San Technology, Inc.

SPECIFICATION
FOR
LCD Module

Customer P/N:

Santek P/N: ST1040S1W-RSMLW-C

DOC. Revision: RS04

Customer Approval:

	SIGNATURE	DATE
PREPARED BY	Zhiyi	2018-07-11
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APPROVED BY	Natty Lee	2018-Jul-11

Document Revision History

Version	Revise Date	Description	Changed by
RS01	2010-10-14	Initial release	Zhiyi Liao
RS02	2017-08-08	Update drawing	Zhiyi Liao
RS03	2018-01-26	Modify uniformity (page5) Add inspection standard (page20~23)	Vivian Huang
RS04	2018-07-11	Revise LED life time and add LED P/N (page12)	Zhiyi Liao

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1. General Description

This specification applies to the Color Active Matrix Liquid Crystal Display ST1040S1W-RSMLW-C composed of a TFT-LCD display, a driver and power supply circuit, and a LED backlight system.

The screen format is intended to support VGA (640(H) x 480(V)) screen and 16.2M (RGB 8-bits) or 262k colors (RGB 6-bits).

All input signals are LVDS interface and compatible with ST1040S1W-RSMLW-C.

ST1040S1W-RSMLW-C designed with wide viewing angle; wide temperature and long life LED backlight is well suited for industial applications.

1.1 Display Characteristics

The following items are characteristics summary on the table under 25℃ condition:

Items	Unit	Specifications
Screen Diagonal	[inch]	10.4
Active Area	[mm]	211.2 (H) x 158.4 (V)
Pixels H x V		640 x 3(RGB) x 480
Pixel Pitch	[mm]	0.33 x 0.33
Pixel Arrangement		R.G.B. Vertical Stripe
Display Mode		TN, Normally White
Nominal Input Voltage VDD	[Volt]	3.3 (typ.)
Typical Power Consumption	[Watt]	5.4 All black pattem
Weight	[Grams]	522.7
Physical Size	[mm]	241.0(H) x 180.2(V) x 10.5(D) (typ)
Electrical Interface		LVDS
Surface Treatment		Anti-glare, Hardness 3H
Support Color		16.2M / 262K colors
Temperature Range Operating Storage (Non-Operating)	[^{o}C] [^{o}C]	-30 to +85 -30 to +85
RoHS Compliance		RoHS Compliance

1.2 Optical Characteristics

The optical characteristics are measured under stable conditions at 25℃ (Room Temperature):

| Item	Unit	Conditions	Min.	Typ.	Max.	Remark
White Luminance	[cd/m2]	I_F= 80mA/1 LED Line (center point)	720	900	-	Note 1
Uniformity	%	5 Points	70	-	-	Note 2, 3
Contrast Ratio			500	700	-	Note 4
Response Time	[msec]	Rising	-	20	30	Note 5
	[msec]	Falling	-	10	20	
	[msec]	Raising + Falling	-	30	50	
Viewing Angle	[degree]	Horizontal (Right) CR = 10	70	80	-	Note 6
	[degree]	(Left)	70	80	-	
	[degree]	Vertical (Upper) CR = 10	50	60	-	
	[degree]	(Lower)	70	80	-	
Color / Chromaticity Coordinates (CIE 1931)		Red x	0.504	0.554	0.604	
		Red y	0.280	0.330	0.380	
		Green x	0.284	0.334	0.384	
		Green y	0.529	0.579	0.629	
		Blue x	0.112	0.162	0.212	
		Blue y	0.092	0.142	0.192	
		White x	0.26	0.31	0.36	
		White y	0.28	0.33	0.38	
Color Gamut	%		-	45	-	

Note 1: Measurement method

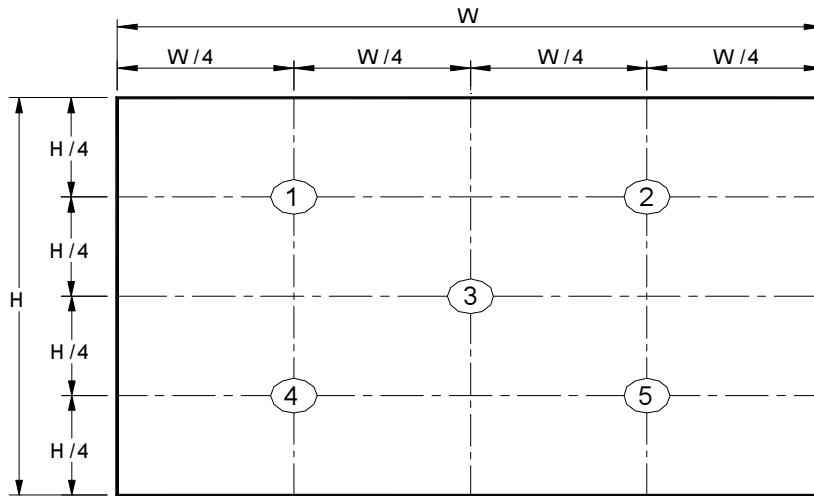Equipment Pattern Generator, Power Supply, Digital Voltmeter, Luminance meter (SR_3 or equivalent)

Aperture   1° with 50cm viewing distance

Test Point   Center

Environment   < 1 *lux*

LCD Module

SR_3 or equivalent

Measuring distance

Module Driving Equipment

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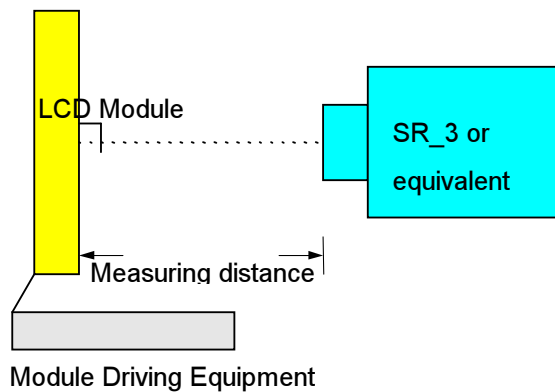
Note 2: Definition of 5 points position (Display active area: 211.2mm (H) x 158.4mm (V))

Note 3: The luminance uniformity of 5 points is defined by dividing the minimum luminance values by the maximum test point luminance

$$\delta_{W9} = \frac{\text{Minimum Brightness of five points}}{\text{Maximum Brightness of five points}}$$

Note 4: Definition of contrast ratio (CR):

$$\text{Contrast ratio (CR)} = \frac{\text{Brightness on the "White" state}}{\text{Brightness on the "Black" state}}$$

Note 5: Definition of response time:

