

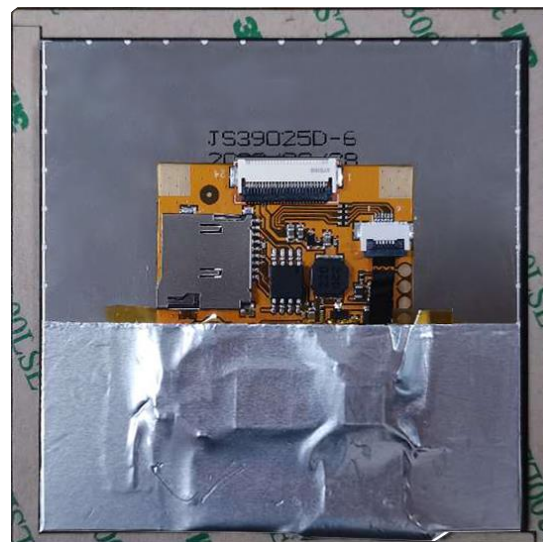
# DMG48480F040\_02WTCZ02

## 产品概述:

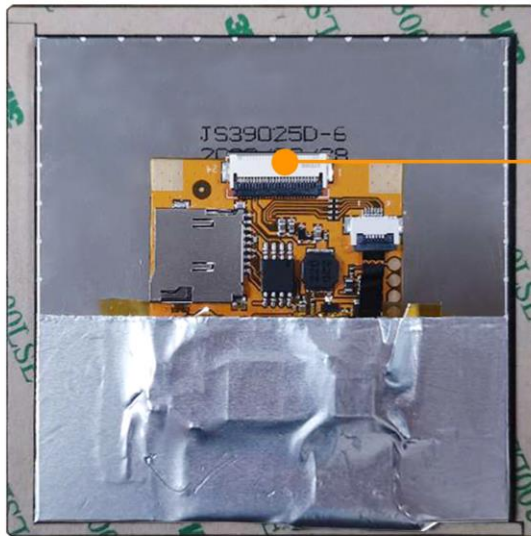
- 基于 T5L0\_Q88 芯片，运行 DGUS II 系统。
- 4 英寸，480\*480 分辨率，262K 色，IPS 屏，宽视角。
- 一体黑全贴合电容触摸屏。
- COF 结构，智能屏的整个核心电路整合在液晶模组 FPC 上，适合结构要求轻、薄，成本要求苛刻，生产简单的应用。

## Features:

- Based on T5L0\_Q88, running DGUS II system.
- 4 inch, 480\*480 pixels resolution, 262K colors, IPS-TFT-LCD, wide viewing angle.
- Integrated black and OCA bonded capacitive touch panel.
- 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 接口定义 Interface definition



用户接口  
User interface

序号 PIN	定义 Definition	类型 Type	功能描述 Functional Description
1	CAN_TX	O	CAN 接口（需外接 CAN 芯片驱动，电路参考见 5） CAN interface (CAN interface (External CAN chip drive is required. See 5 for circuit reference) )
2	CAN_RX	I	
3	TX3	O	串口 3 数据输出 UART3 DOUT
4	RX3	I	串口 3 数据输入 UART3 DIN
5	TX2	I/O	串口 2 数据输出 UART2 DOUT
6	RX2	I/O	串口 2 数据输入 UART2 DIN
7	TR4	-	-
8	TX4	O	串口 4 数据输出 UART4 DOUT
9	RX4	I	串口 4 数据输入 UART4 DIN
10	TX1	O	串口 1 数据输出 UART1 DOUT
11	RX1	I	串口 1 数据输入 UART1 DIN
12	ADC0	I	ADC 输入，3.3V 电源作为参考，12bit 分辨率，输入电压范围 0-3.3V。 ADCs. 12-bit resolution in case of 3.3V power supply. 0-3.3V input voltage.
13	ADC1	I	
14	ADC6	I	接位于壳内的 NTC Connect the NTC inside the housing.
15	ADC7	I	接位于壳壁的 NTC Connect the NTC located on the housing wall.
16	PWM3	O	蜂鸣器/扬声器驱动。外部要 10K 下拉到 GND 确保上电是低电平。 Buzzer/speaker driver. The external 10K resistor should be pulled down to the ground to ensure that power-on is low level.
17	GND	P	公共地 GND
18	GND	P	

