MULTI-INNO TECHNOLOGY CO., LTD.

www.multi-inno.com

LCD MODULE SPECIFICATION

Model : MI0500UT-2

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	2013-05-29
	Our Reference	

REVISION RECORD

REV NO.	REV DATE	CONTENTS	REMARKS
1.0	2013-05-29	First Release	

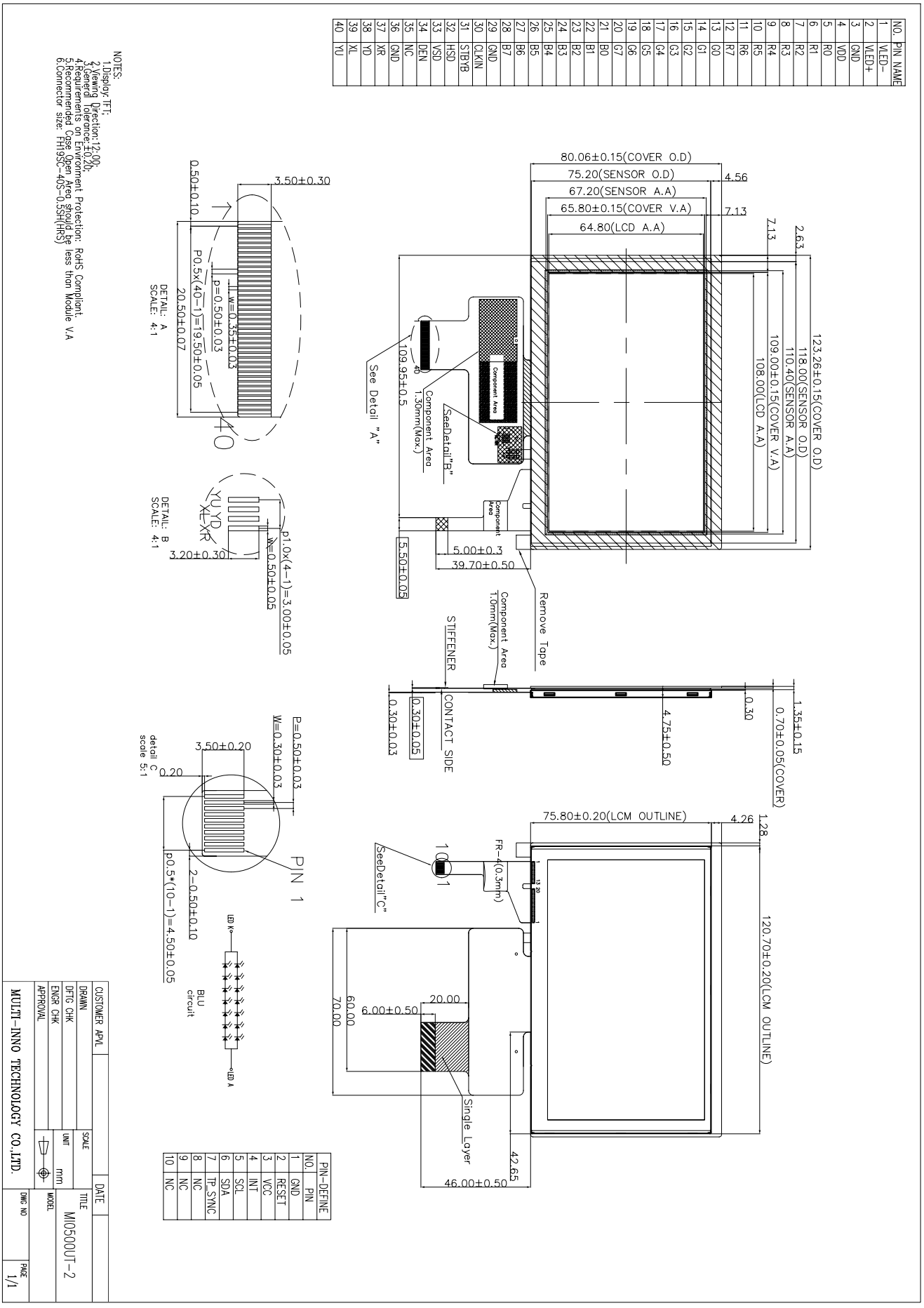
CONTENTS

■ GENERAL INFORMATION

Item	Contents	Unit
LCD type	TFT/Transmissive/Positive	/
Size	5.0	Inch
Viewing direction	12:00	O' Clock
Gray scale inversion direction	6:00	O' Clock
LCM (W × H)× D	123.26×80.06×4.75	mm^3
Active area (W×H)	108.00×64.80	mm^2
Dot pitch (W×H)	0.135×0.135	mm^2
Number of dots	800 (RGB) × 480	/
LCM driver IC	HX8264-D+HX8664-B	/
CTP controller	NT11003QG-48/A	/
Backlight type	14 LEDs	/
Interface type	Digital 24-bits RGB	/
Color depth	16.7M	/
Touch panel resolution	Depend on design	/
Cover lens material	Strengthen glass	/
Input voltage	3.3	V
With/Without TSP	With CTP	/
Weight	82+/-3	g

Note 1:Viewing direction for best image quality is different from TFT definition, there is a 180 degree shift.
Note 2 : RoHS compliant;
Note 3: LCM weight tolerance: ± 5% .

■ EXTERNAL DIMENSIONS



■ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Min	Max	Unit
TFT supply voltage/Power supply for LCD	VDD	-0.5	5.0	V
CTP supply voltage	VDD	2.7	3.6	V
Operating temperature	TOP	-20	70	°C
Storage temperature	TST	-30	80	°C
Humidity	RH	-	90%(Max60°C)	RH

Notes:

1. If the module is above these absolute maximum ratings. It may become permanently damaged. Using the module within the following electrical characteristic conditions are also exceeded, the module will malfunction and cause poor reliability.
2. VDD >GND must be maintained.

■ELECTRICAL CHARACTERISTICS

DC CHARACTERISTICS OF LCM

Parameter	Symbol	Min	Typ	Max	Unit
Supply voltage	VDD	3.0	3.3	3.6	V
Current	ICC1	-	100	150	mA
Consumption	ICC2	-	30	-	mA
Input voltage ' H ' level	VIH	0.7VDD	-	VDD	V
Input voltage ' L ' level	VIL	0	-	0.3VDD	V
Output voltage ' H ' level	VOH	0.7VDD	-	VDD	V
Output voltage ' L ' level	VOL	-	-	GND+0.4	V

Note1: For different LCM, the value may have a bit of difference.

Note2: To test the current dissipation, use “all Black Pattern”.

DC CHARACTERISTICS OF CTP

Parameter	Min	Typ	Max	Unit
Power supply voltage	2.7	-	3.6	V
Power supply current	-	-	4.0	mA

Note1: All current measurement is average current.

■ BACKLIGHT CHARACTERISTICS

Item	Symbol	Min.	Typ.	Max.	Unit	Condition
Forward current voltage	Vf	-	23.1	-	V	Note 1
Forward current	If	-	20	25	mA	Note 1
Backlight power consumption	WBL	-	0.924	-	W	
Life time	-	10000	20000	-	Hrs	Note 3

Note 1: I_F is defined for one channel LED. There are total two LED channels in back light unit

Note 2: Optical performance should be evaluated at Ta=25℃ only.

Note 3: If LED is driven by high current, high ambient temperature & humidity condition. The life time of LED will be reduced.Operating life means brightness goes down to 50% initial brightness. Typical operating life time is estimated data.

