

# DMG12720T050\_06WTC

## 产品特点:

- 基于 T5L2 芯片，运行 DGUS II 系统，工业级产品。
- 5.0 寸，1280\*720 分辨率，16.7M 色，IPS 屏，宽视角。
- Incell 电容触摸屏。

## Features:

- Based on T5L2, running DGUS II system, industrial grade.
- 5.0-inch, 1280\*720 pixels resolution, 16.7M colors, IPS-TFT-LCD, wide viewing angle.
- Incell capacitive touch screen.



## 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 接口说明 Interface description

| 序号<br>No. | 名称<br>Name                            | 说明<br>Description  |
|-----------|---------------------------------------|--|
| 1         | T5L2 芯片<br>T5L2 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         | INCELL 屏接口<br>INCELL LCM<br>interface | FPC40_0.5mm, MIPI 接口<br>FPC40_0.5mm, MIPI interface  |
| 3         | 用户接口<br>User interface                | FCC50_0.5 mm (定义见附件: 表 1)<br>FCC50_0.5 mm (See Annex for definitions: table1)  |
| 4         | 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   |
| 5         | 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  |

## 2、规格参数 Specification parameters

### 2.1 显示参数 Display parameters

|  |   |
|--|---|
| 显示屏类型<br><b>LCD Type</b>   | IPS, TFT LCD  |
| 视角<br><b>Viewing Angle</b>   | 宽视角, 典型值 85°/85°/85°/85° (L/R/U/D)<br>Wide viewing angle, 85°/85°/85°/85° (L/R/U/D)   |
| 分辨率<br><b>Resolution</b>   | 1280×720 (支持 0°/90°/180°/270°显示模式)<br>1280×720 pixels (support 0°/90°/180°/270°)  |
| 色彩<br><b>Color</b>   | 24 位 8R8G8B<br>24-bit 8R8G8B  |
| AA 区<br><b>Active Area (A.A.)</b>  | 110.4mm (W)×62.1mm (H)  |
| VA 区<br><b>View Area (V.A.)</b>  | 111.4mm (W)×63.1mm (H)  |
| 背光模式<br><b>Backlight Mode</b>  | LED   |
| 背光寿命<br><b>Backlight Service Life</b>  | >10000 小时 (以最高亮度连续工作, 亮度减半时间)<br>>10000 hours (Time of the brightness decaying to 50% on the condition of continuous working with the maximum brightness)   |
| 背光亮度<br><b>Brightness</b>  | 280nit  |
| 背光调节<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) |
| <p>注: 超过 30 分钟长时间显示高对比度静止画面可能导致显示残影, 请增加屏保避免该问题。<br/>                     Note: Long time display of high contrast still image over 30 minutes may lead to display residual shadow, please use screen saver to avoid this problem.</p> |   |

### 2.2 触摸参数 Touch parameters

|                                   |  |
|-----------------------------------|--|
| 触摸屏类型<br><b>Type</b>              | 电容式触摸面板<br>CTP (Capacitive touch panel)        |
| 触摸屏结构<br><b>Structure</b>         | INCELL 结构<br>INCELL structure                  |
| 触摸方式<br><b>Touch Mode</b>         | 单点触摸, 支持连续滑动触摸<br>Support point touch and drag |
| 表面硬度<br><b>Surface Hardness</b>   | -  |
| 透光率<br><b>Light Transmittance</b> | 95%以上<br>Over 95%                              |
| 触控次数<br><b>Life</b>               | >1,000,000 次<br>Over 1,000,000 times touch     |

### 2.3 串口参数 Serial interface parameters

|                         |  |         |         |         |         |
|-------------------------|--|---------|---------|---------|---------|
| 串口模式<br>Mode            | TTL/CMOS   |         |         |         |         |
| 串口电平<br>Voltage Level   | 测试条件 Test Condition  | 最小值 Min | 典型值 Typ | 最大值 Max | 单位 Unit |
|                         | Output 1, Iout = 1mA   | 3.0     | 3.3     | -       | V       |
|                         | Output 0, Iout = -1mA  | -       | 0       | 0.3     | V       |
|                         | Input 1, Iin = 1mA   | 2.4     | 3.3     | 5.0     | V       |
|                         | Input 0, Iin = -1mA  | 0       | -       | 0.5     | V       |
| 串口波特率<br>Baud Rate      | 3150~3225600bps, 典型值: 115200bps<br>3150~3225600bps, typical value of 115200bps |         |         |         |         |
| 数据格式<br>Data Format     | N81  |         |         |         |         |
| 接口排线<br>Interface Cable | FCC50_0.5 mm   |         |         |         |         |

### 2.4 电气规格 Electrical specifications

|   |   |   |
|---|---|---|
| 额定功率<br>Rated Power   | <5W   |   |
| 工作电压<br>Operating Voltage                                     | 7~15V, 典型值 12V<br>7~15V, typical value of 12V |   |
| 工作电流<br>Operating Current                                     | 200mA   | VCC=12V, 背光亮度最大<br>VCC=12V, max backlight |
|   | 90mA  | VCC=12V, 背光关闭<br>VCC=12V, backlight off   |
| 推荐工作电源: 12V 1A 的直流稳压电源<br>Recommended power supply: 12V 1A DC |   |   |

### 2.5 工作环境 Operating environment

|                               |  |
|-------------------------------|--|
| 工作温度<br>Operating Temperature | -20℃~70℃ (12V @ 60% RH)                                    |
| 存储温度<br>Storage Temperature   | -30℃~80℃   |
| 三防漆工艺<br>Conformal coating    | 有 Yes  |
| 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，如下图 3.1 所示；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 as shown in Fig.3.1 below. 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.



3.1 静电放电测试图

Electrostatic discharge test

| 放电类型<br>Discharge Type    | 放电值<br>Discharge Value | 结果<br>Result             |
|---------------------------|------------------------|--------------------------|
| 接触放电<br>Contact discharge | ±6KV                   | 正常工作<br>Normal operation |
| 空气放电<br>Air discharge     | ±8KV                   | 正常工作<br>Normal operation |

#### 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如下图 3.2 所示；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 as shown in Fig. 3.2 below. 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 17626.2 B level and above.



3.2 群脉冲测试图  
 EFT test

| 测试项目<br>Test Item    | 测试标准<br>Test Standard | 结果<br>Result             |
|----------------------|-----------------------|--------------------------|
| 电源端口<br>Power supply | ±2KV;100KHz           | 正常工作<br>Normal operation |

