高精度 GNSS 三频四臂螺旋天线

High Precision GNSS Tri-Band Helix Antenna

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目录 Contents

1. 产品信息 Product Overview

1.1 产品描述 Product Description

GNSS 天线是接收机配置中至关重要却常被忽视的一部分，因为天线是 GNSS 空间段与用户之间的主要接口，负责捕获卫星发射的 L 波段信号，为特定应用选择最优的 GNSS 天线，能最大限度提升 GNSS 接收机的定位性能. ST-QHA25 是一款专业级三频高精度天线，它采用四臂螺旋天线技术，具备出色的圆极化信号接收能力和较佳的轴比，能应用于手持及无人机等厘米级要求的场景. 为提高 GNSS 射频灵敏度,其采用三级放大架构，能为系统带来较高的信号杂讯比. ST-QHA25 装配便利且具备 IP67 防水等级，可长期在户外使用.

GNSS antennas are a critical but often overlooked part of a receiver setup. The antenna is the main interface between the GNSS radiation space and the user, as they capture the L-band signal transmitted by satellites. Choosing the optimal GNSS antenna for the application will maximize GNSS receiver's positioning performance.

The ST-QHA25 is a professional-grade tri-band high-precision antenna. It adopts quadrifilar helix antenna technology, featuring excellent circularly polarized signal capability and axial ratio, making it suitable for centimeter-level precision scenarios such as handheld devices and unmanned aerial vehicles (UAV). To enhance GNSS (Global Navigation Satellite System) RF (Radio Frequency) sensitivity, it utilizes a three-stage amplification architecture, which provides the system with a high signal-to-noise ratio (SNR). ST-QHA25 is easy to install and has an IP67 waterproof rating, allowing for long-term outdoor use.

1.2 产品特征 Key Features

- 支持 GNSS 三频多系统 Cover GNSS Tri-band multi systems
- 支持三频 RTK Support triple band RTK（Real-Time Kinematic）
- 高增益 High antenna gain
- 较宽的半功率波束宽 Wider Half Power Beam Width (HPBW)
- 出色的圆极化效果 Excellent circular polarization

1.3 产品应用 Target Applications

- 无人载具 UAV （Unmanned Aerial Vehicle）
- 测量测绘 Mapping
- 手持机 Handheld device
- 执法仪 Body camera

