



# SmarterGlass

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**DLC Display Co., Limited**

德爾西顯示器有限公司



MODEL No: DLC0840AAG-3

TEL: 86-755-86029824

FAX: 86-755-86029827

E-MAIL: [sales@dlcdisplay.com](mailto:sales@dlcdisplay.com)

WEB: [www.dlcdisplay.com](http://www.dlcdisplay.com)

## Record of Revision

Date	Revision No.	Summary
2012 05 28	1.0	Rev 1.0 was issued
2014 03 31	2.0	Change backlight unit driving condition and outline drawing

### 1. Scope

This data sheet is to introduce the specification of DLC0840AAG-3 active matrix TFT module. It is composed of a color TFT-LCD panel, driver ICs, FPC and a backlight unit. The 8.4" display area contains 800(RGB) x 600 pixels.

### 2. Application

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

### 3. General Information

Item	Contents	Unit
Size	8.4	inch
Resolution	800(RGB) x 600	/
Interface	LVDS 6/8 bit	/
Technology type	a-Si TFT	/
Pixel pitch	0.213x0.213	mm
Pixel Configuration	R.G.B. Vertical Stripe	
Outline Dimension (W x H x D)	203.0x142.5x5.7	mm
Active Area	170.4 x 127.8	mm
Display Mode	Transmissive , Normally White	/
Backlight Type	LED	/

### 4. Outline Drawing

203.0±0.5  
Bezel opening 173.20±0.3  
VA. 171.40  
AA. 170.40  
105.2  
800xRGBx600 DOTS  
6.0  
2-Ø3.0  
88.5±0.3  
100.0±0.5  
2-27.00±0.5  
2-16.00  
18.60±0.3  
19.50±0.5  
20.00±0.5  
142.5±0.5  
131.50±0.5  
Bezel opening 130.60±0.3  
VA. 128.80  
AA. 127.8  
71.85  
6.55±0.3  
7.45±0.5  
7.95±0.5  
2-9.80  
5.70±0.2  
4-3.00  
4-1.6  
2-R1.50  
2-198.50±0.5  
2.03  
37.02±0.5  
17.55±0.5  
1.00  
1.50  
CN1  
CN2

**LED CIRCUIT DIAGRAM:**

**Table 1: CN1 Pinout**

PIN	SYMBOL
1	VDD
2	VDD
3	UD
4	LR
5	RxIN1-
6	RxIN1+
7	GND
8	RxIN2-
9	RxIN2+
10	GND
11	RxIN3-
12	RxIN3+
13	GND
14	RxCLKIN-
15	RxCLKIN+
16	GND
17	SEL68
18	NC
19	RxIN4-
20	RxIN4+

**Table 2: CN2 Pinout**

PIN	SYMBOL
1	VBL
2	PGND
3	BL_EN
4	Dimming

**Table 3: Company Information**

DRAWN BY:	TITLE: DLC0840AAG-3
CHECKED BY:	DWG NO:
APPROVED BY:	DWG NAME:
CONFIRMED BY:	SHEET NO: OF

**Company Details:**  
DLC Display Co., Limited  
www.dlcdisplay.com

**Table 4: Scale and Unit**

SCALE:	UNIT: mm
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**NOTES:**

- DISPLAY TYPE: a-si TFT
- DISPLAY MODULE :Transmissive, Normally White
- OPERATING TEMP: -20°C ~ 70°C
- STORAGE TEMP: -30°C ~ 80°C
- BACKLIGHT: LED
- RoHS Compliant

## 5. Interface signals

Pin	Symbol	I/O	Description	Remark
1	VDD	P	Power supply	
2	VDD	P	Power supply	
3	UD	I	Vertical Reverse Scan Control	
4	LR	I	Horizontal Reverse Scan Control	
5	RxIN1-	I	Negative data 1 for LVDS signal input	
6	RxIN1+	I	Positive data 1 for LVDS signal input	
7	GND	P	Ground	
8	RxIN2-	I	Negative data 2 for LVDS signal input	
9	RxIN2+	I	Positive data 2 for LVDS signal input	
10	GND	P	Ground	
11	RxIN3-	I	Negative data 3 for LVDS signal input	
12	RxIN3+	I	Positive data 3 for LVDS signal input	
13	GND	P	Ground	
14	RxCLKIN-	I	negative clock for LVDS signal input	
15	RxCLKIN+	I	Positive clock for LVDS signal input	
16	GND	P	Ground	
17	SEL68	I	LVDS 6/8 bit selection control	
18	NC	I	No connection	
19	RxIN4-	I	Negative data 4 for LVDS signal input	
20	RxIN4+	I	Positive data 4 for LVDS signal input	

