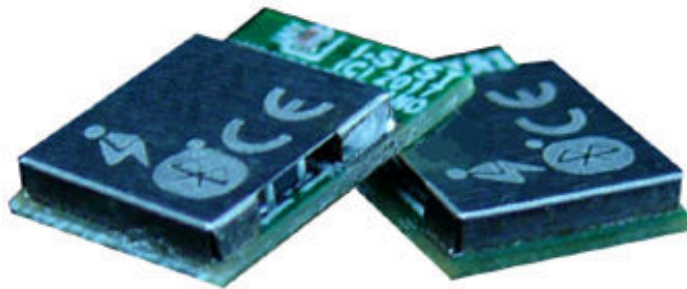


HARDWARE REFERENCE

IMM-NRF52832-NANO Module

Bluetooth 5 Low Energy



Part No : IBLE832N



FCC ID : 2ALTY-52832NANO



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The IMM-NRF52832-NANO module is warranted against defects in materials and workmanship for a period of 30 days from the date of purchase from I-SYST or from an authorized dealer.

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Bluetooth® is a registered trade mark of Bluetooth SIG

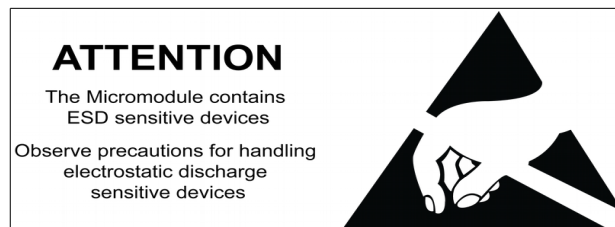


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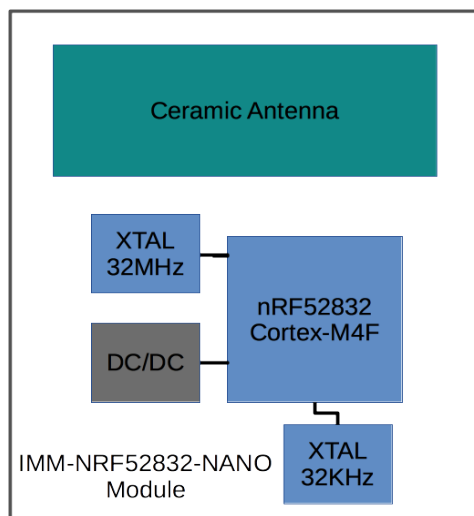
Introduction

The nRF52832 is an ultra low power System on Chip (SoC) from Nordic Semiconductor. It integrates the nRF52 series 2.4GHz transceiver, a 32 bits ARM® Cortex™-M4F MCU, Flash memory, analog and digital I/O. The nRF52832 supports Bluetooth 5 Low Energy.

The IMM-NRF52832-NANO is a 10 x 7 x 1.6 mm module with embedded ceramic antenna. It allows developers to take full advantage of the nRF52832 by making all its I/O available via 34 SMD 0.5mm pitch pads.

Features:

- 32 bits ARM® Cortex™-M4F @ 64MHz.
- 2.4GHz transceiver, Bluetooth 5 LE
- 64KB SRAM.
- 512KB Flash
- 32 MHz Crystal 25PPM
- 32.768 KHz Crystal 20PPM
- DC/DC power mode configuration
- 30 configurable I/O pins
- Type 2 NFC-A Tag with wakeup on field
- 8 configurable 12 bits, 200 ksps ADC
- Digital microphone interface
- 3 x 4 channels PWM
- AES hardware encryption
- RNG, RTC
- Temperature sensor
- Up to 4 PWM
- Digital interfaces SPI Master/Slave, 2-wire Master (I2C compatible), UART (CTS/RTS)
- Quadrature decoder
- Low power comparator
- Operating voltage : 1.8V to 3.6V
- Dimension : 10 x 7 x 1.6 mm
- FCC & CE certified



Module Layout

Dimensions and I/O pins layout

Bellow is the direct relationship of the module pads and the nRF52832 I/O pins.

