



NRF24L01 RF Board

User Manual

Overview

NRF24L01 RF Board (A)

The **NRF24L01 RF Board (A)** is an accessory board offers wireless 2.4G solution with **NRF24L01** onboard. It uses SPI interface for communication. The board is ideal for applications such as wireless data transmission, multicast, and frequency-hopping communication.

Special note:

- The NRF24L01 RF Board (A) integrates only ONE NRF24L01, while at least TWO NRF24L01 are required to establish communication with each other.
- Operating Voltage: 1.9V~3.6V low voltage power supply only.
- Communication distance: almost no loss within 50 meters. (Software settings: 250kbps, 0dBm, low noise amplifier gain; working environment: open area)

NRF24L01 RF Board (B)

The **NRF24L01 RF Board (B)** is an accessory board offers wireless 2.4G solution with **NRF24L01** onboard. It uses SPI interface for communication. The board is ideal for applications such as wireless data transmission, multicast, and frequency-hopping communication.

Features:

- Its pin definition is compatible to the SPI port of STM32 Open series development board.
- Resistors and capacitors are packaged in RC0402. Has better quality than type A.

Special note:

- The NRF24L01 RF Board (B) integrates only ONE NRF24L01, while at least TWO NRF24L01 are required to establish communication with each other.
- Operating Voltage: 1.9V~3.6V low voltage power supply only.

- Communication distance: almost no loss within 55 meters. (Software settings: 250kbps, 0dBm, low noise amplifier gain; working environment: open area)

NRF24L01 RF Board (C)

The NRF24L01 RF Board (C) is an accessory board offers wireless 2.4G solution with NRF24L01 onboard. It uses SPI interface for communication. The board is ideal for applications such as wireless data transmission, multicast, and frequency-hopping communication.

Features:

- Supports 2Mbps data rate.
- Supports 6 node networks.
- Supports 125 radio channels
- Has PA amplification for ultra-long-distance transmission.
- Has LNA low noise amplifier for ultra-long distance transmission.
- mCan work with external high sensitivity antenna. (Optional)
- Power output can be set by software.

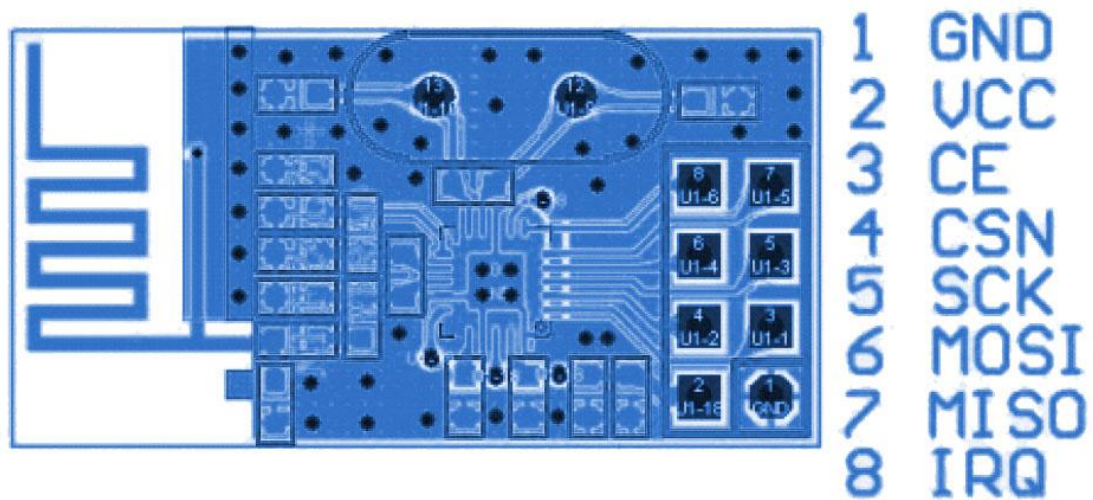
Special note:

- The NRF24L01 RF Board (C) integrates only ONE NRF24L01, while at least TWO NRF24L01 are required to establish communication with each other.
- Operating Voltage: 3V~3.6V power supply only.
- Communication distance: in open area, with 2DB external antenna.
Almost no loss within 1000 meters. (Software settings: 250kbps, 0dBm, low noise amplifier gain).
Almost no loss within 700 meters. (Software settings: 1Mbps, 0dBm, low noise amplifier gain).
Almost no loss within 500 meters. (Software settings: 2Mbps, 0dBm, low noise amplifier gain).

