

# **WiFi6 + BLE5.3 ComboModule**

## **MS12SF1 Datasheet**

V 1.2.0

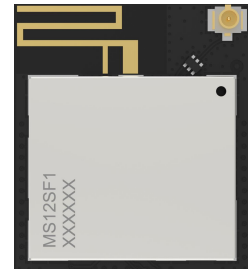
<b>Applicable Product Model</b>
<b>MS12SF1</b>

# Version Note

Version	Details	Contributor(s)	Date	Notes
1.0.0	First edit	Vinle	2022.12.21	First edit
1.1.0	Update GPIOs	Vinle	2023.02.16	Revised
1.2.0	Update pack information	Vinle	2023.06.09	Revised

# MS12SF1-nRF7002+nRF5340

**Dual-Core, High-performance, ultra-low-power, Support At/STA Mode, Support WiFi6 Dual-band that 2.4G and 5G ,1T1R**



MS12SF1 WiFi6+BLE Combo Module adopts integrated nRF7002 and nRF5340 chip, supports BLE mode, at the same time supports WiFi6 dual-band connection, 2.4G and 5G function adopts WiFi and BLE independent antenna design, have no crosstalk between functions. One device can support two wireless connection mode of WiFi and BLE. output Maximum power up to 21dBm, receiving current in 2.4G frequency region is 56mA, while in 5G frequency region is 58mA, meanwhile supports BLE master/slave mode and passthrough mode, adopts WiFi and BLE independent design, no crosstalk.

## ■ Features

- Bluetooth 5.3
- Dual-Core
- Ultra-low-power
- High-performance
- Support WiFi6 Dual-band that 2.4G and 5G ,1T1R

## ■ Application

- Smart Buildings
- Intelligent wearable device
- Smart Healthcare
- Consumer electronics
- Automotive Devices
- Smart Agriculture

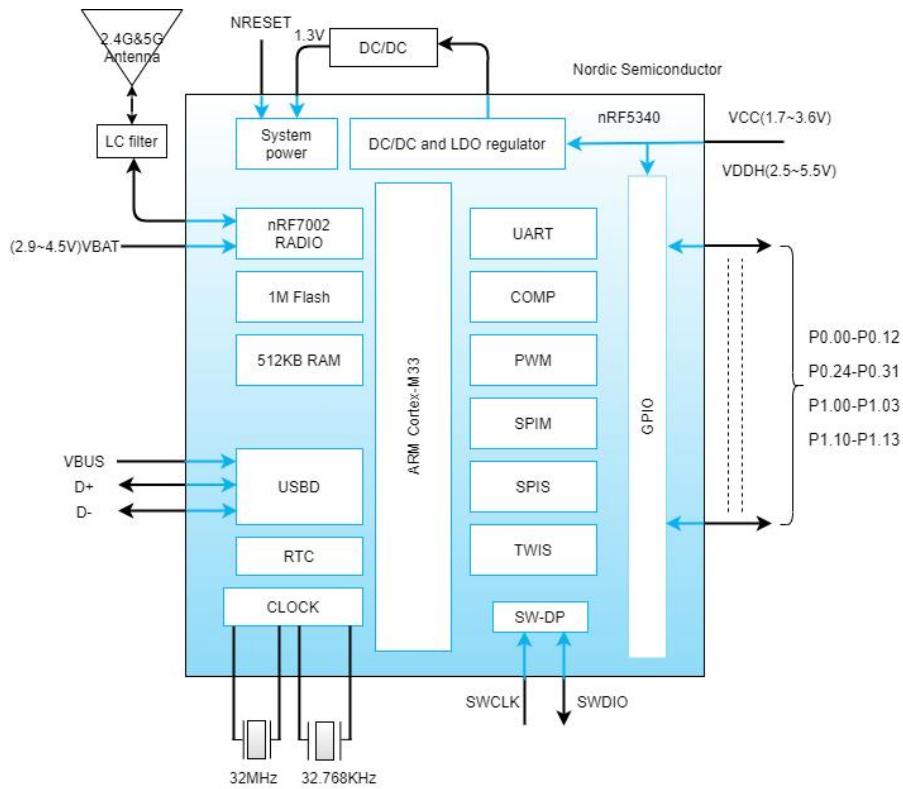
## ■ Key parameter

<b>Chip Model</b>	nRF7002+nRF5340	<b>Antenna</b>	PCB/IPEX
<b>Module size</b>	27×23.5×2.8mm	<b>GPIO</b>	29
<b>Flash</b>	1MB+256KB	<b>RAM</b>	512KB+64KB
<b>Receiving Sensitivity</b>	-98dBm	<b>Transmission Power</b>	BLE:-40 ~ +3dBm WiFi:+21dBm
<b>Current(TX)</b>	2.4G-191mA 5G-260mA	<b>Current(RX)</b>	2.4G-56mA 5G-58mA
<b>Firmware</b>	/		

# INDEX

1 Block Diagram .....	5
2 Electrical Specification .....	5
3 Pin Description .....	6
4 Pin Definition .....	7
5 Mechanical Drawing .....	8
6 Power supply module .....	8
6.1 Power supply .....	8
7 Electrical Schematic .....	9
8 PCB Layout .....	10
9 Reflow and Soldering .....	12
10 Package Information .....	13
Quality .....	14
Contact Us .....	14
Copyright Statement .....	15

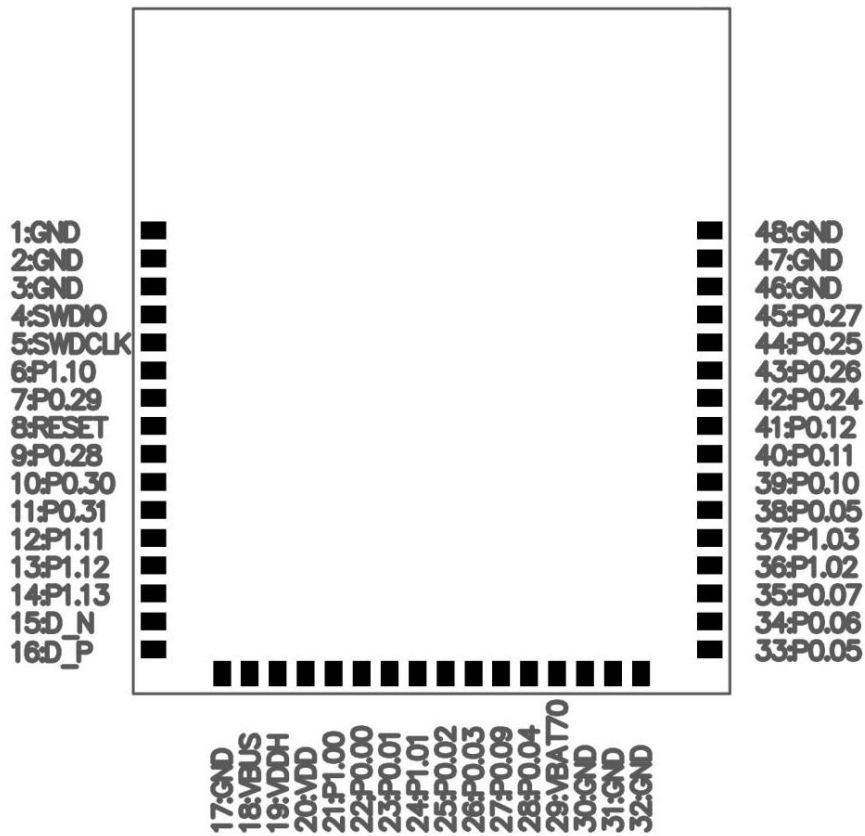
# 1 Block Diagram



# 2 Electrical Specification

Parameter	Values	Notes
Operation Voltage	1.7V-5.5V	To ensure RF operation, suggest BLE supply voltage not lower than 3.3V suggest WiFi supply voltage not lower than 3.6V
Working Temperature	-40°C~+85°C	
Transmission Power	BLE:-40 ~ +3dBm WiFi: +5 ~+21dBm	Configurable
Current(RX)	2.4G-56mA/5G-58mA	
Current(TX)	2.4G-191mA/5G-260mA	BLE 2Mbps transmission
Module Dimension	27×23.5×2.4mm	
Quantity of IO Port	29	General purpose IO interface

### 3 Pin Description

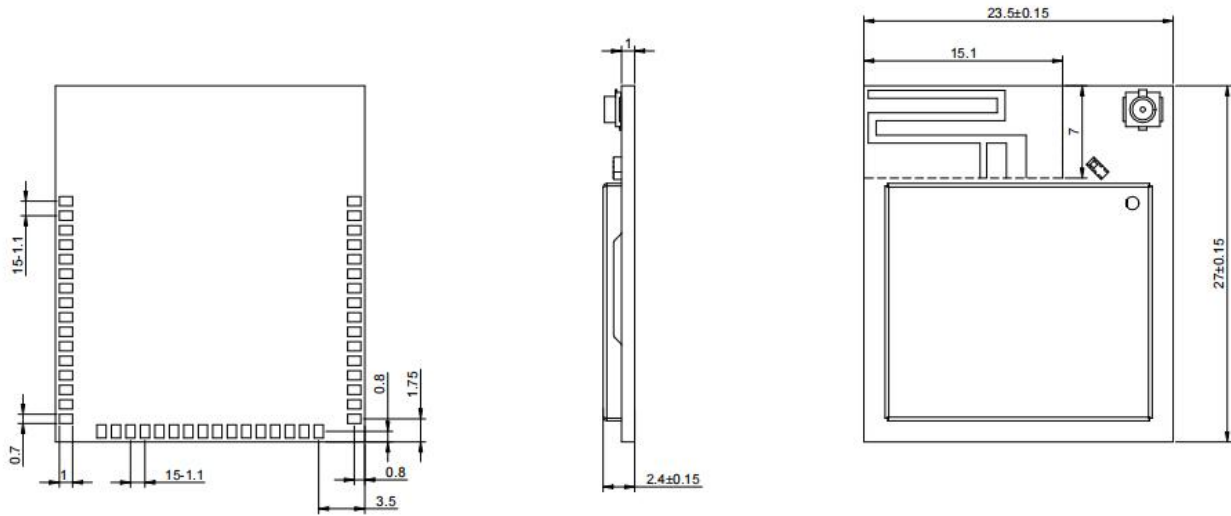


(Top View)

## 4 Pin Definition

Symbol	Type	Definition
VDD	Power positive pole	Supply electricity: 1.7V~3.6V
VDDH	GPIO	Supply electricity: 2.5V~5.5V
VBUS	Power source	USB interface acquired power input after conversion
VBAT70	Power source	WiFi power supply, 2.9V~4.5V, 3.6V standard
GND	Negative power supply	Grounded
SWDCLK/SWDIO	I/O, SWCLK/SWDIO	For burning firmware
P0.00-P0.12 P0.24-P0.31 P1.00-P1.03 P1.10-P1.13	GPIOs	General purpose IO interface
D_P	USB port	USB D+
D_N	USB port	USB D-
RESET	Reset	Pull up the resistor internally to reset

