BDS / GNSS Full constellation of navigation module

# ATGM336H-5N

User's manual

Revision History

| version date | | update content |
|---|---|---|
| 1.0 | 2015/7/01 | First draft |
| 1.1 | 2015/12/1 | Increase product purchase description;<br><br>Increase in orders Model Description;<br><br>**The same series of single increase GPS Module, single BDS A functional module;**<br><br>**increase Flash Features, online upgrade protocol description**<br><br>Revised active antenna application circuit;<br><br>Increasing the passive antenna application circuit;<br><br>Modify telephone technical support phone;<br><br>Other text perfect; |
| 1.2 | 2016/7/15 | Complete text |

# 1 Functional Description

## 1.1 Outline

ATGM336H-5N Series modules are 9.7X10.1 Size, high-performance BDS / GNSS Full constellation positioning

General term for navigation module series. This series of modules are based on the fourth-generation low-power micro-Branch GNSS

SOC Single Chip -AT6558 , Support for multiple satellite navigation systems, including China, BDS (Beidou satellite

Navigation systems), United States GPS ,Russian GLONASS EU GALILEO ,Japan's QZSS

And Satellite Augmentation System SBAS ( WAAS , EGNOS , GAGAN , MSAS ). AT6558 is one

Six true sense of the multi-mode satellite navigation and positioning chip, containing 32 A tracking channels, can be connected simultaneously

Closing six satellite navigation system GNSS Signal, and to achieve joint positioning, navigation and timing.

ATGM336H-5N This series of modules with high sensitivity, low power, low cost advantages for

Vehicle navigation, positioning handheld, wearable devices that can directly replace Ublox MAX Series modules.

## 1.2 Product Selection

| model | Multi-mode function | | | Power Interface | | | | characteristic | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | GPS BDS | GLONASS | | 2.7V ~ 3.6V | 1.65V ~ 3.6V | UART1 UART2 | Flash TCXO | The antenna detection | Antenna overcurrent protection | Front SAW | External LNA |
| ATGM336H-5N-1X | ● | | | ● | | ● | ● | ● | ● | ● | ● |
| ATGM336H-5N-2X | | ● | | ● | | ● | ● | ● | ● | ● | ● |
| ATGM336H-5N-3X | ● | ● | | ● | | ● | ● | ● | ● | ● | ● |
| ATGM336H-5N-5X | ● | | ● | ● | | ● | ● | ● | ● | ● | ● |
| ATGM336H-5N-7X | ● | ● | ● | ● | | ● | ● | ● | ● | ● | ● |

## 1.3 Performance

- Excellent positioning and navigation functions, support BDS / GPS / GLONASS Single System given satellite navigation system

  Position, and any combination of multi-system co-located, and support QZSS with SBAS system

- stand by A-GNSS

- Cold start acquisition sensitivity: - 148dBm

- Tracking Sensitivity: - 162dBm

- positioning accuracy: 2.5 Meter( CEP50 )

- Time to first fix: 32 second

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

- Built-in antenna and the antenna short circuit protection Detection

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

  ATGM336H-5N-7X Module.

  Note 2 : ATGM336H-5N-2X Performance module, make sure that the sales representative.

