

UART 接口 TFT 模组数据手册

UART Interface TFT Module Data Manual

初定规格 Preliminary specification

正式规格 Official specifications

项目编号 Project No.	HTM-TFT043A07-EZUI HTM-TFT043A07-EZUI_CTP
产品描述 Product Description	TFT LCD Module 480 x 3RGB x 800 Dots 4.3 Inch TFT LCD

客户确认签章:
Signature by customer:

小批量试产 Trial production 大批量生产 Mass production

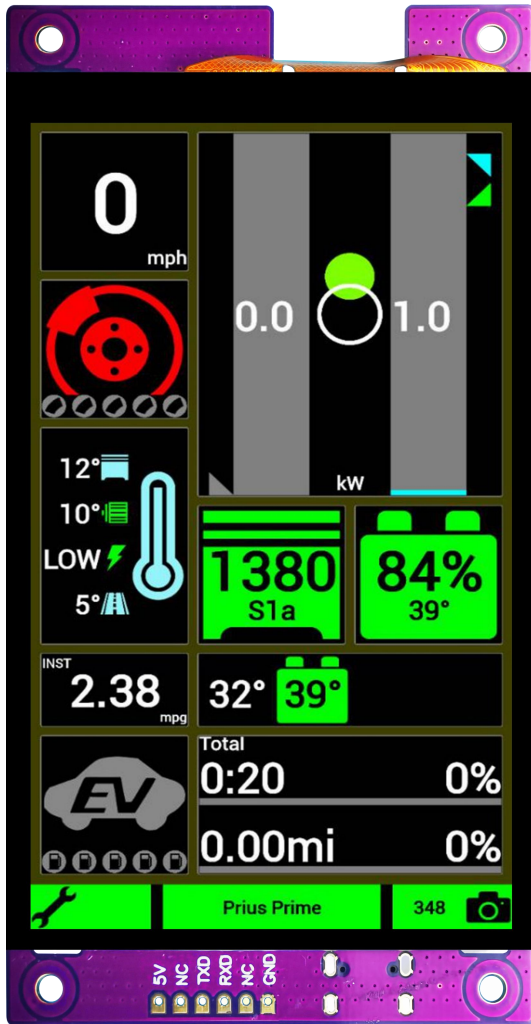
请返回一份带有您的签名和评论的确认副本

Please return one copy confirmation with signature and your comments

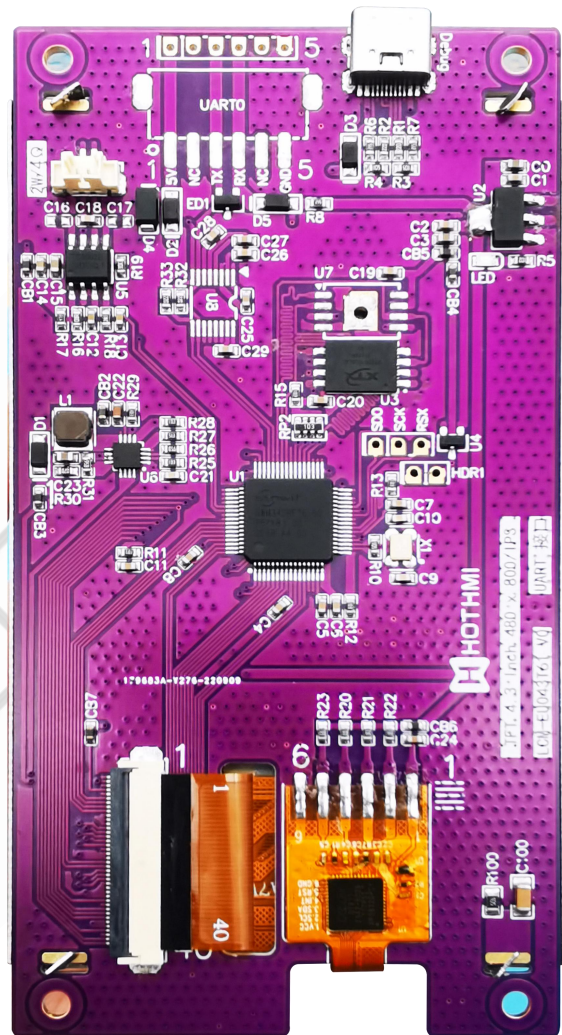
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正面/Front



背面/Rear

HTM-TFT043A07-EZUI_CTP

一、基本特征 General Feature:

EZUI 系列彩色液晶模块为鑫洪泰研发、生产销售的智能型人机界面显示模块；触摸版 EZUI 系列模块基于 TFT 显示屏及触摸屏整合了自成体系的 GUI 系统，结合界面开发工具软件（EzUITool）可实现用户界面设计无代码的目标。

EZUI series color LCD modules are intelligent human-computer interface display modules developed, produced and sold by HOTMI; The touch-screen EZUI series modules integrate a self-contained GUI system based on TFT display and touch screen, and can achieve the goal of codeless user interface design by combining with the interface development tool software (EzUITool).

