



# N5 ANT SoC Module Series

## ANT Operation (when loaded with S210 or S310 SoftDevice)

- 79 selectable RF channels (2402 to 2480 MHz)
- Simple to complex network topologies: peer-to-peer, star, tree, star-to-star and more
- Broadcast, acknowledged, and burst data communication modes
- Supports up to 8 logical channels each with configurable channel periods (5.2ms - 2s)
- Built-in device search and pairing
- Built-in interference handling and radio coexistence management with application radio disable requests and application flash write/erase requests
- Enhanced ANT features
  - Advanced burst data transfer modes (up to 60kbps)
  - Optional single channel encryption mode (AES-128)
  - Supports up to 8 public, private and/or managed networks
  - Advanced power management features to optimize application power consumption including Event Filtering and Selective data updates
  - Asynchronous transmit channel
  - Fast channel initiation

## BLUETOOTH® low energy peripheral Operation (when loaded with S110, S120, S130 or S310 SoftDevice)

- BLUETOOTH 4.0 or 4.1 compliant low energy single-mode protocol stack depending on the SoftDevice
  - Link Layer
  - L2CAP, ATT, and SM protocols
  - GATT, GAP, and L2CAP
  - Peripheral and Broadcaster roles
  - GATT Client and Server
  - Full SMP support including MITM and OOB pairing



## Module Hardware

- Integrated PCB meander antenna
- Onboard 32kHz and 16MHz crystal clocks
- 1.8V to 3.6V supply voltage range
- DC-DC converter
- -25°C to +75°C operating temperature
- 24 GPIOs (LGA package)
- Programmable output per channel from -20dBm up to +4dBm
- Excellent receiver sensitivity
  - 90dBm ANT mode
  - 93dBm BLE mode
- 1dBm resolution RSSI
- Total 256kB embedded flash memory and 16kB RAM
- SPI, I2C and UART interface
- ARM SWD interface
- 14.0x9.8x2.0mm (LGA package)
- Drop-in compatible options with AP2/C7 modules
- Radio regulatory approval for major markets
- BLUETOOTH SIG qualification
- RoHS compliant

## Series Members

- N548M8CB: 14x9.8mm LGA
- N548M4CB: 20x20mm SMT
- N548M5CB: 20x20mm Molex connector

All these modules are pre-loaded with S210 SoftDevice and an ANT network processor code

D00001598 Rev1.3

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To obtain warranty service, the distributor or company shall contact Dynastream for shipping instructions and a return material authorization (RMA) tracking number. Securely pack the device and a copy of the original sales receipt, which is required as the proof of purchase for warranty claims. Write the tracking number clearly on the outside of the package. Send the device, freight charges prepaid, to Dynastream.

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# 1. N5 ANT SoC Module Series

Based on Nordic Semiconductor’s nRF51422 SoC, the N5 ANT SoC module series offers support for both ANT® and Bluetooth® low energy and enables both protocols to run concurrently, depending on the loaded protocol stack.

The N5 ANT SoC module series starts with N548M8CB in a 14.0mm x 9.8mm x 2.0mm LGA (Land Array Grid) package. A compact design meeting the market requirements for small, light and wearable, the N548M8CB is a turnkey system hardware solution including antenna, onboard 32k and 16M crystal clocks, DC-DC converter and 24 GPIOs with 6 analogue inputs.

Nordic Semiconductor protocol stacks, also known as SoftDevices, are pre-compiled, pre-linked binary files, which are downloadable from the Nordic Semiconductor’s web site and can be programmed onto the N5 ANT SoC module series. The N548 modules are pre-programmed with the S210 SoftDevice (ANT 8-channel protocol stack) and ANT network processor application reference code in order to function as a legacy ANT RF module when connected to an application controller. Both pre-programmed images can be easily replaced via the onboard SWD interface pins using off-the-shelf ARM programming tools.

Pin compatible options to the 20mm x 20mm AP2 or C7 modules from Dynastream are also available. In these options, N548M8CB modules are soldered on carrier boards that are pin compatible to the previous modules. Current AP2 or C7 module customers can easily use these models to evaluate the hardware and upgrade their final products.

The N5 module series if loaded with ANT and/or BLUETOOTH Low energy stack has been certified to comply with radio regulation or standards covering major markets include North America, Europe, Australia, New Zealand and Japan. The N5 ANT SoC modules series has also been qualified by the BLUETOOTH SIG.

## 1.1 Nomenclature

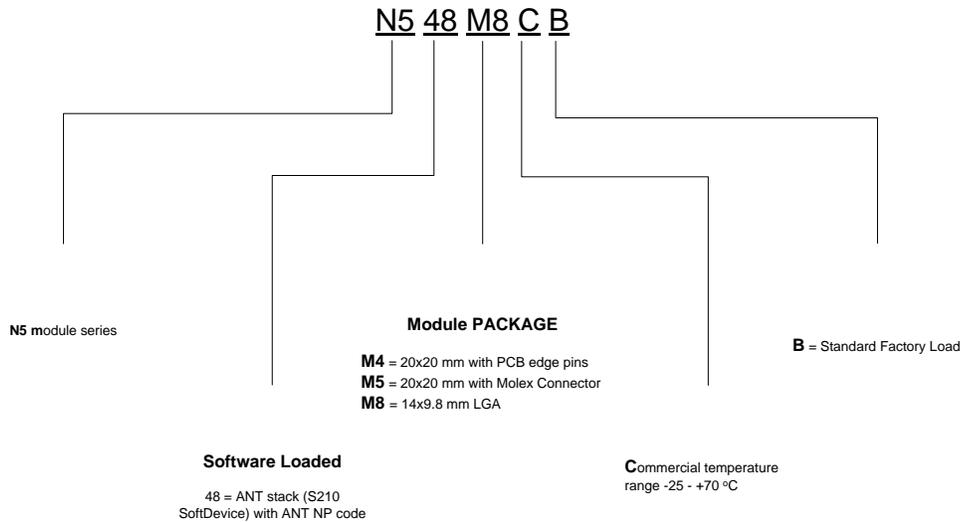


Figure 1: N5 ANT SoC Module Series Nomenclature

## 1.2 Production Tracking Code

For technical support and customer service purposes, a production code of three characters is laser marked on the RF shield as illustrated below.

