



司南导航

Product Specification / 产品规范

K801 GNSS Module

K801 GNSS 模块

2022-08-03

REVISION HISTORY / 修订历史

REVISION / 版本	MODIFICATION / 更改	DATE / 日期
1.1	Add COM2 serial port and reserve LNA and INS/新增 COM2 串口，内部预留 LNA 和惯导	2022-08-03
1.0	New Release/新发	2022-08-01

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1. PRODUCT INTRODUCTION/产品简介

The K801 GNSS module of Sinan Navigation is a small size high-precision positioning module with multiple systems and multiple frequencies independently developed by Sinan Navigation. It supports signal tracking of GPS, BDS-2, BDS-3, GLONASS, Galileo, QZSS, SBAS and other satellite navigation systems, and is applicable to the Internet of things, intelligent driving, unmanned aerial vehicles, intelligent robots and other fields.

司南导航的 K801 GNSS 模块是司南导航自主研发的多系统多频点的小尺寸高精度定位模块，支持 GPS、BDS-2、BDS-3、GLONASS、Galileo、QZSS 以及 SBAS 等卫星导航系统的信号跟踪，适用于物联网、智能驾驶、无人机、智能机器人等领域。

2. PRODUCT PARAMETER 产品参数

2.1. PERFORMANCE PARAMETER/性能参数

The following table shows the detailed specifications of Sinan K801 GNSS module. At the same time, it also lists the technical performance of the module, as well as its physical interface and electrical interface parameters.

下表中为司南 K801 GNSS 模块的详细规范。同时，还列出了该模块的各项技术性能，以及它的物理接口和电气接口参数。

Table1.Product Performance Specifications

K801 SPECIFICATION/K801 规范		
Signal 信号	Position 定位	GPS: L1C/A, L5
		BDS: B1I, B2a
		GLONASS: G1
		Galileo: E1, E5a
		QZSS: L1C/A, L5
		SBAS: L1C/A

Time to First Fix 首次定位时间	Cold Start 冷启动	< 24s
Signal Capture 信号重捕	Signal tracking sensitivity 信号跟踪灵敏度	-165dBm
	Signal Capture Sensitivity 信号捕获灵敏度	-148dBm
Accuracy 精度	Time Accuracy 授时精度	5ns
	SPP Accuracy 标准单点定位精度	$H \leq 1.5m, V \leq 3m (1\sigma, PDOP \leq 4)$
	Speed accuracy 测速精度	$\leq 0.02m/s (PDOP \leq 4)$
RTK	RTK Initialization time RTK 初始化时间	< 15s (Baseline <10km, 基线长小于 10km)
	Initialization 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 D 为基线长度(单位: km) D - Baseline length (Unit: km)
Data Rates 数据速率	Measurements & Position 测量&定位	5Hz (Subsequent upgrades can support 10Hz, 后续升级可支持 10Hz)
	RTK: Positioning RTK: 定位	5Hz (Subsequent upgrades can support 10Hz, 后续升级可支持 10Hz)

Electrical 电气特性	Voltage 供电电压	+ 3.3 V ± 5 % DC
	Power Consumption 功耗	0.15 W (Enable anti-interference by default,默认开启抗干扰)
Environmental 环境要求	Operating Temperature 工作温度	-40°C — +85°C
	Storage Temperature 储存温度	-40°C — +85°C
Data Formats 输出数据格式	NMEA-0183	GPGGA, GPGSV, GPGLL, GPGSA, GPGST, GPRMC, GPVTG, GPZDA, GPNTR etc.
	RTCM3.X	1005, 1019, 1020, 1042, 1044, 1046 MSM4, MSM7
Antenna Interface 天线接口	Impedance matching 阻抗匹配	Wiring 50 Ohm impedance matching 布线 50 欧姆阻抗匹配
	LNA Gain 天线增益	15~35dB
Hardware Interface 硬件接口		LGA (24PIN)
Physical 物理参数	Size 尺寸	12mm×16mm×2.4mm
	Weight 重量	0.9 grams (克)

2.2. PRODUCT FEATURE/产品特性

Table2..Product Feature

FEATURE/特性		K801	K801S
Constellation 星系	GPS	L1C/A	◆
		L5	◆

	L2C	-	-
GLONASS	G1	◆	◆
	G2	-	-
Galileo	E1	◆	◆
	E5a	◆	◆
	E5b	-	-
BDS	B1I	◆	◆
	B2a	◆	◆
	B2I	-	-
QZSS	L1C/A	◆	◆
	L5	◆	◆
SBAS	L1C/A	◆	◆
Type 种类	High precision GNSS 高精度 GNSS	◆	◆
	IMU (Subsequent upgrade support, 后续升级支持)	◆	-
	RTK	◆	◆
VCC voltage VCC 电压	3.1~3.6V, Typical value: 3.3V 典型值: 3.3V	◆	◆
V_BCKP voltage V_BCKP 电压	2.2~5.5V, Typical value: 3.3V 典型值: 3.3V	◆	◆
IO voltage	Typical value: 3.0V	◆	◆

IO 电压	典型值: 3.0V		
Communication interface 通信接口	UART	◆	◆
	SPI	-	-
	I2C	◆	◆
Temperature range 温度范围	Operating temperature range: -40°C~+85°C 工作温度范围: -40°C~+85°C Storage temperature range: -40 °C~+85 °C 存储温度范围: -40°C~+85°C		
Physical characteristics 物理特性	Size: 12mm × 16mm × 2.4mm 尺寸: 12mm×16mm×2.4mm Weight: about 0.9g 重量: 约 0.9g		

2.3. FIRMWARE UPDATE/固件升级

Sinan Navigation K801 GNSS module has been pre installed with formal firmware when leaving the factory. Sinan Navigation will release the latest version of firmware for performance optimization from time to time.

