

**DLC Display Co., Limited**

德爾西顯示器有限公司



MODEL No: DLC0700JBG

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### Record of Revision

Date	Revision No.	Summary
2015-06-18	1.0	Rev 1.0 was issued
2015-10-29	1.1	Update the backlight

## 1. Scope

This data sheet is to introduce the specification of DLC0700JBG active matrix TFT module. It is composed of a color TFT-LCD panel, driver ICs, FPC and a backlight unit. The 7.0'' display area contains 1024 (RGB) x 600 pixels.

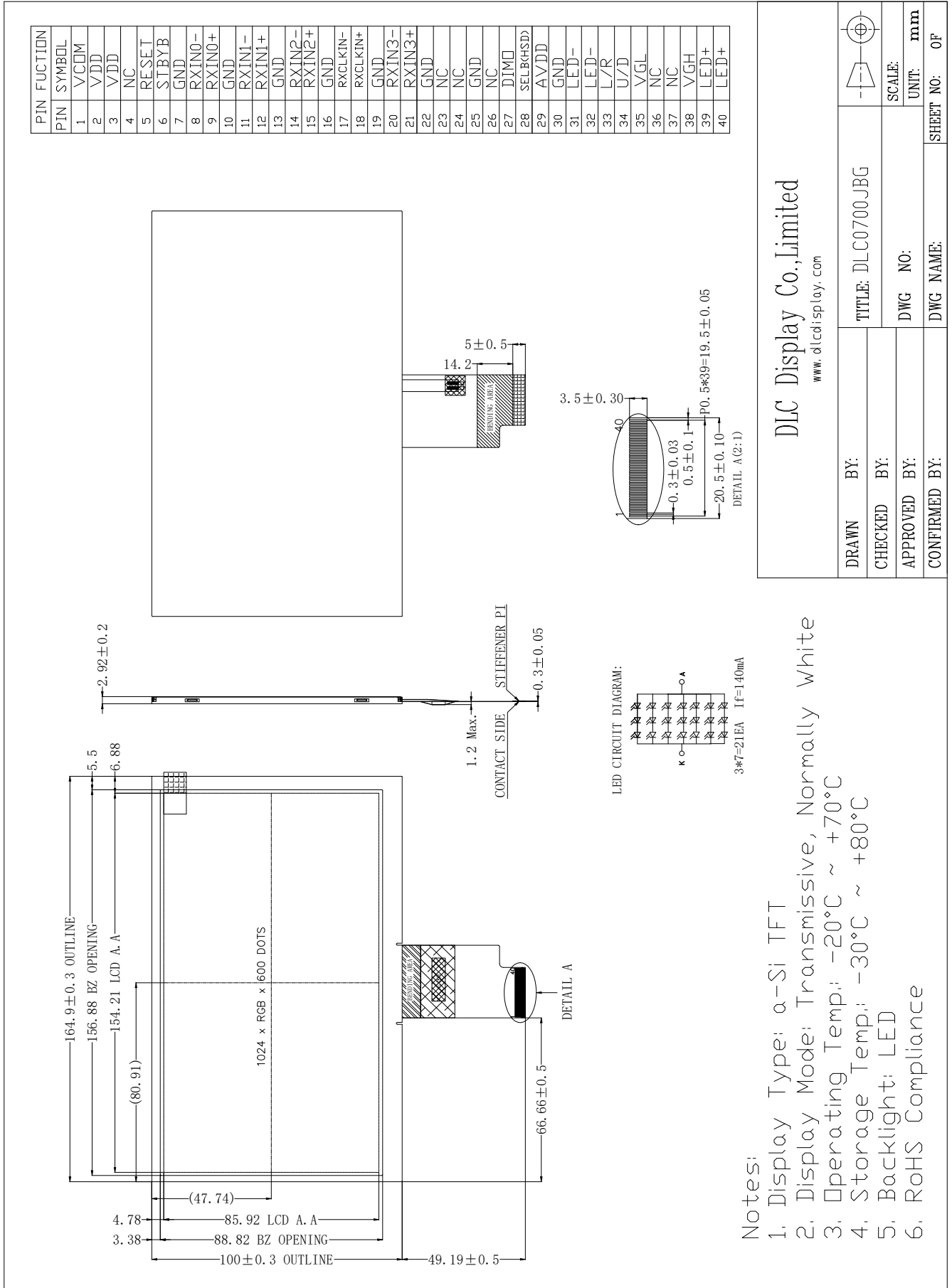
## 2. Application

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

## 3. General Information

Item	Contents	Unit
Size	7.0	inch
Resolution	1024 (RGB)×600	/
Interface	LVDS	
Technology type	a-Si TFT	/
Pixel pitch	0.1506×0.1432	mm
Pixel Configuration	RGB stripe	
Outline Dimension (W x H x D)	164.90×100.00×2.92	mm
Active Area(W x H)	154.21×85.92	mm
Display Mode	TM, Normally White	/
Viewing Direction	12 O'clock	/
Backlight Type	LED	/
Weight	TBD	g

### 4. Outline Drawing



## 5. Interface signals

No	Symbol	Description	Remarks
1	VCOM	Common Voltage	
2	VDD	Power Voltage for digital circuit	
3	VDD	Power Voltage for digital circuit	
4	NC	No connection	
5	Reset	Global reset pin	
6	STBYB	Standby mode, Normally pulled high STBYB="1", Normally operation STBYB="0", Timing controller, source driver will turn off, all output are High-Z	
7	GND	Ground	
8	RXIN0-	- LVDS differential data input	
9	RXIN0+	+LVDS differential data input	
10	GND	Ground	
11	RXIN1-	-LVDS differential data input	
12	RXIN1+	+LVDS differential data input	
13	GND	Ground	
14	RXIN2-	-LVDS differential data input	
15	RXIN2+	+LVDS differential data input	
16	GND	Ground	
17	RXCLKIN-	-LVDS differential clock input	
18	RXCLKIN+	+LVDS differential clock input	
19	GND	Ground	
20	RXIN3-	-LVDS differential data input	
21	RXIN3+	+LVDS differential data input	
22	GND	Ground	
23	NC	No connection	
24	NC	No connection	
25	GND	Ground	
26	NC	No connection	
27	DIMO	Backlight CAB controller signal output	
28	SELB	6-bit / 8-bit mode select	Note 2
29	AVDD	Power for Analog Circuit	
30	GND	Ground	
31	LED-	LED Cathode	
32	LED-	LED Cathode	
33	L/R	Horizontal inversion	

34	U/D	Vertical inversion	
35	VGL	Gate off voltage	
36	NC	No connection	
37	NC	No connection	
38	VGH	Gate ON Voltage	
39	LED+	LED Anode	
40	LED+	LED Anode	

Note 1: The recommended FPC connector model is FH12A-40S-0.5SH manufactured by Hirose.

Note 2: If LVDS input data is 6 bits, SELB must be set to High;

If LVDS input data is 8 bits, SELB must be set to Low.

## 6. Absolute maximum Ratings

### 6.1. Electrical Absolute max. ratings

Parameter	Symbol	MIN	MAX	Unit	Remark
Power Supply Voltage	VDD	-0.3	7.0	V	
	V <sub>IN</sub>	-0.3	VDD+0.3	V	
	VGH	-0.3	30	V	
	VGL	-10	0.3	V	
	AVDD	-0.5	13	V	
	VCOM	0	6.0	V	

### 6.2. Environment Conditions

Item	Symbol	MIN	MAX	Unit	Remark
Operating Temperature	TOPR	-20	70	°C	
Storage Temperature	TSTG	-30	80	°C	

## 7. Electrical Specifications

### 7.1 Electrical characteristics

GND=0V, Ta=25°C

Item	Symbol	MIN	TYP	MAX	Unit	Remark
Digital Supply Voltage	VDD	3.0	3.3	3.6	V	
Analog Supply Voltage	AVDD	9.4	9.6	9.8	V	
Gate On Voltage	VGH	17	18	19	V	
Gate Off Voltage	VGL	-6.6	-6.0	-5.4	V	
Input high voltage	VIH	0.7VDD	--	VDD	V	
Input low voltage	VIL	VSS	--	0.3VDD	V	
Current of power supply	I <sub>VDD</sub>	--	30	45	mA	VDD=3.3V
	I <sub>AVDD</sub>	--	35	45	mA	AVDD=9.6V
	I <sub>VGH</sub>	--	0.5	1.0	mA	VGH=18V
	I <sub>VGL</sub>	--	0.5	1.0	mA	VGL=-6V
Input signal voltage	VCOM	3.7	3.9	4.1	V	

Notes :

1. VGH is TFT Gate operating voltage.
2. VGL is TFT Gate operating voltage. The low voltage level of VGL signal must be fluctuates with same phase as Vcom.
3. Vcom must be adjusted to optimize display quality, as Crosstalk and Contrast Ratio etc..
4. The value is just the reference value. The customer can optimize the setting value by the different D-IC.

### 7.2 LED Backlight

Ta=25°C

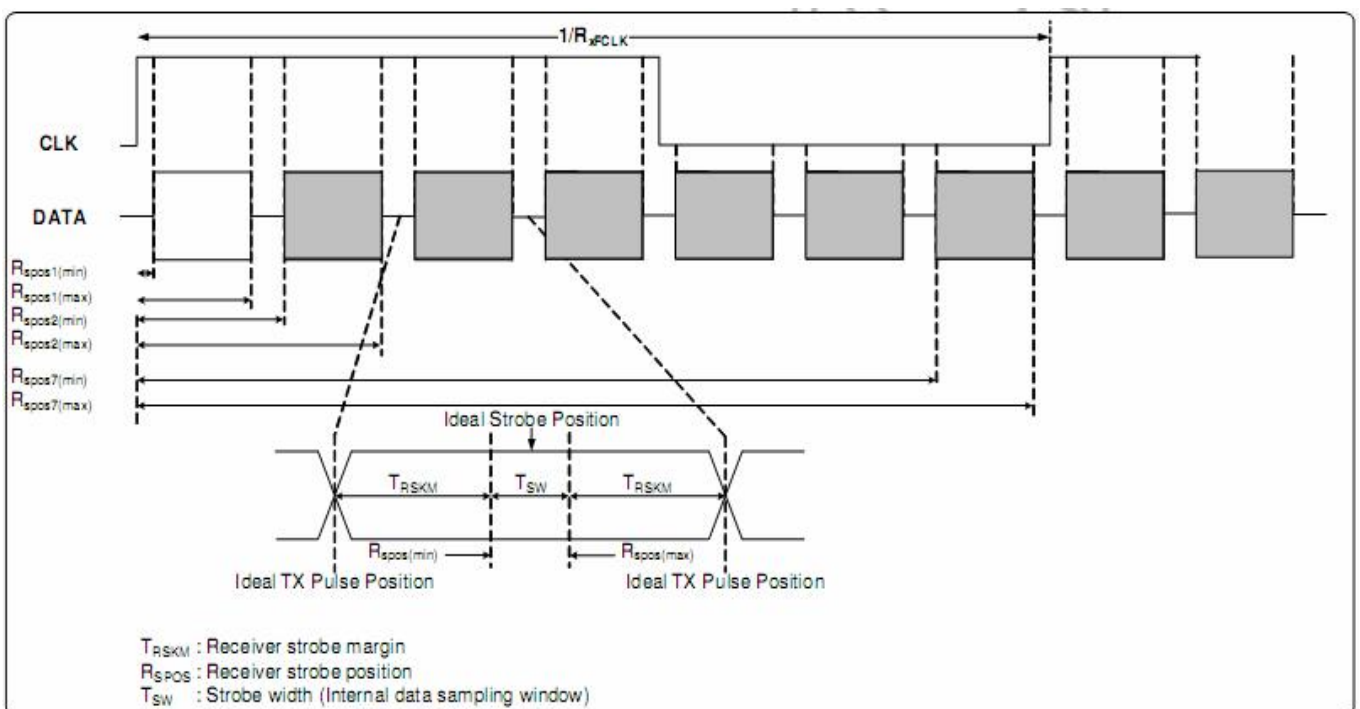
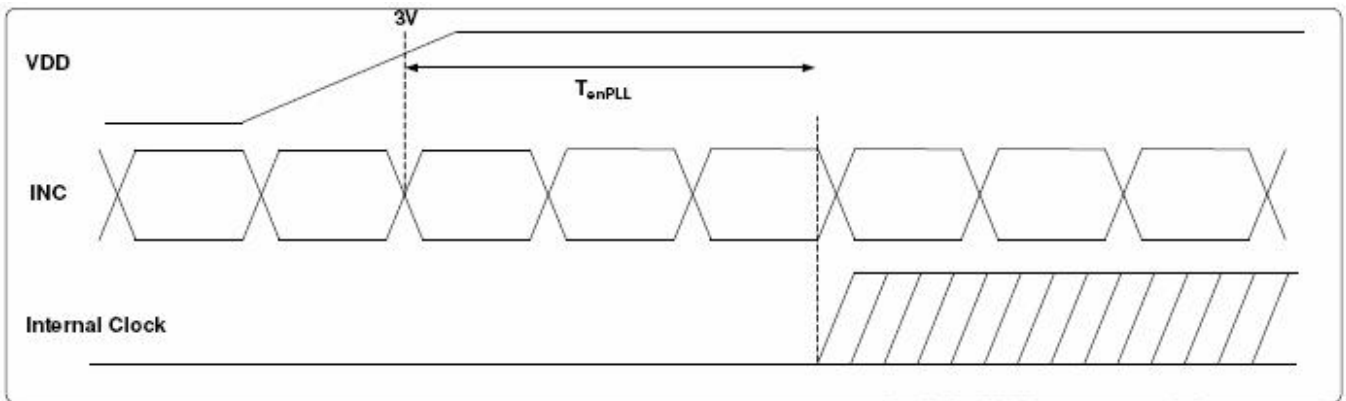
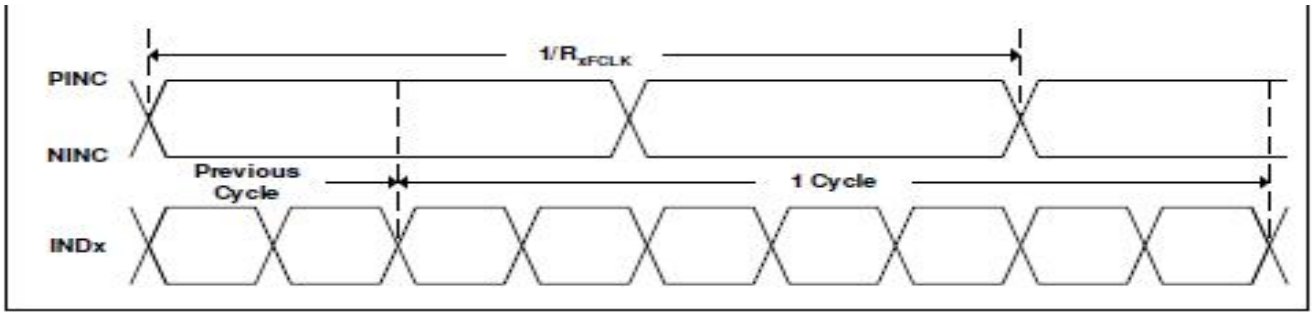
Item	Symbol	MIN	TYP	MAX	Unit	Remark
Forward Current	IF	-	140	-	mA	21 LEDs (3 LED Serial, 7 LED Parallel)
Forward Voltage	VF	-	9.0	10.5	V	
LED lifetime	-	-	30,000	-	Hrs	

## 8. Command/AC Timing

### 8.1 AC Electrical Characteristics

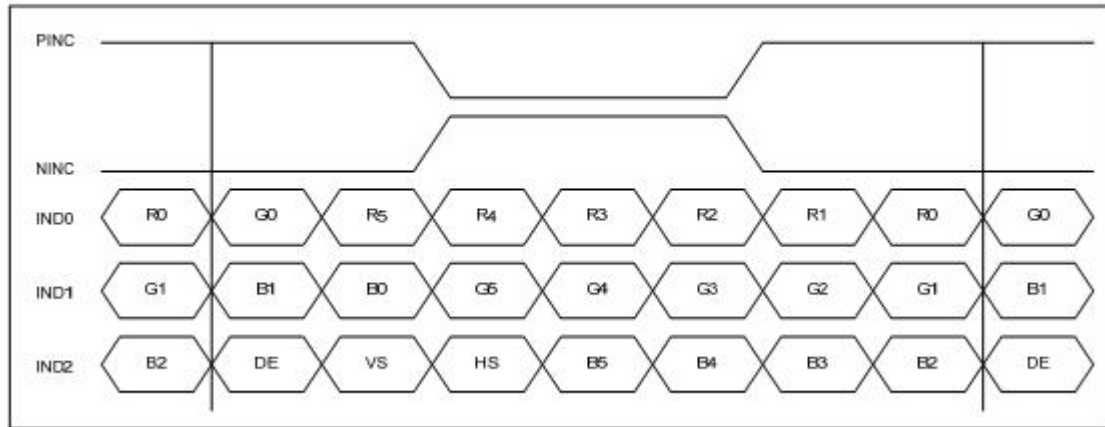
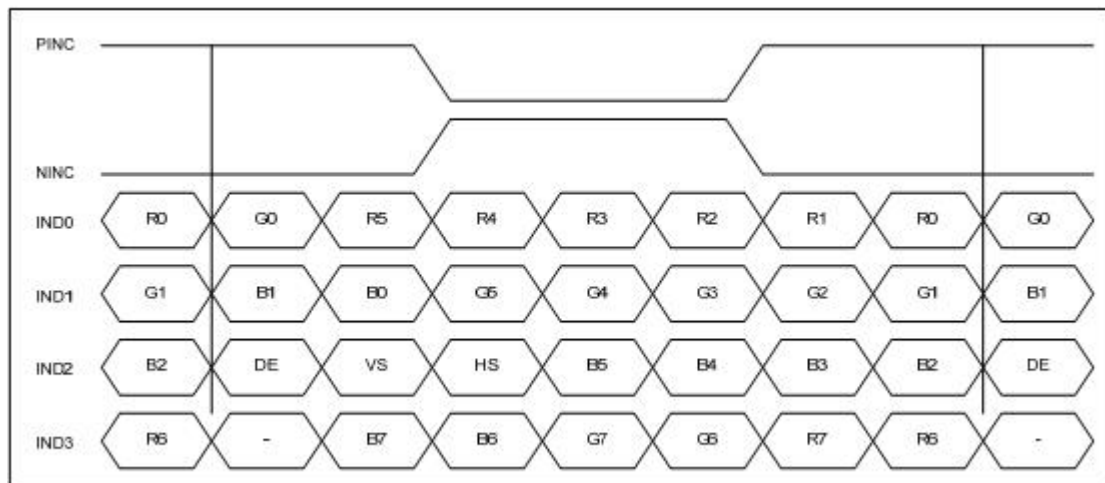
Parameter	Symbol	Min	Typ	Max	Unit	Remark
Clock Frequency	RxFCLK	40.8	51.2	67.2	MHz	
Input data skew margin	TRSKM	500	-	-	ps	
Clock high time	TLVCH	-	$4/(7 * RxFCLK)$	-	ns	
Clock low time	TLVCL	-	$3/(7 * RxFCLK)$	-	ns	
PLL wake-up time	TenPLL	-	-	150	us	

### 8.2 Input Clock and Data Timing Diagram





## 8.3 LVDS Timing

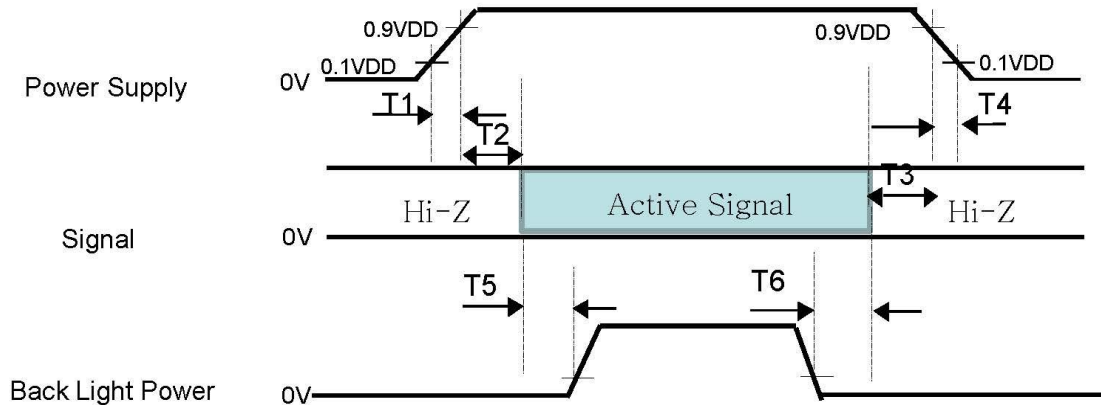
**LVDS mode data input format**

**6-bit LVDS input**

**8-bit LVDS Input**
**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

**Vertical Timing**

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

### 8.4 POWER SEQUENCE



- $0.5\text{ms} \leq T1 \leq 10\text{ms}$
- $0\text{ms} \leq T2$
- $0\text{ms} \leq T3$
- $0\text{ms} \leq T4 \leq 10\text{ms}$
- $100\text{ms} \leq T5$
- $0\text{ms} \leq T6 \leq 10\text{ms}$

**Notes:**

1. When the power supply VDD is 0V, keep the level of input signals on the low or keep high impedance.
2. Do not keep the interface signal high impedance when power is on. Back Light must be turn on after power for logic and interface signal are valid.

### 9. Optical Specification

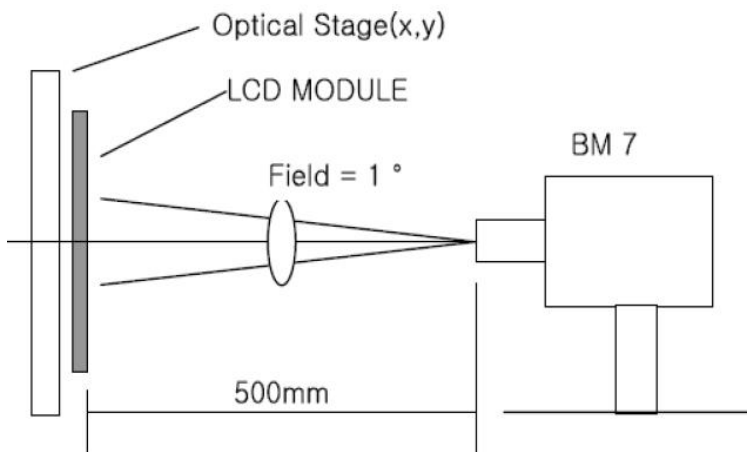
Ta=25°C

Item	Symbol	Condition	Min	Typ.	Max.	Unit	Remark
Contrast Ratio	CR	$\theta=0^\circ$	600	800	-		Note1 Note2
Response Time	Ton +Toff	25°C	-	25	40	ms	Note1 Note3
View Angles	$\Theta T$	$CR \geq 10$	-	65	-	Degree	Note 4
	$\Theta B$		-	55	-		
	$\Theta L$		-	65	-		
	$\Theta R$		-	65	-		
Chromaticity	White	x	Brightness is on	0.26	0.31	0.36	Note5, Note1
		y		0.28	0.33	0.38	
	Red	x		-	TBD		
		y		-	TBD		
	Green	x		-	TBD		
		y		-	TBD		
	Blue	x		-	TBD		
		y		-	TBD		
Luminance	L		-	250	-	cd/m <sup>2</sup>	Note1 Note6
Uniformity	U		70	75	-	%	Note1 Note7

Note 1: Definition of optical measurement system.

