



# **RF-BM-2340A1 硬件规格书**

## **(CC2340R5)**

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# 目录

|                    |    |
|--------------------|----|
| ● 概述 .....         | 3  |
| ➤ 简介 .....         | 3  |
| ➤ 特性 .....         | 3  |
| ➤ 应用 .....         | 4  |
| ➤ 功能框图 .....       | 5  |
| ➤ 主要参数 .....       | 6  |
| ● 尺寸与引脚 .....      | 7  |
| ● 常用外设引脚说明 .....   | 10 |
| ● 软件设置低频时钟来源 ..... | 12 |
| ● 软件修改频偏寄存器 .....  | 13 |
| ● 供电方式配置 .....     | 14 |
| ● 硬件设计注意事项 .....   | 15 |
| ● 常见问题 .....       | 17 |
| ➤ 传输距离不理想 .....    | 17 |
| ➤ 易损坏——异常损坏 .....  | 17 |
| ➤ 误码率太高 .....      | 17 |
| ● 回流焊条件 .....      | 18 |
| ● 静电放电警示 .....     | 18 |
| ● BQB .....        | 19 |
| ● CE .....         | 21 |
| ● 版本更新记录 .....     | 23 |
| ● 联系我们 .....       | 23 |

## ● 概述

### ➤ 简介

RF-BM-2340A1 模块是信驰达基于美国德州仪器(TI)的 CC2340R5 4\*4 封装芯片为核心设计的一款 SimpleLink 2.4 GHz 无线模块。支持 Bluetooth®5.3 Low Energy、Zigbee®、IEEE 802.15.4g、TI 15.4-Stack (2.4 GHz)及私有协议。集成了高性能 ARM Cortex-M0+ 处理器，具有 512 KB Flash、32 KB 超低泄漏 SRAM。模块将芯片的全 IO 引出，包含多种外设，如：I<sup>2</sup>C、UART、SPI、ADC 和 GPIO。



支持 BLE 5 特性：高速模式(2Mbps PHY)，远距离广播（LE Coded 125kbps 和500kbps PHY）、Privacy 1.2.1和CSA#2，且向下兼容 BLE 4.2 及早期的 BLE 规范的关键功能。

### ➤ 特性

#### 无线微控制器

- 经过优化的 48MHz Arm® Cortex®-M0+ 处理器
- 512KB 闪存程序存储器
- 12KB ROM 用于引导加载程序和驱动程序
- 36KB 超低泄漏 SRAM。待机模式下完全 RAM 保持
- 支持无线升级 (OTA)
- 串行线调试 (SWD)

#### 低功耗

- MCU 功耗：
  - 2.6 mA 工作模式，CoreMark®
  - 53  $\mu$ A/MHz（运行 CoreMark® 时）
  - <710nA 待机模式
  - 165nA 关断模式，引脚唤醒
- RF 功耗：
  - RX: 5.3 mA
  - TX: 5.1 mA（在 0 dBm 条件下）
  - TX: < 11.0 mA（在+8 dBm 条件下）

#### 无线协议支持

- BLE 5.3
- Zigbee®
- Thread
- 私有协议

#### 高性能无线电

- 125kbps PHY (LE Coded): -102dBm 接收灵敏度
- 1Mbps PHY: -96.5dBm 接收灵敏度
- IEEE 802.15.4 (2.4Ghz): -98dBm 接收灵敏度
- 高达 +8dBm 的输出功率，具有温度补偿

#### MCU 外设

- 12 个 GPIO
- 3 个 16 位和 1 个 24 位通用计时器，支持正交解码模式
- 12 位 ADC，使用外部基准时 1.2MSPS，使用内

部基准时 267ksps, 4 个外部 ADC 输入

- 1× 低功耗比较器
- 1× UART
- 1× SPI
- 1× I<sup>2</sup>C
- 实时时钟 (RTC)
- 集成温度和电池监控器
- 看门狗计时器

## ➤ 应用

- 医疗
  - 居家医疗保健: 血糖监测仪、血压监测仪、CPAP 呼吸机、电子温度计
  - 患者监护和诊断: 医疗传感器贴片
  - 个人护理和健身: 电动牙刷、可穿戴健身和活动监测仪
- 楼宇自动化
  - 楼宇安防系统: 运动检测器、电子智能锁、门窗传感器、车库门系统、网关
  - HVAC: 恒温器、无线环境传感器
  - 防火安全系统: 烟雾和热量探测器
  - 视频监控: IP 网络摄像头
- 照明
  - LED 灯具
  - 照明控制: 日光传感器、照明传感器、无线控制

## 安全驱动工具

- AES 128 位加密加速计
- 片上模拟噪声随机数发生器

## 开发工具和软件

- SimpleLink™ 低功耗 F3 软件开发套件
- 用于简单无线电配置的 SmartRF™ Studio
- SysConfig 系统配置工具

## 工厂自动化和控制

- 零售自动化和支付: 电子销售终端
  - 电子货架标签
- 电网基础设施
  - 智能仪表: 水表、燃气表、电表和热量分配表
  - 电网通信: 无线通信 - 远距离传感器应用
  - 其他替代能源: 能量收集
- 通信设备
  - 有线网络
  - 无线 LAN 或 Wi-Fi 接入点, 边缘路由器
- 个人电子产品
  - 联网外设: 消费类无线模块、指点设备、键盘
  - 游戏: 电子玩具和机器人玩具
  - 可穿戴设备 (非医用): 智能追踪器、智能服装

## ➤ 功能框图

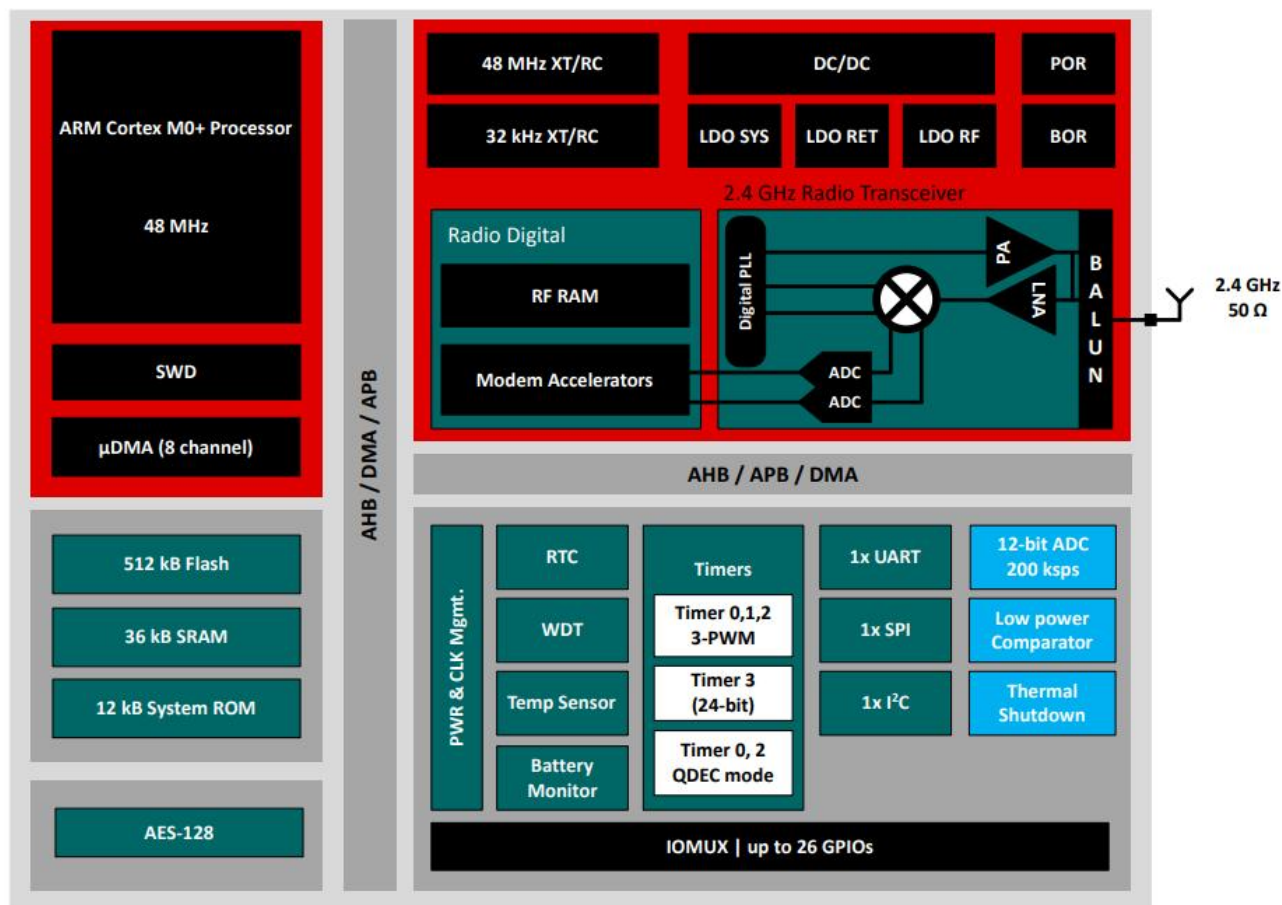


图 1. CC2340R5 系列芯片框图

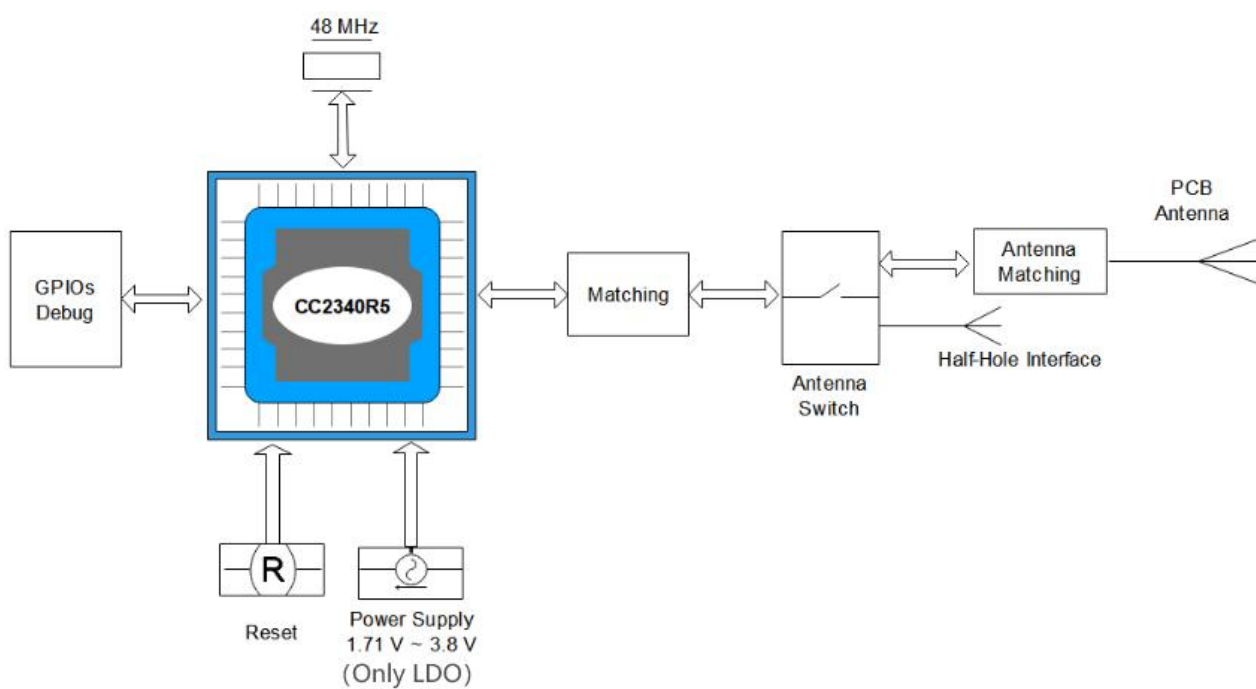


图 2. 模块框图

## ➤ 主要参数

表 1. 主要参数

|         |                                                |
|---------|------------------------------------------------|
| 芯片型号    | CC2340R52N0RGER (4*4mm)                        |
| 工作电压    | 1.71 V ~ 3.8 V (GLDO) <sup>1</sup> , 推荐为 3.3 V |
| 工作频段    | 2360 MHz ~ 2510 MHz                            |
| 最大发射功率  | + 8 dBm                                        |
| 接收灵敏度   | -102 dBm @ Bluetooth 125-kbps(LE Coded)        |
|         | -99 dBm @ Bluetooth 500-kbps(LE Coded)         |
|         | -96.5 dBm @ Bluetooth 1Mbps                    |
|         | -92 dBm @ Bluetooth 2Mbps                      |
| MCU 功耗  | 2.6 mA active mode, CoreMark®                  |
|         | 53 µA/MHz running CoreMark®                    |
|         | < 710 nA standby mode, RTC, 36 KB RAM          |
|         | 150 nA shutdown mode, wake-up on pin           |
| RF 功耗   | 5.3 mA RX                                      |
|         | 5.1 mA TX at 0 dBm                             |
|         | < 11.0 mA TX at +8 dBm                         |
| FLASH   | 512 KB                                         |
| ROM     | 12 KB (for bootloader and drivers)             |
| RAM     | 36 KB                                          |
| GPIO 数量 | 12 个                                           |
| 模块尺寸    | 11.6 * 16.5 * 2.3 mm                           |
| 封装方式    | SMT (邮票半孔)                                     |
| 协议支持    | BLE 5.3、ZigBee、SimpleLink™ TI 15.4-stack、私有协议  |
| 通讯接口    | UART, I <sup>2</sup> C, SPI, ADC               |
| 工作温度    | - 40 °C ~ + 85 °C                              |
| 储存温度    | - 40 °C ~ + 125 °C                             |

注1：该模块仅支持 **LDO** 供电模式，不支持 **DCDC** 模式，需在程序端做好配置，可参考[供电方式配置](#)章节。

## ● 尺寸与引脚

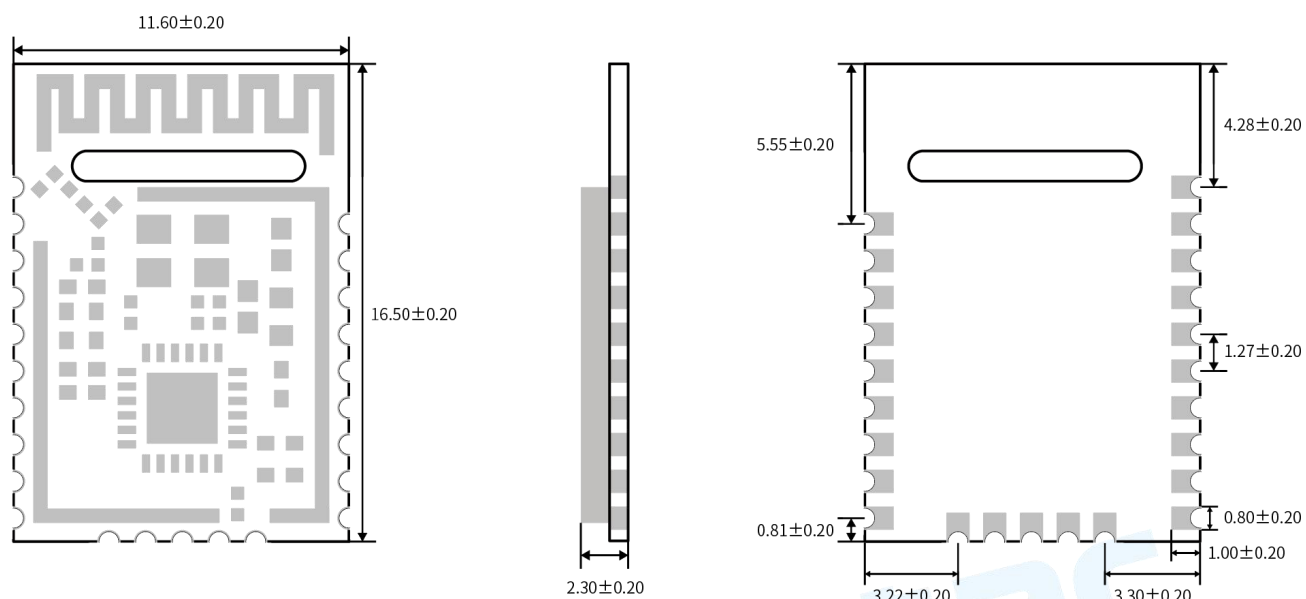


图 3. 模块尺寸图 (unit: mm)

