



MULTI-INNO TECHNOLOGY CO., LTD.

LCD MODULE SPECIFICATION

Model : MI0350GT

Revision	1.1
Engineering	
Date	
Our Reference	



TFT Module Specification

ITEM NO.: MI0350GT

Table of Contents

- 1. COVER & CONTENTS 1
- 2. RECORD OF REVISION 2
- 3. GENERAL SPECIFICATIONS 3
- 4. ABSOLUTE MAXIMUM RATINGS 3
- 5. ELECTRICAL CHARACTERISTICS 4
- 6. BLOCK DIAGRAM 5
- 7. INTERNAL PIN CONNECTIONS 6
- 8. INTERFACE TIMING 7
- 9. OPTICAL CHARACTERISTIC 9
- 10. QUALITY ASSURANCE 11
- 11. LOT NUMBERING SYSTEM 12
- 12. LCM NUMBERING SYSTEM 12
- 13. PRECAUTIONS IN USE LCM 13
- 14. OUTLINE DRAWING 14
- 15. PACKAGE INFORMATION 15

Customer Companies	R&D Dept.	Q.C. Dept.	Eng. Dept.	Prod. Dept.
	<i>Jack</i>	<i>Eric</i>	<i>Paul</i>	<i>heien</i>
Approved by	Version:	Issued Date:	Sheet Code:	Total Pages:
	1.1	2008/12/2		15



2. RECORD OF REVISION

Rev	Date	Item	Page	Comment
1	4/Nov/08			Initial preliminary
2	2/DEC/08	14,15	14,15	Add PACKAGE INFORMATION Modify outline drawing Release Rev. 1.1 for production



3. GENERAL SPECIFICATIONS

The specifications are applied to the following TFT-LCD module with Back-light unit.

Parameter	Specifications	Unit	
Screen Size	3.45 (diagonal)	inch	
Display Format	320 X RGB X 240	dots	
Active Area	70.08 (W) x 52.56 (H)	mm	
Dot Pitch	0.073(W) x 0.219 (H)	mm	
Outline Dimension	86.4 (W) x 64.5 (H) x 6.0(T)	mm	
Pixel Configuration	Stripe		
Display Type	Active Matrix		
Number of Colors	262K Colors (R,G,B 6 Bit Digital each)		
Backlight	LED x 6dices		
Surface Treatment	Anti-glare		
Weight	50	g	
Power Supply Voltage	5V for LDO		
View Angle Direction	6 o'clock		
Temperature Range	Operation	-20~+70	°C
	Storage	-30~+80	°C

4. ABSOLUTE MAXIMUM RATINGS

4.1 ELECTRICAL ABSOLUTE MAXIMUM RATINGS

(vss=0V)

Parameter	Symbol	MIN.	MAX.	Unit	Remark
Power supply for LDO	VDD	-0.3	6.0	V	
Input voltage	VI	-0.3	4.0	V	Note 1
Input Current	li	0	1	A	
Static Electricity	VESD0		±100	V	Note 2,3
	VESD1		8	kV	Note 2,4

Note 1: DB0~DB7,/CS,/WR,/RD,D/C,/RESET, WAIT

Note 2: 200pF-0Ω 25°C-70%RH

Note 3: Interface pin connector

Note 4: The surface of metal bezel and LCD Panel.

**5. ELECTRICAL CHARACTERISTICS****5.1 ELECTRICAL CHARACTERISTICS of LCD**

(VSS=0V, Ta=25°C)

