深圳市勋瑞光电科技有限公司
Xunrui photoelectric technology （shenzhen） CO,.LTD.

Product Specification

Customer:	
Model Name:	H050HHD40I1K002
Date:	2024.04.19
Version:	V0

■ **Preliminary Specification**

☐ **Final Specification**

For Customer's Acceptance

Approved by	Comment

Approved by	Reviewed by	Prepared by

Contents

1. Record of Revision

Version	Revise Date	Content	Editor
V0	2024/04/19	First Release.	

2 General Specifications

Feature		Spec
Characteristics	LCD Size	5.0 inch
	Display Format	480 (RGB) ×854
	Interface	RGB
	Color Depth	16.7M
	Technology type	a-Si
	Display Spec.	-
	Display Mode	Normally BLACK
	Driver IC	ST7701S
	Surface Treatment	HC
	Viewing Direction	ALL
	Gray Viewing Direction	FREE
Mechanical	LCM (W x H x D) (mm)	66.40* 120.05* 2.10
	Active Area(mm)	61.63x 109.65
	With /Without TSP	Without TSP
	Weight (g)	TBD
	LED Numbers	14 LEDs

Note 1: Viewing direction is following the data which measured by optics equipment.

Note 2: Requirements on Environmental Protection: RoHS

Note 3: LCM weight tolerance: +/- 5%

3 Input/Output Terminals

PIN No.	SYMBOL	Function
1	LEDK	Backlight LED Cathode
2	LEDA	Backlight LED Anode.
3	GND	Ground
4	VCC(2.8V)	Power supply
5-12	R0-R7	Data bus
13-20	G0-G7	Data bus
21-28	B0-B7	Data bus
29	GND	Ground
30	PCLK	Pixel clock signal in RGB I/F
31	DISP(NC)	No connection
32	HSYNC	Horizontal sync. Signal in RGB I/F.
33	VSYNC	Vertical sync. Signal in RGB I/F.
34	DEN	Data enable signal in RGB I/F DE mode.
35	NC	No connection
36	GND	Ground
37	RESET	Reset Signal pin ("Low" is enable)
38	SDA	Serial input signal in SPI I/F
39	SCL	A synchronous clock signal in SPI I/F
40	CS	Chip Select input pin. (Active Low)

4 Absolute Maximum Ratings

Item	Symbol	MIN	MAX	Unit	Remark
Power supply voltage (VCC)	V_{cc}	-0.3	+4.6	V	
Logic Input Voltage Range	VIN	-0.3	VCC+ 0.3	V	
Logic Output Voltage Range	VO	-0.3	VCC+ 0.3	V	
Operating Temperature	T_{OPR}	-20	70	℃	
Storage Temperature	T_{STG}	-30	80	℃	

5 Electrical Characteristics

5.1 Operating conditions:

Parameter	Symbol	MIN	TYP	MAX	Unit	Remark
Power Voltage	V_{CC}	2.5	2.8	3.3	V	
Digital Operation Current	Icc	-	30	-	mA	

5.2 Driving Backlight

Item	Symbol	MIN	TYP	MAX	Unit	Remark
LED current	I_F	-	140	-	mA	
LED Voltage	V_F	11.4	12.0	13	V	Note 1
Power Consumption	P	-	1680	-	mW	Note 2,3
LED Life Time	T	20000	-	-	Hr	

