

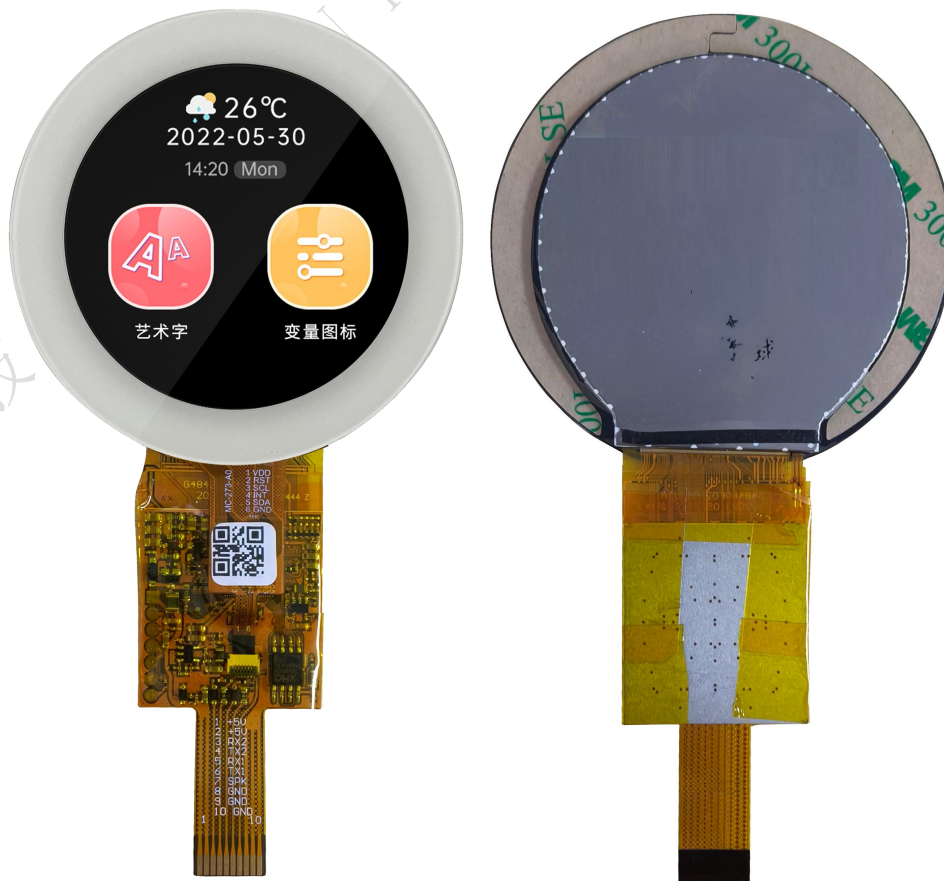
# DMG48480F021\_06WTCZ01

## 产品概述:

- 基于 T5L0-Q88 芯片，运行 DGUS II 系统。
- 2.1 英寸，480\*480 分辨率，IPS 圆形液晶屏，宽视角。
- 全贴合工艺电容触摸屏，白色盖板。
- COF 结构，智能屏的整个核心电路整合在液晶模组 FPC 上，适合结构要求轻、薄，成本要求苛刻，生产简单的应用。

## Features:

- Powered by T5L0-Q88 ASIC, running DGUS II HMI platform.
- 2.1-inch, 480\*480 resolution, IPS circular LCD , Wide viewing angle.
- Full-laminated CTP, White cover plate.
- COF structure. The entire core circuit of the smart screen is fixed on the FPC of LCM, featured by light and thin structure, low cost and easy production.



## 1 外部接口 External Interface

| 序号<br>PIN | 定义<br>Definition | 类型<br>Type | 功能描述<br>Functional Description                                    |
|-----------|------------------|------------|---|
| 1         | +5V              | P          | 供电输入, DC4.5-5.5V<br>Power supply, DC4.5-5.5V                      |
| 2         | +5V              |            |   |
| 3         | RX2              | I          | 串口 2 输入<br>UART2 DIN  |
| 4         | TX2              | O          | 串口 2 输出<br>UART2 DOUT   |
| 5         | RX1              | I          | 串口 1 输入<br>UART1 DIN  |
| 6         | TX1              | O          | 串口 1 输出<br>UART1 DOUT   |
| 7         | SPK              | O          | 外接 MOSFET 驱动蜂鸣器或扬声器<br>External MOSFET to drive buzzer or speaker |
| 8         | GND              | P          | 公共地<br>GND  |
| 9         | GND              |            |   |
| 10        | GND              |            |   |

