

CRYSTAL CLEAR TECHNOLOGY

Product Specification

T500T01X00

(REVISION 9)

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	1. Capacitive Touch Panel Specification	



2.0 Records of Revision

Rev	Date	Item	Page	Comment	Originator	Checked By
1.0	23.10.15			Initial Release	Azhar	Liew
2.0	28.01.16			Change model name T500X01X00 to T500T01X00	Azhar	Azhar
3.0	13.04.16			Change Backlight brightness	Azhar	Azhar
4.0	10.05.16			Change reliability test condition, change precaution for using TFT module.	Adam	Azhar
5.0	08.06.16			Add CTP version	Azhar	Azhar
6.0	14.06.16			Change backlight brightness	Azhar	Azhar
7.0	03.08.16			Change CTP and CG design		
				Add CTP Specification	Azhar	Azhar
8.0	23.12.16			Revised Absolute Maximum Ratings Revised Electrical Characteristics	WHong	Azhar
9.0	02.03.17			Add drawing for R01 version	Azhar	Azhar



3.0 General Specification

T500T01X00 is 5.0" color TFT-LCD (Thin Film Transistor Liquid Crystal Display) module composed of LCD panel, driver ICs control circuit, LED backlight. This display area contains 800(RGB) x 480 pixels and can display up to 16M colors. This product compliant with RoHS environmental requirement.

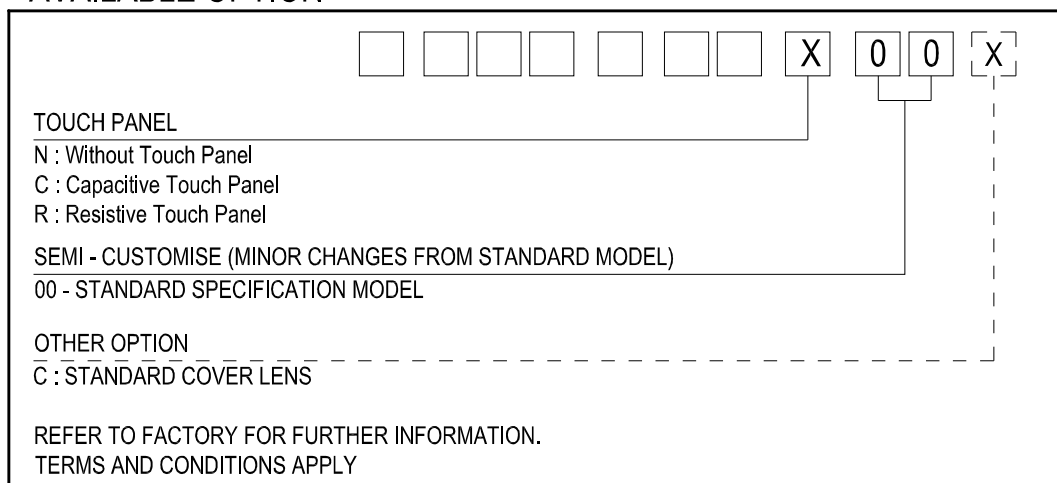
Item	Contents	Unit	Note
LCD Type	5.0" TFT	-	
Display color	16M		1
Viewing Direction (Optimum View)	12	O 'Clock	
Module size	120.7(W)x75.8(H)x3.10(T)	mm	2
Active Area(W×H)	108(W)×64.8(H)	mm	
Number of Dots	800(RGB) x 480	dots	
Driver IC	OTD9960&OTA7001	-	
Backlight	12 White LED	pcs	
Brightness (typ)	500	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 Ratings

4.1 Electrical Absolute Maximum ratings (Vss = 0V, Ta = 25°C)

Item	Symbol	Min	Typ	Max	Unit	Remarks
Power for Circuit Driving	VDD	-0.5	-	5.0	V	
LC Operating Voltage	Vop		3.3		V	Note 1
LED Forward Current	If	-	-	50	mA	
Storage Humidity	HST	10	-	90	%RH	At 25±5°C
Storage Temperature	TST	-30	-	80	°C	
Operating Ambient Humidity	H OP	10	-	90	%RH	
Operating Ambient temperature	TOP	-20	-	70	°C	

Note:

1. Liquid Crystal driving voltage.

Due to the characteristics of LC Material, this voltage vary with environmental temperature.

2. Temp.>60°C, Absolute humidity shall be less than 90%RH at 60°C

3. Temp.≤60°C, 90%RH MAX

**5.0 Electrical Characteristics and Instruction Code****Electrical Characteristics (V_{ss} = 0V, T_a = 25°C)**

Properties		Sym	Min	Typ	Max	Unit	Note
Power for Circuit Driving		VDD	2.3	3.3	3.6	V	Note
BLU Driving Logic		Vbat	-	-	-	V	
Logic Input Voltage	Low Voltage	VIL	0	-	0.2VDD	V	
	High Voltage	VIH	0.8VDD	-	VDD	V	
Logic Output Voltage	Low Voltage	VOL	0	-	0.1VDD	V	
	High Voltage	VOH	0.9VDD	-	VDD	V	

Note:

The recommended operating conditions refer to a range in which operation of this product is guaranteed. Accordingly, please make sure that the module is used within this range. And these current values are measured under the condition that all devices are stopped, each component is stable and logic signal is input.

5.1 LED Backlight Specification (V_{ss} = 0V, T_a = 25°C)

Item	Symbol	Condition	Min	Typ	Max	Unit	Note
Supply Voltage	V _{LED}	-	18.0	19.2	20.4	V	1
Supply Current	I _f	-	-	40	-	mA	2
Led lifetime			30000				3

Note:

1. $V_{LED} = V_{LED (+)} - V_{LED (-)}$.
2. It is recommended that customer supply constant current to prolong the led lifetime and optimum led performance
3. Definition of Lifetime: Luminance < 50% of initial Luminance
(Test condition: T_a = 25°C, Constant current supply (typical Value))

**5.2 Interface Signal**

Pin No.	Symbol	I/O	Function
1	VLED-	I	LED back light(Cathode)
2	VLED+	I	LED back light(Anode)
3	GND		GND
4	VDD	I	Power supply
5-12	R0~R7	I	Red data bus
13-20	G0~G7	I	Green data bus
21-28	B0~B7	I	Blue data bus
29	GND		GND
30	CLK	I	Data clock
31	DISP	I	Standby mode select pin
32	HSYNC	I	Line SYNC signal
33	VSYNC	I	Frame SYNC signal
34	DE	I	Data Enable
35	NC	O	No Connection
36	GND		GND
37	X1/NC	O	For Resistive Touch panel only
38	Y1/NC	O	
39	X2/NC	O	
40	Y2/NC	O	

