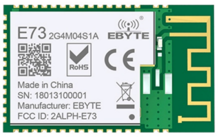

EBYTE E73-2G4M04S1A Wireless Modul User Manual

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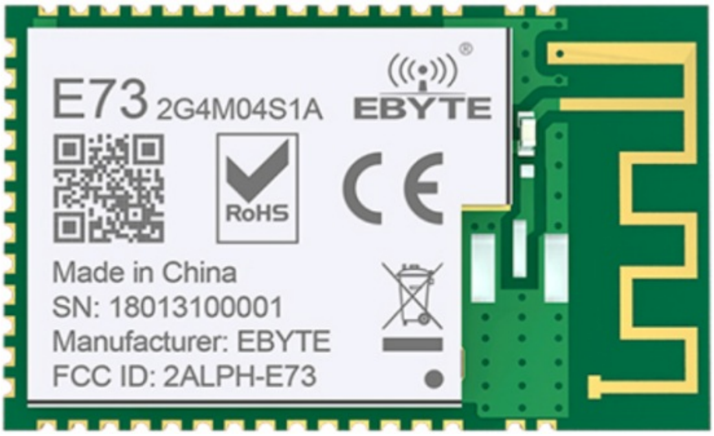

Contents

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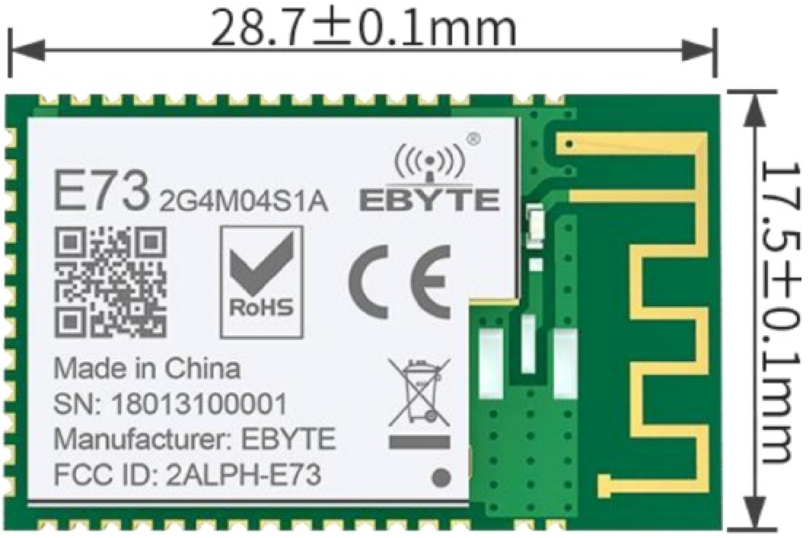
Overview

Introduction

E73-2G4M04S1A is a SMD Bluetooth wireless module based on NORDIC's nRF52810 RF chip. NRF52810 has high-performance ARM CORTEX-M4 core and Bluetooth 4.2 and Bluetooth 5 RF transceiver and protocol stack, and has abundant peripheral resources such as UART, 12C, SPI, ADC, DMA, PWM, etc. The module brings out almost all IO ports, which is convenient for users to conduct multi-faceted development, Please see pin definitions for details. The module has built-in PCB antenna and can connect other antennas through IPEX. The product has obtained FCC, CE, RoHS and other international authoritative certification reports, users do not need to worry about its performance. We use a 32MHz high precision low temperature drift active crystal to ensure its industrial properties and stability.



Because this module is a pure hardware SoC module, users need to program it before they can use it.

Features

- Communication distance tested is up to 100m;
- Maximum transmission power of 2.5mW, software multi-level adjustable;
- Support bluetooth 4.2 and bluetooth 5.0;
- Built-in 32.768 kHz clock crystal oscillator;
- Support for the global license-free ISM 2.4GHz band;
- Rich resources, 512KB FLASH, 64KB RAM;
- Support 2.0V~3.6V power supply, more than 3.3V power supply can guarantee the best performance:
- Industrial grade standard design, support -40~85 °C for a long time;
- Support onboard PCB antenna and IPEX interface, users can choose according to their needs;

Application

- Smart home and industrial sensors;
- Security system and positioning system;
- Wireless remote control, UAV;
- Wireless Game Remote Controller;
- Health care products;
- Wireless voice, wireless headset;
- Automotive industry applications.

