E22P-xxxXBX-SC Series Evaluation Kit
User Manual

Next-generation package compatibleSub-1GWireless Module Kit

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Chengdu Ebyte Electronic Technology Co.,Ltd.

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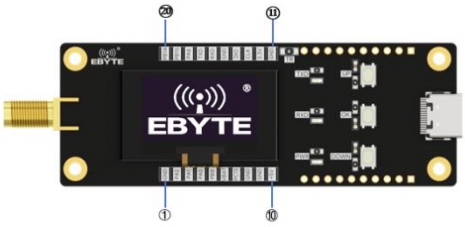
Chapter 1 Product Overview

1.1 Product Introduction

	model	front	back
High Power Kit	**E22P-xxxMBH-SC**		

The SC Series Evaluation Kit is designed to help users quickly evaluate Ebyte's next-generation footprint-compatible wireless modules. The MCU uses the STM32F103C8T6, and all available pins are broken out to two pin headers. Developers can easily connect a variety of peripherals using jumpers, facilitating secondary development.

The kit provides complete software application examples to help customers quickly get started with wireless data communication development. Different types of Sub-1GWireless modules. Supported modules have pin-compatible packages and can be quickly replaced.

1. 2 Pin Definition

Exx-xxxMBH-SC		
Pin number	definition	Functional Description
1	GND	Chassis ground wire
2	PA2	MCU_PA2 pin
3	PA1	MCU_PA1 pin
4	PA0	MCU_PA0 pin
5	PB8	MCU_PB8 pin
6	VBAT	MCU_VBAT pin
7	PC13	MCU_PC13 pin
8	GND	Chassis ground wire
9	GND	Chassis ground wire
10	+5V	5V power supply interface
11	GND	Chassis ground wire
12	3.3V	3.3V power supply interface
13	CLK	SWCLK
14	DIO	SWDIO
15	GND	Chassis ground wire
16	RXD	MCU_RXD data input pin
17	TXD	MCU_TXD data output pin
18	PA8	MCU_PA8 pin
19	PB15	MCU_PB15 pin

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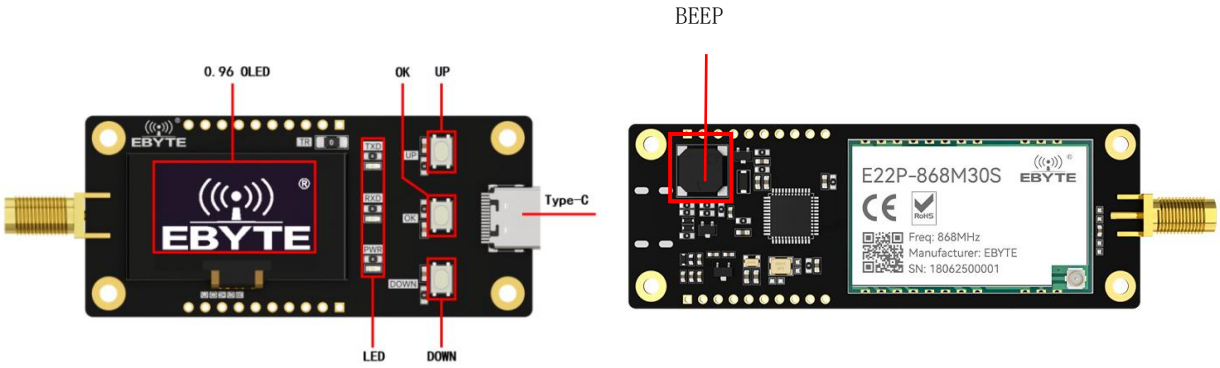
20	PB14	MCU_PB14 pin

1.3 Function Introduction



Display	0.96 OLED	Display current configuration, test parameters, version information, etc.
button	Up	Up key, select or add upwards, supports continuous click when setting frequency and power
	Confirm/OK	Confirm key to enter the next page or exit the last page
	DOWN	Down key, select or decrease downwards, supports continuous click when setting frequency and power
indicator light	TXD	Transmit indicator light, flashes once each time it is sent
	RXD	Receiving indicator light flashes once it receives a signal
	PWR	Power indicator light, always on when powered on
Test resistance	TR	Remove the test resistor and connect an ammeter in series to test the module current.
buzzer	BEEP	Beeps once when a key is pressed

1.4 Parameter Introduction

Serial number	Parameter name	Parameter value	Notes
		MBH-SC	
1	Test board size	30*85mm	-
2	Production process	Lead-free process, machine mounting	Machine labeling can ensure batch consistency and reliability
3	Antenna interface	SMA	-
3	Power supply interface	Type-C	USB to Type-C
4	Operating	-40 ~ +85℃	-

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	temperature		
5	Operating humidity	10% ~90%	-
6	Storage temperature	-40 ~ +125℃	-

1.5 Compatibility List

Low power module	SPI	1	E22-400M22S	E22-400/900MBL-SC
		2	E22-900M22S	
		3	E32-400M20S	E32-400/900MBL-SC
		4	E32-900M20S	
		5	E220-400M22S	E220-400/900MBL-SC
		6	E220-900M22S	
	UART	7	E22-400T22S	E22-400/900TBL-SC
		8	E22-900T22S	
		9	E32-433T20S	E32-433/900TBL-SC
		10	E32-900T20S	
		11	E220-400T22S	E220-400/900TBL-SC
		12	E220-900T22S	
High-power modules	SPI	13	E22-400M30S	E22-400/900MBH-SC
		14	E22-900M30S	
		15	E32-400M30S	E32-400/900MBH-SC
		16	E32-900M30S	
		17	E220-400M30S	E220-400/900MBH-SC
		18	E220-900M30S	
		19	E290-400M20S(3060)	EWT290-400MBL-SC
		20	E290-400M20S(3029)	
		twenty one	E290-400M30S(3029)	EWT290-400MBH-SC
		twenty two	E290-400M30S(3060)	
		twenty three	E22P-868M30S	E22P-868MBH-SC
		twenty four	E22P-915M30S	E22P-915MBH-SC
	UART	25	E22-400T30S	E22-400/900TBH-SC
		26	E22-900T30S	
		27	E32-433T30S	E32-433/900TBH-SC
		28	E32-900T30S	
		29	E220-400T30S	E220-400/900TBH-SC

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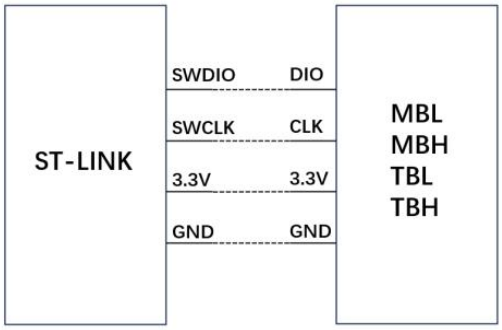
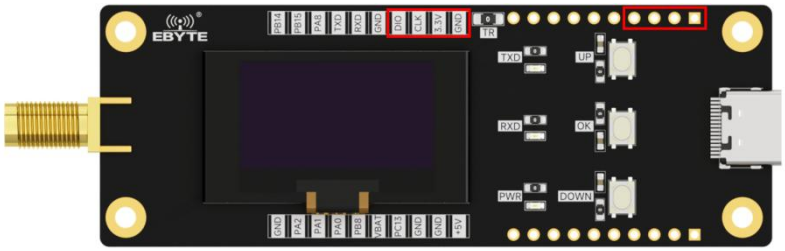
		30	E220-900T30S	

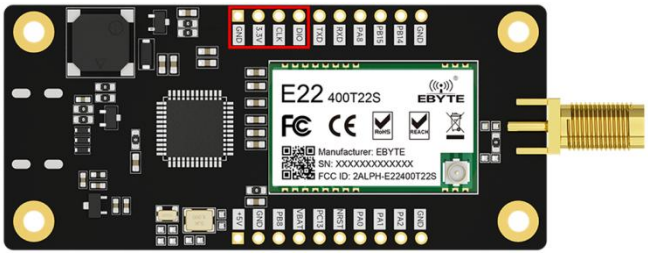
1.6 Program Download Interface



Take E22-400MBH-SC as an example for the M series



T series takes E22-400TBL-SC as an example



You can use ST-LINK to program the MCU. Please compile the program before programming.

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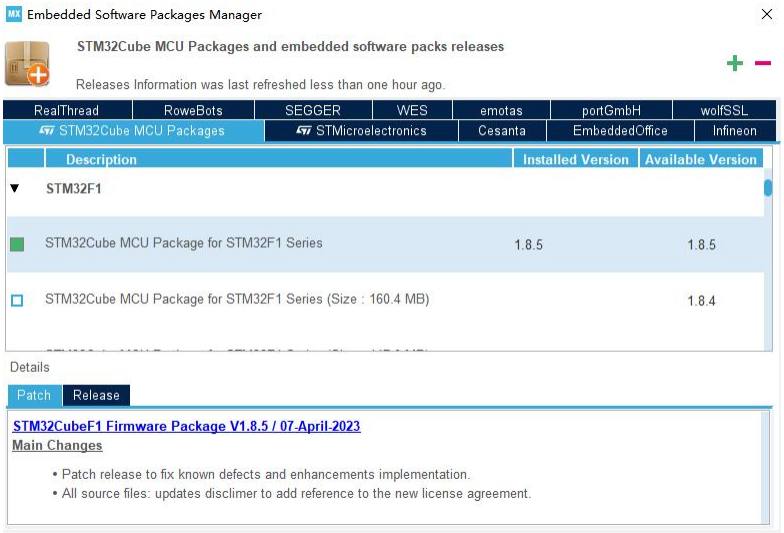
Chapter 2 Software Introduction

2.1 Development Environment

2.1.1 STM32CubeMX

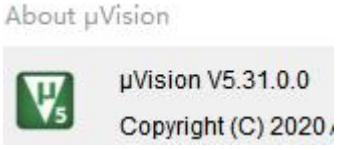
Recommended tool version ≥ v6.9.2

STM32 firmware package version ≥ v1.8.5



2.1.2 MDK-ARM

Keil version ≥ v5.31.0



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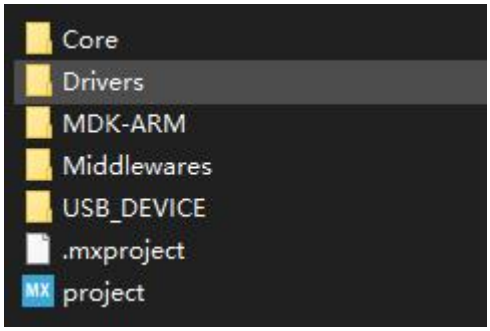
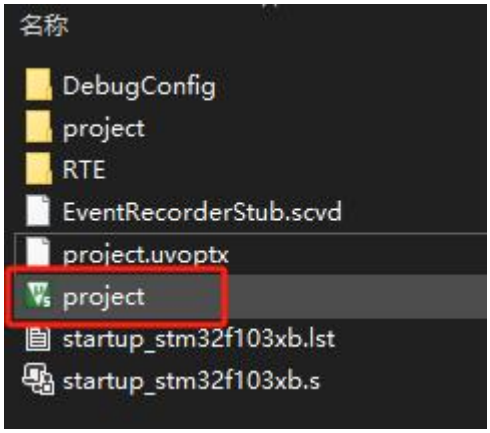
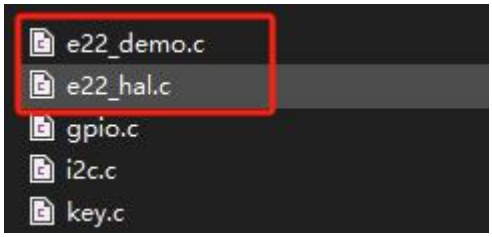
2.2 Directory structure

	matter	illustrate
1	File Directory	You can download the sample project from the official website and open the directory as shown below. 
2	Project launch	There is a startup file under MDK-ARM 
3	Module driver	The Drivers folder contains the corresponding RF chip drivers sx126x/sx127x/llcc68, etc.
4	Module Application	There is a corresponding exx_demo example in the Core/Src folder 

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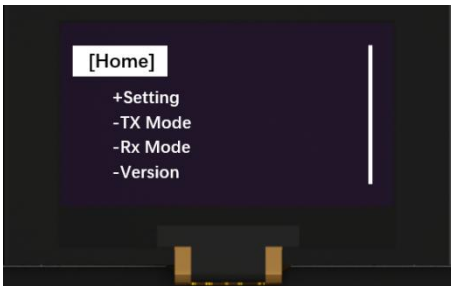
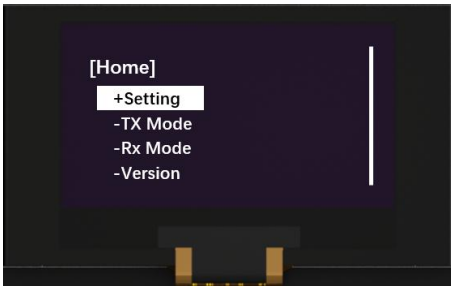
Chapter 3 Function Demonstration

3.1 Quick Start

	matter	illustrate
1	front page	After power on, the default home page is entered and all configuration parameters are restored to the default state.
2	Enter the page	By clicking the entity confirmation button, you can enter the corresponding option page 
3	Basic parameter settings	The M series setting page has a variety of LoRa parameters that can be adjusted according to needs. It is recommended to use Semtech's official LoRa calculation tool for airspeed calculation. The only difference between the T series and the M series is the airspeed configuration method. After the configuration is completed, select [Exit] to confirm and return to the previous page.  The M series configuration is as follows: The T series configuration is as follows:

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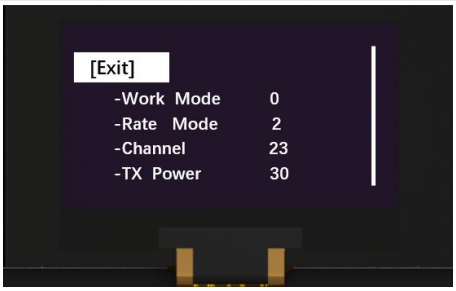
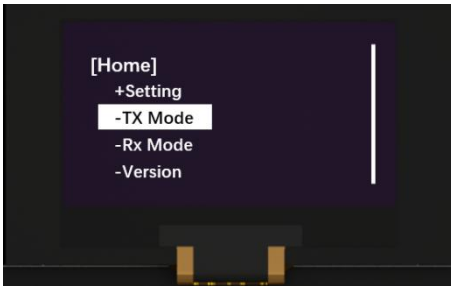


Functional explanation:

M Series			T Series		
LoRa SF	Symbol rate	The airspeed needs to be calculated in combination with SF, BW, and CR.	Work Mode	Working Mode	Select module working mode
LoRa BW	Channel bandwidth		Rate Mode	Rate Mode	Select airspeed
LoRa CR	Coding rate		Channel	Working channel	Select Channel
Frequency	Operating frequency	Select frequency	TX Power	Transmit power	Configure transmit power
TX Power	Transmit power	Configure transmit power	TX Count	Number of times sent	Configure the number of times to send
TX Count	Number of times sent	Configure the number of times to send	Back Color	Background color	Reverse screen background color
Back Color	Background color	Reverse screen background color			

4	Send Test	After entering Tx Mode, it automatically starts sending data packets according to the user-set parameters (the default single packet is 10 bytes). Press the "Confirm" button on the page to exit and return to the previous page After sending is completed, press the "Down" key to restart sending.  The M series TX sending interface is as follows: The T series TX sending interface is as follows:

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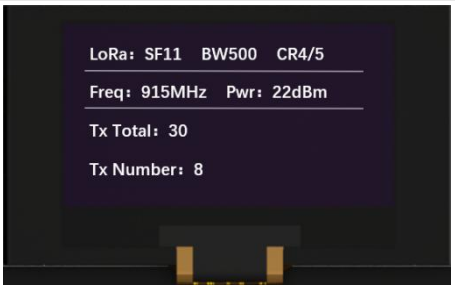
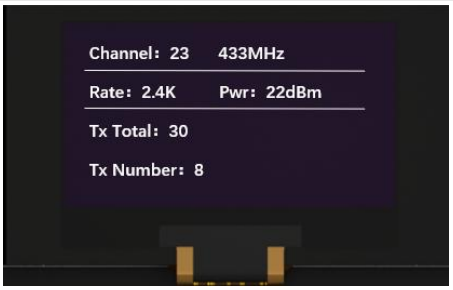
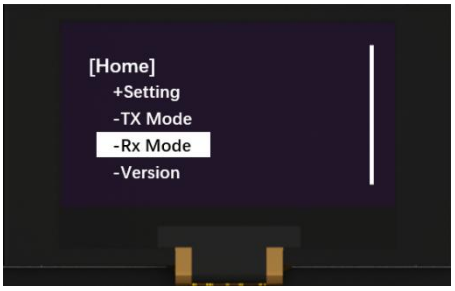
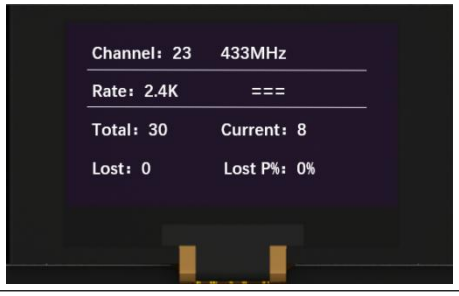
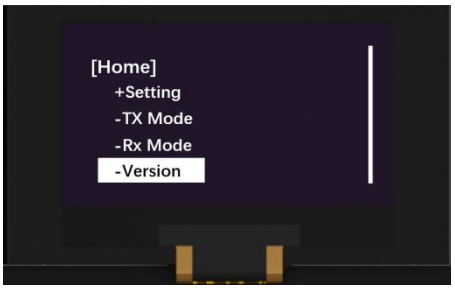
		 
5	Acceptance testing	After entering Rx Mode, it automatically starts to wait for receiving wireless data according to the parameters set by the user. Press the "Confirm" button on the page to exit and return to the previous page After sending, press the "Down" key to restart receiving  The M series RX receiving interface is as follows: The T series RX receiving interface is as follows: 
6	Version Information	Displays basic information such as module model. If there is no firmware inside the M series module, NONE will be displayed.  The M series version information interface is as follows: The T series version information interface is as follows:

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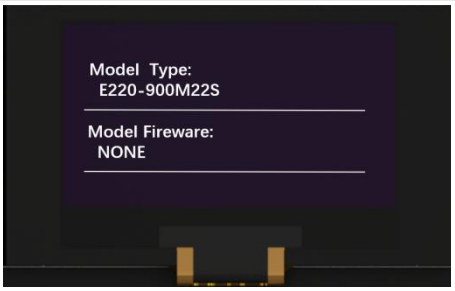
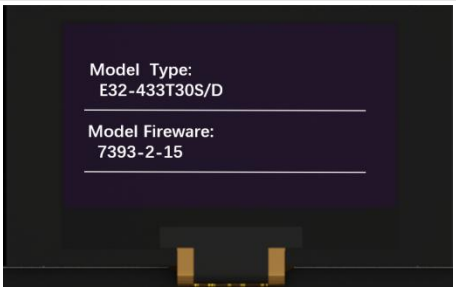
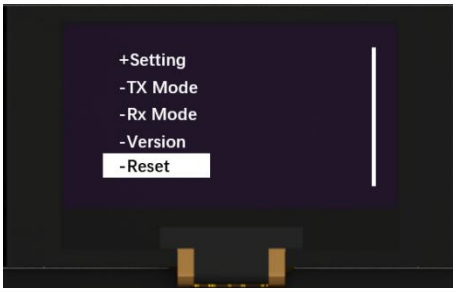
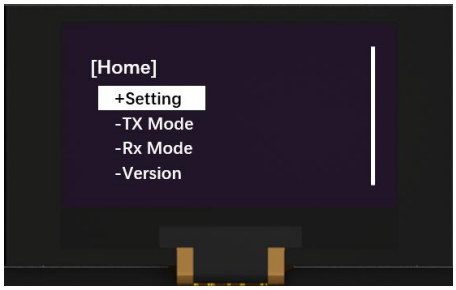
		 
7	Reset	Select Reset and confirm with OK to reset the configuration and return to the home page. 

3.2 Realize transparent transmission function through USB serial port

	matter	illustrate
1	front page	After power on, the default home page is entered and all configuration parameters are restored to the default state.
2	menu	Press any key to enter the menu page, then press the "DOWN" key to select "Setting", and then press the "OK" key to enter the setting mode. 
3	Mode Settings	In the setting mode, press the "DOWN" button to select "Work Mode", then press the "OK" button to enter the mode setting

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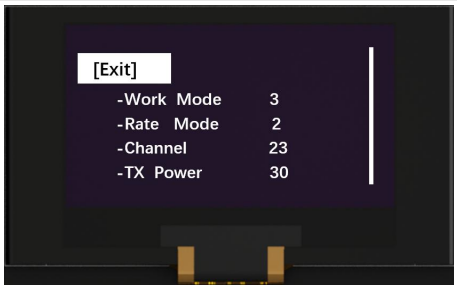
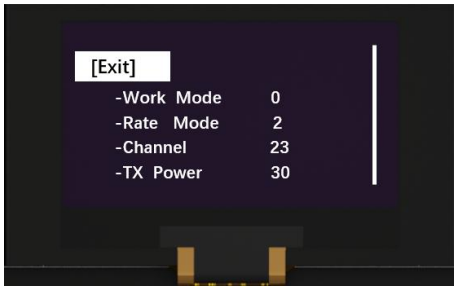
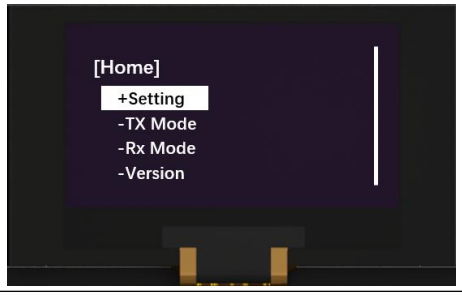
		
4	Transparent transmission mode	Set the mode to transparent mode, that is, "Mode: 0 Transparent", press "OK" to save and return. (For the first use, please switch the mode once using the up and down keys, and then select "Mode: 0") 
5	Realize transparent transmission function through USB serial port	Open the serial port tool to achieve transparent transmission with the module of the same model. Note: the configuration parameters of the kit are the default parameters.

3.3 Realize host computer configuration function through USB serial port

	matter	illustrate
1	front page	After power on, the default home page is entered and all configuration parameters are restored to the default state.
2	menu	Press any key to enter the menu, select "Setting" using the "DOWN" key, and then press the "OK" key to enter the setting mode. 
3	Mode Settings	In the menu, press the "DOWN" button to select "Work Mode", then press

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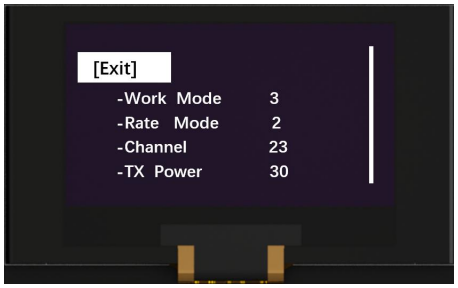
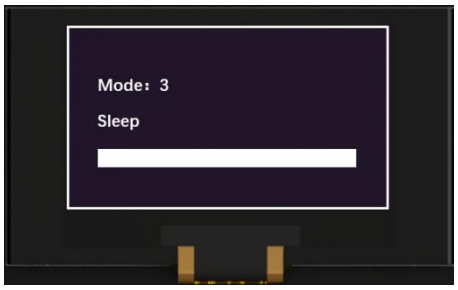
		the "OK" button to enter the mode setting 
4	Set to sleep mode	Set the mode to sleep mode, that is, "Mode: 3 Sleep", and press the "OK" button to save and exit. 
5	Realize host computer configuration function through USB serial port	Open the corresponding official website host computer to read the module parameters and configuration parameters.

Chapter 4 Frequently Asked Questions

4.1The transmission distance is not ideal

- When there is a straight line communication obstacle, the communication distance will be reduced accordingly;
- Temperature, humidity, and co-channel interference will increase the communication packet loss rate.;
- The ground absorbs and reflects radio waves, so the test results are poor near the ground.;
- Seawater has a strong ability to absorb radio waves, so the test results at the seaside are 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 is lower than the recommended value at room temperature. The lower the voltage, the lower the power output.;
- The antenna used does not match the module well or the antenna itself may have quality issues.

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4. 2 Module is easily damaged

- Please check the power supply to ensure that it is within the recommended power supply voltage. Exceeding the maximum value may cause permanent damage to the module.;
- Please check the power supply stability, the voltage should not fluctuate greatly and frequently;
- pleasemake sureAnti-static operation during installation and use, electrostatic sensitivity of high-frequency components;
- Please ensure that the humidity is not too high during installation and use, as some components are humidity sensitive.;
- If there is no special requirement, it is not recommended to use it at too high or too low temperatures.

4.3 The bit error rate is too high

- There is interference from the same frequency signal nearby.Stay away from interference sources or change the frequency or channel to avoid interference.interference;
- An unsatisfactory power supply may also cause garbled characters, so the reliability of the power supply must be ensured;
- Poor quality or excessive length of extension cables or feeders can also cause high bit error rates.

Revision History

Version	Revision Date	Revision Notes	Maintainer
1.0	2025-7-10	Initial version	Hao

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