Temperature = 25°C(±3°C)

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

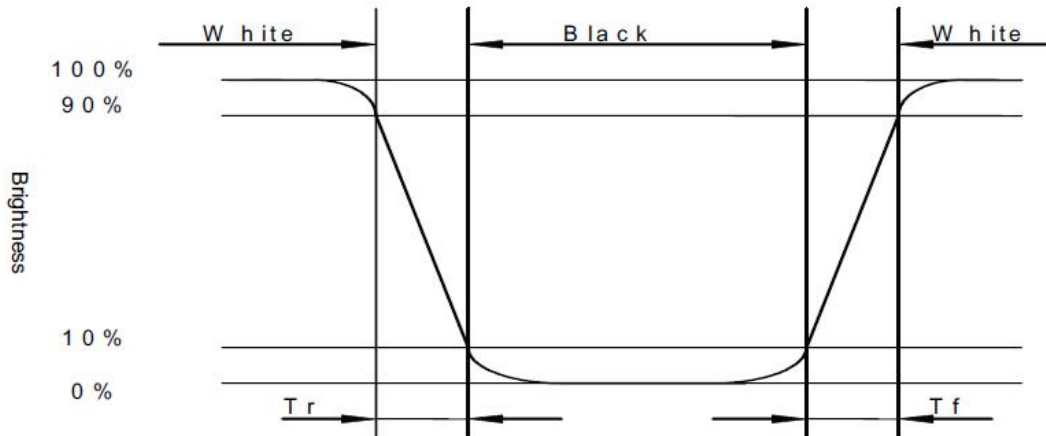


Note 2: Contrast ratio is defined as follow:

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

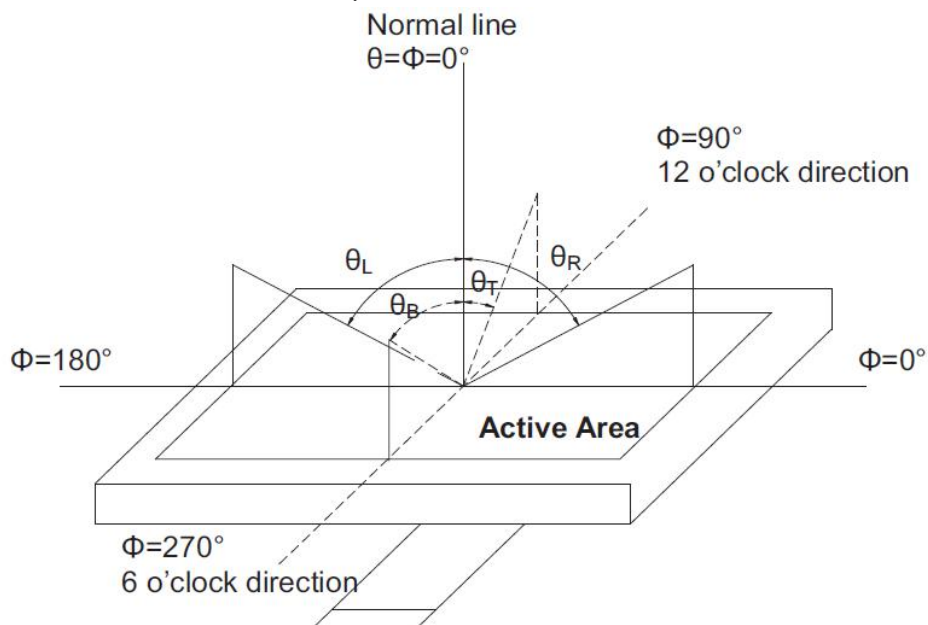
Note 3: Response time is defined as follow:

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,  $T_f$ ).