Note 1: Matching Connection DF19-20S-1C(HRS)

Note 2: Scanning direction description

Scan control input		Scanning direction
UD	LR	
HIGH	HIGH	Down to up, left to right
LOW	LOW	Up to down, right to left
HIGH	LOW	Down to up, right to left
LOW	HIGH	Up to down, left to right

Backlight interface

Pin	Symbol	I/O	Description	Remark
1	VBL	P	Backlight Power supply , 12V input	
2	PGND	P	Ground	
3	BL_EN	I	Enable : 3.3V for backlight on ; 0V for backlight off	
4	Dimming	I	Adjust the luminance of LED's	

	Item	Min	Typ	Max
Dimming Duty cycle	Freq=100HZ to 10kHz	1%	-	100%
	Freq=10KHZ to 100kHz	10%	-	100%

Note 1: Matching Connection H208K-P04N-02B (Entery)

## 6. Absolute maximum Ratings

### 6.1. Electrical Absolute max. ratings

Parameter	Symbol	MIN	MAX	Unit	Remark
Power Voltage	VDD	-0.5	5.0	V	
	VBL	-0.3	24	V	
Input Voltage	VIN	-0.3	5.0	V	Note

Note: Signals include RxIN, RxCLK , SEL68, UD, LR ,EN ,Dimming.