■ELECTRO-OPTICAL CHARACTERISTICS

Item		Symbol	Condition	Min	Typ	Max	Unit	Remark	Note
Response time		Tr+Tf	θ=0° ∅=0° Ta=25℃	-	40	60	ms	FIG 1.	4
Contrast ratio		Cr		400	450	-	---	FIG 2.	1
Luminance uniformity		δ WHITE		75	80	-	%	FIG 2.	3
Surface Luminance		Lv		200	250	-	cd/m^2	FIG 2.	2
Viewing angle range		θ	∅ = 90°	-60	-	45	deg	FIG 3.	6
			∅ = 270°	-60	-	45	deg	FIG 3.	
			∅ = 0°	-60	-	60	deg	FIG 3.	
			∅ = 180°	-60	-	60	deg	FIG 3.	
CIE (x, y) chromaticity	Red	x	θ=0° ∅=0° Ta=25℃	0.540	0.590	0.630		FIG 2.	5
		y		0.300	0.350	0.390			
	Green	x		0.298	0.348	0.388			
		y		0.520	0.570	0.610			
	Blue	x		0.095	0.145	0.185			
		y		0.060	0.110	0.150			
	White	x		0.260	0.310	0.360			
		y		0.280	0.330	0.370			
NTSC	-	-	-	-	50	-	%	-	-

Note 1. Contrast Ratio(CR) is defined mathematically as For more information see FIG 2.

$$\text{Contrast Ratio} = \frac{\text{Average Surface Luminance with all white pixels (P1, P2, P3, P4, P5)}}{\text{Average Surface Luminance with all black pixels (P1, P2, P 3,P4, P5)}}$$

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

Lv = Average Surface Luminance with all white pixels (P1, P2, P 3, P4, P5)

Note 3. 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.

$$\delta \text{ WHITE} = \frac{\text{Minimum Surface Luminance with all white pixels (P1, P2, P 3, P4, P5)}}{\text{Maximum Surface Luminance with all white pixels (P1, P2, P 3, P4, P5)}}$$

Note 4. 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. The test equipment is Autronic-Melchers's ConoScope. Series.

Note 5. CIE (x, y) chromaticity，The x, y value is determined by measuring luminance at each test position 1 through 5,and then make average value.

Note 6. Viewing angle is the angle at which the contrast ratio is greater than 2. For TFT module the conrast 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.

Note 7. 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, CIE The test data is base on TOPCON's BM-5 photo detector.

FIG. 1 The definition of Response Time

The response time is defined as the following figure and shall be measured by switching the input signal for "black" and "white".

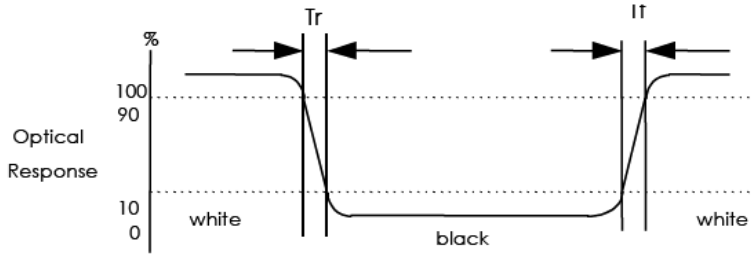
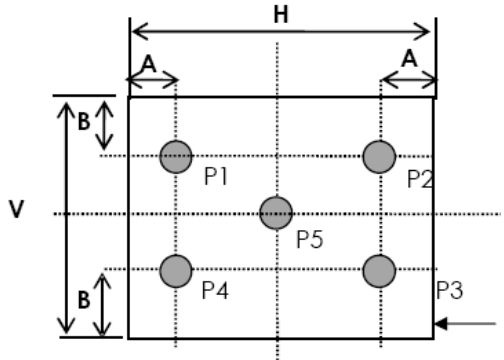
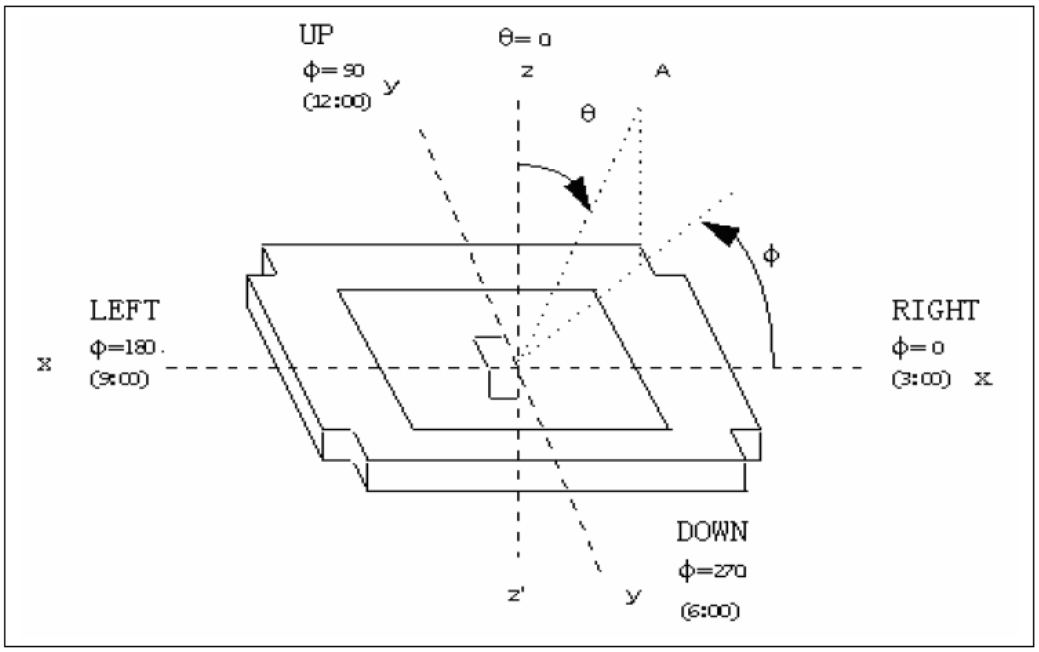


FIG. 2 Measuring method for Contrast ratio, surface luminance, Luminance uniformity , CIE (x, y) chromaticity



A : 5 mm
B : 5 mm
H,V : Active Area
Light spot size ∅=7mm, 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

1. THE FPC CONNECTION OF LCM

Pin No.	Symbol	I/O	Function
1	VLED-	P	Back light cathode
2	VLED+	P	Back light anode
3	GND	P	Ground
4	VDD	P	Power supply
5	R0	I	Data input
6	R1	I	Data input
7	R2	I	Data input
8	R3	I	Data input
9	R4	I	Data input
10	R5	I	Data input
11	R6	I	Data input
12	R7	I	Data input
13	G0	I	Data input
14	G1	I	Data input
15	G2	I	Data input
16	G3	I	Data input
17	G4	I	Data input
18	G5	I	Data input
19	G6	I	Data input
20	G7	I	Data input
21	B0	I	Data input
22	B1	I	Data input
23	B2	I	Data input
24	B3	I	Data input
25	B4	I	Data input
26	B5	I	Data input
27	B6	I	Data input
28	B7	I	Data input

29	GND	I	Ground
30	CLKIN	I	Clock for input data. Data latched at rising edge of this signal.
31	STBYB	I	Standby mode. STBYB="1": Normally operation. STBYB="0": Standby mode .Timing controller, source driver will turn off, all output are High-Z.
32	HSD	I	Horizontal sync input.
33	VSD	I	Vertical sync input
34	DEN	I	Data input enable. Active high to enable the data input bus under "DE Mode ".
35	NC	-	No connection
36	GND	P	Ground
37	XR	-	XR
38	YD	-	YD
39	XL	-	XL
40	YU	-	YU