## 2 规格参数 Specification Parameters

### 2.1 产品参数 Product Parameters

|                                |   |
|--------------------------------|---|
| 主控芯片<br>Main Chip              | T5L0-Q88  |
| 用户接口方式<br>User Interface       | 10Pin_1.0mm FPC   |
| FLASH                          | 8M Bytes  |
| UI 版本<br>UI Version            | DGUS II / TA  |
| 供电方式<br>Power Supply           | HDL662K 转接板供电<br>HDL662K adapter board power supply   |
| 尺寸<br>Dimensions               | 2.1 英寸<br>2.1-inch  |
| 分辨率<br>Resolution              | 480*480   |
| 有效显示区域<br>Active Area (AA)     | 53.28mm (W)×53.28mm (H)   |
| 可视区域<br>Viewing Area (VA)      | 53.88mm (W)×53.88mm (H)   |
| 可视角度 L/R/U/D<br>Viewing Angle  | IPS 宽视角, 典型值 85°/85°/85°/85° (L/R/U/D)<br>IPS wide viewing angle, 85°/85°/85°/85° (L/R/U/D)   |
| 背光寿命<br>Backlight Service Life | > 10,000 小时<br>> 10,000 hours   |
| 亮度<br>Brightness               | 350nit  |
| 亮度调节<br>Brightness Control     | 100 级亮度调节 (当亮度调节至最高亮度的 1%~30%时, 可能出现闪烁现象, 不建议在此范围使用)<br>100-level brightness adjustment (Flickering may occur at 1%-30% of max brightness; not recommended for use in this range) |
| 触摸屏类型<br>Type                  | 电容式触摸面板<br>Capacitive touch panel   |
| 触摸屏结构<br>Structure             | G+FF 结构, 表层为钢化玻璃, 玻璃硬度≥6H<br>G+FF structure with tempered glass surface and hardness ≥ 6H   |
| 透光率<br>Light Transmittance     | >85%  |

## 2.2 串口参数 Interface Parameters

| 参数<br>Item                    | 测试条件<br>Conditions                                  | 最小值<br>Min | 典型值<br>Typ | 最大值<br>Max | 单位<br>Unit |
|-------------------------------|---|------------|------------|------------|------------|
| 串口波特率<br>Baud rate            | 用户自定义（硬件配置文件设置）<br>User Set(Configure the CFG file) | 3150       | 115200     | 3225600    | bps        |
| 串口输出电平<br>Output Voltage(TXD) | Output 1  | 3.0        | 3.3        | -          | V          |
|                               | Output 0  | -          | 0          | 0.3        | V          |
| 串口输入电平<br>Input Voltage(RXD)  | Input 1   | -          | -          | 3.3        | V          |
|                               | Input 0   | 0          | -          | 0.5        | V          |
| 串口模式<br>Interface             | UART1: TTL<br>UART2: TTL                            |            |            |            |            |
| 数据格式<br>Data Format           | N81   |            |            |            |            |

## 2.3 电气规格 Electrical specifications

|   |   |   |
|---|---|---|
| 额定功率<br>Rated Power   | <2W   |   |
| 工作电压<br>Operating Voltage                                   | 4.5~5.5V, 典型值 5V<br>4.5~5.5V, typical value of 5V |   |
| 工作电流<br>Operating Current                                   | 160mA   | VCC=5V, 背光亮度最大<br>VCC=5V, max backlight |
|   | 90mA  | VCC=5V, 背光关闭<br>VCC=5V, backlight off   |
| 推荐工作电源: 5V 1A 的直流稳压电源<br>Recommended power supply: 5V 1A DC |   |   |

## 2.4 工作环境 Operating Environment

|                               |  |
|-------------------------------|--|
| 工作温度<br>Operating Temperature | -10℃~60℃ (5V @ 60% RH)                                     |
| 存储温度<br>Storage Temperature   | -20℃~70℃   |
| 工作湿度<br>Operating Humidity    | 10%~90%RH, 典型值 60%RH<br>10%~90%RH, typical value of 60% RH |

### 3 可靠性测试 Reliability Test

#### 3.1 静电放电 ESD 测试 ESD Test

测试环境温度：25°C，测试环境湿度：50%RH。

Test temperature: 25°C. Test humidity: 50%RH.