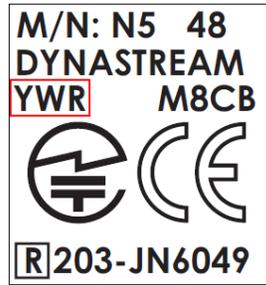


Figure 2: Production Tracking Code

YW – Production date code

R – Product version

**1.3 Offerings**

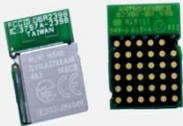
	Module	Description	Packaging and Ordering Options
	N548M8CB	14.0 x 9.8 x 2.0mm, LGA package, 31 pins, 24 GPIOs. Pre-loaded with S210 SoftDevice and ANT network processor code.	<b>N548M8CB-Tray:</b> 40 modules in a tray <b>N548M8CB-Reel:</b> 1500 modules taped on a 13" reel
	N548M4CB	20.0 x 20.0mm, 17 pins, 13 GPIOs. Pre-loaded with S210 SoftDevice and ANT network processor code.	<b>N548M4CB-Tray:</b> 20 modules in a tray <b>N548M4CB-Reel:</b> 800 modules taped on a 13" reel
	N548M5CB	20.0 x 20.0mm, 20 pin Molex connector. Onboard JTAG programming connector. 13 GPIOs. Pre-loaded with S210 SoftDevice and ANT network processor code.	<b>N548M5CB</b>

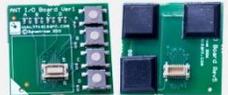
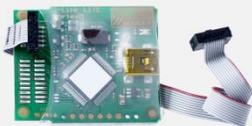
Table 1: N5 ANT SoC Module Series Offerings

**1.4 N548 ANT SoC Module Starter Kit**

The N548 ANT SoC Module Starter Kit, ordering number "N5DK1", contains all the pieces you need to start evaluation and development using the N548 ANT SoC module, as well as the nRF51422 IC.

The kit contains a product key to access all the development tools provided by Nordic Semiconductor. It comes with pre-loaded application ready to be demonstrated when opening the box. More reference application code is available on [www.dynastream.com/N5starterkit](http://www.dynastream.com/N5starterkit).

The kit contains the following hardware pieces as in Table 2. Most of the parts are orderable individually if users need to create a more complex network.

Order Number	Part Description	Quantity	
N548M5CB	Module with 20-pin Molex connector	2	
ANTBAT2	Battery board with a Molex socket, a reset button and a five-position dip switch	1	
ANTIO1	I/O board with a Molex connector, a Molex socket, 4 LEDs and 4 buttons	1	
ANTUIF1	USB Interface Board with a Molex socket	1	
	Segger J-Link Lite Programmer	1	

**Table 2: N548 ANT SoC Module Starter Kit**

## 2. Product Overview

### 2.1 Block Diagram

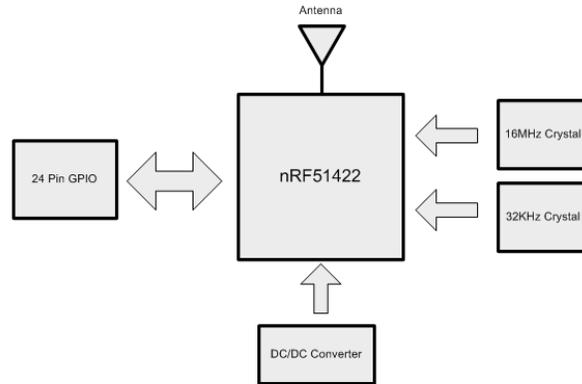
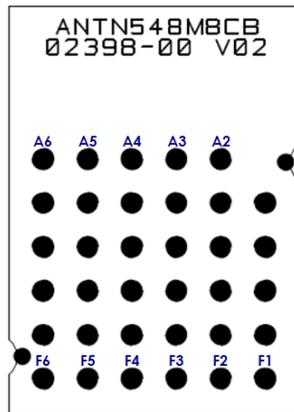


Figure 3: N5 ANT SoC Module Series Block Diagram

### 2.2 Pin-outs



	6	5	4	3	2	1
A	GND	GND	GND	GND	GND	
B	VCC	VCC	P019	P020	P018	RST/SWDIO
C	VCC	VCC	P022	P016	P013	SWDCLK
D	P024	P021	P023	P025	P015	P012
E	P030	P000	P004	P006	P011	P009
F	P031	P002	P001	P003	P005	P008

Figure 4: N5 M8 LGA Bottom View

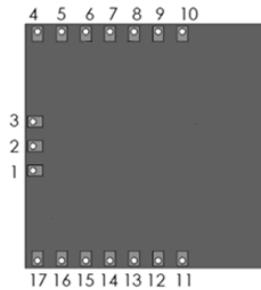


Figure 5: N5 M4 Bottom View

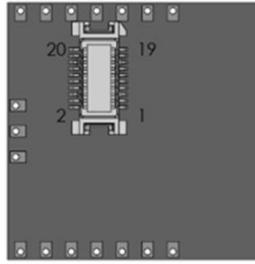


Figure 6: N5 M5 Module Bottom View

N5 M8 LGA Pad	N5 M4 Pin	N5 M5 Molex Connector	nRF51422 Pin Name	Description
A2-6	4	19	GND	Power supply ground
B1	2	10	RST /SWDIO	System reset. Also HW debug and flash programming I/O
B2			P018	GPIO
B3			P020	GPIO
B4			P019	GPIO
B5, B6	3	1	Vcc	Power supply source
C1	5	6	SWDCLK	HW debug and flash programming I/O
C2			P013	GPIO
C3			P016	GPIO
C4			P022	GPIO
C5, C6	3	1	Vcc	Power supply source
D1	12	3	P012	GPIO
D2	11	4	P015	GPIO
D3			P025	GPIO
D4	6	17	P023	GPIO
D5		16	P021	GPIO
D6	10	7	P024	GPIO
E1	14	9	P009	GPIO
E2	15	14	P011	GPIO
E3	13	5	P006	GPIO / ADC input 7/ ADC reference voltage 1
E4		20	P004	GPIO / ADC input 5
E5	9	11	P000	GPIO / ADC reference voltage 0
E6	8	13	P030	GPIO
F1	16	12	P008	GPIO
F2	17	2	P005	GPIO / ADC input 6
F3	1	8	P003	GPIO / ADC input 4
F4		18	P001	GPIO / ADC input 2
F5	7	15	P002	GPIO / ADC input 3
F6			P031	GPIO

Table 3: N5 ANT SoC Module Pin-Outs

### 2.3 Application Code and Programming

N5 ANT SoC module series supports the Serial Wire Debug (SWD) interface (SWDCLK and SWDIO/RESET. Refer to Table 3.) Programming and debugging of the module use common available tools, such as Keil software development environment and Segger J-Link programmer.