### 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

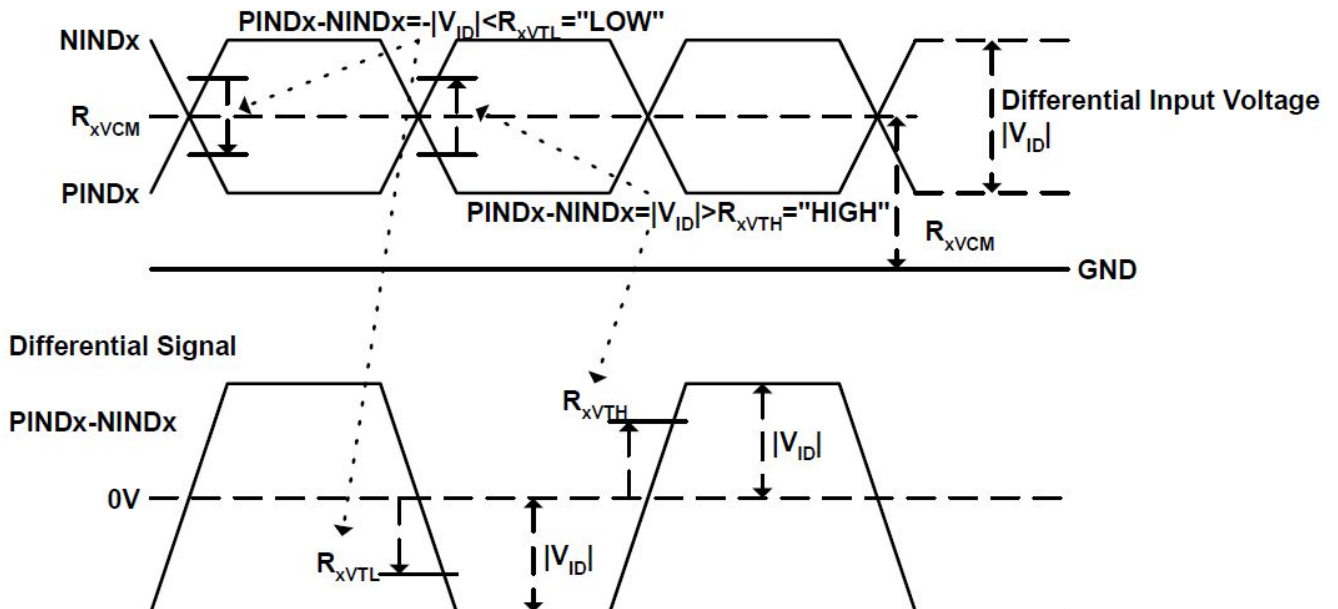
### 7.1 Electrical characteristics

GND=0V, Ta=25°C

Item	Symbol	Min	Typ	Max	Unit	Remark
POWER Supply Voltage	VDD	3	3.3	3.6	V	
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)	$R_{xV N}$	0		2.4	V	
Differential input common mode voltage	$R_{xVCM}$	$ V_{ID} /2$		$2.4 -  V_{D} /2$	V	
Differential input voltage	$ V_{D} $	0.2		0.6	V	
Current of VDD Power supply	$I_{VDD}$	-	230	350	mA	Note1
Power consumption of VDD	$W_{VDD}$	-	759	-	mW	
Inrush current of VDD	$I_{rush}$	-	0.88	1.2	A	

Note1: To test the current dissipation, use "all Black Pattern".

#### Single-end Signals

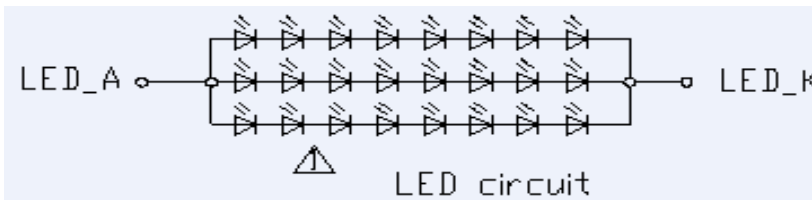




7.2 LED Backlight

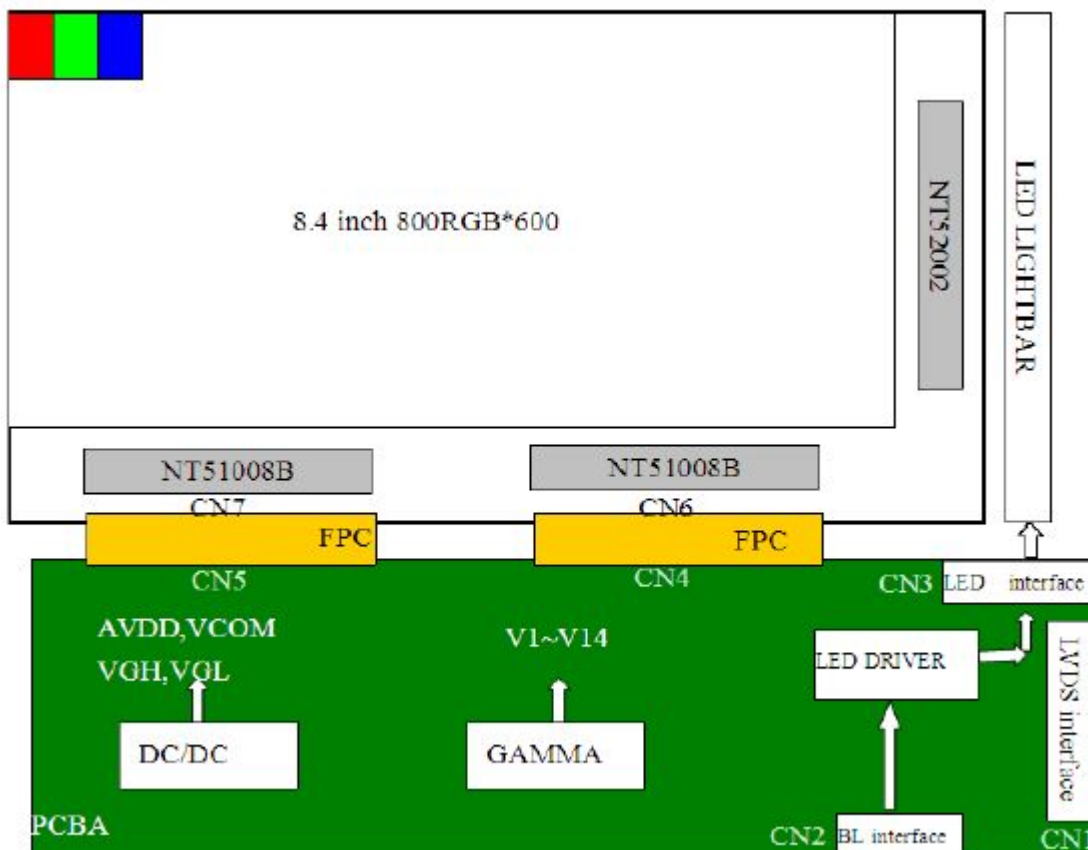
Ta=25°C

Item	Symbol	Min	Typ	Max	Unit	Remark
Voltage of LED driver circuit	$V_{BL}$	11.5	12	12.5	V	
Current of LED driver circuit	$I_{BL}$	-	165	240	mA	
Power Consumption	$W_{BL}$	-	1980	-	mW	
Dimming Signal frequency	$F_{dim g}$	0.1		100	KHz	
Dimming Signal duty	100Hz~10KHz	0	-	100	%	
	10KHz~100KHz	10	-	100	%	
LED lifetime	-	-	50,000	-	Hr	



Note 1: 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

7.3 BLOCK DIAGRAM



## 8. Command/AC Timing

### 8.1 TFT-LCD Input Timing

VCC=3.3V, GND=0V, Ta=25°C

Parameter	Symbol	Min	Typ	Max	Unit	Remark
DCLK	Fclk	34.5	39.6	50.4	MHz	Tclk=1/Fclk
	Tclk	20.2	25.3	30.7	ns	
HSYNC	TH	900	1000	1200	Tclk	
	THD	-	800	-	Tclk	
	Thwh	1	-	40	Tclk	
	Thbp	-	88	-	Tclk	
	Thfp	12	112	312	Tclk	
VSYNC	TV	640	660	700	TH	
	TVD	-	480	-	TH	
	Tvwh	1	-	20	TH	
	Tvbp	-	39	-	TH	
	Tvfp	1	21	61	TH	

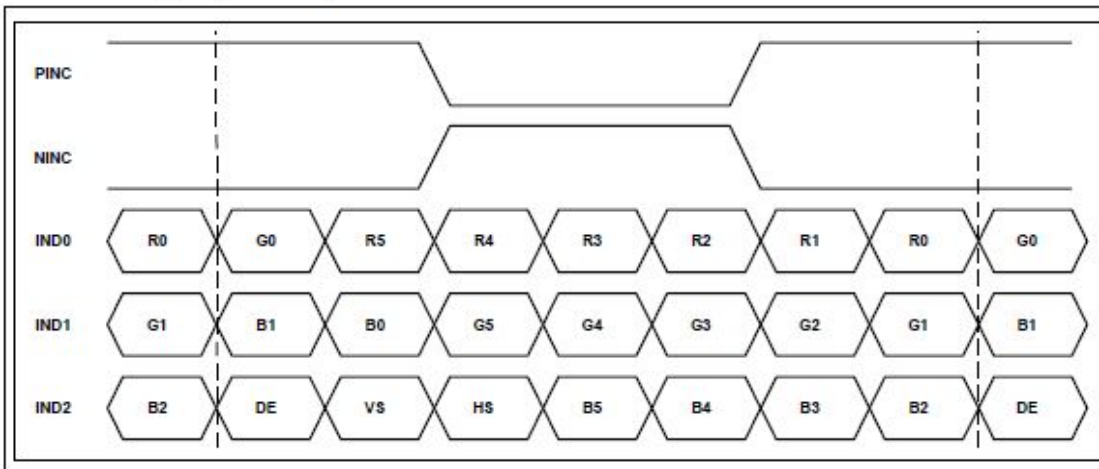
### 8.2 Recommended Timing Setting Of TCON

