HARDWARE REFERENCE

IMM-NRF52832
Micro-module

Limited Warranty

The IMM-NRF52832 Micro-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.

Disclaimer

I-SYST reserves the right to change this product without prior notice. Information furnished by I-SYST is believed to be accurate and reliable. However, no responsibility is assumed by I-SYST for its use; nor for any infringement of patents nor other rights of third parties which may result from its use. No license is granted by implication or otherwise under the patent rights of I-SYST.

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I-SYST products are not designed for use in life support appliances, devices, or systems where malfunction of these products can reasonably be expected to result in personal injury.
I-SYST customers using or selling these products for use in such applications do so at their own risk and agree to fully indemnify I-SYST for any damages resulting from such improper use or sale.

Trademark

ARM® Cortex™ are registered trade mark of ARM
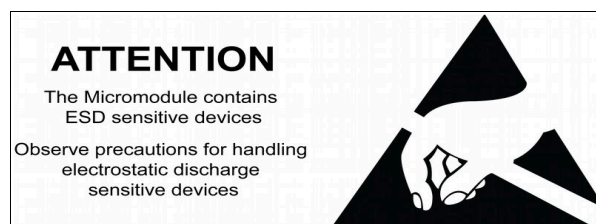Bluetooth® is a registered trade mark of Bluetooth SIG

ATTENTION
The Micromodule contains
ESD sensitive devices

Observe precautions for handling
electrostatic discharge
sensitive devices

Table of Contents

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. This module only supports Bluetooth Low Energy and passive NFC function.

The IMM-NRF52832 is a 23 x 17 mm micro-module with embedded PCB antenna.
The module can be mounted with header pins in order to re-use during development and prototyping phase and SMD it for production to be the most cost effective.

Features:

- 32 bits ARM® Cortex™-M4F @ 64MHz.
- Bluetooth Low Energy
- 64KB SRAM.
- 512KB Flash
- 32 MHz & 32.768 KHz Crystals
- 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 : 23 x 17 mm
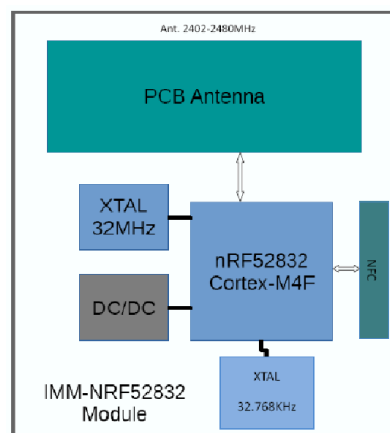
Module Layout

I/O Pads layout

Bellow is the direct relationship of the module pads and the nRF52832 I/O pins. Shared peripherals pins are indicated in different colors.
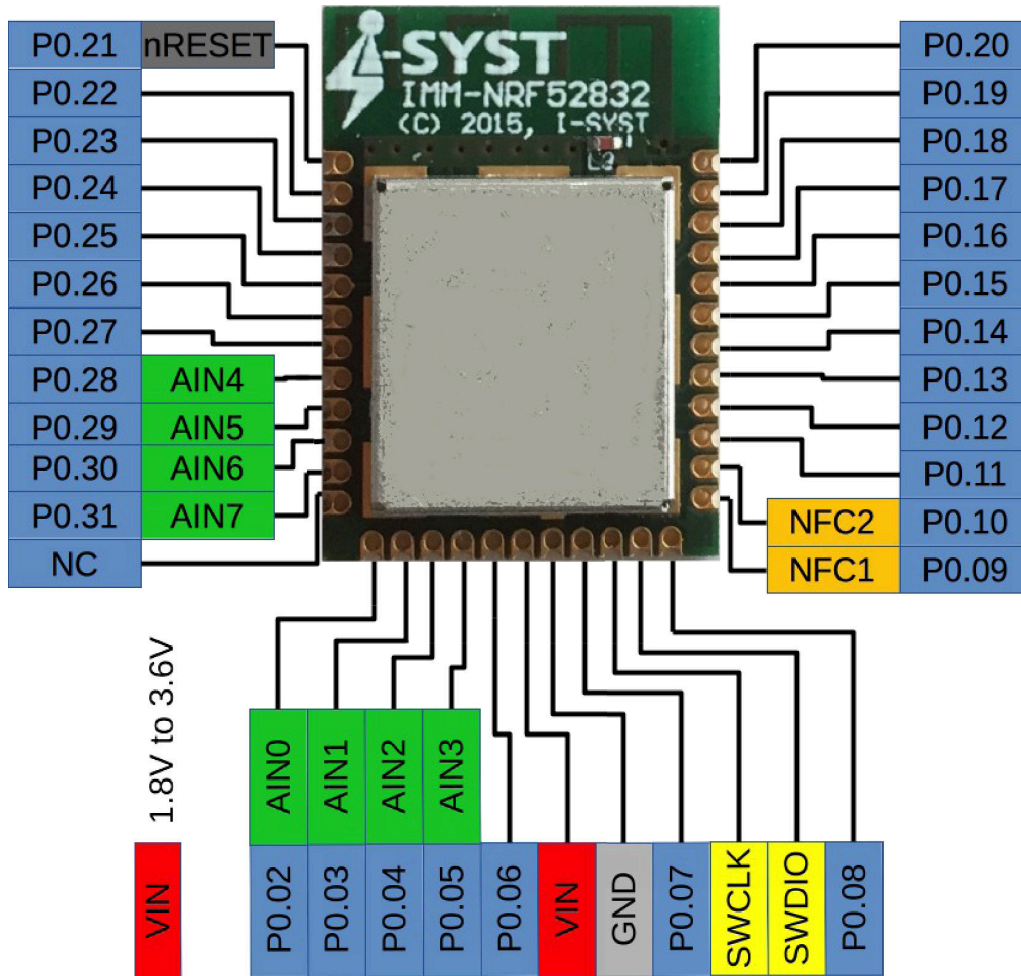