司南导航 K801 GNSS 模块出厂时已预安装正式固件。司南导航将不定期发布性能优化的最新版本固件。

2.4. PRODUCT DIMENSION/产品尺寸

This section provides the physical drawings, three views and corresponding physical dimensions of K801 for the convenience of further system hardware design and installation.

本节提供了 K801 的实物图，三视图和对应的物理尺寸，便于用户进一步的系统硬件设计和安装。

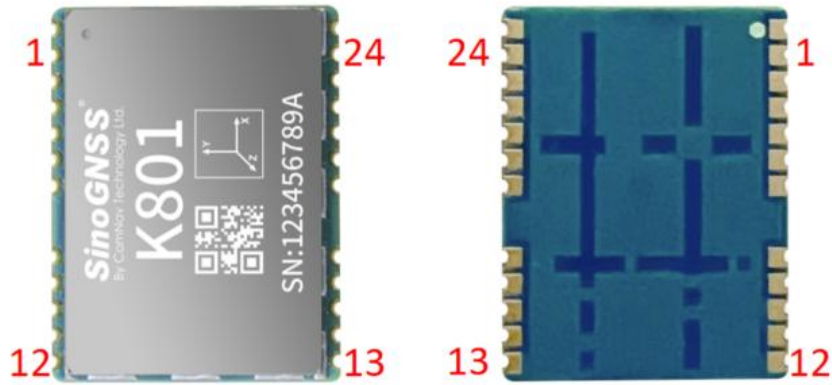


Figure 1. Top and bottom view of the module

图 1.模块俯视图和底视图

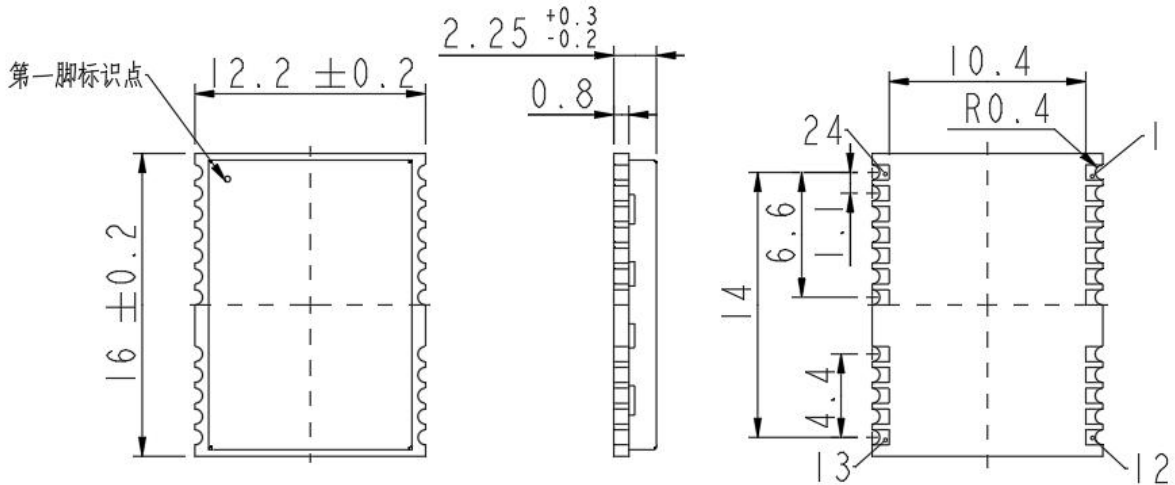


Figure 2. K801 Three View

图 2.K801 三视图

3. PIN LAYOUT/引脚布局

3.1. PIN DEFINITION/引脚定义

K801 module includes 24pin, surface mounted module, which can be integrated by users through definition.

K801 模块包括 24pin，表贴式模块，通过定义用户可自行集成。

13	GND	GND	12
14	GPI02	ANT	11
15	RXD2	GND	10
16	TXD2	VDD_RF	9
17	RSV	RESET_N	8
18	SDA (SLV)	VDD_EXT	7
19	SCL (SLV)	USB_DP	6
20	TXD1	USB_DM	5
21	RXD1	GPI0	4
22	V_BACKP	PPS	3
23	VCC	RSV	2
24	GND4	WAKEUP	1

Figure 3. K801 Module Pins (Front View)

图 3.K801 模块引脚（正视图）

Table3 K801Pin Description

PIN	SIGNAL	TYPE	DESCRIPTION	
1	WAKEUP	I	Wake up the module in Backup mode	Backup 模式中唤醒模块 (1.8V)
2	RSV1	-	Reserved	保留
3	PPS	O	Pulse Per Second	秒脉冲
4	GPI01	I/O	General-purpose input/output	通用 IO
5	USB_DM	I/O	USB data	USB 数据
6	USB_DP	I/O	USB data	USB 数据

PIN	SIGNAL	TYPE	DESCRIPTION	
7	VDD_EXT	I	3.0V power output	3.0V 电源输出,最大电流输出为 100mA
8	RESET_N	I	RESET_N	复位
9	VDD_RF	O	Voltage for external RF	电流输出能力取决于 VCC 3.3V, 用于为外部有源天线供电, 不用则悬空
10	GND1	-	Ground Reference	参考地
11	ANT	I	GNSS Positioning antenna	GNSS 定位天线
12	GND2	-	Ground Reference	参考地
13	GND3	-	Ground Reference	参考地
14	GPIO2	I/O	General-purpose input/output	通用 IO
15	RXD2	I	UART2 input	串口 2 输入
16	TXD2	O	UART2 output	串口 2 输出
17	RSV2	-	Reserved	保留
18	SDA (SLV)	I/O	I2C Data	I2C 数据
19	SCL (SLV)	I/O	I2C Clock	I2C 时钟
20	TXD1	O	UART1 output	串口 1 输出
21	RXD1	I	UART1 input	串口 1 输入
22	V_BACKP	PWR	Backup supply voltage	RTC 电源 (必须供电 2.5~5.5V)
23	VCC	PWR	Voltage supply	电源输入
24	GND4	-	Ground Reference	参考地

Remarks: Please keep the reserved and unused pins hanging (not connected).

