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

Product Specification

Model Name	S043HWV94HS-DR12
Description	4.3" WVGA 800(RGB)x480 Dots
Date	2020/04/14
Version	1.0

Approved by/Date	**Check by/Date**	**Prepared by/Date**
ZHP 2020/04/14	HZX 2020/04/14	Jack Guo 2020/04/14

Customer Approval	
Date	

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1. Record of Revision

Rev	Issued Date	Description	Editor
1.0	2018/03/28	First Release.	ZHP

2. General Specifications

Feature		Spec
Characteristics	Size	4.3 inch
	Resolution	800(horizontal)*480(Vertical)
	Interface	RGB-24bit
	Connect type	Connector
	Display Colors	16.2M
	Pixel pitch (mm)	0.1188*0.1122
	Pixel Configuration	R.G.B.-Stripe
	Display Mode	Normally black
	LCD Driver IC	HX8264-D06+HX8664-B
	Viewing Direction	Full view
Mechanical	LCM (W x H x D) (mm)	105.50*67.20*4.05
	Active Area(mm)	95.04 x 53.86
	Weight (g)	TBD
	LED Numbers	10 LEDS

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

3. Input/Output Terminals

LCD PIN-MAP

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	Normally pulled high. DISP="1": Normally operation (Default) DISP="0": Timing controller, source driver will turn off ,all output are High-Z.
32	HSYNC	Horizontal sync input. Negative polarity.
33	VSYNC	Vertical sync input. Negative polarity..
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	The right side signal pin of TP
38	YD	The bottom side signal pin of TP
39	XL	The left side signal pin of TP
40	YU	The top side signal pin of TP

4. Absolute Maximum Rating

Item	Symbol	MIN	Typ	MAX	Unit	Remark
Supply Voltage	VDD	-0.5	-	3.96	V	-
Operating Temperature	TOPR	-30	-	85	℃	-
Storage Temperature	TSTG	-30	-	85	℃	

5. Electrical Characteristics

5.1 Driving TFT LCD Panel

Parameter	Symbol	Spec. Min.	Spec. Typ.	Spec. Max.	Unit	Condition
Power supply voltage	VDD	2.7	3.3	3.6	V	-
Power supply voltage	VDDA	6.5	-	13.5	V	-
Low level input voltage	V_{IL}	0	-	0.3VDD	V	For digital circuit
High level input voltage	V_{IH}	0.7VDD	-	VDD	V	For digital circuit
Output low voltage	V_{OL}	-	-	VSS+0.4	V	I_{OL}=400μA
Output high voltage	V_{OH}	VDD-0.4	-	-	V	I_{OH}=-400μA
Pull low/high resistance	R_i	200	250	300	kΩ	For the digital input pin @VDD=3.3V
Input leakage current	Ii	-	-	±1	uA	For digital circuit
Digital Operation current	Idd	-	5	14	mA	Dual gate mode or Cascade mode slave, Fclk=50MHz, LD=48KHz, VDD=3.3V, CABC disable, No load
		-	7	16	mA	Cascade mode master, Fclk=50MHz, LD=48KHz,VDD=3.3V, CABC disable, No load
Digital stand-by current	Ist1	-	10	50	μA	Clock & all functions are stopped
Analog Operating current	Idda	-	6	8	mA	No load, Fclk=50MHz,FLD=48KHz @ VDDA=10V, V1=8V, V14=0.4V
Analog Stand-by current	Ist2	-	10	50	μA	No load, clock & all functions are stopped
Input level of V1~V7	Vref1	0.4VDDA	-	VDDA-1	V	Gamma correction voltage input
Input level of V8~V14	Vref2	0.1	-	0.6VDDA	V	Gamma correction voltage input
Output Voltage deviation	Vod1	-	±20	±35	mV	Vo=VSSA+0.1V~VSSA+0.5V & Vo=VDDA-0.5V~VDDA-0.1V
Output Voltage deviation	Vod2	-	±15	±20	mV	Vo=VSSA+0.5V~VDDA-0.5V
Output Voltage Offset between Chips	Voc	-	-	±20	mV	Vo=VSSA+0.5V~VDDA-0.5V
Dynamic Range of Output	Vdr	0.1	-	VDDA-0.1	V	SO1~SO1200
Sinking Current of Outputs	IOLy	80	-	-	μA	SO1~SO1200; Vo=0.1V vs. 1.0V, VDDA=13.5V
Driving Current of Outputs	IOHy	80	-	-	μA	SO1~SO1200 ;Vo=0.1V vs. 12.5V, VDDA=13.5V
Resistance of Gamma Table	Rg	0.7*Rn	1.0*Rn	1.3*Rn	Ω	Rn: Internal gamma resistor

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5.2 LED Driving Conditions

Item	Symbol	MIN	TYP	MAX	Unit	Remark
Forward Current	I_F	-	40	-	mA	
Forward Voltage	V_F	15.0	16.0	17.0	V	
Backlight Power consumption	W_{BL}	-	0.640	-	W	
LED Lifetime		-	30000	-	Hrs	

Note 1: Each LED: IF =20 mA, VF =3.2+/0.2V.
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.

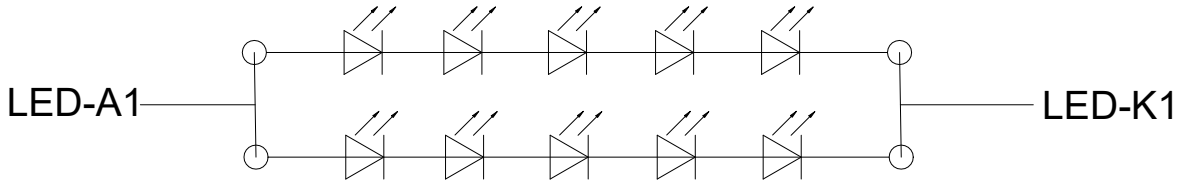
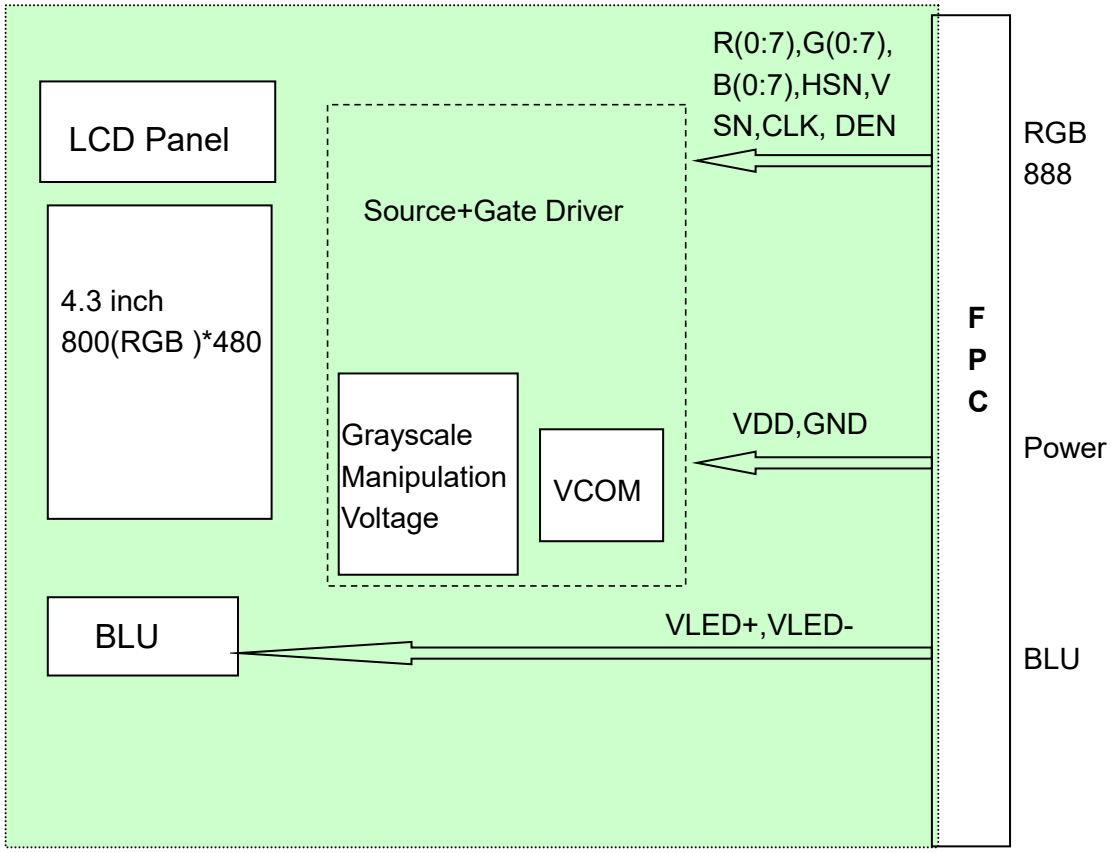


Figure: LED connection of backlight(Constant Current)

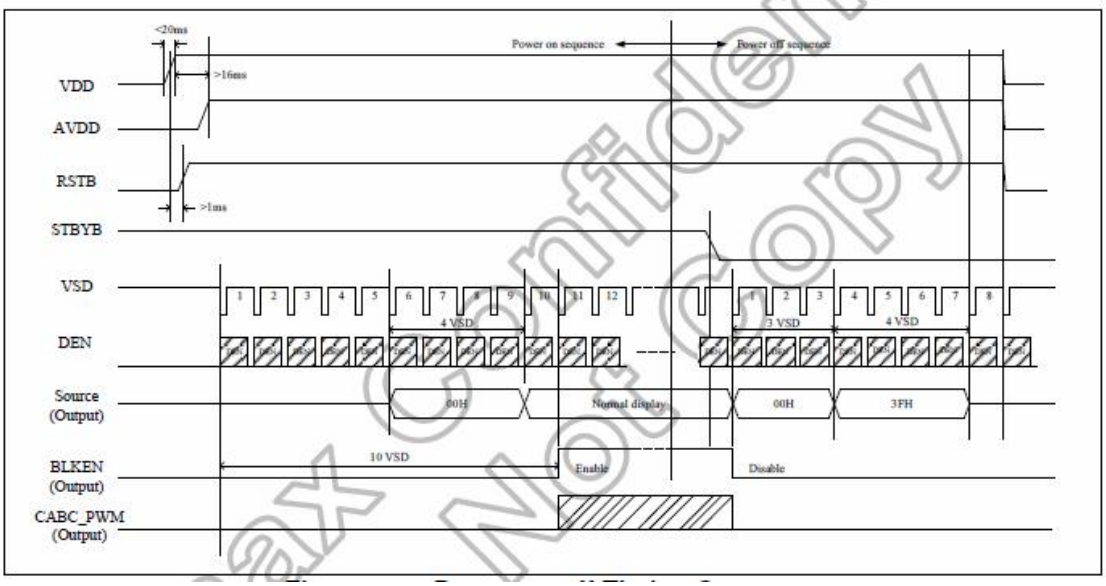
5.3 Block Diagram



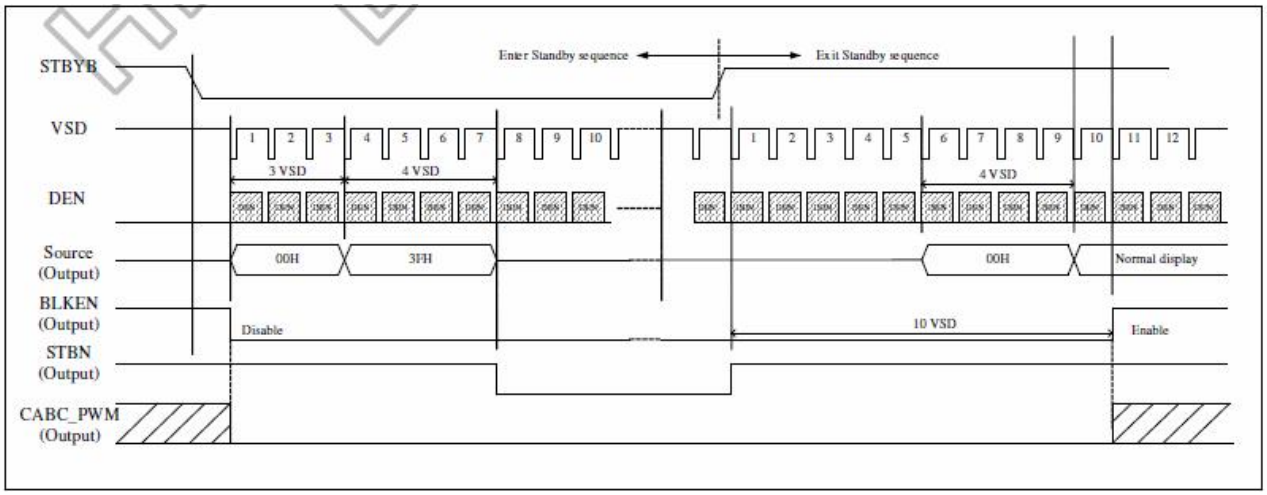
6. Interface Timing

6.1 Power Sequence

Power on/off control:



Enter and exit standby mode sequence:



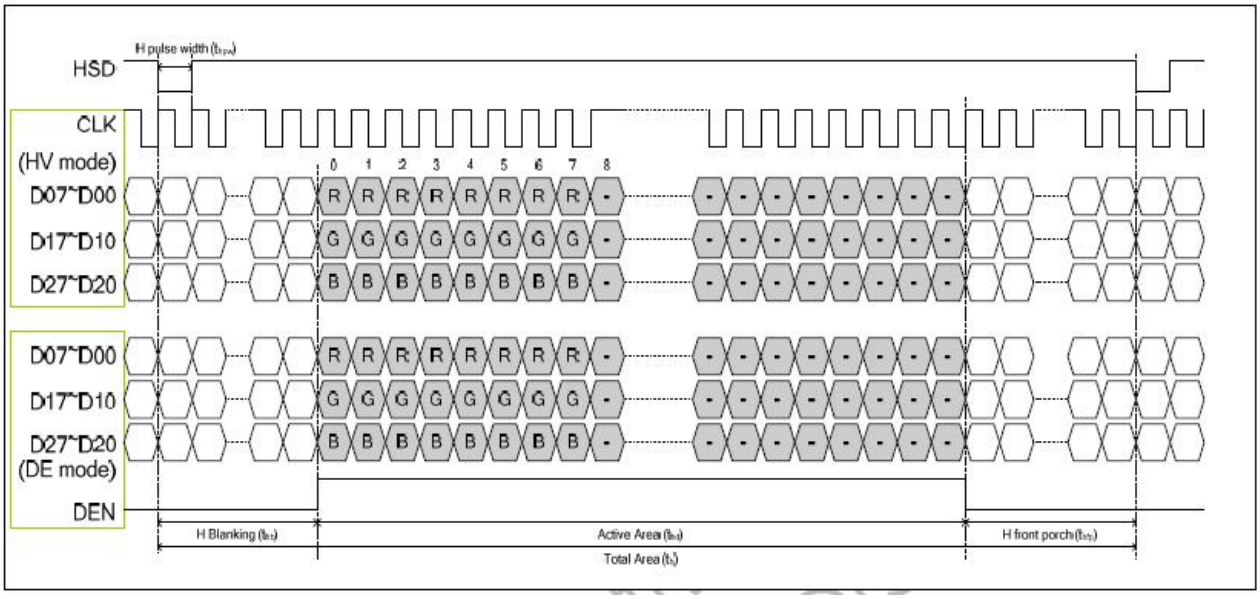
6.2 AC Characteristics

6.2.1 AC electrical characteristics

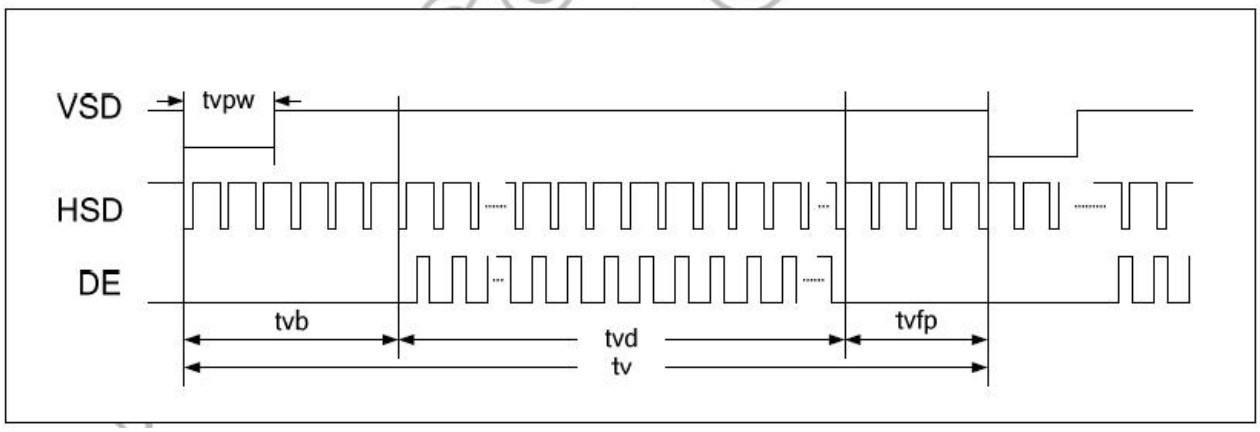
Parameter	Symbol	Spec.			Unit
		Min.	Typ.	Max.	
HS setup time	T_{hst}	8	-	-	ns
HS hold time	T_{hhd}	8	-	-	ns
VS setup time	T_{vst}	8	-	-	ns
VS hold time	T_{vhd}	8	-	-	ns
Data setup time	T_{dsu}	8	-	-	ns
Data hold time	T_{dhd}	8	-	-	ns
DE setup time	T_{esu}	8	-	-	ns
DE hold time	T_{ehd}	8	-	-	ns
VDD Power On Slew rate	T_{POR}	-	-	20	ms
RSTB pulse width	T_{Rst}	10	-	-	us
CLKIN cycle time	T_{cph}	20	-	-	ns
CLKIN pulse duty	T_{cwh}	40	50	60	%
Output stable time	T_{sst}	-	-	6	us

6.2.2 Data input format

- **Horizontal timing**



- **Vertical timing**



- **Horizontal timing**

Parameter	Symbol	Spec.			Unit
		Min.	Typ.	Max.	
Horizontal Display Area	thd		800		DCLK
DCLK frequency	fclk	-	30	50	MHz
One Horizontal Line	th	862	1056	1200	DCLK
HS pulse width	thpw	1	-	40	DCLK
HS Back Porch (Blanking)	thb		46		DCLK
HS Front Porch	thfp	16	210	354	DCLK
DE mode Blanking	th-thd	85	256	400	DCLK

- **Vertical timing**

Parameter	Symbol	Spec.			Unit
		Min.	Typ.	Max.	
Vertical Display Area	tvd		480		T_H
VS period time	tv	513	525	650	T_H
VS pulse width	tvpw	3	-	20	T_H
VS Back Porch (Blanking)	tvb		23		T_H
VS Front Porch	tvfp	7	22	147	T_H
DE mode Blanking	tv-tvd	30	45	170	T_H

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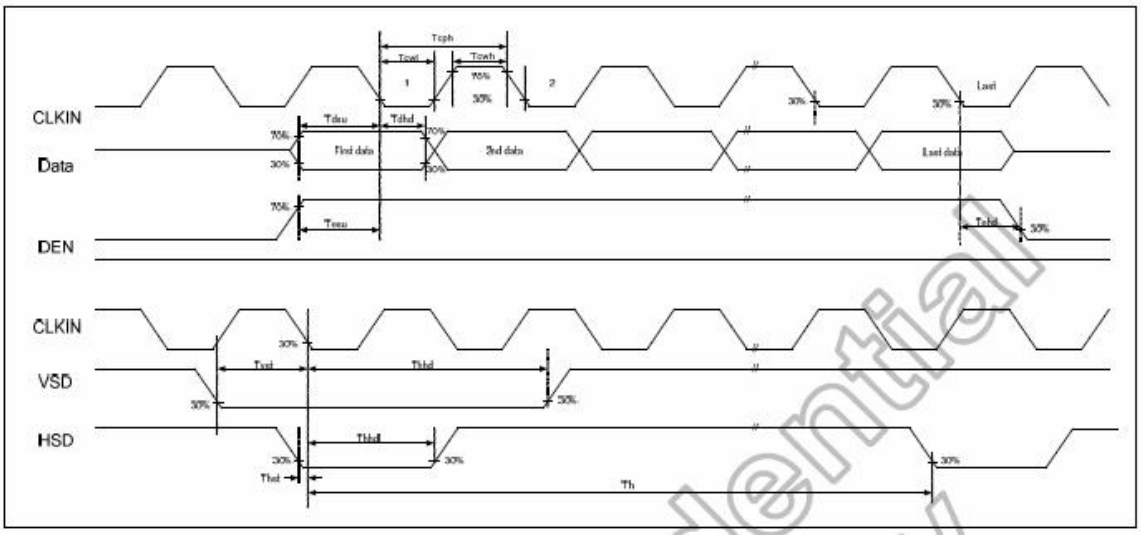
6.3 Waveform

6.3.1 Timing waveform table

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
CLKIN Frequency	Fclk	-	40	50	MHz	VDD=3.0V~3.6V
CLKIN Cycle Time	Tclk	20	25	-	ns	-
CLKIN Pulse Duty	Tcwh	40	50	60	%	Tclk
Time from HSD to Source Output	Thso		64		CLKIN	-
Time from HSD to LD	Thld		64		CLKIN	-
Time from HSD to STV	Thstv		2		CLKIN	-
Time from HSD to CKV	Thckv		20		CLKIN	-
Time from HSD to OEV	Thoev		4		CLKIN	-
LD Pulse Width	Twld		10		CLKIN	-
CKV Pulse Width	Twckv		66		CLKIN	-
OEV Pulse Width	Twoev		74		CLKIN	-

6.3.2 Timing diagram

6.3.2.1 Input clock and data timing waveform:



6.3.2.2 Source output timing waveform (Cascade):

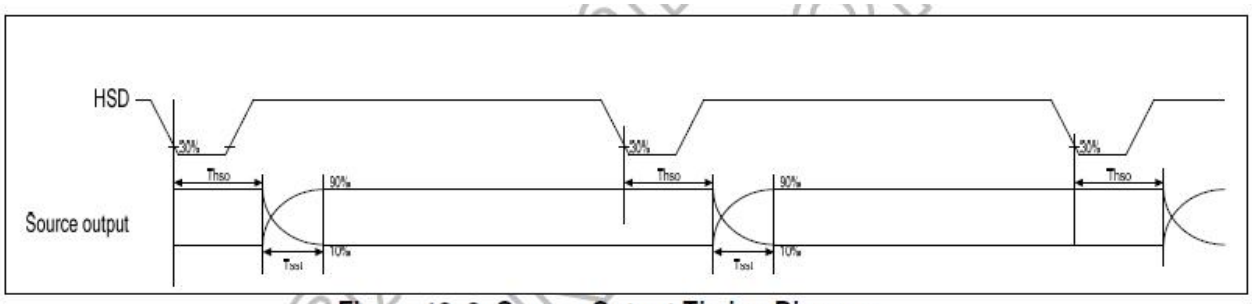


Figure 12. 2: Source Output Timing Diagram

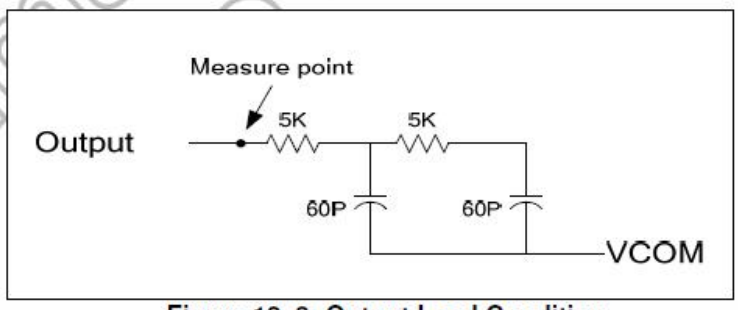
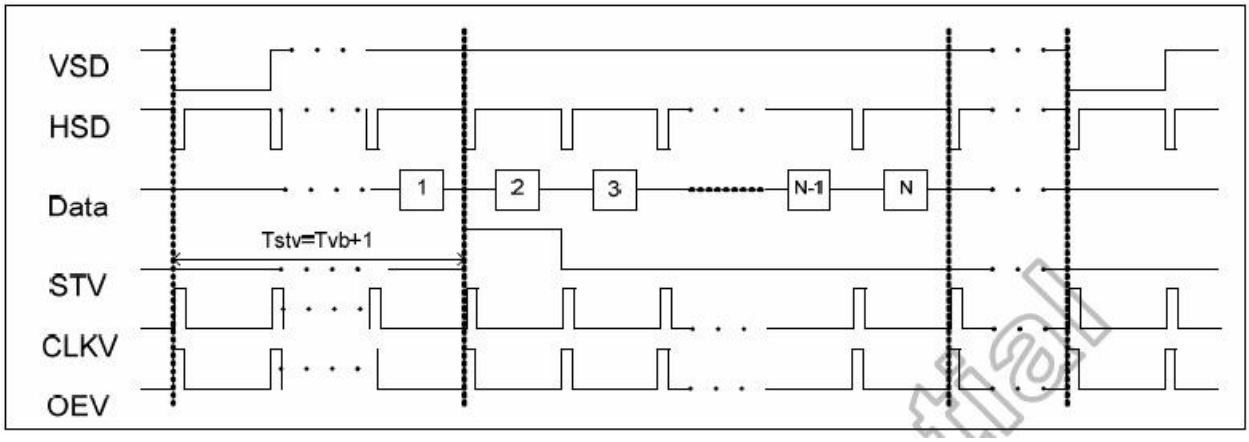
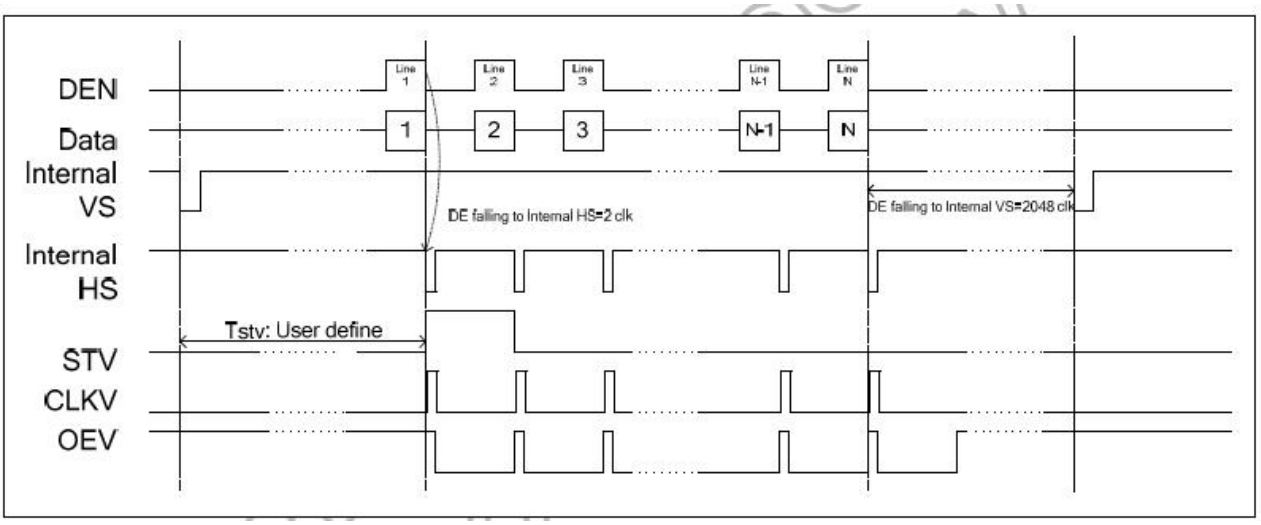


Figure 12. 3: Output Load Condition

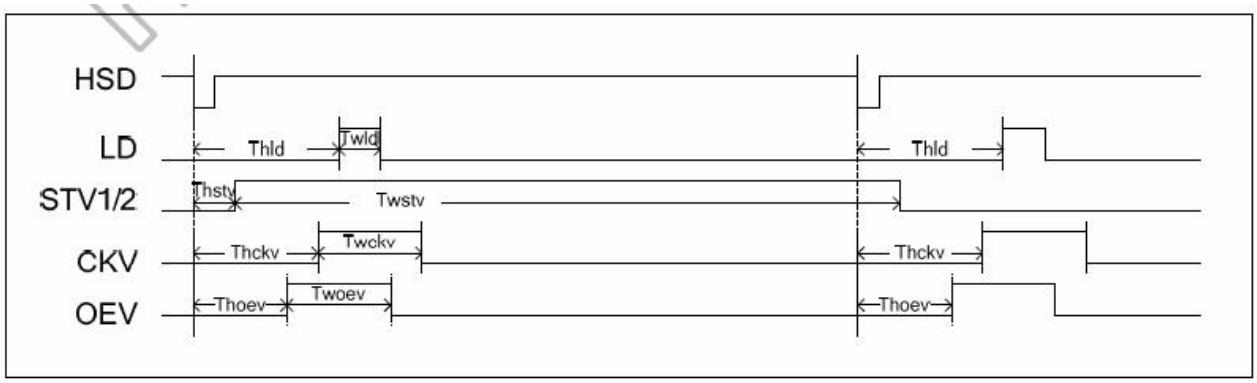
6.3.2.3 Vertical timing diagram HV (Cascade)



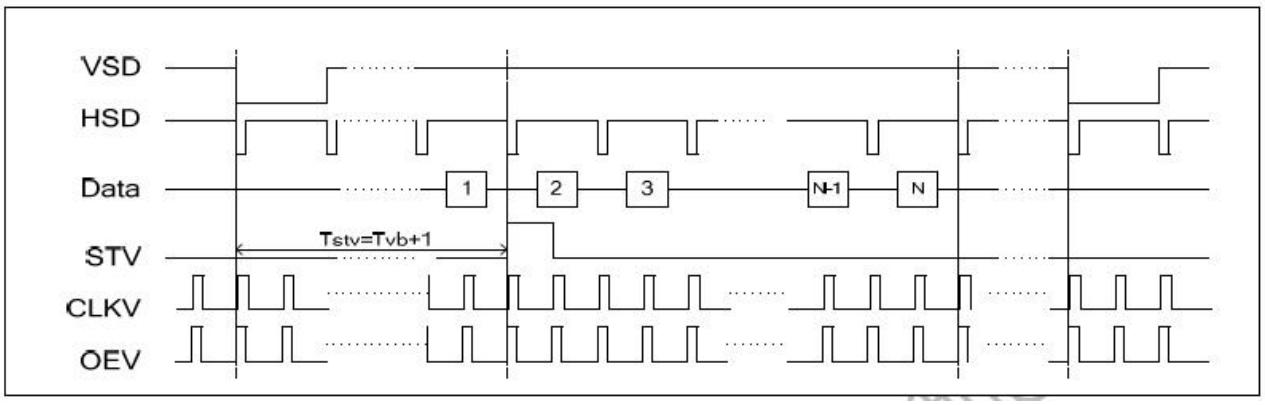
6.3.2.4 Vertical timing diagram DE (Cascade)



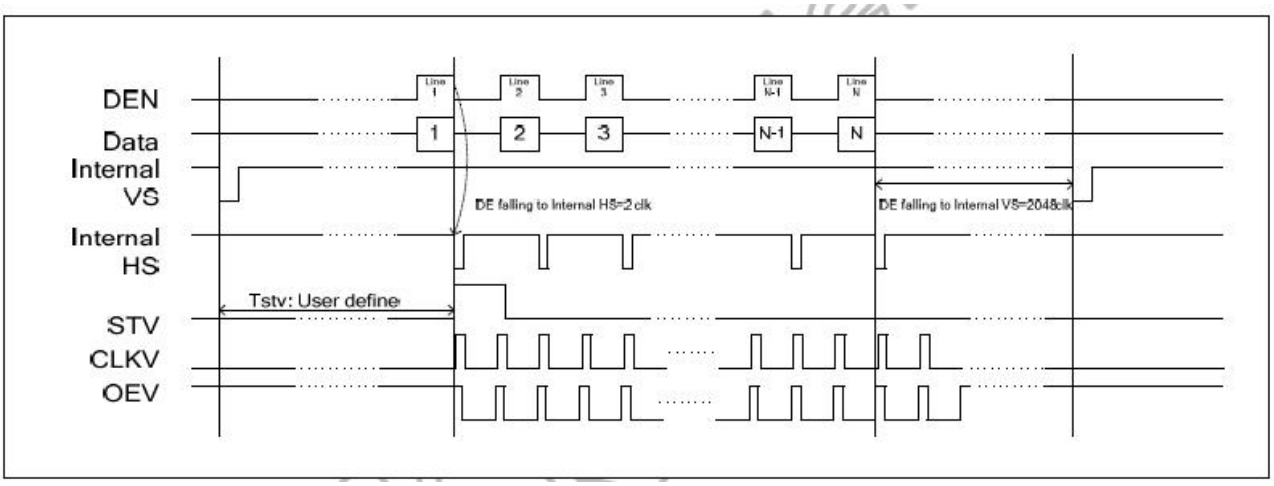
6.3.2.5 Gate output timing diagram (Cascade)



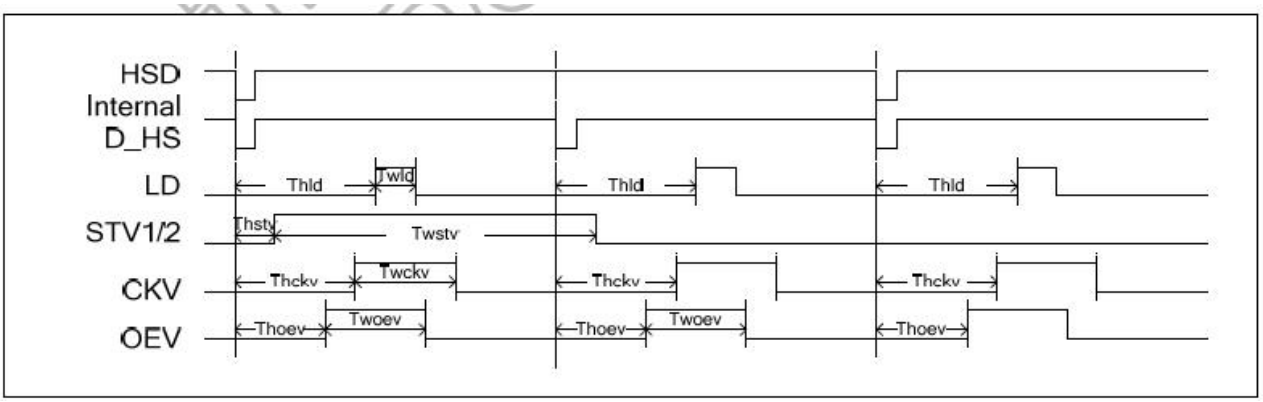
6.3.2.6 Vertical timing diagram HV (Dual gate)



6.3.2.7 Vertical timing diagram DE (Dual gate)



6.3.2.8 Gate output timing diagram (Dual gate)



7. Optical Characteristics

Items		Symbol	Condition	Min.	Typ.	Max.	Unit	Remark	Note
Response time		Tr+Tf	-	-	30	40	ms	FIG.1	Note4
Contrast Ratio		CR		640	800	-	-	FIG.2	Note1
Surface luminance		LV	θ =0°	350	400	-	cd/m2	FIG.2	Note2
Luminance uniformity		Yu	θ =0°	-	-	-	%	FIG.2	Note3
NTSC		-	θ =0°	45	50	-	%	FIG.2	Note5
Viewing angle		θ_T	Center CR≥10	70	80	-	deg	FIG.3	Note6
		θ_B		70	80	-	deg	FIG.3	
		θ_L		70	80	-	deg	FIG.3	
		θ_R		70	80	-	deg	FIG.3	
Chromaticity	Red	R_X	θ =0° ∅ =0° Ta=25°	0.57	0.620	0.67	-	FIG.2 CIE1931	Note5
		R_Y		0.278	0.328	0.378	-		
	Green	G_X		0.284	0.334	0.384	-		
		G_Y		0.494	0.544	0.594	-		
	Blue	B_X		0.089	0.139	0.189	-		
		B_Y		0.083	0.133	0.183	-		
	White	W_X		0.2651	0.3151	0.3651	-		
		W_Y		0.2764	0.3264	0.3764	-		

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

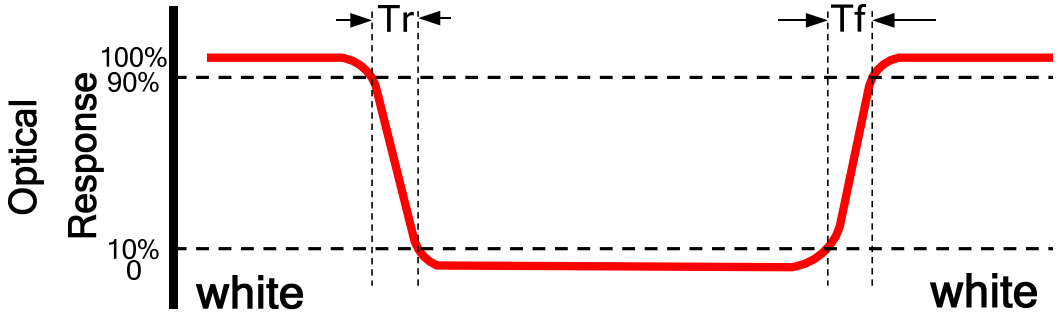


FIG.2. Measuring method for contrast ratio, surface luminance, luminance uniformity, CIE (x,y) chromaticity

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).

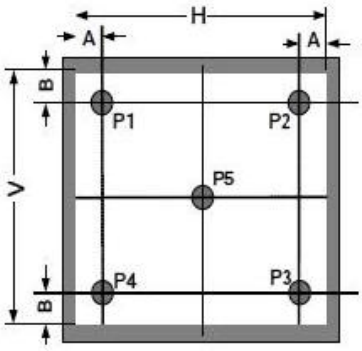


Figure a

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).

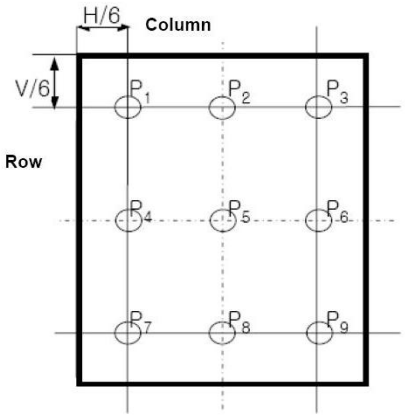


Figure b

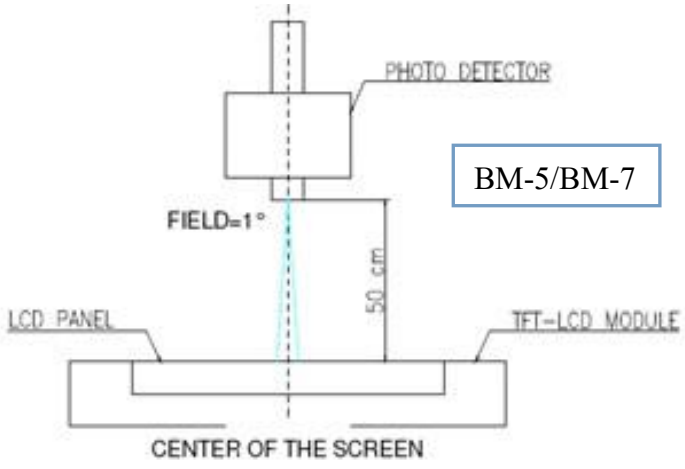
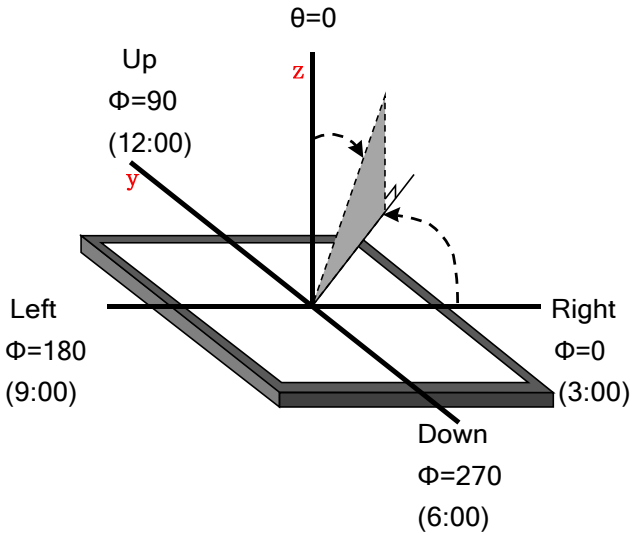


Figure c

FIG.3.The definition of viewing angle

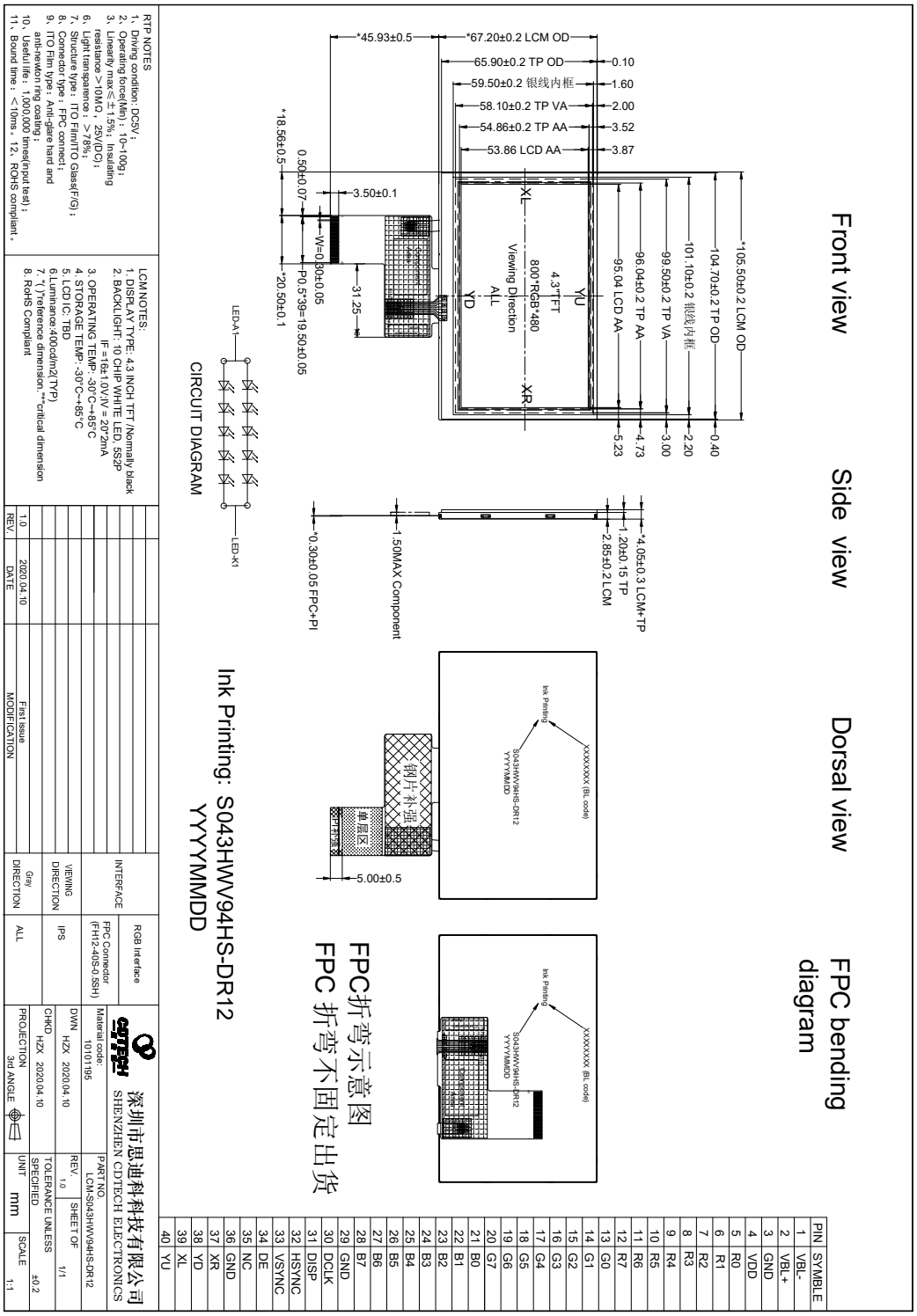


8. Environmental / Reliability Tests

No	Test Item	Condition	Remarks
1	High Temperature Operation	Ts= +85℃, 96hrs	Note 1 IEC60068-2-2, GB2423. 2-89
2	Low Temperature Operation	Ta= -30℃, 96hrs	Note 2 IEC60068-2-1 GB2423.1-89
3	High Temperature Storage	Ta= +85℃, 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: 1Hz~55Hz~3.5Hz 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



