

# CRYSTAL CLEAR TECHNOLOGY

## Product Specification

**T700T13X00**

(REVISION2)

**Crystal Clear Technology Sdn. Bhd.**

16 Jalan TP5, Taman Perindustrian Sime UEP,

47600 Subang Jaya, Selangor DE

Tel: +603-80247099

Website: [www.cct.com.my](http://www.cct.com.my)

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	1. RESISTIVE TOUCH PANEL SPECIFICATION	
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**2. RECORD OF REVISION**

Rev	Date	Item	Page	Comment	Originator	Checked by
1	18/11/16			Initial Release	CF Liew	Azhar
2	14/04/17			Correction: model name in header.	Azhar	Azhar



### 3. SUMMARY

This technical specification applies to 7" TFT-LCD module with a LED Backlight unit and a 40-pin TTL interface. This module supports 800\*R.G.B x 480, WVGA mode and can display 262,144 colors.

### 4. GENERAL SPECIFICATION

Parameter	Specifications	Unit
Screen size	7"(Diagonal)	inch
Display Resolution	800 RGB x 480	pixel
Active area	152.4x91.44	mm
Dot Pitch	63.5 x 190.5	um
Pixel size	190.5 x 190.5	um
Surface treatment	Anti-glare	
Color Saturation (NTSC)	45	%
Pixel Configuration	RGB Vertical Stripe	
Outline dimension	165(W) x 104.44(H)	mm
Weight	TBD	g
View Angle direction (optimum view)	12 o'clock	--
Interface Type	TTL	--
LCD Type	TN	--
Color Depth	262,144	colors
IC controller	Hx8678B,Hx8262A	

### 5. ABSOLUTE MAXIMUM RATINGS (GND-0V)

Item	Symbol	Condition	Min.	Max.	Unit	Remark
Power Voltage	Vcc	GND=0	-0.3	6	V	-
Input logic voltage	Vi	GND=0	-0.3	Vcc+0.3	V	Note 1

Note 1: DCLK, DE, R0~ R5, G0~ G5, B0~ B5.



## 6. ELECTRICAL CHARACTERISTICS

### 6.1 Recommended Operating Condition (GND=0V, Ta=25°C)

Parameter	Symbol	Rating			Unit	Condition	
		Min.	Typ.	Max.			
Power Supply Voltage	V <sub>CC</sub>	3.0	3.3	3.6	V		
Input logic voltage	High Level	V <sub>IH</sub>	0.7V <sub>CC</sub>	-	V <sub>CC</sub>	V	Note 1
	Low Level	V <sub>IL</sub>	0	-	0.3V <sub>CC</sub>	V	Note 1

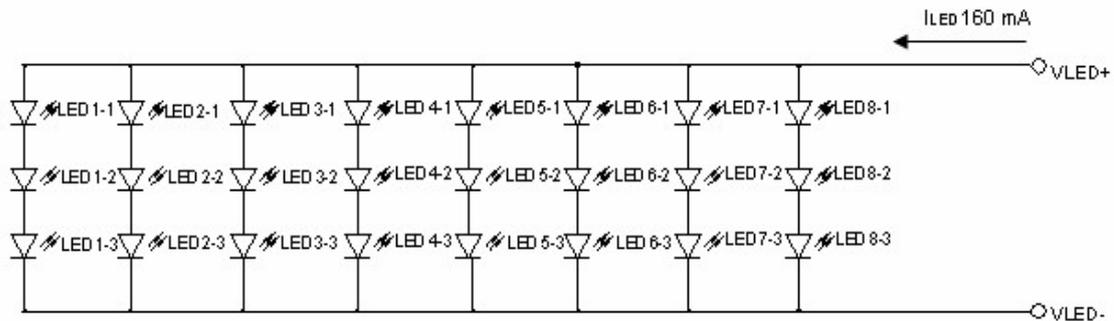
Note 1: DCLK, DE, R0~ R5, G0~ G5, B0~ B5.

### 6.2 LED Driving Conditions

Ta = 25°C

Parameter	Symbol	Min.	Typ.	Max.	Unit	Remark
LED current	I <sub>LED</sub>	-	160	-	mA	Note 1
LED voltage	V <sub>LED</sub>	-	9.9	-	V	
LED Life Time	-	20,000	-	-	Hr	Note 2

Note1: There are 8 groups LED shown as below, V<sub>LED</sub> = 9.9V, I<sub>LED</sub> = 160mA



### 6.3 TFT-LCD Current Consumption

Parameter	Symbol	Rating			Unit	Condition
		Min.	Typ.	Max.		
LCD power current	I <sub>CC</sub>	--	200	260	mA	black pattern
LED power current	I <sub>LED</sub>	--	160	200	mA	



6.4 AC Characteristics

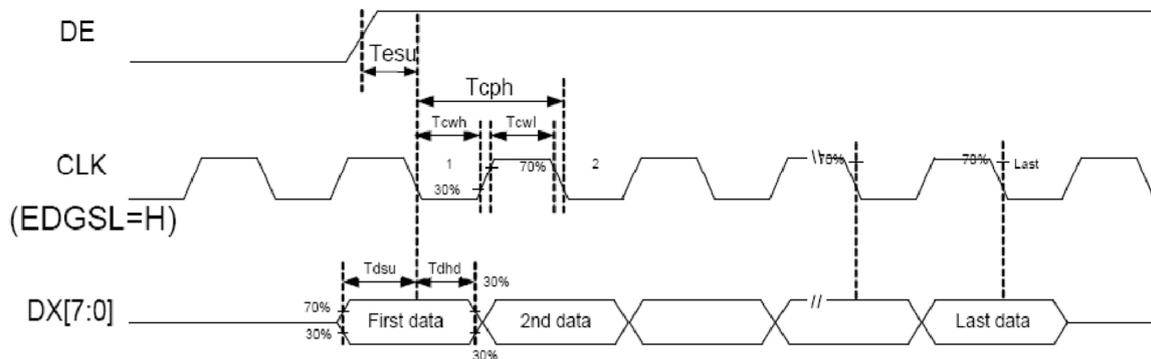
Frame rate range : 60Hz~65Hz

Parameter	Symbol	Rating			Unit
		Min.	Typ.	Max.	
Data setup time	Tdsu	6	-	-	ns
Data hold time	Tdhd	6	-	-	ns
DE setup time	Tesu	6	-	-	ns
CLK frequency	F <sub>CPH</sub>	29.40	33.26	42.48	MHz
CLK period	T <sub>CPH</sub>	23.54	30.06	34.01	ns
CLK pulse duty	T <sub>CWH</sub>	40	50	60	%
CLK pulse duty	T <sub>CWL</sub>	40	50	60	%
DE period	T <sub>DEH</sub> +T <sub>DEL</sub>	1000	1056	1200	T <sub>CPH</sub>
DE pulse width	T <sub>DEH</sub>	-	800	-	T <sub>CPH</sub>
DE frame blanking	T <sub>DEB</sub>	10	45	110	T <sub>DEH</sub> +T <sub>DEL</sub>
DE frame width	T <sub>DE</sub>	-	480	-	T <sub>DEH</sub> +T <sub>DEL</sub>

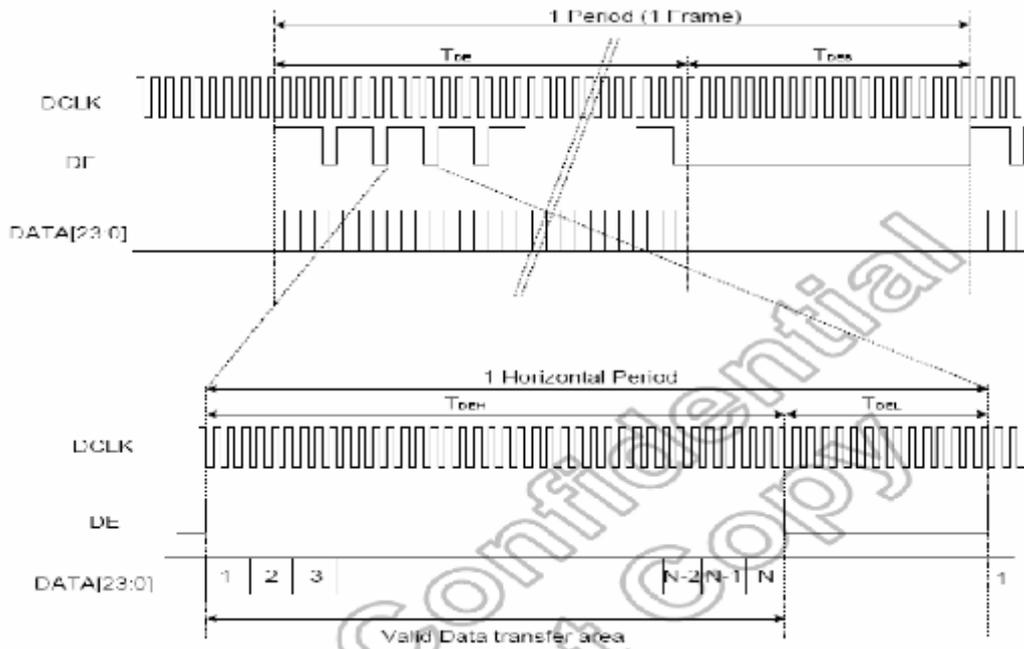
Note: We suggest using the typical value, so it can have better performance

6.5 Timing Controller Timing Chart

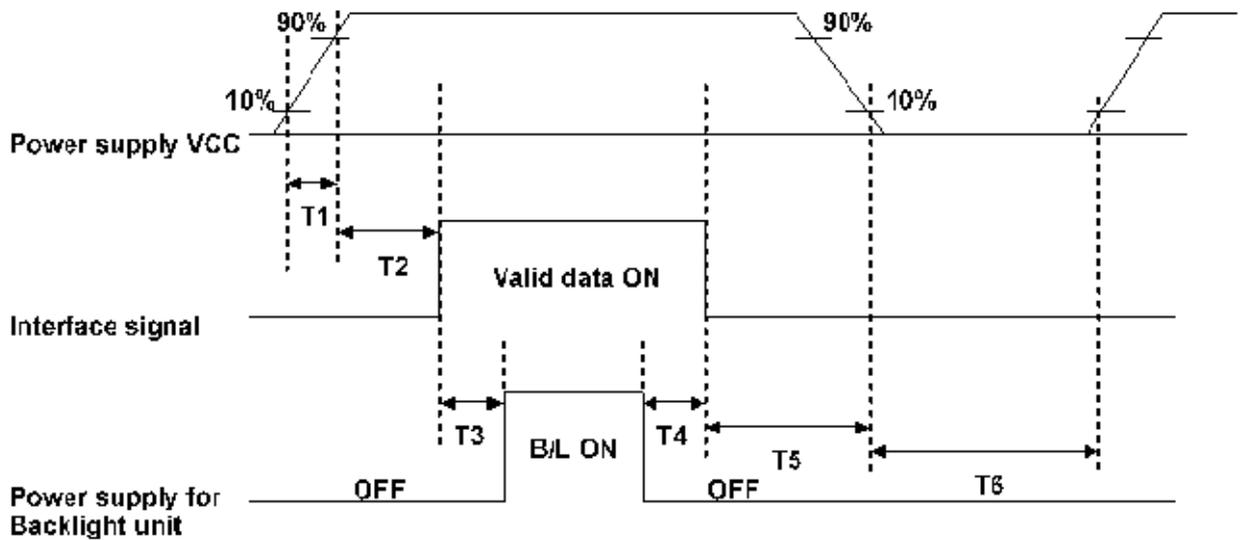
Clock and Data input waveforms



6.6 Data Input format



6.7 Power ON/OFF sequence



Parameter	SPEC.			Unit
	Min.	Typ.	Max.	
T1	1		2	ms
T2	0	60		ms
T3	200			ms
T4	200			ms
T5	1			ms
T6	1000			ms

7. OPTICAL CHARACTERISTICS (ON LCD SURFACE)

Item	Symbol	Condition	Min.	Typ.	Max.	Unit	Remark
Brightness	-	Viewing normal angle $\theta = \psi = 0$	300	350	-	cd/m <sup>2</sup>	Center of display
Response time	Tr		-	5	10	.ms	Note 3,5
	Tf		-	11	16	.ms	
Contrast ratio	CR		250	400	-	-	Note 4,5
Color Chromaticity	White		Wx	0.249	0.299	0.349	-
		Wy	0.278	0.328	0.378		
Viewing angle	Hor.	$\theta_R$	60	70	-	Deg.	Note 1
		$\theta_L$	60	70	-		
	Ver.	$\psi_T$	50	60	-		
		$\psi_B$	60	70	-		

Note 1: Definition of viewing angle range

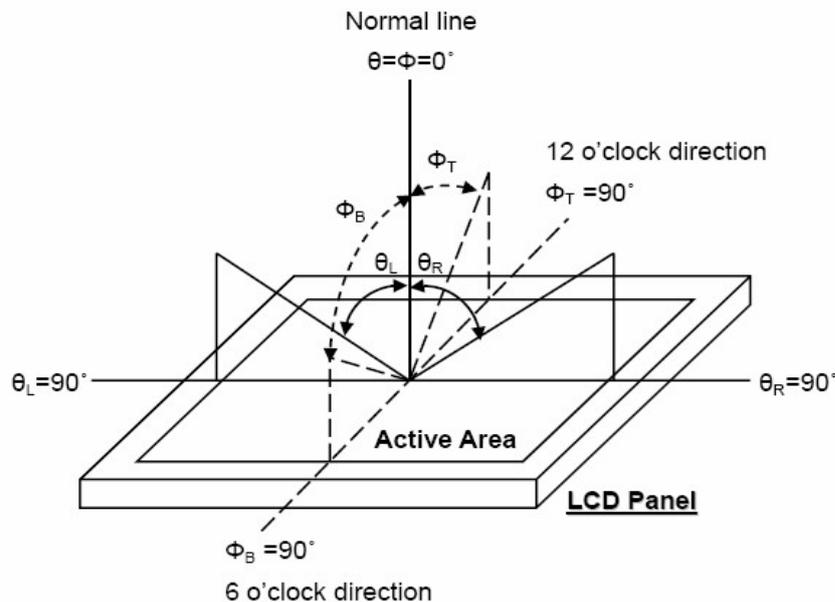


Fig. 7-1 Definition of viewing angle

Note 2: Test equipment setup:

After stabilizing and leaving the panel alone at a driven temperature for 10 minutes, the measurement should be executed. Measurement should be executed in a stable, windless, and dark room. Optical specifications are measured by Topcon BM-7 luminance meter 1.0° field of view at a distance of 50cm and normal direction.

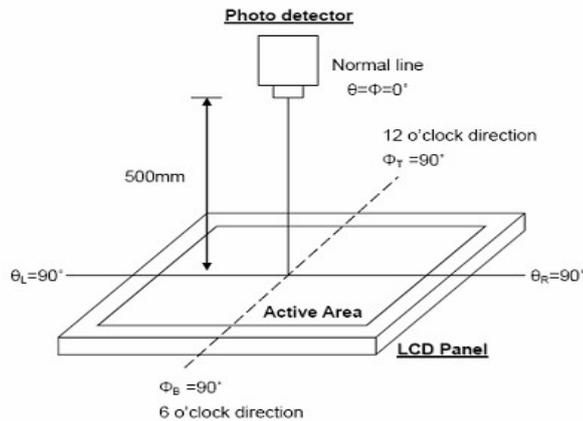


Fig.7-2 Optical measurement system setup

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,  $T_r$ , is the time between photo detector output intensity changed from 90% to 10%. And fall time,  $T_f$ , is the time between photo detector output Intensity changed from 10% to 90%.

