Shenzhen Taiyida Technology Co., Ltd.

LCD MODULE SPECIFICATION

Customer: _____

Model Name: TYB10111H50RI-242C

Date: 2022/02/21

Version: _____

For Customer's Acceptance

Approved by	Comment

Approved By	Checked By	Prepared By
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Record of Revision

Version	Revise Date	Page	Content
00	2022/02/21	ALL	First issue

Contents

1. General Specifications

No.	Item	Specification	Remark
1	LCD size	10.1 inch	
2	Driver element	a-Si TFT active matrix	
3	Resolution	1024 × (RGB) × 600	
4	Display mode	Normally White	
5	Dot pitch	0.2175(H) x 0.2088(V) mm	
6	Active area	222.72(W) ×125.28(H) mm	
7	Module size	235(W) ×143(H) ×5.0(D) mm	Note 1
8	View direction	ALL	O'Clock
9	Surface treatment	Anti-Glare	
10	Color arrangement	RGB-stripe	
11	Interface	RGB	
12	Lcm power consumption	3.0W	TYP
13	Drive IC	HX8282+HX8696	

Note 1: Refer to Mechanical Drawing.

2. Pin Assignment

FPC Connector is used for the module electronics interface. The recommended model is TYB10111H50R1-242C manufactured by Hirose.

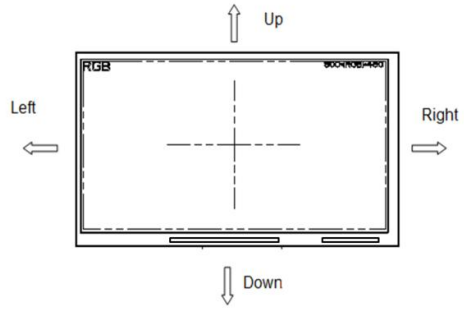
Pin. No	Symbol	I/O	Function	Remark
1-2	NC	-	No connection	
3-4	NC	-	No connection	
5	GND	P	Ground	
6	VCOM	p	Common voltage	
7	VDD	P	Power for Digital Circuit	
8	MODE	I	DE/SYNC mode select	
9	DE	I	Data Input Enable	
10	VSYNC	I	Vertical Sync Input	
11	HSYNC	I	Horizontal Sync Input	
12-19	B7-B0	I	Blue data,B7 is MSB,B0 is LSB.	
20-27	G7-G0	I	Green data,G7 is MSB,G0 is LSB.	
28-35	R7-R0	I	Red data,R7 is MSB,R0 is LSB.	
36	GND	P	Ground	
37	DCLK	I	Sample clock	
38	GND	P	Ground	
39	SHLR	I	Left/right selection	Note 1、2
40	UPDN	I	Up/down selection	Note 1、2
41	VGH	P	Gate ON Voltage	
42	VGL	P	Gate OFF Voltage	
43	AVDD	P	Power for Analog Circuit	
44	RESET	I	Global reset pin.	
45	NC	-	No connect	
46	VCOM	p	Common Voltage	
47	DITHB	I	Dithering function enable control.normally pull high.	
48	GND	P	Ground	
49-50	NC	-	No connection	

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

Note : Selection of scanning mode

Setting of scan control input		Scanning direction
UPDN	SHLR	
GND	VDD	Up to down, left to right
VDD	GND	Down to up, right to left
GND	GND	Up to down, right to left
VDD	VDD	Down to up, left to right

Refer to the figure as below:



CN2 (LED backlight)

PIN NO.	SYMBOL	FUNCTION
Black	A	Anode
White	K	Cathode

3. Operation Specifications

3.1. Typical Operation Conditions

Test condition: GND=0V, T_A=25 °C

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Power voltage	VDD	3.0	3.3	3.6	V	
	VGH	20	21	22	V	
	VGL	-9	-8	-7	V	
	AVDD	9.2	10.8	11.4	V	
	VCOM	3.4	3.8	4.2	V	
Input logic high voltage	V_{IH}	0.7 V_{DD}	-	V_{DD}	V	
Input logic low voltage	V_{IL}	0		0.3 V_{DD}	V	

