MULTI-INNO TECHNOLOGY CO., LTD.

LCD MODULE SPECIFICATION

Model : MI0700J1T-1

Revision	2.0
Engineering	
Date	
Our Reference	

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2. RECORD OF REVISION

Rev	Date	Item	Page	Comment
1	9/Nov/09'			Initial Preliminary
2	5/JAN/10'	6 5,12 8 11 16	4 3,14 7 13 17	Add: LED Dice's Ambient Temp. vs. Allowable Forward Current Curve. Modify: Module's temperature range Add Module's Brightness data:200(min) Modify: TOUCH PANEL CHARACTERISTICS Change OUTLINE DRAWING from Rev:1 to Rev:2

3. APPLICATION

DVD player, Car TV, UMPC, POS

4. GENERAL SPECIFICATIONS

Parameter	Specifications	Unit
Screen Size	7 (diagonal)	inch
Display Format	800(H) x (R,G,B) x 480(V)	dot
Active Area	152.4(H) x 91.44(V)	mm
Dot Pitch	0.0635 (H) x 0.1905 (V)	mm
Pixel Configuration	Stripe	
Outline Dimension	165(W) x 104.44(H) x 11.06 Max (D)	mm
Surface treatment	Anti-glare and hard coating (3H)	
Back-light	LED	
Display mode	Normally white	
Weight	TBD	g
View Angle direction	6 o'clock	

5. ABSOLUTE MAXIMUM RATINGS

Parameter		Symbol	MIN.	MAX.	Unit	Remark
Power supply voltage		Vcc, VDD	-0.3	6	V	Ta=25°C
Logic input voltage		VI	-0.3	V_{CC}+0.3	V	
Operating temperature		Top	-10	60	°C	Module surface*
Storage temperature		Tst	-30	70	°C	-
Humidity	Operation	20%~90% relative humidity				Ta<=38°C
	Non Operation	5%~90% relative humidity				Ta<=38°C

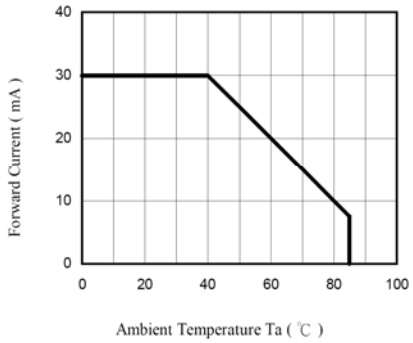
6. ELECTRICAL CHARACTERISTICS

fH=30KHz, fv=60Hz, fCLK=33.26,MHz,Ta=25°C

Parameter	Symbol	MIN.	TYP.	MAX.	Unit	Remark
Power Supply voltage for LCD	V_{CC}	3.0	3.3	3.6	V	
Power Supply Current for LCD	I_{CC}	--	150	200	mA	V_{CC} =3.3V
Power Supply voltage for LED	VDD	3.0	3.3	5.5	V	
Power Supply Current for LED	IDD	--	650	850	mA	V_{DD} =3.3V
		--	400	550		V_{DD} =5.0V
"H" level logical input voltage	V_{IH}	0.7Vcc	--	Vcc	V	
"L" level logical input voltage	V_{IL}	0	--	0.3Vcc	V	
ADJ frequency		19K	20K	21K	Hz	
ADJ input voltage	VIH	3.0	-	3.3	V	
	VIL	0	-	0.3		
LED dice life time			30000		Hr	Not 1,2

Note 1: The "LED dice life time" is defined as the brightness decrease to 50% original brightness that the ambient temperature is 18℃~28℃ and LED dice current=20mA.

Note2: The LED Dice's Ambient Temp. vs. Allowable Forward Current Curve.



7. INPUT SIGNAL CHARACTERISTICS

7.1 AC Characteristics

7.1.1 AC Electrical Characteristics

Parameter	Symbol	MIN.	TYP.	MAX.	Unit
Data setup time	T_{dsu}	6	-	-	ns
Data hold time	T_{dhd}	6	-	-	ns
DE setup time	T_{esu}	6	-	-	ns

7.1.2 Resolution：800x480

Parameter	Symbol	MIN.	TYP.	MAX.	Unit
DCLK frequency	F_{CPH}	-	33.26	-	MHz
DCLK period	T_{CPH}	-	30.06	-	ns
DCLK pulse duty	T_{CWH}	40	50	60	%
DE period	$T_{DEH}+T_{DEL}$	1000	1056	1200	T_{CPH}
DE pulse width	T_{DEH}	-	800	-	T_{CPH}
DE frame blanking	T_{DEB}	10	45	110	$T_{DEH}+T_{DEL}$
DE frame width	T_{DE}	-	480	-	$T_{DEH}+T_{DEL}$

