

DLC Display Co., Limited

德爾西顯示器有限公司



MODEL No:DLC1025ABP40LF-1

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Record of Revision

Date	Revision No.	Summary
2018-10-31	1.0	Rev 1.0 was issued
2019-06-24	1.1	Modify Pixel pitch page3

1. Scope

This data sheet is to introduce the specification of DLC1025ABP40LF-1 active matrix TFT module. It is composed of a color TFT-LCD panel, driver IC, FPC and a backlight unit. The 10.25" display area contains 1920 (RGB) x 720 pixels.

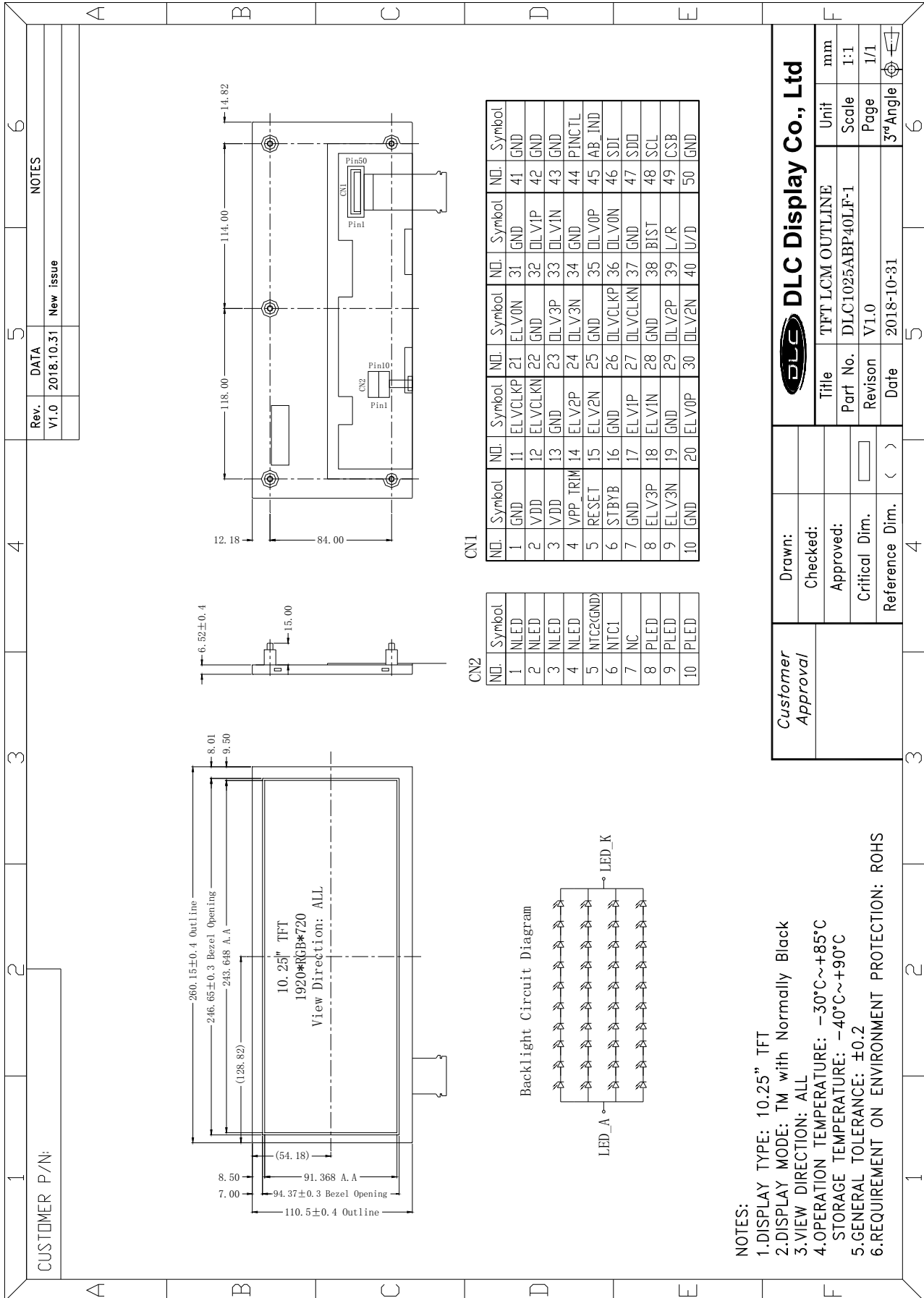
2. Application

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

3. General Information

Item	Contents	Unit
Size	10.25	inch
Resolution	1920(RGB) x 720	/
Interface	2-Port LVDS (DE mode)	/
Technology type	a-Si TFT	/
Pixel pitch	0.1269 x 0.1269	mm
Pixel Configuration	R.G.B. Vertical Stripe	
Outline Dimension (W x H x D)	260.15 x 110.50 x 6.52	mm
Active Area	243.648 x 91.368	mm
Display Mode	Transmissive, Normally black	/
Viewing Direction	ALL	/
Backlight Type	LED	/
Weight	380(Max)	g

4. Outline Drawing



NOTES:

- 1.DISPLAY TYPE: 10.25" TFT
- 2.DISPLAY MODE: TM with Normally Black
- 3.VIEW DIRECTION: ALL
- 4.OPERATION TEMPERATURE: -30°C~+85°C
STORAGE TEMPERATURE: -40°C~+90°C
- 5.GENERAL TOLERANCE: ±0.2
- 6.REQUIREMENT ON ENVIRONMENT PROTECTION: ROHS

5. Interface signals

CN1 Interface Signals:

No	Symbol	Description	Remarks
1	GND	Power ground	
2	VDD	Power supply	
3	VDD	Power supply	
4	VPP_TRIM	Power supply (If not use please keep floating.)	
5	RESET	Global reset pin, set logic high for normal display operation	
6	STBYB	Standby mode setting pin, set logic high for normal display operation	
7	GND	Power ground	
8	ELV3P	LVDS even data 3 +	
9	ELV3N	LVDS even data 3 -	
10	GND	Power ground	
11	ELVCLKP	LVDS even clock +	
12	ELVCLKN	LVDS even clock -	
13	GND	Power ground	
14	ELV2P	LVDS even data 2 +	
15	ELV2N	LVDS even data 2 -	
16	GND	Power ground	
17	ELV1P	LVDS even data 1 +	
18	ELV1N	LVDS even data 1 -	
19	GND	Power ground	
20	ELV0P	LVDS even data 0 +	
21	ELV0N	LVDS even data 0 -	
22	GND	Power ground	
23	OLV3P	LVDS odd data 3 +	
24	OLV3N	LVDS odd data 3 -	
25	GND	Power ground	
26	OLVCLKP	LVDS odd clock +	
27	OLVCLKN	LVDS odd clock -	
28	GND	Power ground	
29	OLV2P	LVDS odd data 2 +	
30	OLV2N	LVDS odd data 2 -	
31	GND	Power ground	
32	OLV1P	LVDS odd data 1 +	
33	OLV1N	LVDS odd data 1 -	
34	GND	Power ground	

