



一众显示科技有限公司

TEAM SOURCE DISPLAY TECH. CO, LTD.

TFT-LCD Module Specification

Module NO.: TST070WSBH-121C

Version: V1.1

☐ APPROVAL FOR SPECIFICATION

☐ APPROVAL FOR SAMPLE

For Customer' s Acceptance:	
Approved by	Comment

Team Source Display:		
Presented by	Reviewed by	Approved by

Version No.	Date	Content	Remark
V1.0	2022-07-16	初始版本	
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1 General Characteristics

ITEM	Specification	Unit
LCD Type	a-Si TFT,Transmissive,Normally black	-
LCD Size	7.0	inch
Resolution (W x H)	1024x (RGB) × 600	pixel
Outline size	179.8(H) x 111.3(V) x5.27(T)	mm
Active Area	154.21 (H) x 85.92 V)	mm
Pixel Pitch	0.1506(H) × 0.1432(V)	mm
Viewing Direction	ALL o'clock	-
Color Depth	16.7M	-
Pixel Arrangement	RGB-stripe	-
Backlight Type	27 LEDs, 180mA	-
Surface Luminance	450(TYP)	cd/m ²
LCD Driver IC	HX8282-A&HX8696-A	-
Interface Type	RGB24-bit	-
Input Voltage	VDD=3.3	V
With/Without TP or Lens	with ttp (IC:GT911)	-
Weight	tbd	g

Note 1: RoHS compliant

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3 Interface description

3.1 LCM interface description

Pin No.	Symbol	I/O	Function	Remark
1	V _{LED+}	P	Power for LED backlight (Anode)	
2	V _{LED+}	P	Power for LED backlight (Anode)	
3	V _{LED-}	P	Power for LED backlight (Cathode)	
4	V _{LED-}	P	Power for LED backlight (Cathode)	
5	GND	P	Power ground	
6	V _{COM}	I	Common voltage	
7	V _{DD}	P	Power for Digital Circuit	
8	MODE	I	DE/SYNC mode select	Note 1
9	DE	I	Data Input Enable	
10	VS _{YNC}	I	Vertical Sync Input	
11	HS _{YNC}	I	Horizontal Sync Input	
12	B7	I	Blue data(MSB)	
13	B6	I	Blue data	
14	B5	I	Blue data	
15	B4	I	Blue data	
16	B3	I	Blue data	
17	B2	I	Blue data	
18	B1	I	Blue data	Note 2
19	B0	I	Blue data(LSB)	Note 2
20	G7	I	Green data(MSB)	
21	G6	I	Green data	
22	G5	I	Green data	
23	G4	I	Green data	
24	G3	I	Green data	
25	G2	I	Green data	
26	G1	I	Green data	Note 2

27	G0	I	Green data(LSB)	Note 2
28	R7	I	Red data(MSB)	
29	R6	I	Red data	
30	R5	I	Red data	
31	R4	I	Red data	
32	R3	I	Red data	
33	R2	I	Red data	
34	R1	I	Red data	Note 2
35	R0	I	Red data(LSB)	Note 2
36	GND	P	Power Ground	
37	DCLK	I	Sample clock	Note 3
38	GND	P	Power Ground	
39	SHLR	I	Left / right selection	Note 4,5
40	UPDN	I	Up/down selection	Note 4,5
41	V _{GH}	P	Gate ON Voltage	
42	V _{GL}	P	Gate OFF Voltage	
43	AV _{DD}	P	Power for Analog Circuit	
44	RESET	I	Global reset pin.	Note 6
45	NC	-	No connection	
46	V _{COM}	I	Common Voltage	
47	DITHB	I	Dithering function	Note 7
48	GND	P	Power Ground	
49	NC	-	No connection	
50	NC	-	No connection	

I: input, O: output, P: Power

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.

