

VG7669T160N0MA satellite positioning and navigation module Hardware Specifications

V1.0



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1. Overview

VG7669T160N0MA positioning and navigation module is a BDS/GNSS full constellation positioning and navigation module with small size and high performance, which integrates ceramic antennas. The positioning module is based on the fourth-generation low-power GNSS SOC single-chip AT6558R of Zhongke Microbase. The chip supports a variety of satellite navigation systems, including Chinese BDS, American GPS, Russian GLONASS, European Union's GALILEO, Japan's QZSS and satellite augmentation systems. SBAS (WAAS, EGNOS, GAGAN, MSAS) .

The positioning and navigation module has the advantages of high sensitivity, low power consumption, and low cost, and is suitable for scenarios such as vehicle navigation, handheld positioning, and wearable devices .

Product main features:

- Excellent positioning and navigation function, support BDS/GPS/GLONASS satellite navigation system
- Cold Start Capture Sensitivity: -148dBm
- Tracking sensitivity: -162dBm
- Positioning accuracy: 2.5 meters (CEP50)
- Time to first fix: 32 seconds
- Low power consumption: <25mA (@ 5 V) continuous operation
- Built-in antenna detection and antenna short-circuit protection

application:

- Vehicle Positioning and Navigation
- Cell Phones, Tablets, Handheld Devices
- Embedded positioning device
- Wearable device

2. Electrical parameters

2.1. Limit parameters

Parameter	Symbol	Minimum	Maximum value	Unit
Module supply voltage (VCC)	VCC	-0.3	5.5	V
Backup battery voltage (VBAT)	VBAT	-0.3	3.6	V
Digital input pin voltage	V in	-0.3	3.6	V

2.2. Operating conditions

Parameter	Symbol	Minimum	Typical value	Maximum value	Unit
Supply voltage	VCC	3.3	5.0	5.5	V
Working current			twenty three		mA
Sleep mode current (ON_OFF=0)			20		uA
VCC peak current (excluding antenna)	I peak			100	mA
Backup power	VBAT	1.5	3.0	3.6	V
Backup power current	ibat		10		uA
input pin	Vil			0.6	V
	Vih	2.3			V
output pin	Vol			0.4	V

	Voh	2.8			V
Antenna gain	Gain	15		20	dB

2.3. Performance indicators

Index	parameter
signal reception	BDS/GPS/GLONASS/GALILEO/QZSS/SBAS
Number of RF Channels	Three-channel RF, supporting simultaneous reception of full constellation BDS, GPS and GLONASS
Cold start TTFF	≤ 35s
Warm start TTFF	≤ 1s
Recapture TTFF	≤ 1s
Cold Start Capture Sensitivity	-148dBm
Hot Start Capture Sensitivity	-156dBm
Recapture sensitivity	-160dBm
tracking sensitivity	-162dBm
positioning accuracy	<2m (1σ)
Speed accuracy	<0.1m/s (1σ)
Timing accuracy	<30ns (1σ)
Location update rate	1Hz (default) , max 10Hz
Serial port features	Baud rate range: 4800 bps ~ 115200 bps , default 9600 bps , 8 data bits, no parity, 1 stop bit
protocol	NMEA0183

maximum height	18000 m
Maximum speed	515m/s
maximum acceleration	4g
Backup battery	1.5V ~ 3.6V
power supply	3.3V to 5.0V _
Typical power consumption of GPS&BDS	< 23mA @ 5V _
storage temperature	-45 ~ +125 °C
Operating temperature	-45 ~ +85°C
size	18.0mm x 1 8.0mm x 7.8mm

2.4 . RF related characteristics

Parameter	Condition	Minimum	Typical value	Maximum value	Unit
input frequency	GPS		1575.42		MHz _
	Galileo		1575.42		MHz _
	BDS		1561.098		MHz _
	GLONASS	1597.78	1602	1605.66	MHz _

2.5. Output protocol

The module uses UART as the main output channel, and outputs according to the NMEA0183 protocol format. For details, please refer to *"CASIC Multimode Satellite Navigation Receiver Protocol Specification"*.

