

## SPECIFICATION OF LCD MODULE

<b>CUSTOMER</b> 客户名称	
<b>PART NO.</b> 产品型号	<b>OTM524B-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**

STN                       FSTN                       DFSTN

**2 Viewing Angle**

Lower 6:00                       Upper 12:00                       Others

**3 Display Mode**

Yellow Green positive                       Blue Negative                       Grey positive  
 FSTN positive                       FSTN negative

**4 Polarizer Mode**

Reflective                       Transflective                       Transmissive

**5 Connector**

Pin                       Heat sealed                       Zebra

**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

REV. NO.	REV. DATE	DESCRIPTION OF REVISION	PAGE	REMARK
1.0	10/05/08	INITIAL RELEASE	ALL	

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## 1. FEATURES

•Display construction.....	192*64 DOTS
•Display mode.....	STN(BLUE)
•Display type.....	Negative Transmissive
•Backlight.....	LED/5.0V(WHITE)
•Viewing direction.....	6 o'clock
•Operating temperature.....	-20 to 70 °C
•Storage temperature .....	-30 to 80°C
•Driving voltage.....	Single power
•Driving method.....	1/64 duty, 1/9 bias
•Type.....	COB (Chip On Board)
•Controller/Drive IC.....	AIP31107/AIP31108
•Number of data line.....	8-bit parallel
•Connector.....	Pin

## 2. MECHANICAL DATA

ITEM		WIDTH	HEIGHT	THICKNESS	UNIT
Module size		130	65	13.0(MAX)	mm
Viewing area		104	39.0	-	mm
Dot	Size	0.458	0.458	-	mm
	Pitch	0.508	0.508	-	mm
Diameter of mounting hole		Φ 3.0			mm
Weight		About 220			g

### 3. ABSOLUTE MAXIMUM RATINGS

Item	Symbol	Value	Unit
Operating voltage	V <sub>DD</sub>	-0.3 to +7.0	V
Supply Voltage	V <sub>EE</sub>	V <sub>DD</sub> -19.0 to V <sub>DD</sub> +0.3	V
Driveer Supply Voltage	V <sub>B</sub>	-0.3 to V <sub>DD</sub> +0.3	
	V <sub>LCD</sub>	V <sub>EE</sub> -0.3 to V <sub>DD</sub> +0.3	V
Operating temperature	T <sub>OPR</sub>	0—50	°C
Storage temperature	T <sub>sto</sub>	-10—60	°C

### 4. ELECTRICAL CHARACTERISTICS

(V<sub>DD</sub> = +5V ± 10%, V<sub>SS</sub> = 0V, V<sub>DD</sub>-V<sub>EE</sub> = 8 to 17V, T<sub>a</sub> = -20 to 70 °C)

Characteristic	Symbol	Condition	Min	Typ	Max	Unit	Note
Input high voltage	V <sub>IH1</sub>	—	0.7V <sub>DD</sub>	—	V <sub>DD</sub>	V	(1)
	V <sub>IH2</sub>	—	2.0	—	V <sub>DD</sub>	V	(2)
Input low voltage	V <sub>IL1</sub>	—	0	—	0.3V <sub>DD</sub>	V	(1)
	V <sub>IL2</sub>	—	0	—	0.8	V	(2)
Output high voltage	V <sub>OH</sub>	I <sub>OH</sub> = -200μA	2.4	—	—	V	(3)
Output low voltage	V <sub>OL</sub>	I <sub>OL</sub> = 1.6mA	—	—	0.4	V	(3)
Input leakage current	I <sub>LKG</sub>	V <sub>IN</sub> = V <sub>SS</sub> - V <sub>DD</sub>	-1.0	—	1.0	μA	(4)
Three-state(off) input current	I <sub>TSL</sub>	V <sub>IN</sub> = V <sub>SS</sub> - V <sub>DD</sub>	-5.0	—	5.0	μA	(5)
Driver input leakage current	I <sub>DIL</sub>	V <sub>IN</sub> = V <sub>EE</sub> - V <sub>DD</sub>	-2.0	—	2.0	μA	(6)
Operating current	I <sub>DD1</sub>	During display	—	—	100	μA	(7)
	I <sub>DD2</sub>	During access Access cycle = 1MHz	—	—	500	μA	(7)
On resistance	R <sub>ON</sub>	V <sub>DD</sub> -V <sub>EE</sub> = 15V I <sub>LOAD</sub> = ± 0.1mA	—	—	7.5	KΩ	(8)

#### NOTES:

- CL, FRM, M, RSTB, CLK1, CLK2
- CS1B, CS2B, CS3, E, R/W, RS, DB0 - DB7
- DB0 - DB7
- Except DB0 - DB7
- DB0 - DB7 at high impedance
- V<sub>0L</sub>(R), V<sub>2L</sub>(R), V<sub>3L</sub>(R), V<sub>5L</sub>(R)
- 1/64 duty, FCLK = 250kHz, frame frequency = 70HZ, output: no load
- V<sub>DD</sub> - V<sub>EE</sub> = 15.5V  
V<sub>0L</sub>(R) > V<sub>2L</sub>(R) = V<sub>DD</sub> - 2/7 (V<sub>DD</sub>-V<sub>EE</sub>) > V<sub>3L</sub>(R) = V<sub>EE</sub> + 2/7 (V<sub>DD</sub>-V<sub>EE</sub>) > V<sub>5L</sub>(R)

