



# SmarterGlass

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**DLC Display Co., Limited**

德爾西顯示器有限公司



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### Record of Revision

Date	Revision No.	Summary
2012 09 25	1.0	Rev 1.0 was issued

## 1. Scope

This data sheet is to introduce the specification of DLC1700AZG-1, active matrix TFT module. It is composed of a color TFT-LCD panel, driver ICs, PCB and a backlight unit. The 17.0" display area contains 1280(RGB) x 1024 pixels.

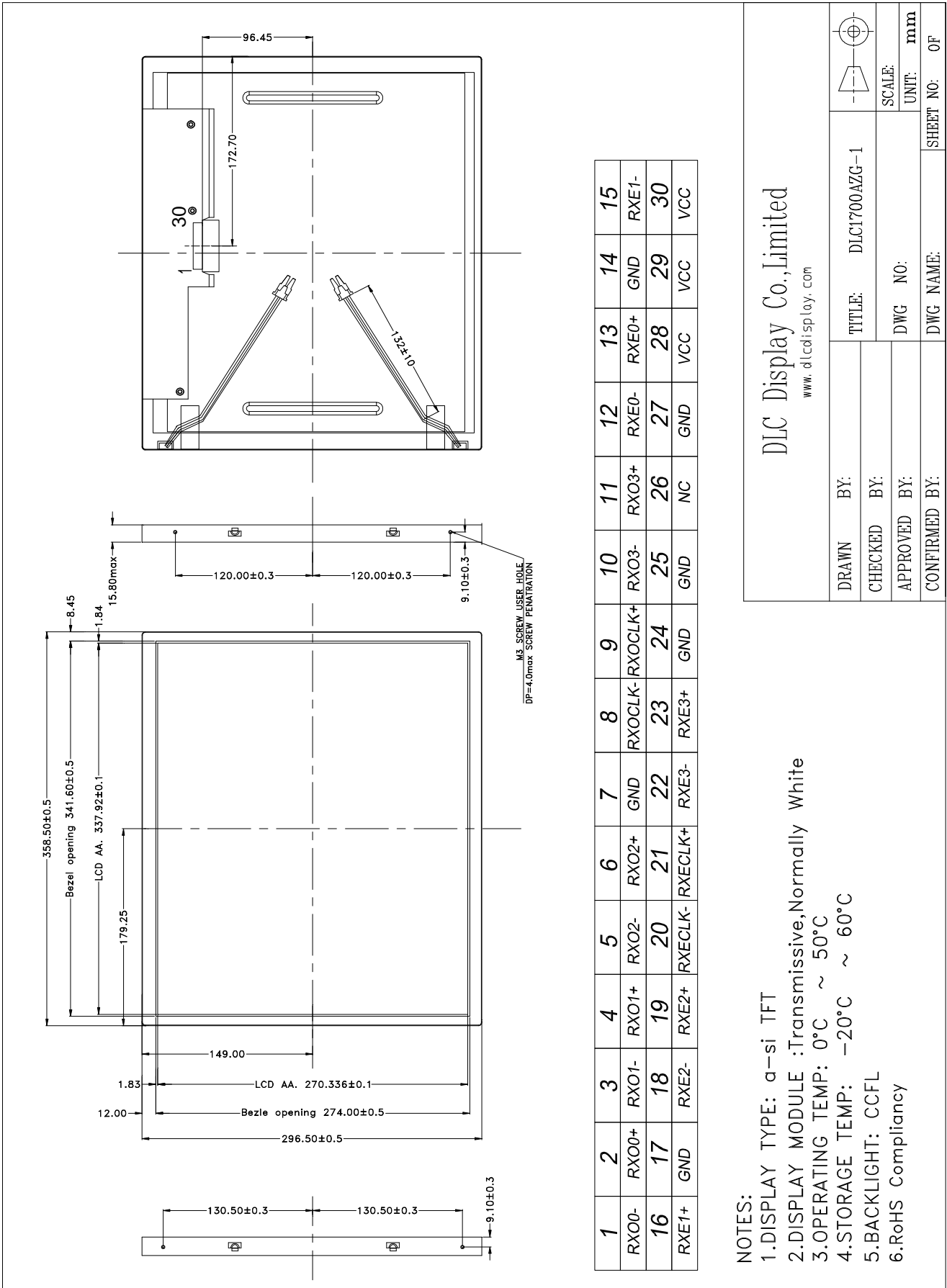
## 2. Application

Digital equipments which need color display, monitor, video systems.

## 3. General Information

Item	Contents	Unit
Size	17.0	inch
Resolution	1280(RGB) x 1024	/
Technology type	a-si TFT	/
Interface	LVDS	/
Color depth	16.7M(6bit+FRC)	/
Pixel pitch	0.264x0.264	mm
Pixel Configuration	R.G.B. Vertical Stripe	/
Outline Dimension (W x H x D)	358.5x296.5x15.8 (max)	mm
Active Area(W x H)	337.92x270.336	mm
Display Mode	Transmissive, Normally white	/
Backlight Type	CCFL	/
Weight	1850	g

