

# DMG48270S043\_03WN

## 产品特点:

- 基于 T5L1 芯片，运行 DGUS II 系统，户外苛刻环境级产品。
- 4.3 英寸，480\*272 分辨率，16.7M 色，TN 屏，普通视角。
- -40~85℃超宽温环境工作，带三防工艺。
- 支持 RS232 与 RS485 通信。
- 高亮度 1000nit。

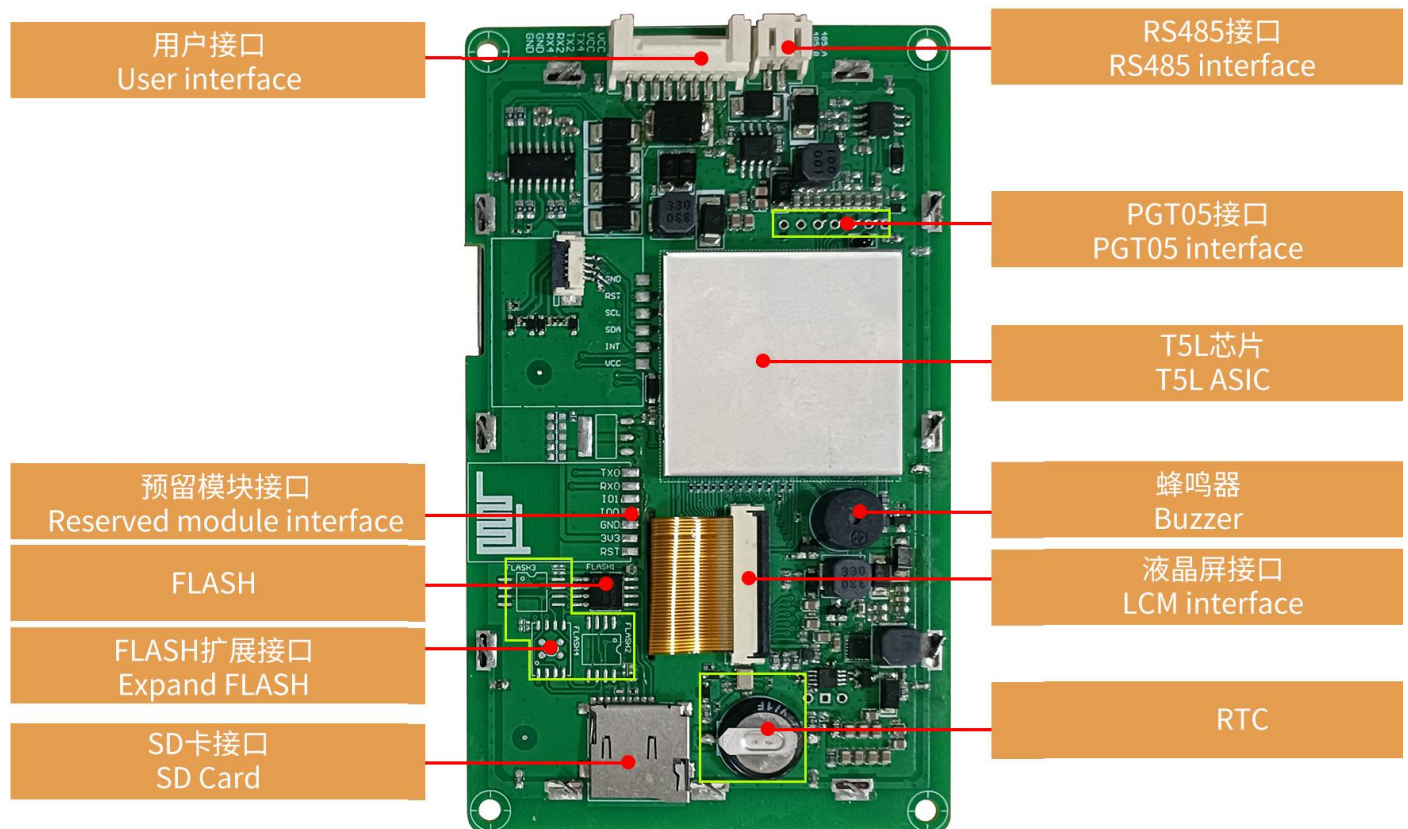
## Features:

- Based on T5L1, running DGUS II system, for outdoor severe environment application.
- 4.3-inch, 480\*272 pixels resolution, 16.7M colors, TN-TFT-LCD, normal viewing angle.
- Capable of working under ultra-wide temperature range from -40~85℃ with conformal coating.
- Support RS232 and RS485 communication.
- High brightness 1000nit.



