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## HBM101WX10A Product Specification Rev.P0

ITEM	BUYER SIGNATURE	DATE
_____	_____	_____
_____	_____	_____
_____	_____	_____

ITEM	SUPPLIER SIGNATURE	DATE
Prepared	_____	_____
Reviewed	_____	_____
Approved	_____	_____

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**REVISION HISTORY**

REV.	ECN No.	DESCRIPTION OF CHANGES	DATE	PREPARED
P0		Initial Release	2020-10- 18	

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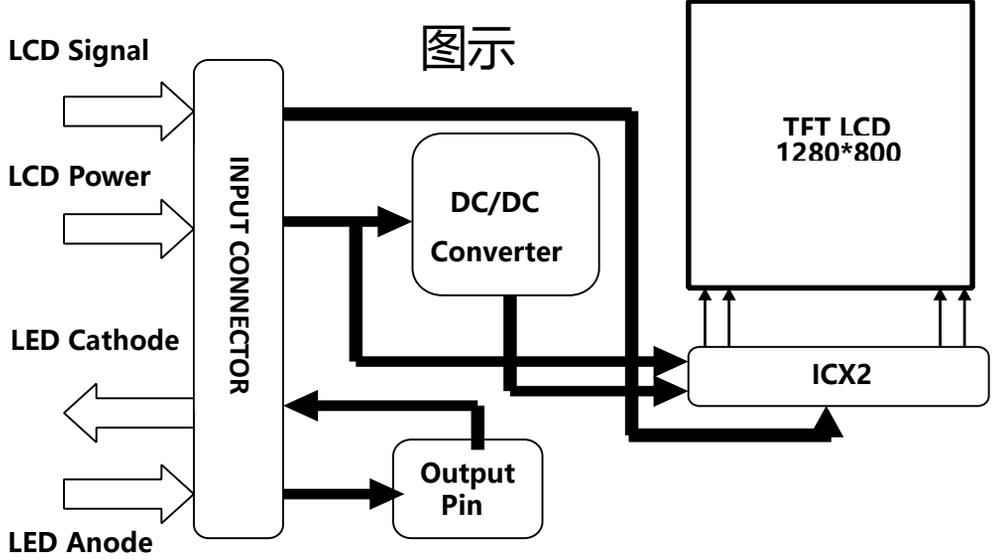
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# 1.0 GENERAL DESCRIPTION

## 1.1 Introduction

HBM101WX10A is a color active matrix TFT LCD LCM using amorphous silicon TFT 's (Thin Film Transistors) as an active switching devices. This module has a 10.1 inch diagonally measured active area with WXGA resolutions (1280 horizontal by 800 vertical pixel array). Each pixel is divided into RED, GREEN, BLUE dots which are arranged in vertical stripe and this module can display 16.7M colors.



## 1.2 Features

- LVDS Interface;
- 6bit + Hi-FRC display 16.7M colors
- High contrast ratio and Transmittance

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### 1.3 Application

- G Industrial

### 1.4 General Specification

The followings are general specifications

**<Table 1. LCD Module Specifications>**

Parameter	Specification	Unit	Remarks
Active Area	216.96(H)*135.6(V)	mm	
Number Of Pixels	1280(H)×800(V)	pixels	
Pixel Pitch	0.0565(H)×RGB×0.1695(V)	mm	
Pixel Arrangement	Pixels RGB stripe arrangement		
Display Mode	Normally Black		
Display Colors	16.7M(6bit +Hi-FRC)	colors	
Surface Treatment	HC		
Contrast Ratio	1000:1(typ.)		
Viewing Angle(CR> 10)	80/80/80/80(typ.)		
Response Time	35(typ.)/40(max.)	ms	
Color Gamut	50%NTSC		
Luminance	350	nits	
Outline Dimension	228.24(H)*148.99(V)*2.85(typ)	mm	

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## 2.0 ABSOLUTE MAXIMUM RATINGS

The followings are maximum values which, if exceed, may cause faulty operation or damage to the unit.

