CRYSTAL CLEAR TECHNOLOGY

Product Specification

T700T03X00

(REVISION 4)

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1.0 Table of Contents

2.0 Records of Revision

Rev	Date	Item	Page	Comment	Originator	Checked By
1.0	13.01.16			Initial Release	Liew	Azhar
2.0	28.01.16			Change model name T700B03X00 to T700X03X00	Azhar	Azhar
3.0	16.03.16			Add new version T700B03D00C	Azhar	Azhar
4.0	10.05.16			Change model name T700X03X00 to T700T03X00, change reliability test condition, add inspection criteria, remove capacitive touch panel TP0021.	Adam	Azhar

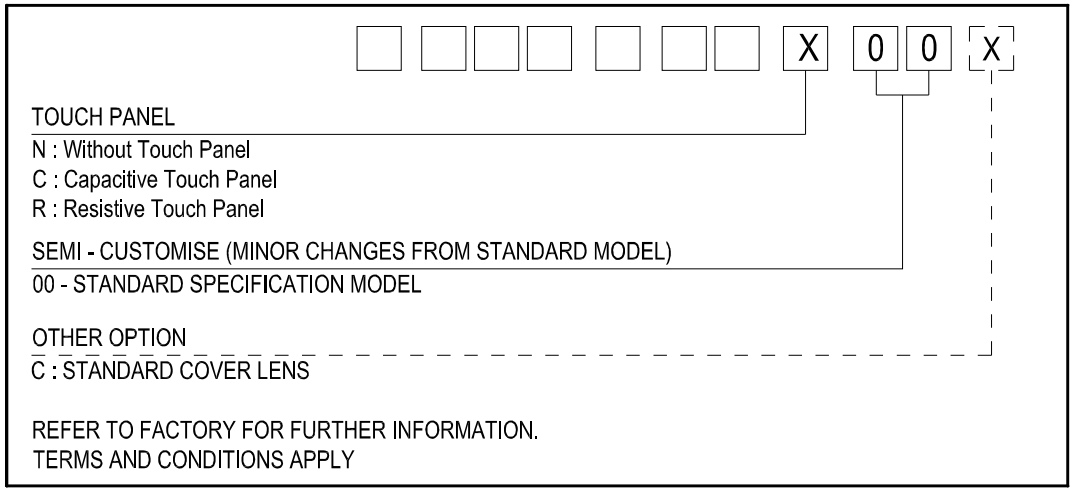
3.0 General Specification

T700T03X00 is 7.0” color TFT-LCD (Thin Film Transistor Liquid Crystal Display) module composed of LCD panel, driver ICs control circuit, LED backlight and Touch Panel. This display area contains 800 x 480 pixels and can display up to 16M colors. This product compliant with RoHS environmental requirement.

Item	Contents	Unit	Note
LCD Type	7.0” TFT	-	
Display color	16.2M	-	1
Viewing Direction (Optimum View)	12	O ’Clock	
Display Mode	Normally White	-	
Module size	165.0(W) ×100.0(H) ×3.5(D)	mm	2
Active Area(W×H)	154.08 (H) x 85.92 (V)	mm	
Number of Dots	800(RGB) X 480	dots	
Controller	ILI6480 or equivalent	-	
Backlight	18-LEDs (white)	pcs	
Brightness	200	cd/m2	3
Interface Mode	TTL RGB	-	
Data Transfer	RGB	-	

Note1: Color tone is slightly changed by temperature and driving voltage.
Note2: FPC or wire are not included.
Note3: Brightness on LCD surface. Module with CTP or RTP, brightness will be about 20% (max) lower on the touch panel surface.

AVAILABLE OPTION



4.0 Absolute Maximum Rating

(Note1)

Item	Symbol	Values		Unit	Remarks
		Min	Max		
Power Voltage	DV_{DD}	-0.3	5.0	V	
	AV_{DD}	-0.5	13.5	V	
	V_{GH}	-0.3	42.0	V	
	V_{GL}	-20.0	0.3	V	
	V_{GH} - V_{GL}	12	40.0	V	
Operating Temperature	T_{OP}	-20	60	°C	
Storage Temperature	T_{ST}	-30	70	°C	

Note1: The absolute maximum ratings values of this product are not allowed to be exceeded at any times. Should a module be used with any of the absolute maximum ratings, the characteristics of the module may not be recovered or is an extreme case, the module may be permanently destroyed.

Note2: VR Condition: Zener Diode 20mA.

5.0 Electrical Characteristic

5.1 Typical Operating Conditions

(Note 1)

Item	Symbol	Values			Unit	Remarks
		Min	Typ	Max		
Power Voltage	DV_{DD}	3.0	3.3	3.6	V	Note2
	AV_{DD}	10.1	10.3	10.5	V	
	V_{GH}	17	18	19	V	
	V_{GL}	-9.0	-8.0	-7.0	V	
Input Signal Voltage	V_{COM}	3.0	3.3	3.6	V	Note 4
Input Logic High Voltage	V_{IH}	$0.7DV_{DD}$	-	DV_{DD}	V	Note 3
Input Logic Low Voltage	V_{IL}	0	-	$0.3DV_{DD}$	V	

Note 1: Be sure to apply DV_{DD} and V_{GL} to the LCD first, and then apply V_{GH}.
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.
Note 4: Typical V_{COM} is only a reference value. It must be optimized according to each LCM. Please use VR and base on below application circuit.

5.2 Current Consumption

Item	Symbol	Values			Unit	Remarks
		Min	Typ	Max		
Current for Driver	I_{GH}	-	0.2	1.0	mA	V_{GH} = 18V
	I_{GL}	-	0.2	1.0	mA	V_{GL} = -8.0V
	IDV_{DD}	-	4.0	10	mA	DV_{DD} = 3.3V
	IAV_{DD}	-	20	50	mA	AV_{DD}= 10.3V

5.2.1 Backlight Driving Conditions

Item	Symbol	Values			Unit	Remarks
		Min	Typ	Max		
Voltage for LED Backlight	I_L	8.7	9.3	9.9	mA	Note 1
Current for Led Backlight	I_L	100	120		mA	
LED lifetime	-	20 000			Hr	Note 2

Note 1: The LED Supply Voltage is defined by the number of LED at Ta=25℃and IL =180mA

Note 2: The “LED life time” is defined as the Backlight brightness decrease to 50% of original brightness at Ta=25℃ and IL =120mA. The LED lifetime could be decreased if operating IL is larger than 120mA.

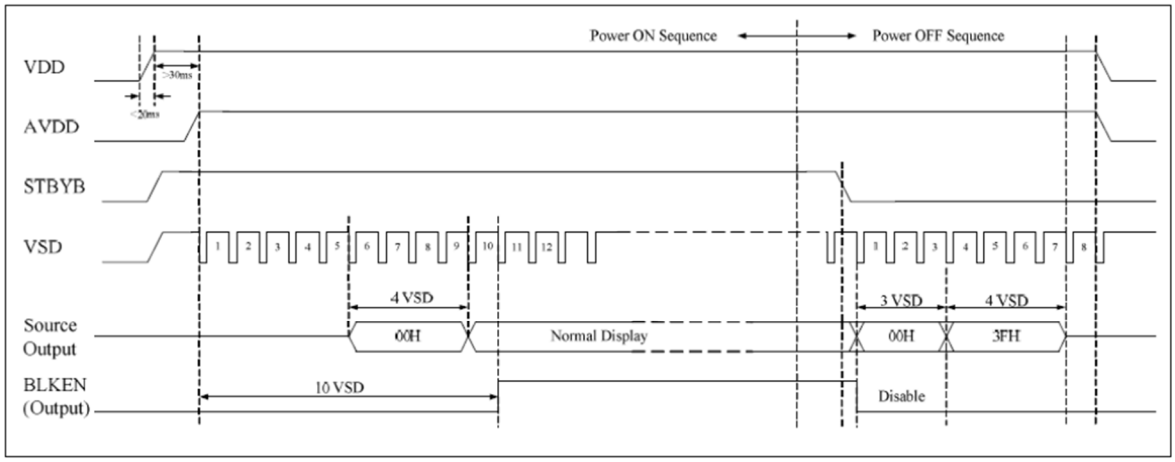
5.3 Power Sequence

To prevent the device damage from latch up, the power on/off sequence shown below must be followed.

