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MODEL NO : ET116FH01-T

MODEL VERSION: 01

SPEC VERSION : 1.0

ISSUED DATE: 2022-08-29

☐ 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 1920xRGBx1080.

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

1920dot-segment and1080 dot-common outputs;

16.7M Color can be selected by software;

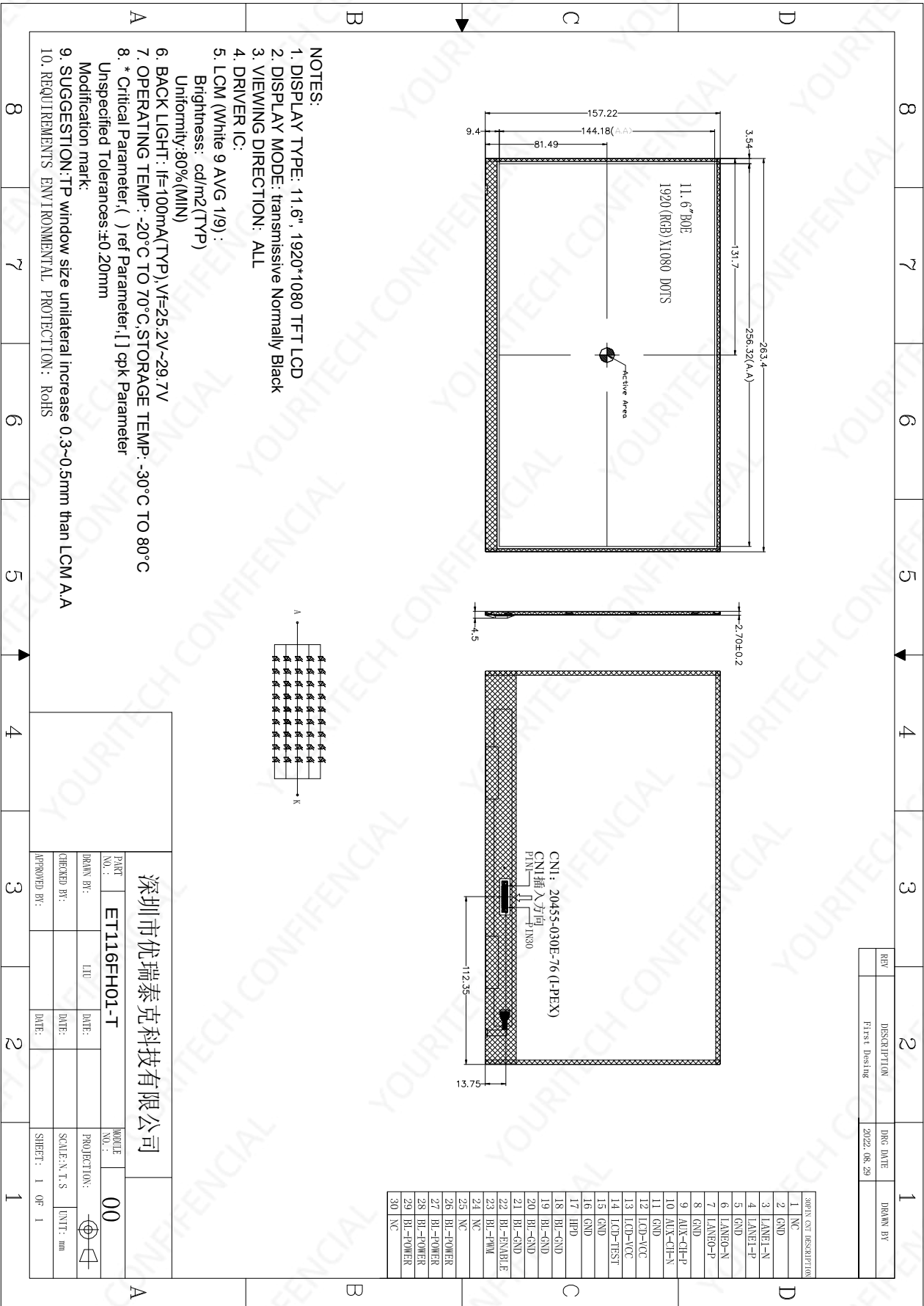
White LED back light;

