

BLE Module

MS51SF1

DateSheet

V 1.1.0

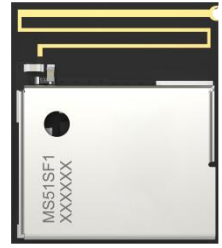
Applicable Product Model
MS51SF1-nRF52833

Version Note

Version	Details	Contributor(s)	Date	Notes
1.0.0	First edit	Coral	2022.11.12	
1.1.0	Layout Changes	Michelle	2023.10.07	

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 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 5.4
- Extremely compact size: 9.8mm*8.4mm*2mm
- High Performance
- Support ANT, BLE, BLE MESH, ZIGBEE and THREAD protocols, etc.

■ Application

- Smart Buildings
- Consumer Electronics
- Smart Healthcare
- Security Equipment
- Automotive Devices
- Smart Agriculture

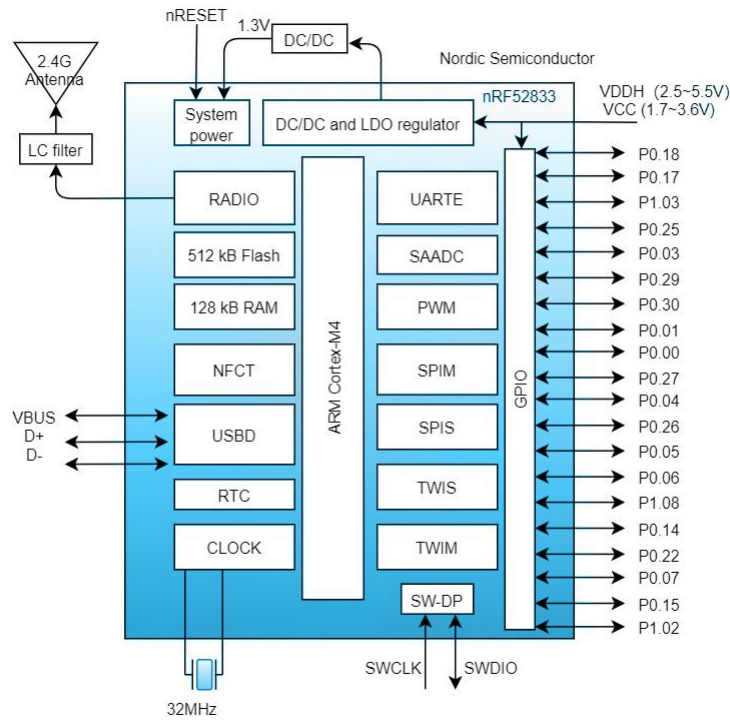
■ Key parameter