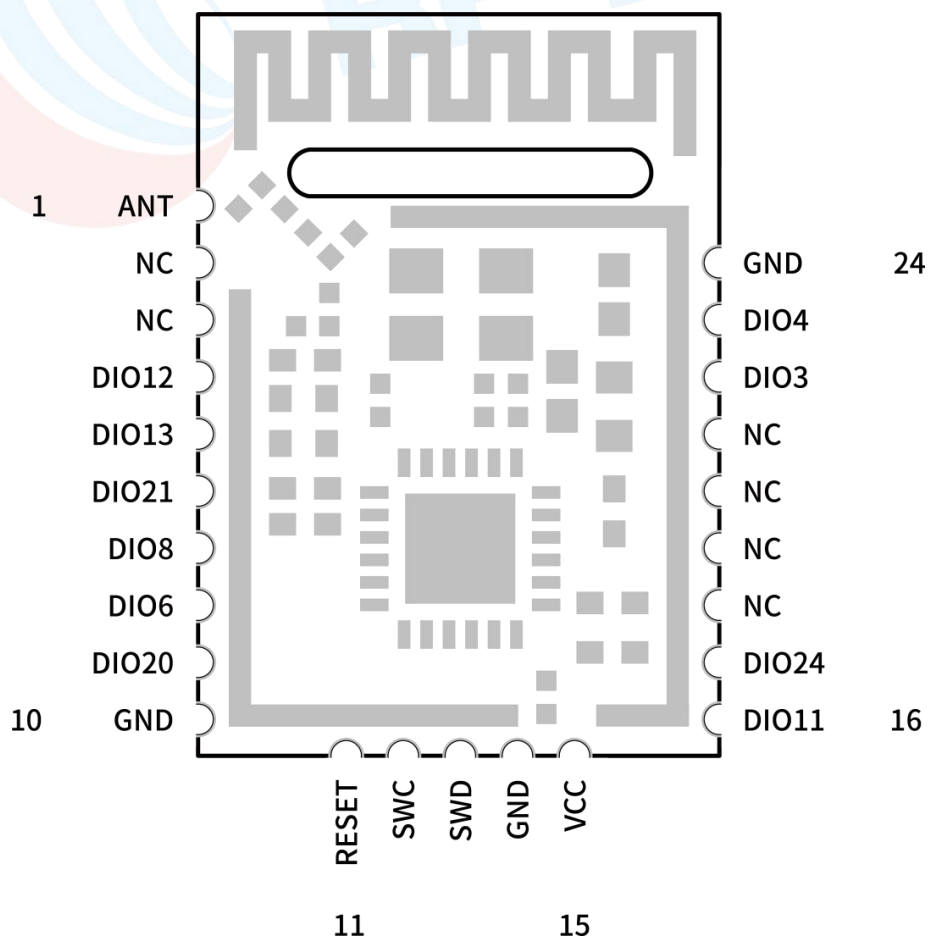


图 4. 模块引脚图

表 2. 模块引脚定义表<sup>2</sup>

| 引脚序号  | 名称                     | 功能                | 描述                                                                                        |
|-------|------------------------|-------------------|-------------------------------------------------------------------------------------------|
| 1     | ANT                    | —                 | 邮票半孔外接天线接口                                                                                |
| 2、3   | NC                     | —                 | None connect                                                                              |
| 4     | DIO12                  | Digital           | GPIO, high-drive capability                                                               |
| 5     | DIO13                  | Digital           | GPIO                                                                                      |
| 6     | DIO21                  | Digital or Analog | GPIO, analog capability                                                                   |
| 7     | DIO8                   | Digital           | GPIO                                                                                      |
| 8     | DIO6                   | Digital or Analog | GPIO, analog capability                                                                   |
| 9     | DIO20                  | Digital or Analog | GPIO, analog capability                                                                   |
| 10    | GND                    | Ground            | 地                                                                                         |
| 11    | RESET                  | RESET             | 复位，低电平有效，已接上拉电阻                                                                           |
| 12    | <b>SWC<sup>3</sup></b> | SWDCK / DIO17     | GPIO, SWD interface: clock (JTAG_TCKC), high-drive capability, <b>禁止浮空</b>                |
| 13    | <b>SWD<sup>3</sup></b> | SWDIO / DIO16     | GPIO, SWD interface: mode select or SWDIO (JTAG_TMSC), high-drive capability, <b>禁止浮空</b> |
| 14    | GND                    | Ground            | 地                                                                                         |
| 15    | VCC                    | Power             | 1.71 V ~ 3.8 V，推荐为 3.3 V                                                                  |
| 16    | DIO11                  | Digital           | GPIO                                                                                      |
| 17    | DIO24                  | Digital or Analog | GPIO, analog capability, high-drive capability                                            |
| 18~21 | NC                     | —                 | None connect                                                                              |
| 22    | DIO3                   | Digital or Analog | GPIO, 32-kHz crystal oscillator pin 1                                                     |
| 23    | DIO4                   | Digital or Analog | GPIO, 32-kHz crystal oscillator pin 2                                                     |
| 24    | GND                    | Ground            | 地                                                                                         |

注2：不同外设可使用的IO有限制，具体请查看[常用外设引脚说明](#)章节。

**注3：禁止浮空**，需对 **SWDCK** 和 **SWDIO** 进行内部或外部上/下拉处理（我司模块未外接上/下拉电阻），否则有可能会引起漏电流，导致功耗过高。（内部上/下拉设置方式看参考图5、图6 所示）

也可使用如下附件**patch**，将**GPIOLPF3.c.txt**放到工程中一起编译，而不是替换掉**SDK**中的同名文件。如果工程中没有这个文件，编译时仍将使用库文件中的代码，**patch**不会生效。

