E32-xxxXBX-SC Series Evaluation Kit
User Manual

New Generation Package Compatible Sub-1G Wireless Module Kit



Chengdu Ebyte Electronic Technology Co.,Ltd.

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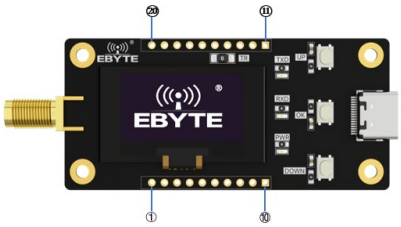
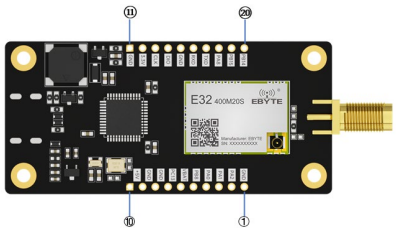
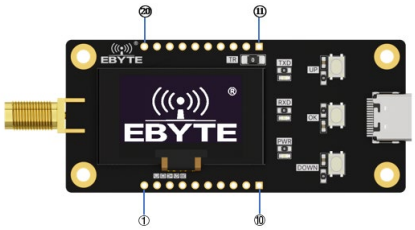
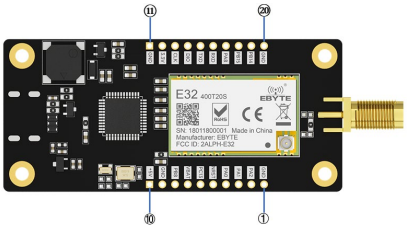
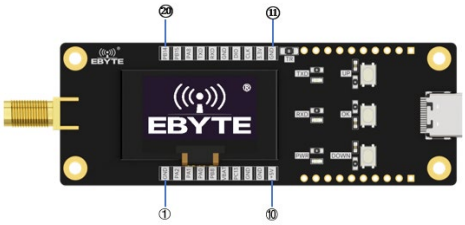
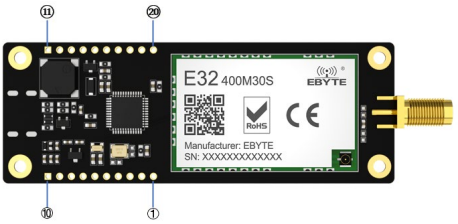
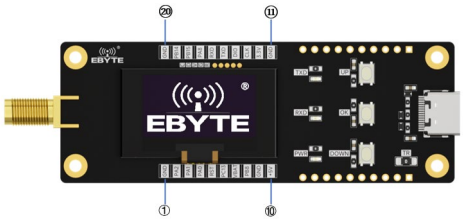
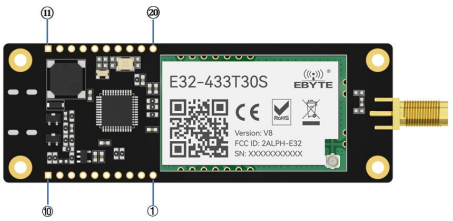
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1 Product Overview

1.1 Product Description

	Model	Front Side	Back Side
Low Power Kit	E32-xxxMBL-SC		
	E32-xxxTBL-SC		
High Power Kit	E32-xxxMBH-SC		
	E32-xxxTBH-SC		

The SC series evaluation kits are designed to help users quickly evaluate EBYTE's new generation of package-compatible wireless modules, using STM32F103C8T6 MCUs with available pins pinned out to both sides of the pin header, which allows developers to easily connect a variety of peripheral devices via jumper wires according to the actual needs, facilitating developers to carry out secondary development.

The kit provides complete software application examples to help customers quickly get started with wireless data communication development. Different types of Sub-1G wireless modules can be on-board according to customer requirements. The supported modules are available in pin-compatible packages for quick replacement.

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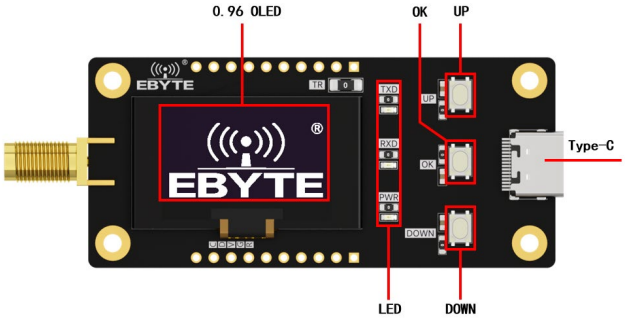
1.2 Pin Definition

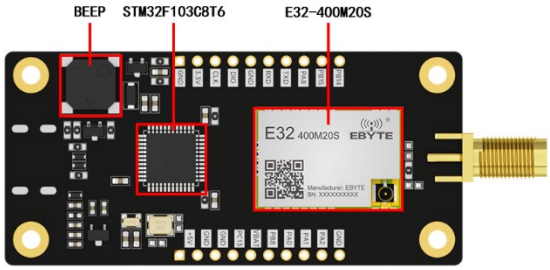
Exx-xxxMBL/MBH-SC			Exx-xxxTBL/TBH-SC		
Pin No.	**Pin Name**	**Function**	**Pin No.**	**Pin Name**	**Function**
1	GND	Ground	1	GND	Ground
2	PA2	MCU_PA2 Pin	2	PA2	MCU_PA2 Pin
3	PA1	MCU_PA1 Pin	3	PA1	MCU_PA1 Pin
4	PA0	MCU_PA0 Pin	4	PA0	MCU_PA0 Pin
5	PB8	MCU_PB8 Pin	5	NRST	MCU Reset Pin
6	VBAT	MCU_VBAT Pin	6	PC13	MCU_PC13 Pin
7	PC13	MCU_PC13 Pin	7	VBAT	MCU_VBAT Pin
8	GND	Ground	8	PB8	MCU_PB8 Pin
9	GND	Ground	9	GND	Ground
10	+5V	Voltage: 5V DC	10	+5V	Voltage: 5V DC
11	GND	Ground	11	GND	Ground
12	3.3V	Voltage: 3.3V DC	12	3.3V	Voltage: 3.3V DC
13	CLK	SWCLK	13	CLK	SWCLK
14	DIO	SWDIO	14	DIO	SWDIO
15	GND	Ground	15	TXD	MCU_TXD Input Pin
16	RXD	MCU_RXD Input Pin	16	RXD	MCU_RXD Output Pin
17	TXD	MCU_TXD Output Pin	17	PA8	MCU_PA8 Pin
18	PA8	MCU_PA8 Pin	18	PB15	MCU_PB15 Pin
19	PB15	MCU_PB15 Pin	19	PB14	MCU_PB14 Pin
20	PB14	MCU_PB14 Pin	20	GND	Ground

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1.3 Function Introduction





Referring to the above figure of E32-400MBL-SC, all other models of SC series have the same hardware functions.

Display Screen	0.96 OLED	Displays the current configuration, test parameters, version information, etc.
Buttons	UP/UP	Up key, up to check or add, frequency and power settings support continuous point.
	OK/OK	Confirmation key to go to the next page or exit the last page
	DOWN/DOWN	Down button, downward check or minus, frequency and power settings support continuous point
Indicator	TXD	Transmit indicator, blinks once for each transmission
	RXD	Receive indicator, blinks once for each reception
	PWR	Power indicator light, power on always on
Testing Resistance	TR	Remove the test resistor and test the module current with an ammeter.
Buzzers	BEEP	Beeps once when key is pressed

1.4 Parameter Introduction

No.	Parameter	Description				Note
		MBL-SC	**TBL-SC**	**MBH-SC**	**TBH-SC**	
1	Borad Size	30*64mm	30*68mm	30*85mm		-
2	Process	Lead free process, machine mount				Machine stickers can ensure batch consistency and reliability
3	Antenna port	SMA				-
3	Power supply	Type-C				USB to Type-C
4	Operating temperature [℃]	-40 ~ +85℃				-
5	Operation Humidity(%)	10% ~90%				-

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6	Storage Temperature [℃]	-40 ~ +125℃	-

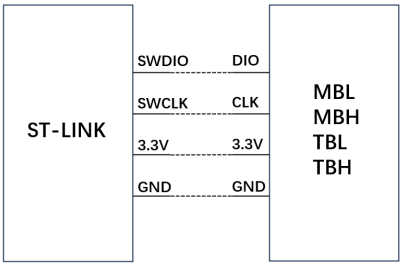
1.5 Compatible List

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 Module	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	
	UART	19	E22-400T30S	E22-400/900TBH-SC
		20	E22-900T30S	
		21	E32-433T30S	E32-433/900TBH-SC
		22	E32-900T30S	
		23	E220-400T30S	E220-400/900TBH-SC
		24	E220-900T30S	

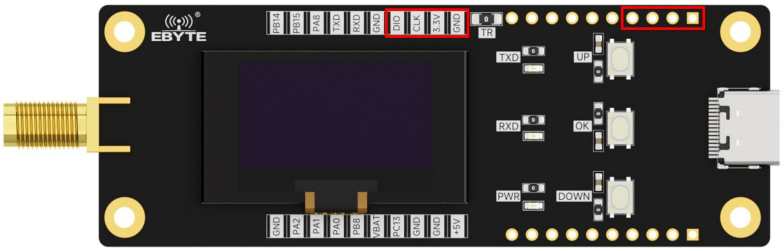
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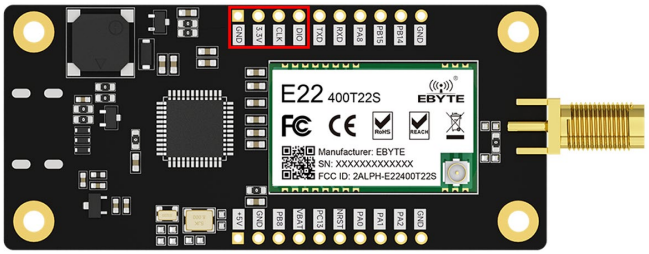
1.6 Program Download Interface



M series take E22-400MBH-SC as an example



T series take E22-400TBL-SC for example



Programs can be burned to the MCU via ST-LINK. Please compile before burning.



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2 Introduction to the software

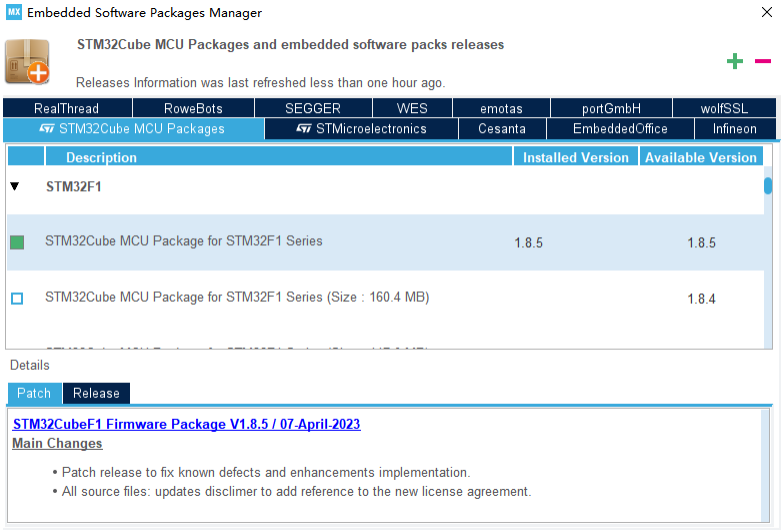
2.1 Development environment (computer)

2.1.1 STM32CubeMX

Tool recommended version≥ v6.9.2

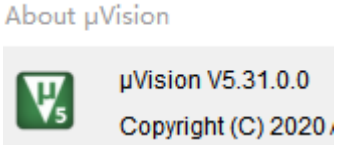


STM32 firmware package version ≥ v1.8.5



2.1.2 MDK-ARM

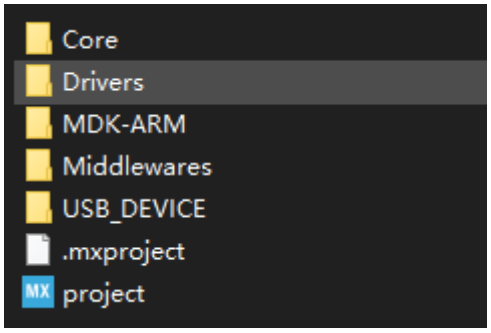
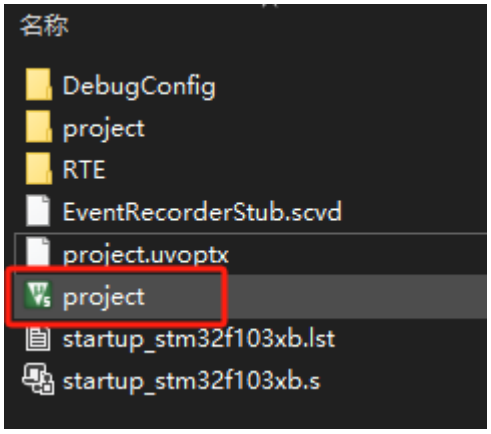
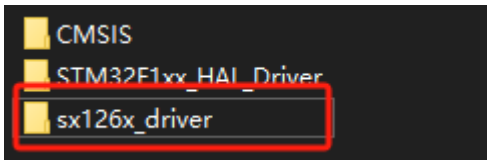
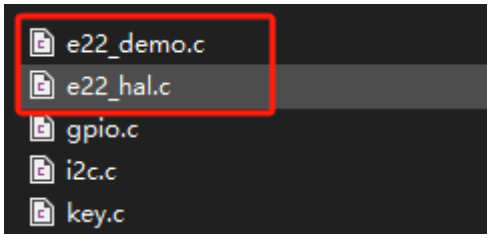
Keil version ≥ v5.31.0



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2.2 Catalog Structure

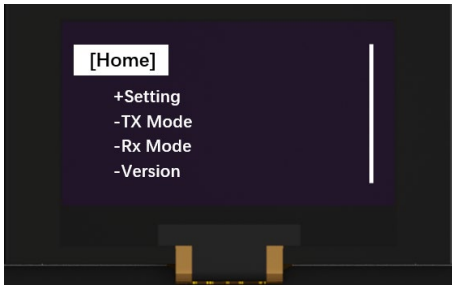
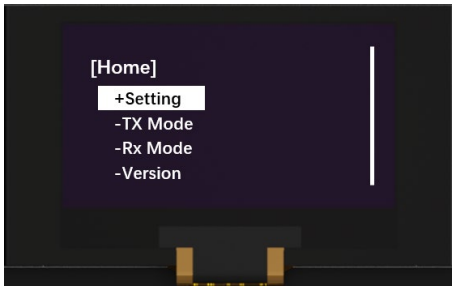
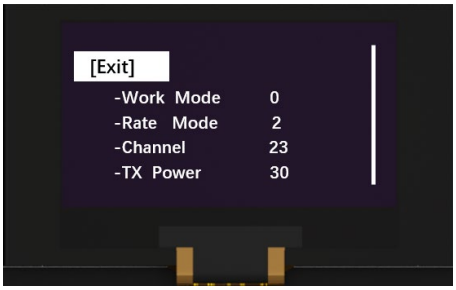
	Item	Instruction
1	File catalog	You can download the sample project from the official website and open the directory as shown below 
2	Project initiation	There are startup files under MDK-ARM 
3	Module Driver	Under the Drivers folder, there are corresponding RF chip drivers sx126x/sx127x/llcc68 and so on. 
4	Module Applications	The corresponding exx_demo example is available in the Core/Src folder. 

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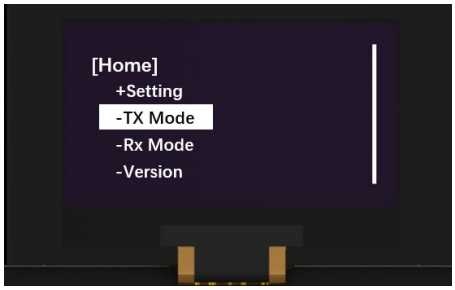
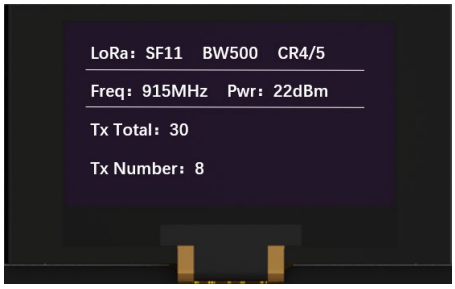
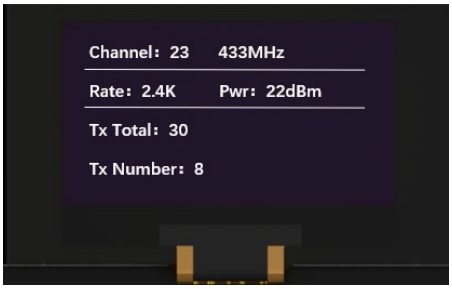
3 Quick Demo

3.1 Menu

	Item	Instruction
1	Home page	Default to home page after power on, all configuration parameters restored to default state 
2	Into the page	By clicking the physical confirmation button, you can go to the corresponding option page 
3	Basic Parameter Setting	M series Setting page has a variety of LoRa parameters, which can be adjusted according to the needs, and airspeed calculation is recommended to use Semtech official LoRa calculation tool. The difference between T series and M series is only the airspeed configuration.  The M-Series configuration is as follows: The T-Series configuration is as follows:   Functional interpretation:

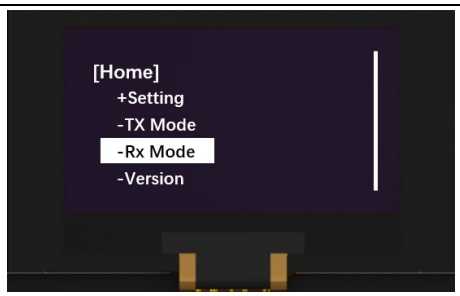
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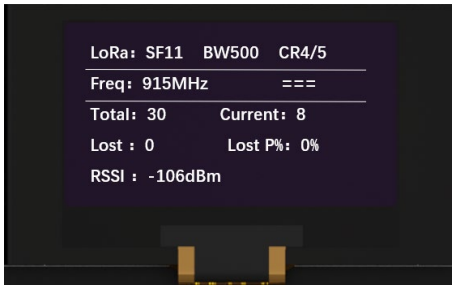
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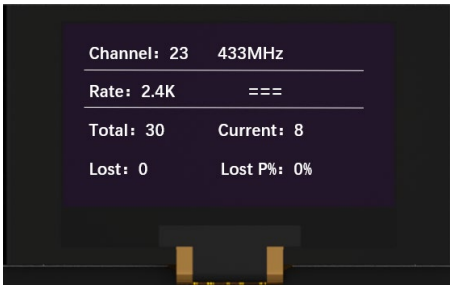
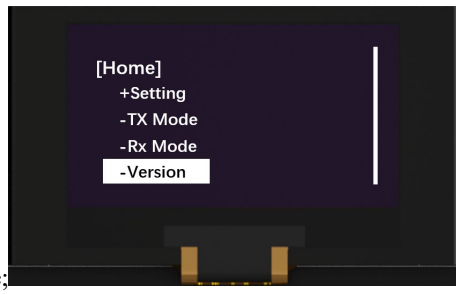
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<table>
<tr><th colspan="3">M Series</th><th colspan="3">T Series</th></tr>
<tr><td>LoRa SF</td><td>symbol rate</td><td rowspan="3">Airspeed needs to be calculated in conjunction with SF, BW, and CR.</td><td>Work Mode</td><td>operating mode</td><td>Select module operating mode</td></tr>
<tr><td>LoRa BW</td><td>channel bandwidth</td><td>Rate Mode</td><td>Rate Mode</td><td>Select Airspeed</td></tr>
<tr><td>LoRa CR</td><td>coding rate</td><td>Channel</td><td>operating channel</td><td>Select Channel</td></tr>
<tr><td>Frequency</td><td>operating frequency</td><td>Select Frequency</td><td>TX Power</td><td>firing power</td><td>Configuring Transmit Power</td></tr>
<tr><td>TX Power</td><td>firing power</td><td>Configuring Transmit Power</td><td>TX Count</td><td>Number of times sent</td><td>Configure the number of transmissions</td></tr>
<tr><td>TX Count</td><td>Number of times sent</td><td>Configure the number of transmissions</td><td>Back Color</td><td>background color</td><td>Reflects the background color of the screen</td></tr>
<tr><td>Back Color</td><td>background color</td><td>Reflects the background color of the screen</td><td></td><td></td><td></td></tr>
</table>
</td></tr>
<tr><td>4</td><td>Sending Test</td><td>When Tx Mode is entered, it will automatically start to send packets according to the parameters set by the user (default 10 bytes per packet).
Pressing “Confirm” in the page will exit and return to the higher page.
After sending, press “Down” key to re-send.

The M series TX transmitter interface is as follows: The T series TX transmitter interface is as follows:

</td></tr>
<tr><td>5</td><td>Reception test</td><td>When Rx Mode is entered, it automatically starts to wait for receiving wireless data according to the parameters set by the user.
Press the “Confirm” button in the page to exit and return to the previous page.
After sending, press “Down” button to start receiving again.</td></tr>
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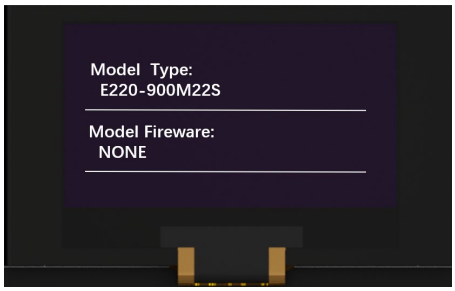
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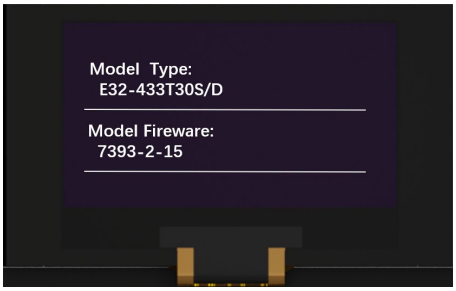
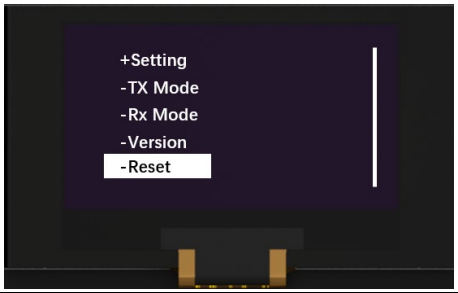
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<table>
<tr><td></td><td></td><td>

The M series RX receive screen is as follows: The T series RX receive screen is as follows:



</td></tr>
<tr><td>6</td><td>Version information</td><td>Displays basic information such as the module model number. NONE is displayed if there is no firmware inside the M series module;


The M-Series version information screen is as follows: The T-Series version information screen is as follows:



</td></tr>
<tr><td>7</td><td>Reset</td><td>Select Reset, OK to confirm, reset the configuration and return to the home page.



</td></tr>
</table>

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4 FAQ

4.1 Communication range is too short

- The communication distance will be affected when obstacle exists;
- Data lose rate will be affected by temperature, humidity and co-channel interference;
- The ground will absorb and reflect wireless radio wave, so the performance will be poor when testing near ground;
- Sea water has great ability in absorbing wireless radio wave, so performance will be poor when testing near the sea;
- The signal will be affected when the antenna is near metal object or put in a metal case;
- Power register was set incorrectly, air data rate is set as too high (the higher the air data rate, the shorter the distance);
- The power supply low voltage under room temperature is lower than 2.5V, the lower the voltage, the lower the transmitting power;
- Due to antenna quality or poor matching between antenna and module.

4.2 Module is easy to damage

- Please check the power supply source, ensure it is 2.0V~3.6V, voltage higher than 3.6V will damage the module;
- Please check the stability of power source, the voltage cannot fluctuate too much;
- Please make sure antistatic measure are taken when installing and using, high frequency devices have electrostatic susceptibility;
- Please ensure the humidity is within limited range, some parts are sensitive to humidity;
- Please avoid using modules under too high or too low temperature.

4.3 BER(Bit Error Rate) is high

- There are co-channel signal interference nearby, please be away from interference sources or modify frequency and channel to avoid interference;
- Poor power supply may cause messy code. Make sure that the power supply is reliable;
- The extension line and feeder quality are poor or too long, so the bit error rate is high.

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Revision history

Version	Revision date	Revised description	Maintainer
1.0	2024-9-2	Initial version	Lei
1.1	2024-10-24	Updated voltage description	Lei

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