



MULTI-INNO TECHNOLOGY CO., LTD.

LCD MODULE SPECIFICATION

Model : MI320240P-T

Revision	
Engineering	
Date	
Our Reference	



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**1. MODE OF DISPLAY****Display mode**

- STN : ☐ Yellow green
☐ Grey
☐ Blue (negative)
☐ FSTN positive
☐ FSTN negative

Display condition

- ☐ Reflective type
☐ Transflective type
☐ Transmissive type
☐ Others

Viewing direction

- ☐ 6 O' clock
☐ 12 O' clock
☐ 3 O' clock
☐ 9 O' clock

2. LCD MODULE NUMBER NOTATION:



3. GENERAL DESCRIPTION

Display mode : 320 x 240 dots, graphic TAB LCD module
Interface : 4-bit Parallel
Driving method : 1/240 duty, 1/15 bias
Backlight : Side-lited LED
Driver IC : NOVATEK NT7701H, NT7702H or equivalent
For the detailed information, please refer to the IC specifications.

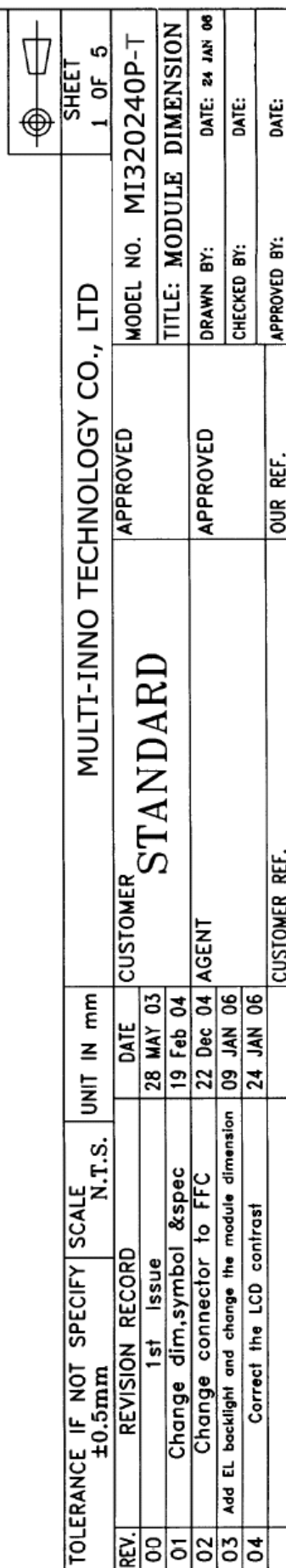
4. MECHANICAL DIMENSIONS

Item	Dimension	Unit	Item	Dimension	Unit
Outline Dimension	97.0(L)x75.0(W)x9.0(H)	mm	Dot Pitch	0.24(L)x0.24(W)	mm
Viewing Area	81.38(L)x62.18(W)	mm	Dot Size	0.21(L)x0.21(W)	mm

5. CONNECTOR PIN ASSIGNMENT

Pin No.	Symbol	Function	Pin No.	Symbol	Function
1	FLM	First Line Marker	9	DB0	Data Bus Line
2	LP	Data latch signal	10	DB1	
3	CP	Clock signal for shifting data	11	DB2	
4	M	Alternate signal for LCD drive	12	DB3	
5	VO	LCD Contrast Adjustment	13	DISPOFF	Display On/Off
6	VDD	Supply Voltage for Logic	14	BL+	Backlight Supply Terminal (+)
7	VSS	Power supply (0V,Ground)	15	BL-	Backlight Supply Terminal (-)
8	VEE	Power supply for LCD control	-	-	-

MARK	REASON	PREPARED	DATE
<u>A</u>	change dim , symbol & spec	Hermus	19 Feb 04
<u>A</u>	change connector to FFC	Hermus	22 Dec 04
<u>A</u>	Add EL backlight and change the module dimension	Roger	09 Jan 06
<u>A</u>	Correct the LCD contrast	Roger	24 Jan 06

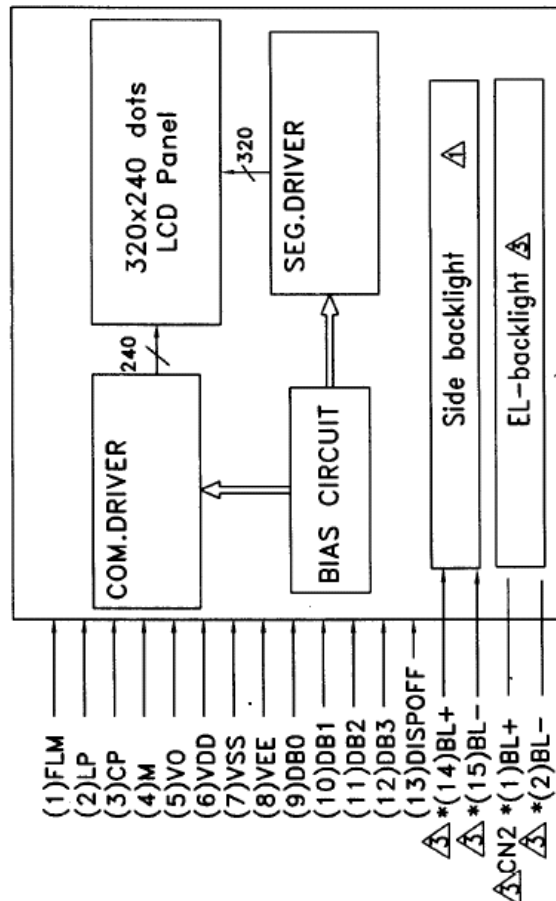


TOLERANCE IF NOT SPECIFY ±0.5mm		SCALE N.T.S.	UNIT IN mm		MULTI-INNO TECHNOLOGY CO.,LTD		SHEET 2 OF 5	
REV.	REVISION RECORD		CUSTOMER	APPROVED	MODEL NO. MI320240P-T			
00	1st ISSUE		STANDARD		TITLE: Module Dimension with EL Backlight			
01	Change dim, symbol & spec				DRAWN BY: DATE: 24 JAN 06			
02	Change connector to FFC		AGENT	APPROVED	CHECKED BY: DATE:			
03	Add EL backlight and change the module dimension				APPROVED BY: DATE:			
04	Correct the LCD contrast		CUSTOMER RFF	QIUR REF 4947				

TOLERANCE IF NOT SPECIFY ±0.5mm			SCALE N.T.S.		UNIT IN mm		MULTI-INNO TECHNOLOGY CO., LTD			SHEET 3 OF 5	
REV.	REVISION RECORD			DATE		CUSTOMER		APPROVED		MODEL NO. MI320240P-T	
00	1st ISSUE			28 MAY 03		STANDARD				TITLE: Module Dimension with Side Backlight	
01	Change dim, symbol & spec			19 Feb 04						DRAWN BY:	
02	Change connector to FFC			22 Dec 04		AGENT		APPROVED		CHECKED BY:	
03	Add EL backlight and change the module dimension			09 JAN 06						DATE: 24 Jan 06	
04	Correct the LCD contrast			24 JAN 06						APPROVED BY:	
						CUSTOMER REF.		OUR REF. 4947		DATE: 17/3/06	

6.3 COUNTER DRAWING OF BLOCK DIAGRAM

BLOCK DIAGRAM



PIN NO.	SYMBOL	FUNCTION
1	FLM	First Line Marker
2	LP	Data latch signal
3	CP	Clock Signal for shifting data
4	M	Alternating Signal for LCD Drive
5	VO	LCD Contrast Adjustment
6	VDD	Supply Voltage for Logic Δ
7	VSS	Power Supply(0V,Ground)
8	VEE	Power supply for LCD control
9	DB0	Data Bus Line
10	DB1	
11	DB2	
12	DB3	
13	DISPOFF	Display ON/OFF
*14	BL+	Backlight Supply Terminal (+)
*15	BL-	Backlight Supply Terminal (-)
Δ CN2		
*1	BL+	Backlight supply terminal (+)
*2	BL-	Backlight supply terminal (-)

Δ Note (*) : BL+ , BL- pins are for EL backlight or Side backlight versions only

Δ Note (*) : CN3 pin(1),(2) are for EL backlight versions only

TOLERANCE IF NOT SPECIFY $\pm 0.5\text{mm}$		SCALE N.T.S.	UNIT IN mm	MULTI-INNO TECHNOLOGY CO., LTD		SHEET 4 OF 5
REV.	REVISION RECORD	DATE	CUSTOMER	APPROVED	MODEL NO. MI320240P-T	
00	1st ISSUE	28 MAY 03	STANDARD		TITLE: PIN OUT & BLOCK DIAGRAM	
01	Change dim, symbol & spec	19 Feb 04	AGENT	APPROVED	DRAWN BY: DATE: 24 JAN 06	
02	Change connector to FFC	22 Dec 04			CHECKED BY: DATE: 24/01/06	
03	Add EL backlight and change the module dimension	09 JAN 06			APPROVED BY: DATE: 17/01/06	
04	Correct the LCD contrast	24 JAN 06	CUSTOMER REF.	OUR REF. 4947		

