

Bluetooth Module

MS51SF1

Specification V1.0

MinewSemi

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

Nordic nRF52833

Bluetooth Module

MS51SF1



PCB Antenna

The nRF52833 in the module is a cost-effective and low-power loss SOC solution that fit for Bluetooth low-power loss' application. It owns a RF transceiver of Cortex-M4F ARM core operating at speed of 64Mhz. Besides, it has 512kB FLASH programmer space, 128kB RAM and other matching powerful resources.

MS51SF1 Basic parameter			
Model	MS51SF1	Antenna	PCB
Chip Model	Nordic nRF52833	Module Dimension	9.8×8.4×2mm
Storage Capacity	512kB	RAM	128kB
Receiving Sensitivity	-96dBm	Emission Power	-40~+8dBm
RF Current	0dBm-4.9mA	Receiving Current	4.6mA
GPIO	20	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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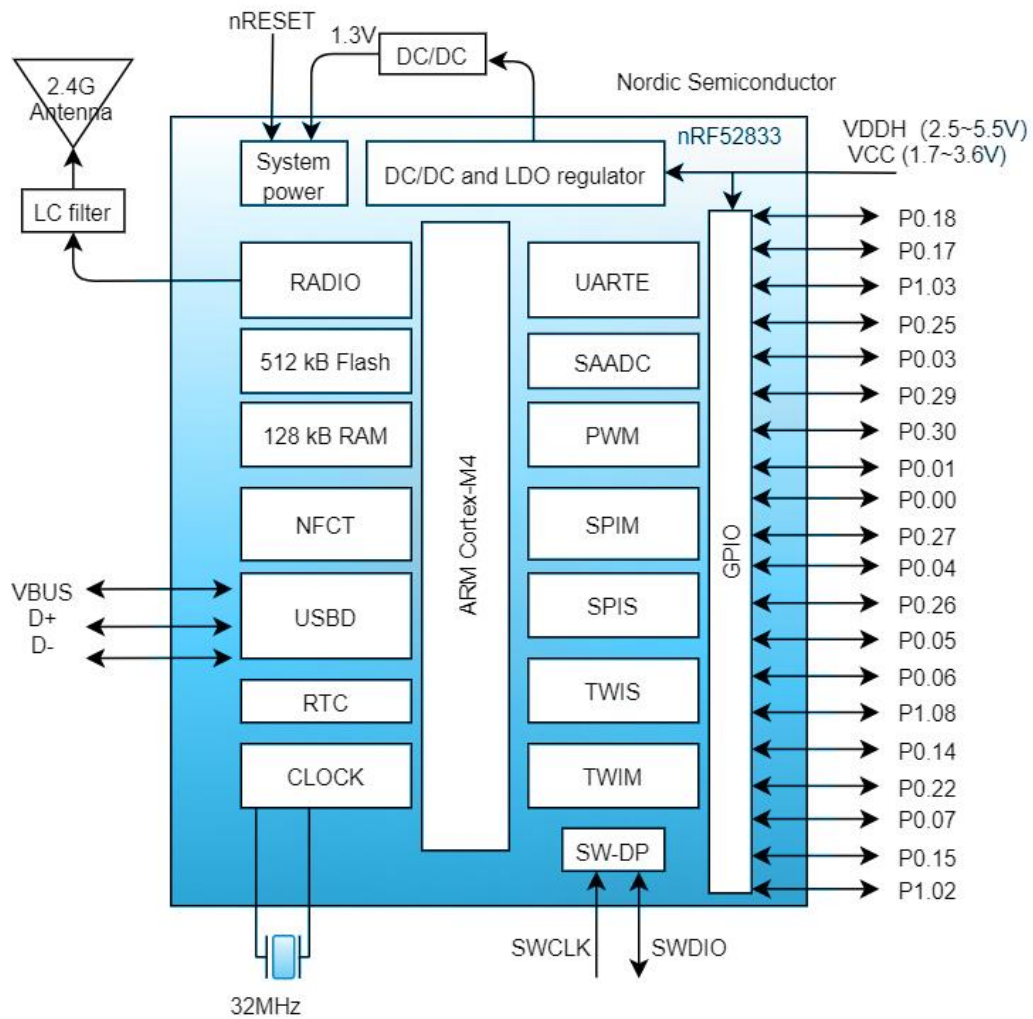
1 Product Introduction

MS51SF1 is a very tiny BLE5.2 module base on highly flexible nRF52833 SoC. The strong 32-bit ARM Cortex™ M4F CPU, 512kB Flash, 128kB RAM and integrated 2.4GH transceiver inside can provide wonderful solutions for bluetooth connecting. The chip nRF52833 is able to support ANT, BLE, BLE MESH, ZIGBEE and THREAD protocols, etc. What makes product work in environment with strict requirement on product is the tiny size of 9.8*8.4mm, PCB antenna, design of ANT pin connect external antenna.

