

DLC Display Co., Limited

德爾西顯示器有限公司



MODEL No:DLC0430VMR

TEL: 86-755-86029824

FAX: 86-755-86029827

E-MAIL: sales@dlcdisplay.com

WEB: www.dlcdisplay.com



Record of Revision

Date	Revision No.	Summary
2015-11-16	1.0	Rev 1.0 was issued

1. Scope

This data sheet is to introduce the specification of DLC0430VMR active matrix TFT module. It is composed of a color TFT-LCD panel, driver ICs, FPC and a backlight unit. The 4.3" display area contains 480(RGB)x272 pixels.

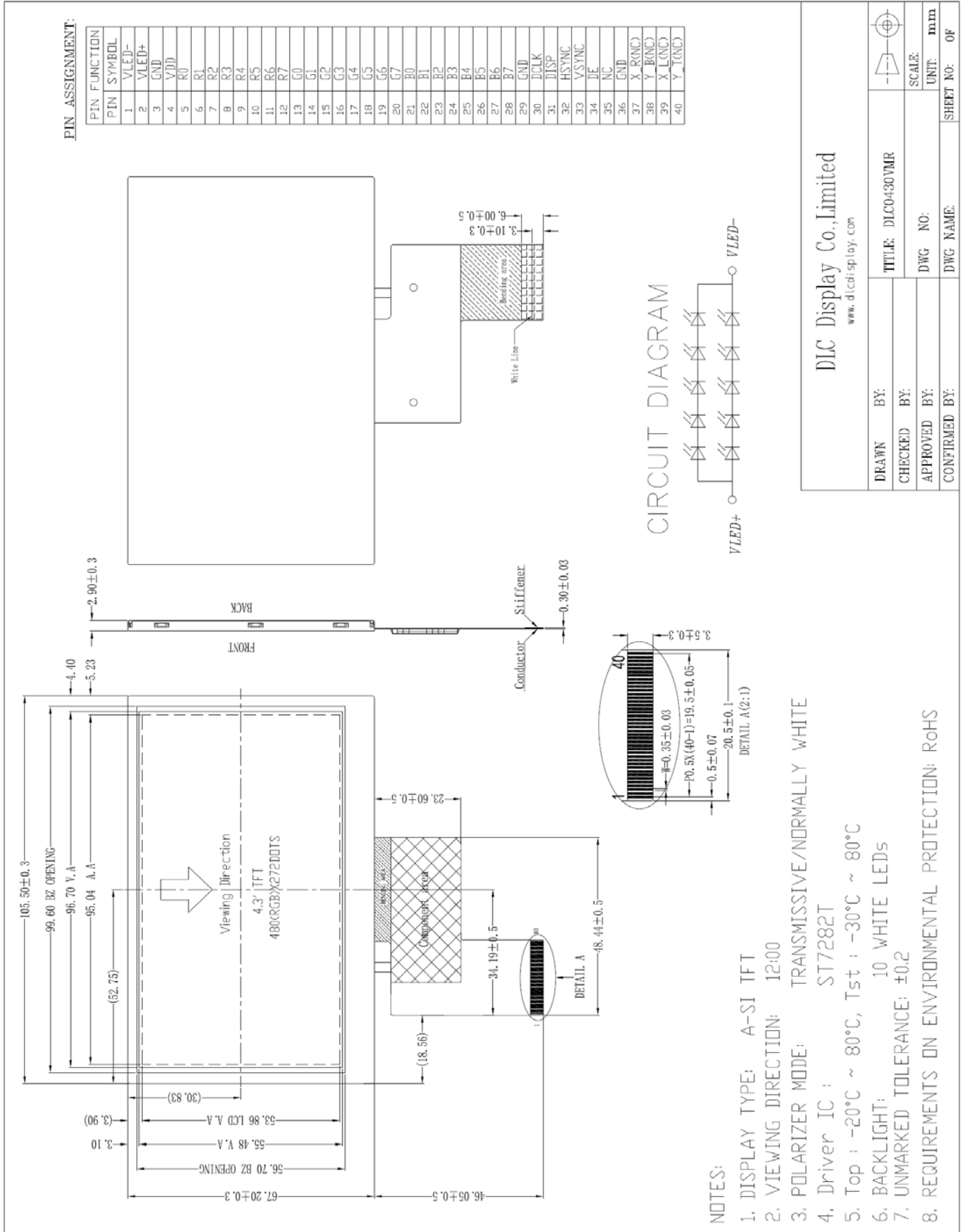
2. Application

Digital equipments which need color display, mobile navigator/video systems.

3. General Information

Item	Contents	Unit
Size	4.3	inch
Resolution	480(RGB)x272	/
Interface	RGB 24 bits	/
Technology type	a-Si TFT	/
Pixel pitch	0.198 x 0.198	mm
Pixel Configuration	R.G.B Vertical Stripe	
Outline Dimension(W x H x D)	105.50 x 67.20 x 2.90	mm
Active Area(W x H)	95.04 x 53.86	mm
Display Mode	Transmissive, Normally white	/
Backlight Type	LED	/

4. Outline Drawing



5. Interface signals

Pin No.	Symbol	I/O	Function	Remark
1	VLED-	P	Backlight cathode	
2	VLED+	P	Backlight anode	
3	GND	P	Ground	
4	VDD	P	Power supply	
5	R0	I	Red Data input	
6	R1	I	Red Data input	
7	R2	I	Red Data input	
8	R3	I	Red Data input	
9	R4	I	Red Data input	
10	R5	I	Red Data input	
11	R6	I	Red Data input	
12	R7	I	Red Data input	
13	G0	I	Green Data input	
14	G1	I	Green Data input	
15	G2	I	Green Data input	
16	G3	I	Green Data input	
17	G4	I	Green Data input	
18	G5	I	Green Data input	
19	G6	I	Green Data input	
20	G7	I	Green Data input	
21	B0	I	Blue Data input	
22	B1	I	Blue Data input	
23	B2	I	Blue Data input	
24	B3	I	Blue Data input	
25	B4	I	Blue Data input	
26	B5	I	Blue Data input	
27	B6	I	Blue Data input	
28	B7	I	Blue Data input	
29	GND	P	Ground	
30	DCLK	I	Clock signal; latching data at the rising edge	
31	DISP	I	Display control/standby mode selection, Internal pull low DISP="Low": Standby; DISP="High": Normal display	
32	HSYNC	I	Horizontal sync signal; negative polarity	
33	VSYNC	I	Vertical sync signal; negative polarity	
34	DE	I	Data input enable. Active High to enable the data input When not used in SYNC mode, user should connect it to "Low"	
35	NC	-	No Connection	
36	GND	P	Ground	
37	X_R	-	No Connection	
38	Y_B	-	No Connection	
39	X_L	-	No Connection	
40	Y_T	-	No Connection	

Note1 : I—Input, O—Output, P—Power/Ground

6. Absolute maximum Ratings

6.1. Electrical Absolute max. ratings

Parameter	Symbol	MIN	MAX	Unit	Remark
Supply Voltage	VDD	-0.3	4.6	V	
Logic Input Voltage Range	VIN	-0.3	VDDI+0.3	V	
Logic Output Voltage Range	VO	-0.3	VDDI+0.3	V	

6.2. Environment Conditions

Item	Symbol	MIN	MAX	Unit	Remark
Operating Temperature	TOPR	-20	80	°C	
Storage Temperature	TSTG	-30	80	°C	

6.3. LED Backlight Absolute max. ratings

Item	Symbol	MIN	MAX	Unit	Remark
LED Forward Current	ILED	--	25	mA	For each LED

7. Electrical Specifications

7.1 Electrical characteristics

GND=0V, Ta=25°C

Item	Symbol	MIN	TYP	MAX	Unit	Remark
Supply Voltage	VDD	3.0	3.3	3.6	V	
NVW Supply Voltage	VPP	7.4	7.5	7.6	V	
Input Signal Voltage	VIL	DGND	--	0.3*VDD	V	
	VIH	0.7*VDD	--	VDD	V	
Output Signal Voltage	VOL	DGND	--	DGND+0.4	V	
	VOH	VDD-0.4	--	VDD	V	

7.2 LED Backlight

Ta=25°C

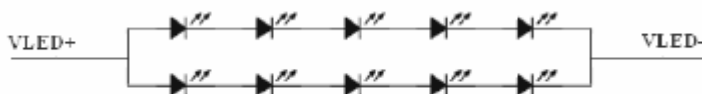
Item	Symbol	MIN	TYP	MAX	Unit	Remark
Forward Current	IF		40	50	mA	10 LEDs (5 LEDs Serial in 2 Parallel)
Forward Voltage	VF	-	16	18	V	
Power Consumption	WBL	-	640	-	Mw	
LED life time			50000		Hrs	

Note1: The LED driving condition is defined for each LED module (5 LEDs Serial in 2 Parallel).

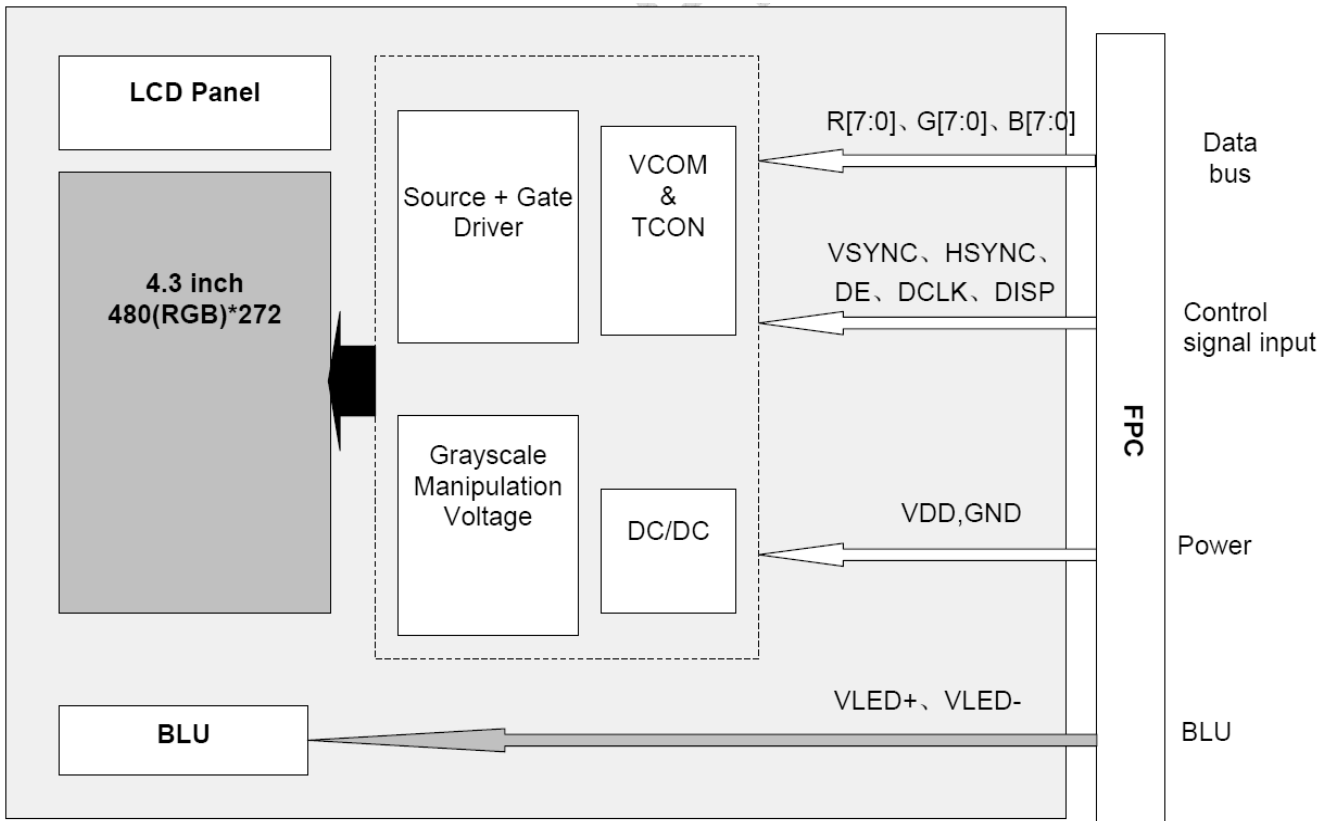
Note2: Under LCM operating, the stable forward current should be inputted. And forward voltage is for reference only.