Please refer to “nRF51422 Evaluation Kit - Developing with the MDK-ARM Microcontroller Development Kit” from Nordic Semiconductor for specific reference to using Keil software and J-Link programmer.  
<https://www.nordicsemi.com/eng/Products/ANT/nRF51422-Evaluation-Kit#Downloads>.

More reference application code is provided on <http://www.dynastream.com/N5starterkit>.

## 2.4 Design Considerations

RF performance is always affected by the environment. Good design makes a product less susceptible. Guidelines provided in this section are for recommendations only. Users should thoroughly test their products in the intended use cases and make necessary modifications and trade-offs.

For design assistance purpose, a STEP model package of all the three module types and an Altium library of the M8 module are provided online.

### 2.4.1 M8 Module Mounting

Best RF performance is achieved by using 0.032" thickness FR4 under the module antenna and following the guideline on Figure 7.

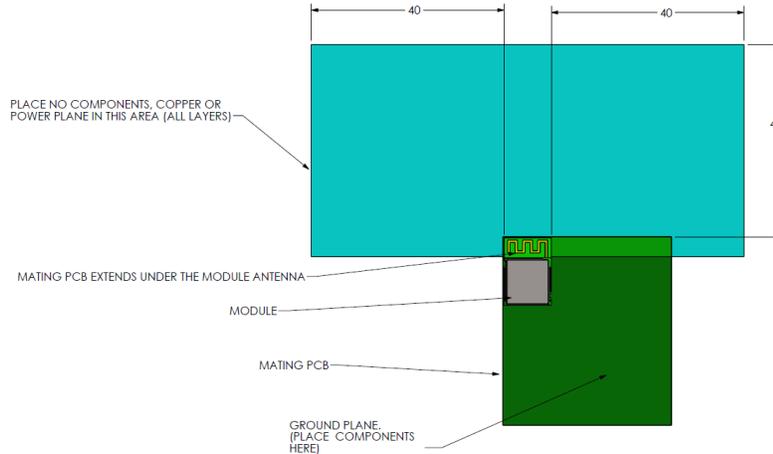


Figure 7: N5 M8 Module Mounting (all dimensions in mm)

### 2.4.2 M4 Module Mounting

Best possible RF performance is achieved when the module is placed such that the module antenna is protruding out from the mating PCB into free space as Figure 8. Place no exposed copper underneath the M4 module. If possible, place continuous ground plane under the module.

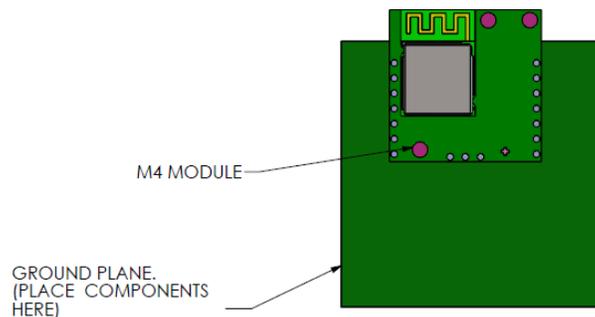


Figure 8: N5 M4 Module Mounting

### 2.4.3 M5 Module Mounting

The mating socket is Molex 52991-0208.

Note: The M5 module is provided for application prototyping and lab use. The M5 module should not be used to evaluate the RF performance of the N5 module family.

## 2.5 Assembly Considerations

### 2.5.1 Moisture Control

The moisture control of the module is rated at level 1 defined by IPC/JEDEC J-STD-020. The modules do not require special storage conditions provided:

- They are maintained at conditions equal to or less than 30 °C/85 % RH, and
- They are solder reflowed at a peak body temperature which does not exceed 260 °C

To ensure good solderability of the PCB pads, it is highly recommended to always have the modules intended for reflow well sealed when in storage.

### 2.5.2 Solder Stencil Design of M8 Module

The following reference stencil design is used to produce N548M4CB and N548M5CB.

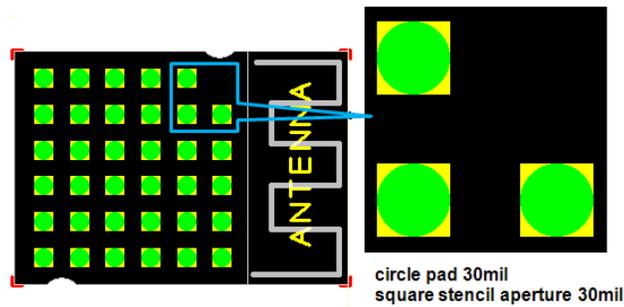


Figure 9: Solder Stencil Reference

### 3. Regulatory Approvals and Compliances

The N5 ANT SoC module series has received regulatory approvals in the United States (FCC) and Canada (IC), and has been verified to conform to the appropriate regulations in Europe, Australia and New Zealand, and Japan. The module series has been qualified by BLUETOOTH SIG. Such approvals and qualification allow the user to place the module inside a finished product and, in most cases, not require regulatory testing for an intentional radiator, provided no changes or modifications are made to the module circuitry. This does not preclude the possibility that some other form of authorization or testing may be required for the finished product. Changes or modifications could void the user's authority to operate the equipment. The end user must comply with all of the instructions provided by the Grantee, which indicate installation and/or operating conditions necessary for compliance.

#### 3.1 United States

The N5 ANT SoC module series has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

The N5 module series 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.

The N5 module series does not contain any user-serviceable parts. Unauthorized repairs or modifications could result in permanent damage to the equipment, and void your warranty and your authority to operate this device under Part 15 regulations.

The N5 module series is labelled with its own FCC ID, O6R2398 (note: First Character is the letter O, not the # 0.) If the FCC ID is not visible when the module is installed inside another device, then the outside of the device into which the module is installed must also display a label referring to the enclosed module. This exterior label can use wording such as the following: "Contains Transmitter Module FCC ID: O6R2398" or "Contains FCC ID: O6R2398". Any similar wording that expresses the same meaning may be used.

#### 3.2 Canada

The N5 ANT SoC module series complies with Industry Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) 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, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.)

