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# **SPECIFICATION FOR LCM MODULE**

**MODULE NO.: O EV24: C34VY 462542RN  
DOC. REVISION 02**

	SIGNATURE	DATE
PREPARED BY (RD ENGINEER)		2010-03-28
PREPARED BY (QA ENGINEER)		
CHECKED BY		
APPROVED BY		

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## 1. GENERAL DESCRIPTION

The OEV24: C34VY 462542RN is a 240RGB320 dot-matrix TFT LCD module. It has an TFT panel composed of 240RGB segments and 320 commons. The LCM can be easily accessed by micro controller via parallel interface.

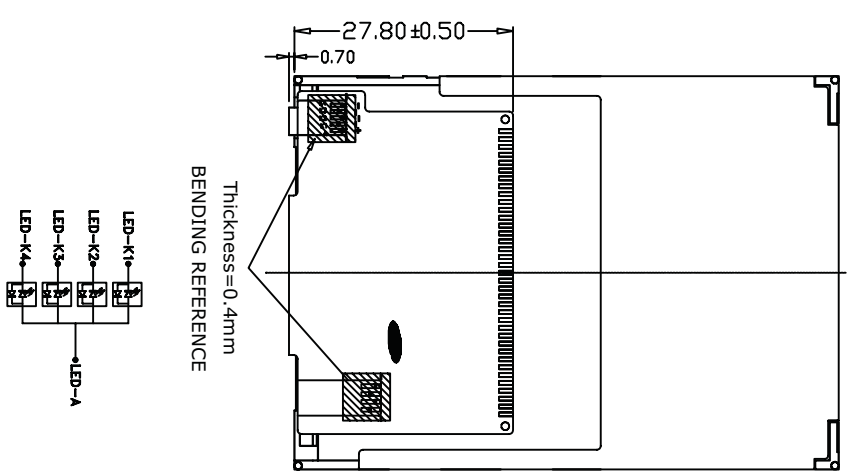
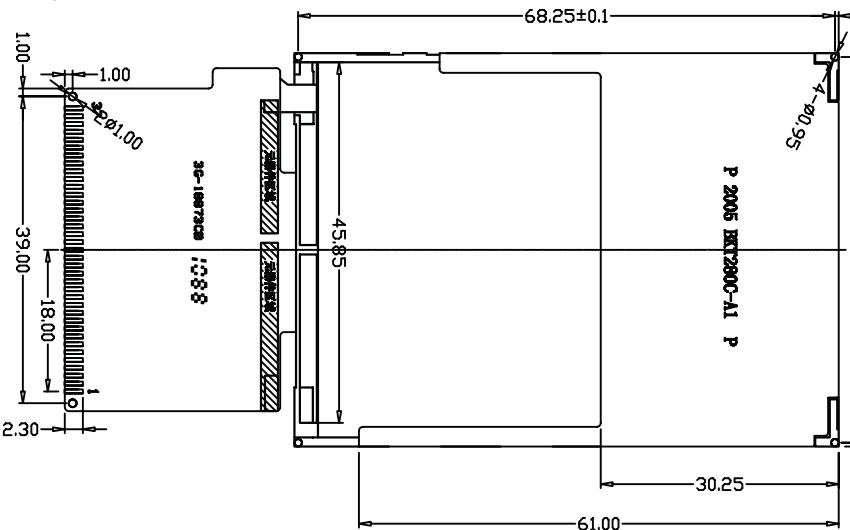
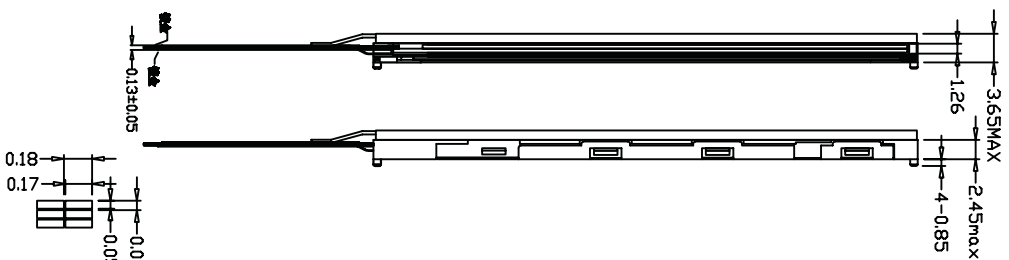
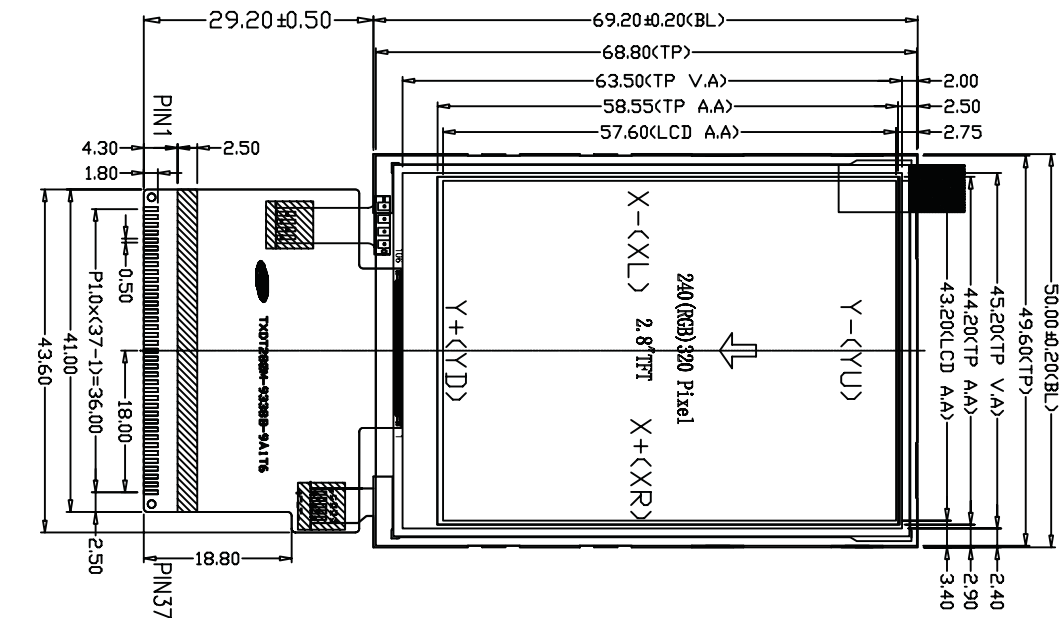
## 2. FEATURES

