深圳市勋瑞光电科技有限公司
Xunrui Shenzhen Optoelectronics Technology Co., Ltd.

CERT. No. QAC0946535 (ISO9001)   CERT. No. HKG002005 (ISO14001)

Product Specification

Customer: _____

Model Name: _____ **H0154PHQ24I1803** _____

Date: _____

Version: _____

■ **Preliminary Specification**

☐ **Final Specification**

For Customer's Acceptance

Approved by	Comment

Approved by	Reviewed by	Prepared by

Contents

深圳市勋瑞光电科技有限公司
Xunrui Shenzhen Optoelectronics Technology Co., Ltd.

1. Record of Revision

Version	Revise Date	Content	Editor
1.0	2016/06/12	First Release.	Rich Liang

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Xunrui Shenzhen Optoelectronics Technology Co., Ltd.

2 General Specifications

Feature		Spec
Characteristics	LCD Size	1.54 inch
	Display Format	240 (RGB) × 240
	Interface	MCU
	Color Depth	262K
	Technology type	a-Si
	Display Spec.	-
	Display Mode	Normally BACK
	Driver IC	ST7789V
	Surface Treatment	HC
	Viewing Direction	ALL
	Gray Viewing Direction	Free
Mechanical	LCM (W x H x D) (mm)	31.52*35.1*2.1
	Active Area(mm)	27.72*27.72
	With /Without TSP	Without TSP
	Weight (g)	TBD
	LED Numbers	3 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

No.	Symbol	Description
1	GND	System Ground
2	RESET	A reset pin
3	GND	System Ground
4	DB8	Data bus
5	DB7	Data bus
6	DB6	Data bus
7	DB5	Data bus
8	DB4	Data bus
9	DB3	Data bus
10	DB2	Data bus
11	DB1	Data bu
12	DB0	Data bus
13	IM1	8/9BIT system select pin
14	RD	Read data input pinl
15	WR	Write data input pin
16	RS	data or command select signal input
17	CS	chip select signal input
18	IOVCC	power supply 1.8V
19	FMARK	Tearing effect signal is used to synchronize MCU to frame memory writing
20	VCI	Power supply
21	GND	System Ground
22	LEDA	Backlight LED Anode.
23	LEDK	Backlight LED Cathode
24	GND	System Ground

4 Absolute Maximum Ratings

Item	Symbol	MIN	MAX	Unit	Remark
Supply Voltage	V_{cc}	-0.3	4.6	V	
Input Signal Voltage	V_{in}	-0.3	Vcc+0.3	V	
Logic Output Voltage	V_{OUT}	-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
Supply voltage for logic	Vcc -Vss	2.4	2.8	3.2	V
I/O power supply	IOVCC	1.65	1.8	3.2	V
Input Current	Idd	-	TBD	TBD	mA
Input voltage ' H ' level	Vih	0.7IOVCC	--	IOVCC	V
Input voltage ' L ' level	Vil	GND	0	0.3IOVCC	V
Output voltage ' H ' level	Voh	0.8IOVCC	--	IOVCC	V
Output voltage ' L ' level	Vol	GND	0	0.2IOVCC	V

5.2 Driving Backlight

Item	Symbol	MIN	TYP	MAX	Unit	Remark
LED current	I_F	-	20	25	mA	
Power Consumption					mW	
LED Voltage	V_F	7.8	9	10	V	Note 1
LED Life Time	W_{BL}	-	TBD	-	Hr	Note 2,3

