



MULTI-INNO TECHNOLOGY CO., LTD.

LCD MODULE SPECIFICATION

Model : MI0350B1T

Revision	1.7
Engineering	
Date	
Our Reference	

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P.2



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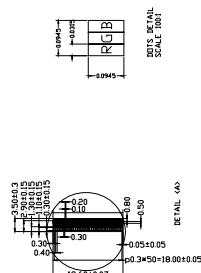
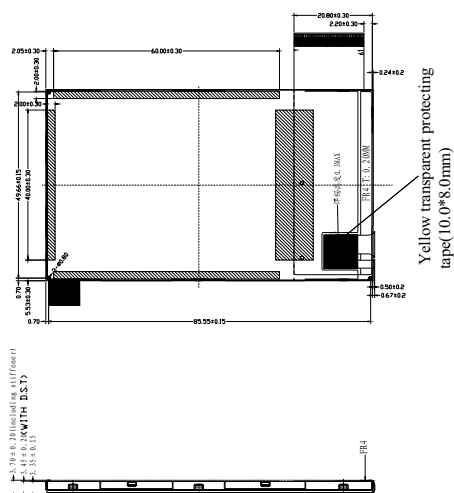
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**■ GENERAL INFORMATION**

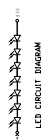
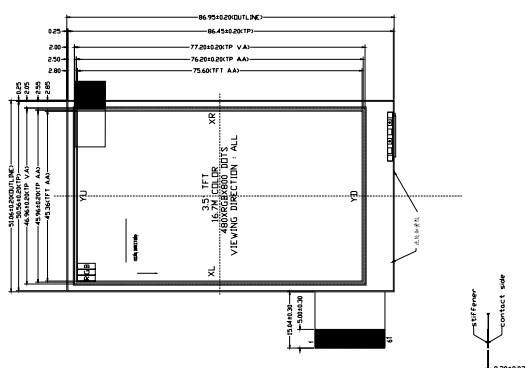
Item	Contents	Unit
LCD type	HFFS/WVGA/TFT/TRANSMISSIVE	/
Recommended Viewing Direction	Full viewing angle	O' Clock
Module area (W × H×T)	51.06×86.95×3.70	mm ³
Viewing area (W×H)	46.96×77.20	mm ²
Active area (W×H)	45.36×75.60	mm ²
Number of Dots	480RGB×800	/
Pixel pitch (W × H)	0.0945×0.0945	mm ²
Driver IC	HX8369-A010PD250	/
Interface Type	MPU/SPI+RGB/MIPI interface	/
Input voltage	3.3	V
Module Power consumption	547	mw
Colors	16.7M	/
Backlight Type	LED	/

■ EXTERNAL DIMENSIONS

PIN DESCRIPTION			
PIN	FUNCTION	PIN SYMBOL	PIN SYMBOL
1	LED	24	D17
2	LED	23	D16
3	TV	34	B6
4	20	35	D14
5	13	36	D13
6	32	37	D12
7	VDD2	38	D11
8	TV	39	D10
9	TV	40	D9
10	TV	41	D8
11	50	42	C18
12	51	43	C19
13	52	44	S11
14	53	45	S10
15	54	46	VTVNC
16	55	47	VTVNC
17	56	48	IE
18	57	49	PCLK
19	58	50	REL_VDD
20	59	51	REL_VDD
21	60	52	REL_VDD
22	61	53	REL_VDD
23	62	54	REL_VDD
24	63	55	REL_VDD
25	64	56	REL_VDD
26	65	57	REL_VDD
27	66	58	REL_VDD
28	67	59	REL_VDD
29	68	60	REL_VDD
30	69	61	VDD3



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NOTES:

- TYPE IC : HX369-0 (DP250)
TYPE IC : HX369-0 (DP250)
TYPE : HX369-0 (DP250)
3. DISPLAY MODE : 16, 7M, 7M Color LCD, Transmissive, Normal Black
BACKLIGHT : 7000-16, LED, LED Color, Connection
OPERATING TEMPERATURE : -10° C TO 60° C
STORAGE TEMPERATURE : -20° C TO 70° C
REWORKING TEMPERATURE : 250-260-310 (TYP.)
4. SIGNAL CONNECTOR : 36P, 0.5mm Pitch, 1.27mm Pitch
5. SIGNAL AXES : 16 is viewing area of the module, We recommend a 0.3mm
(JDS V) as a module size, 建议模块开孔直径为 0.3mm
(JDS V) as a module size, 建议模块开孔直径为 0.3mm
6. Cautions : The following table suggests
to be 0.2 mm away from the case cushion liner edge.
A. 请勿施加压力。建议模块边缘到外壳至少要有 0.1 英寸的
间隙。
Please avoid any conductive material touching
the corner or edge of touch panel after mounting.
(请勿接触导电物体)
B. Please do not conduct hitting/slide tests surrounding the corner
of the module.
The effective area for hitting/slide tests is recommended
to be at least 1.5mm away from the TP viewing area sides.
(TP 有效测试区域为 1.5mm, 有效测试区域为 1.5mm)
7. RELIANCE COMPLIANCE (符合 RoHS 要求)
8. GENERAL TOLERANCE : ± 0.2

**■ ABSOLUTE MAXIMUM RATINGS**

Parameter	Symbol	Min	Max	Unit
Supply voltage for logic	VDD2/VDD3	-0.3	5.5	V
Supply voltage for I/O interface	VDD1	-0.3	3.6	V
Operating temperature	Top	-10	60	°C
Storage temperature	TST	-20	70	°C
Humidity	RH	-	90%(Max60 °C)	RH

■ ELECTRICAL CHARACTERISTICS**DC CHARACTERISTICS**

Parameter	Symbol	Min	Typ	Max	Unit
Supply voltage for logic	VDD2/VDD3	2.3	2.8/3.3	4.8	V
I/O power supply	VDD1	1.65	1.8/2.8/3.3	3.3	V
Input Current	Idd	-	32.04	64.08	mA
Input voltage 'H' level	VIH	0.7VDD1	-	VDD1	V
Input voltage 'L' level	VIL	-0.3	-	0.3VDD1	V
Output voltage 'H' level	VOH	0.8VDD1	-	-	V
Output voltage 'L' level	VOL	-	-	0.2VDD1	V

■ BACKLIGHT CHARACTERISTICS

Item	Symbol	Min.	Typ.	Max.	Unit	Condition
Forward voltage	Vf	21	22.4	23.8	V	If=15mA
Luminance	Lv	4000	4400	4800	cd/m ²	Ta=25°C
Number of LED	-	-	7	-	Piece	-
Connection mode	S	-	Serial	-	-	-

Using condition: constant current driving method If=15mA(+/-10%).

