EWM103-W15 Series Product Instructions

WiFi+BLE 5.1 low power WiFi serial port module



Chengdu Ebyte Electronic Technology Co.,Ltd.

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CONTENTS

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1. OVERVIEW 2
1.1. INTRODUCTION 2
1.2. FEATURES 2
1.3. APPLICATION SCENARIO 3
2. SPECIFICATIONS 3
2.1. RF PARAMETERS 3
2.2. ELECTRICAL PARAMETERS 4
2.3. HARDWARE PARAMETERS 4
3. MECHANICAL DIMENSIONS AND PIN DEFINITION 5
3.1. EWM103-W15S X-PIN DIAGRAM 5
3.2. EWM103-W15S P PIN DIAGRAM 5
4. FUNCTIONAL DESCRIPTION 6
4.1. JOB ROLE 6
4.2. ACCESS POINT (AP MODE) 6
4.3. STATION (STA MODE) 7
4.4. NETWORK FEATURES 7
4.4.1. TCP server 7
4.4.2. TCP client 7
4.4.3. UDP 7
4.4.4. MQTT 7
4.5. LOW POWER CONSUMPTION 8
5. TUTORIAL 8
5.1. BASIC MODULE WIFI CONNECTION 8
5.1.1. WiFi connection between modules 8
5.2. BASIC TCP/UDP DATA TRANSMISSION 9
5.2.1. TCP communication between modules 9
5.2.2. Module-to -module UDP communication 10
5.2.3. Transparent transmission description 10
5.3. MQTT 11
5.3.1. Alibaba Cloud 11
6. WELDING WORK INSTRUCTIONS 14
7.1 REFLOW TEMPERATURE 14
7.2 REFLOW OVEN CURVE 15
7. FREQUENTLY ASKED QUESTIONS 16
7.1. THE TRANSMISSION DISTANCE IS NOT IDEAL 16
7.2. MODULE IS EASILY DAMAGED 16
7.3. THE BIT ERROR RATE IS TOO HIGH 16
8. BULK PACKAGING METHOD 17
8.1. EWM103-W15S 17
8.2. EWM103-W15S X 17
9. REVISION HISTORY 18
ABOUT US 18

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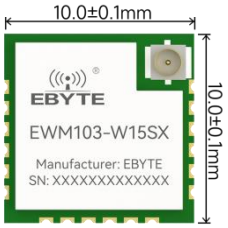
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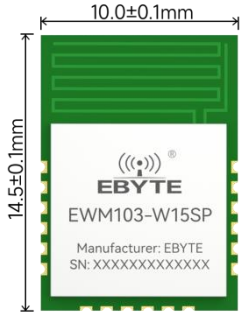
1. Overview

1.1. Introduction

The EWM103-W15 series is a low-cost , cost-effective Wi-Fi + Bluetooth dual-mode WiFi module developed by Chengdu Ebyte Electronics Co., Ltd. It complies with the Bluetooth 5.1 protocol and IEEE 802.11b/g/n standard protocol specifications. The module integrates the hardware and software resources required for complete Wi-Fi and Bluetooth applications, supports AP and STA 2 Wi-Fi working modes and low-power Bluetooth, and is very suitable for low-rate applications and data acquisition applications such as smart homes and industrial control.

In terms of functions, the module also supports multiple network communication protocols such as TCP/UDP/SSL /MQTT . The module can achieve Bluetooth network configuration and Web network configuration , solving the inconvenience of users in various usage scenarios .





EWM103-W15SX EWM103-W15S P

1.2. Features

- Support IEEE802.11 /b/g/n standards and work in 2.4GHz frequency band;
- Support BLE5.1 protocol and work in 2.4GHz frequency band;
- Support STA/SoftAP 2 working modes;
- multiple security encryption methods such as WEP (40/104) , WPA , WPA2 , WPA3 , etc.
- Support TCP/UDP /SSL multiple network communication protocols;
- Supports up to 3 socket connections;
- AP access point supports 3 -way STA device connection;
- Support SNTP network time acquisition (on the premise of Internet access);
- Support MQTT network protocol (Alibaba Cloud, Baidu Cloud, OneNet) ;
- Support Web network configuration ;
- Support Bluetooth network configuration;
- Support TCP SERVER/TCP CLIENT, UDP communication mode;
- Support AT command configuration;
- Support static IP address allocation and DHCP dynamic allocation;

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1.3. Application Scenario

-Medical and healthcare
Multi-parameter patient monitor
Electrocardiogram (ECG)
Hospital electronic bed and bed control system
Telemedicine system
-Building and home automation:
HVAC systems and thermostats
Video surveillance, video doorbells, and low-power cameras
Building security systems and low-power electronic locks
-Smart appliances
-Smart Wear
-Asset tracking
-Factory Automation
-Grid infrastructure

2. Specifications

2.1. RF parameters

RF parameters	unit	model		Remark
		EWM103-W15SX	EWM103-W15SP	
WiFi Protocols	-	IEEE 802.11b/g/n		
Bluetooth Protocol	-	BLE5.1		
Wi-Fi transfer rate	-	● 802.11b: 1Mbps, 2Mbps, 5.5Mbps, 11Mbps ● 802.11g: 6Mbps, 9Mbps, 12Mbps, 18Mbps, 24Mbps, 36Mbps, 48Mbps, 54Mbps ● 802.11n: HT20 (MCS0~MCS7)		
Antenna type	-	IPEX third generation antenna	PCB onboard antenna	Characteristic impedance is about 50 ohms
Reference distance	M	440	250	Antenna gain 5dBi, module communicates with device
Frequency band	GHz	2.4 (WiFi, Bluetooth)		Supports the global license-free ISM 2.4GHz frequency band

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2.2. Electrical parameters

RF parameters		unit	model		Remark
			EWM103-W15S X	EWM103-W15S P	
Operating voltage		V	2.8-3.6		the voltage exceeds 3.6 V, the module may be permanently burned.
Communication level		V	3.3		Using 5V TTL may burn out
Power consumption	Transmit power	dBm	20		
	Emission current	mA	330		
	Receiving current	mA	60		
	Sleep current	uA	30		
temperature	Operating temperature	℃	-40～+85		Industrial Grade
	Storage temperature		-40～+ 95		

2.3. Hardware Parameters

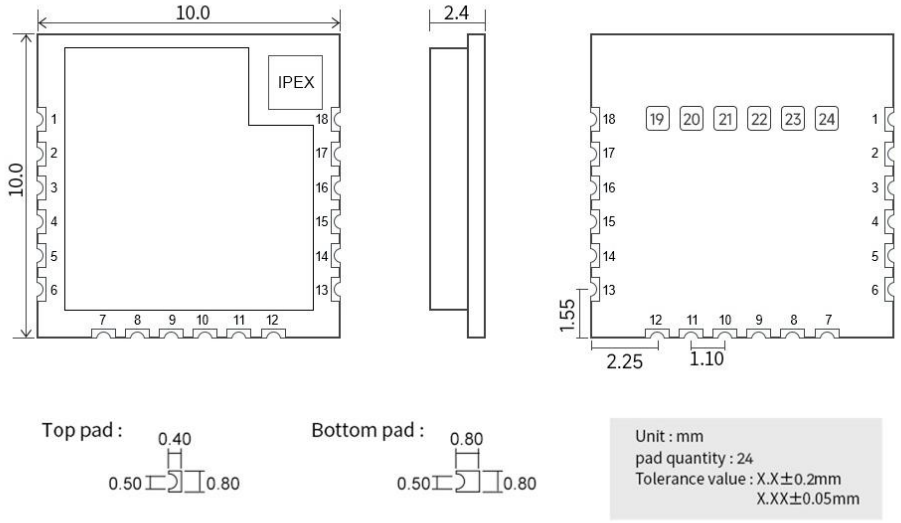
Hardware Parameters	model		Remark
	EWM103-W15S X	EWM103-W15S P	
Flash	2MB		
RAM	296KB RAM		
Frequency	160MHz		
Packaging	Patches		
size	10*10mm	14.5*10mm	The error size is ± 0.2 mm
weight	0.4±0.1g	1.2±0.1g	The error is ±0.1g

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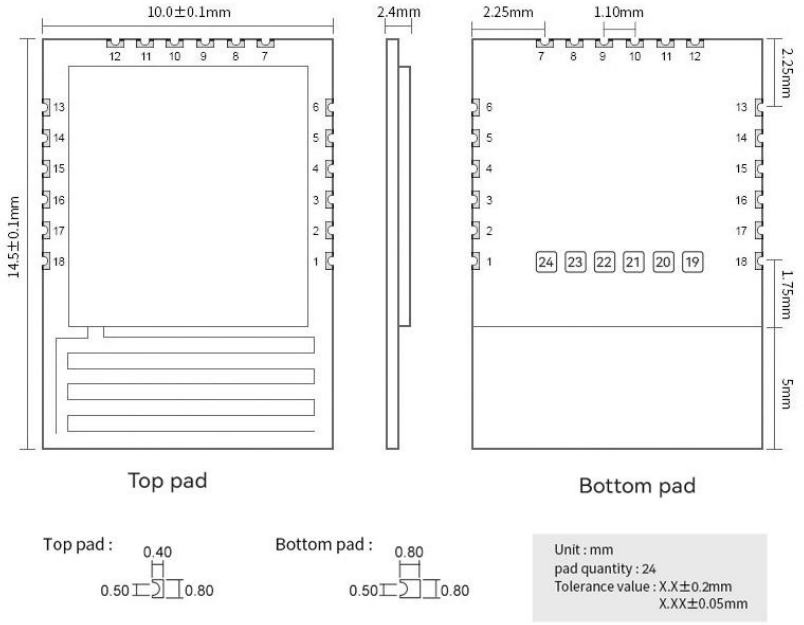
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3. Mechanical dimensions and pin definition

3.1. EWM103-W15S X-pin diagram



3.2. EWM103-W15S P Pin Diagram



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EWM103-W15S P & EWM103-W15S X are pin compatible, pin definition:

Pin number	Pin Name	Pin Type	Pin Purpose
1	GND	-	Power Ground
2	A0	I/O	GPIO
3	VBAT	-	VCC recommended 3.3v
4	A5	I/O	GPIO
5	A6	I/O	GPIO
6	B4	I/O	GPIO
7	RST	-	The chip enable pin is valid at a high level (the module is internally pulled up, and customers can use this pin to implement the hardware reset pin function).
8	A8	I/O	GPIO
9	SWD	-	-
10	SWC	-	-
11	A9	I/O	GPIO
12	B3	I/O	GPIO
13	A7	I/O	GPIO
14	TXD	O	Module serial port sending
15	RXD	I	Module serial port receiving
16	B5	I/O	GPIO
17	B8	I/O	GPIO
18	GND	-	-
19	B9	I/O	GPIO
20	B6	I/O	GPIO
21	B7	I/O	GPIO
22	A12	I/O	GPIO
23	A11	I/O	GPIO
24	A10	I/O	GPIO

4. Functional Description

This module can work in WiFi mode and BLE mode through instructions . From the perspective of the WiFi layer, the module can work in AP and STA modes. From the perspective of the BLE layer, the module currently only supports the slave role. From the perspective of the network layer , the module supports TCP (server, client), UDP, SSL, and MQTT .

4.1. Job Role

This section describes how module support works.

4.2. Access Point (AP Mode)

Access Point is referred to as AP mode, which is similar to a router. It allows wireless devices to connect and establish TCP/IP-based server, client, and UDP communications. This mode supports connecting 3 stations and supports up to 6 TCP socket transmissions. Use the command AT+CWMSAP to configure the module to initialize AP.

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4.3. Station (STA mode)

Station mode is referred to as STA. In this role, the module does not provide connection and can only connect to Access Point or router. This module supports TCP server, TCP client, UDP, and supports up to 3 sockets in the Station role. It also supports MQTT. The command AT+C WJAP enables the module to connect to AP as STA role.

4.4. Network Features

This module supports TCP server, TCP client , UDP, SSL, and MQTT functions.

4.4.1. TCP server

The module can initialize a TCP Server. In this mode, it can only connect to 3 SOCKETs at most. After the module initializes a server, the entire module shares 3 sockets in total. For example, if the server module connects to 3 clients, the server module can no longer connect to other server modules as a client. On the contrary, if the server module only connects to 2 clients, the module can also connect to a server as a client.

4.4.2. TCP client

The module connects to other TCP servers. In single TCP client mode, up to 3 sockets can be connected .

4.4.3. UDP

You can use AT+CIPSTART's udp mode to communicate with the remote UDP service that is listening. The module supports a maximum of 3 sockets.

4.4.4. MQTT

In MQTT mode, the module supports IoT platforms such as Alibaba Cloud, Baidu Cloud, and OneNet. Simply enter the service parameters created on the platform into the module to start communication.

4.4.4.1. Alibaba Cloud

For network communication based on the Alibaba Cloud platform, you need to log in to Alibaba Cloud to obtain relevant parameters, mainly including product key, device name, client ID and other information. For details, see Chapter 7 Alibaba Cloud Configuration Tutorial.

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4.5. Low power consumption

This module has only one low power mode

Deep sleep (AT+SLEEP=1) is a relatively power-saving sleep mode. In this mode, the system has only 32K clocks, and only some hardware modules are working. Except for the AON module, other hardware modules have been powered off. When the GPIO interrupt or RTC timeout interrupt wake-up signal is triggered, the system exits the deep sleep state. (**Note: Wake-up will reset the system.**)

5. Tutorial

This module has many functions, and relevant parameters need to be configured before use so that it can work normally. In the following tutorials, the operations marked with * are required. Please set them according to your needs when using other modes.

5.1. Basic module WiFi connection

5.1.1. WiFi connection between modules

This section mainly demonstrates the WiFi connection between modules

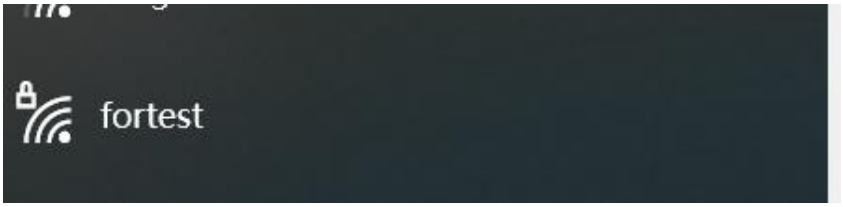
1） Module 1 uses AT+CWMODE=2 to turn on AP mode

2） Module 1 uses AT+CWSAP="fortest","123456789",5,3. Initialize ap

3） Module 2 uses AT+CWMODE=1 to enable STA mode

4） After module 1 turns on AP, module 2 uses AT+CWJAP=fortest,12345678 to connect to module 1.

5) At the same time, you can use a computer or mobile phone to scan the AP generated by the module and connect to it.



6) If module 2 returns OK, it means it has started to connect to AP, but the connection is not successful at this time. Wait for the module to return WIFI GOT IP, which means the connection is successful.

As shown in the figure below, the left side is module 1 and the right side is module 2.

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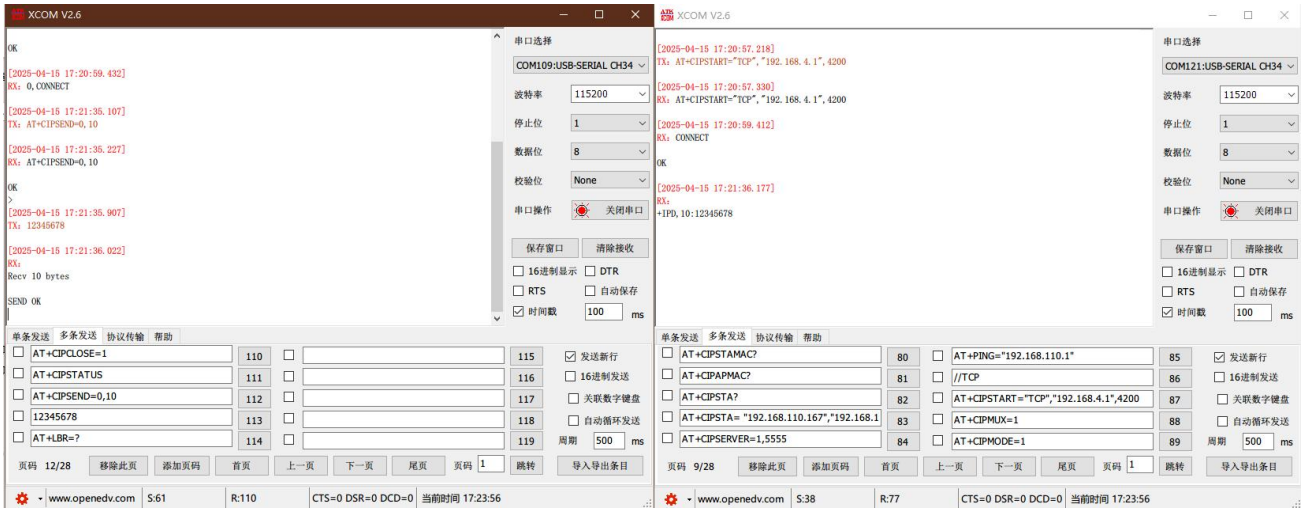


5.2. Basic TCP/UDP data transmission

This section mainly demonstrates the module's TCP and UDP communications.

5.2.1. TCP communication between modules

1) Follow the steps in 6.1.1
2) Module 1 AT+CIPMUX=1 to open multiple links (if you want to open the server, you must first open multiple links)
3) Module 1 AT+CIPSERVER=1,4200 to start the server, listen to port 4200, and wait for the return of LISTENING to indicate successful start. At this point, the configuration of module 1 is complete
4) Module 2 AT+CWJAP=fortest,12345678. Connect module 1 WiFi
5) Wait for the return of WIFI GOIT IP
6) Module 2 AT+CIPSTART=TCP,192.168.4.1,4200 connects to the server of module 1
7) Wait for SOCKET CONNECTED:0 to return that the TCP connection is successful.
8) Both sides send data. Since module 1 is configured as multi-link, it needs to use AT+CIPSEND=<ID>,<LEN> to send data. Module 2 is not configured, so it uses AT+CIPSEND=<LEN> to send data, as shown below



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5.2.2. Module-to -module UDP communication

1） Modules 1 and 2 are connected to the same WiFi as the computer, AT+CWJAP=zhendu,123456789 (**the parameters here need to be replaced with the actual ones of the customer**)

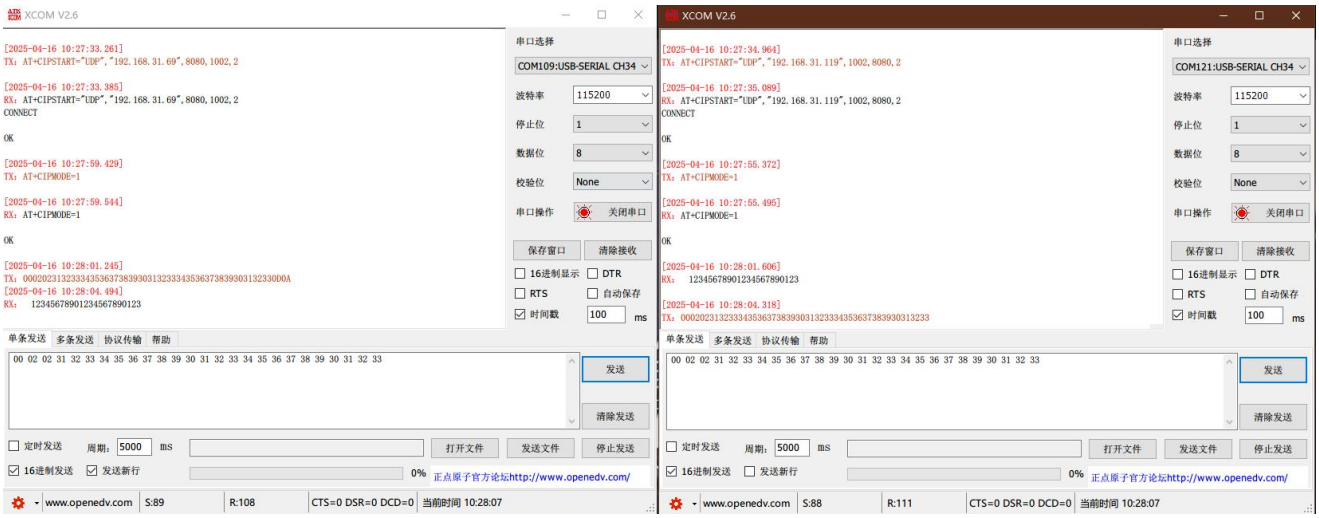
2） Module 1 inputs AT+CIPSTART="UDP","192.168.31.69",8080,1002,2

3） Module 2 inputs AT+CIPSTART="UDP","192.168.31.119",1002,8080,2

4） Use command AT+CIPMODE=1 Enter transparent transmission.

5） Two-way communication successful

6） The whole process is shown in the figure below



5.2.3. Transparent transmission description

1） The transparent transmission mode only supports a single connection, that is, only connection 0 is supported for data transparent transmission.

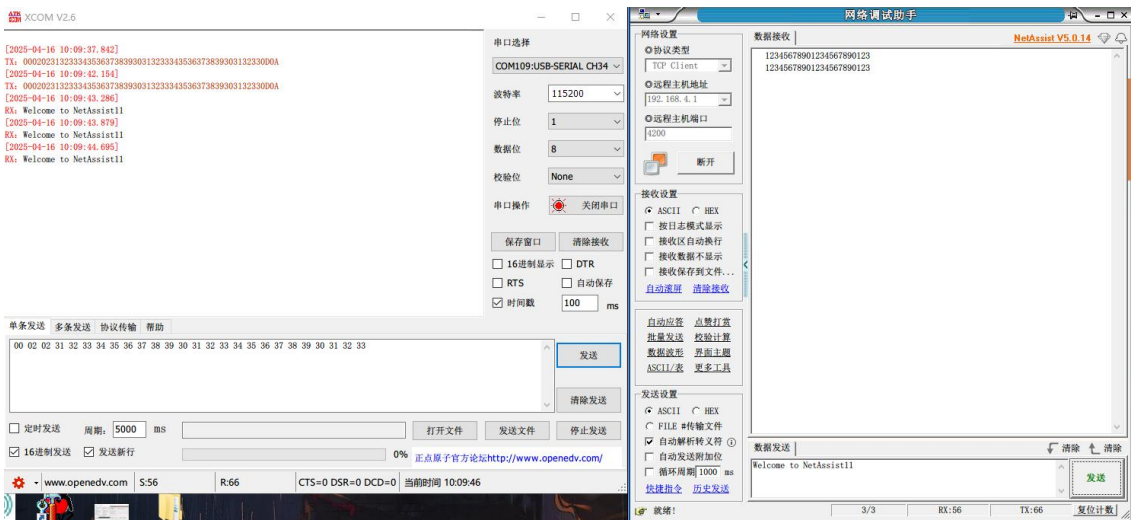
2） The server does not support transparent transmission.

3） The client can directly enter the transparent transmission mode through AT+CIPMODE=1, and all serial port data will be sent on socket link 0.

4） After entering the transparent transmission mode, you can exit the transparent transmission mode by sending +++. Note that unlike the command, which needs to end with a carriage return and line feed, when sending +++, you only need to send three characters +++.

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5.3. MQTT

MQTT supports versions v3.1 and v3.1.1. Any cloud platform that supports these two versions of MQTT can be connected. This summary will use Alibaba Cloud as an example for demonstration.

5.3.1. Alibaba Cloud

1） The module acts as a STA and is connected to a router that can access the external network.

2） Visit Alibaba Cloud IoT Platform, [IoT Platform (aliyun.com) .]

3） Click to enter the public example



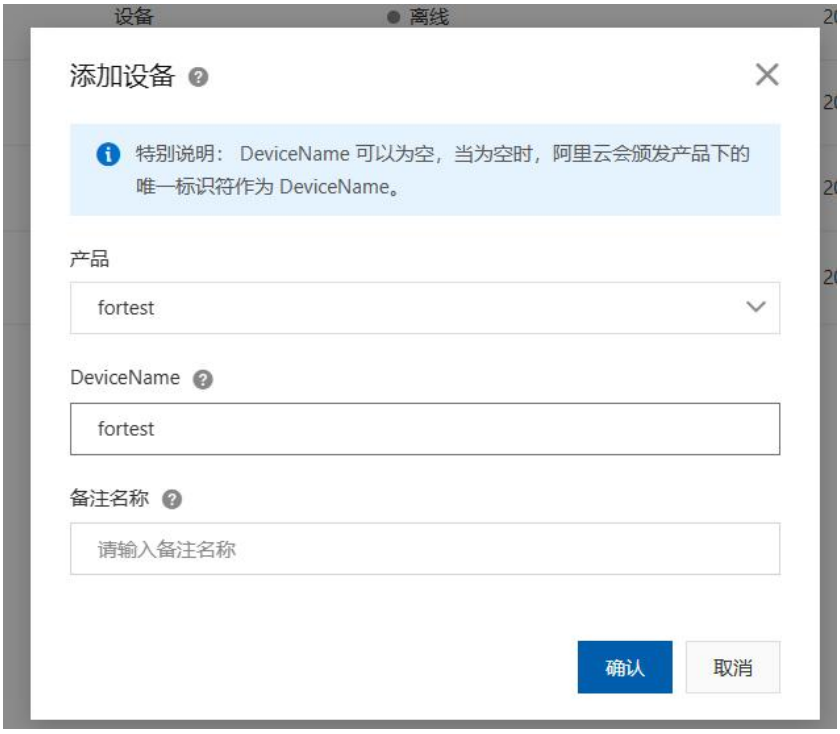
4） Select "Product" on the left column and click Create Product

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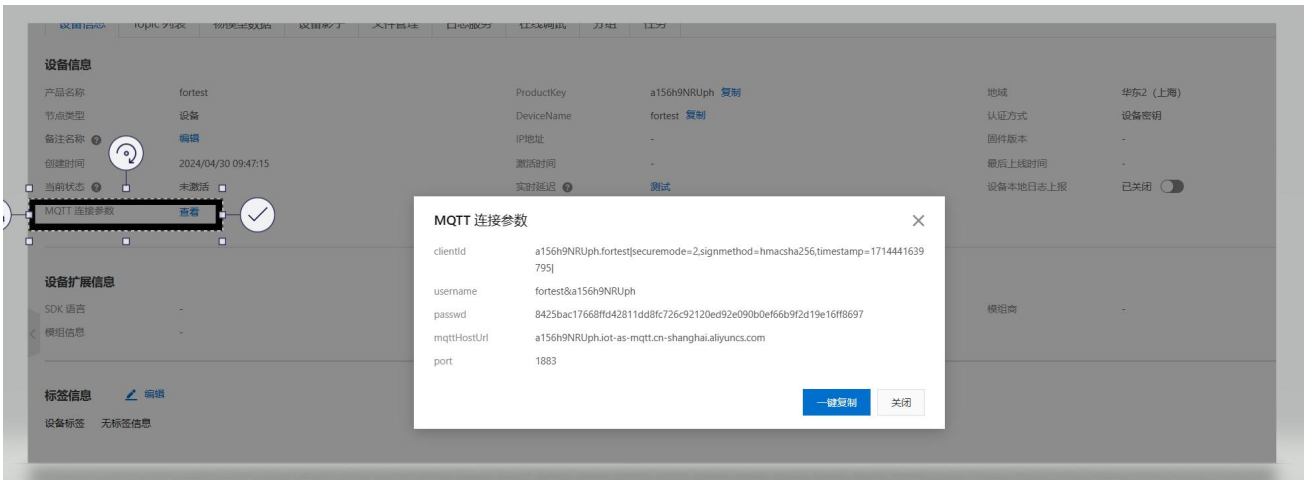
5） Select Device in the left column, click Add Device, and select the product you just created.



6） Click to view the information and get the necessary parameters for the connection (note that if there is a special character ',' in the parameter, please use a backslash to escape it. For example, if the parameter you want to enter is ", asd", you need to send "\, asd" when using the command.

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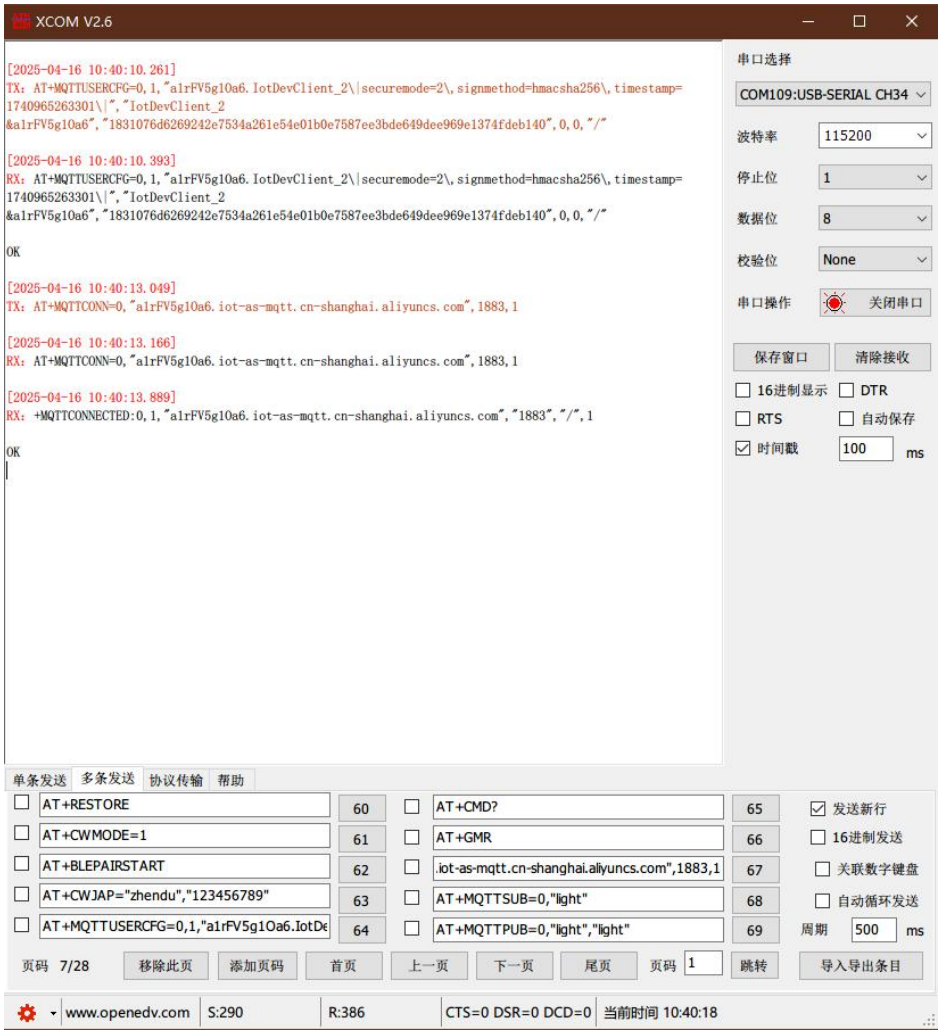
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7） Module sets user login information AT+MQTTUSERCFG=0,1,"a1rFV5g1Oa6.IotDevClient_2 \ |securemode=2 \ ,signmethod=hmacsha256 \ ,timestamp=1740965263301 \ |","IotDevClient_2&a1rFV5g1Oa6","1831076d6269242e7534a261e54e01b0e7587ee3bde649dee969e1374fdeb140",0,0,"/" (**Note that the backslash marked in red is escaped**)

8） Set the connection parameters AT+MQTTCONN=0,"a1rFV5g1Oa6.iot-as-mqtt.cn-shanghai.aliyuncs.com",1883,1 Initiate a connection. Note that you may have to wait for a long time after using this command.

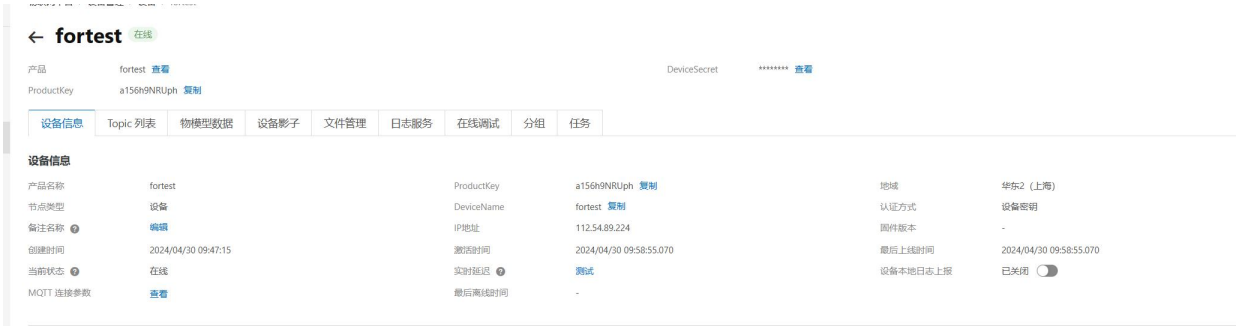
9） The module setting process is shown in the figure below



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10） The device can also be seen online on Alibaba Cloud.



11） Note that Alibaba Cloud can only subscribe to the physical models that it has designed.

12） MQTT can only send data through commands (AT+MQTTPUB /AT+MQTTPUBRAW).

6. Welding work instructions

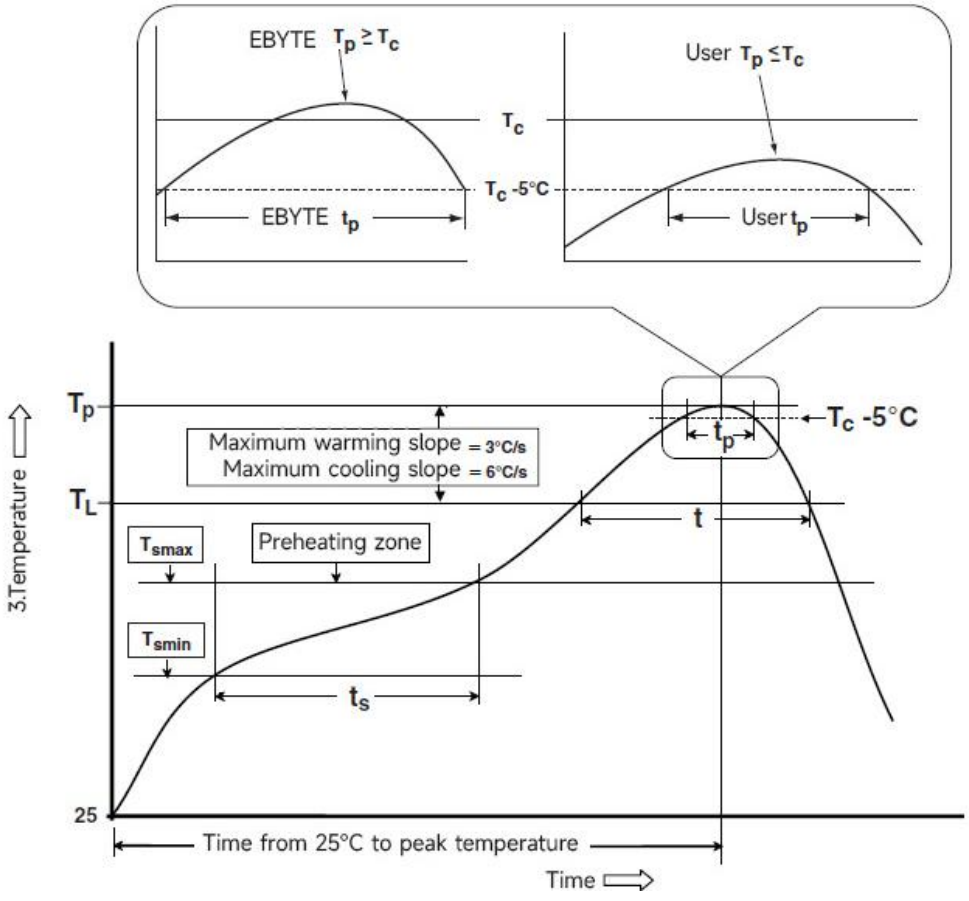
7.1 Reflow Temperature

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Reflow profile characteristics		Leaded process assembly	Lead-free assembly
Preheating/keeping	Minimum temperature (Tsmin)	100℃	150℃
	Maximum temperature (T smax)	150℃	200℃
	Time (T smin ~T smin)	60-120 seconds	60-120 seconds
Heating slope (T L ~T p)		3℃/sec, max.	3℃/sec, max.
Liquidus temperature (TL)		183℃	217℃
T L above the holding time		60~90 seconds	60~90 seconds
Package peak temperature Tp		Users must not exceed the temperature stated on the product's "Moisture Sensitivity" label.	Users must not exceed the temperature stated on the product's "Moisture Sensitivity" label.
p) within 5°C of the specified classification temperature (Tc) is shown in the figure below.		20 seconds	30 seconds
Cooling slope (Tp~T L)		6℃/sec, max.	6℃/sec, max.
Time from room temperature to peak temperature		6 minutes, longest	8 minutes, longest
※The peak temperature (Tp) tolerance of the temperature curve is defined as the upper limit of the user			

