



NF-04 Specification

Version V1.0

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Notice

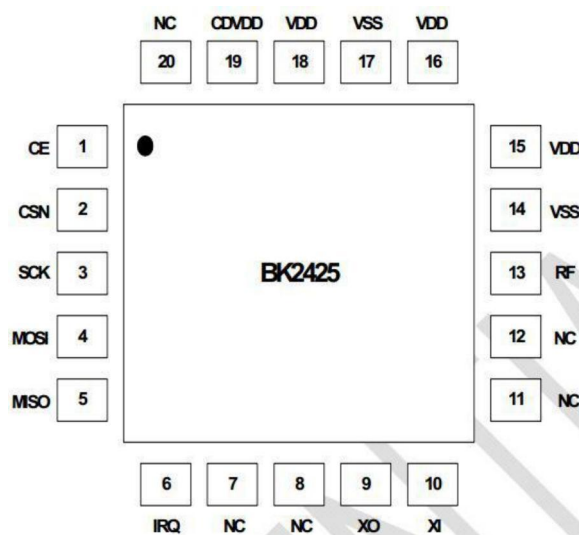
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Module Introduction

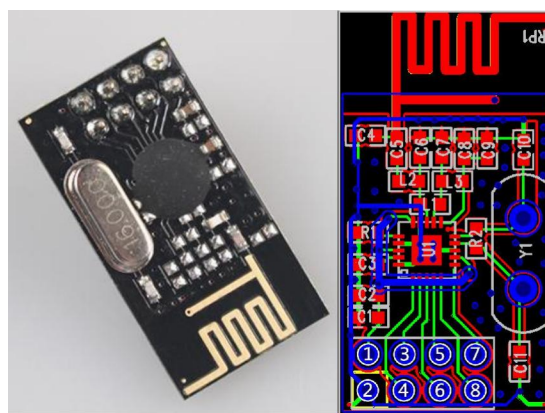
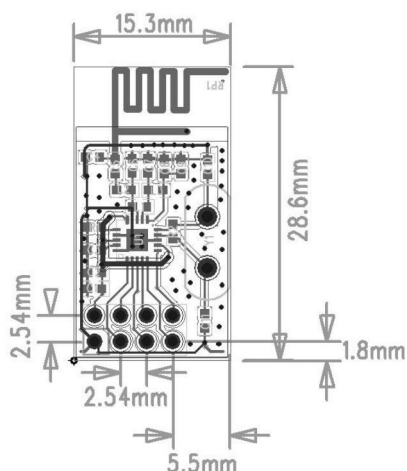
The NF-04 is a 2.4G wireless transceiver module with a transmit power of 2.5mW. It integrates the BK2425 RF chip and adopts a DIP-8 package, enabling quick integration into existing products. The module supports an over-the-air data rate of up to 2Mbps and communicates through an SPI interface. It features 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 ad hoc wireless sensor nodes, etc. It is an ideal solution for IoT applications.

