

MAXEN ELECTRONICS LIMITED

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SPECIFICATION

MX-070HR50HFH-N73

For Customer's Acceptance:

Approved By	Comment		
PREPARED	CHECKED	VERIFIED BY QA DEPT	VERIFIED BY R&D DEPT

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Record of Revisions

Rev.	Date	Sub-Model	Description of change
1.0	Mar.,21, 2024	C10-P	Preliminary Product Specification was first released

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1.0 GENERAL DESCRIPTION

1.1 Introduction

MAXEN Display model MX-070HR50HFH-N73 is a color active matrix thin film transistor (TFT) liquid crystal display (LCD) that uses amorphous silicon TFT as a switching device. This model is composed of a TFT LCD panel, driving IC and a back light system. This TFT LCD has a 7.0 (16:9) inch diagonally measured active display area with 1024x600 (1024 horizontal by 600 vertical pixel) resolution.

1.2 Features

- 7 inch configuration
- 16.7M color by 8 bit R.G.B. signal input
- ROHS / Halogen Free Compliance

1.3 Applications

- TFT LCD Monitor
- Industrial Application
- Amusement
- Vehicle

1.4 General information

Item		Specification	Unit
Outline Dimension		164.9(H) x 100(V) x 5.3(D)	mm
Display area		154.21 (H) x 85.92 (V)	mm
Number of Pixel		1024 RGB (H) x 600 (V)	pixels
Pixel pitch		0.1506 (H) x 0.1432(V)	mm
Pixel arrangement		RGB Vertical Stripe	
Display mode		Normally Black	
Interface		TTL	
NTSC		50 (Typ.)	%
Surface treatment		Anti-Glare	
Weight		TBD	g
Power Consumption	Logic System	TBD(Max.)	W
	B/L System	3.57(Max.)	W

1.5 Mechanical Information

Item		Min.	Typ.	Max.	Unit
Module Size	Horizontal (H)	164.7	164.9	165.1	mm
	Vertical (V)	99.8	100	100.2	mm
	Depth (D)	5.0	5.3	5.6	mm
Weight			TBD		g

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2.0 ABSOLUTE MAXIMUM RATINGS

2.1 Electrical Absolute Rating

Item	Symbol	Min.	Max.	Unit	Note
Power Supply Voltage	V _{cc}	-0.3	4	V	
Logic Signal Input Level	V _I	-0.3	V _{CC} +0.3	V	

Note

- (1) Permanent damage may occur to the LCD module if beyond this specification.
Functional operation should be restricted to the conditions described under normal operating conditions.
- (2) T_a = 25±2℃

2.2 Environment Absolute Rating

Item	Symbol	Min.	Max.	Unit	Note
Operating Temperature	T _{opa}	-30	85	℃	
Storage Temperature	T _{stg}	-30	85	℃	

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3.0 OPTICAL CHARACTERISTICS

3.1 Optical specification

Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Contrast		CR	$\Theta=0$ Normal viewing angle	600	800	—		(1)(2)
Response time	Rising	Tr+Tf		—	30	45	msec	(1)(3)
White luminance (Center)		Y _L		800	1000	—	cd/m ²	(1)(4)
Color chromaticity (CIE1931)	White	W _x		-0.03	0.300	+0.03		(1)(4)
		W _y			0.330			
	Red	R _x			TBD			
		R _y			TBD			
	Green	G _x			TBD			
		G _y			TBD			
	Blue	B _x			TBD			
		B _y			TBD			
Viewing angle	Hor.	Θ_L	CR>10	—	80	—		
		Θ_R		—	80	—		
	Ver.	Θ_U		—	80	—		
		Θ_D		—	80	—		
Brightness uniformity		B _{UNI}	$\Theta=0$	80	—	—	%	(5)
Optima View Direction		Free						(6)

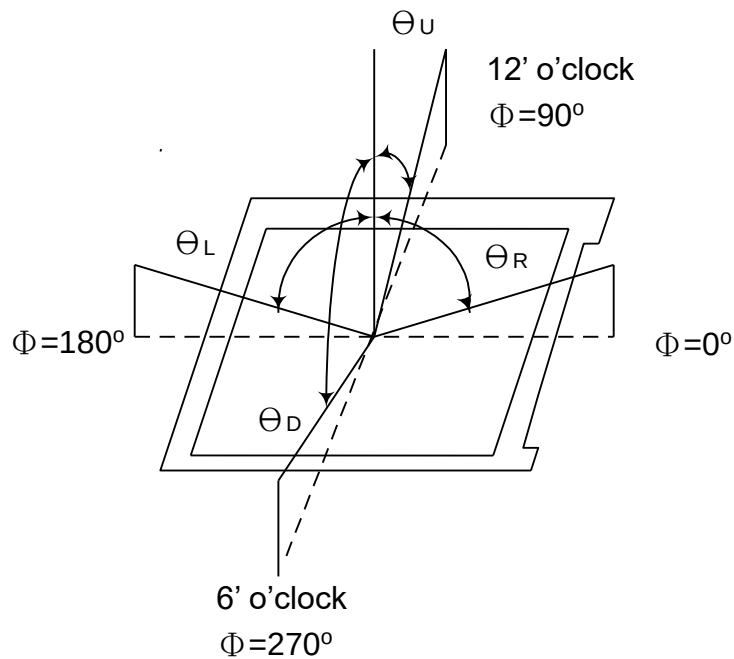
3.2 Measuring Condition

- Measuring surrounding : dark room
- LED current I_L : 20mA
- Ambient temperature : 25±2°C
- 15min. warm-up time.

3.3 Measuring Equipment

- FPM520 of Westar Display technologies, INC., which utilized SR-3 for Chromaticity and BM-5A for other optical characteristics.
- Measuring spot size : 20 ~ 21 mm

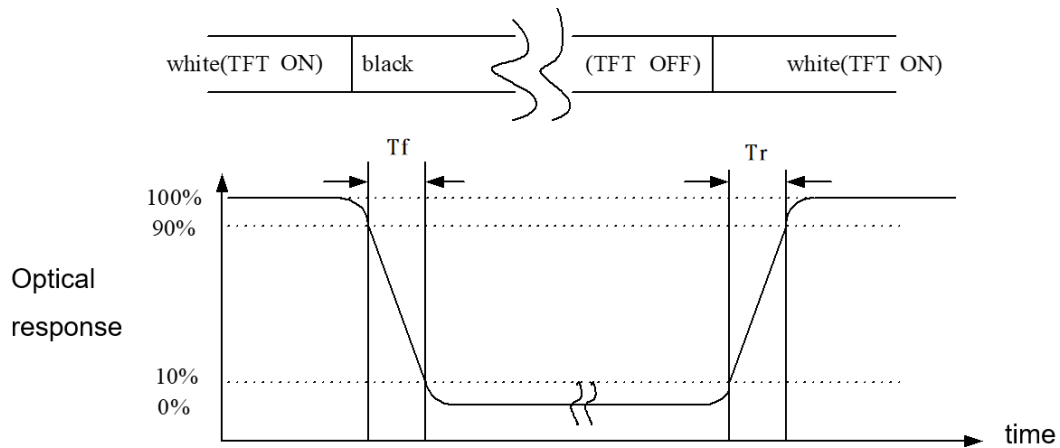
Note (1) Definition of Viewing Angle:



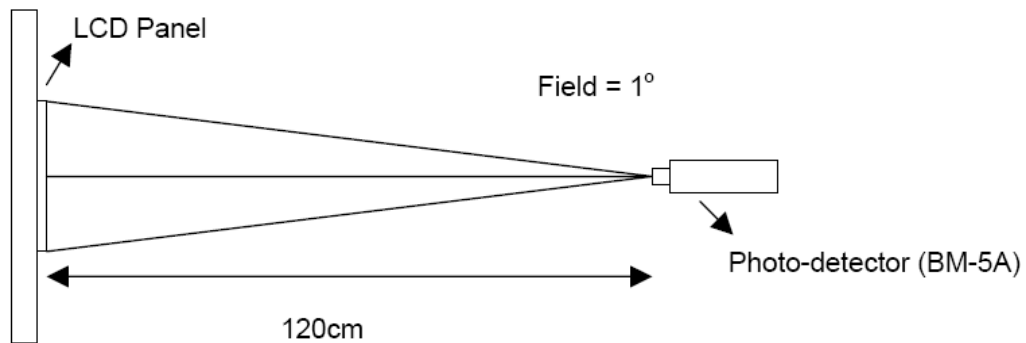
Note (2) Definition of Contrast Ratio (CR) :
measured at the center point of panel

$$CR = \frac{\text{Luminance with all pixels white}}{\text{Luminance with all pixels black}}$$

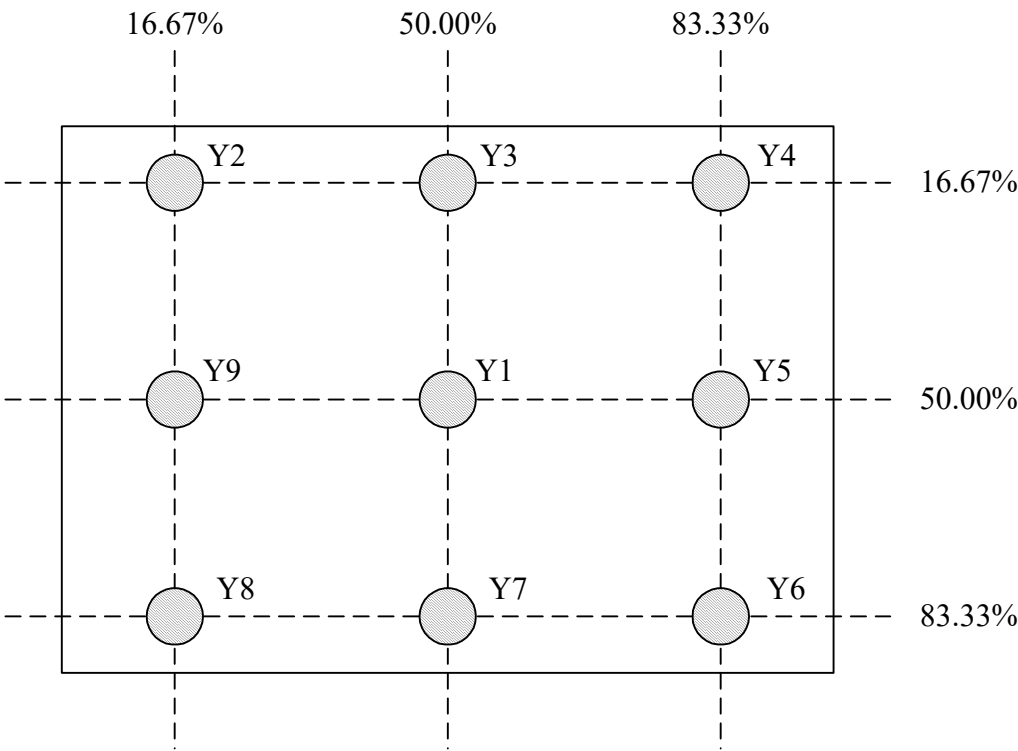
Note (3) Definition of Response Time: Sum of T_r and T_f



