



WiFi 6+BLE 5.3 Combo Module MS12SF1

Specification V1.0

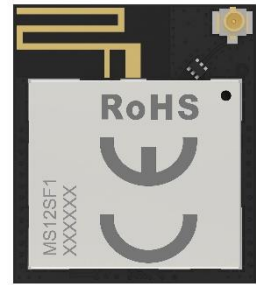
MineWsemi

- ◆ Subsidiary of MineW Technologies
- ◆ Nordicsemi Strategy Partner
- ◆ Bluetooth SIG Associated Member
- ◆ Fira Alliance Adopter Member

Nordic nRF7002+nRF5340

WiFi 6+BLE 5.3 Combo Module

MS12SF1



PCB +IPEX

MS12SF1 WiFi6+BLE Combo Module adopts integrated nRF7002 and nRF5340 chip, supports BLE mode, at the same time supports WiFi6 dual-band connection, 2.4G and 5G function, adopts WiFi and BLE independent antenna design, have no crosstalk between functions. One device can support two wireless connection mode of WiFi and BLE.

MS12SF1 Basic Parameters

Serial Model	MS12SF1	Antenna	PCB+IPEX
Chip Model	Nordic nRF7002+nRF5340	Module size	27x23.5x2.4mm
Storage Capacity	1MB+256kB	RAM	512kB+64kB
Receiving Sensitivity	-98dBm	Transmission Power	21dBm
Current(TX)	2.4G-191mA 5G-260mA	Current(RX)	2.4G-56mA 5G-58mA
GPIO	29	Firmware	/
Application	Smart home , Intelligent wearable device, Consumer electronics, Intelligent medical, Security equipment, Automotive equipment, Sports fitness equipment, Instruments and apparatuses		

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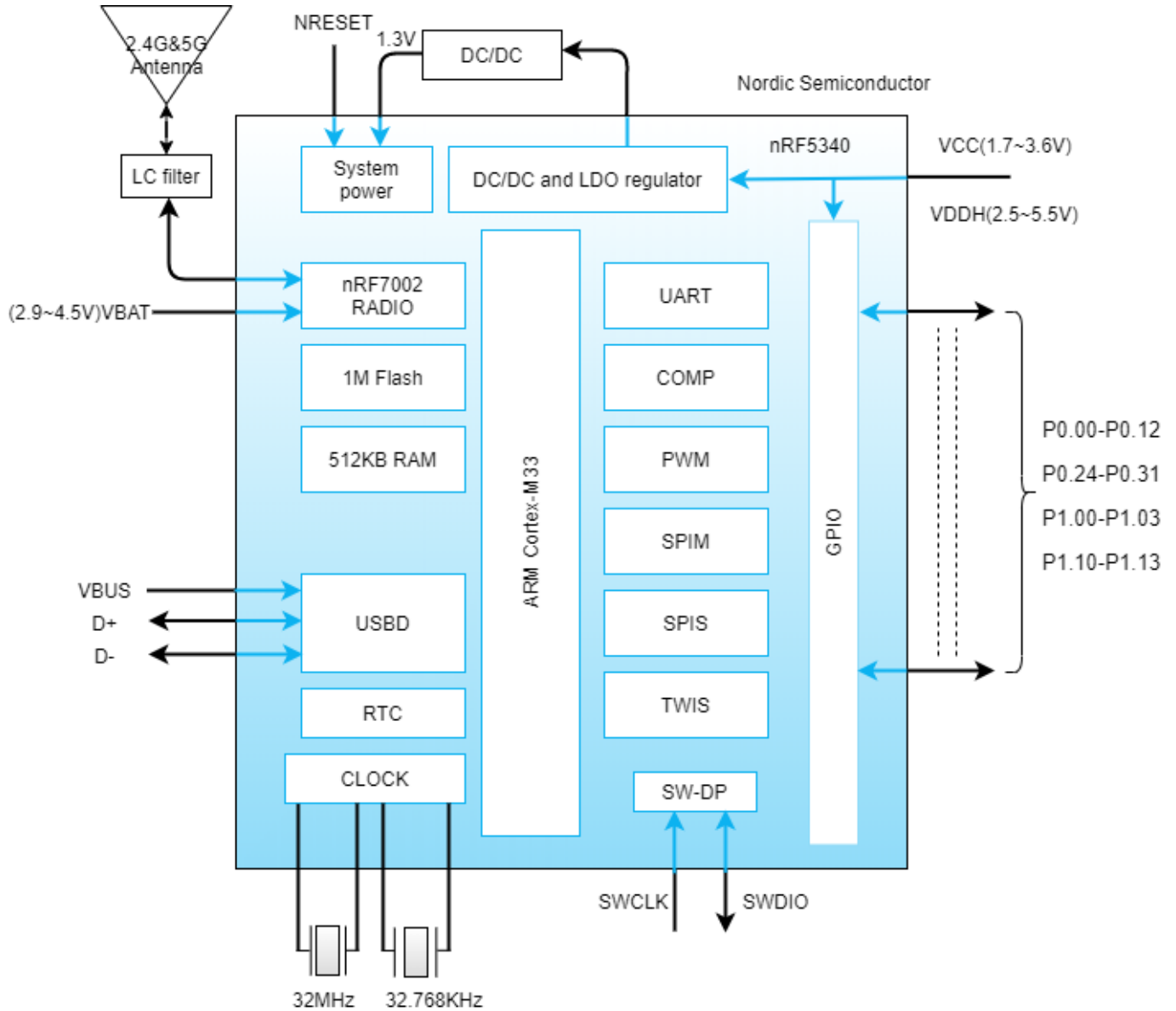
1 Product Introduction

The WiFi + BLE Combo module that supports WiFi6 dual-frequency connection, 2.4G and 5G 1T1R, Maximum WiFi speed 86mbps, output Maximum power up to 21dBm, receiving current in 2.4G frequency region is 56mA, while in 5G frequency region is 58mA, meanwhile supports BLE master/slave mode and passthrough mode, adopts WiFi and BLE independent design, no crosstalk.

Feature:

- Support WiFi 6 double frequency connection, 2.4G and 5G 1T1R
- Support BLE 5.3 pass-through
- Double core
- Low power consumption
- High performance

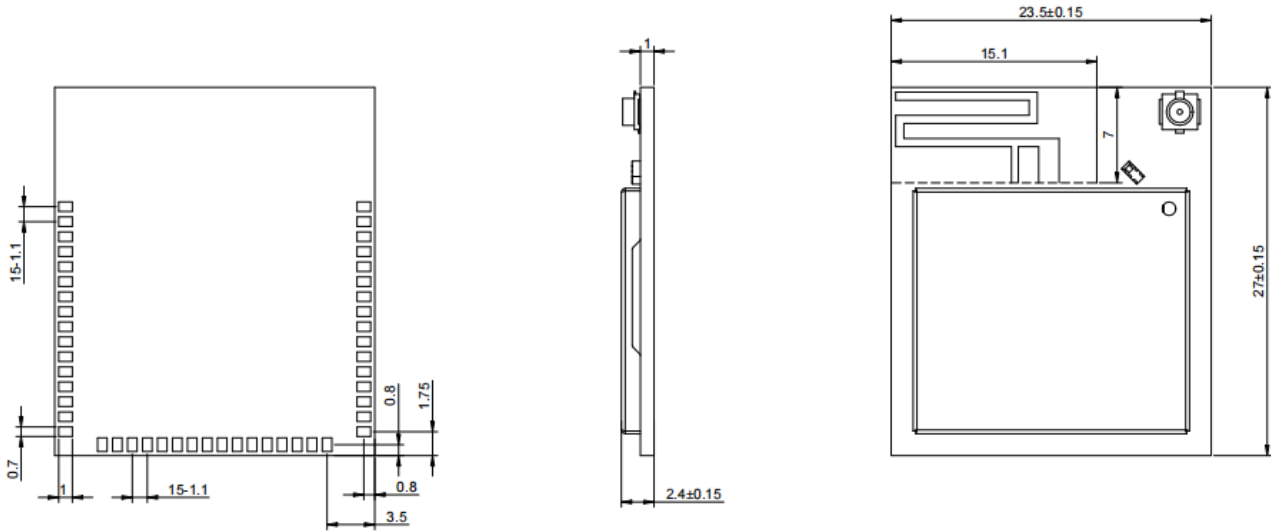
2 Block Diagram



3 Electrical Specification

Parameter	Value	Remark
Working voltage	1.7V-5.5V	To ensure RF, suggest BLE supply voltage not lower than 3.3V suggest WiFi supply voltage not lower than 3.6V
Working Temperature	-40°C~+85°C	
Transmission Power	BLE: -40 ~ +3dBm WiFi: 5~21dBm	Can set up
Current(RX)	2.4G-56mA 5G-58mA	
Current(TX)	2.4G-165mA 5G-244mA	BLE 2Mbps transmission
Module Dimension	27* 23.5* 2.4mm	
Quantity of IO interface	29	General purpose IO interface

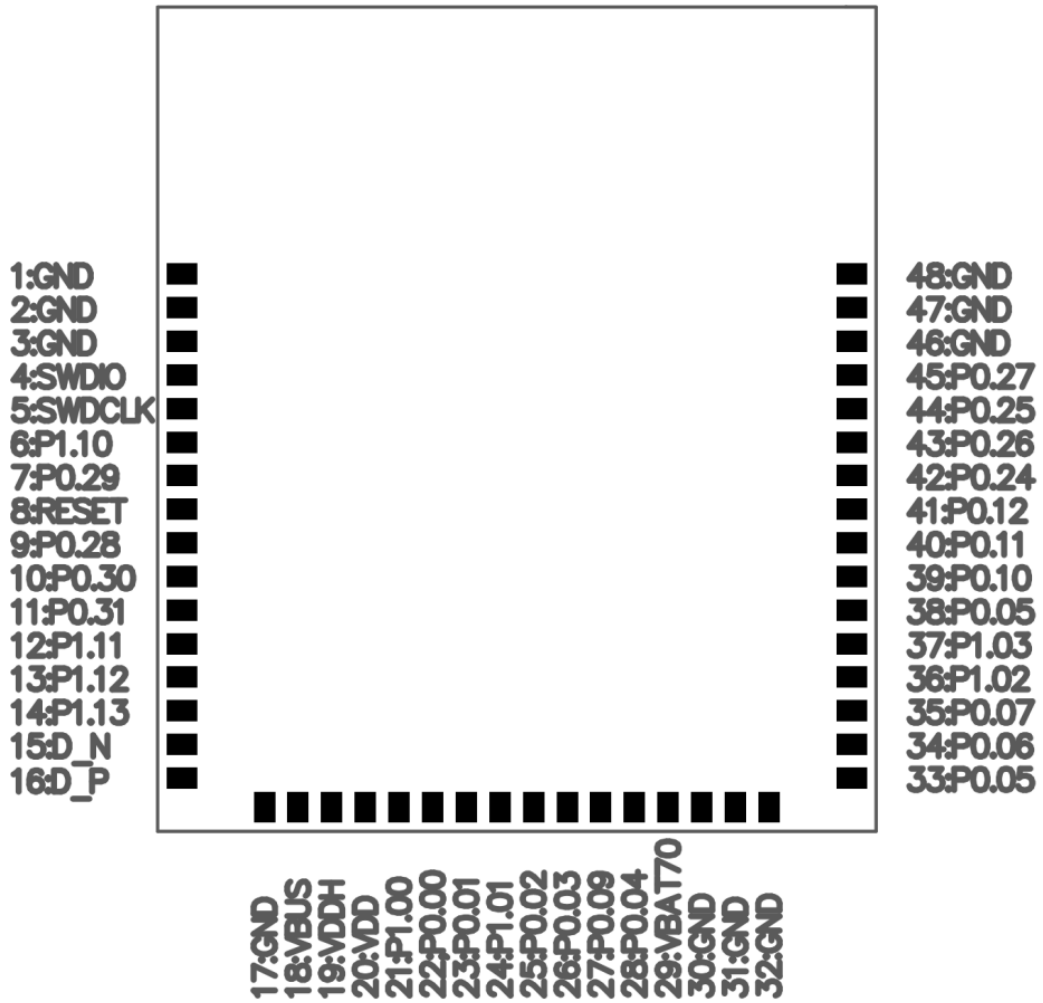
4 Mechanical Drawing



* (Default unit: mm Default tolerance: ±0.1)

Notice: Pad size suggest 2.54*0.65mm, Pad interval 1mm

5 Pin Description



6 Pin Definition

Symbol	Type	Description
VDD	Power positive pole	Supply electricity: 1.7V~3.6V
VDDH	GPIO	Supply electricity: 2.5V~5.5V
VBUS	Power source	USB interface acquired power input after conversion
GND	Power negative pole	Ground
SWDCLK/SWDIO	Debug	Use debug firmware
DCCH	Power	DC/DC converted output
P0.07-P0.12 P0.19-P0.31 P1.00-P1.15	GPIO	General purpose IO interface
D_P	USB port	USB D+
D_N	USB port	USB D-
RF	RF connection	Antenna signal connection
nRESET	Resetting	Pull up the resistor internally to reset

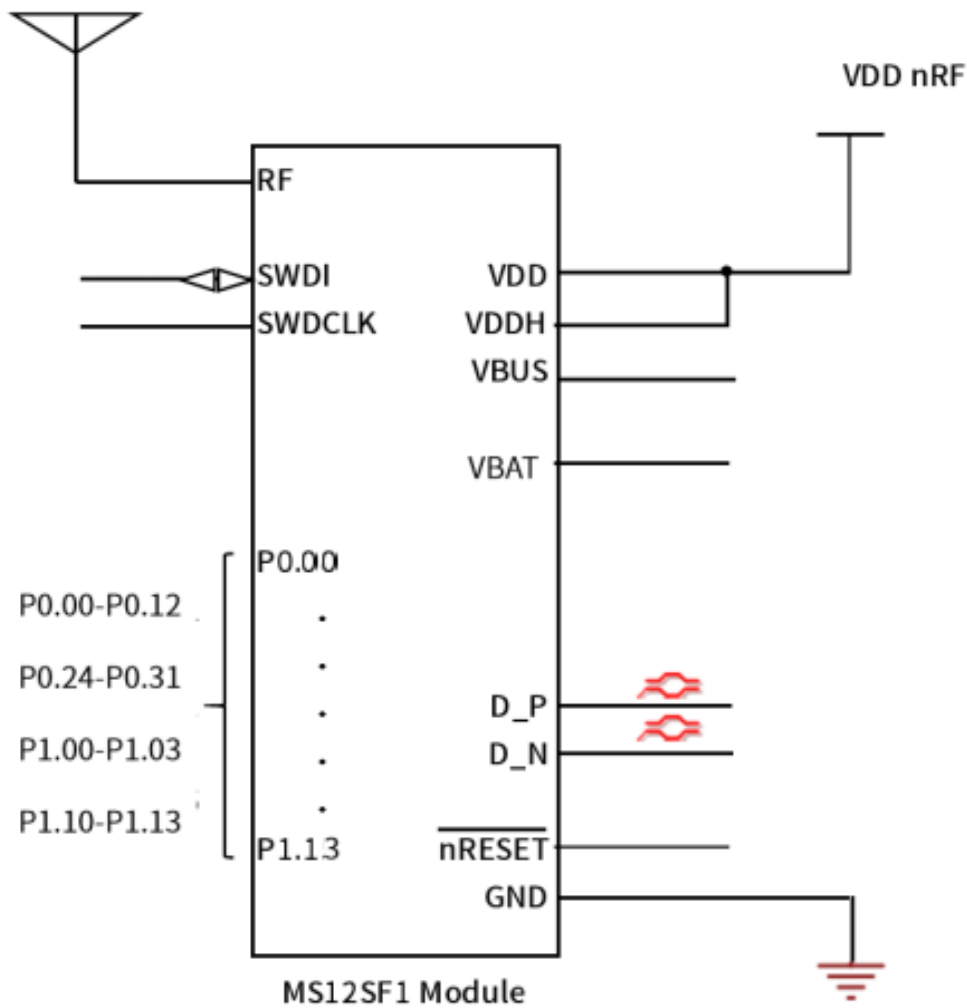
7 Module Usage

Power supply:

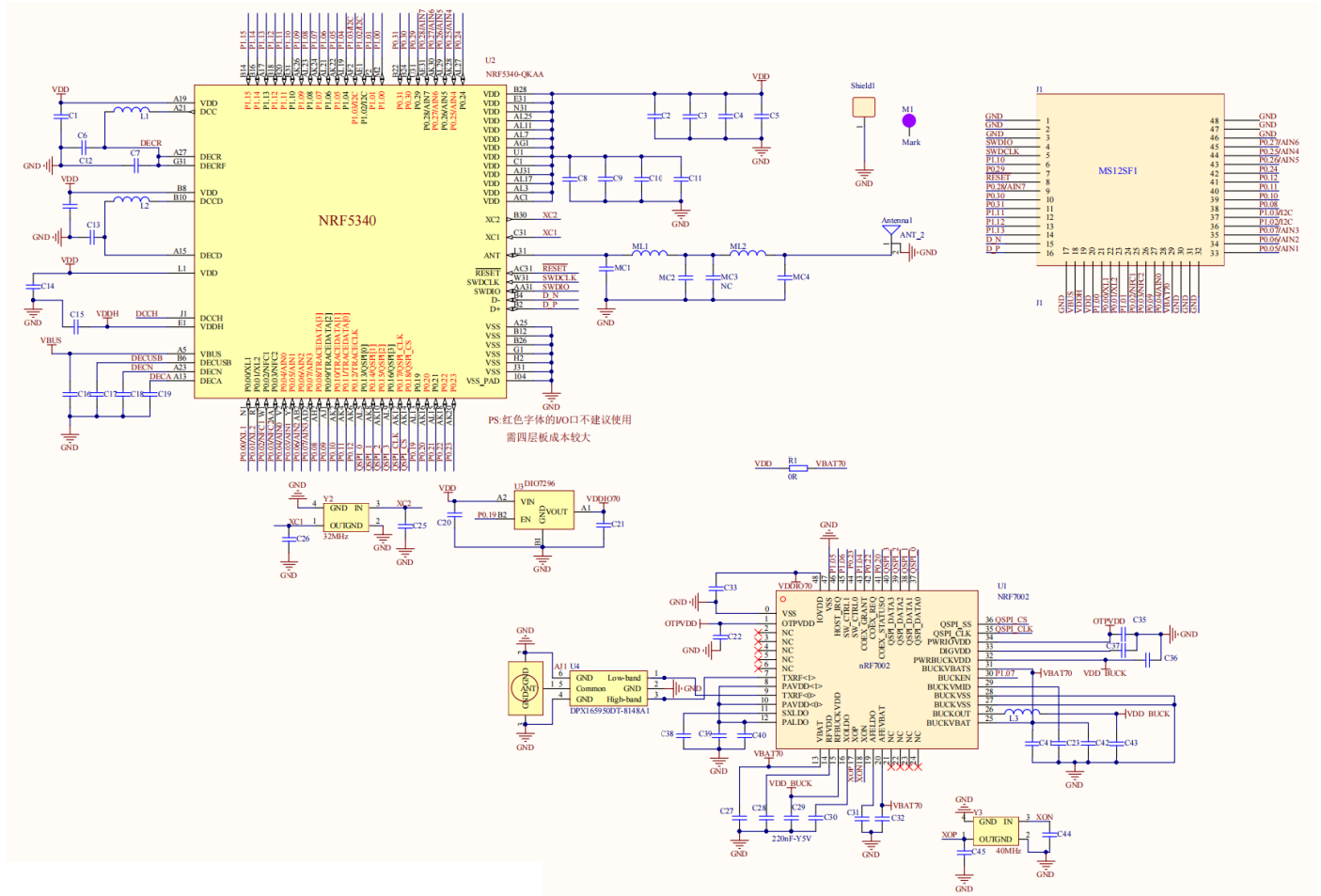
BLE Chip working voltage range is 2.7V to 3.6V, to ensure normal use, supply voltage range should be 3.0V to 3.6V as far as possible.

WiFi Chip working voltage range is 2.9V to 4.5V, to ensure normal use, supply voltage range should be 3.3V to 4.5V as far as possible.

8 Reference Design



9 Module schematic



10 PCB Layout

Module antenna area couldn't have GND plane or metal cross line, couldn't place components nearby. It is better to make hollow out or clearance treatment or place it on the edge of PCB board.

Notice: Refer to examples as below, and highly suggest to use the first design and the adjustment of modules antenna design according to the first wiring.

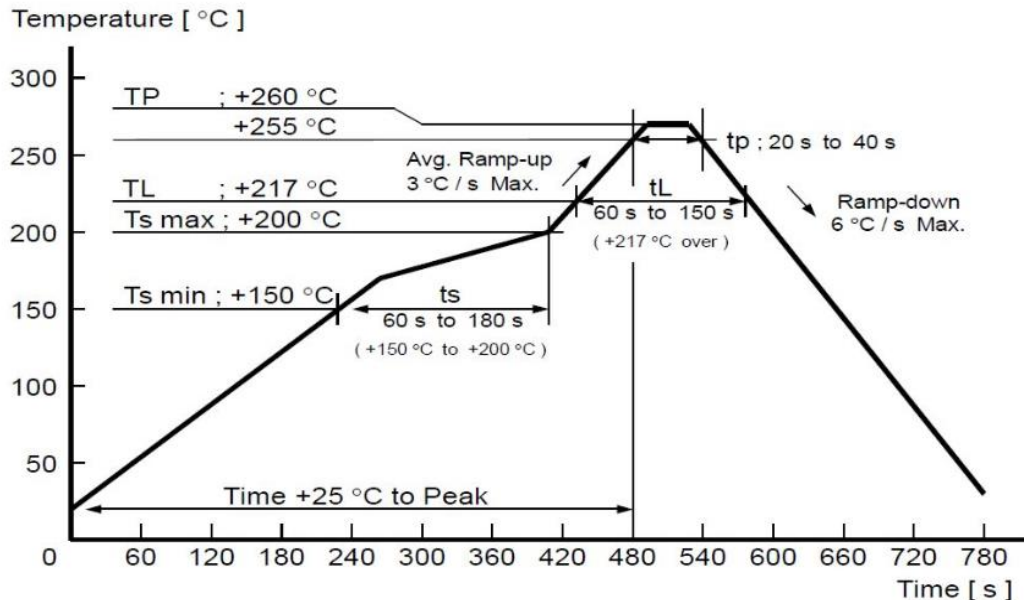


Layout notes:

- 1) Preferred Module antenna area completely clearance and not be prevented by metals, otherwise it will influence antenna's effect (as above DWG. indication).
- 2) Cover the external part of module antenna area with copper as far as possible to reduce the main board's signal cable and other disturbing.
- 3) It is preferred to have a clearance area of 4 square meter or more area around the module antenna (including the shell) to reduce the influence to antenna.
- 4) Device should be grounded well to reduce the parasitic inductance.
- 5) Do not cover copper under module's antenna in order to avoid affect signal radiation or lead to transmission distance affected.
- 6) Antenna should keep far from other circuits to prevent radiation efficiency reduction or affects the normal operation of other lines.
- 7) Module should be placed on edge of circuit board and keep a distance away from other circuits.
- 8) Suggesting to use magnetic beads to insulate module's access power supply.

