

DLC Display Co., Limited

德爾西顯示器有限公司



MODEL No: DLC1210CMP00LF-1

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Record of Revision

Date	Revision No.	Summary
2021-03-03	1.0	Rev 1.0 was issued

1. Scope

This data sheet is to introduce the specification of DLC1210CMP00LF-1 active matrix TFT module. It is composed of a color TFT-LCD panel, driver ICs, FPC and a backlight unit. The 12.1" display area contains 1280(RGB) x 800 pixels.

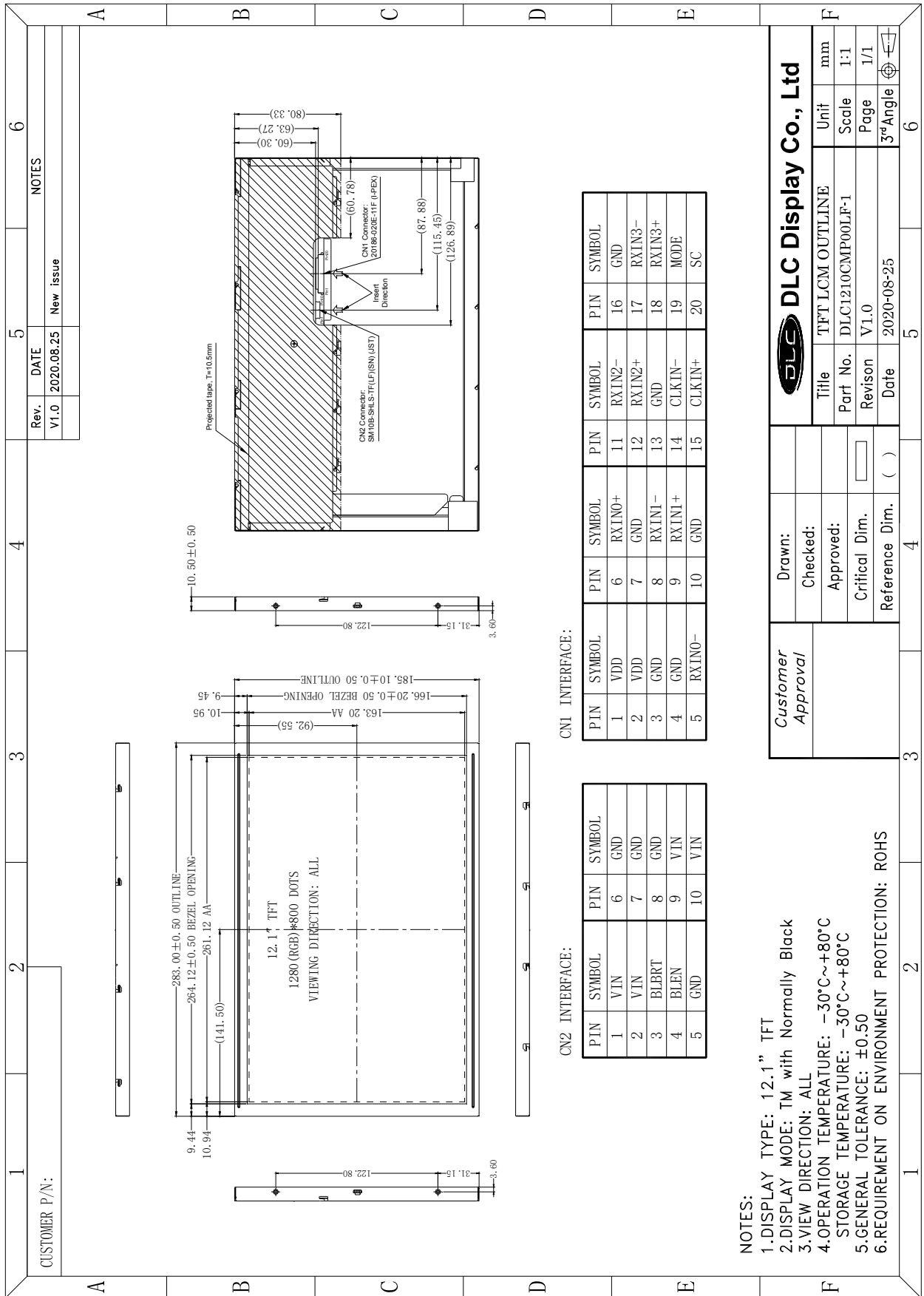
2. Application

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

3. General Information

Item	Contents	Unit
Size	12.1	inch
Resolution	1280(RGB) x 800	/
Interface	LVDS	/
Technology type	IPS	/
Pixel pitch	0.204 x 0.204	mm
Pixel Configuration	RGB Vertical stripe	
Outline Dimension (W x H x D)	283.00 x 185.10 x 10.50	mm
Active Area	261.12 x 163.20	mm
Display Mode	Transmissive, Normally Black	/
Viewing Direction	ALL	/
Backlight Type	LED	/
Weight	(600)	g

4. Outline Drawing



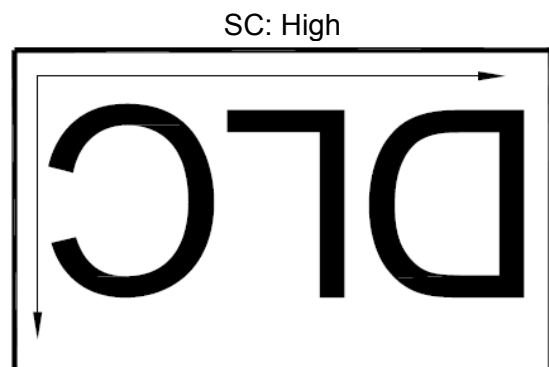
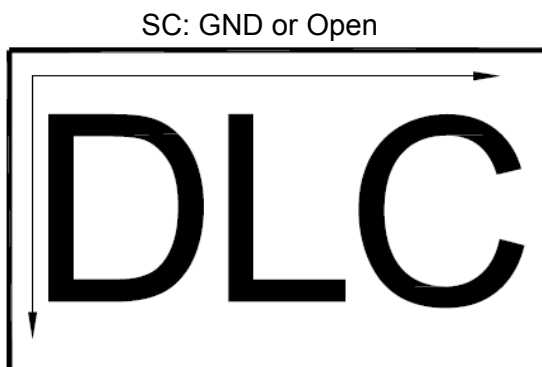
5. Interface signals