TCON (Embedded In Source IC) Input timing at DE mode VCC=3.3V, GND=0V, Ta=25°C

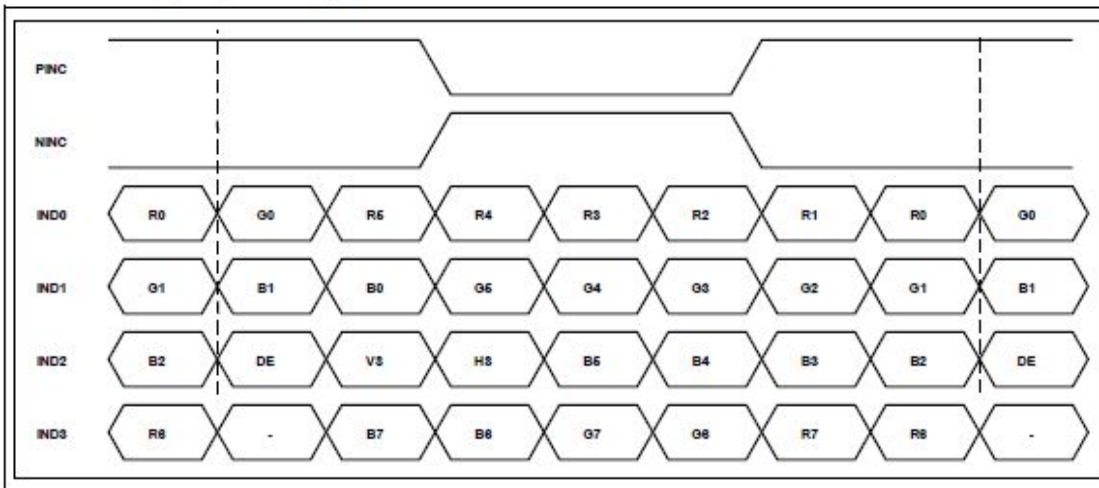
Parameter		Symbol	Min.	Typ.	Max.	Unit	Remark
Dclk frequency		Fclk	33	39.6	49.5	MHz	Tclk=1/Fclk
Horizontal section	Horizontal total	TH	890	1000	1300	Tclk	
	Horizontal blanking	THC	90	200	500	Tclk	
	Valid Data Width	THD		800		Tclk	
Vertical section	Frame rate			60		Hz	
	Vertical total	TV	610	660	800	TH	
	Vertical blanking	TVC	10	60	200	TH	
	Valid Data Width	TVD		600		TH	