■ ELECTRO-OPTICAL CHARACTERISTICS

Item	Symbol	Condition	Min	Typ	Max	Unit	Remark	Note
Response time	Tr+ Tf	$\theta=0^\circ$ $\varnothing=0^\circ$ $T_a=25^\circ\text{C}$	-	35	53	ms	Fig.1	4
Contrast ratio	Cr		282	563	-	---	FIG 2.	1
Luminance uniformity	δ WHITE		82	91	-	%	FIG 2.	3
Surface Luminance	Lv		158	197	-	cd/m ²	FIG 2.	2
Viewing angle range	θ	$\varnothing = 90^\circ$	70	80	-	deg	FIG 3.	6
		$\varnothing = 270^\circ$	70	80	-	deg	FIG 3.	
		$\varnothing = 0^\circ$	70	80	-	deg	FIG 3.	
		$\varnothing = 180^\circ$	70	80	-	deg	FIG 3.	
CIE (x, y) chromaticity	Red x	$\theta=0^\circ$ $\varnothing=0^\circ$ $T_a=25^\circ\text{C}$	0.5757	0.6257	0.6757	-	FIG 2.	5
	Red y		0.3006	0.3506	0.4006	-		
	Green x		0.2817	0.3317	0.3817	-		
	Green y		0.5561	0.6061	0.6561	-		
	Blue x		0.0919	0.1419	0.1919	-		
	Blue y		0.0251	0.0751	0.1251	-		
	White x		0.2233	0.2833	0.3433	-		
	White y		0.2404	0.3004	0.3604	-		

Note1. Contrast Ratio(CR) is defined mathematically by the following formula. For more information see FIG 2.:

$$\text{ContrastRatio} = \frac{\text{AverageSurface Luminance with all white pixels (P 1,P2, P 3,P4, P5)}}{\text{Average SurfaceLuminance with all black pixels (P1, P2, P 3,P4, P5)}}$$

Note2. Surface luminance is the LCD surface from the surface with all pixels displaying white. For more information see FIG 2.

$$L_v = \text{Average Surface Luminance with all white pixels (P1, P2, P 3,P4, P5)}$$

Note3. The uniformity in surface luminance (δ WHITE) is determined by measuring luminance at each test position 1 through 5, and then dividing the maximum luminance of 5 points luminance by minimum luminance of 5 points luminance. For more information see FIG 2.

$$\delta \text{ WHITE} = \frac{\text{Minimum Surface Luminance with all white pixels (P}_1, \text{P}_2, \text{P}_3, \text{P}_4, \text{P}_5)}{\text{Maximum Surface Luminance with allwhite pixels (P}_1, \text{P}_2, \text{P}_3, \text{P}_4, \text{P}_5)}$$

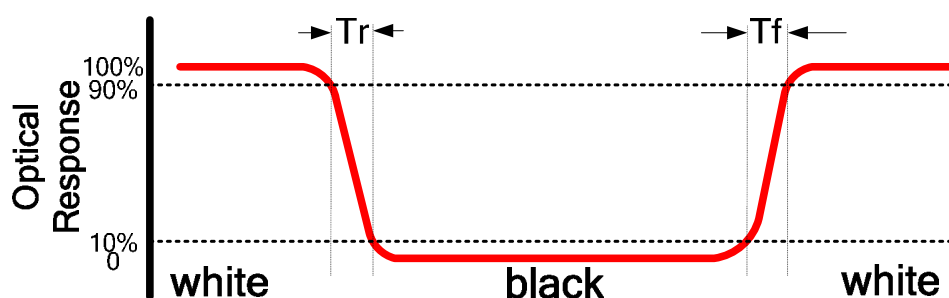
Note4. Response time is the time required for the display to transition from White to black(Rise Time, Tr) and from black to white(Decay Time, Tf). For additional information see FIG 1..

Note5. CIE (x, y) chromaticity ,The x,y value is determined by screen active area position 5. For more information see FIG 2.

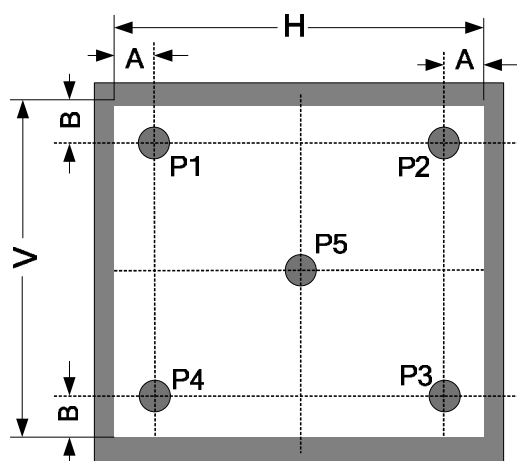
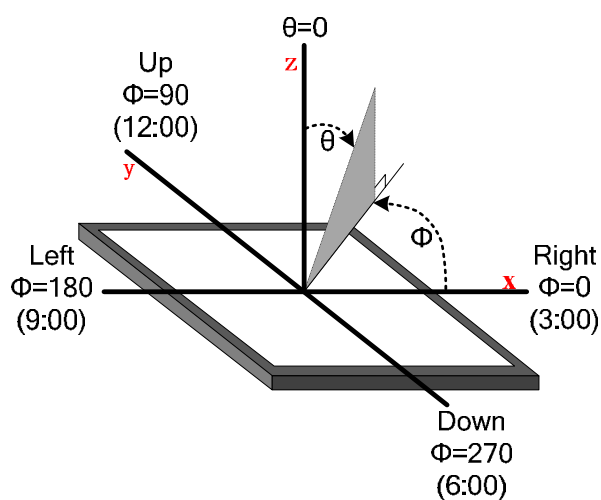
Note6. Viewing angle is the angle at which the contrast ratio is greater than 2. For TFT module the contrast ratio is greater than 10. The angles are determined for the horizontal or x axis and the vertical or y axis with respect to the z axis which is normal to the LCD surface. For more information see FIG 3.

Note7. For Viewing angle and response time testing, the testing data is base on Autronic-Melchers's ConoScope. Series Instruments. For contrast ratio, Surface Luminance, Luminance uniformity and CIE, the testing data is base on TOPCON's BM-5 photo detector.

Note8. For TFT transmissive module, Gray scale reverse occurs in the direction of panel viewing angle.

FIG.1. The definition of Response Time

FIG.2. Measuring method for Contrast ratio, surface luminance, Luminance uniformity, CIE (x, y) chromaticity

A : 5 mm
B : 5 mm
H, V : Active Area
Light spot size $\varnothing=5\text{mm}$, 500mm distance from the LCD surface to detector lens
measurement instrument is TOPCON's luminance meter BM-5


FIG.3. The definition of viewing angle


■ INTERFACE DESCRIPTION

Pin NO.	Symbol	I/O or connect to	Description	When not in use
1	LED-	LED driver	LED CATHODE	-
2	LED+	LED driver	LED ANODE	-
3	YU	TP driver	Touch panel coordinate in the up side of envisage drawing.	-
4	XR	TP driver	Touch panel coordinate in the right side of envisage drawing.	-
5	YD	TP driver	Touch panel coordinate in the down side of envisage drawing.	-
6	XL	TP driver	Touch panel coordinate in the left side of envisage drawing.	-
7	VDD2	Power supply	A power supply for the analog power. VDD2=2.3 to 4.8V VDD2 input level should be same as VDD3 input level to avoid the level-mismatching at internal level shifter circuit. TYPE:2.8/3.3V	-
8	VDD1	Power supply	A power supply for the I/O circuit. VDD1=1.65 to 3.3V. TYPE:1.8V/2.8/3.3V	-
9	BLU_PWM	O	Backlight on/fff control pin. If use CABC function, the pin can connect to external LED driver IC. The output voltage range=0 to VDD1.	OPEN
10	TE	O	Serves TE (Tearing Effect) pin on MPU interface.	OPEN
11	BS0	I Host processor	MPU interface mode selection signal.Must be connected to GND or VDD1.For the details,please refer to NOTE1 .	-
12	BS1	I Host processor		
13	BS2	I Host processor		
14	BS3	I Host processor		
15	RESX	I Hostprocessor/reset circuit	Reset pin. Setting either pin low initializes the LSI. Must be reset after power is supplied (Must be connected to GND or VDD1).	-
16~39	DB[23:00]	I/O Host processor	Data bus. For the connection condition of the MPU & RGB interface mode,please refer to NOTE1 and NOTE2	OPEN
40	RDX_E	I Host processor	DBI Type-A: 0: Read/Write disable, 1: Read / Write enable. DBI Type-B: Serves as a read signal and read data at the low level.	OPEN or VDD1
41	WRX_DCX	I Host processor	DBI Type-B mode: Serves as a write signal and write data at the low level. DBI Type-A mode: 0: Read/Write disable, 1: Read / Write enable.	OPEN or VDD1



42	DCX_SCL	I Host processor	DBI Type-A/B: Data / Command Selection pin DBI Type-C: it servers as SCL (Serial Clock)	OPEN or VDD1
43	CSX	I Host processor	Chip select signal. Low: chip can be accessed; High: chip cannot be accessed.	GND or VDD1
44	SDI	I Host processor	Serial data input pin in serial interface operation.	OPEN
45	SDO	I Host processor	Serial data output. Let it to open in MPU interface mode.	OPEN
46	VSXNC	I Host processor	Frame synchronization signal. Serves VS signal pin on RGB interface. (Input pad).	GND or VDD1
47	HSXNC	I Host processor	Line synchronization signal.	GND or VDD1
48	DE	I Host processor	A data enable signal in RGB I/F mode. Has to be fixed to GND level in MPU interface mode.	GND
49	PCLK	I Host processor	Pixel clock signal.	GND or VDD1
50	DSI_LDO_ENB	I VDD1 or GND	DSI I/F:Control signal of DSI_LDO. The default setting of DSI_LDO_ENB is Low. High: Disable the DSI_LDO;Low: Eable the DSI_LDO. MDDI I/F:Control signal of MDDI_LDO. The default setting of MDDI_LDO_ENB is Low.High: Disable the MDDI_LDO;Low: Eable the MDDI_LDO.It must be connected to VDD1 or GND. (latch type)	-
51	DSI_VSS	Power supply	MIPI DSI analogy ground. DSI_VSS=0V. When using the COG method,connect to VSSA on the FPC to prevent noise.	-
52	DSI_D0N	I/O Host processor	MIPI-DSI interface: MIPI-DSI Data differential signal input pins. (Data lane 0)	GND
53	DSI_D0P		MDDI interface: High Speed Interface Data differential signal input pins. (Data lane 1) Connect to a terminal resistance (100) between MDDI_D1P and MDDI_D1N.	GND
54	DSI_VSS	Power supply	MIPI DSI analogy ground. DSI_VSS=0V. When using the COG method,connect to VSSA on the FPC to prevent noise.	-
55	DSI_D1N	I/O Host processor	MIPI-DSI interface:MIPI-DSI Data differential signal input pins. (Data lane 1)	GND
56	DSI_D1P		MDDI interface: High Speed Interface Data differential signal input pins. (Data lane 0) Connect to a terminal resistance (100) between MDDI_D0P and MDDI_D0N.	GND
57	DSI_VSS	Power supply	MIPI DSI analogy ground. DSI_VSS=0V. When using the COG method,connect to VSSA on the FPC to prevent noise.	-



58	DSI_CLKN	I Host processor	MIPI-DSI interface: MIPI-DSI CLOCK differential signal input pins. MDDI interface: High Speed Interface clock differential signal input pins. Connect to a terminal resistance (100) between MDDI_STBP and MDDI_STBN.	GND
59	DSI_CLKP			GND
60	DSI_VSS	Power supply	MIPI DSI analogy ground. DSI_VSS=0V. When using the COG method, connect to VSSA on the FPC to prevent noise.	-
61	VDD3	Power supply	A power supply for the logic power, DC/DC converter VDD3=2.3 to 4.8V. TYPE: 2.8/3.3V	-

Note1:

Select the MPU interface mode as listed below:

BS3	BS2	BS1	BS0	MPU interface mode	DB pins	Display mode
0	0	0	0	DBI TYPE-A 8-bit (CLK-E)	DB23-DB8: Unused, DB7-DB0: Data	Type 1
0	0	0	1	DBI TYPE-A 9-bit (CLK-E)	DB23-DB9: Unused, DB8-DB0: Data	Type 1
0	0	1	0	DBI TYPE-A 16-bit (CLK-E)	DB23-DB16: Unused, DB15-DB0: Data	Type 1
0	0	1	1	DBI TYPE-A 18-bit (CLK-E)	DB23-DB18: Unused, DB17-DB0: Data	Type 1
0	1	0	0	DBI TYPE-B 8-bit	DB23-DB8: Unused, DB7-DB0: Data	Type 1
0	1	0	1	DBI TYPE-B 9-bit	DB23-DB9: Unused, DB8-DB0: Data	Type 1
0	1	1	0	DBI TYPE-B 16-bit	DB23-DB16: Unused, DB15-DB0: Data	Type 1
0	1	1	1	DBI TYPE-B 18-bit	DB23-DB18: Unused, DB17-DB0: Data	Type 1
1	0	0	0	DSI (Command mode)	DSI_CLKP, DSI_CLKN, DSI_D0P, DSI_D0N, DSI_D1P, DSI_D1N	Type 1
1	0	0	1	3-wire serial + MDDI interface (note 1)	MDDI_STBP, MDDI_STBN, MDDI_D0P, MDDI_D0N, MDDI_D1P, MDDI_D1N,	-
1	0	1	0	DBI TYPE-B 24-bit	DB23-DB0: Data	Type 1
1	0	1	1	-	-	-
1	1	0	0	DSI (Video mode)	DSI_CLKP, DSI_CLKN, DSI_D0P, DSI_D0N, DSI_D1P, DSI_D1N	Type 3
1	1	0	1	DPI/DBI TYPE-C Option 1	SDA DB23-DB0	Type 3
1	1	1	0	DPI/DBI TYPE-C Option 2	SDA, DB23-DB0	Type 3
1	1	1	1	DPI/DBI TYPE-C Option 3	SDA, DB23-DB0	Type 3

Pixel format (RGB565 / RGB666 / RGB888) is selected by DCS command (0x3Ah)

Note 1: 3-wire serial Interface only active on MDDI / Hibernation mode.

Must be connected to VSSD or VDD1.

**Note2:**

RGB interface		
Data bus	Used	Unused
16-bit bus	DB21-17, DB13-8, DB5-1	DB23-22, DB116-14, DB7-6, DB0
18-bit bus	DB21-16, DB13-8, DB5-0	DB22-21, DB15-14, DB7-6
24-bit bus	DB23-D0	-

Let the unused pins open for each mode.

■ REFERENCE APPLICATION CIRCUIT

Please consult our technical department for detail information.

**■ RELIABILITY TEST CONDITIONS**

No.	Test Item	Test Condition	Inspection after test
1	High Temperature Storage	$70 \pm 2^{\circ}\text{C}$ /200 hours	Inspection after 2~4hours storage at room temperature, the sample shall be free from defects: 1.Air bubble in the LCD; 2.Sealleak; 3.Non-display; 4.missing segments; 5.Glass crack; 6.Current Idd is twice higher than initial value. 7. The surface shall be free from damage. 8.Linearity must be no more than 1.5% by the linearity tester. 9.The Electrical characteristics requirements shall be satisfied.
2	Low Temperature Storage	$-20 \pm 2^{\circ}\text{C}$ /200 hours	
3	High Temperature Operating	$60 \pm 2^{\circ}\text{C}$ /120 hours	
4	Low Temperature Operating	$-10 \pm 2^{\circ}\text{C}$ /120 hours	
5	Temperature Cycle	$-10 \pm 2^{\circ}\text{C} \sim 25 \sim 60 \pm 2^{\circ}\text{C} \times 10\text{cycles}$ (30min.) (5min.) (30min.)	
6	Damp Proof Test	$50^{\circ}\text{C} \pm 5^{\circ}\text{C} \times 90\%\text{RH}$ /120 hours	
7	Vibration Test	Frequency: 10Hz~55Hz~10Hz Amplitude: 1.5mm, X, Y, Z direction for total 3hours (Packing condition)	
8	Dropping test	Drop to the ground from 1m height, one time,every side of carton. (Packing condition)	
9	ESD test	Voltage: $\pm 8\text{KV}$ R: 330 Ω C: 150pF Air discharge, 10time	
10	Hitting test	1,000,000 times in the same point, Hitting pad: tip R3.75 mm, Silicone rubber, Hardness:40 deg.; Load: 2.45N; Hitting speed: Twice/sec; Electric load: None; Test area should be at 1.8 mm inside of touch panel view area	
11	Pen sliding durability test	100, 000 times minimum Hitting pad: tip R0.8 mm Plastic pen; Load:1.47N; Sliding speed: 60 mm/sec; Electric load: None Test area should be at 1.8 mm inside of touch panel view area	

Remark:

- 1.The test samples should be applied to only one test item.
- 2.Sample size for each test item is 5~10pcs.
- 3.For Damp Proof Test, Pure water(Resistance $>10\text{M}\Omega$) should be used.
- 4.In case of malfunction defect caused by ESD damage, if it would be recovered to normal state after resetting, it would be judged as a good part.
- 5.EL evaluation should be excepted from reliability test with humidity and temperature: Some defects such as black spot/blemish can happen by natural chemical reaction with humidity and Fluorescence EL has.
- 6.Failure Judgment Criterion: Basic Specification, Electrical Characteristic, Mechanical Characteristic, Optical Characteristic.

■ INSPECTION CRITERION

This specification is made to be used as the standard acceptance/rejection criteria for Color mobile phone LCM with touch panel.

1 Sample plan

Sampling plan according to GB/T2828.1-2003/ISO 2859-1: 1999 and ANSI/ASQC Z1.4-1993, normal level 2 and based on:

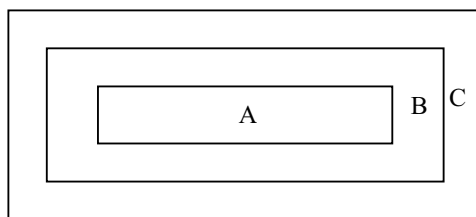
Major defect: AQL 0.65

Minor defect: AQL 1.5

2. Inspection condition

Viewing distance for cosmetic inspection is about 30cm with bare eyes, and under an environment of 20~40W light intensity, all directions for inspecting the sample should be within 45° against perpendicular line.

3. Definition of inspection zone in LCD.



Zone A: character/Digit area

Zone B: viewing area except Zone A (ZoneA+ZoneB=minimum Viewing area)

Zone C: Outside viewing area (invisible area after assembly in customer's product)

Fig.1 Inspection zones in an LCD.

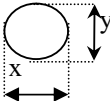
Note: As a general rule, visual defects in Zone C are permissible, when it is no trouble for quality and assembly of customer's product.