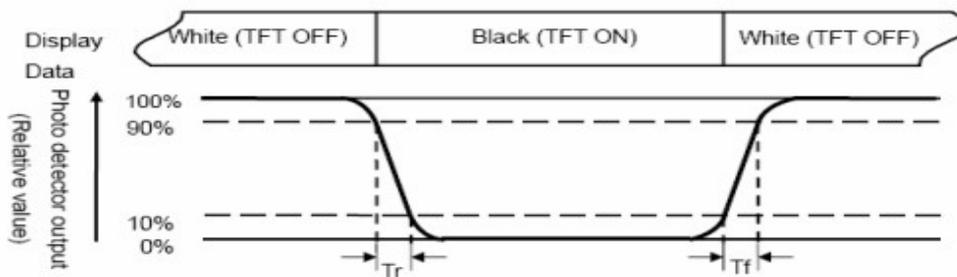


Fig. 3-3 Definition of response time

Note 4: Definition of contrast ratio:

The contrast ratio is defined as the following expression.

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

Note 5: White  $V_i = V_{i50} \pm 1.5V$

Black  $V_i = V_{i50} \pm 2.0V$

“±” means that the analog input signal swings in phase with VCOM signal.

“±” means that the analog input signal swings out of phase with VCOM signal. The 100% transmission is defined as the transmission of LCD panel when all the input terminals of module are electrically opened.

Note 6: Definition of color chromaticity (CIE 1931)

Color coordinates measured at the center point of LCD

Note 7: Measured at the center area of the panel when all the input terminals of LCD panel are electrically opened.

$$\text{Note 8: Uniformity (U)} = \frac{\text{Brightness (min)}}{\text{Brightness (max)}} \times 100\%$$



## 8. INTERFACE

### 8.1 TFT Pin Definition

Pin No.	Symbol	Description	Remarks
1	GND	Power Ground	
2	GND	Power Ground	
3	NC	Not Connect	
4	Vcc	Power Supply for Digital Circuit	
5	Vcc	Power Supply for Digital Circuit	
6	Vcc	Power Supply for Digital Circuit	
7	Vcc	Power Supply for Digital Circuit	
8	NC	Not Connect	
9	DE	Data Enable	
10	GND	Power Ground	
11	GND	Power Ground	
12	GND	Power Ground	
13	B5	Blue Data 5 (MSB)	
14	B4	Blue Data 4	
15	B3	Blue Data 3	
16	GND	Power Ground	
17	B2	Blue Data 2	
18	B1	Blue Data 1	
19	B0	Blue Data 0 (LSB)	
20	GND	Power Ground	
21	G5	Green Data 5 (MSB)	
22	G4	Green Data 4	
23	G3	Green Data 3	
24	GND	Power Ground	
25	G2	Green Data 2	
26	G1	Green Data 1	
27	G0	Green Data 0 (LSB)	
28	GND	Power Ground	
29	R5	Red Data 5 (MSB)	
30	R4	Red Data 4	
31	R3	Red Data 3	
32	GND	Power Ground	
33	R2	Red Data 2	
34	R1	Red Data 1	
35	R0	Red Data 0 (LSB)	
36	GND	Power Ground	
37	GND	Power Ground	
38	DCLK	Clock Signals ; Latch Data at the Falling Edge	
39	GND	Power Ground	
40	GND	Power Ground	

Note: User's connector part number is PF050-40ZSG-F09-S manufactured by UJU or equivalent.

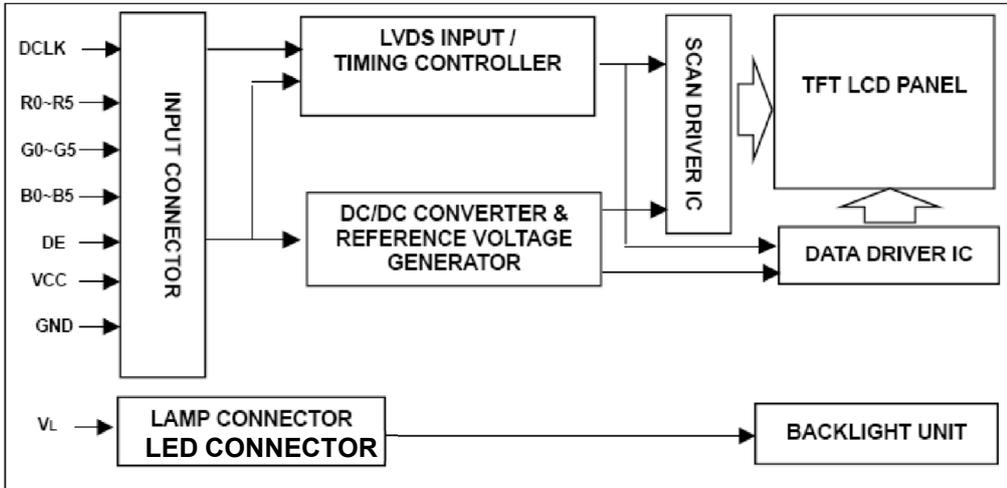
### 8.2 Backlight Driving part

Pin No	Symbol	Description
1	VLED+	Red, LED_ Anode
2	VLED-	White, LED_ Cathode

Note: The backlight interface connector is a model **BHSR-02VS-1** manufactured by JST or equivalent. The matching connector part number is **SM02B-BHSS-1-TB** manufactured by JST or equivalent.



## 9. BLOCK DIAGRAM



## 10. RELIABILITY TEST CONDITION

No.	Test Items	Test Condition	REMARK
1	High Temperature Storage Test	Ta=80°C Dry 240h	
2	Low Temperature Storage Test	Ta=-30°C Dry 240h	
3	High Temperature Operation Test	Ta=70°C Dry 240h	
4	Low Temperature Operation Test	Ta=-20°C Dry 240h	
5	High Temperature and High Humidity Operation Test	Ta=60°C 90%RH 240h	
6	Electro Static Discharge Test	150pF, 330Ω, ±8KV(Contact)/±15KV(Air), 5 points/panel, 5 times/point	
7	Shock Test (non-operating)	Half sine wave, 180G, 2ms one shock of each six faces (I.e. run 180G 2ms for all six faces)	
8	Vibration Test (non-operating)	Sine wave, 10 ~ 500 ~ 10Hz, 1.5G, 0.37oct/min 3 axis, 1hour/axis	
9	Thermal Shock Test	-20°C(0.5h) ~ 70°C(0.5h) / 100 cycles(Dry)	

1. REACH (Directive 2011\55\EU)
2. RoHS (Directive 2002\95\EC)

11. 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> <p>Smaller than 1/2      Larger than 1/2</p> <p>'No dot defect' (ignore)      '1 dot defect' (counted)</p>	<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</p> <p>or</p> <p>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	<p>Black spot White Spot Bright spot Pin Hole Foreign Particle</p>	<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><math>D = \frac{a+b}{2}(\text{mm})</math></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><math>D &lt; 0.10</math></td> <td>NC</td> <td rowspan="4">NC</td> </tr> <tr> <td><math>0.10 \leq D &lt; 0.20</math></td> <td>2</td> </tr> <tr> <td><math>0.20 \leq D \leq 0.30</math></td> <td>1</td> </tr> <tr> <td><math>D &gt; 0.30</math></td> <td>0</td> </tr> </tbody> </table>	Defect Category	A	B	$D < 0.10$	NC	NC	$0.10 \leq D < 0.20$	2	$0.20 \leq D \leq 0.30$	1	$D > 0.30$	0		
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<p>Black Line White line Particle between POL and Glass Scratch on Glass</p>		<table border="1"> <thead> <tr> <th>Defect Category</th> <th>A</th> <th>B</th> </tr> </thead> <tbody> <tr> <td><math>W &lt; 0.03</math></td> <td>NC</td> <td rowspan="3">NC</td> </tr> <tr> <td><math>0.03 \leq W \leq 0.08, L \leq 2.0</math></td> <td>2</td> </tr> <tr> <td><math>W &gt; 0.08</math></td> <td>0</td> </tr> </tbody> </table>	Defect Category	A	B	$W < 0.03$	NC	NC	$0.03 \leq W \leq 0.08, L \leq 2.0$	2	$W > 0.08$	0					
Defect Category	A	B															
$W < 0.03$	NC	NC															
$0.03 \leq W \leq 0.08, L \leq 2.0$	2																
$W > 0.08$	0																
<p>POL Bubble POL Dented</p>		<table border="1"> <thead> <tr> <th>Defect Category</th> <th>A</th> <th>B</th> </tr> </thead> <tbody> <tr> <td><math>D &lt; 0.20</math></td> <td>NC</td> <td rowspan="4">NC</td> </tr> <tr> <td><math>0.20 \leq D &lt; 0.30</math></td> <td>3</td> </tr> <tr> <td><math>0.30 \leq D \leq 0.50</math></td> <td>2</td> </tr> <tr> <td><math>D &gt; 0.5</math></td> <td>0</td> </tr> </tbody> </table>	Defect Category	A	B	$D < 0.20$	NC	NC	$0.20 \leq D < 0.30$	3	$0.30 \leq D \leq 0.50$	2	$D > 0.5$	0			
Defect Category	A	B															
$D < 0.20$	NC	NC															
$0.20 \leq D < 0.30$	3																
$0.30 \leq D \leq 0.50$	2																
$D > 0.5$	0																
3	Mura (50% Grey)		Judged by Limit sample														