备注:预留和未使用的引脚请保持悬空（不连接）。

3.2. APPLICATION INTERFACE/应用接口

3.2.1. UART Interface/UART 接口

The module provides two UART interfaces, and supports NMEA standard statement output, binary data input/output and firmware upgrade; Support 9600, 14400, 19200, 38400, 57600, 115200, 230400, 460800 and 921600 bps; Hardware flow control and synchronization operations are not supported.

模块提供两路 UART 接口，并且支持 NMEA 标准语句输出、二进制数据输入/输出和固件升级；支持 9600、14400、19200、38400、57600、115200、230400、460800 和 921600 bps；不支持硬件流控和同步操作。

3.2.2. I2C Interface/I2C 接口

The module provides one I2C interface, which supports slave mode; Support 7-bit or 10 bit addressing; Support standard (100 kbps) and fast (400 kbps) modes.

模块提供一路 I2C 接口，该接口支持从模式；支持 7 位或 10 位寻址；支持标准（100 kbps）和快速（400 kbps）两种模式。

4. HARDWARE PARAMETER/硬件参数

4.1. ELECTRICAL FEATURE/电气特性

COM1/2 (TX&RX), GPIO and PPS are LVCMOS 3.0V levels, and all these signals are also LVCMOS/LVTTL 3.0V.

COM1/2(TX&RX), GPIO, PPS 为 LVCMOS 3.0V 电平,所有这些信号均兼容 LVCMOS/LVTTL 3.0V。

LVCMOS 3.0V电气标准

Symbols/符号	Description/描述	Min/最小	Max/最大
V _{IH}	Input high voltage 输入高电压	2.0V	3.08V
V _{IL}	Input low voltage	-0.3V	0.8V

	输入低电压		
V_{OH}	High-level output voltage 高电平输出电压	2.2V	3.08V
V_{OL}	Low-level output voltage 低电平输出电压	--	0.4V
I_{OH}	Sourcing current 拉电流	4mA	
I_{OL}	Sinking current 灌电流	4mA	

LVTTTL 3.0V电气标准

Symbols/符号	Description/描述	Min/最小	Max/最大
V_{IH}	Input high voltage 输入高电压	2.0V	---
V_{IL}	Input low voltage 输入低电压	-0.3V	0.8V
V_{OH}	High-level output voltage 高电平输出电压	2.4V	----
V_{OL}	Low-level output voltage 低电平输出电压	---	0.4V
I_{OH}	Sourcing current 拉电流	4mA	
I_{OL}	Sinking current 灌电流	4mA	

4.2. WITHSTAND VOLTAGE/承受电压

The signals that can withstand the voltage of 3.0V are as follows: COM1/2 (TX&RX), PPS;

The signals that can withstand the voltage of 1.8V are as follows: WAKEUP, RESET_N.

所能承受电压为 3.0V 的信号如下: COM1/2(TX&RX), PPS;

所能承受电压为 1.8V 的信号如下: WAKEUP, RESET_N.

4.3. SUPPLY VOLTAGE/供电电压

VCC main power supply, voltage range: 3.3V (DC). Voltage ripple and peak pulse shall be less than 50mV. Voltage ripple and peak pulse shall be less than 50mV. V_ BCKP, voltage 2.5V~5.5V, voltage ripple and peak pulse are required to be less than 30mV.

VCC 主供电电源，电压范围：3.3V（直流）。电压纹波和尖峰脉冲要求小于 50mV。电压纹波和尖峰脉冲要求小于 50mV。V_BACKP，电压 2.5V~5.5V，电压纹波和尖峰脉冲要求小于 30mV。

5. HARDWARE INTEGRATION/硬件集成

During the integration of Sinan Navigation K801 module, the following precautions are required:

司南导航 K801 模块在集成过程中，有以下注意事项：

5.1. ANTENNA INPUT INTERFACE/天线输入接口

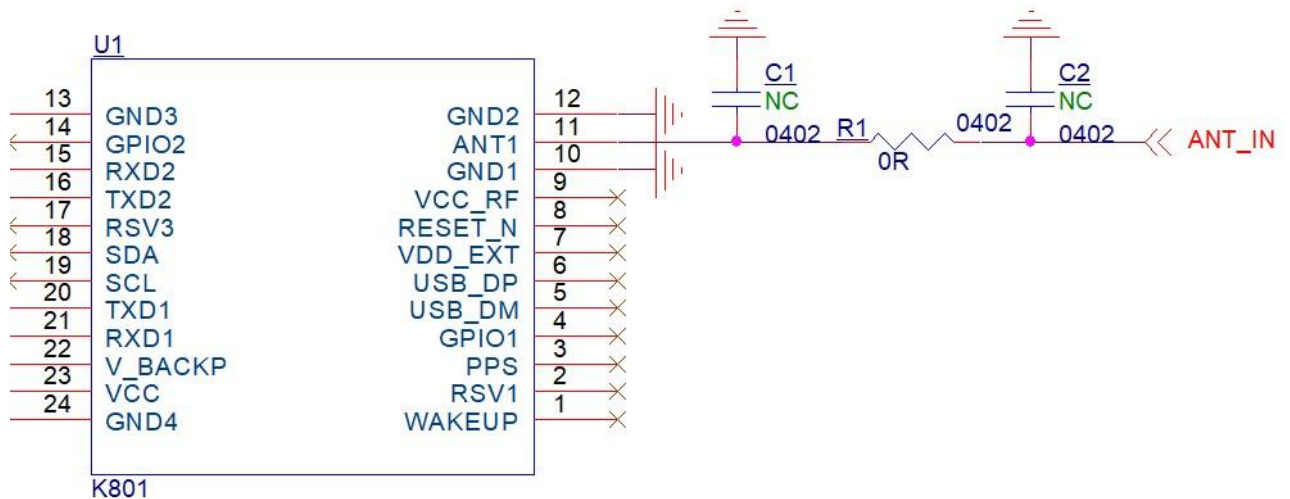


Figure 4. Reference design of antenna access (passive antenna)

图 4. 天线接入参考设计（无源天线）

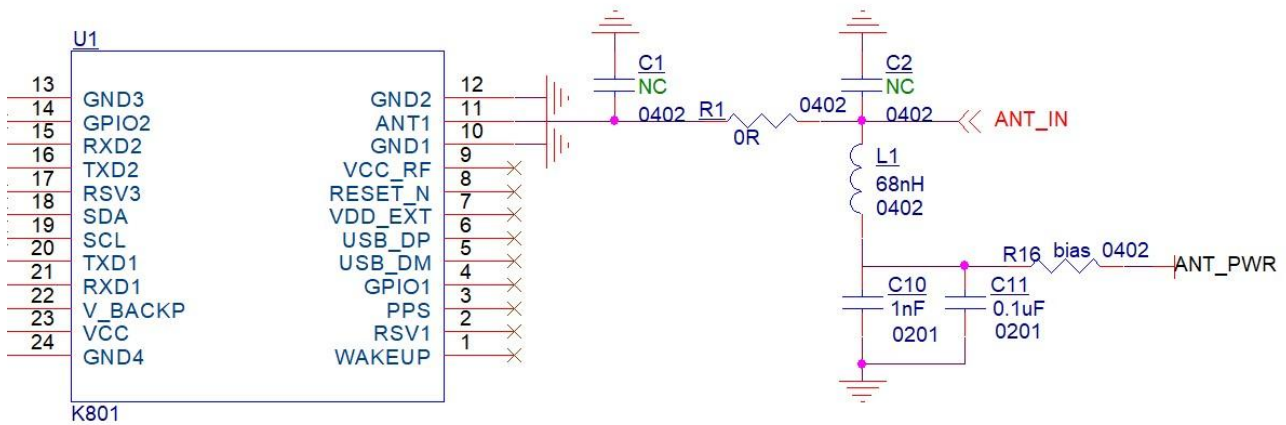


Figure 5. Reference design of antenna access (active antenna)

图 5. 天线接入参考设计（有源天线）

C1, R1 and C29 components II Type B matching circuit is used to optimize the input impedance of the antenna. By default, R1 is 0, C1 and C29 are empty. Anti static protection device has been placed inside the module to protect RF signal input from ESD damage. The impedance of the RF line must be controlled at 50Ω and the wiring should be as short as possible.

Note: In order to prevent the feed inductance L1 from being burnt out in case of antenna short circuit, a current limiting resistance R2 is connected in series on the antenna feed chain. The resistance value of R2 should be selected according to the antenna feed voltage and the rated current value of L1, to ensure that the current value of the feed circuit is less than the rated current value of the feed inductance in case of antenna short circuit. If users want higher data quality, active antenna design is preferred.

C1、R1 和 C29 组件组成 π 型匹配电路，用于优化天线的输入阻抗。默认情况下，R1 为 0，C1 和 C29 空贴。模块内部已经放置防静电保护装置，用于保护射频信号输入免受 ESD 的损害。射频线的阻抗必须控制在 50Ω ，且布线尽可能短。

注意：为防止天线短路时，烧坏馈电电感 L1，在天线馈电链路上串联了一个限流电阻 R2，R2 的电阻值要根据天线馈电电压和 L1 的额定电流值来选定，确保天线短路时，馈电电路电流值小于馈电电感的额定电流值。如果用户想要得到数据质量更高的，优先考虑有源天线设计。

5.2. STATIC ELETRICITY PROTECTION/静电保护

Some components on K801 module are easily damaged by static electricity, thus affecting IC

circuit and other components. Therefore, electrostatic protection measures shall be taken during use.

