深圳市思迪科科技有限公司
SHENZHEN CDTECH ELECTRONICS

Product Specification

Model Name	S046QWV11HS
Description	Standard LCD Module 4.6" WVGA 800(RGB)x320 Dots
Date	2020/09/21
Version	2.0

Approved by/Date	**Check by/Date**	**Prepared by/Date**
ZHP 2020/09/21	HZX 2020/09/21	ZWF 2020/09/21

Customer Approval	
Date	

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1. Record of Revision

Rev	Issued Date	Description	Editor
1.0	2020/07/03	First Release.	ZWF
2.0	2020/09/21	Optimize RTP pad	ZWF

2. General Specifications

Feature		Spec
Characteristics	Size	4.6 inch
	Resolution	800(horizontal)*320(Vertical)
	Interface	RGB-24bit
	Connect type	Connector
	Display Colors	16.7M
	Technology type	a-Si
	Pixel pitch (mm)	0.135*0.135
	Pixel Configuration	R.G.B.-Stripe
	Display Mode	Normally White
	LCD Driver IC	ILI6122+ILI5960
	Viewing Direction	12 O'clock
Mechanical	LCM (W x H x D) (mm)	120.70*56.16*3.10
	Active Area(mm)	108.00 x43.20
	Weight (g)	TBD
	LED Numbers	12 LEDs

Note 1: Requirements on Environmental Protection: RoHs
Note 2: LCM weight tolerance: +/- 5%

3. Input/Output Terminals

No.	Symbol	Description
1	VLED-	Backlight LED Cathode
2	VLED+	Backlight LED Anode.
3	GND	Ground
4	VDD	Power supply
5~12	R0~R7	Data bus
13~20	G0~G7	Data bus
21~28	B0~B7	Data bus
29	GND	Ground
30	DCLK	Dot clock signal input. Latching input data at its rising edge.
31	DISP	Display on/off control
32	HSYNC	Horizontal Sync signal
33	VSYNC	Vrtical Sync signal
34	DE	Data enable input. Active high to enable the input data bus under “DE Mode.”
35	NC	No connect
36	GND	System Ground
37	XR/NC	No connect
38	YD/NC	No connect
39	XL/NC	No connect
40	YU/NC	No connect

4. Absolute Maximum Rating

Item	Symbol	MIN	Typ	MAX	Unit	Remark
Supply Voltage	VDD	-0.3	-	5	V	-
Operating Temperature	TOPR	-20	-	70	℃	-
Storage Temperature	TSTG	-30	-	80	℃	

5. Electrical Characteristics

5.1 Driving TFT LCD Panel

Item	Symbol	MIN	TYP	MAX	Unit	Remark
Power Voltage	VDD	3.0	3.3	3.6	V	
	AVDD	10.2	10.4	10.6	V	
	VGH	14.5	15.0	15.5	V	
	VGL	-8.5	-8.0	-7.5	V	
Input Signal Voltage	VCOM	3.8	4.24	4.5	V	
Low Leve	VIL	0	-	0.3x VDD	V	
High Level	VIH	0.7x VDD	-	VDD	V	

5.2 Current Consumption

Item	Symbol	Values			Unit
		Min.	Typ.	Max.	
Current for Driver	I_{GH}	-	(0.50)	1	mA
	I_{GL}	-	(0.54)	1	mA
	IDV_{DD}	-	(4.2)	10	mA
	IAV_{DD}	-	(19)	50	mA

5.3 LED Driving Conditions

Item	Symbol	MIN	TYP	MAX	Unit	Remark
Forward Current	I_F	-	40	-	mA	
Forward Voltage	V_F	17.2	19.2	21.2	V	
Backlight Power consumption	W_{BL}	-	0.768	-	W	
LED Lifetime		-	30000	-	Hrs	

Note 1: Each LED: IF =20 mA, VF =3.2+/0.3V.
Note 2: Optical performance should be evaluated at Ta=25℃ only.
Note 3: If LED is driven by 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.

