

DLC Display Co., Limited

德爾西顯示器有限公司



MODEL No:DLC0346ADP06RF-1

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Record of Revision

Date	Revision No.	Summary
2020-06-23	1.0	Rev 1.0 was issued

1. Scope

This data sheet is to introduce the specification of DLC0346ADP06RF-1, active matrix TFT module. It is composed of a color TFT-LCD panel, driver ICs, FPC and a backlight unit. The 3.46" display area contains 340(RGB) x 800 pixels.

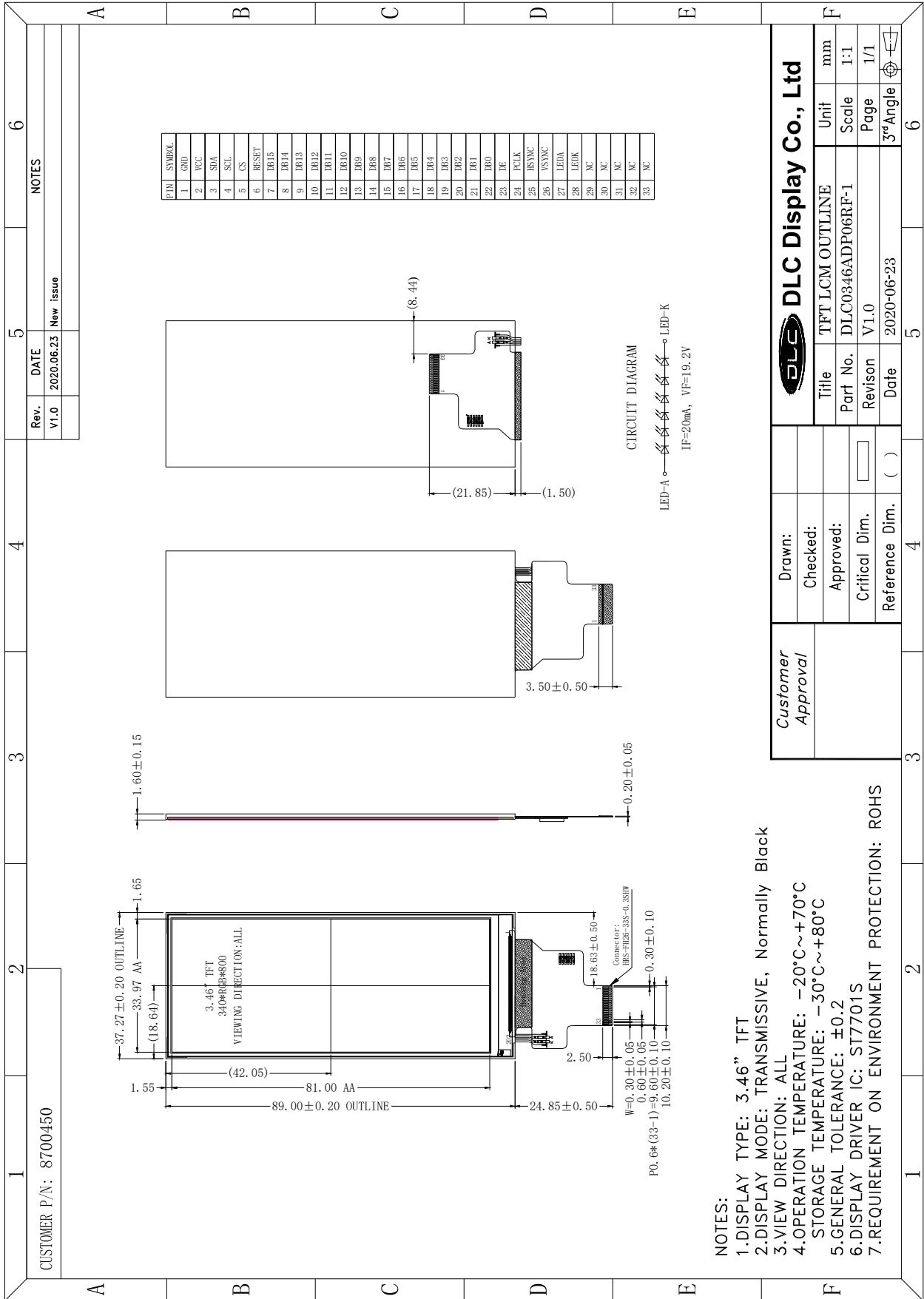
2. Application

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

3. General Information

Item	Contents	Unit
Size	3.46	inch
Resolution	340(RGB) x 800	/
Technology type	IPS	/
Interface	RGB	
Pixel pitch	0.0999 x 0.10125	mm
Pixel Configuration	R.G.B. Vertical Stripe	
Outline Dimension (W x H x D)	37.27 x 89.00 x 1.60	mm
Active Area	33.97 x 81.00	mm
Display Mode	Transmissive, Normally Black	/
Display Driver IC	ST7701S	/
Viewing Direction	ALL	/
Backlight Type	LED	/

4. Outline Drawing



NOTES:

- 1.DISPLAY TYPE: 3.46" TFT
- 2.DISPLAY MODE: TRANSMISSIVE, Normally Black
- 3.VIEW DIRECTION: ALL
- 4.OPERATION TEMPERATURE: -20°C~+70°C
STORAGE TEMPERATURE: -30°C~+80°C
- 5.GENERAL TOLERANCE: ±0.2
- 6.DISPLAY DRIVER IC: ST7701S
- 7.REQUIREMENT ON ENVIRONMENT PROTECTION: ROHS

5. Interface signals

Pin No.	Symbol	Description
1	GND	Ground
2	VCC	Power supply
3	SDA	Serial data input
4	SCL	Serial clock input
