

WiFi Module

MS15SF1

Datasheet

V 1.0.0

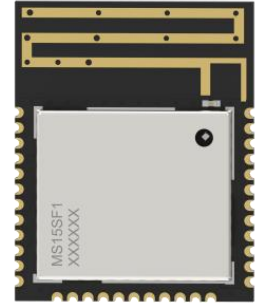
Applicable Product Model
MS15SF11

Version Note

Version	Details	Contributor(s)	Date	Notes
1.0.0	First edit	Vinle	2023.10.23	

MS15SF1-ESP32C6

Multi-protocol, cost-effective, low-power, WiFi 6+ BLE5.3 Multi-protocol module with full development resource support



MS15SF1 is a multi-protocol, high-performance, cost-effective wireless WiFi 6+BLE5.3 combo module based on ESP32-C6 SoC. The RISC-V single-core runs at a frequency of 160 MHz, with 320 KB+4MB FLASH program space, 512KB+16KB RAM, integrated 2.4 GHz transceiver, LNA, and other powerful resources for 2.4GHz WiFi/BLE connections. It is compatible with the MS11SF11 module and can withstand voltages of up to 80M in actual high-interference conditions. MS15SF1 is compatible with the MS11SF11 module.

■ Features

- 2.4G WiFi6 (802.11b/g/n ax) + BLE5.3, Zigbee and Thread (802.15.4) multi-protocolsSupport
- AP、STA、AP+STA Mode
- Support for AT, ESP-IDF developmentupport
- IEEE 802.15.4-2015 protocol compatible
- Support SDIO, I2S, UART and other interfaces.
- Support for OTA encryption upgrade

■ Application

- Smart Buildings
- Consumer Electronics
- Smart Healthcare
- Security Equipment
- Automotive Devices
- Service Robot
- POS

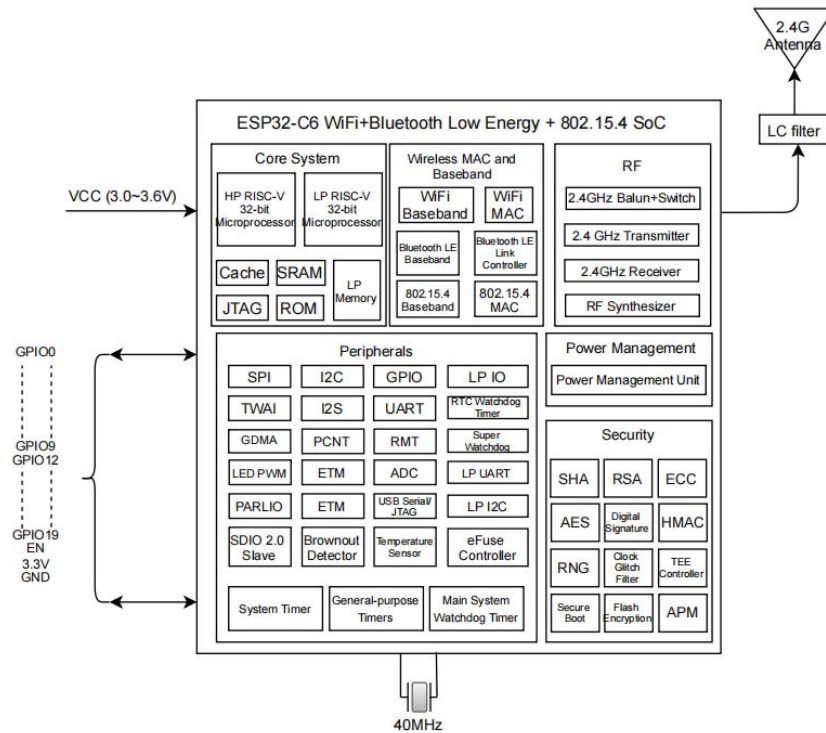
■ Key parameter

Chip Model	ESP32-C6FH4	Antenna	PCB
Module size	16.6x13.2x2.2mm	GPIO	22
Flash	4M + 320KB	RAM	512KB+16KB
Receiving Sensitivity	BLE: -106dBm WiFi: -99.2dBm	Transmission Power	BLE: -34 ~ +21dBm WiFi: -24 ~ + 20dBm
Current(TX)	382mA	Current(RX)	82mA