Specification and parameter

Limit parameter

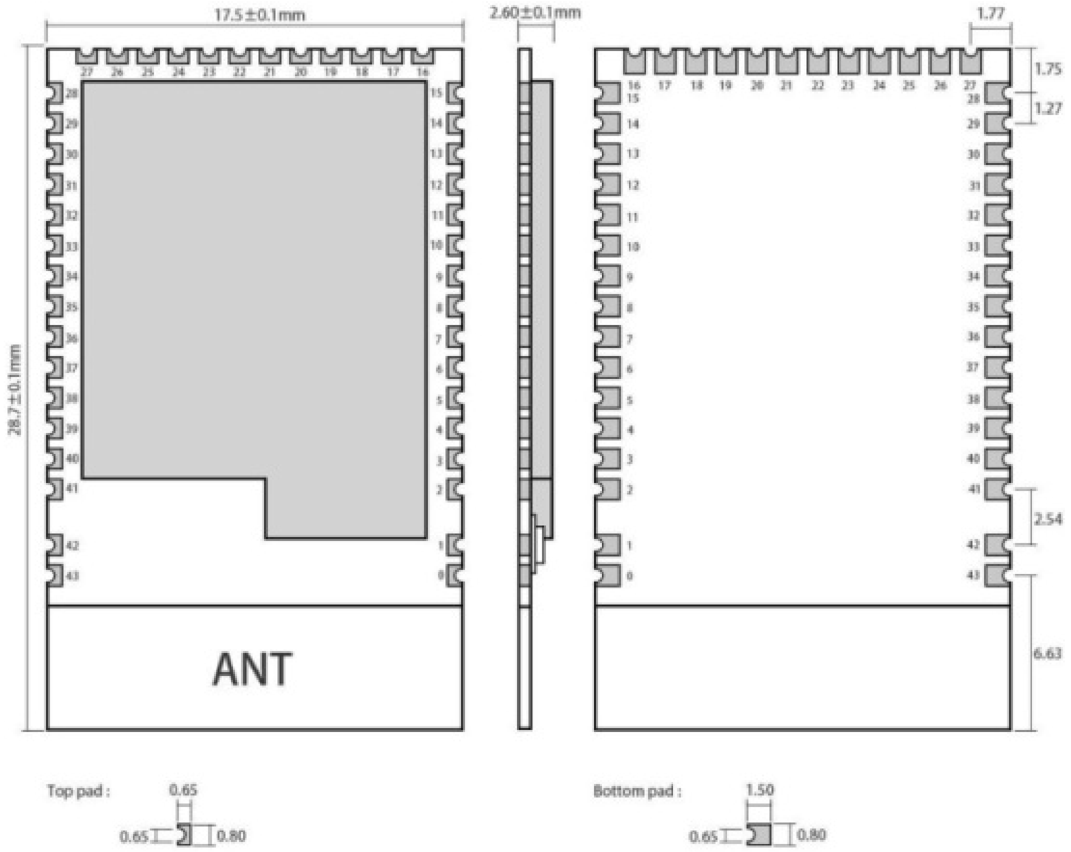
Main parameter	Performance		Remark
	Min.	**Max.**	
Power supply (V	0	3.6	Voltage over 3.6V will cause permanent damage to module
Blocking power (dBm	–	10	Chances of burn is slim when modules are used in short distance
Operating temperature (℃	-40	85	–

Operating parameter

Main parameter		Performance			Remark
		Min.	**Typ.**	**Max.**	
Operating voltage V		1.8	3.3	3.6	≥3.3 V ensures output power
Communication level V		–	3.0	–	For 5V TTL, it may be at risk of burning own
Operating temperature ℃		-40	–	85	Industrial design
Operating frequency (MHz		2379	2430	2496	Support ISM band
Power consumption	TX current (mA	–	18	–	Instant power consumption
	RX current (mA	–	13	–	–
	Sleep current μA	–	2	–	Software is shut down
Max Tx power dBm		3.8	4	4.3	–
Receiving sensitivity (dBm		-94	-95	-96	Air data rate is 1Mbps

Main parameter	Description	Remark
Distance for reference	100m	Test condition : clear and open area, antenna gain: 5dBi antenna height: 2.5m air data rate: 1Mbps
Crystal frequency	24MHz / 32.768KHz	–
Support protocol	BLE 4.2	–
Package	SMD	–
Connector	1.27mm	–
IC	nRF52810-QFAABB/QFN48	–
FLASH	192KB	–
RAM	24KB	–
kernel	ARM CORTEX-M4	–
Size	17.5 * 28.7 mm	–
Antenna	Onboard PCB / IPEX	Equivalent impedance is about 50 ohms

