E80-xxxMBL-01 Series Evaluation Kit
User Manual

Sub-G Hz /2.4G Hz LoRa Dual-Band Wireless Module Evaluation Kit

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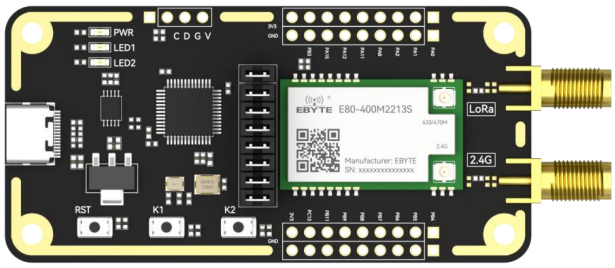
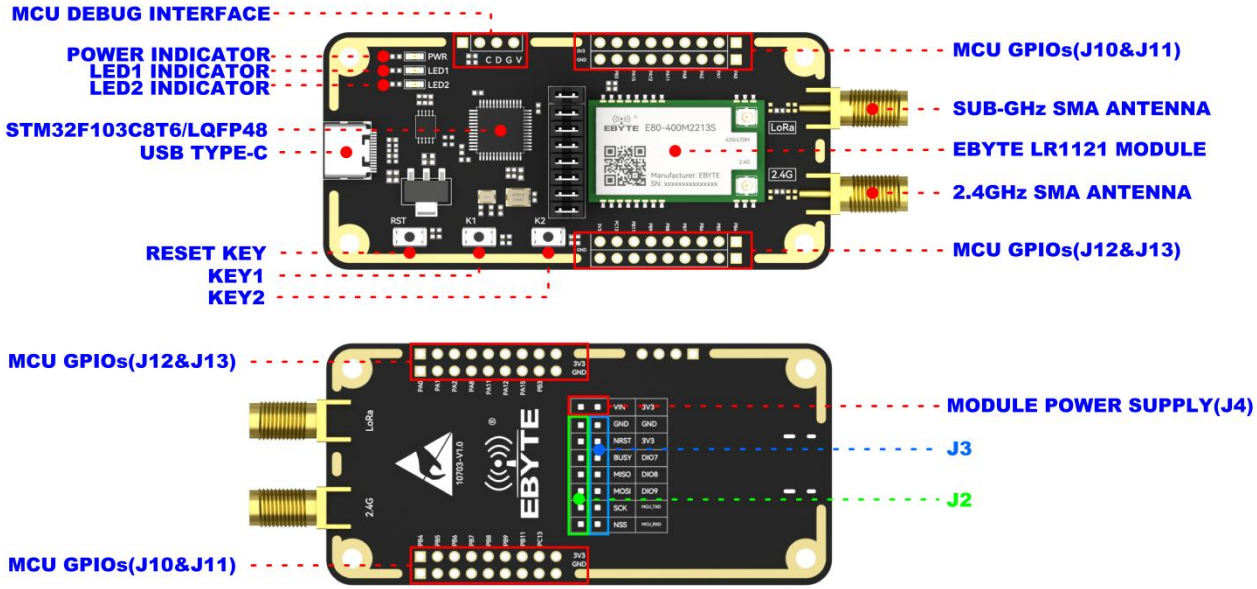
Chapter 1 Product Overview

1.1 Product Introduction



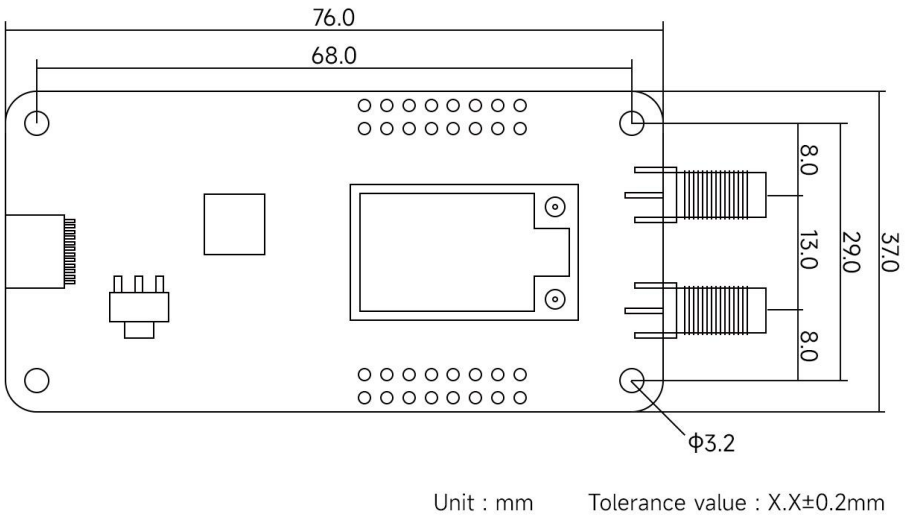


E80-xxx MBL -01 series evaluation kit is designed to help users quickly evaluate Ebyte's new generation LoRa dual-band wireless module. The board is equipped with an STMicroelectronics general-purpose MCU STM32F103C8T6, and most of the pins are led out to the pin headers on both sides . The kit provides simple wireless transceiver software application example source code to help customers quickly get started with wireless data communication test development . Users are requested to complete the test development in conjunction with the E80-xxxMBL-01 evaluation kit schematic and software demo provided by Ebyte . You can also refer to the Semtech official reference routine [1].

1.2 Support List

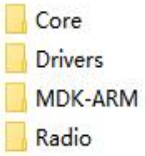
	RF Solution	Manufacturer	Module Model
1	LR1121	Semtech	E80-400M2213S
2	LR1121	Semtech	E80-900M2213S

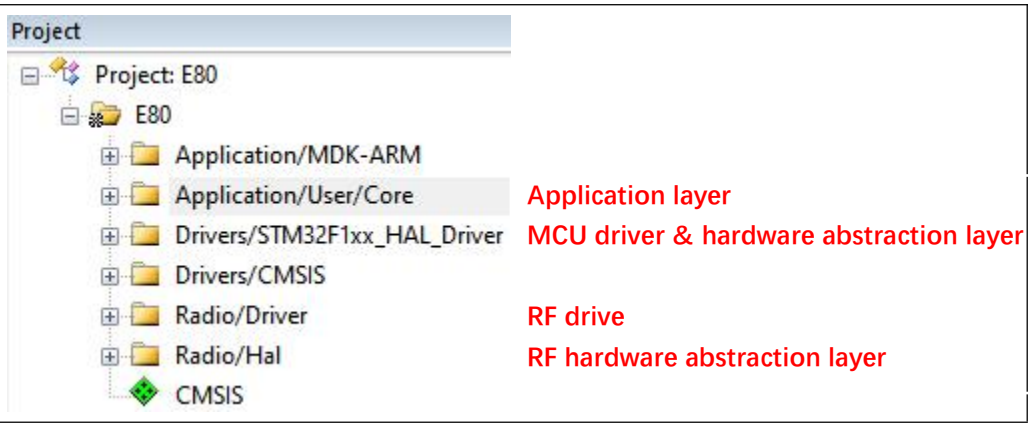
Chapter 2 Mechanical size



Chapter 3 Software Introduction

3.1 Software Demo Directory Structure

	Item	Description
1	File Directory	Download software demo from Ebyte official website and open it . The directory is shown in the figure below . Use the compiler software Keil V5.38 to open the ...\E80_DEMO\E80\MDK-ARM\E80.uvprojx project file. 
2	Catalog Description	The project directory is as follows:

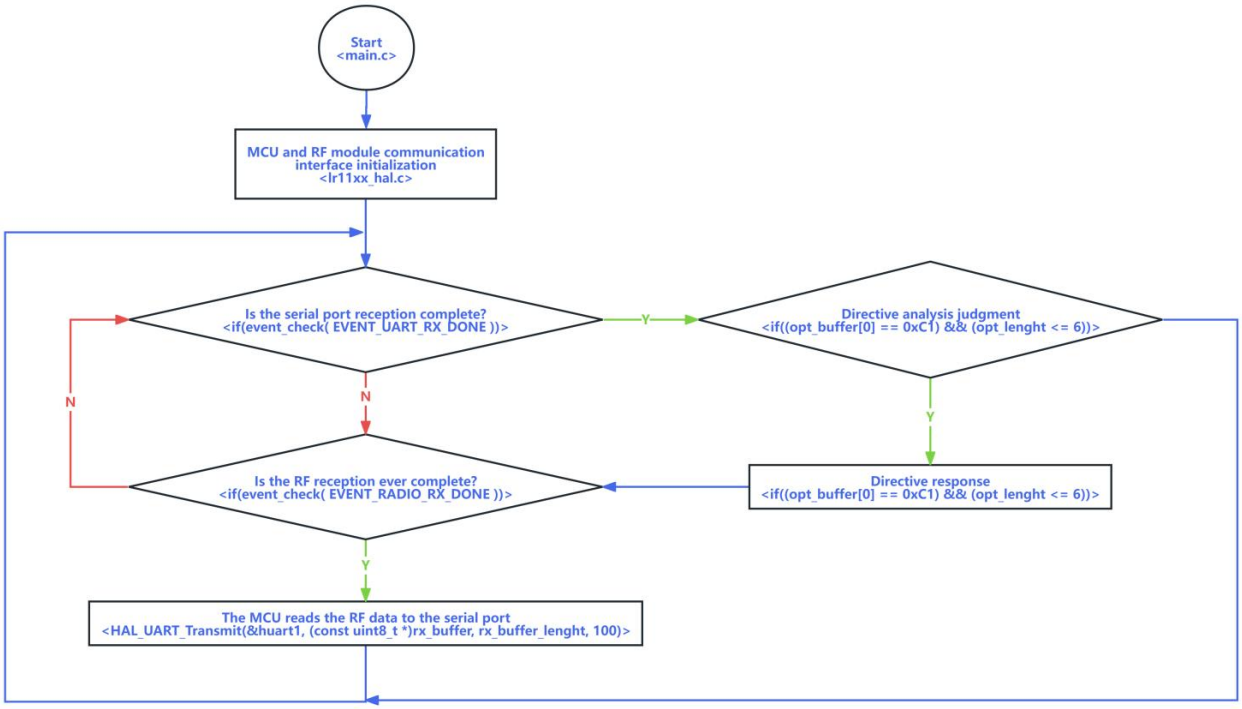
		

3.2 Demo function brief description

< main.c > is the main function entry , and the demonstration function flow is simplified as follows:

	Item	Description
1	Serial data to wireless transmission	After receiving the data, the serial port will automatically start wireless transparent transmission of the data. Of course, it contains some special command responses, which are mainly used for special tests and can be ignored by the user. After the transmission is completed, the user function will be automatically called back to handle the transmission logic by itself.
2	Wireless data reception	Generally, the module internal status flag is read to determine whether there is data. The underlying driver will copy the data and pass it to the user callback function, so as to handle the receiving logic by itself.

The software process is briefly described as follows:



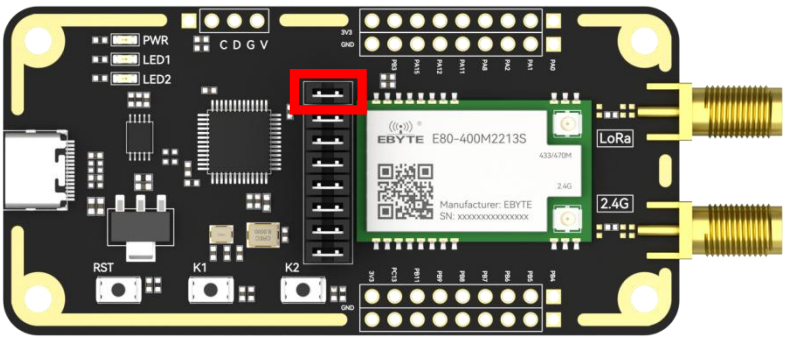
3.3 Transmission and reception timing

The wireless module has multiple operating states and can only perform specific functions in the corresponding state. From the simplest data transmission and reception, only the sending mode and receiving mode are considered.

