MINEWSEMI

Bluetooth LE Module

MS51SF1

Datasheet

V 1.0.0

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Version Note

Version	Details	Contributor(s)	Date	Notes
1.0.0	First edit	Michelle, Leo	2024.05.10	

Part Number

Model	Hardware Code
MS51SF11	1N33AI

Click the icon to view and download the latest product documents electronically.
https://en.minewsemi.com/file/MS51SF1-nRF52833_Datasheet_K_EN.pdf

MS51SF1-nRF52833

Extremely small size, high performance, multi-protocol Bluetooth 5.4 module

The MS51SF1 is a very tiny BLE5.4 module base on highly flexible nRF52833 SoC. The strong 32-bit ARM CortexTM 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 5.4
- Extremely compact size: 9.8mm*8.4mm*2mm
- High Performance
- Support ANT, BLE, BLE MESH, ZIGBEE and THREAD protocols, etc.

KEY PARAMETER

MS51SF1-nRF52833			
Chip Model	nRF52833	**Antenna**	PCB
Module Size	9.8×8.4×2mm	**GPIO**	20
Flash	512KB	**RAM**	128KB
Receiving Sensitivity	-96dBm	**Transmission Power**	-40 ~ +8dBm
Current(TX)	0dBm-4.9mA	**Current(RX)**	4.6mA

APPLICATION

Smart Buildings

Consumer Electronics

Smart Healthcare

Smart Agriculture

Security Equipment

Automotive Equipment

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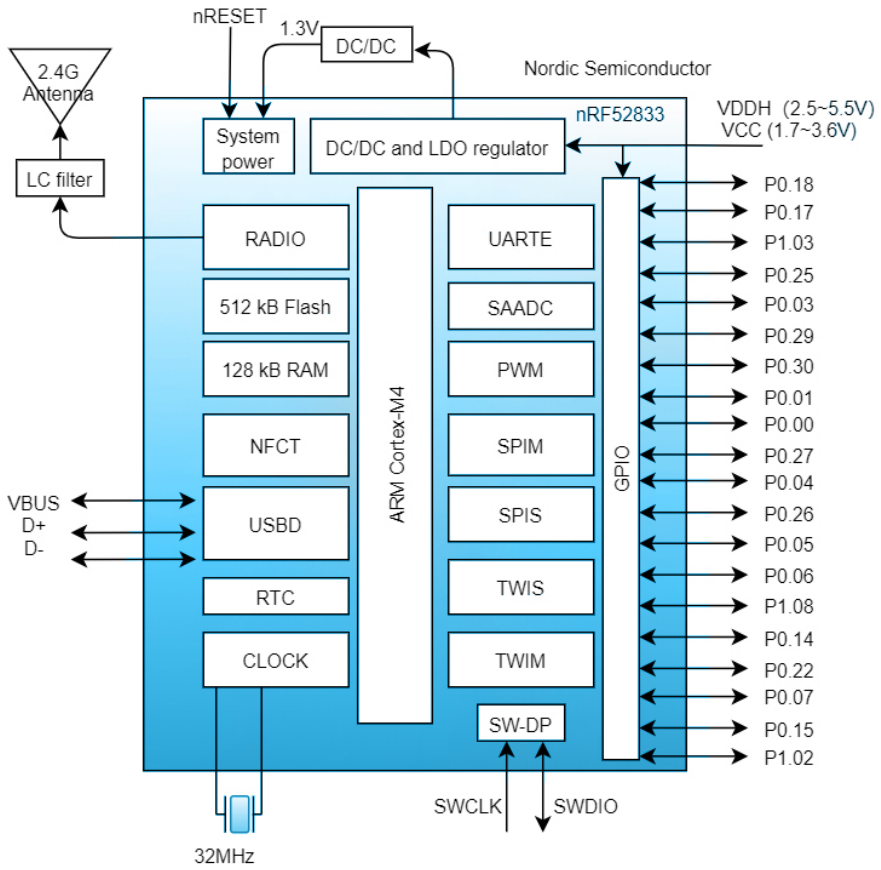
1 BLOCK DIAGRAM



2 ELECTRICAL SPECIFICATION

Parameters	Value	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 ~ +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	

