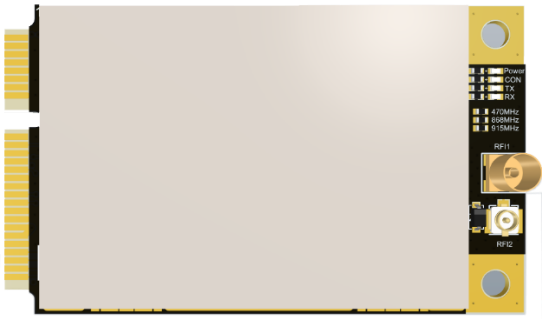
DS12305

RHF0M302B Mini-PCIE 网关模组技术规格书

V1.0



Document information

Info	Content
Keywords	RisingHF, LoRa®网关模块，Mini-PCIE 接口
Abstract	本文档是 RHF0M302B Mini-PCIE 网关模组技术规格书

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1 介绍

RHF0M302B Mini-PCIE 网关模组是基于 Semtech SX1302 的高性能 LoRa®/ LoRaWAN®网关模块。SX1302 是新一代高速 LoRa®网关基带处理芯片，可处理更高容量的数据收发，集成 16 个不同的 LoRa® 解调引擎，支持高速扩频因子 SF5 和 SF6。

RHF0M302B Mini-PCIE 网关模组内含高性能射频前端，包括低噪放 LNA，功放 PA 以及射频开关。通讯接口采用 SPI 接口。 小尺寸、标准化 Mini-PCIE 封装，助力客户可以轻松地开发自己的多通道 LoRa®/ LoRaWAN®网关。

主要特点

- 小尺寸：60mm * 30mm * 3mm
- 52 pin Mini-PCIE封装，易于集成应用
- 频段选择
  - 470MHz / 868MHz / 915MHz
- 集成16个不同的解调引擎：
  - 8xSF5-SF12, 8通道多扩频因子解调器
  - 8xSF5-SF10, 8通道多扩频因子解调器专门用于SF5-SF10
- 1个独立高速LoRa® 解调器，单扩频因子SF, 支持带宽(125, 250 or 500 kHz)
- 自适应调整扩频因子从SF12 到 SF5 （对于8个支持多扩频因子的通道）
- 高性能：
  - -138dBm 接收灵敏度/SF12 125KHz
  - 26dBm 最大功率输出
- 设计接口：SPI接口连接
- 支持GPS PPS 脉冲输入用于网络同步，支持LoRaWAN® CLASS B
- 单电源+3.3V输入
- 完全支持LoRaWAN®协议 Class A, Class B 和 Class C

本产品规格书包括 RHF0M302B Mini-PCIE 接口网关模组性能和功能的详细描述。

2 总体描述

RHF0M302B Mini-PCIE 接口网关模组基于 Semtech LoRaWAN®集中器参考设计。 射频开关用于实现半双工模式。 图 1 显示了该模块的简单框图。

