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System solutions

OEM Solutions

Custom Display

Mechanical design



MODEL NO : ET030VG01-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 960xRGBx240.

As to basic specification of the driver IC, refer to the IC (ILITEK:ILI8961) 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;;

ALL O'CLOCK Type LCD

960dot-segment and 240 dot-common outputs;

16.7M Color can be selected by software;

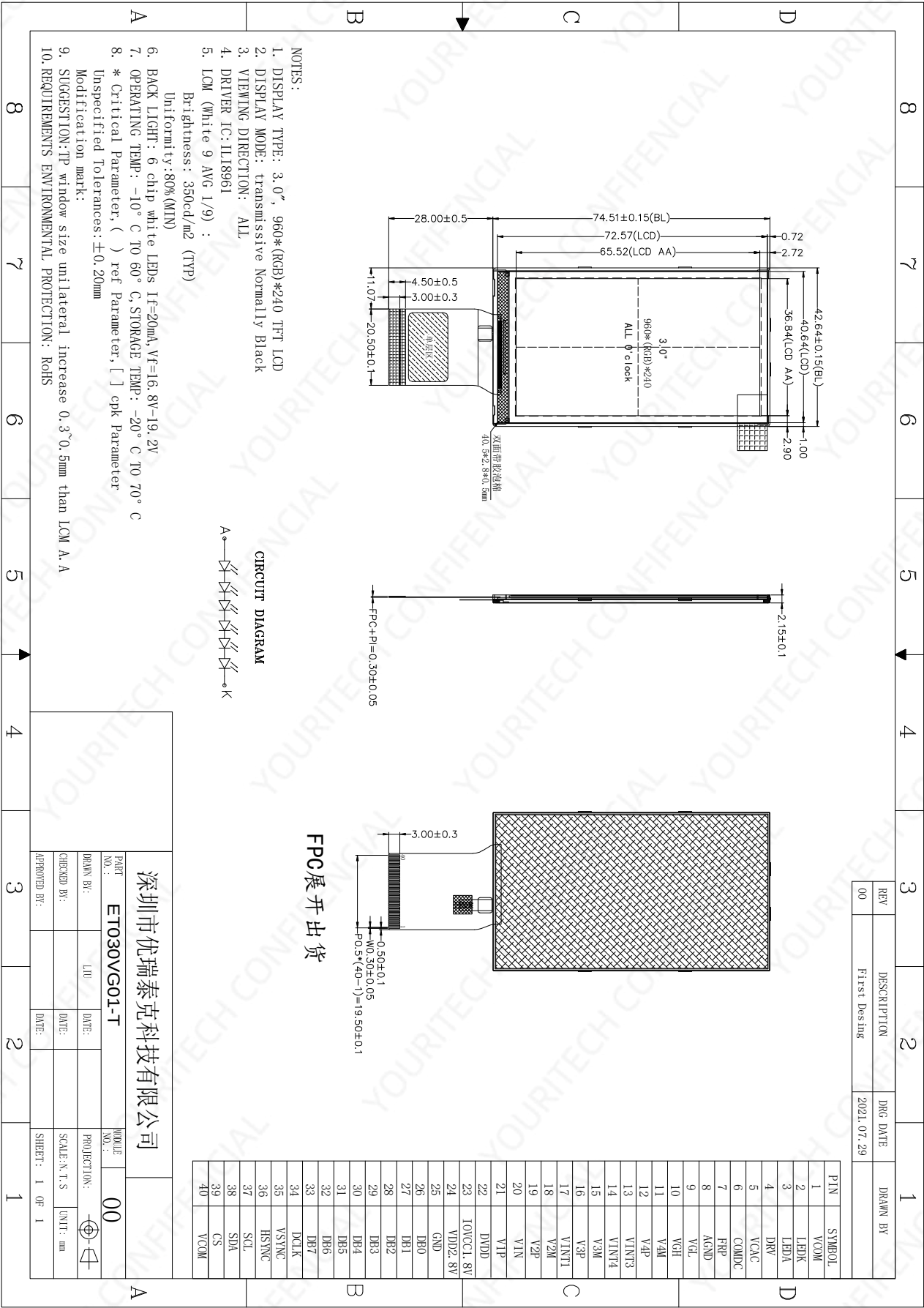
White LED back light;

