



MULTI-INNO TECHNOLOGY CO., LTD.

LCD MODULE SPECIFICATION

Model : MI320240H

Revision	
Engineering	
Date	
Our Reference	



DOCUMENT REVISION HISTORY 1:

DOCUMENT REVISION FROM TO	DATE	DESCRIPTION	CHANGED BY	CHECKED BY
A	2005.09.22	First Release.		



CONTENTS

Page No.

1.	GENERAL DESCRIPTION	4
2.	MECHANICAL SPECIFICATIONS	4
3.	INTERFACE SIGNALS	6
4.	ABSOLUTE MAXIMUM RATINGS	7
4.1	ELECTRICAL MAXIMUM RATINGS (Ta=25°C)	7
4.2	ENVIRONMENTAL CONDITION	7
5.	ELECTRICAL SPECIFICATIONS	8
5.1	TYPICAL ELECTRICAL CHARACTERISTICS	8
5.2	TIMING SPECIFICATIONS	9
5.3	INSTRUCTUION TABLE	10
6.	QUALITY UNITS	11



Specification of LCD Module Type

Item No.: MI320240H

1. General Description

- 320 x 240 Dots FSTN Positive Transmissive Dot Matrix LCD Module.
- Viewing Angle: 6 O'clock direction.
- Driving duty: 1/240 Duty, 1/16 bias.
- 'Epson' SED1335F0A LCD Controller or equivalent.
- 'SUNPLUS' SPLC086 80-Channel LCD Segment & Common Drivers or equivalent.
- 32K SRAM.
- 8-bit 6800 parallel interface.
- Power Supply: +5.0V.
- Connector.
- White LED Backlight (side LED).

2. Mechanical Specifications

The mechanical detail is shown in Fig. 1 and summarized in Table 1 below.

Table 1

Parameter	Specifications	Unit
Outline dimensions	166.0(W) x 109.0(H) x 13.5MAX.(D)(Include LBL, Connector)	mm
Viewing area	122.0(W) x 92.0(H)	mm
Display format	320 x 240	dots
Dot size	0.33(W) x 0.33(H)	mm
Dot spacing	0.03 (W) x 0.03(H)	mm
Dot pitch	0.36(W) x 0.36(H)	mm
Weight:	Approx.224.5	grams

