

**DLC Display Co., Limited**

德爾西顯示器有限公司



MODEL No: DLC0141AEOG

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### Record of Revision

Date	Revision No.	Summary
2019-03-27	1.0	Rev 1.0 was issued

### 1. Scope

This data sheet is to introduce the specification of DLC0141AEOG, AMOLED display module. It is composed of an AMOLED panel, driver IC and FPC. The 1.41" display area contains 320 (RGB) x 360 pixels.

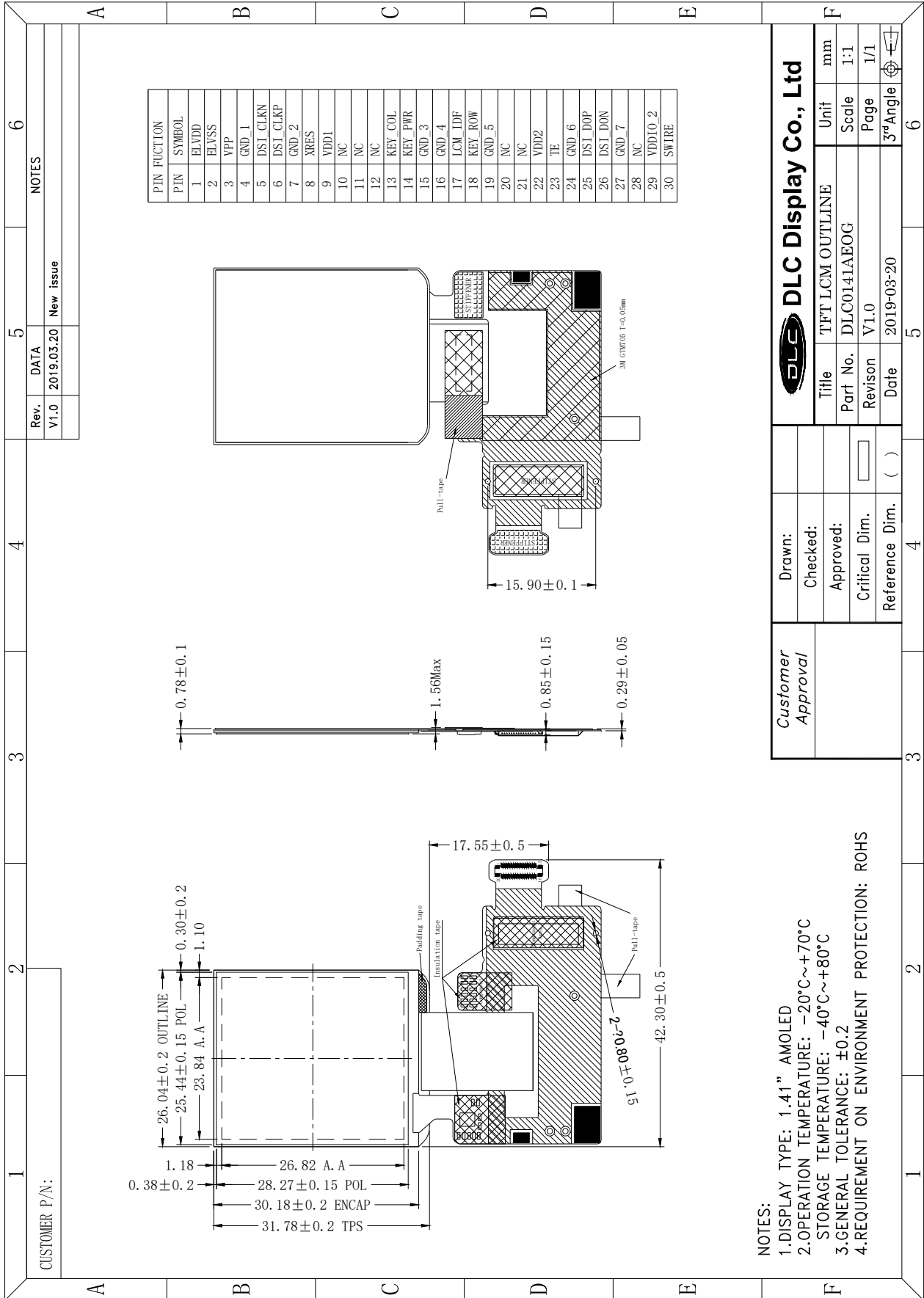
### 2. Application

Digital equipments which need display, instrumentation, remote control, electronic product.

### 3. General Information

Item	Contents	Unit
Size	1.41	inch
Display Technology	AMOLED	/
Resolution	320(RGB) × 360	/
Display Color	16.7M	/
Interface	MIPI	/
Outline Dimension	26.04 x 31.78 x 0.78	mm
Active Area	23.84 x 26.82	mm
Driver IC	RM67162	/
Operating Temperature	-20°C ~ +70°C	/
Storage Temperature	-40°C ~ +80°C	/

### 4. Outline Drawing



5. Interface signals

Pin NO.	Pin Name	Description
1	ELVDD	Power supply for OLED
2	ELVSS	Power supply for OLED
3	VPP	Power supply for OTP. Leave the pin to open when not in use.
4	GND_1	Ground
5	DSI_CLKN	MIPI DSI clock-
6	DSI_CLKP	MIPI DSI clock+
7	GND_2	Ground
8	XRES	This signal will reset the device and must be applied to properly initialize the chip. Active low.
9	VDD1	Driver IC analog supply.
10	NC	NO connection
11	NC	NO connection
12	NC	NO connection
13	KEY_COL	
14	KEY_PWR	
15	GND_3	Ground
16	GND_4	Ground
17	LCM_IDF	
18	KEY_ROW	
19	GND_5	Ground
20	NC	NO connection
21	NC	NO connection
22	VDD2	Driver IC analog supply
23	TE	Tear effect output
24	GND_6	Ground
25	DSI_D0P	MIPI DSI data0+
26	DSI_D0N	MIPI DSI data0-
27	GND_7	Ground
28	NC	NO connection
29	VDDIO_2	Driver IC digital I/O supply
30	SWIRE	Power IC control signal

## 6. Environment Conditions

### 6.1 Electrical Absolute max. ratings

Parameter	Symbol	MIN	MAX	Unit	Remark
Supply voltage	VCI	-0.3	5.5	V	
	VDDIO	-0.3	5.5	V	

### 6.2 Environment Conditions

Item	Symbol	MIN	MAX	Unit	Remark
Operating Temperature	TOPR	-20	70	°C	
Storage Temperature	TSTG	-40	80	°C	

## 7. Electrical Specifications

### 7.1 Electrical characteristics

Item	Symbol	MIN	TYP	MAX	Unit	Remark
AMOLED Power positive	ELVDD	4.55	4.6	4.65	V	
AMOLED Power negative	ELVSS	-2.45	-2.4	-2.35	V	
Digital power supply	VDDIO	1.65	1.8	1.95	V	
Analog power supply	VCI	2.7	2.8	2.9	V	

#### 7.1.1 Normal Mode

Power Supply: IOVCC=1.8V, VCI=2.8V

Frame Frequency: Fframe=60Hz@25degC, Brightness 350 nits, Video Mode.

Display Condition	Symbol	MIN	TYP	MAX	Unit	Remark
100% Pixel On 350nits	IELVDD /ELVSS	-	16	19	mA	Ref
	IVCI	-	6.0	7.2	mA	Ref
	IVDDIO	-	5.8	6.0	mA	Ref
50% Pixel On 175nits	IELVDD /ELVSS	-	8	9.5	mA	Ref
	IVCI	-	6.6	8	mA	Ref
	IVDDIO	-	5.8	6.0	mA	Ref

#### 7.1.2 Idle Mode

Power Supply: IOVCC=1.8V, VCI=2.8V

Frame Frequency: Fframe=15Hz@25degC, Brightness 30 nits

Display Condition	Symbol	MIN	TYP	MAX	Unit	Remark
10% Pixel On 30nits	IELVDD /ELVSS	-	-	-	mA	Supplied by Driver IC
	IVCI	-	5	6.5	mA	Ref
	IVDDIO	-	0.5	1	mA	Ref

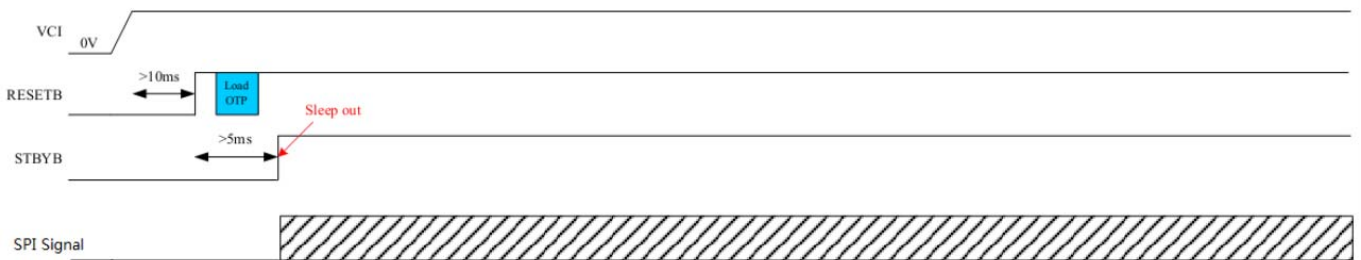
### 7.1.3 Deep Standby Mode

Display Condition	Symbol	MIN	TYP	MAX	Unit	Remark
Deep Standby	IVCI	-	-	3	uA	
	IVDDIO	-	-	3	uA	

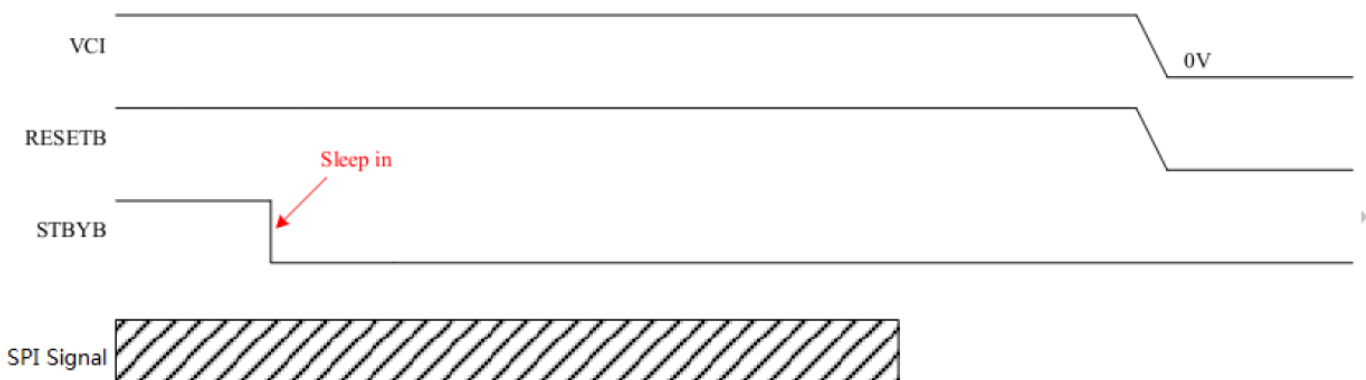
## 8. Command/AC Timing

### 8.1 Recommended Operating Sequence

#### 8.1.1 Power on sequence



#### 8.1.2 Power off sequence



### 8.2 Timing Requirements for RESETB

When RESETB of the reset pin equals to Low, it will be in the condition of reset.

When it is in the condition of reset, it will make the device recover the initial set.

However, in order to avoid the reset noise cause reset, there is a mechanism to judge about whether the reset is needed or not.

The closed interval of Low can be shown as the following.

