



## G.FIT Fitness Equipment Module Series



D52Q Models



D52M Models

### Module Hardware

- Integrated printed antenna
- On-board 32MHz and 32.768 kHz crystal clocks
- 1.7V - 3.6V supply (D52QGFM4IA, D52MGFM8IA)
- 1.71V - 3.6V supply (D52QGFM4IA-A)
- Operating temperature: Industrial (-40°C to +85°C)
- Up to 30 GPIOs (D52QGFM4IA)
- Up to 24 GPIOs (D52QGFM4IA-A, D52MGFM8IA)
- Programmable output/channel from -20dBm to 4dBm
- Excellent receiver sensitivity
  - 93dBm (ANT mode)
  - 96dBm (BLE mode)
- 1dBm resolution RSSI
- Total 512kB flash, 64kB RAM
- SPI, I2C and UART interface
- ARM SWD interface
- Internal DC/DC converter supported
- 20 x 20mm module (D52Q models, M4 format)
- 14 x 9.8 x 2.0mm module (D52M models, M8 format)
- Onboard 3-axis MEMS accelerometer (D52QGFM4IA-A)
  - LIS2DH by ST Microelectronics
  - 2 programmable interrupt pins
- Layout compatible options with N5150M4CD, N550M4CC, N548M4CB, ANTAP281M4IB, ANTC782M4IB (for D52Q models)<sup>1</sup>
- Layout compatible options with N5150M8CD, N550M8CC, N548M8CB (for D52M models)<sup>1</sup>
- Radio regulatory approval for major markets
- BLUETOOTH SIG qualification
- RoHS compliant

### G.FIT Modules:

- D52QGFM4IA, D52QGFM4IA-A, D52MGFM8IA
- D52QSKM6IA-A (Development Model)

### ANT® Operation (using compatible s332 SoftDevice)

- 79 selectable RF channels (2402 to 2480 MHz)
- Flexible network topologies: peer-to-peer, star, tree, high node count, mesh and more
- Broadcast, acknowledged, and burst data communication modes
- 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:
  - Supports up to 9 logical channels<sup>2</sup> for use in custom applications by customers each with configurable channel periods (5.2ms - 2s)
  - Advanced burst data transfer modes (up to 60kbps)
  - Optional channel encryption mode (aes-128)
  - Supports up to 7 customer-specified public, private and/or managed networks<sup>3</sup>
  - Advanced power management features to optimize application power consumption including Event Filtering and Selective Data Updates
  - Asynchronous transmit channel
  - Fast channel initiation
  - High duty search<sup>4</sup>

### G.FIT Features

- G.FIT modules are preloaded with the fitness equipment focused G.FIT Network Processor application
  - ANT+ and Bluetooth® low energy technology
  - List and proximity pairing modes for HR devices
  - Enhanced coexistence support for group gym environments
  - Serial or Wireless (via Bluetooth) firmware update
  - Simple serial interface
- ANT+ profile support in G.FIT Network Processor
  - HRM (heart rate)
  - FE-C (fitness equipment)
- Bluetooth profile support in G.FIT Network Processor
  - HRS/HRP (heart rate)
  - FTMS/FTMP (fitness equipment machine service)
  - DIS (device information service)
- Custom application support
  - G.FIT capabilities wrapped in development library
  - Use G.FIT module as fitness equipment MCU and wireless service controller

<sup>1</sup> In certain configurations; see section 3.3 - Pin-outs - for complete details

<sup>2</sup> 15 logical channels total; 6 are consumed by G.FIT features, leaving 9 for custom applications

<sup>3</sup> 8 networks total, 1 network reserved for G.FIT (ANT+)

<sup>4</sup> High duty search is supported by the S332 SoftDevice, but is not supported in G.FIT configurations.



## Table of Contents

<b>G.FIT Fitness Equipment Module Series.....</b>	<b>1</b>
<b>Table of Figures.....</b>	<b>4</b>
<b>List of Tables.....</b>	<b>5</b>
<b>Notices and Restricted Use Information.....</b>	<b>6</b>
<b>One Year Limited Warranty.....</b>	<b>7</b>
<b>1 G.FIT Use Case Overview .....</b>	<b>8</b>
<b>2 G.FIT Fitness Equipment Module Series Overview .....</b>	<b>9</b>
2.1 Nomenclature.....	10
2.2 Production Tracking Code .....	10
2.3 Models .....	11
2.4 D52 ANT SoC Module Starter Kit and Components .....	12
2.5 D52 ANT SoC Module Extender Kit and Components .....	13
<b>3 Product Overview.....</b>	<b>14</b>
3.1 G.FIT D52Q Model Block Diagrams.....	14
3.2 G.FIT D52M Model Block Diagram .....	15
3.3 Pin-outs .....	15
3.3.1 (Optional) Accelerometer Specification .....	19
3.4 G.FIT ANT ID and RSSI Calibration Information .....	19
3.5 G.FIT Preloaded Software and Custom Applications .....	20
3.5.1 Preloaded Software .....	20
3.5.2 G.FIT Custom Applications.....	21
3.5.3 Programming & updating using the G.FIT Firmware Updater .....	21
3.5.4 Programming via SWD Interface .....	21
3.6 Design Considerations .....	22
3.6.1 Initializing the SoftDevice .....	22
3.6.2 Configuring the DC/DC converter .....	22
3.6.3 D52Q M6 module mounting .....	22
3.6.4 D52Q (including G.FIT) M4 Module Mounting .....	22
3.6.5 D52M (including G.FIT) M8 Module Mounting .....	24
3.7 Assembly Considerations.....	25
3.7.1 Moisture Control.....	25
3.7.2 D52Q (including G.FIT) M4 Module Solder Stencil .....	26
3.7.3 D52M (including G.FIT) M8 Module Solder Stencil .....	26
3.7.4 Cleaning Process .....	26
<b>4 Regulatory Approvals and Compliance .....</b>	<b>27</b>
4.1 United States .....	27

4.2	Canada .....	27
4.3	European Economic Area .....	28
4.4	Australia and New Zealand.....	29
4.5	Japan.....	29
4.6	Korea.....	29
4.7	ANT+ Certification .....	29
4.8	BLUETOOTH Qualification .....	29
<b>5</b>	<b>Licensing &amp; Conditions of Use.....</b>	<b>30</b>
5.1	Conditions of Use .....	30
5.2	SoftDevice Licensing.....	30
<b>6</b>	<b>Electrical Specifications.....</b>	<b>31</b>
6.1	Recommended Operating Conditions .....	31
6.2	Absolute Maximum Ratings .....	31
6.3	Radio Operation Specifications .....	31
6.4	Electrical Specifications .....	33
<b>7</b>	<b>Mechanical Drawings.....</b>	<b>34</b>
<b>8</b>	<b>Support .....</b>	<b>36</b>
8.1	ANT Forum.....	36
8.2	Technical References .....	36
8.3	ANT Developer’s Zone .....	36
8.4	ANT and ANT+ Social Media .....	37
<b>Appendix A</b>	<b>– The G.FIT Network Processor and G.FIT Firmware Updater .....</b>	<b>38</b>
	Pin Assignments for the G.FIT Network Processor Configuration .....	38
	Asynchronous Serial Mode (UART) .....	39
	DC/DC Configuration.....	41
	G.FIT Firmware Updater Pin Assignments .....	41
<b>Appendix B</b>	<b>– G.FIT Module Pre-Loaded Software Versions .....</b>	<b>42</b>

## Table of Figures

Figure 1: The G.FIT Use Case .....	8
Figure 2: D52 Module Series Nomenclature .....	10
Figure 3: Production Tracking Code for D52M (left) and D52Q (right) models (including G.FIT) .....	10
Figure 4: D52QGFM4IA-A Model (with accelerometer) Module Block Diagram .....	14
Figure 5: D52QGFM4IA Model (no accelerometer) Module Block Diagram .....	14
Figure 6: D52MGFM8IA Models Module Block Diagram.....	15
Figure 7: D52Q M4 (including G.FIT, 20mm x 20mm) Bottom View .....	16
Figure 8: D52M M8 (including G.FIT, 14.0mm x 9.8mm) Bottom View .....	16
Figure 9: D52Q M6 (D52 Series Development Module) - Top View.....	17
Figure 10: D52Q M6 (including G.FIT, Development Module) - Bottom View .....	17
Figure 11: Memory Map of G.FIT Modules with the G.FIT Network Processor Application .....	20
Figure 12: D52Q (including G.FIT) signal pads, component outline and keepout areas .....	22
Figure 13: D52Q (including G.FIT) Module Mounting.....	23
Figure 14: D52M (including G.FIT) Module Mounting .....	24
Figure 15: D52M (including G.FIT) signal pads, component outline and keepout areas .....	25
Figure 16: D52Q (including G.FIT) M4 Solder Stencil.....	26
Figure 17: D52M (including G.FIT) M8 Solder Stencil .....	26
Figure 18: D52Q M4 Module (including G.FIT) Typical Antenna Gain (dBi) .....	32
Figure 19: D52M M8 (including G.FIT) Module Typical Antenna Gain (dBi) .....	33
Figure 20: D52Q M4 (including G.FIT) Mechanical Drawing.....	34
Figure 21: D52M M8 (including G.FIT) Mechanical Drawing.....	35
Figure 22: Using an ANT Network Processor .....	38
Figure 23: D52Q M4 G.FIT Network Processor Configuration Async Serial Connection .....	40

## List of Tables

Table 1: G.FIT Fitness Equipment Module Series Models .....	9
Table 2: G.FIT Fitness Equipment Module Models .....	11
Table 3: D52 ANT SoC Module Starter Kit.....	12
Table 4: D52 ANT SoC Module Extender Kit.....	13
Table 5: D52 Module Series (including G.FIT) Pin-Out.....	18
Table 6: Accelerometer Pin Assignment.....	19
Table 7: G.FIT Fitness Equipment Module Moisture Control Levels.....	25
Table 8: SoftDevice Licensing and Downloads .....	30
Table 9: Recommended Operating Conditions .....	31
Table 10: Absolute Maximum Ratings.....	31
Table 11: Current Consumption of Radio Operation .....	31
Table 12: G.FIT Network Processor pin assignments on D52Q (M4) models .....	38
Table 13: G.FIT Network Processor pin assignments on D52M (M8) models.....	39
Table 14: Asynchronous Serial Mode Baud Rate Select .....	39
Table 15: ANT DC/DC Configuration Command.....	41
Table 16: ANT DC/DC Configuration Response .....	41
Table 17: G.FIT Firmware Updater pin assignments on D52Q (M4) models .....	41
Table 18: G.FIT Firmware Updater pin assignments on D52M (M8) models.....	41
Table 19: G.FIT Preloaded Software Versions .....	42