4. Inspection standards

4.1 Major Defect

Item No	Items to be inspected	Inspection Standard	Classification of defects
4.1.1	All functional defects	1) No display 2) Display abnormally 3) Missing vertical, horizontal segment 4) Short circuit 5) Back-light no lighting, flickering and abnormal lighting.	Major
4.1.2	Missing	Missing component	
4.1.3	Outline dimension	Overall outline dimension beyond the drawing is not allowed.	
4.1.4	linearity	No more than 1.5%	

4.2 Cosmetic Defect

Item No	Items to be inspected	Inspection Standard	Classification of defects																							
4.2.1	Clear Spots Black and white Spot defect Pinhole, Foreign Particle, polarizer Dirt	For dark/white spot, size Φ is defined as $\Phi = \frac{(x+y)}{2}$ 	Minor																							
		1.																								
		<table> <tr> <th rowspan="2"> <div>Zone</div> <div>Size(mm)</div> </th> <th colspan="3">Acceptable Qty</th> </tr> <tr> <th>A</th> <th>B</th> <th>C</th> </tr> <tr> <td>$\Phi \leq 0.1$</td> <td colspan="3">Ignore</td> </tr> <tr> <td>$0.10 < \Phi \leq 0.15$</td> <td colspan="3">2</td> </tr> <tr> <td>$0.15 < \Phi \leq 0.20$</td> <td colspan="3">1</td> </tr> <tr> <td>$\Phi > 0.20$</td> <td colspan="3">0</td> </tr> </table>		<div>Zone</div> <div>Size(mm)</div>	Acceptable Qty			A	B	C	$\Phi \leq 0.1$	Ignore			$0.10 < \Phi \leq 0.15$	2			$0.15 < \Phi \leq 0.20$	1			$\Phi > 0.20$	0		
		<div>Zone</div> <div>Size(mm)</div>			Acceptable Qty																					
				A	B	C																				
		$\Phi \leq 0.1$		Ignore																						
		$0.10 < \Phi \leq 0.15$		2																						
	$0.15 < \Phi \leq 0.20$	1																								
	$\Phi > 0.20$	0																								
Clear Spots TP Dirt	2.	Minor																								
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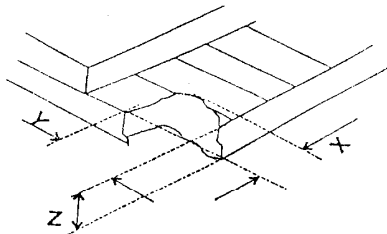
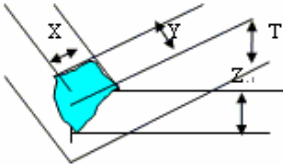
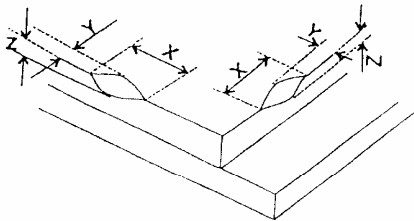
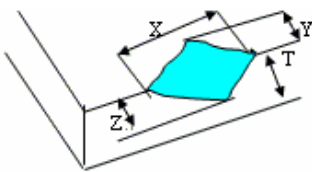
	Dim Spots Circle shaped and dim edged defects	3. <table border="1"> <tr> <th rowspan="2">Size(mm) 2. Zone</th><th colspan="3">Acceptable Qty</th></tr> <tr> <th>A</th><th>B</th><th>C</th></tr> <tr> <td>$\Phi \leq 0.2$</td><td colspan="3">Ignore</td></tr> <tr> <td>$0.20 < \Phi \leq 0.40$</td><td colspan="3">2</td></tr> <tr> <td>$0.40 < \Phi \leq 0.60$</td><td colspan="3">1</td></tr> <tr> <td>$0.60 < \Phi$</td><td colspan="3">0</td></tr> </table>	Size(mm) 2. Zone	Acceptable Qty			A	B	C	$\Phi \leq 0.2$	Ignore			$0.20 < \Phi \leq 0.40$	2			$0.40 < \Phi \leq 0.60$	1			$0.60 < \Phi$	0			Minor
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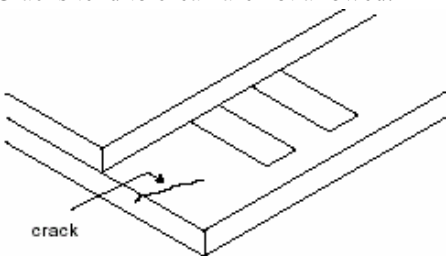
4.2. Cosmetic Defect

Item No	Items to be inspected	Inspection Standard					Classification of defects
	Line defect Black line, White line, Foreign material on polarizer	Size(mm)		Acceptable Qty			Minor
		L(Length)	W(Width)	Zone			
				A	B	C	
		Ignore	$W \leq 0.02$	Ignore		Ignore	
		$L \leq 3.0$	$0.02 < W \leq 0.03$	2			
		$L \leq 2.0$	$0.03 < W \leq 0.05$	1			
			$0.05 < W$	Define as spot defect			
4.2.2	Foreign material on TP film	The line can be seen after mobile phone in the operating condition:					
		size(mm)		Acceptable Qty			
		L(Length)	W(Width)	zone			
				A	B	C	
		Ignore	$W \leq 0.03$	Ignore		Ignore	
		$L \leq 5.0$	$0.03 < W \leq 0.05$	3			
			$0.05 < W$	Define as spot defect			


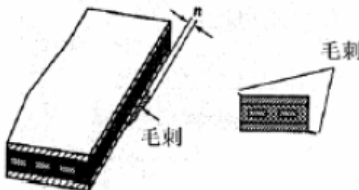





4.2.3	<div>Dim line defect</div> <div>Polarizer scratch</div> <div>TP film scratch</div>	<div>If the scratch can be seen after mobile phone cover assembling or in the operating condition, judge by the line defect of 4.2.2.</div> <div>If the scratch can be seen only in non-operating condition or some special angle, judge by the following.</div> <table><thead><tr><th colspan="2">Size(mm)</th><th colspan="3">Acceptable Qty</th></tr><tr><th rowspan="2">L(Length)</th><th rowspan="2">W(Width)</th><th colspan="3">Zone</th></tr><tr><th>A</th><th>B</th><th>C</th></tr></thead><tbody><tr><td>Ignore</td><td>$W \leq 0.03$</td><td colspan="2">Ignore</td><td rowspan="4">Ignore</td></tr><tr><td>$5.0 < L \leq 10.0$</td><td>$0.03 < W \leq 0.05$</td><td colspan="2">2</td></tr><tr><td>$L \leq 5.0$</td><td>$0.05 < W \leq 0.08$</td><td colspan="2">1</td></tr><tr><td></td><td>$0.08 < W$</td><td colspan="2">0</td></tr></tbody></table>	Size(mm)		Acceptable Qty			L(Length)	W(Width)	Zone			A	B	C	Ignore	$W \leq 0.03$	Ignore		Ignore	$5.0 < L \leq 10.0$	$0.03 < W \leq 0.05$	2		$L \leq 5.0$	$0.05 < W \leq 0.08$	1			$0.08 < W$	0		Minor
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4.2.4	<div>Polarize</div> <div>Air bubble</div>	<div>Air bubbles between glass & polarizer</div> <table><thead><tr><th rowspan="2">2. Zone Size(mm)</th><th colspan="3">Acceptable Qty</th></tr><tr><th>A</th><th>B</th><th>C</th></tr></thead><tbody><tr><td>$\Phi \leq 0.2$</td><td colspan="2">Ignore</td><td rowspan="4">Ignore</td></tr><tr><td>$0.20 < \Phi \leq 0.30$</td><td colspan="2">2</td></tr><tr><td>$0.30 < \Phi \leq 0.50$</td><td colspan="2">1</td></tr><tr><td>$0.50 < \Phi$</td><td colspan="2">0</td></tr></tbody></table>	2. Zone Size(mm)	Acceptable Qty			A	B	C	$\Phi \leq 0.2$	Ignore		Ignore	$0.20 < \Phi \leq 0.30$	2		$0.30 < \Phi \leq 0.50$	1		$0.50 < \Phi$	0		Minor										
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Item No	Items to be inspected	Inspection Standard	Classification of defects																														