Size and pin definition



Pad quantity: 44
Unit: mm

No.	Pin item	Pin direction	Application

0	GND	Input	Ground electrode, connect to reference ground of power
1	GND	Input	Ground electrode, connect to reference ground of power
2	GND	Input	Ground electrode, connect to reference ground of power
3	DEC2	–	1.3 V Digital power supply decoupling controller
4	DEC3	–	Power supply decoupling
5	P0.25	Input/ Output	MCU GPIO
6	P0.26	Input/ Output	MCU GPIO
7	P0.27	Input/ Output	MCU GPIO
8	P0.28	Input/ Output	MCU GPIO
9	P0.29	Input/ Output	MCU GPIO
10	P0.30	Input/ Output	MCU GPIO
11	P0.31	Input/ Output	MCU GPIO
12	DEC4	–	1.3 V Digital power supply decoupling controller Input from DC/DC regulator Output from 1.3 V LDO
13	DCC	–	DC/DC DC regulator output
14	DEC1	–	0.9 V Digital power supply decoupling controller
15	GND	Input	MCU GPIO
16	VCC	Input	Power supply 1.8 ~ 3.6V DC **(Note:** The voltage higher 3.6V is forbidden
17	P0.02	Input/ Output	MCU GPIO
18	P0.03	Input/ Output	MCU GPIO
19	P0.04	Input/ Output	MCU GPIO
20	P0.05	Input/ Output	MCU GPIO
21	P0.06	Input/ Output	MCU GPIO
22	P0.07	Input/ Output	MCU GPIO
23	P0.08	Input/ Output	MCU GPIO
24	P0.09	Input/ Output	MCU GPIO
25	P0.10	Input/ Output	MCU GPIO
26	P0.11	Input/ Output	MCU GPIO

27	P0.12	Input/ Output	MCU GPIO
28	P0.13	Input/ Output	MCU GPIO
29	P0.14	Input/ Output	MCU GPIO
30	P0.15	Input/ Output	MCU GPIO
31	P0.16	Input/ Output	MCU GPIO
32	P0.17	Input/ Output	MCU GPIO
33	P0.18	Input/ Output	MCU GPIO
34	P0.19	Input/ Output	MCU GPIO
35	P0.20	Input/ Output	MCU GPIO
36	P0.21	Input/ Output/RST	MCU GPIO
37	SWDCLK	Input	Serial Line Debugging / Clock Input Debugging and Programming
38	SWDIO	Input	Serial line debugging and programming debugging
39	P0.22	Input/ Output	MCU GPIO
40	P0.23	Input/ Output	MCU GPIO
41	P0.24	Input/ Output	MCU GPIO
42	GND	Input	Ground electrode, connect to power reference ground
43	GND	Input	Ground electrode, connect to power reference ground
★ For more details, please refer to nRF528XXDatasheet in NORDIC ★			

Basic Operation

Hardware Design

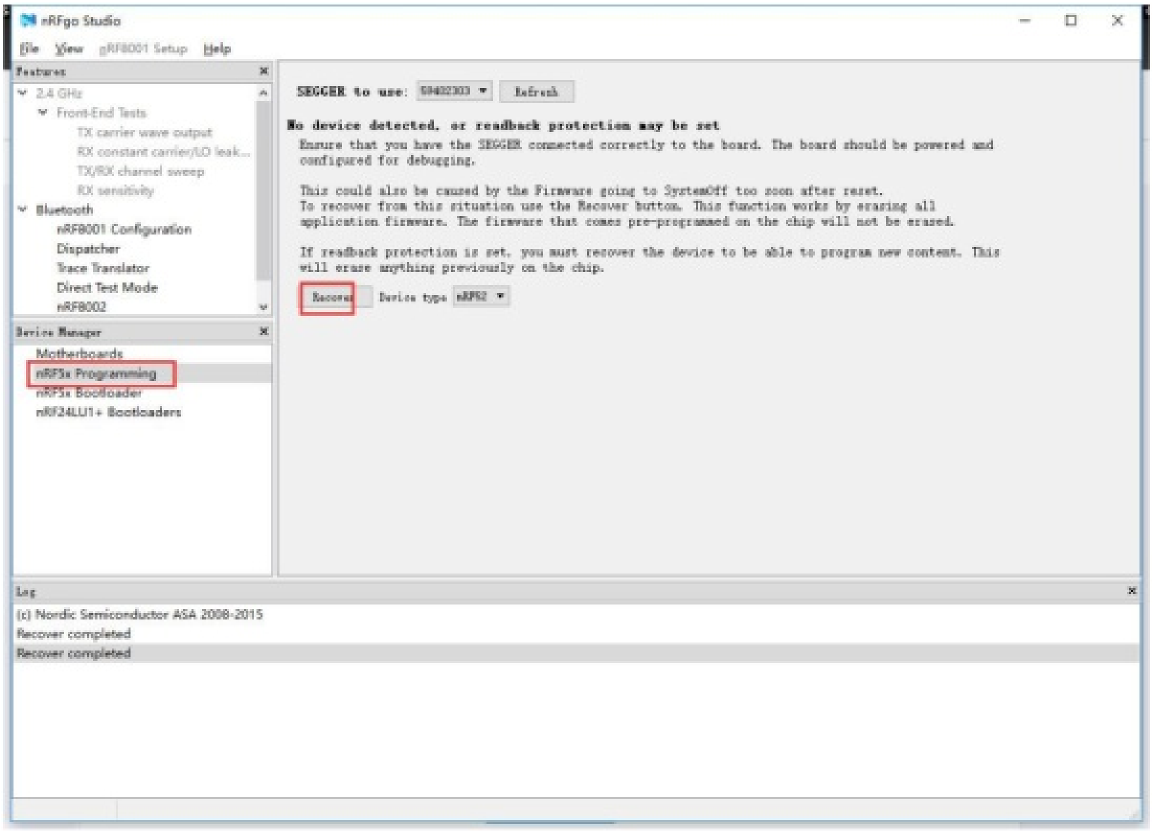
- It is recommended to use DC stabilized power supply to supply power to the module. The power supply ripple coefficient is as small as possible, and the module needs to be reliably grounded.
- Please pay attention to the correct connection of the positive and negative poles of the power supply. If the reverse connection is connected, the module may be permanently damaged.
- Please check the power supply to ensure that between the recommended supply voltage, if exceeding the maximum, the module will be permanently damaged.
- Please check the stability of the power supply, the voltage can not be significantly frequent.
- When designing the power supply circuit for the module, it is often recommended to reserve more than 30% of the margin, and the whole machine is beneficial for long-term stable operation.
- The module should be as far away as possible from the power supply, transformers, high-frequency wiring and other parts with large electromagnetic interference.
- High-frequency digital traces, high-frequency analog traces, and power traces must be avoided under the

module. If it is necessary to pass through the module, assume that the module is soldered to the Top Layer, and the copper is spread on the Top Layer of the module contact part(All copper-covered and well grounded), and must be close to the digital part of the module and routed in the Bottom Layer.

- Assuming the module is soldered or placed in the Top Layer, it is also wrong to randomly route the Bottom
- Layer or other layers, which will affect the module's spurs and receiving sensitivity to varying degrees.
- Assume that there are traces with large electromagnetic interference around the module (high-frequency digital, high-frequency analog, power trace), which will greatly affect the performance of the module. It is recommended to stay away from the module according to the strength of the interference. If possible, you can do it properly. Isolation and shielding
- If the communication line uses a 5V level, a lk-5.1k resistor must be connected in series (not recommended, there is still a risk of damage).
- Try to stay away from some physical layers and also have a 2.4GHz TTL protocol, for example: USB3.0
- The antenna mounting structure has a great influence on the performance of the module. It is necessary to ensure that the antenna is exposed, preferably vertically upward. When the module is mounted inside the case, use a good antenna extension cable to extend the antenna to the outside of the case.
- The antenna must not be installed inside the metal case, which will greatly reduce the transmission distance.

Software Programming

- The core of this module is nRF52810, which is completely equivalent to nRF52810. Users can operate according to the nRF52810 chip manual (see nRF52810 manual for details).
- Because the officially provided programming tool nRFgo Studio has poor compatibility, it is recommended to use J-LINK-V8 or above for program burning.
- About the issue that the old model can be programmed, while the new model can't be programmed, It is because the new model being added with read/write protection during production. It needs to be properly connected to the line and then use the official nRFgo Studio for Recover (Jlink supports the official nRFgo). Studio), as shown below:



SEGGER to use: 59402303

No device detected, or readback protection may be set

Ensure that you have the SEGGER connected correctly to the board. The board should be powered and configured for debugging.

