



NF-02-SM Specification

Version V1.0

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Notice

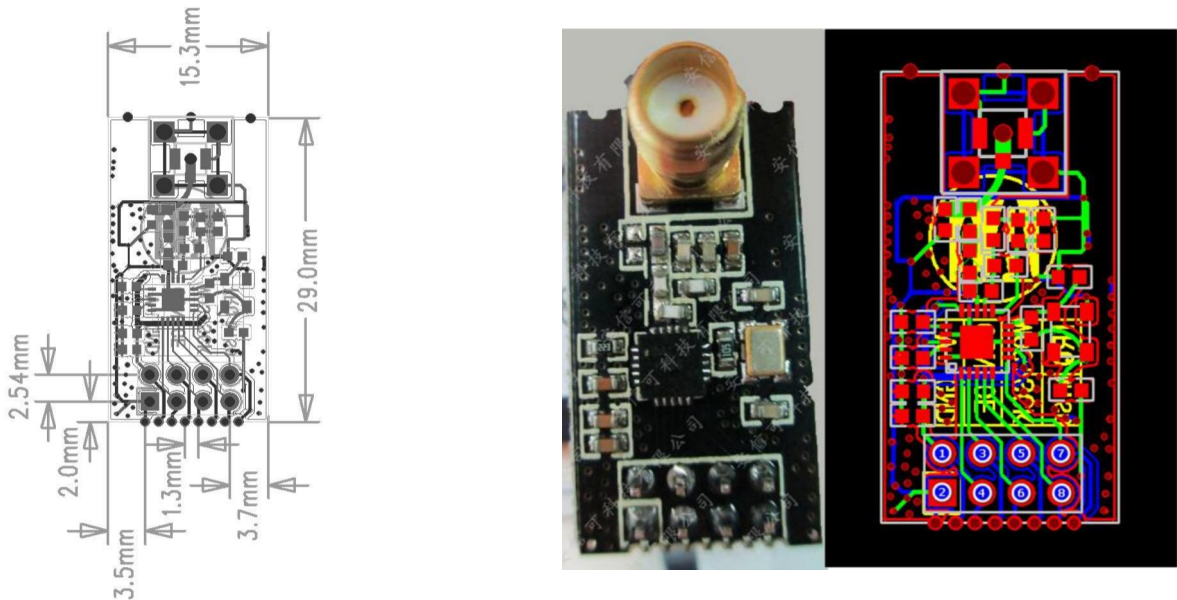
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Module Introduction

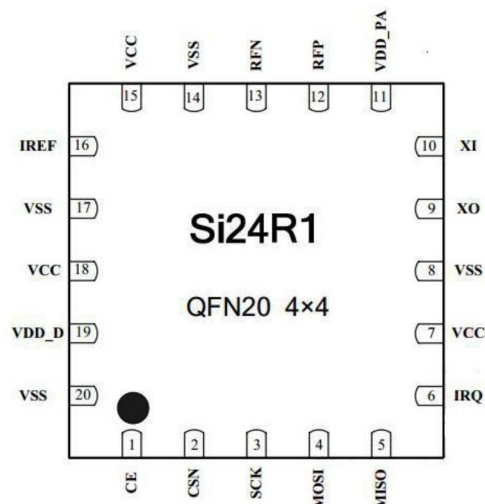
The NF-02-SM is a 2.4G wireless transceiver module with an output power of 5mW. It integrates the Si24R1 RF chip and adopts a DIP-8 package, enabling quick integration into existing products. The module supports an over-the-air data rate of up to 2Mbps and communicates through an SPI interface. It features high stability and cost efficiency, making it suitable for a wide range of IoT applications, including wireless mice, wireless remote controls, motion-sensing devices, active RFID, NFC, and low-power self-organizing wireless sensor network nodes. It is an ideal solution for IoT applications.