## 1、硬件及接口 Hardware and interface

### 1.1 硬件接口图 Hardware interface



硬件接口图  
Hardware interface

## 1.2 硬件及接口说明 Hardware&interface description

| 序号<br>No. | 名称<br>Name                          | 说明<br>Description   |
|-----------|-------------------------------------|---|
| 1         | T5L1 芯片<br>T5L1 ASIC                | 迪文自主研发，2019 年量产，1MBytes 片内 Nor Flash，其中 512KBytes 用于存储用户数据库，擦写次数>100,000 次<br>Developed by DWIN. Mass production in 2019, 1MBytes Nor Flash on the chip, 512KBytes used to store the user database. Rewrite cycle: over 100,000 times   |
| 2         | 液晶屏接口<br>LCM interface              | FPC40_0.5mm, RGB 接口<br>FPC40_0.5mm, RGB interface   |
| 3         | 用户接口<br>User interface              | 用于供电和串口通讯，8Pin_2.0mm 座子。串口下载速率(典型值): 12KByte/s<br>8Pin_2.0mm socket for power supply and serial communication.<br>Download rate(typical value): 12KByte/s   |
| 4         | RS485 接口<br>RS485 interface         | 2Pin_2.0mm 卧式座子：用于 RS485 通讯<br>2Pin_2.0mm horizontal socket: For RS485 communication  |
| 5         | Flash                               | 16MBytes NOR Flash，存放字库、图片、音乐文件，擦写次数>100,000 次<br>16MBytes NOR Flash, for fonts, pictures and audio files.<br>Rewrite cycle: over 100,000 times   |
| 6         | 扩展 Flash 焊盘<br>Expand Flash pads    | 有 3 个扩展位，支持扩展 NOR Flash、NAND Flash。<br>NOR Flash 最大可拓展到 64Mbytes。<br>NOR Flash 与 NAND Flash 组合最大可扩展到 48Mbytes（2 个扩展位）+512Mbytes。<br>Three expansion slots are available, supporting expansion of NOR Flash and NAND Flash.<br>The maximum expansion for NOR Flash is up to 64Mbytes.<br>When combining NOR Flash and NAND Flash, the maximum expansion is up to 48Mbytes (using two expansion slots) + 512Mbytes. |
| 7         | 蜂鸣器<br>Buzzer                       | 3V 无源蜂鸣器，功率：<1W<br>3V passive buzzer. Power: <1W  |
| 8         | RTC                                 | 法拉电容供电，精度：±20ppm @25℃。掉电后可维持 7 天正常工作<br>Super-capacitor for power supply. Accuracy: ±20ppm @25℃. It can work normally for 7 days after power failure  |
| 9         | SD 卡接口<br>SD interface              | FAT32 格式，下载文件，文件可在屏幕统计显示，下载速率：4Mb/s<br>FAT32. Download files by SD interface can be displayed in statistics.<br>Download rate: 4Mb/s  |
| 10        | 预留模块接口<br>Reserved module interface | WIFI 模块：焊接 WIFI-10 模块，可连接到云平台实现远程更新<br>USB 模块：焊接 USB 模块，可通过 U 盘下载文件<br>Wi-Fi module: connect to the cloud platform to update remotely<br>USB module: download files by USB flash disk   |
| 11        | PGT05 接口<br>PGT05 interface         | 当产品因意外无法正常运行时，可通过 PGT05 更新 DGUS 底层，使产品重新恢复正常<br>When product crashes by accident, you can use PGT05 to update DGUS kernel and make the product return to normal   |