## 12. PRECAUTION AND LIMITED WARRANTY

### 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 colour 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 potential 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.

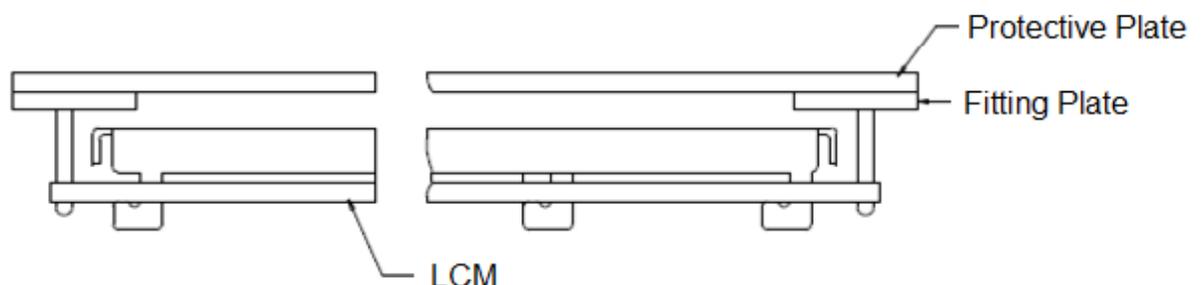
## 4. Using LCD Modules

### a. Installing LCD Modules

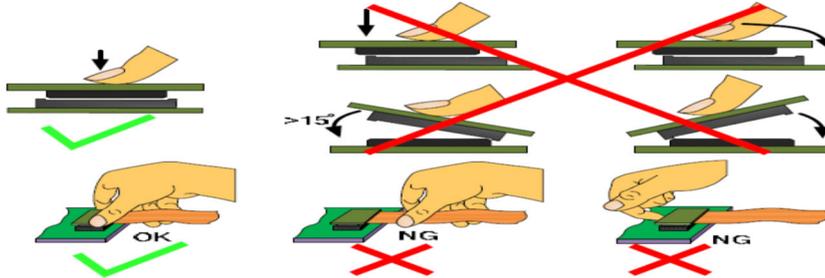
The hole in the printed circuit board is used to fix LCM as shown in the picture below.

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

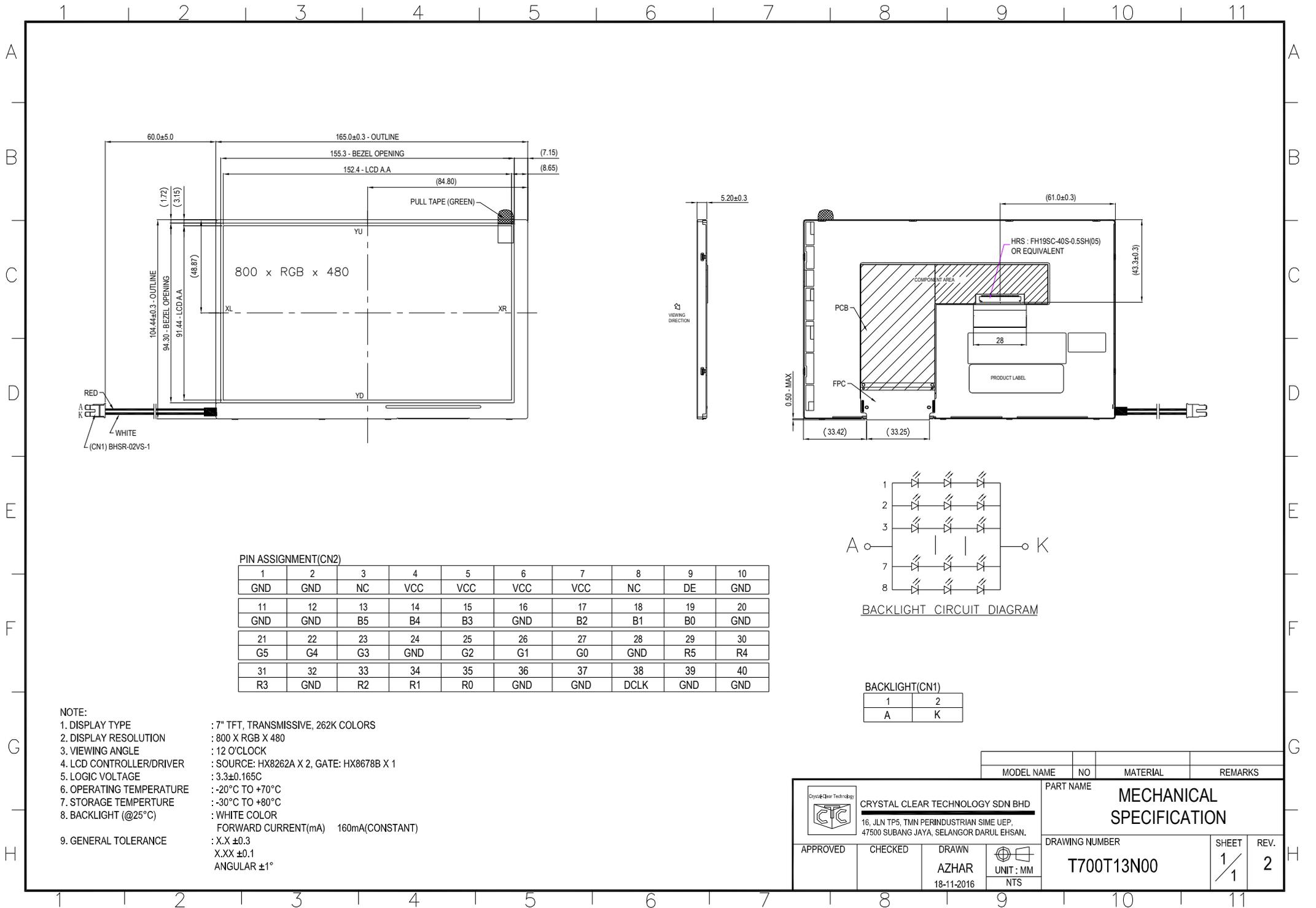
Unless otherwise agreed between Crystal Clear Technology and customer, Crystal Clear Technology will replace or repair any of its LCD and LCM which is found to be defective electrically and visually when inspected in accordance with Crystal Clear Technology acceptance standards, for a period of one year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

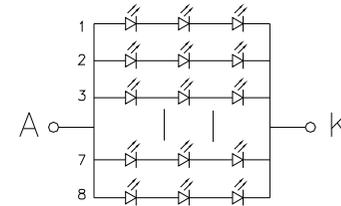
- Broken LCD glass
- PCB eyelet's damaged or modified
- PCB conductors damaged
- Circuit modified in any way, including addition of components.
- PCB tampered with by grinding, engraving or painting varnish.
- Soldering to, or modifying the bezel in any manner.