#### 4、包装和物理尺寸 Packaging & dimensions

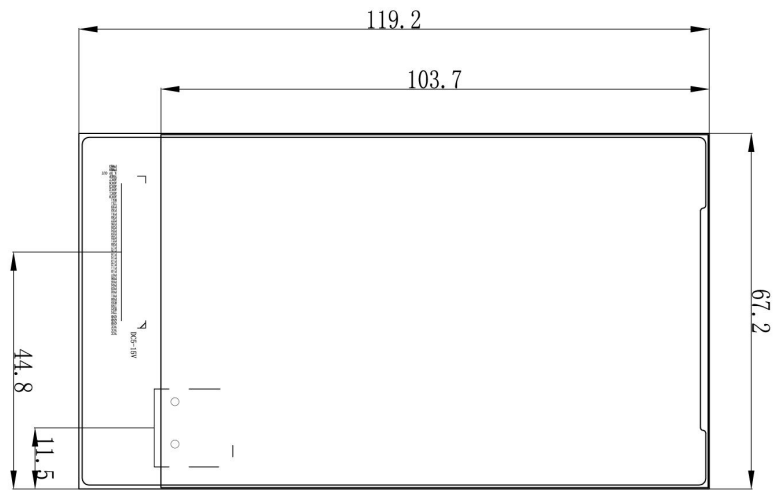
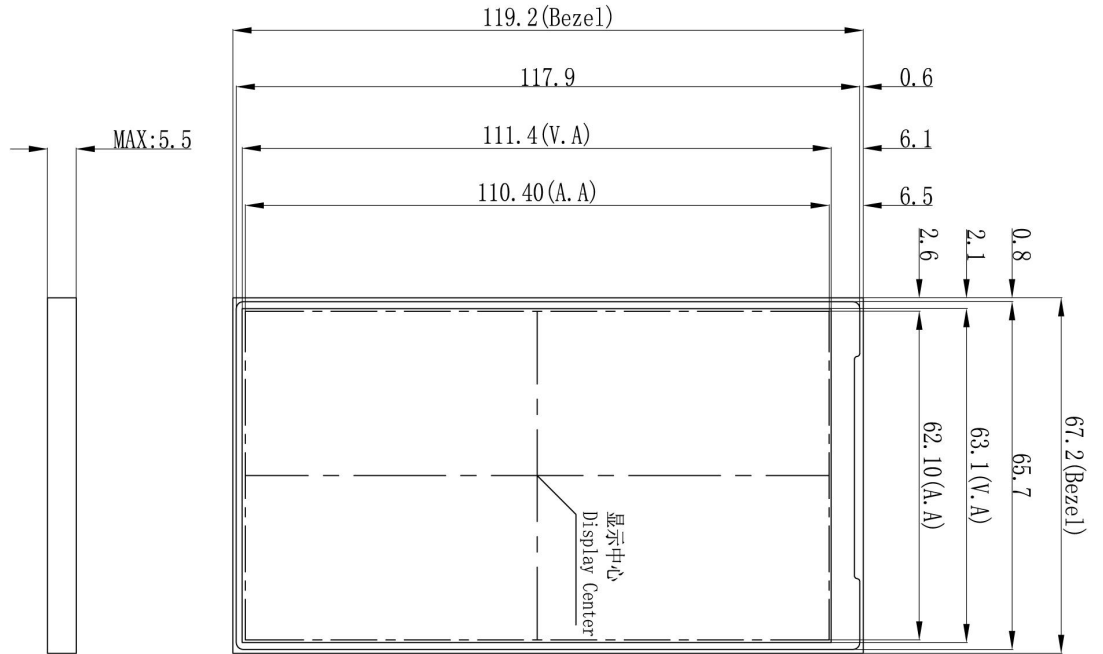
|                                 |                                  |  |  |  |
|---------------------------------|----------------------------------|--|--|--|
| 外形尺寸<br>Form Factor             | 119.2mm (W)×67.2mm (H)×5.5mm (T) |  |  |  |
| 安装尺寸<br>Installation Dimensions | -                                |  |  |  |
| 净重量<br>Net Weight               | 70g                              |  |  |  |

##### 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) | 2               | 25                         | 50                       |
| 5 号箱 Carton5:  | 600mm(L)×430mm(W)×290mm(H) | 2               | 60                         | 120                      |

声明：资料仅供参考，不影响性能参数和使用的产品设计变更，恕不另行通知。

Disclaimer: the data is for reference only and the information of product design that do not affect performance parameters and utilization is subject to alternation without prior notice.



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

|    |                    |    |      |                           |
|----|--------------------|----|------|---------------------------|
| 型号 | DMG12720T050_06WTC |    |      | 迪文科技<br>DWIN Technologies |
| 图纸 | A 4                | 图纸 | DWIN |                           |
| 比例 |                    | 审核 |      |                           |
| 单位 | MM                 | 批准 |      |                           |
|    |                    | 日期 |      |                           |
|    |                    | 日期 |      |                           |



## 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.



HDLUSB  
 连接线  
 USB cable



HDL65074  
 连接线  
 50Pin\_0.5mm cable



HDL667-V2  
 专用调试板  
 Debug board



SD001  
 SD卡  
 SD card

表 1

FCC50\_0.5 接口参数

50

1

VCC  
 VCC  
 VCC  
 VCC  
 GND  
 GND  
 GND  
 GND  
 TX4  
 RX4  
 TX5  
 RX5  
 P00  
 P01  
 P02  
 P03  
 P04  
 P05  
 P06  
 P07  
 P10  
 P11  
 P12  
 P13  
 P14  
 P15  
 P16  
 P17  
 P20  
 P21  
 P22  
 P23  
 P24  
 P25  
 P26  
 P27  
 P30  
 P31  
 P32  
 P33  
 TX1  
 RX1  
 ADC0  
 ADC1  
 ADC2  
 ADC3  
 ADC6  
 ADC7  
 VREF  
 3.3V OUT  
 PWM0  
 PWM3



