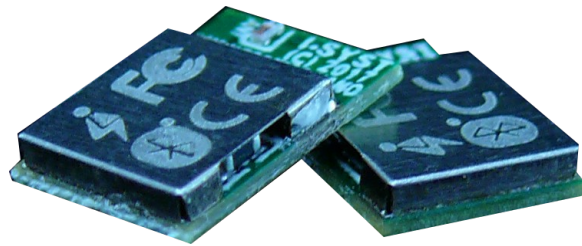


IMM-NRF52832-NANO (BLYST Nano) Module

Bluetooth® 5 / Bluetooth® Mesh



Part No : IBLE832N



FCCID : 2ATLY-52832NANO

IC : 25671-52832NANO

Revision history

Version	Date	Note	Contributor(s)	Approver
1.0	12 Dec 2018	Initial version	Nguyen Hoang Hoan	Nguyen Hoang Hoan
1.1	2019		Nguyen Hoang Hoan	Nguyen Hoang Hoan
1.2	2020		Nguyen Hoang Hoan	Nguyen Hoang Hoan
1.3	2021		Nguyen Hoang Hoan	Nguyen Hoang Hoan

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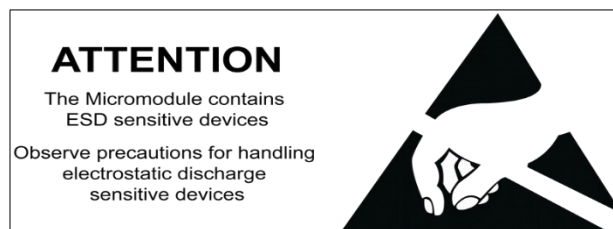
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FCC Caution

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

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.

FCC RF Radiation Exposure Statement

- This Transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.
- This equipment complies with RF radiation exposure limits set forth for an uncontrolled environment.
- This equipment should be installed and operated with minimum distance 20cm between the radiator & your body.

Host product manufacturers that they need to provide a physical or e-label stating “Contains FCC ID : 2ATLY-52832NANO” with their finished product. **Only those antennas with same type and lesser gain filed under this FCC ID can be used with this device. The host product manufacturer is responsible for compliance to any other FCC rules that apply to the host not covered by the modular transmitter grant of certification. The final host product still requires Part 15 Subpart B compliance testing with the modular transmitter installed. The final host integrator must ensure there is no instruction provided in the user manual or customer documentation indicating how to install or remove the transmitter module except such device has implemented two-ways authentication between module and the host system. The final host manual shall include the following regulatory statement: This equipment has been tested and found to comply with the limits for a 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.**

This device complies with Industry Canada license-exempt RSS standard(s). Operation is subject to the following two conditions:

- This device may not cause interference, and
- This device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes :

- 1 L'appareil ne doit pas produire de brouillage.
- 2 L'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement

IC SAR Warning

The device has been tested and compliance with SAR limits, users can obtain Canadian information on RF exposure and compliance.

Le présent appareil est conforme Après examen de ce matériel aux conformité aux limites DAS et/ou aux limites d'intensité de champ RF, les utilisateurs peuvent sur l'exposition aux radiofréquences et la conformité and compliance d'acquérir les informations correspondantes

The ISED certification label of a module shall be clearly visible at all times when installed in the host product; otherwise, the host product must be labelled to display the ISED certification number for the module, preceded by the word "contains" or similar wording expressing the same meaning, as follows:
Contains IC: 2ATLY-52832NANO

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1. 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 (BLYST Nano) is a 10x7x1.6 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.

1.1 Overview and Features

With a design based on the Nordic nRF52832 SoC, combining a low power 64 MHz ARM Cortex-M4F and the 2.4 GHz radio in a single chip, the BLYST Nano SoM (System on Module) is the perfect way to catch this new Bluetooth IoT wave driven by both Bluetooth® 5 and Bluetooth® Mesh.