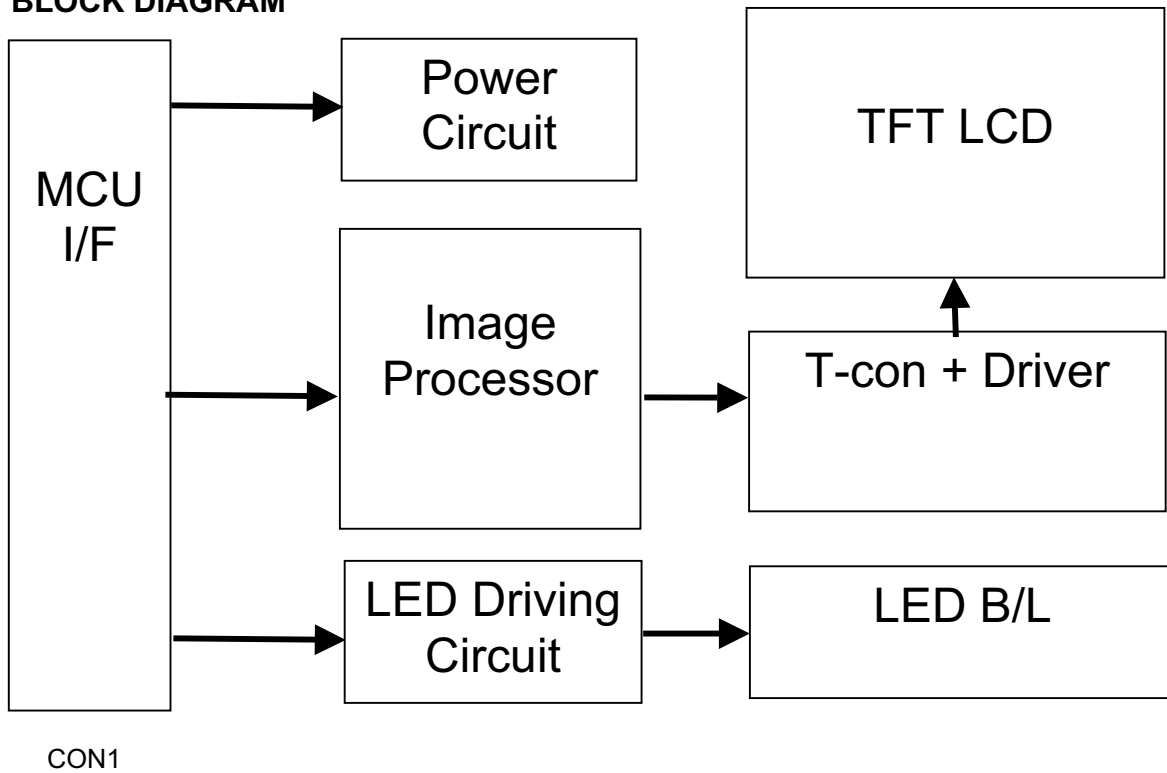
Parameter	Symbol	Condition	MIN.	TYP	MAX.	Unit
Power supply for LDO	VDD		4.5	5.0	5.5	V
Input voltage for logic(note 1)	VI	"H" level	2.64		3.3	V
		"L" level	0	-	0.66	V
Power supply Current (note 2)	IDD	VDD-VSS=5V	-	178	-	mA
Backlight PWM Control	WAIT		19K	20K	30K	Hz
LED dice life time				40000		Hrs

Note 1: DB0~DB7,/CS,/WR,/RD,D/C,/RESET, WAIT

Note 2: fv=60Hz, Ta=25°C, Pattern used as display pattern: All Black.

Note 3: Need to make sure of flickering and rippling of display when setting the frame frequency in your set.

Note 4: The "LED dice life time" is defined as the brightness decrease to 50% original brightness that the ambient temperature is 22°C and LED dice current=20mA.

6. BLOCK DIAGRAM



7. INTERNAL PIN CONNECTIONS

CON1 PIN FUNCTIONS:

Pin No	Symbol	Description
1	VDD	+5V, Power Supply for LDO.
2	VDD	+5V, Power Supply for LDO.
3	/CS	Chip select input.
4	VSS	GND
5	/WR	Write enable signal.
6	/RD	Read enable signal.
7	VSS	GND
8~15	DB7~DB0	8080 MCU 8bit data bus.
16	VSS	GND
17	WAIT	Backlight PWM control.
18	D/C	Data / command select.
19	/RESET	Master chip reset.
20	VSS	GND
21	SCK	Connect to CON2
22	SDI	
23	INT	
24	VSS	
25	ID1I	
26	ID1O	
27	ID2I	
28	ID2O	

CON2 PIN FUNCTIONS:

Pin No	Symbol	Description
1	VDD	+3.3V, Power Supply for touch panel.
2	VSS	GND
3	SCK	Connect to CON1
4	VSS	
5	SDI	
6	INT	
7	ID1I	
8	ID1O	
9	ID2I	
10	ID2O	

8. INTERFACE TIMING

8.1 AC Characteristics

(Unless otherwise specified, Voltage Referenced to V_{SS} , $V_{DD} = 5V$, $T_a = 25^\circ C$)

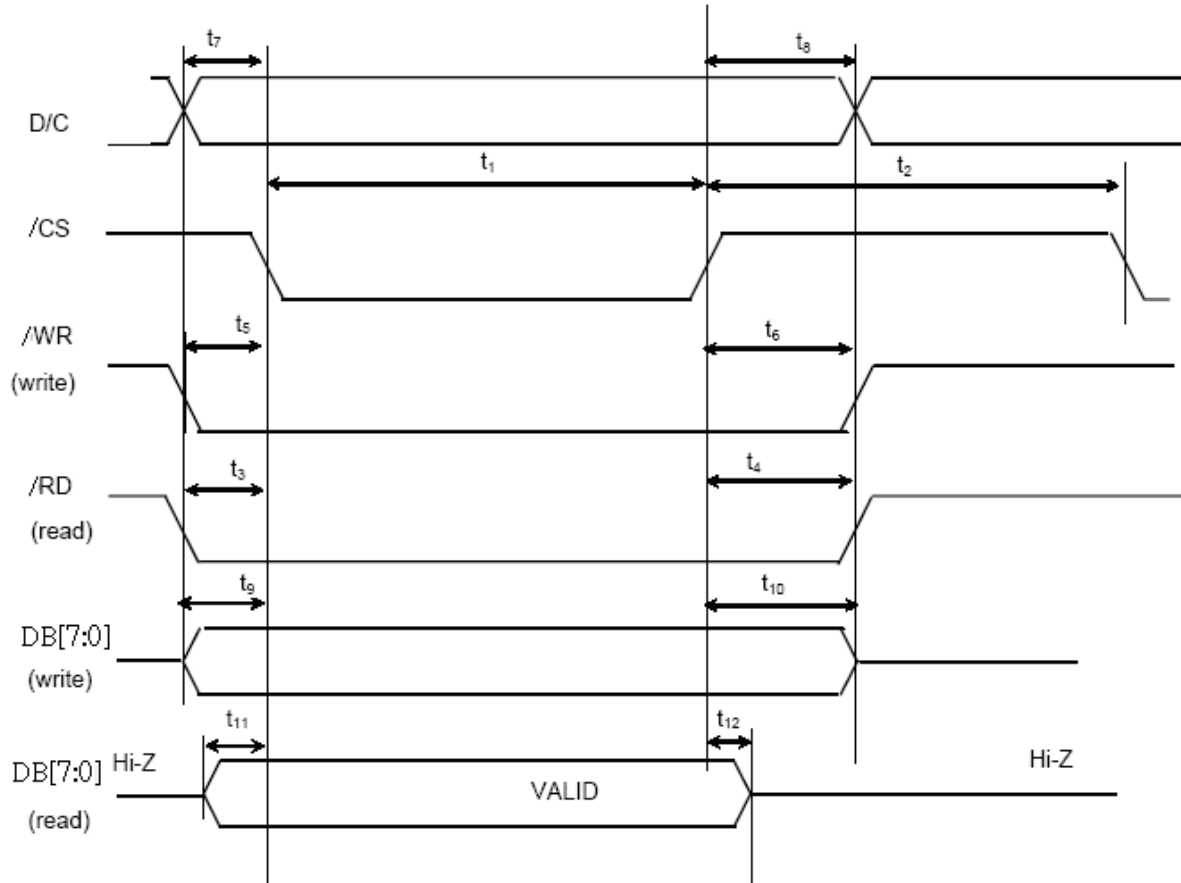
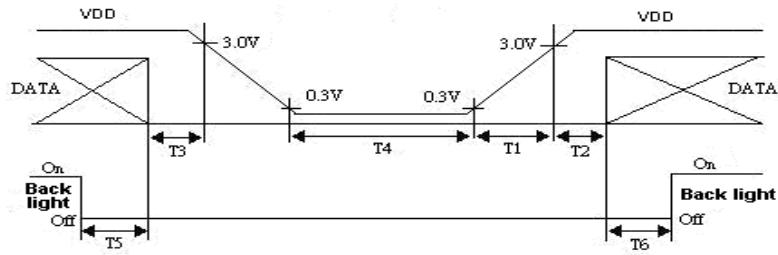


