LCD Module Specifiction

Customer:	
Module No.:	**XC046AQV8855ANT**
Customer P/N:	
Date:	
Version:	**V1.0**

Approved by	Checked by	Prepared by

Final Approval by Customer	
Approved by	**Comment**

Table of Contents

1.Record of Revision.....3

2.General Specifications..... 4

3.Pin Assignment.....5

4.Absolute Maximum Ratings.....6

5.Electrical Characteristics.....6-7

6.Timing Chart.....8-10

7.Mechanical Drawing.....11

8.Optical Characteristics.....12-14

9.Environmental / Reliability Test.....15

10.Precautions for Use of LCD Modules.....16

1.Record of Revision

Rev.	Issued Date	Description	Editor
1.0	2025-05-29	First release	chen

2.General Specifications

Note 1: Viewing direction for best image quality is different from TFT definition. There is a 180°shift.

Note 2: ROHS compliant.

Item	Specification	Unit
LCD size	4.58	inch
Display Mode	Normally Black	--
Resolution	320(RGB)x960	Pixel
Pixel pitch	0.1149*RGB*0.1149	mm
Pixel Arrangement	RGB Vertical Stripe	
Viewing direction	ALL	-
Module outline dimension	41.57(H)*118.8(V)*2.54(D)	mm
LCD AA	36.77x110.30	mm
TP VA	-	mm
Colors	262K	-
Driver IC	ST7701S	-
Interface	3SPI+RGB18BIT	--
Backlight	White LED	--
Touch IC	-	--
Surface hardness	-	--
Touch structure	-	--
Cover lens	-	--
Color	-	--
Operating Temperature	-20℃~ +70℃	--
Storage Temperature	-30℃~ +80℃	--

3.Pin Assignment

PIN	Symbol	Description	Remark
1	LEDA	LED ANODE	
2	LEDK	LED CATHODE	
3	LEDK	LED CATHODE	
4	GND	Ground	
5	VCI	LCD analog power supply (3.3V)	
6	RESET	Reset Signal	
7	NC	Not connect	
8	NC	Not connect	
9	SDA	SPI Data signal	
10	SCK	SPI Clock signal	
11	CS	SPI Chip select signal	
12	PCLK	RGB dot clock signal	
13	DE	RGB data enable signal	
14	VSYNC	RGB frame synchronizing signal	
15	HSYNC	RGB line synchronizing signal	
16-33	DB0-DB17	RGB data(B2-B7,G2-G7,R2-R7)	
34	GND	Ground	
35	TP_INT	Touch Interrupt	
36	TP_SDA	Touch IIC Data signal	
37	TP_SCL	Touch IIC Clock signal	
38	TP_RESET	Touch Reset Signal	
39	TP_VCI	Touch Power supply	
40	TP_GND	Touch Ground	

4.Absolute Maximum Ratings

Item	Symbol	Min.	Max.	Unit	Remark
Power Voltage	VCI	-0.30	+3.3	V	
	IOVCC	-0.30	+2.5	V	
	TP_VCI	/	/	V	
	TP_IOVCC	/	/	V	
Operating Temperature	Top	-20.0	70.0	℃	
Storage Temperature	T_{st}	-30.0	80.0	℃	
Operating and Storage Humidity	H_{stg}	10%	90%	%(RH)	

5.Electrical Characteristics

5.1Recommended Operating Condition

VCI=3.3V，GND=0V，Ta = 25℃

Item		Symbol	Min.	TYP.	Max.	Unit	Remark
Digital supply Voltage		IOVCC	1.65	1.8	1.95	V	
Analog supply Voltage		VCI	2.5	2.8	3.3	V	
TP Power		TP_VCI	/	/	/	V	
TP Power		TP_IOVCC	/	/	/	V	NOTES
Input Signal Voltage	Low Level	V_{IL}	0	-	0.3 x IOVCC	V	
	High Level	V_{IH}	0.7 x IOVCC	-	IOVCC	V	
Current of digital supply voltage		I_{IOVCC}	-	20	35	Ma	VCI=3.3V, color bar pattern
Current of analog supply voltage		I_{VCI}	-	35	50	Ma	

5.2 Backlight Unit Driving Condition

Item	Symbol	Min.	TYP.	Max.	Unit	Remark
Forward Current	I_F	-	40	-	Ma	(4LED Parallel)
Forward Current Voltage	V_F	-	12	-	V	
Operating Life Time	--	20000	--	--	hrs	Note 2, Note 3

Note1: The LED driving condition is defined for each module.

