deviation classified.	

**13. OUTLINE DRAWING**

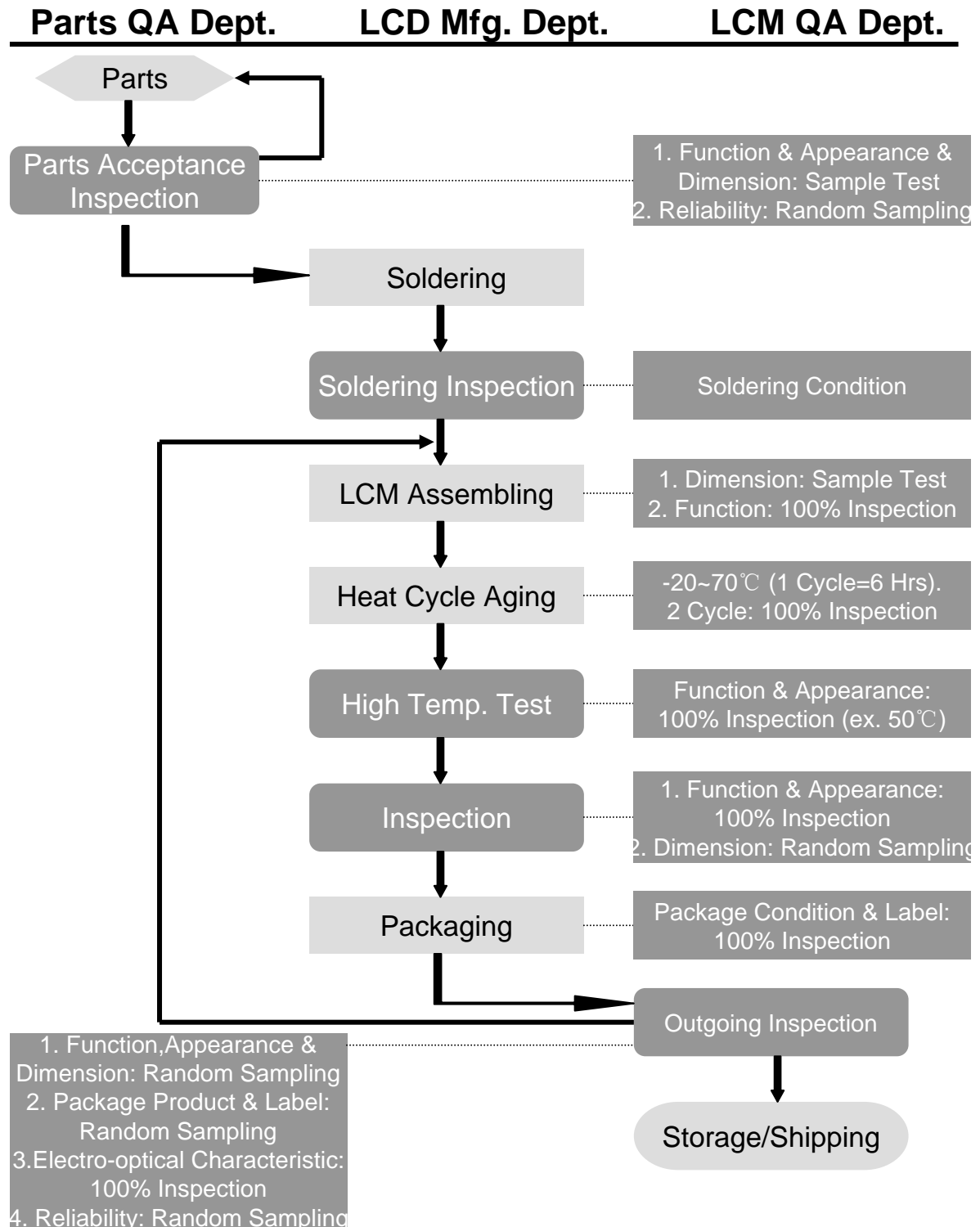


1	2	3	4	5	6	7	8	9
VSS	VDD	V0	A0	E1	E2	R/W	DB0	DB1
10	11	12	13	14	15	16	17	18
DB2	DB3	DB4	DB5	DB6	DB7	/RST	LEDA	LEDK

## 14.INTERFACE

PIN	SYMBOL	LEVEL	INSTRUCTION
1	VDD	5.0V	Power Supply Voltage
2	VSS	0V	Ground contact (GND)
3	Vo	LCD Drive Voltage	Adjust Contrast
4	A0	H/L	H:DATA; L:COMMAND
5	E1	H,H→L	CHIP Select Signal 1
6	E2	H,H→L	CHIP Select Signal 2
7	R/W	H/L	H:READ; L:WRITE
8	D0	H/L	DATA 0
9	D1	H/L	DATA 1
10	D2	H/L	DATA 2
11	D3	H/L	DATA 3
12	D4	H/L	DATA 4
13	D5	H/L	DATA 5
14	D6	H/L	DATA 6
15	D7	H/L	DATA 7
16	/RST	H/L	RESET SIGNAL
17	LEDA	BACK LED+	Back LED Anode (+5V)
18	LEDK	BACK LED-	Back LED Negative(0V)