## Notices and Restricted Use Information

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The Modules are not designed, intended, or authorized for use as components in systems intended for surgical implant into the body, or other applications intended to support or sustain life, or for any other application in which the failure of the Module could create a situation where personal injury or death may occur. If you use the Modules for such unintended and unauthorized applications, you do so at your own risk and you shall indemnify and hold DYNASTREAM and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that DYNASTREAM was negligent regarding the design or manufacture of the Product.

D52 Modules (including G.FIT) have been designed to operate in typical operating environments<sup>5</sup> up to 30m.

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The D52 Series of modules (including G.FIT) have been designed to support the ANT and/or *Bluetooth*<sup>®</sup> low energy Protocols and are certified for use in many geographic regions around the globe. However, a product incorporating the D52 series module may carry the certification IDs of the module only if it complies with the restrictions and terms, including use of Dynastream-approved software, provided in the conditions of use available at:

[www.dynastream.com/components/d52/conditions-of-use](http://www.dynastream.com/components/d52/conditions-of-use)

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<sup>5</sup> Typical operating environment: commercial IoT use case, less than 5% message packet loss rate.

## One Year Limited Warranty

This G.FIT Module is warranted to be free from defects in materials or workmanship for 1 year from the date of purchase by the end customer. Within this period, Dynastream will, at its sole option, replace any G.FIT Modules that fail in normal use. Replaced G.FIT Modules have a 1 year warranty. Dynastream retains the exclusive right to replace (with a new or newly-overhauled replacement product) the G.FIT Module or offer a full refund of the purchase price at its sole discretion. SUCH REMEDY SHALL BE THE SOLE AND EXCLUSIVE REMEDY FOR ANY BREACH OF WARRANTY. Such replacement will be made at no charge to LICENSEE, provided LICENSEE shall be responsible for any transportation cost. This warranty does not apply to: (i) cosmetic damage, such as scratches, nicks and dents; (ii) damage caused by accident, abuse, misuse, water, flood, fire, or other acts of nature or external causes; (iii) damage caused by service performed by anyone who is not an authorized service provider of Dynastream; or (iv) damage to a G.FIT Module that has been modified or altered without the written permission of Dynastream. In addition, Dynastream reserves the right to refuse warranty claims against G.FIT Modules used in contravention of the laws of any country.

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IN NO EVENT SHALL DYNASTREAM BE LIABLE FOR ANY INCIDENTAL, SPECIAL, INDIRECT, OR CONSEQUENTIAL DAMAGES, WHETHER RESULTING FROM THE USE, MISUSE, OR INABILITY TO USE THIS PRODUCT OR FROM DEFECTS IN THE PRODUCT.

To obtain warranty service, LICENSEE shall contact Dynastream for shipping instructions and obtain a return material authorization (RMA) tracking number. LICENSEE shall securely pack the G.FIT Modules and enclose a copy of the original sales receipt, which is required as the proof of purchase for a warranty claim, and write the tracking number clearly on the outside of the package. LICENSEE agrees to send the G.FIT Modules, freight charges prepaid, to the Dynastream address provided in the Module Distribution Agreement (see [www.dynastream.com/components/d52/conditions-of-use](http://www.dynastream.com/components/d52/conditions-of-use)).

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## 1 G.FIT Use Case Overview

G.FIT is a turnkey dual-protocol ANT/*Bluetooth*® low energy technology (BLE) solution for wireless fitness equipment, optimized for group and classroom training applications (e.g., leader board applications) with 50+ fitness devices and multiple receivers.

As group fitness training grows in demand, many challenges to a good experience are presenting themselves:

- Gym and studio environments have very busy WiFi (and other) interference.
- Heart rate monitors from multiple manufacturers and wireless standards are on the market.
- Gym users and instructors are predominantly non-technical users.
- Gym patrons bring in their own personal and fitness-specific devices (e.g. watches and phones).
- Gyms have many types of equipment from multiple manufacturers to maintain, many of them with different operating procedures.