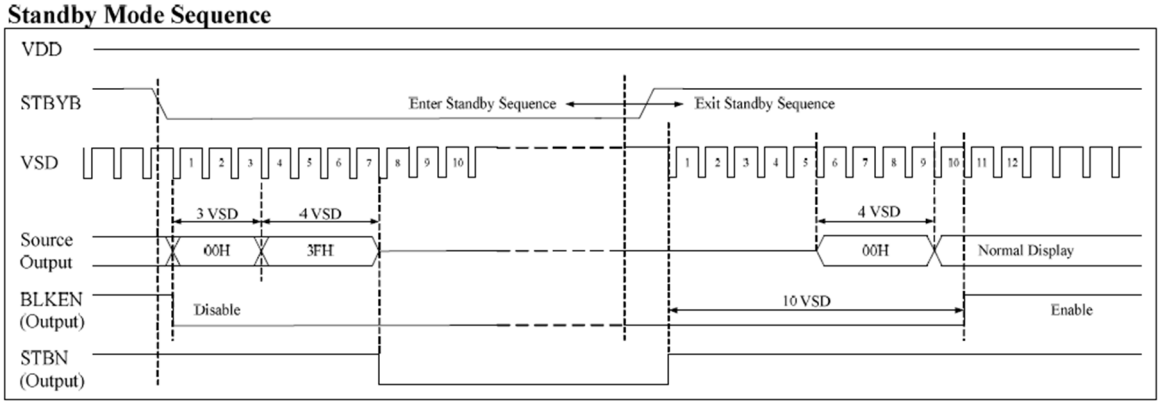
Power ON: VDD, VSS → VDDA, VSSA

Power OFF: VDDA, VSSA → VDD, VSS

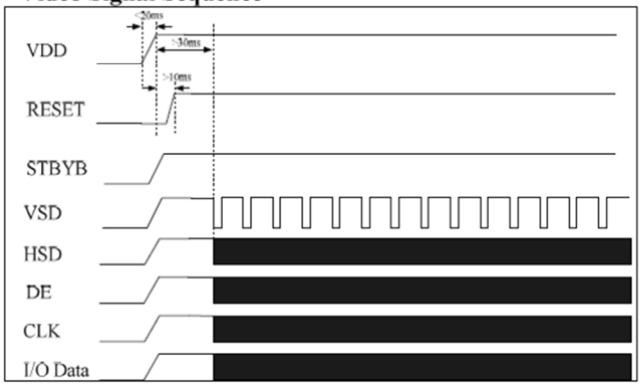
5.3.1 Power on/off control



Standby Mode Sequence



Video Signal Sequence



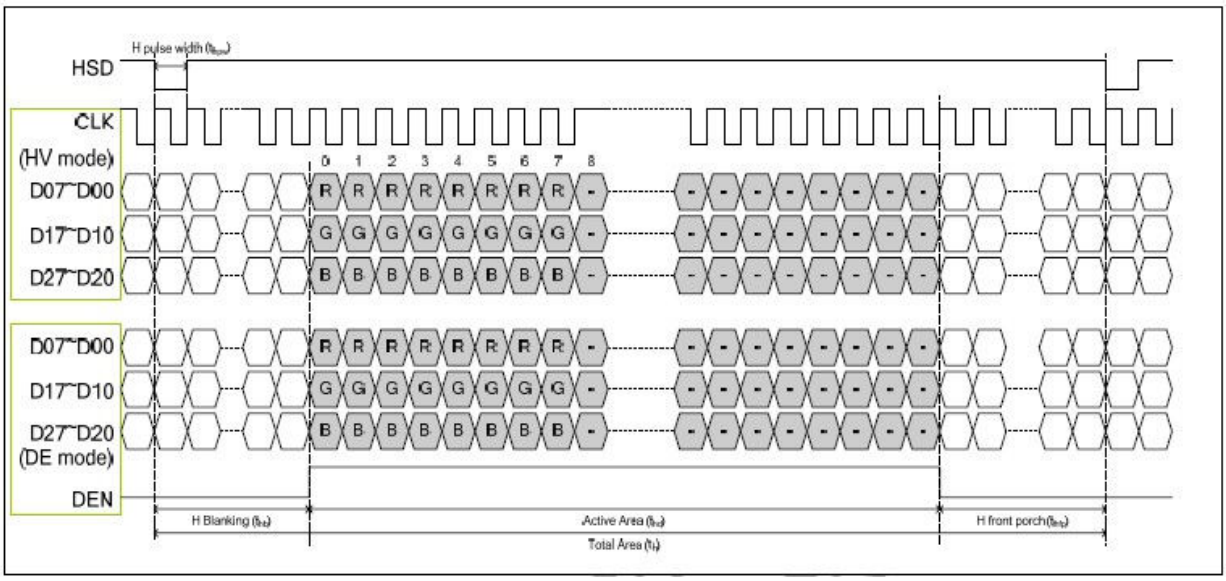
5.4 Timing Characteristics

5.4.1 AC Electrical Characteristics

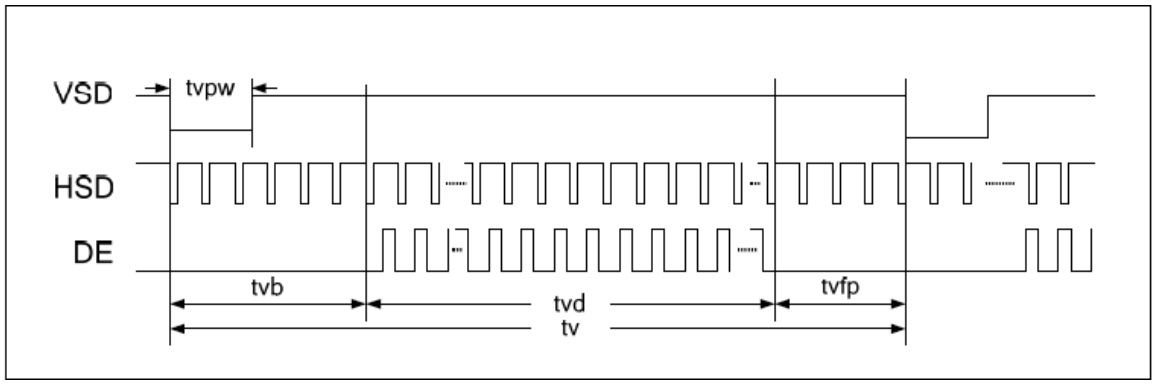
Parameter	Symbol	Spec.			Unit
		Min.	typ.	Max.	
HS setup time	Thst	8	-	-	ns
HS hold time	Thhd	8	-	-	ns
VS setup time	Tvst	8	-	-	ns
VS hold time	Tvhd	8	-	-	ns
Data setup time	Tdsu	8	-	-	ns
Data hold time	Tdhd	8	-	-	ns
DE setup time	Tesu	8	-	-	ns
DE hold time	Tehd	8	-	-	ns
VDD Power On Slew rate	TPOR	-	-	20	ms
RSTB pulse width	TRst	10	-	-	us
CLKIN cycle time	Tcph	20	-	-	ns
CLKIN pulse duty	Tcwh	40	50	60	%
Output stable time	Tsst	-	-	6	us

5.4.2 Data Input Format

Horizontal Timing



Vertical Timing



Horizontal Timing

Parameter	Symbol	Min.	Typ.	Max	Unit	Note
Horizontal Display Area	thd	-	800	-	DCLK	
DCLK frequency	fclk	-	30	50	MHz	
One Horizontal Line	th	889	928	1143	DCLK	
HS pulse width	thpw	1	48	255	DCLK	
HS Back Porch(Blanking)	thbp		88		DCLK	
HS Front Porch	thfp	1	40	255	DCLK	
DE Mode Blanking	th-thd	85	128	512	DCLK	

Vertical Timing

Parameter	Symbol	Min.	Typ.	Max	Unit	Note
Vertical Display Area	tvd	-	480	-	Th	
VS period time	tv	513	525	767	Th	
VS pulse width	tvpw	3	3	255	Th	
VS Back Porch(Blanking)	tvbp		32		Th	
VS Front Porch	tvfp	1	13	255	Th	
DE Mode Blanking	tv-tvd	4	45	255	Th	

6.0 interface Pin Connection

Pin No.	Symbol	I/O	Function	Remark
1	VLED+	P	Power for LED backlight (Anode)	
2	VLED+	P	Power for LED backlight (Anode)	
3	VLED-	P	Power for LED backlight (Cathode)	
4	VLED-	P	Power for LED backlight (Cathode)	
5	GND	P	Power ground	
6	V_{COM}	P	Common Voltage	
7	DV_{DD}	P	Digital Power	
8	MODE	I	DE/SYNC mode select	
9	DE	I	Date Input Enable	
10	VS	I	Vertical Sync Input	
11	HS	I	Horizontal Sync Input	
12	B7	P	Blue Data(MSB)	
13	B6	I	Blue Data	
14	B5	I	Blue Data	
15	B4	I	Blue Data	
16	B3	I	Blue Data	
17	B2	P	Blue Data	
18	B1	I	Blue Data	
19	B0	I	Blue Data(LSB)	
20	G7	I	Green data (MSB)	
21	G6	I	Green data	
22	G5	P	Green data	
23	G4	I	Green data	
24	G3	I	Green data	
25	G2	I	Green data	
26	G1	I	Green data	
27	G0	P	Green data(LSB)	
28	R7	I	Red data	
29	R6	I	Red data	

30	R5	I	Red data	
31	R4	I	Red data	
32	R3	P	Red data	
33	R2	I	Red data	
34	R1	I	Red data	
35	R0	I	Red data LSB)	
36	GND	I	Power ground	
37	DCLK	P	Sample Clock	
38	GND	I	Power ground	
39	L/R	-	Left/Right Selection	
40	U/D	I	Up/down selection	Note 5
41	VGH		Gate ON Voltage	
42	VGL	I	Gate Off Voltage	Note 3,4
43	AVDD	I	Power for Analog Circuit	Note 3,4
44	RESET	I	Global reset pin.	Note 6
45	NC	I	No Connection	Note 1
46	Vcom	P	Common Voltage	
47	DITHB	I	Dithering function	Note 2
48	GND	I	Power ground	
49	NC	I	No Connection	
50	NC	I	No Connection	

I: Input, O: Output, P: Power

Note 1: DE/SYNC mode select normally pull high
When select DE mode, MODE = “1’, VS and HS must pull High
When select SYNC mode, MODE = “0”, DE must be grounded

Note 2: When input 18 bits RGB data, the two low bits of R, G, and B data must be grounded.