8 RGB interface

1.3 Applications:

2. LCM General specification

ITEM	Standard value	Unit
LCD Type	Normally black	--
Drive element	TFT active matrix	--
Number of pixels	960*3RGB(H)X240(V)	Dots
Pixel arrangement	RGB stripe	--
Pixel Pitch (H*V)	0.20475 × 0.1535	mm
Active area	36.84(H) x65.52(V)	mm
Viewing direction	ALL O'CLOCK	--
TFT Driver IC	ILI8961	--
TFT interface	8 RGB interface	--
Approx. Weight	TBD	g
LCM Size(W*H*T)	42.64W) x 74.51(H) x2.15(T)	mm
Touch structure	--	--
Touch Driver IC	--	--
Touch Interface	--	--



3.Absolute Maximum Rating

Characteristics	Symbol	Min.	Max.	Unit
LCM Operating Temperature	T _{OPR}	-10	+60	°C
LCM Storage Temperature	T _{STG}	-20	+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	1.65	1.8	3.6	V
Supply Voltage for(DC/DC)	VDD	2.7	2.8	3.6	V
Supply Voltage for(DC/DC)	AVDD	--	--	--	V
Supply Voltage for(DC/DC)	AVEE	--	--	--	V

4.2Back-Light Unit Characeristics

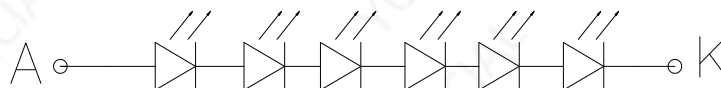
The back-light system is an edge-lighting type with white 6 LEDs. The characteristics of the back-light are shown in the following tables.

Characteristics	Symbol	Min.	Type	Max.	Unit	Notes
Forward Voltage	V _F	16.8	--	19.2	V	--
Forward current	I _F	--	20	--	mA	--
Luminance(With LCD)	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:

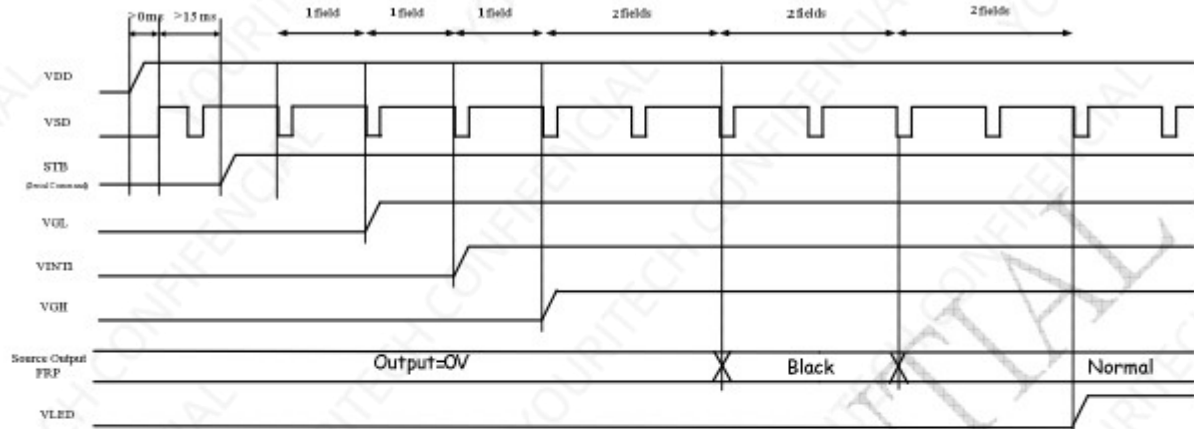


5. Module Function Description

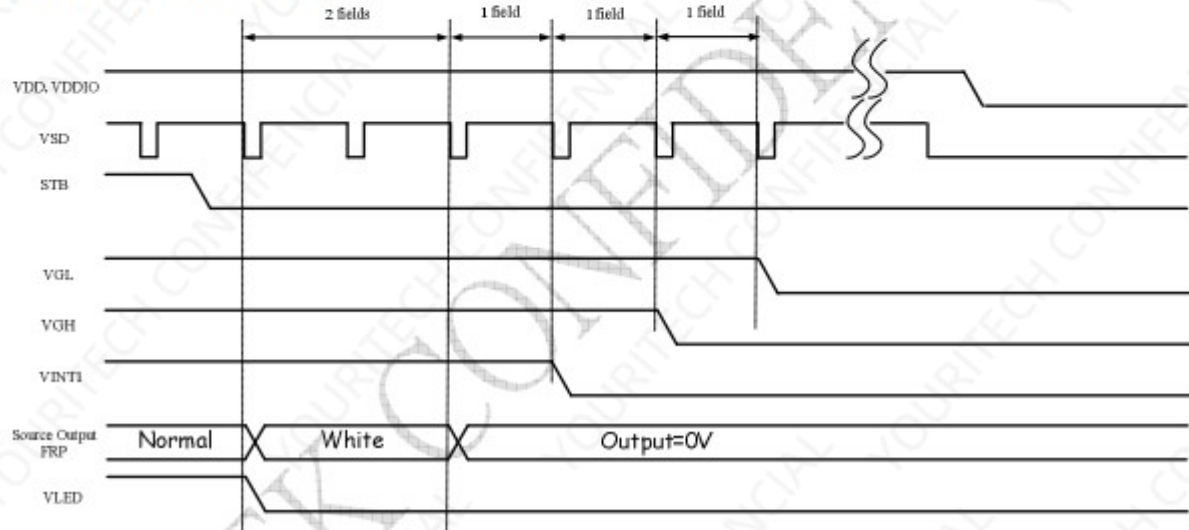
Pin No.	Symbol	Description
1	VCOM	TFT common lane
2	LEDK	POWER SUPPLY- FOR BACKLIGHT cathode
3	LEDA	POWER SUPPLY+ FOR BACKLIGHT ANODE
4	DRV	Power transistor signal for back light power boost converter
5	VCAC	Power setting capacitor for vcom AC.
6	COMDC	VCOM DC output.
7	FRP	Frame polarity output for panel vcom.
8	AGND	Ground for analog circuit.
9	VGL	Power setting capacitor connect pin.
10	VGH	Power setting capacitor connect pin.
11-12	V4M/V4P	V4M/V4P capacitor connect pin for internal charge pump
13	VINT3	VINT3,Floating this pin.
14	VINT4	VINT4,Floating this pin.
15-16	V3M/V3P	V3M/V3P capacitor connect pin for internal charge pump
17	VINT1	VINT1,Power setting capacitor connect pin.
18-19	V2M/V2P	V2M/V2P capacitor connect pin for internal charge pump
20-21	V1N-V1P	V1M/V1P capacitor connect pin for internal charge pump
22	DVDD	Power supply for analog circuit.
23	IOVCC 1.8V	POWER SUPPLY (1.8V/2.8V)
24	VCI 2.8V	PINPOWER SUPPLY (2.8V)
25	GND	Gound
26-33	DB0-DB7	8-bit digital data input.
34	DCLK	Clock signal. Latching data at the rising edge.
35	VSYNC	Vertical sync input. Negative polarity.
36	HSYNC	Horizontal Sync input. Negative polarity.
37	SCL	Serial communication clock input.
38	SDA	Serial communication data input.
39	CS	CHIP SELECT
40	VCOM	TFT common plane.