PIN	SYMBLE
1	VBL-
2	VBL+
3	GND
4	VDD
5	R0
6	R1
7	R2
8	R3
9	R4
10	R5
11	R6
12	R7
13	G0
14	G1
15	G2
16	G3
17	G4
18	G5
19	G6
20	G7
21	B0
22	B1
23	B2
24	B3
25	B4
26	B5
27	B6
28	B7
29	GND
30	DCLK
31	DISP
32	HSYNC
33	VSYNC
34	DE
35	NC
36	GND
37	XR
38	YD
39	XL
40	YU

RTP NOTES
1、Driving condition: DC5V；
2、Operating force(Min): 10~100g；
3、Linearity max:<±1.5%，Insulating resistance: >10MΩ，250V(DC)；
4、Light transparence: ≥ 75%；
5、Structure type：ITO Film/ITO Glass(F/G)；
6、Connector type：FPC connect；
7、ITO Film type：Anti-glare hard and anti-newton ring coating；
8、Connector type：FPC connect；
9、ITO Film type：Anti-glare hard and anti-newton ring coating；
10、Useful life：1,000,000 times(input test)；
11、Bound time：<10ms，12、ROHS compliant。

LCM NOTES:
1. DISPLAY TYPE: 4.3 INCH TFT /Normally black
2. BACKLIGHT: 10 CHIP WHITE LED, SS2P
IF =16± 1.0V,IV = 20*2mA
3. OPERATING TEMP: -30°C~+85°C
4. STORAGE TEMP: -30°C~+85°C
5. LCD IC: TBD
6.Luminance:400cd/m2(TYP)
7. *( )*reference dimension,"**critical dimension
8 RoHS Compliant

REV.	DATE	MODIFICATION
1.0	2020.04.10	First issue

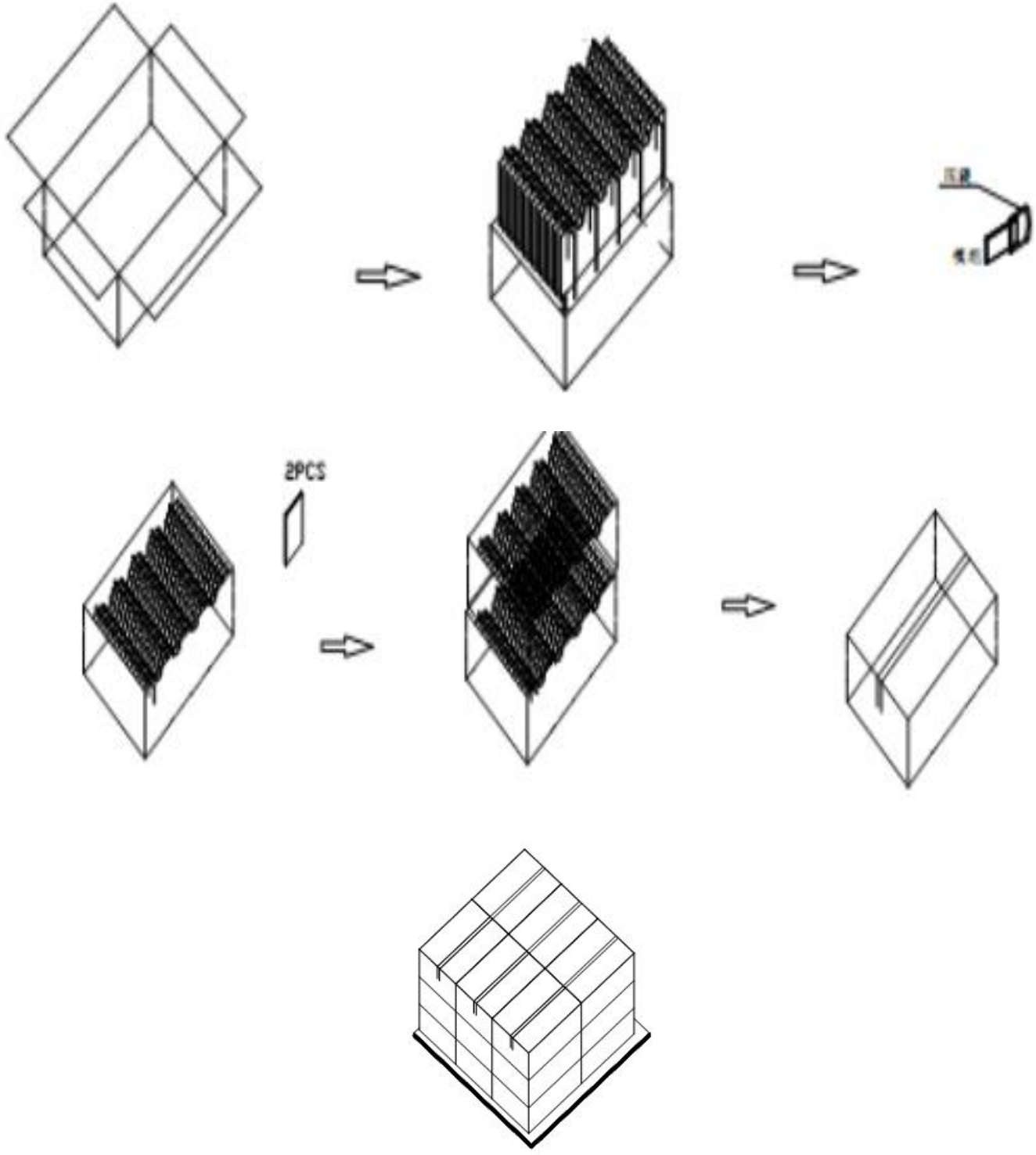
		RGB Interface	
		FPC Connector (FH12-40S-0.5SH)	INTERFACE
		IPS	VIEWING DIRECTION
		ALL	Gray DIRECTION

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

DWN	HZX	2020.04.10	Material code: 10101195
CHKD	HZX	2020.04.10	PART NO. LCM-S043HWV94HS-DR12
PROJECTION 3rd ANGLE			REV. 1.0 SHEET OF 1/1
UNIT mm			TOLERANCE UNLESS SPECIFIED ±0.2
SCALE 1:1			

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.