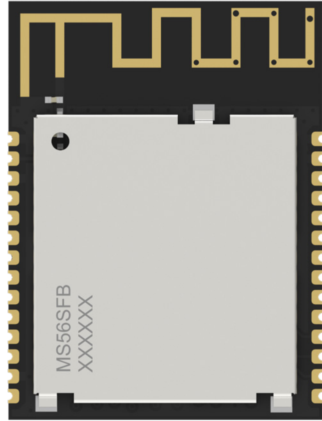
Bluetooth LE Module

MS56SFB



Datasheet

V 1.0.0

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Version Note

Version	Details	Contributor(s)	Date	Notes
1.0.0	First edit	Michelle, Leo	2024.05.09	

Part Numbers

Model	Hardware Code
MS56SFB-IN610	1Y10AI
MS56SFB-IN628E	1Y28AI

Click the icon to view and download the latest product documents electronically.
https://en.minewsemi.com/file/MS56SFB-IN610,IN628E_Datasheet_K_EN.pdf

MS56SFB-IN610

Long-distance,Industry leading cost versus performance ratio, Ultra-low power， Bluetooth module supporting simultaneous connection of 5 BLE devices

The MS56SFB is a highly flexible, ultra-low power, cost-effective Bluetooth 5 compliant Bluetooth module based on the IN610. Its powerful Arm® Cortex®-M4F CPU with a core running speed of 64Mhz, in addition it comes with 512kB FLASH program space, 256 KB ROM, 96 KB SRAM and 4 KB eFuse memory. The hardware supports two VDDIOs for individual power control, five Bluetooth devices for simultaneous access, and other powerful supporting resources to provide the perfect solution for Bluetooth connectivity. With built-in PA/LNA, the communication distance is at least 200 meters at 1Mbps.

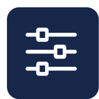
FEATURES

Built-in PA: SKY66111

Minimum communication distance of 200 meters at 1Mbps rate

Industry leading cost versus performance ratio

Ultra-low power

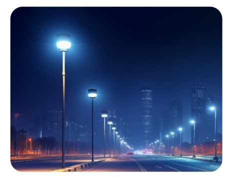

Supports simultaneous connection of 5 BLE devices

Supports optional external antenna

KEY PARAMETER

MS56SFB-IN610			
Chip Model	INPLAY-IN610	**Antenna**	PCB
Module Size	23.2×17.4×2mm	**GPIO**	24
Flash	512KB	**RAM**	256 KB ROM 96 KB SRAM
Receiving Sensitivity	-104.5dBm（125kbps） -97.5dBm(1Mbps)	**Transmission Power**	~ +13dBm
Current(TX)	10dBm-22mA	**Current(RX)**	5mA

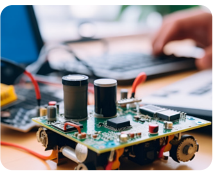
APPLICATION


Smart Lighting

Smart Lock

Industrial Internet

Smart Agriculture


Toys

Function Switches

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MS56SFB-IN628E

Ultra-low latency,Industry leading cost versus performance ratio, Synchronized multi-node Bluetooth modules

The MS56SFB-IN628E is a highly flexible, cost-effective module with a synchronous multi-node low-latency (SMULL) stack based on the IN628E, integrating both the 2.4G band and the MCU system. Its powerful Arm® Cortex®-M4F CPU with cores running at 64Mhz, in addition to 512kB FLASH program space, 384 KB ROM and 184 KB SRAM, has 4 KB of eFuse memory and a well-designed hardware security engine supporting AES128, AES256, SHA-1, AES128, AES256, SHA-1, SHA-2 and ECC encryption and decryption algorithms, as well as other powerful supporting resources provide the perfect solution for synchronous connectivity. Built-in PA/LNA with a minimum distance of 820 meters at 10dbm 1Mbps.