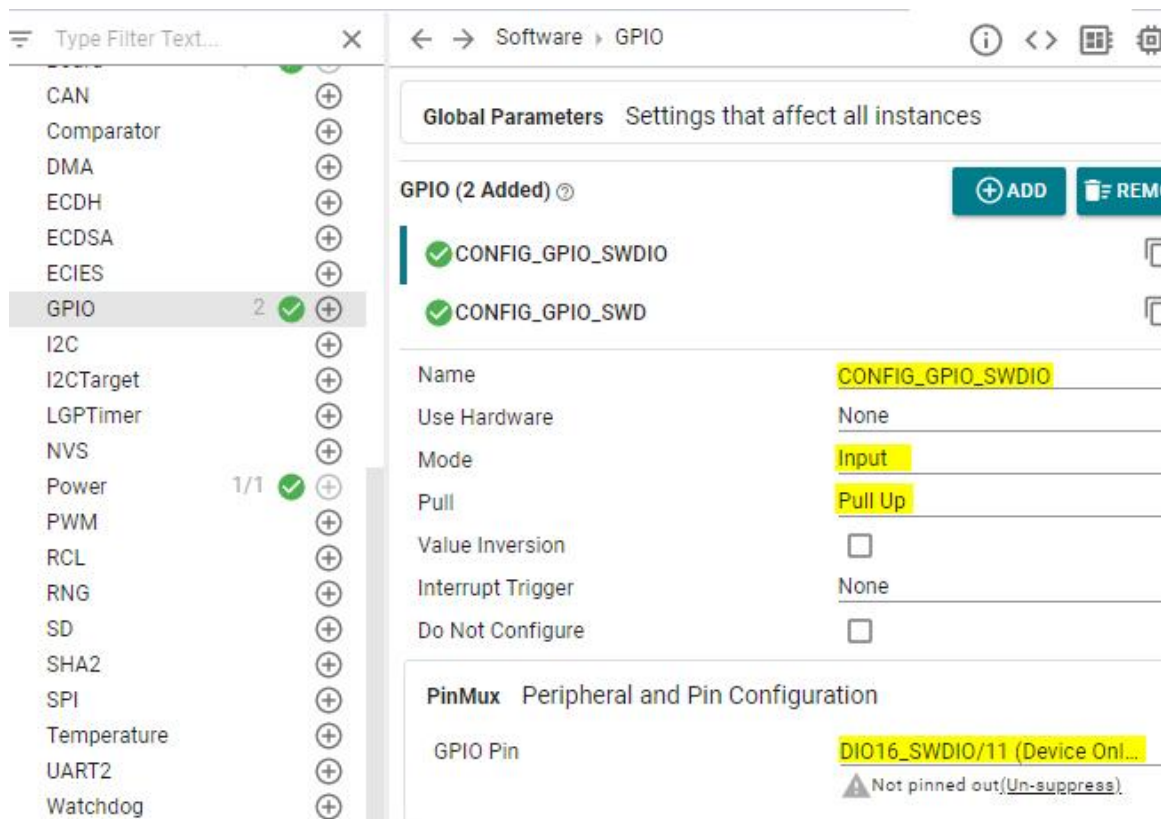


图 5. SWDIO 设置为内部上拉

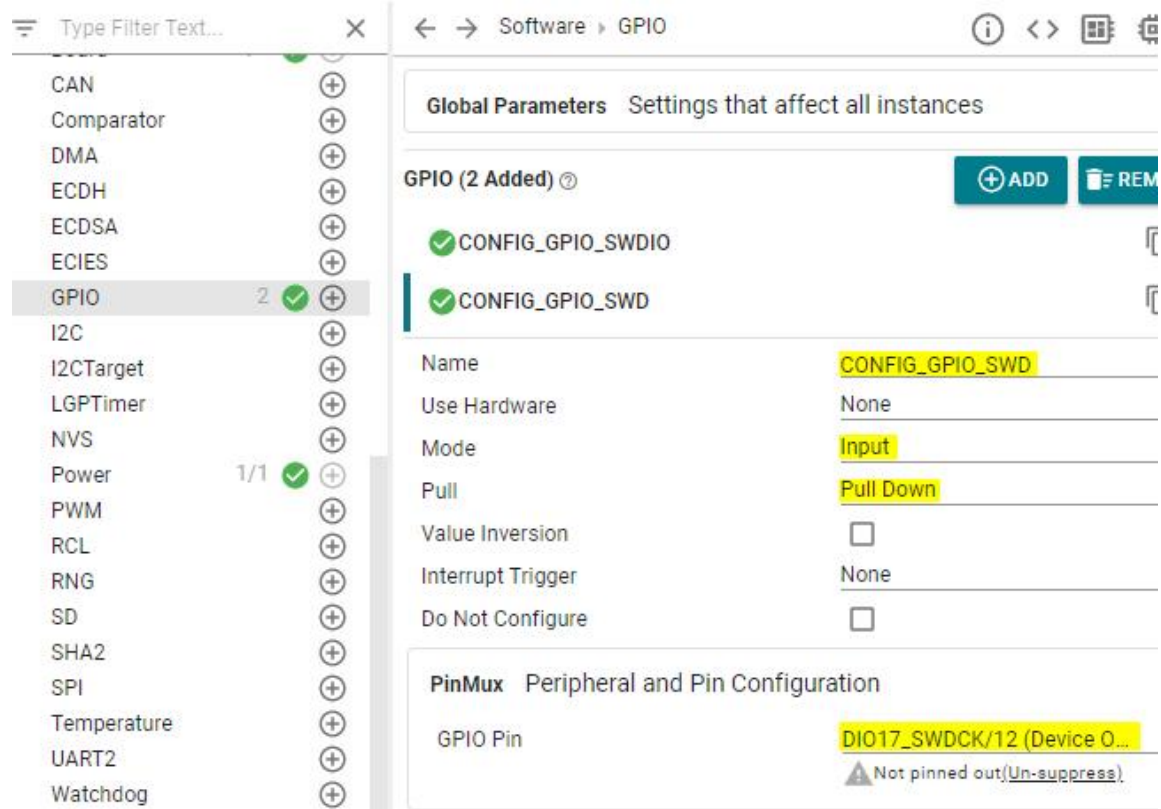


图 6. SWDCK 设置为内部下拉

## ● 常用外设引脚说明

表 3. 常用外设引脚说明

| 功能            | 信号       | 模块引脚  | 芯片脚位         | 方向  | 描述                                                |
|---------------|----------|-------|--------------|-----|---------------------------------------------------|
| UART          | UART0TXD | DIO13 | DIO13        | O   | UART0 TX data                                     |
|               |          | SWC   | DIO17_SWDCCK |     |                                                   |
|               |          | DIO20 | DIO20_A11    |     |                                                   |
|               |          | DIO4  | DIO4_X32N    |     |                                                   |
|               |          | DIO6  | DIO6_A1      |     |                                                   |
|               | UART0RXD | DIO12 | DIO12        | I   | UART0 RX data                                     |
|               |          | SWD   | DIO16_SWDIO  |     |                                                   |
|               |          | DIO20 | DIO20_A11    |     |                                                   |
|               | UART0CTS | DIO21 | DIO21_A10    | I   | UART0 clear-to-send input (active low)            |
|               | UART0RTS | DIO8  | DIO8         | O   | UART0 request-to-send (active low)                |
| ADC           | ADC11    | DIO20 | DIO20_A11    | I   | HP ADC channel 11 input                           |
|               | ADC10    | DIO21 | DIO21_A10    |     | HP ADC channel 10 input                           |
|               | ADC7     | DIO24 | DIO24_A7     |     | HP ADC channel 7 input                            |
|               | ADC1     | DIO6  | DIO6_A1      |     | HP ADC channel 1 input                            |
| ADC Reference | AREF+    | DIO6  | DIO6_A1      | I   | ADC external voltage reference, positive terminal |
| GPIO          | GPIO8    | DIO8  | DIO8         | I/O | General-purpose input or output                   |
|               | GPIO11   | DIO11 | DIO11        |     |                                                   |
|               | GPIO12   | DIO12 | DIO12        |     |                                                   |
|               | GPIO13   | DIO13 | DIO13        |     |                                                   |
|               | GPIO16   | SWD   | DIO16_SWDIO  |     |                                                   |
|               | GPIO17   | SWC   | DIO17_SWDCCK |     |                                                   |
|               | GPIO20   | DIO20 | DIO20_A11    |     |                                                   |
|               | GPIO21   | DIO21 | DIO21_A10    |     |                                                   |
|               | GPIO24   | DIO24 | DIO24_A7     |     |                                                   |
|               | GPIO3    | DIO3  | DIO3_X32P    |     |                                                   |
|               | GPIO4    | DIO4  | DIO4_X32N    |     |                                                   |
|               | GPIO6    | DIO6  | DIO6_A1      |     |                                                   |

表 3. 常用外设引脚说明（续）

| 功能               | 信号       | 模块引脚  | 芯片引脚         | 方向  | 描述                          |
|------------------|----------|-------|--------------|-----|-----------------------------|
| SPI              | SPI0SCLK | DIO8  | DIO8         | I/O | SPI clock                   |
|                  |          | SWC   | DIO17_SWDCCK |     |                             |
|                  |          | DIO24 | DIO24_A7     |     |                             |
|                  | SPI0POCI | DIO11 | DIO11        | I/O | SPI POCI ( MISO )           |
|                  |          | DIO12 | DIO12        |     |                             |
|                  |          | DIO13 | DIO13        |     |                             |
|                  |          | DIO20 | DIO20_A11    |     |                             |
|                  |          | DIO21 | DIO21_A10    |     |                             |
|                  | SPI0CSN  | DIO11 | DIO11        | I/O | SPI chip select             |
|                  |          | DIO6  | DIO6_A1      |     |                             |
|                  | SPI0PICO | DIO12 | DIO12        | I/O | SPI PICO ( MOSI )           |
|                  |          | DIO13 | DIO13        |     |                             |
|                  |          | SWD   | DIO16_SWDIO  |     |                             |
|                  |          | DIO4  | DIO4_X32N    |     |                             |
| I <sup>2</sup> C | I2C0SCL  | SWC   | DIO17_SWDCCK | I/O | I <sup>2</sup> C clock data |
|                  |          | DIO24 | DIO24_A7     |     |                             |
|                  |          | DIO6  | DIO6_A1      |     |                             |
|                  | I2C0SDA  | DIO8  | DIO8         | I/O | I <sup>2</sup> C data       |
|                  |          | DIO12 | DIO12        |     |                             |
|                  |          | SWD   | DIO16_SWDIO  |     |                             |

