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MODEL NO : ET030QV01-T

MODEL VERSION: 01

SPEC VERSION : 1.0

ISSUED DATE: 2020-08-31

□Preliminary Specification

■Final Product Specification

Customer :_____

Approved by	Notes

Youri Confirmation

Prepared by	Reviewed by	Approved by
John	Johnny	Wang

1. Introduction

1.1 Scope of application

LCD specification: Dots 240xRGBx400.
As to basic specification of the driver IC, refer to the IC (ST7793) specification and data book.
All material & processing of the LCD module should be Lead Free.

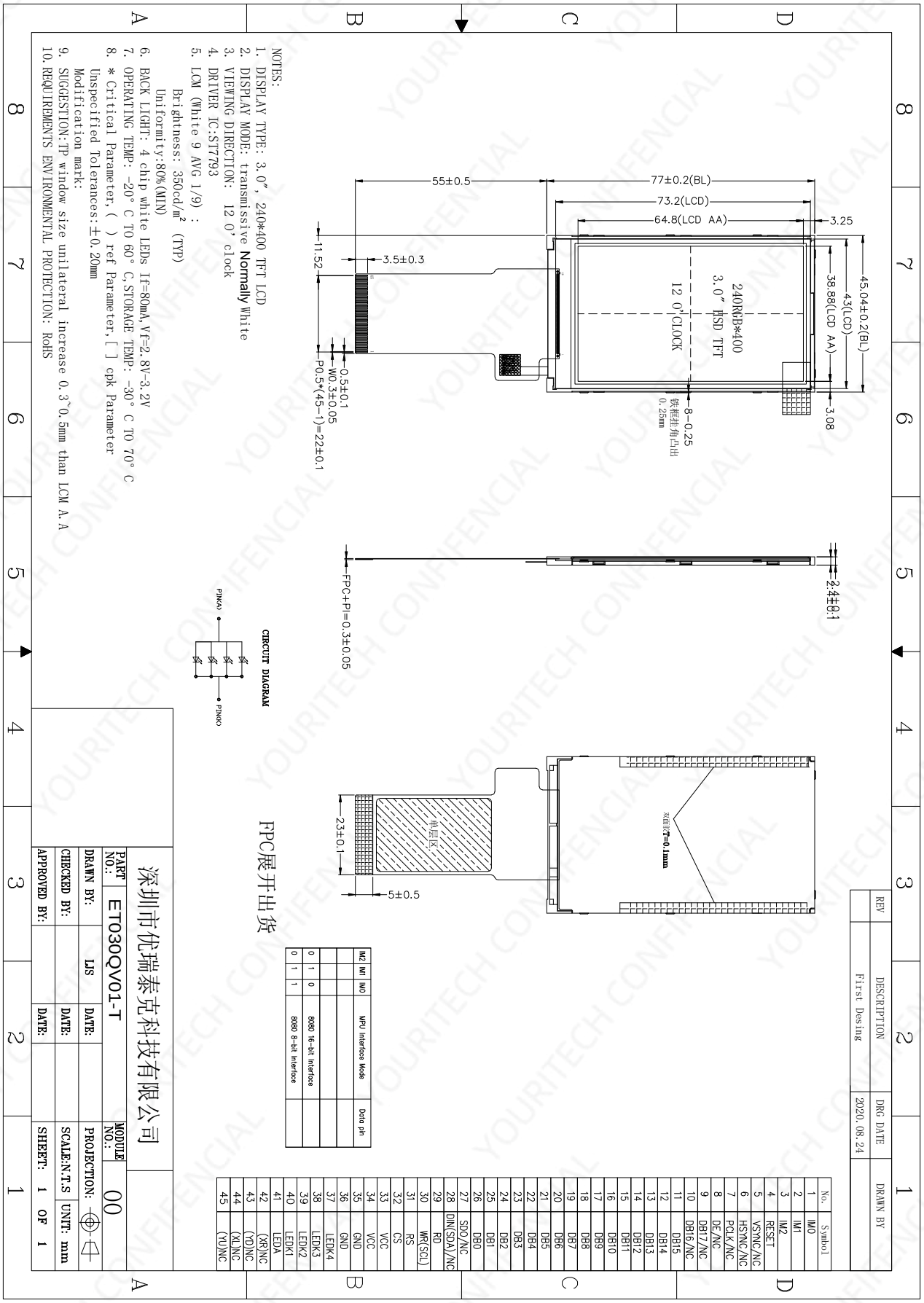
1.2 TFT features:

Structure: TFT PANNEL+IC +FPC+BL;
12'CLOCK Type LCD
240dot-segment and 400 dot-common outputs;
65K Color can be selected by software;
White LED back light;
8/16bit MCU interface

1.3 Applications:

2. LCM General specification

ITEM	Sandard value	Unit
LCD Type	Normally White	--
Drive element	TFT active matrix	--
Number of pixels	240*3RGB(H)X400(V)	Dots
Pixel arrangement	RGB stripe	--
Pixel Pitch (W*H)	0.162(W) × 0.162(H)	mm
Active area	38.88(W) × 64.80(H)	mm
Viewing direction	12 O'CLOCK	--
TFT Driver IC	ST7793	--
TFT interface	8/16bit MCU Interface	--
Module Size(W*H*T)	45.04W) ×77.00 (H) ×2.54(D)	mm
Approx. Weight	TBD	g
Touch structure	--	--
Touch Driver IC	--	--
Touch Interface	--	--



IM2	IM1	IM0	MPU Interface Mode	Data pin
0	1	0	8080 16-bit Interface	
0	1	1	8080 8-bit Interface	

No.	Symbol	No.	Symbol	No.	Symbol
1	IM0	16	DB10	31	RS
2	IM1	17	DB9	32	CS
3	IM2	18	DB8	33	VCC
4	RESET	19	DB7	34	VCC
5	VSYNC/NC	20	DB6	35	GND
6	HSYNC/NC	21	DB5	36	GND
7	PCLK/NC	22	DB4	37	LEDK4
8	DE/NC	23	DB3	38	LEDK3
9	DB17/NC	24	DB2	39	LEDK2
10	DB16/NC	25	DB1	40	LEDK1
11	DB15	26	DB0	41	LEDA
12	DB14	27	SDO/NC	42	(XR)NC
13	DB13	28	DIN(SDA)/NC	43	(YD)NC
14	DB12	29	RD	44	(XL)NC
15	DB11	30	WR(SCL)	45	(YU)NC

3.Absolute Maximum Rating

Characteristics	Symbol	Min.	Max.	Unit
LCM Operating Temperature	T_{OPR}	-20	+60	°C
LCM Storage Temperature	T_{STG}	-30	+70	°C
Humidity	RH	--	90	%

4.Electrical Characteristics

4.1 TFT DC Characteristics

Characteristics	Symbol	Min.	Typ.	Max.	Unit
Supply Voltage for I/O	VDDIO	--	--	--	V
Supply Voltage for(DC/DC)	VDD	2.6	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

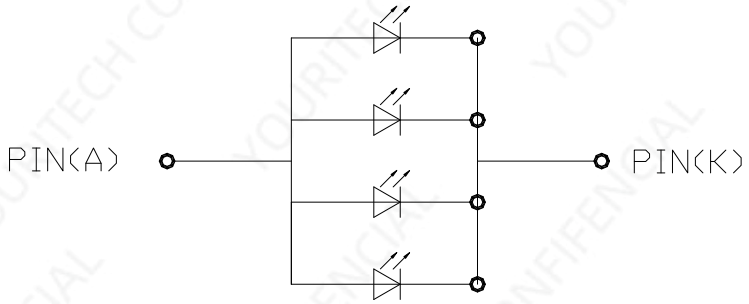
The back-light system is an edge-lighting type with 4 white LEDs. The characteristics of the back-light are shown in the following tables.

Characteristics	Symbol	Min.	Type	Max.	Unit	Notes
Forward Voltage	V_F	2.8	--	3.2	V	--
Forward current	I_F	--	80	--	mA	--
Luminance(With LCD)	Lv	--	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	Notes
1	IM0	IM2 IM1 IM0 MPU Interface Mode Data pin 0 0 0 8080 18-bit Interface DB[17:0] 0 0 1 8080 9-bit Interface DB[17:9] 0 1 0 8080 16-bit Interface DB[17:10], DB[8:1] 0 1 1 8080 8-bit Interface DB[17:10],	Parallel MCU Interface (8/9/16bit) Optional
2	IM1		
3	IM2		
4	RESET	Reset signal input terminal. Active at 'L'.	
5	VSYNC/NC	NC	
6	HSYNC/NC	NC	
7	PCLK/NC	NC	
8	DEN/NC	NC	
9	DB17/NC	NC	
10	DB16/NC	NC	
11~26	DB15~DB0	data bus	
27	SDO/NC	NC	
28	SDA/NC	NC	
29	RD	Read enable in 8080 MCU parallel interface	
30	WR(SCL)	Write enable in MCU parallel interface	
31	RS	Display data/command selection pin in parallel interface	
32	CS	Chip select signal input pin	
33~34	VCC	Power supply	
35~36	GND	Power Ground	
37	LEDK4	Power supply for backlight cathode input terminal.	
38	LEDK3	Power supply for backlight cathode input terminal.	
39	LEDK2	Power supply for backlight cathode input terminal.	
40	LEDK1	Power supply for backlight cathode input terminal.	
41	LEDA	Power supply for backlight anode input terminal.	
42	(XR)NC	NC	
43	(YD)NC	NC	
44	(XL)NC	NC	
45	(YU)NC	NC	

6. Timing Characteristics

8080 Series MCU Parallel Interface Characteristics: 18/16/9/8-bit Bus

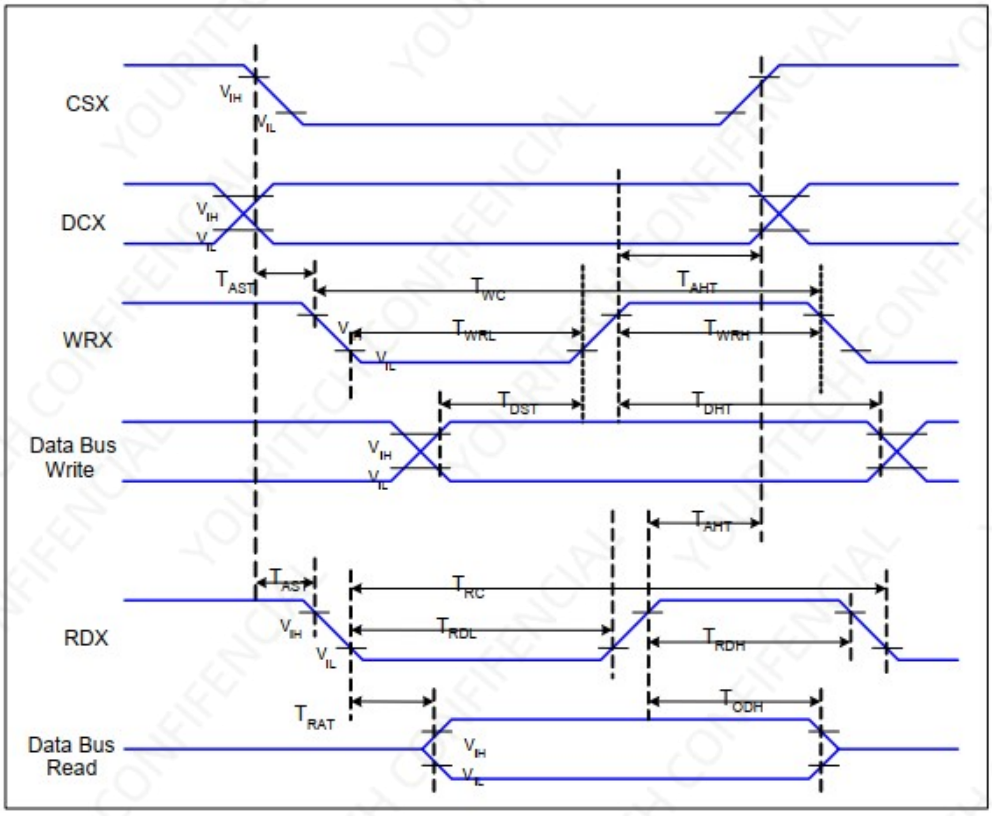


Figure 2 Parallel Interface Timing Characteristics (8080-Series MCU Interface)

VDDI=1.65 to VDD, VDD=2.5 to 3.3V, AGND=DGND=0V, Ta=25 ℃

Signal	Symbol	Parameter	Min	Max	Unit	Description
DCX	TAST	Address Setup Time	0	--	ns	
	TAHT	Address Hold Time (Write/Read)	2	--	ns	
WRX	TWC	Write Cycle	75	--	ns	
	TWRH	Control Pulse "H" Duration	25	--	ns	
	TWRL	Control Pulse "L" Duration	30	--	ns	
RDX	TRC	Read Cycle (ID)	450	--	ns	When Read ID Data
	TRDH	Control Pulse "H" Duration (ID)	250	--	ns	
	TRDL	Control Pulse "L" Duration (ID)	170	--	ns	
DB[17:0]	TDST	Data Setup Time	20	--	ns	TRAT, TRATFM: 3K ohm Pull up or Down and 30pF Parallel Cap. To GND. TODH: 3K ohm Pull up or Down.
	TDHT	Data Hold Time	10	--	ns	
	TRAT	Read Access Time (ID)	--	150	ns	
	TODH	Output Disable Time	10	--	ns	

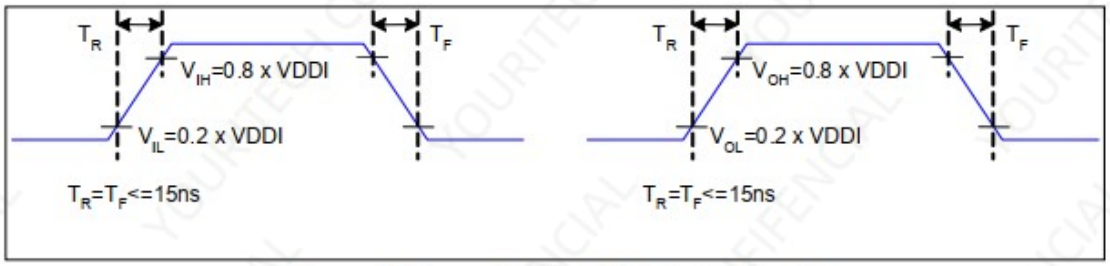


Figure 3 Rising and Falling Timing for I/O Signal

Note: The rising time and falling time (Tr, Tf) of input signal and fall time are specified at 15 ns or less. Logic high and low levels are specified as 20% and 80% of VDDI for Input signals.

Reset Timing

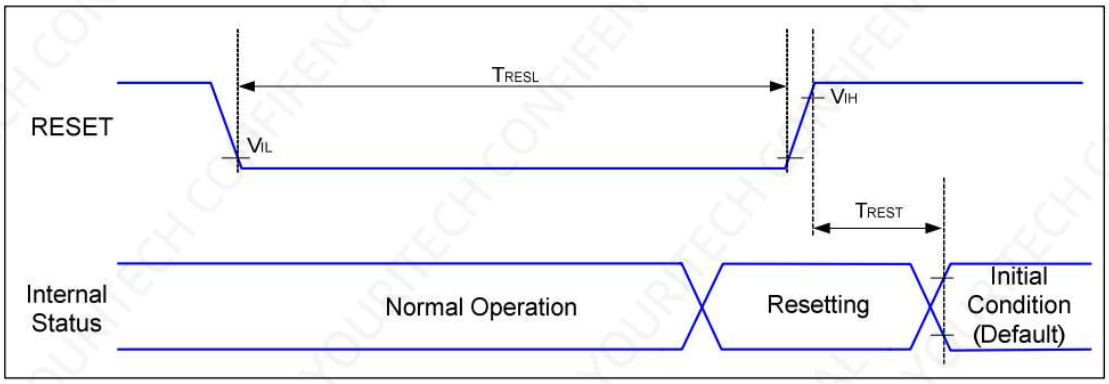


Figure 41 Reset Timing

VDDI=1.65 to VDD, VDD=2.5 to 3.3V, AGND=DGND=0V, Ta=25℃

Signal	Symbol	Parameter	Min	Max	Unit	Description
RESET	TRESL	Reset Low Level Width	1	-	ms	-
	TREST	Reset Complete Time	1		ms	

Table 8 Reset timing Characteristics

7.Optical Characteristics

Optical specification

Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Transmittance (without Polarizer)		T(%)	–	–	14.77%	–	–	
Contrast Ratio		CR	Θ=0	480	600	–	–	(1)(2)
Response time	Rising	T_R	Normal viewing angle	–	2	4	msec	(1)(3)
	Falling	T_F	– –	–	6	12		
Color gamut		S(%)			60		%	
Color chromaticity (CIE1931)	White	W_x		0.283	0.303	0.323		(1)(4) CF glass
		Wy		0.305	0.325	0.345		
	Red	Rx		0.606	0.626	0.646		
		Ry		0.314	0.334	0.354		
	Green	Gx		0.257	0.277	0.297		
		Gy		0.529	0.549	0.569		
	Blue	Bx		0.122	0.142	0.162		
		By		0.102	0.122	0.142		
Viewing angle	Hor.	Θ_L	CR>10	65	75	–		Viewing Angle base on using EWV Polarizer , Reference Only
		Θ_R		65	75	–		
	Ver.	Θ_U		65	75	–		
		Θ_D		45	55	–		
Optima View Direction		12 O'clock						(5)

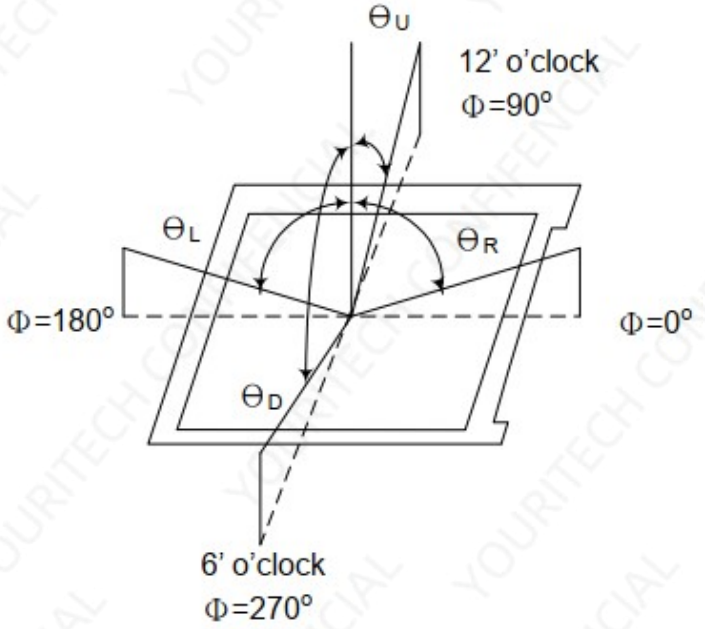
Measuring Condition

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

Measuring Equipment

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

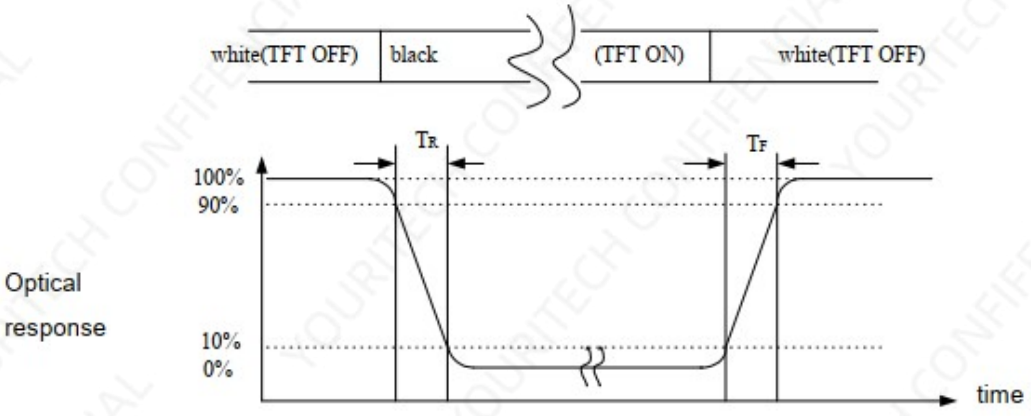
Note (1) Definition of Viewing Angle :



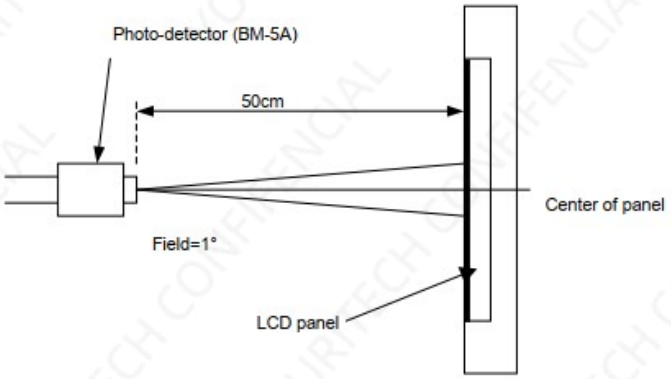
Note (2) Definition of Contrast Ratio(CR) :
measured at the center point of panel

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

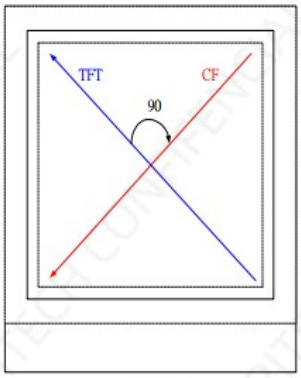
Note (3) Definition of Response Time : Sum of T_R and T_F



Note (4) Definition of optical measurement setup



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



TFT Face up

8. Reliability Test Item

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

9. Packing Method----TBD

- END -