INDEX

1 Block Diagram	5
2 Electrical Specification	5
3 Pin Description	6
4 Pin Definition	7
5 Power Consumption Description	7
5.1 Description	7
5.2 Power management	8
6 Mechanical Drawing	9
7 Electrical Schematic	9
8 PCB Layout	10
9 Reflow and Soldering	13
10 Package Information	14
Quality	15
Contact Us	15
Copyright Statement	16

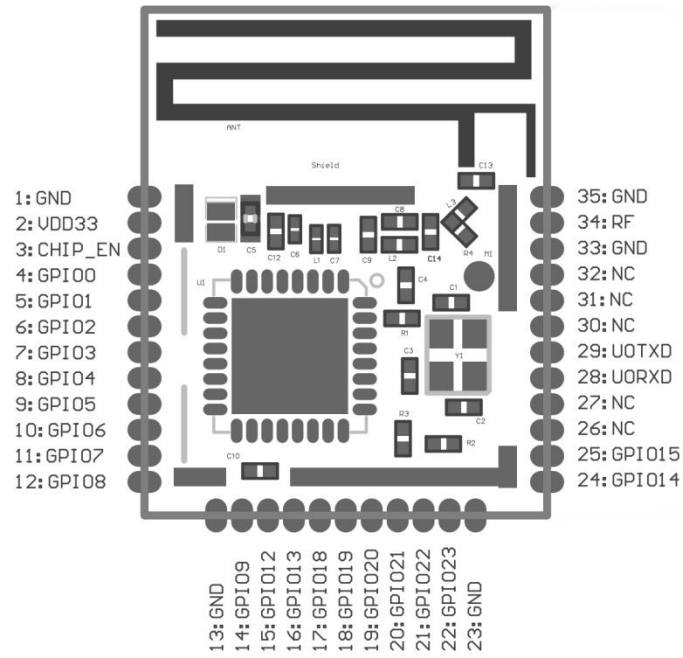
1 Block Diagram



2 Electrical Specification

Parameter	Values	Notes
Working Voltage	3.0V-3.6V	To ensure RF work, supply voltage suggest not lower than 3.3V
Working Temperature	-40°C~+105°C	Storage temperature is -40°C~+125°C
Transmission Power	BLE: -34 ~ +21dBm WiFi: -24 ~ +20 dBm	Configurable
Current(RX)	82mA	RF Receive Current in Maximum Power Mode
Current(TX)	382mA	RF Receive Current in Maximum Power Mode
Module Dimension	16.6x13.2x2.2mm	
Quantity of IO Port	22	

3 Pin Description



(Top View)

4 Pin Definition

Symbol	Type	Definition
GND	Ground	Ground
VDD	Negativ power supply	Power supply: 3.0 ~ 3.6V, with this pin
CHIP_EN	Enable	High: chip enable; Low: chip disable; Note: the EN pin should NC.
RF	-	External antenna pin
GPIO1 - GPIO9 GPIO12 - GPIO15 GPIO18 - GPIO23	GPIO	General IO port, GPIO4 - Serial port RXD. GPIO5 - serial port TXD.
U0TXD	I/O, TX	I/O pin firmware download UART TX
U0RXD	I/O, RX	I/O pin firmware download UART RX
NC	-	Not connected pin

5 Power Consumption Description

5.1 Description

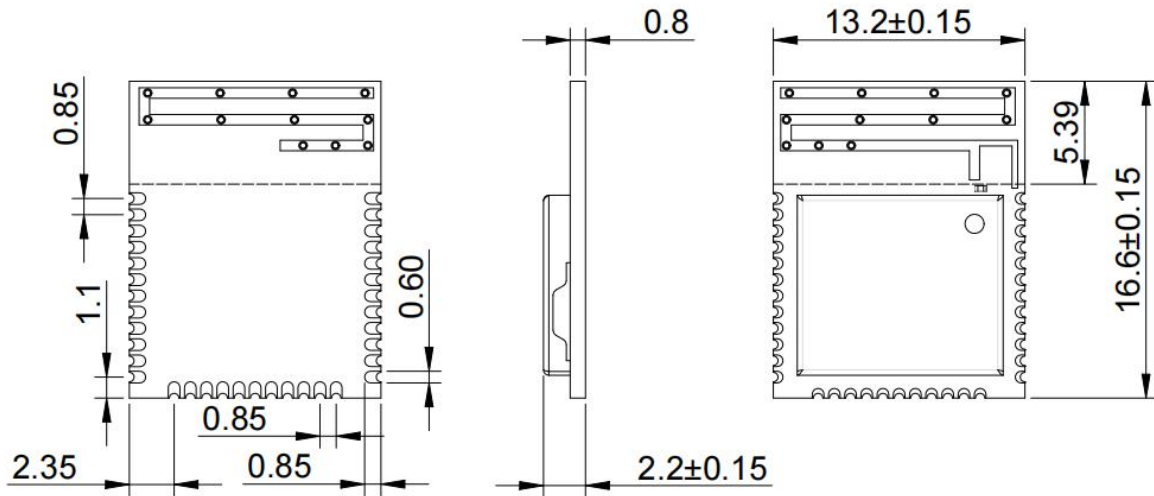
The following power consumption figures are based on 3.3 V power supply, 25°C ambient temperature, and test results done at the RF interface.