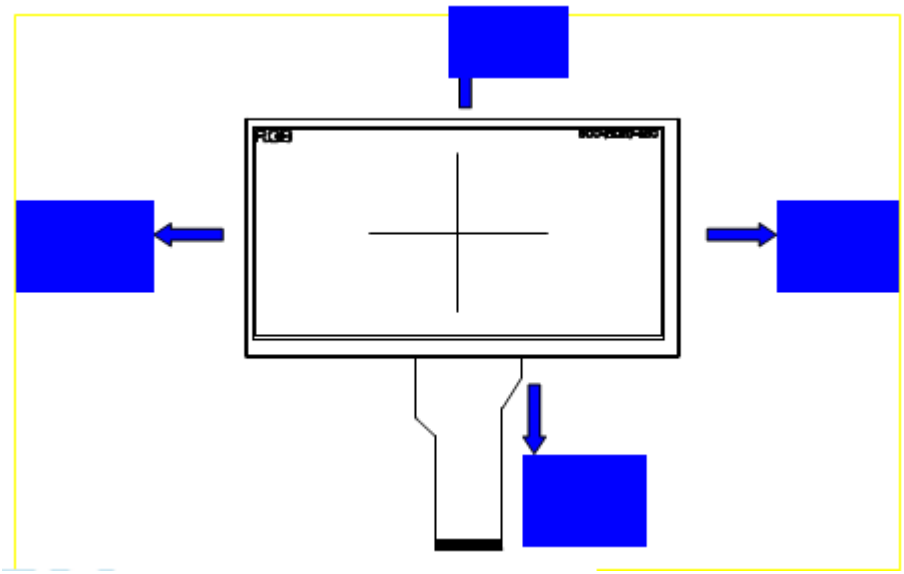
Note 3: Data shall be latched at the falling edge of DCLK

Note 4: Selection of scanning mode

Setting of scan control input		Scanning direction
U/D	L/R	
GND	DVB B B	Up to down, left to right
DVB B	GND	Down to up, right to left
GND	GND	Up to down, right to left
DVB B	DVB B B	Down to up, left to right

Note 5: Definition of Scanning Direction

Refer to figure as below



Note 6: Global reset pin. Active low to enter reset state. Suggect to connect with RC reset circuit for stability. Normally pull high

Note 7: Dithering function enable control, normally pull high
When DITHB = “1”, Disable internal dithering function
When DITHB = “0”, Enable internal dithering function.

7.0 Optical Specifications

Item	Symbol	Condition	Values			Unit	Remarks
			Min.	Typ.	Max.		
Viewing angle (CR≥ 10)	θL	Point-5 CR>=10	-	70	-	degree	Note 1
	θR		-	70	-		
	θT		-	45	-		
	θB		-	60	-		
Response time	TON	Point-5 CR>=10	-	25	35	ms	Note 3
	TOFF		-	25	35	ms	Note 4
Contrast ratio	CR			350	-	-	Note 4
Color chromaticity	WX	Θ=0°	0.26	0.31	0.36	-	Note 2 Note 5 Note 6
	WY		0.28	0.33	0.38	-	
	RX		0.539	0.589	0.639		
	RY		0.307	0.357	0.407		
	BX		0.284	0.334	0.384		
	BY		0.549	0.599	0.649		
	GX		0.101	0.151	0.201		
	GY		0.075	0.125	0.175		
NTSC				52		%	
Luminance	L		180	200	-	cd/m²	Note 6
Luminance uniformity	YU		70	75	-	%	Note 7

Test Conditions:

1. DV_{DD} =3.3V, I_L =120mA (Backlight current), Ta = 25°C
2. The test systems refer to Note 2.

Note 1: Definition of viewing angle range

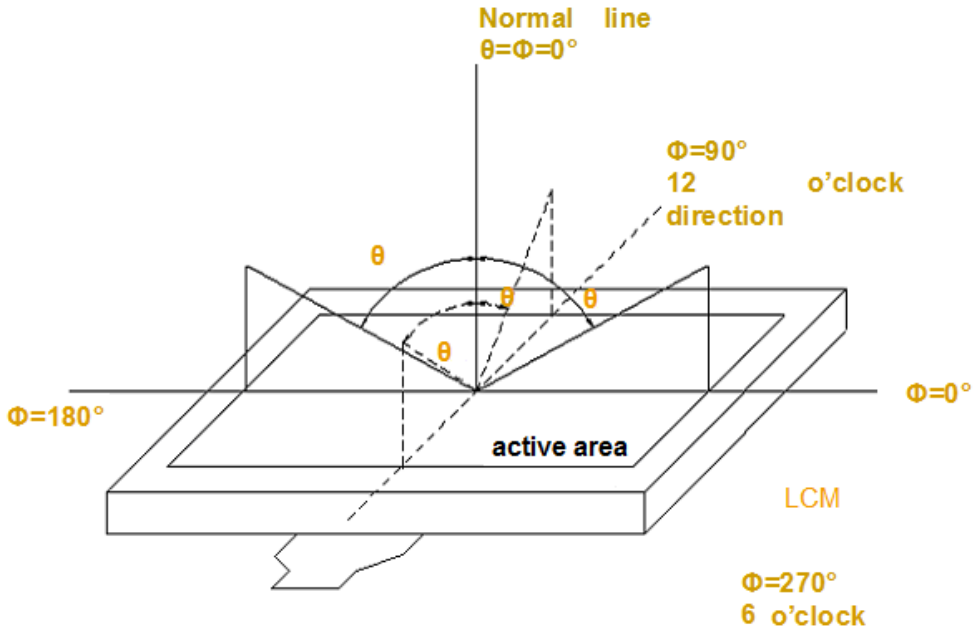


Fig 7-1 Definition of viewing Angle

Note 2: Definition of Optical Measurement system.
The optical characteristics should be measured in dark room. After 30 minutes operation, the optical properties are measured at the centre point of the LCD screen.
(Response time is measured by Photo detector TOPCON BM-7, other items are measured by BM-5A/Field of view: 1° /Height: 500mm.)

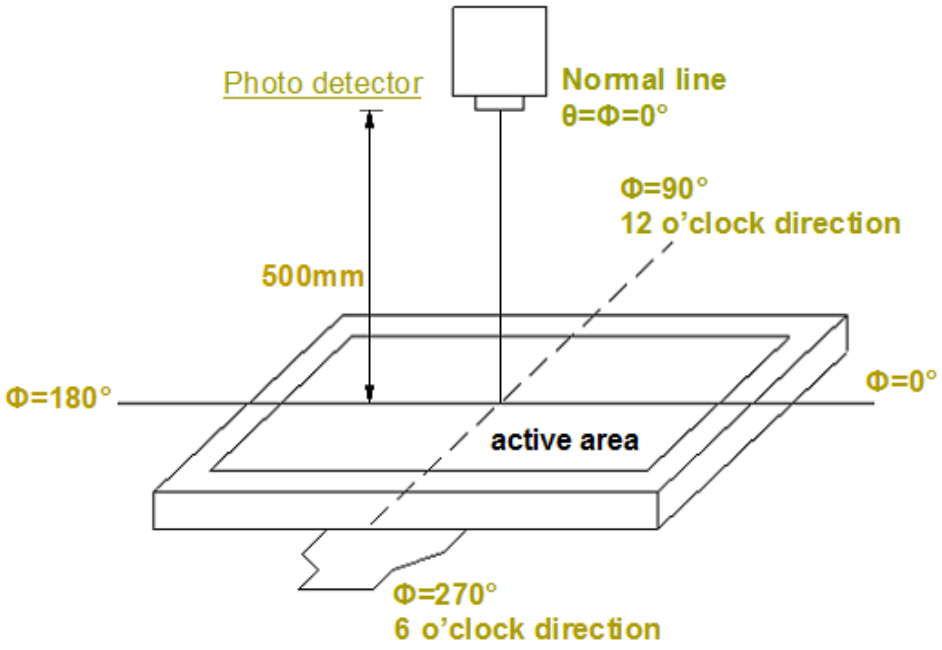


Fig. 7-2 Optical Measurement System setup

Note 3: Definition of response Time
The response time is defined as the LCD optical switching time interval between “White” state and “Black” state. Rise time (TON) is the time between photo detector output intensity changed from 90% to 10%. And fall time (TOFF) is the time between photo detector output intensity changed from 10% to 90%

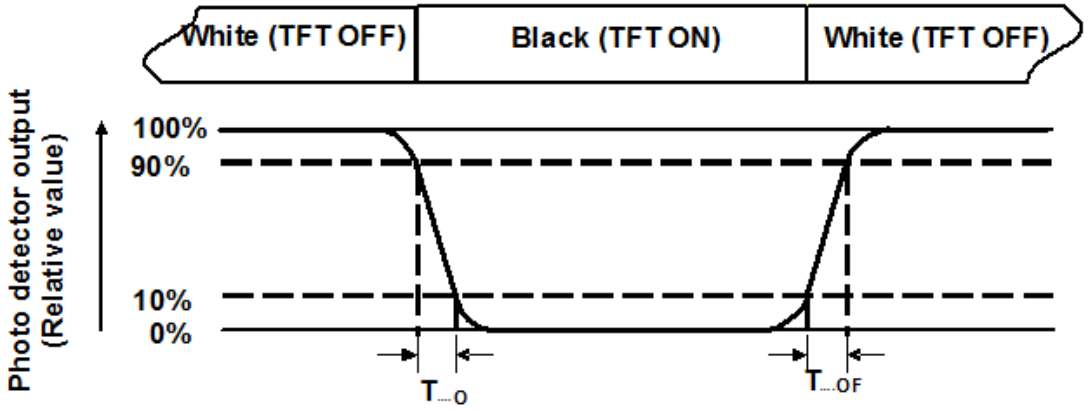


Fig. 7-3 Definition of Response Time

Note 4: Definition of Contrast Ratio

$$\text{Contrast ratio (CR)} = \frac{\text{Luminance measured when LCD on the ‘White ‘ state}}{\text{Luminance measured when LCD on the ‘Black ‘ state}}$$

Note 5: Definition of color chromaticity (CIE1931)
Color coordinates measured at center point of LCD

Note 6: All input terminals LCD panel must be ground while measuring the center area of the panel, The LED driving condition is IL = 120mA

Note 7: Definition of Luminance Uniformity
Active area is divided into 9 measuring areas (refer to Fig 6-4). Every measuring point is placed at center of each measuring area

$$Luminance\ Uniformity\ (Yu) = \frac{B_{min}}{B_{max}}$$

L – Active area Length W – Active area width

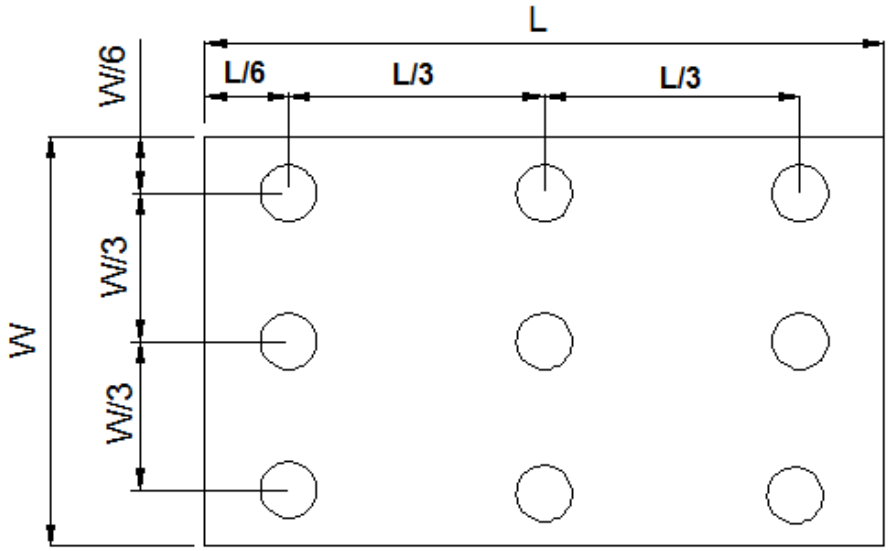


Fig 7-4 Definition of measuring points

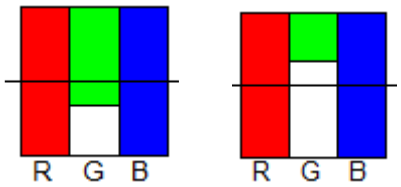
B_{max}: The measured maximum luminance of all measurement position
B_{min}: The measured minimum luminance of all measurement points

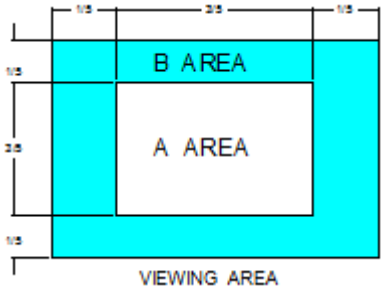
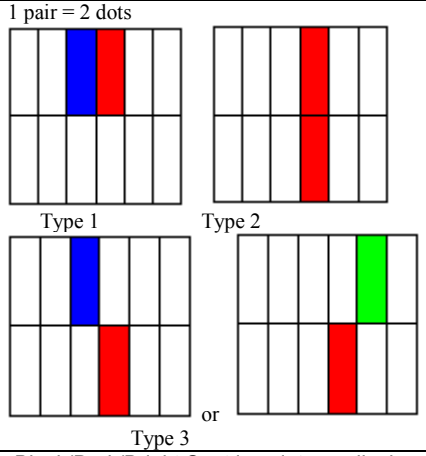
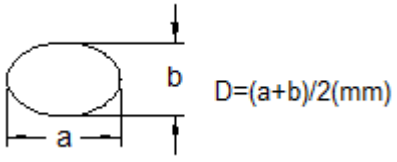
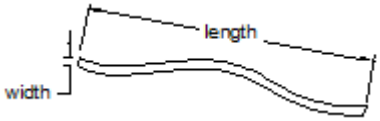
8.0 Reliability Test Condition

Item		Test Condition
Operating	High Temperature	50degC, 240 hrs
	Low Temperature	-10degC,240 hrs
Storage	High Temperature	60degC, 240hrs and recovery for 2hrs
	Low Temperature	-20degC, 240hrs and recovery for 2hrs
	High Temperature and High Humidity	50degC, 90%RH, 240hrs and recovery for 2 hrs
Thermal	Cycle	RT → 10degC → Rt → 50degC → RT 0min 30min 5min 30min 5min 50 cycles (Power off)
	Shock	RT → 10degV → 50degC 0min 30min 30min 50 cycles (Power off)

Note: RT means Room temperature

9. Inspection criteria

<table>
<tr><th>No</th><th>Defect</th><th>Definition of defect</th><th>Inspection Criteria</th></tr>
<tr><td rowspan="4">1</td><td>a) Definition of dot</td><td>The size of defective dot over ½ of whole is regards as one defective dot.
Smaller than ½ Larger than ½
 

'No dot defect' (ignore) '1 dot defect' (counted)</td><td>A – Viewing area
B – Viewing area
C – Outside Viewing area
 
</td></tr>
<tr><td>b) Bright Dot</td><td rowspan="2">Dot appear bright and unchanged in size when LCD panel is displaying black pattern
Dot appear dark and unchanged in size when LCD panel is displaying pure color (RED, GREEN or BLUE) pattern</td><td rowspan="2"><table><tr><td>Defect</td><td>A</td><td>B</td><td>C</td></tr><tr><td>Bright Dot</td><td>1</td><td>1</td><td rowspan="3">NC</td></tr><tr><td>Dark Dot</td><td>2</td><td>2</td></tr><tr><td>Total</td><td colspan="2">4</td></tr></table>NC – Not Count</td></tr>
<tr><td>c) Dark Dot</td></tr>
<tr><td>d) 2 dot adjacent</td><td>1 pair = 2 dots
 
</td><td><table><tr><td>Defect</td><td>Acc. Count</td></tr><tr><td>2 Bright dot Adjacent</td><td>0</td></tr><tr><td>2 Dark dot Adjacent</td><td>1</td></tr></table></td></tr>
<tr><td>2</td><td>Black spot
White Spot
Bright spot
Pin Hole
Foreign Particle</td><td>-Black/Dark/Bright Spot is points on display which appear dark/bright and usually result from contamination
- These defect do not vary in size intensity (contrast) when contras is varied.
 
</td><td><table><tr><td>Defect Category</td><td>A</td><td>B</td></tr><tr><td>D ≤ 0.10</td><td>NC</td><td rowspan="4">NC</td></tr><tr><td>0.10 ≤ D ≤ 0.20</td><td>2</td></tr><tr><td>0.20 ≤ D ≤ 0.30</td><td>1</td></tr><tr><td>D ≥ 0.30</td><td>0</td></tr></table></td></tr>
<tr><td>3</td><td>Black Line
White line
Particle between POL and Glass
Scratch on Glass</td><td> 
</td><td><table><tr><td>Defect Category</td><td>A</td><td>B</td></tr><tr><td>W ≤ 0.03</td><td>NC</td><td rowspan="3">NC</td></tr><tr><td>0.03 ≤ W ≤ 0.08, L ≤2.0</td><td>2</td></tr><tr><td>W ≥ 0.08</td><td>0</td></tr></table></td></tr>
<tr><td>4</td><td>POL Bubble
POL Dented</td><td></td><td><table><tr><td>Defect Category</td><td>A</td><td>B</td></tr><tr><td>D ≤ 0.20</td><td>NC</td><td rowspan="4">NC</td></tr><tr><td>0.20 ≤ D ≤ 0.30</td><td>3</td></tr><tr><td>0.30 ≤ D ≤ 0.50</td><td>2</td></tr><tr><td>D ≥ 0.5</td><td>0</td></tr></table></td></tr>
<tr><td>5</td><td>Mura
(50% Grey)</td><td></td><td>Judged by Limit sample</td></tr>
</table>

10. Precaution and Limited Warranty

1. Handing Precautions
   a. The display panel is made of glass and polarizer. As glass is fragile. It tends to chip during handling especially on the edges. Please avoid dropping or jarring. Do not subject it to a mechanical shock of impact or by dropping it.
   b. 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 is in contact with your skin or clothes, wash it off using soap and water.
   c. 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 degrade the insulation between terminals. Scratch and dents may occur on polarizer too.
   d. 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 a 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.
   e. 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.
   f. 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.
   g. 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.
   h. 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.
   i. Do not attempt to disassemble or process the LCD module.
   j. NC terminal should be open. Do not connect anything.
   k. If the logic circuit power is off, do not apply the input signals.
   l. 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 assembly, 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 screw driver 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 assembly and other work under dry conditions. To reduce the generation of static electricity be careful that the air in the work environment 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.

m. 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. Storage Precautions

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

a. Store them in a sealed polyethylene bag. If properly sealed, there is no need for the desiccant.
b. 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.
c. The polarizer surface should not come in contact with any other objects.

3. Others

a. 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.
b. 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.
c. 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.

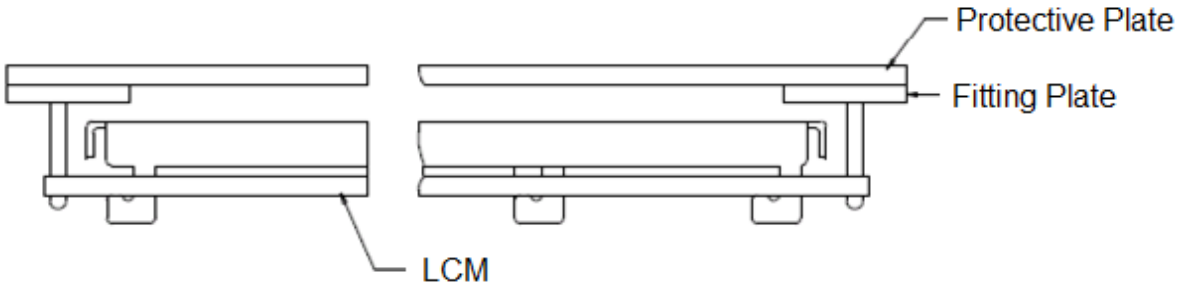
Exposed area of the printed circuit board.
Terminal electrode sections.

4. Using LCD Modules

a. Installing LCD Modules

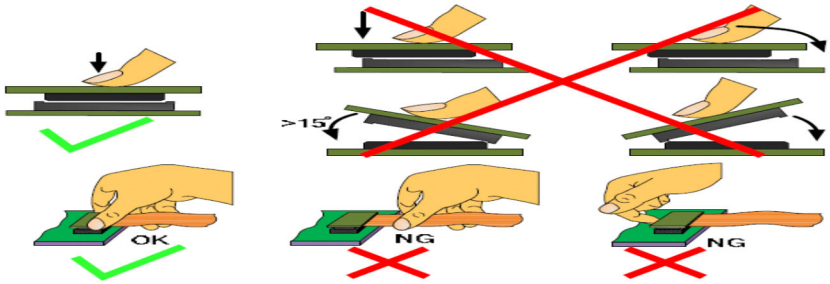
The hole in the printed circuit board is used to fix LCM as shown in the picture below.
Attend to the following items when installing the LCM.

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



c. 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.

d. 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



5. 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

a. If soldering flux is used, be sure to remove any remaining flux after finishing the 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.

b. 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.

c. When removing the electroluminescent panel from the PC board, be sure the solder has completely melted, the soldered pad on the PC board could be damaged.

6. Precautions for Operation

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

b. It is recommended to drive LCD's within the specified voltage limit since over limit will cause shorter LCD life. An electrochemical reaction due to direct current causes LCD-deterioration. Avoid the use of direct current drive.
c. Response time will be extremely delayed at lower temperature compared to room operating temperature range and on the other hand, at higher temperature LCD shows dark color in them. However those phenomena do not mean malfunction. The LCD will return to normal performance when ambient temperature revert to room condition.
d. 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 on.
e. A slight dew depositing on terminals is a cause for electro-chemical reaction resulting in terminal open circuit.
f. Input logic voltage before apply analogue high voltage such as LCD driving voltage when power on. Remove analogue high voltage before logic voltage when power off the module. Input each signal after the positive/negative voltage becomes stable.
g. 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.

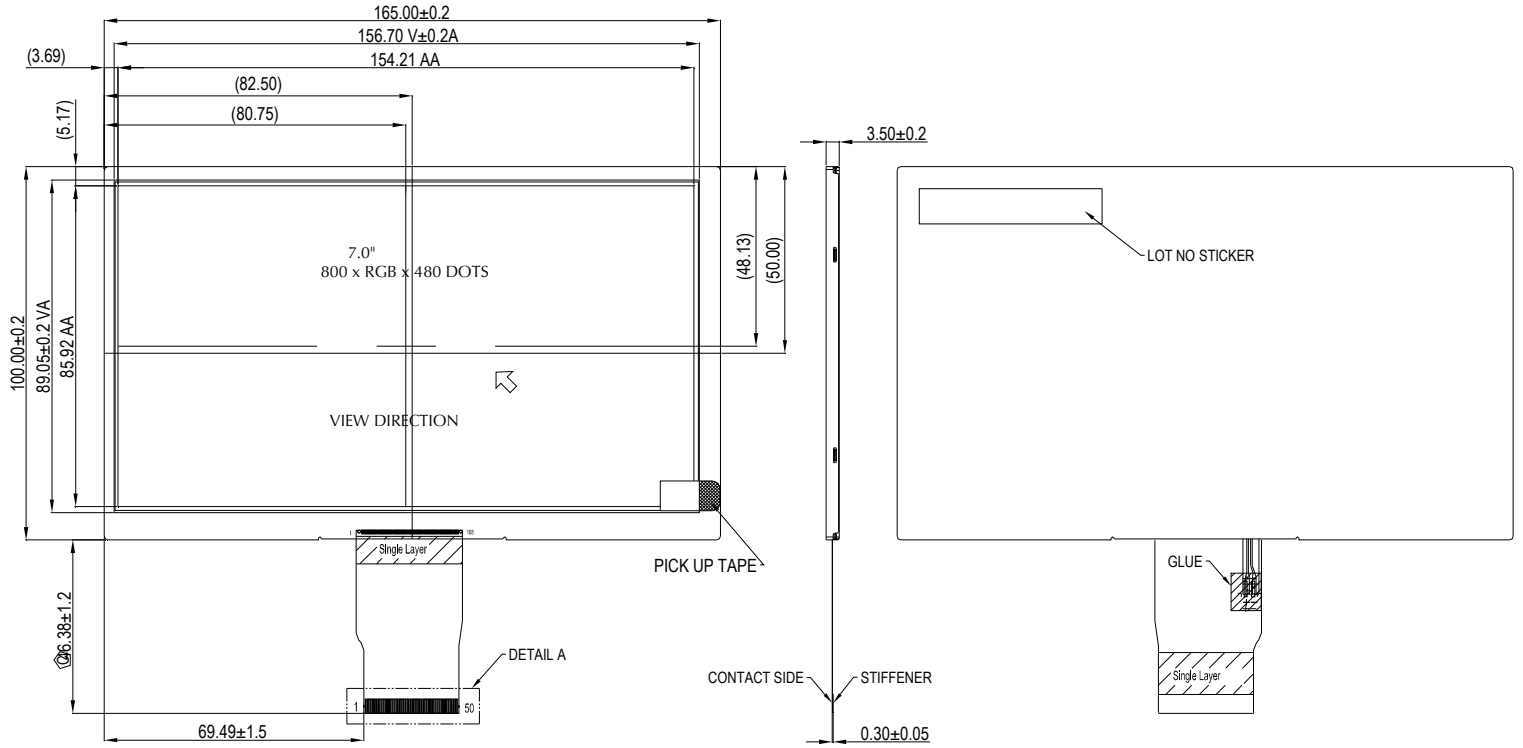
7. Safety
   a. It is recommended to crush damaged or unnecessary LCDs into pieces and wash them off with solvents such as acetone and ethanol, which should later be burned.
   b. If any liquid leaks out of a damaged glass cell and comes in contact with the hands, wash off thoroughly with soap and water.
8. Limited Warranty

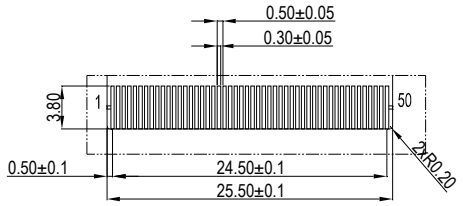
   Unless otherwise agreed between Crystal Clear Technology and customer, Crystal Clear Technology will replace or repair any of its LCD and LCM which is found to be defective electrically and visually when inspected in accordance with Crystal Clear Technology acceptance standards, for a period of one year from date of shipment. Confirmation of such date shall be based on freight documents. The warranty liability of Crystal Clear Technology is limited to repair and/or replacement on the terms set forth above. Crystal Clear Technology will not responsible for any subsequent or consequential events.

9. Return LCM under Warranty

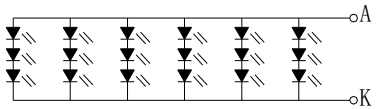
   No warranty can be granted if the precautions stated above have been disregarded. The typical examples of violations are:
   - Broken LCD glass
   - PCB eyelet's damaged or modified
   - PCB conductors damaged
   - Circuit modified in any way, including addition of components.
   - PCB tampered with by grinding, engraving or painting varnish.
   - Soldering to, or modifying the bezel in any manner.