5	CS	Chip select signal
6	RESET	Reset signal pin
7	DB15	Data bus
8	DB14	Data bus
9	DB13	Data bus
10	DB12	Data bus
11	DB11	Data bus
12	DB10	Data bus
13	DB9	Data bus
14	DB8	Data bus
15	DB7	Data bus
16	DB6	Data bus
17	DB5	Data bus
18	DB4	Data bus
19	DB3	Data bus
20	DB2	Data bus
21	DB1	Data bus
22	DB0	Data bus
23	DE	Data bus
24	PCLK	Pixel clock
25	HSYNC	Horizontal sync signal
26	VSNC	Vertical sync signal
27	LEDA	Power for LED backlight Anode
28	LEDK	Power for LED backlight Cathode
29~33	NC	No connection

6. Absolute maximum Ratings

6.1. Electrical Absolute max. ratings

Item	Symbol	MIN	MAX	Unit	Remark
Power Supply Voltage	VDD	-0.3	4.6	V	
	IOVDD	-0.3	4.6	V	Note 1
	Vi	-0.3	IOVDD+0.3	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

Item	Symbol	MIN	TYP	MAX	Unit	Remark
Power Supply Voltage	VDD	2.4	2.8	3.3	V	
	VCI	2.4	2.8	3.3	V	
	IOVDD	1.65	1.8/2.8	3.3	V	
Logic low input voltage	VIL	-0.3IOVDD	-	0.3IOVDD	V	
Logic high input voltage	VIH	0.7IOVDD	-	IOVDD	V	
Logic low output voltage	VOL	-	-	0.2IOVDD	V	
Logic high output voltage	VOH	0.8IOVDD	-	-	V	
Current consumption	Normal display	IVDD	-	25	-	mA
	Standby mode	IVDD	-	20	-	uA
Frame frequency	fFR	-	60	-	Hz	

7.2 LED Backlight

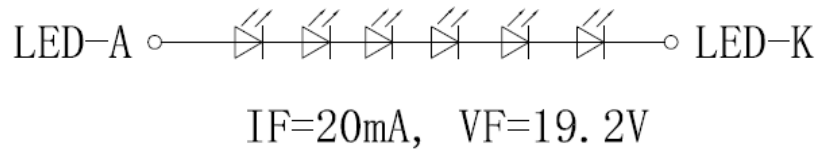
Ta=25°C

Item	Symbol	MIN	TYP	MAX	Unit	Remark
Forward Current	IF	-	20	-	mA	
Forward Current Voltage	VF	-	19.2	-	V	
LED Life time	-	-	30,000	-	Hrs	Note 1