6.0 Optical Characteristics

Item	Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Brightness	Bp	$\theta=0^\circ$	-	500	-	Cd/m ²	1
Uniformity	ΔBp	$\Phi=0^\circ$	70	80	-	%	1,2
Viewing Angle	3:00	Cr \geq 10	-	65	-	Deg	3
	6:00		-	55	-		
	9:00		-	65	-		
	12:00		-	45	-		
Contrast Ratio	Cr	$\theta=0^\circ$ $\Phi=0^\circ$	-	350:1	-	-	4
Response Time	T _r		-	16	-	ms	5
	T _f		-	12	-	ms	
NTSC Ratio	S		45	60	-	%	

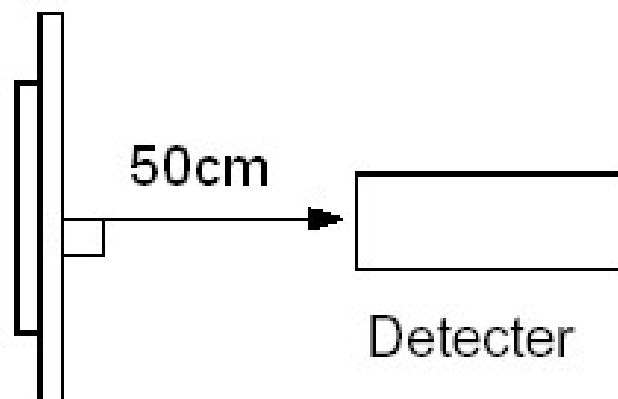
Note: The parameter is slightly changed by temperature, driving voltage and materiel

Note 1: The data are measured after LEDs are turned on for 5 minutes. LCM displays full white. The brightness is the average value of 9 measured spots. Measurement equipment PR-705 (Φ8mm)

Measuring condition:

- Measuring surroundings: Dark room.
- Measuring temperature: Ta=25°C.
- Adjust operating voltage to get optimum contrast at the center of the display.

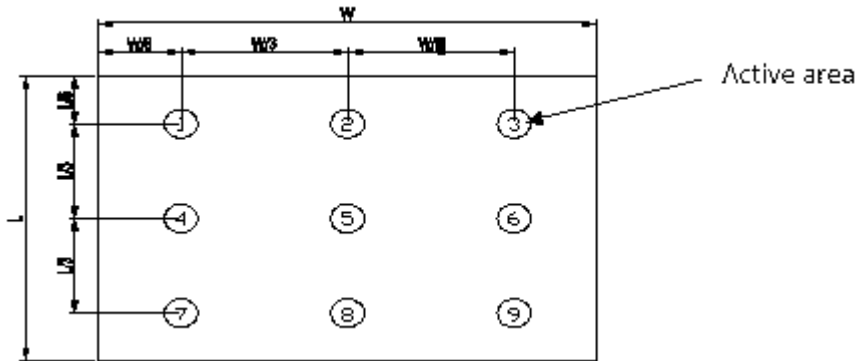
Measured value at the center point of LCD panel after more than 5 minutes while backlight turning on.



Note 2: The luminance uniformity is calculated by using following formula.

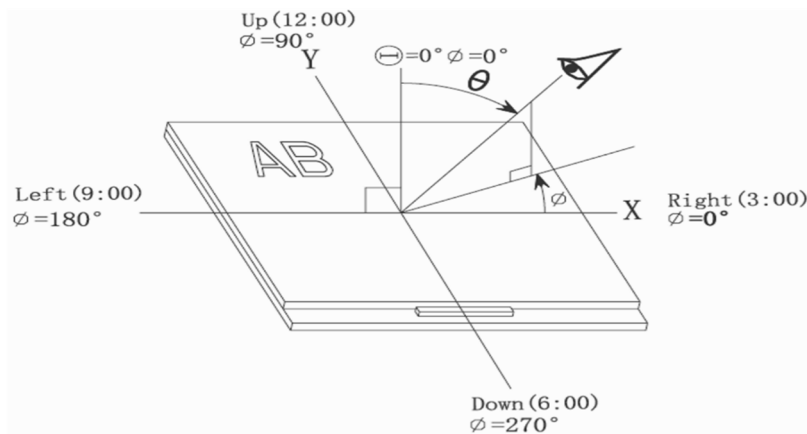
$$\Delta Bp = Bp (\text{Min.}) / Bp (\text{Max.}) \times 100 (\%)$$

$Bp (\text{Max.})$ = Maximum brightness in 9 measured spots
 $Bp (\text{Min.})$ = Minimum brightness in 9 measured spots.

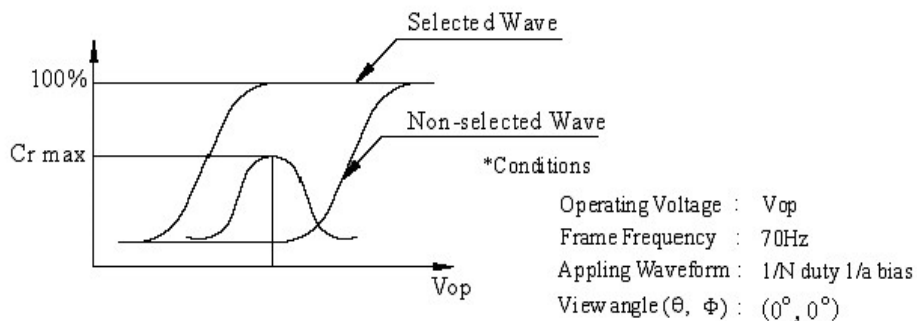


Note 3: The definition of viewing angle:

Refer to the graph below marked by θ and ϕ



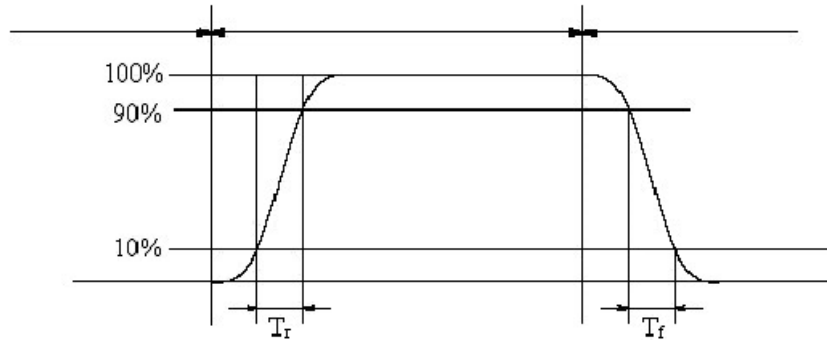
Note 4: Definition of contrast ratio. (Test LCD using DMS501)



$$\text{Contrast ratio (Cr)} = \frac{\text{Brightness of selected dots}}{\text{Brightness of non-selected dots}}$$

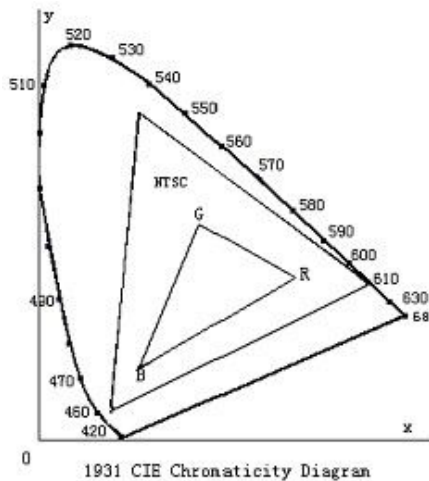
Note 5: Definition of Response time. (Test LCD using DMS501):

The output signals of photo detector are measured when the input signals are changed from “black” to “white”(falling time) and from “white” to “black”(rising time), respectively. The response time is defined as the time interval between the 10% and 90% of amplitudes. Refer to figure as below.



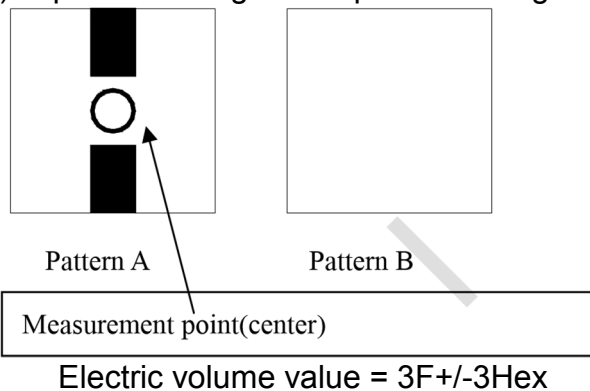
The Definition of response time

Note 6: Definition of Color of CIE Coordinate and NTSC Ratio.

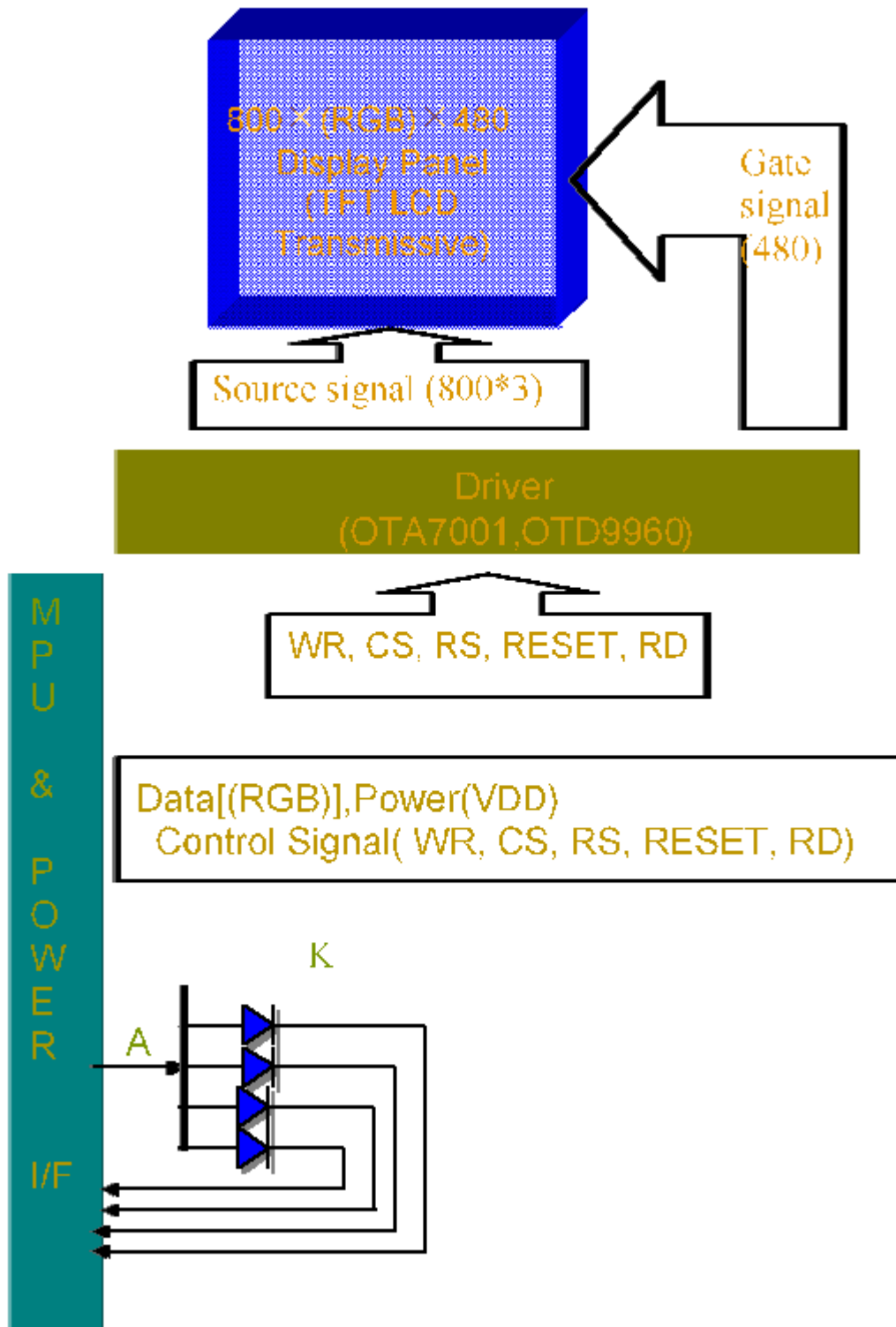


Note 7: Definition of cross talk.