FEATURES

Built-in PA: SKY66111

Minimum communication distance of 200 meters at 1Mbps rate

Ultra-low latency, Bi-directional synchronous communication

Supports optional external antenna

Up to 128 nodes in a single network with InPlay SMULL engine

Hardware security engine with support for AES128, AES256, SHA-1, SHA-2 and ECC encryption and decryption algorithms

KEY PARAMETER

MS56SFB-IN628E			
Chip Model	INPLAY-IN628E	**Antenna**	PCB
Module Size	23.2×17.4×2mm	**GPIO**	24
Flash	512KB	**RAM**	384 KB ROM 184 KB SRAM
Receiving Sensitivity	-97.5dBm（1Mbps） -94.5dBm(2Mbps)	**Transmission Power**	~ +13dBm
Current(TX)	10dBm- 22mA	**Current(RX)**	5mA

APPLICATION

Smart Home

Smart Classrooms

Low latency Wireless audio

Game Accessories

Industrial Robot

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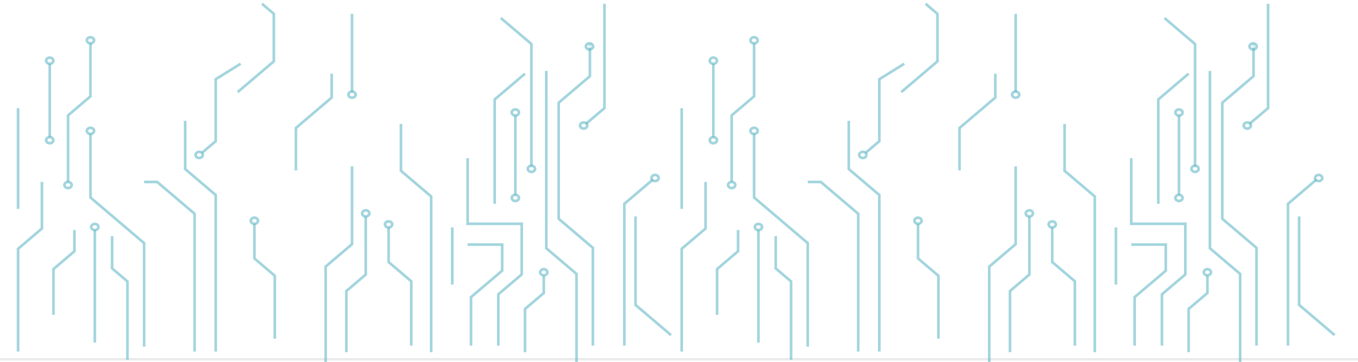

