



MULTI-INNO TECHNOLOGY CO., LTD.

LCD MODULE SPECIFICATION

Model : MI240160E-G

Revision	0.0
Engineering	
Date	
Our Reference	



RECORDS OF REVISION

Date	Ver.	Description	Page	Design by
2008/03/19	0.0	NEW SAMPLE	-	



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Note: For detailed information please refer to IC data sheet: Controller --- ST7529-G



1. SPECIFICATIONS

1.1 Features

Item	Standard Value
Display Type	240 * 160 Dots
LCD Type	FSTN .POSITIVE, TRANSFLECTIVE .Extended Temp
Driver Condition	LCD Module : 1/160 Duty, 1/12 Bias
Viewing Direction	6 O'clock
Backlight	LED B/L
Weight	52g
Interface	-
Controller / Driver IC	Controller --- ST7529-G

1.2 Mechanical Specifications

Item	Standard Value	Unit
Outline Dimension	83.8 (L) * 60.0 (w) * 7.0 (H)(Max)	mm
Viewing Area	69.6 (L) *47.6 (w)	mm
Active Area	67.425 (L) * 44.945 (w)	mm
Dot Size	0.266 (L) * 0.266 (w)	mm
Dot Pitch	0.281 (L) * 0.281 (w)	mm

Note : For detailed information please refer to LCM drawing

1.3 Absolute Maximum Ratings

Item	Symbol	Condition	Min.	Max.	Unit
Power Supply Voltage	V _{DD}	—	-0.5	5.0	V
LCD Driver Supply Voltage	V _{Lcd}	—	-0.5	22.0	V
Input Voltage	V _{IN}	—	-0.5	V _{DD} +0.5	V
Operating Temperature	T _{OP}	—	-20	70	°C
Storage Temperature	T _{ST}	—	-30	80	°C
Storage Humidity	H _D	Ta < 60 °C	-	90	%RH



1.4 DC Electrical Characteristics

 $V_{DD}=3.0\pm 0.3V, V_{SS}=0V, T_a=25^\circ C$

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Logic Supply Voltage	V_{DD}	-	2.7	3.0	3.3	V
“H” Input Voltage	V_{IH}	-	$0.7V_{DD}$	-	V_{DD}	V
“L” Input Voltage	V_{IL}	-	V_{SS}	-	$0.3V_{DD}$	V
“H” Output Voltage	V_{OH}	-	-	-	-	V
“L” Output Voltage	V_{OL}	-	-	-	-	V
Supply Current	I_{DD}	$V_{DD}=3.0V, V_{OP}: 15.0V$ Pattern= Full display	-	0.29	-	mA
		$V_{DD}=3.0V, V_{OP}: 15.0V$ Pattern= Horizontal line*1	-	0.30	1.0	
LCM Driver Voltage	V_{OP}^*2	$-20^\circ C$	15.3	15.5	15.7	V
		$25^\circ C$	14.8	15.0	15.2	
		$70^\circ C$	14.3	14.5	14.7	

NOTE: *1 The maximum current display

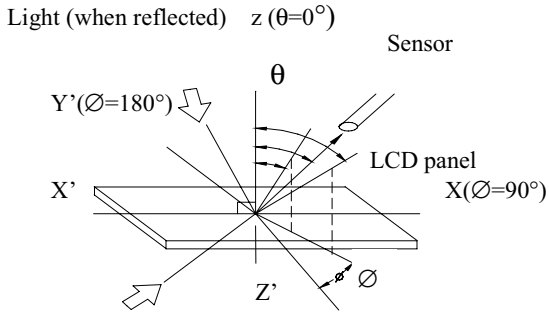
*2 The V_{OP} test point is V_0-V_{SS}

1.5 Optical Characteristics

LCD Panel : 1/160Duty , 1/12ias , $V_{LCD}=15V, T_a=25^\circ C$

Item	Symbol	Conditions	Min.	Typ.	Max.	Reference
View Angle	θ	$C \geq 2.0, \varnothing = 0^\circ$	0°	35°	-	Notes 1 & 2
Contrast Ratio	C	$\theta = 5^\circ, \varnothing = 0^\circ$	-	6	-	Note 3
Response Time(rise)	t_r	$\theta = 5^\circ, \varnothing = 0^\circ$	-	110ms	165ms	Note 4
Response Time(fall)	t_f	$\theta = 5^\circ, \varnothing = 0^\circ$	-	280 ms	420 ms	Note 4

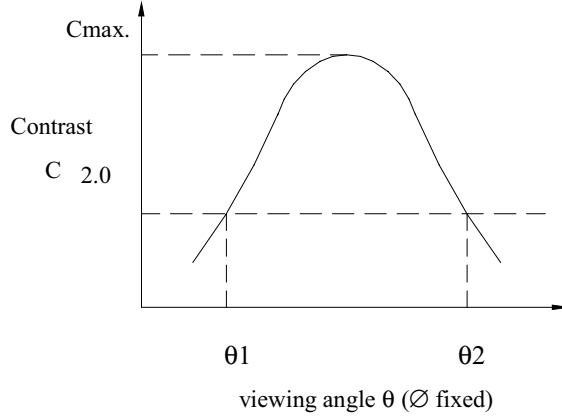
Note 1: Definition of angles θ and \varnothing



Light (when reflected) $z(\theta=0^\circ)$
 $Y(\varnothing=180^\circ)$
 $X(\varnothing=90^\circ)$
 Z'
 θ
 \varnothing
 Sensor
 LCD panel

Light (when transmitted) $Y(\varnothing=0^\circ)$
 $(\theta=90^\circ)$

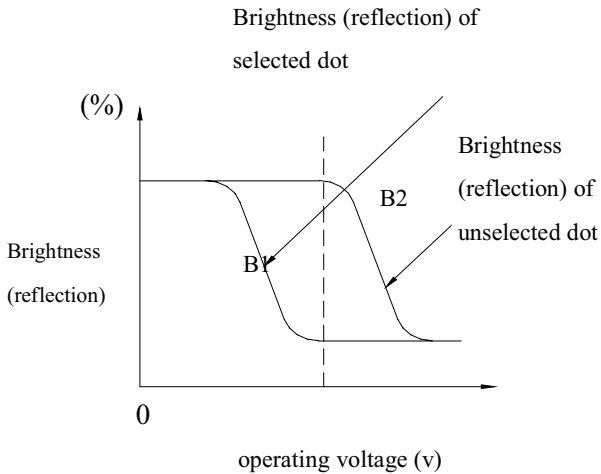
Note 2: Definition of viewing angles θ_1 and θ_2



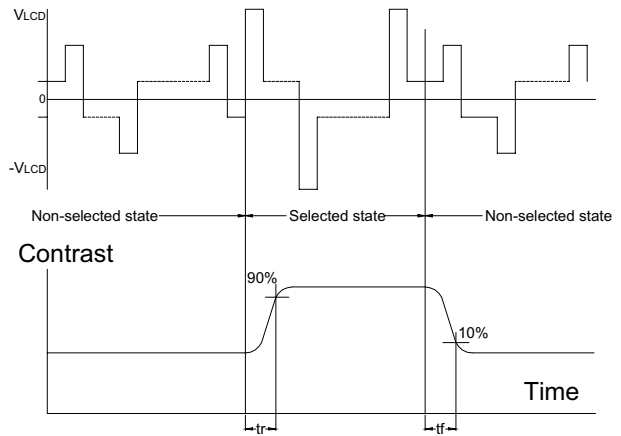
Note : Optimum viewing angle with the naked eye and viewing angle θ at C_{max} . Above are not always the same

Note 3: Definition of contrast C

$$C = \frac{\text{Brightness (reflection) of unselected dot (B2)}}{\text{Brightness (reflection) of selected dot (B1)}}$$



Note 4: Definition of response time



Note: Measured with a transmissive LCD panel which is displayed 1 cm^2

V_{LCD} : Operating voltage f_{FRM} : Frame frequency
 t_r : Response time (rise) t_f : Response time (fall)



1.6 Backlight Characteristics

LCD Module with LED Backlight

Maximum Ratings

Item	Symbol	Conditions	Min.	Max.	Unit
Forward Current	IF	Ta =25°C	-	120	mA
Reverse Voltage	VR	Ta =25°C	-	5	V
Power Dissipation	PO	Ta =25°C	-	288	MW

Electrical / Optical Characteristics

Ta =25°C						
Item	Symbol	Conditions	Min.	Typ.	Max.	Unit
Forward Voltage	Vf	If=80 mA	-	3.2	-	V
Reverse Current	IR	VR=5V	-	-	0.2	mA
Average Brightness (with LCD)*1	IV	If=80mA	100	150		cd/m ²
CIE color coordinate (with LCD)	X	If=80mA	0.26	0.29	0.32	nm
	Y		0.29	0.32	0.35	
Uniformity*2	ΔB	If=80mA	70	-	-	%
Color	White					

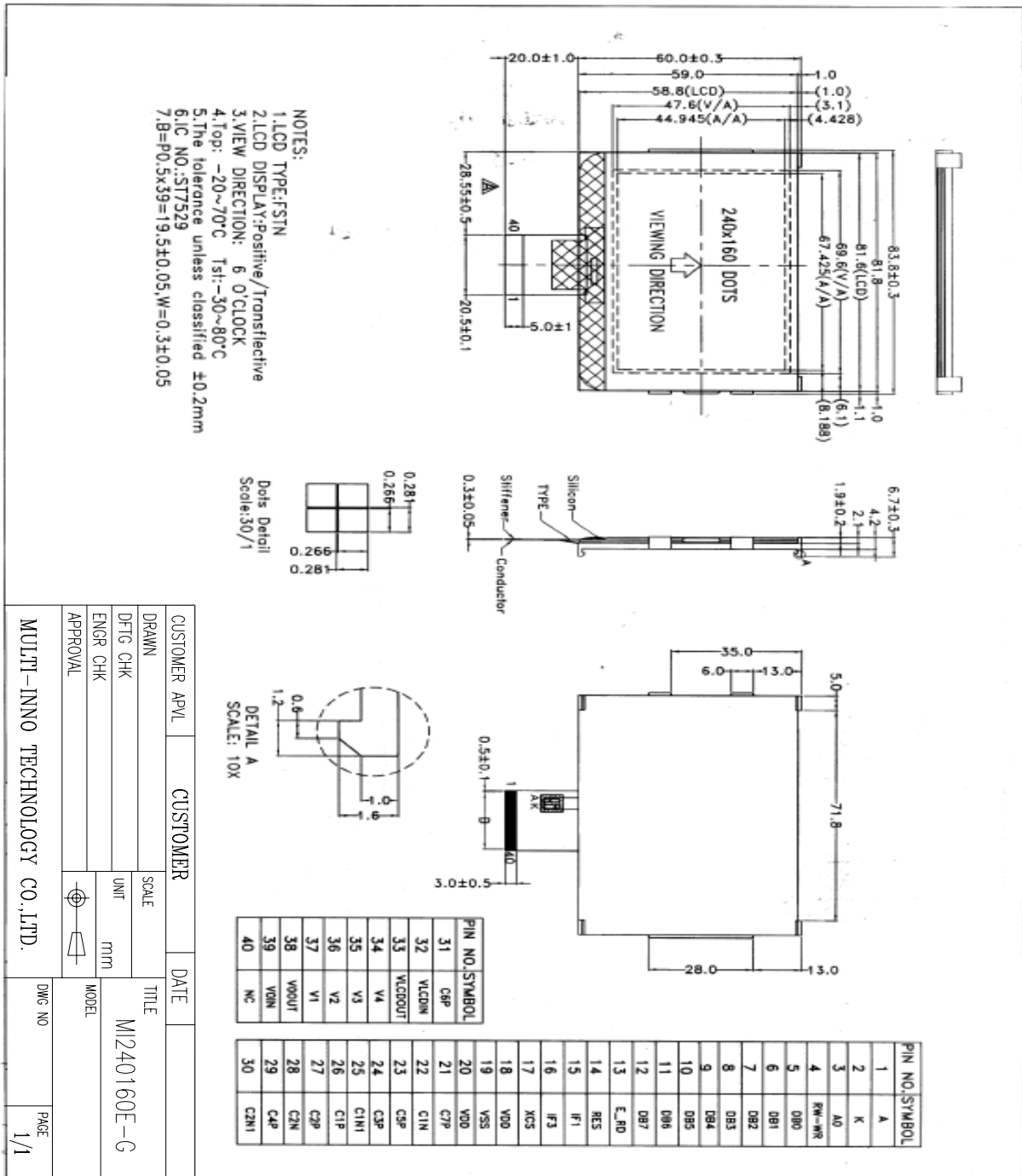
*1 This value will be changed while mass production