35	OLV0P	LVDS odd data 0 +	
36	OLV0N	LVDS odd data 0 -	
37	GND	Power ground	
38	BIST	Normal operation/BIST pattern select, set logic low for normal display operation.	
39	L/R	Horizontal shift direction (source output) selection. L/R=1: Left → Right L/R=0: Right → Left.	
40	U/D	Vertical shift direction (gate output) selection. U/D=1: Top → Bottom U/D=0: Bottom → Top	
41	GND	Power ground	
42	GND	Power ground	
43	GND	Power ground	
44	PINCTL	Select Pin/Register control. (default: Customer to Pull high for Pin Control only) PINCTL = 1: Pin/Register control function controlled by Pin. PINCTL = 0: Pin/Register control function controlled by Register.	
45	AB_IND	Abnormal signal detection indicator. Combine the HV / DE / Clock / STV / UVP detection result. (When normal operating, AB_IND is High-Z. When abnormal detected, AB_IND will active.)	
46	SDI	Serial communication data input pin, set logic High if no use.	
47	SDO	Serial communication data output pin, If not use please keep floating.	
48	SCL	Serial communication clock input pin, set logic High if no use.	
49	CSB	Serial communication chip selection, set logic High if no use.	
50	GND	Power ground	

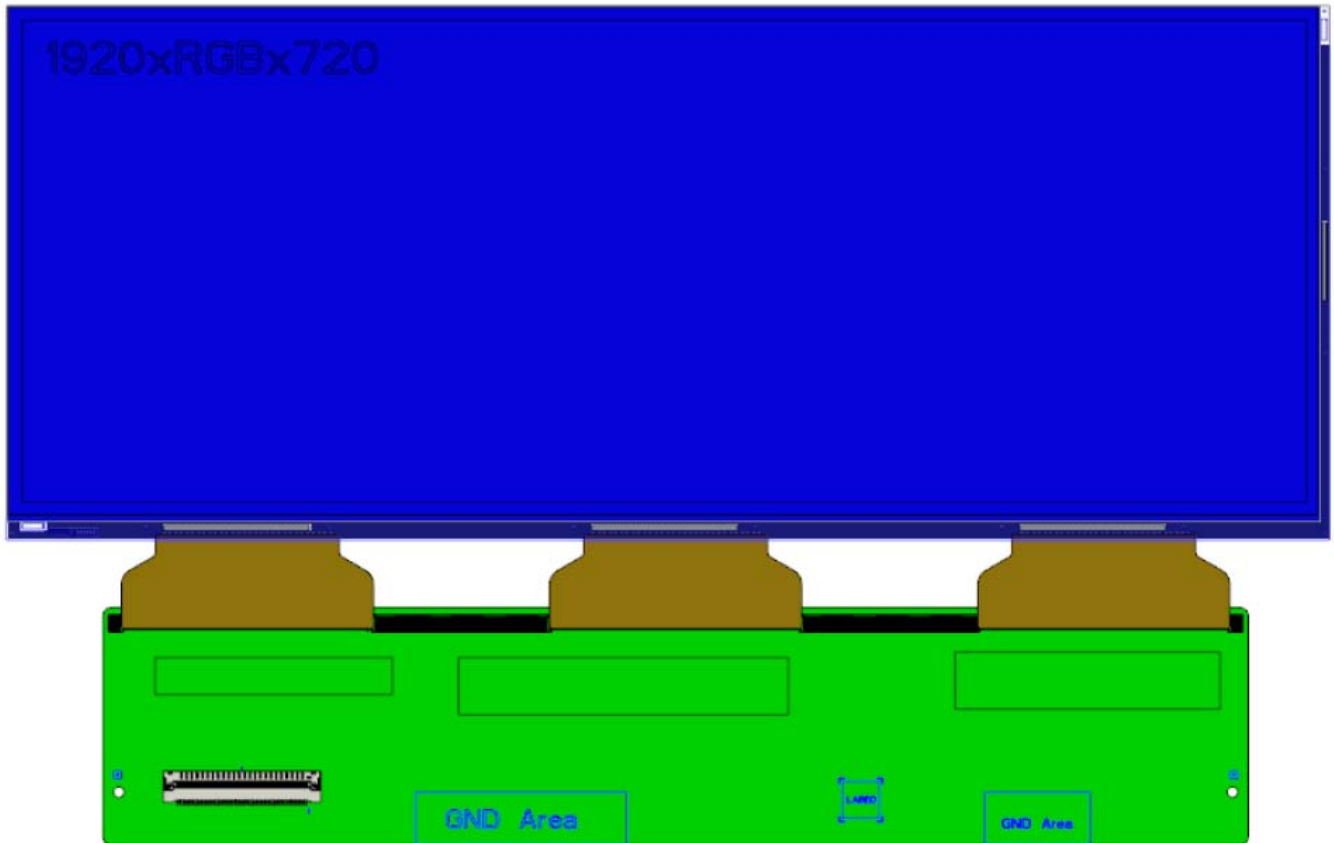
PCBA connector is used for the module electronics interface. The recommended model is 12003S-50Y900 manufactured by IRISO.

CN2 Interface Signals:

No	Symbol	Description	Remarks
1	NLED	LED cathode power supply	
2	NLED	LED cathode power supply	
3	NLED	LED cathode power supply	
4	NLED	LED cathode power supply	
5	NTC2(GND)	Heat sensor	
6	NTC1	Heat sensor	
7	NC	No connection	
8	PLED	LED anode power supply	
9	PLED	LED anode power supply	
10	PLED	LED anode power supply	

The recommended model of FPC Connector is F31L-1A7H1-11010 manufactured by Aorora.

Note1: Definition of scanning direction. Refer to the figure as below:



FPC input direction
The contacts of FPC are face-down.

6. Absolute maximum Ratings

6.1. Electrical Absolute max. ratings

Parameter	Symbol	MIN	MAX	Unit	Remark
Power Supply Voltage	VDD	-0.5	5.0	V	
LED Forward Current	IF	-	150	mA	Each LED

Note1: The absolute maximum rating values of this product are not allowed to be exceeded at any times. Should a module be used with any of the absolute maximum ratings exceeded, the characteristics of the module may not be recovered, or in an extreme case, the module may be permanently destroyed.

6.2. Environment Conditions

Item	Symbol	MIN	MAX	Unit	Remark
Operating Temperature	TOPR	-30	85	°C	
Storage Temperature	TSTG	-40	90	°C	

Note1: This rating applies to all parts of the module and should not be exceeded.

Note2: Maximum wet-bulb temperature is 58°C. Condensation of dew must be avoided as electrical current leaks will occur, causing a degradation of performance specifications.

Note3: The operating temperature only guarantees operation of the LCM and doesn't guarantee all the contents of Electro-optical specification.

7. Electrical Specifications

7.1 Electrical characteristics

GND=0V, Ta=25°C

Item	Symbol	MIN	TYP	MAX	Unit	Remark	
Power Supply Voltage	VDD	3.1	3.3	3.5	V	Note1,2	
Input Signal Voltage	Low Level	VIL	GND	--	0.3*VDD	V	Note3
	High Level	VIH	0.7*VDD	--	VDD		

Note1: VDD setting should match the signals output voltage of customer's system board.

Note2: The ripple voltage should be controlled under 5% of VDD.

Note3: RESET, STBYB , L/R, U/D, BIST, PINCTL, SDI, SCL, CSB.

7.2 LED Backlight

Ta=25°C

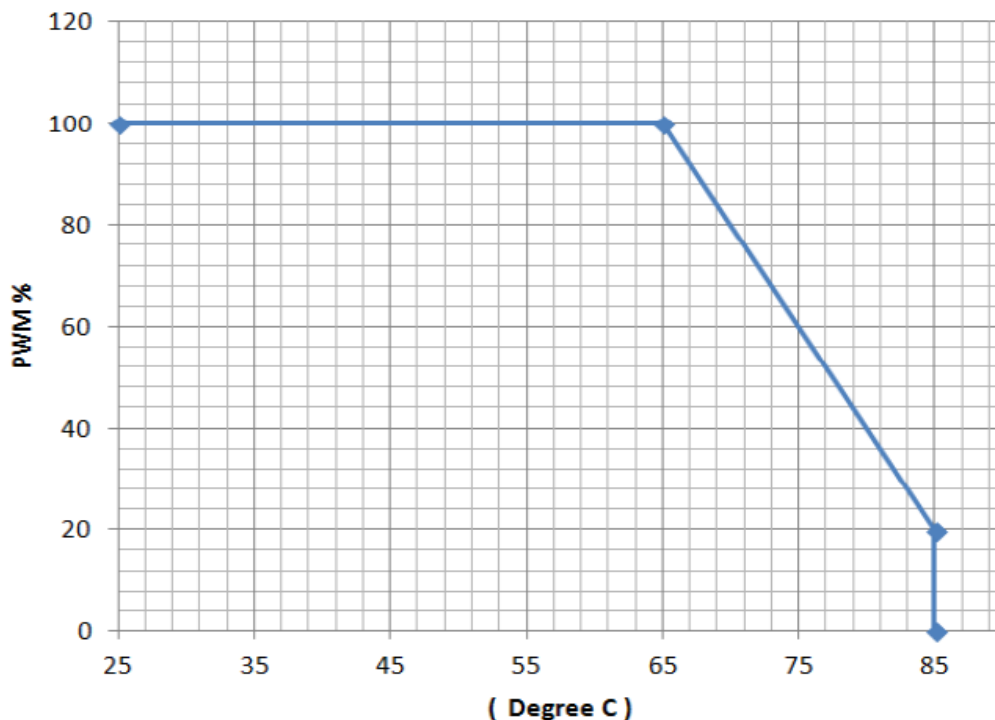
Item	Symbol	MIN	TYP	MAX	Unit	Remark
Forward Current	IBL	--	240	-	mA	
Forward Voltage	VBL	28	31	33	V	
LED Life time	--	--	30,000	--	Hrs	Note

Note: The "LED life time" is defined as the module brightness decrease to 50% original brightness at Ta=25°C and IL =240mA. The LED lifetime could be decreased if operating IL is larger than 240mA.

7.3 PWM

The LED string has a NTC(Negative Temperature Coefficient) to detect the ambient temperature of LED string.

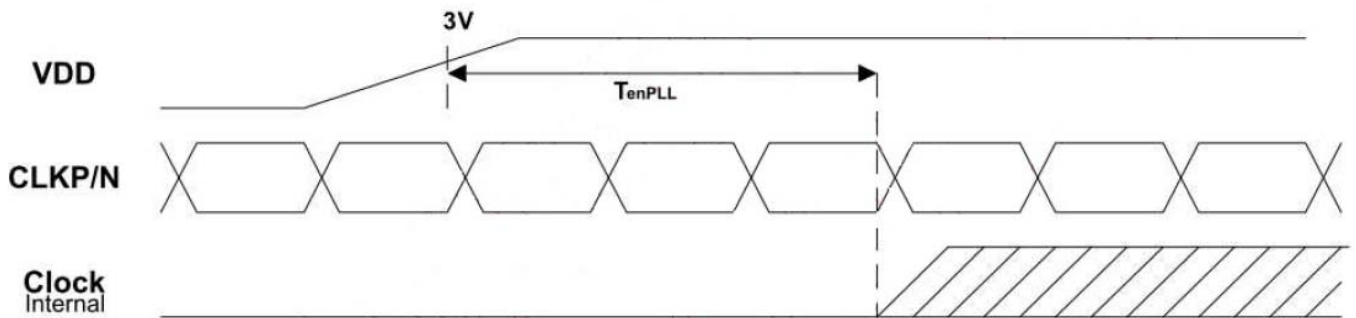
LED power de-rating has to start at 65°C linear down to PWM 20% at 85°C before switching off, see graph as below



8. Command/AC Timing

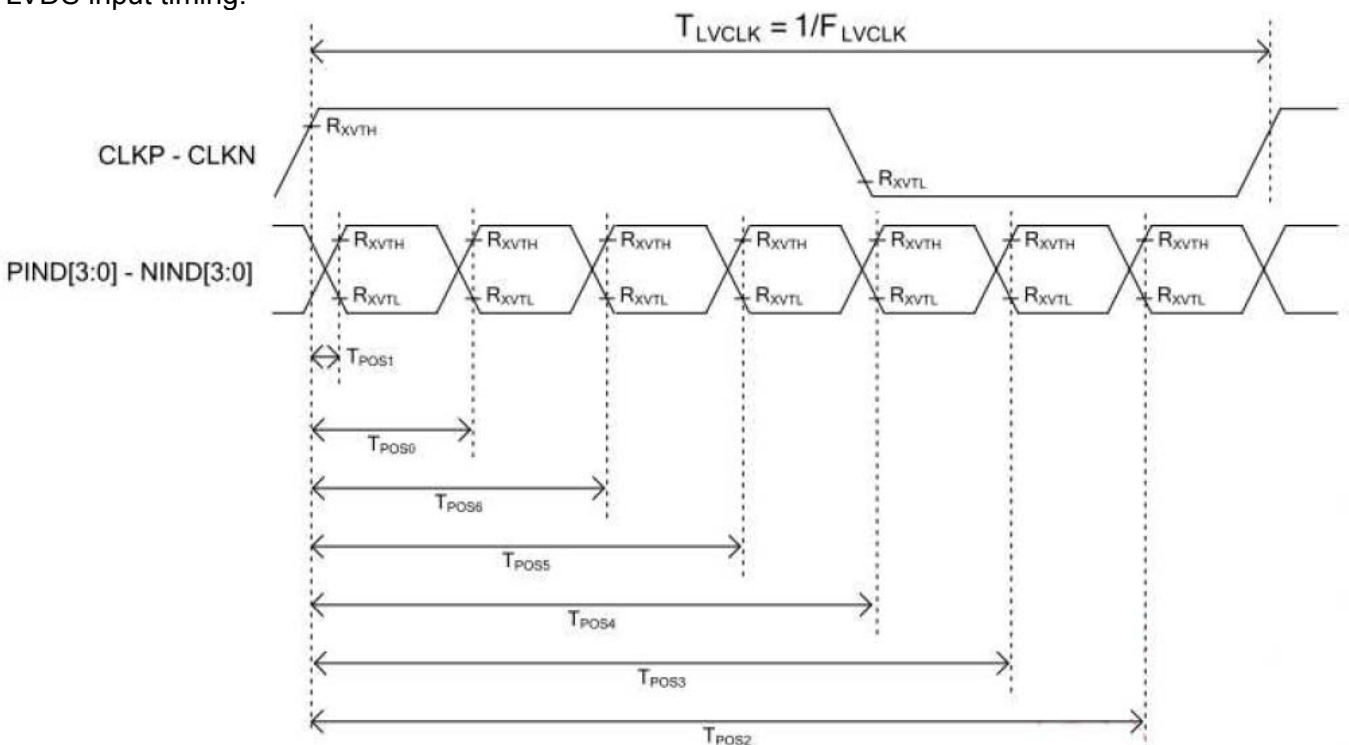
8.1 Timing Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Clock frequency	FLVCLK	25	-	85	MHz	Frame rate=60Hz
Clock period	TLVCLK	40	-	11.76	ns	Frame rate=60Hz
1 data bit time	UI	-	1/7	-	TLVCLK	
Position 1	TPOS1	-0.25	0	0.25	UI	
Position 0	TPOS0	0.75	1	1.25	UI	
Position 6	TPOS6	1.75	2	2.25	UI	
Position 5	TPOS5	2.75	3	3.25	UI	
Position 4	TPOS4	3.75	4	4.25	UI	
Position 3	TPOS3	4.75	5	5.25	UI	
Position 2	TPOS2	5.75	6	6.25	UI	
PLL wake-up time	TenPLL	-	--	150	us	

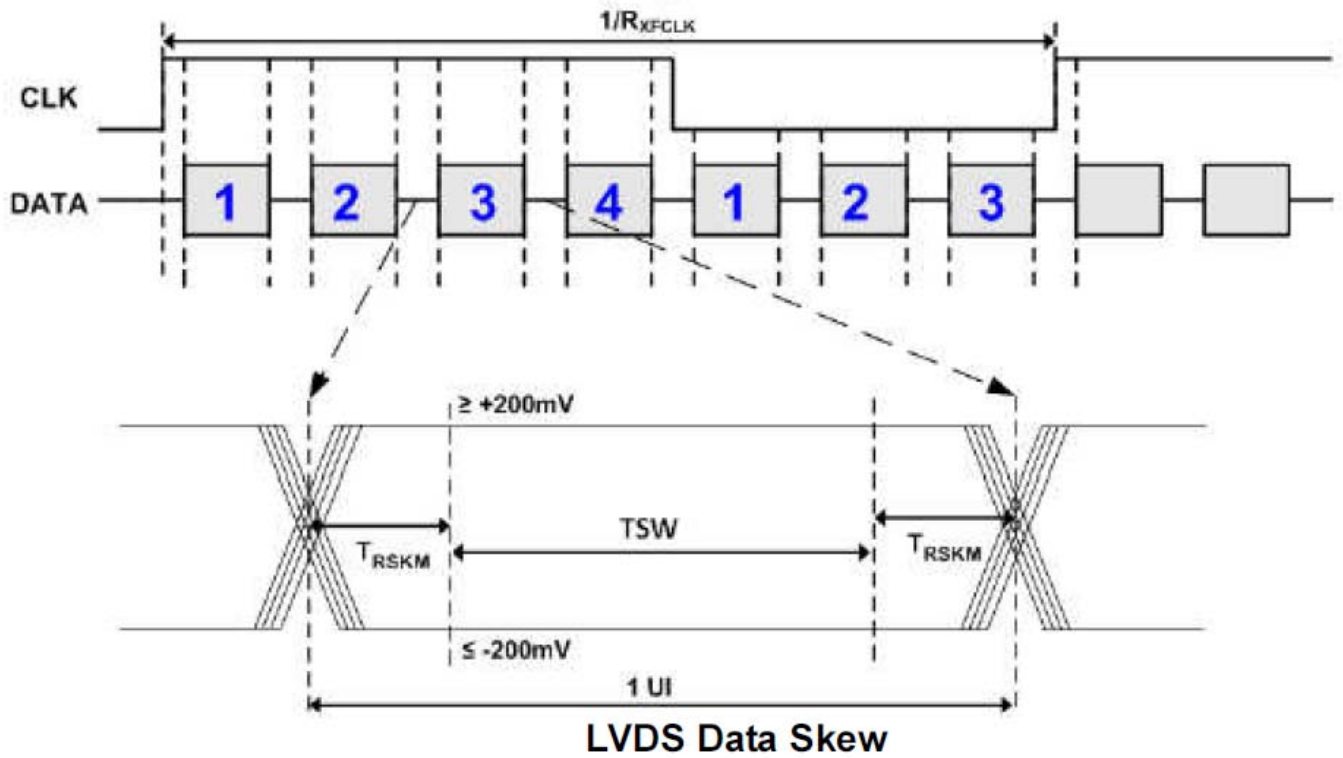


8.1.1 Input Clock and Data Timing Diagram

LVDS input timing:



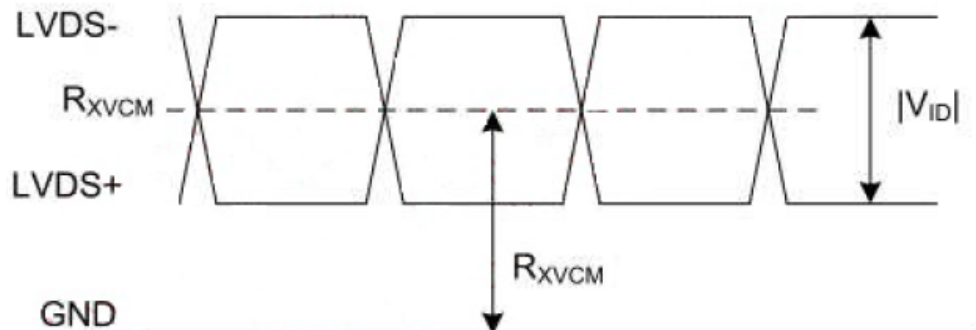
Differential:



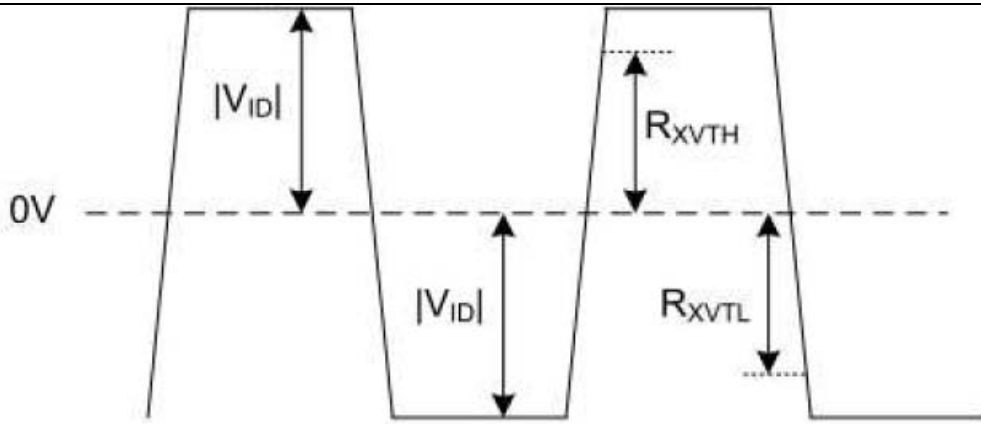
8.1.2 LVDS DC Electrical Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Differential input high Threshold voltage	R_{XVTH}	-	-	+200	mV	
Differential input low Threshold voltage	R_{XVTL}	-200	-	-	mV	
Differential input common mode voltage	R_{XVCM}	1.0	1.2	$1.7 - V_{ID} /2$	V	
Differential input voltage	$ V_{ID} $	200	-	600	mV	
Differential input leakage Current	I_{XVLK}	-10	-	+10	μA	
Termination Resistor	Z_{icl}	90	100	110	Ω	

Single-end Signal:



Differential Signal:

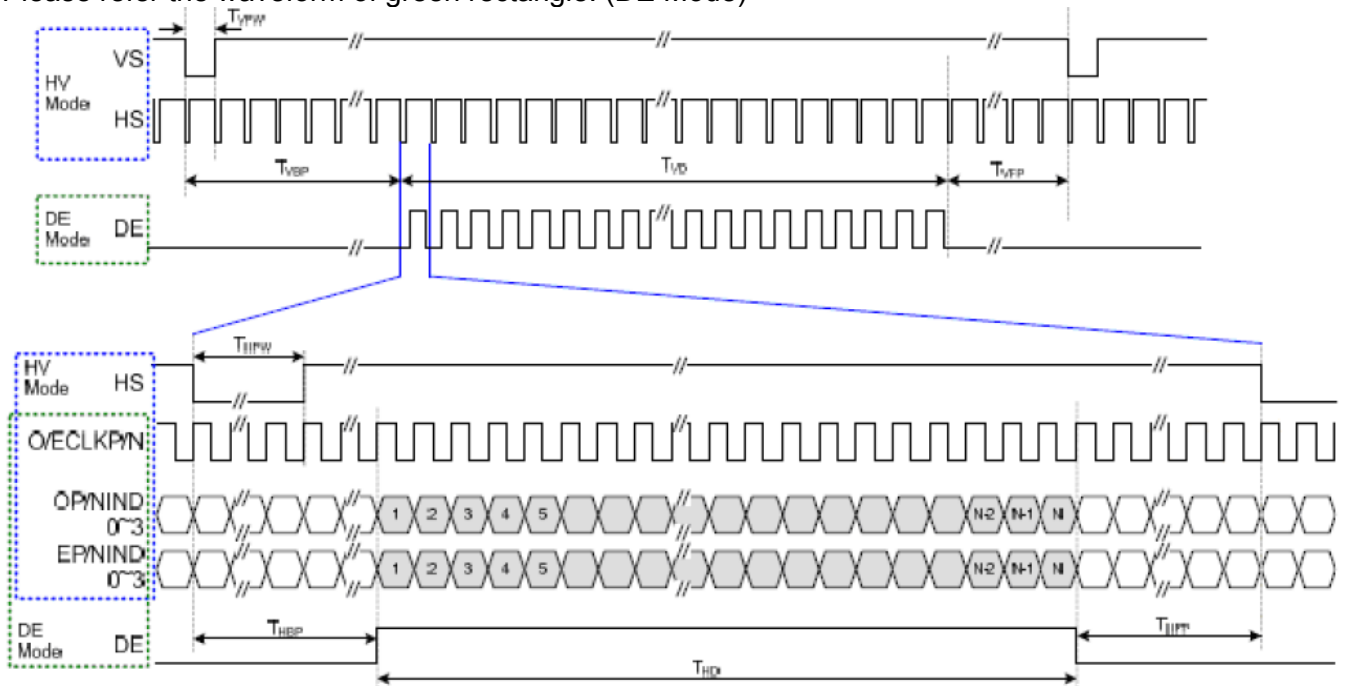


8.1.3 Timing

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
CLK frequency	F _{CLK}	44.6	44.7	50.2	MHz	
Horizontal display area	T _{HD}	960			CLK	
HS period time	T _H	1020	1024	1150	CLK	
Vertical display area	T _{VD}	720			H	
VS period time	T _V	726	728	849	H	
Frame rate	FR		60		Hz	

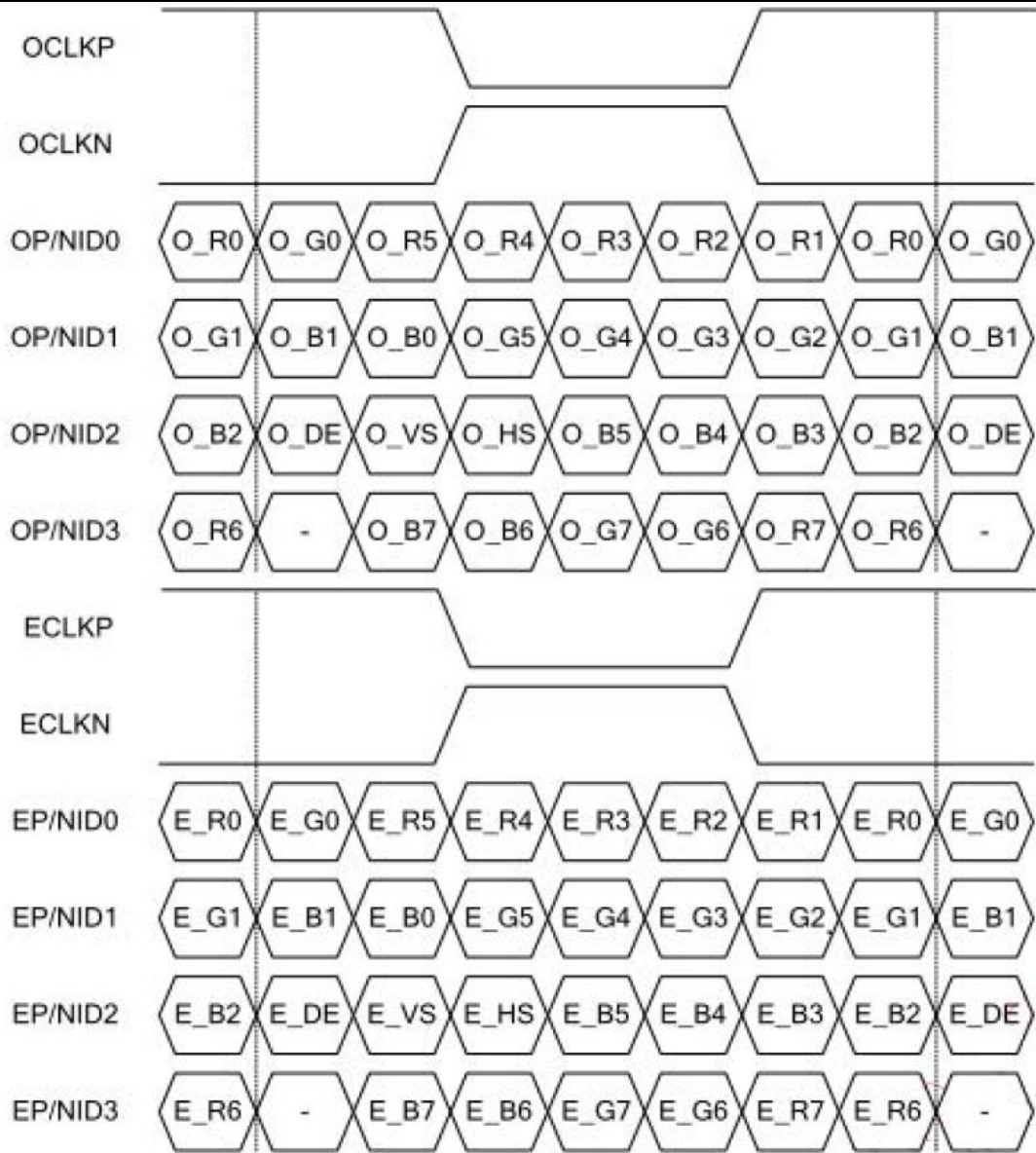
Note: DE mode only.

Please refer the waveform of green rectangle. (DE Mode)



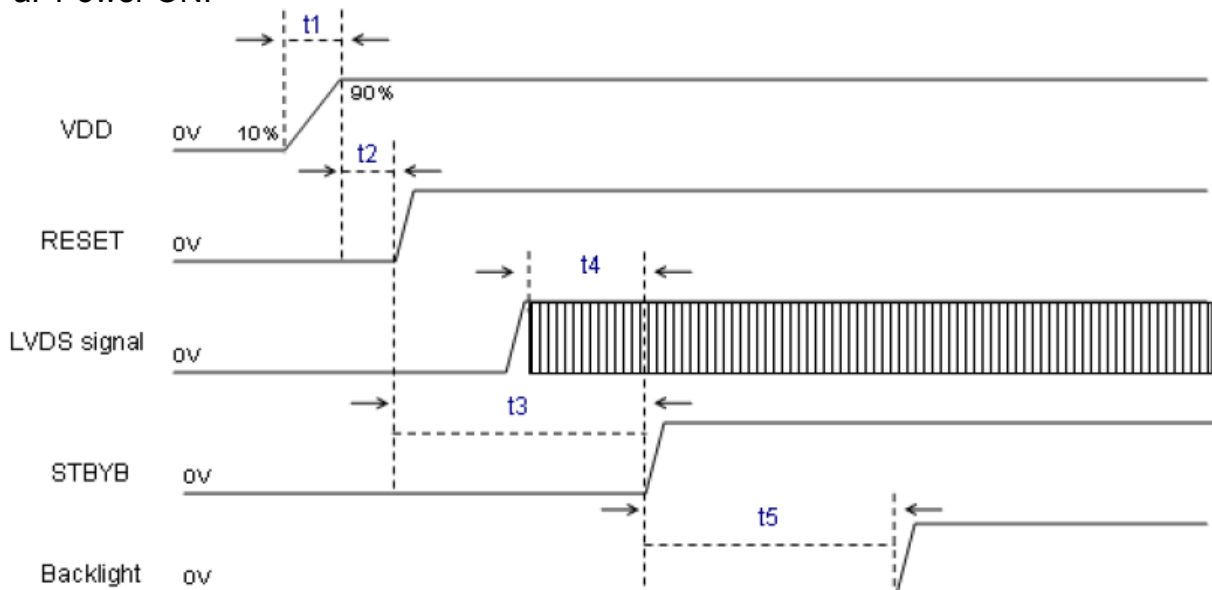
8.1.4 Data Input Format

LVDS , 8-bit, two port, VESA format:

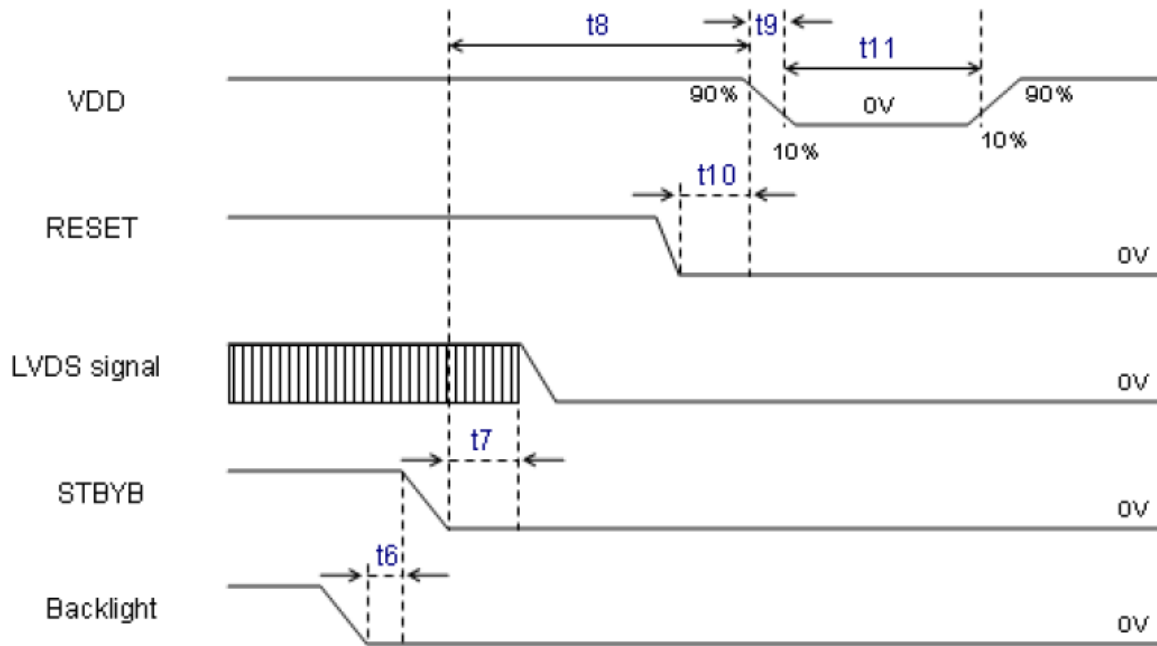


8.2 Power Sequence

a. Power ON:



b. Power OFF:



Symbol	Min.	Typ.	Max.	Unit
t1	0.5	10	20	ms
t2	1	1.2	1.5	ms
t3	10	15	20	ms
t4	1	10	20	ms
t5	180	190	200	ms
t6	0	10	20	ms
t7	150	155	160	ms
t8	160	180	200	ms
t9	0.5	5	10	ms
t10	0	5	10	ms
t11	500	650	800	ms

9. Optical Specification

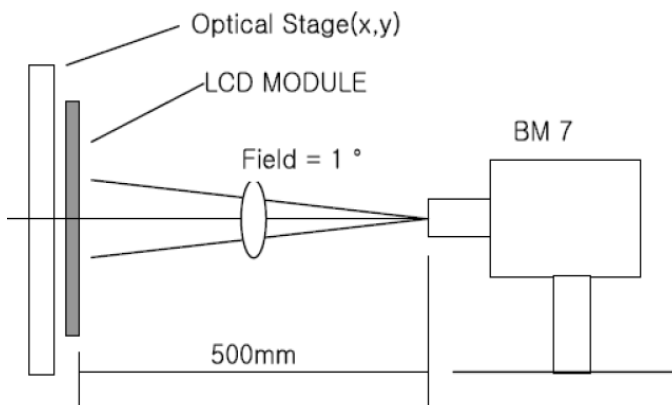
Item	Symbol	Condition	Min	Typ.	Max.	Unit	Remark
Contrast Ratio	CR	$\theta=0^\circ$	700	1000	--		Note1 Note2
Response Time	TR+TF	25°C	--	-	30	ms	Note1 Note3
View Angles	ΘT	$CR \geq 10$	80	-	-	Degree	Note 4
	ΘB		80	-	-		
	ΘL		80	-	-		
	ΘR		80	-	-		
Chromaticity	White	Brightness is on	x	0.280	0.310	0.340	Note5, Note1
			y	0.300	0.330	0.360	
	Red		x	0.619	0.649	0.648	
			y	0.306	0.336	0.366	
	Green		x	0.279	0.309	0.339	
			y	0.561	0.591	0.621	
	Blue		x	0.117	0.147	0.177	
			y	0.023	0.053	0.083	
Luminance	L		640	800	--	cd/m ²	Note1 Note6
Uniformity (White)	U		75	80	--	%	Note1 Note7

Test condition: VDD=3.3V, IL=240mA (Backlight current), the ambient temperature is 25°C.

Note 1: Definition of optical measurement system.