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.



**PIN ASSIGNMENT(CN2)**

1	2	3	4	5	6	7	8	9	10
GND	GND	NC	VCC	VCC	VCC	VCC	NC	DE	GND
11	12	13	14	15	16	17	18	19	20
GND	GND	B5	B4	B3	GND	B2	B1	B0	GND
21	22	23	24	25	26	27	28	29	30
G5	G4	G3	GND	G2	G1	G0	GND	R5	R4
31	32	33	34	35	36	37	38	39	40
R3	GND	R2	R1	R0	GND	GND	DCLK	GND	GND



BACKLIGHT CIRCUIT DIAGRAM

**BACKLIGHT(CN1)**

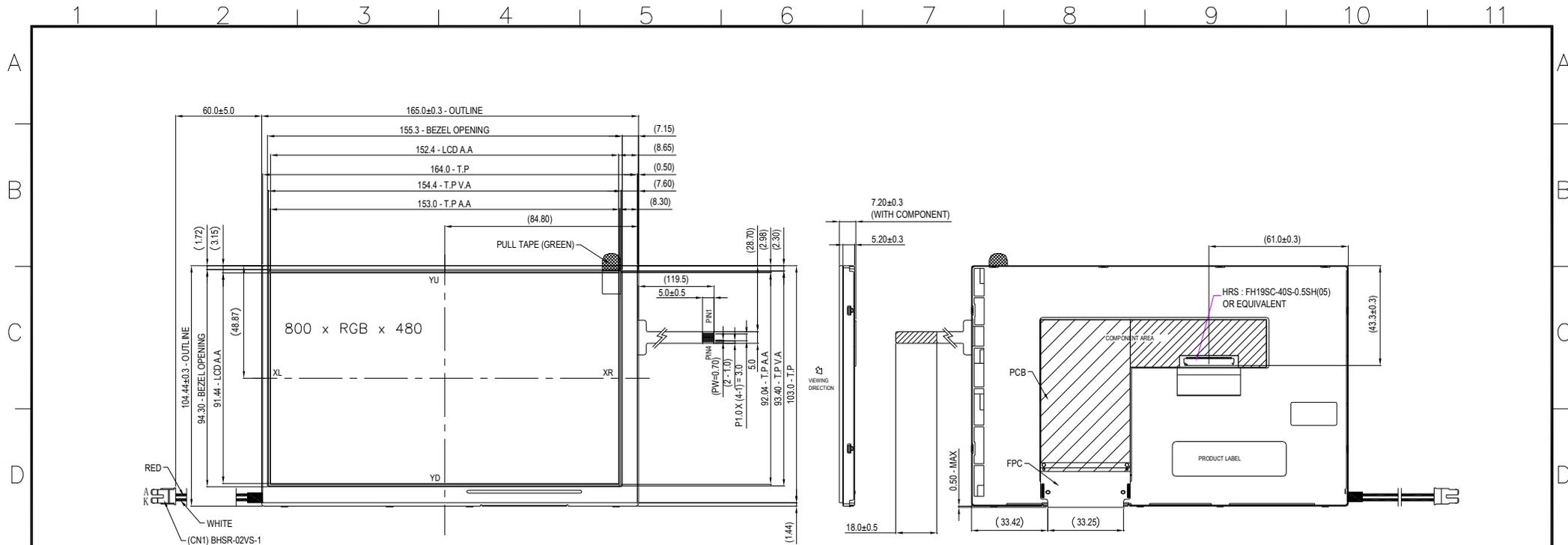
1	2
A	K

**NOTE:**

1. DISPLAY TYPE : 7" TFT, TRANSMISSIVE, 262K COLORS
2. DISPLAY RESOLUTION : 800 X RGB X 480
3. VIEWING ANGLE : 12 O'CLOCK
4. LCD CONTROLLER/DRIVER : SOURCE: HX8262A X 2, GATE: HX8678B X 1
5. LOGIC VOLTAGE : 3.3±0.165C
6. OPERATING TEMPERATURE : -20°C TO +70°C
7. STORAGE TEMPERATURE : -30°C TO +80°C
8. BACKLIGHT (@25°C) : WHITE COLOR  
FORWARD CURRENT(mA) 160mA(CONSTANT)
9. GENERAL TOLERANCE : X.X ±0.3  
X.XX ±0.1  
ANGULAR ±1°

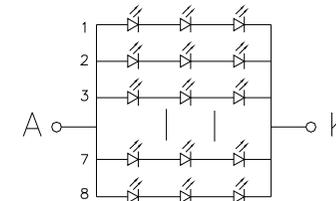
MODEL NAME	NO	MATERIAL	REMARKS

	<b>CRYSTAL CLEAR TECHNOLOGY SDN BHD</b> 16, JLN TP5, TMN PERINDUSTRIAN SIME UEP, 47500 SUBANG JAYA, SELANGOR DARUL EHSAN.		<b>PART NAME</b> <b>MECHANICAL SPECIFICATION</b>	
	<b>APPROVED</b> AZHAR 18-11-2016	<b>CHECKED</b>	<b>DRAWN</b> UNIT : MM NTS	<b>DRAWING NUMBER</b> <b>T700T13N00</b>



**PIN ASSIGNMENT(CN2)**

1	2	3	4	5	6	7	8	9	10
GND	GND	NC	VCC	VCC	VCC	VCC	NC	DE	GND
11	12	13	14	15	16	17	18	19	20
GND	GND	B5	B4	B3	GND	B2	B1	B0	GND
21	22	23	24	25	26	27	28	29	30
G5	G4	G3	GND	G2	G1	G0	GND	R5	R4
31	32	33	34	35	36	37	38	39	40
R3	GND	R2	R1	R0	GND	GND	DCLK	GND	GND



**BACKLIGHT CIRCUIT DIAGRAM**

**TOUCH PANEL CONNECTION**

1	2	3	4
YU	XR	YD	XL

**BACKLIGHT(CN1)**

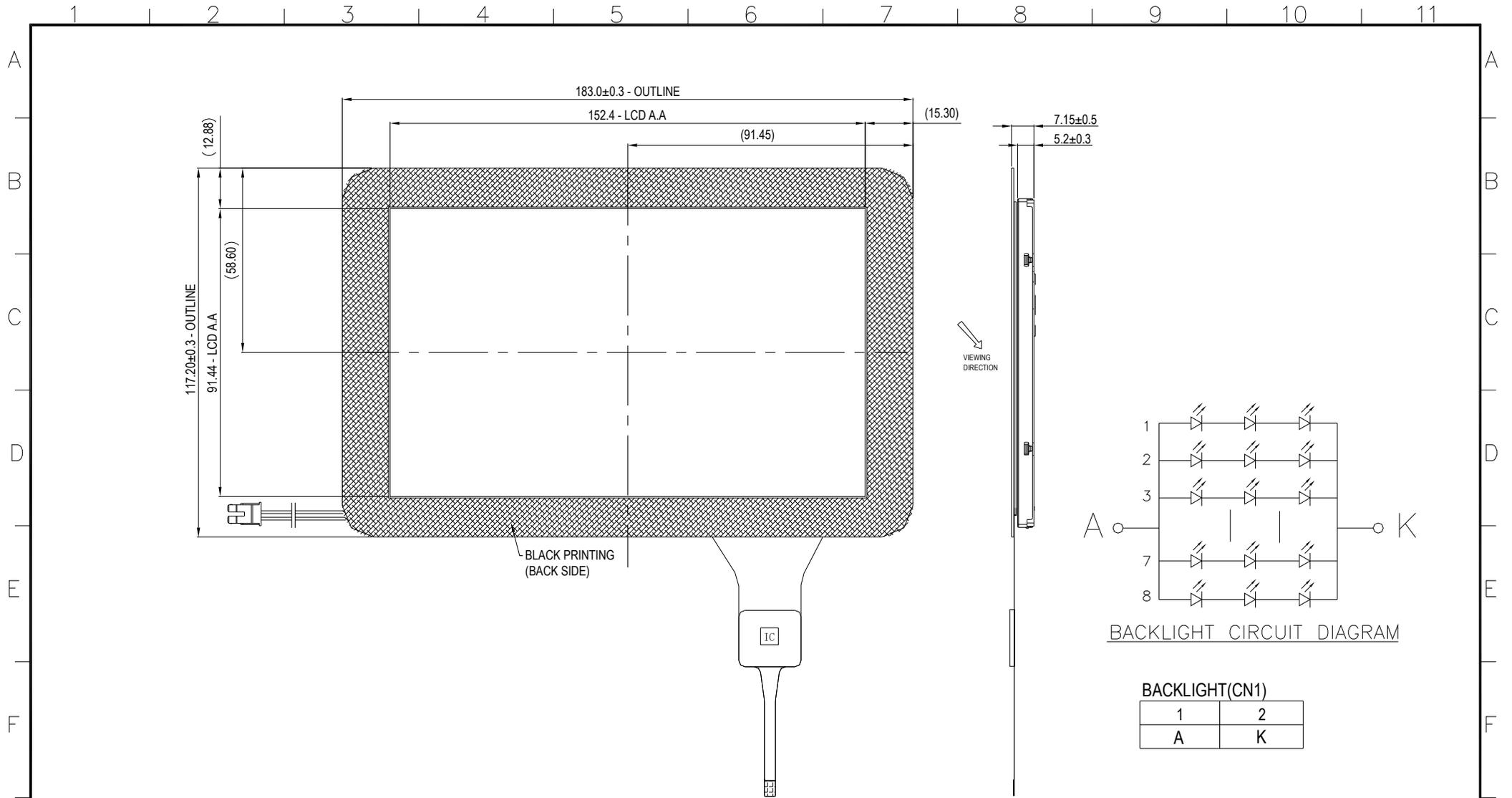
1	2
A	K

**NOTE:**

1. DISPLAY TYPE : 7" TFT, TRANSMISSIVE, 262K COLORS
2. DISPLAY RESOLUTION : 800 X RGB X 480
3. VIEWING ANGLE : 12 O'CLOCK
4. LCD CONTROLLER/DRIVER : SOURCE: HX8262A X 2, GATE: HX8678B X 1
5. LOGIC VOLTAGE : 3.3±0.165C
6. OPERATING TEMPERATURE : -20°C TO +70°C
7. STORAGE TEMPERATURE : -30°C TO +80°C
8. BACKLIGHT (@25°C) : WHITE COLOR  
FORWARD CURRENT(mA) 160mA(CONSTANT)
9. GENERAL TOLERANCE : X.X ±0.3  
X.XX ±0.1  
ANGULAR ±1°

MODEL NAME	NO	MATERIAL	REMARKS
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 <b>CRYSTAL CLEAR TECHNOLOGY SDN BHD</b> 16, JLN TP5, TMN PERINDUSTRIAN SIME UEP, 47500 SUBANG JAYA, SELANGOR DARUL EHSAN.	PART NAME		<b>MECHANICAL SPECIFICATION</b>
	APPROVED	CHECKED	
		AZHAR	DRAWING NUMBER <b>T700T13R00</b>
		18-11-2016	SHEET 1/1
		UNIT : MM NTS	REV. 2

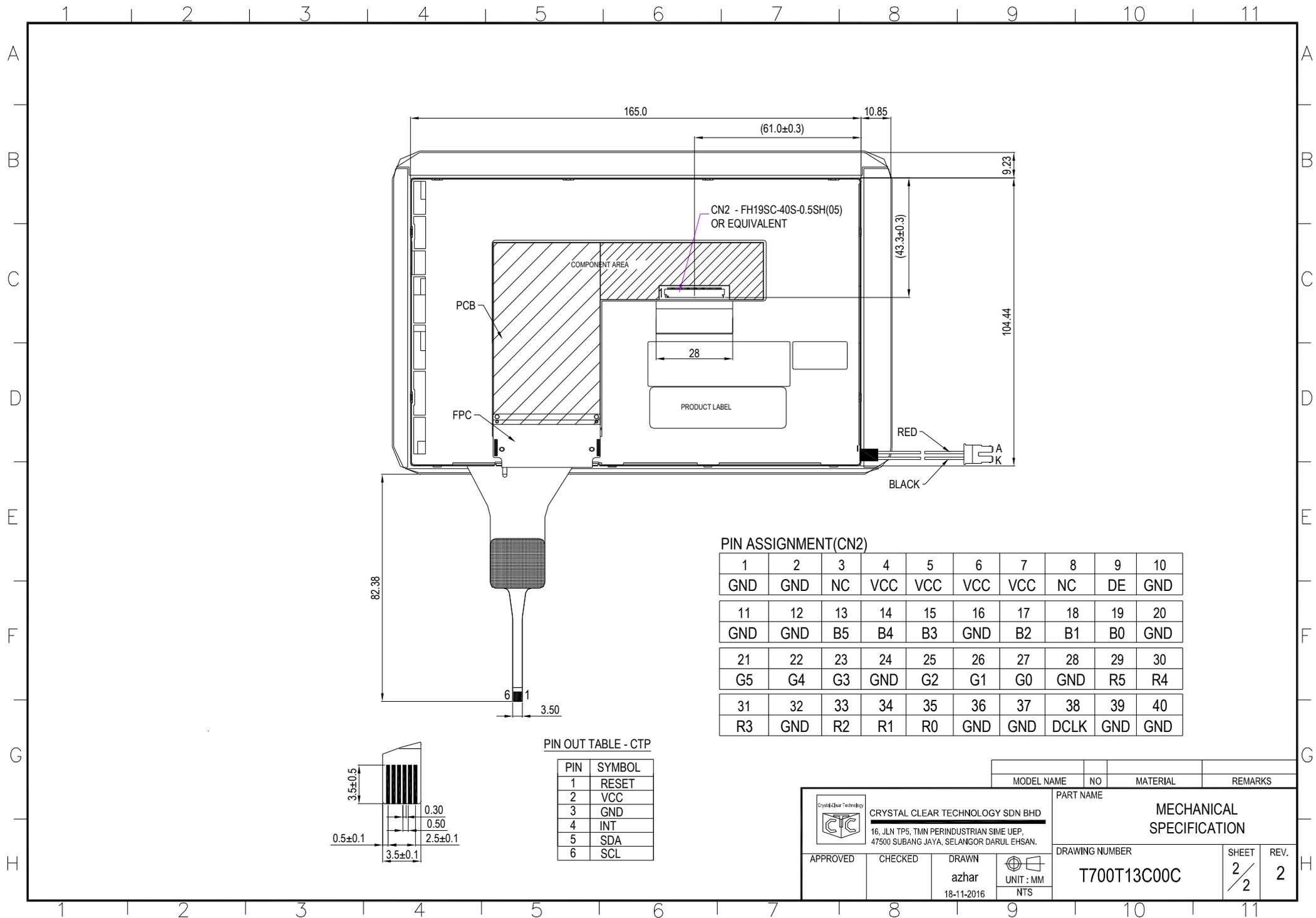


**NOTE:**

- LCD CONTROLLER/DRIVER : SOURCE: HX8262A X 2, GATE: HX8678B X 1
- LOGIC VOLTAGE : 3.3±0.165C
- GENERAL TOLERANCE TO BE ±0.3

MODEL NAME	NO	MATERIAL	REMARKS

 <b>CRYSTAL CLEAR TECHNOLOGY SDN BHD</b> 16, JLN TP5, TMN PERINDUSTRIAN SIME UEP, 47500 SUBANG JAYA, SELANGOR DARUL EHSAN.		<b>PART NAME</b> <b>MECHANICAL SPECIFICATION</b>	
<b>APPROVED</b>  	<b>CHECKED</b>  	<b>DRAWN</b> azhar 18-11-2016	<b>DRAWING NUMBER</b> <b>T700T13C00C</b>
<b>UNIT: MM</b> NTS		<b>SHEET</b> 1/2	<b>REV.</b> 2