*2 $\Delta B = B(\min)/B(\max)$

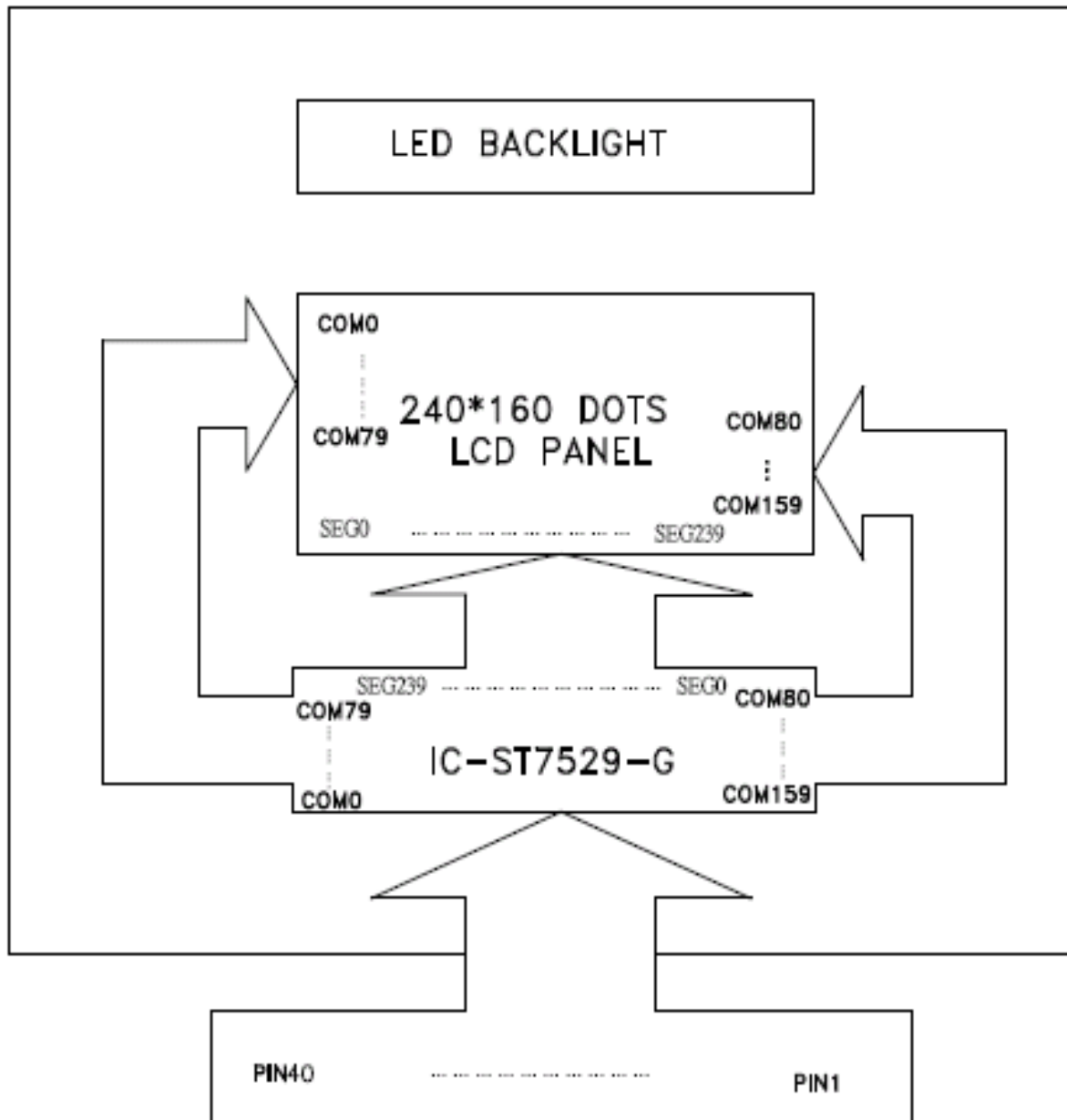
2. MODULE STRUCTURE

2.1 2.1 Counter Drawing

2.1.1 LCM Mechanical Diagram



2.1.2 Block Diagram



Please refer interface pin description for detail



2.2Interface Pin Description

Pin No.	Symbol	Function									
1	A	Power supply for LED B/L.(Anode)									
2	K	Power supply for LED B/L (Cathode)									
3	A0	Register select input pin -A0="H":DB0 to DB8 or SI are display data -A0="L": DB0 to DB8 or SI are control data									
4	RW-WR	Read / Write execution control pin									
		<table border="1"> <thead> <tr> <th>MPU type</th> <th>RW_WR</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>6800-series</td> <td>RW</td> <td>Read / Write control input pin RW = "H" : read RW = "L" : write</td> </tr> <tr> <td>8080-series</td> <td>/WR</td> <td>Write enable clock input pin The data on DB0 to DB15 are latched at the rising edge of the /WR signal.</td> </tr> </tbody> </table>	MPU type	RW_WR	Description	6800-series	RW	Read / Write control input pin RW = "H" : read RW = "L" : write	8080-series	/WR	Write enable clock input pin The data on DB0 to DB15 are latched at the rising edge of the /WR signal.
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8080-series	/WR	Write enable clock input pin The data on DB0 to DB15 are latched at the rising edge of the /WR signal.									
5~12	DB0~DB7	They connect to the standard 8-bit MPU bus via the 8 bit bi-directional bus. When the following interface is selected and the XCS pin is high, the following pins become impedance, which should be fixed to VDD or VSS.									
13	E_RD	Read / Write execution control pin									
		<table border="1"> <thead> <tr> <th>MPU Type</th> <th>E_RD</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>6800-series</td> <td>E</td> <td>Read / Write control input pin - RW = "H": When E is "H", DB0 to DB15 are in an output status. - RW = "L": The data on DB0 to DB15 are latched at the falling edge of the E signal.</td> </tr> <tr> <td>8080-series</td> <td>/RD</td> <td>Read enable clock input pin When /RD is "L", DB0 to DB15 are in an output status.</td> </tr> </tbody> </table>	MPU Type	E_RD	Description	6800-series	E	Read / Write control input pin - RW = "H": When E is "H", DB0 to DB15 are in an output status. - RW = "L": The data on DB0 to DB15 are latched at the falling edge of the E signal.	8080-series	/RD	Read enable clock input pin When /RD is "L", DB0 to DB15 are in an output status.
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8080-series	/RD	Read enable clock input pin When /RD is "L", DB0 to DB15 are in an output status.									
14	RES	Reset input pin. When RST is "L", initialization is executed.									
15	IF1										
16	IF3	<table border="1"> <thead> <tr> <th>IF1</th> <th>IF3</th> <th>MPU interface type</th> </tr> </thead> <tbody> <tr> <td>H</td> <td>L</td> <td>80 series 8-bit parallel</td> </tr> <tr> <td>L</td> <td>H</td> <td>68 series 8-bit parallel</td> </tr> </tbody> </table>	IF1	IF3	MPU interface type	H	L	80 series 8-bit parallel	L	H	68 series 8-bit parallel
		IF1	IF3	MPU interface type							
		H	L	80 series 8-bit parallel							
L	H	68 series 8-bit parallel									
17	XCS	Chip select input pins Data/instruction I/O is enabled only when XCS is "L". When chip select is non-active, DB0 to DB8 may be high impedance.									
18	VDD	Power supply (VDD=3.3V)									
19	VSS	Power supply (VSS=0)									
20	VDD	Power supply (VDD=3.3V)									
21	C7P	DC/DC voltage converter. Connect a capacitor between this terminal and the $\leq 7X$ VLCD; 8X C1N terminal.									