6. Timing Characteristics

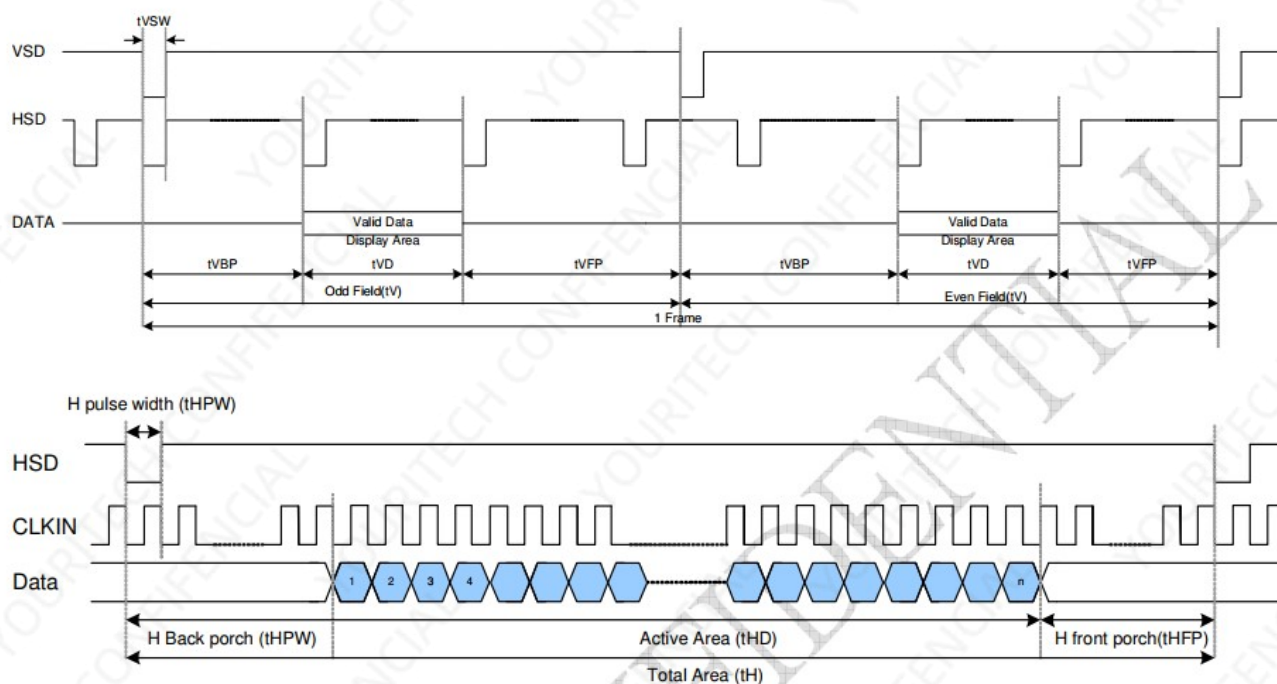
Power On Sequence



Power Off Sequence

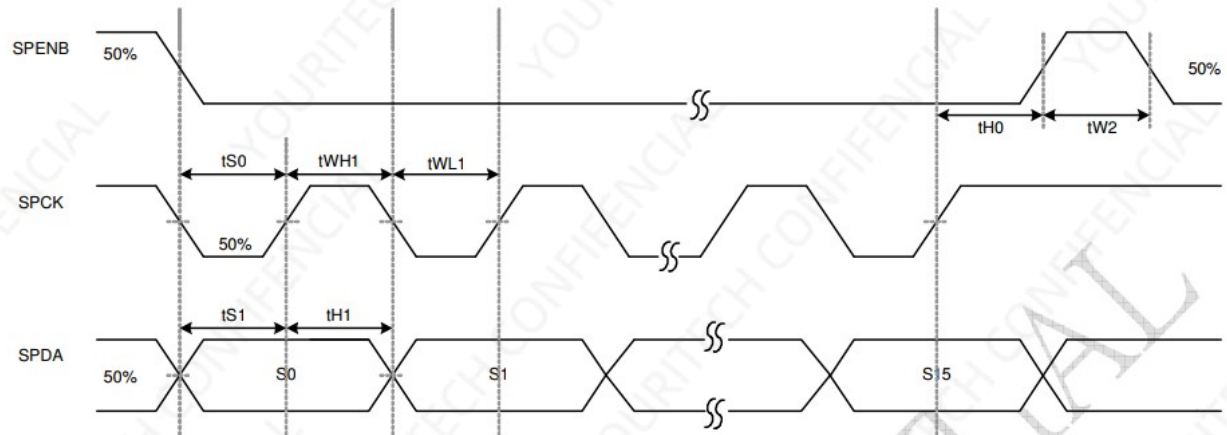


8-bit RGB/8-bit Dummy RGB/YUV /Parallel RGB Input Timing Chart



Parameter	Symbol	Interface			Unit
		Min.	Typ.	Max.	
CLKIN frequency	fCLKIN	13.5	27	27.19	MHz
HSD period	tH	1024	1716	1728	CLKIN
HSD display period	tHD		960		CLKIN
HSD back porch	tHBP	50	70	255	CLKIN
HSD front porch	tHFP	14	686	718	CLKIN
HSD pulse width	tHSW	1	1	tHBP-1	CLKIN
VSD period time	tV	242.5	262.5	450.5	H
Vertical display area	tVD		240		H
VSD back porch	tVBP	1	21	31	H
		1.5	21.5	31.5	
VSD front porch	tVFP	1.5	1.5	179.5	H
		1	1	179	
VSD pulse width	tVSW	1CLKIN	1CLKIN	6H	
1 Frame		485	525	901	H

Serial Control Timing



Item	symbol	Min.	Typ.	Max.	Unit
SPENB input setup time	t_{S0}	50			ns
Serial data input setup time	t_{S1}	50			ns
SPENB input hold time	t_{H0}	50			ns
Serial Data Input hold time	t_{H1}	50			ns
SPCK pulse high width	t_{WH1}	50			ns
SPCK pulse low width	t_{WL1}	50			ns
SPENB pulse high width	t_{W2}	400			ns

7.Optical Characteristics

7.1 Optical Specification

<Table 4. Optical Specifications >

Parameter		Symbol	Condition	Min.	Typ.	Max.	Unit	Remark
Viewing Angle Range	Horizontal	Θ3	CR>10	80	85	-	Deg.	Note1
		Θ9		80	85	-	Deg.	
	Vertical	Θ12		80	85	-	Deg.	
		Θ6		80	85	-	Deg.	
Contrast ratio		CR	Θ = 0°	1000	1500	-		Note2
Transmittance		Tr		4.0	4.7		%	Note3
Color Gamut		CG		55	60		%	
Reproduction of color	Red	Rx	Θ = 0°	0.605	0.635	0.665		Note4 (Based on C Light)
		Ry		0.306	0.336	0.366		
	Green	Gx		0.275	0.305	0.335		
		Gy		0.518	0.548	0.578		
	Blue	Bx		0.108	0.138	0.168		
		By		0.110	0.130	0.150		