- The BLYST Nano is low power and small enough, at 10 x 7 x 1.6 mm, for wearable and sensor applications.
- With 30 programmable I/O pins, it's versatile enough to fit any control and automation application.
- With a hardware floating-point unit, algorithms can be directly implemented on the device, allowing more real-time sensor fusion processing.
- It is a complete System on the Module with all required components (crystals, coils, DC/DC, etc.) built-in and ready to use. So you don't need to take up more board space with add-on components needed to support a given module

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

1.2 Application

IoT

- Smart Home products
- Industrial mesh networks
- Smart city infrastructure

Interactive entertainment devices

- Advanced remote controls
- Gaming controller

Advanced wearables

- Connected watches
- Advanced personal fitness devices
- Wearables with wireless payment
- Connected Health
- Virtual/Augmented Reality applications

2. Specification

Radio	
Frequency Band	2.4 GHz ISM
On-air data rate	2 Mbps and 1 Mbps Bluetooth LE 1 Mbps ANT 2 Mbps and 1 Mbps 2.4 GHz proprietary
Output power	Programmable: -20 to +4 dBm in 4 dB steps
Sensitivity	-96 dBm Bluetooth LE 1 Mbps -89 dBm Bluetooth LE 2 Mbps -93 dBm 1 Mbps ANT -30 dBm whisper mode
RSSI	1 dB resolution
Radio current consumption with DC/DC at 3V	7.5 mA – TX at +4 dBm output power 5.3 mA – TX at 0 dBm output power 5.4 mA – RX at 1 Mbps
Microcontroller	
CPU	ARM® Cortex™ M4F
Floating Point Unit	Yes
Memory	Flash 512 KB (+ cache), 64 KB RAM
GPIO	32 configurable
Peripherals	
NFC	NFC-A Tag
ADC	12-bit 200 ksps
Comparators	General purpose, low-power
Interfaces	SPI/2-wire/I ² S/UART/PDM/QDEC

Security	AES-128/ECB/CCM/AAR
Timers/Counters	32-bit
System	
System peripheral bus	20-channel PPI
Power supply	Automatic system power
System current consumption DC/DC at 3V	DC/DC (1.7 V to 3.6 V), LDO (1.7 V to 3.6 V) 0.3 μ A – No RAM retention 1.2 μ A – All peripherals in IDLE mode 1.6 μ A – All peripherals IDLE mode (32 kHz + RTC) 20 nA per 4 KB - RAM retention
Performance	
Coremark	215 EEMBC CoreMark [®] (3.36 CoreMark/MHz) 58 CoreMark [®] /mA (Flash)

