MULTI-INNO TECHNOLOGY CO., LTD.

www.multi-inno.com

LCD MODULE SPECIFICATION

Model : MI0430UT-1

This module uses ROHS material

For Customer's Acceptance:

Customer	
Approved	
Comment	

This specification may change without prior notice in order to improve performance or quality. Please contact Multi-Inno for updated specification and product status before design for this product or release of this order.

Revision	1.0
Engineering	
Date	2013-08-15
Our Reference	

REVISION RECORD

REV NO.	REV DATE	CONTENTS	REMARKS
1.0	2013-08-15	First Release	

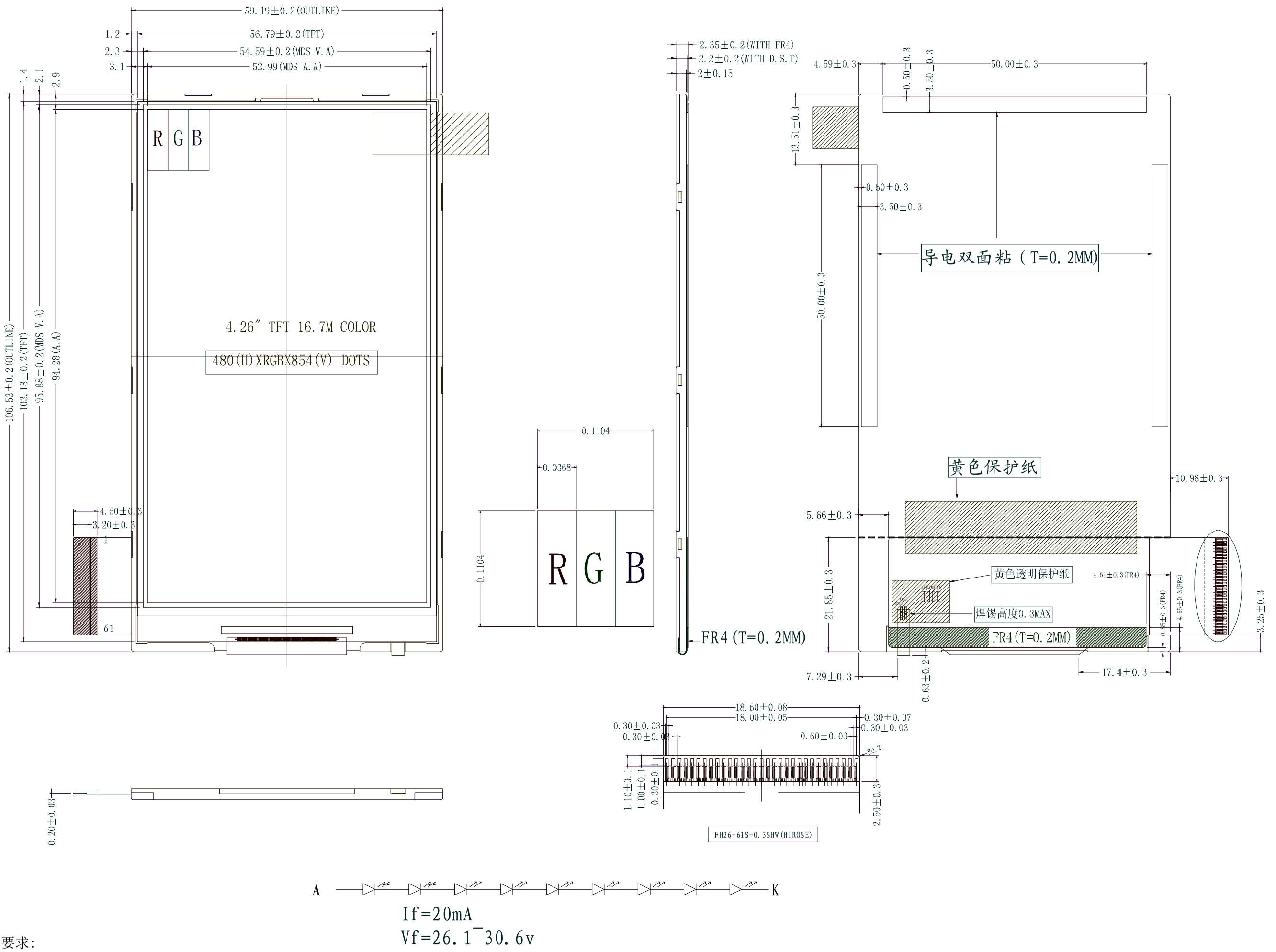
CONTENTS

■ GENERAL INFORMATION

Item of general information	Contents	Unit
LCD type	TFT/Transmissive/Normally black	/
Size	4.26	Inch
Recommended viewing direction	Full viewing angle	O' Clock
Module area (W × H×T)	59.19×106.53×2.35	mm^3
Viewing area (W×H)	54.59×95.88	mm^2
Active area (W×H)	52.99×94.28	mm^2
Number of Dots	480RGB×854	/
Pixel pitch (W × H)	0.1104×0.1104	mm^2
Driver IC	HX8363-B	/
Interface Type	MPU/SPI+RGB/MIPI/MDDI	/
Input voltage	3.3	V
Module Power consumption	680	mw
Colors	16.7M	/
Backlight Type	9 LEDs	/
With/Without TSP	Without TSP	/
Weight	TBD	g

Note 1 : RoHS compliant;
Note 2: LCM weight tolerance: ± 5% .