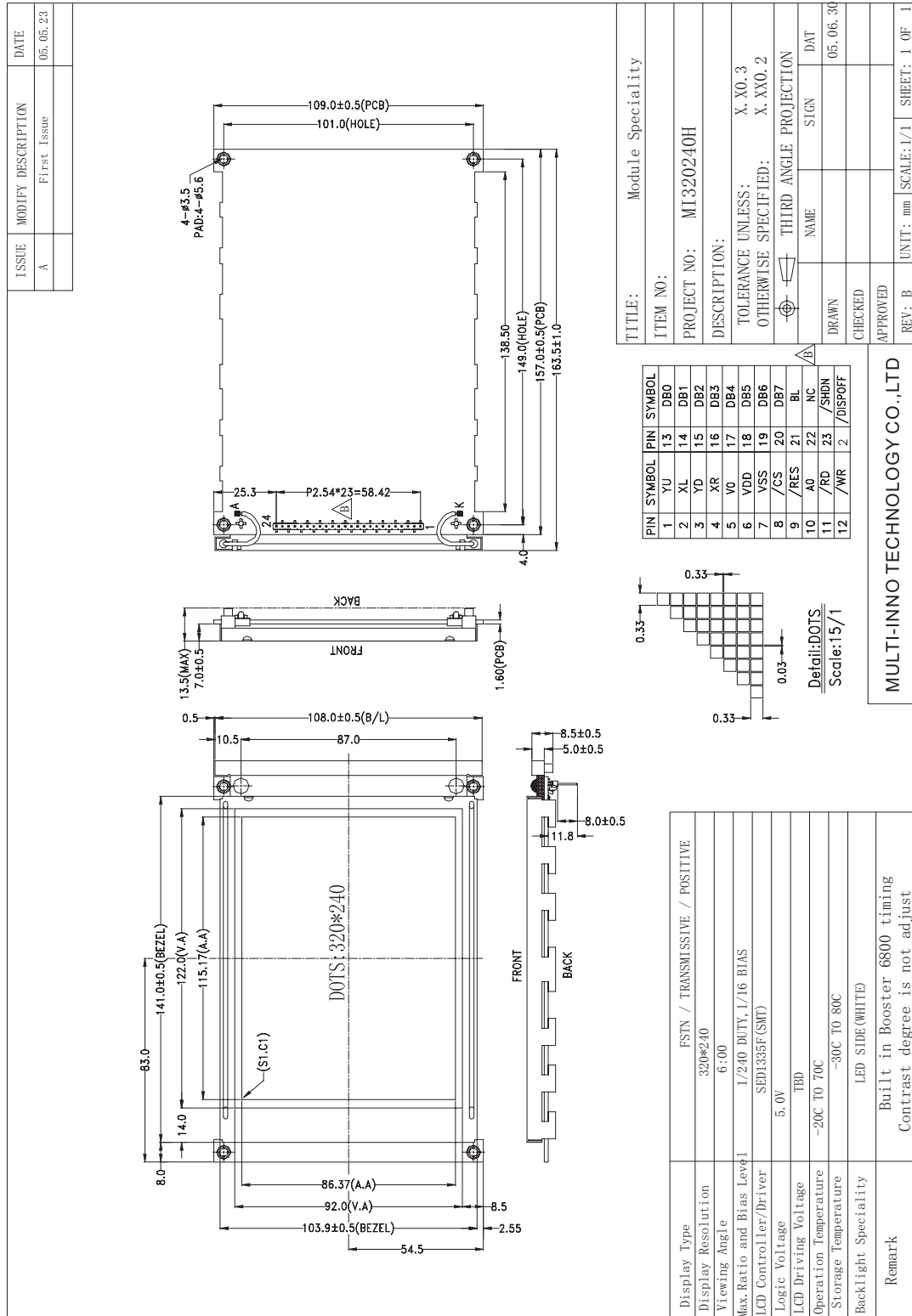


Figure 1: Module Specification

**3. Interface signals**Table 2

Pin No.	Symbol	Description
1	YU	No connection.
2	XL	No connection.
3	YD	No connection.
4	XR	No connection.
5	V0	Power supply for LCD driver.
6	VDD	Power supply for logic +5.0V.
7	VSS	Ground (0V).
8	/CS	Chip select.
9	/RES	Reset pin.
10	A0	Data type select.
11	/RD	When the 6800 family interface is selected, this signal acts as the active-HIGH enable clock. Data is read from or written to the SED1335 series when this clock goes HIGH
12	/WR	When the 6800 family interface is selected, this signal acts as the read/write control signal. Data is read from the SED1335 series if this signal is HIGH, and written to the SED1335 series if it is LOW.
13	DB0	Data input/output (LSB).
14	DB1	Data input/output.
15	DB2	Data input/output.
16	DB3	Data input/output.
17	DB4	Data input/output.
18	DB5	Data input/output.
19	DB6	Data input/output.
20	DB7	Data input/output (MSB).
21	BL	Anode of LED backlight.
22	NC	No connection.
23	/SHDN	DC/DC Negative voltage output enable pin.
24	DISOFF	Power-down signal when display is blanked.

**4. Absolute Maximum Ratings****4.1 Electrical Maximum Ratings (Ta = 25 °C)**Table 3

Parameter	Symbol	Min.	Max.	Unit
Power Supply voltage (Logic)	VDD - VSS	-0.3	+7.0	V
Power Supply voltage (LCD drive)	VLCD	-0.3	+30.0	V
Input voltage	Vin	-0.3	VDD +0.3	V

Note:

The modules may be destroyed if they are used beyond the absolute maximum ratings.

All voltage values are referenced to VSS = 0V.

4.2 Environmental ConditionTable 4

Item	Operating Temperature (Topr)		Storage Temperature (Tstg)		Remark
	Min.	Max.	Min.	Max.	
Ambient Temperature	-20°C	+70°C	-30°C	+80°C	Dry



5. Electrical Specifications

5.1 Typical Electrical Characteristics

At Ta = 25 °C, VDD = 5.0V±0.2V, VSS=0V.

Table 5

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Supply voltage (Logic)	VDD-VSS		4.8	5.0	5.2	V
Supply voltage (LCD)	VLCD	VDD =+5.0V, Graphic mode, Note 1	19.7	20.0	20.3	V
Input signal voltage for E,DB0-DB7,R/W,RS RESETB,INTRS,/CS1.	V _{IH}	“H” level	0.8VDD	-	-	V
	V _{IL}	“L” level	-	-	0.2VDD	V
Supply Current (Logic & LCD)	IDD	Note 1	-	40	60	mA
Supply Voltage (Backlight)	VLED	Forward current =105mA	2.8	3.0	3.2	V

Note 1: There is tolerance in optimum LCD driving voltage during production and it will be within the specified range.



5.2 Timing Specifications

At $T_a = 20^\circ\text{C}$ To $+70^\circ\text{C}$, $V_{DD} = +5.0\text{V} \pm 0.2\text{V}$, $V_{SS} = 0\text{V}$.

Refer to Fig. 2, the bus timing diagram for 6800 Family interface.

Table 6

Signal	Symbol	Parameter	VDD = 4.5 to 5.5V		VDD = 2.7 to 4.5V		Unit	Condition
			min	max	min	max		
A0, $\overline{\text{CS}}$, R/W	tCYC6	System cycle time	See note.	—	See note.	—	ns	CL = 100 pF
	tAW6	Address setup time	0	—	10	—	ns	
	tAH6	Address hold time	0	—	0	—	ns	
D0 to D7	tDS6	Data setup time	100	—	120	—	ns	
	tDH6	Data hold time	0	—	0	—	ns	
	tOH6	Output disable time	10	50	10	75	ns	
	tACC6	Access time	—	85	—	130	ns	
E	tEW	Enable pulsewidth	120	—	150	—	ns	

Note: For memory control and system control commands:

$$t_{\text{CYC6}} = 2t_{\text{C}} + t_{\text{EW}} + t_{\text{CEA}} + 75 > t_{\text{ACV}} + 245$$

For all other commands:

$$t_{\text{CYC6}} = 4t_{\text{C}} + t_{\text{EW}} + 30$$

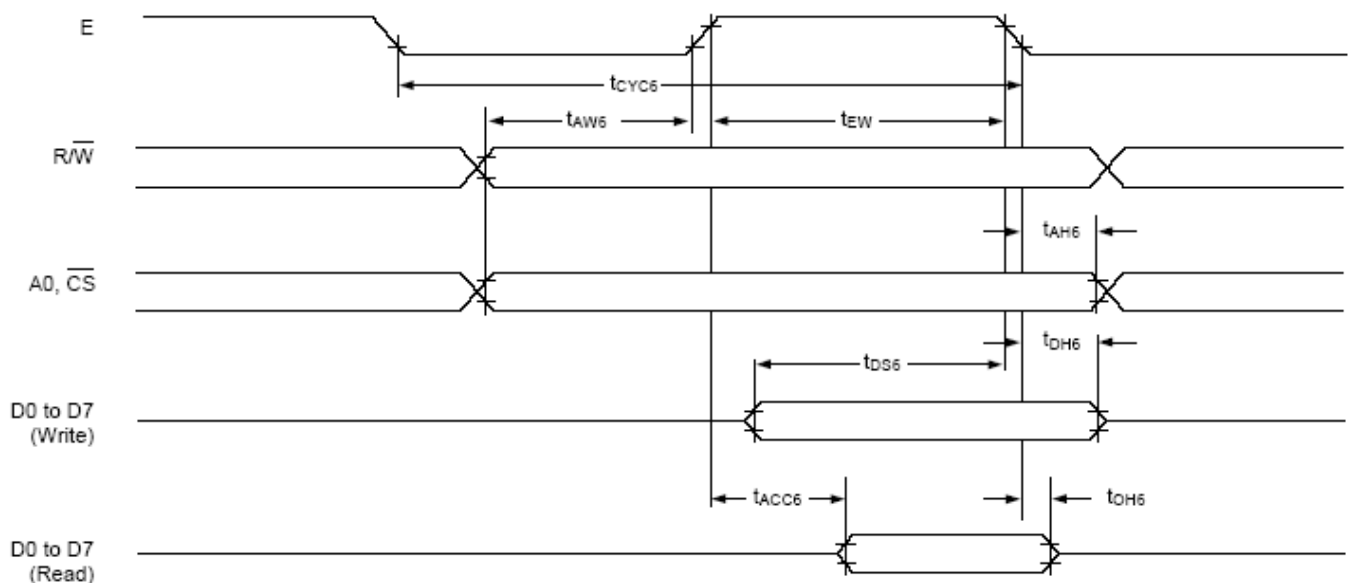


Figure 2: 6800 Family interface timing



At Ta = -20 °C To +70 °C, VDD = +5.0V±0.2V, VSS = 0V.

