MULTI-INNO TECHNOLOGY CO., LTD.

www.multi-inno.com

LCD MODULE SPECIFICATION

Model : MI640480D-T

This module uses ROHS material

For Customer's Acceptance:

Customer	
Approved	
Comment	

This specification may change without prior notice in order to improve performance or quality. Please contact Multi-Inno for updated specification and product status before design for this product or release of this order.	Revision	1.0
	Engineering	
	Date	2012-11-27
	Our Reference	

REVISION RECORD

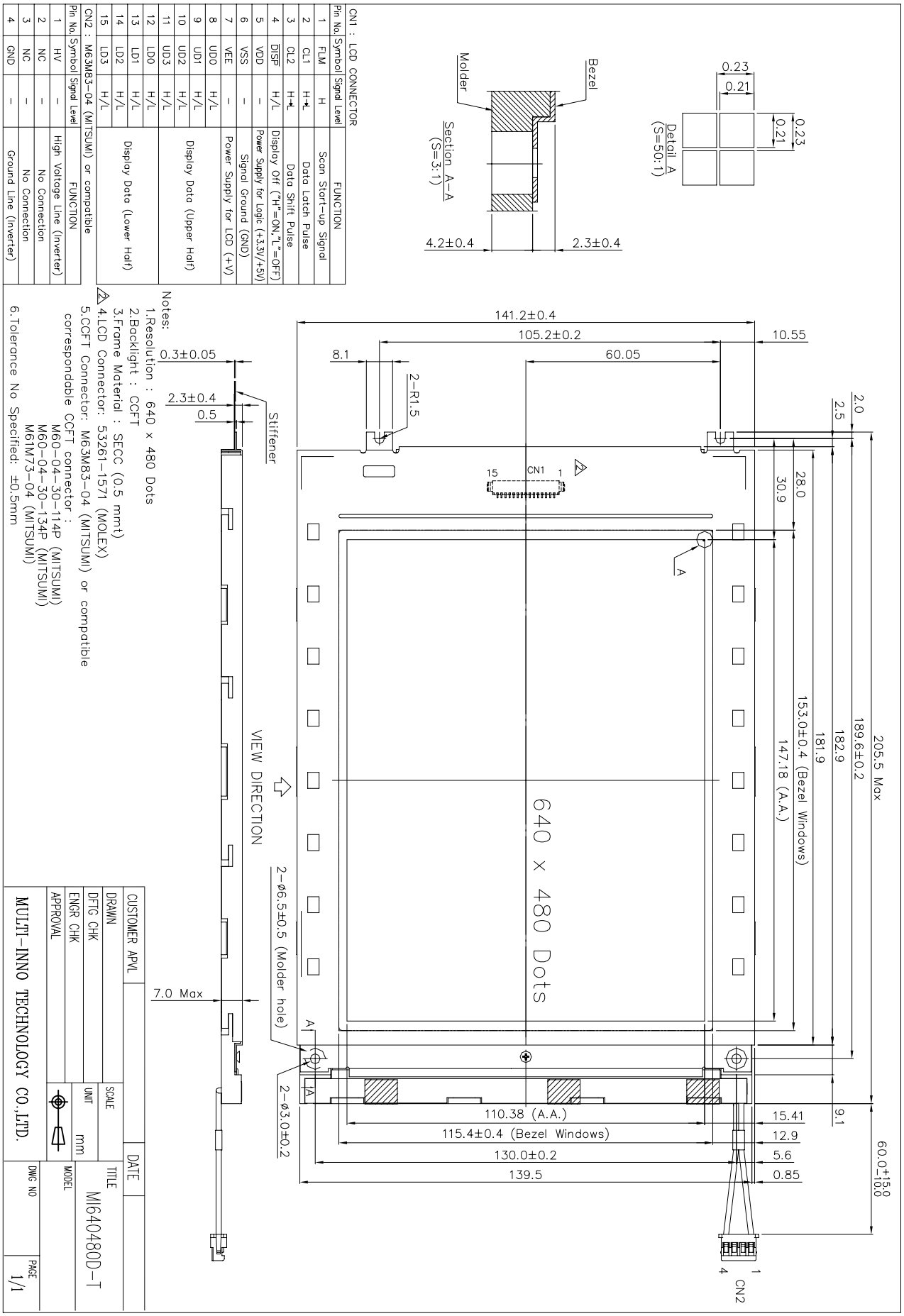
REV NO.	REV DATE	CONTENTS	REMARKS
1.0	2012-11-27	First release	\

CONTENTS

■ GENERAL INFORMATION

Item of general information	Contents	Unit
LCD type	Negative image/Transmissive/Normal black	/
Recommended Viewing Direction	6：00	O’ Clock
Module area (W × H×T)	205.5×141.0×7.0	mm^3
Viewing area (W×H)	153.0×115.4	mm^2
Dot size (W ×H)	0.21×0.21	mm^2
Dot pitch (W×H)	0.23×0.23	mm^2
Number of Dots	640×480	/
Duty	1/240	/
Input voltage	3.3	V
Backlight Type	CCFL	/
Weight	310	g

■ EXTERNAL DIMENSIONS



■ ABSOLUTE MAXIMUM RATINGS

Parameter of absolute maximum ratings	Symbol	Min	Max	Unit
Power supply for voltage	VDD-VSS	-0.3	5.5	V
Input voltage	VIN	-0.3	VDD+0.3	V
Power supply for LCD drive	VEE-VSS	0	27	V
Operating temperature	Top	-20	70	°C
Storage temperature	TST	-30	80	°C
Static electricity	-	-	-	-

Note 1 LCM should be grounded during handling LCM.

Note 2 Ta ≦ 70℃ : 75%RH MAX.

Note 3 Please refer to item of reliability test.

Note 4 Background color will change slightly depending on ambient temperature. That phenomenon is reversible.

■ ELECTRICAL CHARACTERISTICS

ITEM	SYMBOL	CONDITION		MIN.	TYP.	MAX.	UNIT
Power Supply for Logic	VDD-VSS	—		3.0	3.3	3.6	V
Input Voltage	VIH	H Level		0.8VDD	—	VDD	V
	VIL	L Level		0	—	0.2VDD	
Recommended LC Driving Voltage	VEE-VSS (Vop)	Duty = 1/240	-20℃ | 25℃ | 70℃	25.5	26	26.5	V
Power Supply Current (Ta=25℃)	IDD	VDD-VSS=3.3V VEE-VSS = 26V FLM=74.4Hz Pattern:		—	4	6	mA
	IEE			—	25	40	
LCM Surface Luminance (Ta=25℃)	L	Lamp current IL=5mA	Dots All Off	120	150	—	cd/㎡
			Dots All On	—	7	—	

■ BACKLIGHT CHARACTERISTICS

ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT	REMARK
Lamp Voltage	VL	—	295	—	V	—
Lamp current	IL	4	5	6	mArms	—
Lamp power consumption	PL	—	1.48	—	W	—
Starting voltage	VS	—	—	430	V	Ta=25℃
		—	—	500	V	Ta=0℃
LED life time	LL	—	20000	—	Hrs	at IL=5mArms Ta=25℃ (*1)

(*1) Power consumption excluded inverter loss.