This could also be caused by the Firmware going to SystemOff too soon after reset.
To recover from this situation use the Recover button. This function works by erasing all application firmware. The firmware that comes pre-programmed on the chip will not be erased.

If readback protection is set, you must recover the device to be able to program new content. This will erase anything previously on the chip.

Device type nRF52

```
(c) Nordic Semiconductor ASA 2008-2015
Recover completed
Recover completed
```

FAQ

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).
- When the power supply at room temperature is lower than the recommended low voltage, the lower the voltage is, the lower the transmitting power is.
- Due to antenna quality or poor matching between antenna and module.

Module is easy to damage

- Please check the power supply and ensure it is within the recommended range. Voltage higher than the peak will lead to a permanent damage to the module.
- Please check the stability of power supply and ensure the voltage not to fluctuate too much.
- Please make sure anti-static measures are taken when installing and using, high frequency devices have electrostatic susceptibility.
- Please ensure the humidity is within limited range for some parts are sensitive to humidity.

- Please avoid using modules under too high or too low temperature.

High bit error rate

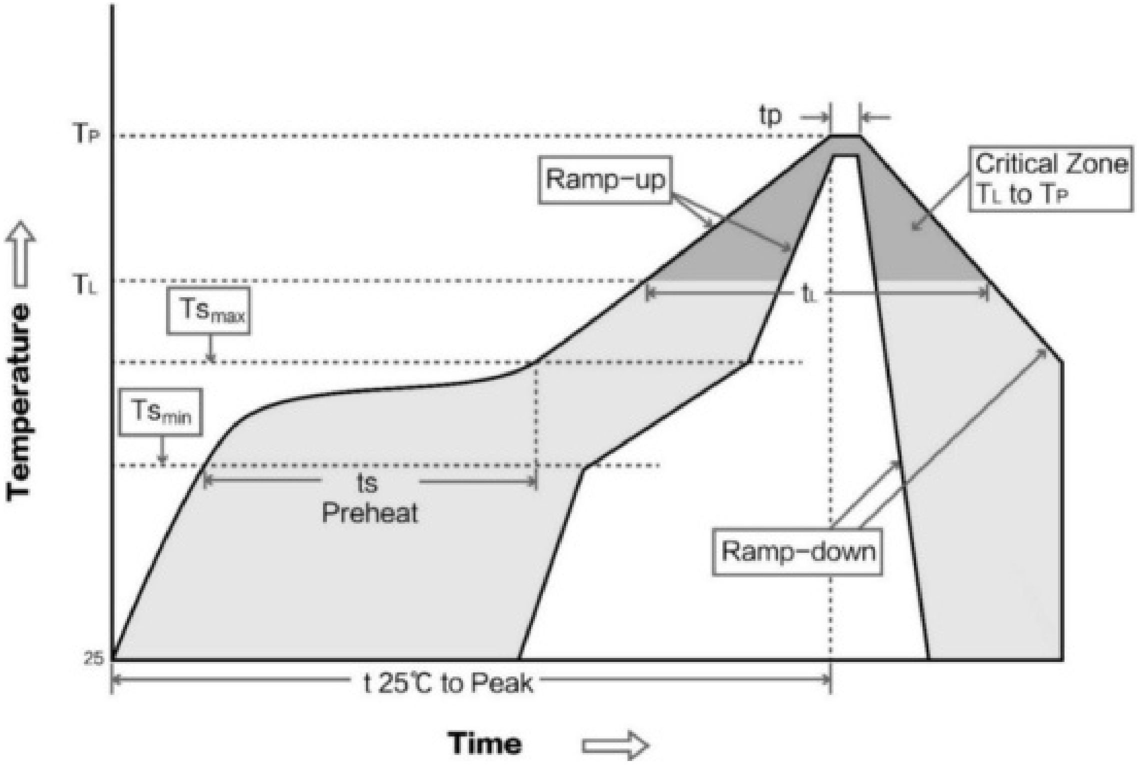
- There are co-channel signal interference nearby, keep away from interference sources or modify frequency, channel to avoid interference.
- The clock waveform on the SPI is not standard. Check whether there is interference on the SPI line. The SPI bus line should not be too long.
- Unsatisfactory power supply may also cause garbled characters, and ensure the reliability of the power supply. If the extension cable or feeder is of poor quality or too long, the bit error rate will be high.

