Tailorpixels

A Professional Manufacturer of Display

Manufacturer Certificated

9001

CERT. No.: 282Q19070712006

14001

CERT. No.: 282E19070712007

Product Specification

Model: TTH128HRG-02C

1.28″TFT Display Module (240*240)

This module uses RoHS material

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Records of Revision 修改记录

Rev 版本号	Date 修改日期	Description 内容	Page 页	Remarks 注释
V0	2022/03/18	首 次	21	

Table of Contents 目录

1 General Description 规格简介

This display module is a transmissive type color active matrix TFT(Thin Film Transistor) liquid crystal display (LCD) that uses amorphous silicon TFT as a switching device. This module is composed of a TFT LCD module, a driver circuit, and a back-light unit.The resolution of a 1.28" contains 240RGB x 240 dots and can display up to 262K colors.

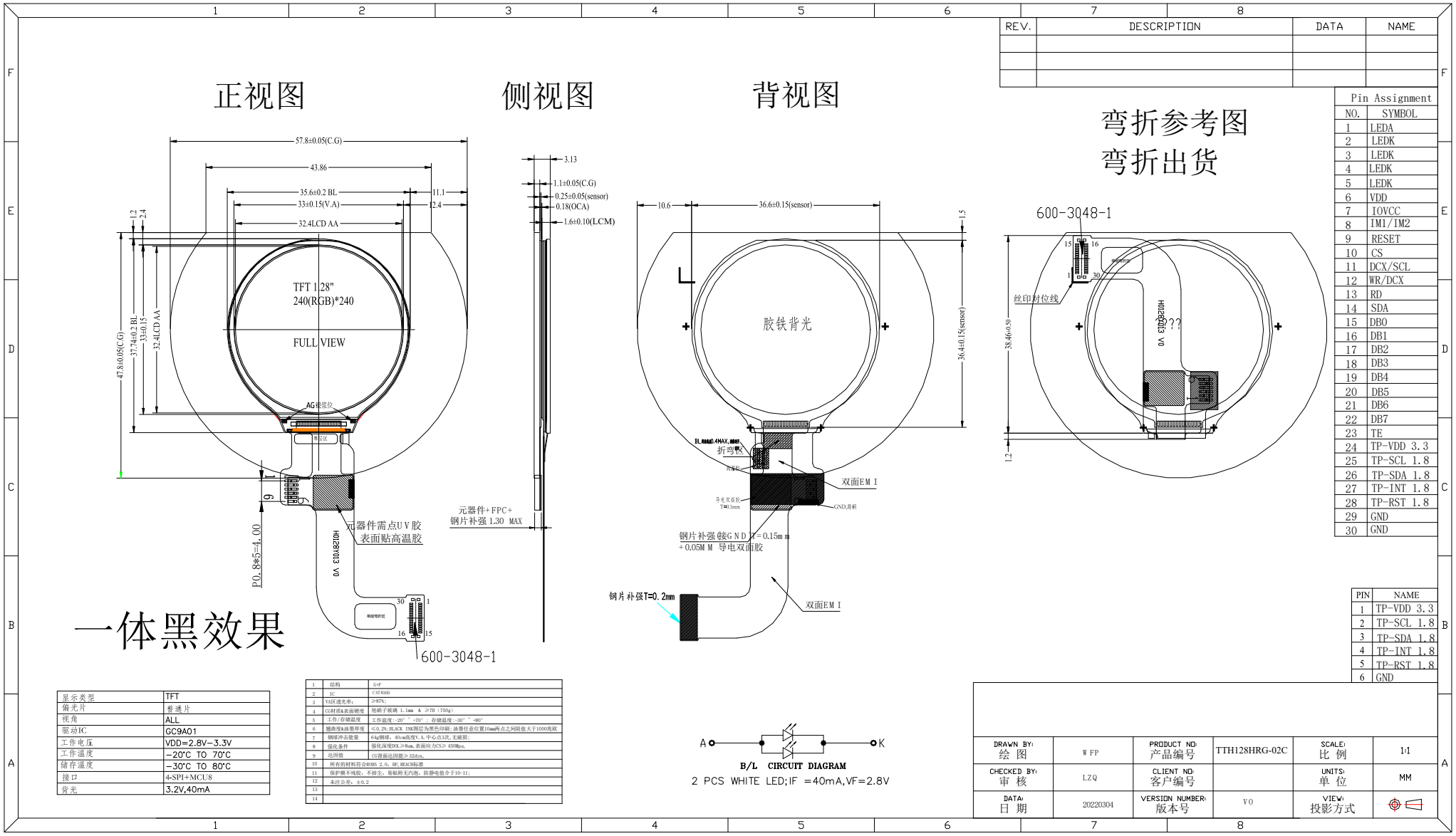
该显示模块是一种采用非晶硅 TFT 作为开关器件的透射型彩色有源矩阵 TFT(薄膜晶体管)液晶显示器。该模块由 TFT 液晶显示模块、驱动电路和背光单元组成。1.28 英寸的分辨率包含 240RGB x 240 点，可显示高达 262K 的颜色。