■ EXTERNAL DIMENSIONS



备注要求:
1. LCD显示模式：Transmissive，Normally Black
2. LCD 驱动IC：HX8363-B
3. 操作温度： -20° C TO 70° C
4. 存储温度： -30° C TO 80° C
5. 背光LED灯：9颗灯串联
6. MDS VA为模块可视区域，推荐客户机壳视区开窗可视区域比 MDS VA单边小0.3mm，并确保比LCD AA区单边大0.4mm或者以上。
7. GENERAL TOLERANCE: ±0.20mm
8. VIEWING ANGLE:80/80/80/80 deg TYP (U/D/L/R @ C/R>10)

环保标准

■ ROHS标准

□《____有害物质管理标准》

PIN ASSIGNMENT

PIN	SYMBOL	PIN	SYMBOL
1	LEDK	32	DB07
2	LEDA	33	DB06
3	YU(NC)	34	DB05
4	XR(NC)	35	DB04
5	YD(NC)	36	DB03
6	XL(NC)	37	DB02
7	VCC	38	DB01
8	IOVCC	39	DB00
9	LEDPWM	40	RDX_E(NC)
10	TE(NC)	41	WRX_DCX(NC)
11	IM0	42	DCX_SCL
12	IM1	43	CS
13	IM2(NC)	44	SDI
14	IM3(NC)	45	SDO
15	RESET	46	NRD_VSYNC
16	DB23	47	NWR_HSYNC
17	DB22	48	TE_ENABLE
18	DB21	49	DOTCLK
19	DB20	50	DSI_LDO_ENB
20	DB19	51	DSI_VSS
21	DB18	52	DSI_D0N
22	DB17	53	DSI_D0P
23	DB16	54	DSI_VSS
24	DB15	55	DSI_D1N
25	DB14	56	DSI_D1P
26	DB13	57	DSI_VSS
27	DB12	58	DSI_CLKN
28	DB11	59	DSI_CLKP
29	DB10	60	DSI_VSS
30	DB09	61	VCI
31	DB08		

CUSTOMER APVL		DATE
DRAWN	SCALE X.X ±0.3 X.XX ±0.2 ANGULAR:±1/4°	TITLE MI0430UT-1
DFTG CHK	UNIT mm	
ENGR CHK		MODEL
APPROVAL		
MULTI-INNO TECHNOLOGY CO.,LTD.	DWG NO	PAGE 1/1

■ ABSOLUTE MAXIMUM RATINGS

Parameter of absolute maximum ratings	Symbol	Min	Max	Unit
Supply voltage for logic	VCC/VCI	-0.3	5.5	V
Supply voltage for I/O	IOVCC	-0.3	3.6	V
Input voltage	VIN	-0.3	IOVCC+0.3	V
Operating temperature	Top	-20	70	°C
Storage temperature	TST	-30	80	°C
Humidity	RH	-	90%(Max60 °C)	RH

Note: Absolute maximum ratings means the product can withstand short-term, NOT more than 120 hours. If the product is a long time to withstand these conditions, the life time would be shorter.

■ ELECTRICAL CHARACTERISTICS

DC CHARACTERISTICS

Parameter of DC characteristics	Symbol	Min	Typ	Max	Unit
Supply voltage for logic	VCC/VCI	2.3	2.8/3.3	4.8	V
I/O power supply	IOVCC	1.65	1.8/2.8/3.3	3.3	V
Input Current	Idd	-	31	37	mA
Input voltage 'H' level	VIH	0.7IOVCC	-	IOVCC	V
Input voltage 'L' level	VIL	GND	-	0.3IOVCC	V
Output voltage 'H' level	VOH	0.8IOVCC	-	IOVCC	V
Output voltage 'L' level	VOL	GND	-	0.2IOVCC	V

■ BACKLIGHT CHARACTERISTICS

Item of backlight characteristics	Symbol	Min.	Typ.	Max.	Unit	Condition
Forward voltage	Vf	26.1	27.9	30.6	V	If=20mA;Ta=25℃
Number of LED	-	-	9	-	Piece	-
Connection mode	S	-	Serial	-	-	-

Using condition: constant current driving method If=20mA(+/-10%).

■ ELECTRO-OPTICAL CHARACTERISTICS

Item of electro-optical characteristics	Symbol	Condition	Min	Typ	Max	Unit	Remark	Note
Response time	Tr+ Tf	θ=0° ∅=0° Ta=25℃	-	35	55	ms	FIG 1.	4
Contrast ratio	Cr		300	1000	-	-	FIG 2.	1
Luminance uniformity	δ WHITE		80	-	-	%	FIG 2.	3
Surface Luminance	Lv		420	530	-	cd/m^2	FIG 2.	2
Viewing angle range	θ	∅ = 90°	80	-	-	deg	FIG 3.	6
		∅ = 270°	80	-	-	deg	FIG 3	
		∅ = 0°	80	-	-	deg	FIG 3	
		∅ = 180°	80	-	-	deg	FIG 3	
NTSC ratio	-	-	-	63	-	%	-	-
CIE (x, y) chromaticity	Red x	θ=0° ∅=0° Ta=25℃	0.5787	0.6287	0.6787	-	FIG 2.	5
	Red y		0.2992	0.3492	0.3992	-		
	Green x		0.2744	0.3244	0.3744	-		
	Green y		0.5621	0.6121	0.6621	-		
	Blue x		0.0994	0.1494	0.1994	-		
	Blue y		0.0324	0.0824	0.1324	-		
	White x		0.2267	0.2867	0.3467	-		
	White y		0.2400	0.3000	0.3600	-		

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

$$\text{Contrast Ratio(CR)} = \frac{\text{Average Surface Luminance with all white pixels } (P1, P2, \cdots\cdots)}{\text{Average Surface Luminance with all black pixels } (P1, P2, \cdots\cdots)}$$

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

$$\text{Lv} = \text{Average Surface Luminance with all white pixels } (P1, P2, \cdots\cdots)$$

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

$$\delta\ \text{WHITE} = \frac{\textbf{Minimum}\text{ Surface Luminance with all white pixels } (P1, P2, \cdots\cdots)}{\textbf{Maximum}\text{ Surface Luminance with all white pixels } (P1, P2, \cdots\cdots)}$$

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 is the Center point value. For more information see FIG 2.

Note6. Viewing angle is the angle at which the contrast ratio is greater than a specific value. For TFT module, the specific value of conrast ratio is 10; For monochrome and color stn module, the specific value of conrast ratio is 2.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 CS-2000 photo detector.

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

The definition of Response Time

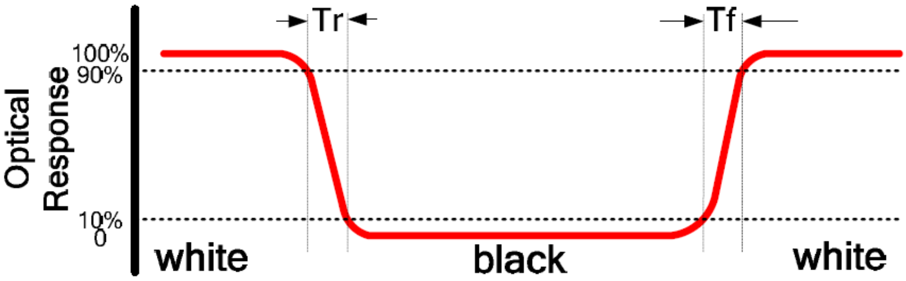
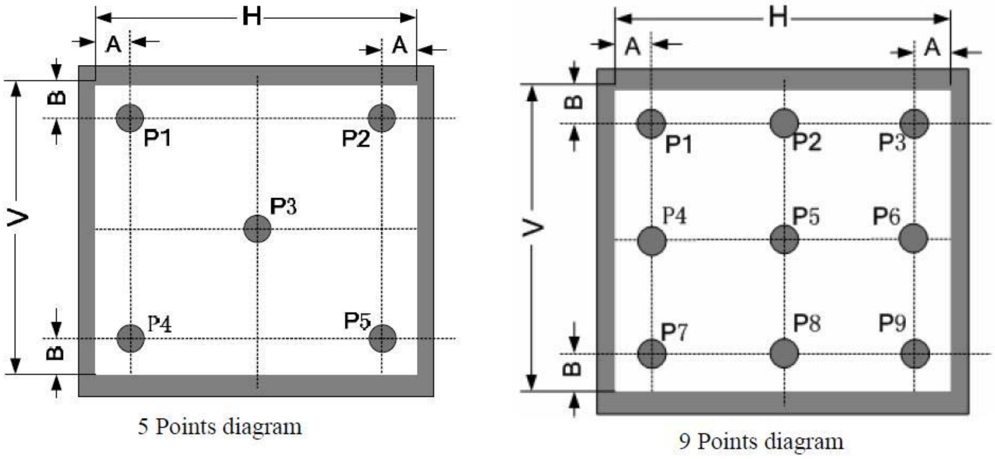


FIG.1. Measuring method for Contrast ratio, surface luminance, Luminance uniformity,CIE (x, y) chromaticity



5 Points diagram

9 Points diagram

Fig2 Note1 For TFT Module Test point:9 points(as 9 Points diagram)

A : H/6 (if AA size<4.0inch); H/10 (if AA size≥4.0inch)

B : V/6 (if AA size<4.0inch); V/10 (if AA size≥4.0inch)

H,V : Active Area(AA) size

Measurement instrument: CS-2000; Light spot size ∅=5mm, 350mm distance from the LCD surface to detector lens.

Fig2 Note2 For non-TFT Module and Dot-Matrix type Module

2.1 If the minimum side size is bigger than 20 mm,the testing method is the same as TFT module.

2.2 If the minimum side size is less than 20 mm, then testing 5 point datas (as 5 Points diagram), Both A and B are 5 mm.

2.3 Measurement instrument: CS-2000 is priority selected to measure.

Light spot size ∅=5mm, 350mm distance from the LCD surface to detector lens.

2.4 Measurement instrument : ConoScope will be selelected to measure If CS-2000 cannot meet the measurement requirement.

Light spot size ∅=0.2-2.0mm. About 2-3mm distance from the LCD surface to detector lens, but suggest to confirm the best distance on focusing the picture to be clearest when actually measuring.

Fig2 Note3 For non-TFT Module and non-Dot-Matrix type Module

The test point is defined by the fact size and shape of module,but the center point and four edges should be selected.

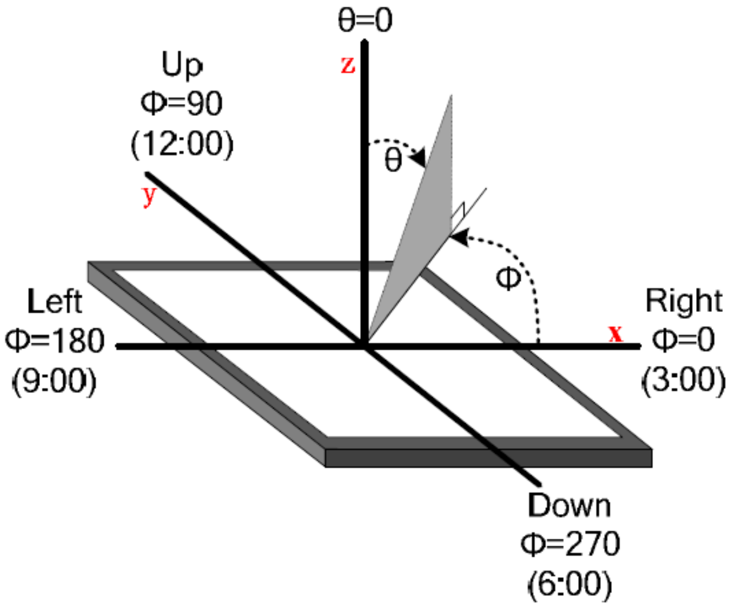
3.1 Measurement instrument: CS-2000 is priority selected to measure..