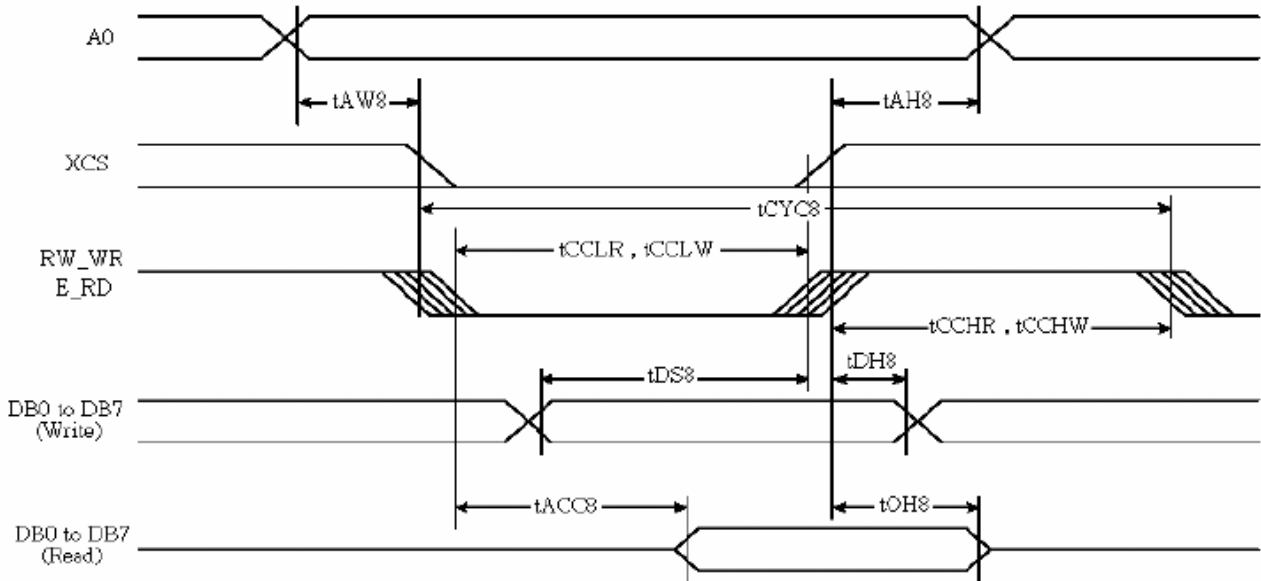


22	C1N	DC/DC voltage converter. Connect a capacitor between this terminal and the $\leq 5X$ OPEN; $\geq 6X$ also C5P; $\geq 8X$ also C7P terminal										
23	C5P	DC/DC voltage converter. Connect a capacitor between this terminal and the $\leq 5X$ VLCD; $\geq 6X$ C1N terminal.										
24	C3P	DC/DC voltage converter. Connect a capacitor between this terminal and the $\leq 3X$ VLCD; $\geq 4X$ C1N terminal.										
25	C1N1	DC/DC voltage converter. Connect a capacitor between this terminal and the C1P terminal.										
26	C1P	DC/DC voltage converter. Connect a capacitor between this terminal and the C1N1 terminal.										
27	C2P	DC/DC voltage converter. Connect a capacitor between this terminal and the 2X VLCD; $\geq 3X$ C2N terminal.										
28	C2N	DC/DC voltage converter. Connect a capacitor between this terminal and the $\leq 2X$ VLCD; $\geq 3X$ C2P terminal.										
29	C4P	DC/DC voltage converter. Connect a capacitor between this terminal and the $\leq 4X$ VLCD; $\geq 5X$ C2N terminal.										
30	C2N1	DC/DC voltage converter. Connect a capacitor between this terminal and the $\leq 6X$ VLCD; $\geq 7X$ C6P terminal.										
31	C6P	DC/DC voltage converter. Connect a capacitor between this terminal and the $\leq 6X$ VLCD; $\geq 7X$ C2N1 terminal.										
32	VLCDIN	An external LCD supply voltage can be supplied using the VLCDIN pad. In this case, VLCDOUT has to be left open, and the Internal voltage generator has to be programmed to zero.(SET register VB=0)										
33	VLCDOUT	If the internal voltage generator is used, the VLCDIN & VLCDOUT must be connected together. If an external supply is used, this pin must be left open.										
34	V4	LCD driver supply voltages										
35	V3	V0In & V0out should be connected together in FPC area.										
36	V2	Voltages should have the following relationship:										
37	V1	$V0 \geq V1 \geq V2 \geq V3 \geq V4 \geq VSS$										
38	V0OUT	When the internal power circuit is active, these voltages are generated as the following table according to the state of LCD bias.										
39	V0IN	<table border="1"> <thead> <tr> <th>LCD Bias</th> <th>V1</th> <th>V2</th> <th>V3</th> <th>V4</th> </tr> </thead> <tbody> <tr> <td>1/N Bias</td> <td>$(N-1) / N \times V0$</td> <td>$(N-2) / N \times V0$</td> <td>$(2/N) \times V0$</td> <td>$(1/N) \times V0$</td> </tr> </tbody> </table>	LCD Bias	V1	V2	V3	V4	1/N Bias	$(N-1) / N \times V0$	$(N-2) / N \times V0$	$(2/N) \times V0$	$(1/N) \times V0$
		LCD Bias	V1	V2	V3	V4						
		1/N Bias	$(N-1) / N \times V0$	$(N-2) / N \times V0$	$(2/N) \times V0$	$(1/N) \times V0$						
NOTE: N = 5 to 14												

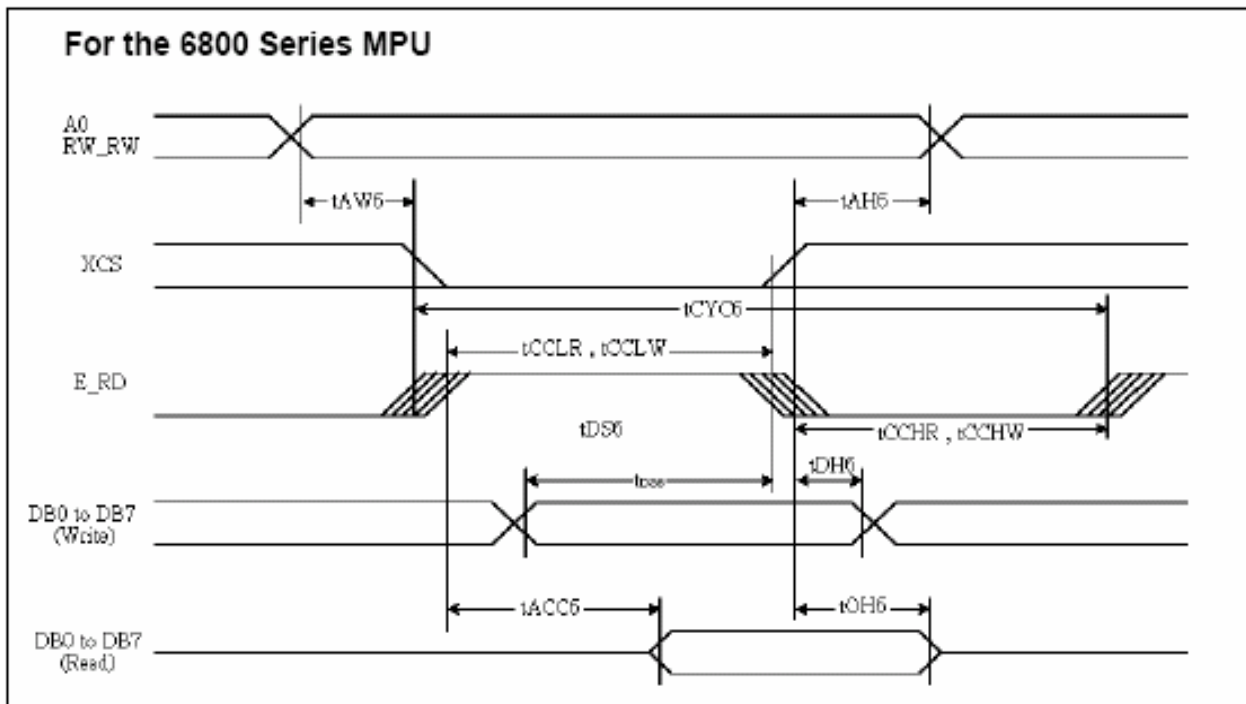
40	NC	Not connection
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2.3 Timing Characteristics

