



MULTI-INNO TECHNOLOGY CO., LTD.

www.multi-inno.com

LCD MODULE SPECIFICATION

Model : MI0700S5T

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	2013-09-18
Our Reference	



REVISION RECORD

REV NO.	REV DATE	CONTENTS	REMARKS
1.0	2013-09-18	First Release	

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■ GENERAL INFORMATION

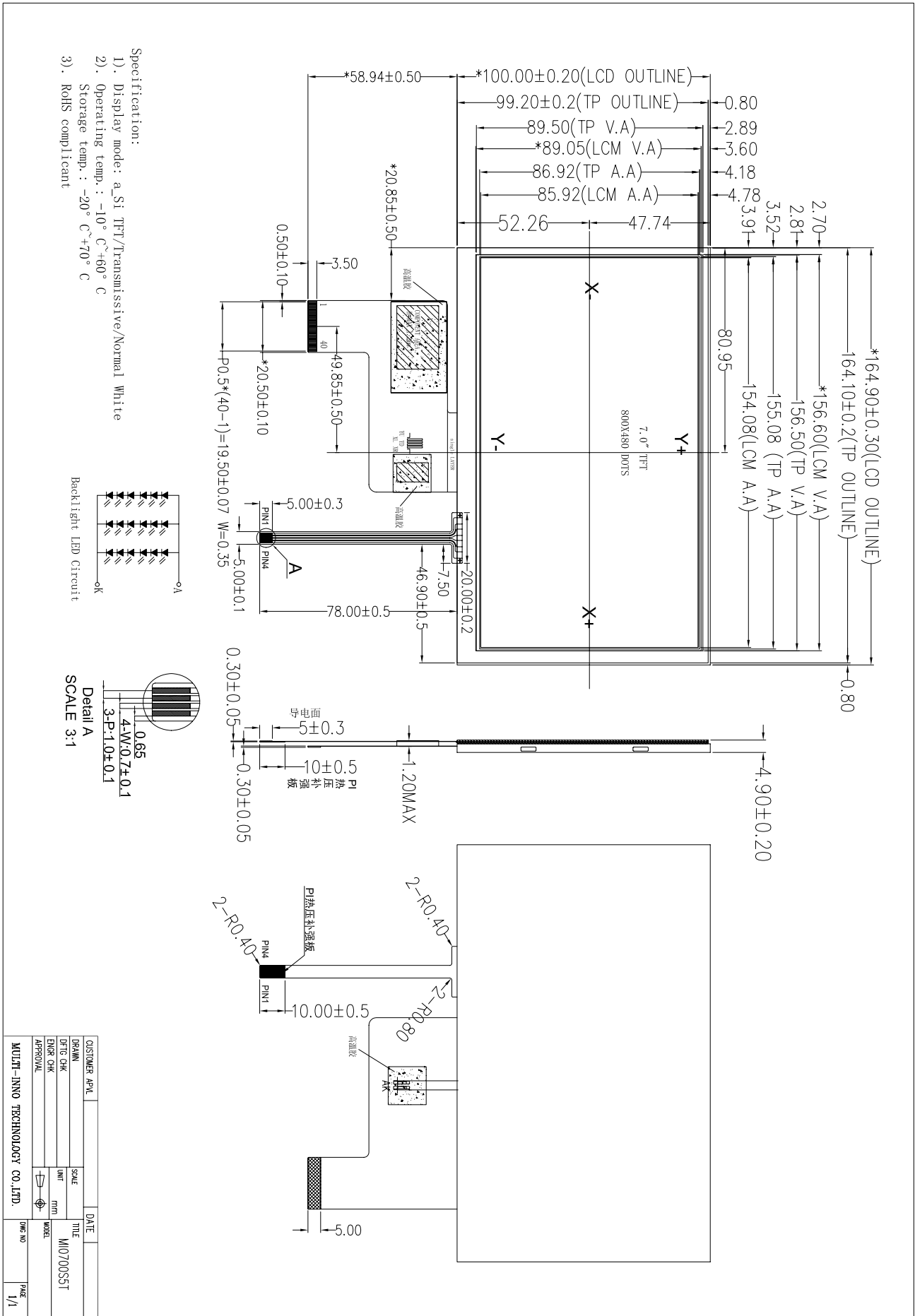
Item	Contents	Unit
LCD type	TFT/Transmissive/Normally white	/
Size	7.0	Inch
Viewing direction	12:00	O' Clock
Gray scale inversion direction	6:00	O' Clock
LCM (W × H × D)	164.9×100.0×4.9	mm ³
Active area (W×H)	154.08×85.92	mm ²
Pixel size (W×H)	0.632×0.179	mm ²
Number of dots	800 (RGB) × 480	/
Backlight type	18 LEDs	/
Interface type	24bit RGB	/
Color depth	16.7M	/
Input voltage	3.3	V
With/Without TSP	With TSP	/
Weight	TBD	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
Power voltage	DVDD	-0.5	5.0	V
	AVDD	-0.5	15	V
	VGH	-0.3	40	V
	VGL	-20	0.3	V
Operating temperature	T _{OP}	-10	60	°C
Storage temperature	T _{ST}	-20	70	°C
Humidity	RH	-	90%(Max60°C)	RH

■ ELECTRICAL CHARACTERISTICS

DC CHARACTERISTICS

Parameter	Symbol	Min	Typ	Max	Unit
Power voltage	DVDD	3.0	3.3	3.6	V
	AVDD	10.1	10.3	10.5	V
	VGH	17.5	18	18.5	V
	VGL	-8.5	-8	-7.5	V
Input signal voltage	V _{com}	3.1	3.3	3.4	V
Input voltage 'H' level	V _{IH}	0.7DVDD	-	DVDD	V
Input voltage 'L' level	V _{IL}	0	-	0.3DVDD	V

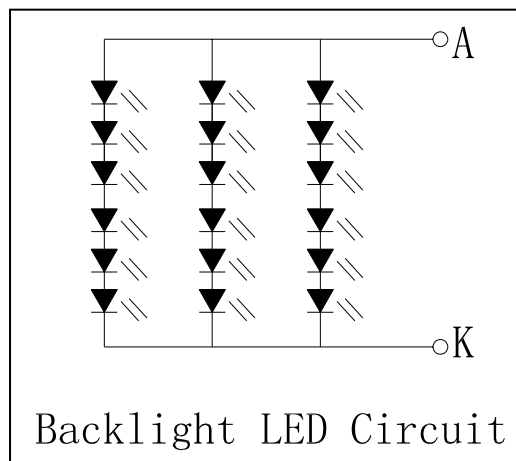
Note 1: Be sure to apply DVDD and VGL to the LCD first, and then apply VGH.

Note 2: DVDD setting should match the signals output voltage (refer to Note 3) of customer's system board.

Note 3: DCLK, HS, VS, RESET, U/D, L/R, DE, R0-R7, G0-G7, B0-B7, MODE, DITHB.

■ BACKLIGHT CHARACTERISTICS

Item	Symbol	Min.	Typ.	Max.	Unit	Condition
Forward voltage	V _f	-	19.8	-	V	
Forward current	I _f	-	60	-	mA	
Power consumption	W _{BL}	-	1.2	-	W	
Operating life time	-	20000	25000	-	Hrs	



■ELECTRO-OPTICAL CHARACTERISTICS

Item	Symbol	Condition	Min	Typ	Max	Unit	Remark	Note
Response time	Tr+Tf	$\theta=0^\circ$ $\varnothing=0^\circ$ Ta=25°C	-	25	50	ms	FIG 1.	4
Contrast ratio	Cr		350	500	-	---	FIG 2.	1
Luminance uniformity	δ WHITE		70	80	-	%	FIG 2.	3
Surface Luminance	Lv		1900	230	-	cd/m ²	FIG 2.	2
Viewing angle range	θ	$\varnothing = 90^\circ$	60	70	-	deg	FIG 3.	6
		$\varnothing = 270^\circ$	65	75	-	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	-	-	-	FIG 2.	5	
		y	-	-	-			
	Green	x	-	-	-			
		y	-	-	-			
	Blue	x	-	-	-			
		y	-	-	-			
	White	x	0.249	0.299	0.349			
		y	0.281	0.331	0.381			

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

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

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

$$L_v = \text{Average Surface Luminance with all white pixels (P1, P2, P3, P4, P5)}$$

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.

$$\delta \text{ WHITE} = \frac{\text{Minimum Surface Luminance with all white pixels (P1, P2, P3, P4, P5)}}{\text{Maximum Surface Luminance with all white pixels (P1, P2, P3, P4, P5)}}$$

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.

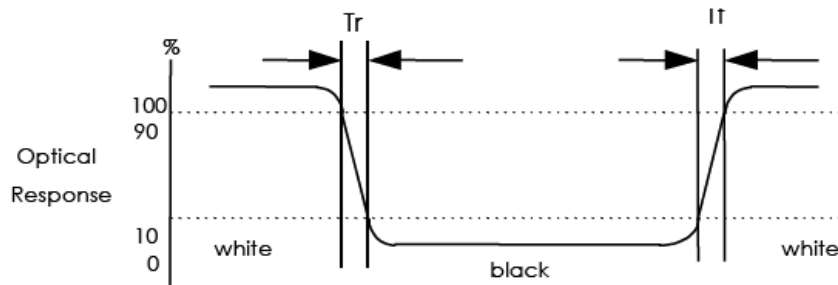
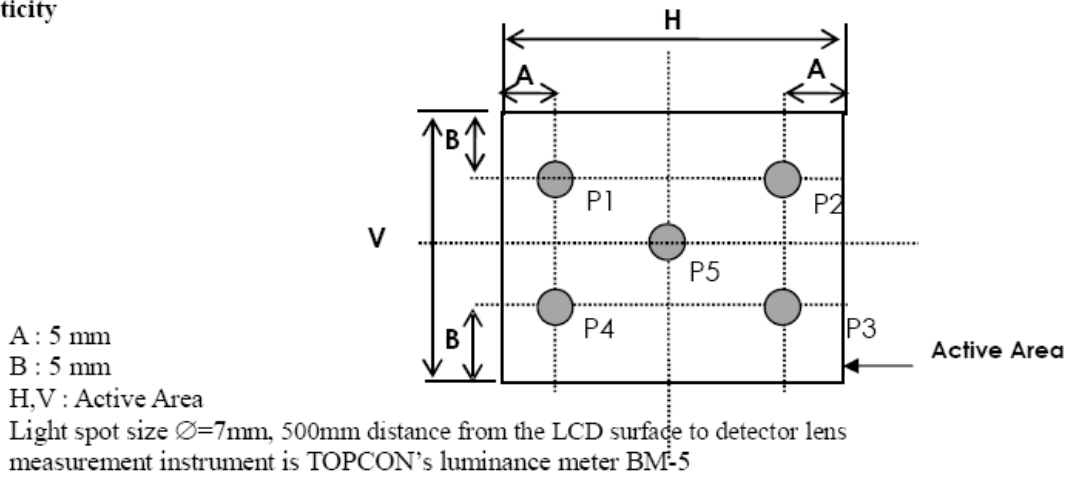
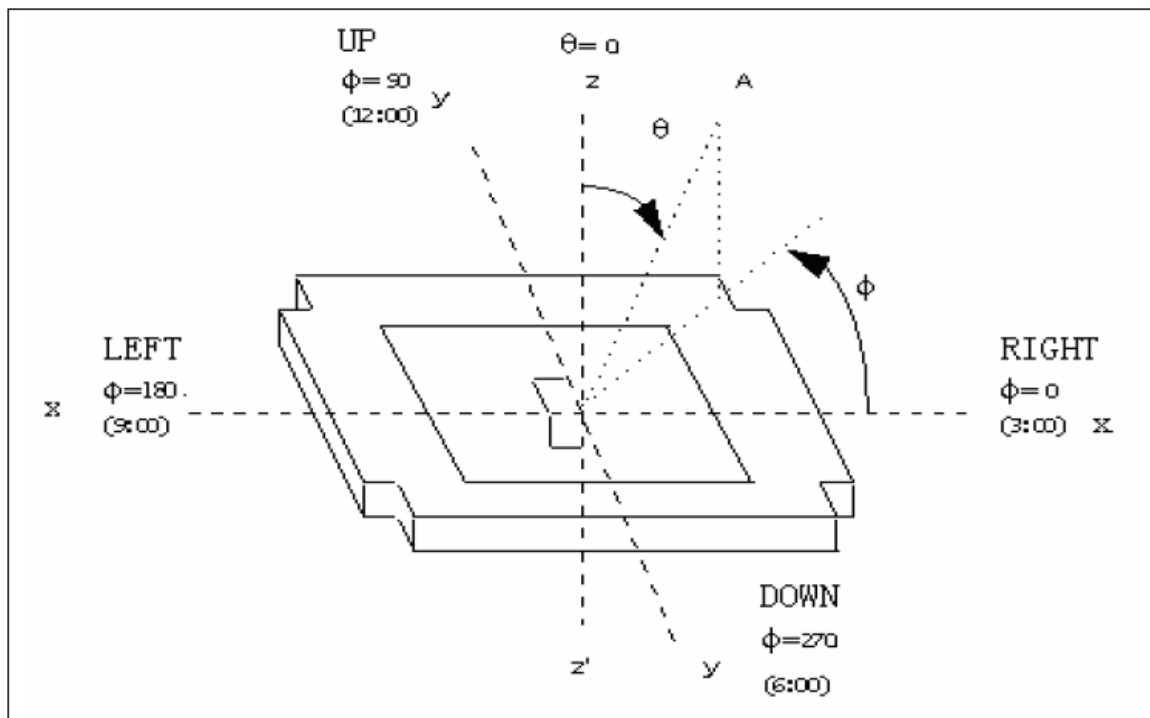
Note 5. CIE (x, y) chromaticity, The x, y value is determined by measuring luminance at each test position 1 through 5, and then make average value.