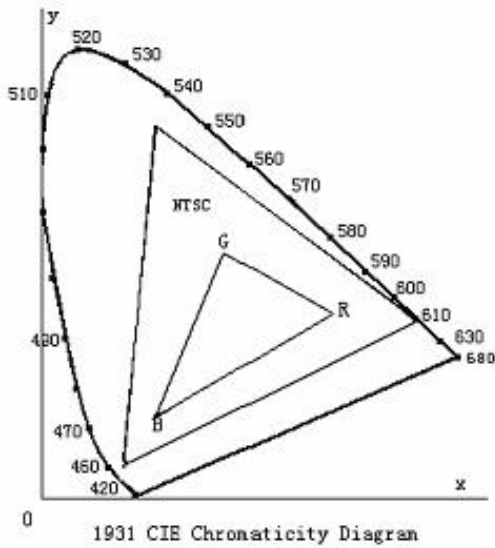
Note 4: Viewing angle range is defined as follow:

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.

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

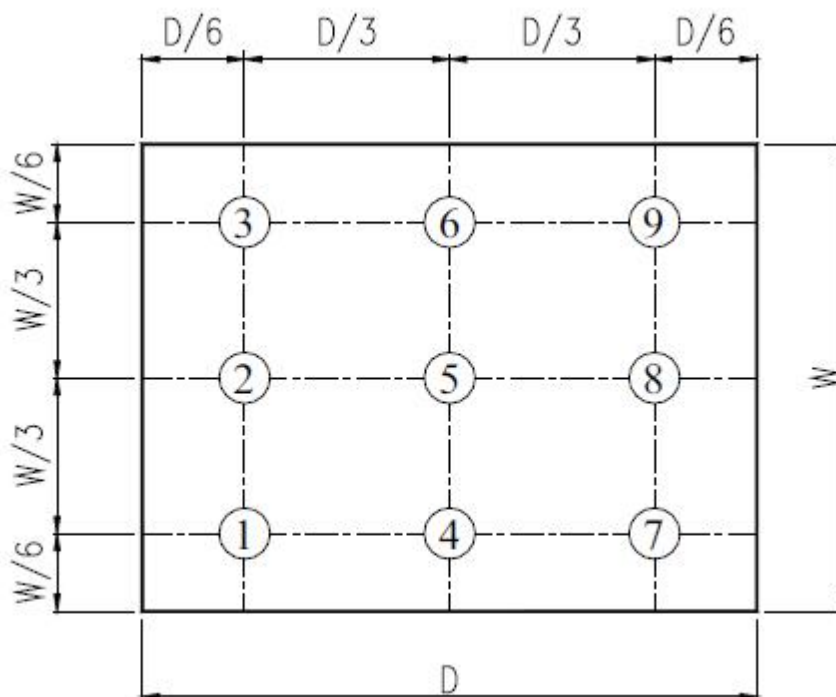


Fig. 2 Definition of uniformity

## 10. Environmental / Reliability Tests

No	Test Item	Condition	Judgment criteria
1	High Temp Operation	Ts=+70°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)	-30°C 30 min~+80°C 30 min, Change time:5min, 20 Cycles	Per table in below
7	ESD (Operation)	± 2KV, Human Body Mode, 100pF/1500 Ω	Per table in below
8	Vibration (Non-operation)	Random Vibration : 0.015G*G/Hz from 5-100HZ, -6dB/Octave from 100-200HZ 2 hours for each direction of X. Y. Z. (6 hours for total)	Per table in below
9	Shock (Non-operation)	100G 6ms, ± X, ± Y, ± Z 3 times for each direction	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  $+25^{\circ}\text{C} \pm 10^{\circ}\text{C}$  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.

