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Mechanical design



MODEL NO : ET070HD01-T

MODEL VERSION: 01

SPEC VERSION : 1.0

ISSUED DATE: 2021-04-29

☐ 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 720xRGBx1280

As to basic specification of the driver IC, refer to the IC (HX8349F) 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 Viewing Type LCD

720 dot-segment and 1280 dot-common outputs;

16.7M Color can be selected by software;

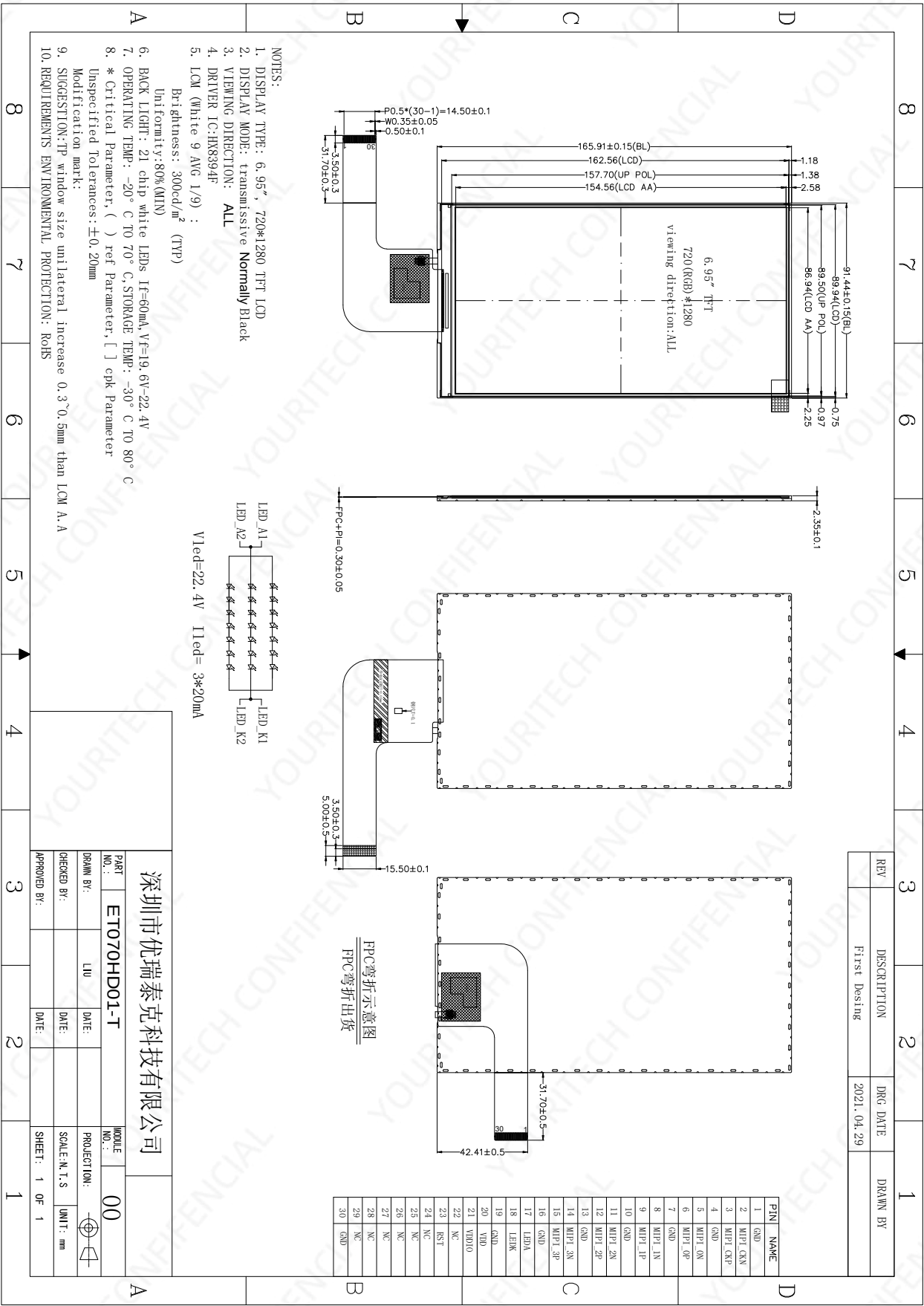
White LED back light;

