

DLC Display Co., Limited

德爾西顯示器有限公司



MODEL No: DLC0430BBM10RT-R-6

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Record of Revision

Date	Revision No.	Summary
2020-10-09	1.0	Rev 1.0 was issued

1. Scope

This data sheet is to introduce the specification of DLC0430BBM10RT-R-6, active matrix TFT module. It is composed of a color TFT-LCD panel, driver IC, FPC, RTP and a backlight unit. The 4.3" display area contains 480(RGB) x 272 pixels.

As to basic specification of the driver IC, refer to the IC specification and datasheet.

2. Application

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

3. General Information

Item	Contents	Unit
Size	4.3	inch
Resolution	480(RGB) x 272	/
Interface	RGB-24bit	/
Technology type	a-Si TFT	/
Pixel pitch	0.198 x 0198	
Pixel Configuration	R.G.B. Stripe	
Outline Dimension (W x H x D)	105.50 x 67.20 x 4.20	mm
Active Area	95.04 x 53.86	mm
Backlight Type	LED	/
Controller/ driver	ILI6480B	/
Viewing Direction	12 o'clock	/
Backlight Type	LED	/

5. Interface signals

5.1 LCD PIN Definition

No	Symbol	Description	Remarks
1~2	VSS	Power Ground	
3~4	DVDD	Power supply	
5~12	R0 ~ R7	Red data	
13~20	G0 ~ G7	Green data	
21~28	B0 ~ B7	Blue data	
29	VSS	Power Ground	
30	PCLK	Pixel clock signal	
31	DISP	Display on/off control	
32	HSYNC	Line synchronous signal	
33	VSYNC	Frame synchronous signal	
34~40	NC	No connection	

5.2 BL PIN Definition:

No	Symbol	Description	Remarks
1	VLED-	LED Power supply (Cathode)	
2	NC	No connection	
3	NC	No connection	
4	VLED+	LED Power supply (Anode)	

5.3 TP PIN Definition:

No	Symbol	Description	Remarks
1	YU	Touch panel control pin, Up	
2	XL	Touch panel control pin, Left	
3	YD	Touch panel control pin, Down	
4	XR	Touch panel control pin, Right	

6. Absolute maximum Ratings

6.1. Electrical Absolute max. ratings

Parameter	Symbol	MIN	MAX	Unit	Remark
Power Supply Voltage	DVDD	-0.3	4.0	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
Power Supply	DVDD	3.0	3.3	3.6	V	
Input Voltage	L level	VIL	GND	-	0.3*DVDD	V
	H level	VIH	0.7*DVDD	-	DVDD	V
Output Voltage	L level	VOL	-	-	0.2*DVDD	V
	H level	VOH	0.8*VDD	-	DVDD	V

7.2 LED Backlight

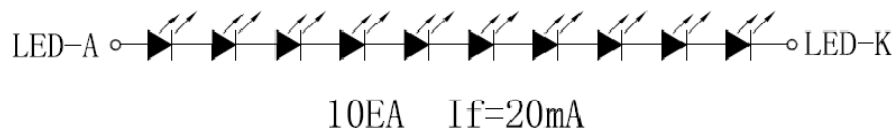
Ta=25°C

Item	Symbol	MIN	TYP	MAX	Unit	Remark
Forward Current	IL	-	20		mA	
Forward Voltage	VL	-	32	-	V	Note1
LED life time	--	--	30,000	--	Hr	Note2

Notes:

1. The LED Supply Voltage is defined by the number of LED at Ta=25°C and IL =20mA.
2. The "LED life time" is defined as the module brightness decrease to 50% original brightness at Ta=25°C and IL =20mA. The LED lifetime could be decreased if operating IL is larger than 20mA.

LED CIRCUIT DIAGRAM:



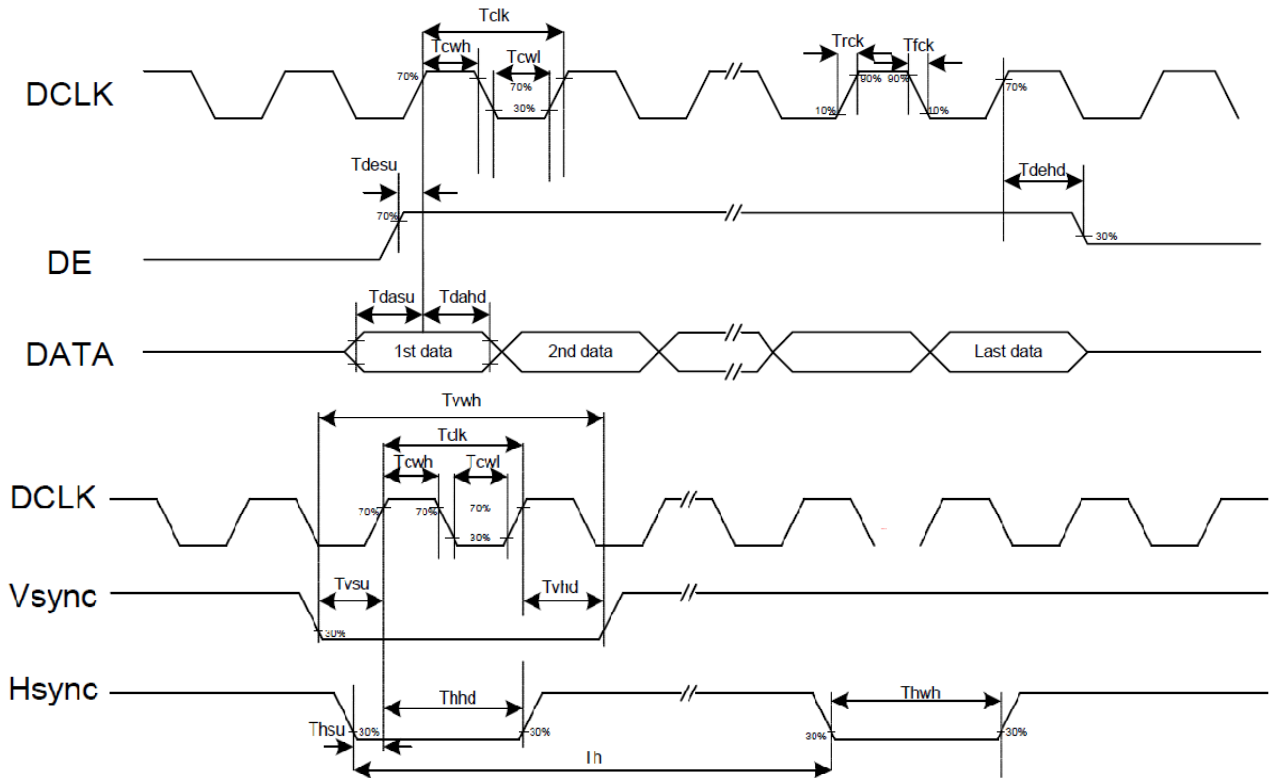
8. Command/AC Timing

8.1 Input Signal Characteristics

(VDDIO=VDD=3.0 to 3.6V, GND=0V, TA= -20 to +85°C)

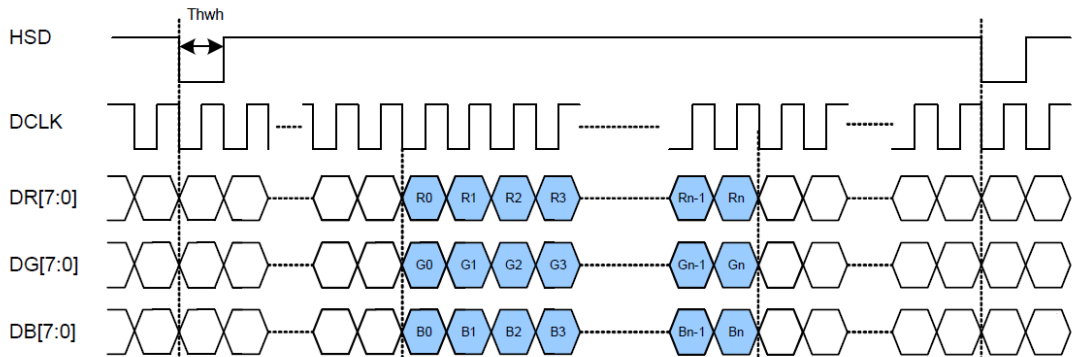
Parameters	Symbol	Min.	Typ.	Max.	Unit	Conditions
System operation timing						
VDD power source slew time	TPOR	-	-	20	ms	From 0V to 99% VDD
GRB pulse width	tRSTW	10	50	-	us	R=10Kohm, C=1uF
Input output timing						
DCLK clock time	tclk	33.3	-	-	ns	DCLK=30MHz
DCLK clock low period	tcwl	40	-	60	%	
DCLK clock high period	tcwh	40	-	60	%	
Clock rising time	trck	9	-	-	ns	
Clock falling time	tfck	9	-	-	ns	
HSD width	thwh	1	-	-	DCLK	
HSD period time	th	55	60	65	us	
HSD setup time	thsu	12	-	-	ns	
HSD hold time	thhd	12	-	-	ns	
VSD width	tvwh	1	-	-	th	
VSD setup time	tvsu	12	-	-	ns	
VSD hold time	tvhd	12	-	-	ns	
Data setup time	tdasu	12	-	-	ns	
Data hold time	tdahd	12	-	-	ns	
DE setup time	tdesu	12	-	-	ns	
DE hold time	tdehd	12	-	-	ns	
Source output setting time	tsst	-	-	12	us	10% to 90%, CL=60pF, RL=2Kohm
Gate output setting time	tgst	-	-	1200	ns	10% to 90%, CL=60pF
VCOM output setting time	tcst	-	-	12	us	10% to 90%, CL=40nF, RL=50ohm
Time from VSD to 1 st line data input	tvS	3	8	31	th	HV mode By HDL[4:0] setting

8.2 Clock and Data Input Waveforms

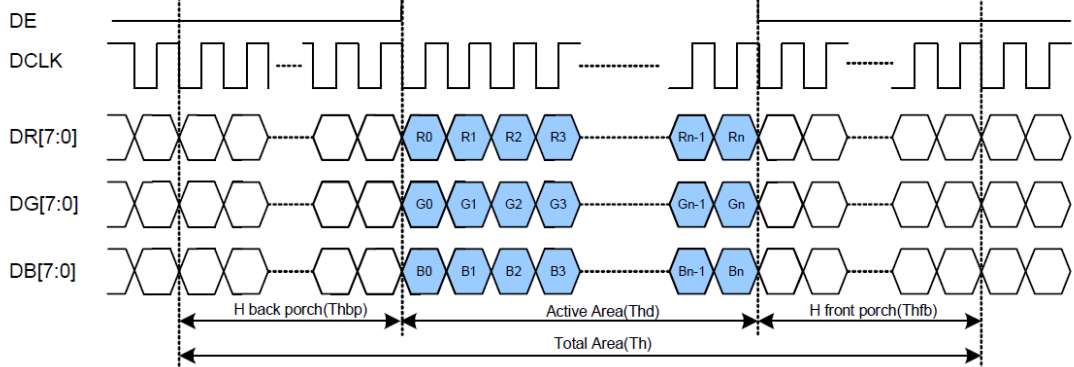


8.3 Parallel RGB Mode Data Format

(HV Mode)



(DE Mode)



Parallel RGB input timing table

Parameter	Symbol	Min.	Typ.	Max.	Unit
DCLK Frequency	fclk	5	9	12	MHz
VSD period time	tv	277	288	400	H
VSD display area	tvd	272			H
VSD back porch	tvb	3	8	31	H
VSD front porch	tvfp	2	8	97	H
HSD period time	th	520	525	800	DCLK
HSD display time	thd	480			DCLK
HSD back porch	thbp	36	40	255	DCLK
HSD front porch	thfp	4	5	65	DCLK

