DLC Display Co., Limited

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MODEL No:DLC1210IBL

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Record of Revision

Date	Revision No.	Summary
2017-08-26	1.0	Rev 1.0 was issued

1. Scope

This data sheet is to introduce the specification of DLC1210IBL active matrix TFT module. It is composed of a color TFT-LCD panel, driver IC, FPC and a backlight unit. The 12.1″ display area contains 1024 (RGB) x 768 pixels.

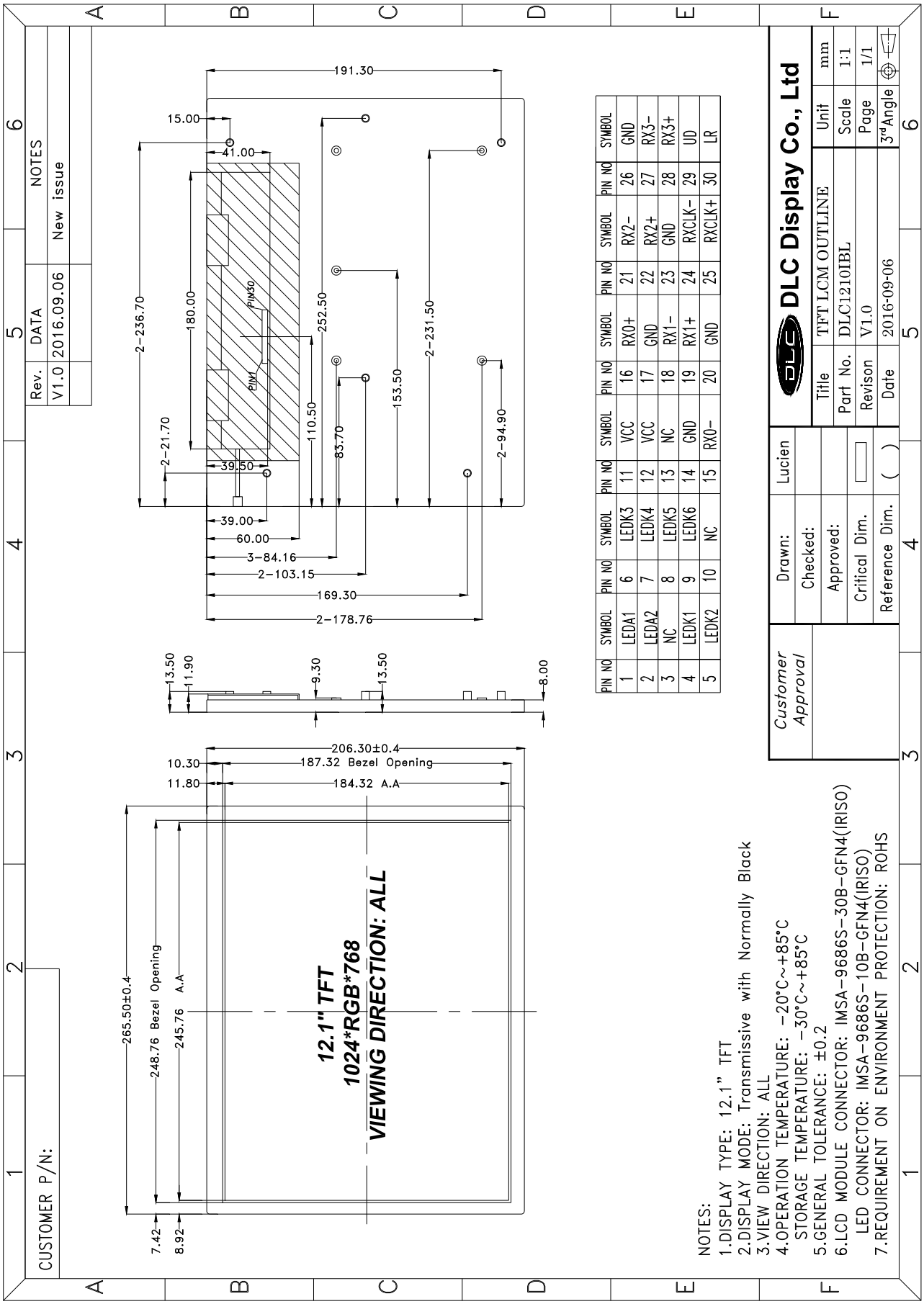
2. Application

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

3. General Information

Item	Contents	Unit
Size	12.1	inch
Resolution	1024(RGB) x 768	/
Interface	LVDS	/
Technology type	a-Si TFT	/
Pixel pitch	0.24 x 0.24	mm
Pixel Configuration	R.G.B. Vertical Stripe	
Outline Dimension (W x H x D)	265.50 x 206.30 x 13.50	mm
Active Area	245.76 x 184.32	mm
Display Mode	Transmissive, Normally Black	/
Viewing Direction	ALL	/
Backlight Type	LED	/