3.2. Current Consumption

Current for LED Driver

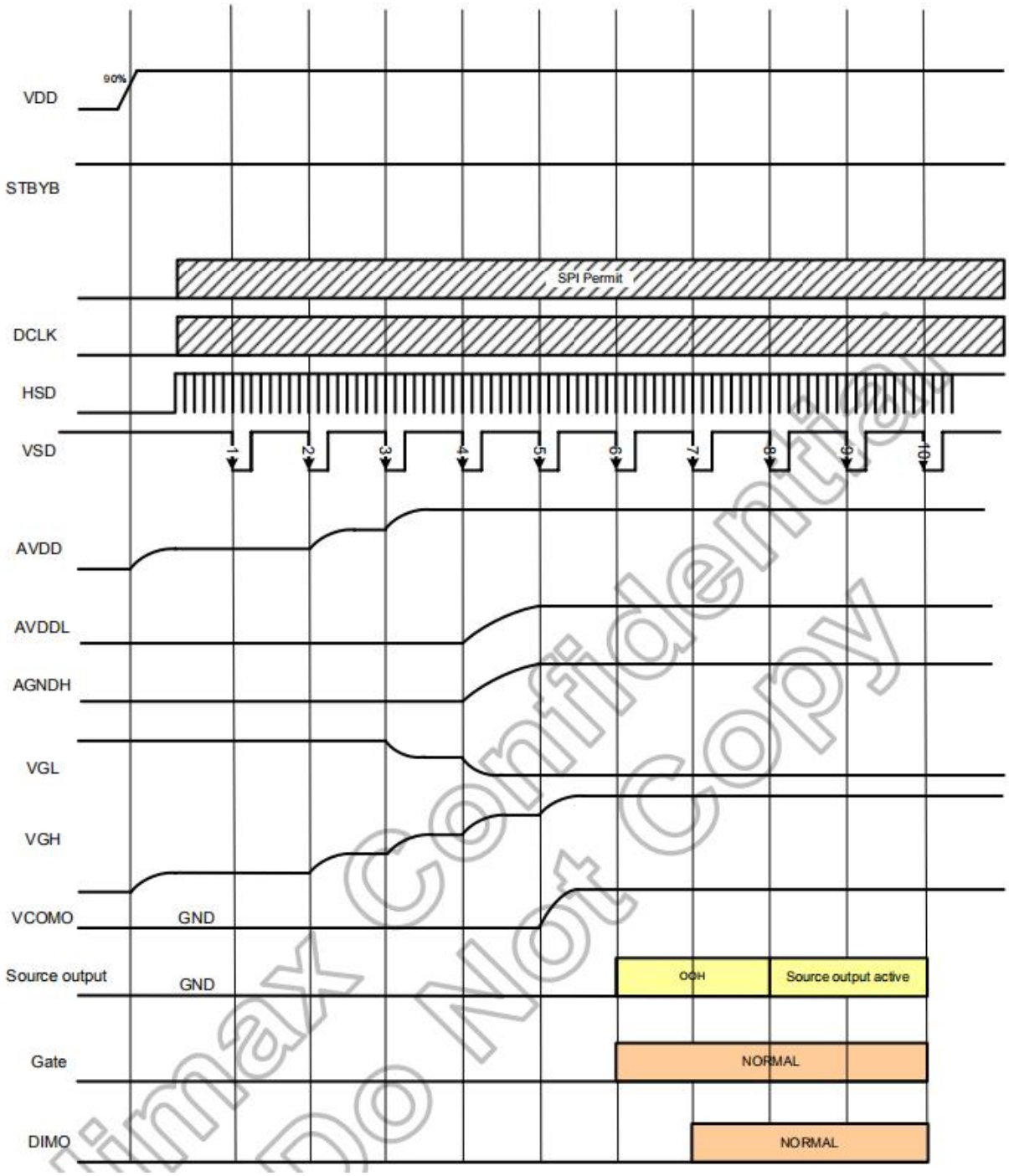
Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Voltage for LED Backlight	V_L		19.2		V	Note 1
Crrent for LED Backlight	I_L	-	210	-	mA	
LED life time	-	20,000	-	-	Hr	Note 2

Fig. 3-1 LED test circuit diagram

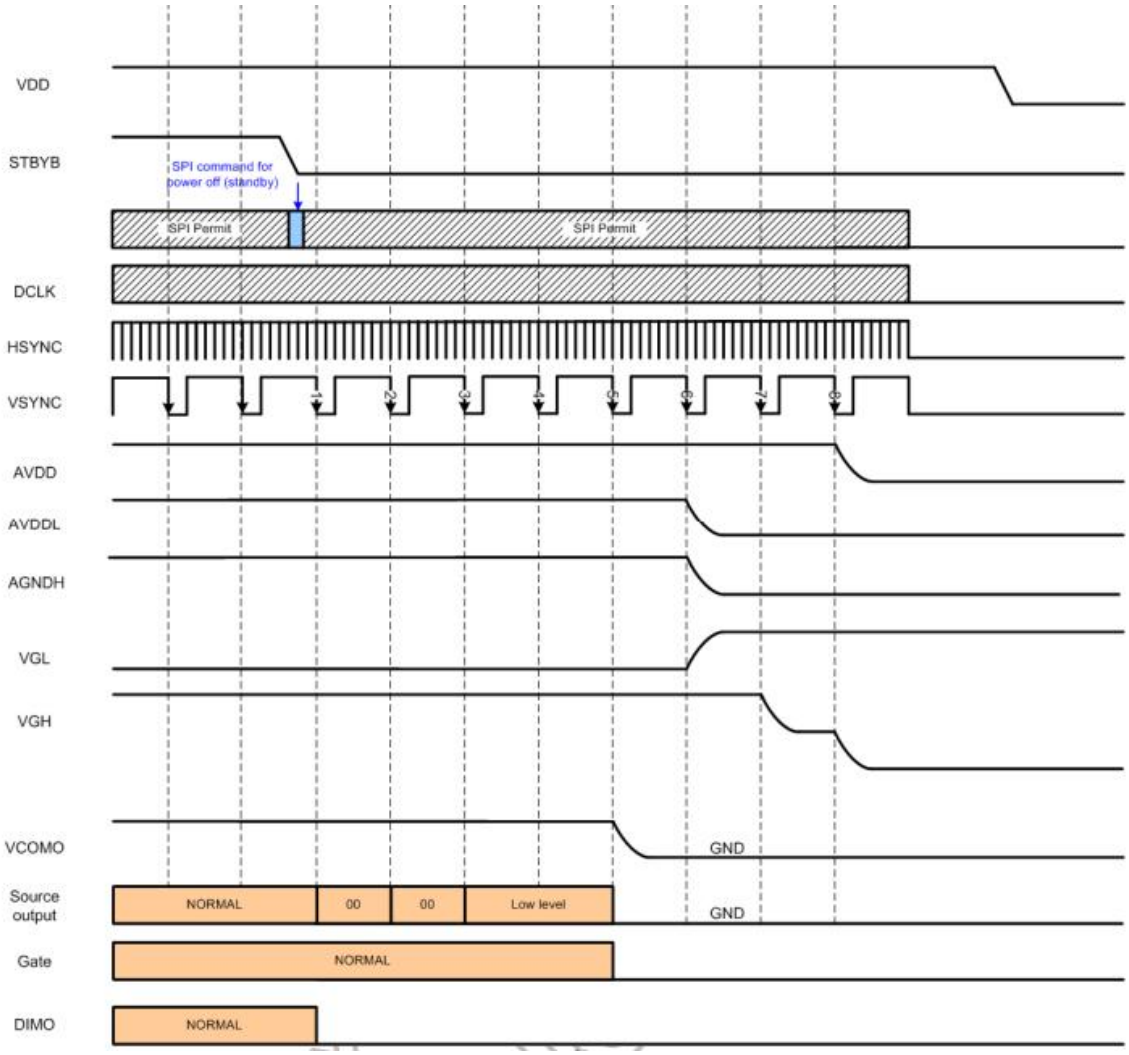
Note 2: The “LED life time” is defined as the module brightness decrease to 50% original brightness at Ta=25℃ and 1/2 rared current . The LED lifetime could be decreased if operating I_L is larger than280mA.

