

SKG12DR-06A规格书

B1+B2双频单北斗

RTK高精度定位模块

SKG12DR-06A Bual-Band

BDS Module RTK

Datasheet

文档信息/Document information

标题/Title	SKG12DR-06A 双频单北斗惯导规格书	
	SKG12DR-06A Bual-Band BDS Module RTK Datasheet	
文档类型/Document type	规格书/Datasheet	
文档编号/Document number	SL-25020493	
修订和日期/Revision and date	V1.01	14-Nov-2024
公开限制/Disclosure restriction	外部公开/External public	

版本历史/Revision History

版本/Version	描述/Description	制定/Make	日期/Date
V1.01	初始版本/Initial version	Jim	20241114

SKYLAB 保留本文档及本文档所包含的信息的所有权利。SKYLAB 拥有本文档所述的产品、名称、标识和设计的全部知识产权。严禁没有征得 SKYLAB 的许可的情况下复制、使用、修改或向第三方披露本文档的全部或部分内容。

SKYLAB 对本文档所包含的信息的使用不承担任何责任。没有明示或暗示的保证，包括但不限于关于信息的准确性、正确性、可靠性和适用性。SKYLAB 可以随时修订这个文档。可以访问 www.skylab.com.cn 获得最新的文件。

Copyright © 2025, 深圳市天工测控技术有限公司。

SKYLAB® 是深圳市天工测控技术有限公司在中国的注册商标。

SKYLAB reserves all rights to this document and the information contained herein. Products, names, logos and designs described herein may in whole or in part be subject to intellectual property rights. Reproduction, use, modification or disclosure to third parties of this document or any part thereof without the express permission of SKYLAB is strictly prohibited.

The information contained herein is provided “as is” and SKYLAB assumes no liability for the use of the information. No warranty, either express or implied, is given, including but not limited, with respect to the accuracy, correctness, reliability and fitness for a particular purpose of the information. This document may be revised by SKYLAB at any time. For most recent documents, visit www.skylab.com.cn.

Copyright © 2025, Skylab M&C Technology Co., Ltd.

SKYLAB® is a registered trademark of Skylab M&C Technology Co., Ltd in China

目录/Contents

1 产品简介/Product Introduction	5
2 典型应用/Application	5
3 产品特点/Features	6
4 传输及外设接口/Transmission and peripheral interface	6
4.1 PPS	6
4.2 UART	6
4.3 通信频率/Frequency of communication	7
4.4 通信协议/Communication protocol	7
4.5 控制命令/Control command	7
4.6 睡眠模式控制/ Sleep mode control	7
4.7 RTK- 实时运动/RTK- Real - time kinematic	7
5 电气特性/Electrical specification	8
6 性能指标/Performance evaluation	9
7 管脚定义/PIN Definition	10
8 管脚描述/Pin description	11
9 机械尺寸/Machine Dimension	12
10 参考电路/Reference circuit	13
11 Layout 注意事项/ Layout Considerations	14
11.1 元件布局/ Placing Components	14
11.2 无源天线设计/ Passive Antenna Design	14
11.3 阻抗匹配/ Impedance Matching	15
11.4 微带线设计/ Microstrip line design	15
11.5 ESD 处理	16
12 包装与处理	17
12.1 包装	17
13 软件说明/ Software description	17
13.1 NMEA 0183 协议/ The NMEA 0183 protocol is available	17

13.2 GGA-定位数据信息/GGA- Location information	18
13.3 GSA-当前卫星信息/GSA- GNSS satellites in using	19
13.4 GSV-可见卫星信息//GSV- GNSS Satellites in View	20
13.5 RMC-推荐定位信息/ RMC- Recommended locating information	21
14 联系方式/ Contact Information	22

1 产品简介/Product Introduction

SKG12DR-06A 是一款高性能的、单北斗高精度 RTK 的定位模块。该模块支持新一代的北斗三号信号体制。模块能够同时支持 B1+B2 频段。启动时间短，定位精度高，可靠性强，有低功耗，高性能的特点，是很多产品应用的理想选择，尤其适用于可穿戴、物联网、跟踪器、无人机和汽车导航。能满足专业定位的严格要求与个人消费需要。外形尺寸紧凑，兼容市场上国际主流导航定位模块，采用 SMD 焊盘，支持标准取放及回流焊接。

SKG12DR-06A is a high-performance, single-Beidou high-precision RTK positioning module. The module supports the new generation of Beidou-3 signaling system. The module can support both B1+B2 frequency bands. With short start-up time, high positioning accuracy, strong reliability, low power consumption and high performance, it is ideal for many product applications, especially for wearables, Internet of Things, trackers, drones and car navigation. It can meet the strict requirements of professional positioning and personal consumption needs. Compact size, compatible with the international mainstream navigation and positioning modules on the market, using SMD pads, supporting standard pick-and-place and reflow soldering.



图 1: SKG12DR-06A 正视图/Top view

2 典型应用/Application

- ◆ 汽车导航/ Auto navigation
- ◆ 个人导航设备/ Personal navigation equipment
- ◆ 汽车保全系统/ Car security system
- ◆ IRNSS 应用/ IRNSS application
- ◆ RTK 高精度定位应用/ High-precision localization of the RTK is used

3 产品特点/Features

- ◆ B1 频点支持 Beidou B1I, Beidou B1C
- ◆ B2 频点支持 Beidou B2A, Beidou B2B, Beidou B2I
- ◆ 支持 SBAS(WAAS, EGNOS, MSAS, GAGAN)/ Support SBAS(WAAS, EGNOS, MSAS, GAGAN)
- ◆ 标准通信协议 NEMA0183/Plug and play standard communication protocol NEMA0183
- ◆ 支持 AGNSS / Support AGNSS
- ◆ 150 个具有快速搜索引擎的跟踪频道/150 tracking channels with fast search engine
- ◆ 符合 RoHS, FCC, CE /Compliance with RoHS, FCC, CE

4 传输及外设接口/Transmission and peripheral interface

4.1 PPS

秒脉冲 (PPS) : SKG12DR-06A 提供非常精准的时间脉冲 PPS 信号, PPS 信号可为外部系统提供授时功能, 脉冲宽度可调, 精度 20ns, 每秒输出一个脉冲。

Second pulse (PPS): The SKG12DR-06A provides a very accurate time pulse PPS signal, the PPS signal can provide the timing function for the external system, the pulse width is adjustable, the accuracy is 20ns, it output a pulse per second.

4.2 UART

SKG12DR-06A 有二个通用异步接收器/发送器 (UART) 接口, 可以最高达 6 Mbps 的波特率提供全双工、异步串行通信。它们支持 5/6/7/8 位数据, 以及偶数、奇数和无奇偶校验。停止位可以是 1 位或 2 位。UART0 支持 Flash 下载。默认主 UART 为 UART0。在启动过程和默认的固件设置中, UART0 配置为: 波特率 115200, 8 位, 无奇偶校验, 1 个停止位。用户可以通过接口命令更改 UART0 的配置。但是在启动过程期间的 UART0 配置无法修改。

The SKG12DR-06A has three Universal Asynchronous Receiver/Transmitter (UART) interfaces that provide full-duplex, asynchronous serial communication at baud rates up to 6 Mbps. They support 5/6/7/8-bit data, as well as even, odd, and no parity. The stop bit can be either 1 or 2 bits. UART0 supports Flash downloads. The default primary UART is UART0. During the boot process and in the default firmware settings, UART0 is configured as: baud rate 115200, 8 bits, no parity, 1 stop bit. The

user can change the configuration of UART0 through interface commands. However, the UART0 configuration during the startup process cannot be modified.

4.3 通信频率/Frequency of communication

目前，系统输出默认频率为 1Hz。

Currently, the default output frequency of the system is 1Hz

4.4 通信协议/Communication protocol

目前，SKG12DR-06A 支持 UART 接口，默认波特率 115200。模块支持数据协议 NMEA0183 和 RTCM3。

At present, SKG12DR-06A module supports UART interface, and the default baud rate is 115200.

The module supports data protocol NMEA0183 and RTCM3.

4.5 控制命令/Control command

SKG12DR-06A 系统支持用户通过串口发送控制命令

The SKG12DR-06A system supports the user to send control commands through the serial port and automatically save the settings

4.6 睡眠模式控制/ Sleep mode control

SKG12DR-06A 支持两种睡眠模式控制。第一种是用户通过串口发送控制命令进入睡眠模式，进入该模式后通过发送任意字节数据唤醒。第二种方式是通过控制 SKG12DR-06A 的电源实现：维持 V_BACKUP 引脚供电，同时切断 VCC 供电，恢复 VCC 供电即可唤醒。

SKG12DR-06A supports two sleep mode controls. The first is that the user sends control commands through the serial port to enter the sleep mode. After entering this mode, the user wakes up by sending any byte of data. The second way is to control the power supply of SKG12DR-06A: maintain V_BACKUP pin power supply and cut off VCC power supply, restore VCC power supply will wake up the system, in this case.

4.7 RTK- 实时运动/RTK- Real - time kinematic

SKG12DR-06A 支持 RTK 功能。为支持 RTK 功能，该模块需要通过 UART 接口接收 RTK 校正信息。RTK 校正信息可通过使用一个蜂窝模块或者其他地面网络技术传送。默认配置下，模块将基于接收到的校正数据尝试实现最优的定位精度。

The SKG12DR-06A supports RTK function. In order to support the RTK function, the module needs to receive the RTK calibration through the UART interface Positive information. RTK correction information can be transmitted using a cellular module or other terrestrial network technology. In the default configuration, the module will try to achieve the best positioning accuracy based on the correction data received.

当模块接收到一条 RTCM 信息流时，将进入 RTK 浮点模式。一旦载波相位模糊度确定，模块进入 RTK 固定模式。RTK 固定模式下，模块可实现厘米级高精度定位。

When the module receives an RTCM information flow, it enters the RTK floating point mode. Once the carrier phase ambiguity is determined, the module enters the RTK fixed mode. In the RTK fixed mode, the module can achieve high-precision positioning at the centimeter-level.