1.4 产品图片 Product Image

图 1 产品图片 Product photo

1.5 设计架构 Block Diagram

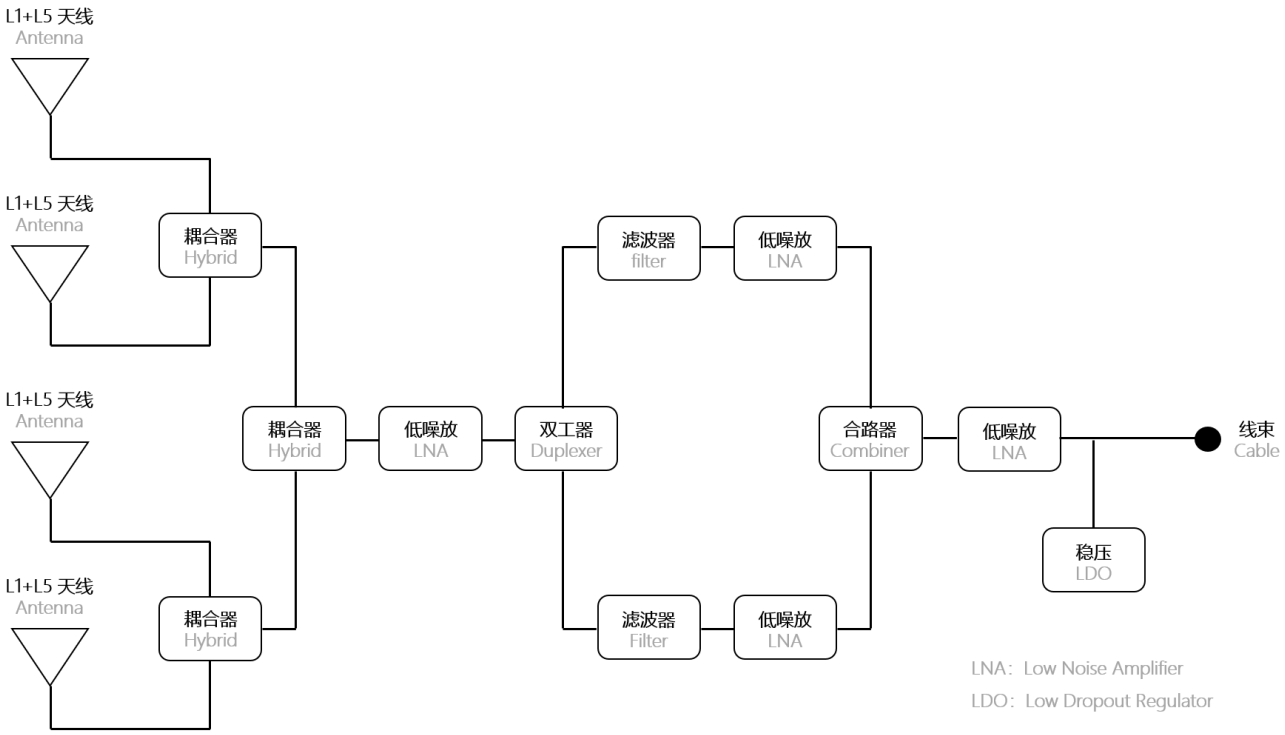


图 2 天线设计架构 Block diagram

1.6 使用说明 Instructions

使用本产品时应确保以下事项 The following matters should be ensured when using this product:

- 本产品使用时需要由接收机端或模块进行外部供电才能运行,请确保供电设备输出端口供电是否正常（仅限有源天线）

  This product requires external power supply from the receiver or GNSS module to operate. Please ensure that the power supply at the output port of the power supply device is normal. (Only active antenna)

- 如使用模块供电,主板供电建议电路如图 3，如接收机端 RF 口不带供电特性,请参考图 4 外拉供电建议（仅限有源天线）

  The recommended circuit for GNSS module and mainboard power supply is shown in Figure 3. The recommended for external power supply in Figure 4. (Only active antenna)

- 本产品与君诺达模块适配已将 LNA 增益调制最佳，不建议在增加放大增益，除非线缆超 10 米或线损超过 10dB

