珠海三泰克科技有限公司

San Technology (Zhuhai) Co., Ltd.

SPECIFICATION

FOR

LCD Module

Customer P/N:

Santek P/N: ST1010B5CYOL-RSLW-C

DOC. Revision: RS01

Customer Approval:

	SIGNATURE	DATE
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Document Revision History

Version	Revise Date	Description	Changed by
RS01	2023-12-20	First issue	Park Zhou

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1. General Specifications

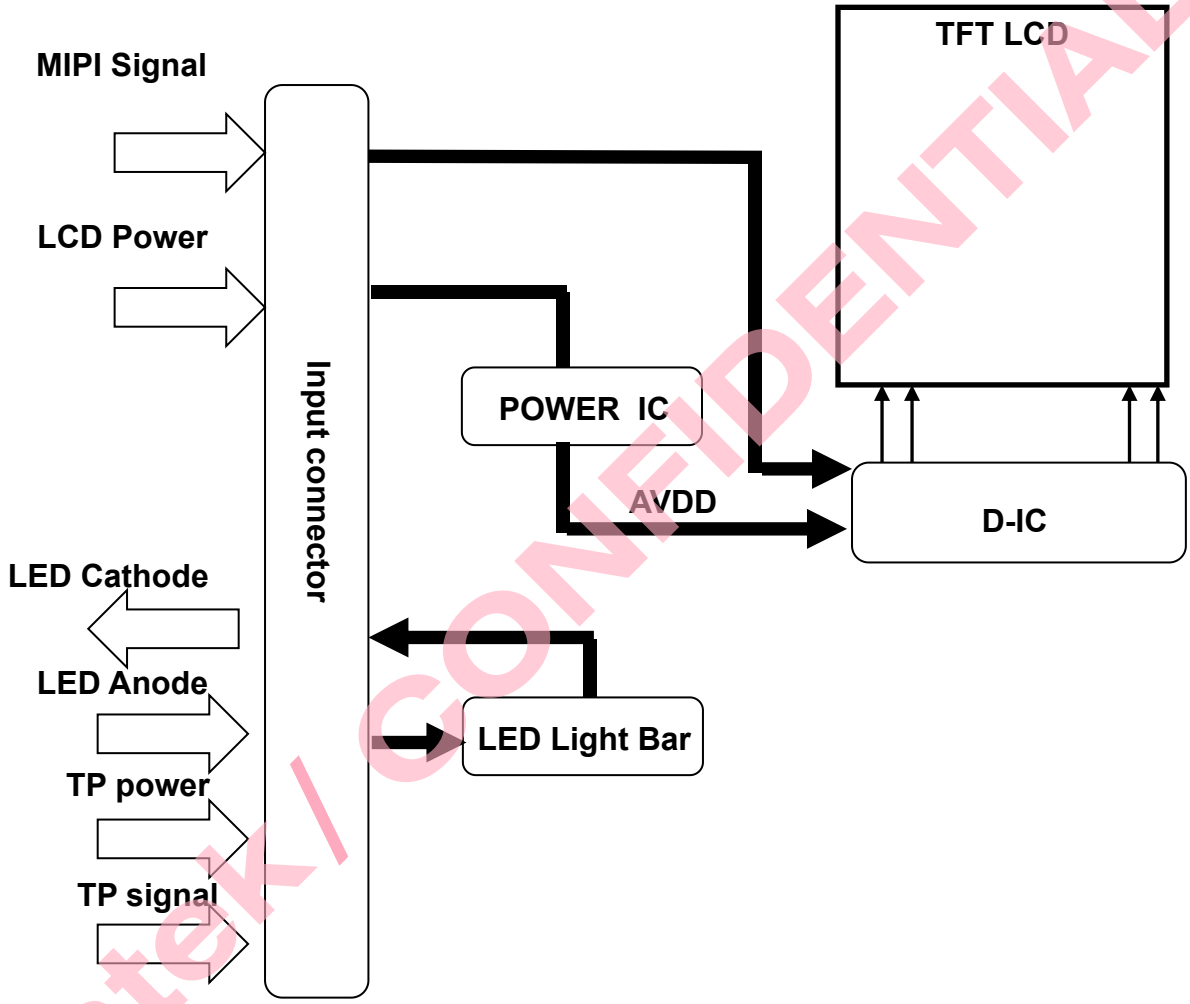
1.1 Description

ST1010B5CYOL-RSLW-C is 10.1” color TFT-LCD (Thin film transistor liquid crystal display) module composed of LCD panel, power drive IC，MIPI driver ICs, control circuit and backlight. by applying 8 bit digital data, 1200×RGB (3) ×1920, 16.7M-color images are displayed on the 10.1” diagonal screen.

1.2 Functions & Features

Parameter	Specification	Unit	Remarks
Size	10.1(Dioginal)	Inch	
Active Area	135.36*216.58	mm	
Display Resolution	1200*3(RGB)*1920	Dot	
Outline Dimension	166.60*243.60*4.13	mm	
Viewing Angle	80/80/85/85(CR>10)	-	
Pixel Pitch	0.0376*0.1128	mm	
Disply Method	HADS	-	
Display Mode	Normal Black	-	
Display Color	16.7M	-	
Driver IC	HX8279-D*2	-	
Contrast Ratio	Typ 1000:1	-	
LED Q'ty	32	pcs	

1.3 Block Diagram



2. Absolute Maximum ratings

The followings are maximum values which, if exceed, may cause faulty operation or damage the unit. The operational and non-operational maximum voltage and current values are listed in the following table .