(1) When taking the module, you should try to wear gloves or finger cots and anti-static wrist straps that meet the electrostatic protection standards

(2) In the process of taking the module, only the edge of the board should be taken, and the solder joints, circuit parts or components should not be directly contacted to avoid sweat fingerprints polluting the solder joints

(3) Soft protective pads shall be used between modules and module intervals for protection during transportation

(4) When the module is idle, it should be placed on the soft protective pad (such as anti-static sponge pad), and should not be stacked randomly

(5) Modules shall be placed in order, with a certain interval between modules to avoid mutual collision

(6) The module shall be handled with care during use to prevent damage to the module due to rough operation

(7) When powering on, pay attention to the positive and negative poles of the power supply and the voltage to avoid reverse connection and burning of the module due to excessive voltage

(8) When welding the module to the motherboard, make sure that GND is welded first, then ANT_ IN pin

(9) Processing ANT_ Please do not touch any charged capacitor or material (such as surface mount antenna, coaxial cable, electric soldering iron, etc.) when pins are placed, so as to prevent the charge generated or stored by the above capacitor or material from damaging the ANT_ IN pin

(10) Be sure to use an electric soldering iron with static protection to weld ANT_ IN pin

K801模块上的部分元器件易受静电影响而损坏,进而影响IC电路及其他元件。因此在使用时应注意做好静电防护措施。

(1) 拿取模块时应尽量戴好手套或者指套以及符合静电防护标准的防静电腕带

(2) 模块拿取过程中应只拿取板卡的边缘部位,不能直接接触焊点,线路部分或者元器件,避免汗液指印污染焊点

- (3) 模块在运输过程中模块与模块间隔之间应该采用软性防护垫进行保护
- (4) 模块闲置时应放置在软性防护垫上（如防静电海绵垫等），不要随意堆叠
- (5) 模块摆放应摆放整齐有序，模块之间保持一定间隔，避免相互碰撞
- (6) 模块在使用过程中应该轻拿轻放，防止粗暴作业损坏模块
- (7) 上电时，注意电源正负极以及电压，避免反接和电压过高烧毁模块
- (8) 将模块焊接到主板时，请确保 GND 先焊接，然后再焊接 ANT_IN 引脚
- (9) 处理 ANT_ 引脚时，请勿接触任何带电电容或材料（例如表贴天线、同轴电缆、电烙铁等），以免上述电容或材料所产生或存储的电荷损坏 ANT_IN 引脚
- (10) 请确保使用带静电保护的电烙铁焊接 ANT_IN 引脚

5.3. HARDWARE INTEGRATION CONSIDERATION/硬件集成注意事项

- (1) VCC power on has good monotonicity, and the starting level is lower than 0.4V, and the down rush and ringing guarantee are within 5% of VCC
- (2) Use VCC pin to provide reliable power supply and all GND pins of the module are grounded
- (3) Connect ANT_ IN signal to antenna, pay attention to the 50 ohm impedance matching of the line
- (4) Module reset pin RST_ N is quick reset, please connect it correctly to ensure that the module can be reset reliably
- (5) Special attention shall be paid in the design

Power supply: guarantee of stable and low ripple power supply, and the peak and peak value of ripple voltage should not be higher than 50mVpp. It is recommended to use a power chip with a current output capacity greater than 2A to power the board. In addition to using LDO to ensure the purity of power supply, it is also necessary to consider: ①. Widen the power supply wiring or use the split copper surface to transmit current; ② LDO shall be placed as close to the module as possible in the layout; ③ Power supply wiring shall not pass through high-power and highly inductive components such as magnetic coils.

(6) Antenna interface: the antenna line shall be as short and smooth as possible to avoid sharp corners; Pay attention to 50ohm impedance matching

(7) Avoid wiring directly below K801

(8) The module shall be kept away from high temperature airflow as far as possible

(1) VCC上电具有良好的单调性,且起始电平低于0.4V,下冲与振铃保障在5%VCC范围内

(2) 用VCC引脚提供可靠的电源且模块所有GND引脚接地

(3) 连接ANT_IN信号至天线,注意线路50欧姆阻抗匹配

(4) 模块复位引脚RST_N为快速复位, 请正确连接以保证模块可以可靠复位

(5) 在设计中应特别注意:

供电: 稳定及低纹波电源的保证,纹波电压峰峰值最好不高于50mVpp。建议采用电流输出能力大于2A的电源芯片给板卡供电。除了可采用LDO保证供电纯净外, 还需要考虑: ①. 加宽电源走线或采用分割铺铜面来传输电流; ②. 布局上尽量将LDO靠近模块放置; ③. 电源走线避免经过大功率与高感抗器件如磁性线圈。

(6) 天线接口:天线线路尽量短且顺畅, 避免走锐角; 注意50ohm阻抗匹配

(7) 避免在K801正下方走线

(8) 模块尽量远离高温气流

5.4. CONNECTION EXAMPLE/连接示例

This section provides an application connection example of K801 module in the form of specific circuit. With reference to the figure below, you can easily establish the communication circuit between K801 module and other terminals (such as PC, GPRS module, Bluetooth module or other devices with UART).

本部分以具体电路的形式提供一个 K801 模块应用连接示例。参照下面的图示, 您可以很方便建立 K801 模块和其他终端(如 PC, GPRS 模块, 蓝牙模块或其他带有 UART 的设备)之间

的通讯电路。

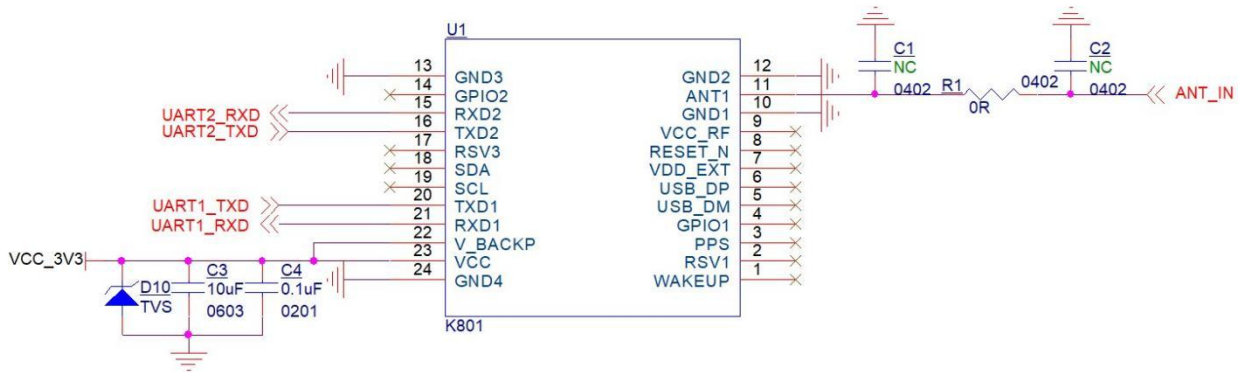


Figure 6. K801 Module Connection Example (Passive Antenna Connection Mode)