## ● 软件设置低频时钟来源

如下图所示，关于低频时钟（32.768 KHz），SDK 代码里一般默认配置使用的外部来源：

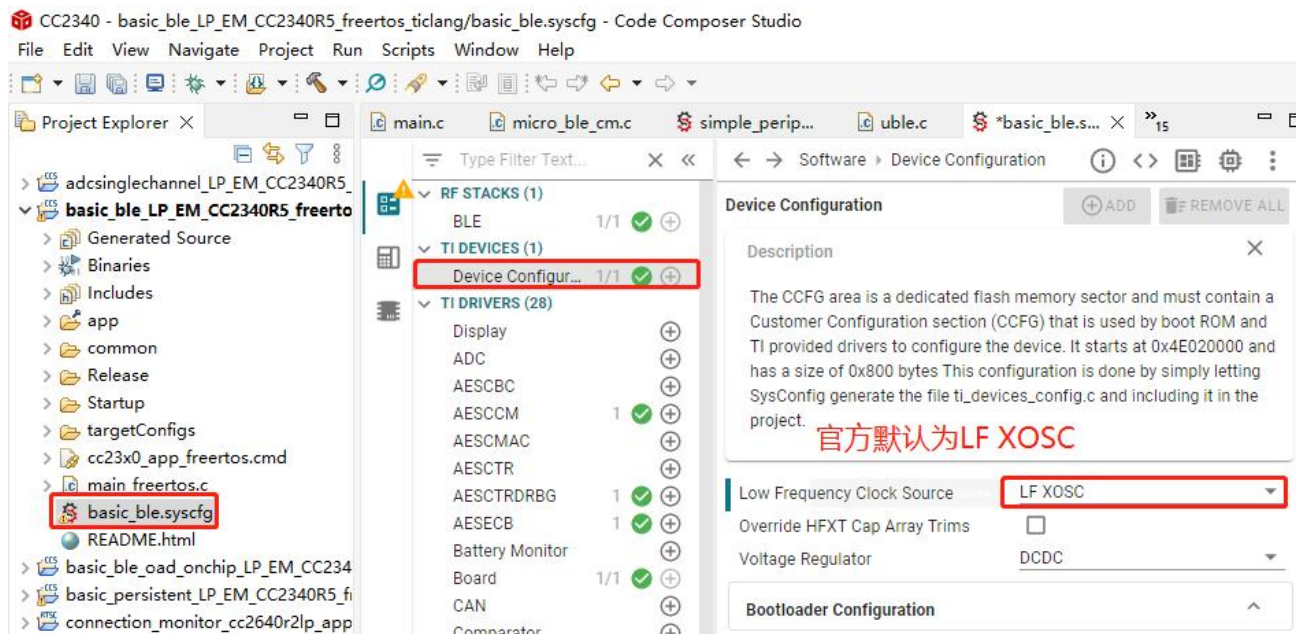


图 7

RF-BM-2340A1 模块外部无 32.768 KHz 晶振，因此代码需要配置为使用内部的 LF RCOSC 才能让模块正常工作。配置方法如下图所示：

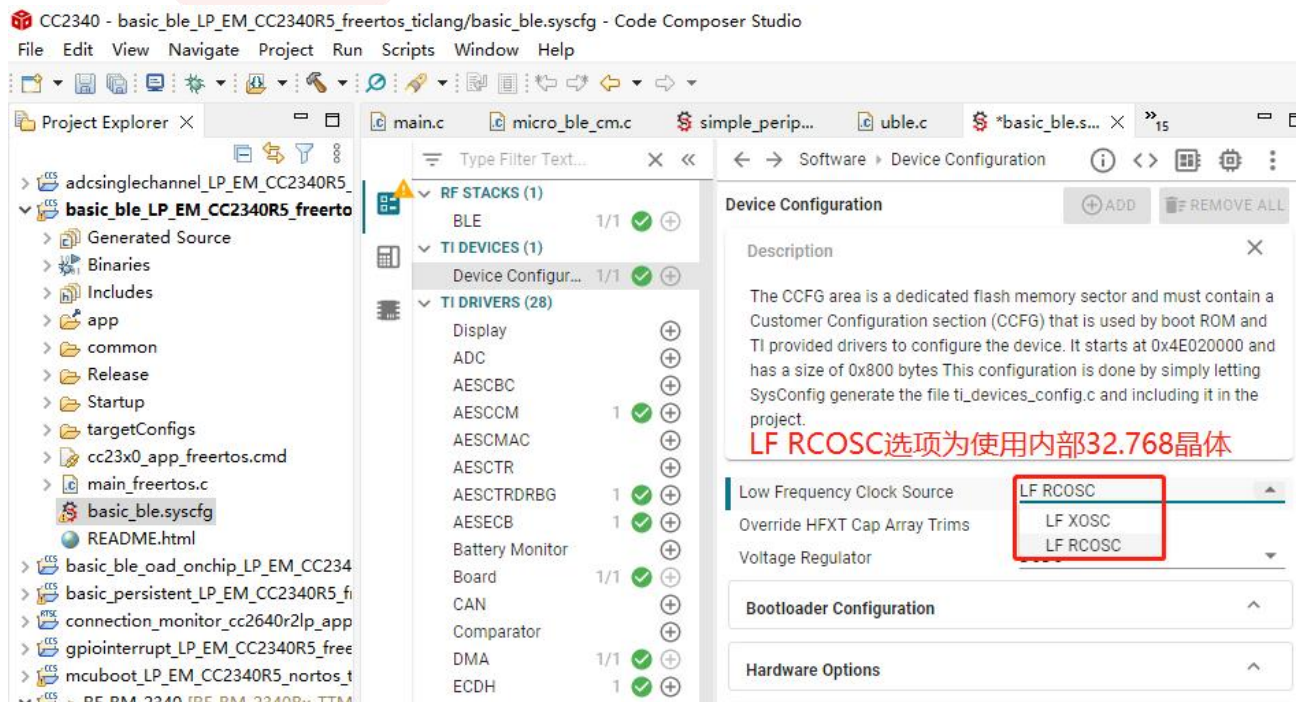


图 8

## ● 软件修改频偏寄存器

RF-BM-2340A1 需要通过软件修改频偏寄存器来为硬件射频部分做辅助设置，调整频偏。配置方法如下图所示，需要分别将红框中的值修改为 **0x31**：

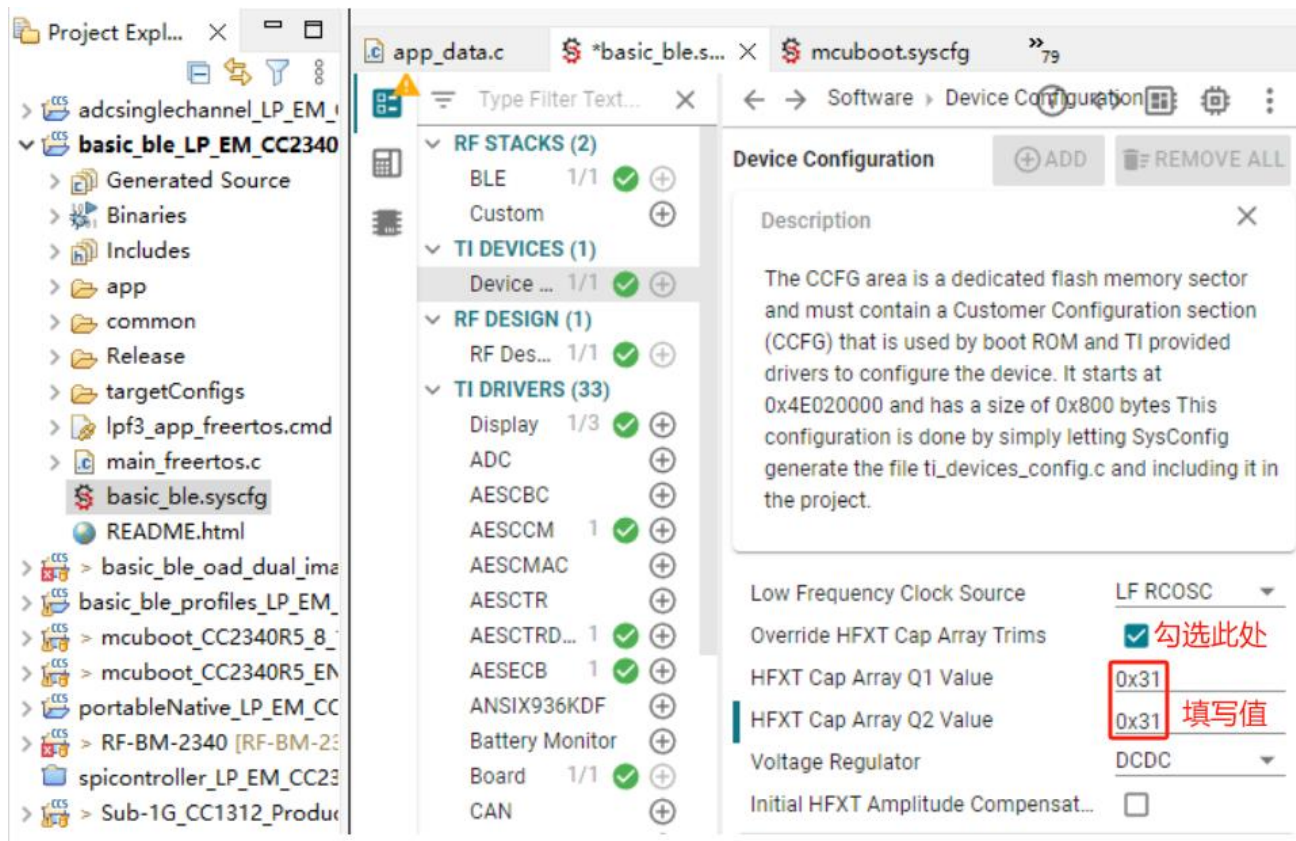


图 9

## ● 供电方式配置

RF-BM-2340A1 模块硬件仅支持 LDO 供电方式，**不支持DCDC**，SDK 代码里一般默认配置使用DCDC方式，因此需要通过软件修改配置使用LDO 才能让模块正常工作。配置方法如下图所示（与低频时钟源及频偏寄存器同一个配置界面）：