2 Module Parameter 模组参数

Features	Details	Unit
Display Size(Diagonal) 显示尺寸(对角线)	1.28	inch
LCD type 液晶显示屏类型	α-Si TFT	-
Display Mode 显示模式	IPS / Transmissive / Normally Black	-
Resolution 分辨率	240RGB x 240	-
Active Area 显示区	Φ32.4	mm
Module Outline 模组外形	35.6(H) ×37.74(V)×1.6(T)	mm
Display Colors 显示颜色	262K	-
Interface 接口	4SPI MCU8	-
Driver IC 驱动 IC	GC9A01	-
TP Viewing Area TP 视窗	Φ33.0	mm
TP Outline(assembly) TP 外形	57.8(H) ×47.8(V)×3.13(T)	mm
Luminance on surface 亮度	400	cd/m²
View Direction 视角方向	All	Best image
Contrast ratio 对比度	1100:1	
Color gamut 色域	60%	
PPI 图像点密集度	188	-
Window effect 视窗效果	一体黑	-
Cover plate surface effect 盖板表面效果	-	-
Operating Temperature 工作温度	-20～70	ºC
Storage Temperature 储存温度	-30～80	ºC
Weight 重量	TBD	g

Note 1: Excluding hooks, posts , FPC/FPC tail etc.

3 Mechanical Drawings 结构图



REV.	DESCRIPTION	DATA	NAME

Pin Assignment	
NO.	SYMBOL
1	LEDA
2	LEDK
3	LEDK
4	LEDK
5	LEDK
6	VDD
7	IOVCC
8	IM1/IM2
9	RESET
10	CS
11	DCX/SCL
12	WR/DCX
13	RD
14	SDA
15	DB0
16	DB1
17	DB2
18	DB3
19	DB4
20	DB5
21	DB6
22	DB7
23	TE
24	TP-VDD 3.3
25	TP-SCL 1.8
26	TP-SDA 1.8
27	TP-INT 1.8
28	TP-RST 1.8
29	GND
30	GND

PIN	NAME
1	TP-VDD 3.3
2	TP-SCL 1.8
3	TP-SDA 1.8
4	TP-INT 1.8
5	TP-RST 1.8
6	GND

显示类型	TFT
偏光片	普通片
视角	ALL
驱动IC	GC9A01
工作电压	VDD=2.8V~3.3V
工作温度	-20°C TO 70°C
储存温度	-30°C TO 80°C
接口	4-SPI+MCU8
背光	3.2V,40mA

1	结构	G+F
2	IC	CST816D
3	VA区透光率：	≥87%；
4	CG材质&表面硬度	玻璃子玻璃 1.1mm & ≥7H（750g）
5	工作/存储温度	工作温度：-20° ~+70° ；存储温度：-30° ~+80°
6	墨曲度&油墨厚度	≤0.2%；BLACK INK图层为黑色印刷；油墨任意位置10mm两点之间阻值大于1000兆欧
7	钢球冲击能量	64g钢球，40cm高度V.A 中心点3次，无破损；
8	强化条件	强化深度DOL≥8um，表面应力CS≥ 450Mpa。
9	达因值	CG背面达因能≥32dyn。
10	所有的材料符合ROHS 2.0，HF，REACH标准	
11	保护膜不残胶，不掉尘，易贴附无汽泡，防静电值介于10~11；	
12	未注公差：±0.2	
13		
14		

DRAWN BY: 绘 图	WFP	PRODUCT NO: 产品编号	TTH128HRG-02C	SCALE: 比 例	1:1
CHECKED BY: 审 核	LZQ	CLIENT NO: 客户编号		UNITS: 单 位	MM
DATA: 日 期	20220304	VERSION NUMBER: 版本号	V0	VIEW: 投影方式	

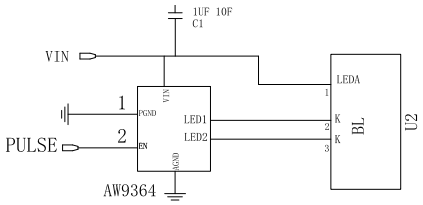
4 Module Interface 模组接口定义

NO	SYMBOL	FUNCTION
1	LEDA	LED Anode
2	LEDK	LED Cathode
3	LEDK	LED Cathode
4	LEDK	LED Cathode
5	LEDK	LED Cathode
6	VDD	Power supply Connect to external power supply (VCC=2.5~3.6V).
7	IOVCC	Low voltage power supply for interface logic circuits(1.65~3.3V)
8	IM	IM=0 8080 MCU 8-bit bus interface I
		IM=1 4-wire 8-bit data serial interface I
9	RESET	This signal will reset the device and must be applied to properly initialize the chip. Signal is active low.
10	CS	Chip select input pin("Low" enable). This pin can be permanently fixed "Low" in MPU interface mode only.
11	DCX/SCL	This pin is used to select "Data or Command" in the parallel interface When DCX='1', data is selected. When DCX='0', command is selected. This pin is used serial interface clock in 3-wire 9-bit / 4-wire 8-bit serial data interface. If not used, this pin should be connected to IOVCC or GND
12	WR/DCX	8080-I/8080-II system (WRX): Serves as a write signal and writes data at the rising edge. 4-line system (D/CX): Serves as command or parameter select. Fix to IOVCC level when not in use.
13	RD	8080-I/8080-II system (RDX): Serves as a read signal and MCU read data at the rising edge. Fix to IOVCC level when not in use
14	SDA	When IM[3]:Low, Serial in/out signal in 3-wire 9-bit/4-wire 8-bit serial data interface. When IM[3]:High, Serial input signal in 3-wire 9-bit/4-wire 8-bit serial data interface. The data is applied on the rising edge of the SCL signal. If not used, fix this pin at IOVCC or GND
15-22	DB0-DB7	8-bit parallel bi-directional data bus for MCU system and RGB interface mode Fix to VSSR level when not in use
23	TE	Tearing effect output pin to synchronize MPU to frame writing, activated by S/W command. When this pin is not activated, this pin is low. If not used, open this pin.
24	TP VDD	Touch panel Power Supply for Analog.If not used, please open it.
25	TP SCL	Touch panel I2C clock..If not used, please open it.
26	TP SDA	Touch panel I2C data.If not used, please open it.
27	TP INT	Touch panel interrupt output.If not used, please open it.
28	TP RST	Touch panel rese.If not used, please open it.
29	GND	Power groun
30	GND	Power groun