3.3. PowerSequence

Power on：



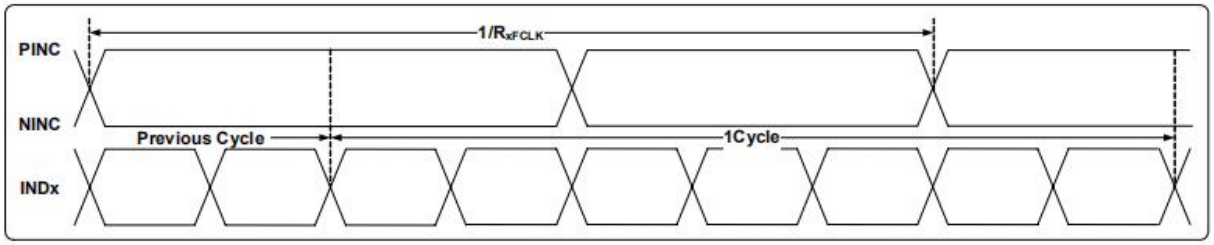
Power off：

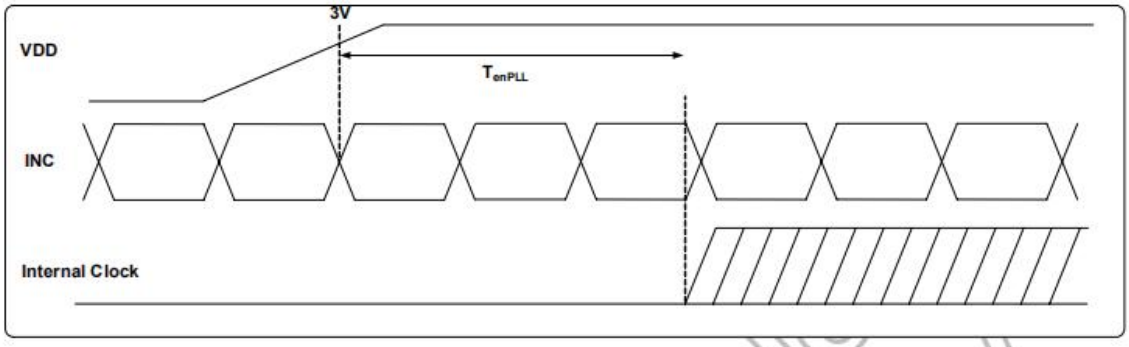

VDD
STBYB
SPI command for power off (standby)
SPI Permit
SPI Permit
DCLK
HSYNC
VSYNC
AVDD
AVDDL
AGNDH
VGL
VGH
VCOMO
GND
Source output
NORMAL
00
00
Low level
GND
Gate
NORMAL
DIMO
NORMAL

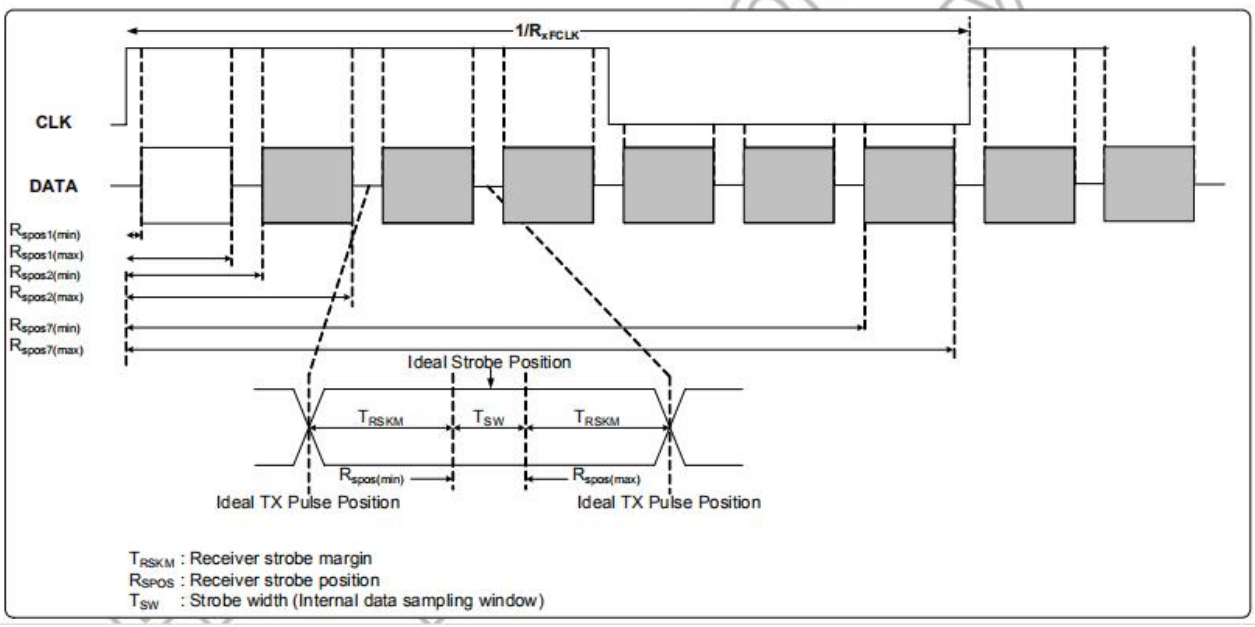
3.4. Signal Timing Characteristics

3.4.1. AC Electrical Characteristics

Parameter	Symbol	Spec.			Unit	Condition
		Min.	Typ.	Max.		
Clock frequency	R_{XFCLK}	20	-	71	MHz	-
Input data skew margin	T_{RSKM}	500	-	-	pS	$\lvert V_{ID} \rvert$=400mV R_{XVCM}=1.2V R_{XFCLK}=71MHz
Clock high time	T_{LVCH}	-	4/(7* R_{XFCLK})	-	ns	-
Clock low time	T_{LVCL}	-	3/(7* R_{XFCLK})	-	ns	-
PLL wake-up time	T_{emPLL}	-	-	150	μs	-

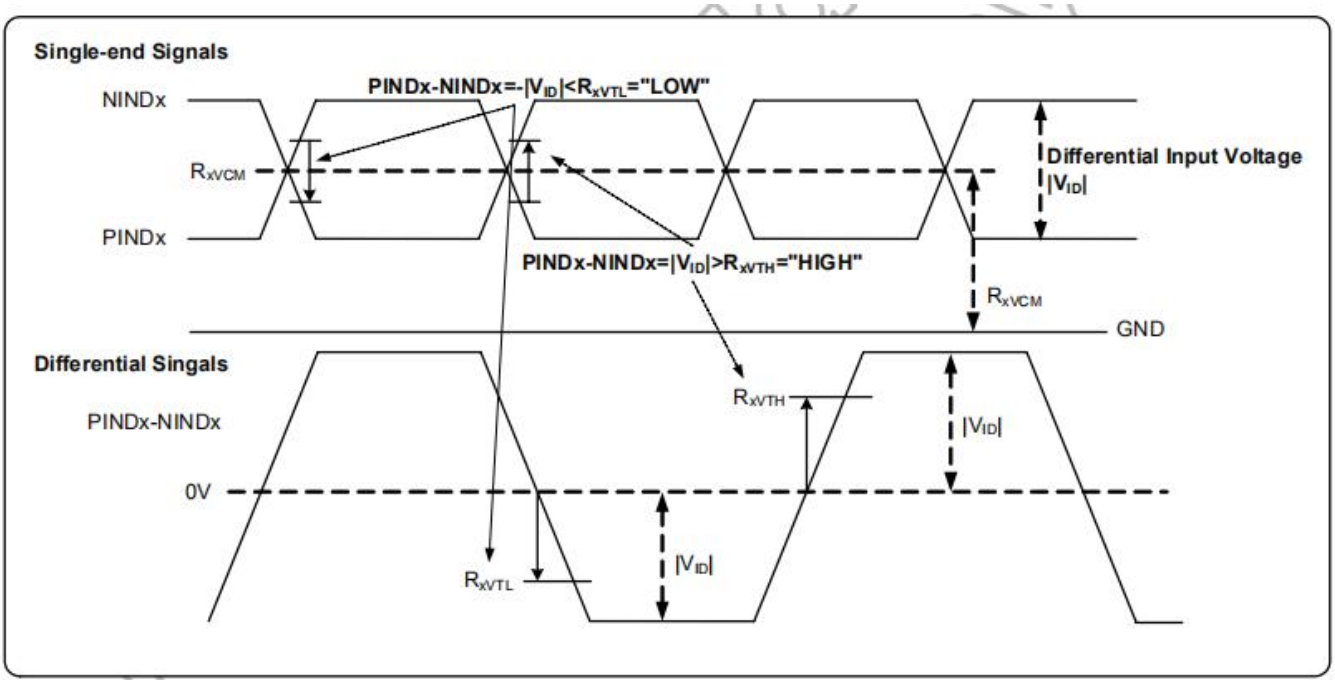

PINC
NINC
INDx
1/RxFCLK
Previous Cycle
1Cycle


VDD
INC
Internal Clock
3V
TenPLL


CLK
DATA
1/RxFCLK
Rspos1(min)
Rspos1(max)
Rspos2(min)
Rspos2(max)
Rspos7(min)
Rspos7(max)
Ideal Strobe Position
TRSKM
TSW
TRSKM
Rspos(min)
Rspos(max)
Ideal TX Pulse Position
Ideal TX Pulse Position
TRSKM : Receiver strobe margin
RSPOS : Receiver strobe position
TSW : Strobe width (Internal data sampling window)

