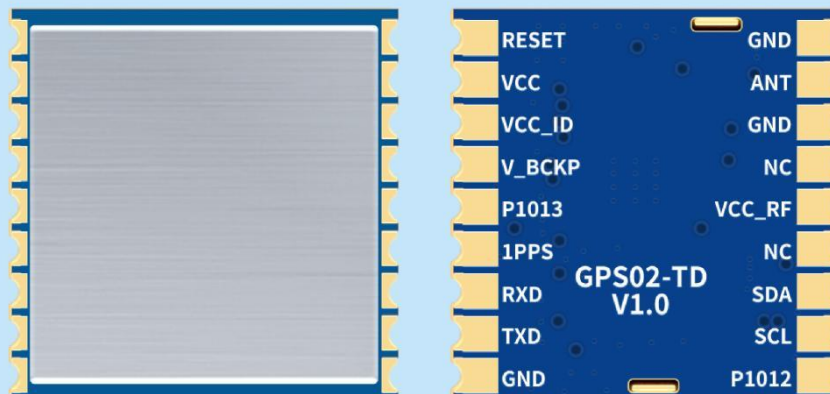


BDS/GPS/GLONASS/Galileo four mode GPS module  
High accuracy and low power consumption

## Product Specification



## Catalogue

1. Overview .....	- 3 -
2. Features .....	- 3 -
3. Applications .....	- 3 -
4. Typical application circuit .....	- 3 -
5. Interface description .....	- 4 -
6. Performance parameters .....	- 5 -
7. Typical application circuit .....	- 6 -
8. Pin definition .....	- 7 -
9. Recommended antenna index .....	- 8 -
10. Mechanical size .....	- 8 -
11. Precautions .....	- 9 -

### Note: Revision History

Revision	Date	Comment
V1.0	2022-9	First release
V1.1	2022-10	Update performance parameter data update rate
V2.0	2022-11	Description Updated

## 1. Overview

GPS02-TD module is a quad-mode GPS module that supports BDS/GPS/GLONASS/Galileo/QZSS/SBAS and fully supports BeiDou B3, which can provide users with high quality, strong anti-jamming and low-power positioning and navigation solutions.

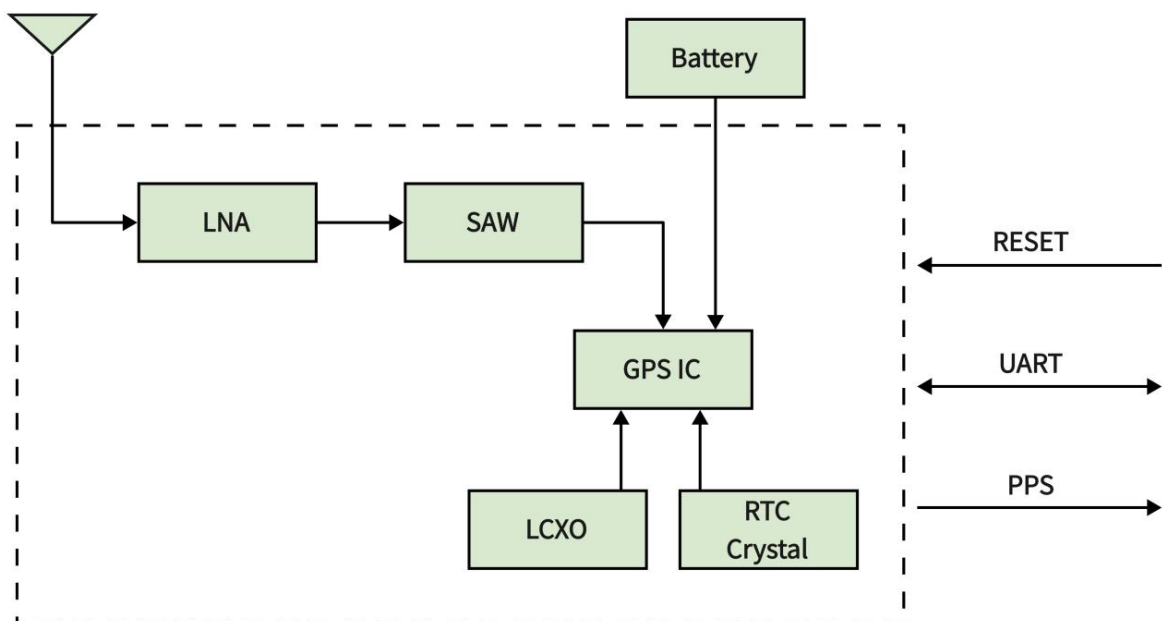
## 2. Features

- Support BDS B1/B1C, GPS L1 C/A, GLO L1OF, Gal E1 frequency point
- Support BDS/GPS/GLONASS/Galileo single-mode, dual-mode and multi-mode work, can switch between each other by command, default BDS/GPS/GLO tri-mode work
- Support A-GNSS assisted positioning
- Support power supply to active antenna
- With backup power input interface
- Support hot start
- Support external reset
- Support UART interface
- Cold start capture sensitivity up to -147dBm. Tracking sensitivity up to -163 dBm.

