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San Technology (Shanghai) Co., Ltd.

SPECIFICATION
FOR
LCD MODULE

Customer P/N:

Santek P/N: ST0700I7WY-RSCLW-F

DOC. Revision: RS01

Customer Approval:

	SIGNATURE	DATE
PREPARED BY	Jacky Zhou	2013-04 -19
CHECKED BY	Natty Lee	2013-Apr-22
APPROVED BY	Yshizaki	2013-04-23

Document Revision History

Revision	Date	Description	Changed by
RS01	2013-04-19	First issue	Jacky Zhou

Contents

1. General Specifications

No.	Item	Specification	Remark
1	LCD size	7.0 inch(Diagonal)	
2	Driver element	a-Si TFT active matrix	
3	Resolution	800X3(RGB)X480	
4	Display mode	Normally white, Transmissive	
5	Dot pitch	0.0635(W)X0.1905(H) mm	
6	Active area	152.4 (W)X91.44 (H) mm	
7	Module size	166(W)X106(H)X12.1(D)mm	Note1
8	Surface treatment	Anti-Glare	
9	Color arrangement	RGB-stripe	
10	Interface	Digital(TTL)	
11	Backlight power consumption	5.58W	
12	Panel power consumption	0.825W	
13	Weight	282g	

Note 1: Refer to Mechanical Drawing.

2. Pin Assignment

2.1 TFT LCD Panel Driving Section

TTL Connector is used for the module electronics interface. The recommended model is FH19SC-40S-0.5SH manufactured by Hirose.

Pin No.	Symbol	I/O	Function	Remark
1	NC			
2	NC			
3	NC			
4	NC			
5	NC			
6	V_{CC}	P	Power voltage for digital circuit	
7	V_{CC}	P	Power voltage for digital circuit	
8	MODE	I	DE or HV mode control	Note 1
9	DE	I	Data enable	
10	VS	I	Vsync signal input	
11	HS	I	Hsync signal input	
12	GND	P	Power ground	
13	B5	I	Blue data input (MSB)	
14	B4	I	Blue data input	
15	B3	I	Blue data input	
16	GND	P	Power ground	
17	B2	I	Blue data input	
18	B1	I	Blue data input	

19	B0	I	Blue data input(LSB)	
20	GND	P	Power ground	
21	G5	I	Green data input(MSB)	
22	G4	I	Green data input	
23	G3	I	Green data input	
24	GND	P	Power ground	
25	G2	I	Green data input	
26	G1	I	Green data input	
27	G0	I	Green data input(LSB)	
28	GND	P	Power ground	
29	R5	I	Red data input(MSB)	
30	R4	I	Red data input	
31	R3	I	Red data input	
32	GND	P	Power ground	
33	R2	I	Red data input	
34	R1	I	Red data input	
35	R0	I	Red data input(LSB)	
36	GND	P	Power ground	
37	DCLK	I	Sample clock	
38	GND	P	Power ground	
39	L/R	I	Select left or right scanning direction	Note 2
40	U/D	I	Select up or down scanning direction	Note 2

I: input, O: output, P: power

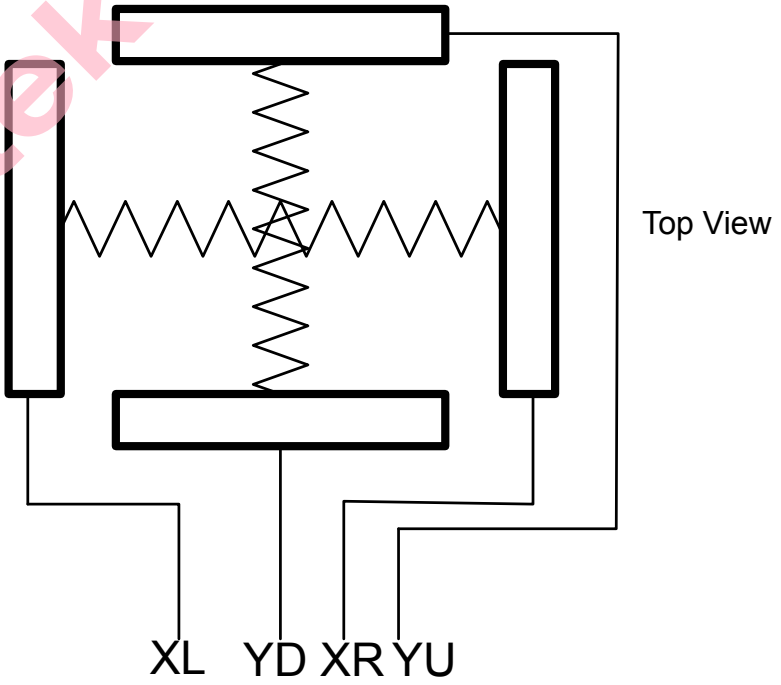
Note 1: DE Mode: Mode="H", HS floating and VS floating.
HV Mode: Mode="L" and DE floating.
Note 2: Selection of scanning mode

Setting of scan control input		Scanning direction
U/D	L/R	
GND	V_{CC}	Up to down, left to right
V_{CC}	GND	Down to up, right to left
GND	GND	Up to down, right to left
V_{CC}	V_{CC}	Down to up, left to right

2.2 Touch Screen Panel Section

Pin No.	Symbol	I/O	Function	Remark
1	XL	Left	Left electrode-differential anolog	
2	YD	Bottom	Bottom electrode-differential anolog	
3	XR	Right	Right electrode-differential anolog	
4	YU	TOP	Top electrode-differential anolog	

Note: Touch Screen Panel Block



2.3 Backlight Unit Section

LED Light Bar connector is used for the the integral backlight system. The recommended model is “BHSR-02VS-1” manufactured by JST.