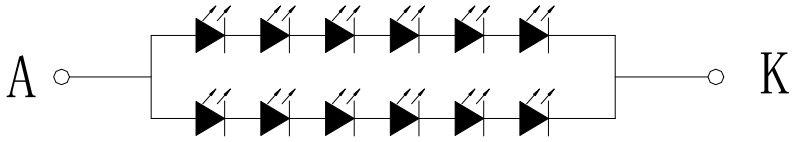
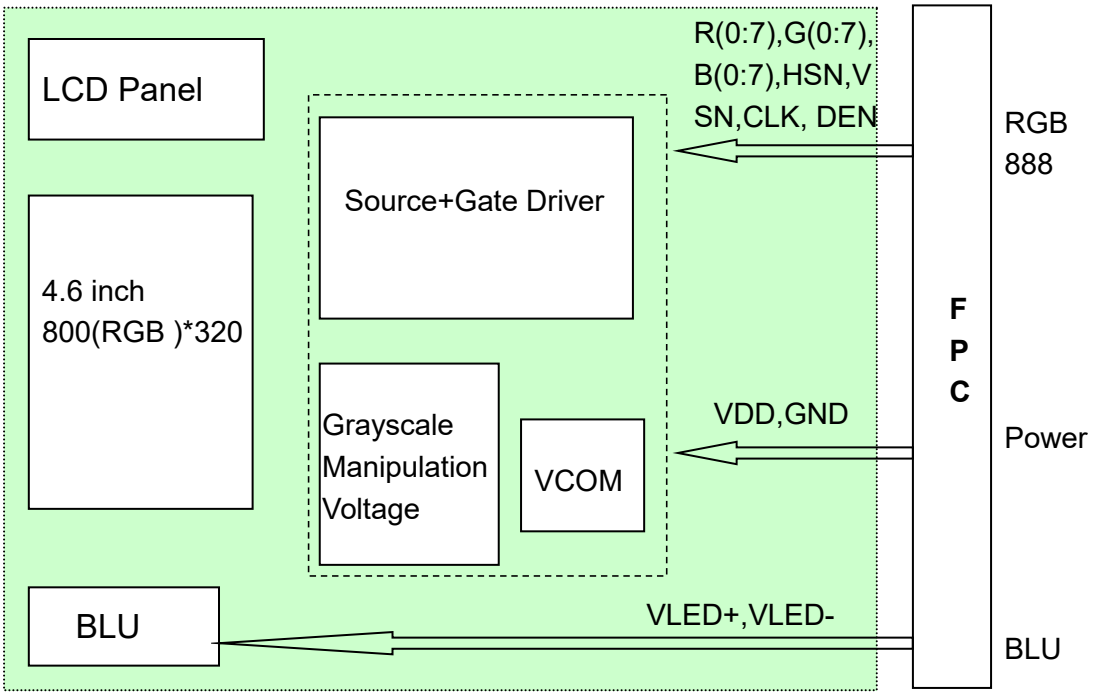


Figure: LED connection of backlight(Constant Current)

5.4 Block Diagram

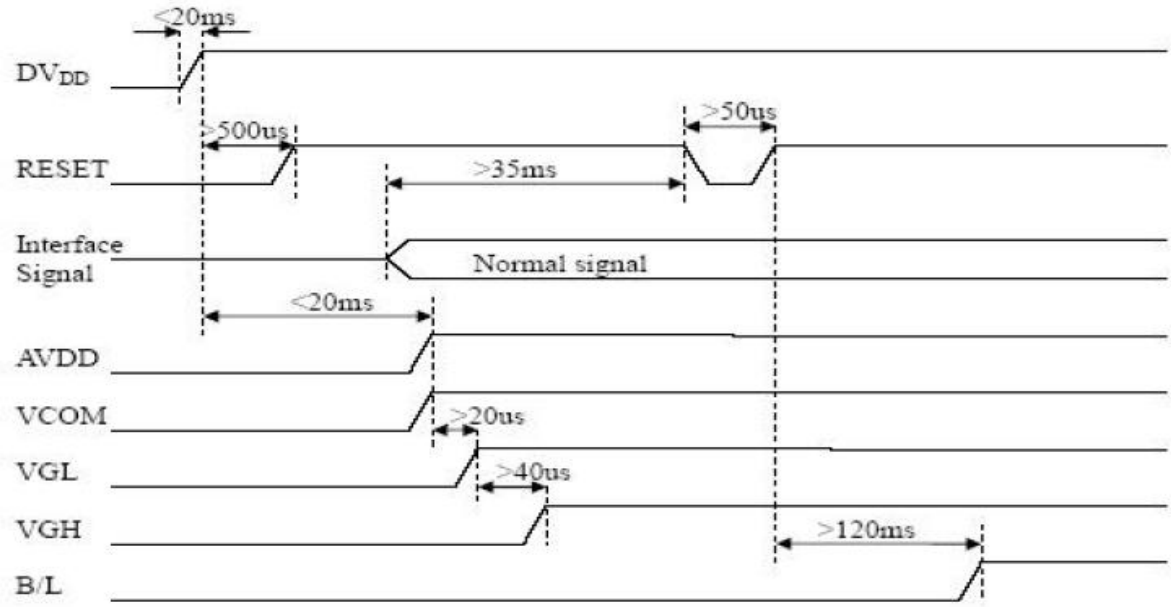


6. Interface Timing

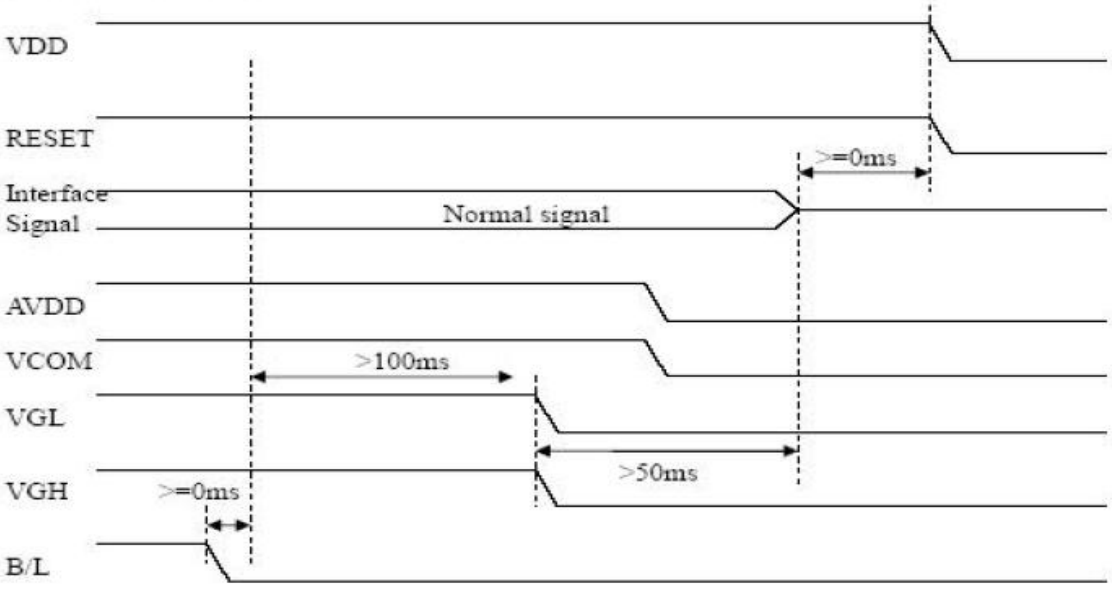
6.1 Power Sequence

To prevent a latch-up or DC operation of the LCD module, the power on/off sequence should be as the diagram below.

a. Power on sequence:



b. Power off sequence:



6.2 Timing Conditions

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
HS setup time	T_{hst}	8	-	-	ns	
HS hold time	T_{hhd}	8	-	-	ns	
VS setup time	T_{vst}	8	-	-	ns	
VS hold time	T_{vhd}	8	-	-	ns	
Data setup time	T_{dsu}	8	-	-	ns	
Data hole time	T_{dhd}	8	-	-	ns	
DE setup time	T_{esu}	8	-	-	ns	
DE hole time	T_{ehd}	8	-	-	ns	
DV_{DD} Power On Slew rate	T_{POR}	-	-	20	ms	From 0 to 90% DV_{DD}
RESET pulse width	T_{Rst}	1	-	-	ms	
DCLK cycle time	T_{coh}	20	-	-	ns	
DCLK pulse duty	T_{cwh}	40	50	60	%	

For Example：

DE 模式：

```
#define LCD_SIZE_X   800
#define LCD_SIZE_Y   480
#define   HDP LCD_SIZE_X-1 //Hsync Display period      320-1
#define   HT   (HDP+HPS)       //Horizontal total period = (HT + 1) pixels
#define   HPS 210       //Horizontal Sync Pulse Start Position = (HPS + 1) pixels
#define   LPS 42        //Horizontal Display Period Start Position = LPS pixels
#define   HPW 1     //Horizontal Sync Pulse Width = (HPW + 1) pixels

#define   VDP LCD_SIZE_Y - 1//LCD_SIZE_Y-1-132
#define   VT   (VDP+VPS)    //Vertical Total = (VT + 1) lines
#define   VPS    22//Vertical Sync Pulse Start Position = VPS lines
#define   FPS 23 //Vertical Display Period Start Position = FPS lines
#define   VPW 1    //Vertical Sync Pulse Width = (VPW + 1) lines
```

