BDS/GNSSFull constellation positioning and navigation module

ATGM332D-5NR32

user manual

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Version update history

Version	date	update content
1.0	2018/11/15	first draft

1Functional description

1.1overview

ATGM332D-5NR32Series modules are12X16high performance in sizeBDS/GNSSFull constellation Generic term for bit navigation module series. This series of module products are based on Zhongke micro low power consumptionGNSS SOCone chip-AT6558R, supports a variety of satellite navigation systems, including China'sBDS(Beidou Satellite Navigation System system), the AmericanGPS,RussianGLONASS, the EU'sGALILEO,Japan'sQZSSby and satellite augmentation systemSBAS(WAAS,EGNOS,GAGAN,MSAS).AT6558Ris one A true six-in-one multi-mode satellite navigation and positioning chip, including32Tracking channels can be connected at the same time with six satellite navigation systemsGNSSsignal, and realize joint positioning, navigation and timing.

ATGM332D-5NR32The series of modules have the advantages of high sensitivity, low power consumption, and low cost, and are suitable for Used in car navigation, handheld positioning, and wearable devices, it can be directly replacedUblox NEOseries of modules.

1.2Product Selection

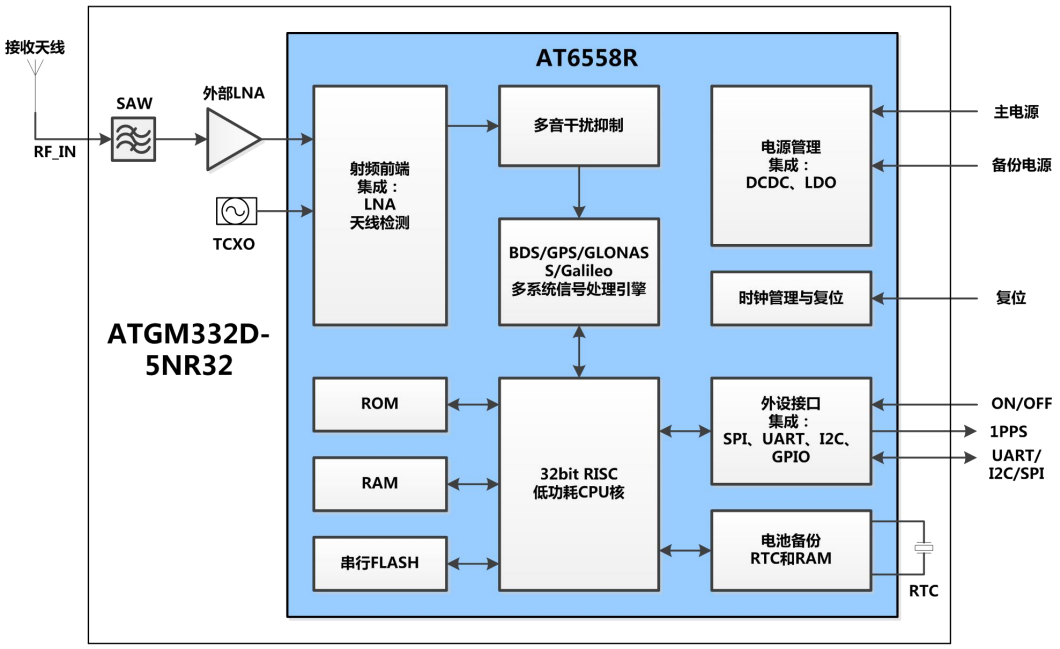
model	Multimode function			power supply		interface		characteristic					
	GPS	BDS	GLONASS	2.7V~3.6V	1.65V~3.6V	UART1	UART2	Flash	TCXO	antenna detection	Antenna Overcurrent Protection	FrontSAW	externalLNA
ATGM332D-5NR32	●	●		●		●	●	●	●	●	●	●	●

* Note1: The above table is the default configuration of the module

1.3Performance

- Excellent positioning and navigation function, supportBDS/GPS/GLONASSSingle system positioning of satellite navigation system bit, and any combination of multi-system joint positioning, and supportsQZSSandSBASsystem
- supportA-GNSS
- Cold Start Capture Sensitivity:-148dBm
- Tracking Sensitivity:-162dBm
- positioning accuracy:2.5rice(CEP50)
- First fix time:32Second
- Low power consumption: continuous operation <26mA(@3.3V)
- Built-in antenna detection and antenna short circuit protection function

1.4Module functional block diagram



1.5Application field

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

1.6auxiliaryGNSS(Assisted GNSS,AGNSS)

ATGM332D-5NR32All series modules support auxiliaryGNSS(AGNSS)Function.AGNSS

It can provide the receiver with auxiliary information necessary for positioning, such as text, rough position and time, which

The time to first fix can be significantly shortened. For specific usage, see ZhongkeweiAGNSSsolution".

1.7 1PPS

ATGM332D-5NR32The series of modules support accurate second pulse output, the pulse rising edge andUTCtime pair

together.

1.8output protocol

ATGM332D-5NR32series of modules throughUARTAs the main output channel, follow theNMEA0183

protocol format output, for details, please refer to "CASICMultimode Satellite Navigation Receiver Protocol Specification".

1.9antenna

ATGM332D-5NR32Series modules support active and passive antennas.