5.1 CN1 PIN Definition

No	Symbol	Description	Remarks
1	VDD	Power Supply +3.3V	
2	VDD	Power Supply +3.3V	
3	GND	Power ground	
4	GND	Power ground	
5	RXIN0-	LVDS receiver signal CH0 (-)	
6	RXIN0+	LVDS receiver signal CH0 (+)	
7	GND	Power ground	
8	RXIN1-	LVDS receiver signal CH1 (-)	
9	RXIN1+	LVDS receiver signal CH1 (+)	
10	GND	Power ground	
11	RXIN2-	LVDS receiver signal CH2 (-)	
12	RXIN2+	LVDS receiver signal CH2 (+)	
13	GND	Power ground	
14	RXCLK-	LVDS receiver signal CK (-)	
15	RXCLK+	LVDS receiver signal CK (+)	
16	GND	Power ground	
17	RXIN3-	LVDS receiver signal CH3 (-)	
18	RXIN3+	LVDS receiver signal CH3 (+)	
19	MODE	Bit data select signal (GND or Open: Link3 RGB[1:0] mode, High: Link3 RGB[7:6] mode)	
20	SC	Scan direction control (GND or Open: Normal, High: Reverse)	

Notes:

- Connector type: 20186-020E-11F (I-PEX)
Matching Connector: 20197-020U-F (I-PEX) or 20197-T20U-F (I-PEX).
- Scanning



5.2 CN2 PIN Definition

No	Symbol	Description	Remarks
1	VIN	Power supply voltage +12V	
2	VIN	Power supply voltage +12V	
3	BLBRT	PWM signal (Brightness adjustment)	
4	BLEN	On/Off terminal voltage	
5	GND	Ground	
6	GND	Ground	
7	GND	Ground	
8	GND	Ground	
9	VIN	Power supply voltage +12V	
10	VIN	Power supply voltage +12V	

Note: Connector type: SM10B-SHLS-TF(LF)(SN) (JST)
 Matching Connector: SHLP-10V-S-B (IJST).

6. Absolute maximum Ratings

6.1. Electrical Absolute max. ratings

Parameter	Symbol	MIN	MAX	Unit	Remark	
Power Supply Voltage (+3.3V)	VDD	(-0.3)	(4.0)	V		
Power Supply Voltage (+12V)	VDD	(-0.3)	(14.0)	V		
Input signal voltage	RxINi+, RxINi- (i=0,1,2,3)	V _{i1}	(-0.3)	(2.8)	V	
	CKIN+, CKIN-	V _{i2}	(-0.3)	(2.8)	V	
	BITSEL, SC	V _{i3}	(-0.3)	(VDD+0.5)	V	
	BLBRT, BLEN	V _{i4}	(-0.3)	(V _{in})	V	

6.2. Environment Conditions

Item	Symbol	MIN	MAX	Unit	Remark
Operating Temperature	TOPR	-30	80	°C	
Storage Temperature	TSTG	-30	80	°C	

7. Electrical Specifications

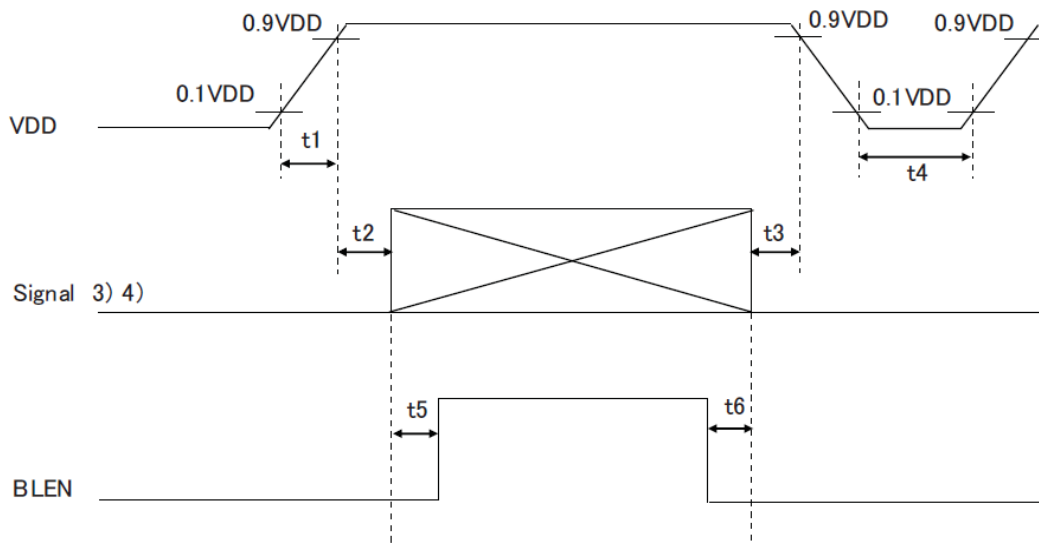
7.1 Electrical characteristics

GND=0V, Ta=25°C

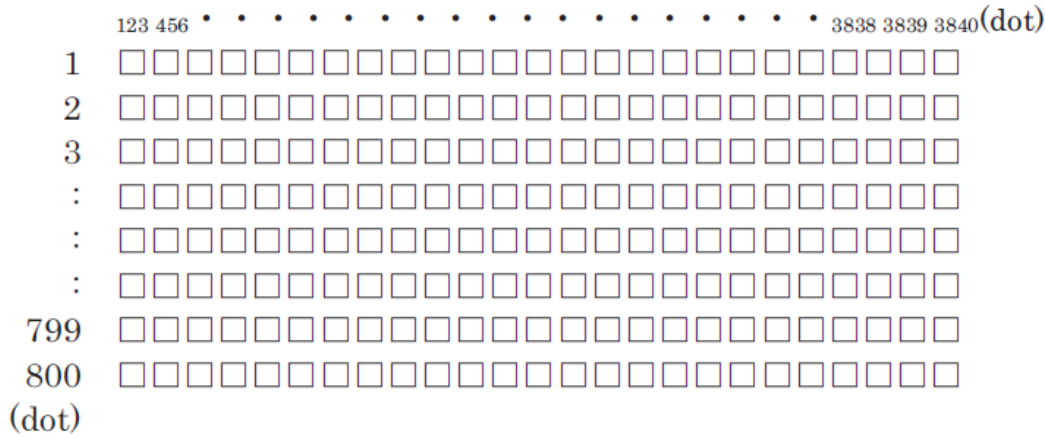
Item	Symbol	Min.	Typ.	Max.	Unit	Remark
Power Supply Voltage	VDD	3.0	3.3	3.6	V	
Current consumption	IDD	-	(410)	(500)	mA	
Permissible input ripple voltage	VRP	-	-	(100)	mVp-p	VDD=3.3V
Input signal voltage	VIL	(0)	-	(0.8)	V	“Low” level
	VIH	(2.0)	-	(VDD)	V	“High” level
Input leak current	IOL	(-10)	-	(10)	μA	V _{I3} =0V
	IOH	-	-	(400)	μA	V _{I3} =3.3V
LVDS input voltage	VL	(0)	-	(1.9)	V	
Differential input voltage	V _{ID}	(100)	(350)	(600)	mV	
Differential input threshold voltage	V _{TL}	(V _{CM} -100)	-		mV	“Low” level
	V _{TH}	-	-	(V _{CM} +100)	mV	“High” level
Terminator	R ₁	-	(100)	-	Ω	
VDD-turn-on conditions	t ₁	-	(0.1)	-	ms	
	t ₂	-	(0)	-	ms	
	t ₃	-	(0)	-	ms	
	t ₄	-	(1.0)	-	s	
	t ₅	-	(200)	-	ms	
	t ₆	-	(200)	-	ms	

