ROHS , ISO9001

ST936P

Multi-Satellite Multi-frequency RTK&IMU Positioning Module Manual

Oct. 2020

www.xbteek.com

Revision History

Ver. NO.	Version	Date
V.1	New	Oct. 2020

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Catalogue

1. Introduction

This document indicates the hardware interface specifications, electrical characteristics and mechanical details of CNT936P module. With the help of this document, combined with our application manual and user guide, customers can quickly apply the CNT936P module to the related fields.

2. Overview

2.1 Main Performances

Performances	Descriptions
Supporting satellites	Support multi-satellite systems, such as GPS, BDS, Galileo, GLONASS and QZSS
Frequency band	Multi-frequency points such as L1, L5, B2I, B2a, E1c, E5a, G1, etc
Power supply	3.0V ~ 3.6V, recommended value 3.3V
RTK	GPS L1/L5; BDS B1I/B2a
Data Protocol Features	NMEA0183; RTCM3.2 MSM4
IMU	Inertial navigation
Data refresh rate	1-10HZ
Serial port	UART1-2: Output, configuration and firmware upgrade serial port, baud rate 115200
Antenna port	Characteristic impedance 50 ohms
Physical characteristics	Dimensions: 22mmX17mmX2.5mm Weight: approx. 2.6g

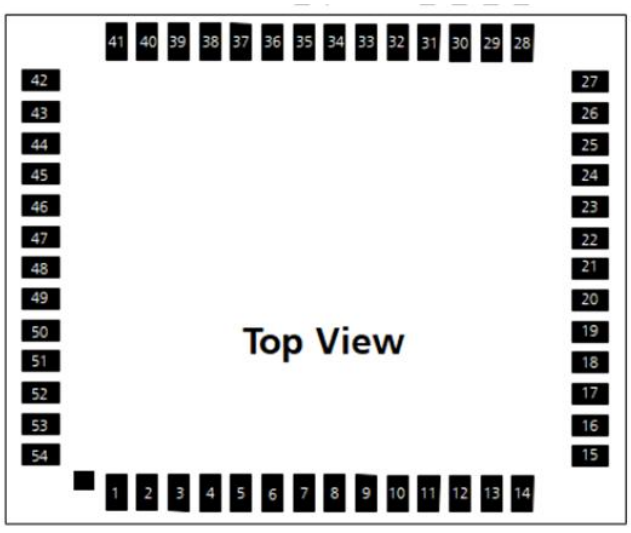
Temperature range	Normal operating temperature: -35°C ~ +70°C Limit operating temperature: -40°C ~ +85°C
RoHS	All devices are fully RoHS compliant
Package	LGA54 pins, the actual available pins see the pins drawing

3. Application Interface

With LGA package, there are 54 SMT welded coil pins on the modules. The following indicates the function of CNT936P interface.

3.1 Pin Arrangement

Figure 2: Pin Arrangement Diagram (front view)



3.2 Pin Descriptions

Serial Number	Pin name	I/O	Description
1	GND	-	Ground
2	RF_IN	I	RF input
3	GND	-	Ground
4	Reserved	-	Reserved
5	Reserved	-	Reserved
6	Reserved	-	Reserved
7	VCC_RF	-	for Antenna (3.3V±5%)
8	RXD2	3.3V TTL	UART input
9	TXD2	3.3V TTL	UART output
10	Reserved	-	Reserved
11	Reserved	-	Reserved
12	GND	-	Ground
13	Reserved	-	Reserved
14	GND	-	Ground
15	Reserved	-	Reserved
16	Reserved	-	Reserved
17	Reserved	-	Reserved
18	Reserved	-	Reserved
19	Reserved	-	Reserved
20	Reserved	-	Reserved
21	Reserved	-	Reserved
22	Reserved	-	Reserved
23	Reserved	-	Reserved
24	Reserved	-	Reserved