  For compatibility with JND modules, the LNA gain of this antenna has been adjusted to the optimal level. It is not to increase the amplification gain unless the cable length exceeds 10 meters or the cable loss exceeds 10dB.

- 请将此产品正面朝向天空方向进行卫星信号接收，产品背面朝地面安装,可增加收星效果.

  Please position the top side of the antenna facing the sky, bottom side facing the ground that can improve satellite reception performance.

- 使用此产品时,周围 1 米内不能有金属物件遮挡，会导致收星效果变差，同时需与其他通信系统保持一定的距离,避免受到干扰.

  Should be no obstruction by metal objects within 1 meter around it, when using this antenna as this will cause deterioration in satellite reception performance. kept at a certain distance from other transmitting communication systems to avoid radio signal interference.

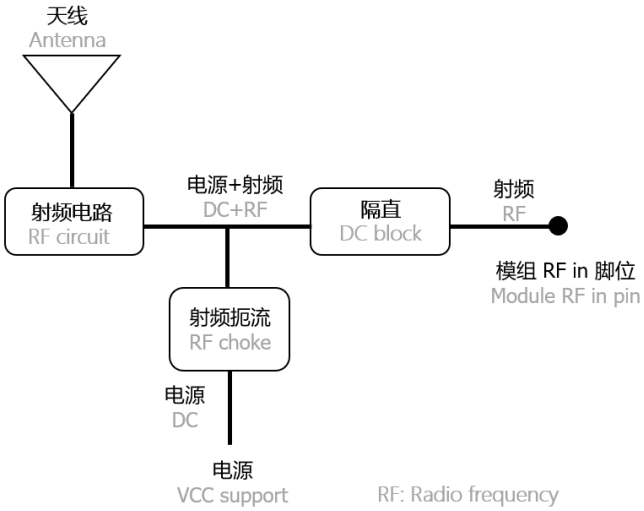


图 3 模块供电 Power supply by module

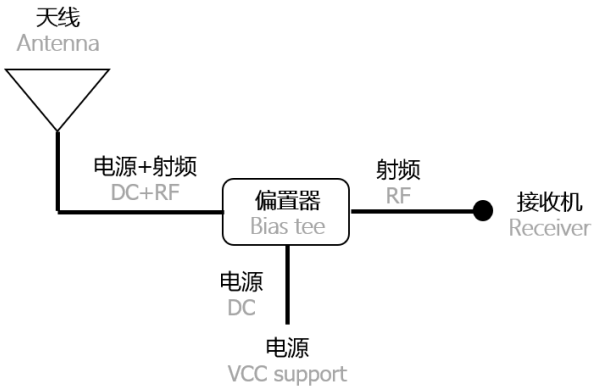


图 4 外部供电 Power supply by external

1.7 支持频段 Support Band

系统/中心频率/带宽 (MHz) System/ Center frequency/ Bandwidth (MHz)

GNSS 系统 GNSS system	是否支持 Support	GNSS 系统 GNSS system	是否支持 Support
GPS		**BEIDOU**	
L1: 1575.42 (1565-1586)	☑	B1I: 1561(1559-1564)	☑
		B1C:1575.42(1559-1592)	☑
L2: 1227.6 (1217-1238)	☑	B2a:1176.45(1166-1187)	☑
		B2I:1207.14(1197-1217)	☑
L5:1176(1164-1189)	☑	B3I:1268.52(1258-1279)	
GLONASS		**GALILEO**	
G1 L1OC/OF:1602(1595-1606)	☑	E1: 1575.42(1563-1588)	☑
G2 L2OC/OF:1248.06(1241-1255)	☑	E5a:1176.45(1166-1187)	☑
G3:1202.02(1189-1213)	☑	E5b:1207.14(1197-1218)	☑
		E6:1278.75(1258-1300)	
QZSS		**IRNSS**	
L1:1575.42(1573-1578)	☑	L5: 1176.45(1164-1189)	☑
L2C: 1227.6(1226-1229)	☑		
L5:1176.45(1166-1187)	☑		
L6:1278.75(1257-1300)			

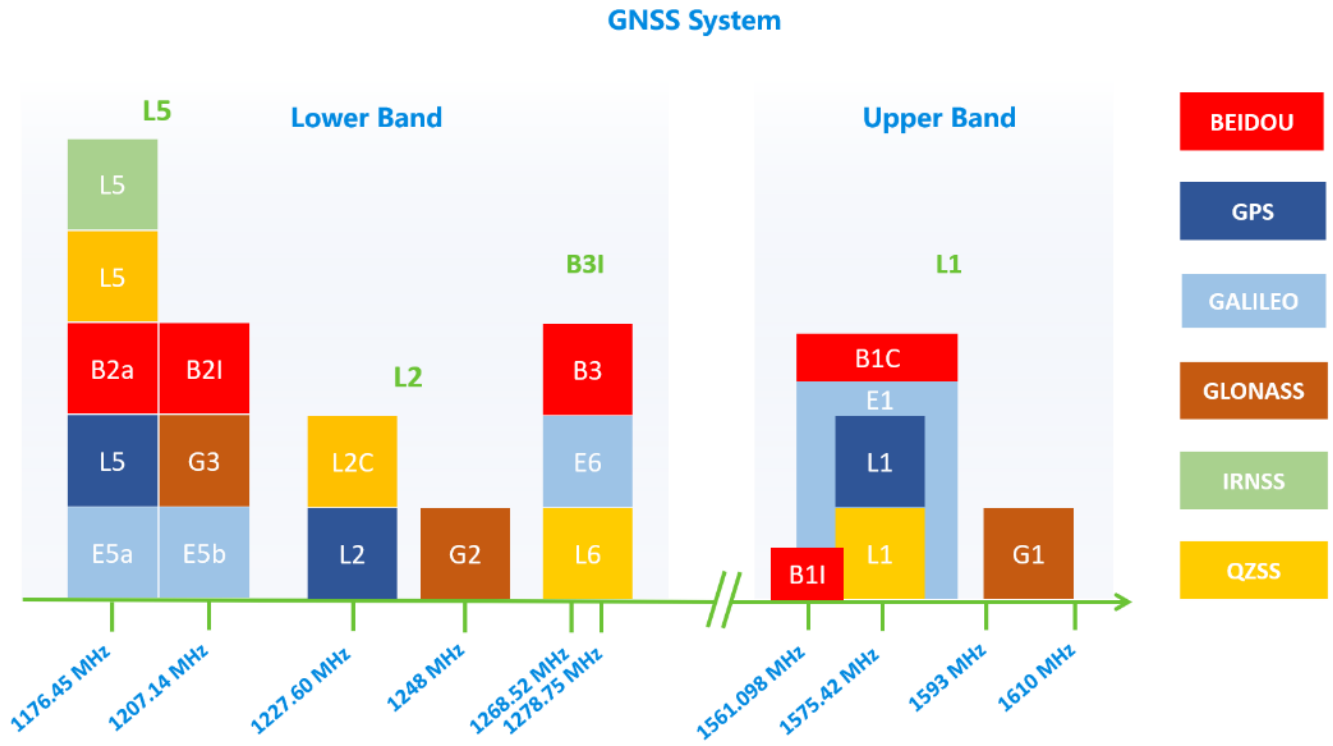


图 5 全球卫星系统及频段 GNSS system and band

2. 产品规格 Specification

2.1 天线性能 Antenna Performance

参数 Parameter	规格 Specification
回波损耗 Return loss	<-10dB
天线极化 Polarization	右手圆极化 RHCP
天线轴比 Axial ratio	<3
天线增益 Peak gain	高频 higher band : L1: 2dBi B1: 1.5dBi G1: 0.6dBi

	低频 Lower band : L5/B2a/E5a: -2dBi B2I/E5b/G3: 1dBi L2: 2dBi G2: -1dBi
半功率波束宽 3dB beam width	高频 higher band : 128^0 低频 Lower band : 110^0
阻抗 impedance	50Ω
水平覆盖范围 Horizontal cover range	360^0

RHCP: Right Hand Circular Polarization

2.2 射频性能 RF Performance

参数 Parameter	规格 Specification
放大器增益 LNA gain	37dB at 3.3V
噪声系数 Noise figure	≤1.5dB
输出端电压驻波比 Output VSWR	<2.5dB
支持电压 Support voltage	3.0-16V
功耗 Power consumption	<20mA at 3.3V

2.3 结构及环境 Mechanicals and Environment

参数 Parameter	规格 Specification
产品尺寸 Product dimension	Φ25x 高 H 59mm

输出接口 Output connector	SMA J
重量 Weight	15g
工作温度 Operation temperature	-40℃ to +85℃
湿敏等级 Moisture Sensitivity Levels	MSL 3
防水等级 Water proof	IP67
环境 Environment	NA

2.4 产品实测 Field Test

测试场景: 天线搭配君诺达定位模组于开阔场景静态测试

Test condition: Open sky static CN (Carrier noise ratio) test of antenna with JND GNSS module.

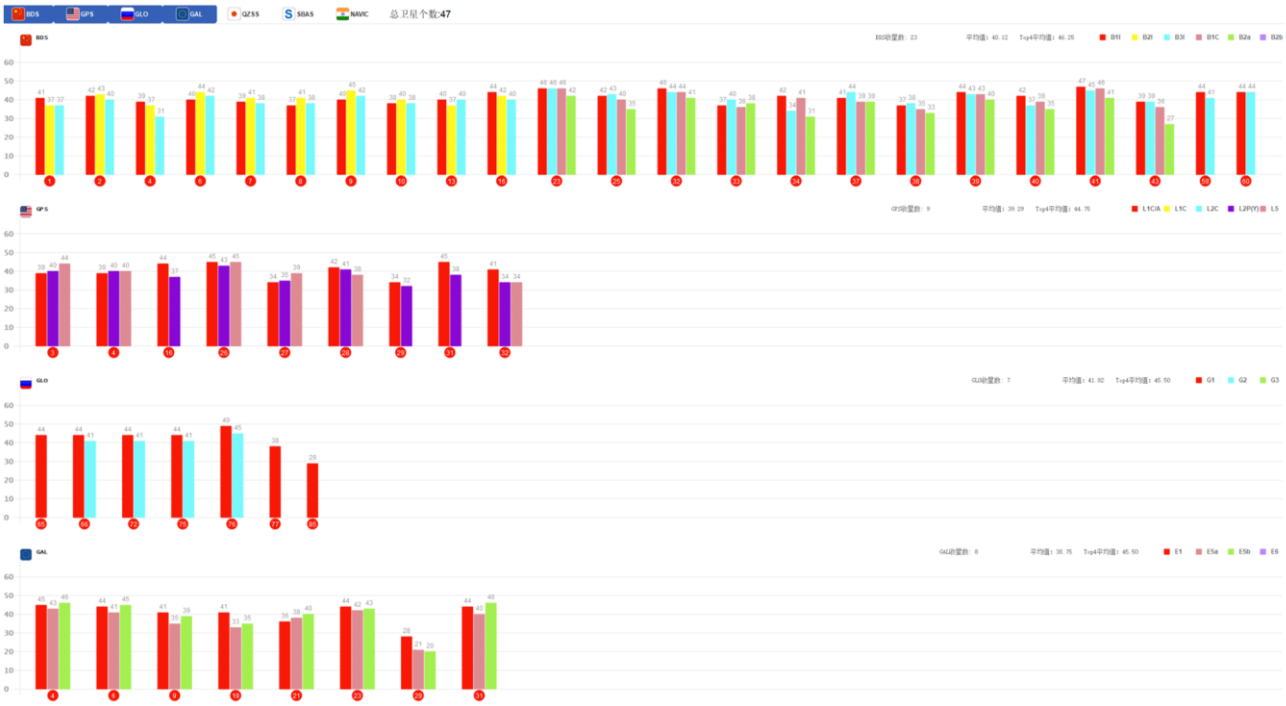


图 6 开阔静态 CN 测试 Open sky static CN test

2.5 产品尺寸 Antenna Dimension

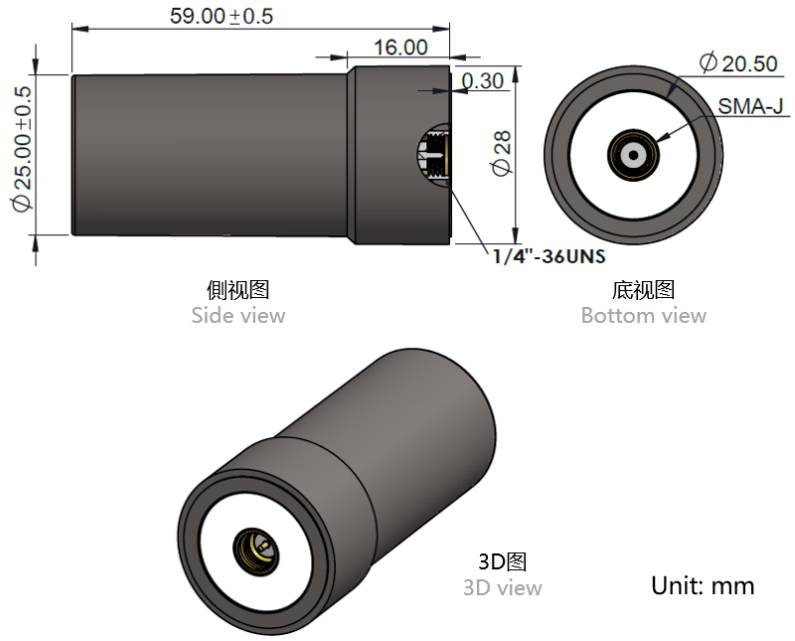


图 7 产品尺寸 Antenna dimension

3. 产品包装 Packaging

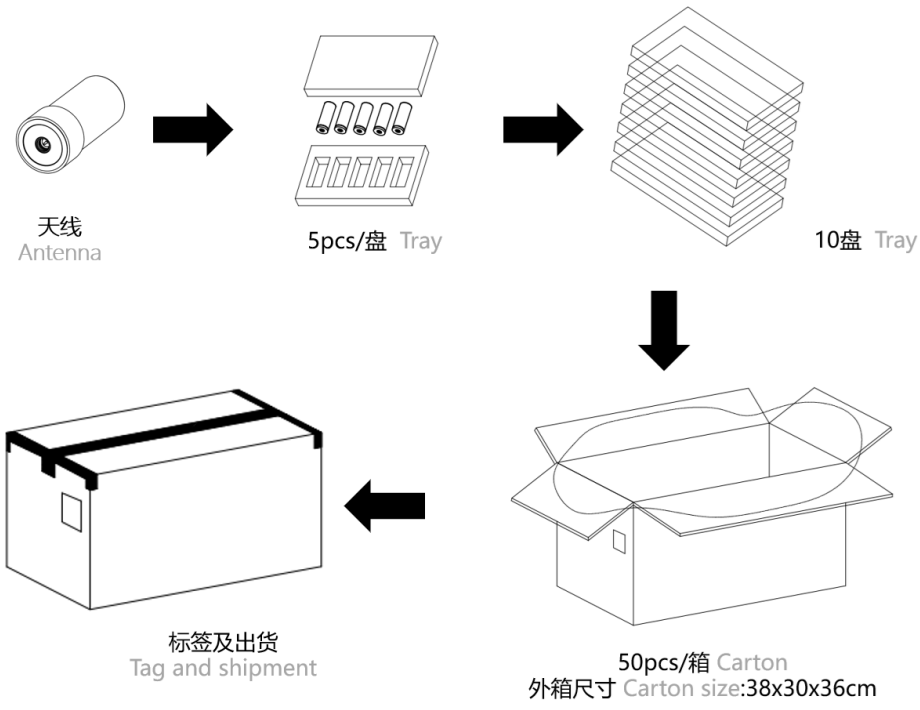


图 8 产品包装 Product packaging

4. 注意事项 Precautions

注意：遵循标准的静电放电（ESD）安全操作规范，在处理接收器时，应考虑以下措施

NOTE: standard ESD safety practices, the following measures should be taken into account whenever handling the receiver.

1. 除非本地接地（即工作台）与印刷电路板（PCB）接地之间存在电耦合，否则在操作印刷电路板时，首要接触点必须始终是本地接地与印刷电路板接地之间

   Unless there is a galvanic coupling between the local GND (i.e. the work table) and the PCB GND, then the first point of contact when handling the PCB must always be between the local GND and PCB GND.

2. 在安装天线之前，先连接设备的接地线

   The device need connect to ground before mounting an antenna.

3. 操作射频引脚时，请勿接触任何带电电容器，可能产生电荷的材料例如：贴片天线≈10 pF、同轴电缆≈50-80 pF / 米、电烙铁等在操作时时需格外小心