3.4.2. DC Electrical Characteristics

Parameter	Symbol	Spec.			Unit	Condition
		Min.	Typ.	Max.		
Differential input high Threshold voltage	R_{XVTH}	-	-	+0.1	V	R_{XVCM}=1.2V
Differential input low threshold voltage	R_{XVTL}	-0.1	-	-	V	
Input voltage range (singled-end)	R_{XVIN}	0	-	VDD-1.2+ $\|V_{ID}\|/2$	V	-
Differential input common Mode voltage	R_{XVCM}	$\|V_{ID}\|/2$	-	VDD-1.2	V	-
Differential input voltage	$\| V_{ID} \|$	0.2	-	0.6	V	-
Differential input leakage Current	RV_{Xliz}	-10	-	+10	μA	-
LVDS Digital Operating Current	Iddlvds	-	15	30	mA	Fclk=65MHz, VDD=3.3V
LVDS Digital Stand-by Current	Istlvds	-	10	50	μA	Clock & all Functions are stopped



3.4.3. Data Input Format

- **DE mode**

Parameter	Symbol	Spec.			Unit
		Min.	Typ.	Max.	
DCLK Frequency	fclk	40.8	51.2	67.2	MHz
Horizontal Display Area	thd		1024		DCLK
HSD Period	th	1114	1344	1400	DCLK
HSD Blanking	thb+ thfp	90	320	376	DCLK
Vertical Display Area	tvd		600		T_H
VSD Period	tv	610	635	800	T_H
VSD Blanking	tvbp+ tvfp	10	35	200	T_H

Table 10.4: DE mode (1024x600)

- **HV mode**

Horizontal timing

Parameter	Symbol	Spec.			Unit
		Min.	Typ.	Max.	
DCLK Frequency	fclk	44.9	51.2	63	MHz
Horizontal Display Area	thd		1024		DCLK
HSD Period	th	1200	1344	1400	DCLK
HSD Pulse Width	thpw	1	-	140	DCLK
HSD Back Porch	thbp		160		DCLK
HSD Front Porch	thfp	16	160	216	DCLK

Table 10.5: HV mode horizontal timing (1024x600)

Vertical Timing

Parameter	Symbol	Spec.			Unit
		Min.	Typ.	Max.	
Vertical Display Area	tvd		600		T_H
VSD Period	tv	624	635	750	T_H
VSD Pulse Width	tvpw	1	-	20	T_H
VSD Back Porch	tvbp		23		T_H
VSD Front Porch	tvfp	1	12	127	T_H

Table 10.6: HV Mode Vertical Timing (1024x600)

Vertical timing

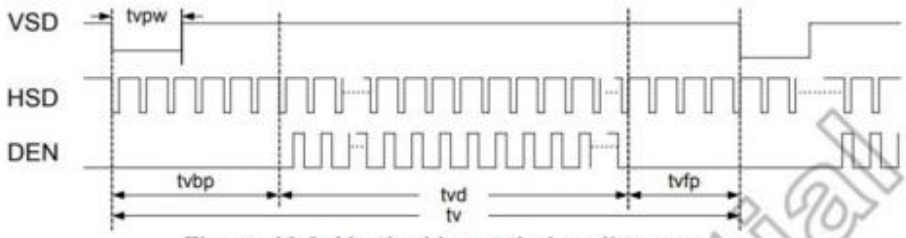


Figure 10.2: Vertical input timing diagram

Horizontal timing

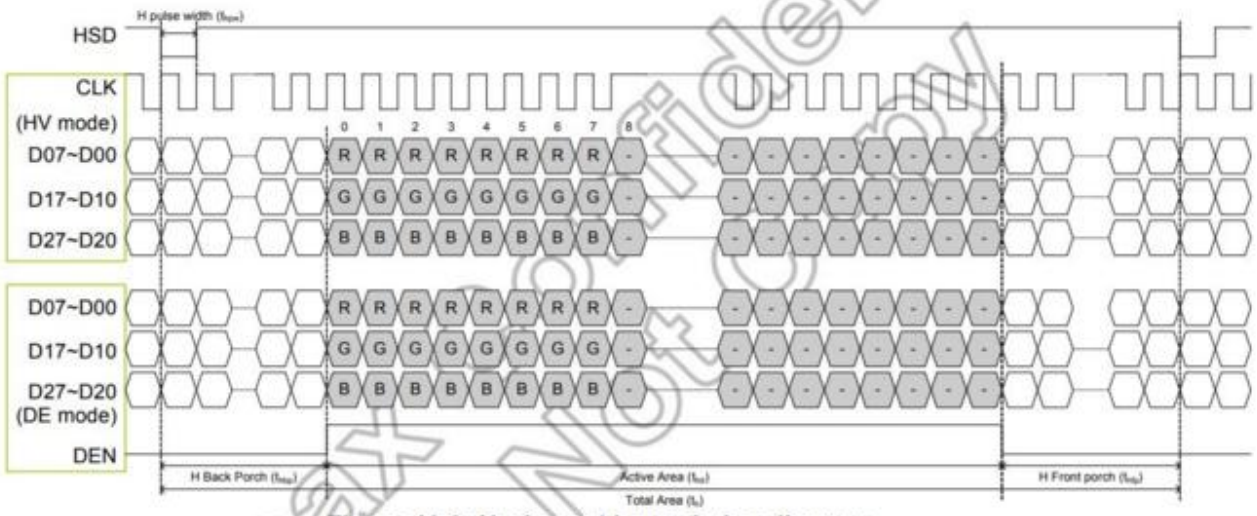


Figure 10.3: Horizontal input timing diagram

4. Optical Specifications

Item	Symbol	Condition	Values			Unit	Remark
			Min.	Typ.	Max.		
Viewing angle (CR≥ 10)	θ_L	Φ=180°(9 o'clock)	-	80	-	degree	Note 1
	θ_R	Φ=0°(3 o'clock)	-	80	-		
	θ_T	Φ=90°(12 o'clock)	-	80	-		
	θ_B	Φ=270°(6 o'clock)	-	80	-		
Response time	T_{ON+off}	Normal θ=Φ=0°	-	25	40	msec	Note 3
Contrast ratio	CR		500	600	-	-	Note 4
Color chromaticity	W_X		-	0.29	-	-	Note 2 Note 5 Note 6
	W_Y		-	0.300	-	-	
NTSC			45	50		%	
Luminance	L			500	-	cd/m²	Note 6
Luminance uniformity	Y_U		70	80	-		Note 7