Notes:

1. VDD-turn-on conditions

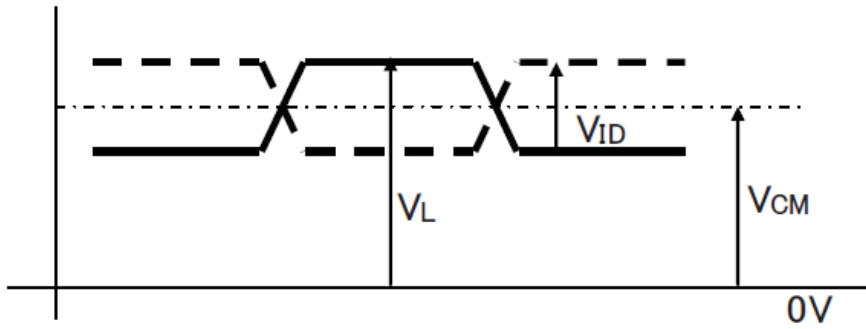


2. Display Pattern (VDD=3.3V, Temp.=25°C)



3. Input signal: BITSEL, SC

4. Input signal: RxIN3+, RxIN3-, RxIN2+, RxIN2-, RxIN1+, RxIN1-, RxIN0+, RxIN0-, CKIN+, CKIN-.



5. V_{CM}: LVDS common mode voltage (V_{CM}=1.25V)

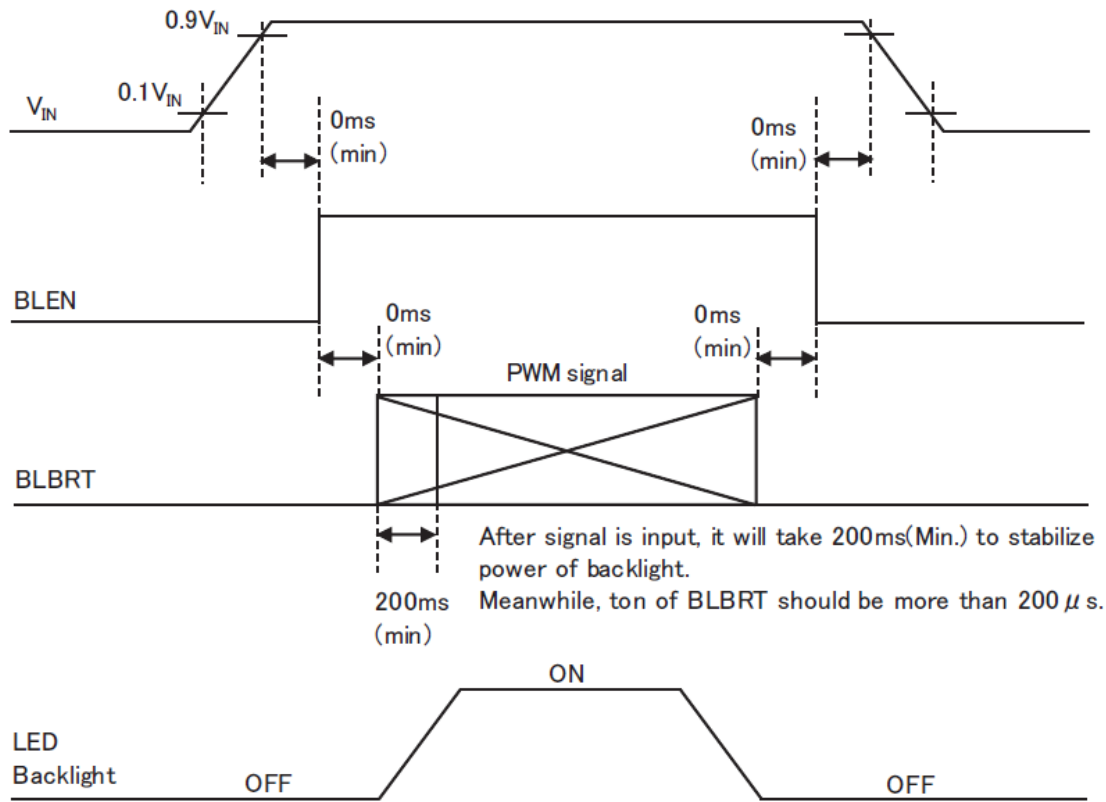
7.2 LED Backlight

T_a=25°C

Item	Symbol	Min.	Typ.	Max.	Unit	Remark
Power supply voltage	V _{IN}	(10.8)	(12.0)	(13.2)	V	
Current consumption	I _{IN}	-	-	-	mA	
Permissible input ripple voltage	V _{RP_BL}	-	-	(100)	mVp-p	V _{IN} =12.0V
BLBRT input signal voltage	V _{IL_BLBRT}	(0)	-	(0.8)	V	“Low” level
	V _{IH_BLBRT}	(2.3)	-	(V _{IN})	V	“High” level
BLEN input signal voltage	V _{IL_BLEN}	(0)	-	(0.8)	V	“Low” level
	V _{IH_BLEN}	(2.3)	-	(V _{IN})	V	“High” level
PWM frequency	f _{PWM}	(200)	-	(10k)	Hz	
PWM duty ratio	D _{PWM}	(1)	-	(100)	%	f _{PWM} =200Hz
		(10)	-	(100)	%	f _{PWM} =2KHz
		(50)	-	(100)	%	f _{PWM} =10KHz
Life time	-		(50,000)	-	h	

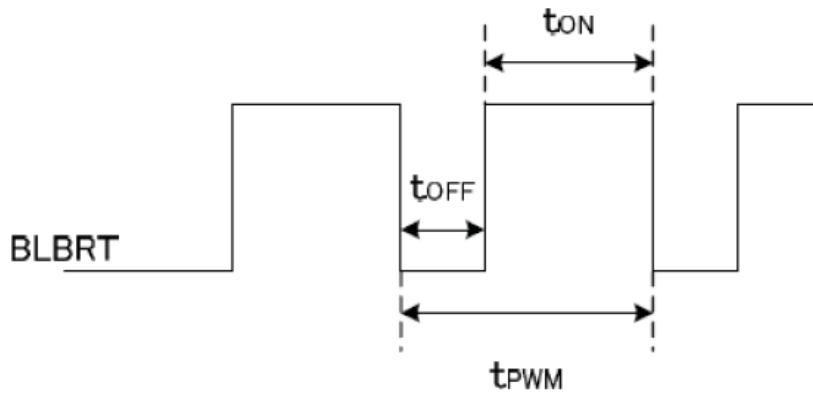
Notes:

1. VIN-turn-on conditions



2. VIN=12V, Temp.=25°C, DPWM=100%

3. PWM Timing Diagram



$t_{ON}, t_{OFF} \geq 50\mu s$.

In case of lower frequency, the deterioration of the display quality, flicker etc., may occur.

4. When brightness decrease 50% of minimum brightness.

The average life of a LED will decrease when the LCD is operating at higher temperature

5. Life time is estimated data.(Condition : IF=(85)mA, Ta=25°C in chamber).

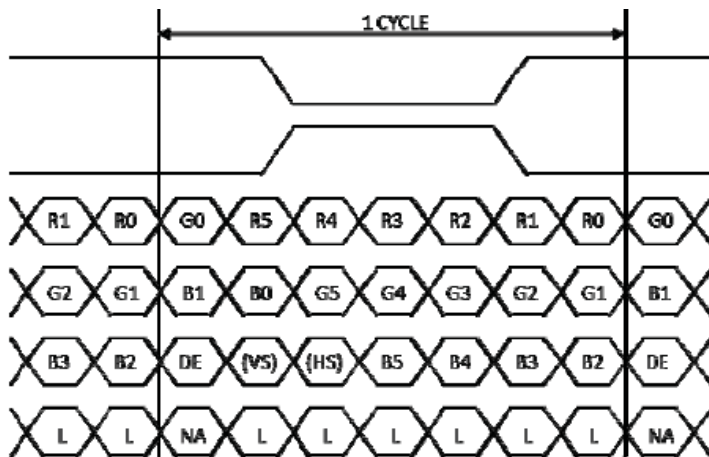
7.3 Data mapping

7.3.1 6-bit Input Mode

Data Mapping (Transmitter: THC63LVDM83R(THine Electronics) or compatible)

Transmitter		19Pin MODE = "L" or OPEN
Pin No.	Data	
51	TA0	R0(LSB)
52	TA1	R1
54	TA2	R2
55	TA3	R3
56	TA4	R4
3	TA5	R5(MSB)
4	TA6	G0(LSB)
6	TB0	G1
7	TB1	G2
11	TB2	G3
12	TB3	G4
14	TB4	G5(MSB)
15	TB5	B0(LSB)
19	TB6	B1
20	TC0	B2
22	TC1	B3
23	TC2	B4
24	TC3	B5(MSB)
27	TC4	(HS)
28	TC5	(VS)
30	TC6	DE
50	TD0	GND
2	TD1	GND
8	TD2	GND
10	TD3	GND
16	TD4	GND
18	TD5	GND
25	TD6	GND

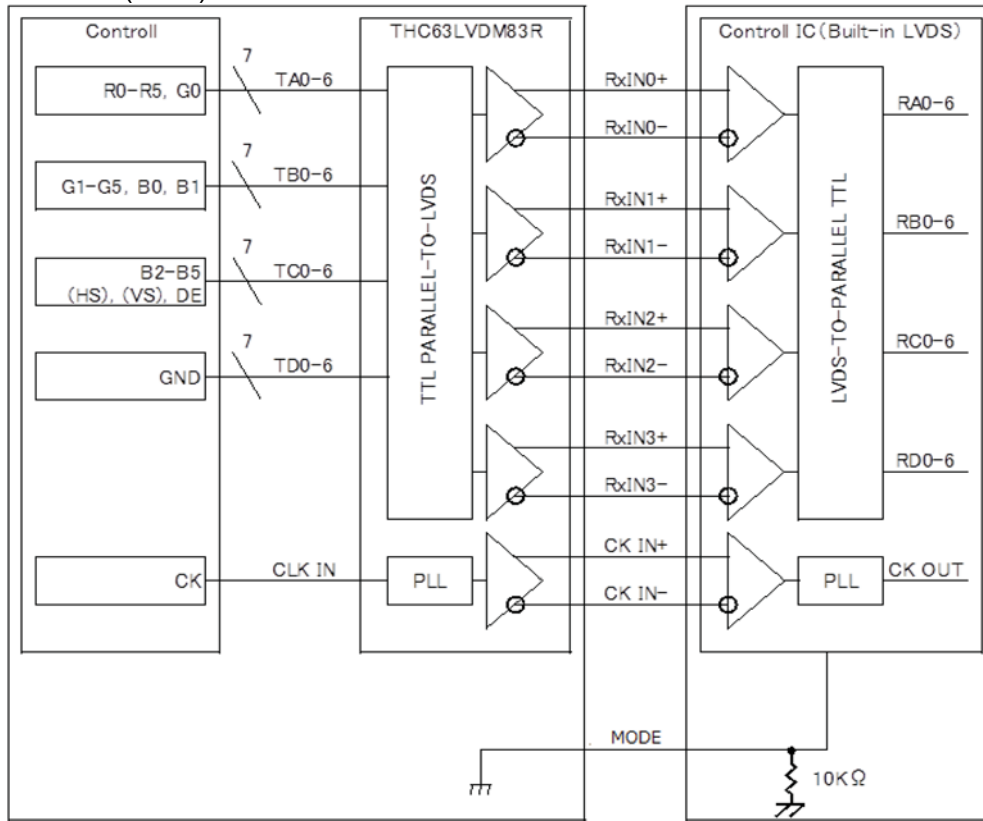
MODE=L(GND) or OPEN



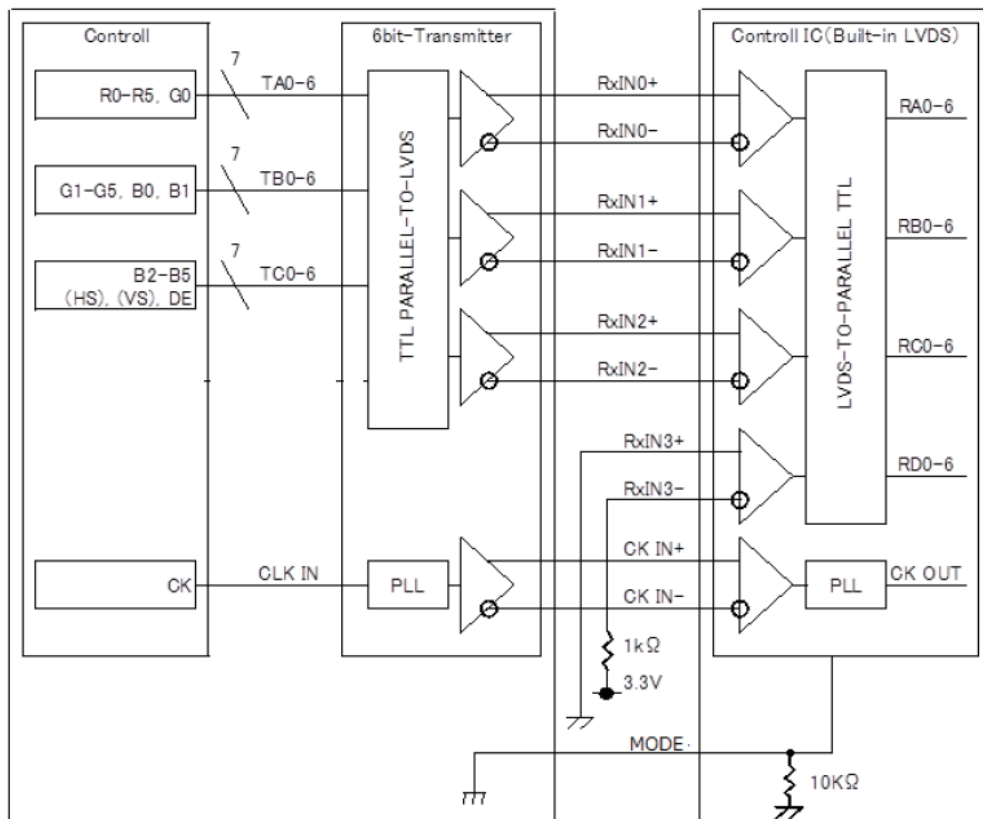
DE: DATA ENABLE HS: HSYNC VS: VSYNC

Block Diagram

MODE=L(GND) or OPEN



When using “6-bit Transmitter”, please connect the unused channel of the control IC receiver as described in the diagram below.

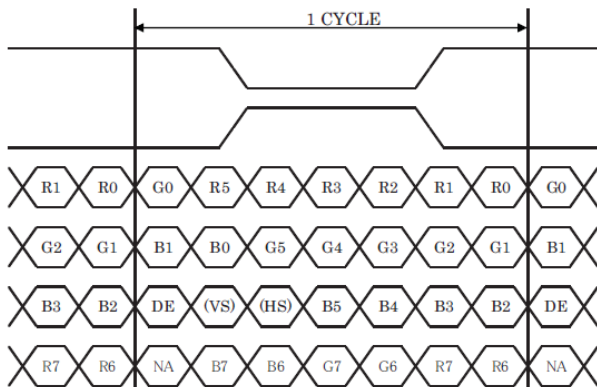


7.3.2 8-bit Input Mode

Data Mapping (Transmitter: THC63LVDM83R(THine Electronics) or compatible)

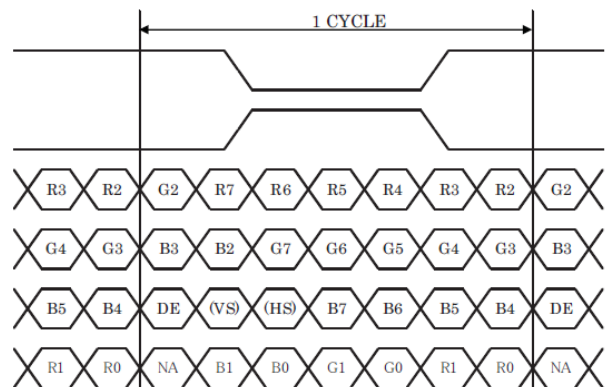
Transmitter		19Pin MODE = "H"	19Pin MODE = "L" or OPEN
Pin No.	Data		
51	TA0	R0(LSB)	R2
52	TA1	R1	R3
54	TA2	R2	R4
55	TA3	R3	R5
56	TA4	R4	R6
3	TA5	R5	R7(MSB)
4	TA6	G0(LSB)	G2
6	TB0	G1	G3
7	TB1	G2	G4
11	TB2	G3	G5
12	TB3	G4	G6
14	TB4	G5	G7(MSB)
15	TB5	B0(LSB)	B2
19	TB6	B1	B3
20	TC0	B2	B4
22	TC1	B3	B5
23	TC2	B4	B6
24	TC3	B5	B7(MSB)
27	TC4	(HS)	(HS)
28	TC5	(VS)	(VS)
30	TC6	DE	DE
50	TD0	R6	R0(LSB)
2	TD1	R7(MSB)	R1
8	TD2	G6	G0(LSB)
10	TD3	G7(MSB)	G1
16	TD4	B6	B0(LSB)
18	TD5	B7(MSB)	B1
25	TD6	(NA)	(NA)

MODE=H



DE: DATA ENABLE HS: HSYNC VS: VSYNC

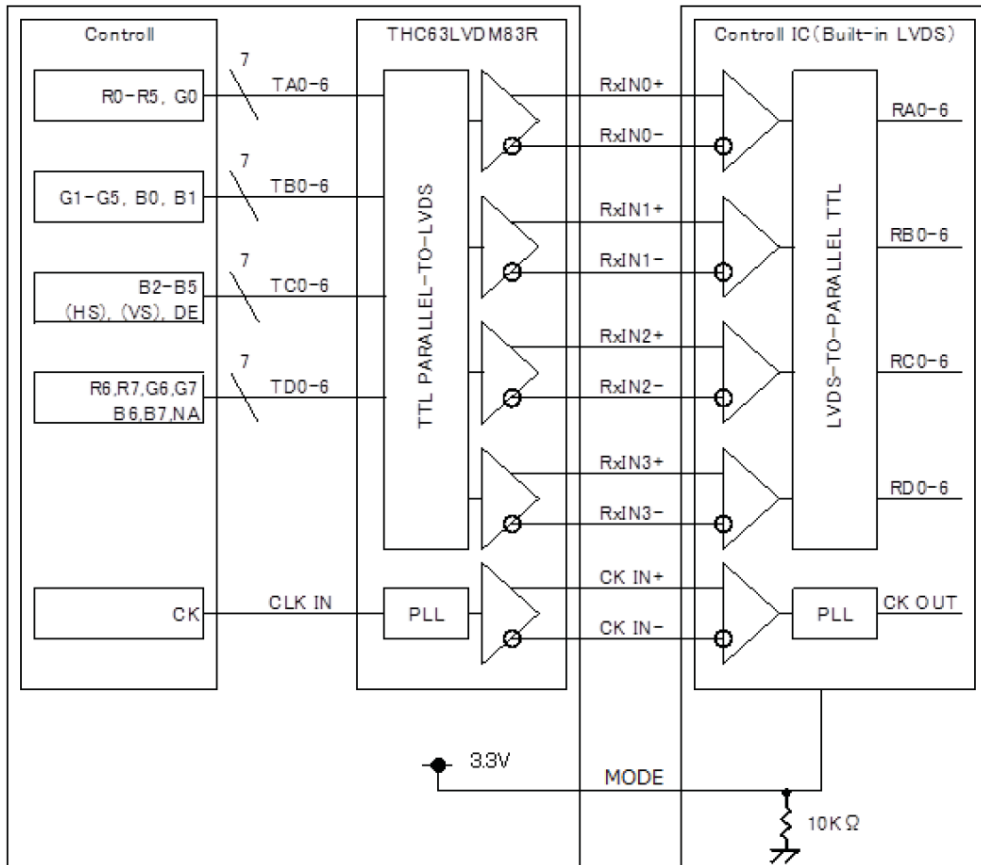
MODE=L(GND) or OPEN



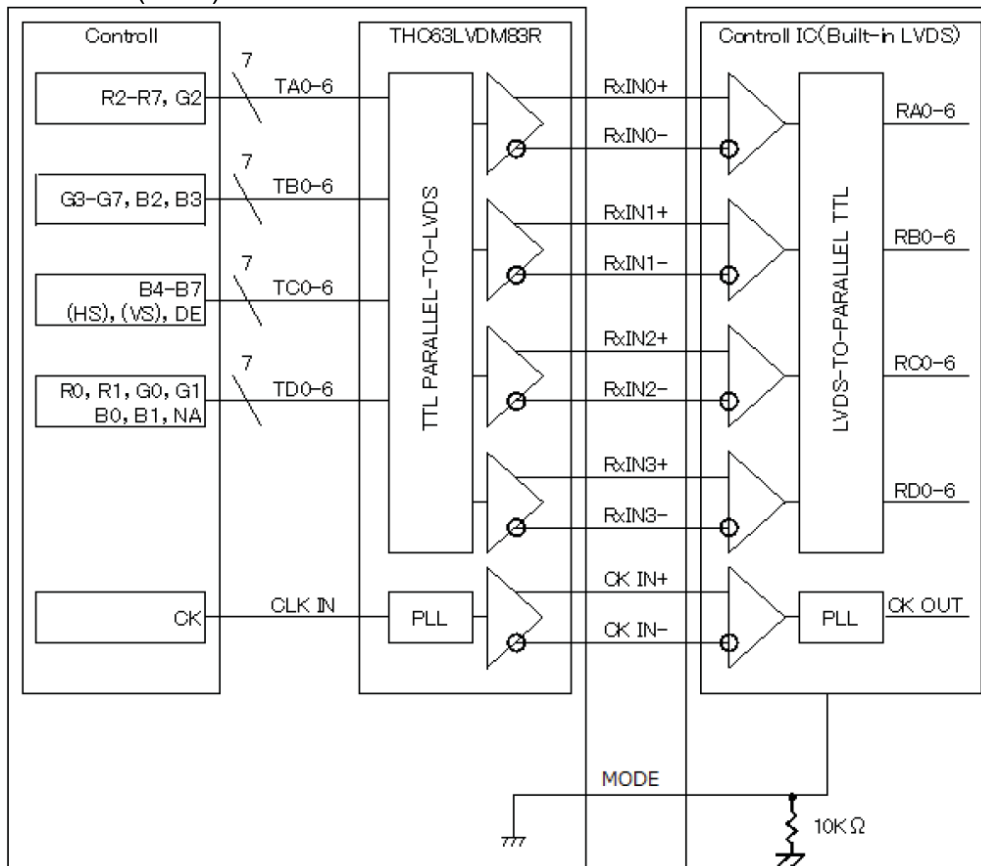
DE: DATA ENABLE HS: HSYNC VS: VSYNC

Block Diagram

MODE=H



MODE=L(GND) or OPEN



8. Timing Chart

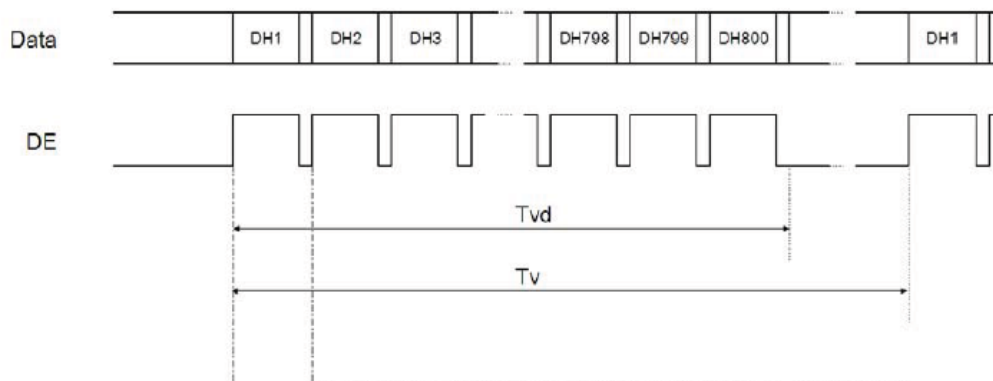
8.1 Timing characteristics

Item		Symbol	Min.	Typ.	Max.	Unit	Note
Clock(CK)	Frequency	1/tc	60	71.1	80	MHz	
Enable signal(DE)	Horizontal period	th	1300	1440	1800	Dot	
			16.25	20.25	-	µs	Note1
	Horizontal display period	thd	1280				
	Vertical period	tv	803	823	1024	line	
	Vertical display period	tvd	800			-	
Refresh rate		fv	50	60	70	-	Note2

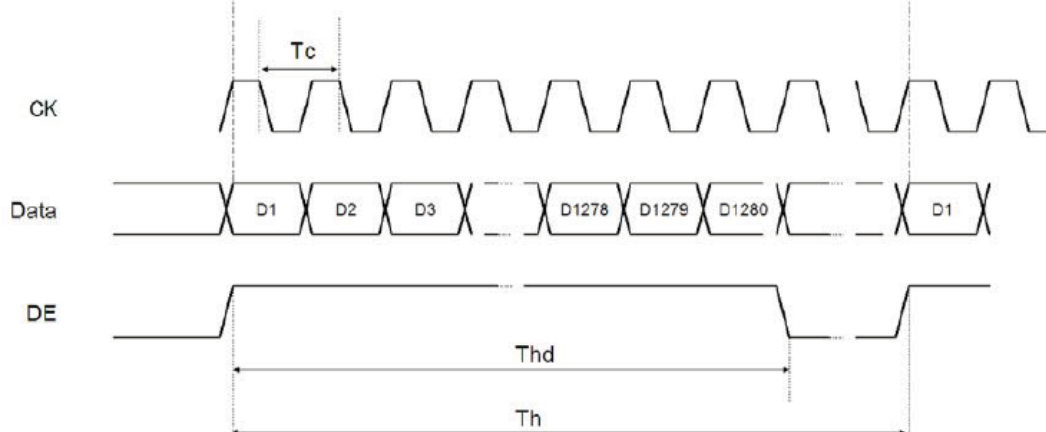
Notes:

1. Please set a clock frequency, a vertical dormant period, and the horizontal dormant period so that the Horizontal Period should not reach less than Min. value.
2. If the refresh rate reach less than Min. value, the deterioration of the display quality, flicker etc., may occur. ($f_v = 1/T_v$)

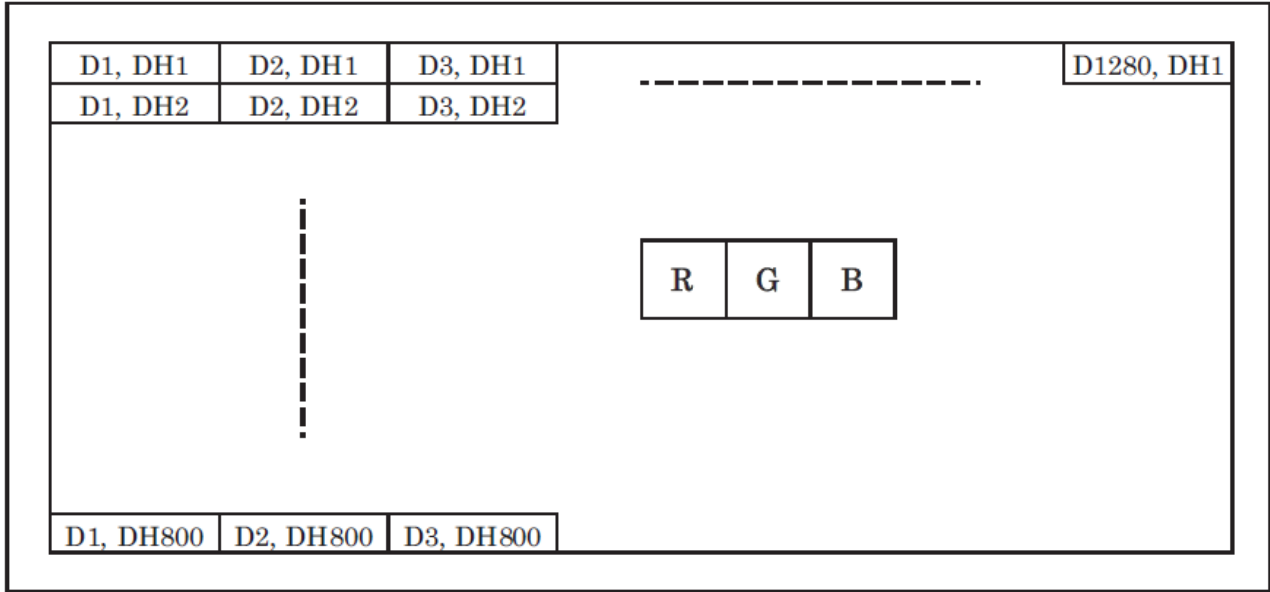
Vertical Timing Diagram



Horizontal Timing Diagram



8.2 Input Data Signals and Display position on the screen



9. Optical Specification

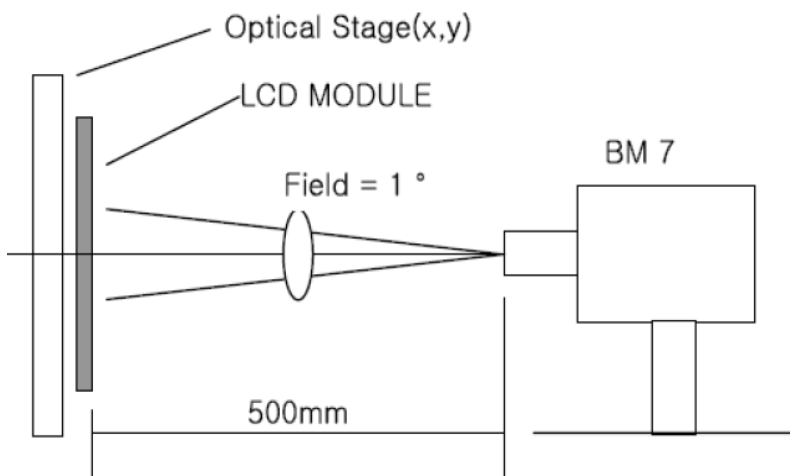
Ta=25°C

Item	Symbol	Condition	Min	Typ.	Max.	Unit	Remark
Contrast Ratio	CR	$\theta=0^\circ$	(500)	(750)	-		Note1 Note2
Response Time	Tr	25°C	-	(18)	-	ms	Note1 Note3
	Tf		-	(12)	-		
View Angles	ΘT	$CR \geq 10$	-	85	-	Degree	Note 4
	ΘB		-	85	-		
	ΘL		-	85	-		
	ΘR		-	85	-		
Chromaticity	White	x	Brightness is on	Typ -0.05	0.305	Typ+0.05	Note5, Note1
		y			0.325		
	Red	x			0.600		
		y			0.350		
	Green	x			0.335		
		y			0.570		
	Blue	x			0.150		
		y			0.120		
Luminance	L		-	1500	-	cd/m ²	Note1 Note6
Uniformity	U	-	70	-	-	%	Note1 Note7

Note 1: Definition of optical measurement system.

Temperature = 25°C(±3°C)

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

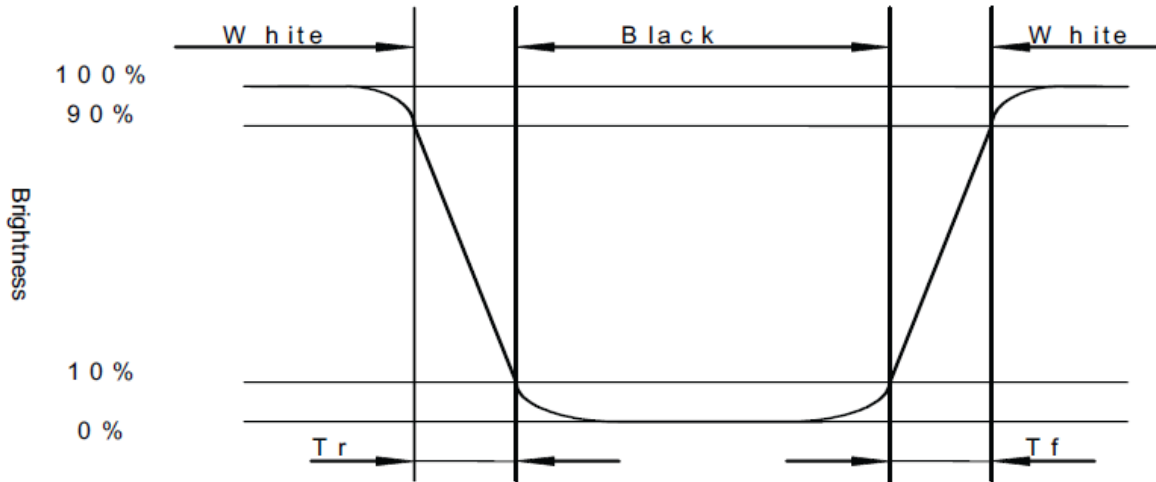


Note 2: Contrast ratio is defined as follow:

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

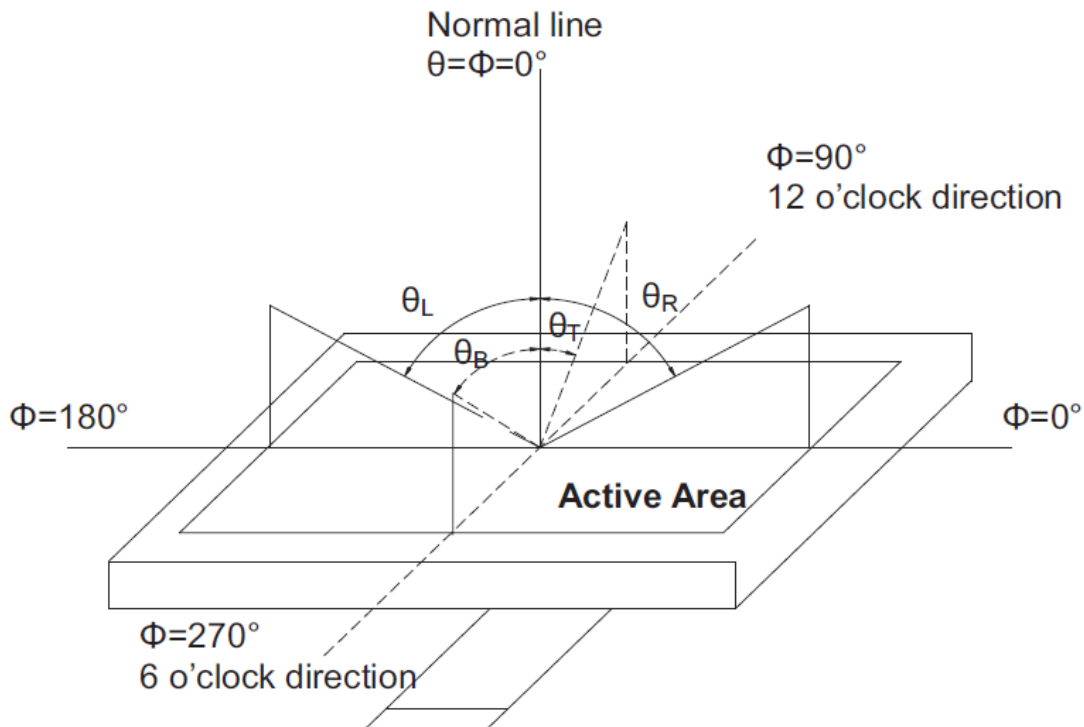
Note 3: Response time is defined as follow:

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).



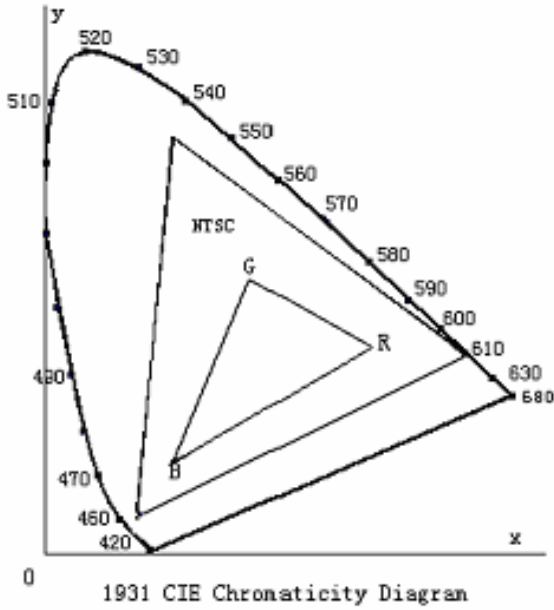
Note 4: Viewing angle range is defined as follow:

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:

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

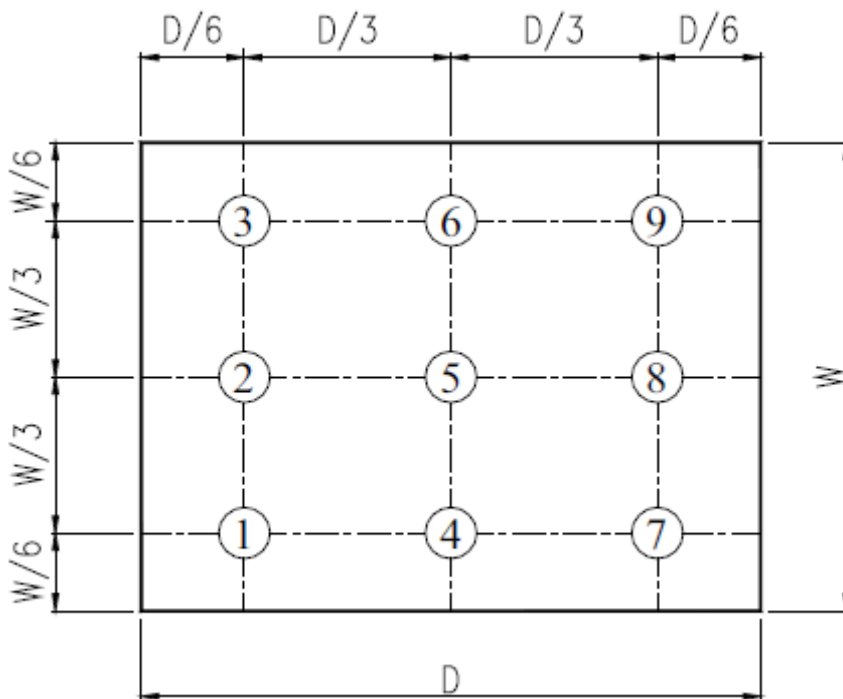


Fig. 2 Definition of uniformity

10. Environmental / Reliability Tests

No	Test Item	Condition	Judgment criteria
1	High Temp Operation	Ta= +80°C, 240hrs	Per table in below
2	Low Temp Operation	Ta= -30°C, 240hrs	Per table in below
3	High Temp Storage	Ta= +80°C, 240hrs	Per table in below
4	Low Temp Storage	Ta= -30°C, 240hrs	Per table in below
5	High Temp & High Humidity Storage	Ta= +60°C, 90% RH, 240 hours	Per table in below (polarizer discoloration is excluded)
6	Thermal Shock (Non-operation)	-30°C, 0.5hour←→80°C, 0.5hour; 1hour/cycle, 100cycles	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)	1.5G, 10 ~ 300 Hz, 10min/cycle, 3 cycles each X, Y, Z	Per table in below
9	Shock (Non-operation)	200G, 2ms, half sine wave, 1 time for ± X, ± Y, ± Z.	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

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.