Parameter	Symbol	Min.	Typ.	Max.	Unit	Remarks
Logic Power Supply Voltage	V_{DD}	3.1	3.3	3.5	V	Note1
LED Forward Current of every LED string	I_{LED}	-	20	23	mA	Note2
LED string Reverse Voltage	V_R	20.8	24	25.6	V	
Operating Temperature	T_{OP}	-10	-	+50	℃	Note3
Storage Temperature	T_{ST}	-20	-	+60	℃	

Notes : 1. Permanent damage to the device may occur if maximum values are exceeded functional operation should be restricted to the condition described under normal operating conditions.

2. the max value of LED forward current is relative to ambient temperature,the correlation is show in figure 1.

3. Temperature and relative humidity range are shown in the figure below.
95 % RH Max. (40 ℃ ≥ Ta)
Maximum wet - bulb temperature at 39℃ or less. (Ta > 40℃) No condensation.

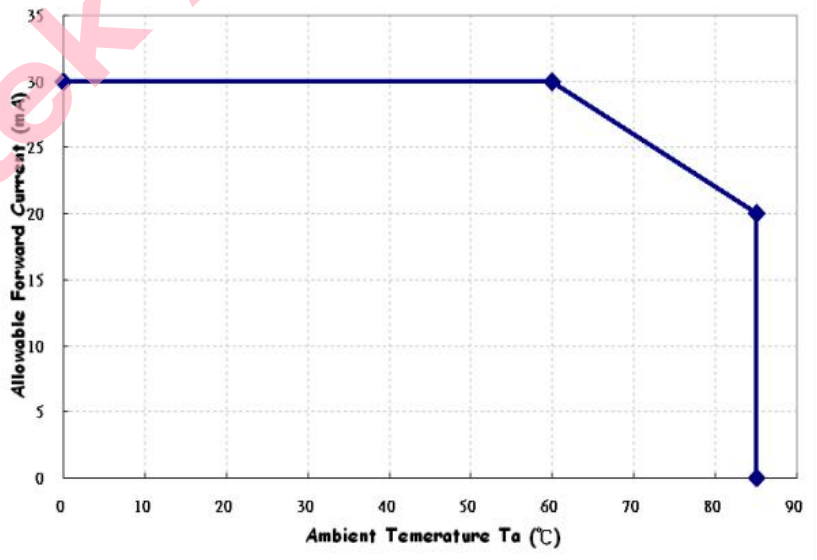


Figure 1. forward current vs ambient temperature

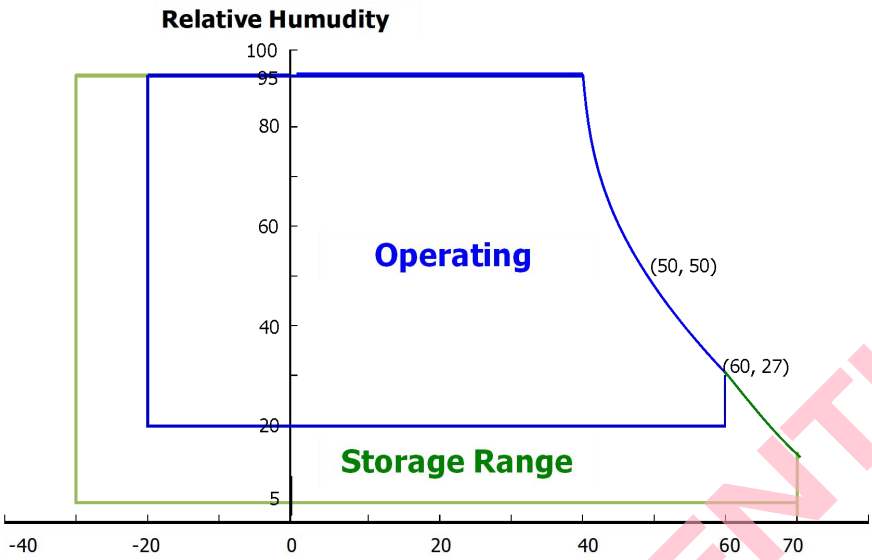


Figure 2 Operation temperature vs Humudity

3. Electrical Specifications

[Ta =25±2 ℃]

Parameter	Symbol	Values			Unit	Notes
		Min	Typ	Max		
Logic Power Supply Input Voltage	VDDI	3.1	3.3	3.5	Vdc	1
LED Forward Voltage of every LED string	V_{LED}	20.8	24	25.6	Vdc	
LED Forward Current of every LED string	I_{LED}	-	20	23	mA	
Logic Power Consumption	Plogic	-	-	0.56	W	
BLU Power Consumption	Pblu	-	2.3	2.43	W	
Rush current	IRUSH	-	0.7	1.3	A	2

Notes : 1. The supply voltage is measured and specified at the interface connector of LCM.
The current draw and power consumption specified is for VDD=3.3V, Frame rate fV=60Hz.
2. The duration of rush current is about 2ms and rising time of Power input is 1ms(min)

3.1. Logic Power Consumption

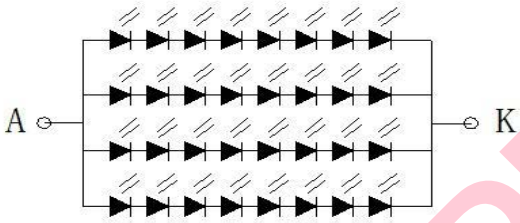
Parameter	Symbol	Typ.		uite	Notes
		Typ.	Max.		
Normal Mode	IVDD	150	170	mA	@W

3.2 Back Light Unit

The edge-lighting type of back light unit consists of 32 LEDs which is connected in serial.