2lane EDP interface

1.3 Applications:

2. LCM General specification

ITEM	Standard value	Unit
LCD Type	Normally Black	--
Drive element	TFT active matrix	--
Number of pixels	1920*3RGB(H)X1080(V)	Dots
Pixel arrangement	RGB vertical stripe	--
Pixel Pitch (W*H)	0.1335 (H) × 0.1335 (V)	mm
Active area	256.32(H) x 144.18(V)	mm
Viewing direction	ALL O'CLOCK	-
TFT Driver IC	TBD	
TFT interface	2lane EDP interface	-
Approx. Weight	TBD	g
LCM Size(W*H*T)	263.40(W)x157.22(H) x 2.7(T)	mm
Touch structure	--	
Touch Driver IC	--	-
Touch Interface	--	



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
Humidity	RH	-	90	%

4.Electrical Characteristics

4.1 TFT-LCD panel driving

Parameter		Min.	Typ.	Max.	Unit	Remarks
LCD Power Supply Voltage	V _{DD}	3.0	3.3	3.6	V	
Operating Temperature	T _{OP}	-20		70	°C	
Storage Temperature	T _{ST}	-30		80	°C	
Power supply voltage for LED Driver	V _{LED}	5	12	21	V	
Maximum LED Current Setting	ICH_MAX	6	~	25	mA	LED 100% setting
Minimum LED Current Setting	ICH_Min	0.1	~	~	mA	Setting by Dimming
Output Voltage	VLED	~	~	37	V	
EN Control Level	Backlight on	1.2		5.0	V	
	Backlight off	0		0.6	V	
PWM Control Level	PWM High Level	1.2		5.0	V	
	PWM Low Level	0		0.6	V	
PWM Control Frequency	F _{PWM}	200	-	20,000	Hz	
Duty Ratio	-	1	-	100	%	

4.2 Back-Light Unit Characteristics

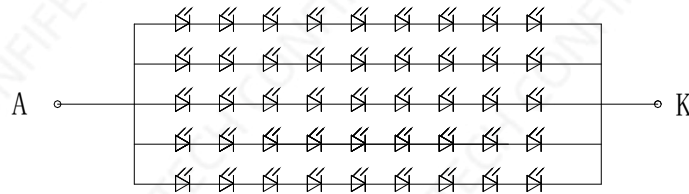
The back-light system is an edge-lighting type with 45 white LEDs. The characteristics of the back-light are shown in the following tables.

Characteristics	Symbol	Min.	Type	Max.	Unit	Notes
Forward Voltage	V_F	25.2	--	29.7	V	-
Forward current	I_F	--	100	--	mA	$V_{BL}=12.0V$ (TYP)
Luminance(With LCD)	L_v		400	--	cd/m ²	-
LED life time	N/A	--	30000	--	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 #	Symbol	Description Remark	PIN #	Symbol	Description Remark
1	CABC-EN	CABC-EN	16	GND	Power Ground
2	GND	Power Ground	17	HPD	Hot plug detect output
3	LANE1-N	eDP RX channel 1 negative	18	BL-GND	Power Ground
4	LANE1-P	eDP RX channel 1 positive	19	BL-GND	Power Ground
5	GND	Power Ground	20	BL-GND	Power Ground
6	LANE0-N	eDP RX channel 0 negative	21	BL-GND	Power Ground
7	LANE0-P	eDP RX channel 0 positive	22	BL-ENABLE	BL-ENABLE
8	GND	Power Ground	23	BL-PWM	Reset low active
9	AUX-CH-P	eDP AUX CH positive	24	MSCL	FOR DEBUG
10	AUX-CH-N	eDP AUX CH negative	25	MSDA	FOR DEBUG
11	GND	Power Ground	26	BL-POWER	BL-POWER
12	LDC-VC-C	3.3V	27	BL-POWER	BL-POWER
13	LCD-VC-C	3.3V	28	BL-POWER	BL-POWER
14	LCD-TEST	Panel self test enable	29	BL-POWER	BL-POWER
15	GND	Power Ground	30	NC	NC

