Product Specification

Customer: _____

Model Name: _____ H050HFH40I1K003 _____

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	720 (RGB) ×1280
	Interface	4 Lane MIPI
	Color Depth	16.7M
	Technology type	a-Si
	Display Spec.	-
	Display Mode	Normally BLACK
	Driver IC	ILI9881C
	Surface Treatment	HC
	Viewing Direction	ALL
	Gray Viewing Direction	FREE
Mechanical	LCM (W x H x D) (mm)	66.40* 120.05 * 2.05
	Active Area(mm)	62.8x 111.10
	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	GND	Ground
2	D0P	DSI Data differential signal input pins. (Data lane0)
3	D0N	DSI Data differential signal input pins. (Data lane 0)
4	GND	Ground
5	D1P	DSI Data differential signal input pins. (Data lane 1)
6	D1N	DSI Data differential signal input pins. (Data lane 1)
7	GND	Ground
8	CLK P	DSI CLOCK differential signal input pins
9	CLK N	DSI CLOCK differential signal input pins
10	GND	Ground
11	D2P	DSI Data differential signal input pins. (Data lane 2)
12	D2N	DSI Data differential signal input pins. (Data lane 2)
13	GND	Ground
14	D3P	DSI Data differential signal input pins. (Data lane3)
15	D3N	DSI Data differential signal input pins. (Data lane3)
16-17	GND	Ground
18-19	IOVCC-1V8	I/O Power supply
20-23	NC	NC
24	RSTBT	Reset Signal pin ("Low" is enable)
25-26	NC	NC
27	GND	Ground
28-29	K	Backlight LED Cathode
30	GND	Ground
31	NC	NC
32-33	GND	Ground
34	NC	NC
35-36	A	Backlight LED Anode.
37	GND	Ground
38-39	VCC-3V3	Power supply
40	NC	NC

4 Absolute Maximum Ratings

Item	Symbol	Rating			Unit
		MIN.	TYP.	MAX	
Supply Voltage range	VDD	-0.3	-	VDD+0.3	V
Operating Temperature range	T_{OP}	-20	-	+70	℃
Storage Temperature range	T_{ST}	-30	-	+80	℃

5 Electrical Characteristics

5.1 DC Characteristics

Item	Symbol	Min.	Type.	Max.	Unit
Logic Supply Voltage	VCC	2.8	-	3.3	V
I/O Supply Voltage	IOVCC	1.8	-	3.3	V

注：复位电压需与 IOVCC 保持一致。

5.2 Driving Backlight

Item	Symbol	MIN	TYP	MAX	Unit	Remark
LED current	I_F	-	140	-	mA	Note 1 Note 2,3
LED Voltage	V_F	11.4	12.0	13	V	
Power Consumption	P	-	1680	-	mW	
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
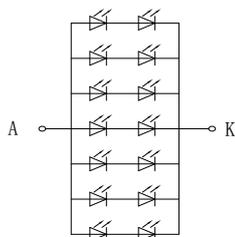
IF=140MA,VF=11.4V~13V

6 Interface Timing

6.1 MIPI Interface Timing Sequence

(a) MIPI interface DC characteristic

DC characteristics for MIPI LP mode

Parameter	Symbol	Spec.			Unit
		Min.	Typ.	Max.	
Logic 1 input voltage	V_{IH}	880	-	-	mV
Logic 0 input voltage	V_{IL}	0	-	550	mV
Logic 1 output voltage	V_{OH}	1.1	1.2	1.3	V
Logic 0 output voltage	V_{OL}	-50	-	50	mV

DC characteristics for MIPI HS mode

Parameter	Symbol	Spec.			Unit
		Min.	Typ.	Max.	
Common-mode voltage HS Receive mode	V_{CMRXDC}	70	-	330	mV
Differential input high threshold[1]	V_{IDTH}	-	-	70	mV
Differential input low threshold[1]	V_{IDTL}	-70	-	-	mV
Single-ended input high voltage	V_{IHHS}	-	-	460	mV
Single-ended input low voltage	V_{ILHS}	-40	-	-	mV
Differential input impedance	Z_{ID}	80	100	125	Ω
HS transmit differential voltage (VDP-VDN)	$|VOD|$	140	200	270	mV