(*2) Lamp life time is defined as follows : The final brightness is at 50% of original brightness.

(*3) a. Please follow the table of lamp characteristics shown above if not to use the inverter tested by Nan Ya.

b. If customers want to design inverter by themselves, please inform Nan Ya to offer the detail lamp specification.

■ ELECTRICAL CHARACTERISTICS OF TESTED INVERTER

TDK CXA-L10L

(If the inverter output "CN2" couldn't mating CCFL connector, please refer to specification "INTERNAL PIN CONNECTION" page to fit it.)

1 GENERAL SPECIFICATIONS

OPERATION TEMPERATURE : -10℃~60℃

STORAGE TEMPERATURE : -20℃~85℃

DIMENSION : 44.0(L)mm x 21.0(W)mm x MAX. 18.0(H)m

2 PIN ASSIGNMENTS

INPUT(CN1) CONNECTOR :

NO.	FUNCTION
1	VIN
2	GND

OUTPUT(CN2) CONNECTOR :

NO.	FUNCTION
3	OUT1
4	OUT2
5	OUT GND

3 RELATIONSHIP BETWEEN VIN & TUBE CURRENT

ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT	REMARK
Input Voltage	VIN	—	(10)	—	V	
No Load Output Voltage	Vs	800	900	—	Vrms	
Tube Current	IL	—	5	—	mA	
Working Frequency	F	30	35	40	KHz	

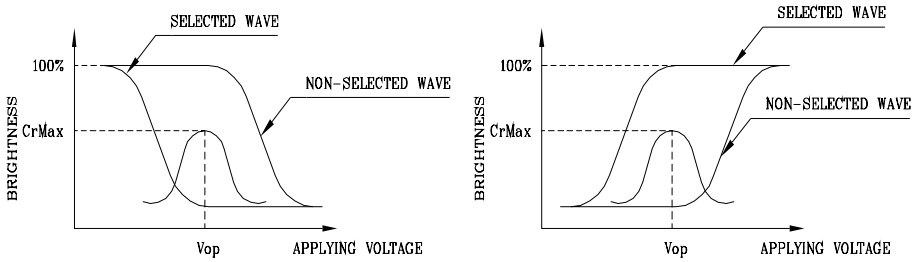
■ ELECTRO-OPTICAL CHARACTERISTICS

at $\varphi=0^{\circ}, \theta=0^{\circ}$

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	NOTE
Response Time (rise)	Tr	-20 ℃	2720	3400	5100	ms	NOTE 2,3
		0 ℃	576	720	1080		
		25 ℃	200	250	375		
		50 ℃	128	160	240		
		70 ℃	48	60	90		
Response Time (fall)	Tf	-20 ℃	2000	2500	3750	ms	NOTE 2,3
		0 ℃	400	500	750		
		25 ℃	120	150	230		
		50 ℃	48	60	90		
		70 ℃	32	40	60		

(NOTE 1)

Definition of Operation Voltage(Vop)



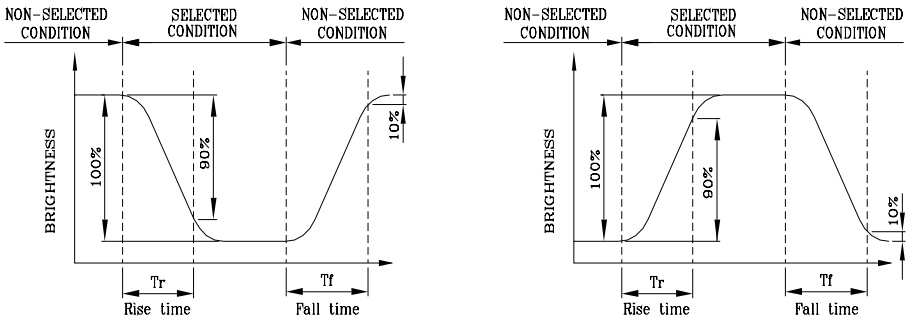
(positive type) (negative type)

*Conditions

Viewing Angle : 0
Frame Frequency : 102.9Hz
Applying Waveform : 1/N duty 1/a bias

(NOTE 2)

Definition of Response Time(Tr,Tf)



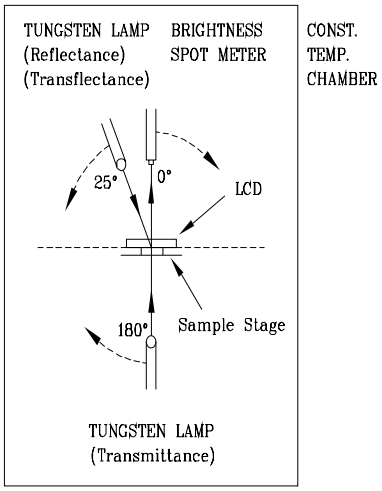
(positive type) (negative type)

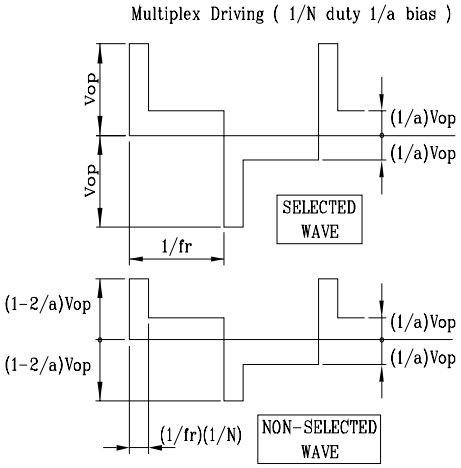
*Conditions

Operating Voltage : Vop
Viewing Angle (θ,Φ) : (0,0)
Frame Frequency : 102.9Hz
Applying Waveform : 1/N duty 1/a bias

(NOTE 3)

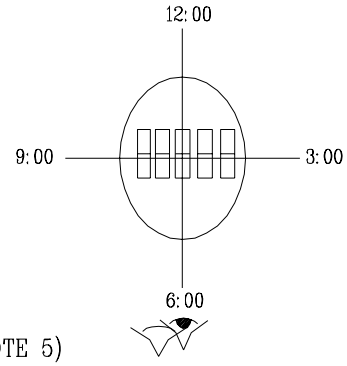
Description of Measuring Equipment and Driving Waveforms





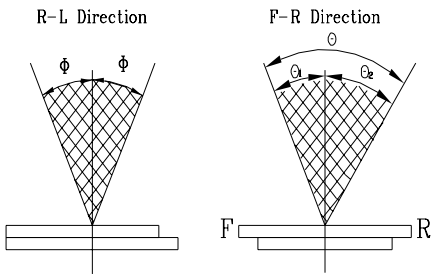
(NOTE 4)

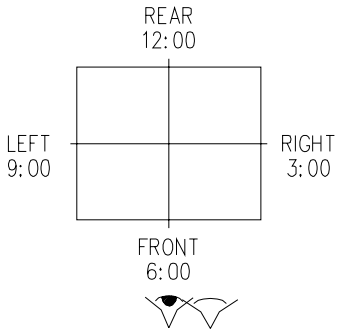
Definition of Viewing Direction



(NOTE 5)

