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DLC Display Co., Limited

德爾西顯示器有限公司



MODEL No:DLC0840AAG-2

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Record of Revision

Date	Revision No.	Summary
2009-12-13	1.0	Rev 1.0 was issued

1. Scope

This data sheet is to introduce the specification of DLC0840AAG-2 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 800X3(RGB) x 600 pixels.

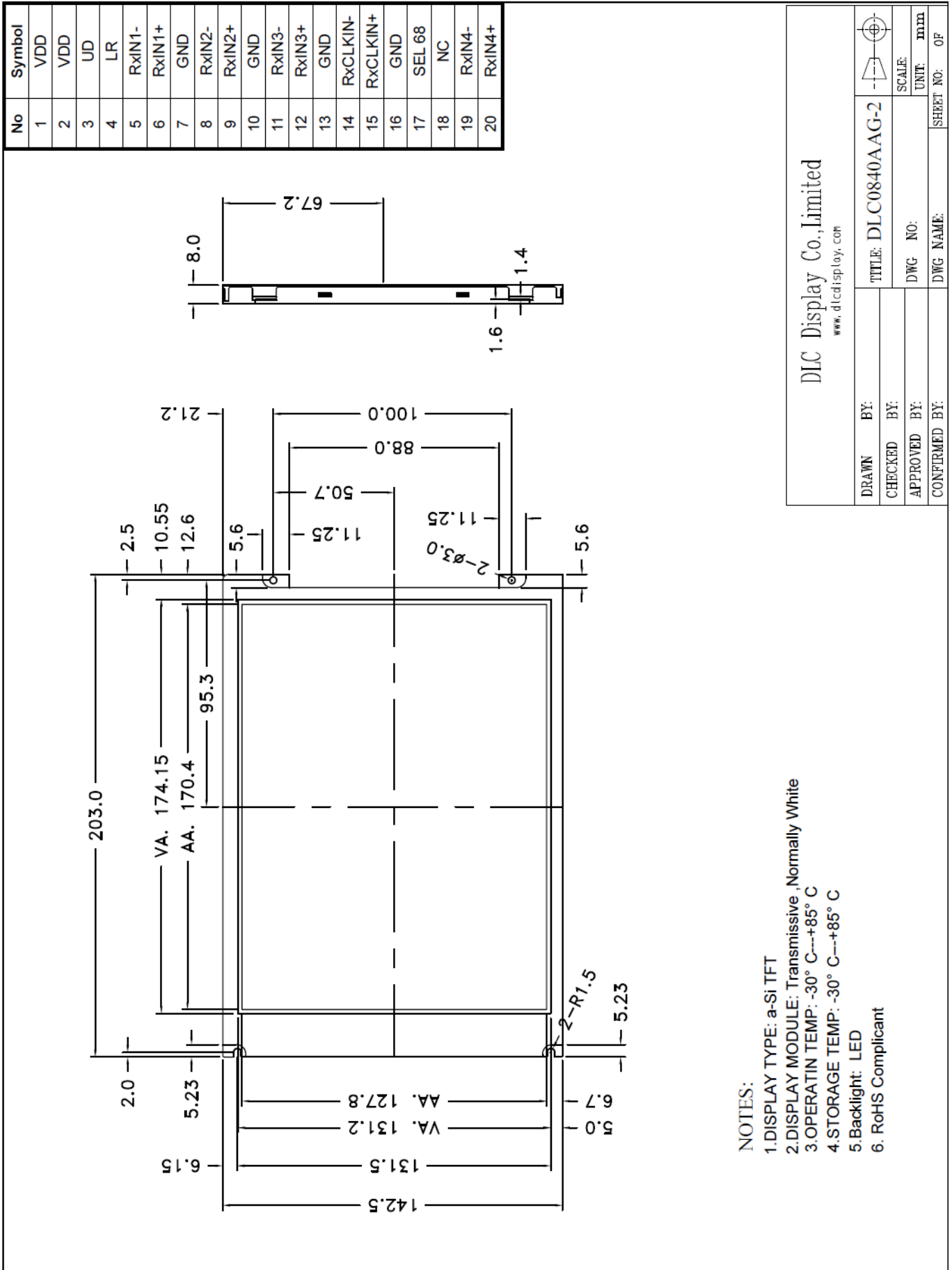
2. Application

Digital equipments which need color display, POS, industrial systems.

