BLE Module RF-BM-ND04

Hardware Specification

SHENZHEN RF STAR TECHNOLOGY CO.,LTD.

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Overview

The Bluetooth module, which is offered by Shenzhen RF-star Technology Co.,Ltd., is based on low power Bluetooth RF technology (BLE) , and can be widely used in applications of short distance wireless communication, with the features of low power consumption, small size, long transmission distance, strong anti-jamming capability, and etc. The module is built in with high-performance inverted F antenna.

The module is helpful to develop consumer electronics products and smart phone peripheral products, which are based on Bluetooth 4.0 (or BLE). It will provide a quick BLE solution to the communication between customers' products and smart mobile devices.

● Version History

Version Number	Release Date	Remarks
V1.0	2017/01/10	✓ First version

● Module Parameters

·Working voltage: 1.8V to 3.6V (3.3V recommended)

·Working frequency: 2400～2483.5MHz

·Max transmit power: +4 dBm（normal output at 0 dBm）

·Receiving sensitivity： -96 dBm

·Frequency error： ±20 kHz

·Working temperature： -20℃ ～ +70℃

·Storage temperature： -40℃ ～ +85℃

● Module Pin Diagram and Definition

➢ RF-BM-ND04

Figure 1 shows the pin assignments of the module, and table shows the pin definition.

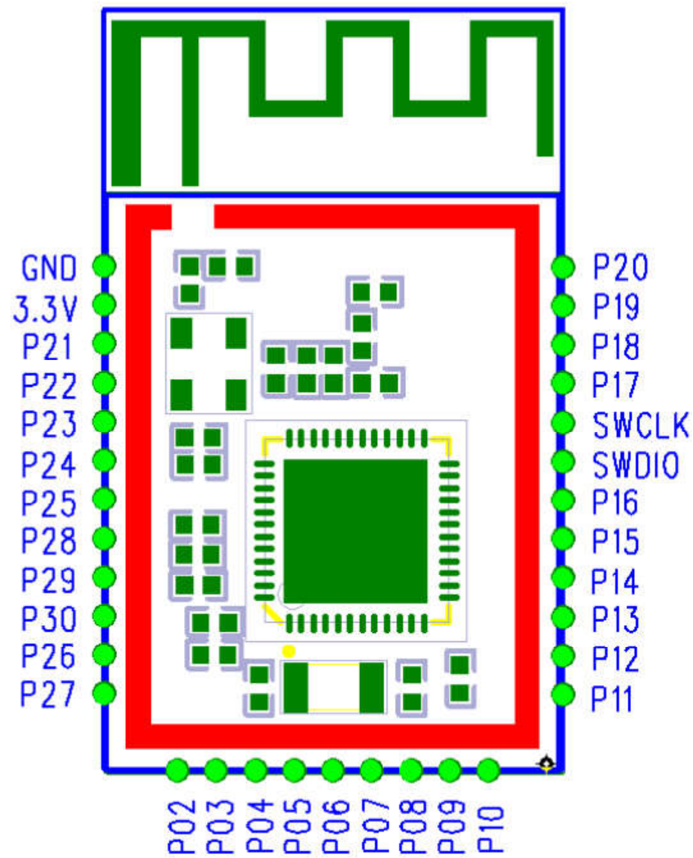

Figure 1 Pin Assignments

Pin No.	Module Pin Name	I/O	Description
Pin1	GND	Ground	Ground
Pin2	VCC	-	Power supply 1.8V~3.8V
Pin3	P21	I/O	
Pin4	P22	I/O	
Pin5	P23	I/O	
Pin6	P24	I/O	
Pin7	P25	I/O	
Pin8	P28	I/O	
Pin9	P29	I/O	
Pin10	P30	I/O	
Pin11	P26	I/O	
Pin12	P27	I/O	
Pin13	P02	I/O	
Pin14	P03	I/O	
Pin15	P04	I/O	
Pin16	P05	I/O	
Pin17	P06	I/O	
Pin18	P07	I/O	
Pin19	P08	I/O	
Pin20	P09	I/O	
Pin21	P10	I/O	
Pin22	P11	I/O	
Pin23	P12	I/O	
Pin24	P13	I/O	
Pin25	P14	I/O	
Pin26	P15	I/O	
Pin27	P16	I/O	
Pin28	SWDIO	I/O	Debug Data Pin
Pin29	SWCLK	I/O	Debug Timer Pin
Pin30	P17	I/O	
Pin31	P18	I/O	
Pin32	P19	I/O	
Pin33	P20	I/O	

● Mechanical Drawing and PCB Packaging Size

Figure 2 shows the mechanic drawing of the module and the PCB packaging size. Module thickness is 0.9±0.2 mm.