Definition of Viewing Angle





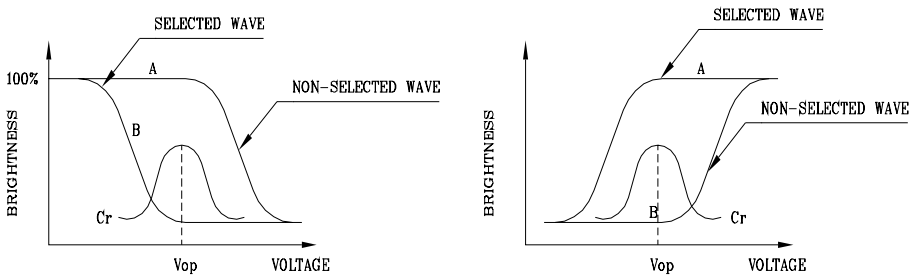
$\Theta = \Theta_1 + \Theta_2$

*Conditions

Operating Voltage : Vop
Frame Frequency : 102.9Hz
Applying Waveform : 1/N duty 1/a bias
Contrast Ratio : larger than 2

(NOTE 6)

Definition of Contrast Ratio (Cr)



(positive type) (negative type)

Contrast Ratio : Cr=A/B

*Conditions

Viewing Angle : 0

Frame Frequency : 102.9Hz

Applying Waveform : 1/N duty 1/a bias

■ INTERFACE DESCRIPTION

LCD

Pin No.	Symbol	I/O	Function
1	FLM	I	SCAN START-UP SIGNAL
2	CL1	I	DATA LATCH PULSE
3	CL2	I	DATA SHIFT PULSE
4	/DISP	I	DISPLAY OFF ("H"=ON,"L"=OFF)
5	VDD	I	POWER SUPPLY FOR LOGIC (+3.3V/+5V)
6	VSS	I	SIGNAL GROUND (GND)
7	VEE	I	POWER SUPPLY FOR LCD (+V)
8	UD0	I	DISPLAY DATA (UPPER HALF)
9	UD1	I	
10	UD2	I	
11	UD3	I	
12	LD0	I	DISPLAY DATA (LOWER HALF)
13	LD1	I	
14	LD2	I	
15	LD3	I	

LCM CN1 : Used FFC Pitch 1.25mm , 15pin

CORRESPONDABLE LCM CONNECTOR : ELCO 6207 33 22 15 000+ or compatible

CCFL

Pin No.	Symbol	Level	Function
1	HV	—	High Voltage Line (Inverter)
2	NC	—	NC
3	NC	—	NC
4	GND	—	Ground Line (Inverter)

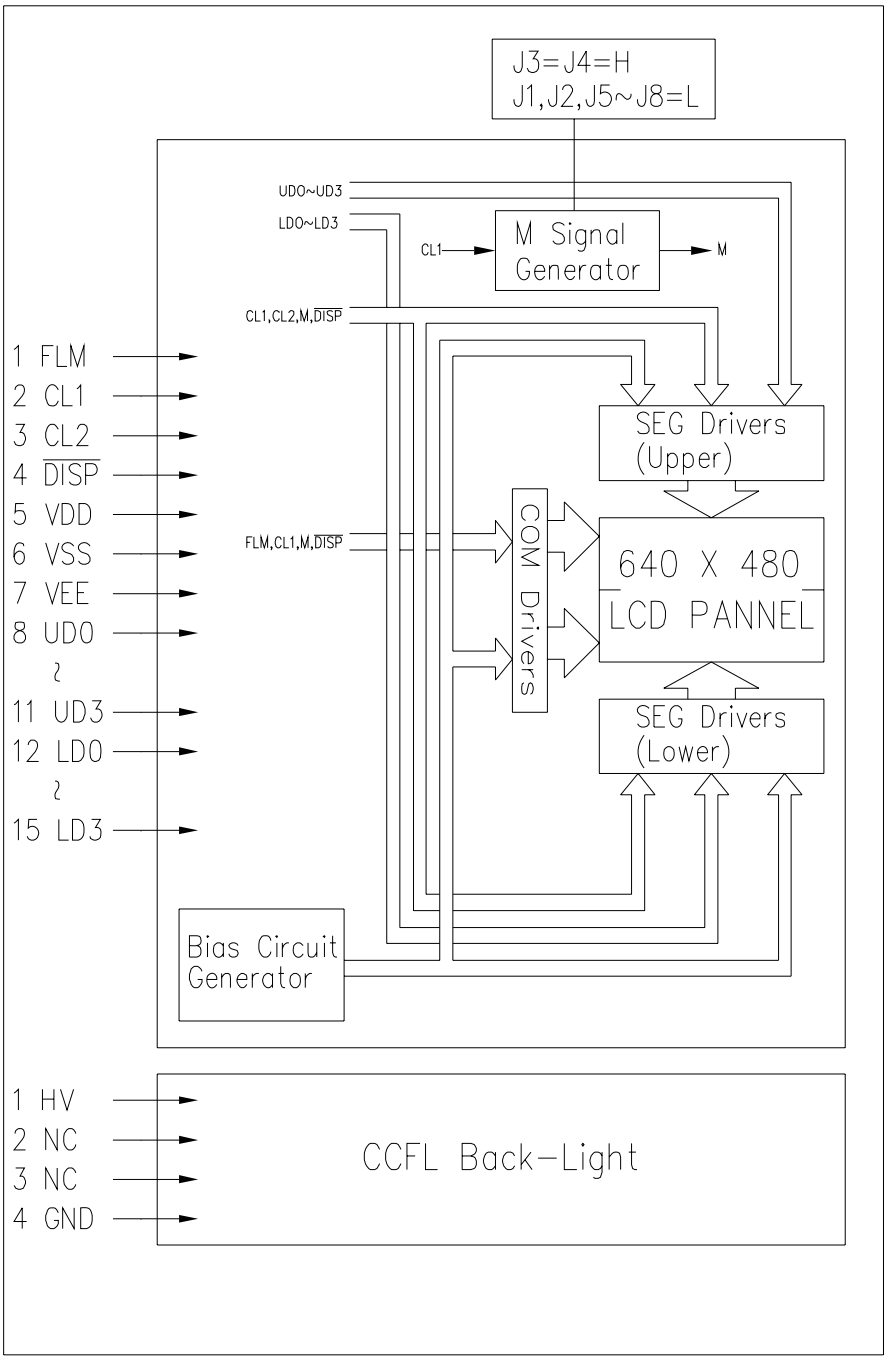
USED CCFL CONNECTOR :