EZUI 系列默认接口为 UART，可为用户扩展为 RS232, RS485, CAN 等接口。

The default interface of EZUI series is UART, which can be extended to RS232, RS485, CAN and other interfaces for users.

EZUI 系列模块最大的特色为使用简便、功能丰富，用户对其使用可简可繁。用户可以使用界面开发工具软件（EzUITool）进行人机界面的设计、编辑、控件配置、响应设置等，将工具软件生成的资源文件复制到 EZUI 系列模块之中，便可达成所需人机交互界面的设计制作，而无需用户单片机或其它控制器的编程控制。而为满足有特殊要求的用户，EZUI 系列模块还保留有串口显示控制指令（如绘直线、矩形、圆、字符串显示等），以便于用户可以更自由的对模块显示进行直接控制。

The greatest feature of EZUI series modules is that they are easy to use and rich in functions, and users can use them simply or complicatedly. The user can use the interface development tool software (EzUITool) to design, edit, control configuration, response settings, etc. of the human-computer interface, copy the resource file generated by the tool software into EZUI series modules, and then achieve the design and production of the required human-computer interaction interface without the programming control of the user's microcontroller or other controllers. In order to meet users with special requirements, EZUI series modules also retain serial display control instructions (such as drawing straight lines,

rectangles, circles, string displays, etc.), so that users can more freely control the module display directly.

EZUI 系列模块 (UART 串口版本) 具备以下特性:

- UART 串行接口 (TTL 电平/RS232 电平) 方式, 支持 9600~1000000bps;
- 标准版模块内置 1G 位 (120M bytes 可用) 大小的资源存储器;
- **选配 RTC 实时时钟模块;**
- 模块内部自带 6×10、8×16、10×20、16×32 点 ASCII 码西文字库;
- 支持基本绘图指令 (绘点、直线、矩形、圆形、字符串显示、位图显示、Jpeg 图片显示等);
- 资源文件支持加载点阵字库 (GBK2312 二级汉字库、ASCII 西文字库等) ;
- 资源文件支持加载 BMP 位图、Jpeg 图片;
- 支持矢量字库 (多国语言、抗锯齿效果) ;
- 支持界面切换效果设置, 如透明度渐入、随机快渐入、百叶窗渐入、缓冲区快速切换;
- 支持区域按钮控件, 多种属性配置, 控件消息响应可配置;
- 支持位图按钮控件, 多种属性配置, 控件消息响应可配置;
- 支持数值控件 (整数、浮点数均可), 多种属性配置, 支持数值输入, 支持数据关联同步;
- 支持字符串控件 (中英文均可), 多种属性配置, 支持中英文字符串输入;
- 支持下拉选择控件, 控件消息响应可配置, 支持数据关联同步;
- 支持波形控件, 允许同一 ID 号控件内最多四条波形线, 支持柱形图显示;
- 支持进度条控件, 控件消息响应可配置, 支持叠加显示数值/字符串控件, 支持数据关联同步;
- 支持位图动画控件, 控件消息响应可配置, 支持数据关联同步, 支持配置图片外置资源文件;
- 支持时间显示、日期显示控件;
- 支持表盘显示控件, 支持数据关联同步;
- 支持滑动条控件, 控件消息响应可配置, 支持数据关联同步;
- 支持二维码显示控件, 二维码生成版本及纠错等级自动选择, 自动放大显示;
- 电容触摸版本模块支持触屏切换界面。

EZUI series modules (UART serial port version) have the following features:

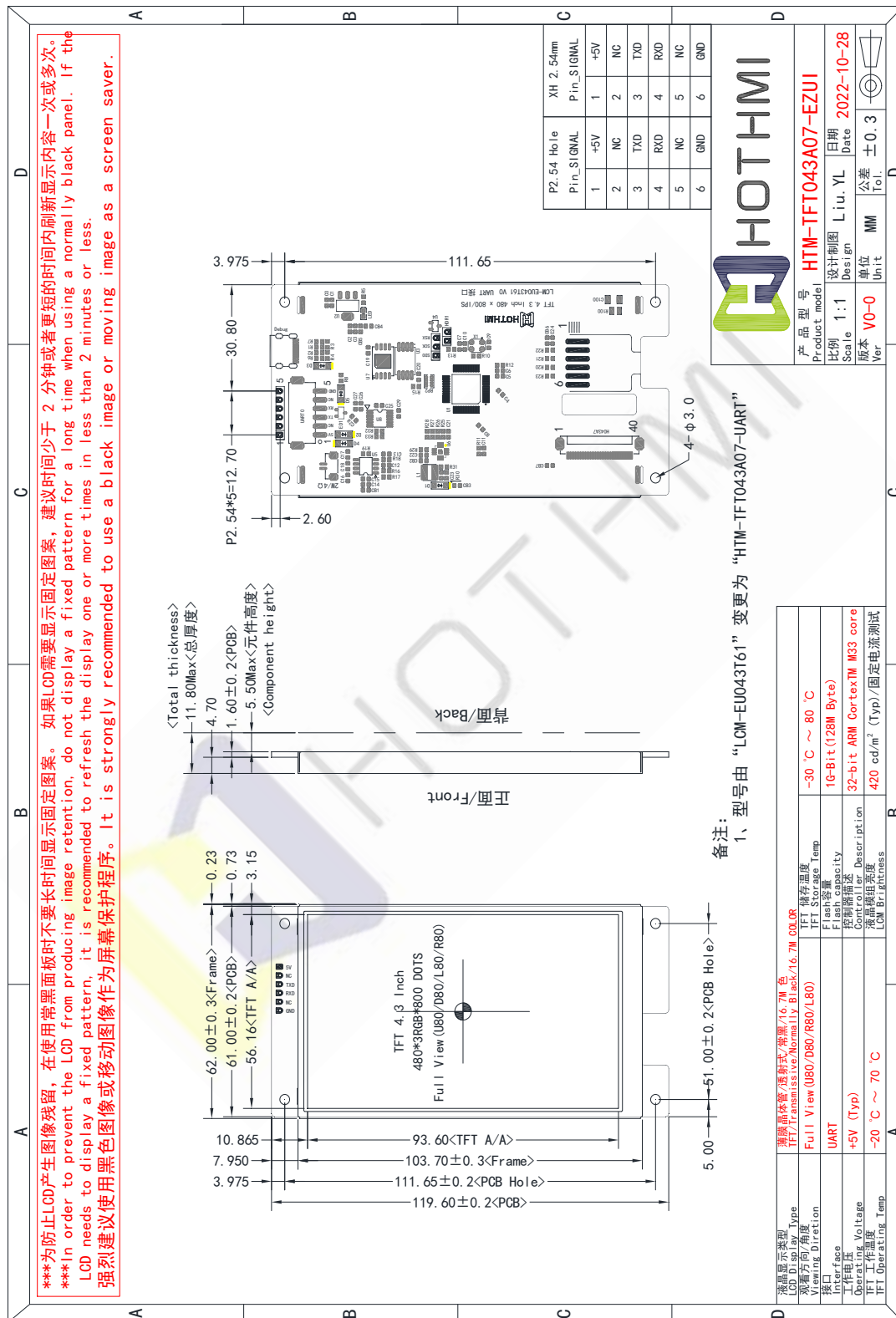
- UART serial interface (TTL level/RS232 level) mode, supporting 9600~1,000,000bps;
- A 1G bit (120M bytes available) resource memory is built in the standard module;
- Optional RTC real-time clock module;
- Internal 6 of the module × 10、8 × 16、10 × 20、16 × 32 point ASCII Western character library;