2. THE FPC CONNECTION OF CTP

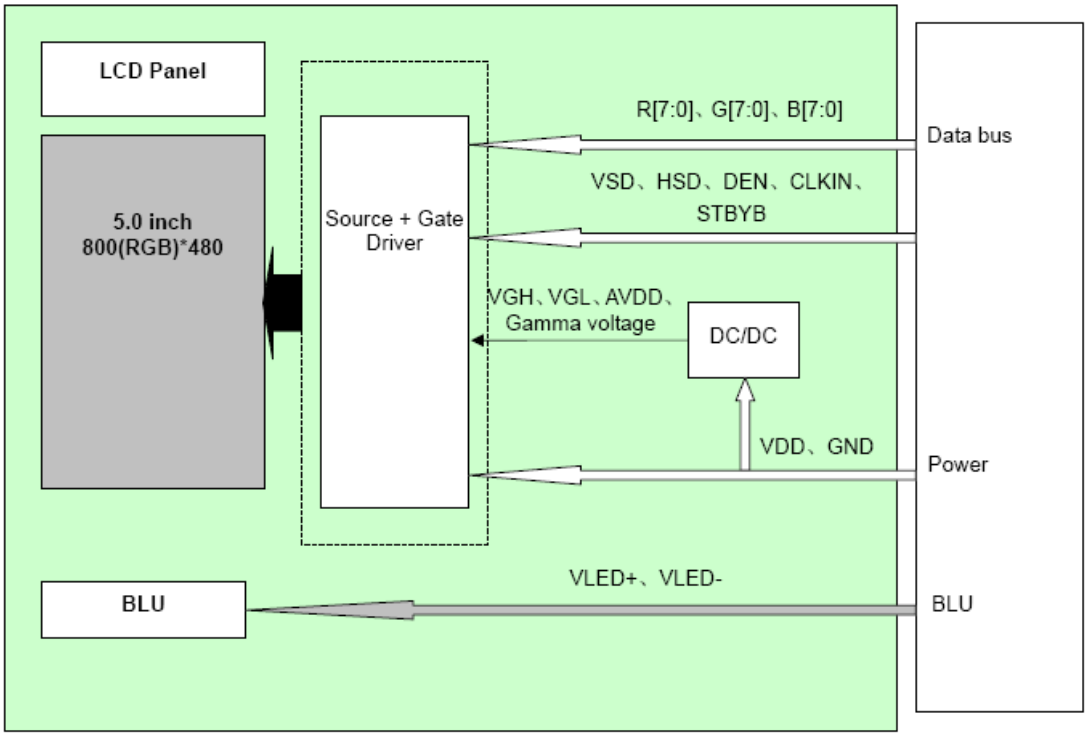
Pin No.	Symbol	I/O	Description	Remark
1	GND	P	Ground	
2	RESET	I/O	Active Low	
3	VDD	P	Power	
4	INT	P	Active Low	
5	SCL	I/O	CLOCK	
6	SDA	I/O	Data I/O	
7	TP_SYNC	I/O	GPIO from LCD	
8	NC	-	No connection	
9	NC	-	No connection	
10	NC	-	No connection	

Note :

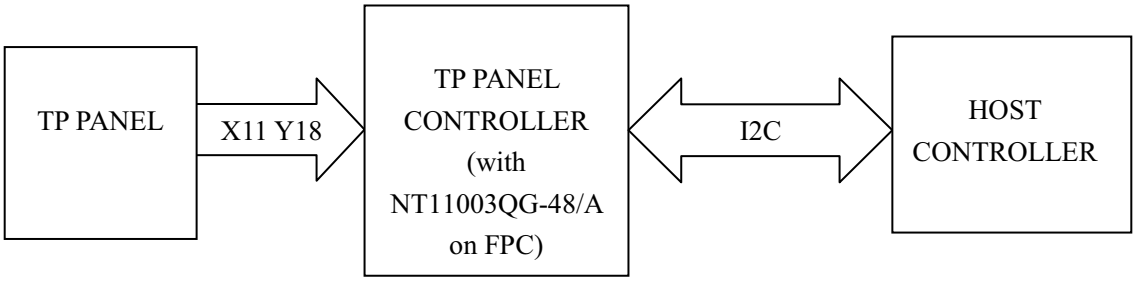
1.Please contacts to product supplier for detail define information.

■BLOCK DIAGRAM

1. LCM BLOCK DIAGRAM



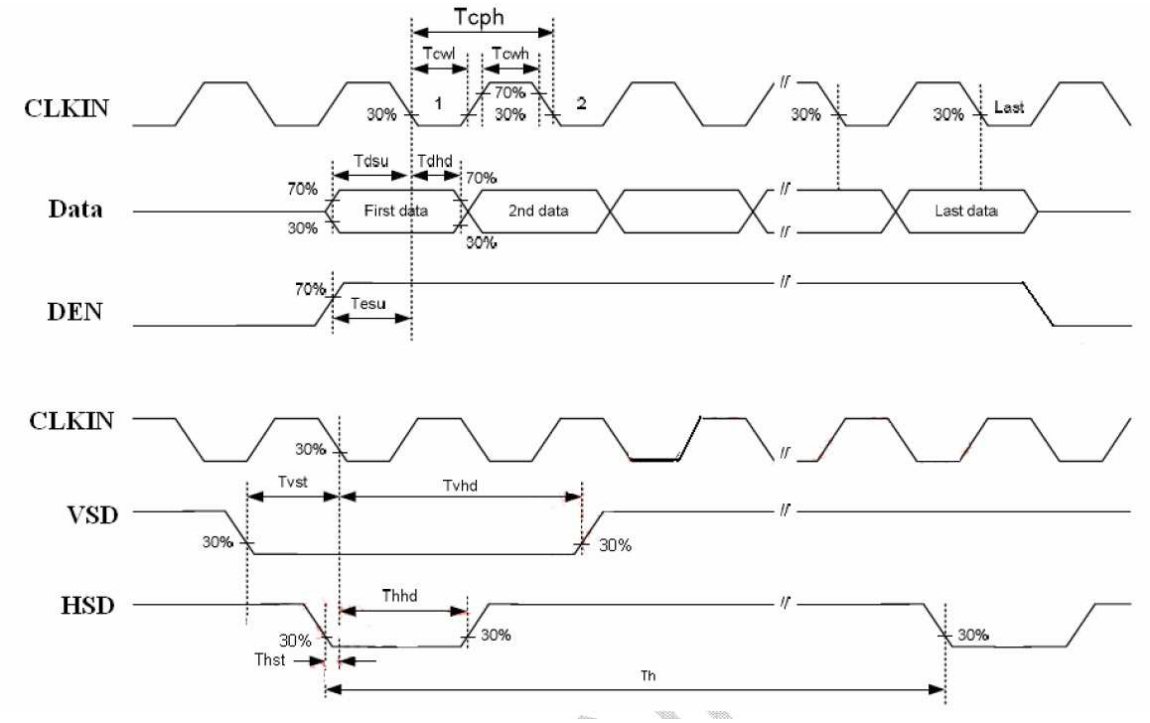
2. CTP BLOCK DIAGRAM



■ APPLICATION NOTES

1 TIMING CHARACTERISTICS OF LCM

1.1 Input Clock And Data Timing Diagram



1.2 Timing Parameters

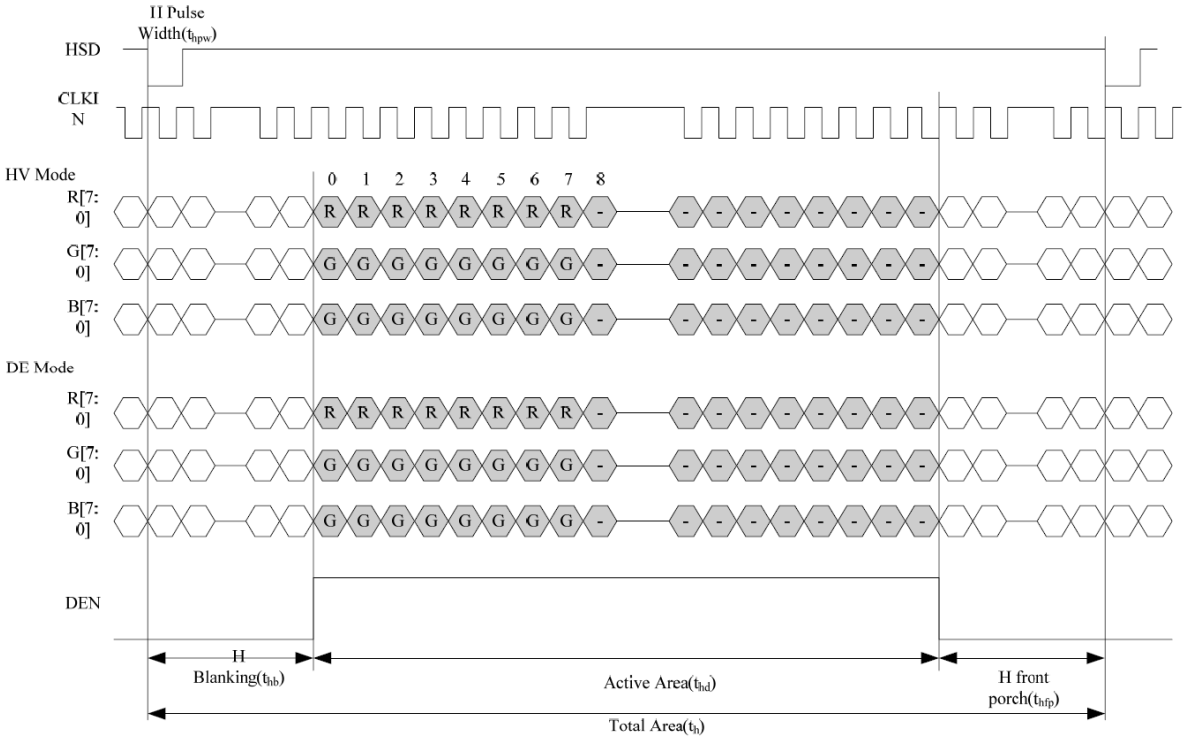
Normal Write Mode

VDD=3.3V Ta=25℃

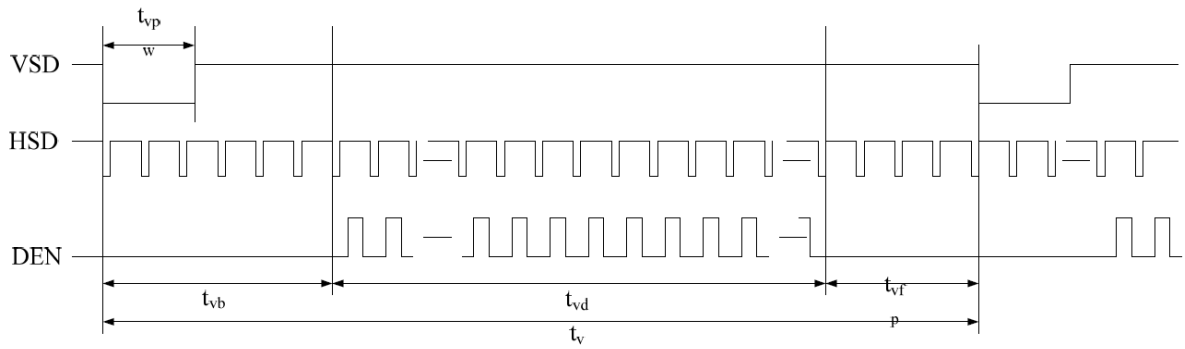
Parameter	Symbol	Min	Typ	Max	Unit	Remark
HSD Setup Time	T_{hst}	8			ns	
HSD Hold Time	T_{hhd}	8	-	-	ns	
VSD Setup Time	T_{vst}	8			ns	
VSD Hold Time	T_{vhd}	8	-	-	ns	
Data Setup Time	T_{dsu}	8			ns	
Data Hold Time	T_{dhd}	8	-	-	ns	
DE Setup Time	T_{esu}	8			ns	
DE Hold Time	T_{ehd}	8	-	-	ns	
CLKIN Cycle Time	T_{cph}	20	-	-	ns	
CLKIN Pulse Width	T_{cwh}	40	50	60	%	
Output stable time	Tsst	-	-	6	us	
VDD Power ON Slew rate	Tpor			20	ms	
RSTB pulse width	TRst	10	-	-	us	

1.3 Data Input Format

1.3.1 Horizontal Input Timing Diagram



1.3.2 Vertical Input Timing Diagram

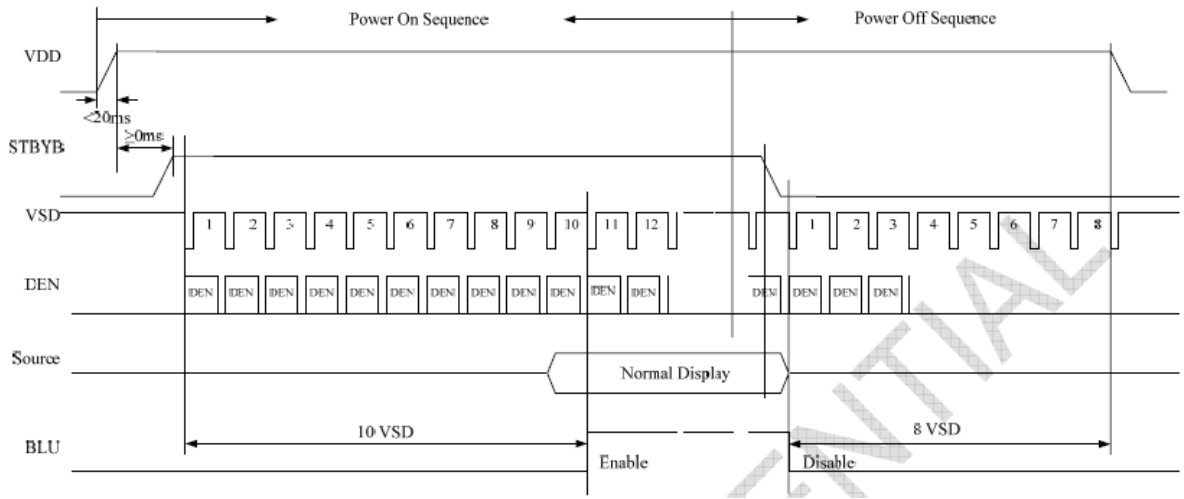


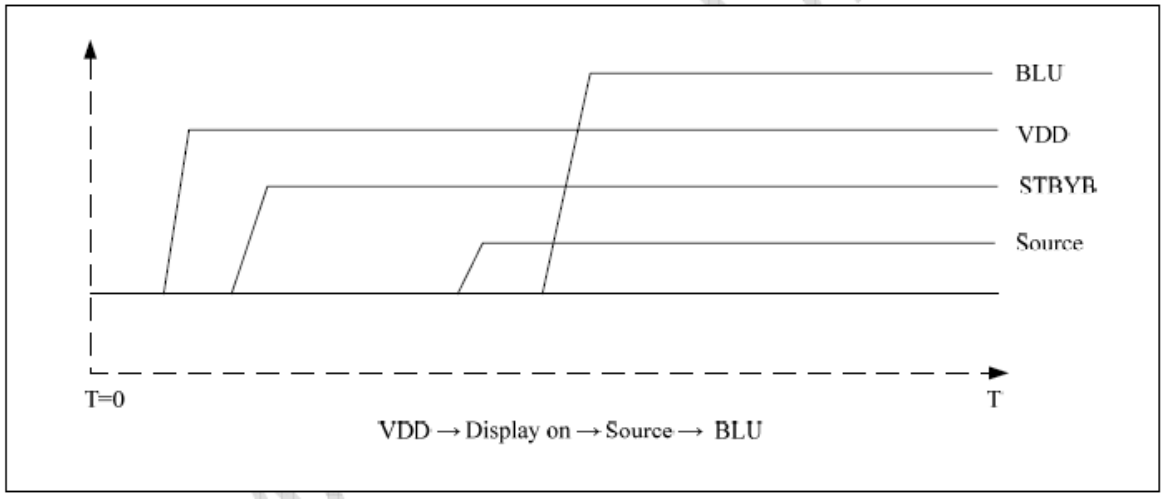
1.3.3 Parameter Setting Of Timing

Parameter	Symbol	Min	Typ	Max	Unit	Remak
Horizontal display area	t_{hd}		800		CLKIN	
CLKIN frequency (60Hz)	Fclk	-	30.0	50.0	MHZ	
HSYNC	t_h	889	928	1143	Tclk	
	t_{hd}	800	800	800	Tclk	
	t_{hpw}	1	48	255	Tclk	
	t_{hb}	88	88	88	Tclk	
	t_{hfp}	1	40	255	Tclk	
VSYNC	t_v	513	525	767	th	
	t_{vd}	480	480	480	th	
	t_{vpw}	3	3	255	th	
	t_{vb}	32	32	32	th	
	t_{vfp}	1	13	255	th	

