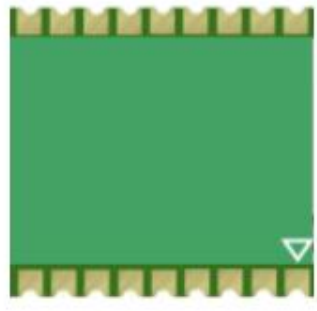
Accurate positioning

22°43'59.57617"N 114°03'03.61546"E

JS-RK10-3

Dual-band High-precision Positioning Module

Data Sheet



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Change revision history

Revised Edition	Date	Modifications and changes	Remark
V1.0	20 26-3-2	First Edition	HJX

1. Product Overview

1.1 Overview

The JS-RK10-3 is a dual-band (L1/L5) GNSS high-precision positioning module characterized by high performance and low power consumption. It employs an advanced hardware and software integrated low-power design, achieving low power consumption without compromising performance. It enables optimized multi-band and multi-mode signal tracking, while featuring an advanced anti-multipath and anti-interference RF front-end, and providing up to eight anti-single-tone interference filters for the L1/L5 bands, significantly improving actual positioning and TTFF performance. The JS-RK10-3 is a new product designed to meet the needs of high-precision positioning applications . It supports multi-constellation joint calculation and maintains centimeter-level positioning stability even in extreme environments such as urban canyons and indoor-outdoor transition zones . It is suitable for applications such as drones, trackers,

handheld devices, PDAs, and car navigation systems.

1.2 Product Features

- Based on high-performance SOC series
- Low power consumption , high performance
- Intelligent interference detection and suppression
- Indoor and outdoor multipath detection and compensation
- Features 200 tracking channels and a dedicated search engine
- Update frequency up to 10Hz
- Supports dual-band across all constellations (L1+L5)
- Supports AGPS and SBAS
- Compact size (10.5mm x 9.7mm x 2.3mm ± 0.3mm), suitable for space-sensitive applications.
- Supports standard NMEA 0183 protocol and RTCM 3.X

1.3 Performance Indicators

category	Specification
Constellation Frequency	■ GPS: L1 L5 ■ BDS: B1I B1C B2I B2B B2A ■ QZSS: L1 L5 ■ GALILEO: E1 E5 ■ GLONASS: G1 ■ IRNSS: L5
Sensitivity	Tracking and navigation - 165dBm Reacquisition -159dBm Hot start -159dBm Cold start -148dBm

First positioning time[1]	Cold start	28s
	AGPS	1.5s
	Warm start	1s
Positioning accuracy[2]	Single point positioning Horizontal: 1.0 m CEP Vertical: 2.0 m CEP RTK level: 1.0 cm + 1 ppm CEP Vertical: 1.5 cm + 1 ppm CEP	
Speed accuracy[3]	0.1 m/s CEP	
Tracking Channels	200	
Application Permission [4]	Dynamic ≤ 4g 20,000m in height Velocity 500m/s	
Baud rate	115200 ~ 921600 bps, (default 115200 bps)	
Maximum update rate	10Hz (default 1Hz)	