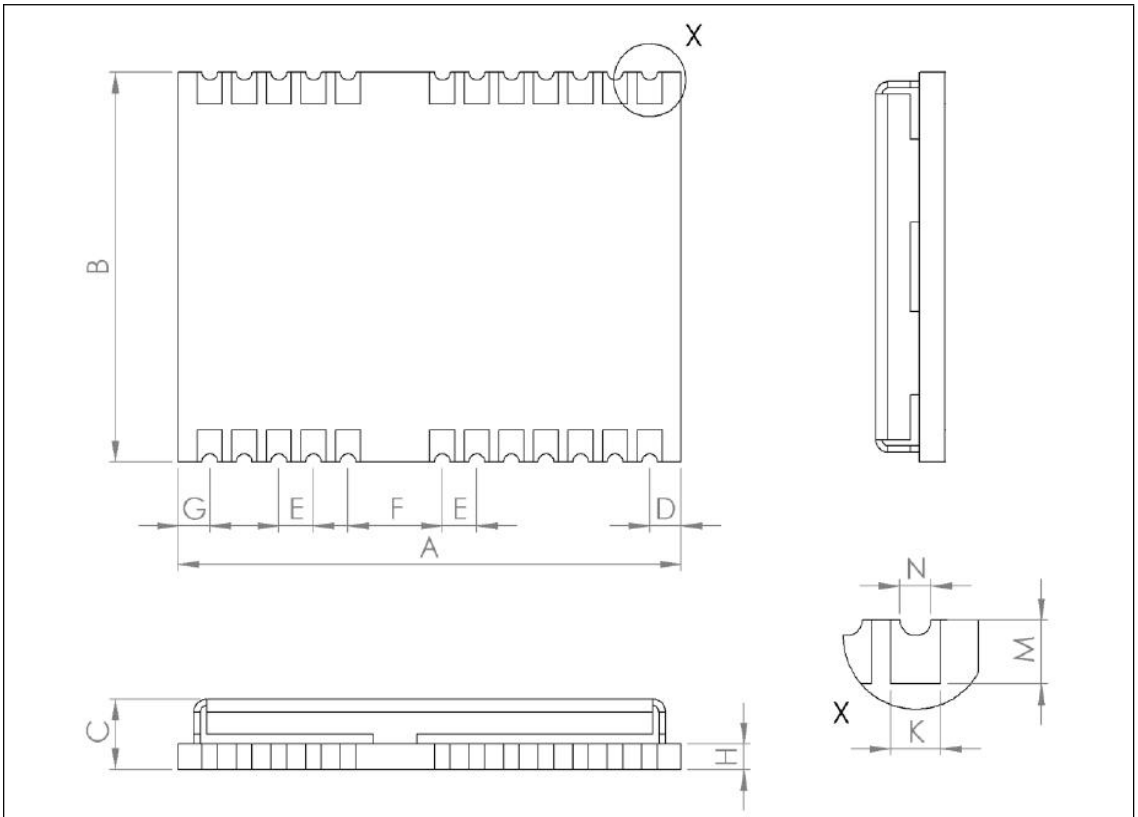
1.10PC tool

Zhongkewei provides "GNSS Tool Kit"liteversion software package (WindowsVersion,androidVersion),

Used for positioning output parsing and working mode configuration.

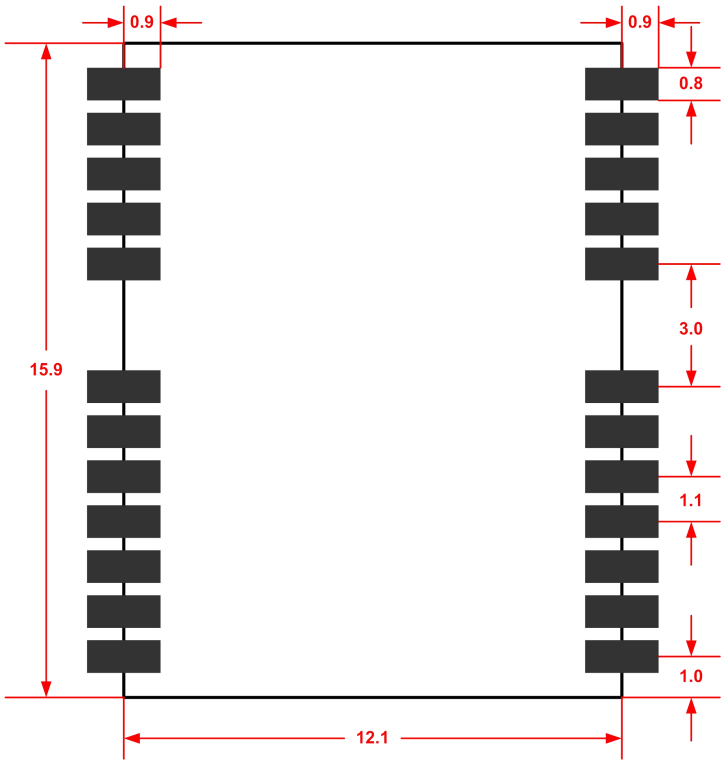
2Technical Description

2.1physical dimension(unit:mm)

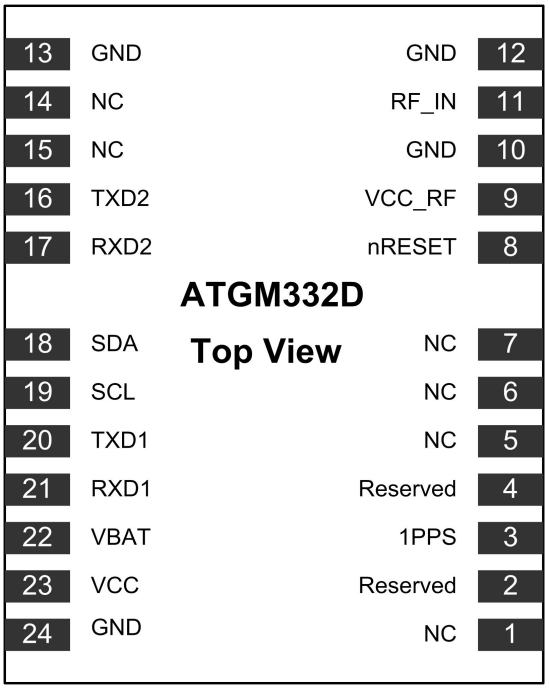


Symbol	Min.(mm)	Typ.(mm)	Max.(mm)
A	15.8	15.9	16.5
B	12.0	12.1	12.2
C	2.2	2.4	2.6
D.	0.9	1.0	1.3
E.	1.0	1.1	1.2
f	2.9	3.0	3.1
G	0.9	1.0	1.3
h		0.8	
K	0.7	0.8	0.9
m	0.8	0.9	1.0
N	0.4	0.5	0.6

2.2 PCB layout(unit:mm)



2.3 PINPareto



2.4Pin definition

pin serial number	name	I/O	describe	electrical characteristics
1	NC			
2	reserve			dangling
3	1PPS	o	second pulse output	
4	reserve			dangling
5	NC			
6	NC			
7	NC			
8	nRESET	I	Module reset input, active low	floating when not in use
9	VCC_RF	o	output power	+3.3V, to power the antenna
10	GND	I	land	
11	RF_IN	I	Antenna signal input	
12	GND	I	land	
13	GND	I	land	
14	NC			
15	NC			
16	TXD2	o	Auxiliary serial port data output, can be used on behalf of code upgrade	
17	RXD2	I	Auxiliary serial data input that can be used on behalf of code upgrade	
18	SDA	I/O	I_2CData interface	dangling
19	SCL	o	I_2Cclock interface	dangling
20	TXD1	o	Navigation data output	NMEA0183protocol
twenty one	RXD1	I	Interactive command input	Configuration command input
twenty two	VBAT	I	RTCandSRAMbackup power	supply1.5~3.6Vpower to ensure Module hot start
twenty three	VCC	I	Module power input	DC3.3V±10% ,100mA
twenty four	GND	I	land	

2.5Electrical parameters

Limit parameter

parameter	symbol	minimum value	maximum value	unit
Module supply voltage (VCC)	Vcc	- 0.3	3.6	V
Backup battery voltage (VBAT)	Vbat	- 0.3	3.6	V
Digital input pin voltage	Vin	- 0.3	Vcc+0.2	V
maximum bearableESDlevel	VESD(HBM)		2000	V

Operating conditions

parameter	symbol	minimum value	typical value	maximum value	unit
supply voltage	Vcc	2.7	3.3	3.6	V
VccPeak current (not including antenna)	Ipeak			100	mA
backup power	Vbat	1.5	3.0	3.6	V
backup power supply (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 protection current power fromVCC_RF (=3.3V)	Iant short		50		mA
Antenna open circuit current power fromVCC_RF (=3.3V)	Iant open		3		mA
antenna gain	Gant	15		30	dB

2.6specifications

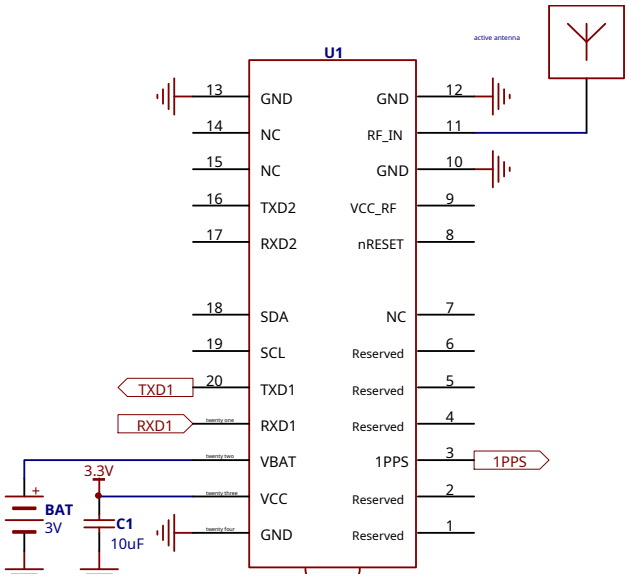
index	Technical Parameters
signal reception	BDS/GPS/GLONASS/GALILEO/QZSS/SBAS
Number of RF channels	Three-channel radio frequency, support full constellationBDS,GPSandGLONASSSimultaneous reception
Cold startTTFF	≤32s
Hot StartTTFF	≤1s
recaptureTTFF	≤1s
Cold Start Capture Sensitivity	- 148dBm
Hot Start Capture Sensitivity	- 156dBm
recapture sensitivity	- 160dBm
Tracking Sensitivity	- 162dBm
positioning accuracy	<2.5m(CEP50)
Speed measurement accuracy	<0.1m/s(1σ)
positioning update rate	1Hz(default), maximum10Hz
Serial port characteristics	Baud rate range:4800 bps ~115200 bps,default9600bps, 8data bits, no parity,1stop bits
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&BDTypical power consumption	<26mA @3.3V
Operating temperature	- 40to +85Celsius
storage temperature	- 45to +125Celsius
size	15.9mm×12.1mm×2.4mm
weight	1.6g

