



RF-BM-ND05 and RF-BM-ND05I nRF52840 Multi-Protocol BLE5.3 ZigBee Thread Module

Version 1.1

Shenzhen RF-star Technology Co., Ltd.

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1 Device Overview

1.1 Description

RF-BM-ND05 and RF-BM-ND05I are RF modules based on Nordic multiprotocol SoC nRF52840 with a best-in-class 32-bit ARM® Cortex®-M4 processor. The module integrates a 32.768 kHz and a 32 MHz crystal, a power filter, an antenna matching, and a high-performance RF out. The module supports BLE stack v5.3, Bluetooth 5.0 low energy, Bluetooth mesh, Thread, ZigBee, IEEE 802.15.4-2006 and 2.4 GHz proprietary. It also has a range of analog and digital interfaces such as NFC-A, ADC, high-speed 32 MHz SPI, UART, SPI, I²C, PWM, I²S, PPI and PDM. It features high-performance digital interfaces, robust connection distance, and rigid reliability. 1.27-mm pitch stamp stick package for easy assembling and cost-effective PCB design. RF-BM-ND05 is pin-to-pin compatible with RF-BM-ND05I.

1.2 Key Features

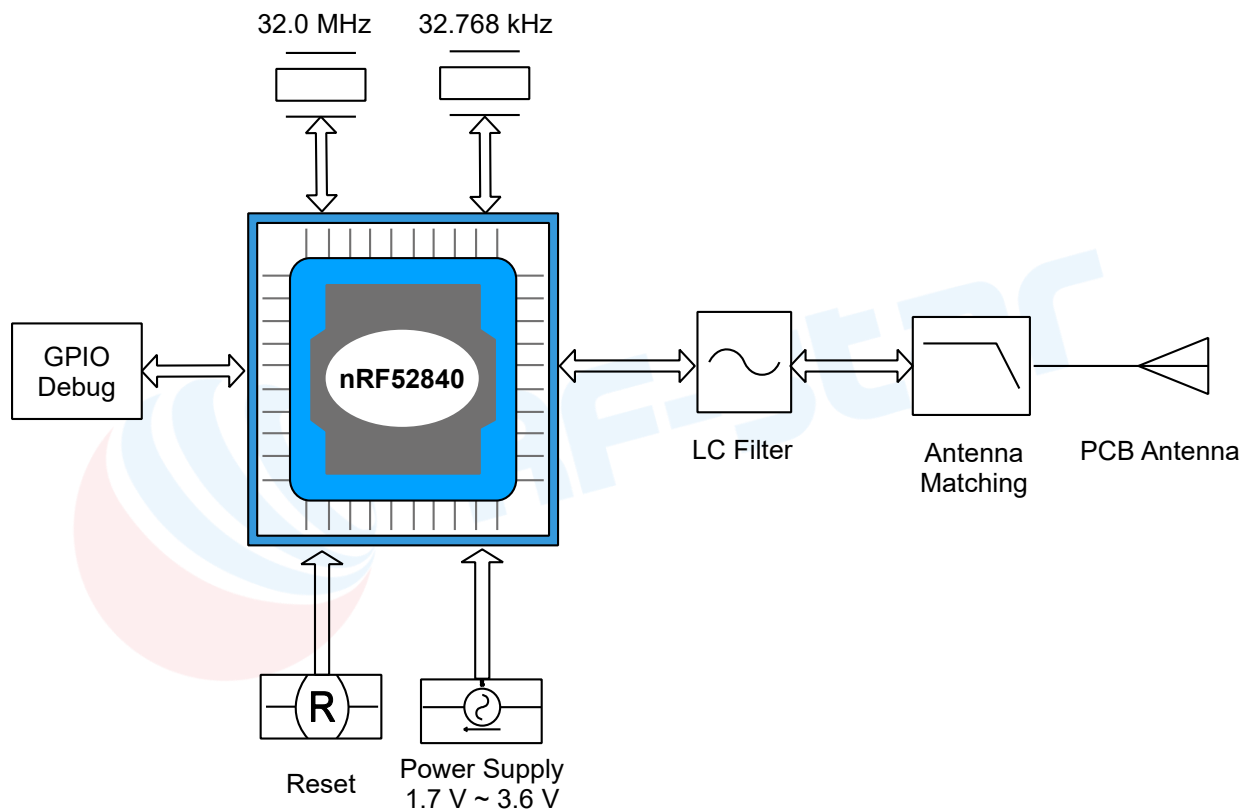
- RF features
 - Bluetooth 5.3 low energy
 - Bluetooth mesh
 - Thread
 - ZigBee
 - IEEE 802.15.4-2006
 - 2.4 GHz proprietary
 - Nordic SoftDevice ready with support for concurrent multiprotocol
- TX power: -20 dBm ~ +8 dBm
- On-air compatible with nRF52, nRF51, nRF24L and nRF24AP series
- ARM® Cortex®-M4 32-bit processor with FPU, 64 MHz
- Supply voltage range: 1.7 V ~ 3.6 V
- Memory
 - Flash: 1 MB
 - RAM: 256 KB
- Advanced peripherals
 - QSPI 32 MHz interface
 - High-speed 32 MHz SPI
 - NFC-A
 - Programmable Peripheral interconnect (PPI)
 - 29 GPIOs
- 12-bit, 200 ksps ADC, 8 configurable channels with programmable gain
- 64 level comparator
- 15 level low-power comparator with wake-up from System OFF mode
- 5x 32-bit timer with counter mode
- Temperature sensor
- 4 x 4-channel PWM
- I2S (PDM)
- 4 x SPI master / 3 x SPI slave with EasyDMA
- 2 x I2C compatible two-wire master/slave
- 2 x UART (CTS/RTS)
- Quadrature decoder (QDEC)
- 3x real-time counter (RTC)
- Secure enablers
 - ARM® TrustZone® Cryptocell 310 security subsystem
 - Secure boot ready
 - Secure erase
- Quadrature decoder (QDEC)
- Certificates of RF-BM-ND05: FCC, CE, IC, RoHS, SRRC

1.3 Applications

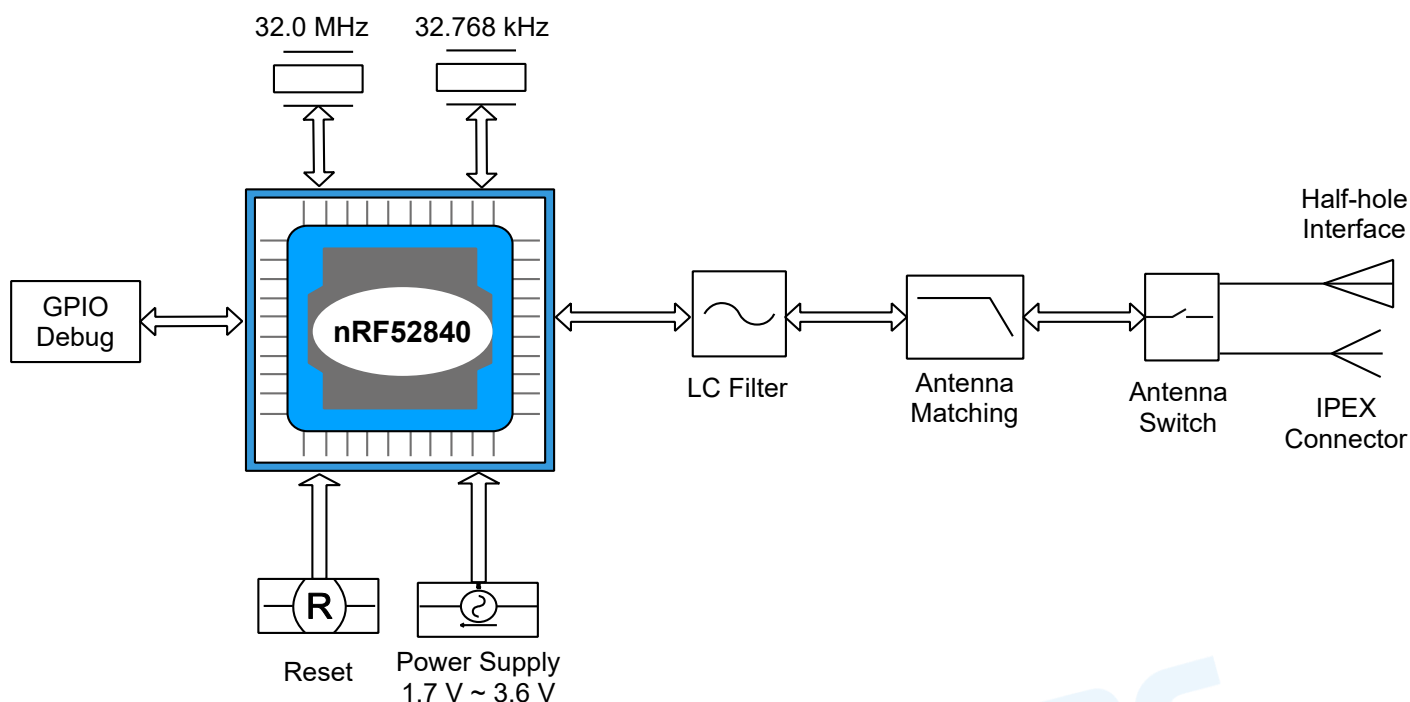
- Internet of Things (IoT)
- Internet Gateway

- Cloud Connectivity
- Industrial Control
- Home Automation
- Smart Plug and Metering
- Wireless Audio
- Access Control
- IP Network Sensor Nodes
- Security Systems
- Wearables
- Building automation
- Retail
- Sensor networks
- Medical devices
- Remote controls

1.4 Functional Block Diagram



RF-BM-ND05



RF-BM-ND05I

Figure 1. Functional Block Diagram of RF-BM-ND05/ND05I

1.5 Part Number Conventions

The part numbers are of the form of RF-BM-ND05/ND05I where the fields are defined as follows:

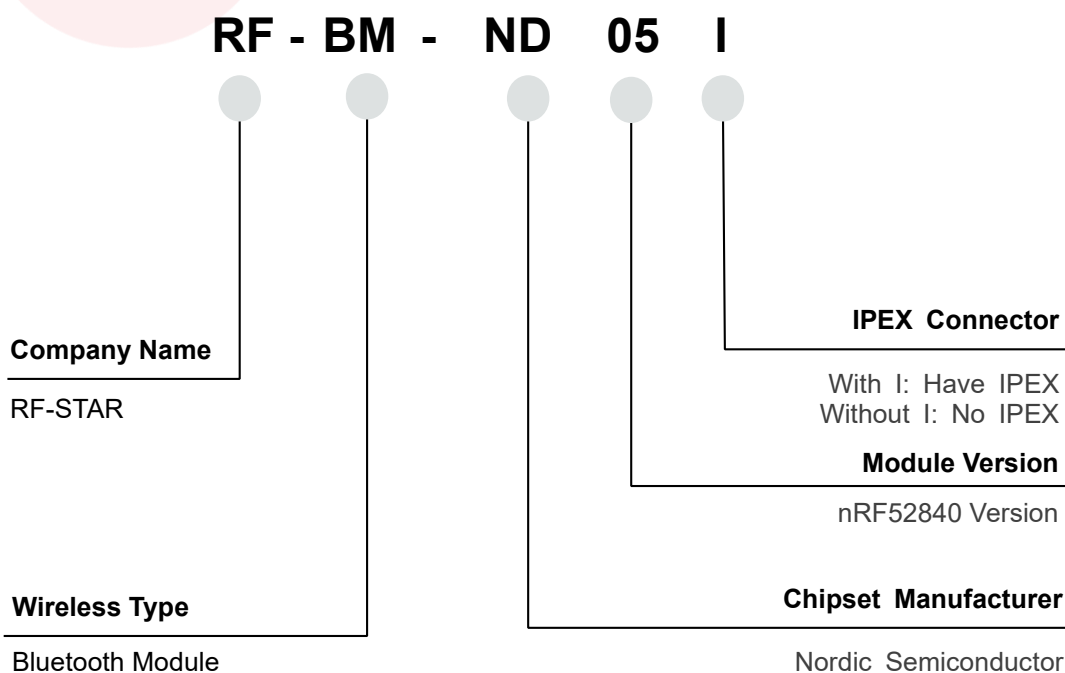


Figure 2. Part Number Conventions of RF-BM-ND05/ND05I

Table of Contents

1 Device Overview	1
1.1 Description.....	1
1.2 Key Features	1
1.3 Applications	1
1.4 Functional Block Diagram	2
1.5 Part Number Conventions	3
Table of Contents.....	4
2 Module Configuration and Functions	6
2.1 Module Parameters.....	6
2.2 Module Pin Diagram	7
2.3 Pin Functions.....	7
3 Specifications	11
3.1 Recommended Operating Conditions	11
3.2 Handling Ratings.....	11
4 Application, Implementation, and Layout.....	12
4.1 Module Photos.....	12
4.2 Recommended PCB Footprint.....	12
4.3 Schematic Diagram.....	13
4.4 Reference Design	14
4.5 Antenna.....	15
4.5.1 Antenna Design Recommendation	15
4.5.2 Antenna Output Mode Modification.....	16
4.5.3 External Antenna Design Recommendation of the Half-Hole ANT Pin.....	16
4.5.4 IPEX Connector Specification	18
4.6 Basic Operation of Hardware Design	19
4.7 Trouble Shooting	19
4.7.1 Unsatisfactory Transmission Distance.....	19
4.7.2 Vulnerable Module.....	20
4.7.3 High Bit Error Rate	20
4.8 Electrostatics Discharge Warnings	20
4.9 Soldering and Reflow Condition.....	20
5 Optional Package Specification	22

6 Certification	24
6.1 FCC	24
6.2 CE	24
6.3 IC	25
6.4 RoHS	25
6.5 SRRC	26
7 Revision History	27
8 Contact Us	28



2 Module Configuration and Functions

2.1 Module Parameters

Table 1. Parameters of RF-BM-ND05/ND05I

Chipset	nRF52840
Supply Power Voltage	1.7 V ~ 3.6 V, recommended to 3.3 V
Frequency	2402 MHz ~ 2480 MHz
Transmit Power	-20.0 dBm ~ +8.0 dBm
Receiving Sensitivity	-95 dBm conductive sensitivity in BLE mode -103 dBm sensitivity in 125 kbps BLE mode (long range)
Data Rate	Bluetooth [®] 5: 2 Mbps, 1 Mbps, 500 kbps and 125 kbps IEEE 802.15.4-2006: 250 kbps Proprietary 2.4 GHz: 2 Mbps, 1 Mbps
Power Consumption	4.8 mA peak current in TX (@0 dBm) 4.6 mA peak current in RX
GPIO	29
Crystal	32 MHz, 32.768 kHz
RAM	256 KB
Flash	1 MB
Package	SMT Packaging
Frequency Error	±20 kHz
Dimension	24.8 mm x 15.0 mm x 2.3 mm
Type of Antenna	RF-BM-ND05: PCB antenna RF-BM-ND05I: IPEX connector/half-hole interface
Operating Temperature	-40 °C ~ +85 °C
Storage Temperature	-40 °C ~ +125 °C

2.2 Module Pin Diagram

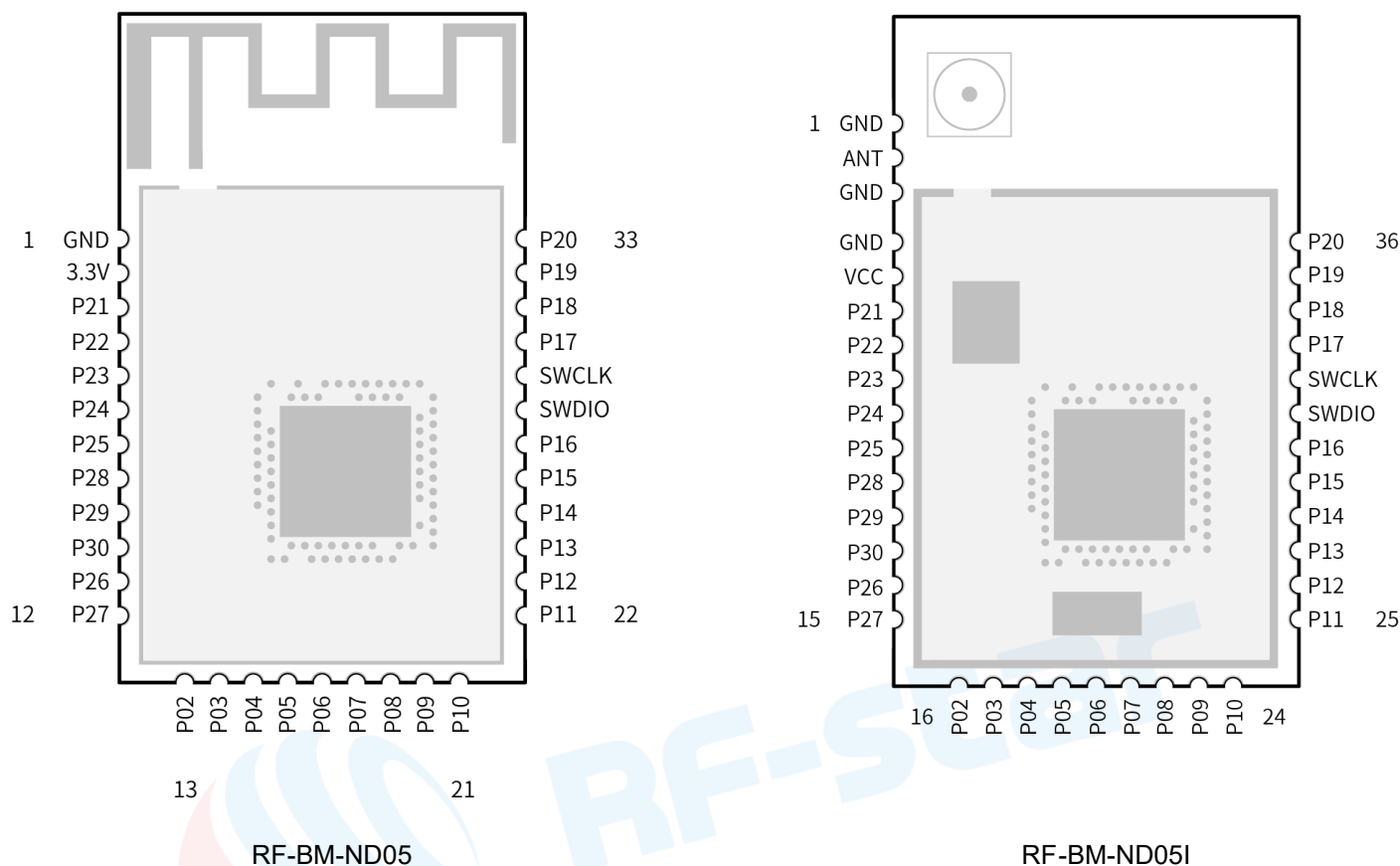


Figure 3. Pin Diagram of RF-BM-ND05/ND05I

2.3 Pin Functions

Table 2. Pin Functions of RF-BM-ND05

Pin	Name	Chip Pin	Pin Type	Description
1	GND	GND	Ground	Ground
2	VCC	VDD	Power	Power supply 1.7 V ~ 3.6 V. Recommend to 3.3 V
3	P21	P0.21	Digital	General purpose I/O. Recommended usage: QSPI
4	P22	P0.22	Digital	General purpose I/O. Recommended usage: QSPI
5	P23	P0.23	Digital	General purpose I/O. Recommended usage: QSPI
6	P24	P0.24	Digital	General purpose I/O
7	P25	P0.25	Digital	General purpose I/O
8	P28	P0.28/AIN4	Digital or Analog	General purpose I/O, Analog input Standard drive, low-frequency I/O only
9	P29	P0.29/AIN5	Digital or Analog	General purpose I/O, Analog input

				Standard drive, low-frequency I/O only
10	P30	P0.30/AIN6	Digital or Analog	General purpose I/O, Analog input Standard drive, low-frequency I/O only
11	P26	P0.26	Digital or Analog	General purpose I/O
12	P27	P0.27	Digital or Analog	General purpose I/O
13	P02	P0.02/AIN0	Digital or Analog	General purpose I/O, Analog input Standard drive, low-frequency I/O only
14	P03	P0.03/AIN1	Digital or Analog	General purpose I/O, Analog input Standard drive, low-frequency I/O only
15	P04	P0.04/AIN2	Digital or Analog	General purpose I/O, Analog input
16	P05	P0.05/AIN3	Digital or Analog	General purpose I/O, Analog input
17	P06	P0.06	Digital	General purpose I/O
18	P07	P0.07 TRACECLK	Digital Trace Clock	General purpose I/O Trace buffer clock
19	P08	P0.08	Digital	General purpose I/O
20	P09	P0.09/NFC1	Digital NFC input	General purpose I/O, NFC antenna connection. Standard drive, low-frequency I/O only
21	P10	P0.10/NFC2	Digital NFC input	General purpose I/O, NFC antenna connection. Standard drive, low-frequency I/O only
22	P11	P0.11 TRACEDATA2	Digital Trace data	General purpose I/O Trace buffer TRACEDATA[2]
23	P12	P0.12 TRACEDATA1	Digital Trace data	General purpose I/O Trace buffer TRACEDATA[1]
24	P13	P0.13	Digital	General purpose I/O
25	P14	P0.14	Digital	General purpose I/O
26	P15	P0.15	Digital	General purpose I/O
27	P16	P0.16	Digital	General purpose I/O
28	SWDIO	SWDIO	Debug	Serial wire debug I/O for debugging and programming
29	SWCLK	SWDCLK	Debug	Serial wire debug clock input for debugging and programming
30	P17	P0.17	Digital	General purpose I/O
31	P18/RST	P0.18/nRESET	Digital	General purpose I/O. Recommended usage: QSPI/CSN Reset, active low.