3. General Information

Item	Contents	Unit
Size	8.4	inch
Resolution	800X3(RGB) x 600	/
Interface	LVDS	/
Technology type	a-si TFT	/
Pixel pitch	0.213x 0.213	mm
Pixel Configuration	R.G.B. Vertical Stripe	
Outline Dimension (W x H x D)	203.0x 142.5x 8.0	mm
Active Area(W x H)	170.4 x 127.8	mm
Display Mode	Transmissive, Normally white	/
Backlight Type	LED	/

4. Outline Drawing



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DRAWN BY:	TITLE: DLC0840AAG-2	SCALE:	UNIT: mm
CHECKED BY:	DWG NO:	DWG NAME:	SHEET NO. OF
APPROVED BY:			
CONFIRMED BY:			

- NOTES:
- 1.DISPLAY TYPE: a-Si TFT
 - 2.DISPLAY MODULE: Transmissive ,Normally White
 - 3.OPERATIN TEMP: -30° C---+85° C
 - 4.STORAGE TEMP: -30° C---+85° C
 - 5.Backlight: LED
 6. RoHS Compliant

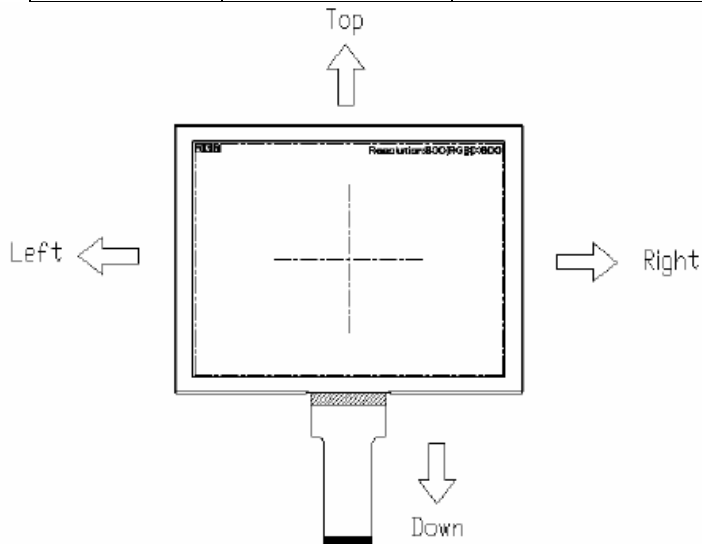
5. Interface signals

No	Symbol	Description	Remarks
1	VDD	Power Supply, 3.3V (typical)	
2	VDD	Power Supply, 3.3V (typical)	
3	UD	Vertical Reverse Scan Control, When UD=Low or NC → Normal Mode. When UD=High → Vertical Reverse Scan.	Note
4	LR	Horizontal Reverse Scan Control, When LR=Low or NC → Normal Mode. When LR=High → Horizontal Reverse Scan.	Note
5	RxIN1-	LVDS differential data input Pair 0	
6	RxIN1+		
7	GND	Ground	
8	RxIN2-	LVDS differential data input Pair 1	
9	RxIN2+		
10	GND	Ground	
11	RxIN3-	LVDS differential data input Pair 2	
12	RxIN3+		
13	GND	Ground	
14	RxCLKIN-	LVDS differential Clock input Pair	
15	RxCLKIN+		
16	GND	Ground	
17	SEL 68	LVDS 6/8 bit select function control, Low or NC → 6 Bit Input Mode. High → 8 Bit Input Mode. Note	
18	NC	NC	
19	RxIN4-	LVDS differential data input Pair 3. Must be tied to Ground in 6 bit input mode.	
20	RxIN4+		

Note

U/D and L/R control Function Vcc=1,GND=0

L/R	U/D	Function
0	0	Up to down, left to right
1	1	Down to up, right to left
1	0	Up to down, right to left
0	1	Down to up, left to right



Backlight:

No	Symbol	Description	Remarks
1	Vcc	Power Supply, 12V (typical)	
2	GND	GND	
3	Display	3.3V:ON 0V:OFF	
4	Dimming	PWM	

6. Absolute maximum Ratings

6.1. Electrical Absolute max. ratings

Parameter	Symbol	MIN	MAX	Unit	Remark
Power Supply Voltage	VDD	-0.3	3.6	V	
Logic supply Voltage	VI	-0.3	3.6	V	

6.2. Environment Conditions

Item	Symbol	MIN	MAX	Unit	Remark
Operating Temperature	TOPR	-30	85	°C	
Storage Temperature	TSTG	-30	85	°C	

7. Electrical Specifications

7.1 Electrical characteristics

GND=0V, Ta=25°C

Item	Symbol	MIN	TYP	MAX	Unit	Remark
Logic/LCD Drive Voltage	VDD	3	3.3	3.6	V	±10%
VDD Current	IVDD	-	270	330	mA	64 Gray Bar Pattern (VDD=3.3V, at 60Hz)
LCD Inrush Current	Irush LCD	-	-	3	A	Note 1
VDD Power	PVDD	-	0.9	1.2	W	(VDD=3.3V, at 60Hz)
Differential Input High Threshold	VTH	-	-	100	mV	VICM=1.2V
Differential Input Low Threshold	VTL	-100	-	-	mV	VICM=1.2V
Input Differential Voltage	VID.	100	400	600	mV	
Differential Input Common Mode Voltage	VICM	1.1		1.6	V	VTH/VTL= ±100mV

7.2 LED Backlight

Ta=25°C

Item	Symbol	MIN	TYP	MAX	Unit	Remark
Input Voltage	VCC	10.8	12	12.6	V	
Input Current	IVCC	-	0.27	-	A	100% PWM Duty
Power Consumption	PVCC	-	3.24	3.4	W	100% PWM Duty
Inrush Current	Irush LED	-	-	0.68	A	at rising time=470us
Dimming Frequency	FPWM	200	-	20K	Hz	
Swing Voltage	--	3	3.3	5.5	V	
Dimming Duty Cycle	--	5	-	100	%	
LED Forward Current	IF	-	80	84	mA	Ta =25°C
LED Forward Voltage	VF	-	42		V	IF = 80mA, Ta = -30°C
		38.4		43.8	V	IF = 80mA, Ta = 25°C
		36.6				IF = 80mA, Ta = 85°C
LED Power Consumption	PLED	-	3.07	-	W	IF = 80mA, Ta = 25°C
Operation Lifetime	--	50,000			Hrs	IF=80mA, Ta= 25°C

Note 1: Ta means ambient temperature of TFT-LCD module.

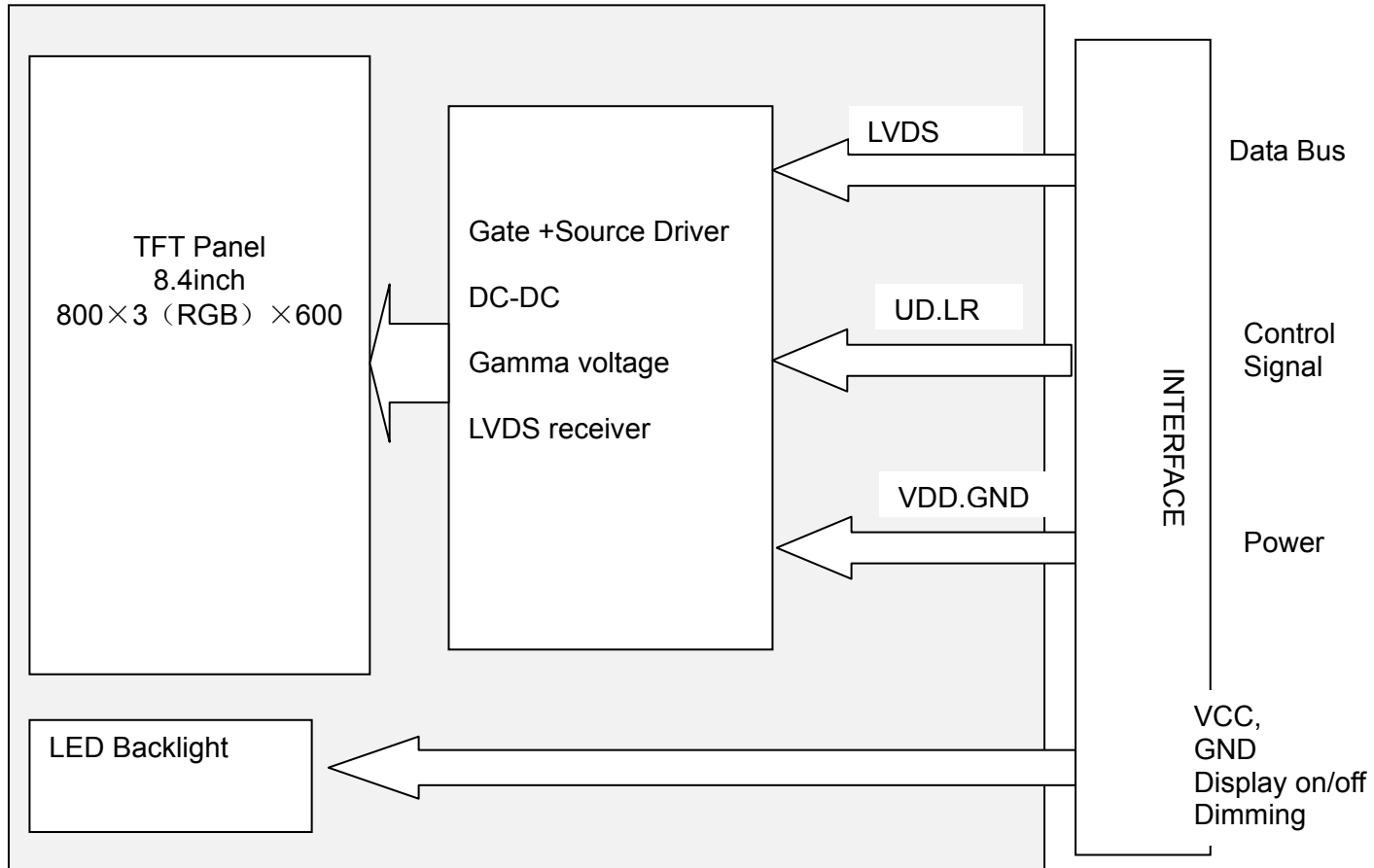
Note 2: VCC, Ivcc, PVCC , Irush LED are defined for LED B/L.(100% duty of PWM dimming)