3. Pin Location Diagram

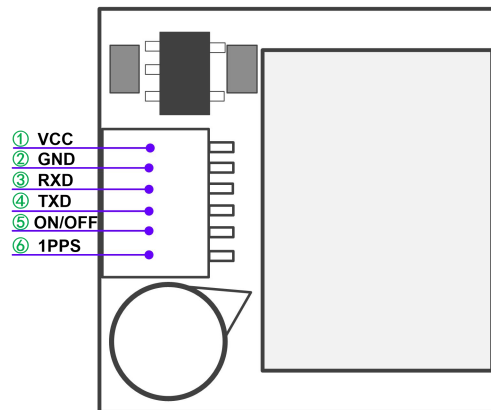


Figure 3-1 Top View

4. The pin description

Number	Pin	Type	Describe
1	VCC	I	Module power input, DC 5V
2	GND	I	land
3	RXD	I	configure command input
4	TXD	O	Navigation data output , NMEA0183 protocol
5	ON/OFF	I	Chip sleep mode control, active low
6	1PPS	O	Second pulse output, the rising edge of the pulse is aligned with UTC time

Description : VCC power input is 5V, there is a 3.3V step-down LDO inside, and the digital input and output pin levels of the module are both 3.3V system

5. Hardware design guidance and matters needing attention

5.1. Schematic diagram of application circuit connection

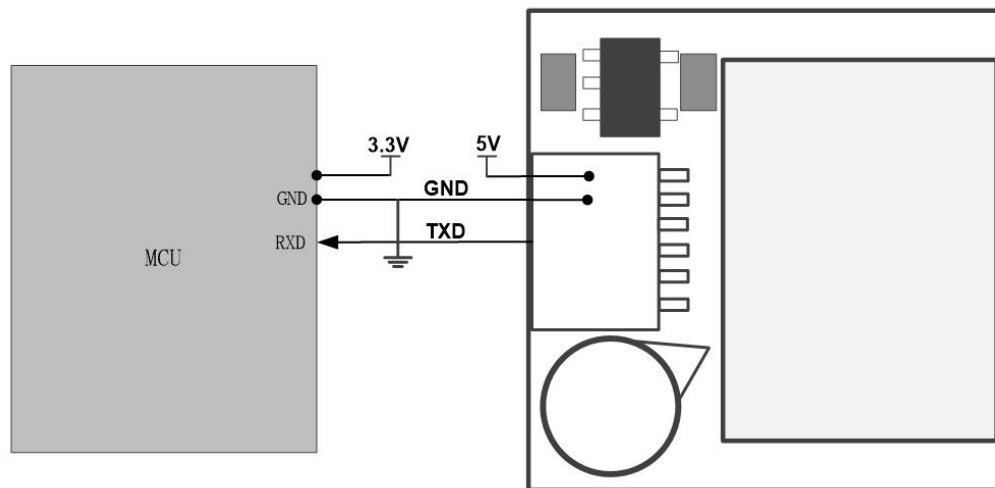


Figure 5-1 Serial port application wiring diagram

5.2. Power supply design and related matters needing attention

1. Please pay attention to the correct connection of the positive and negative poles of the power supply, and ensure that the power supply voltage is within the recommended power supply voltage range. If it exceeds the maximum allowable power supply range of the module, the module will be permanently damaged; the filter capacitor of the module power supply pin should be as close to the module power supply pin as possible.

2. In the power supply system of the module, the excessive ripple may be coupled to the line that is easily interfered by the wire or the ground plane, such as the sensitive signal line such as the antenna, feeder, clock line, etc., which may easily cause the radio frequency performance of the module to deteriorate, so We recommend using LDO as the power supply for the wireless module.

3. When selecting the LDO voltage regulator chip, it is necessary to pay attention to the heat dissipation of the power supply and the driving capability of the LDO stable output current; considering the long-term stable operation of the whole machine, it is recommended to reserve more than 50% of the

current output margin.

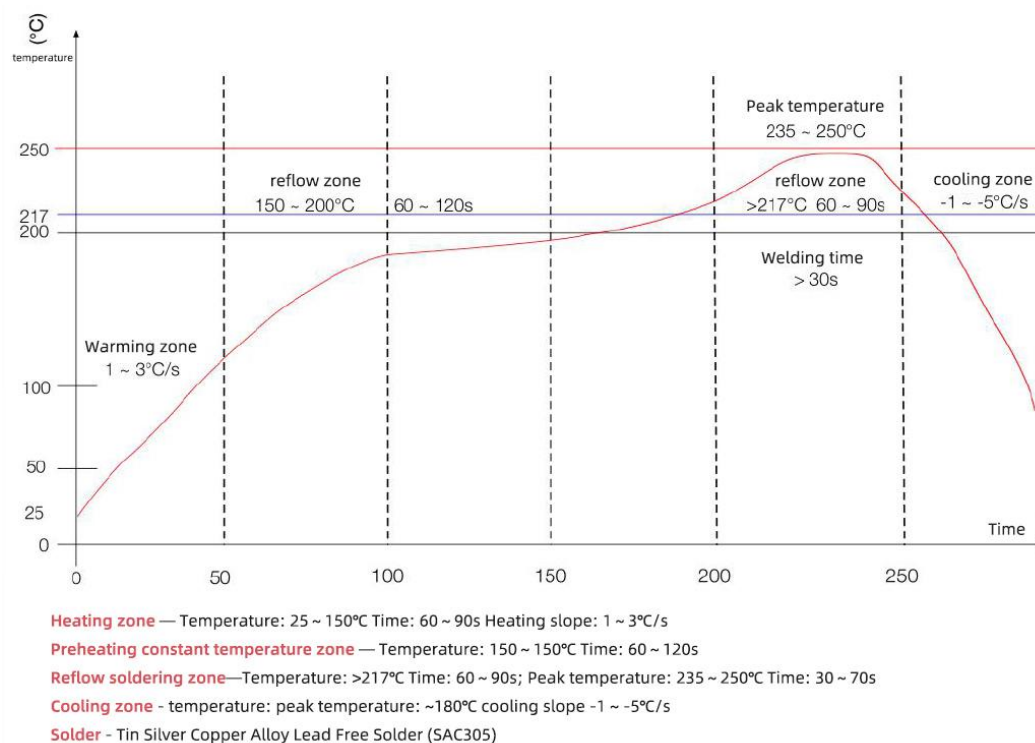
4. It is best to use a single LDO for the module to supply power; if a DC-DC power supply chip is used, an LDO must be added behind as the isolation of the module power supply to prevent the noise of the switching power supply chip from interfering with the working performance of the radio frequency.

5. If the communication line between the MCU and the module uses a 5V level, a 1K-5.1K resistor must be connected in series (not recommended, there is still a risk of damage) .

6. The RF module should be kept away from high-voltage devices as far as possible, because the electromagnetic waves of high-voltage devices will also have a certain impact on the RF signal.

7. High-frequency digital wiring, high-frequency analog wiring, and high-current power supply wiring should be avoided under the module as much as possible. If it is necessary to pass under the module, the wiring should be placed on another layer of the PCB bottom plate where the module is placed, and ensure that the module is under the module. The copper is well grounded.

