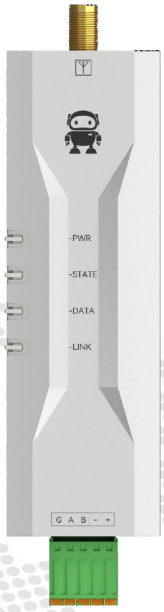
Chengdu Ebyte Electronic Technology Co.,Ltd

Wireless Modem

User Manual



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Content

1. Product Overview 2
1.1. Product Introduction 2
1.2. Features 2
1.3. System Parameters 3
1.4. Product Dimensions 4
1.5. Pin Definition 5

2. Quick Start 6
2.1. Hardware Preparation 6
2.2. Parameter Configuration 6
2.3. Communication Test 7

3. Product Functions 9
3.1. Data Transparent Transmission Mode 9
3.1.1. Heartbeat Packet 10
3.1.2. Registration Packet 10
3.1.3. Multi-Link Protocol Distribution 11
3.1.4. Short Connection 13
3.2. MQTT Mode 13
3.2.1. Alibaba Cloud MQTT Connection 14
3.2.2. Baidu Cloud MQTT Connection 14
3.2.3. OneNET Cloud MQTT Connection 16
3.2.4. Huawei Cloud MQTT Connection 17
3.2.5. Standard MQTT 3.1.1 Connection 18
3.3. HTTP Mode 19
3.3.1. GET Request 19
3.3.2. POST Request 20
3.4. SMS Transparent Transmission Mode 21
3.5. Security Configuration 21
3.6. Quick AT Commands 22
3.7. ModBus TCP to RTU Conversion 23
3.8. APN Access Point 23
3.9. Serial Port Firmware Upgrade Function 24
3.10. Hardware Factory Reset 26
3.11. Serial Port Parameter Settings 26
3.12. NTP Time Acquisition 27
3.13. IP Address Query 27
3.14. No-Data Auto Restart 28

4. Installation Dimensions 29
4.1. DIN Rail Mounting 29
4.2. Mounting Hole Installation 29

5. Important Statement 30

Revision History 30

About Us 30

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1. Product Overview

1.1. Product Introduction

The E840-DTU(EC05-485)x is a compact 4G DTU developed by Chengdu Ebyte Electronic Technology Co., Ltd. based on 4G CAT1 technology. It features a compact size, high transmission speed, low latency, and easy operation. With simple configuration, it can realize networking functions for serial devices (bidirectional transparent transmission between serial devices and network servers).

The product adopts 2.54mm spring-loaded terminal blocks for convenient wiring, supports DIN-rail mounting and positioning-hole installation, and can easily realize serial-to-network communication through simple configuration, making it highly convenient for integration into IoT projects.

The device adopts a compact DIN-rail installation design, featuring a small footprint and easy installation. Through simple configuration, users can easily realize bidirectional transparent data transmission between serial ports and networks.

The device supports two simultaneous connections, supports the MQTT protocol, and can connect to Alibaba Cloud, OneNet, Baidu Cloud, and Huawei Cloud platforms, making IoT applications easy to implement.

E840-DTU(EC05-485) is the domestic version, while E840-DTU(EC05-485)E and E840-DTU(EC05-485)E-V2 are the European and Asian versions.

1.2. Features

- Adopts a 4G CAT1 solution with millisecond-level latency, suitable for various data transmission application scenarios;
- Supports 4G full-network coverage;
- Supports transparent data transmission;
- Supports TCP, UDP, MQTT, and HTTP network protocols;
- Supports connection to MQTT 3.1.1 standard servers such as Alibaba Cloud, Baidu Cloud, Huawei Cloud, Tencent Cloud, and OneNET;
- Supports Heartbeat Packet and Registration Packet functions;
- Supports simultaneous transmission and reception on two Socket connections, with primary/backup connection settings for each Socket;
- Supports automatic conversion between Modbus RTU and Modbus TCP;
- Supports quick AT commands;
- Supports configuration via network, serial port, and SMS AT commands (supported by some models);
- Supports AWS certificates (supported only by E840-DTU(EC05-485)E-V2);
- Supports configurable security mechanisms with customizable passwords;
- PC-side parameter configuration software for convenient and flexible configuration;
- Supports transparent transmission of network and SMS data (supported by some models), and supports phone number filtering;
- Supports automatic restart when no data is detected and automatic reconnection after disconnection;
- Supports APN configuration;
- Supports IP address query;
- Supports wide-voltage power supply from 8V to 28V DC, suitable for various application scenarios;
- Compact size, supporting both DIN-rail and positioning-hole installation methods;
- Uses a V0-grade flame-retardant plastic enclosure.

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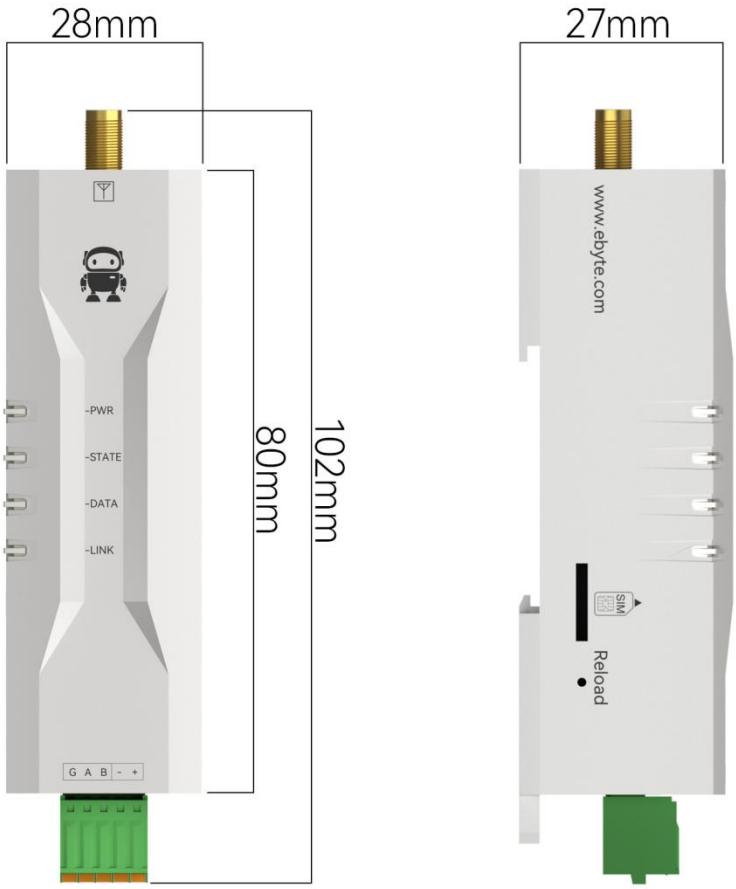
1.3. System Parameters

Parameter Name	Parameter Value	Description
Feature Parameters	Supported Bands	**E840-DTU(EC05-485)：** LTE-TDD: B34/B38/B39/B40/B41 LTE-FDD: B1/B3/B5/B8 **E840-DTU(EC05-485)E：** LTE-FDD: B1/B3/B5/B7/B8/B20/B28 **E840-DTU(EC05-485)E-V2：** LTE-FDD: B1/3/5/7/8/20/28 LTE-TDD：B38/40/41
	Network Protocol Features	Supports TCP/UDP/MQTT/HTTP/DNS protocols
	RF Interface	SMA-K (external thread, internal hole)
	AWS Certificate	Supported only by E840-DTU(EC05-485)E-V2
Hardware Features	Data Interface	RS485 (2.54mm spring terminal)
	Baud Rate	1200–230400, default 115200bps
	Data Bits	8
	Stop Bits	1 (default), 2
	Parity	None (default), Odd, Even
	Operating Voltage	DC 8V～28V
	Operating Temperature	-40～+85℃
	Dimensions	80*28*27mm
	Weight	40g
Indicators	PWR (Blue)	Lights up when power is connected
	STATE (Orange)	Off: Device powered on and searching for SIM card Flashing: Correct SIM card detected, attaching to network Solid ON: Successfully attached to network
	DATA (Green)	Flashing: During serial data transmission/reception
	LINK (Orange)	Solid ON: Device successfully connected to server Off: Device not connected to server

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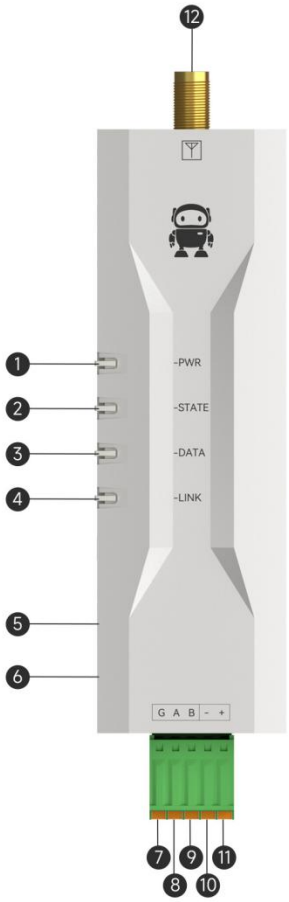
1.4. Product Dimensions



