



Product Specification / 产品规范

M300 Mini and M600 Mini GNSS Receiver

M300 Mini 和 M600 Mini 接收机

2019-03-21

REVISION HISTORY / 修订历史

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I. INTRODUCTION / 简介

M300 Mini receiver and M600 Mini receiver are based on the original volume of the receiver on a smaller upgrade developed multi - band multi - mode receiver. Split structure using highly flexible design, based on ComNav high - precision multi - mode multi - band proprietary, built - in wireless radio module can be used for rover operations. The receiver supports major protocols, support for Ethernet communications, mainstream DB9 interface and a dedicated power supply interface to facilitate practical use, and can achieve single - precision RTK positioning coordinates, azimuth and elevation (or roll angle) measurements, no difference source orientation function can be achieved.

M300 Mini 接收机和 M600 Mini 接收机是在原有产品基础上升级开发的体积更小的多频多模接收机。结构采用高度灵活的分体式设计，采用司南导航自主知识产权的北斗高精度多模多频模块，内置无线电台模块可用于流动站作业。该接收机支持主流通讯协议，支持以太网通讯、主流 DB9 接口和专用电源接口方便实际使用，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 MINI AND M600 MINI /M300 MINI 和 M600 MINI 技术规范

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

下表中为司南 M300 Mini 和 M600 Mini 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 Mini and M600 Mini Receiver Specification

M300 MINI AND M600 MINI RECEIVER SPECIFICATION/ M300 MINI 和 M600 MINI 接收机规范			
GNSS Signals GNSS 信号	M300 Mini (K708)	BDS-2 B1I, B2I, B3I	14 BDS satellites tracked at the same time
		BDS-3 B1C, B2a	可同时跟踪 14 颗 BDS 卫星
		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

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M300 MINI AND M600 MINI RECEIVER SPECIFICATION/ M300 MINI 和 M600 MINI 接收机规范			
		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
	M600 Mini (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
	Time to First Fix 首次定位时间	Cold Start 冷启动	
Warm Start 温启动		< 30s	
Hot Start (with RTC) 热启动 (使用 RTC)		< 15s	
Reacquisition 信号重捕	L1 or B2		< 1.5s (Fast mode) (快速) <3s (normal mode) (普通)
Measurement Precision 测量准确度	M300 Mini (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 Mini (K728)	Pseudorange Precision 伪距精度	BDS: B1=10cm, B2=10cm GPS: L1=10cm, L2=10cm GLONASS: L1=10cm, L2=10cm

M300 MINI AND M600 MINI RECEIVER SPECIFICATION/ M300 MINI 和 M600 MINI 接收机规范			
		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
Accuracy 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)
	Static Differential Accuracy (Supported by Compass Solution) 静态差分精度 (软件支持)		H: ±(2.5+0.5×10 ⁻⁶ ×D)mm V: ±(5+0.5×10 ⁻⁶ ×D)mm
Attitude Accuracy 测姿精度	M600 Mini (K728)	Azimuth Accuracy (dual-board) 方位角精度	(0.2/R)°, 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)°, R is baseline length in meter. R 为基线距离, 单位为米
RTD Performance RTD 性能	M300 Mini (K708)	Pseudorange Differential Accuracy (1σ) 伪距差分精度(1σ)	H: ±0.3m V: ±0.5m
RTK	M300 Mini (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: ±(8+10 ⁻⁶ ×D)mm V: ±(15+10 ⁻⁶ ×D)mm
		E-RTK Initiation Time E-RTK 初始化时间	1s

M300 MINI AND M600 MINI RECEIVER SPECIFICATION/ M300 MINI 和 M600 MINI 接收机规范			
		E-RTK Accuracy E-RTK 精度	H: $\pm(200+10^{-6}\times D)$ mm V: $\pm(400+10^{-6}\times D)$ mm
	M600 Mini (K728)	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)
Electrical 电气特性	Voltage 供电电压		6V~28VDC
	M300 Mini (K708)	Power Consumption (no antenna connected) 功耗(未接天线)	2.5W
	M600 Mini (K728)		3W
Environmental 环境要求	Operating Temperature 工作温度		-40°C — +75°C
	Storage Temperature 储存温度		-45°C — +85°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,

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M300 MINI AND M600 MINI RECEIVER SPECIFICATION/ M300 MINI 和 M600 MINI 接收机规范			
			RTCM59
	M300 Mini (K708)	RTCM3.0	1002, 1003, 1004, 1005, 1006, 1007, 1008, 1010, 1011, 1012, 1019, 1020, 1104, 1033
	M600 Mini (K728)		1004,1005,1006,1007,1008,1011,1012,1104,1033
	M300 Mini (K708)	RTCM3.2 (MSM4)	1074,1084,1124
	M600 Mini (K728)	RTCM3.2 (MSM4&MSM5)	1074,1084,1124,1075,1085,1125
Antenna Interface 天线接口	M300 Mini (K708)	TNC	1 GNSS antenna RF interface 1 个 GNSS 天线射频接口
	M600 Mini (K728)		2 GNSS antenna RF interface 2 个 GNSS 天线射频接口
Communication Mode & Interface 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 interface 1 个 UHF 天线接口 (50ΩTNC 公头) 和 2 个 RS232 接口

M300 MINI AND M600 MINI RECEIVER SPECIFICATION/ M300 MINI 和 M600 MINI 接收机规范		
	Option 2: Network communication & UART 可选项 2: 网络传输和串行异步通信	1 LAN interface and 1 RS232 interface 1 个 LAN 接口和 1 个 RS232 接口
Power supply Interface 电源接口	M300 Mini M600 Mini	External power interface 外置电源两芯接口
Communication Protocol 通讯协议	M300 Mini M600 Mini	Support RS232 and TCP/IP 支持 RS232 串口和 TCP/IP 通讯协议
Physical 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		
Electrical 电气特性	Voltage 供电电压	+3.3~+3.6VDC
	Power consumption 功耗	0.3W
Modulation 调制方式	GMSK	
Communication Protocol 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	
Air Baud	9600bps or 19200bps	

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RADIO RECEIVER MODULE SPECIFICATION/ 电台接收模块规范		
空中波特率	9600bps 或者 19200bps	
Correction 纠错	FEC forward error correction, hamming code FEC 前向纠错, 海明码	
Channel characteristics 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
Receiving indicators 收信指标	Sensitivity 灵敏度	$-115\text{dBm}@BER 10^{-5}$
	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
Hardware Interface 硬件接口	Antenna Interface 天线接口	MCX female(MCX 母头)(50 Ω)
	2 \times 7 pin male connector (14 针公头) pin pitch 2mm (针脚间距 2mm)	
Environmental 环境要求	Operating Temperature 工作温度	$-40^{\circ}\text{C} - +85^{\circ}\text{C}$
	Storage Temperature 储存温度	$-50^{\circ}\text{C} - +90^{\circ}\text{C}$
Physical	Size	71.1mm \times 45.7mm \times 11.6mm with connectors

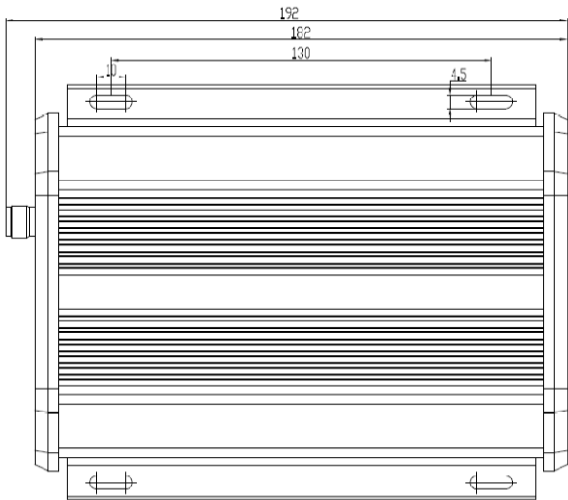
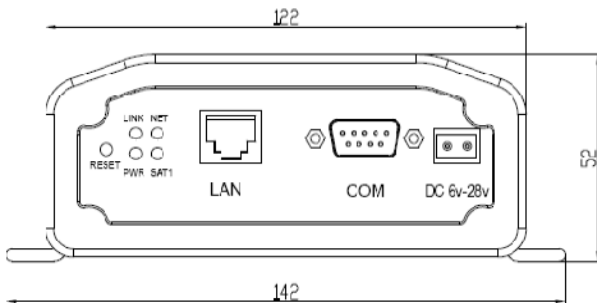
RADIO RECEIVER MODULE SPECIFICATION/ 电台接收模块规范

物理参数	尺寸	(含接头)
	Weight 重量	19g

III. DIMENSION / 尺寸

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

本节提供了 M300 Mini 和 M600 Mini 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**

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Figure 1. M300 Mini(K708) Dimension View

图 1. M300 Mini(K708)三视图

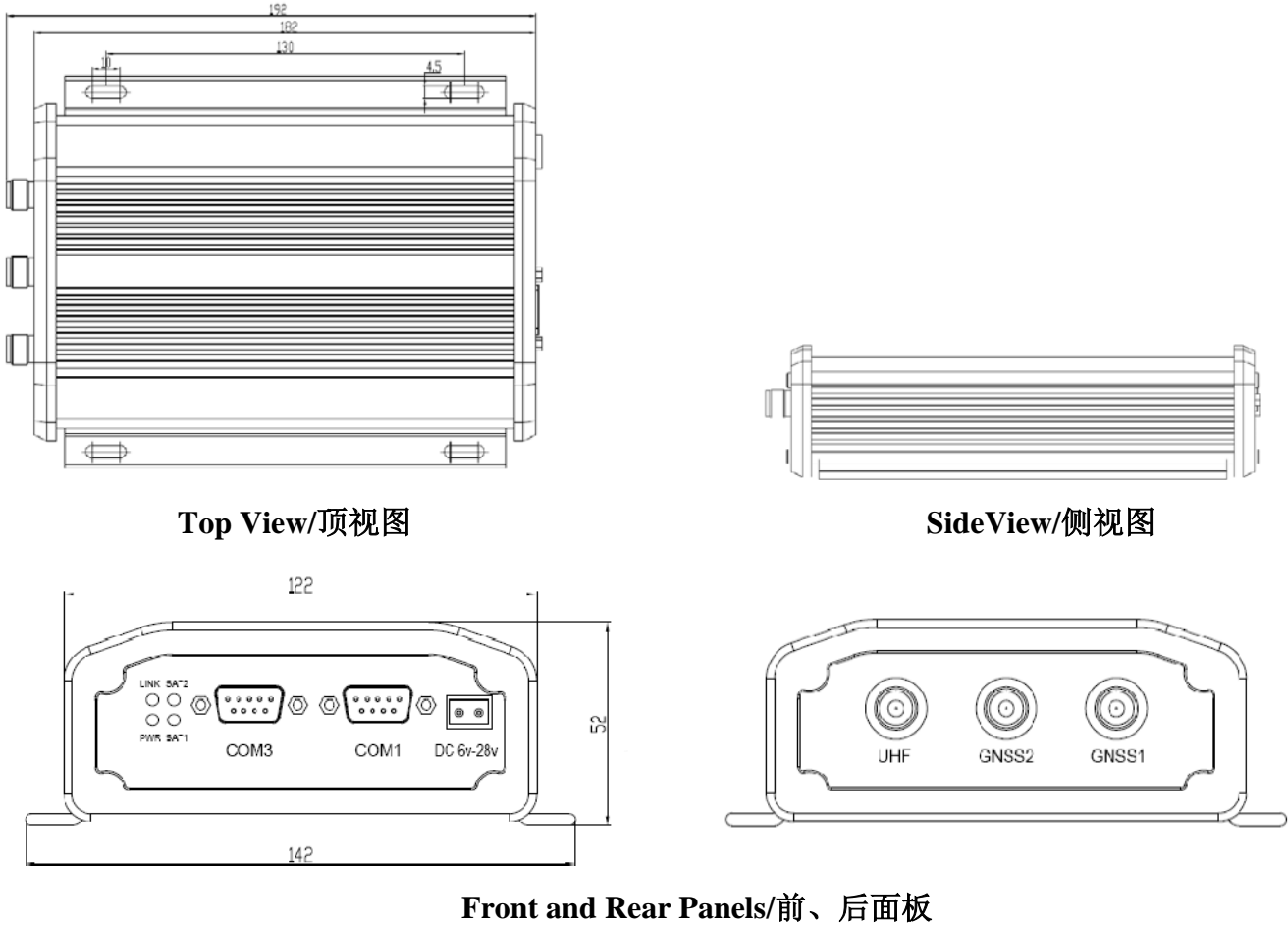


Figure 2. M600 Mini(K728) Dimension View

图 2. M600 Mini(K728)三视图

IV. PHYSICAL INTERFACE DEFINITION / 硬件接口定义

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

本部分的各图表详细定义了 M300 Mini 和 M600 Mini 的硬件接口。

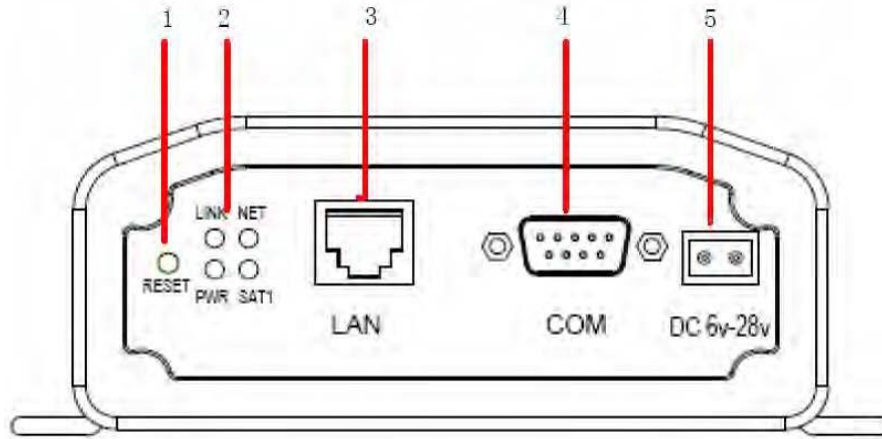
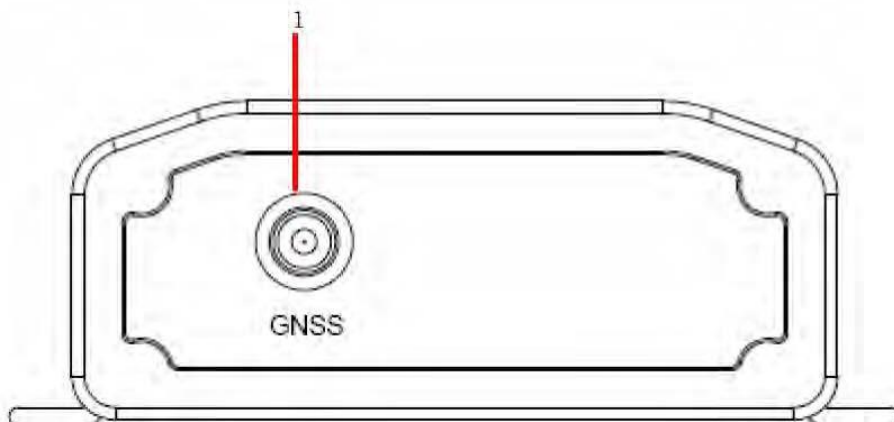


Figure 3. M300 Mini (K708) Front Panel

Table 3. Physical Interface Definition of M300 Mini (K708) Front Panel

NO	NAME	TYPE	DESCRIPTION	
1	RESET	Input	Restore network setting	还原网络设置
2	LED	Output	Status LED indicator	状态指示灯
3	LAN	Input	Ethernet Interface	以太网接口
4	COM	I/ O	Configure the instrument and output data	配置仪器、输出数据
5	DC	PWR	System power supply	系统供电电源



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*Figure 4. M300 Mini (K708) Rear Panel**Table 4. Physical Interface Definition of M300 Mini (K708) Rear Panel*

NO	NAME	TYPE	DESCRIPTION
1	GNSS	Input	Antenna connector 天线接口

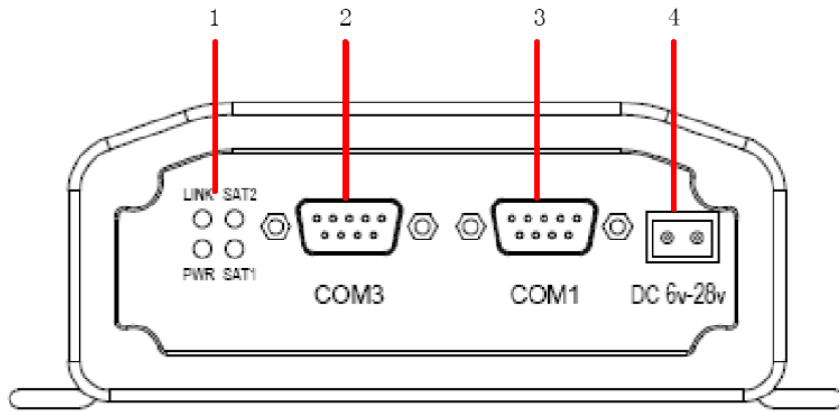


Figure 5. M600 Mini (K728) Front Panel

Table 5. Physical Interface Definition of M600 Mini (K728) Front Panel

NO	NAME	TYPE	DESCRIPTION	
1	LED	Output	Status LED indicator	状态指示灯
2	COM3	I/O	Configure the instrument and output data	配置仪器、输出数据
3	COM1	I/O	Configure the instrument and output data	配置仪器、输出数据
4	DC	PWR	System power supply	系统供电电源

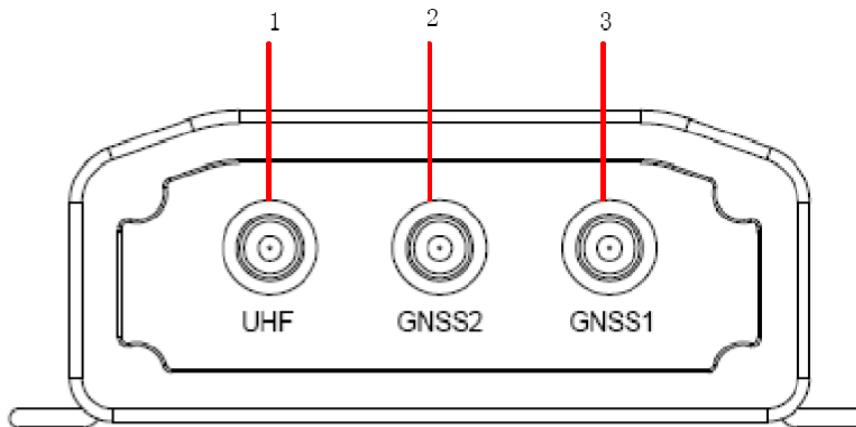


Figure 6. M600 Mini (K728) Rear Panel

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Table 6. *Physical Interface Definition of M600 Mini(K728) Rear Panel*

NO	NAME	TYPE	DESCRIPTION	
1	UHF	Input	Radio Antennaconnector	电台天线接口
2	GNSS2	Input	Master Antennaconnector	主站天线接口
3	GNSS1	Input	Slave Antennaconnector	从站天线接口

V. APPLICATION CONNECTION EXAMPLE / 应用连接示例

In this section, two application connection examples of M300 Mini Receiver (K708) and M600 Mini 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 Mini 接收机(K708)和 M600 Mini 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。

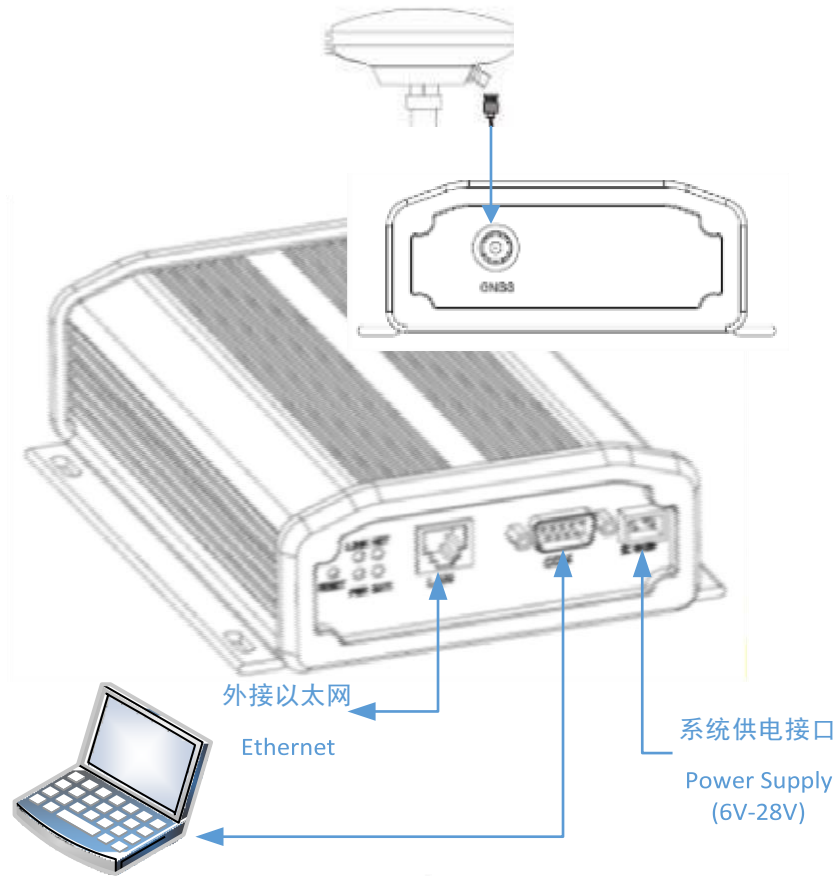


Figure 6. M300 Mini Receiver (K708) Application Connection

M300 MINI 接收机(K708)的应用连接

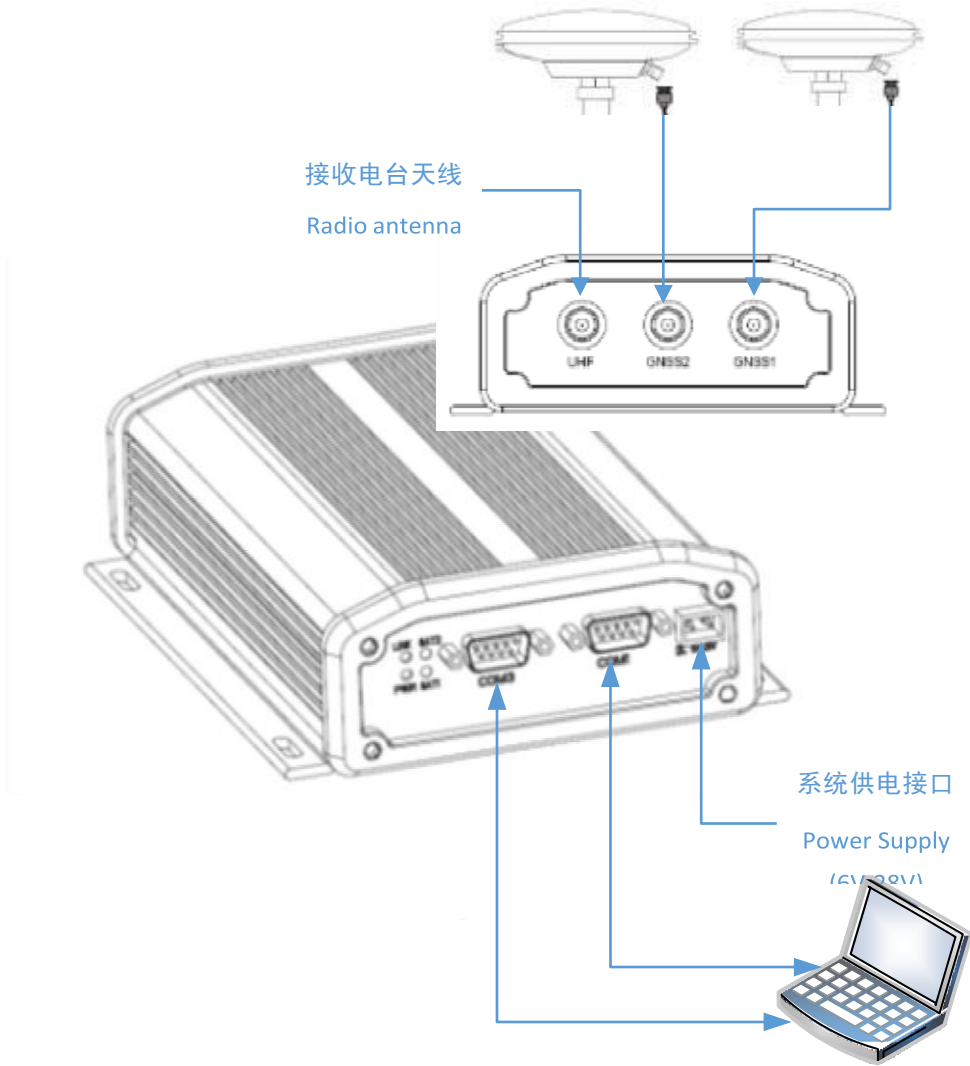


Figure 8. M600 Mini Receiver (K728) Application Connection

M600 MINI 接收机(K728)的应用连接