5 Application Circuit 应用电路

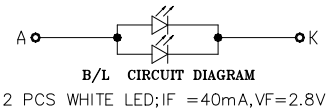
5.1 Backlight recommended circuit 背光电路参考

Motherboard driver backlight is need constant current circuit, if the rated voltage screen after light brightness difference.Current and power consumption of the machine are inconsistent, so recommend a backlight driving circuit is best rated current.It is recommended to use IC (AW9364). The reference circuit is as follows：



5.2Backlight recommended circuit 背光电路参数推荐

Motherboard driver backlight is need constant current circuit:



2 灯并联

Note: constant current circuit for every LED,and though LED lamp current is less than 20mA.Recommand between 15mA and 20 mA for every LED.

5.3 Application Circuit 应用电路（）

6 Absolute Maximum Ratings 绝对最大额定值

VSS=0V, Ta=25ºC

Item 项目		Symbol	Min.最小	Max.最大	Unit 单位
Supply Voltage 电源电压	Power supply 电力供应	VDD	-0.3	+4.6	V
	Analog 模拟	-	-	-	V
	IO	IOVDD	-0.3	+4.6	V
Input Voltage 输入电压		Vi	-0.3	IOVDD+0.3	V
Storage temperature 储存温度		T_{stg}	-30	+70	ºC
Operating temperature 工作温度		T_{op}	-20	+60	ºC
Storage humidity 存储湿度		H_{stg}	10	Note 1	%RH
Operating humidity 操作湿度		H_{op}	10	Note 1	%RH

Note 1: 90%RH max, If Ta is below 50ºC; 60%RH max, If Ta is over 60ºC.

Item 项目		Symbol	Min.最小	Typ.中间	Max.最大	Unit 单位
Supply Voltage 电源电压	Powersupply 电力供应	VDD	2.4	2.8	3.3	V
	Analog	VCI	2.4	2.8	3.3	V
	IO	IOVDD	1.65	1.8/2.8	3.3	V
Logic Low input voltage 输入电压低		V_{IL}	-0.3IOVDD	-	0.3IOVDD	V
Logic High input voltage 输入电压高		V_{IH}	0.7IOVDD	-	IOVDD	V
Logic Low output voltage 输出电压低		V_{OL}	-	-	0.2IOVDD	V
Logic High output voltage 输出电压高		V_{OH}	0.8IOVDD	-	-	V
Current Consumption 电流消耗	Normal display 正常的显示	Ivdd	-	30	-	mA
	Standby mode 待机模式	Ivdd	-	60	-	uA
Frame Frequency 帧频		f_{FR}	-	60	-	Hz