原理框图：

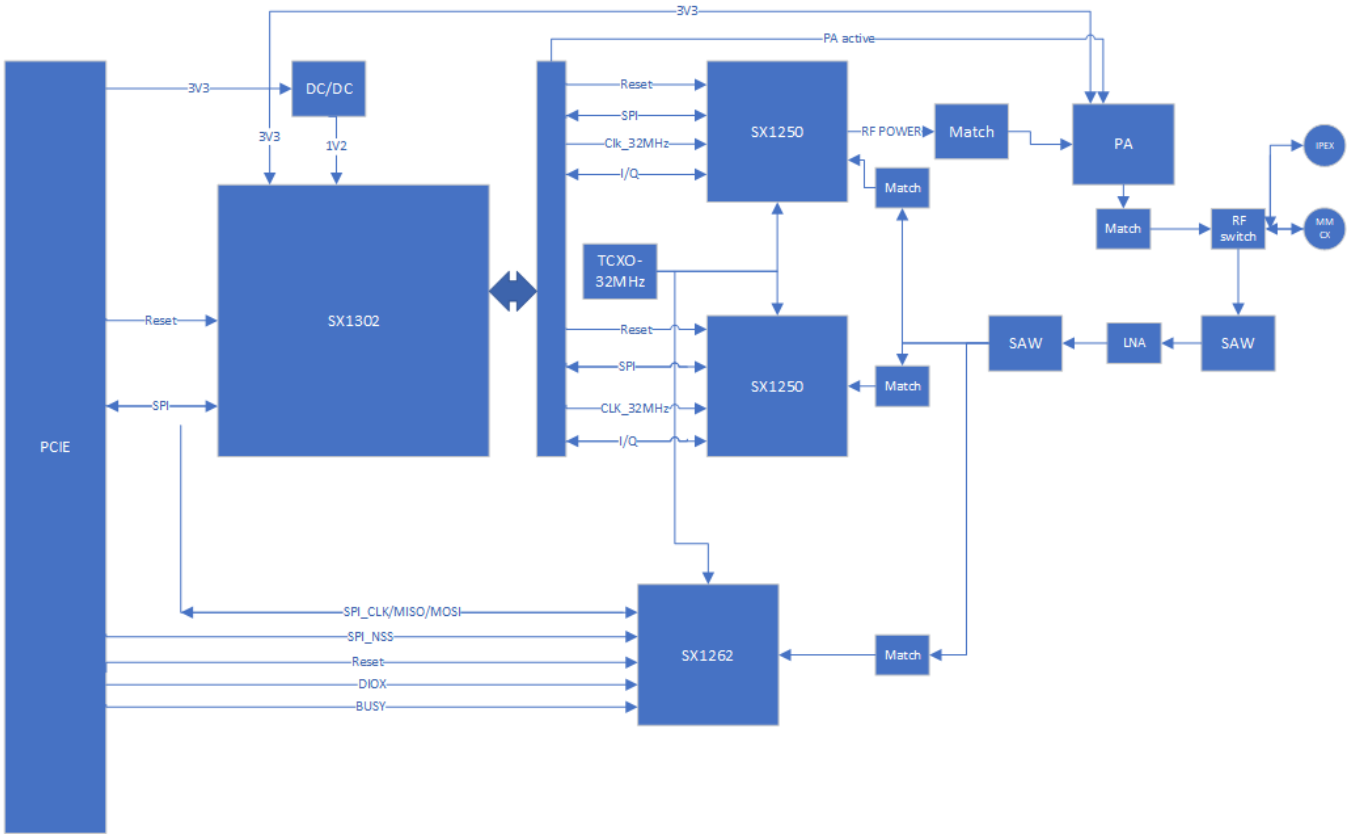

Figure 1 RHF0M302B Mini-PCIE Schematic diagram

2.1 管脚定义

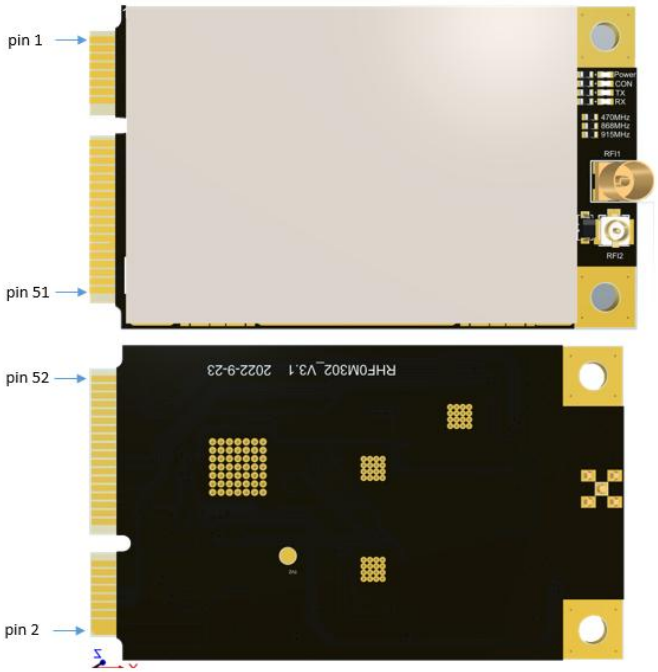

Figure 2 RHF0M302B Mini-PCIE Interface Pin arrangement

Table 1 RHF0M302B Mini-PCIE Interface pinout

Number	Name	Type	Description
1	NC	/	/
2	VCC_3.3V	S	Power
3	NC	/	/
4	GND	S	Ground
5	NC	/	/
6	GPIO(6)	I/O	SX1302 GPIO6
7	NC	/	/
8	SX1261_BUSY	I/O	SX1261_BUSY
9	GND	S	Ground
10	SX1261_NRESET	I/O	SX1261 Reset
11	NC	/	/
12	NC	/	/
13	NC	/	/
14	NC	/	/
15	GND	S	Ground
16	NC	/	/
17	NC	/	/
18	GND	S	Ground
19	PPS	I/O	GPS timing input

20	NC	/	/
21	GND	S	Ground
22	SX1302_RESET	I/O	SX1302 Reset
23	NC	/	/
24	VCC_3.3V	S	Power
25	SX1261_SPI_NSS	I/O	SX1261 Spi chip select signal input
26	GND	S	Ground
27	GND	S	Ground
28	NC	/	/
29	GND	S	Ground
30	NC	/	/
31	SX1261_DIO2	I/O	SX1261_DIO2
32	NC	/	/
33	SX1261_DIO1	I/O	SX1261_DIO1
34	GND	S	Ground
35	GND	S	Ground
36	NC	/	/
37	GND	S	Ground
38	NC	/	/
39	VCC_3.3V	S	Power
40	GND	S	Ground
41	VCC_3.3V	S	Power
42	NC	/	/
43	GND	S	Ground
44	NC	/	/
45	SPI_SCK	I/O	SPI clock signal input
46	NC	/	/
47	SPI_MISO	I/O	SPI data output
48	NC	/	/
49	SPI_MOSI	I/O	SPI data input
50	GND	S	Ground
51	SPI_CSN	I/O	Spi chip select signal input
52	VCC_3.3V	S	Power

3 电气特性

3.1 工作条件

达到或超过下表列出的额定最大值会导致设备损坏。

Table 2 Absolute Maximum Ratings

Item	Description	min	type	max	unit
VCCmr	供电电压	-0.3	+3.3	+3.6	V
Cmr	供电电流	1.5			A
Tmr	环境温度	-40	+25℃	+85	℃
Pmr	射频输入信号	-		-13	dBm

注意：最大电流约为 600mA，最大输出功率与 50Ω匹配。 但是，如果输出端口不匹配（例如，天线不匹配），则峰值电流将约为 1A。

3.2 射频特性

3.2.1 发射特性

Table 3 RHF0M302-SPI-470B RF transmitter characteristics

Part Number	Parameter	Min	Type	Max	Unit
RHF0M302-SPI-470B	Frequency Range(TX)	470.2		509.9	MHz
	Frequency Range(RX)	470.2		490	MHz
	Max output power		25.5		dBm
	TX power ariation temperature (-40~85℃)	-1.5		1.5	dBm
	TX frequency ariationtemperature (-40~85℃)	-3		3	ppm

Table 4 RHF0M302-SPI-868B RF transmitter characteristics

Part Number	Parameter	Min	Type	Max	Unit
RHF0M302-SPI-868B	Frequency Range(TX)	859		928	MHz
	Frequency Range(RX)	859		871	MHz
	Max output power		24		dBm
	TX power ariation temperature (-40~85℃)	-1.5		1.5	dBm
	TX frequency ariation temperature (-40~85℃)	-3		3	ppm

Table 5 RHF0M302-SPI-915B RF transmitter characteristics

Part Number	Parameter	Min	Type	Max	Unit
RHF0M302-SPI-915B	Frequency Range(TX)	859		928	MHz
	Frequency Range(RX)	902.3		927.9	MHz
	Max output power		26		dBm
	TX power ariation temperature (-40~85℃)	-1.5		1.5	dBm
	TX frequency ariation temperature (-40~85℃)	-3		3	ppm