Note2: When LCM is operated, the stable forward current should be inputted. And forward voltage is for reference only.

Note3: Optical performance should be evaluated at Ta=25℃ When LED is driven at high current, high ambient temperature & humidity condition. The life time of LED will be reduced. Operating life means brightness goes down to 50% initial brightness. Typical operating life time is estimated data.

Note4: The LED driving condition is defined for each LED module.

6. Interface Timing Characteristics

6.1 Serial Interface Characteristics (3-line-serial)

Serial Interface Characteristics (3-line serial):

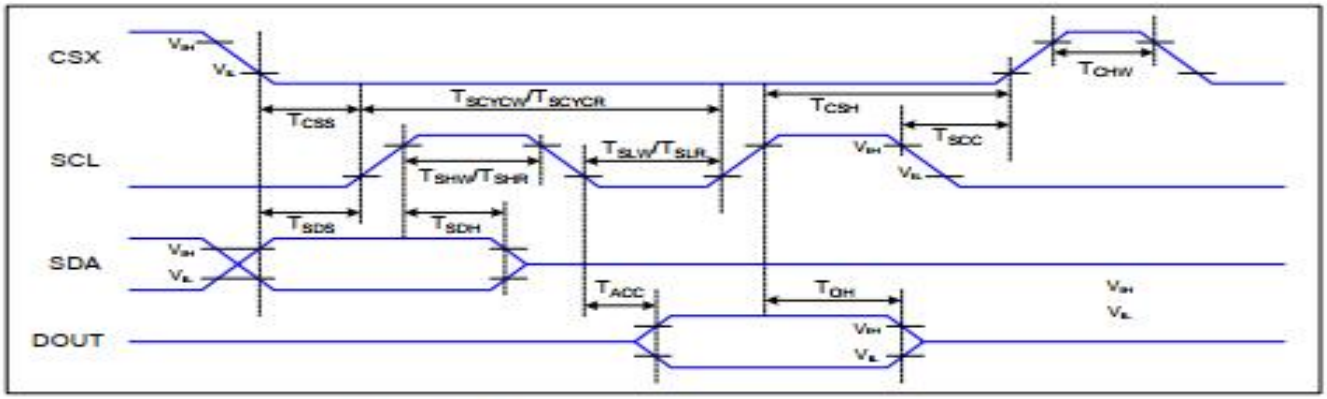


Figure 1 3-line serial Interface Timing Characteristics

VDDI=1.8,VDD=2.8, AGND=DGND=0V, Ta=25℃

Signal	Symbol	Parameter	Min	Max	Unit	Description
CSX	T_{CSS}	Chip select setup time (write)	15		ns	
	T_{CSH}	Chip select hold time (write)	15		ns	
	T_{CSS}	Chip select setup time (read)	60		ns	
	T_{SCC}	Chip select hold time (read)	60		ns	
	T_{CHW}	Chip select "H" pulse width	40		ns	
SCL	T_{SCYCW}	Serial clock cycle (Write)	66		ns	
	T_{SHW}	SCL "H" pulse width (Write)	15		ns	
	T_{SLW}	SCL "L" pulse width (Write)	15		ns	
	T_{SCYCR}	Serial clock cycle (Read)	150		ns	
	T_{SHR}	SCL "H" pulse width (Read)	60		ns	
	T_{SLR}	SCL "L" pulse width (Read)	60		ns	
SDA (DIN)	T_{SDS}	Data setup time	10		ns	
	T_{SDH}	Data hold time	10		ns	
SDO (DOUT)	T_{ACC}	Access time	20	50	ns	Max: CL=30pF
	T_{OH}	Output disable time	50	50	ns	Min: CL=8pF