25	Reserved	-	Reserved
26	RXD3	3.3V TTL	UART input
27	TXD3	3.3V TTL	UART output
28	Reserved	-	Reserved
29	Reserved	-	Reserved
30	Reserved	-	Reserved
31	Reserved	-	Reserved
32	GND	-	Ground
33	VCC	I	power 3.3V±5%
34	VCC	I	power 3.3V±5%
35	Reserved	-	Reserved
36	VBCKP	-	Backup supply voltage power 3.3V±5%
37	GND	-	Ground
38	Reserved	-	Reserved
39	Reserved	-	Reserved
40	Reserved	-	Reserved
41	GND	-	Ground
42	TXD1	3.3V TTL	UART output
43	RXT1	3.3V TTL	UART input
44	Reserved	-	Reserved
45	Reserved	-	Reserved
46	Reserved	-	Reserved
47	Reserved	-	Reserved
48	GND	-	Ground
49	RESET_N	3.3V TTL	RESET_N
50	Reserved	-	Reserved
51	EXTINT	3.3V TTL	External Interrupt Pin

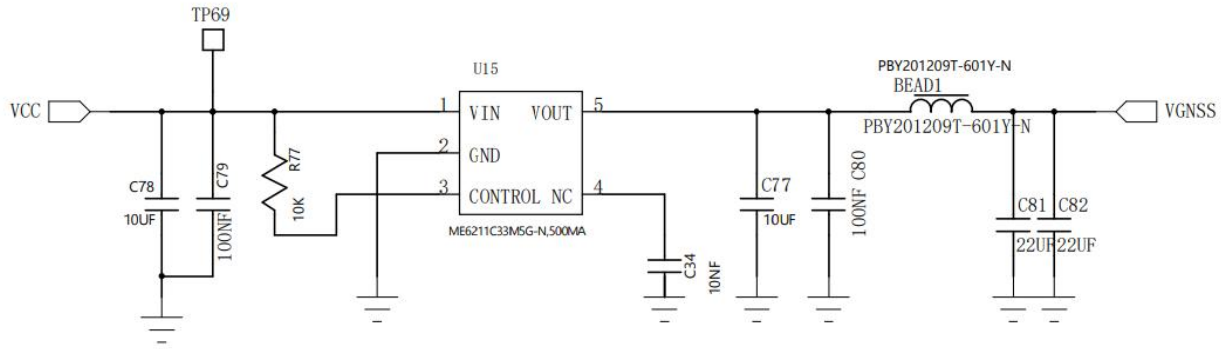
52	Reserved	-	Reserved
53	PPS	3.3V TTL	Time pulse
54	Reserved	-	Reserved

3.3 Power Supply

3.3.1 Operating Characteristics of the module power supply

In the module application design, the power supply design is a very important part. Due to it will have a large current burst pulse in a short time during the operation. In the burst pulse phase, the power supply must be able to provide a high peak current, otherwise it may cause a drop in the supply voltage.

3.3.2 Reduce Power Supply Interference



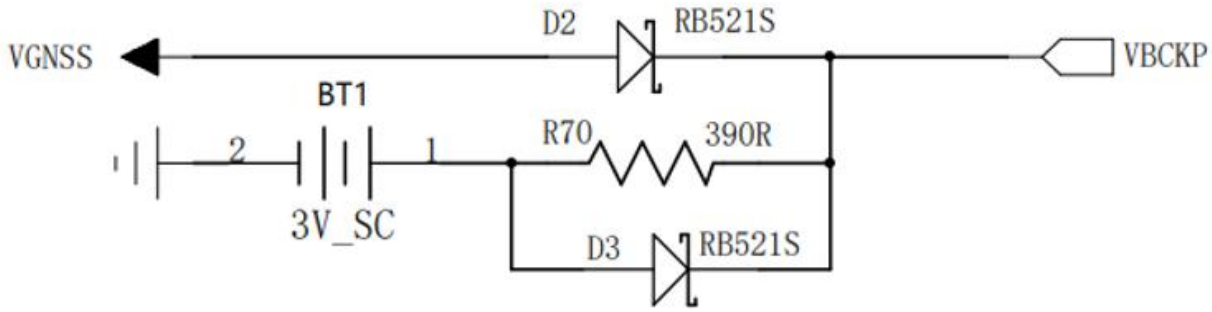
3.4 Backup Power Source VBCKP

3.4.1 Function of backup power supply

The backup power supply provides the module with RTC clock and ephemeris save power. When the module VCC power failure, the lastest positioning ephemeris can be guaranteed to provide hot start data for the repower supply.

3.4.2 Access of Backup Power Supply

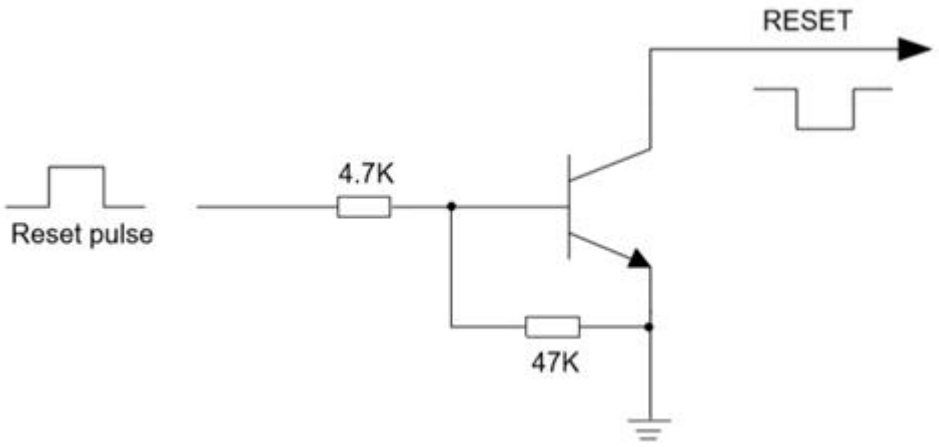
Connect the 2-3.3V DC power supply with continuous power to the pin, or use a rechargeable super capacitor to charge by VCC, see reference design. The the super capacitor should ensure that it can be maintained for more than 2 hours after power failure. The maintenance current of the backup power supply is less than 1 mAh.



3.4.3 Reset

The RESET_N pin can be used to reset the module. Pulling down the RESET_N pin more than 150ms can reset the module. The RESET_N signal is sensitive to interference, so it is recommended that the wiring on the module interface board should be as short as possible and should be wrapped by the ground line. It can also not be used, and it can be unconnected when not in use.

Reference circuit:



3.5 Serial Port

There are three universal asynchronous transceivers on the module: serial UART1, serial UART2, serial UART3.

It can be used for parameter configuration, software writing and data output. Baud rate can provide instruction configuration.

When the serial port is connected to other circuits, it is necessary to pay attention to whether the level matches. If it does not match, it is necessary to add a level switching circuit.

Default level of the CNT936P is 3.3V.

3.6 Status Indication

The CNT936P separately uses two pin signals to indicate the status. The following two tables respectively describe

pin definitions and logic level changes for different network states.

Pin Names	Pin number	Description
GEO_MODE	19	Indicate the positioning status of the module
RTK_STATUS	20	Indicate the RTK status of the module

Position or enter the RTK, the pin will output in high.

3.7 PPS

Output the second pulse. If the module is operating normally, will output the second pulse, frequency 1HZ.

4. RF Interface

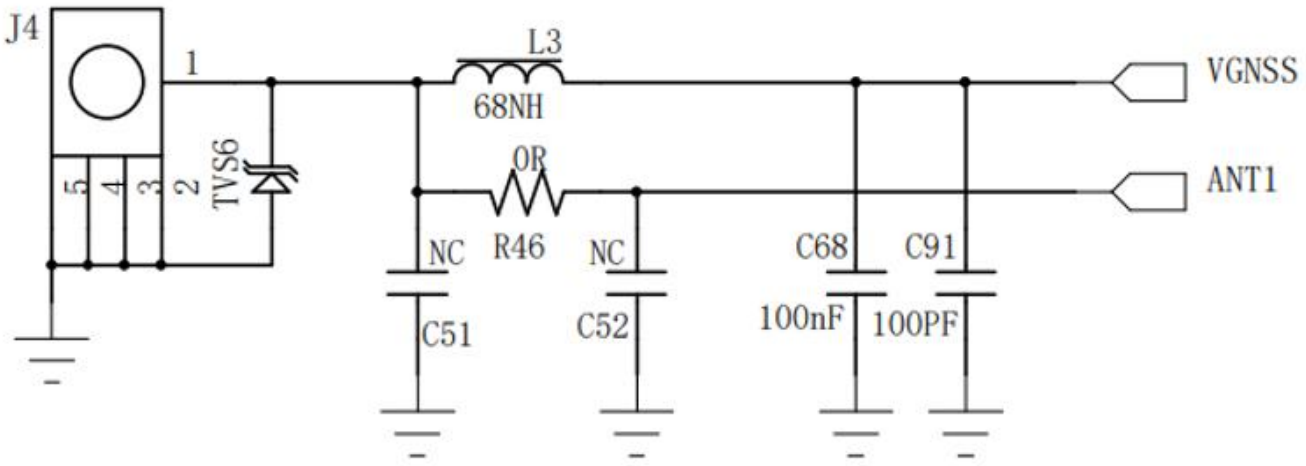
The pins description of the antenna interface as follows:

Pin	Pin No.	Description
RF_IN	2	GNSS antenna interface

4.1 RF Reference Circuit

It's required the RF input,GNSS signal gain of the module to be greater than 40DBM, to ensure effective operation.

Thus, need to use active antenna, and the power supply voltage of the active antenna is 3.3V. There should be DC blocked between the antenna and the module. See the reference design schematic diagram.



4.2 RF Sensitivity

Frequency band	Reception sensitivity
Acquisition sensitivity	-148dbm
Tracking sensitivity	-160dbm

Table 18: RF Sensitivity

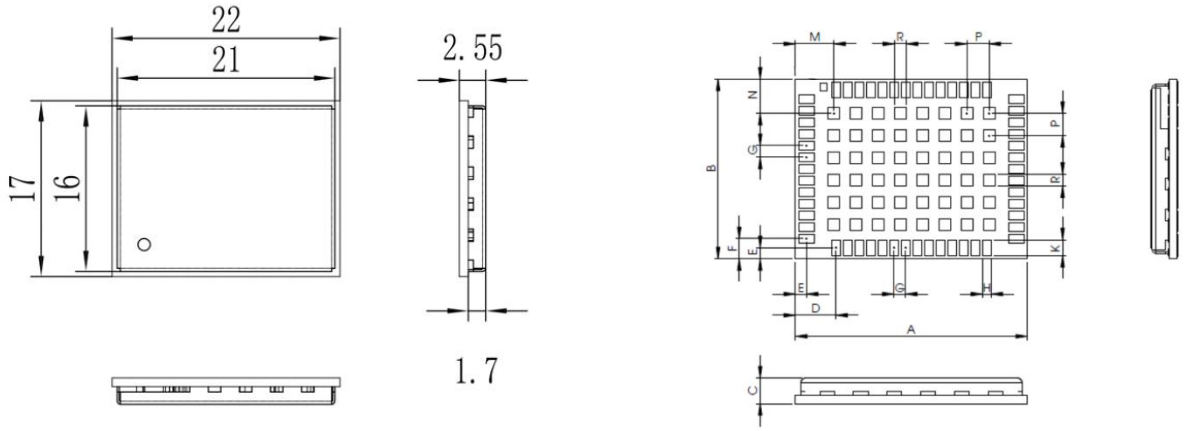
4.3 Electrostatic Protection

When apply the module, due to the static electricity of the human body, electrical friction between microelectronics and other electrostatic, will discharge to the module through various ways. Such discharge will cause some damage to the module, so ESD protection must be paid attention to. Whether in the production assembly, testing, research and development and other processes, especially in the product design, should take

anti-ESD protection measures. Such as add ESD protection in the interface or vulnerable points when do circuit design, wear anti-ESD gloves in production.

The following table shows the ESD withstand voltage state of the key pins.

5. Mechanical Dimensions



Name	Dimensions (mm)	Name	Dimensions (mm)
A	22	H	0.8
B	17	K	1.5
C	2.55	M	3.65
D	3.85	N	3.25
E	1.05	P	2.1
F	1.9	R	1.1
G	1.1		

* The pad in the middle of the module is all grounded and reliably connected to the PCB to ensure good heat dissipation and anti-interference.

6. Storage and Production

6.1 Storage

The module ships in vacuum-sealed bags. Storage of the module is subject to the following:

--- When the environmental temperature is below 40 degrees Celsius and the air humidity is less than 90%, the module can be stored in a vacuum sealed bag for 12 months.

--- When the vacuum seal bag is opened. If the following conditions are met, the module can be reflow soldering or other high temperature process:

- The environmental temperature of the module is below 30 degrees Celsius, the air humidity is less than 60%, and the factory should finish the mounting within 72 hours.
- Less than 10% air humidity

---The modules need to be baked before mounting if:

- When the environmental temperature is 23 degrees Celsius (allowing fluctuations of 5 degrees Celsius up and down), the humidity indicator card indicates that the humidity is greater than 10%
- When the vacuum seal bag is opened, the environmental temperature of the module is lower than 30 degrees Celsius and the air humidity is less than 60%, but the factory fails to finish the patch within 72 hours.
- When the vacuum seal bag is opened, module storage air humidity greater than 10%

If the module needs to be baked, bake for 48 hours at 125 degrees Celsius (fluctuations of 5 degrees up and down are allowed).

Note: The packaging of the module cannot withstand such high temperatures, please remove the packaging of the module before the module is baked. Refer to the IPC/JEDECJ-STD-033 specification if only a short period of baking is required.

6.2 Production Welding

Use the printing scraper to print the solder paste on the screen board, so that the solder paste is leaked onto the PCB through the screen opening. The strength of the printing scraper should be adjusted appropriately. In order to ensure the quality of the module printing paste, the thickness of the steel mesh corresponding to the module welding pad should be 0.2mm.

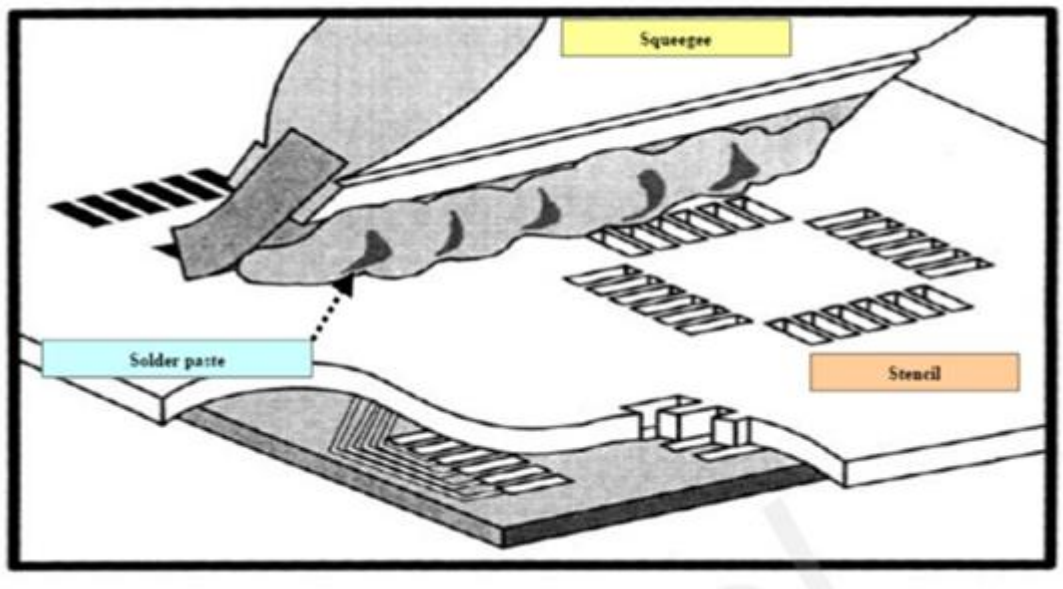
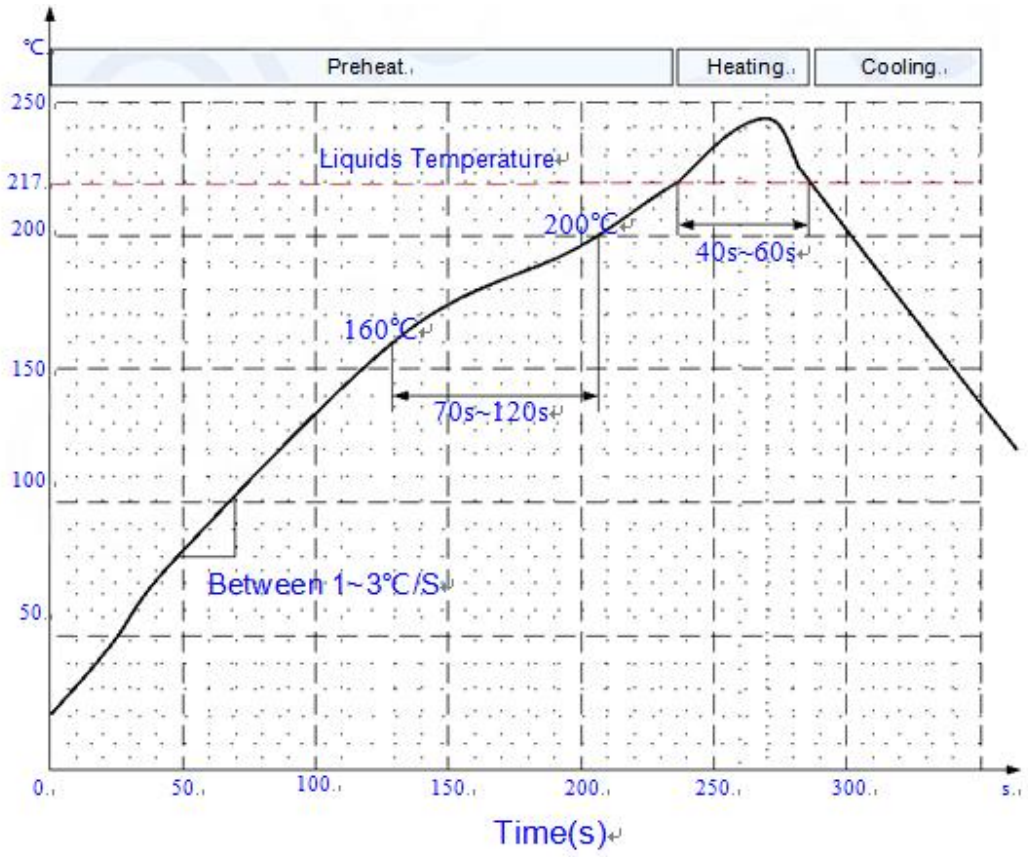


Figure 27: Printing Paste Diagram

In order to avoid repeated heat damage to the module, it is recommended that customers finish reflow soldering on the first side of the PCB board before attaching the module. The recommended furnace temperature curve is shown in the following figure



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