3.2.2 接收特性

Table 6 RHF0M302-SPI-470B RF receive characteristics

Part Number	Bandwith/KHz	Spreading Factor	Sensityvity/dBm
RHF0M302-SPI-470B	125KHz	12	-138
		5	-117
	250KHz	12	-135
		5	-114
	500KHz	12	-132
		5	-111

Table 7 RHF0M302-SPI-868B RF receive characteristics

Part Number	Bandwith/KHz	Spreading Factor	Sensityvity/dBm
RHF0M302-SPI-868B	125KHz	12	-138
		5	-117
	250KHz	12	-135
		5	-114
	500KHz	12	-132
		5	-111

Table 8 RHF0M302-SPI-915B RF receive characteristics

Part Number	Bandwith/KHz	Spreading Factor	Sensityvity/dBm
RHF0M302-SPI-868B	125KHz	12	-138
		5	-117
	250KHz	12	-135
		5	-114
	500KHz	12	-132
		5	-111

3.3 频率响应

3.3.1 RHF0M302-SPI-470B

Available band: 470MHz to 490MHz (uplink); 470MHz to 510MHz (downlink);

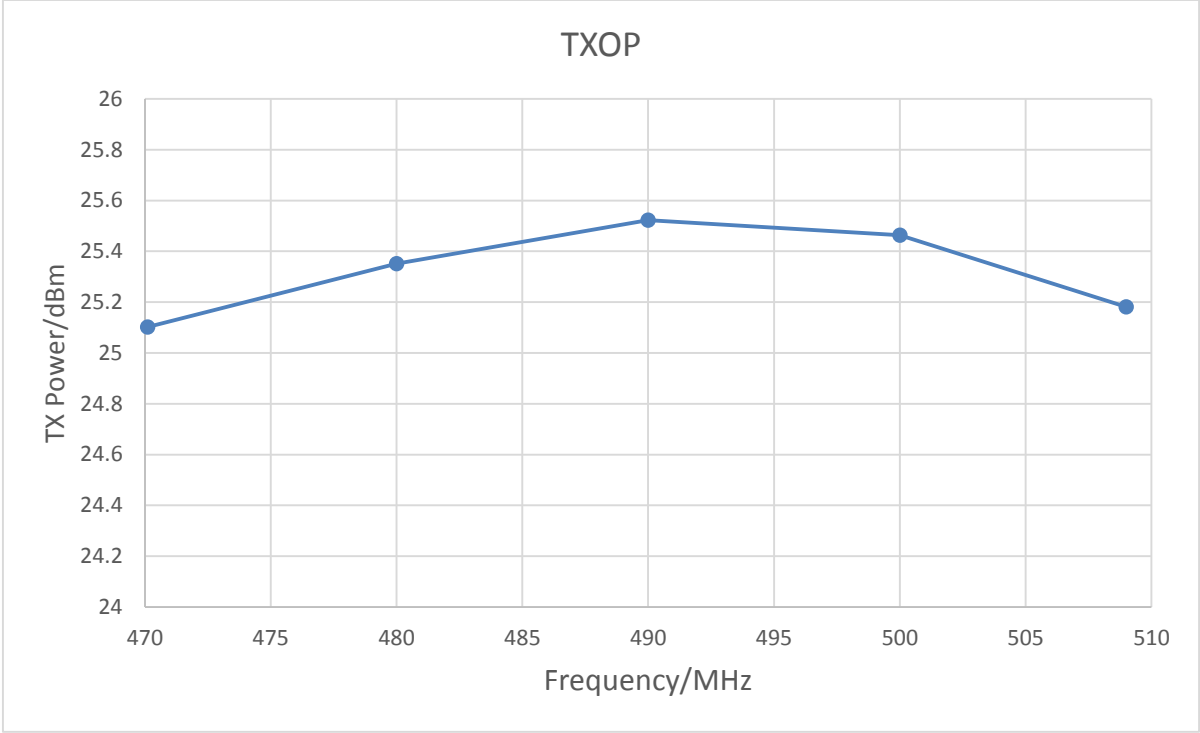

Figure 3 Txop vs Freq for RHF0M302-SPI-470B

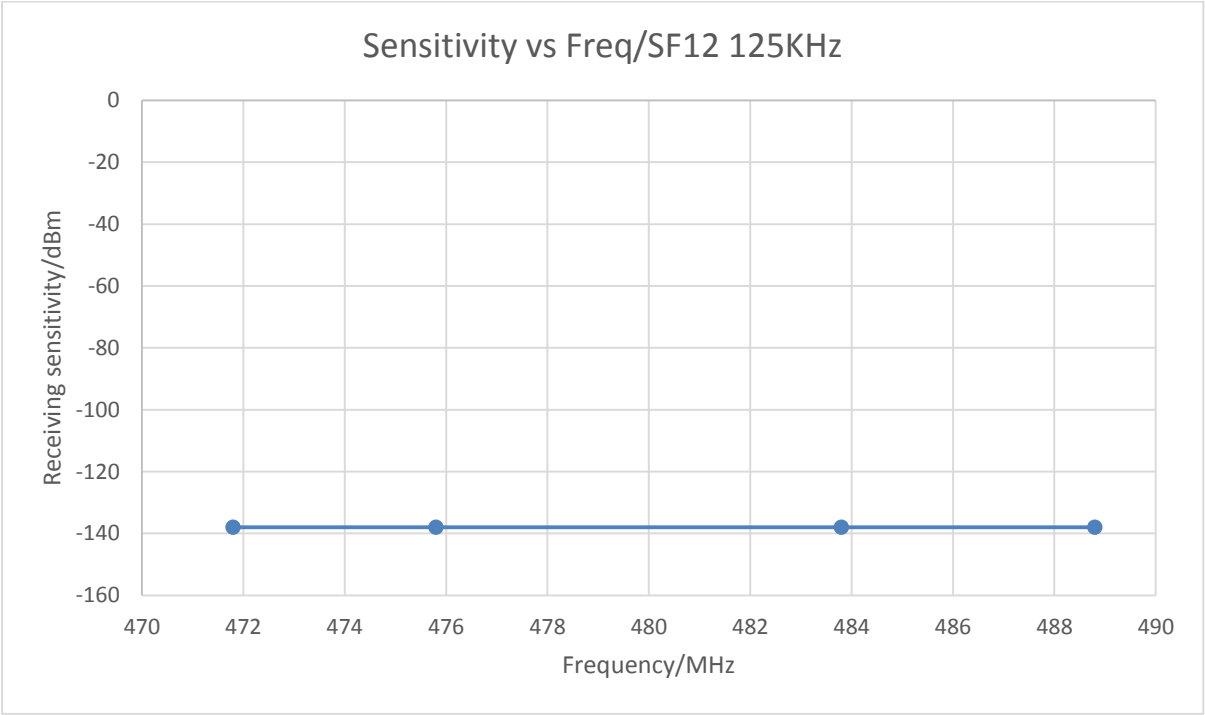

Figure 4 Sensitivity vs Freq for RHF0M302-SPI-470B

3.3.2 RHF0M302-SPI-868B

Available band: 859MHz to 871MHz

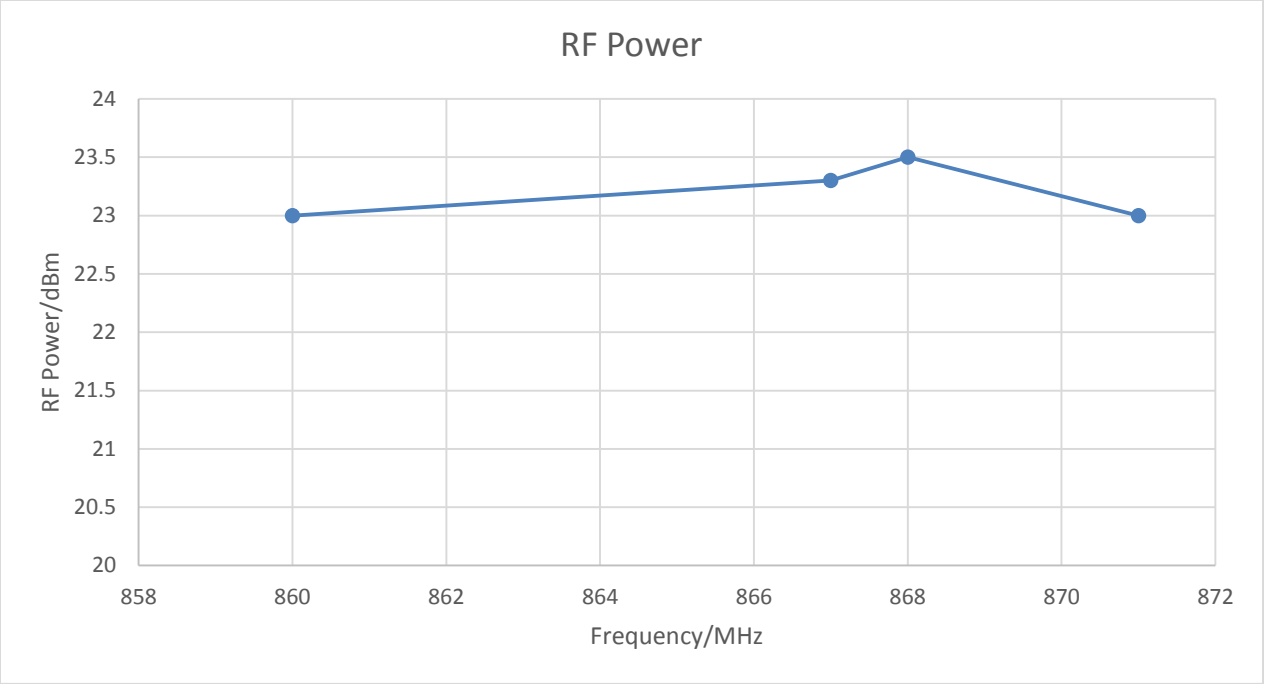

Figure 5 Txop vs Freq for RHF0M302-SPI-868B

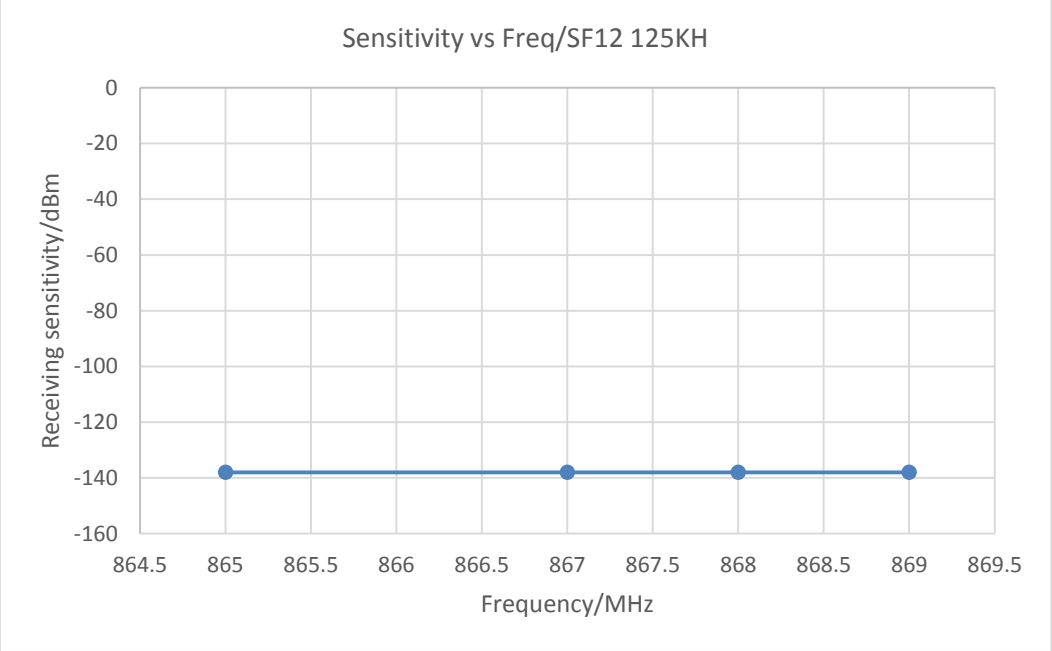

Figure 6 Sensitivity vs Freq for RHF0M302-SPI-868B

3.3.3 RHF0M302-SPI-915B

Available band: 900MHz to 927.9MHz

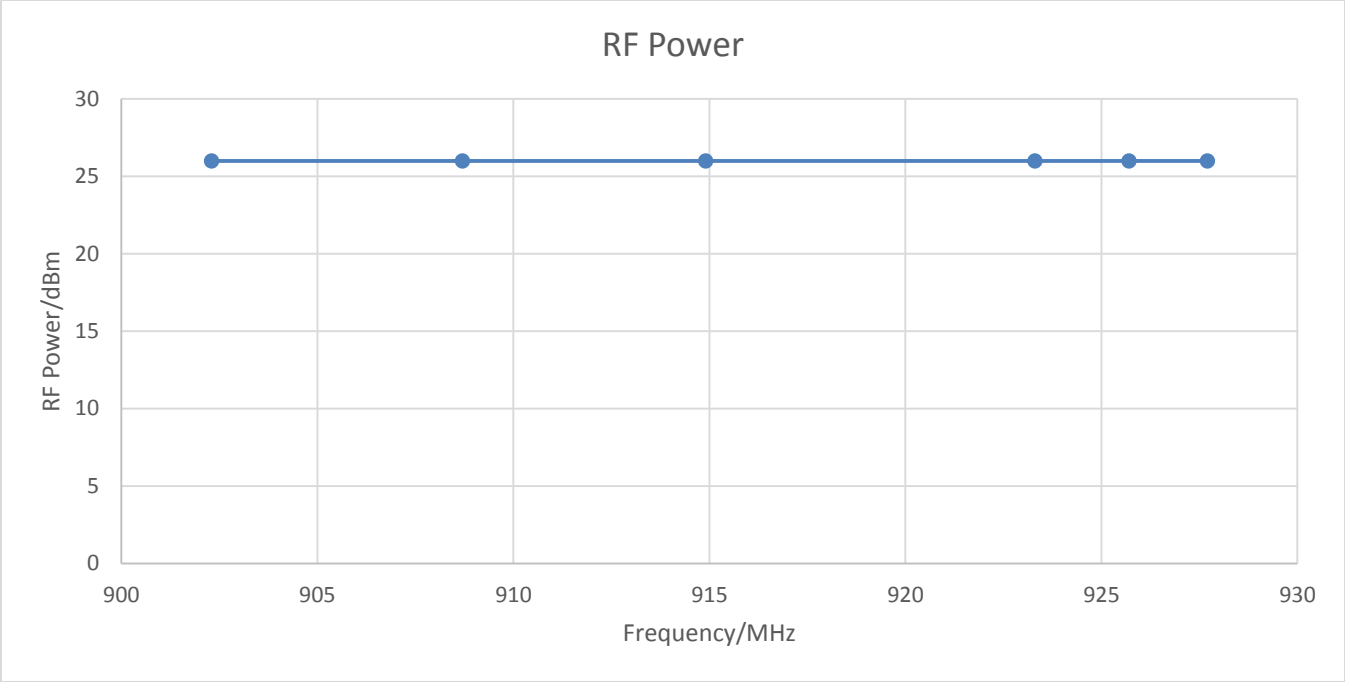

Figure 7 Txop vs Freq for RHF0M302-SPI-915B

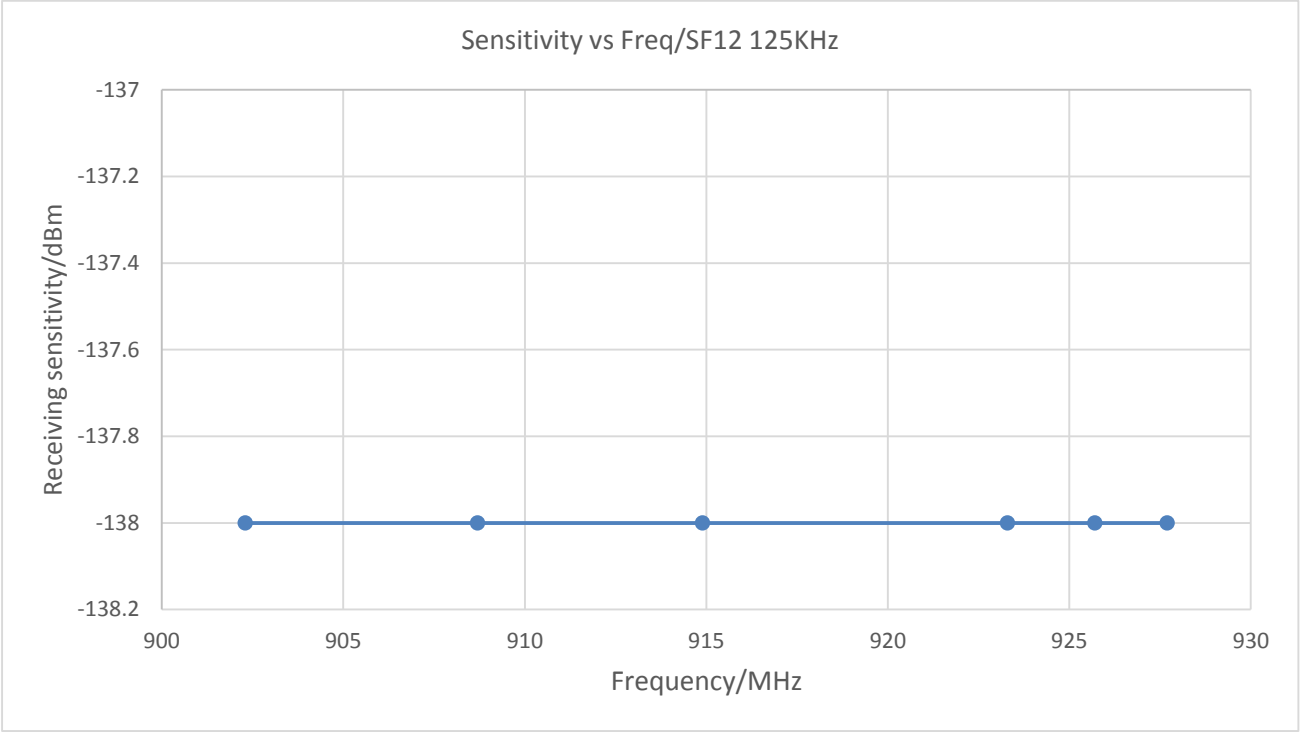

Figure 8 Sensitivity vs Freq for RHF0M302-SPI-915B

4 应用

4.1 Semtech HAL

这部分将给出每个频段的输出功率表。用户应该参考这些表来配置服务器端的 GW。

Power level：LoRaWAN 协议功率等级；RF power：模组实际输出功率

Table 9 RHF0M302B TX Power Table

PA	Pwid	RF Power/dBm		
		490MHz	868MHz	915MHz
1	1	13.502	9.509	18.971
1	2	14.646	10.467	20.117
1	3	15.343	11.046	20.786
1	4	16.585	12.078	21.951
1	5	17.371	12.741	22.649
1	6	18.388	13.569	23.5
1	7	19.516	14.483	24.317
1	8	20.518	15.266	24.962
1	9	21.52	16.044	25.514
1	10	22.318	16.713	25.84
1	11	22.971	17.353	26.002