**< Table 2. Absolute Maximum Ratings >**

Parameter		Symbol	Min.	Max.	Unit	Remarks
Power Supply	LCD Module	VDD	VSS-0.3	3.6	V	Ta = 25 °C Note 1&2
Operating Temperature		T <sub>OP</sub>	0	+50	°C	Note 3
Storage Temperature		T <sub>ST</sub>	-20	+60	°C	
Operating Ambient Humidity		H <sub>OP</sub>	10	90	%RH	
Storage Humidity		H <sub>ST</sub>	10	90	%RH	

Note:

- These range above is maximum value not the actual operating temperature . Actual Operating temperature is no more than 40°C and temperature refers to the LCM surface temperature ; Length of operation: No more than 8 hours per day, and no more than 4 hours of continuous use one time.
- HSD is not responsible for product problems beyond the use conditions.
- Temperature and relative humidity range are shown in the figure below. Wet bulb temperature should be 39 °C max. and no condensation of water.

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### 3.0 ELECTRICAL SPECIFICATIONS

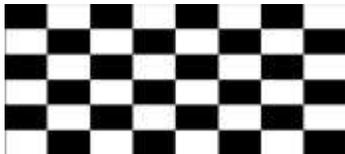
#### 3.1 TFT LCD Module

< Table 3. LCD Module Electrical specifications > [Ta =25± 2 °C]

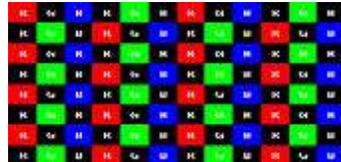
Parameter	Symbol	Values			Unit	Notes	
		Min.	Typ.	Max.			
Power Supply Voltage	VDD	3.0	3.3	3.6	V		
	VRP			300	mV	Ripple	
Power Supply Current	IDD	-	212	364	mA	Note 1	
Power Consumption	PLCD	-	0.7	1.2	W		
Rush current	IRUSH	-	-	3.0	A	Note 2	
CMOS Interface	Input Voltage	VIH	2.7		3.3	V	
		VIL	0		0.5	V	
	Output Voltage	VOH	2.7		3.3	V	
		VOL	0		0.5	V	

Notes : 1. The supply voltage is measured and specified at the interface connector of LCM.  
The current draw and power consumption specified is for VDD=3.3V, Frame rate  $f_V=60\text{Hz}$  and Clock frequency = 72.4MHz. Test Pattern of power supply current

a) Typ : Mosaic 8 x 6 Pattern(L0/L255)



b) Max : skip subPixel(L255)



2. The duration of rush current is about 2ms and rising time of Power Input is 1ms(min)

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### 3.2 INPUT TERMINAL PIN ASSIGNMENT

This LCD employs one interface connections, a 40 pin connector is used for the LCD module electronics interface.

#### 3.2.1 Pin assignment for LCD module

Connector : MSAK24025P40G (STM) or equivalent

< Table4. Pin Assignment for LCD Module Connector >

Pin No.	Symbol	Description	I/O
1	NC	Non Connection	-
2-4	VDDIN	Power supply VDDIN=3.3V (Typ.)	P
5	NC	Non Connection	-
6	GND	GROUND	P
7	GND	GROUND	P
8	RIN0-	LVDS Negative data signal (-)	I
9	RIN0+	LVDS Positive data signal (+)	I
10	GND	GROUND	P
11	RIN1-	LVDS Negative data signal (-)	I
12	RIN1+	LVDS Positive data signal (+)	I
13	GND	GROUND	P
14	RIN2-	LVDS Negative data signal (-)	I
15	RIN2+	LVDS Positive data signal (+)	I
16	GND	GROUND	P
17	LVDS_CLK-	LVDS Negative CLK signal (-)	I
18	LVDS_CLK+	LVDS Positive CLK signal (+)	I
19	GND	GROUND	P
20	RIN3-	LVDS Negative data signal (-)	I

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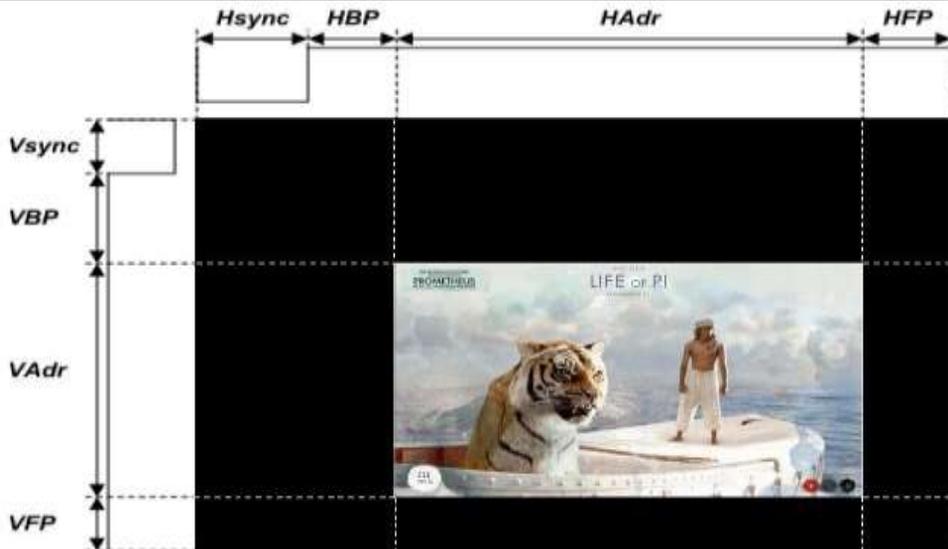
<b>Pin No.</b>	<b>Symbol</b>	<b>Description</b>	<b>I/O</b>
21	RIN3+	LVDS Positive data signal (+)	I
22	GND	GROUND	P
23	NC	Non Connection	-
24	NC	Non Connection	-
25	GND	GROUND	P
26	NC	Non Connection	-
27	NC	Non Connection	-
28	GND	GROUND	P
29	NC	Non Connection	-
30	NC	Non Connection	-
31	LED-	LED Cathode	O
32	LED-		O
33	LED-		O
34	NC	Non Connection	-
35	NC	Non Connection	-
36	NC	Non Connection	-
37	NC	Non Connection	-
38	LED+	LED Anode	P
39	LED+		P
40	LED+		P

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### 3.3 Interface timing Parameter

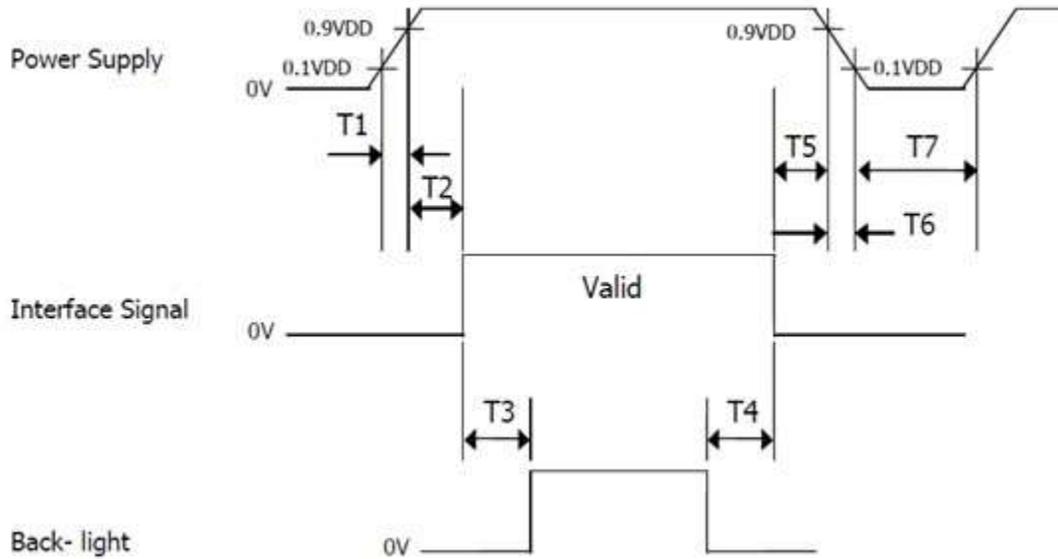
< Table5. LVDS Timing Parameter >

Parameter	Symbol	Value			Unit
		Min.	Typ.	Max.	
DCLK Frequency	Fdclk	66.3	72.4	78.9	MHz
Horizontal display area	Thd	1280			pixel
HSYNC period time	Th	1380	1440	1500	pixel
HSYNC blanking	thbp+ thfp	100	160	220	pixel
Vertical display area	Tvd	800			H
Frequency	fV	55	60	65	Hz
VSYNC period time	Tv	824	838	872	H
VSYNC blanking	Tvbp+ Tvfp	24	38	72	H