6.2 RGB Interface Characteristics

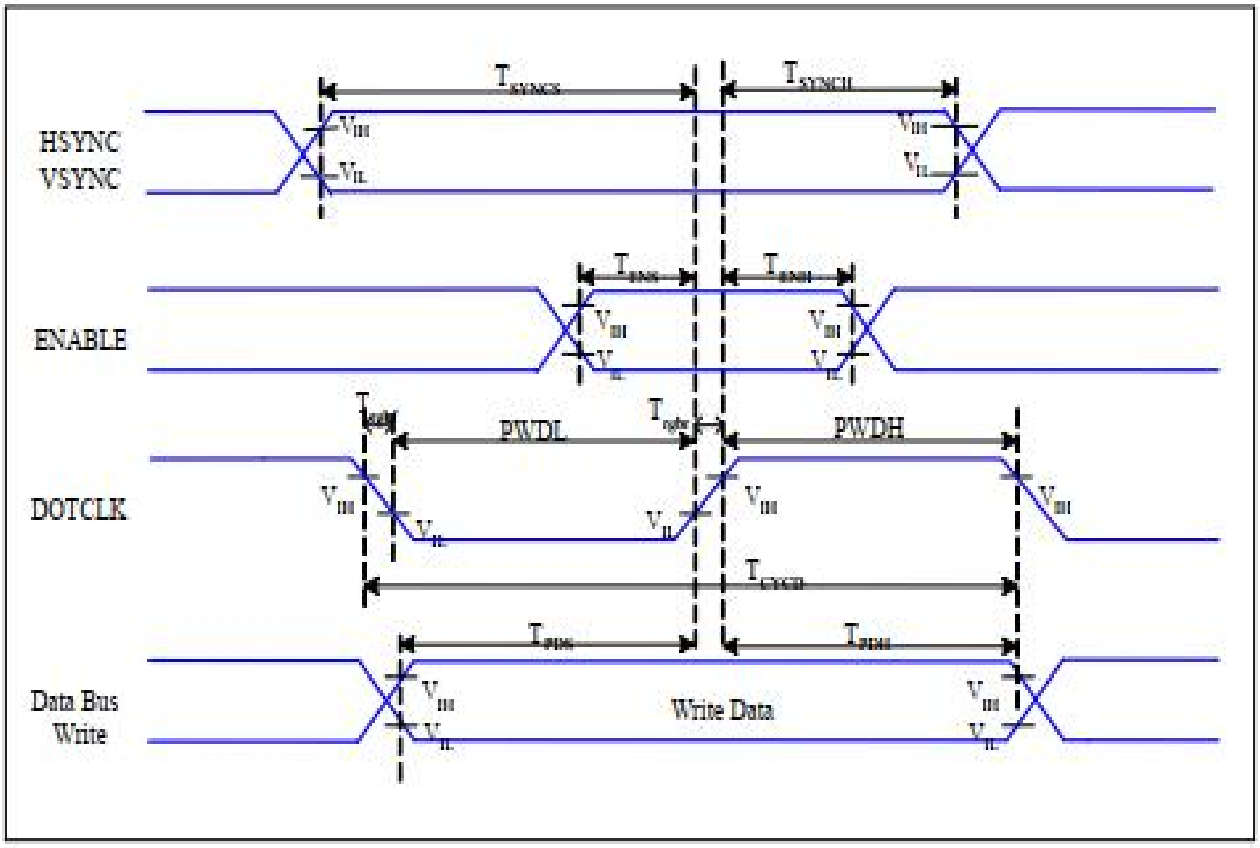


Figure 3 RGB Interface Timing Characteristics

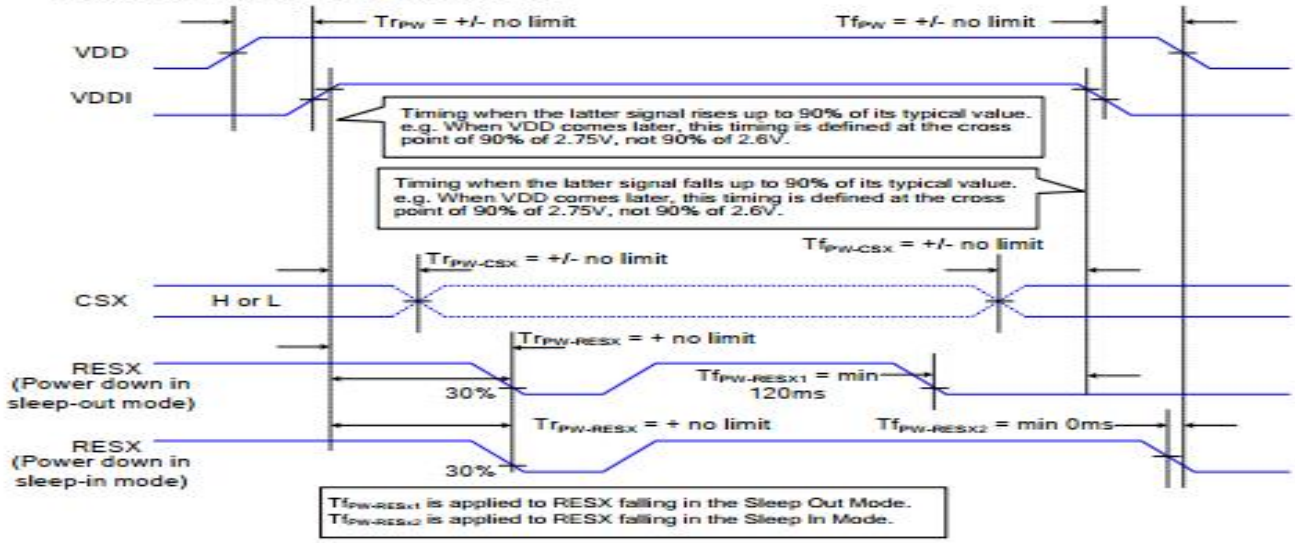
VDDI=1.8, VDD=2.8, AGND=DGND=0V, Ta=25 ℃

Signal	Symbol	Parameter	MIN	MAX	Unit	Description
HSYNC, VSYNC	T_{SYNCS}	VSYNC, HSYNC Setup Time	5	-	ns	
ENABLE	T_{ENS}	Enable Setup Time	5	-	ns	
	T_{ENH}	Enable Hold Time	5	-	ns	
DOTCLK	PWDH	DOTCLK High-level Pulse Width	15	-	ns	
	PWDL	DOTCLK Low-level Pulse Width	15	-	ns	
	T_{CYCD}	DOTCLK Cycle Time	33	-	ns	
	Trghr, Trghf	DOTCLK Rise/Fall time	-	15	ns	
DB	T_{PDS}	PD Data Setup Time	5	-	ns	
	T_{PDH}	PD Data Hold Time	5	-	ns	

6.3 Power On /OFF Timing

VDDI and VDDA can be applied or powered down in any order. During the Power Off sequence, if the LCD is in the Sleep Out mode, VDDA and VDDI must be powered down with minimum 120msec. If the LCD is in the Sleep In mode, VDDA and VDDI can be powered down with minimum 0msec after the RESX is released.
CSX can be applied at any timing or can be permanently grounded. RESX has high priority over CSX.
Notes:
1. There will be no damage to the ST7701SN-1 if the power sequences are not met.
2. There will be no abnormal visible effects on the display panel during the Power On/Off Sequences.
3. There will be no abnormal visible effects on the display between the end of Power On Sequence and before receiving the Sleep Out command, and also between receiving the Sleep In command and the Power Off Sequence.
4. If the RESX line is not steadily held by the host during the Power On Sequence as defined in Sections 9.1 , then it will be necessary to apply the Hardware Reset (RESX) after the completion of the Host Power On Sequence to ensure correct operations. Otherwise, all the functions are not guaranteed.
5. When VDDA is in power off State , the MIPI must set in Ultra Low Power Mode (GND Level).

