Bluetooth PAModule

MS88SFA

Specification V1.0

Minew

- Subsidiary of Minew Technologies
- Nordicsemi Strateau Partner

PCB/IPEX

The nRF52833 inthemodule 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.

MS88SFA Basic Parameter			
Model	MS88SFA	Antenna	PCB/ IPEX
Chip model	Nordic nRF52833	Module Dimension	23.2x17.4x2mm
Storage Capacity	512kB	RAM	128kB
Receiving Sensitivity	-96dBm	Transmission Power	~+20dBm
GPIO	29	Firmware	/
Application area	Smart home , Intelligent wearable device, Consumer electronics, Intelligent medical, Security equipment, Automotive equipment, Sports fitness equipment, Instruments and apparatuses		

Note: PCB Antenna is not used

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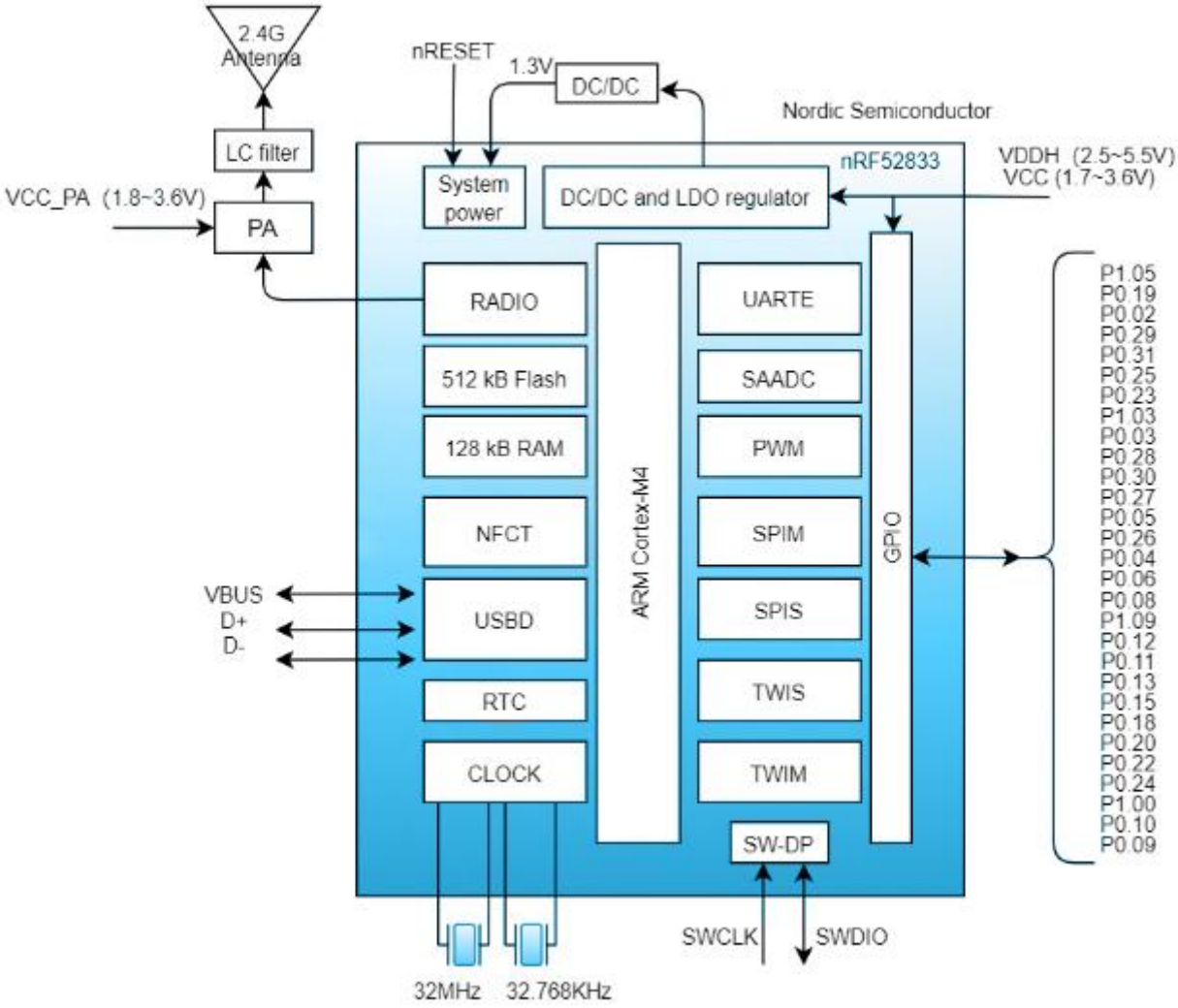
1 Product introduction

MS88SFA is a BLE5.2 PA/LNA module base on highly flexible and very low power-loss nRF52833 SoC. The strong 32-bit ARM CortexTM M4F CPU, 512kB flash memory, 128kB RAM and integrated 2.4GH transceiver inside it providing wonderful solutions for Bluetooth connecting. nRF52833 is able to support ANT, BLE, BLE MESH, and THREAD protocols, etc. Communication distance up to 600m under condition of 1Mbps rate and PA/LNA built in .

Feature:

- Bluetooth 5.2
- Built-in PA/LNA
- Power up to Maximum+20dbm
- PCB antenna and IPEX mount optional
- Communication distance up to 600m at 1Mbps rate
- Support ANT, BLE, BLE MESH, and THREAD protocols, etc.

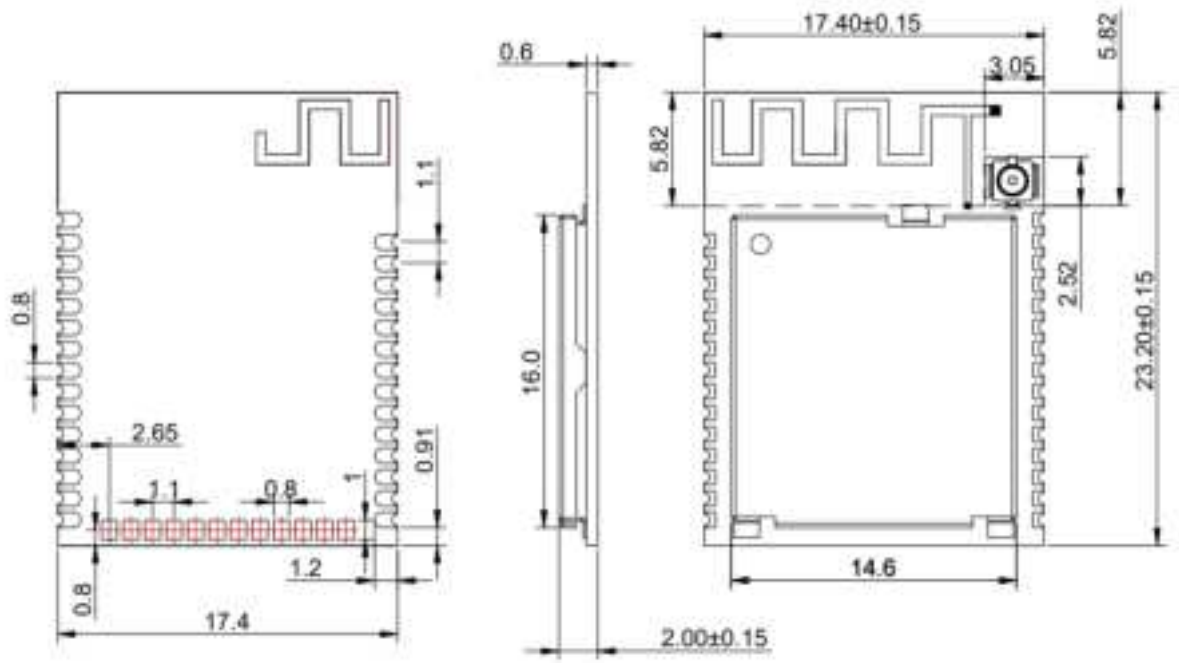
2 Block Diagram



3 Electrical Specification

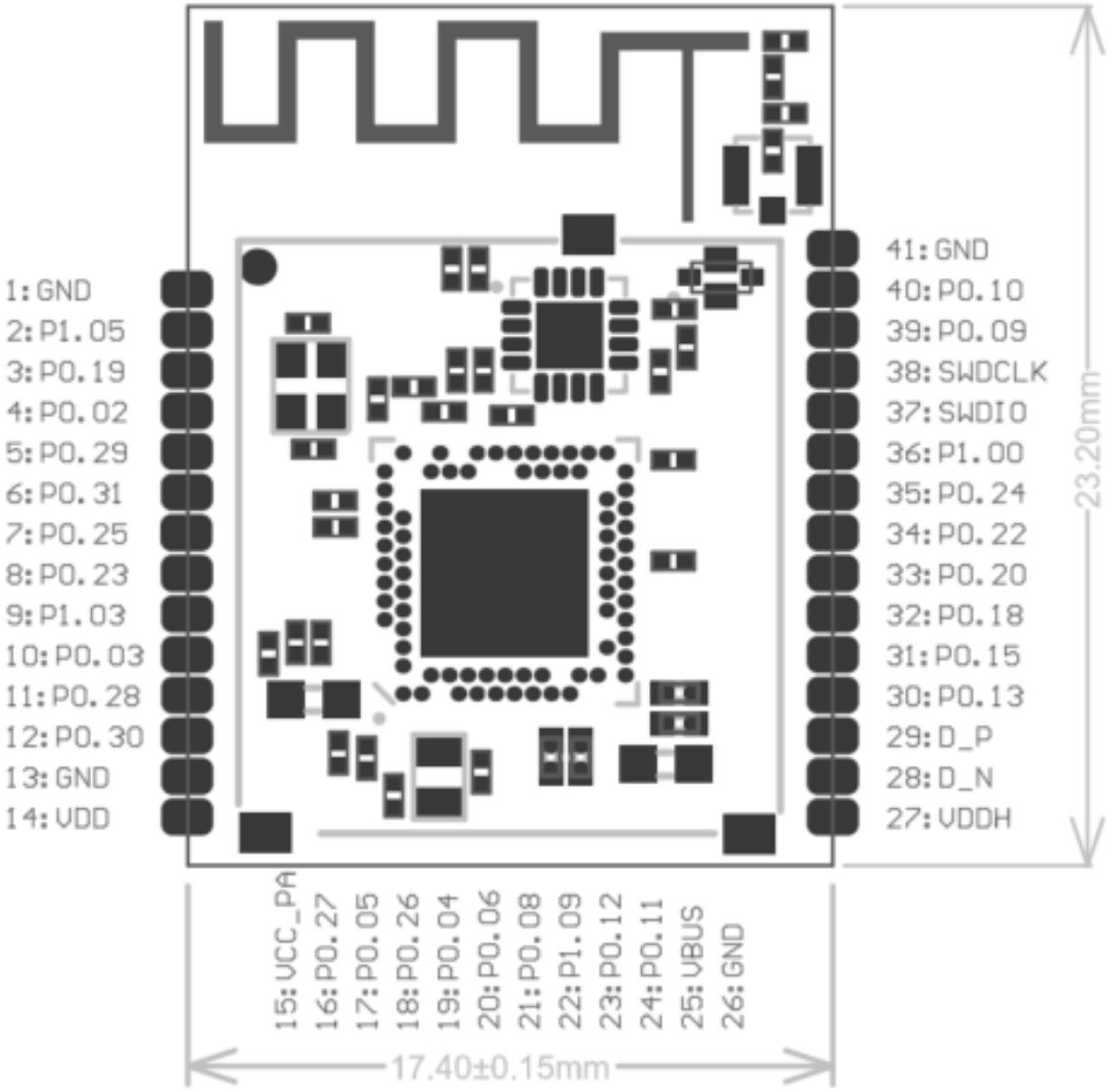
Parameter	Values	Notes
Working Voltage	1.7V-5.5V	To ensure RF work, supply voltage suggest not lower than 2.3V
Working Temperature	-40℃~+85℃	Storage temperature: -40℃~+125℃
Transmission Power	~ +20dBm	Configurable
Module size	23.2*17.4*2mm	
Quantity of IO port	29	

4 Mechanical Drawing



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

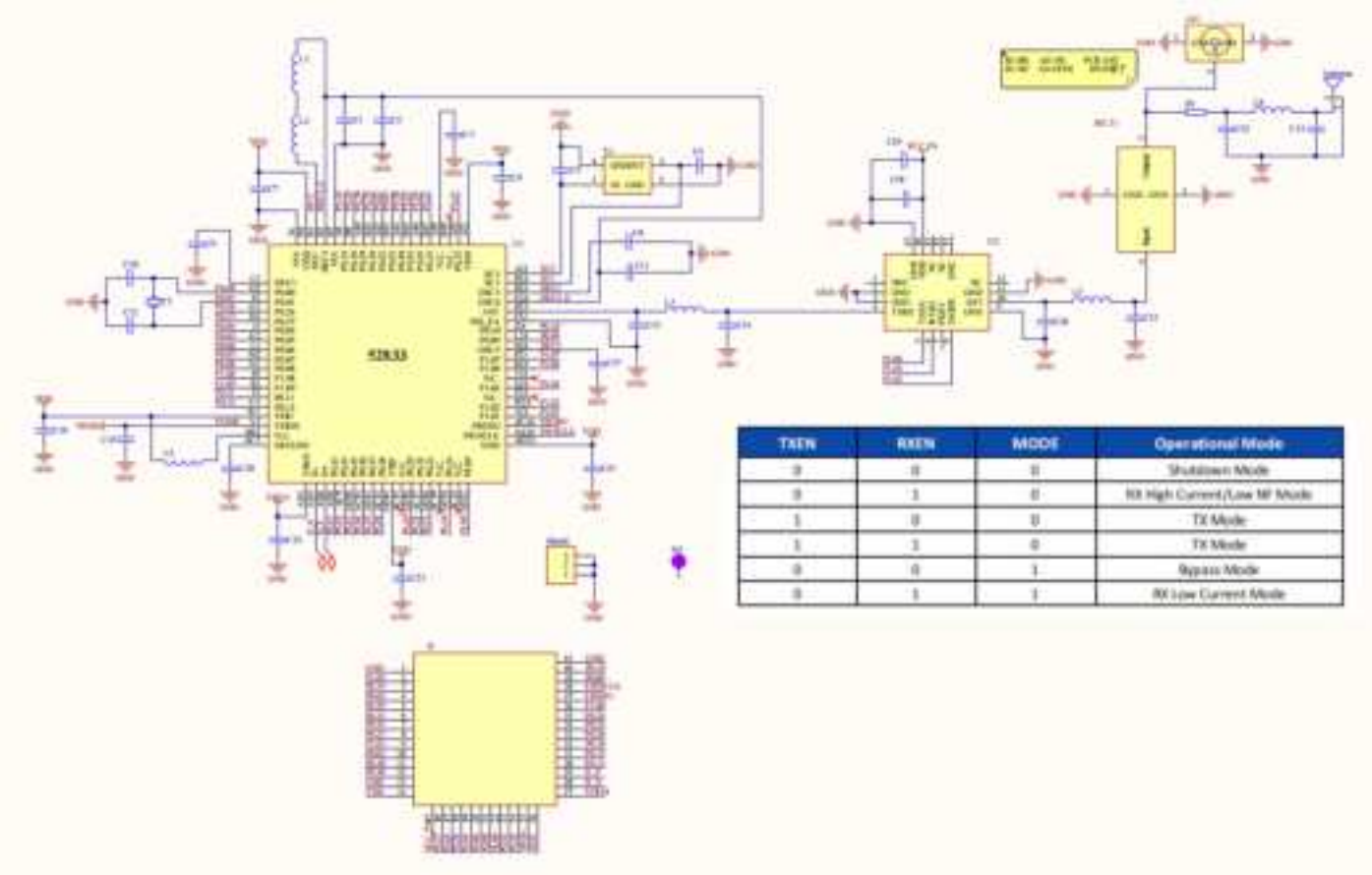
5 Pin Description



6 Pin definition

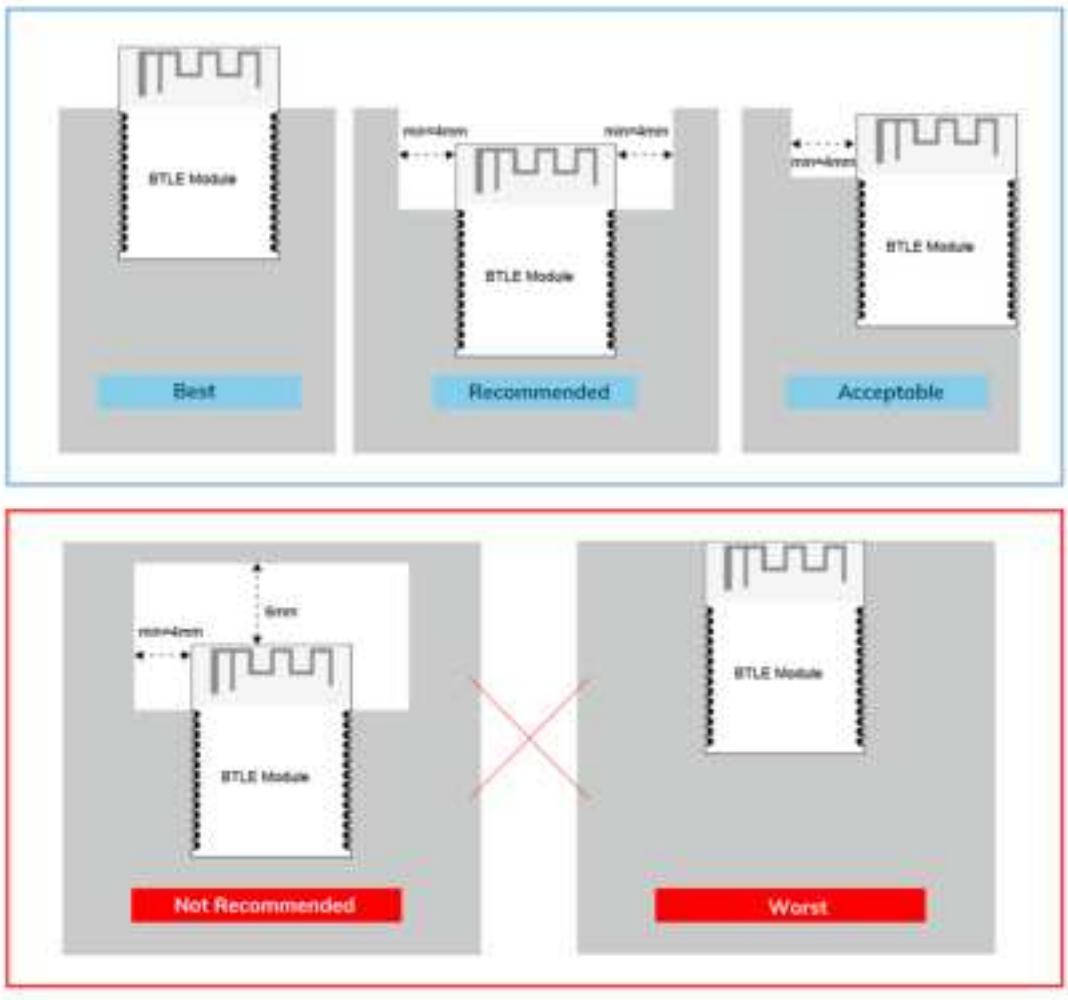
Symbol	Type	Description
VDD	Power source	Power supply: 1.7V-3.6V, short-circuit VDD and VDDH to use the pin to supply power
VDDH	Power source	Power supply: 2.5V-5.5V; When supply 5V electricity, use this pin to supply power, not connect VDD pin.
GND	Ground	Ground
SWCLK/SWDIO	Debug	Debug, when debuging only need to connect power supply pin, ground and these 2 pins.
P0.02-P0.31 P1.00-P1.09	I/O	IO 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 When use USB port
VCC_PA	PA supply power pin	Must provide electricity of 2.7-3.6V stably, 1.7V-3.6V chip voltage, this pin can be shorted to VDD/VDDH
D+	Digital interface	USB D+
D-	Digital interface	USB D-

7 Electrical Schematic



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.



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 Certification

9.1 CE Certification

MS88SFA module is being tested and is expected to be compliant against the EU-Radio Equipment standards. OEM integrator should consult with qualified test house to verify all regulatory requirements have been met for their complete device.

9.2 FCC Certification

Integration instructions for host product manufacturers according to KDB 996369 D03 OEM Manual v01

2.2 List of applicable FCC rules

The MS88SFA is an BT Module with GFSK modulation. It operates on the 2402MHz~2480MHz band and, therefore, is within U.S. FCC part 15.247 standard

2.3 Specific operational use conditions

The EUT is a BT Module

BLE:

Operation Frequency: 2402-2480MHz for BLE;

Modulation Type: GFSK

Number Of Channel: 40 channels

Antenna Designation: External Antenna

Antenna Gain: 3.29dBi

2.4 Limited module procedures

not applicable; Single Modular Approval Request

2.5 Trace antenna designs

Not applicable;

2.6 RF exposure considerations

The device has been evaluated to meet general RF exposure requirement. The device can be used in portable exposure condition without restriction

2.7 Antennas

The MS88SFA is an BT Module beams signals and communicates with its antenna, which is External Antenna . The External Antenna gain is 3.29dBi . Antenna could not be in no-load state when module is working. During debugging, it is suggested to add 50 ohms load to the antenna port to avoid damage or performance degradation of the module under long-time no-load condition.

2.8 Label and compliance information

The final end product must be label in a visible area with the following Host must Contains FCC ID: 2ABU6-MS88SFA . If the size of the end product is larger than 24x16mm, then the following FCC part 15.19 statement has to also be available on the label: This device complies with Part 15 of FCC rules. Operation is subject to the following two conditions:

(1) this device may not cause harmful interference and

(2) this device must accept any interference received, including interference that may cause undesired operation.

2.9 Information on test modes and additional testing requirements

Data transfer module demo board can control the EUT work in RF test mode at specified test channel.

2.10 Additional testing, Part 15 Subpart B disclaimer

The module without unintentional-radiator digital circuit, so the module does not required an evaluationby FCC Part 15 Subpart B. The host should be evaluated by the FCC Subpart B.

ATTENTION

This device is intended only for OEM integrators under the following conditions:

1) The antenna must be installed such that 5 mm is maintained between the antenna and users, and

2) This device and its antenna(s) must not be co - located with any other transmitters except in accordance with FCC multi - transmitter product procedures. Referring to the multi - transmitter policy, multiple transmitter(s) and module(s) can be operated simultaneously without C2P.

3) For all products market in US, OEM has to limit the Operating Frequency: 2402-2480MHz by supplied firmware programming tool. OEM shall not supply any tool or info to the end - user regarding to Regulatory Domain change.

USERS MANUAL OF THE END PRODUCT:

In the user manual of the end product, the end user has to be informed to keep at least 5mm separation with the antenna while this end product is installed and operated. The end user has to be informed that the FCC radio - frequency exposure guidelines for an uncontrolled environment can be satisfied. The end user has to also be informed that any changes or modifications not expressly approved by the manufacturer could void the

user's authority to operate this equipment.

If the size of the end product is smaller than 8x10cm, then additional FCC part 15.19 statement is required to be available in the users manual: This device complies with Part 15 of FCC rules. Operation is subject to the following two conditions:

(1) this device may not cause harmful interference and

(2) this device must accept any interference received, including interference that may cause undesired operation.

FCC WARNING

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:

Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generate, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference

will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

-- Reorient or relocate the receiving antenna.

-- Increase the separation between the equipment and receiver.

-- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

-- Consult the dealer or an experienced radio/TV technician for help.

OEM integration instructions:

This device is intended only for OEM integrators under the following conditions:

The transmitter module may not be co-located with any other transmitter or antenna.

The module shall be only used with the external antenna(s) that has been originally tested and certified with this module.

As long as the conditions above are met, further transmitter test will not be required. However, the OEM integrator is still responsible for testing their end-product for any additional compliance requirements required with this module installed (for example, digital device emissions, PC peripheral requirements, etc.).

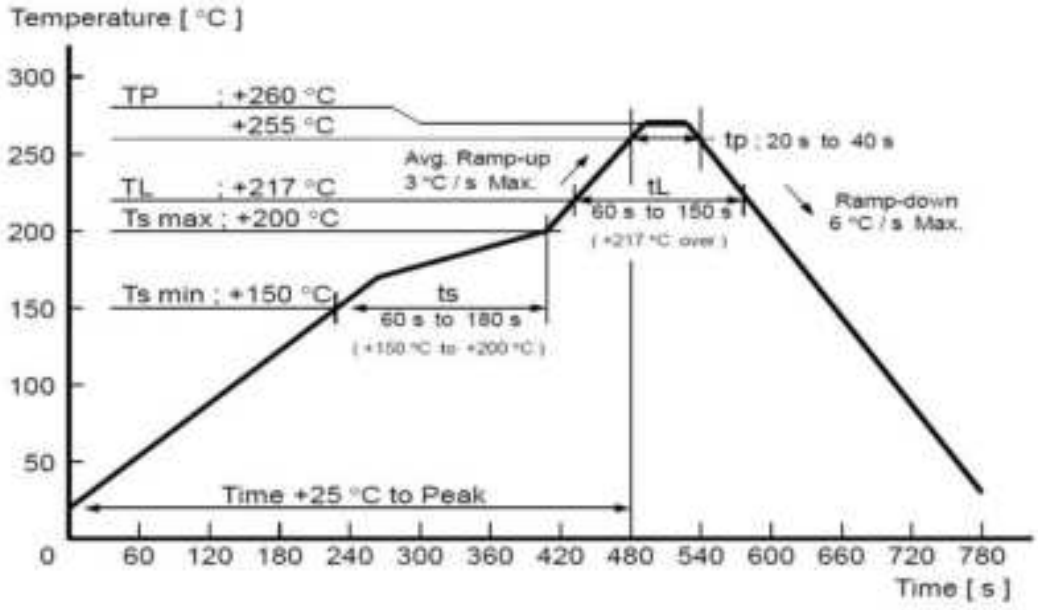
Validity of using the module certification:

In the event that these conditions cannot be met (for example certain laptop configurations or co-location with another transmitter), then the FCC authorization for this module in combination with the host equipment is no longer considered valid and the FCC ID of the module cannot be used on the final product. In these circumstances, the OEM integrator will be responsible for re-evaluating the end product (including the transmitter) and obtaining a separate FCC authorization.

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.



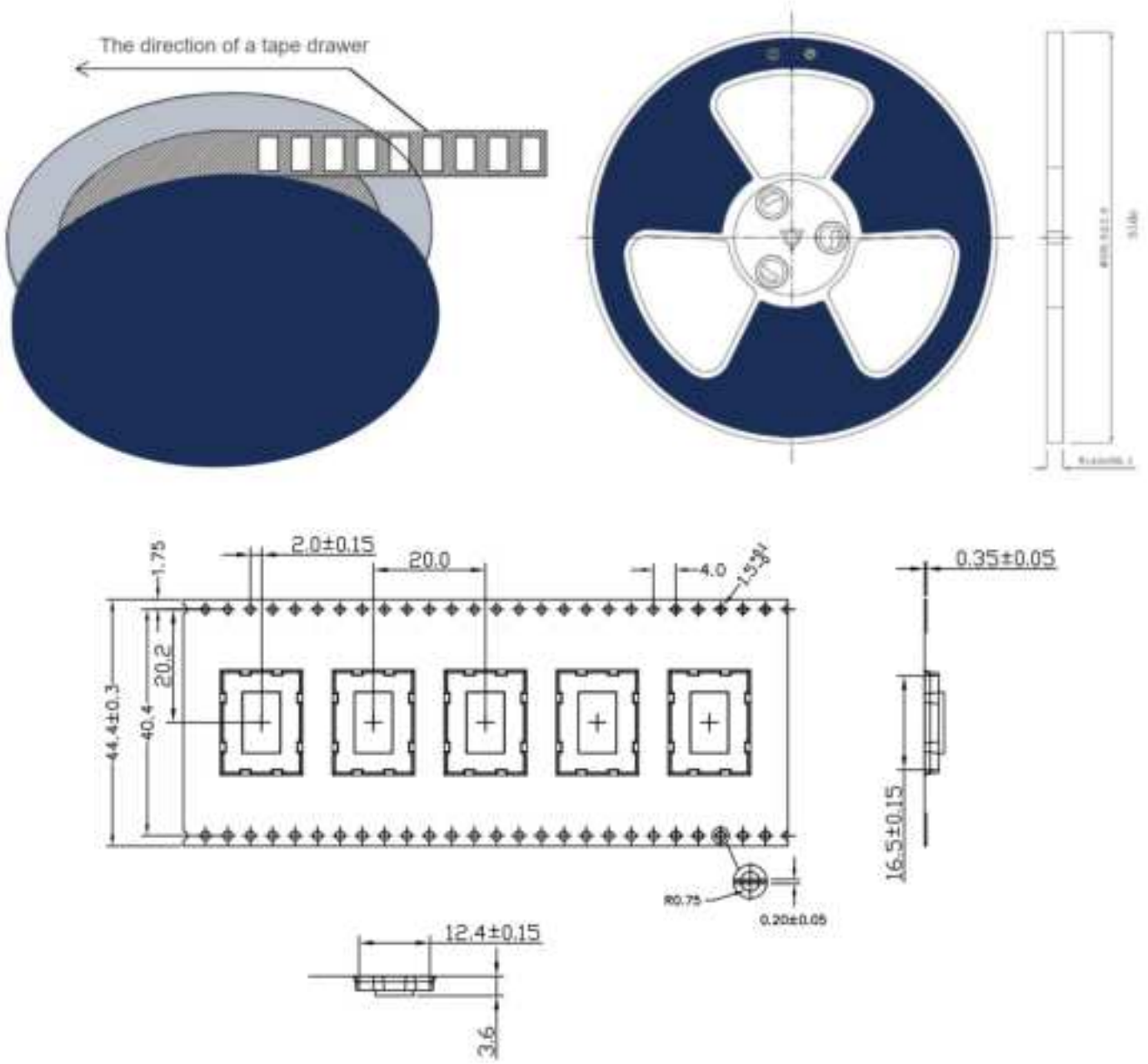
2) Suggesting to make 0.2mm thickness of module SMT for partial ladder steel mesh, then make the opening extend 0.8mm

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	650PCS	560g	1320g	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 define 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
MS88SFA	Module code			
1	Antenna category		1	PCB antenna
			2	Ceramic antenna（Chip antenna）
			3	IPEX connector（1st Generation）
Y	Low-frequency crystal oscillator		Y	With 32.768K Crystal Oscillaor
			N	Without 32.768K Crystal Oscillator
10	SoC		05	m1805, nRF52805
			10	nRF52833
			20	nRF52820
			32	nRF52832
			33	nRF52833
			40	nRF52833, nRF5340
A	SoC Package		A	=AA
			B	=AB
			C	=AC
I	RF Signal		I	Internal

	Output			
			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	2022.11.30	

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