AK992

Dalang Communication Technology Co., Ltd product specification

Product Name:	RTK board
Product model:	AK992
Version number:	V 1.0
Revision Date:	2025.08.08

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1 Product application scenarios

Our company's AK992 module adopts high-performance Septentrio mosaic G5 chip module, which has excellent positioning accuracy and reliability, supports multi frequency and multi constellation GNSS signal reception (including GPS, GLONASS, Galileo, BeiDou, etc.), and can achieve centimeter level real-time dynamic differential positioning (RTK). The board integrates high-sensitivity anti-interference technology, suitable for precise navigation and measurement applications in complex environments. The added aluminum casing not only provides excellent heat dissipation performance and electromagnetic shielding protection, but also enhances mechanical protection capabilities, ensuring stable operation of the equipment in harsh scenarios such as industry, agriculture, drones, and autonomous driving. Its compact design and industrial grade protective features make it an ideal solution in the field of high-precision positioning. Refer to Figure 1 for details.

Figure 1 Product Application Scenarios

2 Function

In this chapter, we will delve into and elaborate on the functions and working principles of AK992, detailing how it plays a key role in different applications, as follows:

1. High precision positioning: Based on the Septentrio mosaic G5 chip, it supports multi frequency and multi constellation GNSS signals (GPS, GLONASS, Galileo, BeiDou, etc.), providing centimeter level RTK positioning accuracy.

2. Strong anti-interference ability: Advanced AIM+anti-interference and anti deception technology is adopted to ensure stable operation in complex electromagnetic environments.

3. Durable and sturdy design: The aluminum alloy casing provides excellent heat dissipation performance, electromagnetic shielding (EMC), and mechanical protection, adapting to harsh industrial environments.

4. High dynamic performance: Supports 20Hz high-frequency GNSS positioning output, combined with IMU to achieve higher frequency position updates, meeting the high dynamic application requirements of unmanned aerial vehicles, autonomous driving, etc.

5. Base station or mobile station configuration: Reflecting extremely high application flexibility, it can adjust the working mode according to different scenario requirements.

6. Differential positioning and vector pose measurement modes: Provides multifunctionality, enabling precise position positioning and directional orientation simultaneously, meeting complex navigation requirements.

7. Compatible with flight control systems such as Pixhawk and APM, demonstrating excellent system integration capabilities that enable seamless integration with existing flight control platforms.

8. Industrial grade low-noise RF circuit: It demonstrates strong signal processing capabilities, effectively suppresses multipath interference, and ensures signal clarity and positioning accuracy.

3 Structural characteristics

In this chapter, we will delve into and analyze the design details of the product, depicting its appearance features through detailed images. This view provides a comprehensive perspec tive for understanding the structure of the product. Refer to Figure 2, Table 1, and Table 2 for details.

