

DLC Display Co., Limited

德爾西顯示器有限公司



MODEL No: DLC0122AZG-1

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Record of Revision

Date	Revision No.	Summary
2015-11-09	1.0	Rev 1.0 was issued
2016-03-20	1.1	Update the backlight and FPC

1. Scope

This data sheet is to introduce the specification of DLC0122AZG-1 active matrix TFT module. It is composed of a color TFT-LCD panel, driver ICs, FPC and a backlight unit. The 1.22'' display area contains 240(RGB) x 204 pixels.

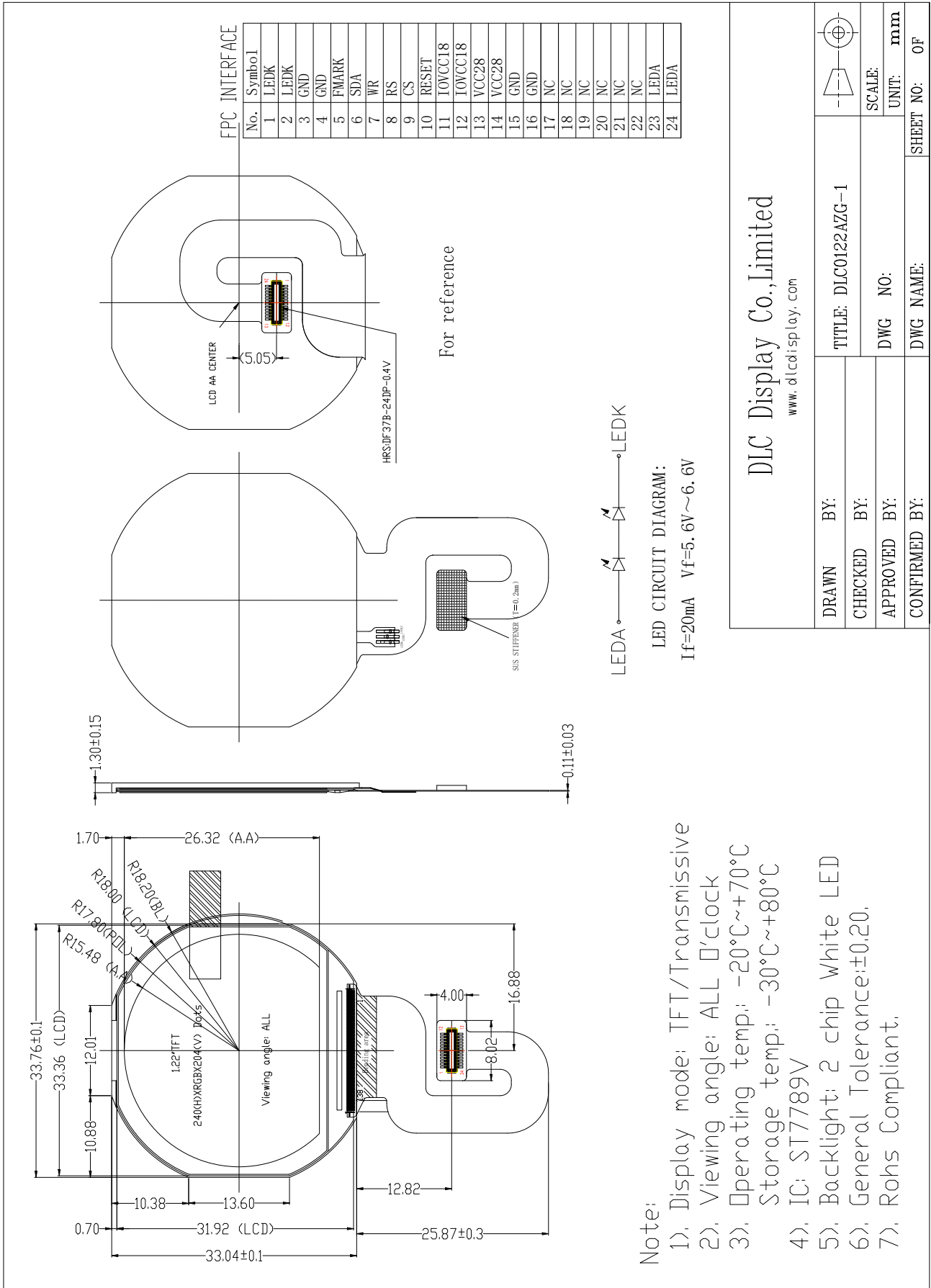
2. Application

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

3. General Information

Item	Contents	Unit
Size	1.22	inch
Resolution	240(RGB) x 204	/
Interface	SPI 3Line2Lane	/
Technology type	IPS	/
Pixel Configuration	R.G.B. Vertical Stripe	
Outline Dimension (W x H x D)	33.76x33.04x1.30	mm
Active Area	30.96X26.32	mm
Display Mode	Transmissive	/
Backlight Type	LED	/
Driver IC	ST7789V	/
Weight	TBD	g

4. Outline Drawing



5. Interface signals

Pin No	Symbol	Function
1-2	LEDK	Power supply Cathode input for backlight
3-4	GND	POWER GROUND.
5	FMARK(NC)	Frame head pulse signal
6	SDA	Serial Data input/output pin1.
7	WR	Serial Data input pin2
8	RS	Clock signal
9	CS	Chip selection pin
10	RESET	Reset signal pin
11-12	IOVCC18	Power supply to the internal logic