The test systems refer to Note 2.

Note 1: Definition of viewing angle range

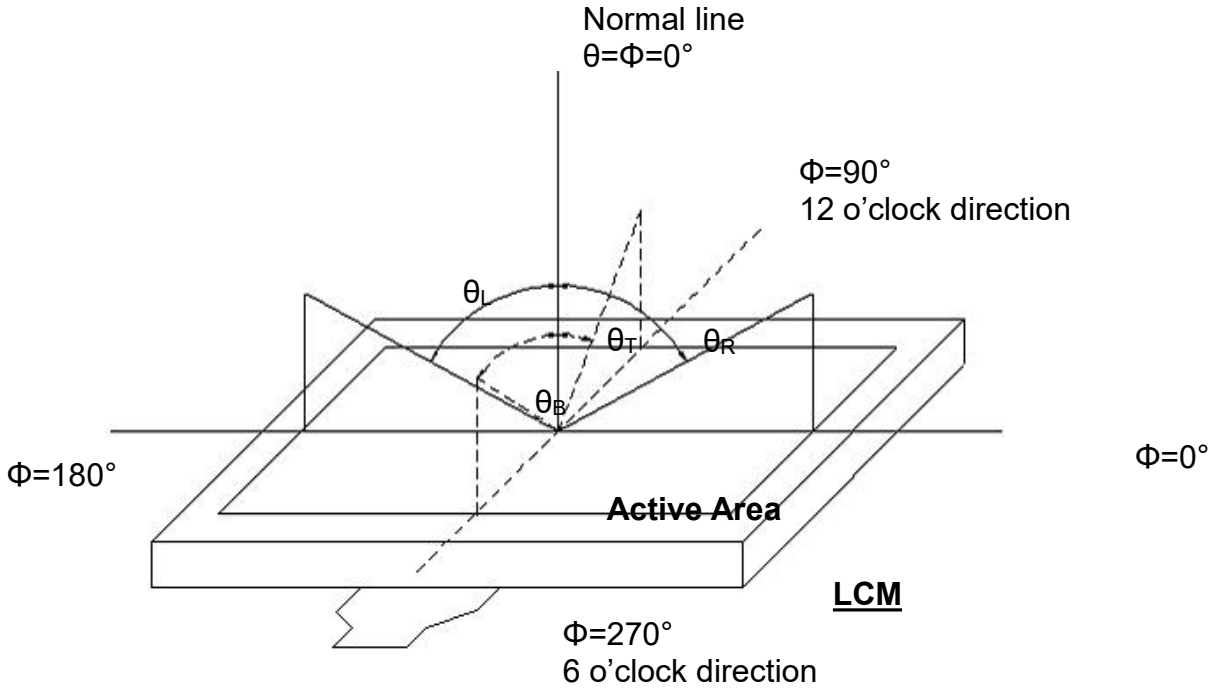


Fig. 4-2 Definition of viewing angle

Note 2: Definition of 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.

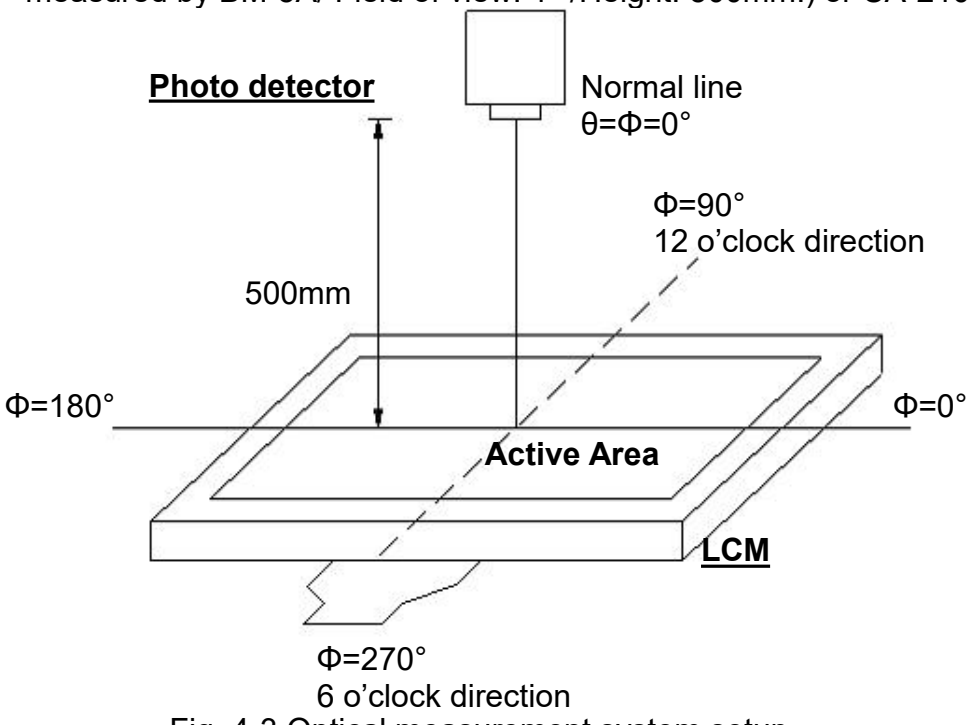


Fig. 4-3 Optical measurement system setup

Note 3: 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%.

