



深圳显昶光电科技有限公司
Shenzhen Xianyang Optoelectronic Technology Co., Ltd

LCD MODULE SPECIFICATION

Customer: _____

Module No.: XY070WVH20-B9527A

Date: 2021-11-24

Version: 1.0

For Customer's Acceptance:

Approved by	Comment

Approved by	Checked by	Prepared by



Table of Contents

Record of Revision.....	3
1 General Specifications.....	4
2 Pin Assignment	5
3 Absolute Maximum Ratings.....	7
4. Electrical Characteristics	8
5 Timing Chart	10
6 Optical Characteristics.....	14
7 Environmental / Reliability Test.....	17
8 Mechanical Drawing	18
9 Precautions for Use of LCD Modules	19



Record of Revision

Rev.	Date	Description	Editor
1.0	2021-11-24	First release	Yang



1 General Specifications

No.	Item	Specification	Remark
1	LCD Size	7.0 inch (Diagonal)	
2	Driver Element	a-Si TFT active matrix	
3	Resolution	800 (RGB) × 480	
4	Display Mode	Normally White	
5	Pixel Pitch(mm)	0.1923 (H) × 0.1784 (V)	
6	Display Colors	16.7M	
7	Surface Treatment	Anti-Glare	
8	Color Arrangement	RGB-Stripe	
9	Interface	RGB 24Bit,Digital (TTL)	
10	Viewing Direction	12 o'clock	
11	Gray Scale Inversion Direction	6 o'clock	Note 1
12	Outline Dimension (mm)	164.9(W) × 100.0 (H) × 3.50(T)	
13	Active Area (mm)	153.84 (W) × 85.63 (H)	
14	Touch Screen	G+G	
15	Display Driver IC	EK9716BD3	
16	Touch Driver IC	GT911	

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

2.1LCD Pin assignment

Match connector: XF2M-5015-1A (OMRON) or equivalent.

N	Symbol	I/O	Description	Remark
1	LED+	P	Power voltage for LED backlight Anode	
2	LED+	P	Power voltage for LED backlight Anode	
3	LED-	P	Power voltage for LED backlight Cathode	
4	LED-	P	Power voltage for LED backlight Cathode	
5	GND	P	Power ground	
6	VCOM	P	VCOM voltage	
7	DVDD	P	Power for Digital Circuit	
8	MODE	I	DE or HV mode control.H:DE mode.L:HSD/VSD mode	
9	DE	I	Data enable	
10	VS	I	Vsync signal input	
11	HS	I	Hsync signal input	
12	B7	I	BLUE Data Signal(MSB)	
13	B6	I	BLUE Data Signal	
14	B5	I	BLUE Data Signal	
15	B4	I	BLUE Data Signal	
16	B3	I	BLUE Data Signal	
17	B2	I	BLUE Data Signal	
18	B1	I	BLUE Data Signal	
19	B0	I	BLUE Data Signal(LSB)	
20	G7	I	GREEN Data Signal(MSB)	
21	G6	I	GREEN Data Signal	
22	G5	I	GREEN Data Signal	
23	G4	I	GREEN Data Signal	
24	G3	I	GREEN Data Signal	
25	G2	I	GREEN Data Signal	
26	G1	I	GREEN Data Signal	
27	G0	I	GREEN Data Signal(LSB)	
28	R7	I	RED Data Signal(MSB)	
29	R6	I	RED Data Signal	
30	R5	I	RED Data Signal	
31	R4	I	RED Data Signal	
32	R3	I	RED Data Signal	
33	R2	I	RED Data Signal	
34	R1	I	RED Data Signal	
35	R0	I	RED Data Signal(LSB)	



36	GND	P	Power ground	
37	DCLK	I	DOT CLOCK	
38	GND	P	Power ground	
39	L/R	I	Select left or right scanning direction.	
40	U/D	I	Select up or down scanning direction.	
41	VGH	P	Gate ON Voltage	
42	VGL	P	Gate OFF Voltage	
43	AVDD	P	Power voltage for Analog circuit.	
44	RESET	I	Global reset pin	
45	NC	--	No connection	
46	VCOM	P	VCOM voltage	
47	DITHB	I	Dithering function enable control.normally pull high.	
48	GND	P	Power ground	
49	NC	--	No connection	
50	NC	--	No connection	

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

Note 1: DE/SYNC mode select. Normally pull high.

When select DE mode, MODE= " 1 " , VS and HS must pull high.

When select SYNC mode, MODE= " 0 " , DE must be grounded.

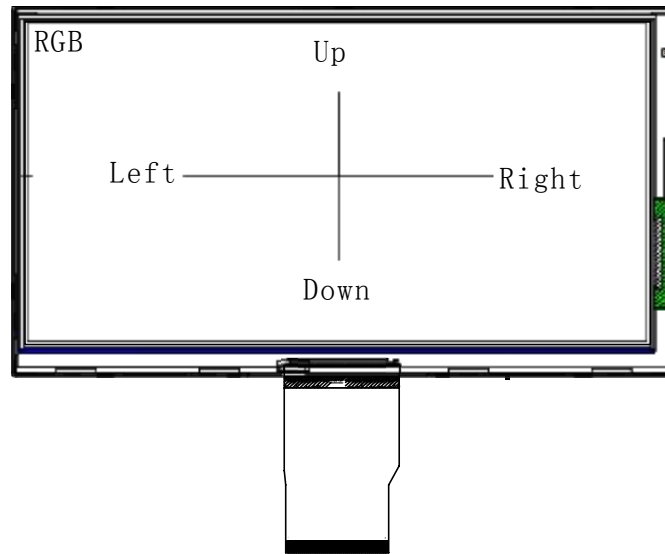
Note 2: When input 18 bits RGB data, the two low bits of R,G and B data must be grounded.

Note 3: Data be latched at the falling edge of DCLK.

Note 4: Selection of scanning mode.

U/D R/L Function Description

Scan control input		Scanning direction
U/D	L/R	
GND	DVDD	Up to down, left to right
DVDD	GND	Down to up, right to left
GND	GND	Up to down, right to left
DVDD	DVDD	Down to up, left to right



Note 5: Global reset pin. Active low to enter reset state. Suggest to connect with an RC reset circuit for stability. Normally pull high.

Note 6: Dithering function enable control, normally pull high.
When DITHB="1", Disable internal dithering function,
When DITHB="0", Enable internal dithering function.

3 Absolute Maximum Ratings

Ta = 25°C

Item	Symbol	Min.	Max.	Unit	Remark
Power Voltage	DVDD	-0.50	4.2	V	
	AVDD	-0.50	15.00	V	
	VGH	-0.30	42.00	V	
	VGL	-20.00	0.30	V	
	VGH-VGL	-0.30	40.00	V	
Operating Temperature	Top	-20.0	70.0	°C	
Storage Temperature	T _{st}	-30.0	80.0	°C	
Operating and Storage Humidity	H _{stg}	10%	90%	%(RH)	

4. Electrical Characteristics

4.1 Recommended Operating Condition

DVDD = 3.3V, GND = 0V, Ta = 25°C

Item	Symbol	Min.	Typ.	Max.	Unit	Remark
Digital supply Voltage	DVDD	3.00	3.30	3.60	V	
Analog supply Voltage	AVDD	9.8	10.13	10.6	V	
Gate on voltage	VGH	17	18	19	V	
Gate off voltage	VGL	-9.0	-7.8	-6.5	V	
Vcom voltage	VCOM	3.5	3.8	4.2	V	
Input logic high voltage	VIH	0.7DVDD	-	DVDD	V	R0~R7, G0~G7, 0~B7, DE, DCLK, HSYNC, VSYNC, MODE, RESET, LR, UD, DITHB
Input logic low voltage	VIL	0		0.3DVDD	V	
Current of digital supply voltage	IDVDD	-	15	25	mA	DVDD = 3.3V, color bar pattern
Current of analog supply voltage	IAVDD	-	30	50	mA	AVDD = 10.13V
Current of Gate on voltage	IVGH	-	0.5	2	mA	VGH = 18.0V
Current of Gate off voltage	IVGL	-	0.5	2	mA	VGL = -7.8V
Current of VCOM	Ivcom	-	0.1	1	mA	VCOM = 3.8V

