BDS/GNSS full constellation positioning navigation module

ATGM336H-5N

user manual

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Version update history

version date		Update details
1.0	2015/7/01 First draft	
1.1	2015/12/1 Add product selection instructions;	Add order model description; Add the function description of single GPS module and single BDS module of the same series; Add feature descriptions such as Flash and online upgrade protocol Revise the active antenna application circuit diagram; Add passive antenna application circuit diagram; Change the contact number to technical support number; Other text improvements;
1.2	2016/7/15 Text improvement	

1 Functional description

1.1 Overview

ATGM336H-5N series module is a 9.7X10.1 size high-performance BDS/GNSS full constellation positioning

The general term for the navigation module series. This series of module products are based on the fourth-generation low-power GNSS of Zhongkewei

SOC single chip—AT6558, supports multiple satellite navigation systems, including China's BDS (Beidou Satellite

navigation system), GPS in the US, GLONASS in Russia, GALILEO in the EU, QZSS in Japan

And satellite augmentation systems SBAS (WAAS, EGNOS, GAGAN, MSAS). AT6558 is a

A true six-in-one multi-mode satellite navigation and positioning chip, including 32 tracking channels, which can be connected simultaneously

Receive GNSS signals of six satellite navigation systems, and realize joint positioning, navigation and timing.

ATGM336H-5N This series of modules has the advantages of high sensitivity, low power consumption, and low cost, and is suitable for

Vehicle navigation, handheld positioning, and wearable devices can directly replace Ublox MAX series modules.

1.2 Product Selection

model	Multi-mode function power interface					characteristic						
	GPS	BDS GLONASS	1.65V~3.6V 2.7V~3.6V	UART1	UART2	Flash	TCXO			EAVM	Internal	EN
ATGM336H-5N-1X	•		•	•	•	•	•	•	•	•	•	●
ATGM336H-5N-2X		•	•	•	•	•	•	•	•	•	•	●
ATGM336H-5N-3X	•	•	•	•	•	•	•	•	•	•	•	●
ATGM336H-5N-5X	•	•	•	•	•	•	•	•	•	•	•	●
ATGM336H-5N-7X	•	•	•	•	•	•	•	•	•	•	•	●

1.3 Performance indicators

ÿ Excellent positioning and navigation function, supporting single system positioning of BDS/GPS/GLONASS satellite navigation system position, and any combination of multi-system joint positioning, and supports QZSS and SBAS systems

ÿ Support A-GNSS

ÿ Cold start capture sensitivity: -148dBm

ÿ Tracking sensitivity: -162dBm

ÿ Positioning accuracy: 2.5 meters (CEP50)

ÿ Time to first fix: 32 seconds

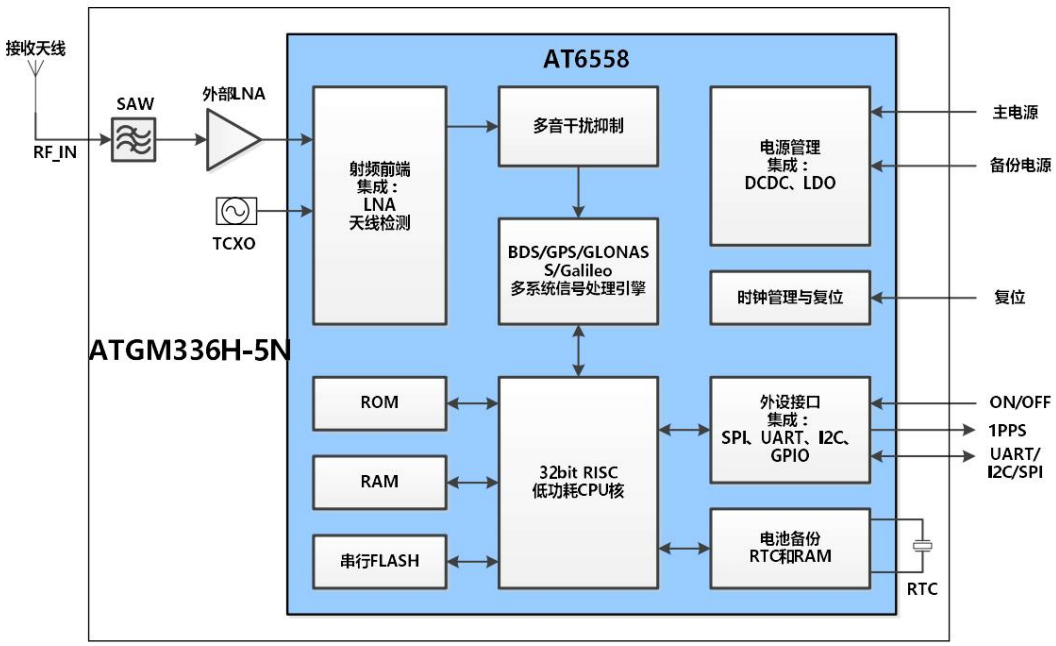
ÿ Low power consumption: continuous operation <25mA (@3.3V)

ÿ Built-in antenna detection and antenna short circuit protection function

Note 1: The above performance indicators are applicable to ATGM336H-5N-1X, ATGM336H-5N-3X, ATGM336H-5N-5X, ATGM336H-5N-7X module.

Note 2: For the performance index of the ATGM336H-5N-2X module, please confirm with the sales representative.

1.4 Functional block diagram of the module



1.5 Application field

ÿ Vehicle positioning and navigation

ÿ Mobile phone, tablet computer, handheld device

ÿ Embedded positioning device

ÿ Wearable devices

1.6 Assisted GNSS (Assisted GNSS, AGNSS)

All ATGM336H-5N series modules support assisted GNSS (AGNSS) function. AGNSS can Provide the receiver with auxiliary information necessary for positioning, such as text, rough position and time. strong letter Signal or weak signal environment, this information can significantly shorten the time to first fix. For specific usage, see "Chinese Kewei AGNSS Solution" description.

1.7 PPS

ATGM336H-5N series modules support precise second pulse output, and the rising edge of the pulse is aligned with UTC time.

1.8 Output protocol

ATGM336H-5N series modules use UART as the main output channel, according to the protocol of NMEA0183 Protocol format output, please refer to "CASIC Multimode Satellite Navigation Receiver Protocol Specification" for details.

1.9 FLASH

ATGM331C-5N series modules are equipped with Flash, which can update the positioning function and algorithm. This configuration function allows customers to independently configure the positioning update rate to obtain applicable low power consumption; To allow customers to update the latest optimization progress of global multi-mode positioning; to allow customers to add new control functions Features such as location records, regular geofences, and custom output formats.

1.10 Online upgrade function

ATGM336H-5N series modules support Zhongkewei's online upgrade protocol. The user can follow the upgrade in the host computer Level protocol, communicate with the module, and upgrade the new software program provided by Zhongkewei to the module to obtain new software features. The user can also use the remote command mode to remotely control the device to start the above upgrade process to realize Remote online upgrade. For online upgrade agreement, please refer to "ATGM Module Online Upgrade Agreement".

1.11 Antenna

ATGM336H-5N series modules support active and passive antennas.

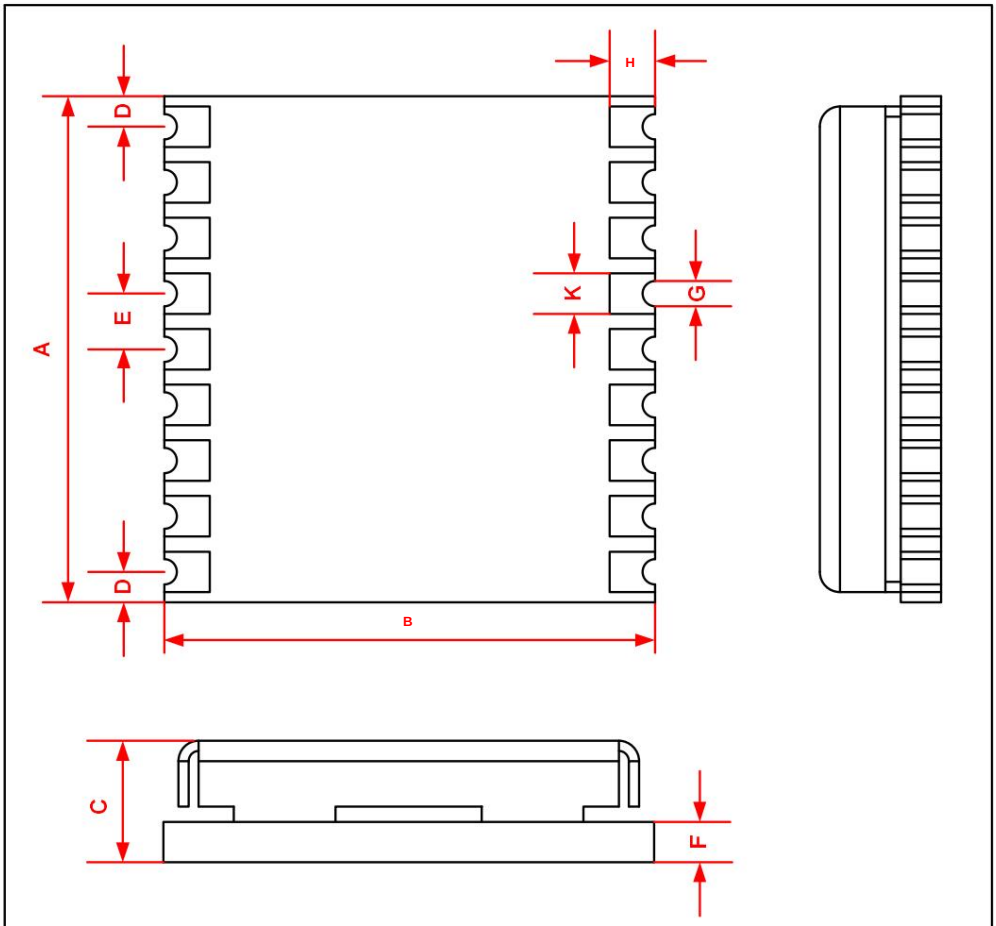
1.12 PC tools

Zhongkewei provides "GNSSToolKit" Lite software package (Windows version, Android version), Used for positioning output parsing and working mode configuration.

Zhongkewei provides the "UBF serial port upgrade tool" software package (Windows version), which is used for PC-based Online upgrade tool. The online upgrade program based on the equipment needs to be developed by the customer.

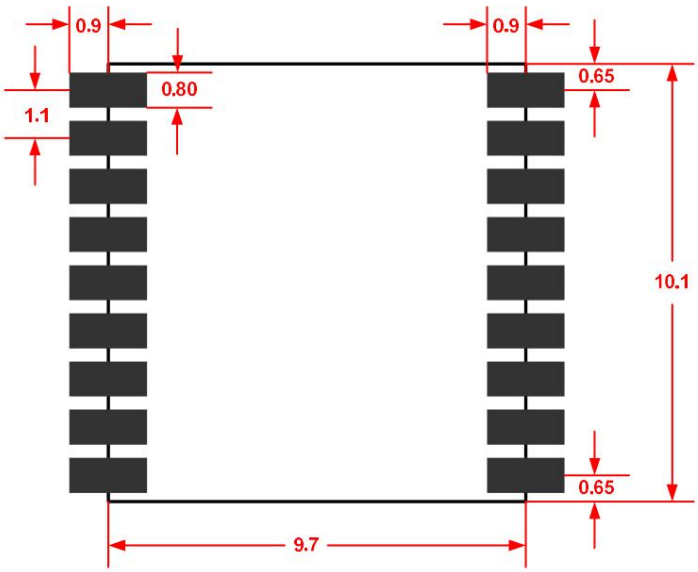
2 Technical description

2.1 Appearance dimensions (unit: mm)

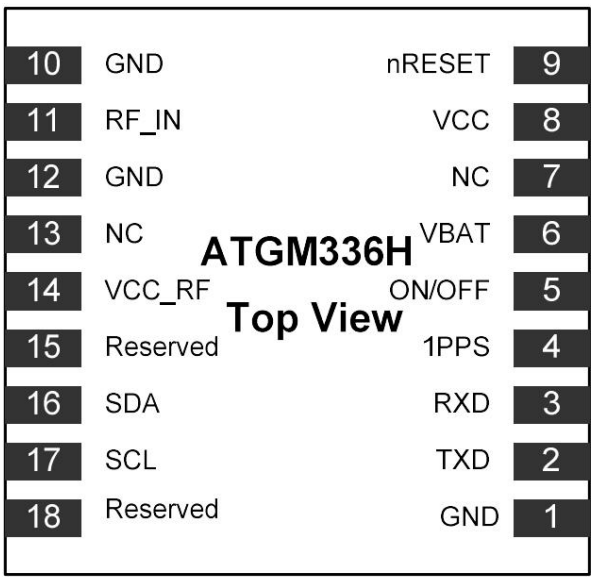


Symbol	Min.(mm) 10.0	Typ.(mm) 10.1	Max.(mm) 10.7
A			
B	9.6	9.7	9.8
C	2.2	2.4	2.6
D	0.55	0.65	0.95
AND	1.0	1.1	1.2
F		0.8	
G	0.4	0.5	0.6
H	0.8	0.9	1.0
K	0.7	0.8	0.9

2.2 PCB layout (unit: mm)



2.3 PIN Arrangement Diagram



2.4 Pin definition

pin Numbering	Name I/O		describe	electrical characteristics
1	GND	I	ground	
2	TXD	O	Navigation data output	NMEA0183 protocol
3	RXD	I	Interactive command input	Configuration command input
4	1PPS	O	second pulse output	
5	ON/OFF	I	module shutdown control, active low	
6	VBAT	I	The backup power supply of RTC and SRAM	provides 1.5~3.6V power supply to ensure Module hot start
7	NC			
8	VCC	I	module power input	DC 3.3V±10ÿ, 100mA
9	nRESET	I	module reset input, active low when not in use	
10	GND	I	ground	
11	RF_IN	I	Antenna signal input	
12	GND	I	ground	
13	NC			
14	VCC_RF 15	O	output power	+3.3V, can supply power to the antenna
Reserved				dangling
16	SDA	I/OI	2C data interface	dangling
17	SCL	OI	2C clock interface	dangling
18	reserved			dangling

2.5 Electrical parameters

Limit parameter

parameter	symbol	min	max	unit
Module supply voltage (VCC)	Vcc	-0.3	3.6	IN
Backup battery voltage (VBAT)	Vbat	-0.3	3.6	IN
Digital input pin voltage	come	-0.3	Vcc+0.2 V	
Maximum withstand ESD level	VESD(HBM)		2000	IN

Operating conditions

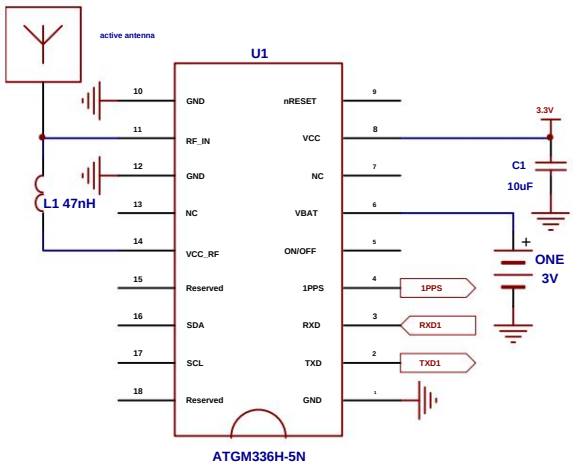
parameter	Symbol Min Typ Max Unit				
supply voltage	Vcc	2.7	3.3	3.6	IN
Vcc peak current (excluding antenna)	Ipeak			100	mA
backup power	Vbat	1.5	3.0	3.6	IN
Backup power supply (Vbat) current	Different		10		uA
input pin	Will			0.2*Vcc	IN
	hiv	0.7*Vcc			IN
output pin	Vol Io=-12mA			0.4	IN
	Voh Io=12mA	Vcc-0.5			IN
Active Antenna Output Voltage	VCC_RF		3.3		IN
Antenna short circuit protection current The power supply comes from VCC_RF (=3.3V)	Iant short		50		mA
Antenna open circuit current The power supply comes from VCC_RF (=3.3V)	Yant open		3		mA
antenna gain	Gant	15		30	dB

2.6 Technical specifications

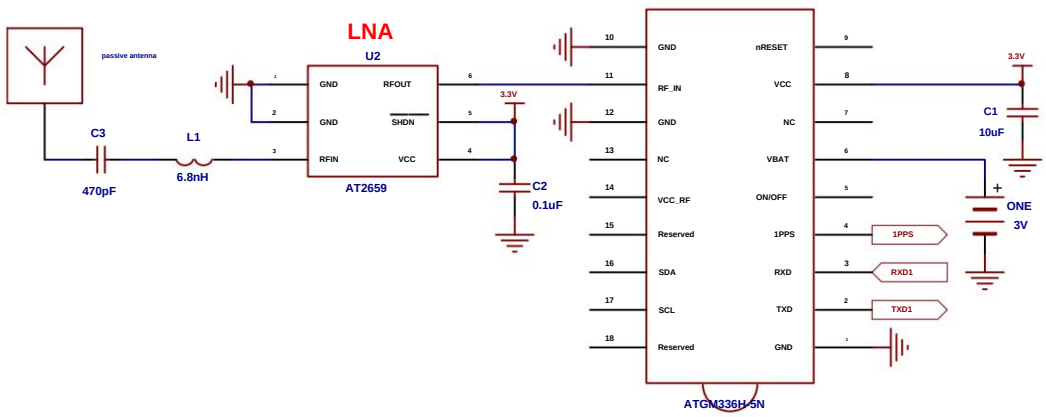
index	technical parameter
Number of RF	BDS/GPS/GLONASS/GALILEO/QZSS/SBAS
channels for signal reception	Three-channel radio frequency, supporting simultaneous reception of full constellation BDS, GPS and GLONASS
Cold Start TTFF Hot	ÿ35s
Start TTFF Recapture	ÿ1s
TTFF Cold Start	ÿ1s
Capture Sensitivity Hot Start	-148dBm
Capture Sensitivity Recapture	-156dBm
Sensitivity Tracking Sensitivity	-160dBm
Positioning Accuracy Speed	-162dBm
Measurement Accuracy	<2mÿ1ÿÿ <0.1m/
Timing Accuracy Positioning	sÿ1ÿÿ <30nsÿ1ÿÿ
Update Rate	
	1Hz (default), max 10Hz
Serial port characteristics	Baud rate range: 4800 bps ~115200 bps, default 9600bps, 8 data bits, no parity, 1 stop bit
protocol	NMEA0183
maximum height	18000m
Maximum speed	515m/s
maximum acceleration	4g
backup battery	1.5V ~ 3.6V
power supply	2.7V ~ 3.6V
GPS&BD typical power consumption	<25mA @3.3V
Operating temperature	-40 to +85 degrees Celsius
storage temperature	-45 to +125 degrees Celsius
size	10.1mm×9.7mm×2.4mm
weight	0.6g

2.7 Module Application Circuit

2.7.1 Active antenna application scheme (antenna power supply, antenna detection and short circuit protection are provided inside the module)



2.7.2 Passive antenna application scheme (adding a level of LNA to the input terminal of module RF_IN)



2.8 Precautions for using the module

In order to give full play to the excellent performance of ATGM336H-5N, users need to pay attention to the following points when using this module:

•LDO power supply with low ripple is used to control the ripple within 50mVpp.

•Try not to use other digital signals with high frequency and large amplitude near the module. It is better to fill the bottom of the module with ground wire.

•The antenna interface should be as close as possible to the RF input pin of the module, and pay attention to the impedance matching of 50 ohms.

•The module itself has active antenna access, pull out, and short-circuit detection circuits. At the same time, when the antenna is accidentally short-circuited, the

The electrical current is limited (50mA) to play a protective role. When the status of the above three antenna ports changes, it can be changed from

The serial port outputs the corresponding information. like

$GPTXT,01,01,01,ANTENNA SHORT*63

$GPTXT,01,01,01,ANTENNA OPEN*25

$GPTXT,01,01,01,ANTENNA OK*35

3 Reliability testing and certification

3.1 RoSH certification

ATGM336H-5N series modules are RoSH compliant.

4 Module transmission and welding

4.1 Module packaging

ATGM336H-5N series modules are packed in vacuum tape, which has the characteristics of moisture-proof and anti-static.

The program is compatible with the major placement machines in the industry. Packed according to 1000 pieces per tray.

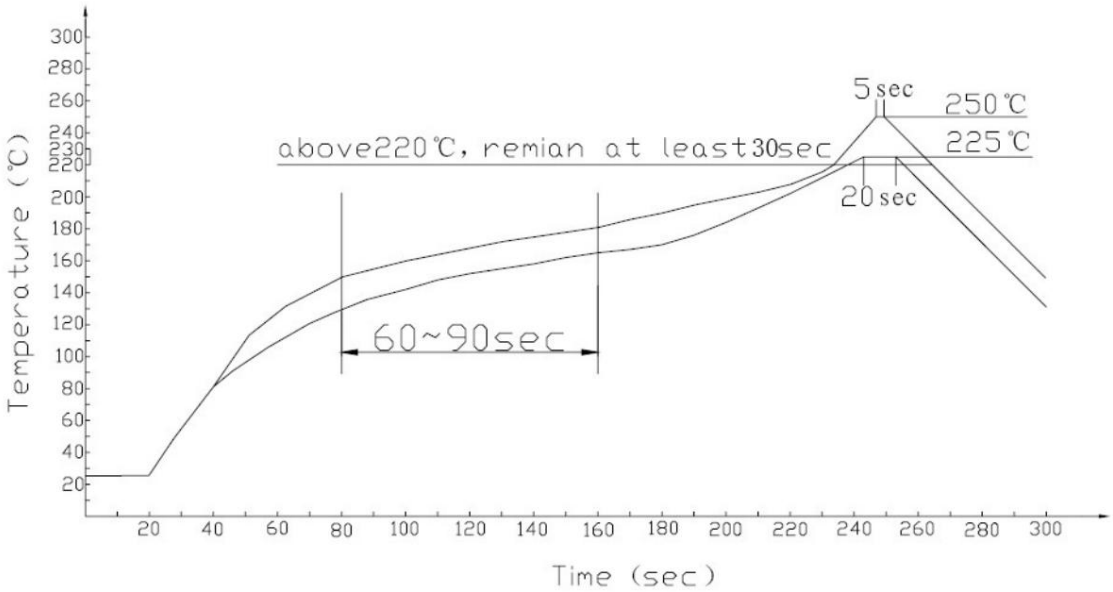
4.2 Module transmission and storage

4.2.1 Moisture-proof grade:

Moisture Sensitivity Level (MSL)ÿ4 ÿ

Please refer to the IPC/JEDEC J-STD-020 standard for MSL.

4.2.2 Reflow soldering curve:



! Notice

Adjust the equilibration time to ensure the rationalization of the gas when the solder paste melts. If there are too many voids on the PCB,

Equilibration time can be increased.