32	P19	P0.19	Digital	General purpose I/O. Recommended usage: QSPI/SCK
33	P20	P0.20	Digital	General purpose I/O

Table 3. Pin Functions of RF-BM-ND05I

Pin	Name	Chip Pin	Pin Type	Description
1	GND	GND	Ground	Ground
2	ANT	ANT	ANT	Half-hole ANT pin. No use by default.
3	GND	GND	Ground	Ground
4	GND	GND	Ground	Ground
5	VCC	VDD	Power	Power supply 1.7 V ~ 3.6 V. Recommend to 3.3 V
6	P21	P0.21	Digital	General purpose I/O. Recommended usage: QSPI
7	P22	P0.22	Digital	General purpose I/O. Recommended usage: QSPI
8	P23	P0.23	Digital	General purpose I/O. Recommended usage: QSPI
9	P24	P0.24	Digital	General purpose I/O
10	P25	P0.25	Digital	General purpose I/O
11	P28	P0.28/AIN4	Digital or Analog	General purpose I/O, Analog input Standard drive, low-frequency I/O only
12	P29	P0.29/AIN5	Digital or Analog	General purpose I/O, Analog input Standard drive, low-frequency I/O only
13	P30	P0.30/AIN6	Digital or Analog	General purpose I/O, Analog input Standard drive, low-frequency I/O only
14	P26	P0.26	Digital or Analog	General purpose I/O
15	P27	P0.27	Digital or Analog	General purpose I/O
16	P02	P0.02/AIN0	Digital or Analog	General purpose I/O, Analog input Standard drive, low-frequency I/O only
17	P03	P0.03/AIN1	Digital or Analog	General purpose I/O, Analog input Standard drive, low-frequency I/O only
18	P04	P0.04/AIN2	Digital or Analog	General purpose I/O, Analog input
19	P05	P0.05/AIN3	Digital or Analog	General purpose I/O, Analog input
20	P06	P0.06	Digital	General purpose I/O
21	P07	P0.07 TRACECLK	Digital Trace Clock	General purpose I/O Trace buffer clock
22	P08	P0.08	Digital	General purpose I/O

23	P09	P0.09/NFC1	Digital NFC input	General purpose I/O, NFC antenna connection. Standard drive, low-frequency I/O only
24	P10	P0.10/NFC2	Digital NFC input	General purpose I/O, NFC antenna connection. Standard drive, low-frequency I/O only
25	P11	P0.11 TRACEDATA2	Digital Trace data	General purpose I/O Trace buffer TRACEDATA[2]
26	P12	P0.12 TRACEDATA1	Digital Trace data	General purpose I/O Trace buffer TRACEDATA[1]
27	P13	P0.13	Digital	General purpose I/O
28	P14	P0.14	Digital	General purpose I/O
29	P15	P0.15	Digital	General purpose I/O
30	P16	P0.16	Digital	General purpose I/O
31	SWDIO	SWDIO	Debug	Serial wire debug I/O for debugging and programming
32	SWCLK	SWDCLK	Debug	Serial wire debug clock input for debugging and programming
33	P17	P0.17	Digital	General purpose I/O
34	P18/RST	P0.18/nRESET	Digital	General purpose I/O. Recommended usage: QSPI/CSN Reset, active low.
35	P19	P0.19	Digital	General purpose I/O. Recommended usage: QSPI/SCK
36	P20	P0.20	Digital	General purpose I/O

3 Specifications

3.1 Recommended Operating Conditions

The functional operation does not guarantee performance beyond the limits of the conditional parameter values in the table below. Long-term work beyond this limit will affect the reliability of the module more or less.

Table 4. Recommended Operating Conditions of RF-BM-ND05/ND05I

Items	Condition	Min.	Typ.	Max.	Unit
Operating Supply Voltage	Battery Mode	1.7	3.3	3.6	V
Operating Temperature	/	-40	+25	+85	°C
Environmental Hot Pendulum	/	-20		+20	°C/min

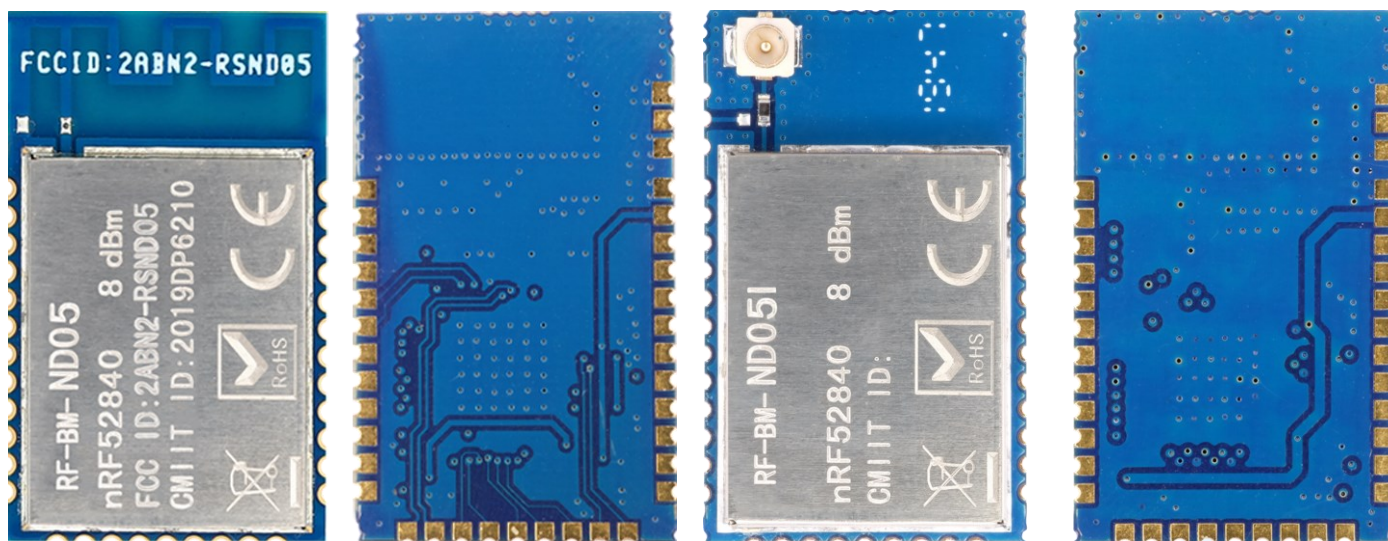
3.2 Handling Ratings

Table 5. Handling Ratings of RF-BM-ND05/ND05I

Items	Condition	Min.	Typ.	Max.	Unit
Storage Temperature	Tstg	-40	+25	+125	°C
Human Body Model	HBM		±2000		V
Moisture Sensitivity Level			3		
Charged Device Model			±750		V

