Microtips TECHNOLOGY

Model No: MTD0430LDR

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Record of Revision

Date	Revision No.	Summary
2016-08-08	1.0	Rev 1.0 was issued

1. Scope

This data sheet is to introduce the specification of **MTD0430LDR** active matrix TFT module. It is composed of a color TFT-LCD panel, driver IC, FPC and a backlight unit. The 4.3" display area contains 480 (RGB) x 272 pixels.

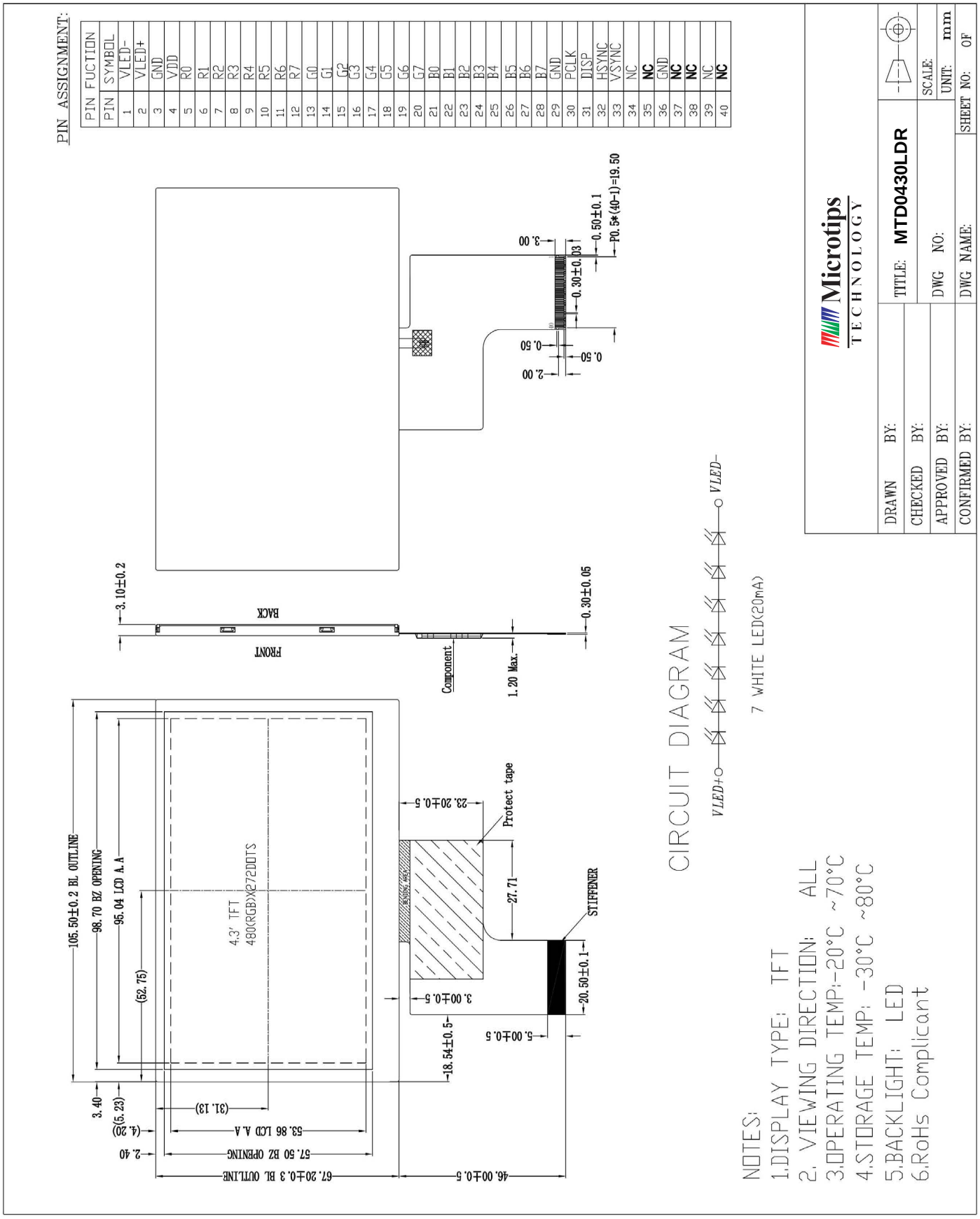
2. Application

Digital equipments which need color display, such as P.O.S, medical equipments and industrial equipments.

