Arduino ABX00053

Arduino Nano RP2040 Connect User Manual

Model: ABX00053

1. INTRODUCTION

The Arduino Nano RP2040 Connect is a compact and powerful development board designed for a wide range of embedded projects. It integrates the Raspberry Pi RP2040 microcontroller with a u-blox NINA-W102 radio module, providing Wi-Fi and Bluetooth connectivity. This board also includes a built-in microphone and a six-axis Inertial Measurement Unit (IMU) with AI capabilities, making it suitable for sound activation, audio control, AI voice recognition, fall sensing, and double-tap activation.

With 16MB of external flash memory, the Nano RP2040 Connect offers ample space for code and data storage. It supports the entire RP2040 software ecosystem, including MicroPython, providing flexibility for developers.
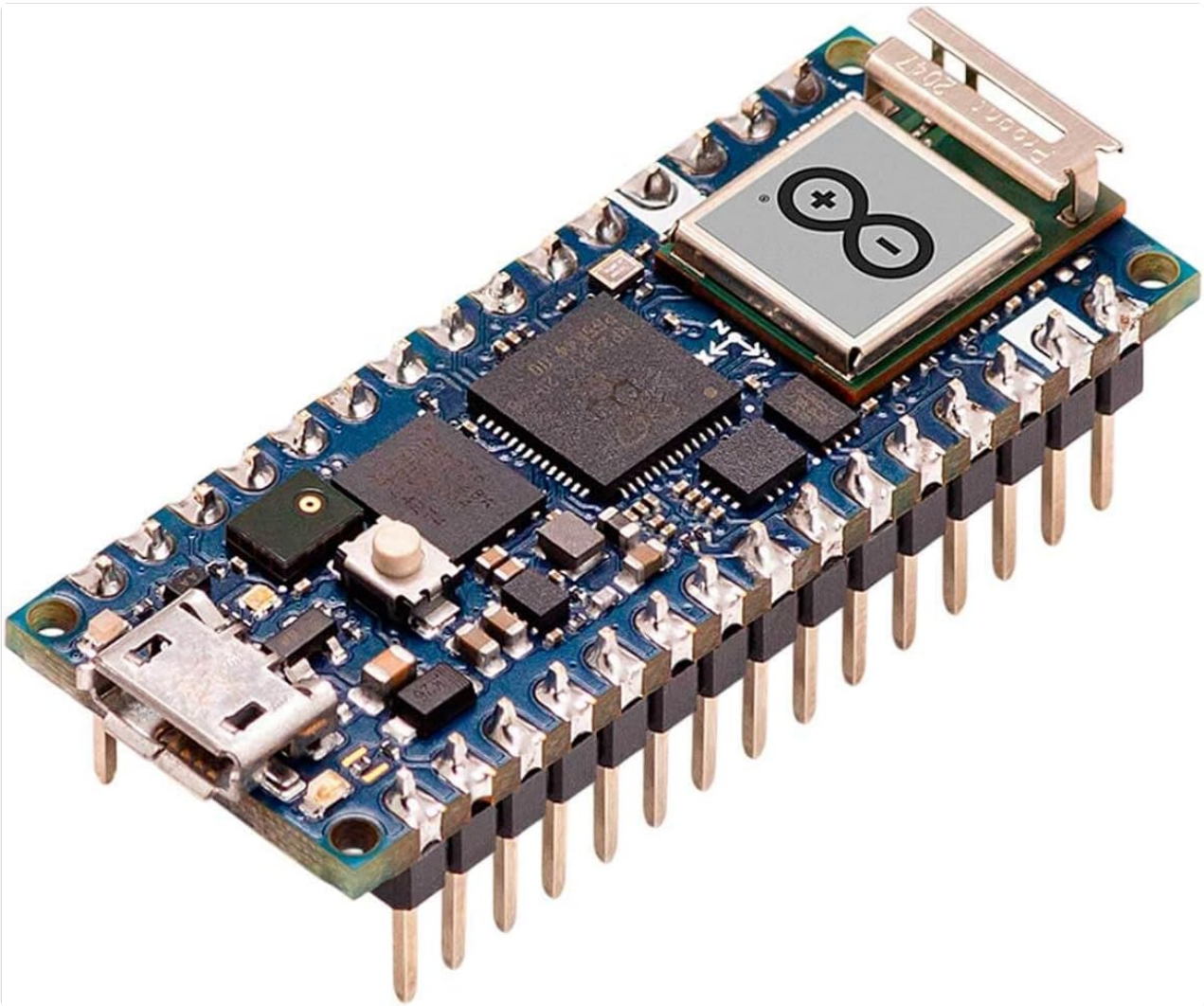
Figure 1.1: Front view of the Arduino Nano RP2040 Connect board with pre-soldered headers.

2. SETUP

To begin using your Arduino Nano RP2040 Connect, follow these steps:

1. **Install Arduino IDE:** Download and install the latest version of the Arduino IDE from the official Arduino website (arduino.cc/en/software).