(Test condition: VDDIO=1.65V~3.6V, VSS=0V, TA=-20°C~+70°C)

Parameter	Symbol	MIN	TYP	MAX	Unit	Condition
Reset low pulse width	trst	20	-	-	μs	

Table: Reset timing

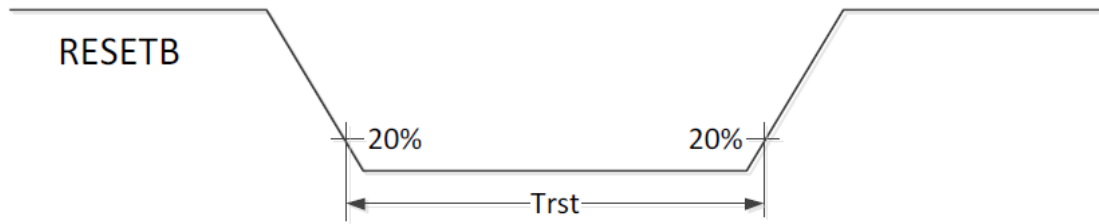


Figure: Reset timing

## 9. Optical Specification

Item	Symbol	Condition	Min	Typ.	Max.	Unit	Remark	
Contrast Ratio	CR	$\theta=0^\circ$	10000	-	-		Note1 Note2	
View Angles	$\theta T$	$CR \geq 10$	80	-	-	Degree	Note 4	
	$\theta B$		80	-	-			
	$\theta L$		80	-	-			
	$\theta R$		80	-	-			
Optical Switching Time	Ton/Toff	25°C	-	2	4	ms	Note1 Note3	
Chromaticity	White	Brightness is on	x	0.28	0.30	0.32		Note5, Note1
			y	0.29	0.31	0.33		
	Red		x	0.63	0.66	0.69		
			y	0.31	0.34	0.37		
	Green		x	0.16	0.21	0.26		
			y	0.68	0.73	0.78		
	Blue		x	0.09	0.13	0.17		
			y	0.02	0.06	0.10		
Luminance	L		300	350	385	cd/m <sup>2</sup>	Note1 Note6	
Brightness Uniformity			80	-	-	%	Note7	
OLED Life Time	$L > 92\% @ 25^\circ C$		100	-	-		Note8	
Gamma			2.0	2.2	2.4			
NTSC			90	105	-	%		

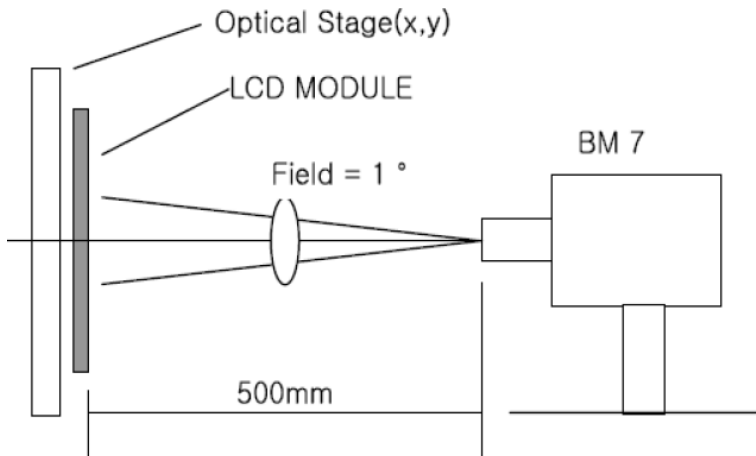
(Test condition: 25°C±3°C, 65±20%RH, darkroom.)



Note 1: Definition of optical measurement system.

Temperature = 25°C(±3°C)

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

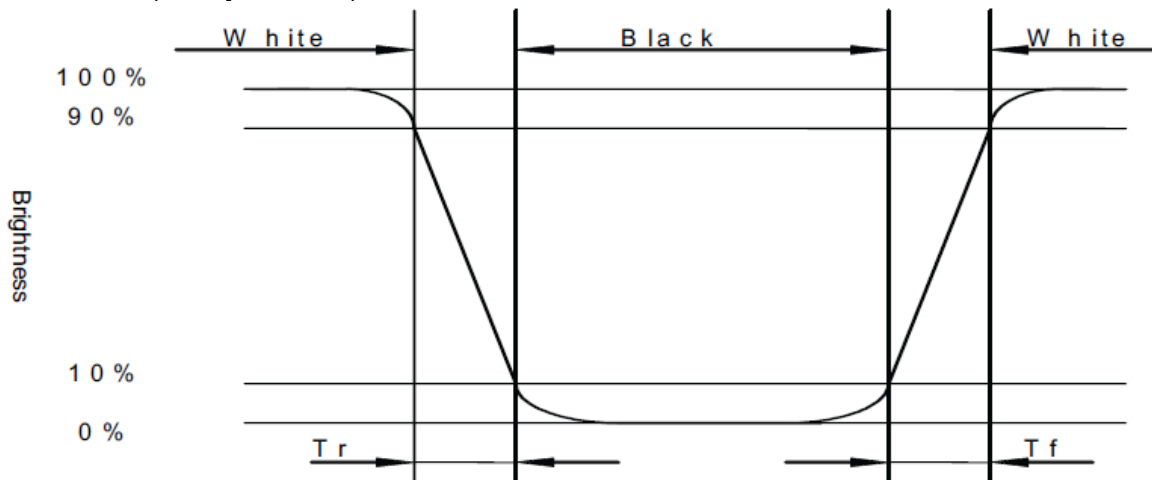


Note 2: Contrast ratio is defined as follow:

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

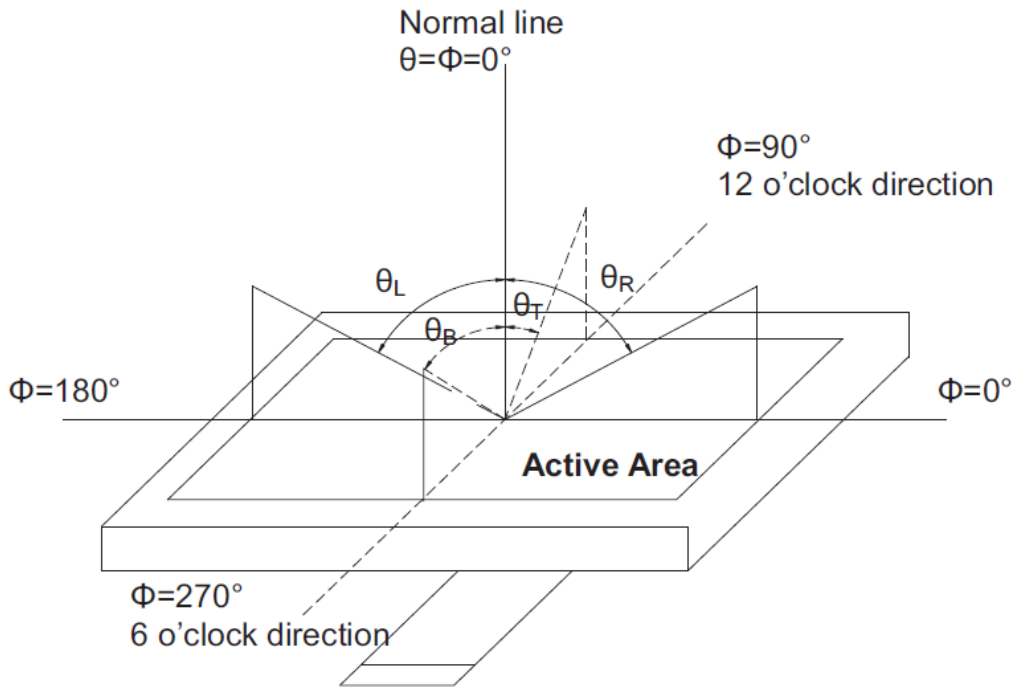
Note 3: Response time is defined as follow:

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,  $T_f$ ).



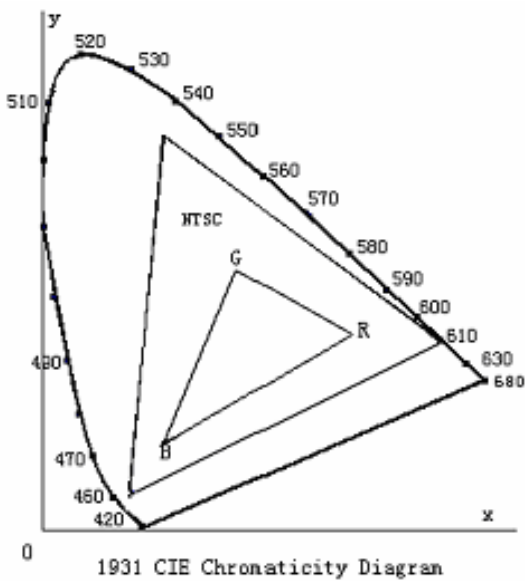
Note 4: Viewing angle range is defined as follow:

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.

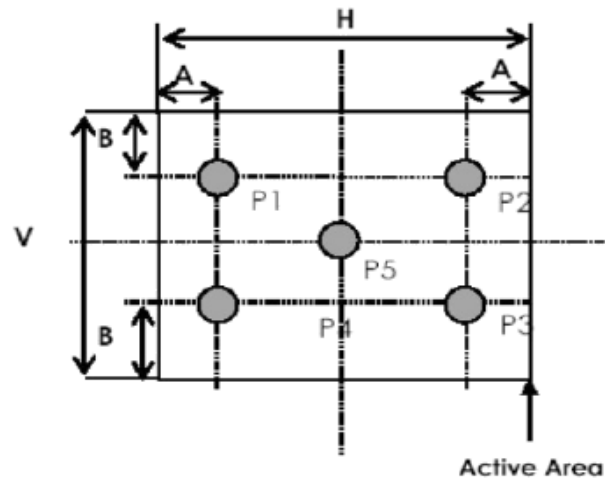


$$S = \frac{\text{area of RGB triangle}}{\text{area of NTSC triangle}} \times 100\%$$

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: Uniformity. Refer to figure as below



A:  $1/4H$   
B:  $1/4V$   
H.V: Active Area

### Note 8: Life Time

OLED life time is defined by the Minimum Duration Time that the luminance is decayed to a specific ratio (ex. 95%) of initial state.

Test Pattern under duration period: L255 White

## 10. Environmental / Reliability Tests

No	Test Item	Condition	Judgment criteria
1	High Temp Operation	Ts=+70°C, 120hrs	Per table in below
2	Low Temp Operation	Ta=-20°C, 120hrs	Per table in below
3	High Temp Storage	Ta=+80°C, 120hrs	Per table in below
4	Low Temp Storage	Ta=-40°C, 120hrs	Per table in below
5	High Temp & High Humidity Storage	Ta=+60°C, 93% RH 120 hours	Per table in below (polarizer discoloration is excluded)
6	Thermal Shock (Non-operation)	-40°C ~80°C, Dwell for 30 min. 50 cycles	Per table in below
7	ESD (Operation)	Air Discharge: ±2 kV, 150pF/330Ω (Module level; without CG) Contact Discharge: ±2kV, 150pF/330Ω (Module level; without CG)	Per table in below
8	Vibration	2g, f=10->55->10Hz apply in each of X, Y, and Z direction for 30 min	Per table in below
9	Package Drop Test	Drop the packing from 60cm height, 6-faces, 3-edges and 1-corner(one time for each)	Per table in below

INSPECTION	CRITERION(after test)
Appearance	No Crack on the FPC, on the OLED Panel
Alignment of OLED Panel	No Bubbles in the OLED Panel No other Defects of Alignment in Active area
Electrical current	Within device specifications Current consumption: within · 50% of initial value.
Function / Display	No Broken Circuit, No Short Circuit or No Black line No Other Defects of Display

## 11. Precautions for Use of OLED Modules

### 11.1 Safety

The liquid crystal in the OLED 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 OLED 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 OLED 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.

