

# LORA Module RA-02 V.1



Technical Manual Rev 1r0



**The SX1276//77/78/79** transceivers features the LoRa long range modem that provides ultra-long range spread spectrum communication and high interference immunity while minimize current consumption. With 433MHz module designed by AI-THINKER, which based on the chips. From SEMTECH's patented LoRa modulation technology, has a high sensitivity of -148 dBm with a power output of +20dBm or +18dBm, a long transmission distance and high reliability. At the same time, compared with the traditional modulation technology, LoRa Modulation technology in anti-blocking and selection also has obvious advantages, to solve the traditional design can not take into account the distance, interference and power consumption. Compatible in all gizduino boards and Arduino.

## Features:

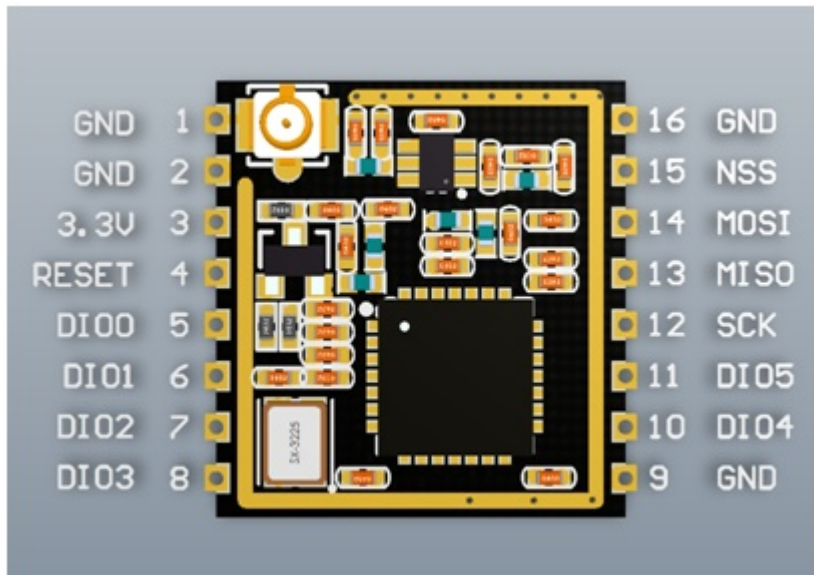
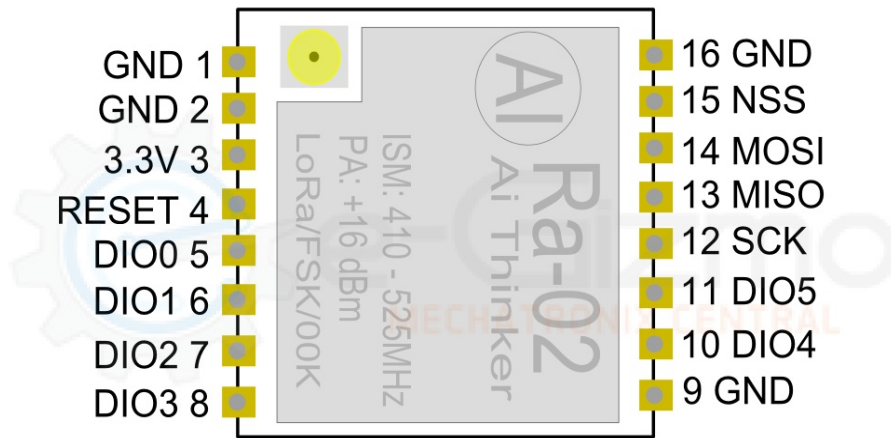
- LoRa Modem
- +18 dBm High efficiency PA
- ISM: 410 - 525 MHz
- Programmable bit rate up to 300kbps
- Packet engine up to 256 bytes with CRC
- 168 dB maximum link budget
- 127 dB Dynamic Range RSSI
- for more features  
see the sx1276/77/78/79 datasheet

## Applications:

- Automated Meter Reading
- Home and Building Automation
- Wireless Alarm and Security Systems
- Industrial Monitoring and Control
- Long range Irrigation Systems

## General Specifications:

- Input supply voltage:** 3.3V
- Temperature:** 25 deg C
- Bandwidth (BW):** 125kHz
- Spreading Factor (SF):** 12
- Frequency:** 434/602 MHz (See the specific Indication)
- Error Correction Code (EC):** 4/6
- Packet Error Rate (PER):** 1%
- CRC on payload enabled
- Output power:** 13 dBm in transmission
- Payload length:** 64 bytes
- Preamble Length:** 12 symbols  
(programmed register PreambleLength=8)  
With matched impedances



**Figure 1: LoRa Ra-02 pin outs**

**Table 1.**

Number	Name	Type	Description
1	Ground	-	Exposed ground pad
2	Ground	-	Exposed ground pad
3	3.3v	-	Input Supply voltage
4	Reset	I/O	Reset trigger input
5	DIO0	I/O	Digital I/O, software configured
6	DIO1/DCLK	I/O	Digital I/O, software configured
7	DIO2/DATA	I/O	Digital I/O, software configured
8	DIO3	I/O	Digital I/O, software configured
9	Ground	-	Exposed ground pad
10	DIO4	I/O	Digital I/O, software configured
11	DIO5	I/O	Digital I/O, software configured
12	SCK	I	SPI Clock input
13	MISO	O	SPI Data output
14	MOSI	I	SPI Data input
15	NSS	I	SPI Chip select input
16	Ground	-	Exposed ground pad

The SX1276 and SX1279 offer bandwidth options ranging from 7.8 kHz to 500 kHz with spreading factors ranging from 6 to 12, and covering all available frequency bands. The SX1277 offers the same bandwidth and frequency band options with spreading factors from 6 to 9. The SX1278 offers bandwidths and spreading factor options, but only covers the lower UHF bands.

**1.1. Simplified Block Diagram**

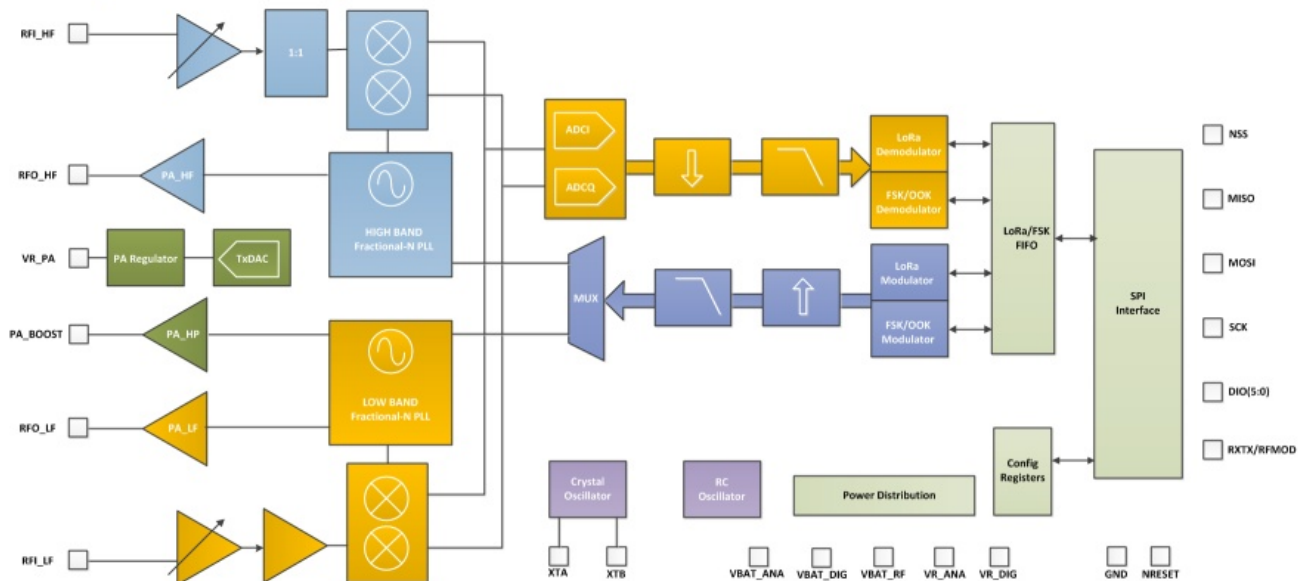
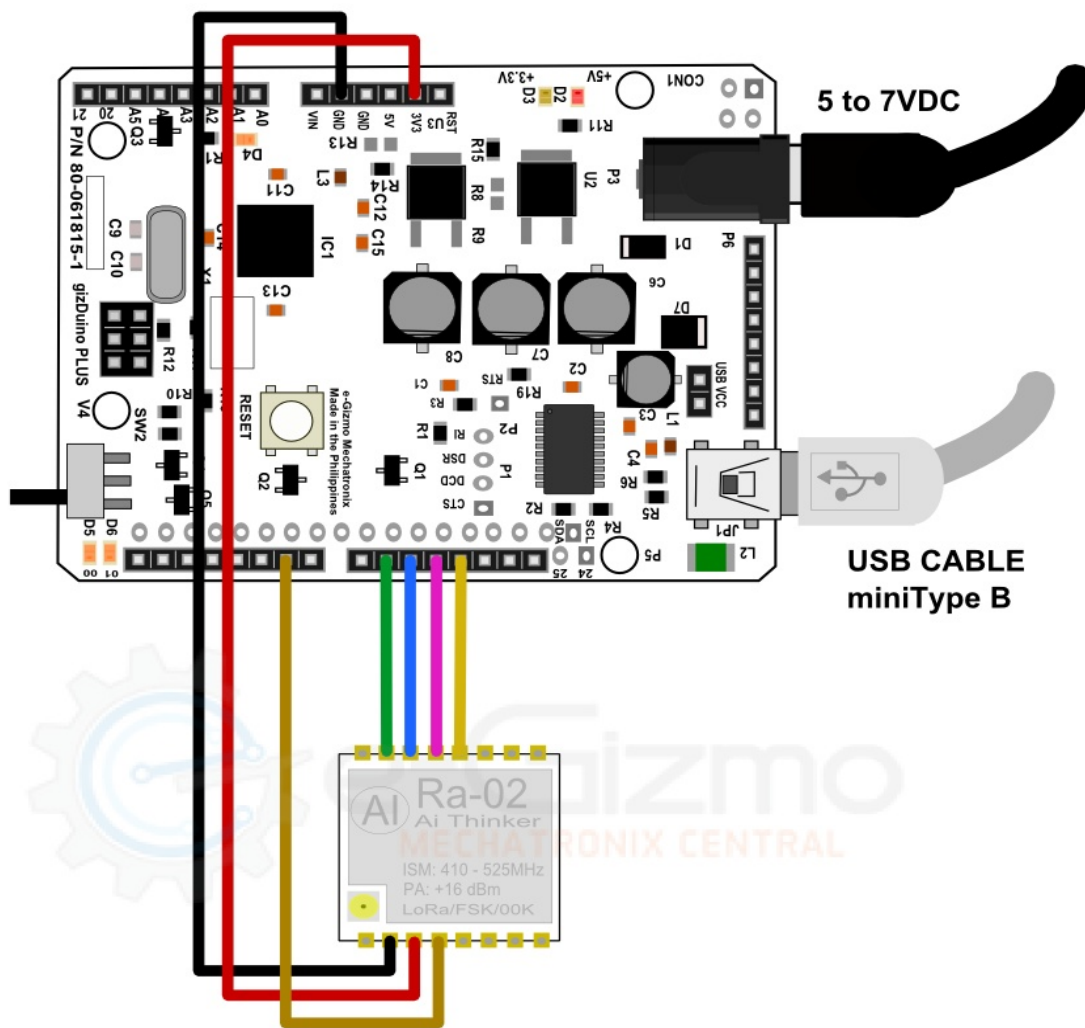


Figure 1. Block Diagram



**Figure 2: Sample connections for Receiver and Transmitter with gizduino PLUS.**

Note: You need two LoRa module to send and received data.

## Arduino Softwares

You may download the Arduino Software IDE at [www.arduino.cc](http://www.arduino.cc).

or if you are using the gizduino boards visit our Github account at [www.github.com/e-Gizmo](https://www.github.com/e-Gizmo) Go to Repositories and Download the Arduino Software version. It includes gizduino patch for the boards list.

## LORA Library

Libraries for LoRa Ra-02 is available in [https://www.makerfabs.com/index.php?route=product/product&product\\_id=409](https://www.makerfabs.com/index.php?route=product/product&product_id=409)

Click and Download the Arduino demo code. The library folder file LORA, must be added to My documents>Arduino>Libraries.

Open the LoRaTxEcho.ino for testing the LoRa. Use together with LoRaRxEcho.ino receiver sketch to test echo.

**LoRaTxEcho.ino** (Transmitter: this is sketch send the MESS or Message string and wait for echo send by receiver. It waits for reply for RXTIMEOUT\*10 milliseconds. Message is sent using a push-button (to ground) on pin "pingo".

Result is showed by serial console and by led (on pin "pinf") and buzzer (on pin "psound"):

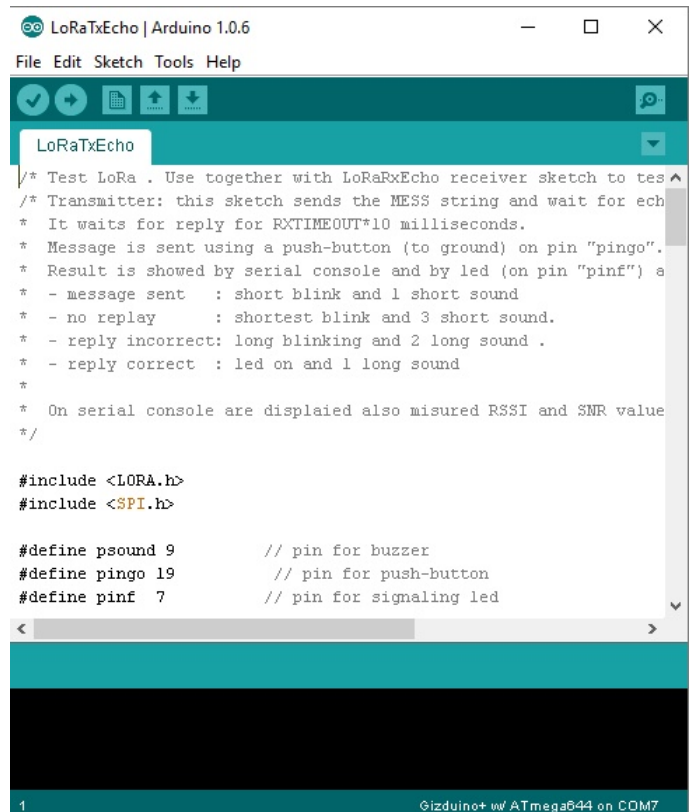
- message sent : short blink and 1 short sound.
- no replay : shortest blink and 3 short sound.
- reply incorrect: long blinking and 2 long sound .
- reply correct : led on and 1 long sound

On serial console are displayed also misured RSSI and SNR values.

**LoRaRxEcho.ino.** Use together with LoRaTxEcho transmitter sketch to test echo. Receiver: this sketch listen for message coming and echoes it back.

It uses continuous receiving. When message arrive stop receiving mode and sends echo. Then restore continuous receiving mode.

On serial console are displayed also misured RSSI and SNR values.



```

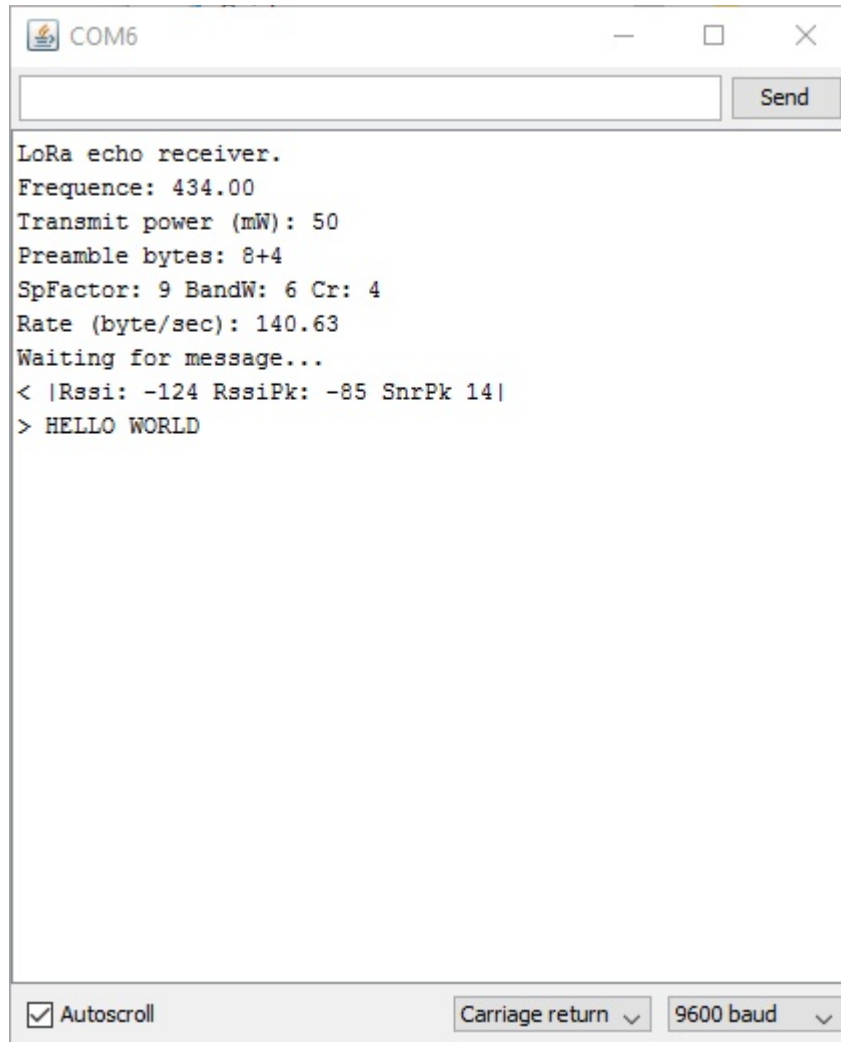
LoRaTxEcho | Arduino 1.0.6
File Edit Sketch Tools Help
LoRaTxEcho
/* Test LoRa . Use together with LoRaRxEcho receiver sketch to tes
/* Transmitter: this sketch sends the MESS string and wait for ech
* It waits for reply for RXTIMEOUT*10 milliseconds.
* Message is sent using a push-button (to ground) on pin "pingo".
* Result is showed by serial console and by led (on pin "pinf") a
* - message sent : short blink and 1 short sound
* - no replay : shortest blink and 3 short sound.
* - reply incorrect: long blinking and 2 long sound .
* - reply correct : led on and 1 long sound
*
* On serial console are displayed also misured RSSI and SNR value
*/

#include <LORA.h>
#include <SPI.h>

#define psound 9 // pin for buzzer
#define pingo 19 // pin for push-button
#define pinf 7 // pin for signaling led
  
```

**Figure 3: Sample codes in Arduino.**





**Figure 5: Serial print data from LoRa echo Receiver.**