- Support basic drawing instructions (drawing points, lines, rectangles, circles, string display, bitmap display, Jpeg image display, etc.);
- The resource file supports the loading of dot matrix character library (GBK2312 level II Chinese character library, ASCII western character library, etc.);
- The resource file supports loading BMP bitmaps and Jpeg images;
- Support vector font (multi language, anti aliasing effect);
- Support interface switching effect settings, such as transparency gradual entry, random quick gradual entry, shutter gradual entry, and buffer quick switching;
- Support regional button controls, multiple attribute configurations, and configurable control message response;
- Support bitmap button control, multiple attribute configurations, and configurable control message response;
- It supports numerical control (both integer and floating point), multiple attribute configurations, numerical input and data association synchronization;
- Support string control (both in Chinese and English), multiple attribute configurations, and support Chinese and English string input;
- Support pull-down selection control, configurable control message response and data association synchronization;
- Support waveform control, allow up to four waveform lines in the same ID number control, and support column chart display;
- Support progress bar control, configurable control message response, overlapping display of numerical/string control, and data association synchronization;
- Support bitmap animation control, configurable control message response, data association synchronization, and configuration of image external resource files;
- Support time display and date display controls;
- Support dial display control and data association synchronization;
- Support sliding bar control, configurable control message response and data association synchronization;
- Support QR code display control, and automatically select the QR code generation version and error correction level, and automatically enlarge the display;
- Capacitance touch version module supports sliding screen switching interface.

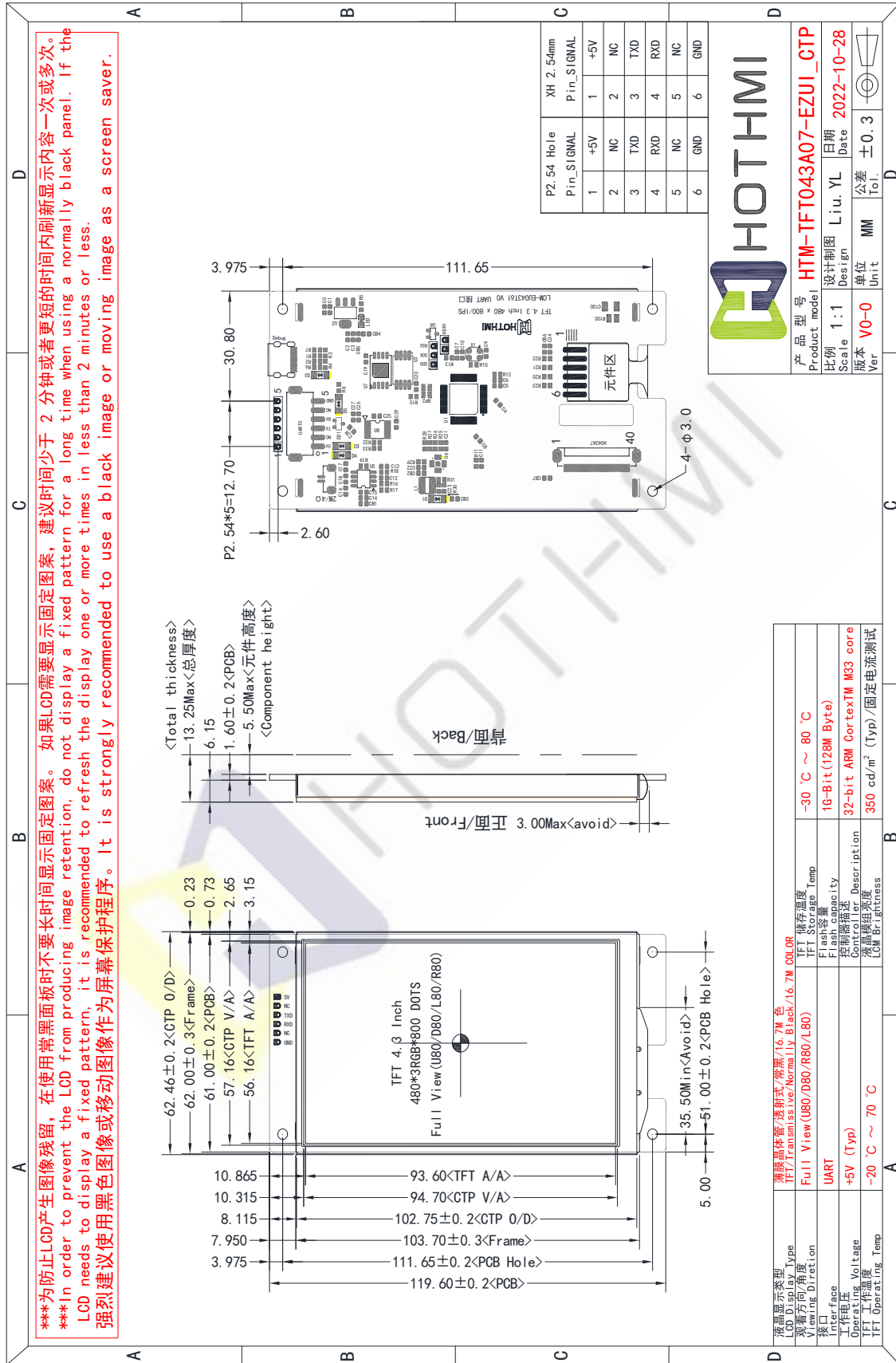
项目 Item	标准值 Standard Value			单位 Unit
显示尺寸 Display Size	4.3			英寸 Inch
色彩深度 Color depth	65K (565 16Bit)			色 Color
分辨率 Number of Pixels	480 (H) * 3(RGB) * 800 (V)			点 dots
显示区域 Active Area	56.16 (H) * 93.60 (V)			毫米 mm
外形尺寸 Outline Dimension	62.46 (H) * 119.60 (V) * 11.80 (D) <HTM> 62.46 (H) * 119.60 (V) * 13.25 (D) <HTM+CTP>			毫米 mm
观看方向 Viewing Direction	全 视角 FULL 0'clock			-
端口 Interface	UART (TTL)			-
驱动电压 Driver Condition	VDD=5.0V/1A (Typ)			伏 V
触摸屏 Touch Panel	<input checked="" type="checkbox"/> 不带触摸屏 Whitout TP	<input type="checkbox"/> 带电阻触摸屏 Whit RTP	<input type="checkbox"/> 带电容触摸屏 Whit CTP	-
TFT 液晶工作温度 Operation Temperature	-20 ~ 70			摄氏度 ℃
TFT 液晶储存温度 Storage Temperature	-30 ~ 80			摄氏度 ℃