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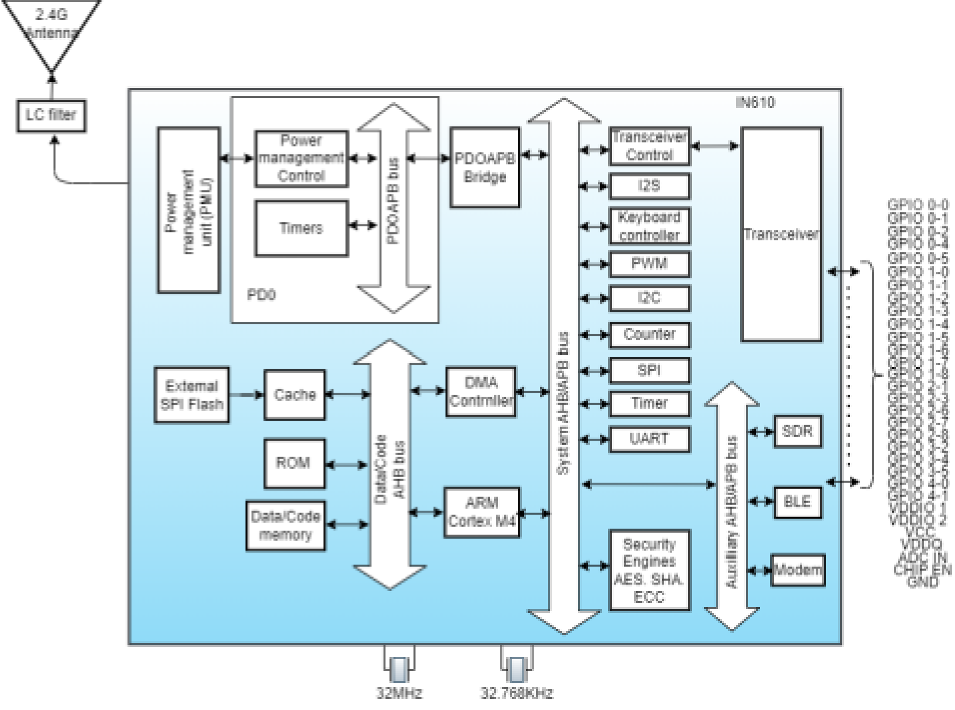
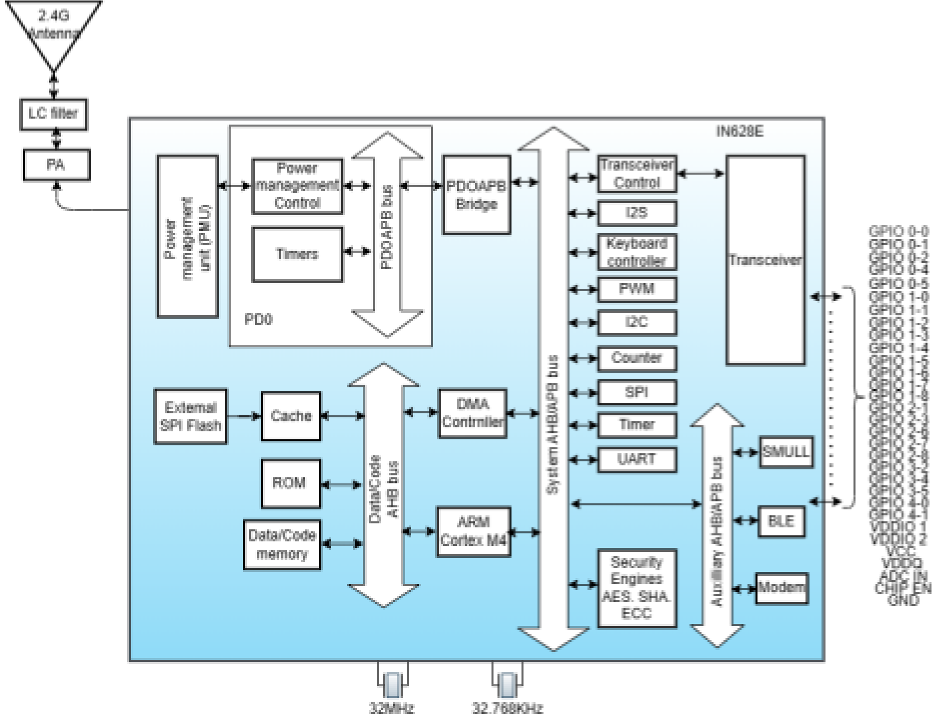
1 BLOCK DIAGRAM



MS56SFB-IN610



MS56SFB-IN628E

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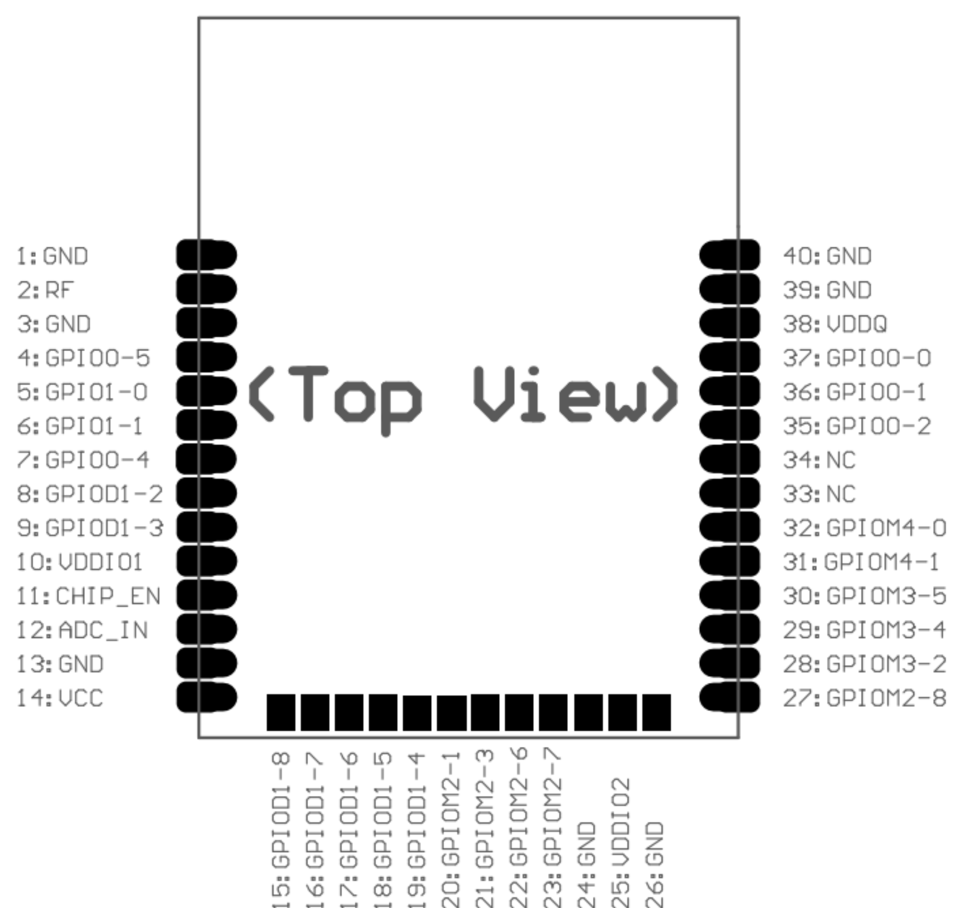
2 ELECTRICAL SPECIFICATION