Refer to Fig. 3, the bus timing diagram for reset timing.

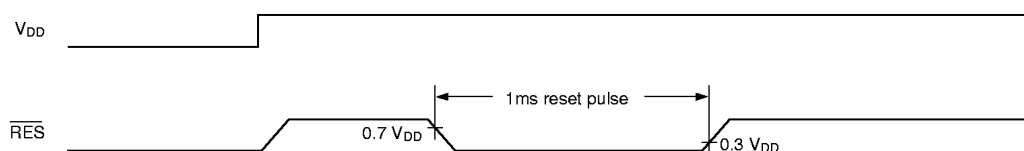


Figure 3: Reset Timing

5.3 Instruction Table

Table 7

Class	Command	Code												Hex	Command Description	Command Read Parameters	
		RD	WR	A0	D7	D6	D5	D4	D3	D2	D1	D0	No. of Bytes			Section	
System control	SYSTEM SET	1	0	1	0	1	0	0	0	0	0	0	40	Initialize device and display	8	8.2.1	
	SLEEP IN	1	0	1	0	1	0	1	0	0	1	1	53	Enter standby mode	0	8.2.2	
Display control	DISP ON/OFF	1	0	1	0	1	0	1	1	0	0	D	58, 59	Enable and disable display and display flashing	1	8.3.1	
	SCROLL	1	0	1	0	1	0	0	0	1	0	0	44	Set display start address and display regions	10	8.3.2	
	CSRFORM	1	0	1	0	1	0	1	1	1	0	1	5D	Set cursor type	2	8.3.3	
	CGRAM ADR	1	0	1	0	1	0	1	1	1	0	0	5C	Set start address of character generator RAM	2	8.3.6	
	CSRDIR	1	0	1	0	1	0	0	1	1	CD 1	CD 0	4C to 4F	Set direction of cursor movement	0	8.3.4	
	HDOT SCR	1	0	1	0	1	0	1	1	0	1	0	5A	Set horizontal scroll position	1	8.3.7	
	OVLAY	1	0	1	0	1	0	1	1	0	1	1	5B	Set display overlay format	1	8.3.5	
Drawing control	CSRW	1	0	1	0	1	0	0	0	1	1	0	46	Set cursor address	2	8.4.1	
	CSRR	1	0	1	0	1	0	0	0	1	1	1	47	Read cursor address	2	8.4.2	
Memory control	MWRITE	1	0	1	0	1	0	0	0	0	1	0	42	Write to display memory	—	8.5.1	
	MREAD	1	0	1	0	1	0	0	0	0	1	1	43	Read from display memory	—	8.5.2	

Notes:

- In general, the internal registers of the SED1335 series are modified as each command parameter is input. However, the microprocessor does not have to set all the parameters of a command and may send a new command before all parameters have been input. The internal registers for the parameters that have been input will have been changed but the remaining parameter registers are unchanged.
 - 2-byte parameters (where two bytes are treated as 1 data item) are handled as follows:
 - CSRW, CSRR: Each byte is processed individually. The microprocessor may read or write just the low byte of the cursor address.
 - SYSTEM SET, SCROLL, CGRAM ADR: Both parameter bytes are processed together. If the command is changed after half of the parameter has been input, the single byte is ignored.
- APL and APH are 2-byte parameters, but are treated as two 1-byte parameters.



6. Quality Units

6.1. Purpose

This standard for quality assurance should define the quality of LCD module products to customer by MULTI-INNO.

6.2. Scope

This document defines general provisions as well as inspection standards for LCD module supplied by MULTI-INNO. except of those with special requirements from customer.

6.3. Definition

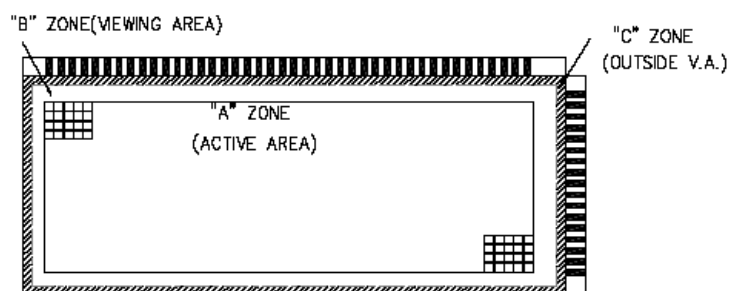
6.3.1 Definition of area

A Zone: Active area.

B Zone: Viewing area.

C Zone: Outside Viewing area.

Multi-Inno Technology Co.,Ltd



6.3.2 Definition of size

Large size(L): Less than or equal to 1 Pcs / 7 " ×14 " unit glass.

Middle size(M): 2~6 Pcs / 7 " ×14 " unit glass.

Small size(S): more than 6 Pcs/7 " ×14 " unit glass.