To comply with Industry Canada regulations, it is required that product containing the N5 module series display a label referring to the enclosed module. This exterior label can use wording similar to the following: "Contains IC: 3797A-2398"

This information shall be affixed in such a manner as not to be removable except by destruction or defacement. The size of the lettering shall be legible without the aid of magnification but is not required to be larger than 8-point font size. If the device is too small to meet this condition, the information can be included in the user manual upon agreement with Industry Canada.

### 3.3 European Economic Area



The N5 ANT SoC module series is declared to be in conformance with the essential requirements and other relevant provisions of Directive 1999/5/EC, as a low-powered unlicensed transmitter:

- IEC 60950-1:2005 (2nd Edition)+Am 1:2009, EN 60950-1:2006/A11:2009/A1:2010/A12:2011 Information technology equipment - Safety - Part 1: General requirements
- EN 300 440-2 v1.4.1 Electromagnetic compatibility and Radio spectrum Matters (ERM); Short range devices; Radio equipment to be used in the 1 GHz to 40 GHz frequency range
- EN 301 489-3 V1.6.1 Electromagnetic compatibility and Radio spectrum Matters (ERM); Electromagnetic Compatibility (EMC); standard for radio equipment and services; Part 3: Specific conditions for Short-Range Devices (SRD) operating on frequencies between 9 kHz and 40 GHz
- EN 301 489-17 V2.2.1 Electromagnetic compatibility and Radio spectrum Matters (ERM); Electromagnetic Compatibility (EMC); standard for radio equipment and services; Part 17: Specific conditions for Broadband Data Transmissions

### 3.4 Australia & New Zealand



The N5 ANT SoC module series has been tested and found to comply with

- AS/NZS 4268:2012 + A1:2013 Radio equipment and systems – Short range devices – Limits and methods of measurement
- AS/NZS CISPR 22:2009 + A1:2010 Information technology equipment - Radio disturbance characteristics - Limits and methods of measurement

The ACMA supplier code number is N20233

### 3.5 Japan

The N5 ANT SoC module series has been granted type certificate (mark number R203-JN6049). Standard applied:

Notification No. 88 of MIC 2004, 2.4GHz band wide-band low-power data communication system (item 19 of Article 2 paragraph 1)

### 3.6 BLUETOOTH Qualification

The N5 ANT SoC module series is listed as a Bluetooth End Product on the Bluetooth SIG Qualified Design List [Qualified Design ID 54799; Declaration ID is D022375]. Further use of this design to create subsequent BLUETOOTH implementations can be achieved without further qualification provided that the resulting implementation has no negative material impact on the BLUETOOTH performance or functionality of the design.

## 4. Electrical Specifications

### 4.1 Absolute Maximum Ratings

PARAMETER	TEST CONDITIONS	Min	Max	Unit
Supply voltage (VCC)	All supply pins must have the same voltage	-0.3	3.9	V
Voltage on any digital pin		-0.3	VCC+0.3, ≤ 3.9	V
Storage temperature range		-40	125	°C
ESD	All pads, according to human-body model, JEDEC STD 22, method A114		4	kV
	According to charged-device model, JEDEC STD 22, method C101		500	V

Table 4: Absolute Maximum Ratings

Stresses beyond those listed under Absolute Maximum Ratings may cause permanent damage to the device. These are stress ratings only and functional operation of the device at these or any other conditions beyond those indicated under Recommended Operating Conditions are not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

### 4.2 Recommended Operating Conditions

PARAMETER	Min	Max	Unit
Operating ambient temperature range, T <sub>A</sub>	-25	+75	°C
Operating supply voltage	1.8	3.6	V

Table 5: Recommended Operating Conditions

### 4.3 Radio Operation Specifications and Antenna Characteristics

nRF5142 Output Setting (dBm)	Peak Antenna Gain (dBi)	EIRP (dBm)
0	0	0
+4	0	+4

Table 6: N5 Module Antenna Gain

nRF51422 Output Setting (dBm)	Typical Radio current (mA)*
0	10.5
+4	16.0

Table 7: Current Consumption of Radio Operation

\* Note: For additional information regarding radio current, please refer to the nRF51422 product specification by Nordic Semiconductor.

The following typical radiation pattern is recorded in an anechoic chamber at 2440MHz and 0dBm output following the recommended mounting guideline. To understand and properly use the radiation pattern for your design, please refer to the application note: Interpreting RF Radiation Patterns.