Parameter	IN610/IN628E 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℃~+105℃
Transmission Power	~ +13dBm	Configurable
Current(RX)	5mA	RF receiving current under 1Mbps pattern
Current(TX)	22mA	RF transmission current under 10dB pattern
Module Dimension	23.2*17.4*2mm	
Quantity of IO Port	24	

3 PIN DESCRIPTION



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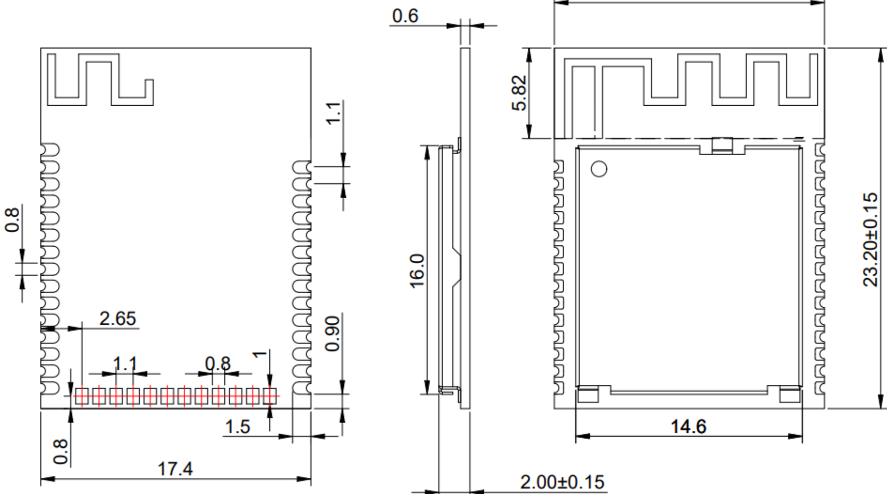
4 PIN DEFINITION