M63M83-04 (MITSUMI) or compatible

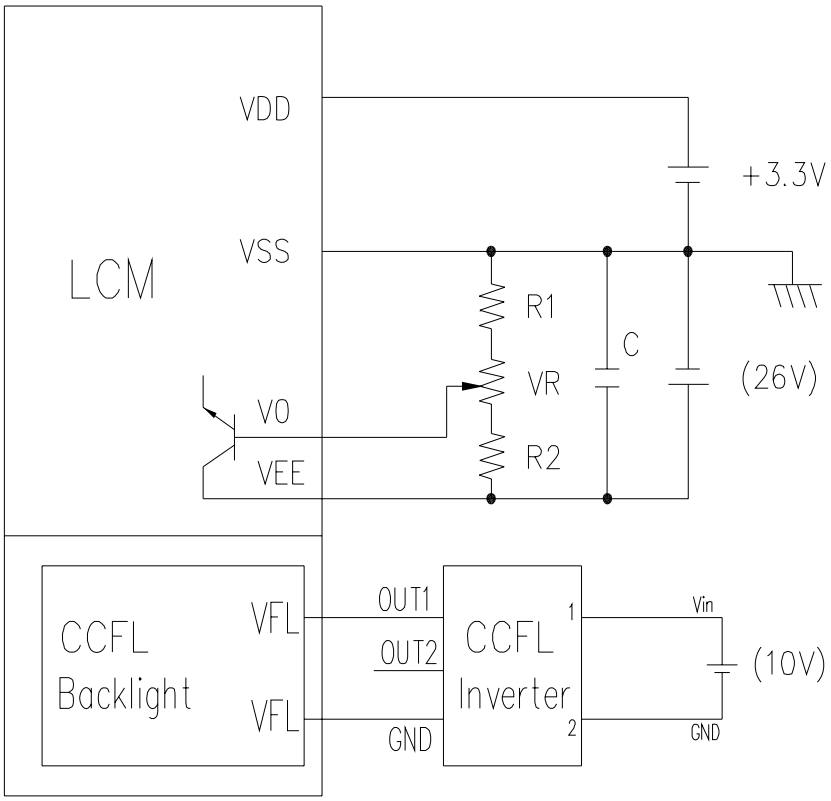
CORRESPONDABLE CCFL CONNECTOR :

M60-04-30-114P , M60-04-30-134P , M61M73-04 (MITSUMI) or compatible

■ BLOCK DIAGRAM



■ POWER SUPPLY



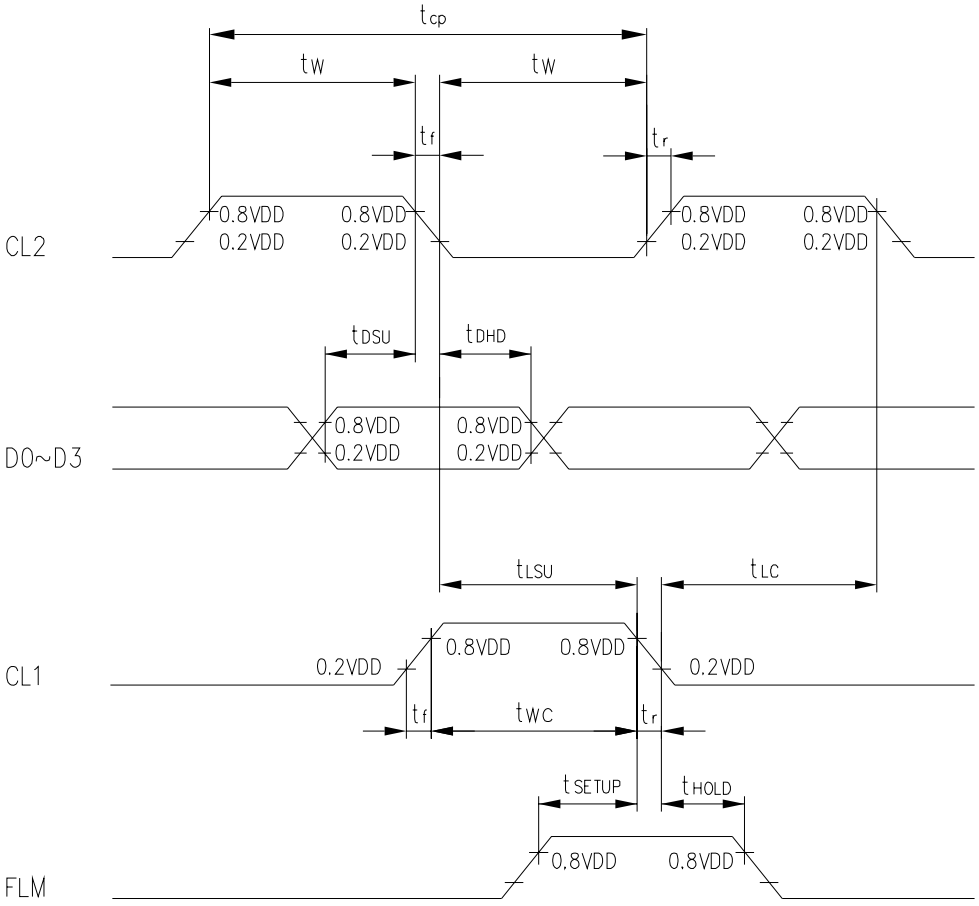
1. R1+VR+R2=10K~20K
2. C=10uF/35V
3. Tested CCFL Inverter : TDK CXA-L10L
   @ Vin=10V

