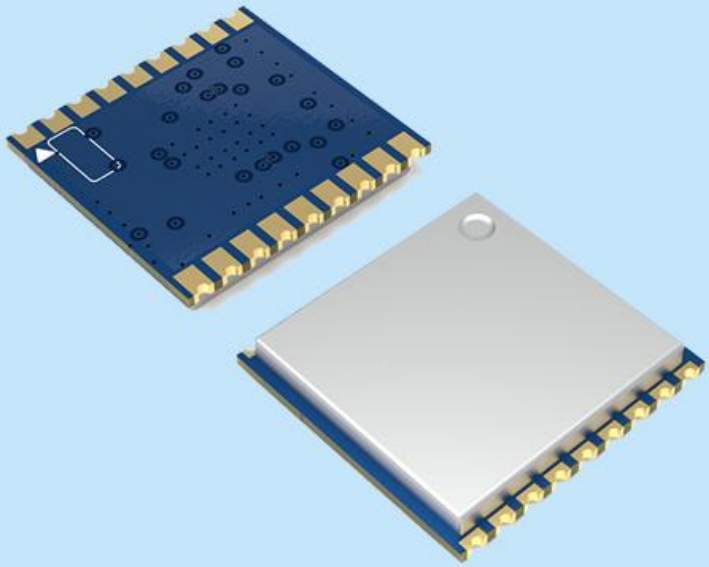
G-NiceRF®

GPS01-TD

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

Product Specifcation



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Catalogue

Note: Revision History

Revision	Date	Comment
V1.0	2022-8	First release
V1.1	2022-10	Update performance parameter data update rate
V2.0	2022-11	Description Updated

1. Overview

GPS01-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.

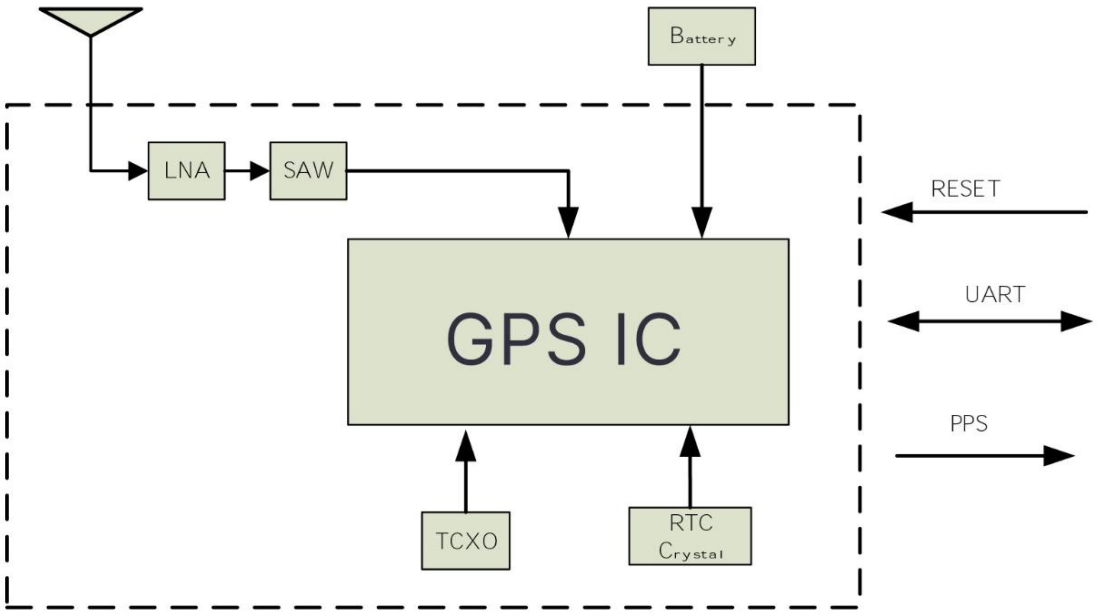
2. Features

- Support BDS B1/B1C, GPS L1 C/A, GLO L1OF, Gal E1frequency 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. Block Diagram



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.