Features:

- Bluetooth 5.2
- Minimize 9.8mm*8.4mm*2mm
- High performance
- Support ANT, BLE, BLE MESH, ZIGBEE and THREAD protocols, etc.

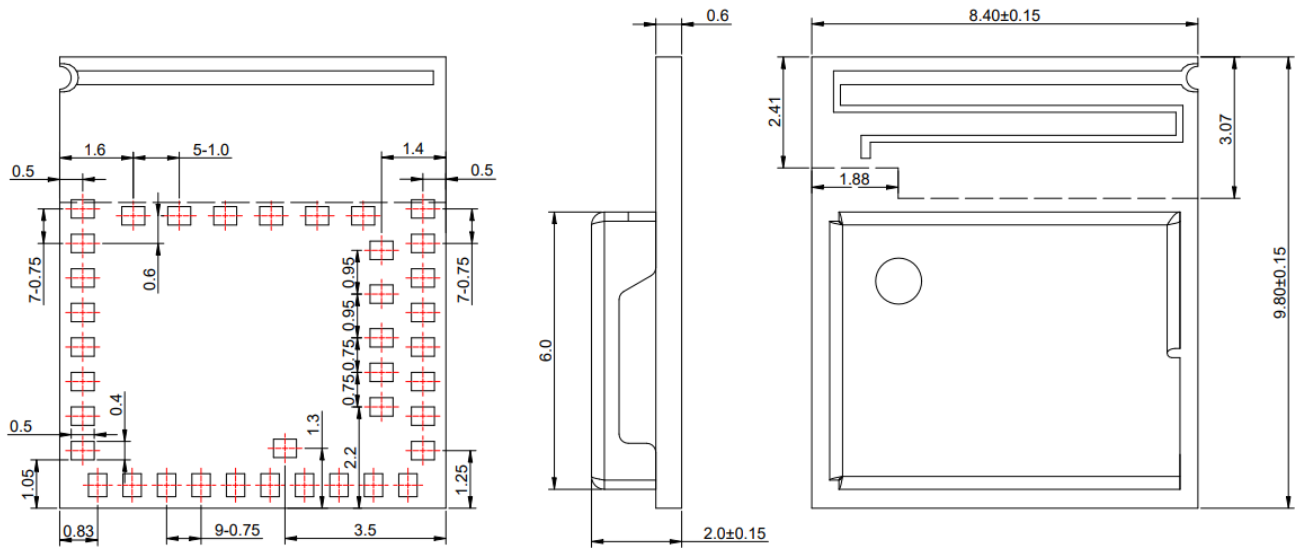
2 Block Diagram



3 Electrical Specification

Parameter	Values	Notes
Working Voltage	1.7V-5.5V	To ensure RF work, supply voltage suggest not lower than 2.3V
Working Temperature	-40°C~+85°C	Storage temperature is -40°C~+125°C
Transmission Power	-40 ~ +8dBm	Configurable
Current(RX)	4.6mA	RF receiving current under 1Mbps pattern
Current(TX)	4.8mA	RF transmission current under odB pattern
Module Dimension	9.8*8.4*2mm	
Quantity of IO Port	20	

4 Mechanical Drawing

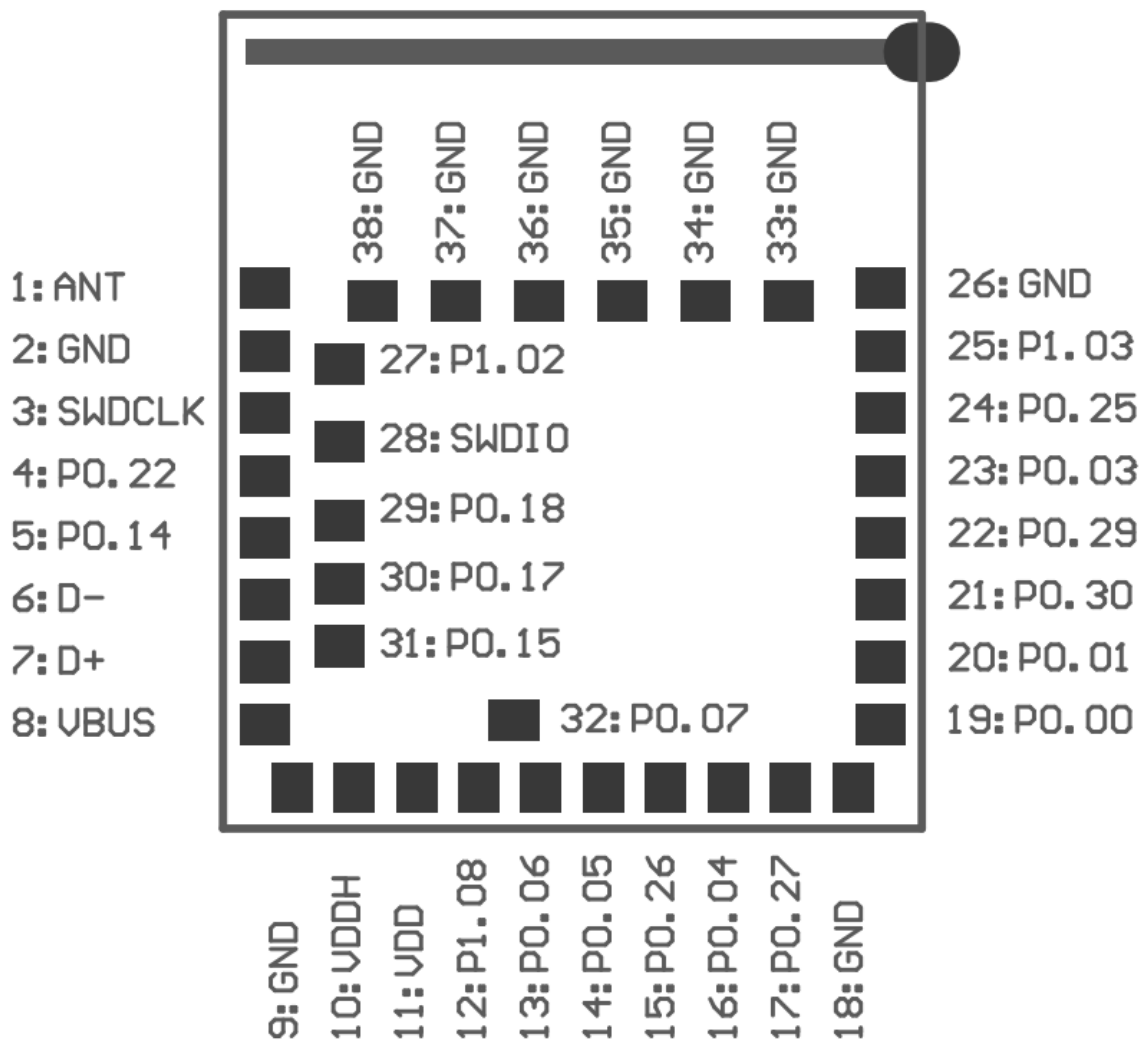


* (Default unit: mm Default tolerance: ±0.1)

Notice: Recommended pad size 0.5*0.4mm

5 Pin Description

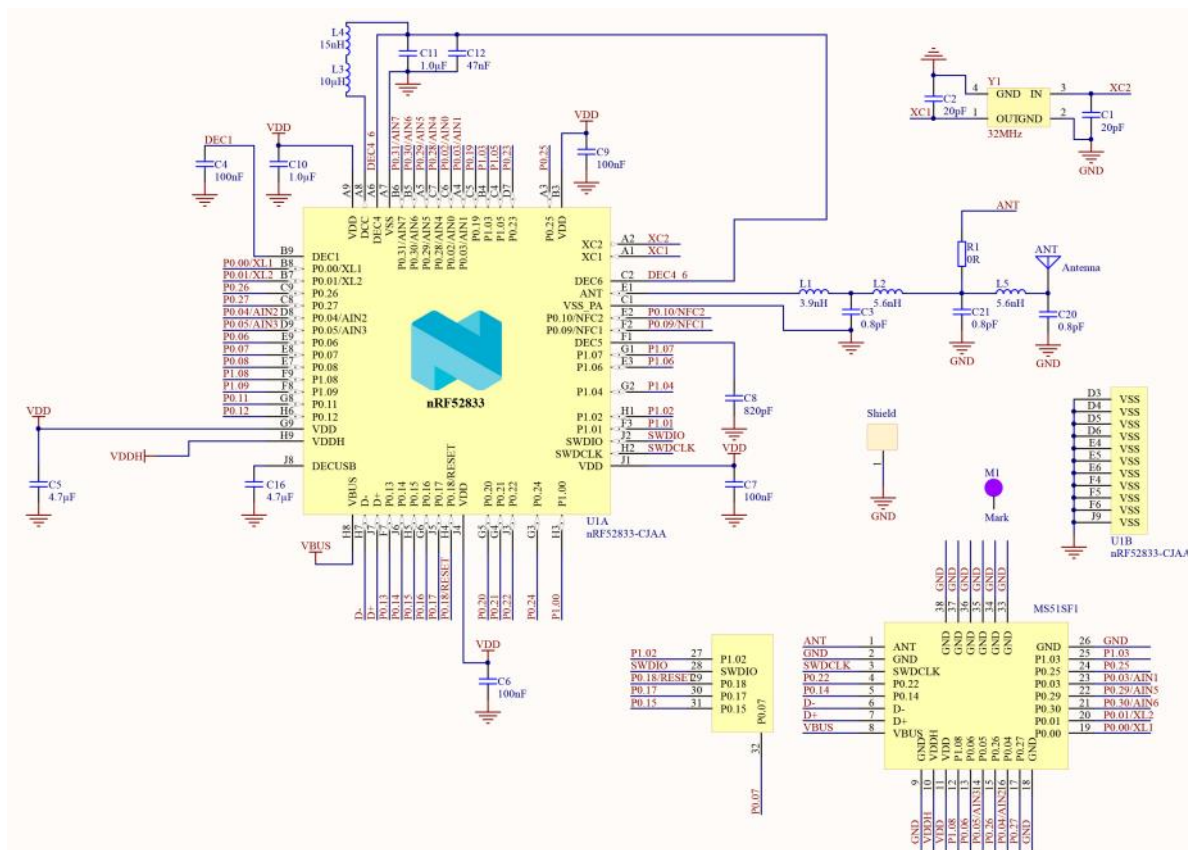
(Top View)



6 Pin Definition

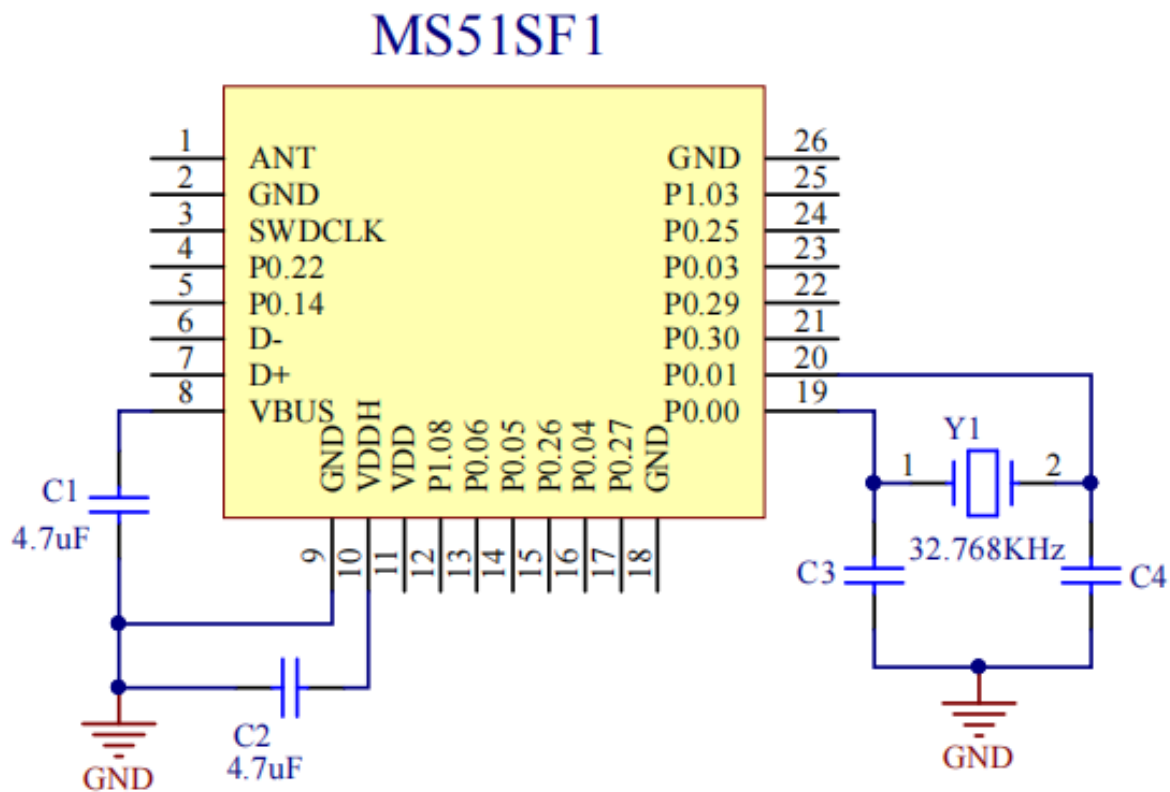
Symbol	Type	Description
VDD	Power source	Power supply: 1.7V-3.6V, short-circuit VDD and VDDH to use the pin to supply power
VDDH	Power source	Power supply: 2.5V-5.5V, When supply 5V electricity, use this pin to supply power, not connect VDD pin
GND	Ground	Ground
SWCLK/SWDIO	Debug	Debug, when debug only need to connect power supply pin, ground and these 2 pins.
P0.00-P0.30 P1.02-P1.08	I/O	I/O port for general purpose
VBUS	Power source for USB port	5V input current for USB 3.3V modulator Need to supply 5V current and short-circuit this pin with VDDH.
D+	Digital interface	USB D+
D-	Digital interface	USB D-