## 1.4 The functional block
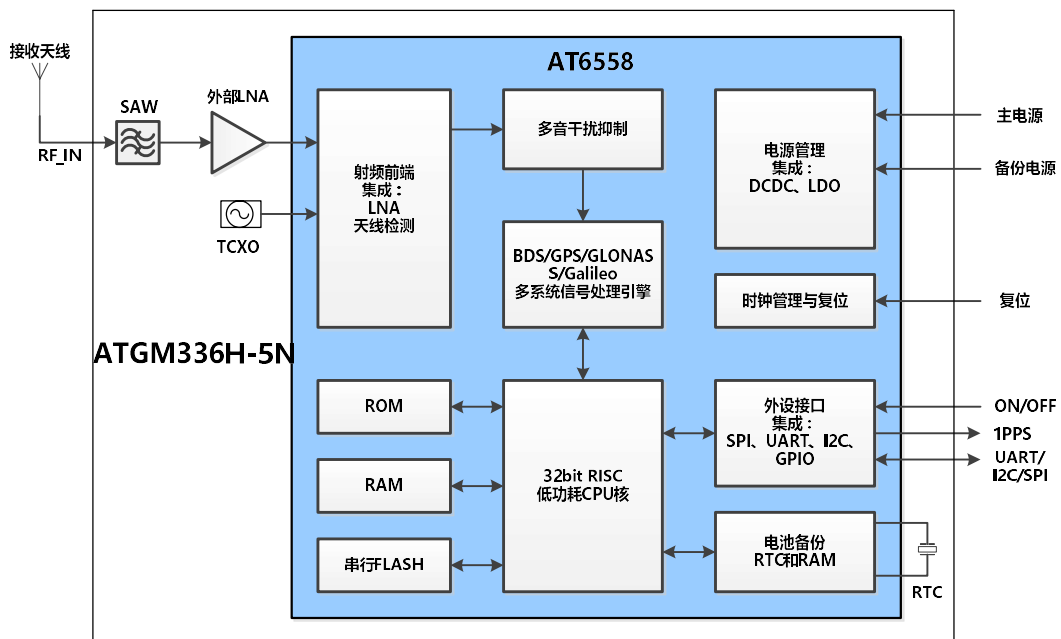
### 1.5 **Applications**

- Vehicle Location and Navigation

- Mobile phones, tablet PCs, handheld devices

- Embedded positioning device

- Wearable device

## 1.6 **Aid** GNSS **(** Assisted GNSS **,** AGNSS **)**

**ATGM336H-5N All series modules support auxiliary GNSS ( AGNSS )Features. AGNSS can**

Positioning assistance information necessary for the receiver, such as message, coarse position and time. Whether in strong faith

No or weak signal environments, such information can significantly shorten the time to first fix. See specific use "in

**Micro Branch AGNSS Solution "description.**

## 1.7 PPS

**ATGM336H-5N Series module supports accurate second pulse output, the rising edge of the pulse UTC Time alignment.**

### 1.8 **Output Protocol**

**ATGM336H-5N Series modules UART As the main output channel, in accordance with NMEA0183 Co**

Yee output format, specific information, refer to " CASIC Multimode satellite navigation receiver Protocol Specification. "

## 1.9 FLASH

**ATGM331C-5N Series modules are equipped Flash Can be upgraded online features, updates and positioning**

algorithm. This configuration feature that allows customers to configure the autonomous position update rate, access to suitable low power consumption; can

The latest update to allow customers to optimize the progress of global multi-mode positioning; allowing customers to add new control functions

Energy, such as location geofence recorded rule, the output format customized.

## 1.10 Online update feature

ATGM336H-5N Support in the Division Series modules micro-line upgrade agreement. The user may lift in accordance with the host computer

Level protocol to communicate with the module, the new software program provided by the Division of micro, upgrade to the module in order to obtain new

The software features. Users can also use the remote command mode, the remote control device to start the upgrade process above, to achieve

Remote online upgrade. Online Upgrade protocol, see " ATGM Online Upgrade protocol module. "

## 1.11 antenna

ATGM336H-5N Series modules support active antenna and a passive antenna.

## 1.12 PC Tools

Branch micro provide " GNSSToolKit " Lite Software package ( Windows version, Android version),

Output configuration for positioning the analytical mode of operation.