13-14	VCC28	Power supply to the internal Analog
15-16	GND	POWER GROUND.
17-22	NC	No Connect
23-24	LEDA	Power supply Anode input for backlight

The connector number: HRS:DF37B-24DP-0.4V

6. Absolute maximum Ratings

6.1. Electrical Absolute max. ratings

Parameter	Symbol	MIN	MAX	Unit	Remark
Power Supply Voltage	VCC	-0.3	4.6	V	
	IOVCC	-0.3	4.6	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

Parameter	Symbol	Min	Typ	Max	Unit	Note
Supply voltage for Analog	VCC	2.4	2.75	3.3	V	
I/O power supply	IOVCC	1.65	1.8	3.3	V	
Input Current	I _{DD}	-	TBD	TBD	mA	
Input voltage	'H'	V _{IH}	0.7IOVCC	IOVCC	V	
	'L'	V _{IL}	GND	0.3IOVCC	V	
Output voltage	'H'	V _{OH}	0.8IOVCC	0.2IOVCC	V	
	'L'	V _{OL}	GND	0.2IOVCC	V	

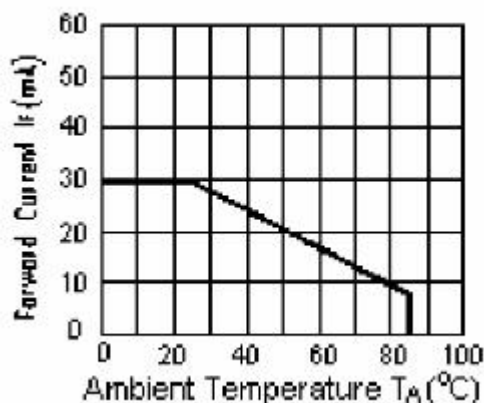
7.2 LED Backlight

Ta=25°C

Item	Symbol	MIN	TYP	MAX	Unit	Remark
Forward Current	I _F	-	20	-	mA	
Forward Voltage	V _F	5.6	6.0	6.6	V	
LED life time	--	-	25,000	--	Hr	Note

Note:

- 1: V_{LED}=V_{LED}(+)-V_{LED}(-).
- 2:The current of LED is 40mA. A LED drive in constant current mode is recommended.
- 3: The "LED life time" is defined as the module brightness decrease to 50% original brightness at Ta=25°C and I_L =20mA. The LED lifetime could be decreased if operating I_L is larger than 20mA.