## 2、规格参数 Specification parameters

### 2.1 显示参数 Display parameters

|   |   |
|---|---|
| <b>显示屏类型</b><br><b>LCD Type</b>   | TN, TFT LCD   |
| <b>视角</b><br><b>Viewing Angle</b>   | 普通视角, 典型值 70°/70°/50°/70° (L/R/U/D)<br>Normal viewing angle, 70°/70°/50°/70° (L/R/U/D)  |
| <b>分辨率</b><br><b>Resolution</b>   | 480×272 (支持 0°/90°/180°/270°显示模式)<br>480×272 pixels (support 0°/90°/180°/270°)  |
| <b>色彩</b><br><b>Color</b>   | 24 位 8R8G8B<br>24-bit 8R8G8B  |
| <b>AA 区</b><br><b>Active Area (A.A.)</b>  | 95.04mm (W)×53.86mm (H)   |
| <b>VA 区</b><br><b>View Area (V.A.)</b>  | -   |
| <b>背光模式</b><br><b>Backlight Mode</b>  | LED   |
| <b>背光寿命</b><br><b>Backlight Service Life</b>  | >30000 小时 (以最高亮度连续工作, 亮度减半时间)<br>>30000 hours (Time of the brightness decaying to 50% on the condition of continuous working with the maximum brightness)   |
| <b>背光亮度</b><br><b>Brightness</b>  | 1000nit   |
| <b>背光调节</b><br><b>Brightness Control</b>  | 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>0~100 grade (When the brightness is adjusted to 1%~30% of the maximum brightness, flickering may occur and is not recommended to use in this range) |
| 注: 长时间固定画面显示可能导致屏幕残影, 可以用动态图片切换做屏保解决。<br>Note: You can use dynamic screen saver wallpapers to avoid afterimages caused by fixed page display for a long time. |   |

## 2.2 串口参数 Serial interface parameters

|                            |  |            |            |            |            |
|----------------------------|--|------------|------------|------------|------------|
| 串口模式<br>Mode               | UART2: RS232<br>UART4: RS232 (OS 配置后才能使用 Only available after OS configuration)<br>UART5: RS485 (OS 配置后才能使用 Only available after OS configuration) |            |            |            |            |
| 串口 2、4 电平<br>Voltage Level | 测试条件<br>Test Condition   | 最小值<br>Min | 典型值<br>Typ | 最大值<br>Max | 单位<br>Unit |
|                            | Output 1   | -          | -5.0       | -3.0       | V          |
|                            | Output 0   | 3.0        | 5.0        | -          | V          |
|                            | Input 1  | -15.0      | -5.0       | -          | V          |
|                            | Input 0  | -          | 5.0        | 15.0       | V          |
| 串口 2、4 波特率<br>Baud Rate    | 3150~3225600bps, 典型值: 115200bps<br>3150~3225600bps, typical value of 115200bps   |            |            |            |            |
| 串口 5 电平<br>Voltage Level   | 测试条件<br>Test Condition   | 最小值<br>Min | 典型值<br>Typ | 最大值<br>Max | 单位<br>Unit |
|                            | Output 1   | 2.5        | 5.0        | -          | V          |
|                            | Output 0   | -          | -5.0       | -2.5       | V          |
|                            | Input 1  | 0          | 2.5        | -          | V          |
|                            | Input 0  | -          | -2.5       | -0.2       | V          |
| 串口 5 波特率<br>Baud Rate      | 3150~921600bps, 典型值: 115200bps<br>3150~921600bps, typical value of 115200bps   |            |            |            |            |
| 数据格式<br>Data Format        | UART2: N81<br>UART4: N81/E81/O81/N82 四种模式可选 (OS 配置) 4 modes (OS configuration)<br>UART5: N81/E81/O81/N82 四种模式可选 (OS 配置) 4 modes (OS configuration) |            |            |            |            |
| 接口排线<br>Interface Cable    | 8Pin_2.0mm (RS232)<br>2Pin_2.0mm (RS485)   |            |            |            |            |

## 2.3 电气规格 Electrical specifications

|   |   |            |
|---|---|------------|
| 工作电压<br>Operating Voltage                                     | 6~36V, 典型值 12V<br>6~36V, typical value of 12V |            |
| 工作电流<br>Operating Current                                     | 160mA   | 12V @ 25℃  |
|   | 600mA   | 12V @ -40℃ |
| 推荐工作电源: 12V 1A 的直流稳压电源<br>Recommended power supply: 12V 1A DC |   |            |

## 2.4 工作环境和可靠性参数 Operating environment & Reliability test

|                               |   |
|-------------------------------|---|
| 工作温度<br>Operating Temperature | -40℃~85℃ (12V @ 60% RH)   |
| 存储温度<br>Storage Temperature   | -40℃~85℃  |
| 工作湿度<br>Operating Humidity    | 10%~90%RH, 典型值 60%RH<br>10%~90%RH, typical value of 60% RH          |
| 三防漆工艺<br>Conformal coating    | 有<br>Yes  |
| 出厂前老化时间<br>Aging Test         | 72 小时 50℃环境高温带电老化<br>72 hours high temperature charged aging at 50℃ |