7.2 Timing Controller Timing Chart

7.2.1 Clock and Data input waveforms

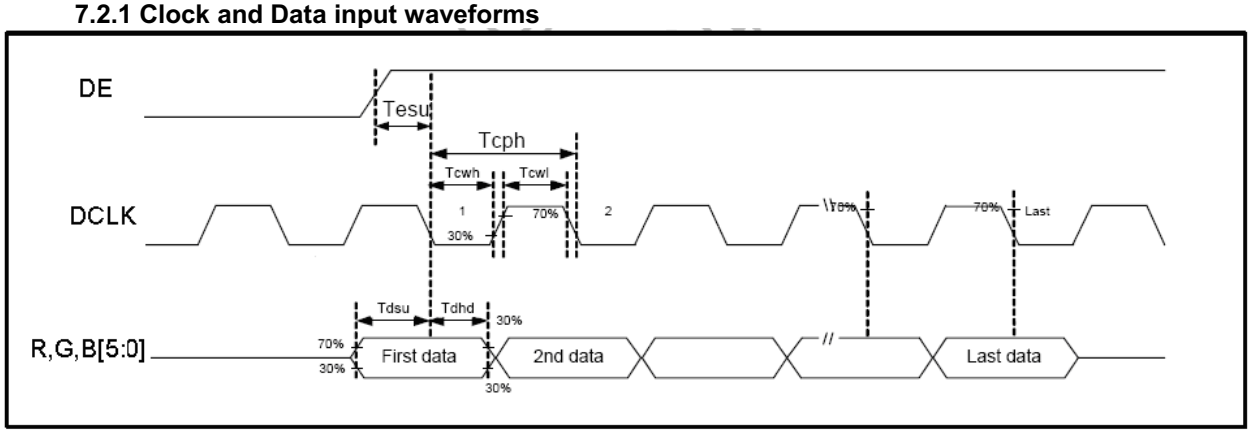
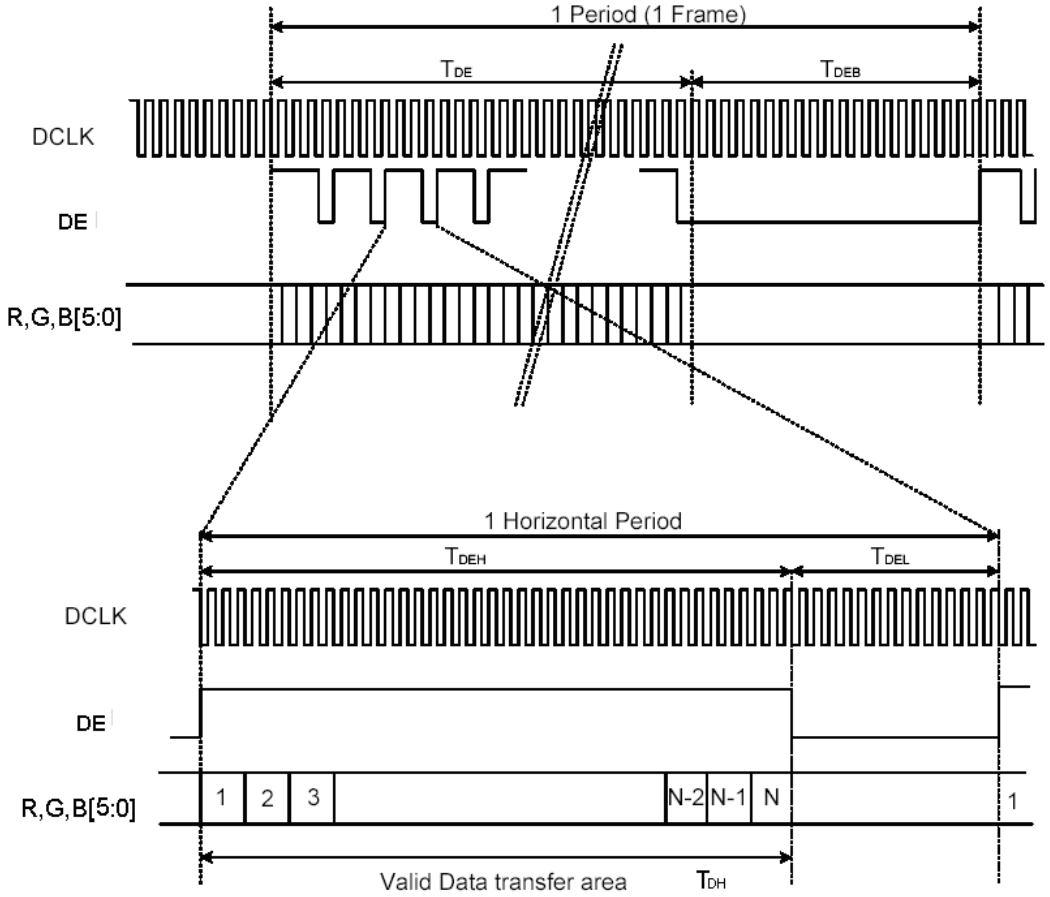


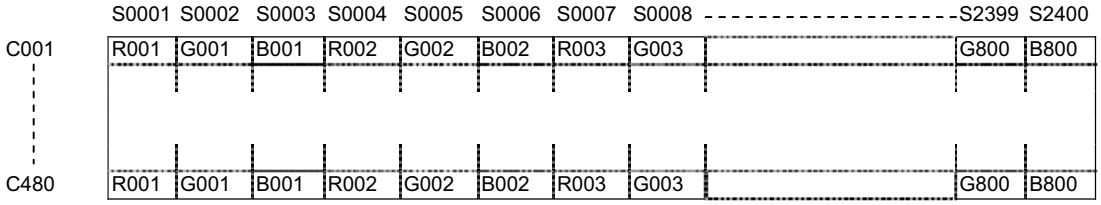
Figure 1 Clock and Data input waveforms.