■ REFERENCE APPLICATION CIRCUIT

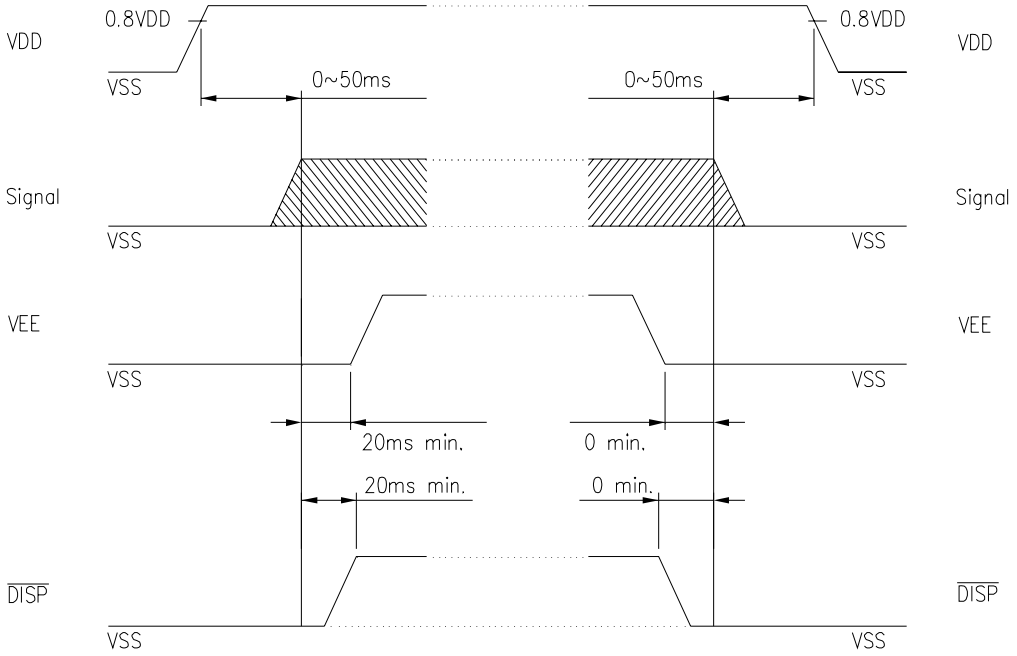
1.INTERFACE TIMING

@VDD=2.5~5.5V

ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT
Shift Clock Period	t_{cp}	152	–	–	ns
"CL2" PULSE WIDTH	t_W	65	–	–	ns
CLOCK RISE, FALL TIME	t_r , t_f	–	–	50	ns
DATA SETUP TIME	t_{DSU}	50	–	–	ns
DATA HOLD TIME	t_{DHD}	40	–	–	ns
"CL2"→ "CL1" FALL TIME	t_{LSU}	65	–	–	ns
"CL1"→ "CL2" FALL TIME	t_{LC}	65	–	–	ns
"FLM" SETUP TIME	t_{SETUP}	100	–	–	ns
"FLM" HOLD TIME	t_{HOLD}	100	–	–	ns
"CL1" PULSE WIDTH	t_{WC}	65	–	–	ns



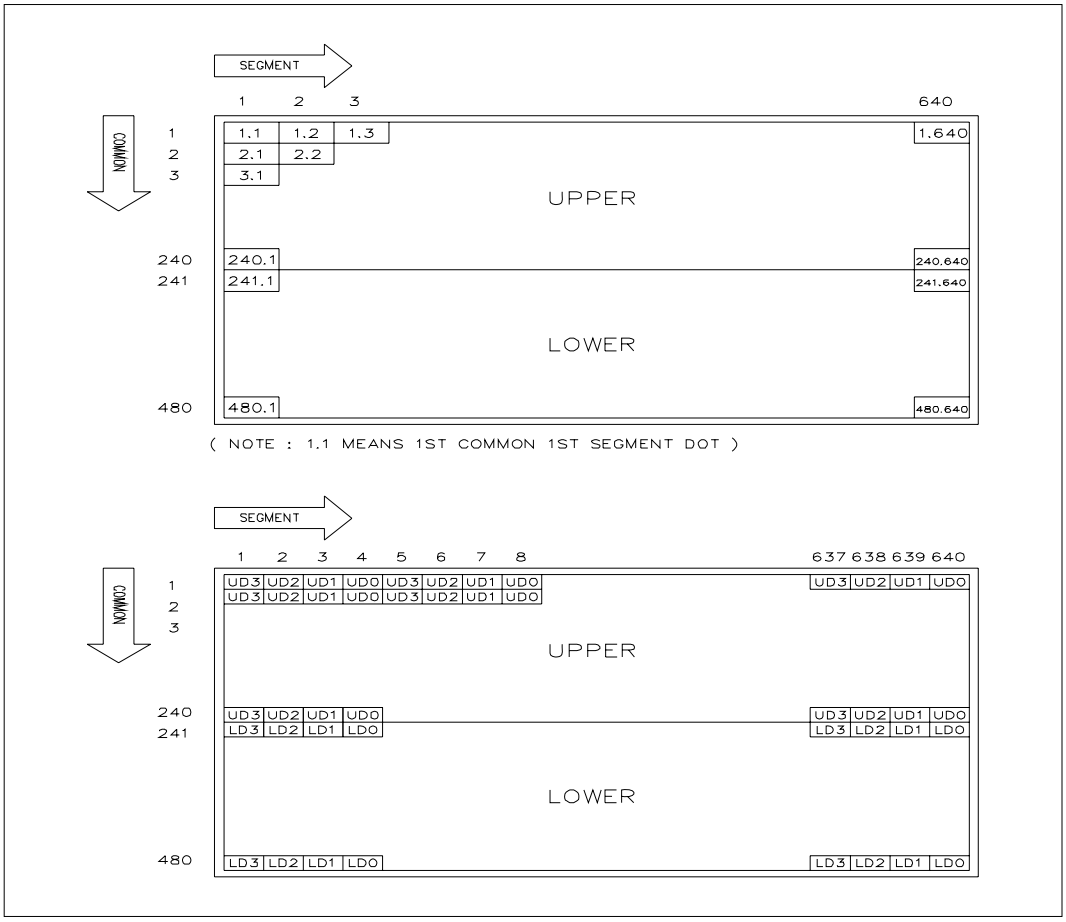
2.PRECAUTION WHEN CONNECTING OR DISCONNECTING THE POWER SUPPLY



POWER ON POWER OFF

The missing pixels may occur when the LCM is driven beyond above power interface timing sequence.

3.DISPLAY PATTERN



■ RELIABILITY TEST CONDITIONS

NO.	ITEM	CONDITION			STANDARD	NOTE
1	High Temp. Storage	80 ℃	120 Hrs		Appearance without defect	
2	Low Temp. Storage	-30 ℃	120 Hrs		Appearance without defect	
3	High Temp. & High Humi. Storage	60 ℃ 90%RH	120 Hrs		Appearance without defect	
4	High Temp. Operating Display	70 ℃	120 Hrs		Appearance without defect	
5	Low Temp. Operating Display	-20 ℃	120 Hrs		Appearance without defect	
6	Thermal Shock	-20 ℃, 30min. → 70℃, 30min. ↑ (1cycle)			Appearance without defect	10 cycles

■ INSPECTION CRITERION

Inspection Provision

1.Purpose

The NAN YA inspection provision provides outgoing inspection provision and its expected quality level based on our outgoing inspection of NAN YA LCD produces.

2.Applicable Scope

The NAN YA inspection provision is applicable to the arrangement in regard to outgoing inspection and quality assurance after outgoing.

3.Technical Terms

3-1 NAN YA Technical Terms

4.Outgoing Inspection

4-1 Inspection Method

MIL-STD-105E Level Ⅱ Regular inspection

4-2 Inspection Standard

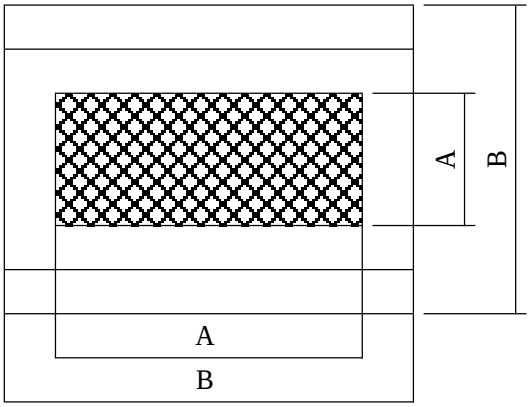
	Item		AQL(%)	Remarks
Major Defect	Dots	Opens Shorts Erroneous operation	0.4	faults which substantially lower the practicality and the initial purpose difficult to achieve
	Solder appearance	Shorts Loose		
	Cracks	Display surface cracks		

	Dimensions	External from Dimensions	0.4	
Minor Defect	Inside the glass	Black spots	0.65	faults which appear to pose almost no obstacle to the practicality, effective use, and operation.
	Polarizing plate	Scratches, foreign Matter, air bubbles, and peeling		
	Dots	Pinhole, deformation		
	Color tone	Color unevenness		
	Solder appearance	Cold solder Solder projections		

4-3 Inspection Provisions

*Viewing Area Definition

Fig. 1



A : Zone Viewing Area

B : Zone Glass Plate Outline

*Inspection place to be 500 to 1000 lux illuminance uniformly without glaring.
The distance between luminous source(daylight fluorescent lamp and cool white fluorescent lamp) and sample to be 30 cm to 50 cm.