7 Electrical Schematic



8 Reference Design

The Module doesn't have 32.768kHz oscillator. To use it, add it as shown below:



9 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.

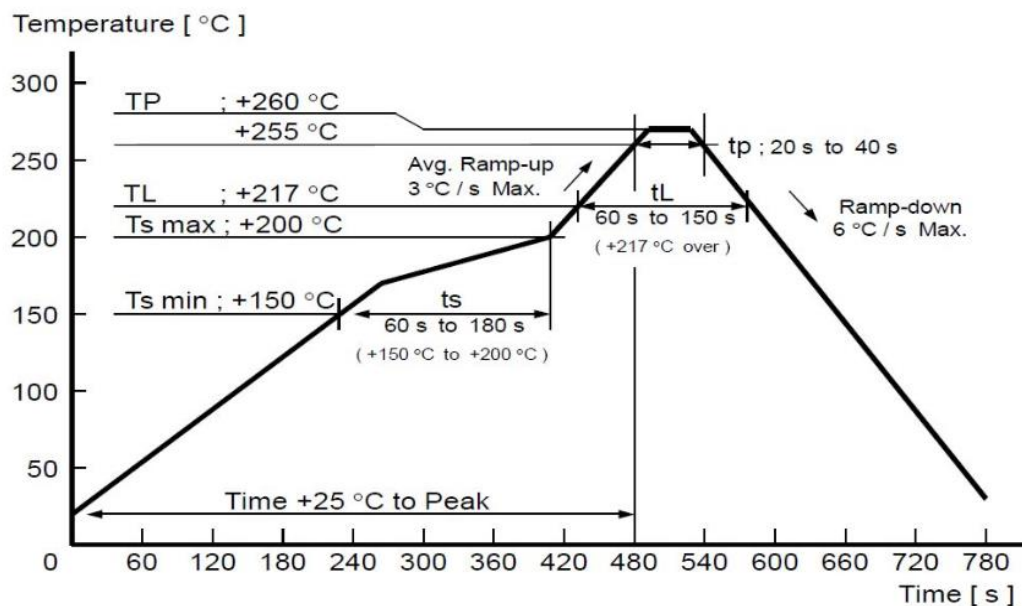


Layout notes:

- 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.

