

Dalang

AK979DC





**Dalang Communication
Technology Co., Ltd
Product Specification**

Product Name: GNSS Receiver

Product Model: AK979DC

Version Number: V 1.0

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1 Product Application Scenarios

AK979DC is a 4G RTK positioning terminal device that transmits RTK differential base station data to the positioning module through 4G network to achieve RTK accurate positioning. The terminal supports Ntrip communication protocol and supports network base station services such as Qianxun position, CORS station, and self built station.

The AK979DC adopts industry-leading 4G hardware solutions, supports the network standards of most domestic and European operators, has a built-in full frequency high-precision positioning antenna, a built-in 10400mAh lithium battery pack, and supports RS232 and BT output for RTK positioning data.

It can be widely applied in fields such as smart agriculture, engineering surveying, drone navigation, vehicle monitoring, geological hazard monitoring, etc., providing reliable solutions for outdoor and mobile high-precision positioning needs. Refer to Figure 1 for 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 K979DC, detailing how it plays a pivotal role in various applications as follows:

- 1. Support full constellation multi frequency chip level RTK positioning.**
- 2. Supports BDS, GPS, GLONASS, Galileo, QZSS, and SBAS.**
- 3. The terminal supports Ntrip communication protocol and supports network base station services such as Chihiro location, CORS stations, and self built stations.**
- 4. Can be used as a mobile station.**
- 5. Adopt industrial grade 4G network communication module.**
- 6. Built in high-performance backup battery, supporting continuous and stable operation of the device without external power supply**

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, Table 2, Figure 4, Table 3.



Figure 2 Structural Diagram (unit: mm)

Table 1 Interface Definition

No.	Interface Name	Feature Introduction
1	NC	/
2	NC	/
3	NC	/
4	NC	/
5	RS232-TXD	RTK positioning output RS232-TXD
6	RS232-RXD	RTK positioning output RS232-RXD
7	NC	empty
8	GND	grounding
Charging&4G card interface		
1	Micro USB interface	Charging&Parameter Configuration USB Interface
2	Nano SIM card interface	Self elastic Nano SIM card socket interface



Figure3 Product Structure Diagram

Table 2 Indicator Light Display Definition

NO.	Name	Indicator light display description
1	RTK	Display RTK function and positioning status
2	NET	Display network connection status
3	BT	Display Bluetooth function and connection status, blue light (HC02)
4	25%、50%、75%、100%	Display the remaining battery level



Figure4 Complete K979 schematic diagram

Table 3 Cable Connection Definition

NO.	Name	Function Description
1	Connecting	Cable 8-core aviation connector to Type C; DC-DC power supply; Female DB9
2	Receiver	Built-in GNSS module, radio module, Bluetooth module (HC02),10400mAh lithium battery pack
3	base	M90SD strong magnetic suction cup

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 4.

Table 4 Product Specifications

Signal tracking	Operating Frequency	BDS: B1I, B2I, B3I, BIC, B2a, B2b GPS: L1C/A, L1C, L2P, L2C, L5 GLONASS: L1, L2 Galileo: E1, E5b, E5a, E5, E6C QZSS: L1C/A, L2C, L5 SBAS: L1C/A IRNSS: L5
Positioning specifications	Single point positioning	Level: 2.5m Vertical: 5m
	Differential DGPS	Level: < 0.8mRMS Vertical: < 0.4mRMS
	RTK	Level: 0.8cm+1ppmRMS Vertical: 1.5cm+1ppmRMS
Performance Specifications	RTK initialization time	< 10s
	cold start	50s
	warm start	15s
	recapture	< 1.5s
	Initialization time	< 5s (Typical)
	Initialize reliability	> 99.99%
	time accuracy	20nsRMS
	speed accuracy	0.03m/s RMS
Data format	Differential data	RTCM3.X, RTCM2.X
	output format	NMEA-0183, RTCM3.X
	Data update rate	1Hz, 2Hz, 5Hz, 10Hz, 20Hz
4G module (Network frequency band)	LTE FDD	B1/3/5/8
	LTE TDD	B34/38/39/40/41 (full frequency band)

	GSM/GPRS/EDGE	NA
4G module (Transmission rate)	LTE FDD (Mbps)	10.3(DL)/5.1(UL)
	LTE TDD (Mbps)	9.1(DL)/3.1(UL)
Bluetooth module	Bluetooth version	2.0
	operating frequency band	2.4G
	air rate	2Mbps
	Reference distance	10m
Battery characteristics	Battery charging current	2.1A
	Battery discharge current	2.4A (maximum)
	operating current	≤ 700mA (battery output terminal)
	Built-in battery	3.7V/10400mAh 18650 battery pack (with protective board)
	Charging time	5~6h
	Continuous working hours	15h
physical parameters	size	138mm*23mm*90mm
	weight	780g
	housing material	ABS+PC+UV
Environment	Operating Temperature	-30°C~+70°C
	Storage temperature	-40°C~+85°C

5 Product Photos

In this chapter, we will showcase real-life images of the product, as shown in Figure 5. 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 5 Product Images

