AK717G

Dalang Communication Technology Co., Ltd Product Specification

Product Name:	**GNSS Receiver**
Product Model:	AK717G
Version Number:	V 1.0
Revision Date:	2024.04.15

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Contents

1 Product Application Scenarios

Our company's AK717G is a high-precision signal receiver that integrates the Ublox F9P module, a multi-frequency quadrifilar helix antenna, and the IST8310 compass. This device is specifically designed for various automated platforms such as lightweight drones, unmanned boats, and driverless cars, providing stable and reliable high-precision positioning capabilities. It is widely applied in fields such as aerial photography, remote telemetry, disaster scene monitoring, traffic patrol, public security surveillance, and performance arts. The AK717-IST is capable of receiving multi-band signals, ensuring efficient operation and signal accuracy in various environments, making it an ideal choice for complex tasks and precision operations. Moreover, its high sensitivity and robust anti-interference ability enable it to maintain excellent performance in urban canyons or dense forests. See Figure 1for details.

Figure 1 Product Application Scenarios

2 Features

In this chapter, we will delve into and comprehensively elaborate on the functionalities and operating principles of the AK717G, detailing how it plays a pivotal role in various applications as follows:

1. **Advanced Positioning Core:** The AK717G is built around the advanced U-blox F9P module, which maintains stable and high-precision positioning performance even under extreme environmental conditions, ensuring reliability and accuracy in challenging scenarios.
2. **Multi-System Satellite Support:** The device offers real-time kinematic (RTK) positioning by supporting the four major global satellite navigation systems: BeiDou, GPS, Galileo, and GLONASS. This multi-constellation capability significantly enhances the speed and accuracy of positioning solutions..
3. **High-Frequency Data Output:** With support for data update rates up to 10Hz, the device meets the dynamic data processing requirements of high-speed movements, such as drones conducting flight missions, ensuring the coherence and timeliness of data transmission.
4. **Extensive System Compatibility:** Fully compatible with mainstream automatic flight control systems such as Pixhawk and APM, allowing for easy integration into various unmanned systems without the need for complex system matching adjustments..
5. **Optimized Antenna Design:** The built-in quadrifilar helix antenna optimizes the balance between weight and performance with a lightweight design, providing high gain and high precision output while greatly enhancing anti-interference capabilities in complex environments.
6. **Industrial-Grade RF Circuitry:** Features an industrial-grade low noise RF circuit design, strengthening the suppression of multipath interference to ensure clear and accurate signals in diverse environments.
7. **High-Precision Geomagnetic Compass:** Incorporates an industrial-grade ISentek IST83 10 geomagnetic compass, providing additional directional positioning support to enhance the precision and stability of the overall navigation system, especially in angle and direct ion measurements.

3 Structural Characteristic

In this section, we will conduct an in-depth analysis of the product's design details, presenting its aesthetic features and precise interface specifications through detailed structural diagrams. This perspective aims to provide a comprehensive framework, thereby enhancing the understanding and perception of the product's architecture. Refer to Figure 2, Figure 3,Table 1.

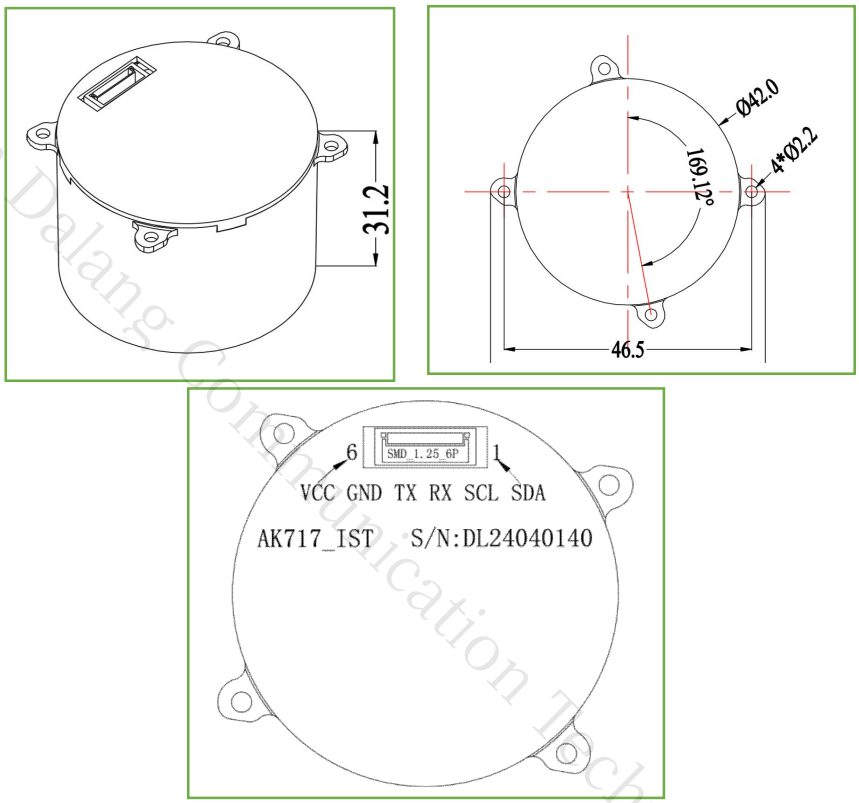


Figure 2 Dimensional Drawing (in millimeters)

Table 1 PIN Function

NO.	Signal Name	Signal Description
1	VCC	Main power supply input, +3.3V to +5V
2	GND	Module ground, this is the negative end of the power supply or the common ground point, used to complete the power circuit.
3	TX	Transmit - This pin is used in serial communication to send data to another device.
4	RX	Receive - This pin is used in serial communication to receive data from another device.
5	SCL	Serial Clock - In the I²C communication protocol, this is the clock signal line used to synchronize data transmission.
6	SDA	Serial Data - In the I²C communication protocol, this is the line used for data transmission.
Note: Typically, VCC and GND are used for power supply, TX and RX are used for serial communication, while SCL and SDA are used for I²C communication. These interfaces allow the receiver to exchange power supply and data with external devices.		

