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Optical Bonding

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Cover glass

System solutions

OEM Solutions

Custom Display

Production Custom designs Installation

Mechanical design



Project No. 项目编号	ET040WF01-TT V.2
Customer 客户名称	
Module No. 客户型号	
Product type 产品内容	Standard LCD Module TFT: 480*RGBx480Dots 3.95" TFT LCD+CTP

客户确认Customer Approval

项目负责人Project Manager	
品质主管Director of Quality	
采购工程师Purchasing Engineer	

PREPARED BY	CHECKED BY	APPROVED BY



1. Introduction

1.1 Scope of application

This specification applies to the LCD module that is supplied by YOURITECH Technology CO., LTD.

LCD specification: Dots 480xRGBx480.

As to basic specification of the driver IC, refer to the IC (Sitronix:ST7701S) specification and data book.

All material & processing of the LCD module should be Lead Free.

1.2 TFT features:

Structure: TFT PANNEL+IC +FPC+BL+CTP;

IPS Type LCD

480dot-segment and 480 dot-common outputs;

262K Color can be selected by software;

White LED back light;

LCM:3SPI +18RGB interface

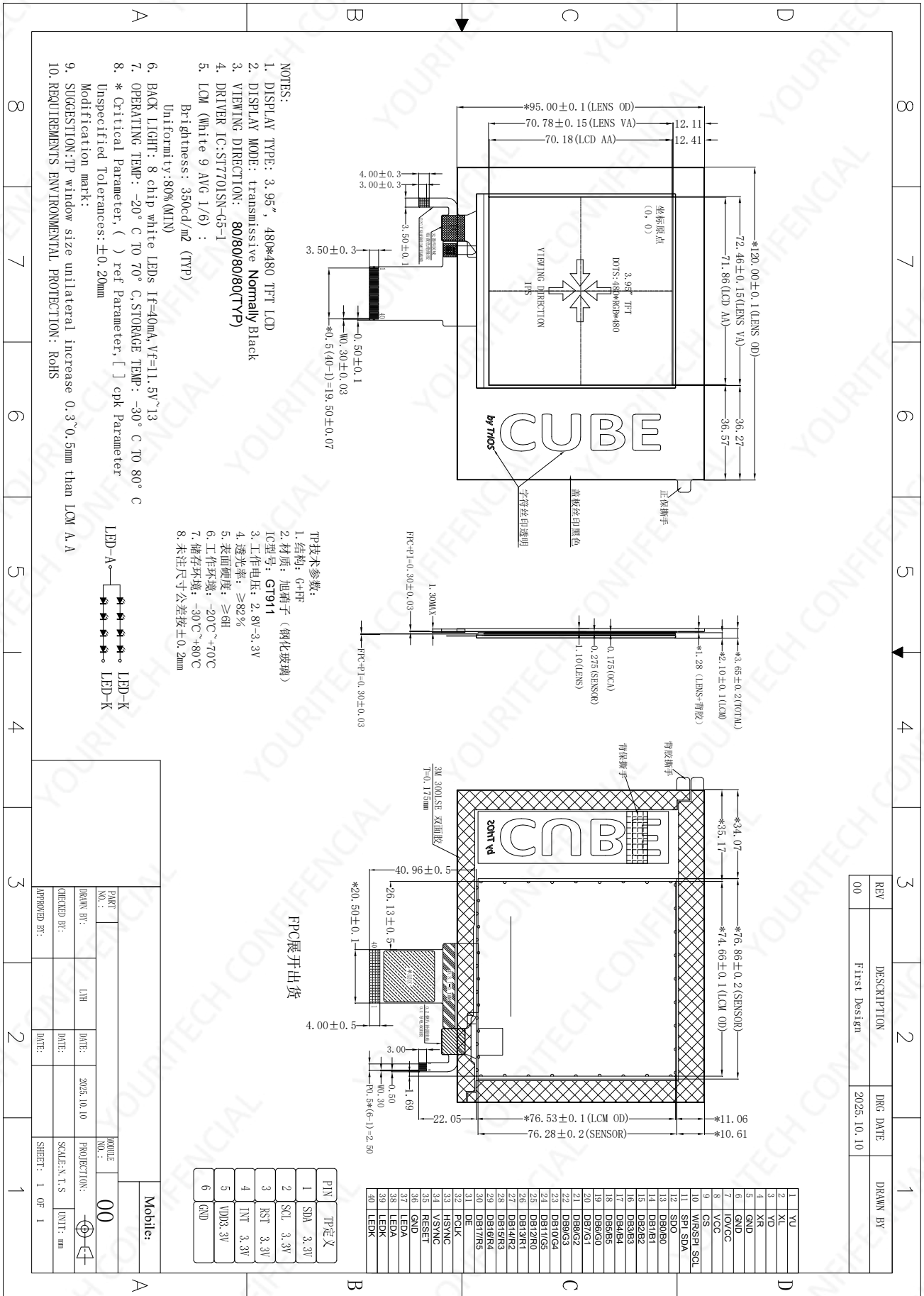
1.3 Applications:



2. LCM General specification

ITEM	Standard value	Unit
LCD Type	Normally black	--
Drive element	TFT active matrix	--
Number of pixels	480*3RGB(H)X480(V)	Dots
Pixel arrangement	RGB stripe	--
Pixel Pitch (W*H)	0.1497x0.1462	mm
Active area	71.86(H) x 70.18(V)	mm
Viewing direction	ALL O'CLOCK	--
TFT Driver IC	ST7701S	--
TFT interface	3SPI +18RGB interface	--
LCM Size(W*H*T)	74.66(H) x 76.53(V) x2.10(D)	mm
LCM+CTP Size(W*H*T)	120.00(H) x 95.00(V) x3.65(D)	mm
Approx. Weight	TBD	g
Touch structure	G+FF	--
Touch Driver IC	GT911	--
Touch Interface	I2C	--





3.Absolute Maximum Rating

Characteristics	Symbol	Min.	Max.	Unit
LCM Operating Temperature	T _{OPR}	-20	+70	°C
LCM Storage Temperature	T _{STG}	-30	+80	°C
TP Operating Temperature & Humidity(20% ~ 90%RH)	T _{OPR}	-20	+70	°C
TP SStorage Temperature & Humidity(20% ~ 90%RH)	T _{STG}	-30	+80	°C
Humidity	RH	-	90	%

4.Electrical Characteristics

4.1 TFT DC Characteristics

Characteristics	Symbol	Min.	Typ.	Max.	Unit
Supply Voltage for I/O	VDDIO	1.65	1.8	3.3	V
Supply Voltage for(DC/DC)	VDD	2.5	2.8	3.3	V
Supply Voltage for(DC/DC)	AVDD	--	--	--	V
Supply Voltage for(DC/DC)	AVEE	--	--	--	V

4.2 Back-Light Unit Characeristics

The back-light system is an edge-lighting type with white 8 LEDs. The characteristics of the back-light are shown in the following tables.

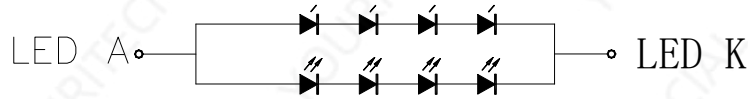
Characteristics	Symbol	Min.	Type	Max.	Unit	Notes
Forward Voltage	V _F	11.5	--	13.0	V	--
Forward current	I _F	--	40	--	mA	--
Luminance(With LCD+CTP)	L _v	--	350	--	cd/m ²	--
LED life time	N/A	--	30,000	--	Hr	Note 1

Note:

- (1) The “LED life time” is defined as the module brightness decrease to 50% of original brightness at I_L=20mA/LED. The LED life time could be decreased if operating I_L is larger than 25mA/LED.