4. Outline Drawing



PIN NO	SYMBOL	PIN NO	SYMBOL	PIN NO	SYMBOL	PIN NO	SYMBOL	PIN NO	SYMBOL
1	LEDA1	6	LEDK3	11	VCC	16	RX0+	21	RX2-	26	GND
2	LEDA2	7	LEDK4	12	VCC	17	GND	22	RX2+	27	RX3-
3	NC	8	LEDK5	13	NC	18	RX1-	23	GND	28	RX3+
4	LEDK1	9	LEDK6	14	GND	19	RX1+	24	RXCLK-	29	UD
5	LEDK2	10	NC	15	RX0-	20	GND	25	RXCLK+	30	LR

5. Interface signals

No	Symbol	Description	Remarks
1	LEDA1	BL Voltage supply	
2	LEDA2	BL Voltage supply	
3	NC	No connection	
4~9	LEDK1~LEDK6	BL negative pole	
10	NC	No connection	
11~12	VCC	Power supply +3.3V	
13	NC	No connection	
14	GND	Power ground	
15	RX0-	Negative transmission data of pixel 0	
16	RX0+	Positive transmission data of pixel 0	
17	GND	Power ground	
18	RX1-	Negative transmission data of pixel 1	
19	RX1+	Positive transmission data of pixel 1	
20	GND	Power ground	
21	RX2-	Negative transmission data of pixel 2	
22	RX2+	Positive transmission data of pixel 2	
23	GND	Power ground	
24	RXCLK-	Negative of clock	
25	RXCLK+	Positive of clock	
26	GND	Power ground	
27	RX3-	Negative transmission data of pixel 3	
28	RX3+	Positive transmission data of pixel 3	
29	U/D	Vertical scan direction setting	
30	L/R	Horizontal scan direction setting	

Note: The recommended connector is : IMSA-9686S-30B-GFN4 (IRISO)

LED Electrical Interface connection:

No	Symbol	Description	Remarks
1	LEDA1	BL Voltage supply	
2	LEDA2	BL Voltage supply	
3	NC	No connection	
4	LEDK1	BL negative pole	
5	LEDK2	BL negative pole	
6	LEDK3	BL negative pole	

7	LEDK4	BL negative pole	
8	LEDK5	BL negative pole	
9	LEDK6	BL negative pole	
10	NC	No connection	

Note: The recommended connector: IMSA-9686S-10B-GFN4 (IRISO)

6. Absolute maximum Ratings

6.1. Electrical Absolute max. ratings

Parameter	Symbol	Value	Unit	Remark
Power supply voltage	VCC	3.3	V	-
Driver supply voltage	VDD	3.3	V	-
Backlight power supply voltage	V_{LED}	24	V	-
Backlight LED current	I_{LED}	360	mA	-

Note: If the absolute maximum rating of even is one of the above parameters is exceeded even momentarily, the quality of the product may be degraded. Absolute maximum ratings, therefore, specify the values exceeding which the product may be physically damaged. Be sure to use the product within the range of the absolute maximum ratings.

6.2. Environment Conditions

Item	Symbol	MIN	MAX	Unit	Remark
Operating Temperature	TOPR	-20	85	℃	
Storage Temperature	TSTG	-30	85	℃	

7. Electrical Specifications

7.1 Electrical characteristics

GND=0V, Ta=25℃

Item	Symbol	MIN	TYP	MAX	Unit	Condition
Power supply voltage	VCC	3	3.3	3.6	V	Note1
Power supply current	IVCC	-	350	600	mA	
Analog voltage	AVDD	-	11.5	-	V	-
Low level input voltage	VGL	-	-9	-	V	-
High level input voltage	VGH	-	17	-	V	-
Common electrode voltage	VCOM	5.1	5.3	5.5	V	Note2
Backlight power supply voltage	VLED	21.6	24	26.4	V	-
Backlight power supply current	ILED	-	360	-	mA	-
Power consumption	PD	-	1.2	2.0	W	Note3
	PBL	7.776	8.64	9.504	W	
	Ptotal	-	10.1	11.8	W	

Notes:

1. The supply voltage is measured and specified at the interface connector of LCM. The current draw and power consumption specified is for 3.3V 60Hz at 25℃.
   a) Typ : Window XP pattern
   b) Max : Skip 2 dot 255 pattern
2. VCOM should be adjusted to make the flicker level be minimum.
3. Frame rate=60HZ, Typ. Pattern: White pattern 25℃.