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

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1 Block Diagram

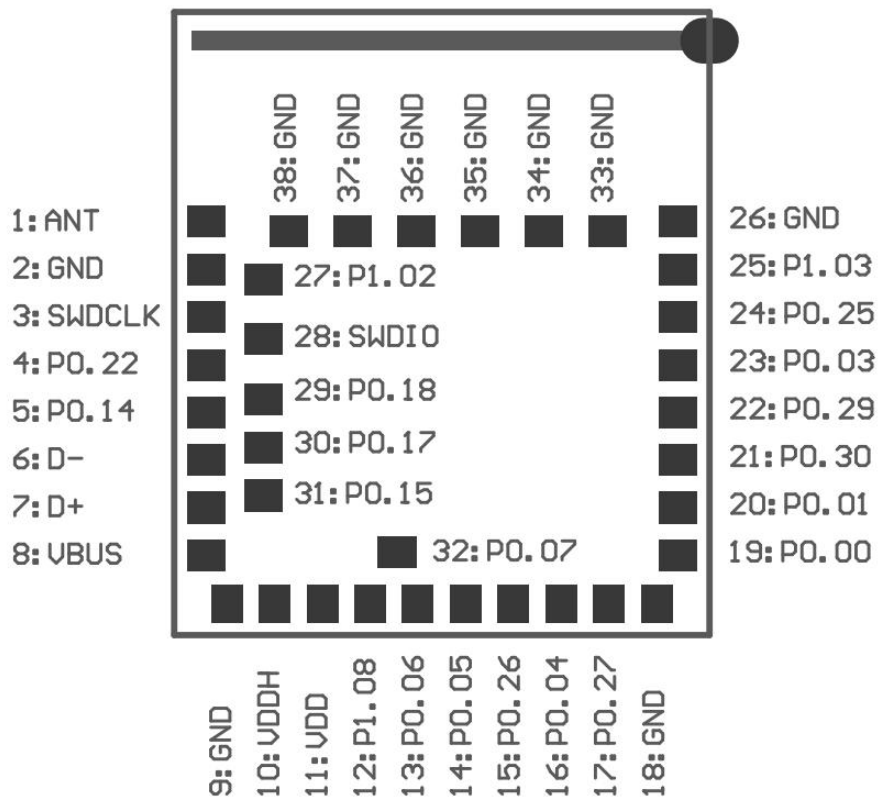


2 Electrical Specification

Parameter	Values	Notes
Working Voltage	1.7V-3.6V	To ensure RF work, supply voltage suggest not lower than 2.3V
Working Temperature	-40°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 0dB pattern
Module Dimension	9.8*8.4*2mm	
Quantity of IO Port	20	

3 Pin Description

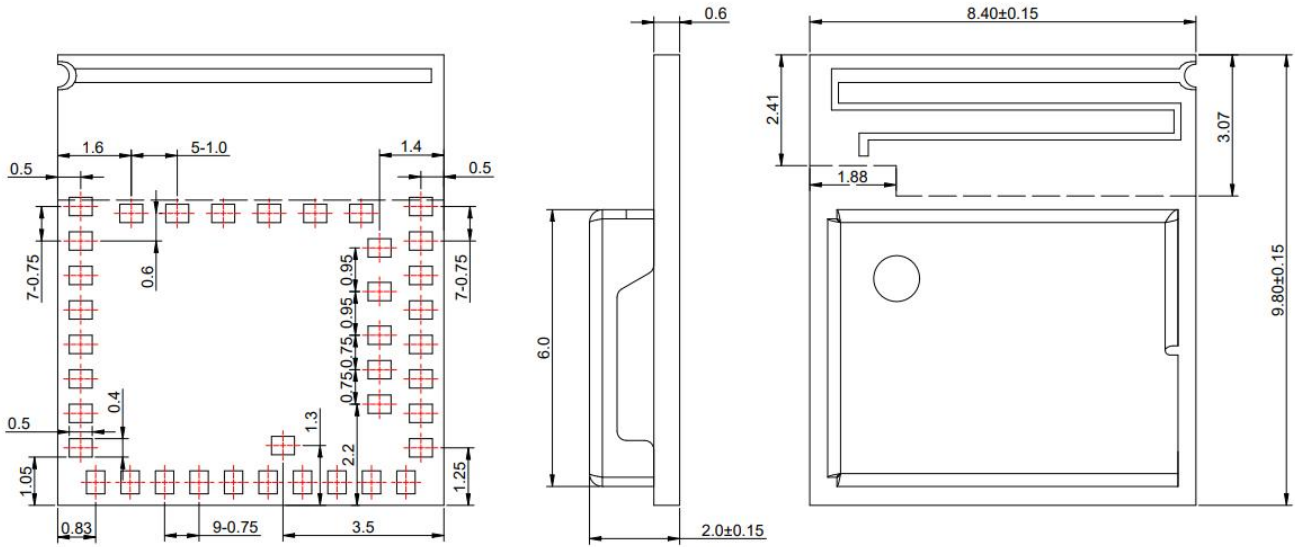
(Top View)



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.
4-5/12-17/19-2 5/27/29-32	P0.00-P0.30 P1.02-P1.08	I/O	I/O 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-