Backlight circuit diagram shown in below:





5. Module Function Description

Pin No.	Symbol	Functional	Not
1	YU	No Connection.	es
2	XL	No Connection.	
3	YD	No Connection.	
4	XR	No Connection.	
5	GND	Power Ground	
6	GND	Power Ground	
7	IOVCC	Power Supply For I/O.	
8	VCI	Power Supply For LCD.	
9	CS	Chip select signal input pin	
10	WR/SPI-SCL	Serial interface clock	
11	SPI-SDA	Input/Output signal pin	
12	SDO	Serial data output pin used for the SPI Interface.	
13	DB0/B0	RGB interface data bus.	
14	DB1/B1	RGB interface data bus.	
15	DB2/B2	RGB interface data bus.	
16	DB3/B3	RGB interface data bus.	
17	DB4/B4	RGB interface data bus.	
18	DB5/B5	RGB interface data bus.	
19	DB6/G0	RGB interface data bus.	
20	DB7/G1	RGB interface data bus.	
21	DB8/G2	RGB interface data bus.	
22	DB9/G3	RGB interface data bus.	
23	DB10/G4	RGB interface data bus.	
24	DB11/G5	RGB interface data bus.	
25	DB12/R0	RGB interface data bus.	



26	DB13/R1	RGB interface data bus.	
27	DB14/R2	RGB interface data bus.	
28	DB15/R3	RGB interface data bus.	
29	DB16/R4	RGB interface data bus.	
30	DB17/R5	RGB interface data bus.	
31	DE	Data enable signal for RGB interface operation.	
32	PCLK	Dot clock signal for RGB interface operation.	
33	HSYNC	Horizontal (Line) synchronizing input signal for RGB interface operation.	
34	VSNC	Vertical (Frame) synchronizing input signal for RGB interface operation.	
35	RESET	Reset signal input terminal. Active at 'L' .	
36	GND	Power Ground	
37	LEDA	Power supply for backlight anode input terminal.	
38	LEDA	Power supply for backlight anode input terminal.	
39	LEDK	Power supply for backlight cathode input terminal.	
40	LEDK	Power supply for backlight cathode input terminal.	

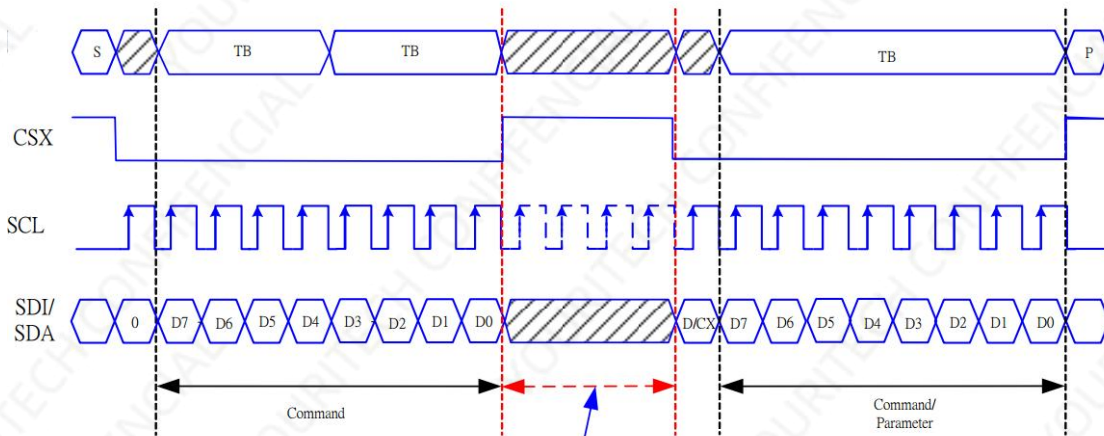
CTP PIN Description:

Pin No.	Symbol	CTP Functional	Notes
1	TP_SDA(3.3V)	Touch panel I2C data	
2	TP_SCL(3.3V)	Touch panel I2C clock	
3	TP_RST(3.3V)	Touch panel reset	
4	TP_INT(3.3V)	Touch panel interrupt output	
5	TP_VDD(3.3V)	Touch panel I/O PWR supply	
6	GND	Power Ground	



6. Timing Characteristics

SPI interface pause



The CSX can be in high level between the data and the next command.
The SDI(SDA) and SCL are invalid if the CSX is in high level.

RGB interface timing

The timing chart of RGB interface DE mode is shown as follows.

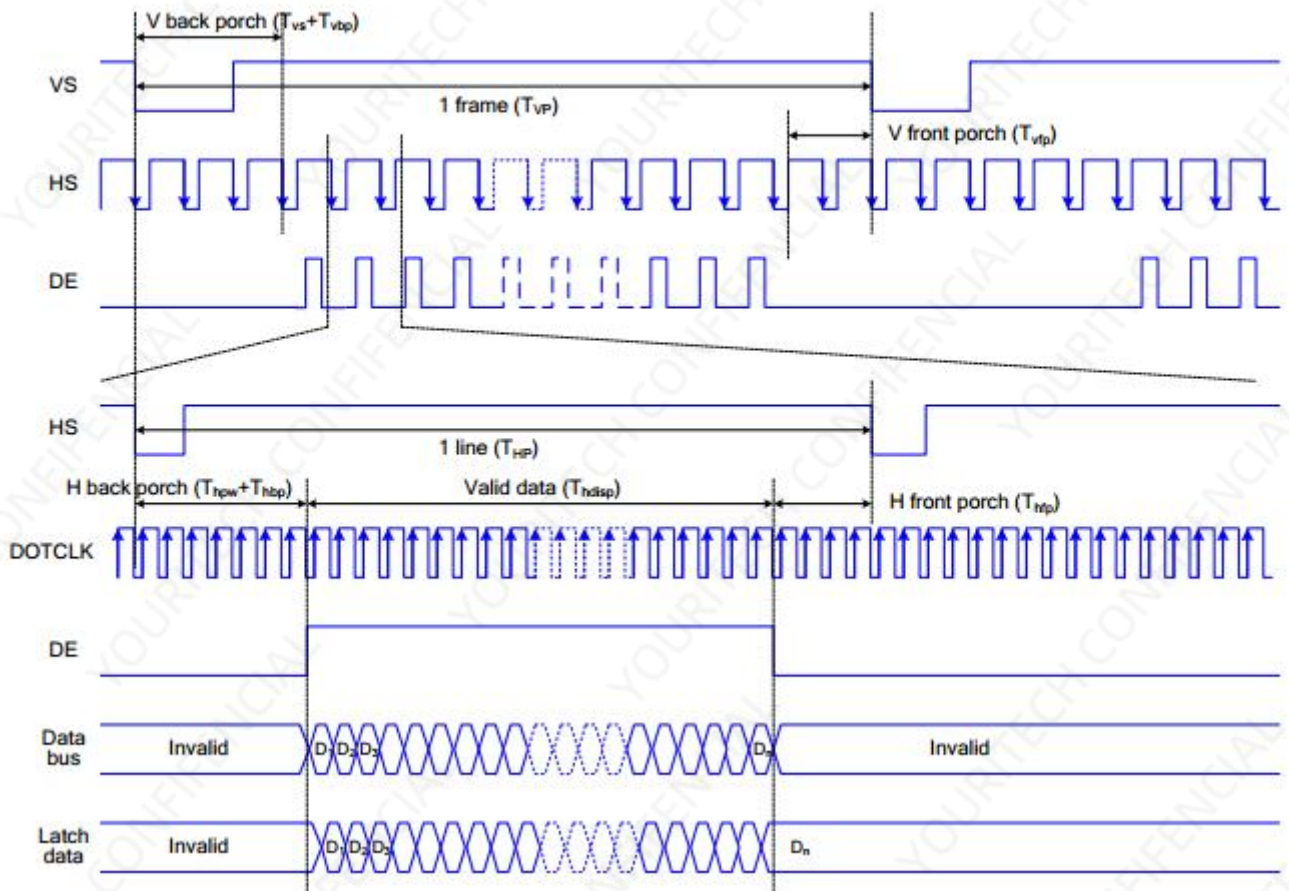
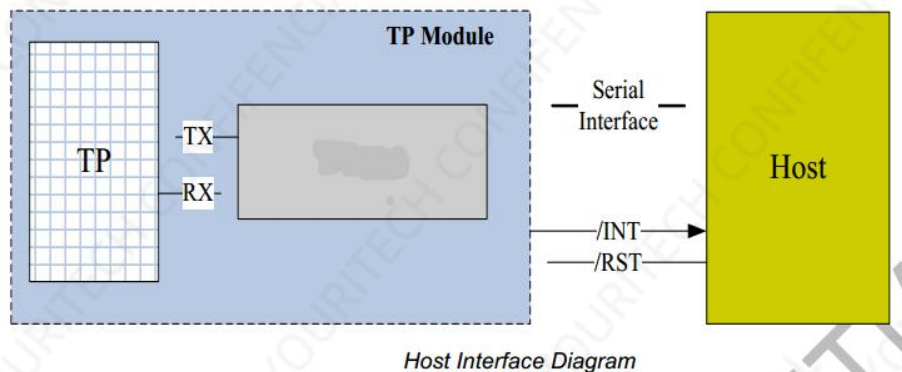


Figure 22 Access Area by RGB Interface

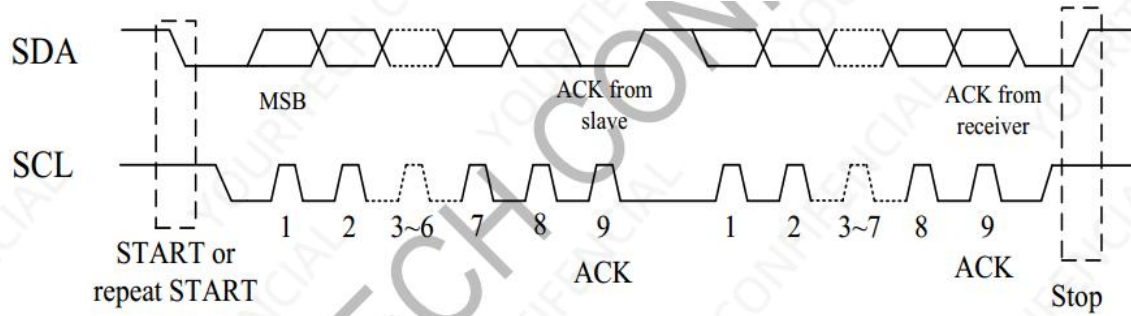
Please refer to the following table for the setting limitation of RGB interface signals.

Parameter	Symbol	Min.	Typ.	Max.	Unit
Horizontal Sync. Width	hpw	1	-	255	Clock
Horizontal Sync. Back Porch	hbp	1	--	255	Clock
Horizontal Sync. Front Porch	hfp	1	--	-	Clock
Vertical Sync. Width	vs	1	--	254	Line
Vertical Sync. Back Porch	vbp	1	--	254	Line
Vertical Sync. Front Porch	vfp	2	--	--	Line

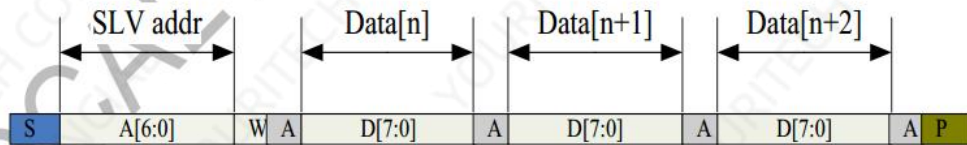


Host Interface Diagram





I2C Serial Data Transfer Format



I2C master write, slave read

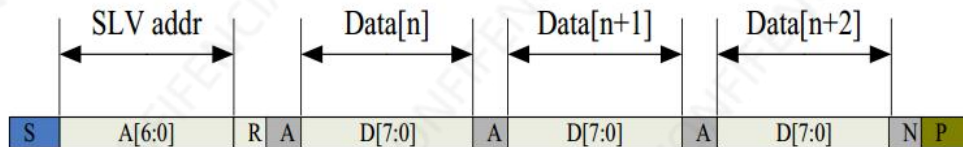


Figure 2-6 I2C master read, slave write

lists the meanings of the mnemonics used in the above figures.