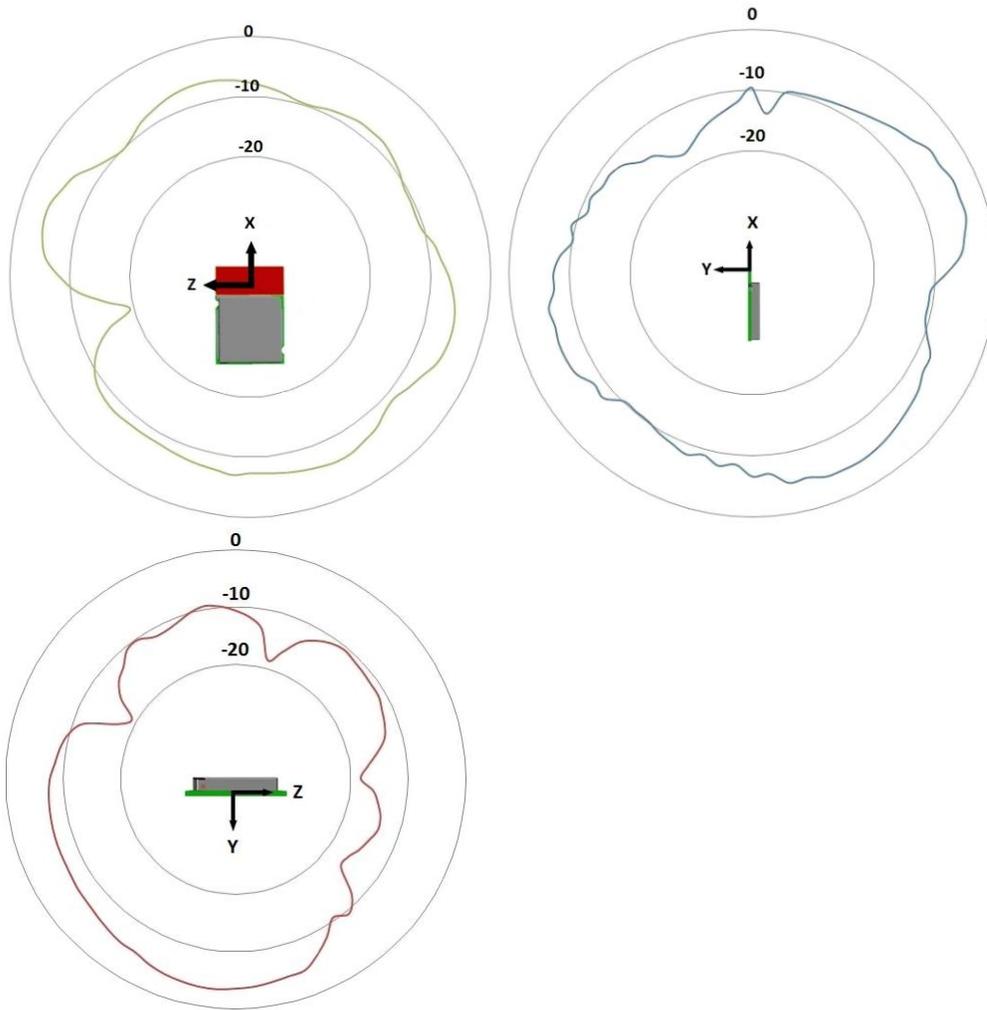


Table 8: N5 M4 Module Typical Antenna Gain (dBi)

#### 4.4 Electrical Specifications

Please refer to the nRF51422 Product Specification by Nordic Semiconductor.