$$\text{Cross talk ratio (\%)} = \frac{[\text{pattern A Brightness} - \text{pattern B Brightness}]}{\text{pattern A}}$$



7.0 Block diagram





8.0 Timing Characteristics

8.1 80-System bus Interface operation

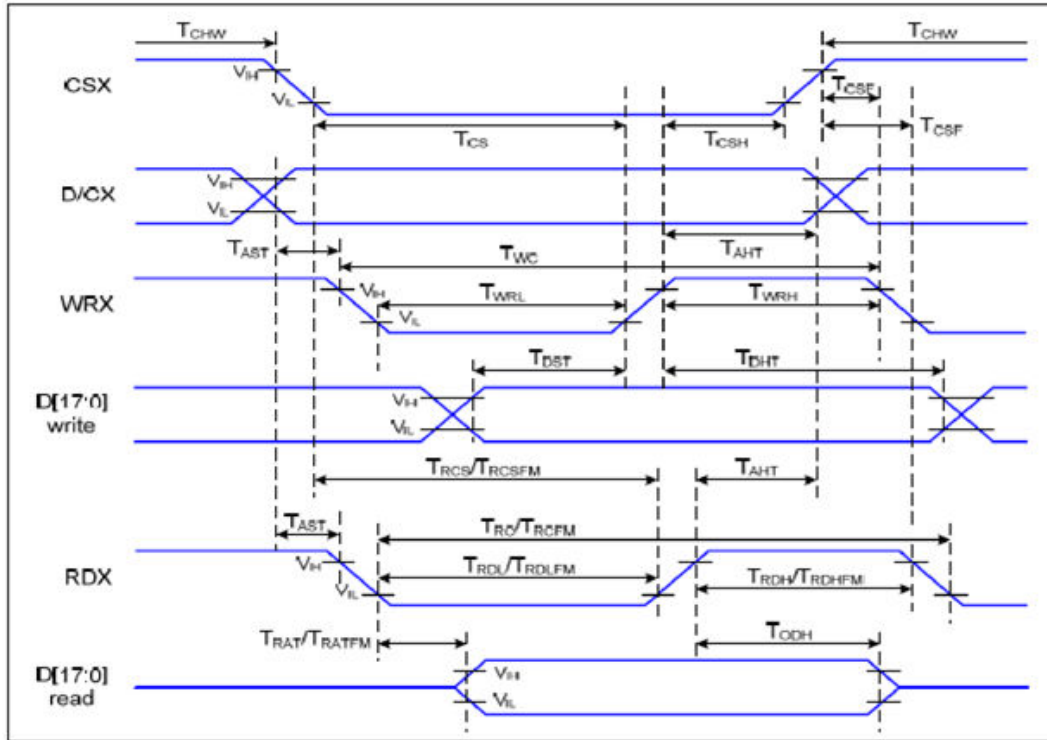
For 800 x 480 Panel

Horizontal input timing

Parameter		Symbol	Value			Unit
			Min.	Typ.	Max.	
Horizontal display area		thd	800			DCLK
DCLK frequency		fclk	-	30	50	MHz
1 Horizontal Line		th	928			DCLK
HSD pulse width	Min.	thpw	1			
	Typ.		48			
	Max.		-			
HSD Back Porch (Blanking)		thb	-	88	-	
HSD Front Porch		thfp	-	40	-	

Vertical input Timing

Parameter		Symbol	Value			Unit
			Min.	Typ.	Max.	
Vertical display area		tvd	480			H
VSD period time		tv	-	525	-	H
VSD pulse width		tvpw	-	3	-	H
VSD Back Porch (Blanking)		tvb	-	32	-	H
VSD Front Porch		tvfp	-	13	-	H



8.2 Timing Characteristics

Parameter	Symbol	Unit	Min.	Max.	Unit
Bus cycle time write	t_{CYCW}	ns	100	-	-
Bus cycle time read	t_{CYCR}	ns	160	-	-
Write low-level pulse width	PW_{LW}	ns	35	-	-
Read low-level pulse width	PW_{LR}	ns	45	-	-
Write high-level pulse width	PW_{HW}	ns	35	-	-
Read high-level pulse width	PW_{HR}	ns	90	-	-
Write/Read rise/fall time	$t_{WR,WRf}$	ns	-	-	25
Setup time Write	t_{AS}	ns	0	-	-
Setup time Read	t_{AS}	ns	10	-	-
Address hold time	t_{AH}	ns	2	-	-
Write data setup time	t_{DSW}	ns	25	-	-
Write data hold time	t_H	ns	5	-	-
Read data delay time	t_{DDR}	ns	-	-	100
Read data hold time	t_{DHR}	ns	5	-	-

**8.3 Reset Operation**

Item	Symbol	Unit	Min	Typ	Max
Reset low level width	tRES	Ms	1	-	-
Reset rise time	trRES	us	-	-	10

9.0 Reliability Test Condition

Item		Test Condition
Operating	High Temperature	70degC, 240 hrs
	Low Temperature	-20degC, 240 hrs
Storage	High Temperature	80degC, 240hrs and recovery for 2hrs
	Low Temperature	-30degC, 240hrs and recovery for 2hrs
	High Temperature and High Humidity	50degC, 90%RH, 240hrs and recovery for 2 hrs
Thermal	Cycle	RT → 20degC → Rt → 70degC → RT 0min 30min 5min 30min 5min 50 cycles (Power off)
	Shock	RT → 20degV → 70degC 0min 30min 30min 50 cycles (Power off)