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

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

FIG. 3 The definition of viewing angle


■ INTERFACE DESCRIPTION

1. TFT LCD Panel Driving Section

Pin No.	Symbol	I/O	Function	Remark
1	LED-K	P	LED backlight(Cathode)	
2	LED-A	P	LED backlight(anode)	
3	GND	P	Power Ground	
4	VDD	P	Power supply	
5	R0	I	Red data(LSB)	Note 1
6	R1	I	Red data	Note 1
7	R2	I	Red data	
8	R3	I	Red data	
9	R4	I	Red data	
10	R5	I	Red data	
11	R6	I	Red data	
12	R7	I	Red data(MSB)	
13	G0	I	Green data(LSB)	Note 1
14	G1	I	Green data	Note 1
15	G2	I	Green data	
16	G3	I	Green data	
17	G4	I	Green data	
18	G5	I	Green data	
19	G6	I	Green data	
20	G7	I	Green data(MSB)	
21	B0	I	Blue data(LSB)	Note 1
22	B1	I	Blue data	Note 1

23	B2	I	Blue data	
24	B3	I	Blue data	
25	B4	I	Blue data	
26	B5	I	Blue data	
27	B6	I	Blue data	
28	B7	I	Blue data(MSB)	
29	GND	P	Power Ground	
30	CLK	I	Sample clock	Note 2
31	DISP	I	Display on/off	Note 3
32	HSYNC	I	Horizontal Sync Input	
33	VSYNC	I	Vertical Sync Input	
34	DEN	I	Data Input Enable	
35	NC	-	No connection	
36	GND	P	Power Ground	
37	NC	-	No connection	
38	NC	-	No connection	
39	NC	-	No connection	
40	NC	-	No connection	

I: input, O: output, P: Power

Note 1: When input 18 bits RGB data, the two low bits of R,G and B data must be grounded.

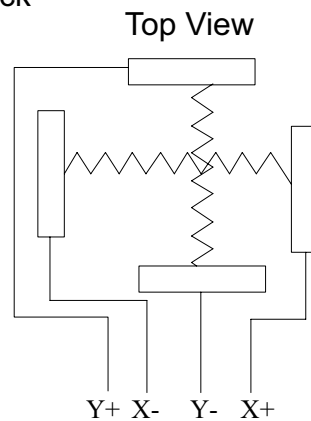
Note 2: Data shall be latched at the falling edge of DCLK.

Note 3: Display on/off control pin.
 When DISP="1", Display on,
 When DISP="0", Display off.

2. Touch Screen Panel Section

Pin No.	Symbol	I/O	Function	Remark
1	Y+	Top	Top electrode-differential analog	
2	X-	Left	Left electrode-differential analog	
3	Y-	Bottom	Bottom electrode-differential analog	
4	X+	Right	Right electrode-differential analog	

Note: Touch screen panel block



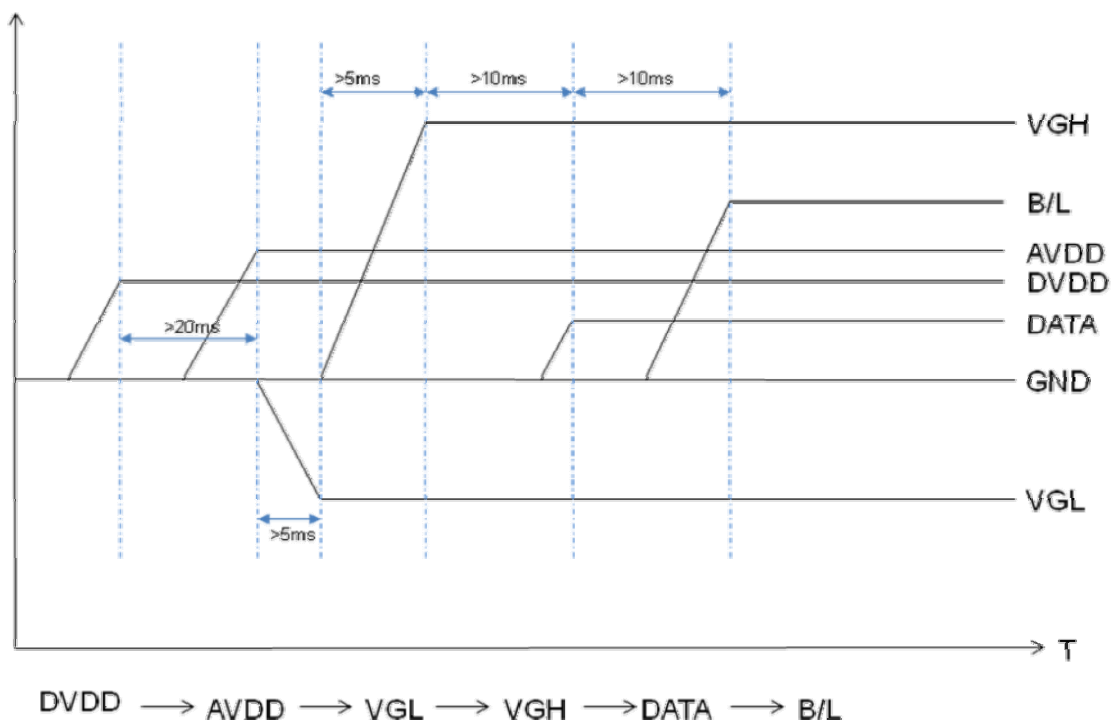
■ APPLICATION NOTES

1.Signal timing diagram

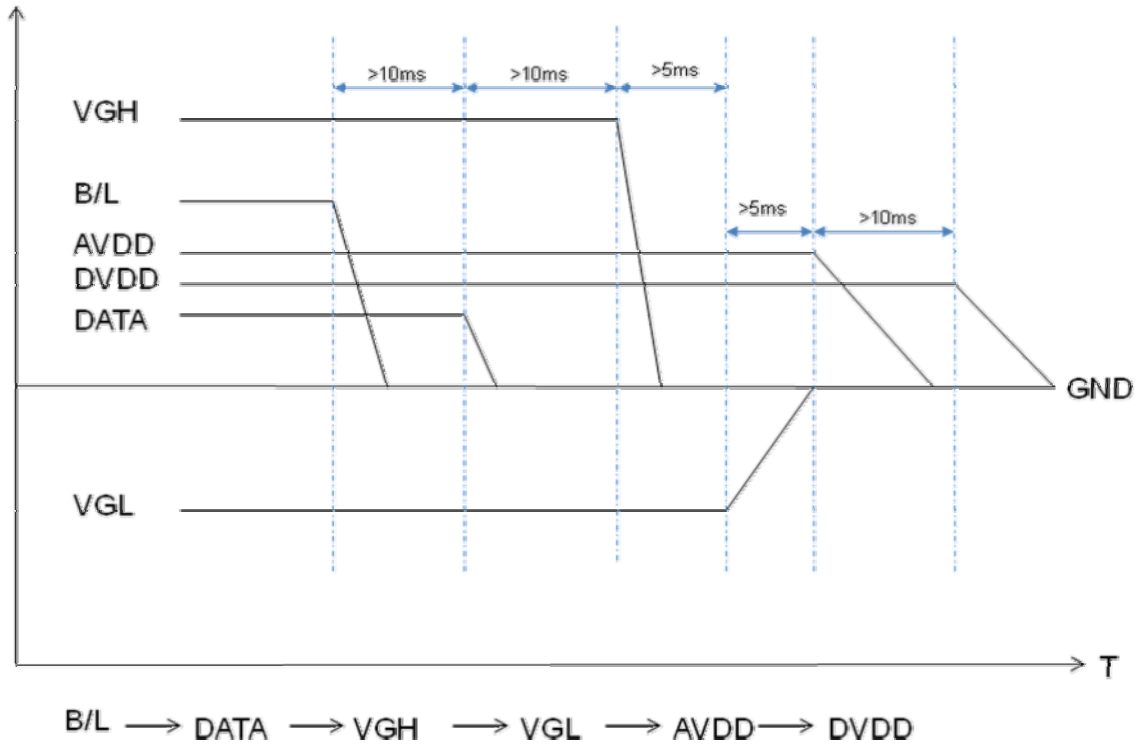
1.1 Signal Timing Diagram

1.1.1 Power ON/OFF Sequence

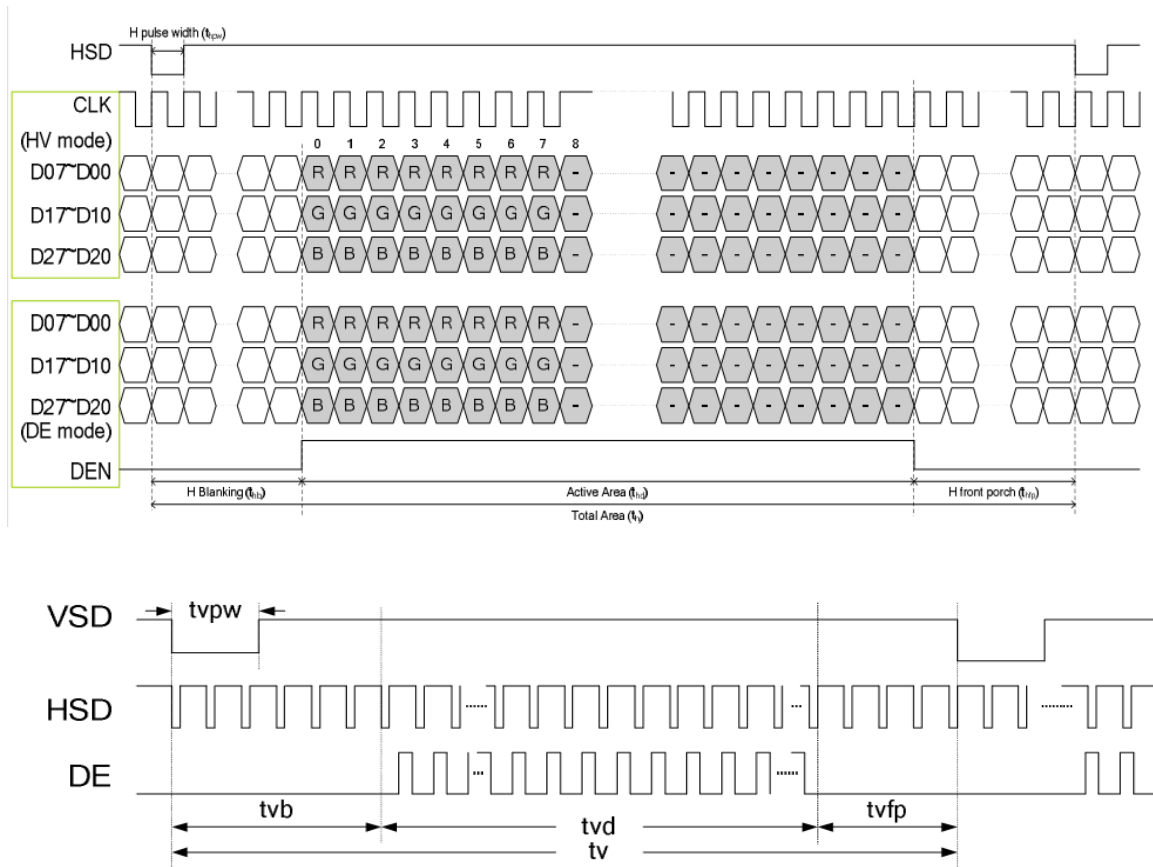
a Power on



b Power off



1.1.2 Data input format



1.1.3 Timing Diagram

Item	Symbol	Values			Unit	Remark
		Min	Typ	Max		
Horizontal Display Area	thd	-	800	-	DCLK	
DCLK frequency	fck	-	30	50	MHz	
One horizontal line	th	889	928	1143	DCLK	
HS pulse width	thpw	1	48	255	DCLK	
HS Blanking	thb	88	88	88	DCLK	
HS Front Porch	thfp	1	40	255	DCLK	

Item	Symbol	Values			Unit	Remark
		Min	Typ	Max		
Vertical display Area	tvd	-	480	-	TH	
VS period time	tv	513	525	767	TH	
VS pulse width	tvpw	3	3	255	TH	
VS Blanking	tvb	32	32	32	TH	
VS Front Porch	tvfp	1	13	255	TH	

■ TOUCH SCREEN PANEL SPECIFICATIONS

1. ELECTRICAL CHARACTERISTICS

Item	Value			Unit	Remark
	Min.	Typ.	Max.		
Linearity	-	-	3.0	%	Analog X and Y directions
Terminal Resistance	440	-	1100	Ω	X(Film side)
	100	-	420	Ω	Y(Glass side)
Insulation resistance	25	-	-	M Ω	DC 25V
Voltage	-	-	10	V	DC
Chattering	-	-	10	ms	100k Ω pull-up
Transparency	78	-	-	%	

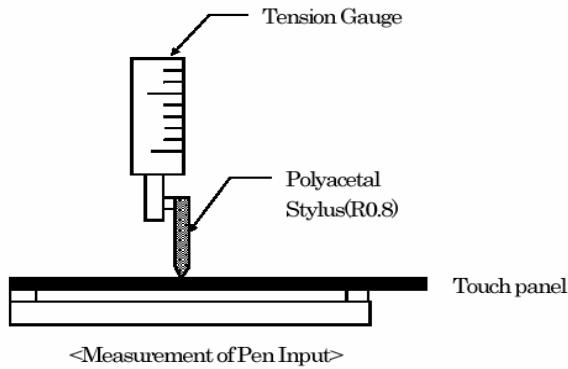
Note: Avoid operating with hard or sharp material such as a ball point pen or a mechanical pencil except a polyacetal pen (tip R0.8mm or less) or a finger.

2. MECHANICAL & RELIABILITY CHARACTERISTICS

Item	Value			Unit	Remark
	Min.	Typ.	Max.		
Active force	80	-	-	gf	Note 1
Durability-surface scratching	Write 100,000	-	-	characters	Note 2
Durability-surface pitting	1,000,000	-	-	touches	Note 3
Surface hardness	3	-	-	H	

Note 1: Active force test condition

- (1) Input DC 5V on X direction, Drop off Polyacetal Stylus (R0.8), until output voltage stabilize ,then get the activation force .
- (2) R8.0mm Silicon rubber for finger Activation force test
- (3) Test point: 9 points



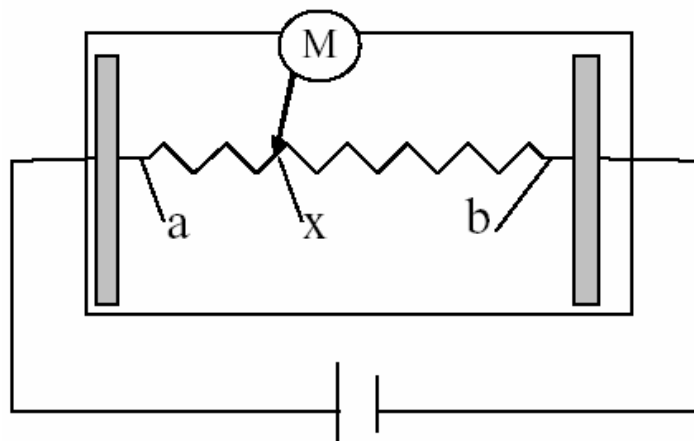
Note 2: Measurement for surface area.