Temperature = 25°C(±3°C)

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

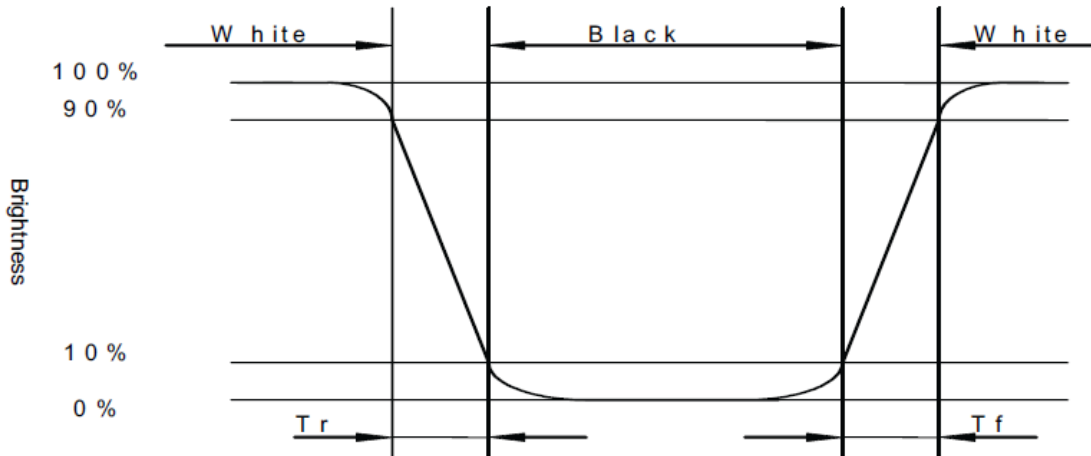


Note 2: Contrast ratio is defined as follow:

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

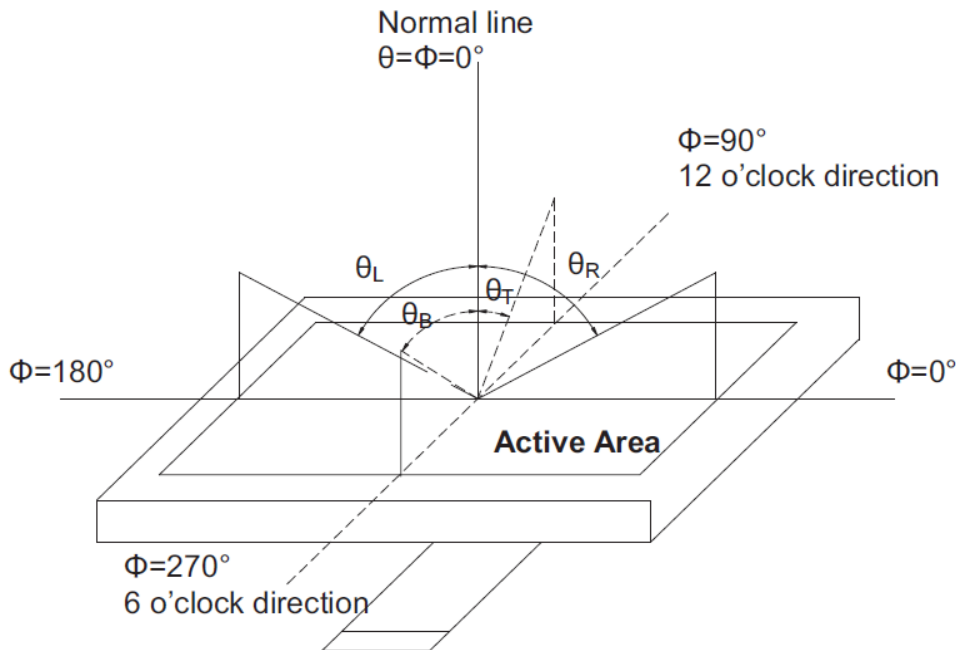
Note 3: Response time is defined as follow:

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).



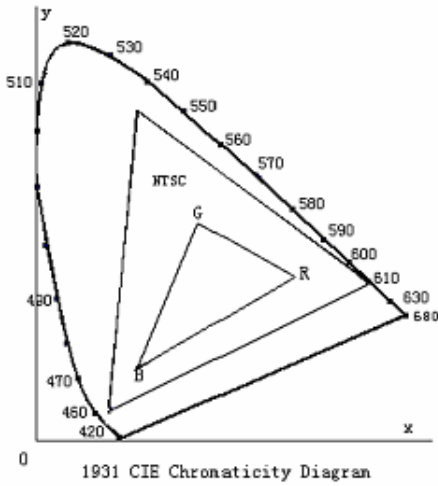
Note 4: Viewing angle range is defined as follow:

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.

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

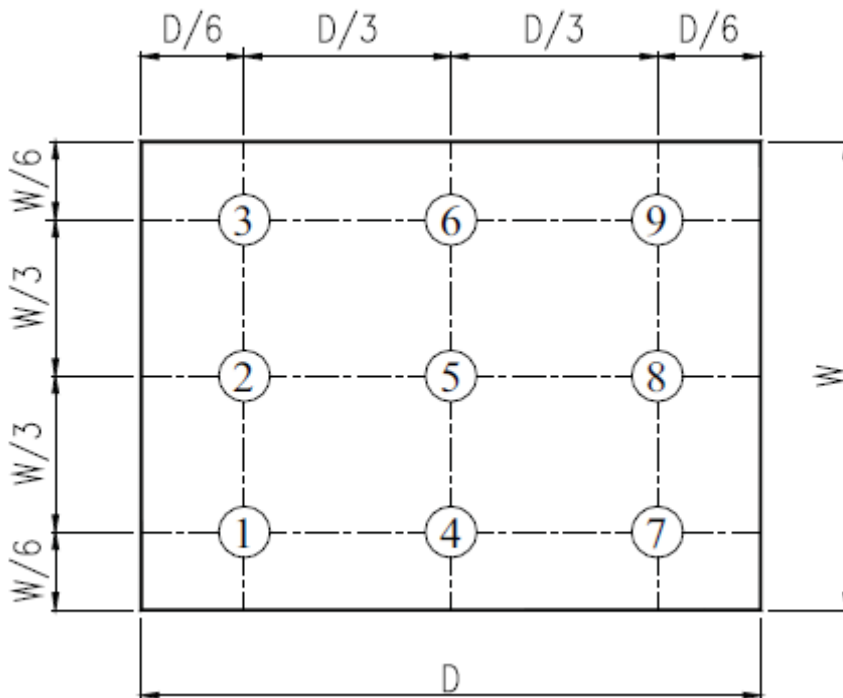


Fig. 2 Definition of uniformity

10. Environmental / Reliability Tests

No	Test Item	Condition	Judgment criteria
1	High Temp Operation	Ts=+85°C, 120hrs	Per table in below
2	Low Temp Operation	Ta=-30°C, 120hrs	Per table in below
3	High Temp Storage	Ta=+90°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, 90% RH 120hours	Per table in below (polarizer discoloration is excluded)
6	Thermal Shock (Non-operation)	-30°C 30 min~+85°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.