通常在 60 秒内，移动站就能够确定载波模糊度并从 RTK 浮点模式切换到 RTK 固定模式。该时间间隔称为收敛时间。

Usually within 60 seconds, the mobile station is able to determine the carrier ambiguity and switch from RTK floating point mode to RTK fixed mode. The time interval called the convergence time.

5 电气特性/Electrical specification

◆ 极限参数/limit Parameter

参数/Parameter	符号/Symbol	最小值/Min.	最大值/Max.	单位/Unit
电源/power supply				
供电电压/Supply Voltage	VCC	-0.3	3.6	V
输入输出/ IO				
I/O 特性/I/O Features	VIO	-0.3	3.6	V
RF 输入功率/RF Input power	RF_IN		10	dBm
环境/Environment				
存储温度/Storage temperature	Tstg	-40	150	° C
湿度/Humidity			95	%

◆ 电气特性/Electrical specification

参数/Parameter	符号 /Symbol	条件 /Condition	最小值 /Min.	典型值 /Type	最大值 /Max.	单位 /Unit
电源电压/Supply voltage	VCC		1.8	3.3	3.6	V
电源电压/Supply voltage	V_BCKP		1.8	3.3	3.6	V
输入高压/input high voltage	V _{IH}		1.8		3.6	V
输入低压/input low voltage	V _{IL}		0		0.7	V
输出高压/output high voltage	V _{OH}	I _{oh} =4mA	2.8			V
输出低压/output low voltage	V _{OL}	I _{ol} =4mA			0.4	V
工作温度/Operating temperature	T _{opr}		-40		85	°C

6 性能指标/Performance evaluation

参数/Parameter	描述/Description		
接收机类型/Receiver type	B1	1575.42 MHz	BDS B1C
		1561.098 MHz	BDS B1I
	B2	1176.45 MHz	BDS B2A
		1207.14 MHz	BDS B2B,BDS B2I
首次定位时间 TTFF	冷启动/Cold Start≤35s		
	热启动/Hot Start≤3s		
	AGPS 启动/AGPS start≤3s		
灵敏度/Sensitivity	跟踪/Tracking: -158dBm		
	重捕获/Re-acquisition: -155dBm		
	冷启动/Cold Start: -143dBm		
	热启动/Hot Start: -155dBm		

定位精度（全开放天空）/ precision(OPEN SKY)	自主定位/Autonomous positioning $\leq 1.5\text{m CEP}$
	RTK 定位/RTK positioning $\leq 1.0\text{ cm}+1\text{ ppm CEP}$
PPS 精度/PPS precision	$\leq 20\text{ns}$
速度精度/Speed precision	0.1m/s
功耗/ Power dissipation	Continuous B1/B2 mode : $50\text{mA}(3.3\text{V})$ Sleep mode: $22\mu\text{A}$
尺寸/Dimension	$16.4*12.2*2.4\text{ mm}$
工作环境/Operational constraint	动态/Dynamic $\leq 4\text{g}$
	高度/Altitude $\leq 50,000\text{m}$
	速度/Speed $\leq 500\text{m/s}$

7 管脚定义/PIN Definition

Top View

13	GND	GND	12
14	NC	RF_IN	11
15	NC	GND	10
16	GPIO14	VDD_LAN	9
17	GPIO13	NRST	8
18	GPIO18	NC	7
19	GPIO19	NC	6
20	UART0_TX	I2C_SDA	5
21	UART0_RX	I2C_SCL	4
22	V_BACKUP	PPS	3
22	V_3V3	NC	2
24	GND	NC	1

图 2: SKG12DR-06A 管脚定义/pin definitions

8 管脚描述/Pin description

管脚编号 /Pin No.	管脚定义 /Pin name	描述/Description	备注/Remark
1	NC	/	/
2	NC	/	/
3	PPS	秒脉冲信号输出/Second pulse signal output	不使用时悬空/Leave open if not used
4	I2C_SCL	I2C 时钟脚/ I2C clock pin	预留，不使用时悬空/Leave open if not used
5	I2C_SDA	I2C 数据脚/ I2C data pin	预留，不使用时悬空/Leave open if not used
6	NC	/	/
7	NC	/	/
8	RSTN	模块复位/Module reset	低电平触发/ Active at low level
9	VDD_LNA	外部LNA使能/ External LNA en able	输出 2.8V/Output 2.8V
10	GND	电源地/Ground	/
11	RF_IN	GNSS 天线接口/ Antenna interface pin	输入端 50 欧姆阻抗匹配/ 50 ohm impedance matching at the input
12	GND	电源地/Ground	/
13	GND	电源地/Ground	/
14	NC	/	/
15	NC	/	/
16	GPIO14	可做 JTAG_TDO 接口 /JTAG_TDO	预留，不使用时悬空/Leave open if not used
17	GPIO13	可做 JTAG_TDI 接口/JTAG_TDI	预留，不使用时悬空/Leave open if not used
18	GPIO18	可做 JTAG_TCK 接口 /JTAG_TCK	预留，不使用时悬空/Leave open if not used

