

DLC Display Co., Limited

德爾西顯示器有限公司



MODEL No: DLC0230AZS-2

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Record of Revision

Date	Revision No.	Summary
2016-01-06	1.0	Rev 1.0 was issued

1. Scope

This data sheet is to introduce the specification of DLC0230AZS-2 active matrix TFT module. It is composed of a color TFT-LCD panel, driver ICs, FPC, a backlight unit . The 2.3" display area contains 320(RGB) x240 pixels.

2. Application

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

3. General Information

Item	Contents	Unit
Size	2.3	inch
Resolution	320(RGB) x 240	/
Interface	SPI+RGB	/
Technology type	a-Si TFT	/
Pixel pitch	0.1461x0.1461	mm
Pixel Configuration	320xRGBx240	
Outline Dimension (W x H x D)	52.70X45.80X2.30	mm
Active Area	46.75X35.06	mm
Display Mode	Transmissive, Normally White	/
Backlight Type	LED	/
Driver IC	ILI9342C	/
Weight	TBD	g

4. Outline Drawing

FPC弯折后示意图
FPC展开出货

(CIRCUIT DIAGRAM)
IF=15*4mA VF=3.2V

DETAIL A

NOTE:

- 1 DISPLAY TYPE : 2.3" QVGA TFT
- 2 VIEWING DIRECTION : 6 O' CLOCK
- 3 LCD DRIVER : ILI9342C
- 4 OPERATING TEMP : -20° C--+70° C
- 5 STORAGE TEMP : -30° C--+80° C
- 6 UNSPECIFIED TOLERANCE ±0.2mm

PIN DESCRIPTION	
NO	SYMBOL
1	GND
2	IN_B
3	IN_A
4	GND
5	LEDA
6	LEDK1
7	GND
8	VCC
9	IOVCC
10	GND
11	/RESET
12	VSYNC
13	HSYNC
14	DOTCLK
15	ENABLE
16	GND
17	DB17 (R7)
18	DB16 (R6)
19	DB15 (R5)
20	DB14 (R4)
21	DB13 (R3)
22	DB12 (R2)
23	DB11 (G7)
24	DB10 (G6)
25	DB9 (G5)
26	DB8 (G4)
	DB7 (G3)
	DB6 (G2)
	DB5 (B7)
	DB4 (B6)
	DB3 (B5)
	DB2 (B4)
	DB1 (B3)
	DB0 (B2)
	GND
	DIN/SDA
	SCL
	CSX
	GND
	XR
	YD
	XL
	YU
	NC
	LEDK2
	LEDK3
	LEDK4
	NC
	OUT_A
	OUT_B
	GND

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TITLE: DLC0230AZS-2

DRAWN BY: _____

CHECKED BY: _____

APPROVED BY: _____

CONFIRMED BY: _____

DWG NO: _____

DWG NAME: _____

5. Interface signals

No	Symbol	Description	Remarks
1	GND	Power Ground	
2	IN_B	Test point B input, for customer use	
3	IN_A	Test point A input, for customer use	
4	GND	Power Ground	
5	LEDA	Anode pin of backlight	
6	LEDK1	Cathode pin OF backlight	
7	GND	Power Ground	
8	VCC	Analog power supply	
9	IOVCC	Digital power supply	
10	GND	Power Ground	
11	/RESET	Input RESET signal	
12	VSYNC	Frame synchronizing signal for RGB interface operation.	
13	HSYNC	Line synchronizing signal for RGB interface operation.	
14	DOTCLK	Dot clock signal for RGB interface operation. Fix to IOVCC or GND level when not in use.	
15	ENABLE	Data enable signal for RGB interface operation. Fix to IOVCC or GND level when not in use.	
16	GND	Power Ground	
17~22	DB17~DB12	Red data-bus (R7~R2)	
23~28	DB11~DB6	Green data-bus (G7~G2)	
29~34	DB5~DB0	Blue data-bus (B7~B2)	
35	GND	Power Ground	
36	DIN/SDA	Serial in/out signal. The data is applied on the rising edge of the SCL signal. If not used, fix this pin at IOVCC or GND.	
37	SCL	This pin is used to select "Data or Command" in the parallel interface. When D/CX = '1', data is selected.	