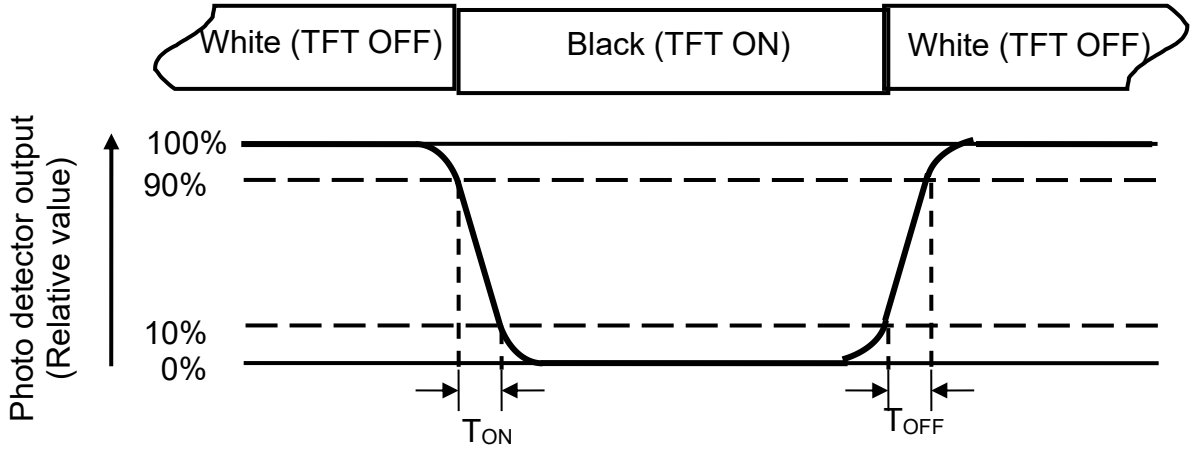


Fig. 4-4 Definition of response time

Note 4: 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 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=140mA .

Note 7: Definition of Luminance Uniformity

Active area is divided into 9 measuring areas(Refer to Fig. 4-4).

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

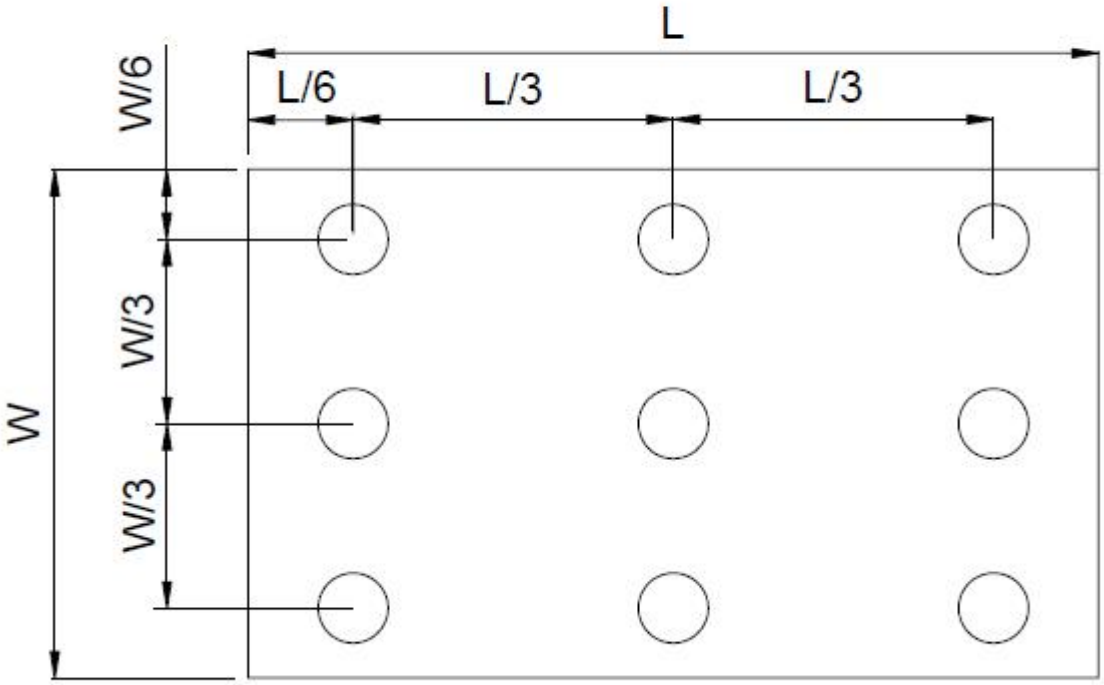


Fig. 4-4 Definition of measuring points

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℃	120hrs	A,B,C,D,E
Low Temperature Storage	Ta = -30℃	120hrs	A,B,C,D,E
High Temperature Operation	Ts =80℃	120hrs	A,B,C,D,E
Low Temperature Operation	Ta =-30℃	120hrs	A,B,C,D,E
Operate at High Temperature and Humidity	+60℃, 90%RH	120hrs	A,B,C,D,E
Thermal Shock(non operation)	-10℃/30 min ~ +60℃/30 min for a total 30 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=+/-4KV, Air=+/-8KV,(R=330R,C=150pF), 1 sec,5point,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.