The output signals of photo detector are measured when the input signals are changed from "White" to "Black" (falling time) and from "Black" to "White" (rising time), respectively. The response time interval is between 10% and 90% of amplitudes. Please refer to the figure as below.
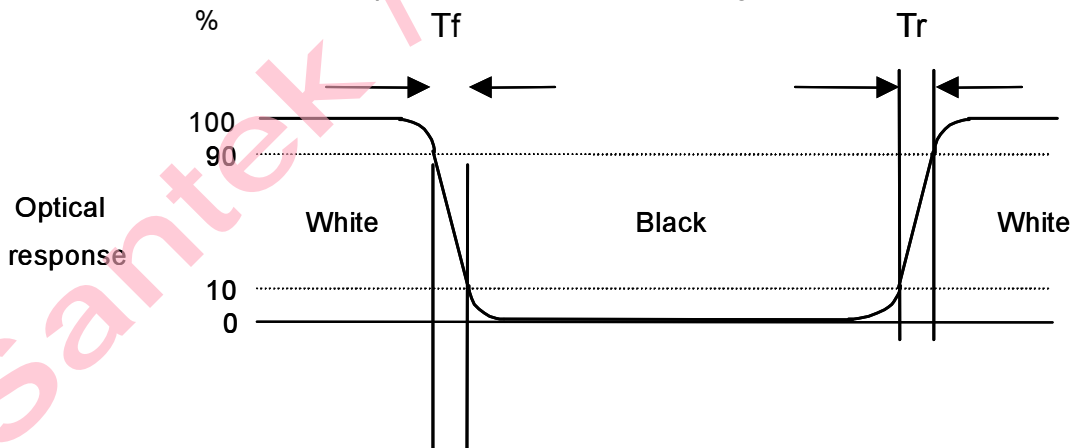
Note 6: Definition of viewing angle

Viewing angle is the measurement of contrast radio 10 , at the screen center , over a 180° horizontal and 180° vertical range (off-normal viewing angles). The 180° viewing angle range is broken down as below: 90° (θ) horizontal left and right, and 90° (Φ) vertical high (up) and low (down). The measurement direction is typically perpendicular to the display surface with the screen rotated to its center to develop the desired

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measurement viewing angle.
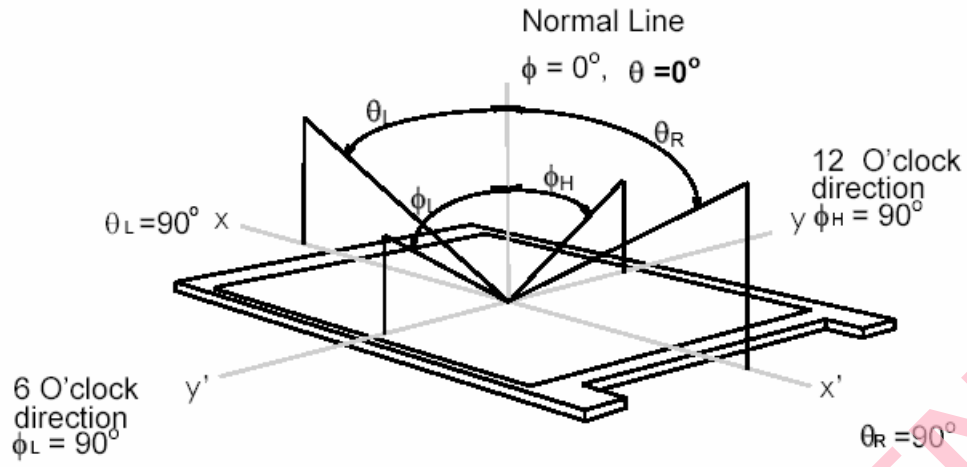
2. Functional Block Diagram

The following diagram shows the functional block of the 10.4 inch color TFT/LCD module:
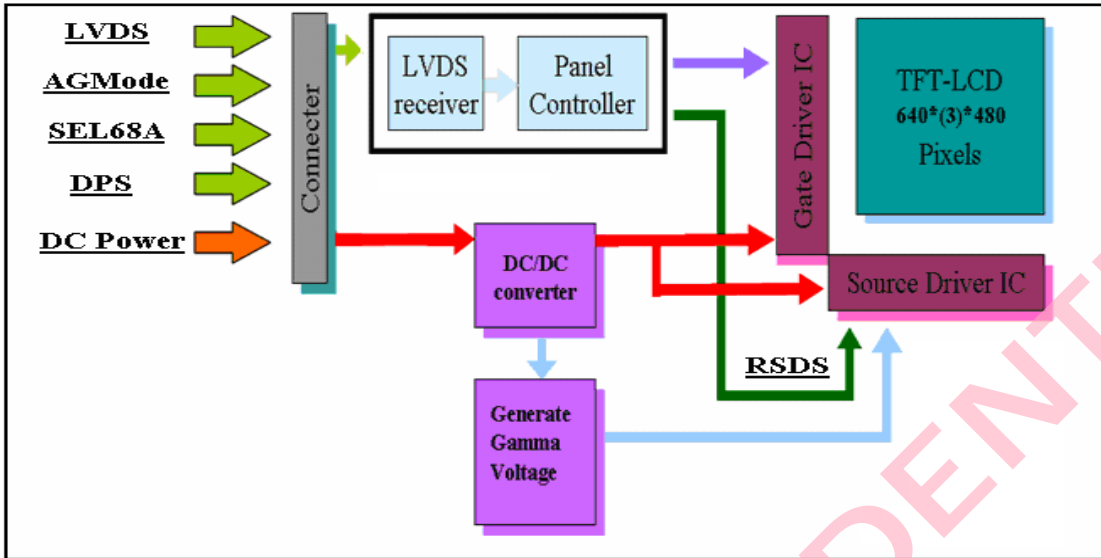
3. Absolute Maximum Ratings

3.1 Absolute Ratings of TFT LCD Module

Item	Symbol	Min	Max	Unit
Logic/LCD Drive Voltage	Vin	-0.3	+4.0	[Volt]

3.2 Absolute Ratings of Environment

Item	Symbol	Min	Max	Unit
Operating Temperature	TOP	-30	+85	[^{o}C]
Operation Humidity	HOP	5	95	[%RH]
Storage Temperature	TST	-30	+85	[^{o}C]
Storage Humidity	HST	5	95	[%RH]

Note: Maximum Wet-Bulb should be 39℃ and no condensation.

4. Electrical Characteristics

4.1 TFT LCD Module

4.1.1 Power Specification

Symbol	Parameter	Min	Typ	Max	Units	Remark
VDD	Logic/LCD Input Voltage	3.0	3.3	3.6	[Volt]	
I_{VDD}	LCD Input Current	-	280	–	[mA]	VDD=3.3V at 60 HZ, all Black Pattern
P_{VDD}	LCD Power comsumption	-	0.924	–	[Watt]	VDD=3.3V at 60 HZ, all Black Pattern
$I_{rush\ LCD}$	LCD Inrush Current	-	-	1.5	[A]	Note 1; VDD=3.3V Black Pattern, Rising time=470us
VDD_{rp}	Allowable Logic/LCD Drive Ripple Voltage	-	–	100	[mV] p-p	VDD=3.3V at 60 HZ, all Black Pattern

Note 1: Measurement condition:
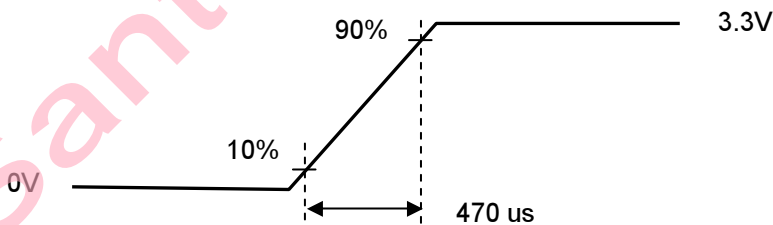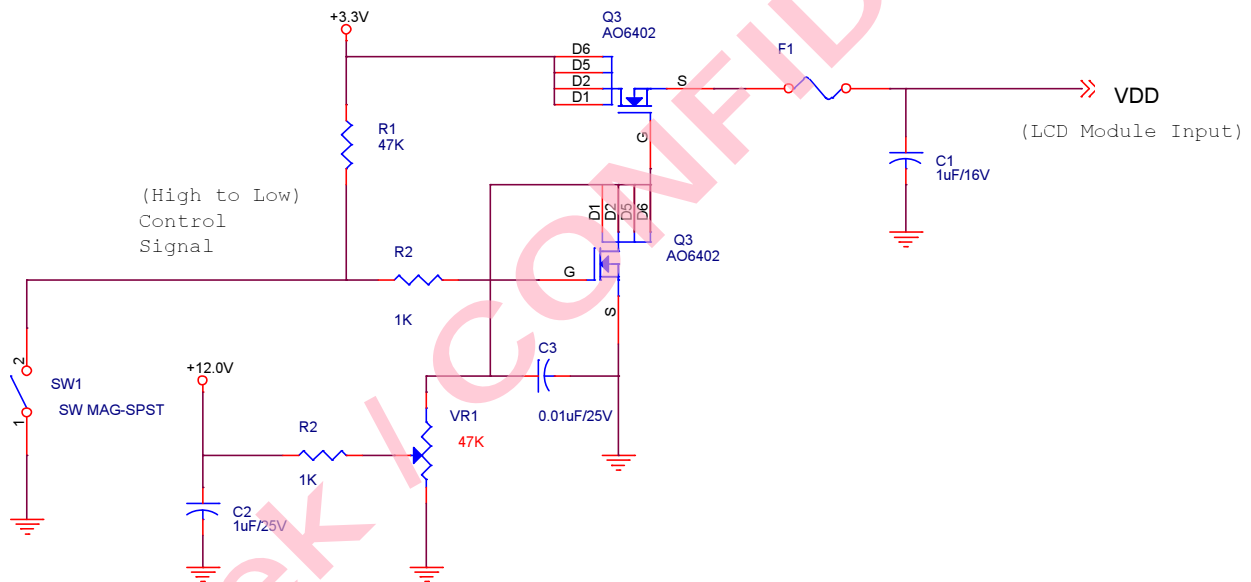
VDD rising time

4.1.2 Signal Electrical Characteristics

Input signals shall be low or Hi-Z state when VDD is off.

Symbol	Item	Min.	Typ.	Max.	Unit	Remark
VTH	Differential Input High Threshold	-	-	100	[mV]	VCM=1.2V
VTL	Differential Input Low Threshold	100	-	-	[mV]	VCM=1.2V
| VID |	Input Differential Voltage	100	400	600	[mV]	
VICM	Differential Input Common Mode Voltage	1.1	-	1.45	[V]	VTH/VTL=+-100mV

Note: LVDS Signal Waveform.
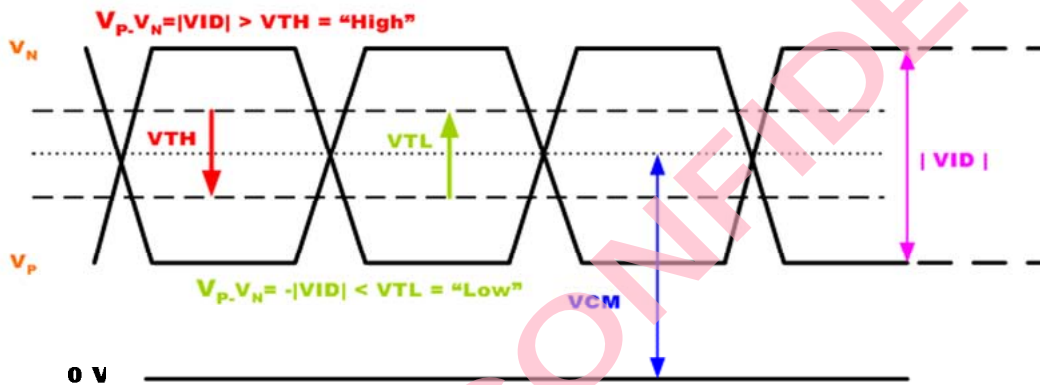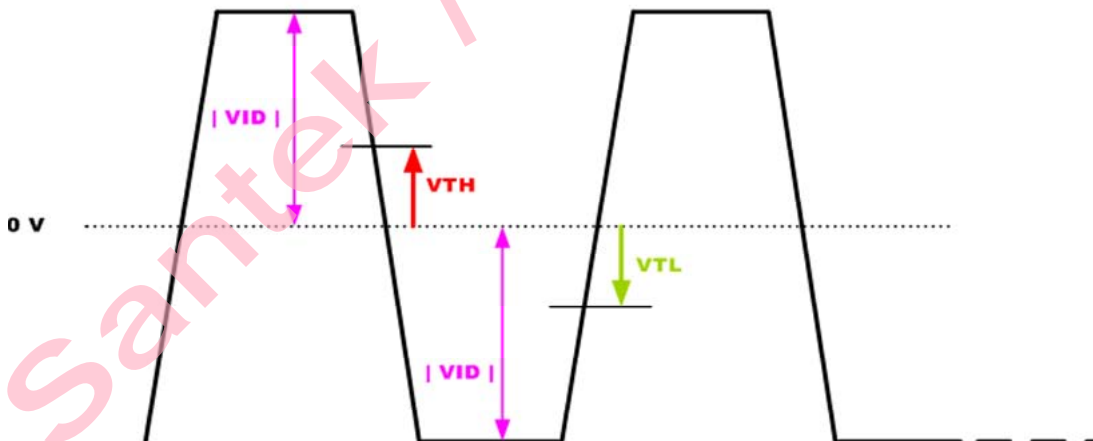
4.2 Backlight Unit

ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT	Remarks
LED Voltage	VF	--	(30)	33.6	V	IF = 80 mA, Ta = 25°C, *2)
		--	--	34.9	V	IF = 80 mA, Ta = 0°C
		--	--	35.9	V	IF = 80 mA, Ta = −20°C
LED Current	IF	--	80	90	mA	Ta = 25°C, *1), *3)
LED Life Time	LT	80,000	100,000	--	h	IF = 80 mA, Ta = 25°C *4), *5), Continuous operation

*LED P/N: SEOUL SEMICONDUCTOR SBWNH120E (3014 Automotive Display)

[Note]
 *1) Constant Current Drive
 *2) The Voltage deviation between strings: $|V_{f1} - V_{f2}| \leq 2V$
 *3) LED Current measurement method
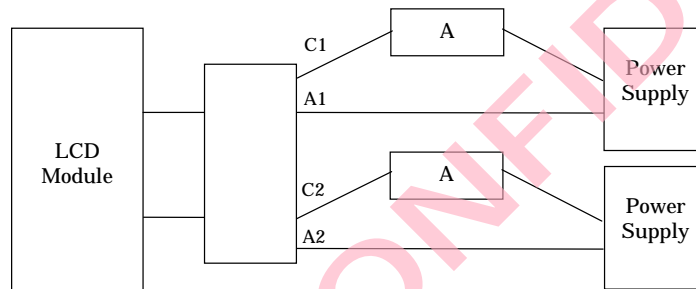
 *4) LED life time is defined as the time when the brightness becomes 50% of the initial value.