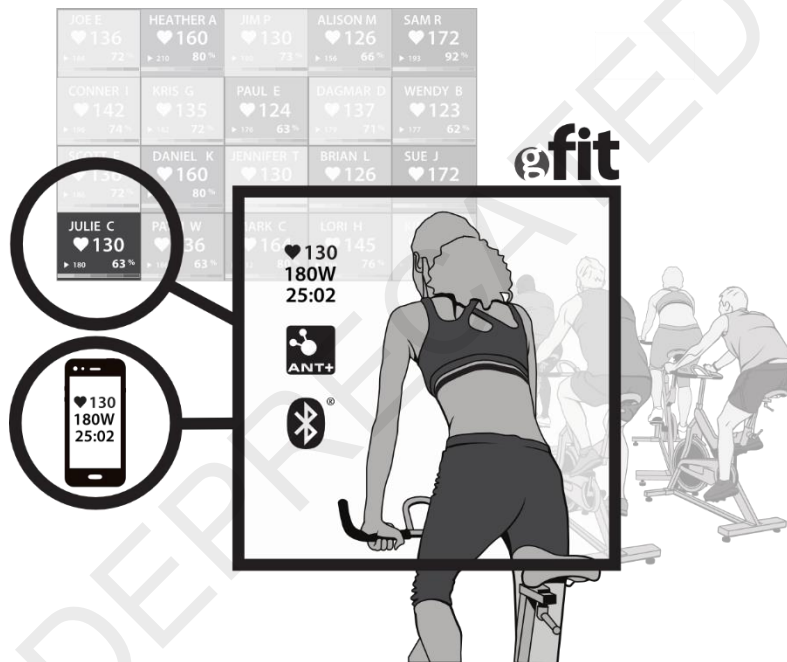


Figure 1: The G.FIT Use Case

Dynastream Innovations Inc. has been working hard to evolve individual fitness machines to incorporate group fitness capabilities. The G.FIT solution is the result of that evolution, and solves the challenges of group fitness:

- G.FIT works around WiFi interference to ensure large groups of **50+ devices can connect** concurrently to a group application (e.g., a leader board).
- G.FIT solves pairing & setup challenges with support for both **ANT+ and Bluetooth heart rate monitors**.
- G.FIT makes it easy for non-technical users to pair by providing **proximity pairing and list pairing** features.
- G.FIT solves personal device pairing by **re-broadcasting ANT+ or Bluetooth heart rate data** and works with the **ANT+ FE-C Device Profile** and **Bluetooth Fitness Machine Service profile** (FTMS/FTMP) so that people can record entire workout sessions on their personal devices.
- G.FIT enables technology maintenance with both **built-in support for easy serial or wireless updates and the creation of custom device-specific G.FIT applications** using the G.FIT Library and SDK.



## 2 G.FIT Fitness Equipment Module Series Overview

Dynastream Innovations offers [G.FIT Fitness Equipment Modules](#), based on Nordic Semiconductor’s nRF52832 SoC supporting ANT+ and *Bluetooth®* low energy technology features aimed at fitness equipment applications and gym environments. Please refer to the G.FIT User Guide and Specification for more information about the G.FIT Library, serial interface. G.FIT modules include:

- Nordic Semiconductor’s nRF52832 chip with 64kB RAM, 512kB Flash and a 32-bit ARM Cortex M4F CPU
- Concurrent ANT and Bluetooth protocol operation using the S332 SoftDevice (a pre-compiled protocol stack solution for nRF52 SoCs)
- Preloaded fitness equipment focused G.FIT Network Processor application including:
  - ANT+ FE-C with diversified frequency support (2457MHz and 2472MHz) and HRM device profile support
  - Bluetooth HRS/HRP (heart rate profile and service), FTMS/FTMP (fitness equipment machine service profile) and DIS (Device Information Service)
  - Enhanced coexistence support for group applications
  - Wireless and serial firmware update support
- Certification of compliance with radio standards in major markets including North America, Australia / New Zealand, Japan and Korea. Declared conformity with radio regulations and requirements for Europe<sup>6</sup>.
- Qualification by the Bluetooth SIG
- G.FIT Library and SDK for building custom fitness equipment applications or MCU implementations using the nRF52832 SoC – refer to the G.FIT User Guide and Specification for more information
- G.FIT modules come with RSSI calibration information stored from the factory
- G.FIT modules are serialized from the factory with an ANT ID to ensure unique device IDs in G.FIT products
- D52Q models support hardware drop-in compatibility with Dynastream FIT2 modules and other Dynastream M4 form factor modules (C7, AP2, N5, D52Q in certain configurations)<sup>7</sup>. For drop-in replacements, the G.FIT serial interface will need to be implemented on the host MCU.
- D52M models (M8 form factor) provide a new, smaller form factor for fitness equipment modules

The G.FIT Fitness Equipment module series includes the following models, all covered in this data sheet:

Part no.	Description
D52QGFM4IA	20 x 20mm module with up to 30GPIOs and 8 analog inputs
D52QGFM4IA-A	20 x 20mm module with up to 24GPIOs and 5 analog inputs; onboard 3-axis MEMS accelerometer
D52MGFM8IA	14.0 x 9.8 x 2.0mm module with up to 24GPIOs and 8 analog inputs
D52QSKM6IA-A	A D52 M4 form factor module with accelerometer mounted on a carrier board; works with the G.FIT Library for development use

**Table 1: G.FIT Fitness Equipment Module Series Models**

The [D52 series development kit](#) (D52DK2) contains everything necessary to evaluate and begin development with G.FIT series modules, with support for the Nordic nRF5 SDK and G.FIT SDK. An additional extender kit (D52EXT1) is also available and is useful for developing larger groups of G.FIT devices.

<sup>6</sup> Please see section 4 of this data sheet for details about leveraging D52 testing and certification.

<sup>7</sup> Layouts are compatible with D52Q when using the `reset` pin only; the nRF52832 supports separate reset and SWDIO lines rather than the single shared line from previous Nordic SoCs. See section 3.3 for more information.