## 5 Mechanical Drawing



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

**Notice :** The recommended pad size suggest 2.54\*0.65mm , Pad interval 1mm

## 6 Power supply module

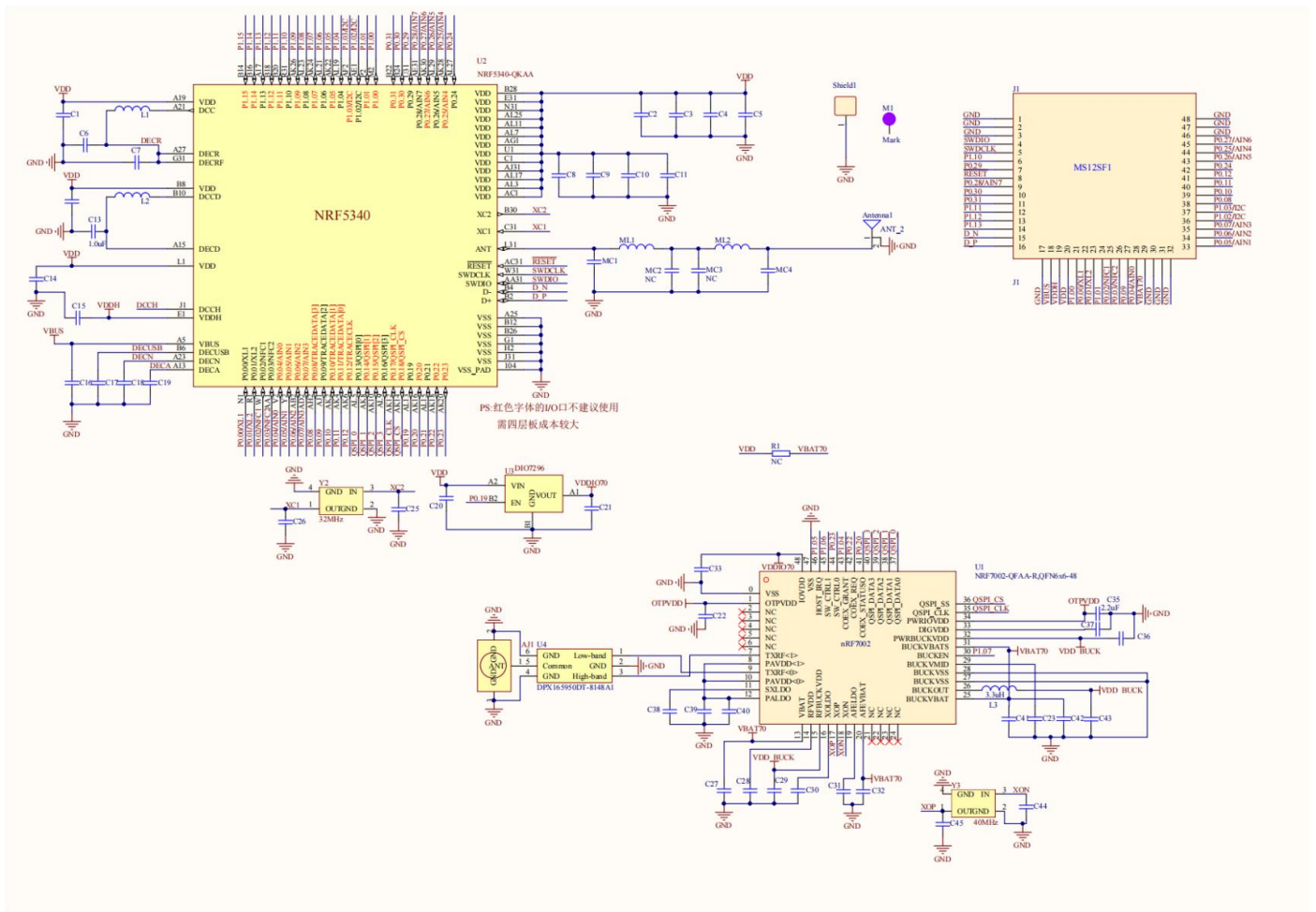
### 6.1 Power supply

BLE Chip operation voltage range is 2.7V to 3.6V, to ensure normal use, supply voltage range should be 3.0V to 3.6V as far as possible.

WiFi Chip operation voltage range is 2.9V to 4.5V, to ensure normal use, supply voltage range should be 3.3V to 4.5V as far as possible.



