

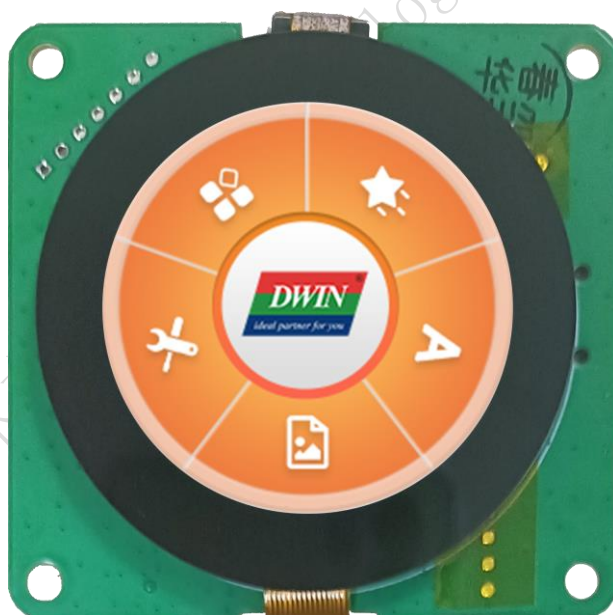
# DMG40400C016\_03WTC

## 产品特点:

- 基于 T5L0-Q88 芯片，运行 DGUS II 系统，商业级产品。
- 1.6 英寸圆形液晶屏，400\*400 分辨率，262K 色，IPS 屏，宽视角。
- 全贴合工艺电容触摸屏。

## Features:

- Based on T5L0-Q88, running DGUS II system, commercial grade.
- 1.6-inch circular LCD, 400\*400 pixels resolution, 262K colors, IPS-TFT-LCD, wide viewing angle.
- Full-laminated CTP.



## 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 and interface description

序号 No.	名称 Name	说明 Description
1	T5L0-Q88 芯片 T5L0-Q88 ASIC	迪文自主研发，2023 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 Developed by DWIN. Mass production in 2023, 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 LCM interface	FPC16_0.5mm, QSPI 接口 FPC16_0.5mm, QSPI interface
3	电容触摸屏接口 CTP interface	FPC6_0.5mm, IIC 接口 FPC6_0.5mm, IIC interface
4	用户接口 User interface	用于供电和串口通讯, 10Pin_1.0mm 座子。串口下载速率(典型值): 12KByte/s 10Pin_1.0mm socket for power supply and serial communication. Download rate(typical value): 12KByte/s
5	Flash	16MBytes NOR Flash, 存放字库、图片、音乐文件，擦写次数>100,000 次 16MBytes NOR Flash, for fonts, pictures and audio files. Rewrite cycle: over 100,000 times
6	SD 卡接口 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 FAT32. Download files by SD interface can be displayed in statistics. Download rate: 4Mb/s
7	PGT05 接口 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 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

显示屏类型 LCD Type	IPS, TFT LCD
视角 Viewing Angle	宽视角, 典型值 85°/85°/85°/85° (L/R/U/D) Wide viewing angle, 85°/85°/85°/85° (L/R/U/D)
分辨率 Resolution	400×400 (支持 0°/90°/180°/270°显示模式) 400×400 pixels (0°/90°/180°/270°)
色彩 Color	18 位 6R6G6B 18-bit 6R6G6B
AA 区 Active Area (A.A.)	直径=39.84mm Diameter=39.84mm
VA 区 View Area (V.A.)	直径=39.84mm Diameter=39.84mm
背光模式 Backlight Mode	LED
背光寿命 Backlight Service Life	>20000 小时 (以最高亮度连续工作, 亮度减半时间) >20000 hours (Time of the brightness decaying to 50% on the condition of continuous working with the maximum brightness)
背光亮度 Brightness	250nit
背光调节 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, 不背光调节建议在此范围使用) 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。 Note: You can use dynamic screen saver wallpapers to avoid afterimages caused by fixed page display for a long time.	

### 2.2 触摸参数 Touch parameters

触摸屏类型 Type	电容式触摸面板。 Capacitive touch panel.
触摸屏结构 Structure	G+FF 结构, 表层为钢化玻璃, 玻璃硬度≥6H。 G+FF structure with tempered glass surface and hardness ≥ 6H.
透光率 Light Transmittance	>85%

## 2.3 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)				
接口排线 Interface Cable	10Pin_1.0mm				

## 2.4 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		

## 2.5 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℃
三防漆工艺 Conformal coating	无 None
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.

■ 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	-4kV	+4kV	-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	/	/	/	/	/	/	/	/
/	/	/	/	/	/	/	/	/
/	/	/	/	/	/	/	/	/

#### 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

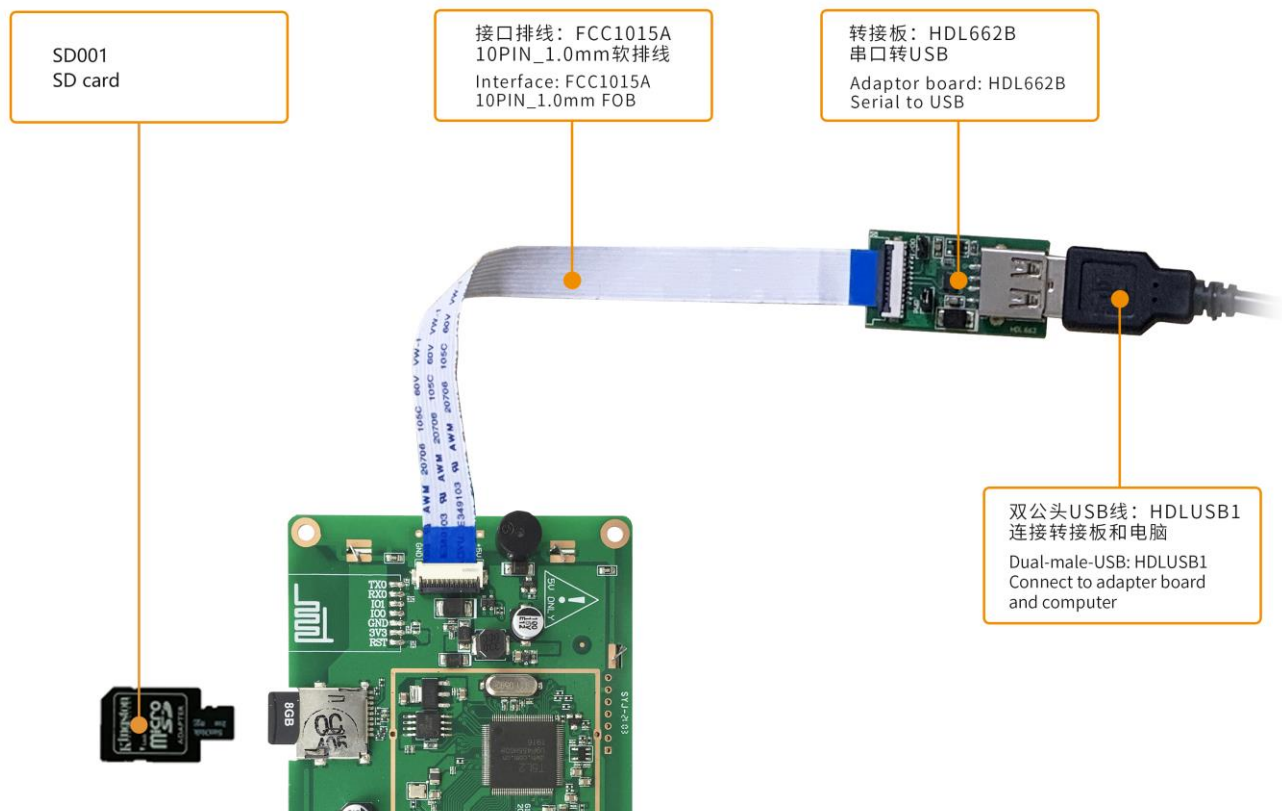
外形尺寸 Form Factor	61.72(W)mm×57.91(H)mm×12.71(T)mm			
净重量 Net Weight	40g			
包装标准 Packaging Standards				
包装箱型号 Model	包装箱尺寸 Dimensions	层数（层） Layer	数量/层（片） Quantity/Layer	总数量（片） Quantity(Pcs)
1 号箱 Carton1:	220mm(L)×160mm(W)×47mm (H)	1	2	2
2 号箱 Carton2:	250mm(L)×200mm(W)×80mm (H)	2	2	4
3 号箱 Carton3:	320mm(L)×270mm(W)×80mm (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



## 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、T5L0-Q88 主控芯片 T5L0-Q88 ASIC

T5L0 -Q88ASIC 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°C~+85°C工作温度范围 (可定制-55°C~105°C工作温度范围 IC)  
Operating temperature ranges from -40°C to +85°C (IC operating temperature customizable from -55°C to 105°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.

## 6、修订记录 Revision records

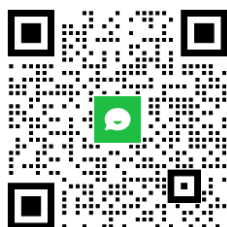
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00	2023-10-25	首次发布 First edition	郑运佳

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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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