序号 PIN	定义 Definition	类型 Type	功能描述 Functional Description
19	+5V	P	供电输入, DC4.5-5.5V。 Power supply, DC4.5-5.5V.
20	+5V	P	
21	I2C_SDA	I/O	RTC/接近传感器/温湿度传感器复用。 RTC/proximity sensor/humidity sensor multiplexing.
22	I2C_SCL	I/O	
23	EX1	I	外部中断 1 输入 External interrupt (INT1)
24	EX0	I	外部中断 0 输入 External interrupt (INT0)

迪文科技 技术文档 DWIN Technology Technical Document

## 2 规格参数 Specification Parameters

### 2.1 产品参数 Product Parameters

主控芯片 Main Chip	T5L0_Q88
用户接口方式 User Interface	24Pin_0.5mm
FLASH	16M Bytes
UI 版本 UI Version	DGUSII / TA
供电方式 Power Supply	5V
显示色彩 Display Color	262K 色 262K colors
尺寸 Dimensions	4 英寸 4 inches
分辨率 Resolution	480*480
显示尺寸 (A.A) Active Area	71.86mm (W)×70.18mm (H)
视域尺寸 (V.A) View Area	71.46mm (W)×69.78mm (H)
可视角度 L/R/U/D Viewing Angle	宽视角, 典型值 85° /85° /85° /85° (L/R/U/D) Wide viewing angel, typical value of 85° /85° /85° /85° (L/R/U/D)
背光寿命 Backlight Service Life	>10000 小时 (以最高亮度连续工作, 亮度减半时间) > 10000 hours (Time of the brightness decaying to 50% on the condition of continuous working with the maximum brightness)
亮度 Brightness	50nit
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)
触摸屏类型 Type	电容式触摸屏 (一体黑盖板) CTP (Integrated black cover plate)
触摸屏结构 Structure	G+G 结构 G+G structure
触摸方式 Touch Mode	单点触摸, 支持连续滑动触摸 Support point touch and drag
表面硬度 Surface Hardness	6H
透光率 Light Transmittance	20%~30%
触控次数 Life	> 10000H

## 2.2 串口参数 Interface Parameters

参数 Item	测试条件 Conditions	最小值 Min	典型值 Typ	最大值 Max	单位 Unit
串口波特率 Baud rate	用户自定义 (硬件配置文件设置) User Set(Configure the CFG file)	3150	115200	3225600	bps
串口输出电平 Output Voltage(TXD)	Output 1	3.0	3.3	-	V
	Output 0	-	0	0.3	V
串口输入电平 Input Voltage(RXD)	Input 1	-	-	3.3	V
	Input 0	0	-	0.5	V
串口模式 Interface	UART2: TTL; UART3: TTL; (OS 配置后才能使用 Only available after OS configuration) UART4: TTL; (OS 配置后才能使用 Only available after OS configuration)				
数据格式 Data Format	UART2: N81; UART3: N81/E81/O81/N82;四种模式可选 (OS 配置) 4 modes (OS configuration) UART4: N81/E81/O81/N82;四种模式可选 (OS 配置) 4 modes (OS configuration)				

## 2.3 电气规格 Electrical specifications

额定功率 Rated Power	<2W	
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	280mA	VCC=5V, 背光亮度最大 VCC=5V, max backlight
	100mA	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	-10°C~60°C
存储温度 Storage Temperature	-20°C~70°C
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

智能屏产品在量产前需根据实际应用需求及产品规格管控标准进行系列流程化可靠性检测，确保产品质量。

Before mass production of smart screens, a series of procedural reliability tests need to be conducted according to actual application requirements and product specification control standards to ensure product quality.

#### 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.

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	-4kV	+4kV	-8kV	+8kV	-15kV	+15kV
屏幕	/	/	/	/	A	A	/	/
/	/	/	/	/	/	/	/	/
/	/	/	/	/	/	/	/	/

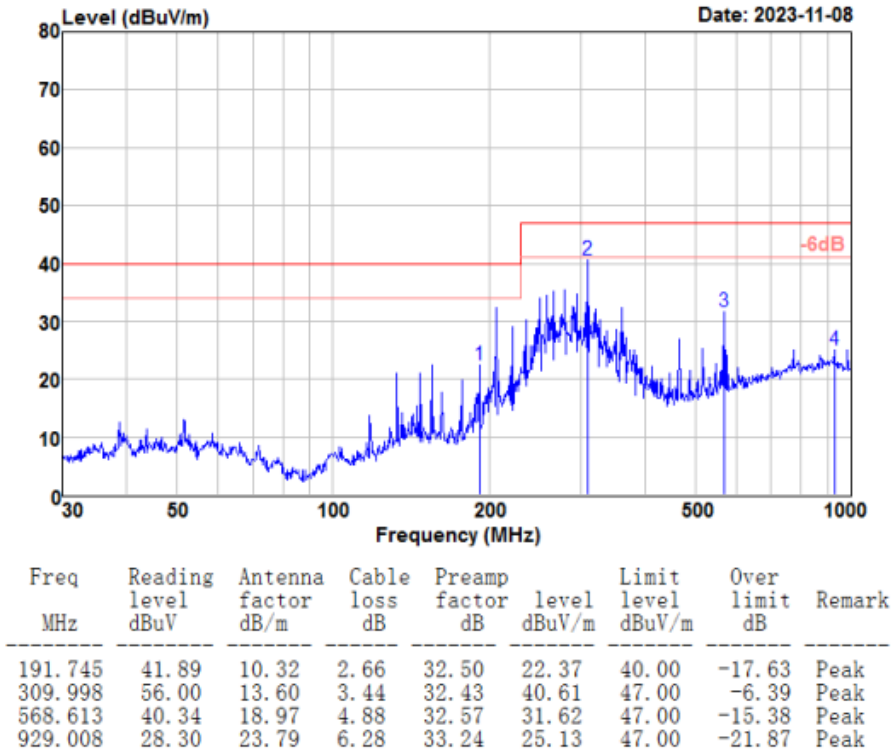
Table 2: Electrostatic Discharge Immunity (Direct Contact)

Test Points Locations	Test Levels							
	-2kV	+2kV	-4kV	+4kV	-6kV	+6kV	-8kV	+8kV
边框 J0	/	/	/	/	/	/	/	/
/	/	/	/	/	/	/	/	/
/	/	/	/	/	/	/	/	/

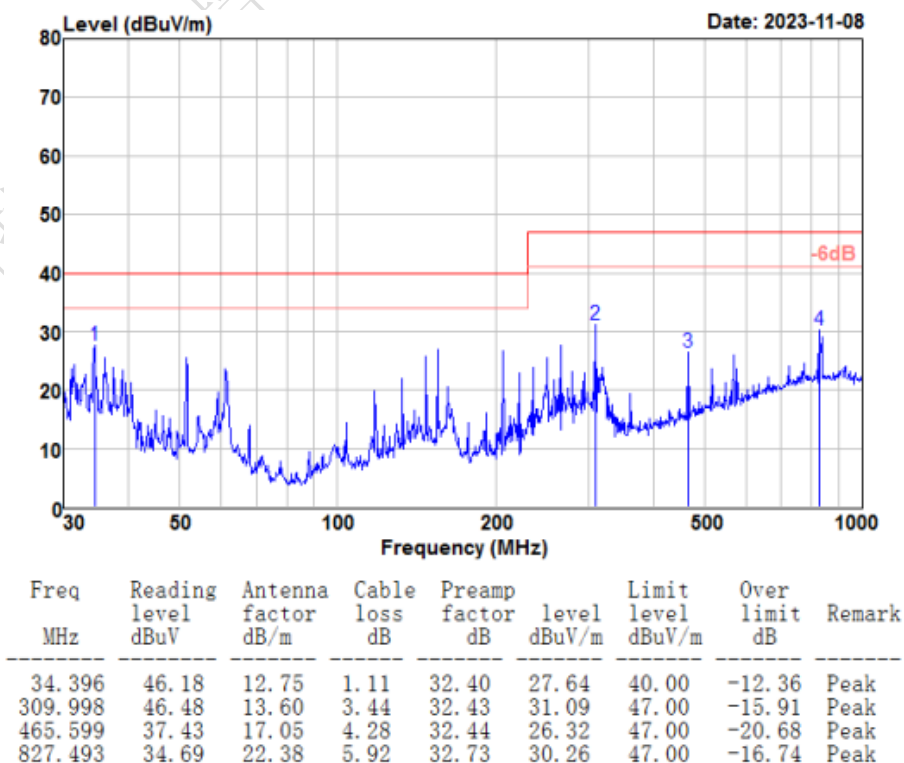
### 3.2 辐射干扰测试 RE test

测试项目 Test Item	测试标准 Test Standard	结果 Result
辐射干扰 RE	Class B	合格 Pass

#### HORIZONTAL



#### VERTICAL



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

试验环境温度：-20~70℃

Test temperature:-20~70℃

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 Temperature	结果 Result
高温 (70℃) High temperature (70℃)	A
低温 (-20℃) Low temperature (-20℃)	A

#### 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:

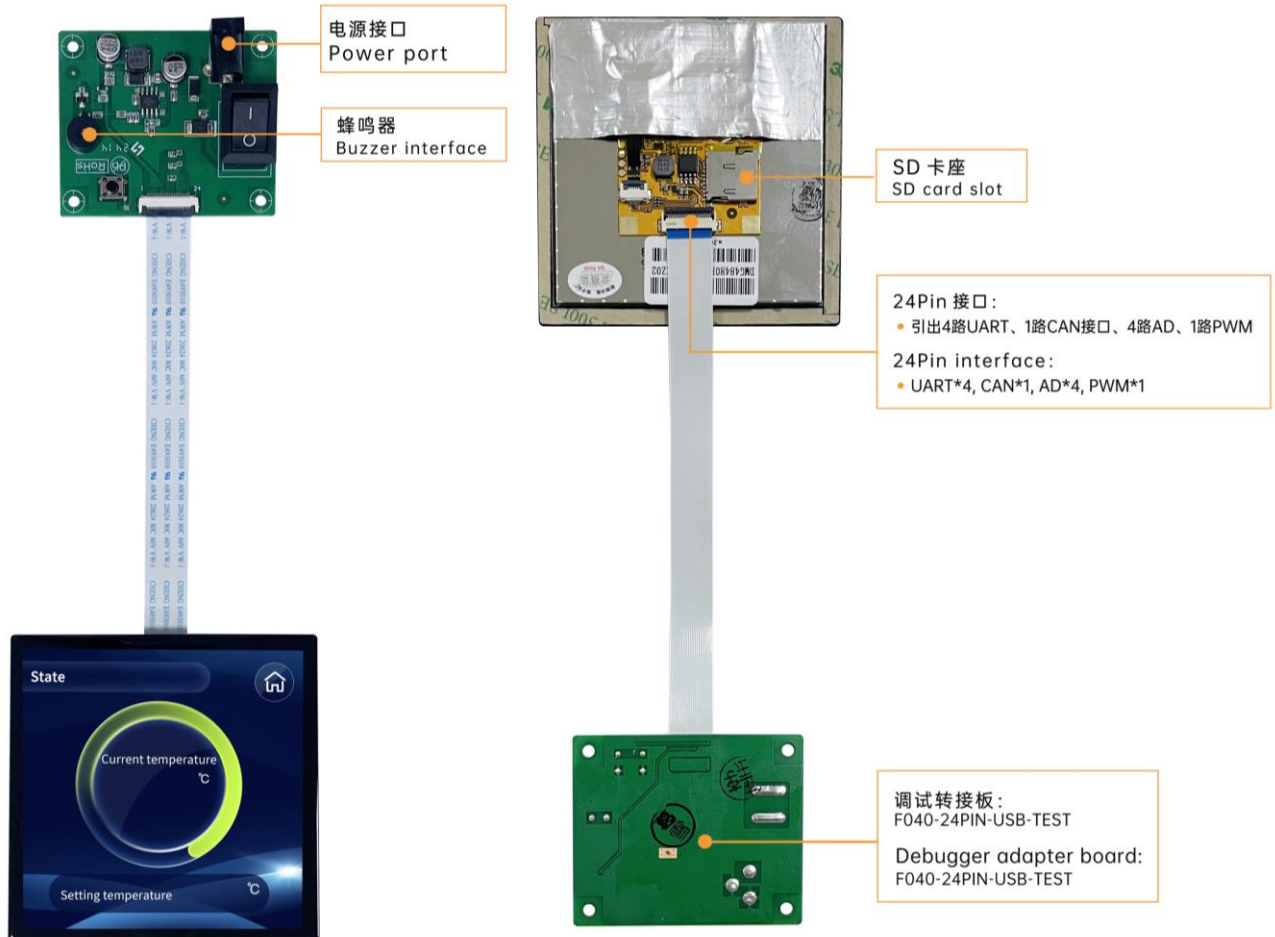
- A. Normal performance within limits specified by the manufacturer, requestor or purchaser;
- B. Temporary loss of function or degradation of performance which ceases after the disturbance ceases, and from which the equipment under test recovers its normal performance, without operator intervention;
- 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 调试示例 Debugging Example

