ROHS，TS16949，ISO9001

R9310

Multi-frequency High Precision RTK Directional Positioning Receiver Manual

Revision History

Ver No.	Version	Date
V.1	New	July, 2022

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Catalogue

1. Product Introduction

1.1 Overview

R9310, full satellites system multi-frequency high precision RTK directional positioning receiver, launched by Shenzhen Simple Technology Electronics Co., LTD, is suitable for vehicle, with characteristics of multi-function, high precision, high reliability, small size, supporting GPS, BDS-2, BDS-3, GLONASS, Galileo, SBAS and QZSS. Mainly be applied for UAV, lawn mower, precision agriculture and intelligent driving test and other fields, support the RTK positioning and dual antenna orientation solution on the chip, can be used as a mobile station or base station.

1.2 Key Index

Channel		1408
Satellites		BDS/GPS/GLONASS/Galileo/QZSS
Signals	Main antenna	GPS: L1C/A, L2C, L2P*,L5
		BDS-2: B1I, B2I, B3I
		BDS-3: B1I, B3I, B2I
		GLONASS: G1, G2
		Galileo: E1, E5a,E5b
		QZSS: L1C/A, L2,L5
	Slave antenna	GPS: L1C/A, L2C, L2P*
		BDS-2: B1I,B2I, B3I
		BDS-3: B1I, B3I, B2I
		GLONASS: G1, G2
		Galileo: E1, E5b
		QZSS: L1C/A, L2C
	Items with * will be altered from the different version	
First positioning Time	Cold start	< 30s (adding acceleration capture module)
	Hot start (using RTC)	< 10s (recommended)
Signal capture	The lost reacquisition	< 1s
	Capture sensitivity	-138dBm
	Pseudo range precision	≤ 10cm

Measurement Precision	Carrier phase precision	≤ 1mm
Accuracy	Timing accuracy	20ns
	Orientation accuracy	0.1 degrees /1m baseline
	Positioning accuracy (single point)	Horizontal :1.5m; Elevation :2.5m
	DGPS	Horizontal 0.4m +1 ppm; Elevation: 0.8 m+1 ppm
	RTK	Horizontal: 0.8cm + 1ppm; Elevation: 1.5 cm+1 ppm
	Speed accuracy	≤ 0.03 m/s (PDOP ≤4)
Data update rate	Positioning direction finding 20 Hz,20 Hz, original observation value	
Data rate	Initialization Reliability	
Environmental requirements	Power supply voltage	+ 5.0V ± 5% DC
Electrical Characteristics	Power Consumption	600mW
Temperature	Operating temperature	-40 ° C ~ +85 ° C
	Storage temperature	-55 ° C ~ +95 ° C
Output data formats	NMEA-0183	1.6W (anti-interference is off) When turned on, power consumption is increased by about 0.2W
	Defined Binary Formats	Self-Defined Binary
	RTCM3.X	1004 ~ 1008, 1012, 1019, 1020, 1033, 1042, 1045/1046, 1230, 4078 MSM3~MSM7: 1073~1077, 1083~1087, 1123~1127, 1093 ~ 1097
Antenna Interface	Impedance matching	50 ohms
	Antenna supply voltage	External power supply: +3.3V ± 5%VDC @ 0-100mA

Requirements for external antennas	Antenna gain, the optimal input gain 30dB	Antenna gain below 20dB or above 36dB, may cause problems such as signal crosstalk.
Power Supply Requirements	Dc voltage 4.5V-5.5V, current greater than 1A	wiring 50 ohm impedance matching
	Customized 12V/24V vehicle power supply system	
Hardware interface	M12 Aviation socket	
Physical parameters	Size	83 mm * 66 mm * 33.3 mm
	Weight	50.0 grams (g)
Data interface		Support USB/RS232/UART-TTL data format, optional * Customizable, dual serial output

2. Electrical Characteristics

2.1 Electrical Maximum

Parameters	Symbols	Minimum value	Recommended value	Maximum value	Units	Conditions
Supply voltage (VCC)	Vcc	4.5	5	5.5	V	
VCC maximum ripple	Vrpp	0		50	mV	
Storage temperature	Tstg	- 45		85	℃	
ESD	VESD(HBM)			2000	V	