Note 1：There are 2 Groups LED

Note 2：Ta = 25℃

Note 3：Brightess to be decreased to 50% of the initial value

LED CIRCUIT DIAGRAM
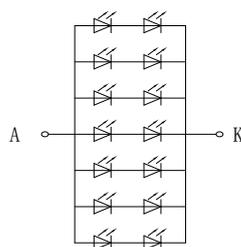
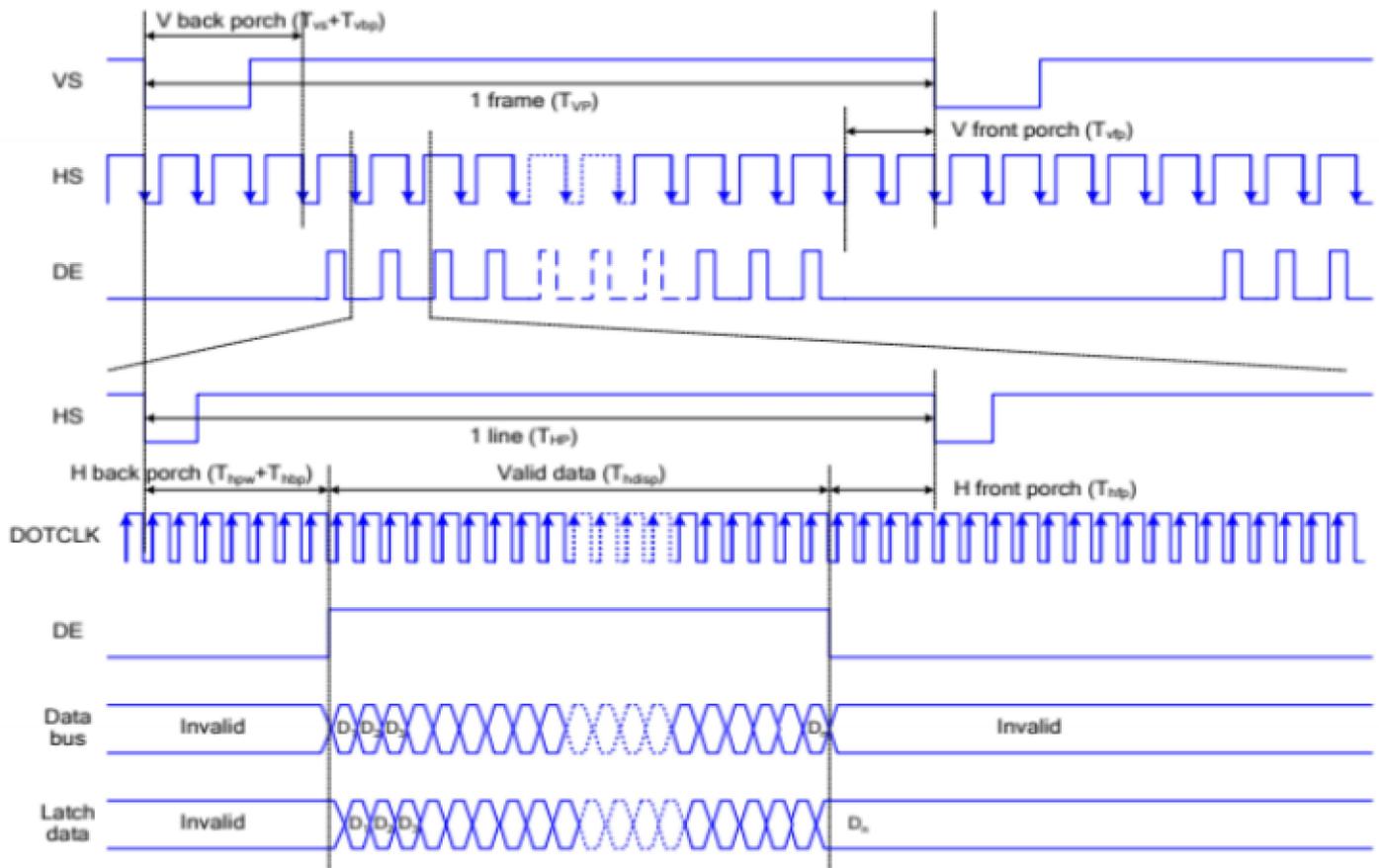IF=140MA, VF=11.4V~13V

6 Interface Timing

6.1 RGB Interface Timing

RGB Interface Mode Selection

ST7701S supports two kinds of RGB interface, DE mode and HV mode. The table shown below uses command C3h to select RGB interface mode.

DE/Sync	RGB Mode
0	DE mode
1	HV mode

The timing chart of RGB interface DE mode is shown as follows.

Note: The setting of front porch and back porch in host must match that in IC as this mode.