4.3.5	Glass defect	<p>(i) Chips on corner A:LCD Glass defect</p>  <table border="1" data-bbox="510 598 1090 683"><tr><th>X</th><th>Y</th><th>Z</th></tr><tr><td>≤2.0</td><td>≤S</td><td>Disregard</td></tr></table> <p>Notes: S=contact pad length Chips on the corner of terminal shall not be allowed to extend into the ITO pad or expose perimeter seal.</p> <p>B:TP Glass defect</p>  <table border="1" data-bbox="510 1030 1090 1117"><tr><th>X(mm)</th><th>Y(mm)</th><th>Z(mm)</th></tr><tr><td>≤3.0</td><td>≤3.0</td><td>Disregard</td></tr></table>	X	Y	Z	≤2.0	≤S	Disregard	X(mm)	Y(mm)	Z(mm)	≤3.0	≤3.0	Disregard	Minor
		X	Y	Z											
≤2.0	≤S	Disregard													
X(mm)	Y(mm)	Z(mm)													
≤3.0	≤3.0	Disregard													
		<p>(ii) Usual surface cracks A:LCD Glass defect</p>  <table border="1" data-bbox="489 1462 1109 1547"><tr><th>X</th><th>Y</th><th>Z</th></tr><tr><td>≤3.0</td><td><Inner border line of the seal</td><td>Disregard</td></tr></table> <p>B:TP Glass defect</p>  <table border="1" data-bbox="470 1776 1128 1863"><tr><th>X(mm)</th><th>Y(mm)</th><th>Z(mm)</th></tr><tr><td>≤6.0</td><td><2.0</td><td>Disregard</td></tr></table>	X	Y	Z	≤3.0	<Inner border line of the seal	Disregard	X(mm)	Y(mm)	Z(mm)	≤6.0	<2.0	Disregard	Minor
X	Y	Z													
≤3.0	<Inner border line of the seal	Disregard													
X(mm)	Y(mm)	Z(mm)													
≤6.0	<2.0	Disregard													

		<p>(iii) Crack Cracks tend to break are not allowed.</p> 	Major
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4.4 Parts Defect

Item No	Items to be inspected	Inspection Standard	Classification of defects
	4.4.1 Parts contraposition	<p>1、 Not allow IC and FPC/heat-seal lead width is more than 50% beyond lead pattern.</p> <p>2、 Not allow chip or solder component is off center more than 50% of the pad outline.</p>	
	4.4.2 SMT	<p>According to the <Acceptability of electronic assemblies> IPC-A-610C class 2 standard. Component missing or function defect are Major defect, the others are Minor defect.</p>	
	4.4.3 TP Defect	<p>1、 Pattern font: Pattern fonts are clear and symmetrical, pattern fonts filter lightly are allowed; The fort line is not allow to thinner or thicker than 1/3of normal size, and swing is not more than 0.1mm. the line is smooth and not broken.</p>  <p>图案字体 Pattern font</p> <p>2、 The wing forward in the side of Visual Area: The length of wing forward inside of the Visual Area: $n \leq 0.2\text{mm}$; Not excess 3 point, and the distance $D \geq 20\text{mm}$.</p>  <p>3、 Film impression: With operation, must be invisibility.</p> <p>4、 Touch panel knob: if writing function normally, it could be allowed.</p>  <p>TP鼓 TP knob</p>	

		<p>5、 Newton ring</p> <p>Without operation, the color circle of Regularity or Non-regularity from the normal or slope angle of view.</p> <p>1、Regularity: The area of the newton ring is less than 1/3 area of the touch panel; and no character affected and line distorted after touch panel lightening. It's ok.</p> <p>2、 Non-regularity : The area of the Newton ring is less than the 1/2 area of touch panel with lightening. And no character affected and line</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  <p>规律形</p> </div> <div style="text-align: center;">  <p>非规律形</p> </div> </div>	
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■ PRECAUTIONS FOR USING LCD MODULES

1 Handling Precautions

- 1.1 The display panel is made of glass and polarizer. As glass is fragile. It tends to become or chipped during handling especially on the edges. Please avoid dropping or jarring. Do not subject it to a mechanical shock by dropping it or impact.
- 1.2 If the display panel is damaged and the liquid crystal substance leaks out, be sure not to get any in your mouth. If the substance contacts your skin or clothes, wash it off using soap and water.
- 1.3 Do not apply excessive force to the display surface or the adjoining areas since this may cause the color tone to vary. Do not touch the display with bare hands. This will stain the display area and degraded insulation between terminals (some cosmetics are determined to the polarizer).
- 1.4 The polarizer covering the display surface of the LCD module is soft and easily scratched. Handle this polarizer carefully. Do not touch, push or rub the exposed polarizers with anything harder than an HB pencil lead (glass, tweezers, etc.). Do not put or attach anything on the display area to avoid leaving marks on it. Condensation on the surface and contact with terminals due to cold will damage, stain or dirty the polarizer. After products are tested at low temperature they must be warmed up in a container before coming in to contact with room temperature air.
- 1.5 If the display surface becomes contaminated, breathe on the surface and gently wipe it with a soft dry cloth. If it is heavily contaminated, moisten cloth with one of the following solvents
 - Isopropyl alcohol
 - Ethyl alcoholDo not scrub hard to avoid damaging the display surface.
- 1.6 Solvents other than those above-mentioned may damage the polarizer. Especially, do not use the following.
 - Water
 - Ketone
 - Aromatic solventsWipe off saliva or water drops immediately, contact with water over a long period of time may cause deformation or color fading. Avoid contact with oil and fats.
- 1.7 Exercise care to minimize corrosion of the electrode. Corrosion of the electrodes is accelerated by water droplets, moisture condensation or a current flow in a high-humidity environment.
- 1.8 Install the LCD Module by using the mounting holes. When mounting the LCD module make sure it is free of twisting, warping and distortion. In particular, do not forcibly pull or bend the I/O cable or the backlight cable.
- 1.9 Do not attempt to disassemble or process the LCD module.
- 1.10 NC terminal should be open. Do not connect anything.
- 1.11 If the logic circuit power is off, do not apply the input signals.
- 1.12 Electro-Static Discharge Control, Since this module uses a CMOS LSI, the same careful attention should be paid to electrostatic discharge as for an ordinary CMOS IC. To prevent destruction of the elements by static electricity, be careful to maintain an optimum work environment.
 - Before removing LCM from its packing case or incorporating it into a set, be sure the module and your body have the same electric potential. Be sure to ground the body when handling the LCD modules.
 - Tools required for assembling, such as soldering irons, must be properly grounded. Make certain the AC power source for the soldering iron does not leak. When using an electric screwdriver to attach LCM, the screwdriver should be of ground potentiality to minimize as much as possible any transmission of electromagnetic waves produced sparks coming from the commutator of the motor.
 - To reduce the amount of static electricity generated, do not conduct assembling