## 4.1 LED ELECTRICAL/OPTICAL CHARACTERISTICS

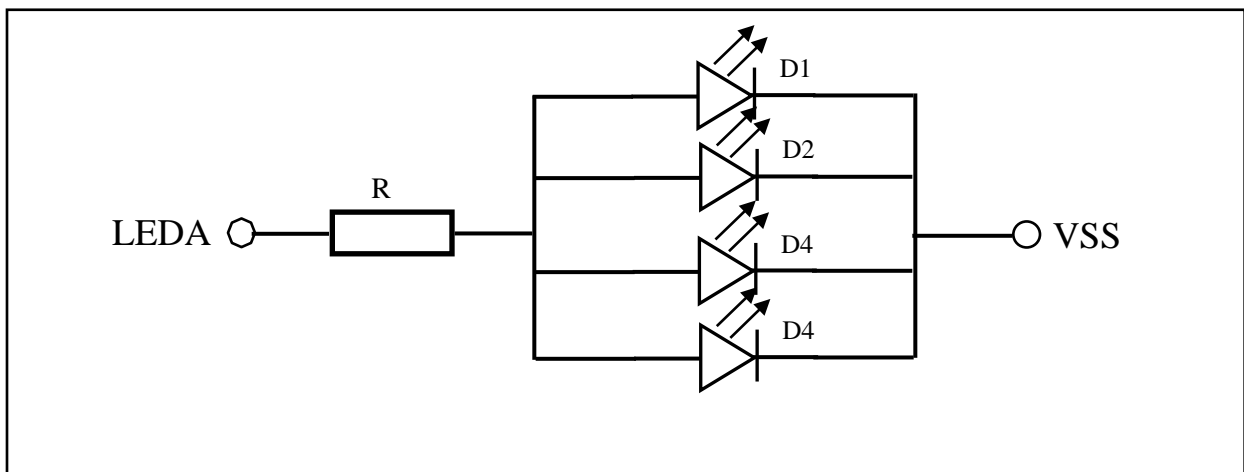
Item	Symbol	min	typ	max	Unit	Condition
Forward Voltage	V <sub>f</sub>	-	5.0	-	V	I <sub>f</sub> =80mA
Reverse Current	I <sub>r</sub>	-	200	-	uA	V <sub>r</sub> =10V
Dominant wave length	λ <sub>d</sub>	-	X=0.29 Y=0.30	-	nm	I <sub>f</sub> =80mA
Spectral Line Half width	Δλ	-	-	-	-	I <sub>f</sub> =80mA
Luminance	L <sub>v</sub>	50	80	-	cd/m <sup>2</sup>	I <sub>f</sub> =80mA

## 4.2 LED ABSOLUTE MAXIMUM RATINGS

Item	Symbol	Condition	Rating	Unit
Reverse Voltage	V <sub>r</sub>	T <sub>a</sub> =25℃	10	V
Absolute maximum forward current	I <sub>fm</sub>	T <sub>a</sub> =25℃	100	mA
Power description	pd	T <sub>a</sub> =25℃	500	mW

### 4.2.1 LED ARRAY BLOCK DIAGRAM

( LED DICE 1×4= 4dices )



### 4.2.2 LED POWER SOURCE

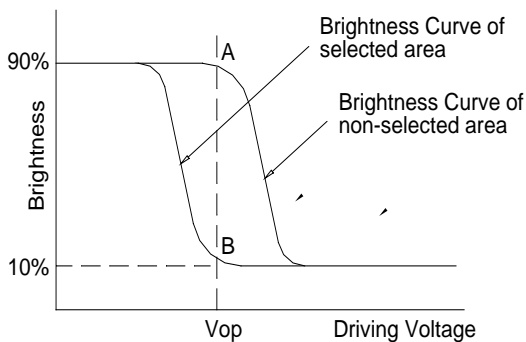
LED	Option	Power source	Jumper setting
	A	20A/1VSS	R9、R16

## 5. ELECTRO-OPTICAL CHARACTERISTICS

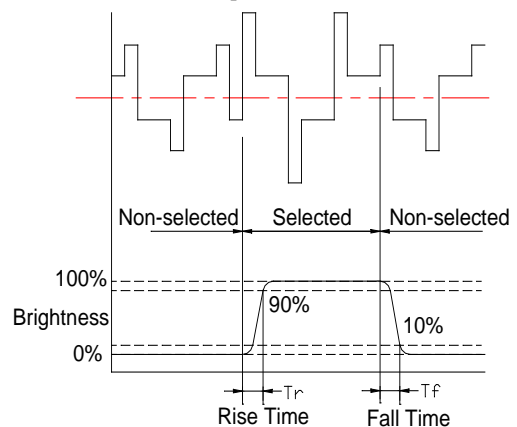
ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	NOTE
Contrast ratio	K	$\varphi=0$	1.4	4	-	-	1
Response time (rise)	Tr	$\varphi=0$	-	250	300	ms	2
Response time (fall)	Tf	$\varphi=0$	-	250	350	ms	2
Viewing angle	$\varphi$	K $\geq 2.0$	-40 -- +40			deg.	3
	$\theta$		-30 -- +30				

### Note 1: Definition of Contrast Ratio "K"

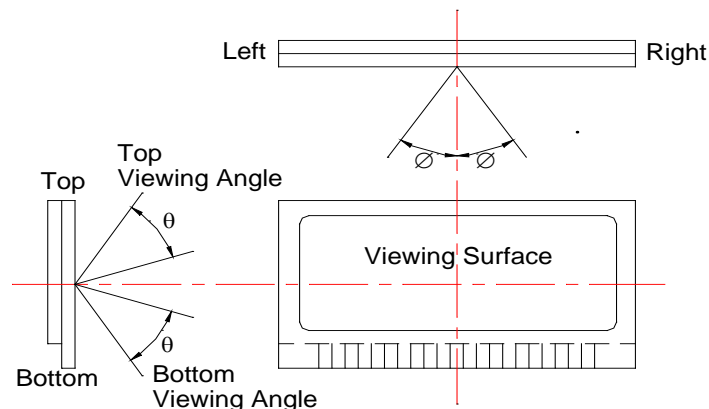
$$K = \frac{\text{Brightness of non-selected segment(A)}}{\text{Brightness of selected segment(B)}}$$



### Note 2: Definition of Optical Response Time



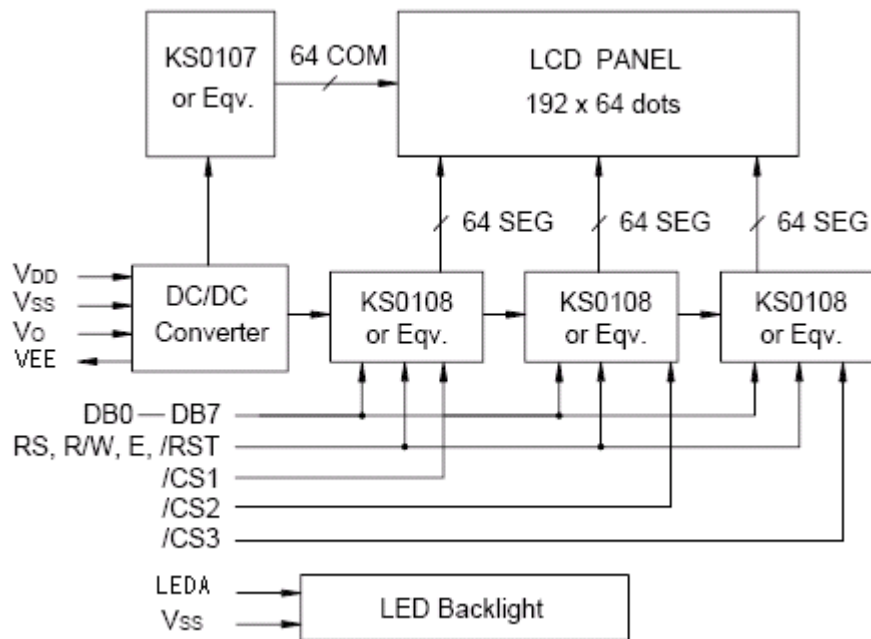
### Note 3: Definition of Viewing Angle



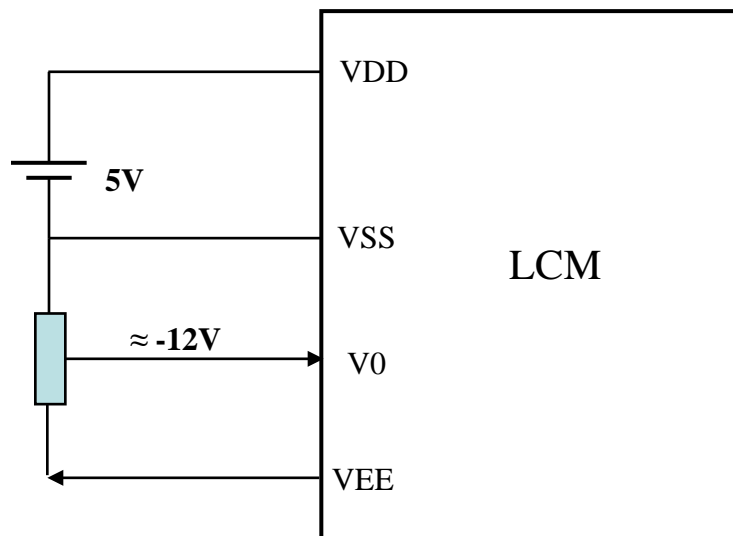
Please select either top or bottom viewing angle