**7. ELECTRICAL CHARACTERISTICS**

Conditions: VSS=0V, @Ta=25

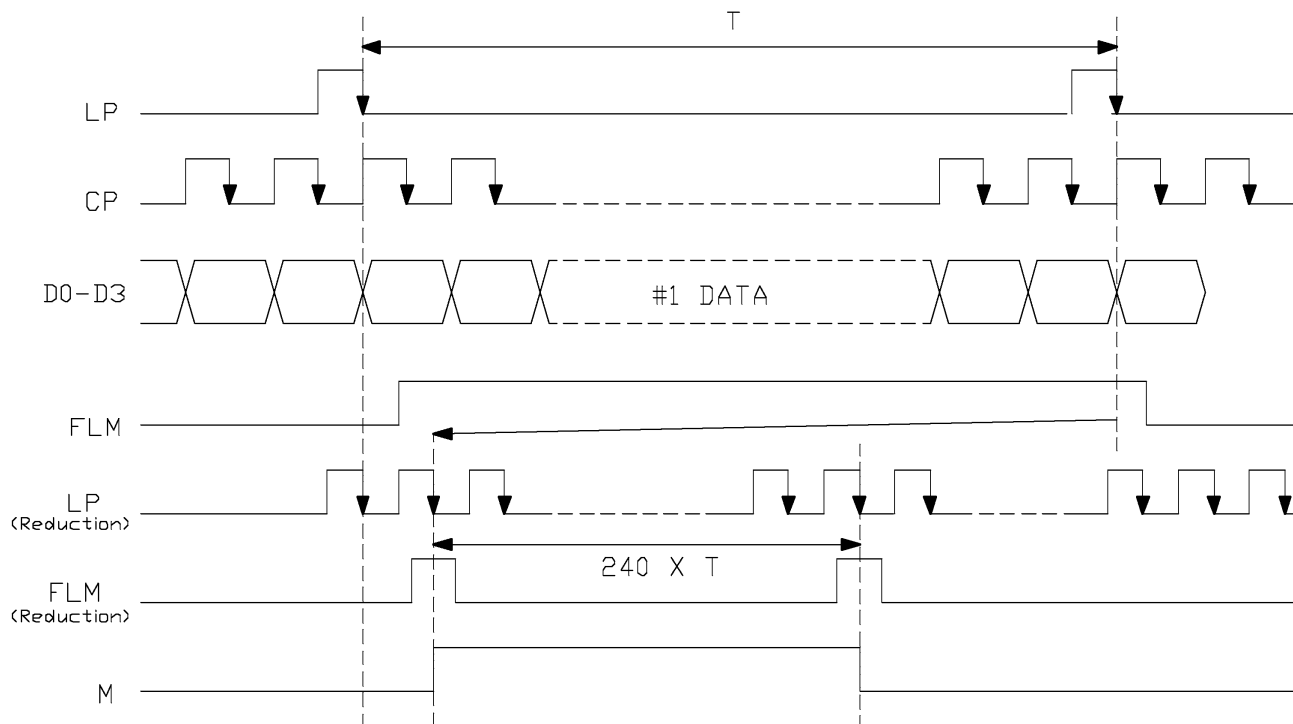
Item	Symbol	MIN.	TYP.	MAX.	Unit	Item	Symbol	MIN.	TYP.	MAX.	Unit
Supply Voltage	VDD	4.5	5.0	5.5	V	“H”Level Input Voltage	VIH	0.7VDD	-	VDD	V
Supply Current	IDD	-	18.0	20.0	mA	“L”Level Input Voltage	VIL	0	-	0.3 VDD	V
Power supply for LCD	VEE	25.0	-	30.0	V	LCD Contrast Adjustment	VO	23.8	24.0	24.2	V
Backlight Voltage						Backlight Current					
EL (@ Frequency 400Hz)	VEL	-	100	150	Vrms	-	-	-	-	-	-
Side-lited LED						Side-lited LED					
White	VBL	-	3.6	3.8	V	White	IBL	-	90	150	mA
Blue	VBL	-	3.6	3.8	V	Blue	IBL	-	90	150	mA
Yellow Green	VBL	-	-	-	V	Yellow Green	IBL	-	-	-	mA
Array LED						Array LED					
Yellow Green	VBL	-	-	-	V	Yellow Green	IBL	-	-	-	mA
Amber	VBL	-	-	-	V	Amber	IBL	-	-	-	mA
Orange	VBL	-	-	-	V	Orange	IBL	-	-	-	mA
Soft Orange	VBL	-	-	-	V	Soft Orange	IBL	-	-	-	mA
CCFL						CCFL					
White	VBL	-	-	-	Vrms	White	IBL	-	-	-	mArms

7.1. ABSOLUTE MAXIMUM RATINGS

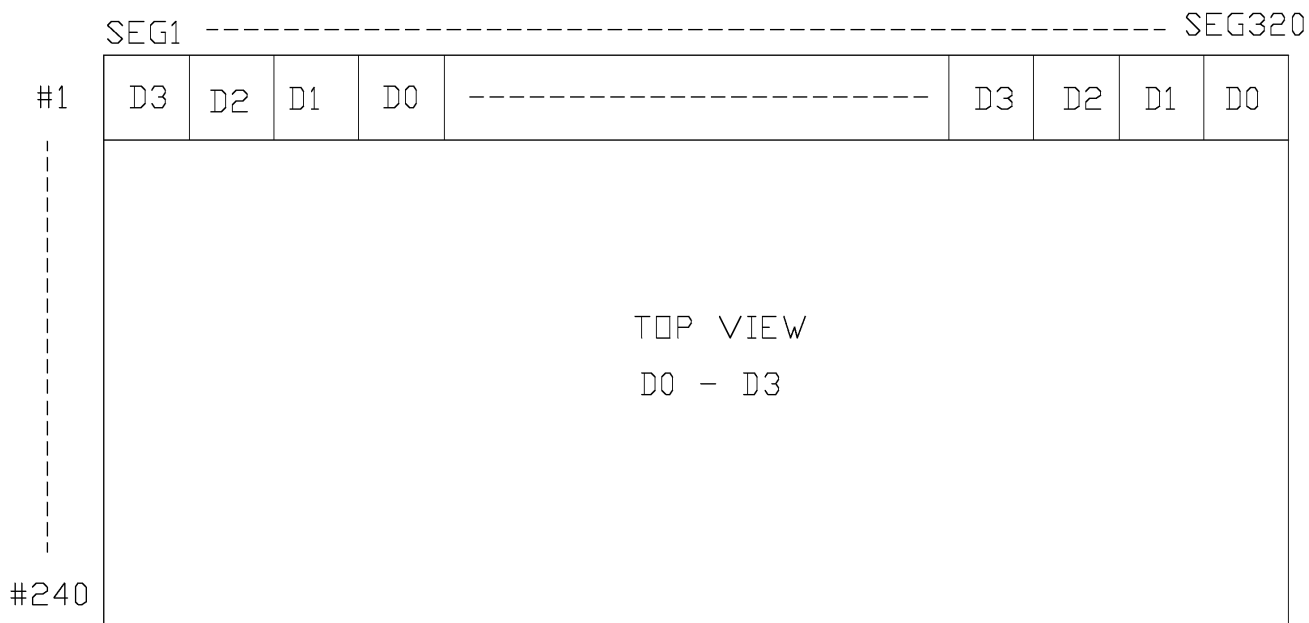
Please make sure not to exceed the following maximum rating values under the worst application conditions

Item	Symbol	Rating (for normal temperature)	Rating (for wide temperature)	Unit
Supply Voltage	VDD	7	7	V
Input Voltage	VT	-0.3 to VDD +0.3	-0.3 to VDD +0.3	V
Operating Temperature	Topr	0 to 50	-20 to 70	
Storage Temperature	Tstg	-10 to 60	-30 to 80	