3. General Information

Item	Contents	Unit
Size	4.3	inch
Resolution	480 (RGB) x 272	/
Interface	RGB-24bit	/
Technology type	MVA	/
Dot pitch	0.066x0.198	mm
Pixel Configuration	R.G.B. Vertical Stripe	
Outline Dimension (W x H x D)	105.5 x 67.2 x 3.1	mm
Active Area	95.04 x 53.856	mm
Display Mode	Transmissive, Normally Black	/
Surface Treatment	Glare	
Backlight Type	LED	/
Weight	54	g

4. Outline Drawing



5. Interface signals

No.	Symbol	Description
1	VLED-	LED Power Source input terminal (Cathode side)
2	VLED+	LED Power Source input terminal (Anode side)
3	GND	System Ground
4	VDD	Power supply : +3.3V
5~12	R0~R7	Data bus
13~20	G0~G7	Data bus
21~28	B0~B7	Data bus
29	GND	System Ground
30	PCLK	Clock Signal; Latching data at the falling edge
31	DISP	Display on/off control
32	HSYNC(HS)	Horizontal synchronous signal
33	VSYNC(VS)	Vertical synchronous signal
34	NC	No Connection
35	NC	No Connection
36	GND	System Ground
37	NC	No Connection
38	NC	No Connection
39	NC	No Connection
40	NC	No Connection

Recommend FPC match connector: Molex 054104-4031 or equivalent

6. Absolute maximum Ratings

6.1. Electrical Absolute max. ratings

Parameter	Symbol	MIN	MAX	Unit	Remark
Supply Voltage	VDD	-0.3	4.5	V	

6.2. Environment Conditions

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

6.3. LED Backlight Absolute max. ratings

Item	Symbol	MIN	MAX	Unit	Remark
LED Forward Current	ILED	--	25	mA	One LED

7. Electrical Specifications

7.1 Electrical characteristics

GND=0V, Ta=25℃

Item	Symbol	MIN	TYP	MAX	Unit	Remark
Power Supply Voltage	VDD	3.0	3.3	3.6	V	Note1
Power Supply Current	IDD	-	12	-	mA	VDD=3.3V
Ripple Voltage	VRFVDD	-	-	100	mVp-p	
	VRFVDD	-	-	100	mVp-p	
"H" level logical input voltage	VIH	0.7*VDD	-	VDD	V	
"L" level logical input voltage	VIL	0	-	0.3*VDD	V	

Note1 : VDD Absolute Maximum Rating -0.3V ~+4.5V

7.2 LED Backlight

Ta=25℃

Item	Symbol	MIN	TYP	MAX	Unit	Remark
Forward Current	IBL	-	20	-	mA	Note 1
Forward Voltage	VBL	21.0	23.1	26.6	V	
LED lifetime	-	-	20K	-	Hrs	Note 2

Note 1: Each LED: IF =20 mA, VF =3.2V.

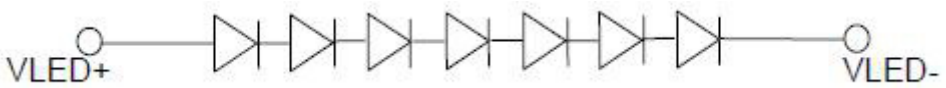
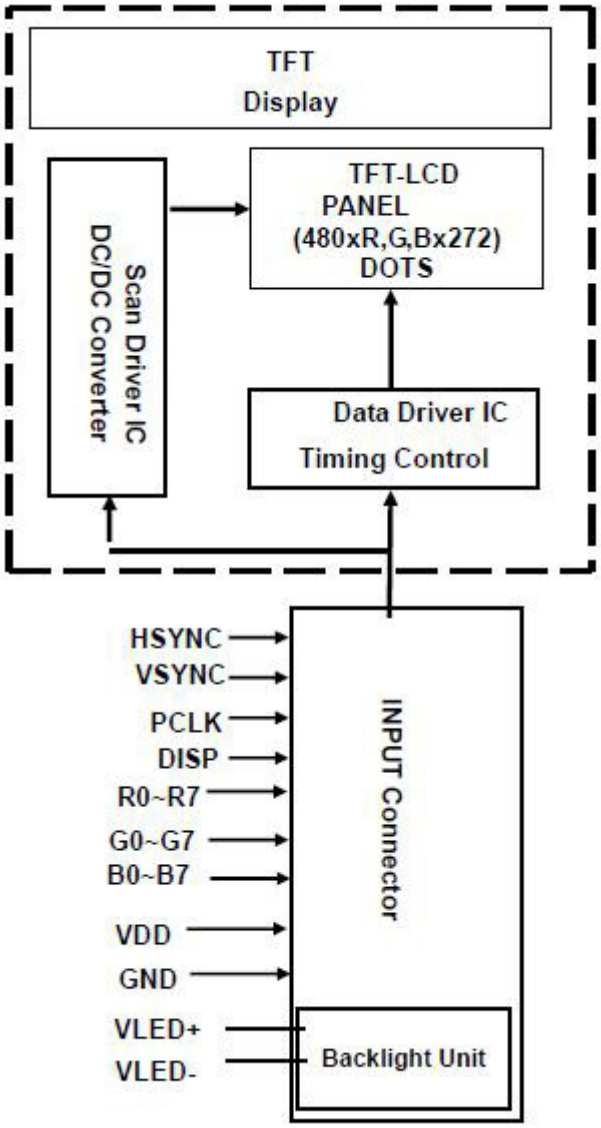


Figure: LED connection of backlight

Note2 : The “LED lifetime” is defined as the module brightness decrease to 50% of original brightness at Ta=25℃ and IBL=20mA. The LED lifetime will be decreased if operating IBL is larger than 20mA.

7.3 Schematic of LCD module system



8. Command/AC Timing

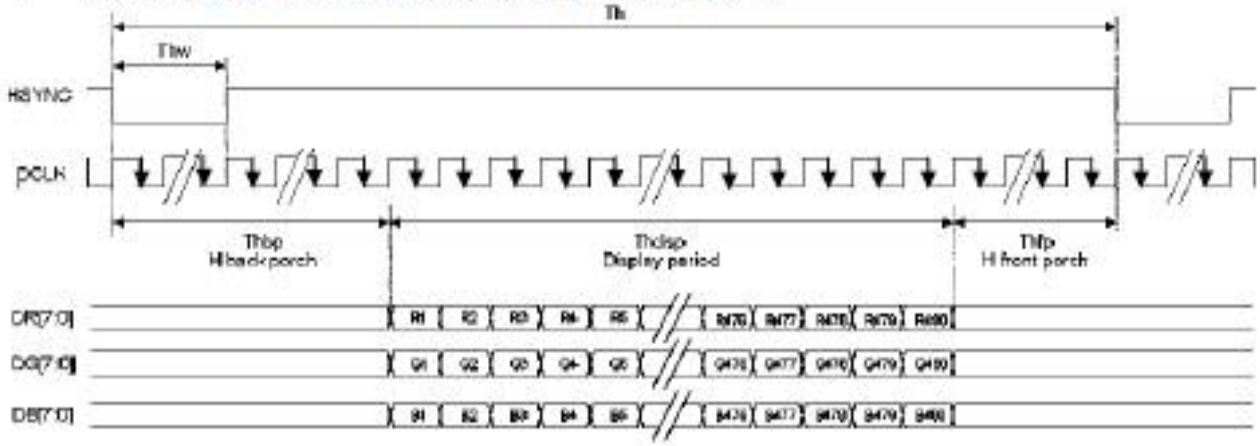
8.1 Input signal Timing characteristics

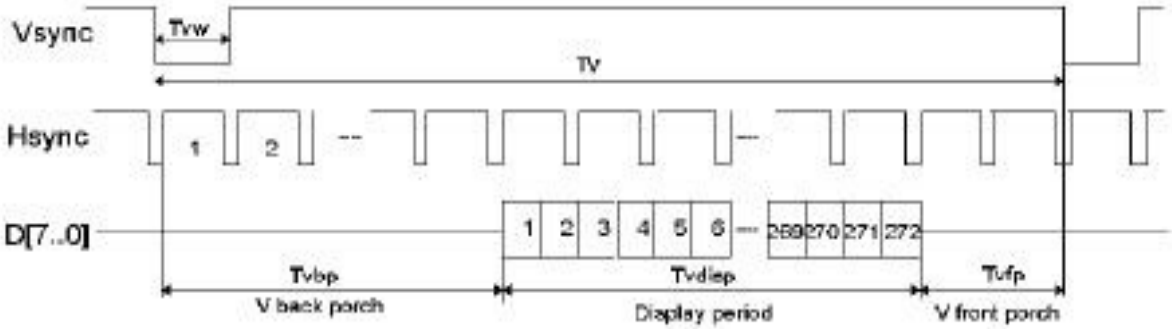
(T_A =25°C, VDD=2.25V~3.6V, GND= 0V)

Parameter	Symbol	MIN.	TYP.	MAX.	Unit	Remarks
Clock cycle	fCLK	5	9	12	MHz	
Hsync cycle	1/th	-	16.95	-	KHZ	
Vsync cycle	1/tv	-	58.85	-	HZ	
Horizontal Signal						
Horizontal cycle	Th	490	531	605	CLK	
Horizontal display period	Thdisp	-	480	-	CLK	
Horizontal front porch	Thfp	2	8	-	CLK	
Horizontal pulse width	Thw	1	-	-	CLK	
Horizontal back porch	Thbp	8	43	-	CLK	
Vertical Signal						
Vertical cycle	Tv	275	288	335	H(1)	
Vertical display period	Tvdisp	-	272	-	H(1)	
Vertical front porch	Tvfp	1	4	-	H(1)	
Vertical pulse width	Tvw	1	10	-	H(1)	
Vertical back porch	Tvbp	2	12	-	H(1)	

Note:

- ✧ In case of using the slow frequency, the deterioration of display flicker etc may occur.
- ✧ The timing characteristics are basically fixed as above.





8.2 Clock and Data Input Assignment

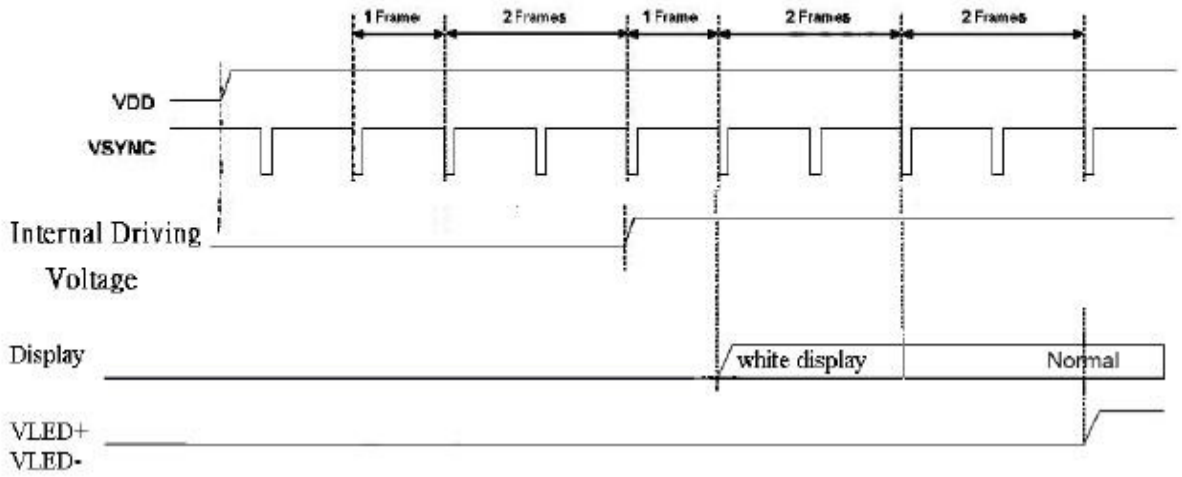
COLOR	INPUT DATA	R DATA								G DATA								B DATA							
		R7	R6	R5	R4	R3	R2	R1	R0	R7	R6	R5	R4	R3	R2	R1	R0	R7	R6	R5	R4	R3	R2	R1	R0
		MSB							LSB	MSB							LSB	MSB							LSB
BASIC COLOR	BLACK	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	RED(255)	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	GREEN(255)	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
	BLUE(255)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
	CYAN	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	MAGENTA	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
	YELLOW	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
	WHITE	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
RED	RED(0)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	RED(1)	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	RED(2)	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	RED(254)	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	RED(255)	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GREEN	GREEN(0)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	GREEN(1)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
	GREEN(2)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
	GREEN(254)	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0
	GREEN(255)	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
BLUE	BLUE (0)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	BLUE (1)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	BLUE (2)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
	BLUE (254)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0
	BLUE (255)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1

[NOTE] :