## 6. BLOCK DIAGRAM



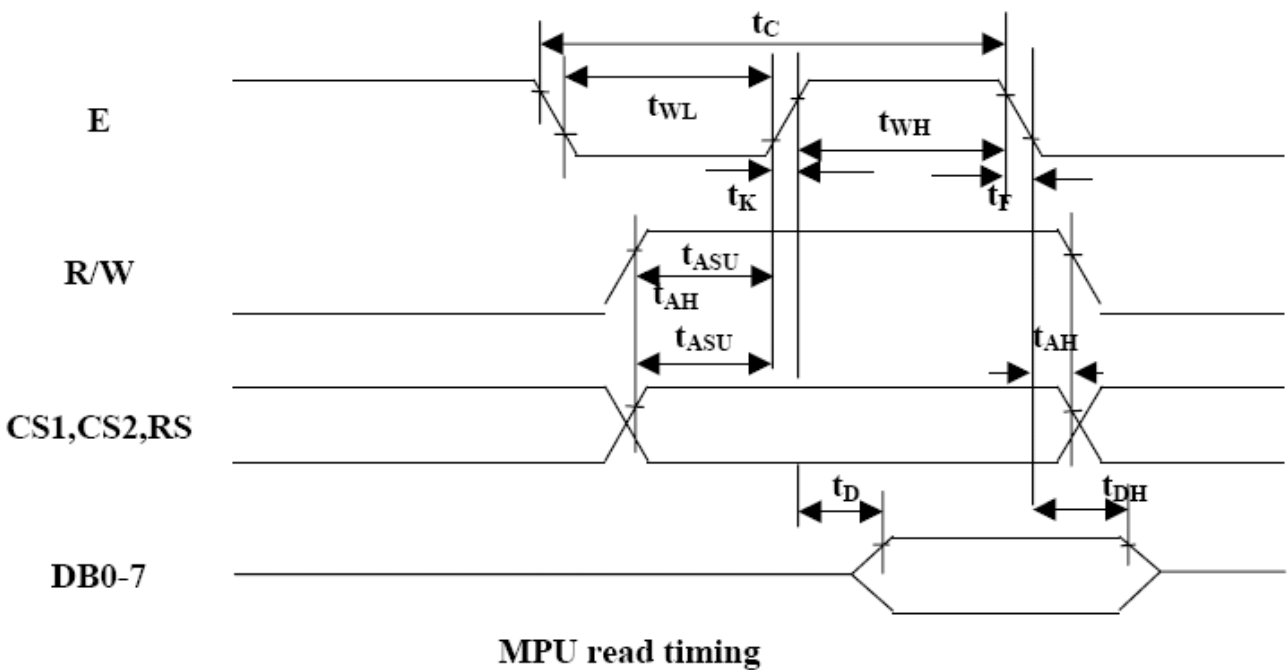
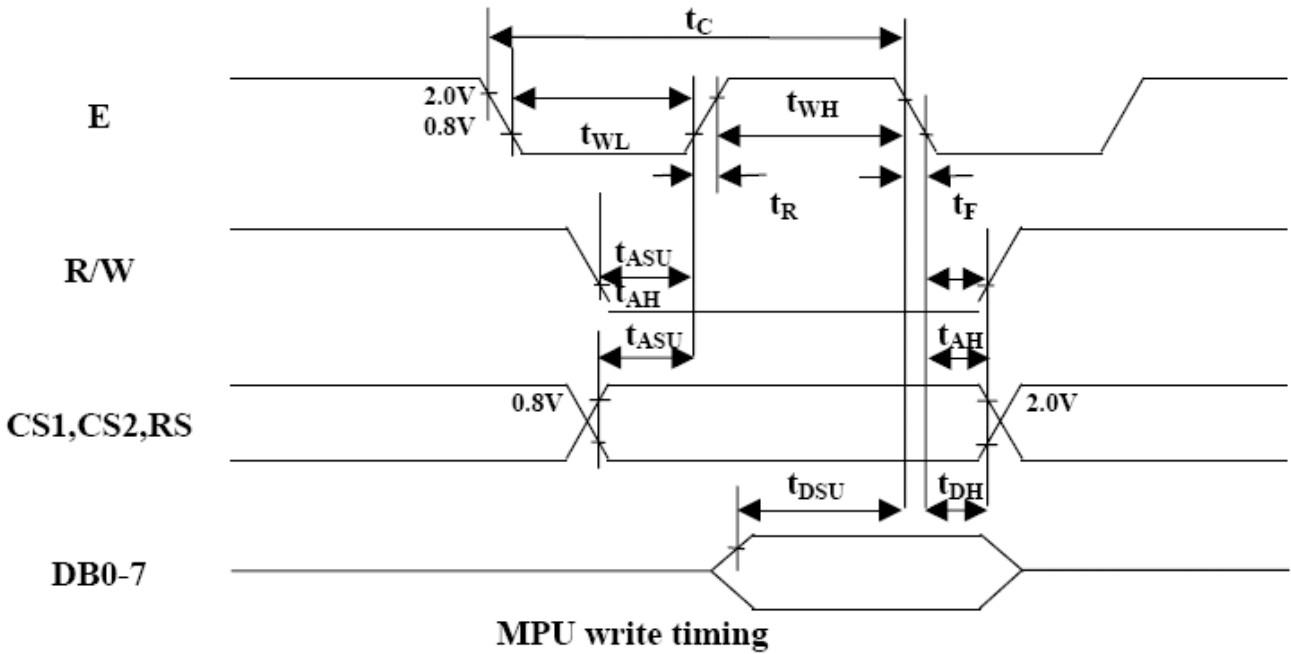
## 7. VOLTAGE REGULATOR CIRCUITS