Appearance and Dimensions

Chip Appearance Diagram



Module Appearance Diagram



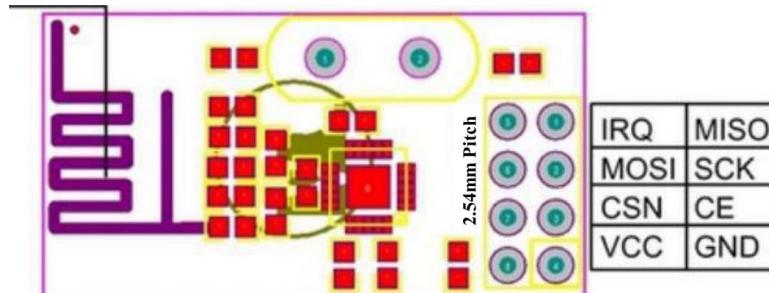
Feature and Specifications

No.	Parameter	Value	Note
01	RF Chip	BK2425	Domestic Chip
02	Module Dimensions	28.6*15.3	Unit: mm
03	Modulation	GFSK	Gaussian Frequency Shift Keying
04	Package Type	DIP-8	Through-hole
05	Interface Type	4-wire SPI interface	Maximum rate shall not exceed 10MHz
06	Transmit Power	Max. 4dBm	See chip datasheet for other details
07	RSSI Support	Not supported	Only supports simple packet-loss
08	Operating Frequency Band	2.4GHz – 2.525GHz	Adjustable, 1MHz step
09	Voltage Range	1.9 – 3.6V	Excessive voltage will damage the module
10	Data Rate	2Mbps/1Mbps/250Kbps	See chip datasheet for details
11	Channel	128 RF channel	1MHz spacing between each channel
12	Test Distance	120m	Clear sky, no obstacles, at max. transmit power
13	Receiver Sensitivity	-96dBm@250Kbps	See chip datasheet for other details
14	Antenna Interface	Onboard PCB antenna	50Ω characteristic impedance
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	Standby Current	50μA (Standby-I mode)	See chip datasheet for other details
20	Receive Current	16.5mA (2Mbps)	See chip datasheet for other details
21	Transmit Current	18mA (4dBm)	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

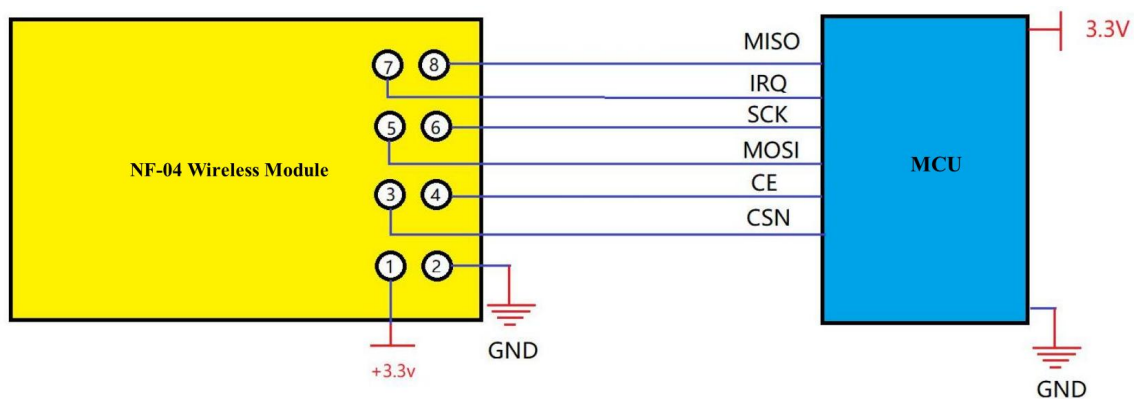
Pin Definition Diagram



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 0Ω 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-04

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-4 is BK2425; the read/write method of the chip registers shall follow the timing described in the chip datasheet. For details, refer to the BK2425 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 materials, please visit the website: <https://docs.ai-thinker.com/2.4g>.

Chip Power Consumption

Mode	Min	Typ	Max	Unit
Power-down Mode	-	3	-	μA
Standby Mode 1	-	50	-	μA
Standby Mode 2	-	300	-	μA
Receive Mode (2Mbps)	-	16.5	-	mA
Transmit Mode (0dBm)	-	18	-	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

Official Website: <https://www.ai-thinker.com>

Development DOCS: <https://docs.ai-thinker.com>

Official Forum: <http://bbs.ai-thinker.com>

Sample Purchase: <https://anxinke.taobao.com>

Business Cooperation: sales@aithinker.com

Technical Support: support@aithinker.com

Company Address:

Room 410, Building C, Huafeng Smart Innovation Port, Xixiang, Gushu, Bao'an District, Shenzhen

Contact Hotline: 0755-29162996