4lane MIPI interface

1.3 Applications:

2. LCM General specification

ITEM	Standard value	Unit
LCD Type	Normally Black	--
Drive element	TFT active matrix	--
Number of pixels	720*3RGB(H)X1280(V)	Dots
Pixel arrangement	RGB Vertical Stripe	--
Pixel Pitch (W*H)	0.12075(H) X 0.12075(V)	mm
Active area	86.94(H) x 154.56(V)	mm
Viewing direction	ALL O'CLOCK	-
TFT Driver IC	HX8394F	
TFT interface	4lane MIPI interface	-
Approx. Weight	TBD	g
LCM Size(W*H*T)	91.44(W) ×165.91(H) ×2.35(T)	mm
Touch structure	--	
Touch Driver IC	--	-
Touch Interface	--	



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	1.65	1.8	3.6	V
Supply Voltage for(DC/DC)	VDD	2.7	2.8	3.6	V
Current Consumption	I _{DD}	--	--	50	mA
	I _{DD-SLEEP}	--	80	160	uA

4.2 Back-Light Unit Characteristics

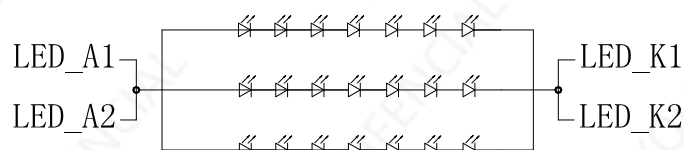
The back-light system is an edge-lighting type with 21 white LEDs. The characteristics of the back-light are shown in the following tables.

Characteristics	Symbol	Min.	Type	Max.	Unit	Notes
Forward Voltage	V _F	19.6		22.4	V	-
Forward current	I _F	--	60	-	mA	-
Luminance(With LCD)	L _v		300	--	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	Symbol	LCM Functional	Notes
1	GND	Ground.	
2	MIPI_CLKN	Negative polarity of low voltage differential clock	
3	MIPI_CLKP	Positive polarity of low voltage differential clock	
4	GND	Ground.	
5	MIPI_D0N	Negative polarity of low voltage differential data 0	
6	MIPI_D0P	Positive polarity of low voltage differential data 0	
7	GND	Ground.	
8	MIPI_D1N	Negative polarity of low voltage differential data 1	
9	MIPI_D1P	Positive polarity of low voltage differential data 1	
10	GND	Ground.	
11	MIPI_D2N	Negative polarity of low voltage differential data 2	
12	MIPI_D2P	Positive polarity of low voltage differential data 2	
13	GND	Ground.	
14	MIPI_3N	Negative polarity of low voltage differential data 3	
15	MIPI_3P	Positive polarity of low voltage differential data 3	
16	GND	Ground.	
17	LEDA	Power Supply For LED Backlight Anode Input.	
18	LEDK	Power Supply For LED Backlight Cathode Input.	
19	GND	Ground.	
20	VDD	Power Supply For LCD.	
21	VDDIO	Power Supply For I/O.	
22	NC	No Connection.	
23	RST	Reset Signal input pin.	
24	NC	No Connection.	
25	NC	No Connection.	
26	NC	No Connection.	
27	NC	No Connection.	
28	NC	No Connection.	
29	NC	No Connection.	
30	GND	Ground.	