2. **Add Board Support:** Open the Arduino IDE. Go to **Tools > Board > Boards Manager...** Search for "Arduino Mbed OS RP2040 Boards" and install it.

3. **Connect the Board:** Connect the Arduino Nano RP2040 Connect to your computer using a micro-USB cable. Ensure the cable is data-capable.

4. **Select Board and Port:** In the Arduino IDE, go to **Tools > Board > Arduino Mbed OS RP2040 Boards** and select "Arduino Nano RP2040 Connect". Then, go to **Tools > Port** and select the serial port corresponding to your connected board.

5. **First Upload (Blink Sketch):** Open the "Blink" example sketch from **File > Examples > 01.Basics > Blink** Click the "Upload" button (right arrow icon) to compile and upload the sketch to your board. The onboard LED should start blinking.

6. **MicroPython Setup (Optional):** For MicroPython development, refer to the official Arduino documentation for instructions on flashing the MicroPython firmware and using a compatible IDE or serial terminal.
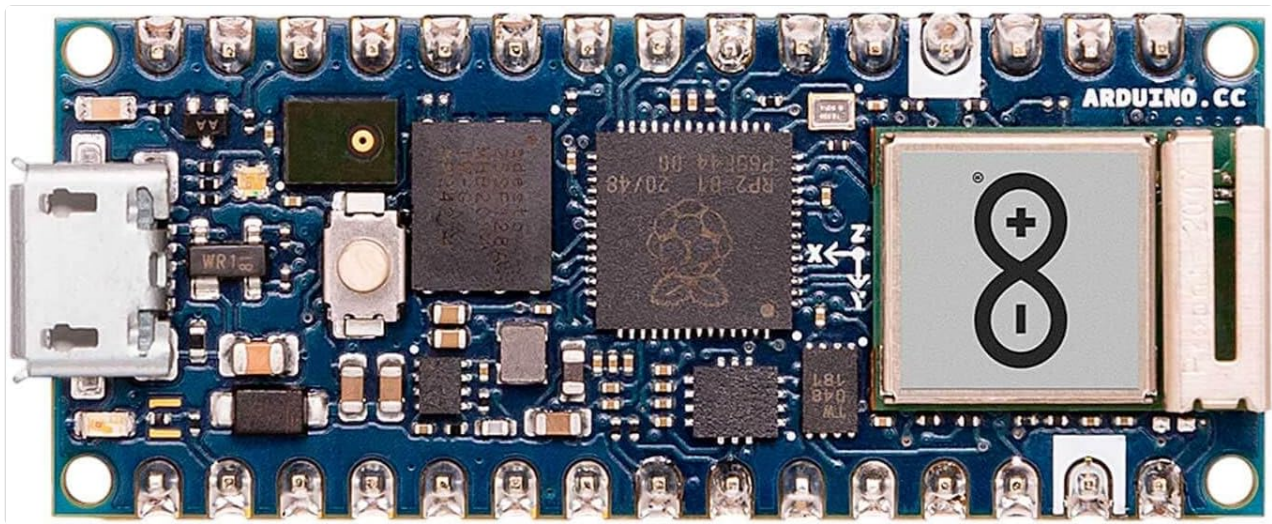
Figure 2.1: Side view of the board, highlighting the micro-USB port for connection.

3. OPERATING THE BOARD

The Arduino Nano RP2040 Connect can be powered via the micro-USB port or through the VIN pin (4.5-21V). Once powered and programmed, the board operates autonomously based on the uploaded sketch.

3.1. Wi-Fi and Bluetooth Connectivity

The integrated u-blox NINA-W102 module provides Wi-Fi (802.11b/g/n) and Bluetooth/BLE v4.2 capabilities. Libraries are available in the Arduino IDE to enable network communication, connect to Wi-Fi networks, and establish Bluetooth connections for various IoT applications.

3.2. Onboard Sensors

- **Microphone:** The built-in microphone can be used for sound detection, audio processing, and voice recognition projects.
- **Six-axis IMU:** The Inertial Measurement Unit provides accelerometer and gyroscope data, enabling motion sensing, orientation tracking, fall detection, and gesture recognition.

3.3. Digital and Analog Pins

The board features 22 digital pins (20 with PWM support) and 8 analog pins. These pins can be configured as inputs or outputs to interface with external components such as LEDs, sensors, motors, and other modules.

Figure 3.1: The Arduino Nano RP2040 Connect in an active development environment.

4. MAINTENANCE

The Arduino Nano RP2040 Connect is a robust electronic device, but proper care ensures its longevity and reliable operation:

- **Handle with Care:** Avoid dropping the board or subjecting it to excessive physical stress.
- **Static Discharge:** Always handle the board by its edges and avoid touching the electronic components directly to prevent damage from electrostatic discharge.
- **Cleanliness:** Keep the board free from dust, dirt, and moisture. Use a soft, dry brush or compressed air for cleaning if necessary.
- **Power Supply:** Ensure you use a stable power supply within the specified voltage range (5V via USB, 4.5-21V via VIN). Incorrect voltage can damage the board.
- **Storage:** Store the board in an anti-static bag or a protective enclosure when not in use.