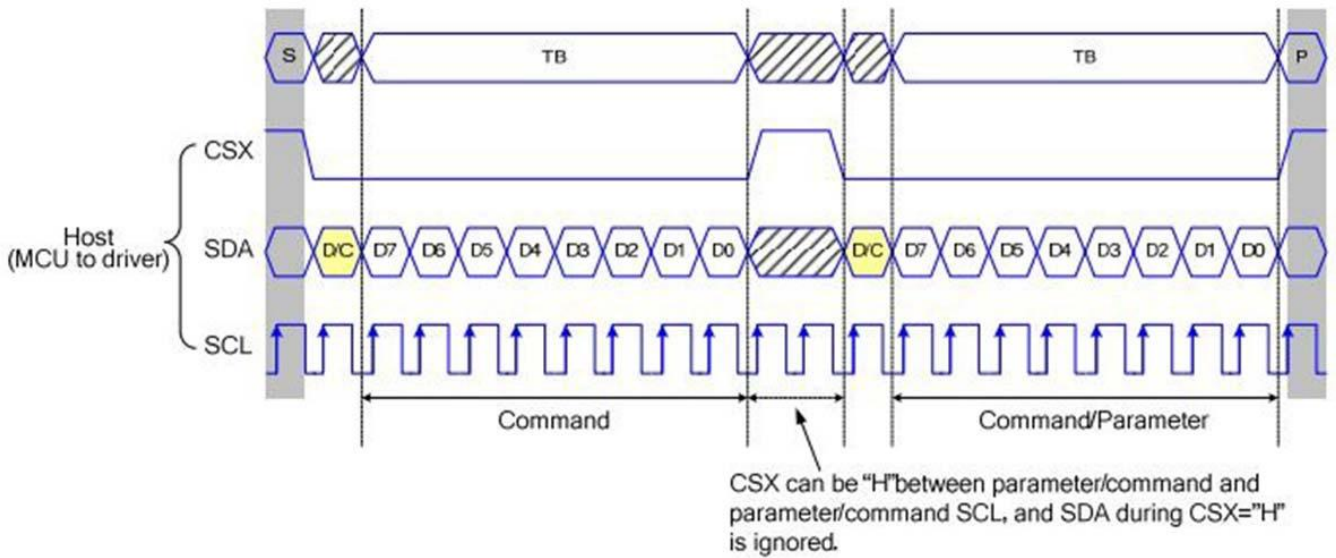


CIRCUIT DIAGRAM(I_{LED} VS TEMP)

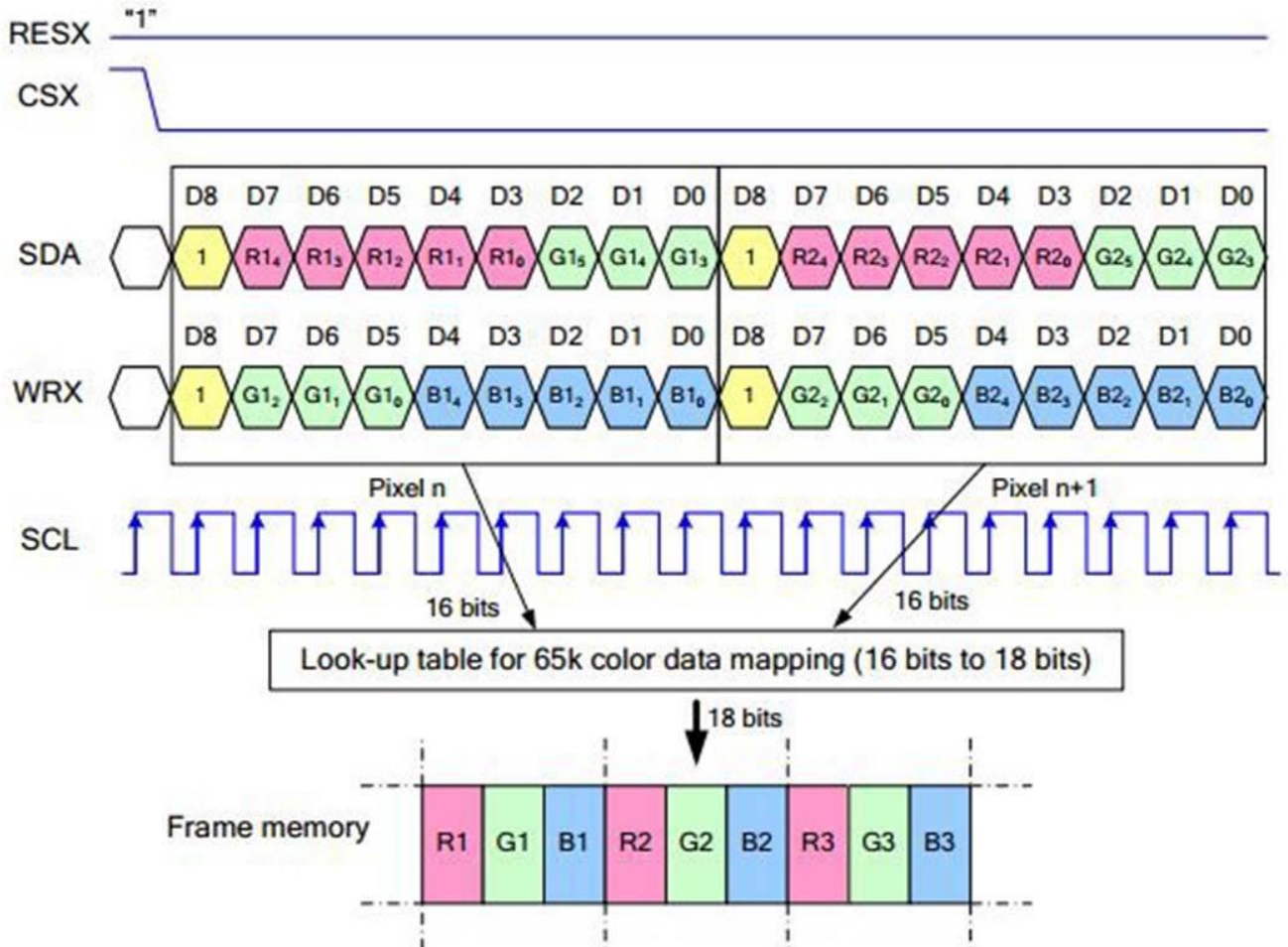
8. Command/AC Timing

8.1 AC Electrical Characteristics

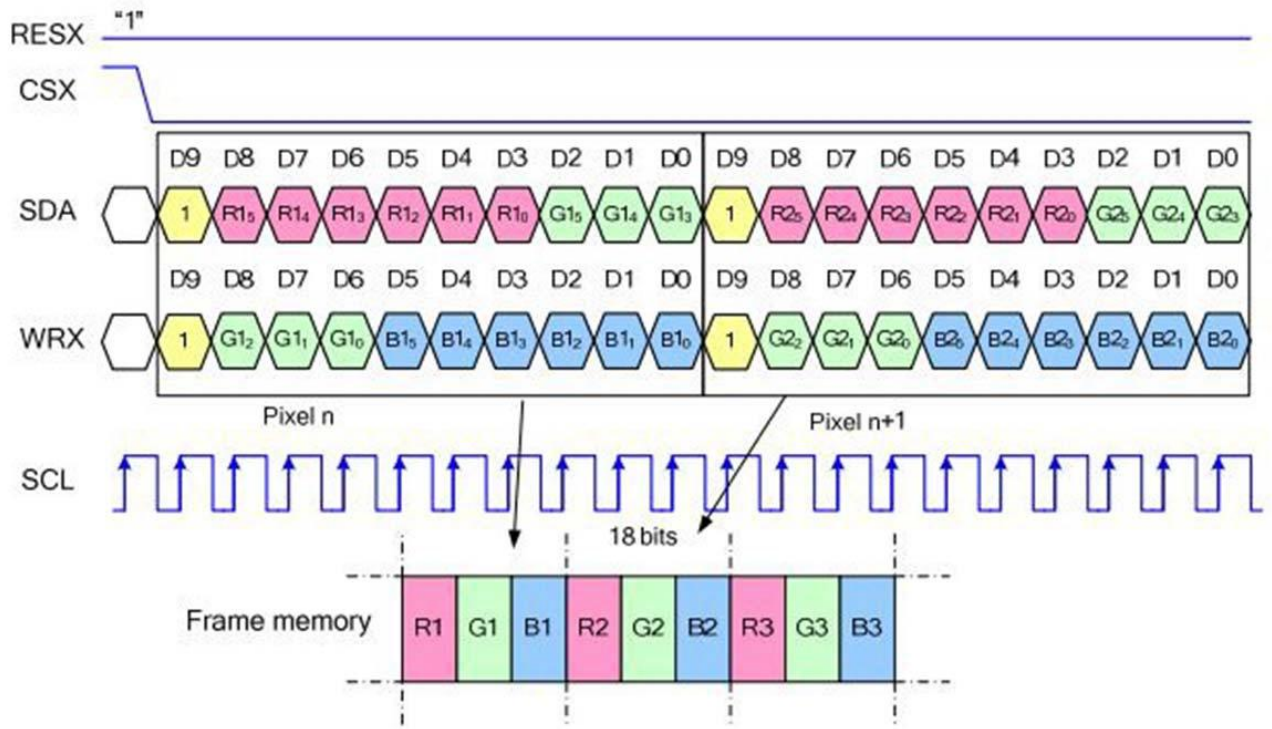
Command write mode:



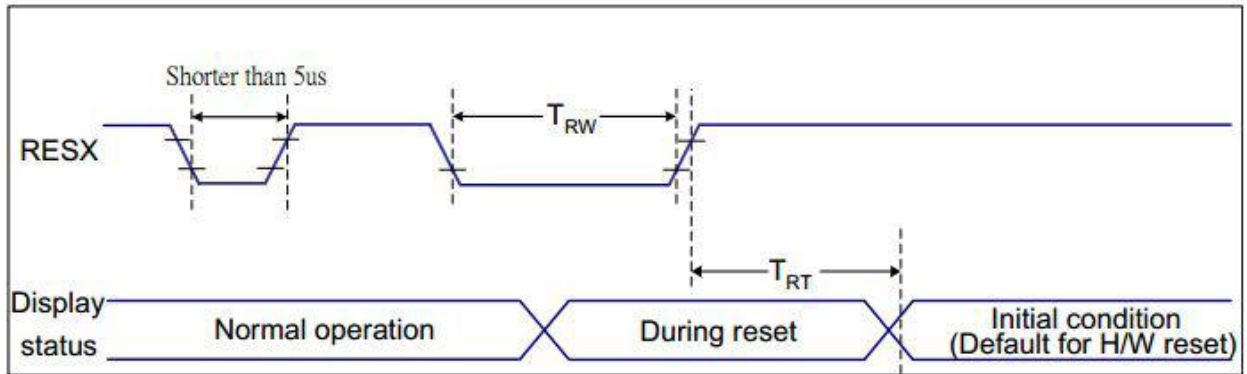
Write data for 16-bit/pixel(RGB 565 bit input), 65K Colors, 3AH=' 05h'



Write data for 18-bit/pixel(RGB 666 bit input), 262K Colors, 3AH=' 06h'



8.2 Reset timing



Related Pins	Symbol	Parameter	MIN	MAX	Unit
RESX	TRW	Reset pulse duration	10	-	us
	TRT	Reset cancel	-	5 (Note 1,2)	ms
			-	120(Note 1,3,4)	ms

Note:

1. The reset cancel includes also required time for loading ID bytes, VCOM setting and other settings from NVM (or similar device) to registers. This loading is done every time when there is HW reset cancel time (t_{RT}) within 5 ms after a rising edge of RESX.
2. When Reset applied during Sleep In Mode.
3. When Reset applied during Sleep Out Mode.
4. It is necessary to wait 5msec after releasing RESX before sending commands. Also Sleep Out command cannot be sent for 120ms.