<b>Display Mode</b>	TFT/262K COLOR
<b>Display Format</b>	Graphic 240RGB320 Dot-matrix
<b>Input Data</b>	Parallel data input from MPU
<b>Screen size(inch)</b>	2.8'(diagonal)
<b>Viewing Direction</b>	12 O'clock
<b>Interface</b>	8080 16&8 bits data bus
<b>Driver</b>	ILI9338B
<b>Backlight type</b>	White LED

## 3. MECHANICAL SPECIFICATION

<b>Item</b>	<b>Specifications</b>	<b>Unit</b>
Dimensional outline	50.0(W)x69.2(H)x3.7(T) (FPC not include)	mm
Resolution	240RGB320 DOT	dots
Active Area	57.6 (W) × 43.2 (H)	mm
Dots pitch	0.18 (W) × 0.18(H)	mm

## 4. MECHANICAL DIMENSION



PIN	SYMBOL
1	DB0
2	DB1
3	DB2
4	DB3
5	GND
6	IO/CC
7	/CS
8	RS
9	/WR
10	/RD
11	IM0
12	XR
13	YD
14	XL
15	YU
16	LEDA
17	LEDK1
18	LEDK2
19	LEDK3
20	LEDK4
21	NC
22	DB4
23	DB8
24	DB9
25	DB10
26	DB11
27	DB12
28	DB13
29	DB14
30	DB15
31	/RESET
32	VCI
33	IO/CC
34	GND
35	DB5
36	DB6
37	DB7

NOTE:  
ILI9338B

REVISED RECORD

MCT028A12TW240320PL

1. DISPLAY TYPE	262K TFT	5. OPERATIVE VOLTAGE	3.0v	B																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
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## 5. MAXIMUM RATINGS

Item	Symbol	Unit	Value	Note
Power supply voltage (1)	VCC, IOVCC	V	-0.3 ~ +4.6	1, 2
Power supply voltage (1)	VCI - AGND	V	-0.3 ~ +4.6	1, 4
Power supply voltage (1)	DDVDH - AGND	V	-0.3 ~ +6.0	1, 4
Power supply voltage (1)	AGND - VCL	V	-0.3 ~ +4.6	1
Power supply voltage (1)	DDVDH - VCL	V	-0.3 ~ +9.0	1, 5
Power supply voltage (1)	VGH - AGND	V	-0.3 ~ +18.5	1, 5
Power supply voltage (1)	AGND - VGL	V	-0.3 ~ +18.5	1, 6
Input voltage	Vt	V	-0.3 ~ VCC+0.3	1
Operating temperature	Topr	°C	-40 ~ +85	8, 9
Storage temperature	Tstg	°C	-55 ~ +110	8, 9

Notes:

1. VCC, DGND must be maintained
2. (High) (VCC = VCC) ≥ DGND (Low); (High) IOVCC ≥ DGND (Low); 2. (High) (VCC = VCC) ≥ DGND (Low); (High) IOVCC ≥ DGND (Low)
3. Make sure (High) VCI ≥ DGND (Low).
4. Make sure (High) DDVDH ≥ ASSD (Low).
5. Make sure (High) DDVDH ≥ VCL (Low).
6. Make sure (High) VGH ≥ ASSD (Low).
7. Make sure (High) ASSD ≥ VGL (Low).
8. For die and wafer products, specified up to 85°C.
9. This temperature specifications apply to the TCP package

Notes:

1. VCC, DGND must be maintained
2. (High) (VCC = VCC) ≥ DGND (Low); (High) IOVCC ≥ DGND (Low); 2. (High) (VCC = VCC) ≥ DGND (Low); (High) IOVCC ≥ DGND (Low)
3. Make sure (High) VCI ≥ DGND (Low).
4. Make sure (High) DDVDH ≥ ASSD (Low).
5. Make sure (High) DDVDH ≥ VCL (Low).
6. Make sure (High) VGH ≥ ASSD (Low).
7. Make sure (High) ASSD ≥ VGL (Low).
8. For die and wafer products, specified up to 85°C.
9. This temperature specifications apply to the TCP package

## 6. ELECTRICAL CHARACTERISTICS

Item		Symbol	Condition	Min.	Typ.	Max.	Unit
Supply Voltage	Logic	V <sub>DD</sub>	-	2.5	3.0	3.3	V
Input Voltage	H level	V <sub>IH</sub>	-	0.8V <sub>DD</sub>	-	V <sub>DD</sub>	V
	L level	V <sub>IL</sub>		V <sub>SS</sub>	-	0.2V <sub>DD</sub>	
Current Consumption		I <sub>DD</sub>	-	-	-	-	mA

### BACKLIGHT

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Supply Voltage	V <sub>DD</sub>	—	2.9		3.4	V
Current Consumption	I <sub>DD</sub>	—	60	-	-	mA
Operating temperature	T <sub>opr</sub>		-20	—	+70	°C
Storage temperature	T <sub>stg</sub>		-30	—	80	°C

## 7. MODULE FUNCTION DESCRIPTION

### 7.1. PIN DESCRIPTION

Pin No.	Symbol	I/O	Functional
1~4	DB0~DB3	I/O	Data bus0~3
5	GND	I	System ground
6	IOVCC	P	Power supply for interface pins
7	/CS	I	Chip select signal. Low: chip can be accessed; High: chip cannot be accessed
8	RS	I	Display data/command selection pin in MCU interface RS='1': display data RS='0': command data
9	/WR	I	Write enable clock input pin. The data on DB0 to DB15 are latched at the rising edge of the WR signal.
10	/RD	I	Read enable clock input pin. When RD is 'L', DB0 to DB15 are in an output status.
11	IM0	I	IM0=0,16-bit interface is selected ,DB[0:15] is used; IM0=1,8-bit interface is selected ,DB[8:15] is used;
12	XR	P	Touch panel XR signal
13	YD	P	Touch panel YD signal
14	XL	P	Touch panel XL signal
15	YU	P	Touch panel YU signal
16	LEDA	P	Power supply Anode input for backlight.
17~20	LEDK1~4	P	Power supply Cathode input for backlight
21	NC	-	No used
22	DB4	I/O	Data bus4
23~30	DB8~DB15	I/O	Data bus8~15
31	/RESET	P	Reset input Pin
32	VCI	P	Power supply for analog circuit 2.5-3.3v
33	IOVCC	P	Power supply for interface pins
34	GND	P	System ground
35~37	DB5~DB7	I/O	Data bus5~7

## 8. ELECTRO-OPTICAL CHARACTERISTICS

Item	Symbol	Conditions	Specifications			Unit	Note
			Min.	Typ.	Max.		
Transmittance	T%	Viewing normal angle $\theta_x = \theta_y = 0^\circ$	-	5.8	-	%	All left side data are based on CMO's following condition – 1. LC Type: TN 2. Light Source : CMO LED BLU 3. Film : Nitto Linear Polarizer (NPF-TEG1465DU) 4. Machine : DMS
Contrast Ratio	CR		150	250	-		
Response Time	$T_R$		-	10	20	ms	
	$T_F$		-	20	30	ms	
Viewing Angle	Hor.	$\theta_{x+}$	-	45	-	deg.	
		$\theta_{x-}$	-	45	-		
	Ver.	$\theta_{y+}$	-	35	-		
		$\theta_{y-}$	-	15	-		
CF only Chromaticity	Red	$X_R$	0.602	0.632	0.662		Under C light Simulation CG : NTSC 61%
		$Y_R$	0.296	0.326	0.358		
	Green	$X_G$	0.266	0.296	0.326		
		$Y_G$	0.546	0.576	0.606		
	Blue	$X_B$	0.103	0.133	0.163		
		$Y_B$	0.092	0.122	0.152		
	White	$X_W$	0.274	0.304	0.334		
		$Y_W$	0.304	0.334	0.364		

Note (1) Definition of Contrast Ratio (CR):

The contrast ratio can be calculated by the following expression.

$$\text{Contrast Ratio (CR)} = L_{63} / L_0$$

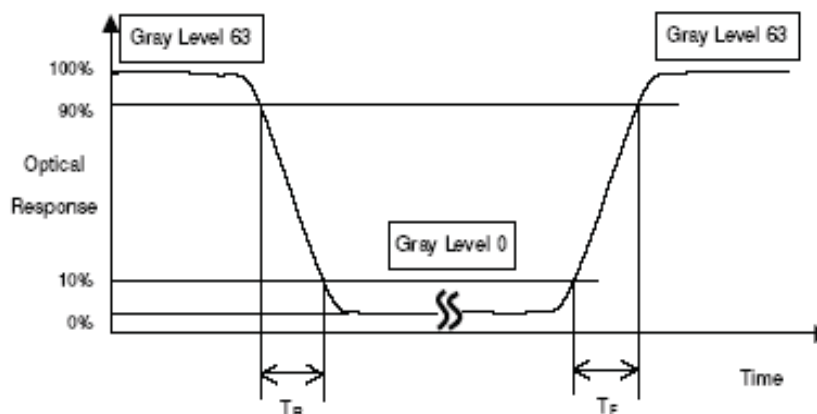
$L_{63}$ : Luminance of gray level 63

$L_0$ : Luminance of gray level 0

$$CR = CR(10)$$

CR (X) is corresponding to the Contrast Ratio of the point X at Figure in Note (5).

Note (2) Definition of Response Time ( $T_R$ ,  $T_F$ ):





## 9. INSPECTION CRITERIA

### 9.1. INSPECTION CONDITIONS

#### 9.1.1. Environmental conditions

The environmental conditions for inspection shall be as follows

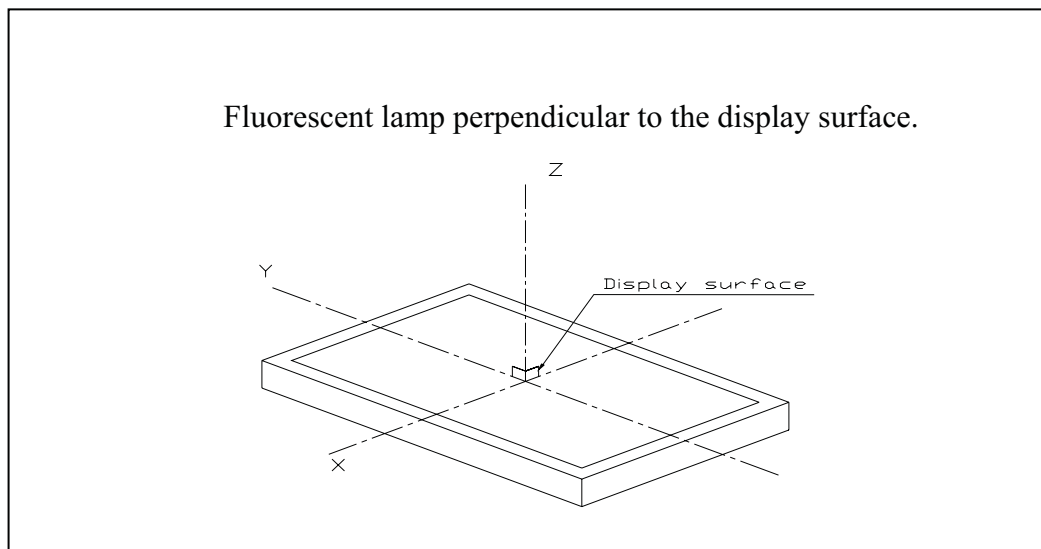
Room temperature:  $20 \pm 3^{\circ}\text{C}$

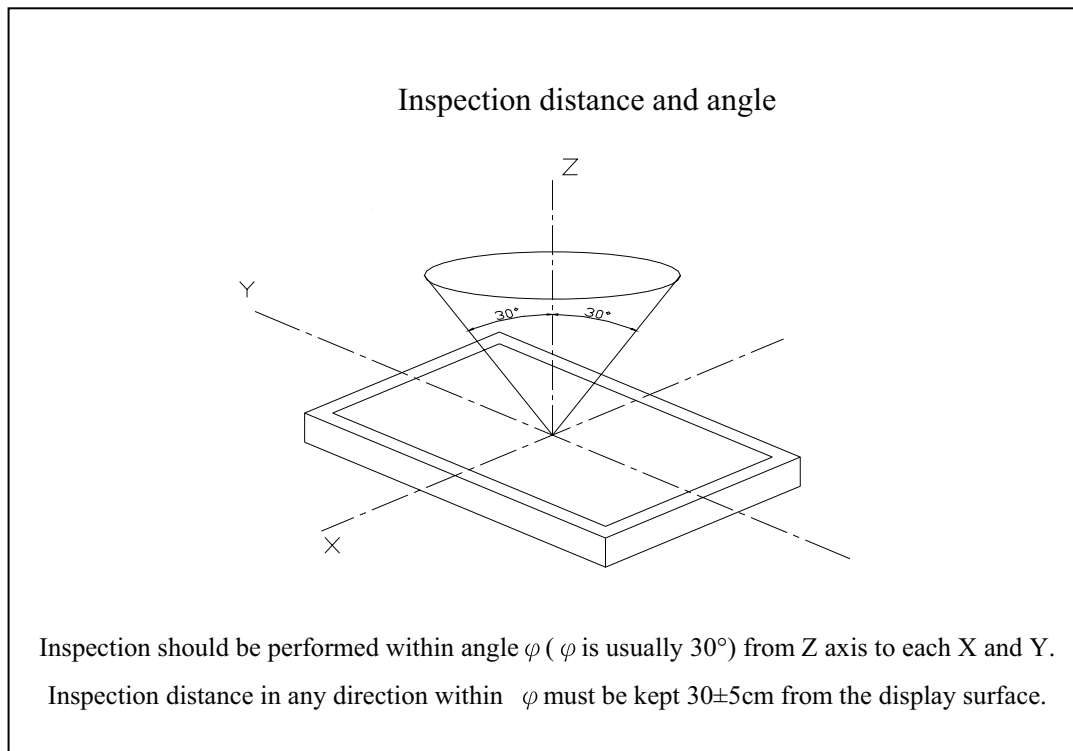
Humidity:  $65 \pm 20\% \text{RH}$

#### 9.1.2. The external visual inspection

With a single 20-watt fluorescent lamp as the light source, the inspection was in the distance of 30cm or more from the LCD to the inspector's eyes .

### 9.2. LIGHT METHOD





## 9.3. CLASSIFICATION OF DEFECTS

### 9.3.1. Major defect

A major defect refers to a defect that may substantially degrade usability for product applications.

### 9.3.2. Minor defect

A minor defect refers to a defect which is not considered to be able substantially degrade the product application or a defect that deviates from existing standards almost unrelated to the effective use of the product or its operation.

## 10.RELIABILITY

### 10.1. MTBF

The LCD module shall be designed to meet a minimum MTBF value of 50000 hours with normal. (25°C in the room without sunlight)

### 10.2. TESTS

NO.	ITEM	CONDITION	CRITERION
1	HIGH TEMPERATURE OPERATING	70°C 240Hrs	NO DEFECT IN COSMETIC AND OPERATIONAL FUNCTION ARE ALLOWABLE.  TOTAL CURRENT CONSUMPTION SHOULD BELOW DOUBLE OF INITIAL VALUE.
2	LOW TEMPERATURE OPERATING	-20°C 240Hrs	
3	HIGH HUMIDITY NON-OPERATING	70°C ,90%RH ,96Hrs	
4	HIGH TEMPERATURE NON-OPERATING	80°C 240Hrs	
5	LOW TEMPERATURE NON-OPERATING	-30°C 240Hrs	
6	TEMPERATURE CYCLING NON-OPERATING	-20°C ↔ 25°C ↔ 70°C 30Min 5Min 30Min 50 CYCLES	
7	VIBRATION NON-OPERATING	RANDOM WAVE 40~500HZ ACCELERATION:5g 50Sec/EACH DIRECTION (X,Y,Z)	

## 11. PRECAUTIONS FOR USING LCD MODULES

### 11.1. HANDING PRECAUTIONS

- (1) The display panel is made of glass. Do not subject it to a mechanical shock or impact by dropping it.
- (2) If the display panel is damaged and the liquid crystal substance leaks out, be sure not to get any in your mouth. If the substance contacts your skin or clothes, wash it off using soap and water.
- (3) Do not apply excessive force to the display surface or the adjoining areas since this may cause the color tone to vary.
- (4) The polarizer covering the display surface of the LCD module is soft and easily scratched. Handle this polarizer carefully.
- (5) If the display surface becomes contaminated, breathe on the surface and gently wipe it with a soft dry cloth. If it is heavily contaminated, moisten a cloth with one of the following solvents:
  - Isopropyl alcohol
  - Ethyl alcohol
- (6) Solvents other than those above mentioned may damage the polarizer.  
Especially, do not use the following:
  - Water
  - Ketone
  - Aromatic solvents
- (7) Extra care to minimize corrosion of the electrode. Water droplets, moisture condensation or a current flow in a high-humidity environment accelerates corrosion of the electrode.
- (8) Install the LCD Module by using the mounting holes. When mounting the LCD Module, make sure it is free of twisting, warping and distortion. In particular, do not forcibly pull or bend the I/O cable or the backlight cable.
- (9) Do not attempt to disassemble or process the LCD Module.
- (10) NC terminal should be open. Do not connect anything.
- (11) If the logic circuit power is off, do not apply the input signals.
- (12) To prevent destruction of the elements by static electricity, be careful to maintain an optimum work environment.

- Be sure to ground the body when handling the LCD Module.
- Tools required for assembling, such as soldering irons, must be properly grounded.
- To reduce the amount of static electricity generated, do not conduct assembling and other work under dry conditions.
- The LCD Module is coated with a film to protect the display surface. Exercise care when peeling off this protective film since static electricity may be generated.

## 11.2. STORAGE PRECAUTIONS

When storing The LCD Module, avoid exposure to direct sunlight of fluorescent lamps. Keep the modules in bags (avoid high temperature/ high humidity and low temperatures below 0°C). Whenever possible, the LCD Module should be stored in the same conditions in which they were shipped from our company.

## 11.3. OTHERS

Liquid crystals solidify under low temperature (below the storage temperature range) leading to defective orientation or the generation of air bubbles (black or white). Air bubbles may also be generated if the module is subject to a low temperature.

If the LCD Module have been operating for a long time showing the same display patterns the display patterns may remain on the screen as ghost images and a slight contrast irregularity may also appear. A normal operating status can be recovered by suspending use for some time. It should be noted that this phenomenon does not adversely affect performance reliability.

To minimize the performance degradation of the LCD Module resulting from destruction caused by static electricity etc. exercise care to avoid holding the following sections when handling the modules.

- Exposed area of the printed circuit board.
- Terminal electrode sections.

## 12. USING LCD MODULES

### 12.1. LIQUID CRYSTAL DISPLAY MODULES

LCD is composed of glass and polarizer. Pay attention to the following items when handling.

- (1) Please keep the temperature within specified range for use and storage. Polarization degradation, bubble generation or polarizer peel-off may occur with high temperature and high humidity.
- (2) Do not touch, push or rub the exposed polarizers with anything harder than a HB pencil lead (glass, tweezers, etc).
- (3) N-hexane is recommended for cleaning the adhesives used to attach front/rear polarizers and reflectors made of organic substances, which will be damaged by chemicals such as acetone, toluene, toluene, ethanol and isopropyl alcohol.
- (4) When the display surface becomes dusty, wipe gently with absorbent cotton or other soft material like chamois soaked in petroleum ether. Do not scrub hard to avoid damaging the display surface.
- (5) Wipe off saliva or water drops immediately, contact with water over a long period of time may cause deformation or color fading.
- (6) Avoid contacting oil and fats.
- (7) Condensation on the surface and contact with terminals due to cold will damage, stain or polarizers. After products are tested at low temperature they must be warmed up in a container before coming in contact with room temperature air.
- (8) Do not put or attach anything on the display area to avoid leaving marks on.
- (9) Do not touch the display with bare hands. This will stain the display area and degrade insulation between terminals (some cosmetics are determinate to the polarizers).
- (10) As glass is fragile, it tends to become or chipped during handling especially on the edges. Please avoid dropping or jarring.

## 12.2. INSTALLING LCD MODULE

Attend to the following items when installing the LCM.

- (1) Cover the surface with a transparent protective plate to protect the polarizer and LC cell.
- (2) When assembling the LCM into other equipment, the spacer to the bit between the LCM and the fitting plate should have enough height to avoid causing stress to the module surface, refer to the individual specifications for measurements. The measurement tolerance should be  $\pm 0.1\text{mm}$ .

## 12.3. ELECTRO-STATIC DISCHARGE CONTROL

Since this module uses a CMOS LSI, the same careful attention should be paid for electrostatic discharge as for an ordinary CMOS IC.

- (1) Make certain that you are grounded when handling LCM.
- (2) Before removing LCM from its packing case or incorporating it into a set, be sure the module and your body have the same electric potential.
- (3) When soldering the terminal of LCM, make certain the AC power source for the soldering iron does not leak.
- (4) When using an electric screwdriver to attach LCM, the screwdriver should be of ground potentiality to minimize as much as possible any transmission of electromagnetic waves produced sparks coming from the commutator of the motor.
- (5) As far as possible, make the electric potential of your work clothes and that of the workbenches to the ground potential.
- (6) To reduce the generation of static electricity, be careful that the air in the work is not too dried. A relative humidity of 50%-60% is recommended.

## 12.4. PRECAUTION FOR SOLDERING TO THE LCM

- (1) Observe the following when soldering lead wire, connector cable and etc. to the LCM.
  - Soldering iron temperature:  $280 \pm 10^\circ\text{C}$ .
  - Soldering time: 3-4 sec.
  - Solder: eutectic solder.

If soldering flux is used, be sure to remove any remaining flux after finishing to soldering operation. (This does not apply in the case of a non-halogen type of flux.) It is recommended that you protect the LCD surface with a cover during soldering the

prevent any damage due to flux spatters.

- (2) When soldering the electroluminescent panel and PC board, the panel and board should not be detached more than three times. This maximum number is determined by the temperature and time conditions mentioned above, though there may be some variance depending on the temperature of the soldering iron.
- (3) When removing the electroluminescent panel from the PC board, be sure the solder has completely melted, otherwise the soldered pad on the PC board could be damaged.

## 12.5. PRECAUTIONS FOR OPERATION

- (1) Viewing angle varies with the change of liquid crystal driving voltage ( $V_o$ ). Adjust  $V_o$  to show the best contrast.
- (2) Driving the LCD in the voltage above the limit will shorten its lifetime.
- (3) Response time is greatly delayed at temperature below the operating temperature range. However, this does not mean the LCD will be out of the order. It will recover when it returns to the specified temperature range.
- (4) If the display area is pushed hard during operation, the display will become abnormal. However, it will return to normal if it is turned off and then on.
- (5) Condensation on terminals can cause an electrochemical reaction disrupting the terminal circuit. Therefore, it must be used under the relative condition of 40°C, 50% RH.
- (6) When turning the power on, input each signal after the positive/negative voltage becomes stable.

## 12.6. STORAGE

When storing LCDS as spares for some years, the following precaution are necessary.

- (1) Store them in a sealed polyethylene bag. If properly sealed, there is no need for desiccant.
- (2) Store them in a dark place. Do not expose to sunlight or fluorescent light, keep the temperature between 0°C and 35°C.
- (3) The polarizer surface should not come in contact with any other objects. (We advise you to store them in the container in which they were shipped.)
- (4) Environmental conditions:
  - Do not leave them for more than 168hrs. at 60 °C.
  - Should not be left for more than 48hrs. at -20 °C.