6. Timing Characteristics

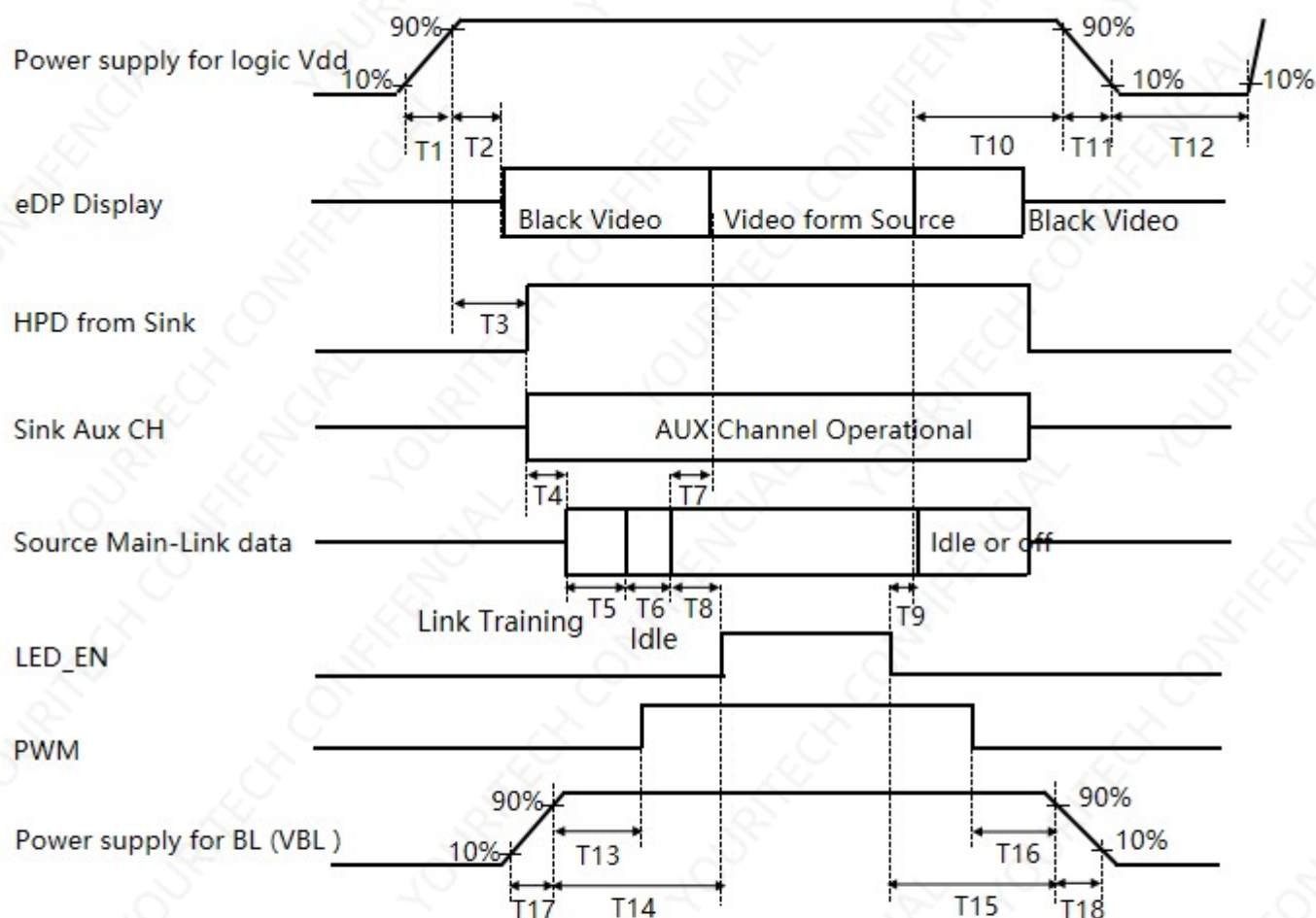
SIGNAL TIMING SPECIFICATION

The QV116FHB-N81 is operated by the DE only.