Note 1 : There are 1 Groups LED

$$A \quad \text{———} \quad K$$

(CIRCUIT DIAGRAM)
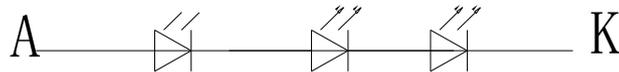
Note 2 : Ta = 25℃

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

6 Interface Timing

6.1 8080 Series MCU Parallel Interface Characteristics: 18/16/9/8-bit Bus
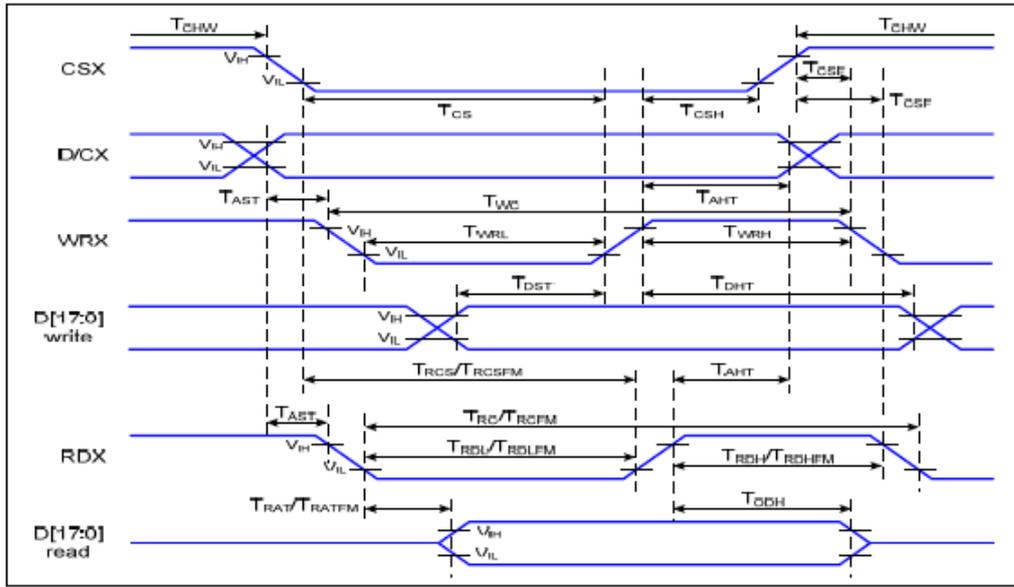

Figure 1 Parallel Interface Timing Characteristics (8080-Series MCU Interface)

VDDI=1.65 to 3.3V, VDD=2.4 to 3.3V, AGND=DGND=0V, Ta= -30 to 70 ℃

Signal	Symbol	Parameter	Min	Max	Unit	Description
D/CX	T_{AST}	Address setup time	0		ns	-
	T_{AHT}	Address hold time (Write/Read)	10		ns	
CSX	T_{CHW}	Chip select "H" pulse width	0		ns	-
	T_{CS}	Chip select setup time (Write)	15		ns	
	T_{RCS}	Chip select setup time (Read ID)	45		ns	
	T_{RCSFM}	Chip select setup time (Read FM)	355		ns	
	T_{CSF}	Chip select wait time (Write/Read)	10		ns	
	T_{CSH}	Chip select hold time	10		ns	
WRX	T_{WC}	Write cycle	66		ns	
	T_{WRH}	Control pulse "H" duration	15		ns	
	T_{WRL}	Control pulse "L" duration	15		ns	
RDX (ID)	T_{RC}	Read cycle (ID)	160		ns	When read ID data
	T_{RDH}	Control pulse "H" duration (ID)	90		ns	
	T_{RDL}	Control pulse "L" duration (ID)	45		ns	
RDX (FM)	T_{RCFM}	Read cycle (FM)	450		ns	When read from frame memory
	T_{RDHFM}	Control pulse "H" duration (FM)	90		ns	
	T_{RDLFM}	Control pulse "L" duration (FM)	355		ns	
D[17:0]	T_{DST}	Data setup time	10		ns	For CL=30pF

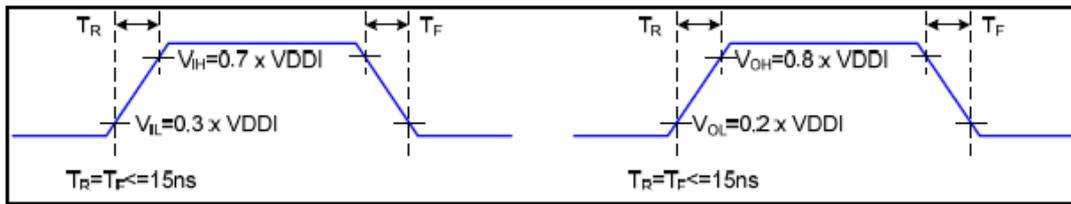|					
T_DHT	Data hold time	10		ns	
T_RAT	Read access time (ID)		40	ns	
T_RATFM	Read access time (FM)		340	ns	
T_ODH	Output disable time	20	80	ns	