Operating mode		Working status	Peak
RF work	TX	802.11b, 1 Mbps, DSSS @ 20.5 dBm	382mA
		802.11g, 54 Mbps, OFDM @ 19.0 dBm	316mA
		802.11n, HT20, MCS7 @ 18.0 dBm	295mA
		802.11n, HT40, MCS7 @ 17.5 dBm	280mA
		802.11ax, MCS9 @ 15.5 dBm	251mA
	RX	802.11b/g/n, HT20	78mA
		802.11n, HT40	82mA
		802.11ax, HE20	78mA

5.2 Power management

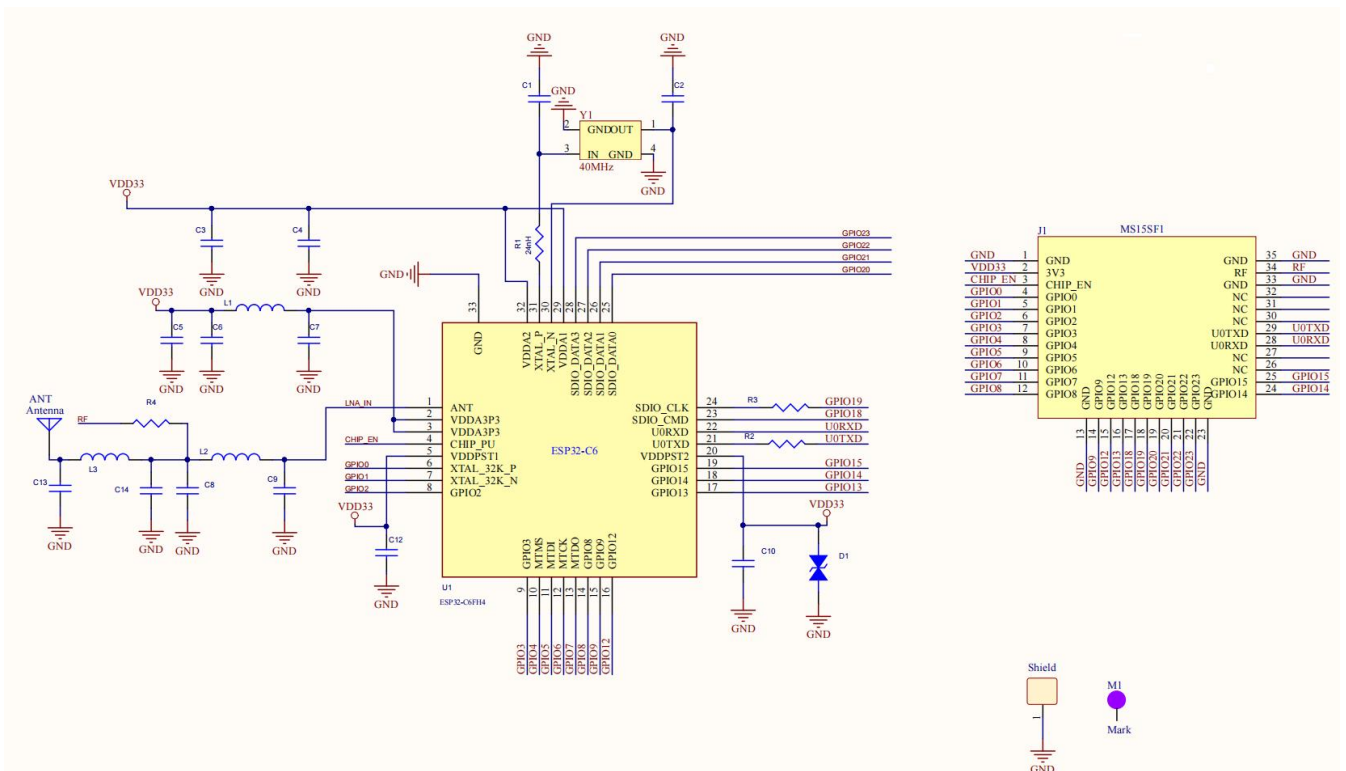
Operating mode	Working status	Type value
Modem-sleep (Support by default)	80MHZ, CPU working, peripheral clock fully on	30mA
	80MHZ, CPU idle, peripheral clock fully on	25mA
Light-sleep	CPU, wireless communication module power off, peripheral clock off, all GPIOs set to high impedance state.	180μA
	CPU, wireless communication module, peripheral power off, all GPIOs set to high state.	35μA
Deep-sleep	RTC Timer and LP Memory Power Up	7μA
Power off (Support by default)	The CHIP_PU pin is pulled low and the chip is turned off.	1μA