 *5) The life time of the backlight depends on the ambient temperature. The life time will decrease under high temperature.

5. Signal Characteristics

5.1 Pixel Format Image

Following figure shows the relationship between input signal and LCD pixel format.
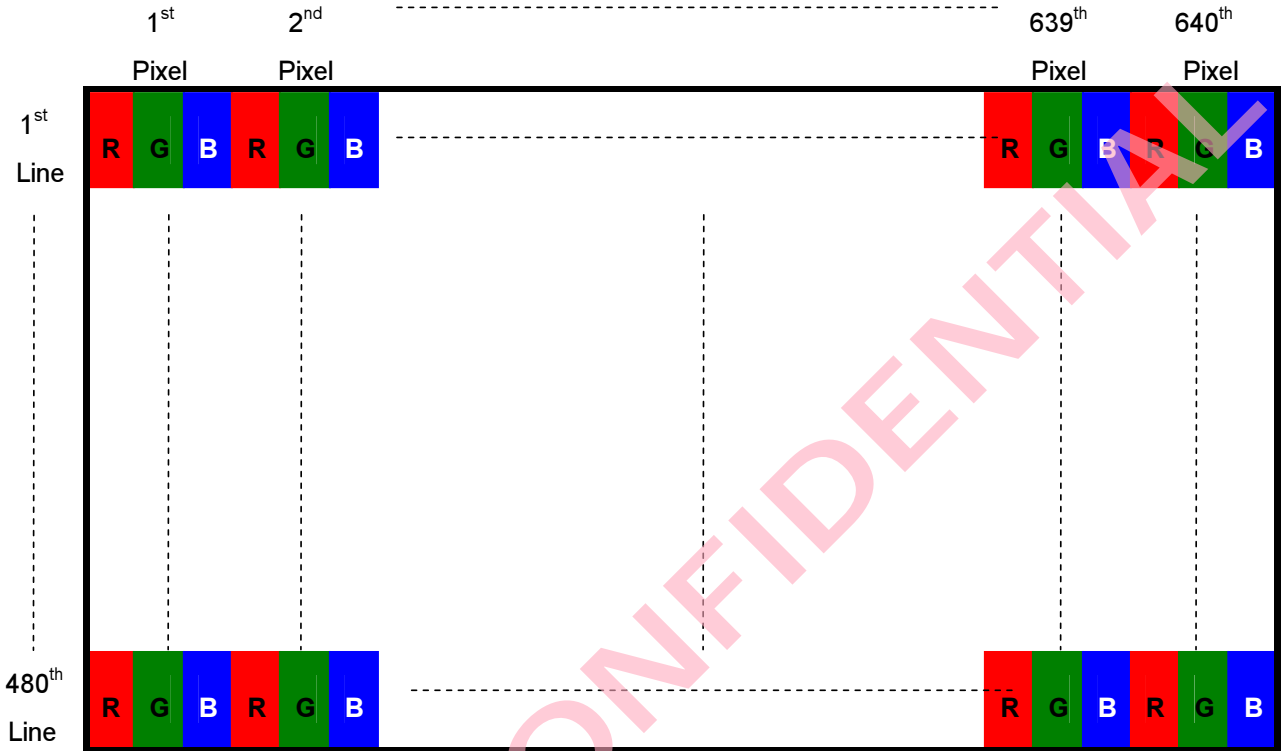
5.2 Scanning Direction

The following figures show the image seen from the front view. The arrow indicates the direction of scan.

Fig. 1 Normal scan (Pin4, DPS = Low or NC)

Fig. 2 Reverse scan (Pin4, DPS = High)

5.3 TFT-LCD Interface Signal Description

The module using a LVDS receiver embaded in Santek's ASIC. LVDS is a differential signal technology for LCD interface and a high-speed data transfer device.

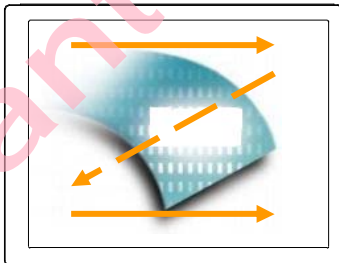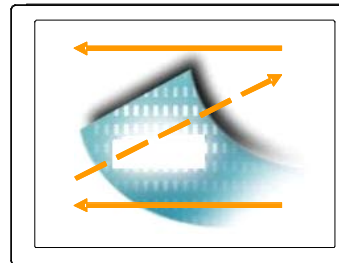| Pin No.	Symbol	Description
Input Signal Interface		
1	VDD	Power Supply, 3.3V (typical)
2	VDD	Power Supply, 3.3V (typical)
3	GND	Ground
4	DPS	Reverse Scan Function [H: Enable; L/NC: Disable]
5	RxIN0-	LVDS receiver signal channel 0
6	RxIN0+	LVDS Differential Data Input (R0, R1, R2, R3, R4, R5, G0)
7	GND	Ground
8	RxIN1-	LVDS receiver signal channel 1
9	RxIN1+	LVDS Differential Data Input (G1, G2, G3, G4, G5, B0, B1)
10	GND	Ground
11	RxIN2-	LVDS receiver signal channel 2
12	RxIN2+	LVDS Differential Data Input (B2, B3, B4, B5, HS, VS, DE)
13	GND	Ground
14	RxCLKIN-	LVDS receiver signal clock
15	RxCLKIN+	
16	GND	Ground
17	RxIN3-	LVDS receiver signal channel 3, NC for 6 bit LVDS Input
18	RxIN3+	LVDS Differential Data Input (R6, R7, G6, G7, B6, B7, RSV)
19	RSV	Reserved for internal test. Please treat it as NC.
20	SEL68	6/ 8bits LVDS data input selection [H: 8bits L/NC: 6bit]

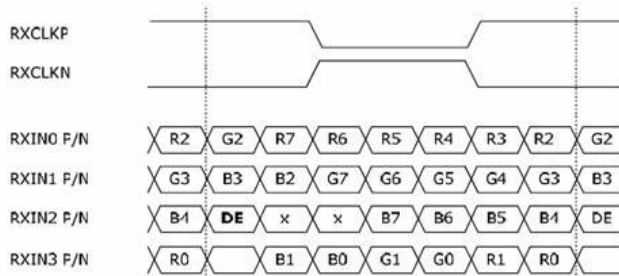Note 1: Input Signals shall be in low status when VDD is off.
Note 2: High stands for "3.3V", Low stands for "0V", NC stands for "No Connection".
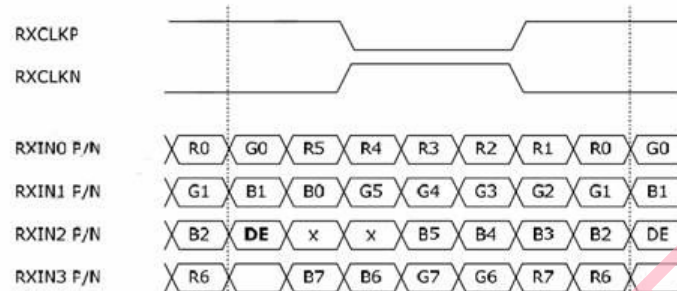Note 3: RSV stands for "Reserved".

5.4 The Input Data Format

5.4.1 SEL68

SEL68 ="Low" or "NC" for 6 bits LVDS Input

SEL68 = "High" for 8 bits LVDS Input

Note1: Please follow PSWG.
Note2: R/G/B data 7:MSB, R/G/B data 0:LSB

Signal Name	Description	Remark
R7	Red Data 7	Red-pixel Data
R6	Red Data 6	
R5	Red Data 5	For 8Bits LVDS input
R4	Red Data 4	MSB: R7 ; LSB: R0
R3	Red Data 3	
R2	Red Data 2	For 6Bits LVDS input
R1	Red Data 1	MSB: R5 ; LSB: R0
R0	Red Data 0	
G7	Green Data 7	Green-pixel Data
G6	Green Data 6	
G5	Green Data 5	For 8Bits LVDS input
G4	Green Data 4	MSB: G7 ; LSB: G0
G3	Green Data 3	
G2	Green Data 2	For 6Bits LVDS input
G1	Green Data 1	MSB: G5 ; LSB: G0
G0	Green Data 0	
B7	Blue Data 7	Blue-pixel Data
B6	Blue Data 6	
B5	Blue Data 5	For 8Bits LVDS input
B4	Blue Data 4	MSB: B7 ; LSB: B0
B3	Blue Data 3	
B2	Blue Data 2	For 6Bits LVDS input
B1	Blue Data 1	MSB: B5 ; LSB: B0
B0	Blue Data 0	
RxCLKIN	LVDS Data Clock	
DE	Data Enable Signal	When the signal is high, the pixel data shall be valid to be displayed.

Note: Output signals from any system shall be low or Hi-Z state when VDD is off.

5.5 TFT-LCD Interface Timing

5.5.1 Timing Characteristics

Signal		Symbol	Min.	Typ.	Max.	Unit
Clock Frequency		$1/T_{Clock}$	20	25.2	28.33	MHz
Vertical Section	Period	T_V	495	525	560	T_{Line}
	Active	T_{VD}	--	480	--	
	Blanking	T_{VB}	15	45	80	
Horizontal Section	Period	T_H	770	800	900	T_{Clock}
	Active	T_{HD}	--	640	--	
	Blanking	T_{HB}	130	160	260	
Frame Rate		F	50	60	75	Hz

Note: DE mode.

5.5.2 Input Timing Diagram
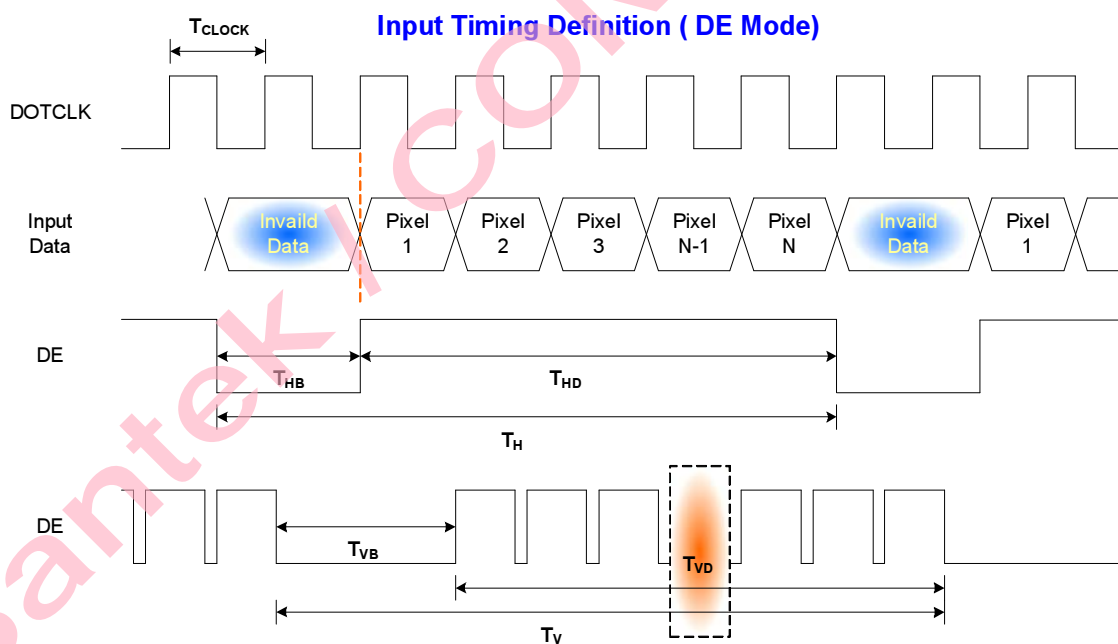
5.6 Power ON/OFF Sequence

VDD power and lamp on/off sequence is as below. Interface signals are also shown in the chart. Signals from any system shall be Hi-Z state or low level when VDD is off.
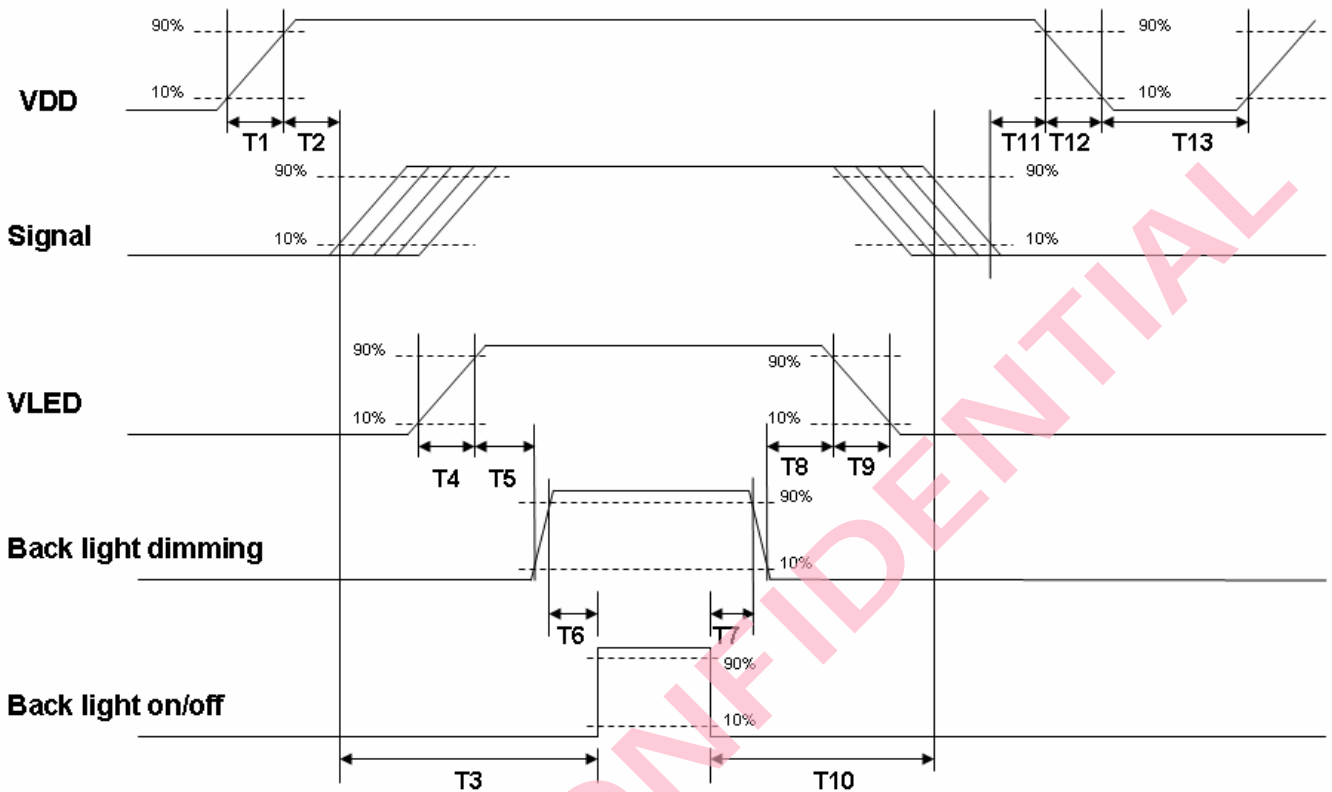
Power ON/OFF sequence timing

Parameter	Value			Units
	Min.	Typ.	Max.	
T1	0.5	-	10	[ms]
T2	30	40	50	[ms]
T3	200	--	--	[ms]
T4	0.5	--	10	[ms]
T5	10	-	-	[ms]
T6	10	-	-	[ms]
T7	0	-	-	[ms]
T8	10	-	-	[ms]
T9	--	--	10	[ms]
T10	110	--	--	[ms]
T11	0	16	50	[ms]
T12	-	-	10	[ms]
T13	1000	-	-	[ms]

The above on/off sequence should be applied to avoid abnormal function in the display. Please make sure to turn off the power when you plug the cable into the input connector or pull the cable out of the connector.

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6. Connector & Pin Assignment

Physical interface is described as for the connector on module. These connectors are capable of accommodating the following signals and will be following components.

6.1 TFT-LCD Signal (CN1): LCD Connector

Connector Name / Designation	Signal Connector
Manufacturer	STM or compatible
Connector Model Number	MSB24013P20HA or compatible
Adaptable Plug	P24013P20 or compatible

Pin No.	Symbol	Pin No.	Symbol
1	VDD	2	VDD
3	GND	4	DPS
5	RxIN0-	6	RxIN0+
7	GND	8	RxIN1-
9	RxIN1+	10	GND
11	RxIN2-	12	RxIN2+
13	GND	14	RxCKIN-
15	RxCKIN+	16	GND
17	RxIN3-	18	RxIN3+
19	RSV	20	SEL68

6.2 LED Backlight Unit (CN2): Backlight Connector

Backlight-side connector: SM06B-SHLS-TF (LF)(SN) (JST)
Corresponding connector: SHLP-06V-S-B (JST)

Pin No.	Symbol	Function
1	NC	This pin should be open.
2	NC	This pin should be open.
3	LED C 1	LED cathode 1
4	LED A 1	LED anode 1
5	LED A 2	LED anode 2
6	LED C 2	LED cathode 2

7. Reliability Test Criteria

Items	Required Condition	Note
Temperature Humidity Bias	40℃, 90%RH, 300 hours	
High Temperature Operation	85℃, 300 hours	
Low Temperature Operation	-30℃, 300 hours	
Hot Storage	85℃, 300 hours	
Cold Storage	-30℃, 300 hours	
Thermal Shock Test	-20℃ / 30 min, 60℃ / 30 min, 100cycles,　40℃ minimun ramp rate	
Hot Start Test	85℃ /　1Hr min. power on/off per 5 minutes, 5 times	
Cold Start Test	-30℃ /　1Hr min. power on/off per 5 minutes, 5 times	
Shock Test (Non-Operating)	50G, 20ms, Half-sine wave, (±X, ±Y, ±Z)	
Vibration Test (Non-Operating)	1.5G, (10~200Hz, Sine wave) 30 mins/axis, 3 direction (X, Y, Z)	
On/off test	On/10 sec, Off/10 sec, 30,000 cycles	
ESD	Contact Discharge: ± 8KV, 150pF(330Ω) 1sec, 8 points, 25 times/ point Air Discharge: ± 15KV, 150pF(330Ω) 1sec, 8 points, 25 times/ point	Note 1
EMI	30-230 MHz, limit 40 dBu V/m, 230-1000 MHz, limit 47 dBu V/m	

Note1: According to EN61000-4-2, ESD class B: Some performance degradation allowed. No data lost

Self-recoverable. No hardware failures.

Note2:

● Water condensation is not allowed for each test items.

● Each test is done by new TFT-LCD module. Don't use the same TFT-LCD module repeatedly for reliability test.

● The reliability test is performed only to examine the TFT-LCD module capability.

● To inspect TFT-LCD module after reliability test, please store it at room temperature and room humidity for 24 hours at least in advance.

8. Inspection standard

8.1 Inspection Conditions Is As Follows:

(1) Viewing distance is approximately 30~ 40 cm.
(2) Viewing angle is normal to the LCD panel as Figure 1(30°).
(3) Ambient temperature is approximately 25 ± 5℃
(4) Ambient humidity is 60 ± 5% RH.
(5) Ambient luminance is about 300 ~ 500 Lux under 40W daylight lamp.
(6) Input signal timing should be typical value.
(7) Mura, Light leakage, bright and dot dots inspection at ND-Filter 5%.
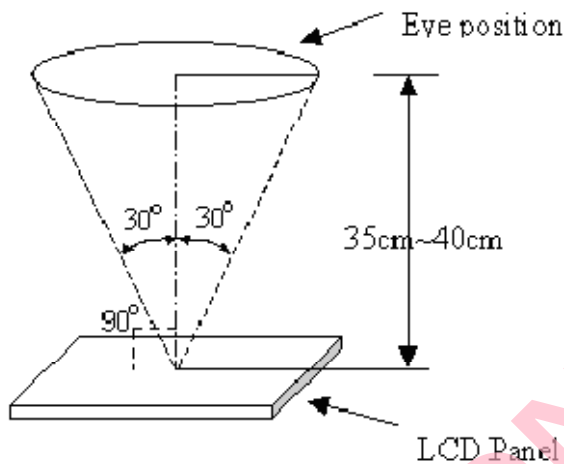
Figure 1

Note 1: Special condition
(1) Viewing distance is close for inspection of adjacent dots and distance between defect dots.
(2) Viewing condition of "Shot block non-uniformity from oblique angle" is as Figure 2.
(3) Exceptional case: View angle ± 40° while inspected image-sticking.
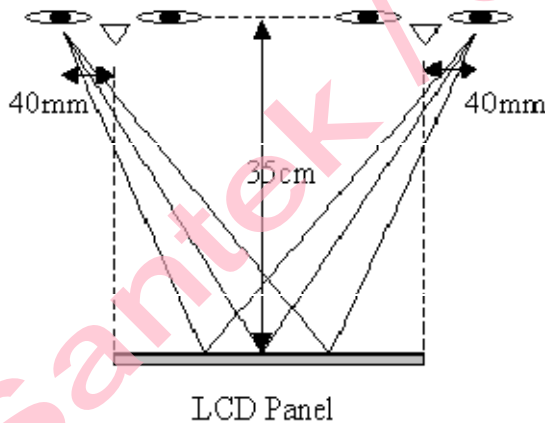
Figure 2

Note2: The definition of Bright dot
(1)The defective area of the dot is larger than 50% of one sub-pixel area. Otherwise, it is ignored.
(2)The bright dot shall be visible under ND-Filter 5%as following.
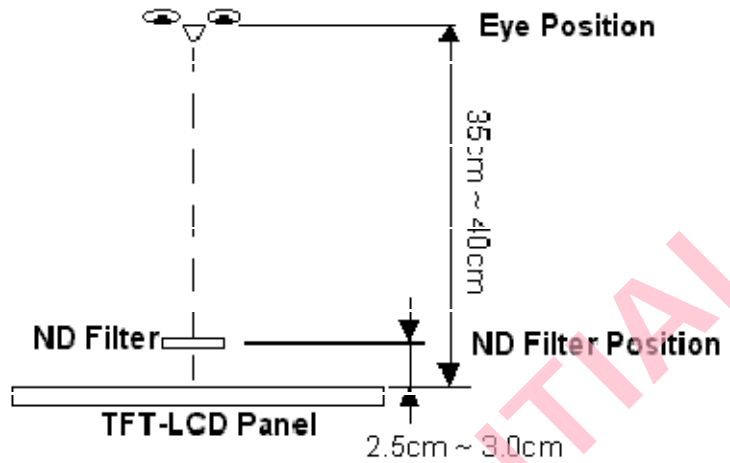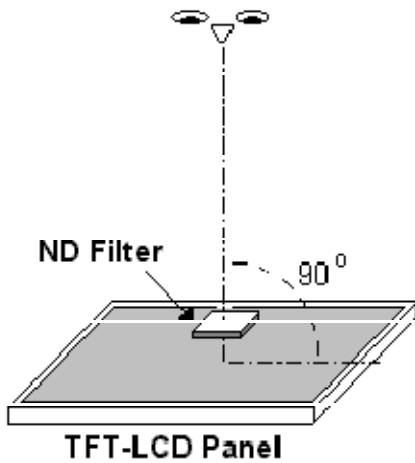
Note 3: Definition of AA, VA and Out of VA
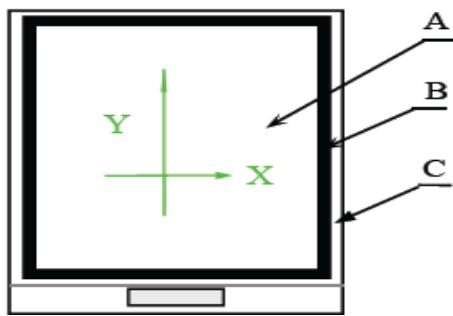
A: AA area

B: VA area

C: Out of VA area
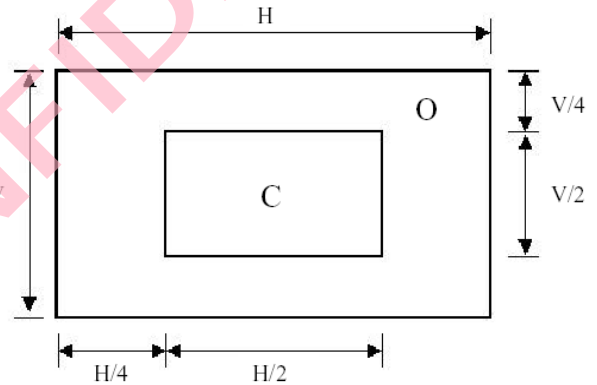
C Area: Center of AA area
O Area: Outer of AA area

Note 4: Judgment for defect and adjacent dots in display:

Judge defect dot and adjacent dot as following. Allow below (as A, B, C and D status) adjacent defect dots, including bright and dart adjacent dot. And they will be counted 2 defect dots in total quantity.

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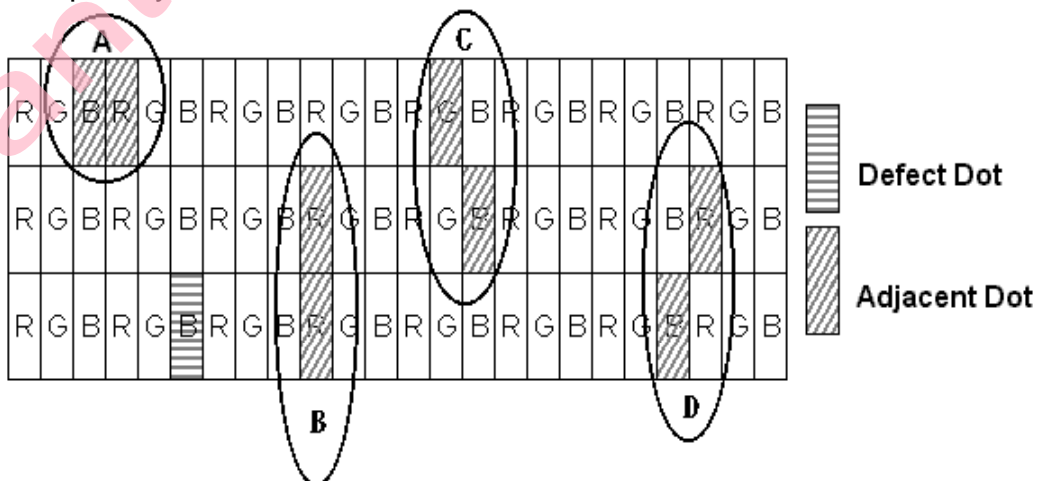
Note 5: Other condition

(1) The defects that are not defined above and considered to be problem shall be reviewed and discussed by both parties.

(2) Defects on the Black Matrix, out of Display area, are not considered as a defect or counted.
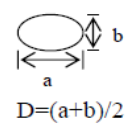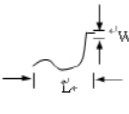
8.2 Sampling Plan/Allowed Standard In Inspection：
MIL-STD-105E, sampling plan: Level II :
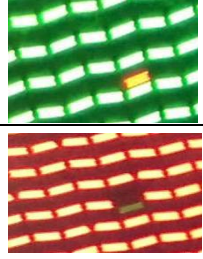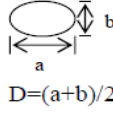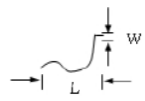
AQL 0.65 ----- Display inspection
AQL 1.0 ----- Appearance inspection

8.3 Appearance Inspection For Display Area - LCM-OFF:

| No.	Defect items	Photos	Tools	Standards			Judge	Remark
				Dimension(mm)	AA/VA area	Out of VA		
1	Foreign matter/ Black/White/Bright Spot/ Dent/Bubbles	$D=(a+b)/2$	Film gauge	D≦0.20	Ignore (Not gathered)	Ignored (Not gathered)	OK	D=diameter L=length W=width T=thickness
				0.25≤D≦0.4	N=5		OK	
				D > 0.4	Not accepted		NG	
2	Foreign matter/ Black/White/Bright Line /Scratches		Film gauge	W≦0.05	Ignore	Ignored	OK	
				0.05≤W≦0.1 L≤5	N=4		OK	
				W > 0.1	Follow spec of dot defects		NG	
3	Class crack		Naked eyes	Any extended crack is not accepted			NG	
4	Stain on surface		Naked eyes	Stain that is removable by soft cloth or air blow is acceptable, it doesn't affect production characteristic			OK	
5	Any dirt or scratch or bubbles or any defects on protective film		Naked eyes	Ignore if it doesn't affect the product			OK	