19	GPIO19	可做 JTAG_TMS 接口 /JTAG_TMS	预留，不使用时悬空/Leave open if not used
20	UART0_TX	串口发送/Serial port to send	默认数据输出脚/ Default data output pin
21	UART0_RX	串口接收/Serial port to receive	默认数据输入脚/ Default data input pin
22	V_BACKUP	备份电源输入/ Backup power supply	工作电压范围 2.4-3.6V/ Operating voltage range: 2.4V-3.6V
23	V_3v3	模块主电源输入/ Module main power supply	工作电压 3.3V/ Operating voltage 3.3V
24	GND	电源地/Ground	/

9 机械尺寸/Machine Dimension

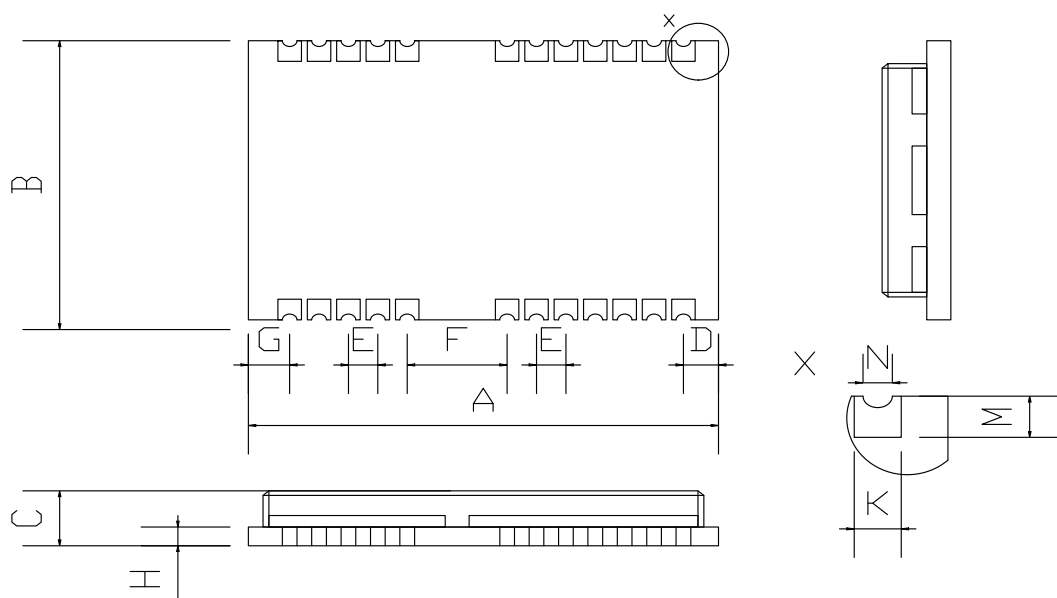


图 3: SKG12DR-06A 机械尺寸/Machine Dimension

符号/Symbol	最小值/Min.(mm)	典型值/Type(mm)	最大值/Max.(mm)
A	15.9	16.0	16.6
B	12.1	12.2	12.3
C	2.2	2.4	2.6
D	0.9	1.0	1.3
E	1.0	1.1	1.2
F	2.9	3.0	3.1
G	0.9	1.0	1.3
H	0.7	0.82	0.9
M	0.7	0.8	0.9
N	0.4	0.5	0.6
K	0.8	0.9	1.0
Weight	1.6g		

10 参考电路/Reference circuit

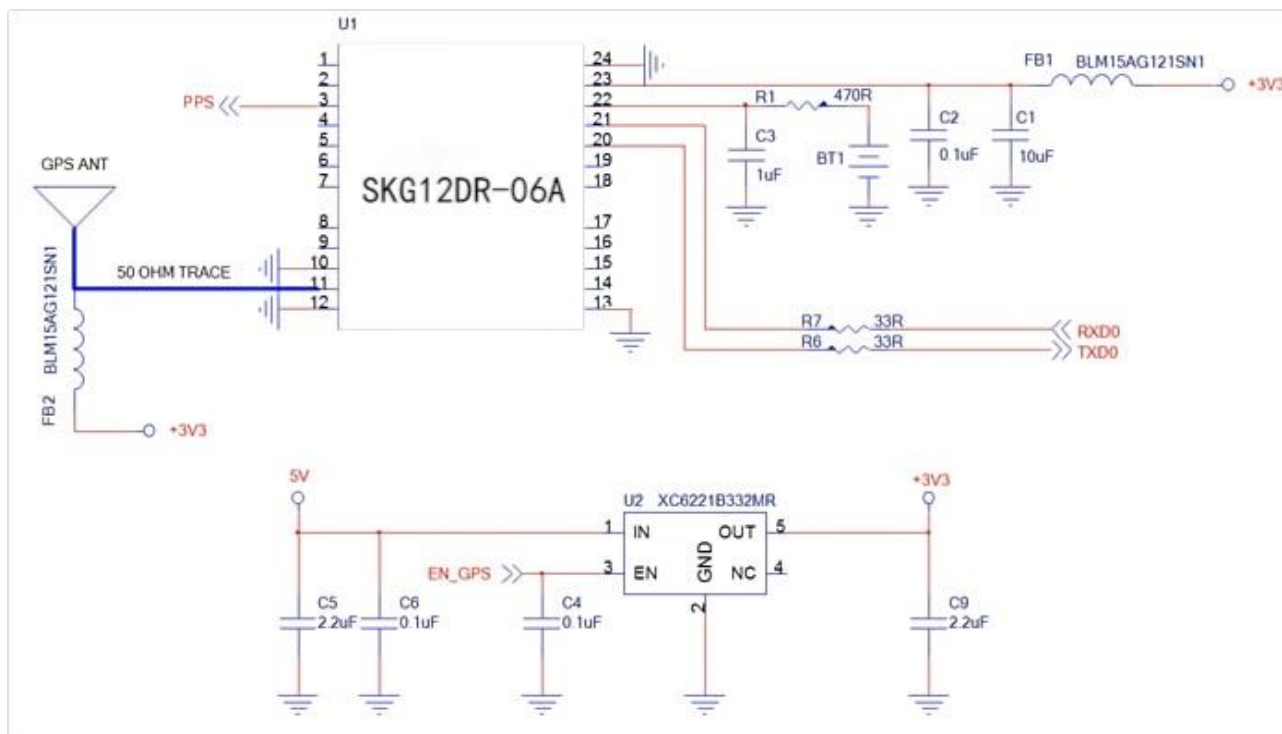


图 4: SKG12DR-06A 参考电路/Reference circuit

11 Layout 注意事项/ Layout Considerations

11.1 元件布局/ Placing Components

GNSS 模块在 PCB 上的布局对于获得最佳的 GNSS 性能来说是至关重要的。与天线的连接应越短越好，避免对信号造成过大的衰减。在系统板设计上，要确保射频电路跟其他数字电路严格分开，将模块远离 PCB 上的数字区域。同时还必须将 GNSS 模块远离发热量较大的区域。

The layout of GNSS modules on the PCB is critical for achieving optimal GNSS performance. The connection with the antenna should be as short as possible to avoid excessive attenuation of the signal. In the system board design, ensure that RF circuits are strictly separated from other digital circuits and that modules are kept away from the digital area on the PCB. At the same time, GNSS modules must be kept away from areas with high heat.

11.2 无源天线设计/ Passive Antenna Design

天线馈线的长度应尽可能短，且无源天线的下方要有一块完整的地。建议无源天线与 GNSS 模块放在 PCB 板相对的另一面。

The length of the antenna feeder should be as short as possible, and the passive antenna should have a complete ground below. It is recommended that the passive antenna and GNSS module be placed on the opposite side of the PCB board.

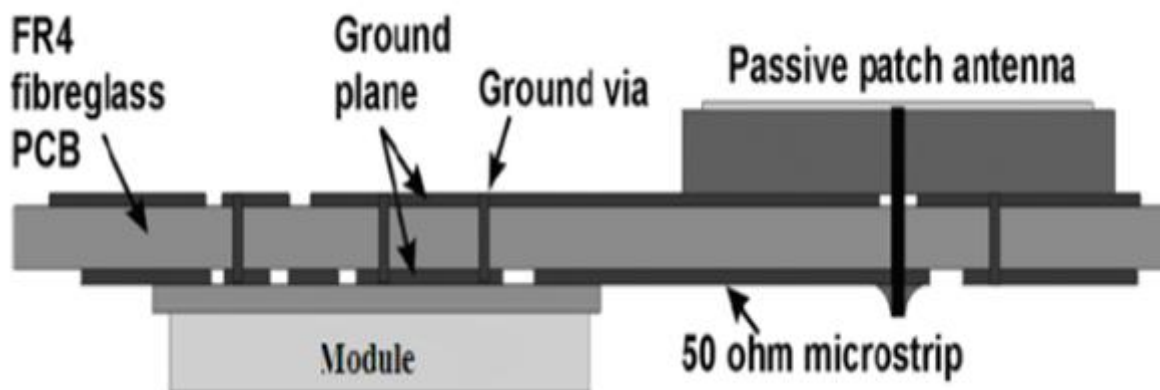


图 5: 无源天线参考设计/ Passive Antenna eference design

11.3 阻抗匹配/ Impedance Matching

天线馈线的阻抗需为 50 Ohm，为了达到 50 Ohm 的阻抗，微带线的宽度 W 要根据导线和参考面的距离 H ，PCB 介质板的介电常数 ϵ_r ，以及 PCB 的结构来选择。

The impedance of the antenna feeder shall be 50 Ohm. In order to achieve the impedance of 50 Ohm, the width W of the microstrip line shall be selected according to the distance H between the wire and the reference plane, the dielectric constant ϵ_r of the PCB dielectric board, and the structure of the PCB.

11.4 微带线设计/ Microstrip line design

1.微带线的长度应该尽可能的短，标准 PCB 上应该尽量不选用超过 2.5 cm (1 inch) 而又没有屏蔽层的微带线；

The length of microstrip lines should be as short as possible, and no microstrip lines exceeding 2.5cm (1 inch) without shielding layer should be selected on standard PCB as far as possible.

2.射频连接线的走线应避免靠近数字信号线；

Avoid routing RF cables close to digital signal cables.

3.在连接地平面时要采用尽可能多的过孔；

Wiring should be far away from noise sources, such as switching power supply, digital signal, crystal oscillator, processor, etc.

4.布线应远离噪声源，如:开关电源，数字信号，晶振，处理器等；

Wiring should be far away from noise sources, such as switching power supply, digital signal, crystal oscillator, processor, etc.

5.微带线相对应的参考地层应保持完整；

The reference strata corresponding to the microstrip line should be kept intact.

6.微带线特性阻抗必须为 50 ohm；

The characteristic impedance of microstrip line must be 50 ohm；

7.为了减小信号衰减，微带线走线时要避免锐角。

In order to reduce signal attenuation, the acute Angle should be avoided when microstrip lines are routed.

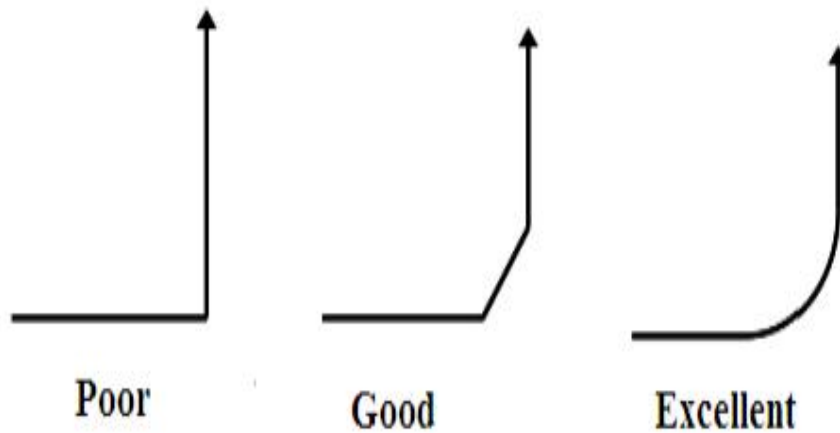


图 6：微带线设计推荐/ microstrip cable design

11.5 ESD 处理

11.5.1 ESD 注意事项

BDS 定位模块包含高度敏感的电子线路，属于静电敏感器件(ESD)。请注意下面的操作事项，若未按照下述预防措施操作，可能会对模块造成严重损坏！

- 天线贴片前，请先接地。
- 在引出 RF 引脚时，请不要接触任何带电电容和其他器件(例如，天线贴片~10 pF；同轴电缆~50–80 pF/m；焊接烙铁)
- 为防止静电放电，请勿将天线区域暴露在外；若因设计原因暴露在外，请采取适当的 ESD 防护措施。
- 在焊接 RF 连接器和天线贴片时，请确保使用 ESD 安全烙铁。



11.5.2 ESD 防护措施

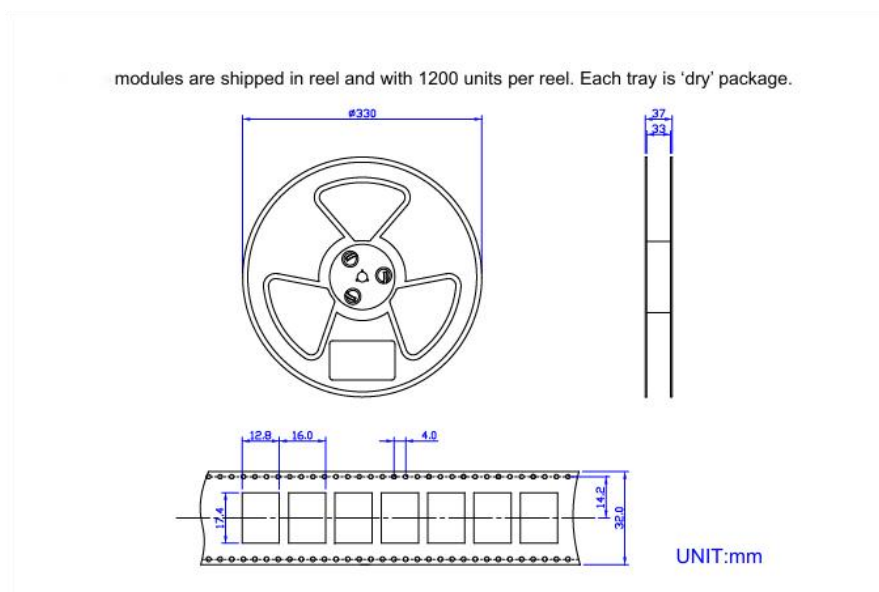
BDS 定位模块为静电敏感器件。在操作使用接收机时，必须特别小心，以减少静电的危险。除了标准的 ESD 安全措施外，还需考虑如下措施：

- 在射频输入部分加入 ESD 二极管，防止静电放电
- 切勿触摸任何暴露的天线区域
- 将 ESD 二极管添加到 UART 接口

12 包装与处理

12.1 包装

SKG12DR-06A 定位模块是湿度、静电均敏感设备。在产品的包装和运输过程中，请务必遵循相关处理要求，并采取相应的预防措施以减少产品损坏。下表为产品运输的标准包装结构。