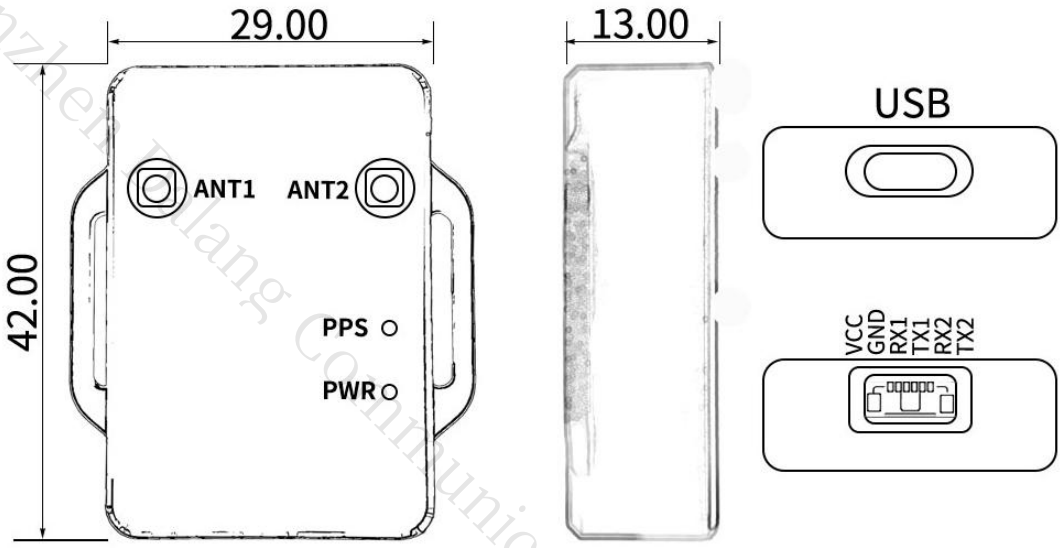


Figure 2 Dimensional drawing (unit: mm）

Table 1 PIN Foot Function

Pin number	signal name	Signal Description
1	VCC	Power input, DC+5V
2	GND	Grounding
3	RX1	Main serial port (COM1) data transmission, output NMEA0183 format positioning results when configured as "mobile station", and output RTCM2. x/3. x format differential data stream when configured as "reference station".
4	TX1	Main serial port (COM1) data reception, configure command input port.
5	RX2	COM2 output interface
6	TX2	COM2 differential serial port (COM2) data input, only valid when configured as "mobile station", accepts RTCM2. x/3. x format differential data input.
7	TYPE-C interface	COM3 output interface

Table 2 Interface Characteristics

NO.	Name	Symbol	Minimum value	Typical values	Maximum value	Unit
1	Main power supply	Vcc	2.7	5.0	5.5	V
2	RF port feeding	VRF	3.0	3.1	3.3	V
3	Input high level	VIH	2.0			V
4	Input low level	VIL			0.7	V
5	Output high level	VOH	3.2			V
6	Input low level	VOL			0.1	V
7	Main serial port baud rate	Baud		115200		bps
8	Differential wave	Baud		115200		bps

4 Specification parameters

In this chapter, we will provide a detailed list and explanation of the product chip characteristics, sensitivity, accuracy, working principle, and other technical details, as shown in Table 3.

Chip characteristics	Chip	mosaic-G5 P3H
	Working mode	GPS: L1C/A, L1C, L2C，L2PY, L5 GLONASS: L1C/A, L2CA, L2P, L3 CDMA BDS: B1I, B1C, B2a, B2I,B2b, B3I Galileo:E1, E5a, E5b, E6 QZSS: L1C/A, L1C/B, L2C, L5,L6[8]
	Receiving channel	789 channels (synchronized tracking across all constellations)
Accuracy	RTK	Horizontal accuracy: 0.6cm+0.5ppm
		Vertical accuracy: 1cm+1ppm
	single-point	Horizontal accuracy: 1.2m
		Vertical accuracy: 1.9m
	DGNSS	Horizontal accuracy: 0.4m
		Vertical accuracy: 0.7m
	GNSS attitude accuracy	When the antenna spacing is 1 meter: heading accuracy is 0.15 °, roll/pitch accuracy is 0.25 °
		When the antenna spacing is 5 meters: heading accuracy is 0.03 °, roll/pitch accuracy is 0.05 °
	time accuracy	PPS resolution: 1.4ns
		Event accuracy:<3 ns
	Speed accuracy (RMS)	0.03m/s
First positioning time TTFF	cold start	＜35s
	hot start	＜10s
	Re capture	<1s
	track	20dB-Hz
	gather	30dB-Hz
	initialization time	7s
Output data	Baud rate	115200bps (default) [Optional: 4800-921600]

	output interface	TTL/USB
	Output Protocol	NMEA 0183, v2.3, v3.03, V4.0
	Data update rate	1-20Hz (default 1Hz)
	Differential data	RTCM3. x (including MSM)
	Carrier phase output	Support, output RAWX statement
	FLASH	built-in
Electrical specifications	working voltage	5V DC
	power consumption	<800mW
Physical parameters	size	42*29*13mm
	weight	24.8g
	casing	aluminium
	connector	TYPE-C/ GH1.25mm 6pin
	Connector	SSMB
Environment	operation temperature	-35℃-80℃
	storage temperature	-40℃-85℃

Table 3 Product Specification Parameters

5 Product physical picture

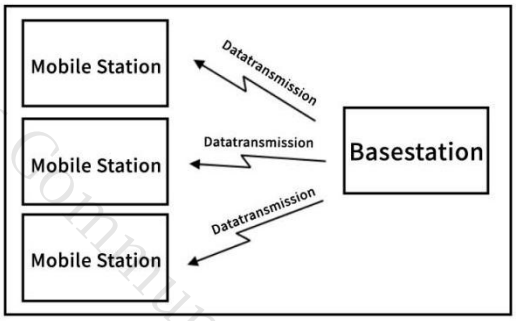
In this chapter, we will present real-life photos of the product, as shown in Figure 3. Through t hese pictures, you can see our products from different angles and details. We believe that thro ugh authentic display, we can better convey the value and philosophy of the product, thereby e nhancing your trust and satisfaction with the product.

Figure 3 Product Physical Picture

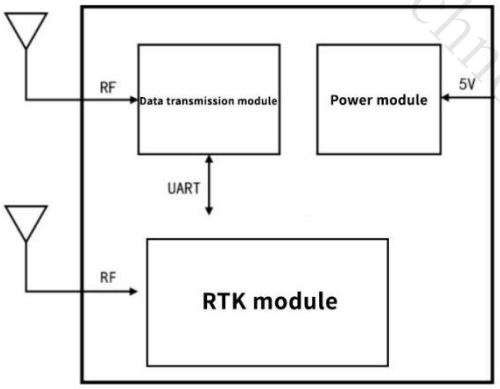
6 Typical Applications

6.1 Application of high-precision positioning for medium and short distances

In high-precision positioning applications for medium to short distances (<3km), the module can be combined with a data transmission module to form a complete high-precision positioning system with only a small amount of external circuits. It is suitable for applications with a large number of mobile stations in a small range, and the module is fully compatible with other automatic flight control systems such as Pixhawk and APM. The schematic diagram is as follows:



The reference station is stationary and fixed, and differential data is broadcasted to all mobile stations through a data transmission module. The circuit diagrams of the mobile station and the reference station are as follows:



3) If the antenna coordinates have been accurately determined through other surveying methods, please use the # set position command to input the antenna coordinates into the reference station module in latitude, longitude, and altitude format;

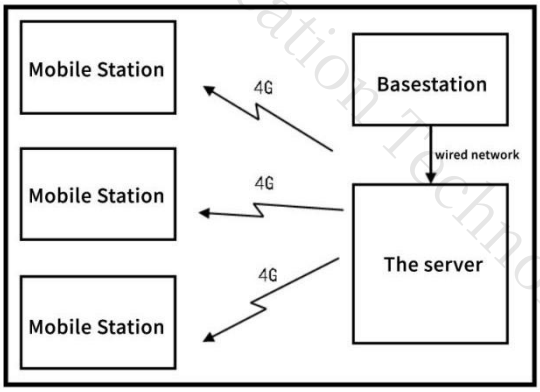
4) If the antenna coordinates are unknown, please wait patiently for about 5 minutes. The module will calculate the antenna position as accurately as possible. After the calculation is c

ompleted, the differential data port will begin to output data. At this point, the base station has already recorded the coordinates and broadcasted them wirelessly to ensure that the base station does not lose power, as the coordinates will be recalculated after a power outage and the repeatability of the mobile station measurement points cannot be guaranteed;

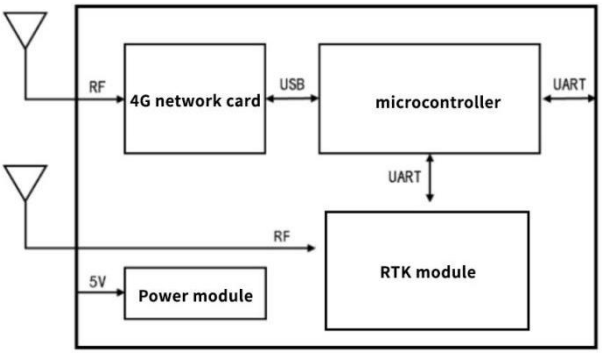
5) Install the mobile station antenna on the mobile carrier, confirm receipt of differential data, and wait for about 120 seconds to obtain high-precision positioning results.

6.2 Application of Medium to Long Range High Precision Positioning

In the application of high-precision positioning over medium to long distances (<10km), common data transmission modules are difficult to provide reliable differential data connections and suffer from serious packet loss problems. For this purpose, the company provides a solution based on 4G network (as shown in the figure below). The benchmark station sends differential data to the server through a wired network and is cached by the server. Mobile stations access servers through 4G networks to obtain differential data. This solution can greatly expand the coverage area of base stations, and mobile stations equipped with 4G network cards can simultaneously transmit positioning results back to designated servers.



The circuit diagram of the mobile station is as follows:



In practical applications, the number of mobile stations that a server can access simultaneously is limited only by server performance and is more suitable for a large number of users. Requirements between the server and the base station: the server can be directly accessed from the public network (with a public IP address), and a network connection can be established between the base station and the server (either through the public network or local area network).

6.3 High precision positioning application without reference station

In high-precision positioning applications without reference stations, the module needs to cooperate with the 4G communication module to obtain differential data. We provide Qianxun with differential data sources nationwide, and users can obtain high-precision positioning results without deploying base stations. The circuit diagram is as follows: