深圳市一众显示科技有限公司

SHEN ZHEN TEAM SOURCE DISPLAY TECH. CO, TD.

TFT-LCD Module Specification

Module NO.: TST080HDSH-10

Version: V1.0

☐ APPROVAL FOR SPECIFICATION ☐ APPROVAL FOR SAMPLE

For Customer's Acceptance:	
Approved by	**Comment**

Team Source Display:		
Presented by	**Reviewed by**	**Organized by**

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V1.0	2019-2-15	Initial Release	

TS Display TECH. CO, LTD.

Record of Revision

Version	Revise Date	Page	Content
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1. General Specifications

No.	Item	Specification	Remark
1	LCD size	8.0 inch	
2	Driver element	a-Si TFT active matrix	
3	Resolution	1280(W) RGB x 720(H)	
4	Display mode	Normally Black, Transmissive	
5	Dot pitch	0.0461x3 (w)x 0.1383(H)	
6	Active area	177.024(W) x 99.576(H) mm	
7	Module size	192.8(W) ×116.9(H) ×6.4(D) mm	Note 1
8	View direction(Gray inversion)	Free	O clock
9	Surface treatment	HC	
10	Color arrangement	RGB-stripe	
11	Interface	LVDS	
12	Lcm power consumption	（6.5145 W）TYP	
13	Driver IC	HX8249-A01，HX8695-E	
14	Weight	(205g) TYP.	

Note 1: Refer to Mechanical Drawing.

2. Pin Assignment

LCM-FPC Connector is used for the module electronics interface. The recommended model is FH28-30S-0.5SH manufactured by HIROSE.

Pin No.	Symbol	I/O	Function	Remark
1	ID	I	Pull to VDD through 10K resistance internally	
2	VDD	P	Power supply 3.3V	
3	VDD	P	Power supply 3.3V	
4	GND	P	Ground	
5	RESET	I	Global reset pin, active low.	Note 1
6	STBYB	I	Standby mode setting pin, active low.	
7	GND	P	Ground	
8	SDA	I/O	Keep this pin floating when not programming OTP.	
9	SCL	I	Keep this pin floating when not programming OTP.	
10	CSB	I	Keep this pin floating when not programming OTP.	
11	GND	P	Ground	
12	TB	I	Vertical shift direction(Gate output) selection	Note 2
13	RL	I	Horizontal shift direction(Source output) selection	
14	GND	P	Ground	
15	D_0N	I	Differential Data Input(D0-)	
16	D_0P	I	Differential Data Input(D0+)	
17	GND	P	Ground	
18	D_1N	I	Differential Data Input(D1-)	
19	D_1P	I	Differential Data Input(D1+)	
20	GND	P	Ground	
21	D_2N	I	Differential Data Input(D2-)	
22	D_2P	I	Differential Data Input(D2+)	
23	GND	P	Ground	
24	CLKN	I	Differential Clock Input(CLK-)	

25	CLKP	I	Differential Clock Input(CLK+)	
26	GND	P	Ground	
27	D_3N	I	Differential Data Input(D3-)	
28	D_3P	I	Differential Data Input(D3+)	
29	GND	P	Ground	
30	OTP	P	Keep this pin floating when not programming OTP.	

I: input; O: output; P: Power or Ground(0V).

BL-FPC Connector is used for the module electronics interface. The recommended model is FH28-10S-0.5SH manufactured by HIROSE.

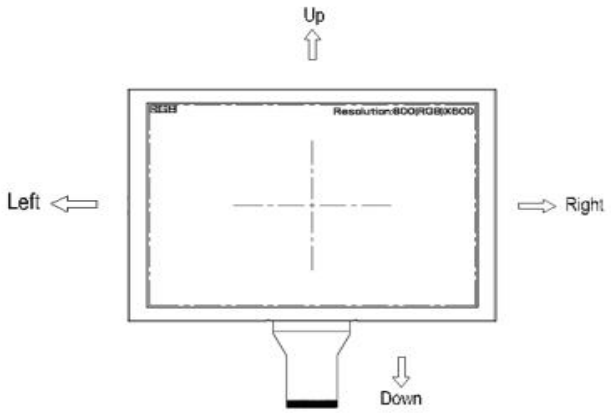
BL PIN	1	2	3	4	5	6	7	8	9	10
	A1	A2	A3	NC	NTC+	NTC-	NC	C3	C2	C1

Note 1: Global reset pin. Active low to enter reset state. Suggest to connect with an RC reset circuit for stability. Normally pull high.

Note 2: Selection of scanning mod

Setting of scan control input		Scanning direction
U/D	L/R	
GND	VDD	bottom to top, left to right
VDD	GND	top to bottom, right to left
GND	GND	bottom to top, right to left
VDD	VDD	top to bottom, left to right

Note 3: Definition of scanning direction. Refer to the figure as below:



3. Operation Specifications

3.1. Absolute Maximum Ratings

(Note 1)

Item	Symbol	Values		Unit	Remark
		Min.	Max.		
Power voltage	VDD	-0.3	4.0	V	TA=25℃
Operation Temperature	T_{OP}	-30	85	℃	
Storage Temperature	T_{ST}	-40	85	℃	
LED Reverse Voltage	V_R	-	5	V	Each LED
LED Forward Current	I_F	-	120	mA	Each LED

Note1 : The absolute maximum rating values of this product are not allowed to be exceeded at any times. Should a module be used with any of the absolute maximum ratings exceeded, the characteristics of the module may not be recovered, or in an extreme case, the module may be permanently destroyed.

3.2. Typical Operation Conditions

Test condition: GND=0V, T_A=25 ºC

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Digital Operating voltage	VDD	3.0	3.3	3.6	V	
High Level Input Voltage	V_{IH}	0.7 VDD	-	VDD	V	
Low Level Input Voltage	V_{IL}	0	-	0.3 VDD	V	

3.3. Current Consumption

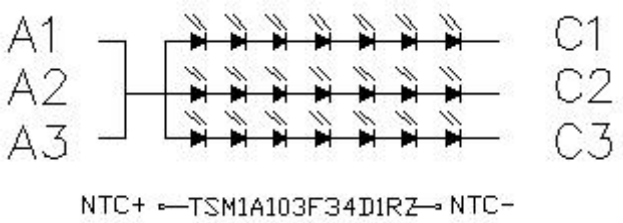
3.3.1. Current for LCD Driver

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
	Ivdd	-	100	200	mA	VDD= 3.3V
	PC	-	330		mW	

3.3.2. Current for LED Driver

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Voltage for LED Backlight	V_L	19.6	21.7	23.8	V	Note 1
Crrent for LED Backlight	I_L	-	285	-	mA	
BL Power Consumption	PC	5.586	6.1845	6.783	W	
LED life time	-	30,000	-	-	Hrs	Note 2

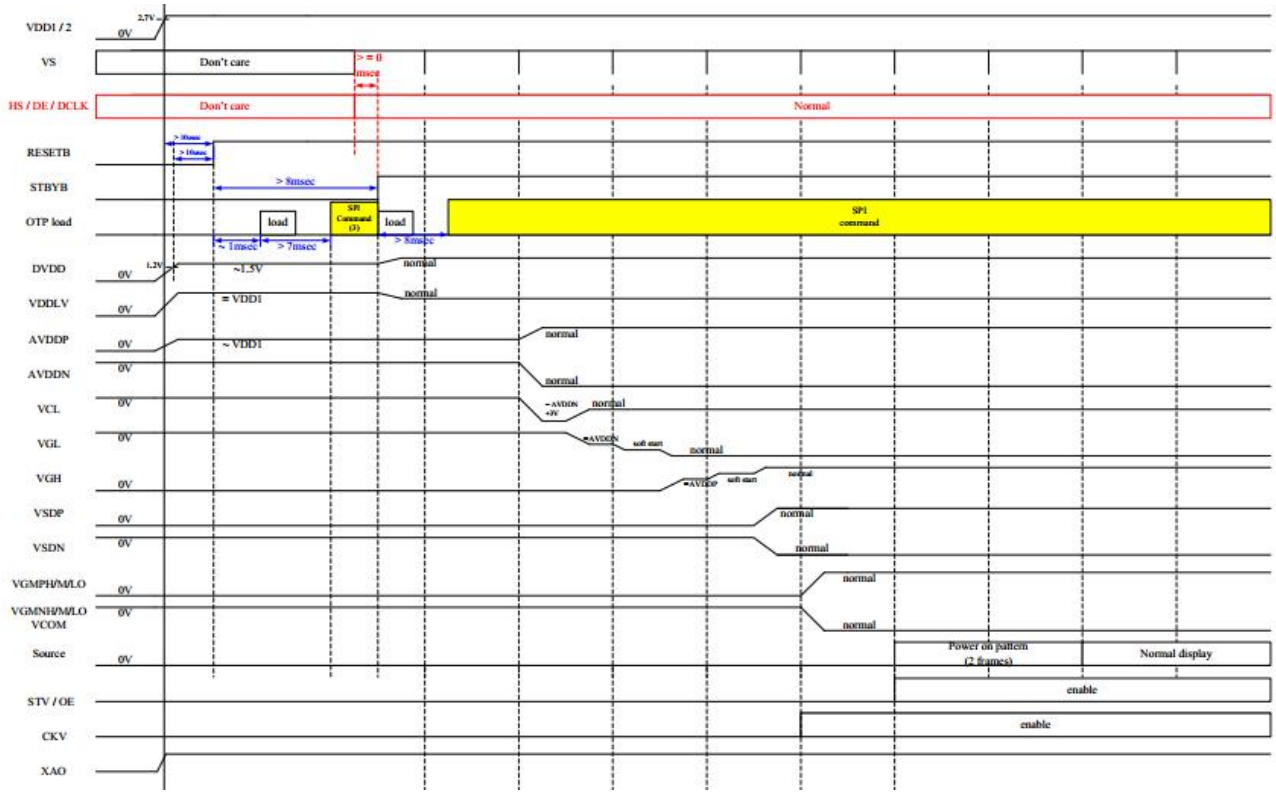
Note1: V_L=21.7V, I_L=285mA (Backlight circuit: 7series connection, 3 parallel connection), the ambient temperature is 25℃.



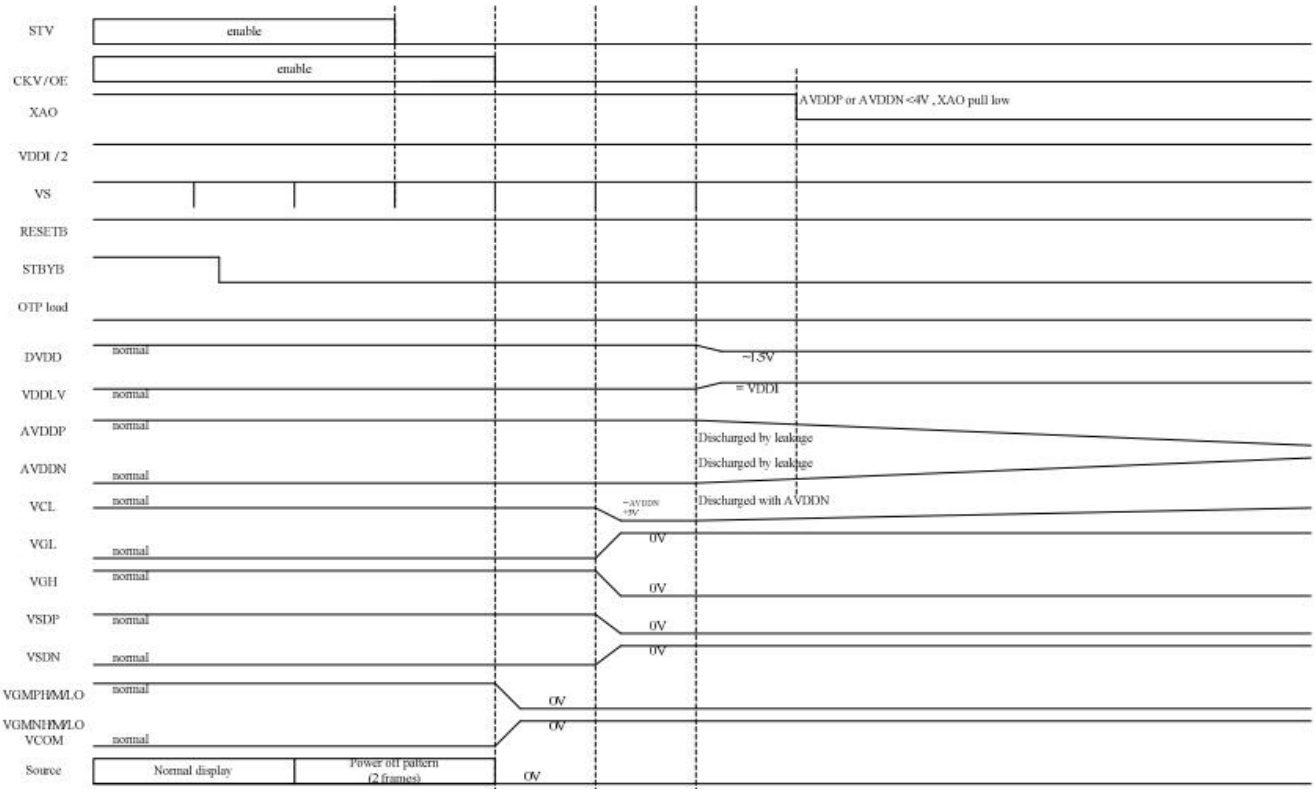
Note 2: The “LED life time” is defined as the module brightness decrease to 50% original brightness at Ta=25℃ and I_L =95mA (each LED). The LED lifetime could be decreased if operating I_L is larger than 120 mA.

3.4. Power Sequence

a. Power on:



b. Power off

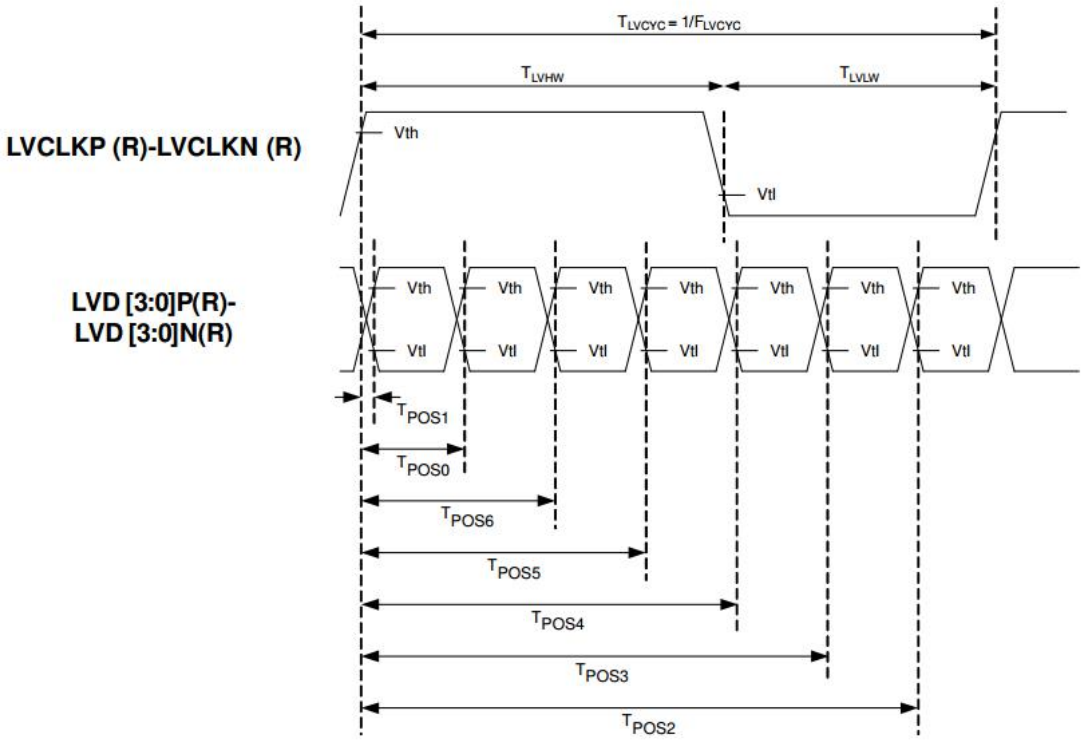


3.5. LVDS Signal Timing Characteristics

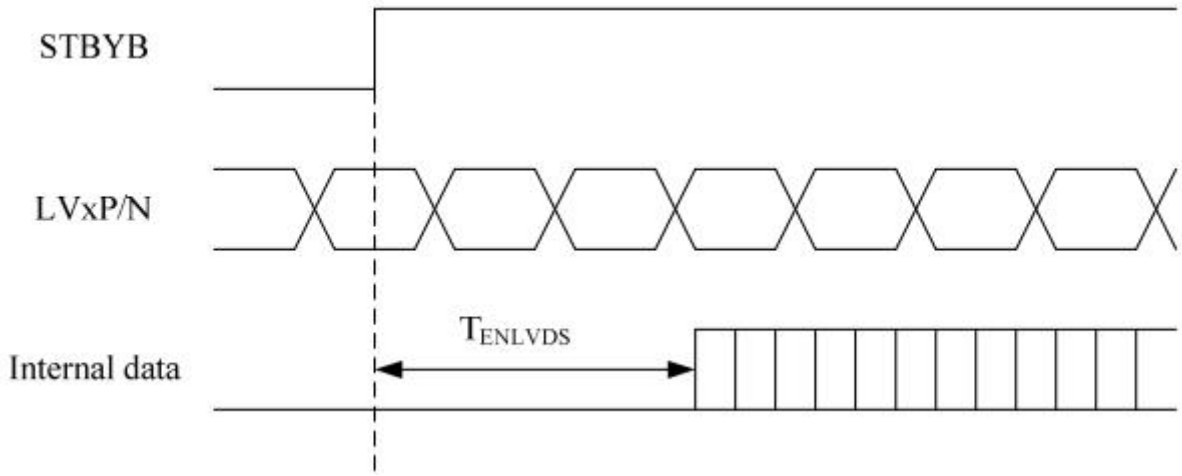
3.5.1. AC Electrical Characteristics

Parameter	Symbol	Spec.			Unit
		Min.	Typ.	Max.	
Clock frequency	F_{LVCYC}	10	-	85	MHz
Clock period	T_{LVCYC}	11.76	-	100	ns
1 data bit time	UI	-	1/7	-	T_{LVCYC}
Clock hight time	T_{LVHW}	2.9	4	4.1	UI
Clock low time	T_{LVLW}	2.9	3	4.1	UI
Position 1	T_{POS1}	-0.2	0	0.2	UI
Position 0	T_{POS0}	0.8	1	1.2	UI
Position 6	T_{POS6}	1.8	2	2.2	UI
Position 5	T_{POS5}	2.8	3	3.2	UI
Position 4	T_{POS4}	3.8	4	4.2	UI
Position 3	T_{POS3}	4.8	5	5.2	UI
Position 2	T_{POS2}	5.8	6	6.2	UI
Input eye width	T_{EYEW}	0.6	-	-	UI
Input eye border	T_{EX}	-	-	0.2	UI
LVDS wake up time	T_{ENLVDS}	-	-	150	us

LVDS input timing is described as beolw:

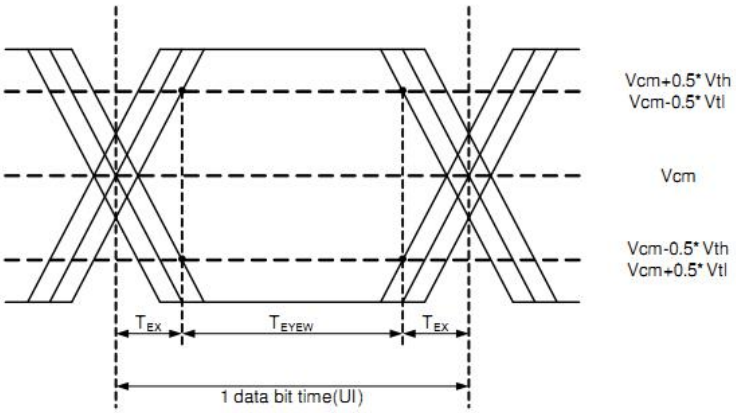


LVDS wake up time:

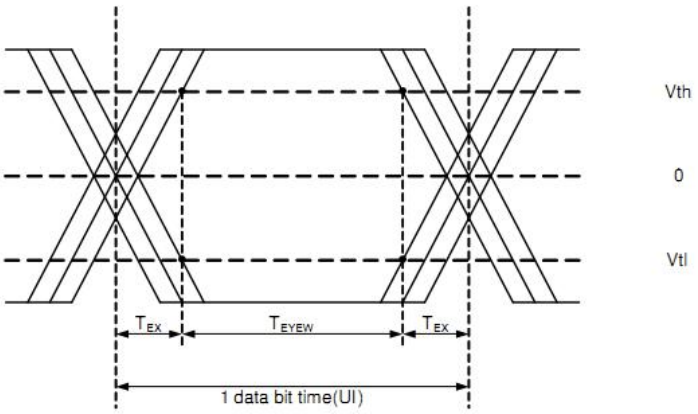


LVDS input eye diagram:

Single-ended:
LVD [3:0]P,
LVD [3:0]N



Differential:
LVD [3:0]P-LVD [3:0]N



LVDS with SSC:

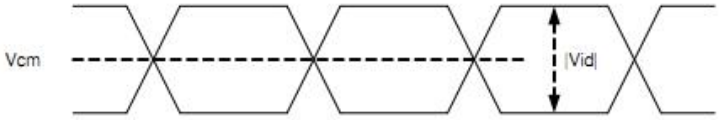
The LVDS receiver can support spread spectrum clock (SSC) .Limitation is listed as below. Note that modulation frequency is proportional to LVDS clock frequency.

Parameter	Symbol	Condition	Spec.			Unit
			Min.	Typ.	Max.	
Modulation frequency	SSC_{MF}	LVDS clock frequency centered at 80MHz.	-	-	200	KHz
		LVDS clock frequency centered at 60MHz.	-	-	150	KHz
		LVDS clock frequency centered at 40MHz.	-	-	100	KHz
		LVDS clock frequency centered at 20MHz.	-	-	50	KHz
Modulation rate	SSC_{MR}	LVDS clock frequency + SSC_{MR} is in the range of 10~85MHz.	-	-	±5	%

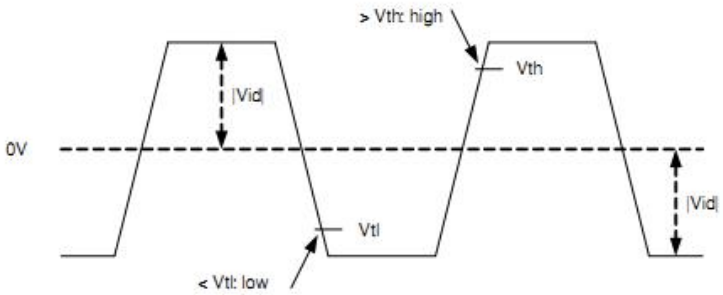
3.5.2. DC Electrical Characteristics

Parameter	Symbol	Condition	Spec.			Unit
			Min.	Typ.	Max.	
Differential input high Threshold voltage	Vth	Vcm=1.2V	-	-	+0.1	V
Differential input low threshold voltage	Vtl		-0.1	-	-	V
Differential input common Mode voltage	Vcm	-	1	1.2	$1.8-\|V_{id}\|/2$	V
LVDS input voltage	V_{INLV}		0.7		1.8	V
Differential input voltage	|Vid|	-	0.2	-	0.6	V
Differential input leakage Current	Ilvleak	-	-10	-	+10	μA
Termination Resistor	Zid	-	80	100	120	Ω

Single-ended:
LVCLKP (R),
LVCLKN (R),
LVD [3:0]P(R),
LVD [3:0]N(R)



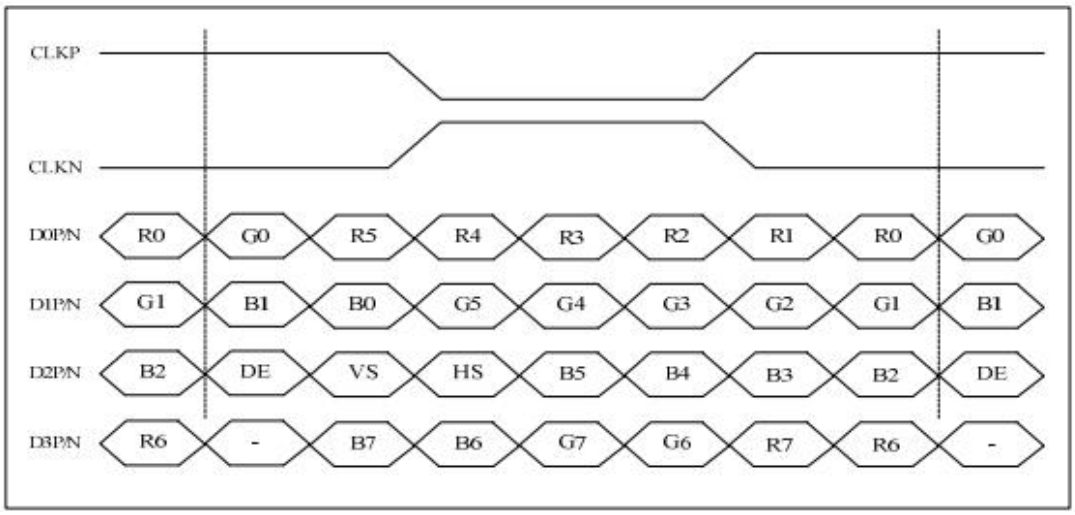
Differential:
LVCLKP (R)-LVCLKN (R),
LVD [3:0]P(R)-
LVD [3:0]N(R)



3.5.3. Timing Controller

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
DCLK frequency	Fclk	57.1	63.7	81.4	MHz	Frame rate =60Hz
Hsync period time	Th		1340		DCLK	
Horizontal valid data	thd		1280		DCLK	
Hsync pulse Width	thpw	1	2	72	DCLK	
Hsync back porch	thbp	5	16	73	DCLK	
Hsync front porch	thfp	16	42	87	DCLK	
Vsync period time	Tv		792		H	
Vertical valid data	tvd		720		H	
Vsync pulse width	tvpw	1	2	38	H	
Vsync back porch	tvbp	5	5	39	H	
Vsync front porch	tvfp	5	65	100	H	

3.5.4. LVDS Data Input Format



VESA format, 8-bit mode

4. Optical Specifications

Item	Symbol	Condition	Values			Unit	Remark
			Min.	Typ.	Max.		
Viewing angle (CR≥ 10)	θ_L	Φ=180° (9 o'clock)	75	85	-	degree	Note 1
	θ_R	Φ=0°(3 o'clock)	75	85	-		
	θ_T	Φ=90° (12 o'clock)	75	85	-		
	θ_B	Φ=270° (6 o'clock)	75	85	-		
Response time	T_{ON+} T_{OFF}	Normal θ=Φ=0°	-	25	35	msec	Note 3
Contrast ratio	CR		800	1000	-	-	Note 4
Color chromaticity	W_X		0.260	0.300	0.340	-	Note 2 Note 5 Note 6
	W_Y		0.290	0.330	0.370	-	
Luminance	L		1000	1200	-	cd/m²	Note 6
Luminance uniformity	Y_U		75	80	-	%	Note 7
Color Gamut	NTSC	CIE1931	73	76	-	%	

The test systems refer to Note 2.

Note 1: Definition of viewing angle range

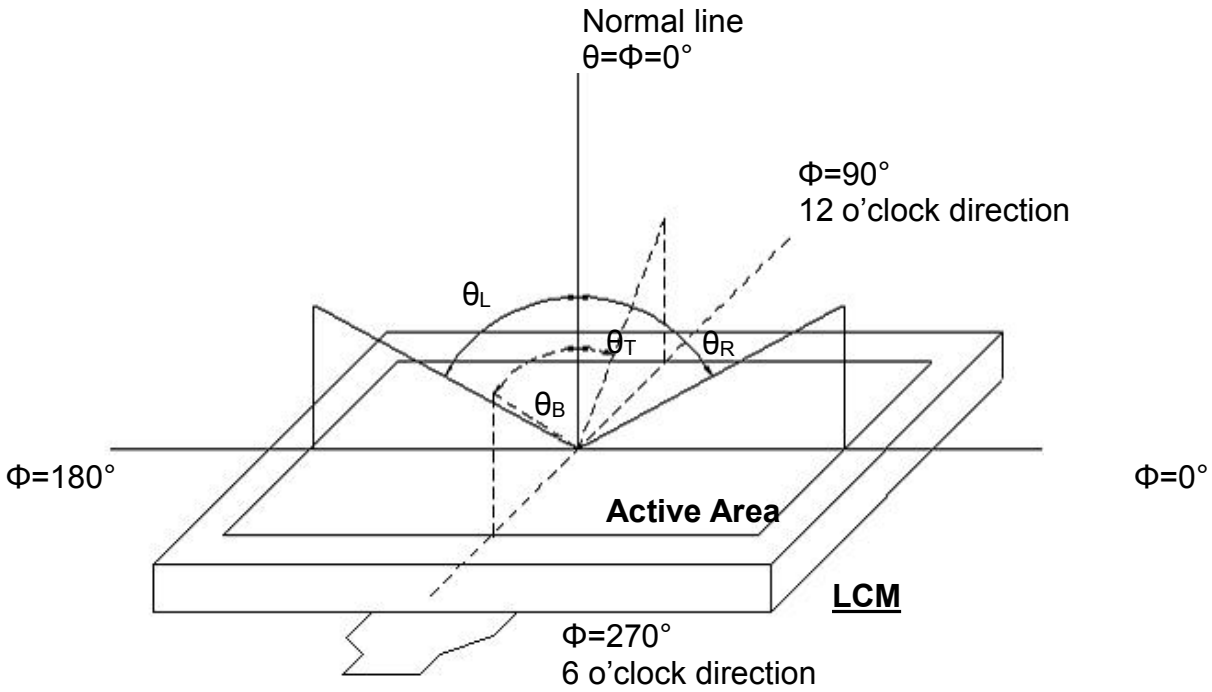


Fig. 4-2 Definition of viewing angle

Note 2: Definition of Response time

The response time is defined as the LCD optical switching time interval between "White" state and "Black" state. Rise time (T_{ON}) is the time between photo detector output intensity changed from 90% to 10%. And fall time (T_{OFF}) is the time between photo detector output intensity changed from 10% to 90%.

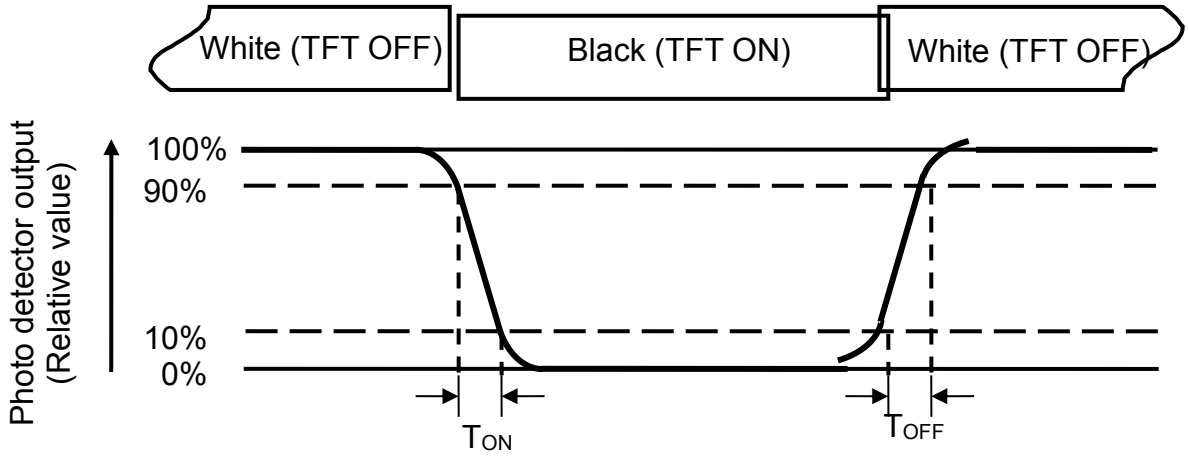


Fig. 4- 3 Definition of response time

Note 3: Definition of contrast ratio

$$\text{Contrast ratio (CR)} = \frac{\text{Luminance measured when LCD on the "White" state}}{\text{Luminance measured when LCD on the "Black" state}}$$

Note 4: Definition of optical measurement system.
The optical characteristics should be measured in dark room. After 30 minutes operation, the optical properties are measured at the center point of the LCD screen. (Viewing angle is measured by ELDIM-EZ contrast/Height :1.2mm, Response time is measured by Photo detector TOPCON BM-7, other items are measured by BM-5A/ Field of view: 1° /Height: 500mm.) or CA-210.

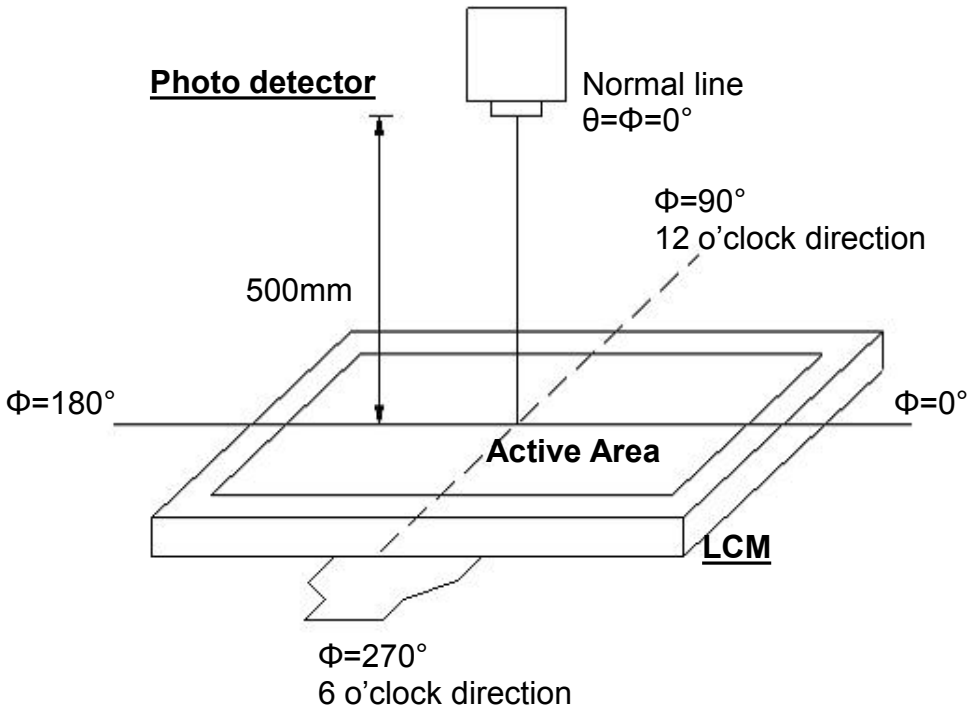


Fig. 4-4 Optical measurement system setup

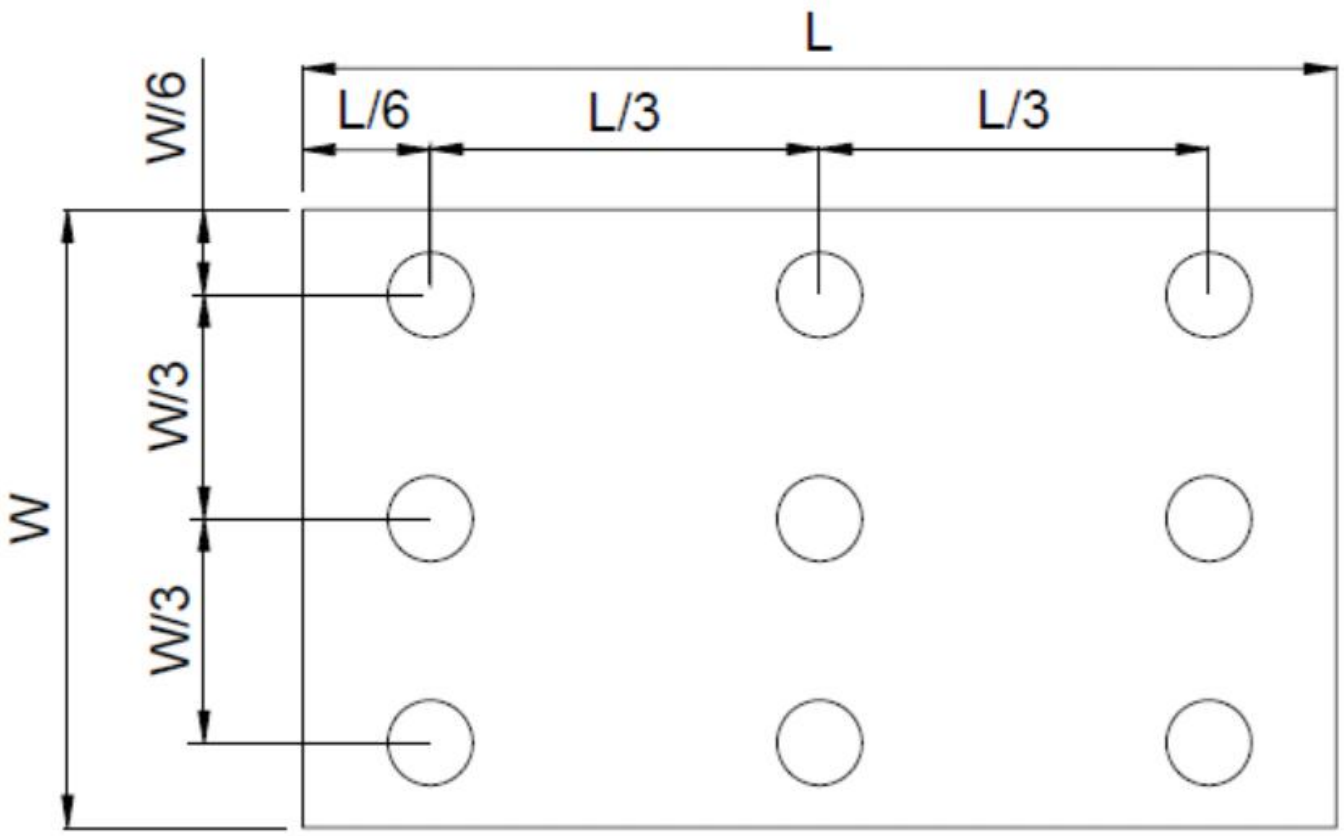
Note 5: Definition of color chromaticity (CIE1931)
Color coordinates measured at center point of LCD.

Note 6: All input terminals LCD panel must be ground while measuring the center area of the panel. The LED driving condition is I_L=285mA .

Note 7: Definition of Luminance Uniformity
Active area is divided into 9 measuring areas(Refer to Fig. 4-5).
Every measuring point is placed at the center of each measuring area.

$$Luminance\ \ Uniformity\ (Yu) = \frac{B_{min}}{B_{max}}$$

L-------Active area length W----- Active area width



B_{MAX}: The measured maximum luminance of all measurement position.
B_{MIN}: The measured minimum luminance of all measurement position.

5. Reliability Test Items

Item	Test Conditions	Criterion
High Temperature Storage	Ta = 85℃ 240hrs	A,B,C,D,E
Low Temperature Storage	Ta = -40℃ 240hrs	A,B,C,D,E
High Temperature Operation	Ts = 85℃ 240hrs	A,B,C,D,E
Low Temperature Operation	Ta =-30℃ 240hrs	A,B,C,D,E
Operate at High Temperature and Humidity	+60℃, 90%RH 240hrs	A,B,C,D,E
Thermal Shock (non operation)	-20℃/30 min ~ +70℃/30 min for a total 100 cycles, Start with cold temperature and end with high temperature.	A,B,C,D,E
Vibration Test	Sweep:10Hz~55Hz~10Hz 2G 2 hours for each direction of X. Y. Z. (6 hours for total)	A,B,C,D,E
Package Vibration Test	Random Vibration : 0.015G*G/Hz from 5-200HZ, -6dB/Octave from 200-500HZ 2 hours for each direction of X. Y. Z. (6 hours for total)	A,B,C,D,E
Package Drop Test	Height:60 cm 1 corner, 3 edges, 6 surfaces	A,B,C,D,E
Electro Static Discharge	Contact=+/-8KV, Air=+/-15KV,(R=330R,C=150pF), 1 sec,9point,10times/point;	A,B,C,D,E

※Criterion:

A.LCM each function is OK,.

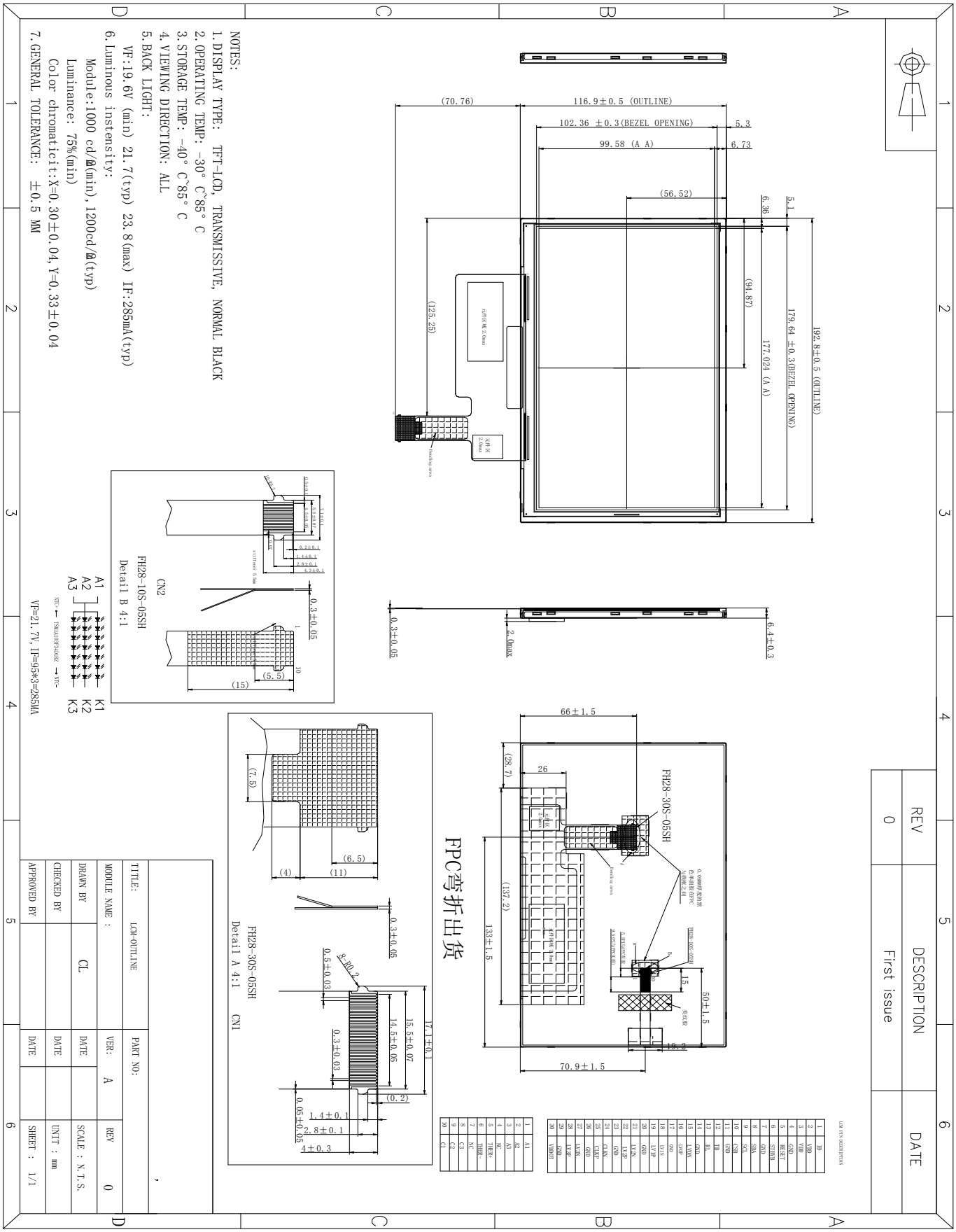
B.LCM appearance inspection without abnormalities (Including scratch, damage, corrosion and serious deformation)

C.LCM brightness above the Min. value of Spec.

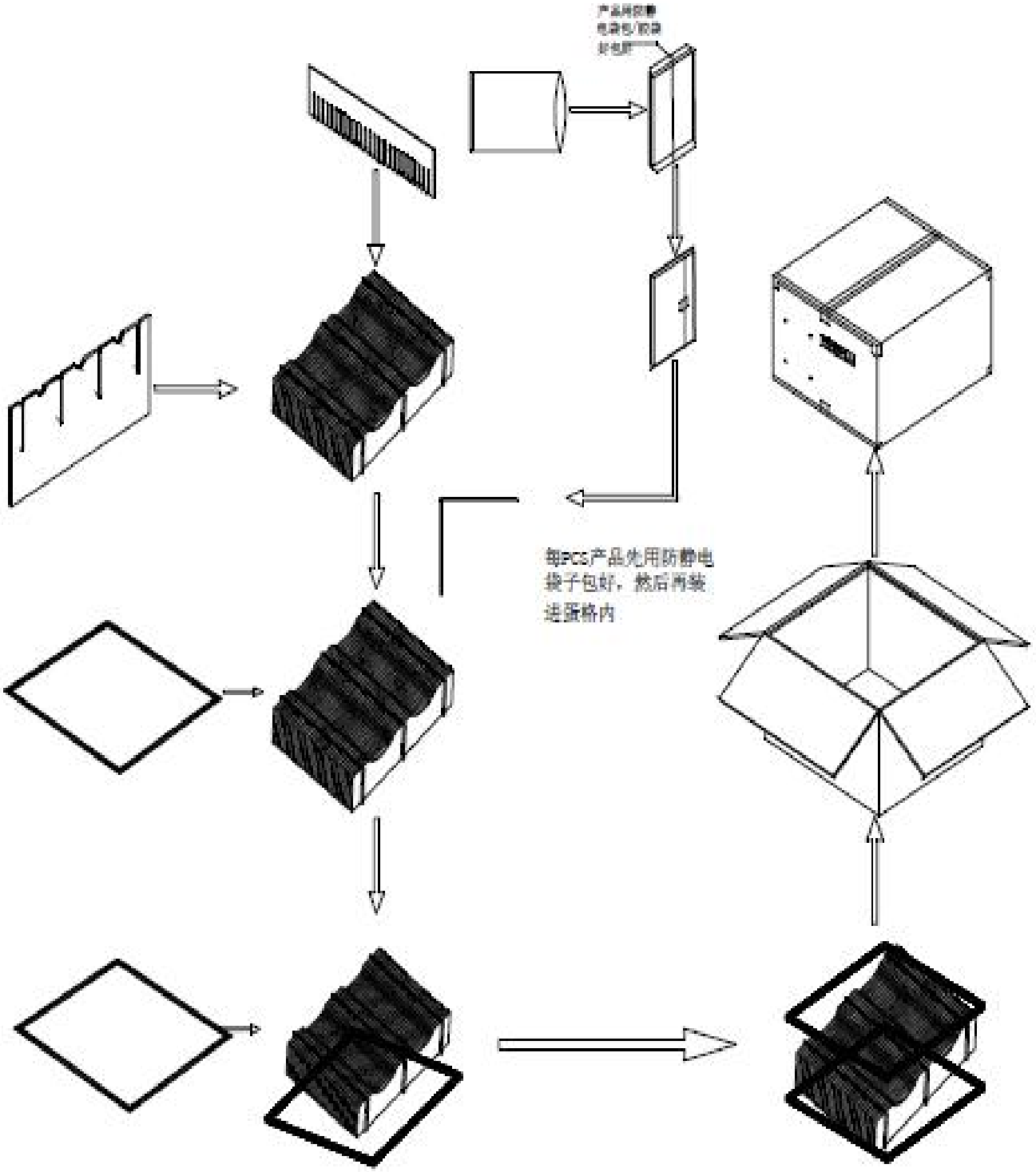
D. Luminance uniformity above the Min. value of Spec.

E. Color chromaticity within tolerance range

6. Mechanical Drawing



7. Package Drawing



8. General Precautions

8.1. Safety

Liquid crystal is poisonous. Do not put it in your mouth. If liquid crystal touches your skin or clothes, wash it off immediately by using soap and water.

8.2. Handling

1. The LCD panel is plate glass. Do not subject the panel to mechanical shock or to excessive force on its surface.
2. The polarizer attached to the display is easily damaged. Please handle it carefully to avoid scratch or other damages.
3. To avoid contamination on the display surface, do not touch the module surface with bare hands.
4. Keep a space so that the LCD panels do not touch other components.
5. Put cover board such as acrylic board on the surface of LCD panel to protect panel from damages.
6. Transparent electrodes may be disconnected if you use the LCD panel under environmental conditions where the condensation of dew occurs.
7. Do not leave module in direct sunlight to avoid malfunction of the ICs.

8.3. Static Electricity

1. Be sure to ground module before turning on power or operating module.
2. Do not apply voltage which exceeds the absolute maximum rating value.

8.4. Storage

1. Store the module in a dark room where must keep at 25±10℃ and 65%RH or less.
2. Do not store the module in surroundings containing organic solvent or corrosive gas.
3. Store the module in an anti-electrostatic container or bag.

8.5. Cleaning

1. Do not wipe the polarizer with dry cloth. It might cause scratch.
2. Only use a soft sloth with IPA to wipe the polarizer, other chemicals might permanent damage to the polarizer.