## 3. Applications

- Personal positioning and navigation products
- Vehicle, ship positioning and navigation
- Internet of Things
- Handheld portable device

## 4. Typical application circuit



## 5. Interface description

### 1) Power supply

The module has three power input pins (VCC, V\_BCKP and VDD\_IO) and one power output pin (VCC\_RF).

VCC is the main power supply of the module.

VCC\_IO is the IO power supply of the module.

V\_BCKP : Back up power supply for RTC circuit to ensure that key information is not lost when the main power supply VCC is off.

VCC\_RF: 3.3V output , which can be used for antenna or external LNA.

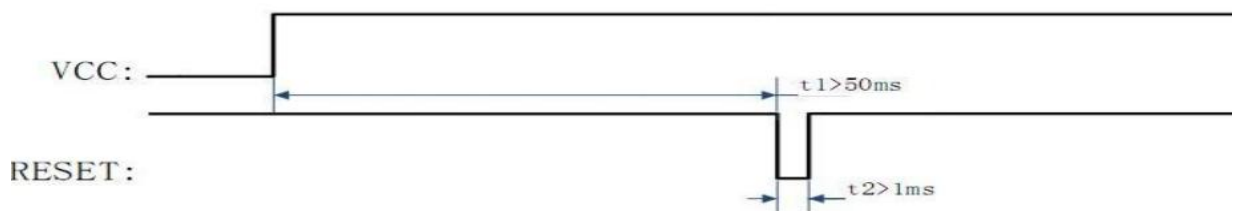
### 2) Antenna interface

The antenna interface (RF\_IN pin) of the module can be directly connected to a multi-mode antenna.

The interface adopts 50Ω impedance matching inside.

### 3) Reset interface

The module has its own power-on reset circuit. If the user does not use the external reset function of the module, the nRESET pin can be left floating; if the user uses the external reset function, the module can be reset after the VCC voltage stabilizes for 50ms. Keep for more than 1ms, the timing is as follows:



### 4) 1PPS signal interface

Module 4 pin 1PPS is the second pulse signal output, 1PPS signal needs to be delayed for several seconds after the module achieves positioning before it is output.

### 5) UART interface

The serial port outputs NMEA data at the UTC second boundary, and the host computer can also switch the module's working mode and baud rate through the serial port. The baud rate range supported by the module is 4800bps~230400bps. The default baud rate is 115200bps.

