HM104XG101HT

10.4" Color TFT-LCD

FUNCTIONAL DRAFT SPECIFICATION

(This document is meant for customers' approval)

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HIGHNESS MICROELECTRONICS PVT. LTD

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2 General Specifications

Feature		Spec
Characteristics	Size	10.4 inch
	Resolution	1024(horizontal)*768(Vertical)
	Interface	LVDS
	Connect type	Connector
	Color Depth	16.2M
	Technology type	a-Si
	Display Spec.	0.20625(H) mm x 0.20625(V)mm
	Pixel Configuration	R.G.B. Vertical Stripe
	Display Mode	Normally Black
	Driver IC	TBD
	Surface Treatment	3H
	Viewing Direction	ALL
	Viewing Direction Gray inversion	
Mechanical	LCM (W x H x D) (mm)	225.8 (H) x 174.3 (V) x 5.6 (D)
	Active Area(mm)	211.2(H) x 158.4(V)
	With /Without TSP	Without TSP
	Weight (g)	TBD
	LED Numbers	42 LEDs

Note 1: Viewing direction is follow the data which measured by optics equipment.
Note 2: Requirements on Environmental Protection: RoHS
Note 3: LCM weight tolerance: +/- 5%

3 Input/Output Terminals

Connector： STM (P/N：LVDS-30RL-GF)OR Compatible

Pin No.	SYMBOL	FUNCTION
1	GND	Ground
2	V_{CC}	+3.3V Power
3	V_{CC}	+3.3V Power
4	NC	NC
5	NC	NC
6	NC	NC
7	GND	GND
8	RXIN0-	LVDS Signal(-)—channel 0
9	RXIN0+	LVDS Signal(+)—channel 0
10	GND	Ground
11	RXIN1-	LVDS Signal(-)—channel 1
12	RXIN1+	LVDS Signal(+)—channel 1
13	GND	Ground
14	RXIN2-	LVDS Signal(-)—channel 2
15	RXIN2+	LVDS Signal(+)—channel 2
16	GND	Ground
17	RXCLKIN-	LVDS Clock Signal(-)
18	RXCLKIN+	LVDS Clock Signal(+)
19	GND	Ground
20	NC	NC
21	NC	NC
22	GND	Ground
23	GND	Ground
24	NC	NC
25	NC	NC
26	NC	NC
27	NC	NC
28	NC	NC
29	NC	NC
30	NC	NC

【Note】

1) GND Pin must be connected to ground. Don’t be floating.
2) NC Pin must be floating.

4 Absolute Maximum Ratings

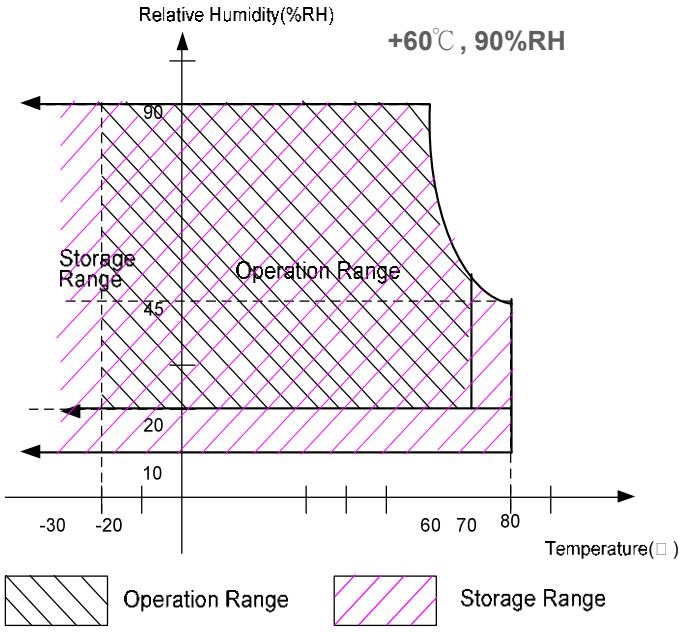
Item	Symbol	Values		Unit	Remark
		Min.	Max.		
Power voltage	V_{DD}	-0.5	5.0	V	
Input signal voltage	Logic input	-0.5	5.0	V	
Operation temperature	T_{OP}	-20	70	℃	Note 3, 4
Storage temperature	T_{ST}	-30	80	℃	Note 3, 4
LED Reverse Voltage	V_R	-	5.0	V	Each LED Note 2
LED Forward Current	I_F	-	30	mA	Each LED

Note 1: The absolute maximum rating values of this product are not allowed to be exceeded at any times. A module should be used with any of the absolute maximum ratings exceeded, the characteristics of the module may not be recovered, or in an extreme condition, the module may be permanently destroyed.