Note: (1) VIDTH and VIDTL only for reference, related to power and ground noise, this spec need to check on panel performance to fine tune
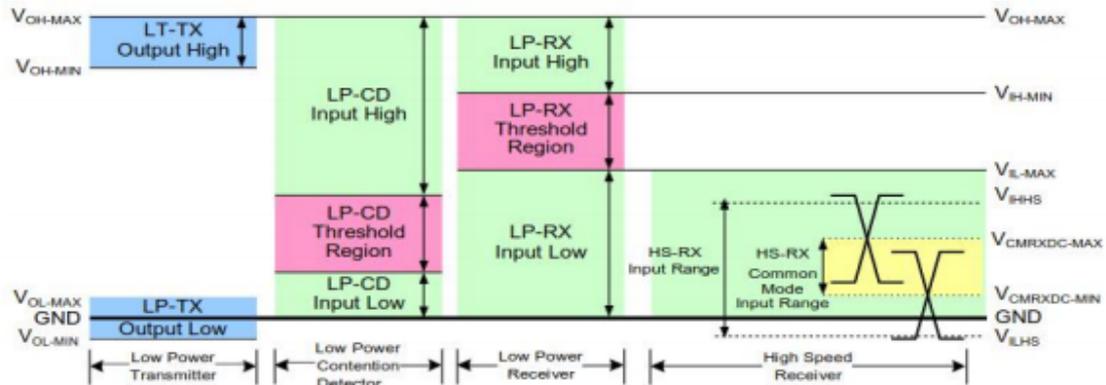

Figure. MIPI signaling and contention voltage levels

(b) MIPI interface AC characteristics

MIPI data-clock timing specification
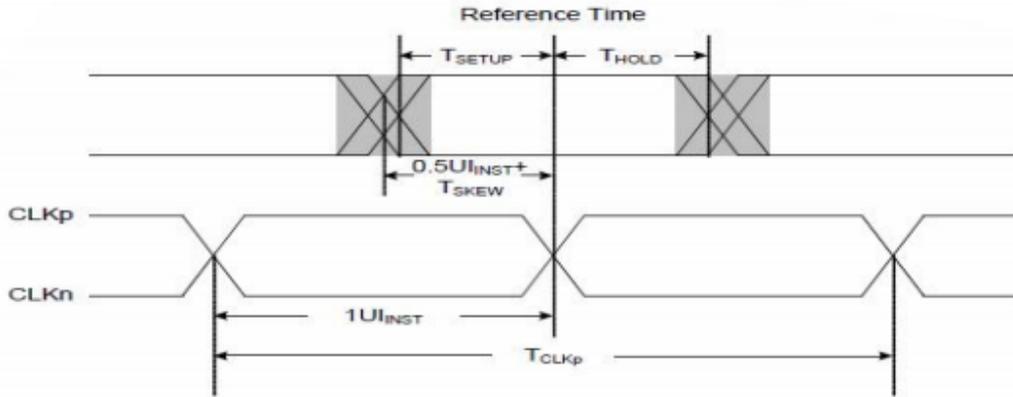
Figure 8.5 : Data to clock timing

Parameter	Symbol	Spec.			Unit
		Min.	Typ.	Max.	
UI instantaneous	UI_{INST}	1.0	-	12.5[1]	ns
Data to clock setup time	T_{SETUP}	0.15[2]	-	-	UI_{INST}
Data to clock hold time	T_{HOLD}	0.15[2]	-	-	UI_{INST}

Note: (1) This value corresponds to a minimum 80 Mbps data rate.
(2) Total SETUP and HOLD window for receiver of 0.3* UI_{INST}.

6.2 Timing Chart

Figure: MIPI video input timing

MIPI Multi-Drop type when normal or reverse scan.