Branch micro provide " UBF Serial Upgrade Tool "software package ( Windows Version), based on PC In
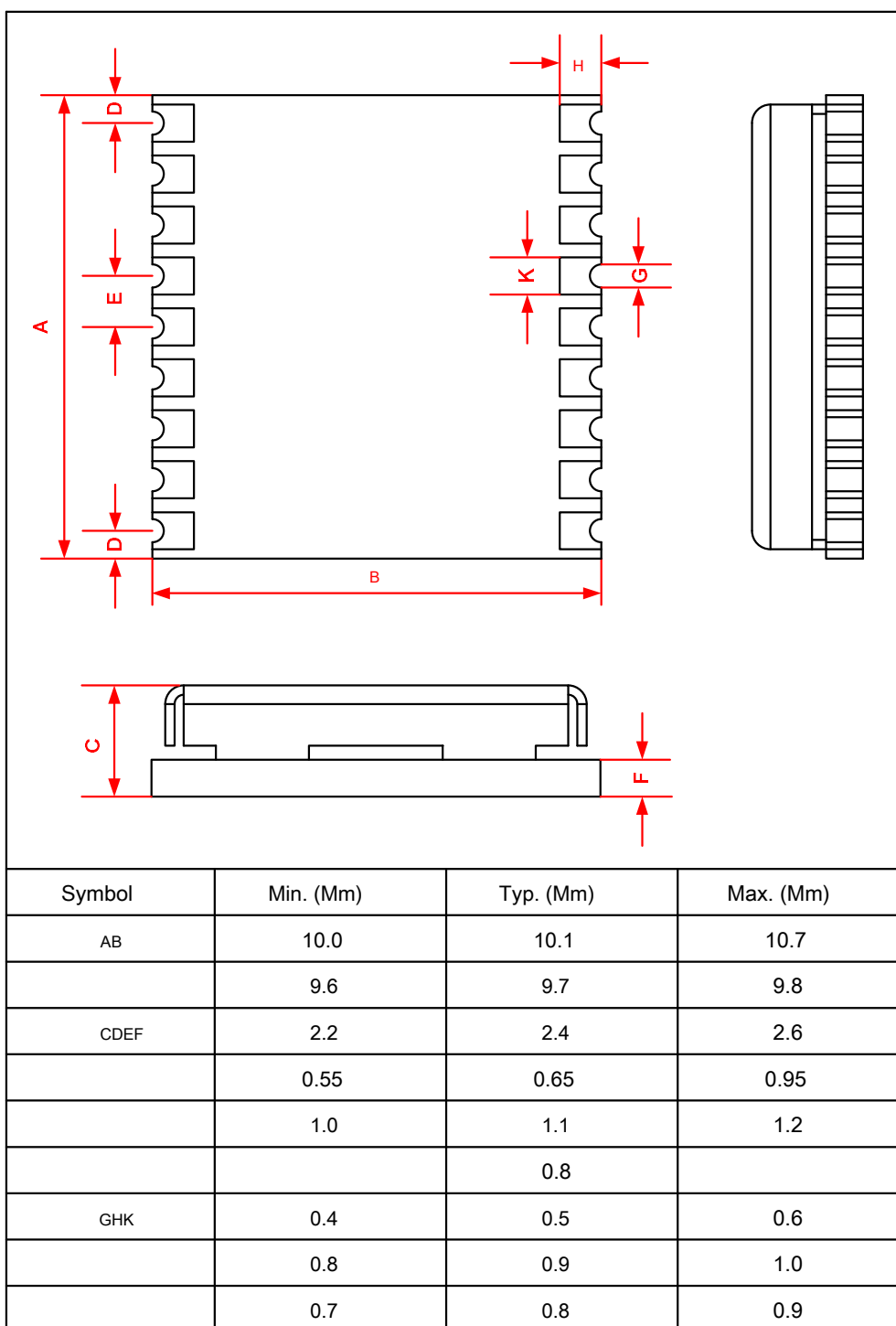
Line upgrade tool. Develop their own device-based online upgrade process required customers.
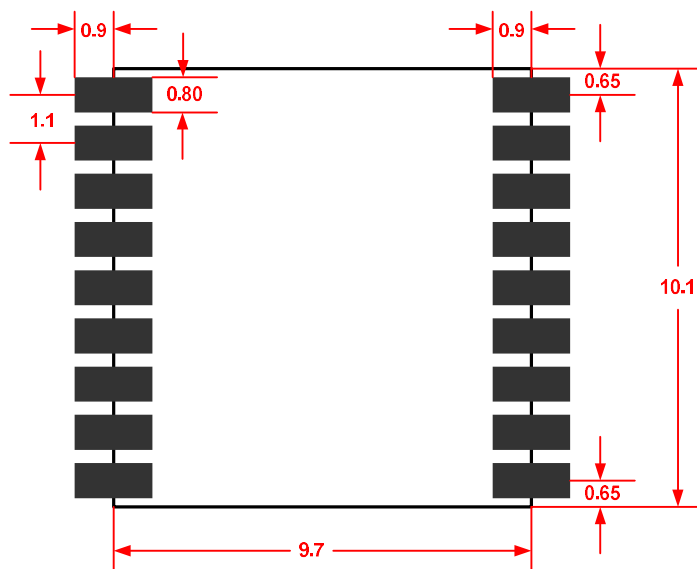
## 2 Technical Description