Note: RT means Room temperature



10.0 Inspection Criteria

No	Defect	Definition of defect	Inspection Criteria														
1	a) Definition of dot	<p>The size of defective dot over 1/2 of whole is regards as one defective dot.</p> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>Smaller than 1/2</p> <p>'No dot defect' (ignore)</p> </div> <div style="text-align: center;"> <p>Larger than 1/2</p> <p>'1 dot defect' (counted)</p> </div> </div>	<p>A – Viewing area B – Viewing area C – Outside Viewing area</p>														
	b) Bright Dot	Dot appear bright and unchanged in size when LCD panel is displaying black pattern	<table border="1"> <thead> <tr> <th>Defect</th> <th>A</th> <th>B</th> <th>C</th> </tr> </thead> <tbody> <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> </tbody> </table> <p>NC – Not Count</p>	Defect	A	B	C	Bright Dot	1	1	NC	Dark Dot	2	2	Total	4	
	Defect	A	B	C													
	Bright Dot	1	1	NC													
Dark Dot	2	2															
Total	4																
c) Dark Dot	Dot appear dark and unchanged in size when LCD panel is displaying pure color (RED, GREEN or BLUE) pattern	<table border="1"> <thead> <tr> <th>Defect</th> <th>Acc. Count</th> </tr> </thead> <tbody> <tr> <td>2 Bright dot Adjacent</td> <td>0</td> </tr> <tr> <td>2 Dark dot Adjacent</td> <td>1</td> </tr> </tbody> </table>	Defect	Acc. Count	2 Bright dot Adjacent	0	2 Dark dot Adjacent	1									
Defect	Acc. Count																
2 Bright dot Adjacent	0																
2 Dark dot Adjacent	1																
d) 2 dot adjacent	<p>1 pair = 2 dots</p> <p>Type 1 Type 2 or Type 3</p>	<table border="1"> <thead> <tr> <th>Defect</th> <th>Acc. Count</th> </tr> </thead> <tbody> <tr> <td>2 Bright dot Adjacent</td> <td>0</td> </tr> <tr> <td>2 Dark dot Adjacent</td> <td>1</td> </tr> </tbody> </table>	Defect	Acc. Count	2 Bright dot Adjacent	0	2 Dark dot Adjacent	1									
Defect	Acc. Count																
2 Bright dot Adjacent	0																
2 Dark dot Adjacent	1																
2	Black spot White Spot Bright spot Pin Hole Foreign Particle	<p>-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 kontras is varied.</p> <p style="text-align: center;">$D = (a+b)/2(\text{mm})$</p>	<p>A: Viewing area B: Outside Viewing area</p> <table border="1"> <thead> <tr> <th>Defect Category</th> <th>A</th> <th>B</th> </tr> </thead> <tbody> <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> </tbody> </table>	Defect Category	A	B	D < 0.10	NC	NC	0.10 ≤ D < 0.20	2	0.20 ≤ D ≤ 0.30	1	D > 0.30	0		
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0.20 ≤ D ≤ 0.30	1																
D > 0.30	0																
Black Line White line Particle between POL and Glass Scratch on Glass		<table border="1"> <thead> <tr> <th>Defect Category</th> <th>A</th> <th>B</th> </tr> </thead> <tbody> <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> </tbody> </table>	Defect Category	A	B	W < 0.03	NC	NC	0.03 ≤ W ≤ 0.08, L ≤ 2.0	2	W > 0.08	0					
Defect Category	A	B															
W < 0.03	NC	NC															
0.03 ≤ W ≤ 0.08, L ≤ 2.0	2																
W > 0.08	0																
POL Bubble POL Dented		<table border="1"> <thead> <tr> <th>Defect Category</th> <th>A</th> <th>B</th> </tr> </thead> <tbody> <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> </tbody> </table>	Defect Category	A	B	D < 0.20	NC	NC	0.20 ≤ D < 0.30	3	0.30 ≤ D ≤ 0.50	2	D > 0.5	0			
Defect Category	A	B															
D < 0.20	NC	NC															
0.20 ≤ D < 0.30	3																
0.30 ≤ D ≤ 0.50	2																
D > 0.5	0																
3	Mura (50% Grey)		Judged by Limit sample														



11.0 Precaution for Using TFT Modules

1. Handling 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 colour 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.

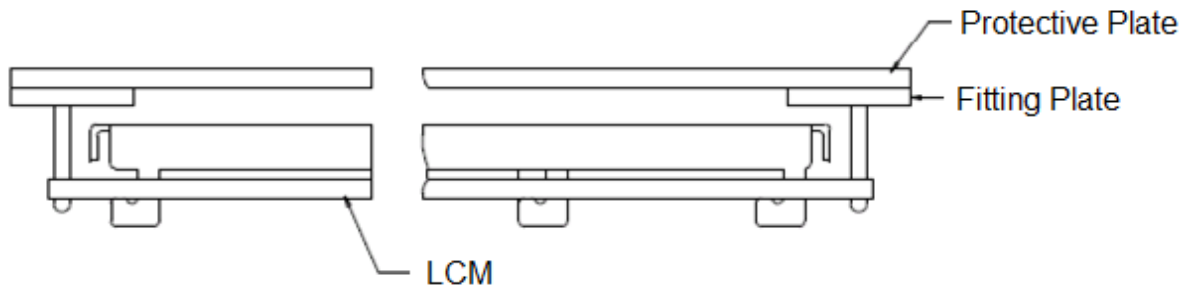
4. Using LCD Modules

a. Installing LCD Modules

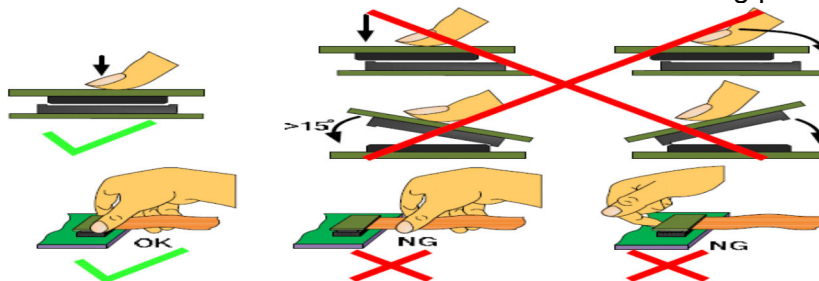
The hole in the printed circuit board is used to fix LCM as shown in the picture below.

