Product Brochure
ECM50-A Industrial Computer



Chengdu Ebyte Electronic Technology Co.,Ltd.

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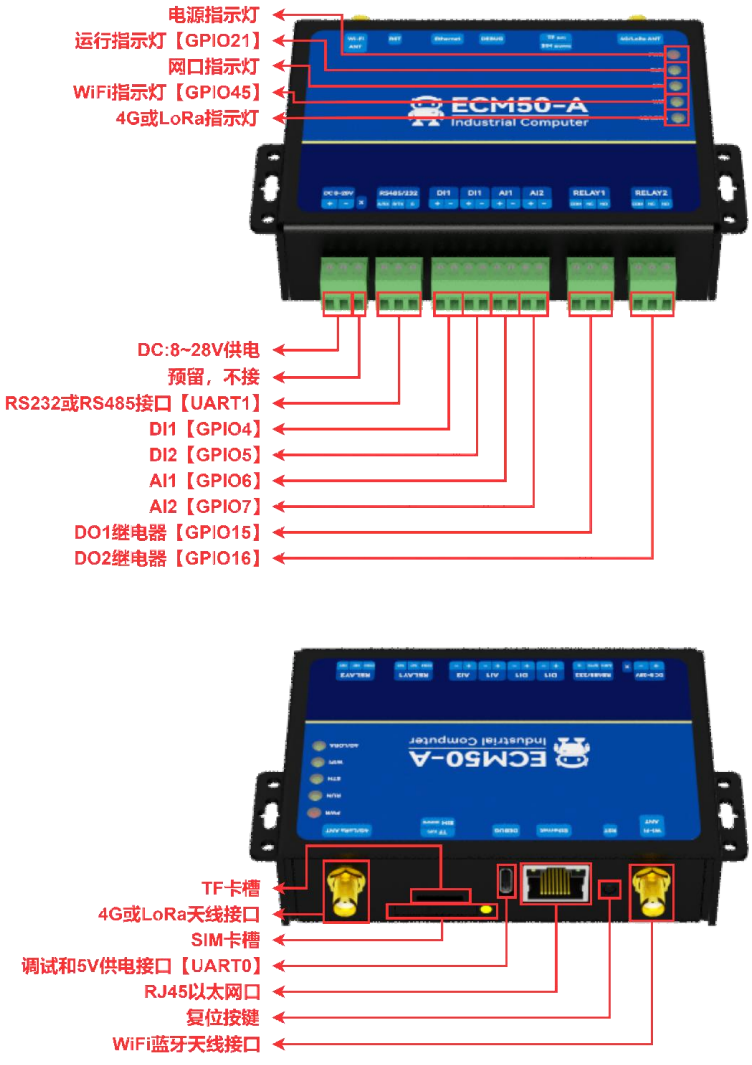
1.Product Overview

1.1.Product Introduction

The ECM50-A is an industrial-grade programmable IPC with full-scenario communication capabilities based on the ESP32-S3 chip. It supports Wi-Fi, Bluetooth, Ethernet, 4G, or LoRa communication, as well as multiple network protocols such as TCP, HTTP, and MQTT. Users can program in MicroPython to execute customized business logic and data processing on the IPC. Suitable for a variety of IoT data collection, transmission, and control scenarios, the ECM50-A allows users to quickly develop their own business functions using the rich official source code. This significantly reduces development cycles and project costs.

Refer to the "ECM50-A_User_Guide.pdf" document in the product information to quickly get started with this product.

The ECM50-A interface function diagram is as follows:



ECM50-A interface function diagram

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1.2.Typical Applications

- Intelligent instruments, smart gas and water meters, and automated control;
- Industrial data collection, smart factories, and assembly line automation transformation;
- Assisted vending equipment, low-power collection, and smart fire protection;
- Smart agriculture, smart water services, smart parking, and smart scenic spots;
- Outdoor testing, water conservancy and geological testing, hydrology and water conservancy;
- Smart environmental protection, energy collection, smart animal husbandry, smart meteorology;
- Power distribution management, smart street lights;

