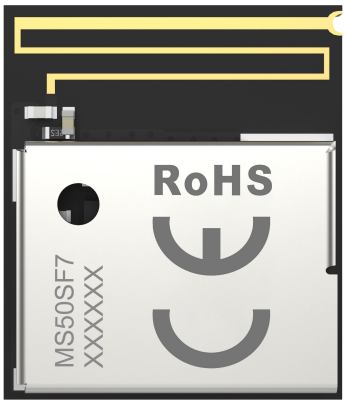
MINEWSEMI

Bluetooth Module

MS50SF7

Specification V1.0



MinewSemi

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

Nordic nRF52832 Bluetooth Module MS50SF7

PCB Antenna

The MS50SF7 is a surface-mount Bluetooth 5.0 module designed with the Nordic nRF52832 chip in a WLCSP package. It is a cost-effective and low-power System-on-Chip (SoC) solution, suitable for Bluetooth Low Energy applications with strict size requirements.

MS50SF7 Basic parameter			
Model	MS50SF7	**Antenna**	PCB
Chip Model	Nordic nRF52832	**Module Dimension**	9.8×8.4×2mm
Storage Capacity	512KB	**RAM**	64KB
Receiving Sensitivity	-96dBm	**Emission Power**	-40-+4dBm
RF Current	0dBm-5.3mA	**Receiving Current**	5.4mA
GPIO	24	**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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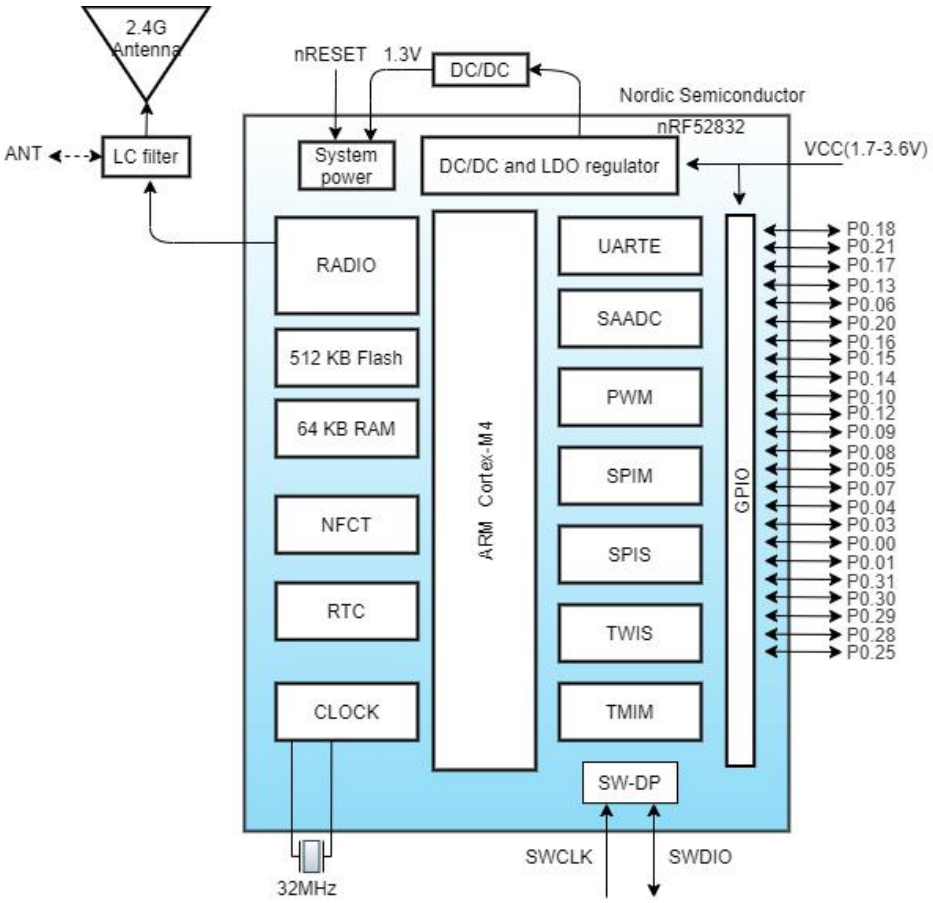
1 Product Introduction