Pin Number	Symbol	Type	Definition
1/3/13/24/26/39/40	GND	Negative Power	GND
2	RF	External Antenna Pin	By default, the module comes with an antenna, this pin is directly suspended. If you don't use the module antenna, you can connect an external antenna through this pin, when connecting an external antenna, the module needs to connect the resistor with the antenna to this pin; you need to explain the configuration requirements with the salesperson.
4-9	GPIO0-5/GPIO1-0/ GPIO1-1/GPIO0-4/ GPIOD1-2/GPIOD1-3	Digital inputs/outputs	Digital signal GPIO, pin multiplexing is detailed in the chip datasheet; Where GPIO1-1/GPIO1-2 can be used as JTAG burn pins; GPIO1-1: JTAG TMS or SWD I/O signals; GPIO1-2: JTAG or SWD clock input (TCK/SCK)
10	VDDIO1	I/O Power Supply	I/O supply voltage for GPIOD_1, 1.7V-3.6V; configurable off in sleep mode to reduce leakage power
11	CHIP-EN	Reset pin	Can be used to enable or disable the device. Enable: "High" ≥ 0.7VBAT; Shutdown: "Low" ≤ 0.3VBAT; Reset (temporary disable and re-enable) during operation toggles the pin and holds it "low" for at least 100 ms, with a "high" rise time of less than 5 ms.
12	ADC-IN	PMU	Sensor ADC input
14	VCC	Positive Power	Power supply, 1.7V-3.6V with this pin
15-23	GPIOD1-8/GPIOD1-7/ GPIOD1-6/GPIOD1-5/ GPIOD1-4/GPIOM2-1/ GPIOM2-3/GPIOM2-6/ GPIOM2-7	GPIO_0/GPIOD_1 digital input/output; GPIOM_2 mixed-signal inputs/outputs	Digital signal GPIO; Mixed-signal GPIO, pin-multiplexing details see chip specification; Among them, GPIOD1-7/GPIOM2-1/GPIOM2-3 can be used as UART1 TX; GPIOD1-8/GPIOM2-7 can be used as UART1 RX; When using UART1 TX and UART1 RX to power up, you need to pull down the GPIOM2-6 boot pin
25	VDDIO2	I/O Power Supply	I/O supply voltage for GPIOM_2, 1.7V-3.6V; configurable off in sleep mode to reduce leakage power
27-32	GPIOM2-8/GPIOM3-2/ GPIOM3-4/GPIOM3-5/ GPIOM4-1/GPIOM4-0	GPIOM_2 mixed -signal input/output. GPIOM_3/GPIOM_4 digital input/output.	Digital signal GPIOs; mixed signal GPIOs, pin-multiplexing see chip datasheet for details
33/34	NC	NC	NC
35-37	GPIO0-2/GPIO0-1/ GPIO0-0	Digital inputs/outputs	Digital signal GPIOs, pin-multiplexed as detailed in the chip datasheet
38	VDDQ	Supply Power	aFuse Programming Supply Voltage 3.3V

Note: 1, VDDIO1/VDDIO2 supplies power to stacked flash memory and external circuits (such as sensors).
In order to facilitate use and testing, the hardware default VDDIO1/VDDIO2 has been connected to the VCC pin.
If you need to call the power supply separately, please confirm the configuration with the salesperson from MinewSemi;
2, The module chip integrated 4KB eFuse memory, can be used as a security key storage, etc., once the eFuse memory is programmed and locked, the contents of the memory will be permanently valid, can not be modified or changed.