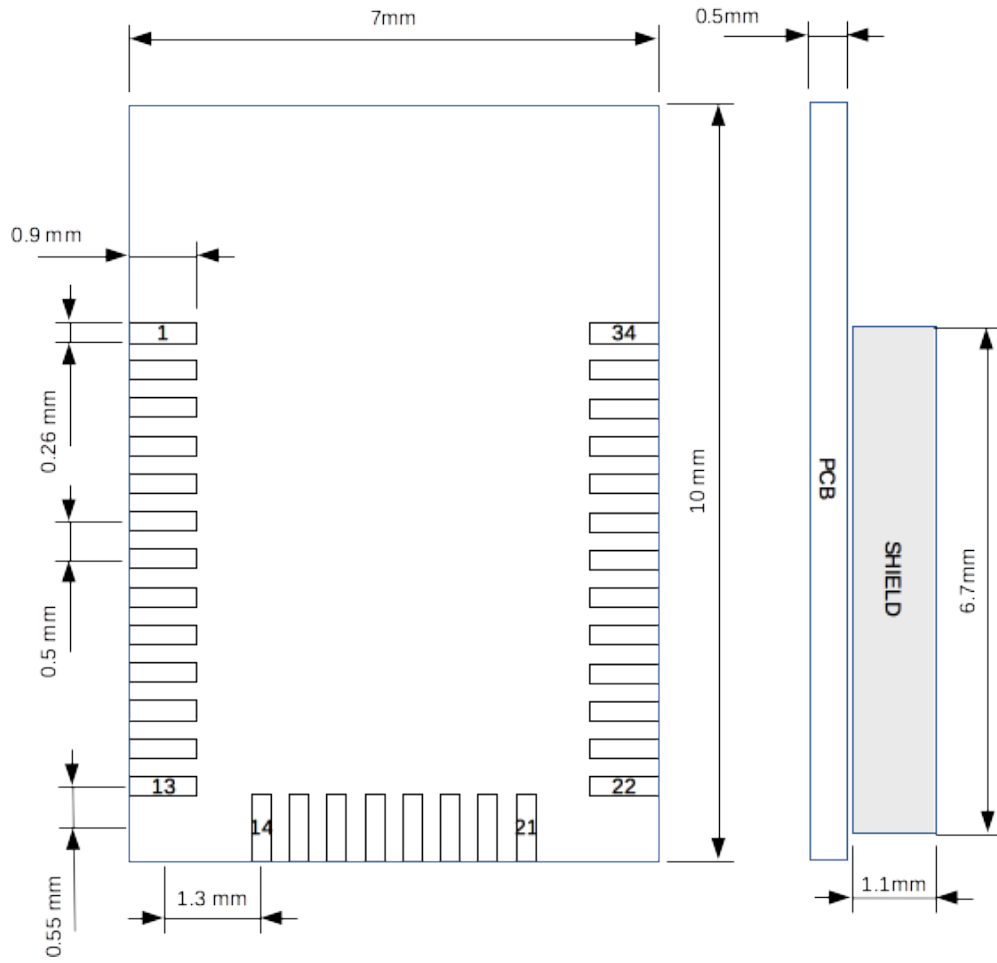


Fig. 1: Dimensions top view

Pin Number	Pin Name	Description
1	P0.22	GPIO 22
2	P0.21/nRESET	GPIO 21 or RESET active low
3	P0.20	GPIO 20
4	P0.19	GPIO 19
5	P0.18	GPIO 18
6	P0.17	GPIO 17
7	P0.16	GPIO 16
8	P0.15	GPIO 15
9	P0.14	GPIO 14
10	P0.13	GPIO 13
11	P0.12	GPIO 12
12	P0.11	GPIO 11
13	P0.10/NFC2	GPIO 10 or NFC2 tag
14	P0.09/NFC1	GPIO 9 or NFC1 tag
15	P0.08	GPIO 8
16	P0.07	GPIO 7
17	P0.06	GPIO 6
18	SWDIO	JTAG Data
19	SWDCLK	JTAG Clock
20	VDD	Power 1.8V-3.6V
21	GND	Ground
22	P0.05/AIN3	GPIO 5 or Analog Input 3
23	P0.04/AIN2	GPIO 4 or Analog Input 2
24	P0.03/AIN1	GPIO 3 or Analog Input 1
25	P0.02/AIN0	GPIO 2 or Analog Input 0
26	P0.31/AIN7	GPIO 31 or Analog Input 7
27	P0.30/AIN6	GPIO 30 or Analog Input 6
28	P0.29/AIN5	GPIO 29 or Analog Input 5
29	P0.28/AIN4	GPIO 28 or Analog Input 4
30	P0.27	GPIO 27
31	P0.26	GPIO 26
32	P0.25	GPIO 25
33	P0.24	GPIO 24
34	P0.23	GPIO 23

SMD Footprint

Note : Do not route any traces or planes under the indicated antenna area.