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.



迪文

## 5 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) 在 T5L0 芯片基础上缩小封装，新封装为 QFN88，大小 9\*9mm，裁剪了 OS 核外设接口，GUI 核性能一致。

On the basis of the T5L0 chip, the package size is reduced to QFN88, with dimensions of 9\*9mm. The peripheral interfaces of the OS core have been trimmed, while maintaining consistent performance of the GUI core.

- (3) 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.

- (4) 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:

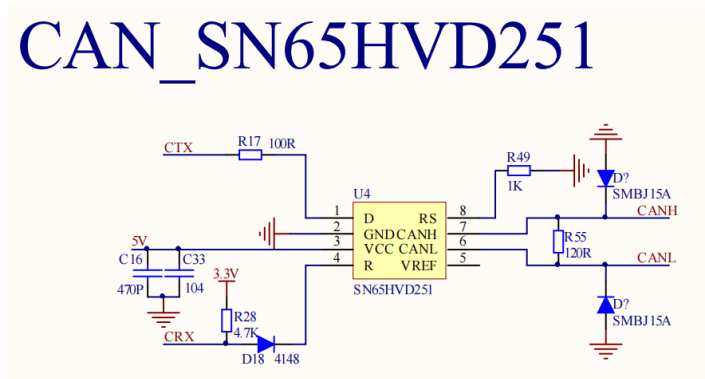
- 标准 8051 架构和指令集，64Kbytes 代码空间，32Kbytes 片内 RAM。  
Standard 8051 core and instruction set, 64Kbytes code space, 32Kbytes on-chip RAM.
  - 64bit 整数型数学运算单元（MDU），包括 64bit MAC 和 64bit 除法器。  
64-bit integer mathematical operation unit (MDU), including 64-bit MAC and 64-bit divider.
  - 15 个 IO，4 路 UARTs，1 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.
- (5) 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.
- (6) -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 自主设计定制化产品。

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

## 6 CAN 电路设计参考 CAN circuit design parameters

### CAN\_SN65HVD251



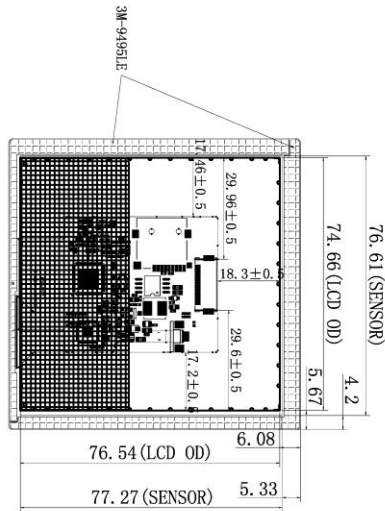
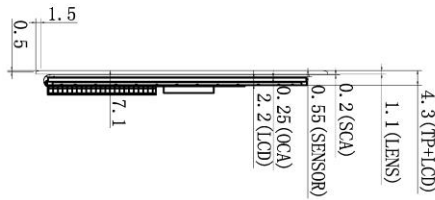
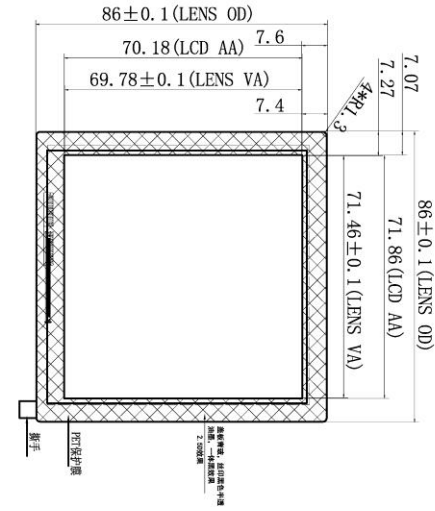
## 7 包装和物理尺寸 Packing Capacity & Dimension

尺寸 Dimension				
外形尺寸 Dimension	86.0(W) × 86.0 (H) × 4.3(T) mm			
净重量 Net Weight	70g			
包装标准 Packing Capacity				
包装箱型号 Model	包装箱尺寸 Size	层数 (层) Layer	数量/层 (片) Quantity/Layer	总数量 (片) Quantity(Pcs)
纸箱 Carton:	415mm(L)×250mm(W)×200mm(H)	-	-	100

# 正视图

# 侧视图

# 背视图



液晶屏PIN 定义

Pin#	Name	
1	CAN TX	13 ADCl
2	CAN RX	14 AD06
3	TX3	15 AD07
4	RX3	16 PNM3
5	TX2	17 GND
6	RX2	18 GND
7	TX4	19 +5V
8	TX4	20 +5V
9	RX4	21 P33
10	TX1	22 P32
11	RX1	23 P31
12	AD00	24 P30



REVISION RECORD	VER	DATE	迪文科技有限公司
1 初次发布	V1-1	2023/02/14	FILE NAME : DMG48480F040_02WTCZ02.TPM
2 修改规格, 更改颜色为白色	V2-1	2023/12/10	CUSTOMER NAME : TOLERANCES : ±0.2 ANGLES : ±0.1°
3			SENSOR: RELEASE: V2-1 SCALE : 1:1
4			DRAWN BY : H.Z.Q DATE : 2023/10/10 UNIT : mm
5			CHECKED BY : DATE : PRO. (S)
6			APPROVED BY : DATE : SHEET : 1/1

## 8 资料下载 Data Download

通过迪文官网 [www.dwin.com.cn](http://www.dwin.com.cn)，下载相应的 DGUS 工具及产品规格书，或进入迪文开发者论坛查看视频教程、应用工程案例。更多了解，欢迎与我们联系：

You can download the corresponding DGUS tools and product specification, or go to DWIN Developer Forum to view video tutorials and application engineering cases through DWIN official website [www.dwin.com.cn](http://www.dwin.com.cn). For more information, please contact us at:

客服电话 Customer service Tel: 400 018 9008

客服 QQ Customer service QQ: 400 018 9008

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://inforum.dwin.com.cn:20080>

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!

## 9 修订记录 Record of Revision

版本 Rev	日期 Date	描述 Content	编辑人 Editor
00	2023-12-27	首次发布 First Edition	郑运佳
01	2024-01-17	更新实物图 Update the actual picture	陈律志
02	2024-01-19	修改型号和接口定义 Modify model number and pin definition	陈律志
03	2024-06-18	添加调试示例 Add debugging example	陈律志
04	2024-07-04	更新 CAD Update dimension diagram	陈律志

## 重要声明

### Important Disclaimer

迪文有权进行产品设计的任何改善或变更，且不另行单独通知客户。

客户应自行确保在产品应用过程中严格遵循所有相关标准及其他要求，包括但不限于功能安全、信息安全及监管等方面的规定。

对于客户在其产品中采用迪文产品可能引发的任何后果，迪文不承担连带责任。特别地，对于可能导致的重大财产损失、环境危害、人身伤害甚至死亡等风险，尤其是在军事、易燃易爆、生命医疗设备等高风险应用领域，客户应自行评估风险，并采取相应的预防和保护措施，迪文不承担相关责任。

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

Customers should ensure strictly adhering to all the relevant standards and requirements during the product application process, including but not limited to functional safety, information security, and regulatory provisions.

DWIN shall not bear any joint and several liability for any consequences that may arise from customers' adoption of DWIN products. In particular, for risks that may lead to significant property losses, environmental hazards, personal injury, or even death, especially in high-risk application areas such as military applications, flammable and explosive places, and life-saving medical equipment, customers should independently assess the risks and take corresponding preventive and protective measures. DWIN shall not bear any relevant responsibility.