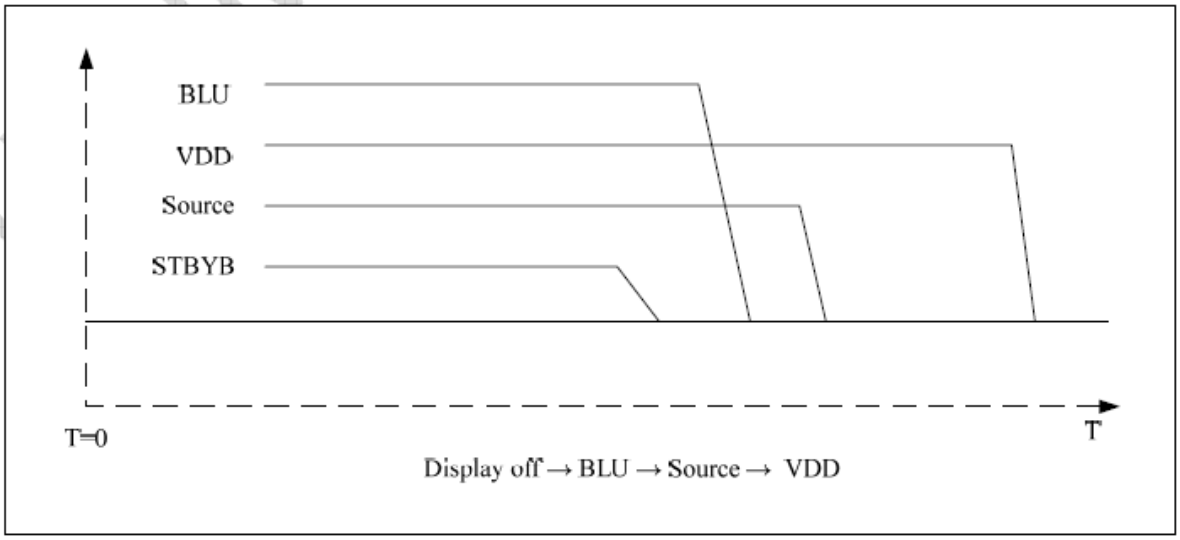
Note:Base on Driver IC HX8264-D

1.3.4 Power ON/OFF Sequence





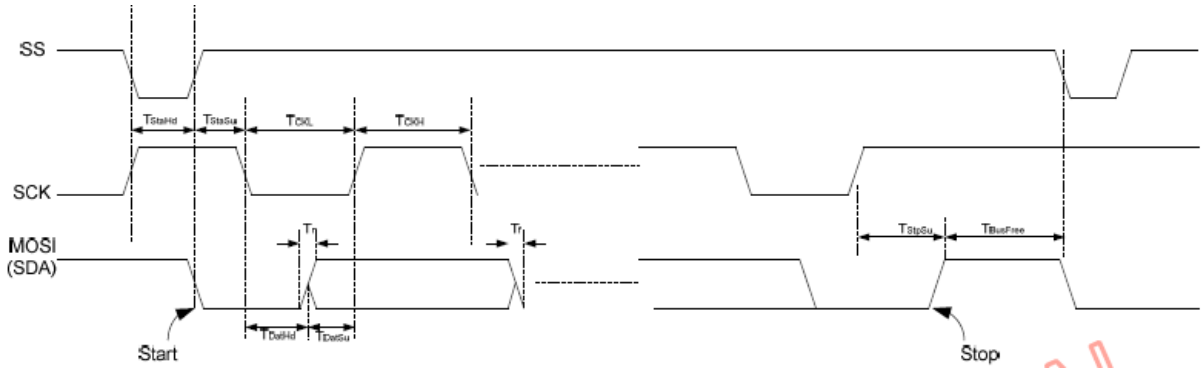
Power on sequence



Power off sequence

2 TIMING CHARACTERISTICS OF CTP

2.1 IIC Timing



The IIC Timing Table as follows.

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Working Frequency	Fclk	0		400	KHz	
I2C Clock Low	TCKL	1250			ns	VDD =3.3V, TA=25 .
I2C Clock High	TCKH	1250			ns	VDD =3.3V, TA=25 .
I2C Data Rising Time	Tr			300	ns	VDD =3.3V, TA=25 .
I2C Data Falling Time	Tf			300	ns	VDD =3.3V, TA=25 .
I2C Data Hold Time	TDatHd	0			ns	VDD = 3.3V, TA=25 .
I2C Data Setup Time	TDatSu	100			ns	VDD = 3.3V, TA=25 .
I2C Start Condition Hold Time	TStaHd	600			ns	VDD = 3.3V, TA=25 . VDD =3.3V, TA=25℃.
I2C Start Condition Setup Time	TStaSu	600			ns	VDD = 3.3V, TA=25 .
I2C Stop Condition Setup Time	TStpSu	600			ns	VDD = 3.3V, TA=25 .
I2C Bus Free Time	TBusFree	1300			ns	VDD = 3.3V, TA=25 .

2.2 Register Definition

We reserve 42 bytes I2C buffer for recording gesture information and 4 bytes system control register for system designer to control touch panel appropriate for your requirement.

Address	I2C Buffer Definition							
00H	GID 1	GID 2	P1_D1	P1_D2	P1_D3	P1_D4	P2_D1	P2_D2
08H	P2_D3	P2_D4	P3_D1	P3_D2	P3_D3	P3_D4	P4_D1	P4_D2
10H	P4_D3	P4_D4	P5_D1	P5_D2	P5_D3	P5_D4	P6_D1	P6_D2
18H	P6_D3	P6_D4	P7_D1	P7_D2	P7_D3	P7_D4	P8_D1	P8_D2
20H	P8_D3	P8D4	P9_D1	P9_D2	P9_D3	P9_D4	P10_D1	P10_D2
28H	P10_D3	P10_D4	F/W Ver.	Pwr_Ctl_1	Pwr_Ctl_2	Read_Pnt	Reserve	Reserve

■ CTP OPTICAL TEST

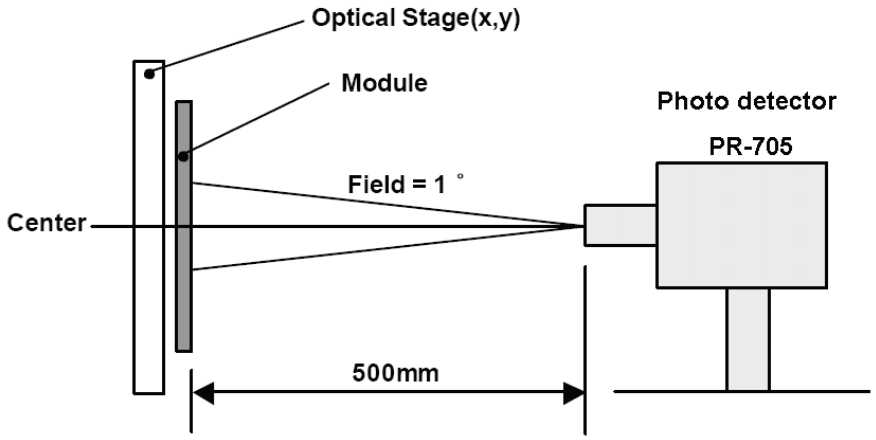
(Ta = 25 °C)

Item	Symbol	Condition	Min.	Typ.	Max.	Unit	Remark
Transmission	%	550nm	86	88	90	%	Note 1

Note 1: Measuring equipments: DMS-501, PR-705. @550nm

Measuring condition:

- After stabilizing and leaving the panel alone at a given temperature for 30 min, the measurement should be executed,
- Measuring surroundings: a stable, windless and dark room,
- Measuring temperature: Ta=25°C,
- 30 min after lighting the back-light.



■ RELIABILITY TEST

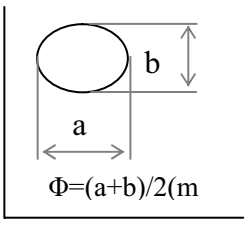
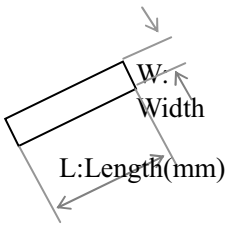
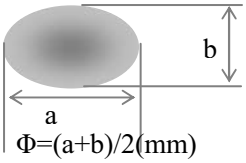
No.	Test Item	Test Condition	Inspection after test
1	High Temperature Storage	80±2℃/240 hours	1.After testing,cosmetic and electrical defects should not happen. 2.the product should remain at initial place 3.Product uncovered or package broken is not permitted.
2	Low Temperature Storage	-30±2℃/240 hours	
3	High Temperature Operating	70±2℃/240 hours	
4	Low Temperature Operating	-20±2℃/240 hours	
5	Temperature Cycle storage	-20±2℃~25~60±2℃×100cycles (30min.) (5min.) (30min.)	
6	Damp proof Test operating	60℃±5℃×90%RH/240 hours	
7	Vibration Test	10Hz~150Hz ,100m/s^2,120min	
8	Package drop test	Height:80 cm 1 corner,3 edges,6 surfaces	
9	ESD test	C=150pF,R=330Ω ,5point/panel Air: ± 8Kv,5times;Contact: ±4Kv,5times (Environment:15℃~35℃ ,30%~60%, 86Kpa~106Kpa) power on	
10	Shock test	Half-sine wave,300m/s^2,11ms	

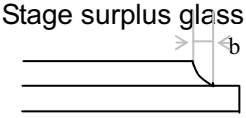
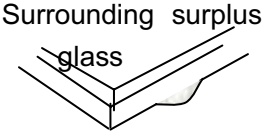
■ INSPECTION CRITERION

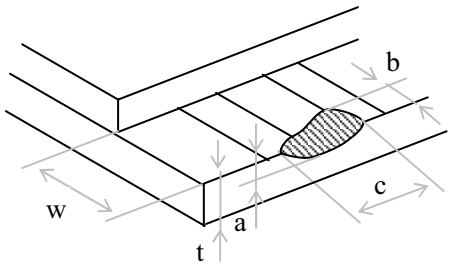
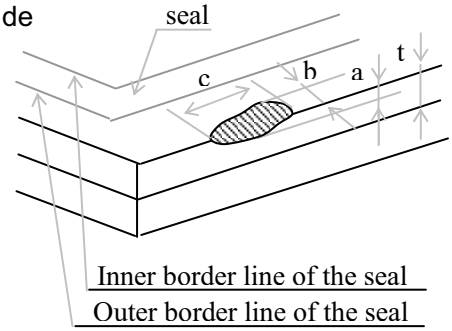
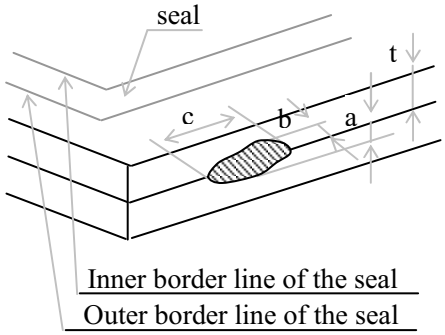
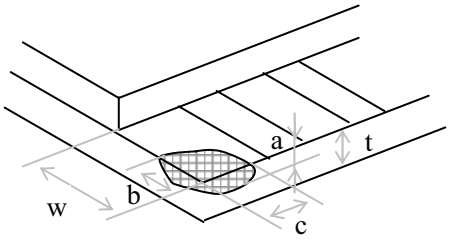
1. Outgoing Inspection Level

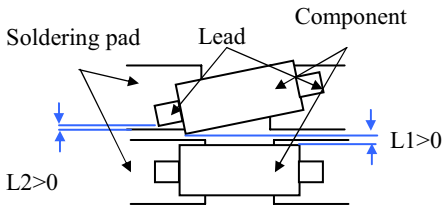
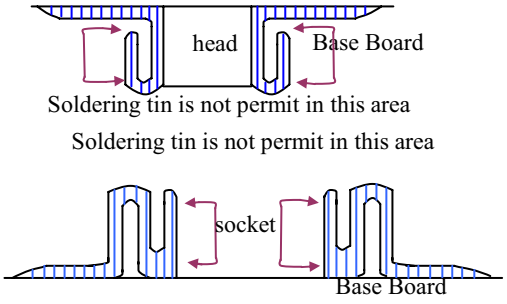
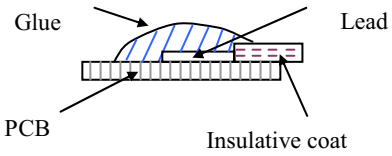
Outgoing Inspection standard	Inspection conditions	Inspection				
		Min.	Max.	Unit	IL	AQL
Major Defects	See 8.3 general notes	See 8.5			II	0.65
Minor Defects	See 8.3 general notes	See 8.5			II	1.5
Note：Sampling standard conforms to GB2828						

2. Inspection Items And Criteria

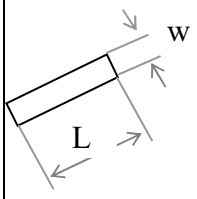
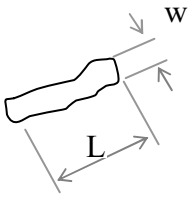
Inspection items			Judgment standard			
			Category		Acceptable number	
					A zone	B zone
1	Black spot, White spot, Bright Spot, Pinhole, Foreign Particle, Particle in or on glass, Scratch on glass		A	Φ≦0.10	Neglected	Neglected
			B	0.10<Φ≦0.15	2	
			C	0.15<Φ≦0.20	1	
			D	0.20<Φ	0	
			Total defective point(B,C)		3	
2	Black line, White line, and Particle Between Polarizer and glass, Scratch on glass		A	W≦0.01	Neglected	Neglected
			B	0.01<W≦0.03 L≦3.0	2	
			C	0.03<W≦0.05 L≦3.0	1	
			D	0.05<W	0	
			Total defective point(B,C)		3	
3	Contrast variation		A	Φ≦0.2	Neglected	Neglected
			B	0.2<Φ≦0.3	2	
			C	0.3<Φ≦0.4	1	
			D	0.4<Φ	0	
			Total defective point(B,C)		3	