1 Period (1 Frame)
TDE
TDEB
DCLK
DE
R,G,B[5:0]
1 Horizontal Period
TDEH
TDEL
DCLK
DE
R,G,B[5:0]
1
2
3
N-2
N-1
N
1
Valid Data transfer area
TDH

7.3 Color Data Input Assignment

Color		Data Signal																	
		Red						Green						Blue					
		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	0	1
	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

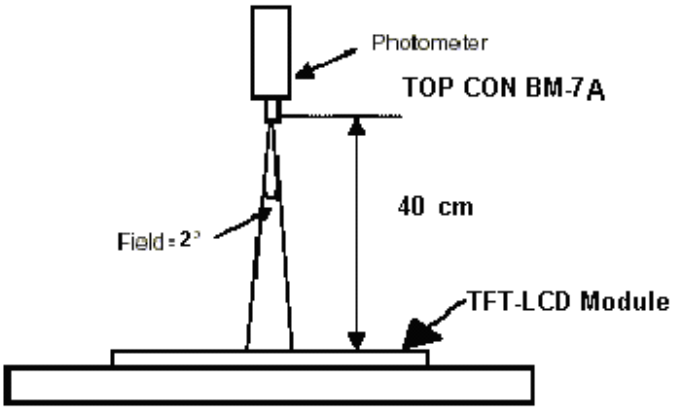


8. OPTICAL CHARACTERISTIC

Parameter		Symbol	Condition	MIN.	TYP.	MAX.	Unit	Remarks
Viewing Angle	Horizontal	θ_x+	Center CR≥10	65	70	--	deg	Note 1,4
		θ_x-		65	70	--		
	Vertical	θ_Y+		55	60	--		
		θ_Y-		55	60	--		
Contrast Ratio		CR	at optimized viewing angle	250	400	--		Note 1,3
Response time	Rise	Tr	Center θx=θy =0°	-	5	10	ms	Note 1,6
	Fall	Tf		-	11	16	ms	
Uniformity		B-uni	θx=θy =0°	70	80	--	%	Note1,5
Brightness		L	θx=θy =0°	200	250	--	cd/㎡	Note 1,2
Chromaticity		x_W	Center θx=θy =0°	0.26	0.31	0.36		Note 1,7
		y_W		0.28	0.33	0.38		
		x_R		TBD	TBD	TBD		
		y_R		TBD	TBD	TBD		
		x_G		TBD	TBD	TBD		
		y_G		TBD	TBD	TBD		
		x_B		TBD	TBD	TBD		
		y_B		TBD	TBD	TBD		
Image sticking		tis	2 hours			2	Sec	Note 8

The following optical specifications shall be measured in a darkroom or equivalent state (ambient luminance ≤1 lux, and at room temperature). The operation temperature is 25°C±2°C and LED Backlight Current IL=160mA. The measurement method is shown in Note1.

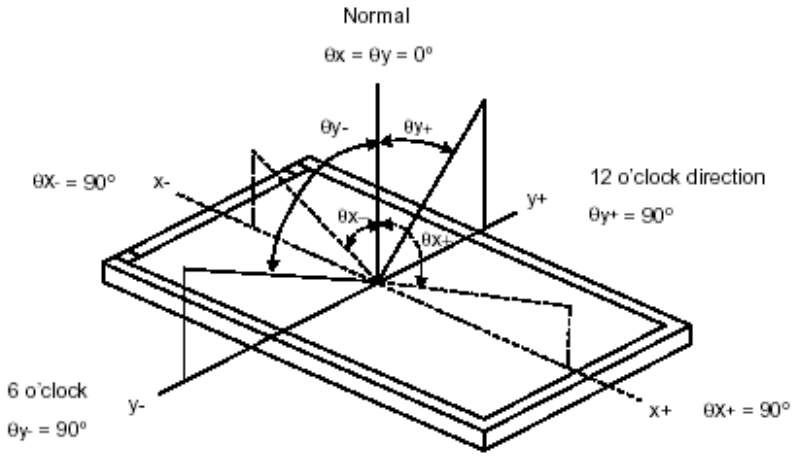
Note1: The method of optical measurement:



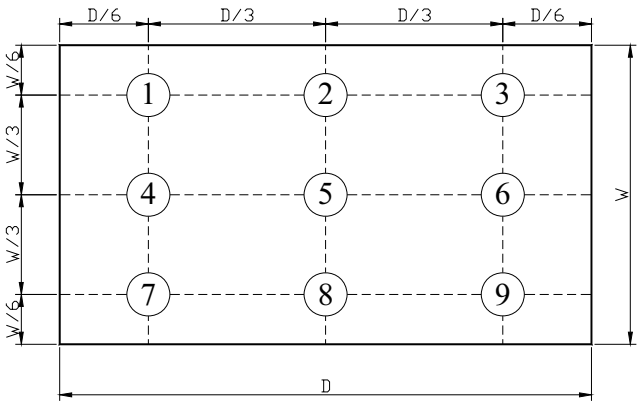
Note2: Measured at the center area of the panel and at the viewing angle of the θx=θy =0°
Note3: Definition of Contrast Ratio (CR):

$$CR = \frac{\text{Luminance with all pixels in white state}}{\text{Luminance with all pixels in Black state}}$$

Note4: Definition of Viewing Angle



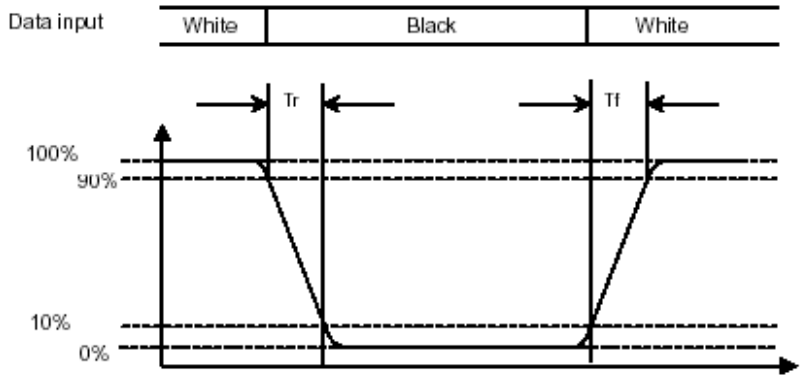
Note 5: Definition of Brightness Uniformity (B-uni):



$$\text{B-uni} = \frac{\text{Minimum luminance of 9 points}}{\text{Maximum luminance of 9points}} \quad \text{(Note 5).}$$

Note6: Definition of Response Time:

The Response Time is set initially by defining the “Rising Time (Tr)” and the “Falling Time (Tf)” respectively. Tr and Tf are defined as following figure.



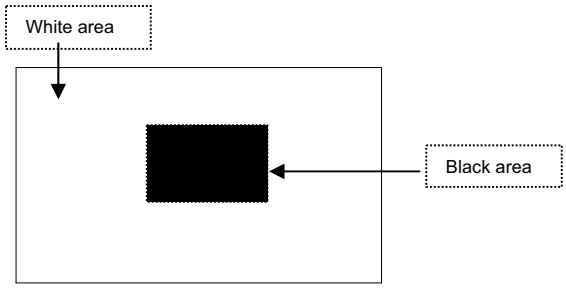
Note 7: Definition of Chromaticity:

The color coordinates (x_W,y_W),(x_R,y_R),(x_G,y_G),and (x_B,y_B) are obtained with all pixels in the viewing field at white, red, green, and blue states, respectively.

Note 8: Definition of Image sticking (tis):

Continuously display the test pattern shown in the figure below for 2 hours. Then display a completely white screen. The previous image shall not persist more than 2 sec at 25 °C

Image sticking pattern



9. PIN CONNECTIONS

Pin NO.	SYMBOL	DESCRIPTION
1	Vss	Power Ground
2	Vss	Power Ground
3	ADJ	Brightness control for LED B/L
4	VDD	Power Supply for LED Driver
5	VDD	Power Supply for LED Driver
6	VDD	Power Supply for LED Driver
7	Vcc	Power Supply for Digital Circuit
8	Vcc	Power Supply for Digital Circuit
9	DE	Data Enable
10	Vss	Power Ground
11	Vss	Power Ground
12	Vss	Power Ground
13	B5	Blue Data 5 (MSB)
14	B4	Blue Data 4
15	B3	Blue Data 3
16	Vss	Power Ground
17	B2	Blue Data 2
18	B1	Blue Data 1
19	B0	Blue Data 0 (LSB)
20	Vss	Power Ground
21	G5	Green Data 5 (MSB)
22	G4	Green Data 4
23	G3	Green Data 3
24	Vss	Power Ground
25	G2	Green Data 2
26	G1	Green Data 1
27	G0	Green Data 0 (LSB)
28	Vss	Power Ground
29	R5	Red Data 5 (MSB)
30	R4	Red Data 4
31	R3	Red Data 3
32	Vss	Power Ground
33	R2	Red Data 2
34	R1	Red Data 1
35	R0	Red Data 0
36	Vss	Power Ground
37	Vss	Power Ground
38	DCLK	Clock Signals ; Latch Data at the Falling Edge
39	Vss	Power Ground
40	Vss	Power Ground

Remarks：
1) ADJ is brightness control Pin. The larger of the pulse duty is the higher of the brightness.
2) ADJ signal is 0~3.3V.Operation frequency is 20KHz
3) VSS PIN must be grounding, can not be floating.