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





DETAIL A



3 x 6=18LED,20mA x 6=120mA

Specification:

2). Operating temp.: -10°C~+50°C
Storage temp.: -20°C~+60°C
3). All the raw material are Rohs compliant

Pin Out

No.	Symbol
1	A
2	A
3	K
4	K
5	GND
6	V_{COM}
7	DV_{DD}
8	MODE
9	DE
10	VS
11	HS
12	B7
13	B6
14	B5
15	B4
16	B3
17	B2
18	B1
19	B0
20	G7
21	G6
22	G5
23	G4
24	G3
25	G2
26	G1
27	G0
28	R7
29	R6
30	R5
31	R4
32	R3
33	R2
34	R1
35	R0
36	GND
37	DCLK
38	GND
39	L/R
40	UD
41	V_{GH}
42	V_{GL}
43	AV_{DD}
44	Reset
45	NC
46	V_{COM}
47	DITHM
48	GND
49	NC
50	NC

CRYSTAL CLEAR TECHNOLOGY SDN BHD
16, JLN TP5, TMN PERINDUSTRIAN SIME UEP,
47500 SUBANG JAYA, SELANGOR DARUL EHSAN.

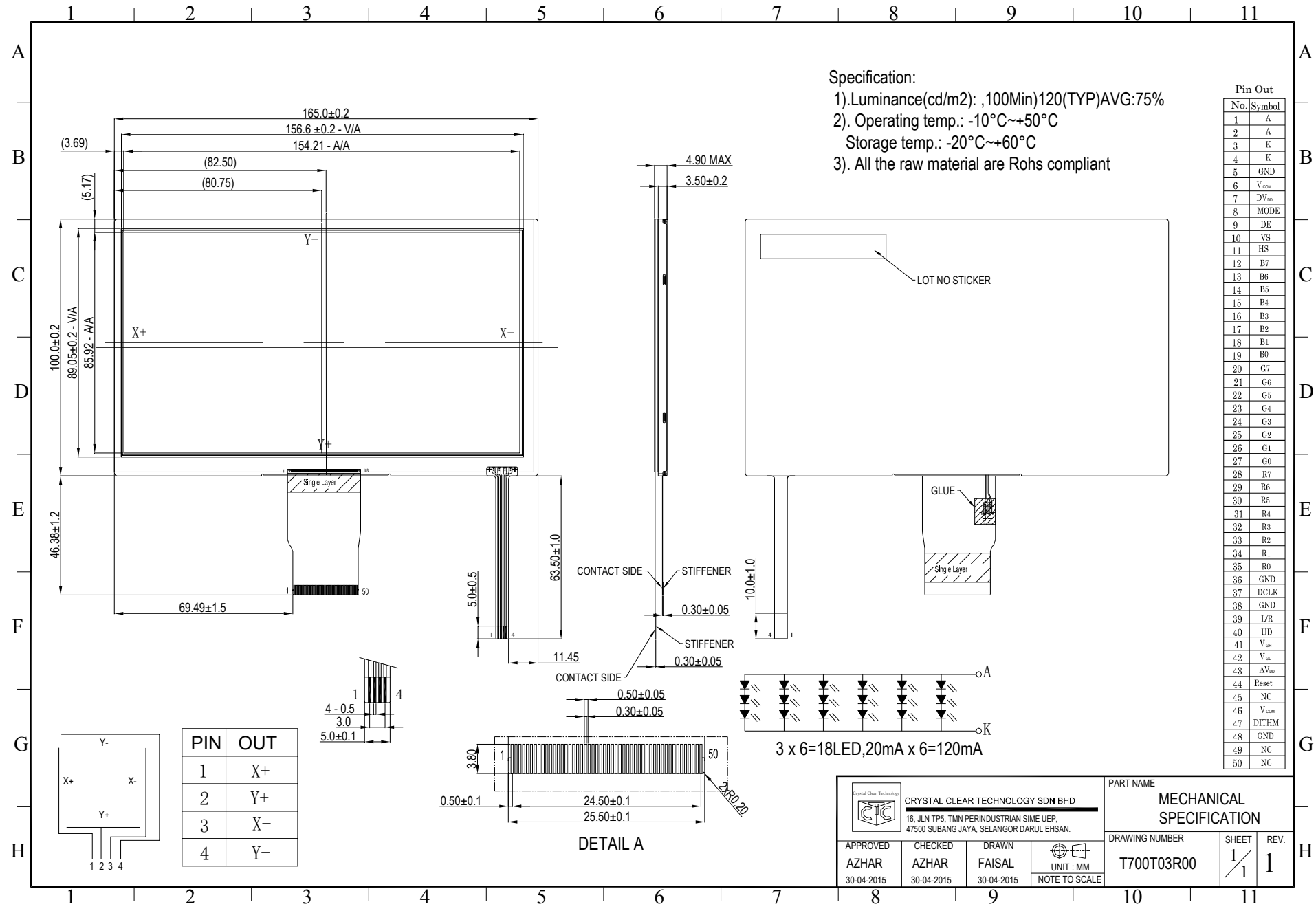
APPROVED	CHECKED	DRAWN	UNIT : MM
AZHAR	AZHAR	FAISAL	NOTE TO SCALE
21-04-2015	21-04-2015	21-04-2015	