### 8.3 LVDS Input Data Format

#### 6bit LVDS input (HSD='H')

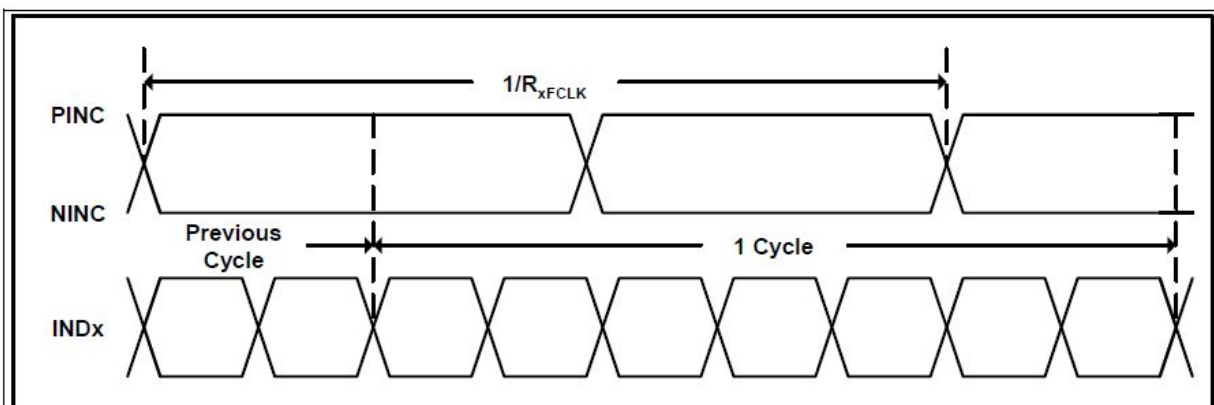


#### 8-bit LVDS input (HSD='L')



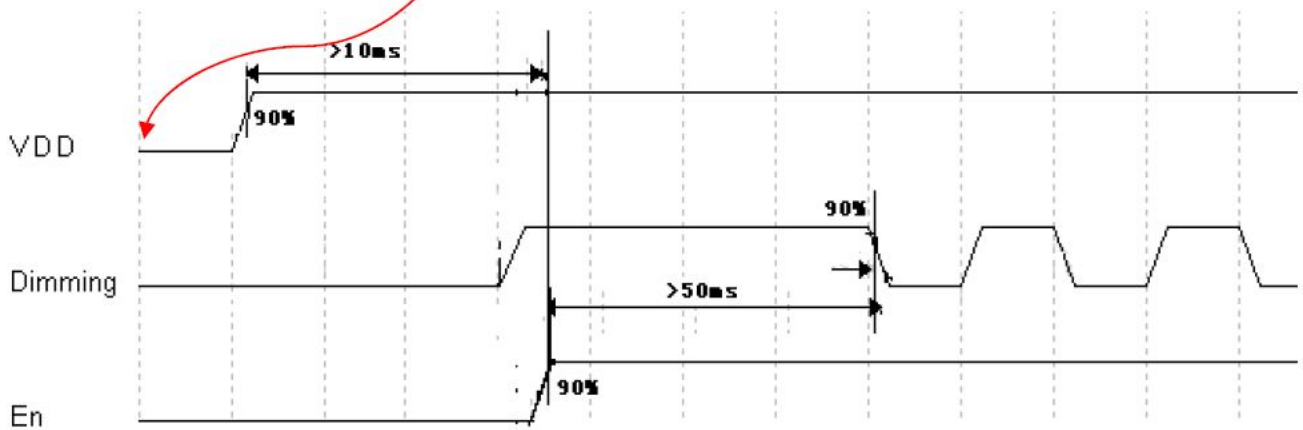
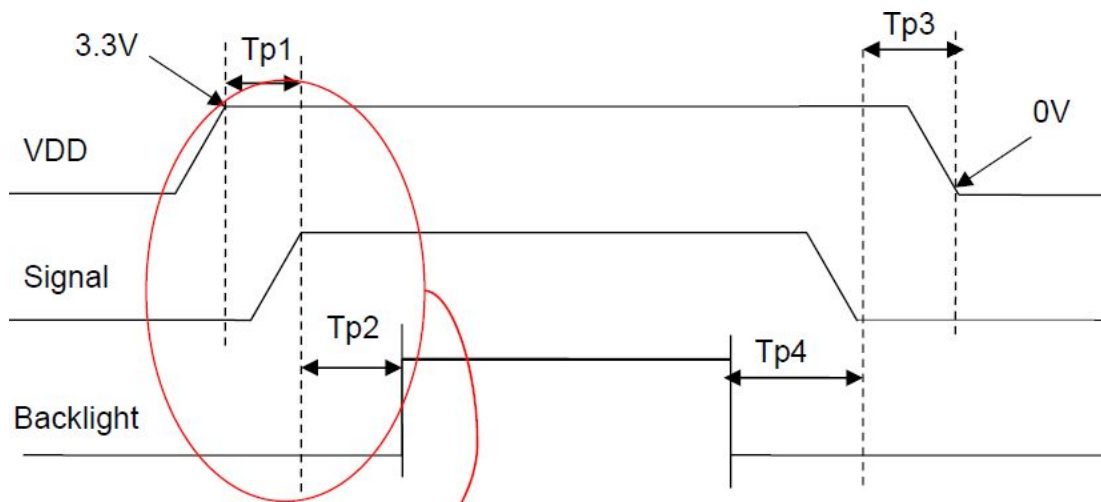
### 8.4 Input signal AC timing

Parameter	Symbol	Min.	Typ.	Max.	Unit	Remark
Clock frequency	RxFCLK	33	39.6	49.5	MHz	
Clock high time	TLVCH		$4/(7 * RxFCLK)$		nS	
Clock low time	TLVCL		$3/(7 * RxFCLK)$		nS	



### 8.5 Power ON/Off Sequence

Item	Symbol	Min	Typ	Max	Unit	Remark
VDD 3.3V to signal starting	Tp1	5	-	50	ms	
VDD rising time	Tr	0.1	-	5	ms	
Signal starting to backlight on	Tp2	150	-	-	ms	
Signal off to VDD 0V	Tp3	5	-	50	ms	
Backlight off to signal off	Tp4	150 -	-	-	ms	