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 colour 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

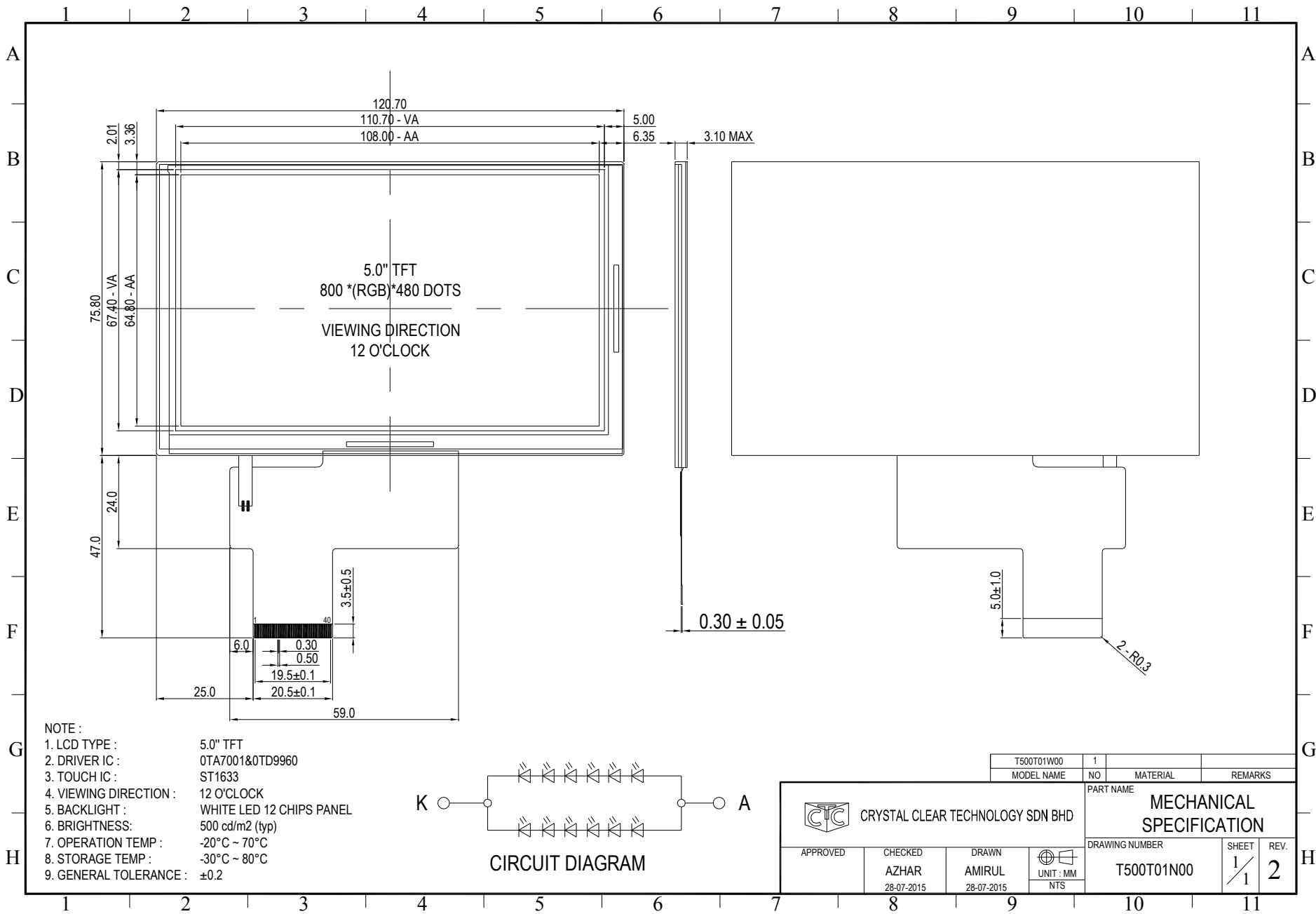
Unless otherwise agreed between Crystal Clear Technology and customer, Crystal Clear Technology will replace or repair any of its LCD and LCM which is found to be defective electrically and visually when inspected in accordance with Crystal Clear Technology acceptance standards, for a period of one year 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:

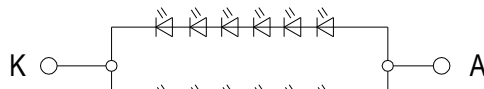
- Broken LCD glass
- PCB eyelet's damaged or modified
- PCB conductors damaged
- Circuit modified in any way, including addition of components.
- PCB tampered with by grinding, engraving or painting varnish.
- Soldering to, or modifying the bezel in any manner.

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.



NOTE :

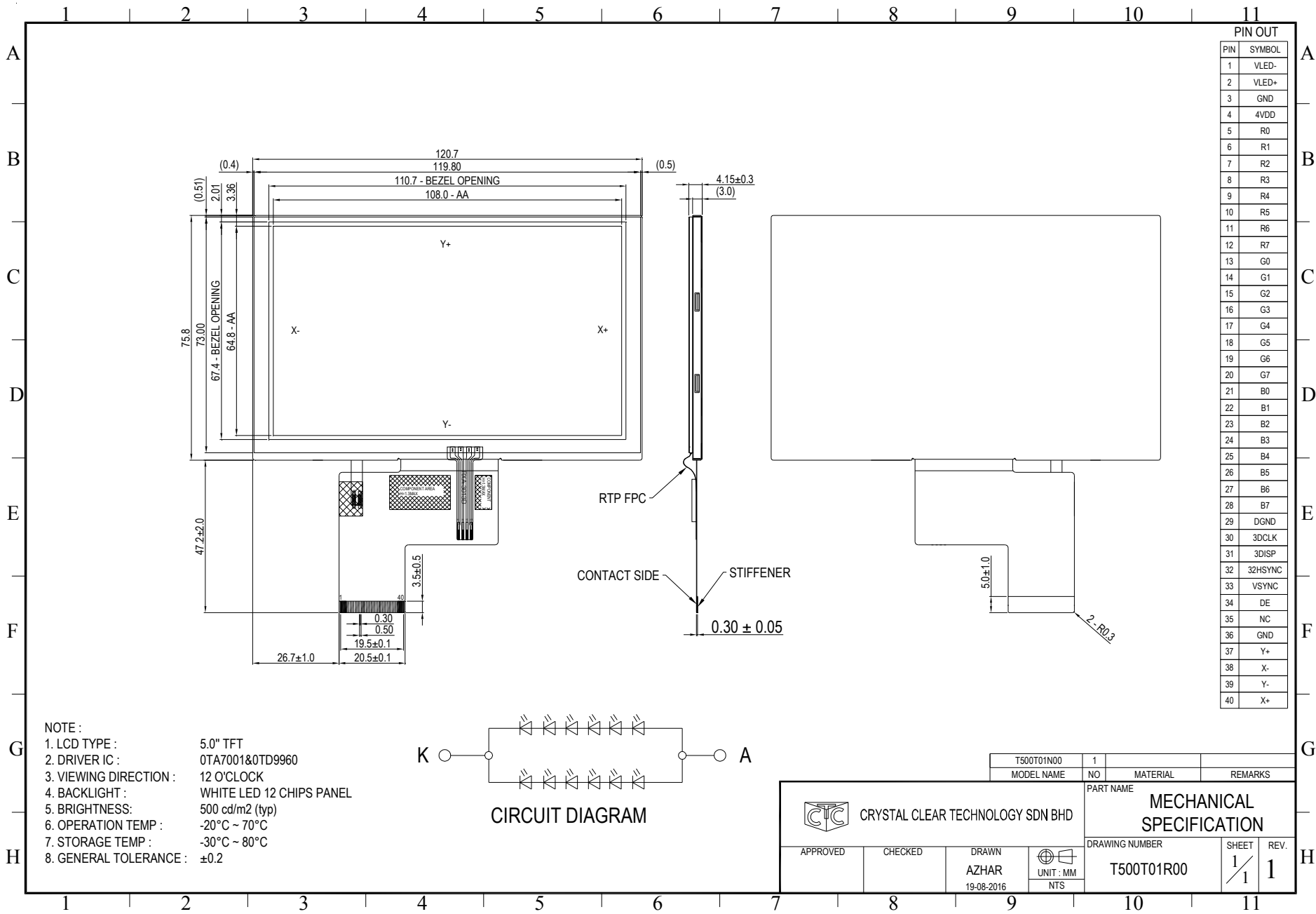
- 1. LCD TYPE : 5.0" TFT
- 2. DRIVER IC : 0TA7001&0TD9960
- 3. TOUCH IC : ST1633
- 4. VIEWING DIRECTION : 12 O'CLOCK
- 5. BACKLIGHT : WHITE LED 12 CHIPS PANEL
- 6. BRIGHTNESS : 500 cd/m2 (typ)
- 7. OPERATION TEMP : -20°C ~ 70°C
- 8. STORAGE TEMP : -30°C ~ 80°C
- 9. GENERAL TOLERANCE : ±0.2



CIRCUIT DIAGRAM

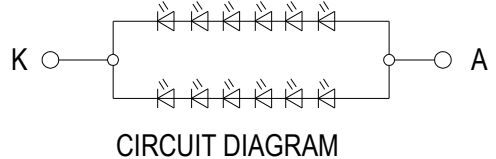
T500T01W00	1		
MODEL NAME	NO	MATERIAL	REMARKS

CRYSTAL CLEAR TECHNOLOGY SDN BHD		PART NAME	
		MECHANICAL SPECIFICATION	
APPROVED	CHECKED	DRAWN	UNIT : MM NTS
	AZHAR 28-07-2015	AMIRUL 28-07-2015	
DRAWING NUMBER		SHEET	REV.
T500T01N00		1/1	2

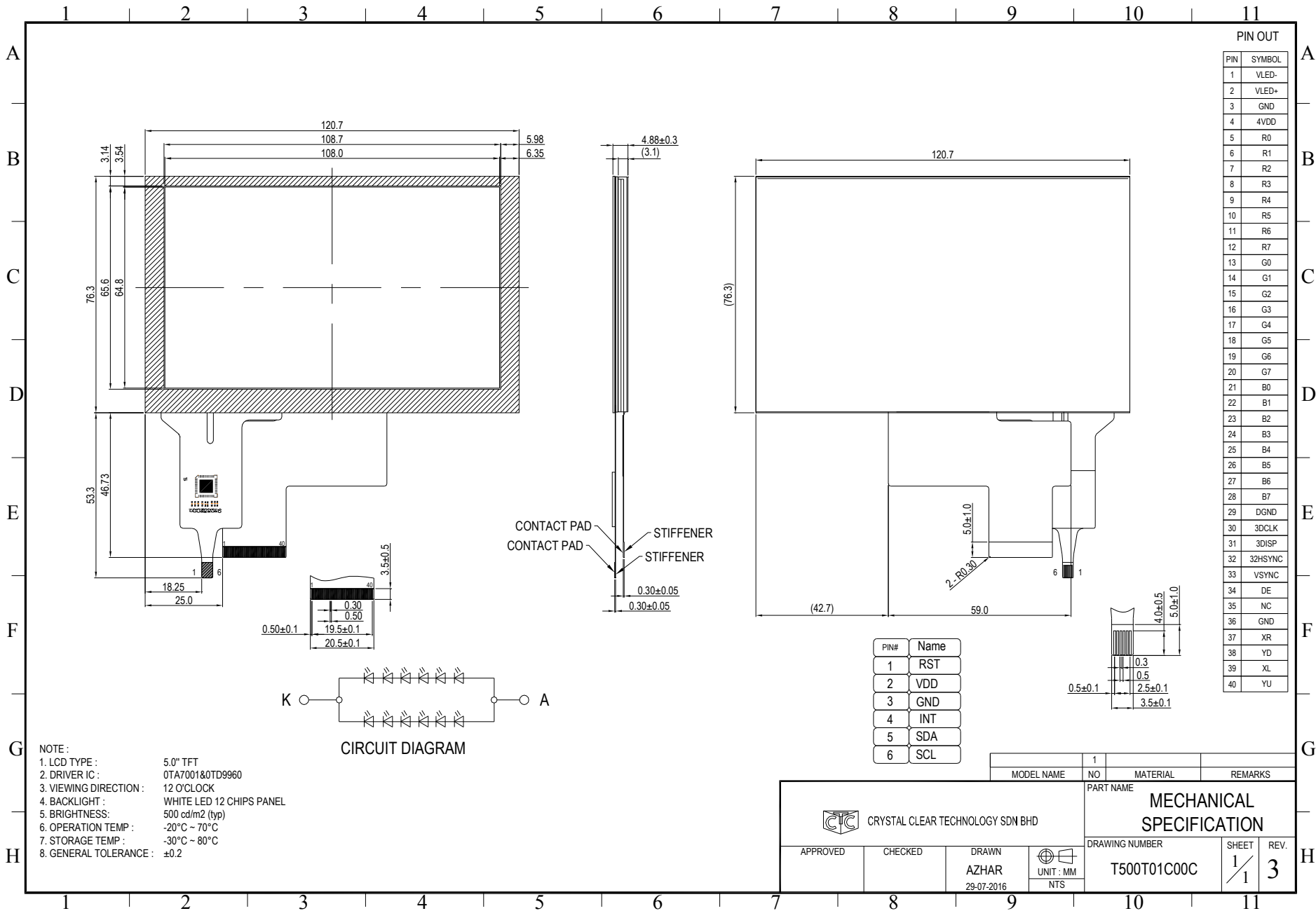


PIN OUT	
PIN	SYMBOL
1	VLED-
2	VLED+
3	GND
4	4VDD
5	R0
6	R1
7	R2
8	R3
9	R4
10	R5
11	R6
12	R7
13	G0
14	G1
15	G2
16	G3
17	G4
18	G5
19	G6
20	G7
21	B0
22	B1
23	B2
24	B3
25	B4
26	B5
27	B6
28	B7
29	DGND
30	3DCLK
31	3DISP
32	32HSYNC
33	VSYSN
34	DE
35	NC
36	GND
37	Y+
38	X-
39	Y-
40	X+

- NOTE :
1. LCD TYPE : 5.0" TFT
 2. DRIVER IC : 0TA7001&0TD9960
 3. VIEWING DIRECTION : 12 O'CLOCK
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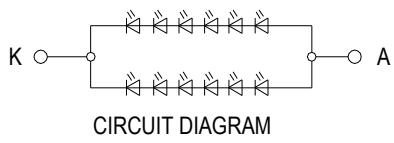
T500T01N00		1		
MODEL NAME		NO	MATERIAL	REMARKS
CRYSTAL CLEAR TECHNOLOGY SDN BHD			PART NAME	
			MECHANICAL SPECIFICATION	
APPROVED	CHECKED	DRAWN	DRAWING NUMBER	SHEET
		AZHAR	T500T01R00	1/1
		19-08-2016		REV. 1
		UNIT : MM NTS		



PIN OUT	
PIN	SYMBOL
1	VLED-
2	VLED+
3	GND
4	4VDD
5	R0
6	R1
7	R2
8	R3
9	R4
10	R5
11	R6
12	R7
13	G0
14	G1
15	G2
16	G3
17	G4
18	G5
19	G6
20	G7
21	B0
22	B1
23	B2
24	B3
25	B4
26	B5
27	B6
28	B7
29	DGND
30	3DCLK
31	3DISP
32	32HSYNC
33	VSYNC
34	DE
35	NC
36	GND
37	XR
38	YD
39	XL
40	YU

PIN#	Name
1	RST
2	VDD
3	GND
4	INT
5	SDA
6	SCL

- NOTE :
1. LCD TYPE : 5.0" TFT
 2. DRIVER IC : 07A7001&07TD9960
 3. VIEWING DIRECTION : 12 O'CLOCK
 4. BACKLIGHT : WHITE LED 12 CHIPS PANEL
 5. BRIGHTNESS : 500 cd/m2 (typ)
 6. OPERATION TEMP : -20°C ~ 70°C
 7. STORAGE TEMP : -30°C ~ 80°C
 8. GENERAL TOLERANCE : ±0.2



MODEL NAME		1	MATERIAL		REMARKS
PART NAME					
MECHANICAL SPECIFICATION					
DRAWING NUMBER		SHEET		REV.	
T500T01C00C		1/1		3	

APPROVED: [Signature] CHECKED: [Signature] DRAWN: AZHAR UNIT: MM NTS 29-07-2016

CRYSTAL CLEAR TECHNOLOGY SDN BHD

Product Specification

