

DLC Display Co., Limited

德爾西顯示器有限公司



MODEL No: DLC0500ABM12RT-R-2

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Record of Revision

Date	Revision No.	Summary
2020-12-06	1.0	Rev 1.0 was issued

1. Scope

This data sheet is to introduce the specification of DLC0500ABM12RT-R-2 active matrix TFT module. It is composed of a color TFT-LCD panel, driver ICs, FPC, RTP and a backlight unit. The 5.0" display area contains 800(RGB) x 480 pixels.

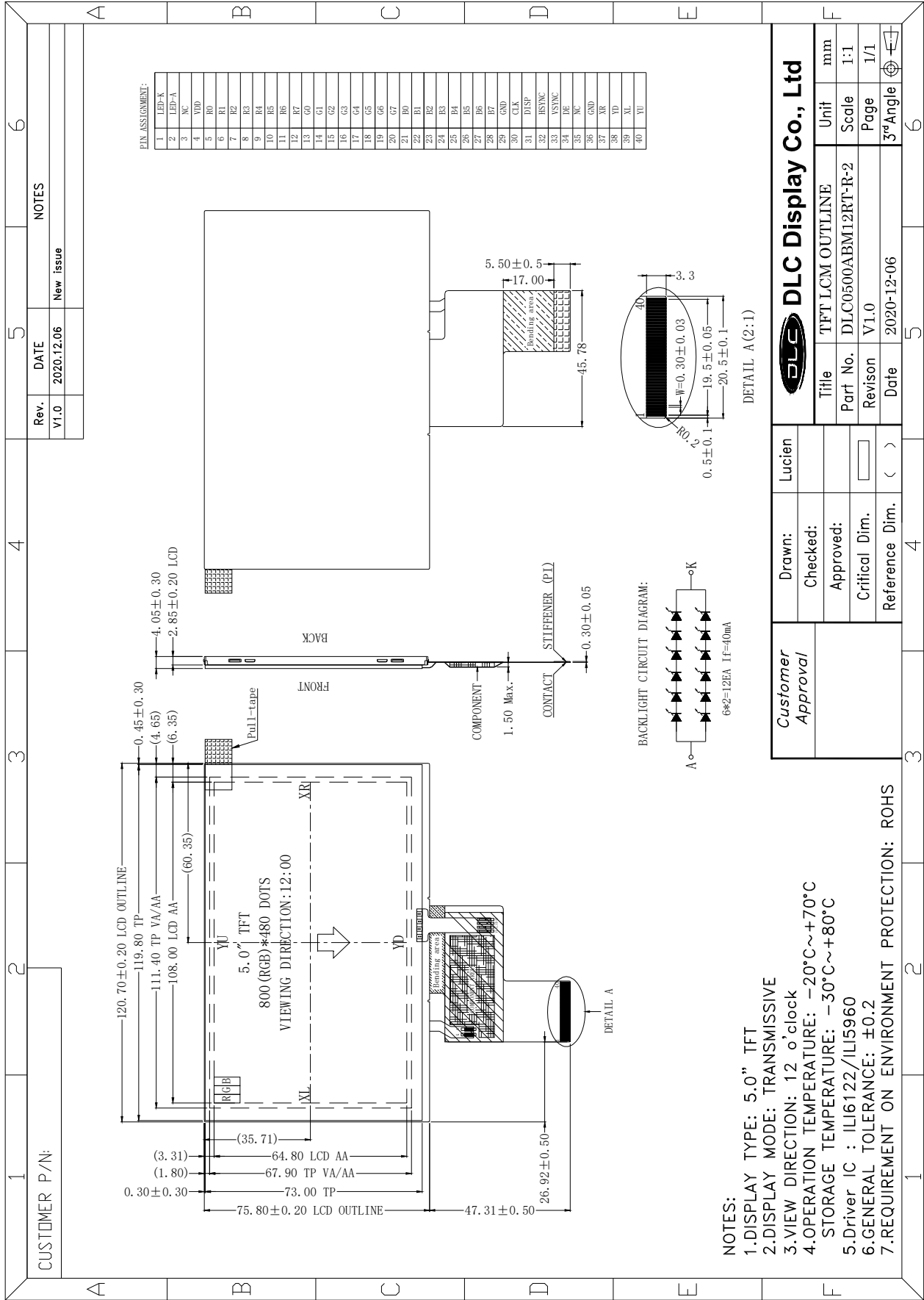
2. Application

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

3. General Information

Item	Contents	Unit
Size	5.0	inch
Resolution	800 (RGB) x 480	/
Interface	RGB 24 bits	/
Technology type	a-Si TFT	/
Pixel pitch	0.135 x 0.135	mm
Pixel Configuration	R.G.B. Vertical Stripe	
Outline Dimension (W x H x D)	120.70 x 75.80 x 4.05	mm
Active Area	108.00 x 64.80	mm
Driver IC	ILI6122 and ILI5960	
Display Mode	Transmissive, Normally white	/
Viewing Direction	12 o'clock	/
Backlight Type	LED	/

4. Outline Drawing



5. Interface signals

No.	Symbol	Description
1	LED-K	Backlight LED Anode.
2	LED-A	Backlight LED Anode.
3	NC	No connection
4	VDD	Digital power supply (+3.0V)
