

# DMG40400C016\_03WN

## 产品特点:

- 基于 T5L0-Q88 ASIC，运行 DGUS II 人机交互软件平台，商业级智能屏。
- 1.6 英寸圆形液晶屏，400\*400 分辨率，IPS 液晶显示屏。

## Features:

- Powered by T5L0-Q88 ASIC, running DGUS II HMI platform, commercial-grade smart LCM.
- 1.6-inch circular LCD, 400\*400 resolution, IPS-TFT LCD.



## 1、硬件及接口 Hardware and interface

### 1.1 硬件接口图 Hardware interface diagram



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

序号 No.	项目 Item	说明 Description
1	T5L0-Q88 芯片 T5L0-Q88 ASIC	迪文自主研发，2023 年量产。芯片采用双 8051 核架构，GUI 和应用分别在一颗 8051 核中运行。 DWIN independently developed, mass production in 2023. Dual 8051 cores, GUI and application run on separate 8051 cores.
2	用户接口 User interface	用于供电和串口通讯，10Pin_1.0mm 座子。 10Pin_1.0mm socket for power supply and serial communication.
3	Flash	16MBytes NOR Flash，可用于存放字库、图片、音乐等用户 UI 文件，擦写次数>100,000 次。 16MBytes NOR Flash, can be used to store user UI files such as fonts, images, music, etc., with erase/write cycles > 100,000 times.
4	蜂鸣器 Buzzer	3V 无源蜂鸣器。 3V passive buzzer.
5	SD 卡座 SD card slot	用于 DGUS 工程文件下载（UI 文件、CFG 文件、内核等），下载速率：4Mb/s。 For DGUS project file downloads (UI, CFG files, kernel, etc.), 4 Mb/s rate.
6	PGT05 接口 PGT05 interface	用于烧录 DGUS 底层程序。 For programming DGUS firmware.

## 2、规格参数 Specification parameters

### 2.1 显示参数 Display parameters

显示屏类型 LCD Type	IPS TFT 液晶屏。 IPS, TFT LCD.
视角 Viewing Angle	视角宽（典型值是 85°/85°/85°/85°），对比度高、色彩还原好。 Wide viewing angle (85°/85°/85°/85° typical), high contrast, and good color reproduction.
分辨率 Resolution	400×400（支持 0°/90°/180°/270°显示模式） 400×400 (0°/90°/180°/270°)
有效显示区域 Active Area (AA)	直径=39.8mm Diameter=39.8mm
背光 Backlight	LED
背光寿命 Backlight Service Life	>20,000H
亮度 Brightness	300nit
亮度调节 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） 100-level brightness adjustment (Flickering may occur at 1%-30% of max brightness; not recommended for use in this range)
注：长时间显示固定画面可能导致残影现象，建议设置动态屏保进行规避。 Note: Use dynamic screen saver to prevent afterimages from prolonged fixed page display.	

### 2.2 串口参数 Serial interface parameters

串口模式 Mode	UART2: TTL/CMOS UART4: TTL/CMOS (OS 配置后才能使用 Only available after OS configuration)				
串口电平 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 = -4mA	3.0	3.3	-	V
	Output 0, Iout = 4mA	-	0	0.3	V
	Input 1	2.4	3.3	5.0	V
	Input 0	0	-	0.5	V
串口波特率 Baud Rate	3150~3225600bps，典型值：115200bps。 3150~3225600bps, typical value of 115200bps.				
数据格式 Data Format	UART2: N81 UART4: N81/E81/O81/N82 四种模式可选（OS 配置）4 modes (OS configuration)				
接口端子 Interface Cable	10Pin_1.0mm 座子。 10Pin_1.0mm Socket.				

## 2.3 电气规格 Electrical specifications

额定功率 Rated Power	<5W	
工作电压 Operating Voltage	4.5~5.5V, 典型值 5V 4.5~5.5V, typical value of 5V	
工作电流 Operating Current	130mA	VCC = +5V, 背光亮度最大 VCC = +5V, Backlight on
	60mA	VCC = +5V, 背光关闭 VCC = +5V, Backlight off
推荐工作电源: 5V 1A 的直流稳压电源。 Recommended power supply: 5V 1A DC.		