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### 3.4 Power Sequence



< Table6. Sequence Table >

Parameter	Values			Units
	Min	Typ	Max	
T1	0	-	10	ms
T2	0	-	50	ms
T3	200	-	-	ms
T4	500	-	-	ms
T5	0	-	50	ms
T6	0	-	10	ms
T7	500	-	-	ms

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## 4.0 OPTICAL SPECIFICATIONS

### 4.1 Overview

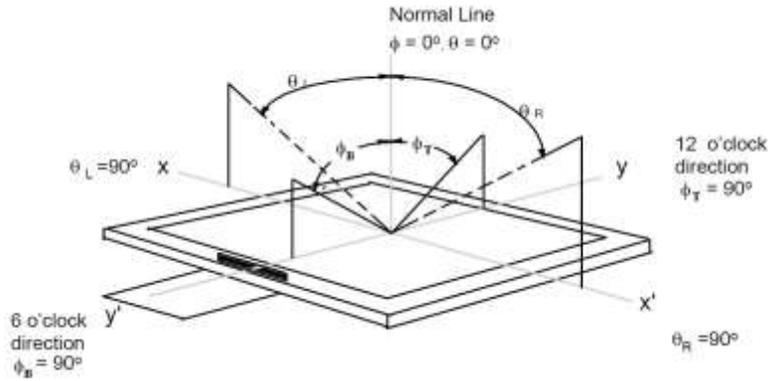
The test of optical specifications shall be measured in a dark room (ambient luminance 1lux and temperature = 25 ±2°C) with the equipment of Luminance meter system (Gonio meter system and TOPCON BM-5) and test unit shall be located at an approximate distance 50cm from the LCD surface at a viewing angle of  $\theta$  and  $\phi$  equal to 0°. We refer to  $\theta=0$  ( $=\theta_3$ ) as the 3 o' clock direction (the "right"),  $\theta=90$  ( $=\theta_{12}$ ) as the 12 O' clock direction ("upward"),  $\theta=180$  ( $=\theta_9$ ) as the 9 O' clock direction ("left") and  $\theta=270$  ( $=\theta_6$ ) as the 6 O' clock direction ("bottom"). While scanning  $\theta$  and/or  $\phi$ , the center of the measuring spot on the Display surface shall stay fixed.

### 4.2 Optical Specifications < Table7. Optical Table >

Item	Symbol	Condition	Min	Typ.	Max	Unit	Note
Viewing Angle	$\theta_L$	$Cr \geq 10$	70	80	--	deg	<u>Note 1</u>
	$\theta_R$		70	80	--		
	$\psi_T$		70	80	--		
	$\psi_B$		70	80	--		
Contrast Ratio	Cr	$\theta=0^\circ$	--	1000		-	<u>Note 2</u>
Response Time	$Tr+Tf$	$FF=0^\circ$	--	35	40	ms	<u>Note 3</u>
Color Coordinate of CIE1 931	Rx	$\theta=0^\circ$		--		-	<u>Note 4</u>
	Ry			--			
	Gx			--			
	Gy						
	Bx						
	By						
	Wx			--			
	Wy			--			
NTSC Ratio	NTSC	CIE1931	45	50	--	%	<u>Note 5</u>
Gamma	-		1.9	2.2	2.5		<u>Note 6</u>

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**Note 1: The definition of Viewing Angle** Refer to the graph below marked by  $\theta$  and  $\Phi$ .



**Note 2: The definition of Contrast Ratio**

Luminance When LCD is at "White" state

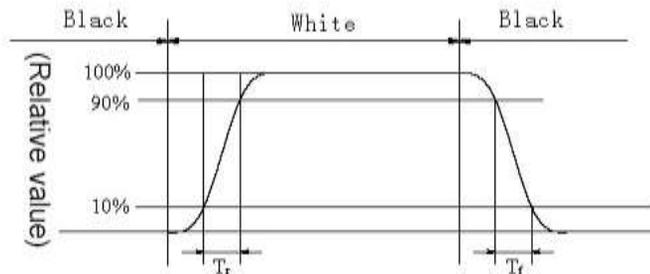
Contrast Ratio(CR)= \_\_\_\_\_

Luminance When LCD is at "Black" state

(Contrast Ratio is measured in optimum common electrode voltage)

**Note 3: Definition of Response time.**(Test LCD using RD80S or similar equipments):

The output sign also photo detector are measured when the input sign also are changed from "black " to "white" (Voltage falling time)and from "white" to "black" (Voltage rising time), respectively . The response time is defined as the time interval between the 10% and 90% of



amplitudes . Refer to fi gures below.