### 4. Outline Drawing



## 5. Interface signals

### (1)CN1

No	Symbol	Description	Remarks
1	RXO0-	negative signal of odd channel 0(LVDS)	
2	RXO0+	positive signal of odd channel 0(LVDS)	
3	RXO1-	negative signal of odd channel 1(LVDS)	
4	RXO1+	positive signal of odd channel 1(LVDS)	
5	RXO2-	negative signal of odd channel 2(LVDS)	
6	RXO2+	positive signal of odd channel 2(LVDS)	
7	GND	ground	
8	RXOCLK-	negative signal of odd clock channel (LVDS)	
9	RXOCLK+	positive signal of odd clock channel (LVDS)	
10	RXO3-	negative signal of odd channel 3(LVDS)	
11	RXO3+	positive signal of odd channel 3(LVDS)	
12	RXE0-	negative signal of even channel 0(LVDS)	
13	RXE0+	positive signal of even channel 0(LVDS)	
14	GND	ground	
15	RXE1-	negative signal of even channel 1(LVDS)	
16	RXE1+	positive signal of even channel 1(LVDS)	
17	GND	ground	
18	RXE2-	negative signal of even channel 2(LVDS)	
19	RXE2+	positive signal of even channel 2(LVDS)	
20	RXECLK-	negative signal of even clock channel (LVDS)	
21	RXECLK+	positive signal of even clock channel (LVDS)	
22	RXE3-	negative signal of even channel 3(LVDS)	
23	RXE3+	positive signal of even channel 3(LVDS)	
24	GND	ground	
25	GND	ground	
26	NC	NC	
27	GND	ground	
28	VCC	Power supply input voltage(5.0 V)	
29	VCC	Power supply input voltage(5.0 V)	
30	VCC	Power supply input voltage(5.0 V)	

CN1: FI XB30SSRL HF15 (JAE)

### CN201, 202 (BACKLIGHT)

Backlight-side connector: 35001HS-02L (YEONHO)

Pin No.	Symbol	Function
1	CTH	High Voltage(Pink)
2	CTL	Low VoltageL(White)

## 6. Absolute maximum Ratings

### 6.1. Electrical Absolute max. ratings

Parameter	Symbol	MIN	MAX	Unit	Remark
Logic/LCD Drive Voltage	VIN	-0.3	6.0	V	

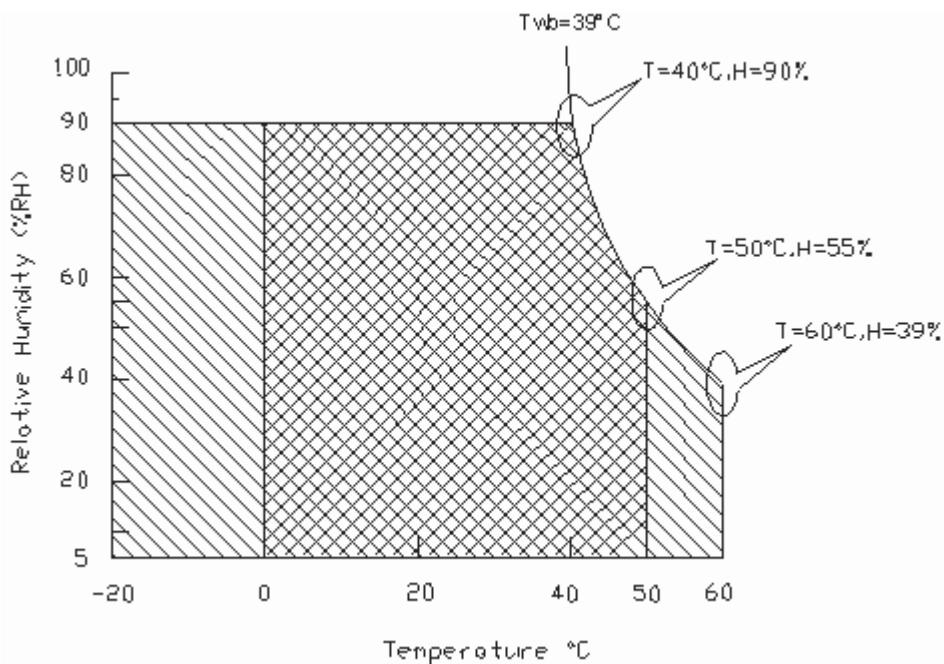
### 6.2. Environment Conditions

Item	Symbol	MIN	MAX	Unit	Remark
Operating Temperature	TOPR	0	50	°C	
Storage Temperature	TSTG	-20	60	°C	
CCFL Current	ICFL	-	8	[mA] rms	

Note 1: With in Ta (25 )

Note 2: Permanent damage to the device may occur if exceed maximum values

Note 3: For quality performance, please refer to AUO IIS (Incoming Inspection Standard).