Figure 8.1-1 8080 Indirect Interface Timing

Characteristics	Symbol	Min	Typ	Max	Unit
/CS pulse width low	t1	82			ns
/CS pulse width high	t2	82			ns
/RD setup	t3	18			ns
/RD hold	t4	0			ns
/WR setup	t5	18			ns
/WR hold	t6	0			ns
D/C setup	t7	18			ns
D/C hold	t8	0			ns
DB[7:0] setup for write	t9	18			ns
DB[7:0] hold for write	t10	0			ns
DB[7:0] delay for read	t11	55			ns
DB[7:0] hold for read	t12	0			ns

Table 8.1-1 Pixel & tRES timing

8.2 Power Off/On Sequence Timing



Timing Specifications:

$$0 < T_1 \leq 15\text{mS}$$

$$T_2 > 0.5\text{S}$$

$$0 < T_3 \leq 0.1\text{S}$$

$$T_4 > 1\text{S}$$

$$T_5 > 0.1\text{S}$$

$$T_6 > 0.1\text{S}$$



8.3 Color Data Input Assignment

		Data Signal																	
		Red						Green						Blue					
Color		R5	R4	R3	R2	R1	R0	G5	G4	G3	G2	G1	G0	B5	B4	B3	B2	B1	B0
Basic Colors	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
	Green	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0
	Blue	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1
	Cyan	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1
	Magenta	1	1	1	1	1	1	0	0	0	0	0	0	1	1	1	1	1	1
	Yellow	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0
	White	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Gray Scale of Red	Red(0) / Dark	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red(1)	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
	Red(2)	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	Red(61)	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0
	Red(62)	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Red(63)	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	
Gray Scale of Green	Green(0) / Dark	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Green(1)	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
	Green(2)	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	Green(61)	0	0	0	0	0	0	1	1	1	1	0	1	0	0	0	0	0	0
	Green(62)	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0	0	0
Green(63)	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0	
Gray Scale of Blue	Blue(0) / Dark	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Blue (1)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	Blue (2)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	Blue (61)	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0
	Blue (62)	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0
Blue (63)	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	

Correspondence between Data and Display Position

	S001	S002	S003	S004	S005	S006	S007	S008	-----	S959	S960
C001	R001	G001	B001	R002	G002	B002	R003	G003		G320	B320
C240	R001	G001	B001	R002	G002	B002	R003	G003		G320	B320

9. OPTICAL CHARACTERISTIC

9.1 Specification:

Ta = 25°C

Parameter		Symbol	Condition	MIN.	TYP.	MAX.	Unit	Remarks
Viewing Angle	Horizontal	θ_{x+}	Center CR \geq 10		70		deg	Note 9-2
		θ_{x-}			70		deg	
	Vertical	θ_{y+}			50		deg	
		θ_{y-}			70		deg	
Contrast Ratio		CR		200				Note 9-1
Response time	Rise	Tr	Center $\theta_x=\theta_y=0^\circ$		15	30	ms	Note 9-4
	Fall	Tf			35	50	ms	
Uniformity		U		70			%	
Brightness			Center	200	250	--	cd/m ²	Note 9-2
Chromaticity	White	x	$\theta_x=\theta_y=0^\circ$	0.25	0.30	0.35		
		y		0.28	0.33	0.38		

Note 9-1 : CR = $\frac{\text{Luminance when LCD is White}}{\text{Luminance when LCD is Black}}$

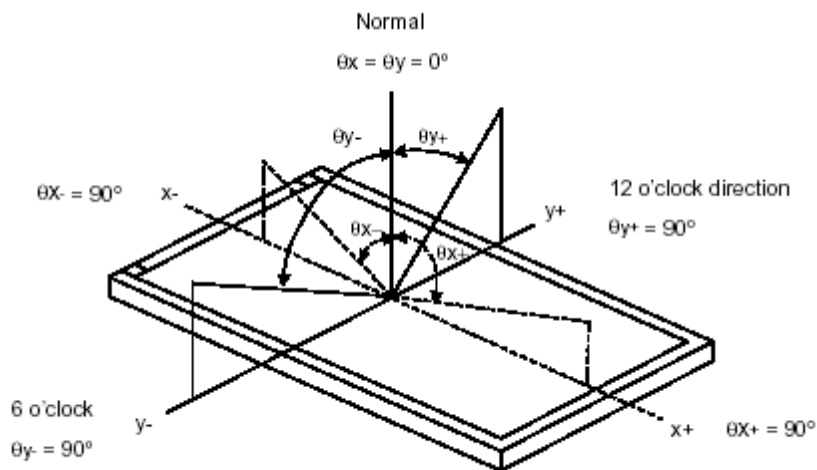
The test configurations of contrast ratio see section 9.2 .

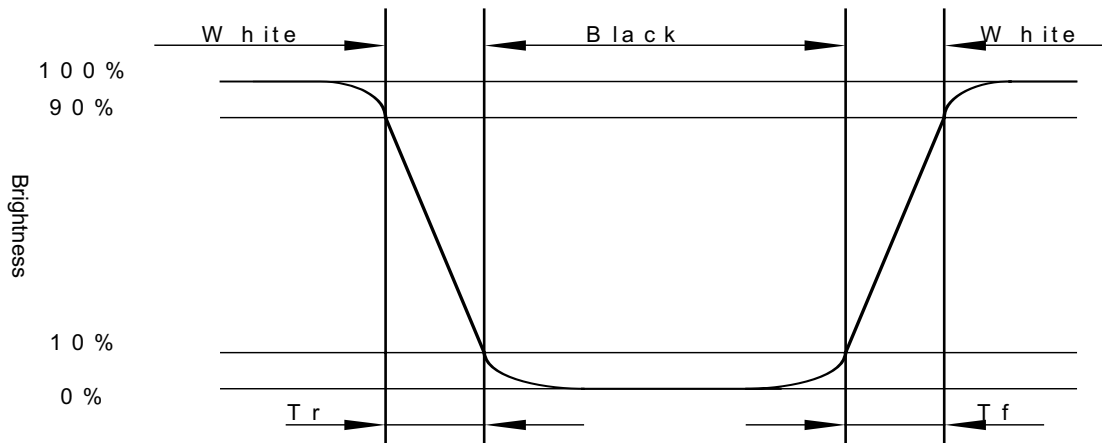
Note 9-2 :1.Topcon BM-7A luminance meter 1.0° field of view is used in the testing (after 2 minutes operation).

2. LED current =20mA.

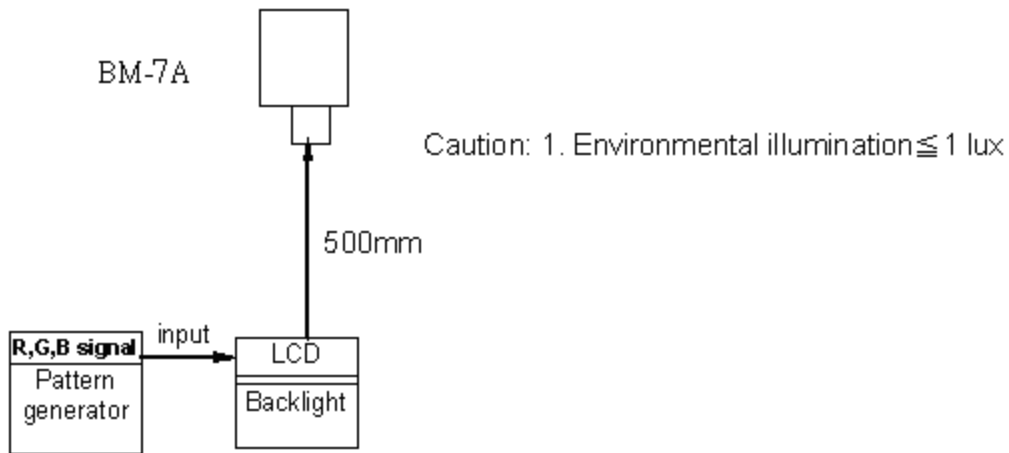
Note 9-3 : The definitions of viewing angles diagrams:

Note 9-4: The definition of response time:





9.2 Testing configuration



**10. QUALITY ASSURANCE****10.1 Test Condition**

10.1.1 Temperature and Humidity(Ambient Temperature)

Temperature : $20 \pm 5^{\circ}\text{C}$ Humidity : $65 \pm 5\%$

10.1.2 Operation

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

10.1.3 Container

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

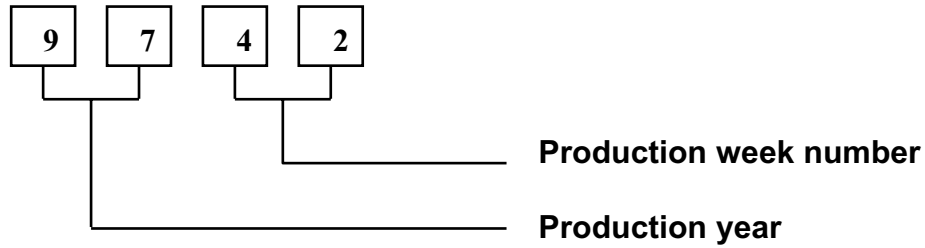
10.1.4 Test Frequency

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

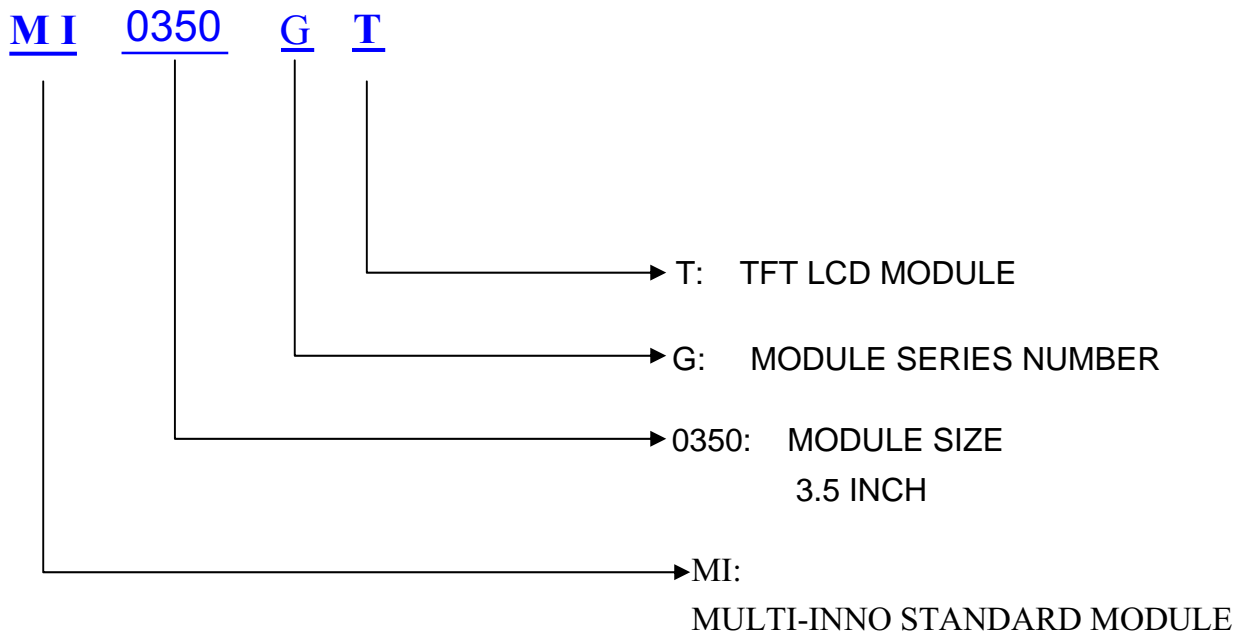
10.1.5 Test Method

No.	Reliability Test Item & Level	Test Level
1	High Temperature Storage Test	T=+80°C,240hrs
2	Low Temperature Storage Test	T=-30°C,240hrs
3	High Temperature Operation Test	T=+70°C,240hrs
4	Low Temperature Operation Test	T=-20°C,240hrs
5	High Temperature and High Humidity Operation Test	T=60°C,90% RH,240hrs
6	Temperature Cycle Test (No operation)	-30°C → +25°C → +80°C,50 Cycles 30 min 5min 30 min
7	Vibration Test (No operation)	Frequency:10 ~ 55 Hz Amplitude:1.0 mm Sweep Time:11min Test Period:6 Cycles for each Direction of X,Y,Z
8	Shock Test (No operation)	100G, 6ms Direction : ± X,± Y,± Z Cycle : 3 times

11. LOT NUMBERING SYSTEM



12. LCM NUMBERING SYSTEM



13. PRECAUTIONS IN USE LCM

1. LIQUID CRYSTAL DISPLAY (LCD)

LCD is made up of glass, organic sealant, organic fluid, and polymer based polarizers. The following precautions should be taken when handling,

- (1). Keep the temperature within range of use and storage. Excessive temperature and humidity could cause polarization degradation, polarizer peel off or bubble.
- (2). Do not contact the exposed polarizers with anything harder than an HB pencil lead. To clean dust off the display surface, wipe gently with cotton, chamois or other soft material soaked in petroleum benzine.
- (3). Wipe off saliva or water drops immediately. Contact with water over a long period of time may cause polarizer deformation or color fading, while an active LCD with water condensation on its surface will cause corrosion of ITO electrodes.
- (4). Glass can be easily chipped or cracked from rough handling, especially at corners and edges.
- (5). Do not drive LCD with DC voltage.

2. Liquid Crystal Display Modules

2.1 Mechanical Considerations

LCM are assembled and adjusted with a high degree of precision. Avoid excessive shocks and do not make any alterations or modifications. The following should be noted.

- (1). Do not tamper in any way with the tabs on the metal frame.