Table 4 8080 Parallel Interface Characteristics
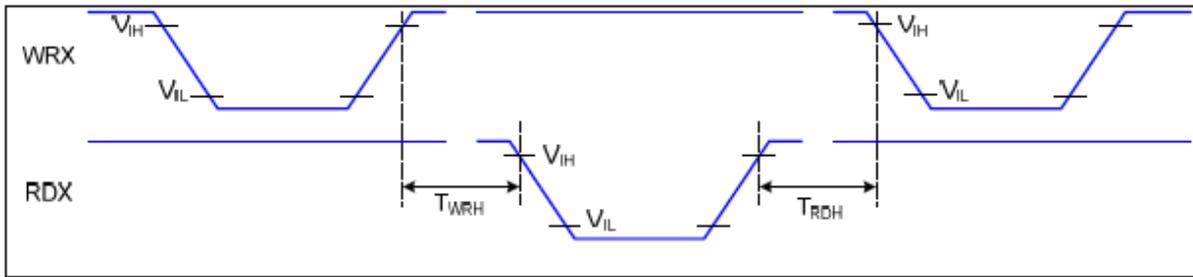

Figure 2 Rising and Falling Timing for I/O Signal

Figure 3 Write-to-Read and Read-to-Write Timing

Note: The rising time and falling time (Tr, Tf) of input signal and fall time are specified at 15 ns or less. Logic high and low levels are specified as 30% and 70% of VDDI for Input signals.
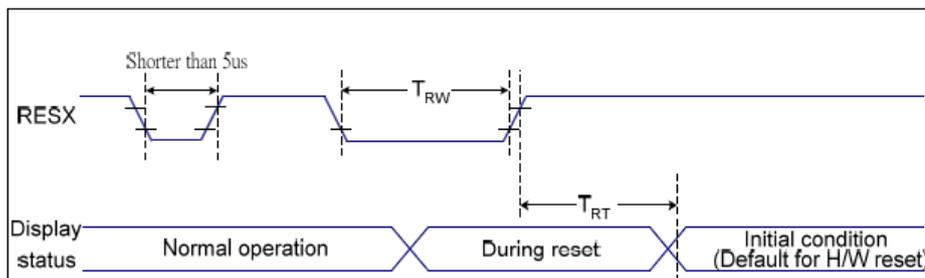
6.2 **Reset Timing:**

Figure 7 Reset Timing

VDDI=1.65 to 3.3V, VDD=2.4 to 3.3V, AGND=DGND=0V, Ta=-30 ~ 70 ℃

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 8 Reset Timing

7 Optical Characteristics

Items		Symbol	Condition	Min.	Typ.	Max.	Unit	Remark
Viewing angles		θ_T	Center CR≥10		85	-	Degree.	Note2
		θ_B			85	-		
		θ_L			85	-		
		θ_R			85	-		
Contrast Ratio		CR	Θ =0	-	900	-	-	Note1, Note3
Response Time		T_{ON}	25°C	-	30	40	ms	Note1, Note4
		T_{OFF}		-	35	45		
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		80	-	-	%	Note1, Note6
NTSC					50		%	Note5
Luminance		L		150	180			Note1, Note7

Test Conditions:

1. IF= 20mA(one channel),the ambient temperature is 25°C.

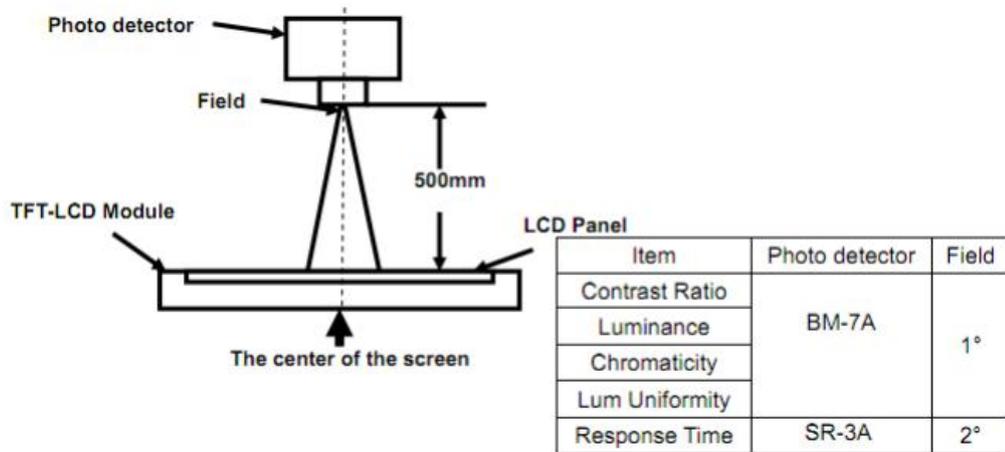2. The test systems refer to Note 1 and Note 2.

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).
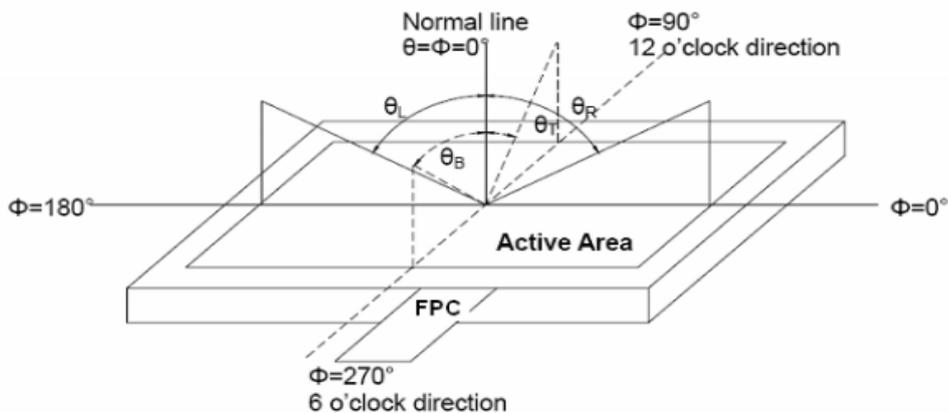

Fig. 1 Definition of viewing angle

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 90% to 10%. And fall time (TOFF) is

The time between photo detector output intensity changed from 10% to 90%
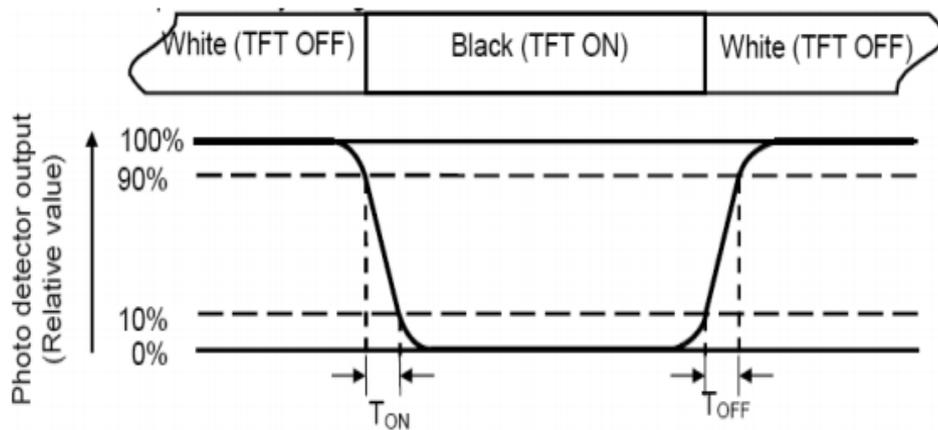
Note 5: Definition of color chromaticity (CIE1931)