Remarks:

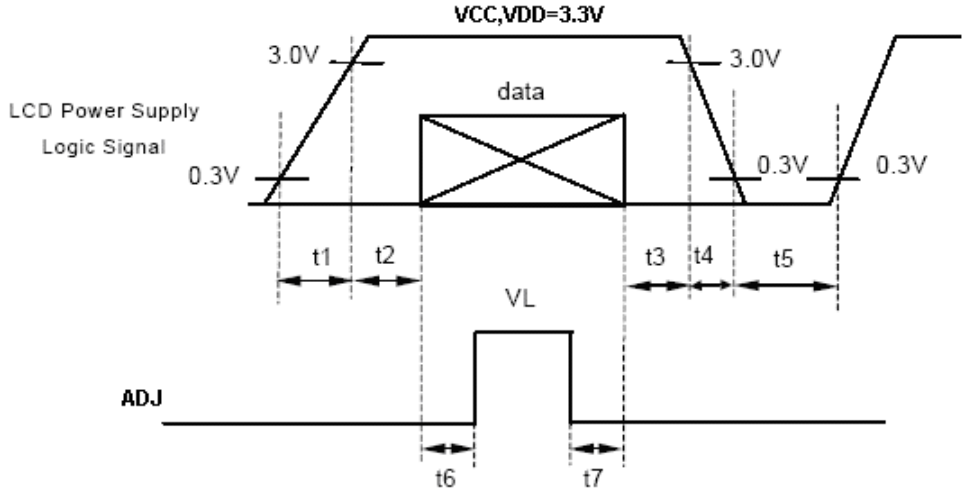
Power Signal sequence:

t1 ≤10ms ; 1 sec≤ t5

50ms≤ t2 ; 200ms ≤t6

0<t3 ≤50ms ; 200ms≤ t7

0<t4 ≤10ms

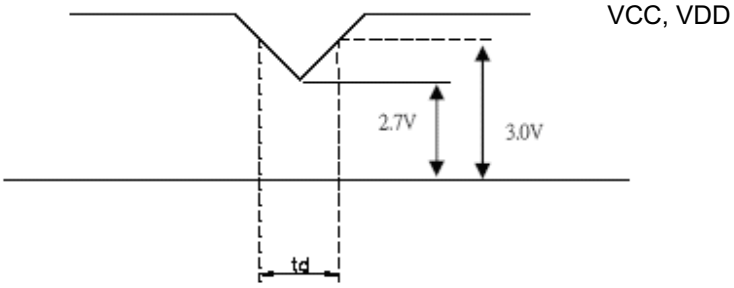


Data: RGB DATA, DCLK, DE

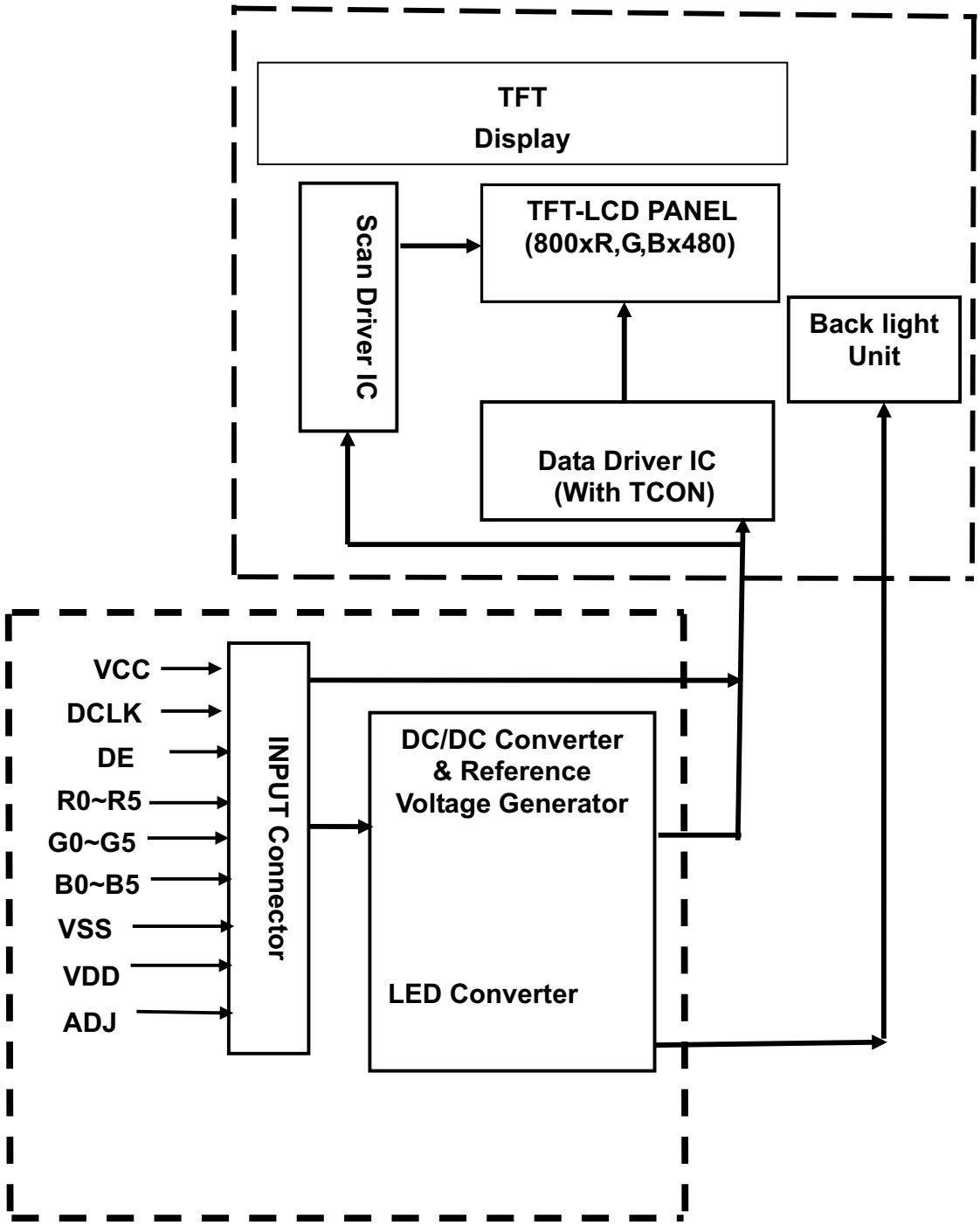
VCC,VDD -dip condition:

(1) 2.7V ≤VCC,VDD≤3.0V: td ≤10 ms

(2) VCC,VDD>3.0V: VCC,VDD -dip condition should be the same with VCC,VDD-turn-on condition.



10. BLOCK DIAGRAM



11. TOUCH PANEL CHARACTERISTICS

1. Input Method and Activation Force

Input Method	Activation Force
0.8mm dia. Delrin Polyacetal stylus	60~100g.
8.0mm dia. Silicon " finger "	60~100g.

2. Typical Optical Characteristics

ITEM	Parameter
Visible Light Transmission	≥ 80%
Haze	<8%
Hardness of surface	3H

3. Electrical Specification

ITEM		Parameter
Operating Voltage		≤ 10V
Circuit close resistance	X	200~600Ω
	Y	450~1000Ω
Circuit open resistance		>20MΩ at 25V DC
Contact bounce		<10ms
Linear Test		<1.5%

4. Linearity

ITEM		Parameter
Linear Test Specification Direction	X	<1.5%
	Y	<1.5%

5. Specification

ITEM	Parameter
Operating Temperature	-10°C~+60°C
Storage Temperature	-30°C~+70°C

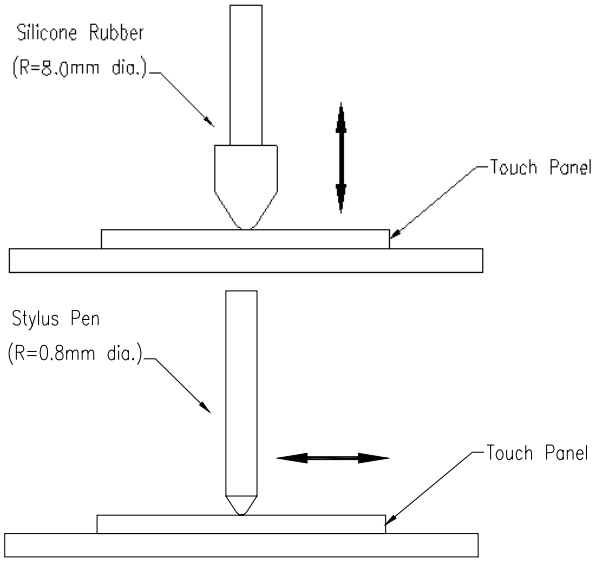
6. Durability test:

6.1 Touch panel is hit 1 millions times with a silicone rubber of R8 finger, hitting rate is by 200g at 2 times per second. The measurement must satisfy the following:

- Circuit close resistance: x200~600Ω;
  y 450~1000Ω
- Circuit open resistance: >20MΩ at 25V DC
- Contact bounce: <10ms
- Linearity test: <1.5%

6.2 Stylus writing
Touch panel is drawn by R0.8 Darling stylus pen, at 250g forces, repeat one inch by 10k times. The measurement must satisfy the following:

- Circuit close resistance: x 200~600ΩΩ ;
  y 450~1000Ω
- Circuit open resistance: >20MΩ at 25V DC
- Contact bounce: <10ms
- Linearity test: <1.5%



12. QUALITY ASSURANCE

12.1 Test Condition

12.1.1 Temperature and Humidity(Ambient Temperature)

Temperature : 25 ± 5°C

Humidity : 65 ± 5%

12.1.2 Operation

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

12.1.3 Container

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

12.1.4 Test Frequency

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

12.1.5 Test Method

Reliability Test Item & Level		Test Level
No.	Test Item	
1	High Temperature Storage Test	T=+70℃,240hrs
2	Low Temperature Storage Test	T=-30℃, 240hrs
3	High Temperature Operation Test	T=+60℃,240hrs
4	Low Temperature Operation Test	T=-10℃,240hrs
5	High Temperature and High Humidity (No operation)	T=40℃,90%RH,240hrs
6	Thermal Cycling Test (No operation)	-20℃ → +25℃ → +70℃, 100 Cycles 30 min 5 min 30 min
7	Vibration Test (No operation)	Frequency :10 ~ 55 H_Z Amplitude :1.5 mm Sweep time : 11 mins Test Period: 6 Cycles for each direction of X, Y, Z