4.2 Backlight Unit Driving Condition

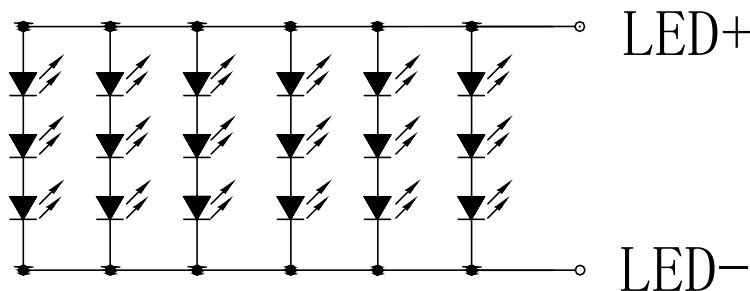
Item	Symbol	Min.	Typ.	Max.	Unit	Remark
Forward Current	I_F	-	120	150	mA	18 LEDs (3 LED Serial, 6LED Parallel)
Forward Current Voltage	V_F	-	9.6	10.5	V	
Backlight Power Consumption	W_{BL}	-	1152	1575	mW	
Operating Life Time	--	20000	--	--	hrs	Note 2, Note 3

Note1: The LED driving condition is defined for each module (3 LED Serial, 6 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 TFT-LCD Input Timing

DVDD=3.3V, GND=0V, Ta=25°C

Parameter	Symbol	Min	Typ.	Max	Unit	Remark
DCLK frequency	Fclk	28	30.0	40.0	MHz	
DCLK cycle time	Tcph	25	33.3	36	ns	
DCLK pulse width	Tcw	40%	50%	60%	Tcph	
VS setup time	Tvst	8			ns	
VS hold time	Tvhd	8	-	-	ns	
HS setup time	Thst	8			ns	
HS hold time	Thhd	8	-	-	ns	
Data setup time	Tdsu	8			ns	Data to DCLK
Data hold time	Tdhd	8	-	-	ns	Data to DCLK
DE setup time	Tesu	8	-	-	ns	
DE hold time	Tehd	8	-	-	ns	

Input Clock and Data timing Diagram:

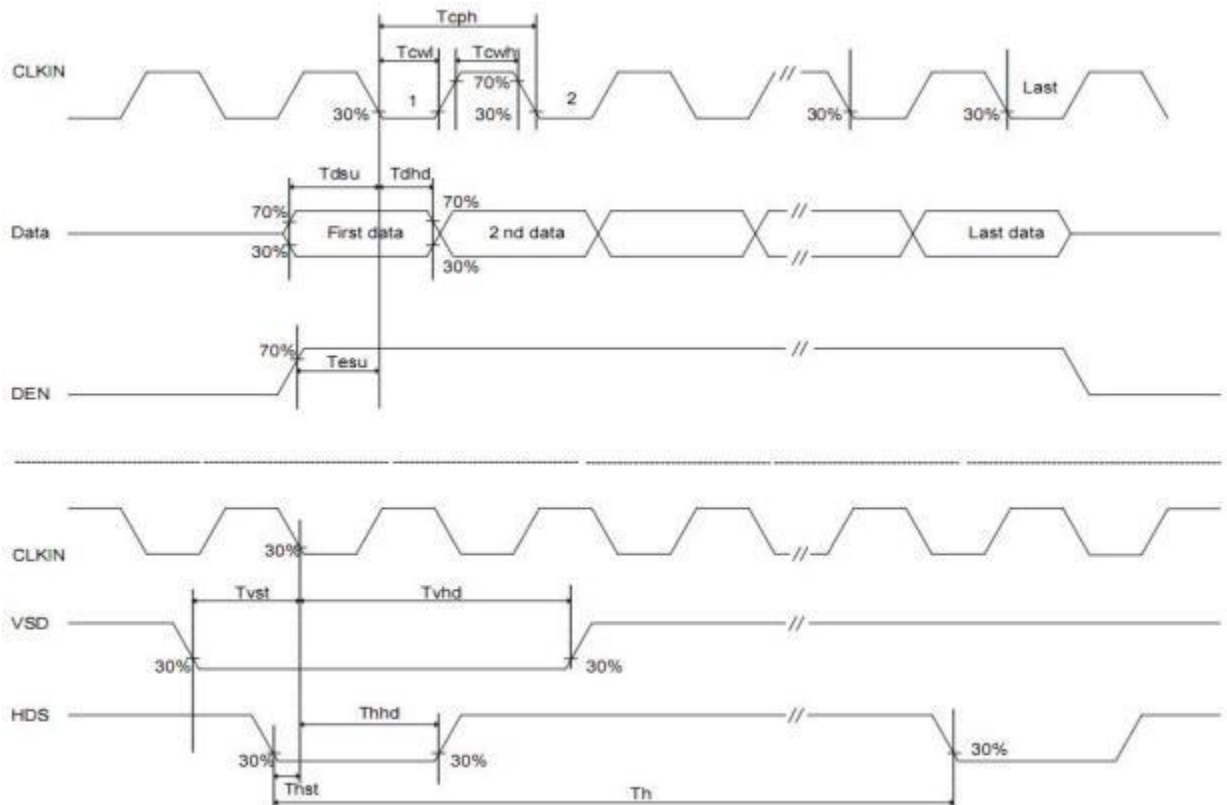


Figure Input Clock and Data Timing Diagram

5.2 Recommended Timing Setting of TCON

TCON (Embedded in Source IC) Input Timing (DCLK, HS, VS, DE)

DVDD=3.3V, GND=0V, Ta=25°C

Parameter	Symbol	Min.	Typ.	Max.	Unit	Remark
DCLK	Fclk	28	30	40	MHz	
	tclk	20	33.3	36	ns	
HSD	th	862	1056	1200	tclk	
	thd	800	800	800	tclk	
	thpw	1	-	40	tclk	
	thb	46	46	46	tclk	
	thfp	16	210	354	tclk	
VSD	tv	510	525	650	th	
	tvd	480	480	480	th	
	tvpw	1	3	20	th	
	tvb	23	23	23	th	
	tvfp	7	22	147	th	

Note: For reference only, it needs to be adjusted according to the actual display effect.

TCON Vertical Input Timing Diagram HV:

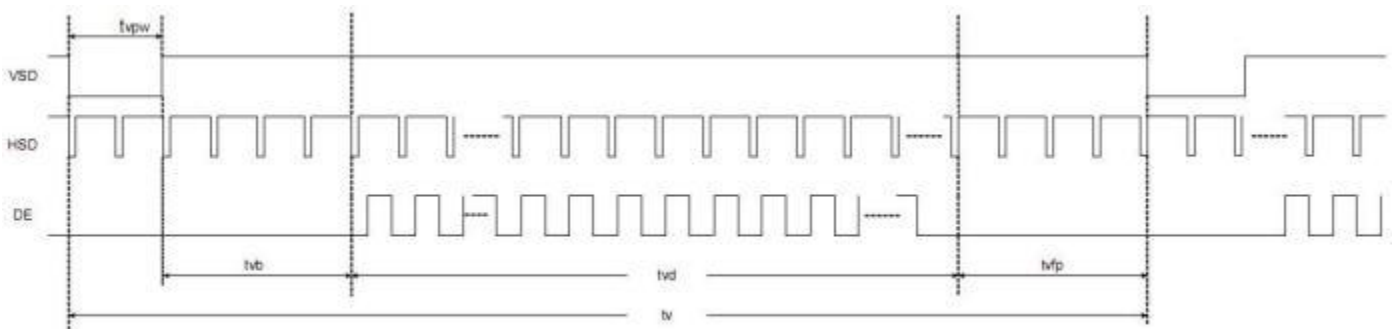


Figure: Vertical input timing

TCON Horizontal Input Timing Diagram:

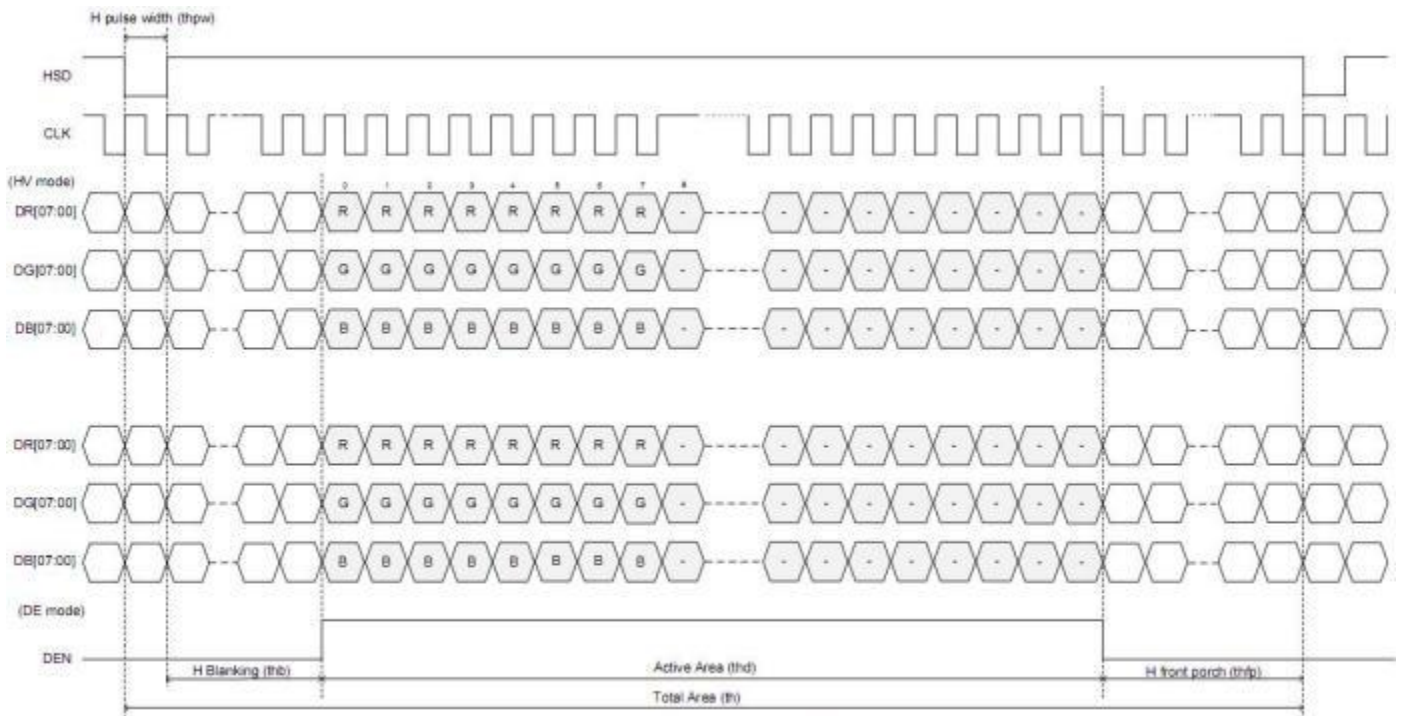
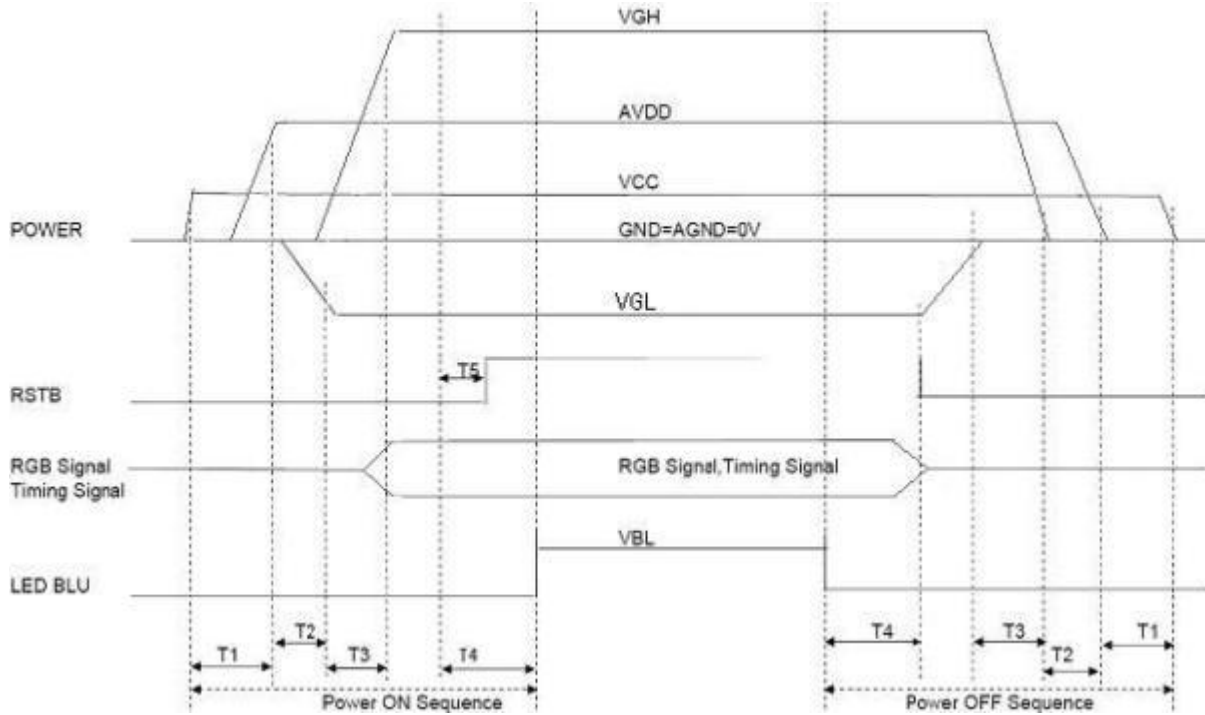
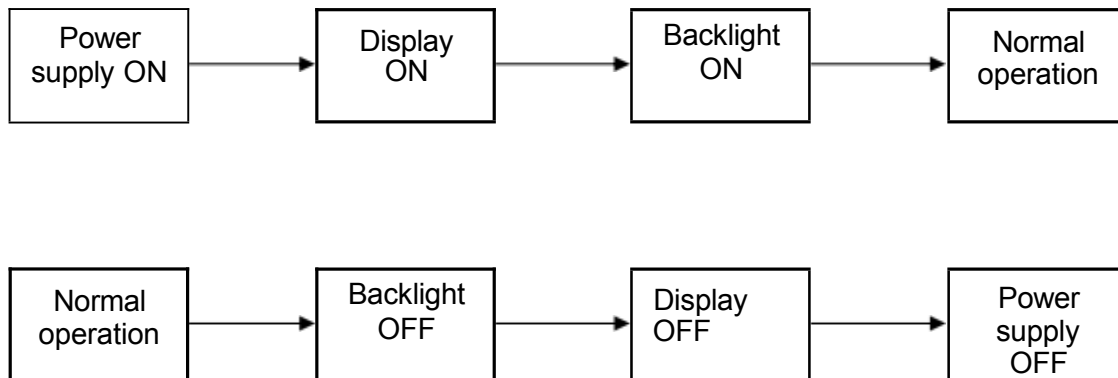