and other work under dry conditions. To reduce the generation of static electricity be careful that the air in the work is not too dry. A relative humidity of 50%-60% is recommended. As far as possible make the electric potential of your work clothes and that of the work bench the ground potential.

- The LCD module is coated with a film to protect the display surface. Exercise care when peeling off this protective film since static electricity may be generated.

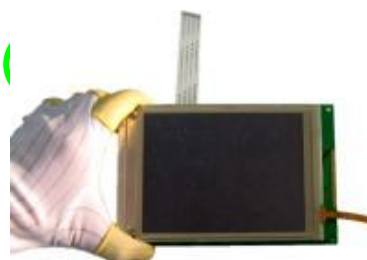
1.13 Since LCM has been assembled and adjusted with a high degree of precision, avoid applying excessive shocks to the module or making any alterations or modifications to it.

- Do not alter, modify or change the shape of the tab on the metal frame.
- Do not make extra holes on the printed circuit board, modify its shape or change the positions of components to be attached.
- Do not damage or modify the pattern writing on the printed circuit board.
- Absolutely do not modify the zebra rubber strip (conductive rubber) or heat seal connector.
- Except for soldering the interface, do not make any alterations or modifications with a soldering iron.
- Do not drop, bend or twist the LCM.

2 Handling precaution for LCM

2.1 LCM is easy to be damaged. Please note below and be careful for handling.

2.2 Correct handling:

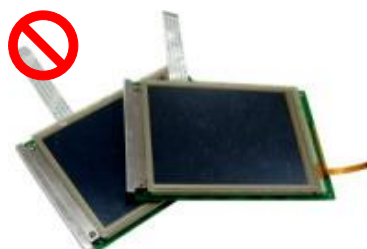


As above picture, please handle with anti-static gloves around LCM edges.

2.3 Incorrect handling:



Please don't touch IC directly.



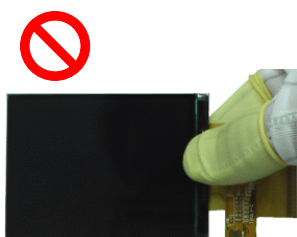
Please don't stack LCM.



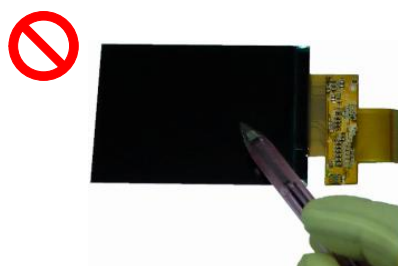
Please don't hold the surface of panel.



Please don't stretch interface of output, such as FPC cable.



Please don't hold the surface of IC.



Please don't operate with sharp stick such as pens.

3 Storage Precautions

3.1 When storing the LCD modules, the following precaution are necessary.

- 3.1.1 Store them in a sealed polyethylene bag. If properly sealed, there is no need for the desiccant.
- 3.1.2 Store them in a dark place. Do not expose to sunlight or fluorescent light, keep the temperature between 0°C and 35°C, and keep the relative humidity between 40%RH and 60%RH.
- 3.1.3 The polarizer surface should not come in contact with any other objects (We advise you to store them in the anti-static electricity container in which they were shipped).

3.2 Others 其它

- 3.2.1 Liquid crystals solidify under low temperature (below the storage temperature range) leading to defective orientation or the generation of air bubbles (black or white). Air bubbles may also be generated if the module is subject to a low temperature.
- 3.2.2 If the LCD modules have been operating for a long time showing the same display patterns, the display patterns may remain on the screen as ghost images and a slight contrast irregularity may also appear. A normal operating status can be regained by suspending use for some time. It should be noted that this phenomenon does not adversely affect performance reliability.
- 3.2.3 To minimize the performance degradation of the LCD modules resulting from destruction caused by static electricity etc., exercise care to avoid holding the following sections when handling the modules.
 - 3.2.3.1 - Exposed area of the printed circuit board.
 - 3.2.3.2 -Terminal electrode sections.

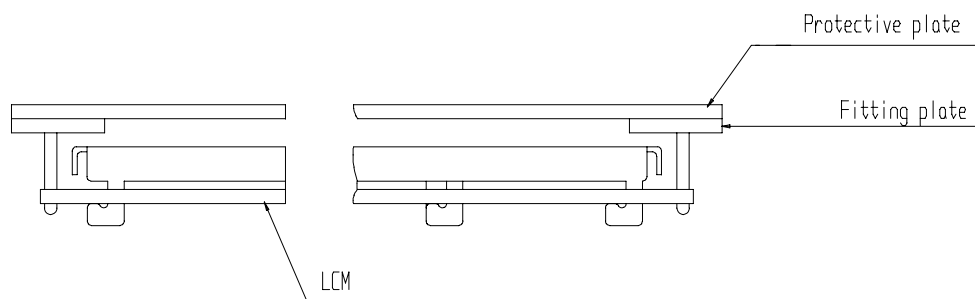
4 USING LCD MODULES

4.1 Installing LCD Modules

The hole in the printed circuit board is used to fix LCM as shown in the picture below.

Attend to the following items when installing the LCM.