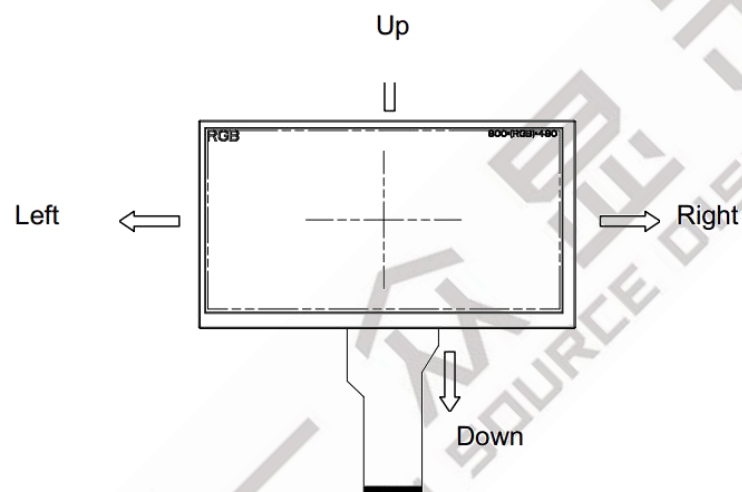
Note 3: Data shall be latched at the falling edge of DCLK.

Note 4: Selection of scanning mode

Setting of scan control input		Scanning direction
U/D	L/R	
GND	DV _{DD}	Up to down, left to right
DV _{DD}	GND	Down to up, right to left
	GND	Up to down, right to left
DV _{DD}	DV _{DD}	Down to up, left to right

Note 5: Definition of scanning direction.

Refer to the figure as below:



Note 6: Global reset pin. Active low to enter reset state. Suggest to connect with an RC reset circuit for stability. Normally pull high.

Note 7: Dithering function enable control, normally pull high.

When DITHB=" 1 " ,Disable internal dithering function,

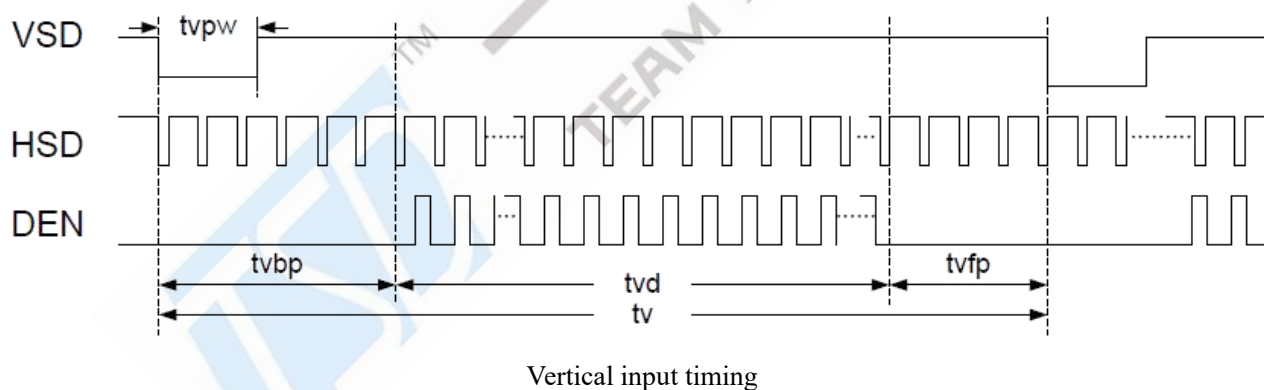
When DITHB=" 0 " ,Enable internal dithering function,

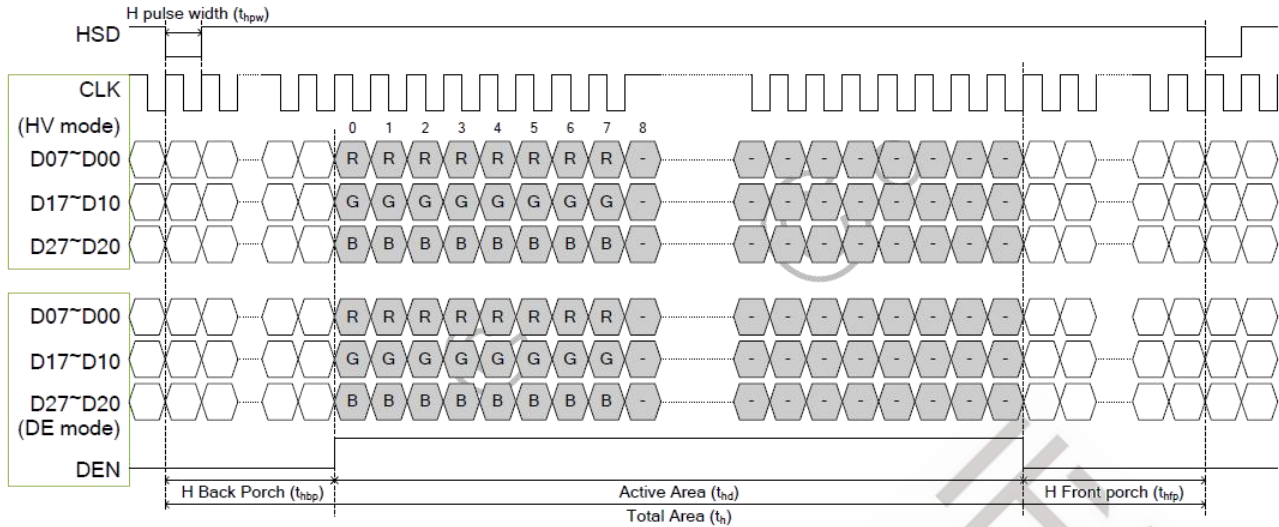
3 CTP interface description

PIN NO.	Symbol	description
1	RST	External Reset, Low is active
2	VDD	Power supply +3.3V
3	GND	Ground. (0V)
4	INT	Interrupt request to the host
5	SDA	I2C data input and output
6	SCL	I2C clock input

4 Timing Characteristics

TTL Interface Timing





Horizontal input timing

DE mode

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

HV mode horizontal timing

Parameter	Symbol	Spec.			Unit
		Min.	Typ.	Max.	
DCLK frequency	fclk	44.9	51.2	63	MHz
Horizontal display area	thd		1024		DCLK
HSD period	th	1200	1344	1400	DCLK
HSD pulse Width	thpw	1	-	140	DCLK
HSD back porch	thbp		160		DCLK
HSD front porch	thfp	16	160	216	DCLK

HV mode vertical timing

Parameter	Symbol	Spec.			Unit
		Min.	Typ.	Max.	
Vertical display area	tvd		600		T_H
VSD period	tv	624	635	750	T_H
VSD pulse width	tvpw	1	-	20	T_H
VSD back porch	tvbp		23		T_H
VSD front porch	tvfp	1	12	127	T_H

5 Absolute Maximum Ratings

PARAMETER	SYMBOL	MIN	MAX	UNIT
Supply Voltage for Analog	VDD	-0.5	3.96	V
Operating Temperature	TOP	-20	70	° C
Storage Temperature	TST	-30	80	° C
Humidity	RH	-	90%(Max 60° C)	RH

6 Electrical Characteristics

PARAMETER	SYMBOL	MIN	TYP	MAX	UNIT
Analog operating voltage	VDD	3.0	3.3	3.6	V
Power supply input	AVDD	8.0	9.6	13.5	V
Gate on voltage	VGH	17	18	19	V
Gate off voltage	VGL	-5.5	-6	-6.5	
Input signal voltage	VCOM	3.0	3.2	3.5	

7 Backlight Characteristics

ITEM	SYMBOL	MIN	TYP	MAX	UNIT
Voltage for LED backlight	V _f	--	9.6	--	V
Current for LED backlight	I _f	-	180	-	mA
Power consumption	W _{bl}	-	1728	-	mW
Uniformity	Avg	75	-	-	%
LED Life Time	-	20000	30000	-	Hrs

Note:

- 1.The LED life time is defined as the module brightness decrease to 50% original brightness at Ta=25°C, 60%RH ±5 %.
2. The life time of LED will be reduced if LED is driven by high current, high ambient temperature and humidity conditions.
3. Typical operating life time is an estimated data.
4. Permanent damage to the device may occur if maximum values are exceeded or reverse voltage is loaded .Functional operation should be restricted to the conditions described under normal operating conditions.

8 LCD Optical specifications

Item	Symbol	Condition	Specification			Unit	Remark
			Min	Typ	Max		
Response time (By Quick)	Tr+Tf	$\theta = 0^\circ$	-	25	40	ms	Note 5
Contrast ratio	CR	$\theta = 0^\circ$	-	800	-		Note 2,6
Viewing angle	Top	$CR \geq 10$	80	85	-	Deg.	Note 2,6,7
	Bottom	$CR \geq 10$	80	85	-		
	Left	$CR \geq 10$	80	85	-		
	Right	$CR \geq 10$	80	85	-		
Color chromaticity (CIE1931)	Wx	$\theta = 0^\circ$	-0.03	TBD	+0.03		Note 3
	Wy			TBD			
	Rx			TBD			
	Ry			TBD			
	Gx			TBD			
	Gy			TBD			
	Bx			TBD			
	By			TBD			
NTSC			-	50%	-		Note 3
Luminance(white)	Lu	$\theta = 0^\circ$	-	450	-	cd/m ²	

Note 1: Ambient temperature = 25°C.

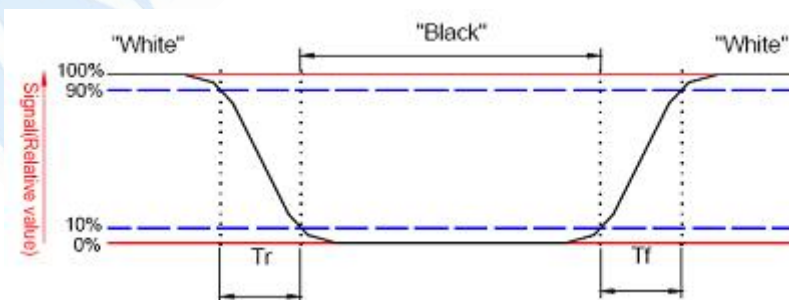
Note 2: To be measured with a viewing cone of 2° by Topcon luminance meter BM-7.

Note 3: To be measured with Otsuta chromaticity meter LCF-2100M, CF only measure under C light simulation.

Note 4: BOE shipping status is cell without polarizer. Transmittance of Specification is cell with polarizer.
The tolerance of Transmittance is $\pm 10\%$.

Note 5: Definition of response time:

The output signals of TRD-100 are measured when the input signals are changed to "White" (falling time) and from "White" to "Black" (rising time), respectively. The interval is between the 10% and 90% of amplitudes. Refer to figure as below.

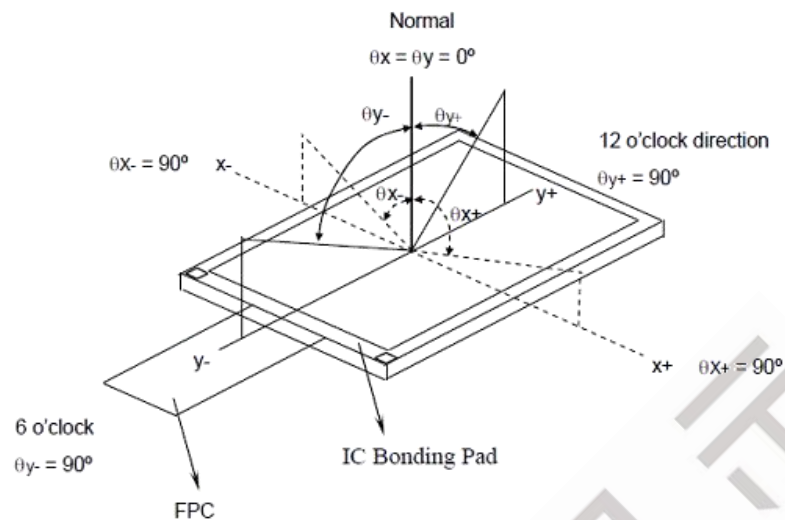


Note 6: Definition of contrast ratio:

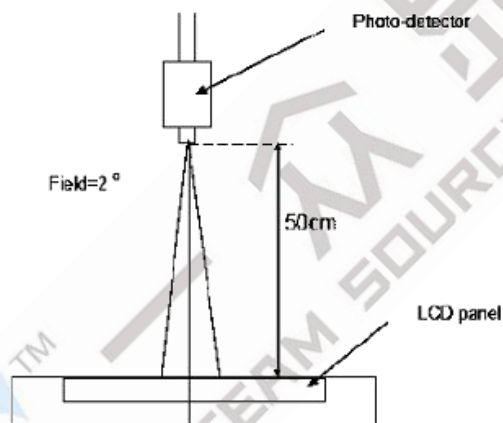
Contrast ratio is calculated by the following formula.

$$\text{Contrast ratio (CR)} = \frac{\text{Brightness on the "white" state}}{\text{Brightness on the "black" state}}$$

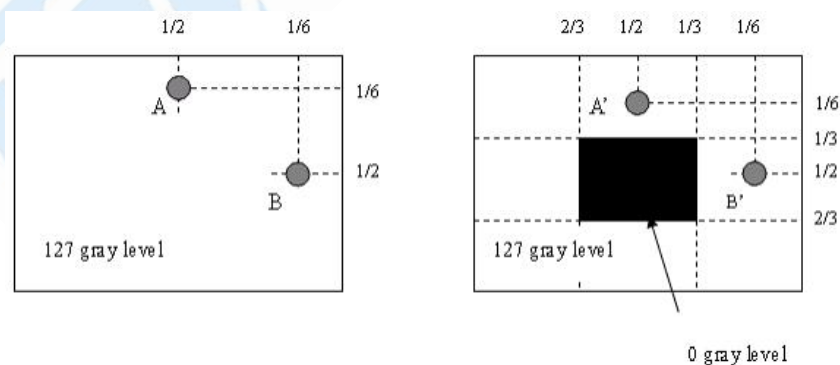
Note 7: Definition of viewing angle



Note 8: Optical characteristic measurement setup.



Note 9:



$1 \text{ LA-LA}' / \text{LA} \times 100\% = 2\% \text{ max.}$, LA and LA' are brightness at location A and A'.

$1 \text{ LB-LB}' / \text{LB} \times 100\% = 2\% \text{ max.}$, LB and LB' are brightness at location B and B'.

9 Capacitive Touch Panel specifications

9.1 Mechanical characteristics

DESCRIPTION	INL SPECIFICATION	REMARK
Touch Panel Size	7.0	
Outline Dimension (OD)	179.80(H) x 111.30(V) mm	Cover Lens Outline
Product Thickness	1.8mm	Include D.S.T and gasket
Glass Thickness	0.7mm	
View Area	155.01x86.72mm	
Input Method	5 Fingers	
Activation Force	Touch	
Surface Hardness	≥6H	

9.2 Electrical characteristics

DESCRIPTION		SPECIFICATION
Operating Voltage		DC 2.8~3.3V
Power Consumption (IDD)	Active Mode	TBD
	Sleep Mode	TBD
Interface		I ² C
Controller IC		GT911
I ² C address		0x28 /0xBA
Resolution		1024*600

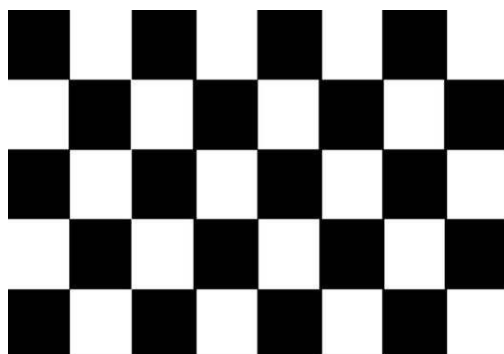
9.3 Interface timing characteristics

PARAMETER	MIN	MAX	UNIT
SCL Frequency	-	400K	Hz
Bus Free Time Between a STOP and START Condition	1.3	-	uS
Hold Time (repeated) START Condition	0.6	-	uS
Data Setup Time	100	-	nS
Setup Time for Repeated START Condition	0.6	-	uS
Setup Time for STOP Condition	0.6	-	uS

10 RELIABILITY TEST

NO.	TEST ITEM	TEST CONDITION	INSPECTION AFTER TEST
1	High Temperature Storage	80±2℃/168 hours	Inspection after 2~4 hours storage at room temperature and humidity. The condensation is not accepted. The sample shall be free from defects:
2	Low Temperature Storage	-30±2℃/168hours	
3	High Temperature Operating	70±2℃/168 hours	
4	Low Temperature Operating	-20±2℃/168 hours	
5	Temperature Cycle	-30±2℃~ 25℃~ 70± 2℃ × 30 cycles (1H) (5min.) (1H)	
6	High Temperature And Humidity Storage	60 ±5℃ × 90%RH/168 hours	1. Air bubble in the LCD 2. Seal leak 3. Non-display 4. Missing segments 5. Glass crack 6. No corrosion
7	Salt Spray Test 盐雾测试	NSS, 12H	
8	Uvioresistant 抗紫外线	Heating power: 0.5KW, 70℃/4H	
9	Image Sticking 影像残留	25℃, 1H	Remark(1)

Remark (1): Switch the image to Grey 127 after displaying the 5*8 chess pattern for **60 minutes**, the afterimage disappears within 10 seconds.



5*8 chess pattern



Gray127

11 MTBF

Functions, performance, appearance, etc. shall be free from remark able deterioration within **50,000 hours** under ordinary operating and storage conditions room temperature ($25 \pm 5^{\circ}\text{C}$), normal humidity ($50 \pm 10\%$ RH), and in area not exposed to direct sunlight.

12 Suggestions for using LCD modules

12.1 Handling of LCM

1. The LCD screen is made of glass. Don't give excessive external shock, or drop from a high place.
2. If the LCD screen is damaged and the liquid crystal leaks out, do not lick and swallow. When the liquid is attach to your hand, skin, cloth etc, wash it off by using soap and water thoroughly and immediately.
3. Don't apply excessive force on the surface of the LCM.
4. If the surface is contaminated, clean it with soft cloth. If the LCM is severely contaminated, use Isopropyl alcohol/Ethyl alcohol to clean. Other solvents may damage the polarizer. The following solvents is especially prohibited: water , ketone Aromatic solvents etc.
5. Exercise care to minimize corrosion of the electrode. Corrosion of the electrodes is accelerated by water droplets, moisture condensation or a current flow in a high-humidity environment.
6. Install the LCD Module by using the mounting holes. When mounting the LCD module make sure it is free of twisting, warping and distortion. In particular, do not forcibly pull or bend the I/O cable or the backlight cable.
7. Don't disassemble the LCM.
8. To prevent destruction of the elements by static electricity, be careful to maintain an optimum work environment.
 - Be sure to ground the body when handling the LCD modules.
 - Tools required for assembling, such as soldering irons, must be properly grounded.
 - To reduce the amount of static electricity generated, do not conduct assembling and other work under dry conditions.
 - The LCD module is coated with a film to protect the display surface. Exercise care when peeling off this protective film since static electricity may be generated.
9. Do not alter, modify or change the the shape of the tab on the metal frame.
10. Do not make extra holes on the printed circuit board, modify its shape or change the positions of components to be attached.
11. Do not damage or modify the pattern writing on the printed circuit board.
12. Absolutely do not modify the zebra rubber strip (conductive rubber) or heat seal connector
13. Except for soldering the interface, do not make any alterations or modifications with a soldering iron.
14. Do not drop, bend or twist LCM.

12.2 Storage

1. Store in an ambient temperature of 5 to 25°C , and in a relative humidity of 40% to 60%. Don't expose to sunlight or fluorescent light.
2. Storage in a clean environment, free from dust, active gas, and solvent.
3. Store in antistatic container.