Figure: Horizontal input timing

5.3 POWER ON/OFF SEQUENCE : VCC=DVDD



Note 1: $T1 \geq 20\text{ms}$, $T2 \geq 20\text{ms}$, $T3 \geq 5\text{ms}$, $T4 \geq 100\text{ms}$, $T5 \geq 5\text{ms}$.



6 Optical Characteristics

Ta=25℃

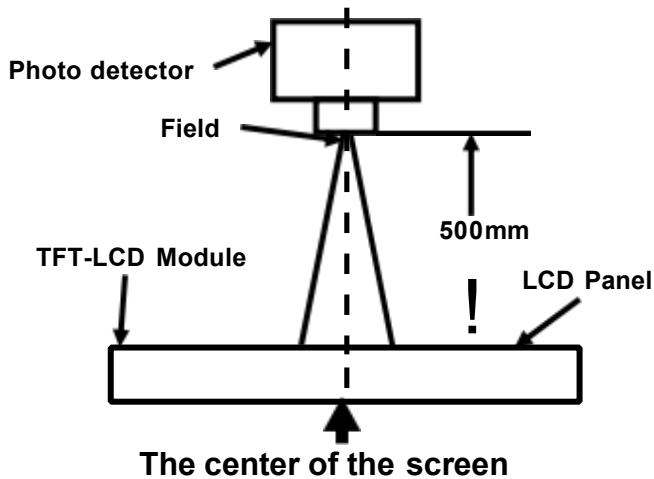
Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Remark
View Angles		θT	CR≧10	50	60	-	Degree	Note 2
		θB		60	70	-		
		θL		60	70	-		
		θR		60	70	-		
Contrast Ratio		CR	θ=0°	-	500	-		Note1 Note3
Response Time		T _{ON}	25℃	-	25	40	ms	Note1 Note4
		T _{OFF}						
Chromaticity	White	x	Backlight is on	0.284	0.300	0.340		Note1 Note5
		y		0.328	0.330	0.384		
	Red	x		0.626	0.599	0.682		
		y		0.287	0.338	0.343		
	Green	x		0.240	0.292	0.300		
		y		0.568	0.550	0.634		
	Blue	x		0.111	0.139	0.171		
		y		0.067	0.131	0.127		
Uniformity		U		70	80	-	%	Note1 Note6
NTSC				-	70	-	%	Note 5
Luminance		L		270	300	-	cd/m ²	Note1 Note7

Test Conditions:

1. $I_F = 120 \text{ mA}$, $V_F = 9.6 \text{ V}$ 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.