Pin No.	Symbol	I/O	Function	Remark
1	A	P	Power for LED backlight anode	Pink
2	K	P	Power for LED backlight kathode	White

3. Operation Specifications

3.1. Absolute Maximum Ratings

Item	Symbol	Values		Unit	Remark
		Min.	Max.		
Power voltage	V_{CC}	-0.3	6.0	V	
	V_{LED}	-	13.0	V	
Input signal voltage	V_I	-0.3	6.3	V	
Operation Temperature	T_{OP}	-20	65	℃	
Storage Temperature	T_{ST}	-30	80	℃	

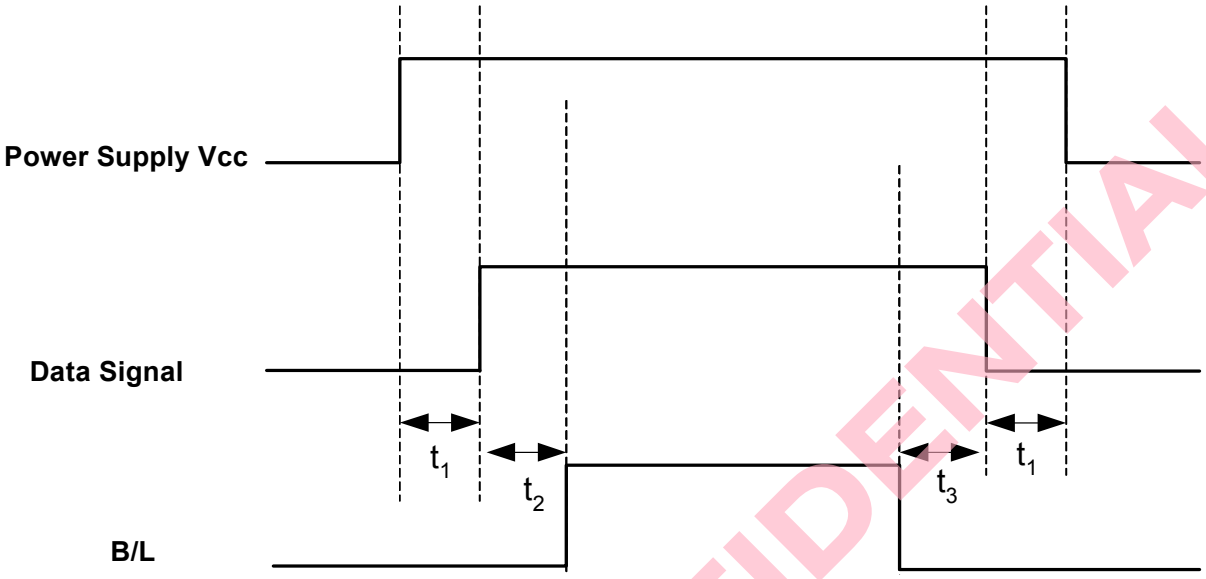
Note: The absolute maximum rating values of this product are not allowed to be exceeded at any times. A module should be used with any of the absolute maximum ratings exceeded, the characteristics of the module may not be recovered, or in an extreme condition, the module may be permanently destroyed.

3.2. Typical Operation Conditions

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Power voltage	V_{CC}	3.1	3.3	3.5	V	Note 1
	V_{LED}	6.0	9.0	12.0	V	Note 2
Current consumption	Icc	-	250	300	mA	
	I_{LED}	-	620	670	mA	Note 3
Input logic high voltage	V_{IH}	$0.7V_{CC}$	-	V_{CC}	V	Note 4
Input logic low voltage	V_{IL}	0	-	$0.3V_{CC}$	V	
LED life time	-	20,000	-	-	Hr	Note 5

Note 1: V_{CC} setting should match the signals output voltage (refer to Note 4) of customer's system board.
Note 2: LED driving voltage.
Note 3: LED driving current.
Note 4: DCLK,DE, HS, VS, R0~ R5,,G0~ G5,B0~ B5.
Note 5: The "LED life time" is defined as the module brightness decrease to 50% original brightness at Ta=25℃ and I_{LED}=620mA. The LED lifetime could be decreased if operating I_{LED} is larger than 620mA.

3.3. Power Sequence



$t_1 > 50$ mSec
$t_2 \geq 200$ mSec
$t_3 \geqq 200$ mSec

Note: Data Signal includes DCLK, DE, HS, VS, R0~ R5, G0~ G5, B0~ B5.

3.4. Timing Characteristics

3.4.1. Timing Conditions

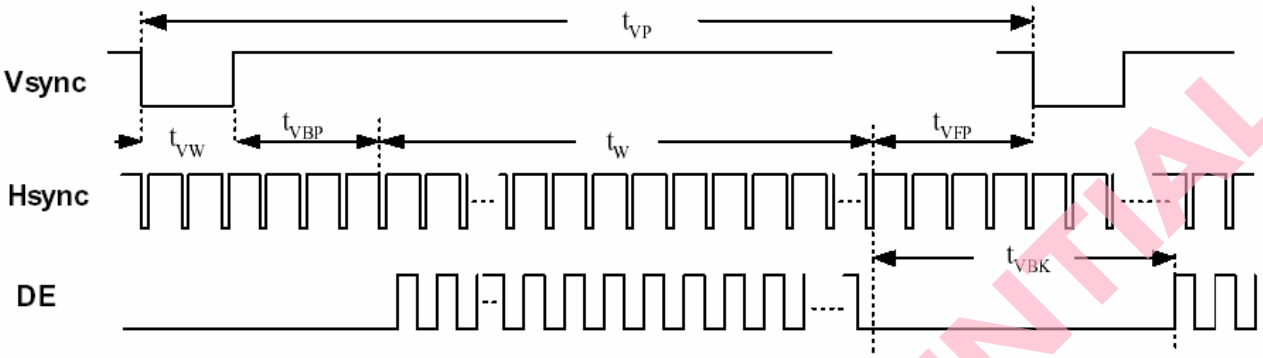
Input signal characteristics of SYNC mode.