6.4. Quality Specification

6.4.1 Conditions of Cosmetic Inspection

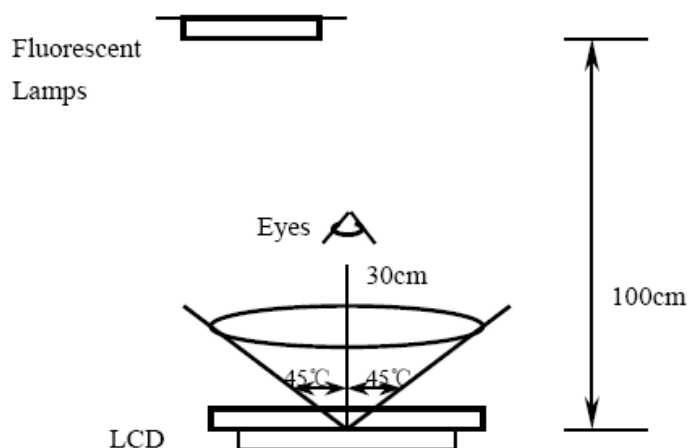
6.4.1.1 Tests should be conducted under the following conditions:

Ambient temperature: $22 \pm 5^{\circ}\text{C}$.

Ambient humidity: $65 \pm 20\%\text{RH}$.

Ambient Luminance: 20 watts fluorescent lamp.

An appearance test should be conducted by human sight at approximately 30 cm distance from the LCD module under fluorescent light. Distance between LCD and fluorescent lamps should be 100 cm or more. Viewing direction for inspection is 45° from vertical against LCD.



6.4.1.2 When test the model of transmissive product must add the reflective plate.

6.4.2 Sampling plan

Unless otherwise agreed in written, the sampling inspection shall be applied to the incoming inspection of customer.

- Lot size: Quantity of shipment lot per model.
- Sampling type: Normal inspection, single sampling.
- Sampling Level: Level II.
- Sampling table: GB/T2828.1. (GB-national standard of China.)



6.4.3 Classification of defects and Acceptable quality level

Defects and classified as either a major or minor defect defined as bellows:

-  Major defect: It is a defect that is likely to result in failure or to reduce materially the usability of the product for the intended function.
-  Minor defect: It is a defect that will not result in functioning problem with deviation classified.

The AQL for major and minor defects is defined as follows:

Partition	Definition	AQL
Major defect	Functional defective as product.	0.4
Minor defect	Satisfy all functions as product but not satisfy cosmetic standard.	0.65

6.4.4 Applicable instrument

-  LCD module tester.
-  Multimeter.
-  Caliper.
-  Defect size filming standard.



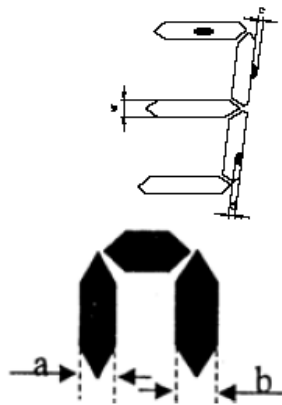
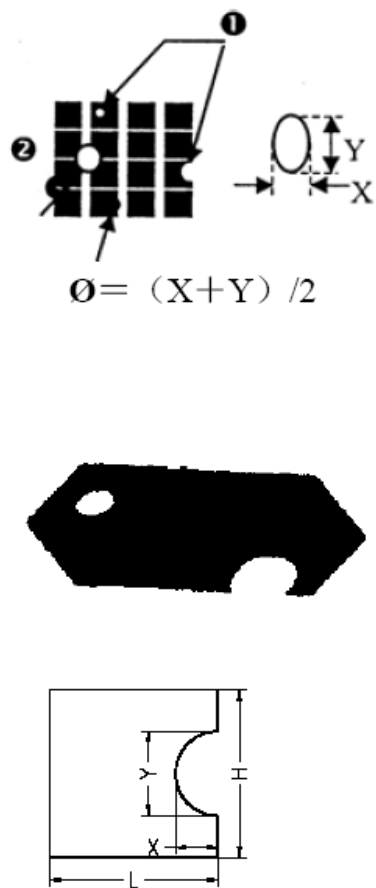
6.4.5 Inspection quality criterion

6.4.5.1 LCD panel part.

The inspection specification as following list:

Classify	Item	Description of defects	Inspection criterion	Drawing specification
Major defect	1. Non-display.	Product no function.	Not accept.	
	2. LCD with wrong view direction.	Difference in Spec.	Not accept.	
	3. Segment missing.	Part or all pattern do not light up.	Not accept.	
	4. Occur high current.	Current exceed designed value.	Not accept.	
	5. LC leakage.	LC does not fulfill the glass cell.	Not accept.	
	6. Deviation from drawing.	LCM Dimension difference from drawing and over tolerance	According to dimensions noted in the specification.	
	7. Wrong type applied.	Wrong polarizer attachment.	Not accept.	
		Pin attached wrong type applied.	Not accept.	
	8. Incorrect pins quantity	Pin attached wrong quantity applied.	Not accept.	



Minor defect	9. Pattern deformation	Segment fatter or smaller.	Reject if c or $d \leq 1/4 - 1/5W$ Or refer to the defect specimen. W= Segment width Reject if $a-b \leq 1/4a$. Or refer to the defect specimen. a = Segment width																													
Minor defect	10. Pinholes	black spot/ white spot at activated state.	1. Large size LCD <table><tr><td>Diameter (mm)</td><td>Accept QTY</td></tr><tr><td>$\varnothing \leq 0.15$</td><td>Not count</td></tr><tr><td>$0.15 \leq \varnothing \leq 0.30$</td><td>5</td></tr><tr><td>$0.30 < \varnothing \leq 0.40$</td><td>2</td></tr><tr><td>$\varnothing > 0.40$</td><td>0</td></tr></table> 2. Middle size LCD <table><tr><td>Diameter (mm)</td><td>Accept QTY</td></tr><tr><td>$\varnothing \leq 0.10$</td><td>Not count</td></tr><tr><td>$0.10 < \varnothing \leq 0.20$</td><td>3</td></tr><tr><td>$0.20 < \varnothing \leq 0.30$</td><td>1</td></tr><tr><td>$\varnothing > 0.30$</td><td>0</td></tr></table> 3. Small size LCD <table><tr><td>Diameter (mm)</td><td>Accept QTY</td></tr><tr><td>$\varnothing \leq 0.1$</td><td>Not count</td></tr><tr><td>$0.10 < \varnothing \leq 0.20$</td><td>2</td></tr><tr><td>$\varnothing > 0.20$</td><td>0</td></tr></table> 4. Only allow one defect in one segment. Accept $X, Y \leq 2/3L, H$ ($X, Y = (\text{Max } X, Y)$) . 5. The nearest distance allowed between two pinholes is 20mm.	Diameter (mm)	Accept QTY	$\varnothing \leq 0.15$	Not count	$0.15 \leq \varnothing \leq 0.30$	5	$0.30 < \varnothing \leq 0.40$	2	$\varnothing > 0.40$	0	Diameter (mm)	Accept QTY	$\varnothing \leq 0.10$	Not count	$0.10 < \varnothing \leq 0.20$	3	$0.20 < \varnothing \leq 0.30$	1	$\varnothing > 0.30$	0	Diameter (mm)	Accept QTY	$\varnothing \leq 0.1$	Not count	$0.10 < \varnothing \leq 0.20$	2	$\varnothing > 0.20$	0	
Diameter (mm)	Accept QTY																															
$\varnothing \leq 0.15$	Not count																															
$0.15 \leq \varnothing \leq 0.30$	5																															
$0.30 < \varnothing \leq 0.40$	2																															
$\varnothing > 0.40$	0																															
Diameter (mm)	Accept QTY																															
$\varnothing \leq 0.10$	Not count																															
$0.10 < \varnothing \leq 0.20$	3																															
$0.20 < \varnothing \leq 0.30$	1																															
$\varnothing > 0.30$	0																															
Diameter (mm)	Accept QTY																															
$\varnothing \leq 0.1$	Not count																															
$0.10 < \varnothing \leq 0.20$	2																															
$\varnothing > 0.20$	0																															