Normal Scan & Reverse Scan

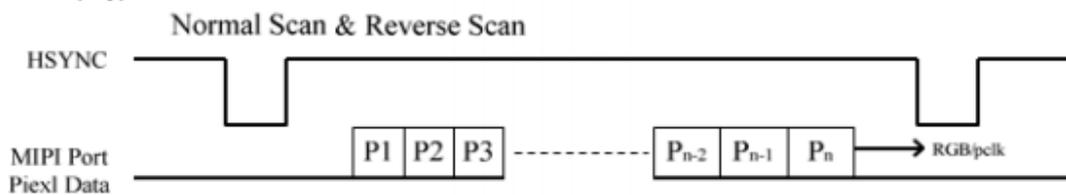| Input Timing	Symbol	800RGBx1280			Unit
		Min.	Typ.	Max.	
PCLK Frequency	-	-	67		MHz
Horizontal Total	THT		854		DCLK
Horizontal Synchronization	THS		18		DCLK
Horizontal Back Porch	THB		18		DCLK
Horizontal Address	THA		800		DCLK
Horizontal Front Porch	THF		18		DCLK
Vertical Frequency	-		60		Hz
Vertical Total(1)	TVT		1316		THT
Vertical Synchronization	TVS		4		THT
Vertical Back Porch	TVB		8		THT
Vertical Address	TVA		1280		THT
Vertical Front Porch	TVF		24		THT

6.3 Reset Input Timing
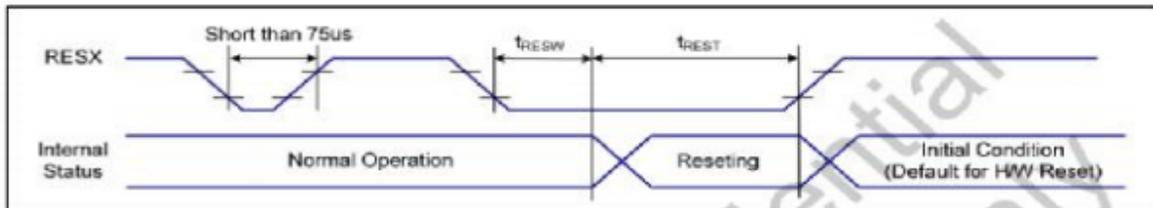
VSS=0V, VDDI=1.65V to 1.95V, Ta = -30°C to 70°C

Symbol	Parameter	MIN	TYP	MAX	Note	Unit
t_{RESW}	*1) Reset low pulse minimum width	150	-	-	Reset signal recognized	us
t_{REST}	*2) Reset complete time	5	-	120	Reset action complete	ms

6.4 DATA mapping

COLOR	INPUT DATA	R7 MSB	R6	R5	R4	R3	R2	R1	R0 LSB	G7 MSB	G6	G5	G4	G3	G2	G1	G0 LSB	B7 MSB	B6	B5	B4	B3	B2	B1	B0 LSB
					R DATA								G DATA								B DATA				
BASIC COLOR	BLACK	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	RED(255)	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	GREEN(255)	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
	BLUE(255)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
	CYAN	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	MAGENTA	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
	YELLOW	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
	WHITE	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
RED	RED(0)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	RED(1)	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	RED(2)	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	RED(254)	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	RED(255)	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GREEN	GREEN(0)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	GREEN(1)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
	GREEN(2)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
	GREEN(254)	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0
	GREEN(255)	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
BLUE	BLUE(0)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	BLUE(1)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	BLUE(2)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
	BLUE(254)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0
	BLUE(255)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1

【Note】

1) Gray level:

Color(n)：n is level order; higher n means brighter level.
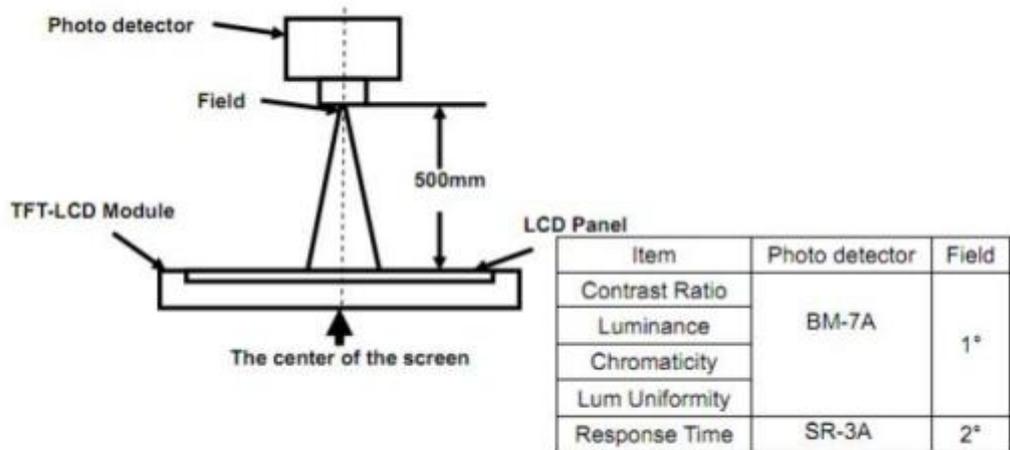
2) DATA:

1: high，0: low

7 Optical Characteristics

Items		Symbol	Condition	Min.	Typ.	Max.	Unit	Remark
Viewing angles		θT	Center CR≥10	-	80	-	Degree.	Note2
		θB		-	80	-		
		θL		-	80	-		
		θR		-	80	-		
Contrast Ratio		CR	Θ =0	640	800		-	Note1, Note3
Response Time		TR	25。C	-	10	15	ms	Note1, Note4
		TF		-	20	25		
Chromaticity	White	XW		0.283	0.303	0.323	-	Note1, Note5
		YW		0.303	0.23	0.343	-	
	Red	XR		0.634	0.654	0.674	-	
		YR		0.299	0.319	0.339	-	
	Green	XG		0.239	0.259	0.279	-	
		YG		0.554	0.574	0.594	-	
	Blue	XB		0.120	0.140	0.160	-	
		YB		0.064	0.084	0.104	-	
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.

Photo detector

Field

500mm

TFT-LCD Module

The center of the screen

LCD 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).

Normal line
$\theta=\Phi=0$

$\Phi=90°$
12 o'clock direction

θ_L θ_R

θ_T

θ_B

$\Phi=180°$

$\Phi=0°$

Active Area

FPC

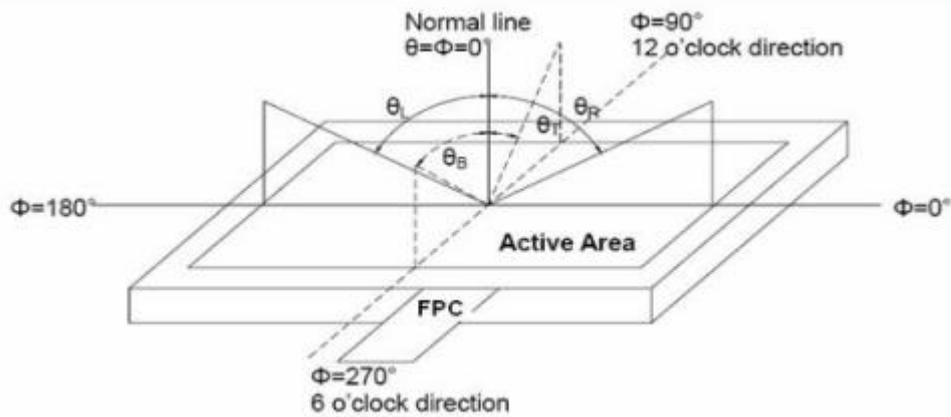$\Phi=270°$
6 o'clock direction

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%
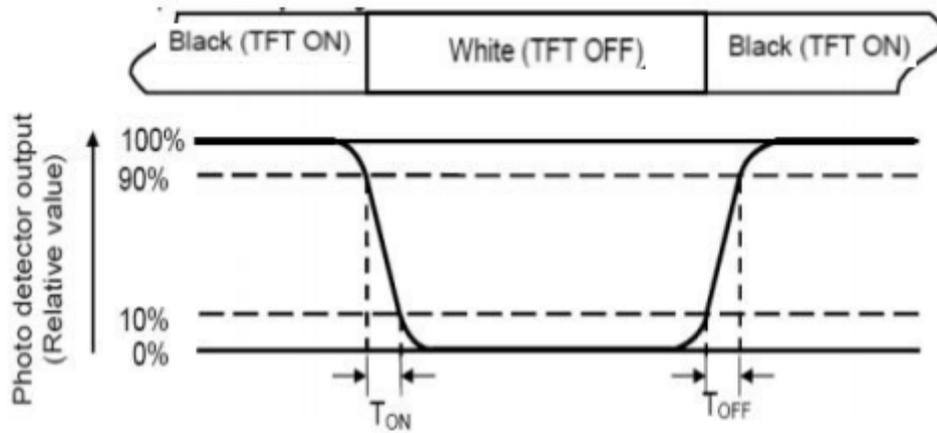
Note 5: Definition of color chromaticity (CIE1931)

      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
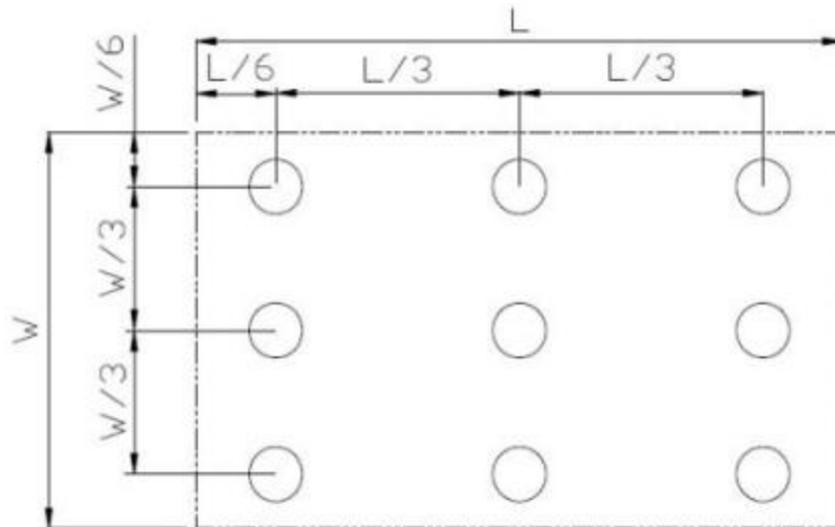

Fig. 2 Definition of uniformity

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

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

P IN	SYMBOL
1	GND
2	D0P
3	D0N
4	GND
5	D1P
6	D1N
7	GND
8	CLKP
9	CLKN
10	GND
11	D2P
12	D2N
13	GND
14	D3P
15	D3N
16	GND
17	IOVCC-1V8
18	IOVCC-1V8
19	IOVCC-1V8
20	NC
21	NC
22	NC
23	NC
24	RSTB
25	NC
26	NC
27	GND
28	GND
29	K
30	K
31	NC
32	GND
33	GND
34	NC
35	A
36	A
37	GND
38	VCC-3V3
39	VCC-3V3
40	NC

PART NO. H050HHD401K003
SHEET OF 1/1
REV. A0
TOLERANCE UNLESS SPECIFIED ±0.3
UNIT mm
SCALE 1:1

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

MODEL NAME TFT Display Module
DWN
CHKD
PROJECTION 3RD ANGLE

INTERFACE	RGB Interface
FPC Connector	ALL
VIEWING DIRECTION	
Gray Scale DIRECTION	FREE

FPC弯折示意图
FPC弯折出货

68.79±0.3 20MAX
机壳请注意避空

23.15±0.5

喷码：
H050HHD401K003
生产日期******

黄色补强胶，焊锡
高度0.4MM机壳
请注意避空

人工右墨片

H050HHD401K003
生产日期******

FPC展开出货

3.50±0.2白油对位线口=0.15

0.33±0.03

LED CIRCUIT DIAGRAM

A — K

IF=140MA, VF=11.4V~13V

-1.20
-1.80

66.40±0.15
64.06±0.2(POL)
62.80 A,A

5.0" TFT

23.15±0.5

1.63
1.05

111.10 A,A
112.82±0.2(POL)
120.05±0.15

70.69±0.5

3.50±0.3

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: 720xRGBx1280
6. Luminous instensity(9 AVG):Module: 900cd/m2(MIN) 1000cd/m2(TYP.)
7. LCD IC:ILI9881C
8. "( )"reference dimension. "*"critical dimension
9. RoHs Compliant

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.