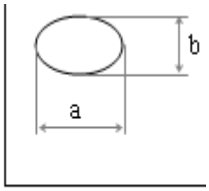
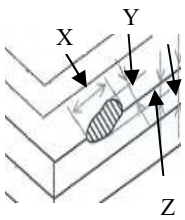
<table>
<tr><td rowspan="13">4</td><td rowspan="13">Dot defect (if TFT LCD is used)</td><td>TFT LCD is smaller than 3 inches</td><td>LCD Class</td><td>Defect</td><td colspan="2">A area</td><td>B area</td></tr>
<tr><td rowspan="3">A</td><td>Bright dot</td><td colspan="2">1</td><td rowspan="6">Neglected</td></tr>
<tr><td>Dark dot</td><td colspan="2">2</td></tr>
<tr><td>Total</td><td colspan="2">2</td></tr>
<tr><td rowspan="3">B</td><td>Bright dot</td><td colspan="2">2</td></tr>
<tr><td>Dark dot</td><td colspan="2">3</td></tr>
<tr><td>Total</td><td colspan="2">4</td></tr>
<tr><td>TFT LCD between 3~10.4 inches</td><td>LCD Class</td><td>Defect</td><td>A area</td><td>B area</td><td>C area</td></tr>
<tr><td rowspan="3">A</td><td>Bright dot</td><td>1</td><td>1</td><td rowspan="6">Neglected</td></tr>
<tr><td>Dark dot</td><td>1</td><td>2</td></tr>
<tr><td>Total</td><td colspan="2">4</td></tr>
<tr><td rowspan="3">B</td><td>Bright dot</td><td>2</td><td>2</td></tr>
<tr><td>Dark dot</td><td>2</td><td>3</td></tr>
<tr><td>Total</td><td colspan="2">6</td></tr>
<tr><td colspan="6">Notes:
Bright dot: in R、G、B or dark display figure, the pixel appears bright.
Dark dot: in R、G、B or white display figure, the pixel appears dark.
Defect area must be less than an half size of the dot.</td></tr>
<tr><td>5</td><td colspan="2">Bubble inside cell</td><td colspan="3">any size</td><td>none</td><td>none</td></tr>
<tr><td rowspan="4">6</td><td rowspan="4">Polarizer defect (if Polarizer is used)</td><td>Scratch ,damage on polarizer, Particle on polarizer or between polarizer and glass.</td><td colspan="5">Refer to item 1 and item 2.</td></tr>
<tr><td rowspan="3">Bubble, dent and convex</td><td>A</td><td>Φ≦0.3</td><td>Neglected</td><td rowspan="3">Neglected</td></tr>
<tr><td>B</td><td>0.3<Φ≦0.7</td><td>2</td></tr>
<tr><td>C</td><td>0.7<Φ</td><td>0</td></tr>
<tr><td rowspan="2">7</td><td rowspan="2">Surplus glass</td><td>Stage surplus glass  </td><td colspan="5">b≦0.3mm</td></tr>
<tr><td>Surrounding surplus glass  </td><td colspan="5">Should not influence outline dimension and assembling.</td></tr>
<tr><td>8</td><td colspan="2">Open segment or open common</td><td colspan="5">Not permitted</td></tr>
<tr><td>9</td><td colspan="2">Short circuit</td><td colspan="5">Not permitted</td></tr>
<tr><td>10</td><td colspan="2">False viewing direction</td><td colspan="5">Not permitted</td></tr>
<tr><td>11</td><td colspan="2">Contrast ratio uneven</td><td colspan="5">According to the limit specimen</td></tr>
<tr><td>12</td><td colspan="2">Crosstalk</td><td colspan="5">According to the limit specimen</td></tr>
<tr><td>13</td><td colspan="2">Black /White spot(display)</td><td colspan="5">Refer to item 1</td></tr>
<tr><td>14</td><td colspan="2">Black /White line(display)</td><td colspan="5">Refer to item 2</td></tr>
</table>

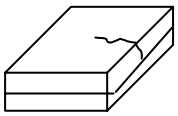
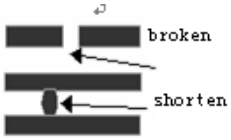
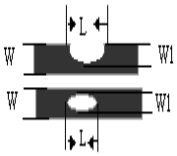
15	Glass defect crack	①The front of lead terminals 	A	a≤ t, b≤1/5W, c≤3mm	Max.3 defects allowed
			B	Crack at two sides of lead terminals should not cover patterns and alignment mark	
		②Surrounding crack—non-contact side 	b < Inner borderline of the seal		
		③ Surrounding crack— contact side 	b < Outer borderline of the seal		
		④Corner 	A	a ≦ t, b ≦ 3.0, c ≦ 3.0	
			B	Glass crack should not cover patterns u and alignment mark and patterns.	

16	PCB defect	Component soldering: No cold soldering、short、open circuit、burr、tin ball The flat encapsulation component position deviation must be less than 1/3 width of the pin (Pic.1); the sheet component deviation: Pin deviates from the pad and contact with the near components is not permitted（Pic.2）	
		lead defect: The lead lack must be less than 1/3 of its width; The lead burr must be less than 1/3 of the seam; Impurities connect with the near leads is not permitted	
		Connector soldering: Soldering tin is at contact position of the plug and socket is not permitted No foundation is scald Serious cave distortion on plug and socket contact pin is not permitted	
		Glue on root of the speaker receiver and motor lead: The insulative coat of the lead must join into the PCB; the protected glue must envelop to the insulative coat.	

3. Appearance Defects Inspection Item And Limit Criteria Of TP

Inspection item	Detail content	criteria				remark
Outline dimension	Length, Width, Thickness	Outline should meet the drawing				Vernier caliper ruler
LOGO inclined, color, icon, grounding		LOGO inclined :not allowed				Eyeballing
Surface scratch		(1) W≤0.03 mm，allowed (2)0.03 mm＜W≤0.05，L≤3 mm， defects space 20mm at least, 2 defects are allowed; L＞3mm，not allowed (3)W＞0.05 mm，not allowed				Eyeballing
Linear foreign matter		TP product under 3.5”	A	W≤0.02mm，L≤3mm	Neglected	Eyeballing
			B	0.02mm ＜ W≤0.05mm ，L≤3mm，	2	
			C	L＞3mm or W＞0.05mm	0	
			Total defects（B）		2	
			Distance: D≥10mm,out of V,A is neglected			
		TP product between 3.5” and 4.3”	A	W≤0.02mm，L≤3mm	Neglected	
			B	0.02mm＜W≤0.03mm，L≤3mm，	3	
			C	0.03mm＜W≤0.05mm，L≤3mm，	2	
			D	L＞3mm or W＞0.05mm	0	
			Total defects(B,C)		2	
			Distance: D≥15mm,out of V,A is neglected			
		TP product over 4.3”	A	W≤0.02mm，L≤3mm	Neglected	
			B	0.02mm ＜ W≤0.03mm ，L≤3mm，	3	
			C	0.03mm ＜ W≤0.05mm ，L≤3mm，	2	
			D	L＞3mm or W＞0.05mm	0	
			Total defects(B,C)		3	
			Distance: D≥20mm,out of V,A is neglected			

Inspection item	Detail content	criteria			remark
Bright spot, Black spot, White spot, Pinhole, Black line, White Line, Foreign matter, air bubble	 Φ=(a+b)/2	TP product under 3.5”	A	Φ≤0.15	Neglected	Eyeballing
			B	0.15＜Φ≤0.20	2	
			C	0.20＜Φ≤0.25	1	
			D	Φ＞0.25	0	
			Total defects(B,C)		2	
			distance	D≥10mm	Out of V,A is neglected	
		TP product between 3.5” and 4.3”	A	Φ≤0.15	Neglected	
			B	0.15＜Φ≤0.35	2	
			C	0.35＜Φ≤0.40	1	
			D	Φ＞0.40	0	
			Total defects(B,C)		2	
			distance	D≥15mm	Out of V,A is neglected	
		TP product over 4.3”	A	Φ≤0.15	Neglected	
			B	0.15＜Φ≤0.35	3	
			C	0.35＜Φ≤0.50	1	
			D	Φ＞0.50	0	
			Total defects(B,C)		3	
			distance	D≥20mm	Out of V,A is neglected	
Glass chip and crack		Side: x(length)≥2mm z(deepness) =T: not allowed y(width)≥2 mm z(deepness) =T: not allowed Corner: x、y≥2 mm or z=T: not allowed （T: glass thickness）				Eyeballing
Newton ring		Film+ glass: Newton ring area(S)≤1/2（T/P area Film+ Film：Newton ring area (S)≤1/3 (T/P area)				Eyeballing with the lamplight
rainbow		Check in the range of viewing angle or press the TP LOGO by the finger, the rainbow is not allowed.				Eyeballing