## 2.1 Nomenclature

G.FIT Fitness Equipment Modules leverage the D52 ANT SoC module series as a hardware platform, and as such fit into the same naming scheme, as described below.

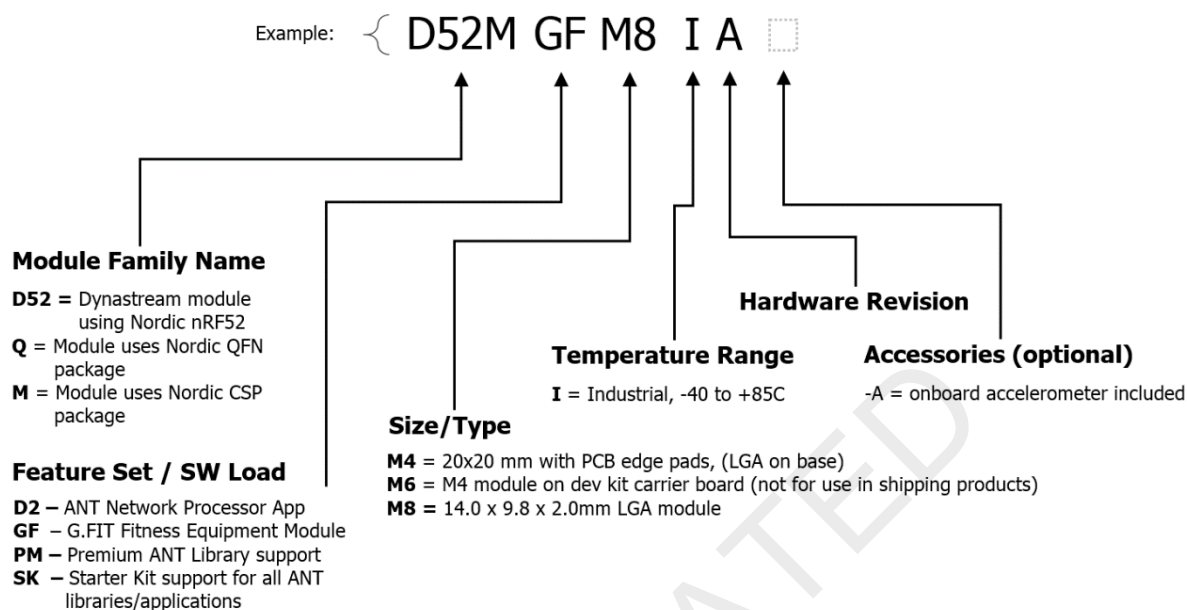


Figure 2: D52 Module Series Nomenclature

## 2.2 Production Tracking Code

For technical support and customer service purposes, a production code of three characters of the format “YWR” is laser marked on the RF shield as illustrated below. In the code, YW (“6V” and “6K” in Figure 3, below) denotes production date code and R (“B” and “2” in Figure 3, below) denotes module version.



Figure 3: Production Tracking Code for D52M (left) and D52Q (right) models (including G.FIT)

Please refer to Appendix B – G.FIT Module Pre-Loaded Software Versions for differences and important notes of each version.

## 2.3 Models

This section contains information about orderable SKUs for G.FIT Fitness Equipment Module models.




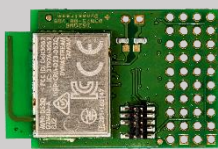
Module	Part No.	Description	Ordering/Package Information	Part Status*
	D52QGM4IA-A	20 x 20mm module with up to 24GPIOs and 5 analog inputs; onboard 3-axis MEMS accelerometer	<ul style="list-style-type: none"> <li>D52QGM4IA-A-TRAY: 20pc in 4x5 tray</li> <li>D52QGM4IA-A-REEL: 800pc on 13" tape and reel</li> </ul>	Active
	D52QGM4IA	20 x 20mm module with up to 30GPIOs and 8 analog inputs	<ul style="list-style-type: none"> <li>D52QGM4IA-TRAY: 20pc in 4x5 tray</li> <li>D52QGM4IA-REEL: 800pc on 13" tape and reel</li> </ul>	Active
	D52MGFM8IA	14.0 x 9.8 x 2.0mm module with up to 24GPIOs and 8 analog inputs	<ul style="list-style-type: none"> <li>D52MGFM8IA-TRAY: 40pc in 8x5 tray</li> <li>D52MGFM8IA-REEL: 1500pc on 13" tape and reel</li> </ul>	Active
	D52QSKM6IA-A	D52QSKM4IA-A mounted on a carrier board for starter kit and development use	<ul style="list-style-type: none"> <li>D52QSKM6IA-A-TRAY: 10 pc on 150x165mm tray</li> </ul>	Active

Table 2: G.FIT Fitness Equipment Module Models

\* ACTIVE: Device, tool, or software recommended for new designs.