## 8. TIMING DIAGRAM

### MPU Interface

Characteristic	Symbol	Min	Typ	Max	Unit
E Cycle	$t_c$	1000	--	--	ns
E High Level Width	$t_{WH}$	450	--	--	ns
E Low Level Width	$t_{WL}$	450	--	--	ns
E Rise Time	$t_R$	--	--	25	ns
E Fall Time	$t_F$	--	--	25	ns
Address Set-Up Time	$t_{ASU}$	140	--	--	ns
Address Hold Time	$t_{AH}$	10	--	--	ns
Data Set-Up Time	$t_{SU}$	200	--	--	ns
Data Delay Time	$t_D$	--	--	320	ns
Data Hold Time (Write)	$t_{DHW}$	10	--	--	ns
Data Hold Time (Read)	$t_{DHR}$	20	--	--	ns



## 9. INSTRUCTION SET

### DISPLAY CONTROL INSTRUCTION

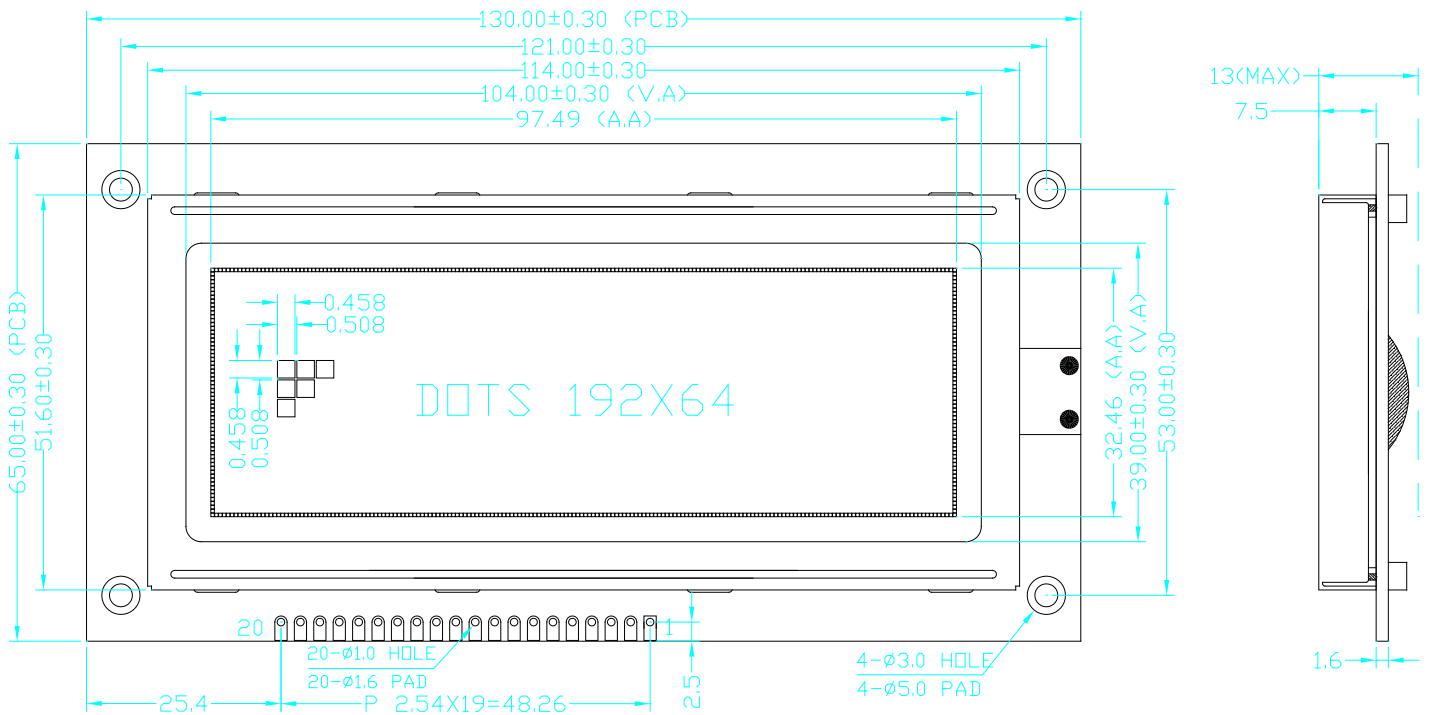
The display control instructions control the internal state of the S6B0108. Instruction is received from MPU to S6B0108 for the display control. The following table shows various instructions.

Instruction	RS	R/W	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0	Function
Display on/off	L	L	L	L	H	H	H	H	H	L/H	Controls the display on or off. Internal status and display RAM data is not affected. L: OFF, H: ON
Set address (Y address)	L	L	L	H	Y address (0 - 63)					Sets the Y address in the Y address counter.	
Set page (X address)	L	L	H	L	H	H	H	Page (0 - 7)			Sets the X address at the X address register.
Display start line (Z address)	L	L	H	H	Display start line (0 - 63)					Indicates the display data RAM displayed at the top of the screen.	
Status read	L	H	Busy	L	On/Off	Reset	L	L	L	L	Read status. BUSY L: Ready H: In operation ON/OFF L: Display ON H: Display OFF RESET L: Normal H: Reset
Write display data	H	L	Write data								Writes data (DB0:7) into display data RAM. After writing instruction, Y address is increased by 1 automatically.
Read display data	H	H	Read data								Reads data (DB0:7) from display data RAM to the data bus.