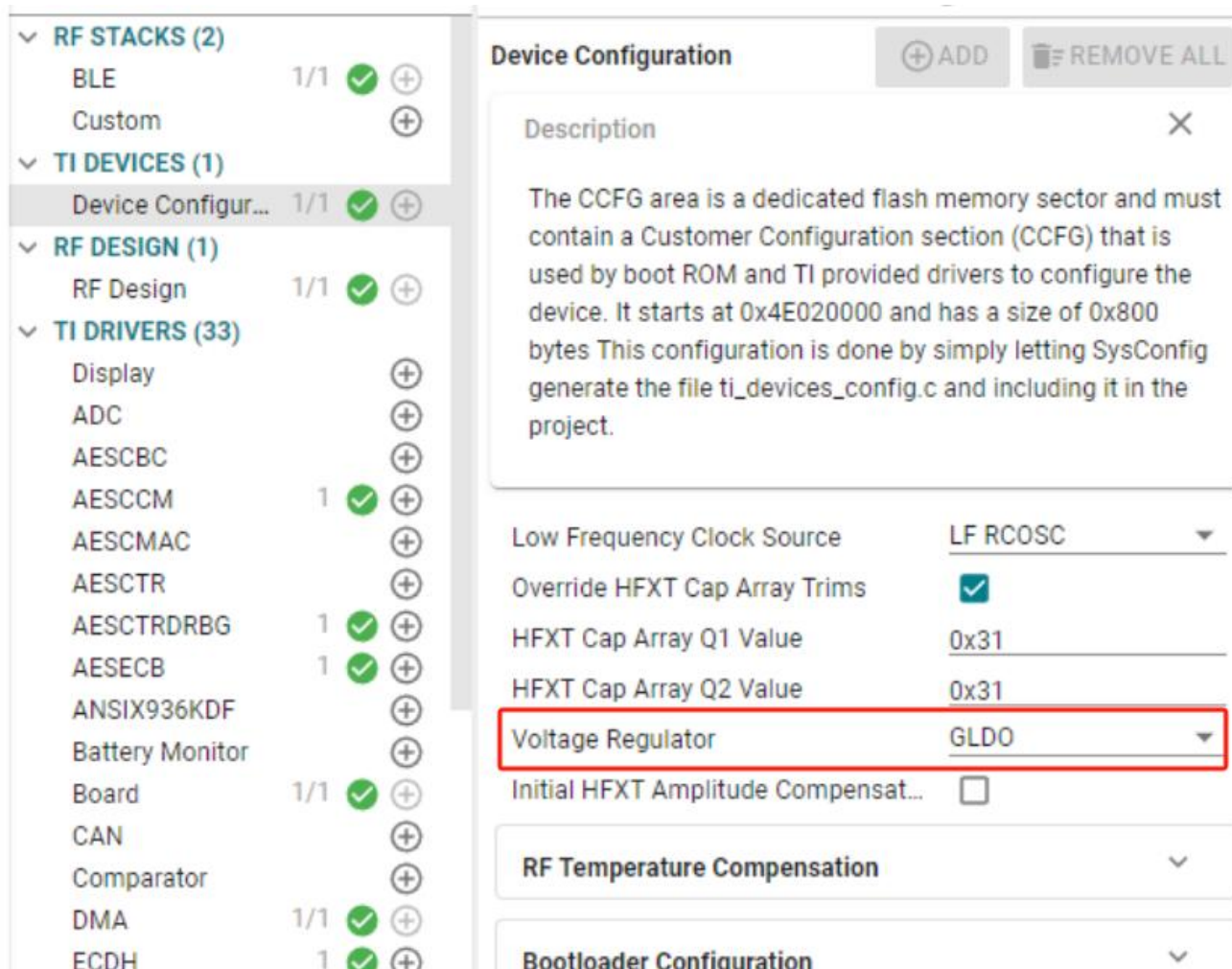


图 10

## ● 硬件设计注意事项

- 1、推荐使用直流稳压电源对模块进行供电，电源纹波系数尽量小，模块需可靠接地；请注意电源正负极的正确连接，如反接可能会导致模块永久性损坏；
- 2、请检查供电电源，确保在推荐供电电压之间，如超过最大值会造成模块永久性损坏；请检查电源稳定性，电压不能大幅频繁波动；
- 3、在针对模块设计供电电路时，往往推荐保留 30% 以上余量，有利于整机长期稳定地工作；模块应尽量远离电源、变压器、高频走线等电磁干扰较大的部分；
- 4、高频数字走线、高频模拟走线、电源走线必须避开模块下方，若实在不得已需要经过模块下方，假设模块焊接在 **Top Layer**，在模块接触部分的 **Top Layer** 铺地铜（全部铺铜并良好接地），必须靠近模块数字部分并走线在 **Bottom Layer**；
- 5、假设模块焊接或放置在 **Top Layer**，在 **Bottom Layer** 或者其他层随意走线也是错误的，会在不同程度影响模块的杂散以及接收灵敏度；
- 6、假设模块周围有存在较大电磁干扰的器件也会极大影响模块的性能，跟据干扰的强度建议适当远离模块，若情况允许可以做适当的隔离与屏蔽；
- 7、假设模块周围有存在较大电磁干扰的走线（高频数字、高频模拟、电源走线）也会极大影响模块的性能，跟据干扰的强度建议适当远离模块，若情况允许可以做适当的隔离与屏蔽；
- 8、通信线若使用5V电平，必须使用电平转换电路；
- 9、尽量远离部分物理层亦为 2.4 GHz 频段的TTL 协议，例如：USB3.0。
- 10、模块天线布局请参考下图。天线的放置直接影响天线的辐射效率，建议客户在实际的产品上在进行一次天线调试，黄色区域为keep out，距离建议大于10 mm：

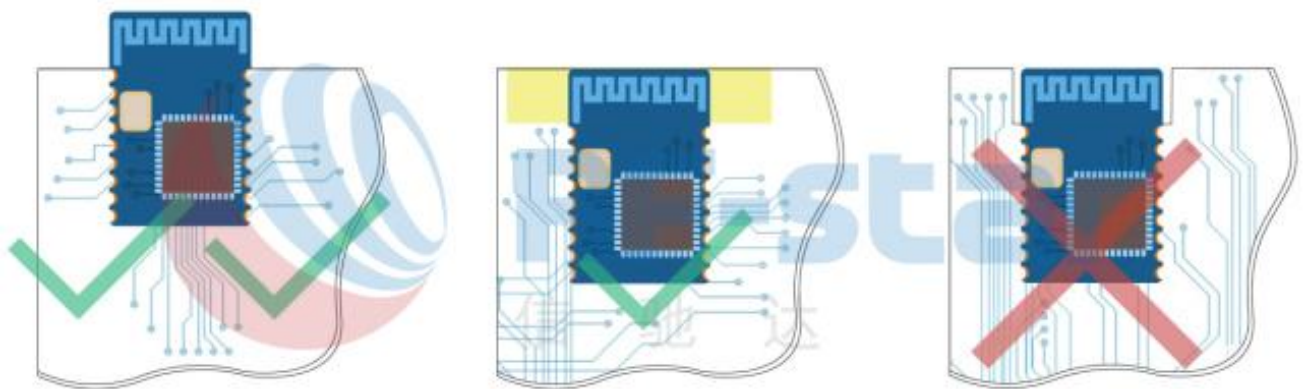


图 11. 布局建议

11、外围电路参考设计如下图所示:

如需外接ANT管脚，可按照虚线框内电路连接

预留C5、R2、C4，用于匹配天线，可以先按如下参数使用。

线路需要做50Ω的特性阻抗。

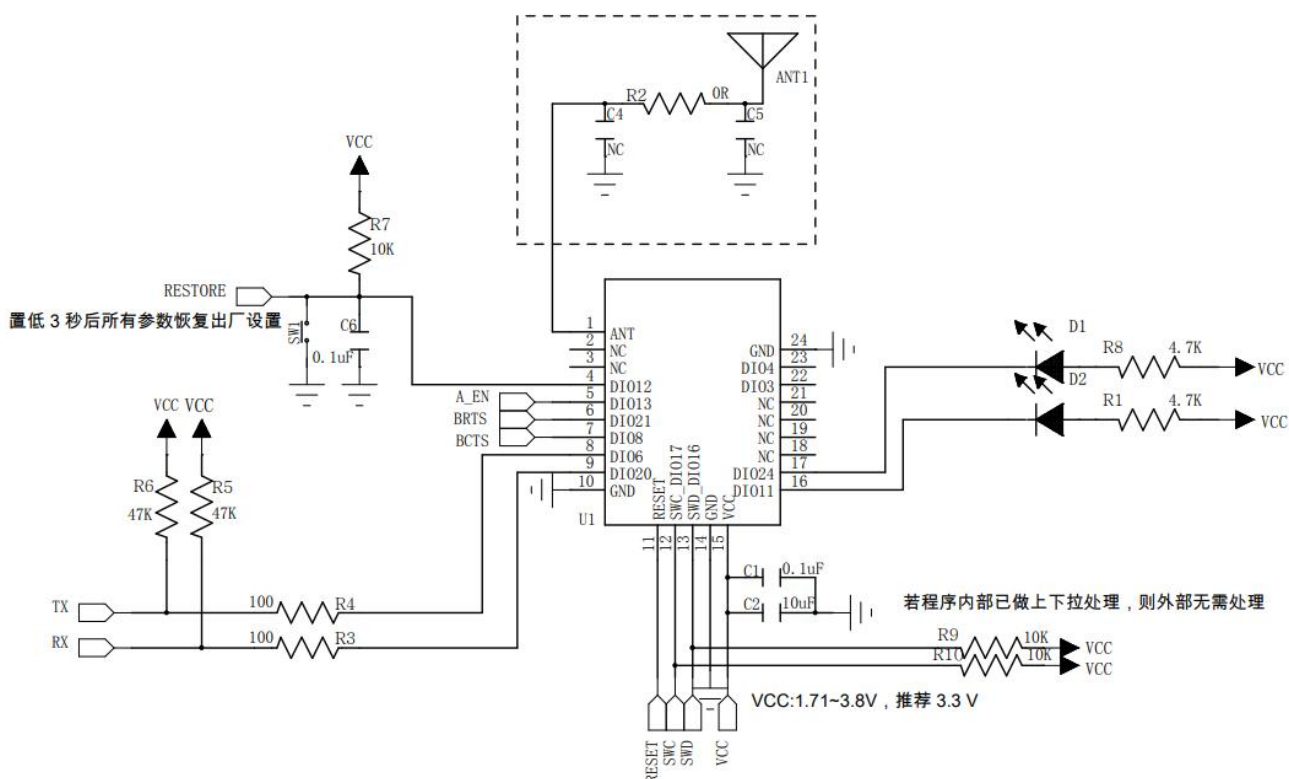


图 12. 外围参考设计

## ● 常见问题

### ➤ 传输距离不理想

- 1、当存在直线通信障碍时，通信距离会相应的衰减；温度、湿度，同频干扰，会导致通信丢包率提高；地面吸收、反射无线电波，靠近地面测试效果较差；
- 2、海水具有极强的吸收无线电波能力，故海边测试效果差；
- 3、天线附近有金属物体，或放置于金属壳内，信号衰减会非常严重；
- 4、功率寄存器设置错误、空中速率设置过高（空中速率越高，距离越近）；
- 5、室温下电源低压低于推荐值，电压越低发功率越小；
- 6、使用天线与模块匹配程度较差或天线本身品质问题。

### ➤ 易损坏——异常损坏

- 1、请检查供电电源，确保在推荐供电电压之间，如超过最大值会造成模块永久性损坏；请检查电源稳定性，电压不能大幅频繁波动；
- 2、请确保安装使用过程防静电操作，高频器件静电敏感性；
- 3、请确保安装使用过程湿度不宜过高，部分元件为湿度敏感器件；如果没有特殊需求不建议在过高、过低温度下使用。

### ➤ 误码率太高

- 1、附近有同频信号干扰，远离干扰源或者修改频率、信道避开干扰；
- 2、电源不理想也可能造成乱码，务必保证电源的可靠性；
- 3、延长线、馈线品质差或太长，也会造成误码率偏高。

## ● 回流焊条件

- 1、加热方法：常规对流或 IR 对流；
- 2、允许回流焊次数：2 次，基于以下回流焊(条件)(见下图)；
- 3、温度曲线：回流焊应按照下列温度曲线(见下图)；
- 4、最高温度：245°C。