# 15. QC/QA PROCEDURE



# 16. Handling Precautions

## 1. Limitation of Application:

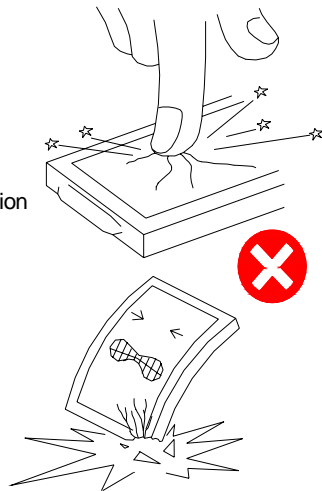
Optrex products are designed for use in ordinary electronic devices such as business machines, telecommunications equipment, measurement devices and etc. Please handle the products with care. (see below)  
 Optrex products are not designed, intended, or authorized for use in any application which the failure of the product could result in a situation where personal injury or death may occur. these applications include, but are not limited to. life-sustaining equipment, nuclear control devices, aerospace equipment, devices related to hazardous or flammable materials, etc. [If Buyer intends to purchase or use the Optrex Products for such unintended or unauthorized applications, Buyer must secure prior written consent to such use by a responsible officer of Optrex Corporation.] Should Buyer purchase or use Optrex Products for any such unintended or unauthorized application [without such consent]. Buyer shall indemnify and hold Optrex and its officers, employees, subsidiaries, affiliates and distributors harmless against all claims, costs, damages and expenses, and reasonable attorney's fees, arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that Optrex was negligent regarding the design or manufacture of the part.

## 2. Industrial Rights and Patents

Optrex shall not be responsible for any infringement of industrial property rights of third parties in any country arising out of the application or use of Optrex products, except which directly concern the structure or production of such products.

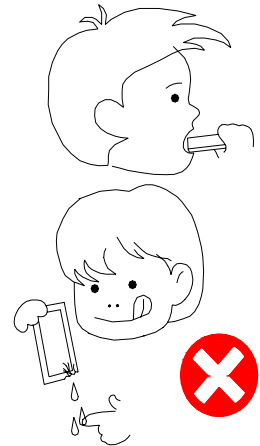
### No Press and Shock!

If pressure to LCD, orientation may be disturbed.  
 LCD will broken by shock!



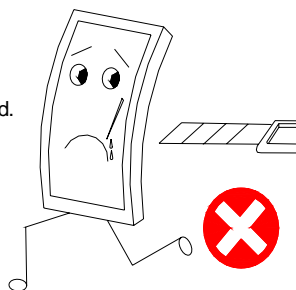
### Don't Swallow or Touch Liquid Crystal!

Liquid Crystal may be leaked when display is broken.  
 If it accidentally gets your hands, wash then with water!



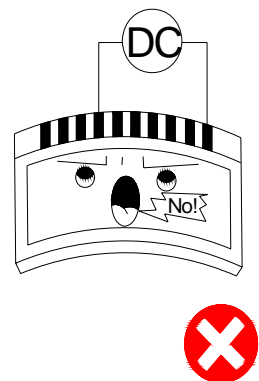
### Don't not Scratch!

Polarizer is a soft material and can easily be scratched.



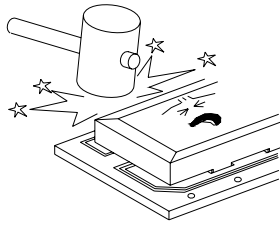
### No DC Voltage to LCD!

DC voltage or driving higher than the specified voltage will reduce the lifetime of the LCD.

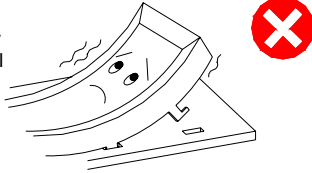


## Don't Press the Metallic Frame and Disassemble the LCM

Pressure on the metallic frame and PCB may deform the conductive rubber or break the liquid crystal cell and back light, which will cause defects.