**Note 4: Color Coordinates of CIE 1931**

The test condition is at ILED=20mA and measured on the surface of LCD module at 25°C.

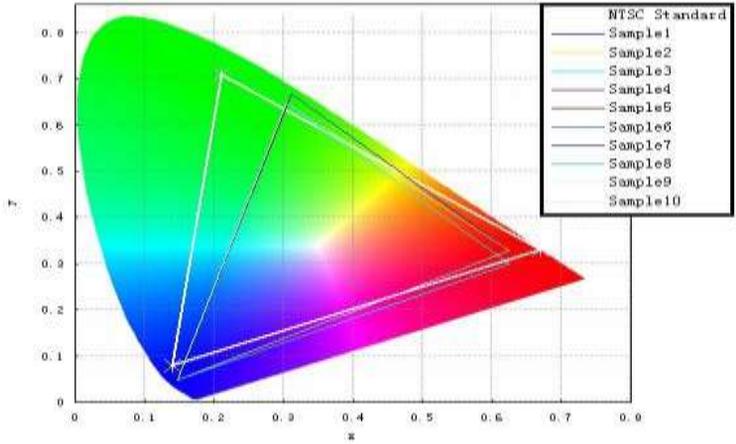
Measurement equipment:CS2000 or similar equipments

The Color Coordinate (CIE 1931) is the measurement of the center of the display shown in below figure.

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**Note 5: Definition of Color of CIE Coordinate and NTSC Ratio.**

$$S = \frac{\text{area of RGB triangle}}{\text{area of NTSC triangle}} \times 100\%$$



**Note 6: gamma curve control**

- For gamma curve control, HUAWEI' s request as below:
- 1,the whole curve' s tolerance must control within +/-0.3, HUAWEI will test the gray scale below:  
0, 8, 16, 25, 33, 41, 49, 58, 66, 74, 82, 90, 99, 107, 115, 123, 132, 140, 148, 156, 165, 173, 181, 189, 197, 206, 214, 222, 230, 239, 247, 255

**Note 7: Polarization Direction Definition**

- Viewing direction is normal user viewing direction which is vertical to the display surface
- The polarizer which is closer to viewer is defined as Front Polarizer
- The polarizer which is on the rear side of viewer is defined as Rear Polarizer
- The X axis is defined as parallel line to top & bottom sidelines of the Active Area
- PdF which is marked in blue arrow is polarization degree of Front polarizer
- PdR which is marked in red arrow is polarization degree of Back polarizer
- The polarization degree parameter must be indicated in range of 0deg to 180deg according to above definition

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## 5.0 RELIABILITY TEST

The Reliability test items and its conditions are shown in below.

**<Table 8. Reliability Test Parameters >**

No	Test Items	Conditions
1	High temperature storage test	60°C 240hr
2	Low temperature storage test	-20°C 240hr
3	Low temperature operation test	0°C 240hr
4	High temperature operation test	50°C 240hr
5	High temperature & high humidity (operation test)	40°C 90%RH 240hr
6	Thermal Shock Test	-20°C~60°C 1hr/cycle 100cycle
7		
8		
9		
10		
...		

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**6.0 PACKING INFORMATION**

**6.1 Packing Note**

TBD

**6.2 Box label**

TBD

**7.0 Product Label**

TBD

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### **8.1 Caution Against Static Charge**

- The LCD modules use C-MOS LSI drivers, so customers are recommended that any unused input terminal would be connected to Vdd or Vss, do not input any signals before power is turn on, and ground you body, work/assembly area, assembly equipments to protect against static electricity.
- Remove the protective film slowly, keeping the removing direction approximate 30-degree not vertical from panel surface, If possible, under ESD control device like ion blower, and the humidity of working room should be kept over 50%RH to reduce the risk of static charge.
- Avoid the use work clothing made of synthetic fibers. We recommend cotton clothing or other conductivity-treated fibers.
- In handling the LCD, wear non-charged material gloves. And the conducting wrist to the earth and the conducting shoes to the earth are necessary.

### **8.2 Caution For operation**

- It is indispensable to drive the LCD within the specified voltage limit since the higher Voltage than the limit causes the shorter LCD's life. An electro-chemical reaction due to DC causes undesirable deterioration of the LCD so that the use of DC drive should avoid.
- Do not connect or disconnect the LCD to or from the system when power is on.
- Never use the LCD under abnormal conditions of high temperature and high humidity.
- When expose to drastic fluctuation of temperature (hot to cold or cold to hot) ,the LCD may be affected; Specifically, drastic temperature fluctuation from cold to hot ,produces dew on the LCD's surface which may affect the operation of the polarizer and the LCD.
- Response time will be extremely delayed at lower temperature than the operating temperature range and on the other hand at higher temperature LCD may turn black at temperature above its operational range. However those phenomena do not mean malfunction or out of order with the LCD. The LCD will revert to normal operation once the temperature returns to the recommended temperature range for normal operation.
- Do not display the fixed pattern for a long time because it may develop image sticking due to the LCD structure. If the screen is displayed with fixed pattern, use a screen saver.

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### 8.3 Packaging

- Modules use LCD element, and must be treated as such.
  - Avoid intense shock and falls from a height.
  - To prevent modules from degradation, do not operate or store them exposed directly to sunshine or high temperature/humidity for long periods.

### 8.4 Storage

- A slight dew depositing on terminals is a cause for electro-chemical reaction resulting in terminal open circuit. Relative humidity of the environment should therefore be kept below 60%RH.
- Original protective film should be used on LCD' s surface (polarizer). Adhesive type protective film should be avoided, because it may change color and/or properties of the polarizers.
- Do not store the LCD near organic solvents or corrosive gasses.
- Keep the LCD safe from vibration, shock and pressure.
- Black or white air-bubbles may be produced if the LCD is stored for long time in the lower temperature or mechanical shocks are applied onto the LCD.
- In the case of storing for a long period of time for the purpose or replacement use, the following ways are recommended.
  - Store in a polyethylene bag with sealed so as not to enter fresh air outside in it.
  - Store in a dark place where neither exposure to direct sunlight nor light is.
  - Keep temperature in the specified storage temperature range.
  - Store with no touch on polarizer surface by the anything else. If possible, store the LCD in the packaging situation LCD when it was delivered.

### 8.5 Safety

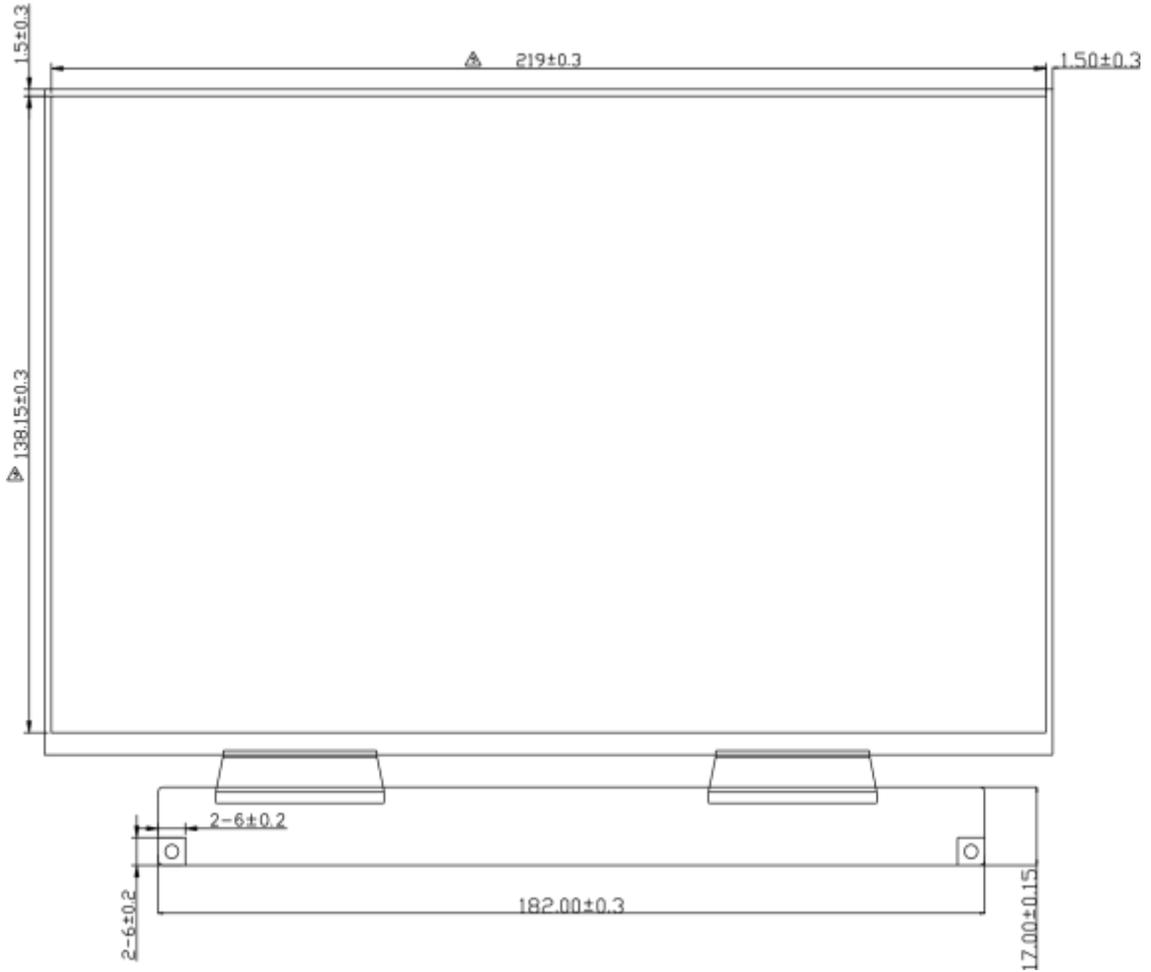
- For the crash damaged or unnecessary LCD, it is recommended to wash off liquid crystal by either of solvents such as acetone and ethanol an should be burned up later.
- In the case the LCD is broken, watch out whether liquid crystal leaks out or not. If your hands touch the liquid crystal, wash your hands cleanly with water an soap as soon as possible.
- If you should swallow the liquid crystal, first, wash your mouth thoroughly with water, then drink a lot of water and induce vomiting, and then, consult a physician.
- If the liquid crystal should get in your eyes, flush your eyes with running water for at least fifteen minutes.
- If the liquid crystal touches your skin or clothes, remove it and wash the affected part of your skin or clothes with soap and running water.