## 10. INSTRUCTION SEQUENCE

```
INIT:
LCALL DEL20MS
CLR RESET
LCALL DEL20MS
SETB RESET
LCALL DEL20MS
MOV A,#0C0H
LCALL WC1
LCALL WC2
LCALL WC3
MOV A,#3FH
LCALL WC1
LCALL WC2
LCALL WC3
RET
```

# 11. EXTERNAL DIMENSION

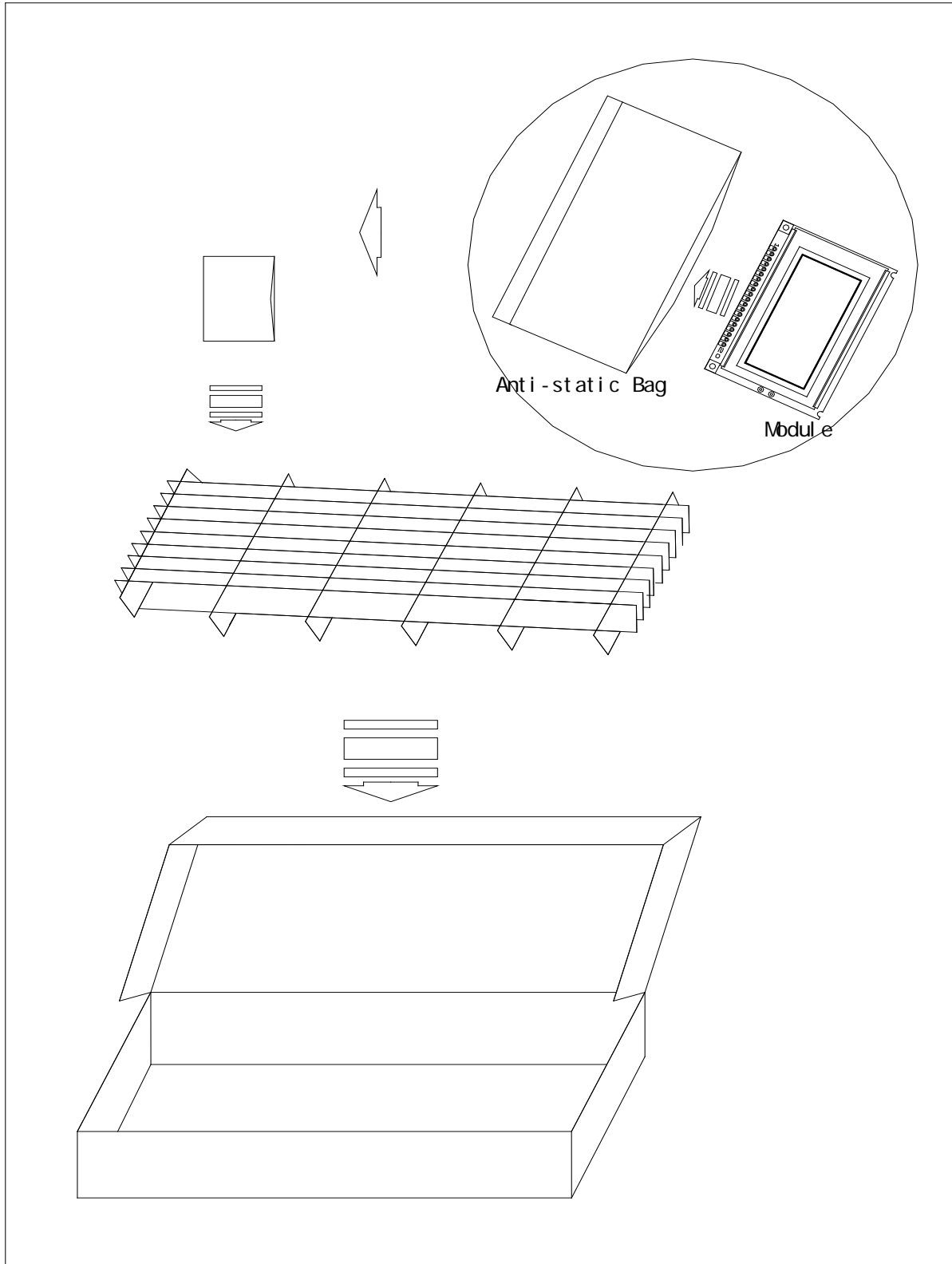


## 12.INTERFACE

Pin No.	Symbol	Level	Function
1	VSS	-	Ground
2	VDD	-	Power Supply for Logic (+5V)
3	VO	-	Power Supply for LCD
4	RS	H/L	Register Selection H: Display Data L: Instruction Code
5	R/W	H/L	Read/Write Selection H: Read Operation L: Write Operation
6	E	H, H→L	Enable Signal.
7	DB0	H/L	Data Bit0
8	DB1	H/L	Data Bit1
9	DB2	H/L	Data Bit2
10	DB3	H/L	Data Bit3
11	DB4	H/L	Data Bit4
12	DB5	H/L	Data Bit5
13	DB6	H/L	Data Bit6
14	DB7	H/L	Data Bit7
15	/CS1	L	Chip Selection for IC1, Active "L"
16	/RST	L	Reset Signal, Active "L"
17	/CS2	L	Chip Selection for IC2, Active "L"
18	/CS3	L	Chip Selection for IC2, Active "L"
19	VEE	--	Negative Voltage Output (-10V)
20	LEDA	--	LED Backlight Power Supply (+5V)