4 Application, Implementation, and Layout

4.1 Module Photos

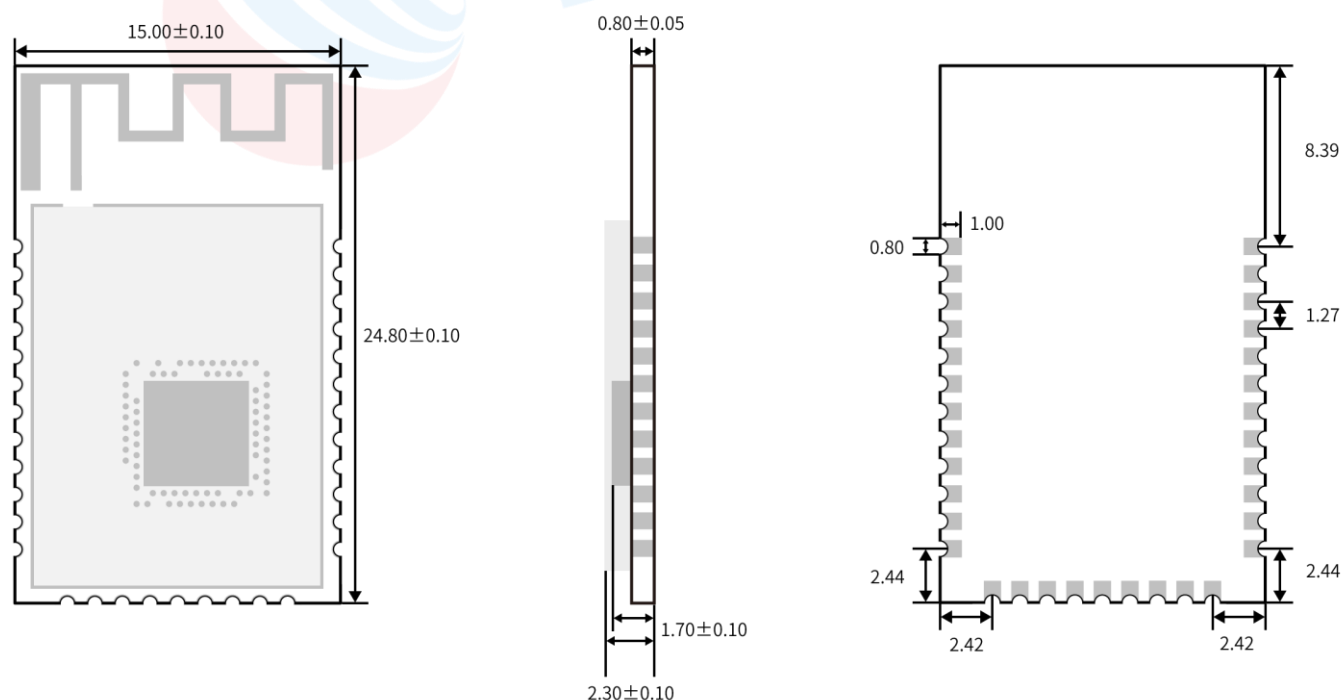


RF-BM-ND05

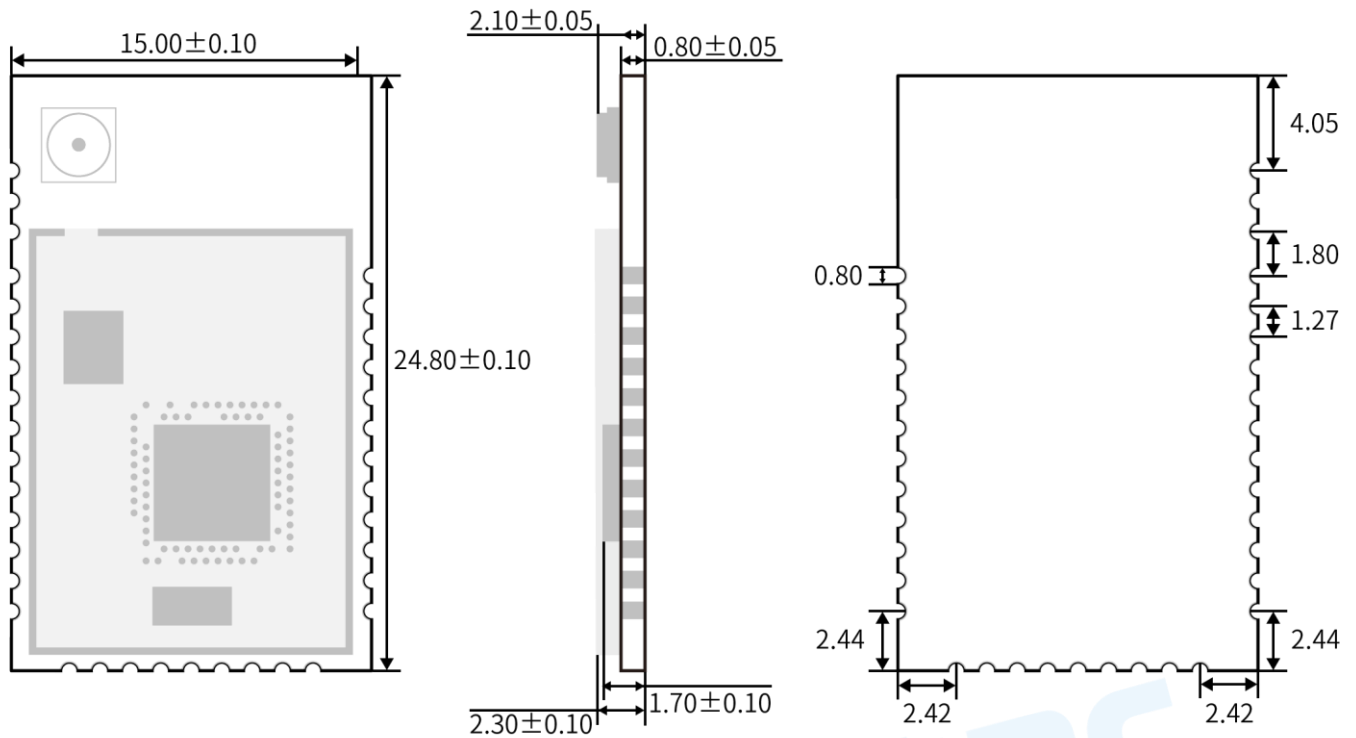
RF-BM-ND05I

Figure 4. Photos of RF-BM-ND05/ND05I

4.2 Recommended PCB Footprint



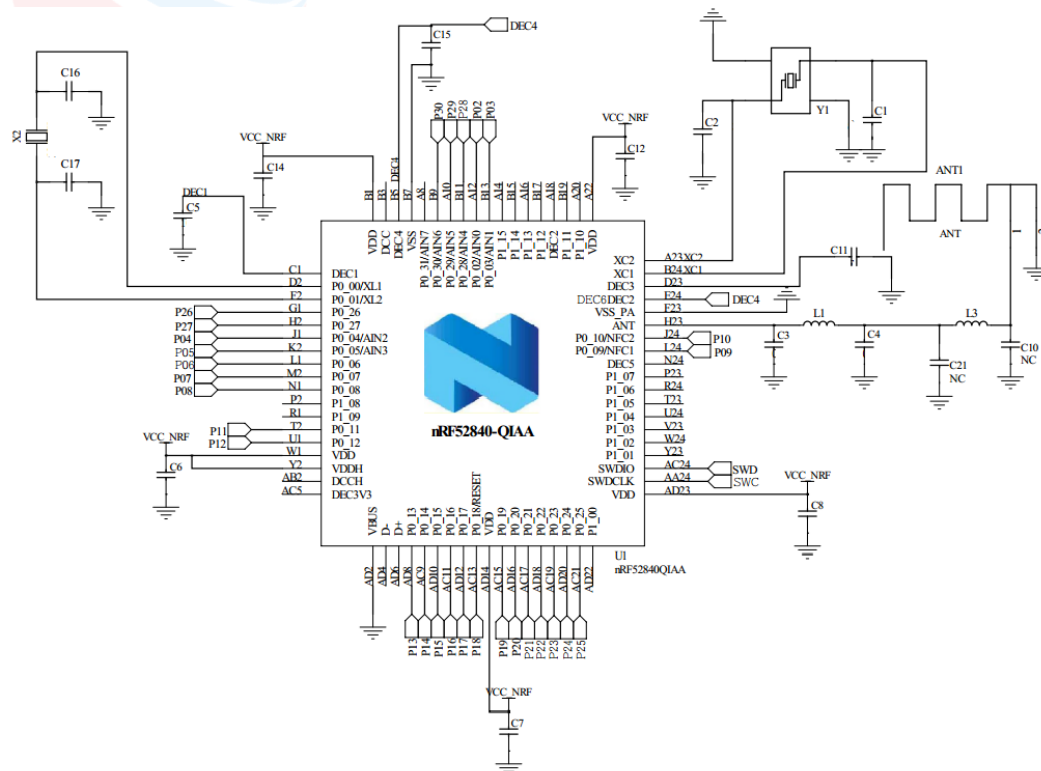
RF-BM-ND05



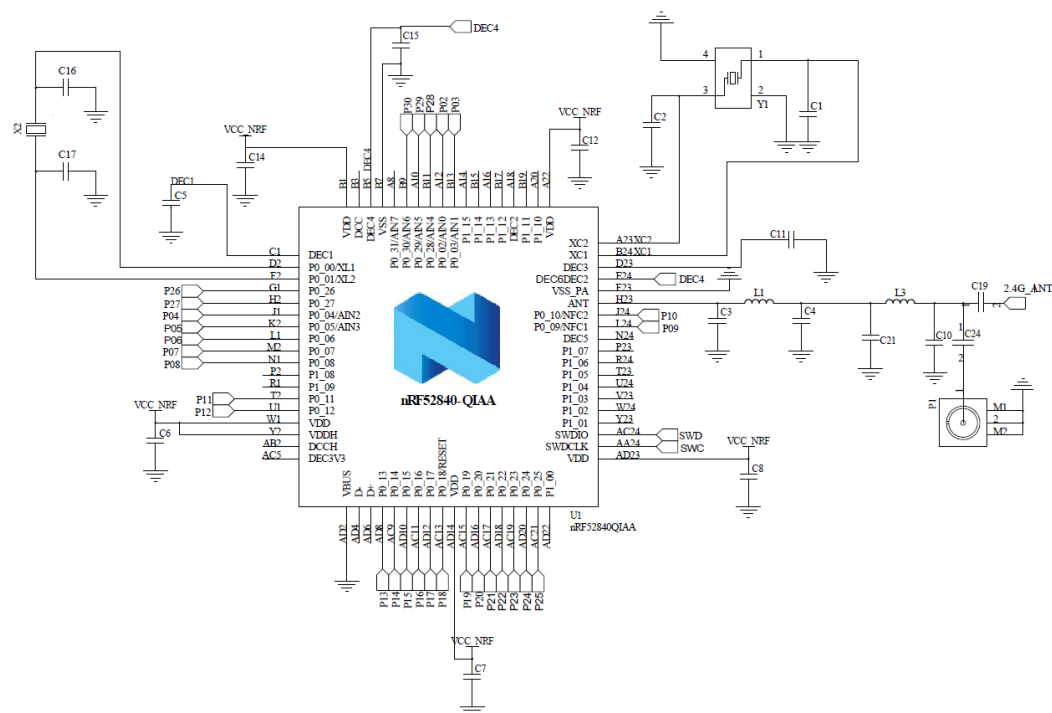
RF-BM-ND05I

Figure 5. Recommended PCB Footprint of RF-BM-ND05/ND05I (mm)

4.3 Schematic Diagram



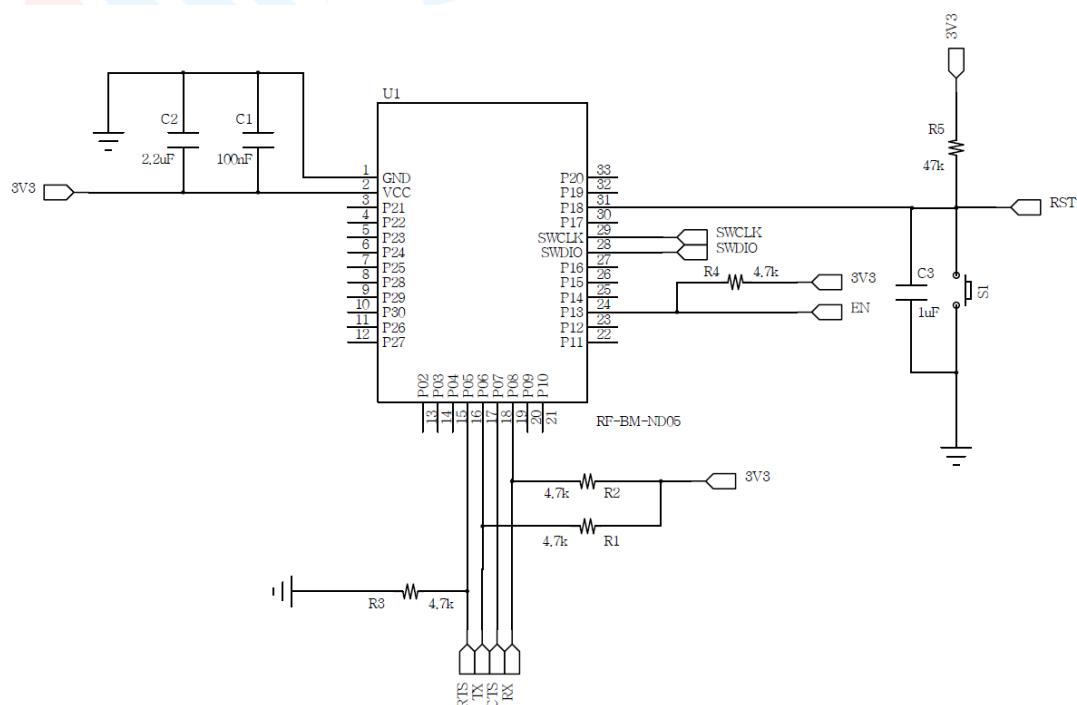
RF-BM-ND05



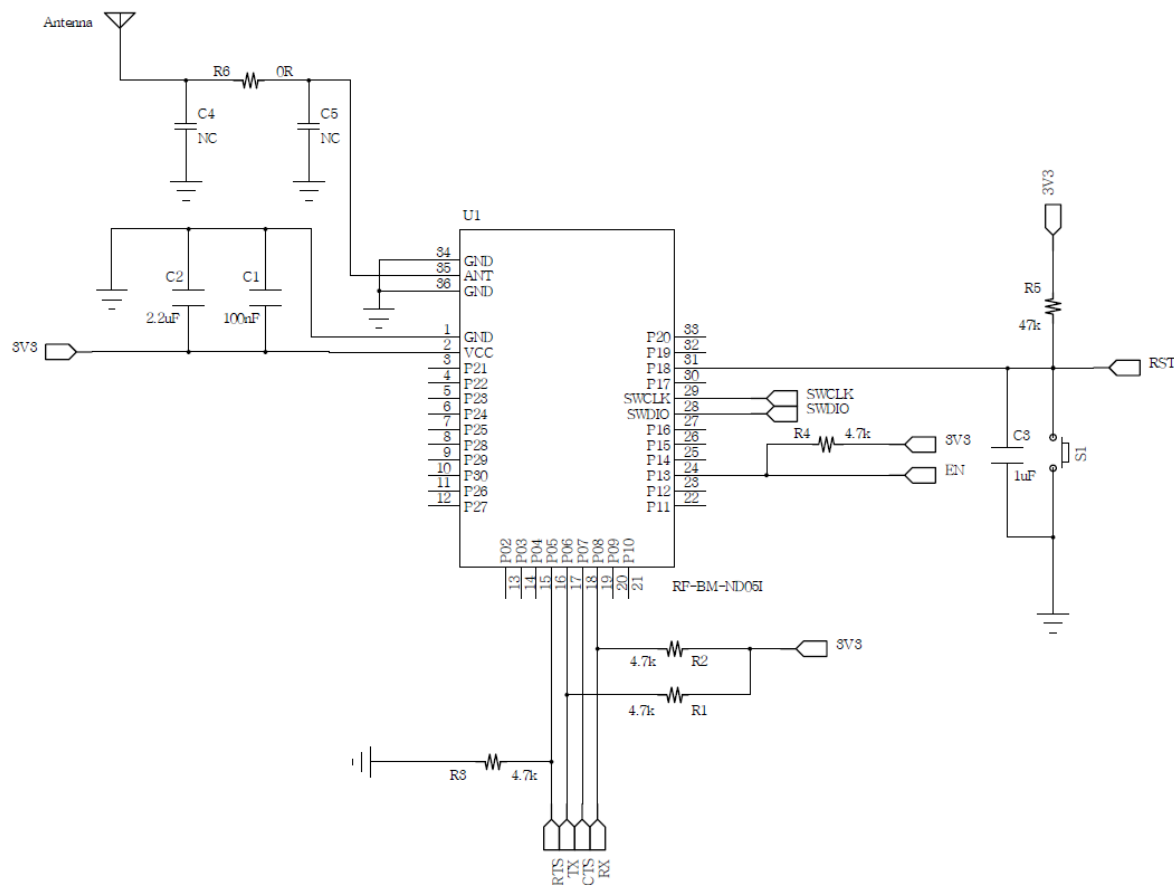
RF-BM-ND05I

Figure 6. Schematic Diagram of RF-BM-ND05/ND05I

4.4 Reference Design



RF-BM-ND05



RF-BM-ND05I

Figure 7. Reference Design of RF-BM-ND05/ND05I

4.5 Antenna

4.5.1 Antenna Design Recommendation

1. The antenna installation structure has a great influence on the module performance. It is necessary to ensure the antenna is exposed and preferably vertically upward. When the module is installed inside of the case, a high-quality antenna extension wire can be used to extend the antenna to the outside of the case.
2. The antenna must not be installed inside the metal case, which will cause the transmission distance to be greatly weakened.
3. The recommendation of antenna layout.

The inverted-F antenna position on PCB is free-space electromagnetic radiation. The location and layout of the antenna are key factors to increase the data rate and transmission range.

Therefore, the layout of the module antenna location and routing is recommended as follows:

- (1) Place the antenna on the edge (corner) of the PCB.
- (2) Make sure that there is no signal line or copper foil in each layer below the antenna.
- (3) It is best to hollow out the antenna position in the following figure to ensure that the S11 of the module is

minimally affected.

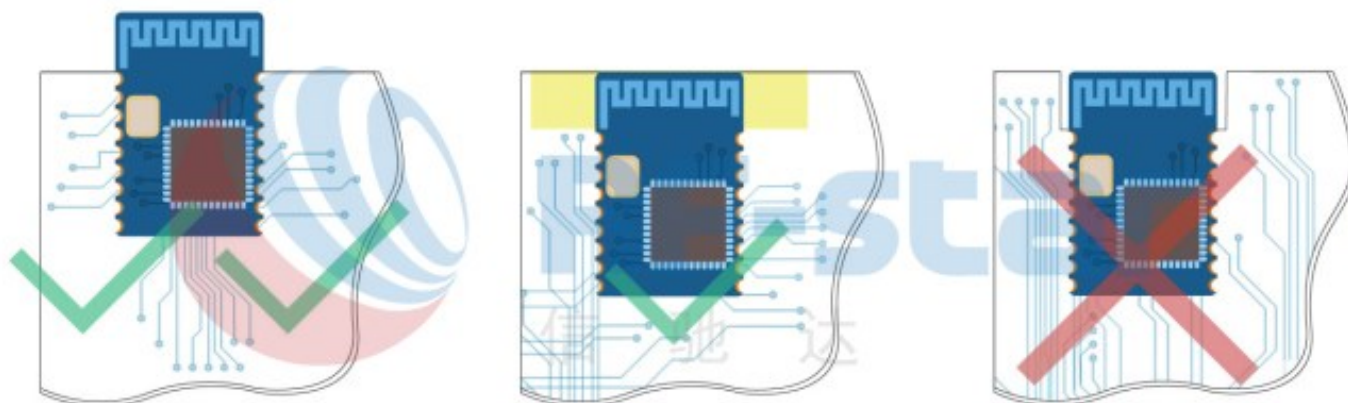


Figure 8. Recommendation of Antenna Layout

Note: The hollow-out position is based on the antenna used.

4.5.2 Antenna Output Mode Modification

RF-BM-ND05I has two antenna output modes: IPEX connector output and stamp half-hole antenna output (ANT pin, see pin function table for details).

The default delivery is IPEX connector mode. Under IPEX connector mode, C1 is off and C2 is welded. If you would like to change to half-hole antenna output mode, please disconnect C2 and weld C2. The locations of C1 and C2 (8 pF) are shown in the figure below.

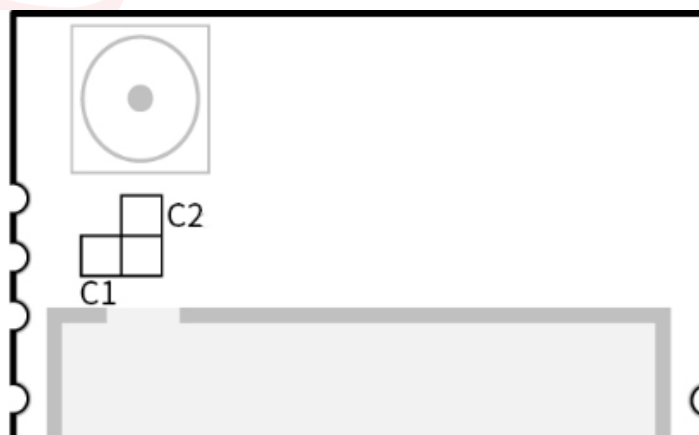


Figure 9. Antenna Output Mode Change

4.5.3 External Antenna Design Recommendation of the Half-Hole ANT Pin

1. A Π -type matching circuit is reserved for the antenna, and 50 Ω impedance control is performed on the RF traces. The traces are as short as possible, and 135° or arc traces are used as much as possible. No vias are used to change layers. More GND vias are placed around the RF traces.

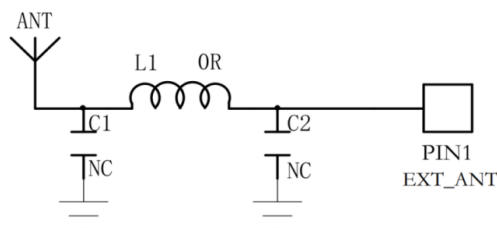


Figure 10. Reference Design of the External Antenna

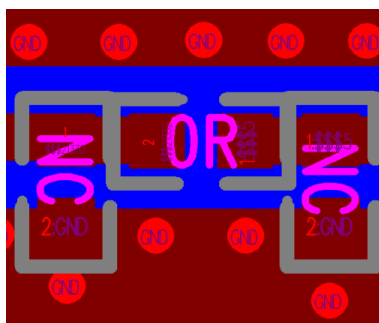


Figure 11. Reference Design of the External Antenna Traces

2. The RF trace width and copper-clad spacing can be calculated by SI9000 software, and the impedance is controlled to 50 Ω according to the actual board thickness, number of layers, plate, dielectric thickness, dielectric constant, copper thickness, line width, line spacing, and solder mask thickness.

Example: FR4 is a double-layer board with a thickness of 1.0 mm. Through calculation, the width of the trace is 0.8254 mm, and the spacing between traces and copper is 0.22 mm.

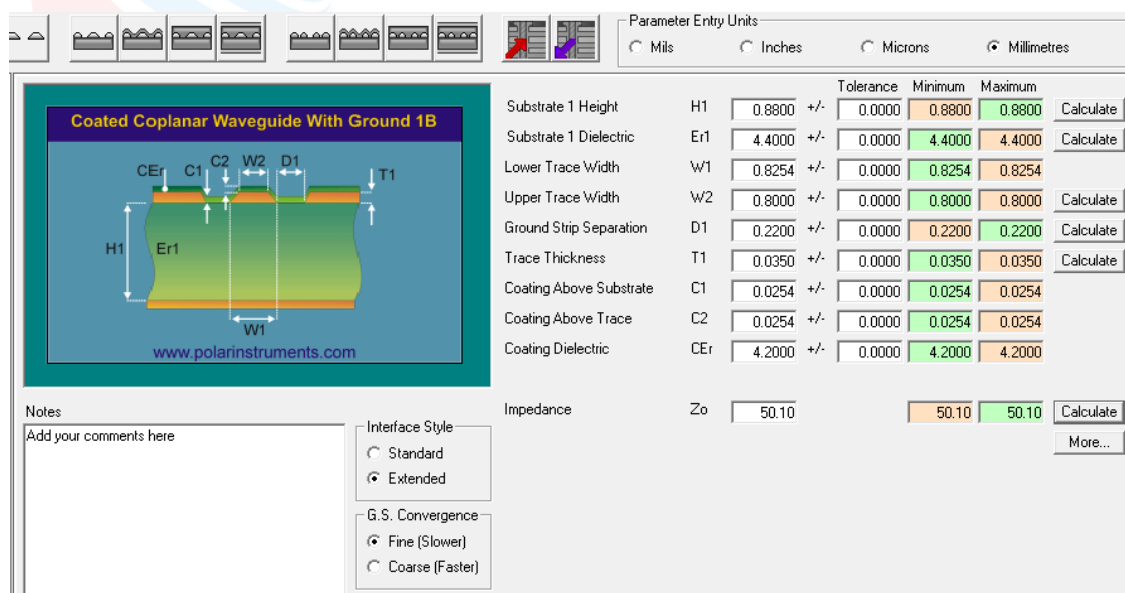


Figure 12. SI9000 Impedance Calculation Diagram

4.5.4 IPEX Connector Specification

RF-BM-ND05I module is integrated the IPEX version 1 antenna seat, the specification of the antenna seat is as follows:

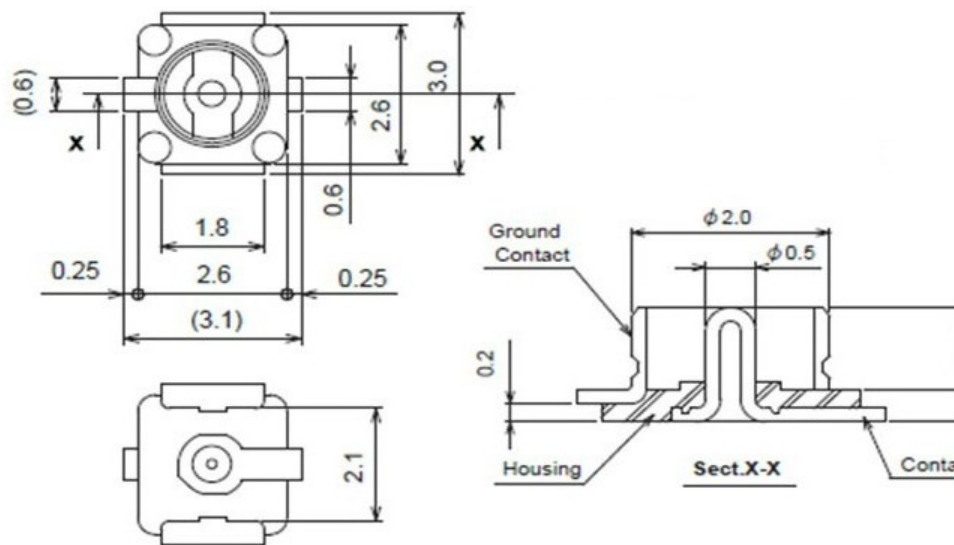


Figure 13. Specification of Antenna Seat

The specification of the IPEX wire end is as follows:

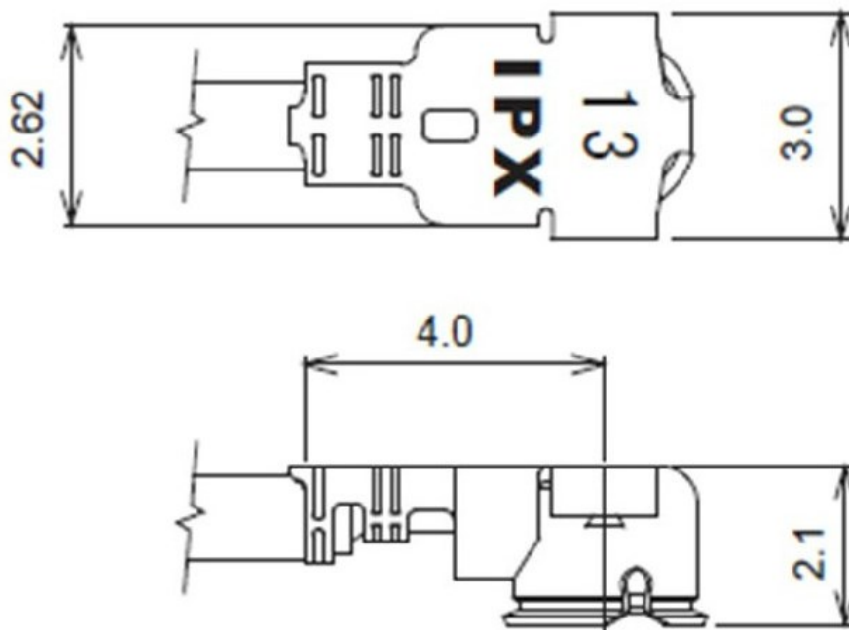


Figure 14. Specification of IPEX Wire

4.6 Basic Operation of Hardware Design

1. It is recommended to offer the module a DC stabilized power supply, a tiny power supply ripple coefficient, and reliable ground. Please pay attention to the correct connection between the positive and negative poles of the power supply. Otherwise, the reverse connection may cause permanent damage to the module.
2. Please ensure the supply voltage is between the recommended values. The module will be permanently damaged if the voltage exceeds the maximum value. Please ensure a stable power supply and no frequently fluctuating voltage.
3. When designing the power supply circuit for the module, it is recommended to reserve more than 30% of the margin, which is beneficial to the long-term stable operation of the whole machine. The module should be far away from the power electromagnetic, transformer, high-frequency wiring, and other parts with large electromagnetic interference.
4. The bottom of the module should avoid high-frequency digital routing, high-frequency analog routing, and power routing. If it has to route the wire on the bottom of the module, for example, it is assumed that the module is soldered to the Top Layer, the copper must be spread on the connection part of the top layer and the module, and be close to the digital part of the module and routed in the Bottom Layer (all copper is well-grounded).
5. Assuming that 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 spurs and receiving sensitivity of the module to some degree.
6. Assuming that there are devices with large electromagnetic interference around the module, which will greatly affect the module performance. It is recommended to stay away from the module according to the strength of the interference. If circumstances permit, appropriate isolation and shielding can be done.
7. Assuming that there are routings of large electromagnetic interference around the module (high-frequency digital, high-frequency analog, power routings), which will also greatly affect the module performance. It is recommended to stay away from the module according to the strength of the interference. If circumstances permit, appropriate isolation and shielding can be done.
8. It is recommended to stay away from the devices whose TTL protocol is the same 2.4 GHz physical layer, for example, USB 3.0.

4.7 Trouble Shooting

4.7.1 Unsatisfactory Transmission Distance

1. When there is a linear communication obstacle, the communication distance will be correspondingly weakened. Temperature, humidity, and co-channel interference will lead to an increase in the communication packet loss rate. The performances of ground absorption and reflection of radio waves will be poor when the module is tested close to the ground.
2. Seawater has a strong ability to absorb radio waves, so the test results by the seaside are poor.
3. The signal attenuation will be very obvious if there is metal near the antenna or if the module is placed inside the

metal shell.

4. The incorrect power register set or the high data rate in the open air may shorten the communication distance. The higher the data rate, the closer the distance.
5. The low voltage of the power supply is lower than the recommended value at ambient temperature, and the lower the voltage, the smaller the power is.
6. The unmatchable antennas and modules or the poor quality of the antenna will affect the communication distance.

4.7.2 Vulnerable Module

1. Please ensure the supply voltage is between the recommended values. The module will be permanently damaged if the voltage exceeds the maximum value. Please ensure a stable power supply and no frequently fluctuating voltage.
2. Please ensure the anti-static installation and the electrostatic sensitivity of high-frequency devices.
3. Due to some humidity-sensitive components, please ensure suitable humidity during installation and application. If there is no special demand, it is not recommended to use at too high or too low temperature.

4.7.3 High Bit Error Rate

1. There are co-channel signal interferences nearby. It is recommended to be away from the interference sources or modify the frequency and channel to avoid interferences.
2. The unsatisfactory power supply may also cause garbled. It is necessary to ensure the power supply's reliability.
3. If the extension wire or feeder wire is of poor quality or too long, the bit error rate will be high.

4.8 Electrostatics Discharge Warnings

The module will be damaged by the discharge of static. RF-star suggests that all modules should follow the 3 precautions below:

1. According to the anti-static measures, bare hands are not allowed to touch modules.
 2. Modules must be placed in anti-static areas.
 3. Take the anti-static circuitry (when inputting HV or VHF) into consideration in product design.
- Static may result in the degradation in performance of the module, even causing failure.

4.9 Soldering and Reflow Condition

1. Heating method: Conventional Convection or IR/convection.
2. Solder paste composition: Sn96.5/Ag3.0/Cu0.5
3. Allowable reflow soldering times: 2 times based on the following reflow soldering profile.
4. Temperature profile: Reflow soldering shall be done according to the following temperature profile.
5. Peak temperature: 245 °C.