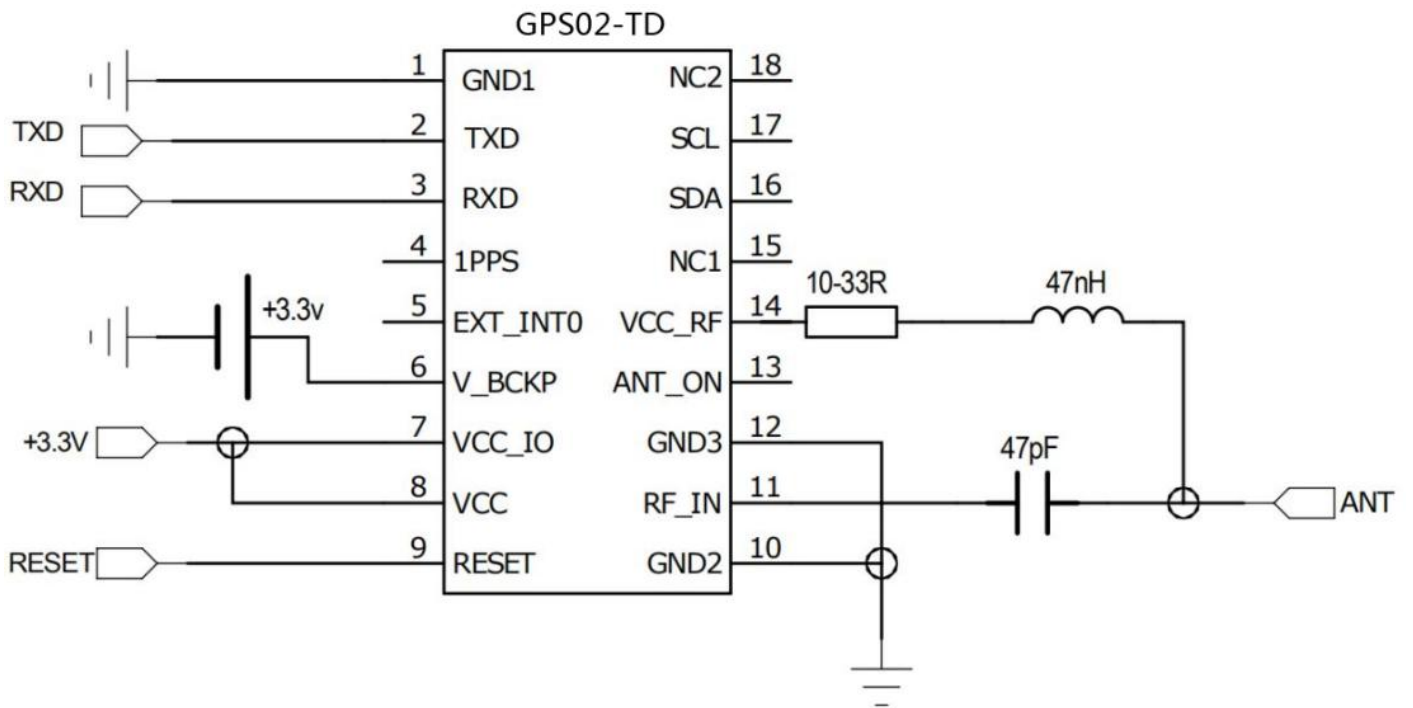
The data format is: 1 start bit, 8 data bits, 1 stop bit, no parity bit.