Parameter	Symbol	Value			Unit
		Min.	Typ.	Max.	
DCLK Frequency	fclk	-	477	-	MHz
Horizontal display area	thd	1920			pixel
HSYNC period time	th	-	2142	-	pixel
HSYNC blanking	thb+ thfp	-	222	-	pixel
Vertical display area	Tvd	1080			H
Frequency	fV	48	60	65	Hz
VSYNC period time	Tv	-	1100	-	H
VSYNC blanking	Tvb+ Tvfp	-	20	-	H

POWER SEQUENCE

To prevent a latch-up or DC operation of the LCD module, the power on/off sequence shall be as shown in below



- | | |
|----------------------|-----------------------|
| • 0.5ms ≤ T1 ≤ 10 ms | • 0ms ≤ T7 ≤ 50ms |
| • 0ms ≤ T2 ≤ 200 ms | • 0ms ≤ T10 ≤ 500 ms |
| • 0ms ≤ T3 ≤ 200 ms | • 0.5ms ≤ T11 ≤ 10 ms |
| • 0ms ≤ T13 | • 500ms ≤ T12 |
| • 0ms ≤ T14 | • 0ms ≤ T15 |
| • 0ms ≤ T17 | • 0ms ≤ T16 |
| • 80ms ≤ T8 | • 0ms ≤ T18 |

Notes:

1. When the power supply VDD is 0V, keep the level of input signals on the low or keep high impedance.
2. Do not keep the interface signal high impedance when power is on. Back Light must be turn on after power for logic and interface signal are valid.

7. Optical Characteristics

Overview

The test of view angle range shall be measured in a dark room (ambient luminance $\leq 1\text{lux}$ and temperature $= 25\pm 2^\circ\text{C}$) with the equipment of Luminance meter system (Goniometer system and TOPCON CS2000/CA310) and test unit shall be located at an approximate distance 50cm from the LCD surface at a viewing angle of θ and ϕ equal to 0° . We refer to $\theta=0$ ($=\theta_3$) as the 3 o'clock direction (the "right"), $\theta=90$ ($=\theta_{12}$) as the 12 o'clock direction ("upward"), $\theta=180$ ($=\theta_9$) as the 9 o'clock direction ("left") and $\theta=270$ ($=\theta_6$) as the 6 o'clock direction ("bottom"). While scanning θ and/or ϕ , the center of the measuring spot on the Display surface shall stay fixed. The luminance, color and uniformity (etc) should be tested by CS2000/CA310. VDD shall be $3.3 \pm 0.3\text{V}$ at 25°C . Optimum viewing angle direction is 6 o'clock

<Table 5. Optical Specifications>

Parameter		Symbol	Condition	Min.	Typ.	Max.	Unit	Remark
Viewing Angle range	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	$\Theta = 0^\circ$	800	1000	-		Note 2
Response Time		T_{RT}	$T_a = 25^\circ\text{C}$ $\Theta = 0^\circ$	-	30	35	ms	Note 6
Cross Talk		CT	$\Theta = 0^\circ$	-	-	2.0	%	Note 7

Notes : 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).

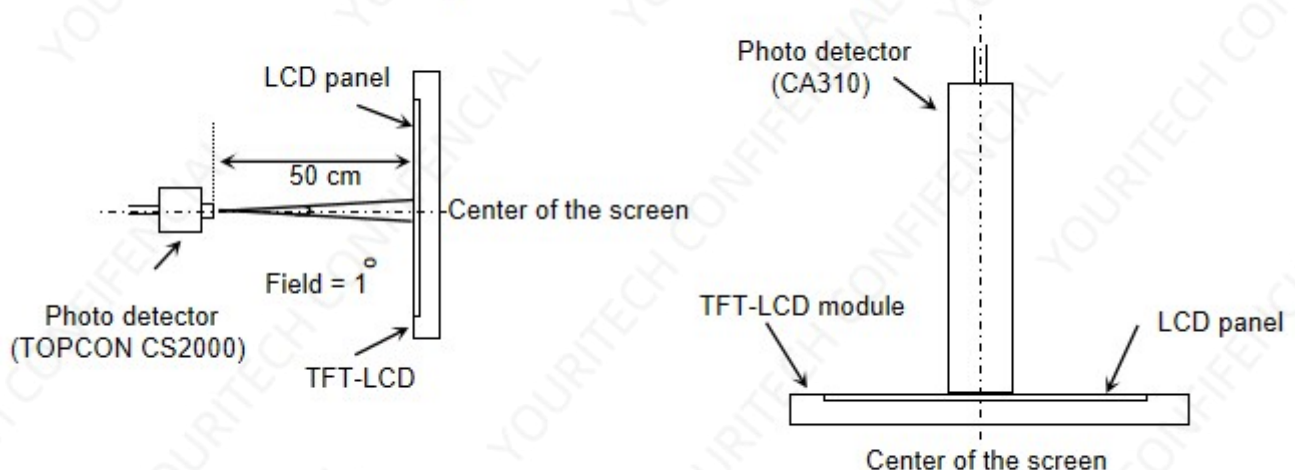
2. Contrast measurements shall be made at viewing angle of $\Theta = 0$ and at the center of the LCD surface. Luminance shall be measured with all pixels in the view field set first to white, then to the dark (black) state. (see FIGURE 1) Luminance Contrast Ratio (CR) is defined mathematically.