### 5. Mechanical Drawings

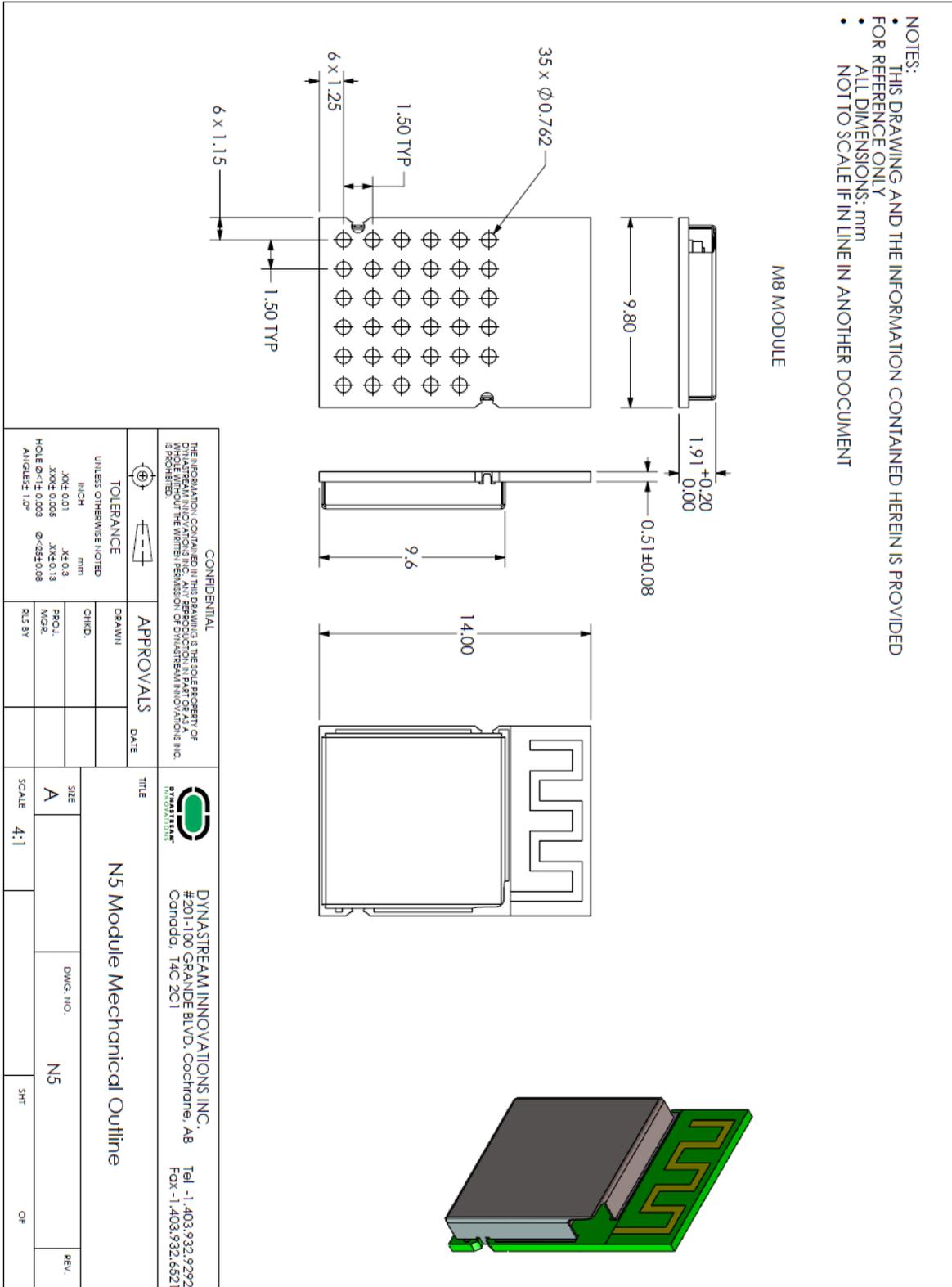


Figure 10: N5 M8 Mechanical Drawing

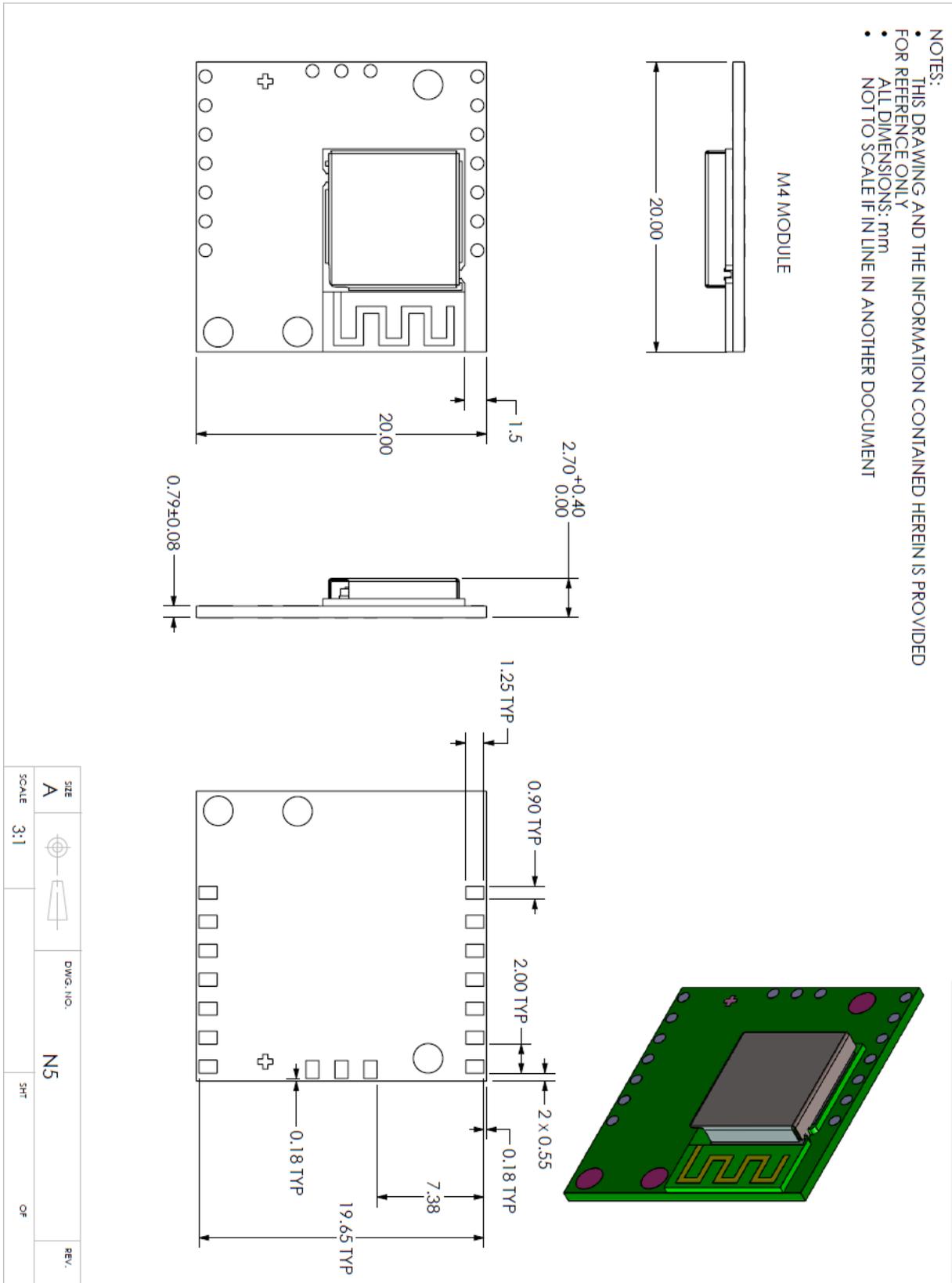


Figure 11: N5 M4 Mechanical Drawing

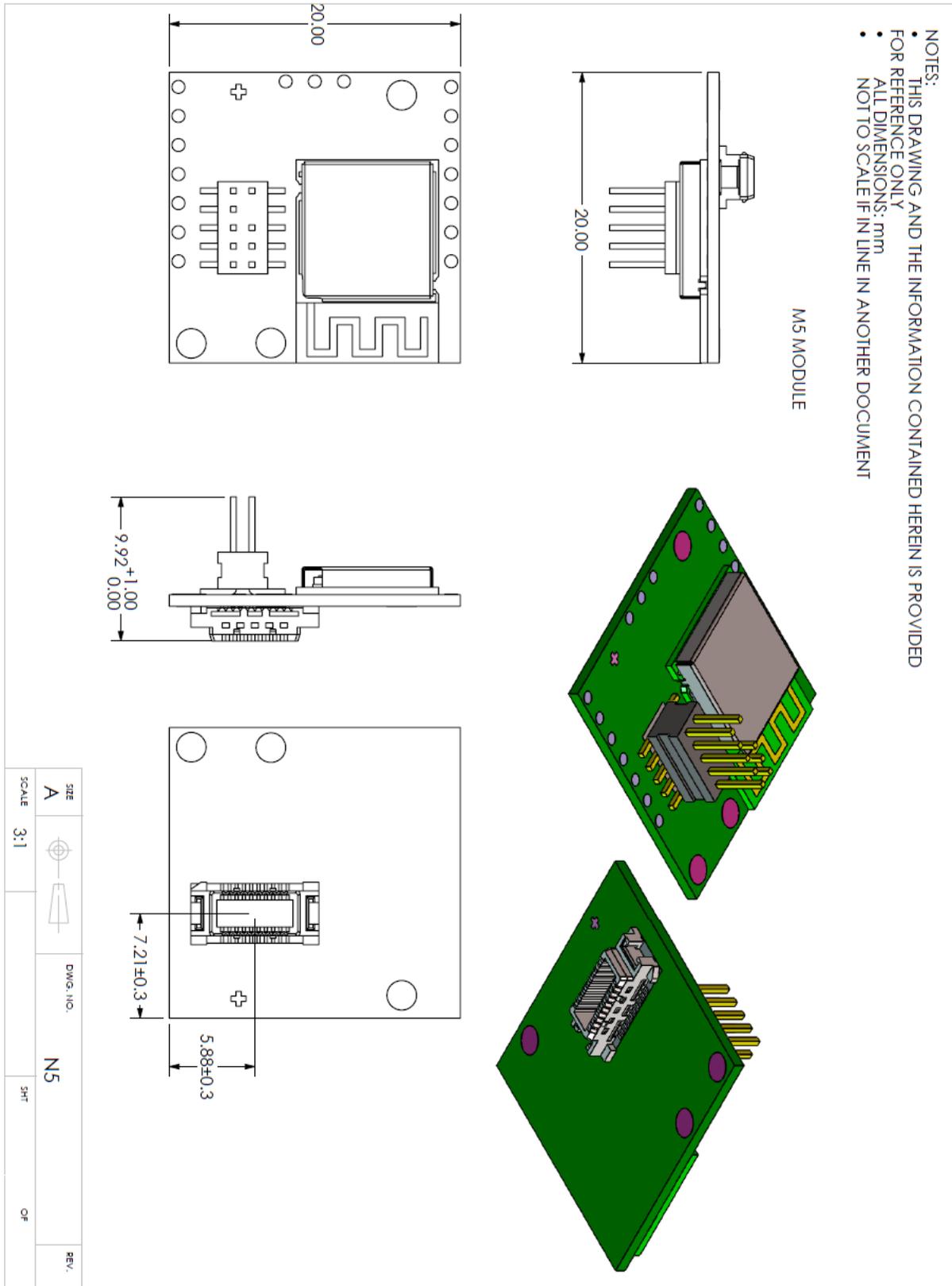


Figure 12: N5 M5 Mechanical Drawing

## 6. Support

The N5 ANT SoC module series uses nRF51422 from Nordic Semiconductor. Users can seek technical support from Nordic Semiconductor, [www.nordicsemi.com](http://www.nordicsemi.com). Users can seek application support from Dynastream Innovations, [www.thisisant.com](http://www.thisisant.com).