3. Hardware Specification

3.1 Module Diagram

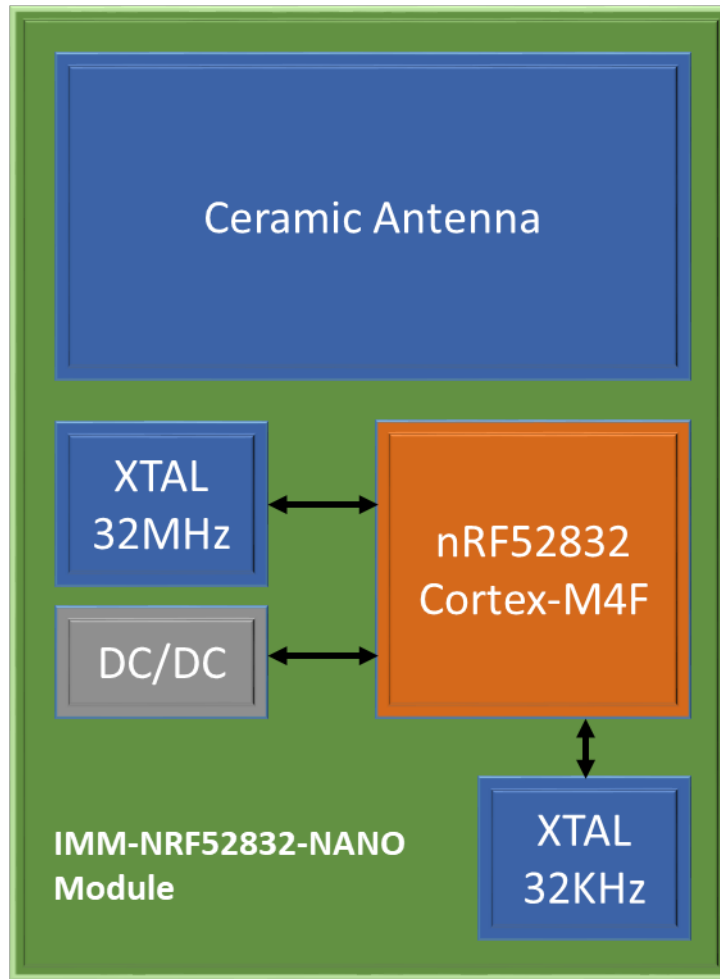


Figure 1: BLYST Nano module

3.1.1 Dimensions and I/O pins layout

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

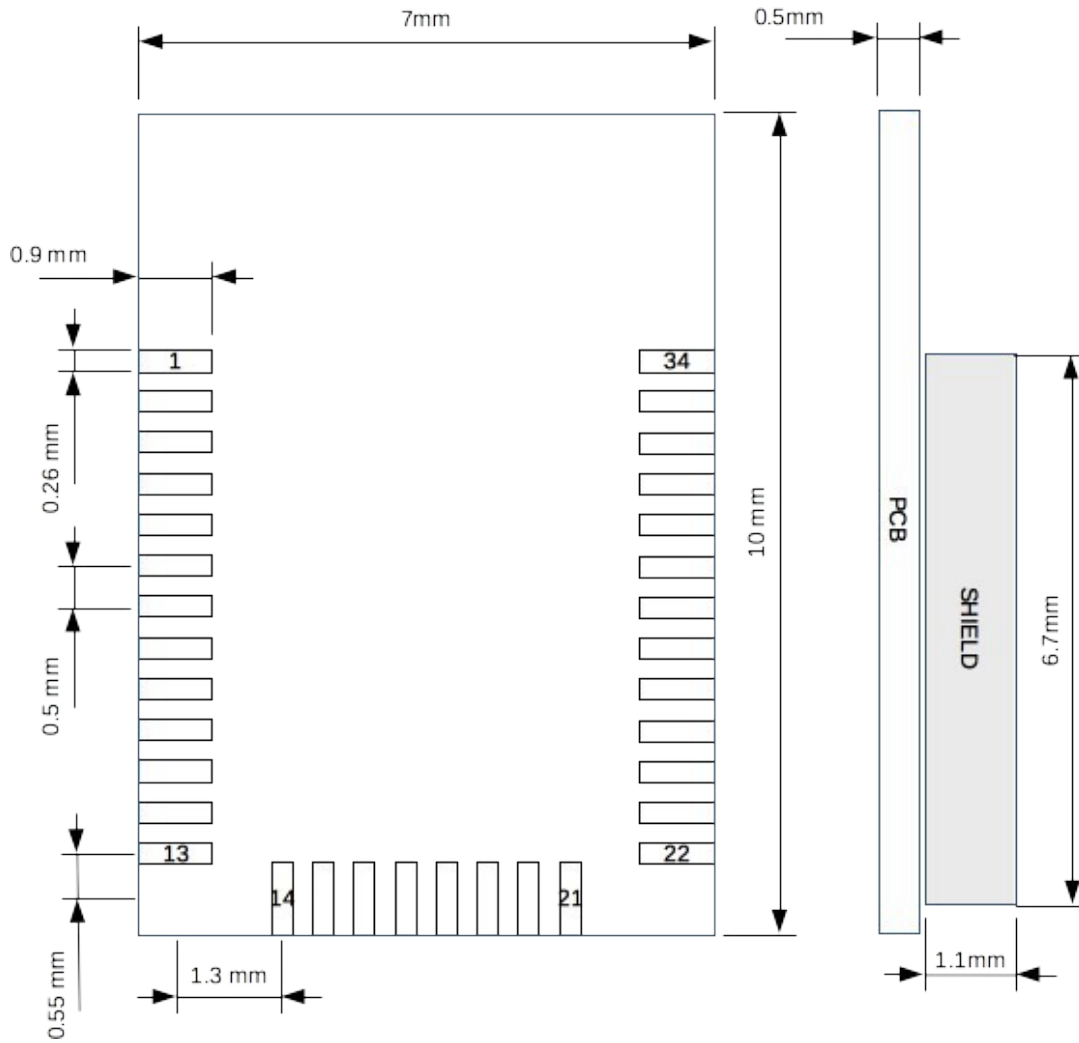


Figure 2: Dimensions top view

3.1.2 Pin Description

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

3.1.3 SMD Footprint

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

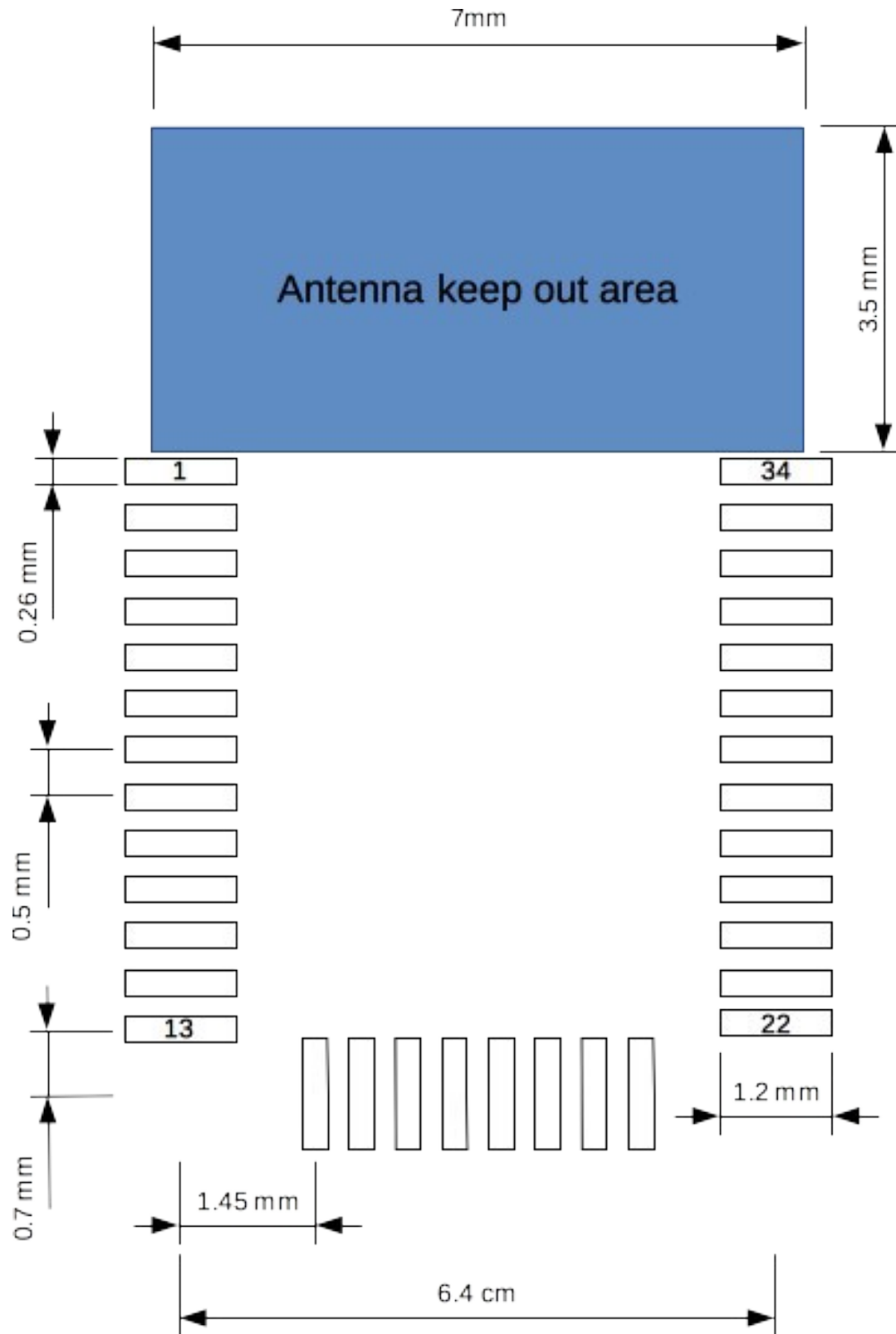


Figure 3: SMD footprint top view

4. Quick Start

4.1 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, ...

4.2 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.

4.3 Breakout board

The module can also be mounted on the optional breakout board, the IBK-BLYST-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 BLYST Nano into mBed compatible.

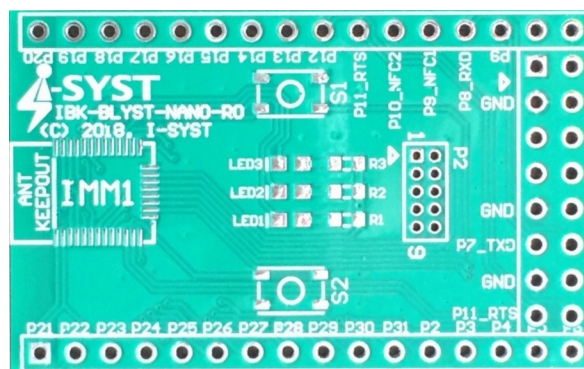


Figure 4: IBK-BLYST-NANO.