- Scratch 100,000 times straight line on the film with a stylus change every 20,000 times.
- Force: 250gf.
- Speed: 60mm/sec.
- Stylus: R0.8 polyacetal tip.

Note 3: Pit 1,000,000 times on the film with a R0.8 silicon rubber.

- Force: 250gf.
- Speed: 2times/sec.

3. LINEARITY DEFINITION



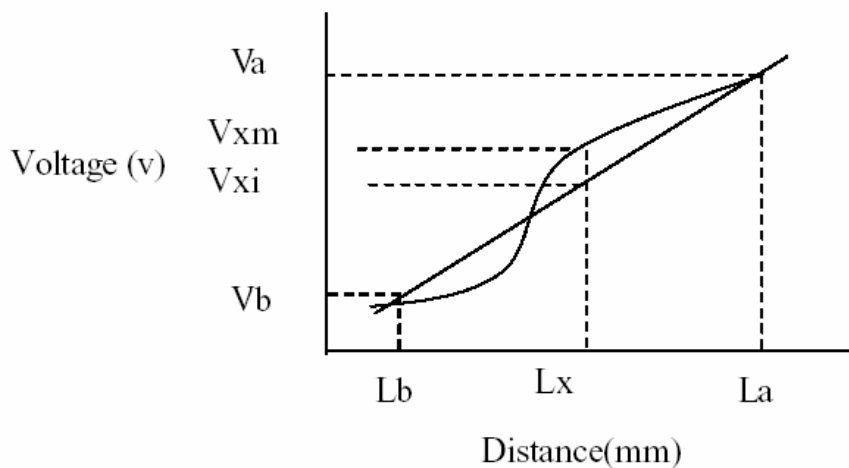
Va: maximum voltage in the active area of touch panel

Vb: minimum voltage in the active area of touch panel

X: random measuring point

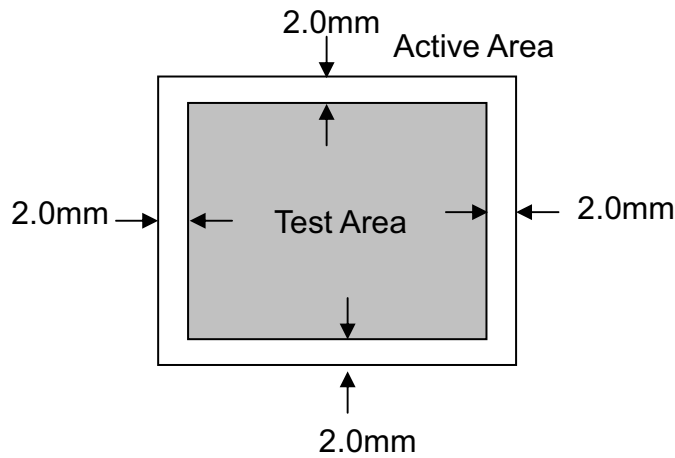
Vxm: actual voltage of Lx point

Vxi: theoretical voltage of Lx point



$$\text{Linearity} = \frac{|V_{xi} - V_{xm}|}{(V_a - V_b)} * 100\%$$

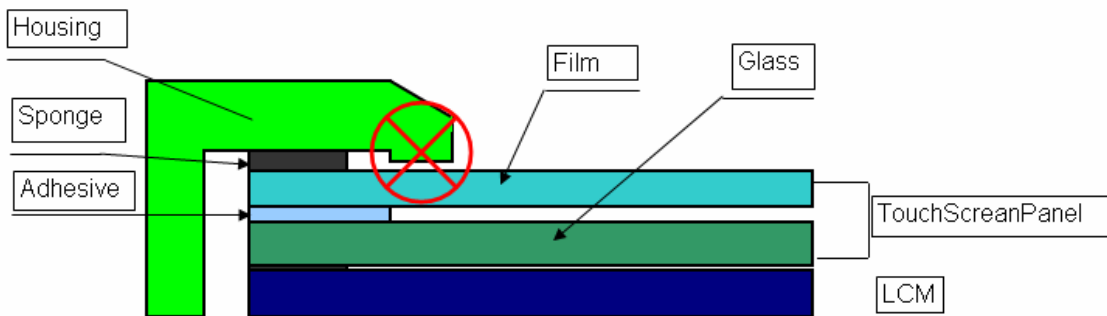
Note: Test area is as follows and operation force is 150gf.



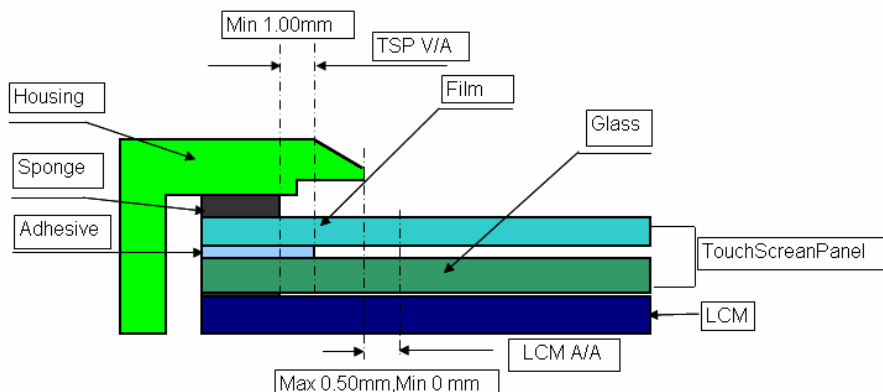
3. HOUSING DESIGN GUIDE

Housing design follow as below.

- 1) Avoid the design that housing overlap and press on the active area of the LCM.
- 2) Give enough gap(over 0.5mm at compressed) between the housing and TSP to protect wrong operating.



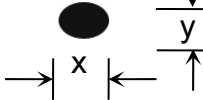
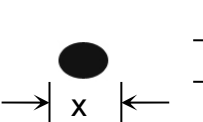
- 3) Use a buffer material(Gasket) between the TSP and housing to protect damage and wrong operating.
overlap and press on the inside of TSP view area.