注释 Note:

二、外形尺寸 Outline Dimensions



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三、引脚说明 Pin Description

3.1 模组引脚说明 TFT Pin Description

引脚编号 Pin NO.	标号 Symbol	详细描述 Description
1	+5V	5V 电源输入 5V power input
2	NC	不连接 Not connected
3	TXD	模组 UART 数据发送端口 Module UART data sending port
4	RXD	模组 UART 数据接收端口 Module UART data receiving port
5	NC	不连接 Not connected
6	GND	电源地 Power supply ground
- 结束 - - END -		

注释 Note:

四、电气特性 Electrical Characteristics

4-1 模组工作条件 Module Operating Conditions

项目 Item	标号 Symbol	条件 Condition	最小值 Min	典型值 Type	最大值 Max	单位 Unit
输入电压 Input voltage	VIN	-	-0.3	-	18	伏 V
工作电压 Forward Voltage	VDD	-	-0.3	-	5.5	伏 V

注释 Note:

1. 超过上面列出的极限值可能会导致驱动 IC 永久损坏。这些值仅用于测试。IC 应在芯片特性条件下正常运行。如果不满足这些条件，IC 操作可能会出错，可靠性可能会下降。

That the exceeds the Limiting Value listed above it may cause the driver IC permanent damage. These values are for test only. IC should be operated under the Chip Characteristic conditions for normal operation. If these conditions are not met, IC operation may be error and the reliability may be deteriorated.

2. 参数在工作温度范围内有效，除非另有说明。除非另有说明，所有电压均相对于 GND。

Parameters are valid over operating temperature range unless otherwise specified. All voltages are with respect to GND unless otherwise noted.

3. 面板显示质量取决于面板负载，在低温/高温下可能有不同的性能。

Panel display quality depends on panel loading, and it may have the different performance at low/high temperature.

4-2 TFT 模组工作条件 TFT Module Operating Conditions

项目 Item	标号 Symbol	条件 Condition	最小值 Min	典型值 Type	最大值 Max	单位 Unit
输入电压 Input voltage	VIN	-	0.9*VDD	-	VDD	伏 V
工作电压 Forward Voltage	VDD	-	-	5.0	-	伏 V
工作电流 Forward current	IF	-	-	-	-	毫安 mA
待机电流 Standby Current	Isc	-	-	-	-	微安 uA

4-3 背光工作条件 LED back light specification

项目 Item	标号 Symbol	条件 Condition	最小值 Min	典型值 Type	最大值 Max	单位 Unit
工作电压 Forward voltage	VF	If=3.2V/20mA /1-chip	-	-	-	伏 V
工作电流 Forward current	IF		-	-	-	毫安 mA
亮度 (带 LCD) Luminance (With LCD)	Lv	Without TP	-	420	-	坎德拉/平方米 cd/m ²
		With TP	-	350	-	
LED 寿命 LED life time	Hr	Ta=25±3 °C	20,000	30,000	-	小时 Hour

注释 Note:

1. LED 寿命 (Hr) 定义为在 Ta=25±3 °C, 上表所示的典型电压电流值条件下持续工作直至亮度低于 50% 的时间。

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%.