### 3、可靠性测试 Reliability test

#### 3.1 静电放电测试 Electrostatic discharge 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.

试验过程：将产品平置于测试台上，针对串口屏铁框和显示区域依次进行接触和空气放电；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。性能符合判据 GB/T 17626.2 B 级及以上。

Test process: the product was placed on the test bench to perform contact and air discharge in turn of the serial screen iron frame and display area. During the experimental process, it was observed whether the screen is dead, black, white, splash, or reboot. According to the experiment results, the performance is in line with the criteria GB/T 17626.2 B level and above.

■ Test standard : ☐ EN 61000-4-2:2009 ☐ IEC 61000-4-2:2008 ☐ GB/T 17626.2-2018

☐ Other:

Table 1: Electrostatic Discharge Immunity (Air Discharge)

| Test Points Locations | Test Levels |      |      |      |      |      |       |       |
|-----------------------|-------------|------|------|------|------|------|-------|-------|
|                       | -2kV        | +2kV | -6kV | +6kV | -8kV | +8kV | -15kV | +15kV |
| 屏幕                    | /           | /    | /    | /    | /    | /    | A     | A     |
| /                     | /           | /    | /    | /    | /    | /    | /     | /     |
| /                     | /           | /    | /    | /    | /    | /    | /     | /     |

Table 2: Electrostatic Discharge Immunity (Direct Contact)

| Test Points Locations | Test Levels |      |      |      |      |      |      |      |
|-----------------------|-------------|------|------|------|------|------|------|------|
|                       | -2kV        | +2kV | -4kV | +4kV | -6kV | +6kV | -8kV | +8kV |
| 边框                    | /           | /    | /    | /    | /    | /    | A    | A    |
| /                     | /           | /    | /    | /    | /    | /    | /    | /    |
| /                     | /           | /    | /    | /    | /    | /    | /    | /    |

### 3.2 电快速瞬变脉冲群 EFT 测试 EFT 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.

试验过程：将产品平置于测试台上，通过脉冲群发生仪耦合脉冲群后的电源对智能屏进行供电；实验过程观察屏幕是否出现复位重启、异常显示、触摸异常等现象，性能符合 GB/T 17626.4 B 级及以上。

Test process: the product was placed on the test bench to perform contact and the smart screen is energized by the power supply coupled with a EFT generator. During the experimental process, it was observed whether abnormal reset, display or touch phenomena occurs. According to the experiment results, the performance is in line with the criteria GB/T 17626.4 B level and above.

■ Test standard : ☐ EN 61000-4-4:2012 ☐ IEC 61000-4-4:2012 ☒ GB/T 17626.4-2018  
☐ Other:

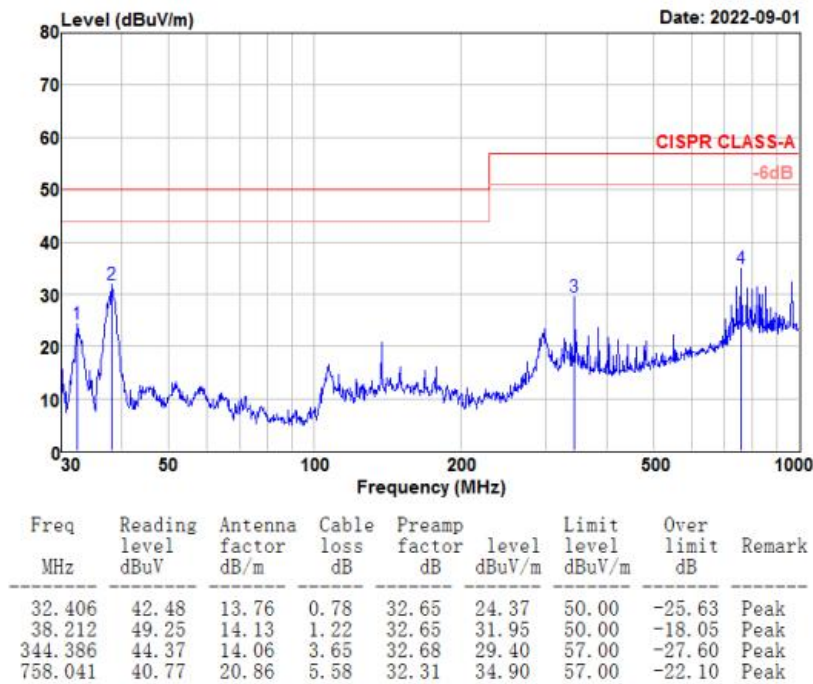
| Test Points  |           | Test Levels(kV) |      |      |      |      |      |      |      |
|--------------|-----------|-----------------|------|------|------|------|------|------|------|
|              |           | -0.5            | +0.5 | -1.0 | +1.0 | -2.0 | +2.0 | -4.0 | +4.0 |
| Power ports  | L         | /               | /    | /    | /    | A    | A    | /    | /    |
|              | N         | /               | /    | /    | /    | A    | A    | /    | /    |
|              | Earth     | /               | /    | /    | /    | /    | /    | /    | /    |
|              | L+N       | /               | /    | /    | /    | A    | A    | /    | /    |
|              | L + Earth | /               | /    | /    | /    | /    | /    | /    | /    |
|              | N + Earth | /               | /    | /    | /    | /    | /    | /    | /    |
|              | L+N+Earth | /               | /    | /    | /    | /    | /    | /    | /    |
| Signal ports | ___/___   | /               | /    | /    | /    | /    | /    | /    | /    |