| 引脚<br>Pin | 信号名称<br>Signal name | 功能<br>function | 描述<br>Discription |
|-----------|---------------------|----------------|-------------------|
| 1         | VCC                 | P              | 电源输入/Input        |
| 2         | VCC                 | P              | 电源输入/Input        |
| 3         | VCC                 | P              | 电源输入/Input        |
| 4         | GND                 | P              | 公共接地/GND          |
| 5         | GND                 | P              | 公共接地/GND          |
| 6         | GND                 | P              | 公共接地/GND          |
| 7         | TX4                 | O              | 串口输出 DOUT         |
| 8         | RX4                 | I              | 串口输入 DIN          |
| 9         | TX5                 | O              | 串口输出 DOUT         |
| 10        | RX5                 | I              | 串口输入 DIN          |
| 11        | P00                 | -              | I/O 口             |
| 12        | P01                 | -              | I/O 口             |
| 13        | P02                 | -              | I/O 口             |
| 14        | P03                 | -              | I/O 口             |
| 15        | P04                 | -              | I/O 口             |
| 16        | P05                 | -              | I/O 口             |
| 17        | P06                 | -              | I/O 口             |
| 18        | P07                 | -              | I/O 口             |
| 19        | P10                 | -              | I/O 口             |
| 20        | P11                 | -              | I/O 口             |
| 21        | P12                 | -              | I/O 口             |
| 22        | P13                 | -              | I/O 口             |
| 23        | P14                 | -              | I/O 口             |
| 24        | P15                 | -              | I/O 口             |
| 25        | P16                 | -              | I/O 口             |
| 26        | P17                 | -              | I/O 口             |
| 27        | P20                 | -              | I/O 口             |
| 28        | P21                 | -              | I/O 口             |
| 29        | P22                 | -              | I/O 口             |
| 30        | P23                 | -              | I/O 口             |
| 31        | P24                 | -              | I/O 口             |
| 32        | P25                 | -              | I/O 口             |
| 33        | P26                 | -              | I/O 口             |
| 34        | P27                 | -              | I/O 口             |
| 35        | P30                 | -              | I/O 口             |
| 36        | P31                 | -              | I/O 口             |
| 37        | P32                 | -              | I/O 口             |
| 38        | P33                 | -              | I/O 口             |
| 39        | TX1                 | O              | 串口输出 DOUT         |
| 40        | RX1                 | I              | 串口输入 DIN          |
| 41        | ADC0                | I              | AD 输入             |
| 42        | ADC1                | I              | AD 输入             |
| 43        | ADC2                | I              | AD 输入             |
| 44        | ADC3                | I              | AD 输入             |
| 45        | ADC6                | I              | AD 输入             |
| 46        | ADC7                | I              | AD 输入             |
| 47        | VREF                | P              | AD 参考电源           |
| 48        | 3.3V OUT            | O              | 3.3V 输出           |
| 49        | PWM0                | O              | 16 bit PWM 输出     |
| 50        | PWM3                | O              | 16 bit PWM 输出     |

## 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)  $-40^{\circ}\text{C}$ ~ $+85^{\circ}\text{C}$  工作温度范围 (可定制  $-55^{\circ}\text{C}$ ~ $+105^{\circ}\text{C}$  工作温度范围 IC)。

Operating temperature ranges from  $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$  (IC operating temperature customizable from  $-55^{\circ}\text{C}$  to  $+105^{\circ}\text{C}$ ).

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     | 2021-09-25     | 首次发布 First Edition      | 郑运佳        |
| 01     | 2021-11-04     | 升级版本<br>Upgrade version | 郑运佳        |

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客服邮箱 Customer service email: [dwinhmi@dwin.com.cn](mailto:dwinhmi@dwin.com.cn)

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

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！

谢谢大家！

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