Operating Range



Storage Range



+



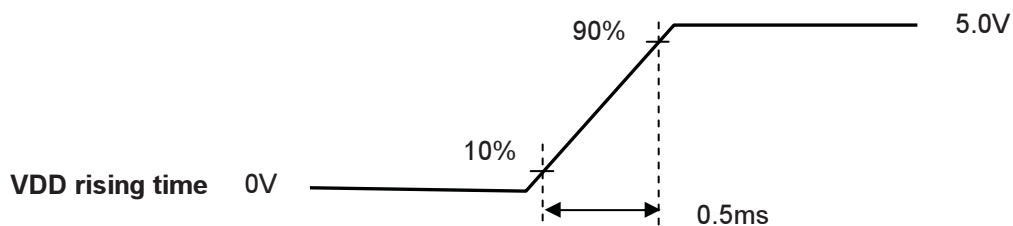
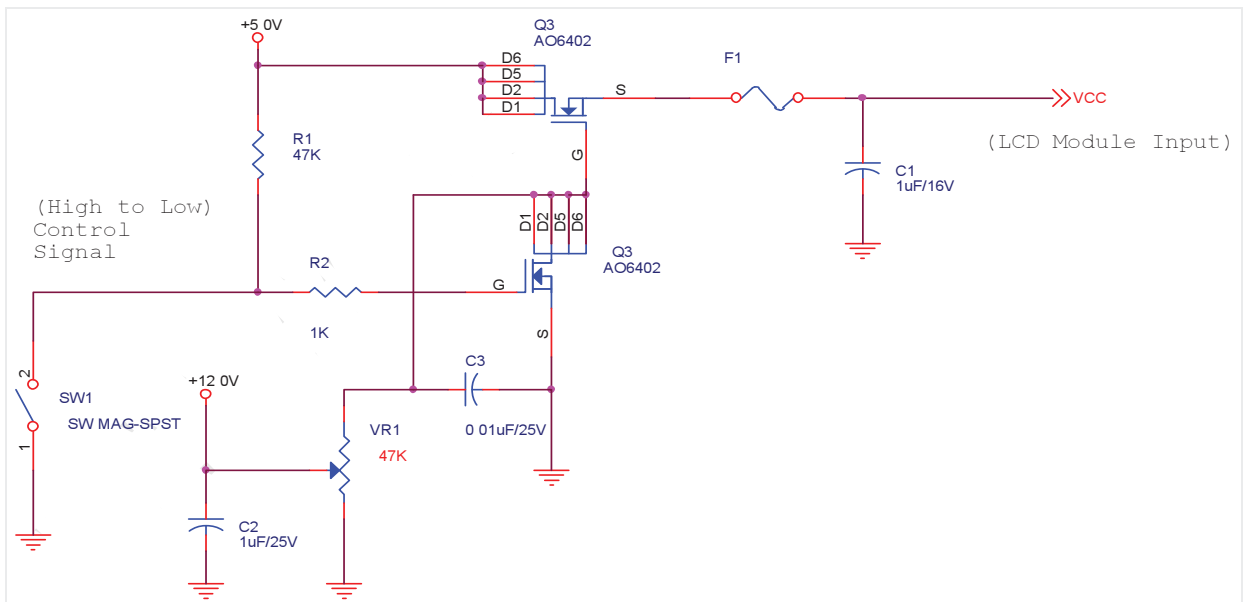
## 7. Electrical Specifications

### 7.1 Power Specification

GND=0V, Ta=25°C

Item	Symbol	MIN	TYP	MAX	Unit	Remark
Logic/LCD Drive Voltage	VDD	4.5	5	5.5	V	
Input Current	IDD	-	0.47	0.56	A	VDD= 5.0V, All Black Pattern At 60Hz
		-	0.59	0.71	A	VDD= 5.0V, All Black Pattern At 75Hz,
VDD Power	PDD		2.35	2.80	W	VDD= 5.0V, All Black Pattern At 60Hz
			2.95	3.55	W	VDD= 5.0V, All Black Pattern At 75Hz,
Allowable Logic/LCD Drive Ripple Voltage	VDDrp	-	-	500	mV	VDD= 5.0V, All Black Pattern At 75Hz
Inrush Current	IRush	-	-	3.0	A	

Note 1: Measurement conditions:



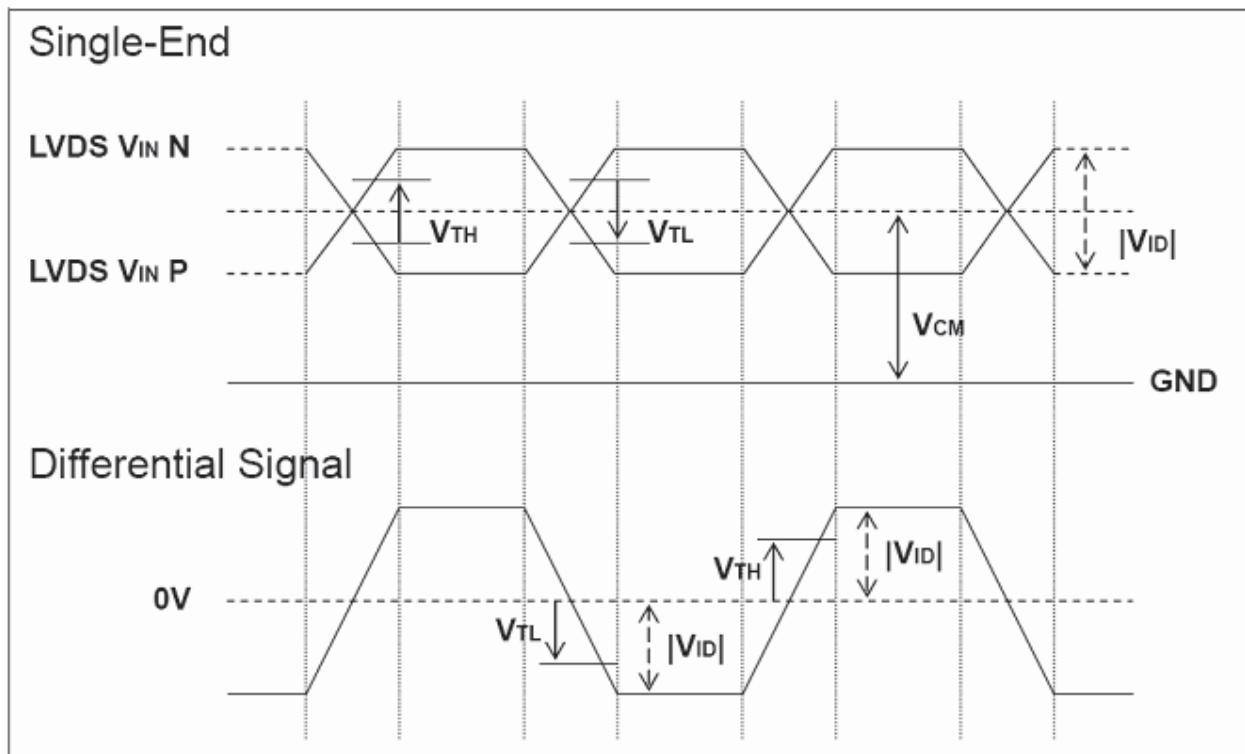


## 7.2 Signal Electrical Characteristics

(1) DC Characteristics of each signal are as following:

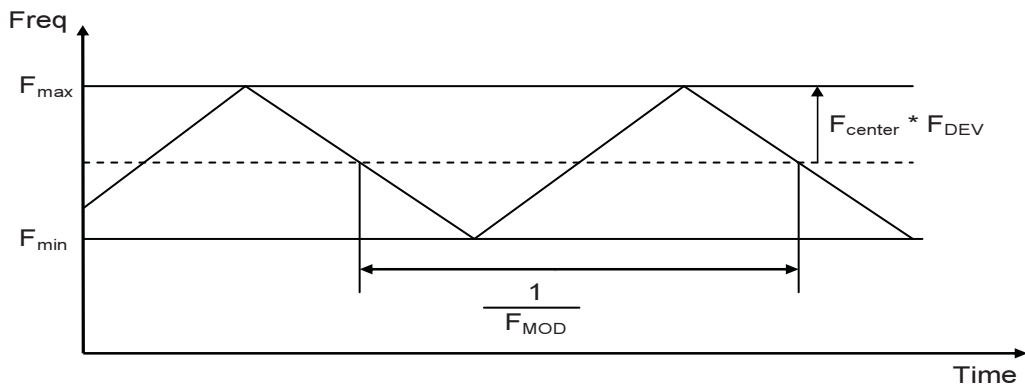
Item	Symbol	MIN	TYP	MAX	Unit	Remark
Differential Input High Threshold	V <sub>TH</sub>	-	-	100	mV	V <sub>ICM</sub> = 1.2V
Differential Input Low Threshold	V <sub>TL</sub>	-100	-	-	mV	V <sub>ICM</sub> = 1.2V
Input Differential Voltage	V <sub>ID</sub>	100	400	600	mV	
Differential Input Common Mode Voltage	V <sub>ICM</sub>	1.0	1.2	1.5	V	V <sub>TH</sub> -V <sub>TL</sub> = 200mV(min)

Note: LVDS Signal Waveform



(2) AC Characteristics

Item	Symbol	MIN	MAX	Unit	Remark
Maximum deviation of input clock frequency during SSC	F <sub>DEV</sub>	-	±3	%	
Maximum modulation frequency of input clock during SSC	F <sub>MOD</sub>	-	200	KHz	



**7.3 Backlight Electrical specification**

Ta=25°C

Parameter	Symbol	min	typ	max	Unit	Remarks
standard current	SCFL	7	7.5	8	mA	
Operation Current	IRCFL	3.5	7.5	8	mA	
Frequency	FCFL	40	60	80	kHz	
Ignition Voltage	ViCFL	1025	-	-	V	
Operation Voltage	VCFL	528	580	638	V	
Power Consumption	PCFL	7.92	8.7	9.57	W	
Life Time	LTCFL	50,000	-	-	Hor	

Note 1: Typ. are AUO recommended design points.

\*1 All of characteristics listed are measured under the condition using the AUO test inverter.

\*2 In case of using an inverter other than listed, it is recommended to check the inverter carefully. Sometimes, interfering noise stripes appear on the screen, and substandard luminance or flicker at low power may happen.

\*3 In designing an inverter, it is suggested to check safety circuit very carefully. Impedance of CCFL, for instance, becomes more than 1 [M ohm] when CCFL is damaged.

\*4 Generally, CCFL has some amount of delay time after applying kick-off voltage. It is recommended to keep on applying kick-off voltage for 1 [Sec] until discharge.

\*5 Reducing CCFL current increases CCFL discharge voltage and generally increases CCFL discharge frequency. So all the parameters of an inverter should be carefully designed so as not to produce too much leakage current from high-voltage output of the inverter.

Note 2: It should be employed the inverter which has “Duty Dimming” , if IRCFL is less than 3mA.

Note 3: CCFL discharge frequency should be carefully determined to avoid interference between inverter and TFT LCD.

