



深圳市思迪科科技有限公司

SHENZHEN CDTECH ELECTRONICS

Product Specification

Model Name	S090BWS05ED-DC01 V3.0
Description	9.0" WSVGA 1024(RGB)x600 Dots
Date	2021/09/16
Version	1.0

Approved by/Date	Check by/Date	Prepared by/Date
ZHP 2021/09/16	HL 2021/09/16	ZWF 2021/09/16

Customer Approval	
Date	



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1. Record of Revision

Rev	Issued Date	Description	Editor
1.0	2021/09/16	First Release.	ZWF

2. General Specifications

	Feature	Spec
Characteristics	Size	9 inch
	Resolution	1024(horizontal)*600(Vertical)
	Interface	LVDS
	Connect type	Connector
	Display Colors	16.7M
	Technology type	a-Si
	Pixel pitch (mm)	0.192*0.190
	Pixel Configuration	R.G.B.-Stripe
	Display Mode	Normally Black
	LCD Driver IC	HX8696-A01+HX8282A11
	CTP Driver IC	GT928
	Viewing Direction	Full view
Mechanical	LCM (W x H x D) (mm)	210.70*126.50*7.45
	Active Area(mm)	196.61 x114.15
	With /Without TSP	With CTP
	Weight (g)	TBD
	LED Numbers	40 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	VCOM	Common Voltage
2	DVDD	Power Voltage for digital circuit
3	DVDD	Power Voltage for digital circuit
4	NC	No connection
5	RESET	Global reset pin
6	U/D	Vertical inversion ,normally pull low
7	L/R	Horizontal inversion ,normally pull high
8	STBYB	Standby mode Normally pulled high STBYB=1,normal operation STBYB=0,timing contrller,source Driver will turn off,all output are High-Z
9	GND	Ground
10	RXCLKIN-	-LVDS differential clock input
11	RXCLKIN+	+LVDS differential clock input
12	GND	Ground
13	RXIN0-	-LVDS differential data input
14	RXIN0+	+LVDS differential data input
15	GND	Ground
16	RXIN1-	-LVDS differential data input
17	RXIN1+	+LVDS differential data input
18	GND	Ground
19	RXIN2-	-LVDS differential data input
20	RXIN2+	+LVDS differential data input
21	GND	Ground
22	RXIN3-	-LVDS differential data input
23	RXIN3+	+LVDS differential data input
24	GND	Ground
25	SELB	6bit/8bit mode select (Note 1)
26	GND	Ground
27	AVDD	Power for Analog Circuit
28	GND	Ground
29	VGH	Gate ON Voltage

30-31	NC	No connection
32	VGL	Gate oFF Voltage
33	GND	Ground
34	NC	No connection
35	LED-	LED Cathode
36	LED-	LED Cathode
37	NC	No connection
38	NC	No connection
39	LED+	LED Anode
40	LED+	LED Anode

Note 1: if LVDS input data is 6bit,selb must be set to high;
if LVDS input data is 8bit,selb must be set to low;

CTP PIN-MAP

Pin	Signal	Description
1	RST	Reset Pin for CTP
2	VDD	Power supply
3	GND	Ground
4	INT	Interrupt request to the host
5	SDA	I2C data input and output
6	SCL	I2C clock input

4. Absolute Maximum Rating

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

5. Electrical Characteristics

5.1 Driving TFT LCD Panel

Item	Symbol	MIN	TYP	MAX	Unit	Remark
Power supply for LCD	DVDD	3.0	3.3	3.6	V	
	AVDD	9.6	10.2	13.5	V	
	VGH	16.0	18.0	20	V	
	VGL	-10	-8.0	-6.8	V	
	VCOM	4.0	4.4	4.6	V	

5.2 CTP Electrical Characteristics

FPC Design	Item	Description	Remark
COF	IC solution on TP Model	GT928	
	Touch Count Max	5 point	
	Display Resolution	1024*600	
	Interface Type	I2C	
	I2C Slave Address	OX28	
	Origin of Coordinate	Top left corner	

Parameter	Min	Typ	Max	Unit
Interface Signal Voltage	-	2.8	-	V
Power Voltage	VDD	3.3	-	V

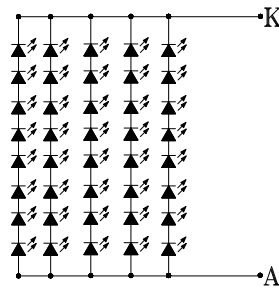
5.3 LED Driving Conditions

Item	Symbol	MIN	TYP	MAX	Unit	Remark
Forward Current	I_F	-	200	-	mA	
Forward Voltage	V_F	21.6	-	27.2	V	
Backlight Power consumption	W_{BL}	4.32	-	5.44	W	
LED Lifetime		-	30000	-	Hrs	

Note 1: Each LED: $I_F = 40 \text{ mA}$, $V_F = 2.7\text{-}3.4 \text{ V}$.