6 Status indicator

NET (green) light	Chang Liang	The 4G module is powered on, but PPP dialing is not completed
	flash mob	PPP dial-up completed
	slow flash	Registered RTK NTRIP base station
RTK (blue) light	Chang Liang	Not positioned
	flash mob	Positioned but not entered RTK fixed solution
	slow flash	RTK fixed solution
BT (blue) light	Chang Liang	Bluetooth connected
	flash mob	Bluetooth not connected

Note: Slow flashing: on for 400ms, off for 800ms

Flash: on 200ms, off 200ms

Discharge				
Electricity consumption C (%)	25% light	50% light	75% light	100% light
$C \geq 75\%$	bright	bright	bright	bright
$50\% \leq C \leq 75\%$	bright	bright	bright	extinguish
$25\% \leq C \leq 50\%$	bright	bright	extinguish	extinguish
$3\% \leq C \leq 25\%$	bright	extinguish	extinguish	extinguish
$0\% \leq C \leq 3\%$	1.5Hz flicker	extinguish	extinguish	extinguish
Charge				
be filled with	bright	bright	bright	bright
$C \geq 75\%$	bright	bright	bright	0.5Hz flicker
$50\% \leq C \leq 75\%$	bright	bright	0.5Hz flicker	extinguish
$25\% \leq C \leq 50\%$	bright	0.5Hz flicker	extinguish	extinguish
$C \leq 25\%$	0.5Hz flicker	extinguish	extinguish	extinguish

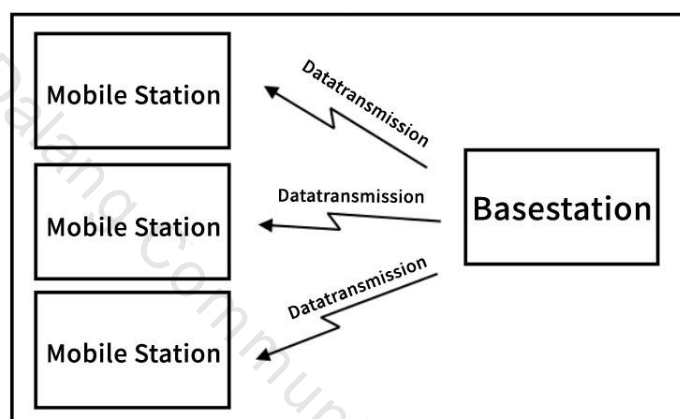
7 Common configuration instructions

NO.	Instruction content	Function Description	Notes
1	VERSIONA	Version query	
2	CONFIG	Query receiver configuration	
3	SAVECONFIG	Save configuration	After configuring the receiver, a save command needs to be sent, otherwise the receiver will return to its factory state after being powered on again
4	CONFIG COM1 115200	Configure COM1 baud rate to 115200	
5	UNLOG	Stop all information output from the current serial port	
6	UNLOG COM1	Stop all output from COM1 serial port	This command can be sent on any serial port
7	UNLOG COM2 GPGGA	Stop COM2 serial port output of GPGGA data	If no serial port number is added, it will be the current serial port
8	GPGGA COM1 1	Output GGA data on COM1 serial port	If COM1 (such as GPGGA 1) is not input, it will be the current serial port. If you want to output other data, such as "GSV", simply change the "GGA" in the instruction to "GSV" (the output information includes DTM, GBS, GGA, GLL, GNS, GRS, GSA, GST, GSV, THS, RMC, ROT, VTG, ZDA)
9	GPGGAH 1	Output satellite positioning GGA data calculated from the antenna from the current serial port	UM982 dual antenna module is only supported
10	freset	Restore factory settings	Note: The factory set baud rate is 115200
11	mode base	Set as reference station	
12	mode rover	Set as mobile station	This instruction can switch the receiver from base station mode to mobile station mode
13	gpgga comx 1	Set 1Hz output GGA message	COMX can be specified as COM1 Either COM2 or COM3
14	gpths comx 1	Output current heading information	COMX can be specified as COM1 Either COM2 or COM4

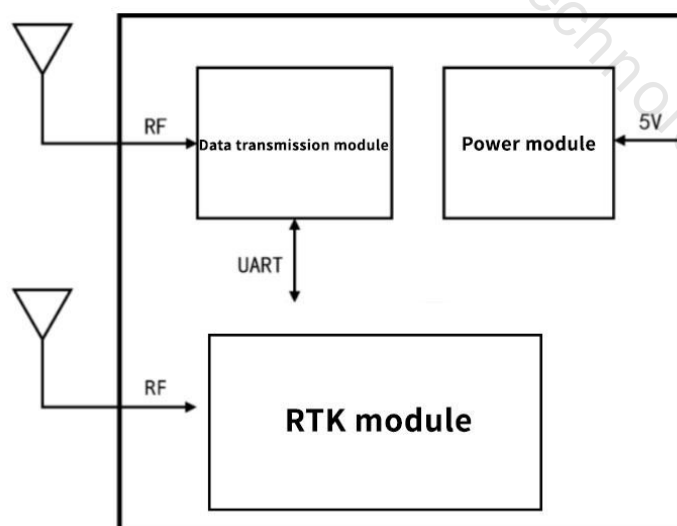
8 Typical applications

Application of high-precision positioning for medium to 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 completed, 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.