- (2). Do not modify the PCB by drilling extra holes, changing its outline, moving its components or modifying its pattern.
- (3). Do not touch the elastomer connector, especially insert an backlight panel (for example, EL).
- (4). When mounting a LCM make sure that the PCB is not under any stress such as bending or twisting. Elastomer contacts are very delicate and missing pixels could result from slight dislocation of any of the elements.
- (5). Avoid pressing on the metal bezel, otherwise the elastomer connector could be deformed and lose contact, resulting in missing pixels.

2.2. Static Electricity

LCM contains CMOS LSI's and the same precaution for such devices should apply, namely

- (1). The operator should be grounded whenever he/she comes into contact with the module. Never touch any of the conductive parts such as the LSI pads, the copper leads on the PCB and the interface terminals with any parts of the human body.
- (2). The modules should be kept in antistatic bags or other containers resistant to static for storage.
- (3). Only properly grounded soldering irons should be used.
- (4). If an electric screwdriver is used, it should be well grounded and shielded from commutator sparks.

(5) The normal static prevention measures should be observed for work clothes and working benches; for the latter conductive (rubber) mat is recommended.

(6). Since dry air is inductive to statics, a relative humidity of 50-60% is recommended.

2.3 Soldering

- (1). Solder only to the I/O terminals.
- (2). Use only soldering irons with proper grounding and no leakage.
- (3). Soldering temperature: $280^{\circ}\text{C} \pm 10^{\circ}\text{C}$
- (4). Soldering time: 3 to 4 sec.
- (5). Use eutectic solder with resin flux fill.
- (6). If flux is used, the LCD surface should be covered to avoid flux spatters. Flux residue should be removed afterwards.

2.4 Operation

- (1). The viewing angle can be adjusted by varying the LCD driving voltage V_0 .
- (2). Driving voltage should be kept within specified range; excess voltage shortens display life.
- (3). Response time increases with decrease in temperature.
- (4). Display may turn black or dark blue at temperatures above its operational range; this is (however not pressing on the viewing area) may cause the segments to appear "fractured".
- (5). Mechanical disturbance during operation (such as pressing on the viewing area) may cause the segments to appear "fractured".