6. Reflow soldering curve



7. Electrostatic damage warning

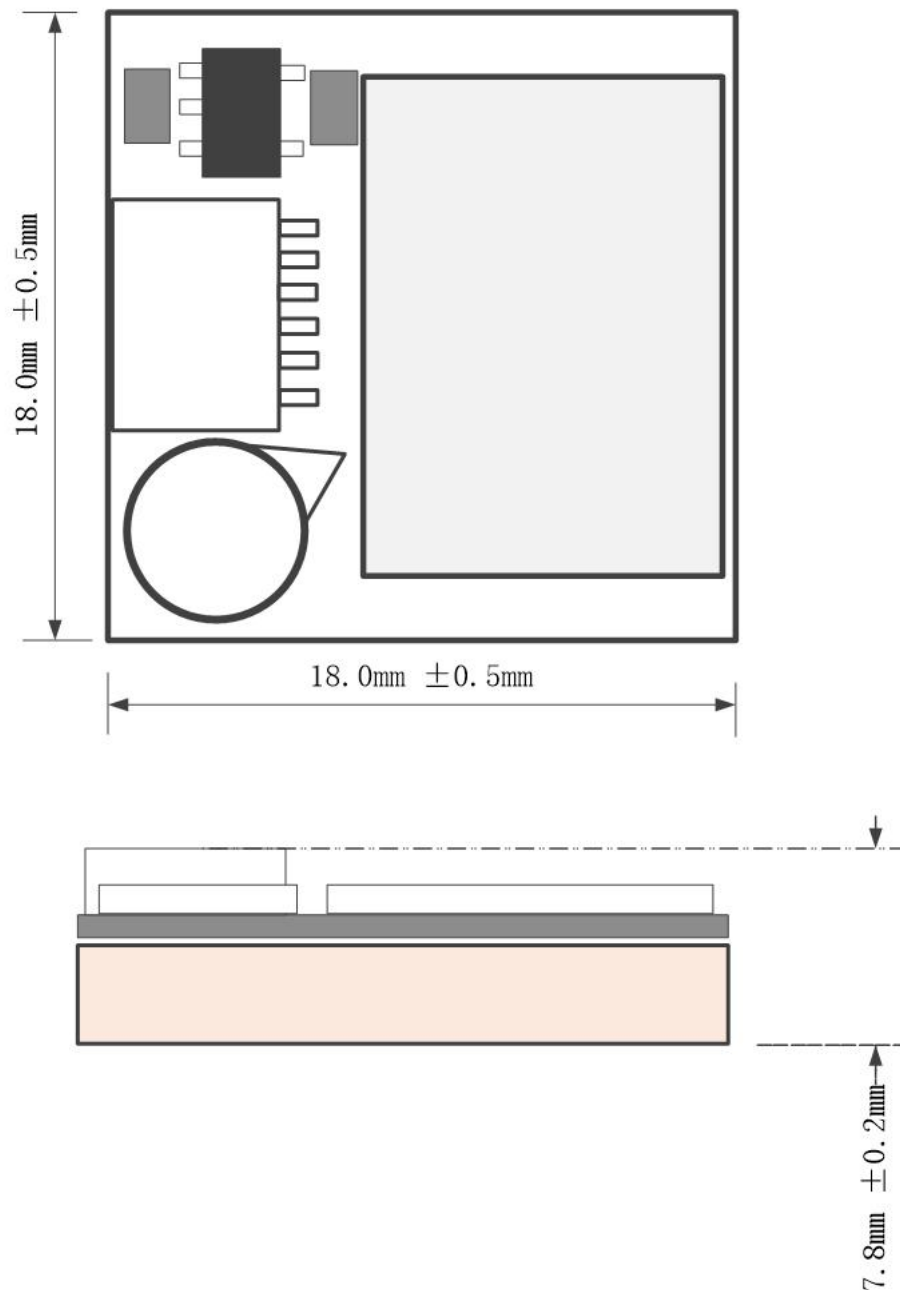
The RF module is a high-voltage electrostatic sensitive device, in order to prevent damage to the module by static electricity

- 1、Strictly follow anti-static measures, and do not touch the module with bare hands during production.
- 2、Modules should be placed in a placement area that can prevent static electricity.
- 3、The anti-static protection circuit at the high voltage input should be considered in product design.



8. Packaging information

Mechanical Dimensions (unit:mm)



9. Version update instructions

Version	Update content	Updated
V1.0	First release	July 9 , 2022 _

10. Purchase selection table

Number	Model	Illustrate
1	VG7669T160N0MA	Self-contained backup battery and ceramic antenna integrated, tape packaging \ tray packaging

11. Statement

1. Due to product version upgrades or other reasons, the content of this document will be updated from time to time. Unless otherwise agreed, this document is only used as a guide, and the statements, information and recommendations in this document do not constitute any express or implied warranty.
2. The company reserves the right of final interpretation and modification of all the information provided, if any changes are made without prior notice.

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