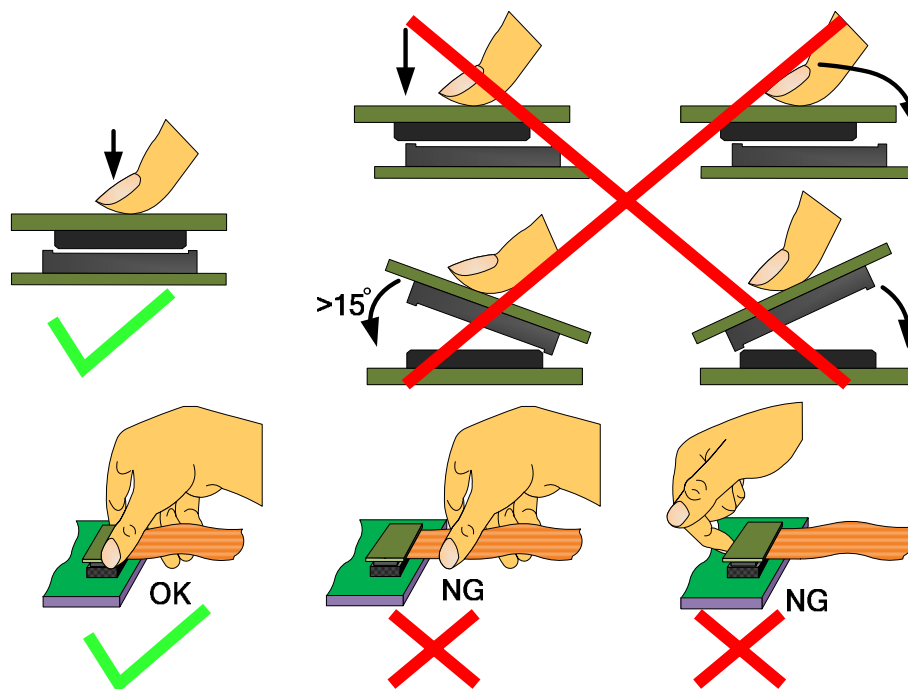
4.1.1 Cover the surface with a transparent protective plate to protect the polarizer and LC cell.



4.1.2 When assembling the LCM into other equipment, the spacer to the bit between the LCM and the fitting plate should have enough height to avoid causing stress to the module surface, refer to the individual specifications for measurements. The measurement tolerance should be $\pm 0.1\text{mm}$.

4.2 Precaution for assemble the module with BTB connector:

Please note the position of the male and female connector position, don't assemble or assemble like the method which the following picture shows



4.3 Precaution for soldering the LCM

	Manual soldering	Machine drag soldering	Machine press soldering
No RoHS Product	290°C ~350°C. Time : 3-5S.	330°C ~350°C. Speed : 15-17 mm/s.	300°C ~330°C. Time : 3-6S. Press: 0.8~1.2Mpa
RoHS Product	340°C ~370°C. Time : 3-5S.	350°C ~370°C. Speed : 15-17 mm/s.	330°C ~360°C. Time : 3-6S. Press: 0.8~1.2Mpa

- 4.3.1 If soldering flux is used, be sure to remove any remaining flux after finishing to soldering operation (This does not apply in the case of a non-halogen type of flux). It is recommended that you protect the LCD surface with a cover during soldering to prevent any damage due to flux spatters.
- 4.3.2 When soldering the electroluminescent panel and PC board, the panel and board should not be detached more than three times. This maximum number is determined by the temperature and time conditions mentioned above, though there may be some variance depending on the temperature of the soldering iron.
- 4.3.3 When remove the electroluminescent panel from the PC board, be sure the solder has completely melted, the soldered pad on the PC board could be damaged.
- 4.4 Precautions for Operation
- 4.4.1 Viewing angle varies with the change of liquid crystal driving voltage (VLCD). Adjust VLCD to show the best contrast.
- 4.4.2 It is an indispensable condition to drive LCD's within the specified voltage limit since the higher voltage then the limit cause the shorter LCD life. An electrochemical reaction due to direct current causes LCD's undesirable deterioration, so that the use of direct current drive should be avoided.
- 4.4.3 Response time will be extremely delayed at lower temperature than the operating temperature range and on the other hand at higher temperature LCD's show dark color in them. However those phenomena do not mean malfunction or out of order with LCD's, which will come back in the specified operating temperature.
- 4.4.4 If the display area is pushed hard during operation, the display will become abnormal. However, it will return to normal if it is turned off and then back on.
- 4.4.5 A slight dew depositing on terminals is a cause for electro-chemical reaction resulting in terminal open circuit. Usage under the maximum operating temperature, 50%RH or less is required.
- 4.4.6 Input logic voltage before apply analog high voltage such as LCD driving voltage when power on. Remove analog high voltage before logic voltage when power off the module. Input each signal after the positive/negative voltage becomes stable.
- 4.4.7 Please keep the temperature within the specified range for use and storage. Polarization degradation, bubble generation or polarizer peel-off may occur with high temperature and high humidity.
- 4.5 Safety
- 4.5.1 It is recommended to crush damaged or unnecessary LCDs into pieces and wash them off with solvents such as acetone and ethanol, which should later be burned.
- 4.5.2 If any liquid leaks out of a damaged glass cell and comes in contact with the hands, wash off thoroughly with soap and water.



4.6 Limited Warranty

Unless agreed between Multi-Inno and the customer, Multi-Inno will replace or repair any of its LCD modules which are found to be functionally defective when inspected in accordance with Multi-Inno LCD acceptance standards (copies available upon request) for a period of one year from date of production. Cosmetic/visual defects must be returned to Multi-Inno within 90 days of shipment. Confirmation of such date shall be based on data code on product. The warranty liability of Multi-Inno limited to repair and/or replace on the terms set forth above. Multi-Inno will not be responsible for any subsequent or consequential events.

4.7 Return LCM under warranty

4.7.1 No warranty can be granted if the precautions stated above have been disregarded. The typical examples of violations are :

4.7.1.1 - Broken LCD glass.

4.7.1.2 - PCB eyelet is damaged or modified.

4.7.1.3 -PCB conductors damaged.

4.7.1.4 - Circuit modified in any way, including addition of components.

4.7.1.5 - PCB tampered with by grinding, engraving or painting varnish.

4.7.1.6 - Soldering to or modifying the bezel in any manner.

4.7.2 Module repairs will be invoiced to the customer upon mutual agreement. Modules must be returned with sufficient description of the failures or defects. Any connectors or cable installed by the customer must be removed completely without damaging the PCB eyelet, conductors and terminals.

■ PACKING SPECIFICATION

Please consult our technical department for detail information.

■ PRIOR CONSULT MATTER

- 1 For Multi-Inno standard products, we keep the right to change material, process ... for improving the product property without prior notice to our customer.
- 2 For OEM products, if any changes are needed which may affect the product property, we will consult with our customer in advance.
- 3 If you have special requirement about reliability condition, please let us know before you start the test on our samples.