**PIN ASSIGNMENT (CN2)**

1	2	3	4	5	6	7	8	9	10
GND	GND	NC	VCC	VCC	VCC	VCC	NC	DE	GND
11	12	13	14	15	16	17	18	19	20
GND	GND	B5	B4	B3	GND	B2	B1	B0	GND
21	22	23	24	25	26	27	28	29	30
G5	G4	G3	GND	G2	G1	G0	GND	R5	R4
31	32	33	34	35	36	37	38	39	40
R3	GND	R2	R1	R0	GND	GND	DCLK	GND	GND

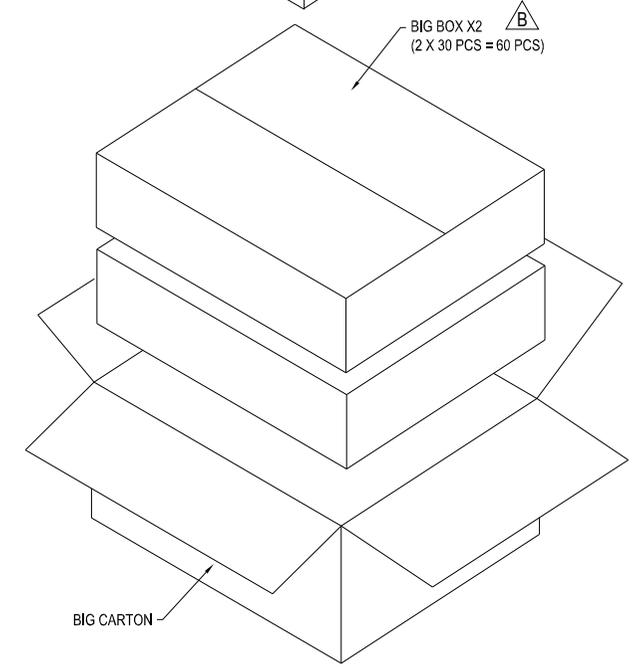
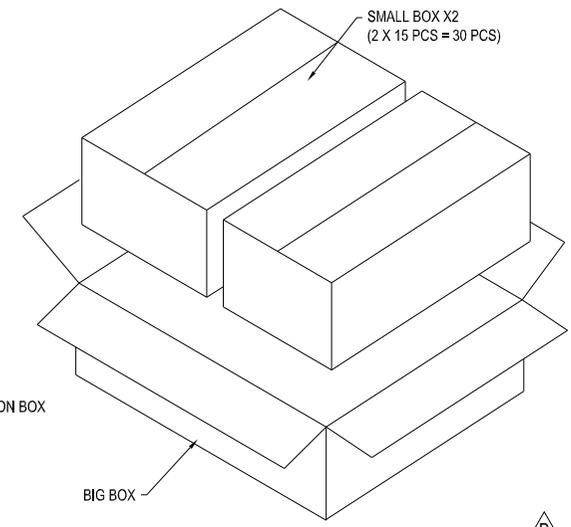
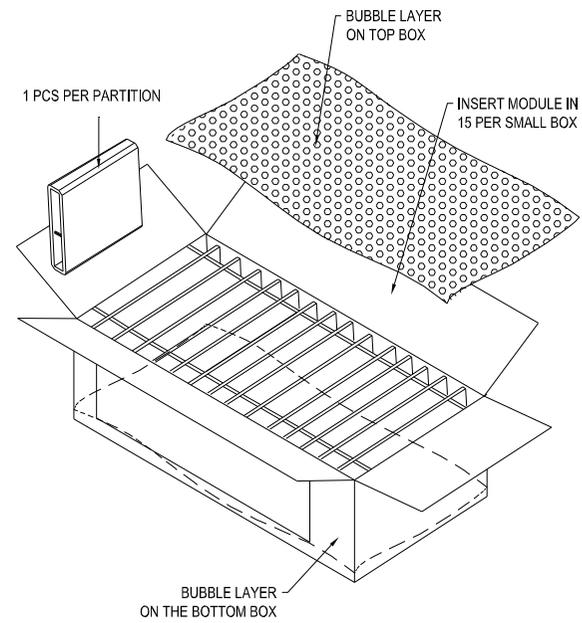
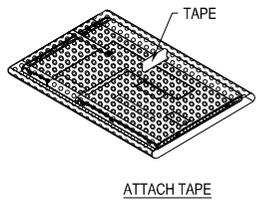
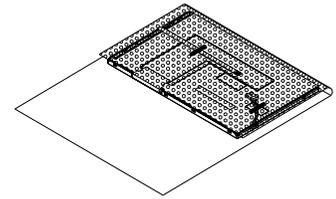
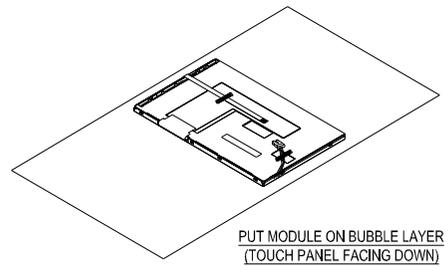
**PIN OUT TABLE - CTP**

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

MODEL NAME	NO	MATERIAL	REMARKS

	<b>CRYSTAL CLEAR TECHNOLOGY SDN BHD</b> 16, JLN TP5, TMN PERINDUSTRIAN SIME UEP, 47500 SUBANG JAYA, SELANGOR DARUL EHSAN.		<b>PART NAME</b> MECHANICAL SPECIFICATION	
	APPROVED azhar 18-11-2016	CHECKED	DRAWN azhar 18-11-2016	DRAWING NUMBER <b>T700T13C00C</b>

**B** REVISE PACKING  
HAFIZAH 16-12-2014



- NOTE:
1. GENERAL TOLERANCE TO BE  $\pm 5.0\text{MM}$
  2. WRAP WITH BUBBLE LAYER
  3. 1 SLOT = 1 PC
  4. 1 SMALL BOX = 15 PCS
  5. 1 BIG BOX = 2 SMALL BOX
  6. 1 BIG BOX = 2 X 15 PCS = 30 PCS
  7. 1 BIG CARTON = 2 BIG BOX
  8. 1 BIG CARTON = 2 X 30 = 60 PCS
  9. MAXIMUM WEIGHT = 16 KG
  10. BUBBLE LAYER AT BOTTOM AND TOP SMALL BOX

 <b>CRYSTAL CLEAR TECHNOLOGY SDN BHD</b> 16, JLN TP5, TMN PERINDUSTRIAN SIME UEP, 47500 SUBANG JAYA, SELANGOR DARUL EHSAN.		PART NAME <b>ASSEMBLY DRAWING</b>	
APPROVED	CHECKED	DRAWN HAFIZAH 03-12-2014	DRAWING NUMBER <b>T4880C08WQ31</b>
		UNIT : MM NTS	SHEET <b>3 / 3</b>
			REV. <b>A</b>