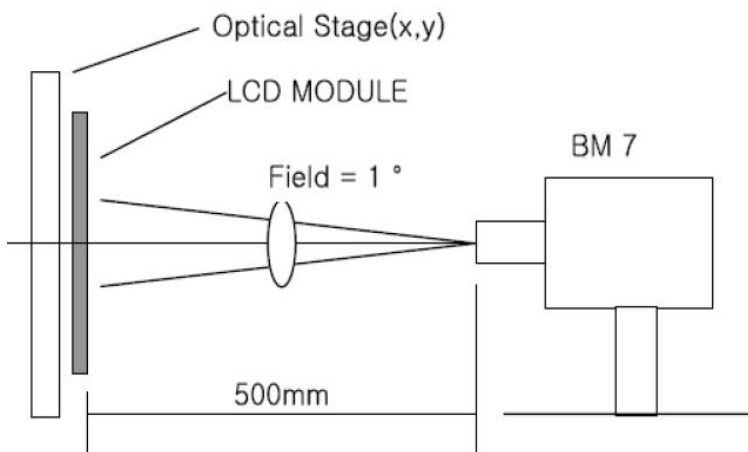
9. Optical Specification

Ta=25°C

Item	Symbol	Condition	Min	Typ.	Max.	Unit	Remark
Contrast Ratio	CR	$\theta=0^\circ$	-	1000	-		Note1 Note2
Response Time	Tr+Tf	25°C	-	30	35	ms	Note1 Note3
View Angles	θT	$CR \geq 10$	-	80	-	Degree	Note 4
	θB		-	80	-		
	θL		-	80	-		
	θR		-	80	-		
Chromaticity	White	x	-	TBD	-	Note5, Note1	
		y	-	TBD	-		
	Red	x	-	TBD	-		
		y	-	TBD	-		
	Green	x	-	TBD	-		
		y	-	TBD	-		
	Blue	x	-	TBD	-		
		y	-	TBD	-		
NTSC		S	-	50	--	%	Note5
Luminance	L		350	450	--	cd/m ²	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

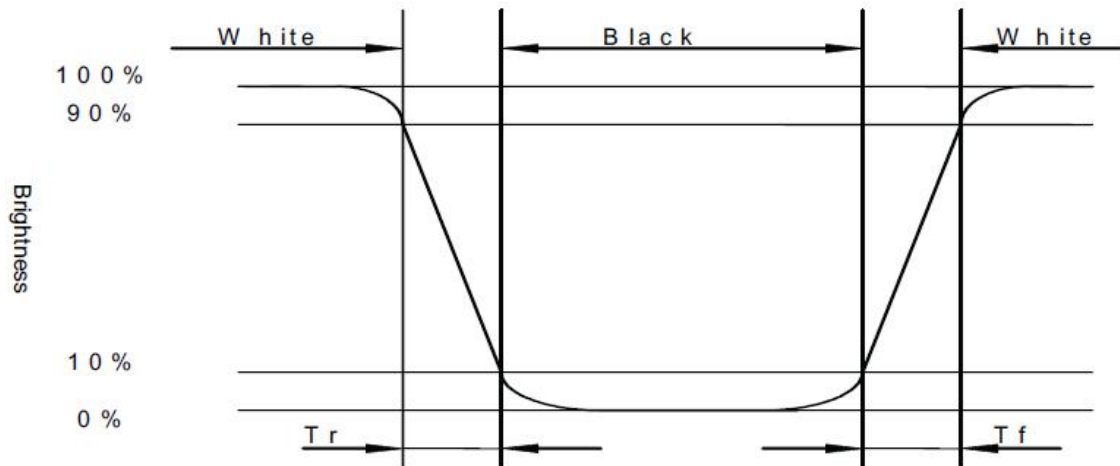


Note 2: Contrast ratio is defined as follow:

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

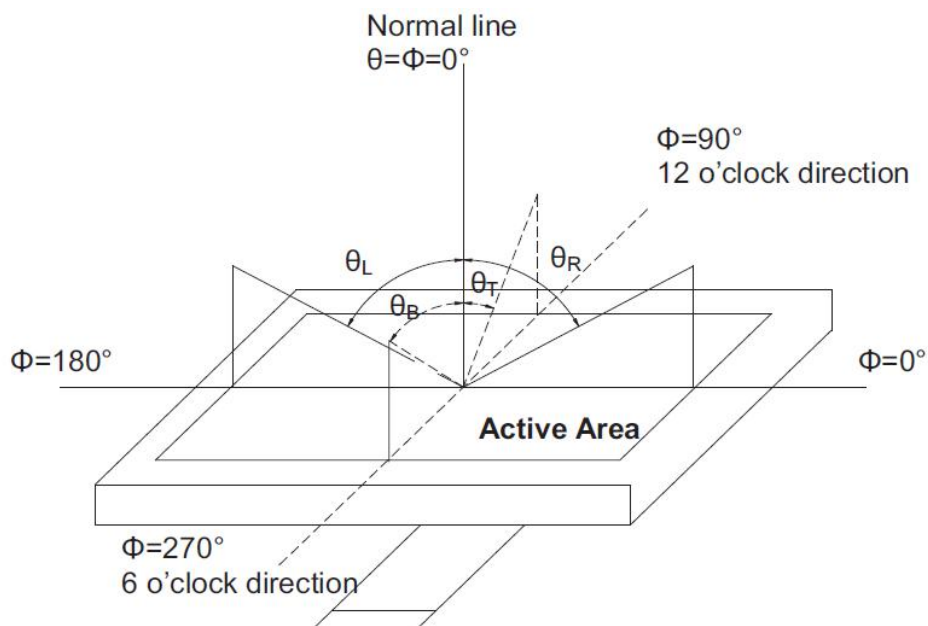
Note 3: Response time is defined as follow:

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).



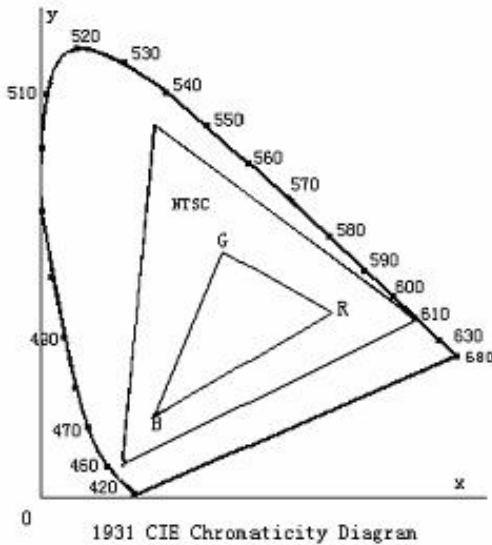
Note 4: Viewing angle range is defined as follow:

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.

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

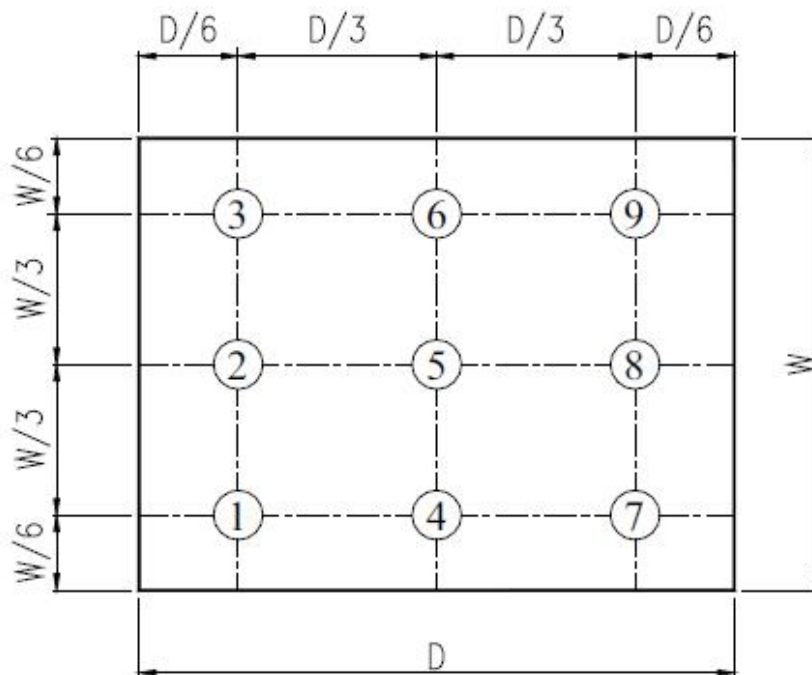


Fig. 2 Definition of uniformity

10. Environmental / Reliability Tests

No	Test Item	Condition	Judgment criteria
1	High Temp Operation	Ts=+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 120 hours	Per table in below (polarizer discoloration is excluded)
6	Thermal Shock (Non-operation)	-20°C 30 min~+70°C 30 min, Change time:5min, 5 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:10HZ-55Hz , Amplitude:1.5mm , x,y,z every direction for 1 hour (Packing condition)	Per table in below
9	Shock (Non-operation)	Half- sine wave,300m/s ² ,11ms	Per table in below
10	Package Drop Test	Height:100 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

10.1 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.

10.2 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.

10.3 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.

10.4 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.

10.5 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.

10.6 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.