5~12	R0-R7	Red data
13~20	G0-G7	Green data
21~28	B0-B7	Blue data
29	GND	Power Ground
30	CLK	Clock for input data
31	DISP	Display on/off control
32	HSYNC	Horizontal sync signal
33	VSYNC	Vertical sync signal
34	DE	Data enable
35	NC	No connection
36	GND	Power ground
37	XR	Touch panel right side
38	YD	Touch panel bottom side
39	XL	Touch panel left side
40	YU	Touch panel up side

Note: Recommended connector: FH12-40S-0.5SH

6. Absolute maximum Ratings

6.1. Electrical Absolute max. ratings

Parameter	Symbol	MIN	MAX	Unit	Remark
Supply Voltage	VDD	-0.3	3.6	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

Ta=25°C

Item	Symbol	MIN	TYP	MAX	Unit	Remark
Digital Supply Voltage	VDD	3.0	3.3	3.5	V	
Clock Frequency	fCLK	-	30	-	MHz	
Input Voltage Level	VIH	0.8*VDD	-	VDD	V	VDD=3.3V
	VIL	0	-	0.2*VDD	V	VDD=3.3V
Current Consumption	Icc1	-	20	30	mA	Normal mode
	Icc2	-	0.03	0.1	mA	Sleep mode

7.2 LED Backlight

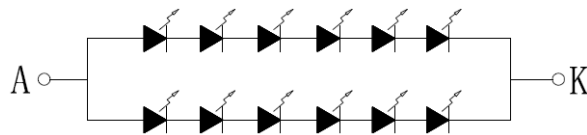
Ta=25°C

Item	Symbol	MIN	TYP	MAX	Unit	Remark
Forward Current	IF	-	40	-	mA	Note 1
Forward Voltage	VF	-	18	-	V	
LED life time	--	-	30,000	--	Hr	Note 2

Notes:

- The figure below shows the connection of backlight LED.

CIRCUIT DIAGRAM:



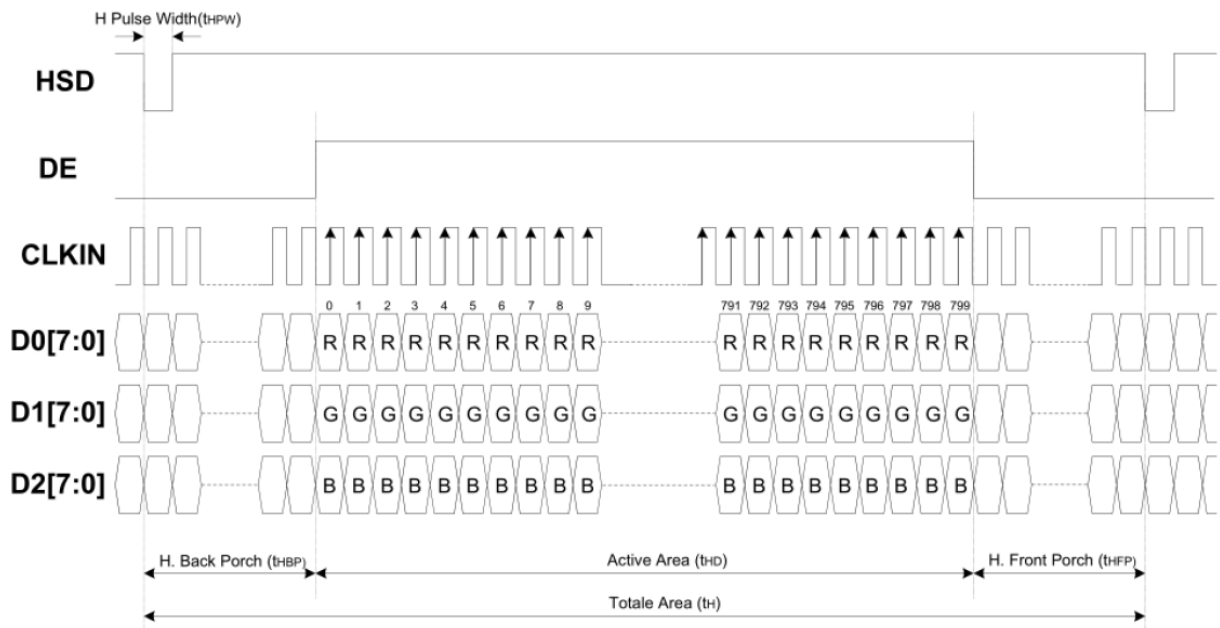
6*2=12EA If=40mA

- The "LED life time" is defined as the module brightness decrease to 50% original brightness at Ta=25°C and IL =40mA. The LED lifetime could be decreased if operating IL is larger than 40mA.

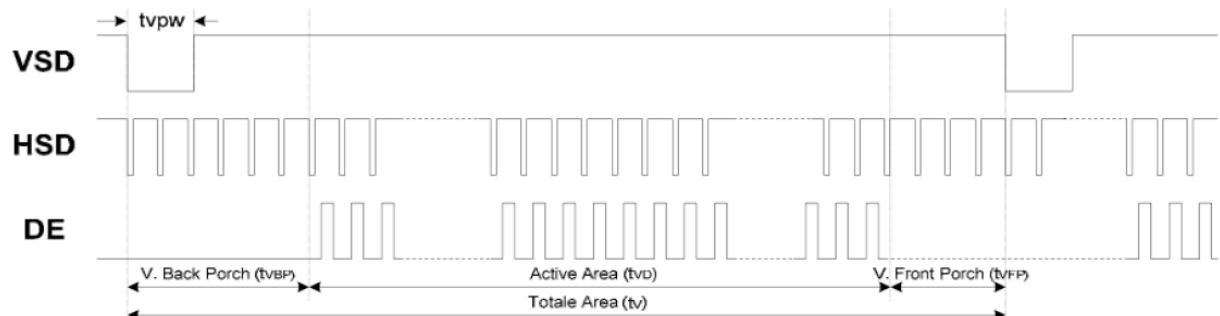
8. Command/AC Timing

8.1 Display Timing Characteristics

Horizontal Input Timing					
Parameter	Symbol	Min.	Typ.	Max.	Unit
Horizontal display area	t _{HD}	-	800	-	CLKIN
CLKN frequency	f _{CLK}	-	33.3	50	MHz
1 Horizontal line period	t _H	862	1056	1200	CLKIN
HSD pulse width	t _{HPW}	1	-	40	CLKIN
HSD back porch	t _{HBP}	46	46	46	CLKIN
HSD front porch	t _{HFP}	16	210	354	CLKIN



Vertical Input Timing					
Parameter	Symbol	Min.	Typ.	Max.	Unit
Vertical display area	t _{VD}	-	480	-	HSD
VSD period time	t _v	510	525	650	HSD
VSD pulse width	t _{VPW}	1	-	20	HSD
VSD back porch	t _{VBP}	23	23	23	HSD
VSD front porch	t _{VFP}	7	22	147	HSD



9. Optical Specification

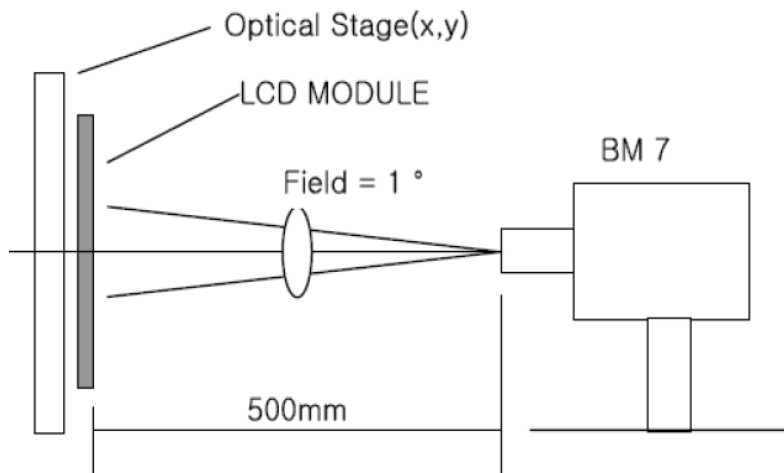
Ta=25°C

Item	Symbol	Condition	Min	Typ.	Max.	Unit	Remark
Contrast Ratio	CR	$\theta=0^\circ$	300	500	-		Note1 Note2
Response Time	Tr	25°C	-	10	-	ms	Note1 Note3
	Tf		-	10	-		
View Angles	ΘT	$CR \geq 10$	-	55	-	Degree	Note 4
	ΘB		-	65	-		
	ΘL		-	65	-		
	ΘR		-	65	-		
Chromaticity	Red	x	Brightness is on	Typ-0.05	0.51	Typ+0.05	Note5, Note1
		y			0.34		
	Green	x			0.31		
		y			0.56		
	Blue	x			0.15		
		y			0.14		
	White	x			0.28		
		y			0.33		
NTSC	S		50	60	-	%	Note5
Luminance	L		-	240	-	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

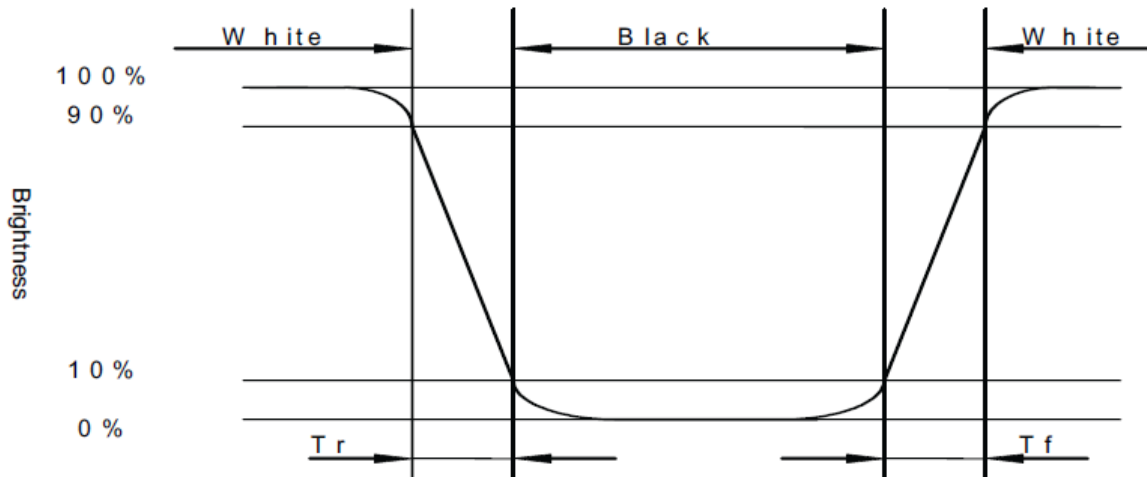


Note 2: Contrast ratio is defined as follow:

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

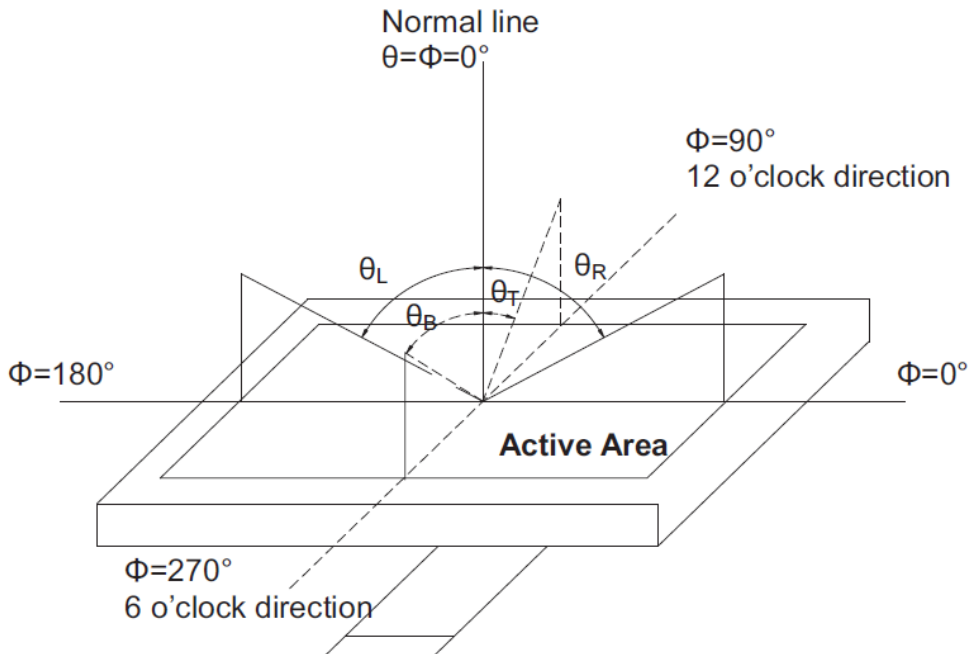
Note 3: Response time is defined as follow:

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).



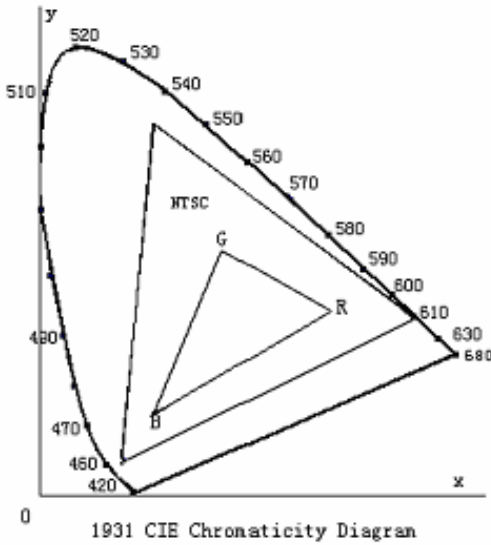
Note 4: Viewing angle range is defined as follow:

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.

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

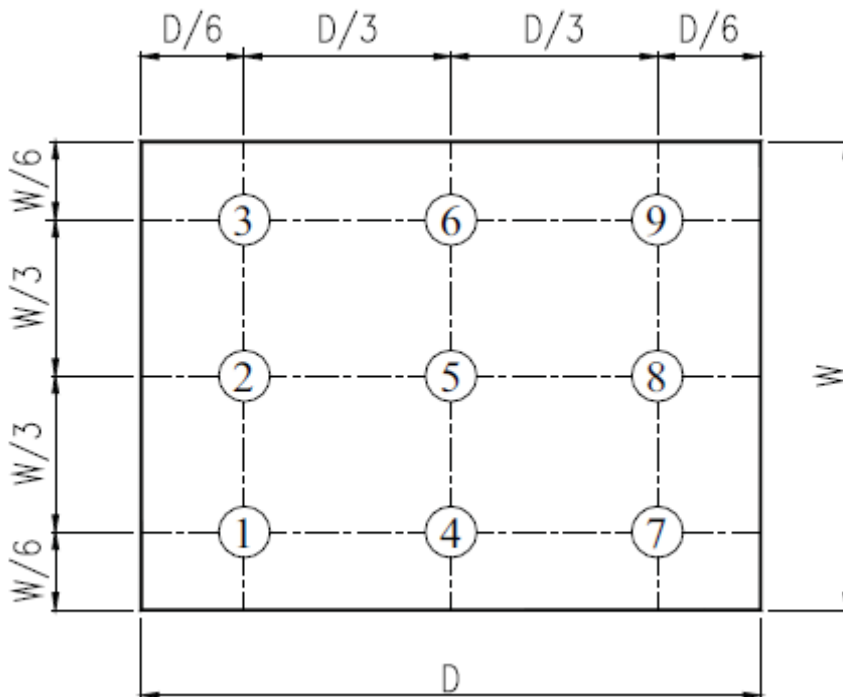


Figure: Definition of uniformity

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	Ts=+80°C, 120hrs	Per table in below
4	Low Temp Storage	Ts=-30°C, 120hrs	Per table in below
5	High Temp & High Humidity Storage	Ts=+60°C, 90% RH, 120 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 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.

11.4 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.