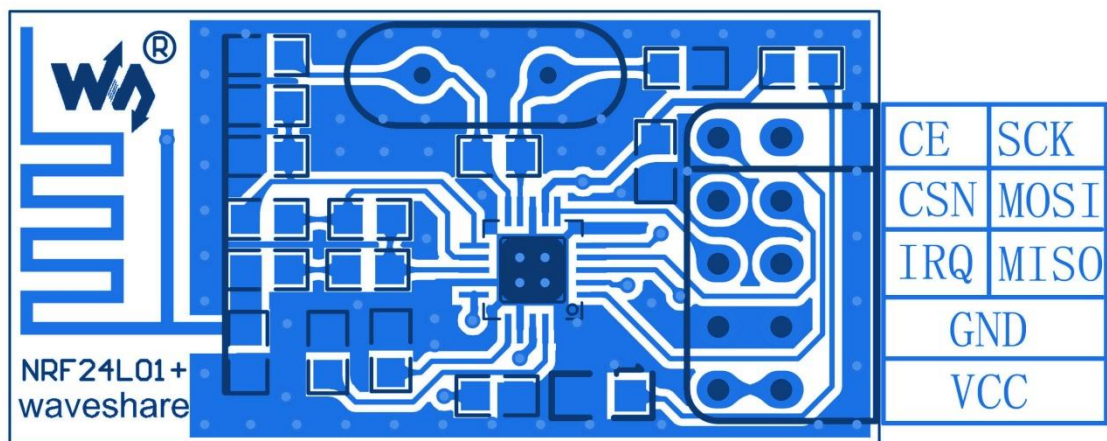
External antenna is NOT included in the price. You should buy one separately for long-distance communication. Recommended antenna: RP-SMA 2.4G 2DB Antenna.

Pin Definition

NRF24L01 RF Board (A) Pin Definition



NRF24L01 RF Board (B) Pin Definition



NRF24L01 RF Board (C) Pin Definition

Pin Definition of NRF24L01 RF Board (C) and NRF24L01 RF Board (A) are the same.

Operation and Phenomena

This module usually supports any development board with SPI interface. In the present document, Waveshare Open103Z development boards are used for demonstration. That is because the SPI pin definition of Open103Z is the same as NRF24L01 RF Board (B)'s. So the module can be plugged in the SPI port directly. If the module is used to other development board, jumper wires are required in the accordance with specified SPI definition. Meanwhile, please attention to power supply voltage.

Preparation

- Open103Z development board (Contains power supply) x 2
- NRF24L01 RF Board (B) x 2 (Type A and type C are optional. But their SPI definitions are different from type B's, while the SPI pin definition of Open103Z is the same as type B's.)
- Programmer (ST-Link, U-Link, J-Link, etc.)

Connection

- Connect NRF24L01 RF Board (B) to Open103Z's SPI-1 interface.
- Connect a programmer to the JTAG interface on Open103Z.
- Connect power supply.

Steps

Connect the two NRF24L01 RF boards to the SPI-1 ports of Open103Z. One group is sender and the other group is receiver.

Download Sender Program

- 1) Connect the programmer to JTAG on Open103Z Sender. Power up.
- 2) Open Keil project \STM32\MDK_Project\NRF24L01.uvproj.
- 3) Modify the macro definition in mian.c, located to:

```
//#define Send 1 //transmit  
  
//#define Receive 0 //receive
```

Delete the “//” before “#define Send 1 //transmit”, modified as:

```
#define Send 1 //transmit

//#define Receive 0 //receive
```

4) Click **Build** to compile project. After building successfully, click **Download**.

Download Receiver Program

- 1) Connect the programmer to JTAG on Open103Z Receiver. Power up.
- 2) Open Keil project \STM32\MDK_Project\NRF24L01.uvproj.
- 3) Modify the macro definition in mian.c. Delete the “//” before “#define Receive 0 //receive”, modified as:

```
//#define Send 1 //transmit

#define Receive 0 //receive
```

4) Click **Build** to compile project. After building successfully, click **Download**.

Phenomena

- Sender: press any key onboard to send data.
- Receiver: Light up LED accordingly.

FAQ

Q: Is the pin definition of NRF24L01 RF Board (A) the same as NRF24L01 RF Board (C)?

A: Yes, pin definition of NRF24L01 RF Board (A) and NRF24L01 RF Board (C) are the same. but driven currents are different. Type A's driven current is 30mA while Type C's driven current is 300mA.

Q: How to set the power output of NRF24L01 RF Board (C)?

A: Set the RF_PWR of the register RF_SETUP to '11'. It will be set to 0dBm.

Set the RF_DR_LOW and RF_DR_HIGH of the register RF_SETUP to '10'. It will be set to 250kbps.

Set the RF_DR_LOW and RF_DR_HIGH of the register RF_SETUP to '00'. It will be set to 1Mbps.

Set the RF_DR_LOW and RF_DR_HIGH of the register RF_SETUP to '01'. It will be set to 2Mbps.

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