Fig. 1: I/O Mapping

| Pin Name	Description
P0.02/AIN0	GPIO 02 or Analog Input 0
P0.3/AIN1	GPIO 03 or Analog Input 1
P0.4/ANI2	GPIO 04 or Analog Input 2
P0.5/ANI3	GPIO 05 or Analog Input 3
P0.6	GPIO 06
VIN	Power input 1.8V-3.6V
GND	Ground pin
P0.7	GPIO 07
SWCLK	SWD JTag clock
SWDIO	SWD JTag Data
P0.08	GPIO 08
P0.09/NFC1	GPIO 09 or NFC1 tag
P0.10/NFC2	GPIO 10 or NFC2 tag
P0.11	GPIO 11
P0.12	GPIO 12
P0.13	GPIO 13
P0.14	GPIO 14
P0.15	GPIO 15
P0.16	GPIO 16
P0.17	GPIO 17
P0.18	GPIO 18
P0.19	GPIO 19
P0.20	GPIO 20
P0.21/nRESET	GPIO 21 or Reset active low
P0.22	GPIO 22
P0.23	GPIO 23
P0.24	GPIO 24
P0.25	GPIO 25
P0.26	GPIO 26
P0.27	GPIO 27
P0.28/AIN4	GPIO 28 or Analog Input 4
P0.29/AIN5	GPIO 29 or Analog Input 5
P0.30/AIN6	GPIO 30 or Analog Input 6
P0.31/AIN7	GPIO 31 or Analog Input 7

SMD Foot Print

Note : Do not route any traces or planes under the indicated antenna area.
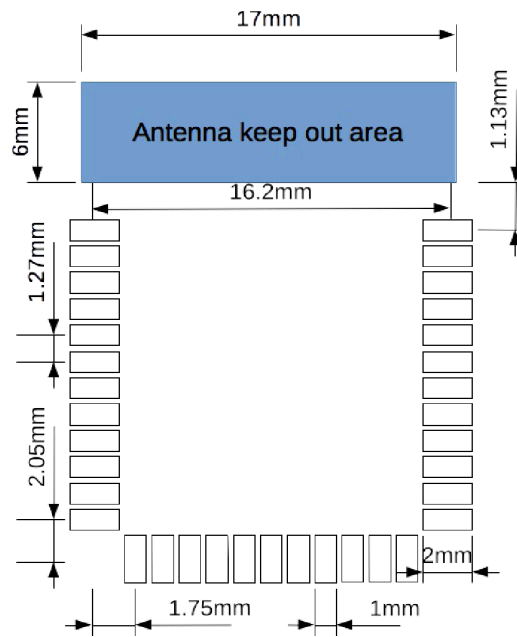
Through Hole Foot Print

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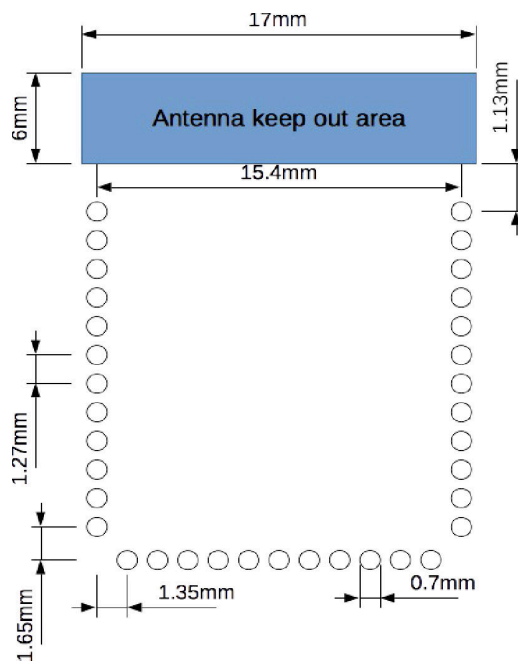
Quick Start

Requirements

The follows are required for software development

- Debug J-Tag : IDAP-Link, Segger J-Link, or any ARM compatible J-Tag.
- Nordic SDK & 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 methodes to flash it in the module. The official methode form 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. 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 into mBed compatible.
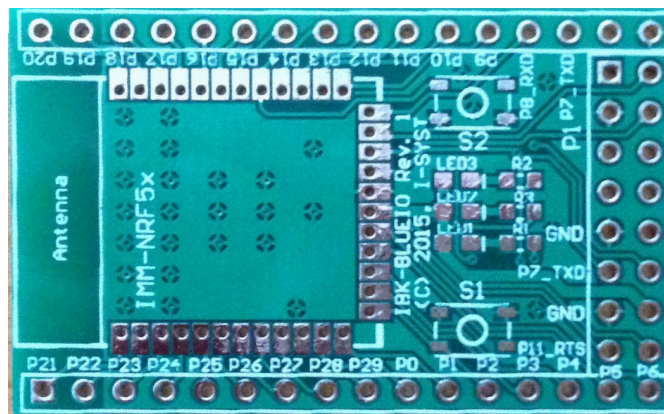

Fig. 2: IBK-BLUEIO - Breakout board for the IMM-NRF51822, IMM-NRF51422 & IMM-NRF52832 micro-module
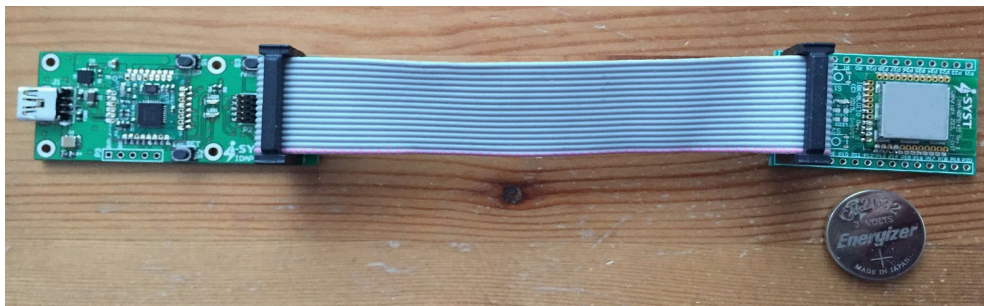
Fig. 3: Connecting IDAP-Link R3 to the breakout board

J-Tag wiring

The IMM-NRF52832 micro-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.
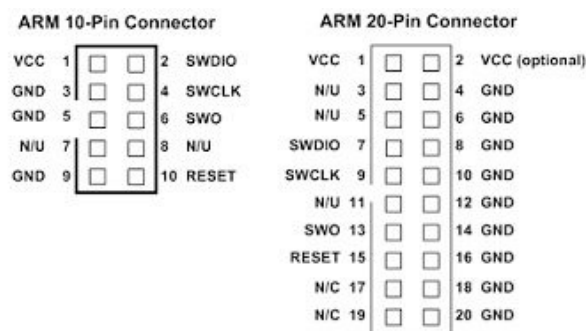

Fig. 4: ARM JTAGE Connector

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

Nordic Software

The Nordic SDK and software tools can be download from http://developer.nordicsemi.com and http://developer.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 the 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: 2ALTYIMM-NRF52832" or "Contains transmitter module FCC ID: 2ALTYIMM-NRF52832".

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.