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
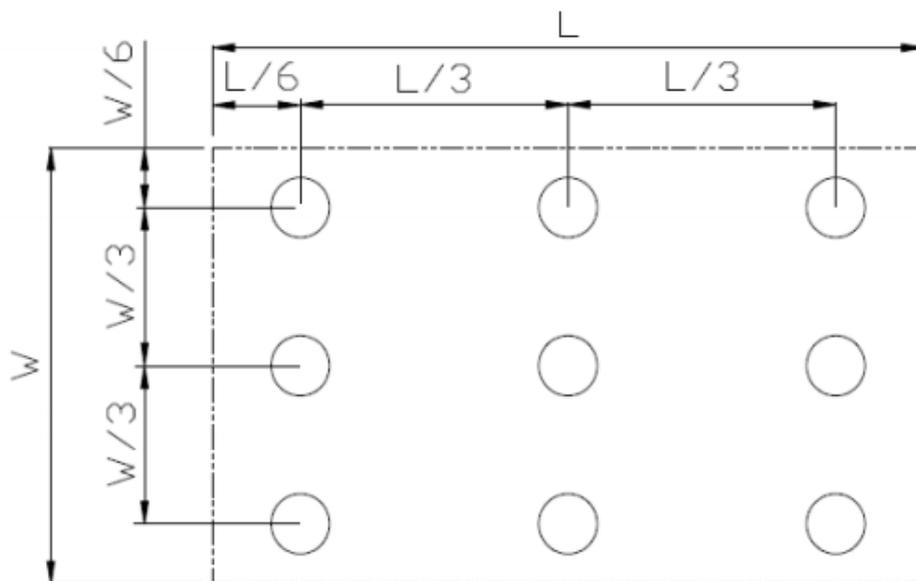

Fig. 2 Definition of uniformity

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.
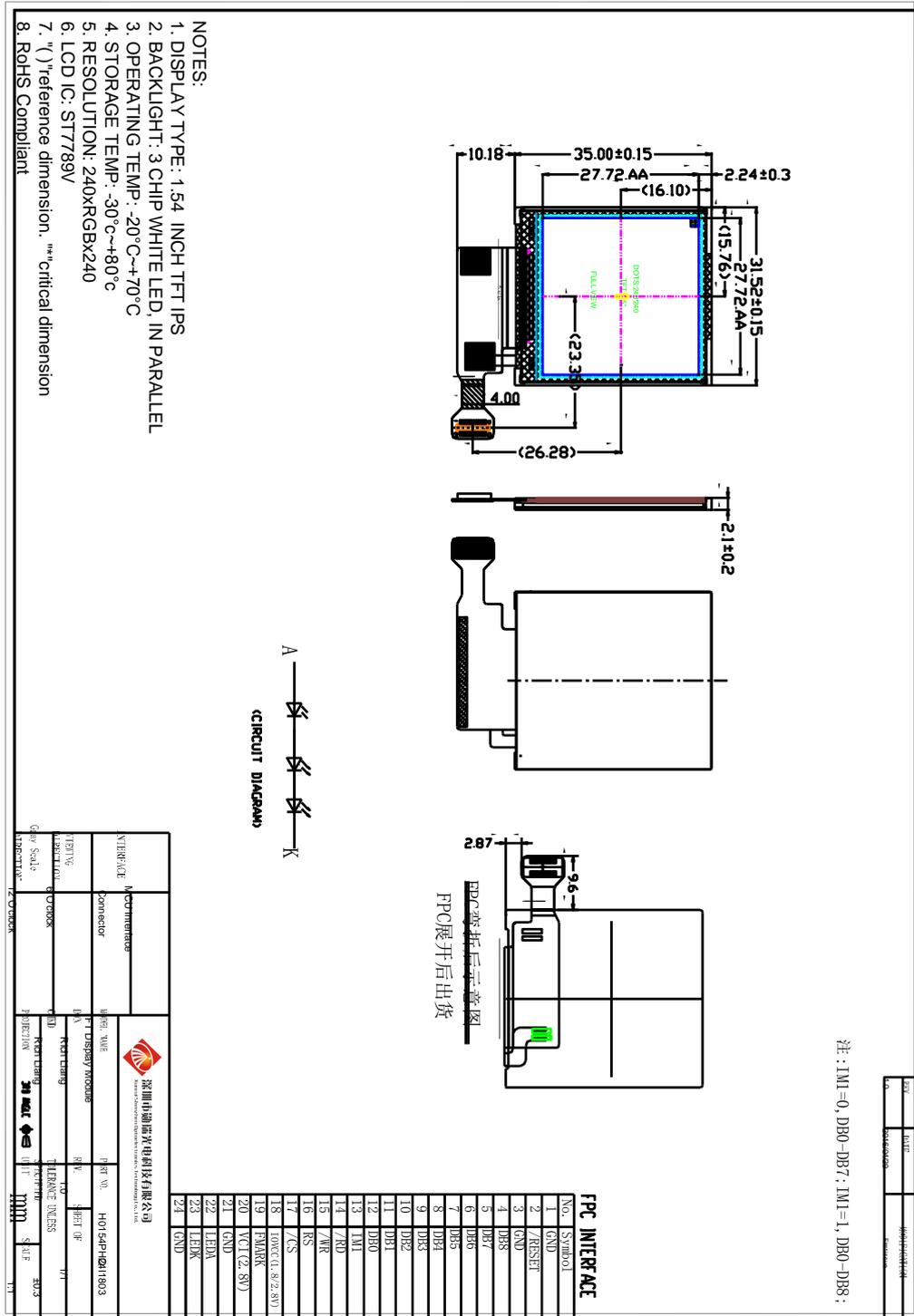
8 Environmental / Reliability Tests