6.2 Horizontal Timings

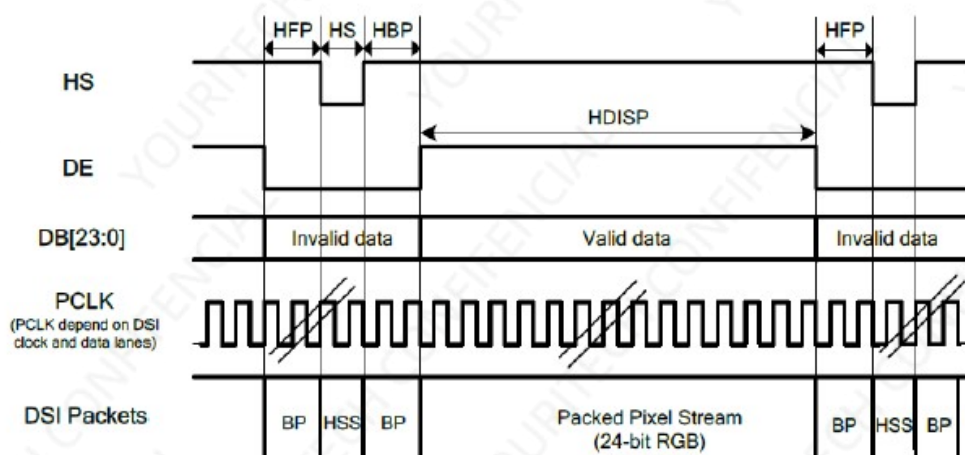


Figure 10.10: Horizontal Timing for DSI Video mode I/F

Resolution=720x1280 ($T_A=25^{\circ}\text{C}$, $V_{DDI}=1.8\text{V}$, $V_{SP}=2.8\text{V}$)

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
HS low pulse width	HS	-	6	-	78	DCK
Horizontal back porch	HBP	-	5	-	78	DCK
Horizontal front porch	HFP	-	5	-	78	DCK
Horizontal blanking period	HBLK	$HS+HBP+HFP$	16	-	88	DCK
Horizontal active area	HDISP	-	-	720	-	DCK

Resolution=640x1280 ($T_A=25^{\circ}\text{C}$, $V_{DDI}=1.8\text{V}$, $V_{SP}=2.8\text{V}$)

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
HS low pulse width	HS	-	6	-	78	DCK
Horizontal back porch	HBP	-	5	-	78	DCK
Horizontal front porch	HFP	-	5	-	78	DCK
Horizontal blanking period	HBLK	$HS+HBP+HFP$	16	-	88	DCK
Horizontal active area	HDISP	-	-	640	-	DCK

Table 10.14: Horizontal Timings for DSI Video mode I/F

Reset input timings

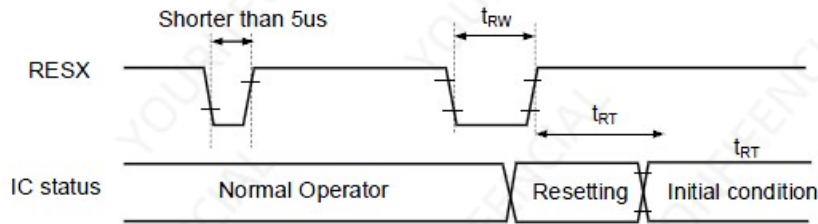


Figure 10.1: Reset input timings

Symbol	Parameter	Related pins	Min.	Max.	Unit
t_{RW}	Reset pulse width ⁽²⁾	RESX	10	-	μs
t_{RT}	Reset complete time ⁽³⁾	-	-	5 (Note 5)	ms
		-	-	120 (Note 6, 7)	ms

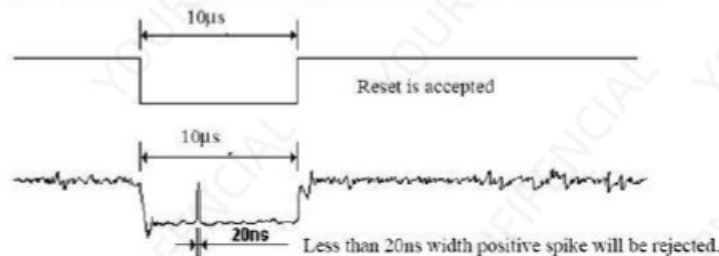
Note: (1) The reset complete time also required time for loading ID bytes from OTP to registers. This loading is done every time when there is HW reset cancel time (t_{RT}) within 5 ms after a rising edge of RESX.

(2) Spike due to an electrostatic discharge on RESX line does not cause irregular system reset according to the table below.

RESX Pulse	Action
Shorter than 5 μs	Reset Rejected
Longer than 10 μs	Reset
Between 5 μs and 10 μs	Reset Start

(3) During the resetting period, the display will be blanked (The display is entering blanking sequence, which maximum time is 120 ms, when Reset Starts in Sleep Out -mode. The display remains the blank state in Sleep In -mode) and then returns to Default condition for H/W reset.

(4) Spike Rejection also applies during a valid reset pulse as shown below:



(5) When Reset is applied during Sleep In Mode.

(6) When Reset is applied during Sleep Out Mode.

(7) It is necessary to wait 5msec after releasing RESX before sending commands. Also Sleep Out command cannot be sent for 120msec.

Table 10.3: Reset timings

7. Optical Characteristics

7.1 Optical Specification

Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Transmittance (with Polarizer)		T (%)	Θ=0 Normal viewing angle	—	4.0	—	—	Measuring with Polarizer , Reference Only
Transmittance (without Polarizer)		T (%)		—	10.8	—	—	
Contrast		CR		640	800	—	—	(1)(2)
Response time	Rising	T _R		—	10	15	msec	(1)(3)
	Falling	T _F		—	20	25		
Color gamut	(%)			—	70	—	%	C-light
Color chromaticity (CIE1931)	White	W _x		(0.284)	(0.304)	(0.324)	—	(1)(4) CF glass
		W _y		(0.304)	(0.324)	(0.344)		
	Red	R _x	(0.627)	(0.647)	(0.667)	—		
		R _y	(0.297)	(0.317)	(0.337)	—		
	Green	G _x	(0.238)	(0.258)	(0.260)	—		
		G _y	(0.546)	(0.566)	(0.586)			
	Blue	B _x	(0.120)	(0.140)	(0.160)	—		
		B _y	(0.068)	(0.088)	(0.108)			
Viewing angle	Hor.	Θ _L	CR>10	—	80	—	—	(1)(4) Measuring with Polarizer , Reference Only
		Θ _R		—	80	—		
	Ver.	Θ _U		—	80	—		
		Θ _D		—	80	—		
Optima View Direction		Free						(5)

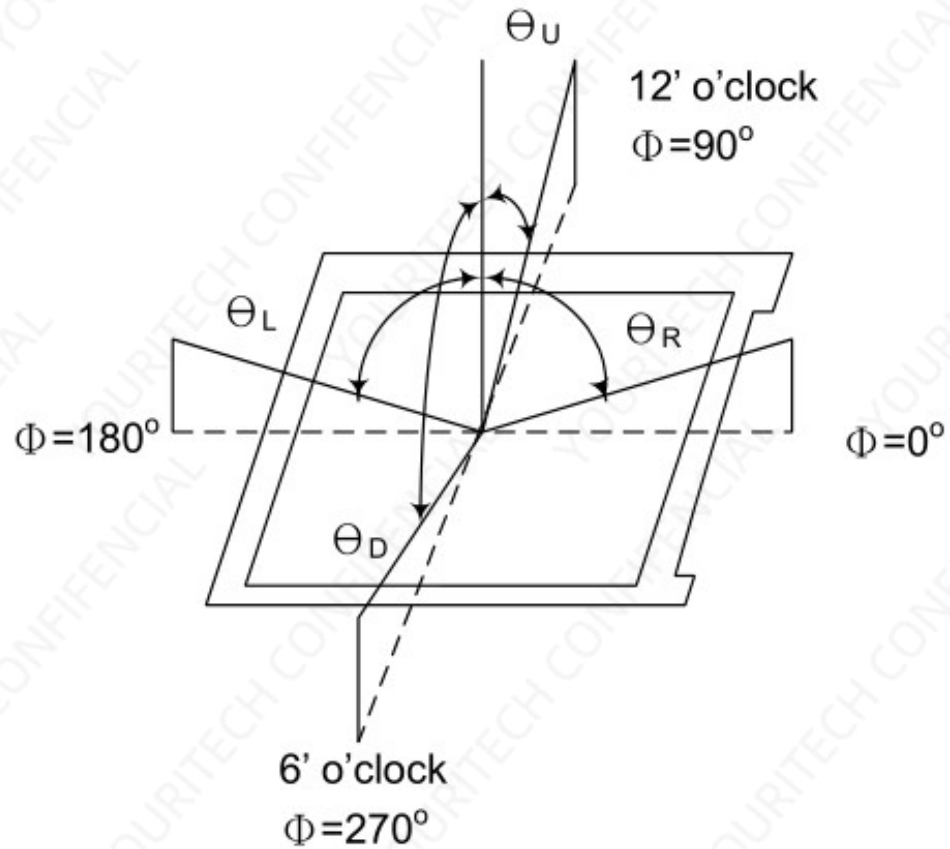
7.2 Measuring Condition

- 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.