Welding operation guidance

Reflow Soldering Temperature

Profile Feature	Curve feature	Sn-Pb Assembly	Pb-Free Assembly
Solder Paste	Solder paste	Sn63/Pb37	Sn96.5/Ag3/Cu0.5
Preheat Temperature min Tsmin	Minimum preheating temperature	100℃	150℃
Preheat temperature max (Tsmax)	Maximum preheating temperature	150℃	200℃
Preheat Time (Tsmin to Tsmax)(ts)	Preheating time	60-120 sec	60-120 sec
Average ramp-up rate(Tsmax to Tp)	Average rising rate	3℃/second max	3℃/second max
Liquidous Temperature (TL)	Liquid phase temperature	183℃	217℃
Time tL Maintained Above TL	Time above liquidus	60-90 sec	30-90 sec
Peak temperature (Tp	Peak temperature	220-235℃	230-250℃
Average ramp-down rate (Tp to Tsmax	Average descent rate	6℃/second max	6℃/second max
Time 25℃ to peak temperature	Time of 25 ° C to peak temperature	6 minutes max	8 minutes max

Reflow Soldering Curve



Related Model

Model	Chip	Frequency Hz	Transmit power dBm	Testdistance km	Air Data rate	Packaging	Size mm	Antenna Type
E73-2G4M08S1C	nRF52840	2.4G	8	0.1	BLE 4.2/5.0	SMD	13.0 *18.0	PCB/IPX
E73-2G4M04S1A	nRF52810	2.4G	4	0.1	BLE 4.2	PCB/IPEX	17.5 *28.7	PCB/IPX
E73-2G4M04S1D	nRF51822	2.4G	4	0.1	BLE 4.2	PCB/IPX	17.5 *28.7	PCB/IPX
E73-2G4M04S1B	nRF52832	2.4G	4	0.1	BLE 4.2/5.0	PCB/IPX	17.5 *28.7	PCB/IPX

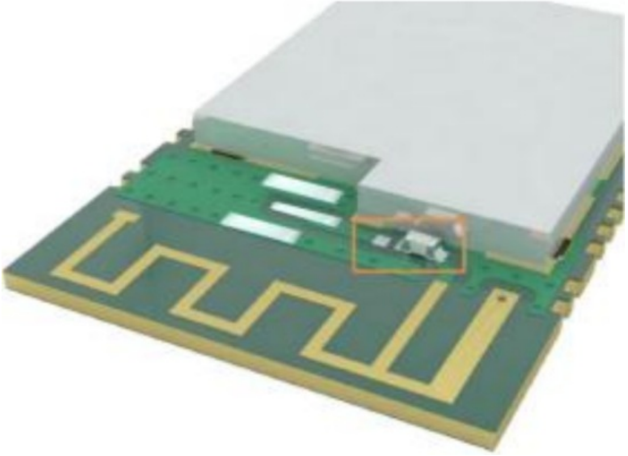
Antenna Type

Antenna recommendation

The antenna plays an important role in the communication process. The inferior antenna often has a great impact on the communication system. Therefore, we recommend some antennas that support our wireless modules and have excellent performance and reasonable price.

Product	Type	Frequency	Interface	Gain	Size	Feeder	Features
		Hz		dBi			
TX2400-NP-5010	Flexible antenna	2.4G	IPEX	2	50*10 mm	–	Built-in flexible FPC soft antenna
TX2400-XP-150	Sucker antenna	2.4G	SMA-J	3.5	15cm	150cm	High Gain
TX2400-JK-20	Rubber antenna	2.4G	SMA-J	3	200mm	–	Flexible, Omnidirectional
TX2400-JK-11	Rubber antenna	2.4G	SMA-J	2.5	110mm	–	Flexible, Omnidirectional
TX2400-JZ-3	Rubber antenna	2.4G	SMA-J	2	30mm	–	Ultra short straight Omnidirectional

Antenna



PCB onboard antenna

Revision history

Version	Date	Description	Issued by
1.00	2018/8/30	Original version	huaa
1.10	2018/9/30	Model No. split	huaa
1.30	2021/1/13	PCN	Lenson
1.8	2025/01/13	Modify the pin sequence number description	Bin

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Address: B2 Mould Industrial Park, 199# Xiqu Ave, High tech Zone, Chengdu, Sichuan

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Documents / Resources

 E73-2G4M04S1A User Manual nRF52810 2.4GHz BLE4.2 SMD Wireless Module Chengdu Ebyte Electronic Technology Co.,Ltd.	EBYTE EBYTE E73-2G4M04S1A Wireless Modul [pdf] User Manual E73-2G4M04S1A, EBYTE E73-2G4M04S1A Wireless Modul

References

- User Manual