Note 2: Optical performance should be evaluated at $T_a = 25^\circ \text{C}$ 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.



Circuit Diagram(8S5P)

Figure: LED connection of backlight(Constant Current)

6. Interface Timing

6.1 Power sequence

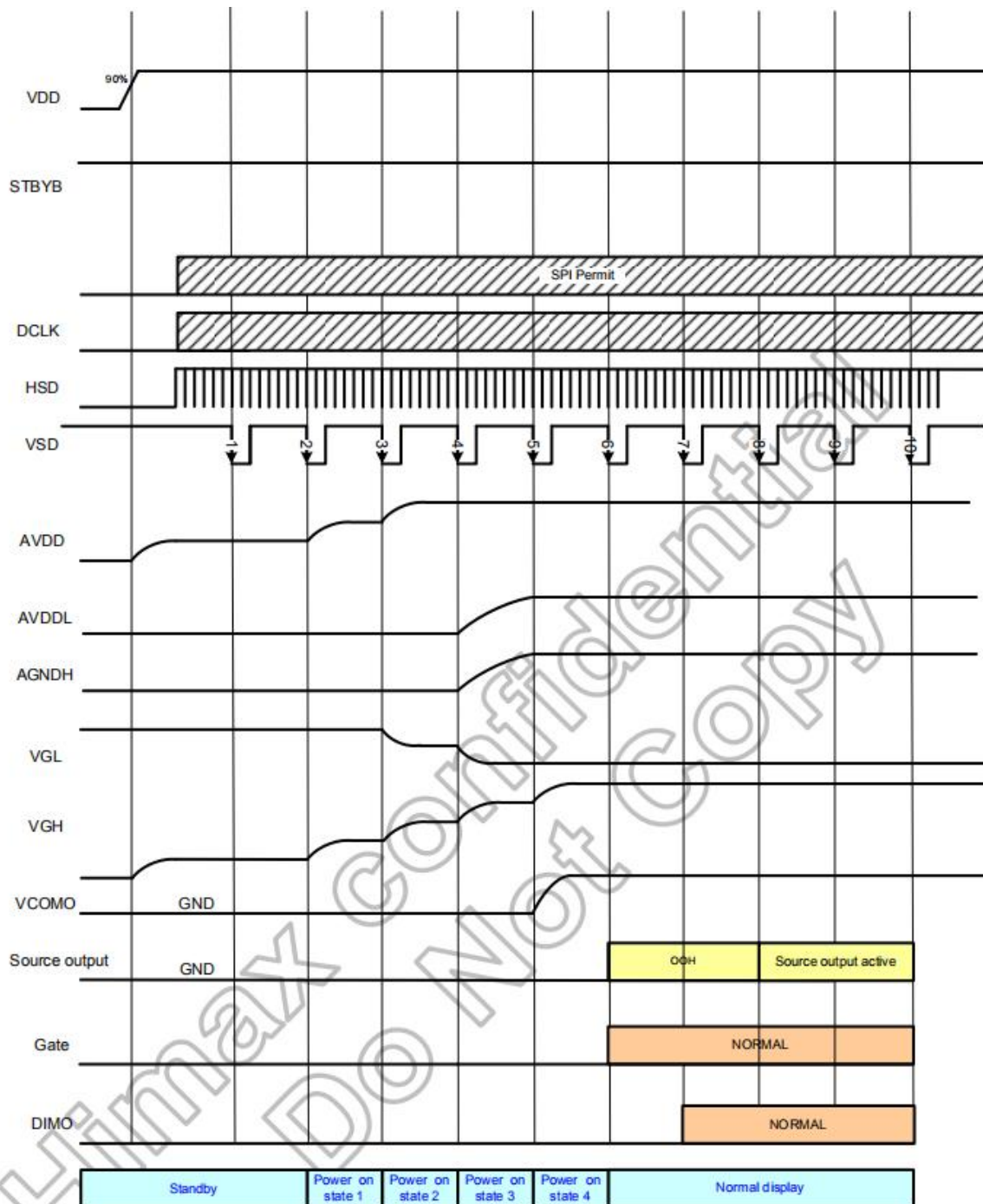
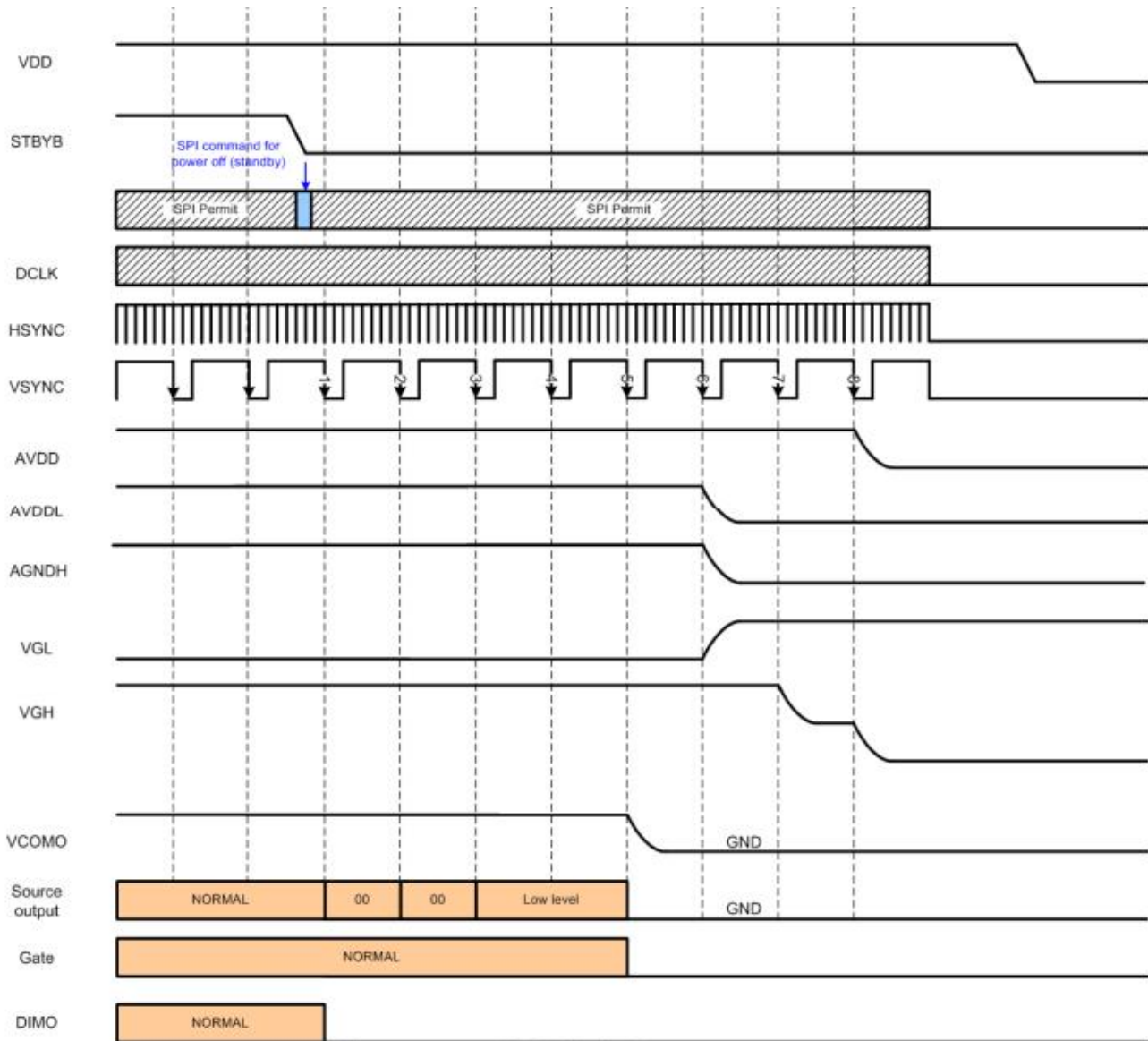


Figure 8.1: Power on timing sequence



Note: (1) Low level=3FH, when NBW=L. (Normally white)
(2) Low level=00H, when NBW=H. (Normally black)

Figure 8.2: Power off timing sequence

6.2 Timing Characteristics

Parameter	Symbol	Condition	Spec.			Unit
			Min.	Typ.	Max.	
Clock frequency	R_{XFCLK}	-	20	-	71	MHz
Input data skew margin	T_{RSKM}	$ V_{ID} =400mV$ $R_{XVCM}=1.2V$ $R_{XFCLK}=71MHz$	500	-	-	pS
Clock high time	T_{LVCH}	-	-	$4/(7 \times R_{XFCLK})$	-	ns
Clock low time	T_{LVCL}	-	-	$3/(7 \times R_{XFCLK})$	-	ns
PLL wake-up time	T_{enPLL}	-	-	-	150	μs

Table 10.2: LVDS mode AC electrical characteristics

Parameter	Symbol	Spec.			Unit
		Min.	Typ.	Max.	
DCLK frequency	fclk	40.8	51.2	67.2	MHz
Horizontal display area	thd	1024			DCLK
HSD period	th	1114	1344	1400	DCLK
HSD blanking	thb+thfp	90	320	376	DCLK
Vertical display area	tvd	600			T_H
VSD period	tv	610	635	800	T_H
VSD blanking	tvbp+tvfp	10	35	200	T_H

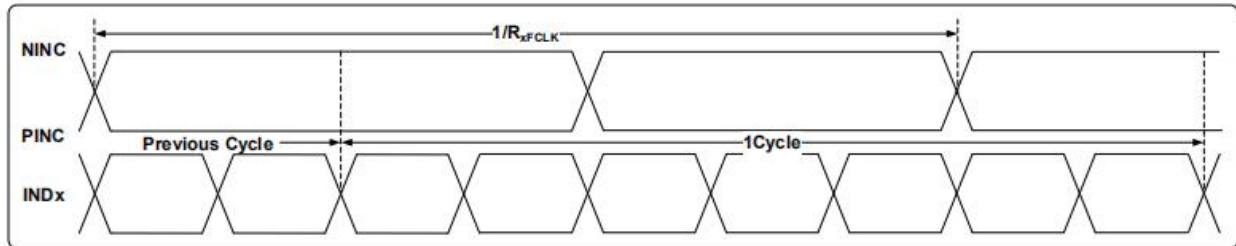
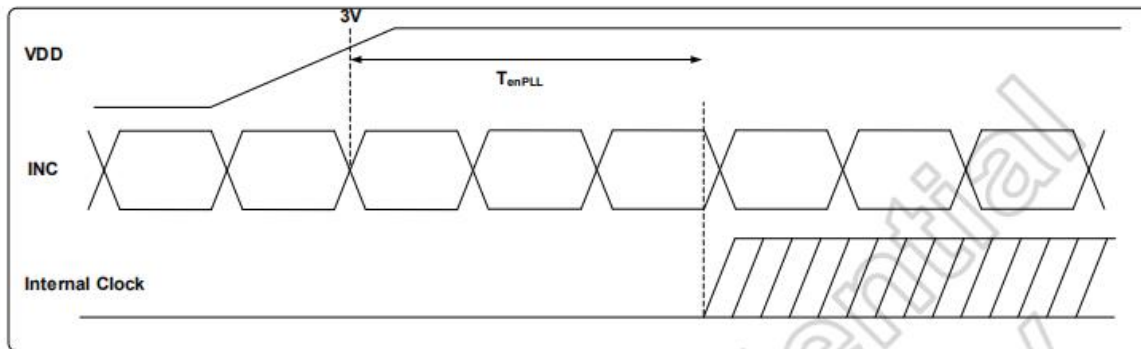
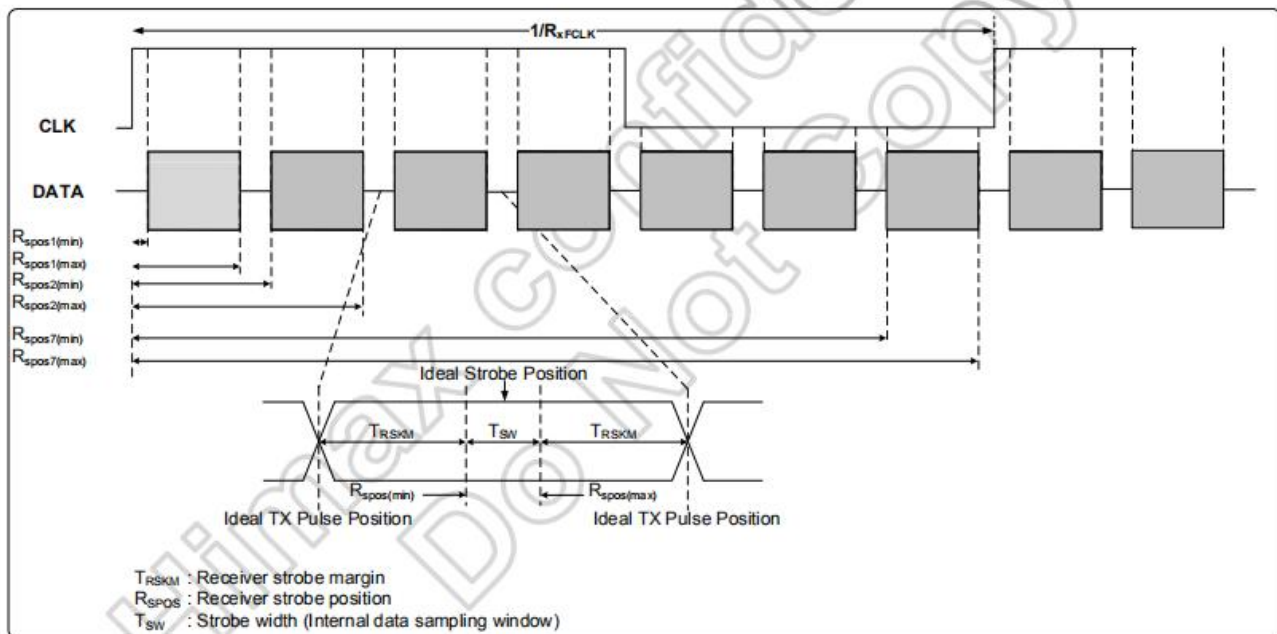


Figure 10.1: LVDS figure

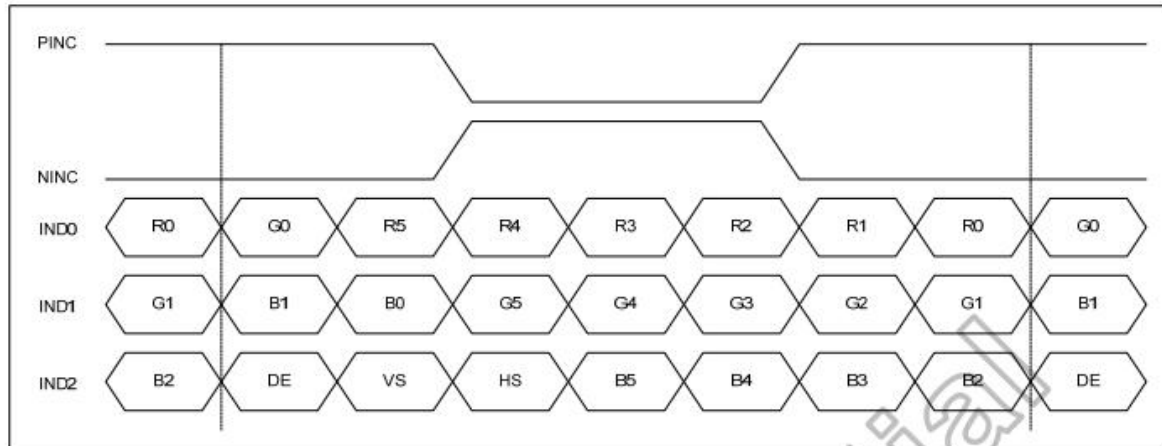


Figure 10.4: 6-bit LVDS input

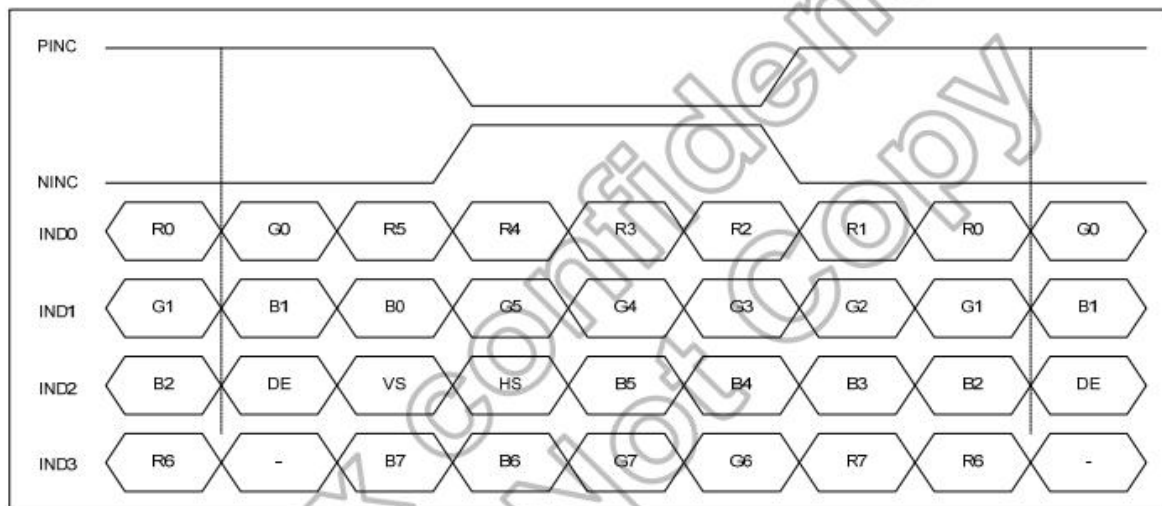


Figure 10.5: 8-bit LVDS input

6.3 Capacitive touch panel Specification

I2C

The I2C is always configured in the Slave mode. The data transfer format is shown in [Figure 2-4](#).

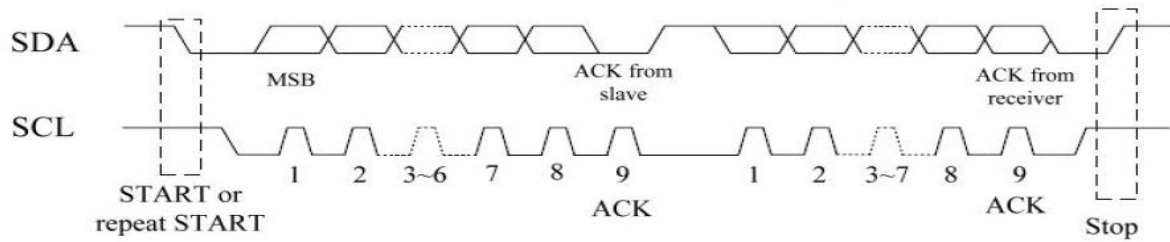
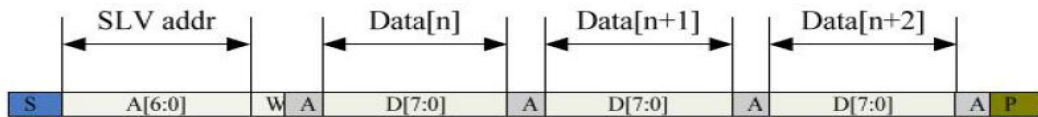


Figure 2-5 I2C master write, slave read

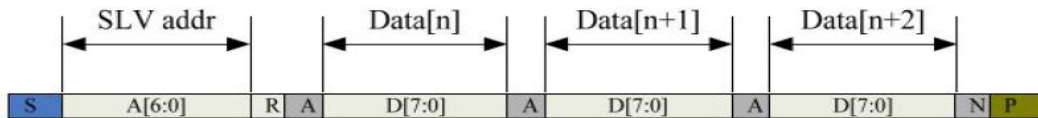


Figure 2-6 I2C master read, slave write

Table 2-1 lists the meanings of the mnemonics used in the above figures.

Table 2-1 Mnemonics Description

Mnemonics	Description
S	I2C Start or I2C Restart
A[6:0]	Slave address A[6:4]: 3'b011 A[3:0]: data bits are identical to those of I2CCON[7:4] register.
W	1'b0: Write
R	1'b1: Read
A(N)	ACK(NACK)
P	STOP: the indication of the end of a packet (if this bit is missing, S will indicate the end of the current packet and the beginning of the next packet)

I2C Interface Timing Characteristics is shown in Table 2-2.

Table 2-2 I2C Timing Characteristics

Parameter	Unit	Min	Max
SCL frequency	KHz	0	400
Bus free time between a STOP and START condition	us	4.7	\
Hold time (repeated) START condition	us	4.0	\
Data setup time	ns	250	\
Setup time for a repeated START condition	us	4.7	\
Setup Time for STOP condition	us	4.0	\