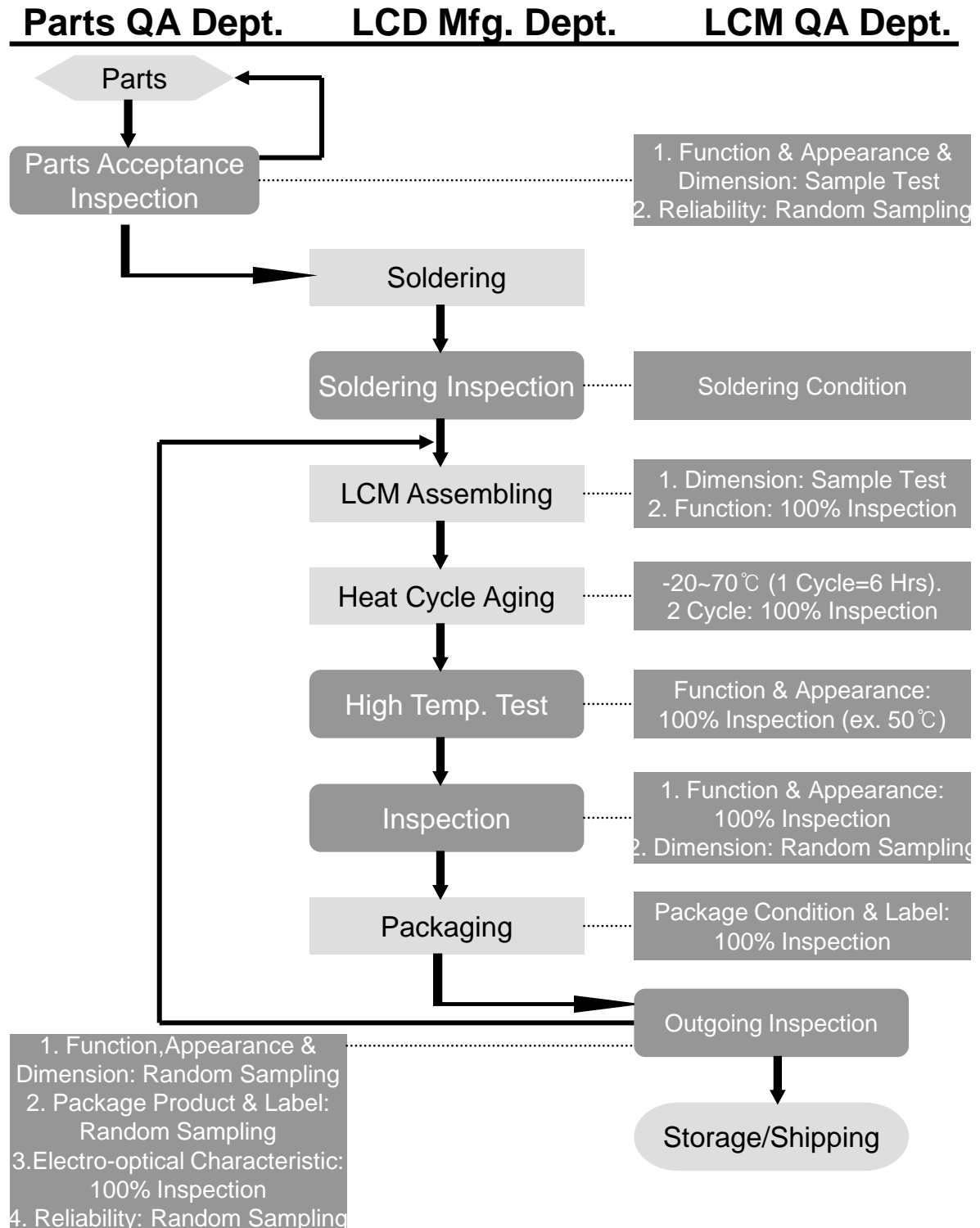
# 13. PACKAGE INFORMATION

A Box include 30pcs





# 14. QC/QA PROCEDURE



## 15. RELIABILITY

### •Operating life time:

Longer than 50000 hours (at room temperature without direct irradiation of sunlight)

### •Reliability Characteristics:

Item	Test	Criterion
High temp	50°C / 200 Hrs	■Total current consumption should be below double of initial value ■Contrast ratio should be within initial value $\pm 50\%$ ■No defect in cosmetic and operational function is allowable
Low temp.	0°C / 200 Hrs	
High humidity	40°C * 90%RH / 200 Hrs	
Thermal shock	0°C→25°C→50°C→25°C /5 Cycles (30min) (5min) (30min) (5min)	
Vibration	1.Operating time: Thirty minutes exposure in each direction (x, y, z) 2.Sweep Frequency (1min):10Hz→ 55Hz→10Hz 3.Amplitude: 0.75mm double amplitude	