For the 8080 Series MPU

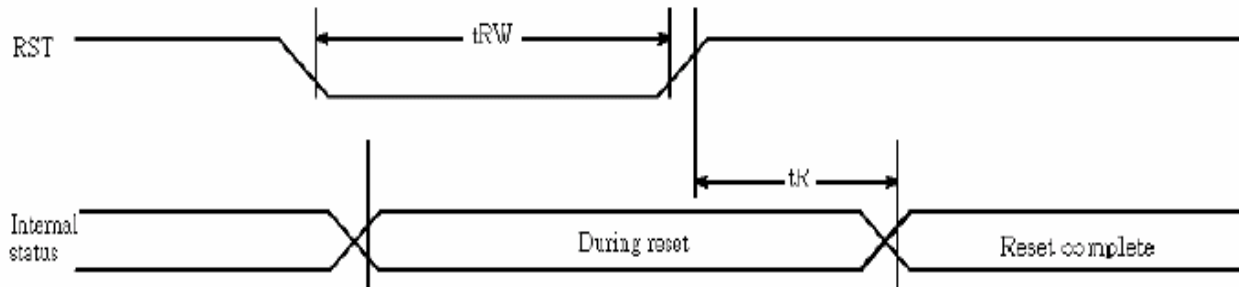

 $V_{DD} = 3.3V, T_a = 25^{\circ}C$

Item	Signal	Symbol	Condition	Rating		Units
				Min	Max	
Address hold time	A0	t_{AH8}	-	20	-	ns
Address setup time		t_{AW8}	-	20	-	
System cycle time		t_{CYC8}	-	200	-	
Enable L pulse width (Write)	RW_WR	t_{CCLW}	-	100	-	
Enable H pulse width (Write)		t_{CCHW}	-	100	-	
Enable L pulse width (Read)	E_RD	t_{CCLR}	-	100	-	
Enable H pulse width (Read)		t_{CCHR}	-	100	-	
WRITE Data setup time	DB0 to DB7	t_{DS8}	-	150	-	
WRITE Address hold time		t_{DH8}	-	20	-	
READ access time		t_{ACC8}	$C_L = 100pF$	-	40	
READ Output disable time		t_{OH8}	$C_L = 100pF$	-	30	


 $V_{DD} = 3.3V, T_a = 25^{\circ}C$

Item	Signal	Symbol	Condition	Rating		Units
				Min	Max	
Address hold time	A0	t_{AH6}	-	20	-	ns
Address setup time		t_{AW6}	-	20	-	
System cycle time		t_{CYC6}	-	200	-	
Enable L pulse width (Write)	RW_WR	t_{EWLW}	-	100	-	
Enable H pulse width (Write)		t_{EWHW}	-	100	-	
Enable L pulse width (Read)	E_RD	t_{EWLR}	-	100	-	
Enable H pulse width (Read)		t_{EWHR}	-	100	-	
WRITE Data setup time	DB0 to DB7	t_{DS6}	-	150	-	
WRITE Address hold time		t_{DH6}	-	20	-	
READ access time		t_{ACC6}	$C_L = 100pF$	-	40	
READ Output disable time		t_{OH6}	$C_L = 100pF$	-	30	

Reset Timing


 $V_{DD} = 3.3V, T_a = 25^{\circ}C$

Item	Signal	Symbol	Condition	Rating			Units
				Min	Typ	Max	
Reset time	-	t_R	-	-	-	1	μs
Reset "L" pulse width	RES	t_{RW}	-	1	-	-	μs

2.4 Display Command

Ext=0 or Ext=1

<i>Index</i>	<i>Command</i>	<i>A0</i>	<i>RD</i>	<i>WR</i>	<i>D7</i>	<i>D6</i>	<i>D5</i>	<i>D4</i>	<i>D3</i>	<i>D2</i>	<i>D1</i>	<i>D0</i>	<i>Function</i>
1	Ext In	0	1	0	0	0	1	1	0	0	0	0	Ext=0 Set
2	Ext Out	0	1	0	0	0	1	1	0	0	0	1	Ext=1 Set

Ext=0

<i>Index</i>	<i>Command</i>	<i>A0</i>	<i>RD</i>	<i>WR</i>	<i>D7</i>	<i>D6</i>	<i>D5</i>	<i>D4</i>	<i>D3</i>	<i>D2</i>	<i>D1</i>	<i>D0</i>	<i>Function</i>
1	DISON	0	1	0	1	0	1	0	1	1	1	1	Display On
2	DISOFF	0	1	0	1	0	1	0	1	1	1	0	Display Off
3	DISNOR	0	1	0	1	0	1	0	0	1	1	0	Normal Display
4	DISINV	0	1	0	1	0	1	0	0	1	1	1	Inverse Display
5	COMSCN	0	1	0	1	0	1	1	1	0	1	1	COM Scan Direction
6	DISCTRL	0	1	0	1	1	0	0	1	0	1	0	Display Control
7	SLPIN	0	1	0	1	0	0	1	0	1	0	1	Sleep In
8	SLPOUT	0	1	0	1	0	0	1	0	1	0	0	Sleep Out
9	LASET	0	1	0	0	1	1	1	0	1	0	1	Line Address Set
10	CASET	0	1	0	0	0	0	1	0	1	0	1	Column Address Set
11	DATSDR	0	1	0	1	0	1	1	1	1	0	0	Data Scan Direction
12	RAMWR	0	1	0	0	1	0	1	1	1	0	0	Writing to Memory
13	RAMRD	0	1	0	0	1	0	1	1	1	0	1	Reading from Memory
14	PTLIN	0	1	0	1	0	1	0	1	0	0	0	Partial display in
15	PTLOUT	0	1	0	1	0	1	0	1	0	0	1	Partial display out
16	RMWIN	0	1	0	1	1	1	0	0	0	0	0	Read and Modify Write
17	RMWOUT	0	1	0	1	1	1	0	1	1	1	0	RMW end
18	ASCSET	0	1	0	1	0	1	0	1	0	1	0	Area Scroll Set
19	SCSTART	0	1	0	1	0	1	0	1	0	1	1	Scroll Start Set