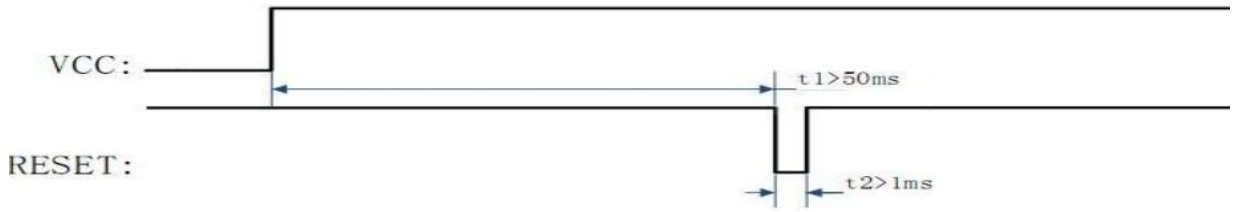
VCC_RF: 3.3V output , which can be used for antenna or external LNA.

2) Antenna interface

RF_IN of the module can be connected to multi-mode antenna directly. The impedance is 50Ω.

3) Reset interface

The module has built-in power-on reset circuit. The nRESET pin can be left floating if the external reset function is not used; Below is the time chart for external reset function:



4) 1PPS signal interface

The 4th pin (1PPS):1 pulse output per second, 1PPS signal will not appear until a few seconds after successful positioning.

5) UART interface

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

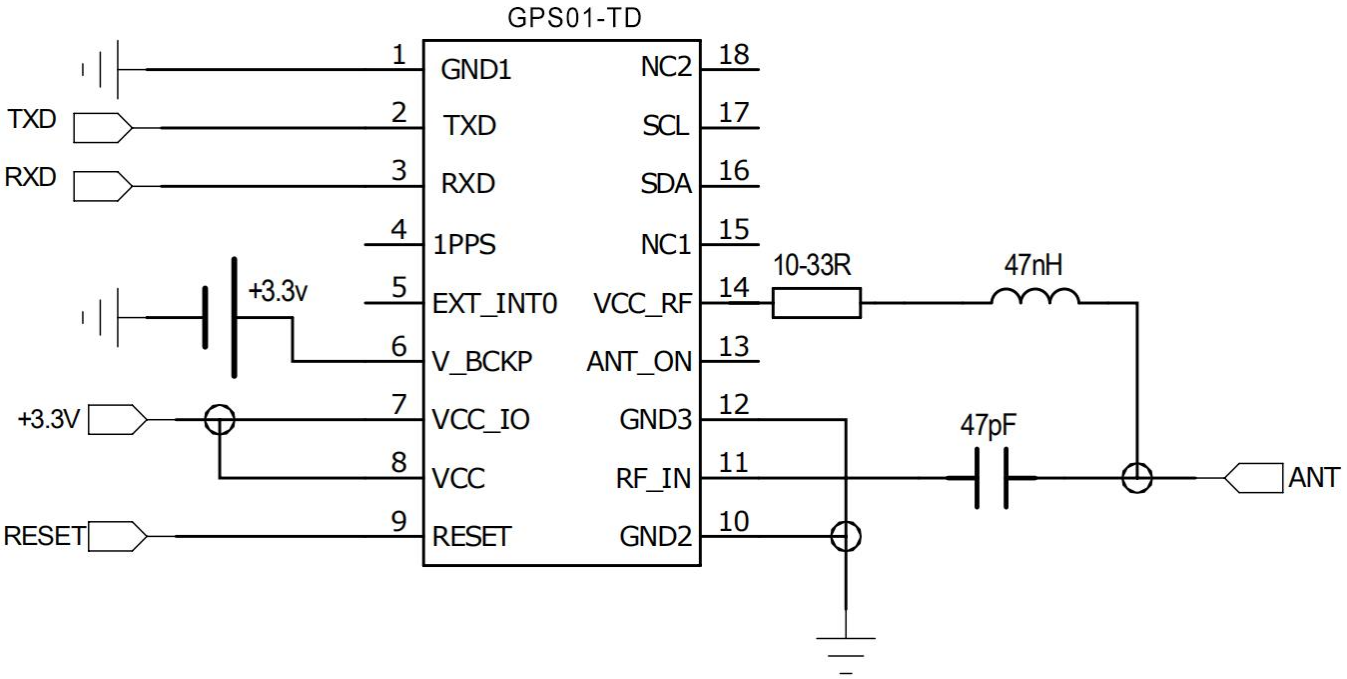
The data format is: 1 start bit, 8 data bits, 1 stop bit, no parity bit.

