

DLC Display Co., Limited

德爾西顯示器有限公司



MODEL No: DLC1010ABP42QF-1

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Record of Revision

Date	Revision No.	Summary
2020-02-29	1.0	Rev 1.0 was issued
2020-06-17	1.1	Modify interface type page 3
2022-09-01	1.2	Add Command/AC timing page 7

1. Scope

This data sheet is to introduce the specification of DLC1010ABP42QF-1 active matrix TFT module. It is composed of a color TFT-LCD panel, driver ICs, FPC and a backlight unit. The 10.1" display area contains 1024(RGB) x 600 pixels.

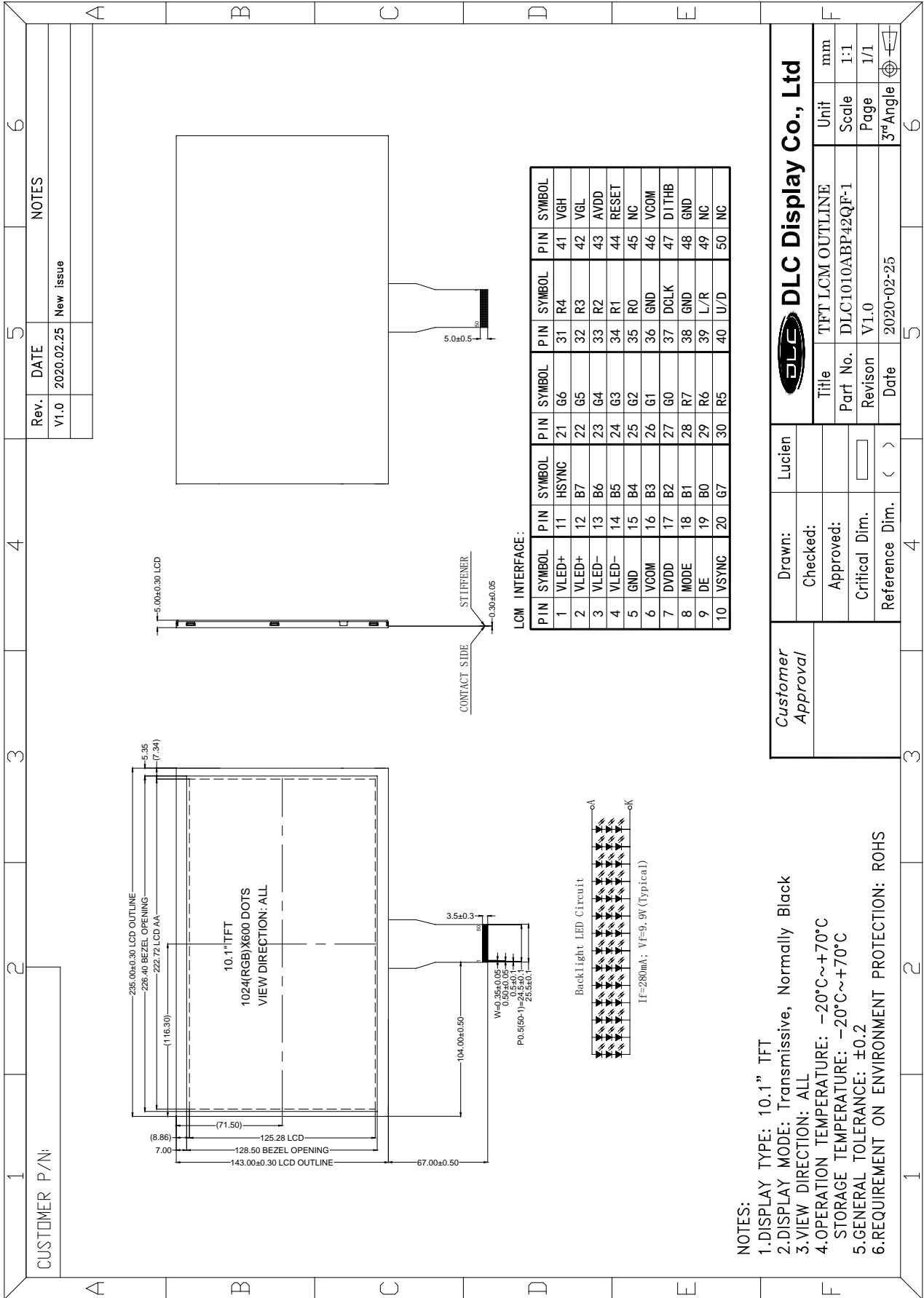
2. Application

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

3. General Information

Item	Contents	Unit
Size	10.1	inch
Resolution	1024(RGB) x 600	/
Interface	RGB	/
Technology type	IPS	/
Pixel pitch	0.1695 x 0.1695	mm
Pixel Configuration	RGB stripes	
Outline Dimension (W x H x D)	235.00 x 143.00 x 5.00	mm
Active Area	222.72 x 125.28	mm
Display Mode	Transmissive, Normally Black	/
Backlight Type	LED	/
Viewing Direction	ALL	/

4. Outline Drawing



5. Interface signals

Pin No.	Symbol	Function	Remark
1~2	VLED+	Power for LED backlight (Anode)	
3~4	VLED-	Power for LED backlight (Cathode)	
5	GND	Ground	
6	VCOM	Common voltage (3.3V)	
7	DVDD	Power supply for digital circuit	
8	MODE	DE/SYNC mode select	
9	DE	Data enable input	
10	VSYNC	Vertical Sync input	
11	HSYNC	Horizontal Sync input	
12~19	B7 – B0	Blue data bit	
20~27	G7 – G0	Green data bit	
28~35	R7 – R0	Red data bit	
36	GND	Ground	
37	DCLK	Dot data clock	
38	GND	Ground	
39	L/R	Left / Right selection	
40	U/D	Up / Down selection	
41	VGH	Gate On voltage (18V)	
42	VGL	Gate Off voltage (-8.0V)	
43	AVDD	Power for analog circuit (10.3V)	
44	RESET	Reset pin, this is an active low signal	
45	NC	No connection	
46	VCOM	Common voltage (3.3V)	
47	DITHB	Dithering function	
48	GND	Ground	
49~50	NC	No connection	

6. Absolute maximum Ratings

6.1. Electrical Absolute max. ratings

Parameter	Symbol	MIN	MAX	Unit	Remark
Power supply voltage	VCC	-0.3	3.6	V	
Logic signal input / output voltage	VioVCC	-0.3	VCC+0.5	V	
Power supply voltage for LCD	Vop	0	3.6	V	

Notes:

1. If the module is above these absolute maximum ratings. It may become permanently damaged. Using the module within the following electrical characteristic conditions are also exceeded, the module will malfunction and cause poor reliability.
2. VCC >VSS must be maintained.
3. Please be sure users are grounded when handing LCD Module.

6.2. Environment Conditions

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

Notes:

1. The response time will become lower when operated at low temperature.
2. Background color changes slightly depending on ambient temperature. The phenomenon is reversible.

7. Electrical Specifications

7.1 Electrical characteristics

GND=0V, Ta=25°C

Item	Symbol	MIN	TYP	MAX	Unit	Remark
Power Voltage	VCC	2.6	3.3	3.6	V	
Input Logic Voltage	VIL	0	--	0.2*VCC	V	
	VIH	0.8*VCC	--	VCC	V	
Current consumption	Icc1 Normal mode	--	--	--	mA	Note 2
	Icc2 Sleep mode	--	0.03	0.09	mA	

Notes:

1. When an optimum contrast is obtained in transmissive mode.
2. Tested in 1×1 chessboard pattern.

7.2 LED Backlight

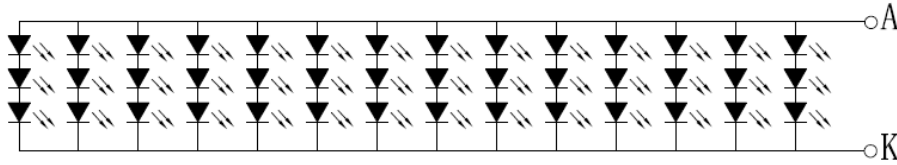
Ta=25°C

Item	Symbol	MIN	TYP	MAX	Unit	Remark
Voltage for LED backlight	VL	9.0	9.9	10.5	V	Note 1
Current for LED backlight	IL	--	280	--	mA	
LED life time	-	--	30,000	--	Hr	Note 2

Notes:

1. The LED Supply Voltage is defined by the number of LED at Ta=25°C and IL=280mA.
2. The "LED life time" is defined as the module brightness decrease to 50% original brightness at Ta=25°C and IL =280mA. The LED lifetime could be decreased if operating IL is larger than 280mA.

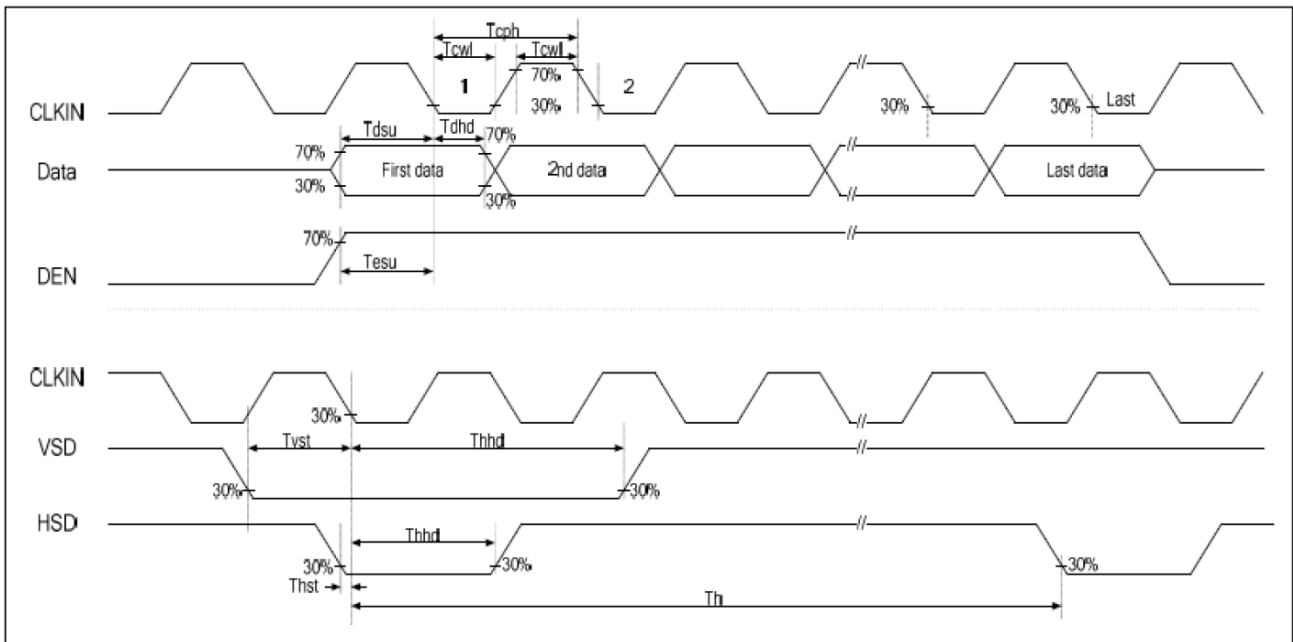
Backlight LED Circuit


 $I_f=280\text{mA}; V_f=9.9\text{V(Typical)}$

8. Command/AC Timing

8.1 AC Electrical Characteristics

Parameter	Symbol	Min	Typ	Max	Unit
HS setup time	thst	5	-	-	ns
HS hold time	thhd	5	-	-	ns
VS setup time	tvst	5	-	-	ns
VS hold time	tvhd	5	-	-	ns
Data setup time	tdsu	5	-	-	ns
Data hold time	tdhd	5	-	-	ns
DE setup time	tesu	5	-	-	ns
DE hold time	tehd	5	-	-	ns
VDD power on slew rate	tpor	-	-	20	ms
CLKIN cycle time	tcph	14	-	-	ns
CLKIN pulse duty	tcwh	40	50	60	%
Output stable time	tsst	-	-	3	us



8.2 Parallel RGB Input Timing Table

DE Mode

Parameter	Symbol	Min	Typ	Max	Unit
DCLK frequency Frame rate=60Hz	fclk	42.6	51.2	67.2	MHz
Horizontal display area	thd	1024			DCLK
HSYNC period time	th	1164	1344	1400	DCLK
HSYNC blanking	thb+thfp	140	320	376	DCLK s
Vertical display area	tvd	600			H
VSYNC period time	tv	610	635	800	H
VSYNC blanking	tvb+tvfp	10	35	200	H

HV Mode

Horizontal input timing

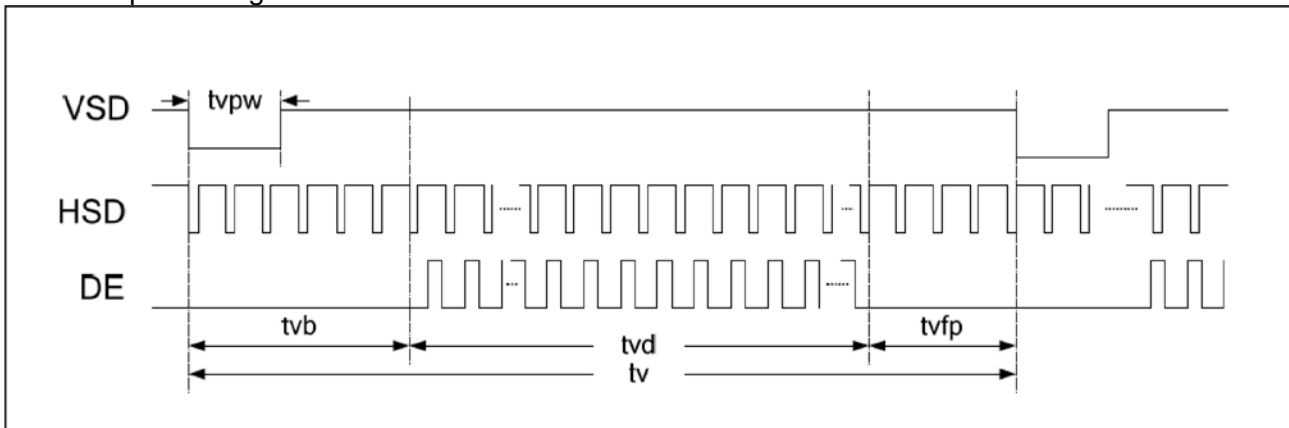
Parameter	Symbol	Min	Typ	Max	Unit
DCLK frequency Frame rate=60Hz	fclk	44.9	51.2	63	MHz
Horizontal display area	thd	1024			DCLK
1 Horizontal line	th	1200	1344	1400	DCLK
HSYNC pulse width	thpw	1	-	140	DCLK
HSYNC blanking	thb	160	160	160	DCLK
HSYNC front porch	thfp	16	160	216	DCLK

Vertical input timing

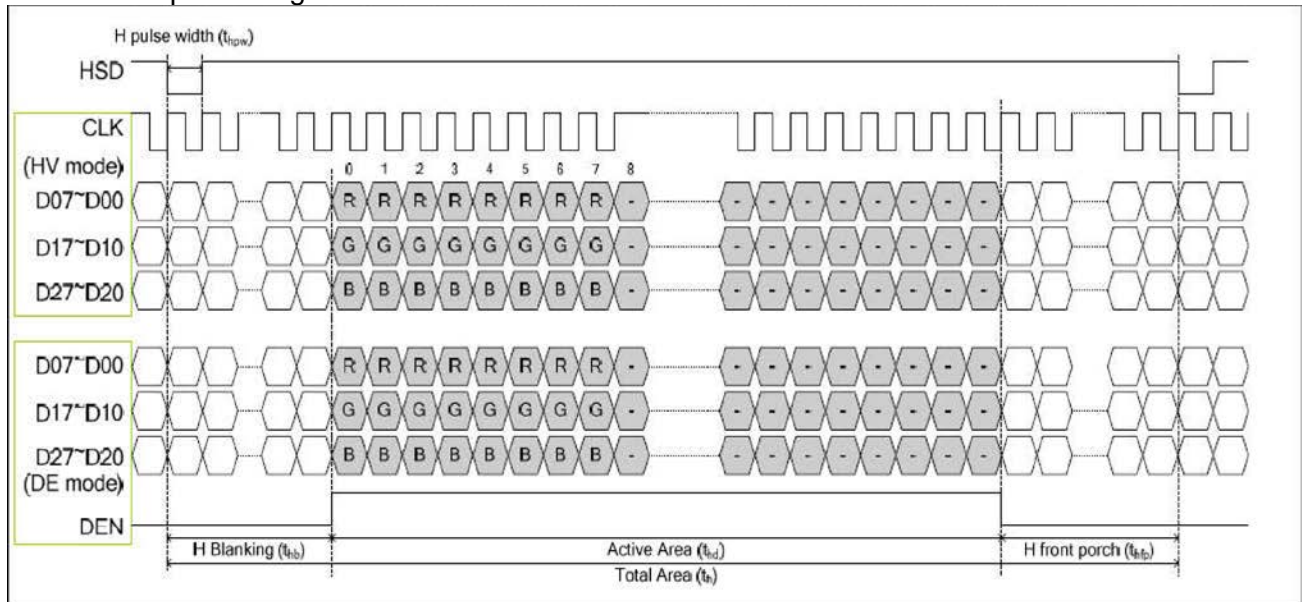
Parameter	Symbol	Min	Typ	Max	Unit
Vertical display area	tvd	600			H
VSYNC period time	tv	624	635	750	H
VSYNC pulse width	tpw	1	-	20	H
VSYNC blanking	tvb	23	23	23	H
VSYNC front porch	tvfp	1	12	127	H

8.3 Data Input Format

Vertical input Timing

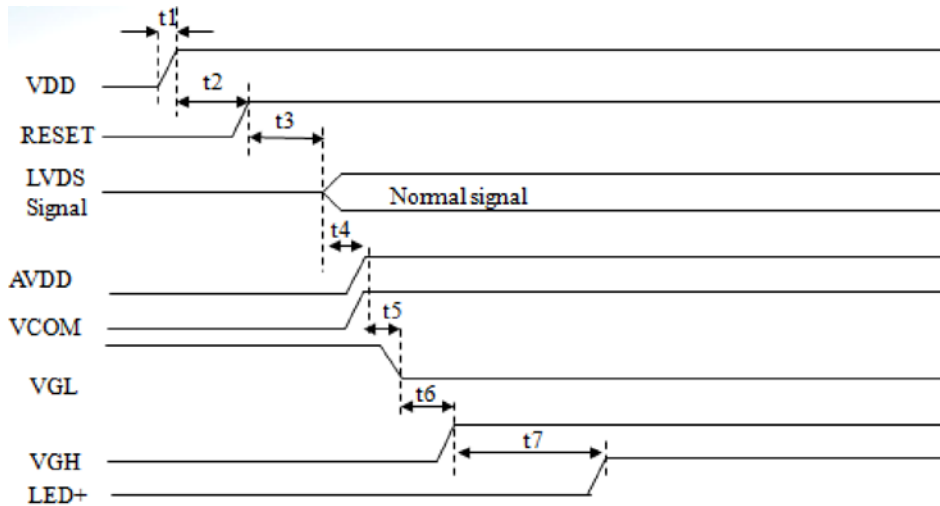


Horizontal input Timing



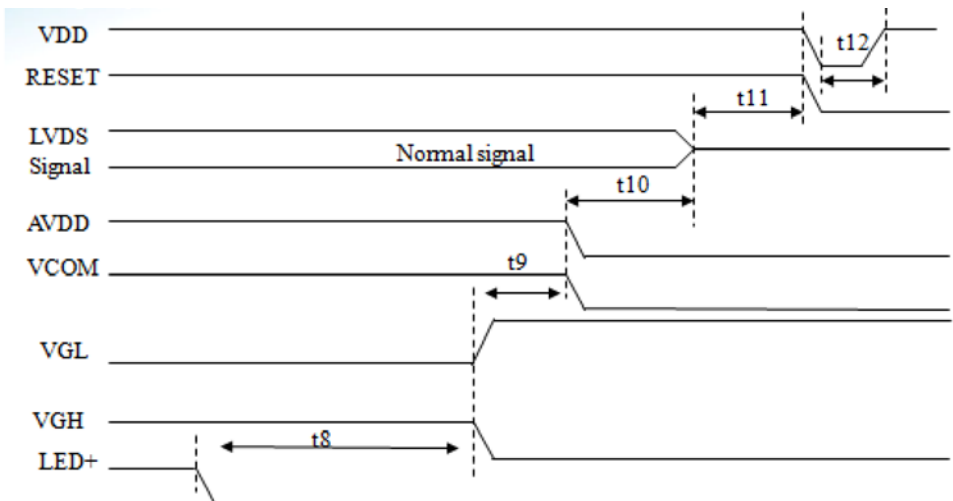
8.4 Power Sequence

Power On



Symbol	SPEC			Unit
	Min.	Typ.	Max.	
t1	1	10	20	ms
t2	1	10(RC Delay)	12	ms
t3	30	50	100	ms
t4	0.1	5	20	ms
t5	20	70	120	ms
t6	40	90	140	ms
t7	150	170	200	ms

Power Off



Symbol	SPEC			Unit
	Min.	Typ.	Max.	
t8	120	150	200	ms
t9	50	100	200	ms
t10	1	10	20	ms
t11	0.1	10	100	ms
t12	500	-	-	ms

9. Optical Specification

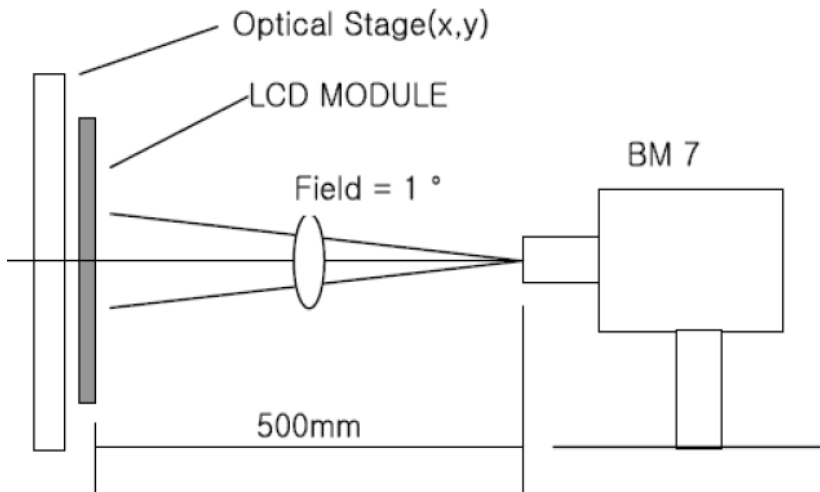
Ta=25°C

Item	Symbol	Condition	Min	Typ.	Max.	Unit	Remark
Contrast Ratio	CR	$\theta=0^\circ$	--	1000	--		Note1 Note2
Response Time	Tr + Tf	25°C	--	25	--	ms	Note1 Note3
View Angles	ΘT	CR \geq 10	--	80	--	Degree	Note 4
	ΘB		--	80	--		
	ΘL		--	80	--		
	ΘR		--	80	--		
Chromaticity	White	x	Brightness is on	--	TBD	--	Note5, Note1
		y		--	TBD	--	
Luminance	L		450	500	-	cd/m2	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

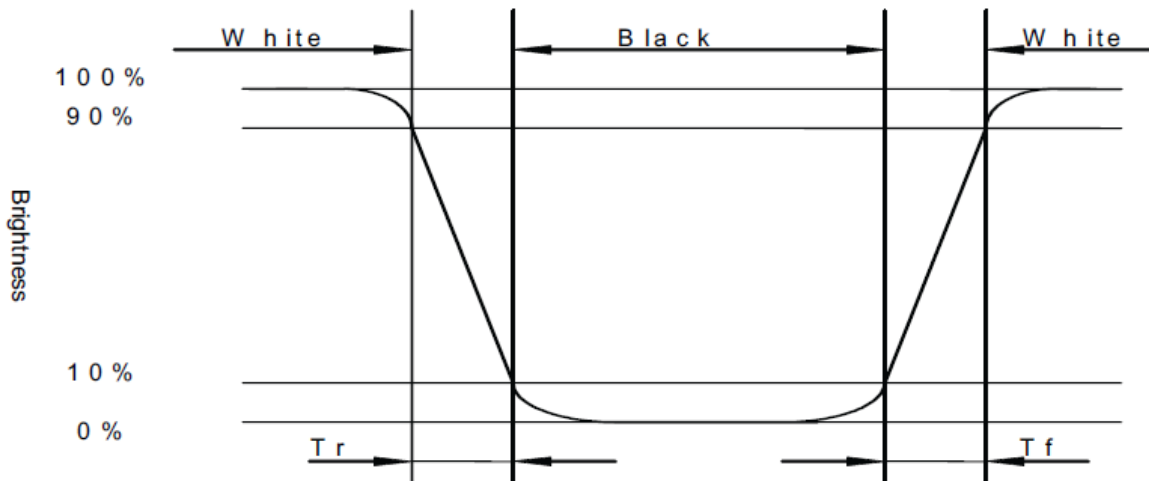


Note 2: Contrast ratio is defined as follow:

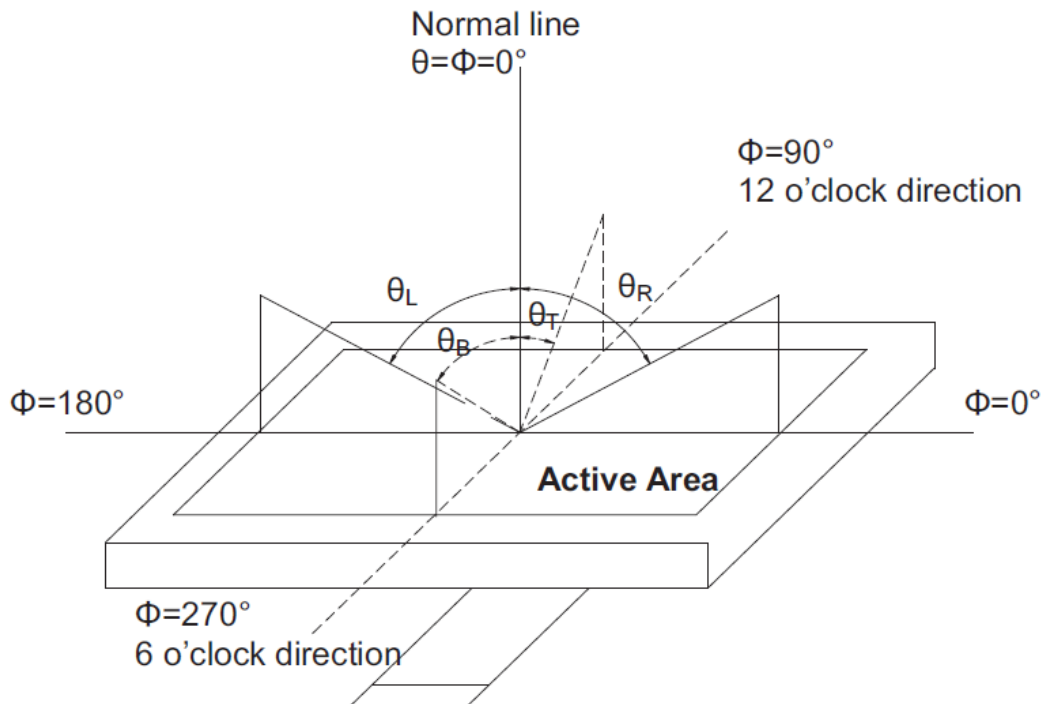
$$\text{Contrast Ratio} = \frac{\text{Surface Luminance with all white pixels}}{\text{Surface Luminance with all black pixels}}$$