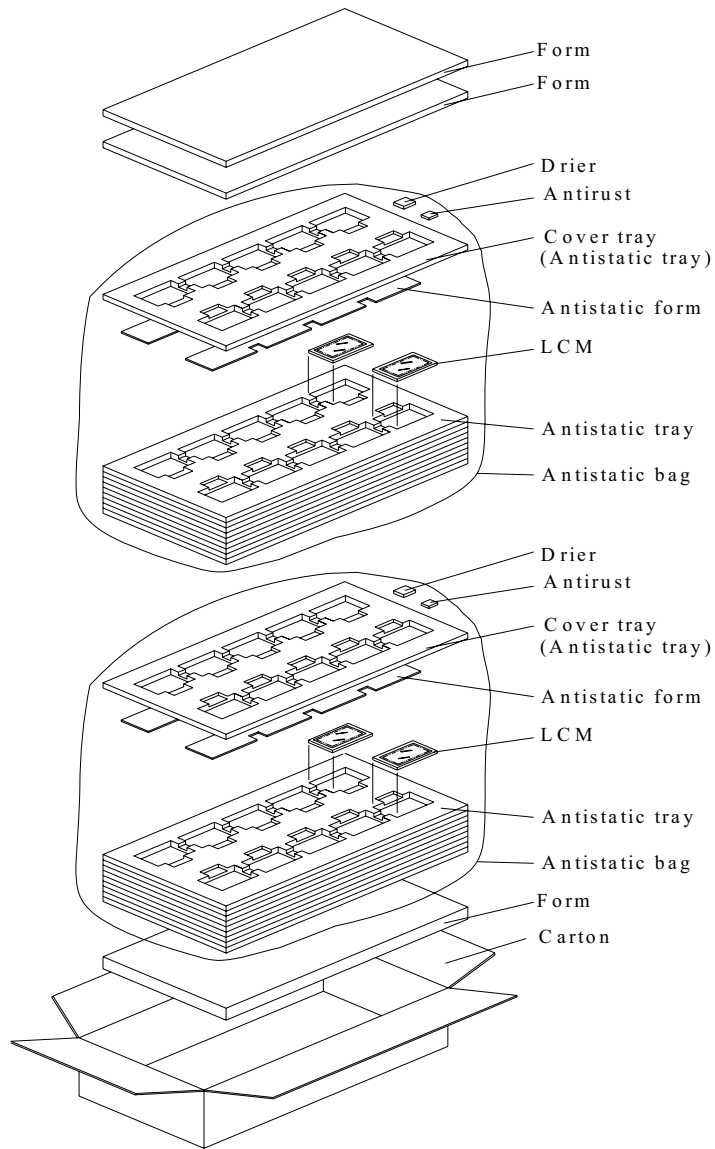
2.5 Storage

If any fluid leaks out of a damaged glass cell, wash off any human part that comes into contact with soap and water. Never swallow the fluid. The toxicity is extremely low but caution should be exercised at all the time.

2.6 Limited Warranty

Unless otherwise agreed between MULTI-INNO and customer, MULTI-INNO will replace or repair any of its LCD and LCM which is found to be defective electrically and visually when inspected in accordance with MULTI-INNO acceptance standards, for a period on one year from date of shipment. Confirmation of such date shall be based on freight documents. The warranty liability of MULTI-INNO is limited to repair and/or replacement on the terms set forth above. MULTI-INNO will not responsible for any subsequent or consequential events.

15. PACKAGE INFORMATION



Material

1 Carton + 3 Form (15mm) + 2 Anti-static bag + 10 Antistatic form
+ 12 Anti-static tray + 2 Drier + 2 Antirust

Total pcs

1 Antistatic tray = 10 panel pcs

1 Anti-static bag = 5 Anti-static tray + cover tray = $5 * 10 + 1 * 0 = 50$ pcs

1 Carton = 2 Anti-static bag = $2 * 50 = 100$ pcs

1 Carton = 100 pcs

Carton size : 482L x 282W x 279H (mm)

Total Weight $\doteq 6.5$ kgw

MI0350GT TFT LCM PACKING