## 2.4 D52 ANT SoC Module Starter Kit and Components

The D52 starter kit (D52DK2) contains all the hardware necessary to develop on the G.FIT platform, ANT, and other advanced ANT libraries (e.g., ANT BLAZE™). The downloadable ANT SoC Module Starter Kit User Manual describes using the kit with reference examples and the nRF5 SDK from Nordic Semiconductor. The G.FIT SDK and the G.FIT User Guide and Specification will be available for download from [Thisisant.com](http://thisisant.com). Kit contents are outlined in Table 3, below:



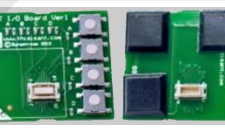


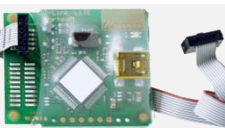
D52 Starter Kit		Part No: D52DK2	
Part No.	Description	Quantity	Picture
D52QSKM6IA-A	M4 module on carrier board with 20-pin Molex connector, NFC connections available, SWD programming header, additional through-hole connections for I/O pins	2	
ANTBAT2	Battery board with a Molex socket, a reset button and a five-position dip switch	2	
ANTIO1	I/O board with a Molex connector, a Molex socket, 4 LEDs and 4 buttons	2	
ANTUIF1	USB interface board with a Molex socket	1	
ANTUSB-m	ANT USB dongle	1	
	Segger J-Link Lite Programmer	1	

Table 3: D52 ANT SoC Module Starter Kit





## 2.5 D52 ANT SoC Module Extender Kit and Components

The D52 extender kit (D52EXT1) builds on the D52 starter kit to provide extra nodes and more power for IoT developers and platforms, including G.FIT group gym applications and ANT BLAZE™. This kit also includes the ANTBAT3 combination I/O and battery board. Powered by 2 AA batteries, the development board enables longer testing and development and includes buttons and LEDs for testing input and interaction. A D52 starter kit (D52DK2) is recommended for use with the extender kit, as the starter kit includes the tools necessary to program and monitor development nodes.



D52 Extender Kit		Part No: D52EXT1	
Part No.	Description	Quantity	Picture
D52QSKM6IA-A	M4 module on carrier board with 20-pin Molex connector, NFC connections available, SWD programming header, additional through-hole connections for I/O pins	4	
ANTBAT3	Combined battery and I/O board with a Molex socket, a reset button, I/O buttons, LEDs and dip switches, powered by two AA batteries	4	