11 Reflow and Soldering

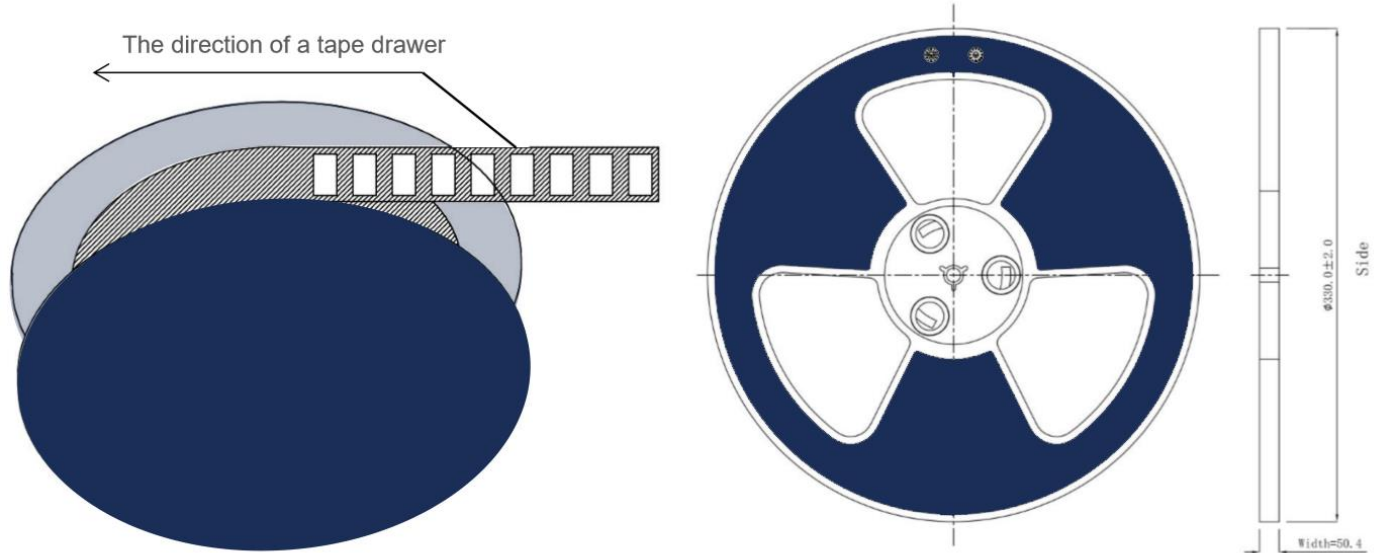
- 1) Do SMT according to above reflow oven temperature deal curve. Max. Temperature is 260°C. Refer to IPC/JEDEC standard; Peak TEMP<260°C; Times: ≤2 times, suggest only do once reflow soldering on module surface in case of SMT double pad involved. Contact us if special crafts involved.



- 2) Suggesting to make 0.2mm thickness of module SMT for partial ladder steel mesh, then make the opening extend 0.8mm
- 3) After unsealing, it cannot be used up at one time, should be vacuumed for storage, couldn't be exposed in the air for long time. Please avoid getting damp and soldering-pan oxidizing. If there are 7 to 30 days interval before using online SMT, suggest to bake at 65-70 °C for 24 hours without disassembling the tape.
- 4) Before using SMT, please adopt ESD protection measure.

12 Package Information

12.1 Package dimension



* (Default unit: mm Default tolerance: ± 0.1)

Packing detail	Specification	Net weight	Gross weight	Dimension
Quantity	650PCS	1042g	1512g	W=44mm, T=0.35mm

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

12.2 Part number description

Each module is with different code no. To devine whether with 32.768k or not, with on-board antenna or external antenna, the code no. will be marked on the metal shield, description as below:

Part No. in the first line		MS12SF1	Part No. in the second line		8Y40AI
MS12SF1	Module code				
1	Antenna category		1		PCB antenna
			2		Ceramic antenna (Chip antenna)
			3		IPEX connector (1st Gener)
Y	Low-frequency crystal oscillator		Y		With 32.768K Crystal Oscillaor
			N		Without 32.768K Crystal Oscillator
10	SoC		05		m1805, nRF52805
			08		TLSR8208
			10		nRF52810
			20		nRF52820
			32		nRF52832
			33		nRF52833
			40		nRF52840, nRF5340
			C3		ESP32-C3FN4
A	SoC Package		A		=AA
			B		=AB
			C		=AC
I	Module RF signal Output		I		Internal
			E		External

13 Quality Disclaimer

The factory has passed the ISO9001 quality management system, ISO14001 environmental management system and OAHS18001 occupational health and safety assessment . Each product has been rigorously tested (transmission power test, sensitivity test, power consumption test, stability test, aging test, etc.).

14 Revision History

Version	Content change	Changed by	Date	Remark
1.0	First edition	Vinle	2022.12.21	Original version
1.1	Amend GPIO	Vinle	2023.02.16	Revised

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