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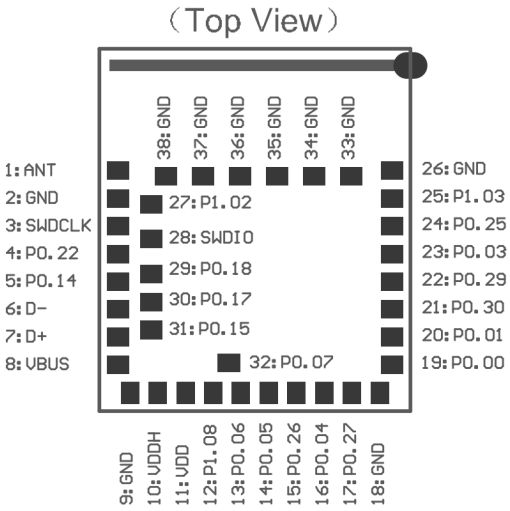
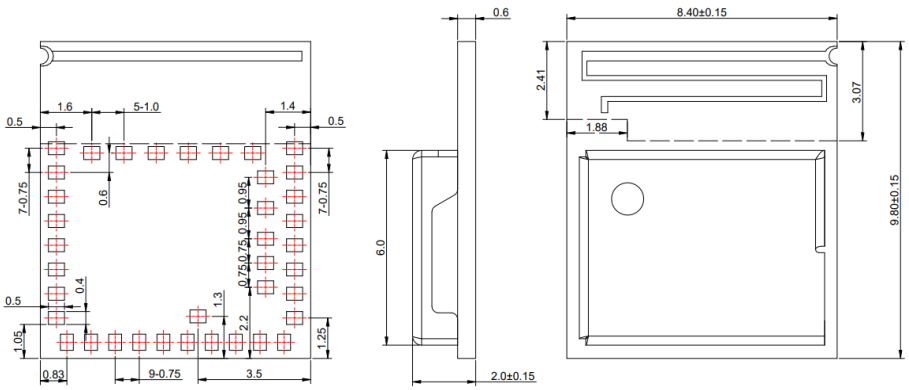
3 PIN DESCRIPTION



4 PIN DEFINITION

Pin Number	Symbol	Type	Definition
11	VDD	Power source	Power supply: 1.7V-3.6V, short-circuit VDD and VDDH to use the pin to supply power
10	VDDH	Power source	Power supply: 2.5V-5.5V, When supply 5V electricity, use this pin to supply power, not connect VDD pin
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.
4-5/12-17/19-25 /27/29-32	P0.00-P0.30 P1.02-P1.08	I/O	I0 port for general purpose
8	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.
7	D+	Digital interface	USB D+
6	D-	Digital interface	USB D-