13 软件说明/ Software description

13.1 NMEA 0183 协议/ The NMEA 0183 protocol is available

NMEA 语句是 GNSS 的标准协议信息，每条语句都有一个前缀，以“\$”开头，以回车符/换行符结束，为不超过 80 个字符的可见文本（含行终止符）。每条语句末尾都有一个校验和，读取数据的单元可能会对其进行检查。校验和字段由一个“*”和两个十六进制数字组成，代表“\$”和“*”（不含这两个字符）之间所有字符的 8 位异或结果。

NMEA statement is the standard protocol information of GNSS. Each statement has a prefix, starting with "\$" and ending with carriage return/line feed, which is visible text (including line terminator) with no more than 80 characters. There is a checksum at the end of each statement, which may be checked by the unit reading the data. The checksum field consists of a "*" and two hexadecimal digits, representing the 8-digit XOR result of all characters between "\$" and "*" (excluding these two characters). 表 1-1

NMEA-0183 输出信息/ Table 1-1 NMEA-0183 Output information

NMEA 协议/NMEA protocol	描述/Description	默认/Default
GGA	定位数据信息/ Global positioning system fixed data	打开/Y
GSA	当前卫星信息/ DOP and active satellites	打开/Y
GSV	可见卫星信息/ Satellites in view	打开/Y
RMC	推荐定位信息/Recommended minimum specific data	打开/Y

表 1-2 标识符助记码/Identifier mnemonic code

标识符/Identifier	数据类型/ Data type
GN	GNSS 模式/ GNSS mode
BD	北斗模式/ BDS mode

13.2 GGA-定位数据信息/GGA- Location information

此语句包含定位位置、定位时间、定位精度。

Contains the location, time, and precision factor of navigation positioning.

\$GNGGA,093314.00,3110.4880379,N,12135.9872231,E,1,37,0.5,17.362,M,0.000,M,,*74<CR><LF>

表 2-1 GGA 语句格式/GGA Data Format

名称/Name	举例 /Example	单位/Units	描述/Description
语句 ID/Message ID	\$GNGGA		表明语句为 GGA 信息/ GGA protocol header
UTC 时间/UTC Position	093314.00		hhmmss.sss 时分秒格式/Time seconds format
纬度/ Latitude	3110.48803 79		ddmm.mmmmm 度分格式/Degree split format
纬度 N/S / N/S indicator	N		N=北纬 S=南纬/ N= north or S= South
经度/ Longitude	12135.9872 231		DDMM.mmmmm 度分格式/Degree split format
经度 E/W / E/W Indicator	E		E=东经 W=西经/ N=north or S=south
定位状态/ Position Fix Indicator	1		见附表 2-2/ See Table 2-2
已使用卫星数量/Satellites Used	37		解算卫星颗数

HDOP 水平精度因子/HDOP horizontal accuracy factor	0.5		
海拔高度/MSL Altitude	17.362	米/m	正高度
单位/Unit	M	M (米)	
大地水准面高度/ Geoidal height	-		水平面高度
水准面划分单位/Level surface division unit	M	米/m	
差分数据时效信息/AGE	-		差分数据时效信息
差分数据提供站 ID 编号 /REFS_ID			差分数据提供站 ID 编号
CS	*74		校验和
<CR><LF>	--		回车和换行符

表 2-2 定位状态描述/ Position Fix Indicators

数值/Value	描述//Description
0	未定位或定位信息不可用/ Unpositioned or positioned information is not available
1	GNSS 定位/ GNSS fix
2	差分 GNSS 定位 (DGNSS、SBAS) / Differential GNSS fix(DGNSS, SBAS)
3	PPP 解算 / PPP Solution
4	RTK 固定解 / RTK fixed solution
5	RTK 浮点解 / RTK floating-point solution
6	组合惯性推算解算 / Combined inertia calculation and solving

13.3 GSA-当前卫星信息/GSA- GNSS satellites in using

此条语句包含模块的选定工作模式，定位类型，已使用卫星的 PRN 信息及 PDOP, HDOP, VDOP 等信息。

This statement contains the selected working mode of the module, positioning type, PRN information of used satellites, PDOP, HDOP, VDOP and other information.

\$GPGSA,A,3,01,07,08,14,17,21,27,30,194,195,199,,0.9,0.5,0.7,1*1C<CR><LF>

表 3-1 GSA 语句格式/GSA Data Format

名称/Name	举例/Example	单位/Units	描述/Description
语句 ID/ Message ID	\$GNGSA		表明语句为 GSA 信息/ Indicates that the statement is GSA information
运行模式/OP_MODE	A		表 3-3/ See Table 3-3

定位模式/FIX_MODE	3		表 3-2/ See Table 3-2
卫星 PRN 编号/[PRN]	01		卫星 PRN 编号
PDOP 精度因子/PDOP	0.9		PDOP 精度因子/PDOP accuracy factor
水平精度因子/HDOP	0.5		水平精度因子/Horizontal Dilution of Precision
VDOP	0.7		垂直精度因子/Vertical Dilution of Precision
SYS_ID	37		系统 ID
校验和/checksum	*1C		校验和
<CR><LF>			回车和换行符