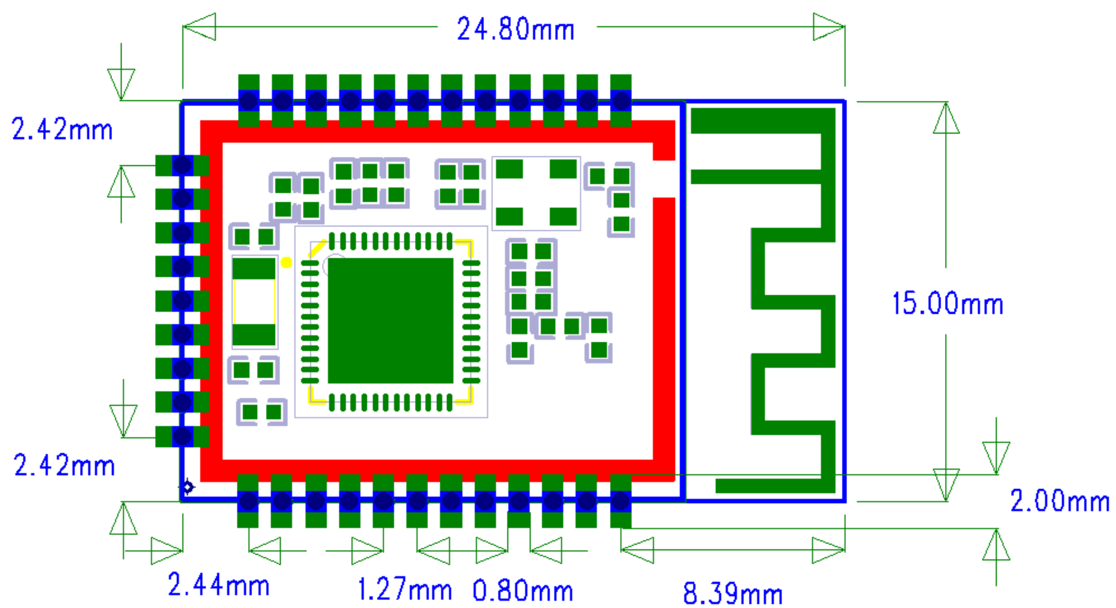

Figure 2　RF-BM-ND04 Mechanical Drawing and Packaging Size

● Power Consumption

Testing environment：TA = +25°C,　VBAT = 3. 3 V。

Parameters		Testing conditions	Mini value	Type	Max value	Unit
MCU Working	TX	0dbm		17		mA
	RX	High gain mode		9		
MCU Stand-by	TX					
	RX					
MCU LPDS	TX					
	RX					
MCU Sleeping	TX					
	RX			0.7		μA
Calibrated Current Peak Value	TX	Voltage =3. 3V， Powe r=4 dBm		7.5		mA
	RX	Voltage =3. 3V， Power =4 dBm		5.4		

● Layout Proposal（Antenna Location and Routing）

The Inverted-F antenna is built in the PCB for free space electromagnetic radiation. Position of the antenna and the scope of the antenna layout is the key to increase data rate and transmission range.

Here is the suggestion about the layout of antenna and routing:

1. Place the antenna at the edge of the PCB board or on the corner.
2. Ensure that each layer under the antenna is without wire or copper foil.
3. Better hollow out the yellow boxed area in figure3, to ensure S11 affects little.