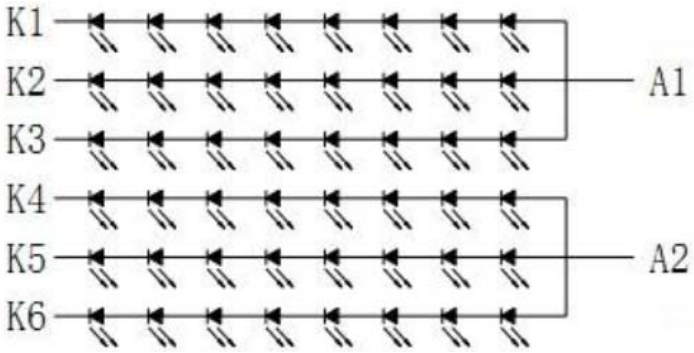
7.2 LED Backlight

Ta=25℃

Item	Symbol	MIN	TYP	MAX	Unit	Remark
Forward Current	IF_{LED}	--	60	--	mA	
Forward Voltage	VF_{LED}	2.7	3.0	3.3	V	
Power consumption	PLED	7.776	8.64	9.504	W	Note1
LED life time	--	30,000	--	--	Hrs	Note2

Notes:

1. Calculator Value for reference ILED x VLED x LED Quantity = PLED.
2. The “LED life time” is defined as the module brightness decrease to 50% original brightness at Ta=25℃ and IF=60mA. The LED lifetime could be decreased if operating IF is larger than 60mA.

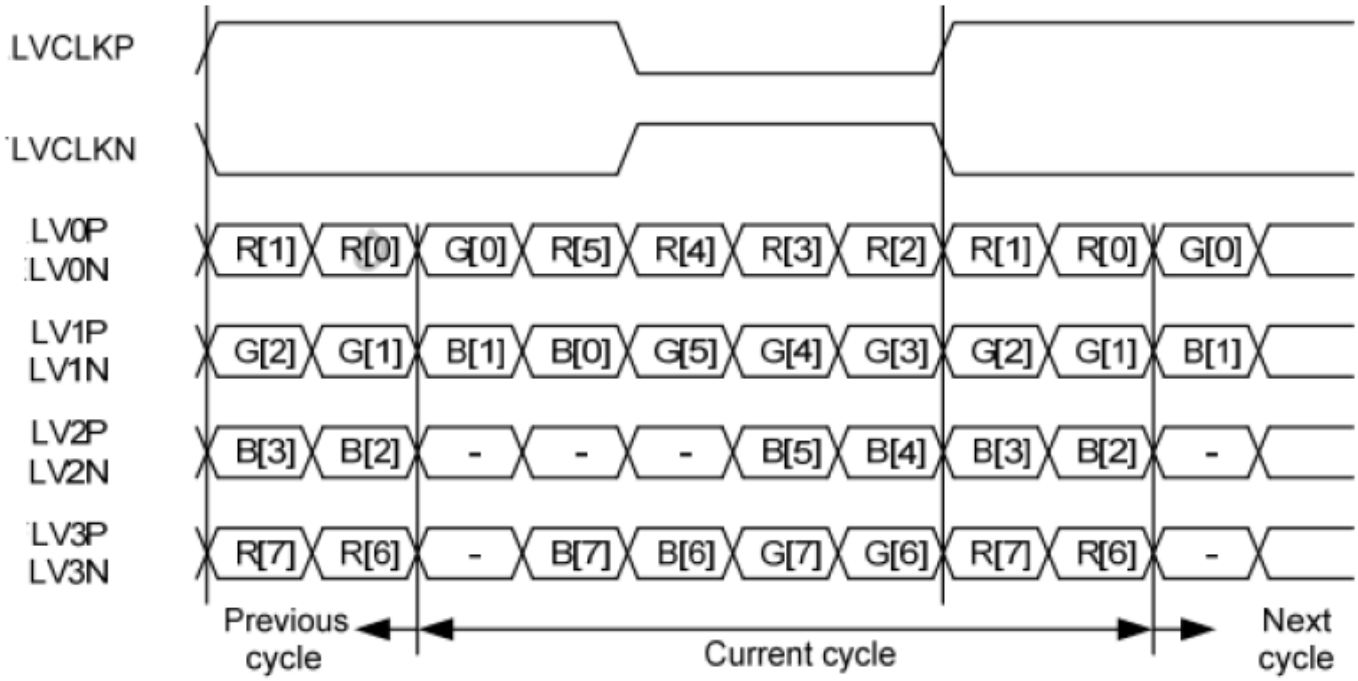


8. Command/AC Timing

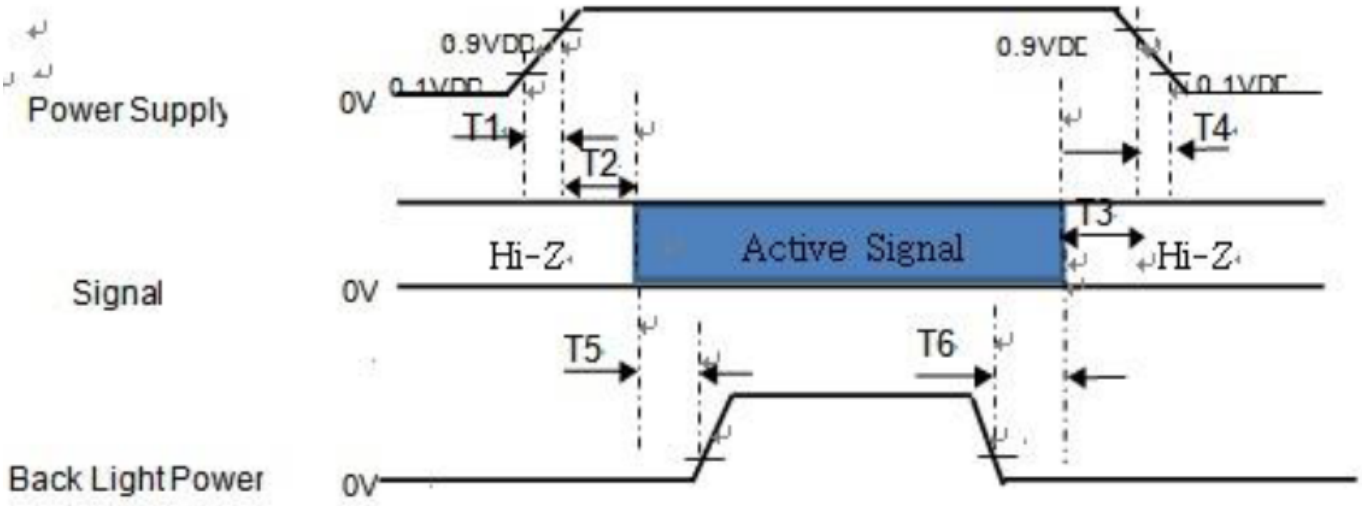
8.1.LVDS Signal Timing

Parameter	Symbol	Min	Typ	Max	Unit	Conditions
Clock frequency	RXFCLK	52	65	71	MHz	
Horizontal display area	thd		1024			
HS period	th	1114	1344	1400	DCLK	
HS blanking	thb+thfp	90	320	376	DCLK	
Vertical display area	tvd		768			
VS period	tv	778	806	845	TH	
VS blanking	tvbp+tvfp	10	38	77	TH	
Input data skew margin	TRSKM	500	-	-	ps	
Clock high time	TLVCH	10.99	8.79	8.05	ns	
Clock low time	TLVCL	8.24	6.59	6.04	ns	
PLL wake-up time	TENPLL	-	-	150	us	

8.2.Signal Format



8.3.Power Sequence (Voltage Source)



0.5ms ≦ T1 ≦ 10ms
2ms ≦ T2
16.6ms ≦ T3
0ms ≦ T4 ≦ 10ms
200ms ≦ T5
500ms ≦ T6

Notes:
1. When the power supply VDD is 0V, keep the level of input signals on the low or keep high impedance.
2. Do not keep the interface signal high impedance when power is on. Back Light must be turn on after power for logic and interface signal are valid.