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Clock Period	t_{CLK}	23.2	25.0	30.7	ns	
Clock Frequency	f_{CLK}	32.4	40	43	MHz	
Clock Low Level Width	t_{WCL}	8	-	-	ns	
Clock High Level Width	t_{WCH}	8	-	-		
Clock Rise/Fall Time	t_{CLKr}, t_{CLKf}	-	-	3		
HSYNC Period	t_{HP}	862	1056	1100	t_{CLK}	
HSYNC Pulse Width	t_{HW}	-	1	-	t_{CLK}	
HSYNC Back Porch	t_{HBP}	-	45	-	t_{CLK}	
HSYNC Width + Back Porch	$t_{hw} + t_{HBP}$	46			t_{CLK}	
Horizontal valid data width	t_{HV}	800			t_{CLK}	
HSYNC Front Porch	t_{HFP}	$t_{HP} - t_{HW} - t_{HBP} - t_{HV}$			t_{CLK}	
Horizontal Blank	t_{HBK}	$t_{HP} - t_{HV}$			t_{CLK}	
VSYNC Period	t_{VP}	628	635	650	t_{HP}	
VSYNC Pulse Width	t_{VW}	-	1	-	t_{HP}	
VSYNC Back Porch	t_{VBP}	22			t_{HP}	
Vertical valid data width	t_w	480			t_{HP}	
Vertical Front Porch	t_{VFP}	$t_{VP} - t_{VW} - t_{VBP} - t_w$			t_{HP}	
Vertical Blank	t_{VBK}	$t_{VP} - t_w$			t_{HP}	
Data Setup Time	t_{DS}	5	-	-	ns	
Data Hold Time	t_{DH}	10	-	-	ns	

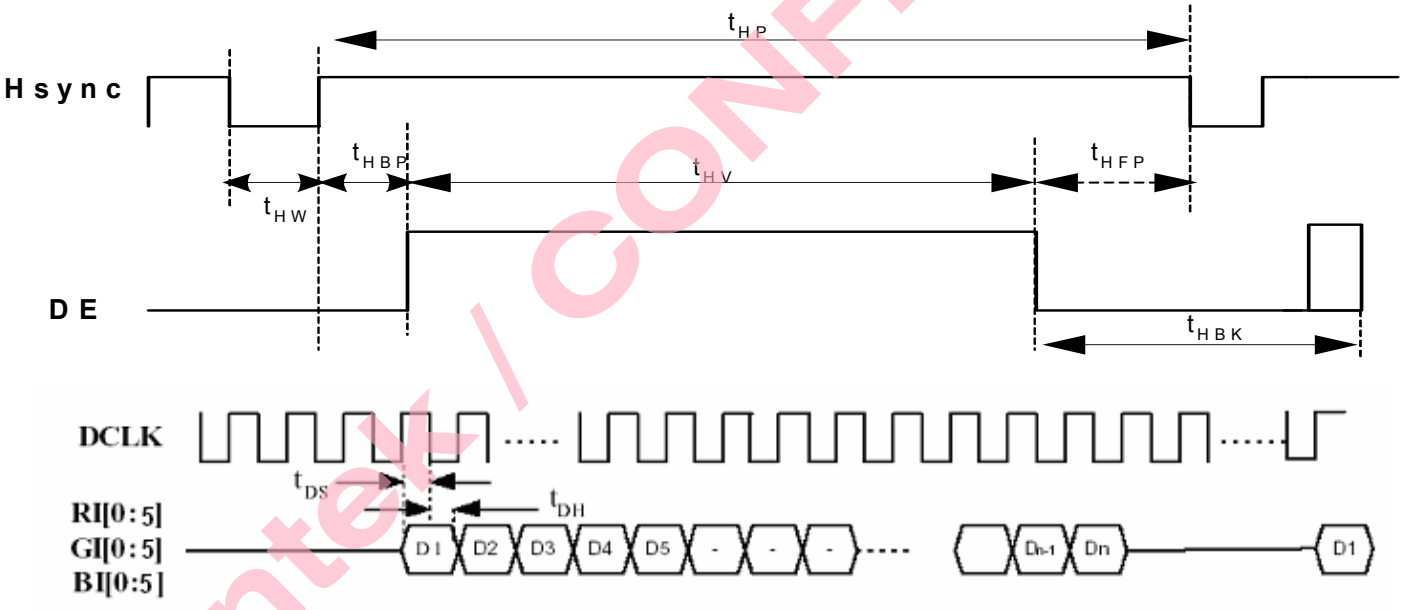
Input signal characteristics of DE mode.

Item		Symbol	Values			Unit	Remark
			Min.	Typ.	Max.		
DCLK	Period	t_{CLK}	23.2	25.0	30.7	ns	
	Frequency	f_{CLK}	32.4	40.0	43.0	MHz	
	Low Level Width	t_{WCL}	6	-	-	ns	
	High Level Width	t_{WCH}	6	-	-		
	Rise/Fall Time	t_{CLKr}, t_{CLKf}	-	-	3		
	Duty	-	0.45	0.50	0.55	-	t_{CLKL}/ t_{CLK}
DE	Setup Time	t_{DES}	5	-	-	ns	
	Hold Time	t_{DEH}	10	-	-		
	Rise/Fall Time	t_{DEr}, t_{DEf}	-	-	16		
	Horizontal Period	t_{HP}	862	1056	1100	t_{CLK}	
	Horizontal Valid	t_{HV}	800				
	Horizontal Blank	t_{HBK}	t_{HP} - t_{HV}				
	Vertical Period	t_{VP}	628	635	650	t_{HP}	
	Vertical Valid	t_w	480				
	Vertical Blank	t_{VBK}	t_{VP} - t_w				
DATA	Setup Time	t_{DS}	5	-	-	ns	
	Hold Time	t_{DH}	10	-	-		
	Rise/Fall Time	t_{Dr}, t_{Df}	-	-	3		