Light spot size ∅=5mm, 350mm distance from the LCD surface to detector lens.

3.2 Measurement instrument : ConoScope will be selelected to measure If CS-2000 cannot meet the measurement requirement.

Light spot size ∅=0.2-2.0mm. About 2-3mm distance from the LCD surface to detector lens, but suggest to confirm the best distance on focusing the picture to be clearest when actually measuring.

FIG.2. The definition of viewing angle



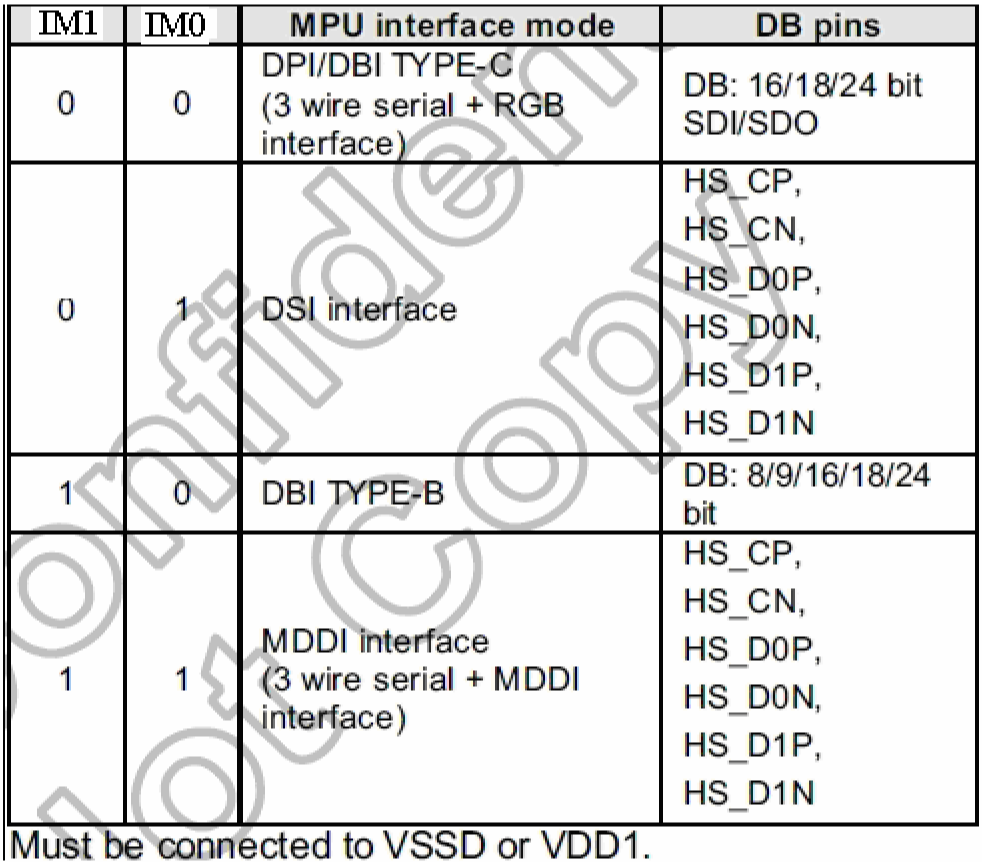
■ INTERFACE DESCRIPTION

NO.	Symbol	I/O or connect to	Description	When not in use
1	LEDK	LED driver	LED CATHODE	OPEN
2	LEDA	LED driver	LED ANODE	OPEN
3	YU(NC)	-	No connection	-
4	XR(NC)	-	No connection	-
5	YD(NC)	-	No connection	-
6	XL(NC)	-	No connection	-
7	VCC	Power supply	A power supply for the analog power. VCC = 2.3 ~ 4.8V. VCC input level should be same as VCI input level to avoid the level-mismatching at internal level shifter circuit. TYPE:2.8/3.3V	-
8	IOVCC	Power supply	A power supply for the I/O circuit. IOVCC= 1.65 ~ 3.3V. IOVCC must less than VCC and VCI. TYPE:1.8V/2.8/3.3V	-
9	LEDPWM	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 IOVCC.	OPEN
10	TE(NC)	-	No connection	-
11	IM0	I Host processor	Mode select pins. For the details,please refer to NOTE1	-
12	IM1	I Host processor		-
13	IM2(NC)	-	No connection	-
14	IM3(NC)	-	No connection	-
15	RESET	I Host processor	Reset pin. Setting either pin low initializes the LSI. Must be reset after power is supplied (Must be connected to GND or IOVCC).	-
16	DB23	I/O Host processor	Databus. For the details,please refer to NOTE1	OPEN
17	DB22			
18	DB21			
19	DB20			
20	DB19			
21	DB18			
22	DB17			
23	DB16			
24	DB15			
25	DB14			
26	DB13			
27	DB12			
28	DB11			
29	DB10			
30	DB09			
31	DB08			
32	DB07			

