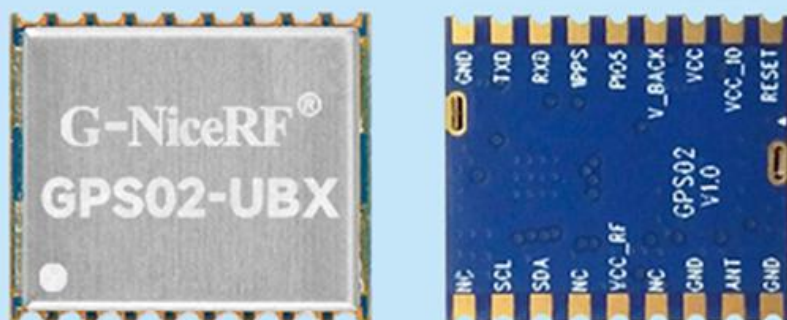


Supports BDS/GPS/GLONASS/Galileo

## Product Specification



## Catalogue

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

### Note:Revision History

Revision	Date	Comment
V1.0	2020-9	First release
V1.1	2022-10	Update performance parameter
V2.0	2022-11	Description Updated
V2.1	2023-4	Update PIN and circuit

## 1. Overview

GPS02-UBX module features the newest u-blox M10, which provides exceptional sensitivity and acquisition times for all L1 GNSS signals. The extremely low power consumption in continuous tracking mode allows great power autonomy for all battery-operated devices, such as asset trackers, without compromising on GNSS performance.

GPS02-UBX module supports concurrent reception of up to four GNSS (GPS, GLONASS, Galileo, and BDS). **Note: Choose three of four, BDS and GLONASS cannot be used at the same time.**

The high number of visible satellites enables the receiver to select the best signals.

This maximizes the position accuracy, in particular under challenging conditions such as in deep urban canyons. In the firmware described here, however, the number of concurrently received GNSS is limited to three. u-blox Super-S (Super-Signal) technology offers great RF sensitivity.

It provides high sensitivity, high positioning accuracy, low power consumption and low cost positioning and navigation solutions for the manufacture of navigation and positioning terminal products such as vehicle, ship borne, handheld and wearable.

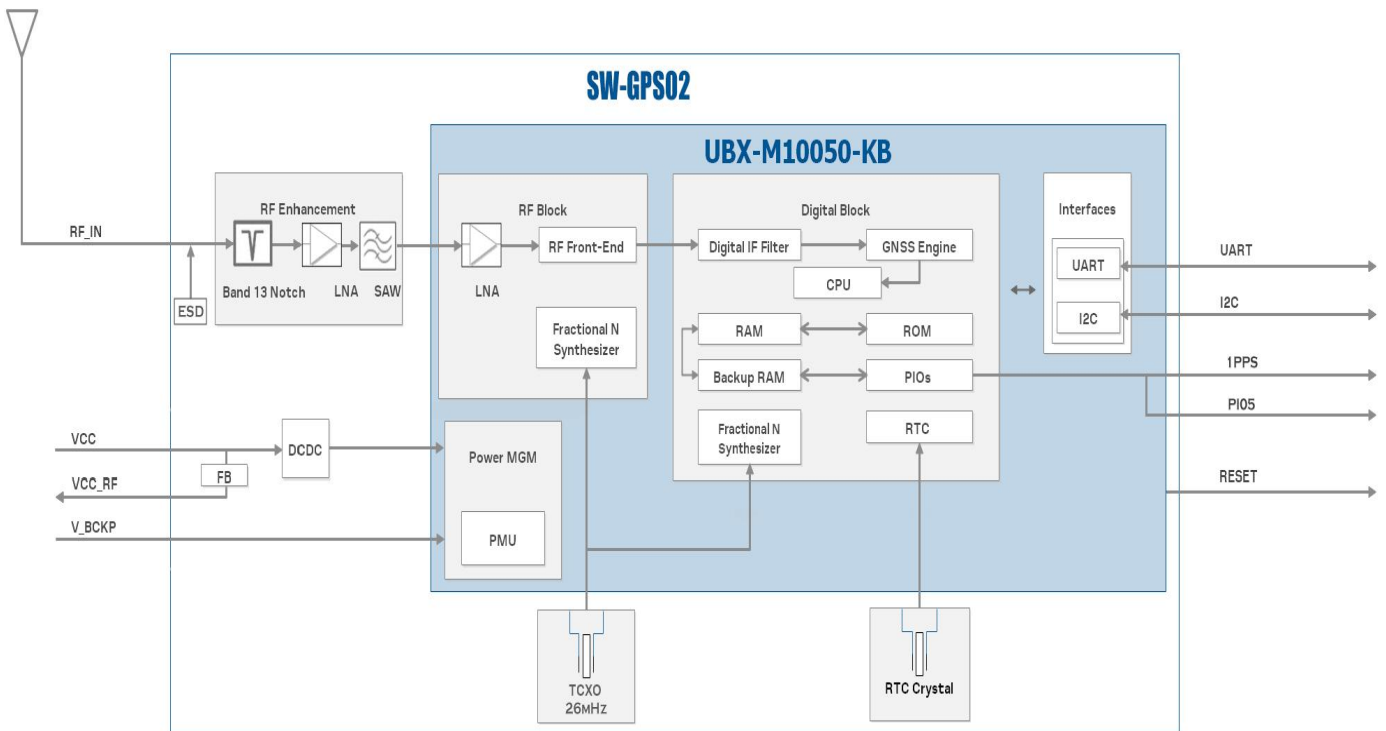
## 2. Features

- Support BDS B1I, GPS L1C/A, GLO L1OF, Gal E1-B/C 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 power supply to active antenna
- With backup power input interface
- Support hot start
- Support external reset
- Support UART and I2C interface
- Cold start capture sensitivity up to -148dBm. Tracking sensitivity up to -166 dBm.
- Support A-GNSS assisted positioning

## 3. Applications

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

## 4. Typical application circuit



## 5. Module 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 is the backup input power supply of the module, which supplies power to the RTC circuit when the main power supply VCC is cut off to ensure that key information is not lost, so as to realize the hot start function.

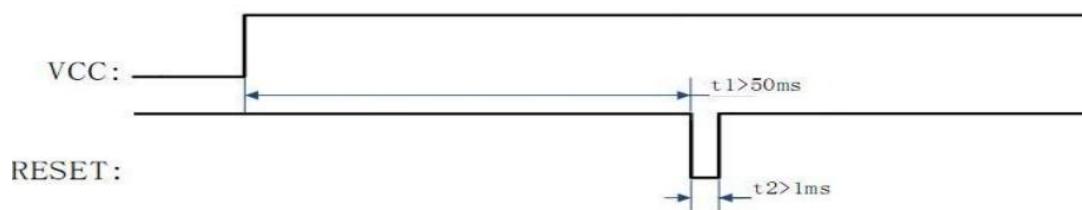
VCC\_RF outputs 3.3V voltage value, which can be used to power the antenna or the external LNA of the module.

### 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.

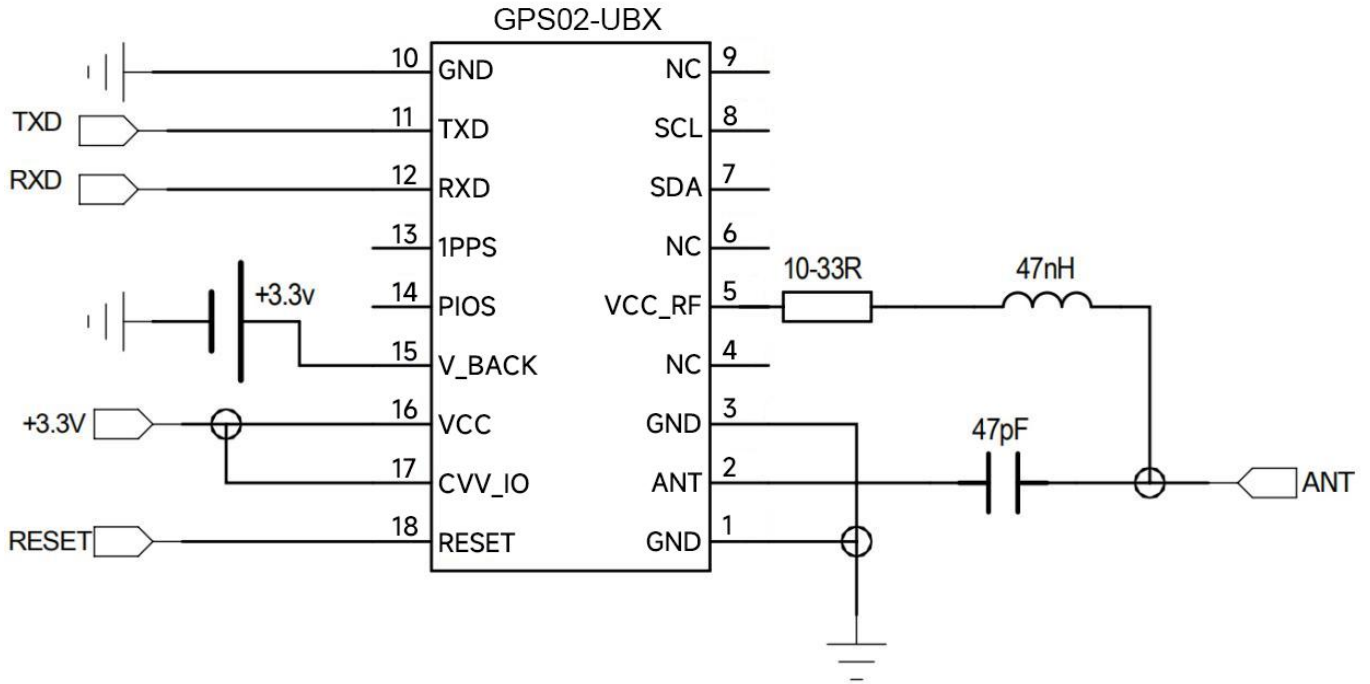
### 6. Performance parameters

Parameter	Description	Minimum	Typical	Maximum	Unit	Condition
<b>Operating conditions</b>						
Operating voltage range	VCC	2.7	3.3	3.6	V	
	V_BCKP	2.5	3.3	3.5	V	
Temperature range	Working	-40		85	°C	
	Storage	-40		125	°C	
<b>Current consumption</b>						
Receive current			<25		mA	@Dual mode, VCC=3.3V, V_BCKP=3.3V
Sleep current			<35		uA	VCC=0V, V_BCKP=3.3V
<b>Radio frequency parameters</b>						
Positioning	Level		< 3		m	@Open land

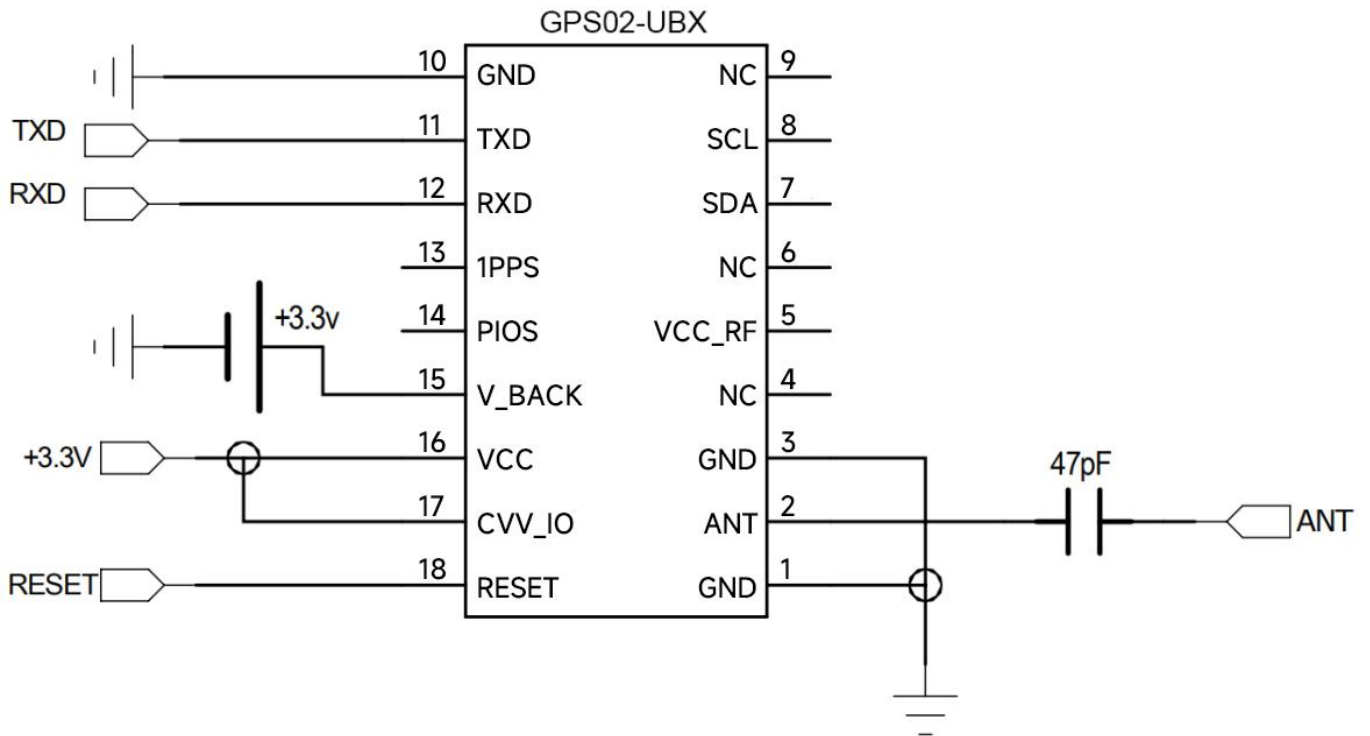
accuracy	Elevation		< 4.5		m	
Speed Measurement accuracy			<0.1		m	
Sensitivity	capture		-148		dBm	
	track		-166		dBm	
External antenna gain				30	dB	
Speed measurement accuracy			< 0.1		m/s	
Time to First fix(TTFF)	Cold start		< 28		s	
	Hot Start		1		s	
	Recapture		1		s	
<b>Serial port parameters</b>						
Serial Baud rate		4800	38400	921600	bps	
Data update rate (Single mode)	BDS/GPS/GLONASS/Galileo		1	18	Hz	Default 1 Hz
Data update rate (Dual mode)	BDS+GPS		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)	GPS+Galileo+GLONASS		1	10	Hz	
	GPS+Galileo+BDS		1	10	Hz	

### 7. Typical application circuit

- Active antenna is used:



- Passive antenna is used:



8. Pin definition



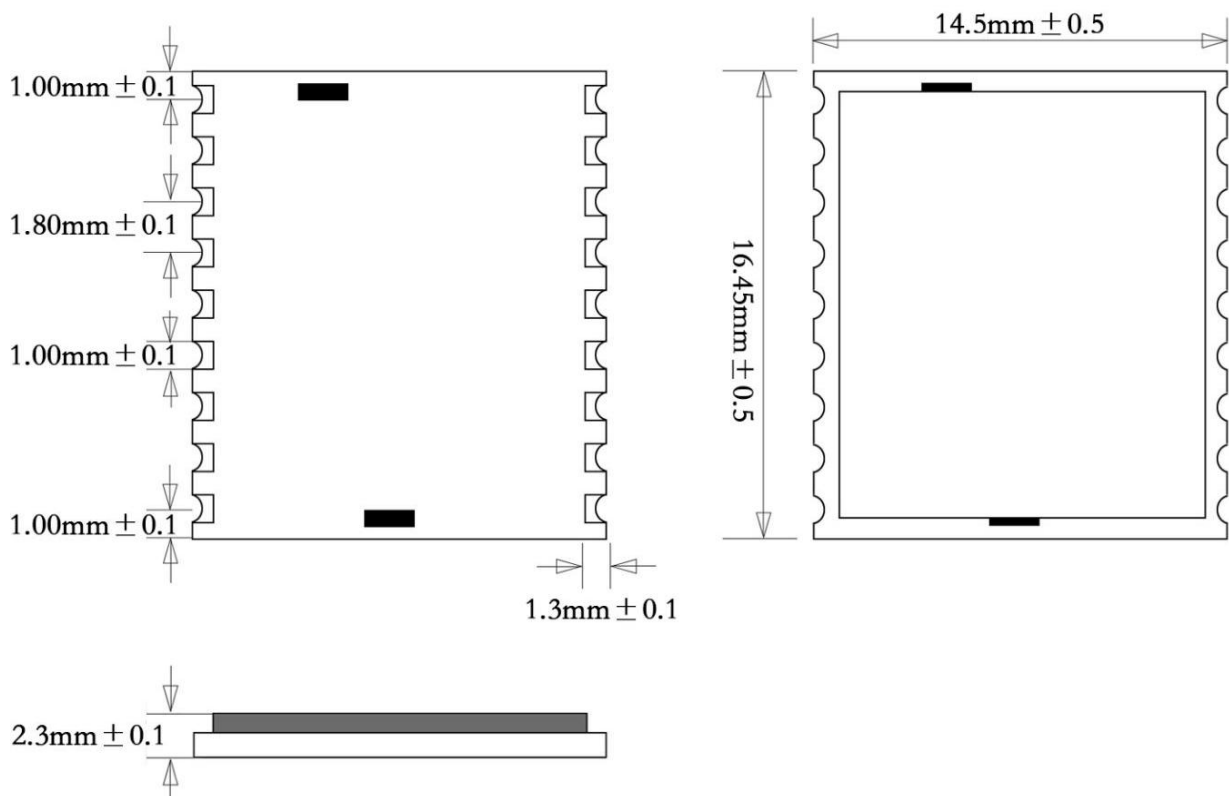
Pin number	Pin definition	I/O	Level standard	Description
1、3、10	GND	—		Power ground
2	ANT	I		Antenna Input
4、6、9	NC	—		No function
5	VCC_RF	O	VCC	3.3V output, powered for the antenna or LNA, not exceed 20mA
7	SDA	I/O	0-3.5 V	<b>I2C interface</b>
8	SCL	I	0-3.5 V	<b>I2C interface</b>
11	TXD	O	0-3.5 V	Serial interface
12	RXD	I	0-3.5 V	Serial interface
13	1PPS	O	0-3.5 V	1 pulse output per second
14	PIO5	I	0-3.5 V	Reserved interface
15	V_BACK	I	2.5-3.5 V	Backup power input
16	VCC	—	3.0-3.5 V	Main power input
17	VCC_IO	—	3.0-3.5 V	IO power input
18	RESET	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)**

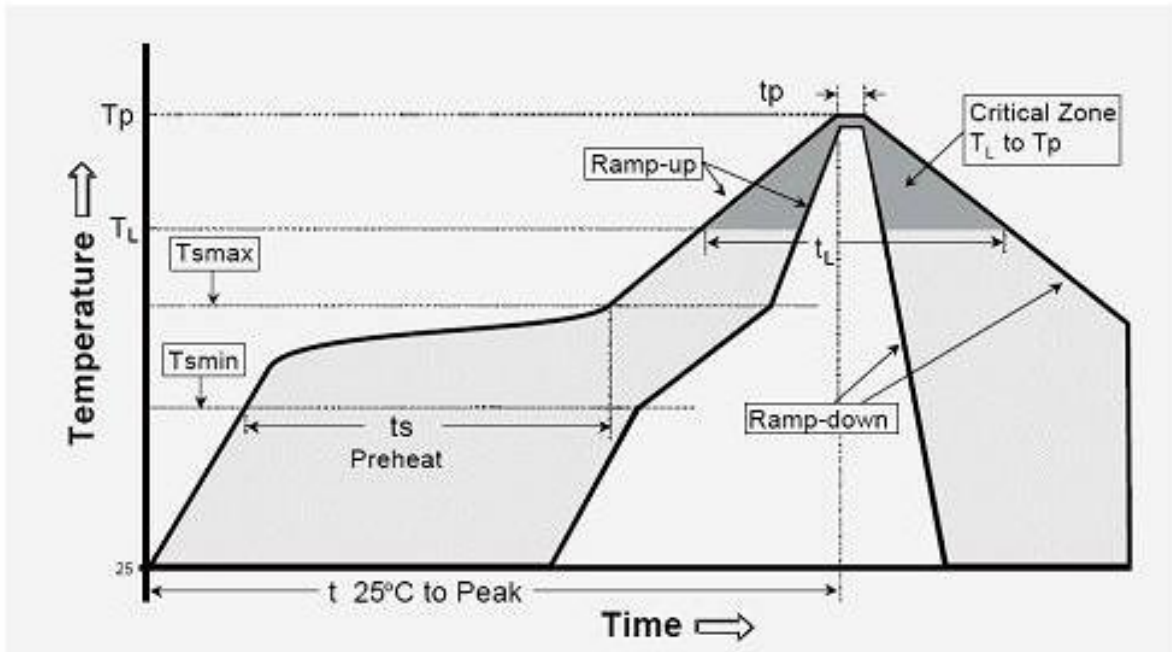


**11. Precautions:**

- 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 (T <sub>l</sub> to T <sub>p</sub> )	3°C/s (max.)
preheat temperature	
- Temperature minimum (T <sub>min</sub> )	150°C
- Temperature maximum (T <sub>max</sub> )	200°C
- preheat time (t <sub>s</sub> )	60~180s
Average ramp-up rate(T <sub>max</sub> to T <sub>p</sub> )	3°C/s (Max.)
- Liquidous temperature(T <sub>L</sub> )	217°C
- Time at liquidous(t <sub>L</sub> )	60~150 second
peak temperature(T <sub>p</sub> )	245+/-5°C