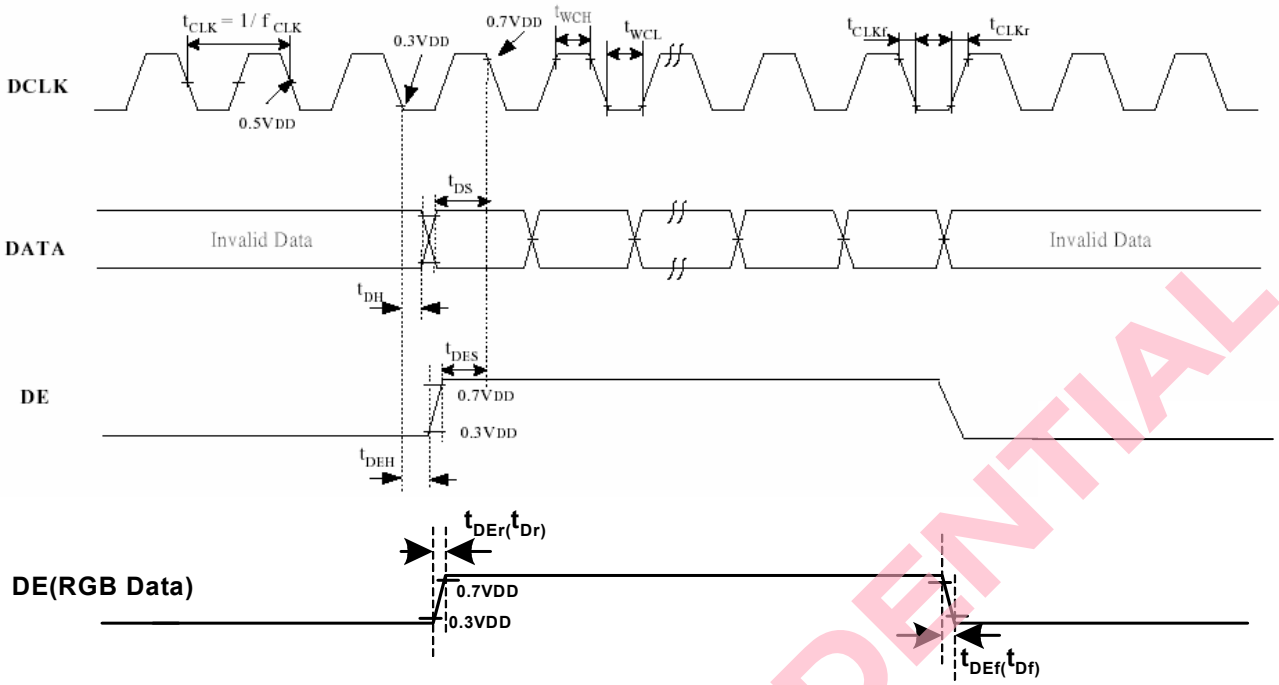
3.4.2. Timing Diagram



Input Vertical Timing



Input Horizontal Timing



DE and RGB Input Timing

4. Touch Screen Panel Specifications

4.1. Electrical Characteristics

Item	Value			Unit	Remark
	Min.	Typ.	Max.		
Linearity	-1.5	-	1.5	%	Analog X and Y directions
Terminal Resistance	450	-	1250	Ω	X(Film side)
	150	-	450	Ω	Y(Glass side)
Insulation resistance	10	-	-	MΩ	DC 25V
Voltage	-	5	-	V	DC
Chattering	-	-	10	ms	100kΩ pull-up
Transparency	80	-	-	%	

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

4.2. Mechanical & Reliability Characteristics

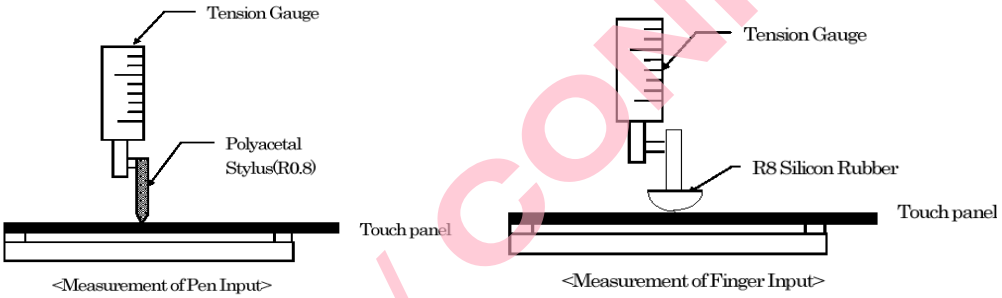
Item	Value			Unit	Remark
	Min.	Typ.	Max.		
Activation force	80	-	-	gf	Note 1
Durability-surface scratching	Write 100,000	-	-	characters	Note 2
Durability-surface pitting	1,000,000	-	-	touches	Note 3
Surface hardness	3	-	-	H	JIS K 5400

Note 1: Activation force test condition

(1) Input DC 5V on X direction, Drop off Polyacetal Stylus (R0.8), until output voltage stabilize ,then get the activation force。

(2) R8.0mm Silicon rubber for finger Activation force test

(3) Test point: 9 points



Note 2: Measurement for surface area.

-Scratch 100,000 times straight line on the film with a stylus change every 20,000 times.

-Force: 250gf.

-Speed: 60mm/sec.

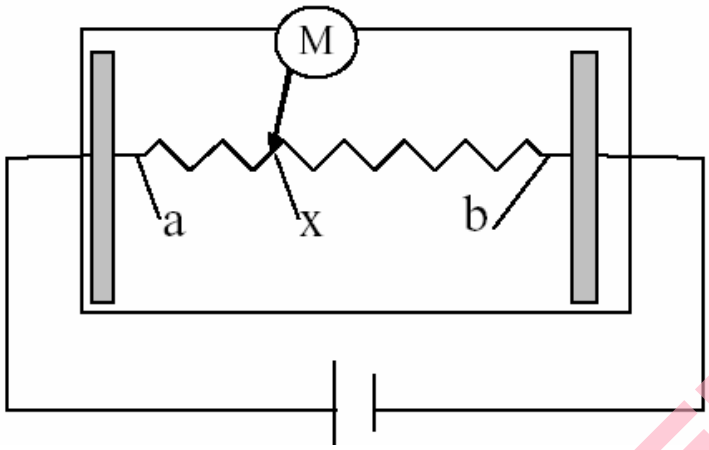
-Stylus: R0.8 polyacetal tip.

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

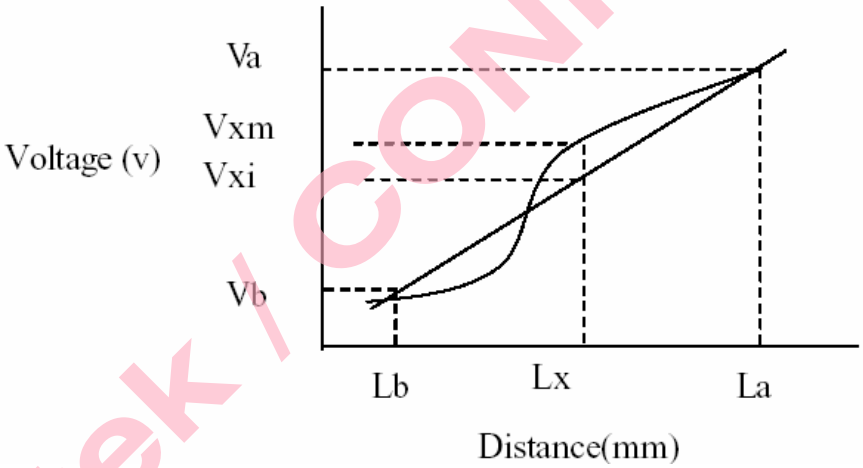
-Force: 250gf.

-Speed: 2times/sec.

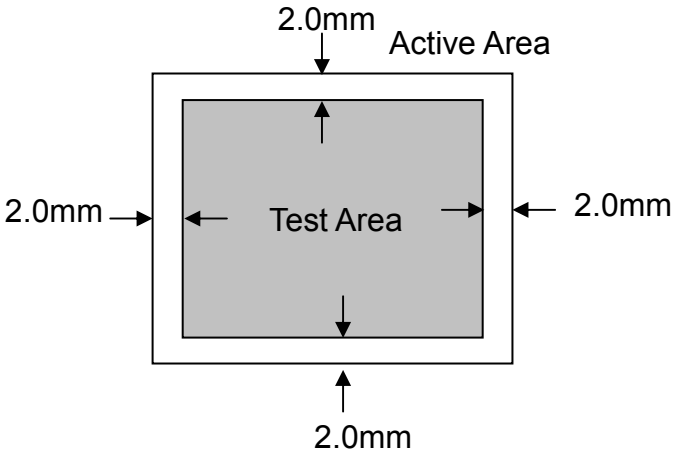
4.3. Linearity Definition



Va: maximum voltage in the active area of touch panel
Vb: minimum voltage in the active area of touch panel
X: random measuring point
Vxm: actual voltage of Lx point
Vxi: theoretical voltage of Lx point



Linearity = [|Vxi-Vxm |/(Va-Vb)]*100%
Note: Test area is as follows and operation force is 150gf

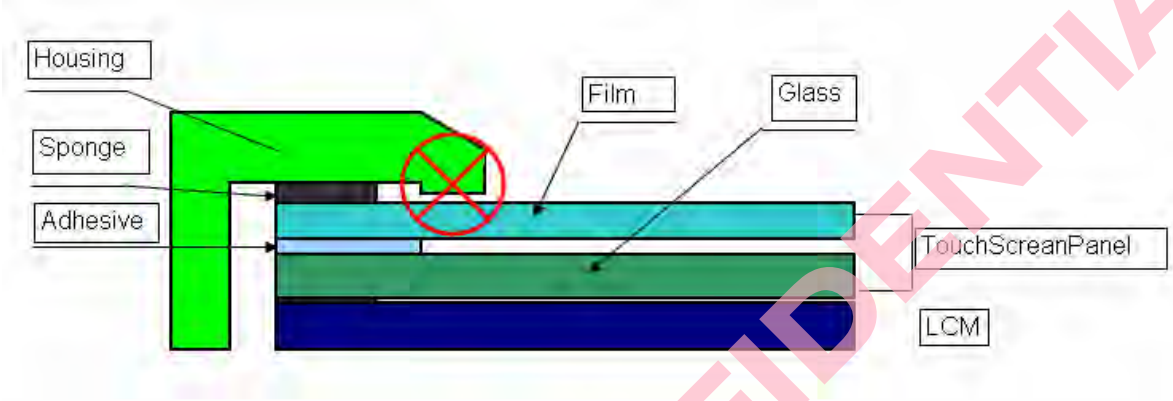


4.4. Housing design guide

Housing design follow as below

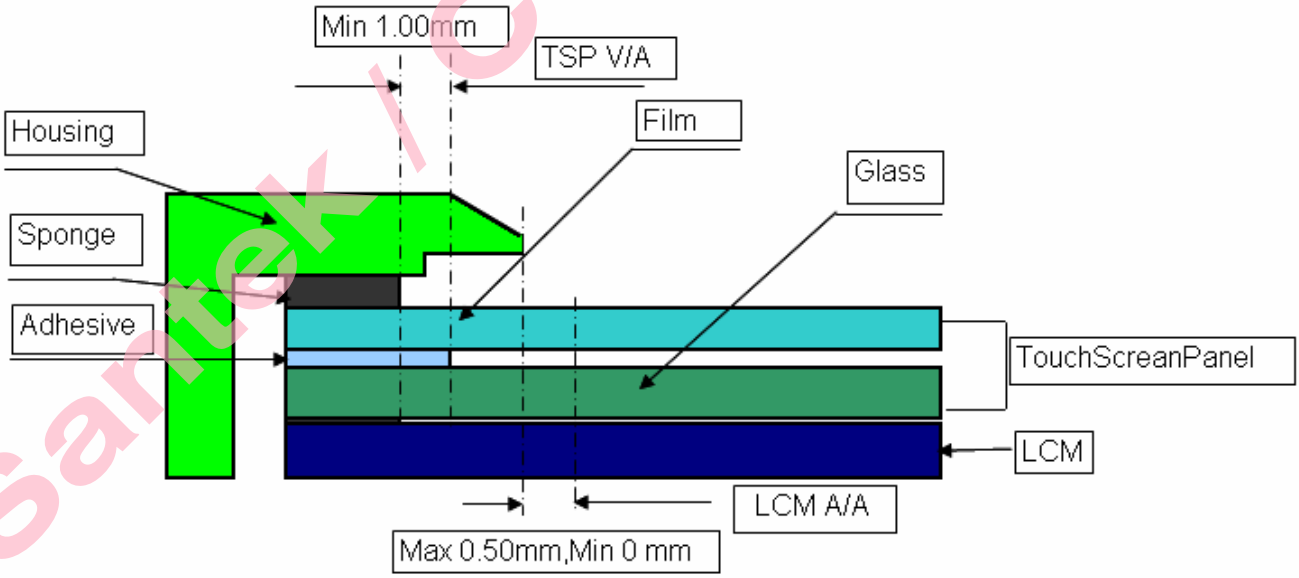
1) Avoid the design that housing overlap and press on the active area of the LCM

2) Give enough gap(over 0.5mm at compressed) between the housing and TSP to protect wrong operating.



3) Use a buffer material(Gasket) between the TSP and and wrong operating

4) Avoid the design that buffer material overlap and press on the inside of TSP view area



5.Optical Specifications

Item	Symbol	Condition	Values			Unit	Remark
			Min.	Typ.	Max.		
Viewing angle (CR≥ 10)	θ_L	Φ=180°(9 o'clock)	60	70	-	degree	Note 1
	θ_R	Φ=0°(3 o'clock)	60	70	-		
	θ_T	Φ=90°(12 o'clock)	40	50	-		
	θ_B	Φ=270°(6 o'clock)	60	70	-		
Response time	T_{ON}	Normal θ=Φ=0°	-	10	20	msec	Note 3
	T_{OFF}		-	15	30	msec	Note 3
Contrast ratio	CR		600	800	-	-	Note 4
Color chromaticity	W_X		0.26	0.31	0.36	-	Note 2 Note 5 Note 6
	W_Y		0.28	0.33	0.38	-	
Luminance	L		896	1120	-	cd/m^2	Note 6
Luminance uniformity	Y_U		70	75	-	%	Note 7

Test Conditions:

1. DV_{DD} =3.3V, I_L =620mA (Backlight current), the ambient temperature is 25℃.
2. The test systems refer to Note 2.

Note 1: Definition of viewing angle range

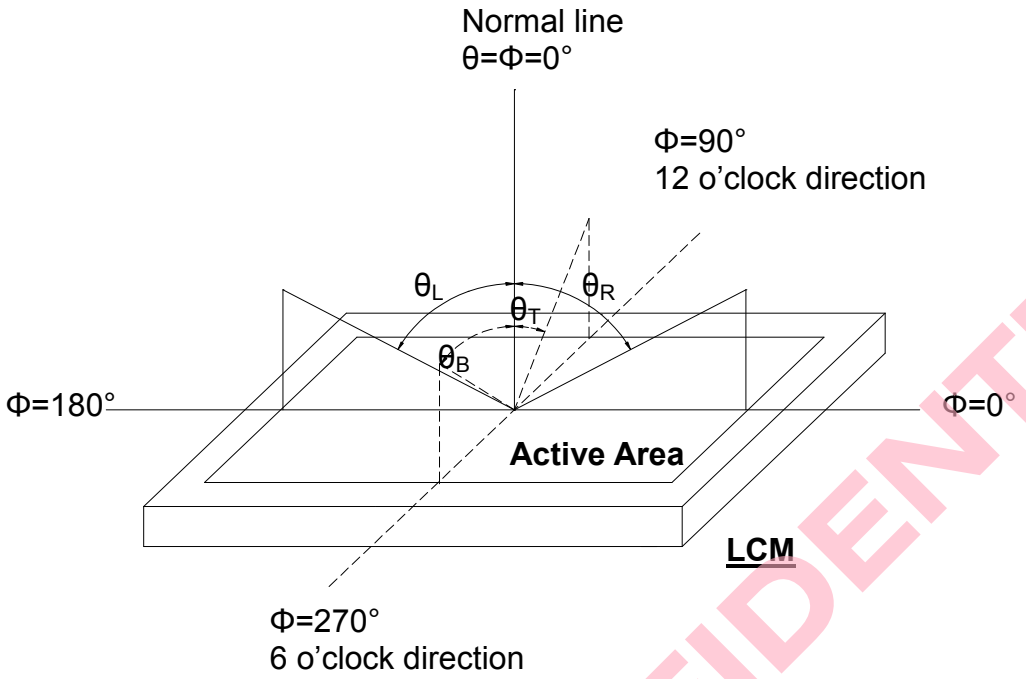


Fig. 4-1 Definition of viewing angle

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 center 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.)

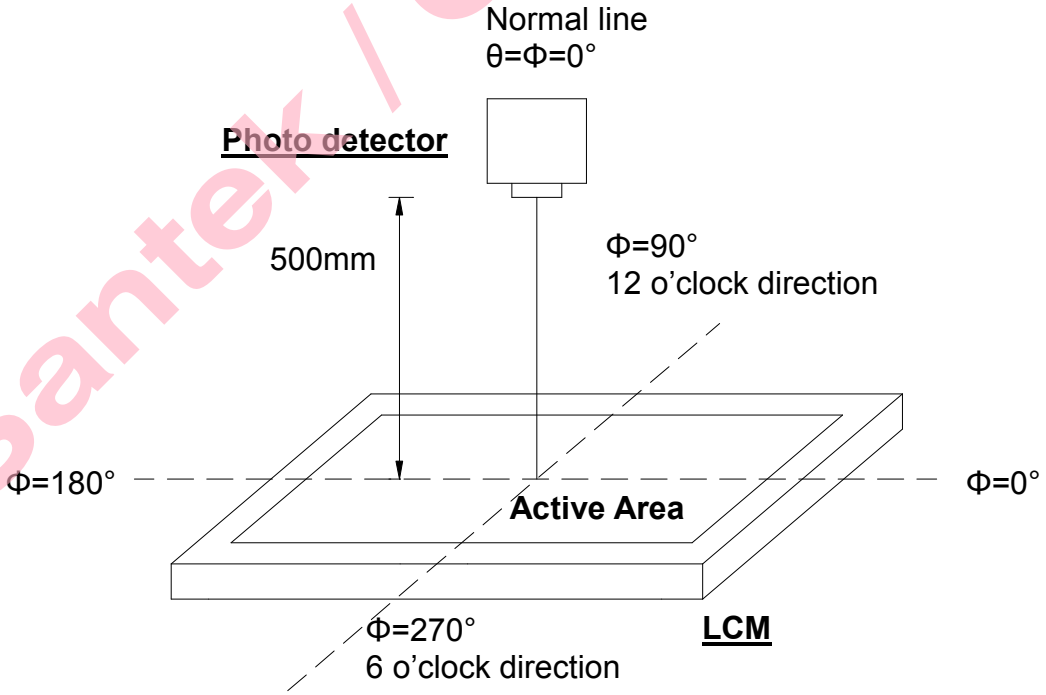


Fig. 4-2 Optical measurement system setup

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_{ON}) is the time between photo detector output intensity changed from 90% to 10%. And fall time (T_{OFF}) is the time between photo detector output intensity changed from 10% to 90%.