Table 3.1 Electrical Characteristics Of Back Light Unit

Parameter	Symbol	Values			Units	Notes
		Min	Typ.	Max		
LED Current	I_{LED}	-	92	-	mA	
LED Forward Voltage	V_{LED}	20.8	-	25.6	V	



8*4=32LED 23*4=92mA

LED Circuit Diagram

3.3 Interface Connections

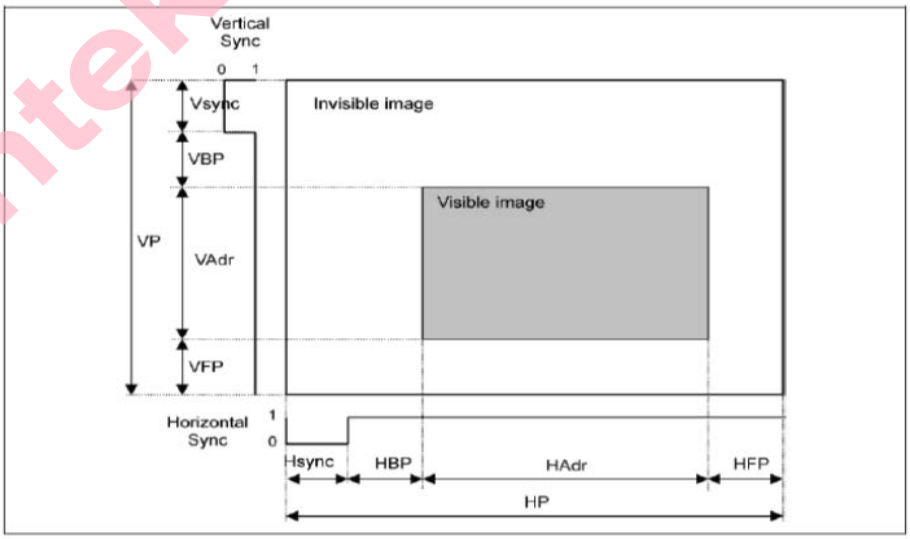
Interface Connector: FPC Connector **FH33J-40S-0.5SH** is used for the module electronics interface.

<Table 3.2. Pin Assignments for the Interface Connector>

10.1 inch WUXGA ADS Portrait									
Pin NO.	Symbol	Pin NO.	Symbol	Pin NO.	Symbol	Pin NO.	Symbol	Pin NO.	Symbol
1	NC	9	MIPI_0P	17	MIPI_2N	25	GND	33	SCL
2	VDD	10	GND	18	MIPI_2P	26	SDA	34	NC
3	VDD	11	MIPI_1N	19	GND	27	PWMO	35	NC
4	NC	12	MIPI_1P	20	MIPI_3N	28	GND	36	NC
5	NC	13	GND	21	MIPI_3P	29	NC	37	NC
6	ID(0V)	14	MIPI_CKN	22	GND	30	GND	38	NC
7	GND	15	MIPI_CKP	23	NC	31	LED-	39	LED+
8	MIPI_0N	16	GND	24	NC	32	LED-	40	LED+

4. Signal Timing Specifications

ITEM			SYNBOL	min	typ	max	UNIT
LCD	Frame Rate		-	-	60	-	Hz
	Pixels Rate		-	-	156	-	MHz
Timing	Mipi CLK	Frequency	fCLK	-	468	-	MHz
		Period	Tclk	-	2.14	-	ns
	Horizontal	Horizontal total time	tHP	-	1340	2047	t_{CLK}
		Horizontal Active time	tHadr	1200			t_{CLK}
		Horizontal Pulse Width	tHsync	-	24	-	t_{CLK}
		Horizontal Back Porch	tHBP	-	80	-	t_{CLK}
		Horizontal Front Porch	tHFP	-	60	-	t_{CLK}
	Vertical	Vertical total time	tvp	-	1944	2047	t_H
		Vertical Active time	tVadr	1920			t_H
		Vertical Pulse Width	tVsync	-	2	-	t_H
		Vertical Back Porch	tVBP	-	12	-	t_H
		Vertical Front Porch	tVFP	-	17	-	t_H
Bit Rate			TX SPD (MBPS)	980	980	995	Mbps
Lane				-	4	-	Lane



4.1 MIPI Interface (Mobile Industry Processing Interface)

The Display Serial Interface standard defines protocols between a host processor and peripheral devices that adhere to MIPI Alliance standards for mobile device interfaces. The DSI standard builds on existing standards by adopting pixel formats and command set defined in MIPI Alliance standards.

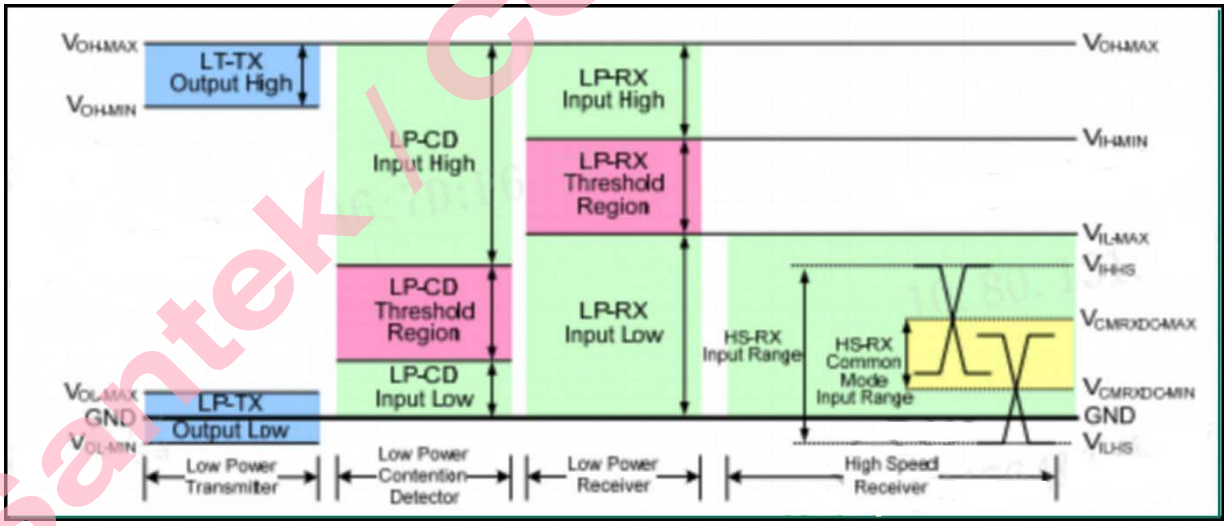
DSI-compliant peripherals support either of two basic modes of operation: Command Mode and Video Mode. Which mode is used depends on the architecture and capabilities of the peripheral. The mode definitions reflect the primary intended use of DSI for display interconnect, but are not intended to restrict DSI from operating in other applications.

Command Mode refers to operation in which transactions primarily take the form of sending commands and data to a peripheral, such as a display module, that incorporates a display controller. The display controller may include local registers. Systems using Command Mode write to, and read from the registers.The host processor indirectly controls activity at the peripheral by sending commands, parameters and data to the display controller. The host processor can also read display module status information. Command Mode operation requires a bidirectional interface.

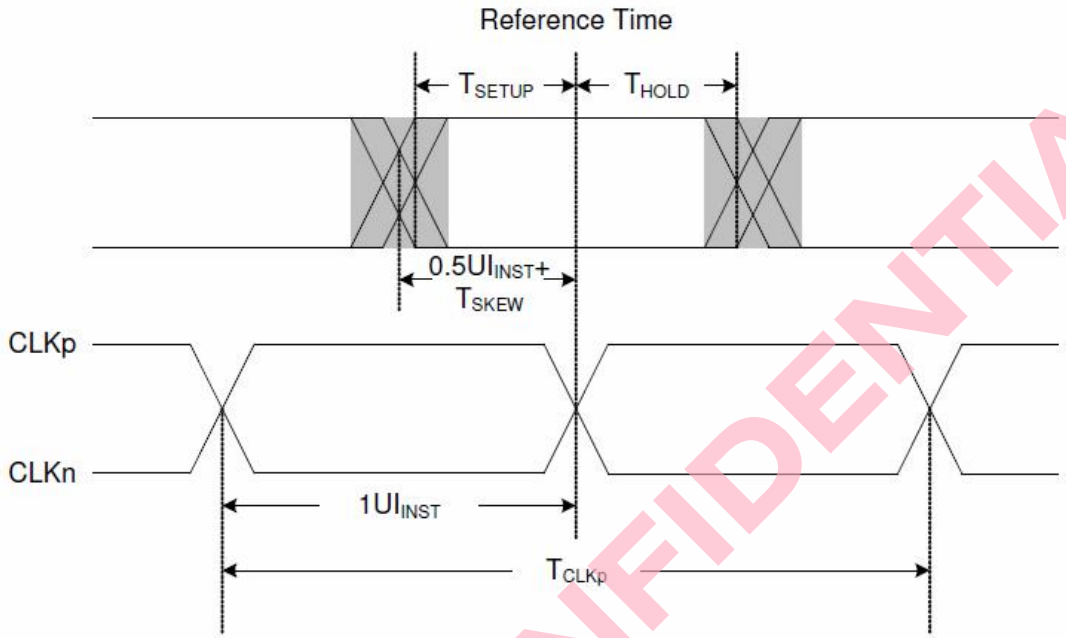
Video Mode refers to operation in which transfers from the host processor to the peripheral take the form of a real-time pixel stream. In normal operation, the display module relies on the host processor to provide image data at sufficient bandwidth to avoid flicker or other visible artifacts in the displayed image. Video information should only be transmitted using High Speed Mode. To reduce complexity and cost, systems that only operate in Video Mode may use an unidirectional data path.

4.2 MIPI DC Specification

Parameter	Symbol	Min	Typ	Max	Unit	Condition
MIPI Characteristics for High Speed Receiver						
Differential input low voltage	V_{IDTL}	-70	-	-	mV	
Differential input high voltage	V_{IDTH}	-	-	70	mV	
Single-ended input low voltage	V_{ILHS}	-40	-	-	mV	
Single-ended input high voltage	V_{IHHS}	-	-	460	mV	
Common-mode voltage	V_{CMRXDC}	70	-	330	mV	
Differential input impedance	Z_{ID}	80	100	125	Ω	
HS transmit differential voltage ($V_{OD}=V_{DP}-V_{DN}$)	$\|V_{OD}\|$	140	200	270	mV	
MIPI Characteristics for Low Power Receiver						
Input low level	VIH	880	-	-	mV	
Input high level	VIL	0	-	550	mV	
Output low level	V_{OL}	-50	-	50	mV	
Output high level	V_{OH}	1.1	1.2	1.3	V	



4.3 MIPI AC Specification



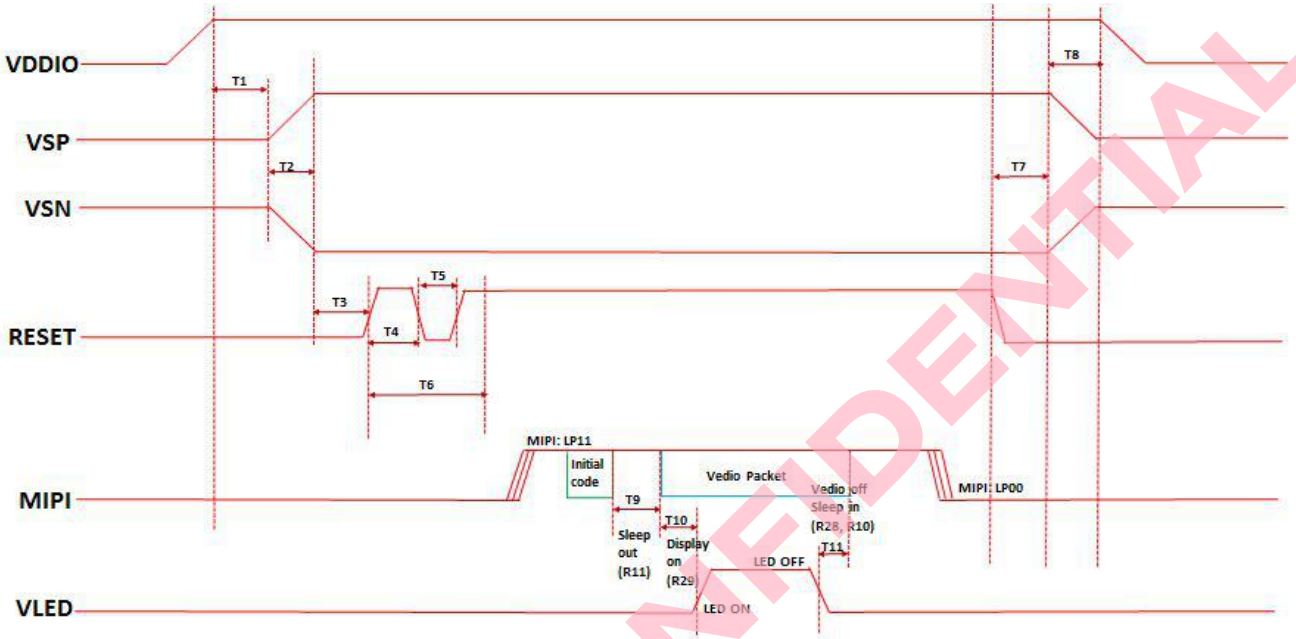
Description	Symbol	Condition	Min	Typ	Max	Unit
UI instantaneous	UIINST	-	1.0	-	12.5(1)	NS
Data to Clock Setup Time	TSETUP	-	0.3	-	-	UIINST
Clock to Data Hold Time	THOLD	-	0.3	-	-	UIINST

Note: (1) This value corresponds to a minimum 80 Mbps data rate.

4.4 Power On/Off Sequence

Power on Timing Sequence:

VDD=3.3V



Item	Time	Unit	Remark
T1	>0	ms	
T2	1	ms	
T3	>5	ms	
T4	>=0	ms	
T5	>=0	ms	
T6	>6	ms	
T7	>0	ms	
T8	>0	ms	
T9	>0	ms	
T10	>120	ms	
T11	>120	ms	
T12			
T13			
T14			

4.5 Power Consumption

	Parameter	Symbol	Typ.	Unit	Remark
CABC OFF	Logic Power	L255	562.3	mW	
	BLU	100% on	2.28	W	

5. CTP Specifications

5.1 CTP Construction And Mechanical Characteristics

Construction

Construction	Materials Used	Comment
Cover LENS	Glass	Thickness：0.7mm
SCA	Adhesive	Thickness：0.15mm
ITO Sensor	ITO Sensor	Thickness：0.55mm

Mechanical Characteristics

Item	Description	Unit
Outside Dimension	243.60×166.60	mm
View Area	217.18×135.96	mm
Sensor OD	228.46×148.10	mm
Thickness	1.4	mm
Input Method	Finger Or Conductive Pen	
Hardness Of Surface	Hard Surface : Glass Lens≥6H	
Support Operation	5 Finger	
Channel	RX23*TX38	
Interface	I^2C	

5.2 CTP Electrical Characteristics

Item	Description	Unit
Operating Voltage	DC2.8V-3.3V	V
Insulation Resistance	＞20MΩ At DC 25V	MΩ
Insulation Ability	≥60sec. At DC 25V	sec
Chatting Times	<5ms	ms

5.4 PIN Definition

PIN	Signal	Description
1	VDD 3.3V	Supply Voltage 3.3V
2	GND	Ground
3	SCL	I2C Serial Clock Input.
4	SDA	I2C Serial Data Input And Output.
5	INT	An interrupt signal to inform the host processor that touch data is ready for read
6	RESET	RESET

6. Optical Specifications -Backlight

6.1 Optical Specifications

Parameter		Symbol	Condition	Min.	Typ.	Max.	Unit	
Viewing Angles	Horizontal	Θ_3	CR > 10	-	85	-	Deg.	Note 1
		Θ_9		-	85	-	Deg.	
	Vertical	Θ_{12}		-	85	-	Deg.	
		Θ_6		-	85	-	Deg.	
Luminance Contrast ratio		CR	Θ = 0°	800	1000	-	-	Note 2
Luminance of White		LV	Θ = 0°	320	400	-	cd/m²	Note 3
Luminance uniformity		U		70	80	-	%	Note 4
White balance		Wx	Θ = 0°	0.26	0.30	0.34	-	Note 5
		Wy		0.29	0.33	0.37	-	
Response Time (Rising + Falling)		T_{RT}	Ta= 25° C Θ = 0°	25	30	35	ms	Note 6
NTSC Ratio				65	70	-	%	

Note :

1. Viewing angle is the angle at which the contrast ratio is greater than 10. The viewing angles are determined for the horizontal or 3, 9 o'clock direction and the vertical or 6, 12 o'clock direction with respect to the optical axis which is normal to the LCD surface (see FIGURE 1).

2. Contrast measurements shall be made at viewing angle of Θ= 0 and at the center of the LCD surface. Luminance shall be measured with all pixels in the view field set first to white, then to the dark (black) state . (see FIGURE 1) Luminance Contrast Ratio (CR) is defined mathematically.

$$CR = \frac{\text{Luminance when displaying a white raster}}{\text{Luminance when displaying a black raster}}$$

3. Center Luminance of white is defined as luminance values of 1point average across the LCD surface. Luminance shall be measured with all pixels in the view field set first to white. This measurement shall be taken at the locations shown in FIGURE 1 for a total of the measurements per display. The luminance is measured by TOPCON BM-7 when the LED current is set at 20mA.
4. The White luminance uniformity on LCD surface is then expressed as : ΔY = Minimum Luminance of 9points / Maximum Luminance of 9points (see FIGURE 2).

5. The color chromaticity coordinates specified shall be calculated from the spectral data measured with all pixels first in red, green, blue and white. Measurements shall be made at the center of the panel.

6. The electro-optical response time measurements shall be made as FIGURE 3 by switching the "data" input signal ON and OFF. The times needed for the luminance to change from 10% to 90% is Tr, and 90% to 10% is Td.

Figure 1. Definition of viewing angle

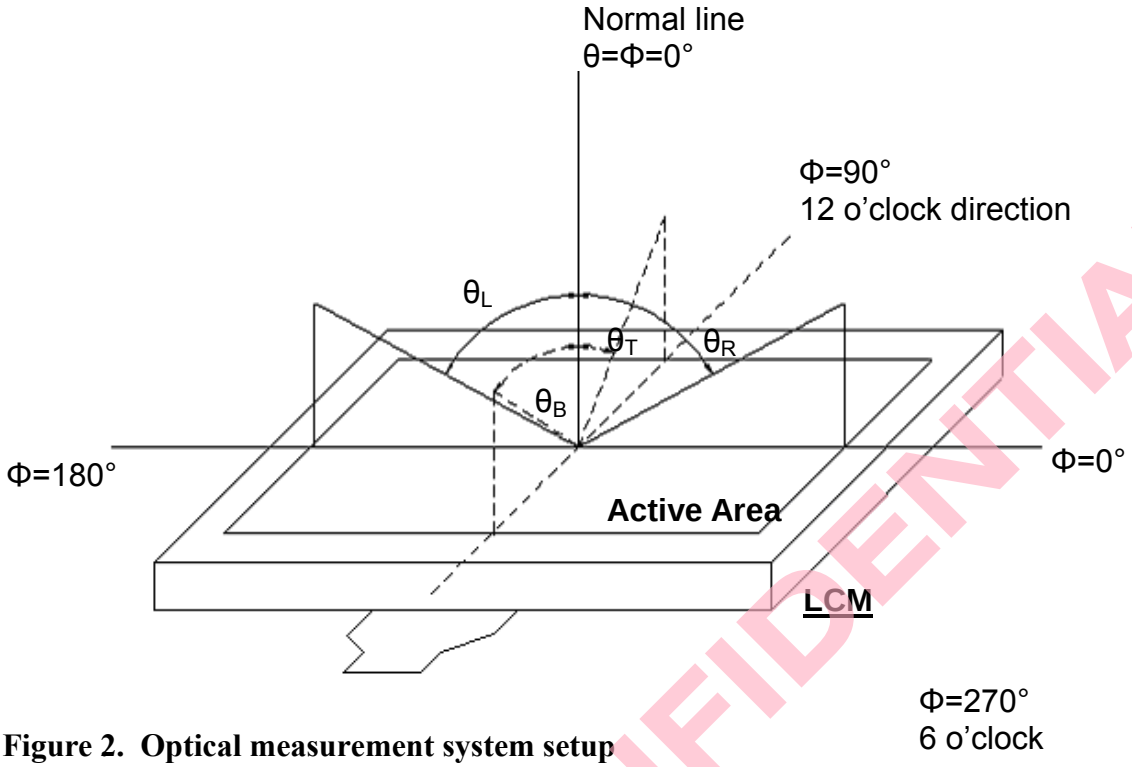


Figure 2. Optical measurement system setup

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. (Viewing angle is measured by ELDIM-EZ contrast/Height :1.2mm, Response time is measured by Photo detector TOPCON BM-7.)

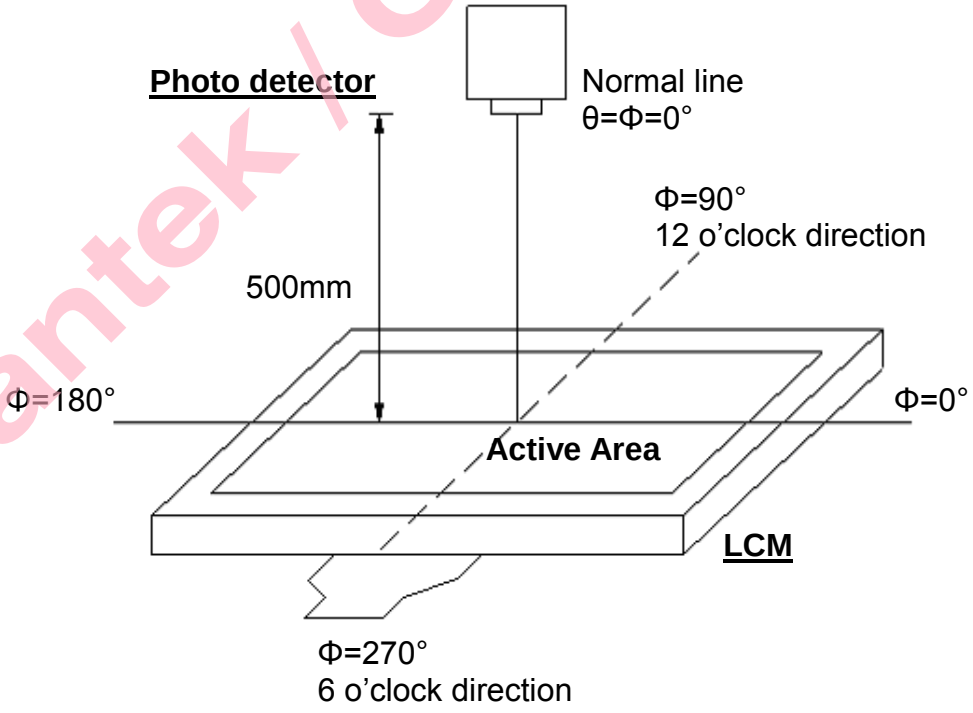
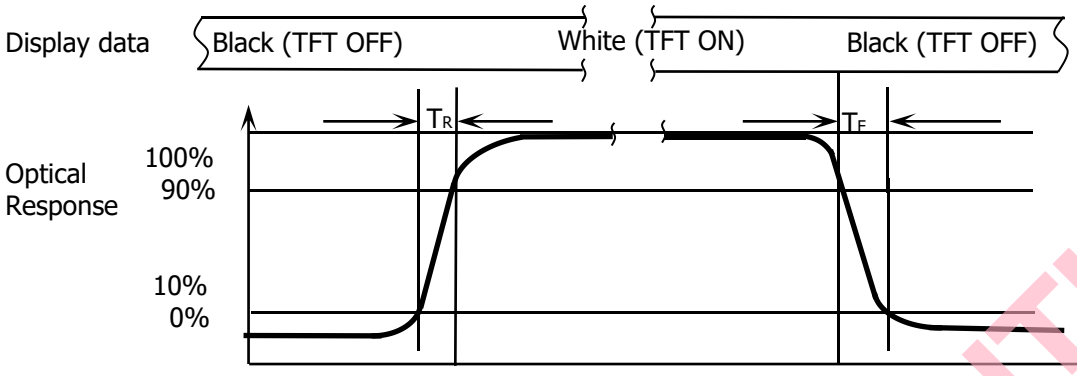
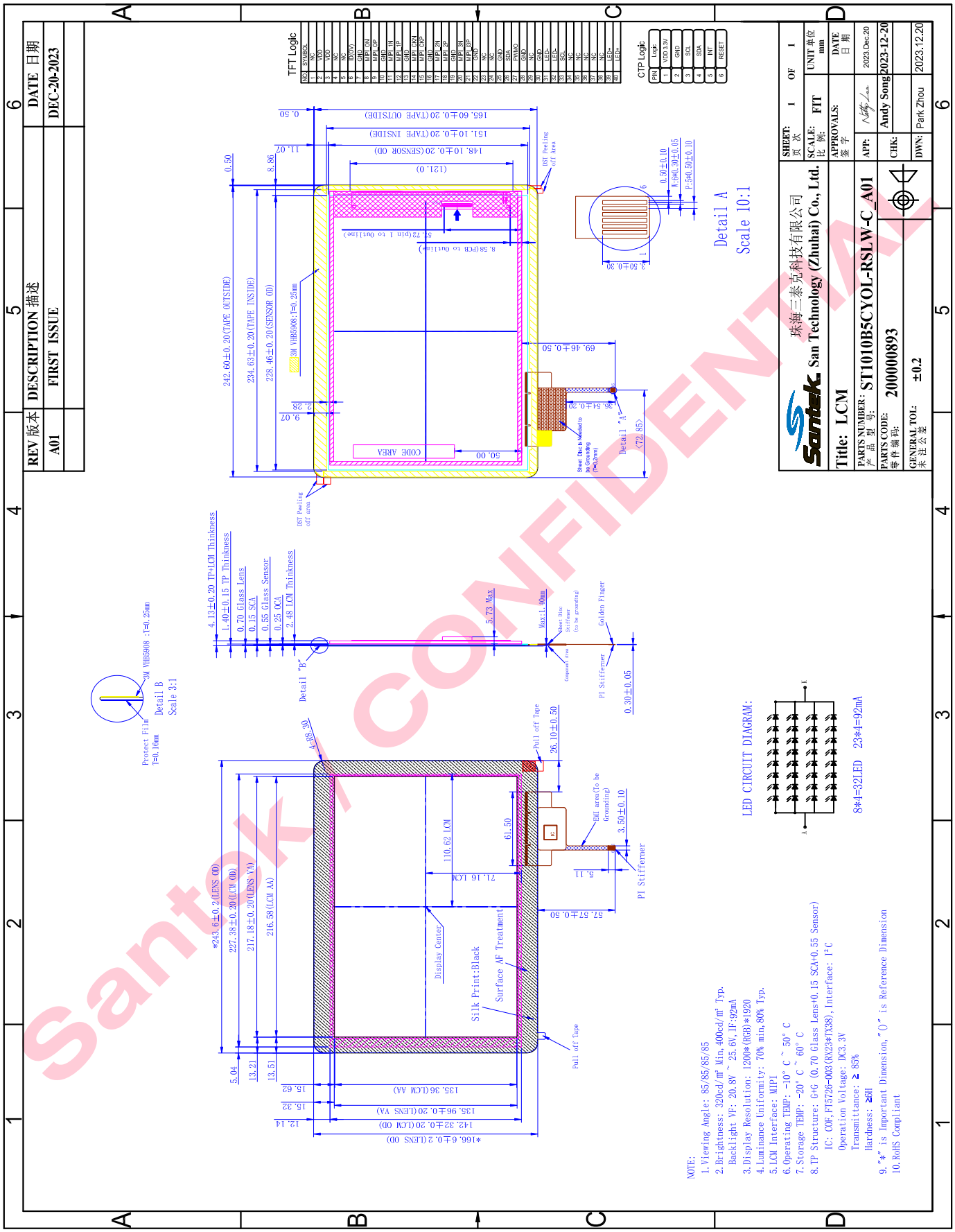


Figure 3. Response Time Testing



The electro-optical response time measurements shall be made as shown in FIG URE 3 by switching the “data” input signal ON and OFF. The times needed for th e luminance to change from 10% to 90% is Tr and 90% to 10% is Td.

7. Mechanical Drawing



8. Reliability Test

No	Test Item	Test Condition	Remark
1	High temperature storage test	Ta = 60 ℃, 240 hrs	
2	Low temperature storage test	Ta = -20℃, 240 hrs	
3	Thermal Shock Test	-10℃/1hr → 60℃/1hr ×10Cycle	
4	High temperature Operate test	Ta = 50 ℃,240hrs,	
5	Low temperature Operate test	Ta = -10 ℃, 240hrs	
6	High temperature High humidity	Ta = 40 ℃, 90%，240hrs	
7	Vibration (Non-operation)	Frequency Range:10~55Hz, Stroke: 1.5mm Sweep:10Hz~55Hz~10Hz 2 hours for each direction of X.Y.Z. (package condition)	
8	Package Drop Test	Height: 80cm, 1 corner, 3 edges, 6 surfaces	

Note (1) criteria : Normal display image with no obvious non-uniformity and no line defect.
Note (2) Evaluation should be tested after storage at room temperature for more than two hours.

9. Handing & Cautions

(1) Cautions when taking out the module
- Pick the pouch only, when taking out module from a shipping package.

(2) Cautions for handling the module
- As the electrostatic discharges may break the LCD module, handle the LCD module with care. Peel a protection sheet off from the LCD panel surface as slowly as possible.
- As the LCD panel and back - light element are made from fragile glass material, impulse and pressure to the LCD module should be avoided.
- As the surface of the polarizer is very soft and easily scratched, use a soft dry cloth without chemicals for cleaning.
- Do not pull the interface connector in or out while the LCD module is operating.
- Put the module display side down on a flat horizontal plane.
- Handle connectors and cables with care.

(3) Cautions for the operation
- When the module is operating, do not lose CLK, ENAB signals. If any one of these signals is lost, the LCD panel would be damaged.
- Obey the supply voltage sequence. If wrong sequence is applied, the module would be damaged.

(4) Cautions for the atmosphere
- Dew drop atmosphere should be avoided.
- Do not store and/or operate the LCD module in a high temperature and/or humidity atmosphere. Storage in an electro-conductive polymer packing pouch and under relatively low temperature atmosphere is recommended.

(5) Cautions for the module characteristics
- Do not apply fixed pattern data signal to the LCD module at product aging.
- Applying fixed pattern for a long time may cause image sticking.

(6) Other cautions
- Do not disassemble and/or re-assemble LCD module.
- Do not re-adjust variable resistor or switch etc.
- When returning the module for repair or etc., Please pack the module not to be broken. We recommend to use the original shipping packages.

10. Package

(TBD)