### 6.1 ANT Forum

Users are encouraged to participate in the ANT forum moderated by the application engineering team of Dynastream Innovations for any engineering discussions. Joining the ANT forum is free and open at <http://www.thisisant.com/forum>.

### 6.2 Technical References

Documents:

1. nRF51422 Product Specification, Nordic semiconductor
2. nRF51822 and nRF51422 Product Anomaly Notification (PAN-028), Nordic Semiconductor
3. nRF51 Series Reference Manual, Nordic Semiconductor
4. nRF51422 S210 SoftDevice Specification, Nordic Semiconductor
5. nRF51422 S310 SoftDevice Specification, Nordic Semiconductor
6. nRF51822 S110 SoftDevice Specification, Nordic Semiconductor
7. nRF51822 S120 SoftDevice Specification, Nordic Semiconductor
8. S130 nRF51822 SoftDevice Specification, Nordic Semiconductor
9. nRF51422 Evaluation Kit - Developing with the MDK-ARM Microcontroller Development Kit, Nordic Semiconductor
10. N548 ANT SoC Module Starter Kit User Manual, Dynastream Innovations
11. ANT Message Protocol and Usage, Dynastream Innovations
12. Interfacing with ANT General Purpose Chipsets and Modules, Dynastream Innovations
13. Application note: Interpreting RF Radiation Patterns, Dynastream Innovations

Software:

14. S210 nRF51422 SoftDevice, Nordic Semiconductor
15. S310 nRF51422 SoftDevice, Nordic Semiconductor
16. S110 nRF51822 SoftDevice, Nordic Semiconductor
17. S120 nRF51822 SoftDevice, Nordic Semiconductor
18. S130 nRF51822 SoftDevice, Nordic Semiconductor
19. ANT network processor reference code, Dynastream Innovations
20. ANTwareII – a system testing and debugging tool, Dynastream Innovations

Design models:

21. N548M8CB Altium library, Dynastream Innovations
22. N5 module STEP mode, Dynastream Innovations

The above documents and software are available at [www.dynastream.com](http://www.dynastream.com), [www.thisisant.com](http://www.thisisant.com) and/or [www.nordicsemi.com](http://www.nordicsemi.com). User registration or supplier product code may be required.

### 6.3 ANT Developer's Zone

ANT development software tools, application notes, reference designs and other public resources are found in the ANT developer's zone at <http://www.thisisant.com/developer>.

To begin development with the ANT+ interoperability, please become an [ANT+ Adopter or ANT+ Alliance member](#) to obtain the access to the ANT+ Adopter Zone. ANT+ documents and design tools contained in the ANT+ Adopter zone include the ANT+ Device Profiles, ANT-FS specification, ANT software (PC/Mac) libraries with source code, and embedded reference designs with source code.

### 6.4 ANT and ANT+ Social Media

ANT is on the following social media sites,

YouTube: <http://www.youtube.com/user/ANTAlliance>

Twitter: <http://twitter.com/ANTPlus>

Facebook: <https://www.facebook.com/thisisant>

LinkedIn: <http://www.linkedin.com/groups?gid=1379137>

## Appendix: Using the ANT Network Processor Configuration

N548 modules are preloaded with a default ANT network processor reference code image in the application code space of the nRF51422. Using this configuration is similar to ANT legacy ICs or modules, as illustrated in the diagram below. This reference code is available at [www.dynastream.com/developer/n5](http://www.dynastream.com/developer/n5).

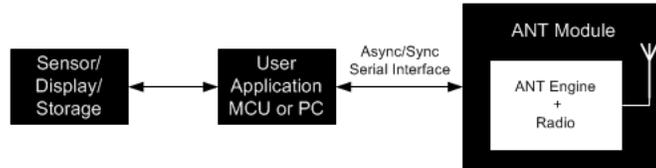


Figure 13: Using ANT Network Processor

With this configuration, the N548M4/5CB module is basically drop-in compatible with ANT11TS33M4/5IB, ANTAP281M4/5IB and ANTC782M4/5IB modules.

### Pin Assignments in the ANT Network Processor Configuration

In the pre-loaded ANT network processor configuration, specific functions are assigned to the module pins. The details are as the following.

N548M8xx LGA Pad	N548M4xx Pin	N548M5xx Molex Connector	nRF51422 Pin Name	Default Reference Code ANT Network Processor Pin Assignments			
				Pin Name	Async Mode	Sync Mode	Function
A2-6	4	19	GND	GND	GND	GND	Power supply ground
B1	2	10	RST /SWDIO	RST	RST	RST	Reset the device
B2			P018	NC	NC	NC	No connection
B3			P020	NC	NC	NC	No connection
B4			P019	NC	NC	NC	No connection
B5, B6	3	1	Vcc	Vcc	Vcc	Vcc	Power supply source
C1	5	6	SWDCLK	NC	NC	NC	No connection
C2			P013	NC	NC	NC	No connection
C3			P016	NC	NC	NC	No connection
C4			P022	NC	NC	NC	No connection
C5, C6	3	1	Vcc	Vcc	Vcc	Vcc	Power supply source
D1	12	3	P012	RXD0/SIN	RXD0	SIN	Async -> Receive data signal Sync -> Data input
D2	11	4	P015	TXD0/SOUT	TXD0	SOUT	Async -> Transmit data signal Sync -> Data output
D3			P025	NC	NC	NC	No connection
D4	6	17	P023	SUSPEND / SRDY	SUSPEND	SRDY	Async -> Suspend control Sync -> Serial port ready
D5		16	P021	Unused	Unused	Unused	Not used, tie to ground
D6	10	7	P024	BR2/SCLK	BR2	SCLK	Async -> Baud rate selection Sync -> Clock output signal