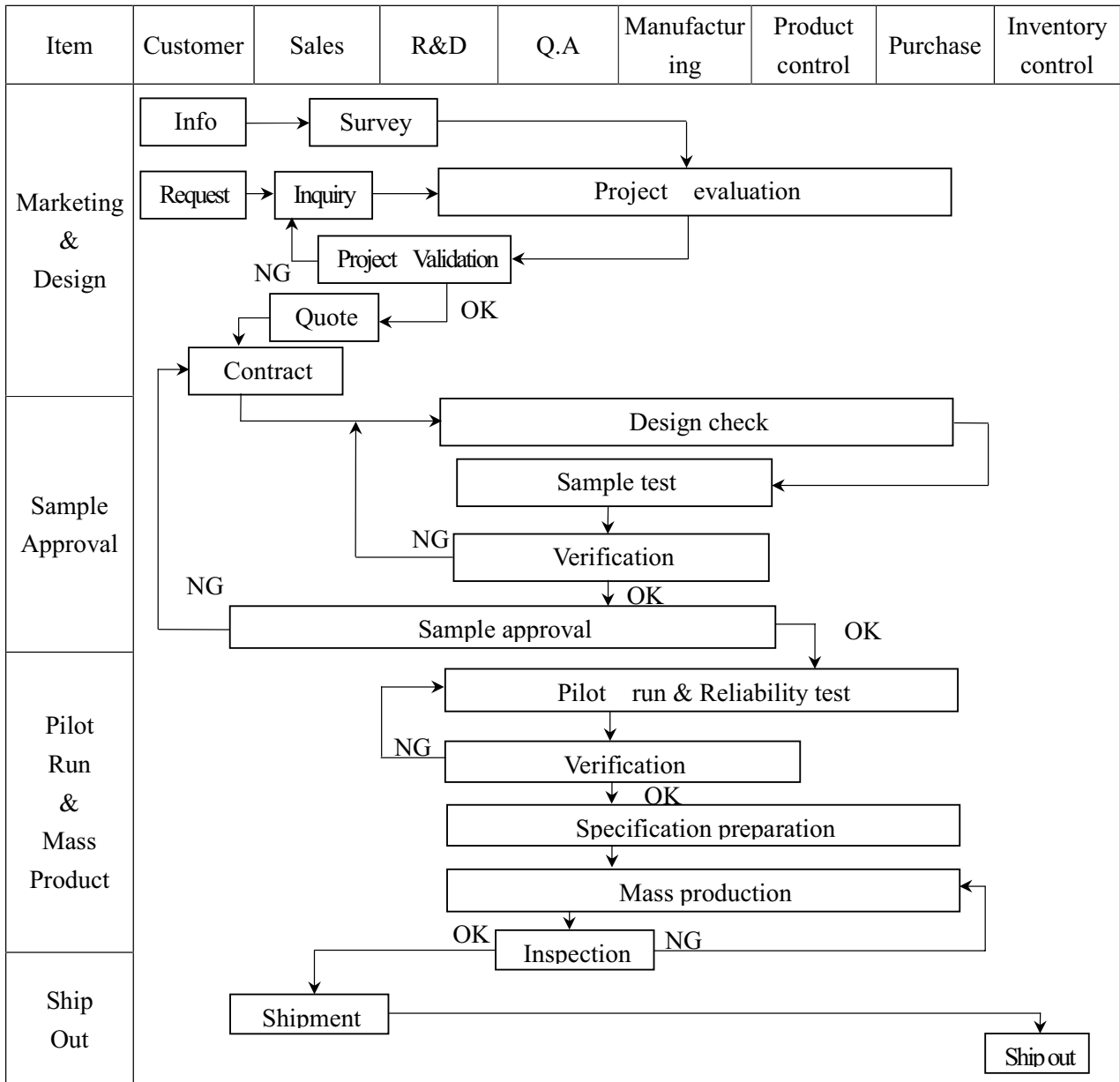
20	OSCON	0	1	0	1	1	0	1	0	0	0	1	Internal OSC on
21	OSCOFF	0	1	0	1	1	0	1	0	0	1	0	Internal OSC off
22	PWRCTRL	0	1	0	0	0	1	0	0	0	0	0	Power Control
23	VOLCTRL	0	1	0	1	0	0	0	0	0	0	1	EC control
24	VOLUP	0	1	0	1	1	0	1	0	1	1	0	EC increase 1
25	VOLDOWN	0	1	0	1	1	0	1	0	1	1	1	EC decrease 1
26	RESERVED	0	1	0	1	0	0	0	0	0	1	0	Not Use
27	EPSRRD1	0	1	0	0	1	1	1	1	1	0	0	READ Register1
28	EPSRRD2	0	1	0	0	1	1	1	1	1	0	1	READ Register2
29	NOP	0	1	0	0	0	1	0	0	1	0	1	NOP Instruction
30	STREAD	0	0	1	Read Data						Status Read		
31	EPINT	0	1	0	0	0	0	0	0	1	1	1	Initial code(1)

Ext=1

Index	Command	A0	RD	WR	D7	D6	D5	D4	D3	D2	D1	D0	Function
1	Gray 1 Set	0	1	0	0	0	1	0	0	0	0	0	FRAME 1 Gray PWM Set
2	Gray 2 Set	0	1	0	0	0	1	0	0	0	0	1	FRAME 2 Gray PWM Set
3	Wt. Set	0	1	0	0	0	1	0	0	0	1	0	Weight Set
4	ANASET	0	1	0	0	0	1	1	0	0	1	0	Analog Circuit Set
5	DITHOFF	0	1	0	0	0	1	1	0	1	0	0	Dithering Circuit Off
6	DITHON	0	1	0	0	0	1	1	0	1	0	1	Dithering Circuit On
7	EPCTIN	0	1	0	1	1	0	0	1	1	0	1	Control EEPROM
8	EPCOUT	0	1	0	1	1	0	0	1	1	0	0	Cancel EEPROM
9	EPMWR	0	1	0	1	1	1	1	1	1	0	0	Write to EEPROM
10	EPMRD	0	1	0	1	1	1	1	1	1	0	1	Read from EEPROM

3. QUALITY ASSURANCE SYSTEM

3.1 Quality Assurance Flow Chart

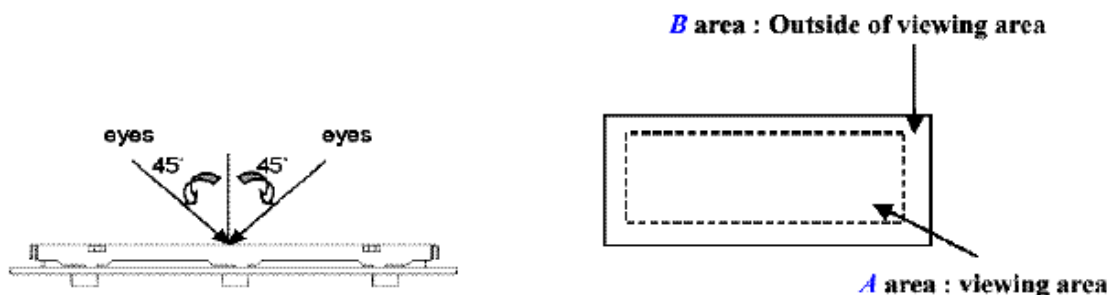




Item	Customer	Sales	R&D	Q.A	Manufacturing	Product control	Purchase	Inventory control
Sales Service	<pre> graph TD Info[Info] --> Claim[Claim] Claim --> FA[Failure analysis] Claim --> AR[Analysis report] FA --> CA[Corrective action] CA --> Tracking[Tracking] </pre>							
Q.A Activity	1. ISO 9001 Maintenance Activities 3. Equipment calibration 5. Standardization Management				2. Process improvement proposal 4. Education And Training Activities			

3.2 Inspection Specification

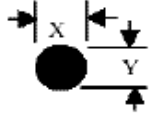
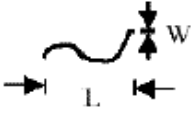

- ◆ Inspection Standard : MIL-STD-105E Table Normal Inspection Single Sampling Level II .
- ◆ Equipment : Gauge 、 MIL-STD 、 Tester 、 Sample
- ◆ Defect Level : Major Defect AQL 0.4; Minor Defect AQL 1.5 .
- ◆ OUT Going Defect Level : Sampling .
- ◆ Manner of appearance test :
 - (1). The test be under 40W×2 fluorescent light ' and distance of view must be at 30 cm.
 - (2). The test direction is base on about around 45° of vertical line. (Fig. 1)
 - (3). Definition of area . (Fig. 2)