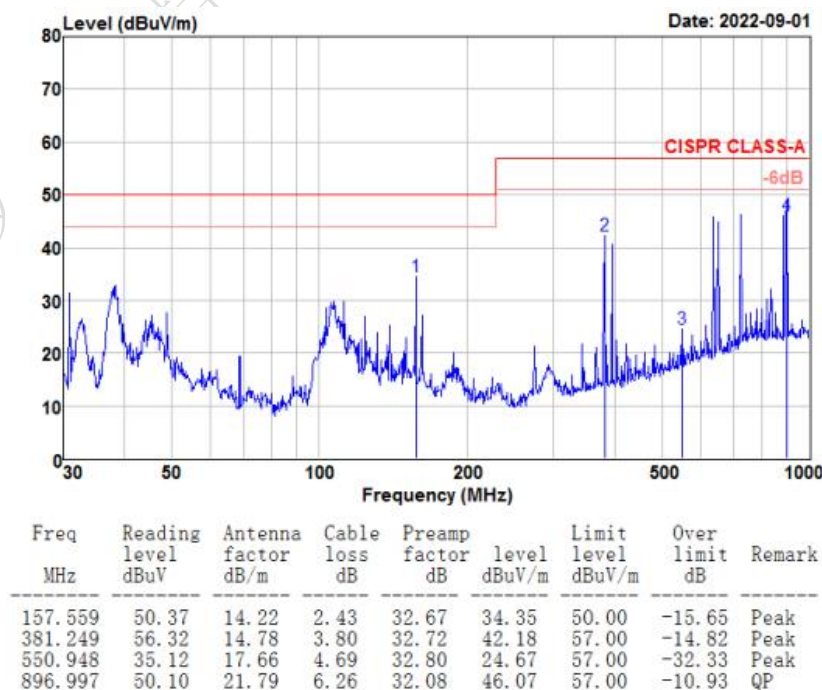
### 3.3 辐射干扰测试 RE test

| 测试项目<br>Test Item | 测试标准<br>Test Standard | 结果<br>Result             |
|-------------------|-----------------------|--------------------------|
| 辐射干扰<br>RE        | Class A               | 正常工作<br>Normal operation |

#### HORIZONTAL



#### VERTICAL



### 3.4 传导骚扰抗扰度测试 CS test

- Test standard : ☐ EN 61000-4-6:2014 ☐ IEC 61000-4-6:2013 ■ GB/T 17626.6-2017  
☐ Other:  
 ■ Modulation: ■ Amplitude 80%,1kHz sine wave ☐ Amplitude 80%,2Hz sine wave ☐ Other:  
 ■ Dwell time: ■ 1s ☐ 3s ☐ other:  
 ■ Frequency Step Size : ■ 1 % of preceding frequency value ☐ other:

| Coupling Line | Frequency Range<br>(MHz) | Voltage Level(e.m.f.)<br>(V) | Result |
|---------------|--------------------------|------------------------------|--------|
| 电源端           | 0.15-80                  | 10                           | A      |

### 3.5 浪涌（冲击）测试 SURGE test

- Test standard : ☐ EN 61000-4-5:2014+A1:2017 ☐ IEC 61000-4-5:2014+A1:2017 ■ GB/T 17626.5-2019  
☐ Other:

Table 1: \_\_\_\_DC\_\_\_\_ mains power input port

| Level | Voltage | Polarity | Path  | Result |
|-------|---------|----------|-------|--------|
| 1     | 0.5kV   | ±        | /     | /      |
| 2     | 1kV     | ±        | 正极对负极 | A      |
| 3     | 2kV     | ±        | /     | /      |
| 4     | 4kV     | ±        | /     | /      |

#### 性能标准:

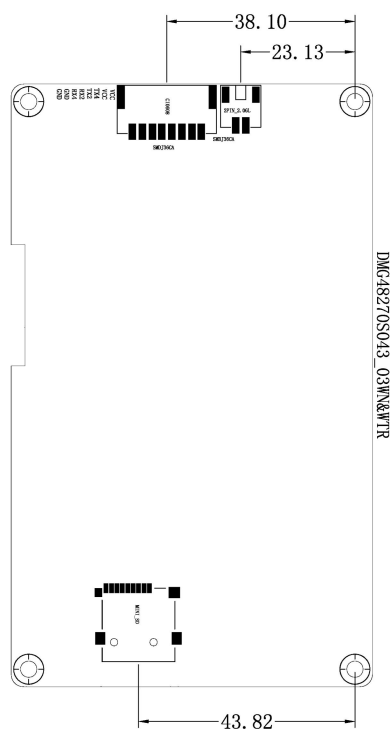
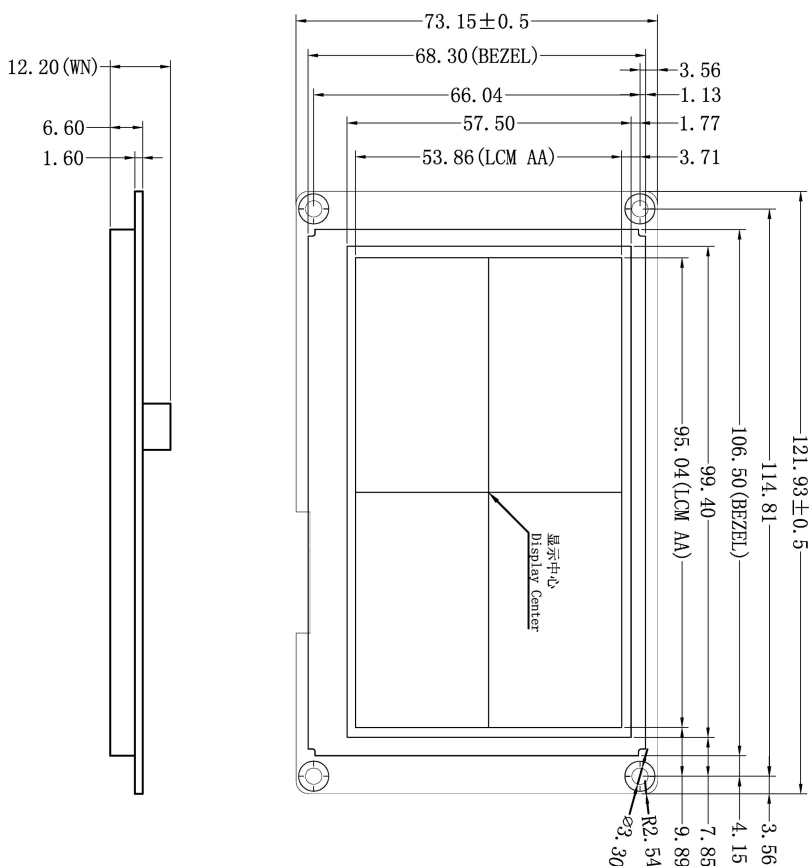
- A.在制造商、委托方或购买方规定的限值内性能正常;  
 B.功能或性能暂时丧失或降低,但在骚扰停止后能自行恢复,不需要操作者干预;  
 C.功能或性能暂时丧失或降低,但需操作者干预才能恢复;  
 D.因设备硬件或软件损坏,或数据丢失而造成不能恢复的功能丧失或性能降低。

#### Performance Criterion:

- A. Normal performance within limits specified by the manufacturer, requestor or purchaser;  
 B. Temporary loss of function or degradation of performance which ceases after the disturbance ceases, and from which the equipment under test recovers its normal performance, without operator intervention;  
 C. Temporary loss of function or degradation of performance, the correction of which requires operator intervention;  
 D. Loss of function or degradation of performance which is not recoverable, due to damage to hardware or software, or loss of data.

#### 4、包装和物理尺寸 Packaging & dimensions

|                                 |   |                |                           |                         |
|---------------------------------|---|----------------|---------------------------|-------------------------|
| 外形尺寸<br>Form Factor             | 121.93mm (W)×73.15mm (H)×12.20mm (T)  |                |                           |                         |
| 安装尺寸<br>Installation Dimensions | 开孔尺寸: 106.50 (+0.3mm)×68.30(+0.3mm)<br>Positioning hole: 106.50 (+0.3mm)×68.30 (+0.3mm) |                |                           |                         |
| 净重量<br>Net Weight               | 110g  |                |                           |                         |
| 包装标准 Packaging Standards        |   |                |                           |                         |
| 包装箱型号<br>Model                  | 包装箱尺寸<br>Dimensions   | 层数（层）<br>Layer | 数量/层（片）<br>Quantity/Layer | 总数量（片）<br>Quantity(Pcs) |
| 1 号箱 Carton1:                   | 220mm(L)×160mm(W)×47mm (H)  | 1              | 2                         | 2                       |
| 2 号箱 Carton2:                   | 250mm(L)×200mm(W)×80mm (H)  | 2              | 2                         | 4                       |
| 3 号箱 Carton3:                   | 320mm(L)×270mm(W)×80mm (H)  | 2              | 4                         | 8                       |
| 4 号箱 Carton4:                   | 435mm(L)×335mm(W)×290mm(H)  | -              | -                         | -                       |
| 5 号箱 Carton5:                   | 600mm(L)×430mm(W)×290mm(H)  | 2              | 60                        | 120                     |



| 定义 Definition | 序号 Pin# | 类型 Type | 说明 Description   |
|---------------|---------|---------|------------------|
| VCC           | 1, 2    | P       | 电源输入 Power Input |
| TX4           | 3       | 0       | 串口4输出 Output     |
| TX2           | 4       | 0       | 串口2输出 Output     |
| RX2           | 5       | I       | 串口2输入 Input      |
| RX4           | 6       | I       | 串口4输入 Input      |
| GND           | 7, 8    | P       | 公共接地 GND         |

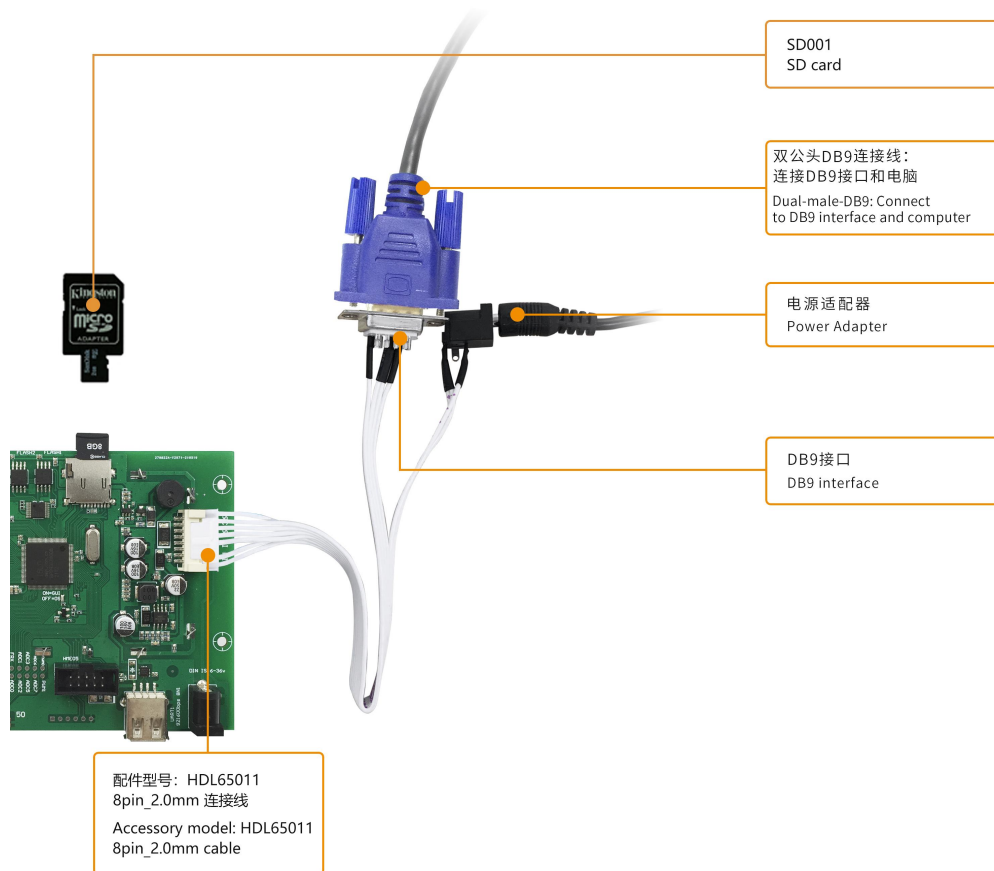
|               |     |                |      |                    |            |  |  |                           |  |  |  |
|---------------|-----|----------------|------|--------------------|------------|--|--|---------------------------|--|--|--|
| 型号<br>Model   |     |                |      | DMG48270S043_03WIN |            |  |  | 迪文科技<br>DWIN Technologies |  |  |  |
| 图纸<br>Drawing | A 4 | 绘制<br>Drawn    | G. Y | 日期<br>Date         | 2022.09.26 |  |  |                           |  |  |  |
| 比例<br>Scale   | 1:1 | 审核<br>Review   |      | 日期<br>Date         |            |  |  |                           |  |  |  |
| 单位<br>Unit    | MM  | 批准<br>Approval |      | 日期<br>Date         |            |  |  |                           |  |  |  |

1. 尺寸定位基准为定位孔  
Location hole is used as position reference.  
2. 未标注公差为 $\pm 0.3\text{mm}$   
Unmarked Tolerance is  $\pm 0.3\text{mm}$   
注: 虚线标注为有效显示区域  
Active area is marked in Dash lines

## 5、调试工具 Debugging tools

建议首次使用迪文智能屏的用户购买标准配件。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.



## 6、T5L 系列芯片特点 T5L series IC features

(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 250MHz。

Mature and stable 8051 core which is the most widely used with the maximum operating frequency of T5L is up to 250MHz, 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。

High-speed display memory, 2.4GB/S bandwidth.

- 2D 硬件加速，JPEG 解压缩速度高达 200fps@1280\*800，UI 极其流畅。

2D hardware acceleration, the decompression speed of JPEG is up to 200fps@1280\*800 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.

- 支持电阻或电容触摸屏，灵敏度可以调节，最快 400Hz 触控打点速度。

Support CTP or RTP with adjustable sensitivity and maximum 400 Hz touch frequency.

- 1 路 15bit 32Ksps PWM 数字功放驱动扬声器，实现高品质语音压缩存储和播放。

1-way 15bit 32Ksps PWM digital power amplifier driver loudspeaker, save power amplifier cost and achieve high signal-to-noise ratio and sound quality restoration.

- 128Kbytes 变量存储器空间，存储器接口和 OS CPU 核交换数据，应用及其简单。

128Kbytes variable storage space for exchanging data with OS CPU Core and memory.

- 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 background remote upgrade.

(3) 单独 CPU 核（OS CPU）运行用户 8051 代码，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 architecture 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.

- 28 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。

28 IOs, 4-channel UARTs, 1-channel CAN, up to 8-channel 12-bit A/Ds and 2-channle 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 on-line simulation and debugging with unlimited number of 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.**



## 7、修订记录 Revision records

| 版本 Rev | 日期 Revise Date | 描述 Content                                       | 编辑人 Editor |
|--------|----------------|--|------------|
| 00     | 2022-09-27     | 首次发布<br>First Edition                            | 郑运佳        |
| 01     | 2022-11-14     | 修改尺寸说明<br>Modify dimension description           | 郑运佳        |
| 02     | 2024-05-27     | 增加 FLASH 扩展元器件<br>Add FLASH extension components | 郑运佳        |
| 03     | 2024-09-04     | 修改背光亮度<br>Modify Brightness                      | 欧阳开杏       |

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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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