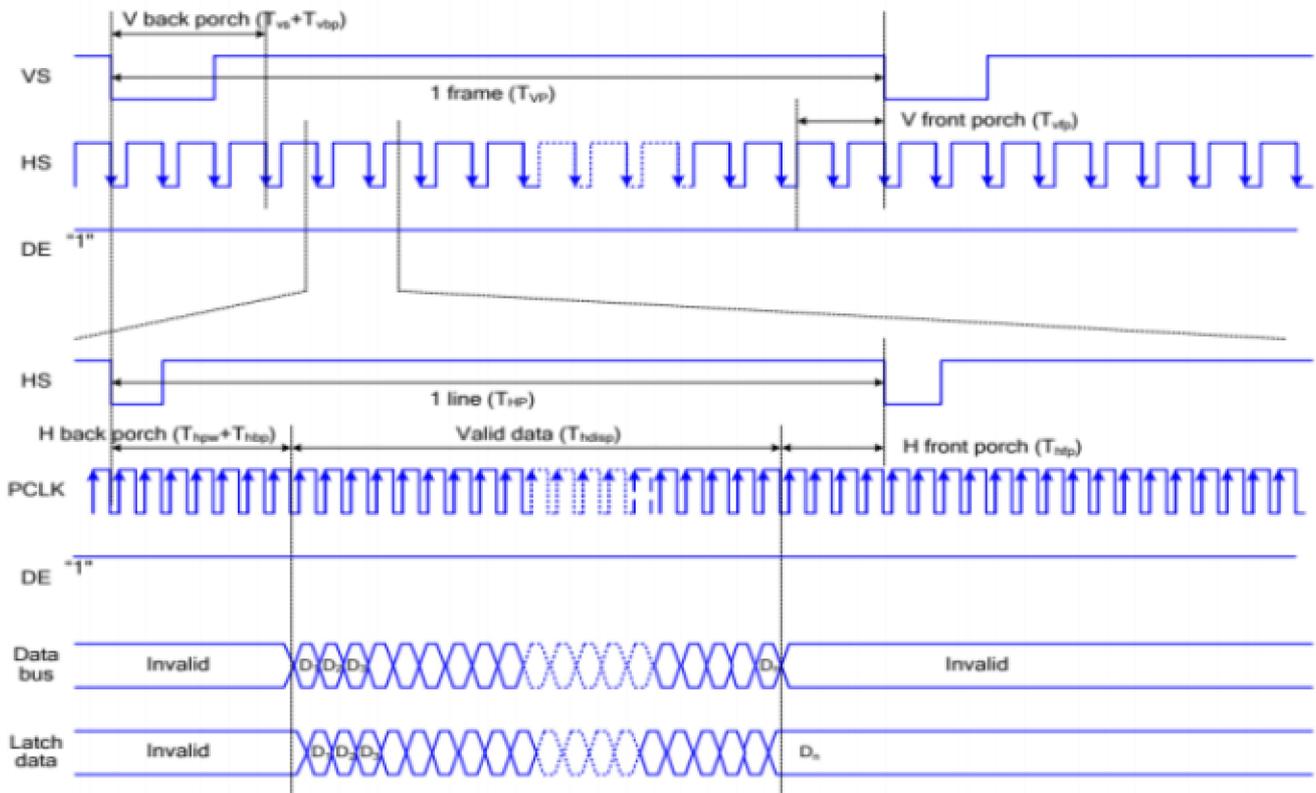The timing chart of RGB interface HV mode is shown as follows.

Figure 24 Timing chart of RGB interface HV mod
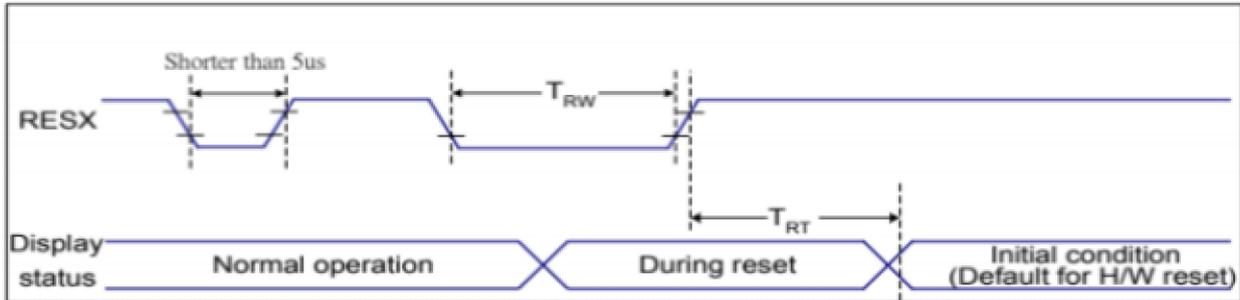
*Refer to IC materials for details

6.2 Reset Timing:

Figure 9 Reset Timing

VDDI=1.8,VDD=2.8, AGND=DGND=0V, Ta=25 ℃

| Related Pins	Symbol	Parameter	MIN	MAX	Unit
RESX	TRW	Reset pulse duration	10	-	us
	TRT	Reset cancel	-	5 (Note 1, 5)	ms
				120(Note 1, 6, 7)	ms

Table 9 Reset Timing

Notes:

1. The reset cancel includes also required time for loading ID bytes, VCOM setting and other settings from NVM (or similar device) to registers. This loading is done every time when there is HW reset cancel time (tRT) within 5 ms after a rising edge of RESX.