2.2 Operating Conditions

Parameters	Symbols	Minimum value	Recommended value	Maximum value	Units	Conditions
Supply voltage (VCC)	Vcc	4.5	5.0	5.5	V	
Peak current	Iccp	500	550	800	mA	Vcc =5.0 V
Operating temperature	Topr	- 40		85	℃	

3. Product Functions

3.1 Full Satellite Model

The R9310 receiver can receive multiple satellite constellation system signals at the same time, including the main satellite system and based augmentation system signals of the wide area and local space, as listed in the table:

	Satellite navigation system	Maintenance country/region
Primary navigation system(GNSS)	GPS	United States
	BDS	China
	GLONASS	Russia
	GALIELO	European Union
Local area navigation System	QZSS	Japan
Star-based wide Area enhancement (SBSA)	WASS	USA
	EGNOS	European Union
	MSAS	Japan
	GAGAN	India

GPS/SBSA/QZSS can be used at the same time, and GPS/BDS is factory configured.

3.2 System Enhancements

The R9310 receiver supports a variety of augmentation AIDS.

3.2.1 Fast Ephemeris Auxiliary Positioning (AGNSS)

R9310 is with AGNSS capability. The user host can send AGNSS information to R9310 to speed up the first positioning time, only valid for auxiliary GNSS ephemeris.

3.3 Free Installation

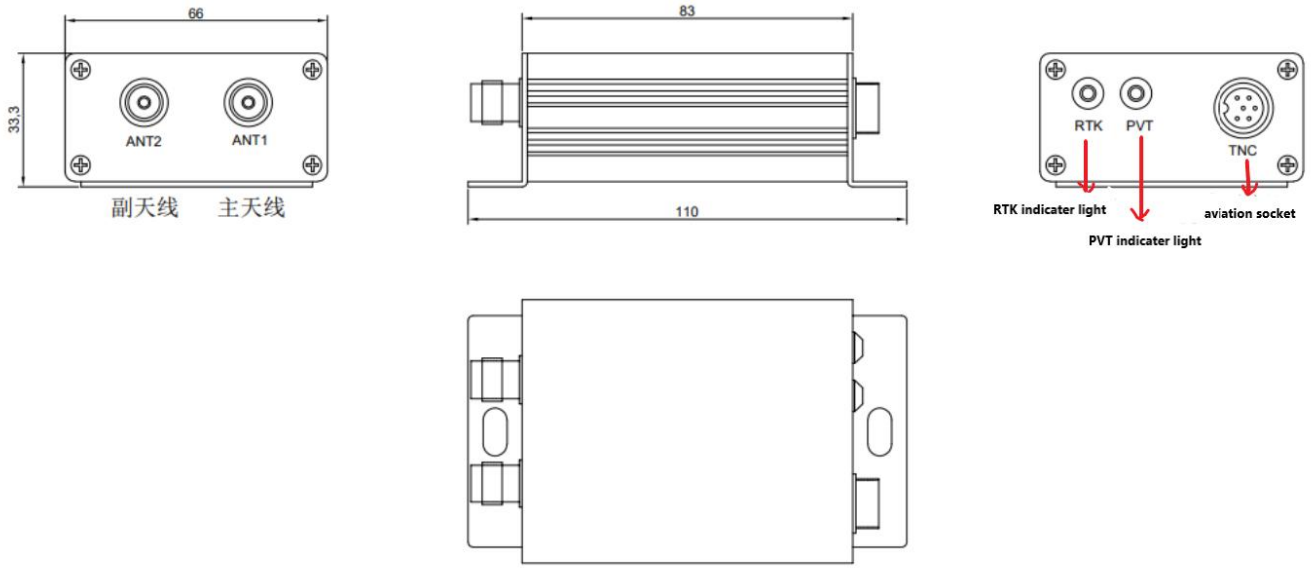
It is recommended to install in a location that does not affect the satellite signal. Make the distance between the main and secondary antennas as large as possible.

3.4 Data Refresh Rate

The R9310 receiver supports the configuration of user input and can achieve a refresh rate of 1Hz_20Hz.

4. Dimensions

Parameters	Minimum value	Recommended value	Maximum value	Units
Housing length		110		millimeter
Housing width	-	66	-	millimeter
Housing height	-	33.3	-	millimeter
Exposed cable length (customizable)		Customizable		meter



ANT1: main antenna interface;

ANT2: secondary antenna interface;

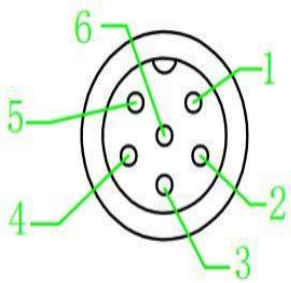
RTK: RTK status indicator light;

PVT: positioning status indicator;

TNC power supply and data output interface, M12.

5. Transmission and Interface

Use RS232 serial port communication of 6P aviation plug interface by default, adopting 8 bit data bit, 0 bit parity check bit, 1 bit stop bit (8-N-1) mode, the default baud rate 115200, which can be modified according to user requirements, any common baud rate (see the figure below).



1, Power supply 5V positive terminal;
2, Negative terminal of power supply/public ground;
3, Serial port 1_TX;
4, Serial port 1RX,
5, USB_DP,
6, USB_DM

PIN	Features	Voltage domain	Remarks
1	Power supply 5V positive terminal	0-5.5 V	
2	Power supply negative/public ground		
3	Serial 1_TX	3.3 V	TTL data
4	Serial 1RX	3.3 V	TTL data
5	USB_DP	3.3 V	
6	USB_DM	3.3 V	

*USB can be optionally configured as RS232,UART-TTL data.

6. Default Configuration

6.1 Interface and Output Settings (CFGPRT)

Parameter	Default Configuration	Description
Baud Rate	115200	
Output protocol indication	F	SIMPLE+RTCM
Output protocol indication	1	NMEA0183

6.2 Message Setup (CFGMSG)

Message Type	Parameter	Default Configuration	Instructions
NMEA message	RMC	1	1Hz Output
	VTG	1	1Hz Output
	GGA	1	1Hz Output
	GSA	1	1Hz Output
	GSV	1	1Hz Output

	GLL	1	1Hz Output
	ZDA	0	Off
	TXT	0	Off
	TXT	1	1Hz Output

6.3 Satellite System Setting (CFGSYS)

Navigation Type	Default configuration	Instructions
NavSys	7	GPS + BDS+GLO

6.4 Navigation System Settings (CFGNAV)

Parameter	Default configuration	Instructions
NavRate	1000	1000ms Positioning frequency
minElev	10	Satellite cutoff Angle 10 degrees

7. Difference Data

The module supports RTD/RTK positioning, and the differential data can be sent to the chip through RTCM3.x protocol. The types of messages supported by the RTCM3.x protocol are as below:

- 1005/1006 (base station coordinates);
- 1074 (GPS observation value, including L1 and L2 frequency points);
- 1084 (GLONASS observation value, including G1 and G2 frequency points);
- 1124 (BDS observation value, including B1 and B2 frequency points).

8.RTCM Original Observation Output

The module supports the original observation output in RTCM3.3 format. The output message types are:

- 1005/1006 (reference station coordinates);
- 1074/1075(GPS observation value);
- 1084/1085 (GLONASS observation value);
- 1124/1125 (BDS observation value);
- 1019(GPS ephemeris data);
- 1020(GLONASS ephemeris data);
- 1042(BDS ephemeris data) output

9. Package and Transportation

9.1 Packaging Dimensions

Outer packing box dimensions；55(W)×36(D)×25(H)cm, 36PCS/box (MOQ).

9.2 ESD requirements

The R9310 is an electrostatic sensitive product. Special attention should be paid to ESD protection when using the metal connector.

Shenzhen Simple Technology Electronics Co., LTD.

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