2.7Module Application Circuit

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

moduleVCC_RFhas been internally connected toRF_INTo supply power to the antenna, in order to avoid introducing interference, the

Module application design does not need to start fromVCC_RFexternally connected toRF_INPower the antenna.



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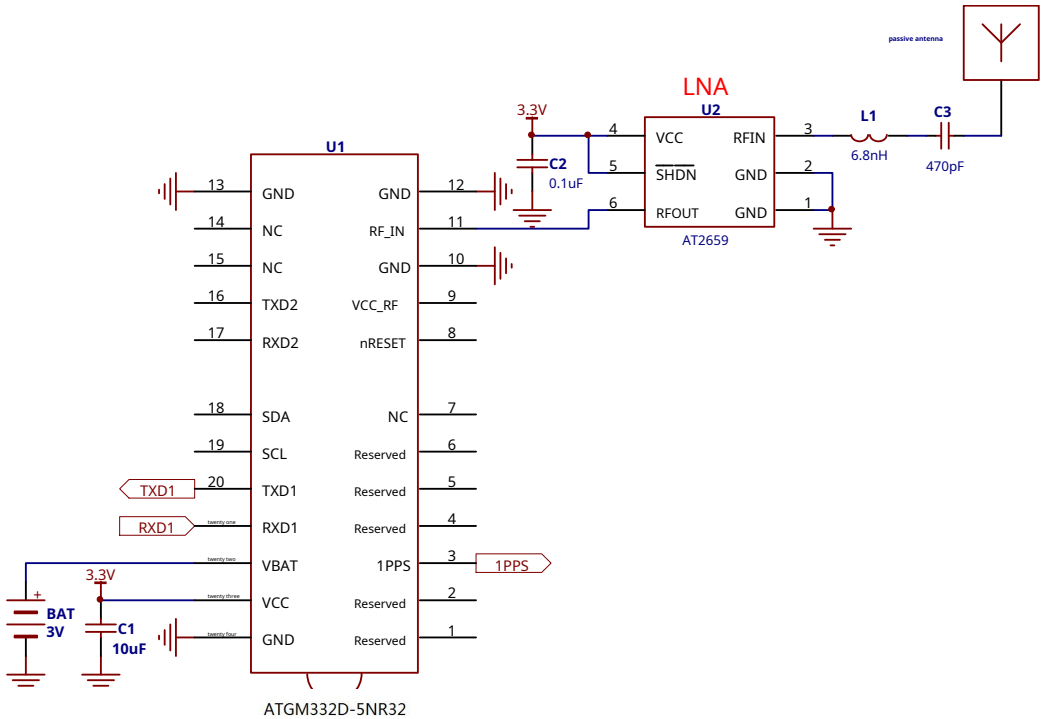
2.7.2Passive Antenna Application Scheme (ModuleRF_INThe input is increased by one levelLNA)



ATGM332D-5NR32

2.8Precautions for using the module

In order to make full use ofATGM332D-5NR32Excellent performance, users need to pay attention when using this module

The following points:

- low rippleLDOspower supply, controlling the ripple at50mVppwithin.
- Try not to use other digital signals with high frequency and large amplitude near the module. All the modules are grounded

  Filling is good.
- The antenna interface should be as close as possible to the moduleRFinput pins, and note that50Ohm impedance matching.
- 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,

  Limit the supply current of the antenna (50mA), play a protective role. in the above3antenna port

  When the status changes, the corresponding information can be output from the serial port. like

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

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

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

- When the module uses a passive antenna, it cannot support antenna access, extraction, short circuit detection circuit, and serial port output

  Statements are open. like

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

3Reliability Testing and Certification

3.1RoHScertified

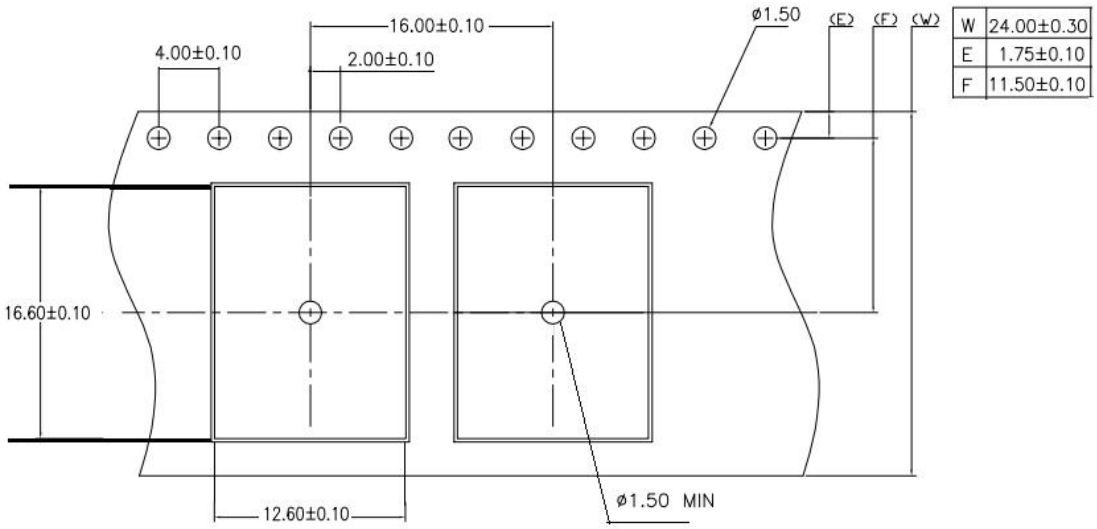
ATGM332D-5NR32series of modules are compatible withRoHScertified.

4Module Transfer and Soldering

4.1module packaging

ATGM332D-5NR32The series of modules are packed in vacuum tape, which has the characteristics of moisture-proof and anti-static, so that

The process is compatible with the major placement machines in the industry. per plate1000slices for packaging. The specific tape size is as follows:



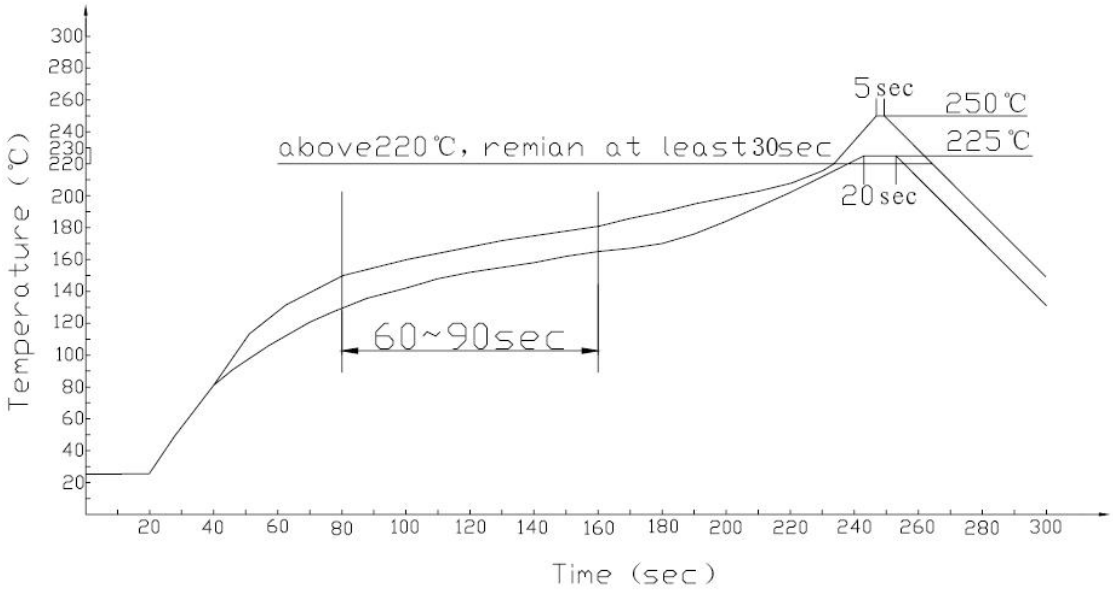
4.2Module transfer and storage

4.2.1Moisture-proof grade:

Moisture Sensitivity Level (MSL):3class

MSLPlease refer toIPC/JEDEC J-STD-020standard.

4.2.2Reflow Soldering Profile:



!Notice

Adjust the equilibration time to ensure the rationalization of the gas when the solder paste melts. ifPCBExcessive voids on the board,

Equilibration time can be increased.

Considering that the product is placed in the welding area for a long time (the temperature is180℃ above), in order to prevent components and chassis

The damage should be kept as short as possible.

! Important features of curves:

Ascent speed =1~4°C /sec, 25°C to150°Caverage

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

temperature fluctuation =225°C to 250°C,About30sec

Falling speed =2~6°C/sec, to 183°C,About15sec

total time = approx.300sec

4.2.3Static Protection:

ATGM332D-5NR32The module series is an electrostatic sensitive device. Regular electrostatic contact can cause

A module has been accidentally damaged. In addition to operating in accordance with the standard electrostatic protection requirements, the following points should be followed as much as possible

follow:

1)unlessPCB GNDalready well grounded, otherwise the first place to touch the module should be

PCB GND.

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

3)touchRFWhen connecting some circuits, please do not touch the charging capacitor and keep away from devices that can generate static electricity with equipment such as dielectric antennas, coaxial wires, soldering irons, etc.

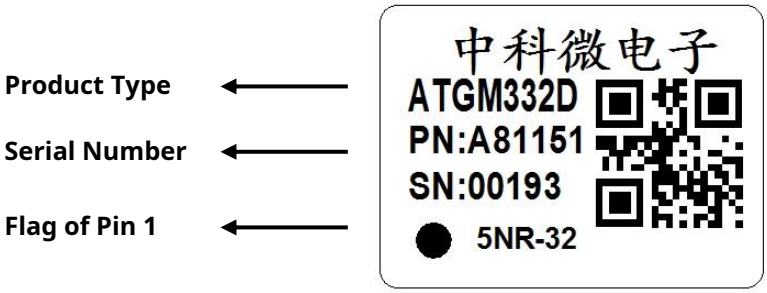
4) To avoid charge discharge through the RF input, please do not touch the exposed part of the antenna dielectric. For situations where the contact antenna medium may be exposed, anti-static protection needs to be added to the design circuit.

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

5module label

5.1module label

ATGM332D-5NR32The label contains important product information, and the format of the label content is as follows:



references

1."ZhongkeweiAGNSSsolution"

2."CASICMultimode Satellite Navigation Receiver Protocol Specification"

3."AT6558RChip Data Book

4."GNSS Tool KitTool Instructions"