The power on/off sequence is illustrated below



6.4 Reset Timing

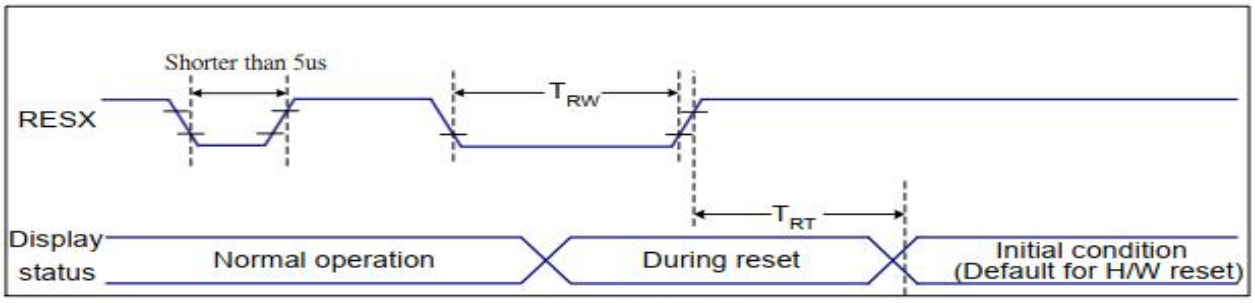
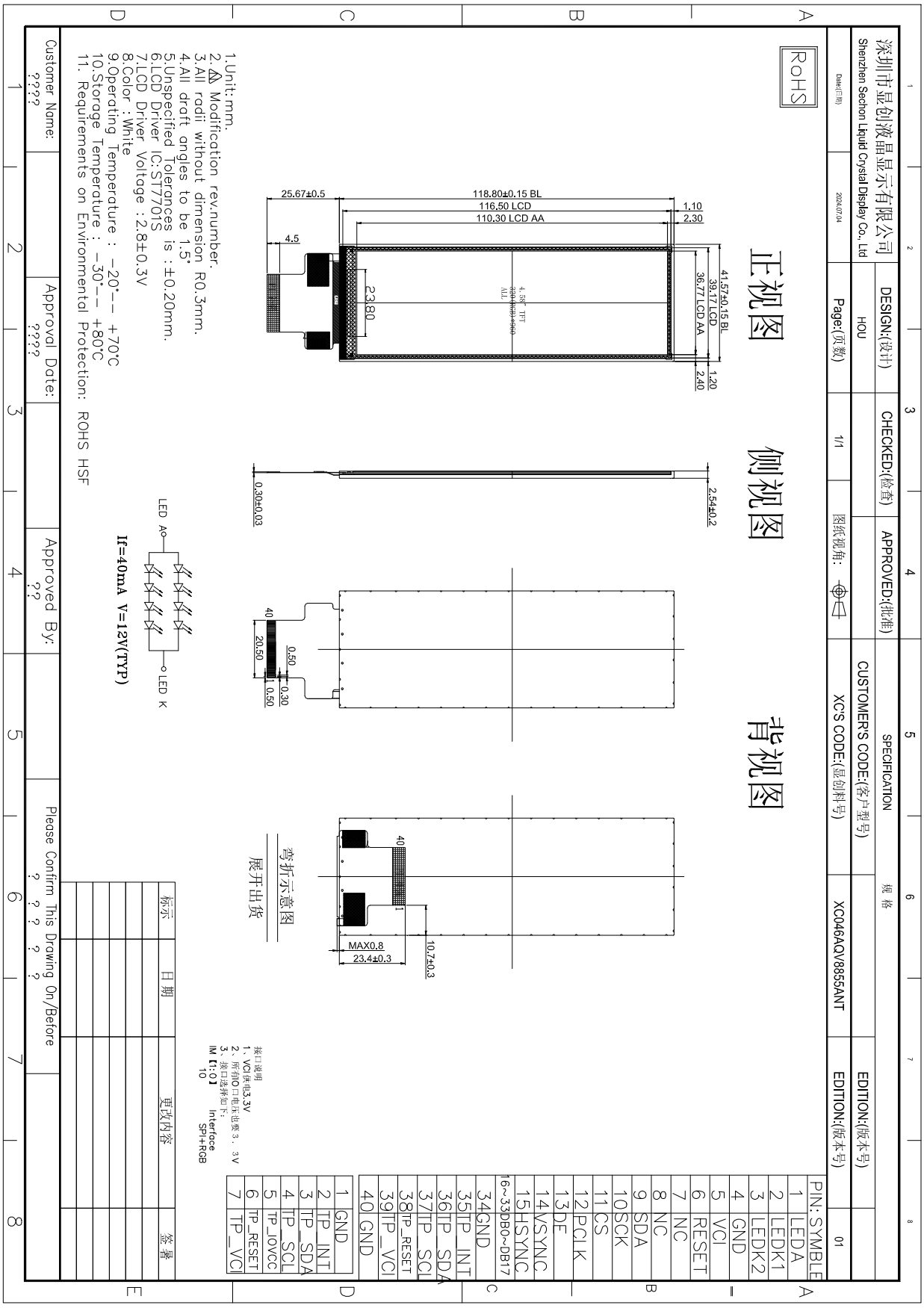


Figure 9 Reset Timing

VDDI=1.8,VDD=2.8, AGND=DGND=0V, Ta=25 ℃

Related Pins	Symbol	Parameter	MIN	MAX	Unit
RESX	TRW	Reset pulse duration	10	-	us
	TRT	Reset cancel	-	5 (Note 1, 5)	ms
				120(Note 1, 6, 7)	ms

7.Mechanical Drawing



8.Optical Characteristics

Item		Symbol	Condition	Min.	TYP.	Max.	Unit	Remark
View Angles		θT	CR≧10	-	85	-	Degree	Note 2
		θB		-	85	-		
		θL		-	85	-		
		θR		-	85	-		
Contrast Ratio		CR	θ=0°	1000	1200	-		Note1 Note3
Response Time		T_{ON}	25℃		25	35	ms	Note1 Note4
		T_{OFF}						
Chromaticity	White	x	Backlight is on	-	-	-		Note1 Note5
		y		-	-	-		
Uniformity		U		-	80	-	%	Note1 Note6
NTSC				60	70	-	%	Note 5
Luminance		L		350	400	-	CD/m^2	Note1 Note7

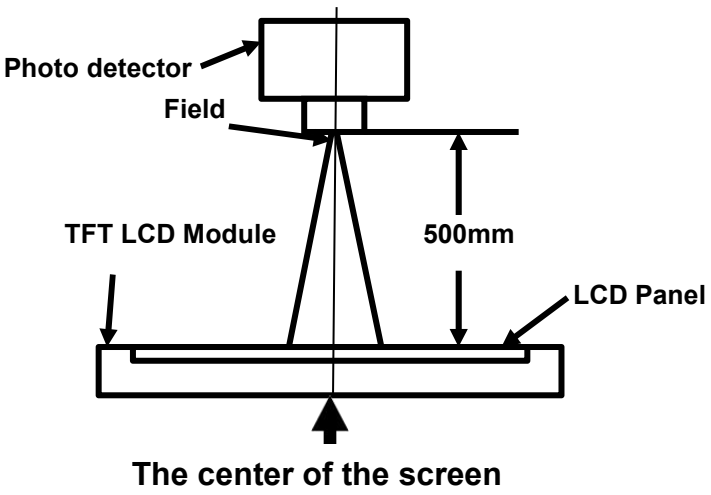
Test Conditions:

1.IF= 40 Ma, VF=12 V and the ambient temperature is 25±2℃.humidity is 65±7%

2.The test systems refer to Note 1 and Note 2.

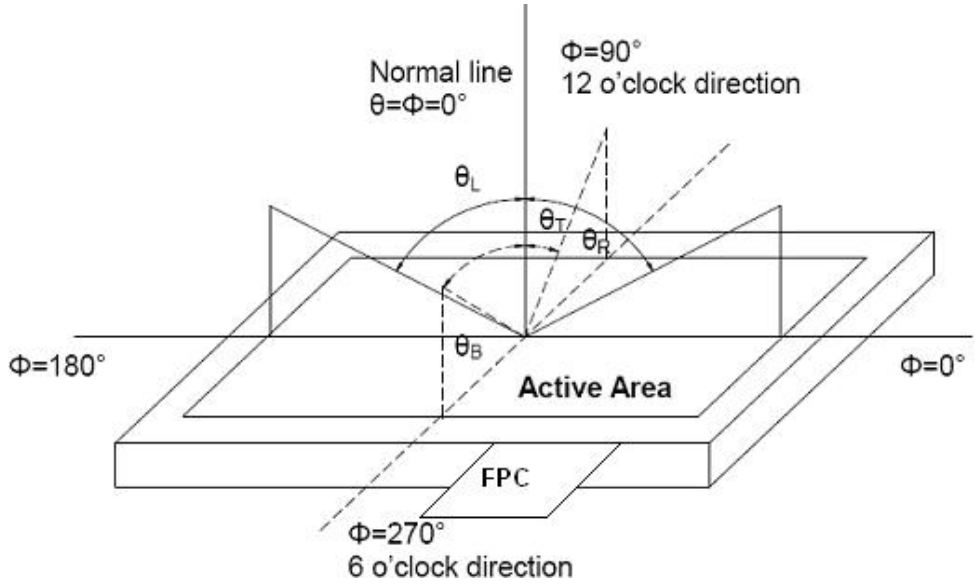
Note 1: Definition of optical measurement system.

Properties are measured at the center point of the LCD screen. All input terminals LCD panel must be ground when measuring the center area of the panel.



Note 2: Definition of viewing angle range and measurement system.