Note 2: V_R Conditions: Zener Diode 20mA

Note 3: 90% RH Max. (Max wet temp. is 60℃)

Maximum wet-bulb temperature is at 60℃ or less. And No condensation (no drops of dew)



Note 4: In case of temperature below 0℃,the response time of liquid crystal (LC) becomes slower and the color of panel darker than normal one.

5 Electrical Characteristics

5.1. Typical operation conditions

Ta=25℃

ITEM		SYMBOL	MIN.	TYP.	MAX.	UNIT	NOTE
Power Supply Voltage For LCD		V_{DD}	3.0	3.3	3.6	V	【Note 1】
Logic Input Voltage (LVDS:IN+,IN-)	Common Mode Voltage	VCM	1.08	1.2	1.32	V	【Note 2】
	Differential Input Voltage	| VID |	-	400	-	mV	【Note 2】
	Threshold Voltage(high)	VTH	-	-	100	mV	【Note 2】
	Threshold Voltage(low)	VTL	-100	-	-	mV	【Note 2】

Remarks :

【Note1】 VCC –dip condition:

1) When 2.7 V≦VCC＜3.0V，td≦10ms.
2) VCC＞3.0V，VCC-dip condition should be same as VCC-turn-on condition.

5.2. Backlight Driving for Power Consumption

Parameter	Symbol	Min.	Typ.	Max.	Unit	Remark
LED current	I_{LED}	-	380	-	mA	Note 1
LED voltage	V_{LED}	8.4	8.7	9.0	V	
LED Life Time	-	20000	-	-	Hr	Note 2

Note 1 : There are 14 Groups LED shown as below , V_{LED}=8.7V.

Note 2: The “LED life time” is defined as the module brightness decrease to 50% original brightness that the ambient temperature is 25℃ and I_L =380mA. The LED lifetime could be decreased if operating I_L is lager than 420 mA.

Note 2: The LED Supply Voltage is defined by the number of LED at Ta=25℃ and I_L =380mA.