测试过程：将产品放置在测试台面的测试工装上（测试工装高度约 15cm），针对智能屏进行接触放电和空气放电测试，实验过程观察屏幕有无死机、黑屏、白屏、花屏、重启等异常现象。

Test process: Place the product on the test bench fixture (approximately 15cm in height), and perform contact and air discharge tests on the smart LCM. Observe if any freezing, black or white screen, flickering, or rebooting occurs during the test.

测试结论：产品 ESD 性能达到 GB/T 17626.2 B 级。

Test conclusion: The product's ESD performance meets GB/T 17626.2 Class B standards.

| 放电类型<br>Discharge Type | 放电值<br>Discharge Value | 结果<br>Result             |
|------------------------|------------------------|--------------------------|
| 空气放电<br>Air discharge  | ±8KV                   | 正常工作<br>Normal operation |

#### 3.2 高低温储存测试 High and Low Temperature Test

试验环境温度：-20~70°C

Test temperature:-20~70°C

试验过程：将产品斜置放在高低温测试箱内，测试时间 12H，进行 20 次开机、关机循环，自然恢复至常温后上电检查外观及功能，电容屏无偏移、跳点、乱跳和失效等问题。

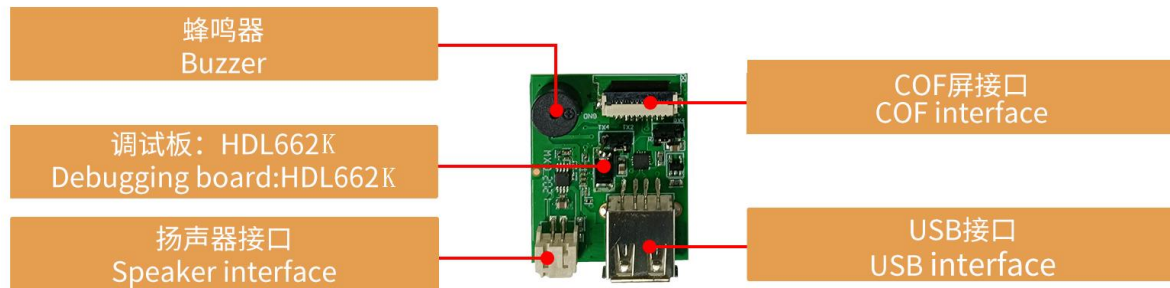
Test process: the product will be placed obliquely in the high and low temperature test chamber for 12h for 20 on and off cycles. Then it will be check at room temperature after power on for the appearance and function, CTP offset situation, jumping point, page random switching and failure.

| 温度<br>Temperature                   | 结果<br>Result             |
|-------------------------------------|--------------------------|
| 高温（70°C）<br>High temperature（70°C）  | 正常工作<br>Normal operation |
| 低温（-20°C）<br>Low temperature（-20°C） | 正常工作<br>Normal operation |

## 4 调试工具 Debug tools

建议首次使用迪文智能屏的用户购买测试套件。详细信息可联系客服人员。

It is recommended for new users of DWIN smart LCMs to purchase official accessories. For more details, please refer to customer service center.



请注意调试板与 COF 屏线序，请勿反接。

Please pay attention to the wiring sequence between the debugging board and the COF screen, do not reverse connect.

## 5 T5L0-Q88 主控芯片 T5L0-Q88 ASIC

T5L0-Q88 ASIC 是迪文科技针对小尺寸液晶应用显示而设计的小封装、低功耗、低成本、GUI 和应用高度整合的单芯片双核 ASIC，2023 年正式量产。

T5L0-Q88 ASIC is a small package, low-power, cost-effective, GUI and application highly integrated single-chip dual-core ASIC designed by DWIN Technology for small-size LCD and mass produced in 2023.

- (1) 采用应用最广泛、成熟和稳定的 8051 核，1T（单指令周期）高速工作，最高主频 400MHz。

Mature and stable 8051 core which is the most widely used with the maximum operating frequency of T5L is up to 400MHz, 1T(single instruction cycle)high speed operation.

- (2) 单独 CPU 核（GUI CPU）运行 DGUS II 系统：

Separate GUI CPU core running DGUS II System:

- 内置高速显存，2.4GB/S 带宽，18bit 彩色显示分辨率支持到 1024\*768（TA 模式），854\*480（DGUS 模式）。  
High-speed display memory, 2.4GB/S bandwidth. 18-bit color display resolution support up to 1024\*768 (TA mode), 854\*480 (DGUS mode).
- 2D 硬件加速，动画和图标为主的 UI 极其炫酷、流畅。  
2D hardware acceleration and the UI with animation and icons as its main feature is extremely cool and smooth.
- JPEG 压缩模式存储图片、图标，大幅度缩小外置存储器到低成本的 16Mbytes SPI Flash。  
Images and icons stored in JPEG format. Adopt Low-cost 16Mbytes SPI Flash.
- 高品质语音压缩存储和播放。  
High quality ratio and sound restoration and playback.
- 128Kbytes 变量存储器空间，存储器接口和 OS CPU 核交换数据，应用简单。  
128Kbytes variable storage space for exchanging data with OS CPU Core and memory.
- 2 路 10bit 800KHz DC/DC 控制器，简化 LED 背光、模拟电源设计并节约成本和空间。  
2 10-bit 800KHz DC/DC controllers simplify LED backlight, analog power design and save cost and space.
- 支持 PC 端组态开发和仿真，支持后台远程升级。  
Support DGUS development and simulation on PC. Support backend remote upgrade.

- (3) 单独 CPU 核（OS CPU）运行用户 8051 代码或迪文 DWIN OS 系统，应用中省掉用户 CPU：

Separate CPU (OS CPU) core runs user 8051 code or DWIN OS system and user CPU is omitted in practical application:

- 标准 8051 架构和指令集，64Kbytes 代码空间，32Kbytes 片内 RAM。  
Standard 8051 core and instruction set, 64Kbytes code space, 32Kbytes on-chip RAM.
- 64bit 整数型数学运算单元（MDU），包括 64bit MAC 和 64bit 除法器。

64-bit integer mathematical operation unit (MDU), including 64-bit MAC and 64-bit divider.

- 15 个 IO, 4 路 UARTs, 1 路 CAN 接口, 最多 8 路 12bit A/D, 2 路 16bit 分辨率可调的 PWM。

15 IOs, 4-channel UARTs, 1-channel CAN, up to 8-channel 12-bit A/Ds and 2-channel 16-bit PWM of adjustable resolution.

- 支持 IAP 在线仿真和调试, 断点数量无限制。

Support IAP online simulation and debugging with unlimited breakpoints.

- 可以透过 DGUS 系统在线升级代码。

Upgrade code online through DGUS system.

- (4) 1Mbytes 片内 Flash, 迪文专利加密技术, 确保代码和数据安全, 杜绝山寨和克隆。

1Mbytes on-chip Flash with DWIN patent encryption technology ensure code and data security.

- (5) -40℃~+85℃工作温度范围 (可定制-55℃~105℃工作温度范围 IC)。

Operating temperature ranges from -40℃ to +85℃ (IC operating temperature customizable from -55℃ to 105℃).

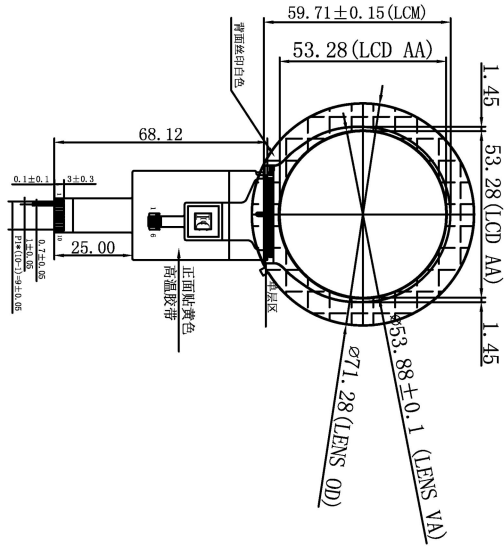
迪文欢迎广大用户基于 T5L 自主设计客制化产品。

DWIN encourages users to design your own customized product based on T5L.

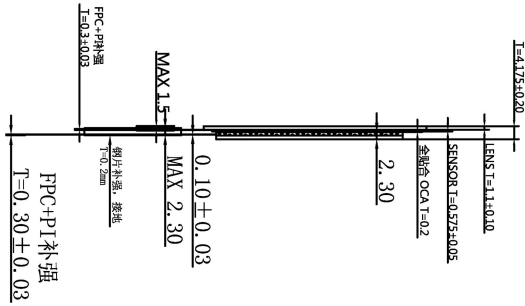


## 6 包装和物理尺寸 Packing Capacity & Dimension

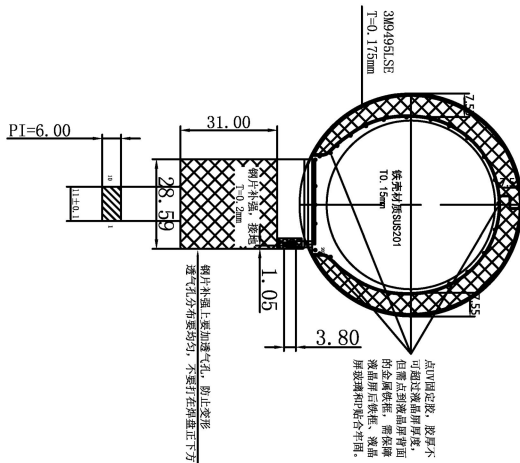
| 尺寸<br>Dimension          |                                |                |                           |                         |
|--------------------------|--------------------------------|----------------|---------------------------|-------------------------|
| 外形尺寸<br>Dimension        | 71.28(W) ×71.28(H) ×4.18(T) mm |                |                           |                         |
| 净重量<br>Net Weight        | 30g                            |                |                           |                         |
| 包装标准<br>Packing Capacity |                                |                |                           |                         |
| 包装箱型号<br>Model           | 包装箱尺寸<br>Size                  | 层数（层）<br>Layer | 数量/层（片）<br>Quantity/Layer | 总数量（片）<br>Quantity(Pcs) |
| 纸箱<br>Carton:            | 450mm(L)×355mm(W)×250mm(H)     | 4              | 25                        | 100                     |



正视图



侧视图



背视图

液晶用PIN 定义

| PIN# | Name |
|------|------|
| 1    | +5V  |
| 2    | +5V  |
| 3    | RX2  |
| 4    | TX2  |
| 5    | RX1  |
| 6    | TX1  |
| 7    | SPK  |
| 8    | GND  |
| 9    | GND  |
| 10   | GND  |

设计参数:

1. 结构: G+TF,
2. IC: GT911, 工作电压和通讯电压3.3V
3. 透光率: 85% MIN;
4. \*为重点尺寸, lens未标注倒边
5. C: 0.125±0.05, 最小R角: 0.5±0.1;
6. 表面硬度: ≥6H;
7. 工作温度: -20~70℃;
8. 存储温度: -30~80℃;
9. 未标注尺寸公差±0.2mm;
10. 符合ROHS标准;
11. SDA, SCL 4.7K上拉电阻设计在FPC上面
12. 要求肉眼看不到蚀刻纹
13. 分辨率480\*480

成品型号: DMG48480F021-06WTCZ01

| PIN# | CTP Name | REVISION | RECORD | VER | DATE     | 迪文科技有限公司                         |
|------|----------|----------|--------|-----|----------|----------------------------------|
| 1    | VDD-3.3V | 1        | 初次发行   | V1  | 20230618 | FILE NAME: DMG48480F021_06WTCZ01 |
| 2    | RST      | 2        | 增加配合点胶 | V1  | 20241222 | DESIGNER: 李亮                     |
| 3    | SCL      | 3        |        |     |          | DRAWN BY: 李亮                     |
| 4    | INT      | 4        |        |     |          | CHECKED BY: 李亮                   |
| 5    | SDA      | 5        |        |     |          | APPROVED BY: 李亮                  |
| 6    | GND      | 6        |        |     |          | DATE: 20241222                   |

## 7 修订记录 Revision records

| 版本<br>Rev | 日期<br>Revise Date | 描述<br>Content         | 编辑人<br>Editor |
|-----------|-------------------|-----------------------|---------------|
| 00        | 2025-02-06        | 首次发布<br>First Edition | 郑运佳           |

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迪文开发者论坛 DWIN Developer Forum: <http://inforum.dwin.com.cn:20080/forum.php>

感谢大家一直以来对迪文的支持，您的支持是我们进步的动力！

Thank you all for continuous support of DWIN, and your approval is the driving force of our progress!

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DWIN reserves the right to make any changes to product designs without prior notice.

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