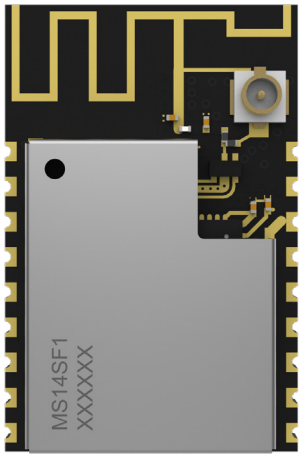
MINEWSEMI

Wi-Fi Module

MS14SF1



Datasheet

V 1.0.0

Version Note

Version	Details	Contributor(s)	Date	Notes
1.0.0	First edit	Vincle, Leo	2024.07.08	

Part Number

Model	Hardware Code
MS14SF1	1N02AI

Click the icon to view and download the latest product documents electronically.
https://en.minewsemi.com/file/MS14SF1-nRF7002_Datasheet_K_EN.pdf

MS14SF1-nRF7002

Low-power, Dual-band 2.4&5G Wi-Fi 6, Support TWT, Support STA/AP Mode

The MS14SF1 is a low-power, cost-effective wireless WiFi 6 module based on nRF7002. It integrates 2.4G and 5.8G dual-band 1T1R transceiver and LNA, as well as other powerful supporting development resources to provide a perfect solution for WiFi connection. The module has optional onboard antenna and u.FL external antenna, supports WPA/WPA2/WPA3 encryption, supports STA/AP mode, and has a transmission distance of 80M in office environment, which can meet the needs of various structural scenarios.

FEATURES

- Wi-Fi 6 Low power
- High Cost-effective
- Dual-band 2.4G + 5G, 1T1R
- Support optional external antenna
- Support TWT
- Support STA/AP Mode
- Transmission distance in office environment: 80M

KEY PARAMETER

MS14SF1			
Chip Model	nRF7002	**Antenna**	PCB/u.FL
Module Size	22.9×15×3mm	**Firmware**	None
Receiving Sensitivity	-98.6dBm	**Transmission Power**	Maximum +21dBm
Current(TX)	191mA - 2.4G 260mA - 5G	**Current(RX)**	60mA - 2.4G 56mA - 5G

