
LCD MODULE SPECIFICATION

Customer: _____

Model Name: XY043BDIB40-0701Q151

Date: 2022/08/19

Version: 00

Approved by Customer	Comment

Approved By	Checked By	Prepared By

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1. General Specifications

No.	Item	Specification	Remark
1	LCD size	4.3" inch(Diagonal)	
2	Driver element	TFT active matrix	
3	Number of Pixels	480× (RGB) ×272	
4	Display mode	Normally White, Transmissive	
5	Pixel Pitch	0.198(W) × 0.198(H) mm	
6	Active area	95.04(W) × 53.856(H) mm	
7	Module size	105.5(W) × 67.15(H) ×2.85(D) mm	Note 1
8	View direction	6	O'Clock
9	Surface treatment	Anti-Glare	
10	Color arrangement	RGB-stripe	
11	Interface	RGB	
12	LCM power consumption	0.6W	TYP
13	Drive IC	ILI6485	

Note 1: Refer to Mechanical Drawing.

2. Pin Assignmen

FPC Connector is used for the module electronics interface. The recommended model is FH12A-40S-0.5SH manufactured by Hirose.

Pin No	Symbol	I/O	Function	Remark
1	LEDK	P	LED Cathode	
2	LEDA	P	LED Anode	
3	GND	P	Ground	
4	VDD	P	Power for Digital Circuit	
5-12	R0-R7	I	Red data,R7 is MSB,R0 is LSB.	
13-20	G0-G7	I	Green data,G7 is MSB,G0 is LSB.	
21-28	B0-B7	I	Blue data,B7 is MSB,B0 is LSB.	
29	GND	P	Ground	
30	DCLK	I	Clock signal	
31	DISP	I	Display on/off	
32	HSYNC	I	Horizontal sync signal; negative polarity	
33	VSYNC	I	Vertical sync signal; negative polarity	
34	DE	I	Data input enable. Active Hight to enable the data input	
35	NC	-	No connect	
36	GND	P	Ground	
37	NC	-	No connect	
38	NC	-	No connect	
39	NC	-	No connect	
40	NC	-	No connect	

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

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	V _{DD}	3.0	3.3	3.6	V	
Input logic high voltage	V _{IH}	0.8 V _{DD}	-	V _{DD}	V	Note 1
Input logic low voltage	V _{IL}	0		0.2 V _{DD}	V	

3.2. Backlight Driving Conditions

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Voltage for LED Backlight	V_L	20.5	21	21.3	V	Note 1
Current for LED Backlight	I_L		20		mA	
LED life time	-	20,000	-	-	Hr	Note 2

Note1: $V_L=21V$, $I_L=20mA$ (Backlight circuit: 7 series connection, 1 parallel connection), the ambient temperature is 25°C.

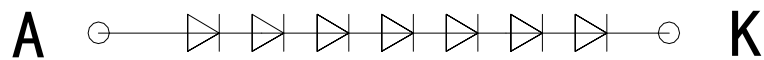
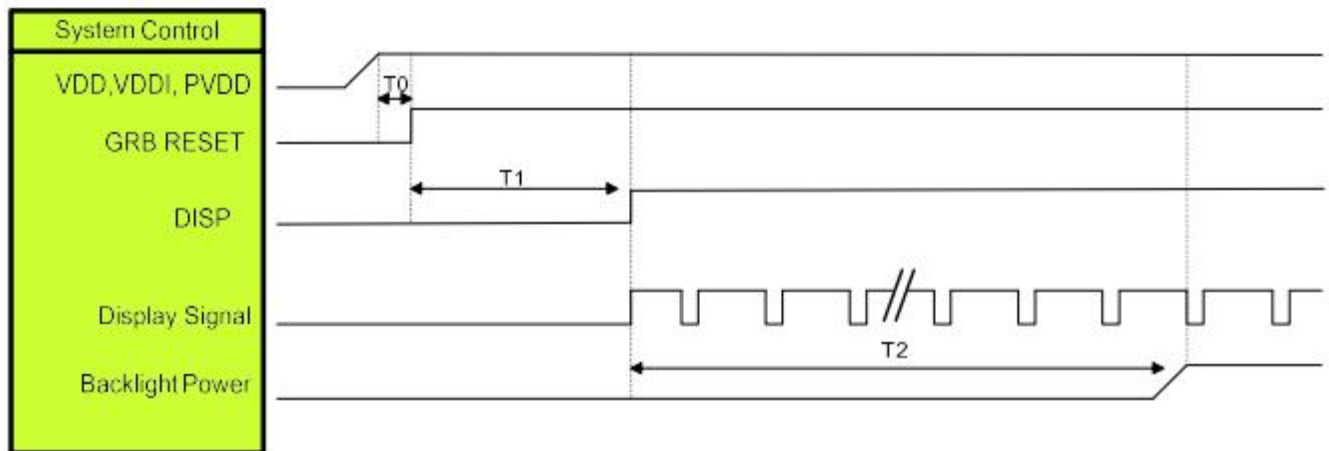


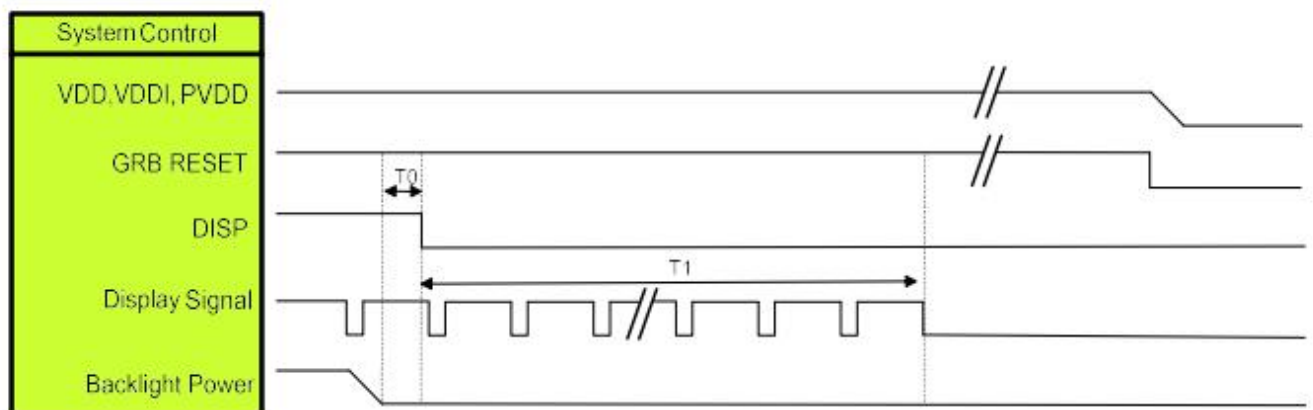
Fig. 3-1 LED test circuit diagram

Note 2: The “LED life time” is defined as the module brightness decrease to 50% original brightness at $T_a=25^{\circ}C$ and $I_L=20mA$. The LED lifetime could be decreased if operating I_L is larger than 20mA.

3.3. Power ON/OFF Sequence



Symbol	Description	Min. Time	Unit
T0	System power stability to GRB RESET signal	0	ms
T1	GRB RESET= "High" to DISP="High"	10	ms
T2	Display Signal output to Backlight Power on	250	ms



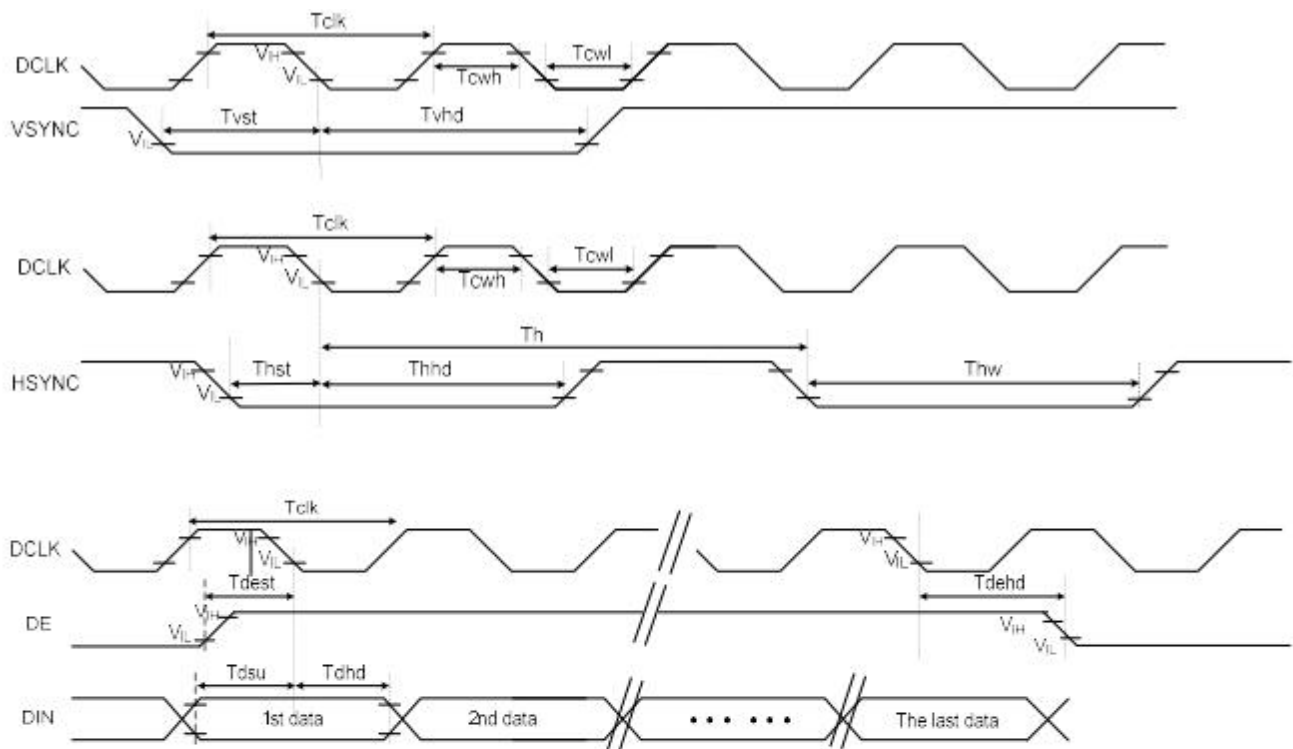
Symbol	Description	Min. Time	Unit
T0	Backlight Power off to DISP="Low"	5	ms
T1	DISP="Low" to IC internal voltage discharge complete	80	ms

3.4. AC Characteristics

System Operation AC Characteristics:

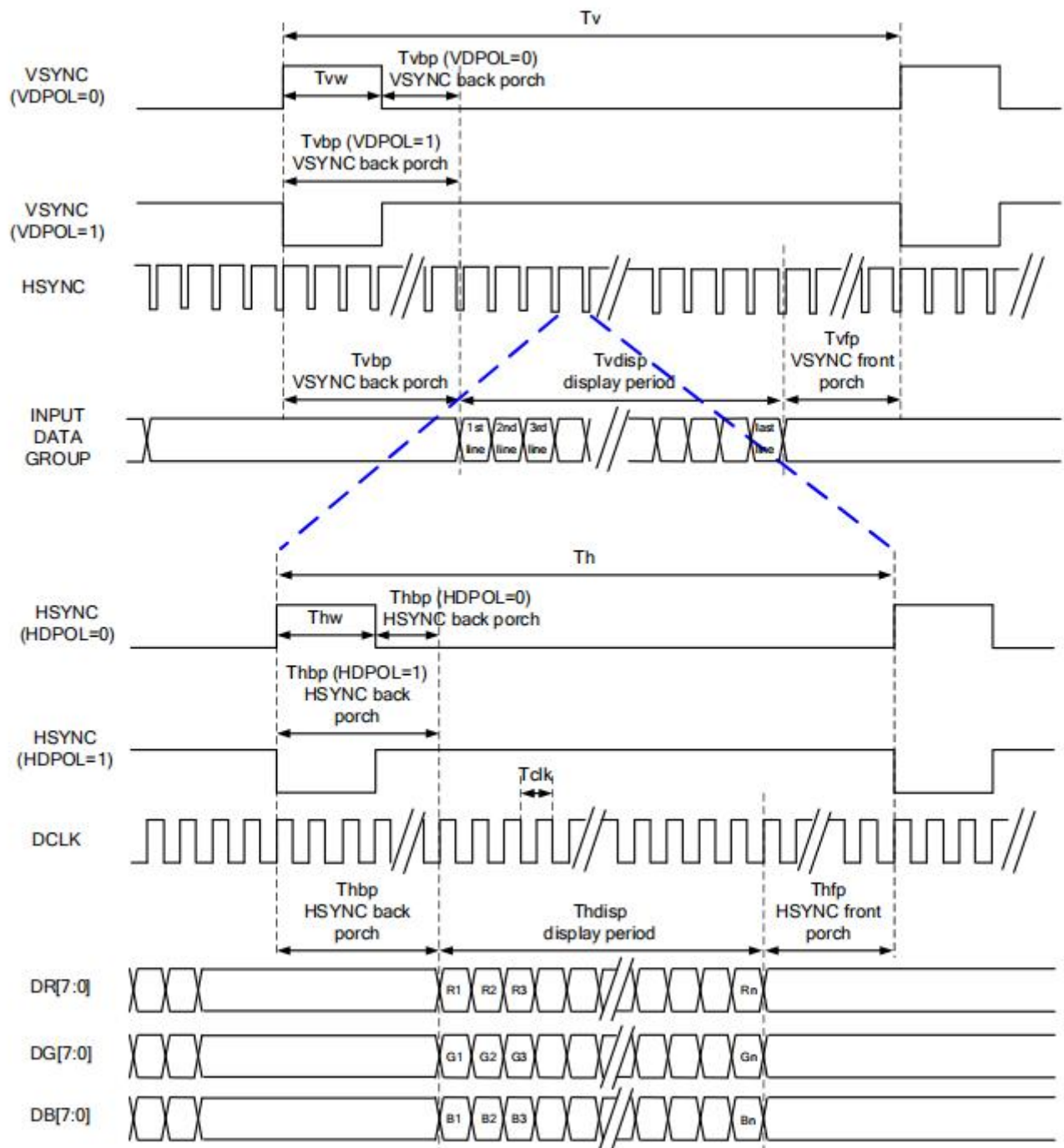
Item	Symbol	Min.	Typ.	Max.	Unit	Conditions
VDD Power Source Slew Time	TPOR	-	-	20	ms	From 0V to 99% VDD
GRB Pulse Width	tRSTW	10	50	-	us	R=10Kohm, C=1uF
SD Output Stable Time	Tst	-	-	12	us	Output settled within +20mV Loading = 6.8k+28.2pF.
GD Output Rise and Fall Time	Tgst	-	-	6	us	Output settled (5%~95%), Loading = 4.7k+29.8pF

System Bus Timing for RGB Interface:

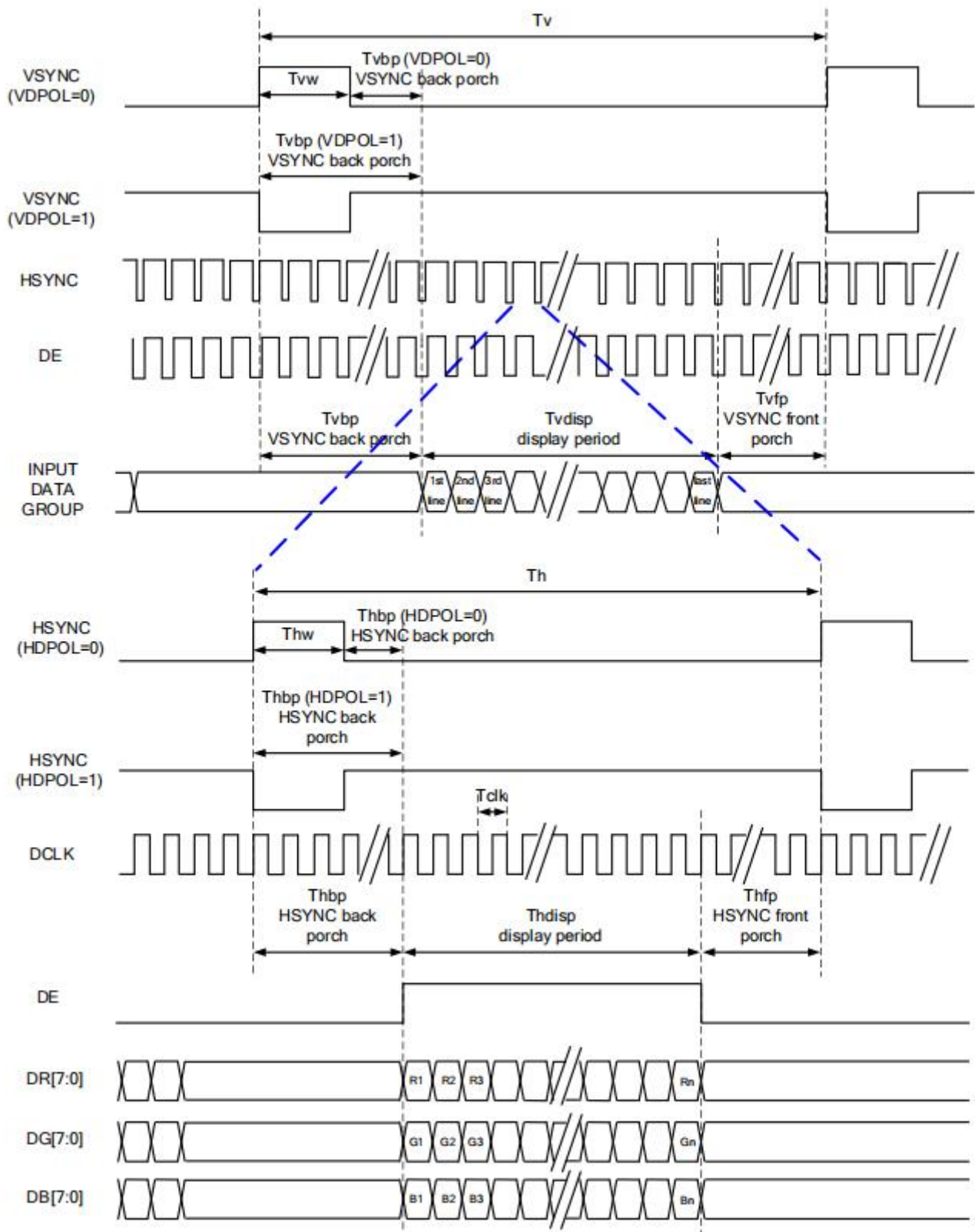


Item	Symbol	Min.	Typ.	Max.	Unit	Conditions
CLK Pulse Duty	T_{cw}	40	50	60	%	
HSYNC Width	T_{hw}	2	-	-	DCLK	
HSYNC Period	T_h	55	60	65	us	
VSYNC Setup Time	T_{vst}	12	-	-	ns	
VSYNC Hold Time	T_{vhd}	12	-	-	ns	
HSYNC Setup Time	T_{hst}	12	-	-	ns	
HSYNC Hold Time	T_{hhd}	12	-	-	ns	
Data Setup Time	T_{dsu}	12	-	-	ns	
Data Hold Time	T_{dhd}	12	-	-	ns	
DE Setup Time	T_{dest}	12	-	-	ns	
DE Hold Time	T_{dehd}	12	-	-	ns	

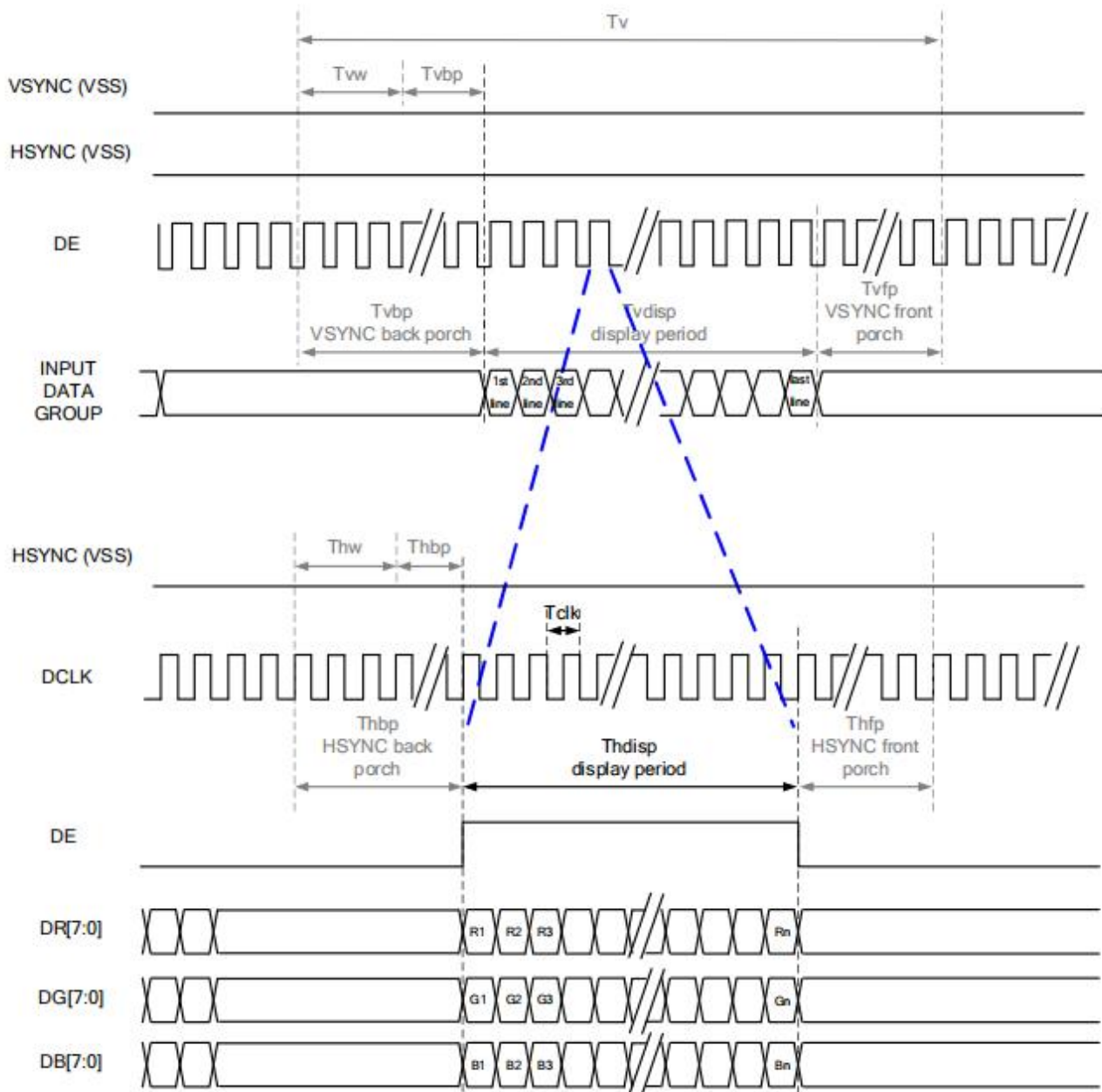
3.4.1. SYNC Mode



3.4.2. SYNC-DE Mode:



3.4.3. DE Mode:



RGB Mode Selection Table	DCLK	HSYNC	VSYNC	DE
SYNC - DE Mode	Input	Input	Input	Input
SYNC Mode	Input	Input	Input	GND
DE Mode	Input	GND	GND	Input

Note: "Input" means these signals are driven by host side.

4. Optical Specifications

Item	Symbol	Condition	Values			Unit	Remark
			Min.	Typ.	Max.		
Viewing angle (CR $\geq$ 10)	θ_L	$\Phi=180^\circ$ (9 o'clock)	-	70	-	degree	Note 1
	θ_R	$\Phi=0^\circ$ (3 o'clock)	-	70	-		
	θ_T	$\Phi=90^\circ$ (12 o'clock)	-	50	-		
	θ_B	$\Phi=270^\circ$ (6 o'clock)	-	70	-		
Response time	T_{ON}	Normal $\theta=\Phi=0^\circ$	-	15	20	msec	Note 3
	T_{OFF}		-	10	15	msec	Note 3
Contrast ratio	CR		-	500	-	-	Note 4
Color chromaticity	W_X		-	0.25	-	-	Note 2 Note 5 Note 6
	W_Y		-	0.29	-	-	
Luminance	L		230	250	-	cd/m ²	Note 6
Luminance uniformity	Y_U		70	80	-	%	Note 7

The test systems refer to Note 2.

Note 1: Definition of viewing angle range

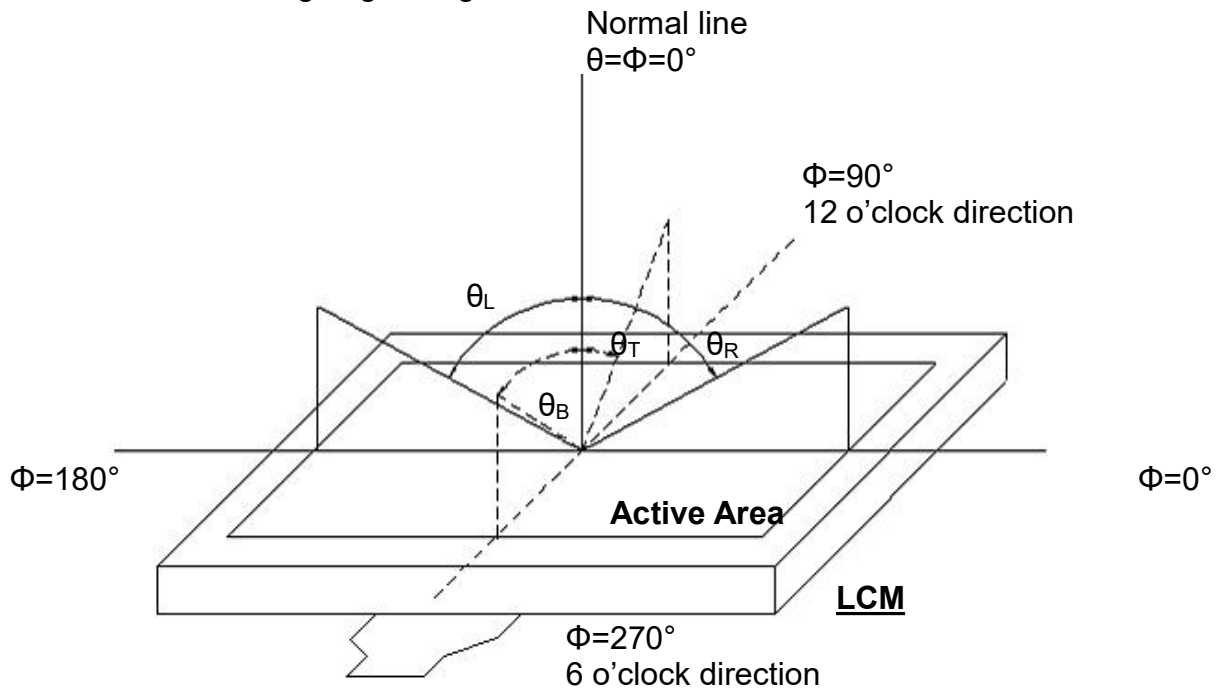


Fig. 4-2 Definition of viewing angle

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.

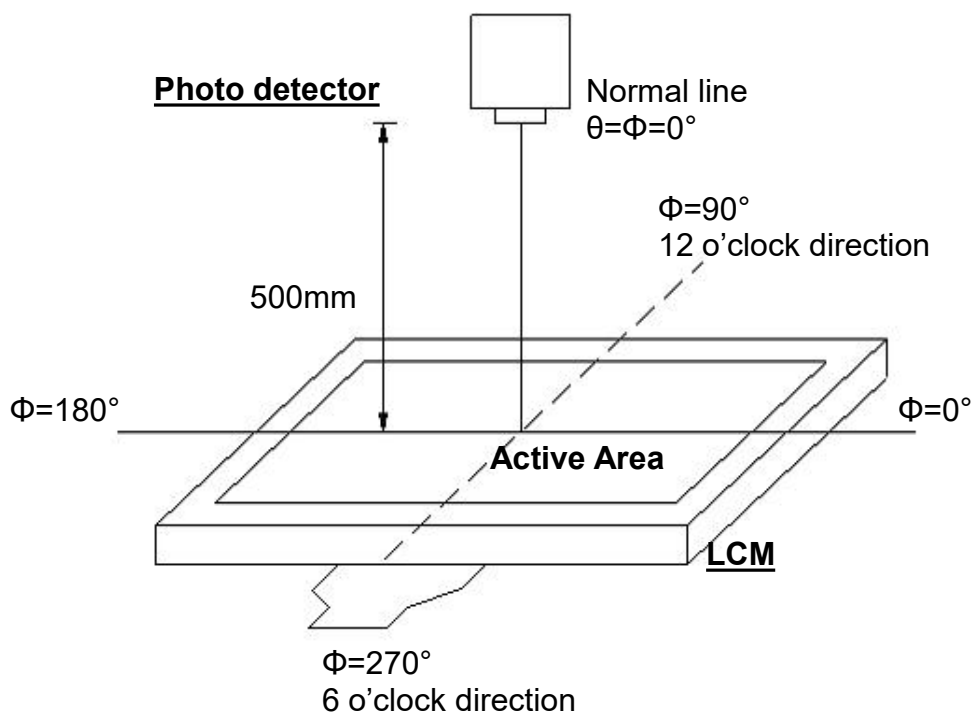


Fig. 4-3 Optical measurement system setup

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%.

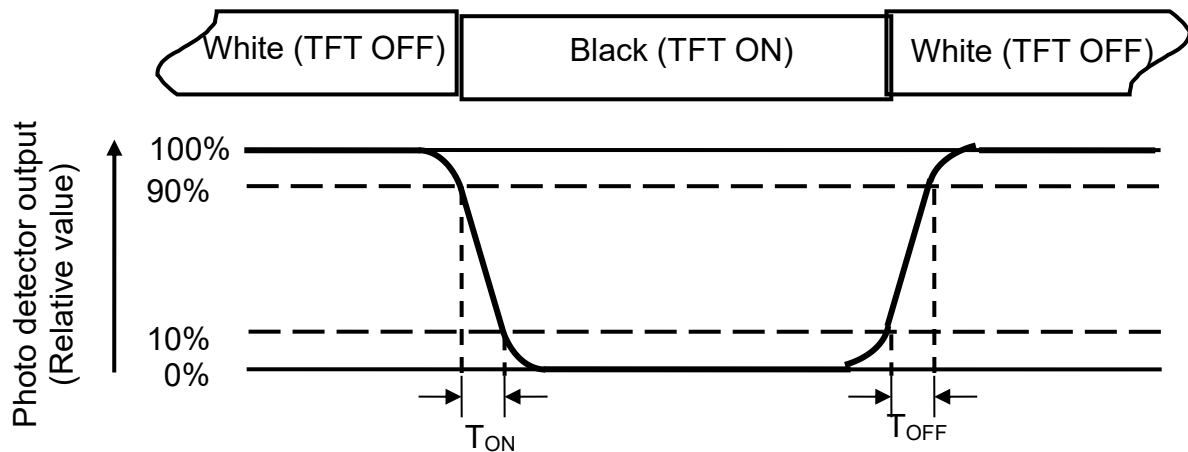


Fig. 4-4 Definition of response time

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 $I_L=20\text{mA}$.

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.

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

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

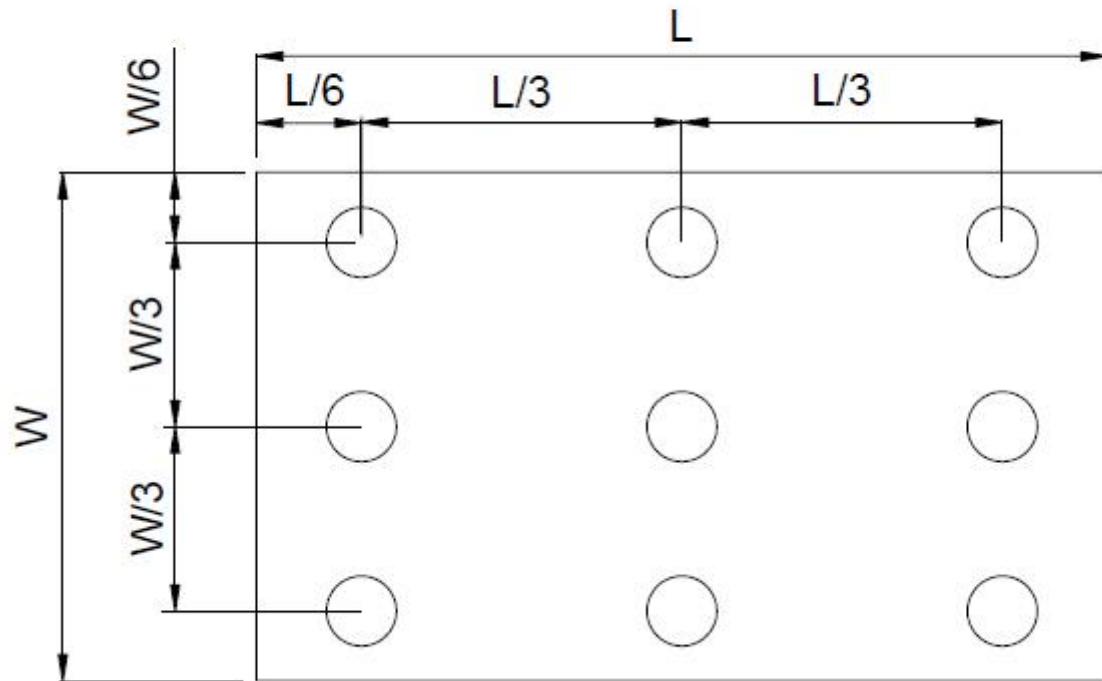


Fig. 4-4 Definition of measuring points

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 = 70℃ 96hrs	A,B,C,D,E
Low Temperature Storage	Ta = -20℃ 96hrs	A,B,C,D,E
High Temperature Operation	Ts = 60℃ 96hrs	A,B,C,D,E
Low Temperature Operation	Ta = -10℃ 96hrs	A,B,C,D,E
Operate at High Temperature and Humidity	+60℃, 90%RH 96hrs	A,B,C,D,E
Thermal Shock(non operation)	-10℃/30 min ~ +60℃/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=+/-4KV, Air=+/-8KV,(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)

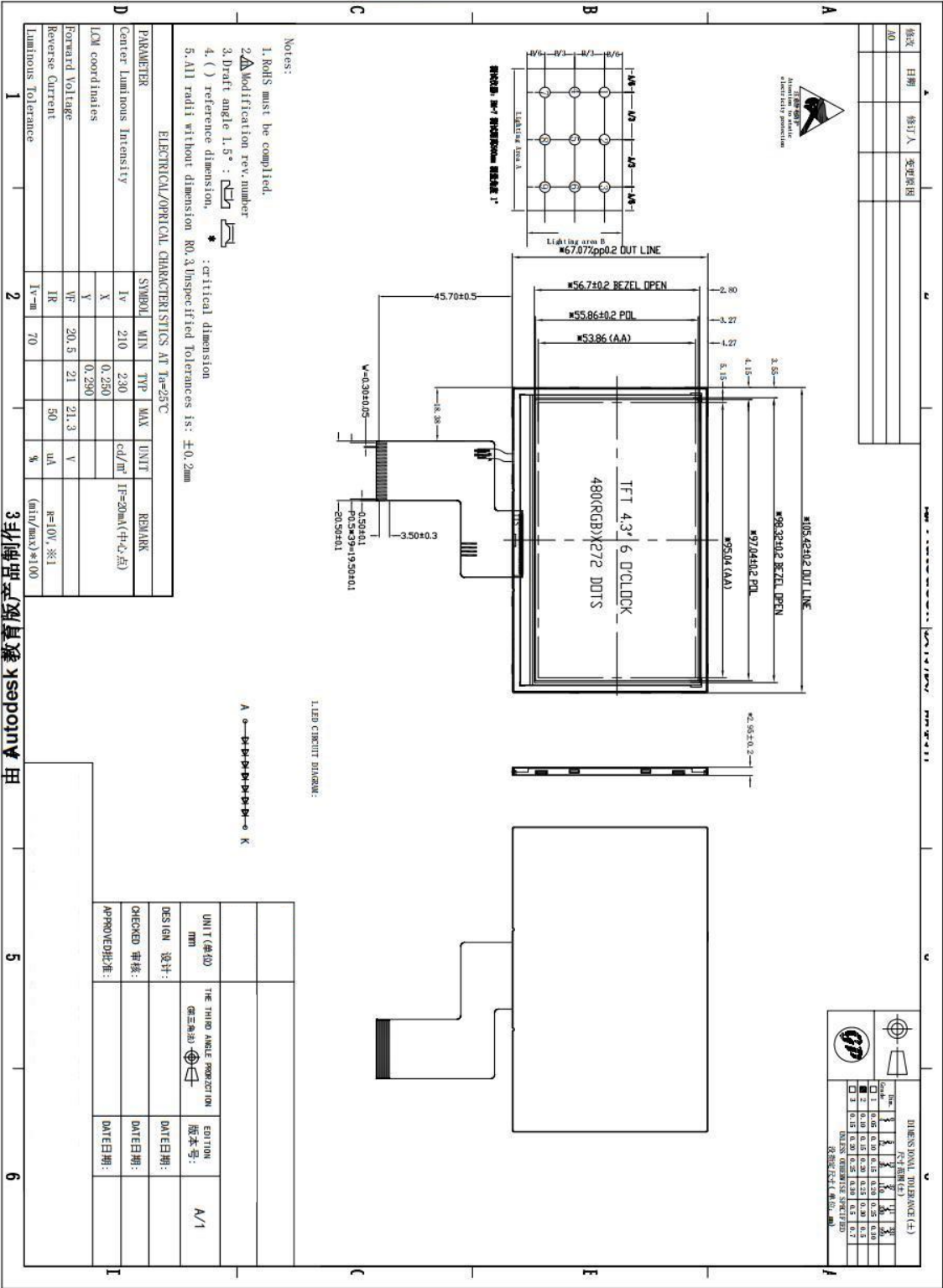
C.LCM brightness above the Min. value of Spec.

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

E. Color chromaticity within tolerance range

6. Mechanical Drawing

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7. Package Drawing

TBD

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 $25\pm 10^{\circ}\text{C}$ 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.