6. Performance parameters

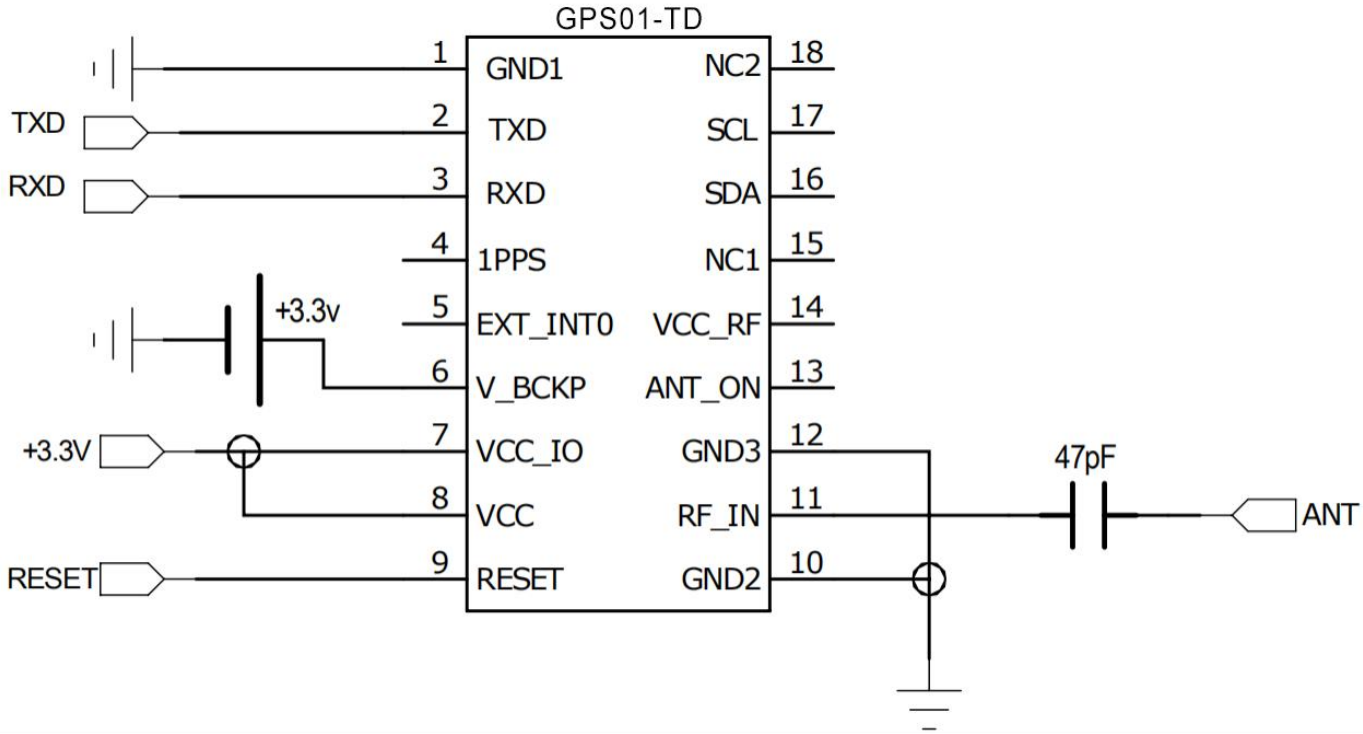
Parameter	Description	Minimum	Typical	Maximum	Unit	Condition
Operating conditions						
Operating voltage range	VCC	3.0	3.3	3.5	V	
	V_BCKP	2.5	3.3	3.5	V	
Temperature range	Working	-40		85	℃	
	Storage	-40		125	℃	
Current consumption						
Receive current			< 35		mA	@Dual mode, VCC=3.3V, V_BCKP=3.3V
Sleep current			< 25		uA	VCC=0V, V_BCKP=3.3V
Radio frequency parameters						
Positioning accuracy	Level		< 3		m	@Open area
	Altitude		< 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	
Serial port parameters						
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

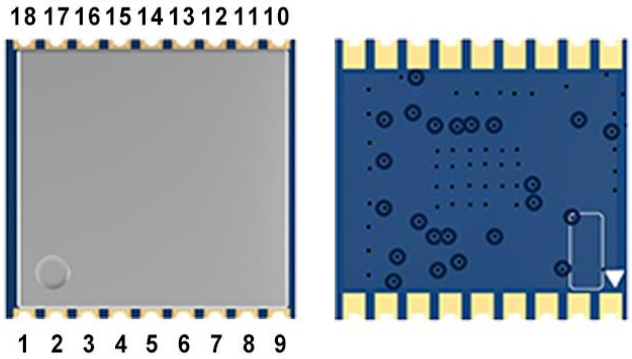
- Active antenna is used:



- Passive antenna is used:



8. Pin definition

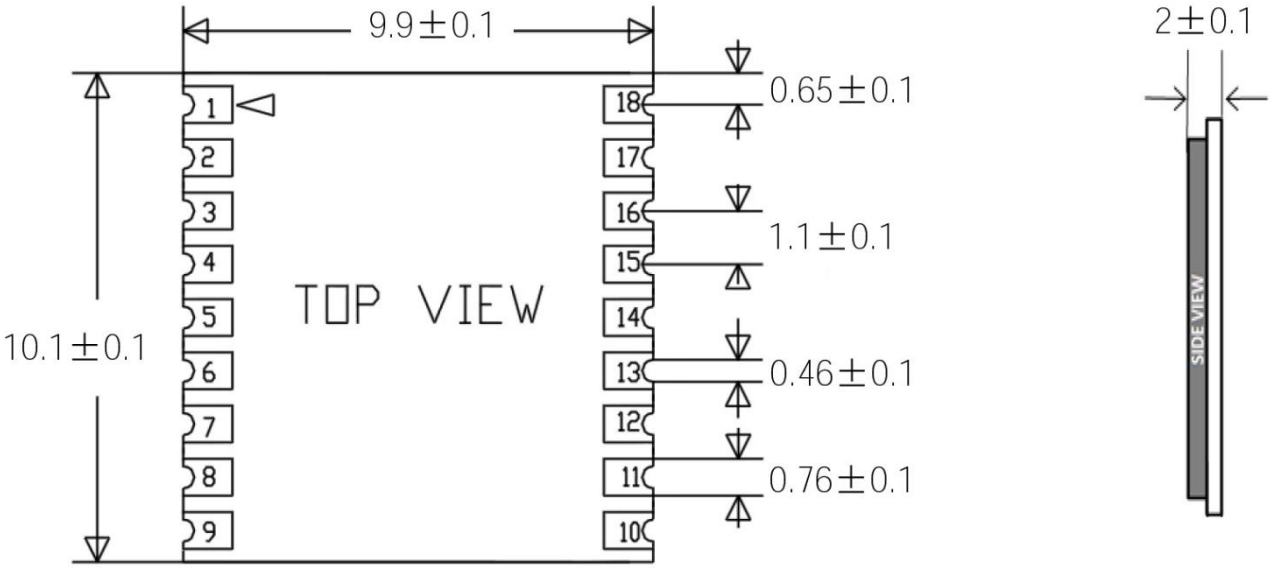


Pin number	Pin definition	I/O	Level standard	Description
1、10、12	GND	—		Power ground
2	TXD	O	0-3.5 V	Serial interface
3	RXD	I	0-3.5 V	Serial interface
4	1PPS	O	0-3.5 V	1 pulse output per second
5	EXT_INT0	I	0-3.5 V	Reserved
6	V_BCKP	I	2.5-3.5 V	Backup power input
7	VCC_IO	—	3.0-3.5 V	IO power input
8	VCC	—	3.0-3.5 V	Main power input
9	nRESET	I	0-3.5 V	External reset, active low. Cannot be connected to ground through capacitor.
C	RF_IN	I		Antenna input
13	ANT_ON	O	0-3.5 V	Reserved
14	VCC_RF	O	VCC	3.3V output, powered for the antenna or LNA, not exceed 20mA
15、18	NC	—		
16	SDA	I/O	0-3.5 V	**I2C interface**
17	SCL	I	0-3.5 V	**I2C interface**