Viewing angle is measured at the center point of the LCD by CONOSCOPE(ergo-80)。

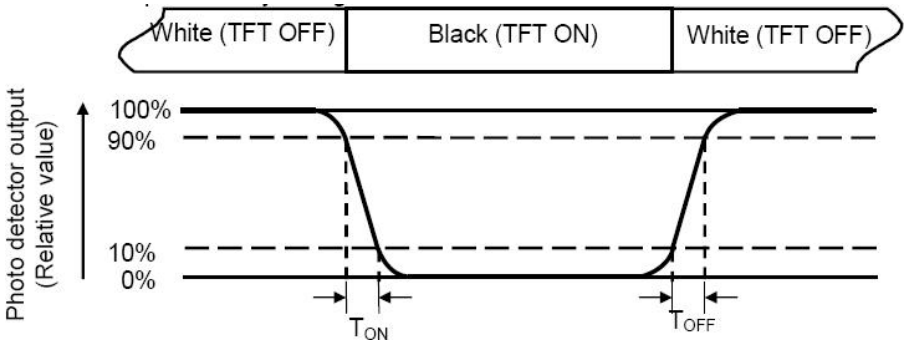


Note 3: Definition of contrast ratio

$$\text{Contrast ratio (CR)} = \frac{\text{Luminance measured when LCD is on the "White" state}}{\text{Luminance measured when LCD is on the "Black" state}}$$

Note 4: 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%.

Note 5: Definition of color chromaticity (CIE1931)

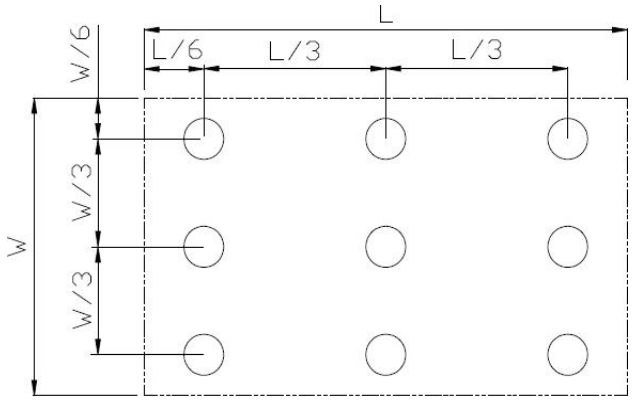
Color coordinates measured at center point of LCD.

Note 6: Definition of luminance uniformity

Active area is divided into 9 measuring areas (Refer Fig. 2). Every measuring point is placed at the center of each measuring area.

Luminance Uniformity (U) = Luminance min / Luminance max

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



Luminance max: The measured Maximum luminance of all measurement position. Luminance min: The measured Minimum luminance of all measurement position.

Note 7: Definition of luminance:

Measure the luminance of white state at center point

9.Environmental / Reliability Test

No.	Items	Condition	Inspection after test
1	High Temperature Storage	T = 80℃for 120 hr	Inspection after 4 hours storage at room temperature, the sample shall be free from defects: 1.Air bubble in the LCD 2.Seal leak; 3.Non-display; 4.missing segments; 5.Glass crack; 6.Current IDD is twice higher than initial value.
2	Low Temperature Storage	T = -30℃for 120 hr	
3	High Temperature Operating	T = 70℃for 120 hr	
4	Low Temperature Operating	T = -20℃ for 120 hr (But no condensation of dew)	
5	High Temp. and High Humidity Operating	T = 60℃/90% for 96 hr (But no condensation dew)	
6	Thermal Shock	-20±2℃~25~70±2℃×10cycles (30min.) (5min.) (30min.)	
7	ESD	Voltage:±2KV R: 330Ω C: 150pF Air discharge, 10time	

Note1: Ts is the temperature of panel's surface.

Note2: Ta is the ambient temperature of samples

10.Precautions for Use of LCD Modules Handling Precautions

10.1Handling Precautions

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

10.1.2 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.

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

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

10.1.5 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

10.1.6 Do not attempt to disassemble the LCD Module.

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

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

10.1.8.1 Be sure to ground the body when handling the LCD Modules.
Tools required for assembly, such as soldering irons, must be properly ground.

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

10.1.8.3 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.

10.2 Storage Precautions

10.2.1When storing the LCD modules, avoid exposure to direct sunlight or to the light of fluorescent lamps.

10.2.2The 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%

10.2.3The LCD modules should be stored in the room without acid, alkali and harmful gas.

10.3Transportation Precautions

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