The nRF52832 chip used in this module features an ARM Cortex-M4F RF transceiver with faster MCU operating speed, reaching up to 64MHz. It has 512KB of FLASH program space, 64KB of RAM, and other powerful resources. This chip is suitable for low-power systems, offering ultra-low sleep current and low power consumption during operation. The nRF52832 supports protocols such as ANT, Bluetooth Low Energy (BLE), BLE Mesh, Zigbee, and Thread. With its compact size of 9.8*8.4mm and built-in PCB antenna, it can be utilized in applications with strict size requirements. Additionally, it also allows for external antenna designs through the ANT pins.

Features:

- Bluetooth 5.0
- Extremely compact size: 9.8mm*8.4mm*2mm
- High performance
- Supports protocols such as ANT, Bluetooth Low Energy (BLE), BLE Mesh, Zigbee, and Thread

2 Block Diagram



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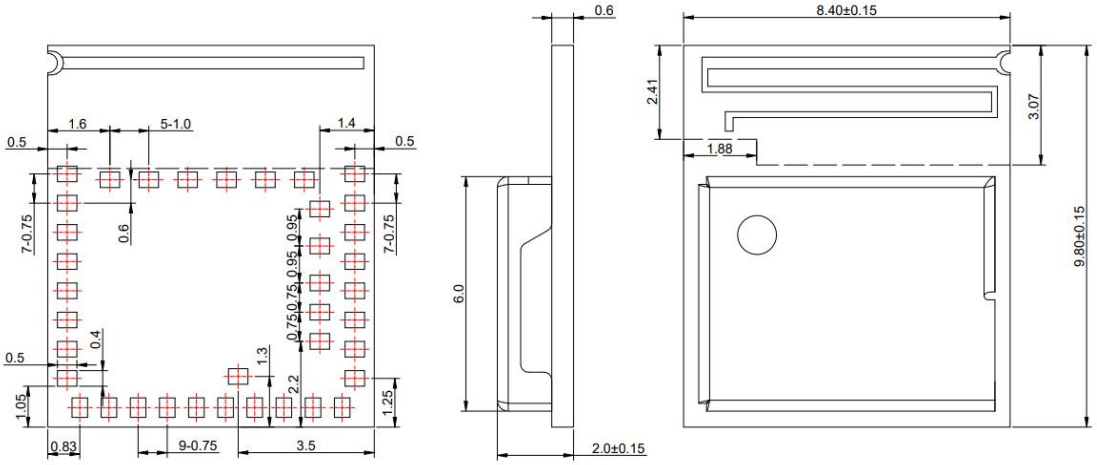
3 Electrical Specification

Parameter	Values	Notes
Working Voltage	1.7V-3.6V	To ensure RF work, supply voltage suggest not lower than 2.3V
Working Temperature	-40℃~+85℃	Storage temperature is -40℃~+125℃
Transmission Power	-40 ~ +4dBm	Configurable
Current(RX)	5.4mA	RF receiving current under 1Mbps pattern
Current(TX)	5.3mA	RF transmission current under odB pattern
Module Dimension	9.8*8.4*2mm	
Quantity of IO Port	24	