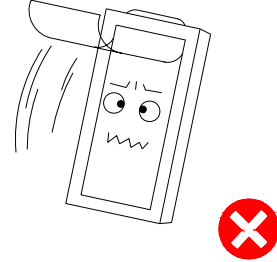


LCD may be shifted or conductive rubber may be reshaped, which will cause defects.



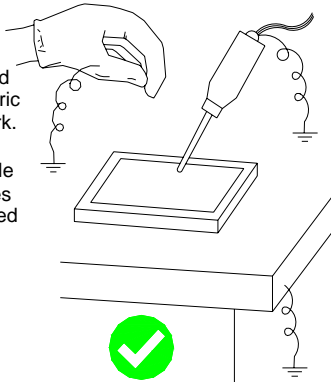
## Slowly Peel Off Protective Film!

Avoid static electricity.



## Avoid Static Electricity!

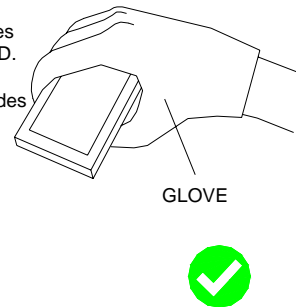
Please be sure to ground human body and electric appliances during work. It is preferable to use conductive mat on table and wear cotton clothes or conduction processed fiber. Synthetic fiber is not recommended.



## Wear Gloves While Handling!

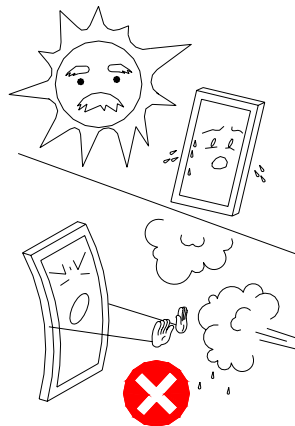
It is preferable to wear gloves to avoid damaging the LCD.

Please do not touch electrodes with bare hands or make them dirty.



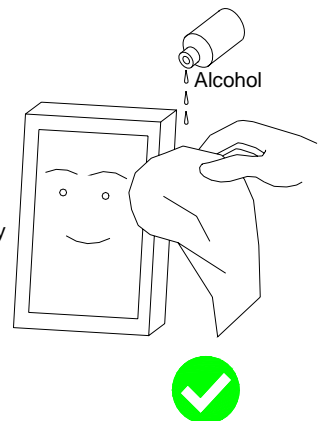
## Keep Away From Extreme Heat and Humidity!

LCD deteriorates.



## Use Alcohol to Clean Terminals!

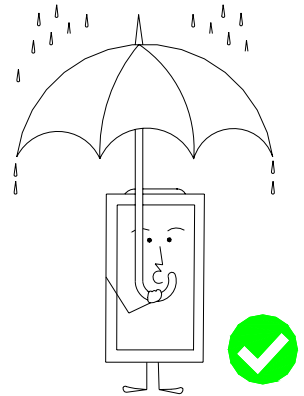
When attaching with the heat seal or anisotropically conductive film, wipe off with alcohol before use.





**Don't Drop Water on LCD!**

Note that the presence of waterdrops or dew in the LCD panel may deteriorate the polarizer or corrode electrode.

**Precaution in Soldering LCD Module**

Basic instructions: Solder I/O terminals only.

Use soldering iron without leakage.

(1) Soldering condition to I/O terminals

Temperature at tip of the iron:  $280 \pm 10^{\circ}\text{C}$

Soldering time: 3~4 sec.

Type of solder: Eutectic solder (containing colophony-flux)

\*Please do not use flux because it may soak into LCD Module or contaminate it.

\*It is preferable to peel off protective film on display surface after soldering I/O terminals is finished.

(2) Remove connector or cable

\*When you remove connector or cable soldered to I/O terminals, please confirm that solder is fully melted. If you remove by force, electrodes at I/O terminals may be damaged (or stripped off).

\*It is recommended to use solder suction machine.

**Long-term Storage**

If it is necessary to store LCD modules for a long time, please comply with the following procedures.

If storage condition is not satisfactory, display (especially polarizer) may be deteriorated or soldering I/O terminals may become difficult (some oxide is generated at I/O terminals plating).

1. Store as delivered by Optrex

2. If you store as unpacked, put in anti-static bag, seal its opening and store where it is not subjected to direct sunshine nor fluorescent lamp.

3. Store at temperature  $0$  to  $+35^{\circ}\text{C}$  and at low humidity. Please refer to our specification sheets for storage temperature range and humidity condition.

**Long-term Storage**

Please use power supply with built-in surge protection circuit.