8. TIMING CHART



9. DISPLAY AND DATA



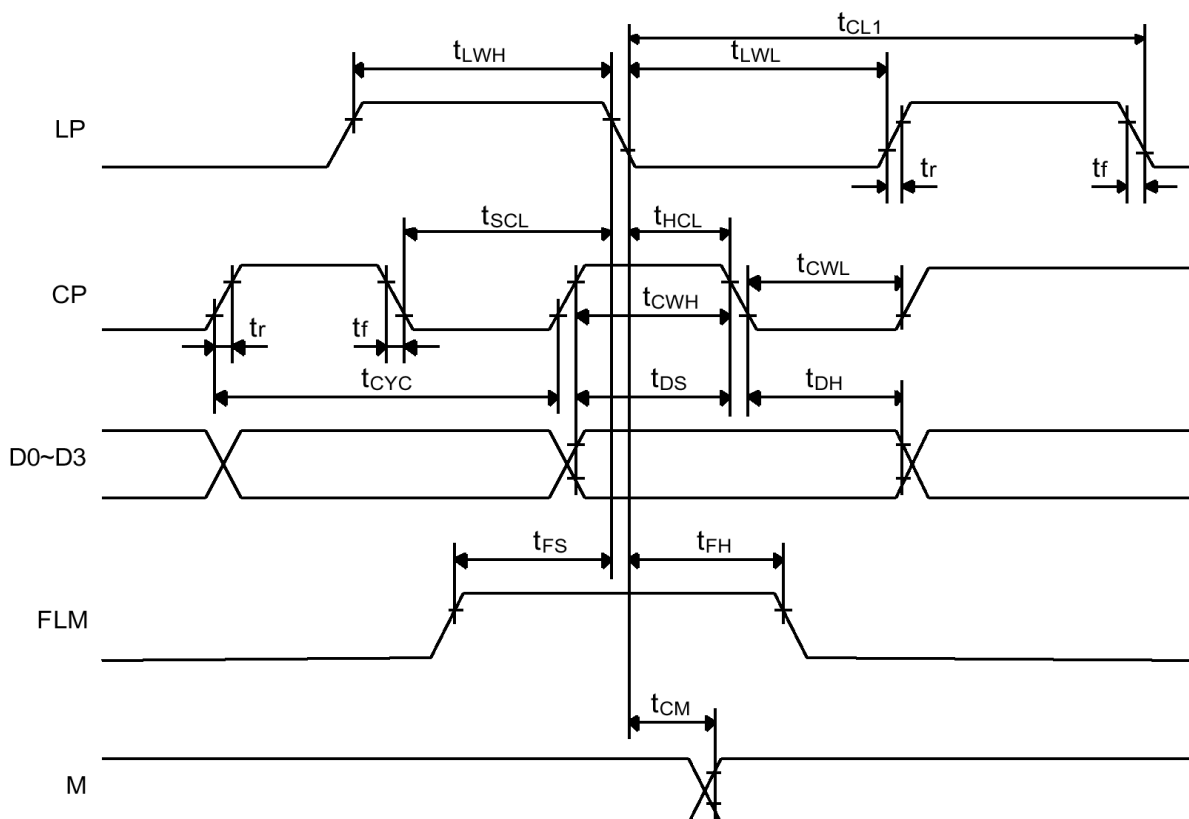
10. AC CHARACTERISTICS

Parameter	Symbol	Min.	Max.	Units
Clock Pulse Cycle Time	t_{CYC}	71	-	ns
Clock Pulse High Level Width	t_{CWH}	23	-	ns
Clock Pulse Low Level Width	t_{CWL}	23	-	ns
Clock Pulse Setup Time	t_{SCL}	25	-	ns
Clock Pulse Hold Time	t_{HCL}	25	-	ns
Clock Pulse Rise/Fall Time	t_r, t_f	-	50	ns
LP High Level Width	t_{LWH}	15	-	ns
LP Low Level Width	t_{LWL}	15	-	ns
LP Cycle Time	t_{CL1}	250	-	ns
Data Setup Time	t_{DS}	30	-	ns
Data Hole Time	t_{DH}	40	-	ns
FLM Data Setup Time	t_{FS}	30	-	ns
FLM Data Hole Time	t_{FH}	50	-	ns
M Phase Difference	t_{CM}	-	200	ns

Note : Please satisfy the following conditions (1), (2) in the same time.

(1) $t_r, t_f < (t_{CYC} - t_{CWH} - t_{CWL}) / 2$

(2) $t_r, t_f \leq 50$



**11. ELECTRO-OPTICAL CHARACTERISTICS**

MEASURING CONDITION: POWER SUPPLY = V_{OP} / 64 Hz
TEMPERATURE = 22 ± 5 °C
RELATIVE HUMIDITY = 60 ± 15 %

ITEM	SYMBOL	UNIT	TYP.
RESPONSE TIME	Ton	ms	370
	Toff	ms	470
CONTRAST RATIO	Cr	-	7
VIEWING ANGLE (6 O'clock) (Cr ≥ 2)	V3:00	°	40
	V6:00	°	50
	V9:00	°	40
	V12:00	°	30

THE ELECTRO-OPTICAL CHARACTERISTICS ARE MEASURED VALUE BUT NOT GUARANTEED ONES.