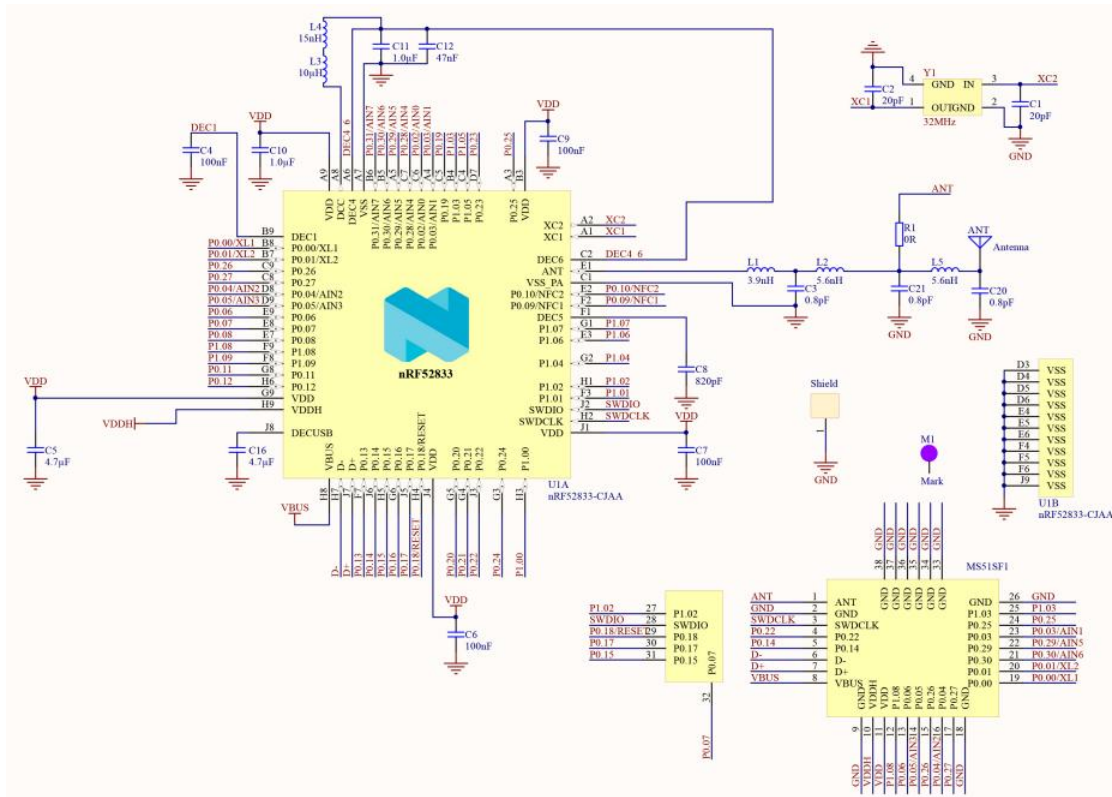
5 Mechanical Drawing



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

Notice: The recommended pad size is 1.8*0.8mm with a pad extension of 0.5mm

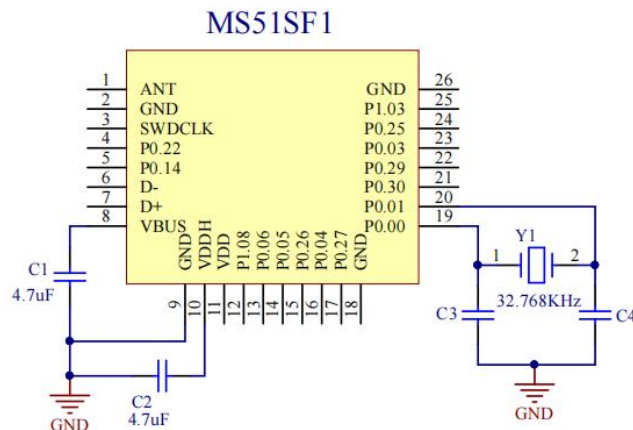
6 Electrical Schematic



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