Note 3: IF, VF , PLED are defined for LED Light Bar. There is two LED channel (AN1-CA1-CA2) in back light unit.

Note 4: If module is driven by high current or at high ambient temperature & humidity condition. The operating life will be reduced.

Note 5: Operating life means brightness goes down to 50% initial brightness. Minimum operating life time is estimated data.

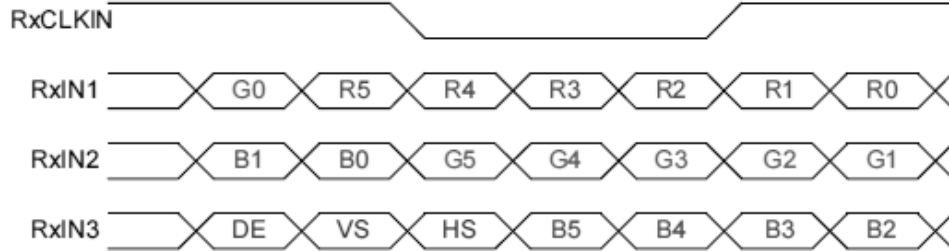
7.3 Schematic of LCD module system



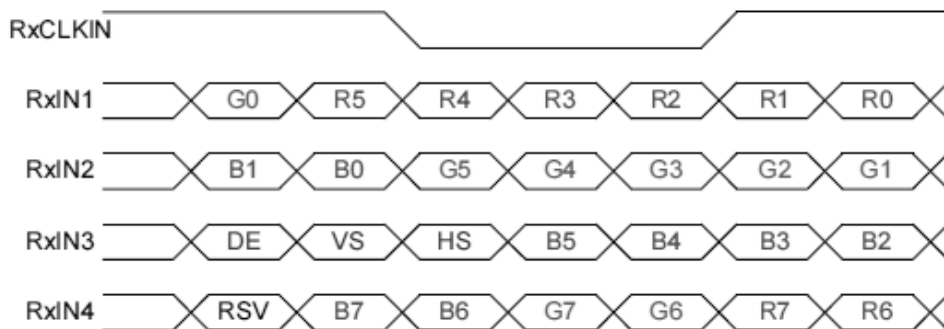
8. Command/AC Timing

8.1 the input data format

SEL68 = "Low" or "NC" for 6 bits LVDS Input



SEL68 = "High" for 8 bits LVDS Input



Note1: Please follow PSWG.