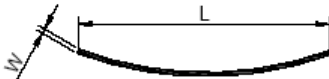


Minor defect	11.Blemishes and foreign matters.	Black spot/ dust on LCD. (non-display)	Positive panel: 1. A zone. (1) Large size LCD Accept if can't find at 1m distance and will not enlarge under electronic test. (2) Middle size LCD <table><tr><td>Diameter (mm)</td><td>Accept QTY</td></tr><tr><td>$\varnothing \leq 0.1$</td><td>Not count</td></tr><tr><td>$0.10 < \varnothing \leq 0.20$</td><td>2</td></tr><tr><td>$0.20 < \varnothing \leq 0.30$</td><td>1</td></tr><tr><td>$\varnothing > 0.30$</td><td>0</td></tr></table> (3) Small size LCD <table><tr><td>Diameter (mm)</td><td>Accept QTY</td></tr><tr><td>$\varnothing \leq 0.1$</td><td>Not count</td></tr><tr><td>$0.10 < \varnothing \leq 0.15$</td><td>2</td></tr><tr><td>$0.15 < \varnothing \leq 0.20$</td><td>1</td></tr><tr><td>$\varnothing > 0.20$</td><td>0</td></tr></table> 2. B zone. 1.5 times of acceptable largest diameter size of Zone A. 3. C area Not count. Negative panel: 1. A zone. (1) Large size LCD <table><tr><td>Diameter (mm)</td><td>Accept QTY</td></tr><tr><td>$\varnothing \leq 0.15$</td><td>Not count</td></tr><tr><td>$0.15 < \varnothing \leq 0.30$</td><td>3</td></tr><tr><td>$0.30 < \varnothing \leq 0.40$</td><td>1</td></tr><tr><td>$\varnothing > 0.40$</td><td>0</td></tr></table> (2) Middle size LCD <table><tr><td>Diameter (mm)</td><td>Accept QTY</td></tr><tr><td>$\varnothing \leq 0.1$</td><td>Not count</td></tr><tr><td>$0.10 < \varnothing \leq 0.20$</td><td>2</td></tr><tr><td>$\varnothing > 0.20$</td><td>0</td></tr></table> (3) Small size LCD <table><tr><td>Diameter (mm)</td><td>Accept QTY</td></tr><tr><td>$\varnothing \leq 0.1$</td><td>Not count</td></tr><tr><td>$0.10 < \varnothing \leq 0.15$</td><td>2</td></tr><tr><td>$\varnothing > 0.15$</td><td>0</td></tr></table>	Diameter (mm)	Accept QTY	$\varnothing \leq 0.1$	Not count	$0.10 < \varnothing \leq 0.20$	2	$0.20 < \varnothing \leq 0.30$	1	$\varnothing > 0.30$	0	Diameter (mm)	Accept QTY	$\varnothing \leq 0.1$	Not count	$0.10 < \varnothing \leq 0.15$	2	$0.15 < \varnothing \leq 0.20$	1	$\varnothing > 0.20$	0	Diameter (mm)	Accept QTY	$\varnothing \leq 0.15$	Not count	$0.15 < \varnothing \leq 0.30$	3	$0.30 < \varnothing \leq 0.40$	1	$\varnothing > 0.40$	0	Diameter (mm)	Accept QTY	$\varnothing \leq 0.1$	Not count	$0.10 < \varnothing \leq 0.20$	2	$\varnothing > 0.20$	0	Diameter (mm)	Accept QTY	$\varnothing \leq 0.1$	Not count	$0.10 < \varnothing \leq 0.15$	2	$\varnothing > 0.15$	0	 $\varnothing = (X + Y) / 2$
Diameter (mm)	Accept QTY																																																	
$\varnothing \leq 0.1$	Not count																																																	
$0.10 < \varnothing \leq 0.20$	2																																																	
$0.20 < \varnothing \leq 0.30$	1																																																	
$\varnothing > 0.30$	0																																																	
Diameter (mm)	Accept QTY																																																	
$\varnothing \leq 0.1$	Not count																																																	
$0.10 < \varnothing \leq 0.15$	2																																																	
$0.15 < \varnothing \leq 0.20$	1																																																	
$\varnothing > 0.20$	0																																																	
Diameter (mm)	Accept QTY																																																	
$\varnothing \leq 0.15$	Not count																																																	
$0.15 < \varnothing \leq 0.30$	3																																																	
$0.30 < \varnothing \leq 0.40$	1																																																	
$\varnothing > 0.40$	0																																																	
Diameter (mm)	Accept QTY																																																	
$\varnothing \leq 0.1$	Not count																																																	
$0.10 < \varnothing \leq 0.20$	2																																																	
$\varnothing > 0.20$	0																																																	
Diameter (mm)	Accept QTY																																																	
$\varnothing \leq 0.1$	Not count																																																	
$0.10 < \varnothing \leq 0.15$	2																																																	
$\varnothing > 0.15$	0																																																	