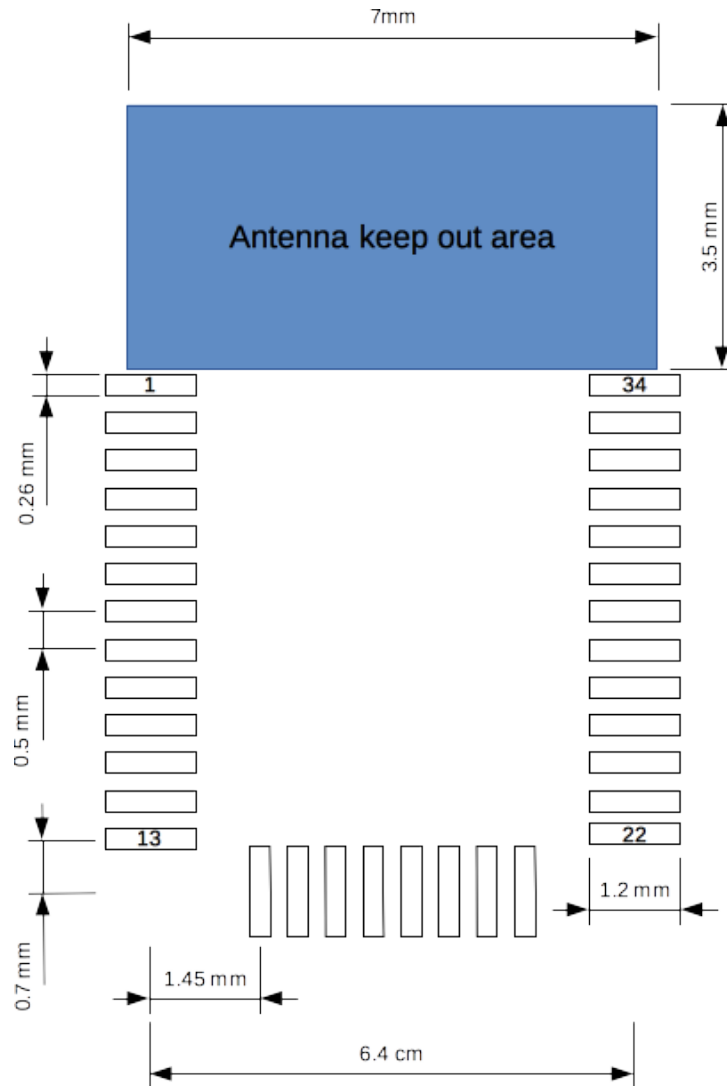


Fig. 2: SMD footprint top view

Quick Start

Requirements

The follows are required for software development

- Debug J-Tag : IDAP-Link, Segger J-Link, or any ARM compatible J-Tag.
- Nordic SDK & Softdevice BLE stack (<https://developer.nordicsemi.com/>)
- C/C++ embedded software development environment : Eclipse, Keil, CrossWorks, ...

Flashing firmware

The Nordic Softdevice is required to use BLE application. There are many methods to flash it in the module. The official method from Nordic is to use nRFGo with J-Link. This program is available only on Windows operating system. The other method is to use IDAP-Link with IDAPnRFProg for OSX & Windows. More details available on blog page <http://embeddedsoftdev.blogspot.ca/p/ehal-nrf51.html>. The IDAPnRFProg can program Softdevice, DFU and Firmware app without requiring mergehex. It can parallel program multiple nRF51 boards at once when multiple IDAP-Link are connected to PC..

Breakout board

The module can also be mounted on the optional breakout board, the IBK-BLUEIO-NANO. This breakout board has all I/O pins routed out to standard DIP32, 2.54mm pitch header pin, with onboard LED indicator and coin battery holder. Ready to be mounted on a breadboard. The SWD pins are also routed out for debug probe. Connect it to the IDAP-Link for OpenOCD debugging or turn the IMM-NRF52832-NANO into mBed compatible.

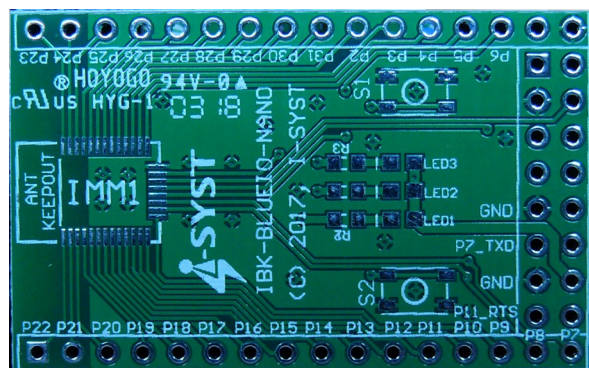


Fig. 3: IBK-BLUEIO-NANO.