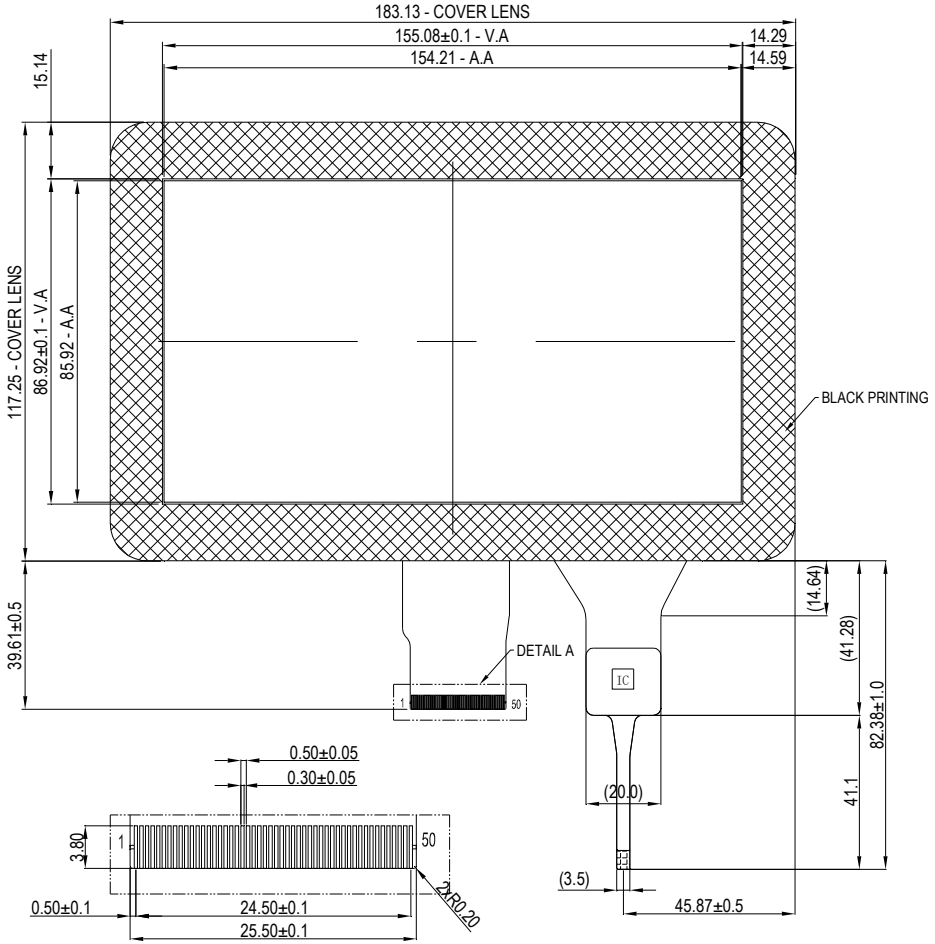
PART NAME: MECHANICAL SPECIFICATION

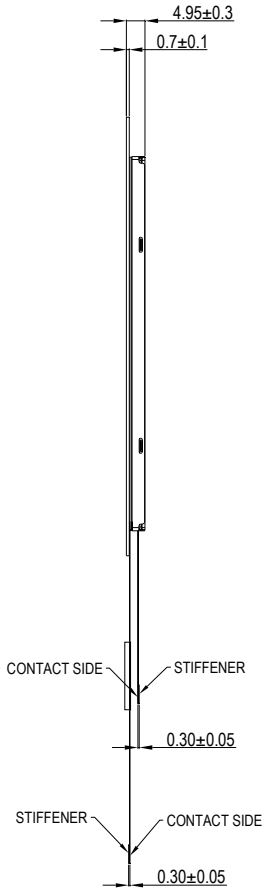
DRAWING NUMBER: T700T03N00

SHEET: 1/1

REV.: 1


Specification:
1).Luminance(cd/m2): ,100Min)120(TYP)AVG:75%
2). Operating temp.: -10°C~+50°C
Storage temp.: -20°C~+60°C
3). All the raw material are Rohs compliant
Pin Out
No. Symbol
1 A
2 A
3 K
4 K
5 GND
6 VCOM
7 DVDD
8 MODE
9 DE
10 VS
11 HS
12 B7
13 B6
14 B5
15 B4
16 B3
17 B2
18 B1
19 B0
20 G7
21 G6
22 G5
23 G4
24 G3
25 G2
26 G1
27 G0
28 R7
29 R6
30 R5
31 R4
32 R3
33 R2
34 R1
35 R0
36 GND
37 DCLK
38 GND
39 L/R
40 UD
41 VGH
42 VGL
43 AVDD
44 Reset
45 NC
46 VCOM
47 DITHM
48 GND
49 NC
50 NC
165.0±0.2
156.6 ±0.2 - V/A
154.21 - A/A
(3.69)
(82.50)
(80.75)
(5.17)
100.0±0.2
89.05±0.2 - V/A
85.92 - A/A
46.38±1.2
69.49±1.5
Y-
Y+
X+
X-
Single Layer
4.90 MAX
3.50±0.2
63.50±1.0
5.0±0.5
11.45
CONTACT SIDE
STIFFENER
0.30±0.05
STIFFENER
0.30±0.05
CONTACT SIDE
LOT NO STICKER
GLUE
Single Layer
10.0±1.0
A
K
3 x 6=18LED,20mA x 6=120mA
4 - 0.5
3.0
5.0±0.1
0.50±0.05
0.30±0.05
3.80
0.50±0.1
24.50±0.1
25.50±0.1
2XR0.20
DETAIL A
PIN OUT
1 X+
2 Y+
3 X-
4 Y-
CRYSTAL CLEAR TECHNOLOGY SDN BHD
16, JLN TP5, TMN PERINDUSTRIAN SIME UEP,
47500 SUBANG JAYA, SELANGOR DARUL EHSAN.
PART NAME
MECHANICAL SPECIFICATION
APPROVED AZHAR 30-04-2015
CHECKED AZHAR 30-04-2015
DRAWN FAISAL 30-04-2015
UNIT : MM
NOTE TO SCALE
DRAWING NUMBER
T700T03R00
SHEET 1/1
REV. 1





Pin Out

No.	Symbol
1	A
2	A
3	K
4	K
5	GND
6	V_{COM}
7	DV_{DD}
8	MODE
9	DE
10	VS
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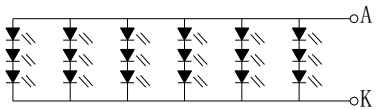
13	B6
14	B5
15	B4
16	B3
17	B2
18	B1
19	B0
20	G7
21	G6
22	G5
23	G4
24	G3
25	G2
26	G1
27	G0
28	R7
29	R6
30	R5
31	R4
32	R3
33	R2
34	R1
35	R0
36	GND
37	DCLK
38	GND
39	L/R
40	UD
41	V_{GH}
42	V_{GL}
43	AV_{DD}
44	Reset
45	NC
46	V_{COM}
47	DITHM
48	GND
49	NC
50	NC

Specification:

2). Operating temp.: -10°C~+50°C
Storage temp.: -20°C~+60°C
3). All the raw material are Rohs compliant

DETAIL A

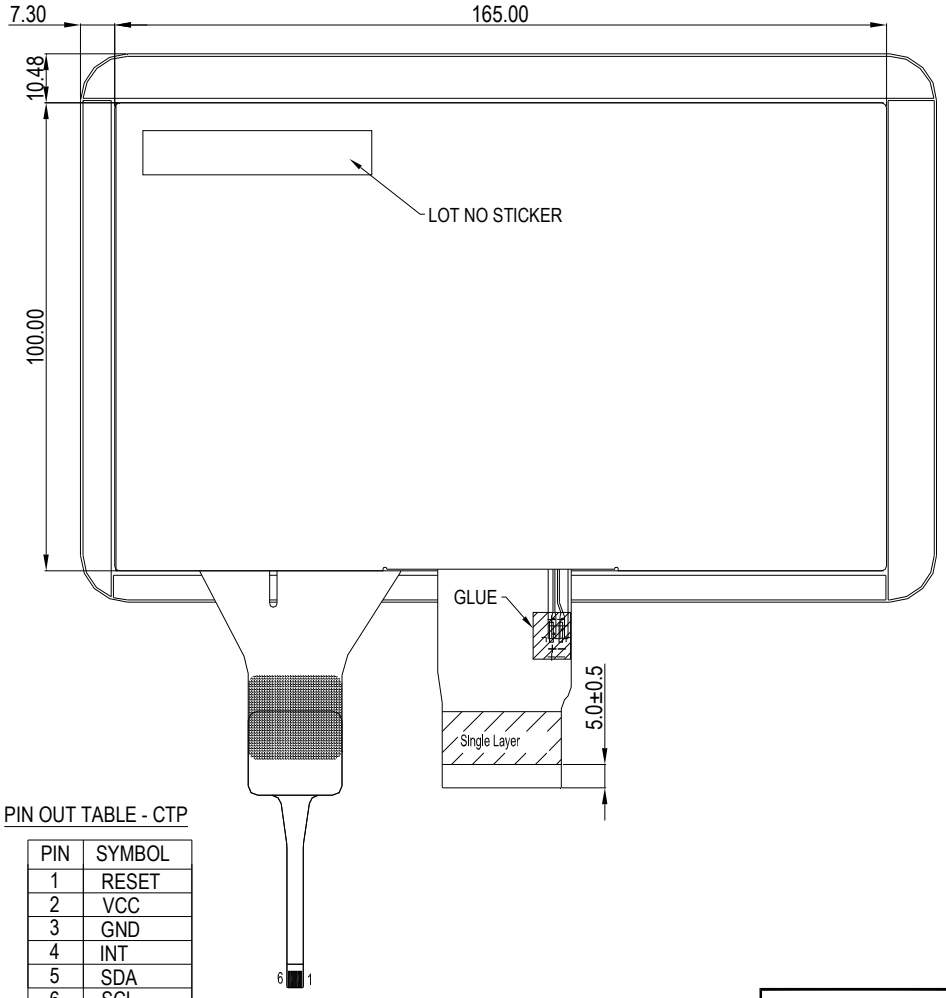


3 x 6=18LED,20mA x 6=120mA

CRYSTAL CLEAR TECHNOLOGY SDN BHD
16, JLN TP5, TMN PERINDUSTRIAN SIME UEP,
47500 SUBANG JAYA, SELANGOR DARUL EHSAN.

APPROVED	CHECKED	DRAWN	UNIT : MM
		AZHAR 21-04-2015	NOTE TO SCALE

PART NAME: MECHANICAL SPECIFICATION
DRAWING NUMBER: T700T03C00C
SHEET: 1/2
REV.: 1



PIN OUT TABLE - CTP

PIN	SYMBOL
1	RESET
2	VCC
3	GND
4	INT
5	SDA
6	SCL

CRYSTAL CLEAR TECHNOLOGY SDN BHD 16, JLN TP5, TMN PERINDUSTRIAN SIME UEP, 47500 SUBANG JAYA, SELANGOR DARUL EHSAN.				PART NAME: MECHANICAL SPECIFICATION	
APPROVED	CHECKED	DRAWN: AZHAR, 17-03-2016	UNIT : MM NOTE TO SCALE	DRAWING NUMBER: T700T03C00C	SHEET: 2/2 REV: 1

Product Specification

TP0085

Crystal Clear Technology sdn. bhd.

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47600 Subang Jaya—Selangor DE
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Contents

1. Introduction

The purpose of this specification is defined the general provision and quality requirement apply to 7 inch Capacitive Touch module integrated by Crystal Clear Technology. This document, together with the module drawing, is the highest level specification for this product. When users touch module by finger, the module can send coordinates of point at the contact point to host. The finger position information is sent to host by I2C bus which is determined by host through IRQ line.

2. General Description

This document contains the Capacitive Touch module specification. The maximum rating, characteristics, hardware, and inspection of the module are described in the subsequent sections. In special, I2C protocol will be introduced in detail.

2.1. Touch sensor characteristics

- Technology: Use the character of capacitive among the touch electrodes on touch panel to identify the positions of touch signals
- Touch method: Ten fingers multi touch with pressure sensing
- Interface: I2C

2.2. General Specification

Item	Specification	Unit
Screen Diagonal	7.0	Inch
Applied Resolution	800 x 480	pixel
Module Outline	100(H) x 164.1(W) x 1.4(T) (Excluded FPC)	Mm
Touch Area	(H) x (W)	Mm
Cover Lens Material	Glass	-
Transparency	85	%
Origin	-	-
Controller	GT911	-

3. Absolute Maximum Ratings

Absolute Maximum rating of touch panel module is as following

Symbol	Parameter	Value	Unit
V_{CORE}	Supply Voltage for Logic	-0.3 to +2.8	V
V_{DDIO}	Supply Voltage for I/O	-0.3 to +3.3	V
T_A	Operating Temperature	-20 to +85	°C
T_{STG}	Storage Temperature	-30 to +85	°C

Note: If the module exceeds the absolute maximum ratings, it may be damaged permanently. Also, if the module operated with the absolute maximum ratings for a long time, its reliability may drop.