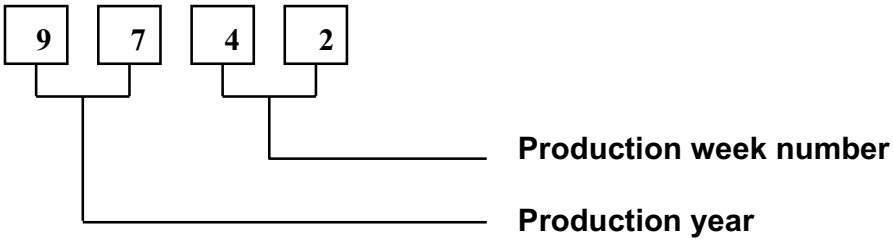
12.2 Judgment standard

The Judgment of the above test should be made as follow:

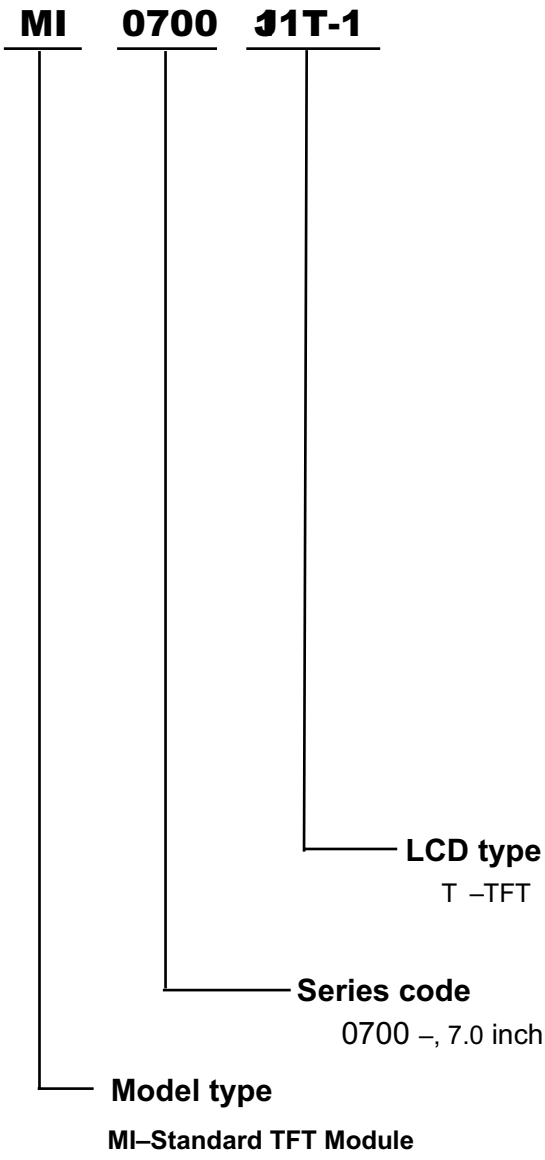
Pass: Normal display image with no obvious non-uniformity and no line defect. Partial transformation of the module parts should be ignored.

Fail: No display image, obvious non-uniformity, or line defect.

13. LOT NUMBERING SYSTEM



14. LCM NUMBERING SYSTEM



15. 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 handing,

(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 benzin.

(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°C ± 10°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 after wards.

2.4 Operation

(1). The viewing angle can be adjusted by varying the LCD driving voltage V0.

(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".