Notes:

- The "LED life time" is defined as the module brightness decrease to 50% original brightness at Ta=25 °C and IL =20mA. The LED lifetime could be decreased if operating IL is larger than 20mA.
- LED Backlight Circuit Diagram as follow:

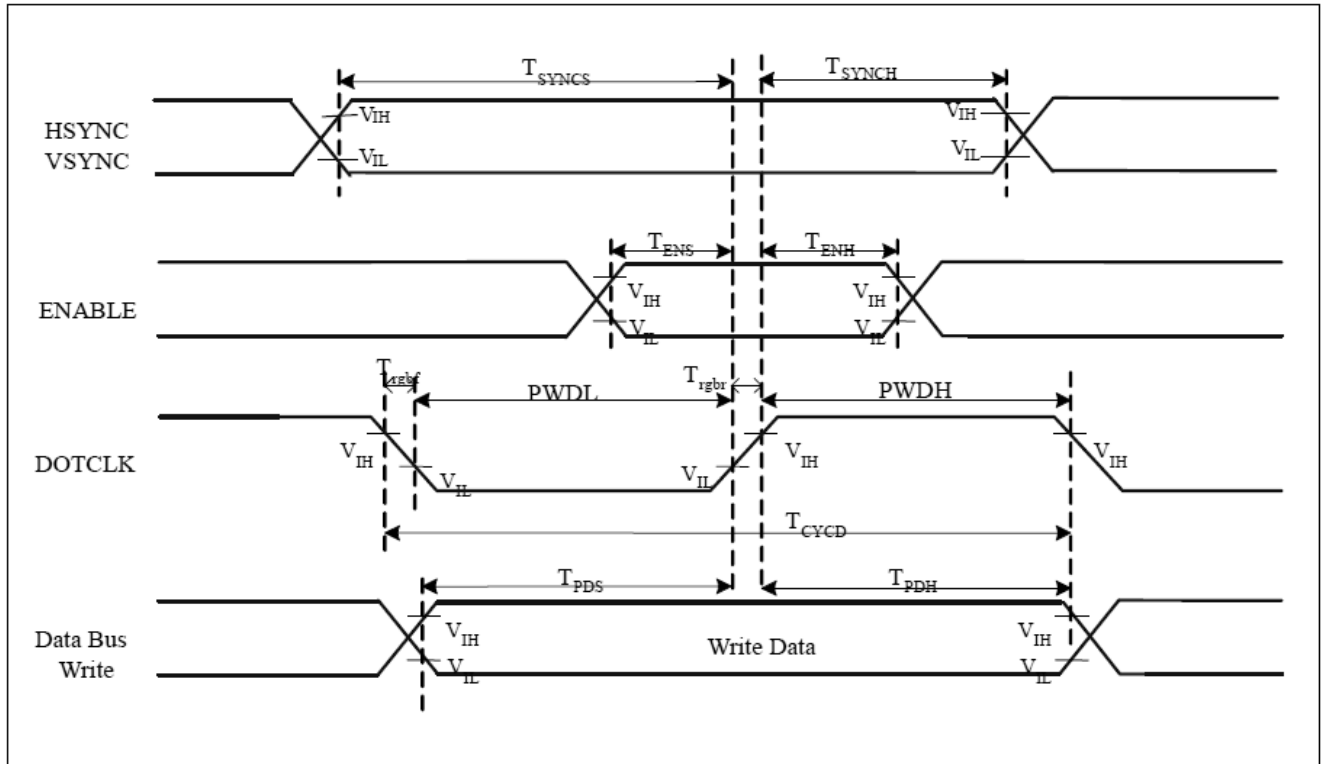
CIRCUIT DIAGRAM


 8. Command/AC Timing

8.1 RGB Interface Characteristics

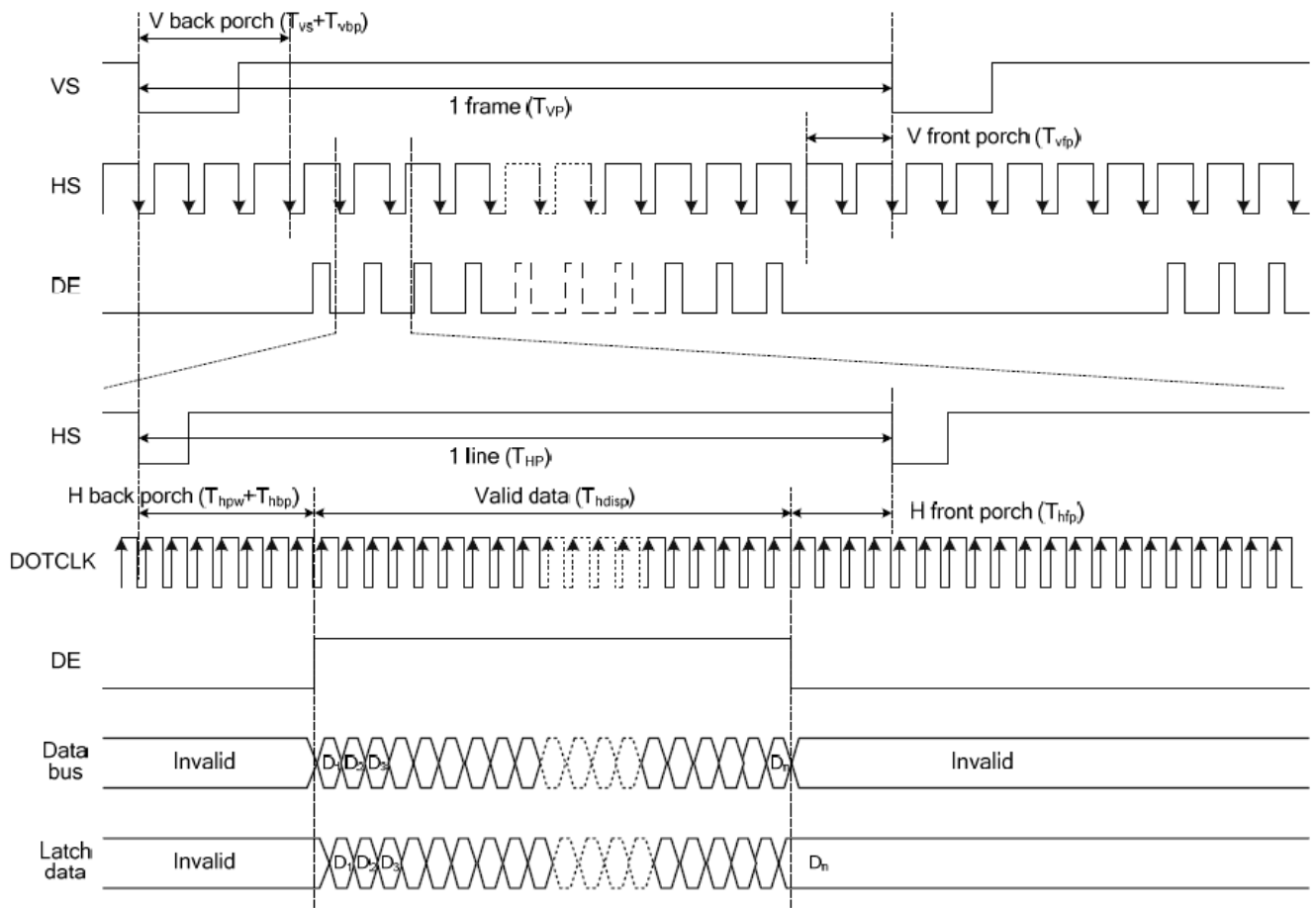
VDDI=1.8V, VDD-2.8V, AGND=DGND=0V, Ta=25°C

