R9300

Multi Frequency RTK High Precision Positioning Receiver
Manual

Revision History

Ver. NO.	Description	Date
V.1	Initial Establish	April 2021

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Catalogue

1. Descriptions

1.1 Overview

R9300 multi-frequency RTK high-precision positioning receiver, launched and produced by Shenzhen Simple Technology Electronics Co., LTD. is designed with the basis on the company's completely independent intellectual property rights of high-precision navigation and positioning algorithm, supporting all the world's civil navigation and positioning systems -- GPS, BEIDOU, GLONASS, GALILEO, IRNSS, QZSS and satellite enhanced system SBAS(WAAS, EGNOS, GAGAN, MSAS). With the built-in dual-frequency RTK engine, it can achieve centimeter level positioning, and suitable for industrial and consumer fields of navigation and positioning applications. R9300 adopts standard industrial design, adopts waterproof, high temperature resistant housing, ROHS process, is with high sensitivity, anti-interference, high performance and other characteristics.

1.2 Characteristics

◊ enable simultaneous reception of multiple systems and multiple frequency points

◊ support the third generation of Beidou satellites

◊ smart SuppressTM anti-jamming technology

◊ enable AGNSS support for fast positioning [1]

◊ support DGNSS, RTK centimeter level positioning accuracy

◊ make industrial design, waterproof, dustproof, high temperature resistance

1.3 Application

R9300 id mainly used in industries   with high positioning accuracy requirements, such as intelligent transportation vehicles, unmanned driving, precision agriculture agricultural machinery, drones, unmanned boats, automatic lawn mower applications, etc.

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2. Technical indicators

Performance indicators	
	GPS: L1CA,L5
	BDS: B1I, B2A
Signals	Galileo: E1, E5a
	QZSS: L1,L5
Single Point Positioning (RMS)	Horizontal: 1.5m
	Elevation: 2.5m
DGNSS（RMS)	Horizontal: 0.4m
	Elevation: 0.8m
RTK(RMS)	Horizontal: 1cm+1ppm
	Elevation: 2cm+1ppm
Tracking sensitivity	-167dBm
Capture sensitivity	-149dBm
Speed accuracy	0.03 m/s
Differential data	RTCM 3.2/3.3
Data Format	NMEA0183, Extended Protocol (customizable)
Cold Start	30s
Warm Start	2s
Recapture	1s
Initialization reliability	＞99.9%

Data update rate	1, 2, 5Hz (10Hz optional)
PPS timing accuracy	20ns
Physical characteristics	
Temperature	Operating temperature: -40℃ ~ +85℃
	Storage temperature: -45℃ ~ +85℃
Humidity	95% non-condensing
Vibration	GJB 150.16-2009, MIL-STD-810
Impact	GJB 150.18-2009, MIL-STD-810

[1] Test conditions: The number of available satellites is greater than 6, and the signal strength of all satellites is not less than -130dBm

[2] Test conditions: CEP,50%, the number of satellites is greater than 8, 24-hour static positioning, the signal strength of all satellites is not less than -130dBm

[3] Test conditions: 50%@30m/s

3. Electrical Characteristics

3.1 Electrical maximum

Parameters	Symbols	Minimum value	Maximum	Units	Conditions
Supply voltage (VCC)	Vcc	- 0.5	5.5	V	
VCC maximum ripple	Vrpp	0	50	mV	
Storage temperature	Tstg	- 45	85	℃	
ESD	VESD(HBM)		2000	V	All pins

3.2 Operating Conditions

Parameters	Symbols	Minimum value	Typical value	Maximum value	Units	Conditions
Supply voltage (VCC)	Vcc	4.8	5.0	5.5	V	
Peak current	Iccp			100	mA	Vcc = 5.0V
Receiver link noise factor	NFtot		3		dB	
Operating temperature	Topr	- 40		85	℃	

* When the power supply is insufficient, the system data may be unstable, resulting in track deviation.
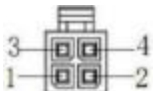
4. Dimensions

Table 2-1 Housing Dimensions

Parameters	Minimum value	Typical value	Maximum value	Units
Housing length		90		millimeter
Housing width	-	90	-	millimeter
Housing height (without 3M adhesive)	-	28	-	millimeter
3M adhesive thickness	-	1.9	-	millimeter
Cable diameter	-	3.0	-	millimeter
Exposed cable length	1.9	2.0	2.1	meter

5. Transmission and Interface

The high-precision series products use analog USB communication by default, and the default interface is TYPE-C standard USB, using 8-bit data bit, 0-bit parity check bit, 1-bit stop bit (8-N-1. The baud rate is 115200 by default, which can be modified to any common baud rate according to user requirements. The external interface adopts the standard universal USB interface, which can be directly connected to the computer, Android mobile

phone and other devices for testing performance experience. If you need other interfaces, you need to customize them. The common interfaces are as below:

USB-A	Standard	USB	5V
Micro USB	Standard	USB	5V
TYPE-C	Standard	USB	5V
MINI USB	Standard	USB	5V
MX3.0		RS-232	5V

UART/TTL Descriptions

1	VCC	P	Power Supply Voltage (Typ. 5.0V)
2	TXD	O	SerialTX Port (GPS to Host)
3	RXD	I	SerialRX Port(Host to GPS)
4	GND	G	Ground

RS232 Descriptions

1	VCC	P	Power Supply Voltage (Typ. 5.0V)
2	RS232-TXD	O	RS232TX Port (GPS to Host)
3	RS232 -RXD	I	RS232RX Port(Host to GPS)
4	GND	G	Ground

6. Default Configurations

6.1 Interface and Output Settings (CFGPRT)

Parameter	Default configuration	Instructions
Baud rate	115200	

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Enter protocol instructions	F	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
	GST	0	Off
	TXT	1	1Hz output

6.3 Satellite System Setup (CFGSYS)

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

6.4 Navigation System Setup (CFGNAV)

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

7. Difference Data

Module support RTD/RTK positioning, differential data can be sent to the chip via RTCM3.x protocol. The messages types supported by the RTCM3.x protocol are:

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

8. RTCM Original Observation Output

The module supports the original observation output in RTCM3.3 format. The message types supported by the output are:
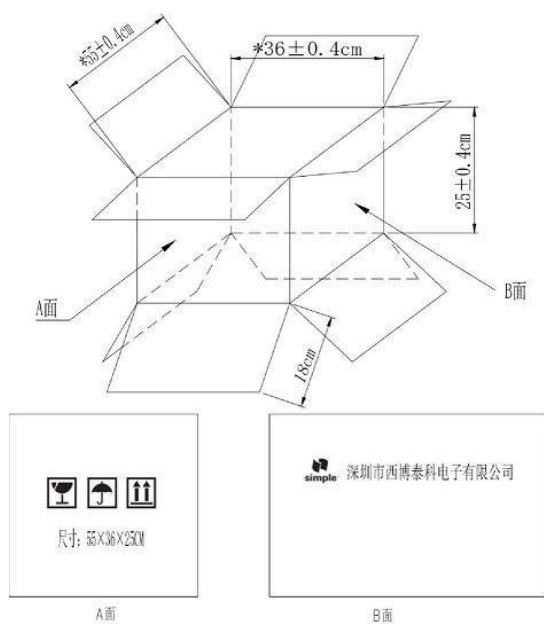
- 1005/1006 (base station coordinates);
- 1074/1075(GPS observations);
- 1084/1085 (GLONASS observations);
- 1124/1125 (BDS observations);

- 1019(GPS ephemeris data);

- 1020(GLONASS ephemeris data);

- 1042(BDS ephemeris data) output

9. Package and Transportation

9.1 Package Dimensions

Outer packing box: 55(W)×36(D)×25(H)cm, with standard MOQ=36PCS per box.

材料	定量/g数
瓦楞纸面纸	175g
瓦楞纸里纸	120g
瓦楞纸A/B瓦楞	120g
瓦楞纸内芯	110g

9.2 ESD Requirements

The R9300 is an electrostatic sensitive product, and special attention should be paid to electrostatic protection when using the metal connector.

ESD CAUTION

10. Ordering information

Model No.	Description	Interface protocol	Interface configuration	Line length	Baud rate
R9300	Multi-frequency RTK high precision positioning receiver	USB	Type-C USB	2m	1 15,200
R9300K	Multi-frequency RTK High precision + inertial navigation positioning receiver	USB	Type-C USB	2m	1 15,200

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