		When D/CX = '0', command is selected.	
38	CSX	Chip select input pin ("Low" enable).	
39	GND	Power Ground	
40	XR	Touch right input	
41	YD	Touch down input	
42	XL	Touch left input	
43	YU	Touch up input	
44	NC	No connect	
45	LEDK2	Cathode pin OF backlight	
46	LEDK3	Cathode pin OF backlight	
47	LEDK4	Cathode pin OF backlight	
48	NC	No connect	
49	OUT_A	Test point A output, for customer use	
50	OUT_B	Test point B output, for customer use	
51	GND	Power Ground	

6. Absolute maximum Ratings

6.1. Electrical Absolute max. ratings

Parameter	Symbol	MIN	MAX	Unit	Remark
Supply voltage for Analog	VCC	-0.3	4.2	V	
Supply voltage for Logic	IOVCC	-0.3	3.0	V	
Input voltage for logic	VIN	-0.3	IOVCC +0.5	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

Item	Symbol	MIN	TYP	MAX	Unit	Remark
Logic Supply Voltage	IOVCC	1.65	1.8	2.8	V	Note 2
Analog Supply Voltage	VCC	2.6	2.8	3.3	V	Note 2
Input Signal Voltage	V _{IL}	GND	--	0.3xIOVCC	V	Note 1,2,3
	V _{IH}	0.7xIOVCC	--	IOVCC	V	
Output Signal Voltage	V _{OL}	GND	--	0.2xIOVCC	V	IOL=1.0mA Note 1,2,3
	V _{OH}	0.8xIOVCC	--	IOVCC	V	

Note 1: IOVCC=1.65 to 2.8V, VCC=2.6 to 3.3V, AGND=GND=0V, Ta=-30 to 70 (to +80°C no damage).

Note2: Please supply digital IOVCC voltage equal or less than analog VCI voltage.

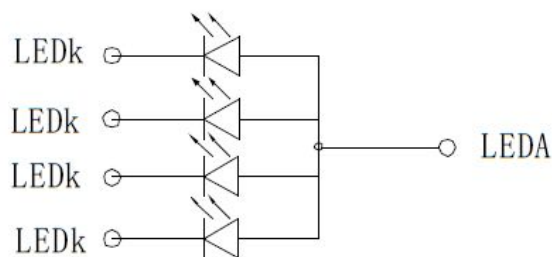
Note3: CSX, RDX, WRX, D[17:0], D/CX, RESX, TE, DOTCLK, VSYNC, HSYNC, DE, SDA, SCL, and Test pins.

