

**SPECIFICATION
FOR
LCM Module**

Customer P/N:

Santek P/N: ST0620P2WY-RSLW-F

DOC. Revision: RS01

Customer Approval:

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	SIGNATURE	DATE
PREPARED BY	Vivian Huang	2017-01-03
CHECKED BY	Park Zhou	2017-01-04
APPROVED BY	Natty Lee	2107-Jan-4

Document Revision History

Version	Revise Date	Description	Changed by
RS01	2017.01.04	Initial release	Vivian Huang

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1. OVERVIEW

ST0620P2WY-RSLW-F is 6.2" color TFT-LCD (Thin Film Transistor Liquid Crystal Display) module composed of LCD panel, driver ICs, control circuit and LED backlight. By applying 800x480 images are displayed on the 6.2" diagonal screen. Display 16.2M colors by R.G.B signal input.

General specifications are summarized in the following table:

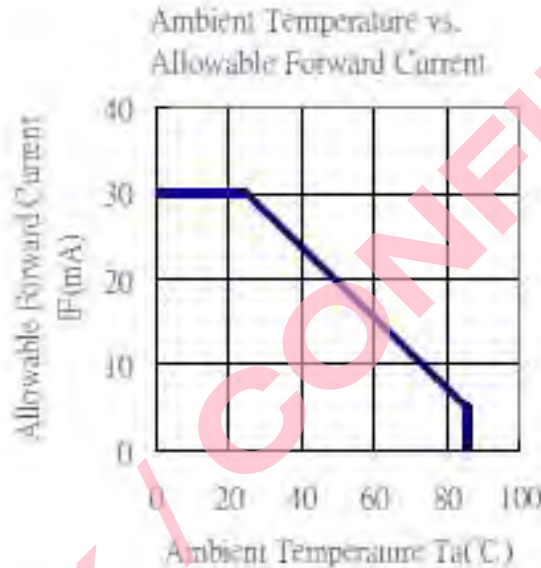
ITEM	SPECIFICATION
Number of Pixels	800RGBx480
Pixel Pitch(mm)	0.1719x0.1609
Color Pixel Arrangement	Strip RGB
Module Size(mm)	155.2 x 88.2 x 5.0
Display Area(mm)	137.52 x 77.232
Module Weight(g)	115 g(Typ.)
Brightness(cd/m ²)	390(Typ.)/310(Min.)
Contrast Ratio	min. 480 typ. 600
Response Tims(ms)	Ta=25°C, 20 (Max.)
Viewing Angle(H/V)--CR>10	150/140(typ.) , 130/120(min.)
Color Saturation	50%
Color Coordinate-White	x=0.310, y=0.330
Display Mode	TN
Surface Treatment	Anti-Glare
Luminance Uniformity(Δ LW)	min.70% (9 points)
Optimum Viewing Direction	6 O'clock
Electrical Interface	TTL(Cascade), 60pin
Inversion	dot Inversion
Total Module Power(W)	PLCD=0.321W (typ)/ 0.396 W (max); PLED=1.344(Typ.)/1.5(Max.) Total:1.665(Typ.)/1.896(Max.)
Number of Colors	16.2M

2. ABSOLUTE MAXIMUM RATINGS

Item	Symbol	Min.	Max.	Unit	Note
Digital Supply Voltage	DVDD	-0.3	+5.0	V	
Analog Supply Voltage	AVDD	-0.5	+15	V	
Gate On Voltage	VDDG	-0.3	+40	V	
Gate Off Voltage	VEEG	-20	+0.3	V	
Gate On-Gate Off Voltage	VDDG-VEEG	-0.3	40	V	
Forward Current (per LED)	If	-	30	mA	
Reverse Voltage (per LED)	VR	-	5	V	
Pulse forward current (per LED)	I _{fp}	-	80	mA	1,2
Operation Temperature	T _{op}	-20	70	°C	3
Storage Temperature	T _{stg}	-30	80	°C	3

Note1 : I_{fp} Conditions : Pulse Width ≤ 10msec ; Duty ≤ 1/10

Note2: Each LED operating must under the condition as below drawing.
(Ambient Temperature /Allowable Forward Current)



Note3 : If users use the product out off the environmental operation range (temperature and humidity) , it will have visual quality concerns.

3. ELECTRICAL CHARACTERISTICS

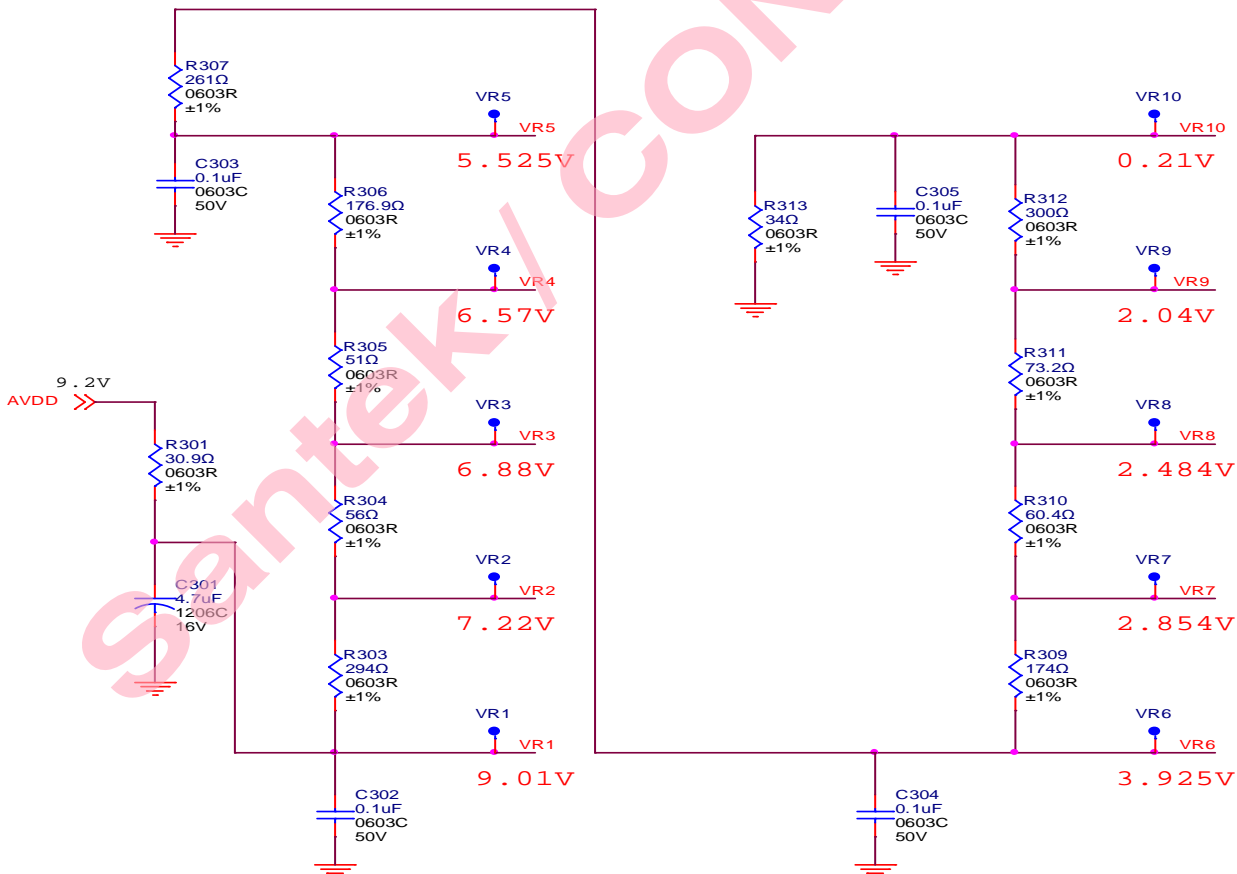
3.1 Typical operation conditions

Ta=25°C

Item	Symbol	Min.	Typ.	Max.	Unit.	Note.
Digital Supply Voltage	DVDD	3	3.3	3.6	V	
Analog Supply Voltage	AVDD	(9)	(9.2)	(9.4)	V	
Gate On Voltage	VDDG	17	18	19	V	
Gate Off Voltage	VEEG	-6.6	-6	-5.4	V	
Common Voltage	VCOM	(3.5)	(4)	(4.5)	V	1
Gamma Voltage	VR 1	-	9.01	-	V	2
	VR 2	-	7.22	-	V	2
	VR 3	-	6.88	-	V	2
	VR 4	-	6.57	-	V	2
	VR 5	-	5.525	-	V	2
	VR 6	-	3.925	-	V	2
	VR 7	-	2.854	-	V	2
	VR 8	-	2.484	-	V	2
	VR 9	-	2.04	-	V	2
	VR 10	-	0.21	-	V	2
Logic Input Voltage	VIH	0.7DVDD	-	DVDD	V	
	VIL	GND	-	0.3DVDD	V	

Note1 : Please adjust VCOM to make the flicker level be minimum.

Note2 : Gamma circuit for reference only



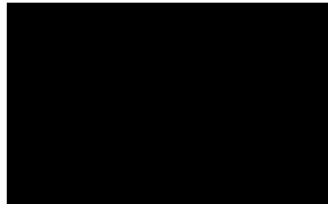
3.2 Current consumption

Item	Symbol	Condition	Min.	Typ.	Max.	Unit.	Note.
Gate on Current	IVDDG	VDDG = 18 V	-	0.5	1	mA	1
Gate off Current	IVEEG	VEEG = -6 V	-	0.5	1	mA	1
Digital Current	IDVDD	DVDD = 3.3V	-	10	15	mA	1
Analog Current	IAVDD	AVDD = 9.2 V	-	30	35	mA	1
Total Power Consumption	PC		-	321	396	mW	1

Note1: Typ. specification : Gray-level test Pattern
 Max. specification : Black test Pattern



(a) Gray-level Pattern

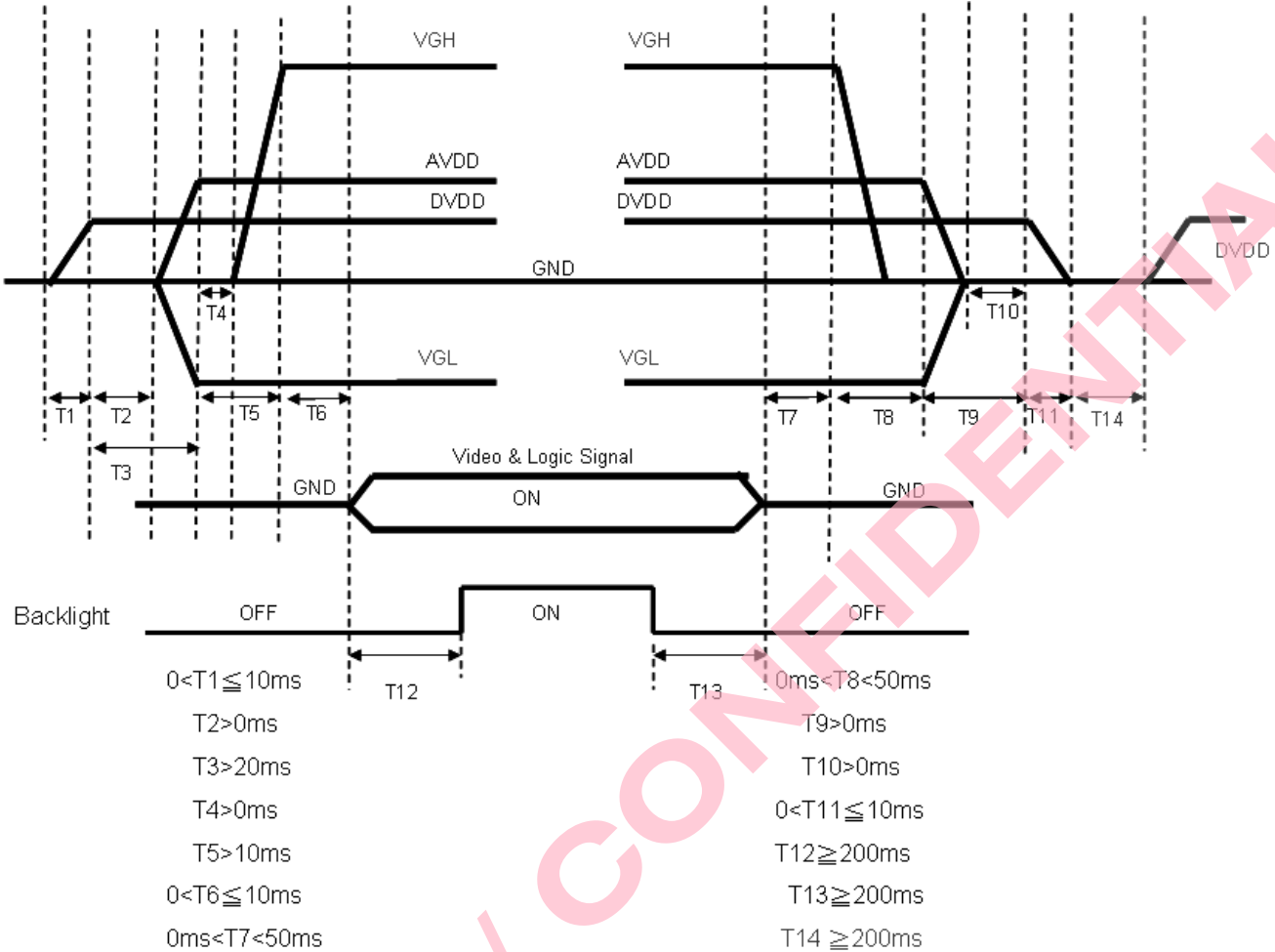


(b) Black Pattern

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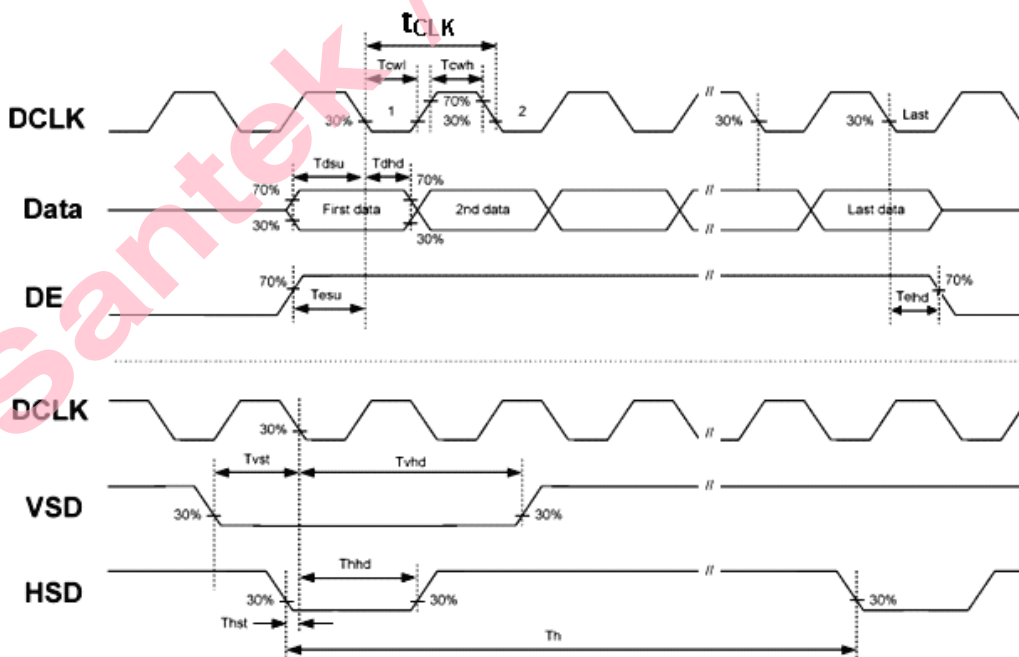
3.3 Power Signal sequence

Power On : DVDD→AVDD/VEEG→VDDG→Video & Logic Signal→Backlight
 Power Off : Backlight→ Video & Logic Signal→VDDG→AVDD/VEEG→DVDD



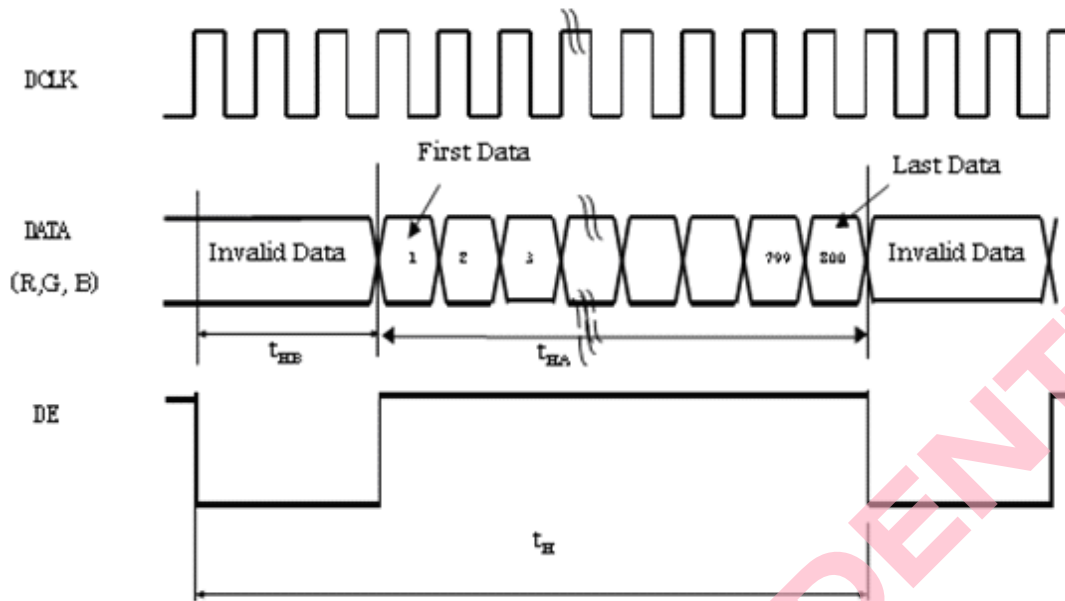
3.4 Timing characteristics of input signals

	ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT	Note
DCLK	Dot Clock	$1/t_{CLK}$	26	30	35	MHz	
	DCLK pulse duty	T_{cwh}	40	50	60	%	
DE	Setup Time	T_{esu}	8	-	-	ns	
	Hold time	T_{ehd}	8	-	-	ns	
	Horizontal Period	t_H	908	928	1000	t_{CLK}	
	Horizontal Valid	t_{HA}	800				
	Horizontal Blank	t_{HB}	108	128	200	t_{CLK}	
	Vertical Period	t_V	515	525	700	t_H	
	Vertical Valid	t_{VA}	480				
	Vertical Blank	t_{VB}	35	45	220	t_H	
SYNC	HSYNC Setup Time	T_{hst}	8	-	-	ns	
	HSYNC Hold Time	T_{hhd}	8	-	-	ns	
	VSYNC Setup Time	T_{vst}	8	-	-	ns	
	VSYNC Hold Time	T_{vhd}	8	-	-	ns	
	Horizontal Period	t_H	908	928	1000	t_{CLK}	
	Horizontal Pulse Width	t_{HPW}	-	48	-	t_{CLK}	$t_{hb} + t_{HPW} = 88DCLK$ is fixed
	Horizontal Back Porch	t_{hb}	-	40	-	t_{CLK}	
	Horizontal Front Porch	t_{HFP}	20	40	112	t_{CLK}	
	Horizontal Valid	t_{HD}	800				
	Vertical Period	t_V	515	525	700	t_H	
	Vertical Pulse Width	t_{VPW}	-	3	-	t_H	$t_{VPW} + t_{VB} = 32t_H$ is fixed
	Vertical Back Porch	t_{VB}	-	29	-	t_H	
	Vertical Front Porch	t_{VFP}	3	13	188	t_H	
	Vertical Valid	t_{VD}	480				
DATA	Setup Time	T_{dsu}	8	-	-	ns	
	Hold Time	T_{dhd}	8	-	-	ns	

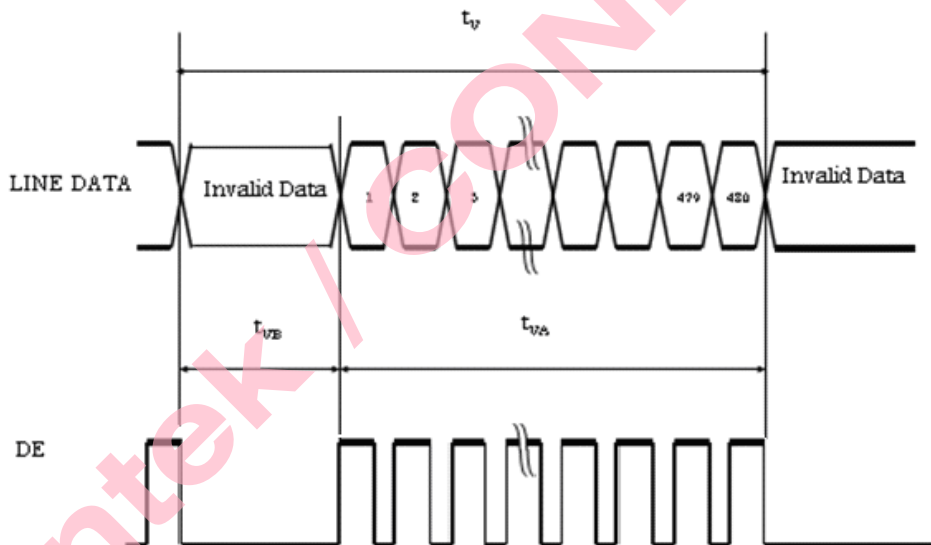


DE Mode

Horizontal timing :

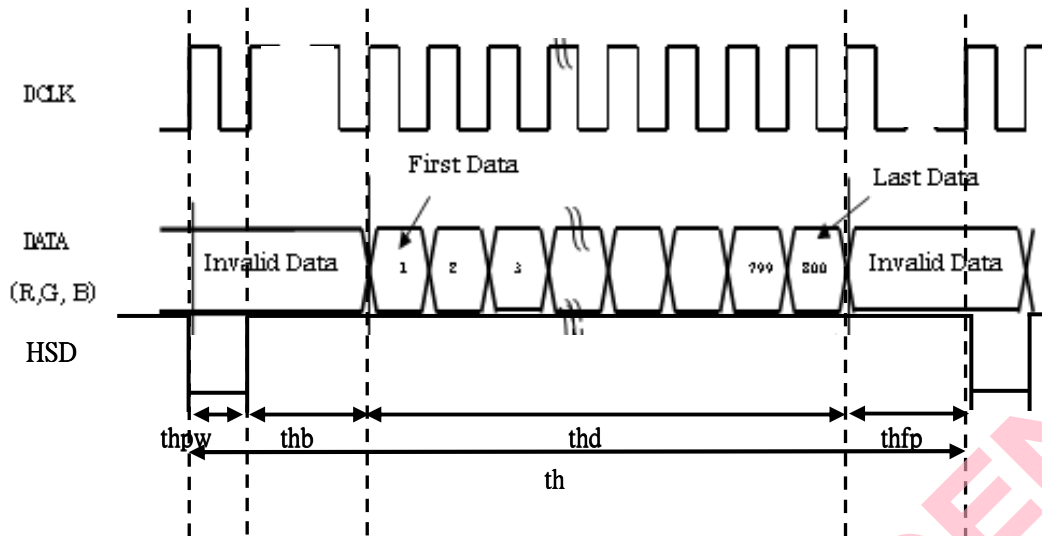


Vertical timing :

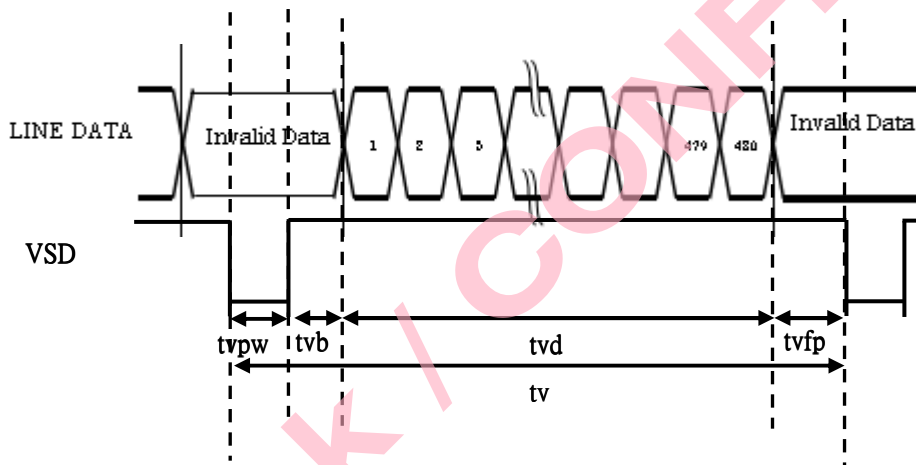


SYNC Mode

Horizontal timing :



Vertical timing :

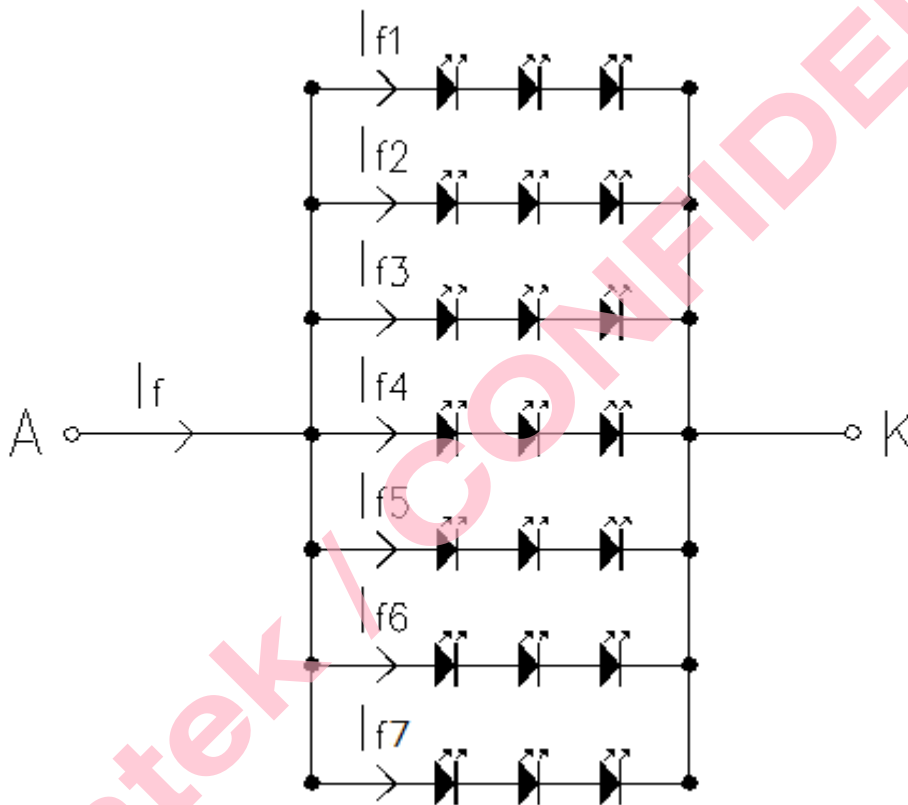


3.5 Backlight

Ta=25°C

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	Note
LED current	IL	Ta=25°C Each serial=20mA	-	140	-	mA	1,2,3
LED voltage	VL	Ta=25°C Each serial=20mA	8.55	9.6	10.65	V	1,2,3
Power consumption	WL	Ta=25°C Each serial=20mA	-	1.344	-	W	1,2
LED Lifetime	-	Ta=25°C Each serial=20mA	30000	-	-	Hour	4

Note1 : LED Circuit Diagram :



Note2 : A : Anode(+), K : Cathode(-)

Note3 : LED control must use the constant current control to avoid the leakage light and brightness quality issue.

Note4 : Definition of the LED life time : Luminance will decay less than 50%

4. TOUCH SCREEN PANEL SPECIFICATIONS

4.1 Structure

Structure	Material used	Note
Top Circuit	ITO FILM	Anti-glare&anti-newtoning, Thickness:0.188mm
Bottom Circuit	ITO GLASS	Thickness:1.1mm

4.2 Shape dimension

Item	Dimension	Unit
Out dimension	154.80±0.2*87.80±0.2	mm
View Area	139.50*79.00	mm
Active Area	138.12*77.83	mm
TP	1.55±0.1	

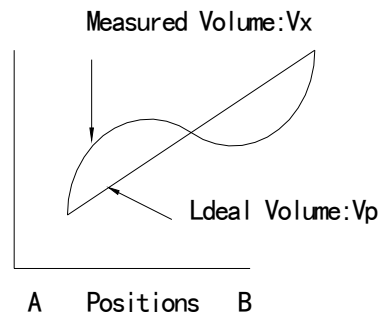
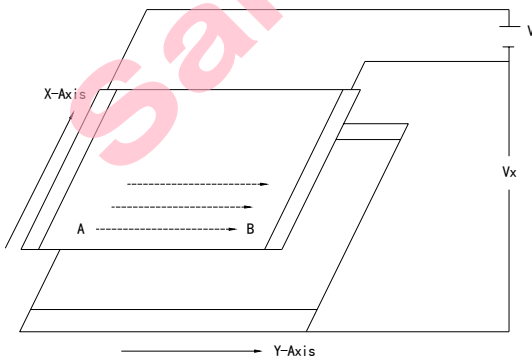
4.3 Feature

4.3.1 Conditions of use and storage

Item	Value(condition)	Note
Temperature range upon operation	Humidity: 20%~90% non dew, condensation -20℃~70℃	In a simple substance
Temperature range upon storage	Humidity: 20%~90% non dew, condensation -30℃~80℃	In a simple substance

4.3.2 Electrical property

Item	Value	Note
Maximum voltage	DC7V	
Resistance between terminals	X direction[Glass side]: 400-1050 Ω Y direction [Film side]: 100-500 Ω	
Insulation resistance	DC 25V 20MΩor above	Connect X + ~X- and Y+ ~Y-, apply 25VDC Between X and Y for perform measurements
Chattering	10 msec or below	
Rating	Voltage is DC 5V	
Linearity	≤ 2.0%	



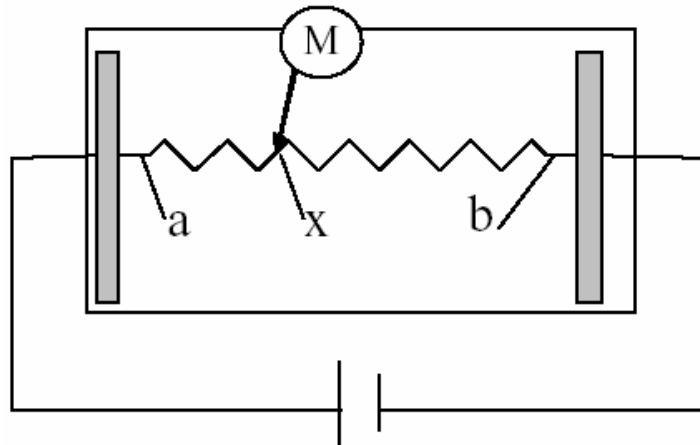
4.3.3 Mechanical property

Item	Performance		Note
Input method	Used of an exclusive pen or finger		
Load upon operation	Exclusive pen	20-100g or below	Operation and measurement with a pen must be carried out under the following tip conditions: Stylus pen material : POM (polyacetal) Tip : Diameter 3.0mm, SR 0.8 mm
	Finger	20-100g or below	Operations and measurement methods simulated for a finger must be carried out under the following tip conditions: Material : Silicon rubber (Hardness : 30°Hs) Tip : Diameter 12.0 mm, SR 12.5mm
Surface hardness	Pencil hardness : 3H or above		It complies with the way of test method JIS K5400.

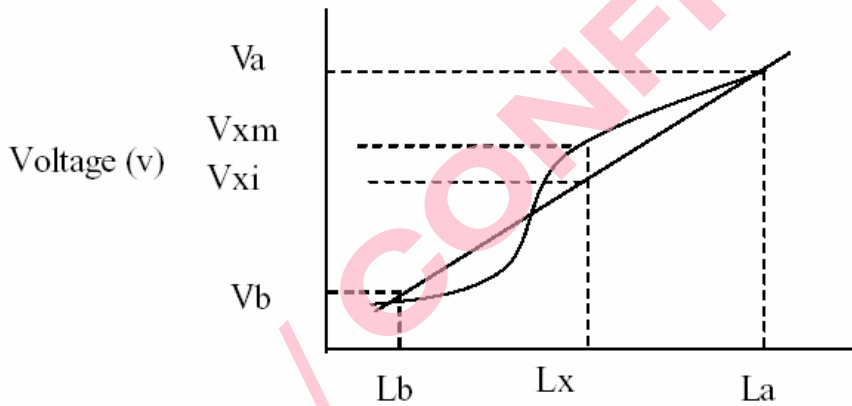
4.3.4 Optical property

Item	Performance	Note
Total light transmittance	78% ± 3%	JIS K7105
Haze	8% or below	JIS K7136
Film specification	Fog type with hard coated surface	

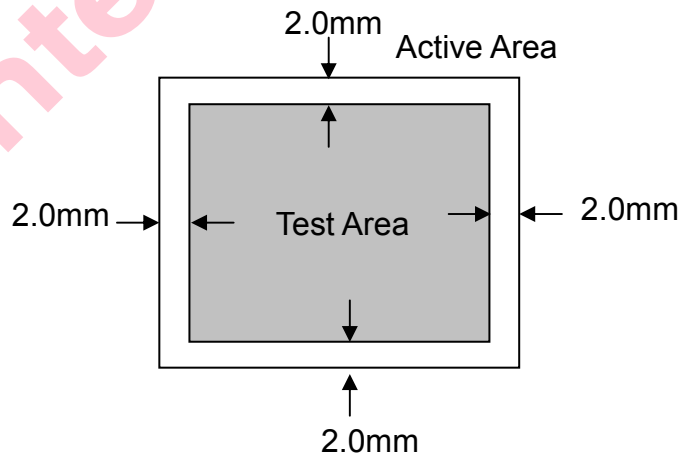
4.4 Linearity Definition



V_a : maximum voltage in the active area of touch panel
 V_b : minimum voltage in the active area of touch panel
 X : random measuring point
 V_{xm} : actual voltage of L_x point
 V_{xi} : theoretical voltage of L_x point



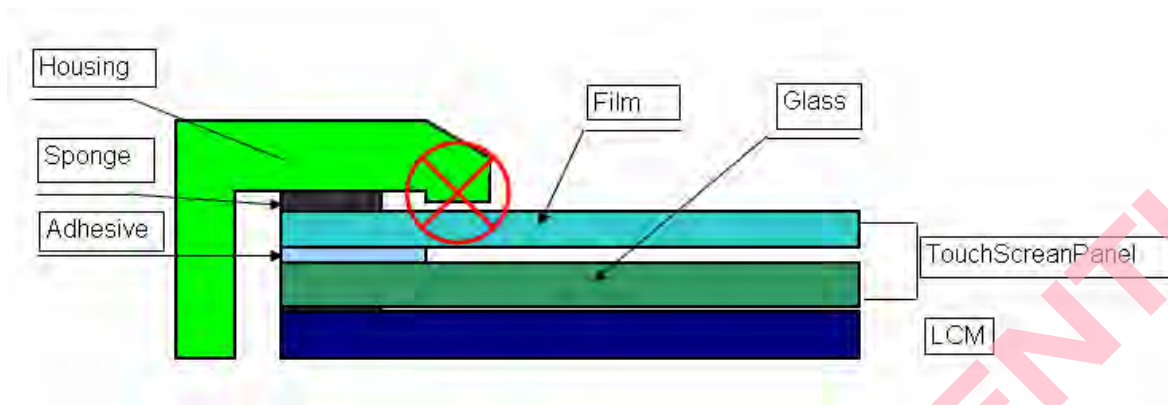
Linearity
 Note: Test area is as follows and operation force is 150gf



4.5 Housing design guide

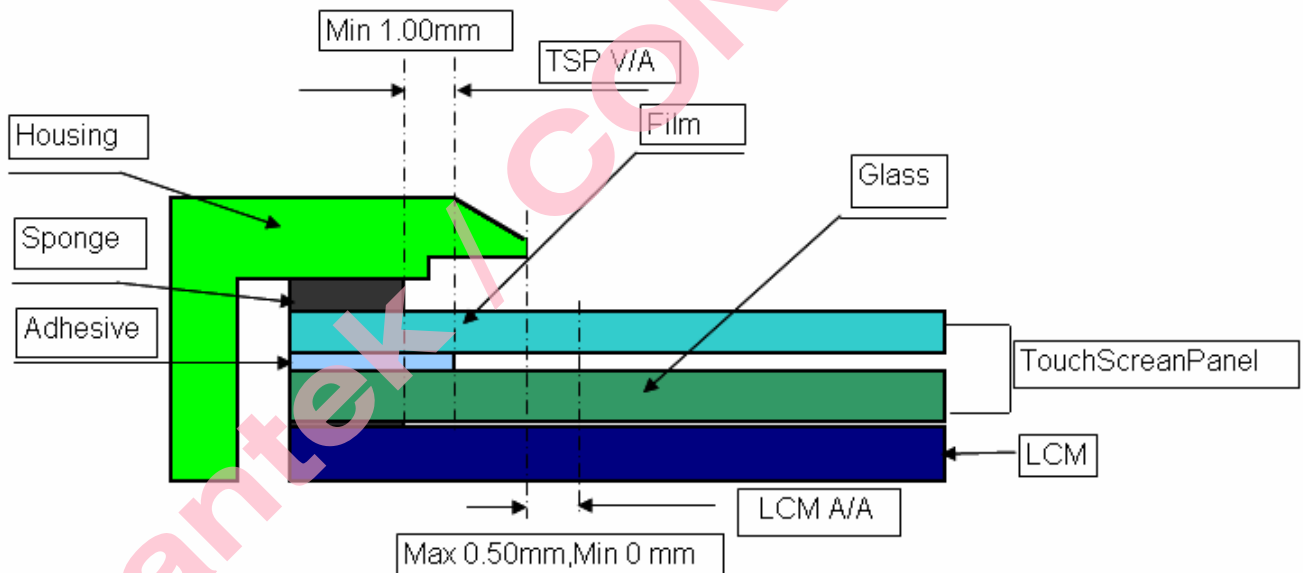
4.5.1 Avoid the design that housing overlap and press on the active area of the LCM

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



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

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



5. INTERFACE CONNECTION:

5.1 CN1(Signal of interface)

Pin NO.	SYMBOL	DESCRIPTION
1	AGND	Analog Ground
2	AVDD	Analog Power
3	DVDD	Digital Power
4	R0	Data Input(LSB)
5	R1	Data Input
6	R2	Data Input
7	R3	Data Input
8	R4	Data Input
9	R5	Data Input
10	R6	Data Input
11	R7	Data Input(MSB)
12	G0	Data Input(LSB)
13	G1	Data Input
14	G2	Data Input
15	G3	Data Input
16	G4	Data Input
17	G5	Data Input
18	G6	Data Input
19	G7	Data Input(MSB)
20	B0	Data Input(LSB)
21	B1	Data Input
22	B2	Data Input
23	B3	Data Input
24	B4	Data Input
25	B5	Data Input
26	B6	Data Input
27	B7	Data Input(MSB)
28	DCLK	Clock input
29	DE	Data Enable signal
30	HSD	Horizontal sync input. Negative polarity
31	VSD	Vertical sync input. Negative polarity
32	MODE	DE/SYNC mode select. Normally pull high H: DE mode. L: HSD/VSD mode
33	RSTB	Global reset pin. Active low to enter reset state. Suggest to connecting with an RC reset circuit for stability. Normally pull high. (R=47KΩ · C=1 μ)
34	STBYB	Standby mode, normally pull high STBYB="1", normal operation STBYB="0", timing control, source driver will turn off, all output are high-Z
35	SHLR	Left or Right Display Control
36	DVDD	Digital Power
37	UPDN	Up / Down Display Control
38	GND	Digital Ground
39	AGND	Analog Ground
40	AVDD	Analog Power
41	VCOM	Common Voltage
42	DITH	Dithering setting DITH="H" 6bit resolution(last 2 bit of input data truncated) (default setting) DITH="L" 8bit resolution
43	NC	Not connect
44	NC	Not connect
45	V10	Gamma correction voltage reference
46	V9	Gamma correction voltage reference
47	V8	Gamma correction voltage reference
48	V7	Gamma correction voltage reference
49	V6	Gamma correction voltage reference
50	V5	Gamma correction voltage reference

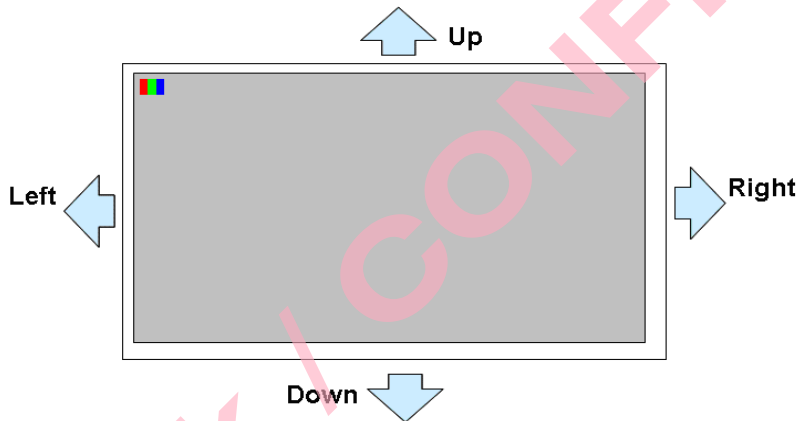
51	V4	Gamma correction voltage reference
52	V3	Gamma correction voltage reference
53	V2	Gamma correction voltage reference
54	V1	Gamma correction voltage reference
55	NC	Not connect
56	VDDG	Positive Power for TFT
57	DVDD	Digital Power
58	VEEG	Negative Power for TFT
59	GND	Digital Ground
60	NC	Not connect

【Note1】 Mating connector : HIROSE, FH28-60S-0.5SH, 60pin,pitch = 0.5mm

【Note2】 SHLR : left or right setting
UPDN : up or down setting

SHLR	UPDN	Data shifting
DVDD	GND	Left→Right , Up→Down(default)
GND	GND	Right→Left , Up→Down
DVDD	DVDD	Left→Right , Down→Up
GND	DVDD	Right→Left , Down→Up

Definition of scanning direction.



5.2 CN2(Backlight)

Input connector : BHSR-02VS-1(JST)

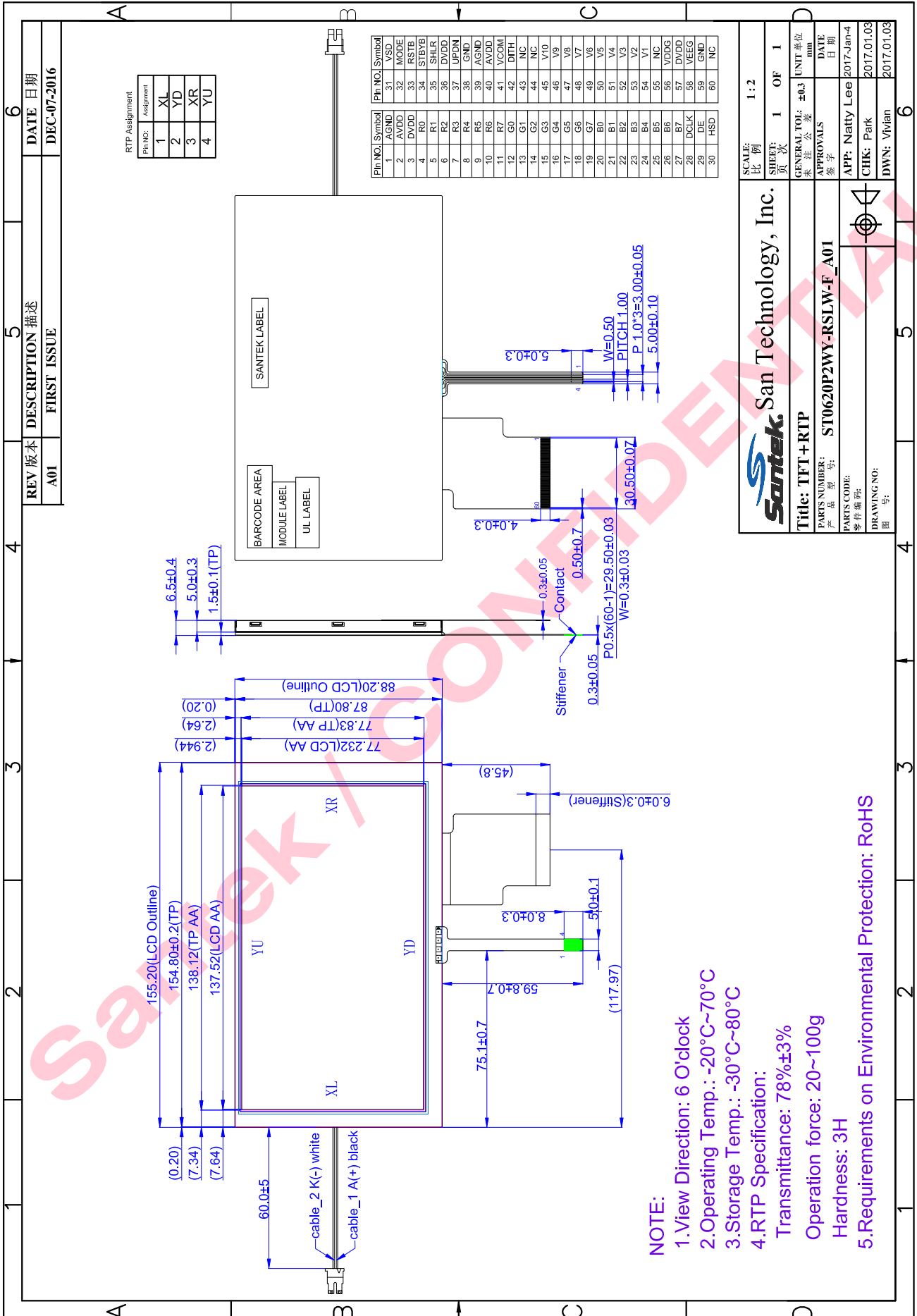
Outlet connector: SM02B-BHSS-1(JST)

Pin No.	Symbol	Function
1	A	Anode
2	K	Cathode

5.3 RTP Assignment

Pin NO:	Assignment
1	XL
2	YD
3	XR
4	YU

6. MECHANICAL DIMENSION

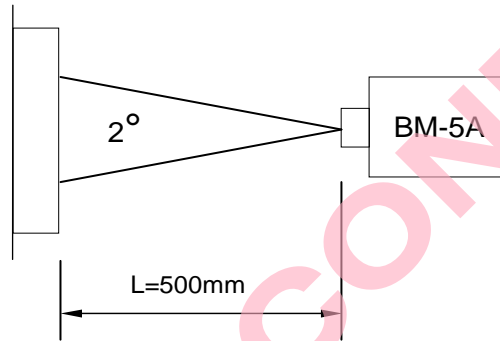


7. OPTICAL CHARACTERISTICS

(Use CPT LED backlight)

ITEM		SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT	NOTE
Constrast Ratio		CR	Point-5	480	600	-	--	1, 2, 3
Luminance(CEN)		Lw	Point-5	310	390	-	cd/m ²	1, 3
Luminance Uniformity		ΔL	-	70	80	-	%	1, 3
Response Time (White - Black)		Tr +Tf	Point-5 Ta=25°C	-	-	20	ms	1, 3, 5
NTSC		-	Point-5	-	50	-	%	1, 3
Viewing Angle	Horizontal		CR ≥ 10 Point-5	130	150	--	°	1, 3
	Vertical			120	140	--	°	1, 2, 4
MDL Chromaticity	White	Wx Wy	$\theta = \phi = 0^\circ$	0.270 0.290	0.310 0.330	0.350 0.370	--	1, 3
	Red	Rx Ry		0.561 0.302	0.601 0.342	0.641 0.382		
	Green	Gx Gy		0.300 0.562	0.340 0.602	0.380 0.642		
	Blue	Bx By		0.118 0.077	0.158 0.117	0.198 0.157		

Note1: Measure condition : 25°C±2°C , 60±10%RH , under 1 Lux in the dark room.BM-5A (TOPCON) , viewing angle2° , IL=140 mA (Backlight current) , measurement after lighting on 10 mins.



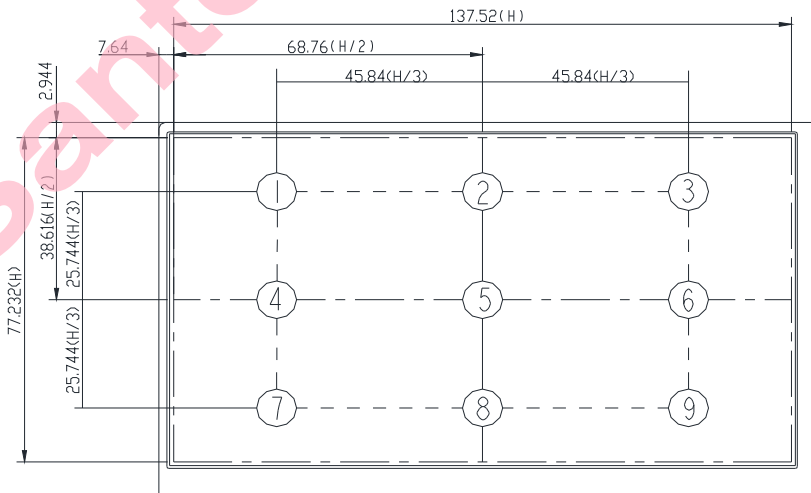
Note2: Definition of contrast ratio :

$$\text{Contrast Ratio (CR)} = (\text{White}) \text{ Luminance of ON} \div (\text{Black}) \text{ Luminance of OFF}$$

Note3: Definition of luminance : Measure white luminance on the point 5 as figure.6-1

Definition of Luminance Uniformity: Measure white luminance on the point 1~9 as figure.6-1

$$\Delta L = [L(\text{MIN})/L(\text{MAX})] \times 100$$



Note 4: Definition of Viewing Angle(θ, ψ), refer to Fig.6-2 as below :

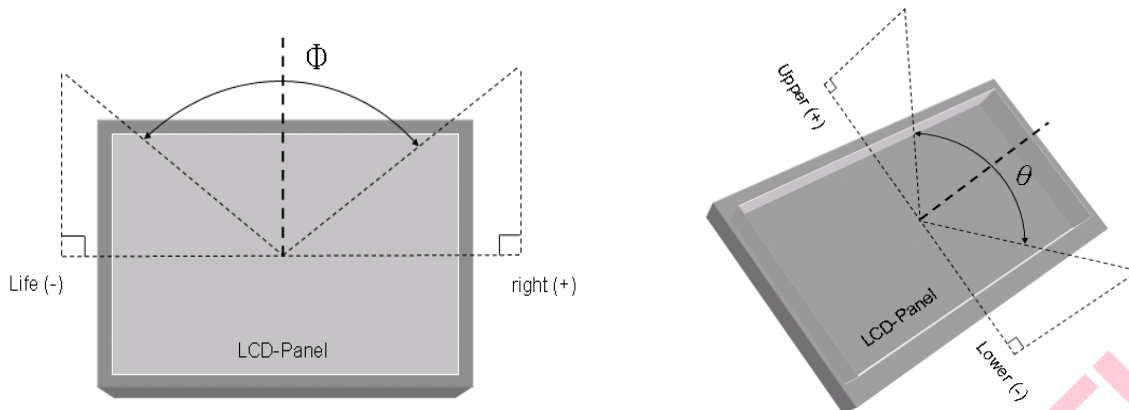


Fig.6-2 Definition of Viewing Angle

Note5: Definition of Response Time.(White-Black)

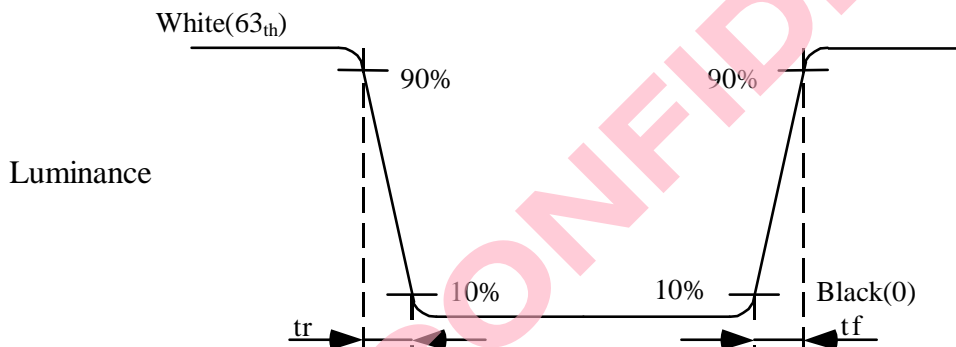


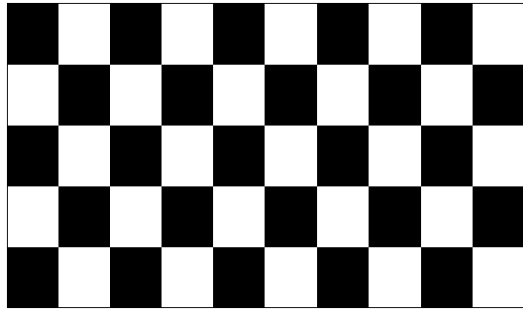
Fig.6-3 Definition of Response Time(White-Black)

8. RELIABILITY TEST

8.1 Temperature and Humidity

TEST ITEMS	CONDITIONS	NOTE
High Temperature Operation	70°C ;240hrs	
High Temperature Storage	80°C ; 240hrs	
High Temperature High Humidity Operation	60°C ; 90%RH ;240hrs	No condensation
Low Temperature Operation	-20°C ; 240hrs	Backlight unit always turn on
Low Temperature Storage	-30°C ; 240hrs	
Thermal Shock	-30°C (0.5hr) ~ 80°C (0.5hr) ; 200 Cycles	
Image Sticking	25°C ; 4hrs	

Note 1: Condition of Image Sticking test : $25\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$
 Operation with test pattern sustained for 4 hrs, then change to gray pattern immediately.
 After 5 mins, the mura must be disappeared completely .



(a) Test Pattern (chess board Pattern)



(b) Gray Pattern

8.2 Shock and Vibration

ITEMS	CONDITIONS
Shock (Non-operation)	<ul style="list-style-type: none"> ● Shock level: 980m/s^2 (equal to 100G). ● Waveform: half sinusoidal wave, 6ms. ● Number of shocks: one shock input in each direction of three mutually perpendicular axes for a total of three shock inputs.
Vibration (Non-operation)	<ul style="list-style-type: none"> ● Frequency range: 8~33.3Hz ● Stoke : 1.3 mm ● Vibration: sinusoidal wave, perpendicular axis(x, z axis: 2Hrs y axis: 4Hrs). ● Sweep: 2.9G, 33.3 Hz -400 Hz ● Cycle: 15 min
Vibration Random (Non-operation)	<ul style="list-style-type: none"> ● 1.04Grms, 5~500Hz, X/Y/Z, ● 30min/each direction

8.3 Electrostatic Discharge

TEST ITEM	CONDITIONS	Note
ESD	150pF , 330Ω , ±8kV&±15kV air& contact test	1
	200pF , 0Ω , ±200V contact test	2

