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MODEL NO : ET060HD04-TT

MODEL VERSION: 01

SPEC VERSION : 1.0

ISSUED DATE: 2022-05-23

□**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 (**Raydium:RM68200**) 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;
ALL Viewing Type LCD
720dot-segment and 1280 dot-common outputs;
16.7M Color can be selected by software;
White LED back light;
4lane MIPI interface

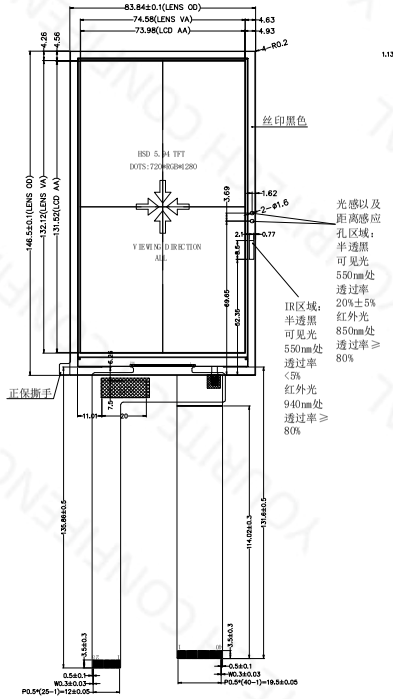
1.3 Applications:

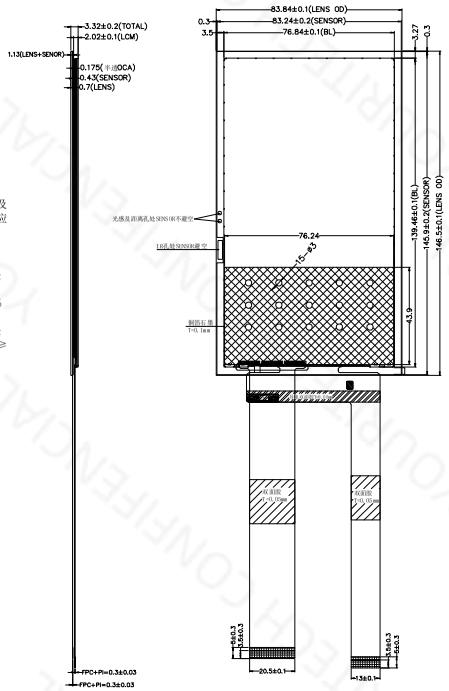
2. LCM General specification

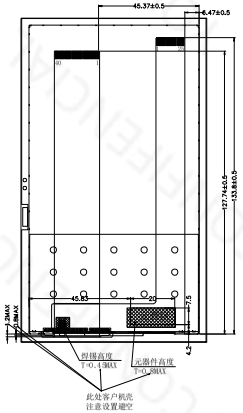
ITEM	Sandard value	Unit
LCD Type	Normally black	--
Drive element	TFT active matrix	--
Number of pixels	720*3RGB(H)X1280(V)	Dots
Pixel arrangement	RGB stripe	--
Pixel Pitch (W*H)	0.10275(W) × 0. 10275 (H)	mm
Active area	73.98(W) × 131.52(H)	mm
Viewing direction	ALL O'CLOCK	-
TFT Driver IC	RM68200	
TFT interface	MIPI 4Lane	-
Approx. Weight	TBD	g
TFTModule Size(W*H*T)	76.84(W) ×139.46(H) ×2.02D)	mm
LCM+CTP Size(W*H*T)	83.84*(W) ×146.50(H) ×3.32(T)	mm
Touch structure	G+F+F	
Touch Driver IC	COB	-
Touch Interface	I2C	

LCD靠下组装

REV	DESCRIPTION	DRG DATE	DRAWN BY
00	First Desing	2022.07.01	
01	增加铜箔石墨，排线双面胶更改，IR孔更改	2022.09.13	







FPC弯折示意图

FPC弯折出货

LCM

Pad No.	Pad Name
1	GND
2	CLKP
3	CLKN
4	GND
5	D0P
6	D0N
7	GND
8	D1P
9	D1N
10	GND
11	D2P
12	D2N
13	GND
14	D3P
15	D3N
16	GND
17	VCC
18	VCC
19	RESET
20	GND
21	LED-
22	LED-
23	LED+
24	LED+
25	GND