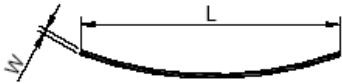


Minor defect	Blemishes and foreign matters.	Black spot/ dust on LCD . (non-display)	2. B area. (1) Large size LCD <table><tr><th>Diameter (mm)</th><th>Accept QTY</th></tr><tr><td>$\varnothing \leq 0.15$</td><td>Not count</td></tr><tr><td>$0.15 < \varnothing \leq 0.40$</td><td>3</td></tr><tr><td>$0.40 < \varnothing \leq 0.50$</td><td>1</td></tr><tr><td>$\varnothing > 0.50$</td><td>0</td></tr></table> (2) Middle size LCD <table><tr><th>Diameter (mm)</th><th>Accept QTY</th></tr><tr><td>$\varnothing \leq 0.1$</td><td>Not count</td></tr><tr><td>$0.10 < \varnothing \leq 0.20$</td><td>2</td></tr><tr><td>$0.20 < \varnothing \leq 0.25$</td><td>1</td></tr><tr><td>$\varnothing > 0.25$</td><td>0</td></tr></table> (3) Small size LCD <table><tr><th>Diameter (mm)</th><th>Accept QTY</th></tr><tr><td>$\varnothing \leq 0.1$</td><td>Not count</td></tr><tr><td>$0.10 < \varnothing \leq 0.20$</td><td>2</td></tr><tr><td>$\varnothing > 0.20$</td><td>0</td></tr></table> 3. C zone Not count. The nearest distance allowed between two black spot is 20mm.	Diameter (mm)	Accept QTY	$\varnothing \leq 0.15$	Not count	$0.15 < \varnothing \leq 0.40$	3	$0.40 < \varnothing \leq 0.50$	1	$\varnothing > 0.50$	0	Diameter (mm)	Accept QTY	$\varnothing \leq 0.1$	Not count	$0.10 < \varnothing \leq 0.20$	2	$0.20 < \varnothing \leq 0.25$	1	$\varnothing > 0.25$	0	Diameter (mm)	Accept QTY	$\varnothing \leq 0.1$	Not count	$0.10 < \varnothing \leq 0.20$	2	$\varnothing > 0.20$	0	
Diameter (mm)	Accept QTY																															
$\varnothing \leq 0.15$	Not count																															
$0.15 < \varnothing \leq 0.40$	3																															
$0.40 < \varnothing \leq 0.50$	1																															
$\varnothing > 0.50$	0																															
Diameter (mm)	Accept QTY																															
$\varnothing \leq 0.1$	Not count																															
$0.10 < \varnothing \leq 0.20$	2																															
$0.20 < \varnothing \leq 0.25$	1																															
$\varnothing > 0.25$	0																															
Diameter (mm)	Accept QTY																															
$\varnothing \leq 0.1$	Not count																															
$0.10 < \varnothing \leq 0.20$	2																															
$\varnothing > 0.20$	0																															

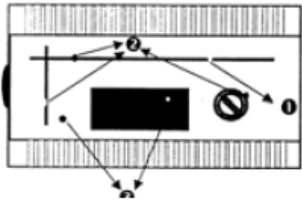
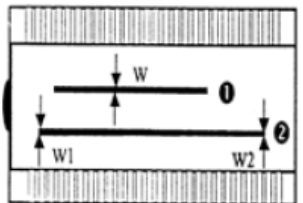
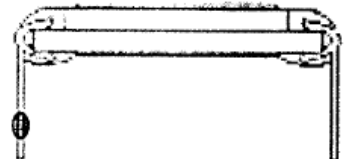


Minor defect	12.Black lines and scratches.	Scratch on glass or polarizer surface. And foreign linear matters in LCD.	Positive panel:		
			1. A 、 B zone.		
			(1) Large size LCD		
			Diameter (mm)	Accept QTY	
			W≤0.02	Not count	
			0.02<W≤0.03, L ≤ 5	3	
			0.03<W≤0.05, L ≤ 3	2	
			0.02<W≤0.03, L > 5	0	
			0.03<W≤0.05, L > 3	0	
			W> 0.05	As the spot criteria.	
(2) Middle size LCD					
Diameter (mm)	Accept QTY				
W≤0.02	Not count				
0.02<W≤0.03, L ≤ 3	2				
0.03<W≤0.05, L ≤ 2	2				
0.02<W≤0.03, L > 3	0				
0.03<W≤0.05, L > 2	0				
W> 0.05	As the spot criteria.				
(3) Small size LCD					
Diameter (mm)	Accept QTY				
W≤0.02	Not count				
0.02<W≤0.03, L ≤ 2	2				
0.03<W≤0.05, L ≤ 1	1				
0.02<W≤0.03, L > 2	0				
0.03<W≤0.05, L > 1	0				
W> 0.05	As the spot criteria.				
2. C zone					
Not count.					

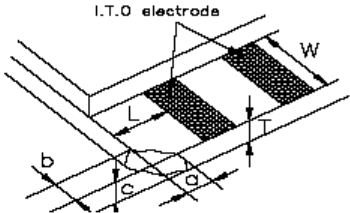
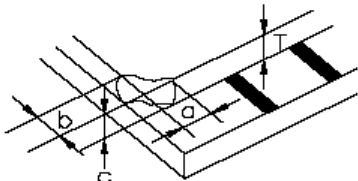
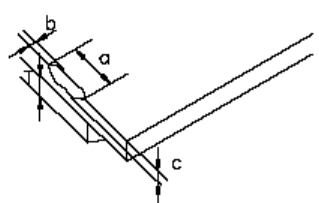
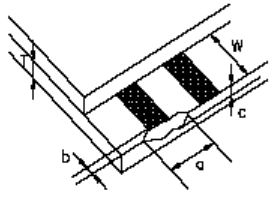