7 Reference Design

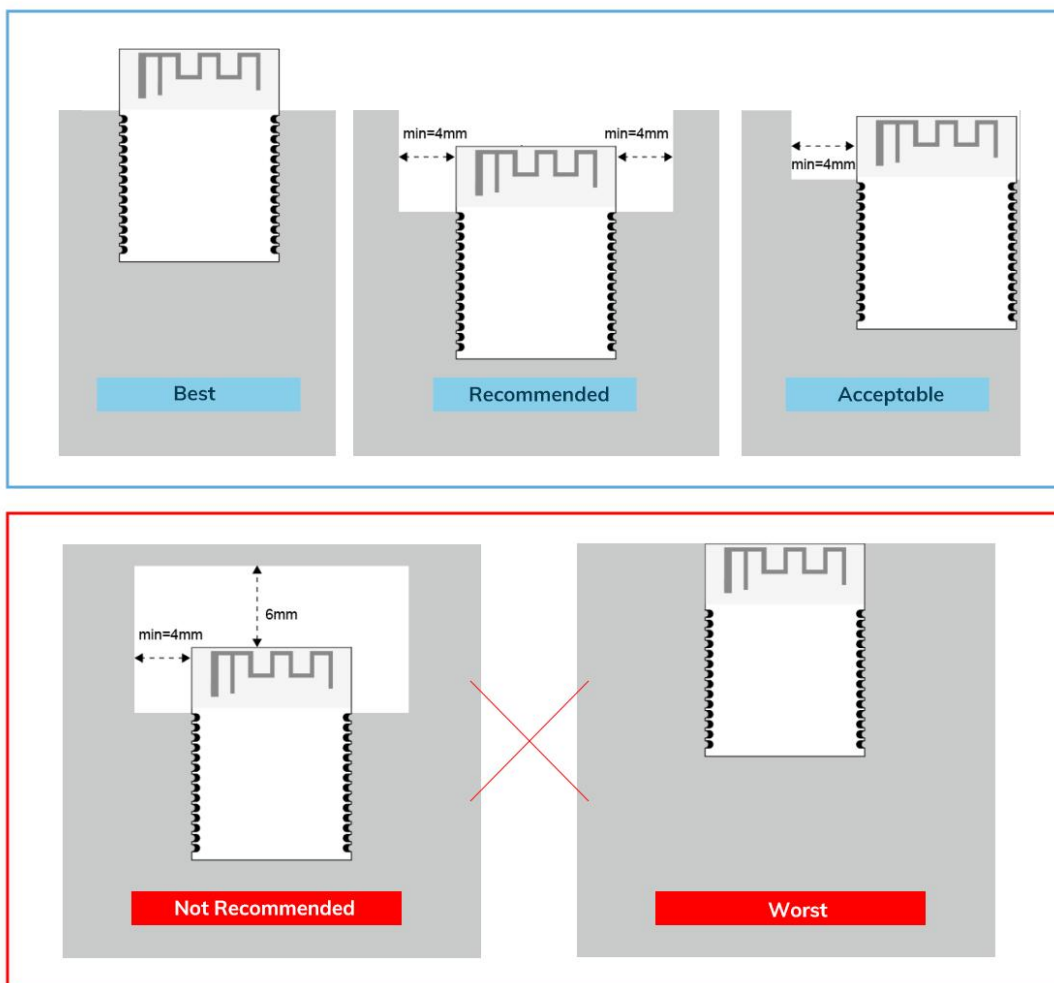
The Module doesn't have 32.768kHz oscillator. To use it, add it as shown below:



8 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.



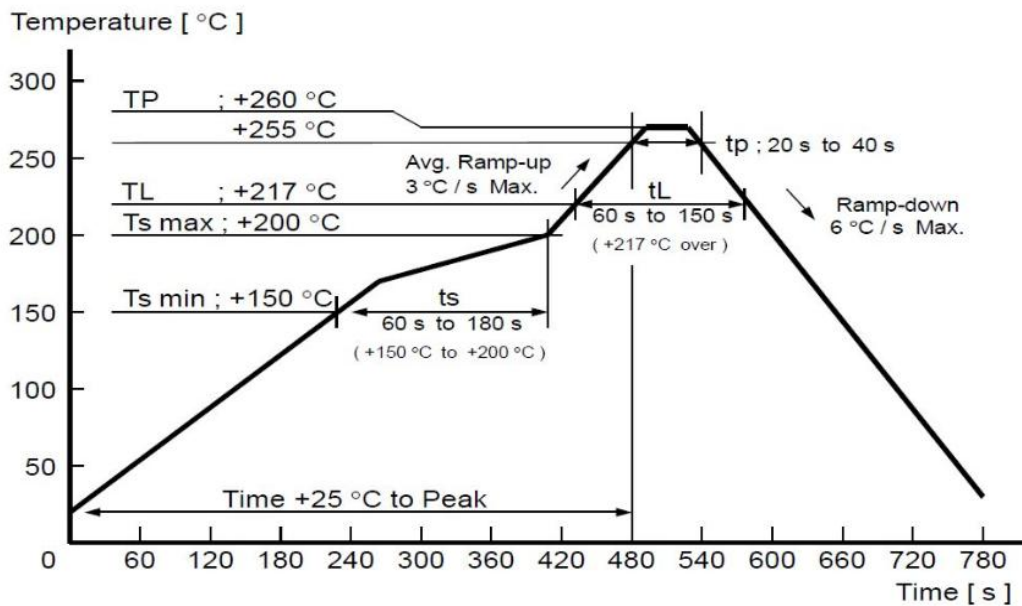
Layout notes:

- 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.