1	12	23.537	18.039	26.061
1	13	24.08	18.79	26.082
1	14	24.498	19.482	26.064
1	15	24.859	20.254	26.051
1	16	25.183	21.146	26.016
1	17	25.415	21.996	25.978
1	18	25.514	22.853	25.926
1	19	25.467	23.561	25.849
1	20	25.34	23.916	25.767
1	21	25.222	23.966	25.658
1	22	25.159	23.98	25.545

4.2 Reset sequence

每次给 RHF0M302B Mini-PCIE 接口网关模组通电时，都必需进行复位操作。电源 VCC+3.3V 稳定后延时大于 1ms 进行复位，复位信号持续时间大于 100ns。

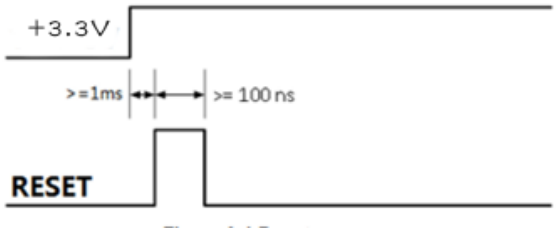

Figure 9 Reset sequence

5 参考设计

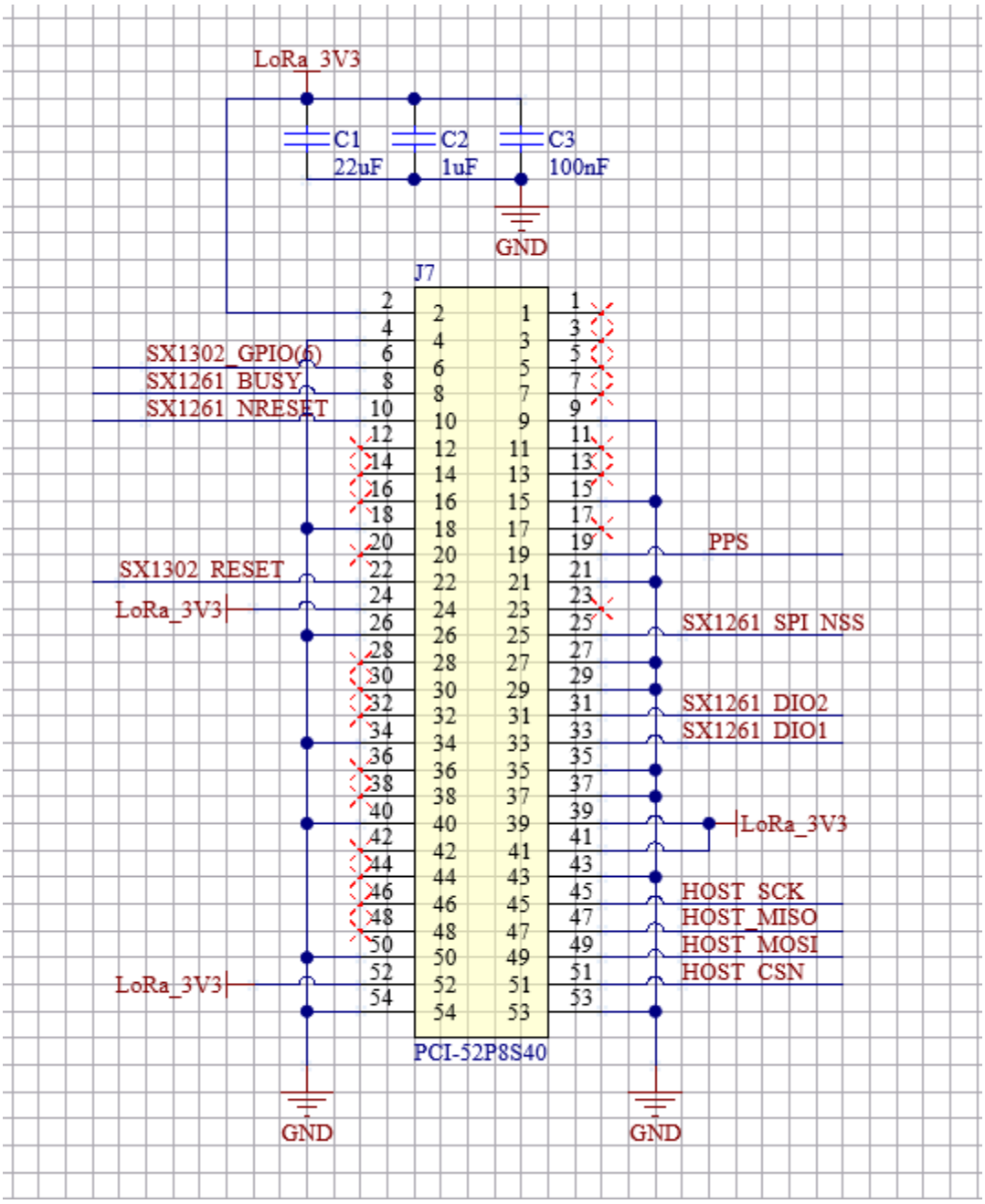

Figure 10 Recommended Connection

1) 强烈建议在布局时，将 22uF//1uF//100nF 尽量靠近模块的电源输入引脚
2) 强烈建议为复位连接增加 RC 滤波器（R=22R，C=10nF）。