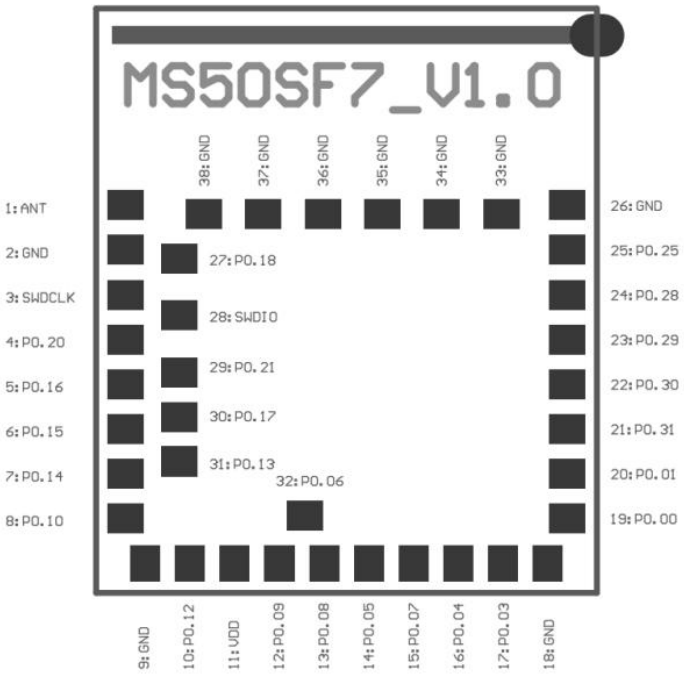
4 Mechanical Drawing



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

Notice：Recommended pad size 0.5*0.4mm

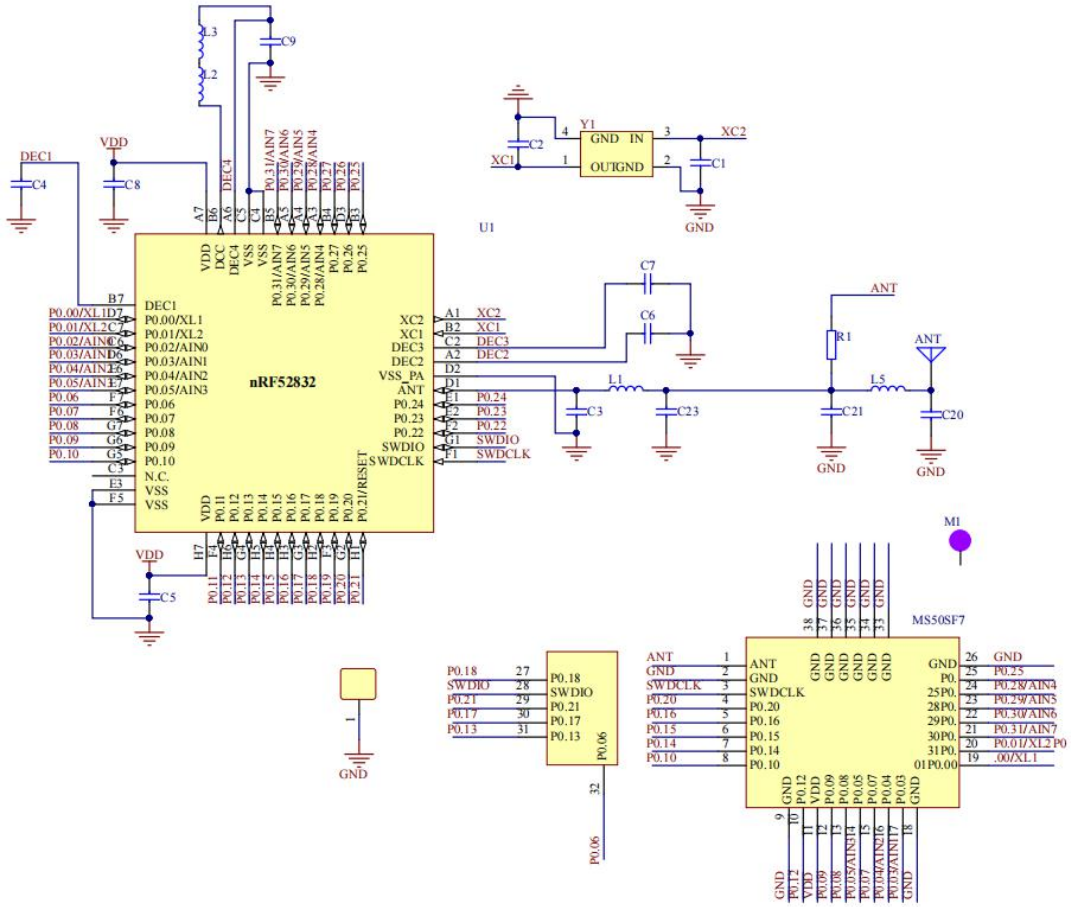
5 Pin Description



6 Pin Definition

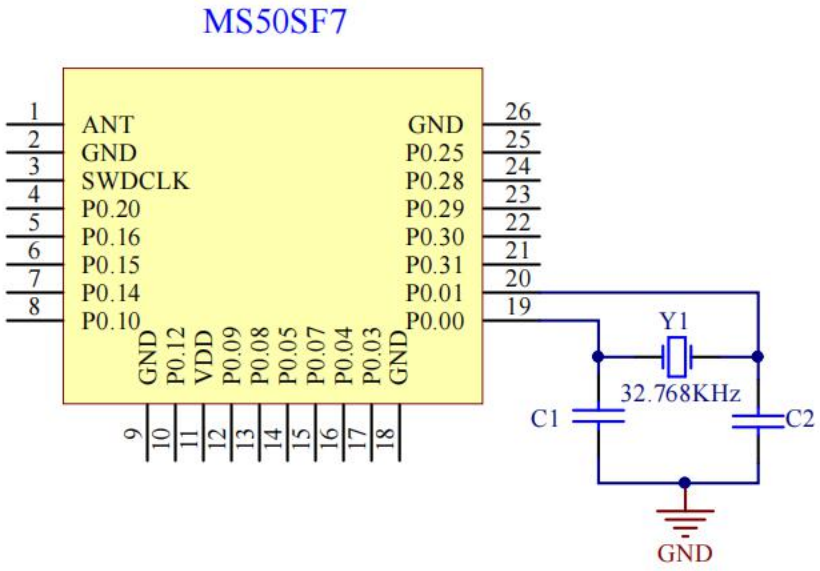
Pin Number	Symbol	Type	Description
1	ANT	External antenna pins	Using the module's built-in antenna, this pin is directly suspended. If not using the built-in antenna of the module, an external antenna can be connected through this pin. When using an external antenna, the resistor that is connected to the antenna needs to be horizontally soldered to this pin.
