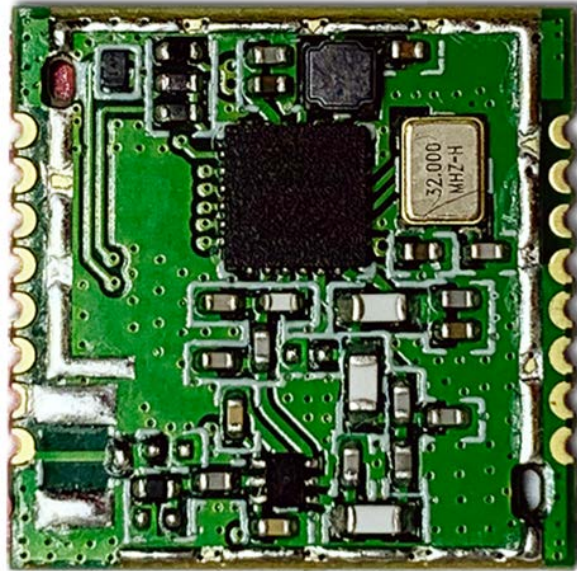


LORA Transceiver Module

RFM91(SC)



RFM91 Module



RFM91SC Module

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1 Overview

RFM91(SC) is an ultra-low-power, high-performance, LoRa transceiver module for a variety of wireless application scenarios from 410MHz to 810MHz. The high level of integration of the RFM91(SC) simplifies the external materials required in the system design, and the sensitivity up to -137dBm optimizes the link performance of the application. In addition, RFM91(SC) also supports Duty-Cycle operation mode, channel listening, high-precision RSSI, power-on reset, squelch output and other functions, making the application design more flexible and realizing product differentiation design. The RFM91(SC) operates from 1.8V to 3.7V. When the sensitivity is up to -137dBm, only 8.8mA is consumed, and the ultra-low-power receiving mode further reduces the power consumption of the chip.

2 Features

- Frequency range: 410-810MHz
- Modulation mode: LORA
- Data rate: 0.018 to 62.5kbps
- Sensitivity: -137dBm, BW=12KHz, SF=12
- Maximum power: +22dBm
- Operating voltage: 1.8-3.7V

- LoRa RX current: 8.8mA @ BW=125KHz
- LoRa Tx current: 120mA @ 433MHz
- Sleep Current: 1uA

3 Applications

- Smart meters
- Supply chain and logistics
- Building automation
- Agricultural sensors
- Smart cities
- Retail store sensors
- Asset tracking
- Streetlights
- Parking sensors
- Environmental sensors
- Healthcare
- Smoke sensors
- Safety and security sensors
- Remote control applications

4 Pin Diagram

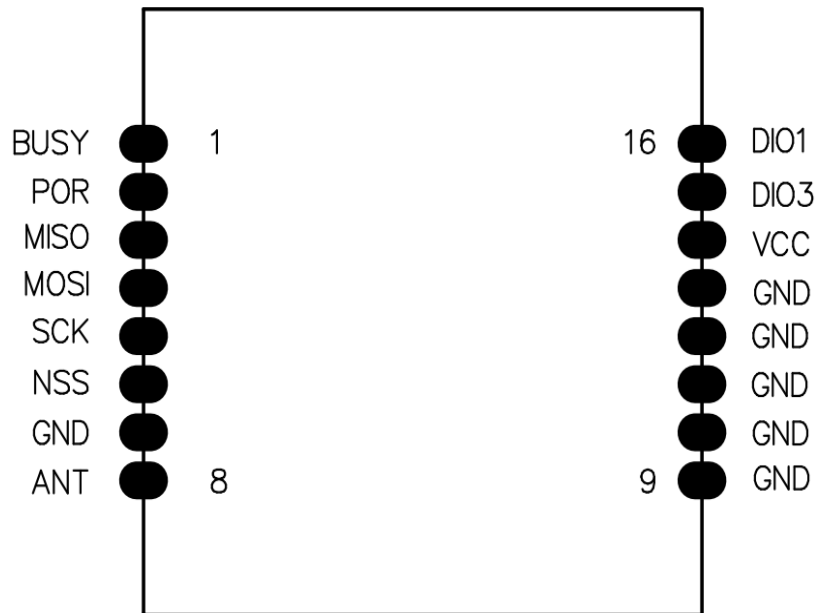


Figure 1 Pin Diagram

Table 1. Pin Definition

Pin	Name	Description
1	BUSY	Internal control pin
2	POR	Reset, low level is active
3	MISO	SPI slave output
4	MOSI	SPI slave input
5	SCK	SPI clock
6	NSS	SPI slave selection
7	GND	Ground

8	ANT	Antenna Port
9	GND	Ground
10	GND	Ground
11	GND	Ground
12	GND	Ground
13	GND	Ground
14	VCC	Power
15	DIO3	Interrupt output and the power supply of external TCXO
16	DIO1	Interrupt output

5 Reference Design

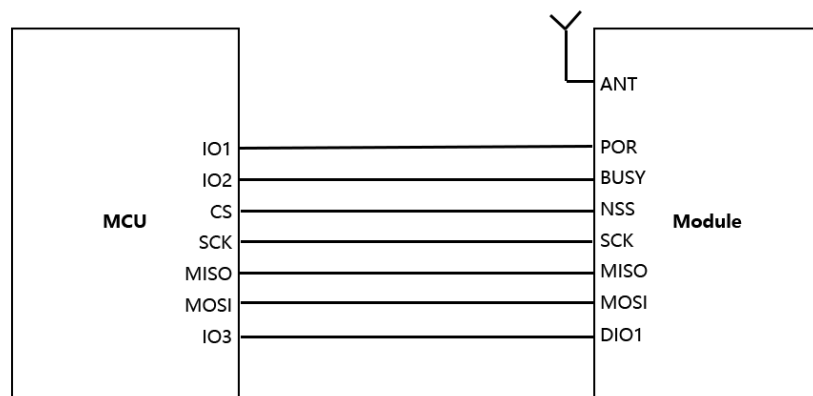


Figure 2 Reference Design

6 Electrical Parameters

Test Condition: Operating Voltage: 3.3V, Operating Temperature: +25°C

Table 2. Recommended Operating Conditions

Parameter	Symbol	Status	Min.	Typ.	Max.	Unit
Operating Voltage	VDD		1.8	3.3	3.7	V
Operating Temperature	T		-40		85	°C
Slope of Voltage			1			mV/us

Table 3. Rated Maximum Value

Parameter	Symbol	Status	Min.	Max.	Unit
Power Supply	VDD		-0.5	3.9	V
Interface Voltage	VIN		-0.3	3.3	V
Junction temperature	TJ		-40	125	°C
Storage Temperature	TSTG		-50	150	°C
Soldering	TSDR	at least 30		255	°C

temperature		seconds			
ESD Level	HBM	-2	-2	2	kV
Latch Current	@85°C	-100	-100	100	mA