Considering that the product is placed in the soldering area for a long time (the temperature is above 180°C), in order to prevent the components and the bottom plate

The damage should be kept as short as possible.

! Important features of curves:

Ascent rate=1ÿ4°C/sec, 25°C to150°C average

Preheating temperature=140°C to 150°C, 60secÿ90sec

Temperature fluctuation=225°C to 250°C, about 30sec

Falling speed=2ÿ6°C/sec, to 183°C, about 15sec

Total time = about 300sec

4.2.3 Electrostatic protection:

The ATGM336H-5N module series is an electrostatic sensitive device. Regular electrostatic contact can cause the module

accidental damage. In addition to operating in accordance with the standard electrostatic protection requirements, the following points should be followed as much as possible:

1) Unless the PCB GND is well grounded, the first place to touch the module should be

PCB GNDÿ

2) When connecting the antenna, please connect the GND first, and then connect the signal line.

3) When touching the RF part of the circuit, please do not touch the charging capacitor, please stay away from devices that can generate static electricity with equipment such as dielectric antennas, coaxial wires, soldering irons, etc.

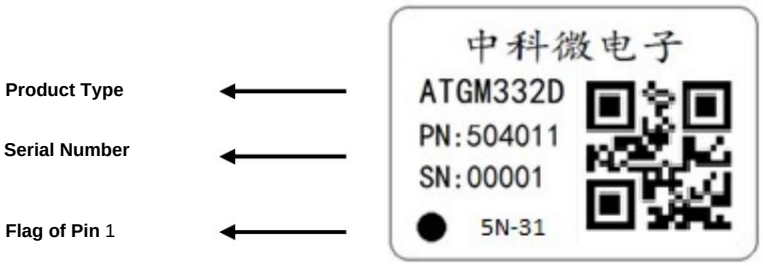
4) In order to avoid charge discharge through the RF input terminal, please do not touch the exposed part of the antenna medium. For situations where the contact antenna medium may be exposed, anti-static protection needs to be added to the design circuit.

5) When welding the connectors and antennas connected to the RF input, please make sure to use a non-static welding gun.

5 Module label and order model number

5.1 Module label

The label of ATGM336H-5N contains important product information, and the content format of the label is as follows:



5.2 Model naming rules:

Taking ATGM336H-5N-31-0 as an example, the explanation is as follows:

field	example	explain
Product code product name	ATGM336H 9.7mmX10.1mm	module series
Type code type name	5N	Navigation module using AT6558 hardware platform

Hardware code hardware function name	31	Hardware with GPS+BDS function Version=1 hardware version
Software code Software function name	0	Standard software function version

5.3 List of general order models:

General Order Model	product
ATGM336H-5N-11-0	9.7X10.1 size, AT6558 chip, navigation module, single GPS bit, 16.369M crystal oscillator, standard output
ATGM336H-5N-21-0	9.7X10.1 size, AT6558 chip, navigation module, single BDS positioning, 16.369M crystal oscillator, standard output
ATGM336H-5N-31-0	9.7X10.1 size, AT6558 chip, navigation module, GPS+BDS Positioning, 16.369M crystal oscillator, standard output
ATGM336H-5N-51-0	9.7X10.1 size, AT6558 chip, navigation module, GPS+GLONASS positioning, 16.369M crystal oscillator, standard output
ATGM336H-5N-71-0	9.7X10.1 size, AT6558 chip, navigation module, GPS+BDS+GLONASS positioning, 16.369M crystal oscillator, standard output

5.4 Customized order model:

Zhongke Micromodule provides software function customization services for domestic customers. The specific cooperation method and product order naming,

Please contact a sales representative.

references

1. "Zhongkewei AGNSS Solution"

2. "CASIC Multi-mode Satellite Navigation Receiver Protocol Specification"

3. "ATGM Module Online Upgrade Agreement"

4. "AT6558 Chip Data Sheet"

5. "GNSSToolKitLite Tool Instructions"

6. "UBF Serial Port Upgrade Tool Instructions"