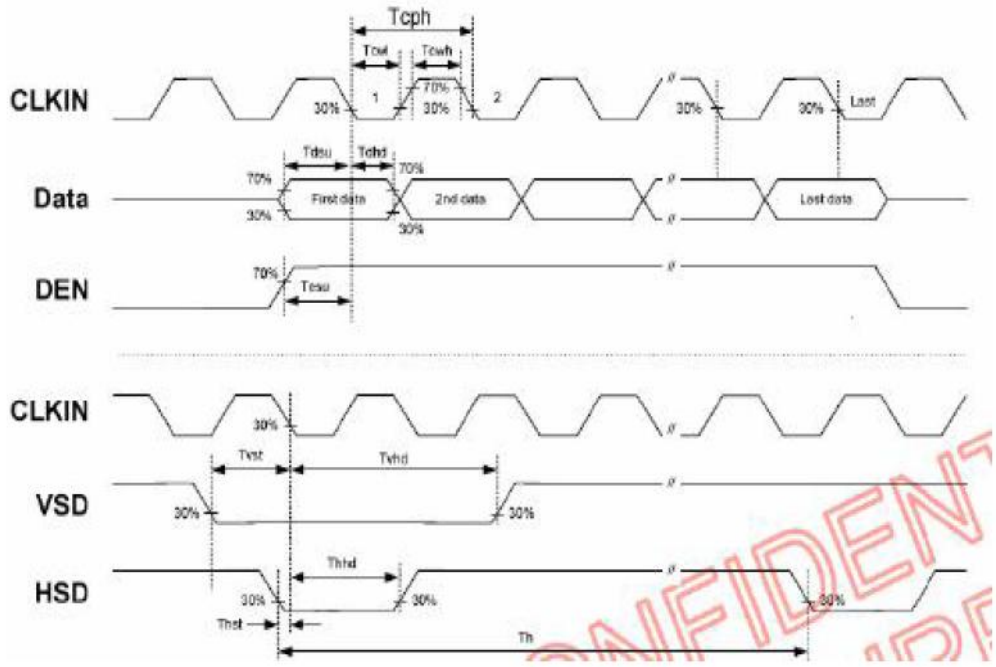
HV 模式：

```
#define LCD_SIZE_X   800
#define LCD_SIZE_Y   320

#define   HDP LCD_SIZE_X-1 //Hsync Display period      320-1
#define   HT    (HDP+HPS)       //Horizontal total period = (HT + 1) pixels
#define   HPS 86         //Horizontal Sync Pulse Start Position = (HPS + 1) pixels
#define   LPS 40         //Horizontal Display Period Start Position = LPS pixels
#define   HPW 0      //Horizontal Sync Pulse Width = (HPW + 1) pixels

#define   VDP LCD_SIZE_Y-1
#define   VT    525     //Vertical Total = (VT + 1) lines
#define   VPS 202    //Vertical Sync Pulse Start Position = VPS lines
#define   FPS 23     //Vertical Display Period Start Position = FPS lines
#define   VPW 1    //Vertical Sync Pulse Width = (VPW + 1) lines
```

6.3 Timing Diagram



6.4 Timing

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Horizontal Display Area	thd	-	800	-	DCLK	
DCLK Frequency	fclk	26.4	33.3	46.8	MHz	
One Horizontal Line	th	862	1056	1200	DCLK	
HS pulse width	thpw	1	-	40	DCLK	
HS Blanking	thb	46	46	46	DCLK	
HS Front Porch	thfp	16	210	354	DCLK	

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Vertical Display Area	tvd	-	480	-	TH	
VS period time	tv	510	525	650	TH	
VS pulse width	tvpw	1	-	20	TH	
VS Blanking	tvb	23	23	23	TH	
VS Front Porch	tvfp	7	22	147	TH	

6.5 Data Input Format

Figure 3. 1 Horizontal input timing diagram.

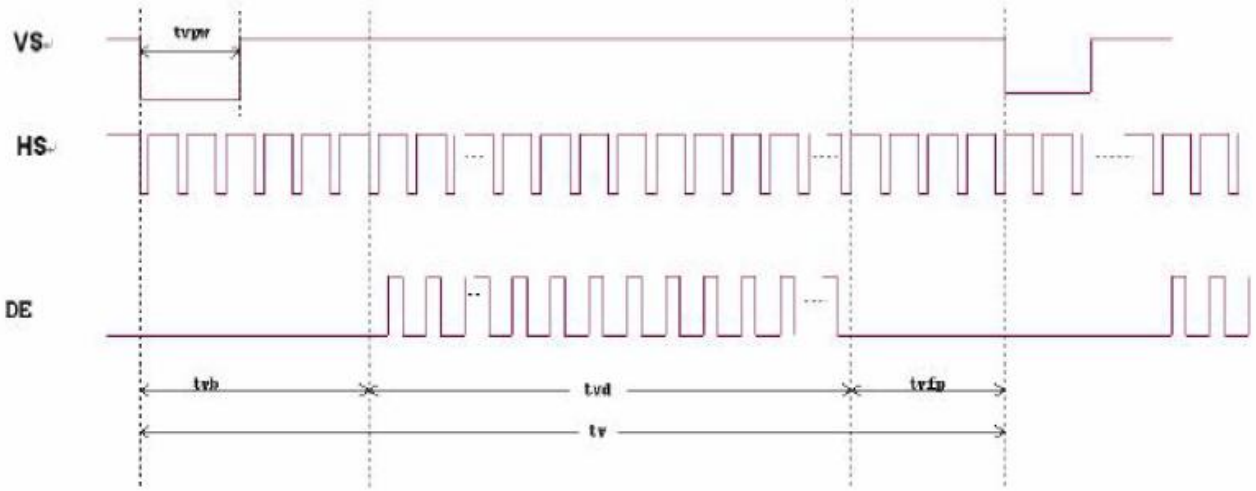


Figure 3. 2 Vertical input timing diagram.

7. Optical Characteristics

Items		Symbol	Condition	Min.	Typ.	Max.	Unit	Remark	Note
Response time		Tr+Tf	-	-	20	30	ms	FIG.1	Note4
Contrast Ratio		CR		500	600	-	-	FIG.2	Note1
Surface luminance		LV	θ =0°	500	550	-	cd/m2	FIG.2	Note2
Luminance uniformity		Yu	θ =0°	80	-	-	%	FIG.2	Note3
NTSC		-	θ =0°	-	50	-	%	FIG.2	Note5
Viewing angle		θ_T	Center （CR≥10）	-	50	-	deg	FIG.3	Note6
		θ_B		-	55	-	deg	FIG.3	
		θ_L		-	65	-	deg	FIG.3	
		θ_R		-	65	-	deg	FIG.3	
Chromaticity	Red	R_X	θ =0° ∅=0° Ta=25°	0.483	0.533	0.583	-	FIG.2 CIE1931	Note5
		R_Y		0.264	0.314	0.364	-		
	Green	G_X		0.280	0.330	0.380	-		
		G_Y		0.544	0.594	0.644	-		
	Blue	B_X		0.097	0.147	0.197	-		
		B_Y		0.032	0.082	0.132	-		
	White	W_X		0.238	0.288	0.338	-		
		W_Y		0.258	0.308	0.358	-		

Note1. Definition of contrast ratio

Contrast ratio(Cr) is defined mathematically by the following formula. For more information see FIG.2.

$$\text{Contrast ratio} = \frac{\text{Luminance measured when LCD on the “White” state}}{\text{Luminance measured when LCD on the “Black” state}}$$

For contrast ratio, Surface Luminance, Luminance uniformity and CIE,the testing data is base on TOPCON’s BM-5 or BM-7 photo detector or compatible.

Note2. Definition of surface luminance.

Surface luminance is the luminance with all pixels displaying white. For more information see FIG.2.

Lv = Average Surface Luminance with all white pixels(P1,P2,P3, ...,Pn)

Note3. Definition of luminance uniformity

The luminance uniformity in surface luminance is determined by measuring luminance at each test position 1 through n, and then dividing the maximum luminance of n points luminance by minimum luminance of n points luminance.For more information see FIG.2

$$Yu = \frac{\text{Minimum surface luminance with all white pixels (P1,P2,P3,.....,Pn)}}{\text{Maximum surface luminance with all white pixels (P1,P2,P3,.....,Pn)}}$$

Note4. Definition of response time

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

For additional information see FIG1.

Note5. Definition of color chromaticity (CIE1931)

CIE (x,y) chromaticity,The x,y value is determined by screen active area center position P5.For more information see FIG.2.

Note6. Definition of viewing angle

Viewing angle is the angle at which the contrast ratio is greater than 10. Angles are determined for the horizontal or x axis and the vertical or y axis with respect to the z axis which is normal to the LCD surface. For more information see FIG.3.

For viewing angle and response time testing, the testing data is base on Autronic-Melchers’s ConoScope or DMS series Instruments or compatible.

FIG.1. The definition of response Time

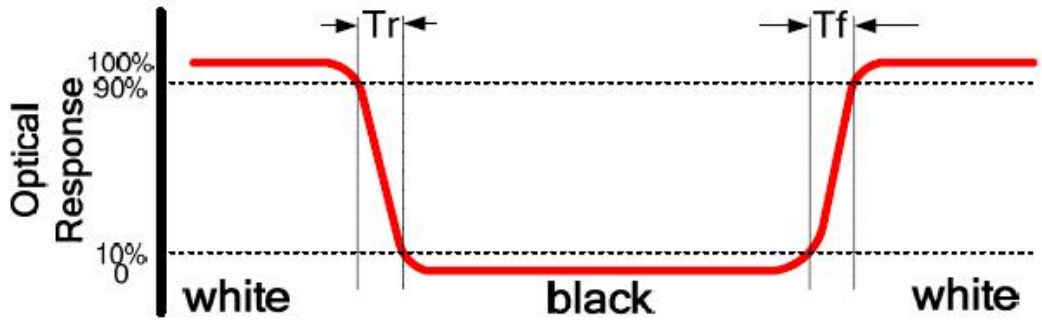


FIG.2. Measuring method for contrast ratio, surface luminance, luminance uniformity, CIE (x,y) chromaticity

Size : S≤5"(see Figure a)
A : 5 mm B : 5 mm
H,V : Active area
Light spot size ∅=5mm(BM-5) or ∅=7.7mm (BM-7)50cm distance or compatible distance from the LCD surface to detector lens.
test spot position : see Figure a.
measurement instrument : TOPCON's luminance meter BM-5 or BM-7 or compatible (see Figure c).

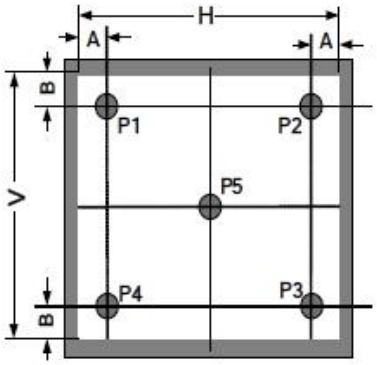


Figure a

Size : 5"＜S≤12.3"(see Figure b)
H,V : Active area
Light spot size ∅=5mm(BM-5) or ∅=7.7mm (BM-7)50cm distance or compatible distance from the LCD surface to detector lens.
test spot position : see Figure b.
measurement instrument : TOPCON's luminance meter BM-5 or BM-7 or compatible (see Figure c).

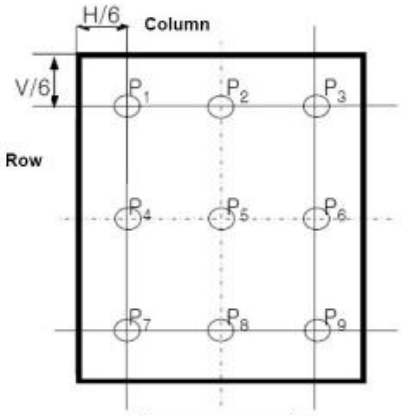


Figure b

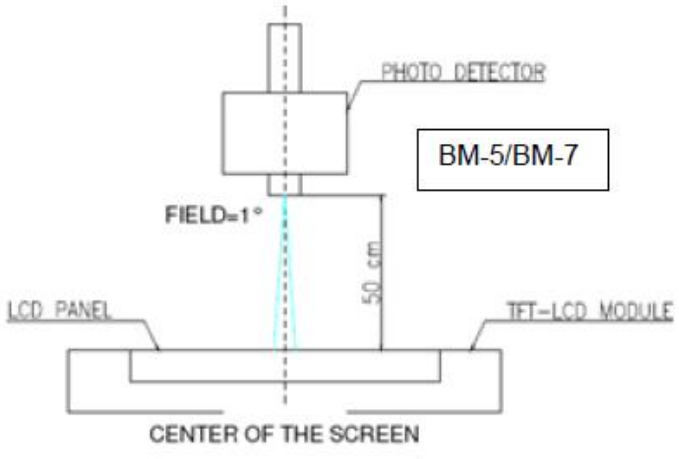
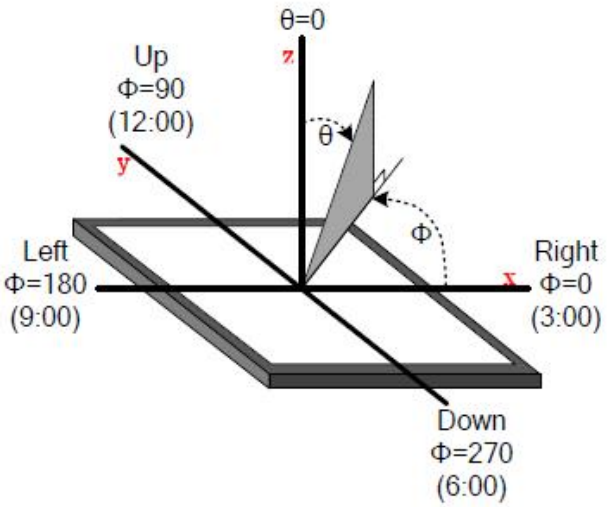


Figure c

FIG.3. The definition of viewing angle

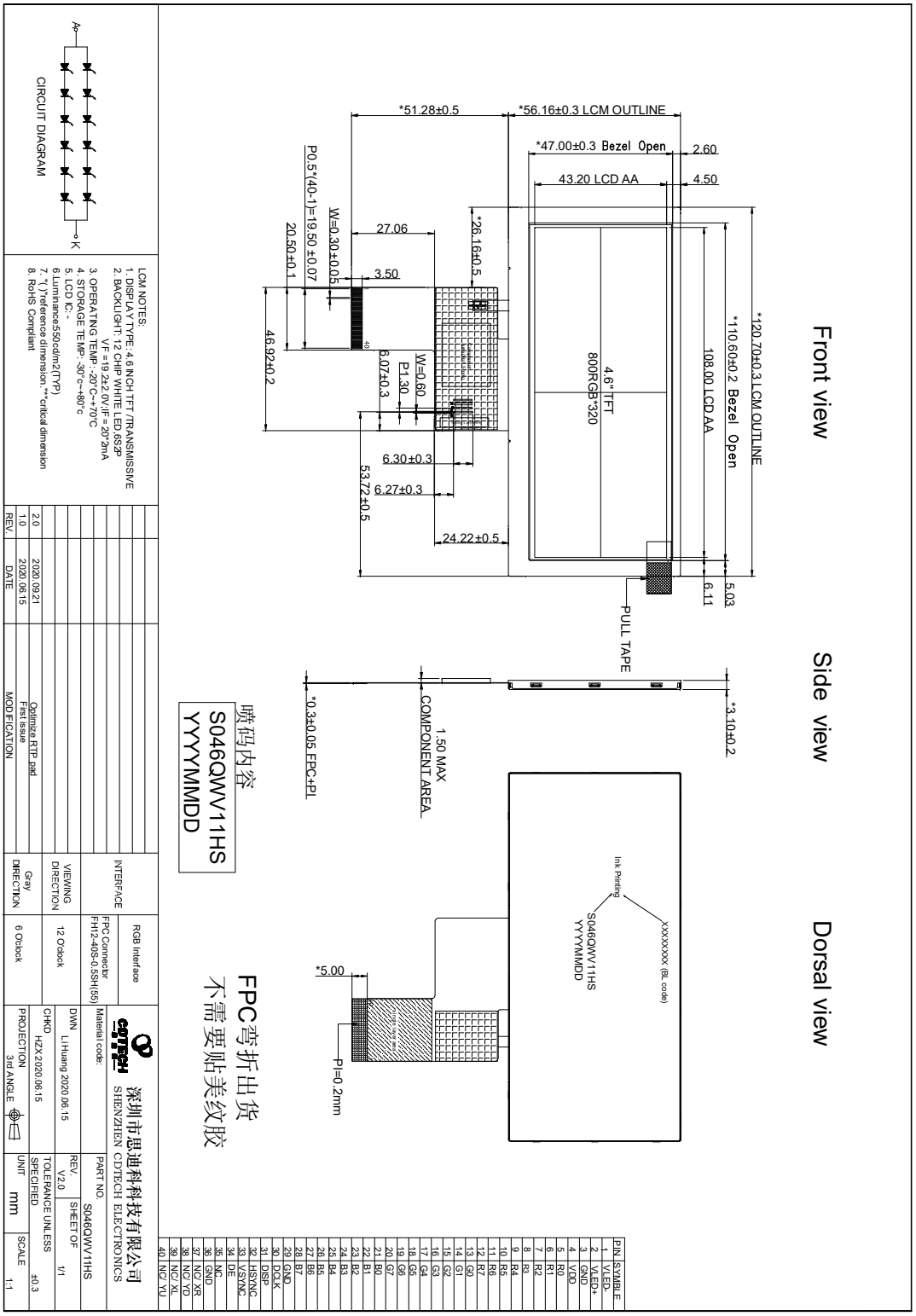


8. Environmental / Reliability Tests

No	Test Item	Condition	Remarks
1	High Temperature Operation	Ts= +70℃, 96hrs	Note 1 IEC60068-2-2, GB2423. 2-89
2	Low Temperature Operation	Ta= -20℃, 96hrs	Note 2 IEC60068-2-1 GB2423.1-89
3	High Temperature Storage	Ta= +80℃, 96hrs	IEC60068-2-2 GB2423. 2-89
4	Low Temperature Storage	Ta= -30℃, 96hrs	IEC60068-2-1 GB/T2423.1-89
5	High Temperature & Humidity Storage	Ta= +60℃, 90% RH max,96 hours	IEC60068-2-3 GB/T2423.3-2006
6	Thermal Shock (Non-operation)	-20℃ 30 min ~ +60℃ 30 min Change time: 5min, 30 Cycle	Start with cold temperature, end with high temperature IEC60068-2-14, GB2423.22-87
7	Electro Static Discharge (Operation)	C=150pF, R=330 Ω, 5 points/panel Air:±8KV, 5 times; Contact: ±4KV, 5 times; (Environment: 15℃ ~ 35℃, 30% ~ 60%, 86Kpa ~ 106Kpa)	IEC61000-4-2 GB/T17626.2-1998
8	Vibration (Non-operation)	Frequency range: 10~55Hz, Stroke: 1.mm Sweep: 10Hz~55Hz~10Hz 2 hours for each direction of X .Y. Z. (package condition)	IEC60068-2-6 GB/T2423.5-1995
9	Shock (Non-operation)	60G 6ms, ± X, ±Y , ± Z 3 times for each direction	IEC60068-2-27 GB/T2423.5-1995
10	Package Drop Test	Height: 80 cm, 1 corner, 3 edges, 6 surfaces	IEC60068-2-32 GB/T2423.8-1995

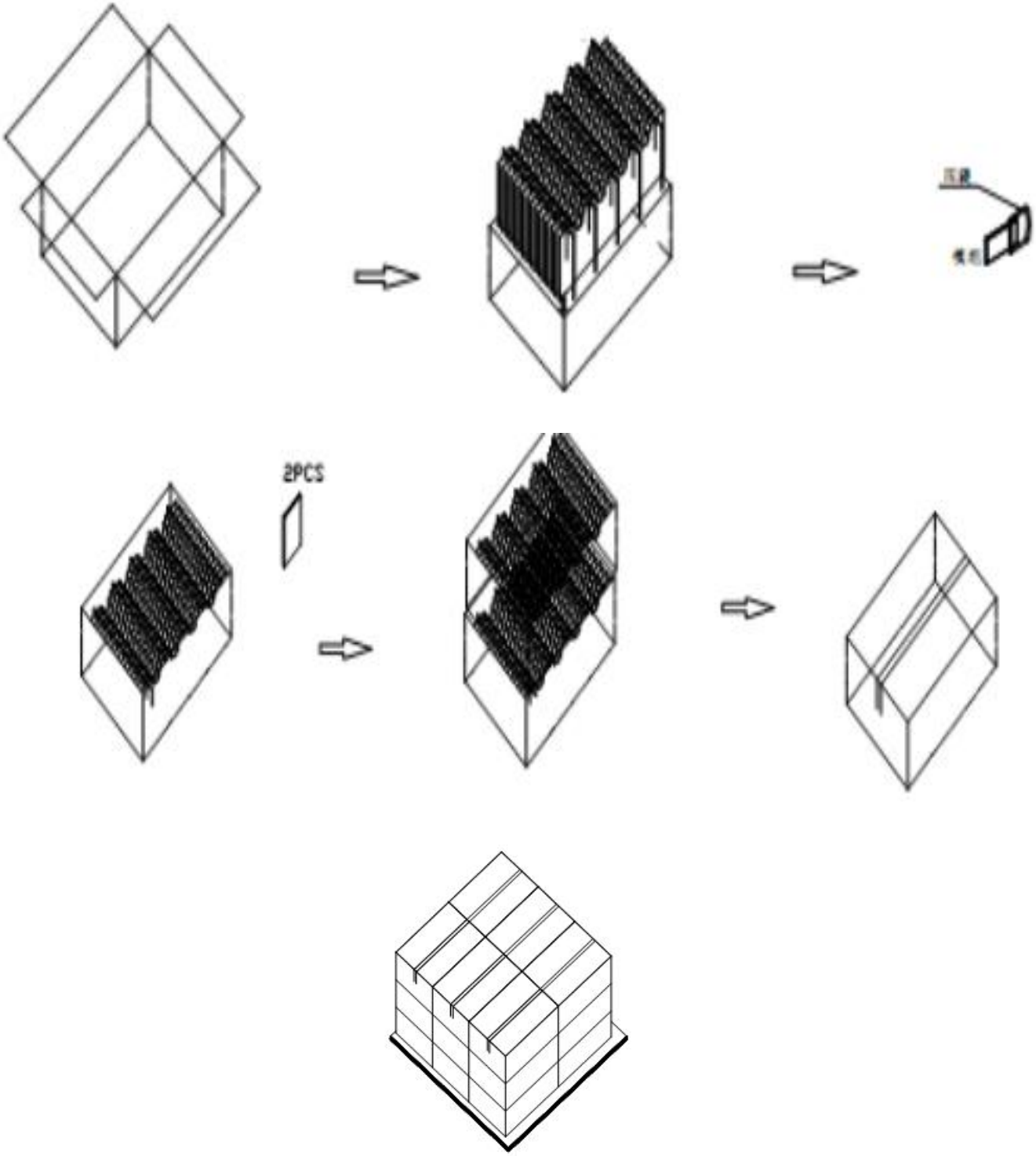
Note: 1. Ts is the temperature of panel's surface.
2. Ta is the ambient temperature of sample.
3. The size of sample is 5pcs.

9. Mechanical Drawing



10. Packing

Packing Method



11. Precautions for Use of LCD modules

11.1 Handling Precautions

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

11.1.2. 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.

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

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

11.1.5. 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
- Ketene
- Aromatic solvents

11.1.6. Do not attempt to disassemble the LCD Module.

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

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

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

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

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

11.1.8.4. 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.

11.2 Storage Precautions

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

11.2.2. 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℃ ～ 40℃ Relatively humidity: ≤80%

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

11.3 Transportation Precautions

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