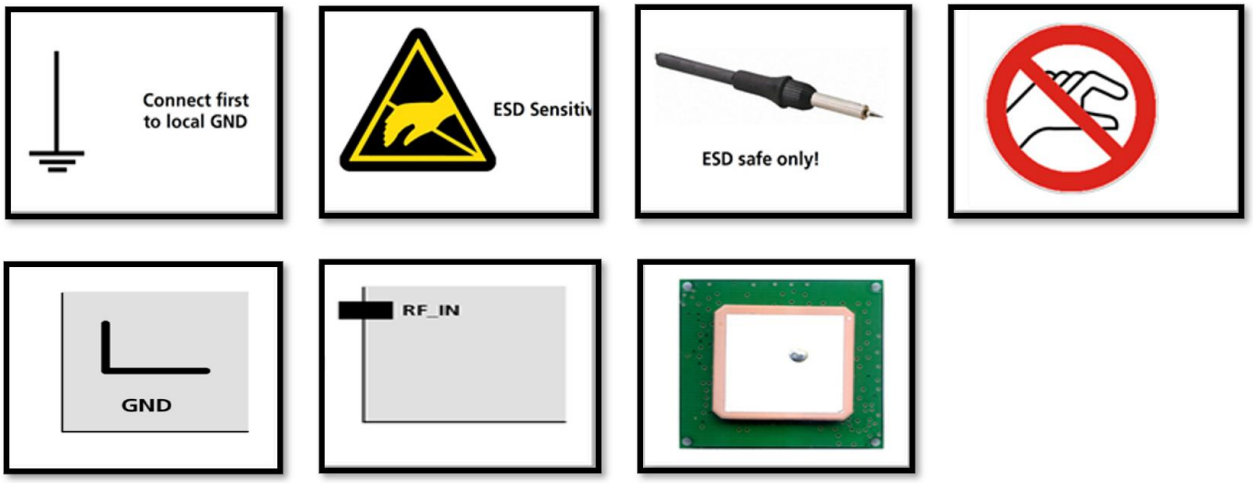
   When handling the RF pin, do not come into contact with any charged capacitors and be careful when contacting materials that can develop charges (e.g. patch antenna ~10 pF, coax cable ~50 - 80 pF/m, soldering iron etc.)

4. 为防止静电通过射频输入端放电，请勿触摸任何裸露的天线区域。如果在非防静电工作区域存在触碰此类裸露天线区域的风险，需在设计中采取适当的防静电保护措施

   To prevent electrostatic discharge through the RF input, do not touch any exposed antenna area. If there is any risk that such exposed antenna area is touched in non ESD protected work area, implement proper ESD protection measures in the design.

5. 在将射频连接器和贴片天线焊接到接收器的射频引脚上时，务必使用防静电电烙铁

Make sure to use an ESD safe soldering iron when soldering RF connectors with patch antennas to the receiver's RF pin.



5. 版本记录 Revision History

版本 Version	日期 Date	编辑 Author	描述 Note
V1.0	20250516	Sam	初始版本 Start version

6. 联系我们 Contact Us

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