Note 3: Response time is defined as follow:

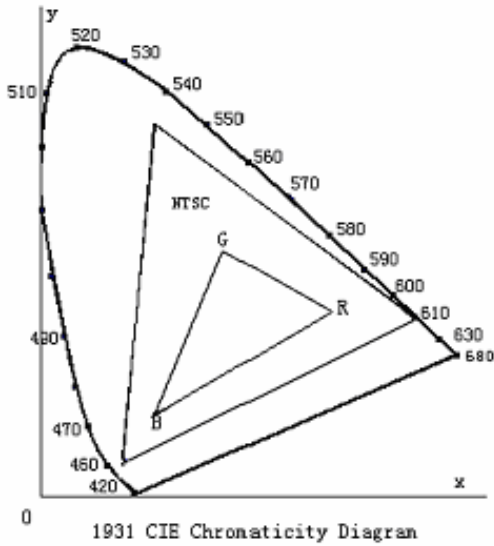
Response time is the time required for the display to transition from black to white (Rise Time, Tr) and from white to black (Decay Time, Tf).



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.

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

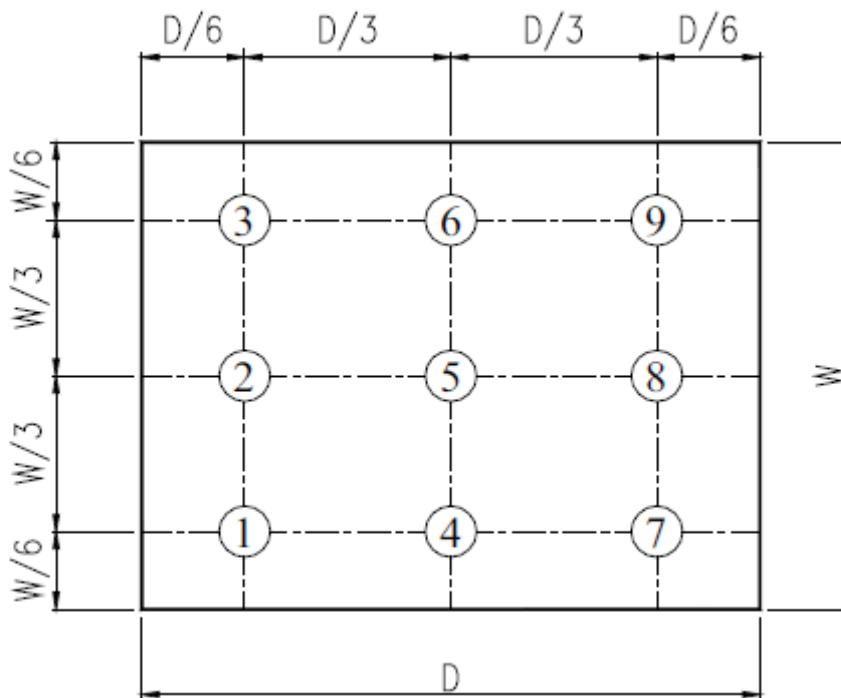


Fig. 2 Definition of uniformity

10. Environmental / Reliability Tests

No	Test Item	Condition	Judgment criteria
1	High Temp Operation	Ts=+70°C, 96hrs	Per table in below
2	Low Temp Operation	Ta=-20°C, 96hrs	Per table in below
3	High Temp Storage	Ta=+70°C, 96hrs	Per table in below
4	Low Temp Storage	Ta=-20°C, 96hrs	Per table in below
5	High Temp & High Humidity Storage	Ta=+60°C, 90% RH, 96hours	Per table in below (polarizer discoloration is excluded)
6	Thermal Shock (Non-operation)	-20°C 30 min~+70°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:60 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.