7 Electrical Specification 电性规格

DC Characteristics 直流特性

8 Initialization Code 初始化代码

```
lcd_set_reset(false);
    sys_delay(50);
    lcd_set_reset(true);
    sys_delay(50);
    lcd_set_reset(false);
    sys_delay(120);              //Delay
120ms

    write_cmd(0xFE);
    write_cmd(0xEF);

    write_cmd(0xEB);
    write_data(0x14);

    write_cmd(0x84);
    write_data(0x60);
```

```
                                        write_cmd(0x3A);
write_cmd(0x85);                        write_data(0x05);
write_data(0xF1);
                                        write_cmd(0x90);
write_cmd(0x86);                        write_data(0x08);
write_data(0xFF);                       write_data(0x08);
                                        write_data(0x08);
write_cmd(0x87);                        write_data(0x08);
write_data(0x28);

write_cmd(0x88);                        write_cmd(0xBD);
write_data(0x0A);                       write_data(0x06);

write_cmd(0x89);                        write_cmd(0xA6);
write_data(0x23);                       write_data(0x74);

write_cmd(0x8A);                        write_cmd(0xBF);
write_data(0x00);                       write_data(0x1C);

write_cmd(0x8B);                        write_cmd(0xA7);
write_data(0x80);                       write_data(0x45);

write_cmd(0x8C);                        write_cmd(0xA9);
write_data(0x01);                       write_data(0xBB);

write_cmd(0x8D);                        write_cmd(0xB8);
write_data(0x03);                       write_data(0x63);

write_cmd(0x8E);                        write_cmd(0xBC);
write_data(0xDF);                       write_data(0x00);

write_cmd(0x8F);                        write_cmd(0xFF);
write_data(0x52);                       write_data(0x60);
                                        write_data(0x01);
write_cmd(0xB6);                        write_data(0x04);
write_data(0x00);
write_data(0x00);                       write_cmd(0xC0);
                                        write_data(0x0E);
write_cmd(0x36);
write_data(0x48);                       write_cmd(0xC3);
                                        write_data(0x1d);
```

```
write_cmd(0xC4);
write_data(0x1d);

write_cmd(0xC9);
write_data(0x3F);

write_cmd(0xBE);
write_data(0x11);

write_cmd(0xE1);
write_data(0x10);
write_data(0x0E);

write_cmd(0xDF);
write_data(0x21);
write_data(0x10);
write_data(0x02);

write_cmd(0xF0);
write_data(0x4C);
write_data(0x10);
write_data(0x09);
write_data(0x09);
write_data(0x86);
write_data(0x32);

write_cmd(0xF1);
write_data(0x48);
write_data(0x75);
write_data(0x95);
write_data(0x2E);
write_data(0x34);
write_data(0x8F);

write_cmd(0xF2);
write_data(0x4C);
write_data(0x10);
write_data(0x09);
write_data(0x09);
write_data(0x86);
write_data(0x32);

write_cmd(0xF3);
write_data(0x48);
write_data(0x75);
write_data(0x95);
write_data(0x2E);
write_data(0x34);
write_data(0x8F);

write_cmd(0xED);
write_data(0x1B);
write_data(0x0B);

write_cmd(0xAC);
write_data(0x47);

write_cmd(0xAE);
write_data(0x77);

write_cmd(0xCB);
write_data(0x02);

write_cmd(0xCD);
write_data(0x63);

write_cmd(0x70);
write_data(0x07);
write_data(0x07);
write_data(0x04);
write_data(0x0E);
write_data(0x0F);
write_data(0x09);
write_data(0x07);
write_data(0x08);
write_data(0x03);

write_cmd(0xE8);
write_data(0x34);   // 04:column 14:1-dot 24:2-dot inversion
```

```
write_cmd(0x62);
write_data(0x18);
write_data(0x0D);
write_data(0x71);
write_data(0xED);
write_data(0x70);
write_data(0x70);
write_data(0x18);
write_data(0x0F);
write_data(0x71);
write_data(0xEF);
write_data(0x70);
write_data(0x70);

write_cmd(0x63);
write_data(0x18);
write_data(0x11);
write_data(0x71);
write_data(0xF1);
write_data(0x70);
write_data(0x70);
write_data(0x18);
write_data(0x13);
write_data(0x71);
write_data(0xF3);
write_data(0x70);
write_data(0x70);

write_cmd(0x64);
write_data(0x3B);
write_data(0x29);
write_data(0xF1);
write_data(0x01);
write_data(0xF1);
write_data(0x00);
write_data(0x0A);


write_cmd(0x66);
write_data(0x3C);
write_data(0x00);
write_data(0xCD);
write_data(0x67);
write_data(0x45);
write_data(0x45);
write_data(0x10);
write_data(0x00);
write_data(0x00);
write_data(0x00);

write_cmd(0x67);
write_data(0x00);
write_data(0x3C);
write_data(0x00);
write_data(0x00);
write_data(0x00);
write_data(0x01);
write_data(0x54);
write_data(0x10);
write_data(0x32);
write_data(0x98);

write_cmd(0x74);
write_data(0x10);
write_data(0x85);
write_data(0x80);
write_data(0x00);
write_data(0x00);
write_data(0x4E);
write_data(0x00);


write_cmd(0x35);
    write_cmd(0x00);
write_cmd(0x21);
delay(120);

write_cmd(0x11);

//  oled_clear_all(0); // 清屏函数
sys_delay(120);
write_cmd(0x29);
```

sys_delay(120); write_cmd(0x2C);