Note (4) Definition of optical measurement setup



Note (5) Definition of brightness uniformity



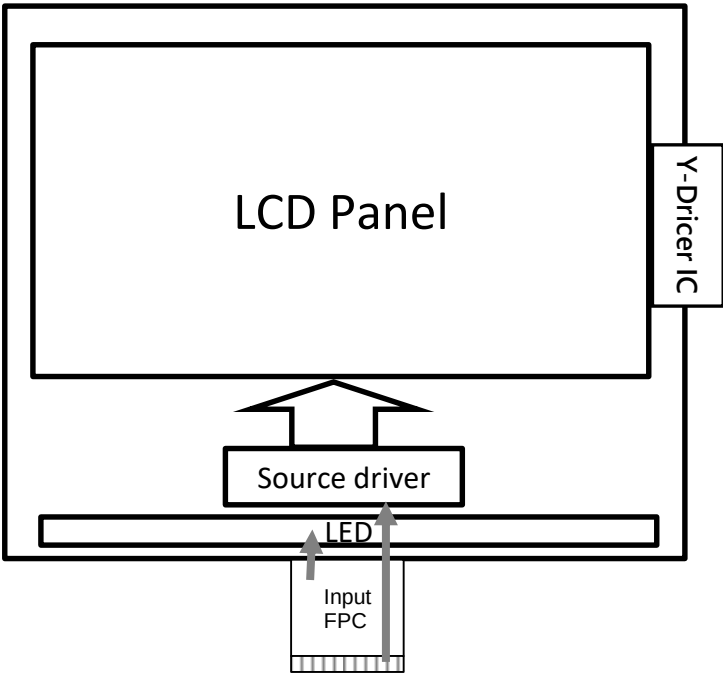
$$\text{Luminance uniformity} = \frac{(\text{Min Luminance of 9 points})}{(\text{Max Luminance of 9 points})} \times 100\%$$

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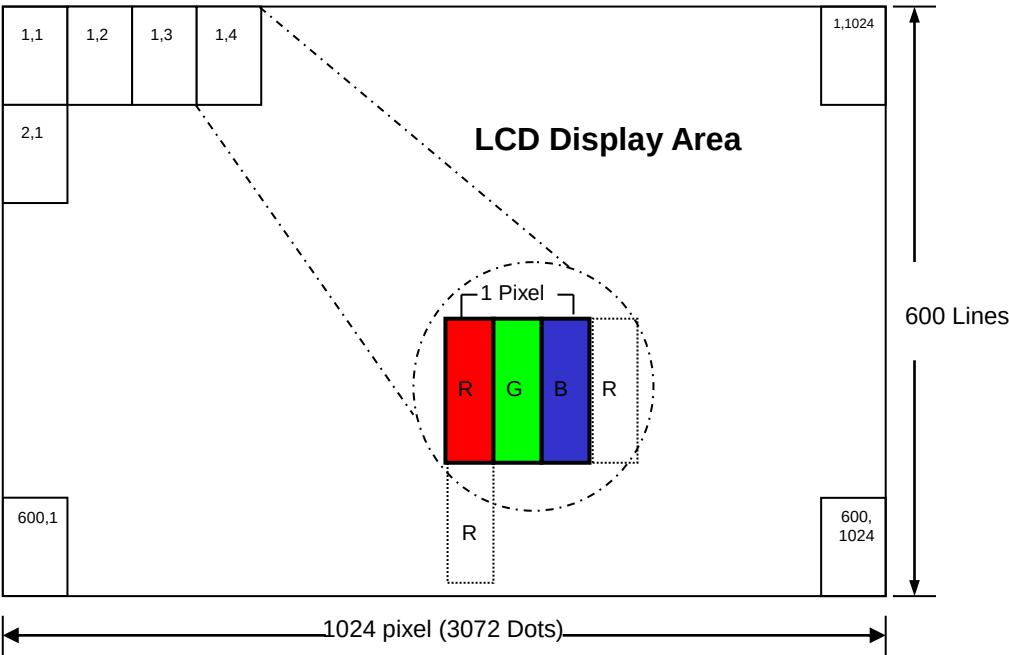
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4.0 BLOCK DIAGRAM

4.1 TFT LCD module



4.2 Pixel Format



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5.0 INTERFACE PIN CONNECTION

5.1 FPC Pin Assignment:

FPC connector is used for electronics interface. The recommended model is CN1 (Input signal): FH52K-50S-0.5SH (HRS) all compatible

Terminal no.	Symbol	I/O	Function
1-2	VLED	P	Power for LED backlight (Anode)
3-4	VLED	P	Power for LED backlight (Cathode)
5	GND	P	Ground
6	VOM	I	Common voltage
7	DVDD	P	Power for Digital Circuit
8	MODE	I	DE/SYNC mode select
9	DE	I	Data Input Enable
10	VS	I	Vertical Sync Input
11	HS	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
19	B0	I	Blue Data (LSB)
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
27	G0	I	Green Data (LSB)
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
35	R0	I	Red Data(LSB)
36	GND	P	Power Ground
37	DCLK	I	Sample clock
38	GND	P	Power Ground
39	L/R	I	Left / right selection
40	U/D	I	Up/down selection
41	VGH	P	Gate ON Voltage
42	VGL	P	Gate OFF Voltage
43	AVDD	P	Power for Analog Circuit

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44	RESET	I	Global reset pin.
45	NC	I	No connection
46	VCOM		Common Voltage
47	DITHB		Dithering function
48	GND		Power Ground
49	NC		No connection
50	NC		No connection

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5.2 Relationship Between Displayed Color and Input

	Display	MSB LSB								MSB LSB								MSB LSB								Gray scale Level
		R7	R6	R5	R4	R3	R2	R1	R0	G7	G6	G5	G4	G3	G2	G1	G0	B7	B6	B5	B4	B3	B2	B1	B0	
Basic color	Black	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	-
	Blue	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	H	H	H	H	H	H	H	H	-
	Green	L	L	L	L	L	L	L	L	H	H	H	H	H	H	H	H	L	L	L	L	L	L	L	L	-
	Light Blue	L	L	L	L	L	L	L	L	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	-
	Red	H	H	H	H	H	H	H	H	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	-
	Purple	H	H	H	H	H	H	H	H	L	L	L	L	L	L	L	L	H	H	H	H	H	H	H	H	-
	Yellow	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	L	L	L	L	L	L	L	L	-
	White	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	-
Gray scale of Red	Black	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L0
	Dark ↑ ↓ Light	L	L	L	L	L	L	L	L	H	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L1
		L	L	L	L	L	L	H	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L2
		:								:								:								L3...L251
		H	H	H	H	H	H	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L252
		H	H	H	H	H	H	L	H	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L253
		H	H	H	H	H	H	H	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L254
	Red	H	H	H	H	H	H	H	H	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	Red L255
Gray scale of Green	Black	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L0
	Dark ↑ ↓ Light	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	H	L	L	L	L	L	L	L	L	L1
		L	L	L	L	L	L	L	L	L	L	L	L	L	H	L	L	L	L	L	L	L	L	L	L	L2
		:								:								:								L3...L251
		L	L	L	L	L	L	L	L	H	H	H	H	H	H	L	L	L	L	L	L	L	L	L	L	L252
		L	L	L	L	L	L	L	L	H	H	H	H	H	H	L	H	L	L	L	L	L	L	L	L	L253
		L	L	L	L	L	L	L	L	H	H	H	H	H	H	H	L	L	L	L	L	L	L	L	L	L254
	Green	L	L	L	L	L	L	L	L	H	H	H	H	H	H	H	H	L	L	L	L	L	L	L	L	Green L255
Gray scale of Blue	Black	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L0
	Dark ↑ ↓ Light	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	H	L	L1
		L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	H	L	L	L	L2
		:								:								:								L3...L251
		L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	H	H	H	H	H	H	L	L	L252
		L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	H	H	H	H	H	H	L	H	L253
		L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	H	H	H	H	H	H	H	L	L254
	Blue	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	H	H	H	H	H	H	H	H	Blue L255
Gray scale of White & Black	Black	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L0
	Dark ↑ ↓ Light	L	L	L	L	L	L	L	H	L	L	L	L	L	L	L	H	L	L	L	L	L	L	H	L	L1
		L	L	L	L	L	L	H	L	L	L	L	L	L	H	L	L	L	L	L	L	H	L	L	L	L2
		:								:								:								L3...L251
		H	H	H	H	H	H	L	L	H	H	H	H	H	H	L	L	H	H	H	H	H	H	L	L	L252
		H	H	H	H	H	H	L	H	H	H	H	H	H	L	H	H	H	H	H	H	H	L	H	H	L253
		H	H	H	H	H	H	H	L	H	H	H	H	H	H	L	H	H	H	H	H	H	H	L	H	L254
	White	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	White L255

6.0 ELECTRICAL CHARACTERISTICS

6.1 TFT LCD Module

Item	Symbol	Min.	Typ.	Max.	Unit	Note
Supply Voltage	Vcc	3.1	3.3	3.6	V	
Supply current	Ivcc	-	-	TBD	mA	
Input signal voltage	ViH	0.7*Vcc	-	Vcc	V	
	ViL	0	-	0.3*Vcc	V	

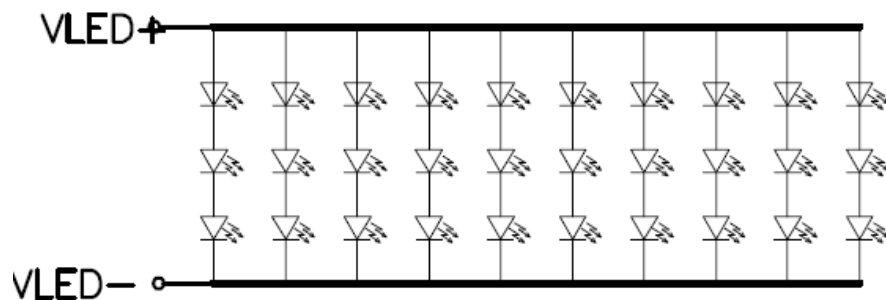
6.2 Backlight Unit

Parameter	Symbol	Min	Typ	Max	Units	Condition
LED Current	I _F	--	300	350	mA	Ta=25°C
LED Voltage	V _F	8.4	9	9.6	Volt	Ta=25°C
LED Life-Time	N/A	30,000	--	--	Hour	Ta=25°C Note (2)

Note (1) LED life time (Hr) can be defined as the time in which it continues to operate under the condition: Ta=25±3 °C, typical IL value indicated in the above table until the brightness becomes less than 50%.

Note (2) The “LED life time” is defined as the module brightness decrease to 50% original brightness at Ta=25°C. and IF=300mA. The LED lifetime could be decreased if operating IF is larger than 300mA. The constant current driving method is suggested.

Note (3) LED Light Bar Circuit



LED 电路, 单芯灯 (3*10=30)

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6.3 Interface Timing

6.3.1 Input Timing Table

Item		Symbol	Min.	Typ.	Max.	Unit	Remark
DCLK Frequency		Fclk		TBD		MHz	
HSYNC	Period Time	Th		TBD		DCLK	
	Display Period	Thdisp	1024			DCLK	
	Back Porch	Thbp		TBD		DCLK	
	Front Porch	Thfp		TBD		DCLK	
	Pulse Width	Thw		TBD		DCLK	
VSYNC	Period Time	Tv		TBD		HSYNC	
	Display Period	Tvdisp	600			HSYNC	
	Back Porch	Tvbp		TBD		HSYNC	
	Front Porch	Tvfp		TBD		HSYNC	
	Pulse Width	Tvw		TBD		HSYNC	

6.3.2 DE and SYNC mode selection table

Mode Selection Table	DCLK	HSYNC	VSYNC	DE
SYNC-DE mode	Input	Input	Input	Input
SYNC mode	Input	Input	Input	GND
DE mode	Input	GND	GND	Input

7Note: "Input" means these signals are driven by host side

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7.0 RELIABILITY TEST ITEMS

No.	Item	Conditions	Remark
1	High Temperature Storage	Ta=+85℃, 240hrs	Note 1,2,3
2	Low Temperature Storage	Ta=-30℃, 240hrs	Note 1,2,3
3	High Temperature Operation	Ta=+85℃, 240hrs	Note 1,2,3
4	Low Temperature Operation	Ta=-30℃, 240hrs	Note 1,2,3
5	High Temperature and High Humidity (operation)	Ta=+60℃, 90%RH, 240hrs	Note 1,2,3
6	Thermal Cycling Test (non operation)	-30℃ (30min)→+80℃ (30min),100 cycles	Note 1,2,3
7	ESD (Operation)	C=150pF, R=330Ω, Contact : +/- 4KV (center) ,5 times Air = +/- 8KV (center) ,5 times	Note 4
8	Vibration	1.Random: 1.04G, 10~500Hz, XYZ, 30min/each direction 2.Sine: Freq. Range, 8~33.3Hz, Stoke: 1.3mm Sweep: 2.9G, 33.3~400Hz X/Z: 2hrs, Y:4hrs	
9	Shock	Half-Sine, 100G, 6ms, ±XYZ, 1 time	
10	Vibration (with carton)	Random: 0.015G ² /Hz, 5~200Hz -6dB/Octave, 200~400Hz XYZ 2hrs/each direction	
11	Drop (with carton)	Drop height condition, base on the product weight and follow QB200-0015 ,1 corner, 3 edges, 6 surfaces	

Note1: There is no display function NG issue occurred, all the cosmetic specification is judged before the reliability stress.

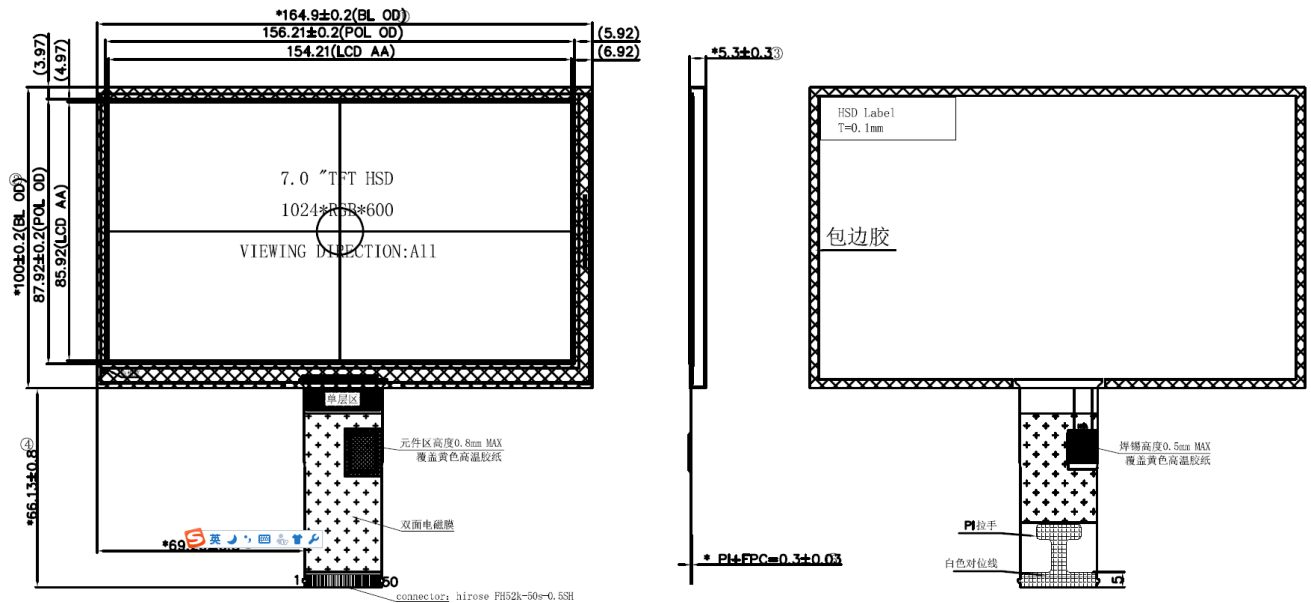
Note2: All of the function & cosmetic Judgment basis base on room temperature.
(The tested module must have enough recovery time at least 2 hours at room temperature.)

Note3: The test condition definition panel's surface temperature.

Note 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

8.0 OUTLINE DIMENSION

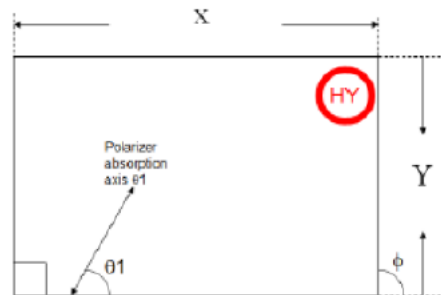
Unit : mm



FPC展开示意图

FPC弯折出货

Note : Reading direction of Polarized Sunglasses : The absorption axis of the upper polarizer is 0 degrees ($\theta 1=0$).



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9.0 LOT MARK

TBD

10.0 PACKAGE SPECIFICATION

TBD

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11.0 GENERAL PRECAUTION

11.1 Use Restriction

This product is not authorized for use in life supporting systems, aircraft navigation control systems, military systems and any other application where performance failure could be life-threatening or otherwise catastrophic.

11.2 Disassembling or Modification

Do not disassemble or modify the module. It may damage sensitive parts inside LCD module, and may cause scratches or dust on the display. MAXEN does not warrant the module, if customers disassemble or modify the module.

11.3 Breakage of LCD Panel

11.3.1. If LCD panel is broken and liquid crystal spills out, do not ingest or inhale liquid crystal, and do not contact liquid crystal with skin.

11.3.2. If liquid crystal contacts mouth or eyes, rinse out with water immediately.

11.3.3. If liquid crystal contacts skin or cloths, wash it off immediately with alcohol and rinse thoroughly with water.

11.3.4. Handle carefully with chips of glass that may cause injury, when the glass is broken.

11.4 Electric Shock

11.4.1. Disconnect power supply before handling LCD module.

11.4.2. Do not pull or fold the LED cable.

11.4.3. Do not touch the parts inside LCD modules and the fluorescent LED's connector or cables in order to prevent electric shock.

11.5 Absolute Maximum Ratings and Power Protection Circuit

11.5.1. Do not exceed the absolute maximum rating values, such as the supply voltage variation, input voltage variation, variation in parts' parameters, environmental temperature, etc., otherwise LCD module may be damaged.

11.5.2. Please do not leave LCD module in the environment of high humidity and high temperature for a long time.

11.5.3. It's recommended to employ protection circuit for power supply.

11.6 Operation

11.6.1 Do not touch, push or rub the polarizer with anything harder than HB pencil lead.

11.6.2 Use fingerstalls of soft gloves in order to keep clean display quality, when persons handle the LCD module for incoming inspection or assembly.

11.6.3 When the surface is dusty, please wipe gently with absorbent cotton or other soft material.

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11.6.4 Wipe off saliva or water drops as soon as possible. If saliva or water drops contact with polarizer for a long time, they may causes deformation or color fading.

11.6.5 When cleaning the adhesives, please use absorbent cotton wetted with a little petroleum benzine or other adequate solvent.

11.7 Mechanism

Please mount LCD module by using mounting holes arranged in four corners tightly.

11.8 Static Electricity

11.8.1 Protection film must remove very slowly from the surface of LCD module to prevent from electrostatic occurrence.

11.8.2 Because LCD module use CMOS-IC on circuit board and TFT-LCD panel, it is very weak to electrostatic discharge. Please be careful with electrostatic discharge. Persons who handle the module should be grounded through adequate methods.

11.9 Strong Light Exposure

The module shall not be exposed under strong light such as direct sunlight. Otherwise, display characteristics may be changed.

11.10 Disposal

When disposing LCD module, obey the local environmental regulations.

11.11 Optical Bonding

Before CL / TP bonding, LCM must be baked at 95 degrees for 2 hours or 80 degrees for 8 hours, and the bonding time shall be completed within 8 hours.