## 9. Optical Specification

Ta=25°C

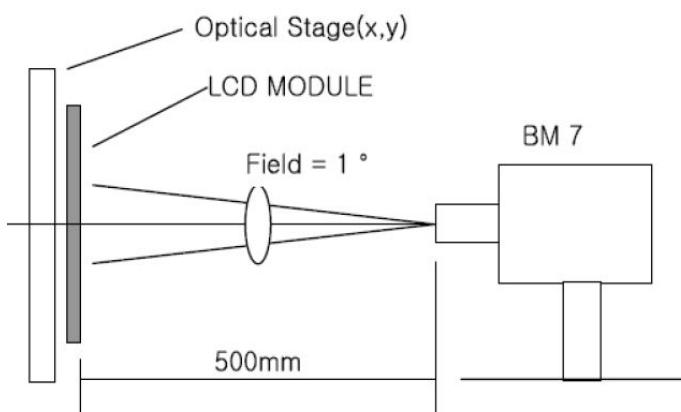
Item	Symbol	Condition	Min	Typ.	Max.	Unit	Remark
Contrast Ratio	CR	$\theta=0^\circ$	400	500			Note1 Note2
Response Time	Ton/ Toff	25°C		20	30		Note1 Note3
View Angles	$\theta T$	$CR \geq 10$	50	60		Degree	Note 4
	$\theta B$		60	70			
	$\theta L$		60	70			
	$\theta R$		60	70			
Chromaticity	White	Brightness is on	x	0.250	0.300	0.350	Note5, Note1
			y	0.281	0.331	0.381	
	Red		x	0.546	0.596	0.646	
			y	0.281	0.331	0.381	
	Green		x	0.296	0.346	0.3960	
			y	0.539	0.589	0.639	
	Blue		x	0.103	0.153	0.203	
			y	0.054	0.104	0.154	
NTSC	S		40	50		%	Note5
Luminance	L		280	350		cd/m <sup>2</sup>	Note1 Note6
Uniformity	U			75		%	Note1 Note7

Test condition:  $I_F=160$  mA,  $V_F=9.6$  V and the ambient temperature is  $25 \pm 2^\circ\text{C}$ . humidity is  $65 \pm 7\%$ .

Note 1: Definition of optical measurement system.

Temperature =  $25^\circ\text{C} (\pm 3^\circ\text{C})$

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

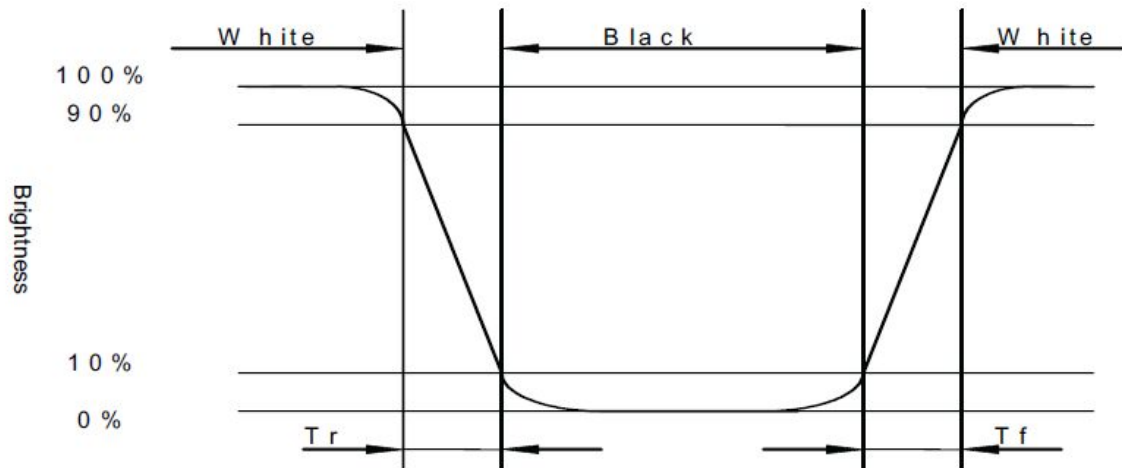


Note 2: Contrast ratio is defined as follow:

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

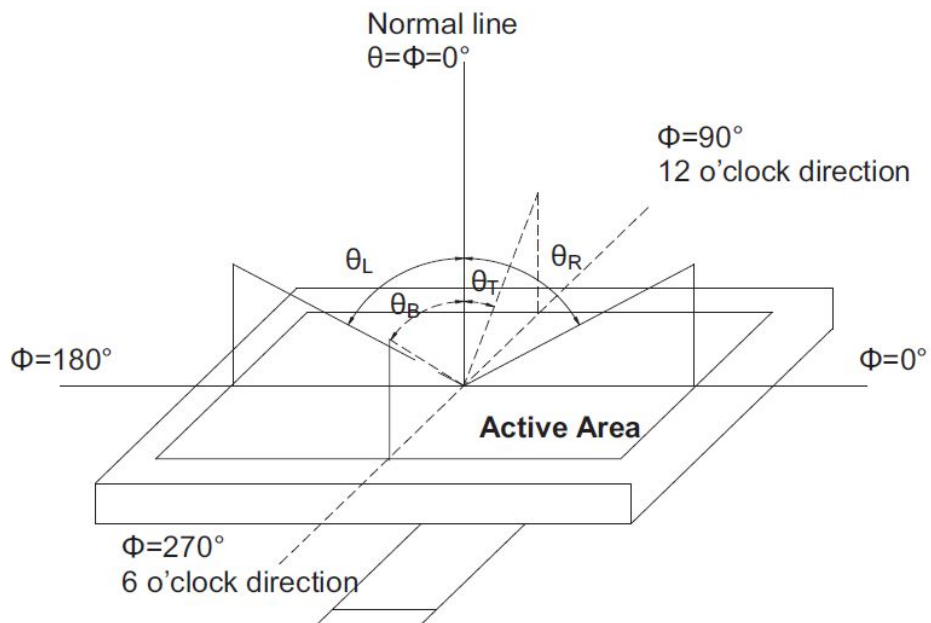
Note 3: Response time is defined as follow:

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,  $T_f$ ).



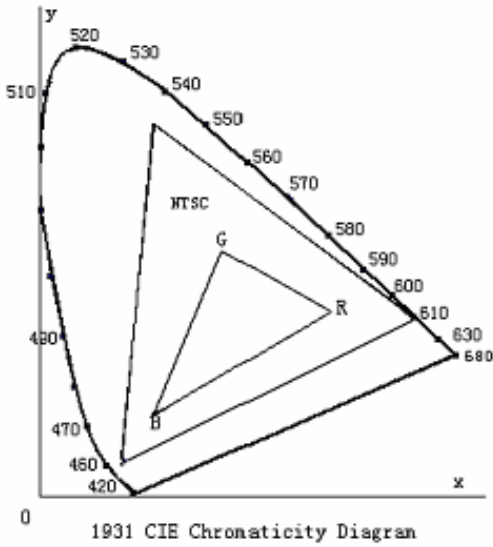
Note 4: Viewing angle range is defined as follow:

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.

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

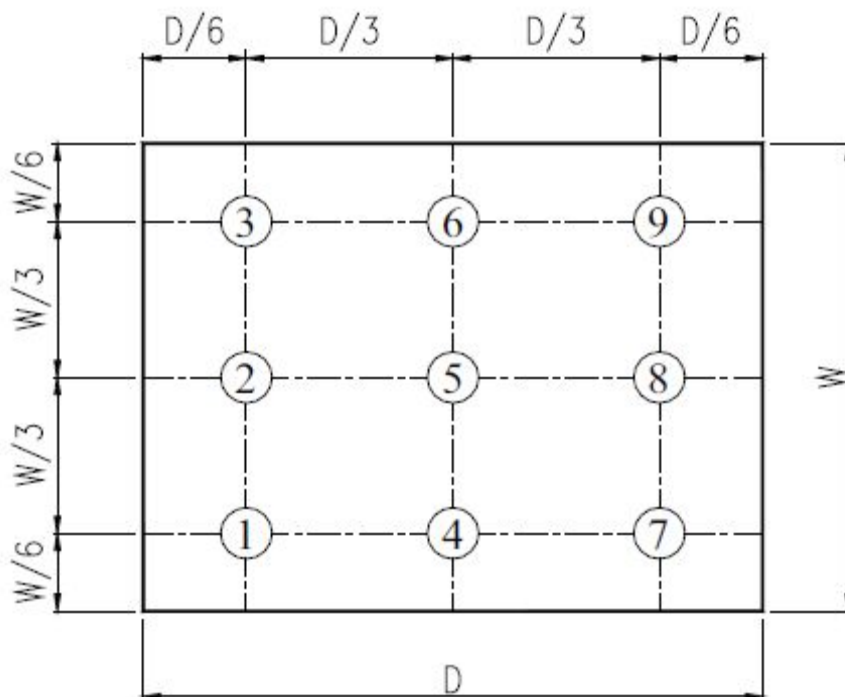


Fig. 2 Definition of uniformity

## 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=+60°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, 10 0Cycles	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.	Per table in below
9	Shock (Non operation)	100G 6ms, ±X,±Y,±Z 3times, 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.