4. Electrical Characteristics

DC Characteristics (Unless otherwise specified, Voltage Referenced to V_{SS}, T_A = -20 to 85°C)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
AV_{DD}	Analog power supply		2.8	-	3.3	V
V_{DDIO}	Digital I/O power supply		1.8	-	3.3	V
I_{DD}	Operating mode current		-	8	14.5	mA
I_{GR}	Green mode current		-	3.3	-	mA
I_{sleep}	Sleep mode current		70	-	120	uA
V_{OH1}	Logic High Output Voltage		0.85* V_{DDIO}	-	-	V
V_{OL1}	Logic Low Output Voltage		-	-	0.15* V_{DDIO}	V
V_{IH1}	Logic High Input voltage		0.75* V_{DDIO}	-	V_{DDIO} +3	V
V_{IL1}	Logic Low Input voltage		-0.3	-	0.25* V_{DDIO}	V

5. Pin Definition

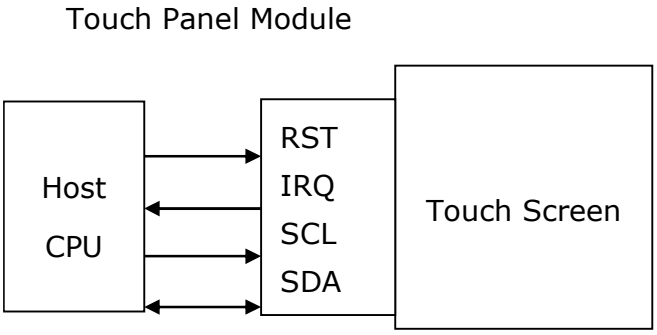
No.	Symbol	I/O	Function
1	RST	I	Sensor system global reset
2	VDD	P	Power supply
3	VSS	P	Ground
4	IRQ	O	Sensor data ready request
5	SDA	I/O	I2C serial data
6	SCL	I	I2C serial clock

6. I2C Interface

Touch panel is used as I2C Slave Device, I2C Slave address is 0x14.

6.1. Interface Diagram

The system block diagram is as shown in below. There are three communication pins connected between CPU and Touch Panel Module which are including external interrupt IRQ, I2C pins SCL and SDA. The IRQ is active low while the touch state is calculated by Touch Panel Module and the touch information can be translated via I2C communication interface. The I2C data format, protocol and report packet are described as following.



6.2. Timing Characteristic

Conditions:

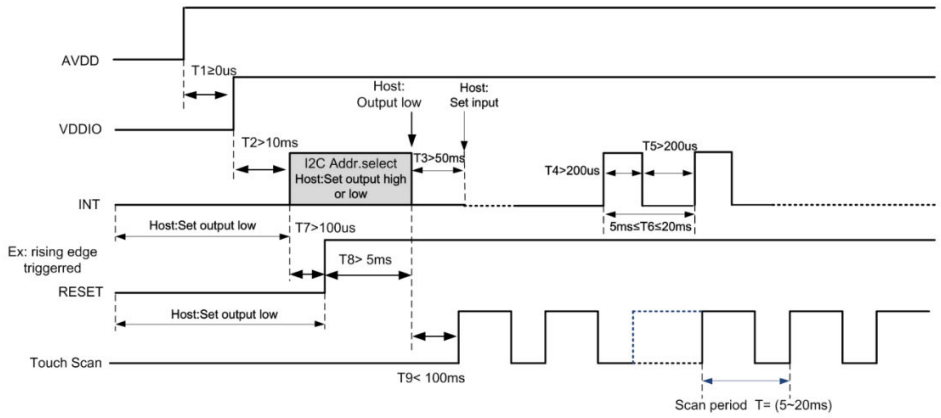
V_{DD} - V_{SS} = 2.5 TO 3.3V

T_A = 25°C

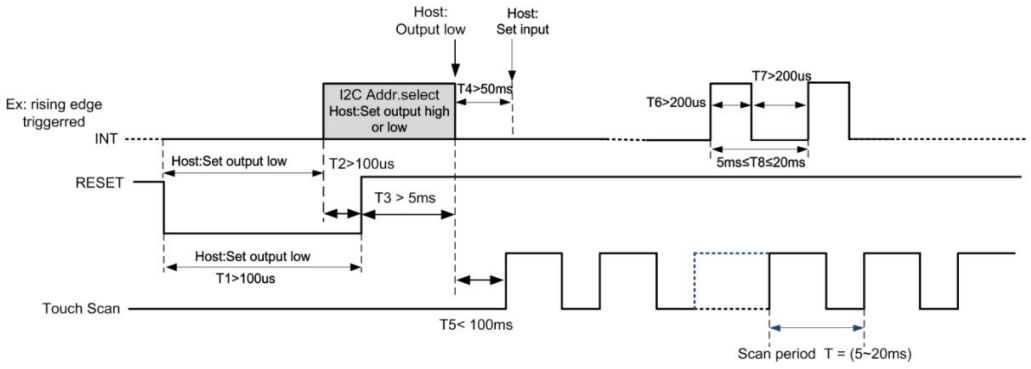
400Kbps transmission rate, 2K pull-up resistor

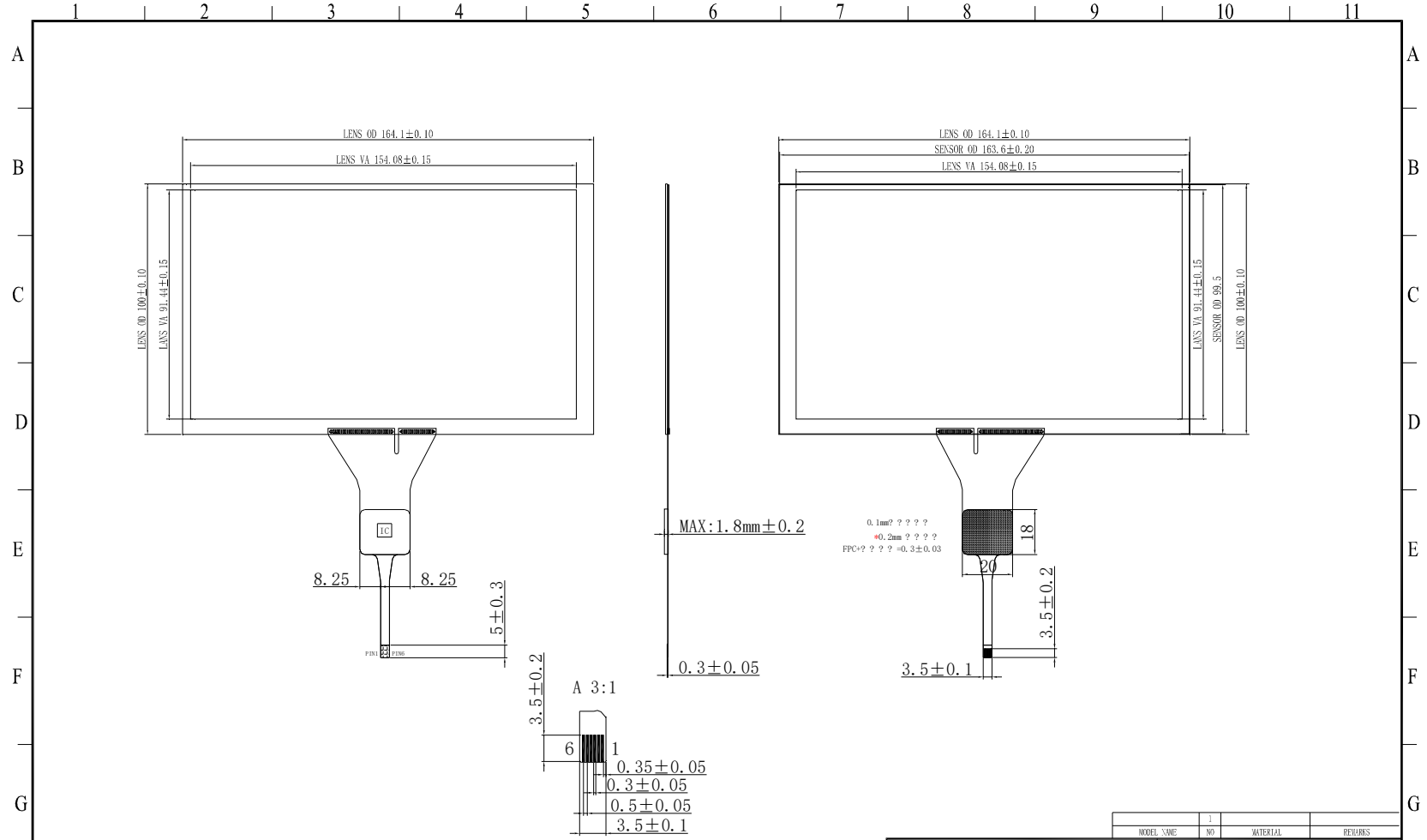
Symbol	Parameter	Min	Typ	Max	Unit
Tlo	SCL low period	1.3	-	-	us
thi	SCL high period	0.6	-	-	us
tst1	SCL setup time for Start condition	0.6	-	-	us
tst3	SCL setup time for Start condition	0.6	-	-	us
thd1	SCL setup time for Start condition	0.6	-	-	us
tst2	SDA setup time	0.1	-	-	us
thd2	SDA hold time	0	-	-	us

Power On Timing:



Timing for host resetting





MODEL NAME	NO	MATERIAL	REMARKS
	1		

Crystal-Clear Technology
CRYSTAL CLEAR TECHNOLOGY SDN BHD
16, JLN TP5, TMN PERINDUSTRIAN SIME UEP,
47500 SUBANG JAYA, SELANGOR DARUL EHSAN.

CAPACITIVE TOUCH PANEL

APPROVED	CHECKED	DRAWN	UNIT : MM	DRAWING NUMBER	SHEET	REV.
		azhar 16-03-2016	NTS	TP0085	1/1	1