Table 6. Temperature Table of Soldering and Reflow

Profile Feature	Sn-Pb Assembly	Pb-Free Assembly
Solder Paste	Sn63 / Pb37	Sn96.5 / Ag3.0 / Cu0.5
Min. Preheating Temperature (T_{min})	100 °C	150 °C
Max. Preheating Temperature (T_{max})	150 °C	200 °C
Preheating Time (T_{min} to T_{max}) (t_1)	60 s ~ 120 s	60 s ~ 120 s
Average Ascend Rate (T_{max} to T_p)	Max. 3 °C/s	Max. 3 °C/s
Liquid Temperature (T_L)	183 °C	217 °C
Time above Liquidus (t_L)	60 s ~ 90 s	30 s ~ 90 s
Peak Temperature (T_p)	220 °C ~ 235 °C	230 °C ~ 250 °C
Average Descend Rate (T_p to T_{max})	Max. 6 °C/s	Max. 6 °C/s
Time from 25 °C to Peak Temperature (t_2)	Max. 6 minutes	Max. 8 minutes
Time of Soldering Zone (t_p)	20±10 s	20±10 s

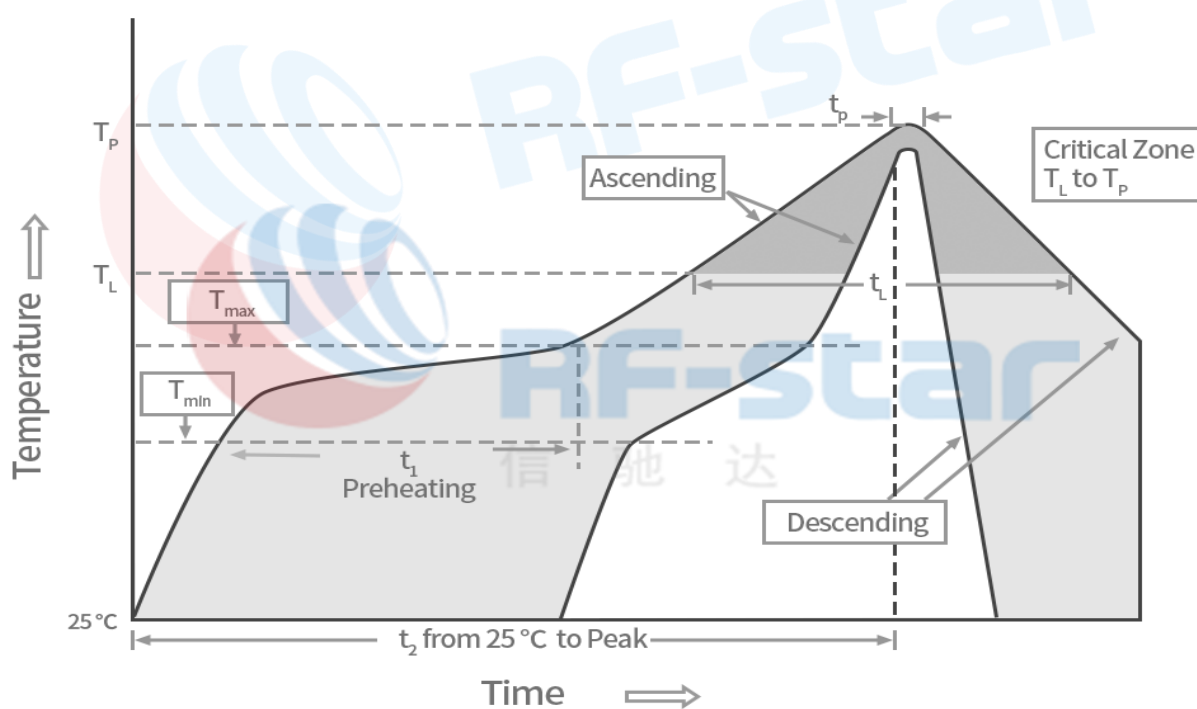


Figure 15. Recommended Reflow for Lead-Free Solder

5 Optional Package Specification

The default package method is **by tray**. If you need the modules to be shipped by tape & reel, pls contact us in advance.

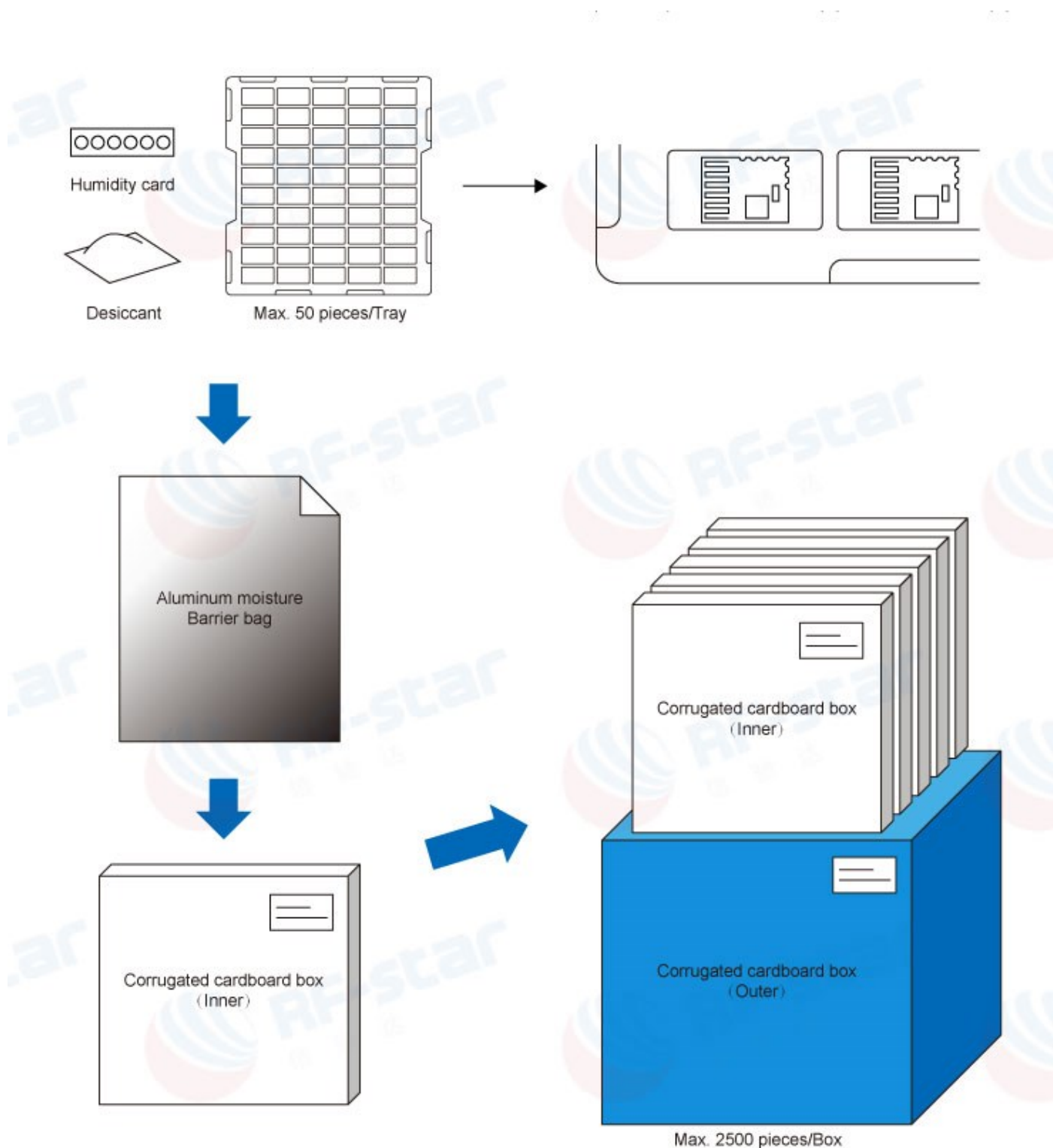


Figure 16. Default Package by Tray

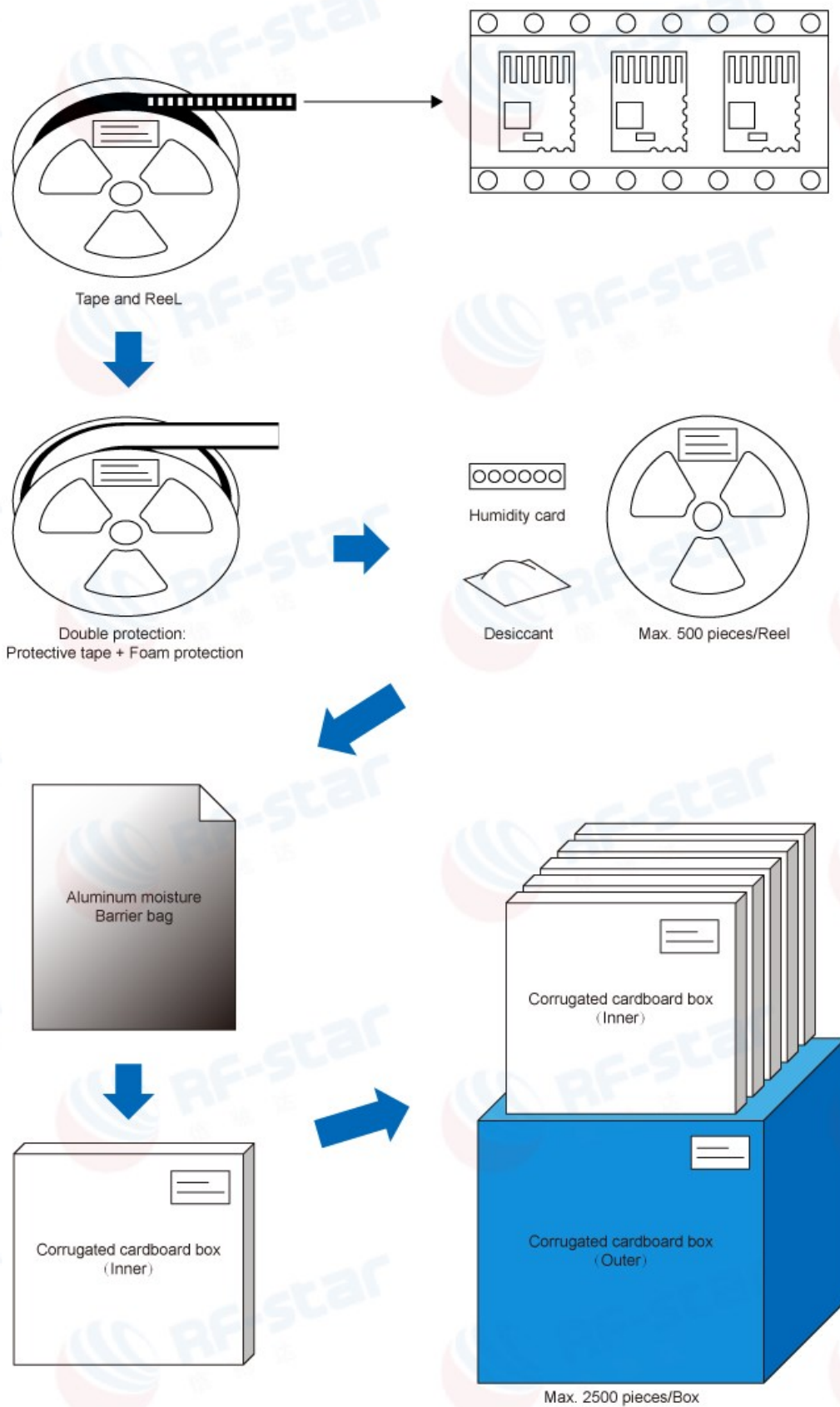


Figure 17. Package by Tape & Reel

6 Certification

6.1 FCC

Warnings:

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

FCC ID: 2ABN2-RSND05

TCB **GRANT OF EQUIPMENT AUTHORIZATION** **TCB**

Certification
Issued Under the Authority of the
Federal Communications Commission
By:

MET Laboratories, Inc.
914 W. Patuxent Avenue
Baltimore, MD 21238-3432

Date of Grant: 05/10/2018
Application Date: 05/10/2018

Shenzhen RF-STAR Technology Co., Ltd.
27 JIULI 8 Zone A, Baoan Internet Industry Base,
BaoYuan Road, Xixiang, Baoan DIST,
Shenzhen,
China

Attention: Aroo woo

NOT TRANSFERABLE

EQUIPMENT AUTHORIZATION is hereby issued to the named GRANTEE, and is
VALID ONLY for the equipment identified herein for use under the Commission's
Rules and Regulations listed below.

FCC IDENTIFIER: 2ABN2-RSND05
Name of Grantee: Shenzhen RF-STAR Technology Co., Ltd.
Equipment Class: Digital Transmission System
Notes: BLE Module
Modular Type: Single Modular

FCC Rule Part	Frequency Range (MHz)	Output Power (W)	Frequency Tolerance	Emission Designator
15C	2402.0 - 2480.0	0.00100		

Grant Notes: Single modular approval. Output Power listed is controlled.



Figure 18. FCC Certificate of RF-BM-ND05

6.2 CE

CE verification No.: BLA-EMC-201904-A58

 **Declaration of Conformity**

The submitted sample of the following equipment has been tested for CE marking according to the following European Directive: the RED Directive 2014/53/EU

Applicant name & address : SHENZHEN RF STAR TECHNOLOGY CO., LTD.
Room 601, Block C, Skyworth Building, Nanshan High-Tech Park,
Shenzhen

Manufacturer name & address : SHENZHEN RF STAR TECHNOLOGY CO., LTD.
Room 601, Block C, Skyworth Building, Nanshan High-Tech Park,
Shenzhen

Product : RF-BM-ND05

Model/Type reference : RF-BM-ND05

Trade mark : RF-STAR

Order No. : BLA-EMC-201904-A58

Essential Requirements	Applied Specifications/Standards	Documentary Evidence
Art 3.1 (a) Health	EN 62479:2010	Test Report BLA-EMC-201904-A58-03
Art 3.1 (a) Safety	IEC 62368-1:2014 EN 62368-1:2014+A11:2017	Test Report BLA-EMC-201904-A58-04
Art 3.1 (b) EMC	Draft EN 301 489-1 V2.2.0 (2017-03) Draft EN 301 489-17 V3.2.0 (2017-03)	Test Report BLA-EMC-201904-A58-01
Art 3.2 Radio	ETSI EN 300 328 V2.1.1 (2016-11)	Test Report BLA-EMC-201904-A58-02

This verification has been granted to the applicant based on the results of the tests, performed by laboratory of Quantel BlueAsia of Technical Services (Shenzhen) Co., Ltd. on the sample of the above-mentioned product in accordance with the provisions of the relevant specific standards and the product is in conformity with the essential requirements of Article 3.1(a) (b) 3.2 of Directive 2014/53/EU. The CE mark as shown below can be used, under the responsibility of the manufacturer, after completion of an EC Declaration of Conformity and compliance with all relevant EMC Directives.

CE

E-mer...
E-mer...
Lab manager
Date: 2019-04-24



Quantel BlueAsia of Technical Services (Shenzhen) Co., Ltd.
IOT Test Centre of BlueAsia
No. 448 Bulong Road, Bentian Street, Longgang District, Shenzhen, China
Telephone: TEL: +86-755-28682073 FAX: +86-755-28682073

Figure 19. CE Certificate of RF-BM-ND05

6.3 IC

IC Certification No.: IC: 23949-RSND05



GRANT OF EQUIPMENT CERTIFICATION

THE FOLLOWING EQUIPMENT HAS BEEN TESTED
AND CERTIFIED UNDER
INNOVATION, SCIENCE AND ECONOMIC DEVELOPMENT CANADA
RSS-247, Issue 2, February 2017
RSS-GEN, ISSUE 4, NOVEMBER 2014

Issued By:

MET Laboratories, Inc.
914 W. Patapsco Avenue
Baltimore, Maryland 21230
Laboratory Number: 2043A

Equipment Certification is hereby issued to the Identified Certificate Holder and is VALID ONLY for the equipment identified herein.
La certification du matériel est distribuée à la Société identifiée et est VALABLE SEULEMENT pour l'équipement identifié ci-dessous.
NOT TRANSFERABLE / PAS TRANSMISSIBLE

FILE/CERTIFICATE NUMBER: 1029-6-2018-99421

CERTIFICATION NUMBER: IC: 23949-RSND05

Issued to/Délivré à: ShenZhen RF-STAR Technology CO.,LTD Date Issued/ Date de publication: 6/13/2018
Address/Adresse: 2F BLDG 8, Zone A, BaoAn Internet Industry Base, BaoYuan Road, XXGiang, BaoAn DIST, ShenZhen 518100, China

Nature of Application/Nature d'Application: New Family Certification
Equipment Description/Genre de Matériel: BLE Module
Type of Radio Equipment/categorie du matériel certifié: Spread Spectrum/Digital Device (2400-2483.5 MHz)
Equipment Category/Categorie de Matériel: Category 1

Hardware Version Identification Number (HVIN) / Numéro d'identification de la version du matériel (NIV du matériel informatique): IS-BM-ND01, RF-BM-ND05
Product Marketing Name (PMN)/Nom de Marque du Produit (NMP): BLE Module
Firmware Version Identification Number (FVIN) / Numéro d'identification de la version du micrologiciel (NIV du micrologiciel): N/A
Hosting Marketing Name (HMN)/nom de marque de l'hôte (NMF): N/A

Conducted RF Power or Field Strength/Puissance H.F.: 0.00109W
Frequency Range/Bande de Fréquences: 2402-2480 MHz
Bandwidth(s) / largeurs de bande: 1076.1 kHz
Emission Designations/Genre D'Emission: 1M08FID
Antenna Information/ l'information d'antenne: PCB Antenna

Test Lab/ Laboratoire de test: Global United Technology Services Co., Ltd. No. 301-309, 3/F., Jinyuan Business Building, No. 2, Laodong Industrial Zone, Xixiang Road, Shenzhen, Guangdong, China
Tel: +86(0)755-2779-8480 Fax: +86(0)755-2779-8960

Test Lab ISCED Site Number/Laboratoire de test ISCED Numéro de site: IC: 9079A-2

Notes/Remarques: Single modular approval. Power output listed is PTC conducted power. The antenna(s) used for this transmitter must be installed to provide a separation distance of at least 20 cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter device.

Figure 20. IC Certificate of RF-BM-ND05

6.4 RoHS

RoHS Report No.: BLA-C-201811-A06-01



Report No.: BLA-C-201811-A06-01 Date: Nov.30, 2018 Page 1 of 8

Applicant : ShenZhen RF-STAR Technology CO.,LTD
Address : 2F BLDG 8, Zone A, BaoAn Internet Industry Base, BaoYuan Road, XXGiang, BaoAn DIST, ShenZhen, China

Report on the submitted sample said to be:

Sample Name : Nordic BLE module
Model No. : RF-BM-ND05
Sample Received Date : Nov.23, 2018
Testing Period : Nov.23, 2018 to Nov.29, 2018
Test Site : 5 Floor, 6 Building, Second Guangdong Industrial Park, Xili Town, Nanshan District, Shenzhen, China

Test Requested	Result
1. As specified by the client, to determine Pb, Cd, Hg, Cr(VI), PBBs & PBDEs DIBP, BBP, DBP, DEHP content in the submitted sample in accordance with EU Directive 2011/65/EU (RoHS 2.0)& (EU)2015/863.	Pass

*****FOR FURTHER DETAILS, PLEASE REFER TO THE FOLLOWING PAGE(S)*****

Tested by: Murray Reviewed by: Michelle

Approved by: Marco Date: 2018.11.30

Lab manager

检测专用章

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested. This test report cannot be reproduced, except in full, without prior written permission of the Company.

Qinhuai Electronics of Technical Services (Shenzhen) Co., Ltd.
8 Floor, 8 Building, Second Guangdong Industrial Park, Xili Town, Nanshan District, Shenzhen, China
TEL: +86-755-2305-9481

Figure 21. RoHS Certificate of RF-BM-ND05

6.5 SRRC

SRRC CMIIT ID: 2019DP6210



Figure 22. SRRC Certificate of RF-BM-ND05

7 Revision History

Date	Version No.	Description
2018.01.26	V1.0	The initial version is released.
2018.04.27	V1.1	Update module picture.
2018.05.18	V1.1	Update module parameters.
2018.12.10	V1.1	Update company address.
2020.03.31	V1.1	Modify reset pin.
2020.09.22	V1.1	Add reference design.
2023.05.25	V1.1	Update MSL level. Update the Shenzhen office address.

Note:

1. The document will be optimized and updated from time to time. Before using this document, please make sure it is the latest version.
2. To obtain the latest document, please download it from the official website: www.rfstariot.com and www.szrfstar.com.

8 Contact Us

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Tel.: 86-755-8632 9829

Chengdu Branch:

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