7.2 LED Backlight

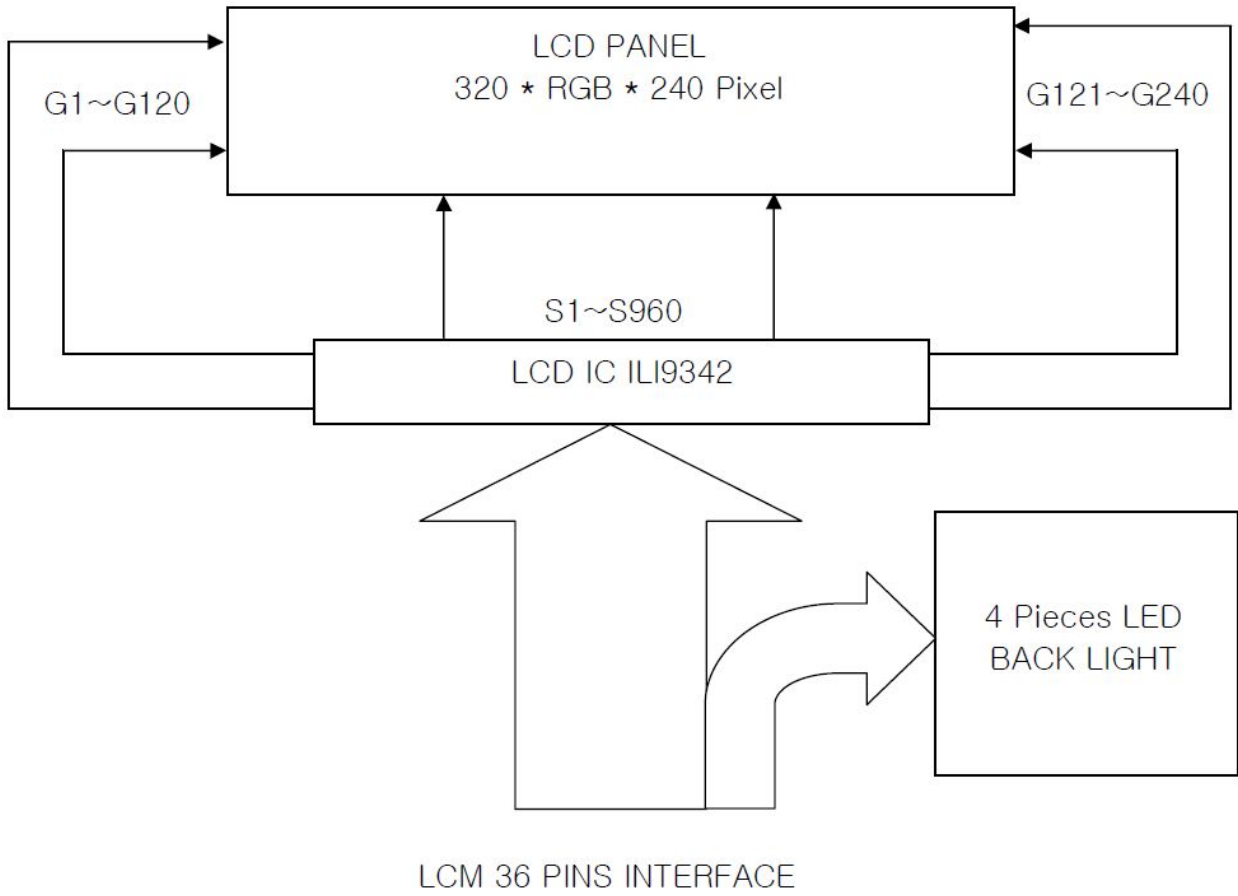
Ta=25°C

Item	Symbol	MIN	TYP	MAX	Unit	Remark
Supply current	IBL	--	60	--	mA	
Supply voltage	VBL	--	3.2	--	V	
LED life time		--	30,000	--	Hrs	

Note: LED connection as below:



7.3 Schematic of LCD module system

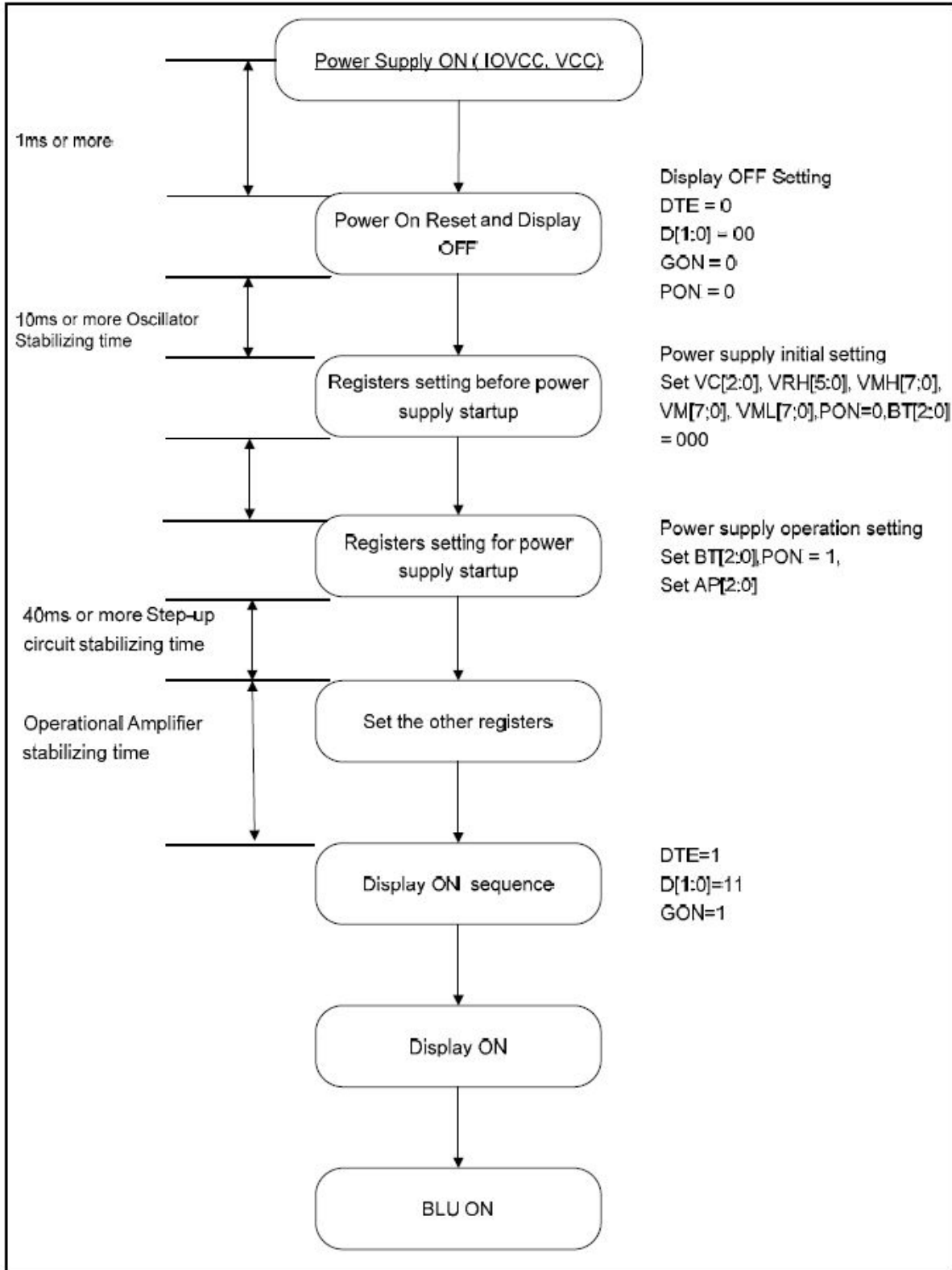


8. Command/AC Timing

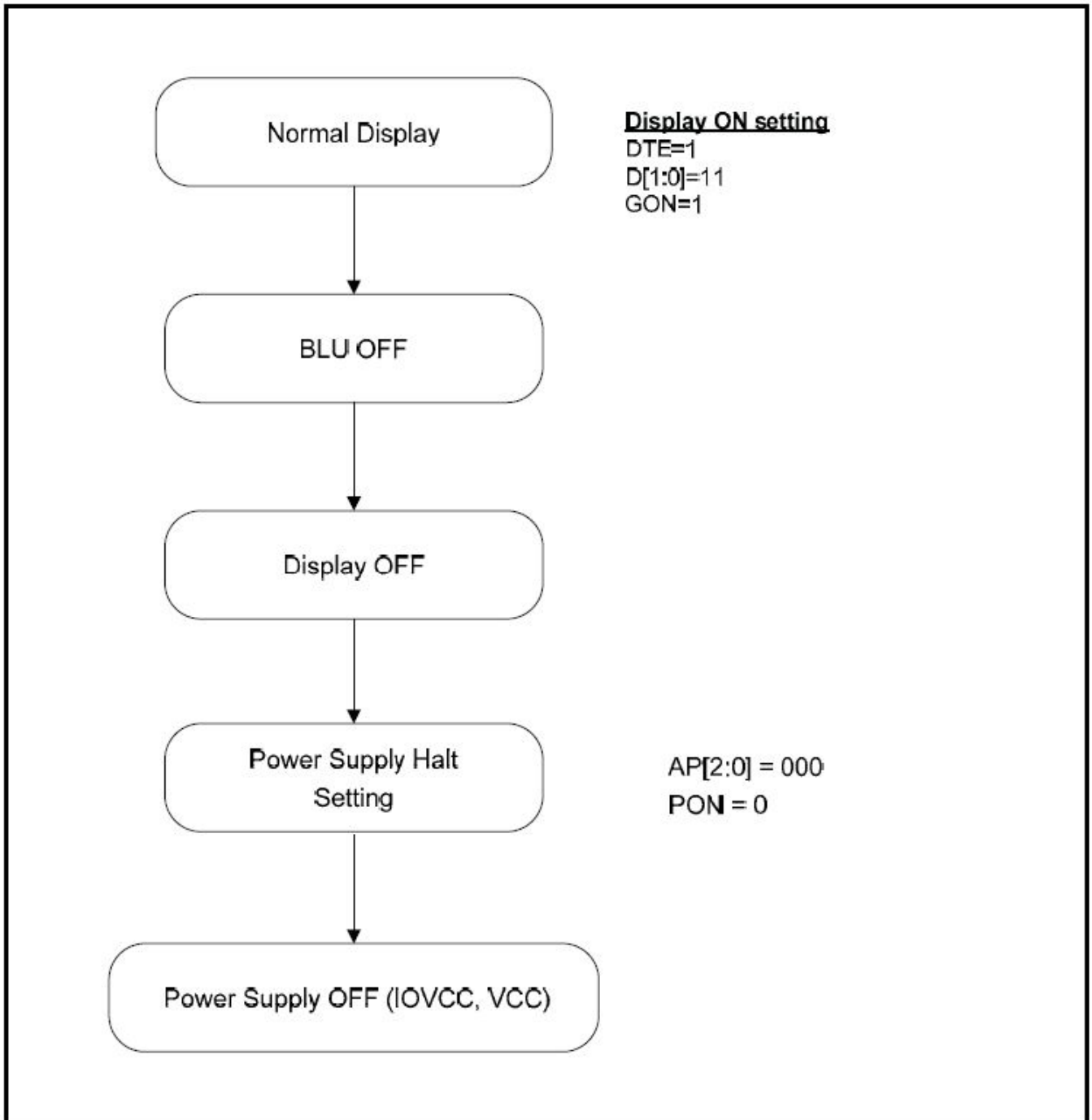
8.1 Details can be referred in the IC datasheet ---- ILI9342C.

8.2 Power On/Off Sequence

a. Power On Sequence



b. Power Off Sequence



9. Optical Specification

Ta=25°C

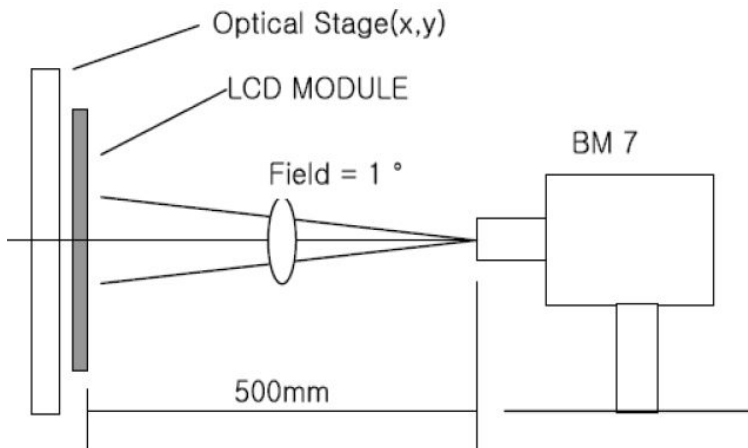
Item	Symbol	Condition	Min	Typ.	Max.	Unit	Remark
Contrast Ratio	CR	$\theta = 0^\circ$	-	500	-		Note1 Note2
Response Time	Ton+Toff	25°C	-	25	-	ms	Note1 Note3
View Angles	$\ominus T$	CR ≥ 10	-	60	-	Degree	Note 4
	$\ominus B$		-	50	-		
	$\ominus L$		-	60	-		
	θR		-	60	-		
Chromaticity	White	x	Brightness is on	Typ-0.05	0.30	Tpy+0.05	Note5, Note1
		y			0.32		
	RED	x			Tbd		
		y			Tbd		
	GREEN	x			Tbd		
		y			Tbd		
	BLUE	x			Tbd		
		y			Tbd		
NTSC	δL		-	50	-	%	Note5
Uniformity	U		-	80	-	%	Note1 Note6
Luminance	L		-	200	-	cd/m ²	Note1 Note7