Appearance and Dimensions

Module Appearance Diagram



Chip Appearance Diagram



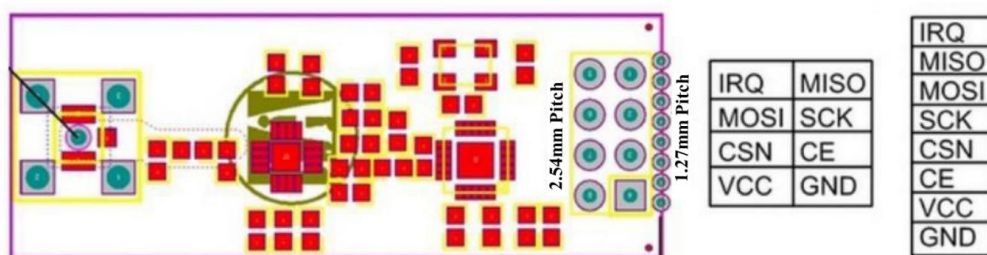
Features and Specifications

No.	Parameter	Value	Note
01	RF Chip	Si24R1	Taiwan-made chip
02	Module Dimensions	29.0*15.3	Unit: mm
03	Modulation	GFSK/FSK	Gaussian Frequency Shift Keying / Frequency Shift Keying modulation
04	Package	DIP-8	Through-hole
05	Interface	4-wire SPI interface	Maximum rate shall not exceed 10MHz
06	Output Power	Max. 7dBm	Approx. 5mW
07	RSSI Support	Supported	Received Signal Strength Indication
08	Operating Frequency Band	2.4 – 2.525GHz	Adjustable, 1MHz step
09	Voltage Range	1.9 – 3.6V	Typical 3.3V. Excessive voltage will damage the module
10	Data Rate	2Mbps/1Mbps/250Kbps	See chip datasheet for details
11	Channel	126 RF channels	1MHz spacing between each channel
12	Test Distance	300m	Clear sky, no obstacles, at max. transmit power
13	Receiver Sensitivity	-96dBm @ 250Kbps	See chip datasheet for other details
14	Antenna Interface	Rod antenna	SMA
15	Transmit Length	1 – 32 bytes per packet	3-level FIFO
16	Receive Length	1 – 32 bytes per packet	3-level FIFO
17	Operating Temperature	-20 – +70°C	Excessive temperature will damage the module
18	Storage Temperature	-40 – +125°C	Excessive temperature will damage the module
19	Shutdown Current	0.7μA	See chip datasheet for other details
20	Receive Current	15mA (2Mbps)	See chip datasheet for other details
21	Transmit Current	25mA (7dBm)	See chip datasheet for other details

Pin Definition

Name	Direction	Function
VCC	-	Power supply, must be between 1.9 – 3.6V
GND	-	Ground, connected to power reference ground
CSN	Input	Module chip select pin, used to initiate an SPI communication
CE	Input	Module enable control pin; the module enters standby mode when CE is at low level
MOSI	Input	Module SPI data input pin
SCK	Input	Module SPI bus clock
IRQ	Output	Module interrupt signal output, active at low level
MISO	Output	Module SPI data output pin

