



# 司南导航

Product Specification / 产品规范

## M300 and M600 GNSS Receiver

## M300 和 M600 接收机

2019-03-21

## REVISION HISTORY / 修订历史

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## TABLE OF CONTENTS

<b>I. Introduction / 简介 .....</b>	<b>4</b>
<b>II. Specification of M300 and M600 / M300 和 M600 技术规范 .....</b>	<b>4</b>
<b>III. Dimension / 尺寸 .....</b>	<b>8</b>
<b>IV. Physical Interface Definition / 硬件接口定义 .....</b>	<b>11</b>
<b>V. Application Connection Example / 应用连接示例.....</b>	<b>14</b>

### FIGURE & TABLE 图表

Figure 1. M300(K708) Dimension View .....	11
Figure 2. M600(K728) Dimension View .....	11
Figure 3. M300(K708) Front Panel .....	12
Figure 4. M600(K728) Front Panel .....	13
Figure 5. M300(K708) Application Connector .....	14
Figure 6. M600(K728) Application Connector .....	15
Table 1 . M300 and M600 Receiver Specification .....	4
Table 2 . Physical interface Definition of M300(K708) Front Panel .....	12
Table 3 . Physical interface Definition of M600(K728) Front Panel .....	13

## I. INTRODUCTION / 简介

The M300 receiver and M600 receiver adopt the Beidou/GNSS high-precision multi-mode multi-frequency module with independent intellectual property rights of Sinan Navigation. The data communication method adopts radio or network mode and can be used as a base station or mobile station. The receiver supports mainstream communication protocols, supports Ethernet communication, mainstream RS232 interface and dedicated power interface (Lemo) for practical use, and can achieve high-precision RTK positioning coordinates, azimuth and elevation angle (or roll angle) measurement. The orientation function can also be implemented without a differential source.

M300 接收机和 M600 接收机采用司南导航自主知识产权的北斗/GNSS 高精度多模多频模块，数据通信方式采用无线电或网络模式，可以作为基准站或移动站使用。该接收机支持主流通讯协议，支持以太网通讯、主流 RS232 接口和专用电源接口（Lemo）方便实际使用，且单机可实现高精度 RTK 定位坐标、方位角和俯仰角（或横滚角）的测量，无差分源也可实现定向功能。

## II. SPECIFICATION OF M300 AND M600 / M300 和 M600 技术规范

Following table presents the detailed specification of ComNav M300 and M600 GNSS Receiver. Specific technical characteristics are listed with their physical interface and electrical parameters.

下表中为司南 M300 和 M600 的详细规范。同时，还列出了这两种产品的各项技术性能，以及它的物理接口和电气接口参数。

Table 1. M300 and M600 Receiver Specification

M300 AND M600 RECEIVER SPECIFICATION/ M300 和 M600 接收机规范			
GNSS Signals GNSS 信号	M300 (K708)	BDS-2 B1I, B2I, B3I	14 BDS satellites tracked at the same time 可同时跟踪 14 颗 BDS 卫星
		BDS-3 B1C, B2a	
		GPS L1C/A, L1P, L2P, L2C, L5	14 GPS satellites tracked at the same time 可同时跟踪 14 颗 GPS 卫星
		GLONASS L1C, L2C, L1P, L2P	14 GLONASS satellites tracked at the same time 可同时跟踪 14 颗 GLONASS 卫星
		Galileo E1, E5a, E5b	14 GALILEO satellites tracked at the same time 可同时跟踪 14 颗 GALILEO 卫星
		SBAS L1C/A	4 SBAS satellites tracked at the same time 可同时跟踪 4 颗 SBAS 卫星