5.3 Data Timing (Under frame rate is equal to 60Hz)

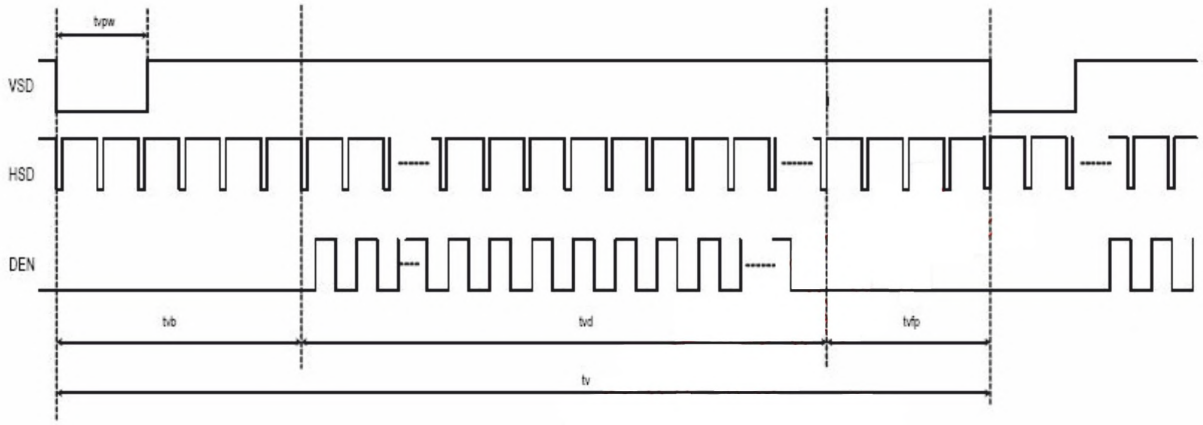
⍓ Horizontal Timing

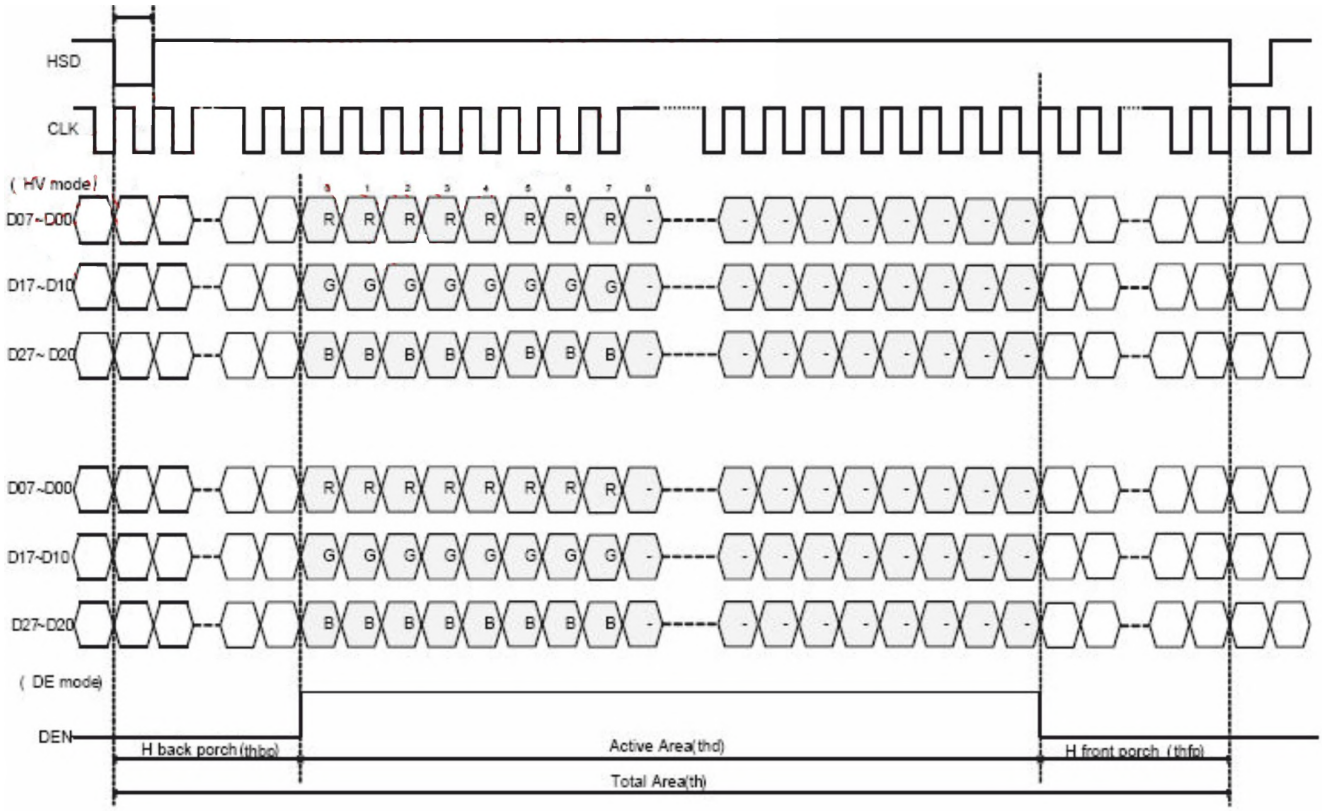
Parameter	Symbol	Spec			Unit
		Min.	Typ.	Max.	
Horizontal Display Area	thd		1024		CLK
CLK Frequency	fclk	52	65	71.0	MHz
One Horizontal Line	th	1200	1344	1400	CLK
HS Pulse Width	thpw	1	-	140	CLK
HS Back Porch	thb		160		CLK
HS Front Porch	thfp	16	160	216	CLK