Minor defect	Black lines and scratches.	Scratch on glass or polarizer surface. And foreign linear matters in LCD.	Negative panel: 1. A 、 B zone. (1) Large size LCD <table><tr><th>Diameter (mm)</th><th>Accept QTY</th></tr><tr><td>$W \leq 0.02$</td><td>Not count</td></tr><tr><td>$0.02 < W \leq 0.03, L \leq 4$</td><td>3</td></tr><tr><td>$0.03 < W \leq 0.05, L \leq 3$</td><td>2</td></tr><tr><td>$0.02 < W \leq 0.03, L > 4$</td><td>0</td></tr><tr><td>$0.03 < W \leq 0.05, L > 3$</td><td>0</td></tr></table> $W > 0.05$ As the spot criteria. (2) Middle size LCD <table><tr><th>Diameter (mm)</th><th>Accept QTY</th></tr><tr><td>$W \leq 0.02$</td><td>Not count</td></tr><tr><td>$0.02 < W \leq 0.03, L \leq 3$</td><td>2</td></tr><tr><td>$0.03 < W \leq 0.05, L \leq 2$</td><td>1</td></tr><tr><td>$0.02 < W \leq 0.03, L > 3$</td><td>0</td></tr><tr><td>$0.03 < W \leq 0.05, L > 2$</td><td>0</td></tr></table> $W > 0.05$ As the spot criteria. (3) Small size LCD <table><tr><th>Diameter (mm)</th><th>Accept QTY</th></tr><tr><td>$W \leq 0.02$</td><td>Not count</td></tr><tr><td>$0.02 < W \leq 0.03, L \leq 3$</td><td>2</td></tr><tr><td>$0.02 < W \leq 0.03, L > 3$</td><td>0</td></tr></table> $W > 0.03$ As the spot criteria. 2. C zone Not count.	Diameter (mm)	Accept QTY	$W \leq 0.02$	Not count	$0.02 < W \leq 0.03, L \leq 4$	3	$0.03 < W \leq 0.05, L \leq 3$	2	$0.02 < W \leq 0.03, L > 4$	0	$0.03 < W \leq 0.05, L > 3$	0	Diameter (mm)	Accept QTY	$W \leq 0.02$	Not count	$0.02 < W \leq 0.03, L \leq 3$	2	$0.03 < W \leq 0.05, L \leq 2$	1	$0.02 < W \leq 0.03, L > 3$	0	$0.03 < W \leq 0.05, L > 2$	0	Diameter (mm)	Accept QTY	$W \leq 0.02$	Not count	$0.02 < W \leq 0.03, L \leq 3$	2	$0.02 < W \leq 0.03, L > 3$	0	
Diameter (mm)	Accept QTY																																			
$W \leq 0.02$	Not count																																			
$0.02 < W \leq 0.03, L \leq 4$	3																																			
$0.03 < W \leq 0.05, L \leq 3$	2																																			
$0.02 < W \leq 0.03, L > 4$	0																																			
$0.03 < W \leq 0.05, L > 3$	0																																			
Diameter (mm)	Accept QTY																																			
$W \leq 0.02$	Not count																																			
$0.02 < W \leq 0.03, L \leq 3$	2																																			
$0.03 < W \leq 0.05, L \leq 2$	1																																			
$0.02 < W \leq 0.03, L > 3$	0																																			
$0.03 < W \leq 0.05, L > 2$	0																																			
Diameter (mm)	Accept QTY																																			
$W \leq 0.02$	Not count																																			
$0.02 < W \leq 0.03, L \leq 3$	2																																			
$0.02 < W \leq 0.03, L > 3$	0																																			
Minor defect	13.Scratch on PI coating.	PI coating scratched.	The visible scratch of A zone can not accepted at 30cm view distance.																																	
Minor defect	14.Rainbow	Arches, circular or parallel colorful spread.	According to the limit specimen.																																	
Minor defect	15.Bubbles or wrinkles in polarizer	Bubbles or wrinkles between polarizer and glass.	According to black spot/ foreign material specification.																																	

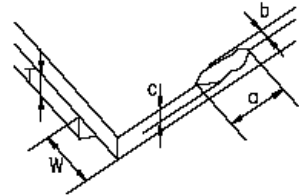
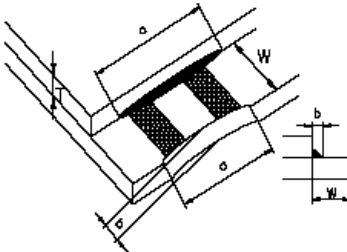


Minor defect	16.Position of polarizer attachment	16.1 Wrong polarizer attachment in position or dimension.	Polarizer protruding from edge of glass and exceeding/ within the maximum external dimension of LCD.	
Minor defect	17. Ink printing defect	17.1 Ink line/ pattern broken	Not accept.	
		17.2 Ink pattern/ line jagged.	Accept if the thick or thin part is less than or equal to 25% segment width or according to the limit specimen.	
		17.3 Light leakage	When activated with current white light appears in the position of pinhole or scratch due to ink printing misalignment. According to the pinhole specification.	
Minor defect		17.4 Ink printing pattern/ line uneven	Reject if the thick or thin is more than $1/2W$. Reject when $W1 - W2 \leq 1/3W$.	
Minor defect	18. Pin defect.	18.1 Corrosion or foreign material on terminal legs.	Pin incoming defect: oxidized, damage (including pins plating damaged), excess epoxy on bottom glass or terminal legs. Not accept.	
Minor defect		18.2 Pin deviation over tolerance	According to the specification.	



Minor defect	19. Chipped glass on corner	19.1 Chip in lead contact area.	a	b	c	Accept QTY		
			$a \leq 3\text{mm}$ ($L \geq 5\text{mm}$)	$b \leq 1/2W$	$c \leq T$	2		
			$a < 1/2L$ ($L < 5\text{mm}$)	$b \leq 1/2W$	$c \leq T$	2		
		19.2 Others	a	b	c	Accept QTY		
not exceed 1/2 width of seal			$c \leq T$	2				
Minor defect	20. Glass chip on edge		a	b	c	Accept QTY		
			$a \leq 3\text{mm}$	not exceed 1/2 width of seal	$c \leq 3/4T$	2		
Minor defect	21. Chipped electrode pad	21.1 Glass chip on ITO edge	COG and TAB product.	a	b	c	Accept QTY	
				$a \leq 2\text{mm}$ (and not exceed 3 ITO terminal)	$b \leq W/5$	$T > 0.7\text{mm}$ $c \leq 1/2T$ $T \leq 0.7\text{mm}$ $c \leq T$	2	
Minor defect	21. Chipped electrode pad	21.1 Glass chip on ITO edge	Others	a	b	c	Accept QTY	
				$a \leq 3\text{mm}$ (and not exceed 4 ITO terminal)	$b \leq W/4$	$c \leq T$	2	



Minor defect		21.2 Glass chip on ITO back	COG and TAB product.	a	b	c	Accept QTY	
				$a \leq 3\text{mm}$	$b \leq W/4$	$T > 0.7\text{mm}$ $c \leq 1/2T$ $T \leq 0.7\text{mm}$ $c \leq T$	2	
			Others	a	b	c	Accept QTY	
				$a \leq 5\text{mm}$	$b \leq W/4$	$c \leq T$	2	
Minor defect	22.Mechanical damage.	Extended crack inspector shall attempt to remove the chip with tweezers, re-evaluate if the remaining defect is still a crack or a chip.	B		Accept QTY			
			$b \leq 1/5W$		2			
Minor defect	23.Glass cracks		Not accept					

Remark;

The minimum space between any 2 defects (spot, dirt) should more than 20mm, and Max. allowed defect QTY in total:

Large size LCD : Zone A: $\leq 5/\text{unit}$, Zone B $\leq 5/\text{unit}$;

Middle size LCD : Zone A: $\leq 3/\text{unit}$, Zone B $\leq 3/\text{unit}$;

Small size LCD: Zone A: $\leq 2/\text{unit}$, Zone B $\leq 2/\text{unit}$.

**6.4.5.2 Other part**

The inspection specification as following list:

NO	Items	Criterion of defects	AQL
1	Backlight	1.Lumination source flickers. 2.Using spot, lines and contamination standard of LCD to judge the spots or scratches defect on backlight. 3.Not allow unlighted on backlight. 4.Colour and luminance of backlight should correspond its specification.	Major Minor Major Major
2	PCB, COB	1.COB seal may not have pinholes larger than 0.2mm or contamination. 2.COB seal surface may not have pinholes through to the IC. 3.The height of the COB should not exceed the height indicated in the assembly diagram. 4.Beyond 2mm of the seal area, there may not have sealant on the PCB. 5.No oxidation or contamination on PCB connector. 6.Parts on PCB should correspond the characteristic, and not allow wrong parts, missing parts or additional parts. 7.The jumper on the PCB should correspond to the characteristic. 8.The solder which gets on bezel, LED pad, zebra pad or screw hole pad should be smoothed down.	Minor Minor Major Minor Minor Major Minor Major
3	Soldering	1.No unmelted solder pastes on the PCB. 2.No cold solder joints, solder connection missing, oxidation of solder. 3.No short circuits in components on PCB.	Minor Minor Minor
4	General Appearance	1.No oxidation, contamination, curves ,cracks or bends on interface Pin of TCP. 2.No solder residue or solder balls on product. 3.The IC on the TCP may not be damaged. 4.The residual rosin or tin oil of soldering (component or chip component) is not turned into brown or black color. 5.Packing method correspond the specification. 6.Dimension and structure correspond the specification sheet. 7.No dirt and break on the heat seal.	Minor Minor Major Minor Major Major Major

**6.5. Reliability**

Standard specification for reliability of LCD Module

ITEM	Condition		Criterion
High temperature operation	+70 8h		Total current consumption should be below double of initial value. Cosmetic defects should not be happened.
Low temperature operation	-20 8h		
Humidity	Storage	40 93%RH 24h	
	Operation	40 93%RH 8h	
High temperature storage	+80 10h		
Low temperature storage	-30 10h		
Thermal shock storage	-20 → +70 60min → 60min 5 cycle		
Vibration (Package state)	50Hz 0.7mm 30min in each direction (X, Y, Z).		
Falling test (Packaged state)	Weight ≥ 15kg; Falling height: 80cm. Weight < 15kg; Falling height: 100cm.		



6.6. Quality Assurance

6.6.1 Multi-Inno Technology Co.,Ltd will only replace or repair any of its LCD which is found defective electrically or visually when inspected in accordance with the LCM specification, for a period of one year from the date of shipment. Confirmation of such date shall be based on freight documents.

No warranty can be granted if any of the precautions stated in handling LCD and LCD Modules above have been disregarded.

6.6.2 In returning the LCD and LCD Modules, they must be properly packaged and there should be detailed description of the failures or defects. Broken glass, scratches on polarizers, mechanical damages as well as defects that are caused by accelerated environmental tests are excluded from warranty.

6.7. Precautions in Use of LCM

1. Handling of LCM

- 1.1 Don't give external shock.
- 1.2 Liquid crystal is chemical hazardous substance. Once the liquid crystal inside it leaks out, be sure not to get any in your mouth. If the liquid is adhered your skin or clothes etc, wash it off using soap and water thoroughly and immediately.
- 1.3 Don't apply excessive force on the display surface.
- 1.4 Don't scratch and dirty polarizer of covering the display surface of the LCD module.
- 1.5 In order to prevent static electricity from destructing, be sure to wear gauntlet that is tested up to grade.

2. Storage

- 2.1 Don't expose to sunlight or fluorescent light directly.
- 2.2 The LCD modules should be stored under the storage temperature and humidity range. General its storage temperature range is $-10^{\circ}\text{C} \sim 60^{\circ}\text{C}$ and operation temperature range is $0^{\circ}\text{C} \sim +50^{\circ}\text{C}$, its humidity range is 40%~60%.
- 2.3 Storage in a clean environment, free-dust and well ventilated.
- 2.4 Storage in anti-static electricity container.

3. Soldering

- 3.1 The soldering temperature is $260 \pm 5^{\circ}\text{C}$ and soldering Time should be less than 3 sec, and soldering iron power should be less than 30w.
- 3.2 Re-soldering: no more than 3 times.
- 3.3 The soldering point should be further than 1.6 mm from body.