Note3: IF is defined for one channel LED. Optical performance should be evaluated at Ta=25°C only if LED is driven by high current, high ambient temperature & Humidity condition. The life time of LED will be reduced. Operating life means brightness goes down to 50% initial brightness. Typical operating life time is estimated data.

Note4: The LED driving condition is defined for each LED module.

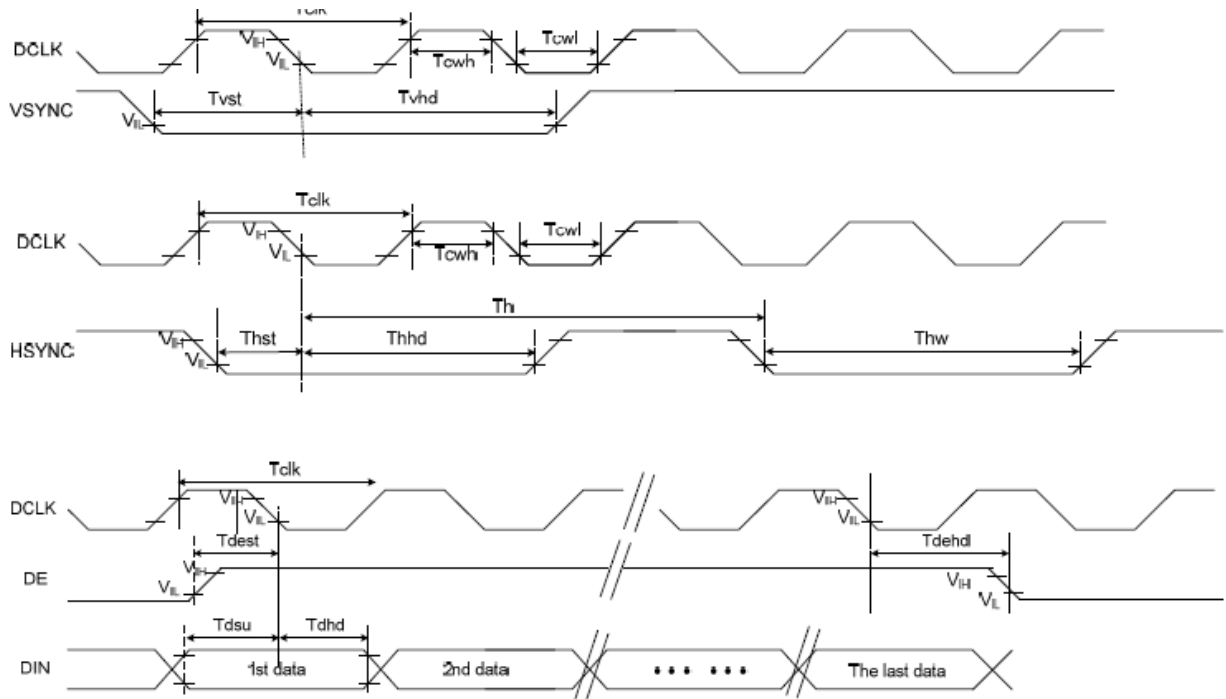


7.3 Schematic of LCD module system

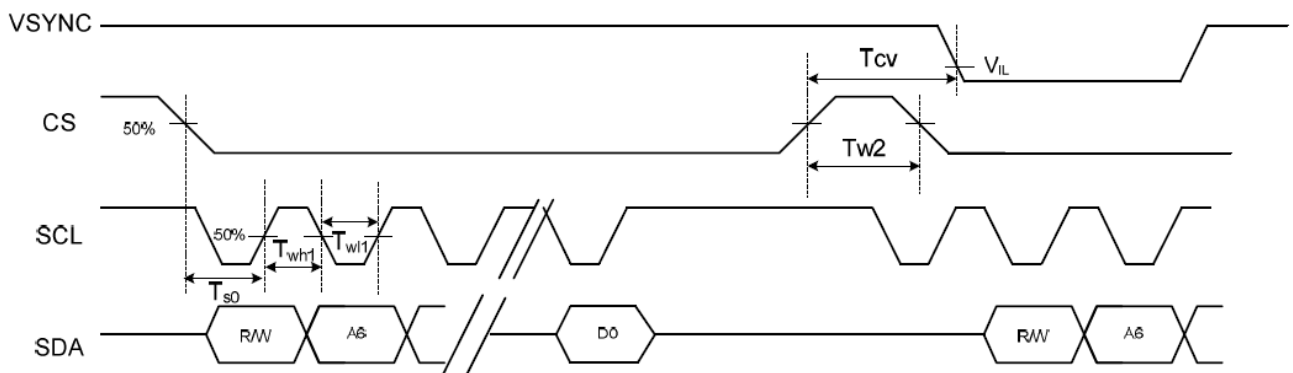


8. Command/AC Timing

8.1 Clock and Data Input Timing Diagram



8.2 3-Wire Communication Timing Diagram

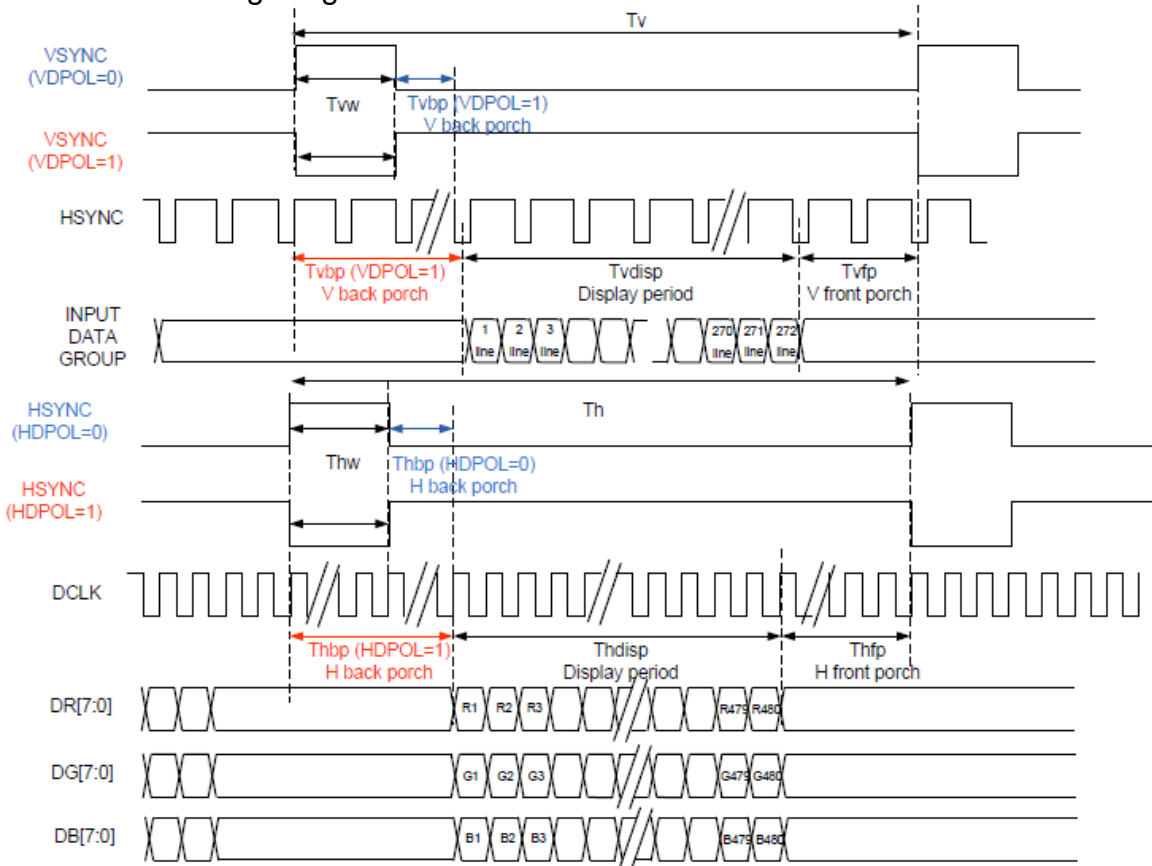


8.3 AC Characteristics

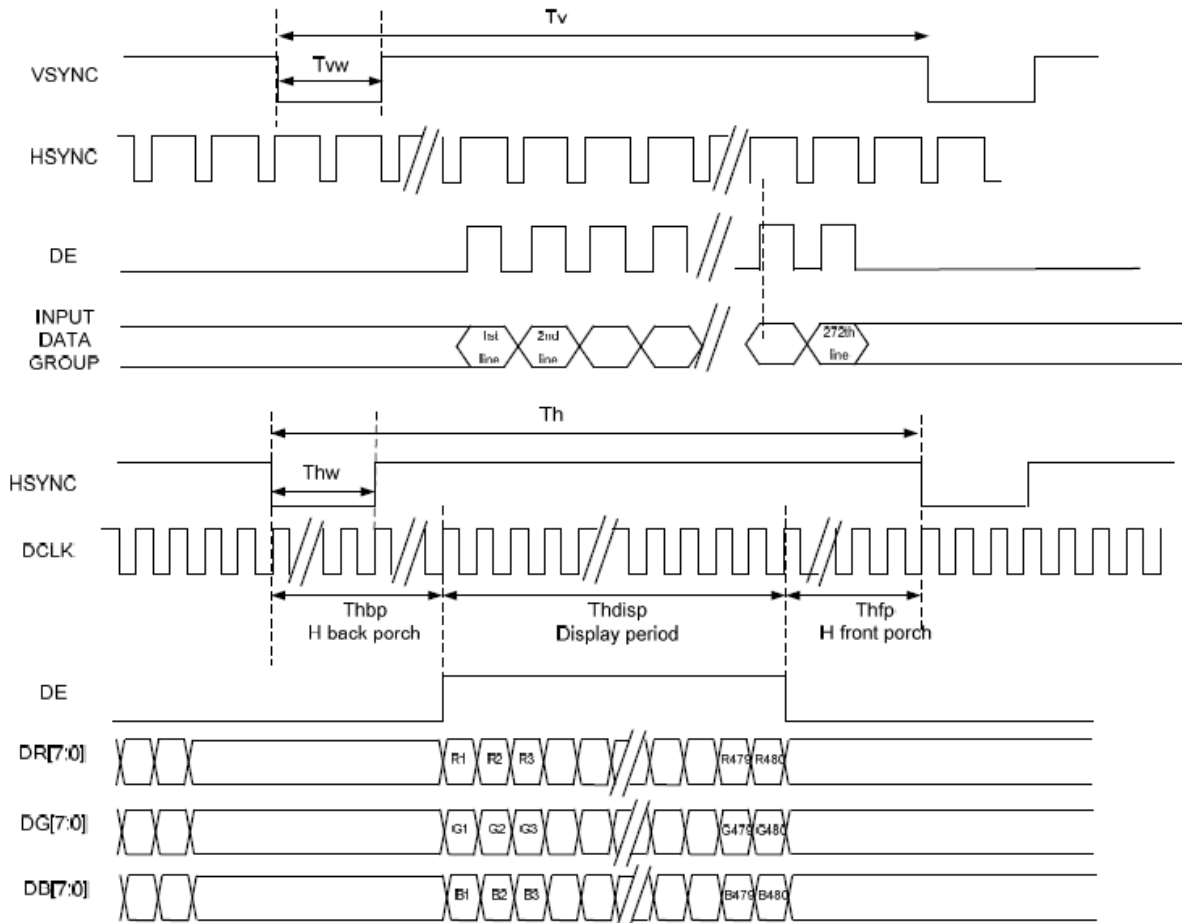
VDDI= 3.3V, VDD= 3.3V, AGND= 0V

Item	Symbol	Min.	Typ.	Max.	Unit	Conditions
System operation timing						
VDD power source slew time	TPOR	-	-	20	ms	From 0V to 99% VDD
GRB pulse width	tRSTW	10	50	-	us	R=10Kohm, C=1uF
Input/ Output timing						
CLK pulse duty	Tcw	40	50	60	%	
Hsync width	Thw	1	-	-	DCLK	
Hsync period	Th	55	60	65	us	
Vsync setup time	Tvst	12	-	-	ns	
Vsync hold time	Tvhd	12	-	-	ns	
Hsync setup time	Thst	12	-	-	ns	
Hsync hold time	Thhd	12	-	-	ns	
Data setup time	Tdsu	12	-	-	ns	
Data hold time	Tdhd	12	-	-	ns	
DE setup time	Tdest	10	-	-	ns	
DE hold time	Tdehd	10	-	-	ns	
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
3-wire serial communication						
Delay between CSB and Vsync	Tcv	1			us	
CS input setup time	Ts0	50			ns	
Serial data input setup time	Ts1	50			ns	
CS input hold time	Th0	50			ns	
Serial data input hold time	Th1	50			ns	
SCL pulse high width	Twh1	50			ns	
SCL pulse low width	Twl1	50			ns	
CS pulse high width	Tw2	400			ns	

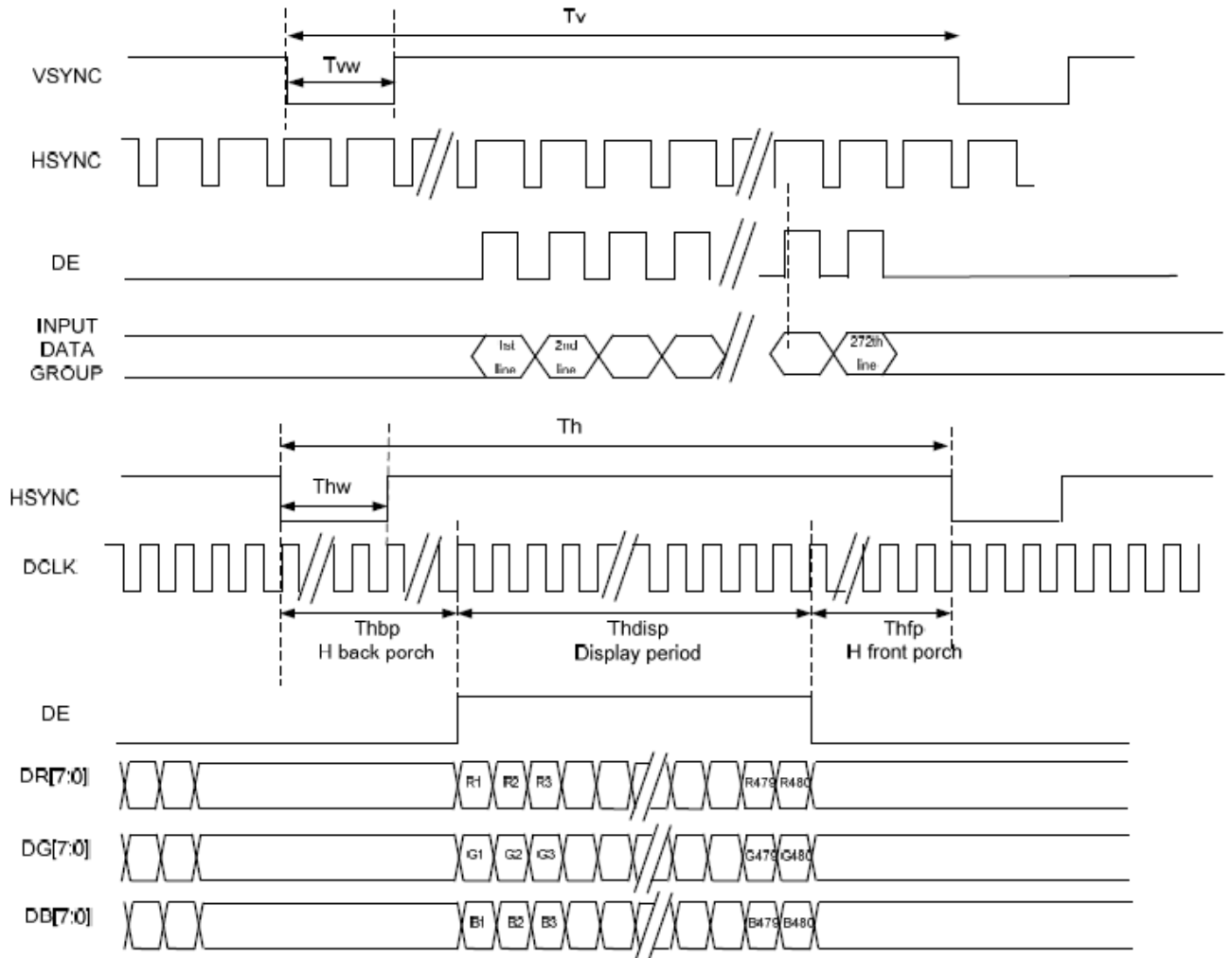
8.4 SYNC Mode Timing Diagram



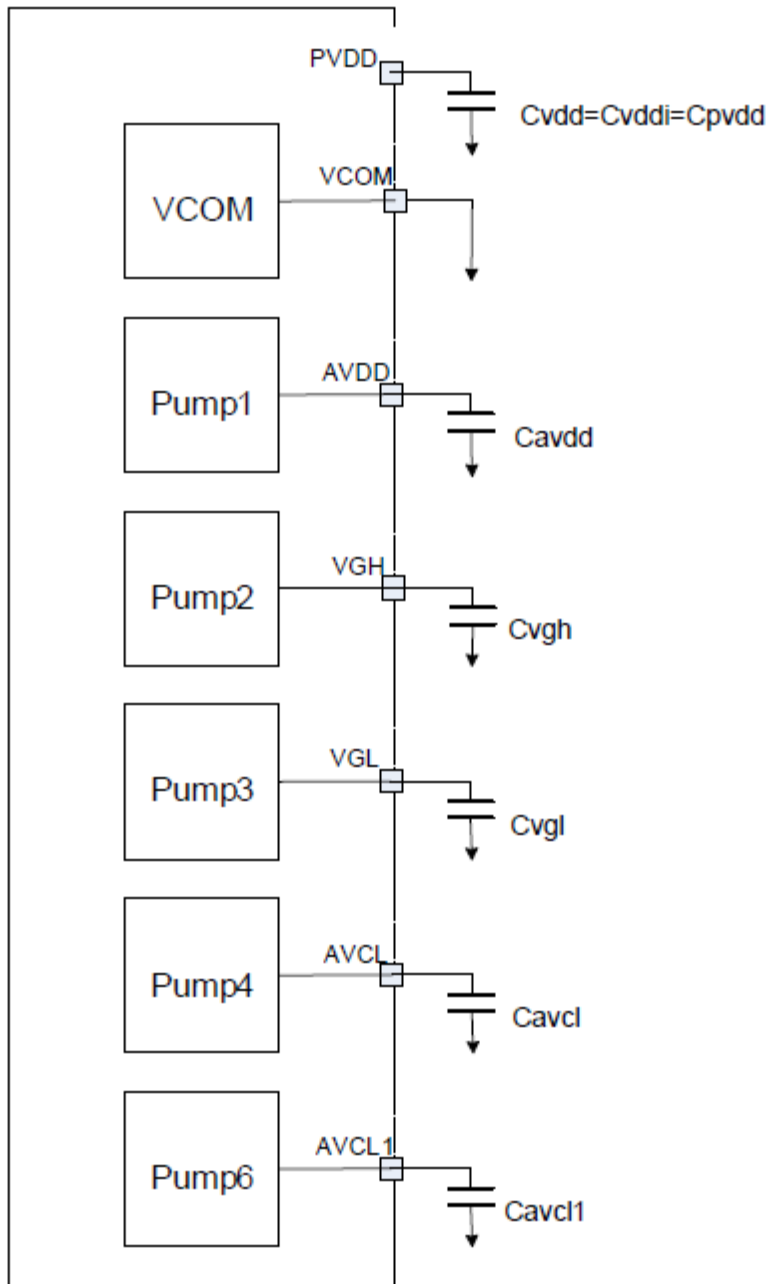
8.5 SYNC-DE Mode Timing Diagram



8.6 DE Mode Timing Diagram



8.7 Power Application Circuit



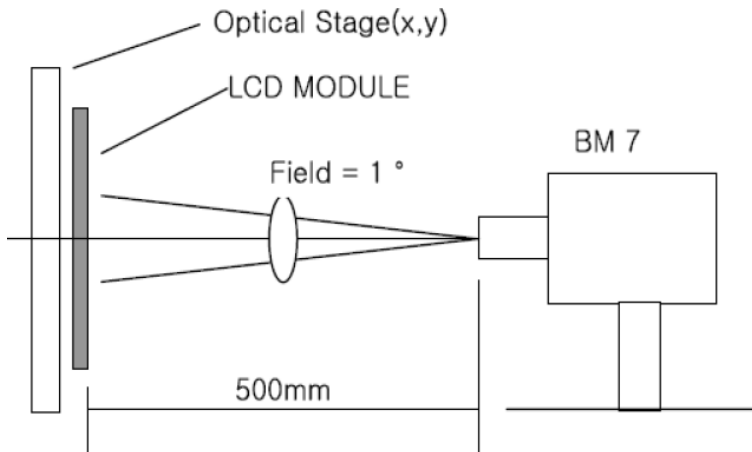
9. Optical Specification

Item	Symbol	Condition	Min	Typ.	Max.	Unit	Remark
Contrast Ratio	CR	$\theta=0^\circ$	700	900	-		Note1 Note2
Response Time	Ton	25°C	-	20	30	ms	Note1 Note3
	Toff						
View Angles	θT	$CR \geq 10$	70	80	-	Degree	Note 4
	θB		50	60	-		
	θL		70	80	-		
	θR		70	80	-		
Chromaticity	White	Brightness is on	x	0.300	0.305	0.310	Note5, Note1
			y	0.322	0.327	0.332	
	Red		x	0.579	0.584	0.589	
			y	0.345	0.350	0.355	
	Green		x	0.335	0.340	0.345	
			y	0.588	0.593	0.598	
	Blue		x	0.147	0.152	0.157	
			y	0.085	0.090	0.095	
NTSC	S		45	50		%	Note5
Luminance	L		350	400	-	cd/m ²	Note1 Note6
Uniformity	U		75	80	-	%	Note1 Note7

Note 1: Definition of optical measurement system.