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1.5. Pin Definition



No.	Name	Function	Description
1	PWR	Power Indicator	Lights up when power is connected
2	STATE	Network Status Indicator	Off: Device powered on and searching for SIM card; Flashing: Correct SIM card detected and attaching to network; Solid ON: Successfully attached to network
3	DATA	Data TX/RX Indicator	Flashes when sending or receiving data
4	LINK	Link Indicator	Solid ON: Any Socket connection successfully connected to the server; Off: Device not connected to the server
5	SIM卡座	SIM Card Holder	Nano SIM card holder, chip facing upward, notch facing inward
6	Reload	Button	Press and hold for 5–6 seconds to restore factory settings; all indicators light up when successful. Hold the button while powering on to enter upgrade mode; all indicators flash
7	GND	RS485 Communication Port	Connect to converter shield wire or signal ground
8	RS485-A		2.54mm spring terminal, connect to converter A
9	RS485-B		2.54mm spring terminal, connect to converter B
10	V-	Power Interface	DC 8–28V power input, 2.54mm spring terminal
11	V+		
12	ANT	Antenna Interface	SMA-K, external thread with internal hole, characteristic impedance 50Ω

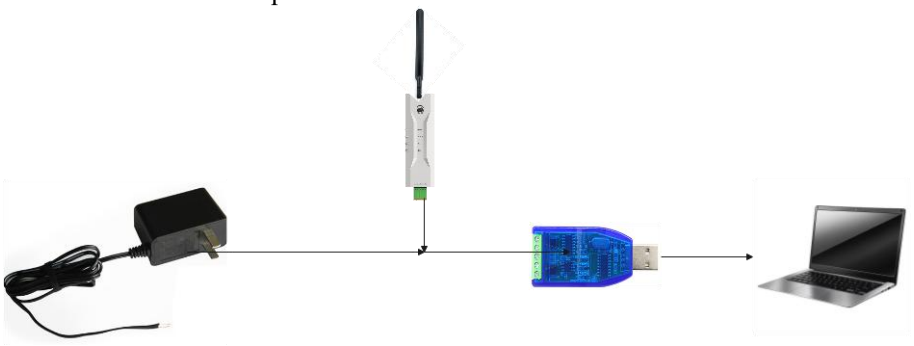
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2. Quick Start

2.1. Hardware Preparation

The following hardware devices are required for this test:



1. Before testing, connect the power supply, antenna, SIM card, serial cable, and other hardware properly.
2. Insert the SIM card into the device. Please use a Nano SIM card (small card), with the notch facing outward and the chip facing upward.
3. Connect the SMA antenna interface to the device.
4. Connect the USB-to-RS485 converter to the device. Use a suitable length of wire to connect the A terminal of the USB-to-RS485 converter to the device A terminal, the B terminal to the device B terminal, and the GND terminal to the device GND terminal (for short-distance communication, GND connection may be omitted; for long-distance communication, GND connection and twisted-pair shielded cable are recommended).
5. Connect the USB-to-RS485 converter to the computer and check whether the corresponding COM port appears in Device Manager (if not, please install the corresponding driver).
6. Connect power to the device (power supply VCC to device VCC, power supply GND to device GND). If using a DC terminal adapter cable, the inner conductor is positive (+) and the outer conductor is negative (-).

2.2. Parameter Configuration

To modify the DTU parameter configuration so that it connects to the user server, you must know the server IP address (or domain name) and port in advance. The following example demonstrates connection to a TCP server.

The parameter configuration software can be downloaded from the Ebyte official website. After downloading, double-click the software to run it.

1、Select the COM port corresponding to the converter (if not found, download and install the driver from the converter manufacturer's website), and select the corresponding baud rate, data bits, stop bits, and parity (default: 115200, 8, N, 1);

2、Click **"Open Serial Port"**. After opening, the button changes to **"Close Serial Port"**;

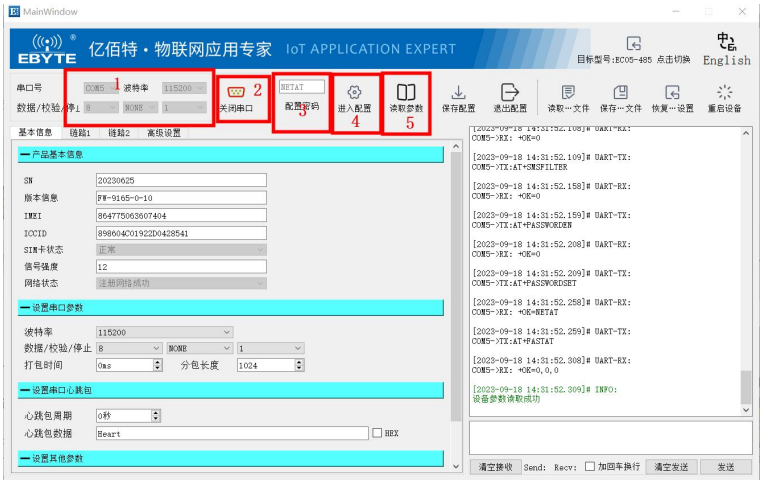
3、Enter the corresponding **Configuration Password**. If the password has not been changed, ignore this step. If forgotten, press and hold the Reload button for 5 seconds to restore factory settings;

4、Click **"Enter Configuration"**;

5、Click **"Read Parameters"**;

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6、Select **"Link 1"** and configure the **Connection Type**. Here, **TCPC (TCP Client)** is used as an example;

7、Set the server **Target Port**;

8、Set the **Server Address** (target IP address or domain name, maximum 128 bytes). The Ebyte test server is used in this example: Target IP: 116.62.42.192; Target Port: 8125; Function: Send any data to the server and receive the same data back.

9、After configuration, click **"Save Configuration"**;

10、Click **"Restart Device"** to apply the configuration;

11、Click **"Close Serial Port"**.

Note: Always read parameters before saving parameters. Please strictly follow this sequence to prevent incorrect parameters from being written into the device, which may cause the device to malfunction.

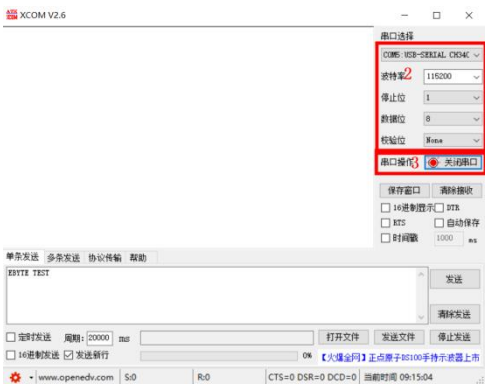
2.3. Communication Test

Note: Since the Ebyte test server provides an echo-back service, after the LINK indicator lights up, any data sent to the device will be forwarded to the server, and the server will return the same data through the original connection to the device serial port, realizing bidirectional data transmission between the device and the server.

1. Double-click and run XCOM2.6.



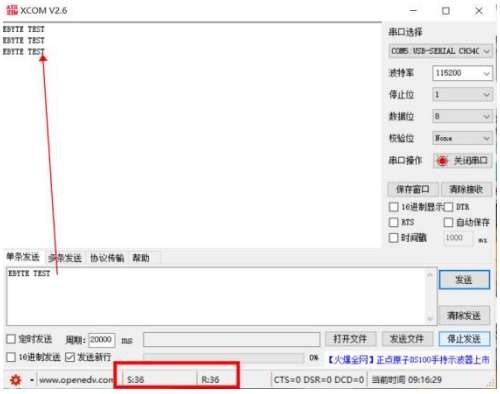
2. Select the serial port connected to the current device, and select the correct baud rate, stop bits, data bits, and parity (default: 115200 / 1 / 8 / N).
3. Open the serial port.



4. Send any data. After approximately one second, the returned data can be observed.

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5. Test completed.

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3. Product Functions

This chapter mainly introduces the product functions. The following figure shows the overall functional block diagram of the product, providing a general understanding of its capabilities.

3.1. Data Transparent Transmission Mode

In this mode, the user's serial device can send data to a designated server through this device. The device can also receive data from the server and forward it to the serial device.

Supports independent configuration of 2 Socket connections.。\

This product supports transparent communication in TCP Client (TCPC), UDP Client (UDPC), TCP Server (TCPS), and UDP Server (UDPS) modes.

(TCPS and UDPS require support from APN SIM cards. Standard IoT SIM cards generally do not support server mode.)

Users do not need to concern themselves with the conversion process between serial data and network packets. Through simple parameter settings, transparent communication between serial devices and network servers can be achieved.

Quick Operation Steps:

1、Select the corresponding link.

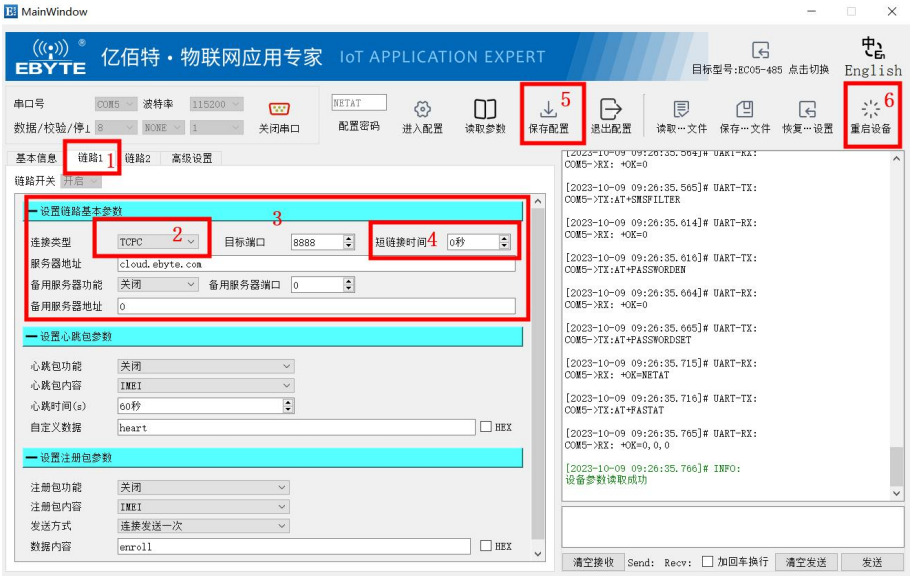
2、Configure the connection type.

3、Enter the target IP address/domain name and target port. A backup server can also be configured.

4、If a short connection is required, configure the short connection timeout (0 indicates a long connection).

5、Click **Save Configuration**.

6、Click **Restart Device**.



After the device successfully registers on the network, it will automatically connect to the configured server.

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3.1.1. Heartbeat Packet

Heartbeat packets support both **Network Heartbeat Packets** and **Serial Heartbeat Packets**. Network heartbeat packets are sent to the server, while serial heartbeat packets are sent to the serial port.

Network Heartbeat Packet

In network transparent transmission mode, users can enable network heartbeat packets.

The primary purpose of sending heartbeat packets to the server is to maintain connection activity, ensuring that idle devices (which may not send data for long periods) remain connected to the server.

When serial data is uploaded, heartbeat packets will not be sent. The heartbeat timer starts counting from the idle period and sends heartbeat data once the configured interval expires.

Heartbeat packet content can be: ICCID, IMEI, SN, Custom heartbeat data

Custom heartbeat packets support: HEX format, ASCII format

Maximum configuration length: ASCII: 64 bytes, HEX: 32 bytes

Heartbeat packets are only effective in: TCPC, MQTTC, HTTPC

Heartbeat packets are not effective in short connection mode.

Configuration Steps

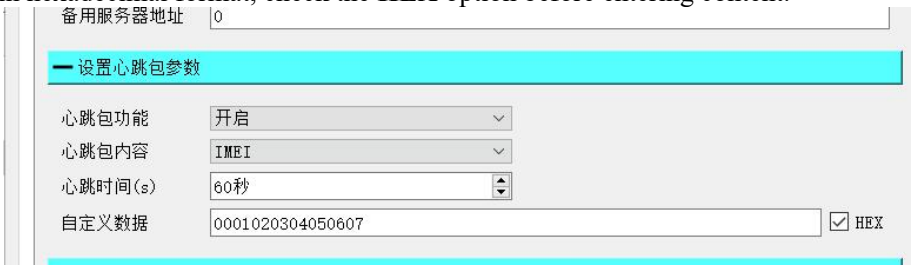
1、Enable the heartbeat packet function.

2、Select heartbeat packet content.

3、If using a custom heartbeat packet, enter the heartbeat content (if IMEI or ICCID is selected, custom data will not take effect).

4、Set the heartbeat interval (unit: seconds).

5、If sending in hexadecimal format, check the **HEX** option before entering content.



Serial Heartbeat Packet

Users can configure serial heartbeat packets to poll serial devices and can customize heartbeat data.

Configuration Steps

1、Set heartbeat interval (5–300 seconds).

2、Configure heartbeat packet data.

3、If sending in hexadecimal format, check the **HEX** option.

Maximum configuration length: ASCII: 64 bytes, HEX: 32 bytes



3.1.2. Registration Packet

In network transparent transmission mode (TCPC/UDPC), users can configure the device to send registration packets to the server.

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Registration packets allow the server to identify the data source or serve as authorization credentials for server functionality.

Registration packets can be sent:

- When the device establishes a connection with the server
- As a packet header prepended to each data packet

Heartbeat packet content can be: ICCID, IMEI, SN, Custom heartbeat data

Custom heartbeat packets support: HEX format, ASCII format

Maximum configuration length: ASCII: 64 bytes, HEX: 32 bytes

Configuration Steps

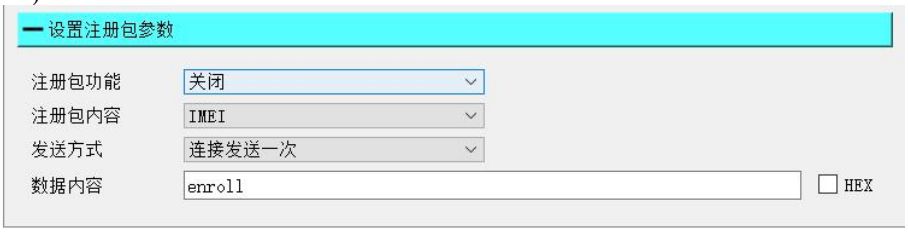
1、Enable the registration packet function.

2、Select registration packet content (ICCID, IMEI, or custom data).

3、Select registration packet transmission method (connection transmission or data header).

4、If transmitting in hexadecimal format, check the **HEX** option.

5、If using custom registration data, enter the registration packet content (if HEX is selected, re-enter the content in HEX format).



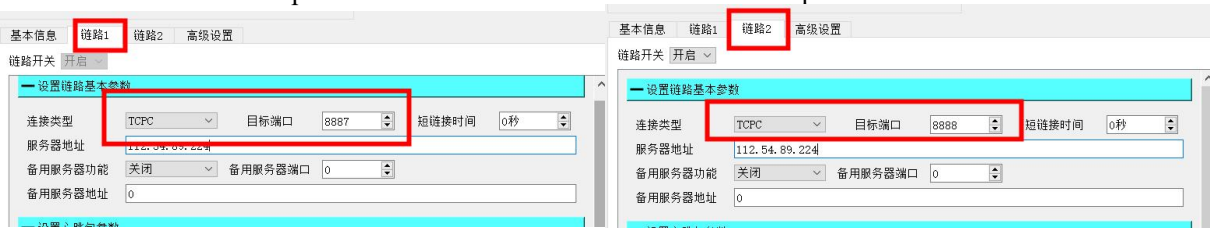
3.1.3. Multi-Link Protocol Distribution

The device supports Socket distribution protocols. Specific protocol headers can be used to route data to different Socket connections, and data received from different Sockets can be distinguished by adding headers and tails.

Configuration Steps



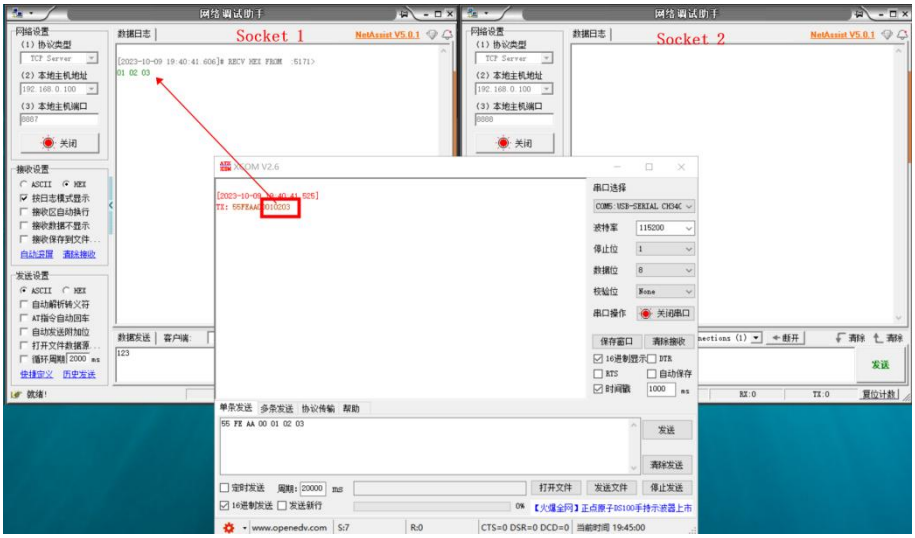
After enabling the Multi-Link Protocol Distribution mode, the following situations may occur. In this example, Socket1 is connected to server port **8887** and Socket2 is connected to server port **8888**:



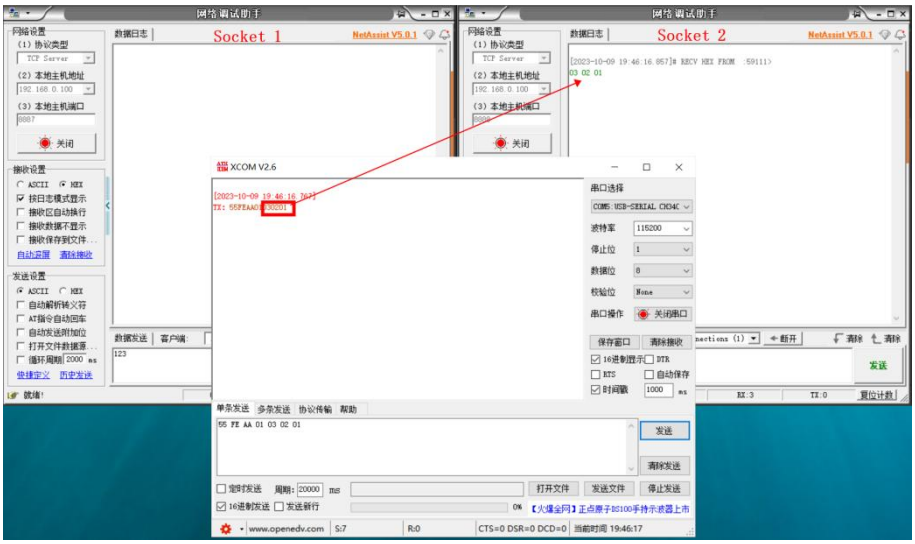
1. When the serial port sends data with the header **55 FE AA 00**, that is, **55 FE AA 00 + Data**, the data will only be transmitted to Socket1. The received content contains only the data and does not include the header.

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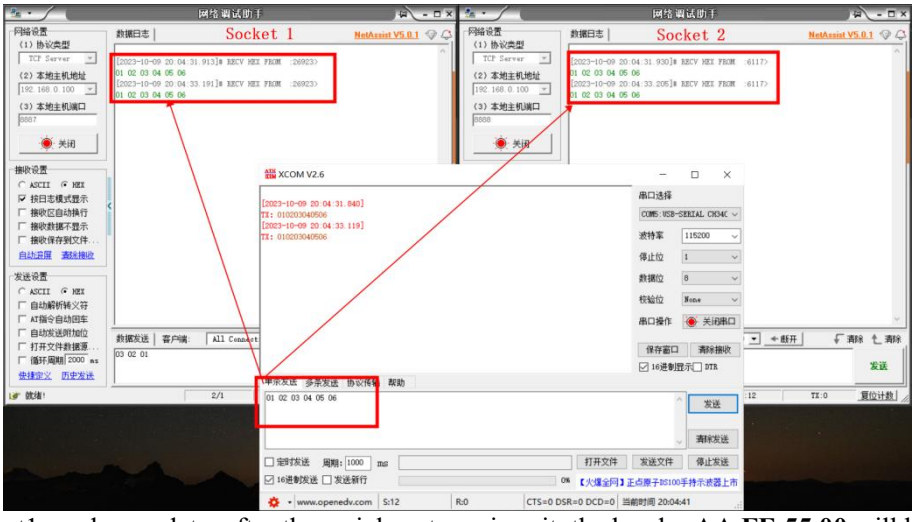
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2. When the serial port sends data with the header **55 FE AA 01**, that is, **55 FE AA 01 + Data**, the data will only be transmitted to Socket2. The received content contains only the data and does not include the header.



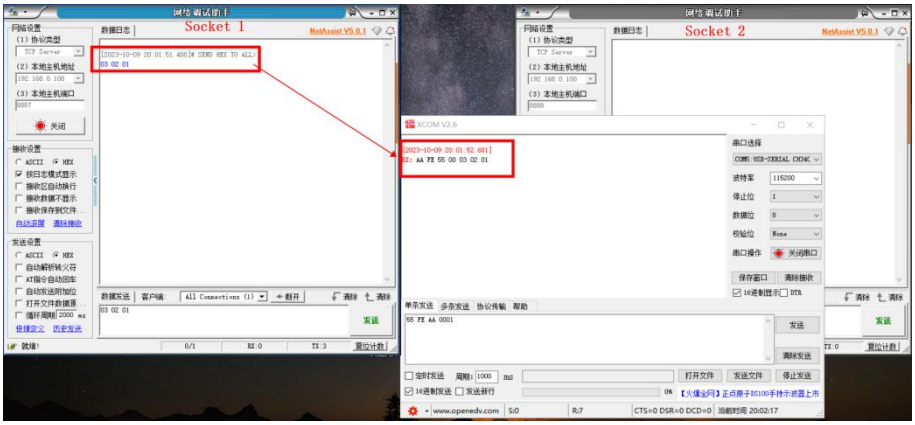
3. When the serial port sends arbitrary data without the specified header, the data will be transmitted to both Socket connections.



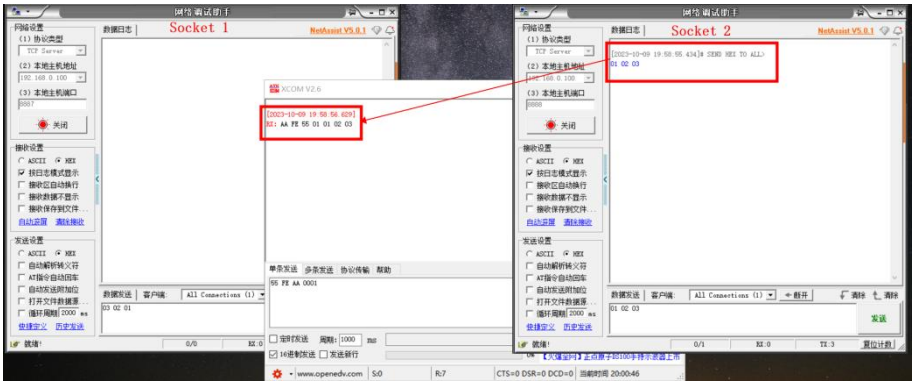
4. When Socket1 sends any data, after the serial port receives it, the header **AA FE 55 00** will be added before the data.

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5. When Socket2 sends any data, after the serial port receives it, the header **AA FE 55 01** will be added before the data.



3.1.4. Short Connection

When configured as a Short Connection, the device establishes a connection with the server only when data needs to be transmitted. After data transmission ends, the device starts timing. If no data is transmitted within the configured period, the connection to the server will be disconnected.

The short connection timeout can be configured up to **65535 seconds**.

This setting is only effective in **TCPC mode**.

PC Configuration Software Steps:



3.2. MQTT Mode

Note: New firmware versions support **three groups of publish/subscribe topics** and provide flexible topic selection. Refer to the **AT Command Manual** for details.

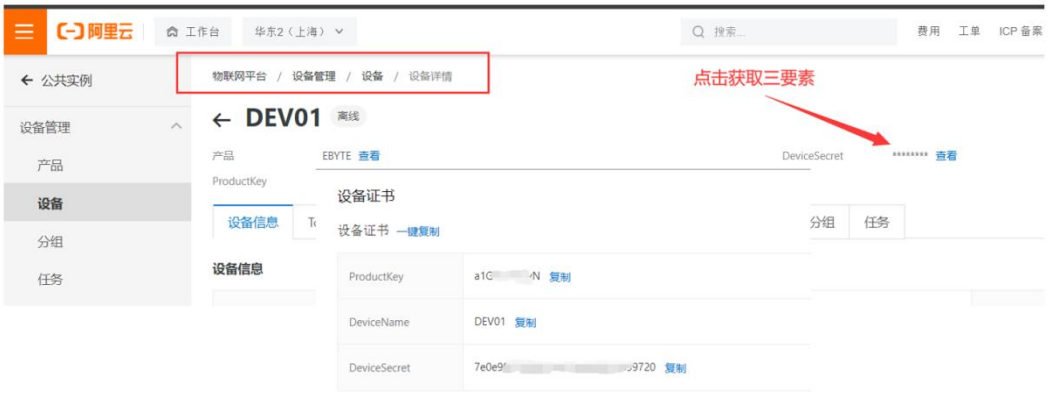
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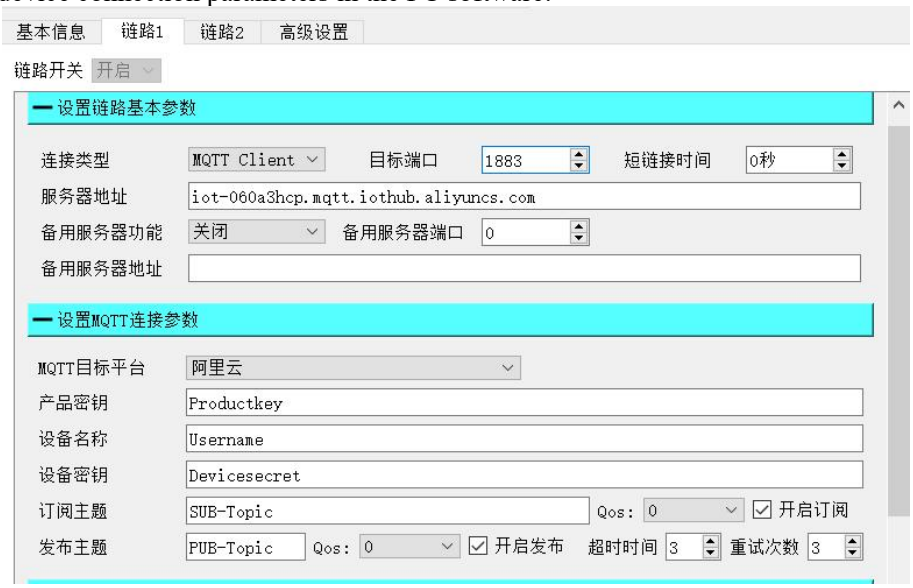
3.2.1. Alibaba Cloud MQTT Connection

Supports direct connection to Alibaba Cloud using the Alibaba Cloud **"Three Elements"**.

Obtain the required **Three Elements** for Alibaba Cloud connection (for details, refer to the *Alibaba Cloud MQTT Three Elements Acquisition Guide*), as shown below:



Configure the device connection parameters in the PC software:



3.2.2. Baidu Cloud MQTT Connection

Supports direct connection to Baidu Cloud using the Baidu Cloud **"Three Elements"**.

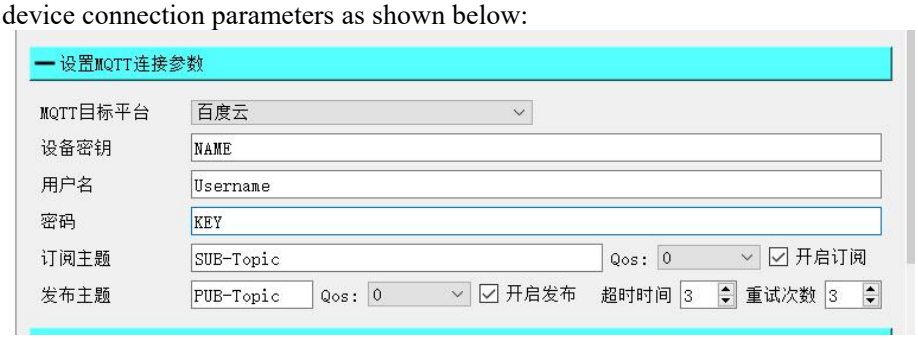
Obtain the required **Three Elements** for Baidu Cloud connection as shown below:

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Configure the device connection parameters as shown below:

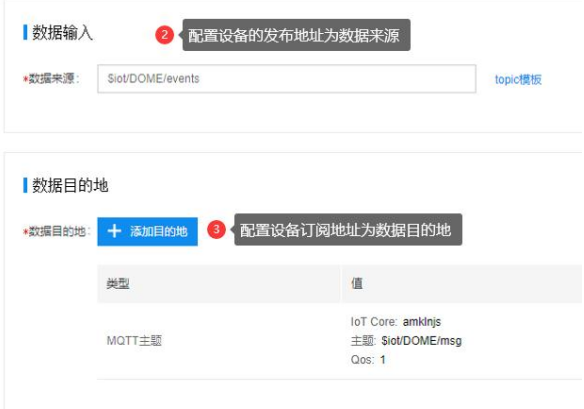


To achieve data return transmission, a **Rule Engine** must be created. First, create a **Message Template** as shown below:



Create a **Rule Engine** for data return transmission as shown below:





Enable the Rule Engine and restart the device (re-subscribe and re-publish). Communication testing is shown

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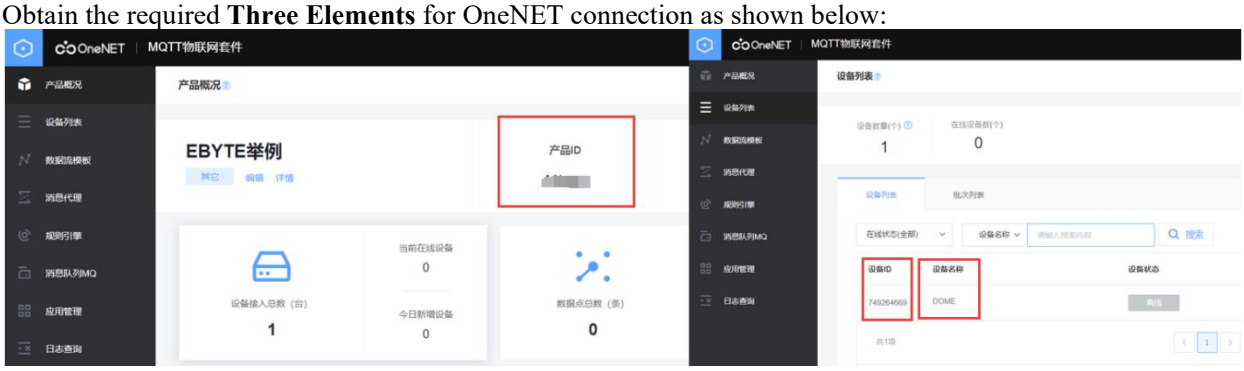
below:



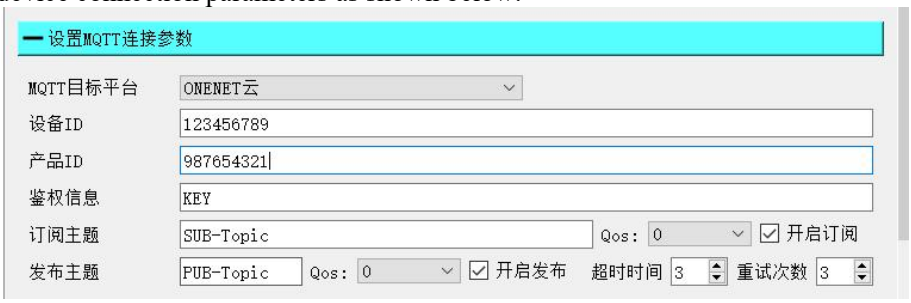
3.2.3. OneNET Cloud MQTT Connection

Supports direct connection to OneNET using the OneNET **"Three Elements"**.

Obtain the required **Three Elements** for OneNET connection as shown below:



Configure the device connection parameters as shown below:



OneNET supports automatic generation of Topics with publish/subscribe attributes. Simply use the same Topic address for subscription and publishing to achieve data return transmission.

Communication test:

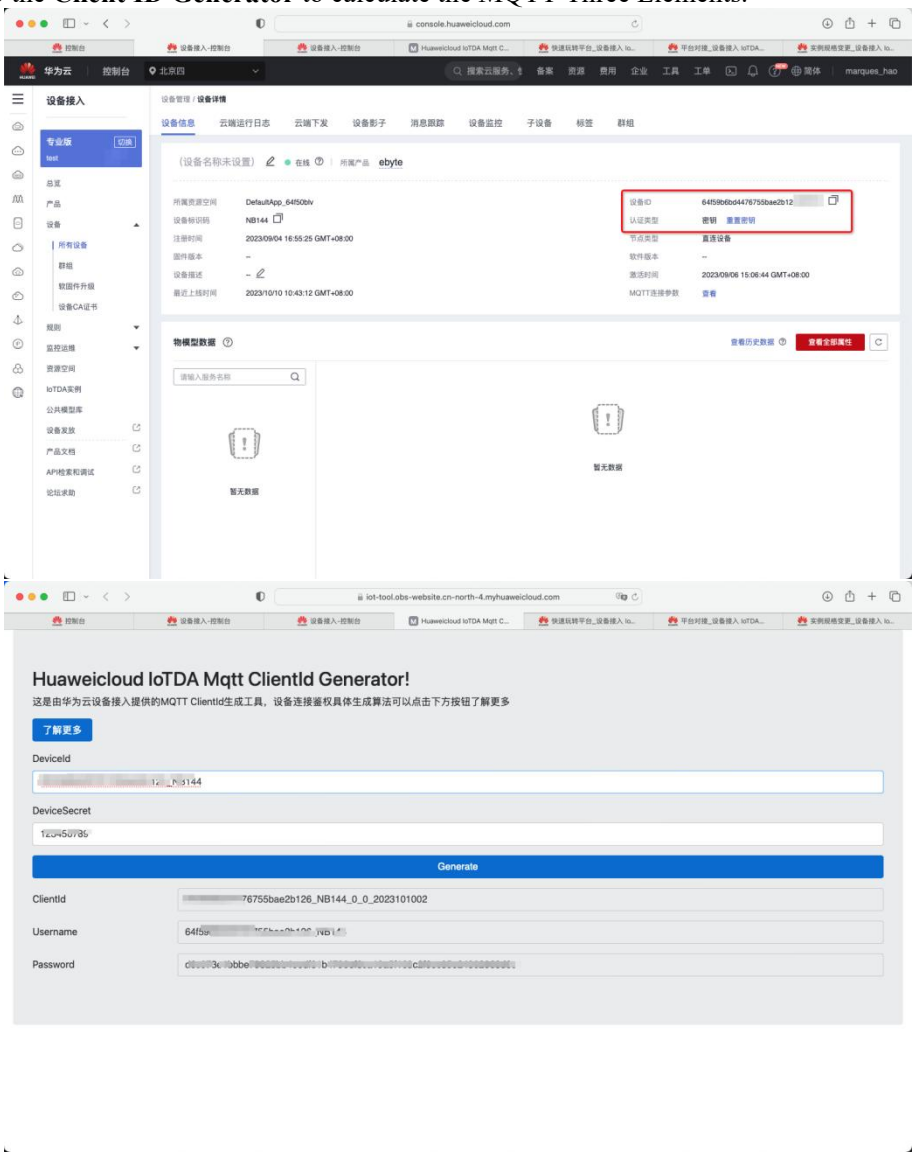


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3.2.4. Huawei Cloud MQTT Connection

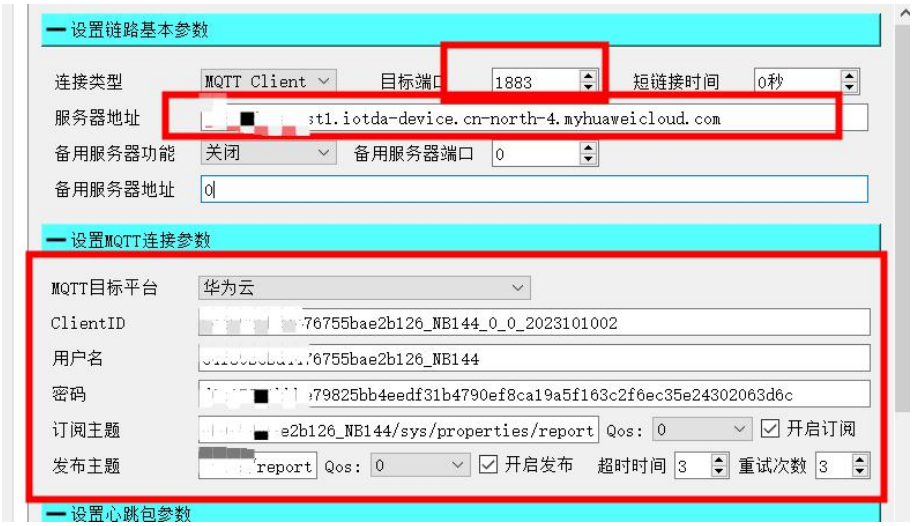
After registering products and devices on Huawei Cloud, record the **Device ID** and **Authentication Key**, then copy them into the **Client ID Generator** to calculate the MQTT Three Elements.



After adding subscription and publication topics, fill all parameters into the device (remember to replace wildcard characters), then save and restart the device.

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Afterward, transmitted data can be viewed on the server side.

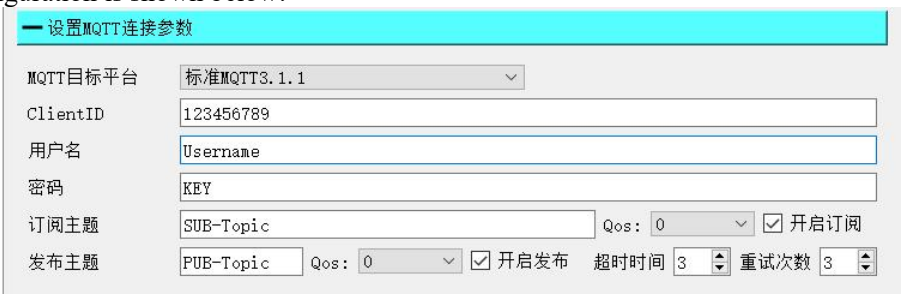


3.2.5. Standard MQTT 3.1.1 Connection

This example uses the standard MQTT 3.1.1 server provided by Tencent.
The standard MQTT **Three Elements** can be obtained from the Tencent server as shown below:



Parameter configuration is shown below:



Configure the corresponding publish and subscribe topics, then use the platform's online debugging tool to send data for communication testing:

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Enable **MQTT Group Publishing** in the PC configuration software, and add the prefix: $share/GroupName/ before the subscription topic on the platform side.



SSL certificates can be programmed via **AT commands** or through the **PC configuration software**.
Note: The domestic version does not support SSL certificate programming.

3.3. HTTP Mode

The device supports access to HTTP servers as an HTTP client and supports data interaction through both **POST** and **GET** methods.

3.3.1. GET Request

Use an HTTP server to test HTTP GET requests and configure the parameters as shown below.



After sending the request through the serial port, the response parameters will be returned.

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3.3.2. POST Request

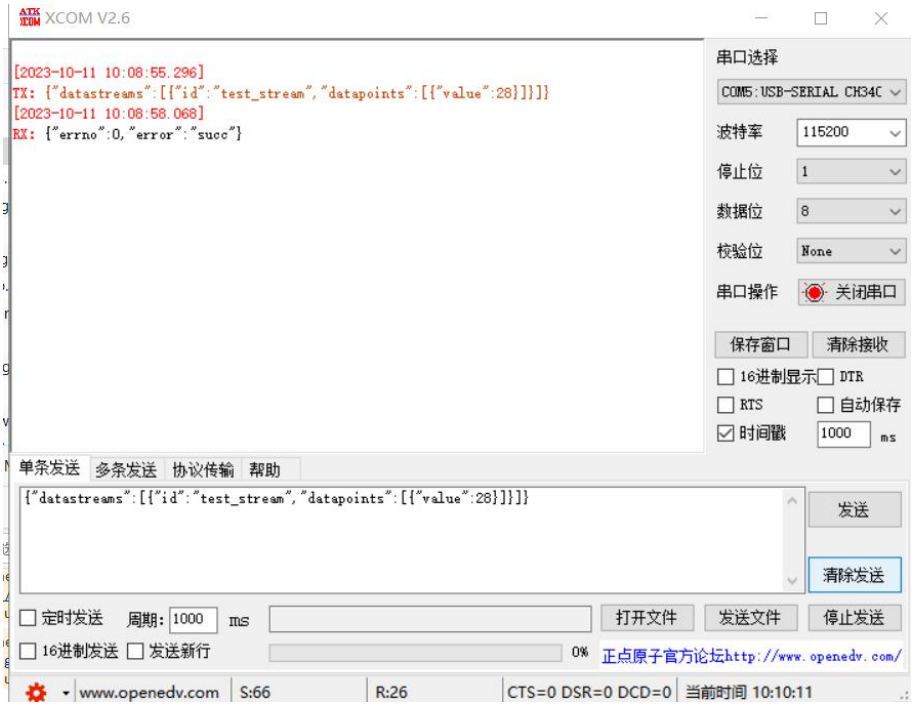
Use an HTTP server to test HTTP POST requests and configure the parameters as shown below.



After sending the request through the serial port, the response parameters will be returned.

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3.4. SMS Transparent Transmission Mode

In this mode, data received from the serial port will be sent to the target phone number via SMS.

SMS messages sent to the device's phone number will be transparently transmitted to the serial port output.

PC Configuration Software Steps:

1、Enable SMS Transparent Transmission.

2、Set the target SMS phone number (not required if only receiving SMS messages).

3、Enable phone number filtering (check this option if only SMS messages from the specified target number should be received).

Note: Products using the **EC801E 4G module** do not support this function.



3.5. Security Configuration

Users can configure a security password.

When entering configuration mode or reading parameters, password verification is required. Parameter configuration is only allowed after successful password authentication.

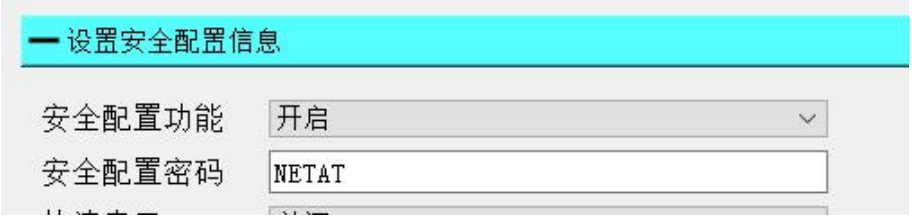
If no password is sent within **30 seconds**, or an incorrect password is provided, the device automatically exits configuration mode.

PC Configuration Software Steps:

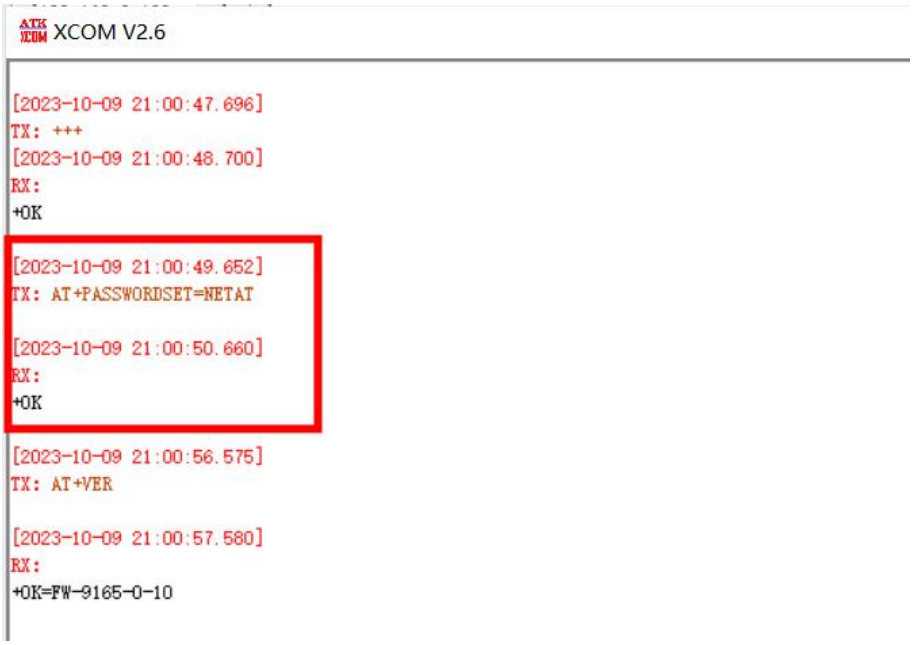
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1、Enable **AT Command Mode Security Verification**.
2、Set the security password (0–32 bytes).
3、Save the configuration.
4、Restart the device.



To enter configuration mode:
Send: +++
Then send: AT+PASSWORDSET=NETAT
After receiving the response: OK
other AT commands can then be issued.



3.6. Quick AT Commands

Quick AT Commands allow users to modify device configurations through **Serial Port**, **Network**, or **SMS** using a single command, without switching to command mode via +++.

This provides a fast and convenient configuration method.

PC Configuration Software Steps:

1、Enable Quick AT Commands. Quick Serial AT, Quick Network AT, and Quick SMS AT can be enabled separately.

2、Save the configuration.

3、Restart the device.

Send AT commands via serial port, network, or SMS. The security password and keyword must be prefixed to the AT command. For example, if the security password is: NETAT*. To execute: AT+VER, send: NETAT*AT+VER

Note: The AT command must end with a carriage return character.

Note: Supported only on certain models.

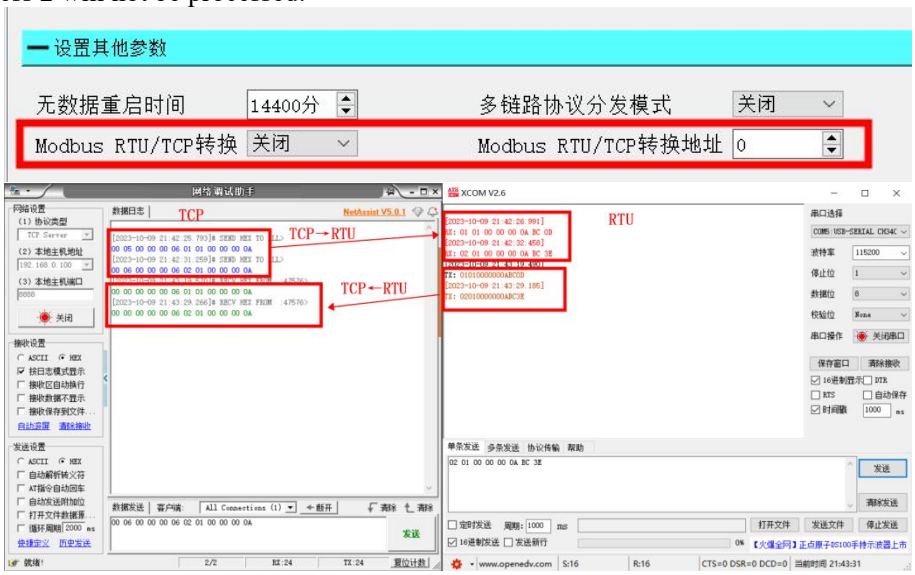
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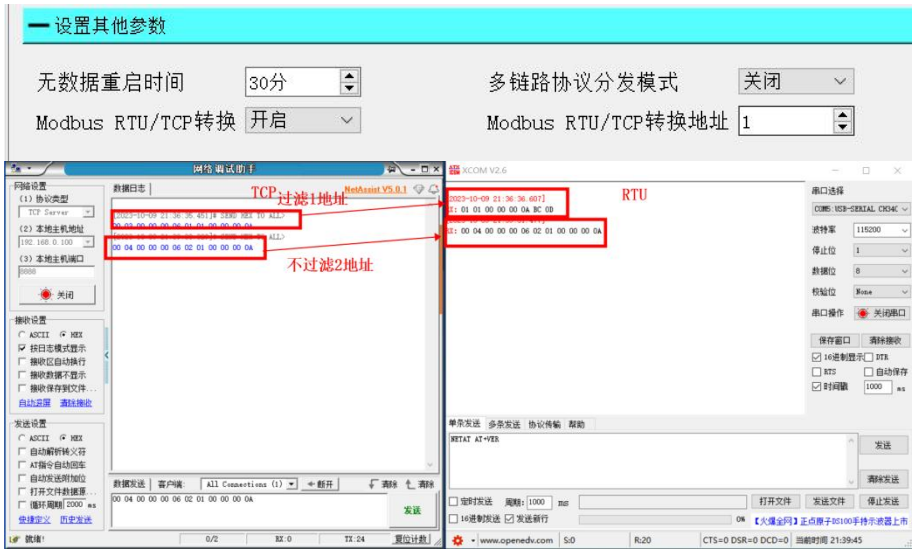
3.7. ModBus TCP to RTU Conversion

This function can be enabled by checking **TCP Modbus**. It enables bidirectional conversion between Modbus RTU data transmitted via the serial port and Modbus TCP data transmitted via the 4G network.

By setting the conversion address, the corresponding device address for conversion can be specified. A value of **0** means converting all addresses. For example, if it is set to **1**, only data for address **1** will be converted, while commands for address **2** will not be processed.



Convert All Addresses



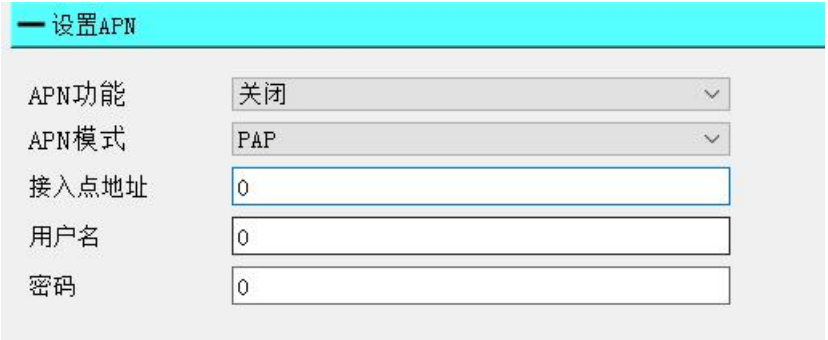
Convert Address 1 Only

3.8. APN Access Point

The device APN access point can be modified through AT commands. An APN-enabled SIM card is required.

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3.9. Serial Port Firmware Upgrade Function

Firmware upgrading is implemented through the serial port to switch firmware versions. The upgrade procedure is as follows:

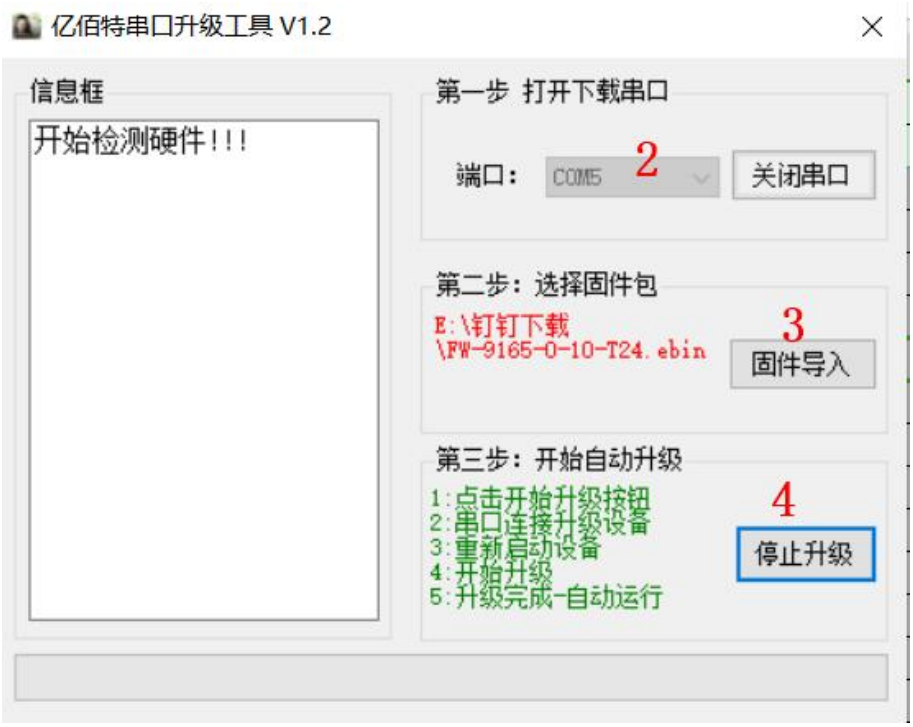
1. Double-click and run the Ebyte Firmware Download Tool.



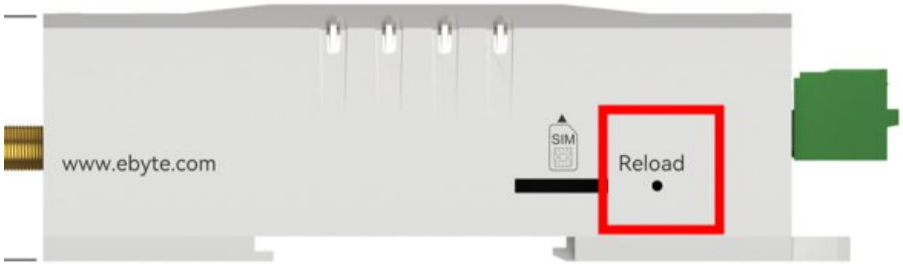
2. Select the download port and open the serial port.
3. Import the firmware package.
4. Click **Start Upgrade**.

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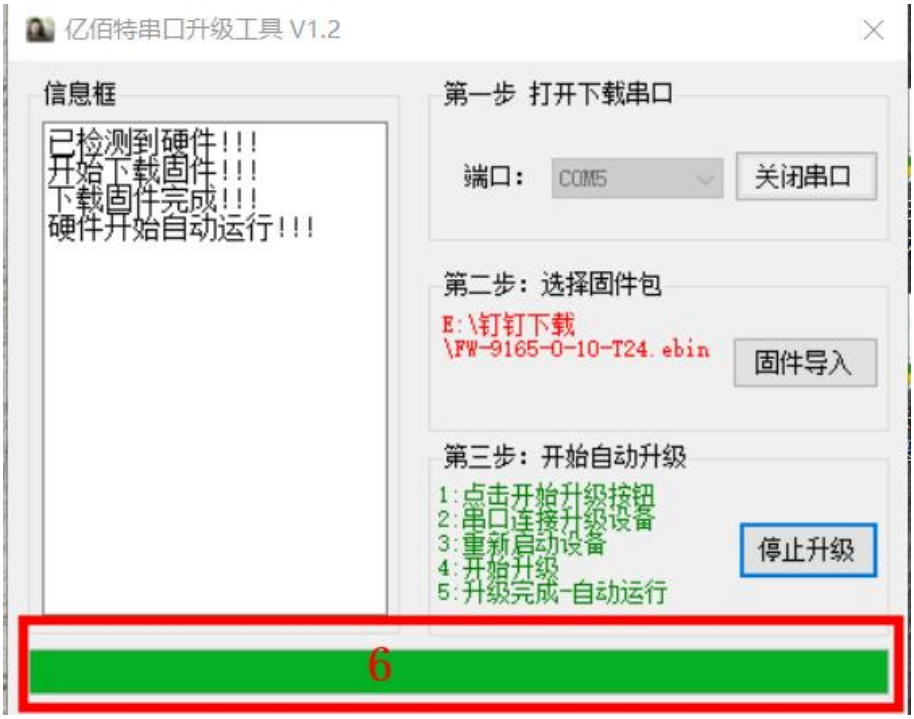
5. Power off the device, then press and hold the **Reload** button (located on the left side of the device) while powering it on. When all LEDs except the **PWR** LED begin flashing, the upgrade process has started.



6. Wait until the progress bar at the bottom of the software reaches completion, then close the software. This indicates that the upgrade has been completed successfully.

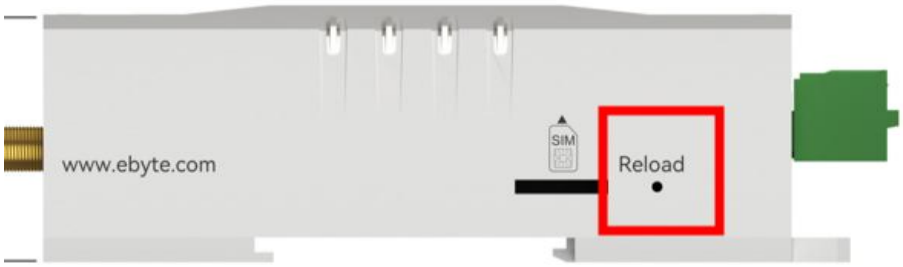
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3.10. Hardware Factory Reset

To restore the factory default parameters, after powering on the device, press and hold the **Restore** button for **5–6 seconds** until all LEDs light up. Then release the button. The device parameters will be restored to the factory default settings and the device will automatically restart.



3.11. Serial Port Parameter Settings

Supported serial baud rates:1200/2400/4800/9600/19200/38400/57600/115200/230400
Supported data bits: 8 bits
Supported stop bits: 1 / 2 bits
Packet interval time: 0–1024 (unit: ms, 0 = Auto)
Packet length:50–1024 bytes (default: 1024)

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There are two methods for packet framing of serial data. The first is **time-triggered framing**, and the second is **length-triggered framing**.

Time-triggered framing:

When receiving data from the UART, the device continuously checks the interval between two adjacent bytes. If the interval is greater than or equal to a certain **time threshold**, the current frame is considered complete. Otherwise, data reception continues until the configured packet length is reached. The frame is then sent to the network as a TCP or UDP packet.

The **time threshold** is the packet interval time. The configurable range is **0ms–1024ms**. The factory default is **0ms**, which means automatic detection.

Length-triggered framing:

When receiving data from the UART, the device continuously checks the number of received bytes. If the number of received bytes reaches a specified **length threshold**, the current frame is considered complete. Otherwise, it waits until the packet interval timer expires. The frame is then sent to the network as a TCP or UDP packet.

The **length threshold** is the packet length. The configurable range is **50–1024 bytes**. The factory default value is **1024 bytes**.

3.12. NTP Time Acquisition

The device supports NTP time acquisition. The time can be obtained through the host software or AT commands.

Command:

AT+NTP

Example return value:

2022.12.31,12:25:35



3.13. IP Address Query

The module supports IP address query through AT commands.

Command:

AT+IP

Example return value:

10.100.123.456

For details, please refer to the AT Command Manual.

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3.14. No-Data Auto Restart

To prevent abnormal operation caused by long-term operation, a no-data auto restart time can be configured.

If the module does not receive downlink data from the server, the module will automatically restart when the configured no-data restart time expires, ensuring stable operation.

Configurable range: **0–65535 minutes**

Setting:

0: Disable this function (default setting)



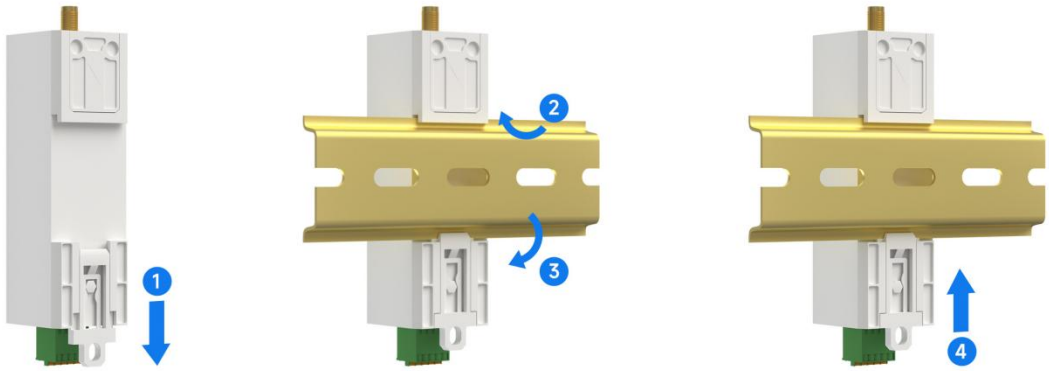
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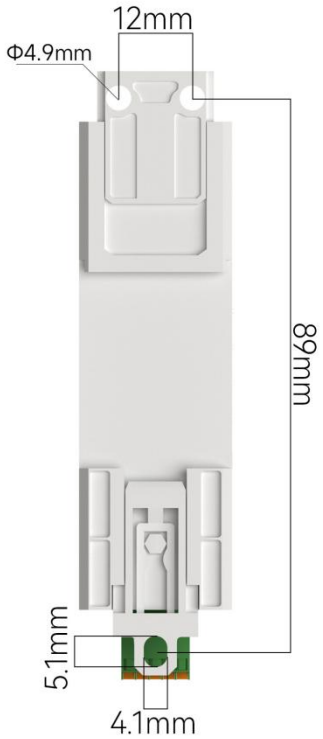
4. Installation Dimensions

4.1. DIN Rail Mounting

Uses a standard DIN35 rail clip (35mm).



4.2. Mounting Hole Installation



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5. Important Statement

- Ebyte reserves the final right of interpretation and modification of all contents in this manual.
- Due to continuous improvements in hardware and software, this manual may be updated without prior notice. Please refer to the latest version of the manual for final information.
- Users of this product should regularly check the official website for product updates in order to obtain the latest information about this product in a timely manner.
- This product is strictly prohibited from being used in military applications or life-safety-related scenarios. Any responsibility arising from improper use shall be borne solely by the user.

Revision History

Version	Revisio Date	Revision Description	Maintainer
1.0	2023-10-13	Initial Version	LYL
1.1	2024-05-11	Modified LED Description	LYL
1.2	2024-10-18	Added New Features	LYL
1.3	2025-04-14	Modified Default Parameters	LYL
1.4	2026-03-11	Added New Model	ZYD
1.5	2026-06-12	Software Firmware Upgrade	ZT

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