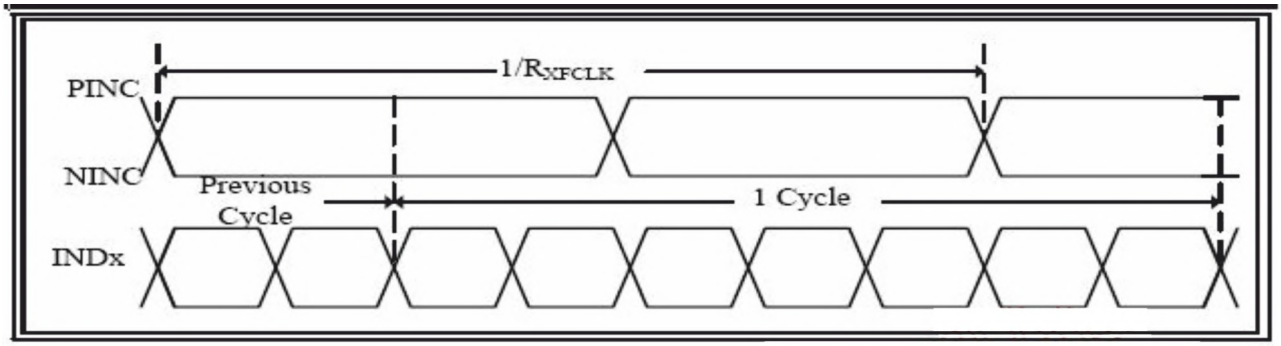
⍓ Vertical Timing

Parameter	Symbol	Spec			Unit
		Min.	Typ.	Max.	
Vertical Display Area	tvd		768		th
VS Period Time	tv	778	806	842	th
VS Pulse Width	tvpw	2	-	15	th
VS Back Porch	tvb	23	23	23	th
VS Front Porch	tvfp	1	15	49	th

V







LVDS timing(1)

5.4 AC Electrical characteristic

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Clock Frequency	RxFCLK		20		71	MHz
Input data skew margin	TRSKM	|VID|=400mV RxVCM=1.2V RxFCLK=71MHz	500			ps
Clock High Time	TLVCH			4/(7* RxFCLK)		ns ns
Clock Low Time	TLVCL			3/(7* RxFCLK)		ns
PLL wake-up-time	TenPLL				150	us

6 Optical Characteristics

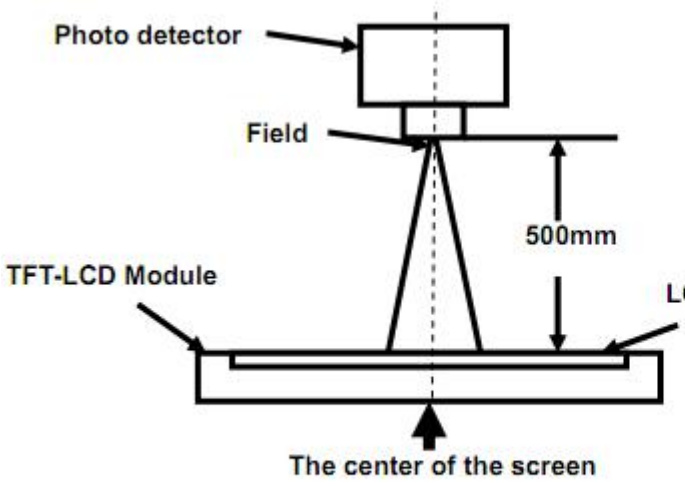
Items	Symbol	Condition	Min.	Typ.	Max.	Unit	Remark
Viewing angles	θ_T	Center CR≥10	80	85	-	Degree.	Note2
	θ_B		80	85	-		
	θ_L		80	85	-		
	θ_R		80	85	-		
Contrast Ratio	CR	Θ =0	600	900		-	Note1, Note3
Response Time	T_{r+f}	25° C	-	30	40	ms	Note1, Note4
			-				
Chromaticity	R_X		-0.03	0.667	+0.03	-	Note1, Note5
	R_Y			0.326		-	
	G_X			0.274			
	G_Y			0.597			
	B_X			0.134			
	B_Y			0.115			
Uniformity	U		-	70	-	%	Note1, Note6
Luminance	L		350	400			Note1, Note7

Test Conditions:

1. IF= 27mA(one channel),the ambient temperature is 25.
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	SR-3A	1°
Luminance		
Chromaticity		
Lum Uniformity		
Response Time	BM-7A	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).