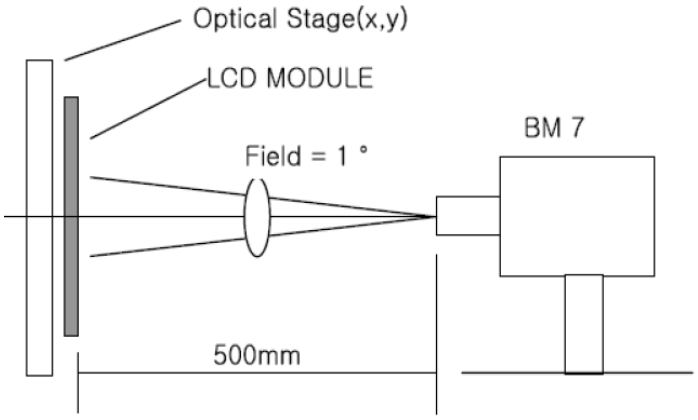
9. Optical Specification

Item		Symbol	Condition	Min	Typ.	Max.	Unit	Remark
Contrast Ratio		CR	θ=0°	800	1000	-		Note1 Note2
Response Time		Tr+Tf	25℃	-	30	35	ms	Note1 Note3
View Angles		ΘT	CR≧10	-	85	-	Degree	Note 4
		ΘB		-	85	-		
		ΘL		-	85	-		
		ΘR		-	85	-		
Chromaticity	White	x	Brightness is on	0.271	0.311	0.351		Note5, Note1
		y		0.270	0.310	0.340		
	Red	x		0.608	0.648	0.688		
		y		0.298	0.338	0.378		
	Green	x		0.270	0.310	0.350		
		y		0.557	0.597	0.637		
	Blue	x		0.100	0.140	0.180		
		y		0.045	0.085	0.125		
Luminance		L		600	-	-	cd/m^2	Note1 Note6
NTSC				60	70		%	
Uniformity (White)		U		75	80	-	%	Note1 Note7

Note 1: Definition of optical measurement system.

Temperature = 25℃(±3℃)

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

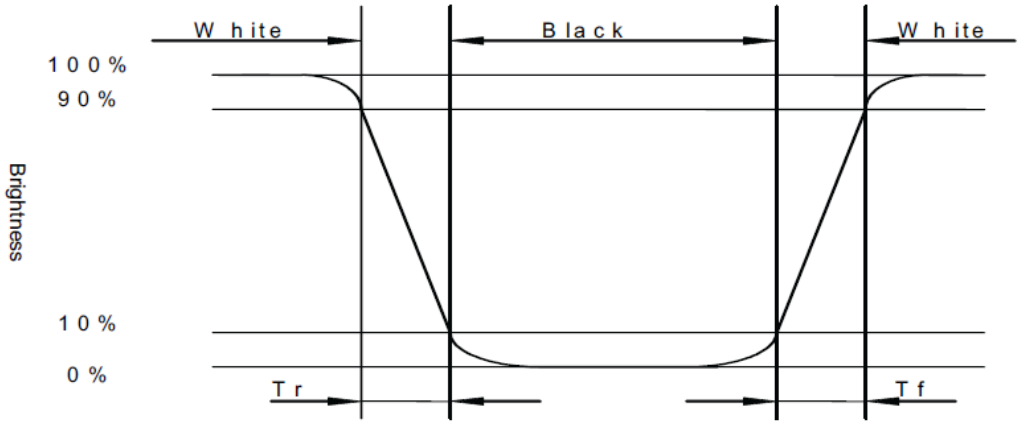


Note 2: Contrast ratio is defined as follow:

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

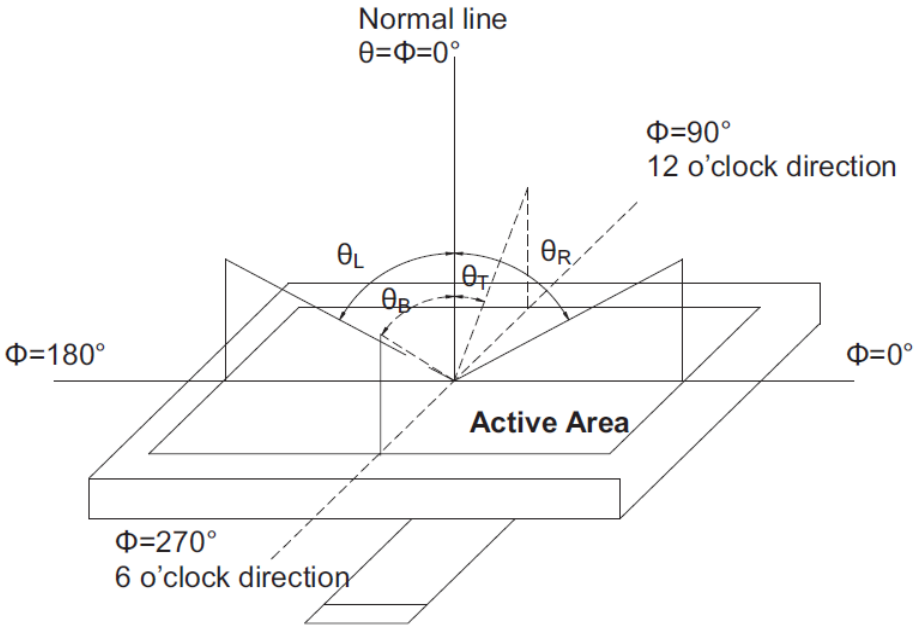
Note 3: Response time is defined as follow:

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).



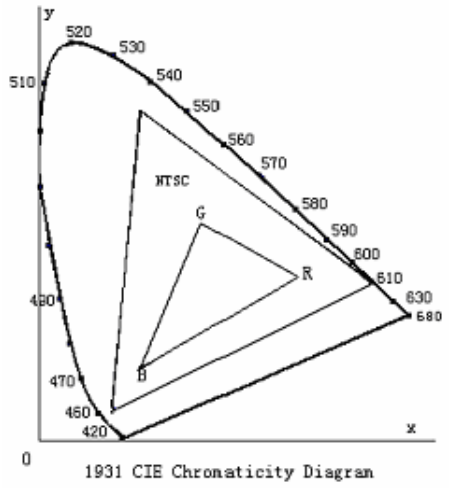
Note 4: Viewing angle range is defined as follow:

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.

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

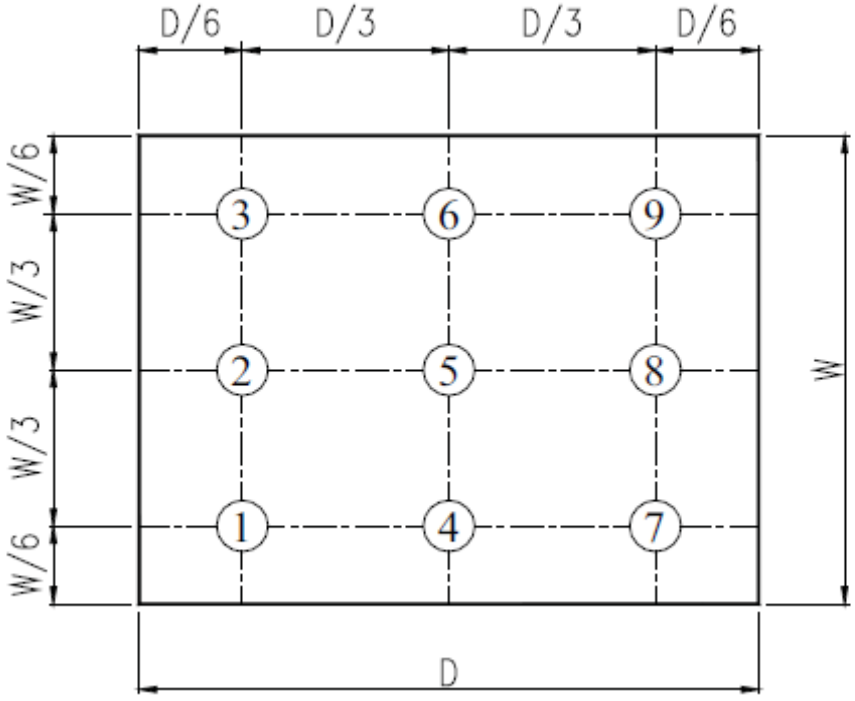


Fig. 2 Definition of uniformity

10. Environmental / Reliability Tests

No	Test Item	Condition	Judgment criteria
1	High Temp Operation	Ts=+85℃, 120hrs	Per table in below
2	Low Temp Operation	Ta=-20℃, 120hrs	Per table in below
3	High Temp Storage	Ta=+85℃, 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~+85℃ 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

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.