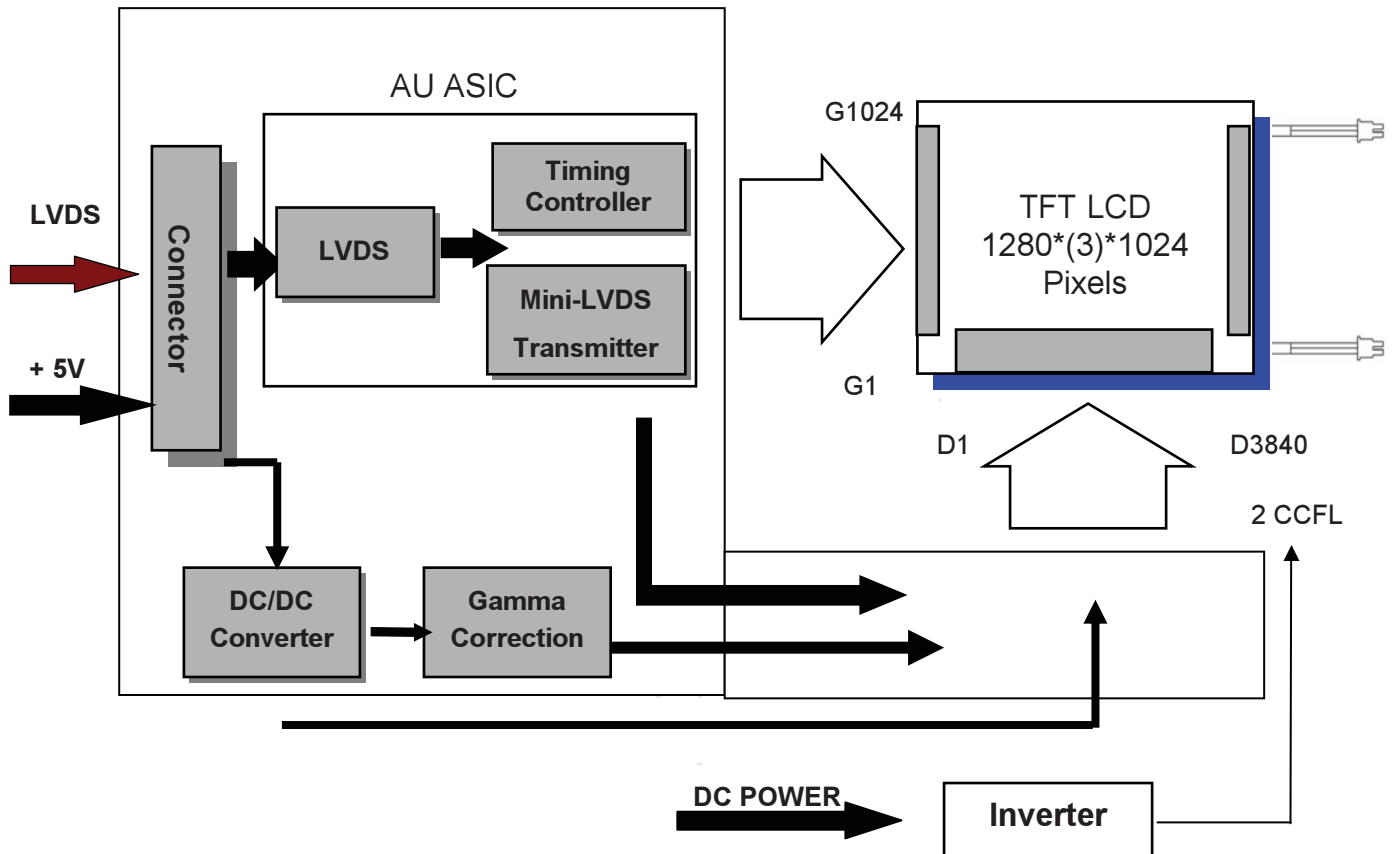
Note 4: The frequency range will not affect to lamp life and reliability characteristics.

Note 5: CCFL inverter should be able to give out a power that has a generating capacity of over 1,560 voltage. Lamp units need 1,560 voltage minimum for ignition.

Note 6: The variance of CCFL power consumption is  $\pm 10\%$ . Calculator value for reference  
 $(ISCFL \times VCFL \times 2 = PCFL)$

Note 7: Definition of Life time: Brightness becomes 50%. The typical life time CCFL in on the condition at 7.5m A lamp current.

### 7.4 Schematic of LCD module system



#### I/F PCB Interface:

JAE FI XB30SSLA HF15  
 P TWO 187034 30091  
 STM MSBKT2407P30HB

#### Mating Type:

FI X30HL (Locked Type)  
 FI X30H (Unlocked Type)

#### CCFL Connector:

YEONHO 35001HS 02L  
 CVILUX CP0502SL090

## 8. Timing Characteristics

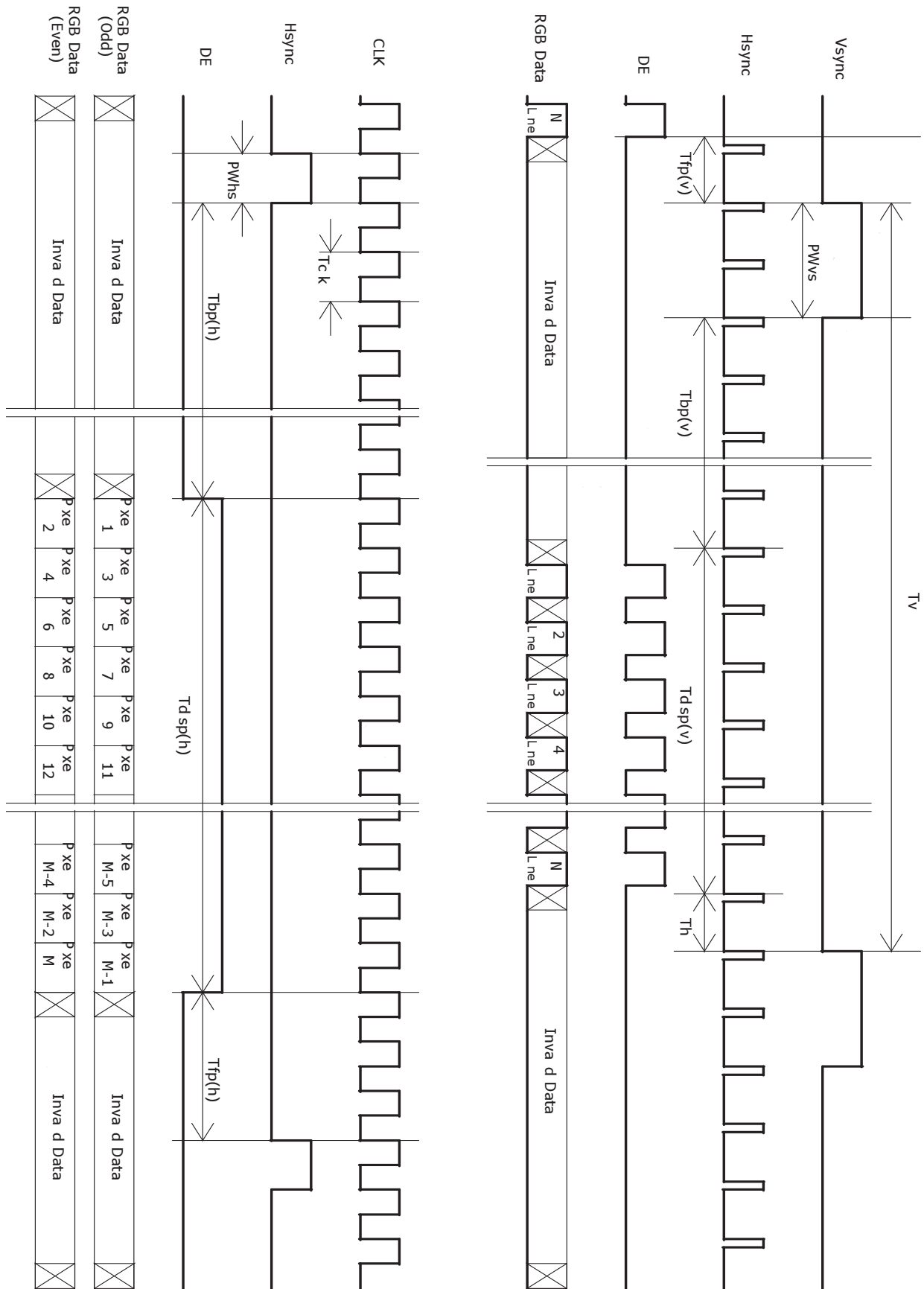
### 8.1 Timing Characteristics

The input signal timing specifications are shown as the following table

Signal	Item	Symbol	MIN	TYP	MAX	Unit
Vertical Section	Period	$T_v$	1036	1066	1873	Th
	Active	$T_{disp(v)}$	1024	1024	1024	Th
	Blanking	$T_{bp(v)}+T_{fp(v)}+PW_{vs}$	12	42	849	Th
Horizontal Section	Period	$T_h$	730	844	1320	Tclk
	Active	$T_{disp(h)}$	640	640	640	Tclk
	Blanking	$T_{bp(h)}+T_{fp(h)}+PW_{hs}$	90	204	680	Tclk
Clock	Period	Tclk	14.6	18.5	26.4	ns
	Frequency	Freq	37.8	54.0	68.4	MHz
Frame rate	Frame rate	F	50	60	76	Hz

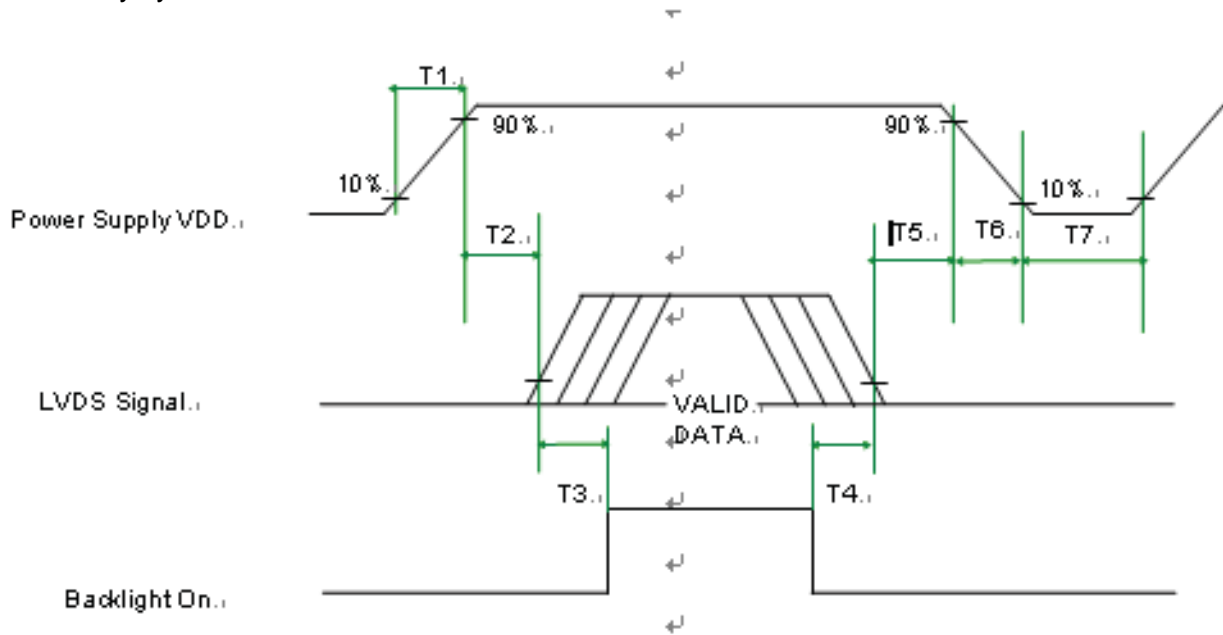
Note : DE mode only

## 8.2 Timing Diagram



### 8.3 POWER SUPPLY VOLTAGE SEQUENCE AND RIPPLE

VDD power and lamp on/off sequence is as follows. Interface signals are also shown in the chart. from any system shall be Hi-Z state or low level when VDD is off.