CTP

Pad No.	Pad Name
1	GND
2	DRV23
3	DRV22
4	DRV21
5	DRV20
6	DRV19
7	DRV18
8	DRV17
9	DRV16
10	DRV15
11	DRV14
12	DRV13
13	DRV12
14	DRV11
15	DRV10
16	DRV9
17	DRV8
18	DRV7
19	DRV6
20	DRV5
21	DRV4
22	DRV3
23	DRV2
24	DRV1
25	DRV0
26	GND
27	GND
28	SENS11
29	SENS10
30	SENS9
31	SENS8
32	SENS7
33	SENS6
34	SENS5
35	SENS4
36	SENS3
37	SENS2
38	SENS1
39	SENS0
40	GND

NOTES:
1. DISPLAY TYPE: 5.94″, 720*1280 TFT LCD
2. DISPLAY MODE: transmissive Normally Black
3. VIEWING DIRECTION: ALL O'clock
4. DRIVER IC:RM68200
5. LCM (White 9 AVG 1/9) :
   Brightness: 450cd/m² (TYP)
   Uniformity:80%(MIN)
6. BACK LIGHT: 16 chip white LEDs If=40mA,Vf=22.5V-26V
7. OPERATING TEMP: -20° C TO 60° C,STORAGE TEMP: -30° C TO 70° C
8. * Critical Parameter,( ) ref Parameter,[ ] cpk Parameter
   Unspecified Tolerances:±0.20mm
   Modification mark:
9. SUGGESTION:TP window size unilateral increase 0.3~0.5mm than LCM A.A
10. REQUIREMENTS ENVIRONMENTAL PROTECTION: RoHS

1	结构	G+FF
2	IC	
3	透光率	≥85%
4	表明硬度	6H
5	材质及厚度	旭硝子：T=0.7mm
6	工作湿温度	-20℃~+60℃;20-90RH
7	储存湿温度	-30℃~+70℃;20-90RH
8	翘曲度	≤0.3%
9	未注公差	±0.20mm
10	所有的材料符合ROHS	

深圳市优瑞泰克科技有限公司

PART NO.:	ET060HD04-TT			MODULE NO.:	01
DRAWN BY:	LIU	DATE:		PROJECTION:	
CHECKED BY:		DATE:		SCALE:N.T.S	UNIT: mm
APPROVED BY:		DATE:		SHEET: 1 OF 1	

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
TP Operating Temperature & Humidity(20%～90%RH)	T_{OPR}	-20	+60	°C
TP SStorage Temperature & Humidity(20%～90%RH)	T_{STG}	-30	+70	°C
Humidity	RH	-	90	%

4.Electrical Characteristics

4.1TFT DC Characteristics

Characteristics	Symbol	Min.	Typ.	Max.	Unit
Supply Voltage for I/O	VDDIO	-	-	-	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
Current Consumption	I_{DD}	-	TBD	-	mA
	$I_{DD-SLEEP}$		TBD		uA

4.2 Back-Light Unit Characeristics

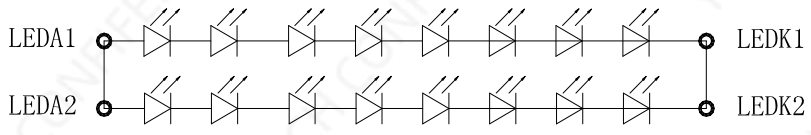
The back-light system is an edge-lighting type with 16 white LEDs. The characteristics of the back-light are shown in the following tables.

Characteristics	Symbol	Min.	Type	Max.	Unit	Notes
Forward Voltage	V_F	22.5	--	26	V	-
Forward current	I_F	--	40	-	mA	-
Luminance(With LCD)	Lv		450	--	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	GND	Power Ground	
2	TCP	MIPI DSI differential clock pair	
3	TCN		
4	GND	Power Ground	
5	TDP0	MIPI DSI differential data pair	
6	TDN0		
7	GND	Power Ground	
8	TDP1	MIPI DSI differential data pair	
9	TDN1		
10	GND	Power Ground	
11	TDP2	MIPI DSI differential data pair	
12	TDN2		
13	GND	Power Ground	
14	TDP3	MIPI DSI differential data pair	
15	TDN3		
16	GND	Power Ground	
17	VCC	MIPI Voltage (VDDAM to VSSAM): 2.5V ~ 3.6V	
18	VCC		
19	RESET	Reset signal input terminal. Active at ‘L’.	
20	GND	Power Ground	
21	LEDK	Power supply for backlight cathode input terminal.	
22	LEDK	Power supply for backlight cathode input terminal.	
23	LEDA	Power supply for backlight anode input terminal.	
24	LEDA	Power supply for backlight anode input terminal.	
25	GND	Power Ground	

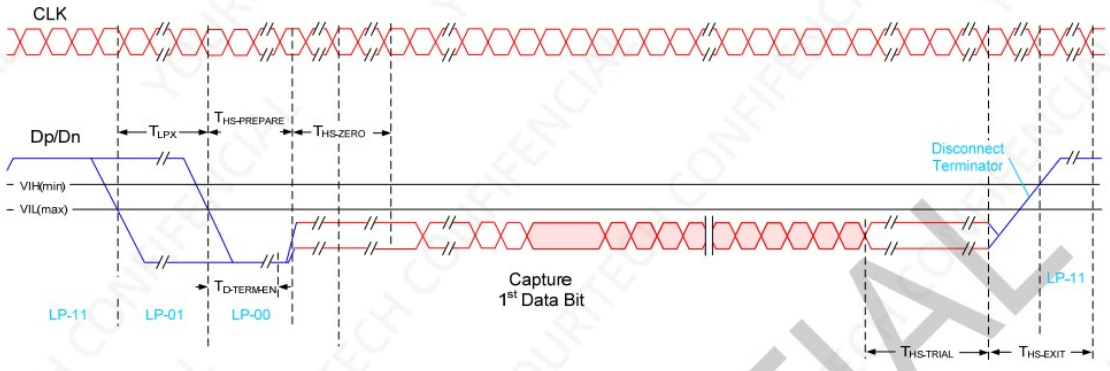
TP Pin Descriptions

Pin No.	Symbol	CTP Functional	Notes
1	GND	Power Ground	
2~25	DRV23~DRV0	Touch the channel	
26~27	GND	Power Ground	
28~39	SENS11~SENS0	Touch the channel	
40	GND	Power Ground	

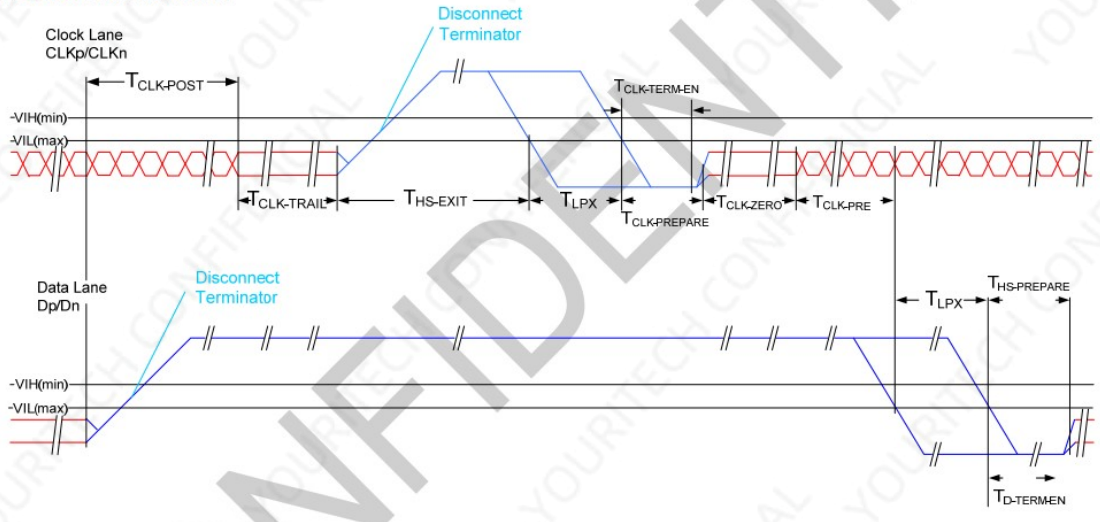
6. Timing Characteristics

9.5.4 DSI Timing Characteristics

HS Data Transmission Burst



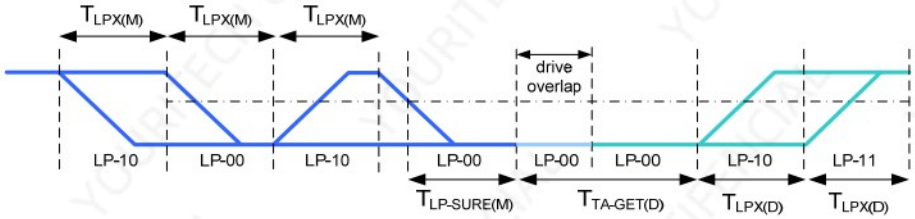
HS clock transmission



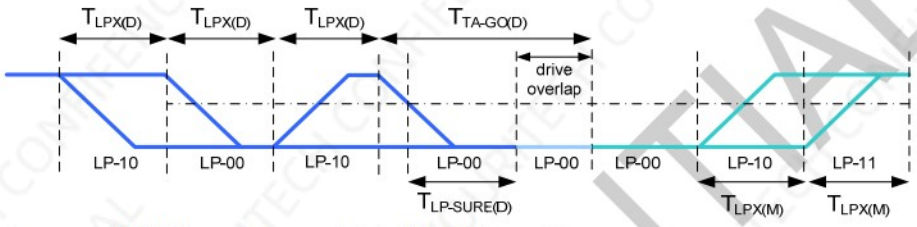
Timing Parameters:

Parameter	Description	Min	Typ	Max	Unit
$T_{CLK-POST}$	Time that the transmitter continues to send HS clock after the last associated Data Lane has transitioned to LP Mode. Interval is defined as the period from the end of $T_{HS-TRAIL}$ to the beginning of $T_{CLK-TRAIL}$.	60ns + 52*UI			ns
$T_{CLK-TRAIL}$	Time that the transmitter drives the HS-0 state after the last payload clock bit of a HS transmission burst.	60			ns
$T_{HS-EXIT}$	Time that the transmitter drives LP-11 following a HS burst.	**300**			ns
$T_{CLK-TERM-EN}$	Time for the Clock Lane receiver to enable the HS line termination, starting from the time point when Dn crosses $V_{IL,MAX}$.	Time for Dn to reach $V_{TERM-EN}$		38	ns
$T_{CLK-PREPARE}$	Time that the transmitter drives the Clock Lane LP-00 Line state immediately before the HS-0 Line state starting the HS transmission.	38		95	ns
$T_{CLK-PRE}$	Time that the HS clock shall be driven by the transmitter prior to any associated Data Lane beginning the transition from LP to HS mode.	8			UI
$T_{CLK-PREPARE}$ + $T_{CLK-ZERO}$	$T_{CLK-PREPARE}$ + time that the transmitter drives the HS-0 state prior to starting the Clock.	300			ns
$T_{D-TERM-EN}$	Time for the Data Lane receiver to enable the HS line termination, starting from the time point when Dn crosses $V_{IL,MAX}$.	Time for Dn to reach $V_{TERM-EN}$		35 ns +4*UI	
$T_{HS-PREPARE}$	Time that the transmitter drives the Data Lane LP-00 Line state immediately before the HS-0 Line state starting the HS transmission	40ns + 4*UI		85 ns + 6*UI	ns
$T_{HS-PREPARE}$ + $T_{HS-ZERO}$	$T_{HS-PREPARE}$ + time that the transmitter drives the HS-0 state prior to transmitting the Sync sequence.	145ns + 10*UI			ns
$T_{HS-TRAIL}$	Time that the transmitter drives the flipped differential state after last payload data bit of a HS transmission burst	60ns + 4*UI			ns

Turnaround Procedure



Bus turnaround (BAT) from MPU to display module timing



Bus turnaround (BAT) from display module to MPU timing

Low Power Mode:

Parameter	Description	Min	Typ	Max	Unit	Notes
$T_{LPX(M)}$	Transmitted length of any Low-Power state period of MCU to display module	50		**150**	ns	1,2
$T_{TA-SURE(M)}$	Time that the display module waits after the LP-10 state before transmitting the Bridge state (LP-00) during a Link Turnaround.	$T_{LPX(M)}$		$2*T_{LPX(M)}$	ns	2
$T_{LPX(D)}$	Transmitted length of any Low-Power state period of display module to MCU	50		**150**	ns	1,2
$T_{TA-GET(D)}$	Time that the display module drives the Bridge state (LP-00) after accepting control during a Link Turnaround.		$5*T_{LPX(D)}$		ns	2
$T_{TA-GO(D)}$	Time that the display module drives the Bridge state (LP-00) before releasing control during a Link Turnaround.		$4*T_{LPX(D)}$		ns	2
$T_{TA-SURE(D)}$	Time that the MPU waits after the LP-10 state before transmitting the Bridge state (LP-00) during a Link Turnaround.	$T_{LPX(D)}$		$2*T_{LPX(D)}$	ns	2