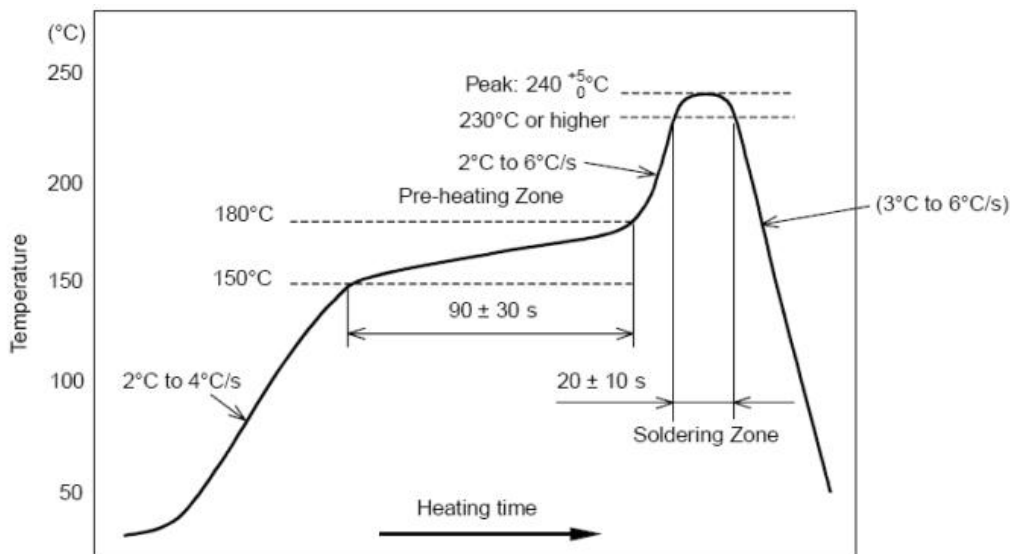


图 13. 部件的焊接耐热性温度曲线(焊接点)

## ● 静电放电警示

模块会因静电释放而被损坏，RF-star 建议所有模块应在以下 3 个预防措施下处理：

- 1、必须遵循防静电措施，不可以裸手拿模块。
- 2、模块必须放置在能够预防静电的放置区。
- 3、在产品设计时应该考虑高电压输入或者高频输入处的防静电电路。

静电可能导致的结果为细微的性能下降到整个设备的故障。由于非常小的参数变化都可能导致设备不符合其认证要求的值限，从而模块会更容易受到损害。

# ● BQB



## Project Details

| Project Name                                              | BLE Wireless Module                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        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| Product Type                                              | End Product                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                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| TCRL Version:                                             | TCRL 2023-1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                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| Referenced Qualified Design(s)                            | 201833                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     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| Previously Qualified Design Used in this Qualification(s) | 201833                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     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| Listing Date                                              | 2024-01-11                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 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| Receipt Number                                            | D067533                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    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| Product Listing(s)                                        | <table><tr><th>Name</th><th>Website</th><th>Category</th><th>Publish Date</th><th>Model Number</th><th>Description</th></tr><tr><td>RF-star BLE Wireless Module</td><td>www.szrfstar.com</td><td>Unique Products</td><td>1/11/2024 12:00:00 AM</td><td>RF-BM-2340B1</td><td>RF-BM-2340B1 are RF modules based on TI lower-power CC2340R5 SoC. They are multiprotocol 2.4 GHz wireless modules supporting Thread, ZigBee®, Bluetooth® 5.3 Low Energy, IEEE 802.15.4, and proprietary 2.4 GHz. The modules integrate a 48 MHz crystal, 512 KB of in-system Programmable Flash, 12 KB ROM for bootloader, and 36 KB of ultra-low leakage SRAM. The ARM® Cortex®-M0+ core application processor can operate at an extremely low current at flexible power modes.</td></tr><tr><td>RF-star BLE Wireless Module</td><td>www.szrfstar.com</td><td></td><td>8/21/2024 12:00:00 AM</td><td>RF-BM-2340B1I</td><td>RF-BM-2340B1I are RF modules based on TI lower-power CC2340R5 SoC. They are multiprotocol 2.4 GHz wireless modules supporting Thread, ZigBee, Bluetooth® 5.3 Low Energy, IEEE 802.15.4, and proprietary 2.4 GHz. The modules integrate a 48 MHz crystal, 512 KB of in-system Programmable Flash, 12 KB ROM for bootloader, and 64 KB of ultra-low leakage SRAM. The ARM® Cortex®-M0+ core application processor can operate at an extremely low current at flexible power modes.</td></tr><tr><td>RF-star BLE Wireless Module</td><td>www.szrfstar.com</td><td></td><td>8/21/2024 12:00:00 AM</td><td>RF-BM-2340A2</td><td>RF-BM-2340A2 are RF modules based on TI lower-power CC2340R5 SoC. They are multiprotocol 2.4 GHz wireless modules supporting Thread, ZigBee, Bluetooth® 5.3 Low Energy, IEEE 802.15.4, and proprietary 2.4 GHz. The modules integrate a 48 MHz crystal, 512 KB of in-system Programmable Flash, 12 KB ROM for bootloader, and 64 KB of ultra-low leakage SRAM. The ARM® Cortex®-M0+ core application processor can operate at an extremely low current at flexible power modes.</td></tr><tr><td>RF-star BLE Wireless Module</td><td>www.szrfstar.com</td><td></td><td>8/21/2024 12:00:00 AM</td><td>RF-BM-2340A2I</td><td>RF-BM-2340A2I are RF modules based on TI lower-power CC2340R5 SoC. They are multiprotocol 2.4 GHz wireless modules supporting Thread, ZigBee, Bluetooth® 5.3 Low Energy, IEEE 802.15.4, and proprietary 2.4 GHz. The modules integrate a 48 MHz crystal, 512 KB of in-system Programmable Flash, 12 KB ROM for bootloader, and 64 KB of ultra-low leakage SRAM. 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They are multiprotocol 2.4 GHz wireless modules supporting Thread, ZigBee, Bluetooth® 5.3 Low Energy, IEEE 802.15.4, and proprietary 2.4 GHz. The modules integrate a 48 MHz crystal, 512 KB of in-system Programmable Flash, 12 KB ROM for bootloader, and 36 KB of ultra-low leakage SRAM. The ARM® Cortex®-M0+ core application processor can operate at an extremely low current at flexible power modes.</td></tr></table> |                 |                       |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |  | Name | Website | Category | Publish Date | Model Number | Description | RF-star BLE Wireless Module | www.szrfstar.com | Unique Products | 1/11/2024 12:00:00 AM | RF-BM-2340B1 | RF-BM-2340B1 are RF modules based on TI lower-power CC2340R5 SoC. 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| RF-star BLE Wireless Module                               | www.szrfstar.com                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Unique Products | 1/11/2024 12:00:00 AM | RF-BM-2340B1  | RF-BM-2340B1 are RF modules based on TI lower-power CC2340R5 SoC. 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| RF-star BLE Wireless Module                               | www.szrfstar.com                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                 | 8/21/2024 12:00:00 AM | RF-BM-2340B1I | RF-BM-2340B1I are RF modules based on TI lower-power CC2340R5 SoC. They are multiprotocol 2.4 GHz wireless modules supporting Thread, ZigBee, Bluetooth® 5.3 Low Energy, IEEE 802.15.4, and proprietary 2.4 GHz. The modules integrate a 48 MHz crystal, 512 KB of in-system Programmable Flash, 12 KB ROM for bootloader, and 64 KB of ultra-low leakage SRAM. 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| RF-star BLE Wireless Module                               | www.szrfstar.com                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                 | 8/21/2024 12:00:00 AM | RF-BM-2340A2  | RF-BM-2340A2 are RF modules based on TI lower-power CC2340R5 SoC. They are multiprotocol 2.4 GHz wireless modules supporting Thread, ZigBee, Bluetooth® 5.3 Low Energy, IEEE 802.15.4, and proprietary 2.4 GHz. The modules integrate a 48 MHz crystal, 512 KB of in-system Programmable Flash, 12 KB ROM for bootloader, and 64 KB of ultra-low leakage SRAM. The ARM® Cortex®-M0+ core application processor can operate at an extremely low current at flexible power modes.     |  |      |         |          |              |              |             |                             |                  |                 |                       |              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                             |                  |  |                       |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                             |                  |  |                       |              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                             |                  |  |                       |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                             |                  |  |                       |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                             |                  |  |                       |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| RF-star BLE Wireless Module                               | www.szrfstar.com                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                 | 8/21/2024 12:00:00 AM | RF-BM-2340A2I | RF-BM-2340A2I are RF modules based on TI lower-power CC2340R5 SoC. They are multiprotocol 2.4 GHz wireless modules supporting Thread, ZigBee, Bluetooth® 5.3 Low Energy, IEEE 802.15.4, and proprietary 2.4 GHz. The modules integrate a 48 MHz crystal, 512 KB of in-system Programmable Flash, 12 KB ROM for bootloader, and 64 KB of ultra-low leakage SRAM. The ARM® Cortex®-M0+ core application processor can operate at an extremely low current at flexible power modes.    |  |      |         |          |              |              |             |                             |                  |                 |                       |              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                             |                  |  |                       |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                             |                  |  |                       |              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                             |                  |  |                       |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                             |                  |  |                       |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                             |                  |  |                       |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| RF-star BLE Wireless Module                               | www.szrfstar.com                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                 | 8/21/2024 12:00:00 AM | RF-BM-2340QA1 | RF-BM-2340QA1 are RF modules based on TI lower-power CC2340R5-Q1 SoC. They are multiprotocol 2.4 GHz wireless modules supporting Thread, ZigBee, Bluetooth® 5.3 Low Energy, IEEE 802.15.4, and proprietary 2.4 GHz. The modules integrate a 48 MHz crystal, 512 KB of in-system Programmable Flash, 12 KB ROM for bootloader, and 36 KB of ultra-low leakage SRAM. The ARM® Cortex®-M0+ core application processor can operate at an extremely low current at flexible power modes. |  |      |         |          |              |              |             |                             |                  |                 |                       |              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                             |                  |  |                       |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                             |                  |  |                       |              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                             |                  |  |                       |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                             |                  |  |                       |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                             |                  |  |                       |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| RF-star BLE Wireless Module                               | www.szrfstar.com                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                 | 8/21/2024 12:00:00 AM | RF-BM-2340QB1 | RF-BM-2340QB1 are RF modules based on TI lower-power CC2340R5-Q1 SoC. They are multiprotocol 2.4 GHz wireless modules supporting Thread, ZigBee, Bluetooth® 5.3 Low Energy, IEEE 802.15.4, and proprietary 2.4 GHz. The modules integrate a 48 MHz crystal, 512 KB of in-system Programmable Flash, 12 KB ROM for bootloader, and 36 KB of ultra-low leakage SRAM. The ARM® Cortex®-M0+ core application processor can operate at an extremely low current at flexible power modes. |  |      |         |          |              |              |             |                             |                  |                 |                       |              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                             |                  |  |                       |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                             |                  |  |                       |              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                             |                  |  |                       |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                             |                  |  |                       |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                             |                  |  |                       |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |

|                             |                  |                        |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|-----------------------------|------------------|------------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| RF-star BLE Wireless Module | www.szrfstar.com | 8/21/2024 12:00:00 AM  | RF-BM-2340QD1 | RF-BM-2340QD1 are RF modules based on TI lower-power CC2340R5-Q1 SoC. They are multiprotocol 2.4 GHz wireless modules supporting Thread, ZigBee, Bluetooth® 5.3 Low Energy, IEEE 802.15.4, and proprietary 2.4 GHz. The modules integrate a 48 MHz crystal, 512 kB of in-system Programmable Flash, 12 kB ROM for bootloader, and 36 kB of ultra-low leakage SRAM. The ARM® Cortex®-M0+ core application processor can operate at an extremely low current at flexible power modes. |
| RF-star BLE Wireless Module | www.szrfstar.com | 8/21/2024 12:00:00 AM  | RF-BM-2340C2  | RF-BM-2340C2 are RF modules based on TI lower-power CC2340R5 SoC. They are multiprotocol 2.4 GHz wireless modules supporting Thread, ZigBee, Bluetooth® 5.3 Low Energy, IEEE 802.15.4, and proprietary 2.4 GHz. The modules integrate a 48 MHz crystal, 512 kB of in-system Programmable Flash, 12 kB ROM for bootloader, and 64 kB of ultra-low leakage SRAM. The ARM® Cortex®-M0+ core application processor can operate at an extremely low current at flexible power modes.     |
| RF-star BLE Wireless Module | www.szrfstar.com | 8/21/2024 12:00:00 AM  | RF-BM-2340T1  | RF-BM-2340T1 are RF modules based on TI lower-power CC2340R5 SoC. They are multiprotocol 2.4 GHz wireless modules supporting Thread, ZigBee, Bluetooth® 5.3 Low Energy, IEEE 802.15.4, and proprietary 2.4 GHz. The modules integrate a 48 MHz crystal, 512 kB of in-system Programmable Flash, 12 kB ROM for bootloader, and 64 kB of ultra-low leakage SRAM. The ARM® Cortex®-M0+ core application processor can operate at an extremely low current at flexible power modes.     |
| RF-star BLE Wireless Module | www.szrfstar.com | 8/21/2024 12:00:00 AM  | RF-BM-2340T2  | RF-BM-2340T2 are RF modules based on TI lower-power CC2340R5 SoC. They are multiprotocol 2.4 GHz wireless modules supporting Thread, ZigBee, Bluetooth® 5.3 Low Energy, IEEE 802.15.4, and proprietary 2.4 GHz. The modules integrate a 48 MHz crystal, 512 kB of in-system Programmable Flash, 12 kB ROM for bootloader, and 64 kB of ultra-low leakage SRAM. The ARM® Cortex®-M0+ core application processor can operate at an extremely low current at flexible power modes.     |
| RF-star BLE Wireless Module | www.szrfstar.com | 8/21/2024 12:00:00 AM  | RF-BM-2340T3  | RF-BM-2340T3 are RF modules based on TI lower-power CC2340R5 SoC. They are multiprotocol 2.4 GHz wireless modules supporting Thread, ZigBee, Bluetooth® 5.3 Low Energy, IEEE 802.15.4, and proprietary 2.4 GHz. The modules integrate a 48 MHz crystal, 512 kB of in-system Programmable Flash, 12 kB ROM for bootloader, and 64 kB of ultra-low leakage SRAM. The ARM® Cortex®-M0+ core application processor can operate at an extremely low current at flexible power modes.     |
| RF-star BLE Wireless Module | www.szrfstar.com | 12/24/2024 12:00:00 AM | RF-BM-2340A1  | RF-BM-2340A1 are RF modules based on TI lower-power CC2340R5 SoC. They are multiprotocol 2.4 GHz wireless modules supporting Thread, ZigBee, Bluetooth® 5.3 Low Energy, IEEE 802.15.4, and proprietary 2.4 GHz. The modules integrate a 48 MHz crystal, 512 kB of in-system Programmable Flash, 12 kB ROM for bootloader, and 64 kB of ultra-low leakage SRAM. The ARM® Cortex®-M0+ core application processor can operate at an extremely low current at flexible power modes.     |
| RF-star BLE Wireless Module | www.szrfstar.com | 12/24/2024 12:00:00 AM | RF-BM-2340A1I | RF-BM-2340A1I are RF modules based on TI lower-power CC2340R5 SoC. They are multiprotocol 2.4 GHz wireless modules supporting Thread, ZigBee, Bluetooth® 5.3 Low Energy, IEEE 802.15.4, and proprietary 2.4 GHz. The modules integrate a 48 MHz crystal, 512 kB of in-system Programmable Flash, 12 kB ROM for bootloader, and 64 kB of ultra-low leakage SRAM. The ARM® Cortex®-M0+ core application processor can operate at an extremely low current at flexible power modes.    |

**Member Company** ShenZhen RF STAR Technology CO.,LTD.

**Declaring Member Contact / Listing Contact Person**

|                    |                                                                                                                  |
|--------------------|------------------------------------------------------------------------------------------------------------------|
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| <b>Address</b>     | Room 502-503, Block12-A5, Shenzhen Bay Science and Technology Ecological Park, Nanshan District, Shenzhen, China |
| <b>City</b>        | Shenzhen                                                                                                         |
| <b>State</b>       | Guangdong                                                                                                        |
| <b>Country</b>     | China                                                                                                            |
| <b>Postal Code</b> | 518063                                                                                                           |

● CE

C O M P L I A N C E



## VERIFICATION OF COMPLIANCE

Verification No.: SZCR2501000349ATV  
Applicant: Shenzhen RF-star Technology Co., Ltd.  
Address of Applicant: Room 503, Block 12-A5, Shenzhen Bay Science and Technology Ecological Park, Nanshan District, Shenzhen, China  
Manufacturer: Shenzhen RF-star Technology Co., Ltd.  
Address of Manufacturer: Room 503, Block 12-A5, Shenzhen Bay Science and Technology Ecological Park, Nanshan District, Shenzhen, China  
Product Description: Multiprotocol 2.4 GHz Wireless Module  
Model No.: RF-BM-2340A1  
Standard Required: EN 300 328 V2.2.2, EN 301 489-1 V2.2.3, EN 301 489-17 V3.3.1, EN 62479:2010, EN IEC 62368-1:2020+A11:2020  
Test Report Number(s): SZCR250100034901, SZCR250100034902, SZCR250100034903, SZES250100071201

### Conclusion

Based on a review of the test report(s) detailed above, this apparatus meets the requirements of above standards. The product is in conformity with the essential requirements of Article 3.1 (a) the protection of the health and with safety, 3.1 (b) an adequate level of electromagnetic compatibility and 3.2 effective use of the spectrum of 2014/53/EU.

The CE mark can be used, under the responsibility of the manufacturer, after completion of an EU Declaration of Conformity and compliance with all relevant EU Directives.



Keny Xu  
Laboratory Manager  
SGS-CSTC Standards Technical Services Co., Ltd.

2025-02-25

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EMC-VOC-F07/ Rev.2.0/ 2024-03-25  
Page 1 of 1



## Test Report

Report No: SZES250100071201

Date: 2025-02-25

Applicant: Shenzhen RF-star Technology Co., Ltd.  
Room 503, Block12-A5, Shenzhen Bay Science and Technology Ecological Park,  
Nanshan District, Shenzhen, China

Manufacturer: Same as applicant

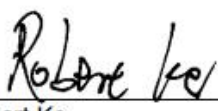
Test object / Model: Multiprotocol 2.4 GHz Wireless Module / RF-BM-2340A1

Test specifications / Test standard: EN IEC 62368-1:2020+A11:2020

Purpose of examination: Test according to the test specification.

Test result: In the opinion of SGS-CSTC the presented appliance was found to be in compliance with the test specification and standards.

Remark: None

  
Robert Ke  
Project Manager  
Safety Laboratory

  
Hazel Huang  
Project Engineer



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## ● 版本更新记录

| 文档日期       | 更新内容                                                  |
|------------|-------------------------------------------------------|
| 2024/11/29 | 第一次发布                                                 |
| 2025/03/20 | 更新芯片型号<br>新增仅支持 LDO 供电方式说明<br>新增 BQB 认证<br>新增 CE 认证证书 |

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