**12. RELIABILITY OF LCD MODULE**

ITEM	TEST CONDITION FOR NORMAL TEMPERATURE	TEST CONDITION FOR WIDE TEMPERATURE	TIME
High temperature operating	50°C	70°C	240 hours
Low temperature operating	0°C	-20°C	240 hours
High temperature storage	60°C	80°C	240 hours
Low temperature storage	-10°C	-30°C	240 hours
Temperature-humidity storage	40°C 90% R.H.	60°C 90% R.H.	96 hours
Temperature cycling	-10°C to 60°C 30 Min Dwell	-30°C to 80°C 30 Min Dwell	5 cycles
Vibration Test at LCM Level	Freq 10-55 Hz Sweep rate: 10-55-10 at 1 min Sweep mode Linear Displacement: 2 mm p-p 1 Hour each for X, Y, Z	Freq 10-55 Hz Sweep rate: 10-55-10 at 1 min Sweep mode Linear Displacement: 2 mm p-p 1 Hour each for X, Y, Z	—

13. QUALITY STANDARD OF LCD MODULE

1.0	Sampling Method Sampling Plan : MIL STD 105 E Class of AQL : Level II/Single Sampling Critical : 0.25% Major 0.65% Minor 1.5%		
2.0	Defect Group	Failure Category	Failure Reasons
	Critical Defect 0.25%(AQL)	Malfunction	Open Short Burnt or dead component Missing part/improper part P.C.B. Broken
	Major Defect 0.65%(AQL)	Poor Insulation	Potential short High current Component damage or scratched or Lying too close improper coating
		Poor Conduction	Damage joint Wrong polarity Wrong spec. part Uneven/intermittent contact Loose part Copper peeling Rust or corrosion or dirt's
	Minor Defect 1.5%(AQL)	Cosmetic Defect	Minor scratch Flux residue Thin solder Poor plating Poor marking Crack solder Poor bending Poor packing Wrong size



HANDLING PRECAUTIONS

(1) CAUTION OF LCD HANDLING & CLEANING

The polarizing plate on the surface of the panel is made from organic substances. Be very careful for chemicals not to touch the plate or it leads the polarizing plate to deteriorate.

If the use of a chemical is unavoidable, wipe the panel lightly with soft materials, such as gauze and absorbent cotton, soaked in a solvent.

*Usable solvent: Alcohol (ethanol, IPA and the like)

*Appropriate solvent: Ketones, ethyl alcohol

Avoid wiping with a dry cloth, since it could damage the surface of the polarizing plate and others.

(2) CAUTION AGAINST STATIC CHARGE

The LCD modules use CMOS LSI drivers, so customers are recommended that any unused input terminal would be connected to V_{DD} or V_{SS} , do not input any signals before power is turned on, and ground your body, work/assembly areas, assembly equipment to protect against static electricity.

(3) PACKAGING

Avoid intense shock and falls from a height and do not operate or store them exposed to direct sunshine or high temperature/humidity for long periods.

(4) CAUTION FOR OPERATION

The viewing angle can be adjusted by varying the LCD driving voltage V_O .

Driving voltage should be kept within specified range, excess voltage shortens display life.

Response time increases with decrease in temperature.

Display may turn black or dark Blue at temperature above its operational range; this is however not destructive and the display will return to normal once the temperature falls back to range.

Mechanical disturbance during operation (such as pressing on the viewing area) may cause the segments to appear "fractured". They will recover once the display is turned off.

Condensation at terminals will cause malfunction and possible electrochemical reaction. Relative humidity of the environment should therefore be kept below 60%.

(5) SAFETY

Liquid crystal may leak out of a damaged LCD, it is recommended to wash off the liquid crystal by using solvents such as acetone or ethanol and should be burned up later.

If any liquid leaks out of a damaged glass cell comes in contact with your hands, wash it off with soap and water immediately.

WARRANTY

Multi-Inno will replace or repair any of her LCD module in accordance with her LCD specification for a period of one year from date of shipment. The warranty liability of Multi-Inno is limited to repair and/or replacement. Multi-Inno will not be responsible for any subsequent or consequential event.