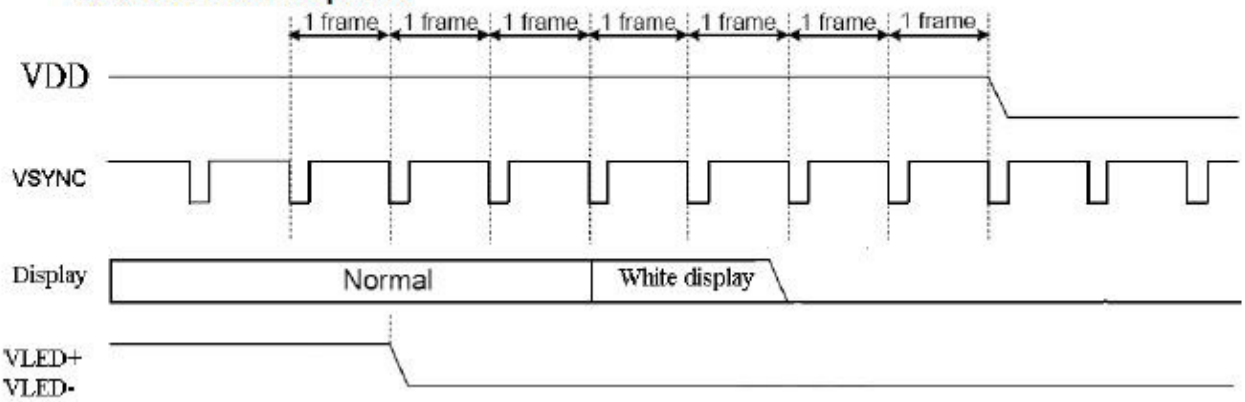
1) Definition of Gray level : Color(n) : n to show the Gray level，n is the more high and the light more bright.
2) Data:1-High, 0-Low.

8.3 Sequences of supply voltage and signals

8.3.1 Power on Sequence



8.3.2 Power off Sequence



9. Optical Specification

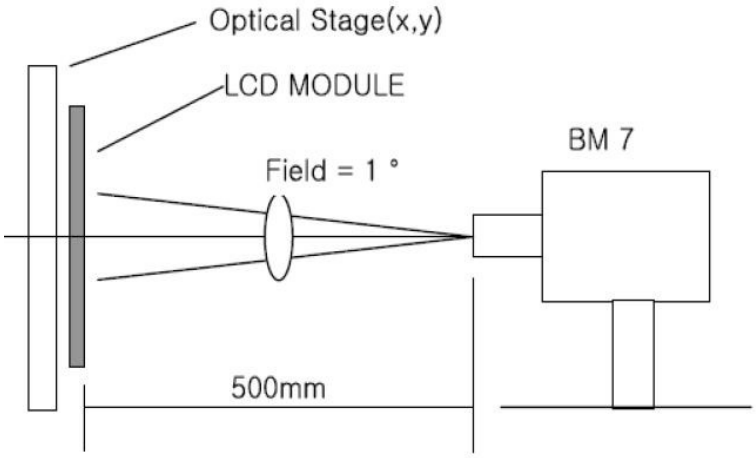
Ta=25℃

Item		Symbol	Condition	Min	Typ.	Max.	Unit	Remark
Contrast Ratio		CR	θ=0°	300	500	-		Note1 Note2
Response Time		Ton/ Toff	25℃	-	25	--	ms	Note1 Note3
View Angles		ΘT	CR≧10	70	80	-	Degree	Note 4
		ΘB		70	80	-		
		ΘL		70	80	-		
		ΘR		70	80	-		
Chromaticity	White	x	Brightness is on	0.27	0.32	0.37		Note5, Note1
		y		0.28	0.33	0.38		
NTSC		S			50		%	Note5
Luminance		L		320	400	-	cd/m^2	Note1 Note6
Uniformity		U		70	--	-	%	Note1 Note7

Note 1: Definition of optical measurement system.