4 Specifications

In this section, we will provide a detailed list and explanation of the product's chip features, sensitivity, accuracy, operating principles, and other technical details, as detailed in Table 2.

Table 2 Product Specifications

Chip characteristics	chip	UBLOX-F9P
	working frequency	BDS: B1 B2 GPS: L1 L2 GLONASS: G1 G2 GALILEO: E1 E5b QZSS: L1 L2
	Receiving channel	184 search channel
Sensitivity	track	-167 dBm
	Re capture	-160 dBm
	cold boot	-148 dBm
	Hot start	-157 dBm
First positioning time TTFF	cold boot	26s
	Hot start	2s
	Re capture	2s
Accuracy	RTK horizontal accuracy	0.01 m + 1 ppm CEP
	RTK vertical accuracy	0.01 m + 1 ppm CEP
	Single point horizontal accuracy	1.5m CEP
	Single point vertical accuracy	1.5m CEP
	Speed accuracy	0.05m/s
	1PPS time accuracy	RMS 30ns
		99% 60ns
Convergence time	Convergence time	≤10s
Output data	Baud rate	38400bps (default) [Optional: 4800-921600]
	Output interface	TTL

	Output Protocol	NMEA0183，RTCM 3.3，UBX
	update frequency	Default 1Hz (0.25Hz-10Hz)
	Carrier phase output	Support, output RAWX statement
	FLASH	built-in
Working conditions	height	＜50,000m
	speed	500m/s
	Gravitational acceleration	⩽4g
Environment	working temperature	-35℃+80℃
	Storage temperature	-40℃-+85℃
Electrical specifications	working voltage	3V-5.5V DC
	power waste	＜180mW @3.3V
Physical parameters	size	Φ42*31.2mm
	weight	13.2g
	Connector	GH1.25mm 6pin
Compass	Compass	IST8310

5 Product Photos

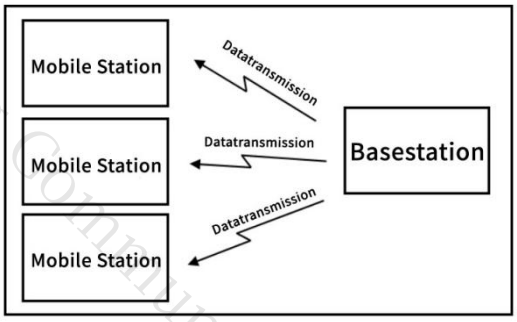
In this chapter, we will showcase real-life images of the product, as shown in Figure 4. These images provide a detailed view of our product from various angles and perspectives. We believe that through authentic representation, we can better convey the value and concept of the product, thereby enhancing your trust and satisfaction.

Figure 4 Product Images

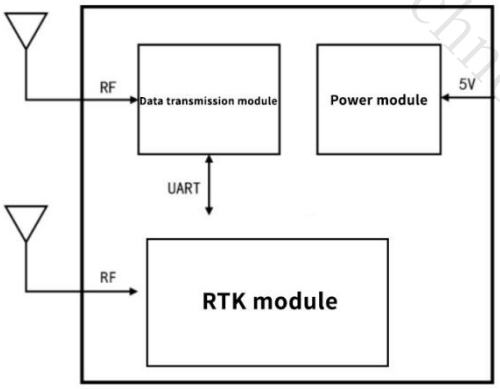
6 Typical Applications

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;

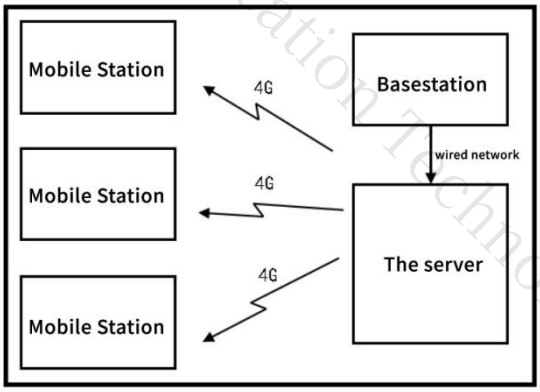
4) If the antenna coordinates are unknown, please wait patiently for about 5 minutes. The module will calculate the antenna position as accurately as possible. After the calculation is c

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;

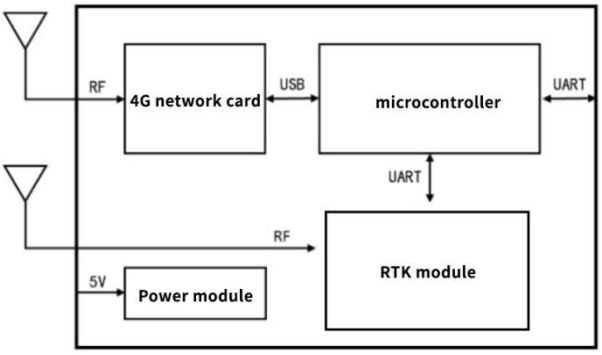
5) Install the mobile station antenna on the mobile carrier, confirm receipt of differential data, and wait for about 120 seconds to obtain high-precision positioning results.

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: