



深圳显昶光电科技有限公司

Shenzhen Xianyang Optoelectronic Technology Co., Ltd

LCD MODULE SPECIFICATION

Customer: _____

Module No.: XY050WVH12-B1714A

Date: 2023-06-07

Version: 2.0

For Customer's Acceptance:

Approved by	Comment

Approved by	Checked by	Prepared by

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Record of Revision

Rev.	Date	Description	Editor
1.0	2023-2-23	First release	ping.Yang
2.0	2023-06-07	Update brightness and color coordinate parameters	ping.Yang

1 General Specifications

No.	Item	Specification	Remark
1	LCD Size	5.0 inch (Diagonal)	
2	Driver Element	a-Si TFT active matrix	
3	Resolution	800 (RGB) × 480	
4	Display Mode	Normally Black, Transmissive	
5	Pixel Pitch(mm)	0.045 (H) × 0.135 (V)	
6	Display Colors	16.7M	
7	Surface Treatment	/	
8	Color Arrangement	RGB-Stripe	
9	Interface	RGB 24Bit,Digital (TTL)	
10	Viewing Direction	All	
11	Gray Scale Inversion Direction	/	Note 1
12	Outline Dimension (mm)	120.7(W) × 75.8 (H) × 2.90 (T)	
13	Active Area (mm)	108.0 (W) × 64.8 (H)	
14	Touch Screen	Without CTP	
15	Display Driver IC	ST7265	
16	Touch Driver IC	/	

Note 1: Viewing direction for best image quality is different from TFT definition. There is a 180° shift.

Note 2: RoHS compliant.

2 Pin Assignment

2.1 LCD Pin assignment

Match connector: XF2M-4015-1A (OMRON) or equivalent.

PIN	Symbol	I/O	Description	Remark
1	LED-K	P	LED Cathode	
2	LED-A	P	LED Anode	
3	VSS	P	Power Ground	
4	VDD	P	Power Source	
5	R00	I	RED Data Signal (LSB)	
6	R01	I	RED Data Signal	
7	R02	I	RED Data Signal	
8	R03	I	RED Data Signal	
9	R04	I	RED Data Signal	
10	R05	I	RED Data Signal	
11	R06	I	RED Data Signal	
12	R07	I	RED Data Signal	
13	G00	I	GREEN Data Signal(LSB)	
14	G01	I	GREEN Data Signal	
15	G02	I	GREEN Data Signal	
16	G03	I	GREEN Data Signal	
17	G04	I	GREEN Data Signal	
18	G05	I	GREEN Data Signal	
19	G06	I	GREEN Data Signal	
20	G07	I	GREEN Data Signal	
21	B00	I	BLUE Data Signal(LSB)	
22	B01	I	BLUE Data Signal	
23	B02	I	BLUE Data Signal	
24	B03	I	BLUE Data Signal	
25	B04	I	BLUE Data Signal	
26	B05	I	BLUE Data Signal	
27	B06	I	BLUE Data Signal	
28	B07	I	BLUE Data Signal	
29	VSS	P	Power Ground	
30	DLCK	I	Clock Signal to Sample each date	
31	DISP	I	Display ON/OFF Signal	
32	HSYNC	I	Horizontal Synchronizing Signal	
33	VSYNC	I	Vertical Synchronizing Signal	
34	DE	I	Input Data enable control	
35	NC	-	Set Open	
36	VSS	P	Power Ground	
37	XR	-	Touch Panel PIN(No connection)	

38	YD	-	Touch Panel PIN(No connection)	
39	XL	-	Touch Panel PIN(No connection)	
40	YU	-	Touch Panel PIN(No connection)	

I---Input, O---Output, P--- Power/Ground

3 Absolute Maximum Ratings

Ta = 25℃

Item	Symbol	Min.	Max.	Unit	Remark
Power Voltage	VDD	-0.30	4.0	V	
Backlight Forward Current(LED)	IF	0	40	mA	
Operating Temperature	Top	-30.0	85.0	℃	
Storage Temperature	T _{st}	-35.0	85.0	℃	
Operating and Storage Humidity	H _{stg}	-	90%	%(RH)	

4. Electrical Characteristics

4.1 Recommended Operating Condition

VDD=3.3V, GND=0V, Ta = 25℃

Item	Symbol	Min.	Typ.	Max.	Unit	Remark
Analog/Digital supply Voltage	VDD	3.1	3.3	3.6	V	
Input logic high voltage	VIH	0.7VDD	-	VDD	V	R0~R5, G0~G5,0~B5, DE, DCLK, HSYNC, VSYNC, MODE, RESET,
Input logic low voltage	VIL	0		0.3DD	V	
Analog/Digital supply Voltage	I _{VDD}	-	70	-	mA	VDD=3.3V, color bar pattern

4.2 Backlight Unit Driving Condition

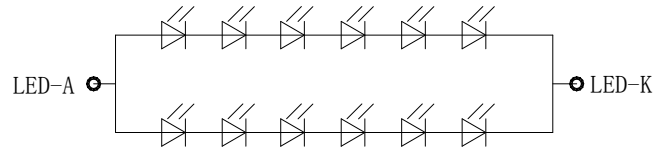
Item	Symbol	Min.	Typ.	Max.	Unit	Remark
Forward Current	I _F	-	40	50	mA	12 LEDs (6 LED Serial, 2 LED Parallel)
Forward Current Voltage	V _F	-	18	20.4	V	
Backlight Power Consumption	W _{BL}	-	720	1020	mW	
Operating Life Time	--	50000	--	--	hrs	Note 2, Note 3

Note1: The LED driving condition is defined for each module (6LED Serial, 2 LED Parallel).

Note2: When LCM is operated, the stable forward current should be inputted. And forward voltage is for reference only.

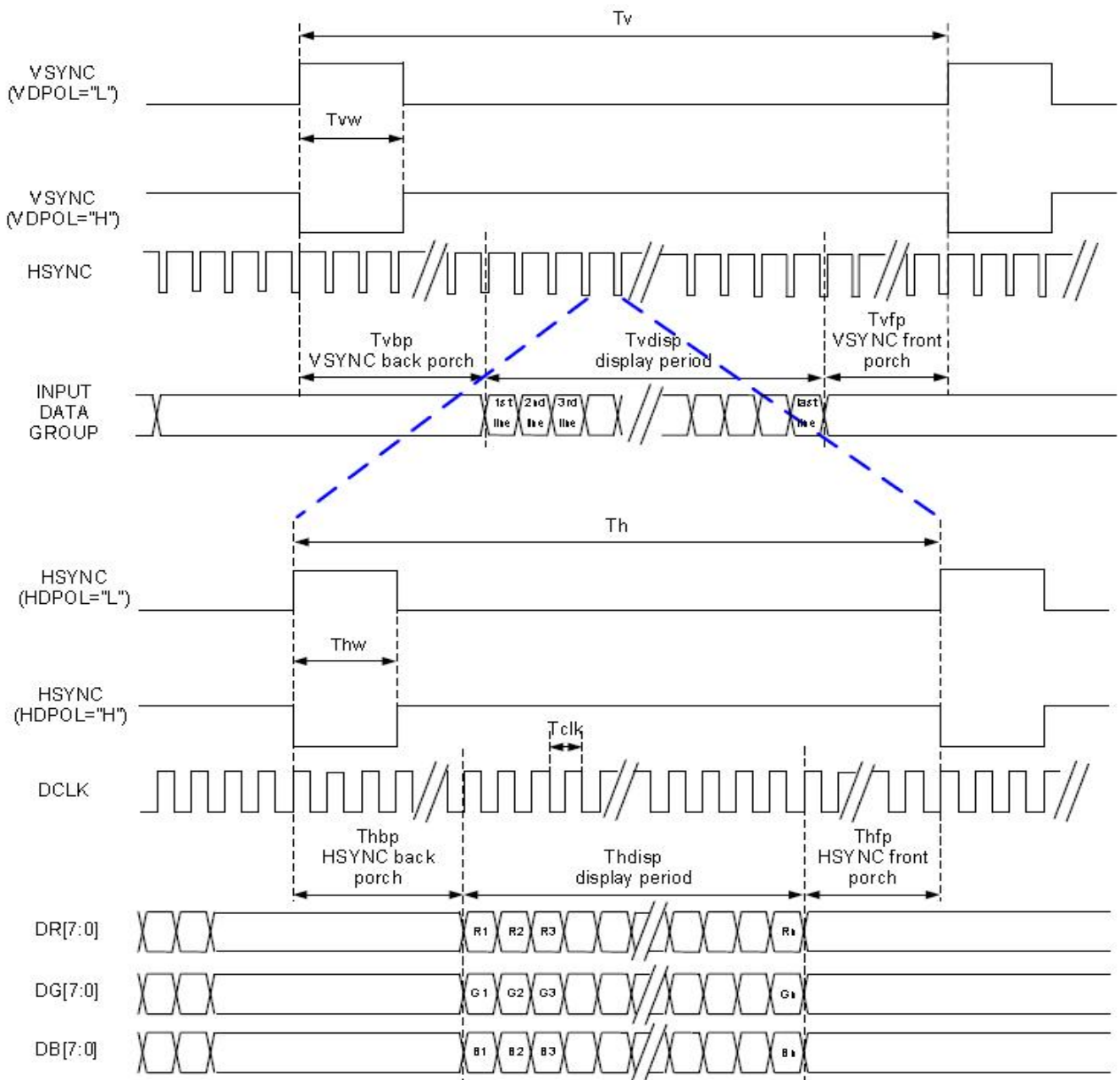
Note3: Optical performance should be evaluated at $T_a=25^{\circ}\text{C}$ When LED is driven at high current, high ambient temperature & humidity condition. The life time of LED will be reduced. Operating life means brightness goes down to 50% initial brightness. Typical operating life time is estimated data.

Note4: The LED driving condition is defined for each LED module.

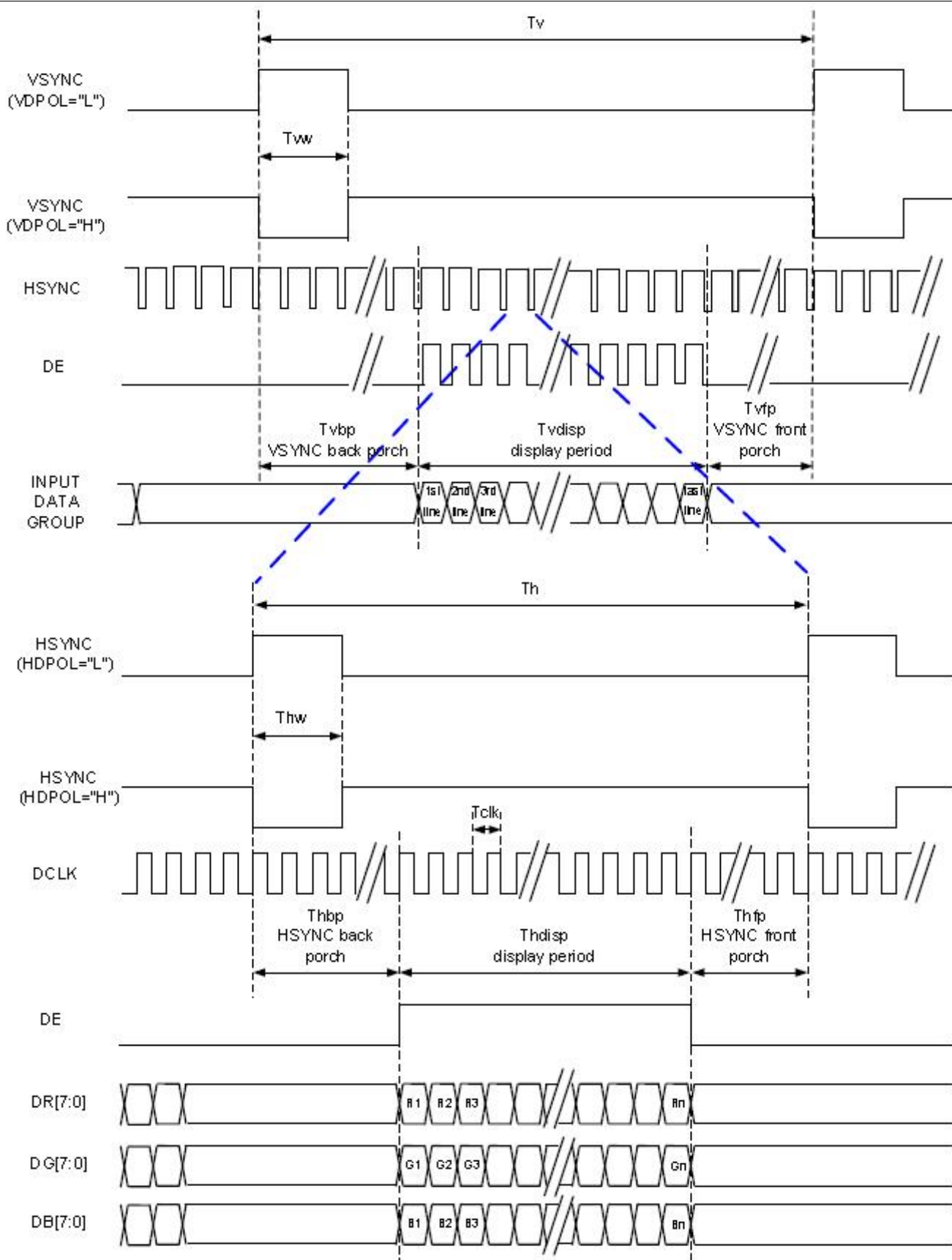


5 Timing Chart

5.1 RGB SYNC Mode:

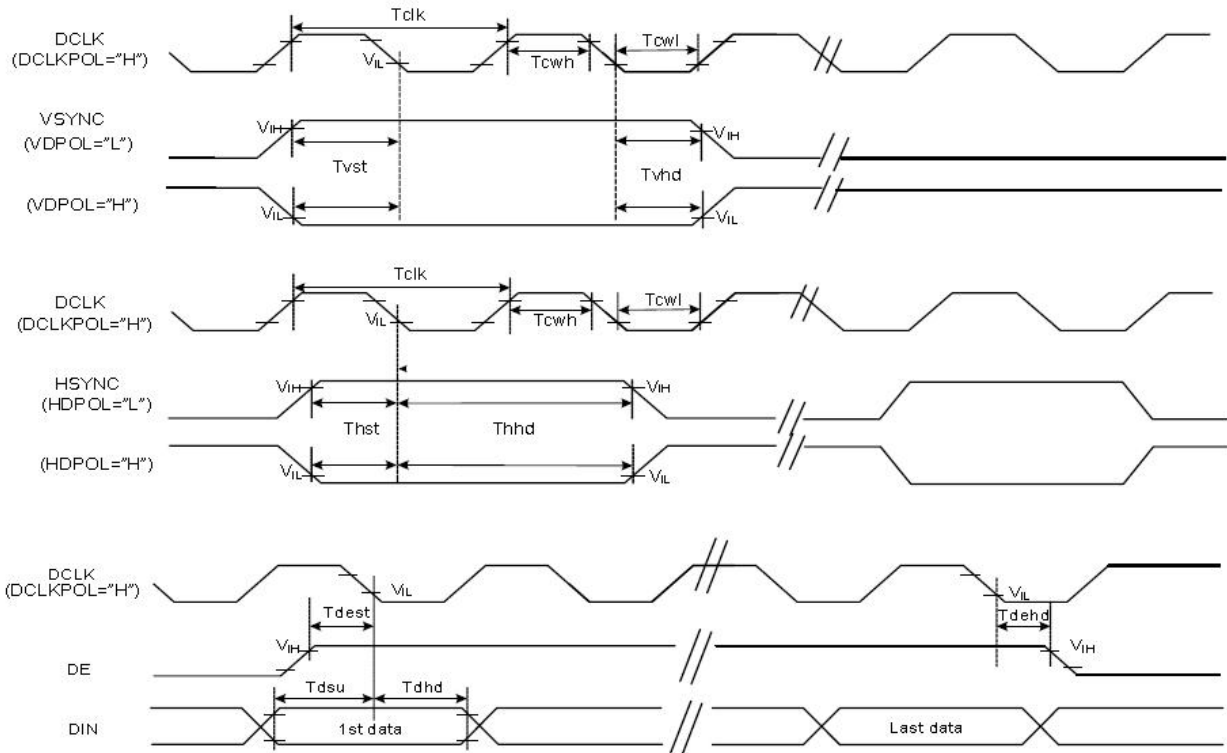


5.2 RGB SYNC-DE Mode:

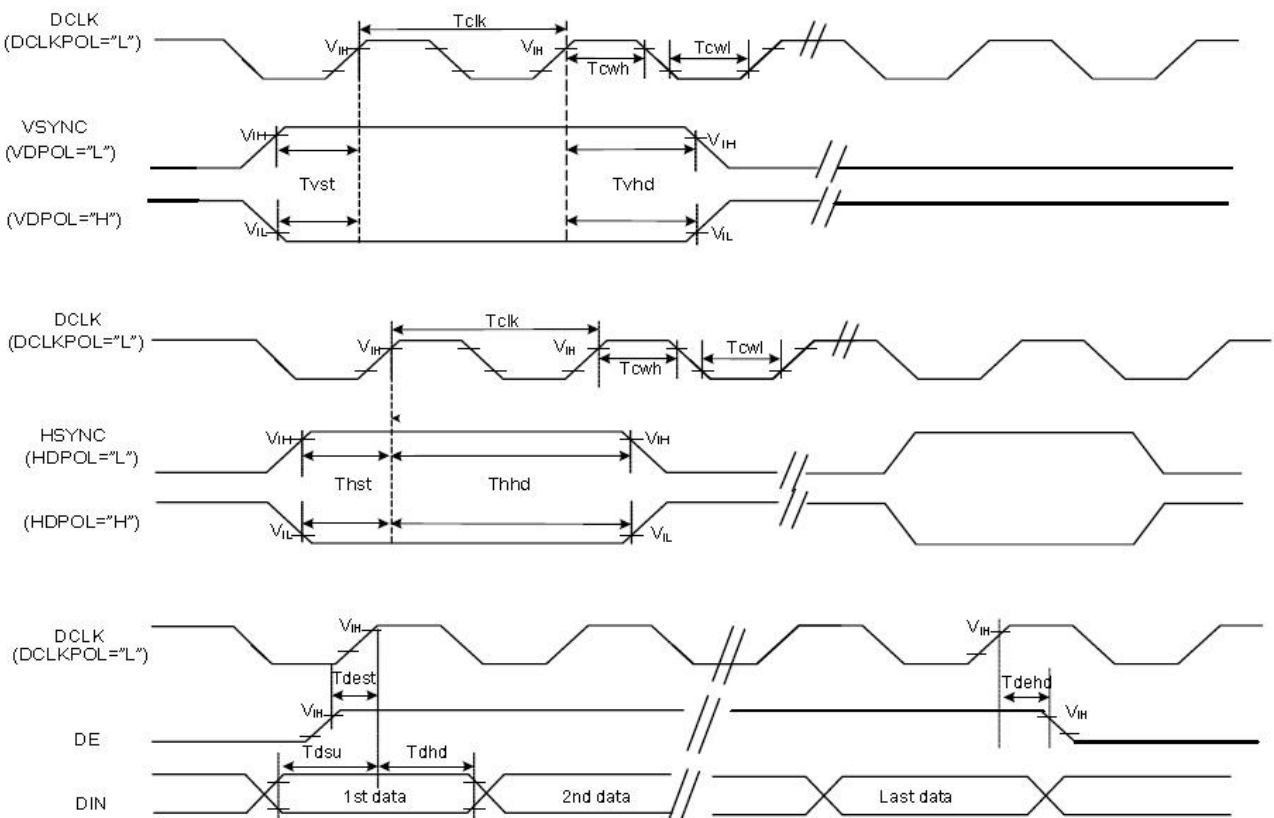


5.3 Clock and Data Input Timing Diagram:

DCLK Negative Polarity (DCLPOL="H")



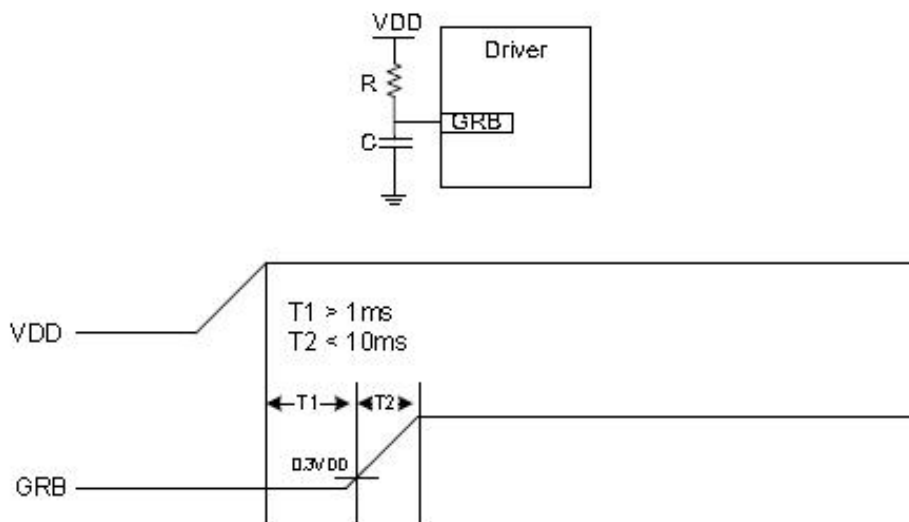
DCLK Positive Polarity (DCLKPOL="L")



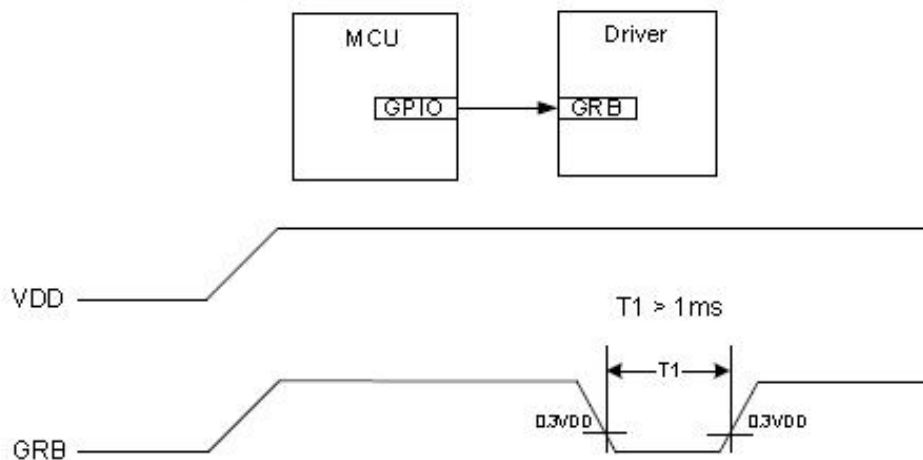
Item	Symbol	Min.	Typ.	Max.	Unit	Conditions
CLK Pulse Duty	T _{cd}	40	50	60	%	
VS _{YNC} Setup Time	T _{vst}	10	-	-	ns	
VS _{YNC} Hold Time	T _{vhd}	10	-	-	ns	
HS _{YNC} Setup Time	T _{hst}	10	-	-	ns	
HS _{YNC} Hold Time	T _{hhd}	10	-	-	ns	
Data Setup Time	T _{dsu}	10	-	-	ns	
Data Hold Time	T _{dhd}	10	-	-	ns	
DE Setup Time	T _{dest}	10	-	-	ns	
DE Hold Time	T _{deshd}	10	-	-	ns	

5.4 Reset timing

(1) The GRB pin with external RC circuit.



(2) The GRB pin controlled by MCU.



5.5 Recommended Timing Setting of TCON

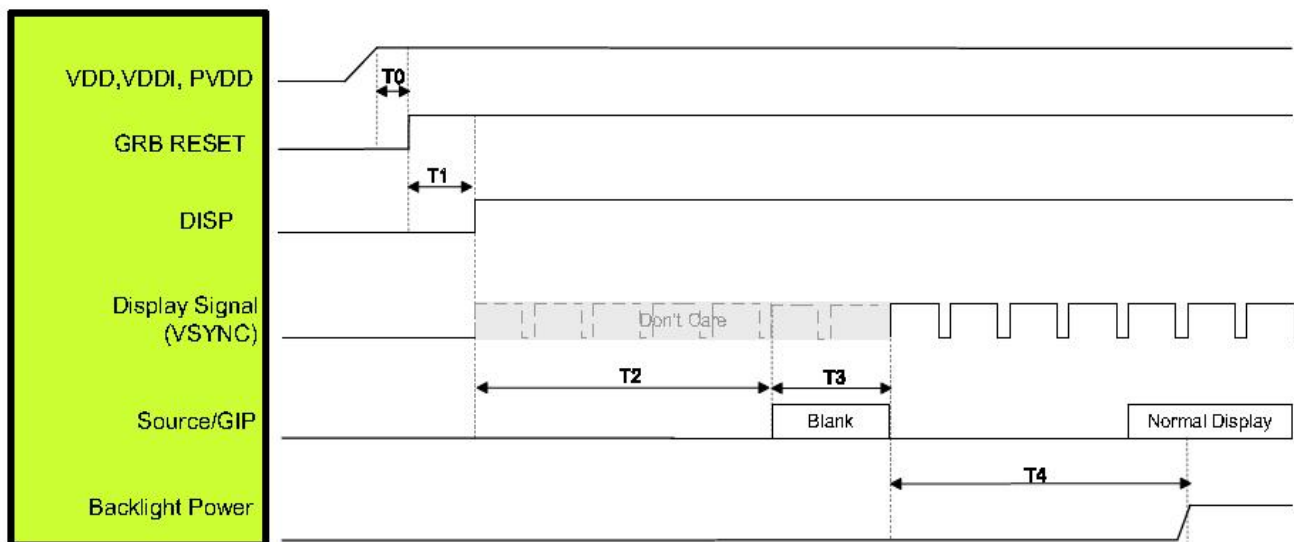
Parallel 24-bit RGB Input Timing (VDD=VDDI= 3.3V, AGND= 0V, T_A=25°C)

Parallel 24-bit RGB Interface Timing Table						
Item	Sym bol	Min.	Typ.	Max.	Unit	Rem ark
DCLK Frequency	Fclk	23	25	27	MHz	
HSYNC	Period Time	Th	808	816	848	DCLK
	Display Period	Thdisp	800		DCLK	
	Back Porch	Thbp	4	8	24	DCLK
	Front Porch	Thfp	4	8	24	DCLK
	Pulse Width	Thw	2	4	8	DCLK
VSYNC	Period Time	Tv	496	512	528	HSYNC
	Display Period	Tvdisp	480		HSYNC	
	Back Porch	Tvbp	8	16	24	HSYNC
	Front Porch	Tvfp	8	16	24	HSYNC
	Pulse Width	Tvw	2	4	8	HSYNC

Note:

1. It is necessary to keep Tvbp =12, Tvfp = 8 , Tw = 4 and Thbp = 43, Thfp = 8 Thw = 4 in sync mode.
2. The Max Value and Min Value of porch must satisfy the range of Frame Pate and Line Period
3. It is necessary to keep Thbp>10, Tvbp+Tvfp<128

5.6 POWER ON SEQUENCE (VDDI=VDD)



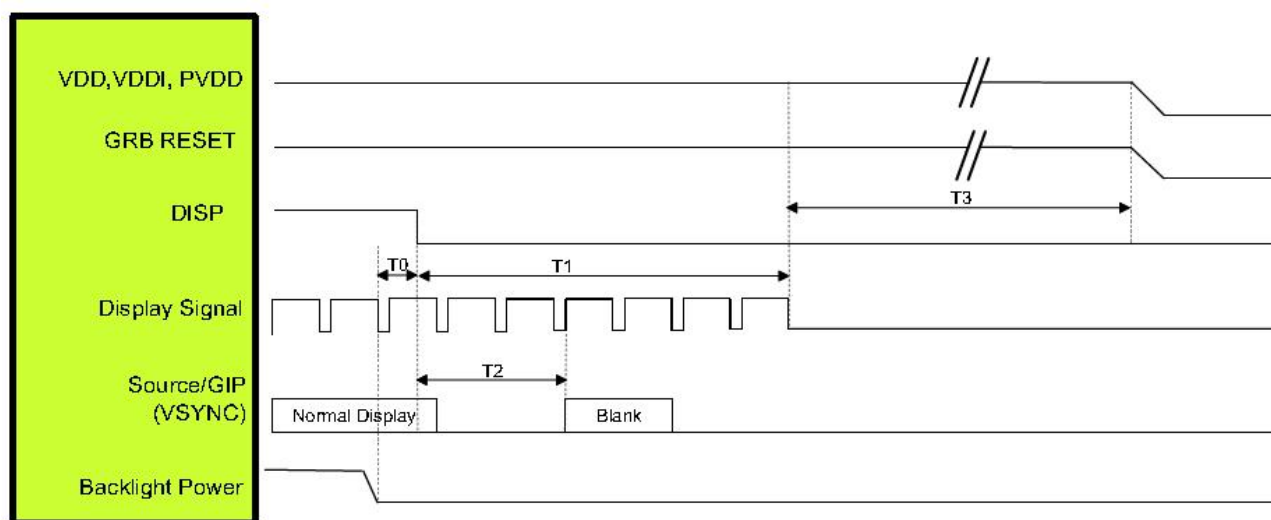
Symbol	Description	Time	Unit
T0	System power stability to GRB RESET signal	≥ 1	ms
T1	GRB RESET= "High" to DISP="High"	≥ 10	ms
T2	DISP="High" to Source/GIP scan blank	85	ms
T3	IC scan blanking signal	≥ 33	ms
T4	Display signal input to Backlight power on (base on Display Signal Frame Rate 60Hz)	≥ 100	ms

Note: 1. When DISP pull "H" or "L", IC will execute the internal power on or power off procedures .Please be careful about the timing of DISP and do not interrupt it during power on or power off procedure, otherwise unexpected errors will occur.

2. RGB interface Display signal: DCLK; VSYNC; HSYNC; DE; DR[7:0]; DG[7:0]; DB[7:0].

3. LVDS interface Display signal: DCLK P/N; RX[3:0] P/N.

5.7 POWER OFF SEQUENCE (VDDI=VDD)



Symbol	Description	Time	Unit
T0	Backlight Power off to DISP="Low"	≥ 1	ms
T1	DISP="Low" to IC internal voltage discharge complete	≥ 100	ms
T2	DISP="Low" to Source/GIP scan blank (base on Display Signal Frame Rate 60Hz)	≤ 50	ms
T3	IC internal voltage discharge is completed to VDD/VDDI/PVDD off	≥ 0	ms

Note: 1. When DISP pull "H" or "L", IC will execute the internal power on or power off procedures .Please be careful about the timing of DISP and do not interrupt it during power on or power off procedure, otherwise unexpected errors will occur.

2. RGB interface Display signal: DCLK; VSYNC; HSYNC; DE; DR[7:0]; DG[7:0]; DB[7:0].

3. LVDS interface Display signal: DCLK P/N; RX[3:0] P/N.

6 Optical Characteristics

Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Remark
View Angles		θT	CR ≥ 10	70	80	-	Degree	Note 2
		θB		70	80	-		
		θL		70	80	-		
		θR		70	80	-		
Contrast Ratio		CR	θ=0°	1000	1200	-		Note1 Note3
Response Time		T _{ON}	25℃	--	30	40	ms	Note1
		T _{OFF}						Note4
Chromaticity	White	x	Backlight is on	0.276	0.306	0.336		Note1 Note5
		y		0.303	0.333	0.363		
	Red	x		0.565	0.595	0.625		
		y		0.298	0.328	0.358		
	Green	x		0.323	0.353	0.383		
		y		0.563	0.593	0.623		
	Blue	x		0.123	0.153	0.183		
		y		0.069	0.099	0.129		
Uniformity		U		70	80	-	%	Note1 Note6
NTSC				50	55	-	%	Note 5
Luminance		L		-	600	-	cd/m ²	Note1 Note7

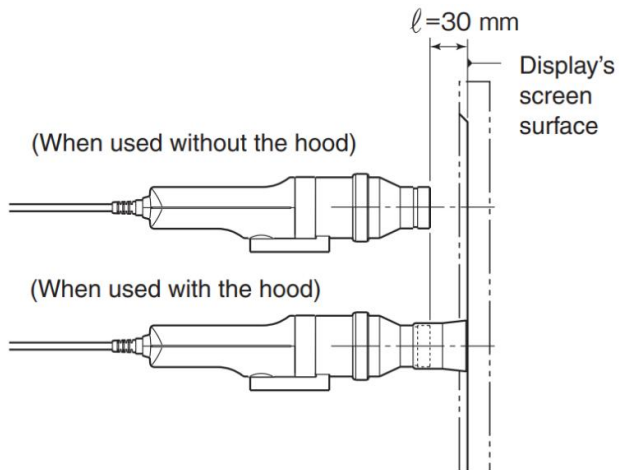
Test Conditions:

1. $I_F = 40 \text{ mA}$, $V_F = 18\text{V}$ and the ambient temperature is $25 \pm 2^\circ\text{C}$. humidity is $65 \pm 7\%$
2. The test systems refer to Note 1 and Note 2.

Note 1: Definition of optical measurement system.

Properties are measured at the center point of the LCD screen. All input terminals LCD panel must be

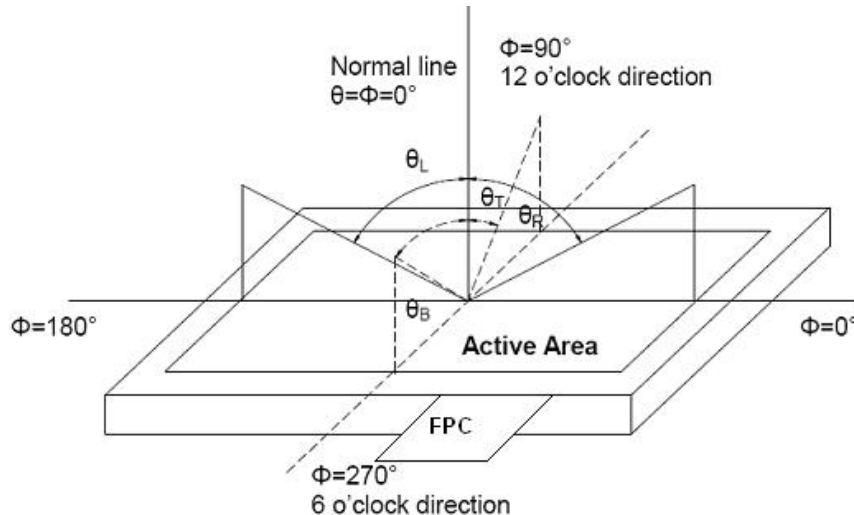
ground when measuring the center area of the panel.



Item	Photo detector	Field
Contrast Ratio	CA210 or similar equipment	1°
Luminance		
Chromaticity		
Lum Uniformity		
Response Time	BM-7A	2°

Note 2: Definition of viewing angle range and measurement system.

Viewing angle is measured at the center point of the LCD by CONOSCOPE(ergo-80)。



Note 3: Definition of contrast ratio

$$\text{Contrast ratio (CR)} = \frac{\text{Luminance measured when LCD is on the "White" state}}{\text{Luminance measured when LCD is on the "Black" state}}$$

“White state”: The state is that the LCD should drive by Vwhite.

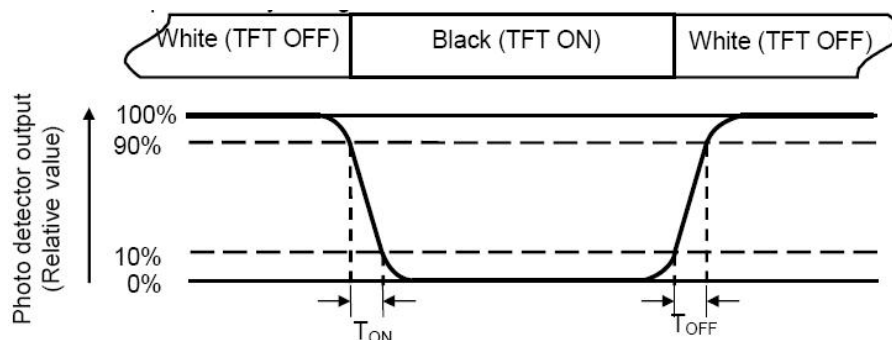
“Black state”: The state is that the LCD should drive by Vblack.

Vwhite: To be determined Vblack: To be determined.

Note 4: Definition of response time

The response time is defined as the LCD optical switching time interval between “White” state and “Black” state. Rise time (TON) is the time between photo detector output intensity changed from 90% to 10%. And

fall time (T_{OFF}) is the time between photo detector output intensity changed from 10% to 90%.



Note 5: Definition of color chromaticity (CIE1931)

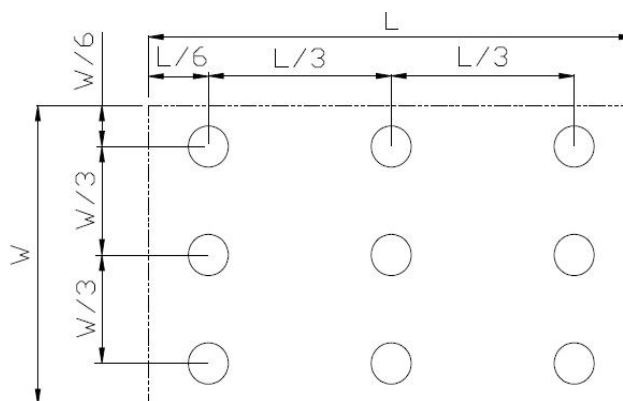
Color coordinates measured at center point of LCD.

Note 6: 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.

$$\text{Luminance Uniformity (U)} = L_{\min} / L_{\max}$$

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



$L_{\max}$: The measured Maximum luminance of all measurement position.

$L_{\min}$: The measured Minimum luminance of all measurement position.

Note 7: Definition of luminance:

Measure the luminance of white state at center point.

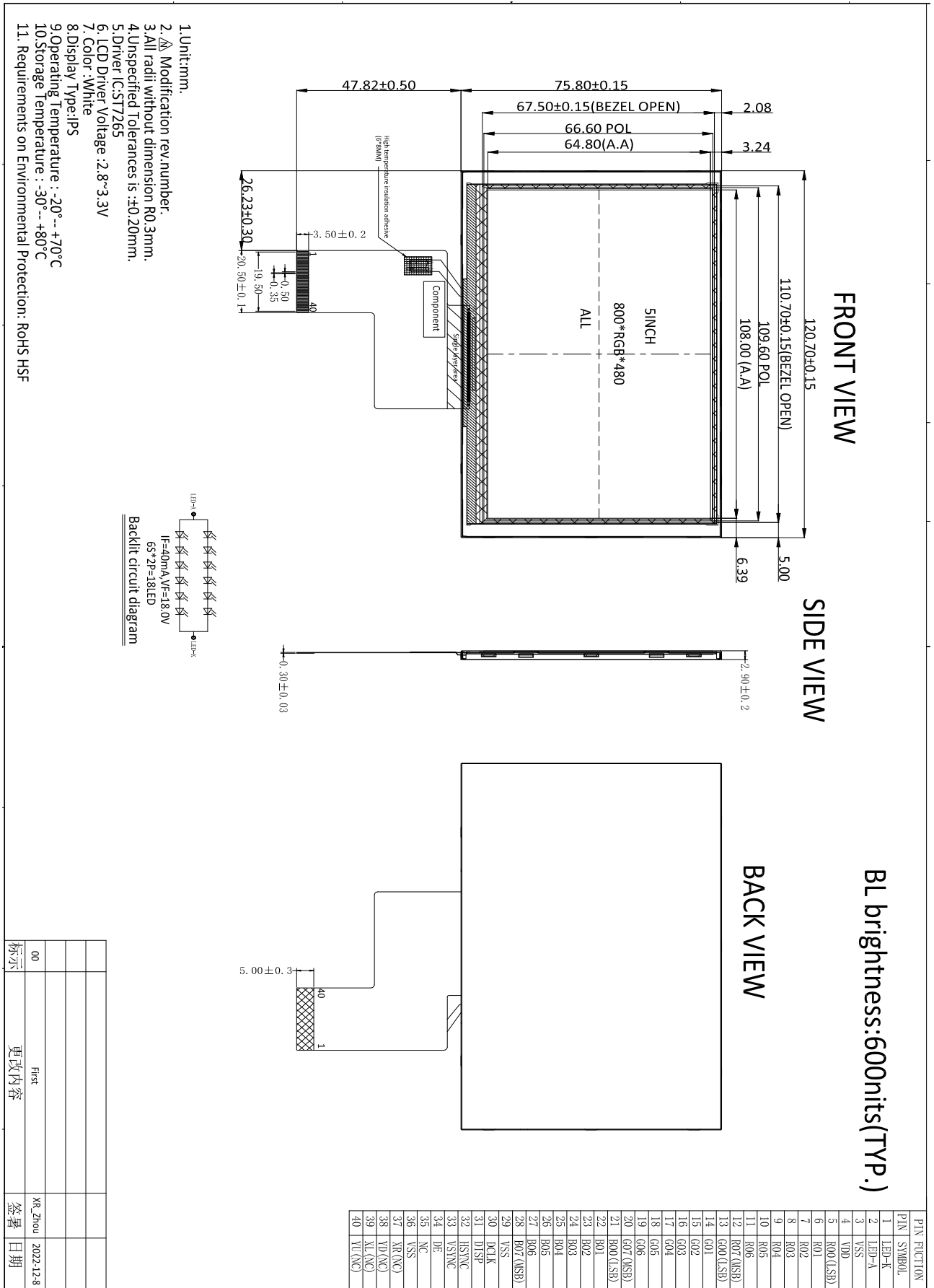
7 Environmental / Reliability Test

No	Test Item	Condition	Remarks
1	High Temperature Operation	Ts = +70℃, 120 hours	IEC60068-2-1 GB2423.2
2	Low Temperature Operation	Ta = -20℃, 120 hours	IEC60068-2-1 GB2423.1
3	High Temperature Storage	Ta = +80℃, 120 hours	IEC60068-2-1 GB2423.2
4	Low Temperature Storage	Ta = -30℃, 120 hours	IEC60068-2-1 GB2423.1
5	Storage at High Temperature and Humidity	Ta = +60℃, 90% RH max,120hours	IEC60068-2-78 GB/T2423.3
6	Thermal Shock (non-operating)	-30℃ 30 min~ +70℃ 30 min, Change time: 0.5 hour ← 5 min → 0.5 hour.10 Cycle	Start with cold temperature, End with high temperature, IEC60068-2-14,GB2423.22
7	ESD	C=150pF, R=330Ω,5point/panel Air: ±8Kv, 5times; Contact:±4Kv,5times (Environment:15℃~35℃, 30%~60%.86Kpa~106Kpa)	IEC61000-4-2 GB/T17626.2
8	Vibration Test	Frequency range:10~55Hz Stroke:1.5mm Sweep:10Hz~55Hz~10Hz 2 hours for each direction of X.Y.Z. (6 hours for total)	IEC60068-2-6 GB/T2423.10

Note1: Ts is the temperature of panel's surface.

Note2: Ta is the ambient temperature of samples.

8 Mechanical Drawing



9 Precautions for Use of LCD Modules

Handling Precautions

9.1.1 The display panel is made of glass. Do not subject it to a mechanical shock by dropping it from a high place, etc.

9.1.2 If the display panel is damaged and the liquid crystal substance inside it leaks out, be sure not to get any in your mouth, if the substance comes into contact with your skin or clothes, promptly wash it off using soap and water.

9.1.3 Do not apply excessive force to the display surface or the adjoining areas since this may cause the color tone to vary.

9.1.4 The polarizer covering the display surface of the LCD module is soft and easily scratched. Handle this polarizer carefully.

9.1.5 If the display surface is contaminated, breathe on the surface and gently wipe it with a soft dry cloth. If still not completely clear, moisten cloth with one of the following solvents:

- Isopropyl alcohol
- Ethyl alcohol

Solvents other than those mentioned above may damage the polarizer. Especially, do not use the following:

- Water
- Ketone
- Aromatic solvents

9.1.6 Do not attempt to disassemble the LCD Module.

9.1.7 If the logic circuit power is off, do not apply the input signals.

9.1.8 To prevent destruction of the elements by static electricity, be careful to maintain an optimum work environment.

9.1.8.1 Be sure to ground the body when handling the LCD Modules.

9.1.8.2 Tools required for assembly, such as soldering irons, must be properly ground.

9.1.8.3 To reduce the amount of static electricity generated, do not conduct assembly and other work under dry conditions.

9.1.8.4 The LCD Module is coated with a film to protect the display surface. Be care when peeling off this protective film since static electricity may be generated.

Storage Precautions

9.2.1 When storing the LCD modules, avoid exposure to direct sunlight or to the light of fluorescent lamps.

9.2.2 The LCD modules should be stored under the storage temperature range. If the LCD modules will be stored for a long time, the recommend condition is: Temperature : 0°C ~ 40°C Relatively humidity: ≤80%

9.2.3 The LCD modules should be stored in the room without acid, alkali and harmful gas.

Transportation Precautions

9.3.1 The LCD modules should be no falling and violent shocking during transportation, and also should avoid excessive press, water, damp and sunshine.