Breakout PCB for the BLYST Nano module

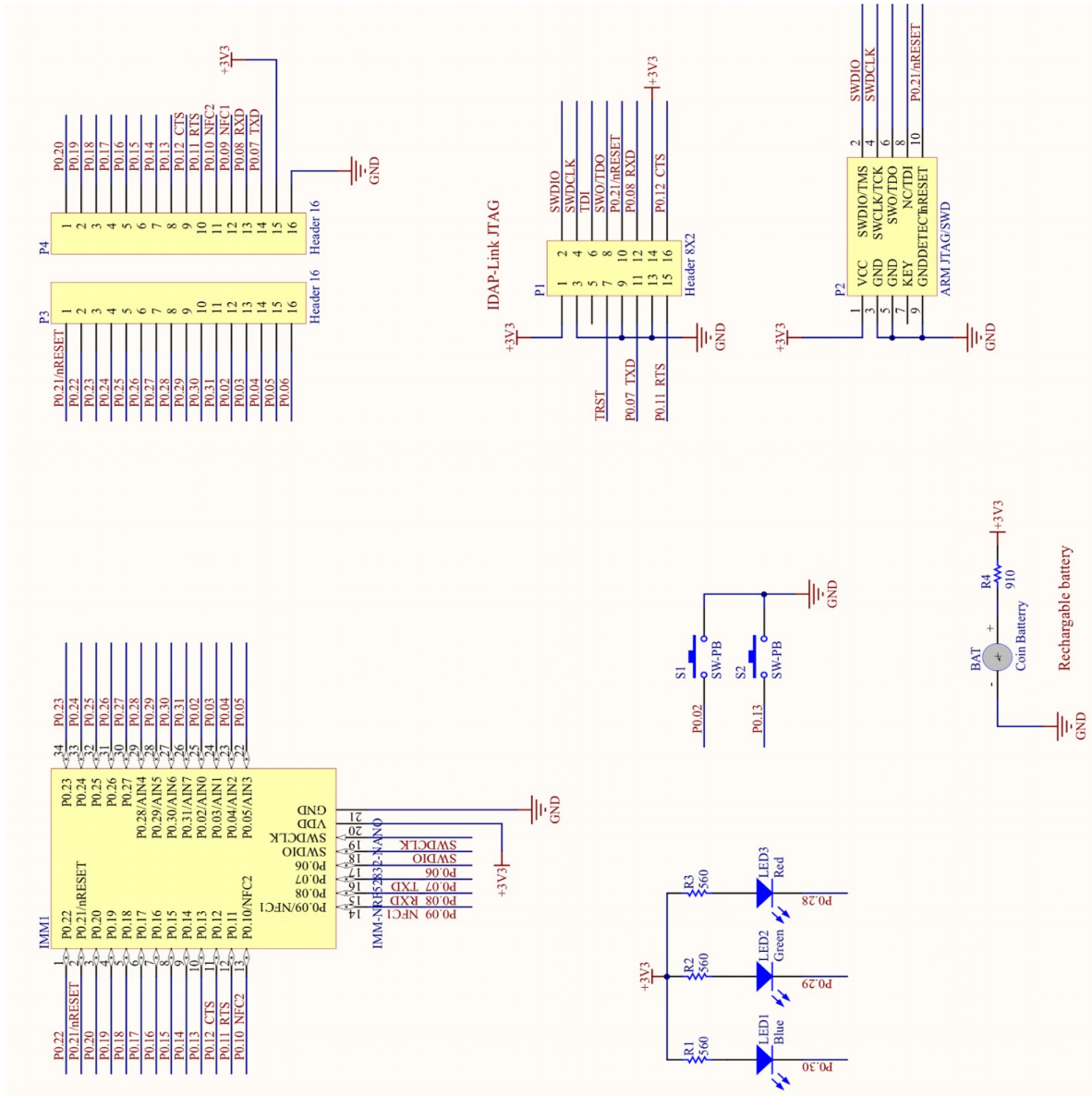


Figure 5: IBK-BLYST-NANO Schematic

4.4 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.

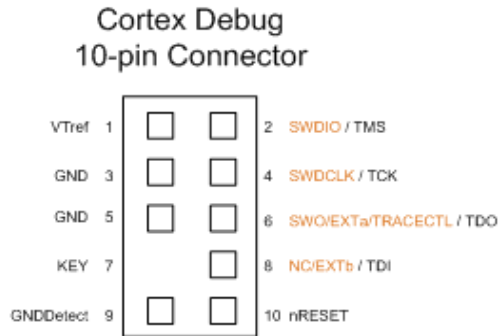


Figure 6: ARM JTAGE Connector

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



Figure 7: IDAP-Link JTag with IBK-BLUEIO-NANO for development with the IMM-NRF52832-NANO module

4.5 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>.

4.6 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>

5. CE Certificate of conformity


Certificate of Conformity

Certificate No.: ZKS18005559

Holder of Certificate : I-SYST Inc.
212-6415 Corbiere, Brossard, QC., Canada J4Z 0H7

Manufacturer : I-SYST Inc.
212-6415 Corbiere, Brossard, QC., Canada J4Z 0H7

Description of Product : BLE Module
Model No. : IMM-NRF52832-NANO
Trade Name : I-SYST
Description of Object : DC 1.6-3.6V

Test Standards : EN 300328 V2.1.1 (2016-11)
Draft EN 301489-1 V2.2.0 (2017-03)
Draft EN 301489-17 V3.2.0 (2017-03)
EN 62479:2010
EN 60950-1:2006+A11:2009+A12:2011+A1:2010+A2:2013

Applicable Directives : 2014/53/EU
Report No. : ZKS180300257E-1, ZKS180300257E-2, ZKS180300257E-3,
ZKS180300257S

Based upon the referenced test report(s), sample of the above product have been found to comply with the harmonized standards and directives listed on this certificate. Other standards and directives may be relevant to the product. The manufacturer may indicate compliance by signing a declaration of conformity themselves and applying the mark to product identical to the test sample(s) if the product complies with all relevant CE mark directives requirements.



Certification Body



Frank Feng / General Manager


Date: June 15, 2018

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