TP0097-01



1. Introduction

The purpose of this specification is defined the general provision and quality requirement apply to 5.0 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 INT 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: Five fingers multi touch
- Interface: I2C

2.2. General Specification

Item	Specification	Unit
Touch Module Size	5.0	inch
Outer Dimension(with Cover LENS)	120.7(L)x76.3(w)	mm
View Area	108.7(L)x65.6 (W)	mm
Sensor Area	108.7(L)x65.6(W)	mm
Touch Module trace number(Tx*Ty)	17*10	
Controller	GT911	
Resolution	800 x 480	
Origin	Top, Left	



3. Absolute Maximum Ratings

Absolute Maximum rating of touch panel module is as following

Parameter	Min.	Max.	Unit
Analog power AVDD28 (refer to AGND)	2.66	3.47	V
VDDIO (REF: DGND)	1.7	3.47	V
Input voltage on Digital I/O	0	3.47	V
Input voltage on Analog I/O	0	3.47	V
Operating temperature	-40	85	°C
Storage temperature	-60	125	°C
Welding temperature (10s)		300	°C
ESD protective voltage HB Model)		±2	KV

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 VSS, TA = 25°C)

Parameter	MIN.	Typical	Max.	Unit
VDD	2.8	-	3.3	V
Operating current (Normal mode)	-	8.0	14.5	mA
Operating current (Green mode)	-	3.3	-	mA
Operating current (Sleep mode)	70	-	120	uA
Input voltage in low level	-0.3	-	0.25*VDD	V
Input voltage in high level	0.75*VDD	-	VDD+0.3	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	/INT	O	Sensor data ready request
5	SDA	I/O	I2C serial data
6	SCL	I	I2C serial clock

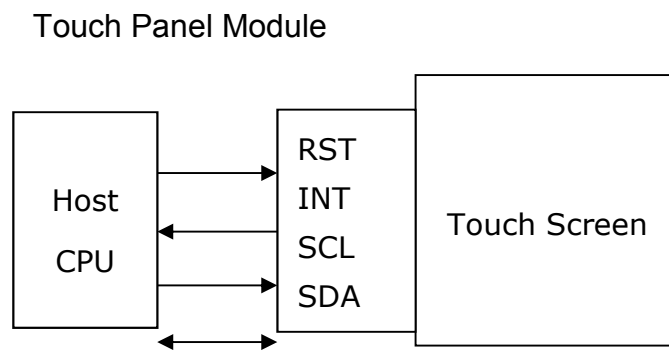


6. I2C Interface

Touch panel is used as I2C Slave Device, I2C Slave address is 0x28 or 0xBA.

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 INT, I2C pins SCL and SDA. The INT 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

Parameter	Min.	Typical	Max.	Unit
OSC oscillation frequency	59	60	61	MHz
I/O output rise time	-	-	0.5	ns
I/O output fall time	-	-	0.5	ns