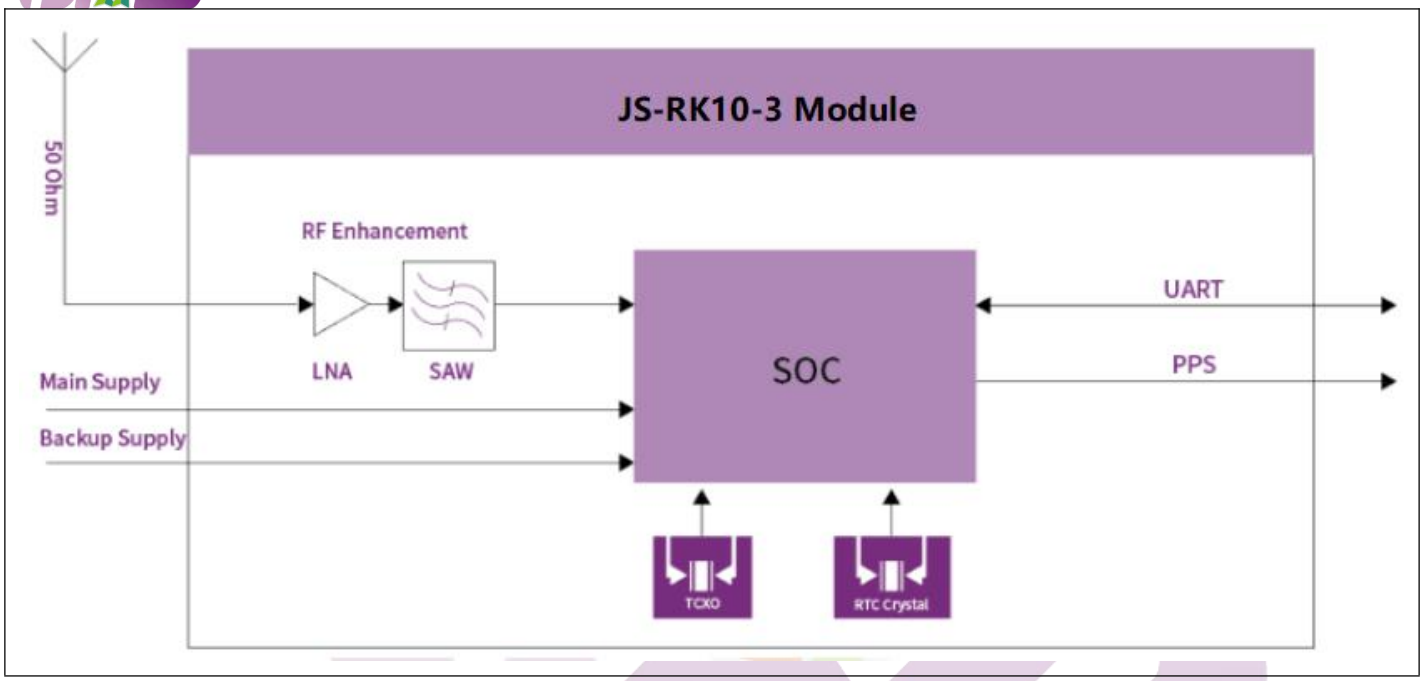
1. All satellites must have a strength of ≥-130dBm ; a minimum of 4 satellites are required for static positioning.

2. Open sky, 24-hour static, ≥-130dBm, >6SVs, CEP 50%

3 50%@30m/s Dynamic Operation

4. Assuming airborne <4 g platform

1.4 Block Diagram



1.5 Protocol

protocol	Type
NMEA 0183	Input/Output, ASCII
RTCM3.X	Input/Output

1. 6 Antennas

Since the JS-RK10-3 positioning module has a built-in LNA and SAW, it is recommended that the antenna gain not exceed 30dB when using an active antenna. The module has built-in active antenna detection and antenna overcurrent protection functions, which can detect the status of the active antenna in normal connection, open circuit, and short circuit, and issue prompt information in the form of NMEA data .

Antenna status	Information output	VCC_RF current
Normal	$POANT, 1 , 803*4E	3.5mA≤VCC_RF<50mA
Open circuit	$POANT, 0 , 803*4 F	0 < VCC_RF ≤ 3.5mA
Short circuit	$POANT, 2 , 803*4 D	VCC_RF≥55mA

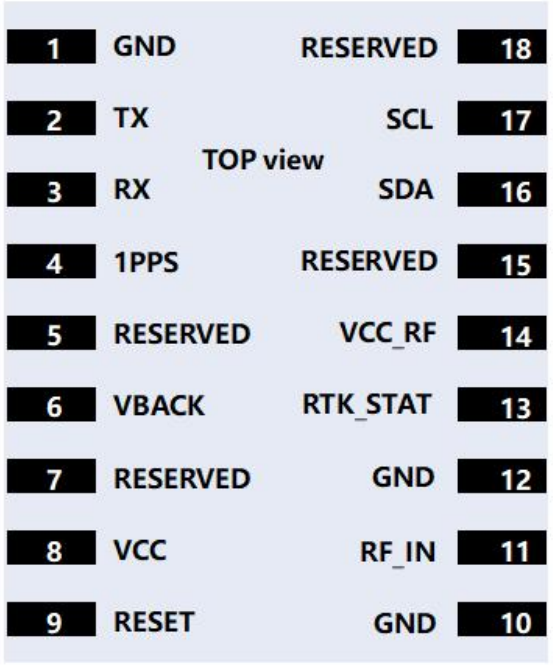
1.7 Product Application

- UAV • Automotive Applications
- AVL and location-based services
- Navigation and fleet management
- Smart wearable devices
- Intelligent logistics scheduling
- Personal protection

• Tablets • Car navigation and tracking • Shared bicycles

2. Pin definition

2.1 Pin Assignment



Pin number	Pin Name	I/O	Description
1,10,12	GND	G	Ground
2	TX	O	TTL output (keep on when not in use)
3	RX	I	TTL input (keep on when not in use)
4	1PPS	O	Time pulse (keep it on if not in use)
5	RESERVED	-	Reserved
6	VBACK	I	Backup voltage power supply
7	RESERVED	-	Reserved
8	VCC	P	main power supply
9	RESET	O	Reset pin (low activation, stays open when not in use)
11	RF_IN	I	GNSS signal input
13	RTK_STAT	-	RTK status indicator
14	VCC_RF	O	RF power output (keep on if not in use)
15	RESERVED	-	Reserved
16	SDA	I/O	Reserved (Please contact us for customization if IIC is required).
17	SCL	I/O	Reserved (Please contact us for customization if IIC is required).

18	RESERVED	I/O	Reserved

3. Electrical Specifications

Parameter	Symbol	Minimum	Typical	Maximum	Unit
Power supply voltage	VCC	1.8	3.3	3.6	V
Average current [1]	I	16@3.3V	20@3.3V	30@3.3V	mA
Backup battery voltage	V_BACK	1.8	3.3	3.6	V
Standby Mode [2]			15uA@3.3V		uA
Digital I/O voltage	Div	1.8		3.6	V
Storage temperature	Tstg	-40		85	°C
Operating temperature	Topr	-40		8 5	°C
Humidity				95	%
Maximum ESD tolerance level	VESD (HBM)		2000		V

1 VCC = 3.3V, room temperature, all pins are floating.

2 V_BACK = 3.3V, room temperature, all pins are floating.

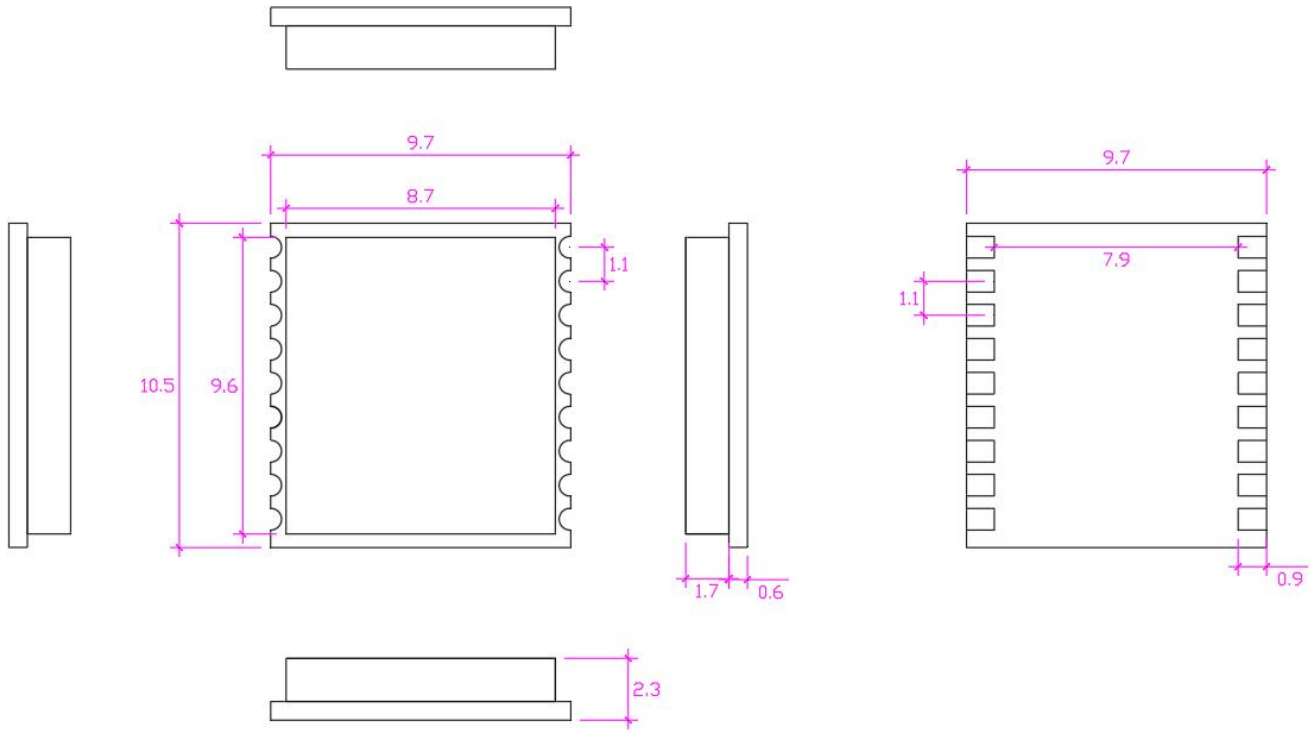
Power supply description

The JS-RK10-3 positioning module has two power supply pins: VDD (main power) and AVDD_BAK (backup power). To ensure the module's positioning performance, the power supply ripple should be controlled as much as possible. It is recommended to use an LDO with an output current greater than 100mA for power supply.

When all power supplies except AVDD_BAK are turned off, the module will enter standby mode, where only a minimal current is needed to maintain the RTC clock and backup RAM. After power is restored, the navigation program can be restored from the backup RAM for a fast warm start. With the backup power supply connected, ephemeris data can still be retained, enabling a warm or warm start upon system power-up. If no backup power supply is connected and the module has not received auxiliary data, the system will perform a cold start upon power-up. If a separate backup power supply is required, ensure that the supply voltage is greater than or equal to the mains voltage.

Note: Backup power can be supplied from the mains power via diodes within the module. If no backup power is available, leave the AVDD_BAK pin floating.

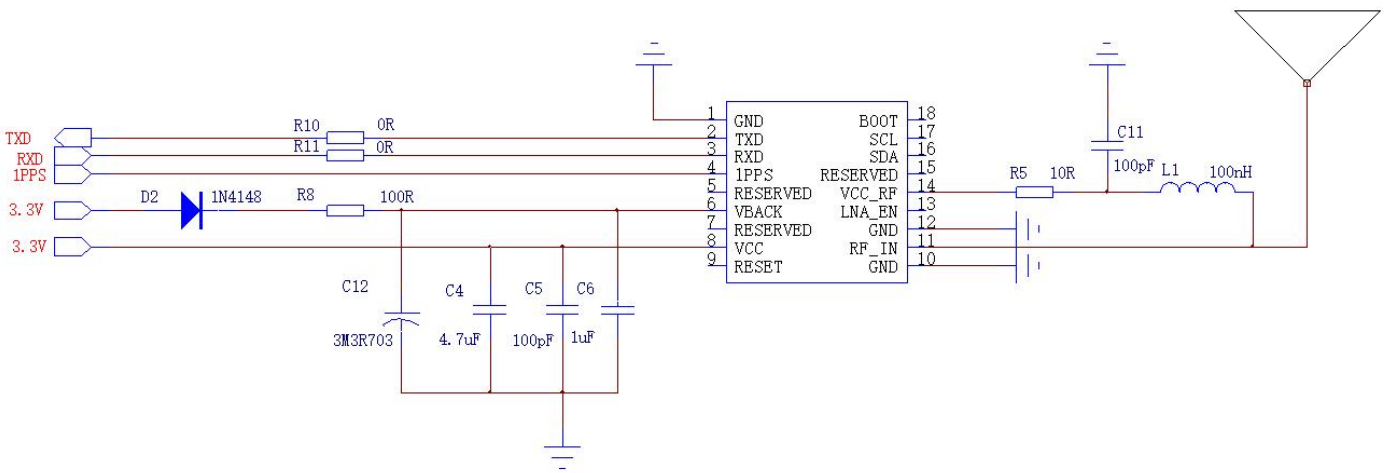
4. Mechanical Specifications



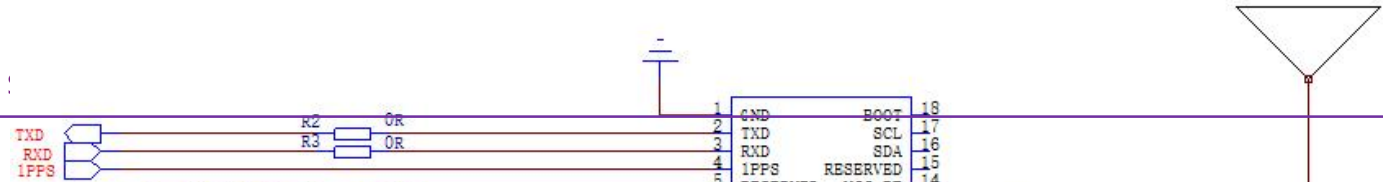
Unit: mm Dimensional tolerance: ±0.3mm

5. Antenna design

5.1 Active Antenna



5.2 Passive Antenna



6. RoHS

This product complies with RoHS standards.

7. Recommended reflux profile

7.1 GNSS module notes prior to SMT

7.1.1 When the customer opens the stencil, they must ensure that the holes are larger than the GNSS module board. Please widen the opening by 0.7 mm at a 1:1 ratio, with a thickness of 0.12 mm.

7.1.2 When necessary, GNSS modules must not be handled with bare hands; gloves and a static ring must be worn.

7.1.3 The furnace temperature depends on the size of the customer's motherboard. The standard temperature for motherboards that are usually mounted on flat panels is 250±5°C, but it can also be 260±5°C.

7.2 The following points should be noted when storing and using GNSS module control:

7.2.1 Shelf life: 12 months. Storage conditions: < 40℃. Relative humidity: < 90%

7.2.2 After opening the bag, the apparatus to be subjected to infrared reflux, gas phase reflux or equivalent treatment must be inspected.

7.2.3 Check the humidity card: Store in an environment with a relative humidity ≤20%. If: 30%~40% (pink) or greater than 40% (red), the label module is hygroscopic.

7.2.4 Installation within 168 hours under factory conditions: t ≤ 30% ℃, relative humidity ≤ 60%

7.2.5 Once opened, the shelf life in the workshop is 168 hours.

7.3 If baking is required, the apparatus may be baked:

7.3.1 The module must be free of moisture.

7.3.2 Baking temperature: 125 ℃, 8 hours.

7.3.3 After baking, place an appropriate amount of desiccant into the sealed packaging.

7.4 The actual quantity of vacuum-packed modules, which is based on the actual packaging quantity required by the customer.

The 7.5 module roll packaging project is as follows.

7.5.1 Shelf life: 12 months. Storage conditions: < 40℃. Relative humidity: < 90%.

7.5.2 After the module is unpacked for 168 hours, it needs to be baked before it can be pushed out of the surface mount to remove the moisture absorption of the module. Baking temperature conditions: 125℃, 8 hours.

7.5.3 The actual quantity of module reel packaging is based on the actual packaging quantity required by the customer.

7.6 The modular pallet packaging project is as follows:

7.6.1 Shelf life: 3 months. Storage conditions: < 40℃. Relative humidity: < 90%

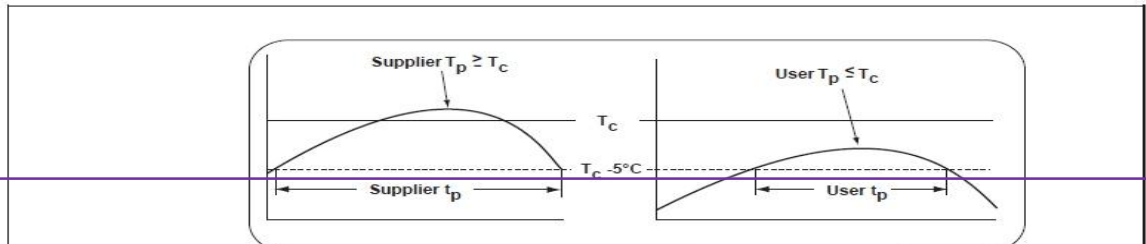
7.6.2 If the module is not used within 48 hours, it needs to be baked before starting. Baking temperature: 125 ℃, 8 hours.

7.6.3 Pallet packaging: 100 pieces per pallet. The actual quantity of modular pallet packaging is based on the actual packaging quantity required by the customer.

7.6.4 Lead-free process - Classification temperature (Ta)

pack thickness	Volume (mm3) <350	Volume (mm3) 350 - 2000	Volume (mm3) >2000
< 1.6mm	260 ℃	260℃	260℃
1.6mm-25mm	260℃	250℃	245℃
> 2.5mm	250℃	245℃	245℃

7.6.5 Temperature curve



Contour features	Lead-free assembly
Preheating/Soaking	150 ℃
Minimum temperature (Tsmin)	200 ℃
Maximum temperature (Tamax)	60-120 seconds
Rate of increase (TL to Tp)	Maximum 3°C/second
Liquid phase temperature (TL)	217 ℃
Peak package temperature (Tp)	It must not exceed Tc (Tc=260℃)
tp) within the specified temperature (Tc) ± 5°C ✦	30* seconds
Rate of descent (Tp to TL)	Maximum 6℃/second
Time from 25°C to peak temperature	Maximum 8 minutes
✦The tolerance for peak temperature (Tp) is defined as the minimum value from the supplier and the	

*The time spent above 255℃ should not exceed 30 seconds.