No	Test Item	Condition	Remarks
1	High Temperature Operation	Ts= +70℃, 240hrs	Note 1 IEC60068-2-2, GB2423. 2-89
2	Low Temperature Operation	Ta= -20℃, 240hrs	Note 2 IEC60068-2-1 GB2423.1-89
3	High Temperature Storage	Ta= +80℃, 240hrs	IEC60068-2-2 GB2423. 2-89
4	Low Temperature Storage	Ta= -30℃, 240hrs	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, 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: 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.

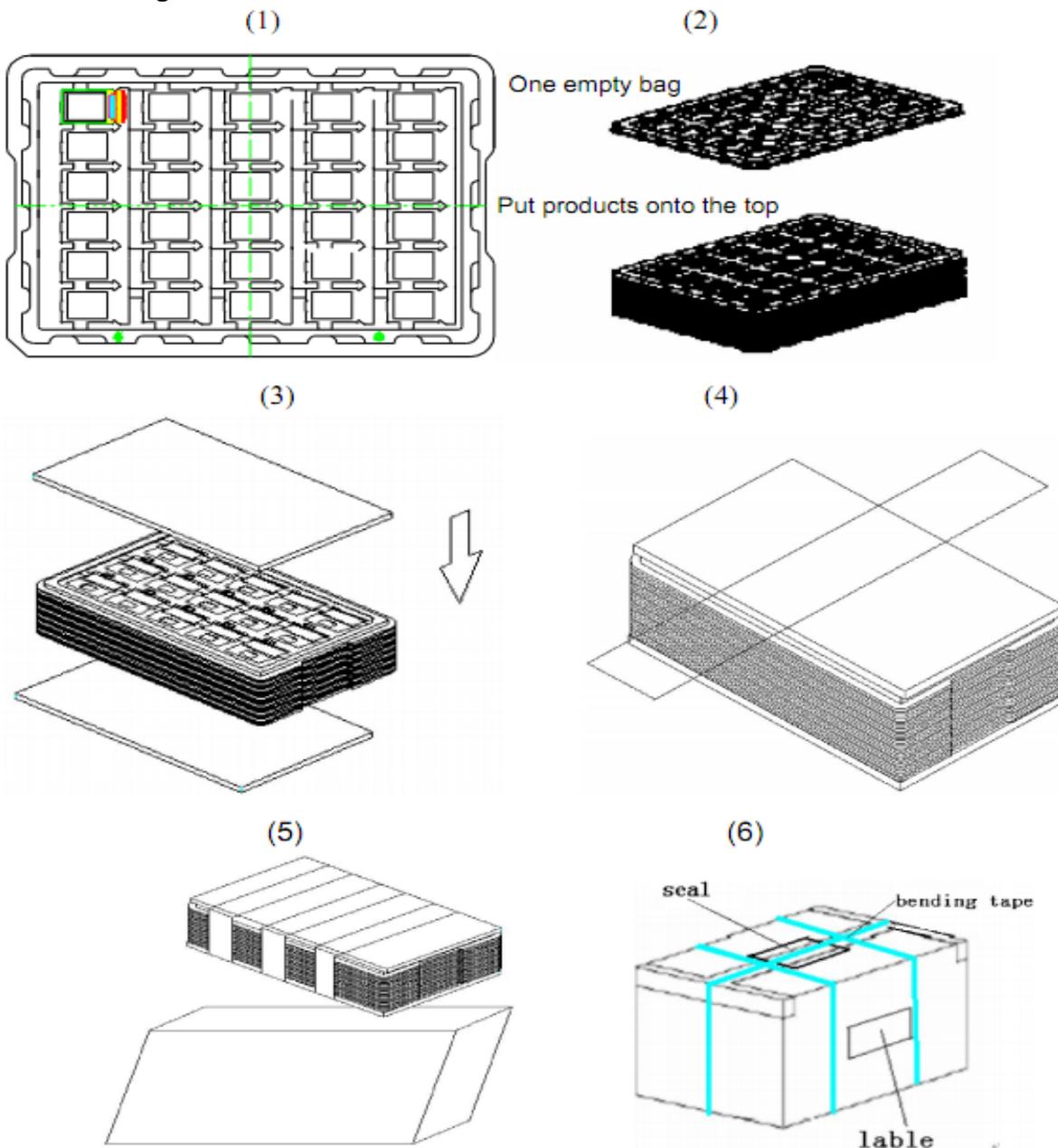　　　2. Ta is the ambient temperature of sample.

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9 Mechanical Drawing

NOTES:
1. DISPLAY TYPE: 1.54 INCH TFT IPS
2. BACKLIGHT: 3 CHIP WHITE LED, IN PARALLEL
3. OPERATING TEMP: -20°C~+70°C
4. STORAGE TEMP: -30°C~+80°C
5. RESOLUTION: 240xRGBx240
6. LCD IC: ST7789V
7. "( )"reference dimension. "*"critical dimension
8. RoHS Compliant

〈CIRCUIT DIAGRAM〉