2. 以上结果是按 MTBF 计算方式预估判定的 LED 失效时间, 实际测试 LED 在 Ta=25±3 °C 点亮 5000H, 亮度衰减 8%.

The above results are estimated and judged by the MTBF calculation method of the LED failure time. The actual test LED is lit for 5000H at Ta=25±3 °C, and the brightness decays by 8%.

五、可靠性测试 RELIABILITY TEST

5-1 温度和湿度 Temperature and Humidity

测试项目 TEST ITEMS	条件 CONDITIONS	注释 NOTE
高温储存 High Temperature Storage	Ta=+80 o C, 120hrs	
低温储存 Low Temperature Storage	Ta=-30 o C, 120hrs	
高温运行试验 High Temperature Operation	Ta=+70 o C, 120hrs	
低温运行试验 Low Temperature Operation	Ta=-20 o C, 120hrs	
高温高湿（运行测试） High Temperature and High Humidity (Operating)	Ta=+60 o C, 90%RH, 120hrs	

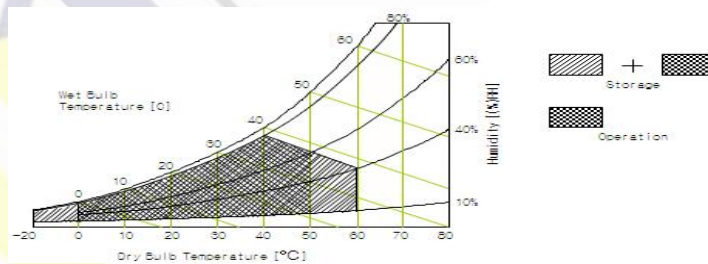
注释 Note:

1. 液晶驱动电压。由于液晶材料的特性，该电压随环境温度而变化。

Liquid Crystal driving voltage. Due to the characteristics of LC Material, this voltage varies with environmental temperature.

2. 温度和相对湿度范围如下图所示。湿球温度最高应为39℃。并且没有冷凝水。

Temperature and relative humidity range are shown in the figure below. Wet bulb temperature should be 39 °C max. and no condensation of water.



3. 产品经可靠性测试后，仅保证功能正常，无任何致命缺陷（不显示、线路缺陷、显示异常等）。

After the reliability test, the product only guarantee function normally without any fatal defect (non-display, line defect, abnormal display etc).

4. 所有显示判断均在面板温度恢复到室温后进行

All judgments of display are performed after temp of panel returns to room temperature

5. Ta: 环境温度

Ta: Ambient temperature

5-2 冲击和振动 Shock and Vibration

测试项目 TEST ITEMS	条件 CONDITIONS
包装冲击(非操作) Packing Shock (Non-Operation)	<ul style="list-style-type: none"> ● Shock level:980m/s² ● Waveform:1/2 Sine wave,6msec ● ±X, ±Y ±Z, each axis 1 times
包装振动(非操作) Packing Vibration (Non-Operation)	<ul style="list-style-type: none"> ● Frequency range:8-33.3HZ ● Stoke:1.0mm ● Sweep: 10Hz-50Hz ● x, y, z 2 hours for each direction

5-3 静电放电测试 Electrostatic Discharge

测试项目 TEST ITEMS	条件 CONDITIONS
ESD (Non-operation)	150pF, 330 Ω, Contact ±4KV, Air : ±8KV. Note 1
	200pF, 0 Ω, ±200V Contact test. Note 2

测量点 Measure Point:

1. LCD玻璃和金属边框
LCD glass and metal bezel
2. 连接器引脚
IF connector pins

八、处理和注意事项 HANDLING & CAUTIONS

8-1 操作注意事项 Caution For Operation

◆由于液晶模组是玻璃材质，请勿对其施加强烈的机械冲击或静载荷。请小心搬运，因为冲击、振动和粗心的搬运可能会严重影响产品。如果从高处坠落或受到强烈冲击，玻璃可能碎了。

Since the LCM is made of glass, do not apply strong mechanical impact or static load onto it. Handling with care since shock, vibration, and careless handling may seriously affect the product. If it falls from a high place or receives a strong shock, the glass maybe broken.