Table 4: D52 ANT SoC Module Extender Kit



### 3 Product Overview

#### 3.1 G.FIT D52Q Model Block Diagrams

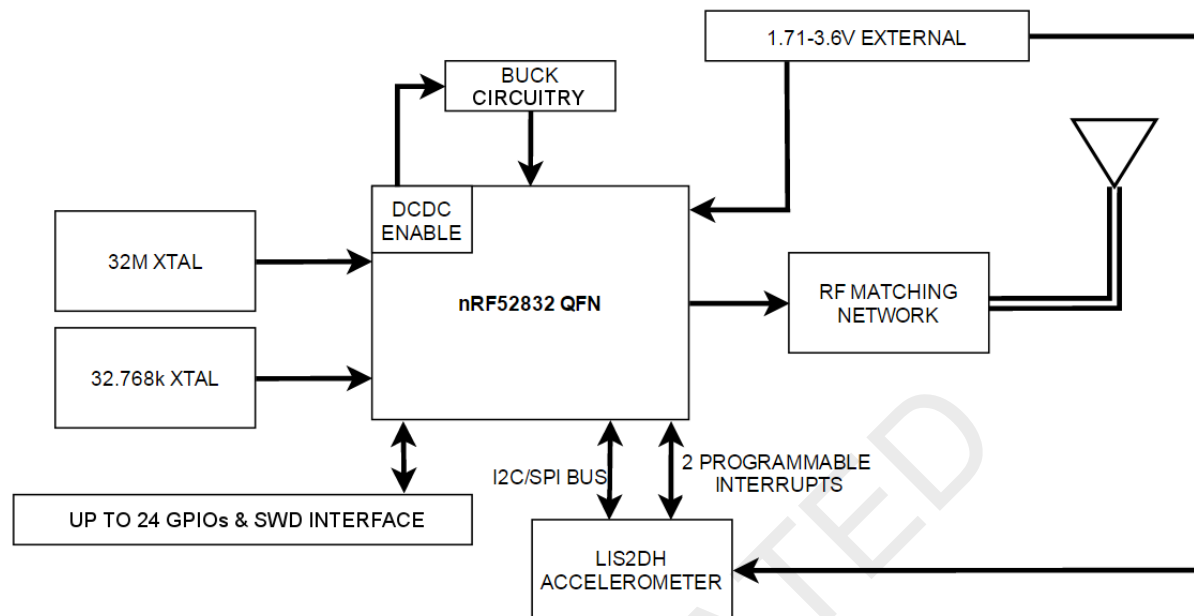


Figure 4: D52QGFM4IA-A Model (with accelerometer) Module Block Diagram

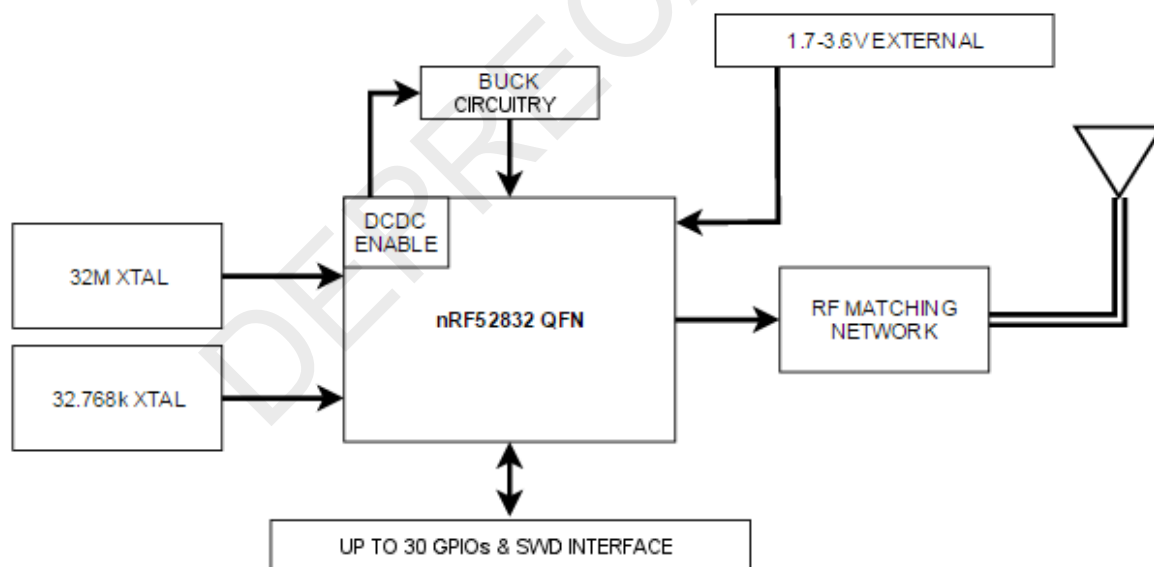


Figure 5: D52QGFM4IA Model (no accelerometer) Module Block Diagram

### 3.2 G.FIT D52M Model Block Diagram

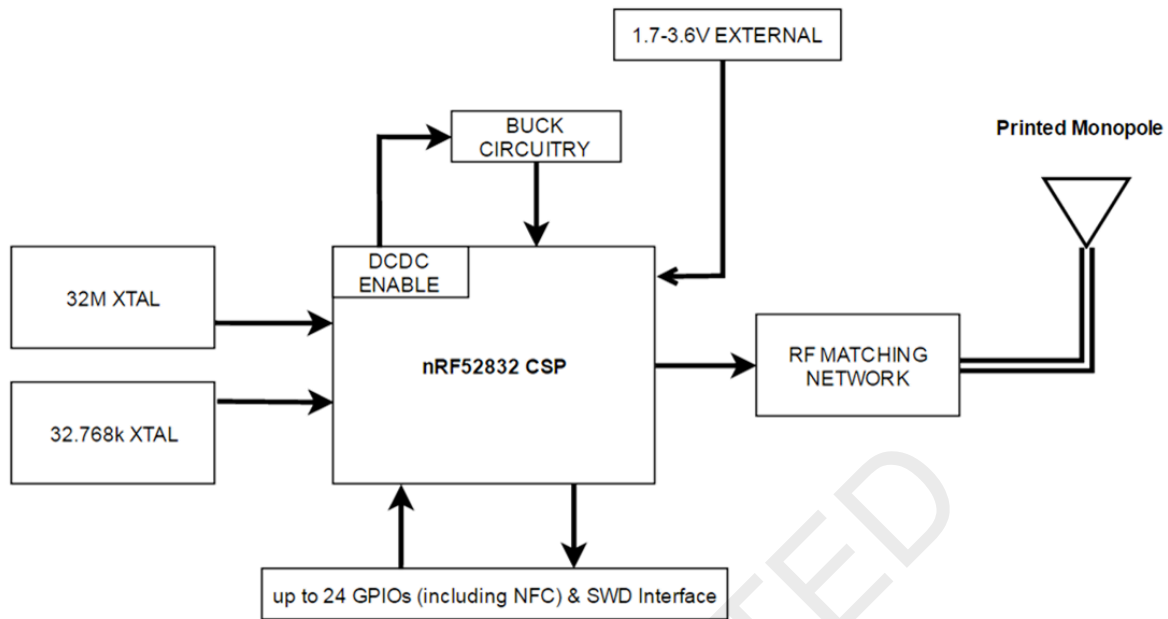


Figure 6: D52MGFM8IA Models Module Block Diagram

### 3.3 Pin-outs

**A note on backwards drop-in compatibility with D52Q:** G.FIT D52Q M4 modules support drop-in compatibility with FIT2, ANTAP281M4IB, ANTC782M4IB, N5150M4CD, N550M4CC and N548M4CB modules from Dynastream Innovations under certain configurations. For drop-in compatibility, existing designs must use only the reset capability of the reset/SWDIO pin on previous modules. See pin H202 below in Table 5. In addition, there must be nothing on existing designs that would contact the new-to-layout LGA pads in the middle of the D52Q M4 models. FIT2 layout drop-in compatibility is supported, but FIT2 replacements will also require host software to be updated to use the G.FIT Serial Message Protocol (see the G.FIT User Guide and Specification).

**A note on backwards drop-in compatibility with D52M:** G.FIT D52M M8 modules support drop-in compatibility with the following N5 M8 module models from Dynastream Innovations in certain configurations: N5150M8CD, N550M8CC, N548M8CB. For drop-in compatibility, existing designs must use only the SWDIO capability of the reset/SWDIO pad on previous modules. If needed, the reset function can be configured on another pad; see Table 5 below for more information.

