

Wireless Module for Crowpanel

Advanced Series-nRF2401

DataSheet

(2.4GHz)

2.4 GHz ISM-band ultra-low-power RF transceiver chip

from Nordic Semiconductor

DataSheet

V1.3

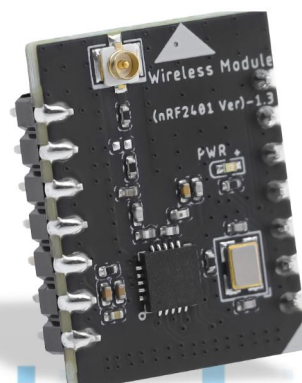


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1 Overview

1.1 Product Description

The nRF2401 wireless module is a highly integrated, ultra-low-power wireless RF transceiver module operating in the 2.4GHz ISM band. Powered by the nRF24L01+ core chip, it supports three air data rates (250kbps, 1Mbps, 2Mbps) and GFSK modulation, with access to 126 selectable channels. Featuring an SPI communication interface and an IPEX-1 antenna connector, the module works with external high-performance 2.4GHz antennas and supports multi-mode switching (transmit, receive, standby, etc.).

With a compact form factor of 18×23.7×1.6mm, the hardware design enables flexible transceiver mode switching via CE/CSN/IRQ pins. Its SPI interface ensures seamless integration with mainstream microcontrollers. The module is widely used in industrial sensor networks, medical wearables, smart homes, audio streaming, and other scenarios.

1.2 Core Features

- **High-Performance Core:** Equipped with the original Nordic nRF24L01+ chip, featuring high integration and strong stability.
- **Global Frequency Band Compatibility:** 2.4GHz ISM band (2.400~2.4835GHz) with 126 selectable channels, no regional restrictions.
- **Flexible Transmission Configuration:** Supports GFSK modulation with selectable data rates (250kbps/1Mbps/2Mbps), adapting to diverse transmission requirements.
- **Ultra-Low Power Consumption Design:** Transmit current 11.3mA, receive current 13.5mA, standby current 26μA, power-down current 900nA, ensuring long battery life.
- **Convenient Communication Interface:** SPI interface design, compatible with mainstream microcontrollers for rapid integration and development.
- **Multi-Mode Switching:** Supports transmit/receive/standby/power-down modes, flexibly controlled via CE/CSN/IRQ pins.
- **Enhanced Antenna Design:** IPEX-1 antenna connector with external high-performance 2.4GHz antenna for more stable signal transmission.
- **Wide Environmental Adaptability:** Operating voltage 1.9~3.6V (typical 3.3V), operating temperature -40℃~+85℃, suitable for extreme scenarios.
- **Compact Package Dimensions:** Compact size of 18×23.7×1.6mm, facilitating integration into embedded devices.
- **Intuitive Status Indication:** Power indicator (green LED), remains steadily lit when powered on for clear status visibility.

1.3 Application Fields

- **Wireless Sensor Networks (WSN)**
- **Internet of Things (IoT)**
- **Medical & Health Monitoring**
- **Ultra-Low Power Sensor Networks**
- **Wireless Remote Sensing**
- **Smart Home**
- **Industrial Automation**

2 Dimensions Drawing

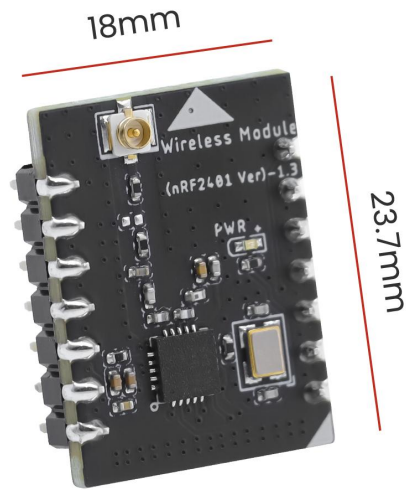


Figure 1:Dimensions Drawing

3 System Block Diagram

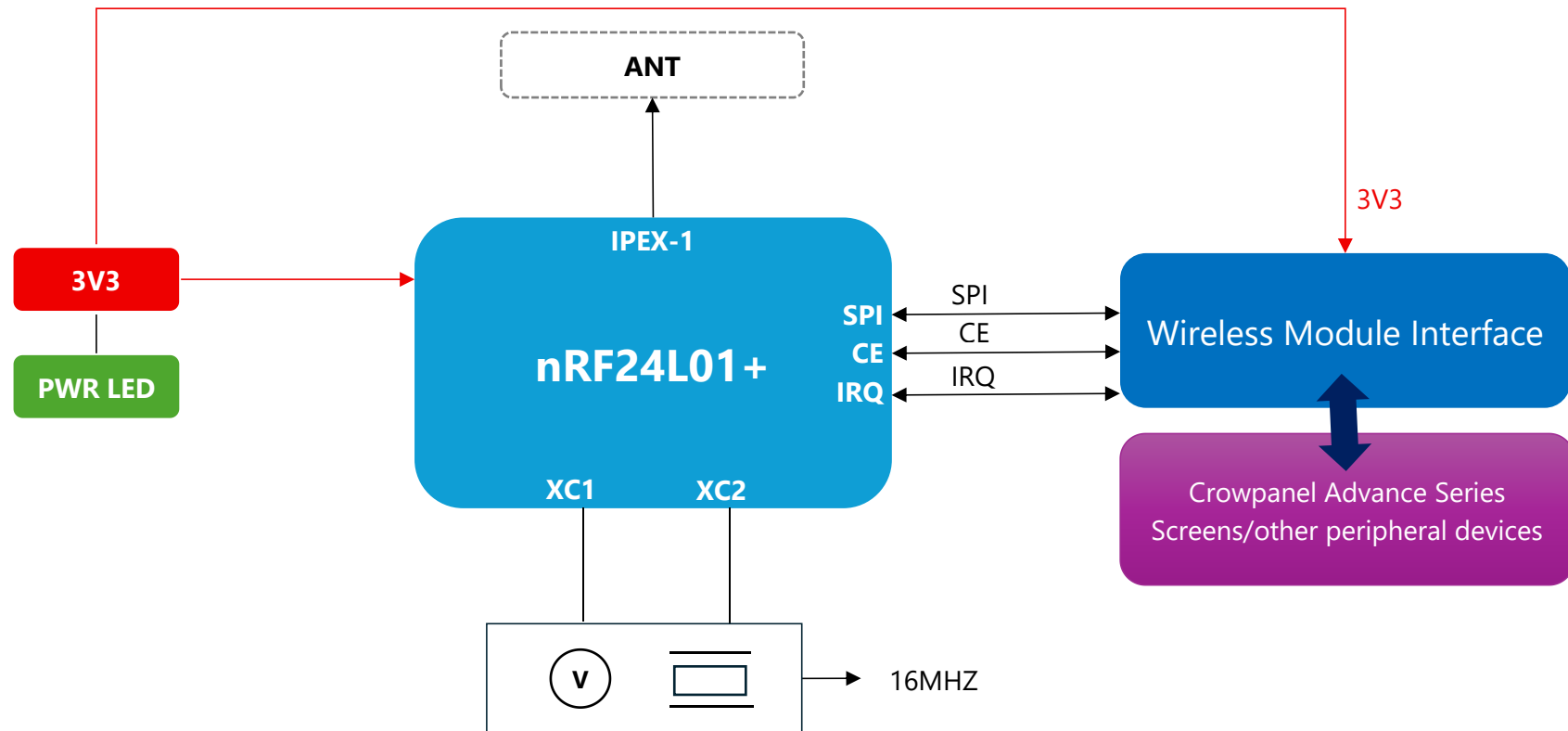


Figure 2: System Block Diagram

4 Hardware Overview

The hardware overview covers the nRF2401 module's interfaces, pin layout, and corresponding pin functions.

nRF2401 (2.4GHz)

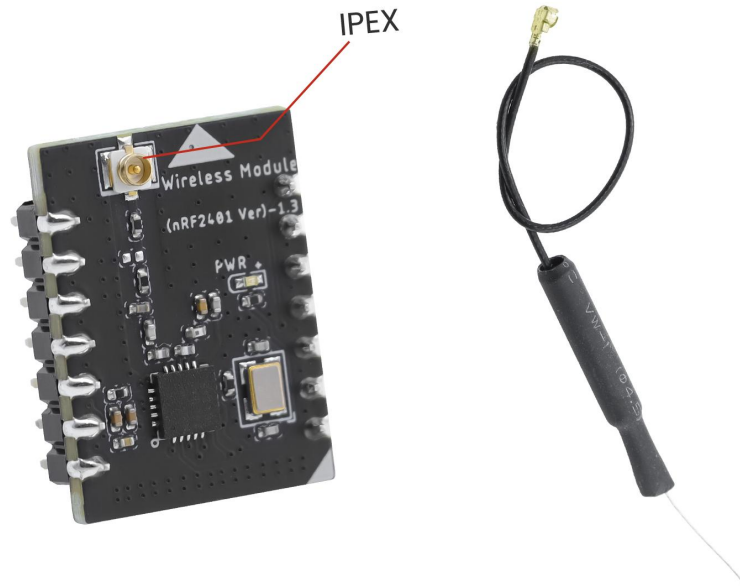


Figure 3:Module Interface Diagram

4.1 LED

No.	Name	Silkscreen	Pin	Color	Description
1	Power Indicator	PWR	VDD3V3	Green	Power indicator; remains steadily lit green when powered on.

4.2 Antenna Interface

No.	Name	MCU Pin	Description
1	IPEX-1	ANT	External 2.4GHz coaxial antenna connection.

4.3 Pin Layout

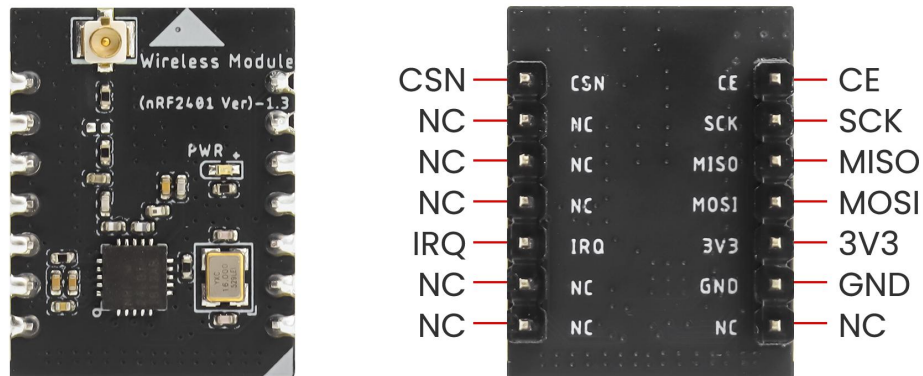


Figure 4:Module Pin Diagram

Pin Definition: The following table shows the pin definitions and descriptions of the nRF2401 wireless module:

Left Interface:

No.	Pin No.	Type	Pin	MCU Pin	Description
1	P\$1	I	CSN	CSN	Chip Select signal for SPI interface (controls SPI communication enable)
2	P\$2	-	NC	-	Not Connected
3	P\$3	-	NC	-	
4	P\$4	-	NC	-	
5	P\$5	I	IRQ	IRQ	Interrupt Output Pin
6	P\$6	-	NC	-	Not Connected
7	P\$7	-	NC	-	

Right Interface:

No.	Pin No.	Type	Silkscreen	MCU Pin	Description
1	P\$1	I	CE	CE	Digital input pin for activating the chip's Receive (RX) or Transmit (TX) mode
2	P\$2	I	SCK	SCK	SPI Clock Line
3	P\$3	I	MISO	MISO	SPI Data Output Line (Slave → Master)
4	P\$4	O	MOSI	MOSI	SPI Data Input Line (Master → Slave)
5	P\$5	P	VDD3V3	-	Power Input (3.3V)
6	P\$6	-	GND	-	Ground
7	P\$7	-	NC	-	Not Connected

5 Module Specifications

No.	Item	Parameter	Specification
1	Core & Performance	Main Chip	nRF24L01+
2		Frequency Band	Global 2.4GHz ISM Band
3		Modulation Scheme	GFSK Supported
4		Operating Frequency Range	2.400 to 2.4835GHz, with 126 selectable channels
5		Communication Interface	SPI Interface
6		Data Transmission Rate	Supports three data rates: 250kbps, 1Mbps, and 2Mbps
7	nRF24L01+ Operating Current	TX Current	11.3mA
8		RX Current	13.5mA
9		Standby Mode Current	26μA
10		Power-Down Current	900nA
11	Package Type	Dimensions	18×23.7×1.6mm
12	Electrical Characteristics	Operating Voltage	3.3V
13		Operating Temperature	-40℃ ~ +85℃

6 Electrical Characteristics

6.1 Power Consumption Parameters

No.	Mode	Current	Power
1	Transmit Mode	10.2 mA	33.66mW
2	Receive Mode	13.5 mA	44.55mW

6.2 Absolute Maximum Ratings

No.	Item	Description	Min	Max	Unit
1	V _{CC}	Supply Voltage	-0.3	3.6	V
2	Top	Operating Temperature	-40	+85	°C
3	T _{ST}	Storage Temperature	-40	+125	°C

6.3 Recommended Operating Conditions

No.	Item	Description	Min	Typ	Max	Unit
1	V _{CC}	Supply Voltage	1.9	3.0	3.6	V
2	Top	Operating Temperature	-40	+27	+85	°C

7 Mechanical Characteristics

7.1 Module Dimensions

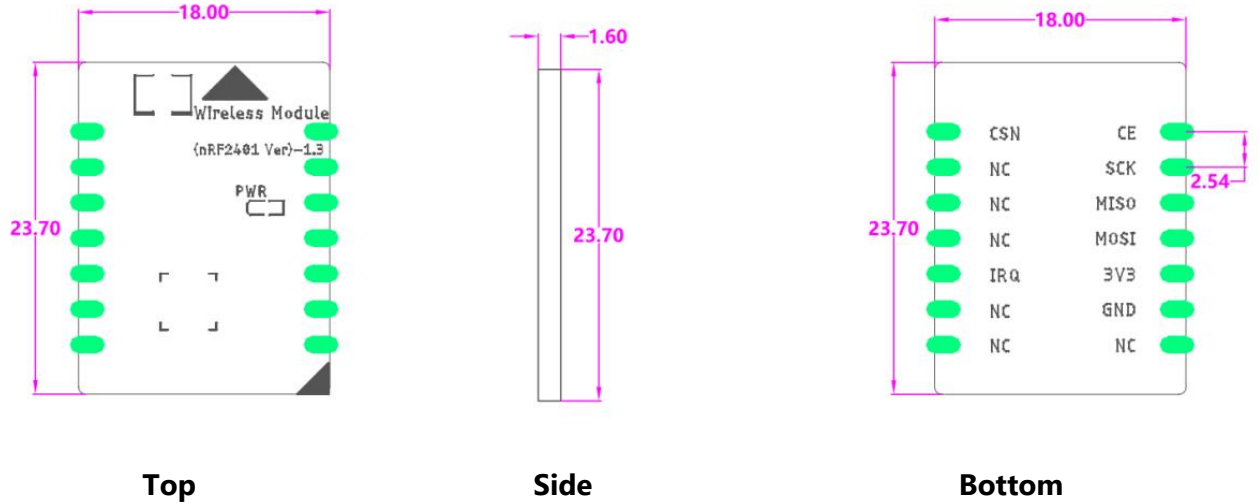


Figure 5:Outline Dimensions (Unit:mm)

7.2 Layout Recommendations

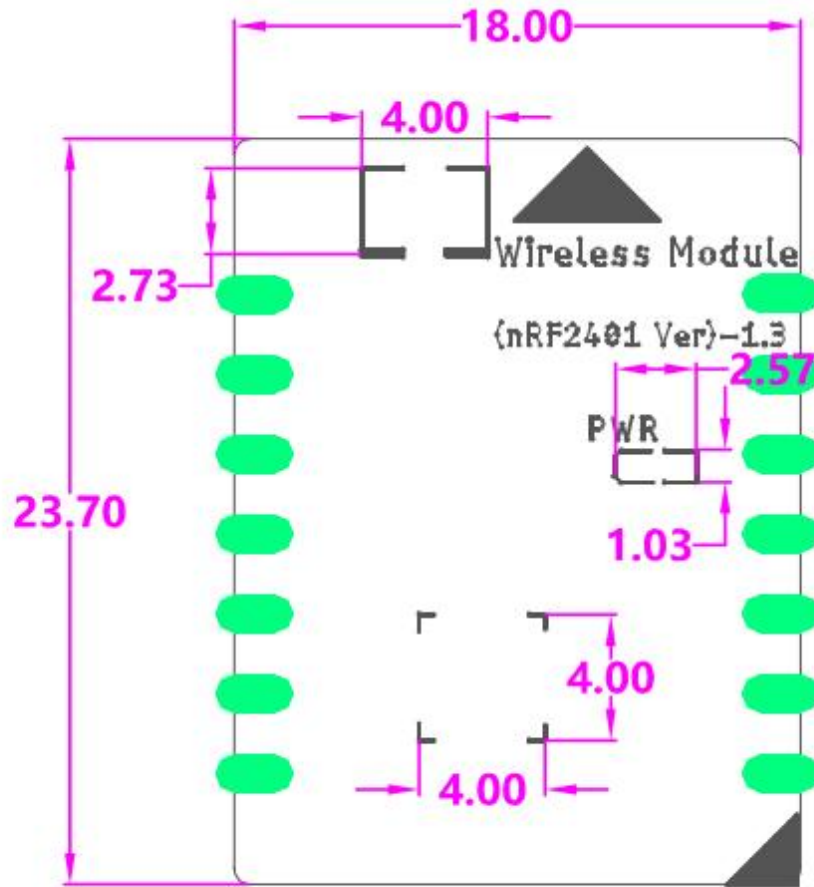


Figure 6:PCB Layout (Unit: mm)

8 Related Documents and Resources

- [nRF24L01+ Datasheet](#)
- [Wireless module for Crowpanel Advanced Series](#)

9 Revision History

Date	Version	Release Notes
2026/1/2	V1.0	Initial Release