◆在规定的电压限制内驱动 LCM 是必不可少的，因为高于限制的电压会导致 LCM 的寿命缩短。由直流引起的电化学反应会导致 LCM 出现不良劣化，因此应避免使用直流驱动。

It is indispensable to drive the LCM within the specified voltage limit since the higher voltage than the limit causes LCM's life shorter. An electro-chemical reaction due to DC causes undesirable deterioration of the LCM so that the use of DC drive should avoid.

◆请勿在电源开启时将 LCM 连接到系统或从系统断开连接。

Do not connect or disconnect the LCM to or from the system when power is on.

◆切勿在高温高湿的异常条件下使用 LCM。

Never use the LCM under abnormal conditions of high temperature and high humidity.

◆当暴露于剧烈的温度波动（热到冷或冷到热）时，LCM可能会受到影响；具体来说，从冷到热的剧烈温度波动会在 LCM 表面产生露水，这可能会影响 LCM 上偏振片的运行。

When expose to drastic fluctuation of temperature (hot to cold or cold to hot), the LCM may be affected; specifically, drastic temperature fluctuation from cold to hot, produces dew on the LCM's surface which may affect the operation of the polarizer on the LCM.

◆在低于工作温度范围的温度下，响应时间将极度延迟，另一方面，在高于其工作范围的温度下，LCM 可能会变黑。然而，这些现象并不意味着 LCM 出现故障或故障。一旦温度恢复到正常运行的推荐温度范围，LCM 将恢复正常运行。

Response time will be extremely delay at lower temperature than the operating temperature range and on the other hand LCM may turn black at temperature above its operational range. However those phenomenon do not mean malfunction or out of order with the LCM. The LCM will revert to normal operation once the temperature returns to the recommended temperature range for normal operation.

◆为防止LCD产生图像残留，在使用常黑面板时不要长时间显示固定图案。如果LCD需要显示固定图案，建议时间少于 2 分钟或者更短的时间内刷新显示内容一次或多次。强烈建议使用黑色图像或移动图像作为屏幕保护程序。

In order to prevent the LCD from producing image retention, do not display a fixed pattern for a long time when using a normally black panel. If the LCD needs to display a fixed pattern, it is recommended to refresh the display one or more times in less

than 2 minutes or less. It is strongly recommended to use a black image or moving image as a screen saver.

◆强烈的光照会导致 LCD 偏光片和彩色滤光片退化。 不准在强光或高温高湿下长期存放或直接运行。

Strong sunlight can cause LCD polarizers and color filters to degrade. Long-term storage or direct operation under strong light or high temperature and humidity is not allowed.

8-2 防静电措施 Caution Against Static Charge

◆LCM 使用 C-MOS LSI 驱动器，因此建议客户将任何未使用的输入端连接到 Vdd 或 Vss，上电前不要输入任何信号，并将您的身体、工作/装配区、装配设备接地 防止静电。

The LCM 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.

◆缓慢去除保护膜，保持去除方向与面板表面不垂直约 30 度，如有可能，在离子风机等 ESD 控制装置下，工作室内湿度应保持在 50%RH 以上，以减少静电风险

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.

◆避免使用合成纤维制成的工作服。 我们推荐棉质衣服或其他经过导电处理的纤维。

Avoid the use work clothing made of synthetic fibers. We recommend cotton clothing or other conductivity-treated fibers.

◆在处理 LCM 时，请戴上不带电材料的手套。 对地导电手腕和对地导电鞋是必需的

In handling the LCM, wear non-charged material gloves. And the conducting wrist to the earth and the conducting shoes to the earth are necessary

鑫洪泰 TFT 模组命名方式

鑫洪泰模组	-	TFT英寸	A:标准品 B:半定制 C:全定制	流水号	-	SPI MCU LVDS MIPI HDMI VGA EZUI	扩展功能 _CTP _RTP _USBCTP	-	版本号
HTM	-	TFT043	A	07	-	EZUI		-	V0.0

文档修订记录 Document revision history :

版本 Version	日期 DATE	修改说明 Modify description	编制 PREPARED BY
0-0	2022-11-07	初次编制 First compilation.	YL

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