Inspection item	Detail content	criteria	remark
TP white border		The insulation tape meet the LOGO is not allowed	Eyeballing
Glass crack		Not allowed	Eyeballing
TP surface dirty matter		Cleaned before shipment	Eyeballing
TP pressing mark	The mark btween the TP and LCD	in the V,A(see limited sample):not allowed	Eyeballing
FPC brim teared, shorten, broken, trace mended		Not allowed	Eyeballing with the lamplight
FPC damage		(1)W1＜1/3 trace width W，2 lines are allowed (2)W1≥1/3 routing line width W， the damage length L≥ W，not allowed	Eyeballing with the lamplight
FPC pressing mark /folding mark		(1)hot pressing side and connecting side: not allowed(make the limited sample if necessary) (2)around the hole: not allowed (3)routing line: mark width≤1/3trace width, The mark length ≤1mm is allowed (4)big ground area: neglected (5)no see base material because of the mark.	Eyeballing with the lamplight
FPC trace reveal copper, Electrode oxidated, scratch		Revealing copper is not allowed; Palm oxidation is allowed; black oxidation is allowed; protect cover is forbad scratched and damaged	Eyeballing with the lamplight
TP inclined		Obvious incline is not allowed. No affect the machine assembly first.	eyeballing
Bezel defect		Scratch: length ≤10mm，width≤0.4mm and 3 defects at most; rust and distortion is not allowed	eyeballing
Spray Code defect		According to the content specified by the customer font illegible and wrong position is not allowed	eyeballing
Note: other appearance inspection standards which not mentioned in it ,please refer to《LCM raw material inspection standard》（Q/DDG212-2005）			

■ 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.

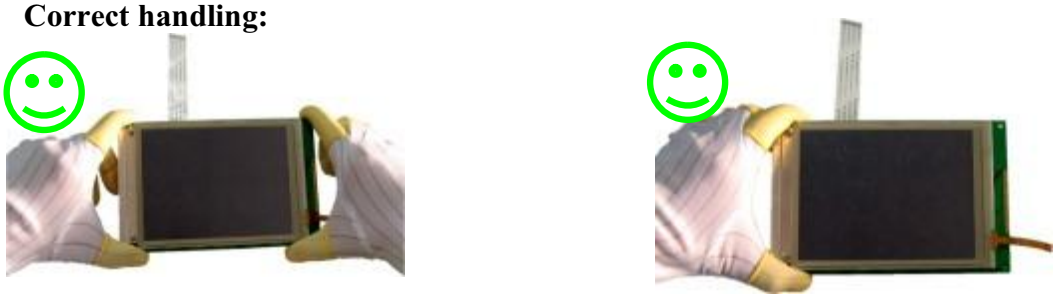
- Except for soldering the interface, do not make any alterations or modifications with a soldering iron.

- 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.

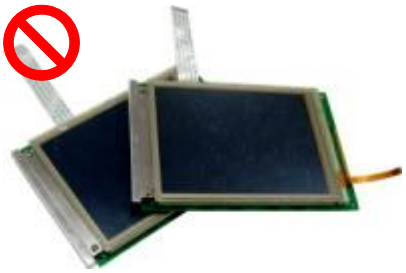
2.2 Correct handling:



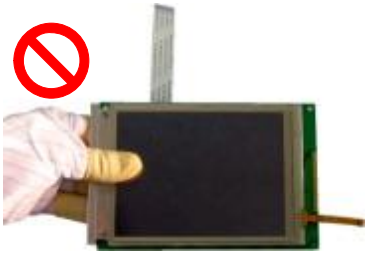
As above picture, please handle with anti-static gloves around LCM edges.

2.3 Incorrect handling:

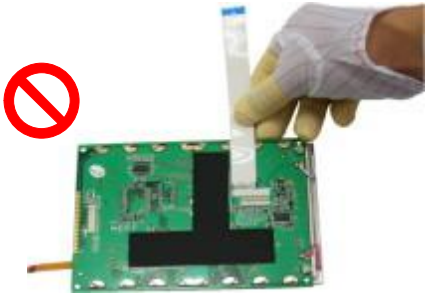
Please don't touch IC directly.



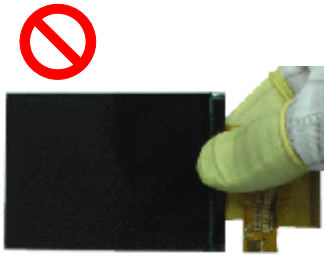
Please don't stack LCM.



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.

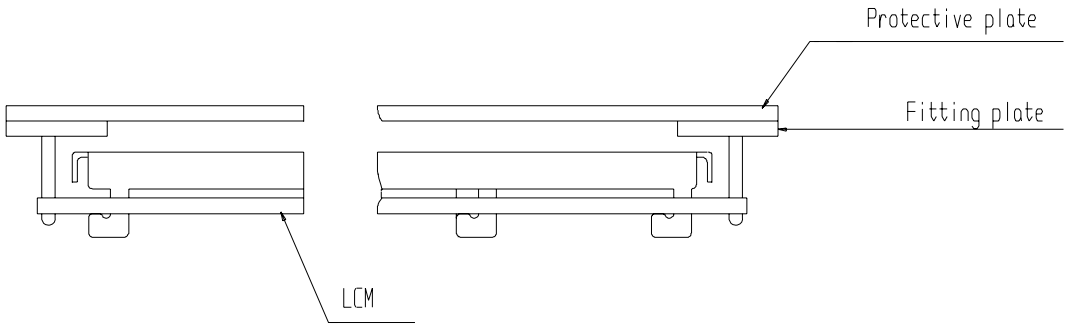
3.3.3.2 -Terminal electrode sections.

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.

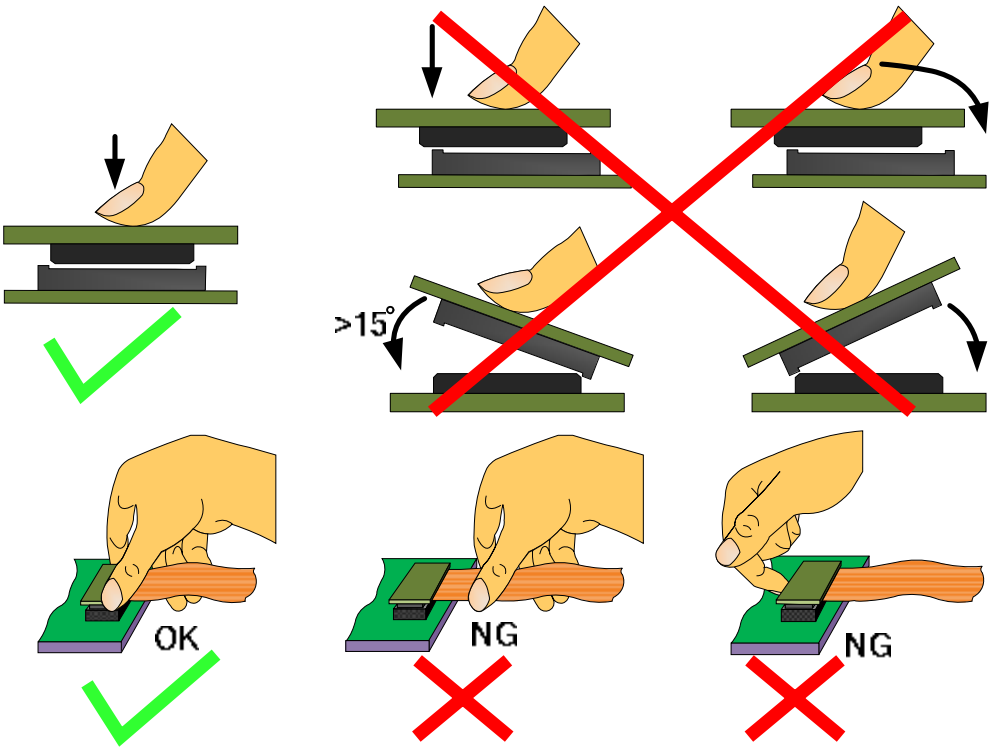
4.1.1 Cover the surface with a transparent protective plate to protect the polarizer and LC cell.



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 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.