5.1 封装信息

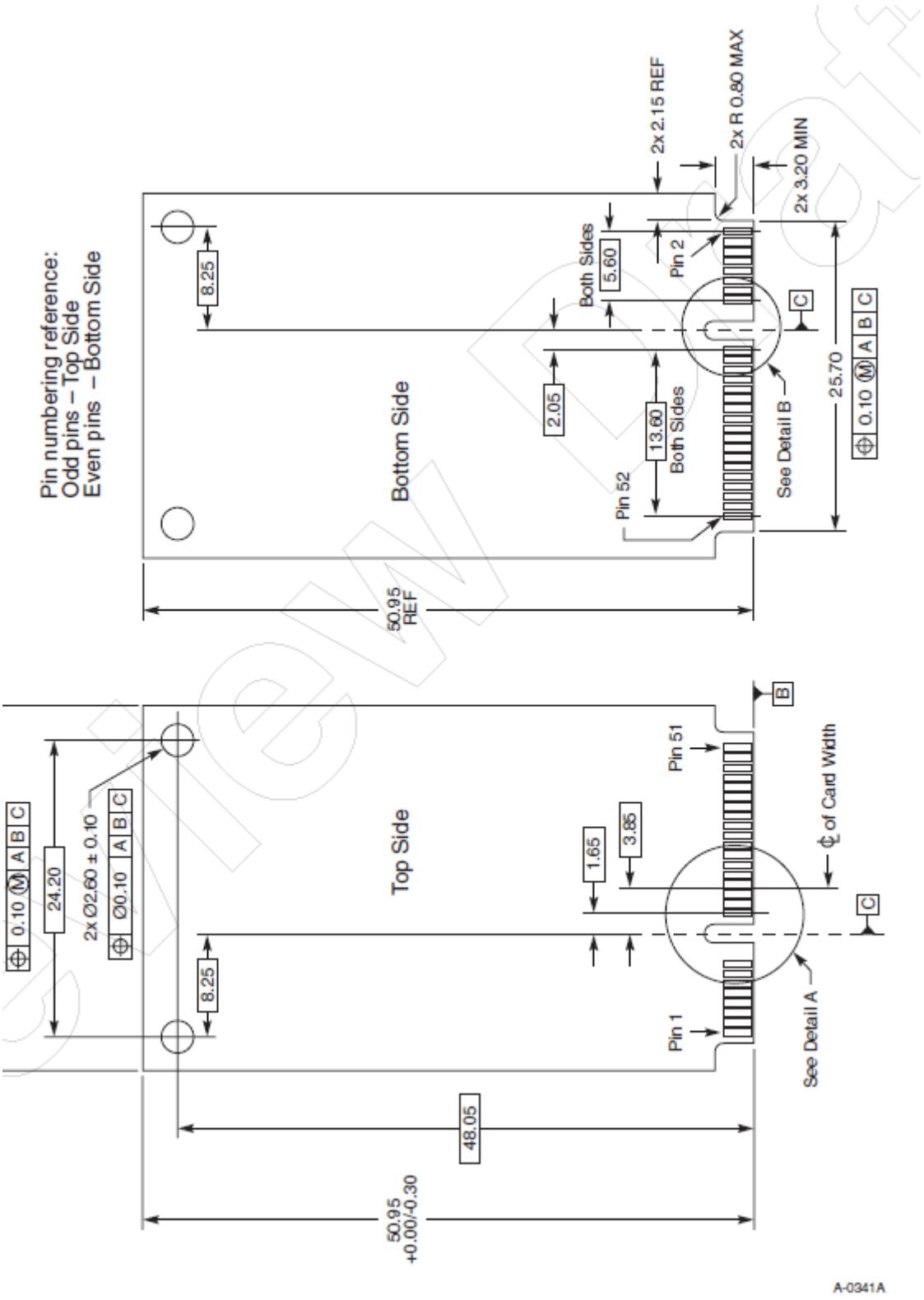

Figure 11 Mechanical size of RHF0M302B Mini-PCIE Interface gateway module 1

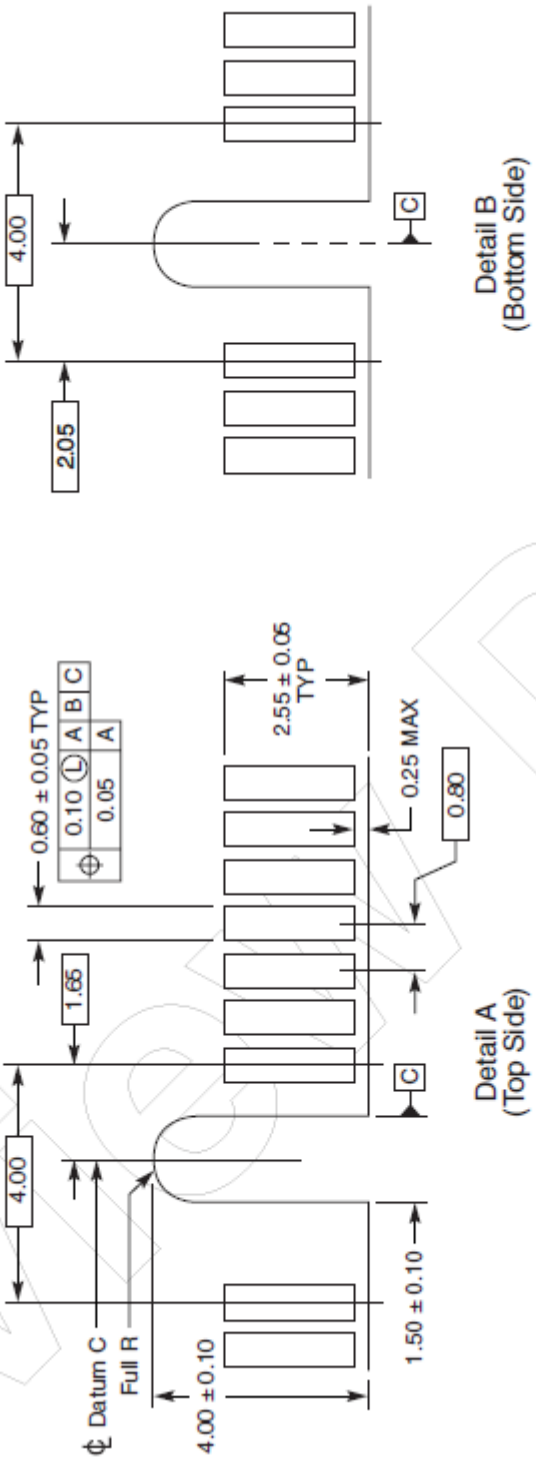

Figure 12 Mechanical size of Mechanical size of RHF0M302B Mini-PCIE Interface gateway module 2

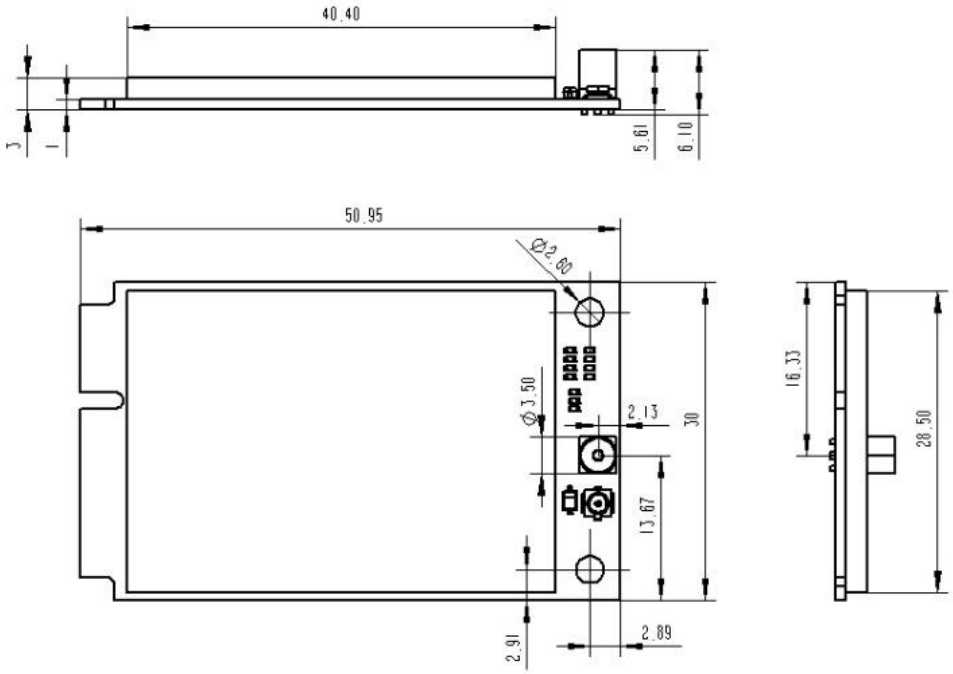

Figure 13 Mechanical size of enclosure on board

5.2 标签

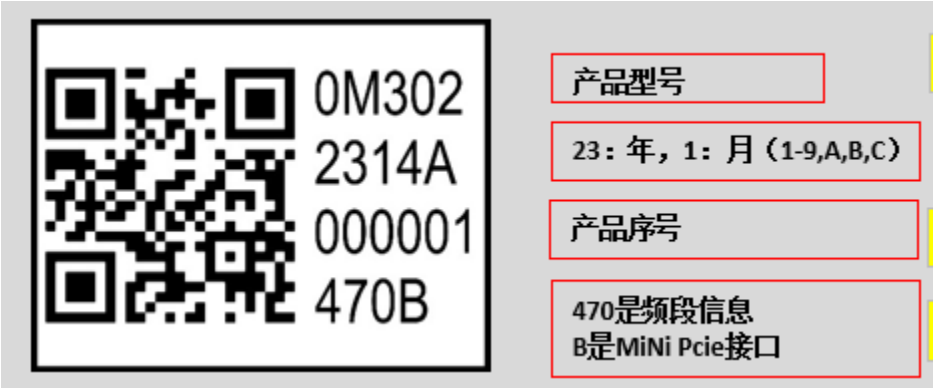

Figure 14 Label

5.3 包装信息

盒子的顶部会有一个标有“RHFOM302 xxx”的标签。箱体尺寸为 150x90x42mm。

--RHFOM302-SPI-470B 是 470MHz 频段的产品。

--RHFOM302-SPI-868B 是 868MHz 频段的产品。

--RHFOM302-SPI-915B 是 915MHz 频段（902MHz 至 928MHz）产品。

Figure 15 Box for packaging

Figure 16 Package of the module (2 pcs in one box)

6 订购信息

技术支持： support@risinghf.com

中国销售：salescn@risnghf.com

海外销售：saleswww@risinghf.com

Table 10 Ordering Information

产品型号	频段	发射功率
RHF0M302-SPI-470B	470-490 MHz	26dBm
RHF0M302-SPI-868B	859-871 MHz	24dBm
RHF0M302-SPI-915B	900-930 MHz	26dBm

7 Revision

V1.0 2023-1-31

+ 初稿

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