2.Product Selection

2.1.Model configuration

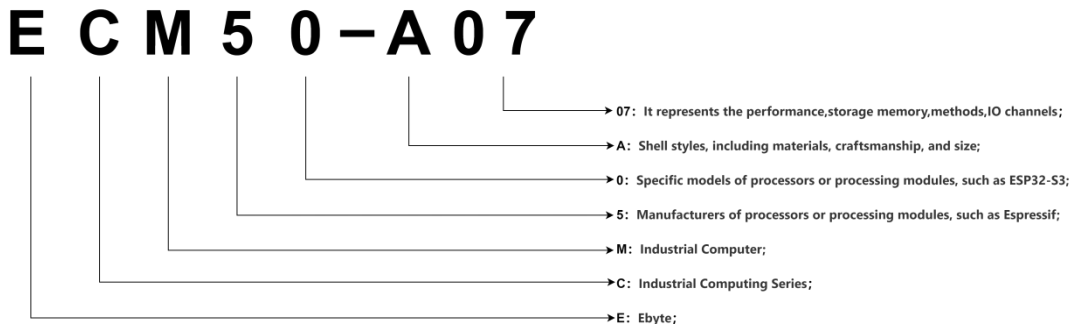
The ECM50-A series industrial computer selection and configuration table is as follows:

Product selection and configuration table

Serial number	Product Model	Configuration
1	ECM50-A06	RS232+LoRa
2	ECM50-A07	RS485+LoRa
3	ECM50-A08	RS232+4G
4	ECM50-A09	RS485+4G

2.2.Model code

The product model coding is shown in the figure below:



Model code description

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3.Specifications

3.1.Functional parameters

ECM50-A series industrial computer function parameter table

Product Model	ECM50-A06	ECM50-A07	ECM50-A08	ECM50-A09
Processor model	ESP32-S3R8			
Main frequency	Dual-core 32-bit LX7 microprocessor, up to 240 MHz main frequency			
Memory	8MB PSRAM			
storage	16MB NOR FLASH			
Expanded storage	1* TF card slot			
RS485/RS232	RS232	RS485	RS232	RS485
4G/LoRa	LoRa: Communication distance 5km (under ideal conditions) Data transfer rates up to 62.5Kbps Operating frequency: 410.125~493.125MHz		4G: Frequency band: LTE-FDD B1/3/5/8 LTE-TDD B34/38/39/40/41 Operator: default mobile, full network access needs to be customized	
Ethernet interface	1* RJ45 10/100Mbps			
WiFi	WiFi supports IEEE 802.11b/g/n Supports 20 MHz and 40 MHz bandwidth in the 2.4 GHz band Supports 1T1R mode with data rate up to 150 Mbps			
Bluetooth	Bluetooth Low Energy (Bluetooth LE): Bluetooth 5, Bluetooth mesh			
DI	2* Digital detection, compatible with dry and wet contacts, wet contact default is NPN type			
AI	2* Analog detection, default current type 4-20mA; can be changed to voltage type; accuracy 12 bits			
DO	2* Relay, 3A 250VAC			
button	1* Reset button			
indicator light	Power indicator, operation indicator (programmable), Ethernet indicator, WiFi indicator (programmable), 4G/LoRa indicator			
Power input	DC 8-28V Phoenix terminal interface or DC 5V Type-C interface			
Power consumption	Typical value: 0.5W RF fully open, relay fully open: 1.56W			
Structural dimensions	111.2*79.2*28mm (excluding terminals and mounting ears)			

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3.2.Environmental characteristics

ECB10-PGD Test Baseboard Environmental Characteristics Table

Operating temperature	Industrial grade: -40℃ ~ 85℃;
Storage temperature	-40℃ ~ 85℃;
Operating humidity	5~95% humidity, non-condensing;
Storage humidity	60℃@95% humidity, non-condensing;

4.Indicator Light Description

There are five indicator lights on the top of the ECM50-A series industrial computer: "PWR" power indicator, "RUN" operation indicator, "ETH" status indicator, "WIFI" status indicator, and "4G/LoRa" status indicator. The indicator light status is shown in the following table:

Indicator status table

indicator light	state	meaning	illustrate
PWR	Not bright	The power supply is abnormal, please check the power connection	-
	Constantly on	Power supply is normal	-
RUN	Not bright	The device is not operating normally	Programmable via GPIO21
	Flash	Running normally	
ETH	Not bright	No data transmission on the network port	-
	Flash	There is data transmission on the network port	-
WIFI	Not bright	WiFi no data transmission	Programmable via GPIO45
	Flash	WiFi has data transmission	
4G/LoRa	Not bright	LoRa no data transmission	Applicable to: ECM50-A06, ECM50-A07
	Flash	LoRa has data transmission	
4G/LoRa	Not bright	4G is not enabled (possibly because the 4G power is not turned on)	Applicable to: ECM50-A08, ECM50-A09
	Slow flash (200 ms high/1800 msLow)	Search status	
	Slow flash (1800 mshigh/200 msLow)	Standby mode	
	Flash125 mshigh/125 msLow)	4G has data transmission	

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5.Interface Description

5.1.Debug interface

The TYPE-C interface is used to convert the TTL signal of UART0 into a USB signal. One data line is used to realize serial debugging (default baud rate: 115200), burning and debugging power supply.

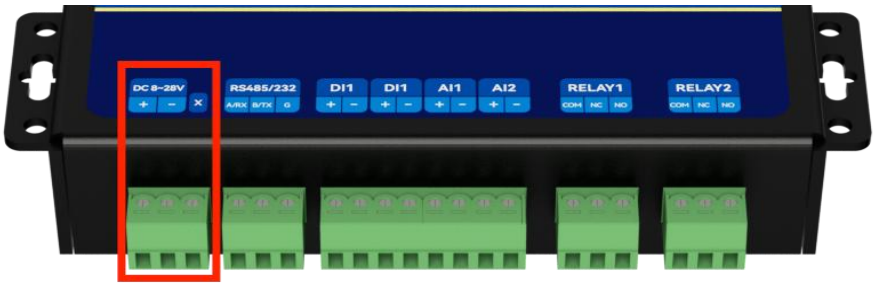
It is recommended to use Phoenix terminal to power the radio frequency function. When the Phoenix terminal and TYPE-C data cable are connected at the same time,ECM50-AIt will automatically switch to Phoenix terminal power supply. The interface is shown in the figure below:



Debug interface diagram

5.2.Power interface

Supports 8~28V DC wide voltage power supply. The interface uses 3.81mm pitch 3P Phoenix terminal. The rightmost interface marked with "X" is reserved for use, please do not connect it. The power interface is designed withLightning surge protection, electrostatic protection, reverse connection protection, and short circuit protection.



Power interface diagram

The power consumption of ECM50-A series industrial computers is shown in the table below:

Power consumption parameter table

Working conditions	Power supply voltage (V)	Average current (A)	Power consumption (W)
Normal operation, no RF communication	12	0.05	0.6
Normal operation, RF communication	12	0.13	1.56

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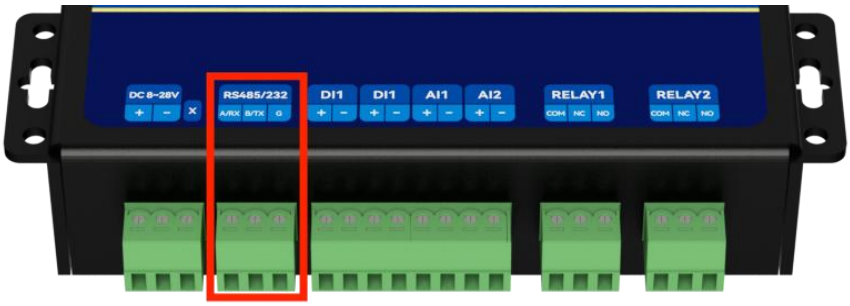
5.3.RS485/RS232 interface

ECM50-A06 and ECM50-A08 support RS232; ECM50-A07 and ECM50-A09 support RS485.

"A/RX" connects to the "A" of RS485 device or the "TX" of RS232 device;

"B/TX" connects to "B" of RS485 device or "RX" of RS232 device;

"GND" is connected to the "GND" of the RS485 or RS232 device. The interface location is shown in the figure below:



RS485/RS232 interface diagram

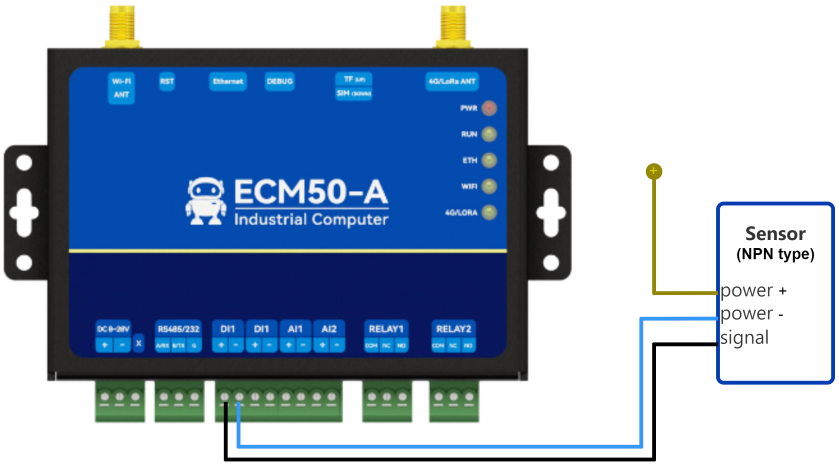
5.4.DI interface

Two sets of DI (digital input) interfaces compatible with both dry and wet contacts use 3.81mm-pitch Phoenix terminal connectors. By default, wet contacts can only accommodate NPN sensors. If you need to connect a PNP sensor, please purchase an NPN-to-PNP converter module. If you require four DI interfaces, please contact sales for customization. The wiring diagram is shown below:



Dry contact wiring diagram

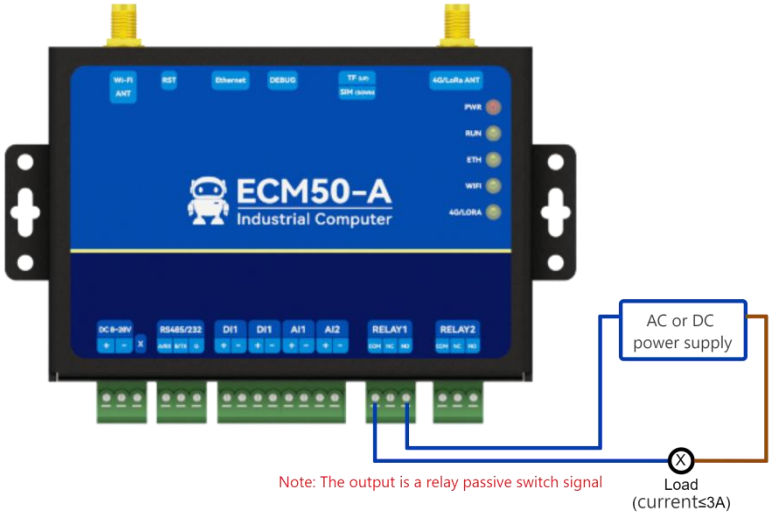
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Wet contact wiring diagram

5.5.DO interface

Two sets of 3A 250VAC single-pole double-throw relay switches use 3.81mm pitch Phoenix terminal connectors. "COM" is the common contact; "NC" is the normally closed contact; "NO" is the normally open contact. The wiring method is shown in the figure below:

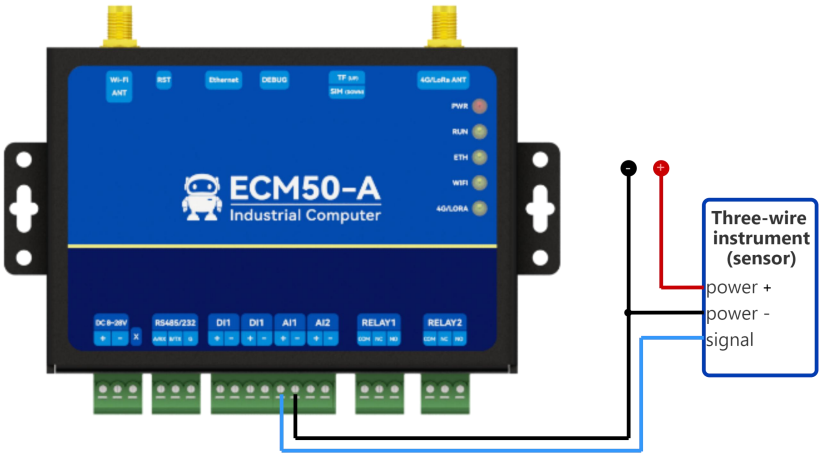


Relay switch wiring diagram

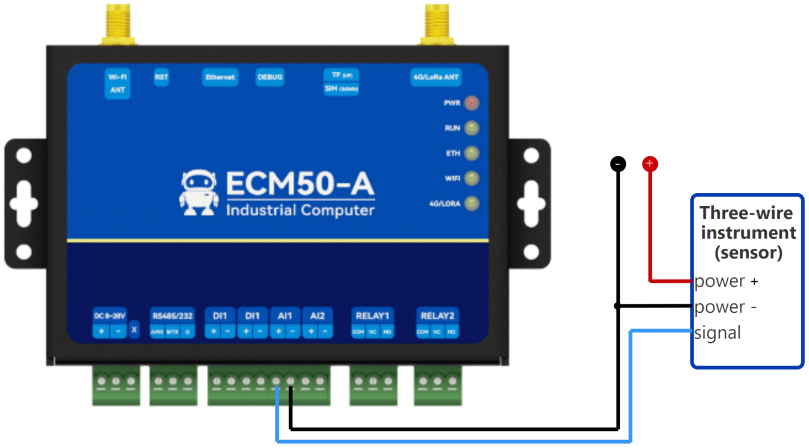
5.6.AI Interface

Two AI (analog input) interfaces, default 4-20mA, use 3.81mm pitch Phoenix terminal connectors. Acquisition accuracy is 12 bits. If voltage acquisition or four AI interfaces are required, please contact sales for customization. The wiring diagram is as follows:

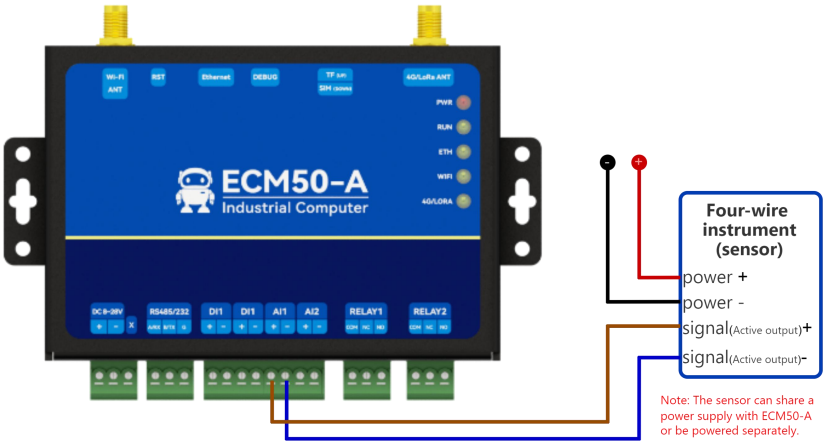
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Wiring diagram of two-wire instrument



Wiring diagram of three-wire instrument



Wiring diagram of four-wire instrument

5.7.TF card interface

Supports inserting TF card to expand storage, with a maximum capacity of 2TB. When removing, press the TF card inward to eject it. The TF card interface is shown in the figure below:

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TF card interface diagram

5.8.RJ45 network port

One RJ45 10/100M adaptive network port, the default is DHCP (Dynamic Host Configuration Protocol), which can automatically configure the IP address. The location of the RJ45 network port is as follows:



RJ45 network port diagram

The RJ45 network port has green and yellow indicators. The lighting status is shown in the following table:

RJ45 network port light status table

Yellow light		Green Light	
Not bright	No data transfer	Not bright	not yetEstablishing links
constant	—	constant	alreadyEstablishing links
Flash	There is data transmission	Flash	—

5.9.Wi-Fi&BT antenna interface

Wi-Fi and BTSMA share a single external screw and internal hole antenna port. A 2.4GHz RF antenna is recommended. Our antenna model is TX2400-JKS-20. The antenna position is shown in the figure below:

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WiFi antenna location map

5.10.SIM card interface

To enable 4G functionality, you must install a SIM card. Press the yellow button next to the SIM card slot to eject the card holder. Please note that although the ECM50-A06 and ECM50-A07 have a SIM card port, they do not have 4G functionality. The SIM card port is shown in the figure below:



SIM card interface diagram

5.11.LoRa/4G antenna interface

The LoRa/4G antenna uses an SMA external screw and internal hole interface.