M300 AND M600 RECEIVER SPECIFICATION/ M300 和 M600 接收机规范			
	M600 (K728)	BDS B1, B2	14 GPS satellites tracked at the same time 可同时跟踪 14 颗 BDS 卫星
		GPS L1, L2	14 BDS satellites tracked at the same time 可同时跟踪 14 颗 GPS 卫星
		GLONASS L1, L2	14 GLONASS satellites tracked at the same time 可同时跟踪 14 颗 GLONASS 卫星
<b>Time to First Fix</b> 首次定位时间	Cold Start 冷启动		< 50s
	Warm Start 温启动		< 30s
	Hot Start (with RTC) 热启动 (使用 RTC)		< 15s
<b>Reacquisition</b> 信号重捕	L1 or B2		< 1.5s (Fast mode) (快速) < 3s (normal mode) (普通)
<b>Measurement Precision</b> 测量准确度	M300 (K708)	Pseudorange Precision 伪距精度	BDS: B1=10cm, B2=10cm, B3=5cm GPS: L1=10cm, L2=10cm, L5=5cm GLONASS: L1=10cm, L2=10cm
		Carrier Phase Precision 载波相位精度	BDS: B1=0.5mm, B2=0.5mm, B3=0.5mm GPS: L1=0.5mm, L2=1.0mm, L5=0.5mm GLONASS: L1=1.0mm, L2=1.0mm
	M600 (K728)	Pseudorange Precision 伪距精度	BDS: B1=10cm, B2=10cm GPS: L1=10cm, L2=10cm GLONASS: L1=10cm, L2=10cm
		Carrier Phase Precision 载波相位精度	BDS: B1=0.5mm, B2=0.5mm GPS: L1=0.5mm, L2=1.0mm GLONASS: L1=1.0mm, L2=1.0mm
<b>Accuracy</b> 精度	Time Accuracy 授时精度		20ns
	SPP Accuracy 标准单点定位精度		single-frequency 单频: H≤3m, V≤5m (1σ, PDOP≤4) dual-frequency 双频: H≤1.5m, V≤3m (1σ, PDOP≤4)

M300 AND M600 RECEIVER SPECIFICATION/ M300 和 M600 接收机规范			
		Static Differential Accuracy (Supported by Compass Solution) 静态差分精度 (软件支持)	H: $\pm(2.5+0.5\times 10^{-6}\times D)$ mm V: $\pm(5+0.5\times 10^{-6}\times D)$ mm
Attitude Accuracy 测姿精度	M600 (K728)	Azimuth Accuracy (dual-board) 方位角精度	$(0.2/R)^\circ$ , R is baseline length in meter. R 为基线距离, 单位为米
		Roll or Pitch Accuracy (dual-board) 横滚或俯仰角	$(0.4/R)^\circ$ , R is baseline length in meter. R 为基线距离, 单位为米
RTD Performance RTD 性能	M300 (K708)	Pseudorange Differential Accuracy (1 $\sigma$ ) 伪距差分精度(1 $\sigma$ )	H: $\pm 0.3$ m V: $\pm 0.5$ m
RTK	M300 (K708)	RTK Initiation time RTK 初始化时间	< 10s (baseline<20km, 基线长小于 20km)
		Initiation Reliability 初始化置信度	> 99.9%
		RTK Accuracy RTK 精度	H: $\pm(8+10^{-6}\times D)$ mm V: $\pm(15+10^{-6}\times D)$ mm
		E-RTK Initiation Time E-RTK 初始化时间	1s
	M600 (K728)	E-RTK Accuracy E-RTK 精度	H: $\pm(200+10^{-6}\times D)$ mm V: $\pm(400+10^{-6}\times D)$ mm
		RTK Initiation time RTK 初始化时间	< 10s (baseline<10km, 基线长小于 10km)
		Initiation Reliability 初始化置信度	> 99.9%
		RTK Accuracy RTK 精度	H: $\pm(8+10^{-6}\times D)$ mm V: $\pm(15+10^{-6}\times D)$ mm
Data Rates 数据速率	Measurements & Position 测量&定位	1Hz, 2Hz, 5Hz, 10Hz, 20Hz, 50Hz (可选配)	

M300 AND M600 RECEIVER SPECIFICATION/ M300 和 M600 接收机规范			
Electrical 电气特性	Voltage 供电电压		10.5V~28VDC
	M300 (K708)	Power Consumption (no antenna connected) 功耗(未接天线)	2.5W
	M600 (K728)		3W
Environmental 环境要求	Operating Temperature 工作温度		-40°C — +70°C
	Storage Temperature 储存温度		-55°C — +95°C
Data Formats 输出数据格式	NMEA-0183		GPGGA, GPGGARTK, GPGSV, GPGLL, GPGSA, GPGST, GPHDT, GPRMC, GPVTG, GPZDA etc.
	BINEX		0x00, 0x01-01, 0x01-02, 0x01-05, 0x7d-00, 0x7e-00, 0x7f-05
	ComNav Binary 司南二进制格式		ComNav Self-Defined 司南自定义
	CMR (GPS)		CMROBS, CMRREF
	RTCM2.X		RTCM1, RTCM3, RTCM9, RTCM1819, RTCM31, RTCM59
	M300 (K708)	RTCM3.0	1002, 1003, 1004, 1005, 1006, 1007, 1008, 1010, 1011, 1012, 1019, 1020, 1104, 1033
	M600 (K728)		1004,1005,1006,1007,1008,1011,1012,1104,1033
M300 (K708)	RTCM3.2 (MSM4)	1074,1084,1124	
M600 (K728)	RTCM3.2 (MSM4&MSM5)	1074,1084,1124,1075,1085,1125	
Antenna Interface 天线接口	M300 (K708)	TNC	1 GNSS antenna RF interface 1 个 GNSS 天线射频接口
	M600 (K728)		2 GNSS antenna RF interface 2 个 GNSS 天线射频接口