6 Mechanical Drawing



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

7 Electrical Schematic

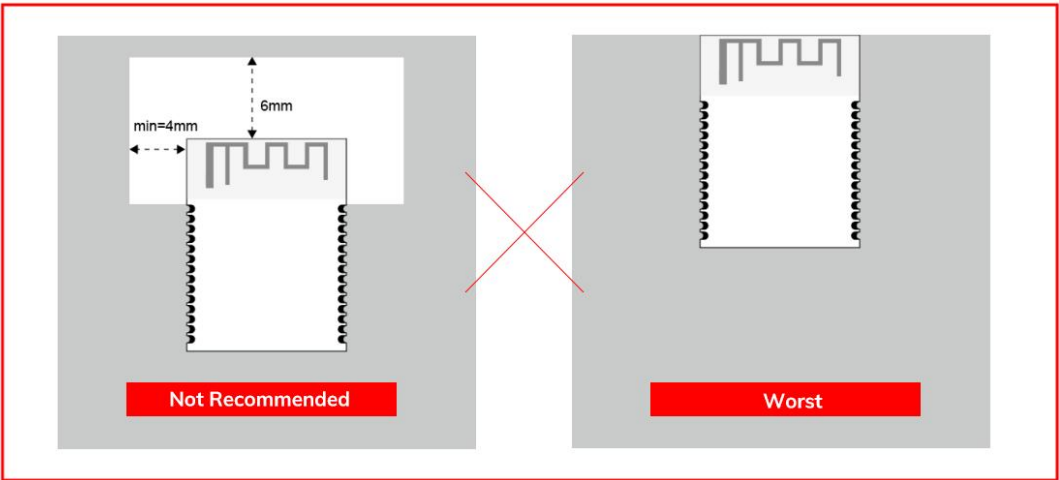
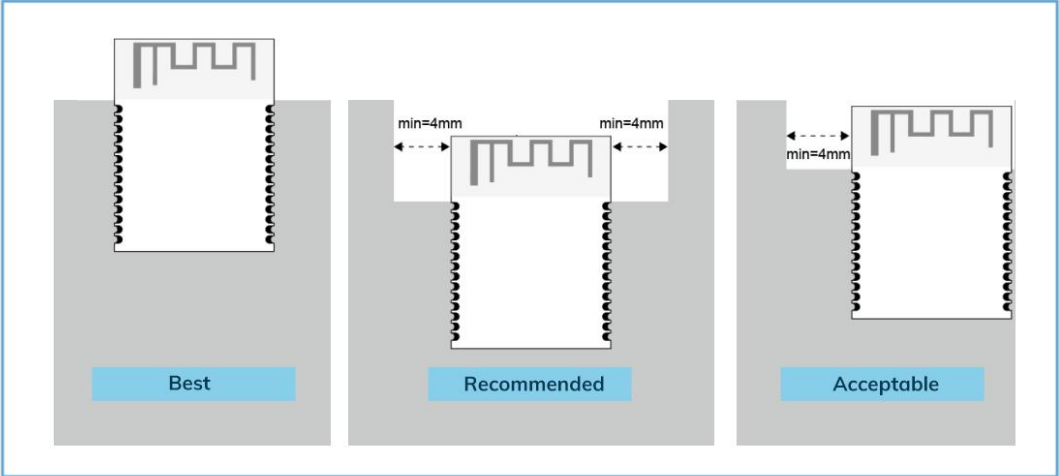