Breakout PCB for the IMM-NRF52832-NANO module

J-Tag wiring

The IMM-NRF52832-NANO module has exposed the SWD (Serial Wire Debug) pins SWDIO & SWCLK, see I/O layout section. The module can be directly connected to a J-Tag tool for development by wiring the 2 SWD and the optional Reset pins to the appropriate pins on the J-Tag connector. The VIN must be wire to the VCC pin on the J-Tag. GND pad is also require to be connected to GND on J-Tag.

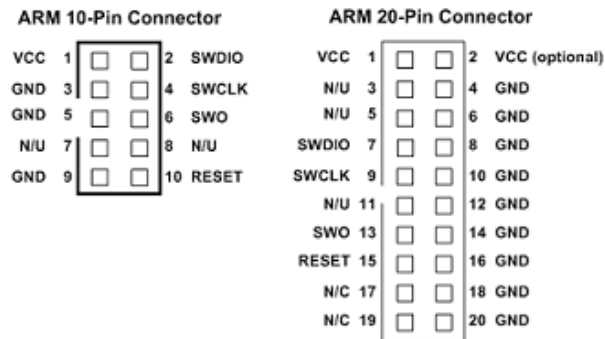


Fig. 4: ARM JTAG Connector

The module can be powered from 1.8V to 3.6V on VIN. It could be coin battery or DC supply source.



Fig. 5: IDAP-Link JTag with IBK-BLUEIO-NANO for development with the IMM-NRF52832-NANO module

Nordic Software

The Nordic SDK and software tools can be download from <http://developer.nordicsemi.com> and <http://www.nordicsemi.com>. Community support forum at <https://devzone.nordicsemi.com>.

Eclipse IDE

Eclipse with GCC is the most cost effective software development environment. It is 100% free. The drawback is that it requires a bit of gymnastics to setup. Fortunately many Blog posts are available on the Internet showing step by step. Follow this blog to setup the Eclipse IDE & GCC compiler: <http://embeddedsoftdev.blogspot.ca/p/eclipse.html>.

There are samples code in the Nordic SDK itself. Other Eclipse based example code are available from this Blog page <http://embeddedsoftdev.blogspot.ca/p/ehal-nrf51.html>

FCC Warning

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Any changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

FCC Radiation Exposure Statement:

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. End users must follow the specific operating instructions for satisfying RF exposure compliance.

Note 1: This module certified that complies with RF exposure requirement under portable or mobile or fixed condition, this module is to be installed only in portable or mobile or fixed applications.

A portable device is defined as a transmitting device designed to be used so that the radiating structure(s) of the device is/are within 20 centimeters of the body of the user

A mobile device is defined as a transmitting device designed to be used in other than fixed locations and to generally be used in such a way that a separation distance of at least 20 centimeters is normally maintained between the transmitter's radiating structure(s) and the body of the user or nearby persons. Transmitting devices designed to be used by consumers or workers that can be easily re-located, such as wireless devices associated with a personal computer, are considered to be mobile devices if they meet the 20 centimeter separation requirement.

A fixed device is defined as a device is physically secured at one location and is not able to be easily moved to another location.

Note 2: Any modifications made to the module will void the Grant of Certification, this module is limited to OEM installation only and must not be sold to end-users, end-user has no manual instructions to remove or install the device, only software or operating procedure shall be placed in the end-user operating manual of final products.

Note 3: The device must not transmit simultaneously with any other antenna or transmitter.

Note 4: To ensure compliance with all non-transmitter functions the host manufacturer is responsible for ensuring compliance with the module(s) installed and fully operational. For example, if a host was previously authorized as an unintentional radiator under the Declaration of Conformity procedure without a transmitter certified module and a module is added, the host manufacturer is responsible for ensuring that after the module is installed and operational the host continues to be compliant with the Part 15B unintentional radiator requirements. Since this may depend on the details of how the module is integrated with the host, I-SYST Inc. shall provide guidance to the host manufacturer for compliance with the Part 15B requirements.

The OEM integrator is still responsible for the FCC compliance requirement of the end product, which integrates this module. Appropriate measurements (e.g. 15 B compliance, 15C intentional emissions (Fundamental + Out-of-Band Emission)) and if applicable additional equipment authorizations (e.g. Verification , DoC) of the host device to be addressed by the integrator/manufacturer.

Note 5: FCC ID label on the final system must be labeled with “Contains FCC ID: 2ALTY-52832NANO” or “Contains transmitter module FCC ID: 2ALTY-52832NANO”.

The transmitter module must be installed and used in strict accordance with the manufacturer's instructions as described in the user documentation that comes with the host product. I-SYST Inc. is responsible for the compliance of the module in all final hosts.