图 6.K801 模块连接示例（无源天线连接方式）

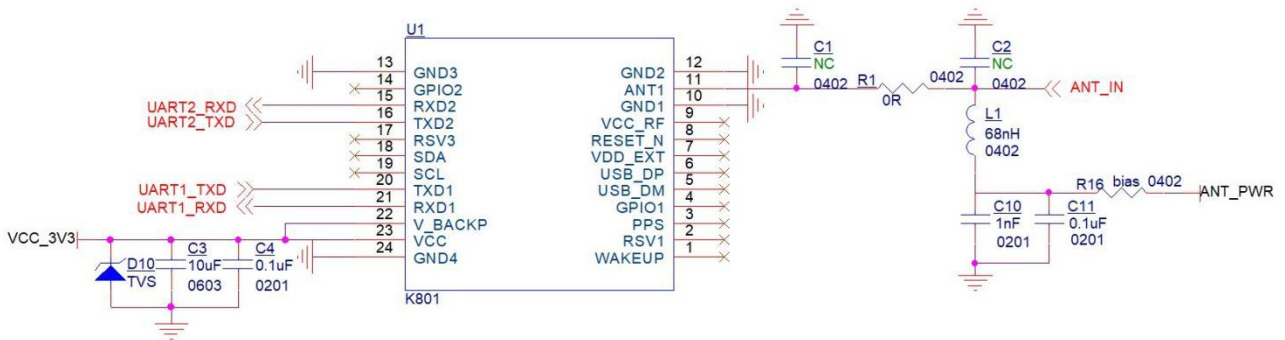


Figure 7. K801 module connection example (active antenna connection mode)

图 7.K801 模块连接示例（有源天线连接方式）

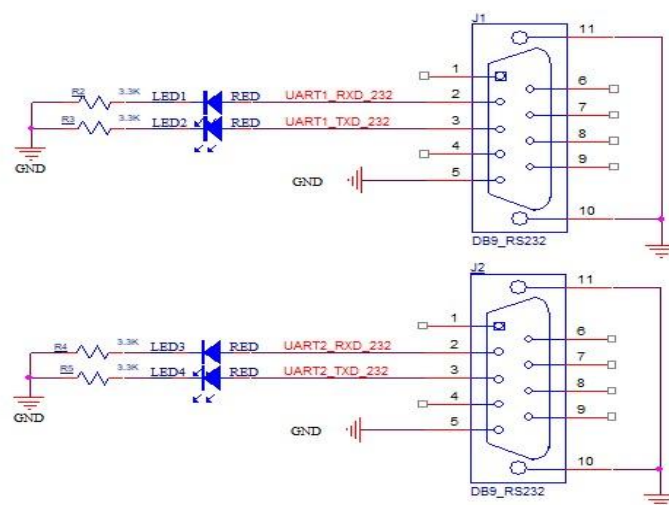


Figure 8. Example of connection between K801 RS232 COM1, 2 and other devices using UART interface