33	DB06	I/O Host processor	Databus. For the details,please refer to NOTE1	OPEN
34	DB05			
35	DB04			
36	DB03			
37	DB02			
38	DB01			
39	DB00			
40	RDX_E(NC)	-	No connection	-
41	WRX_DCX (NC)	-	No connection	-
42	DCX_SCL	I Host processor	DBI Type-B: Data / Command Selection pin DBI Type-C: When operate in serial interface, it serves as SCL (Serial Clock)	OPEN or IOVCC
43	CS	I Host processor	Chip select signal. Low: chip can be accessed; High: chip cannot be accessed.	GND or IOVCC
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	NRD_ VSYNC	I Host processor	DBI Type-B: Serves as a read signal and read data at the low level. DPI: Frame synchronizing signal.	GND or IOVCC
47	NWR_ HSYNC	I Host processor	DBI Type-B: Serves as a write signal and write data at the low level. DPI: Line synchronizing signal.	GND or IOVCC
48	TE_ENABLE	I Host processor	DBI Type-B: Serves TE (Tearing Effect) function. DSI: Serves TE (Tearing Effect) function. MDDI: Serves TE (Tearing Effect) function. DPI: A data ENABLE signal in RGB I/F mode. Can't support TE function in this interface.(BS[1:0]=00)	GND
49	DOTCLK	I Host processor	DPI: Dot clock signal.	GND or IOVCC
50	DSI_LDO_ENB	NC	This pin is no function, please let it open.	OPEN
51	DSI_VSS	Power supply	MDDI/DSI analogy ground. DSI_VSS=0V. When using the COG method, connect to GND on the FPC to prevent noise.	-
52	DSI_D0N	I/O Host processor	In MDDI interface: MDDI Data differential signal input pins. Connect to a terminal resistance (100_) between DSI_D0P and DSI_D0N. (Data lane 0) In DSI interface: DSI Data differential signal input pins. (Data lane 0)	GND
53	DSI_D0P	I/O Host processor		
54	DSI_VSS	Power supply	MDDI/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	In MDDI interface: MDDI Data differential signal input pins. Connect to a terminal resistance (100_) between DSI_D1P and DSI_D1N. (Data lane 1) In DSI interface: DSI Data differential signal input pins. (Data lane 1)	GND
56	DSI_D1P	I/O Host processor		

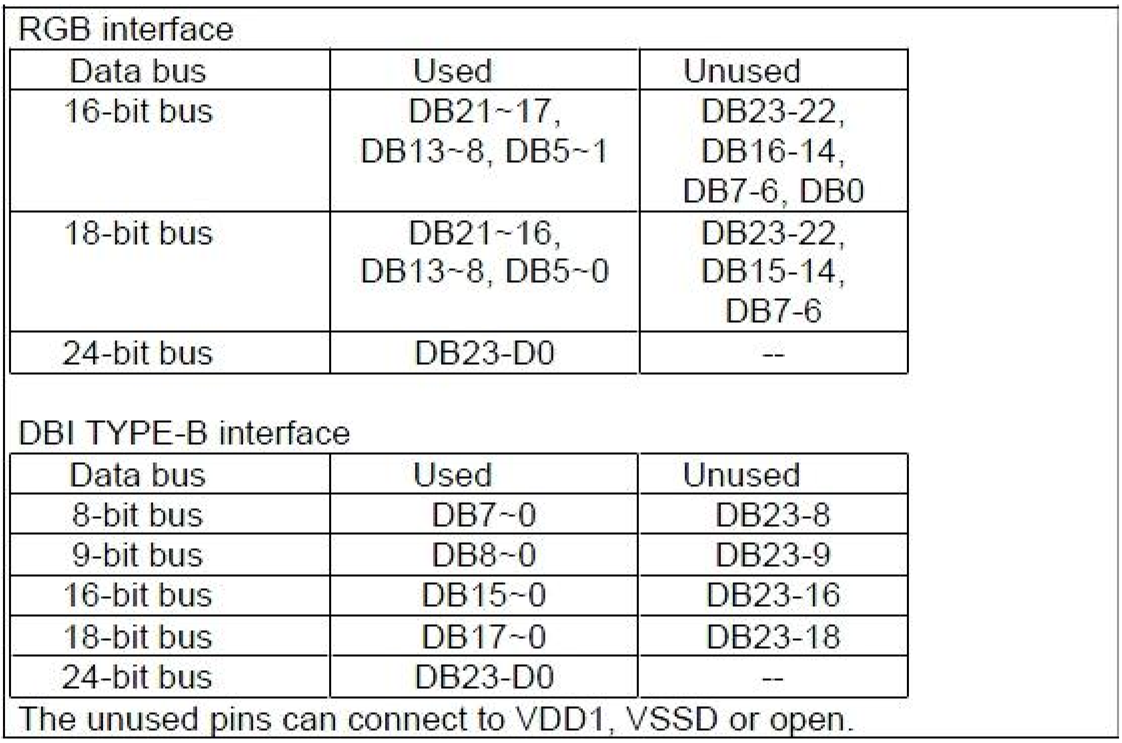
57	DSI_VSS	Power supply	MDDI/DSI analogy ground. DSI_VSS=0V. When using the COG method, connect to GND on the FPC to prevent noise.	-
58	DSI_CLKN	I Host processor	In MDDI interface: MDDI CLOCK differential signal input pins. Connect to a terminal resistance (100_) between DSI_CLKP and DSI_CLKN. In DSI interface: DSI CLOCK differential signal input pins.	OPEN or GND
59	DSI_CLKP	I Host processor		
60	DSI_VSS	Power supply	MDDI/DSI analogy ground. DSI_VSS=0V. When using the COG method, connect to VSSA on the FPC to prevent noise.	-
61	VCI	Power supply	A power supply for the main power, DC/DC converter VDD3 = 2.3 ~4.8V..TYPE:2.8/3.3V	-

NOTE1



IM1	IM0	MPU interface mode	DB pins
0	0	DPI/DBI TYPE-C (3 wire serial + RGB interface)	DB: 16/18/24 bit SDI/SDO
0	1	DSI interface	HS_CP, HS_CN, HS_D0P, HS_D0N, HS_D1P, HS_D1N
1	0	DBI TYPE-B	DB: 8/9/16/18/24 bit
1	1	MDDI interface (3 wire serial + MDDI interface)	HS_CP, HS_CN, HS_D0P, HS_D0N, HS_D1P, HS_D1N

Must be connected to VSSD or VDD1.