9 Reflow and Soldering

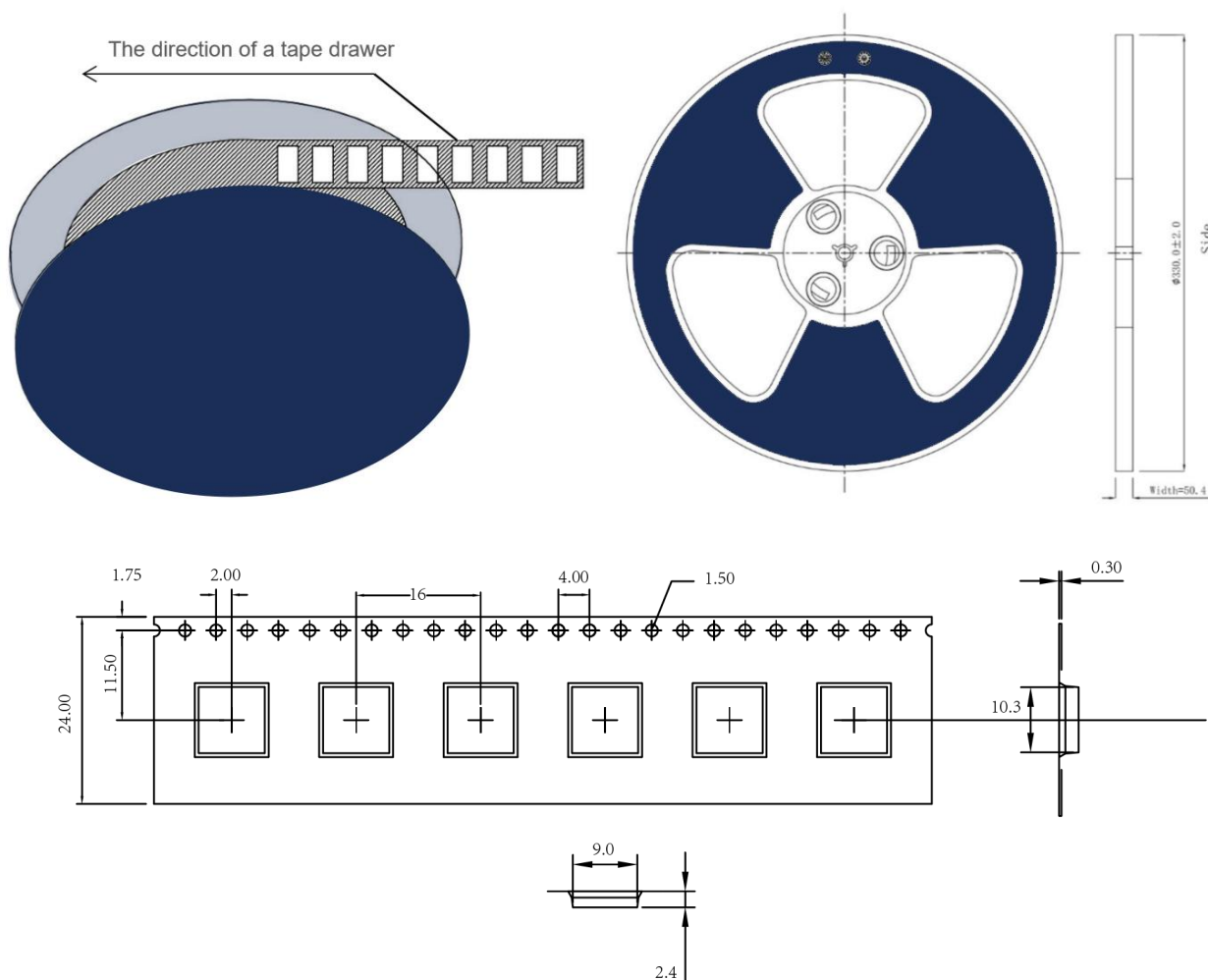
1) Do SMT according to above reflow oven temperature deal curve. Max. Temperature is 260°C;

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.

10 Package Information



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

Packing detail	Specification	Net weight	Gross weight	Dimension
Quantity	1300PCS	338g	1135g	W: 24mm,T:0.35mm

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

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● Contact Us

Shenzhen Minewsemi Co., Ltd. is committed to swiftly delivering top-quality connectivity modules to our customers. For assistance and support, please feel free to contact our relevant personnel, or contact us as follows:

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Related documents: Chip specification

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