2. Spike due to an electrostatic discharge on RESX line does not cause irregular system reset according to the table below:

RESX Pulse	Action
Shorter than 5us	Reset Rejected
Longer than 9us	Reset
Between 5us and 9us	Reset starts

3. During the Resetting period, the display will be blanked (The display is entering blanking sequence, which maximum time is 120 ms, when Reset Starts in Sleep Out –mode. The display remains the blank state in Sleep In –mode.) and then return to Default condition for Hardware Reset.

4. Spike Rejection also applies during a valid reset pulse as shown below:
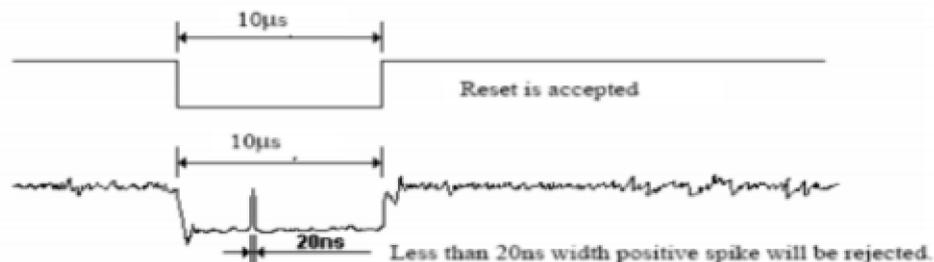
5. When Reset applied during Sleep In Mode.

6. When Reset applied during Sleep Out Mode.

7. It is necessary to wait 5msec after releasing RESX before sending commands. Also Sleep Out command cannot be sent for 120msec.
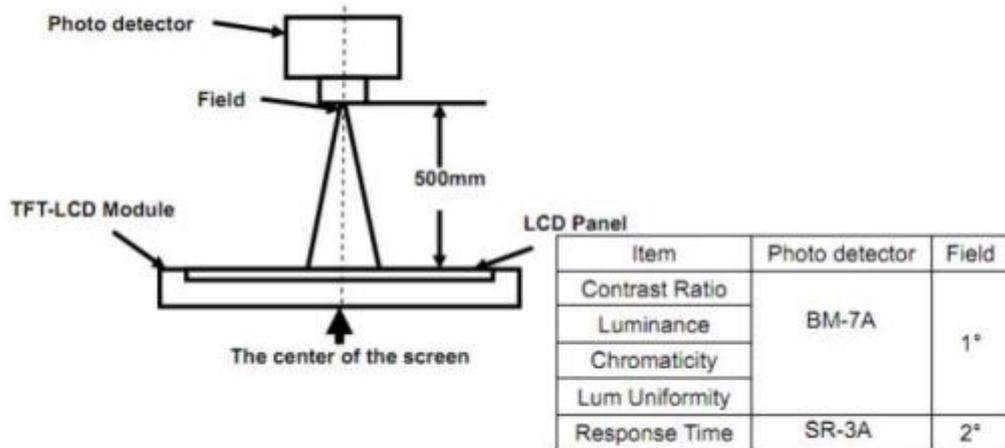
7 Optical Characteristics

Items		Symbol	Condition	Min.	Typ.	Max.	Unit	Remark
Viewing angles		θ$_T$	Center CR≥10	-	80	-	Degree.	Note2
		θ$_B$		-	80	-		
		θ$_L$		-	80	-		
		θ$_R$		-	80	-		
Contrast Ratio		CR	Θ =0	640	800		-	Note1, Note3
Response Time		T$_R$	25。C	-	16	21	ms	Note1, Note4
		T$_F$		-	19	24		
Chromaticity	White	X$_W$	Backlight is on	0.282	0.312	0.342	-	Note1, Note5
		Y$_W$		0.319	0.349	0.379	-	
	Red	X$_R$		0.609	0.639	0.669	-	
		Y$_R$		0.314	0.344	0.374	-	
	Green	X$_G$		0.264	0.294	0.324	-	
		Y$_G$		0.557	0.587	0.617	-	
	Blue	X$_B$		0.102	0.132	0.162	-	
		Y$_B$		0.106	0.136	0.166	-	
Uniformity		U		75	80	-	%	Note1, Note6
NTSC					70		%	Note5
Luminance		L		900	1000	-		Note1, Note7

Test Conditions:
1. IF= 40mA(one channel),the ambient temperature is 25°C.
2. The test systems refer to Note 1 and Note 2.

Note 1: Definition of optical measurement system.
The optical characteristics should be measured in dark room. After 5 minutes operation, the optical
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	BM-7A	1°
Luminance		
Chromaticity		
Lum Uniformity		
Response Time	SR-3A	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).
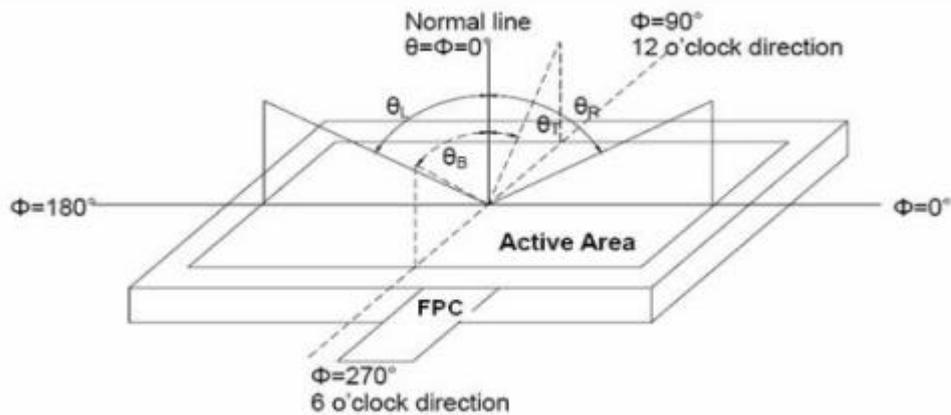

Fig. 1 Definition of viewing angle

Note 3: Definition of contrast ratio

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

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 (TON) is the time between
Photo detector output intensity changed from 10% to 90%. And fall time (TOFF) is
The time between photo detector output intensity changed from 90% to 10%
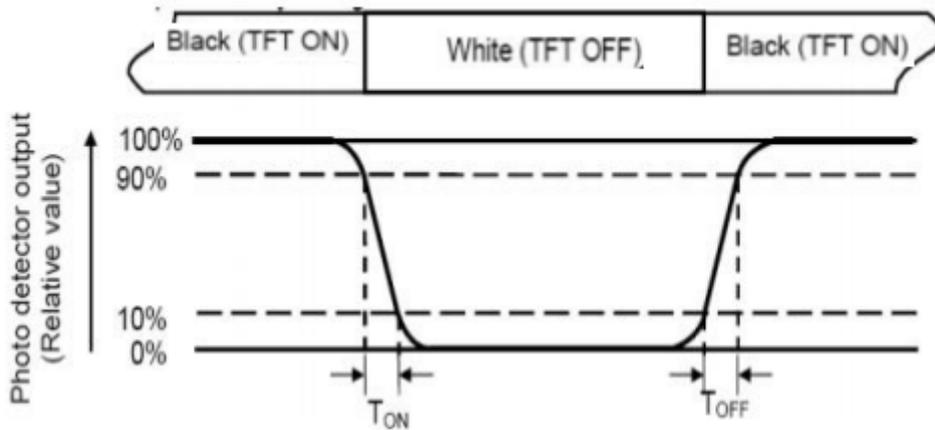
Note 5: Definition of color chromaticity (CIE1931)
      Color coordinates measured at center point of LCD.
Note 6: Definition of Luminance Uniformity
Active area is divided into 9 measuring areas (Refer Fig. 2). Every measuring point is placed at the
Center of each measuring area
Luminance Uniformity (U) = Lmin/ Lmax X100%
L-------Active area length W----- Active area width
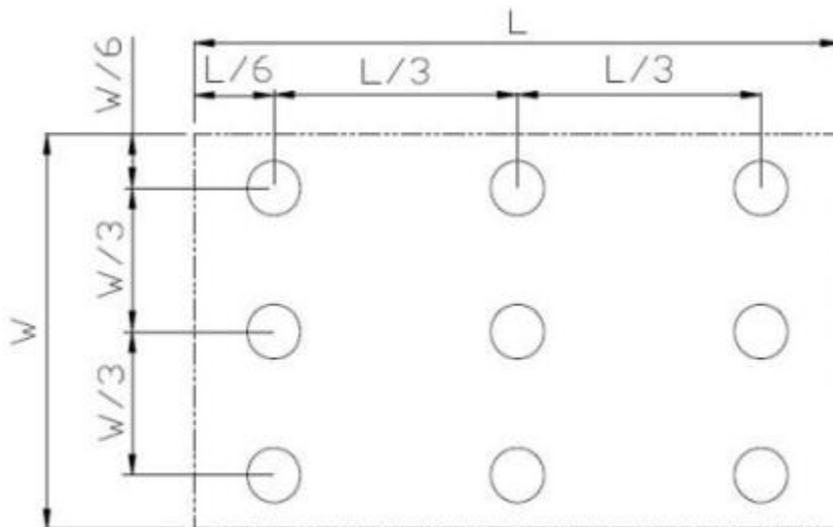

Fig. 2 Definition of uniformity

Lmax: The measured maximum luminance of all measurement position.
Lmin: The measured minimum luminance of all measurement position.
Note 7: Definition of Luminance:
Measure the luminance of white state at center point.

8 Environmental / Reliability Tests

No	Test Item	Condition	Remarks
1	High Temperature Operation	Ts= +70℃， 48hrs	Note 1 IEC60068-2-2, GB2423. 2-89
2	Low Temperature Operation	Ta= -20℃， 48hrs	Note 2 IEC60068-2-1 GB2423.1-89
3	High Temperature Storage	Ta= +80℃， 48hrs	IEC60068-2-2 GB2423. 2-89
4	Low Temperature Storage	Ta= -30℃， 48hrs	IEC60068-2-1 GB/T2423.1-89
5	High Temperature & Humidity Storage	Ta= +60℃, 90% RH max, 160 hours	IEC60068-2-3 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, 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: 60 cm, 1 corner, 3 edges, 6 surfaces	IEC60068-2-32 GB/T2423.8-1995

Note: 1. T_S is the temperature of panel's surface.
　　　2. Ta is the ambient temperature of sample.

9 Mechanical Drawing

PIN	SYMBOL
1	LEDK
2	LEDA
3	GND
4	VCC(2.8V)
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	PCLK
31	DISP(NC)
32	HS
33	VS
34	DE
35	NC
36	GND
37	RESRT
38	SDA
39	SCL
40	CS

REV.	DATE	MODIFICATION
A0	2024/03/18	First issue

MODEL NAME: TFT Display Module
PART NO. H050HHD4011K002
SHEET OF 1/1
REV. A0
TOLERANCE UNLESS SPECIFIED ±0.3
UNIT mm
SCALE 1:1
INTERFACE RGB Interface
FPC Connector
VIEWING DIRECTION ALL
Gray Scale FREE
DWN
CHKD
PROJECTION 3RD ANGLE

LED CIRCUIT DIAGRAM
IF=140MA, VF=11.4V~13V

FPC弯折示意图
FPC弯折出货
FPC展开出货
机壳请注意避空
人工石墨片

5.0" TFT
DOTS:480(RGB)*854
AA

NOTES:
1. DISPLAY TYPE: 5.0' INCH TFT
2. BACKLIGHT:14 CHIP WHITE LED, IN PARALLEL
3. OPERATING TEMP: -20°C~+70°C
4. STORAGE TEMP: -30°c~+80°c
5. RESOLUTION: 480xRGBx854
6. Luminous instensity(9 AVG):Module: 900cd/m2(MIN) 1000cd/m2(TYP.)
7. LCD IC:ST7701S
8. "( )"reference dimension. "*"critical dimension
9. RoHs Compliant

深圳市勖瑞光电科技有限公司

Xunrui photoelectric technology （shenzhen） CO,.LTD.

1 0.Packing

TBD

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.