N548M8xx LGA Pad	N548M4xx Pin	N548M5xx Molex Connector	nRF51422 Pin Name	Default Reference Code ANT Network Processor Pin Assignments			
				Pin Name	Async Mode	Sync Mode	Function
E1	14	9	P009	BR3	BR3	Tie to GND	Async -> Baud rate selection Sync -> Not used, tie to ground
E2	15	14	P011	Unused	Tie to GND	Tie to GND	Not used, tie to ground
E3	13	5	P006	BR1	BR1	Tie to GND	Async -> Baud rate selection Sync -> Not used, tie to ground
E4		20	P004	Unused	Unused	Unused	Not used, tie to ground
E5	9	11	P000	PORTSEL	Tie to GND	Tie to VCC	Asynchronous or synchronous port select
E6	8	13	P030	Unused	NC	NC	No connection
F1	16	12	P008	Unused	Tie to GND	Tie to GND	Not used, tie to ground
F2	17	2	P005	RTS/SEN	RTS	SEN	Async -> Request to send Sync -> Serial enable signal
F3	1	8	P003	Unused	Unused	Unused	Not used, tie to ground
F4		18	P001	Unused	Unused	Unused	Not used, tie to ground
F5	7	15	P002	SLEEP/ $\overline{\text{MRDY}}$	SLEEP	$\overline{\text{MRDY}}$	Async -> Sleep mode enable Sync -> Message ready indication
F6			P031	NC	NC	NC	No connection

**Table 9: Pin Assignments in ANT Network Processor Configuration**

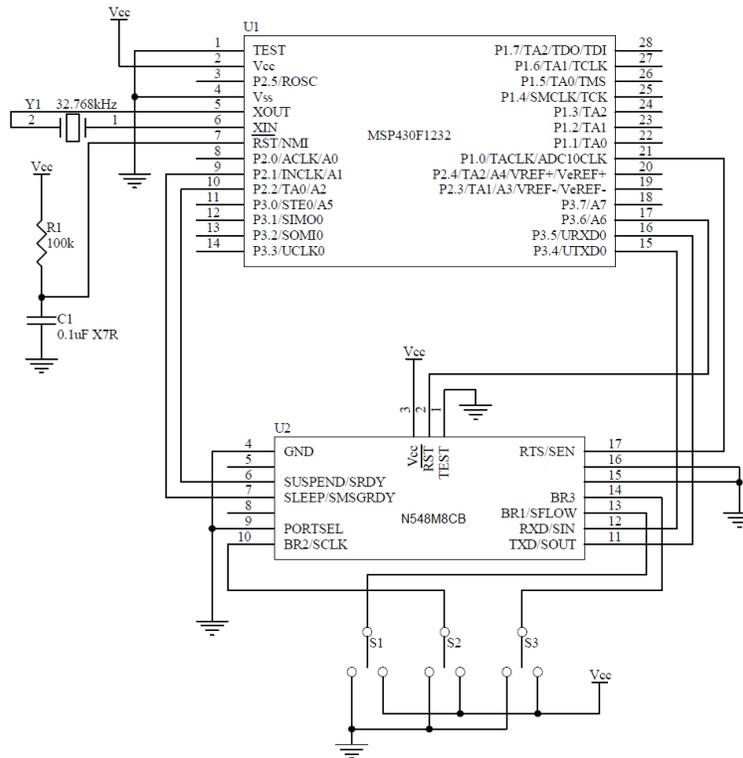
### ***Async Mode Baud Rate Select***

The baud rate of the asynchronous communication is controlled by the speed select signals BR1, BR2 and BR3. Please refer to the table below.

BR3	BR2	BR1	Baud Rate
0	0	0	4800
1	0	1	9600
0	1	0	19200
0	0	1	38400
1	1	1	57600

**Table 10: Async Mode Baud Rate Select**

**Async Mode Baud Connection Example**

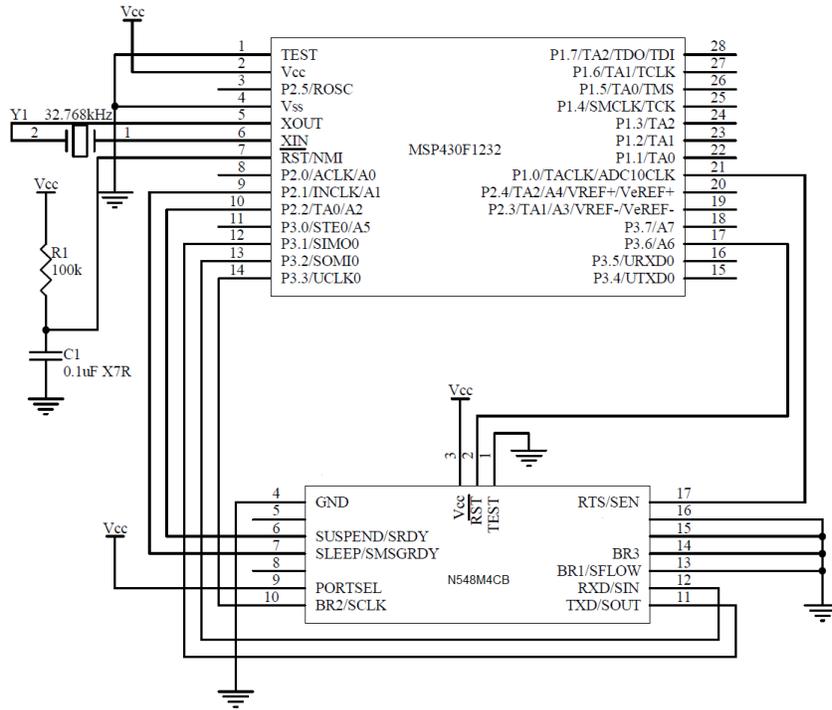


**Figure 14: N548M8CB ANT NP Configuration Connection**

**Notes:**

- Module RXD and TXD connected directly to hardware USART of microcontroller.
- Switches on baud rate selection pins (BR1, BR2 and BR3) are for ease of use only. They can be connected directly to the logic level of interest.
- RTS is hardware controlled on the N5 module and will toggle on a per byte level. If HW flow control is not available on MCU, the software implemented flow control must be able to manage serial communication flow control on a per byte level.

**Byte Sync Mode Connection Example**



**Figure 15: N548M4CB ANT NP Configuration Byte Sync Connection**

**Notes:**

- Module SOUT, SIN, and SCLK connected directly to hardware USART of microcontroller.
- SEN needs to be on an interrupt capable I/O pin on the microcontroller. (Interrupt pins located on Port 1&2 on the MSP430F1232)