RGB interface

Data bus	Used	Unused
16-bit bus	DB21~17, DB13~8, DB5~1	DB23-22, DB16-14, DB7-6, DB0
18-bit bus	DB21~16, DB13~8, DB5~0	DB23-22, DB15-14, DB7-6
24-bit bus	DB23-D0	--

DBI TYPE-B interface

Data bus	Used	Unused
8-bit bus	DB7~0	DB23-8
9-bit bus	DB8~0	DB23-9
16-bit bus	DB15~0	DB23-16
18-bit bus	DB17~0	DB23-18
24-bit bus	DB23-D0	--

The unused pins can connect to VDD1, VSSD or open.

■ 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	80±2℃/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.
2	Low Temperature Storage	-30±2℃/200 hours	
3	High Temperature Operating	70±2℃/120 hours	
4	Low Temperature Operating	-20±2℃/120 hours	
5	Temperature Cycle storage	-20±2℃~25~70±2℃×10cycles	
6	Damp proof Test operating	50℃±5℃×90%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:±8KV R: 330Ω C: 150pF Air discharge, 10time	

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＞10MΩ) 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

OUTGOING QUALITY STANDARD	PAGE 1 OF 4
TITLE:FUNCTIONAL TEST & INSPECTION CRITERIA	MDS Product

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

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:

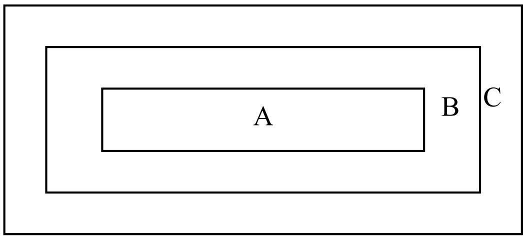
Major defect: AQL 0.65

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.

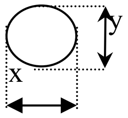
Note: As a general rule, visual defects in Zone C are permissible, when it is no trouble for quality and assembly of customer’s product.

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.	

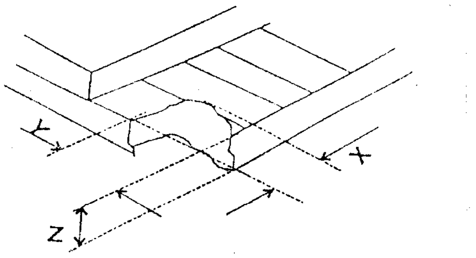
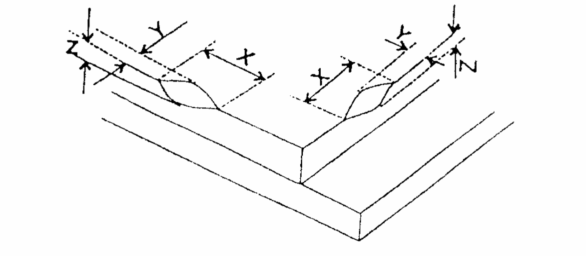
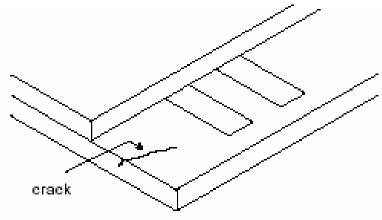
4.2 Cosmetic Defect

<table>
<tr><th>Item No</th><th>Items to be inspected</th><th>Inspection Standard</th><th>Classification of defects</th></tr>
<tr><td rowspan="3">4.2.1</td><td rowspan="2">Clear Spots
Black and white Spot defect Pinhole, Foreign Particle, Dirt under polarizer</td><td>For dark/white spot, sizeΦis defined as $\Phi = \frac{(x+y)}{2}$
 </td><td rowspan="2">Minor</td></tr>
<tr><td>1.
<table>
<tr><th rowspan="2">Zone / Size(mm)</th><th colspan="3">Acceptable Qty</th></tr>
<tr><th>A</th><th>B</th><th>C</th></tr>
<tr><td>Φ≤0.10</td><td colspan="2">Ignore</td><td rowspan="4">Ignore</td></tr>
<tr><td>0.10＜Φ≤0.15</td><td colspan="2">2</td></tr>
<tr><td>0.15＜Φ≤0.20</td><td colspan="2">1</td></tr>
<tr><td>Φ＞0.20</td><td colspan="2">0</td></tr>
</table></td></tr>
<tr><td>Dim Spots
Circle shaped and dim edged defects</td><td>2.
<table>
<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>
<tr><td>Φ≤0.2</td><td colspan="2">Ignore</td><td rowspan="4">Ignore</td></tr>
<tr><td>0.20＜Φ≤0.40</td><td colspan="2">3</td></tr>
<tr><td>0.40＜Φ≤0.60</td><td colspan="2">2</td></tr>
<tr><td>0.60＜Φ≤0.80</td><td colspan="2">1</td></tr>
<tr><td>0.80＜Φ</td><td colspan="2">0</td><td></td></tr>
</table></td><td>Minor</td></tr>
</table>

4.2. Cosmetic Defect

<table>
<tr><th>Item No</th><th>Items to be inspected</th><th>Inspection Standard</th><th>Classification of defects</th></tr>
<tr><td>4.2.2</td><td>Line defect
Black line,
White line,
Foreign material under polarizer,</td><td>
<table>
<tr><td colspan="2">Size(mm)</td><td colspan="3">Acceptable Qty</td></tr>
<tr><td rowspan="2">L(Length)</td><td rowspan="2">W(Width)</td><td colspan="3">Zone</td></tr>
<tr><td>A</td><td>B</td><td>C</td></tr>
<tr><td>Ignore</td><td>W≤0.02</td><td colspan="2">Ignore</td><td rowspan="4">Ignore</td></tr>
<tr><td>L≤3.0</td><td>0.02＜W≤0.03</td><td colspan="2">2</td></tr>
<tr><td>L≤2.0</td><td>0.03＜W≤0.05</td><td colspan="2">1</td></tr>
<tr><td></td><td>0.05＜W</td><td colspan="2">Define as spot defect</td></tr>
</table>
</td><td>Minor</td></tr>
<tr><td>4.2.3</td><td>Polarizer scratch</td><td>
If the Polarizer scratch can be seen after mobile phone cover assembling or in the operating condition, judge by the line defect of 4.2.2.
If the Polarizer scratch can be seen only in non-operating condition or some special angle, judge by the following.
<table>
<tr><td colspan="2">Size(mm)</td><td colspan="3">Acceptable Qty</td></tr>
<tr><td rowspan="2">L(Length)</td><td rowspan="2">W(Width)</td><td colspan="3">Zone</td></tr>
<tr><td>A</td><td>B</td><td>C</td></tr>
<tr><td>Ignore</td><td>W≤0.03</td><td colspan="2">Ignore</td><td rowspan="4">Ignore</td></tr>
<tr><td>5.0＜L≤10.0</td><td>0.03＜W≤0.05</td><td colspan="2">2</td></tr>
<tr><td>L≤5.0</td><td>0.05＜W≤0.08</td><td colspan="2">1</td></tr>
<tr><td></td><td>0.08＜W</td><td colspan="2">0</td></tr>
</table>
</td><td>Minor</td></tr>
<tr><td>4.2.4</td><td>Polarize
Air bubble</td><td>
Air bubbles between glass & polarizer
<table>
<tr><td rowspan="2">2. Zone
Size(mm)</td><td colspan="3">Acceptable Qty</td></tr>
<tr><td>A</td><td>B</td><td>C</td></tr>
<tr><td>Φ≤0.2</td><td colspan="2">Ignore</td><td rowspan="4">Ignore</td></tr>
<tr><td>0.20＜Φ≤0.30</td><td colspan="2">2</td></tr>
<tr><td>0.30＜Φ≤0.50</td><td colspan="2">1</td></tr>
<tr><td>0.50＜Φ</td><td colspan="2">0</td></tr>
</table>
</td><td>Minor</td></tr>
</table>

4.3. Cosmetic Defect

<table>
<tr><th>Item No</th><th>Items to be inspected</th><th>Inspection Standard</th><th>Classification of defects</th></tr>
<tr><td rowspan="3">4.3.5</td><td rowspan="3">Glass defect</td><td>(i) Chips on corner

<table>
<tr><th>X</th><th>Y</th><th>Z</th></tr>
<tr><td>≤2.0</td><td>≤S</td><td>Disregard</td></tr>
</table>
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.</td><td>Minor</td></tr>
<tr><td>(ii)Usual surface cracks

<table>
<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></td><td>Minor</td></tr>
<tr><td>(iii) Crack
Cracks tend to break are not allowed.
 </td><td>Major</td></tr>
<tr><td>4.3.6</td><td>Parts alignment</td><td>1) Not allow IC and FPC/heat-seal lead width is more than 50% beyond lead pattern.
2) Not allow chip or solder component is off center more than 50% of the pad outline.</td><td>Minor</td></tr>
<tr><td>4.3.7</td><td>SMT</td><td>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.</td><td></td></tr>
</table>

■ PRECAUTIONS FOR USING LCD MODULES

1 Handing 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 alcohol

Do 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 solvents

Wipe 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.

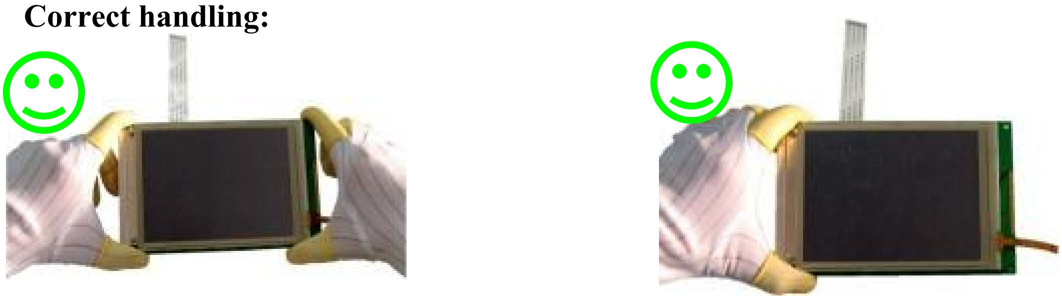
1.13 Since LCM has been assembled and adjusted with a high degree of precision, avoid applying excessive shocks to the module or making any alterations or modifications to it.

- 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.

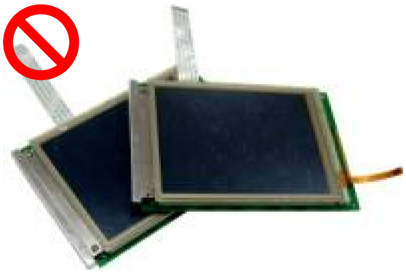
2.2 Correct handling:



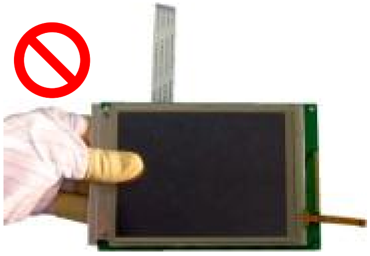
As above picture, please handle with anti-static gloves around LCM edges.

2.3 Incorrect handling:

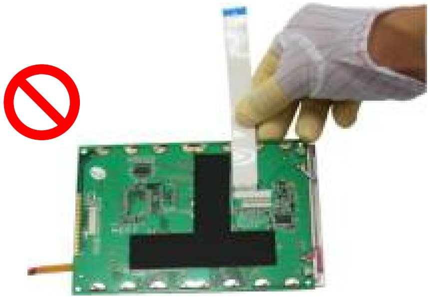
Please don't touch IC directly.



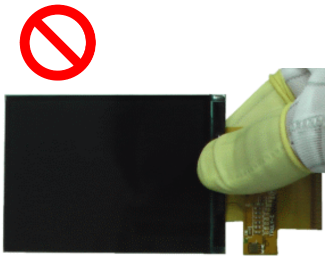
Please don't stack LCM.



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 Transportation Precautions

3.2.1 During shipment, please handle with care. The packaging bag can not be broken, step on trap. Packaging Carton layer height can not be over two meters.

3.2.2 The transportation process should pay attention to the waterproof and moisture-proof measures. Product can not be watering. Ethylene sealed bags can not be unsealed.

3.3 Others

3.3.1 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.

3.3.2 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.

3.3.3 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.

3.3.3.1 - Exposed area of the printed circuit board.

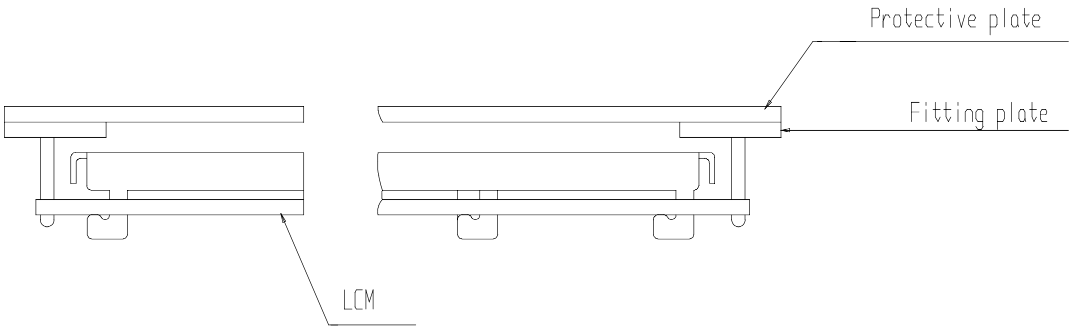
3.3.3.2 -Terminal electrode sections.

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.

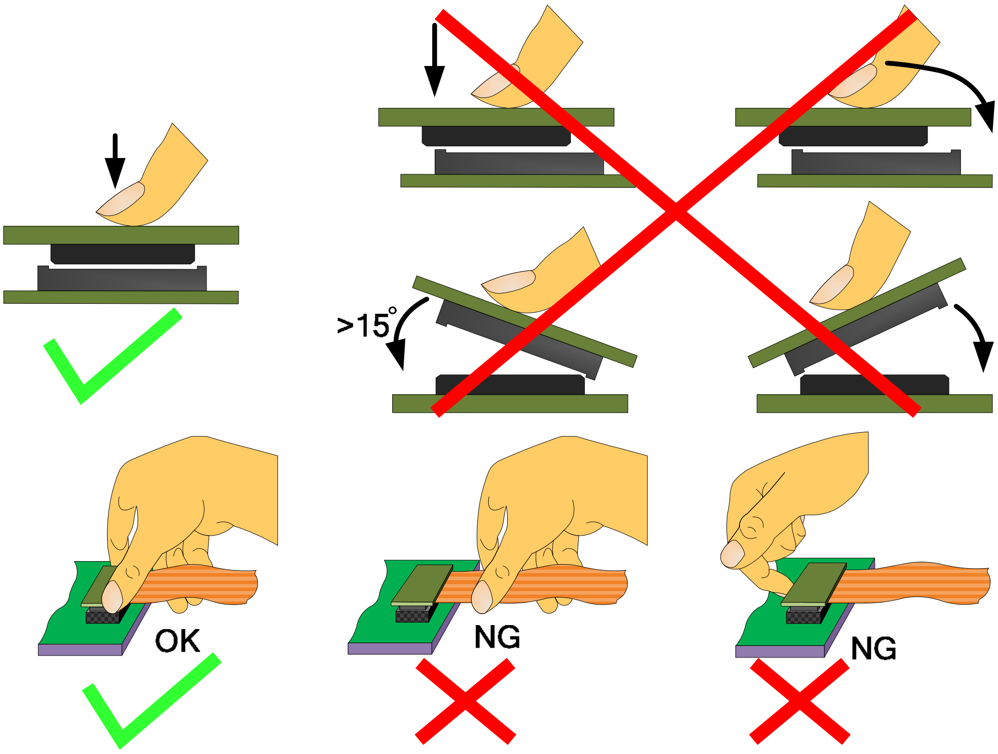
4.1.1 Cover the surface with a transparent protective plate to protect the polarizer and LC cell.



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 ±0.1mm.

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 : 4-8 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. Time : 4-8 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 Mutli-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.