M300 AND M600 RECEIVER SPECIFICATION/ M300 和 M600 接收机规范		
<b>Communication Mode &amp; Interface</b> 通讯模式及接口	Option 1: Radio communication & UART 可选项 1: 电台传输和串行异步通信 Parameters of internal radioreceiver module(U30) are defined Table 2 内置电台模块 (U30) 的参数参见 Table 2	1 UHF antenna interface (50ΩTNC male) and 2 RS232(Lemo) interface 1 个 UHF 天线接口 (50ΩTNC 公头) 和 2 个 RS232(Lemo)接口
	Option 2: Network communication & UART 可选项 2: 网络传输和串行异步通信	1 LAN interface and 2 RS232(Lemo) interface 1 个 LAN 接口和 2 个 RS232(Lemo)接口
<b>Power supply Interface</b> 电源接口	M300 M600	External power (Lemo) interface 外置电源(Lemo)接口
<b>Communication Protocol</b> 通讯协议	M300 M600	Support RS232 and TCP/IP 支持 RS232 串口和 TCP/IP 通讯协议
<b>Physical</b> 物理参数	Size 尺寸	209mm×145mm×78mm with connectors (含接头)
	Weight 重量	About 1.2 Kg 约 1.2 Kg

Table 2. Radio Receiver Module (U30)Specification

RADIO RECEIVER MODULE SPECIFICATION/ 电台接收模块规范		
<b>Electrical</b> 电气特性	Voltage 供电电压	+3.3~+3.6VDC
	Power consumption 功耗	0.3W



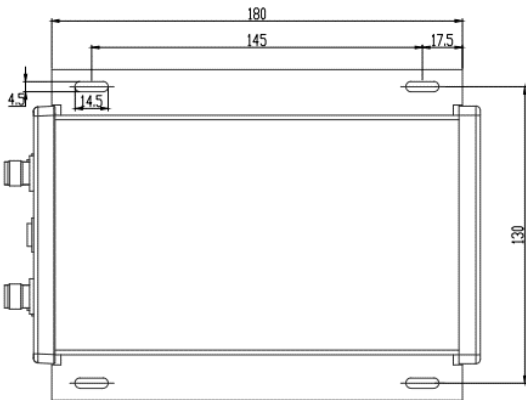
RADIO RECEIVER MODULE SPECIFICATION/ 电台接收模块规范		
<b>Modulation</b> 调制方式	GMSK	
<b>Communication Protocol</b> 通讯协议	Support transparent transmission protocol, TT450S and MAC 支持透明传输协议、TT450S 协议和 MAC 协议	
<b>Air Baud</b> 空中波特率	9600bps or 19200bps 9600bps 或者 19200bps	
<b>Correction</b> 纠错	FEC forward error correction, hamming code FEC 前向纠错, 海明码	
<b>Channel characteristics</b> 信道特性	Channel spacing 信道间隔	25kHz Stepping 25kHz 步进
	Frequency stability 频率稳定度	$\pm 1.5\text{ppm}(-40^{\circ}\text{C} - +85^{\circ}\text{C})$
	Working frequency 工作频段	410~430MHz or 450~470MHz 410~430MHz 或者 450~470MHz
<b>Receiving indicators</b> 收信指标	Sensitivity 灵敏度	-115dBm@BER $10^{-5}$
	Spurious and image rejection 杂散及镜像抑制	$\geq 70\text{dB}$
	Intermodulation suppression 互调抑制	$\geq 70\text{dB}$
	Adjacent channel rejection 邻道抑制	$\geq 65\text{dB}$
	Mode 工作模式	Reception/Transmit mode 接收/发射模式
<b>Hardware Interface</b> 硬件接口	Antenna Interface 天线接口	MCX female(MCX 母头)(50 $\Omega$ )
	2 $\times$ 7 pin male connector (14 针公头) pin pitch 2mm (针脚间距 2mm)	
<b>Environmental</b> 环境要求	Operating Temperature 工作温度	-40 $^{\circ}\text{C} - +85^{\circ}\text{C}$

RADIO RECEIVER MODULE SPECIFICATION/ 电台接收模块规范		
	Storage Temperature 储存温度	-50°C— +90°C
Physical 物理参数	Size 尺寸	71.1mm×45.7mm×11.6mm with connectors (含接头)
	Weight 重量	19g

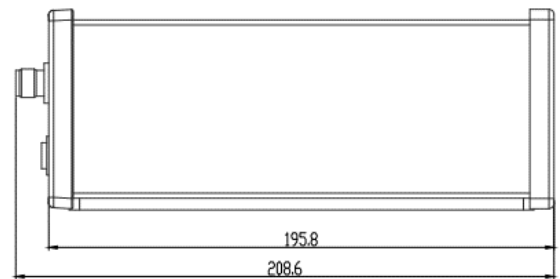
### III. DIMENSION / 尺寸

In this section, three-side views and the dimension of M300 and M600 are provided for customers' further hardware design and installation.

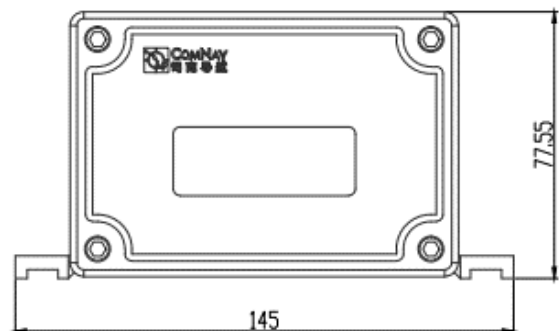
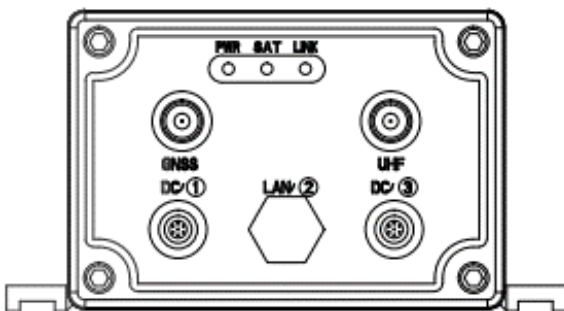
本节提供了 M300 和 M600 的前面板、后面板及整机的视图和对应的物理尺寸，便于用户的进一步系统硬件设计和安装。



Top View/顶视图



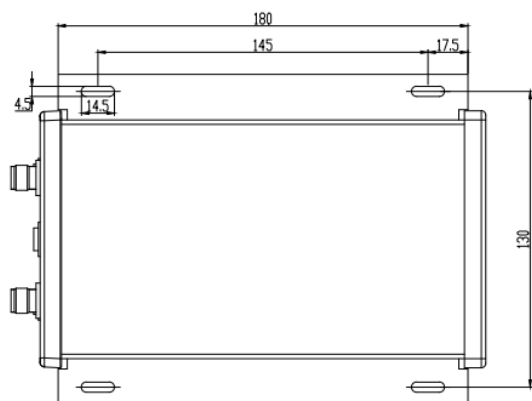
SideView/侧视图



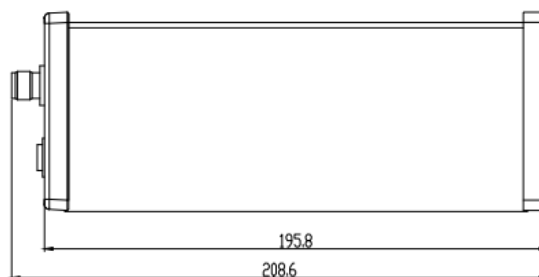
## Front and Rear Panels/前、后面板

Figure 1. M300(K708) Dimension View

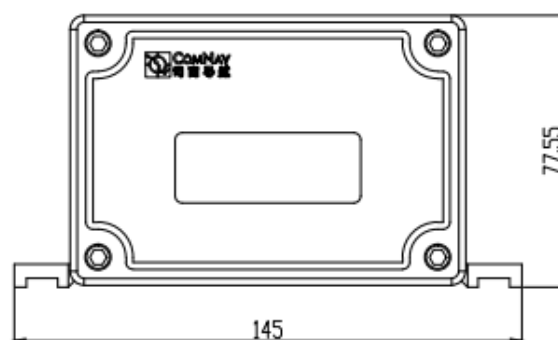
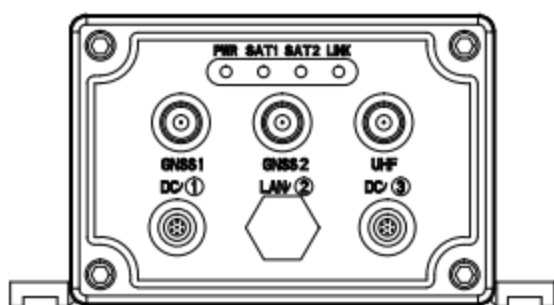
图 1. M300(K708)三视图



Top View/顶视图



SideView/侧视图



## Front and Rear Panels/前、后面板

Figure 2. M600(K728) Dimension View

图 2. M600(K728)三视图

## IV. PHYSICAL INTERFACE DEFINITION / 硬件接口定义

Physical Interface definitions of M300 and M600 are listed in following tables and figures.

本部分的各图表详细定义了 M300 和 M600 的硬件接口。

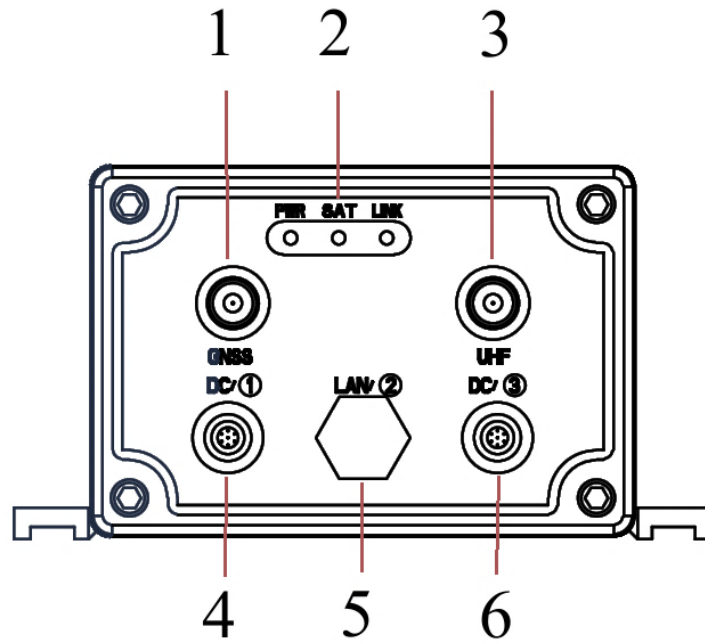


Figure 3. M300(K708) Front Panel

图 3. M300(K708)前面板

Table 2. Physical interface Definition of M300(K708) Front Panel

NO	NAME	TYPE	DESCRIPTION	
1	GNSS	Input	Antenna connector	天线接口
2	LED	Output	Status LED indicator	状态指示灯
3	UHF	Input	Radio Antenna connector	电台天线接口
4	DC/①	PWR I/O	System power supply Configure the instrument and output data	系统供电电源 配置仪器、输出数据
5	LAN/②	Input	Ethernet Interface(Reserved)	以太网接口（预留）
6	DC/③	PWR I/O	System power supply Configure the instrument and output data	系统供电电源 配置仪器、输出数据

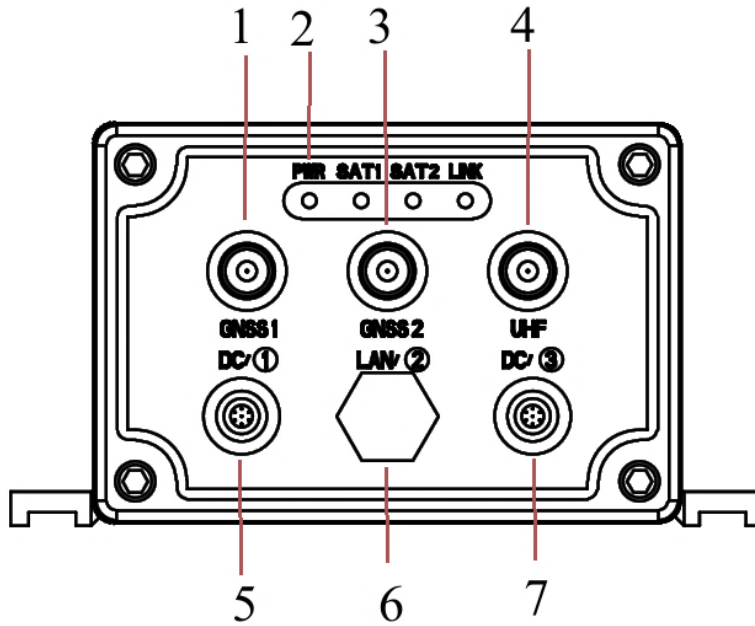


Figure 4. M600(K728) Front Panel

图 4. M600(K728)前面板

Table 3. Physical interface Definition of M600(K728) Front Panel

NO	NAME	TYPE	DESCRIPTION	
1	GNSS 1	Input	Antenna connector 1	天线接口 1
2	LED	Output	Status LED indicator	状态指示灯
1	GNSS 2	Input	Antenna connector 2	天线接口 2
3	UHF	Input	Radio Antenna connector	电台天线接口
4	DC/①	PWR I/O	System power supply Configure the instrument and output data	系统供电电源 配置仪器、输出数据
5	LAN/②	Input	Ethernet Interface(Reserved)	以太网接口（预留）
6	DC/③	PWR I/O	System power supply Configure the instrument and output data	系统复位信号 配置仪器、输出数据

## V. APPLICATION CONNECTION EXAMPLE / 应用连接示例

In this section, two application connection examples of M300 Receiver (K708) and M600 Receiver (K728) are presented in following diagrams. Per the instruction of these diagrams, you could easily build communication connections between receivers and other terminals such as PC, GNSS antenna or radio antenna, and so on.

本部分提供了 M300 接收机(K708)和 M600 接收机(K728)的应用连接示例。参照下面的图示，您可以很快速建立接收机和其他终端（如 PC, GNSS 天线和电台天线等）之间的通讯连接。

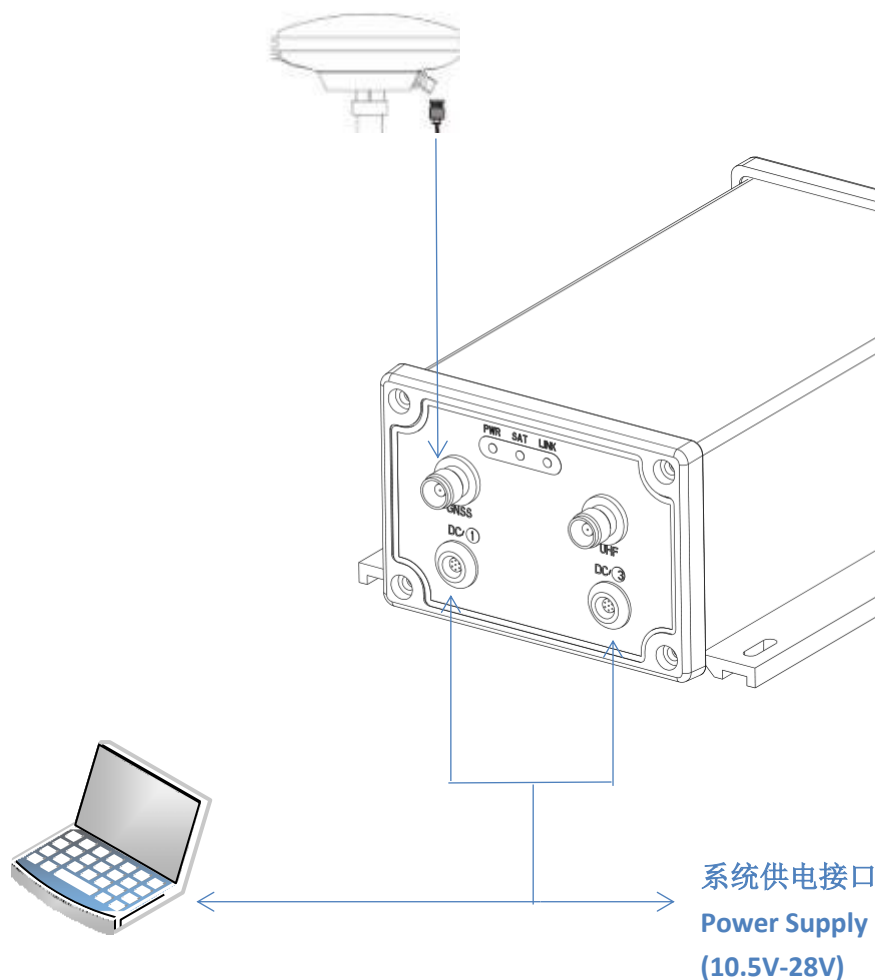


Figure 5. M300(K708) Application Connector

图 5. M300(K708)应用连接

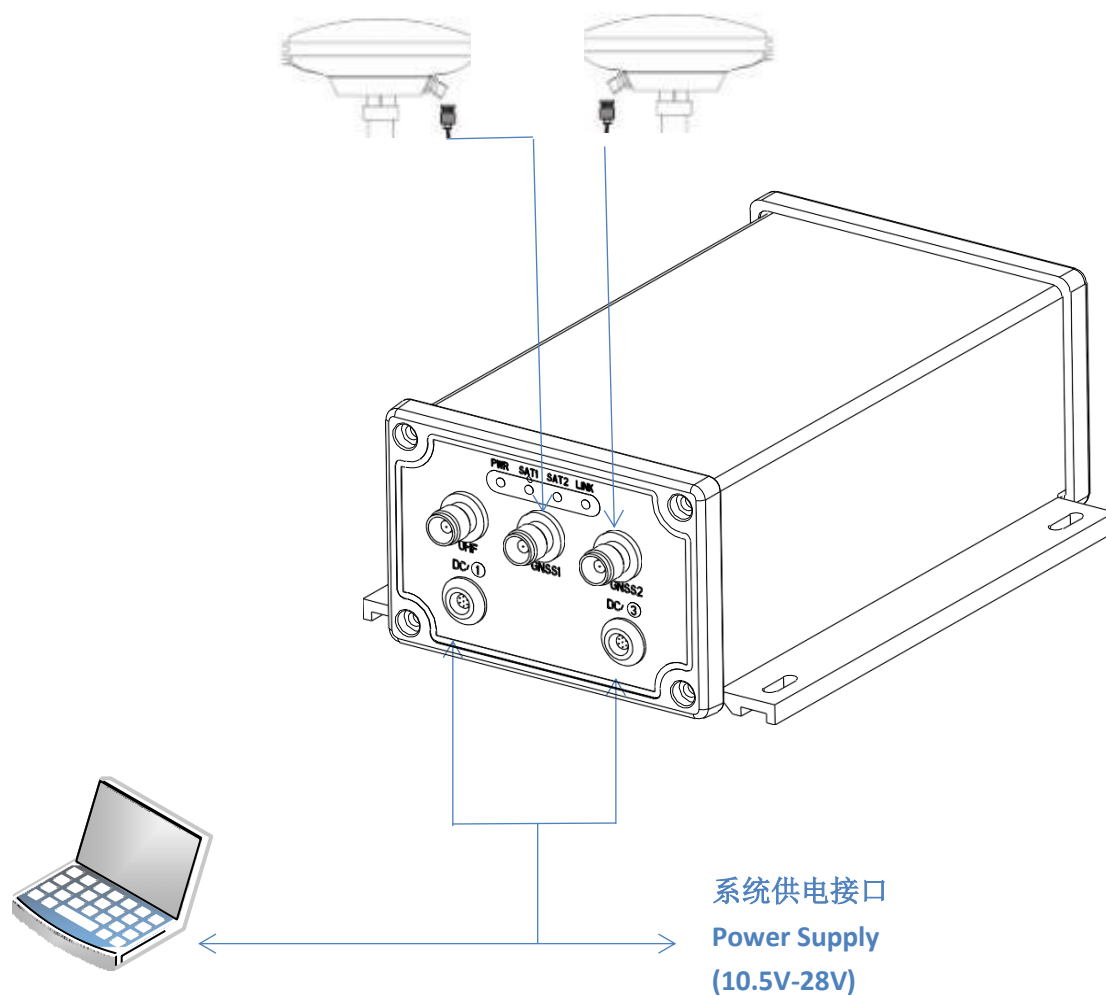


Figure 6. M600(K728) Application Connector

图 6. M600(K728)应用连接