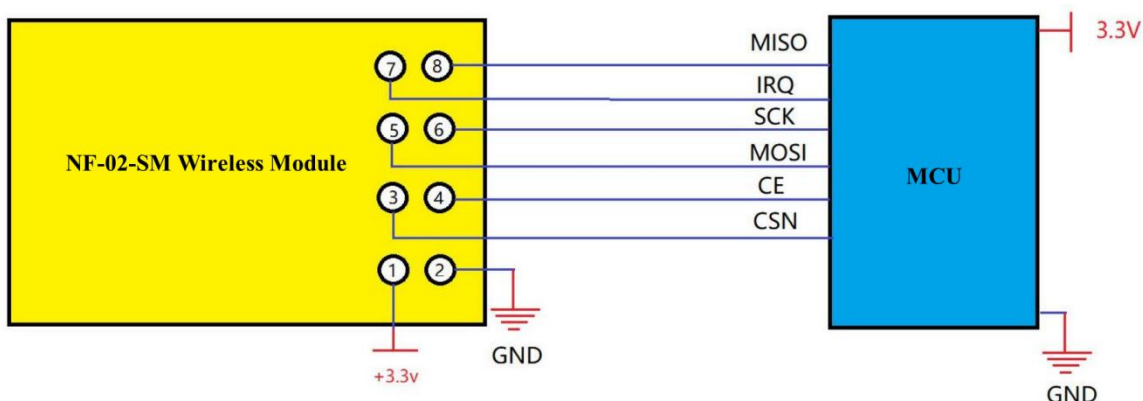
Pin Definition Diagram



Precautions

No.	Category	Precautions
01	Electrostatic	High-frequency analog devices are electrostatic-sensitive; please avoid human contact with the electronic components on the module as much as possible.
02	Power Supply	Ensure the power supply has low ripple and avoid large fluctuations in supply voltage; it is recommended to use a π -type filter (ceramic capacitor // tantalum capacitor + inductor).
03	Ground	The module ground uses single-point grounding; it is recommended to use a 0 Ω resistor or a 0mH inductor, and keep the reference ground of other circuits separate.
04	Antenna	Do not cover the antenna with metal housings. Certain components such as relays will affect antenna performance. Keep the antenna exposed, preferably vertically upward.
05	Interference	If there are wireless modules of other frequency bands inside the same product, the frequency shall be properly planned and shielding measures adopted to reduce the impact of harmonic interference and intermodulation interference.
06	Crystal Oscillator	If a crystal oscillator exists near the module circuit board where this module is located, please increase the straight-line distance between the module and the crystal oscillator as much as possible.

Typical Circuit



Connection Diagram between MCU and NF-02-SM

Notes

- CE can be tied to high level for a long time, but the module must be set to power-down mode when writing registers; it is recommended to connect the CE pin to the MCU GPIO port.
- IRQ may be left unconnected; the SPI polling method can be used to obtain the interrupt status of the STATUS register. However, it is recommended to use the MCU hardware external interrupt and connect IRQ to the MCU external trigger pin to trigger the MCU interrupt.
- The RF chip model used by the NF-02-SM is Si24R1; the read/write method of the chip registers shall follow the timing described in the chip datasheet. For details, refer to the Si24R1 chip datasheet or download the driver examples for STM32 and 51 MCU from the official website.
- Ensure good grounding with a large ground plane and small power ripple; add filtering capacitors as close as possible to the module's VCC and GND pins.
- For other 2.4G selection guides, please visit the website: <https://docs.ai-thinker.com/2.4g>.

Chip Power Consumption

Mode	Min.	Typ.	Max.	Unit
Power-down Mode	-	0.7	-	μA
Standby Mode	-	15	-	μA
Receive Mode (2Mbps)	-	15	-	mA
Transmit Mode (0dBm)	-	25	-	mA

FAQ

Short Communication Distance: Ideal Range Not Achieved

No.	Cause	Description
01	Obstacle	The 2.4G band has poor penetration due to its physical characteristics; when an obstacle exists during line-of-sight communication, the communication distance will be greatly shortened.
02	Interference Source	Temperature, humidity, and electromagnetic interference from the same frequency band will increase the packet loss rate of communication.
03	Antenna	The antenna uses a 50-ohm impedance trace; if there are metal objects near the antenna or the module is placed inside a shielding case, signal attenuation will occur.
04	CE Pin	In the program configuration, the transmitting device is not kept at high level, resulting in reduced sensitivity when receiving the acknowledgment signal.
05	Transmit Power	When configuring the register, the higher the transmit power is configured, the farther the transmission distance will be.
06	Transmit Rate	If the configured transmit rate is too high, the transmission distance will also be relatively reduced.
07	Low Voltage	The supply voltage is less than 3.3V, resulting in insufficient module power supply, which relatively affects the module's transmit power.

Module Overheating and Damage

No.	Cause	Description
01	Supply Voltage	Check the power supply to ensure it is between 1.9 and 3.6V; exceeding 3.6V will cause module damage.
02	Stability	Check the stability of the power supply; the voltage must not fluctuate too much.
03	ESD Protection	Ensure proper ESD protection during power installation and use; high-frequency devices have electrostatic sensitivity.
04	Soldering	The module cannot undergo reflow soldering or wave soldering; otherwise it will be damaged.

Contact Information

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