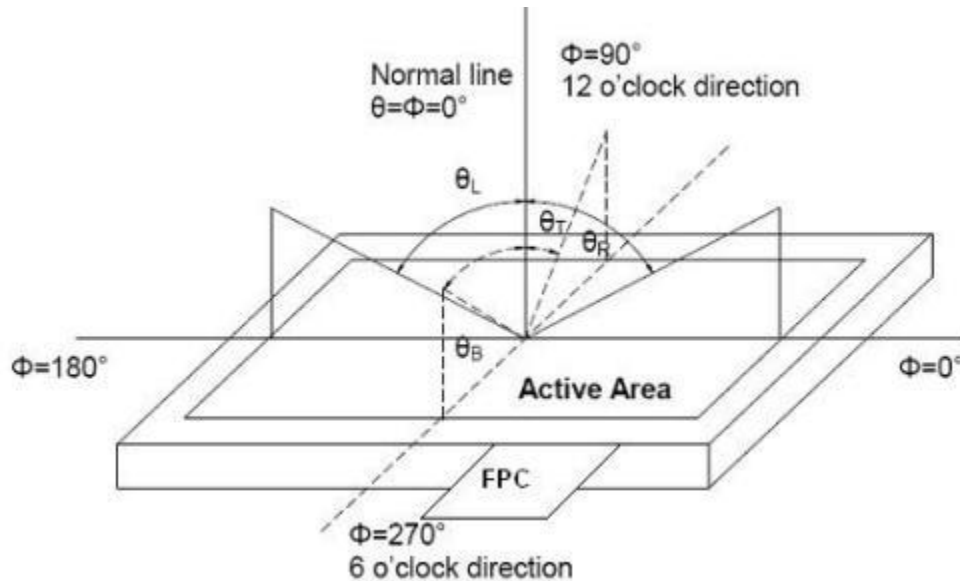
Properties are measured at the center point of the LCD screen. All input terminals LCD panel must be ground when measuring the center area of the panel.



Item	Photo detector	Field
Contrast Ratio	SR-3A	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

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

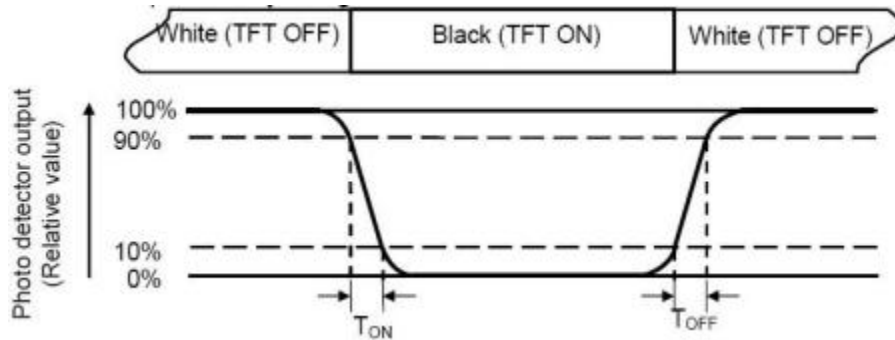
"White state ": The state is that the LCD should drive by V_{white}.

"Black state": The state is that the LCD should drive by V_{black}.

V_{white}: To be determined V_{black}: 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 (T_{ON}) 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)

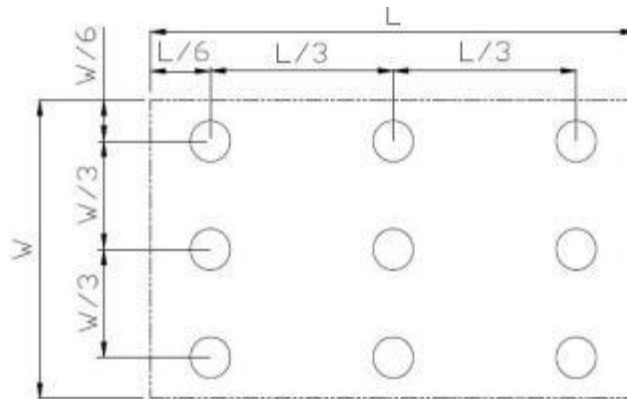
Color coordinates measured at center point of LCD.

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.