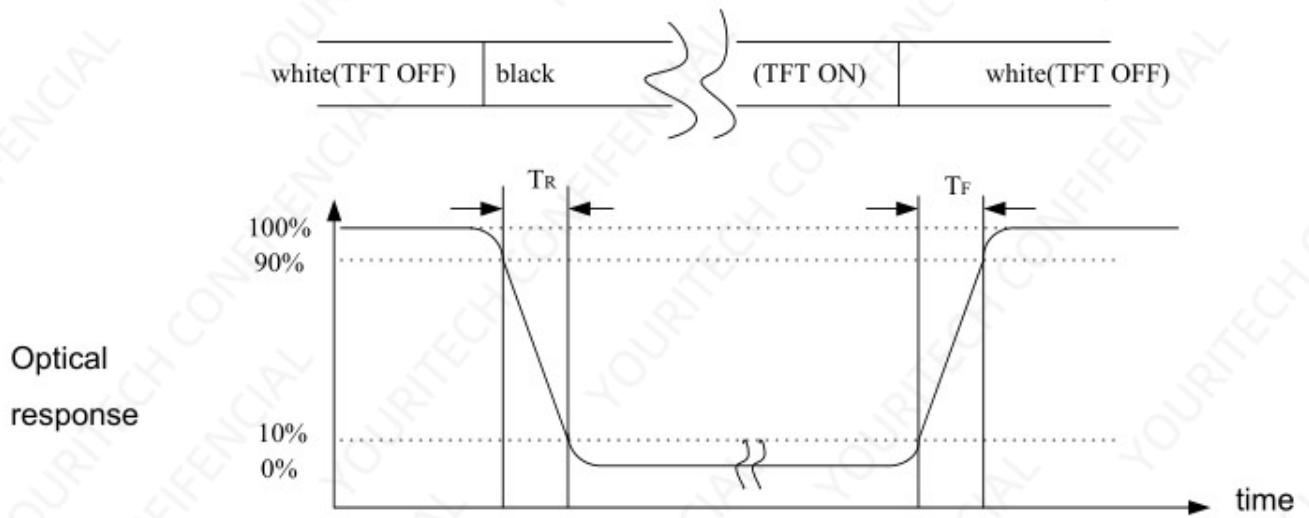
Note (1) Definition of Viewing Angle:



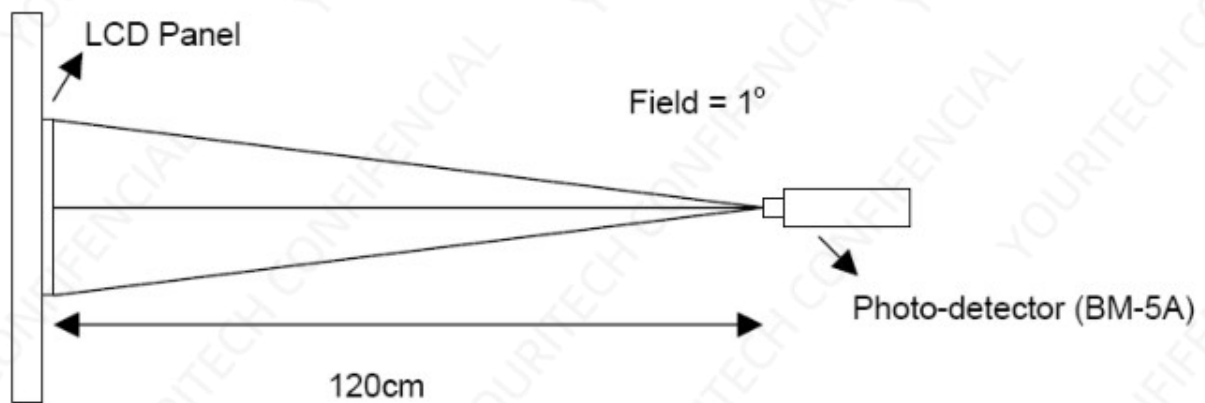
Note (2) Definition of Contrast Ratio (CR) :
measured at the center point of panel

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

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



Note (4) Definition of optical measurement setup



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	-30°C / 96H	
3	High Temp. Operating	+60°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), 50 cycles	

9. Packing Method----TBD

- END -