图 8.K801 RS232 COM1、2 与其他使用 UART 接口的设备之间的连接示例

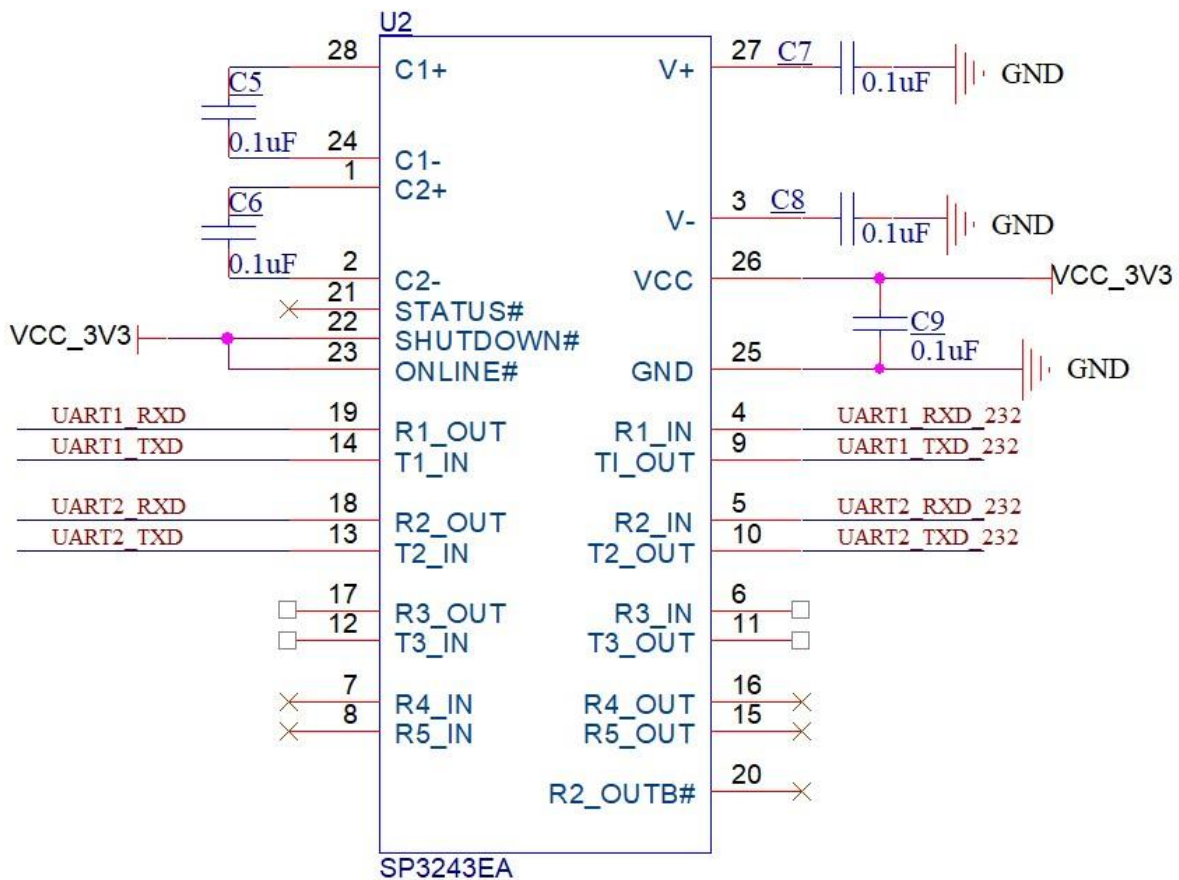


Figure 9. Example of COM Serial Port TTL to RS232 Connection

图 9.COM 串口 TTL 转 RS232 连接示例

6. PACKAGING PRODUCT/包装生产

6.1. PACKAGING/包装

The appearance and structure of the specific package shall be subject to the actual delivery. This chapter has the following suggestions for module packaging

具体包装的外观、结构以实际交货为准，本章节对于模块包装有以下几点建议：



Figure 10. Label Description

图 10.标签说明

K801 module uses tape and reel (applicable to mainstream surface mounting equipment), and is packaged in a vacuum sealed aluminum foil electrostatic discharge bag containing desiccant to prevent moisture. When using reflow soldering process to weld modules, please strictly follow IPC standards to control the humidity of modules. As the carrier belt and other packaging materials can only withstand 65 °C, the module needs to be taken out of the package during baking.

K801 模块使用载带、卷盘方式（适用于主流表面贴装设备），包装在真空密封的铝箔防静电袋中，内含干燥剂防潮。采用回流焊工艺焊接模块时，请严格遵守 IPC 标准对模块进行湿度管控。由于载带等包装材料只能承受 65℃，在进行烘烤作业时需要将模块从包装中取出。

Table4.K801 Package Description

PROJECT 项目	DESCRIPTION 描述
Number of modules 模块数量	250 Slice/Roll 片/卷
Reel size 卷盘尺寸	Material tray: 13 inch 料盘：13 寸
	Outer diameter: 330mm, inner diameter: 100mm, width: 24mm, wall thickness: 2.0mm 外径 330mm，内径 100mm，宽 24mm，壁厚 2.0mm
tape 载带	Module spacing (center distance): 20mm 模块间距（中心距）：20mm

6.2. STORAGE/储存

The storage life of K801 module is one year, and the humidity sensitivity level is 3. The packaging and operation precautions related to the humidity sensitivity level refer to the standard IPC/JEDECJ-STD-020. Users can download and view them at www.jedec.org.

remarks:

1. To avoid poor welding of the module during use, it is recommended not to take the module out of the vacuum package and expose it to the air for a long time before use.
2. Before high temperature operation, please take the module out of the vacuum package and place it on the high temperature resistant appliance to avoid high temperature damage to the plastic tray or reel.
3. When taking the module, please pay attention to ESD protection to prevent some components on the module from being damaged by static electricity, thus affecting IC circuits and other components.

K801 模块的保存期限为 1 年，湿度敏感等级为 3，与湿度敏感等级相关的包装及操作注意事项参照标准 IPC/JEDECJ-STD-020，用户可至网页 www.jedec.org 自行下载查看。

备注：

1. 为避免模块在使用时出现焊接不良的情况，建议勿在使用前将模块从真空包装中取出并长时间暴露在空气中。
2. 在进行高温操作前，请将模块从真空包装中取出并放置在耐高温器具上，以免高温损伤塑料托盘或卷盘。
3. 在拿取模块时请注意 ESD 防护，避免模块上的部分元器件易受静电影响而损坏，进而影响 IC 电路及其他元件。

6.3. ASSEMBLE/装配

6.3.1. Module Assembling Note/模块装配说明

K801 is a surface mounted module. SMT welding is recommended for assembly.

K801 为表贴式模块，推荐使用 SMT 的焊接方式进行装配。

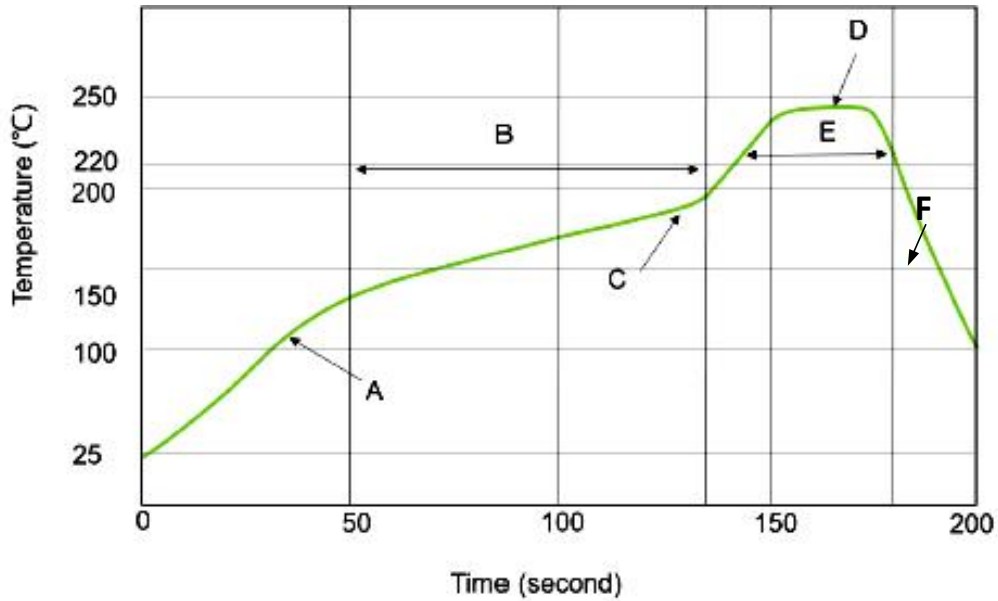


Figure 11. Furnace Temperature Curve

图 11.炉温曲线

Process temperature limits are as follows:

- A: Temperature rise zone: slope: 1~3 °C/sec
- B: Constant temperature zone: 150-190 °C Time: 80-110 S
- C: Constant temperature → reflux zone: slope: 1~3 °C/sec
- D: Peak temperature: 235-245 °C
- E: Reflux zone: more than 220 °C Time: 50-80 S
- F: Falling slope: - 5 ~ - 1 °C/sec

To avoid damage to the module due to repeated heating, it is recommended to paste the module after reflow soldering on the first side of PCB board.

制程温度界限如下：

- A: 升温区：斜率：1~3 °C/sec
- B: 恒温区：150-190 °C 时间：80-110 S
- C: 恒温→回流区：斜率：1~3 °C/sec
- D: 峰值温度：235-245 °C
- E: 回流区：大于 220 °C 时间：50-80 S
- F: 下降斜率：-5~-1 °C/sec

为避免模块因反复受热而损坏，建议在完成 PCB 板第一面的回流焊之后再贴模块。

6.3.2. IMU Installation Note(support for subsequent upgrades)/惯导安装说明（后续升级支持）

If you need to use the inertial navigation function of the module, please keep the Y axis of the identification parallel or vertical to the direction of travel of the carrier.

若需使用模块的惯导功能，请保持标识的 Y 轴与载体行进方向平行或垂直。



Figure 12. IMU installation diagram

图 12.IMU 安装图

6.4. REPAIR/维修

6.4.1. Repairing Note/维修说明

When disassembling the module, please use the BGA repair bench, select the air nozzle with appropriate size and use the appropriate temperature curve. The maximum temperature shall not exceed 245 °C, and the temperature rise slope shall not exceed 3 °C/s.

拆卸模块时，请使用 BGA 返修台，选择适合尺寸的风嘴并使用合适的温度曲线，最高温度不超过 245°C，升温斜率不超过 3°C/s。

7. ABBREVIATION/术语缩写

7.1. ABBREVIATION/术语缩写

Table 5. Abbreviations

Abbreviation 缩写	Full English name 英文全称	Full Chinese name 中文全称
AI	Analog Input	模拟输入
AO	Analog Output	模拟输出
BDS	BeiDou Navigation Satellite System	北斗卫星导航系统
Bps	bit(s) per second	比特每秒
DI	Digital Input	数字输入
DO	Digital Output	数字输出
DIO	Digital Input Output	数字输入/输出
ESD	Electrostatic Discharge	静电释放
Galileo	Galileo Satellite Navigation System (EU)	伽利略卫星导航系统（欧盟）
GLONASS	Global Navigation Satellite System (Russia)	格洛纳斯导航卫星系统（俄罗斯）
GNSS	Global Navigation Satellite System	全球导航卫星系统
GPS	Global Positioning System	全球定位系统
I/O	Input/Output	输入/输出
I2C	Inter-Integrated Circuit	集成电路总线
IC	Integrated Circuit	集成电路
IMU	Inertial Measurement Unit	惯性测量单元
Kbps	kilobits per second	千位每秒
LDO	Low-dropout Regulator	低压差线性稳压器
LNA	Low-Noise Amplifier	低噪声放大器
NMEA	National Marine Electronics Association	0183 Interface StandardNMEA（美国国家海洋电子协会）

PCB	Printed Circuit Board	印刷电路板
PI	Power Input	电源输入
PO	Power Output	电源输出
QZSS	Quasi-Zenith Satellite System	准天顶卫星系统（日本）
RF	Radio Frequency	射频
RHCP	Right Hand Circular Polarization	右旋圆极化
RTC	Real-Time Clock	实时时钟
RTCM	Radio Technical Commission for Maritime Services	海事无线电技术委员会
RTK	Real-Time Kinematic	实时动态
RXD	Receiver Data (Pin)	数据接收（引脚）
SBAS	Satellite-Based Augmentation System	星基增强系统
SMT	Surface Mount Technology	表面贴装技术
TCXO	Temperature Compensated Crystal Oscillator	温度补偿型晶体振荡器
TVS	Transient Voltage Suppressor	瞬变电压抑制二极管
TXD	Transmit Data (Pin)	发送数据（引脚）
UART	Universal Asynchronous Receiver/Transmitter	通用异步收发传输器