Temperature = 25°C(±3°C)

LED back-light: ON, Environment brightness < 150 lx

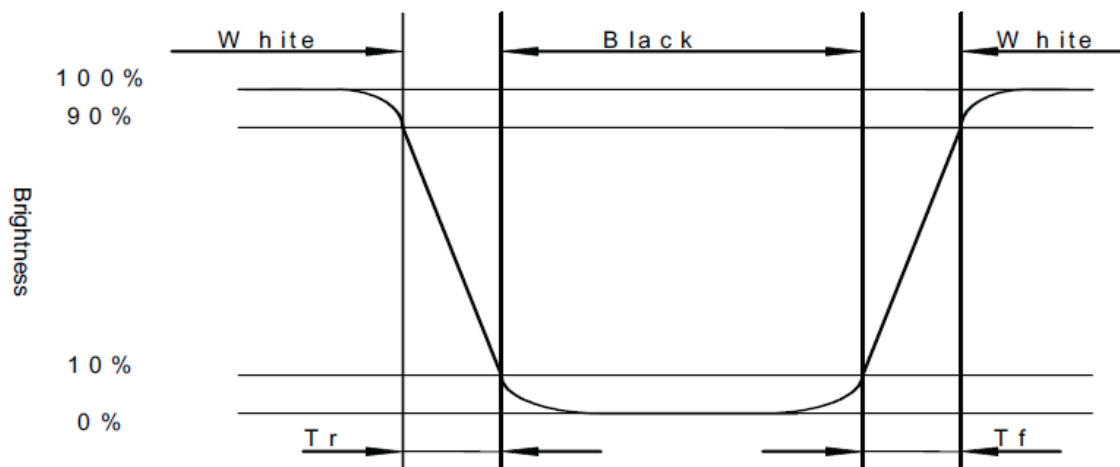


Note 2: Contrast ratio is defined as follow:

$$\text{Contrast Ratio} = \frac{\text{Surface Luminance with all white pixels}}{\text{Surface Luminance with all black pixels}}$$

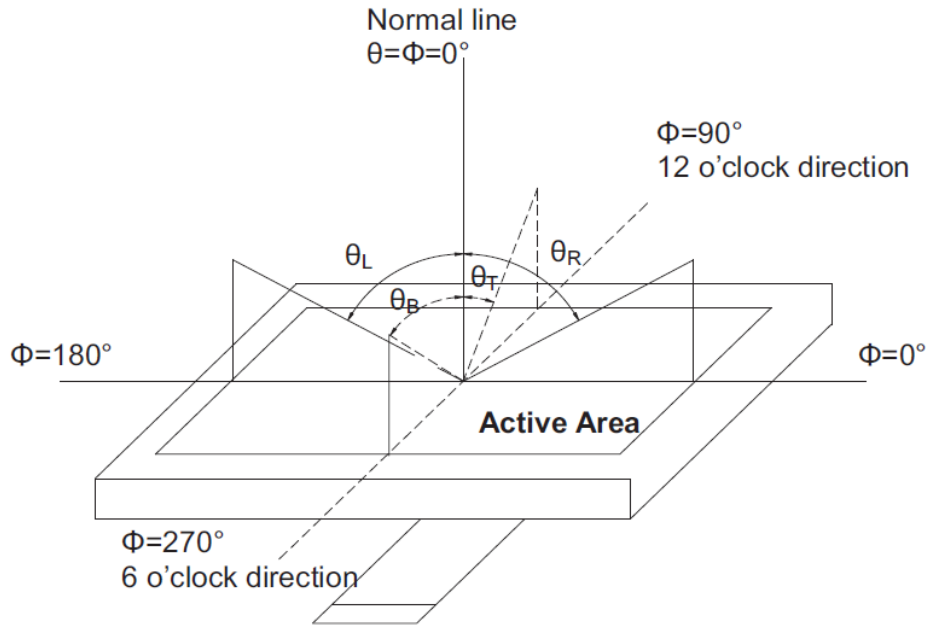
Note 3: Response time is defined as follow:

Response time is the time required for the display to transition from black to white (Rise Time, Tr) and from white to black(Decay Time, Tf).



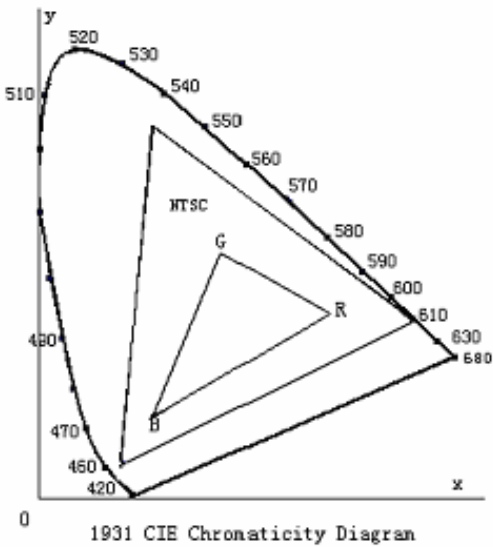
Note 4: Viewing angle range is defined as follow:

Viewing angle is measured at the center point of the LCD.



Note 5: Color chromaticity is defined as follow: (CIE1931)

Color coordinates measured at center point of LCD.



$$S = \frac{\text{area of RGB triangle}}{\text{area of NTSC triangle}} \times 100\%$$

Note 6: Luminance is defined as follow:

Luminance is defined as the brightness of all pixels “White” at the center of display area on optimum contrast.

Note 7: Luminance Uniformity is defined as follow:

Active area is divided into 9 measuring areas (Refer Fig. 2). Every measuring point is placed at the center of each measuring area.

$$\text{Uniformity}(U) = \frac{\text{Minimum Luminance(brightness) in 9 points}}{\text{Maximum Luminance(brightness) in 9 points}}$$

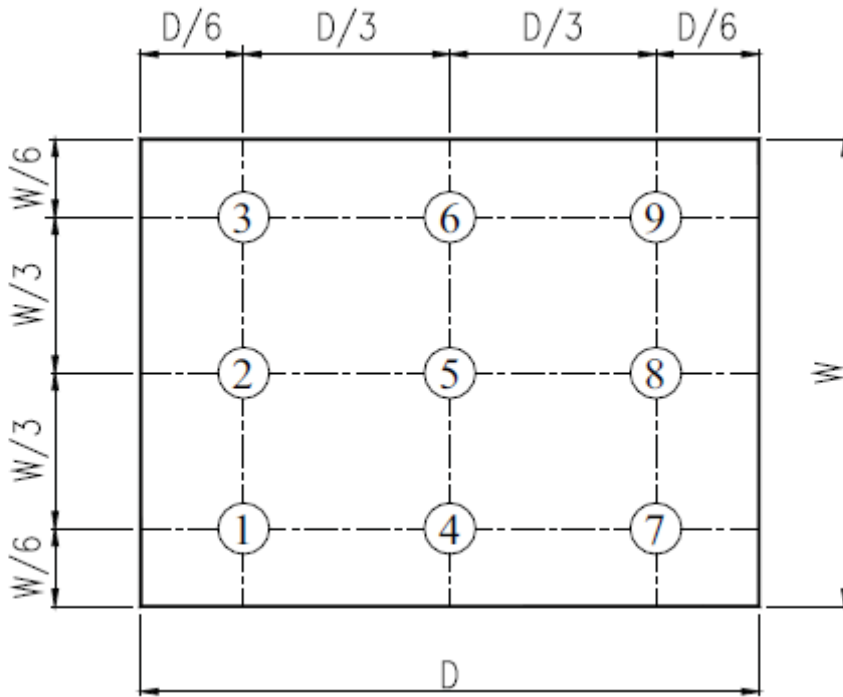


Fig. 2 Definition of uniformity

10. Environmental / Reliability Tests

No	Test Item	Condition	Judgment criteria
1	High Temp Operation	Ts=+80°C, 240hrs	Per table in below
2	Low Temp Operation	Ta=-20°C, 240hrs	Per table in below
3	High Temp Storage	Ta=+80°C, 240hrs	Per table in below
4	Low Temp Storage	Ta=-30°C, 240hrs	Per table in below
5	High Temp & High Humidity Storage	Ta=+40°C, 90% RH 240 hours	Per table in below (polarizer discoloration is excluded)
6	Thermal Shock (Non-operation)	-20°C 30 min~+80°C 30 min, Change time:5min, 20 Cycles	Per table in below
7	ESD (Operation)	C=150pF, R=330Ω · 5points/panel Air:±8KV, 5times; Contact:±4KV, 5 times; (Environment: 15°C~ 35°C, 30%~60%, 86Kpa~106Kpa)	Per table in below
8	Vibration (Non-operation)	Frequency range:10~55Hz, Stroke:1.5mm Sweep:10Hz~55Hz~10Hz 2 hours for each direction of X.Y.Z. (6 hours for total)(Package condition)	Per table in below
9	Shock (Non-operation)	60G 6ms, ±X,±Y,±Z 3times, for each direction	Per table in below
10	Package Drop Test	Height:80 cm, 1 corner, 3 edges, 6 surfaces	Per table in below
11	Package Vibration Test	Random Vibration: 0.015GxG/Hz for 5-200Hz, -6dB/Octave from 200-500Hz 2 hours for each direction of X,Y,Z (6 hours for total)	

INSPECTION	CRITERION(after test)
Appearance	No Crack on the FPC, on the LCD Panel
Alignment of LCD Panel	No Bubbles in the LCD Panel No other Defects of Alignment in Active area
Electrical current	Within device specifications
Function / Display	No Broken Circuit, No Short Circuit or No Black line No Other Defects of Display

11. Precautions for Use of LCD Modules

11.1 Safety

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

11.2 Handling

- A. The LCD and touch panel is made of plate glass. Do not subject the panel to mechanical shock or to excessive force on its surface.
- B. Do not handle the product by holding the flexible pattern portion in order to assure the reliability
- C. Transparency is an important factor for the touch panel. Please wear clear finger sacks, gloves and mask to protect the touch panel from finger print or stain and also hold the portion outside the view area when handling the touch panel.
- D. Provide a space so that the panel does not come into contact with other components.
- E. To protect the product from external force, put a covering lens (acrylic board or similar board) and keep an appropriate gap between them.
- F. Transparent electrodes may be disconnected if the panel is used under environmental conditions where dew condensation occurs.
- G. Property of semiconductor devices may be affected when they are exposed to light, possibly resulting in IC malfunctions.
- H. To prevent such IC malfunctions, your design and mounting layout shall be done in the way that the IC is not exposed to light in actual use.

11.3 Static Electricity

- A. Ground soldering iron tips, tools and testers when they are in operation.
- B. Ground your body when handling the products.
- C. Power on the LCD module before applying the voltage to the input terminals.
- D. Do not apply voltage which exceeds the absolute maximum rating.
- E. Store the products in an anti-electrostatic bag or container.

11.4 Storage

- A. Store the products in a dark place at $+25^{\circ}\text{C} \pm 10^{\circ}\text{C}$ with low humidity (40% RH to 60% RH). Don't expose to sunlight or fluorescent light.
- B. Storage in a clean environment, free from dust, active gas, and solvent.

11.5 Cleaning

- A. Do not wipe the touch panel with dry cloth, as it may cause scratch.
- B. Wipe off the stain on the product by using soft cloth moistened with ethanol. Do not allow ethanol to get in between the upper film and the bottom glass. It may cause peeling issue or defective operation. Do not use any organic solvent or detergent other than ethanol.

11.6 Cautions for installing and assembling

Bezel edge must be positioned in the area between the Active area and View area. The bezel may press the touch screen and cause activation if the edge touches the active area. A gap of approximately 0.5mm is needed between the bezel and the top electrode. It may cause unexpected activation if the gap is too narrow. There is a tolerance of 0.2 to 0.3mm for the outside dimensions of the touch panel and tail. A gap must be made to absorb the tolerance in the case and connector.