11	VDD	Power source	Power supply: 1.7V-3.6V, short-circuit VDD and VDDH to use the pin to supply power
2/9/18/26/33-38	GND	Ground	Ground
3/28	SWCLK/SWDIO	Debug	Debug, when debug only need to connect power supply pin, ground and these 2 pins.
4-8/10/12-17/19-25/27/29-32	P0.0-P0.1/ P0.3-P0.10/ P0.12-P0.18/ P0.20-P0.21/P0.25/ P0.28-P0.31	I/O	I0 port for general purpose

7 Electrical Schematic



8 Reference Design

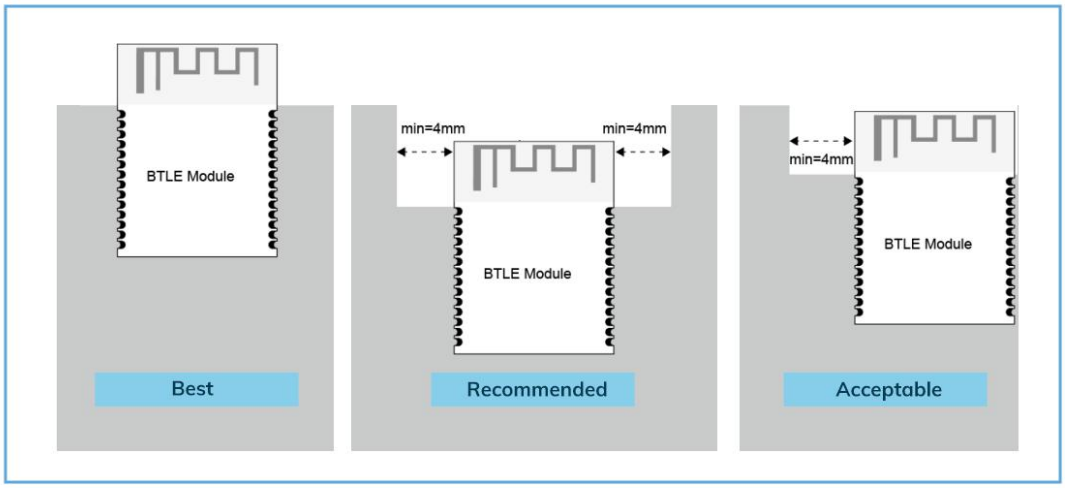
The Module doesn't have 32.768kHz oscillator. To use it, add it as shown below:

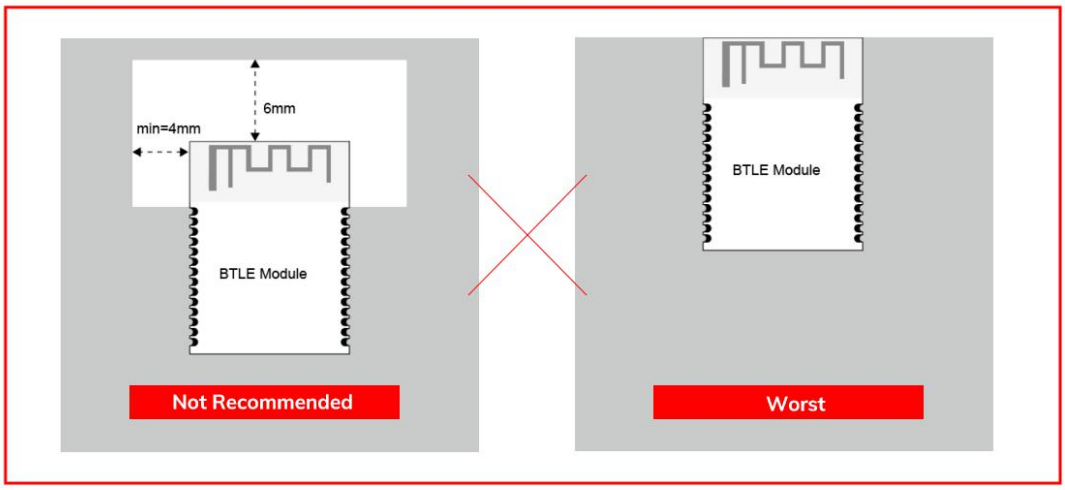


9 PCB Layout

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.





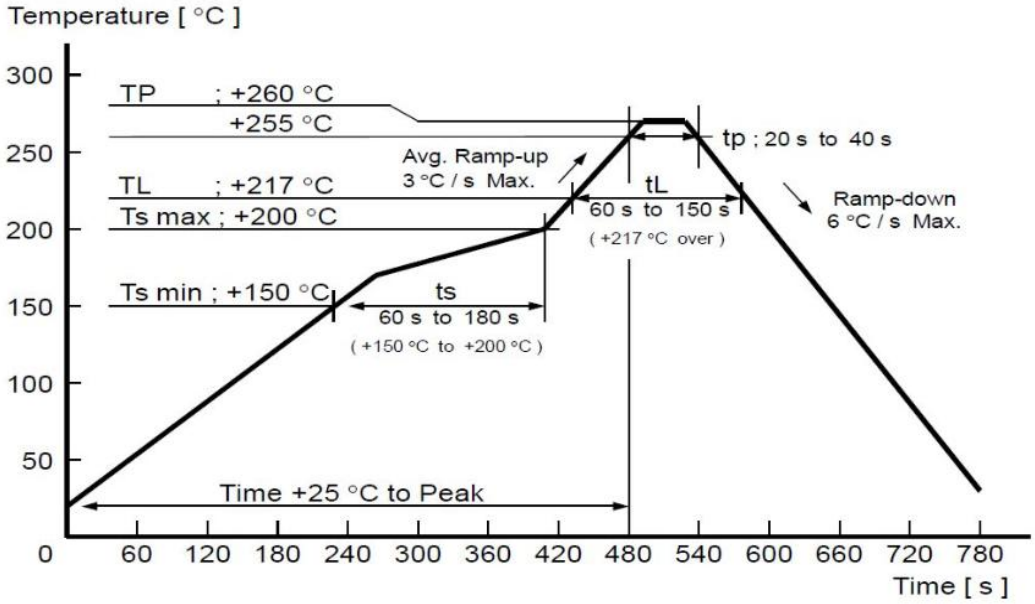
Layout notes：

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℃;

   Refer to IPC/JEDEC standard；Peak TEMP<260℃；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.