 9. Optical Specification

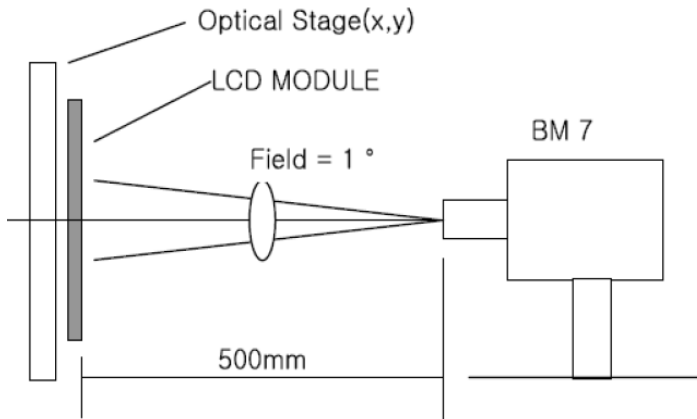
Ta=25°C

Item	Symbol	Condition	Min	Typ.	Max.	Unit	Remark	
Contrast Ratio	CR	$\theta=0^\circ$	350	500	-		Note1 Note2	
Response Time	Ton+Toff	25°C	-	20	30	ms	Note1 Note3	
View Angles	ΘT	CR \geq 10	40	50	-	Degree	Note 4	
	ΘB		60	70	-			
	ΘL		60	70	-			
	ΘR		60	70	-			
Chromaticity	White	Brightness is on	Typ-0.05	0.298	Typ+0.05		Note5, Note1	
				y				0.331
	Red			x				0.607
				y				0.330
	Green			x				0.278
				y				0.546
	Blue			x				0.141
				y				0.158
Luminance	L		-	500	-	cd/m ²	Note1 Note6	
Uniformity	U		75	80	-	%	Note1 Note7	

Note 1: Definition of optical measurement system.

 Temperature = 25°C ($\pm 3^\circ\text{C}$),

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

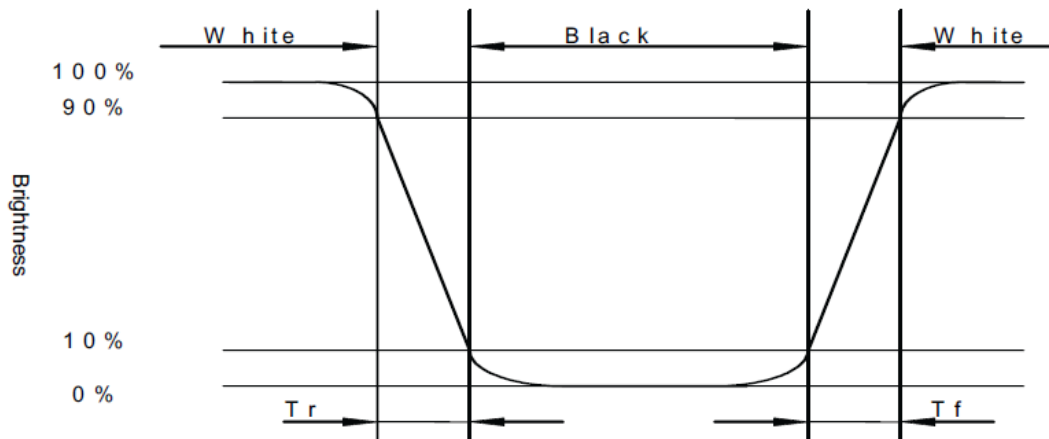


Note 2: Contrast ratio is defined as follow:

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

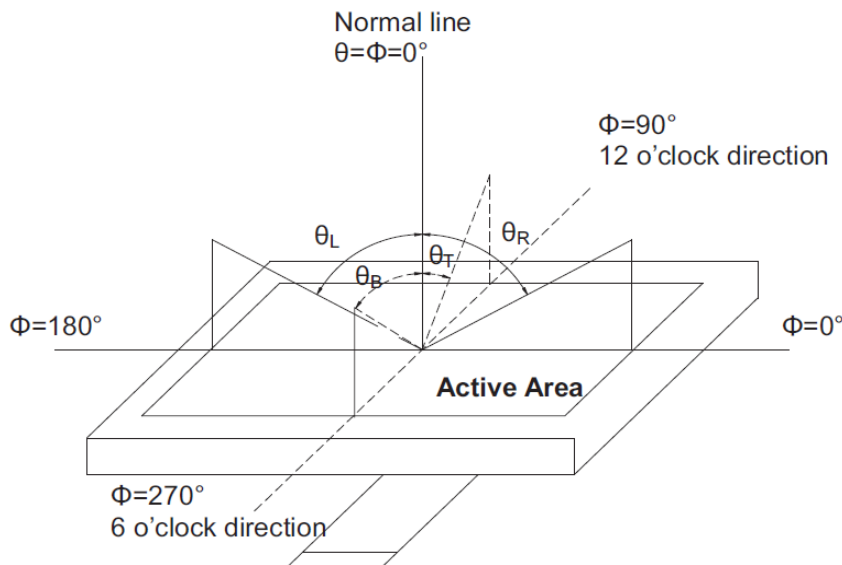
Note 3: Response time is defined as follow:

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).



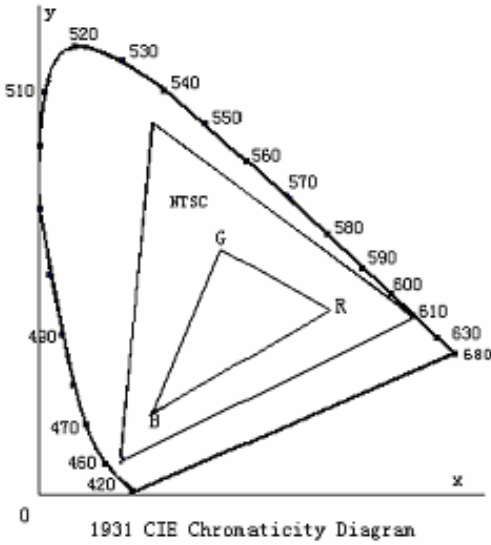
Note 4: Viewing angle range is defined as follow:

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.

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

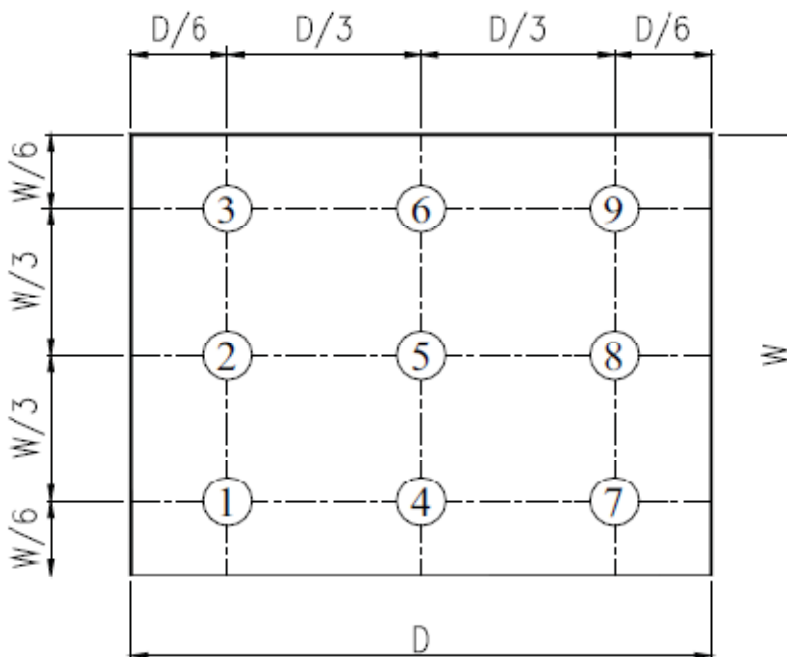


Fig. 2 Definition of uniformity

10. Environmental / Reliability Tests

No	Test Item	Condition	Judgment criteria
1	High Temp Operation	Ta= +70°C, 96hrs	Per table in below
2	Low Temp Operation	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 hrs	Per table in below (polarizer discoloration is excluded)
6	Thermal Shock (Non-operation)	-30°C 30 min~+80°C 30 min, Change time:5min, 5Cycles	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

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

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.