## 6. Performance parameters

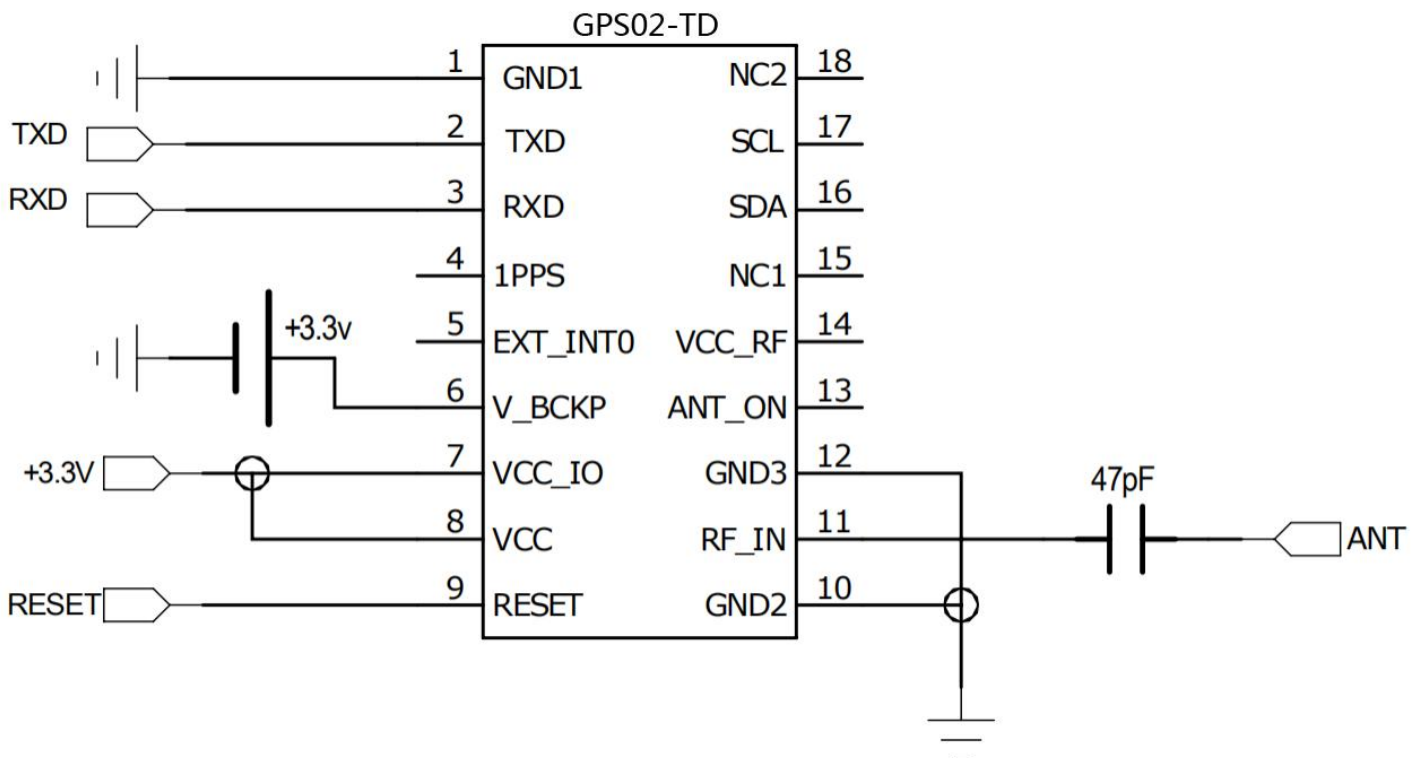
Parameter	Description	Minimum	Typical	Maximum	Unit	Condition
<b>Operating conditions</b>						
Operating voltage range	VCC	3.0	3.3	3.5	V	
	V_BCKP	2.5	3.3	3.5	V	
Temperature	Work	-40		85	°C	
	Storage	-40		125	°C	
<b>Current consumption</b>						
Receive current			< 35		mA	@Dual mode VCC=3.3V, V_BCKP=3.3V
Sleep current			< 25		uA	VCC=0V, V_BCKP=3.3V
<b>Radio frequency parameters</b>						
Positioning accuracy	Level		< 3		m	@Open land
	Elevation		< 4.5		m	
Speed measurement accuracy			<0.1		m	
Sensitivity	capture		-147		dBm	
	track		-163		dBm	
External antenna gain				30	dB	
Speed measurement accuracy			< 0.1		m/s	
Time to First fix(TTFF)	Cold start		< 28		s	
	Hot Start		1		s	
	Recapture		1		s	
<b>Serial port parameters</b>						
Serial Port baud rate		4800	115200	230400	bps	
Data update rate (Single mode)	BDS/GPS/GLONASS/Galileo		1	20	Hz	Default 1 Hz
Data update rate (Dual mode)	BDS+GPS		1	10	Hz	
	BDS+GLONASS		1	10	Hz	
	BDS+Galileo		1	10	Hz	
	GPS+GLONASS		1	10	Hz	
	GPS+Galileo		1	10	Hz	
	GLONASS+Galileo		1	10	Hz	
Data update rate (Tri-mode)	BDS+GPS+GLONASS		1	10	Hz	
	BDS+GPS+Galileo		1	10	Hz	
Data update rate (Quad-mode)	BDS+GPS+GLONASS+Galileo		1	10	Hz	

7. Typical application circuit

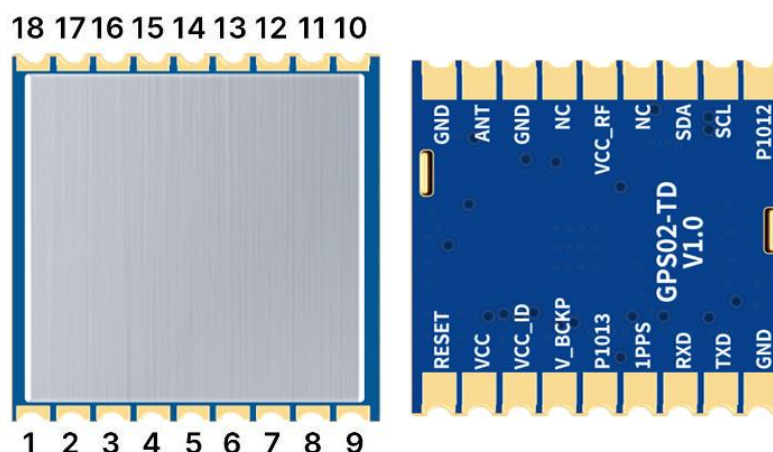
- The active antenna connection method is as follows:



- The passive antenna connection method is as follows:



### 8. Pin definition

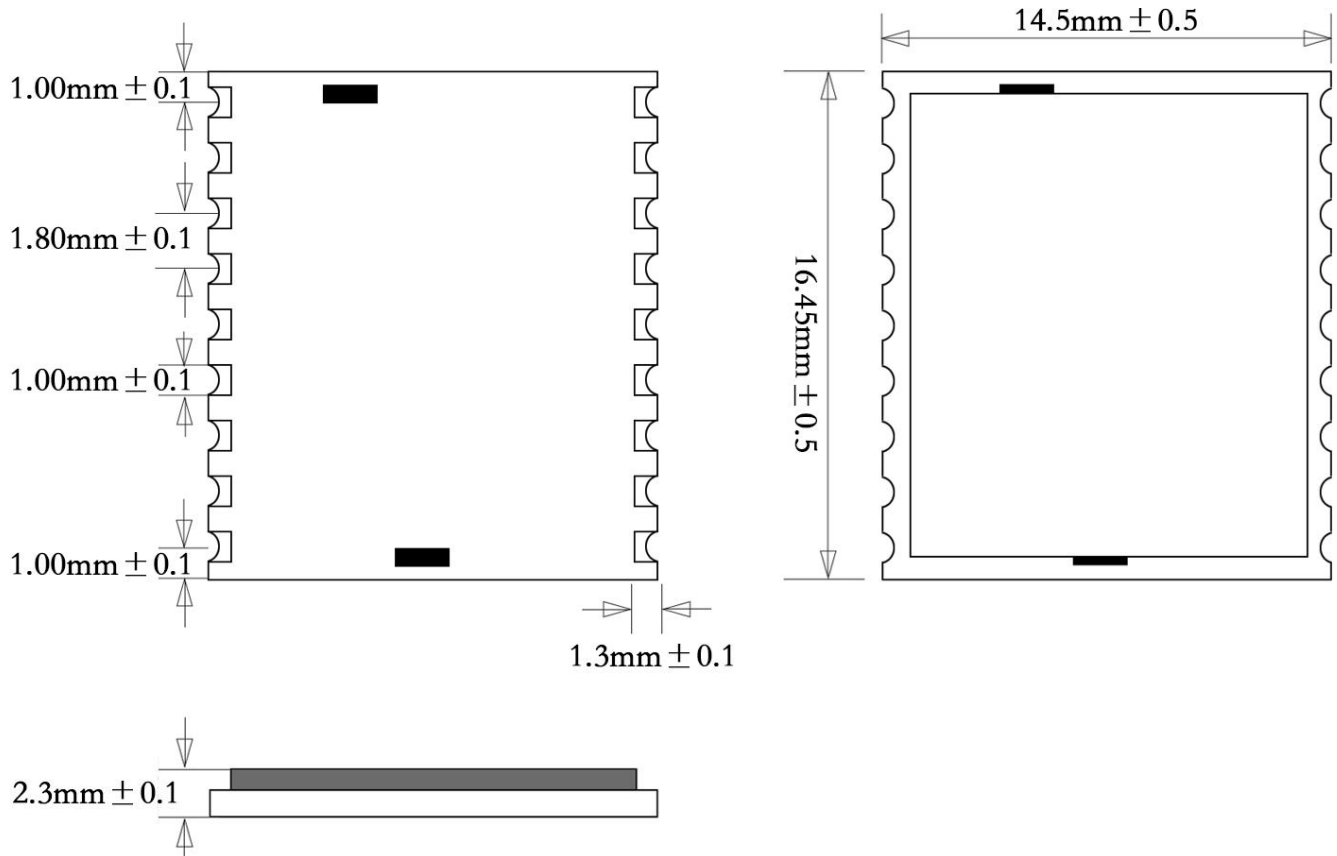


Pin number	Pin definition	I/O	Level standard	Description
1、 3、 10	GND	—		Power ground
2	RF_IN	I		Antenna input
4、 6	NC	—		
5	VCC_RF	O	VCC	3.3V output, powered for the antenna or LNA, not exceed 20mA
7	SDA	I/O	0-3.5 V	<b>I2C interface</b>
8	SCL	I	0-3.5 V	<b>I2C interface</b>
9、 14	PIO12、 13	O	0-3.5 V	Reserved port
11	TXD	O	0-3.5 V	Serial interface
12	RXD	I	0-3.5 V	Serial interface
13	1PPS	O	0-3.5 V	1 pulse output per second
15	V_BCKP	I	2.5-3.5 V	Backup power input
16	VCC_IO	—	3.0-3.5 V	IO power input
17	VCC	—	3.0-3.5 V	Main power input
18	nRESET	I	0-3.5 V	External reset, active low. Cannot be connected to ground through capacitor.