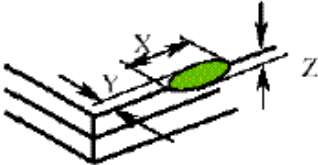

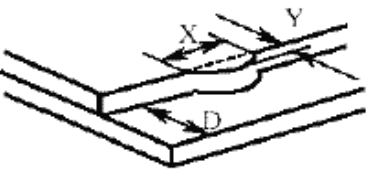
◆ Specification:

NO	Item	Criterion	level
01	Product condition	1.1 The part number is inconsistent with work order of Production.	Major
		1.2 Mixed production types.	Major
		1.3 Assembled in inverse direction.	Major
02	Quantity	2.1 The quantity is inconsistent with work order of production.	Major
03	Outline dimension	3.1 Product dimension and structure must conform to Structure diagram.	Major
04	Electrical Testing	4.1 Missing line character 、 dot and icon.	Major
		4.2 No function or no display.	Major
		4.3 Output data is error.	Major
		4.4 LCD viewing angle defect.	Major
		4.5 Current consumption exceeds product specifications.	Major
05	Black or white dot 、 scratch 、 contamination Round type	5.1 Round type: 5.1.1 display only : <ul style="list-style-type: none"> • White and black spots on display $\leq 0.30\text{mm}$, no more than Four white or black spots present. • Densely spaced : NO more than two spots or lines within 3mm 	Minor

◆Specification :

NO	Item	Criterion	level																																	
05	Black or white dot、scratch、contamination Round type  $\Phi = (x+y)/2$ 	5.1.2 Nom-display : <table border="1" data-bbox="544 524 1294 719"> <thead> <tr> <th>Dimension (diameter : Φ)</th> <th>Acceptance(Q'ty)</th> </tr> </thead> <tbody> <tr> <td>$\Phi \leq 0.10\text{mm}$</td> <td>Accept no dense</td> </tr> <tr> <td>$0.10\text{mm} < \Phi \leq 0.20\text{mm}$</td> <td>3</td> </tr> <tr> <td>$0.20\text{mm} < \Phi \leq 0.30\text{mm}$</td> <td>2</td> </tr> <tr> <td>Total</td> <td>4</td> </tr> </tbody> </table> 5.1.3 Line type <table border="1" data-bbox="459 786 1358 1016"> <thead> <tr> <th colspan="2">Dimension (diameter : Φ)</th> <th colspan="2">Acceptance (Q'ty)</th> </tr> <tr> <th>Length</th> <th>width</th> <th>A area</th> <th>B area</th> </tr> </thead> <tbody> <tr> <td>---</td> <td>$w \leq 0.03\text{mm}$</td> <td>Accept no dense</td> <td>Don't count</td> </tr> <tr> <td>$L \leq 3.0\text{mm}$</td> <td>$0.03\text{mm} < \Phi \leq 0.05\text{mm}$</td> <td rowspan="2">4</td> <td>Don't count</td> </tr> <tr> <td>$L \leq 2.5\text{mm}$</td> <td>$0.05\text{mm} < \Phi \leq 0.075\text{mm}$</td> <td>Don't count</td> </tr> <tr> <td>---</td> <td>$w > 0.075\text{mm}$</td> <td colspan="2">As round type</td> </tr> </tbody> </table>	Dimension (diameter : Φ)	Acceptance(Q'ty)	$\Phi \leq 0.10\text{mm}$	Accept no dense	$0.10\text{mm} < \Phi \leq 0.20\text{mm}$	3	$0.20\text{mm} < \Phi \leq 0.30\text{mm}$	2	Total	4	Dimension (diameter : Φ)		Acceptance (Q'ty)		Length	width	A area	B area	---	$w \leq 0.03\text{mm}$	Accept no dense	Don't count	$L \leq 3.0\text{mm}$	$0.03\text{mm} < \Phi \leq 0.05\text{mm}$	4	Don't count	$L \leq 2.5\text{mm}$	$0.05\text{mm} < \Phi \leq 0.075\text{mm}$	Don't count	---	$w > 0.075\text{mm}$	As round type		Minor
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07	The crack of glass 	<ul style="list-style-type: none"> ● Glass Crack: 7.1 Crack on the circuit of electrode terminal : <table border="1" data-bbox="520 1742 1289 1877"> <thead> <tr> <th></th> <th>X</th> <th>Y</th> <th>Z</th> </tr> </thead> <tbody> <tr> <td>Front</td> <td>$X \leq 1/5 a$</td> <td>$Y \leq 1/2 D$</td> <td>$Z \leq t$</td> </tr> <tr> <td>Back</td> <td colspan="3">Neglect</td> </tr> </tbody> </table>		X	Y	Z	Front	$X \leq 1/5 a$	$Y \leq 1/2 D$	$Z \leq t$	Back	Neglect			Minor																					
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◆Specification :

NO	Item	Criterion	Level												
07	<p>The crack of glass</p> <p>X: The length of Crack</p> <p>Y: The width of crack</p> <p>Z: The thickness of crack</p> <p>D: terminal length</p> <p>T: The thickness of glass</p> <p>A : The length of glass</p>	<p>● Glass Crack:</p> <p>7.2 General glass crack and corner edge:</p> <p>7.2.1</p>  <table border="1" data-bbox="576 853 1233 943"> <tr> <td>X</td> <td>Y</td> <td>Z</td> </tr> <tr> <td>Neglect</td> <td>Out A area</td> <td>Neglect</td> </tr> </table> <p>7.2.2</p>  <table border="1" data-bbox="576 1196 1233 1285"> <tr> <td>X</td> <td>Y</td> <td>Z</td> </tr> <tr> <td>Neglect</td> <td>Out A area</td> <td>Neglect</td> </tr> </table>	X	Y	Z	Neglect	Out A area	Neglect	X	Y	Z	Neglect	Out A area	Neglect	Minor
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		<p>7.3 Glass remain:</p>  <table border="1" data-bbox="711 1727 1126 1816"> <tr> <td>X</td> <td>Y</td> </tr> <tr> <td>Neglect</td> <td>$\leq 1/3 d$</td> </tr> </table>	X	Y	Neglect	$\leq 1/3 d$	Minor								
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◆Specification :

NO	Item	Criterion	Level									
07	The crack of glass X: The length of Crack Y: The width of crack Z: The thickness of crack D: terminal length T: The thickness of glass A : The length of glass	7.4 Corner crack and medial crack: <table border="1" style="margin-top: 10px;"> <thead> <tr> <th>X</th> <th>Y</th> <th>Z</th> </tr> </thead> <tbody> <tr> <td>$\leq 1/5a$</td> <td>Crack can't enter viewing area</td> <td>$\leq 1/2t$</td> </tr> <tr> <td>$\leq 1/5a$</td> <td>Crack can't exceed the half of width of SP</td> <td>$1/2t < Z \leq 2t$</td> </tr> </tbody> </table>	X	Y	Z	$\leq 1/5a$	Crack can't enter viewing area	$\leq 1/2t$	$\leq 1/5a$	Crack can't exceed the half of width of SP	$1/2t < Z \leq 2t$	Minor
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08	Backlight elements	8.1 Backlight can't work normally.	Major									
		8.2 Backlight doesn't light or color is wrong.	Major									
		8.3 Illumination source flickers when lit.	Major									
09	General appearance	9.1 pin type must match type in specification sheet	Major									
		9.2 No short circuits in components on PCB or FPC	Major									
		9.3 Product packaging must the same as specified on packaging specification sheet.	Major									
		9.4 The folding and peeled off in polarizer are not acceptable	Major									
		9.5 The PCB or FPC between B/L assembled distance (PCB or FPC) is $\leq 1.5\text{mm}$	Major									