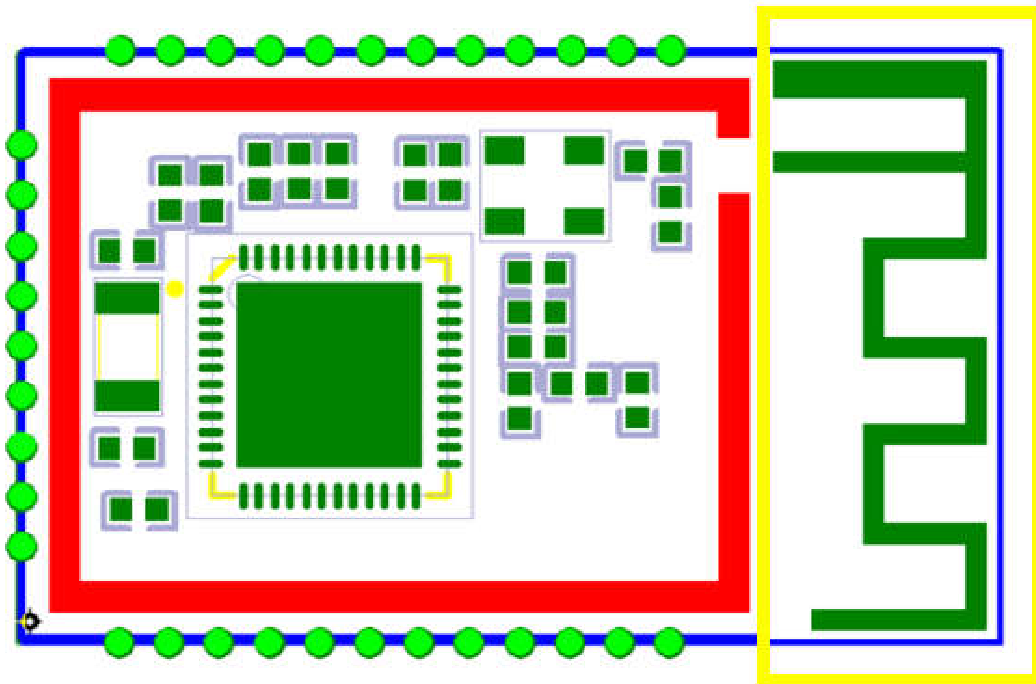

Figure 4

● Recommended Operating Conditions

The good performance will not be guaranteed for operations under the conditions beyond the limits of the parameter values in the following chart for a long time. And such operations for a long time will more or less affect the long-term reliability of the module.

Note ：
1) Operating temperature is restricted by the frequency change of the crystal；
2) To ensure the wireless RF performance, the power supply ripple must be less than ±300mV

Identification	Conditions	Min. Value	Typical Value	Max. Value	Unit
Power supply and IO	Battery mode	1.8	3.3	3.8	V
Operation Temperature	/	-20	25	70	℃
Environment Temperature Swing		-20		20	℃/min.

● Reflow Soldering Conditions

1. Heating method: Conventional Convection or IR/convection；
2. Maximum 2 times of reflow soldering are allowed, based on the following reflow soldering profile (see figure 5)；
3 Temperature profile: Reflow soldering shall be done following the temperature profile below (see figure 5)；
4. Peak temperature: 245°C.

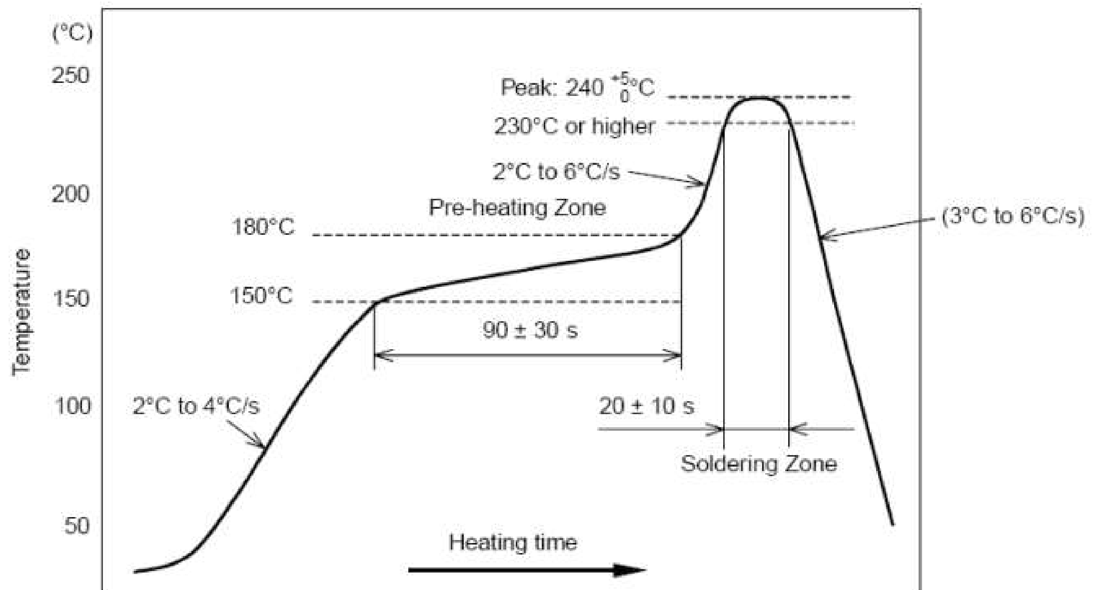

Figure 5. Temperature Curve of Soldering Heat Resistance (at Soldering Point)

● Cautions of Electrostatic Discharge

The module will be damaged by electrostatic discharge. We recommend that all the modules should be treated with the following 3 precautions:

1. Must follow the anti-static measurements and cannot carry the module by bare hand.
2. Modules must be stored in the area where there is electrostatic prevention.
3. Anti-static circuit where there is high voltage input or high frequency input should be considered during the product design.

Static electricity may cause from minor performance degradation to the failure of the whole device. Considering the fact that even tiny changes of parameters may lead to the result that the whole device will fail to comply with certifications, the module is easier to be damaged by static electricity.

● Contact Us

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