Signal	Symbol	Parameter	MIN	MAX	Unit
HSYNC, VSYNC	TSYNCS	VSYNC, HSYNC setup time	5	-	ns
ENABLE	TENS	Enable setup time	5	-	ns
	TENH	Enable hold time	5	-	ns
DOTCLK	PWDH	DOTCLK high-level pulse width	15	-	ns
	PWDL	DOTCLK low-level pulse width	15	-	ns
	TCYCD	DOTCLK cycle time	33	-	ns
	Trghr, Trghf	DOTCLK rise/fall time	-	15	ns
DB	TPDS	PD data setup time	5	-	ns
	TPDH	PD data hold time	5	-	ns



8.2 RGB Interface Timing

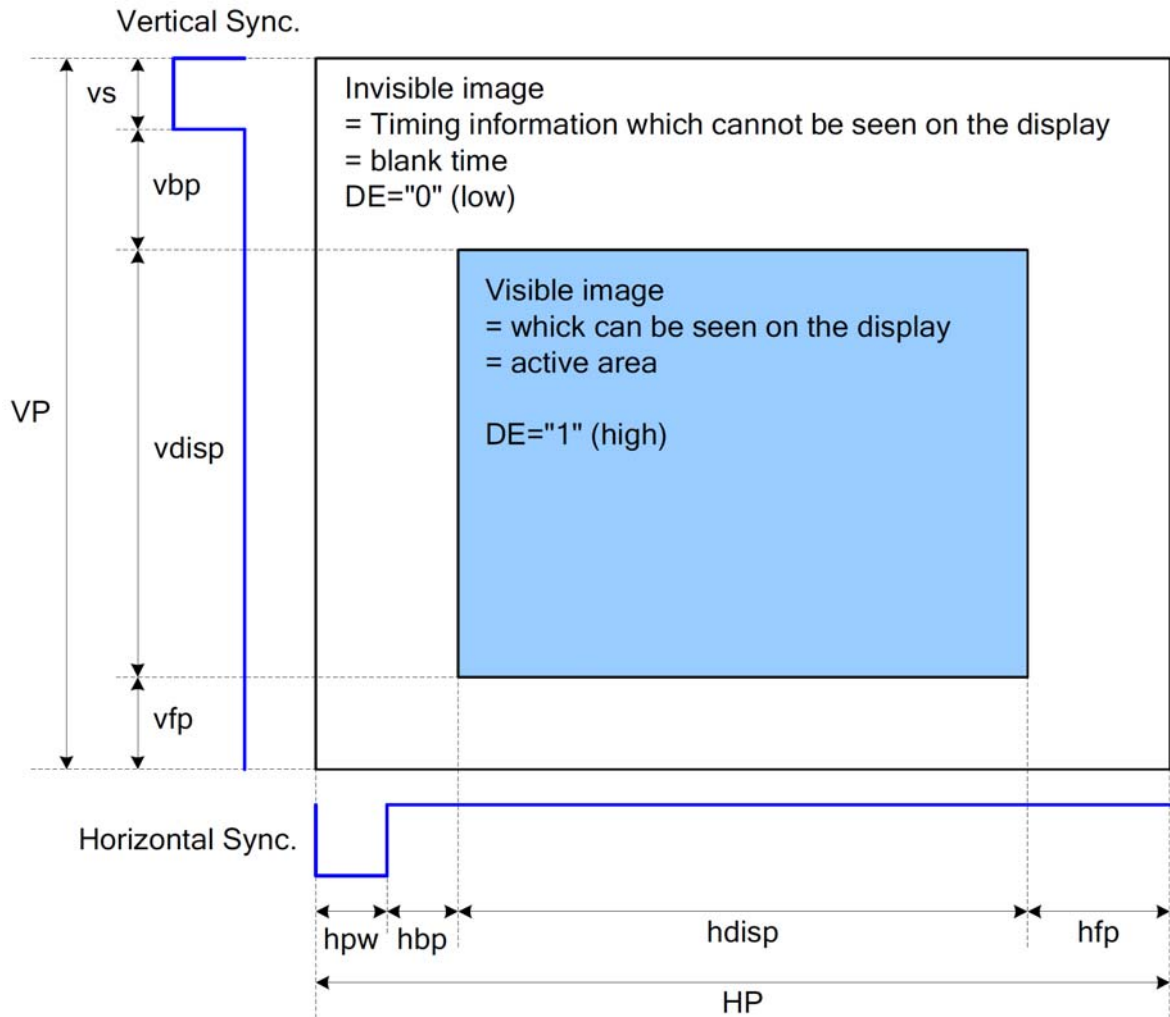
The timing chart of RGB interface DE mode is shown as follow.



Note: The setting of front porch and back porch in host must match that in IC as this mode.

8.3 RGB Interface Definition

The display operation via the RGB interface is synchronized with the VSYNC, HSYNC, and DOTCLK signals. The data can be written only within the specified area with low power consumption by using window address function. The back porch and front porch are used to set the RGB interface timing.



Please refer to the following table for the setting limitation of RGB interface signals.

Parameter	Symbol	MIN	TYP	MAX	Unit
Horizontal Sync width	hbw	1	8	255	Clock
Horizontal Sync back porch	hbp	1	60	255	Clock
Horizontal Sync front porch	hfp	1	60	--	Clock
Vertical Sync width	vs	1	4	254	Line
Vertical Sync back porch	vbp	1	20	254	Line
Vertical Sync front porch	vfp	2	20	--	Line

Note: Typical value are related to the setting frame rate is 60Hz..

9. Optical Specification

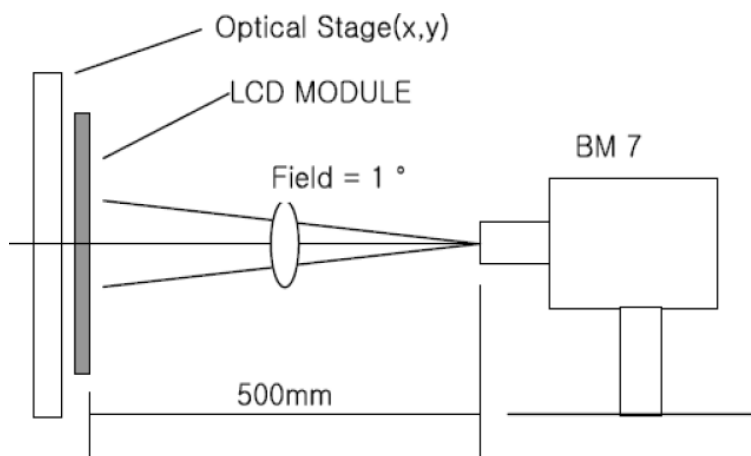
Ta=25°C

Item	Symbol	Condition	Min	Typ.	Max.	Unit	Remark
Contrast Ratio	CR	$\theta=0^\circ$	-	600	-		Note1 Note2
Response Time	Tr	25°C	-	10	20	ms	Note1 Note3
	Tf		-	20	30		
View Angles	ΘT	$CR \geq 10$	-	80	-	Degree	Note 4
	ΘB		-	80	-		
	ΘL		-	80	-		
	ΘR		-	80	-		
Chromaticity	Red	x	Brightness is on	Typ-0.05	0.644	Typ+0.05	Note5, Note1
		y			0.320		
	Green	x			0.300		
		y			0.570		
	Blue	x			0.134		
		y			0.127		
	White	x			0.297		
		y			0.332		
Luminance	L		300	330	-	cd/m ²	Note1 Note6
Uniformity	U		75	-	-	%	Note1 Note7

Note 1: Definition of optical measurement system.

Temperature = 25°C(±3°C)

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

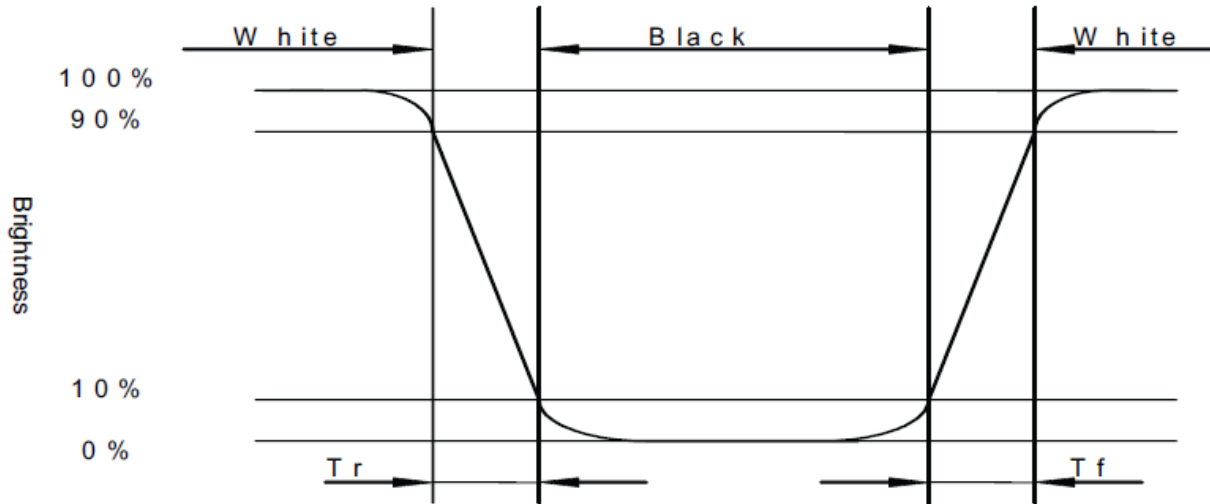


Note 2: Contrast ratio is defined as follow:

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

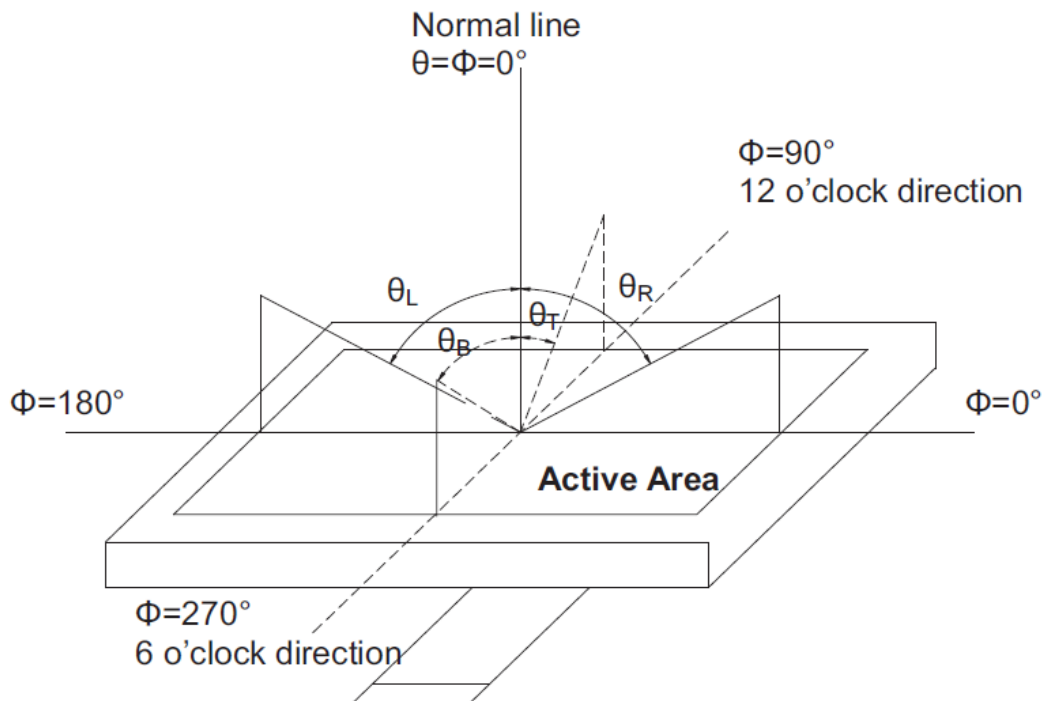
Note 3: Response time is defined as follow:

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).



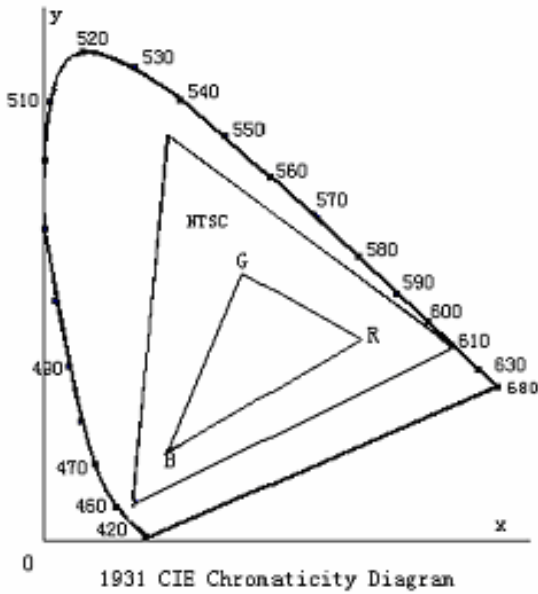
Note 4: Viewing angle range is defined as follow:

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.

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

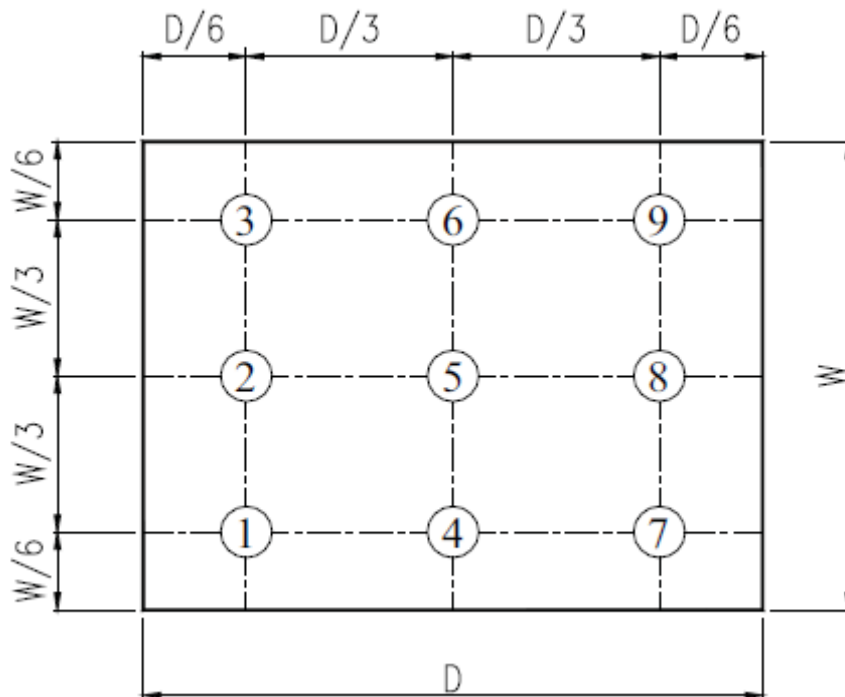


Fig. 2 Definition of uniformity

10. Environmental / Reliability Tests

No	Test Item	Condition	Judgment criteria
1	High Temp Operation	Ta= +70°C, 120hrs	Per table in below
2	Low Temp Operation	Ta= -20°C, 120hrs	Per table in below
3	High Temp Storage	Ta= +80°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, 120hours	Per table in below (polarizer discoloration is excluded)
6	Thermal Shock (Non-operation)	-30°C 30 min~+70°C 30 min, Change time:5min, 10 Cycles	Per table in below
7	ESD (Operation)	150pF, 330Ω, ±2KV, Contact 150pF, 330Ω, ±6KV, Air	Per table in below
8	Vibration (Non-operation)	Frequency: 10Hz to 55Hz to 10Hz, Swing: 1.5mm, time: X, Y, Z each 2H.	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

- A. 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.
- B. In order to make the display assembly stable and firm, DLC recommends to design some supporting at the display backside, especially for the display with tape-attached touch panel, such supporting is important and essential, or else, the display may drop-off from front after some period of time.
- C. Do not display the fixed pattern for a long time because it may develop image sticking due to the LCD structure. If the screen is displayed with fixed pattern, use a screen saver.