注：IM1=0，DB0~DB7；IM1=1，DB0~DB8；

FPC弯折后示意图
FPC展开后出货

FPC INTERFACE	
No.	Symbol
1	GND
2	/RESET
3	GND
4	DB8
5	DB7
6	DB6
7	DB5
8	DB4
9	DB3
10	DB2
11	DB1
12	DB0
13	IM1
14	/RD
15	/WR
16	RS
17	/CS
18	IOVCC(1.8/2.8V)
19	FMARK
20	VCI(2.8V)
21	LEDA
22	LEDA
23	LEDK
24	GND

INTERFACE: MCU Interface
Connector

MODEL NAME: TFT Display Module
PART NO.: H0154PH028H1803

35.00±0.15
27.72.AA
(16.10)
2.24±0.3
10.18
31.52±0.15
27.72.AA
(15.76)
(23.35)
4.00
(26.28)
2.1±0.2
2.87
9.6

TOLERANCE UNLESS
UNIT mm

1 0.Packing

Packing Method

(1)

(2)

One empty bag

Put products onto the top

(3)

(4)

(5)

(6)

seal   bending tape

lable

1. Put module into tray cavity:
2. Tray stacking
3. Put 1 cardboard under the tray stack and 1 cardboard above:
4. Fix the cardboard to the tray stack with adhesive tape:
5. Put the tray stack into carton.

6. Carton sealing with adhesive tape.

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.