San Technology, Inc.

SPECIFICATION
FOR
LCD Module

Customer P/N:

Santek P/N: ST0700O2WCYOL-RSHLW-F

DOC. Revision: RS01

Customer Approval:

	SIGNATURE	DATE
PREPARED BY	YF Zhou	2016-08-08
CHECKED BY		
APROVED BY		

Document Revision History

Version	Revise Date	Description	Changed by
RS01	2016.08.08	Initial release	Y F Zhou

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1. OVERVIEW

ST0700O2WCYOL-RSHLW-F is 7” color TFT-LCD (Thin Film Transistor Liquid Crystal Display) module composed of LCD panel, driver ICs ,control circuit and LED backlight. By applying 800×480 images are displayed on the 7” diagonal screen. Display 16.7Mcolors by R.G.B signal input.

General specification are summarized in the following table:

ITEM	SPECIFICATION			
Display Area (mm)	154.08(H) x 85.92(V)			
Number of Pixels	800(H) × 3 (RGB) × 480(V)			
Pixel Pitch (mm)	0.1926(H) x 0.1790(V)			
Color Pixel Arrangement	RGB vertical stripe			
Display Mode	Normally white			
Number of Colors	16.2M			
Brightness (cd/m^2)	800 cd/m^2(typ)			
Response Time (ms)	25ms(typ.)			
Contrast Ratio	500:1			
Viewing Angle (CR≧10)	160degree (Horizontal.)			
	160degree (Vertical)			
Power Consumption (W)	TBD			
Interface connection	TTL			
Module Size (mm)		Min.	Typ.	Max.
	Horizontal (H)		179.4	
	Vertical (V)		117.4	
	Depth (D) w/o FPC		7.0	
Module Weight (g)	214.3(typ)			
Backlight Unit	LED			
Surface Treatment	Anti-Glare,3H			

2 .CTP Construction And Mechanical Characteristics

Construction

Construction	Materials Used	Comment
Glass LENS	Glass	Thickness：0.70mm
OCA	Adhesive	Thickness：0.175mm
ITO Sensor	ITO Sensor	Thickness：0.70 mm

Mechanical Characteristics

Item	Description	Unit
Outside Dimension	179.40±0.1 ×117.40±0.1	mm
View Area	154.08×85.92	mm^2
Active Area	154.60×87.04	mm^2
Thickness	1.58±0.1	mm
Input Method	Finger Or Conductive Pen	
Hardness Of Surface	Hard Surface : >3H [JIS K 5400]	
Accuracy	+/-1mm@10mm	mm
Support Operation	2-5 Finger	
Channel	20*10	
Interface	I^2C	
Supported Operating Systems	Android,Window7	

3.CTP Electrical Characteristics

Item	Description	Unit
Operating Voltage	DC 2.8-3.6 V	V
Insulation Resistance	＞20MΩ At DC 25V	MΩ
Insulation Ability	≥60sec. At DC 25V	sec
Chatting Times	<5ms	ms

4.CTP Optical Characteristics

Item	Description
Total Transmittance	＞85% [JISK7105]
Total Haze	<3% [JISK7105]

5.CTP Processing Environment

Item	Description
Operating Temperature	-20℃～+70℃
Operating Humidity	≤90%RH
Storage Temperature	-30℃～+80 ℃
Storage Humidity	<90%RH

6. ABSOLUTE MAXIMUM RATINGS

The following are maximun values which, if exceeded, may cause faulty operation ordamage to the unit.

Item	Symbol	Min.	Max.	Unit	Note
Digital Supply Voltage	VDD VDD_LVDS	-0.3	+5.0	V	
Analog Supply Voltage	AVDD	-0.5	+13.5	V	
Gate On Voltage	VGH	-0.3	+42	V	
Gate Off Voltage	VGL	-20	+0.3	V	
Gate On-Gate Off Voltage	VGH-VGL	12	40	V	
Forward Current (per LED)	If	-	40	mA	
Reverse Voltage (per LED)	VR	-	5	V	
Pulse forward current (per LED)	Ifp	-	100	mA	Note *2)
Operation Temperature	Top	-20	70	℃	Note *1)
Storage Temperature	Tstg	-30	80	℃	Note *1)

Note:

*1) If users use the product out of the operation and storage range,it will have quality is sue.

*2) Ifp Conditions ： Pulse Width≦10msec, Duty≦1/10

*3) Each one of LED operation must be follow diagram of Ambient Temperature and Allowable Forward Current.

*4) If users use the product out off the environmemtal operation range（temperature and humidity）, it will have visual quality concerns.

7. ELECTRICAL CHARACTERISTICS

7.1. Typical Operation Conditions

Item	Symbol	MIN	TYP	MAX	UNIT	NOTE
Digital Supply Voltage	DVDD	3	3.3	3.6	V	
Analog Supply Voltage	AVDD	9.4	9.6	9.8	V	
Gate On Voltage	VGH	17	18	19	V	
Gate Off Voltage	VGL	-6.6	-6	-5.4	V	
Common Voltage	VCOM	3.8	4	4.2	V	Note 1
Logic Input Voltage	VIH	0.7*DVDD	-	DVDD	V	
	VIL	GND	-	0.3*DVDD	V	

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

7.2. Current Consumption

Item	Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Gate on current	IVGH	VGH =18V	-	0.5	1	mA	Note 1
Gate off current	IVGL	VGL= -6V	-	0.5	1	mA	Note 1
Digital current	IVDD	DVDD = 3.3V	-	8	15	mA	Note 1
Analog current	IAVDD	AVDD = 9.6V	-	30	40	mA	Note 1
Total Power Consumption	PC		-	327	458	mW	Note 1

Note 1: Typical: Under 256 gray pattern
Maximum: Under black pattern

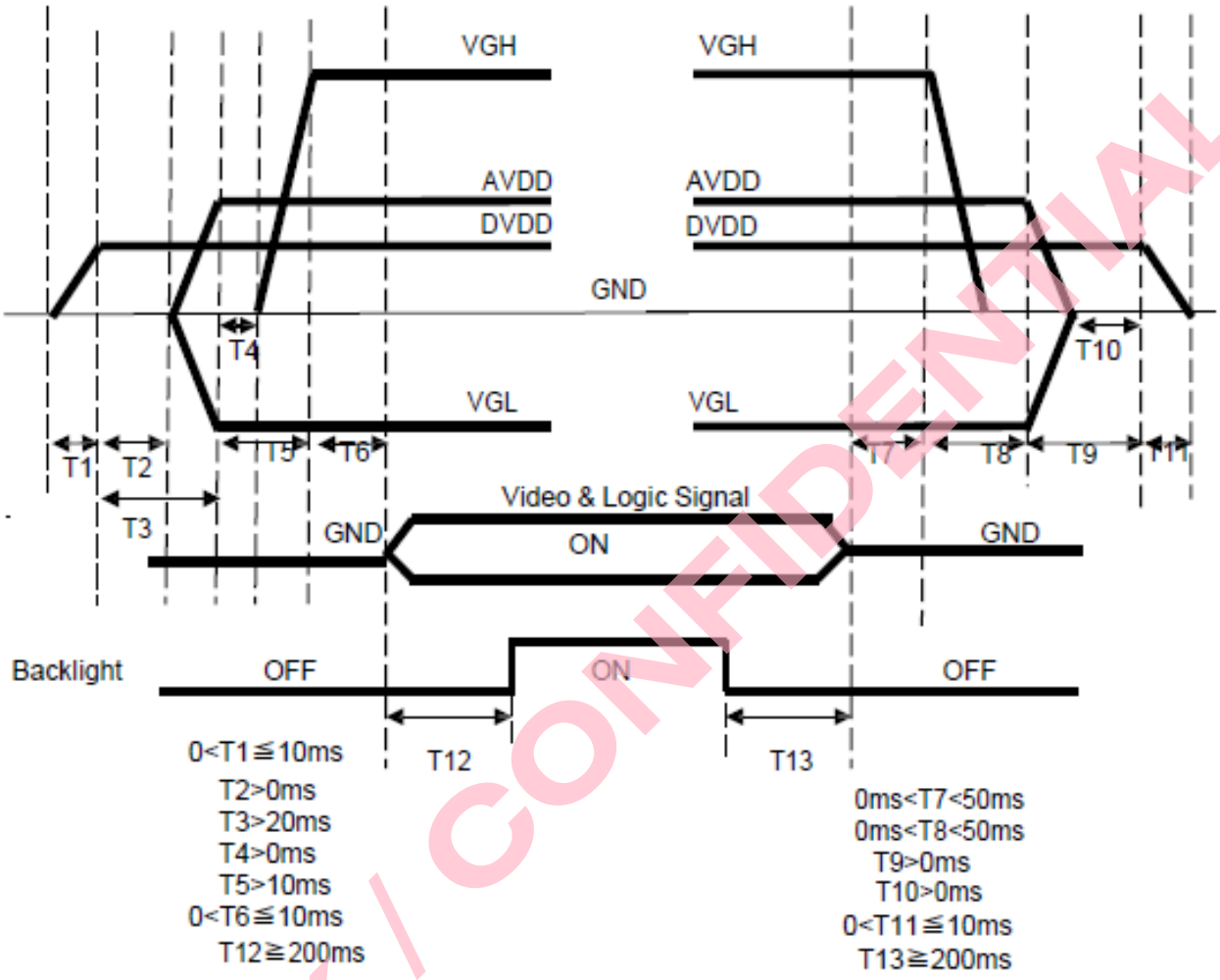
256 gray pattern

Black Pattern

7.3. Power、Signal sequence

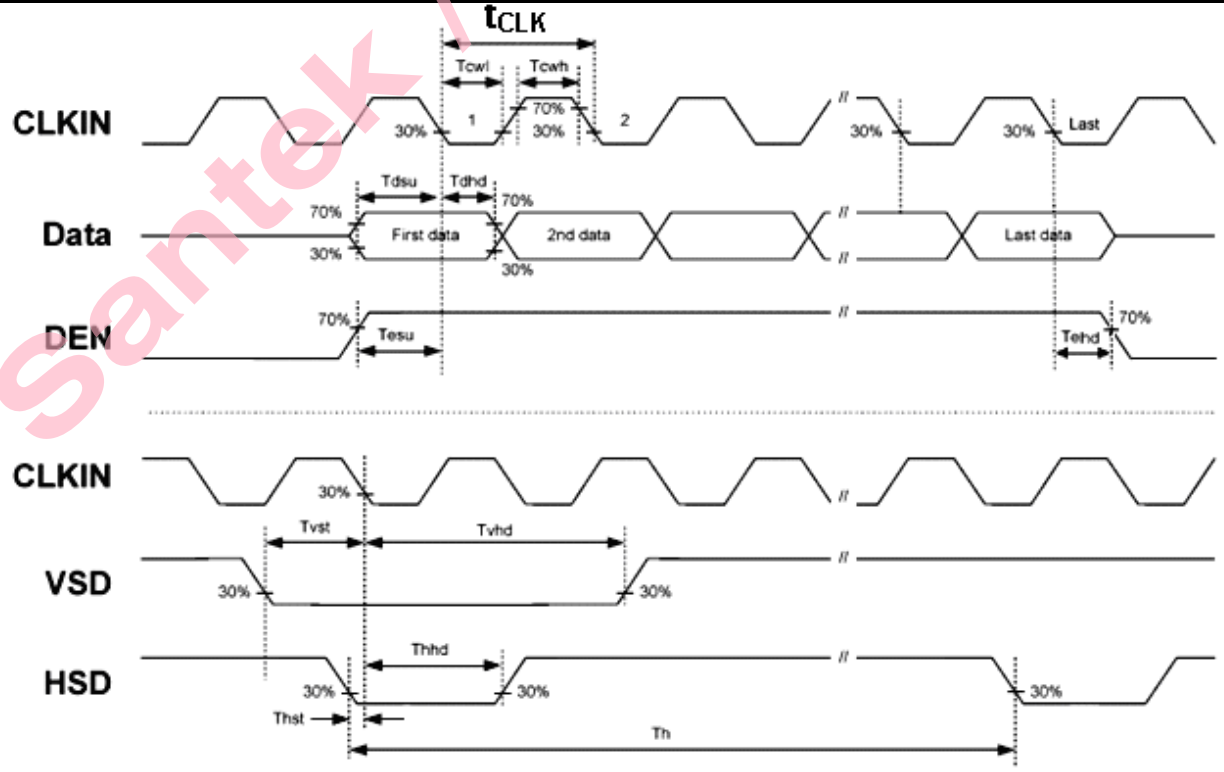
Power On：DVDD→AVDD/VGL→VGH→Video &Logic Signal→Backlight

Power Off：Backlight→Video &Logic Signal→VGH→AVDD/VGL→DVDD



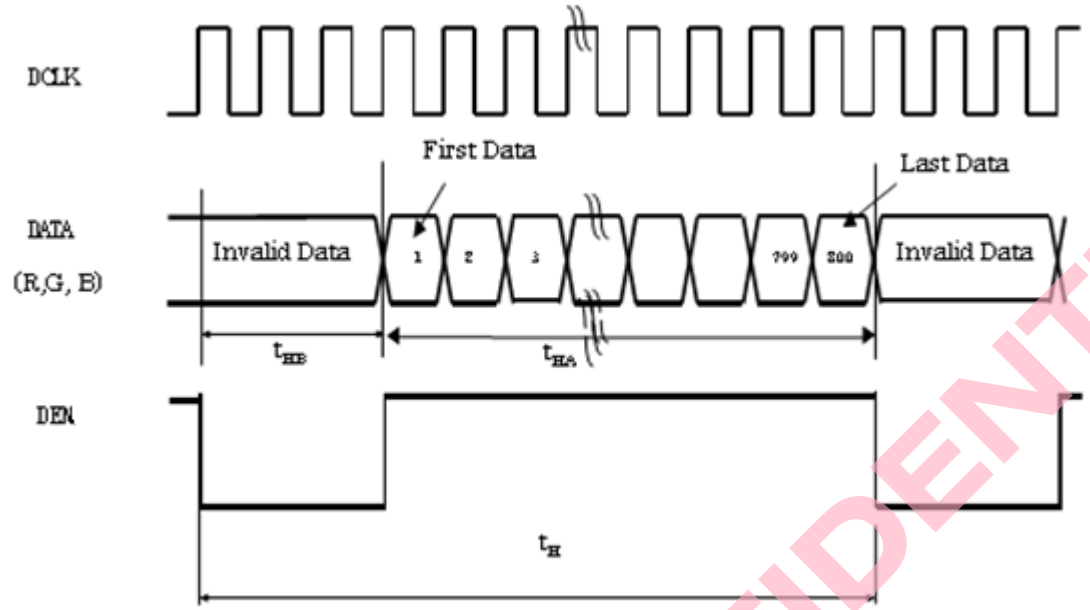
7.4. Timing characteristics of input signals

ITEM		SYMBOL	MIN.	TYP.	MAX.	UNIT	Note
DCLK	Dot Clock	$1/t_{CLK}$	29	33	38	MHz	
	DCLK pulse duty	Tcwh	40	50	60	%	
DE	Setup Time	Tesu	8	-	-	ns	
	Hold time	Tehd	8	-	-	ns	
	Horizontal Period	t_H	1026	1056	1086	t_{CLK}	
	Horizontal Valid	t_{HA}		800		t_{CLK}	
	Horizontal Blank	t_{HB}	226	256	286	t_{CLK}	
	Vertical Period	t_V	515	525	535	t_H	
	Vertical Valid	t_{VA}		480		t_H	
	Vertical Blank	t_{VB}	35	45	55	t_H	
SYNC	HSYNC Setup Time	Thst	8	-	-	ns	
	HSYNC Hold Time	Thhd	8	-	-	ns	
	VSYNC Setup Time	Tvst	8	-	-	ns	
	VSYNC Hold Time	Tvhd	8	-	-	ns	
	Horizontal Period	th	1026	1056	1086	t_{CLK}	
	Horizontal Pulse Width	thpw	-	30	-	t_{CLK}	thb + thpw=46DCLK is fixed
	Horizontal Back Porch	thb	-	16	-	t_{CLK}	
	Horizontal Front Porch	thfp	180	210	240	t_{CLK}	
	Horizontal Valid	thd		800		t_{CLK}	
	Vertical Period	tv	515	525	535	th	
	Vertical Pulse Width	tvpw	-	13	-	th	tvpw + tvb = 23th is fixed
	Vertical Back Porch	tvb	-	10	-	th	
	Vertical Front Porch	tvfp	12	22	32	th	
	Vertical Valid	tvd		480		th	
DATA	Setup Time	Tdsu	8	-	-	ns	
	Hold Time	Tdhd	8	-	-	ns	

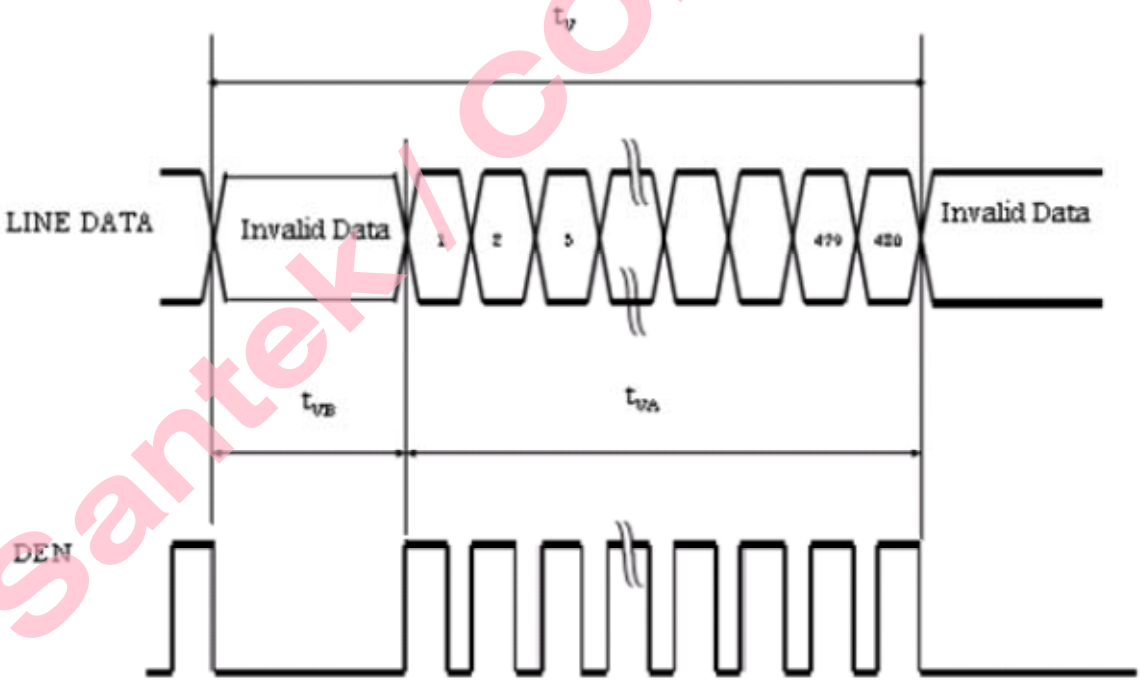


DE mode

Horizontal timing：

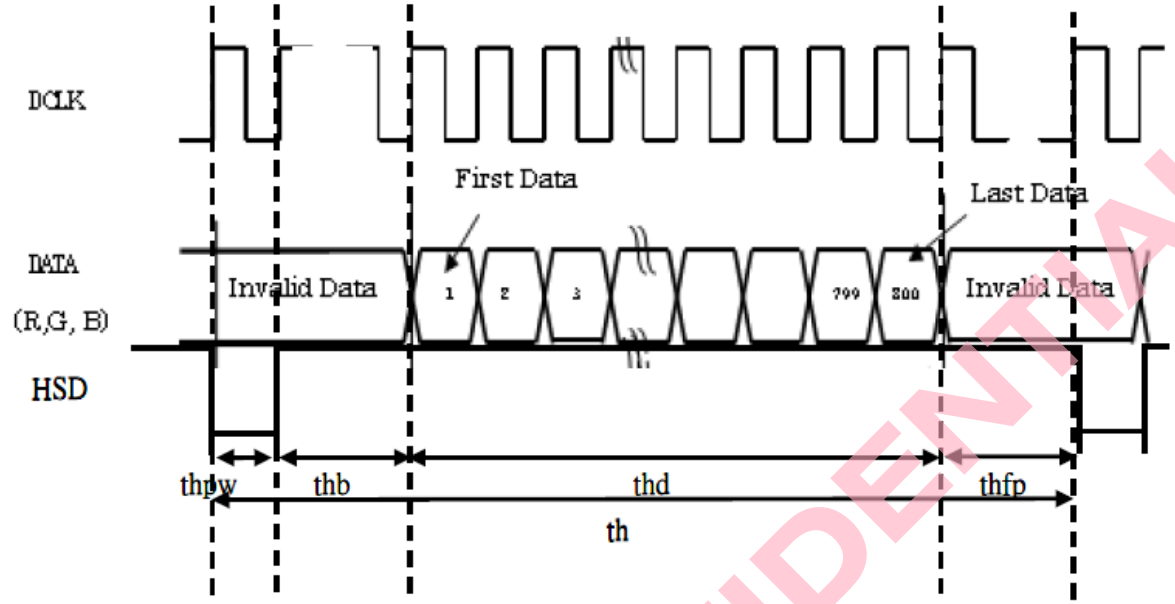


Vertical timing：

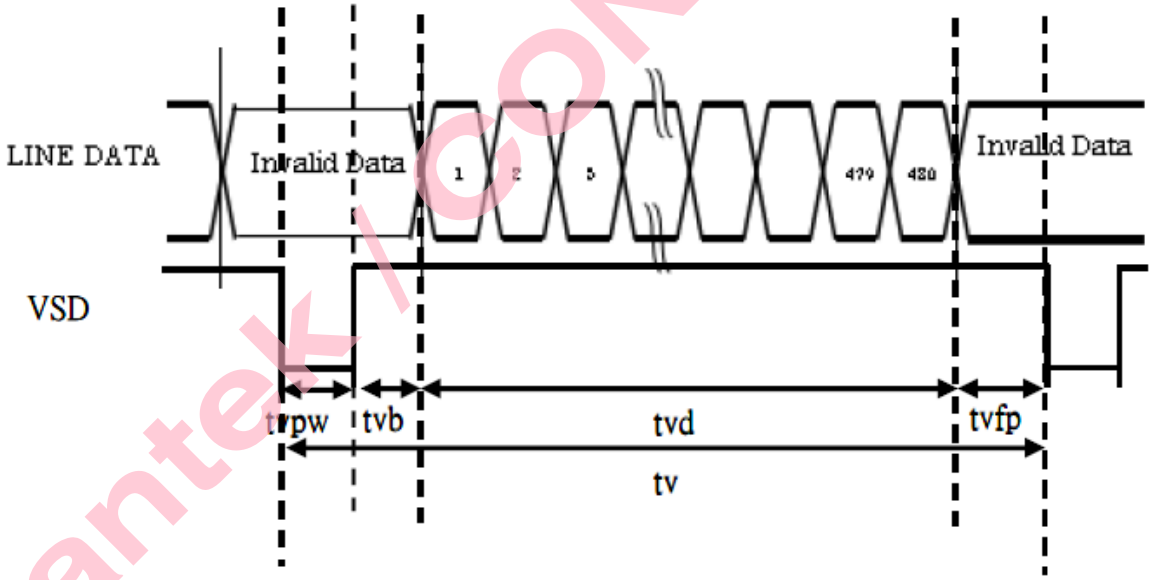


SYNC mode

Horizontal timing：



Vertical timing：



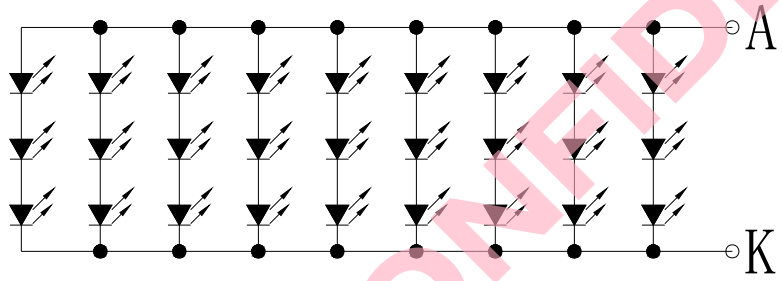
7.5. Backlight

Ta=25℃

ITEM	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT	NOTE
LED current	IL	Ta=25℃ (40mA/series)	--	360	--	mA	
LED voltage	VL	Ta=25℃ (40mA/series)	9.3	9.9	10.5	V	
Power consumption	WL	Ta=25℃ (40mA/series)	--	3.564	--	W	
LED Lifetime	-	Ta=25℃ IF=40mA	30000	--	--	Hr	

Remarks:

*1) LED Circuit Diagram



LED Circuit Diagram

（3S9P=27LED）

*2) A:Anode(＋),K:Cathode(－)

*3) Suggestion: Using the constant current control to avoid the leakage light and brightness quality issue.

*4) Definition of Led lifetimećLuminance < Initial luminance 50%.

8. INTERFACE CONNECTION

8.1. CN1 (Input Signal)

PIN NO.	SYMBOL	DESCRIPTION
1	AGND	Analog Ground
2	AVDD	Analog Power
3	VCC	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.
34	STBYB	Standby mode, normally pull high .STBYB="1", normal operation STBYB="0",timming control, source driver will turn off, all output are high-Z
35	SHLR	Left or Right Display Control
36	VCC	Digital Power
37	UPDN	Up / Down Display Control
38	GND	Digital Ground
39	AGND	Analog Ground
40	AVDD	Analog Power

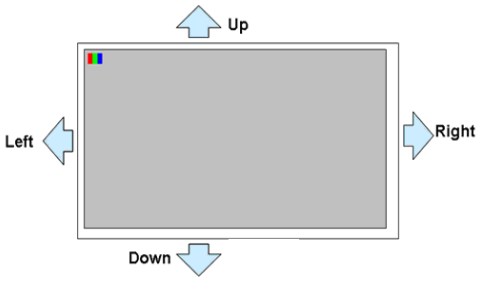
41	VCOM	Common Voltage
42	DITH	Dithering setting.DITH="H" 6bit resolution(last 2 bit of input data truncated) (default setting) DITH="L" 8bit resolution
43	NC	Not connect
44	NC	Not connect
45	NC	Not connect
46	NC	Not connect
47	NC	Not connect
48	NC	Not connect
49	NC	Not connect
50	NC	Not connect
51	NC	Not connect
52	NC	Not connect
53	NC	Not connect
54	NC	Not connect
55	NC	Not connect
56	VGH	Positive Power for TFT
57	VCC	Digital Power
58	VGL	Negative Power for TFT
58	GND	Digital Ground
60	NC	Not connect

【Note1】SHLR：left or right setting

UPDN：up or down setting

UD	LR	FUNCTION
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



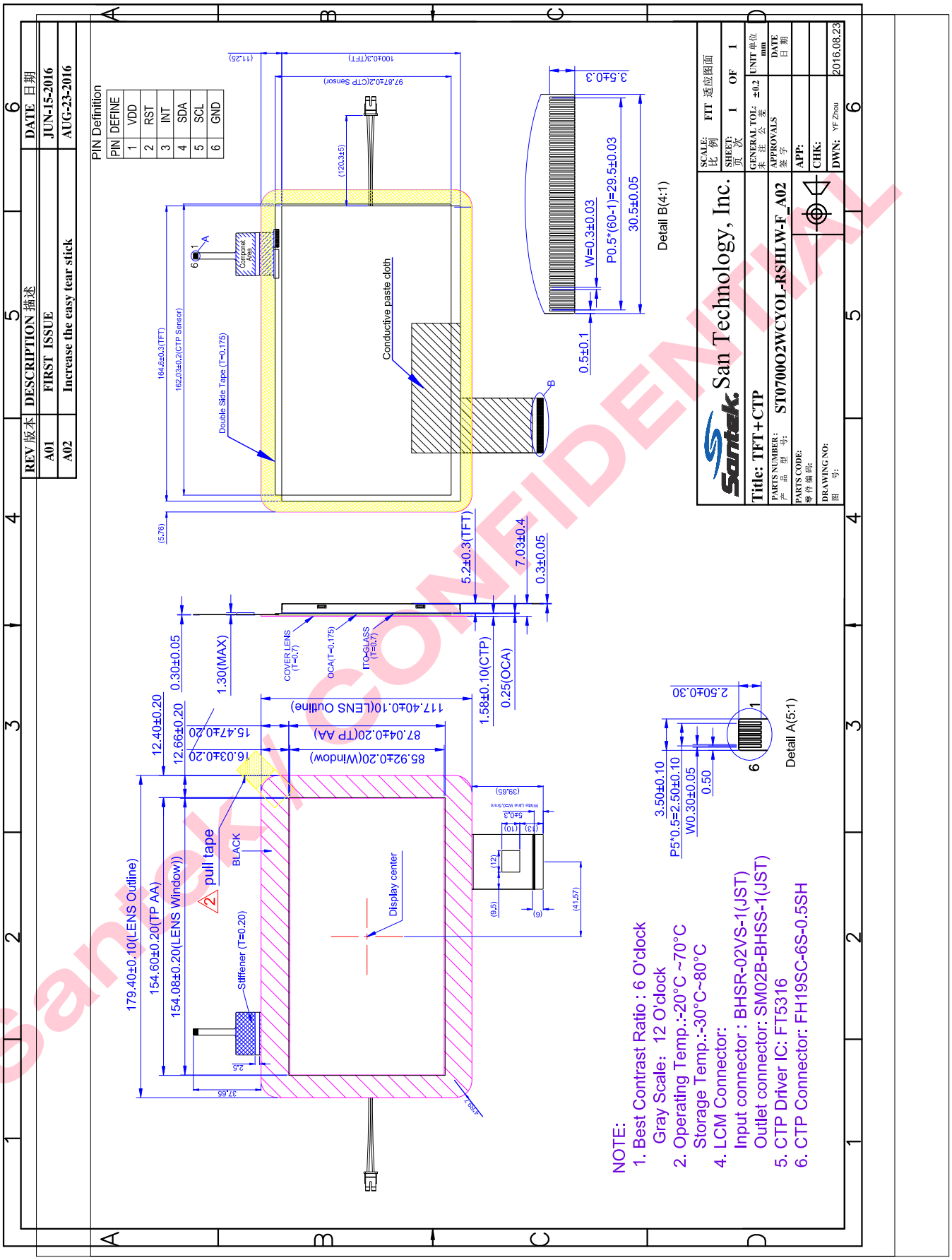
8.2. CN2 (LED backlight)

PIN NO	SYMBOL	FUNCTION
1	A	Anode
2	K	Cathode

Note：

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

Outlet connector: SM02B-BHSS-1(JST)

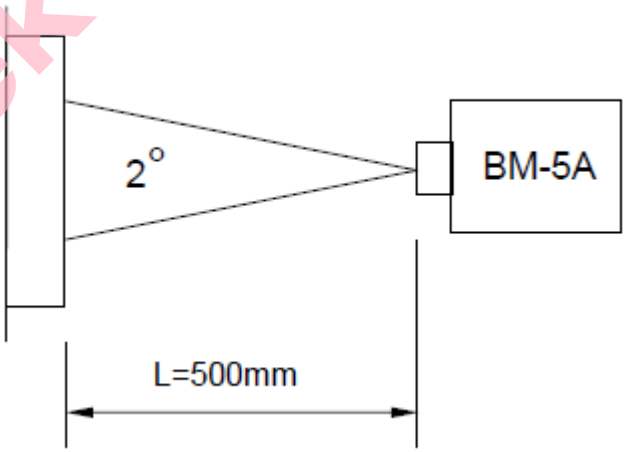


10. OPTICAL CHARACTERISTICS

Ta = 25°C, VCC=3.3V

ITEM		SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT	NOTE
Panel Transmittance		T		4.8	5.1	--	%	
Contrast Ratio		CR	Point-5	400	500		--	1,2,3
Luminance(CEN)		LW	Point-5	750	800		cd/m^2	1,3
Luminance Uniformity		ΔL		70	80		%	1,3
Response Time (White - Black)		Tr +Tf	Point-5	-	25	40	ms	1,3,5
NTSC		-	Point-5	45	50	-	%	1,3
Viewing Angle	Horizontal	Left(ψ)	CR≧10 Point-5	70	80	--	°	1,3
		Right(ψ)		70	80	--	°	
	Vertical	Upper(θ)		70	80	--	°	1,2,4
		Down(θ)		70	80	--	°	
Color Coordinate	White	Wx Wy	Point-5	0.273 0.289	0.313 0.329	0.353 0.369	--	1,3
	Red	Rx Ry		0.562 0.297	0.602 0.337	0.642 0.377		
	Green	Gx Gy		0.309 0.547	0.349 0.587	0.389 0.627		
	Blue	Bx By		0.123 0.074	0.163 0.114	0.203 0.154		

Note1： Measure condition: 25℃±2℃, 60±10%RH, under10 Lux in the dark room.BM-5A (TOPCON), viewing angle2°, IL=360 mA （Backlight current）, measurement after lighting on 10 mins.



Note2：Definition of contrast ratio：
Contrast Ratio (CR)= (White) Luminance of ON ÷ (Black) Luminance of OFF

Note3： Definition of luminance：Measure white lu minance on the point 5 as figure.7-1

Definition of Luminance Uniformity: Measure white luminance on the point1~9 as figure.7-1

△L = [L(MIN)/L(MAX)]×100

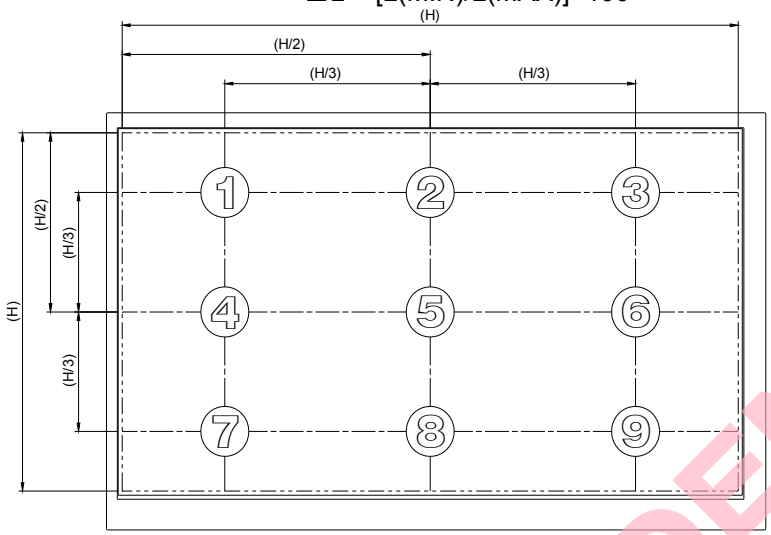


Fig.7-1 Measuring point

Note 4：Definition of Viewing Angle(θ , ψ),refer to Fig.7-2 as below：

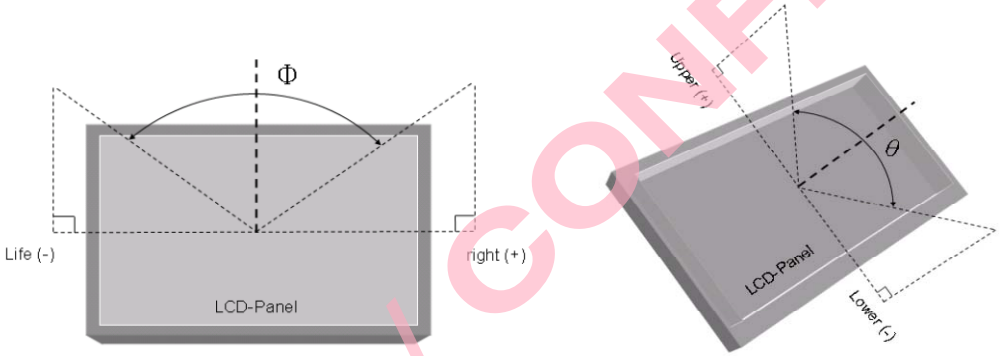


Fig.7-2 Definition of Viewing Angle

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

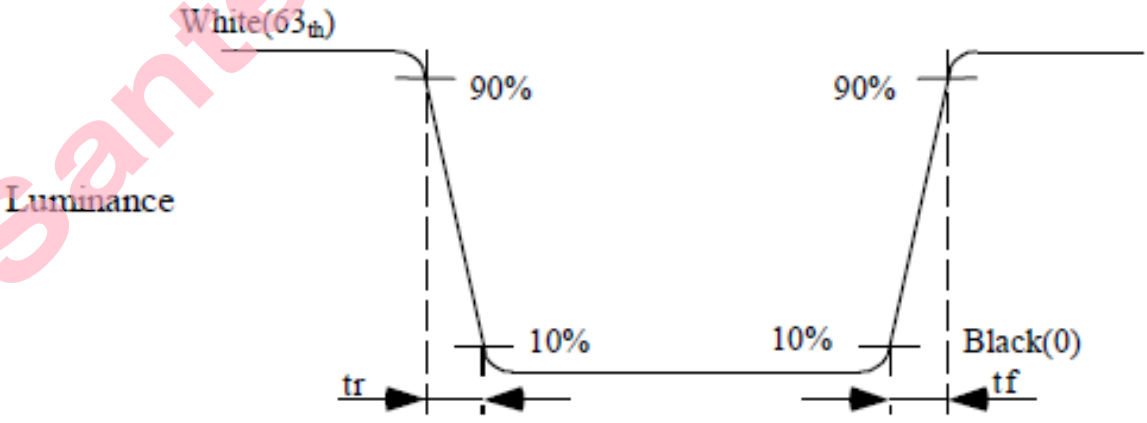


Fig.7-3 Definition of Response Time(White-Black)

11. RELIABILITYTEST

11.1. Temperature and humidity

TEST ITEMS	CONDITIONS	NOTE
High Temperature Operation	70℃ ;240hrs	
High Temperature Storage	80℃ ; 240hrs	
High Temperature High Humidity Operation	60℃ ; 90%RH ;240hrs	No condensation
Low Temperature Operation	-20℃ ; 240hrs	Backlight unit always turn on
Low Temperature Storage	-30℃ ; 240hrs	
Thermal Shock	–20℃(0.5hr) ~ 70℃(0.5hr) ; 100 Cycles	
Image Sticking	25℃ ; 4hrs	
MTBF	200,00hrs	

Note 1：

Condition of Image Sticking test：25 ℃± 2 ℃

Operation with test pattern sustained for 4 hrs, then change to mid-gray pattern immediately.

After 5 mins, the mura must be disappeared completely .

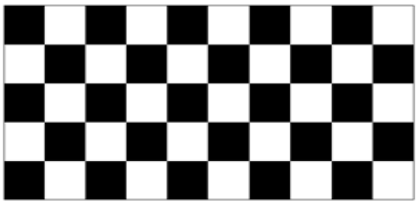


Image Sticking –pattern

Mid-Gray pattern

11.2. Shock and Vibration

ITEMS	CONDITIONS
Shock (Non-operation)	● Shock level: 980m/s^2(equal to 100G). ● Waveform:1/2 Sine wave,6msec. ● ±X,±Y,±Z,each axis 1 times
Vibration (Non-operation)	● Frequency range:8~33.3Hz ● Stoke：1.3 mm ● Vibration: sinusoidal wave, perpendicular axis(both x, z axis: 2Hrs,y axis 4Hrs). ● Sweep: 2.9G,33.3 Hz -400 Hz ● Cycle: 15 min

11.3. 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

11.4. Judgment standard

The Judgment of the above test should be made as follow:

Pass: Normal display image and no line defect.

Partial transformation of the module parts should be ignored.

Fail: No display image, Function NG, or line defects.

8. PACKING FORM

TBD

9. WARRANTY

9.1 The period is within 12 months since the date of shipping out under normal using and storage conditions.

9.2 The warranty will be avoided in case of defect induced by customer