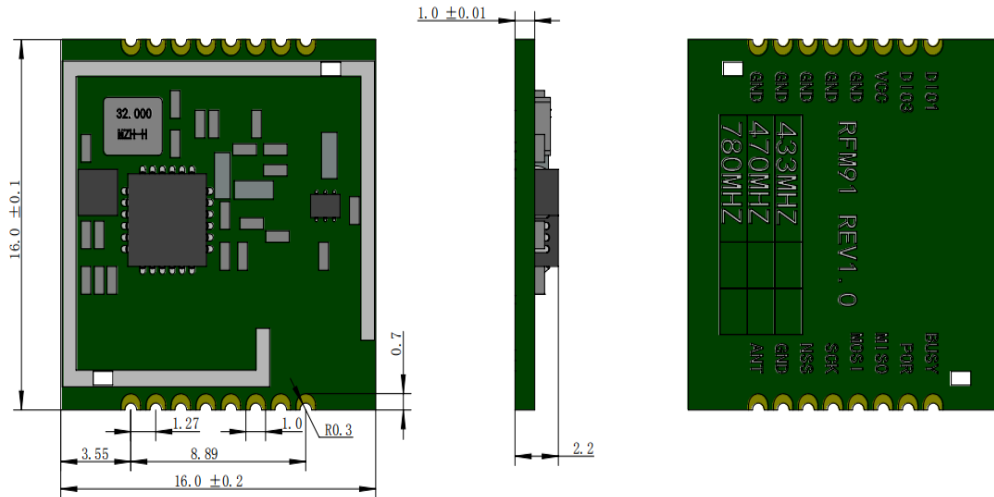
Table 4. Tx Parameter

Parameter	Condition	Min.	Typ.	Max.	Unit
Tx Frequency	433 MHz band,	433.912	433.92	433.928	MHz
	470 MHz band,	469.992	470	470.008	MHz
	780 MHz band,	779.990	780	780.010	MHz
TX Power	433MHz	-	22	-	dBm
	470MHz	-	22	-	dBm
	780MHz	-	22	-	dBm
Power Reduction	22dBm	-	2	-	dB
	Vbat=2.7V	-	3	-	
	22dBm	-	6	-	
	Vbat=2.4V	-			
Tx Current	22dBm	-			
	Vbat=1.8V	-			
	433MHz	-	120	135	mA
Tx Current	470MHz	-	120	135	mA
	780MHz	-	125	140	mA

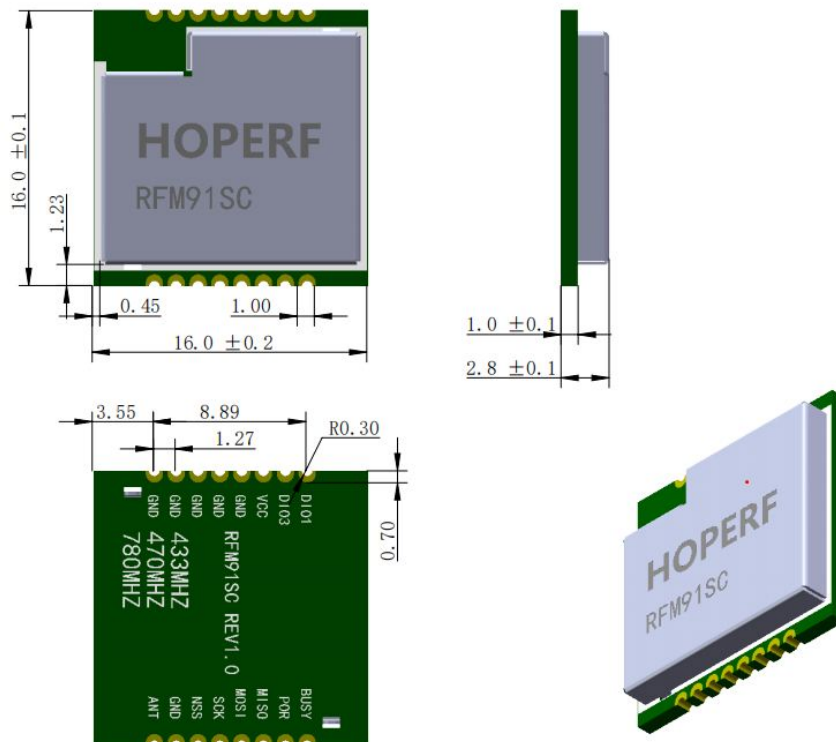
Table 5. Rx Parameter

Parameter	Condition	Min.	Typ.	Max.	Unit
Sensitivity	433MHz	-	-106		dBm
(FSK)	470MHz	-	-106		dBm
Rate=38.4Kb ps, FDA=40KHz	780MHz	-	-106		dBm
Sensitivity	433MHz	-	-	-137	dBm
(Lora)	470MHz	-	-	-137	dBm
SF=12, BW=125KHz	780MHz	-	-	-137	dBm

7 Dimension



RFM91 Module (unit: mm)



RFM91SC Module (unit: mm)

8 Ordering Information

Part Number	Frequency
RFM91(SC)-433S2	433.92MHz
RFM91(SC)-470S2	470MHz
RFM91(SC)-780S2	780MHz

9 Revision History

Version	Release Notes	Date
1.0	First Release	2022.3.15
1.1	Update module parameter	2022.11.16

10 Contact Information

Shenzhen HOPE Microelectronics Co., Ltd.

Address: 30th floor of 8th Building, C Zone, Vanke Cloud City, Xili

Sub-district, Nanshan, Shenzhen, GD, P.R. China

Tel: +86-755-82973805

Sales: sales@hoperf.com

Website: www.hoperf.com