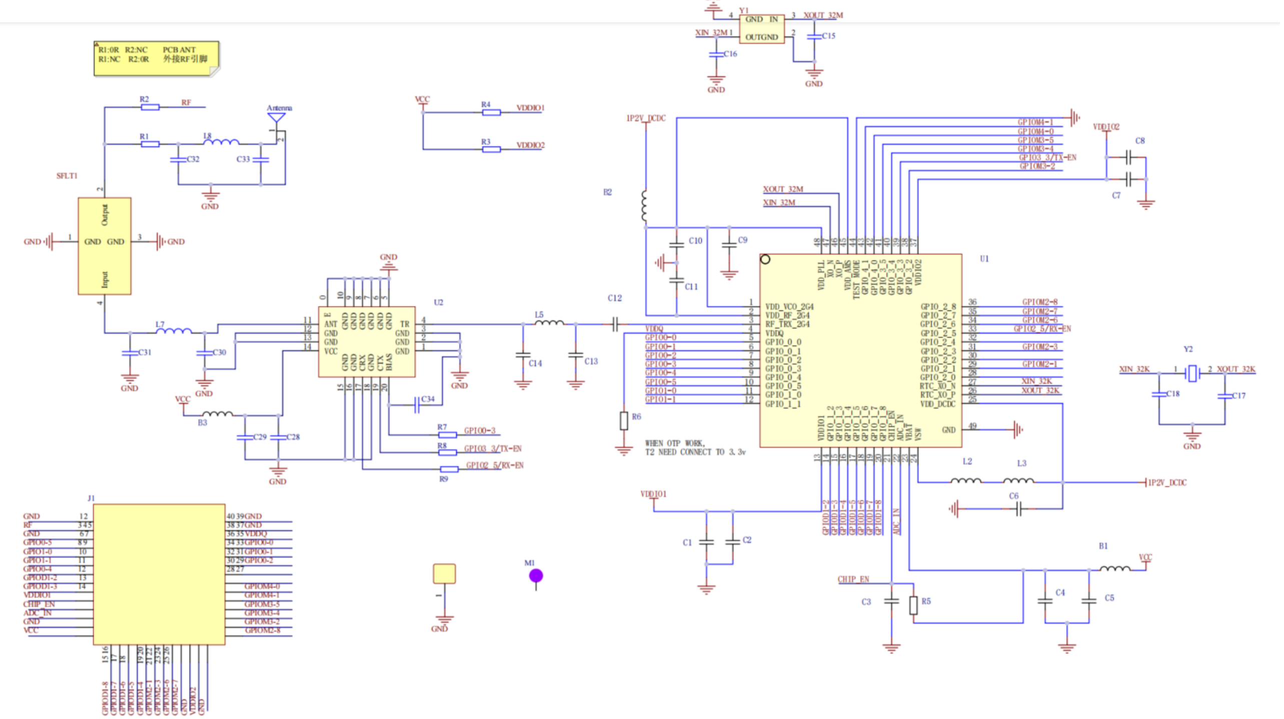
5 MECHANICAL DRAWING



	Default unit：mm Default tolerance：±0.15

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

6 ELECTRICAL SCHEMATIC



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

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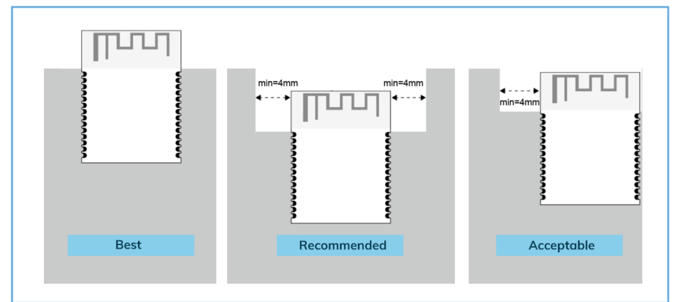
7 PCB LAYOUT

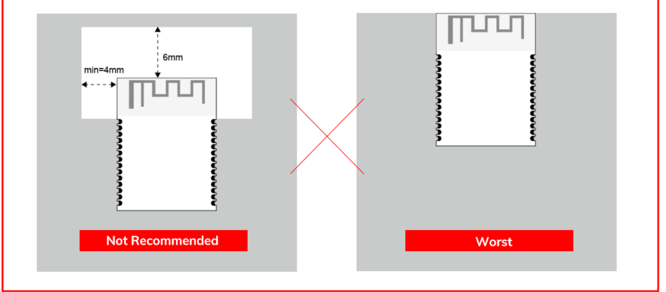
There should be no GND plane or metal cross wiring in the module antenna area, and components should not be placed nearby. It is best to make a hollow or clear area, or place it on the edge of the PCB board.

> 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.