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		500	800	-	-	FIG.2	Note1
Surface luminance		LV	$\theta = 0^\circ$	900	1000	-	cd/m2	FIG.2	Note2
Luminance uniformity		Yu	$\theta = 0^\circ$	75	85	-	%	FIG.2	Note3
NTSC		-	$\theta = 0^\circ$	-	50	-	%	FIG.2	Note5
Viewing angle		θ_T	Center CR $\geq$ 10	-	85	-	deg	FIG.3	Note6
		θ_B		-	85	-	deg	FIG.3	
		θ_L		-	85	-	deg	FIG.3	
		θ_R		-	85	-	deg	FIG.3	
Chromaticity	Red	R _X	$\theta = 0^\circ$ $\phi = 0^\circ$ Ta=25°	0.569	0.619	0.669	-	FIG.2 CIE1931	Note5
		R _Y		0.287	0.337	0.387	-		
	Green	G _X		0.229	0.279	0.329	-		
		G _Y		0.488	0.538	0.588	-		
	Blue	B _X		0.091	0.141	0.191	-		
		B _Y		0.084	0.134	0.184	-		
	White	W _X		0.270	0.320	0.370	-		
		W _Y		0.300	0.350	0.400	-		

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 based 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 (T_r) is the time between photo detector output intensity changed from 90% to 10%. And fall time (T_f) 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

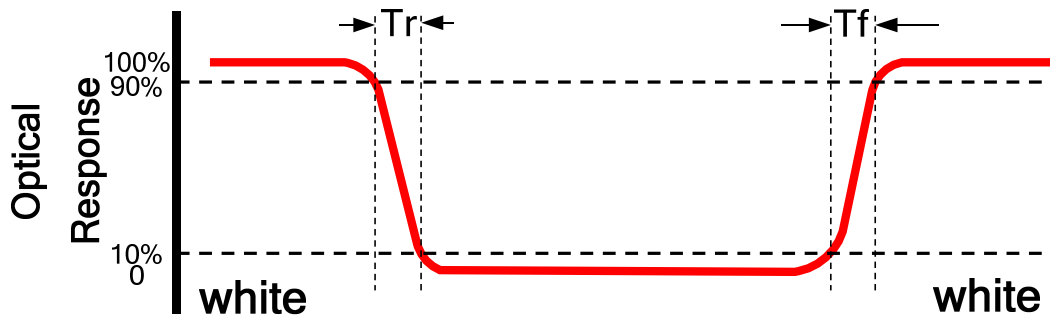


FIG.2. Measuring method for contrast ratio, surface luminance, luminance uniformity, CIE (x,y) chromaticity

Size : $S \leq 5"$ (see Figure a) A : 5 mm B : 5 mm

H,V : Active area

Light spot size $\varnothing = 5\text{mm}$ (BM-5) or $\varnothing = 7.7\text{mm}$ (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).

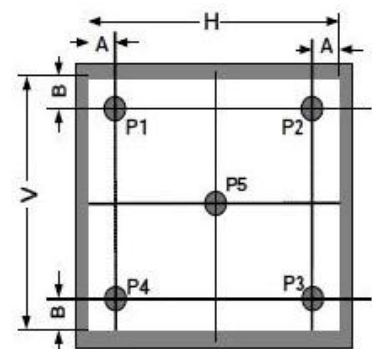


Figure a

Size : $5'' < S \leq 12.3''$ (see Figure b) H,V : Active area

Light spot size $\varnothing=5\text{mm}$ (BM-5) or $\varnothing=7.7\text{mm}$ (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).

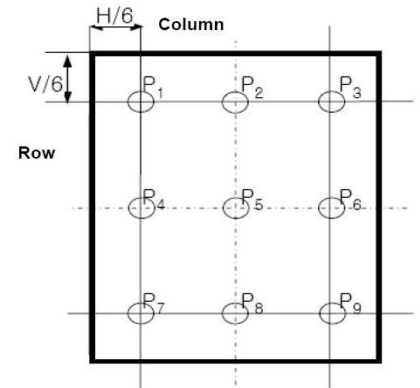


Figure b

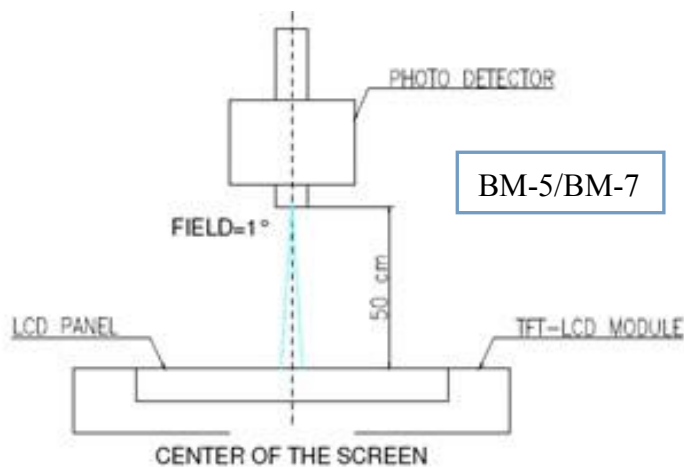
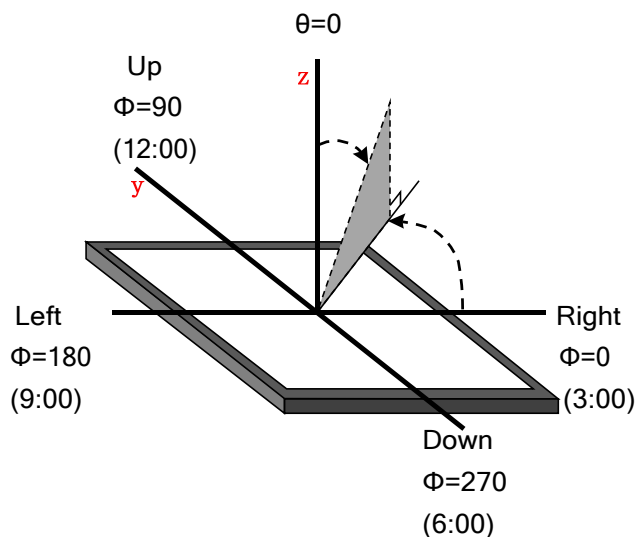


Figure c

FIG.3.The definition of viewing angle



8. Environmental / Reliability Tests

No	Test Item	Condition	Remarks
1	High Temperature Operation	Ts= +70℃, 96hrs	IEC60068-2-1:2007 GB2423. 2-2008
2	Low Temperature Operation	Ta= -20℃, 96hrs	IEC60068-2-1:2007 GB2423.1-2008
3	High Temperature Storage	Ta= +80℃, 96hrs	IEC60068-2-1:2007 GB2423. 2-2008
4	Low Temperature Storage	Ta= -30℃, 96hrs	IEC60068-2-1:2007 GB2423.1-2008
5	High Temperature & Humidity Operation	Ta= +60℃, 90% RH max, 96 hours	IEC60068-2-78:2001 GB/T2423.3-2006
6	Thermal Shock (Non-operation)	-30℃ 30 min ~ +80℃ 30 min Change time: 5min, 20 Cycle	Start with cold temperature, end with high temperature IEC60068-2-14:1984, GB2423.22-2002
7	ESD	C=150pF, R=330 Ω, 5 points/panel , Air:±8KV, 5 times Contact: ±4KV, 5 times (Environment: 15℃ ~ 35℃, 30% ~ 60%, 86Kpa ~ 106Kpa)	IEC61000-4-2:2001 GB/T17626.2-2006
8	Vibration (Non-operation)	Frequency range: 10~55Hz, Stroke: 1.5mm , Sweep: 10Hz~55Hz~10Hz 2 hours for each direction of X .Y. Z. (6 hours for total)	IEC60068-2-6:1982 GB/T2423.10-1995
9	Mechanical Shock (Non-operation)	Half Sine Wave 60G ,6ms,±X,±Y,±Z 3times for each direction	IEC60068-2-27:1987 GB/T2423.5—1995
10	Package Drop Test	Height: 60 cm, 1 corner, 3 edges, 6 surfaces	IEC60068-2-32:1990 GB/T2423.8-1995



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Notes:

1. The test result shall be evaluated after the sample has been left at room temperature and humidity for 2 hours without load. No condensation shall be accepted. The sample will not be accepted if appear these defects:
 - 1).Air bubble in the LCD;
 - 2).Seal leak
 - 3).Non-display
 - 4).missing segments
 - 5).Glass crack
 - 6).CR reduction >40%
 - 7).IDD increase >100%
 - 8).Brightness reduction >50%
 - 9).Color coordinate tolerance >0.05
- 2.≤7.0 inch: The size of sample is 5pcs;
>7.0 inch: The size of sample is 2pcs;
3. One test sample must complete each test item;
- 4.In case of malfunction defect caused by ESD damage, if it would be recovered to normal state after resetting, it would be judge as a good part.
- 5.In the test of High Temperature Operation and High Temperature & Humidity Operation ,the operation temperature is the surface temperature of module.

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

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.



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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.