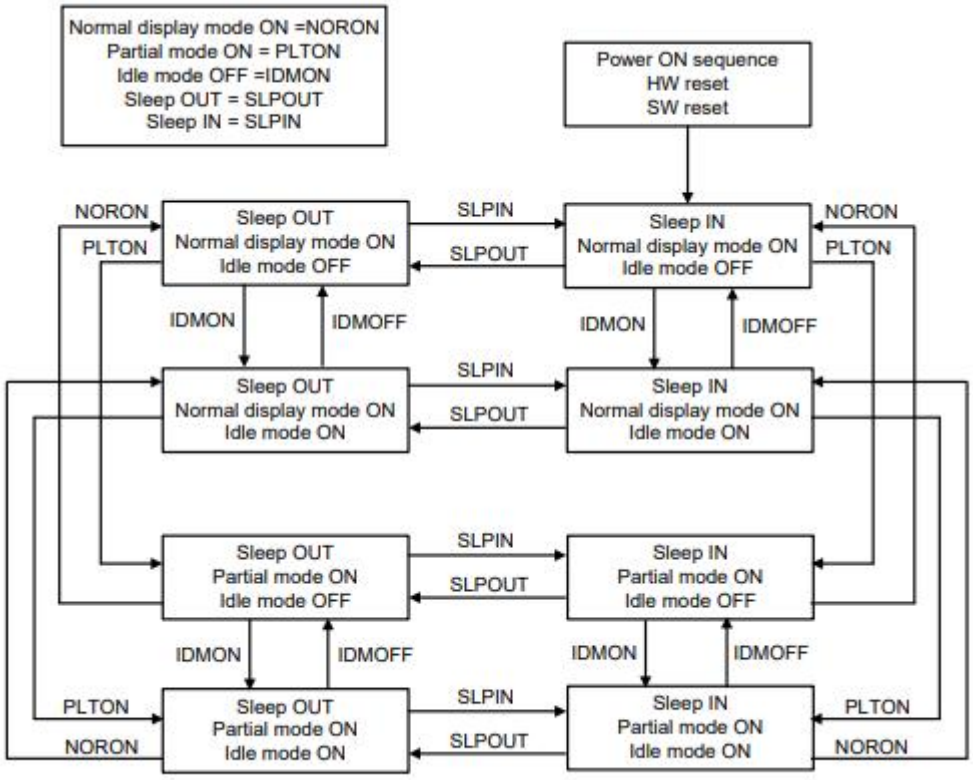
9 Optical Specifications 光学规格

9.1 Optical Specifications 光学规格

Ta=25ºC, VDD=2.8V, TN LC+ Polarizer

	Item 项目		Symbol 标志	Condition 条件	Specification 规范			Unit 单位
					Min. 最小	Typ. 中间	Max. 最大	
Backlight On (Transmissive Mode)	Luminance on surface(I_f =20mA) 表面亮度		*Lv*	Normally viewing angle $\theta_X=\theta_Y$ =0º		400	-	cd/m²
	Contrast ratio 对比度		*CR*		800	1100	-	-
	Response time 响应时间		*TR*		-	10	15	ms
			TF	-	-	20	20	
	Chromaticity Transmissive 色度	Red 红	*XR*	-	0.614	0.634	0.654	-
			YR		0.318	0.338	0.358	-
		Green 绿	*XG*		0.276	0.296	0.316	-
			YG		0.552	0.572	0.592	-
		Blue 蓝	*XB*		0.114	0.134	0.154	-
			YB		0.107	0.127	0.147	-
		White 白	*XW*		0.296	0.316	0.336	-
			YW		0.325	0.345	0.365	-
	Viewing Angle 视角	Horizontal	θX+	Center CR≥10	75	80	-	Deg.
			θX-		75	80	-	
		Vertical	θY+		75	80	-	
			θY-		75	80	-	
	NTSC Ratio(Gamut)		-	-	50	60	-	%

9.2 The power on/off sequence is illustrated below 电源启动/关闭顺序



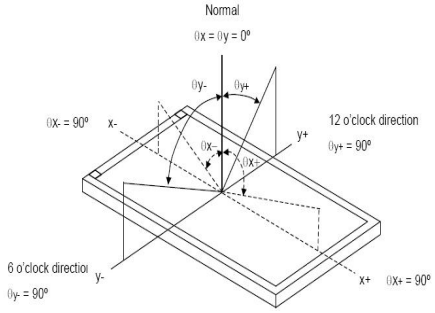
9.3 Definition of Contrast Ratio 对比度的定义

Contrast is measured perpendicular to display surface in reflective and transmissive mode. The measurement condition is:

Measuring Equipment 测量设备	**BM-7 or EQUI**
Measuring Point Diameter 测点直径	3mm//1mm
Measuring Point Location 测点位置	Active Area centre point
Test pattern 测试模式	A: All Pixels white
	B: All Pixel black
Contrast setting	Maximum

Definitions: CR (Contrast) = Luminance of White Pixel / Luminance of Black Pixel

9.4 Definition of Viewing Angles 视角的定义



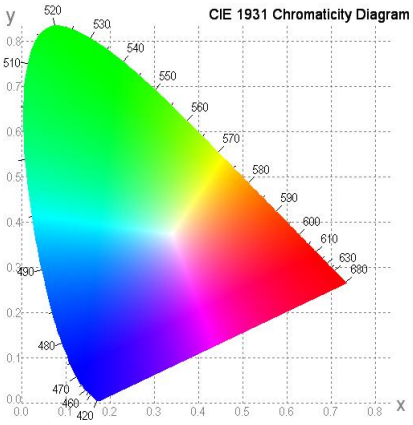
Measuring machine: LCD-5100 or EQUI

9.5 Definition of Color Appearance 色域的定义

R,G,B and W are defined by (x, y) on the IE chromaticity diagram

NTSC=area of RGB triangle/area of NTSC triangleX100%

Measuring picture: Red, Green, Blue and White (Measuring machine: BM-7)



9.6 Definition of Surface Luminance, Uniformity and Transmittance

表面亮度、均匀性和透光率的定义

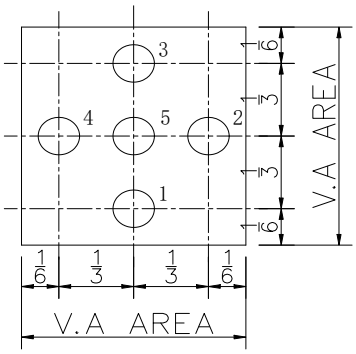
Using the transmissive mode measurement approach, measure the white screen luminance of the display panel and backlight.

9.6.1 Surface Luminance: LV = average (LP1:LP5)

9.6.2 Uniformity = Minimal (LP1:LP5) / Maximal (LP1:LP5) * 100%

9.6.3 Transmittance = LV on LCD / LV on Backlight * 100%

Note :Measuring machine:BM-7



10 Quality Assurance 质量标准

10.1 Purpose 目的

This standard for Quality Assurance assures the quality of LCD module products supplied to customer by Tailorpixels .

10.2 Agreement Items 协议项目

Tailorpixels and customer shall negotiate if the following situation occurs:

10.2.1 Discrepancies between Tailorpixels 's QA standards and customer' s QA standards.

10.2.2 Additional requirement to be added in product specification.

10.2.3 Any other special problem.

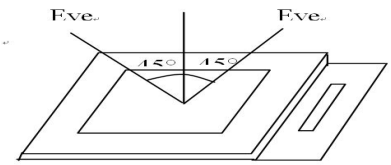
10.3 Standard of the Product Visual Inspection 产品外观检验标准

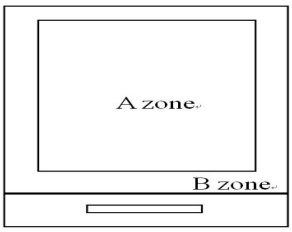
10.3.1 Appearance inspection:

10.3.1.1 The inspection must be under illumination about 1000 – 1500 lx, and the distance of view must be at 30cm ± 2cm.

10.3.1.2 The viewing angle should be 45° from the vertical line without reflection light or follows customer's viewing angle specifications.

10.3.1.3 Definition of area: A Zone: Active Area, B Zone: Viewing Area.





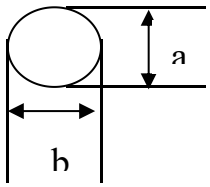
10.3.2 Basic principle:A set of sample to indicate the limit of acceptable quality level must be discussed by both Tailorpixels and customer when there is any dispute happened.

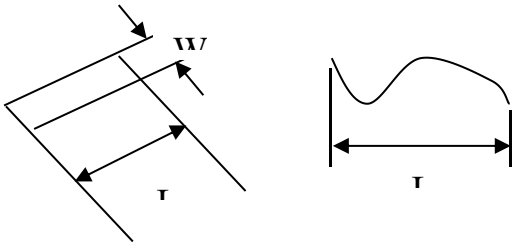
10.4 Inspection Specification 检验标准

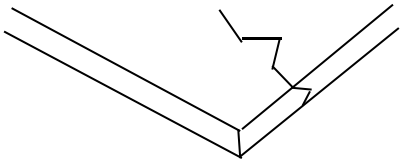
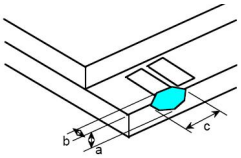
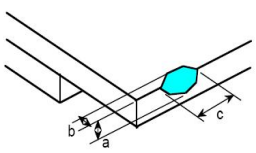
Sampling plan according to GB/T2828.1-2012/ISO 2859-1：1999 and ANSI/ASQC Z1.4-1993,normal level 2 and based on:

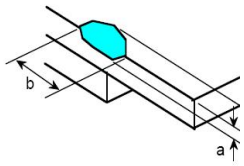
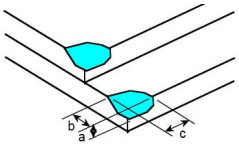
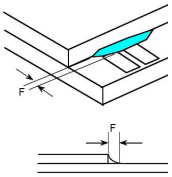
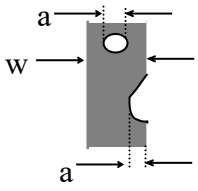
Major defect: AQL 0.4

Minor defect: AQL 1.0

<table>
<tr><th>No.</th><th>Item 项目</th><th>Criteria (Unit: mm) 标准</th></tr>
<tr><td>01</td><td>Black / White spot
Foreign material
(Round type)
Pinholes Stain
Particles inside cell.
(Minor defect) 黑/白斑/异物
(圆类型)细胞内的针孔染色颗粒。(小瑕疵)</td><td> 

<table>
<tr><th>Area / Size</th><th>Acc. Qty</th></tr>
<tr><td>φ≤0.10</td><td>Ignore</td></tr>
<tr><td>0.10<φ≤0.2</td><td>2</td></tr>
<tr><td>0.2<φ</td><td>0</td></tr>
<tr><td>Total</td><td>N≦3
NO include
φ≤ 0.10</td></tr>
</table>
φ= (a + b) /2
Distance between 2 defects should more than10mm apart.</td></tr>
<tr><td>02</td><td>Black and White line
Scratch
Foreign material
(Line type)
(Minor defect) 黑白线刮伤异物(类型)行(小瑕疵)</td><td> 
</td></tr>
</table>

<table>
<tr><th>No.</th><th>Item 项目</th><th>Criteria (Unit: mm) 标准</th></tr>
<tr><td></td><td></td><td>
<table>
<tr><td>Length</td><td>Width</td><td>Acc. Qty</td></tr>
<tr><td>/</td><td>W ≦ 0.03</td><td>Ignore</td></tr>
<tr><td>L ≦ 3</td><td>0.05 ＜ W ≦ 0.08</td><td>2</td></tr>
<tr><td>/</td><td>0.08 ＜ W</td><td>0</td></tr>
<tr><td colspan="2">Total</td><td>N≦2</td></tr>
</table>
Distance between 2 defects should more than 10mm apart.
Scratches not viewable through the back of the display are acceptable.
</td></tr>
<tr><td>03</td><td>Glass Crack
(Minor defect) 玻璃裂纹(小瑕疵)</td><td> 
LCD with extensible crack line is unacceptable(When press the cracked LCD area, the line will expand, we define it is extensible crack line)</td></tr>
<tr><td>04</td><td>Glass Chipping Pad Area: (Minor defect)
玻璃碎片面积:(轻微缺陷)
  </td><td>
<table>
<tr><td>Length and Width</td><td>Acc. Qty</td></tr>
<tr><td>c ＜ 5.0, b< 0.4</td><td>Ignore</td></tr>
</table>
</td></tr>
<tr><td>05</td><td>Glass Chipping Rear of PadArea:(Minordefect) 玻璃切屑垫区后方:(小瑕疵)
  </td><td>
<table>
<tr><td>Length and Width</td><td>Acc. Qty</td></tr>
<tr><td>c > 3.0, b< 1.0</td><td>1</td></tr>
<tr><td>c< 3.0, b< 1.0</td><td>2</td></tr>
<tr><td>c< 3.0, b< 0.5</td><td>4</td></tr>
<tr><td colspan="2">a<Glass Thickness</td></tr>
</table>
</td></tr>
</table>

<table>
<tr><th>No.</th><th>Item 项目</th><th>Criteria (Unit: mm) 标准</th></tr>
<tr><td>06</td><td>Glass Chipping Except Pad Area: (Minor defect) 除垫区外的玻璃切屑:(小瑕疵)
  </td><td><table><tr><td>Length and Width</td><td>Acc. Qty</td></tr><tr><td>c ≤0.6, b< 5.0</td><td>Ignore</td></tr><tr><td colspan="2">aGlass Thickness</td></tr></table></td></tr>
<tr><td>07</td><td>Glass Corner Chipping: (Minor defect) 玻璃切角:(小瑕疵)
  </td><td><table><tr><td>Length and Width</td><td>Acc. Qty</td></tr><tr><td>c < 2.0, b< 1.5</td><td>Ignore</td></tr><tr><td>c < 1.5, b< 2</td><td>Ignore</td></tr><tr><td colspan="2">a<Glass Thickness</td></tr></table></td></tr>
<tr><td>08</td><td>Glass Burr: (Minor defect) 玻璃磨:(小瑕疵)
  </td><td>Glass burr don’t affect assemble and module dimension.
<table><tr><td>Length</td><td>Acc. Qty</td></tr><tr><td>F < 0.5</td><td>Ignore</td></tr></table></td></tr>
<tr><td>09</td><td>FPC Defect: (Minor defect) FPC 缺陷:(小瑕疵)
  </td><td>9.1 Dent, pinhole width a<w/3.
(w: circuitry width.)
9.2 Open circuit is unacceptable.
9.3 No oxidation, contamination and distortion.</td></tr>
<tr><td>10</td><td>Screen deformation 屏幕上的变形
  </td><td>Test for insertion of plug gauge at highest warping point：
(3.1-6.0inches)
H≦0.3MM
The client has special requirements,according to drawing</td></tr>
</table>

<table>
<tr><th>No.</th><th>Item 项目</th><th>Criteria (Unit: mm) 标准</th></tr>
<tr><td>11</td><td>Bubble on Polarizer (Minor defect) 偏光片上的气泡(小瑕疵)</td><td>
<table>
<tr><td>Diameter</td><td>Acc. Qty</td></tr>
<tr><td>φ≤0.15</td><td>Ignore</td></tr>
<tr><td>0.15 <φ≤0.25</td><td>2</td></tr>
<tr><td>0.25 <φ≤0.3</td><td>1</td></tr>
<tr><td>0.3 < φ</td><td>0</td></tr>
</table>
</td></tr>
<tr><td>12</td><td>Dent on Polarizer (Minor defect) 偏光片上的凹痕(小瑕疵)</td><td>
<table>
<tr><td>Diameter</td><td>Acc. Qty</td></tr>
<tr><td>φ≤0.15</td><td>Ignore</td></tr>
<tr><td>0.15 <φ≤0.25</td><td>2</td></tr>
<tr><td>0.2 5<φ≤0.30</td><td>1</td></tr>
<tr><td>0.3< φ</td><td>0</td></tr>
</table>
</td></tr>
<tr><td>13</td><td>Bezel 边框</td><td>13.1 No rust, distortion on the Bezel.</td></tr>
<tr><td>14</td><td>Touch Panel 触控面板</td><td>D: Diameter W: width L: length
14.1 Spot: D≤0.20 is acceptable
0.20<D≤0.3, acceptable QTY, 3
D>0.3 is unacceptable
14.2 Dent（dot):
D≤0.20 is acceptable
0.20<D≤0.3, acceptable QTY, 3
D>0.30 is unacceptable
2dots are acceptable and the distance between defects should more than 10 mm.
Dent（line） According to the limit sample
14.3 Scratch: W≤0.03, L≤10 is acceptable,
0.03<W≤0.10, L≤10 ,acceptable QTY, 3
W>0.10 is unacceptable.
Distance between 2 defects should more than 10 mm.</td></tr>
<tr><td>15</td><td>PCB</td><td>15.1 No distortion or contamination on PCB terminals.
15.2 All components on PCB must same as documented on the BOM/component layout.
15.3 Follow IPC-A-600F.</td></tr>
<tr><td>16</td><td>Soldering 焊接</td><td>Follow IPC-A-610C standard</td></tr>
</table>

No.	Item 项目	Criteria (Unit: mm) 标准
17	Electrical Defect (Major defect) 电气缺陷(主要缺陷)	The below defects must be rejected. 17.1 Missing vertical / horizontal segment, 17.2 Abnormal Display. 17.3 No function or no display. 17.4 Current exceeds product specifications. 17.5 LCD viewing angle defect. 17.6 No Backlight. 17.7 Dark Backlight. 17.8 Touch Panel no function. 17.9 Dark Dot –one Allowed. 17.10 Bright Dot – one Allowed. Remark: 1. A pixel defect is acceptable if one color is none functional and causes a bright dot. The display may have one case where one color is out and cause a dark dot. 2. Bright dot caused by scratch and foreign object accords to item1.
18	Light leak 漏光	Yellow light OK; White light,According to the limit sample

Remark: Visual and cosmetic defects are rejectable only if these fall within the LCD viewing area.

10.5 Classification of Defects 缺陷的分类

Visual defects (Except no / wrong label) are treated as minor defect and electrical defect is major.

10.6 Identification/marking criteria 识别/评分标准

Any unit with illegible / wrong /double or no marking/ label shall be rejected.

10.7 Packing 包装

10.7.1 There should be no damage of the outside carton box, each packaging box should has label in the correct location per packing drawing requirement.

10.7.2 All direct package materials shall offer ESD protection.

11 Reliability Specification 可靠性规范

Item 项目	Condition 条件	Cycle Time 周期时间	Quantity 数量	Remark 备注
Constant Temp. and Constant Humidity Operation Test 恒温恒湿运行试验	+40 ± 3ºC,90 ± 3%RH	96hrs	--	*1
High Temp. Operation Test 高温操作试验	+70 ± 3ºC	96hrs	--	
Low Temp. Operation Test 低温操作试验	-20 ± 3ºC	96hrs	--	
Thermal Shock Test 热冲击试验	-20 ± 3ºC (30min)	10cycles	--	

	+70 ± 3ºC (30min)			
ESD Test(end product) ESD 测试(最终产品)	150pF, 330Ω, ±2KV,Contact 150pF, 330Ω, ±6KV, Air	10times	--	*2, *3
Vibration Test(for packaging) 振动测试(包装)	Frequency: 10Hz to 55Hz to10Hz,Swing:1.5mm,time：X,Y,Z each 2H.	6hrs	One inner carton	*4

Note 1. For humidity test, DI water should be used.

Inspection Standard: Inspect after 1-2hrs storage at room temperature, the sample shall be free from the following defects:

- Air bubble in the LCD
- Seal Leakage
- Non-display
- Missing Segment
- Glass Crack
- IDD is greater than twice initial value.
- Others as per QA Inspection Criteria

Note 2. No defect is allowed after testing

The End Product ESD value is only indicative and depends on customer ESD protection design for the whole system.

Note 3. ESD should be applied to LCD glass panel, not other areas (such as on IC and so on) IDD should be within twice initial value.

In case of malfunction defect caused by ESD damage, if it would be recovered to normal state after resetting, it would be judged as a good part.

Note 4. Only upon request.

12 Precautions and Warranty 注意事项和保证

12.1 Safety 安全

12.1.1 The liquid crystal in the LCD is poisonous. Do not put it in your mouth. If the liquid crystal touches your skin or clothes, wash it off immediately using soap and water.

12.1.2 Since the liquid crystal cells are made of glass, do not apply strong impact on them. Handle with care.

12.2 Handling 处理

12.2.1 Reverse and use within ratings in order to keep performance and prevent damage.

12.2.2 Do not wipe the polarizer with dry cloth, as it might cause scratch. If the surface of the LCD needs to be cleaned, wipe it swiftly with cotton or other soft cloth soaked with petroleum IPA, do not use other chemicals.

12.3 Operation 操作

12.3.1 Do not drive LCD with DC voltage

12.3.2 Response time will increase below lower temperature

12.3.3 Display may change color with different temperature

12.3.4 Mechanical disturbance during operation, such as pressing on the display area, may

cause the segments to appear “fractured”.

12.4 Static Electricity 静电

12.4.1 CMOS LSIs are equipped in this unit, so care must be taken to avoid the electro-static charge, by ground human body, etc.

12.4.2 The normal static prevention measures should be observed for work clothes and benches.

12.4.3 The module should be kept into anti-static bags or other containers resistant to static for storage.

12.5 Limited Warranty 有限质量保证

12.5.1 Unless otherwise agreed between Tailorpixels and customer, Tailorpixels will replace or repair any of its LCD and LCM which Tailorpixels found to be defective electrically and visually when inspected in accordance with Tailorpixels Quality Standards, for a period of one year from date of shipment.

12.5.2 The warranty liability of Tailorpixels is limited to repair and/or replacement. Tailorpixels will not be responsible for any consequential loss.

12.5.3 If possible, we suggest you use up all modules in six months. If the module storage time over twelve months, we suggest that recheck it before the module be used.

13 Packaging 包装

TBD

14 Prior Consult Matter 免责声明

1. For **HongzhanZhixian** standard products, we keep the right to change material, process for improving the product property without prior notice to our customer.

2. For OEM products, if any changes are needed which may affect the product property, we will consult with our customer in advance.

3. If you have special requirement about reliability condition, please let us know before you start the test on our samples.

Reference 参考

Item 项目	Description 描述	Revision 修订
GC9A01	IC Data sheet	V0
Panel 1.28 寸 240X240	LCM assembly drawing	V0