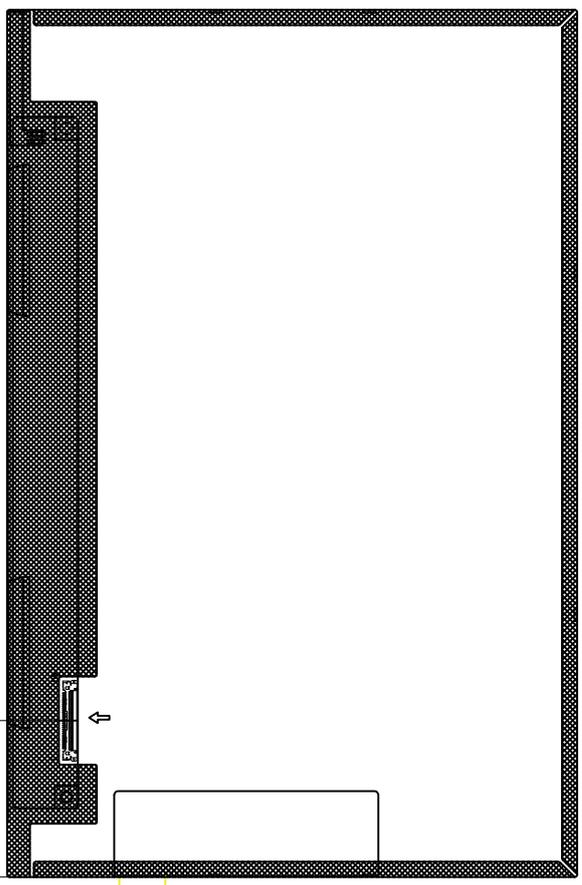
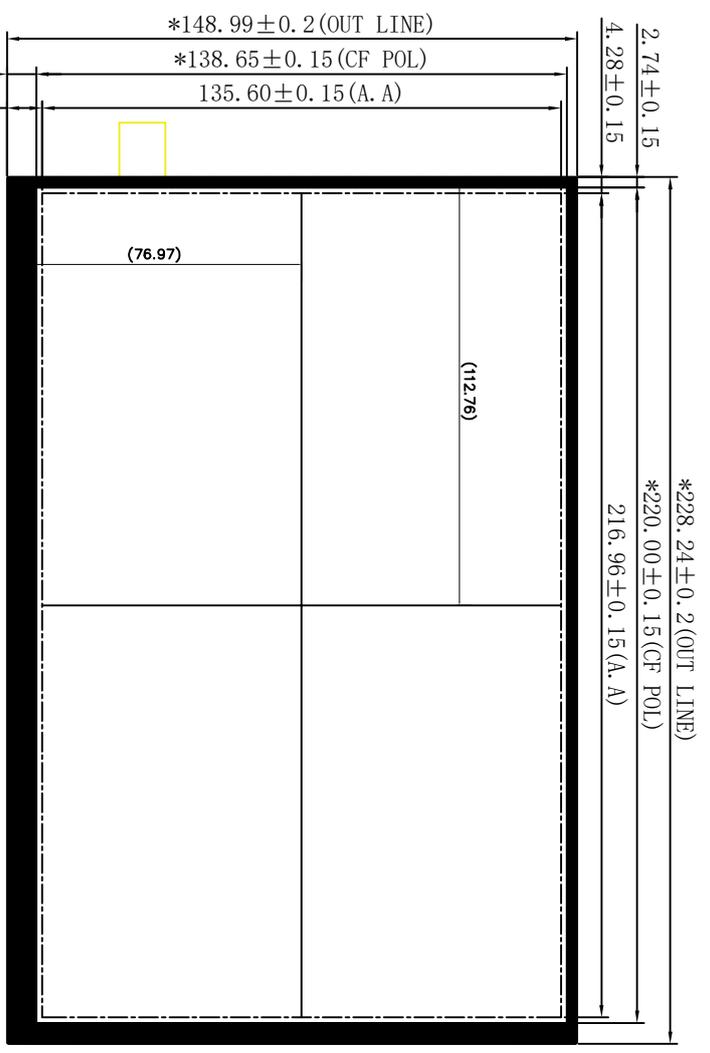


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**Mechanical Drawing**

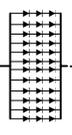
Drawing Attachment: Back





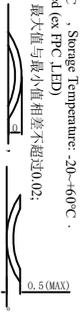
NOTES:  
7.62±0.15  
9.17±0.15

1.LED CIRCUIT DIAGRAM:  
所使用的LED不带反向二极管



LED: 3\*12=36 PCS

- Do not scale drawing Unit:mm.
- Modification ex: number.
- General Tolerance:±0.2 ( ) reference dimension,带\*的尺寸为重点管控尺寸.
- Drift angle: 1.5°
- Operating Temperature: 0~50°C . Storage Temperature: -20~60°C .
- Operating materials are insulated (ex: FPC, LED)
- 同一平面内亮度差标xy要求: 最大值与最小值相差不得超过0.02;
- 平面度≤0.5mm. 变形方向为



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△	2021. 08. 30	首次发行

Electrical-Optical Characteristics (Ta=25°C):

Item	Symbol	min.	typ.	max.	Unit	Condition
Main screen	Luminance	Lv	300	350	---	cd/m <sup>2</sup>
	Uniformity	Avg	75	80	---	%
Colour Coordinate	X	0.27	0.31	0.35		If =0.12=24mA (恒定电流测试)
	Y	0.28	0.32	0.36		
Forward Voltage	Vf	8.4	9	10.2	V	

\*视角要求:

Customer Name: 客户名称  
Check by: 确认  
Approved by: 承认  
Please Confirm This Drawing On/Before 请 签 回 此 图