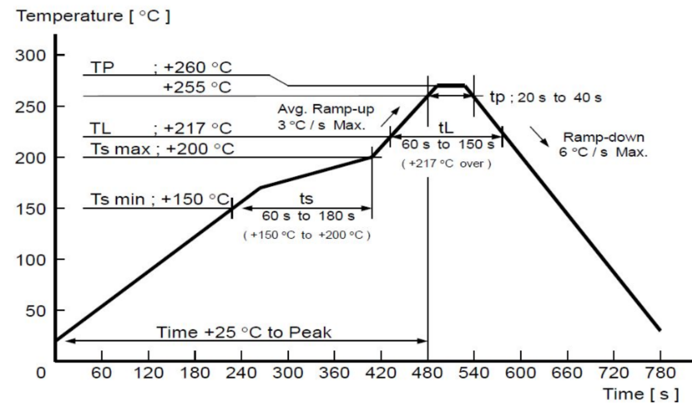




8 REFLOW AND SOLDERING

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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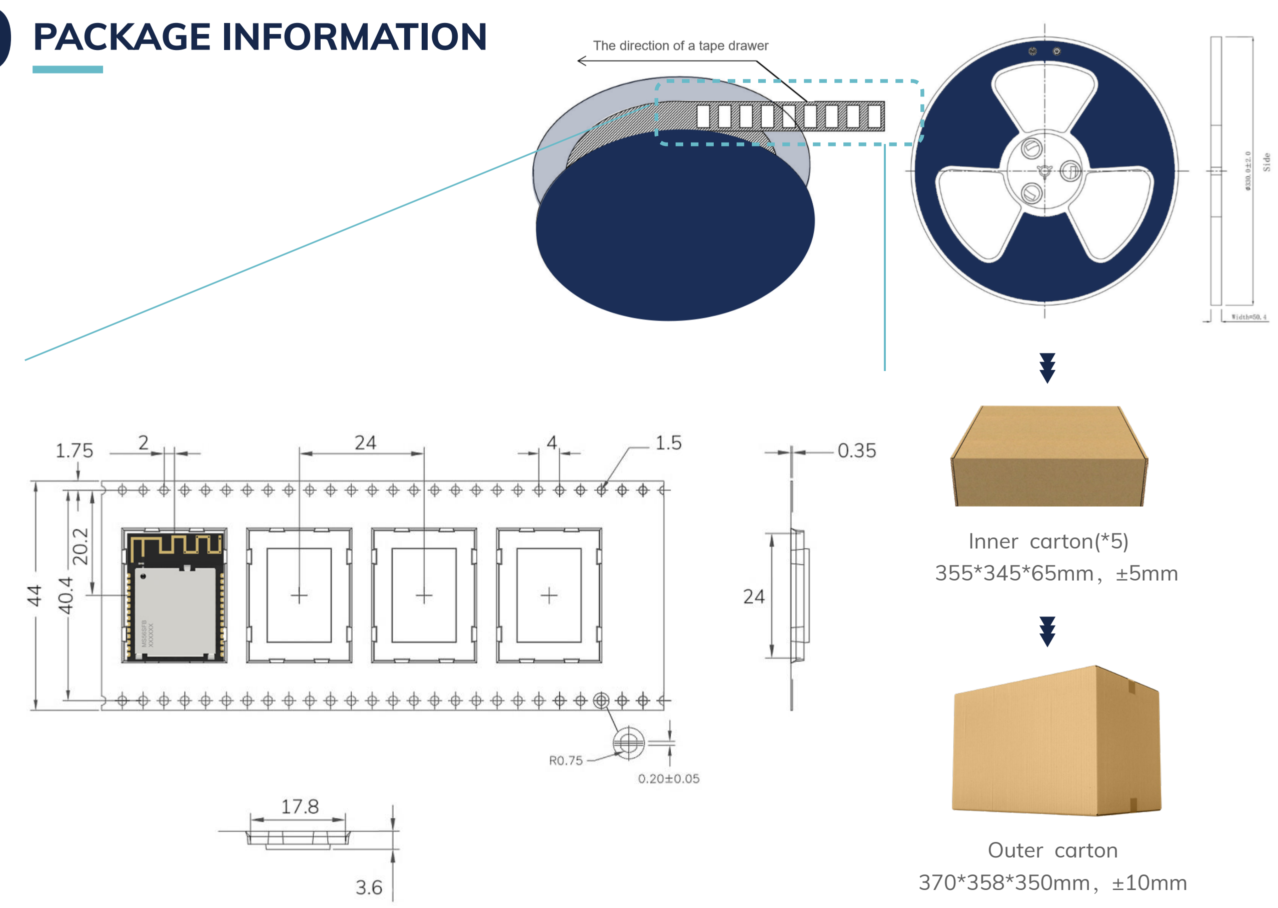
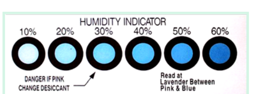
9 PACKAGE INFORMATION



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(*5)
355*345*65mm, ±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
MS56SFB	650PCS	680g	1500g	W=44mm, 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

- IN610,IN610L,IN612L_Chip_Datasheet
  https://en.minewsemi.com/file/IN610,IN610L,IN612L_Chip_Datasheet_EN.pdf
- IN628E_Chip_Datasheet
  https://en.minewsemi.com/file/IN628E_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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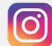

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