4. RELIABILITY TEST

4.1 Reliability Test Condition

NO.	TEST ITEM	TEST CONDITION										
1	High Temperature Storage Test	Keep in $80 \pm 2^{\circ}\text{C}$ 96 hrs Surrounding temperature, then storage at normal condition 4hrs										
2	Low Temperature Storage Test	Keep in $-30 \pm 2^{\circ}\text{C}$ 96 hrs Surrounding temperature, then storage at normal condition 4hrs										
3	High Humidity Storage	Keep in $+60^{\circ}\text{C}/90\%\text{RH}$ duration for 96 hrs Surrounding temperature, then storage at normal condition 4hrs (Excluding the polarizer)Or Keep in $+40^{\circ}\text{C}/90\%\text{RH}$ duration for 96 hrs Surrounding temperature, then storage at normal condition 4hrs										
4	ESD Test	<table border="1" style="width: 100%;"> <tr> <td style="width: 50%;">Air Discharge: Apply 6 KV with 5 times Discharge for each polarity +/-</td> <td style="width: 50%;">Contact Discharge: Apply 250V with 5 times discharge for each polarity +/-</td> </tr> </table> <ol style="list-style-type: none"> 1. Temperature ambient: $15^{\circ}\text{C} \sim 35^{\circ}\text{C}$ 2. Humidity relative: $30\% \sim 60\%$ 3. Energy Storage Capacitance(C_s+C_d): $150\text{pF} \pm 10\%$ 4. Discharge Resistance(R_d): $330 \Omega \pm 10\%$ 5. Discharge, mode of operation: Single Discharge (time between successive discharges at least 1 s) (Tolerance If the output voltage indication: $\pm 5\%$) 	Air Discharge: Apply 6 KV with 5 times Discharge for each polarity +/-	Contact Discharge: Apply 250V with 5 times discharge for each polarity +/-								
Air Discharge: Apply 6 KV with 5 times Discharge for each polarity +/-	Contact Discharge: Apply 250V with 5 times discharge for each polarity +/-											
5	Temperature Cycling Test	<p style="text-align: center;"> $-20^{\circ}\text{C} \rightarrow 25^{\circ}\text{C} \rightarrow 70^{\circ}\text{C} \rightarrow 25^{\circ}\text{C}$ $\leftarrow (30\text{mins}) (5\text{mins}) (30\text{mins}) (5\text{mins}) \rightarrow$ 10 Cycle </p> <p style="text-align: center;">Surrounding temperature, then storage at normal condition 4hrs</p>										
6	Vibration Test (Packaged)	<ol style="list-style-type: none"> 1. Sine wave $10 \sim 55\text{HZ}$ frequency (1 min) 2. The amplitude of vibration :1.5 mm 3. Each direction (XYZ) duration for 2 Hrs 										
7	Drop Test (Packaged)	<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Packing Weight (Kg)</th> <th>Drop Height (cm)</th> </tr> </thead> <tbody> <tr> <td>0 ~ 45.4</td> <td>122</td> </tr> <tr> <td>45.4 ~ 90.8</td> <td>76</td> </tr> <tr> <td>90.8 ~ 454</td> <td>61</td> </tr> <tr> <td>Over 454</td> <td>46</td> </tr> </tbody> </table> <p style="text-align: center;">Drop direction :※3 comer /1 edges /6 sides etch 1times</p>	Packing Weight (Kg)	Drop Height (cm)	0 ~ 45.4	122	45.4 ~ 90.8	76	90.8 ~ 454	61	Over 454	46
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Over 454	46											



5. PRECAUTION RELATING PRODUCT HANDLING

5.1 SAFETY

- 5.1.1 If the LCD panel breaks , be careful not to get the liquid crystal to touch your skin.
- 5.1.2 If the liquid crystal touches your skin or clothes , please wash it off immediately by using soap and water.

5.2 HANDLING

- 5.2.1 Avoid any strong mechanical shock which can break the glass.
- 5.2.2 Avoid static electricity which can damage the CMOS LSI—When working with the module , be sure to ground your body and any electrical equipment you may be using.
- 5.2.3 Do not remove the panel or frame from the module.
- 5.2.4 The polarizing plate of the display is very fragile. So , please handle it very carefully ,do not touch , push or rub the exposed polarizing with anything harder than an HB pencil lead (glass , tweezers , etc.)
- 5.2.5 Do not wipe the polarizing plate with a dry cloth , as it may easily scratch the surface of plate.
- 5.2.6 Do not touch the display area with bare hands , this will stain the display area.
- 5.2.7 Do not use ketonics solvent & aromatic solvent. Use with a soft cloth soaked with a cleaning naphtha solvent.
- 5.2.8 To control temperature and time of soldering is $350\pm 20^{\circ}\text{C}$ and 3-5 sec.
- 5.2.9 To avoid liquid (include organic solvent) stained on LCM .

5.3 STORAGE

- 5.3.1 Store the panel or module in a dark place where the temperature is $25^{\circ}\text{C} \pm 5^{\circ}\text{C}$ and the humidity is below 65% RH.
- 5.3.2 Do not place the module near organics solvents or corrosive gases.
- 5.3.3 Do not crush , shake , or jolt the module.

5.4 TERMS OF WARRANTY

- 5.4.1 Applicable warrant period
The period is within thirteen months since the date of shipping out under normal using and storage conditions.
- 5.4.2 Unaccepted responsibility
This product has been manufactured to your company's specification as a part for use in your company's general electronic products. It is guaranteed to perform according to delivery specifications. For any other use apart from general electronic equipment , we cannot take responsibility if the product is used in nuclear power control equipment , aerospace equipment , fire and security systems or any other applications in which there is a direct risk to human life and where extremely high levels of reliability are required

6. PACKING Specification

LCM Model	MI240160E-G	LCM包裝規格書 LCM Packaging Specifications	Approve	Check	Contact
Drawing NO.			DATE	初版	版次Ver
08/03/19					
1.包裝材料規格表 (Packaging Material) : (per carton)					
No.	Item	Model	Dimensions (mm)	Quantity	
1	成品(1) LCM	MI240160E-G	83.8*60.0*6.7	432	
2	靜電袋 (2)BAG	BAG100100ARABA	100*100*0.05	432	
3	氣泡墊(3)BAG	BAG290240BRBBA	240*290*5	12	
4	刀卡A7(4)BX	BX29500010BZBA	295*105*3	78	
5	刀卡B7(5)BX	BX24500010BZBA	245*105*3	24	
6	C3內盒(6)Product Box	BX31025511AABA	310*255*116	6	
7	外紙箱(7)Carton	BX52532536CCBA	525*325*360	1	
8					
9					
2.單箱數量規格表 (Packaging Specifications and Quantity) :					
(1)LCM quantity per box : no. per box		12*2 x no. of box	3	=	72
(2)Total LCM quantity in carton : quantity per box		72 x no. of boxes	6	=	432
特 記 事 項 (REMARK)					
1. Label Specifications : MODEL: LOT NO: QUANTITY: CHECK:				前後空一格,每一格放2PCS模 組,LCD面相對放入間格FPC 朝上.	