9. Recommended antenna index

Item		Active antenna	Passive antenna
Frequency range	BDS	1561.098 ± 2.046 MHz	1561.098 ± 2.046 MHz
	GPS	1575.42 ± 1.023 MHz	1575.42 ± 1.023 MHz
	GLONASS	1602.0 ± 4 MHz	1602.0 ± 4 MHz
Input resistance		50Ω	50Ω
Gain		<30dB	-
In-band gain flatness		≤1.5dB	-
Noise Factor		≤1.5dB	-
Input standing wave		≤1.5	≤1.5
Output standing wave		≤2	≤2
Out-of-band rejection: 1568 ± 30MHz		≤30dB	-
Recommend working voltage		3.0V±0.3	-
Temperature range		-40~85℃	-40~85℃

10. Mechanical size (unit: mm)



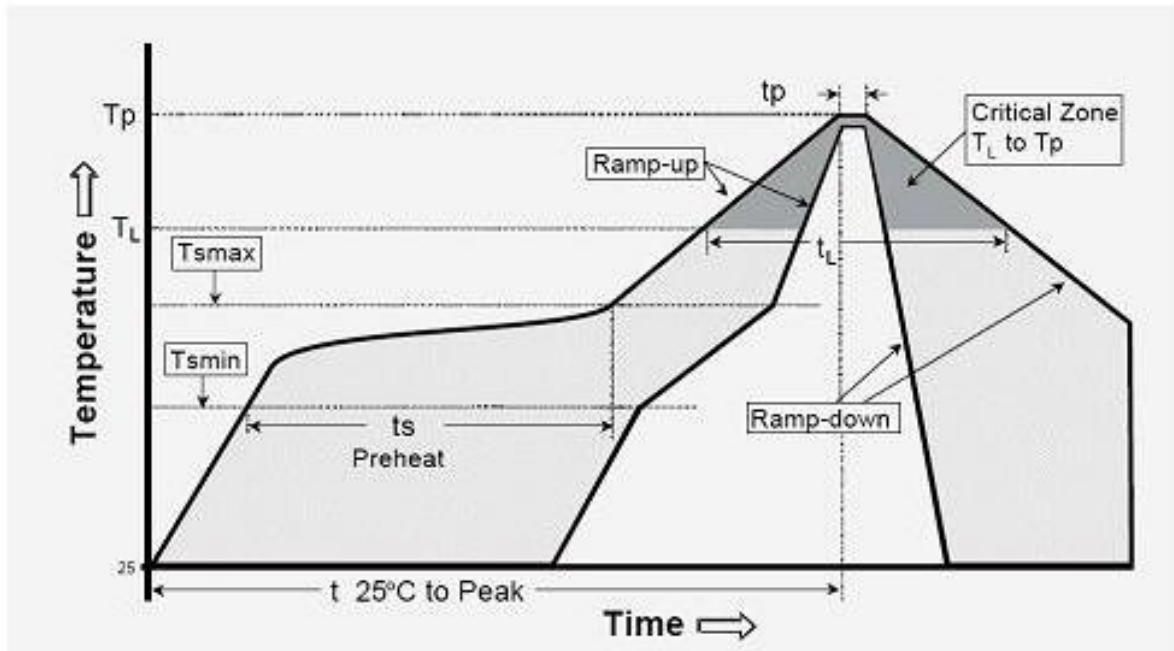


**11. Precautions:**

- 1) The module contains electrostatic sensitive components. Please pay attention to electrostatic protection during soldering, installation and transportation. Please do not touch the RF\_IN pin with bare hands, otherwise the module may be damaged.
- 2) Try to control the ripple of VCC power supply within 100mV.
- 3) Please ensure that the baud rate of the host computer and the module is same.
- 4) It is recommended to choose our active or passive antenna.
- 5) Please control the temperature when solder the module.

**Appendix: SMD Reflow Chart**

Below reflow profile is recommended for SMT technology:



IPC/JEDEC J-STD-020B the condition for lead-free reflow soldering	big size components (thickness $\geq 2.5\text{mm}$ )
The ramp-up rate (Tl to Tp)	3°C/s (max.)
preheat temperature	
- Temperature minimum (T Amin)	150°C
- Temperature maximum (Tsmax)	200°C
- preheat time (ts)	60~180s
Average ramp-up rate(Tsmax to Tp)	3°C/s (Max.)
- Liquidous temperature(TL)	217°C
- Time at liquidous(tL)	60~150 second
peak temperature(Tp)	245+/-5°C