NOTE:
1. T_{LPX} is an internal state machine timing reference. Externally measured values may differ slightly from the specified values due to asymmetrical rise and fall times.
2. Transmitter-specific parameter

7.Optical Characteristics

Items		Symbol	Condition	Specifications			Unit	
				Min.	Typ.	Max.		
Contrast Ratio		CR		-	800	-	-	All left side data are based on TIAN XIAN WEI product reference only
Response Time		$T_R + T_F$		-	35	-	ms	
				-	-	-	ms	
Chromaticity	Red	X_R			/		-	
		Y_R			/		-	
	Green	X_G			/		-	
		Y_G			/		-	
	Blue	X_B			/		-	
		Y_B			/		-	
	White	X_W		0.28	0.31	0.34	-	
		Y_W		0.29	0.32	0.35	-	
Viewing angle	Hor.	ϕ1(3 o'clock)	Center CR≥10	-	80	-	g.	
		ϕ2(9 o'clock)		-	80	-		
	Ver.	θ2(12 o'clock)		-	80	-		
		θ1(6 o'clock)		-	80	-		
Uniformity					--		%	

Note 1: Definition of Contrast Ratio (CR):

The contrast ratio can be calculated by the following expression.

Contrast Ratio (CR) = L63 / L0

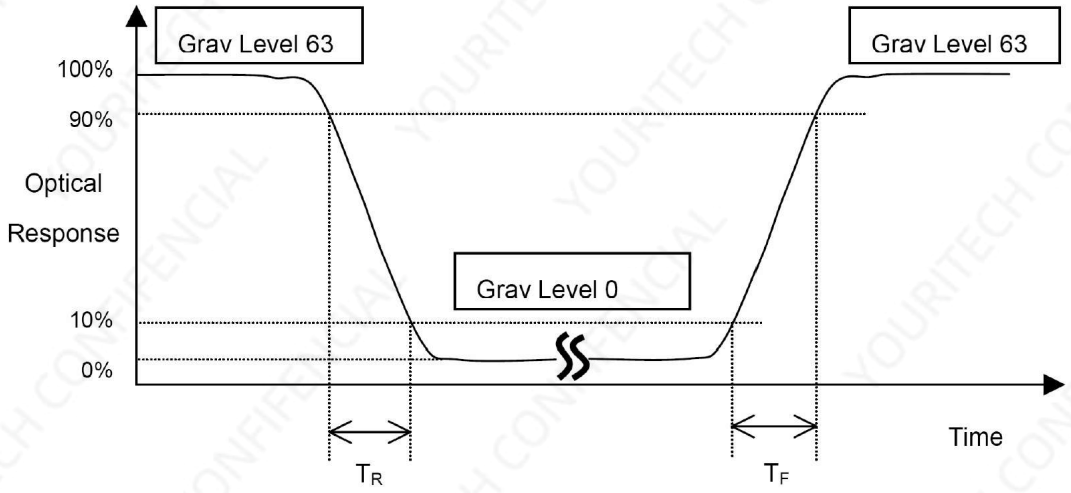
L63: Luminance of gray level 63

L0: Luminance of gray level 0

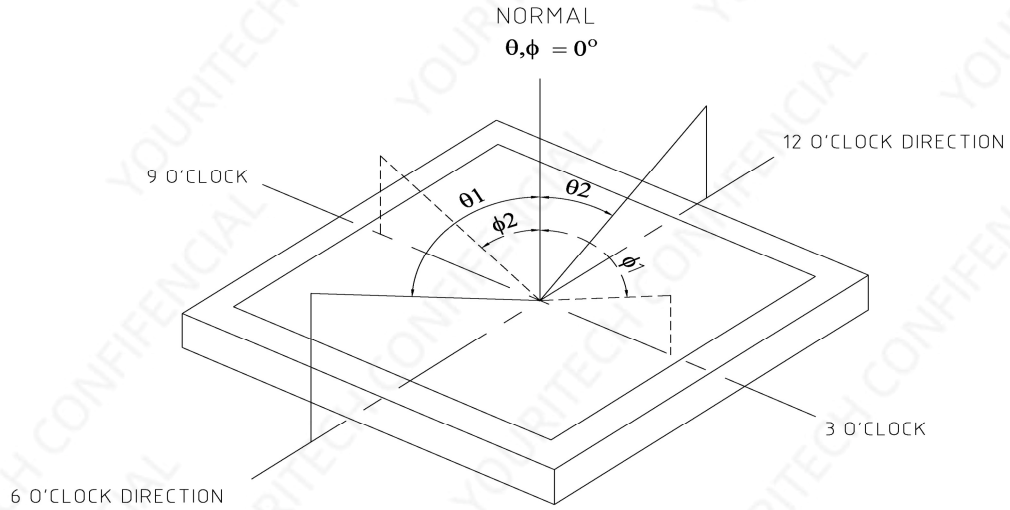
CR = CR (10)

CR (X) is corresponding to the Contrast Ratio of the point X at Figure in Note 5.

Note 2: Definition of Response Time (TR, TF):



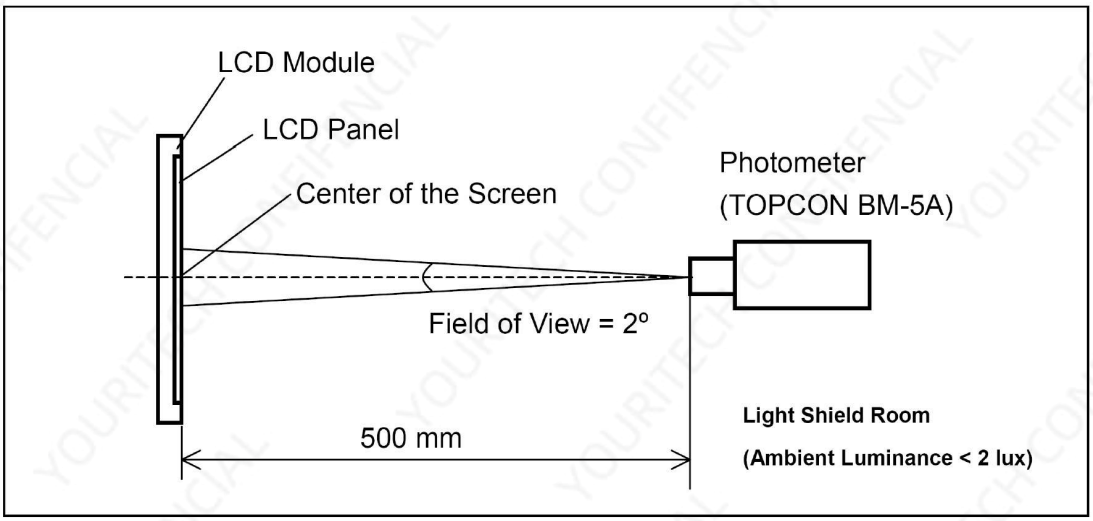
Note 3: Viewing Angle



The above "Viewing Angle" is the measuring position with Largest Contrast Ratio; not for good image quality. View Direction for good image quality is 6 O'clock. Module maker can increase the "Viewing Angle" by applying Wide View Film.

Note 4: Measurement Set-Up:

The LCD module should be stabilized at a given temperature for 20 minutes to avoid abrupt temperature change during measuring. In order to stabilize the luminance, the measurement should be executed after lighting Backlight for 20 minutes in a windless room.



8. Reliability Test Item

No.	Item	Conditions	Remark
1	High Temperature Storage	Ta=+80°C, 240hrs	-
2	Low Temperature Storage	Ta=-30°C, 240hrs	-
3	High Temperature Operation	Ta=+70°C, 240hrs	-
4	Low Temperature Operation	Ta=-20°C, 240hrs	-
5	High Temperature and High Humidity (Operating)	Ta=+60°C, 90%RH, 240hrs	-

Note: (1) All tests above are practiced at module type.
(2) There is no display function NG issue occurred, all the cosmetic specification is judged before the reliability stress.

9. Packing Method----TBD

- END -