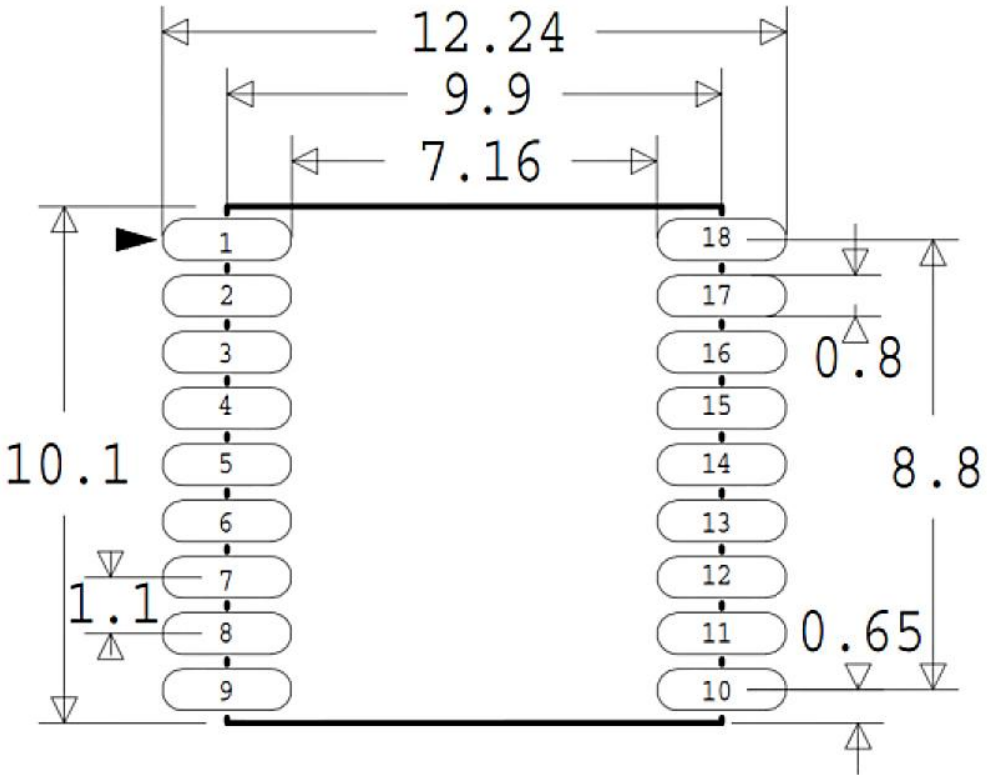
9. Recommended antenna index

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 impedance		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. Recommended package



➢ 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.

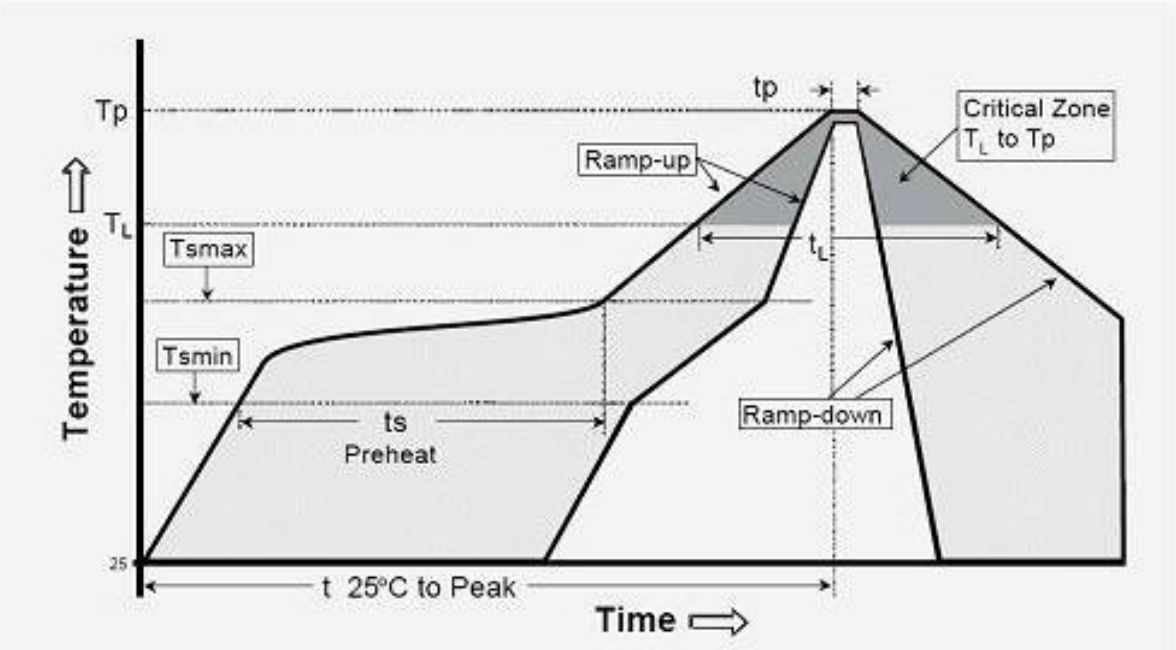
3) Please ensure that the baud rate of the host computer and the module is same.

4) It is recommended to choose our active or passive antenna.

5) Please control the temperature when solder the module.

Appendix: Furnace temperature graph

Below reflow profile is recommended for SMT technology:



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