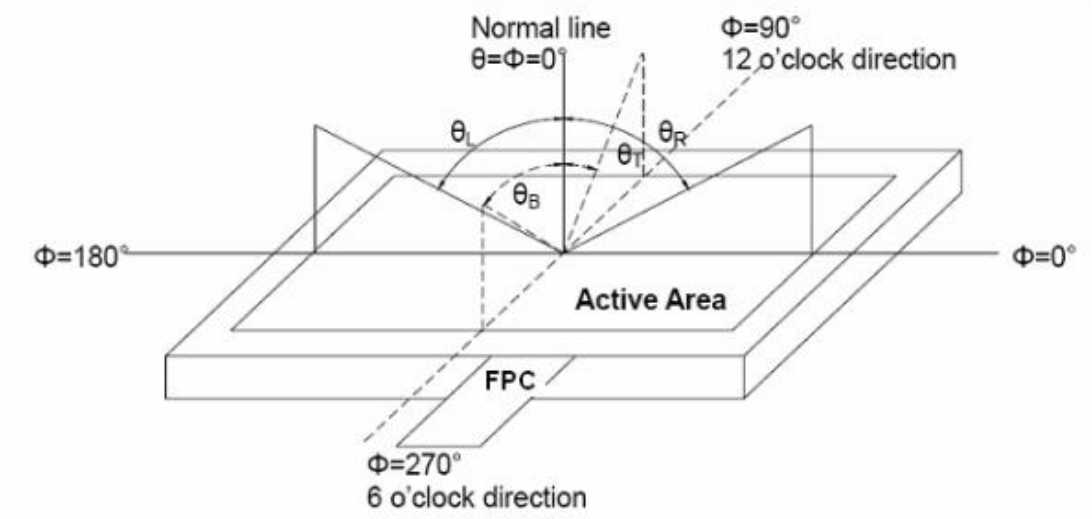


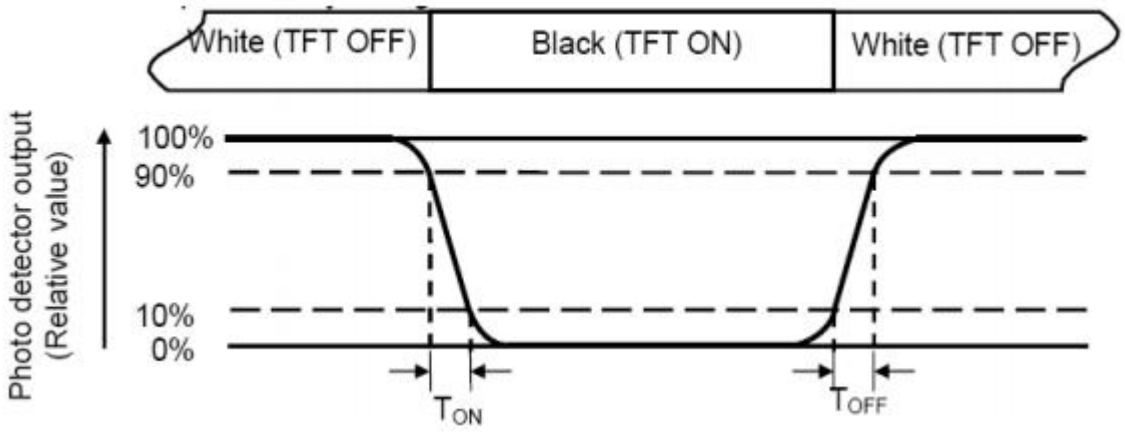
Fig. 1 Definition of viewing angle

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

L-------Active area length W----- Active area width

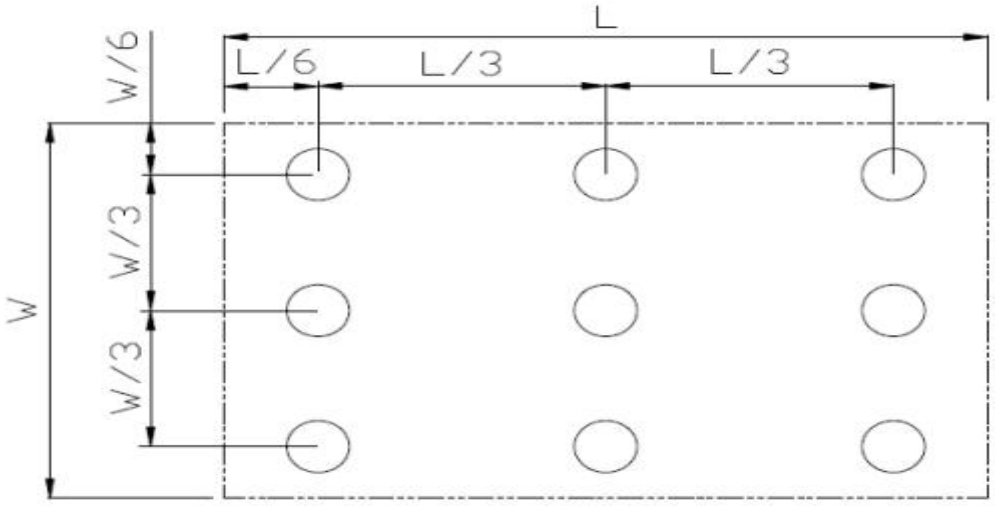


Fig. 2 Definition of uniformity

Lmax: The measured maximum luminance of all measurement position.

Lmin: The measured minimum luminance of all measurement position.

Note 7: Definition of Luminance :

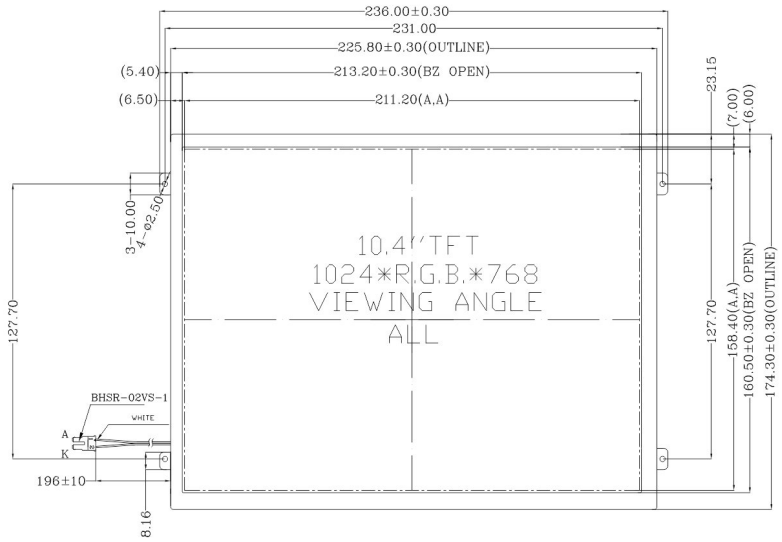
Measure the luminance of white state at center point.

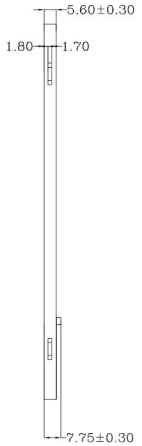
7 Environmental / Reliability Tests

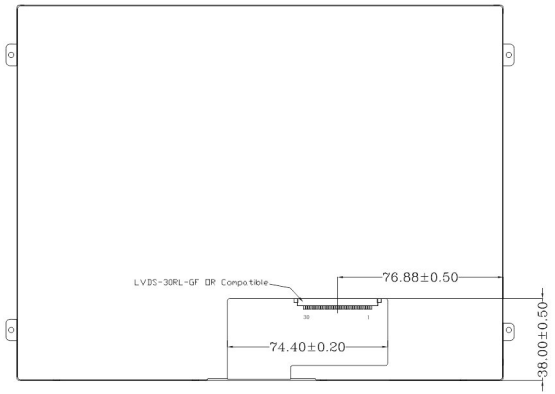
No	Test Item	Condition	Remarks
1	High Temperature Opeartion	Ts= +70℃, 240hrs	Note 1 IEC60068-2-2, GB2423. 2-89
2	Low Temperature Opeartion	Ta= -20℃, 240hrs	Note 2 IEC60068-2-1 GB2423.1-89
3	High Temperature Storage	Ta= +80℃, 240hrs	IEC60068-2-2 GB2423. 2-89
4	Low Temperature Storage	Ta= -30℃, 240hrs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

8 Mechanical Drawing

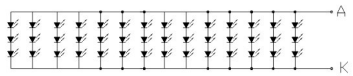






LCM	PIN
1	GND
2	VCC
3	VCC
4	NC
5	NC
6	NC
7	GND
8	RXIN0-
9	RXIN0+
10	GND
11	RXIN1-
12	RXIN1+
13	GND
14	RXIN2-
15	RXIN2+
16	GND
17	RXCLKIN-
18	RXCLKIN+
19	GND
20	NC
21	NC
22	GND
23	GND
24	NC
25	NC
26	NC
27	NC
28	NC
29	NC
30	NC

NOTES:
1. GENERAL TOLERANCE: ±0.2
2. ( )REFERENCE DIMENSION
3. RECOMMENDED CUSHION ADHERENT ARAE: TP V.A+1.6mm
4. REQUIREMENTS ON ENVIRONMENTAL PROTECTION: RoHS



CIRCUIT DIAGRAM

Display Type	TFT NORMALLY BLACK,TRANSMISSIVE
Viewing Angle	ALL
LCD Driver IC	---
Logic Voltage	VDD=3.3V
Operation Temperature	-20°C TO 70°C
Storage Temperature	-30°C TO 80°C
Interface	6BIT LVDS Interface
Backlight	42-LED WHITE 380mA/8.4~9.6V
Surface luminance	400cd/m²(type)
White X/Y	X:--- Y:---

VER.	SYMBOL	AMENDMENT	SIGN	DATE
V00.		Frist issue	XW.Qin	

DRAWN
ME.CHECKED
EE.CHECKED
APPROVED
CUSTOMER'S APPROVAL

TITLE
MODULE SPEC.

DRAWING NO.
HM104XG101HT

UNIT	mm	SCALE	FIT
3rd Angle		SHEET	OF 1

HIGHNESS™

9 Packing

TBD

10. Precautions For Use of LCD modules

10.1 Handling Precautions

10.1.1. The display panel is made of glass. Do not subject it to a mechanical shock by dropping it from a high place, etc.

10.1.2. 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.

10.1.3. Do not apply excessive force to the display surface or the adjoining areas since this may cause the color tone to vary.

10.1.4. The polarizer covering the display surface of the LCD module is soft and easily scratched. Handle this polarizer carefully.

10.1.5. 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
- Ketone
- Aromatic solvents

10.1.6. Do not attempt to disassemble the LCD Module.

10.1.7. If the logic circuit power is off, do not apply the input signals.

10.1.8. To prevent destruction of the elements by static electricity, be careful to maintain an optimum work environment.

10.1.8.1. Be sure to ground the body when handling the LCD Modules.

10.1.8.2. Tools required for assembly, such as soldering irons, must be properly ground.

10.1.8.3. To reduce the amount of static electricity generated, do not conduct assembly and other work under dry conditions.

10.1.8.4. 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.

10.2 Storage Precautions

10.2.1. When storing the LCD modules, avoid exposure to direct sunlight or to the light of fluorescent lamps.

10.2.2. 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%

10.2.3. The LCD modules should be stored in the room without acid, alkali and harmful gas.

10.3 Transportation Precautions

The LCD modules should be no falling and violent shocking during transportation, and also should avoid excessive press, water, damp and sunshine.