Temperature = 25℃(±3℃)

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

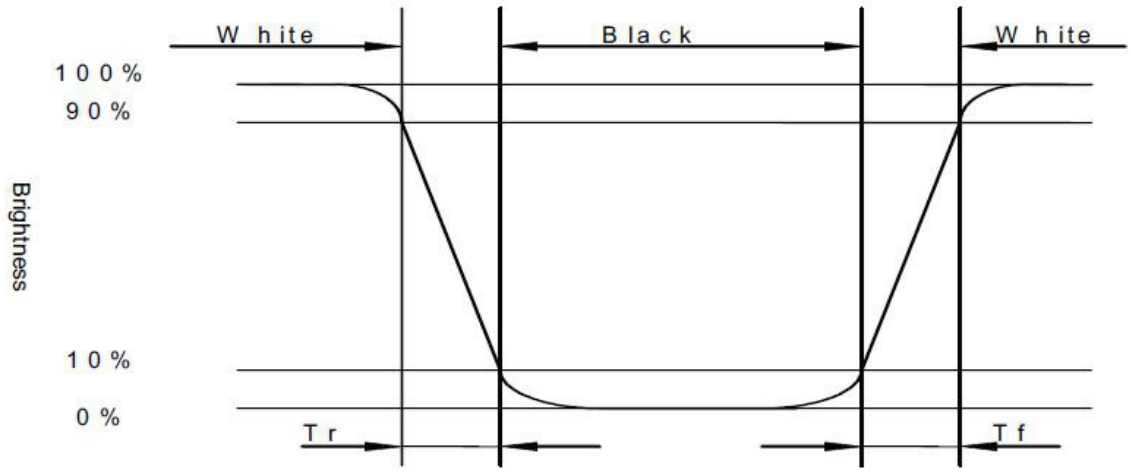


Note 2: Contrast ratio is defined as follow:

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

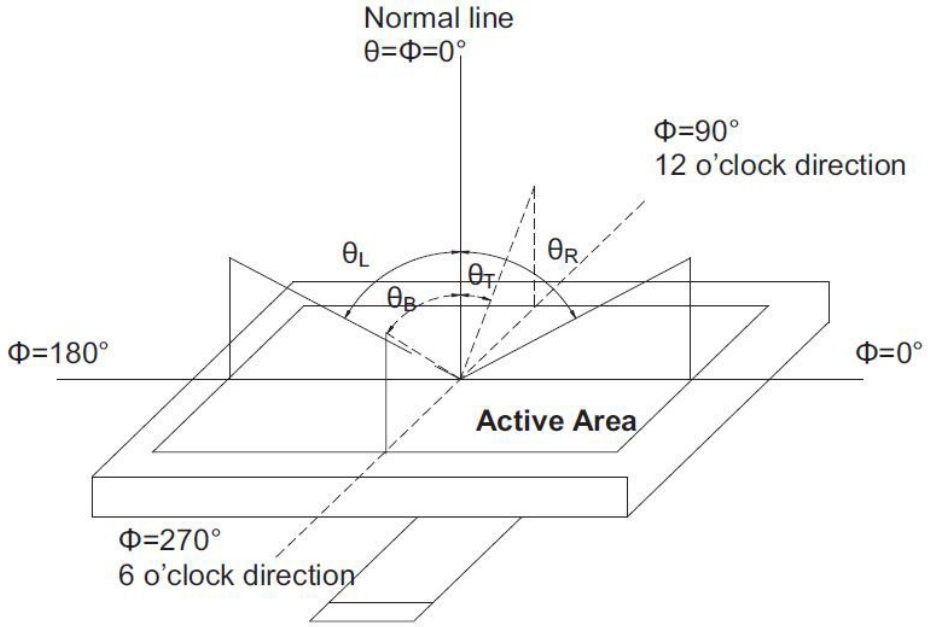
Note 3: Response time is defined as follow:

Response time is the time required for the display to transition from black to white (Rise Time, Tr) and from white to black(Decay Time, Tf).



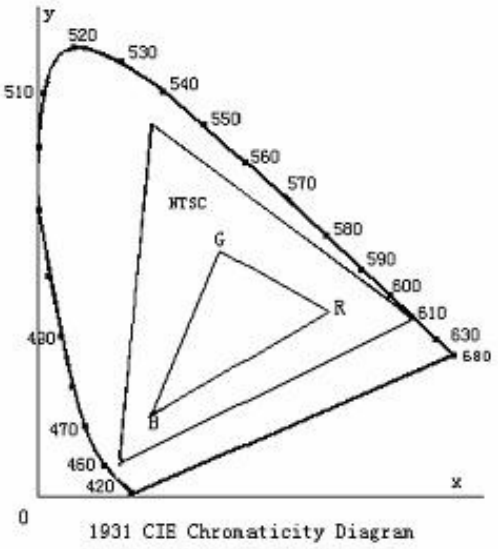
Note 4: Viewing angle range is defined as follow:

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.

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

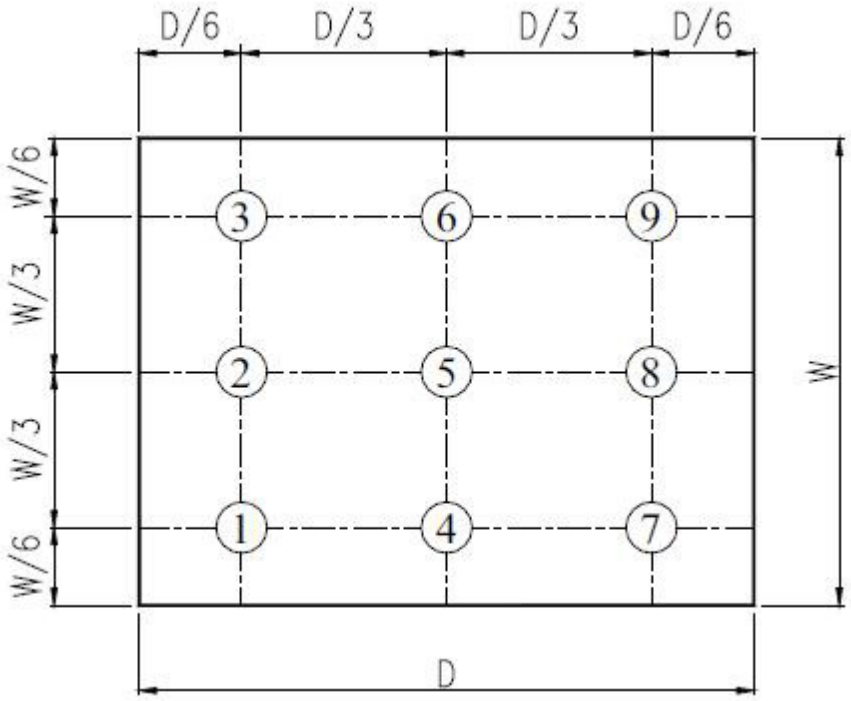


Fig. 2 Definition of uniformity

10. Environmental / Reliability Tests

No	Test Item	Condition	Judgment criteria
1	High Temp Operation	Ts=+70℃, 120hrs	Per table in below
2	Low Temp Operation	Ta=-20℃, 120hrs	Per table in below
3	High Temp Storage	Ta=+80℃, 120hrs	Per table in below
4	Low Temp Storage	Ta=-30℃, 120hrs	Per table in below
5	High Temp & High Humidity Storage	Ta=+60℃, 90% RH 120 hours	Per table in below (polarizer discoloration is excluded)
6	Thermal Shock (Non-operation)	-30℃ 30 min~+80℃ 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 2 hours for each direction of X.Y.Z.	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.

11.4Storage

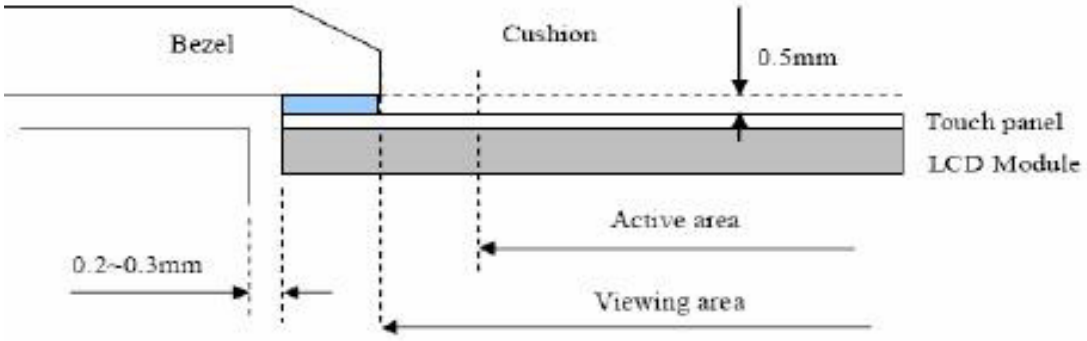
A. Store the products in a dark place at +25℃±10℃ with low humidity (40% RH to 60% RH). Don't expose to sunlight or fluorescent light.
B. Storage in a clean environment, free from dust, active gas, and solvent.

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.



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