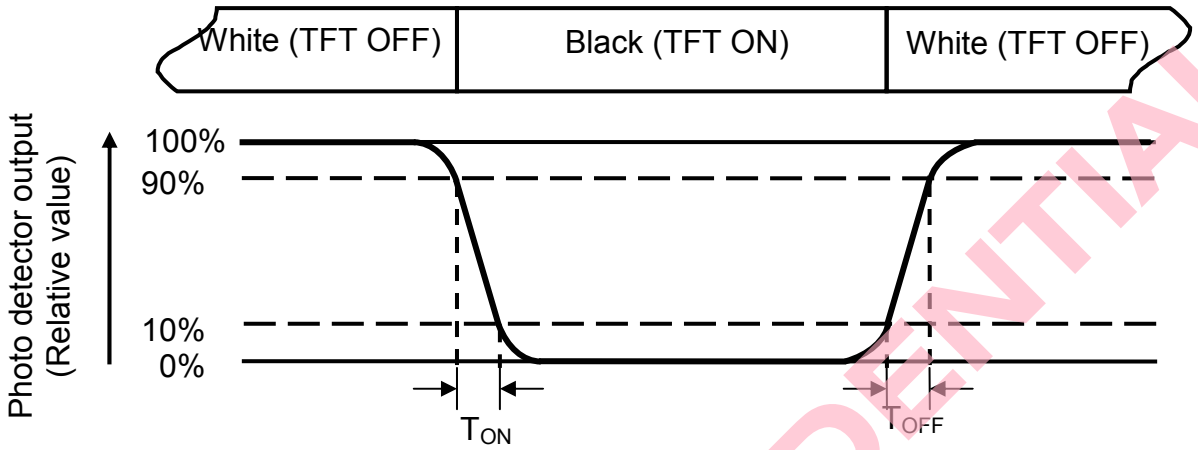


Fig. 4-3 Definition of response time

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 I_{LED}=620mA.

Note 7: Definition of Luminance Uniformity

Active area is divided into 9 measuring areas (Refer to Fig. 4-4).Every measuring point is placed at the center of each measuring area.

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

L-------Active area length W----- Active area width

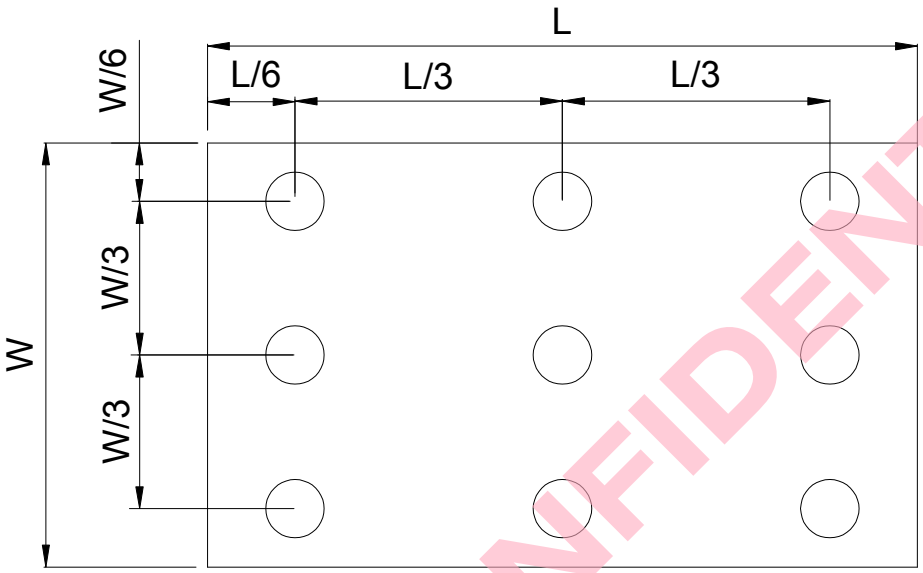


Fig. 4-4 Definition of measuring points

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

6.Reliability Test Items

(Note3)

Item	Test Conditions	Remark
High Temperature Storage	Ta = 80℃ 240 hrs	Note 1
Low Temperature Storage	Ta = -30℃ 240hrs	Note 1
High Temperature Operation	Ts = 65℃ 240hrs	Note 2
Low Temperature Operation	Ta =-20℃ 240hrs	Note 1,Note 4
Operate at High Temperature and Humidity	+40℃, 90%RH max. 240 hrs	Note 4
Thermal Shock	-30℃/30 min ~ +80℃/30 min for a total 100 cycles, Start with cold temperature and end with high temperature.	Note 4
Vibration Test	Frequency range:10~55Hz Stroke:1.5mm Sweep:10Hz~55Hz~10Hz 2 hours for each direction of X. Y. Z. (6 hours for total)	
Mechanical Shock	100G 6ms,±X, ±Y, ±Z 3 times for each direction	
Package Vibration Test	Random Vibration : 0.015G*G/Hz from 5-200HZ, -6dB/Octave from 200-500HZ 2 hours for each direction of X. Y. Z. (6 hours for total)	
Package Drop Test	Height:60 cm 1 corner, 3 edges, 6 surfaces	
Electro Static Discharge	± 2KV, Human Body Mode, 100pF/1500Ω	

Note 1: Ta is the ambient temperature of samples.
Note 2: Ts is the temperature of panel's surface.
Note 3: In the standard condition, there shall be no practical problem that may affect the display function. After the reliability test, the product only guarantees operation, but doesn't guarantee all the cosmetic specification.
Note 4: Before cosmetic and function test, the product must have enough recovery time, at least 2 hours at room temperature.

