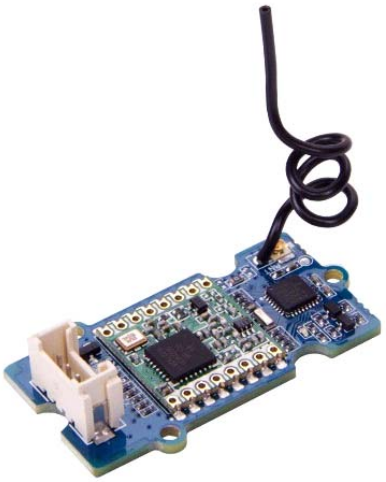
Grove - LoRa Radio 868MHz

SKU 113060006

- Using RFM95 module based on SX1276 LoRa®
- Inputting voltage: 5V/3.3V
- ~28mA(Avg) @+20dBm continuous transmit
- ~8.4mA(Avg)@standby mode
- ~20mA(Avg) @receive mode, BW-500kHz



Description

Grove is a very powerful platform developed by Seeed Studio to simplify your IoT projects.We have integrated the grove connector to most boards produced by Seeed to make them become a system. This time, we combined Grove with LoRa to provide an ultra-long-range wireless module for you.

The main functional module in Grove - LoRa Radio 868MHz is **RFM95**, which is a transceiver features the LoRa long range modem that provides ultra-long range spread spectrum communication and high interference immunity whilst mini-missing current consumption. The

heart of Grove - LoRa Radio 868MHz is ATmega168, a widely used chip with very high-performance and low power consumption, especially suitable for this grove module.

There we already integrated a simple wire antenna to receive signal, if the signal is too weak to receive, don't worry, the MHF connector next to the antenna is for adding a second antenna which has MHF interface to gain more signal.

This is the 868MHz version, which can be used for 868MHz communication. You can also find the version for 433MHz at Grove - LoRa Radio 433MHz.

Note:

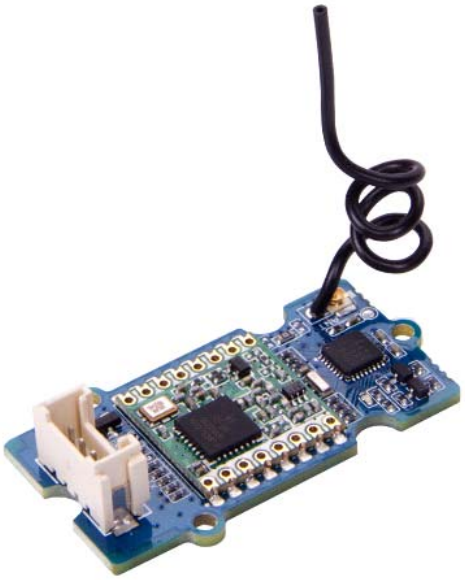
- Please keep the antenna vertical to the board and as straight as possible to make the best performance.
- Please avoid making any big metal object near the antenna and a metal cape is also not recommended if you need to add a cape for your device.

Features

- Using RFM95 module based on SX1276 LoRa®
- Inputting voltage: 5V/3.3V
- ~28mA(Avg) @+20dBm continuous transmit
- ~8.4mA(Avg)@standby mode
- ~20mA(Avg) @receive mode, BW-500kHz
- Working Temperature: -20 – 70℃
- Communication Interface: UART
- Simple wire antenna or MHF Connector for external high gain antenna
- Working Frequency: 868MHz
- +20dBm - 100 mW Power Output Capability
- Size: 20*40mm

Grove - LoRa Radio

Introduction



Grove is a very powerful platform developed by Seeed Studio to simplify your IoT projects.We have integrated the grove connector to most boards produced by Seeed to make them become a system. This time, we combined Grove with LoRa to provide an ultra-long-range wireless module for you.

The main functional module in Grove - LoRa Radio 433MHz is RFM98, which is a transceiver features the LoRa long range modem that provides ultra-long range spread spectrum communication and high interference immunity whilst mini-missing current consumption. The heart of Grove - LoRa Radio 433MHz is ATmega168, a widely used chip with very high-performance and low power consumption, especially suitable for this grove module.

There we already integrated a simple wire antenna to receive signal, if the signal is too weak to receive, don’t worry, the MHF connector next to the antenna is for adding a second antenna which has MHF interface to gain more signal.

This is the 433MHz version, which can be used for 433MHz communication. You can also find the version for 868MHz at Grove - LoRa Radio 868MHz.

Version	Released Date
Grove - LoRa Radio 433 MHz	**Dec 10, 2016**
Grove - LoRa Radio 868 MHz	**Dec 10, 2016**

Features

- Using RFM95 module based on SX1276 LoRa®
- Working Voltage:5V/3.3V
- ~28mA(Avg) @+20dBm continuous transmit
- ~8.4mA(Avg)@standby mode
- ~20mA(Avg) @receive mode, BW-500kHz
- Working Temperature:-20 – 70℃
- Interface:Grove - UART(RX,TX,VCC,GND)
- Simple wire antenna or MHF Connector for external high gain antenna
- Working Frequency:868MHz/433MHz
- +20dBm 100 mW Power Output Capability
- Size:20*40mm
- Rate:0.3kps~50kps
- Ready-to-go Arduino libraries
- Resered MHF antenna connector
-

- **Tip**
  - More details about Grove modules please refer to Grove System

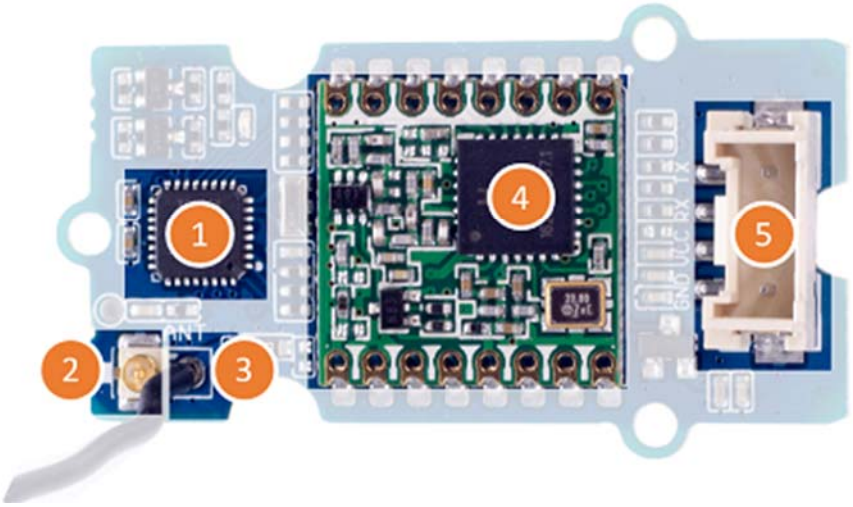
Platforms Supported

Arduino Wio BeagleBone Raspberry Pi LinkIt ONE

Caution

The platforms mentioned above as supported is/are an indication of the module's hardware or theoritical compatibility. We only provide software library or code examples for Arduino platform in most cases. It is not possible to provide software library / demo code for all possible MCU platforms. Hence, users have to write their own software library.

Hardware Overview



1. ATMega168 MCU (datasheet)
2. MHF Connector
3. Wire Antenna
4. RFM95 Module (datesheet)
5. Grove Interface

PIN	NAME	FUNCTION
1	TX	TX of UART
2	RX	RX of UART
3	VCC	Power supply, 3.3V or 5V

PIN	NAME	FUNCTION
4	GND	Connect Ground

Application Ideas

- Internet of Things
- Smart Home
- Sensor Hub
- Long distance wireless communication

Getting Started

After this section, you can make **Grove - LoRa Radio** run with only few steps.

Preparations

Now we are making a demo for P2P(point to point) communication with the Grove - Lora Radio 433MHz, the Grove - LoRa Radio 868MHz is the same way to use.

Tip

Grove - LoRa Radio 433MHz can’t talk to Grove - LoRa Radio 868MHz.

Item	Qty	Link
Seeeduino Lotus	2	GET ONE NOW!
Grove - LoRa Radio 433MHz	2	GET ONE NOW!
Micro USB Cable	2	GET ONE NOW!

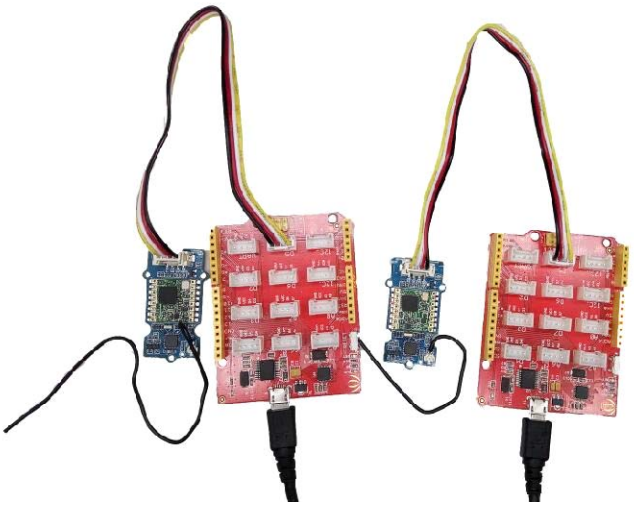
If this is your first time using Seeeduino Lotus, please refer to Seeeduino Lotus’s wiki.

Seeeduino Lotus is fully compatible with Arduino which works as simple as Arduino.

If this is your first time using Arduino, Please put hand on here to start your Arduino journey.

Connecting hardware

Seeeduino Lotus is a combination of Seeeduino and Base Shield. We can connect the LoRa Radio module to the D5 socket directly as the below picture shows.



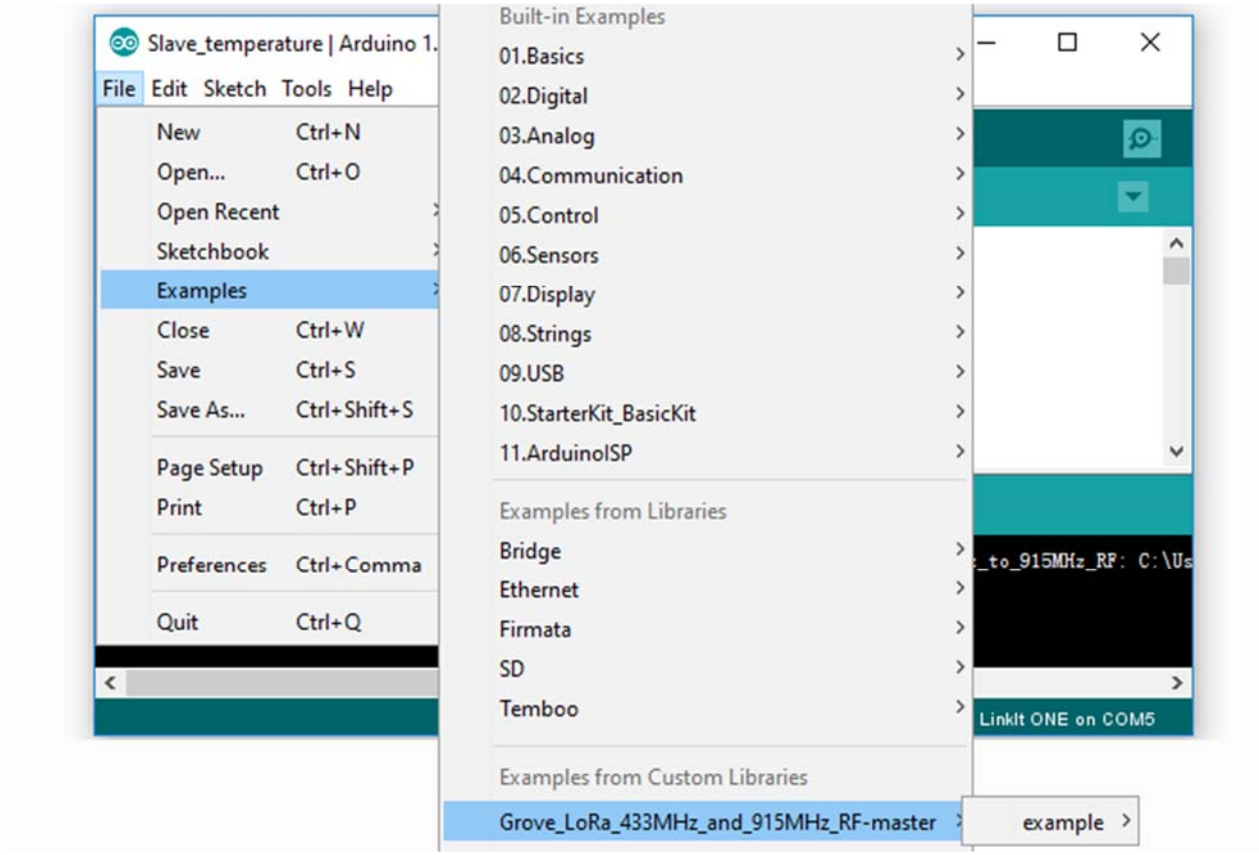
Download Library

Click to download the library and install it (How to install an Arduino Library)

Download Arduino Library

Open the example

Open your Arduino IDE, click **File > Examples>Grove_LoRa_433MHz_and_915MHz_RF-master** you will get many examples for the module.



Node	Example Name	Function
Sender	rf95_client	Send “Hello World” every 1s
Receiver	rf95_server	Receive data and print it

Click **Tools>Board** to choose “Seeeduino Lotus” and select respective serial port then click on Upload button to finish the steps.

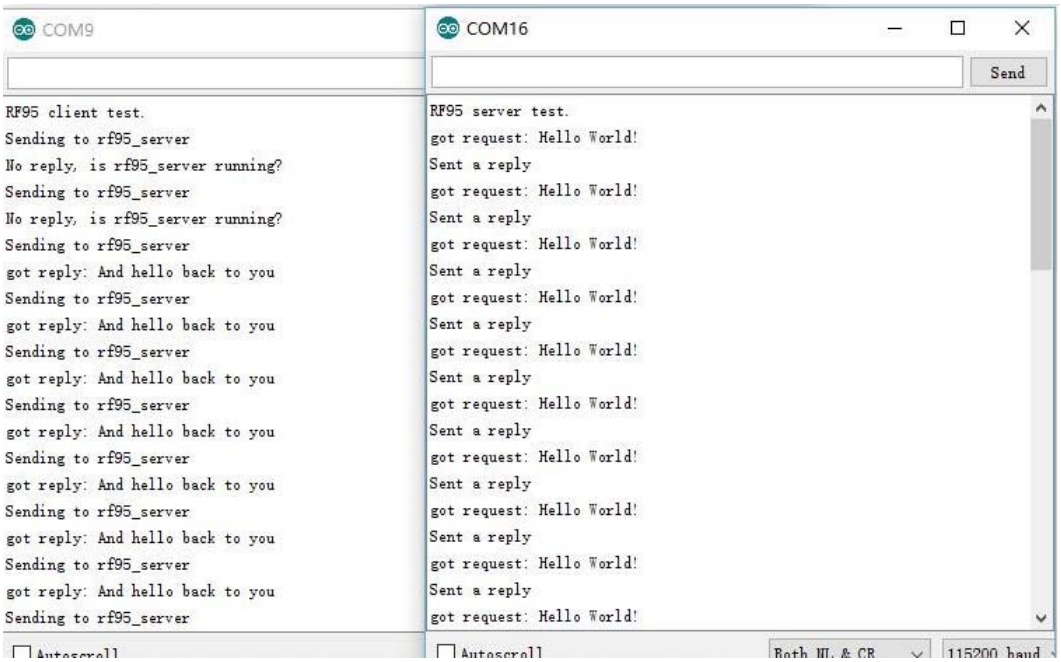
Tip

If you’re using Grove - LoRa Radio 868MHz module change the following code.

```
//rf95.setFrequency(434.0);
rf95.setFrequency(868.0);
```

Review Results

After upload completed, you can open the serial monitor to see the result.



Data Rate

The below chart shows the relationships between the band rate signal band width spreding factor and sensitivity.

SingnalBandWidth	SpreadingFactor	Sensitivity(dbm)	ActualBandRate(pbs)
62.5kHz	SF=7	-126	2169
62.5kHz	SF=8	-129	**1187**
62.5kHz	SF=9	-132	**656**
62.5kHz	SF=10	-135	**296**
62.5kHz	SF=11	-137	**164**
62.5kHz	SF=12	-139	**91**
125kHz	SF=7	-123	4338
125kHz	SF=8	-126	2375
125kHz	SF=9	-129	1312
125kHz	SF=10	-132	733
125kHz	SF=11	-133	328
125kHz	SF=12	-136	183
250kHz	SF=7	-120	8676
250kHz	SF=8	-123	4750
250kHz	SF=9	-125	2624
250kHz	SF=10	-128	1466
250kHz	SF=11	-130	778
250kHz	SF=12	-133	366
500kHz	SF=7	-118	17353
500kHz	SF=8	-121	9501
500kHz	SF=9	-124	5249
500kHz	SF=10	-127	2932
500kHz	SF=11	-129	1557
500kHz	SF=12	-130	830

Resources

- ***Schematics***

- Grove - LoRa Radio 433MHz v1.0 Schematics (Eagle files)
- Grove - LoRa Radio 433MHz v1.0 Schematics (PDF files)
- Grove - LoRa Radio 868MHz v1.0 Schematics (Eagle files)
- Grove - LoRa Radio 868MHz v1.0 Schematics (PDF files)

- ***Datasheet***

- RFM95/96/97 Datasheet
- Atmega168 Datasheet

- ***References***

- LoRa Alliance

- ***Library***

- Grove - LoRa Radio Library and Examples

- ***Download ALL Above***

Help us make it better

Thank you for choosing Seeed. A couple of months ago we initiated a project to improve our documentation system. What you are looking at now is the first edition of the new documentation system. Comparing to the old one, here is the progresses that we made:

- Replaced the old documentation system with a new one that was developed from Mkdocs, a more widely used and cooler tool to develop documentation system.
- Integrated the documentation system with our official website, now you can go to Bazaar and other section like Forum and Community more conveniently.
- Reviewed and rewrote documents for hundreds of products for the system's first edition, and will continue migrate documents from old wiki to the new one.

An easy-to-use instruction is as important as the product itself. We are expecting this new system will improve your experience when using Seeed's products. However since this is the first edition, there are still many things need to improve, if you have any suggestions or findings, you are most welcome to submit the amended version as our contributor or give us suggestions in the survey below, Please don't forget to leave your email address so that we can reply.

Happy hacking