**Rakstore NRF52832**

# Rakstore NRF52832 BLE 4.2 Module User Manual

Model: NRF52832

## 1. Introduction

The Rakstore NRF52832 BLE 4.2 Module is a compact, low-power wireless communication module designed for a wide range of applications requiring Bluetooth Low Energy (BLE) connectivity. Based on the Nordic NRF52832 SoC, this module offers robust performance, multi-protocol support, and an external antenna option via an IPEX connector, making it suitable for IoT devices, wearables, smart home systems, and more. It is compatible with NRF51, NRF24AP, and NRF24L series for flexible integration.

## 2. Product Overview

This section provides a visual and descriptive overview of the NRF52832 BLE 4.2 Module, highlighting its key components and physical characteristics.

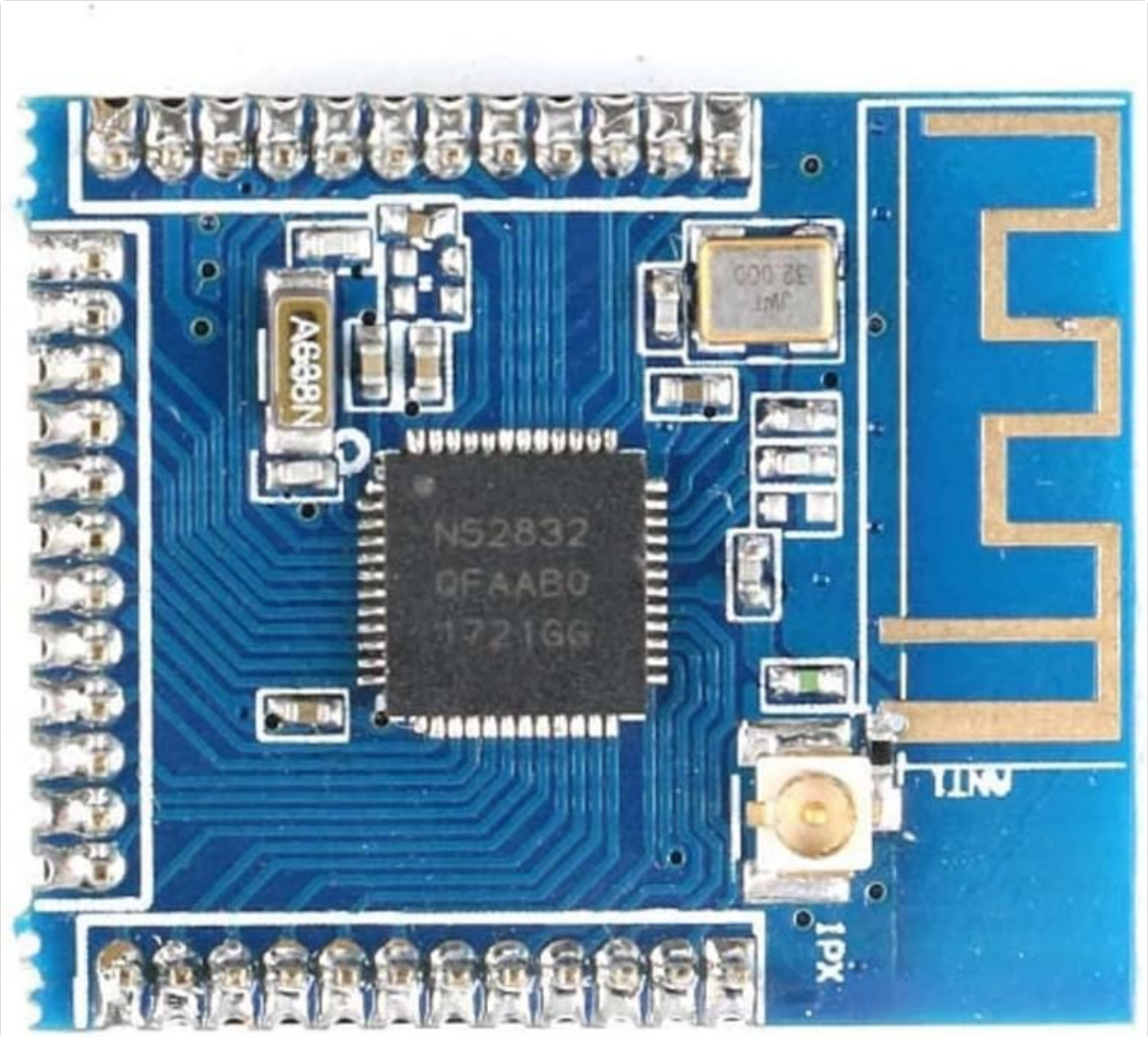


**Figure 2.1:** Top view of the NRF52832 BLE 4.2 Module. This image displays the central NRF52832 integrated circuit, surrounding passive components, a crystal oscillator for precise timing, and the IPEX connector for an external antenna. The PCB traces for the integrated antenna are also visible on the right side.

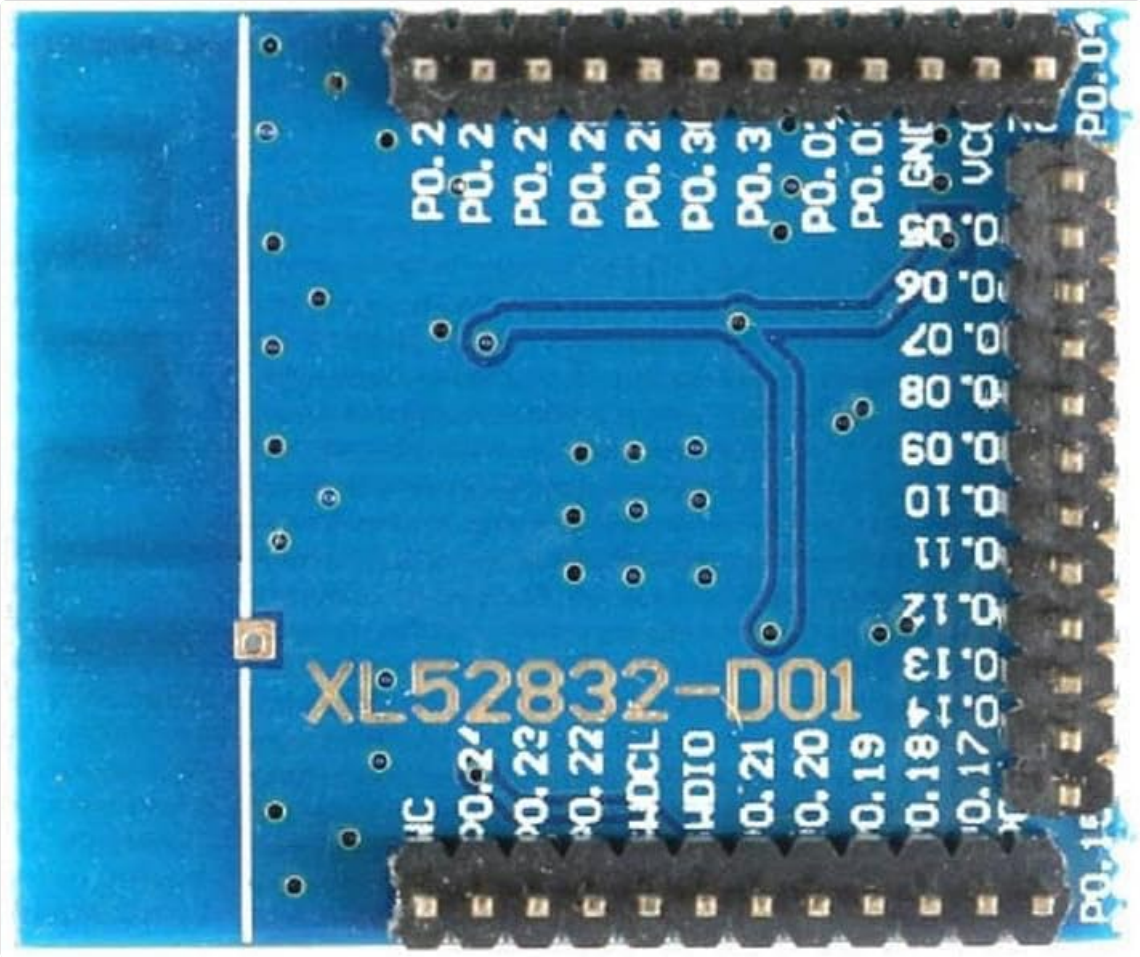


**Figure 2.2:** Bottom view of the NRF52832 BLE 4.2 Module. This image shows the underside of the module, revealing the pin headers with clear labels for various GPIOs, power, and ground connections. The model identifier "XL52832-D01" is also printed on the PCB.

### Key Components:

- **NRF52832 SoC:** The core microcontroller unit providing Bluetooth Low Energy capabilities and general-purpose processing.
- **Integrated PCB Antenna:** For basic wireless communication.
- **IPEX Connector:** Allows for the connection of an external antenna for improved range and signal quality.
- **Pin Headers:** Standard 2.54mm pitch headers for easy integration into breadboards or custom PCBs, providing access to GPIOs, power, and communication interfaces.

## 3. Specifications

The following table details the technical specifications of the NRF52832 BLE 4.2 Module.

| Feature | Value |
|---|---|
| Model | NRF52832 |
| Frequency Range | 2360-2483 MHz |
| Output Power | 4 dBm |
| Receiver Sensitivity | -96 dBm (Bluetooth-compatible) |
| Emission Current | 5.3mA @0dBm |
| Receiving Current | 5.3mA @1MBPS |

| Feature | Value |
|---|---|
| Deep Sleep Current | 0.4uA |
| RAM / FLASH | 64KB / 512KB |
| Modulation Method | GFSK |
| Module Size | 21 x 25 mm |
| Platform | Not Machine Specific |
| UPC | 717981931277 |

## 4. Setup Instructions

This section outlines the general steps for setting up the NRF52832 BLE 4.2 Module. Specific wiring and programming will depend on your development board and application.

1. **Power Supply:** Connect the module to a stable 3.3V power supply. Ensure proper grounding. Refer to the pinout diagram (if available from the manufacturer's datasheet) for exact VCC and GND pins.
2. **Antenna Connection:**
    - For the integrated PCB antenna, no external connection is needed.
    - For an external antenna, connect a compatible 2.4GHz antenna to the IPEX connector on the module. Ensure the connection is secure.
3. **Data Interface:** Connect the module's communication pins (e.g., SWD for programming, UART for serial communication) to your development board (e.g., Arduino, Raspberry Pi, or a dedicated NRF52 development kit).
4. **Software Development Kit (SDK):** Download and install the appropriate Nordic Semiconductor SDK for the NRF52832. This typically includes drivers, libraries, and example code.
5. **Programming Environment:** Set up your preferred Integrated Development Environment (IDE), such as Segger Embedded Studio, Keil uVision, or VS Code with relevant extensions, and configure it for NRF52832 development.
6. **Firmware Upload:** Use a compatible programmer (e.g., J-Link) to upload your custom firmware or example code to the NRF52832 module via the SWD interface.

***Note:*** *Always consult the official Nordic Semiconductor documentation and the module's specific datasheet for detailed pinouts and programming guides.*

## 5. Operating Instructions

Once the NRF52832 module is set up and programmed, its operation will depend on the specific firmware loaded. Below are general operating principles for BLE modules.

1. **Power On:** Apply power to the module. The module will typically execute the loaded firmware.
2. **BLE Advertising:** If configured as a peripheral, the module will begin advertising its presence, allowing other BLE devices (centrals) to discover it.
3. **BLE Connection:** A central device can initiate a connection with the module. Once connected, data can be exchanged.
4. **Data Exchange:** Data is typically exchanged using GATT (Generic Attribute Profile) services and characteristics. Your firmware defines these services and how data is read from or written to them.
5. **Multi-Protocol Operation:** If your firmware supports multi-protocol, the module can switch between different wireless protocols (e.g., BLE, ANT, 2.4GHz proprietary) as programmed.

6. **Low Power Modes:** The NRF52832 supports various low-power modes. Your firmware should utilize these modes to optimize battery life when the module is not actively transmitting or receiving.

***Tip:*** *Use a BLE scanner application on your smartphone or computer to verify the module's advertising and connection capabilities during development.*

## 6. Maintenance

The NRF52832 BLE 4.2 Module is a robust electronic component designed for long-term operation with minimal maintenance.

- **Environmental Conditions:** Operate and store the module within its specified temperature and humidity ranges to prevent damage. Avoid extreme temperatures, direct sunlight, and high moisture environments.
- **Physical Handling:** Handle the module with care to avoid physical damage to the PCB, components, or pin headers. Use anti-static precautions when handling to prevent electrostatic discharge (ESD) damage.
- **Cleaning:** If necessary, gently clean the module with a soft, dry, anti-static brush or cloth. Do not use liquids or abrasive cleaners.
- **Firmware Updates:** Regularly check for updated SDKs and firmware examples from Nordic Semiconductor to ensure optimal performance and access to new features or bug fixes.

## 7. Troubleshooting

If you encounter issues with your NRF52832 BLE 4.2 Module, consider the following troubleshooting steps:

- **Module Not Powering On:**
  - Verify the power supply voltage is 3.3V and stable.
  - Check all power and ground connections for proper contact and polarity.
- **Cannot Detect Module (BLE Scanner):**
  - Ensure the module is powered on and your firmware is correctly configured to advertise.
  - Check the antenna connection (internal or external). A loose or incorrect antenna can severely limit range.
  - Verify the BLE scanner on your central device is working correctly and within range.
  - Ensure no other device is already connected to the module, preventing it from advertising.
- **Programming Errors:**
  - Double-check SWD connections (SWDIO, SWCLK, VCC, GND, RESET).
  - Ensure your programmer (e.g., J-Link) drivers are installed and the IDE is configured for the correct target device (NRF52832).
  - Verify the firmware image is valid and compatible with the NRF52832.
- **Unstable Connection / Poor Range:**
  - Check for environmental interference from other 2.4GHz devices (Wi-Fi, microwaves).
  - Ensure the antenna is clear of obstructions and not placed near large metal objects.
  - If using an external antenna, ensure it is rated for 2.4GHz and properly connected.
  - Consider increasing the transmit power in your firmware (if allowed and within regulations).
- **Module Not Responding:**
  - Perform a hard reset by cycling power to the module.

- Re-flash the firmware to ensure no corruption.

## 8. Warranty and Support

For specific warranty information, please refer to the purchase documentation or contact the vendor directly. Rakstore products are generally covered by a standard manufacturer's warranty against defects in materials and workmanship. For technical support, documentation, and further assistance with the NRF52832 SoC, please visit the official Nordic Semiconductor website. For module-specific inquiries, contact Rakstore customer support through their official channels.