7.General Precautions

7.1. Safety

Liquid crystal is poisonous. Do not put it in your mouth. If liquid crystal touches your skin or clothes, wash it off immediately by using soap and water.

7.2. Handling

1. The LCD panel is plate glass. Do not subject the panel to mechanical shock or to excessive force on its surface.
2. The polarizer attached to the display is easily damaged. Please handle it carefully to avoid scratch or other damages.
3. To avoid contamination on the display surface, do not touch the module surface with bare hands.
4. Keep a space so that the LCD panels do not touch other components.
5. Put cover board such as acrylic board on the surface from damages.
6. Transparent electrodes may be disconnected if you use the LCD panel under environmental conditions where the condensation of dew occurs.
7. Do not leave module in direct sunlight to avoid malfunction of the ICs.

7.3. Static Electricity

1. Be sure to ground module before turning on power or operating module.
2. Do not apply voltage which exceeds the absolute maximum rating value.

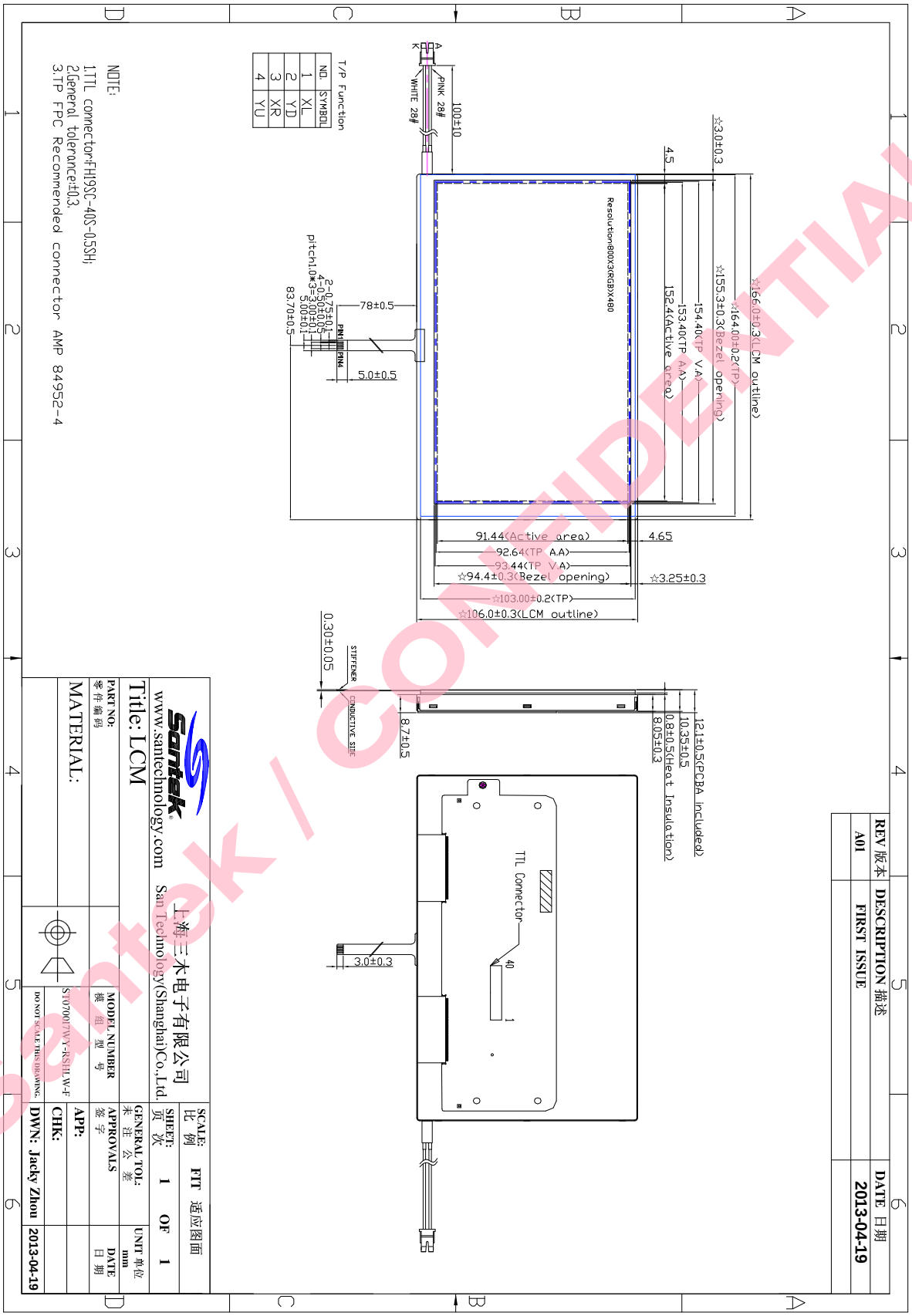
7.4. Storage

1. Store the module in a dark room where must keep at 25±10℃
2. Do not store the module in surroundings containing organic solvent or corrosive gas.
3. Store the module in an anti-electrostatic container or bag.

7.5. Cleaning

1. Do not wipe the polarizer with dry cloth. It might cause scratch.
2. Only use a soft sloth with IPA to wipe the polarizer, other chemicals might permanent damage to the polarizer.

8.Mechanical Drawing



9.Package Drawing

9.1 Packaging Material Table

No.	Item	Model (Material)	Dimensions(mm)	Unit Weight (kg)	Quantity	Remark
1	LCM Module	ST0700I7WY-RSCLW-F	166×106×12.1	0.282	50pcs	
2	Partition	BC Corrugated Paper	512 X 349 X 226	1.466	1 set	
3	Corrugated Bar	BC Corrugated Paper	512X162	0.046	4 set	
4	Corrugated Board	BC Corrugated Paper	510 X 343	0.130	1pcs	
5	Dust-Proof Bag	PE	700X530	0.048	1 pcs	
6	A/S Bag	PE	180 X 160 X 0.05	0.002	50 pcs	
7	Carton	Corrugated paper	530 X 355 X 255	1.100	1 pcs	
8	Total weight	17.128kg				

9.2 Packaging Quantity

Total LCM quantity in Carton: no. of	Partition	2 Rows x	quantity per Row	25	= 50

9.3 Packaging Drawing