Note: Measure
 1: LCD glass and metal bezel
 2: IF connector pins

9. SPECIFICATIONS FOR QUALITY ASSURANCE

9.1 Responsibility

9.1.1 This specification is applicable for ST0620P2WY-RSLW-F.

9.1.2 It is used for inspection when inspection at customer incoming inspection and Santek OQC inspection.

9.1.3 If the requirement is beyond or out of this specification, it should be modified after discussion.

9.2 Inspection condition

9.2.1 Inspection environment: temperature: 23C+/-3C, Humidity: 45%RH~65%RH

9.2.2 Inspection Distance: 30cm~40cm from eyes

9.2.3 Viewing angle: 30°from top side view

9.2.4 Illumination for visual inspection: 800-1000Lux, illumination for functional inspection: 300-500Lux.

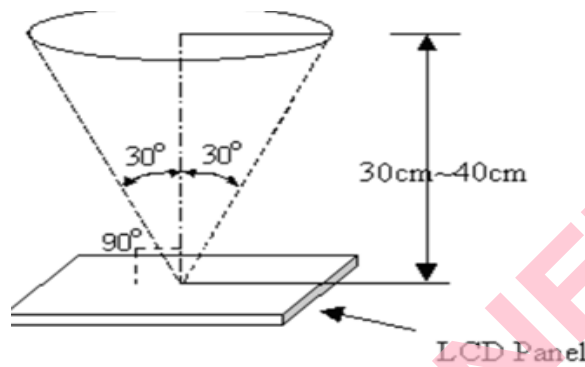


Photo 1: Inspection viewing angles and scope

9.3 Sampling plan and AQL :

MIL-STD-105E, Level II, visual: AQL=1.0, Function: AQL=0.65;

9.4 Tools and fixtures

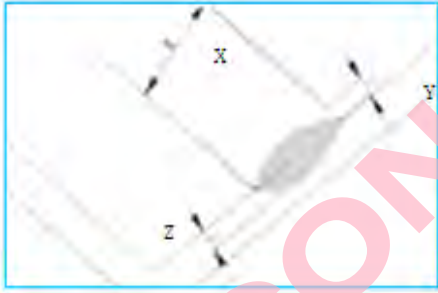
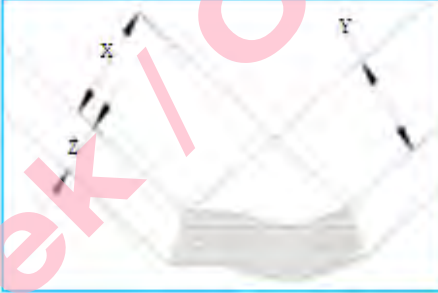
9.4.1 5% ND filter (For Mura, light leakage)

9.4.2 Film gauge (dot and linear defects)

9.4.3 5X~10X microscope (Bright & dark dots, dot size and etc). Higher magnifier microscope is necessary for some other defects.

9.5 Visual inspection:

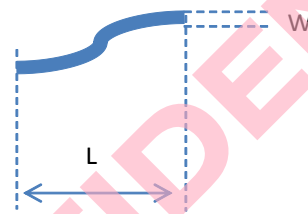
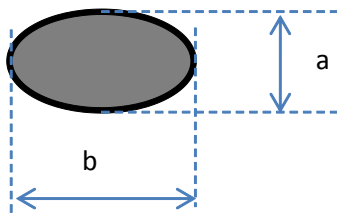
Defects	Specification		Remark
	Criteria	Judge	
TP surface dirt	If dirt is cleanable, OK, otherwise, NG		
Scratches on TP or polarizer surface	$W \leq 0.05\text{mm}$	Ignored	
	$0.05\text{mm} < W \leq 0.1\text{mm}$ $L \leq 10\text{mm}$	$N \leq 3$	Distance $\geq 15\text{mm}$
	$0.1\text{mm} < W$ $10\text{mm} < L$	NG	
Dot defects between TP	$\phi < 0.2\text{mm}$	Ignored	

and TFT or TP surface. For example: Foreign matter, black or white dot defects, dent, pricking dots	$0.2\text{mm} \cong \phi \cong 0.4\text{mm}$	$N \cong 3$	Distance $\geq 15\text{mm}$
	$0.4\text{mm} < \phi$	NG	
Fiber or linear defects between TP and TFT	$W \cong 0.1\text{mm}$	Ignored	
	$0.1\text{mm} < W \cong 0.2\text{mm}$ $L \cong 2.5\text{mm}$	$N \cong 4$	Distance $\geq 15\text{mm}$
	$0.2\text{mm} < W$ $2.5\text{mm} < L$	NG	
Polarizer bubbles	$\phi < 0.25\text{mm}$	Ignored	
	$0.25\text{mm} \cong \phi \cong 0.4\text{mm}$	$N \cong 2$	Distance $\geq 15\text{mm}$
	$0.4\text{mm} < \phi$	NG	
Dent on polarizer surface	$\phi < 0.25\text{mm}$	Ignored	
	$0.25\text{mm} \cong \phi \cong 0.5\text{mm}$	$N \cong 4$	Distance $\geq 15\text{mm}$
	$0.5\text{mm} < \phi$	NG	
Chipping at edge on TP	 <p> $X \cong 1.5\text{mm}$ $Y \cong 1.5\text{mm}$ $Z \cong T$ X: Chipping Length Y: Chipping Width Z: TP thickness </p>	$N < 2$ in same side is OK. Total 4 sides in TP	Distance $\geq 15\text{mm}$, Crack in extension is NG.
Chipping at corner on TP	 <p> $X \cong 2\text{mm}$ $Y \cong 2\text{mm}$ $Z \cong T$ X: Chipping Length Y: Chipping Width Z: TP thickness </p>		Distance $\geq 15\text{mm}$, Crack in extension is NG.
Scratches on metal frame	Scratch doesn't make frame deformed	OK	
	Scratch makes base material exposed or frame deformed	NG	
Metal frame deforms	<ol style="list-style-type: none"> Obvious deform by naked eyes Or deformation makes display or luminance abnormal or co-planarity $> 1\text{mm}$ 	NG	Naked eyes and co-planarity stone
TP assembly shifting	TP edge over hanging TFT edge $> 0.2\text{mm}$	NG	
TP damage	Damage affects TP function and visual	NG	
TP crack	Crack is extending	NG	
TP bump	Height of bump is over 0.4mm	NG	

TFT damage	Damage affects TFT function, NG, otherwise, OK.	NG	
TFT Crack	Crack is extending	NG	
Dot and linear defects on FPC of TFT and TP	Defect doesn't affect function	OK	
Crease and folding trace on FPC of TFT and TP	Defect doesn't affect function	OK	
Soldering	Judge according to IPC-A-610E	N/A	

Remark: 1.If the requirement is out of this specification, discussion is necessary base on sample between customer and Santek.

2. The defect which is beyond VA area is ignored if it doesn't affect function.



$$\varphi = (a+b)/2$$

Dot defects- for example: Black & white dots, foreign matter, polarizer bubbles, dent, protrusion, bump)

Linear defects- for example: Scratches, fiber

9.6 Visual inspection when lighting up

Defect	Specification (Acceptance)		Total defects	Remark
	A region	B region		
Bright dot	$N \leq 0$	$N \leq 2$	$N \leq 2$	Distance between 2 dots $\geq 15\text{mm}$
Dark dot	$N \leq 2$	$N \leq 3$	$N \leq 3$	
Accepted quantities of defect in total	$N \leq 2$	$N \leq 3$	$N \leq 4$	
2 dots adjacent	$N \leq 0$	$N \leq 1$	$N \leq 1$	
3 dots adjacent	NG			
Bright lines	NG			
Mura	If it is invisible via 5% ND filter, OK, otherwise, NG			
Light leakage	If it is invisible via 5% ND filter, OK, otherwise, NG			
Abnormal display	NG			
No display	NG			
TP function NG	NG			
TP Calibration NG	NG			

9.6.1 Use of ND filter:

Put ND filter on top of defects, and look through ND filter to check the defects between 35~40cm. and the distance between product and ND filter is 2.5cm~3cm.

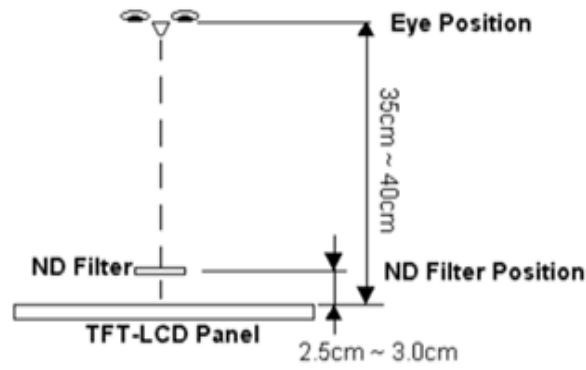


Photo 2: Figure about using ND filter

9.6.2 Definition of A and B regions:

A region: The area in red rectangle;

B region: Except A area, the area in black rectangle;

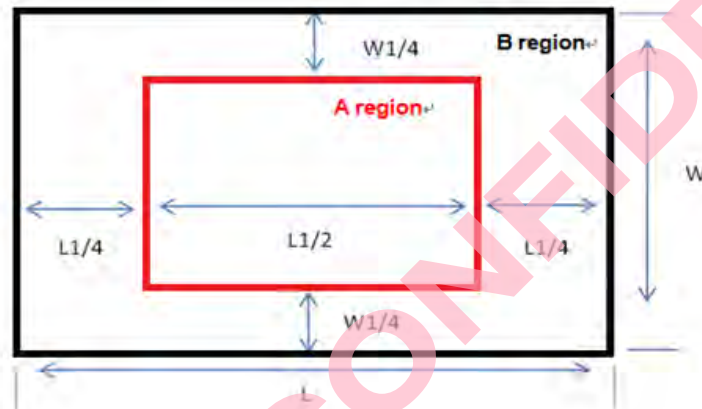


Photo 3: Definition of A and B regions

9.6.3 Definition of TFT dot defects:

TFT dot defects are found when lighting up. These dot defects cover bright and dark dots.

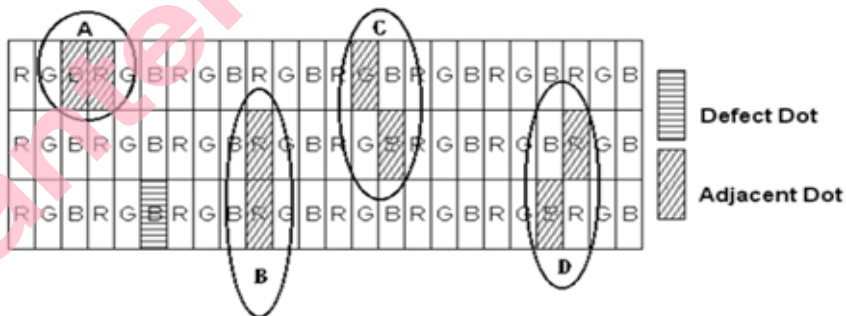


Photo 4: explanation of adjacent dots

9.6.3.1 A, B, C & D points mean adjacent dots in above picture.

9.6.4 Definition of defective bright dots

9.6.4.1 The defective area is cover >50% area of pixel;

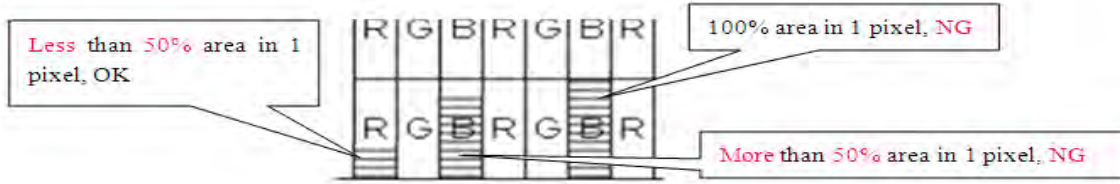


Photo 5: Explanation for defective pixel

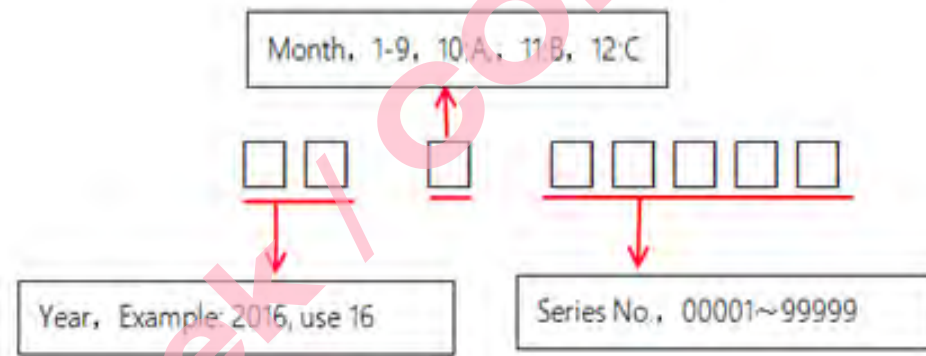
9.6.4.2 It is visible with 5% ND filter.

9.7 Lot No. definition:

9.7.1 Label content



9.7.2 Lot NO.:



Example: 16200001=This is 1st sample(00001) in Feb of year 2016

9.8 Product outline:



Photo 6: Front view of product

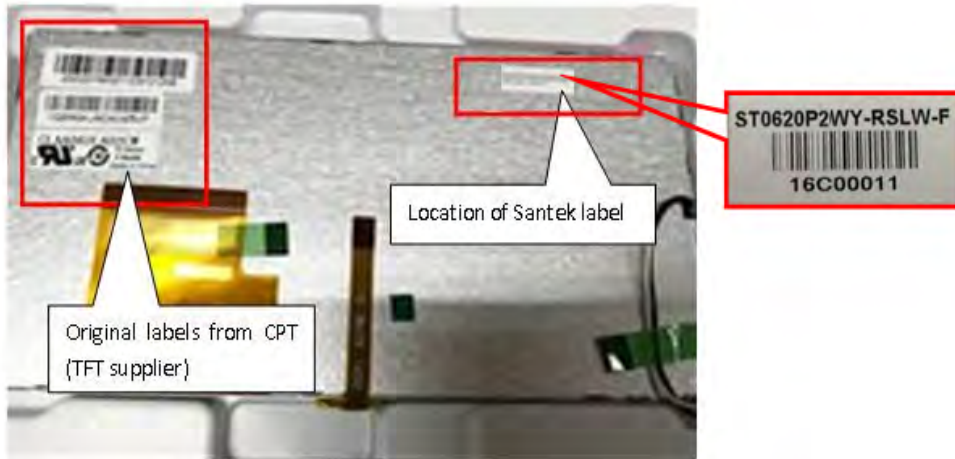
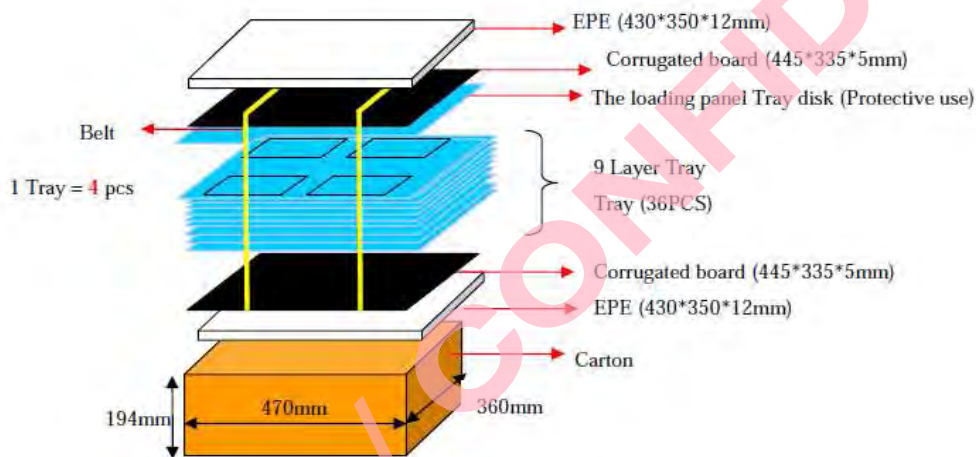


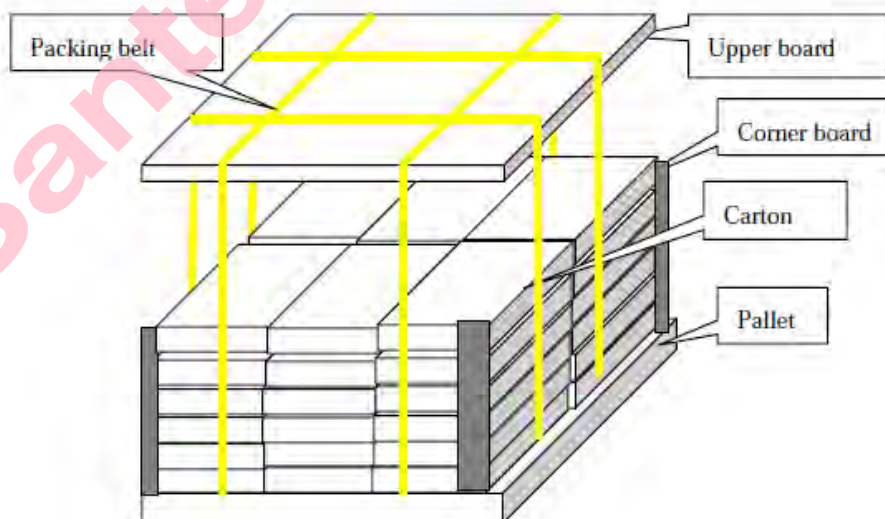
Photo 7: Backside view of product

10. PACKAGE FORM

Carton : 9+1Tray



Pallet Packing (1150*1000*130mm) : 1 Layer with 6 cartons, total 6 layers. : 6x6 cartons

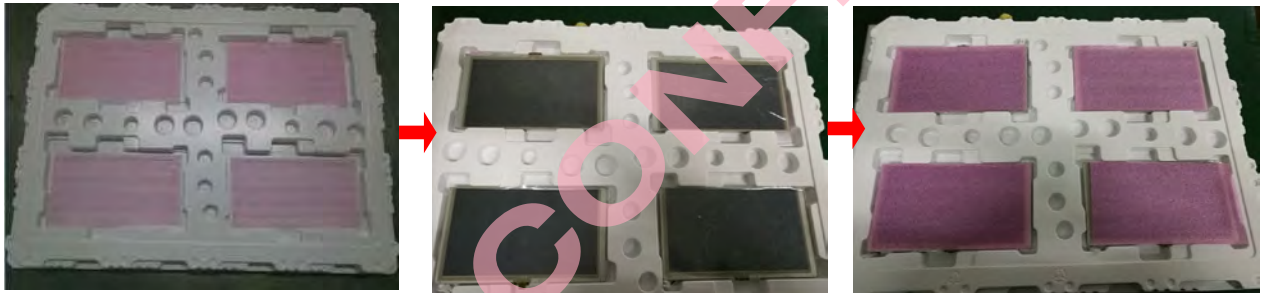


Packing Procedure

- (1) To wipe the surface of module surface with clean cloth, then attached the hard type protect film.
- (2) UL, Module, B/L Label & fixed tape of FPC attached



- (3) First place an EPE cushioning material in Tray.



- (4). The uppermost loading plate tray disk (protection) , Placed the chamber into 8 packages of desiccant



- (5). Tray disk stack: Cross-stack 9 +1 plus two corrugated board, and then fixed with Velcro; In an aluminum foil bag, suction vacuum packaging sealed and filled with nitrogen.



- (6). Packing: at the bottom put an EPE foam and then into the tray tray packaging group who had an EPE foam.



- (7). Label attachment