*Test and measurement are performed under the following conditions, unless otherwise specified.

Temperature 20 ± 15℃
Humidity 65 ± 20%R.H.
Pressure 860~1060hPa(mmbar)

In case of doubtful judgment, it is performed under the following conditions.

Temperature 20 ± 2℃
Humidity 65 ± 5%R.H.
Pressure 860~1060hPa(mmbar)

5.Specification for quality check

5-1 Electrical characteristics

NO.	Item	Criterion
1	Non operational	Fail
2	Miss operating	Fail
3	Missing dot	Fail
4	Contrast irregular	Fail
5	Response time	Within Specified value
6	Backlight turn on/off	Within Specified value

5-2 External Appearance Defect

<table>
<tr><th>NO.</th><th>Item</th><th>Criterion</th></tr>
<tr><td>1</td><td>Black spots, foreign matter, and white spots (Including light leakage due to pinholes of polarizing plates, etc.)</td><td>(1)-1-Spots
<table>
<tr><th>Average Diameter (mm):D</th><th>Number of pieces permitted</th><th>Minimum Space</th></tr>
<tr><td>D≦0.2</td><td>Ignore</td><td>—</td></tr>
<tr><td>0.2<D≦0.3</td><td>5</td><td>10mm</td></tr>
<tr><td>0.3<D≦0.4</td><td>2</td><td>30mm</td></tr>
<tr><td>0.4<D</td><td>0</td><td>—</td></tr>
</table>
Number of total pieces is set to within 5 pieces.

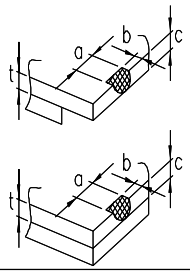
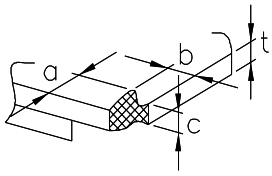
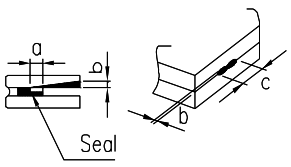
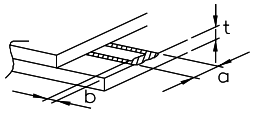
Note that when there are 2 pieces or more, they are not to be concentrated. Set as: Average diameter = (Long diameter + Short diameter)/2

(1)-2-Blurred Spots(At lighting condition)
<table>
<tr><th>Average Diameter (mm):D</th><th>Number of pieces permitted</th></tr>
<tr><td>D≦0.3</td><td>Ignore</td></tr>
<tr><td>0.3<D≦0.75</td><td>5</td></tr>
<tr><td>0.75<D</td><td>0</td></tr>
</table>
Number of total pieces is set to within 5 pieces.

Note that when there are 2 pieces or more, they are not to be concentrated. Set as: Average diameter = (Long diameter + Short diameter)/2</td></tr>
</table>

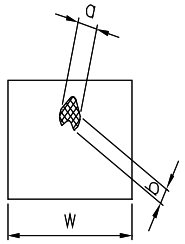
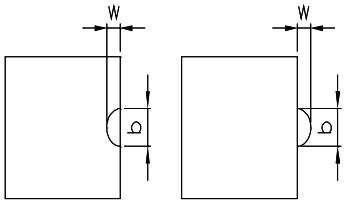
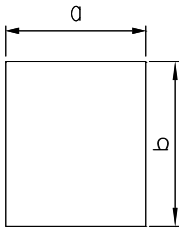
<table>
<tr><td>1</td><td>Line</td><td>(1)-1-Lines
<table><tr><th>Width(mm):W</th><th>Length(mm): L</th><th>Number of pieces permitted</th></tr><tr><td>W≦0.03</td><td>Ignore</td><td>Ignore</td></tr><tr><td>0.03<W≦0.08</td><td>L≦4</td><td>2</td></tr><tr><td>0.08<W≦0.1</td><td>L≦1</td><td>1</td></tr></table>Object exceeding 0.1mm follow the standards of the spots form. Note that when there are 2 pieces or more, they are not to be concentrated.

(1)-2-Blurred Lines(At lighting condition)
<table><tr><th>Width(mm):W</th><th>Length(mm): L</th><th>Number of pieces permitted</th></tr><tr><td>W≦0.03</td><td>Ignore</td><td>Ignore</td></tr><tr><td>0.03<W≦0.08</td><td>L≦3</td><td>6</td></tr><tr><td>0.08<W</td><td>3<L</td><td>None</td></tr></table>Object exceeding 0.1mm follow the standards of the spots form. Note that when there are 2 pieces or more, they are not to be concentrated.</td></tr>
<tr><td>2</td><td>Scratches(Glass, reflection plates, and polarizing plates)</td><td>In accordance with black spots.
(At non lighting condition)</td></tr>
<tr><td>3</td><td>Color irregular</td><td>Not remarkable color irregular.</td></tr>
</table>

<table>
<tr><td>4</td><td>Air bubbles polarizing plates, and reflection plates</td><td colspan="2">
<table>
<tr><th>Average Diameter (mm):D</th><th>Number of pieces permitted</th></tr>
<tr><td>D≦0.3</td><td>Ignore</td></tr>
<tr><td>0.3<D</td><td>0</td></tr>
</table>
Average diameter = (Long diameter + Short diameter)/2
Note that when there are 4 pieces or more, they are not to be concentrated.
</td></tr>
<tr><td rowspan="5">5</td><td rowspan="5">Cracks</td><td>(1)General crack
  </td><td>a≦5
b≦2
c≦t
Where, a and b are ignored when less than or equal to 0.5 . The numbers of pieces are set at up to 5 pieces.</td></tr>
<tr><td>(2)Corner crack
  </td><td>a≦2.5
b≦2.5
c≦t
a+b≦4</td></tr>
<tr><td>(3)Seal portion crack
  </td><td>a≦The seal width x 1/3
b≦t x 2/3
c≦5
The numbers of pieces are set at up to 5 pieces.</td></tr>
<tr><td>(4)ITO Pin crack
  </td><td>a≦5
b≦1/3 pin length
c≦t</td></tr>
<tr><td>(5)Progressive cracks</td><td>All taken to be unacceptable</td></tr>
</table>

6	Outer dimensions	Should be within the tolerance.
7	Soldering	Should be no defective soldering such as shorting, loose terminal cold solder, peeling of printed circuit board pattern, improper mounting position, etc.

5-3 Dot Appearance Defect

NO.	Item	Criteria	
1	Pinhole		Dot display a and b are each ≦ 0.2mm. The overall total is taken be with in 10 units. Note that they are not to be concentrated.
2	Missing		Dot display a and b are each ≦ 0.2mm. The overall total is taken to be with in 10 units.
3	Thick and thin display		Taken to be within ±1.5% of display character width(a) and height(b).

■ PRECAUTIONS FOR USING LCD MODULES

1 Handing Precautions

1.1 The display panel is made of glass and polarizer. As glass is fragile. It tends to become or chipped during handling especially on the edges. Please avoid dropping or jarring. Do not subject it to a mechanical shock by dropping it or impact.

1.2 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.

1.3 Do not apply excessive force to the display surface or the adjoining areas since this may cause the color tone to vary. Do not touch the display with bare hands. This will stain the display area and degraded insulation between terminals (some cosmetics are determined to the polarizer).

1.4 The polarizer covering the display surface of the LCD module is soft and easily scratched. Handle this polarizer carefully. Do not touch, push or rub the exposed polarizers with anything harder than an HB pencil lead (glass, tweezers, etc.). Do not put or attach anything on the display area to avoid leaving marks on it. Condensation on the surface and contact with terminals due to cold will damage, stain or dirty the polarizer. After products are tested at low temperature they must be warmed up in a container before coming in to contact with room temperature air.

1.5 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 cloth with one of the following solvents

- Isopropyl alcohol
- Ethyl alcohol

Do not scrub hard to avoid damaging the display surface.

1.6 Solvents other than those above-mentioned may damage the polarizer. Especially, do not use the following.

- Water
- Ketone
- Aromatic solvents

Wipe off saliva or water drops immediately, contact with water over a long period of time may cause deformation or color fading. Avoid contact with oil and fats.

1.7 Exercise care to minimize corrosion of the electrode. Corrosion of the electrodes is accelerated by water droplets, moisture condensation or a current flow in a high-humidity environment.

1.8 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.

1.9 Do not attempt to disassemble or process the LCD module.

1.10 NC terminal should be open. Do not connect anything.

1.11 If the logic circuit power is off, do not apply the input signals.

1.12 Electro-Static Discharge Control，Since this module uses a CMOS LSI, the same careful attention should be paid to electrostatic discharge as for an ordinary CMOS IC. To prevent destruction of the elements by static electricity, be careful to maintain an optimum work environment.

- 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. Be sure to ground the body when handling the LCD modules.
- Tools required for assembling, such as soldering irons, must be properly grounded. Make certain the AC power source for the soldering iron does not leak. 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.
- To reduce the amount of static electricity generated, do not conduct assembling

and other work under dry conditions. To reduce the generation of static electricity be careful that the air in the work is not too dry. A relative humidity of 50%-60% is recommended. As far as possible make the electric potential of your work clothes and that of the work bench the ground potential.

- 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.

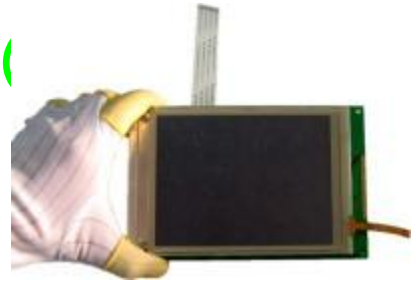
1.13 Since LCM has been assembled and adjusted with a high degree of precision, avoid applying excessive shocks to the module or making any alterations or modifications to it.

- Do not alter, modify or change the shape of the tab on the metal frame.
- Do not make extra holes on the printed circuit board, modify its shape or change the positions of components to be attached.
- Do not damage or modify the pattern writing on the printed circuit board.
- Absolutely do not modify the zebra rubber strip (conductive rubber) or heat seal connector.
- Except for soldering the interface, do not make any alterations or modifications with a soldering iron.
- Do not drop, bend or twist the LCM.

2 Handling precaution for LCM

2.1 LCM is easy to be damaged. Please note below and be careful for handling.

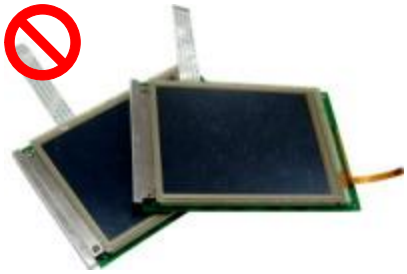
2.2 Correct handling:



As above picture, please handle with anti-static gloves around LCM edges.

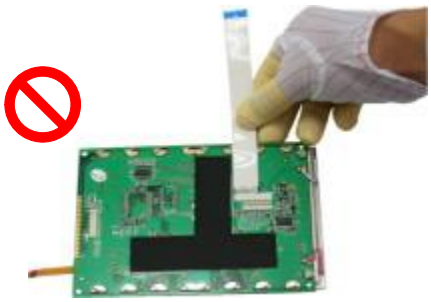
2.3 Incorrect handling:

Please don't touch IC directly.

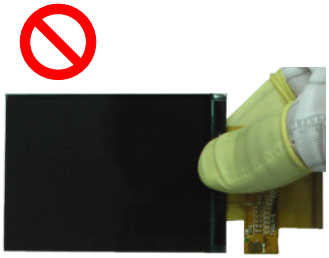


Please don't stack LCM.

Please don't hold the surface of panel.



Please don't stretch interface of output, such as FPC cable.



Please don't hold the surface of IC.

Please don't operate with sharp stick such as pens.

3 Storage Precautions

3.1 When storing the LCD modules, the following precaution are necessary.

3.1.1 Store them in a sealed polyethylene bag. If properly sealed, there is no need for the desiccant.

3.1.2 Store them in a dark place. Do not expose to sunlight or fluorescent light, keep the temperature between 0°C and 35°C, and keep the relative humidity between 40%RH and 60%RH.

3.1.3 The polarizer surface should not come in contact with any other objects (We advise you to store them in the anti-static electricity container in which they were shipped).

3.2 Others

3.2.1 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.

3.2.2 If the LCD modules 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 regained by suspending use for some time. It should be noted that this phenomenon does not adversely affect performance reliability.

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

3.2.3.1 - Exposed area of the printed circuit board.

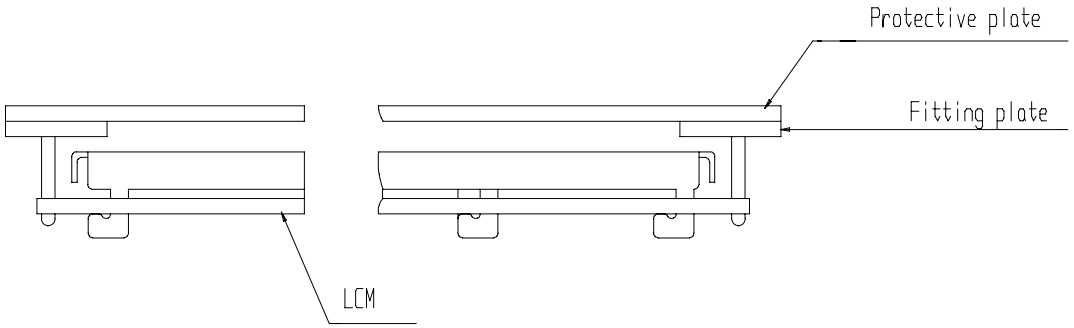
3.2.3.2 -Terminal electrode sections.

4 USING LCD MODULES

4.1 Installing LCD Modules

The hole in the printed circuit board is used to fix LCM as shown in the picture below. Attend to the following items when installing the LCM.

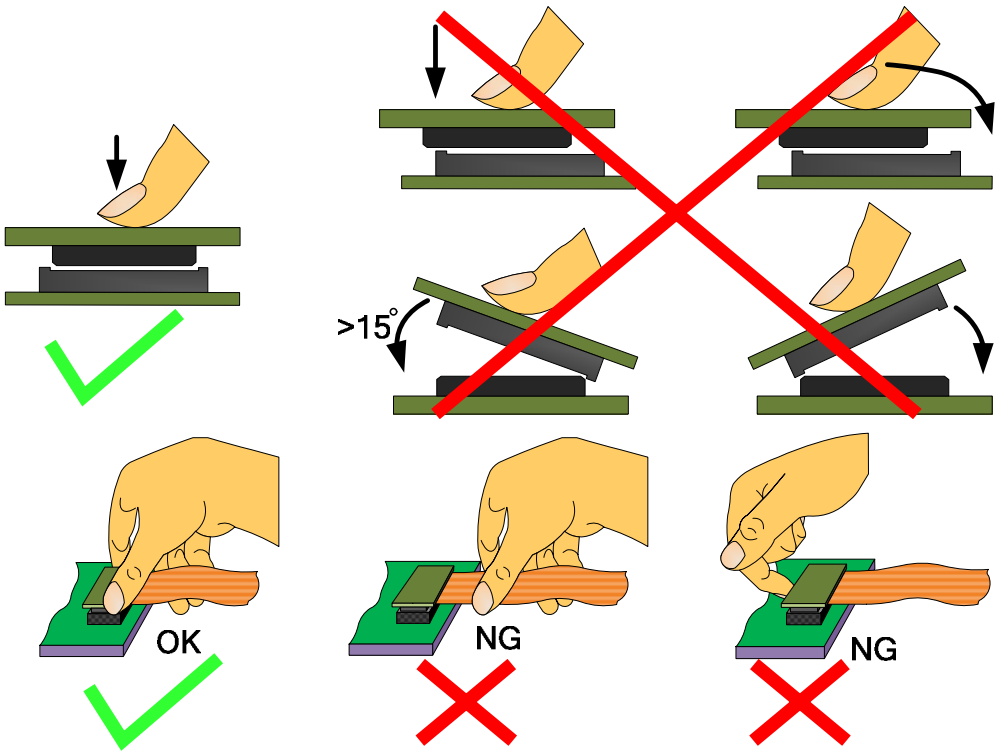
4.1.1 Cover the surface with a transparent protective plate to protect the polarizer and LC cell.



4.1.2 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 ±0.1mm.

4.2 Precaution for assemble the module with BTB connector:

Please note the position of the male and female connector position, don't assemble or assemble like the method which the following picture shows



4.3 Precaution for soldering the LCM

	Manual soldering	Machine drag soldering	Machine press soldering
No RoHS Product	290°C ~350°C. Time : 3-5S.	330°C ~350°C. Speed : 15-17 mm/s.	300°C ~330°C. Time : 3-6S. Press: 0.8~1.2Mpa
RoHS Product	340°C ~370°C. Time : 3-5S.	350°C ~370°C. Speed : 15-17 mm/s.	330°C ~360°C. Time : 3-6S. Press: 0.8~1.2Mpa

4.3.1 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 to prevent any damage due to flux spatters.

4.3.2 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.

4.3.3 When remove the electroluminescent panel from the PC board, be sure the solder has completely melted, the soldered pad on the PC board could be damaged.

4.4 Precautions for Operation

4.4.1 Viewing angle varies with the change of liquid crystal driving voltage (VLCD). Adjust VLCD to show the best contrast.

4.4.2 It is an indispensable condition to drive LCD's within the specified voltage limit since the higher voltage then the limit cause the shorter LCD life. An electrochemical reaction due to direct current causes LCD's undesirable deterioration, so that the use of direct current drive should be avoided.

4.4.3 Response time will be extremely delayed at lower temperature than the operating temperature range and on the other hand at higher temperature LCD's show dark color in them. However those phenomena do not mean malfunction or out of order with LCD's, which will come back in the specified operating temperature.

4.4.4 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 back on.

4.4.5 A slight dew depositing on terminals is a cause for electro-chemical reaction resulting in terminal open circuit. Usage under the maximum operating temperature, 50%RH or less is required.

4.4.6 Input logic voltage before apply analog high voltage such as LCD driving voltage when power on. Remove analog high voltage before logic voltage when power off the module. Input each signal after the positive/negative voltage becomes stable.

4.4.7 Please keep the temperature within the specified range for use and storage. Polarization degradation, bubble generation or polarizer peel-off may occur with high temperature and high humidity.

4.5 Safety

4.5.1 It is recommended to crush damaged or unnecessary LCDs into pieces and wash them off with solvents such as acetone and ethanol, which should later be burned.

4.5.2 If any liquid leaks out of a damaged glass cell and comes in contact with the hands, wash off thoroughly with soap and water.

4. 6 Limited Warranty

Unless agreed between Multi-Inno and the customer, Multi-Inno will replace or repair any of its LCD modules which are found to be functionally defective when inspected in accordance with Multi-Inno LCD acceptance standards (copies available upon request) for a period of one year from date of production. Cosmetic/visual defects must be returned to Multi-Inno within 90 days of shipment. Confirmation of such date shall be based on data code on product The warranty liability of Multi-Inno limited to repair and/or replace on the terms set forth above. Multi-Inno will not be responsible for any subsequent or consequential events.

4.7 Return LCM under warranty

4.7.1 No warranty can be granted if the precautions stated above have been disregarded. The typical examples of violations are :

4.7.1.1 - Broken LCD glass.

4.7.1.2 - PCB eyelet is damaged or modified.

4.7.1.3 -PCB conductors damaged.

4.7.1.4 - Circuit modified in any way, including addition of components.

4.7.1.5 - PCB tampered with by grinding, engraving or painting varnish.

4.7.1.6 - Soldering to or modifying the bezel in any manner.

4.7.2 Module repairs will be invoiced to the customer upon mutual agreement. Modules must be returned with sufficient description of the failures or defects. Any connectors or cable installed by the customer must be removed completely without damaging the PCB eyelet, conductors and terminals.

■ PACKING SPECIFICATION

Please consult our technical department for detail information.

■ PRIOR CONSULT MATTER

1 For Multi-Inno standard products, we keep the right to change material, process ... for improving the product property without prior notice to our customer.

2 For OEM products, if any changes are needed which may affect the product property, we will consult with our customer in advance.

3 If you have special requirement about reliability condition, please let us know before you start the test on our samples.