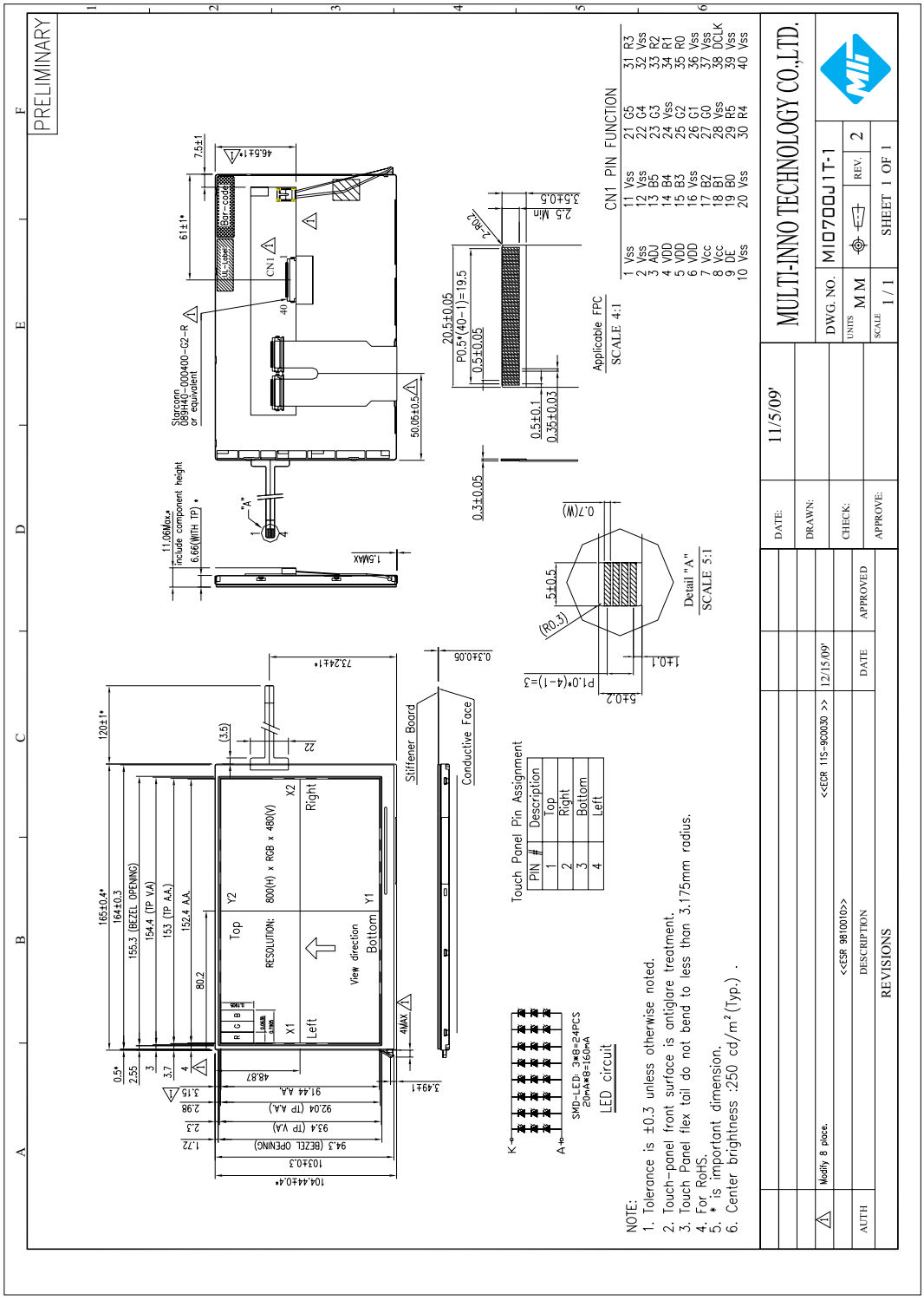
2.5 Storage

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.

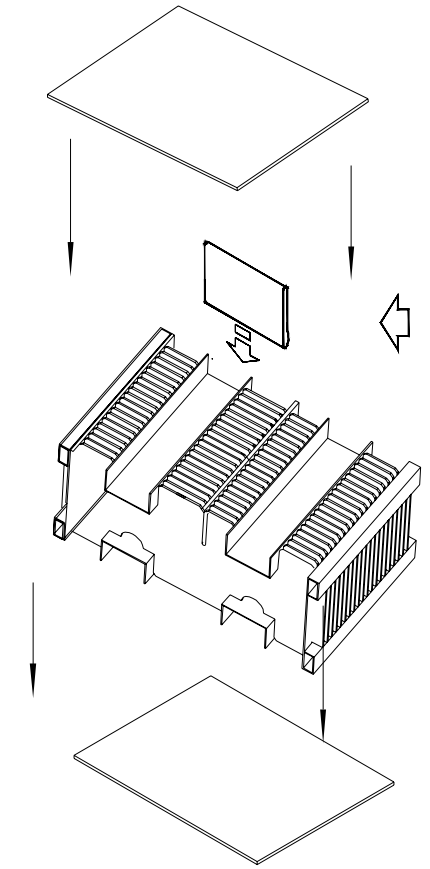
2.6 Limited Warranty

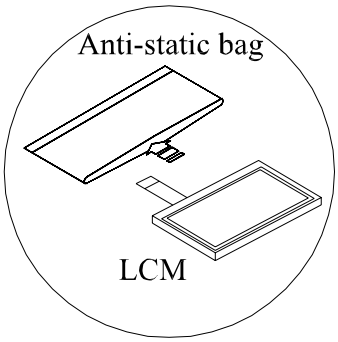
Unless otherwise agreed between Multi-Inno and customer, Multi-Inno will replace or repair any of its LCD and LCM which is found to be defective electrically and visually when inspected in accordance with Multi-Inno acceptance standards, for a period on one year from date of shipment. Confirmation of 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.

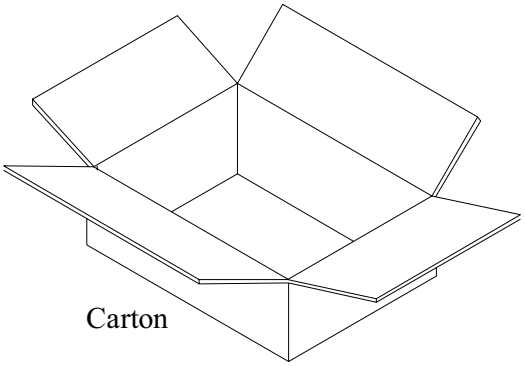
16. OUTLINE DRAWING



17. PACKAGE INFORMATION







Item	Size(L*W*H)	Quantity	Note
Master Carton	482*282*279	1	
Quantity Per Master Carton		30	
N . W	T.B.D (kg)	G . W	T.B.D (kg)