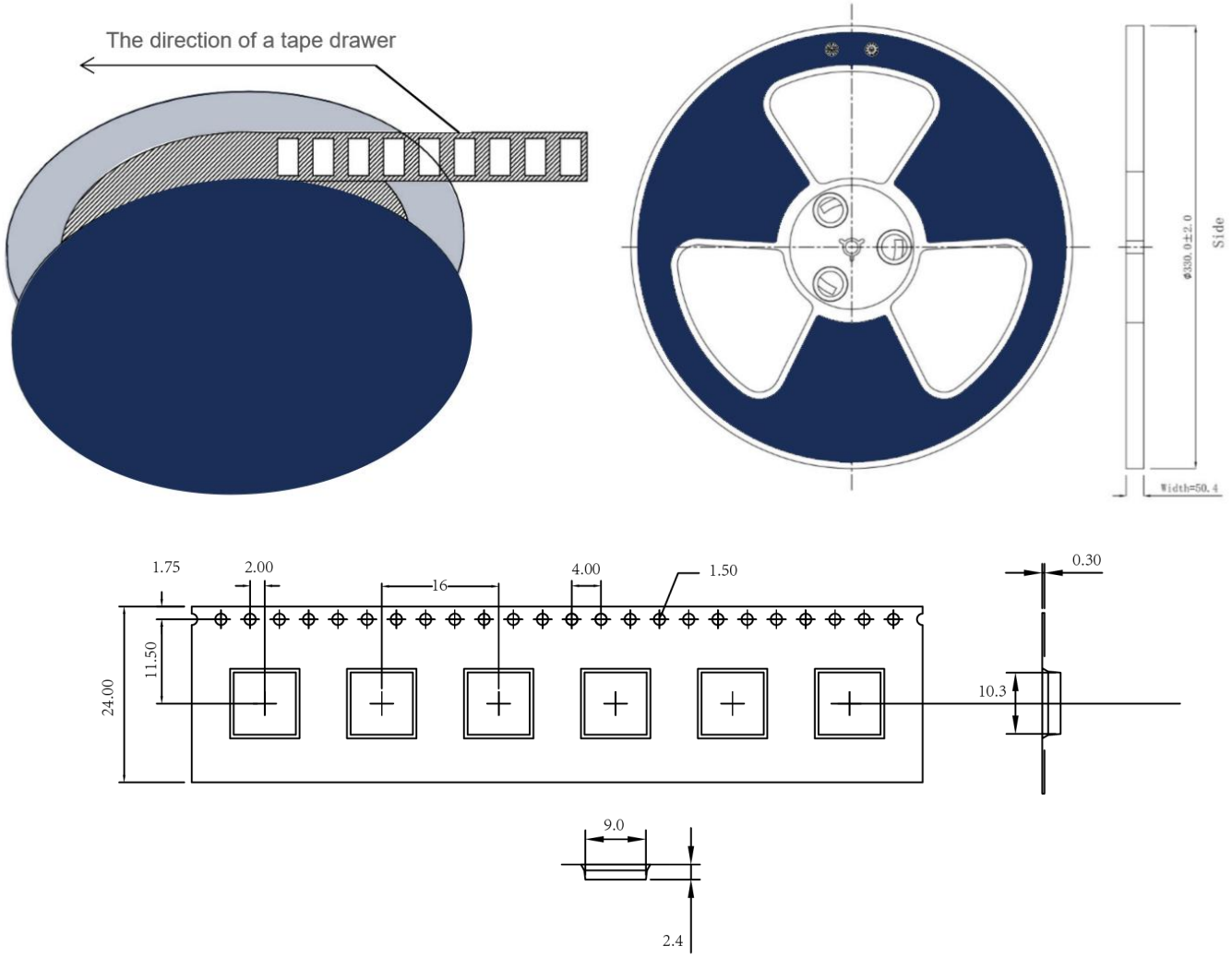
2) Suggesting to make 0.2mm thickness of module SMT for partial ladder steel mesh, then make the opening extend 0.8mm

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 ℃ 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=24mm，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		MS50SF7	Part No. in the second line	1N32AIR
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
32	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	Michelle	2023.6.9	

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