8.4 Display Inspection - LCM ON:

No.	Defect items	Photos	Tools	Standards			Judge	Remark
				Dimension(mm)	AA/VA area	Out of VA		
1	Circular defects Foreign matter/ black dots/ bubbles and etc	Bright dot is caused by Foreign matter	Naked eyes & 5% ND filter	D≦0.15	Ignore (Not gathered)	Ignored (Not gathered)	OK	Use microsco
				0.15≤D≦0.3	N=4		OK	
				0.3≦D≦0.4	N=3		OK	
				D > 0.4	Not accepted		NG	
2	Pixel spot bright dot/dark dots		Naked eyes & 5% ND filter	D≤1/2 pixel	Ignore		OK	
				D > 1/2 pixel	N=3		OK	
				Total dots	N≤5		OK	
				2dots adjacent	N≤ 1 pair		OK	
				3dots adjacent or more	Not allowed		NG	
3	Foreign matter/ Black/White/Bright Spot/ Dent/Bubbles	$D=(a+b)/2$	Film gauge	D≦0.20	Ignore (Not gathered)	Ignored (Not gathered)	OK	D=diameter L=length W=width T=thickness
				0.25≤D≦0.4	N=5		OK	
				D > 0.4	Not accepted		NG	
4	Foreign matter/ Black/White/Bright Line /Scratches		Film gauge	W≦0.05	Ignore	Ignored	OK	
				0.05≤W≦0.1 L≤3	N=4		OK	
				W > 0.1	Follow spec of dot defects		NG	
5	MURA white/black spot and other visible vague defects		Naked eyes 5% ND filter	Mura is invisible with 5% ND filter			OK	
				Visible with 5% ND filter			NG	
6	Uneven color when display in grey/black or TFT off conditions		Naked eyes 5% ND filter	This situation is always happening at VA edge, it only happens in Grey/Black or TFT off conditions, if it is invisible in RGB or other color photos, OK. otherwise, NG			OK	
7	Light leakage from Backlight		Naked eyes	Viewing from topside view (0 degree), Light leakage happens out of VA area, or invisible.			OK	
				Viewing from topside view (0 degree), Light leakage happens inside VA area			NG	
8	Abnormal color		Naked eyes	Not accepted			NG	
9	No display		Naked eyes / Under 40W	Not accepted			NG	
10	Irregular display			Not accepted			NG	
11	Missing line			Not accepted			NG	
12	Short circuit			Not accepted			NG	
13	Flicker			Not accepted			NG	

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9. Mechanical Characteristics

TFT-LCD SINGNAL(CN1)：LCD CONNECTOR

CONNECTOR MODEL NUMBER	MSB24013P20HA OR COMPATIBLE		P24013P20 OR COMPATIBLE	
ADAPTABLE PLUG				
PIN NO.	SYMBOL	PIN NO.	SYMBOL	
1	VDD	2	VDD	
3	GND	4	DPS	
5	RXIN0-	6	RXIN0+	
7	GND	8	RXIN1-	
9	RXIN1+	10	GND	
11	RXIN2-	12	RXIN2+	
13	GND	14	RXCKIN-	
15	RXCKIN+	16	GND	
17	RXIN3-	18	RXIN3+	
19	RSV	20	SEL68	

LED BACKLIGHT UNIT(CN2)：BACKLIGHT CONNECTOR
BACKLIGHT-SIDE CONNECTOR :SM06B-SHLS-TF(LF)(SN)(JST)
CORRES PONDING CONNECTOR:SHLP-06V-S-B(JST)

PIN NO.	SYMBOL	FUNCTION
1	NC	THIS PIN SHOULD BE OPEN.
2	NC	THIS PIN SHOULD BE OPEN.
3	LED C1	LED CATHODE 1
4	LED A1	LED ANODE 1
5	LED A2	LED ANODE 2
6	LED C2	LED CATHODE 2

NOTE:
1. Operating Temp.:-20~70°C
   Storage Temp.:-30°C~80°C
2. Brightness:720cd/m² Min / 900cd/m² Typ

REV 版本	DESCRIPTION 描述	DATE 日期
A01	FIRST ISSUE	JAN-25-2017
A02	Change the size	FEB-20-2017
A03	Change the size add 3D sketch	JULY-19-2017

San Technology, Inc.

Title: TFT LCM
PARTS NUMBER 产品型号: ST10040S1W-RSMLW-C_A03
PARTS CODE:
零件编码:
DRAWING NO:
图号:

SCALE: 比例	Fit
SHEET: 页次	1 OF 1
GENERAL TOL 未注公差	±0.5
UNIT 单位	mm
APPROVALS 签字	
APP: Natty Lee	2017-Jul-24
CHK: Park&Tom	2017.07.21
DWN: LIULIHUA	2017.07.19

640RGB*480

LABEL AREA

10. Packaging

TBD

11. Precautions For Use of LCD Modules

11.1 Handling Precautions

11.1.1   The display panel is made of glass. Do not subject it to a mechanical shock by dropping it from a high place, etc.

11.1.2   If the display panel is damaged and the liquid crystal substance inside it leaks out, be sure not to get any in your mouth, if the substance comes into contact with your skin or clothes, promptly wash it off using soap and water.

11.1.3   Do not apply excessive force to the display surface or the adjoining areas since this may cause the color tone to vary.

11.1.4   The polarizer covering the display surface of the LCD module is soft and easily scratched. Handle this polarizer carefully.

11.1.5   If the display surface is contaminated, breathe on the surface and gently wipe it with a soft dry cloth. If still not completely clear, moisten cloth with one of the following solvents:

— Isopropyl alcohol

— Ethyl alcohol

Solvents other than those mentioned above may damage the polarizer. Especially, do not use the following:

— Water

— Ketone

— Aromatic solvents

11.1.6   Do not attempt to disassemble the LCD Module.

11.1.7   If the logic circuit power is off, do not apply the input signals.

11.1.8   To prevent destruction of the elements by static electricity, be careful to maintain an optimum work environment.

11.1.8.1   Be sure to ground the body when handling the LCD Modules.

11.1.8.2   Tools required for assembly, such as soldering irons, must be properly ground.

11.1.8.3   To reduce the amount of static electricity, do not conduct assembly and other work under dry conditions.

11.1.8.4   The LCD Module is coated with a film to protect the display surface. Be care when peeling off this protective film since static electricity may be generated.

11.2 Storage Precautions

11.2.1   When storing the LCD modules, avoid exposure to direct sunlight or to the light of fluorescent lamps.

11.2.2   The LCD modules should be stored under the storage temperature range. If the LCD modules will be stored for a long time, the recommend condition is:

Temperature: 0℃ ~ 40℃   Relatively humidity: ≦80%

11.2.3   The LCD modules should be stored in the room without acid, alkali and harmful gas.

11.3 Transportation Precautions

The LCD modules should be no falling and violent shocking during transportation, and also should avoid excessive press, water, damp and sunshine.