I2C Interface Timing Characteristics is shown in Table 2-2.

Table 2-2 I2C Timing Characteristics

Parameter	Min	Max	Unit
SCL frequency	0	400	KHz
Bus free time between a STOP and START condition	1.3		us
Hold time (repeated) START condition	0.6		us
Data setup time	100		ns
Setup time for a repeated START condition	0.6		us
Setup Time for STOP condition	0.6		us

7. Optical Characteristics

7.1 Optical Specification

Item	Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Transmittance (with Polarizer)	T (%)	$\Theta=0$ Normal viewing	-	(4.2)	-	%	Measuring with normal polarizer, Reference Only Base on Vop=5.1V



Transmittance (without Polarizer)		T (%)	angle	-	(14.7)	—	%	
Contrast Ratio		CR		640	800	—	-	(1)(2)
Response Time		T _R +T _F		—	25	35	msec	(1)(3)
Color Gamut	(%)			55	60	—	%	C-light
Color Chromaticity (CIE1931)	White	W _x		—	TBD	—	-	(1)(4) CF glass C-light
		W _y		—	TBD	—	-	
	Red	R _x		—	TBD	—	-	
		R _y		—	TBD	—	-	
	Green	G _x		—	TBD	—	-	
		G _y		—	TBD	—	-	
	Blue	B _x		—	TBD	—	-	
		B _y		—	TBD	—	-	
Viewing Angle	Hor.	Θ _L	CR>10	70	80	—	-	(1)(4) Measuring with normal polarizer, Reference Only
		Θ _R		70	80	—	-	
	Ver.	Θ _U		70	80	—	-	
		Θ _D		70	80	—	-	
Optima View Direction		Free						(5)

7.2 Measuring Condition

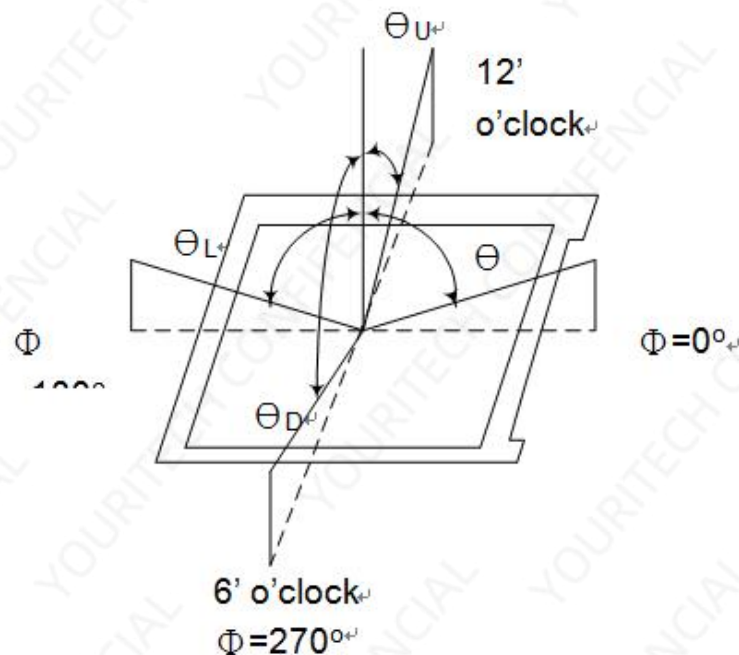
- Measuring surrounding: dark room
- Ambient temperature: 25±2°C
- 15min. warm-up time.

7.3 Measuring Equipment

- FPM520 of Westar Display technologies, INC., which utilized SR-3 for Chromaticity and BM-5A for other optical characteristics.