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

3. 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 T_r , and 90% to 10% is T_d .
4. Cross-Talk of one area of the LCD surface by another shall be measured by comparing the luminance (YA) of a 25mm diameter area, with all display pixels set to a gray level, to the luminance (YB) of that same area when any adjacent area is driven dark. (See FIGURE 4).

Optical measurements

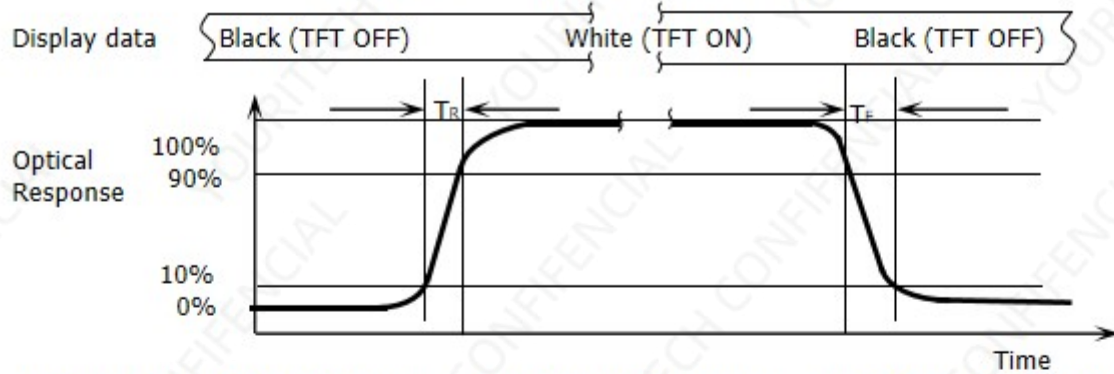
Figure 1. Measurement Set Up



View angel range, etc. measurement setup

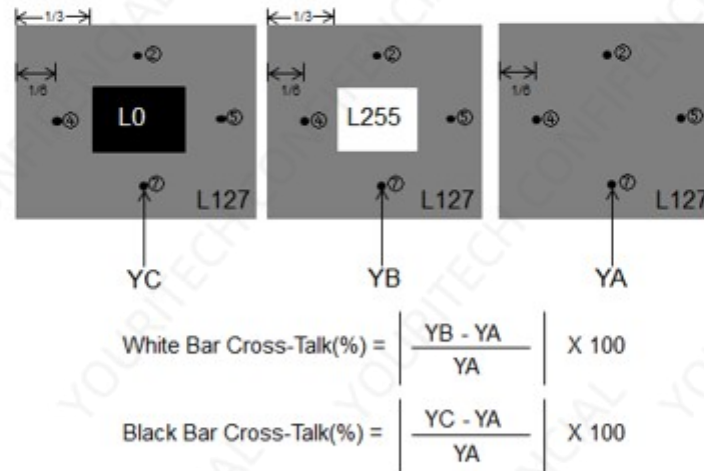
Flicker, measurement setup

Figure 2. Response Time Testing



The electro-optical response time measurements shall be made as shown in FIGURE 3 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_d .

Figure 3. Cross Modulation Test Description



Where:

Y_A = Initial luminance of measured area (cd/m²)

Y_B = Subsequent luminance of measured area (cd/m²) @ White Bar

Y_C = Subsequent luminance of measured area (cd/m²) @ Black Bar

The location measured will be exactly the same in both patterns

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) ~70°C (30min), 50 cycles	ESD
7	Air	±15KV, 150pF(330) 1sec, 100 points, 1 times/ point	
8	Contact	±8KV, 150pF(330) 1sec, 100 points, 1 times/ point	

9. Packing Method----TBD

- END -