## Appendix 1: Resistive Touch Panel Specification

1. Scope  
Resistive product spec
2. Features
  - 2.1. Type 4 Wire analog resistive Touch panel
  - 2.2. Input Method Pen and/or Finger
  - 2.3. Structure PET Based Film + Glass
  - 2.4. Shape Shape, structure and dimension are referred to drawing
3. Electrical Characteristic (R=Resistance)
  - 3.1. Rating Maximum voltage is less than DC10.0 volts.
  - 3.2. R between pads
    - ▶ X axis 200 - 1000  $\Omega$
    - ▶ Y axis 100 - 400  $\Omega$
  - 3.3. Linearity Less than  $\pm 3.0\%$
  - 3.4. Chattering time 10ms or less
  - 3.5. Insulation R Minimum 20M $\Omega$  at DC2 volts
4. Optical Characteristics (T=transmission)
  - 4.1. Light T More than 80 %
  - 4.2. Newton-ring Criterion is specified as reference sample agreed upon
5. Mechanical Characteristics
  - 5.1. Input Method 0.8 R Polyacetal stylus and/or Finger
  - 5.2. Activation Force
    - ▶ Finger Input 90 g or less with 8.0 R silicon rubber
    - ▶ Pen Input 100 g or less with 0.8 R Polyacetal-stylus
  - 5.3 Surface Hardness Pencil hardness 3 H more (JIS-K5400)
6. Environmental Characteristics (T=Temperature)
  - 6.1. Operating T. -20  $^{\circ}\text{C}$  - +70  $^{\circ}\text{C}$
  - 6.2. Storage T. -30  $^{\circ}\text{C}$  - +80  $^{\circ}\text{C}$
7. Reliability Characteristics (Storage)
  - 7.1. High Temperature 96 hours at +80 $^{\circ}\text{C}$   
The measurement must be made after 24 hours or more at room temperature and should satisfy the following condition.
    - ▶ Resistance between pads In accordance with 3.2
    - ▶ Linearity In accordance with 3.3
    - ▶ Insulation resistance In accordance with 3.5
  - 7.2. Low Temperature 96 hours at -30  $^{\circ}\text{C}$   
The measurement must be made after 24 hours or more at room temperature and should satisfy the following condition.
    - ▶ Resistance between pads In accordance with 3.2
    - ▶ Linearity In accordance with 3.3
    - ▶ Insulation resistance In accordance with 3.5
  - 7.3. High Temperature and Humidity 96 hours at +60  $^{\circ}\text{C}$ , 90 %RH  
The measurement must be made after 24 hours or more at room temperature and should satisfy the following condition.



- ▶ Resistance between pads In accordance with 3.2
  - ▶ Linearity In accordance with 3.3
  - ▶ Insulation resistance In accordance with 3.5
- 7.4. Thermal Shock 10 Cycles
- One cycle is 60 min at -10 °C and then 60 min at +60 °C.
- The measurement must be made after 24 hours or more at room temperature and should satisfy the following condition.
- ▶ Resistance between pads In accordance with 3.2
  - ▶ Linearity In accordance with 3.3
  - ▶ Insulation resistance In accordance with 3.5

## 8. Durability

### 8.1. Writing Durability

100,000 capital alphabetical characters at following conditions.

Pen: R0.8mm Polyacetal stylus Load: 150 ~ 250 gf

Writing speed: 66mm/s

Voltage supply: no

The measurement must satisfy followings.

- ▶ Resistance between pads In accordance with 3.2
- ▶ Linearity In accordance with 3.3
- ▶ Insulation resistance In accordance with 3.5

### 8.2. Finger Touch

1,000,000 times punching at following conditions.

Pen: R3.75mm silicon rubber Load: 250 gf

Hitting speed: 3 times/s

The measurement must satisfy followings.

- ▶ Resistance between pads In accordance with 3.2
- ▶ Linearity In accordance with 3.3
- ▶ Insulation resistance In accordance with 3.5



## Appendix 2: Capacitive Touch Panel Specification

### 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	117.2(H) x 183(W) x 1.4(T) (Excluded FPC)	Mm
Touch Area	91(H) x 154.6(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 <sub>CORE</sub>	Supply Voltage for Logic	-0.3 to +2.8	V
V <sub>DDIO</sub>	Supply Voltage for I/O	-0.3 to +3.3	V
T <sub>A</sub>	Operating Temperature	-20 to +85	°C
T <sub>STG</sub>	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<sub>SS</sub>, T<sub>A</sub> = -20 to 85°C)

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

## 5. Pin Definition

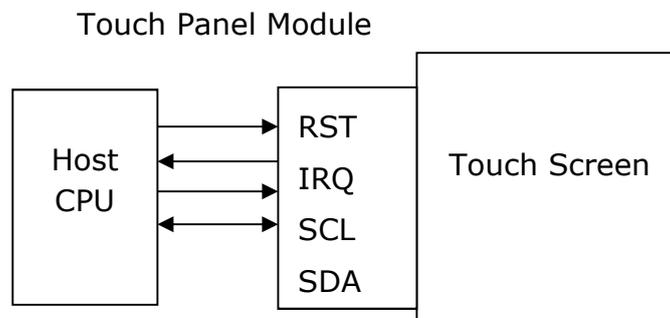
No.	Symbol	I/O	Function
1	RST	I	Sensor system global reset
2	VDD	P	Power supply
3	VSS	P	Ground
4	IRQ	O	Sensor data ready request
5	SDA	I/O	I2C serial data
6	SCL	I	I2C serial clock

## 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:

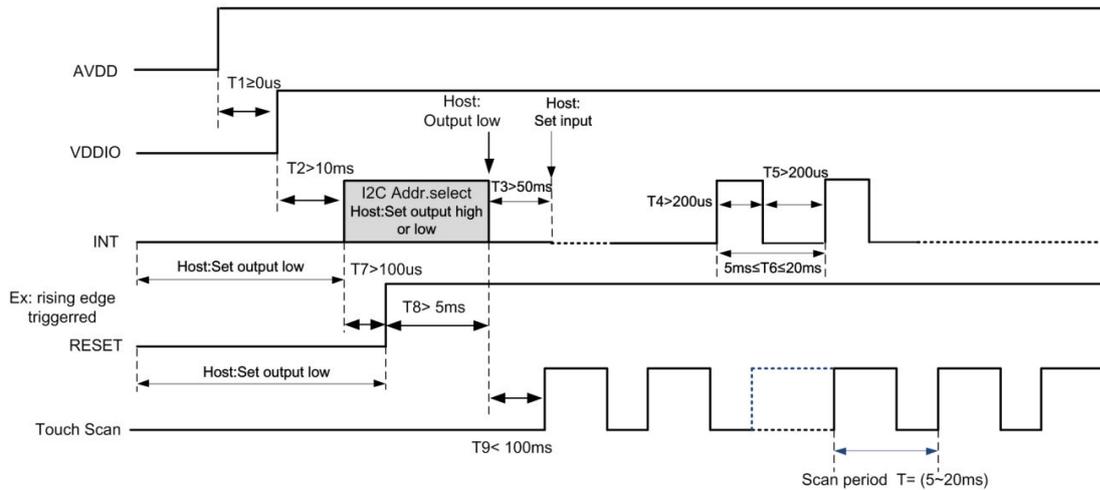
VDD - VSS = 2.5 TO 3.3V

TA = 25°C

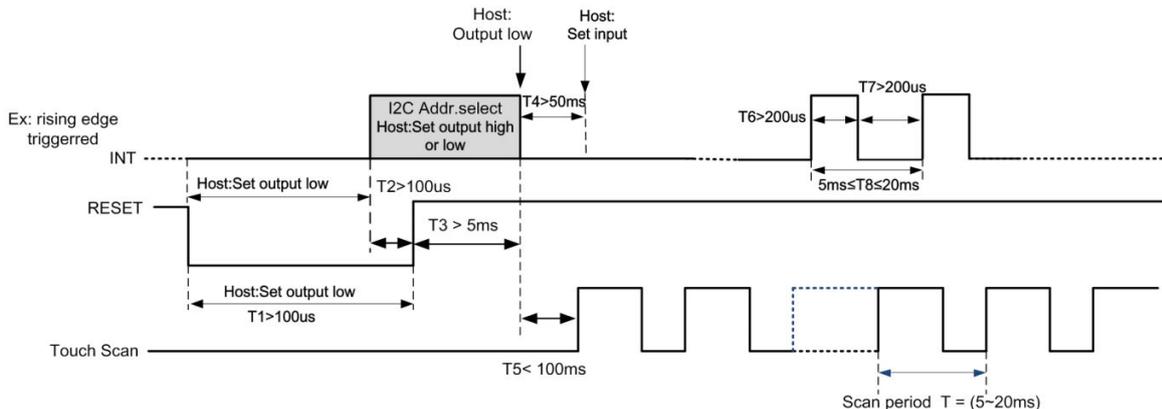
400Kbps transmission rate, 2K pull-up resistor

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





**Crystal Clear Technology**  
16 Jalan TP5—Taman Perindustrian Sime UEP  
47600 Subang Jaya—Selangor DE  
Malaysia