7.2 Reflow Oven Curve



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7. Frequently asked questions

7.1. The transmission distance is not ideal

- When there is a straight-line communication obstacle, the communication distance will be attenuated accordingly ;
- Temperature, humidity, and co-channel interference can increase the communication packet loss rate ;
- The ground absorbs and reflects radio waves, so the test results are poor when close to the ground ;
- Seawater has a strong ability to absorb radio waves, so the test effect at the seaside is poor ;
- If there are metal objects near the antenna, or the antenna is placed in a metal shell, the signal attenuation will be very serious ;
- The power register is set incorrectly, or the air rate is set too high (the higher the air rate, the closer the distance) ;
- The power supply voltage at room temperature is lower than the recommended value. The lower the voltage, the lower the power output .
- The antenna used does not match the module well or the antenna itself has quality issues.

7.2. Module is easily damaged

- Please check the power supply to ensure that it is within the recommended power supply voltage. If it exceeds the maximum value, the module will be permanently damaged .
- Please check the stability of the power supply. The voltage should not fluctuate greatly or frequently .
- Please ensure anti-static operation during installation and use, as high-frequency components are sensitive to static electricity ;
- Please ensure that the humidity is not too high during installation and use, as some components are humidity sensitive devices ;
- If there is no special requirement, it is not recommended to use it at too high or too low temperature.

7.3. The bit error rate is too high

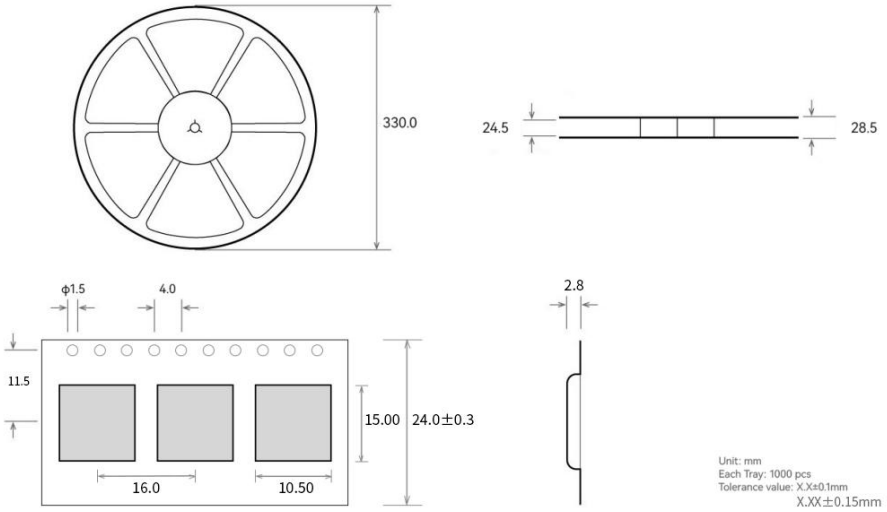
- There is interference from the same frequency signal nearby. Stay away from the interference source or change the frequency or channel to avoid interference.
- An unsatisfactory power supply may also cause garbled characters, so the reliability of the power supply must be ensured;
- Extension cables or feeder cables that are of poor quality or are too long can also cause a high bit error rate.

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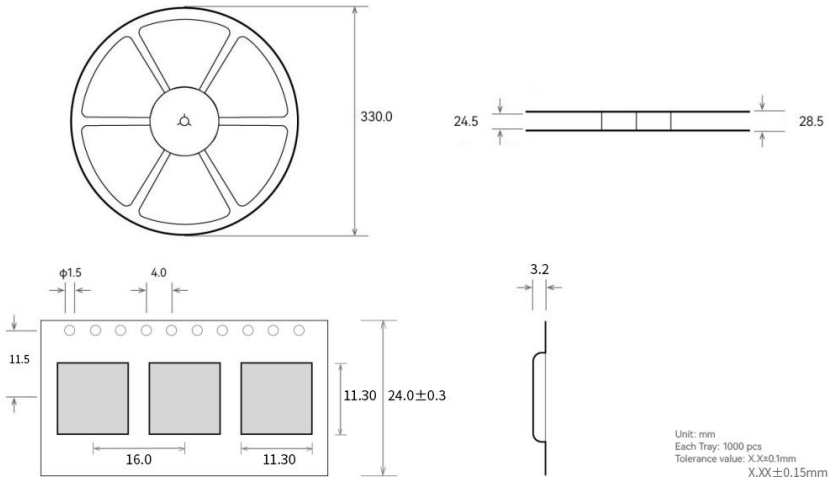
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8. Bulk packaging method

8.1. EWM103-W15S



8.2. EWM103-W15S X



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9. Revision History

Version	Revision Date	Revision Notes	Maintainer
1.0	2025-2-24	Initial release	Hao
1.1	2025-12-22	Revision of IPEX Antenna Module Dimension Diagram	Hao
1.2	2026-7-14	Modify pin definitions and partial descriptions	Hao

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