### 2.1 physical dimension (unit: mm )



| Symbol | Min. (Mm) | Typ. (Mm) | Max. (Mm) |
|--------|-----------|-----------|-----------|
| AB | 10.0 | 10.1 | 10.7 |
| | 9.6 | 9.7 | 9.8 |
| CDEF | 2.2 | 2.4 | 2.6 |
| | 0.55 | 0.65 | 0.95 |
| | 1.0 | 1.1 | 1.2 |
| | | 0.8 | |
| GHK | 0.4 | 0.5 | 0.6 |
| | 0.8 | 0.9 | 1.0 |
| | 0.7 | 0.8 | 0.9 |

## 2.2 PCB layout (unit: mm )



### 2.3 PIN Arrangement of FIG.

| | | | |
|---|---|---|---|
| 10 | GND | nRESET | 9 |
| 11 | RF_IN | VCC | 8 |
| 12 | GND | NC | 7 |
| 13 | NC | VBAT | 6 |
| 14 | VCC_RF | ON/OFF | 5 |
| 15 | Reserved | 1PPS | 4 |
| 16 | SDA | RXD | 3 |
| 17 | SCL | TXD | 2 |
| 18 | Reserved | GND | 1 |

ATGM336H Top View

## 2.4 Pin definitions

| Pin Numbering | name | I / O | description | Electrical Characteristics |
|---|---|---|---|---|
| 1 GND | | I | Ground | |
| 2 | TXD | O | Navigation data output | NMEA0183 protocol |
| 3 | RXD | I | Interactive command input | Enter configuration commands |
| 4 | 1PPS | O | Second pulse output | |
| 5 ON / OFF | | I | Shutdown control module, active low | |
| 6 | VBAT | I | RTC and SRAM backup power | provide 1.5 ~ 3.6V Power to ensure Module hot start |
| 7 | NC 8 | | | |
| | VCC | I | Input Power Module | Direct-current 3.3V ± 10 % , 100mA |
| 9 | nRESET | I | Module reset input, active low when not vacant | |
| 10 GND | | I | Ground | |
| 11 RF_IN | | I | Antenna signal input | |
| 12 GND | | I | Ground | |
| 13 NC 14 VCC_RF | | | | |
| | | O | Output Power | ＋3.3V , May supply to the antenna |
| 15 Retention | | | | Suspended |
| 16 SDA | | I / O | I $_2$ C Data interface | Suspended |
| 17 SCL | | O | I $_2$ C Clock Interface | Suspended |
| 18 Retention | | | | Suspended |

## 2.5 Electrical parameters

**Limit parameters**

| parameter | symbol | Minimum | Maximum | Unit |
|---|---|---|---|---|
| Module supply voltage ( VCC) | Vcc | -0.3 | 3.6 | V |
| Backup battery voltage ( VBAT) | Vbat | -0.3 | 3.6 | V |
| Digital input voltage | Vin | -0.3 | Vcc + 0.2 | V |
| The maximum acceptable ESD Level | VESD (HBM) | | 2000 | V |

**Operating conditions**

| parameter | symbol | Min | Typ | Max | Units | | |
|---|---|---|---|---|---|---|---|
| Supply voltage | Vcc | 2.7 | 3.3 | 3.6 | V | | |
| Vcc Peak current (not including antenna) | Ipeak | | | 100 | mA | | |
| Backup Power | Vbat | 1.5 | 3.0 | 3.6 | V | | |
| Backup Power ( Vbat) Electric current | Ibat | | 10 | | uA | | |
| Input pin | Vil | | | 0.2 * Vcc | V | | |
| | Vih | 0.7 * Vcc | | | V | | |
| Output pin | Vol Io = -12mA | | | 0.4 | V | | |
| | Voh Io = 12mA | Vcc-0.5 | | | V | | |
| Active antenna output voltage | VCC_RF | | 3.3 | | V | | |
| Antenna short-circuit current protection Power from VCC_RF (= 3.3V) | Iant short | | 50 | | mA | | |
| Open the current antenna Power from VCC_RF (= 3.3V) | Iant open | | 3 | | mA | | |
| Antenna gain | Gant | 15 | | 30 | dB | | |

2.6 **specifications**

| index | Technical Parameters |
|---|---|
| signal reception | BDS / GPS / GLONASS / GALILEO / QZSS / SBAS |
| The number of radio channels | Three-channel radio, support full constellation BDS , GPS with GLONASS with<br><br>Upon receipt |
| Cold start TTFF | ≤35s |
| Hot Start TTFF | ≤1s |
| Recaptured TTFF | ≤1s |
| Cold start acquisition sensitivity | - 148dBm |
| Hot start acquisition sensitivity | - 156dBm |
| Sensitivity recaptured | - 160dBm |
| Tracking sensitivity | - 162dBm |
| positioning accuracy | <2m ( 1σ ) |
| Speed accuracy | <0.1m / s ( 1σ ) |
| Timing Accuracy | <30ns ( 1σ ) |
| Positioning update rate | 1Hz (Default), the largest 10Hz |
| Serial properties | Baud rate range: 4800 bps ~ 115200 bps, default 9600bps, 8 Data bits,<br><br>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 Celsius |
| storage temperature | - 45 To + 125 Celsius |
| size | 10.1mm × 9.7mm × 2.4mm |
| weight | 0.6g |

## 2.7 Application of circuit modules

### 2.7.1 Active antenna applications (internal power module providing an antenna, an antenna detection and short-circuit protection)
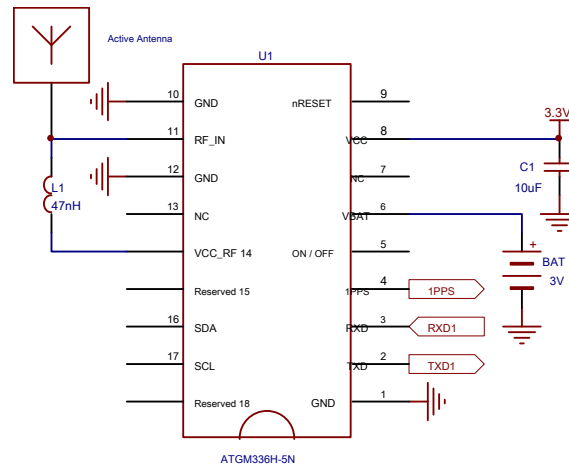


### 2.7.2 Passive antenna applications (module RF_IN An increase in input LNA )
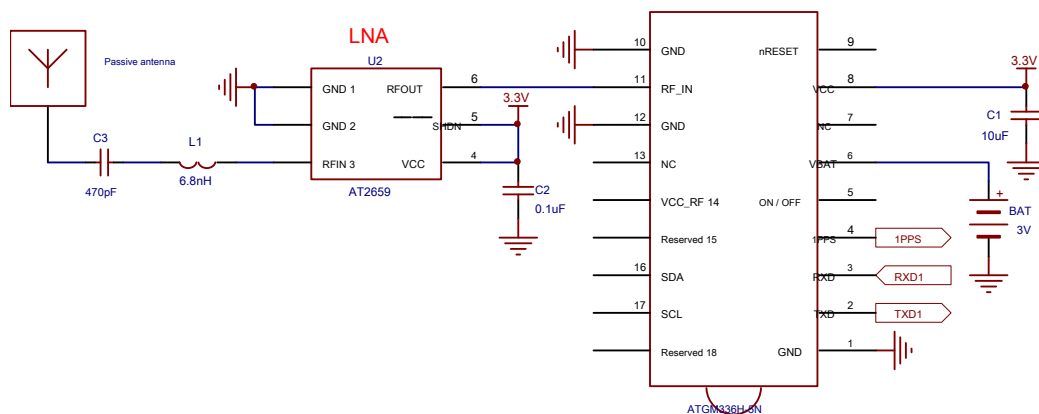


## 2.8 Module Precautions

To take full advantage ATGM336H-5N Excellent performance, when using the modules the user to note the following:

- Low ripple LDO Power, ripple control 50mVpp Or less.

- Try not to go near the module other high-frequency, high amplitude digital signal. Below to fill all of the modules preferably ground.

- As close to the antenna interface module RF Input pin, and note 50 Ohm impedance matching.

● An active antenna access module itself, pull, short circuit detecting circuit, while when the antenna accidental short-circuit of the antenna for

**Electric current is limited ( 50mA) , Play a protective role. In the above 3 When the types of antenna port status change from**

Serial output corresponding information. Such as

$ 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 **Authenticate**

ATGM336H-5N Series modules are in line with RoSH Certification.

# 4 And welding module transmits

## 4.1 **Module Packaging**

ATGM336H-5N Series Modules vacuum packing tape, is moisture-resistant, anti-static properties, used

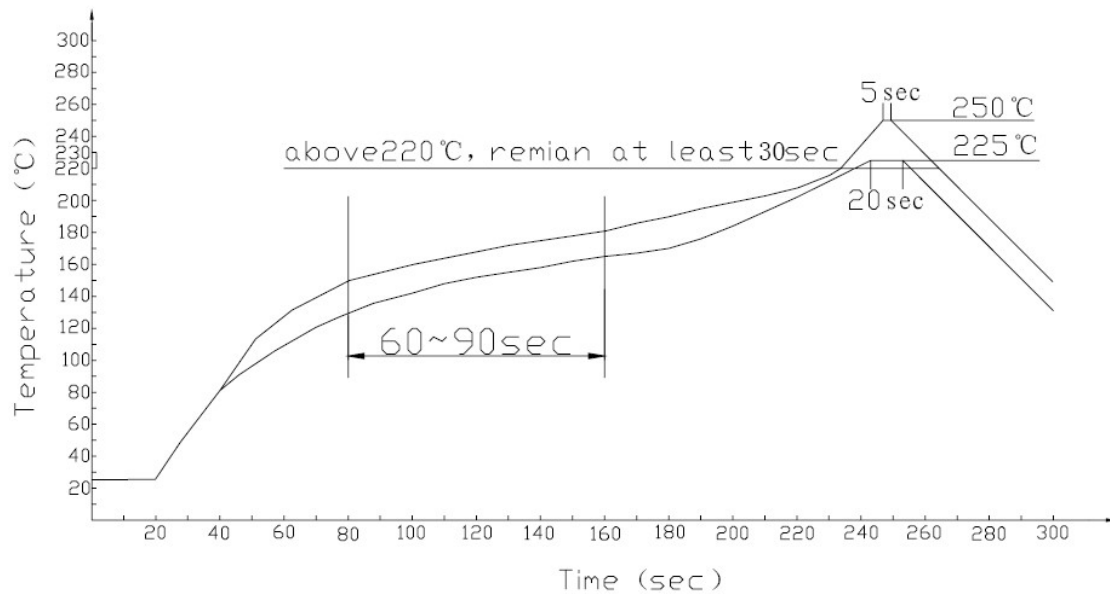Cheng is compatible with the industry's major patch. According to each plate 1000 Film for packaging.

## 4.2 **Transmission and storage module**

4.2.1. Moisture levels:

### Moisture Sensitivity Level (MSL) : 4 level

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

## 4.2.2 Reflow profile:

**! note**

Adjust the balance of time to ensure rationalized gas when melting solder paste. in case PCB Board has too many gaps,

You can increase the equilibration time.

Considering the time the product is placed in the weld zone (in the temperature 180 ℃ above), in order to prevent the bottom plate and components

The damage should be as short as possible storage time.

**! Important characteristic curve:**

The rate of increase = 1 ~ 4 ° C / sec, 25 ° C to150 ° C average

Preheating temperature = 140 ° C to 150 ° C, 60sec ~ 90sec

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

The rate of decline = 2 ~ 6 ° C / sec, to 183 ° C, about 15sec

Total time = about 300sec

4.2.3 Static Protection:

ATGM336H-5N Module series, is a static-sensitive devices. Regular contact with static electricity can cause the module

Unexpected damage. In addition to the electrostatic protection requirements according to the standard operation, the following points need to follow as much as

1 ) Unless PCB GND Already well grounded, otherwise the first position of the contact module should be

PCB GND .

2 ) When the antenna is connected, first connection GND , Then even signal line.

3 ) Contacts RF When part of the circuit, do not touch the charging capacitor, can move away from the static device

Device, such as a dielectric antenna, a coaxial wire, electric iron and the like.

4 ) In order to avoid the charge is discharged through the RF input terminal, do not touch the exposed portion of the antenna dielectric.

In the case of contact with the antenna media exposed that may arise, need to increase the anti-static protection in the design
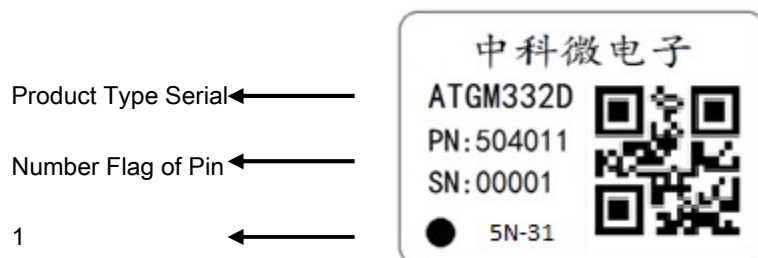
Circuit.

5 ) RF welding the connector connected to the input of the antenna, make sure that no electrostatic gun.

# 5 Module type label orders

## 5.1 Module label

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

Product Type Serial ⟵

Number Flag of Pin ⟵

1 ⟵



## 5.2 Model naming rules:

With ATGM336H-5N-31-0 For example, explained as follows:

| Field | Examples | Explanation |
|---|---|---|
| Product code<br><br>product name | ATGM336H 9.7mmX10.1mm Module Series | |
| Type code<br><br>Type Name | 5N | use AT6558 Hardware platform navigation module |

| Hardware code<br><br>Hardware function name | 31 | have GPS + BDS functional Hardware Version = 1 Hardware<br><br>version |
| --- | --- | --- |
| Software code<br><br>Software function name | 0 | Standard software features version |

## 5.3 General Order Type summary:

| General Order Model | product |
| --- | --- |
| ATGM336H-5N-11-0 9.7X10.1 size, AT6558 Chip, a navigation module, a single GPS set<br><br>Position, 16.369M Crystal, standard output | |
| ATGM336H-5N-21-0 9.7X10.1 size, AT6558 Chip, a navigation module, a single BDS Positioning,<br><br>16.369M Crystal, standard output | |
| ATGM336H-5N-31-0 9.7X10.1 | size, AT6558 Chip, a navigation module, GPS + BDS<br><br>Positioning, 16.369M Crystal, standard output |
| ATGM336H-5N-51-0 9.7X10.1 | size, AT6558 Chip, a navigation module,<br><br>GPS + GLONASS Positioning, 16.369M Crystal, standard output |
| ATGM336H-5N-71-0 9.7X10.1 | size, AT6558 Chip, a navigation module,<br><br>GPS + BDS + GLONASS Positioning, 16.369M Crystal, standard output |

## 5.4 Custom orders Model:

Branch micro module for domestic customers with software features customized services. Concrete forms of cooperation with the named product orders,

Please contact your sales representative.

# references

1. "Micro Branch AGNSS solution"

2. " CASIC Multimode satellite navigation receiver Protocol Specification "

3. " ATGM Online Upgrade protocol module "

4. " AT6558 Chip Data Sheet "

5. " GNSSToolKitLite Tools for use "

6. " UBF Serial upgrade tool for use "