5. TROUBLESHOOTING

If you encounter issues with your Arduino Nano RP2040 Connect, consider the following troubleshooting steps:

5.1. Board Not Recognized by Computer

- **Check USB Cable:** Ensure the micro-USB cable is a data-capable cable, not just a charging cable. Try a different cable.
- **Check USB Port:** Try connecting to a different USB port on your computer.
- **Driver Installation:** Verify that the necessary drivers are installed. The Arduino IDE installation typically

handles this, but manual installation might be needed on some systems.

- **Reset Button:** Double-tap the reset button on the board quickly. This often puts the board into bootloader mode, making it discoverable by the computer.

5.2. Code Upload Failure

- **Correct Board and Port:** Confirm that the correct board type and serial port are selected in the Arduino IDE (**Tools > Board** and **Tools > Port**).
- **Bootloader Mode:** If uploads consistently fail, try putting the board into bootloader mode by double-tapping the reset button before attempting to upload.
- **Syntax Errors:** Check your code for any syntax errors that might prevent compilation.

5.3. Flimsy USB Connector

Some users have reported issues with the micro-USB connector being fragile. To minimize stress on the connector:

- **Gentle Handling:** Always insert and remove the USB cable gently and without force.
- **Secure Connection:** If possible, secure the board to a breadboard or enclosure to prevent movement that could strain the connector.

6. SPECIFICATIONS

Below are the technical specifications for the Arduino Nano RP2040 Connect:
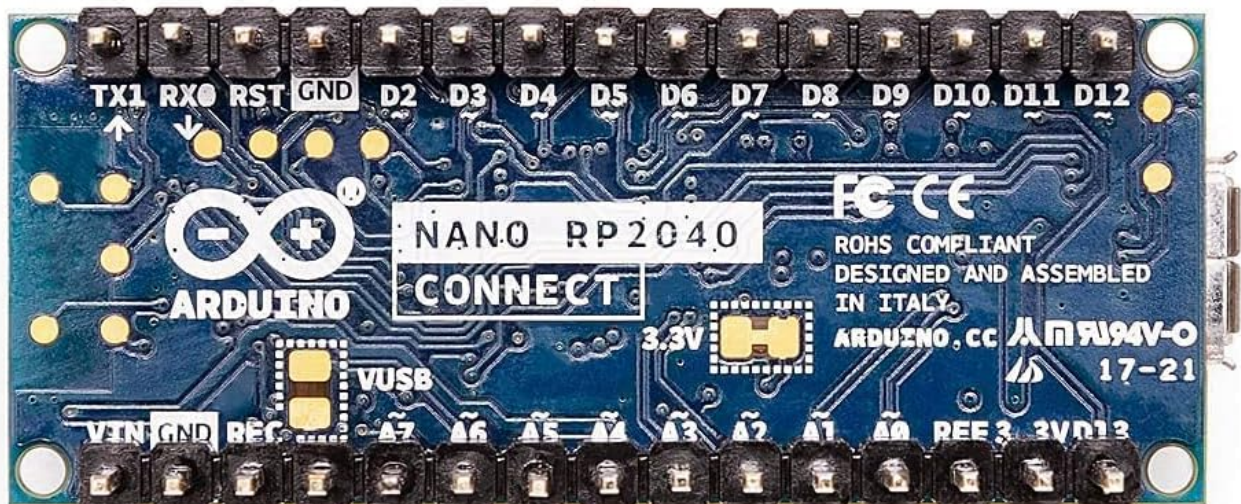

Figure 6.1: Packaging detail showing key specifications.

Feature	Detail
Processor	Dual-core ARM Cortex M0+ (RP2040)
Clock Speed	133 MHz
RAM	264 KB SRAM
Flash Memory	16 MB (external)

Feature	Detail
Wireless Connectivity	Wi-Fi 802.11b/g/n, Bluetooth & BLE v4.2 (u-blox NINA-W102)
Onboard Sensors	Microphone, 6-axis IMU
Digital I/O Pins	22 (20 with PWM)
Analog Input Pins	8
Operating Voltage	3.3V
Input Voltage (VIN)	4.5-21V
Input Voltage (USB)	5V
Dimensions (LxWxH)	3.15 x 2.28 x 0.91 inches (approx. 80 x 58 x 23 mm)
Weight	0.6 ounces (approx. 17 grams)
Item Model Number	ABX00053

7. WARRANTY AND SUPPORT

For information regarding product warranty, returns, and technical support, please refer to the official Arduino website or contact Arduino customer service directly. Specific warranty terms may vary by region and retailer.

Official Arduino Website: www.arduino.cc

Community Forums: The Arduino community forums are an excellent resource for project ideas, troubleshooting, and peer support.