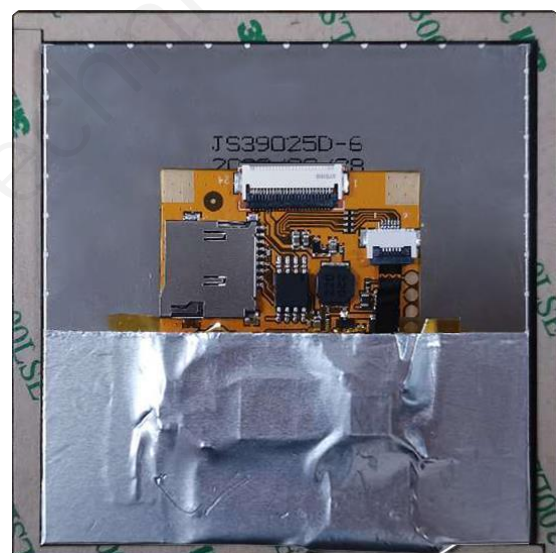


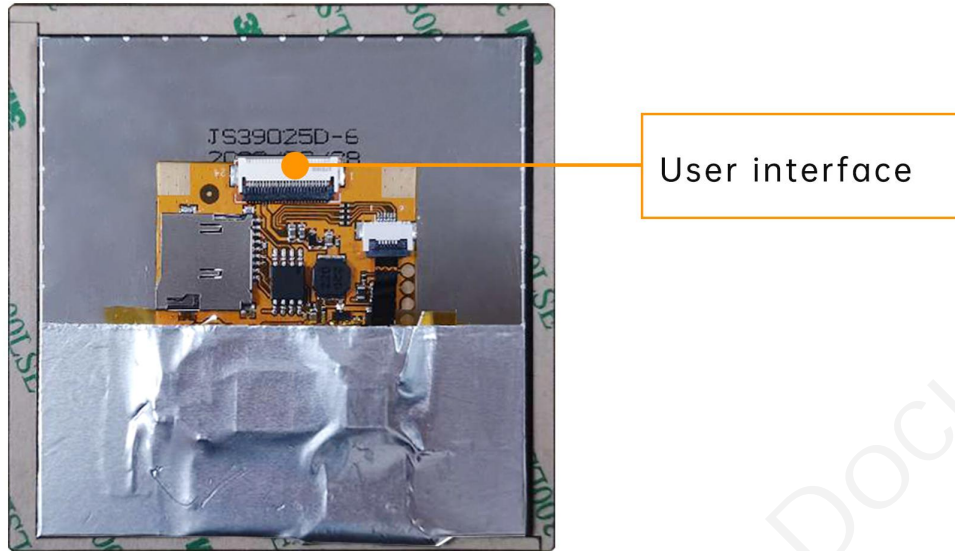
# DMG48480F040\_02WTCZ02

## 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 Interface definition



PIN	Definition	Type	Functional Description
1	CAN_TX	O	CAN interface (CAN interface (External CAN chip drive is required. See 5 for circuit reference) )
2	CAN_RX	I	
3	TX3	O	UART3 Output
4	RX3	I	UART3 Input
5	TX2	O	UART2 Output
6	RX2	I	UART2 Input
7	TR4	-	-
8	TX4	O	UART4 Output
9	RX4	I	UART4 Input
10	TX1	O	UART1 Output
11	RX1	I	UART1 Input
12	ADC0	I	ADC input. 12-bit resolution in case of 3.3V power supply. 0-3.3V input voltage.
13	ADC1	I	
14	ADC6	I	Connect the NTC inside the enclosure
15	ADC7	I	Connect the NTC located on the enclosure wall
16	PWM3	O	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	GND

PIN	Definition	Type	Functional Description
18	GND	P	Power supply, DC4.5-5.5V.
19	+5V	P	
20	+5V	P	
21	I2C_SDA	IO	RTC/proximity sensor/humidity sensor multiplexing.
22	I2C_SCL	IO	
23	EX1	IO	External interrupt (INT1)
24	EX0	IO	External interrupt (INT0)

## 2 Specification Parameters

### 2.1 Product Parameters

<b>Main Chip</b>	T5L0-Q88
<b>User Interface</b>	24Pin_0.5mm
<b>FLASH</b>	16M Bytes
<b>UI Version</b>	DGUSII / TA
<b>Power Supply</b>	5V
<b>Display Color</b>	262K colors
<b>Dimensions</b>	4 inch
<b>Resolution</b>	480*480
<b>Active Area</b>	71.86mm (W)×70.18mm (H)
<b>View Area</b>	71.46mm (W)×69.78mm (H)
<b>Viewing Angle</b>	Wide viewing angle, typical value of 85° /85° /85° /85° (L/R/U/D)
<b>Backlight Service Life</b>	> 10000 hours (Time of the brightness decaying to 50% on the condition of continuous working with the maximum brightness)
<b>Brightness</b>	50nit
<b>Brightness Control</b>	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)
<b>TP Type</b>	CTP (Capacitive Touch Panel)
<b>TP Structure</b>	G+G structure
<b>Touch Mode</b>	Single point touch, support continuous sliding touch
<b>Surface Hardness</b>	6H
<b>Light Transmittance</b>	20%~30%
<b>Life</b>	> 10000H

## 2.2 Interface Parameters

Item	Conditions	Min	Typ	Max	Unit
<b>Baud Rate</b>	User Set(Configure the CFG file)	3150	115200	3225600	bps
<b>Output Voltage(TXD)</b>	Output 1	3.0	3.3	-	V
	Output 0	-	0	0.3	V
<b>Input Voltage(RXD)</b>	Input 1	-	-	3.3	V
	Input 0	0	-	0.5	V
<b>Interface</b>	UART2: TTL; UART3: TTL; (Only available after OS configuration) UART4: TTL; (Only available after OS configuration)				
<b>Data Format</b>	UART2: N81; UART3: N81/E81/O81/N82;4 modes (OS configuration) UART4: N81/E81/O81/N82;4 modes (OS configuration)				

## 2.3 Electrical specifications

<b>Rated Power</b>	<2W	
<b>Operating Voltage</b>	4.5~5.5V, typical value of 5V	
<b>Operating Current</b>	280mA	VCC=5V, max backlight
	100mA	VCC=5V, backlight off
<b>Recommended power supply: 5V 1A DC</b>		

## 2.4 Operating Environment

<b>Operating Temperature</b>	-10°C~60°C
<b>Storage Temperature</b>	-20°C~70°C
<b>Operating Humidity</b>	10%~90%RH, typical value of 60% RH

### 3 Reliability Test

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 ESD Test

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
Screen	/	/	/	/	A	A	/	/
/	/	/	/	/	/	/	/	/
/	/	/	/	/	/	/	/	/

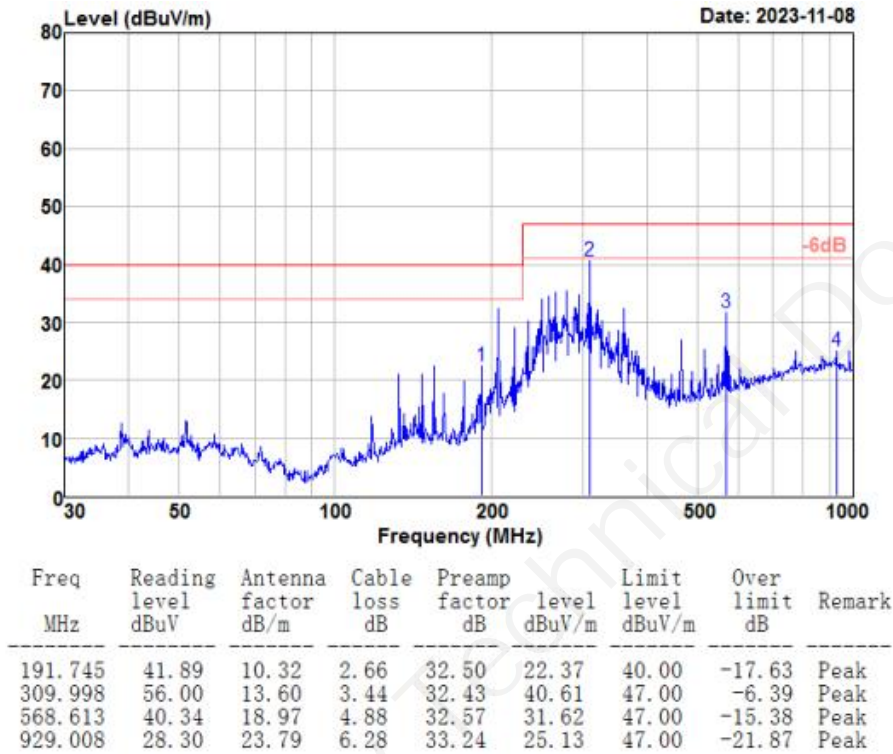
Table 2: Electrostatic Discharge Immunity (Direct Contact)

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

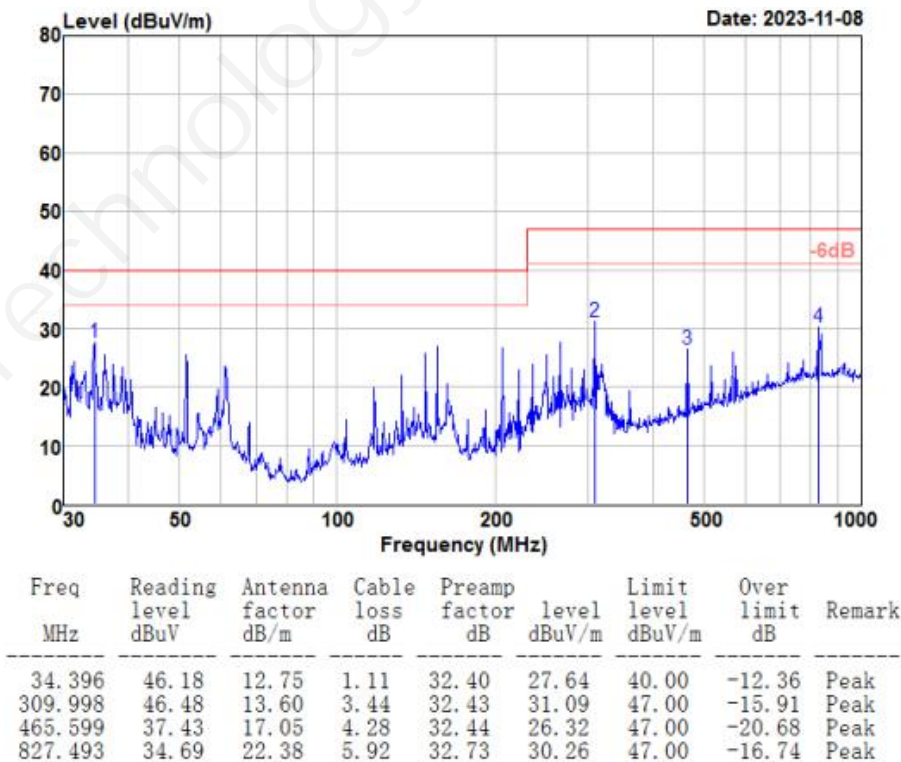
### 3.2 RE test

Test Item	Test Standard	Result
RE	Class B	Normal operation

#### HORIZONTAL



#### VERTICAL





### 3.3 High and Low Temperature Test

Test temperature:-20~70℃

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.

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

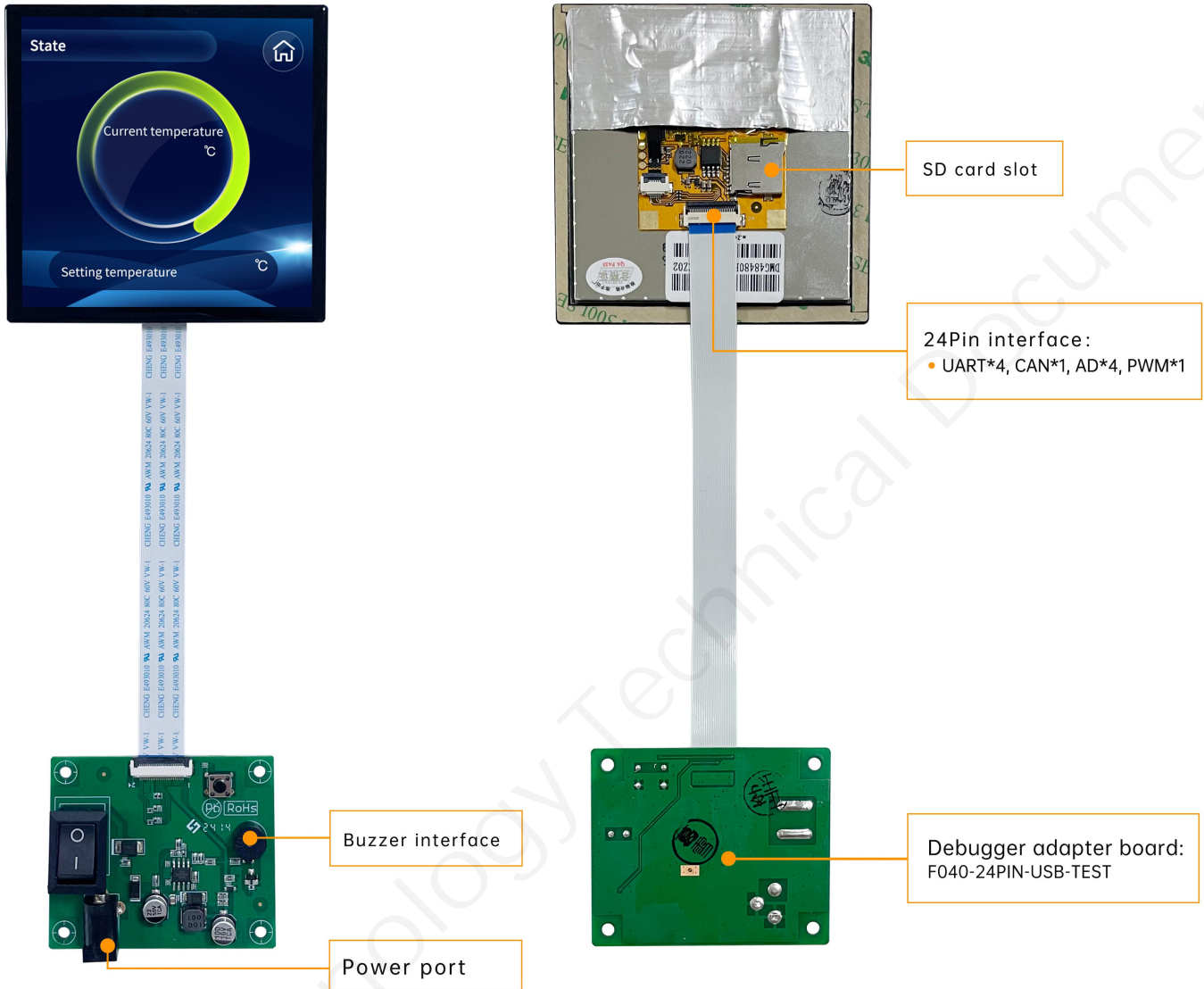
#### Performance Criterion:

- 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 Debugging Example

It is recommended for new users of DWIN smart LCMs to purchase official accessories. For more details, please refer to customer service center.



## 5 T5L0-Q88 ASIC

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) Adopting the widely used, mature, and stable 8051 core, operating at a high speed of 1T (single instruction cycle), with a maximum clock frequency of 400MHz.

(2) 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) Separate GUI CPU core running DGUS II System:

- 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 hardware acceleration and the UI with animation and icons as its main feature is extremely cool and smooth.
- Images and icons stored in JPEG format. Adopt Low-cost 16Mbytes SPI Flash.
- High quality ratio and sound restoration and playback.
- 2\*10-bit 800KHz DC/DC controllers simplify LED backlight, analog power design and save cost and space.
- Support DGUS development and simulation on PC. Support backend remote upgrade.

(4) Separate CPU (OS CPU) core runs user 8051 code or DWIN OS system and user CPU is omitted in practical application:

- Standard 8051 core and instruction set, 64Kbytes code space, 32Kbytes on-chip RAM.
- 64-bit integer mathematical operation unit (MDU), including 64-bit MAC and 64-bit divider.
- 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.
- Support IAP online simulation and debugging with unlimited breakpoints.
- Upgrade code online through DGUS system.

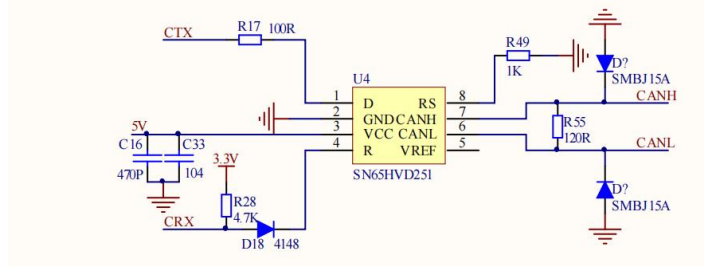
(5) 1Mbytes on-chip Flash with DWIN patent encryption technology ensure code and data security.

(6) Operating temperature ranges from -40°C to +85°C (IC operating temperature customizable from -55°C to 105°C).

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

## 6 CAN circuit design parameters

### CAN\_SN65HVD251



## 7 Packing Capacity & Dimension

Dimension				
Dimension	86.0(W) × 86.0 (H) × 4.3(T) mm			
Net Weight	70g			
Packing Capacity				
Model	Size	Layer	Quantity/Layer	Quantity(Pcs)
Carton1:	220mm(L)×160mm(W)×47mm(H)	1	4	4
Carton2:	250mm(L)×200mm(W)×80mm(H)	1	8	8
Carton3:	320mm(L)×270mm(W)×80mm(H)	1	16	16
Carton4:	415mm(L)×250mm(W)×200mm(H)	-	-	102



## 7 Revision records

Rev	Revise Date	Content	Editor
00	2024-01-02	First Edition	Xu Ying
01	2024-02-23	Modify model number and pin definition	Xu Ying
02	2024-07-04	CAD Update dimension diagram	Xu Ying

Please contact us if you have any questions about the use of this document or our products, or if you would like to know the latest information about our products:

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

## Important Disclaimer

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.

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