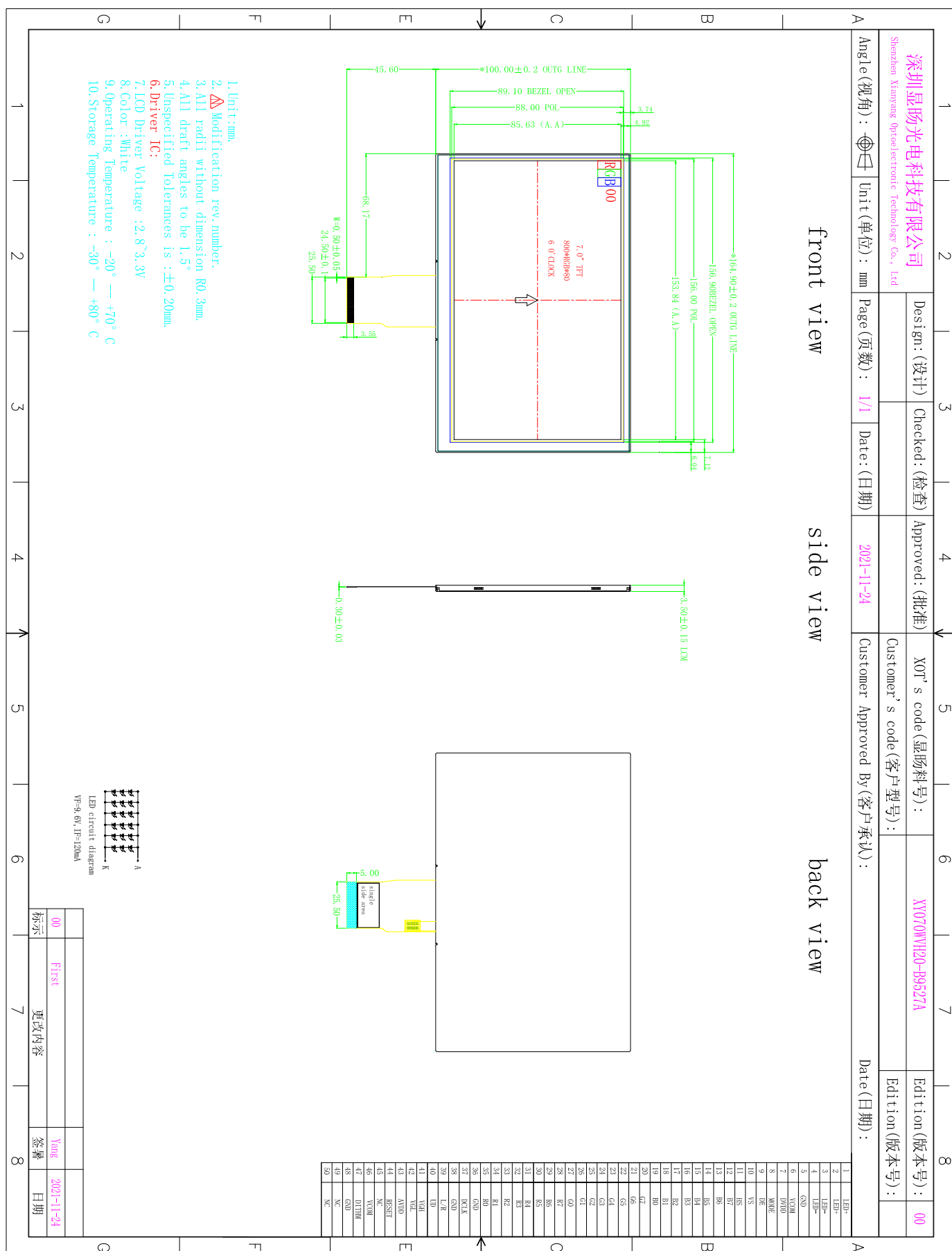
7 Environmental / Reliability Test

No	Test Item	Condition	Remarks
1	High Temperature Operation	Ts = +70°C, 240 hours	No abnormalities in functions
2	Low Temperature Operation	Ta = -20°C, 240 hours	No abnormalities in functions
3	High Temperature Storage	Ta = +80°C, 240 hours	No abnormalities in functions
4	Low Temperature Storage	Ta = -30°C, 240 hours	No abnormalities in functions
5	Storage at High Temperature and Humidity	Ta = +60°C, 90% RH max, 240 hours	No abnormalities in functions
6	Thermal Shock (non-operating)	-30°C 30 min ~ +70°C 30 min, Change time: 0.5 hour 5 min 0.5 hour. 10 Cycle	Start with cold temperature, End with high temperature,
7	ESD	C=150pF, R=330Ω, 5point/panel Air: ±8Kv, 5times; Contact: ±4Kv, 5times (Environment: 15°C ~ 35°C, 30% ~ 60% RH, 86Kpa ~ 106Kpa)	No abnormalities in functions

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.