Note2: R/G/B data 7:MSB, R/G/B data 0:LSB

Signal Name	Description	Remark
R7	Red Data 7 (MSB)	Red-pixel Data Each red pixel's brightness data consists of these 8 bits pixel data.
R6	Red Data 6	
R5	Red Data 5	
R4	Red Data 4	
R3	Red Data 3	
R2	Red Data 2	
R1	Red Data 1	
R0	Red Data 0 (LSB)	
G7	Green Data 7 (MSB)	Green-pixel Data Each green pixel's brightness data consists of these 8 bits pixel data.
G6	GreenData 6	
G5	GreenData 5	
G4	GreenData 4	
G3	GreenData 3	
G2	GreenData 2	
G1	GreenData 1	
G0	GreenData 0 (LSB)	
B7	Blue Data 7 (MSB)	Blue-pixel Data Each blue pixel's brightness data consists of these 8 bits pixel data.
B6	Blue Data 6	
B5	Blue Data 5	
B4	Blue Data 4	
B3	Blue Data 3	
B2	Blue Data 2	
B1	Blue Data 1	
B0	Blue Data 0 (LSB)	
RxCLKIN+ RxCLKIN-	LVDS Clock Input	
DE	Display Enable	
VS	Vertical Sync	
HS	Horizontal Sync	

Note: Output signals from any system shall be low or Hi-Z state when VDD is off.