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit	Remark
White Chromaticity	W _x	$\Theta = 0^\circ$	0.289	0.319	0.349		Based on C Light
	W _y		0.310	0.340	0.370		
Response Time (Rising + Falling)	T _r + T _f	T _a = 25° C $\Theta = 0^\circ$		25	35	ms	Note 5

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 $\Theta = 0$ 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 FIGUR 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. Transmittance is the Value without APF and without CG.
4. The color chromaticity coordinates specified in the above table 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.
5. The electro-optical response time measurements shall be made as FIGURE 2 by switching the "data" input signal ON and OFF. The times needed for the luminance to change from 10% to 90% is T_r, and 90% to 10% is T_f.

Figure1 Measurement Set Up

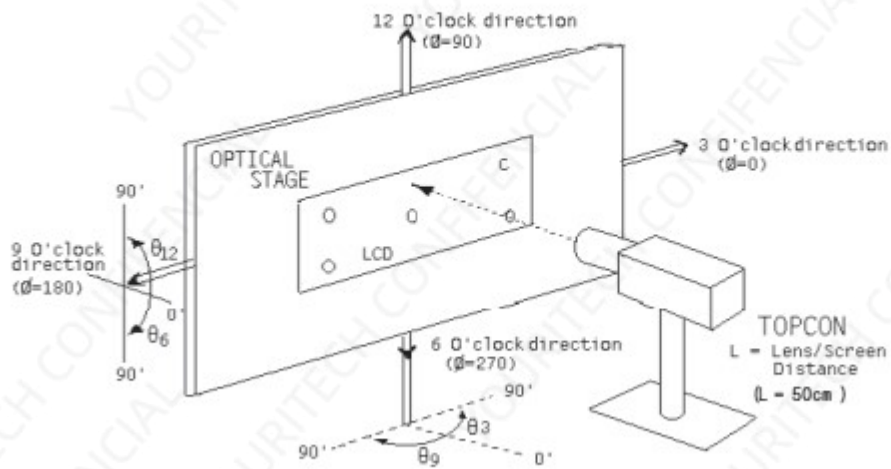
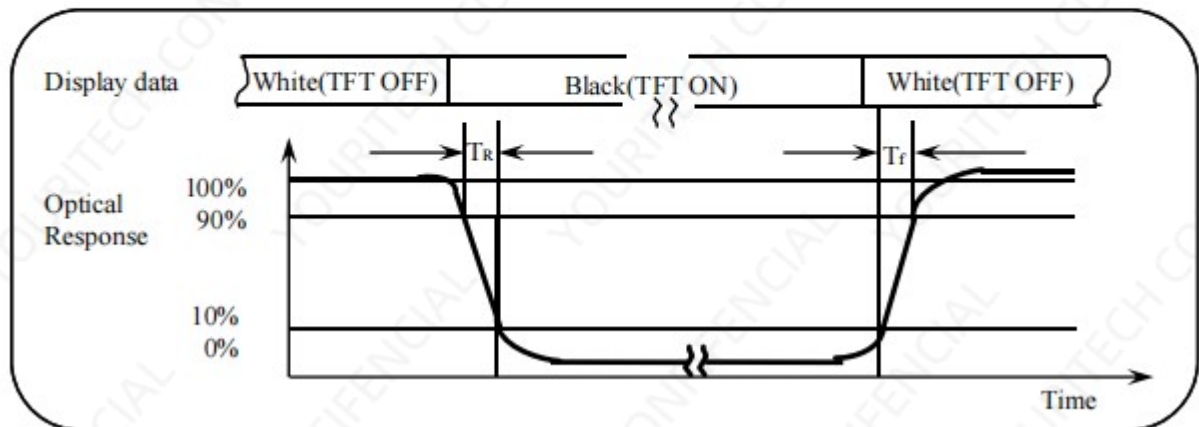


Figure2 Response Time Testing



8. Reliability Test Item

No.	Test Item	Test Condition	Notes
1	High Temp. Storage	+70°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	-20°C / 96H	
3	High Temp. Operating	+60°C / 96H	
4	Low Temp. Operating	-10°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), 50 cycles	

9. Packing Method----TBD

- END -