Note (1) Definition of Viewing Angle:

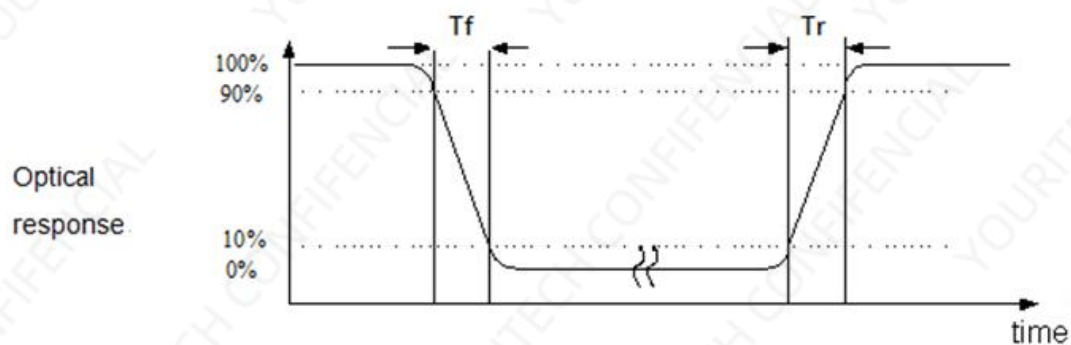




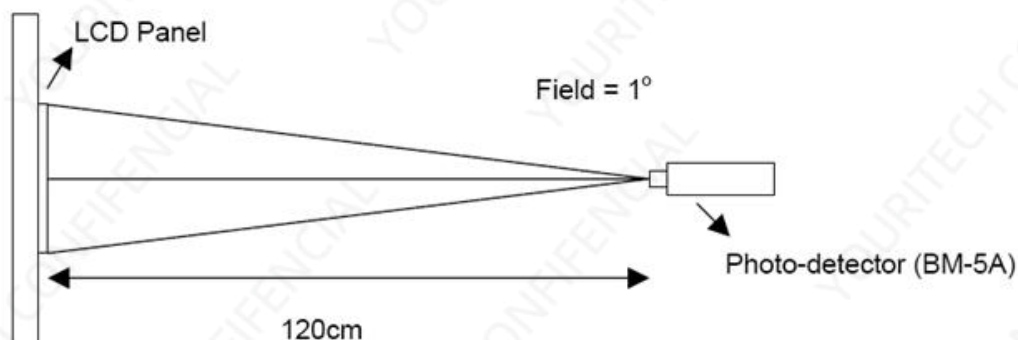
Note (2) Definition of Contrast Ratio (CR) :
measured at the center point of panel

$$CR = \frac{\text{Luminance with all pixels white}}{\text{Luminance with all pixels black}}$$

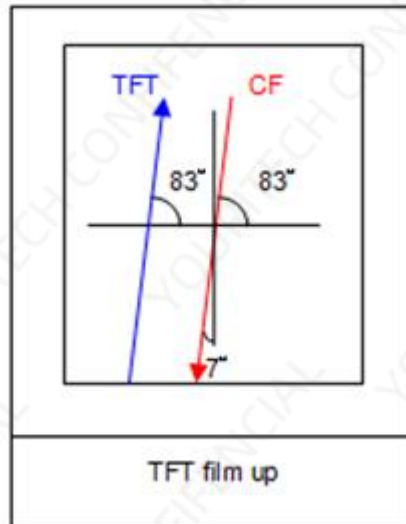
Note (3) Definition of Response Time : Sum of T_R and T_F



Note (4) Definition of optical measurement setup



Note (5) Rubbing Direction (The different Rubbing Direction will cause the different optima view direction.)



8. Reliability Test Item

No.	Test Item	Test Condition	Notes
1	High Temp. Storage	+80°C / 96H	1. Functional test is OK. Missing Segment, short, unclear segment non-display, display abnormally and liquid crystal leakage un-allowed. 2. No low temperature bubbles, end seal loose and fall, frame rainbow.
2	Low Temp. Storage	-30°C / 96H	
3	High Temp. Operating	+70°C / 96H	
4	Low Temp. Operating	-20°C / 96H	
5	High Temperature / Humidity storage	50°C x 90%RH / 96H	
6	Thermal and cold shock	Static state, -20°C (30min) ~ 60°C (30min), 10 cycles	

9. Packing Method----TBD

- END -