10 Reflow and Soldering

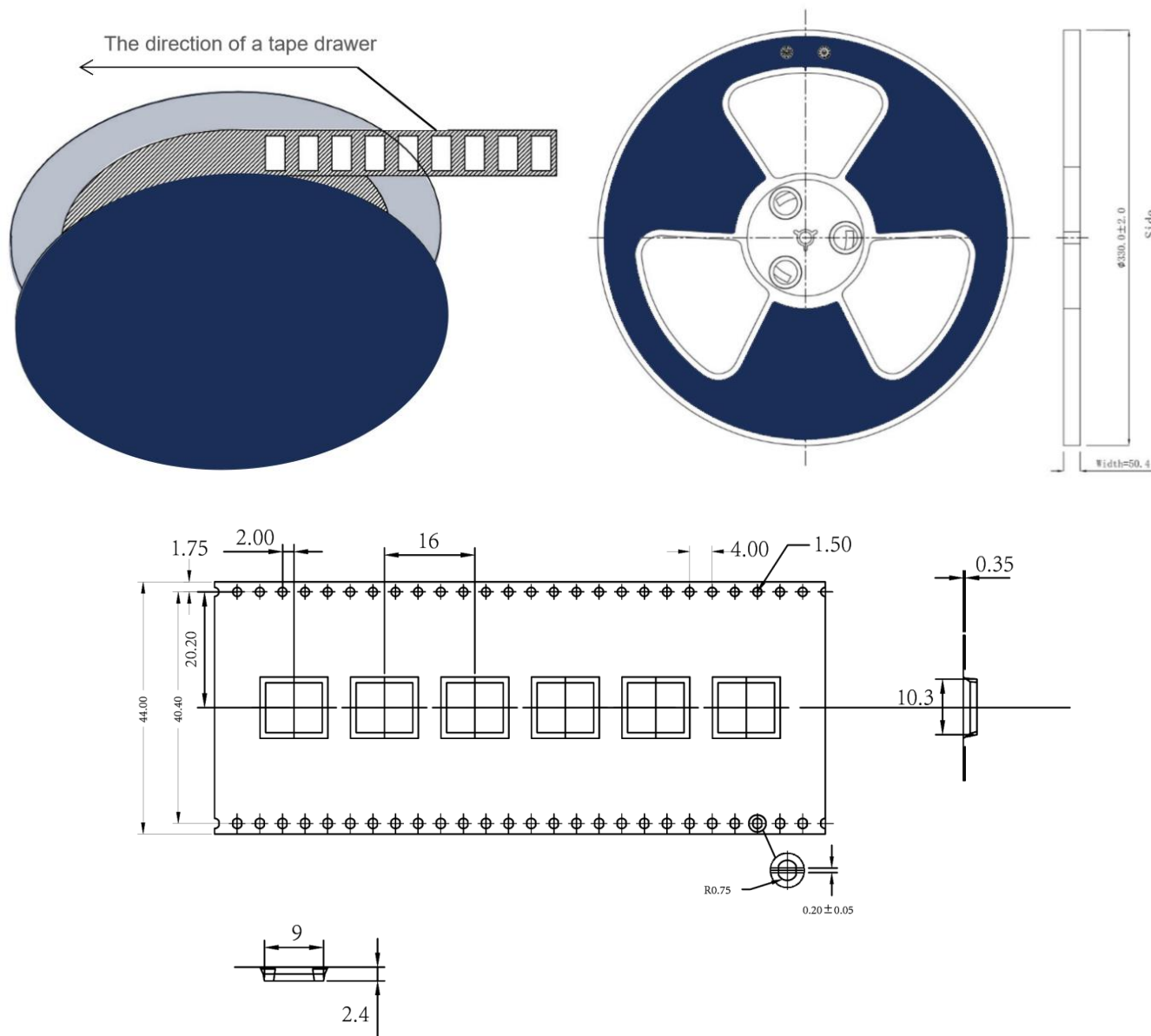
- 1) Do SMT according to above reflow oven temperature deal curve. Max. Temperature is 260°C; Refer to IPC/JEDEC standard; Peak TEMP<260°C; Times: ≤2 times, suggest only do once reflow soldering on module surface in case of SMT double pad involved. Contact us if special crafts involved.



- 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.

11 Package Information

11.1 Package dimension



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

Packing detail	Specification	Net weight	Gross weight	Dimension
Quantity	1300PCS	420g	1000g	W=44mm, T=0.35mm

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

11.2 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		MS51SF1	Part No. in the second line	1N33AIR
MS51SF1	Module code			
1	Antenna category		1	PCB antenna
			2	Ceramic antenna (Chip antenna)
			3	IPEX Connector (1st Generation)
N	Low-frequency crystal oscillator		Y	With 32.768K Crystal Oscillaor
			N	Without 32.768K Crystal Oscillator
33	SoC		05	m1805, nRF52805
			10	nRF52810
			20	nRF52820
			32	nRF52832
			33	nRF52833
			40	nRF52833, nRF5340
A	SoC Package		A	=AA
			B	=AB
			C	=AC
I	RF Signal Output		I	internal
			E	external
R	Packing mode		R	Reel tray
			T	Tray pallet

12 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.).

13 Revision History

Version	Change	Contributor	Date	Notes
1.0	First edition	Coral	2022.11.12	

● COPYRIGHT STATEMENT

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