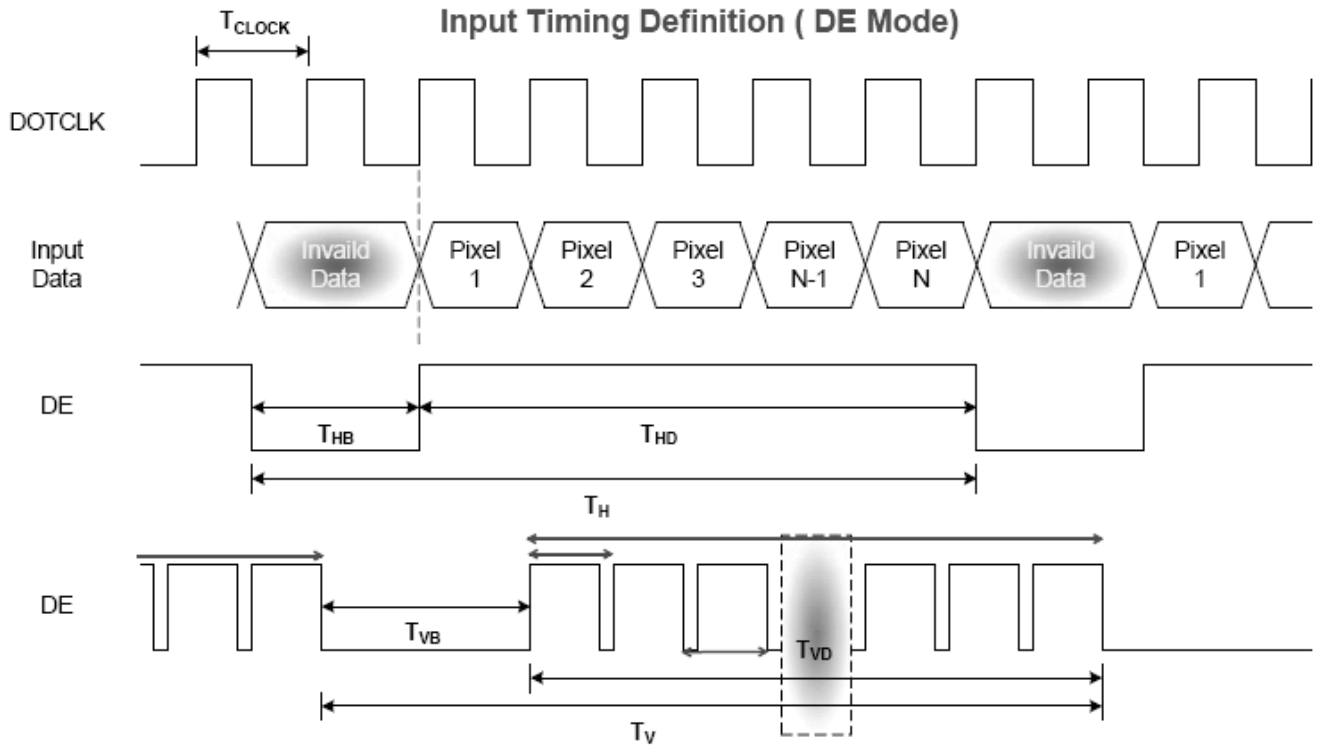
8.2 interface timing

8.2.1 Timing Characteristics

DE mode only

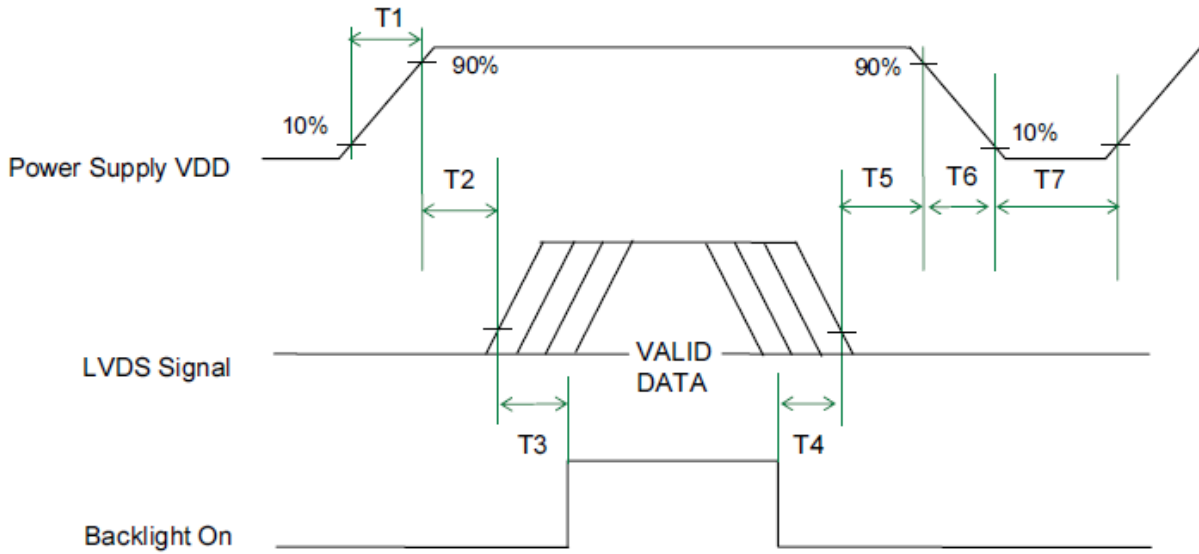
Parameter		Symbol	Min.	Typ.	Max.	Unit
Clock frequency		1/ TClock	33.6	39.8	48.3	MHz
Vertical Section	Period	TV	608	628	650	TH
	Active	TVD	600	600	600	
	Blanking	TVB	8	28	50	
Horizontal Section	Period	TH	920	1056	1240	TClock
	Active	THD	800	800	800	
	Blanking	THB	120	256	440	

8.2.2 Input timing Diagram



8.3 Power ON/OFF Sequence

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



Power ON/OFF sequence timing

Parameter	Value			Units
	Min.	Typ.	Max.	
T1	0.5	-	10	ms
T2	0	40	50	ms
T3	200	-	-	ms
T4	200	-	-	ms
T5	0	16	50	ms
T6	0	-	10	ms
T7	1000	-	-	ms

The above on/off sequence should be applied to avoid abnormal function in the display. Please make sure to turn off the power when you plug the cable into the input connector or pull the cable out of the connector.

9. Optical Specification

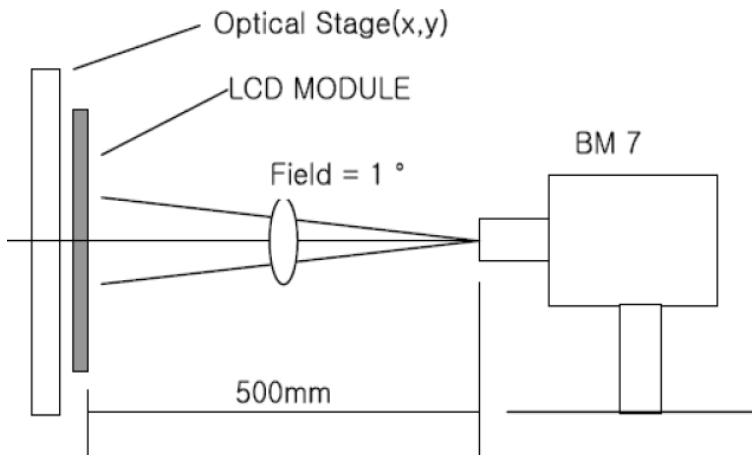
Ta=25°C

Item	Symbol	Condition	Min	Typ.	Max.	Unit	Remark		
Contrast Ratio	CR	$\theta=0^\circ$	400	600	-		Note1 Note2		
Response Time	Ton/ Toff	25°C	-	30	50	ms	Note1 Note3		
View Angles	θT	$CR \geq 10$	65	80	-	Degree	Note 4		
	θB		50	60	-				
	θL		70	80	-				
	θR		70	80	-				
Chromaticity	White	Brightness is on	Typ-0.05	Typ+0.05			Note5, Note1		
								x	0.31
	y							0.33	
	Red							x	0.56
								y	0.33
	Green							x	0.34
								y	0.55
	Blue							x	0.15
y		0.12							
Luminance	L		350	450	-	cd/m ²	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

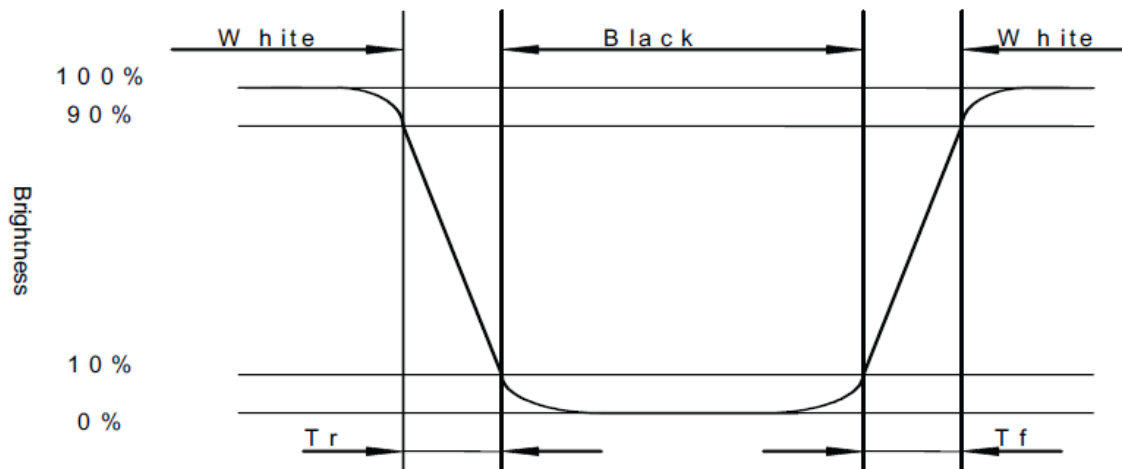


Note 2: Contrast ratio is defined as follow:

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

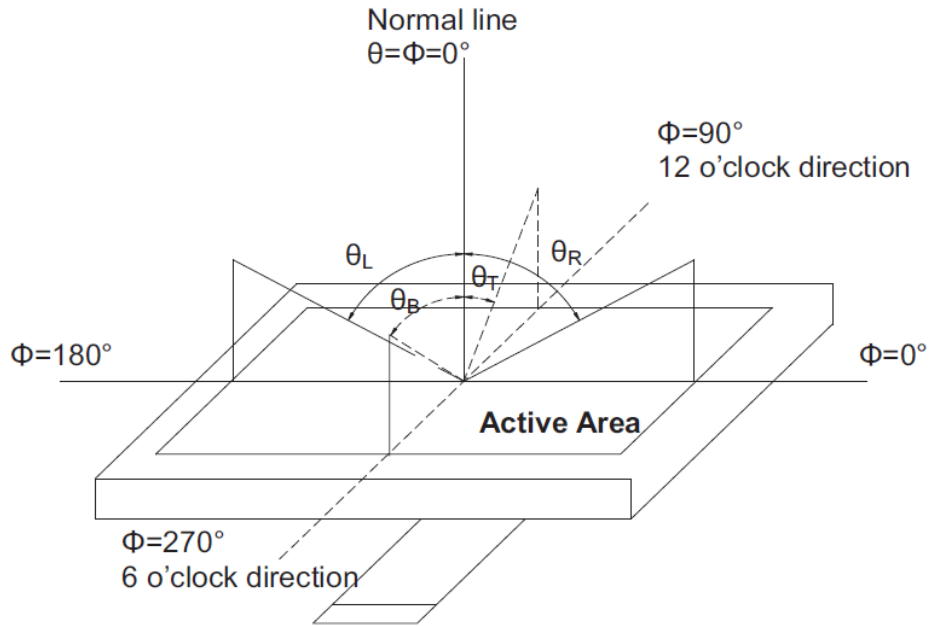
Note 3: Response time is defined as follow:

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).



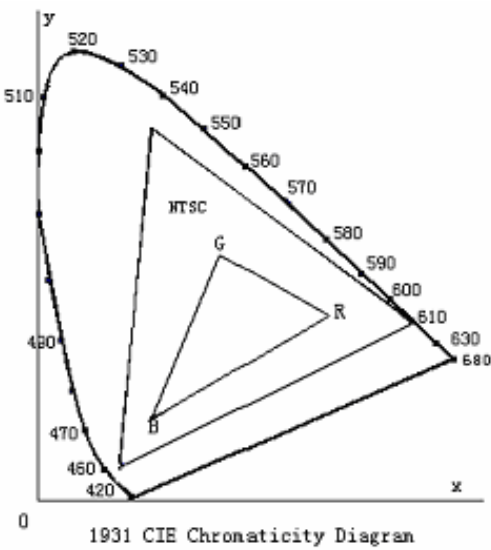
Note 4: Viewing angle range is defined as follow:

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.

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

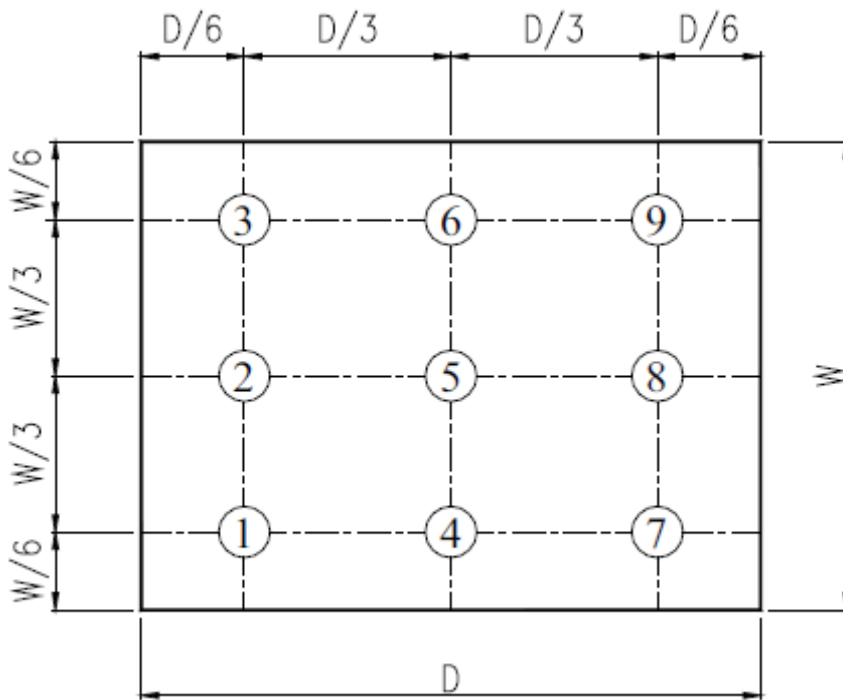


Fig. 2 Definition of uniformity

10. Environmental / Reliability Tests

No	Test Item	Condition	Judgment criteria
1	High Operation Temp	Ts=+85°C, 120hrs	Per table in below
2	Low Operation Temp	Ta=-30°C, 120hrs	Per table in below
3	High Temp Storage	Ta=+85°C, 120hrs	Per table in below
4	Low Temp Storage	Ta=-30°C, 120hrs	Per table in below
5	High Temp & High Humidity Storage	Ta=+40°C, 90% RH 120 hours	Per table in below (polarizer discoloration is excluded)
6	Thermal Shock (Non-operation)	-30°C 30 min~+85°C 30 min, Change time:5min, 10 Cycles	Per table in below
7	ESD (Operation)	C=150pF, R=330Ω 5points/panel Air:±8KV, 5times; Contact:±4KV, 5 times;	Per table in below
8	Vibration (Non-operation)	Frequency range:10~55Hz, Stroke:1.5mm Sweep:10Hz~55Hz~10Hz hours for each direction of X.Y.Z.	2 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

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.