Test conditions: IBL=60mA, VBL=3.2V, the ambient temperature is 25°C.

Note 1: Definition of optical measurement system.

Temperature = 25°C(±3°C)

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

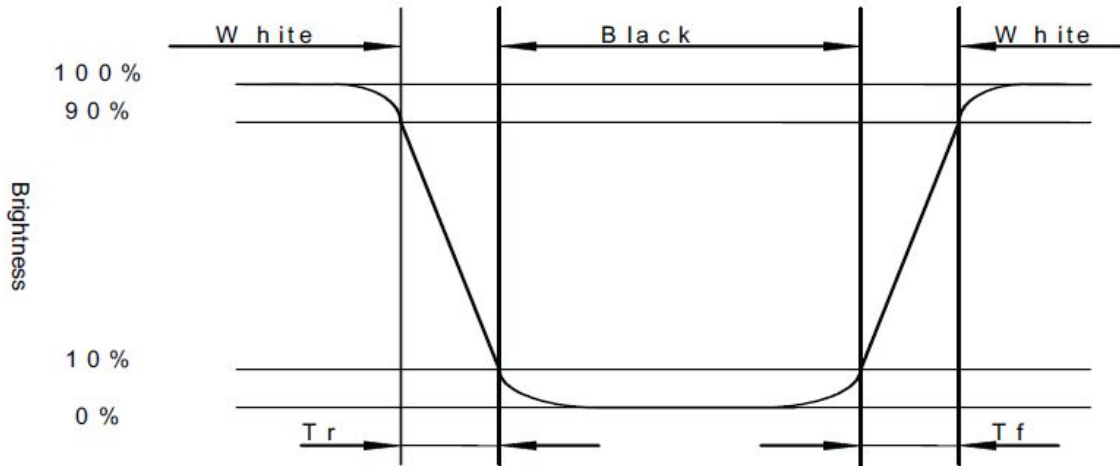


Note 2: Contrast ratio is defined as follow:

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

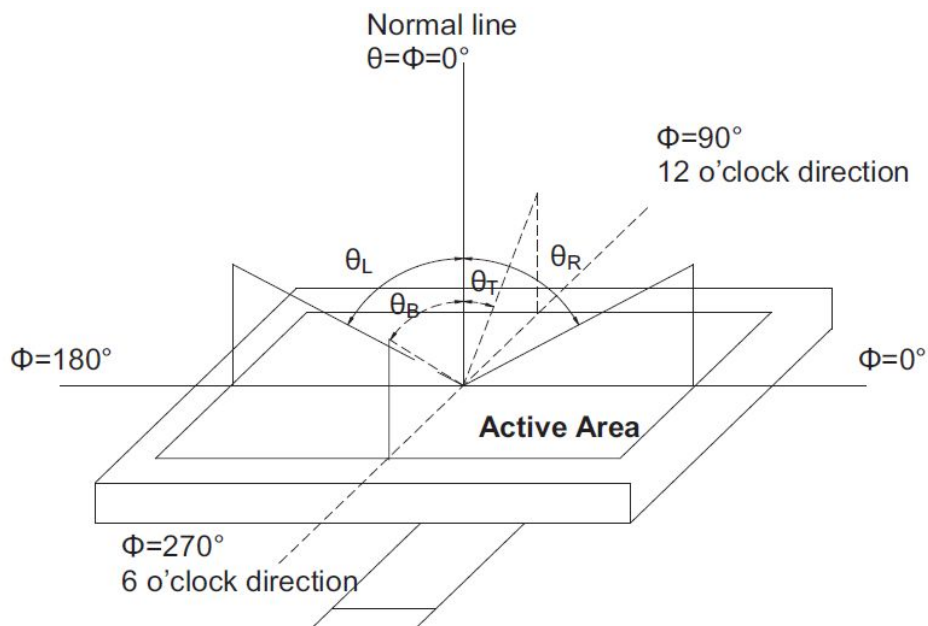
Note 3: Response time is defined as follow:

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).



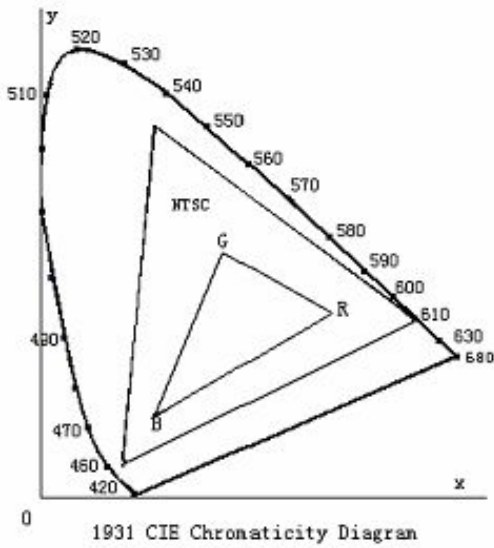
Note 4: Viewing angle range is defined as follow:

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.

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

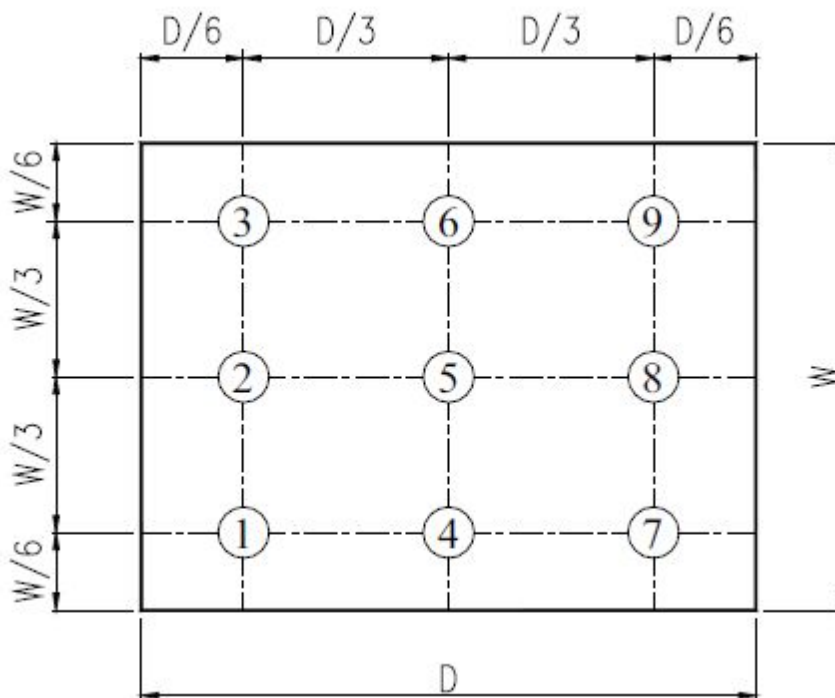


Fig. 2 Definition of uniformity

10. Environmental / Reliability Tests

No	Test Item	Condition	Judgment criteria
1	High Operation Temp	Ts=+70°C, 96hrs	Per table in below
2	Low Operation Temp	Ta=-20°C, 96hrs	Per table in below
3	High Temp Storage	Ta=+80°C, 96hrs	Per table in below
4	Low Temp Storage	Ta=-30°C, 96hrs	Per table in below
5	High Temp & High Humidity Storage	Ta=+40°C, 90% RH 96 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 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.