## 2.4 工作环境 Operating environment

工作温度 Operating Temperature	-20℃~70℃ (5V @ 60% RH)
存储温度 Storage Temperature	-30℃~80℃
三防漆 Conformal coating	无 N
工作湿度 Operating Humidity	10%~90%RH, 典型值 60%RH。 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.

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.

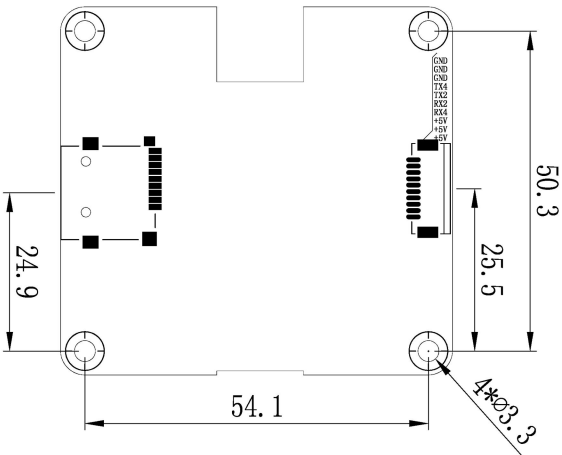
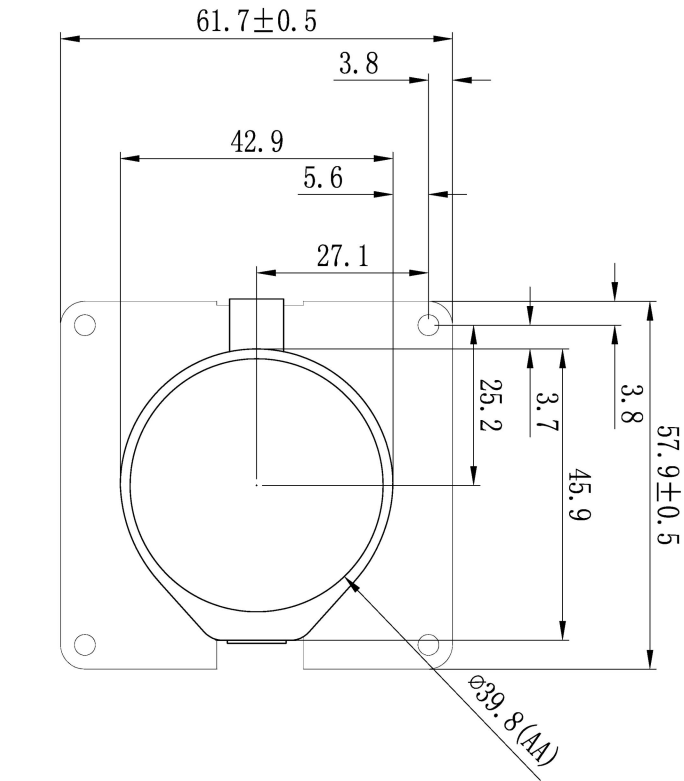
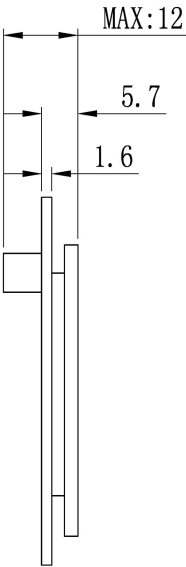
测试结论：产品 ESD 性能达到 GB/T 17626.2 B 级。

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

放电类型 Discharge Type	放电值 Discharge Value	结果 Result
空气放电 Air discharge	±4KV	正常工作 Normal operation

#### 4、包装和物理尺寸 Packaging & dimensions

外形尺寸 Form Factor	61.7(W)mm×57.9(H)mm×12.0(T)mm			
净重量 Net Weight	30g			
包装标准 Packaging Standards				
包装箱型号 Model	包装箱尺寸 Dimensions	层数（层） Layer	数量/层（片） Quantity/Layer	总数量（片） 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



定义 Definition	序号 Pin#	类型 Type	说明 Description
GND	8, 9, 10	P	公共接地 GND
TX4	7	0	串口4输出 Output
TX2	6	0	串口2输出 Output
RX2	5	I	串口2输入 Input
RX4	4	I	串口4输入 Input
+5V	1, 2, 3	P	电源输入 Power Input

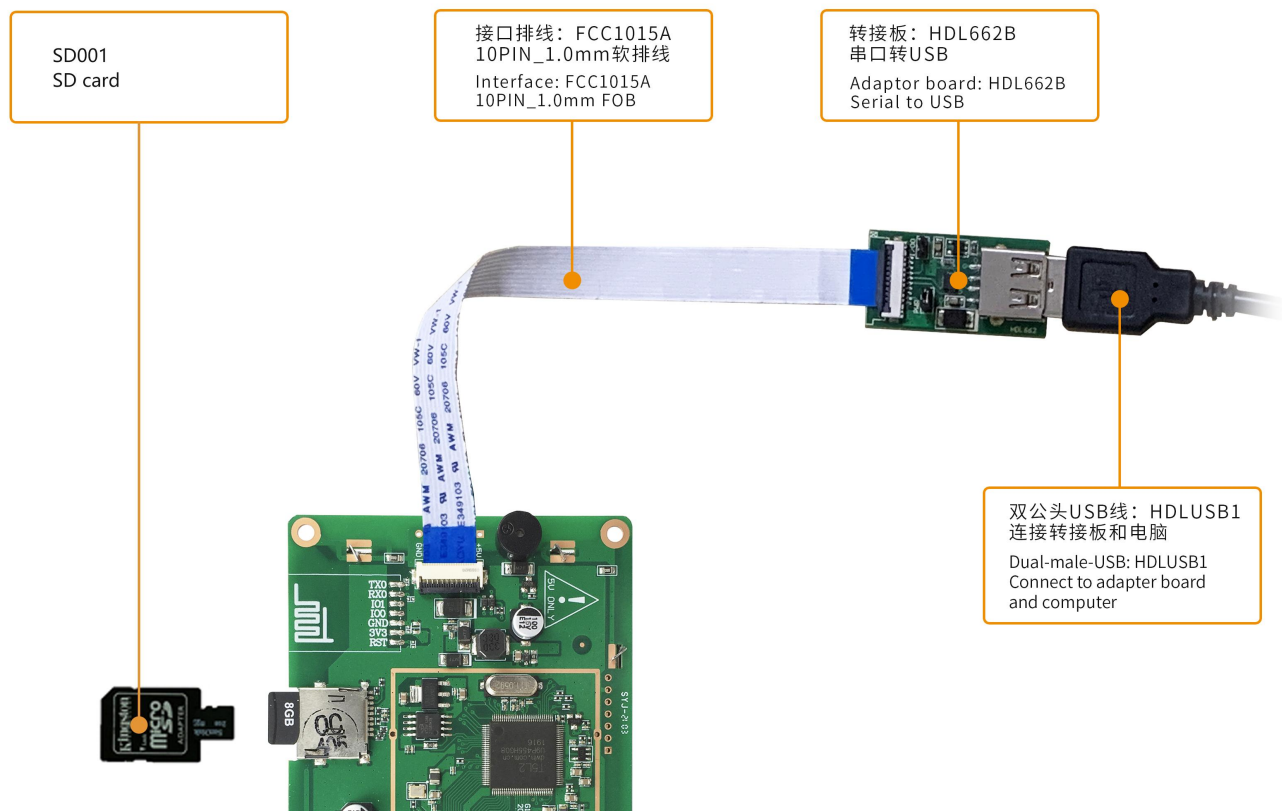
型号	DMG40400C016_03WN				迪文科技 DWIN Technologies			
图纸	A 4	图纸	DWIN	日期				
比例		审核		日期				
单位	MM	批准		日期				

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 Debug 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	2024-12-11	首次发布 First Edition	郑运佳

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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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