# 7 Electrical Schematic

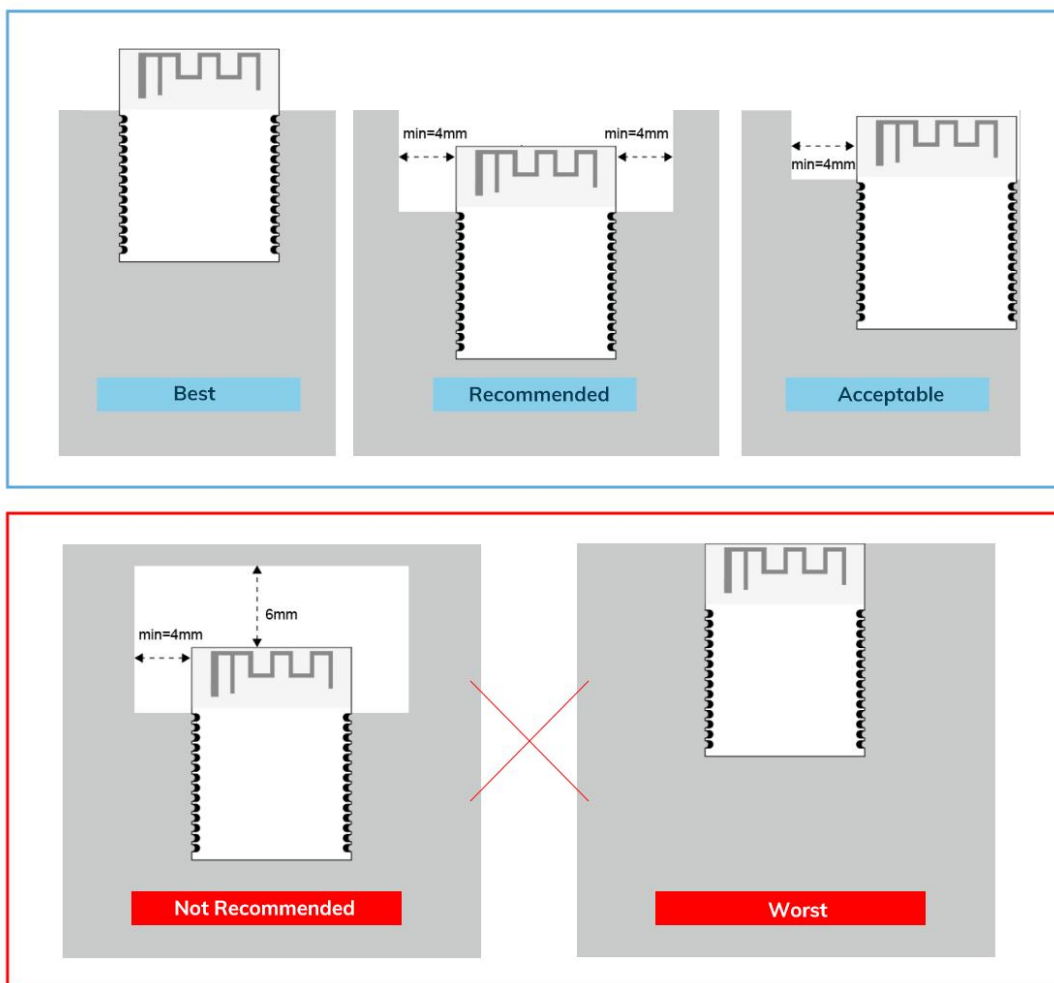


**Notice:** Before placing an order, please confirm the specific configuration required with the salesperson.

## 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.



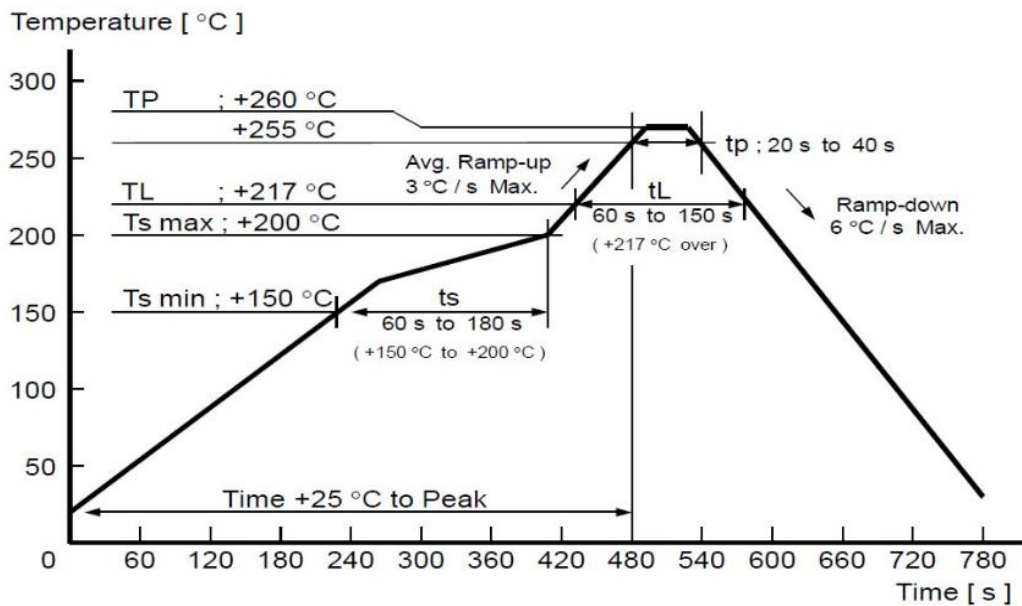
**Layout notes:**

- 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

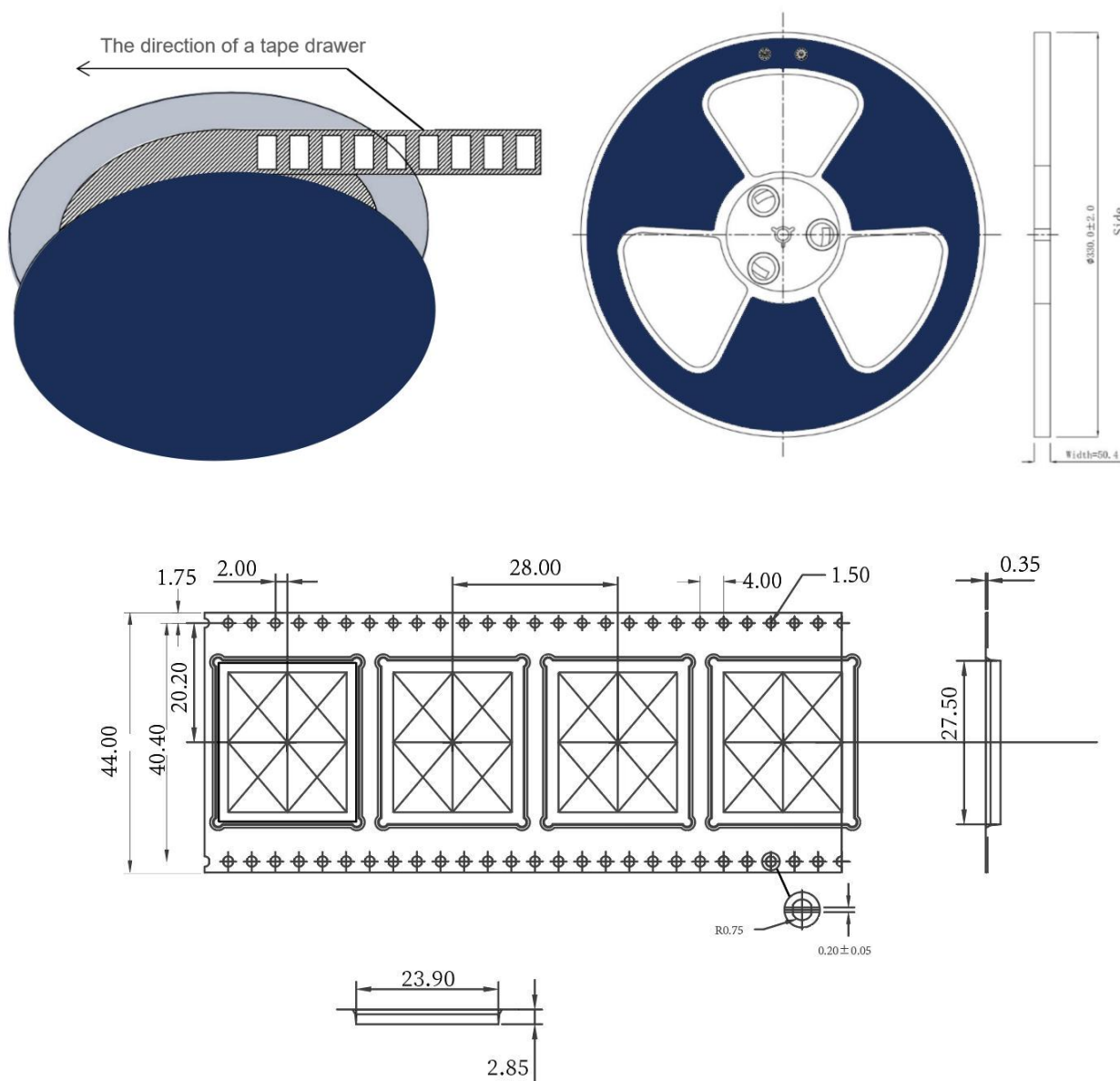
1) Do SMT according to above reflow oven temperature deal curve. Max. Temperature is 260°C;

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:  $\pm 0.1$ )

Packing detail	Specification	Net weight	Gross weight	Dimension
Quantity	700PCS	1820g	2350g	W=44mm, T=0.35mm

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

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