## 16. Handling Precaution

### 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)

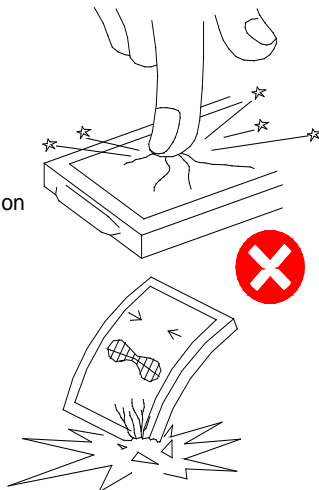
Optrex products are not designed, intended, or authorized for use in any application which the failure of the product could result in a situation where personal injury or death may occur. These applications include, but are not limited to, life-sustaining equipment, nuclear control devices, aerospace 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.

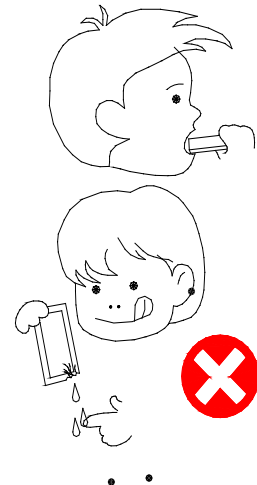
### No Press and Shock!

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



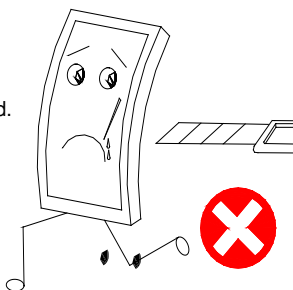
### Don't Swallow or Touch Liquid Crystal!

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



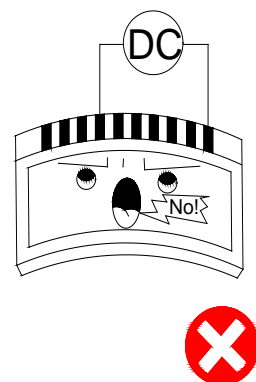
### Don't not Scratch!

Polarizer is a soft material and can easily be scratched.



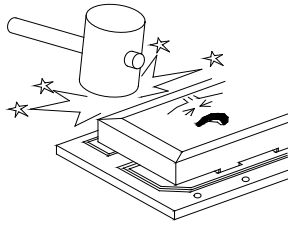
### No DC Voltage to LCD!

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

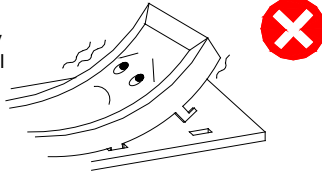


## Don't Press the Metallic Frame and Disassemble the LCM

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.

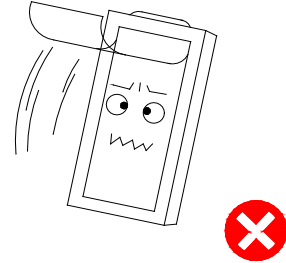


LCD may be shifted or conductive rubber may be reshaped, which will cause defects.



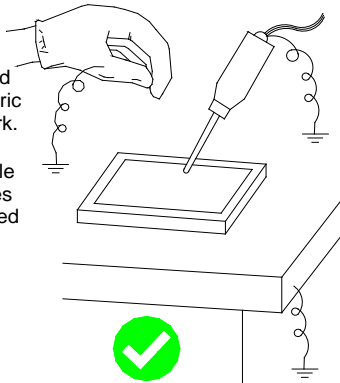
## Slowly Peel Off Protective Film!

Avoid static electricity.



## Avoid Static Electricity!

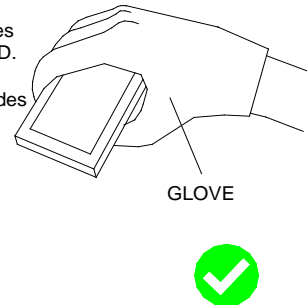
Please be sure to ground human body and electric appliances during work. It is preferable to use conductive mat on table and wear cotton clothes or conduction processed fiber. Synthetic fiber is not recommended.



## 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.



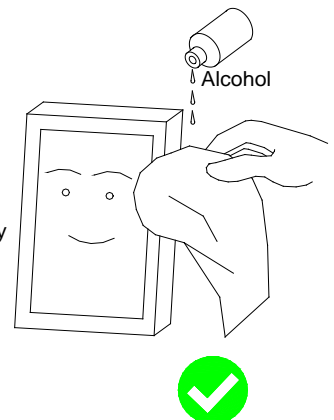
## Keep Away From Extreme Heat and Humidity!

LCD deteriorates.



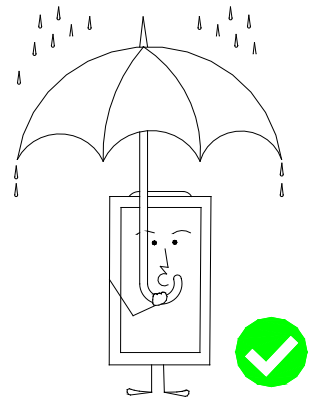
## Use Alcohol to Clean Terminals!

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:  $280 \pm 10$  °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 °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.