APPLICATION

Smart Buildings

Consumer Electronics

Smart Healthcare

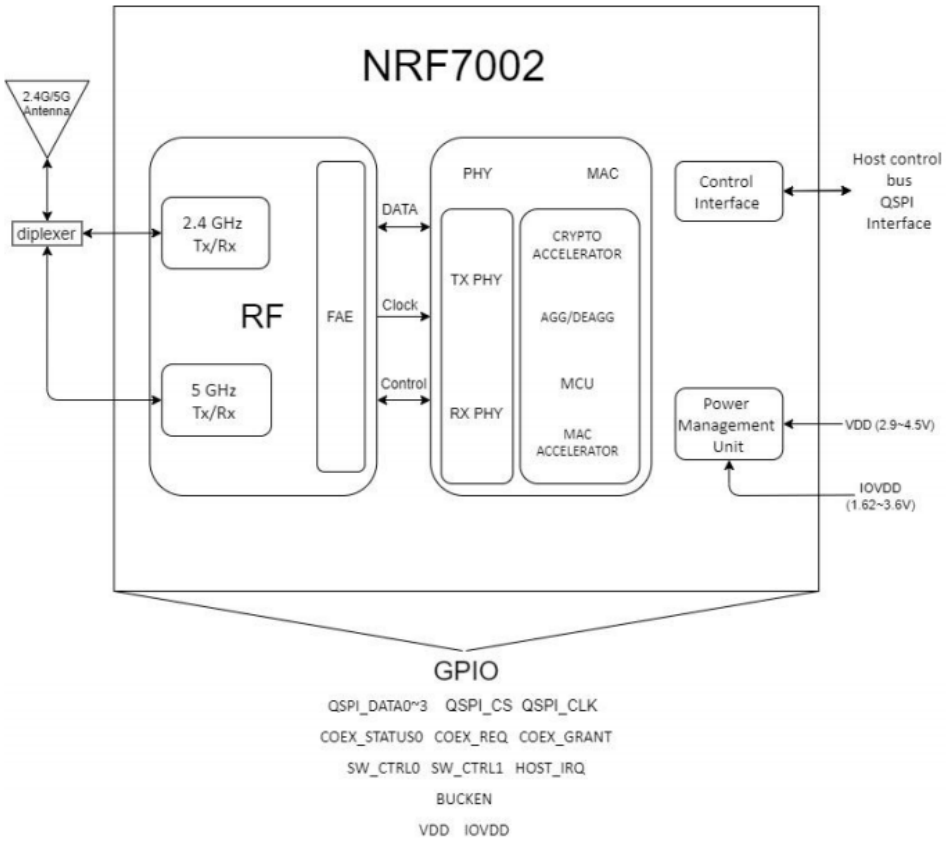
Security Equipment

Automotive Devices

Smart Agriculture

INDEX

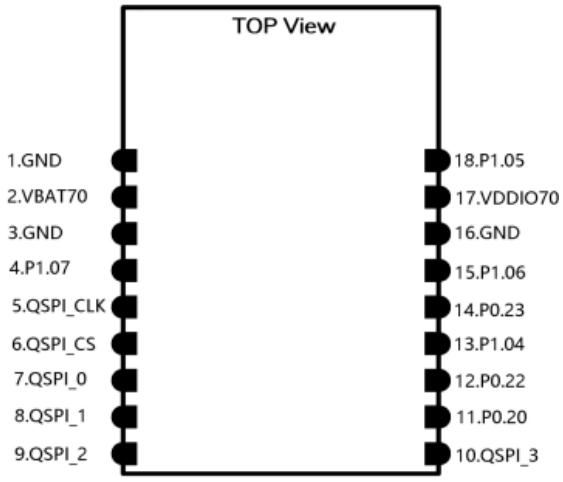
1 BLOCK DIAGRAM



2 ELECTRICAL SPECIFICATION

Parameter	Values	Notes
Operating Voltage	2.9V-4.5V	To ensure RF work, supply voltage suggest not lower than 3.6V
Operating Temperature	-40℃~+85℃	Storage temperature is -40℃~+125℃
Transmission Power	Maximum +21dBm	Configurable
Current(RX)	2.4G - 60mA 5G - 56mA	Maximum output power
Current(TX)	2.4G - 191mA 5G - 260mA	Maximum output power
Module Dimension	22.9*15*3mm	
Quantity of IO Port	13	QSPI, SPI

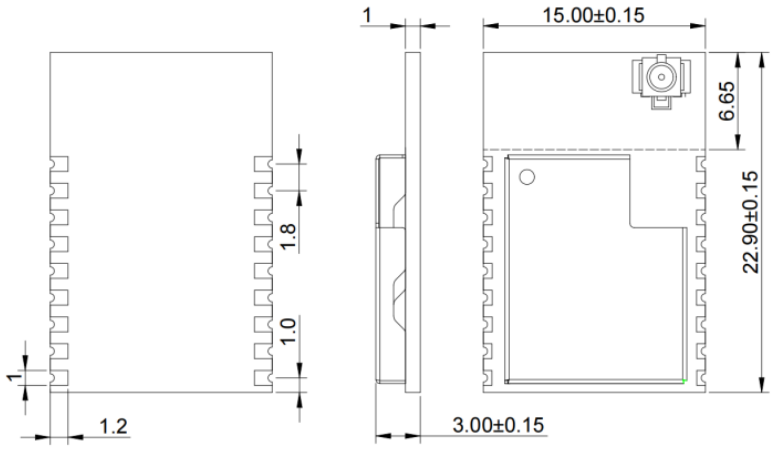
3 PIN DESCRIPTION



4 PIN DEFINITION

Pin Number	Symbol	Definition
VBAT70	Positive power supply	Power supply, 2.5V-5.5V, with this pin, and recommended voltage 3.6V
VDDIO70	Power	VDD IO Power supply 1.8V
GND	Ground	Negative power supply
P0.20	Digital I/O	Coex interface: COEX_STATUS0
P0.22	Digital I/O	Coex interface: COEX_REQ
P0.23	Digital I/O	SW_CTRL0: External switch control
P1.04	Digital I/O	Coex interface: COEX_GRANT
P1.05	Digital I/O	HOST_IRQ: Host processor interrupt request
P1.06	Digital I/O	SW_CTRL1: External switch control
P1.07	Digital I/O	BUCKEN: PWR IP enable pin
QSPI_CLK	Digital I/O	QSPI clock
QSPI_CS	Digital I/O	QSPI Slave select (CS)
QSPI_0	Digital I/O	QSPI data
QSPI_1	Digital I/O	QSPI data
QSPI_2	Digital I/O	QSPI data
QSPI_3	Digital I/O	QSPI data

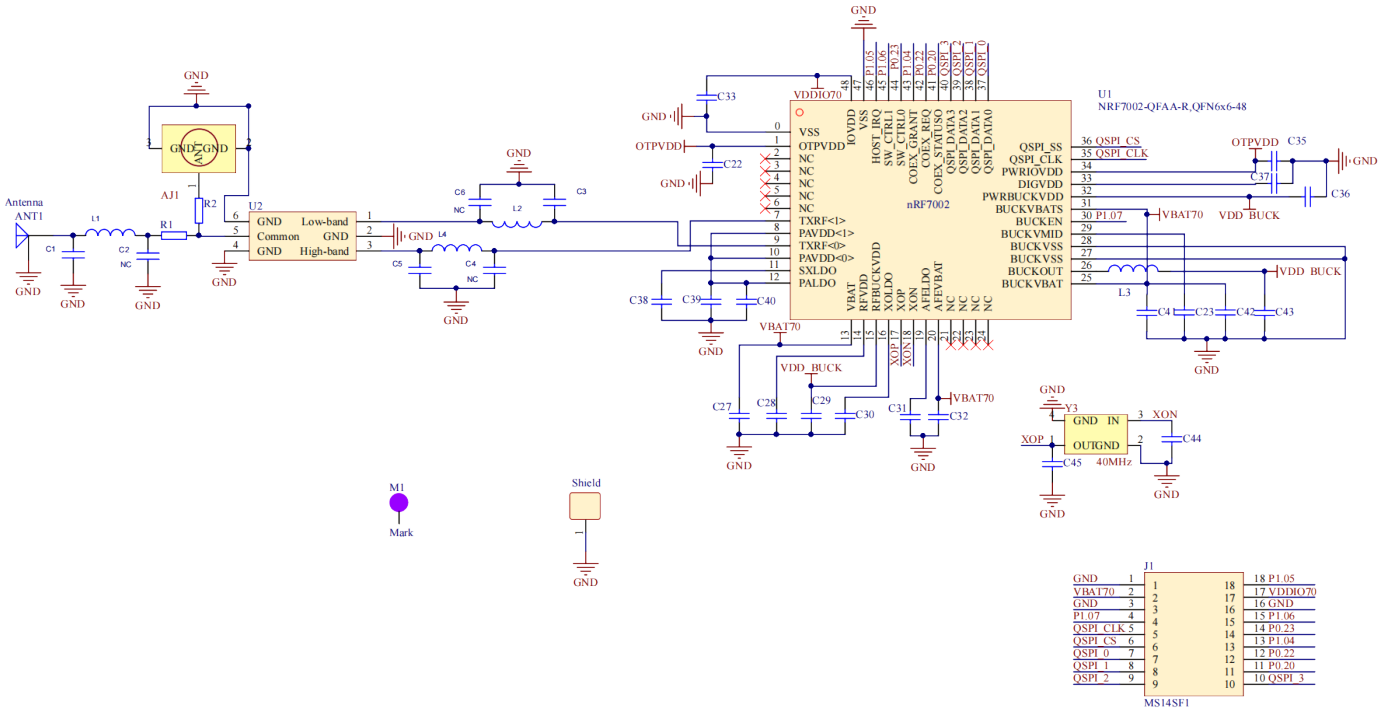
5 MECHANICAL DRAWING



Default unit: mm Default tolerance: ±0.15

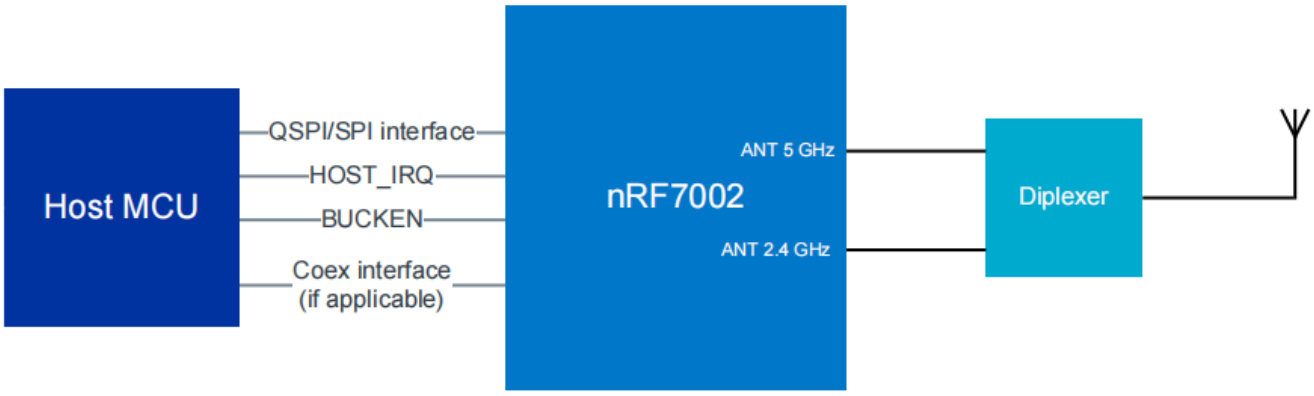
Notice: The recommended pad size is 1.2*1.0mm with a pad extension of 0.5mm

6 ELECTRICAL SCHEMATIC



Notice: Before placing an order, please confirm the specific configuration required with the salesperson.

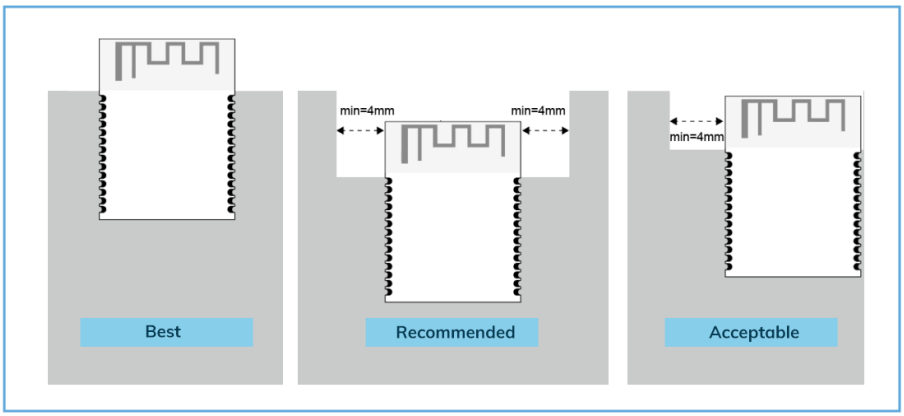
7 CONNECTION DIAGRAM

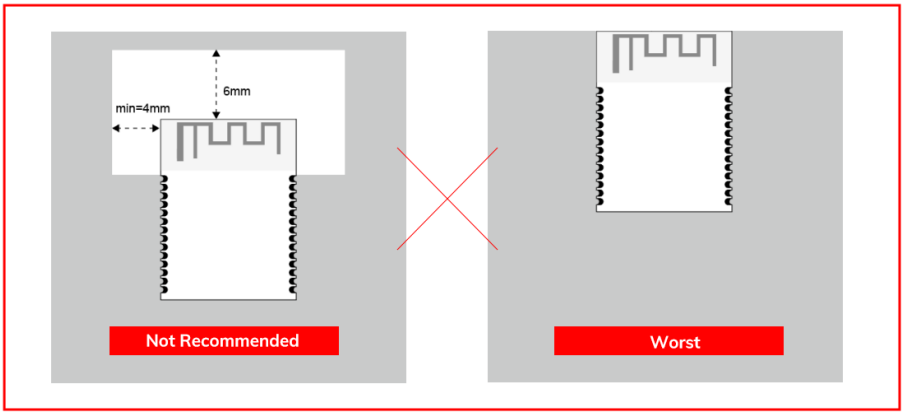


8 PCB LAYOUT

There should be no GND plane or metal cross wiring in the module antenna area, and no components should be placed nearby. It is best to make a hollow or clear area, or place it on the edge of the PCB board. The reference example is as follows:

Notice: It is strongly recommended to use the first design method. The module antenna design is debugged according to the first wiring.



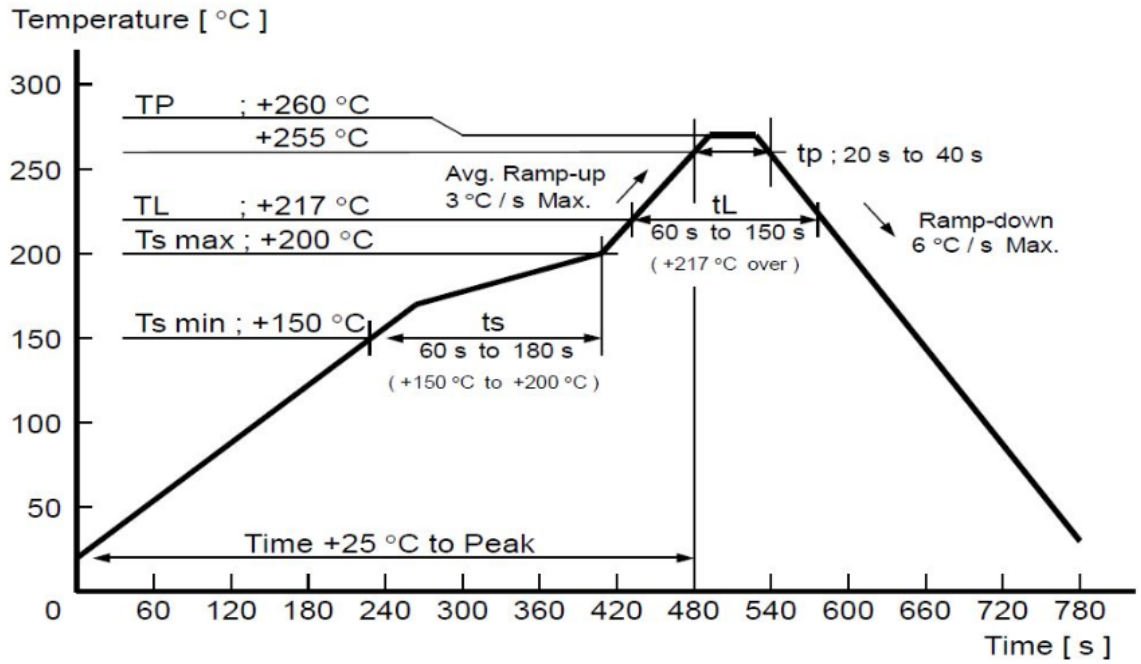


Layout Notes:

1)The module's antenna area should be completely clear of any metal obstructions to avoid affecting antenna performance (as shown in the diagram).
2)Outside the module's antenna area, try to maintain a solid copper pour to minimize interference from the mainboard signal lines or other sources.
3)A clear area of at least 4mm should surround the module's antenna (including its casing) to reduce interference with the antenna.
4)Ensure good grounding for components to minimize parasitic inductance.
5)Do not place copper under the module's antenna to prevent interference with signal radiation, which could affect transmission distance.
6)The antenna should be kept away from other circuits to maintain radiation efficiency and avoid impacting the normal operation of other circuits.
7)Position the module as close to the edge of the circuit board as possible, away from other circuitry.
8) It is recommended to use a ferrite bead for isolation when connecting the module to the power supply.

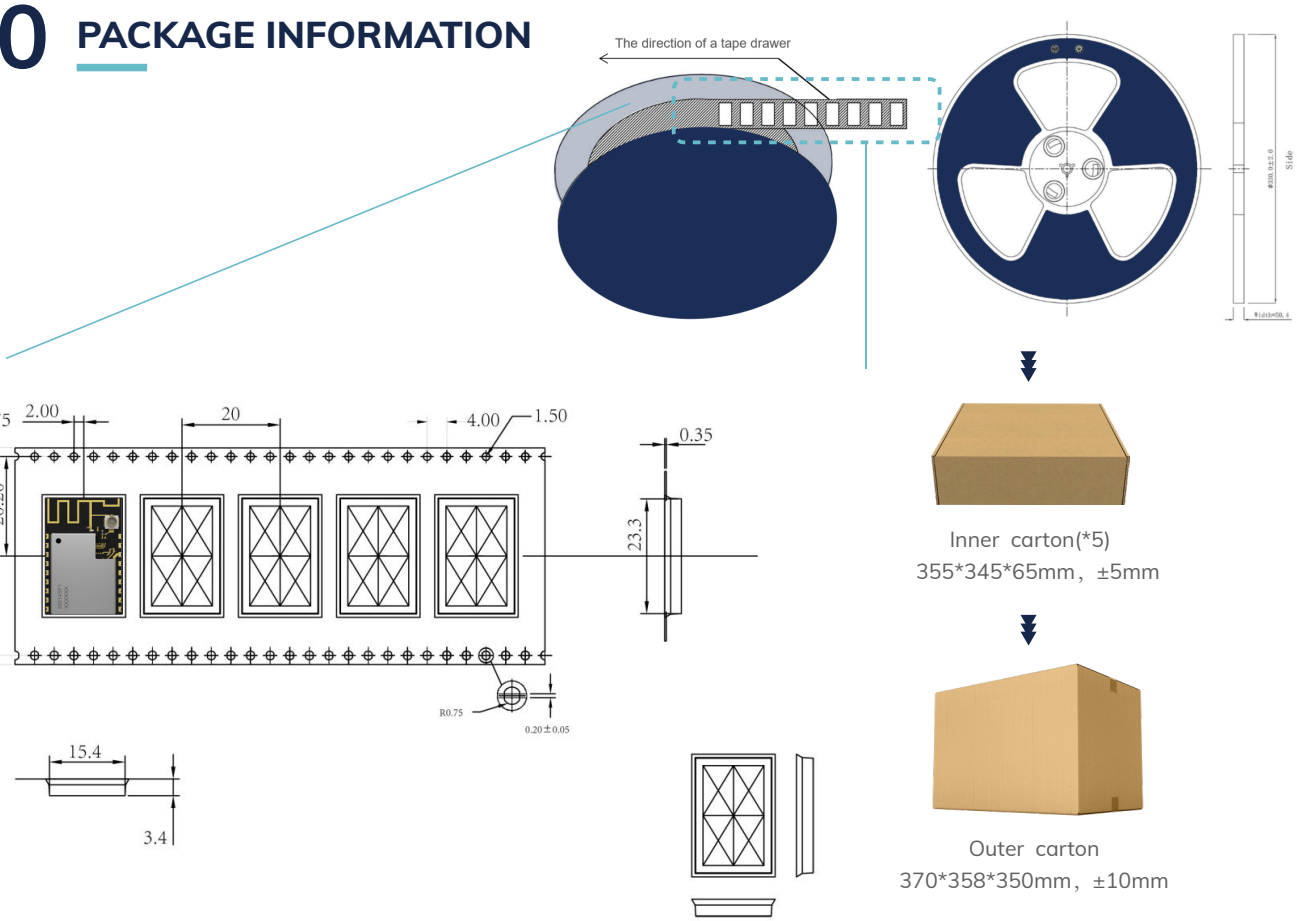
9 REFLOW AND SOLDERING

1) Perform SMT according to the reflow oven temperature profile provided below, with a maximum temperature of 260°C;
2) Follow IPC/JEDEC standards; Peak temperature: < 260°C; Number of reflows: ≤2 times; For SMT involving double-sided placement, it is recommended that the module side undergoes reflow soldering only once. For any special processes, please contact our company.



3) Suggesting to make 0.2mm thickness of module SMT for partial ladder steel mesh, then make the opening extend 0.8mm
4)After opening, if the entire package is not used at once, it should be stored in a vacuum to prevent long-term exposure to air, which can cause moisture absorption and pad oxidation. If there is a gap of 7 to 30 days before reuse, it is recommended to bake the tape at 65-70°C for 24 hours without unrolling it before returning to SMT.
5) ESD protection measures should be implemented before using SMT.

10 PACKAGE INFORMATION



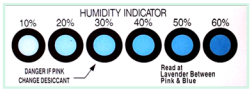
Inner carton(*5)
355*345*65mm，±5mm

Outer carton
370*358*350mm，±10mm

Remarks

General material list for FCL packaging:

Carrier tape packaging tray



Humidity Indicator
(1 pcs/bag)

Desiccant
(placed in a vacuum bag)

Vacuum bag

Inner carton(*5)
355*345*65mm，±5mm

Outer carton
370*358*350mm，±10mm

Other:

Moisture-proof label (attached to the vacuum bag)

Certification label (attached to the vacuum bag)

Outer box label

Default unit：mm Default tolerance：±0.1

Packing detail	Specification	Net weight	Gross weight	Dimension
MS14SF1	900PCS	1260g	2656g	W=44mm，T=0.35mm

Note: Default weight tolerance all are within 10g（except the special notes）

11 STORAGE CONDITIONS

- **Please use this product within 6 months after signing the receipt.**
  - This product should be stored without opening the package at an ambient temperature of 5~35°C and a humidity of 20~70%RH.
  - This product should be left for more than 6 months after receipt and should be confirmed before use.
  - The product must be stored in a non-corrosive gas (Cl2, NH3, SO2, NOx, etc.).
  - To avoid damaging the packaging material, do not apply any excessive mechanical shocks, including but not limited to sharp objects adhering to the packaging material and product dropping.

- **This product is suitable for MSL2 (based on JEDEC standard J-STD-020).**
  - After opening the package, the product must be stored at ≤30°C/<60%RH. It is recommended to use the product within 3-6 months after opening the package.
  - When the color of the indicator in the package changes, the product should be baked before welding.

- **Baking is not required for one year if exposure is limited to <30°C and 60%RH. Refer to MSL2 for exposure criteria for moisture sensitivity level. If exposed to (≥168h@85°C/60%RH) conditions or stored for more than one year, recommended baking conditions.**
  1. 120 +5/-5°C, 8 hours, 1 time
  Products must be baked individually on heat-resistant trays because the materials (base tape, reel tape, and cover tape) are not heat-resistant, and the packaging material may be deformed at temperatures of 120℃;
  2、90℃ +8/-0℃，24hours，1times
  The base tape can be baked together with the product at this temperature. Please pay attention to the uniformity of heat.

12 HANDLING CONDITIONS

• Be careful in handling or transporting products because excessive stress or mechanical shock may break products.

• Handle with care if products may have cracks or damages on their terminals. If there is any such damage, the characteristics of products may change. Do not touch products with bare hands that may result in poor solder ability and destroy by static electrical charge.

13 QUALITY

Cognizant of our commitment to quality, we operate our own factory equipped with state-of-the-art production facilities and a meticulous quality management system. We hold certifications for ISO9001, ISO14001, ISO27001, OHSA18001, BSCI.

Every product undergoes stringent testing, including transmit power, sensitivity, power consumption, stability, and aging tests. Our fully automated module production line is now in full operation, boasting a production capacity in the millions, capable of meeting high-volume production demands.

14 COPYRIGHT STATEMENT

This manual and all the contents contained in it are owned by Shenzhen Minewsemi Co., Ltd. and are protected by Chinese laws and applicable international conventions related to copyright laws.

The certified trademarks included in this product and related documents have been licensed for use by MinewSemi. This includes but is not limited to certifications such as BQB, RoHS, REACH, CE, FCC, BQB, IC, SRRC, TELEC, WPC, RCM, WEEE, etc. The respective textual trademarks and logos belong to their respective owners. For example, the Bluetooth® textual trademark and logo are owned by Bluetooth SIG, Inc. Other trademarks and trade names are those of their respective owners. Due to the small size of the module product, the "®" symbol is omitted from the Bluetooth Primary Trademarks information in compliance with regulations.

The company has the right to change the content of this manual according to the technological development, and the revised version will not be notified otherwise. Without the written permission and authorization of the company, any individual, company, or organization shall not modify the contents of this manual or use part or all of the contents of this manual in other ways. Violators will be held accountable in accordance with the law.

15 RELATED DOCUMENTS

- nRF7002_Chip_Datasheet
  https://en.minewsemi.com/file/nRF7002_Chip_Datasheet_EN.pdf
- MinewSemi_Product_Naming_Reference_Manual_V1.0
  https://en.minewsemi.com/file/MinewSemi_Product_Naming_Reference_Manual_EN.pdf
- MinewSemi_Connectivity_Module_Catalogue_V2.0
  https://en.minewsemi.com/file/MinewSemi_Connectivity_Module_Catalogue_EN.pdf

For product change notifications and regular updates of Minewsemi documentation, please register on our website: **www.minewsemi.com**

MINEWSEMI
Innovative IoT Module Expert

SHENZHEN MINEWSEMI CO., LTD.

0086-755-2801 0353
https://minewsemi.com
minewsemi@minew.com
https://store.minewsemi.com
Gangzhilong Technology Park, Qinglong Road, Longhua District, Shenzhen