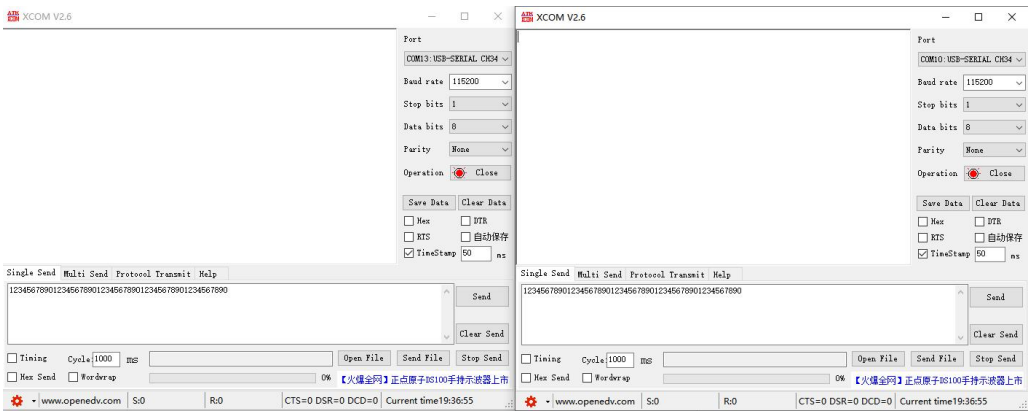
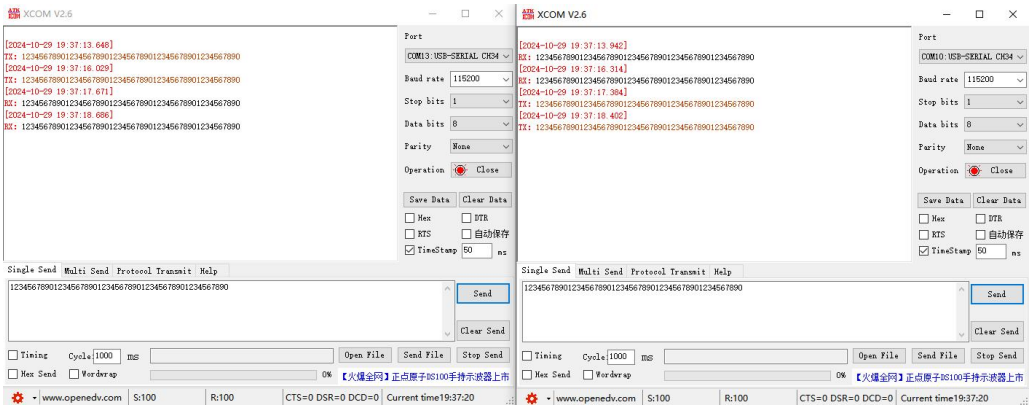
	Item	Description
1	Receiving Mode	By default, the receiving mode is automatically entered after initialization is completed. In fact, the receiving function is called during initialization to enter the receiving mode. Call the function radio_rx(void).
2	Send Mode	When calling the send function, the underlying driver actually switches the module to standby mode first. Usually, the modulation parameters are configured in this mode, such as frequency, power, frequency deviation, etc. After the parameters are configured correctly, it gradually enters some intermediate modes, turns on the internal FIFO, PA, external XTAL, etc., and the current consumption gradually increases. Finally, it switches to the send mode to trigger wireless data transmission . After completion, the module automatically enters the receive mode.

Chapter 4 Quick Demo

4.1 Signal line connection

	Item	Description
1	RF module power supply Jumper cap	
2	Assistance	USB cable, PC, etc.

4.2 Serial Port Assistant

	Item	Description
1	Device Manager View the serial port number	
2	Serial port software	
3	Serial communication example	
4	Serial data transparent transmission	Serial port data transparent transmission directly transmits the required content through XCOM
5	Serial port special instructions (HEX instruction)	Set frequency: C1 00 + 4 bytes frequency For example: C1 00 18 70 1A 80 (configuration frequency is 410MHz) Set power: C1 01 + 1 byte PA channel + 1 byte power parameter For example: C1 01 00 16 (High Power PA 22dbm) C1 01 01 0F (low power PA 15dbm)

		C1 01 02 0D (2.4G PA 13dbm) Single carrier: C1 02 00 (stop single carrier) C1 02 00 (send single carrier) RF low power configuration: C1 03 00: Exit sleep C1 03 01: Enter sleep mode (RF module 7.6uA) Send data: C1 C1 C1 (send data automatically) Configuration requirements: Configure frequency first and then configure power

Chapter 5 Frequently Asked Questions

5.1 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 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 has quality issues.

5.2 Modules are 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.

5.3 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.

Revision History

Version	Revision Date	Revision Notes	Maintainer
1.0	2024-10-29	Initial release	Ning
1.1	2025-01-02	Add the product size diagram	Ning

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