5 MECHANICAL DRAWING



Default unit: mm Default tolerance: ±0.15

Notice: The recommended pad size 0.5*0.4mm

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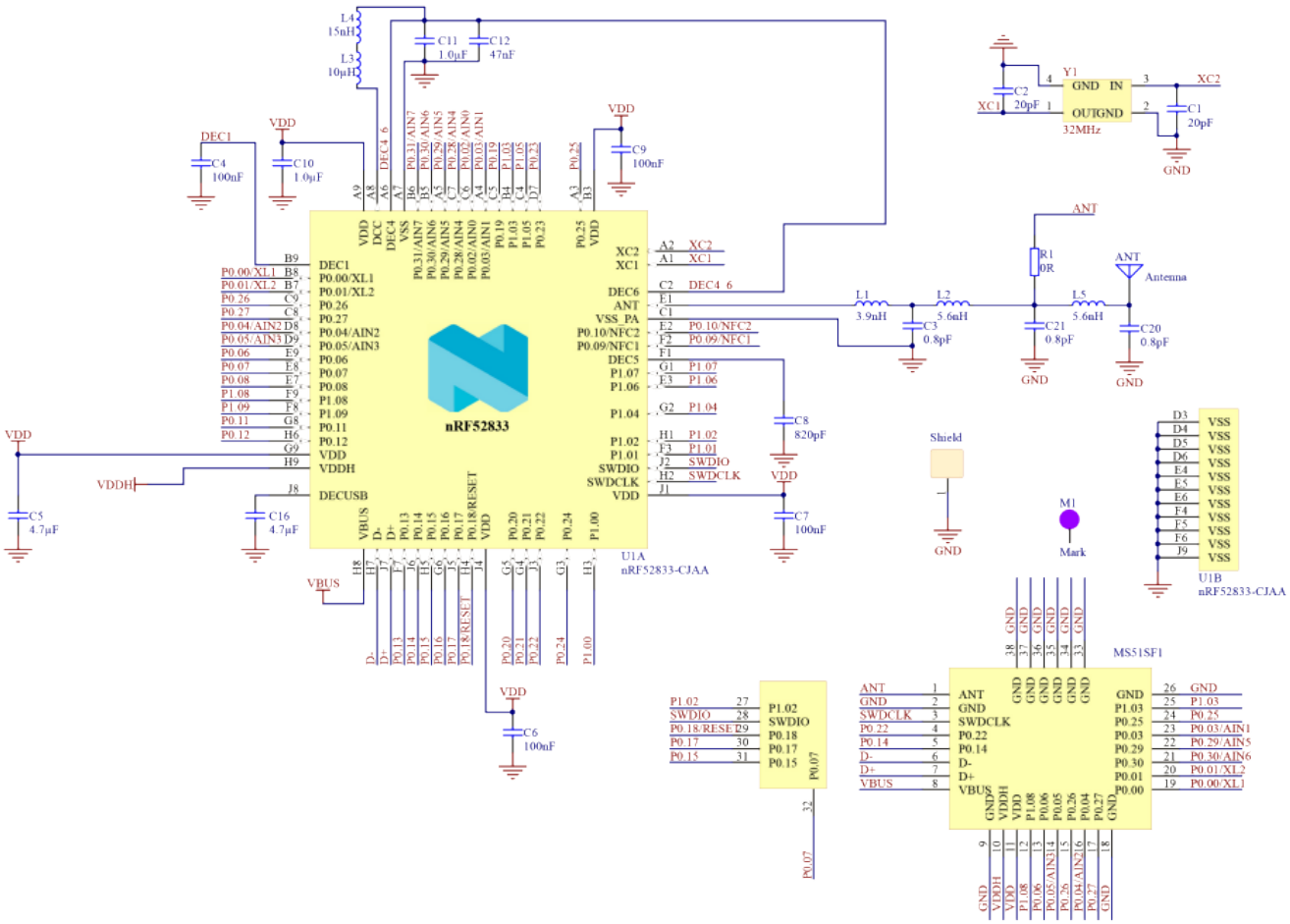
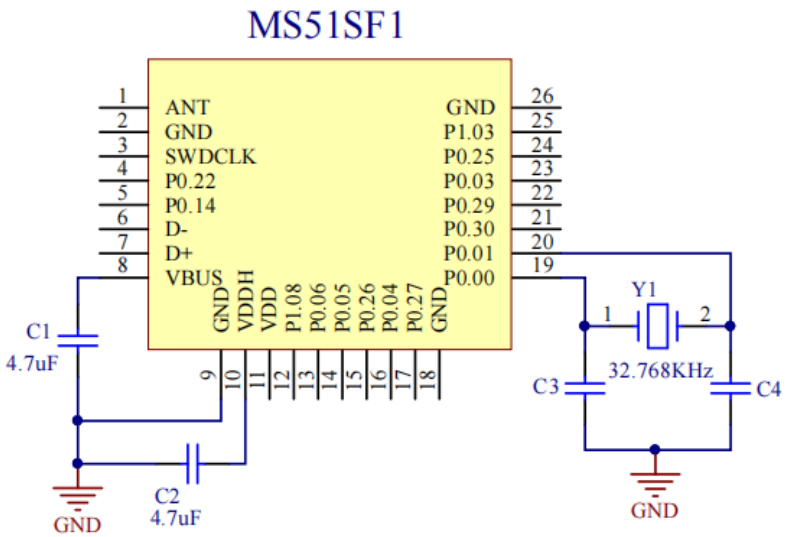
6 ELECTRICAL SCHEMATIC



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

Reference Design



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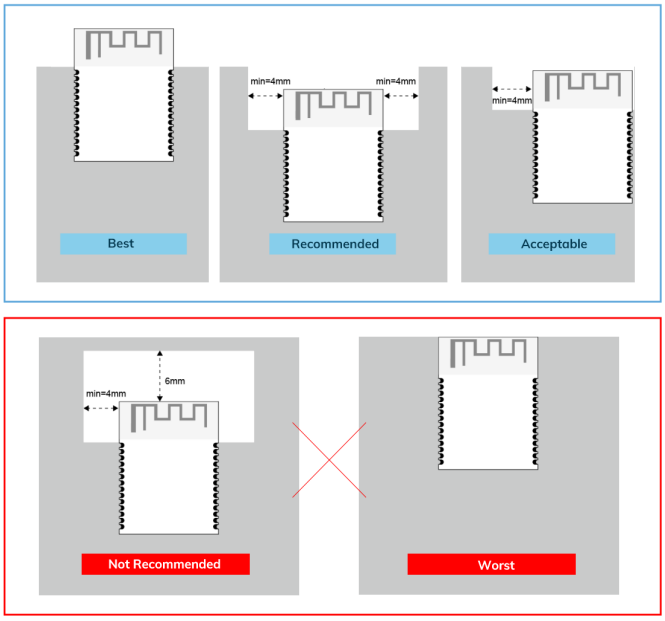
7 PCB LAYOUT

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:

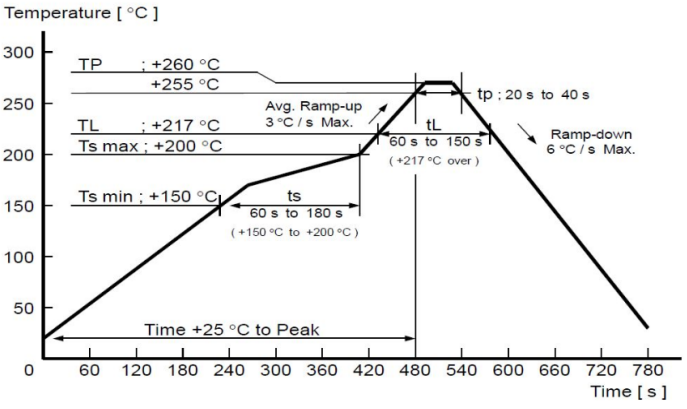
1) Preferred Module antenna area completely clearance and not be prevented by metals, otherwise it will influence antenna's effect (as above DWG. indication).
2) Cover the external part of module antenna area with copper as far as possible to reduce the main board's signal cable and other disturbing.
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.



8 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.



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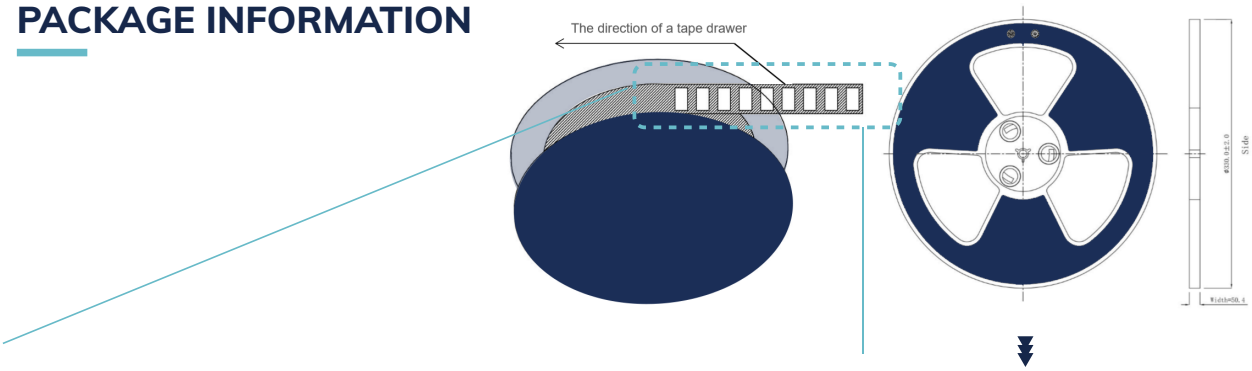
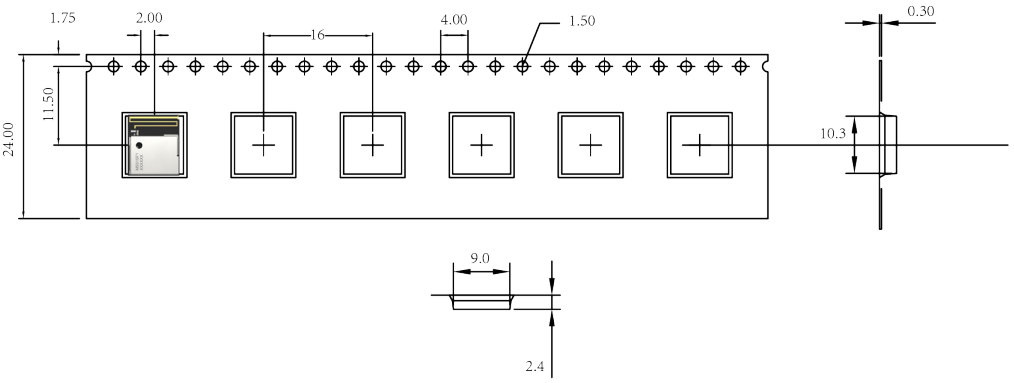
9 PACKAGE INFORMATION





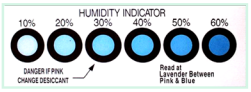
Inner carton(*8)
355*340*35mm，±5mm

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(*8)
355*340*35mm，±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
MS51SF1	1300PCS	338g	1135g	W=24mm，T=0.35mm

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

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10 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.

11 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.

12 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.

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13 COPYRIGHT STATEMENT

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14 RELATED DOCUMENTS

- nRF52833_Chip_Datasheet
  https://en.minewsemi.com/file/nRF52833_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

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