表 3-2/Table 3-2

值/Value	描述/Description
1	未定位
2	2D 定位
3	3D 定位

表 3-3 /Table 3-3

值/Value	描述/Description
M	手动选择 2D 或者 3D 模式
A	自动选择 2D 或者 3D 模式

13.4 GSV-可见卫星信息//GSV- GNSS Satellites in View

此语句包含可见卫星的 PRNs, 方位角和仰角等信息。

This sentence contains the mode of operation, type of fix, PRN of the satellites used in the solution as well as PDOP, HDOP and VDOP.

```
$GPGSV,5,1,17,01,73,173,42,07,57,238,45,08,39,046,42,14,25,313,36,1*6D<CR><LF>
$GPGSV,5,2,17,17,17,264,25,21,66,056,42,27,10,063,28,28,00,000,29,1*6E<CR><LF>
$GPGSV,5,3,17,30,48,284,40,194,66,121,40,195,76,068,40,196,00,000,14,1*56<CR><LF>
$GPGSV,5,4,17,199,53,170,15,56,00,000,43,57,00,000,32,03,09,158,00,1*57<CR><LF>
$GPGSV,5,5,17,193,05,155,00,,,,,,,,,,,,,1*6D<CR><LF>
```

表 4-1 GSV 语句格式/ GSV Data Format

名称/Name	举例/Example	单位/Units	描述/Description
---------	------------	----------	----------------

语句 ID/Message ID	\$GPGSV		表明此语句为 GSV 信息/GSV protocol header
GSV 总数信息/ Number of Message	5		本次 GSV 语句的总条数/ Total number of GSV sentences
GSV 条数信息/ Message Number	1		本条语句为 GSV 语句中的第几条/ Sentence number of the total
可见卫星信息/ Satellites in View	17		当前可见卫星总数/Number of satellites in view
卫星 ID/Satellite ID	01		
卫星仰角/Elevation	73	度/degrees	范围 00 到 90/ Range 00 to 90
卫星方位角/Azinmuth	173	度/degrees	范围 000 到 359/ Range 000 to 359
信噪比(C/NO)/SNR(C/NO)	42	dB-Hz	范围 00 到 99 (未使用则为空) / Range 00 to 99, null when not tracking
...			...
校验值/Checksum	*6D		
EOL	<CR> <LF>		结束标志符/End of message termination

13.5 RMC-推荐定位信息/ RMC- Recommended locating information

此语句包含推荐定位的卫星定位信息。

This statement contains the satellite positioning information for the recommended location.

\$GNRMC,093314.00,A,3110.4880379,N,12135.9872231,E,3.09,30.61,090222,,,A,V*09<CR><LF>

表 5-1: RMC 语句格式/ RMC Data Format

名称/Name	举例/Example	单位/Units	描述/Description
语句 ID/Message ID	\$GNRMC		表明此语句为 RMC 信息/RMC protocol header
UTC 时间/UTS Position	093314.00		HHMMSS.ss
使用状态/Status	A		A=数据已使用 V=数据未使用/A=data valid or V=data not valid
纬度/ Latitude	3110.4880379		DDMM.mmmmm
纬度 N/S/ N/S Indicator	N		N=北纬 S=南纬/N=north or S=south
经度/Longitude	12135.9872231		DDDMM.mmmmm
经度 E/W /E/W Indicator	E		E=东经 W=西经/E=east or W=west
速度/ Speed Over Ground	3.09	节	

航向角/Course Over Ground	30.61	度	航向角度（范围：0–360）/Heading Angle (Radius: 0 – 360)
UTC 日期/Date(UTC)	090222		ddmmyy
磁偏角/Magnetic variation	<Null>	度	未使用则为空/Null fields when it is not Used
磁偏角方位/Magnetic Variation Direction	<Null>		E=东经 W=西经 /E=east or W=west
定位模式/Fix Mode	A		A=GNSS 定位, N=未定位, D=RTD or SBAS 定位, F=RTK 浮点定位, R=RTK 定位, P=PPP 定位, E=估算（推测航行）定位/A=GNSS positioning, N=unlocalized, D=RTD or SBAS positioning, F=RTK floating-point positioning, R=RTK positioning, P=PPP positioning, E=estimated (speculative navigation) positioning
校验值/Checksum	*09		
EOL	<CR> <LF>		结束标志符/End of message termination

14 联系方式/ Contact Information

Skylab M&C Technology Co., Ltd.

深圳市天工测控技术有限公司

地址: 深圳市龙华区福城街道鸿创科技中心6栋11楼

Address: 11th Floor, Building 6, Hongchuang Science and Technology Center, Fucheng Street, Longhua District, Shenzhen, Guangdong, China.

电话/Phone: 86-0755 8340 8210 (Sales Support)

电话/Phone: 86-0755 8340 8510 (Technical Support)

传真/Fax: 86-0755-8340 8560

邮箱/E-Mail: technicalsupport@skylab.com.cn

网站/Website: www.skylab.com.cn www.skylabmodule.com