DLC Display Co., Limited

德爾西顯示器有限公司

MODEL No:DLC0570CAL18MF-1

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Record of Revision

Date	Revision No.	Summary
2017-08-30	1.0	Rev 1.0 was issued

1. Scope

This data sheet is to introduce the specification of DLC0570CAL18MF-1, active matrix TFT module. It is composed of a color TFT-LCD panel, driver ICs, FPC and a backlight unit. The 5.7″ display area contains 1440x(RGB) x 2560 pixels.

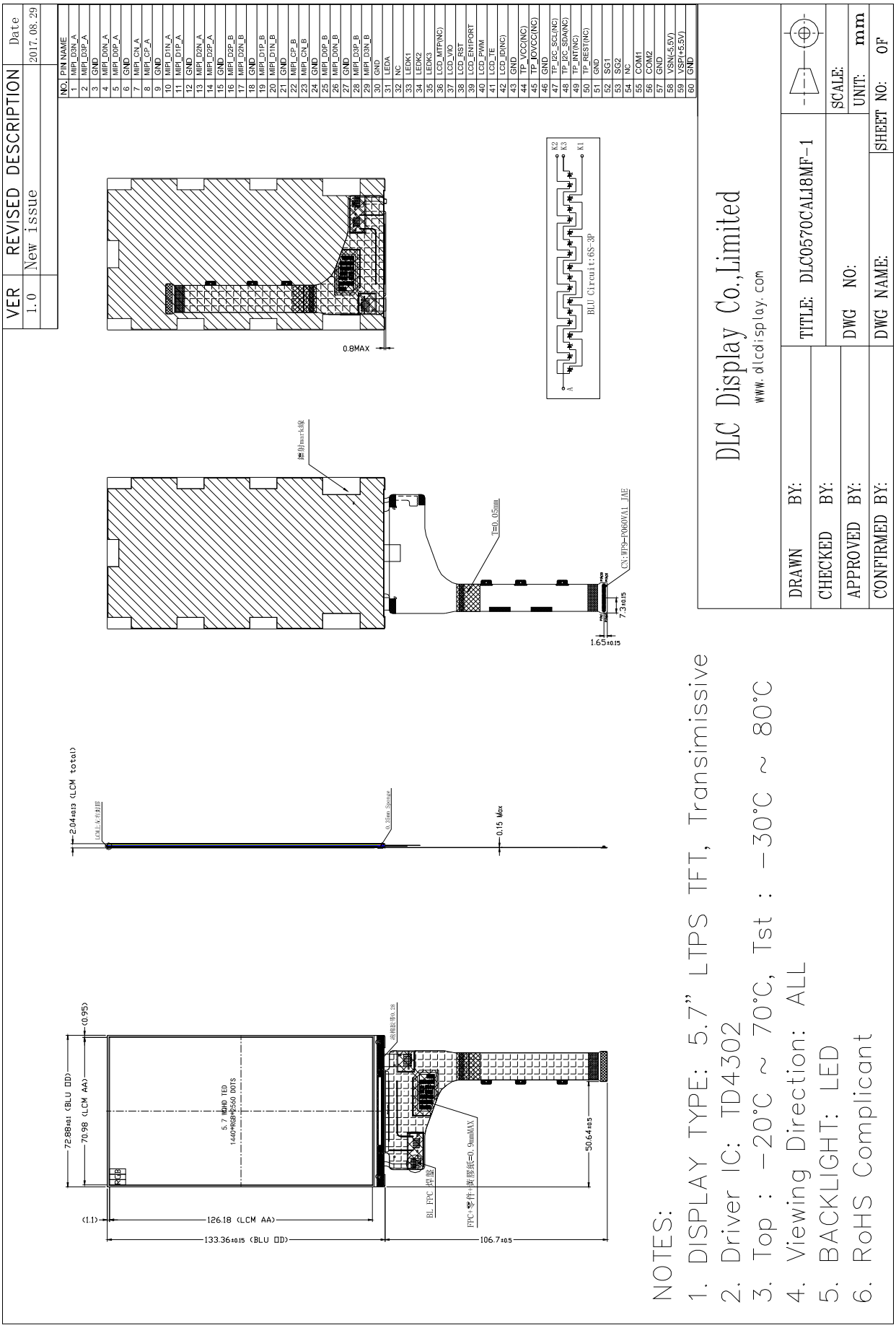
2. Application

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

3. General Information

Item	Contents	Unit
Size	5.7	inch
Resolution	1440x(RGB) x 2560	/
Technology type	LTPS	/
Interface	8 Lane MIPI	
Dot pitch	0.0493 x 0.0493	mm
Pixel Configuration	R.G.B. Vertical Stripe	
Outline Dimension (W x H x D)	72.88 x 133.36 x 2.04	mm
Active Area	70.98 x 126.18	mm
Display Mode	Transmissive, Normally Black	/
Driver IC	TD4302	/
Viewing Direction	ALL	/
Weight	TBD	g

4. Outline Drawing



5. Interface signals

Connector: WP9-P060VA1 JAE .

No	Symbol	Description	Remarks
1	MIPI_D3N_A	Negative MIPI Differential Data input	
2	MIPI_D3P_A	Positive MIPI Differential Data input	
3	GND	Power Ground	
4	MIPI_D0N_A	Negative MIPI Differential Data input	
5	MIPI_D0P_A	Positive MIPI Differential Data input	
6	GND	Power Ground	
7	MIPI_CN_A	Negative MIPI Differential Clock input	
8	MIPI_CP_A	Positive MIPI Differential Clock input	
9	GND	Power Ground	
10	MIPI_D1N_A	Negative MIPI Differential Data input	
11	MIPI_D1P_A	Positive MIPI Differential Data input	
12	GND	Power Ground	
13	MIPI_D2N_A	Negative MIPI Differential Data input	
14	MIPI_D2P_A	Positive MIPI Differential Data input	
15	GND	Power Ground	
16	MIPI_D2P_B	Positive MIPI Differential Data input	
17	MIPI_D2N_B	Negative MIPI Differential Data input	
18	GND	Power Ground	
19	MIPI_D1P_B	Positive MIPI Differential Data input	
20	MIPI_D1N_B	Negative MIPI Differential Data input	
21	GND	Power Ground	
22	MIPI_CP_B	Positive MIPI Differential Clock input	
23	MIPI_CN_B	Negative MIPI Differential Clock input	
24	GND	Power Ground	
25	MIPI_D0P_B	Positive MIPI Differential Data input	
26	MIPI_D0N_B	Negative MIPI Differential Data input	
27	GND	Power Ground	
28	MIPI_D3P_B	Positive MIPI Differential Data input	
29	MIPI_D3N_B	Negative MIPI Differential Data input	
30	GND	Power Ground	
31	LEDA	LED Anode	
32	NC	No Connection	
33	LEDK1	LED Cathode	
34	LEDK2	LED Cathode	
35	LEDK3	LED Cathode	
36	LCD_MTP(NC)	No Connection	
37	LCD_VIO		

38	LCD_RST	Reset pin	
39	LCD_EN1PORT		
40	LCD_PWM	PWM control signal for LED driver (CABC)	
41	LCD_TE	LCD Synchronization Signal	
42	LCD_ID(NC)	No Connection	
43	GND	Power Ground	
44	TP_VCC(NC)	No Connection	
45	TP_IOVCC(NC)	No Connection	
46	GND	Power Ground	
47	TP_I2C_SCL(NC)	No Connection	
48	TP_I2C_SDA(NC)	No Connection	
49	TP_INT(NC)	No Connection	
50	TP_REST(NC)	No Connection	
51	GND	Power Ground	
52	SG1		
53	SG2		
54	NC	No Connection	
55	COM1		
56	COM2		
57	GND	Power Ground	
58	VSN(-5.5V)		
59	VSP(+5.5V)		
60	GND	Power Ground	

6. Absolute maximum Ratings

6.1. Electrical Absolute max. ratings

Parameter	Symbol	MIN	MAX	Unit	Remark
Power supply Voltage	VSP	4.5	6.0	V	
	VSN	-4.5	6.0	V	
	IOVCC	1.7	1.9	V	
Logic input voltage Range	VIN	-0.3	4	V	Note

Note : Signals include MIPI_D0±, MIPI_D1±, MIPI_D2±, MIPI_D3±, MIPI_CLK±, RESET.

6.2 Environment Conditions

Item	Symbol	MIN	MAX	Unit	Remark
Operating Temperature	TOPR	-20	70	℃	
Storage Temperature	TSTG	-30	80	℃	

7. Electrical Specifications

VSP=+5.5V, VSN=-5.5V, IOVCC=1.8V, GND=0V, Ta=25℃

Item		Symbol	MIN	TYP	MAX	Unit	Remark
LCD Logic I/O Voltage		IOVCC	1.7	1.8	1.9	V	
LCD Input Analog Voltage		VSP	4.5	5.5	6.0	V	
		VSN	-6.0	-5.5	-4.5	V	
MIPI Operating Voltage		DPHYVCC	1.7	1.8	1.9	V	
LCD Logic I/O Current		IOVCC	30	40	50	mA	
LCD Input Analog Current		VSP	8	12	16	mA	
		VSN	6	8	10	mA	
Input Signal Voltage	Low Level	VIL	0	-	0.3*IOVCC	mV	Note 1
	High Level	VIH	0.7*IOVCC	-	IOVCC	mV	
Output Signal Voltage	Low Level	VIL	0	-	0.2*IOVCC	V	Note 2
	High Level	VIH	0.8*IOVCC	-	IOVCC	V	

Note 1: Signals include MIPI_D0±, MIPI_D1±, MIPI_D2±, MIPI_D3±, MIPI_CLK±, RESET.
Note 2: Signals include TE, LED_PWM

8. Command/AC Timing

8.1 AC Electrical Characteristics

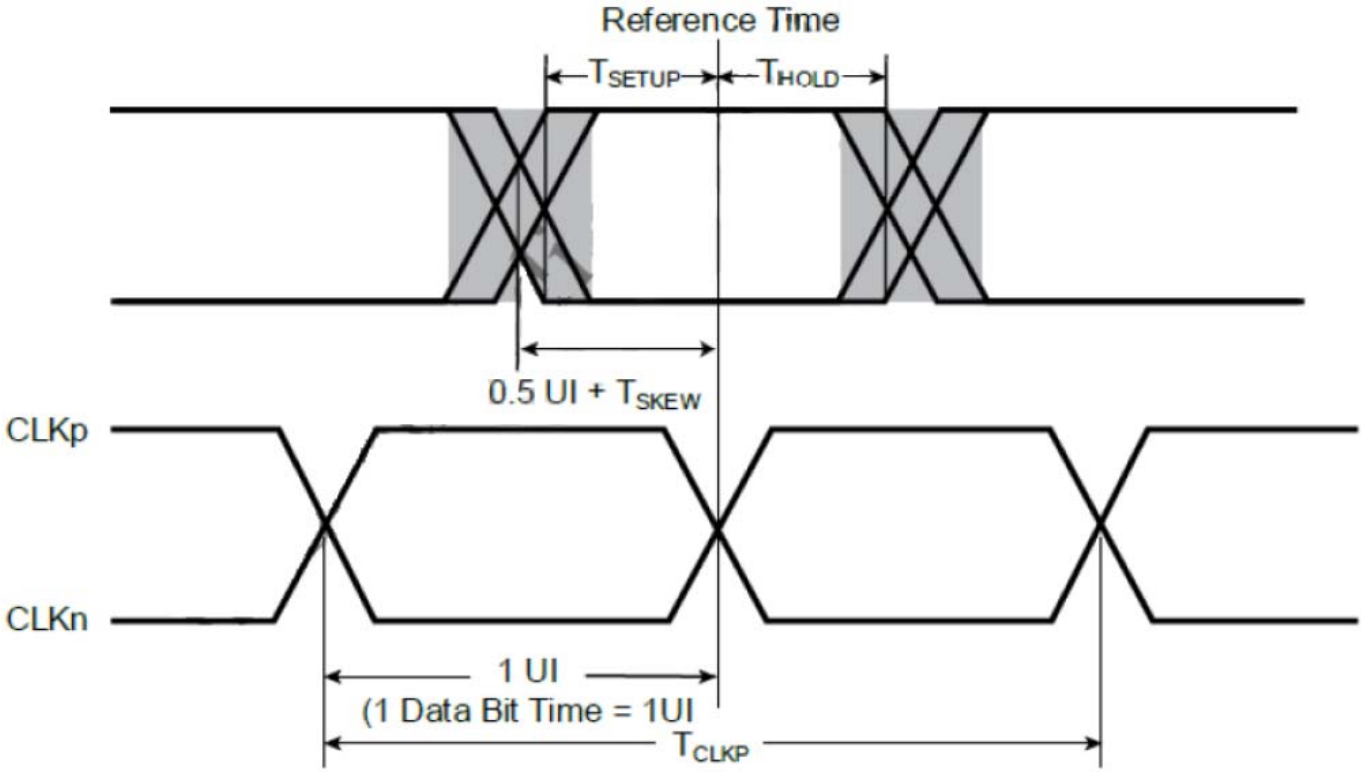


Figure: Data to clock timing definitions

Parameter	Symbol	MIN	TYP	MAX	Unit	Remark
UI instantaneous	UIINST	1	-	12.5	ns	
Data to Clock Skew (measured at transmitter)	TSKEW(TX)	-0.15	-	0.15	UIINST	
Data to Clock Setup Time (measured at receiver)	TSETUP(RX)	-0.15	-	0.15	UIINST	
Data to Clock Hold Time (measured at receiver)	THOLD(RX)	-0.15	-	0.15	UIINST	

Table: MIPI Interface characteristics

Note 1: When fDSICLK<125MHz, change auto load NV setting so that it is compliant with THS-PREPARE+THS-ZERO spec.
Note 2: Minimum tSETUP/tHOLD Time is 0.15UI. This value may change according to DSI transfer rate.

8.2 MIPI 24bits RGB Data Format

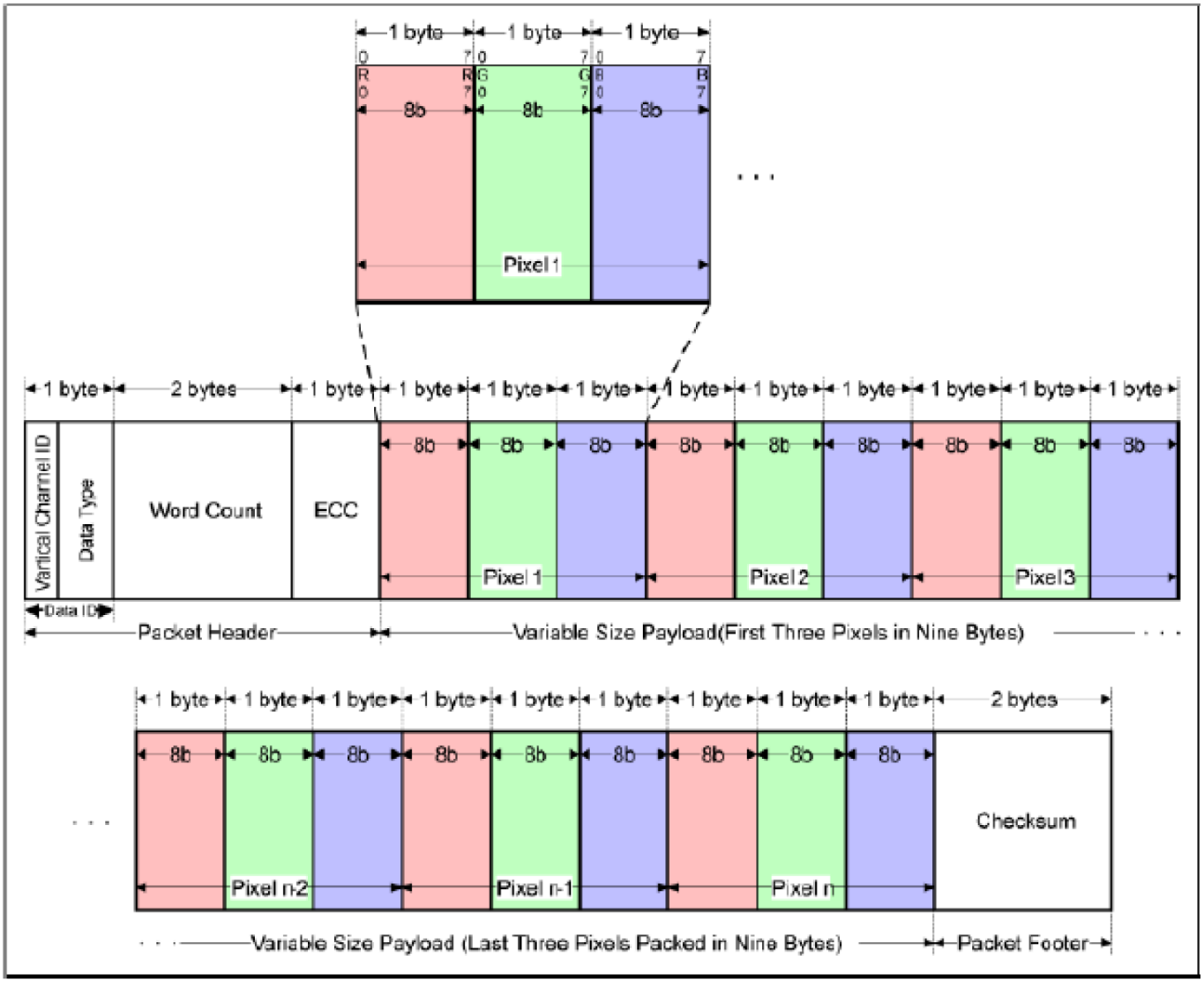
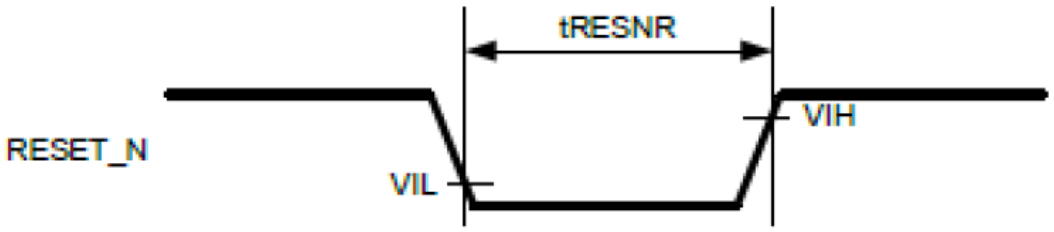


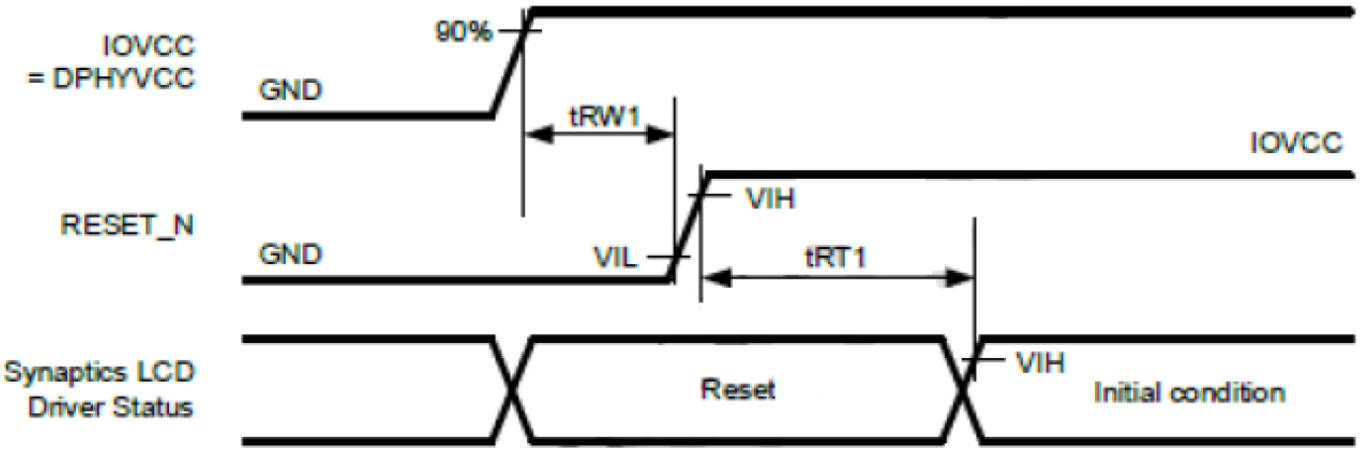
Figure: MIPI RGB 24 bits RGB Data Format

8.3 Reset Input Timing

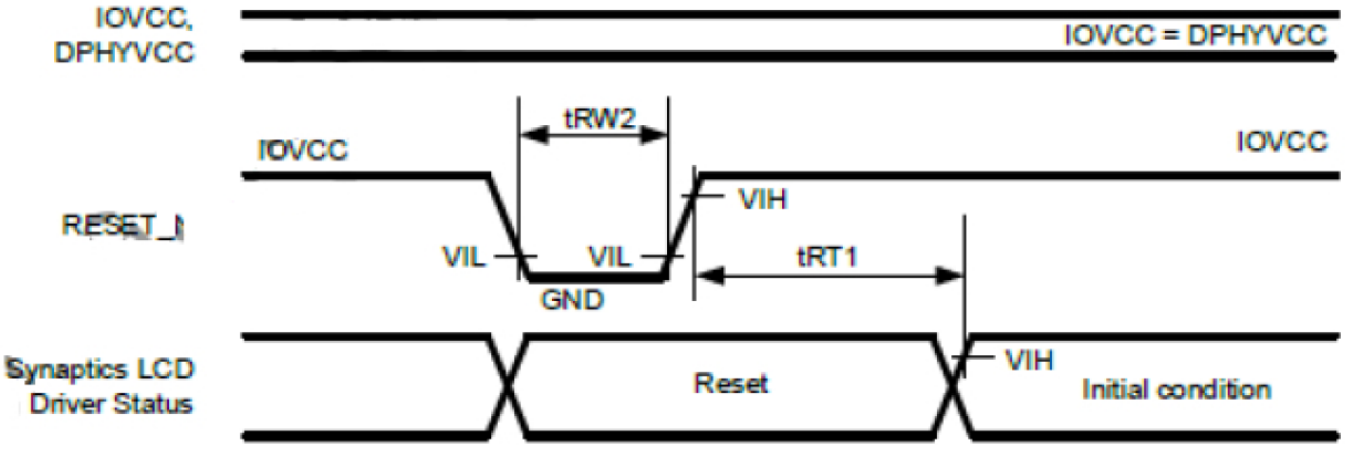
8.3.1.Reset Reject



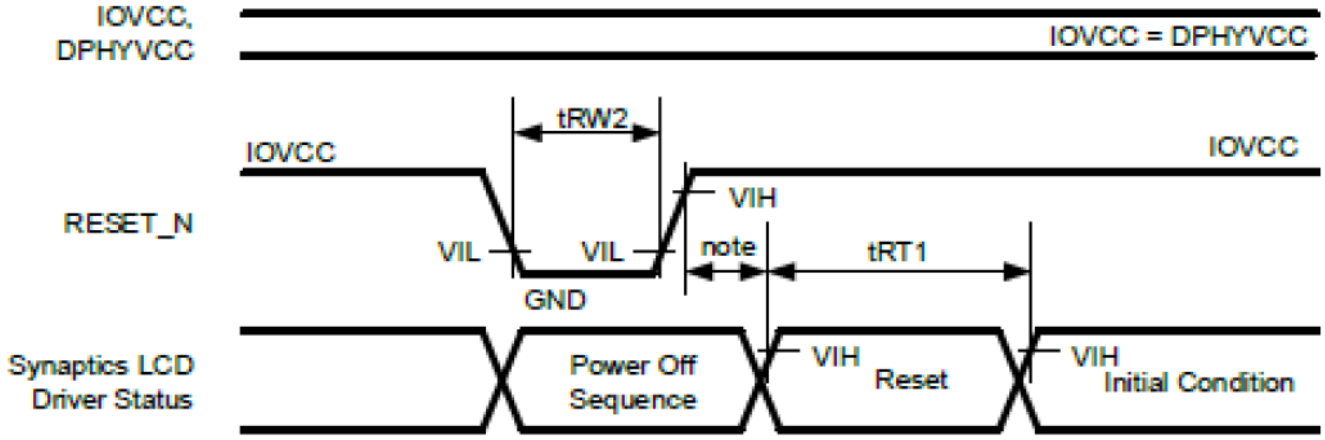
8.3.2.Reset Timing at Power Supply On



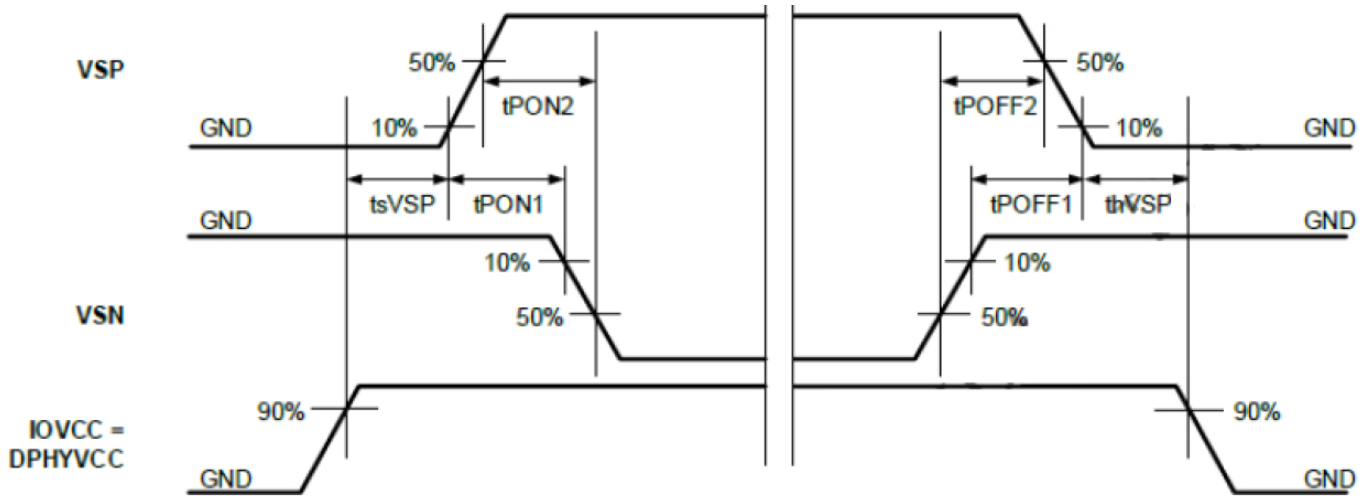
8.3.3.Reset Timing During Operation (Sleep in)



8.3.4.Reset Timing During Operation (Sleep out)



8.4 POWER ON/OFF SEQUENCE



9. Optical Specification

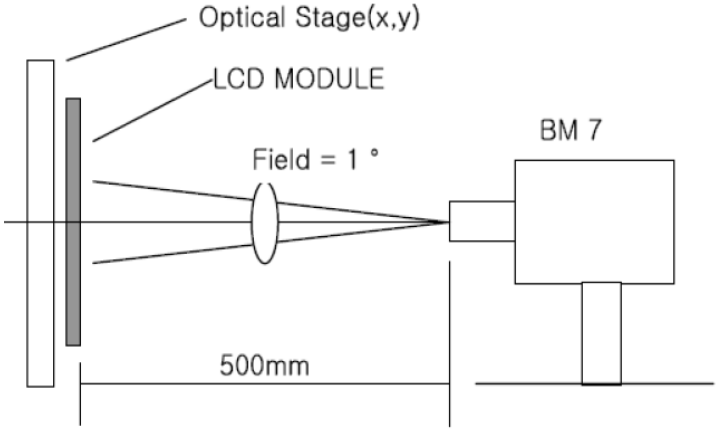
Item		Symbol	Condition	Min	Typ.	Max.	Unit	Remark
Contrast Ratio		CR	θ=0°	1000	1500	-		Note1 Note2
Response Time		Ton+Toff	25℃	-	-	35	ms	Note1 Note3
View Angles		ΘT	CR≧10	80	-	-	Degree	Note 4
		ΘB		80	-	-		
		ΘL		80	-	-		
		ΘR		80	-	-		
Chromaticity	White	x	Brightness is on		TBD			Note5, Note1
		y			TBD			
Luminance		L		600	650	-	cd/m^2	Note1 Note6
NSTC				72	75	-	%	
W,R,G,B Gamma			θ=0°	1.9	2.2	2.5		
Flicker			θ=0° 53Hz~63Hz	-	-	-25	dB	
Uniformity		U		70	80	-	%	Note1 Note7
Cross talk		X-talk	FHD	-	-	5	%	

Test Conditions: 1/3*IF= 20mA, VF=3.0 V(Backlight current for each LED), the ambient temperature is 25℃.

Note 1: Definition of optical measurement system.

Temperature = 25℃(±3℃)

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

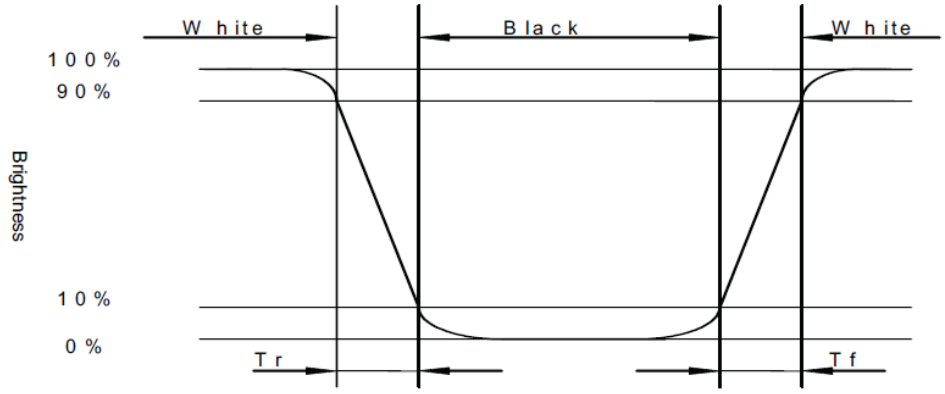


Note 2: Contrast ratio is defined as follow:

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

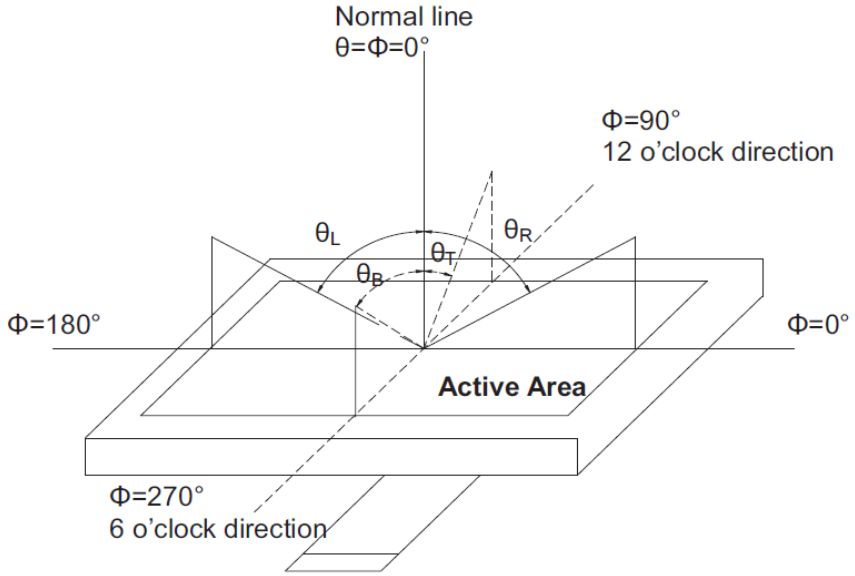
Note 3: Response time is defined as follow:

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).



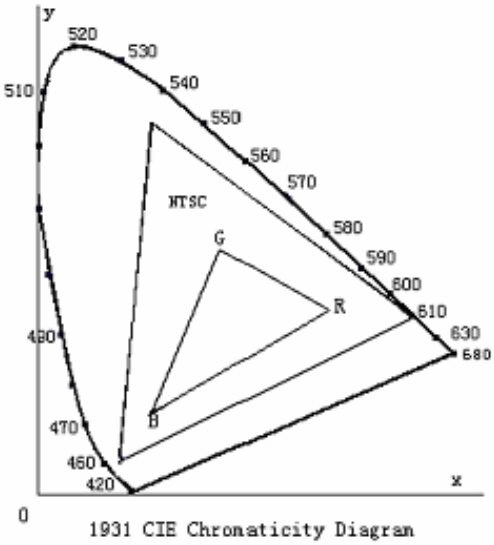
Note 4: Viewing angle range is defined as follow:

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:

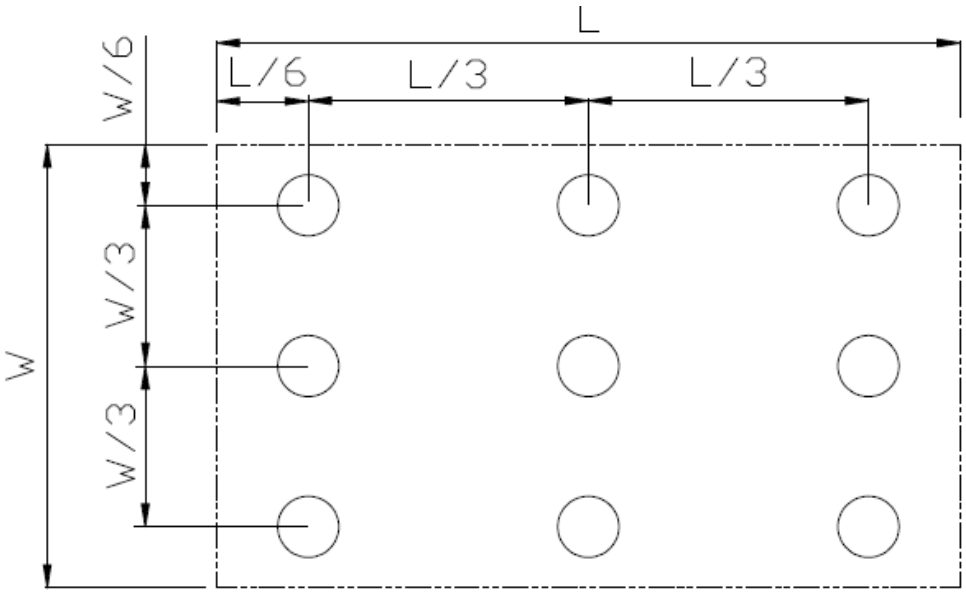
Luminance is defined as the brightness of all pixels “White” at the center of display area on optimum contras.

Note 7: Definition of Luminance Uniformity

Active area is divided into 9 measuring areas (Refer Fig. 2). Every measuring point is placed at the center of each measuring area.

Luminance Uniformity (U) = Lmin/ Lmax

L-------Active area length W----- Active area width



10 Environmental / Reliability Tests

No	Test Item	Condition	Judgment criteria
1	High Temp Operation	Ts=+70℃, 120hrs	Per table in below
2	Low Temp Operation	Ta=-20℃, 120hrs	Per table in below
3	High Temp Storage	Ta=+80℃, 120hrs	Per table in below
4	Low Temp Storage	Ta=-30℃, 120hrs	Per table in below
5	High Temp & High Humidity Storage	Ta=+40℃, 90% RH 120 hours	Per table in below (polarizer discoloration is excluded)
6	Thermal Shock (Non-operation)	-30℃ 30 min~+80℃ 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.

11.4Storage

A. Store the products in a dark place at +25℃±10℃ 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

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.
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.