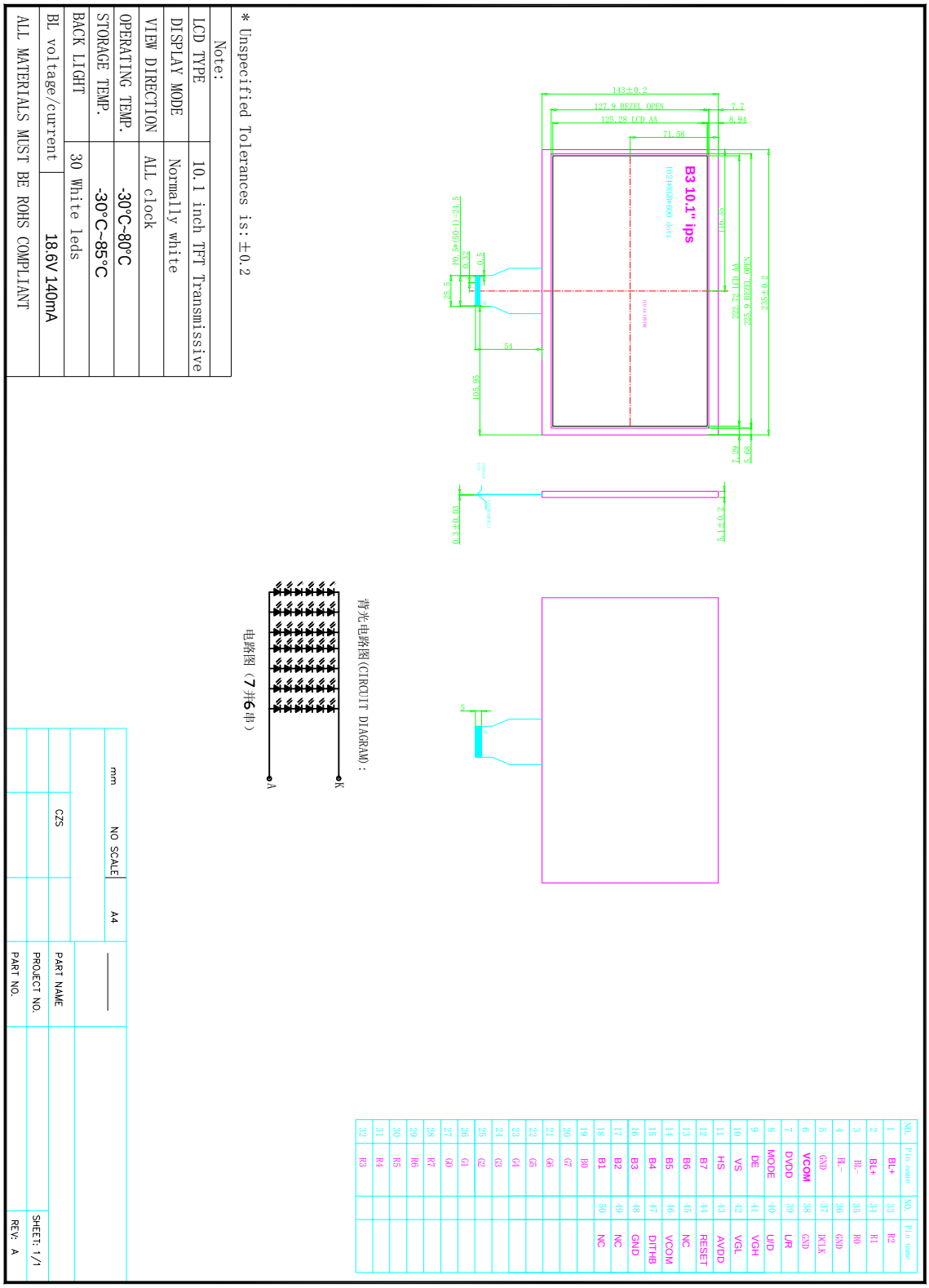
D. Luminance uniformity above the Min. value of Spec.

E. Color chromaticity within tolerance range

This verification data is only responsible for this sample.

For actual batch production, please refer to the actual test results!

3. Mechanical Dimension



Note:	
LCD TYPE	10.1 inch TFT Transmissive
DISPLAY MODE	Normally white
VIEW DIRECTION	ALL clock
OPERATING TEMP.	-30°C~80°C
STORAGE TEMP.	-30°C~85°C
BACK LIGHT	30 White leds
BL voltage/current	18.6V 140mA
ALL MATERIALS MUST BE ROHS COMPLIANT	

* Unspecified Tolerances is: ±0.2

NO.	Pin name	NO.	Pin name
1	BL+	33	R2
2	BL+	34	R1
3	BL-	35	R0
4	BL-	36	GND
5	GND	37	DCLK
6	VCOM	38	GND
7	DVDD	39	L/R
8	MODE	40	U/D
9	DE	41	VGH
10	VS	42	VGL
11	HS	43	AVDD
12	B7	44	RESET
13	B6	45	NC
14	B5	46	VCOM
15	B4	47	DITHB
16	B3	48	GND
17	B2	49	NC
18	B1	50	NC
19	B0		
20	G7		
21	G6		
22	G5		
23	G4		
24	G3		
25	G2		
26	G1		
27	G0		
28	R7		
29	R6		
30	R5		
31	R4		
32	R3		

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.