Power Sequence Timing

Parameter	Value			Unit
	MIN	TYP	MAX	
T1	0.5	-	10	ms
T2	0	-	50	ms
T3	500	-	-	ms
T4	100	-	-	ms
T5	0	-	50	ms
T6	5	-	100	ms
T7	1000	-	-	ms

Note1 : Recommend setting T5 = 0ms to avoid electronic noise when VDD is off.

Note2 : During T5 and T6 period , please keep the level of input LVDS signals with Hi-Z state.

## 9. Optical Specification

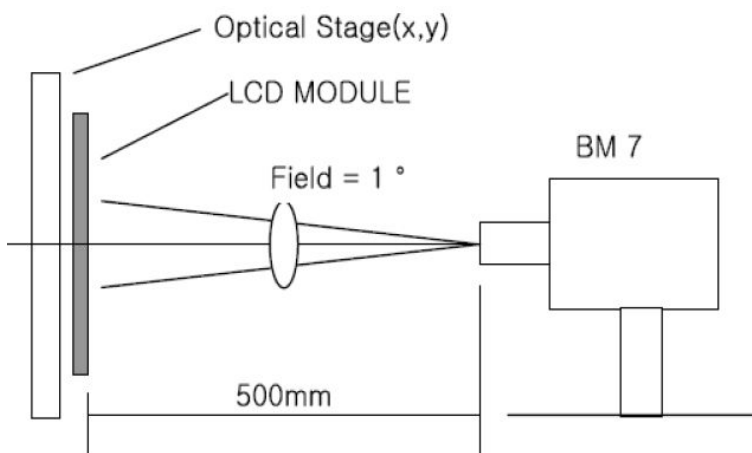
Ta=25°C

Item	Symbol	Condition	Min	Typ.	Max.	Unit	Remark
Contrast Ratio	CR	$\theta=0^\circ$	600	1000			Note1 Note2
Response Time	Ton/ Toff	25°C		5	9	ms	Note1 Note3
View Angles	$\theta T$	$CR \geq 10$	70	80		Degree	Note 4
	$\theta B$		70	80			
	$\theta L$		70	85			
	$\theta R$		70	85			
Chromaticity	White	x	Brightness is on	Typ 0.03	0.313	Typ+0.03	Note5, Note1
		y			0.329		
	Red	x			0.653		
		y			0.328		
	Green	x			0.303		
		y			0.608		
	Blue	x			0.144		
		y			0.064		
Luminance	L		200	250		cd/m <sup>2</sup>	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

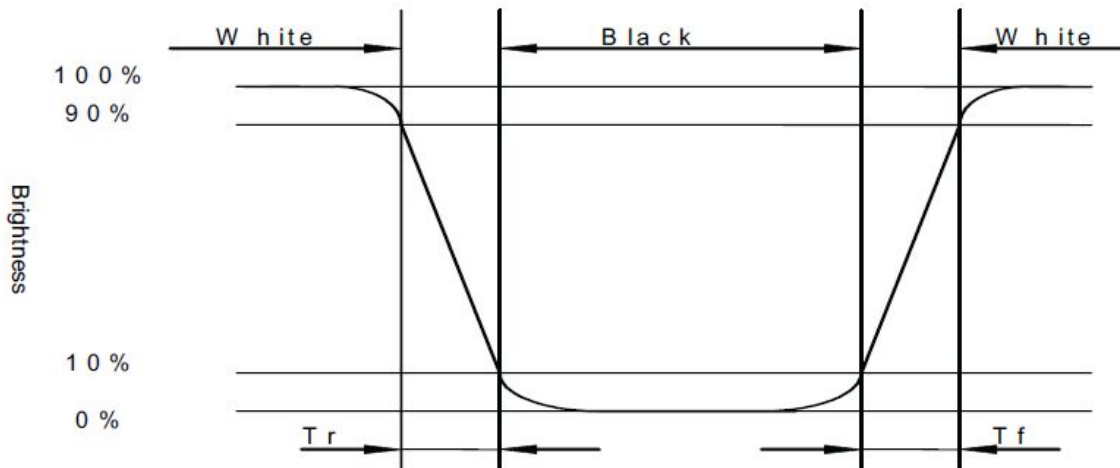


Note 2: Contrast ratio is defined as follow:

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

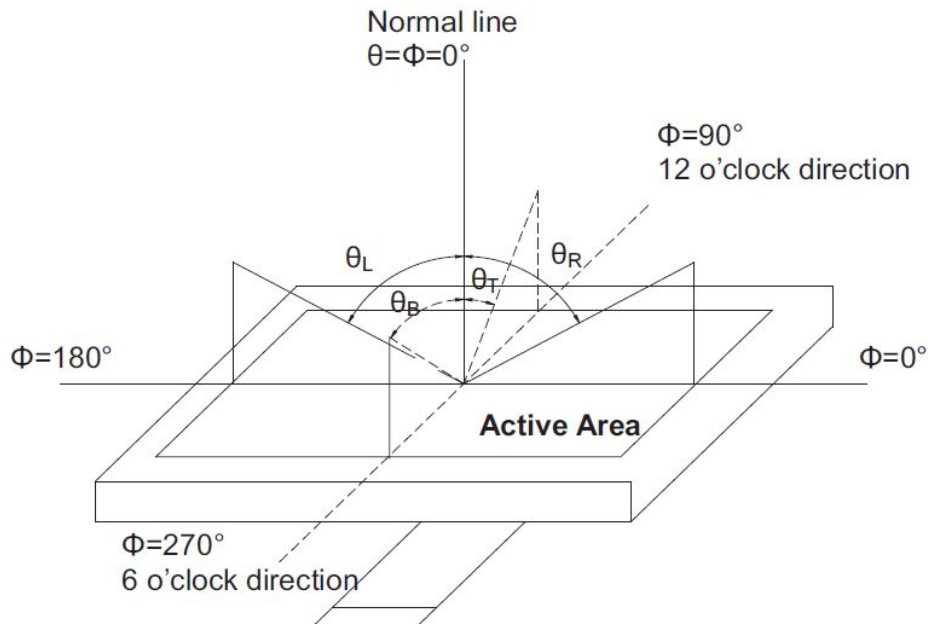
Note 3: Response time is defined as follow:

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



Note 4: Viewing angle range is defined as follow:

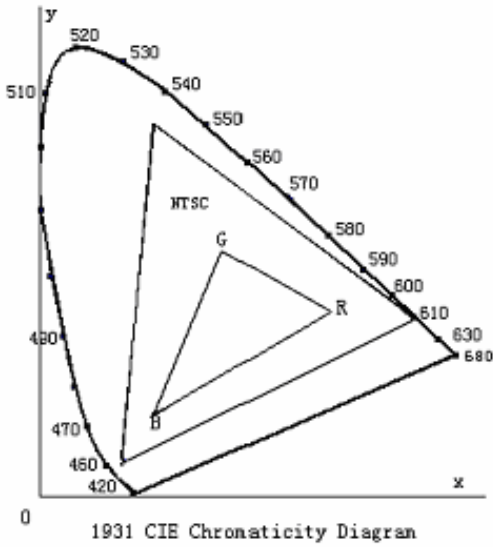
Viewing angle is measured at the center point of the LCD.





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.

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

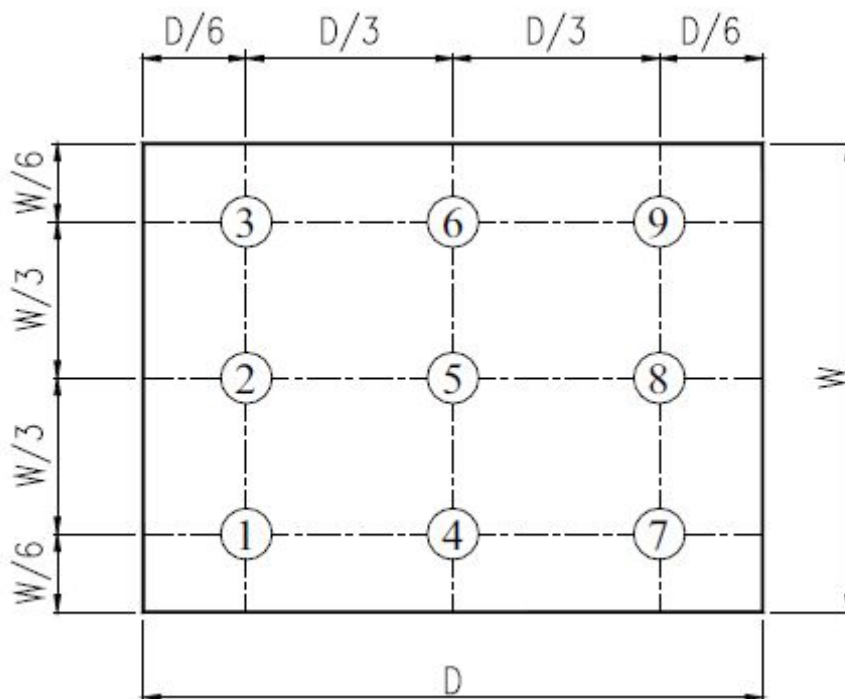


Fig. 2 Definition of uniformity

## 10. Environmental / Reliability Tests

No	Test Item	Condition	Judgment criteria
1	High Temp Operation	Ts=+50°C, 300hrs	Per table in below
2	Low Temp Operation	Ta=0°C, 300hrs	Per table in below
3	High Temp Storage	Ta=+60°C, 300hrs	Per table in below
4	Low Temp Storage	Ta= 20°C, 300hrs	Per table in below
5	High Temp & High Humidity Storage	Ta=+50°C, 80% RH 300 hours	Per table in below (polarizer discoloration is excluded)
6	Thermal Shock (Non operation)	20°C/30min,60°C/30min,100 cycles	Per table in below
7	ESD (Operation)	Contact Discharge: ± 15KV, 150pF(330 Ω ) 1sec,8 points, 25 times/ point. Air Discharge: ± 15KV, 150pF(330 Ω ) 1sec,8 points, 25 times/ point.	Per table in below
8	Vibration (Non operation)	Acceleration: 1.5 G Wave: Random Frequency: 10 200 10 Hz Sweep: 30 Minutes each Axis (X, Y, Z)	Per table in below
9	Shock (Non operation)	Acceleration: 50 G Wave: Half sine Active Time: 20 ms Direction: X, Y, Z (one time for each Axis)	Per table in below
10	Package Drop Test	Height:60 cm, 1 corner, 3 edges, 6 surfaces	Per table in below

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  $+25^{\circ}\text{C} \sim 10^{\circ}\text{C}$  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.