Notice: To ensure that the power supply to the ESP32-C6 chip is stable during power-up, it is advised to add an RC delay circuit at the EN pin. The recommended setting for the RC delay circuit is usually $R = 10\text{ k}\Omega$ and $C = 1\text{ }\mu\text{F}$. However, specific parameters should be adjusted based on the power-up timing of the module and the power-up and reset sequence timing of the chip.

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.



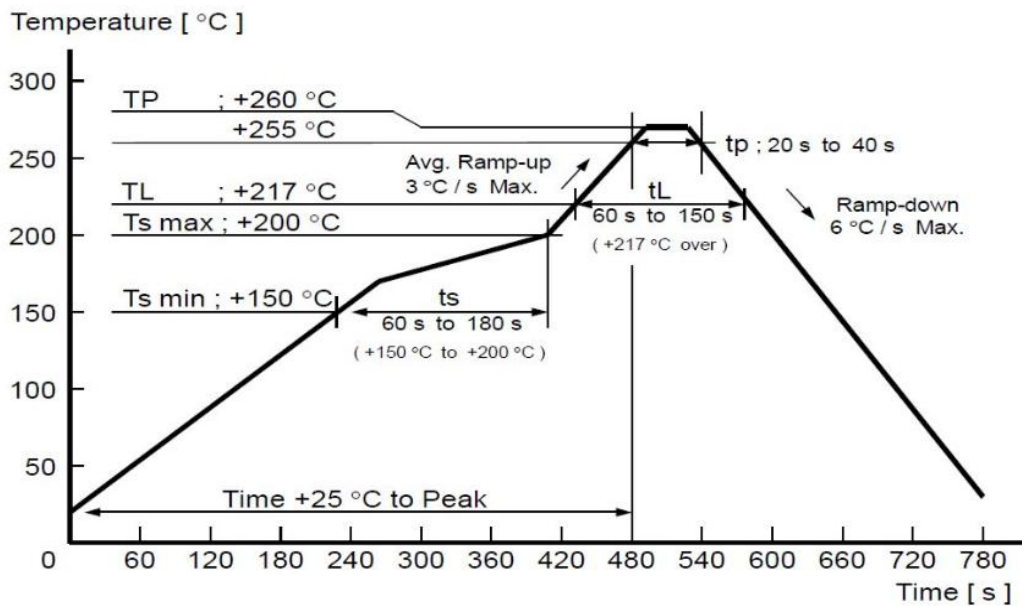
Layout notes:

- 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

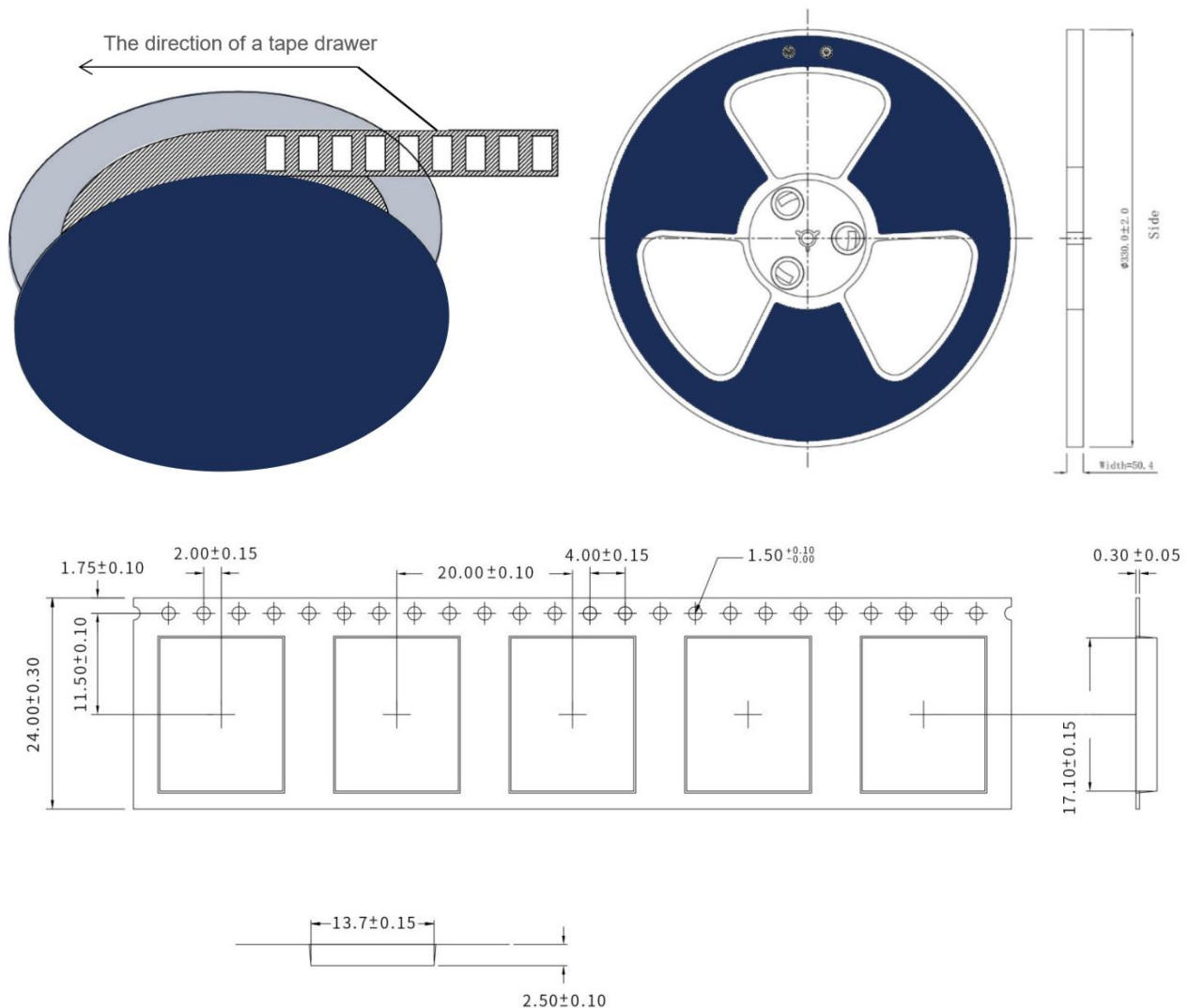
1) Do SMT according to above reflow oven temperature deal curve. Max. Temperature is 260°C;

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	850PCS	TBD	TBD	W=44mm, T=0.35mm

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

● 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, OHS18001, 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.

● 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:

Web: www.minewsemi.com

Email: minewsemi@minew.com

Linkedin: www.linkedin.com/company/minewsemi

Shop: <https://minewsemi.en.alibaba.com/>

Tel: +86 0755-28010353

Address: 3rd Floor,I Building, Gangzhilong Science Park, NO.6, Qinglong Road,Longhua District, Shenzhen, China

**Click the icon to view and download
the latest product documents electronically.**



● Copyright Statement

This manual and all the contents contained in it are owned by Shenzhen Minewsemi Co., Ltd. and are protected by Chinese laws and applicable international conventions related to copyright laws.

The certified trademarks included in this product and related documents have been licensed for use by MinewSemi. This includes but is not limited to certifications such as BQB, RoHS, REACH, CE, FCC, BQB, IC, SRRC, TELEC, WPC, RCM, WEEE, etc. The respective textual trademarks and logos belong to their respective owners. For example, the Bluetooth® textual trademark and logo are owned by Bluetooth SIG, Inc. Other trademarks and trade names are those of their respective owners. Due to the small size of the module product, the "@" symbol is omitted from the Bluetooth Primary Trademarks information in compliance with regulations.

The company has the right to change the content of this manual according to the technological development, and the revised version will not be notified otherwise. Without the written permission and authorization of the company, any individual, company, or organization shall not modify the contents of this manual or use part or all of the contents of this manual in other ways. Violators will be held accountable in accordance with the law.

MINEWSEMI

Tel: 0086-755-2801 0353

Email: minewsemi@minew.com

Web: www.minewsemi.com

Address: 3rd Floor, Building I, Gangzhilong Science Park, Qinglong Road Longhua District, Shenzhen 518109, China