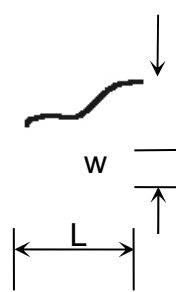
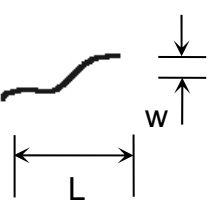


■ RELIABILITY TEST

No.	Test Item	Test Condition	Inspection after test
1	High Temperature Storage	80±2℃/120 hours	Check and record every 48Hrs
2	Low Temperature Storage	-30±2℃/120 hours	
3	High Temperature Operating	70±2℃/120 hours	
4	Low Temperature Operating	-20±2℃/120 hours	
5	Temperature Cycle	-20±2℃~25~70±2℃×20cycles (30min.) (5min.) (30min.)	Each 10 cycles end , check
6	Damp Proof Test	60℃±5℃×90%RH/96 hours	Check and record every 48hrs
7	Vibration Test	Frequency: 10Hz~55Hz~10Hz Amplitude: 1.5mm, X, Y, Z direction for total 2hours (Packing condition)	Check the Appearance and Electrical Characteristics
8	Curve	60 Thousand times, 40 times/min 150° (according to die if exist)	Check and record every 2~4 thousand times
9	ESD test	Gap mood: ±1KV~±8KV (10 times air discharge with positive/negative voltage voltage gap : 1kv) Touch mood: ±1KV~ ±4KV	Each discharge end, Check the Electrical Characteristics
10	Slump	Free faller movement for each side, cording,angle (75cm High,6 sides,2 angle,2 cording)	End

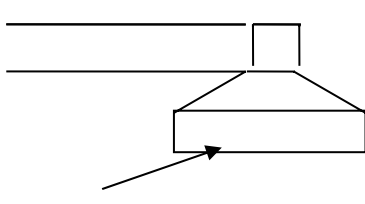
■ INSPECTION CRITERION

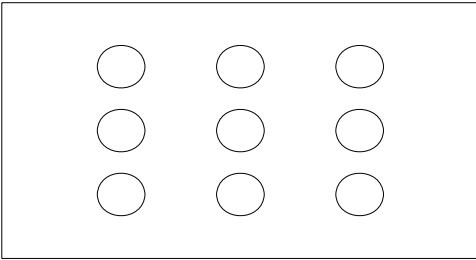
No	Item	Criterion								
01	Outline Dimension	In accord with drawing								
02	Position-finding Dimension Assemble Dimension	In accord with drawing								
03	LCD black spots, white spots (Round type)	Round type: non display 3.1 Small area LCD <div style="display: flex; align-items: center; margin-top: 10px;">  <div style="margin-left: 20px;"> Unit : mm <table border="1" style="border-collapse: collapse; text-align: center;"> <thead> <tr> <th>Dimension</th> <th>Qualified Quantity</th> </tr> </thead> <tbody> <tr> <td>$D \leq 0.1$</td> <td>Ignore</td> </tr> <tr> <td>$0.1 < D \leq 0.15$</td> <td>2</td> </tr> <tr> <td>$D > 0.15$</td> <td>0</td> </tr> </tbody> </table> </div> </div>	Dimension	Qualified Quantity	$D \leq 0.1$	Ignore	$0.1 < D \leq 0.15$	2	$D > 0.15$	0
		Dimension	Qualified Quantity							
$D \leq 0.1$	Ignore									
$0.1 < D \leq 0.15$	2									
$D > 0.15$	0									
3.2 Large area LCD <div style="display: flex; align-items: center; margin-top: 10px;">  <div style="margin-left: 20px;"> <table border="1" style="border-collapse: collapse; text-align: center;"> <thead> <tr> <th>Dimension</th> <th>Qualified Quantity</th> </tr> </thead> <tbody> <tr> <td>$D \leq 0.1$</td> <td>Ignore</td> </tr> <tr> <td>$0.1 < D \leq 0.15$</td> <td>2</td> </tr> <tr> <td>$0.15 < D \leq 0.20$</td> <td>1</td> </tr> <tr> <td>$D > 0.20$</td> <td>0</td> </tr> </tbody> </table> <p>C-STN : if $D > 0.1$, unqualified</p> </div> </div>	Dimension	Qualified Quantity	$D \leq 0.1$	Ignore	$0.1 < D \leq 0.15$	2	$0.15 < D \leq 0.20$	1	$D > 0.20$	0
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04	LCD black spots, white spots (Line Style)	Unit : mm 		4.1 Small area LCD																
			4.2 Large area LCD																	
			<table border="1"> <thead> <tr> <th>Length</th> <th>Width</th> <th>Qualified Quantity</th> </tr> </thead> <tbody> <tr> <td>-</td> <td>≤ 0.015</td> <td>Ignore</td> </tr> <tr> <td>≤ 1.0</td> <td rowspan="2">$0.015 < W \leq 0.025$</td> <td>2</td> </tr> <tr> <td>≤ 2.0</td> <td>1</td> </tr> <tr> <td>≤ 1.0</td> <td>$0.025 < W \leq 0.05$</td> <td>1</td> </tr> <tr> <td>-</td> <td>$D > 0.05$</td> <td>According to circle</td> </tr> </tbody> </table>	Length	Width	Qualified Quantity	-	≤ 0.015	Ignore	≤ 1.0	$0.015 < W \leq 0.025$	2	≤ 2.0	1	≤ 1.0	$0.025 < W \leq 0.05$	1	-	$D > 0.05$	According to circle
Length	Width	Qualified Quantity																		
-	≤ 0.015	Ignore																		
≤ 1.0	$0.015 < W \leq 0.025$	2																		
≤ 2.0		1																		
≤ 1.0	$0.025 < W \leq 0.05$	1																		
-	$D > 0.05$	According to circle																		
			<table border="1"> <thead> <tr> <th>Length</th> <th>Width</th> <th>Qualified Quantity</th> </tr> </thead> <tbody> <tr> <td>-</td> <td>≤ 0.015</td> <td>Ignore</td> </tr> <tr> <td>≤ 2.0</td> <td>$0.015 < W \leq 0.025$</td> <td>2</td> </tr> <tr> <td>≤ 1.0</td> <td>$0.025 < W \leq 0.05$</td> <td>1</td> </tr> <tr> <td>-</td> <td>$D > 0.05$</td> <td>According to circle</td> </tr> </tbody> </table> <p style="text-align: center;">CSTN : If $W \geq 0.015$, unqualified Ignore beyond viewing area</p>	Length	Width	Qualified Quantity	-	≤ 0.015	Ignore	≤ 2.0	$0.015 < W \leq 0.025$	2	≤ 1.0	$0.025 < W \leq 0.05$	1	-	$D > 0.05$	According to circle		
Length	Width	Qualified Quantity																		
-	≤ 0.015	Ignore																		
≤ 2.0	$0.015 < W \leq 0.025$	2																		
≤ 1.0	$0.025 < W \leq 0.05$	1																		
-	$D > 0.05$	According to circle																		
05	LCD Scratch , Threadlike Fiber	Same to NO.3 circle sightline and surface of LCD is vertical (2) Same to NO.3 line style																		
06	POL	It is not admissible that POL is beyond the edge of glass, else, unqualified. It is essential that POL is over the 50 percent of width of frame , else ,unqualified. According to the drawing in case of special definition.																		
07	IC/FPC Bonding	Scratch	Reject																	

		Intensity Of Adhesion	If lower than specification, reject	
		Gold Fold Twist	Reject	
07	IC/FPC Bonding	Silicon	According to outline, no gold outside, seal can not be higher than LCD	
		FPC Gold Sever	Reject	
08	SMT	Lack of Component、Polarity Inverse	If exist, reject	
		Leak Solder、Virtual Solder	If exist, reject	
		Short Circuit In Solder Point	If exist, reject	
		Tin Ball	If exist, reject	
		Tin Acumination	If visual, reject	
		Height Solder Point	If higher 0.5mm than component. reject	
		Height of component	Either side higher 0.5mm than component, reject	

		Component Shift	<p> $X < 3/4Z$ $y > 1/3D$ </p> <p>reject reject</p>	
08	SMT	Few Tin	<p>If $\theta \leq 20^\circ$ reject</p>	
		Component Deflection	<p>If $Y > 1/3D$ reject</p>	
		Component Carcass Sideways	Reject	

		Component Carcass Sideways	If exist with visual inspection , reject	
		Lot Tin	A: Tin accrete the solder side completely , hollowly ,Ok B: Tin accrete the solder side completely , full circle arc , ok C: Jointing include whole solder side, height of tin>50 percent of height of component, reject	
		Few Tin	A: Tin accrete the solder side completely , hollowly ,Ok B: height of tin > 1/3 of solder side of component , ok C: height of tin \leq 1/3 of solder side of component, reject	
08	SMT	<p style="text-align: center;">Normal</p>  <p style="text-align: center;">Jointing side</p>		
		Short circuit , Open circuit	Forbid	
09	Light	Quality of CSTN Display	1、 Rolling strake with visual inspection, forbid 2、 Differentness of color in viewing area with visual inspection (full white、 red、 green、 blue), forbid 3 、 Display change with visual inspection , forbid	

10	Color Of CIE Coordinate		x	y	Drive LCD under normal condition, 25°C $\phi=0$ $\theta=0$ Test white、red、green blue with DMS Record
		white	± 0.05	± 0.05	
		Red	± 0.05	± 0.05	
		Green	± 0.05	± 0.05	
		Blue	± 0.05	± 0.05	
		According to the specification or sample customer have approved			
11	Brightness	In accord with product specification	Drive condition is according to specification Measure location is in Follow Picture 3、Adjust brightness instrument to zero , burrow against the surface of LCD , press “measure” , record when the display is steady. (YOKOGAWA-3298)		
			 <p style="text-align: center;">Measure location</p>		
12	CR (Max)	According to specification	According to product specification Measure instrument (DMS-501)		
13	Response time	According to specification	According to product specification Measure instrument (DMS-501)		
14	Viewing angle	According to specification	According to product specification Measure instrument (DMS-501)		
15	Vibration、Ring	Compare with the sample customer supply	Compare with the sample customer supply when assemble		
16	Frequency Of FPC Bend	According to the use of product (main FPC of foldaway cell phone ≥ 6 thousand)	Measure instrument Bend angle : 150° Fix FPC in the casement when customer supply		

■ PRECAUTIONS FOR USING LCD MODULES

Handing Precautions

(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.

(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.

(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).

(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. 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 is contacting with room temperature air.

(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.

(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 contacting oil and fats.

(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.

(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.

(9) Do not attempt to disassemble or process the LCD module.

(10) NC terminal should be open. Do not connect anything.

(11) If the logic circuit power is off, do not apply the input signals.

(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 remove 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 dried. 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

(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 LCM.

Storage Precautions

When storing the LCD modules, the following precaution is necessary.

- (1) Store them in a sealed polyethylene bag. If properly sealed, there is no need for the dessicant.
- (2) Store them in a dark place. Do not expose to sunlight or fluorescent light, keep the temperature between 0°C and 35°C.
- (3) The polarizer surface should not come in contact with any other objects. (We advise you to store them in the container in which they were shipped).

Others

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.

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.

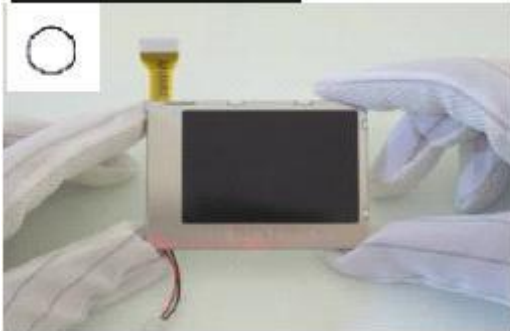
To minimize the performance degradation of the LCD modules resulting from destruction caused by static electricity etc., exercise care to avoid holding the following sections when handling the modules.

- Exposed area of the printed circuit board.
- Terminal electrode sections.

Handling precaution for LCM

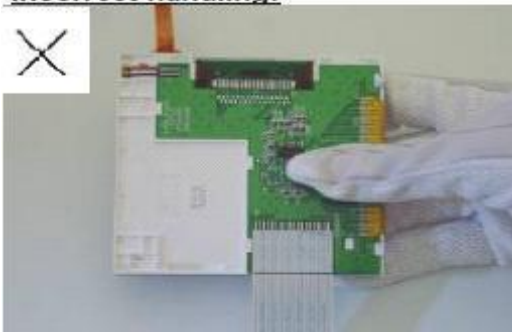
LCM is easy to be damaged.
Please note below and be careful for handling!

Correct handling:



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

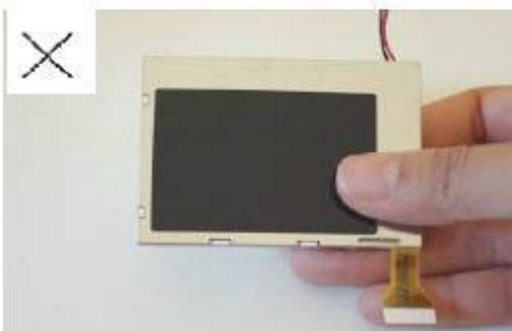
Incorrect handling:



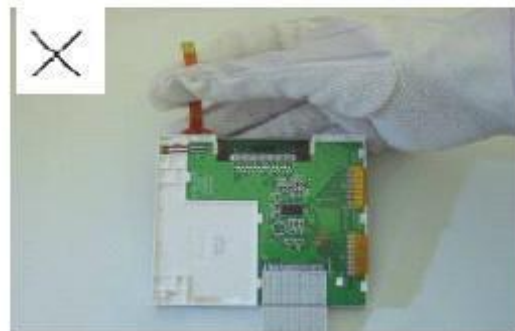
Please don't touch IC directly.



Please don't stack LCM.



Please don't hold the surface of panel.

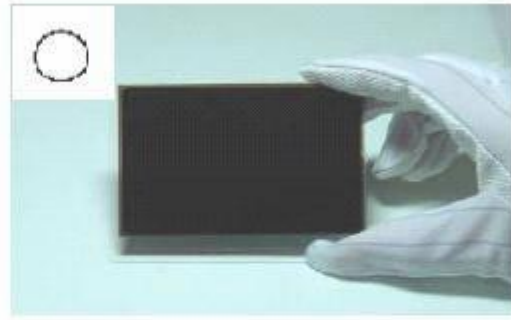


Please don't stretch interface of output, such as FPC cable.

Handling precaution for LCD

LCD is easy to be damaged.
Please note below and be careful for handling!

Correct handling:

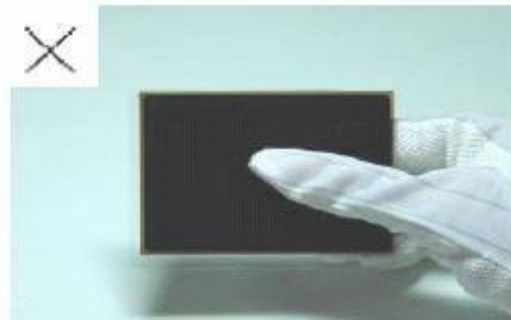


As above photo, please handle with anti-static gloves around LCD edges.

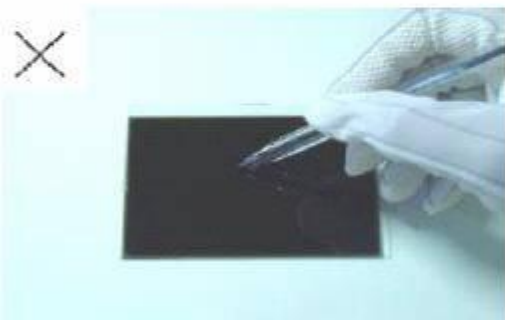
Incorrect handling:



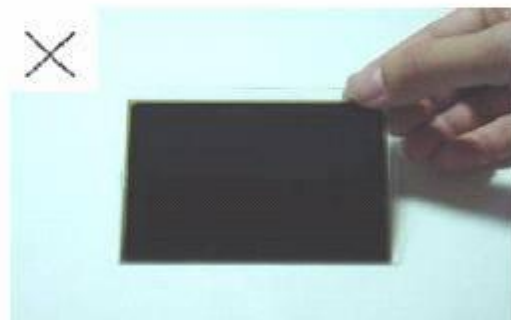
Please don't stack the LCDS.



Please don't hold the surface of LCD.



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



Please don't touch ITO glass without anti-static gloves.

Storage Precautions

When storing the LCD modules, the following precaution is necessary.

- (1) Store them in a sealed polyethylene bag. If properly sealed, there is no need for the dessicant.
- (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) 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.

Others

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.

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.

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.

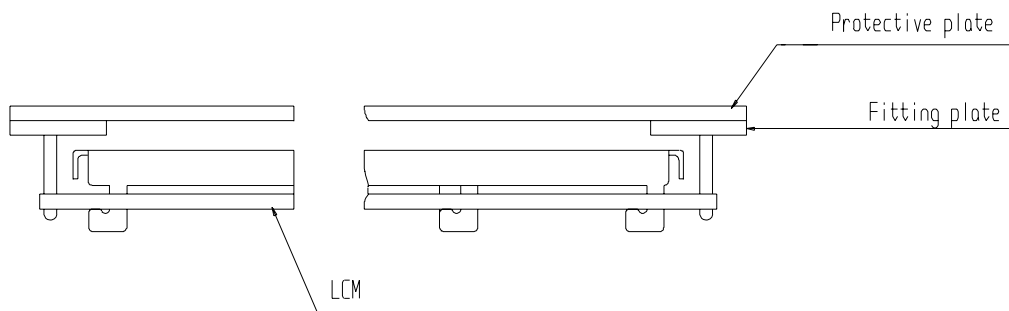
- Exposed area of the printed circuit board.
- Terminal electrode sections.

USING LCD MODULES

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.

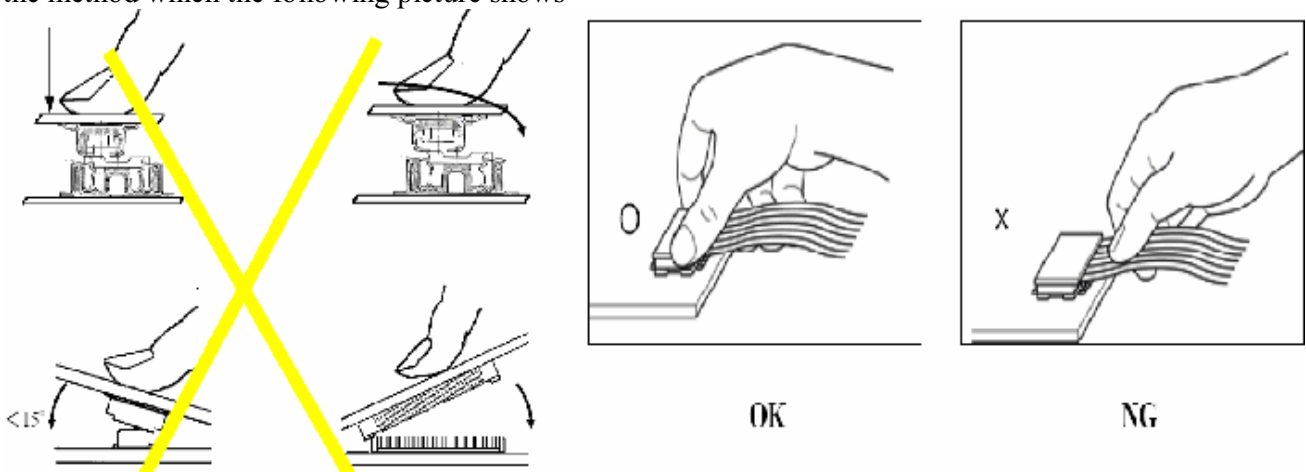
- (1) Cover the surface with a transparent protective plate to protect the polarizer and LC cell.



- (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 ± 0.1 mm.

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



Precaution for soldering to the LCM

	Hand 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

(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.

(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.

(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.

Precautions for Operation

(1) Viewing angle varies with the change of liquid crystal driving voltage (VLCD). Adjust VLCD to show the best contrast.

(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.

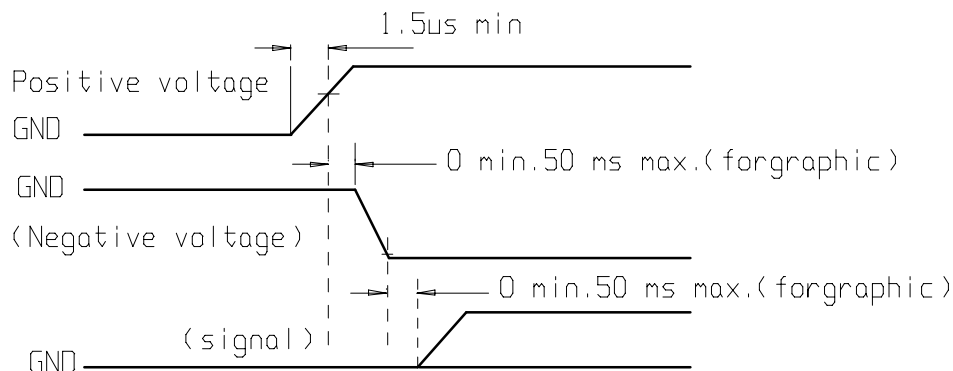
(3) Response time will be extremely delayed at lower temperature than the operating temperature range and on the other hand at higher temperature LCD's show dark color in them. However those phenomena do not mean malfunction or out of order with LCD's, Which will come back in the specified operating temperature.

(4) 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.

(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.

(6) Input each signal after the positive/negative voltage becomes stable.

(7) Please keep the temperature within specified range for use and storage. Polarization degradation, bubble generation or polarizer peel-off may occur with high temperature and high humidity.



Safety

(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.

(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.

Limited Warranty

Unless agreed between Multi-Inno and 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 replacement on the terms set forth above. Multi-Inno will not be responsible for any subsequent or consequential events.

Return LCM under warranty

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

- Broken LCD glass.
- PCB eyelet is damaged or modified.
- PCB conductors damaged.
- Circuit modified in any way, including addition of components.
- PCB tampered with by grinding, engraving or painting varnish.
- Soldering to or modifying the bezel in any manner.

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.

■ PRIOR CONSULT MATTER

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