ECM50-A06 and ECM50-A07 support LoRa communication. We recommend installing a 433M RF antenna. Our antenna model is TX433-JKS-20.

ECM50-A08 and ECM50-A09 support 4G communication and are recommended to install a 4G RF antenna. Our antenna model is TX4G-JKS-20. The antenna position is shown in the figure below:



LoRa/4G antenna location diagram

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6.Software Resources

The ECM50 comes with the MicroPython operating system. Users can quickly develop their own business functions using MicroPython programming and the rich official source code examples. This significantly reduces development cycles and project development costs. It includes numerous functions such as LED, GPIO, DI, DO, AI, ETH, 4G, Lora, WIFI, BLE, RS232/485 serial ports, and SD card. Communication supports multiple network protocols such as TCP, HTTP, and MQTT. Software resources are shown in the table below:

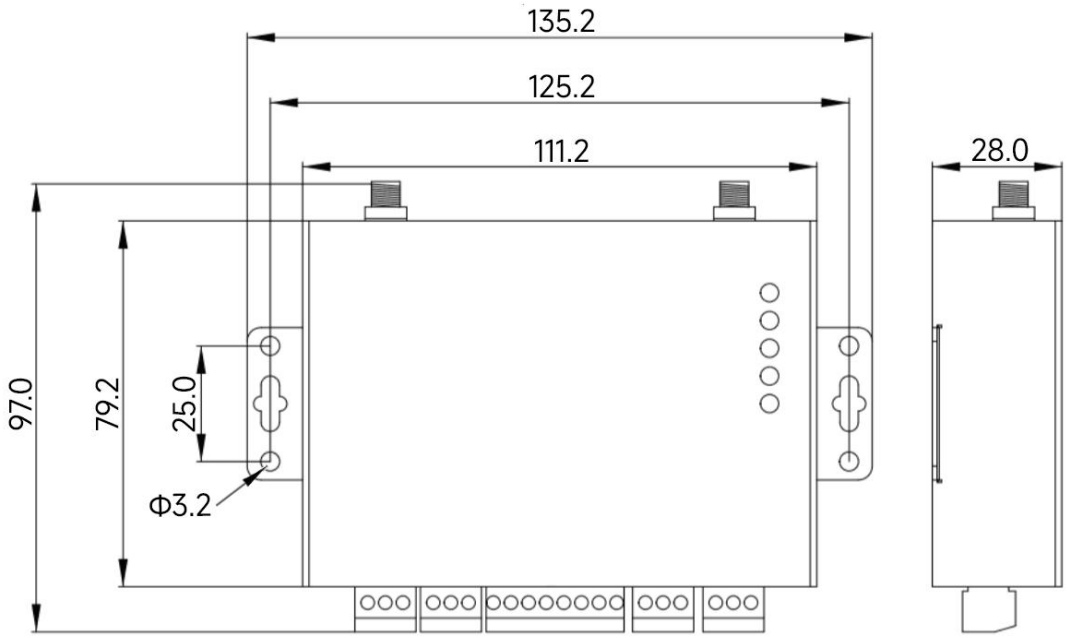
Software Resource Table

category	name	Description
operating system	OS	MicroPython
Development Tools	flash_download_tool_3.9.5_0.zip	Flashing tools
	thonny-4.1.7.exe	Code execution and compilation tools
	mbslave.exe	Modbus test tool
	netassist5.15.exe	Network Debugging Assistant
Test routine	led	2 controllable indicator lights
	GPIO	GPIO control
	485/232 UART	485/232 Communications
	DI	Voltage measurement
	DO	Voltage output
	AI	Current measurement
	ETH	Ethernet communication
	4G	4G communication
	LORA	LORA Communications
	WIFI	WIFI communication
	BLE	Bluetooth communication
	SD	SD card reading and writing

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7.Structural dimensions

The dimensions are shown in the figure below:



Unit : mm Tolerance value : X.X±0.2mm X.XX±0.05mm

ECM50-A Dimensional Drawing

8.Reference Documentation

- ECM50-A_User_Guide.pdf
- ECM50-A_Pin_List.xlsx
- esp32-s3_datasheet_cn.pdf

9.Revision Notes

Revision Notes Table

Version	Modifications	Modification time	prepared by	Proofreading	Approval
V1.0	First Draft	25-10-13	LJQ	WFX	WFX

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