**A note on the preloaded G.FIT Network Processor application:** Please refer to Appendix A – The G.FIT Network Processor for ANT Serial Line specification, and to the G.FIT User Guide and Specification for more information about the G.FIT Serial Messaging Protocol.



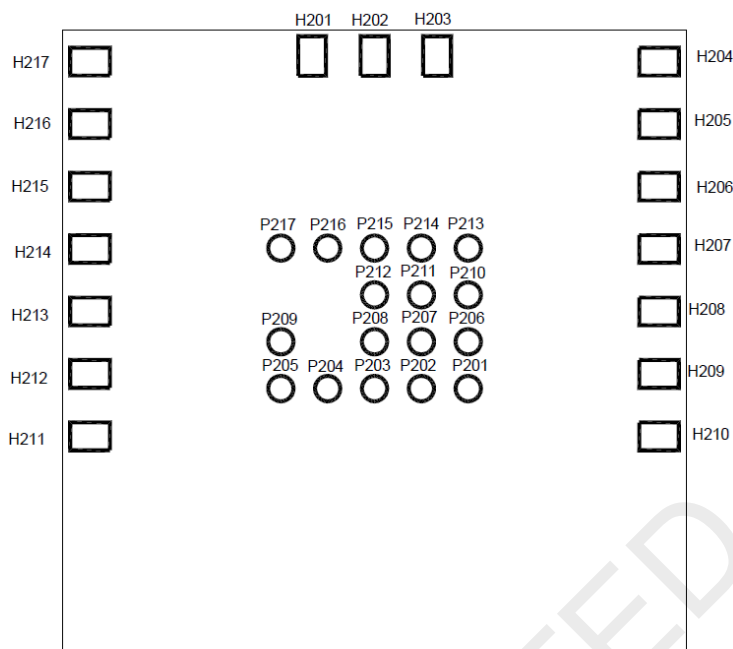


Figure 7: D52Q M4 (including G.FIT, 20mm x 20mm) Bottom View

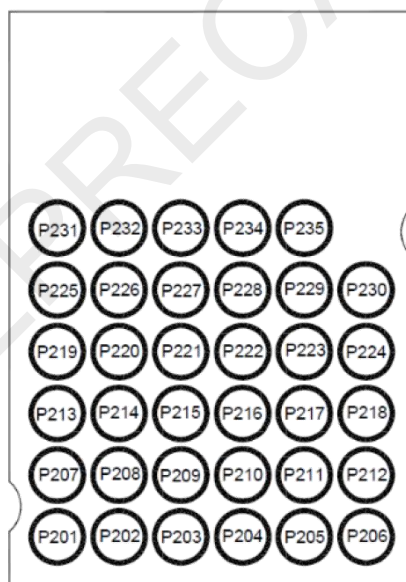


Figure 8: D52M M8 (including G.FIT, 14.0mm x 9.8mm) Bottom View

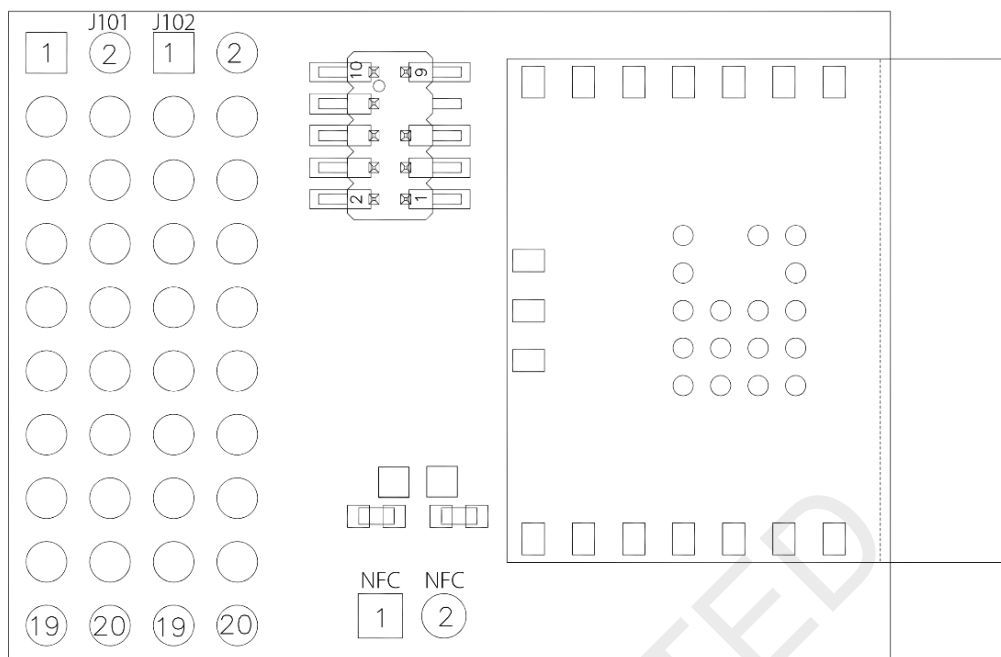


Figure 9: D52Q M6 (D52 Series Development Module) - Top View

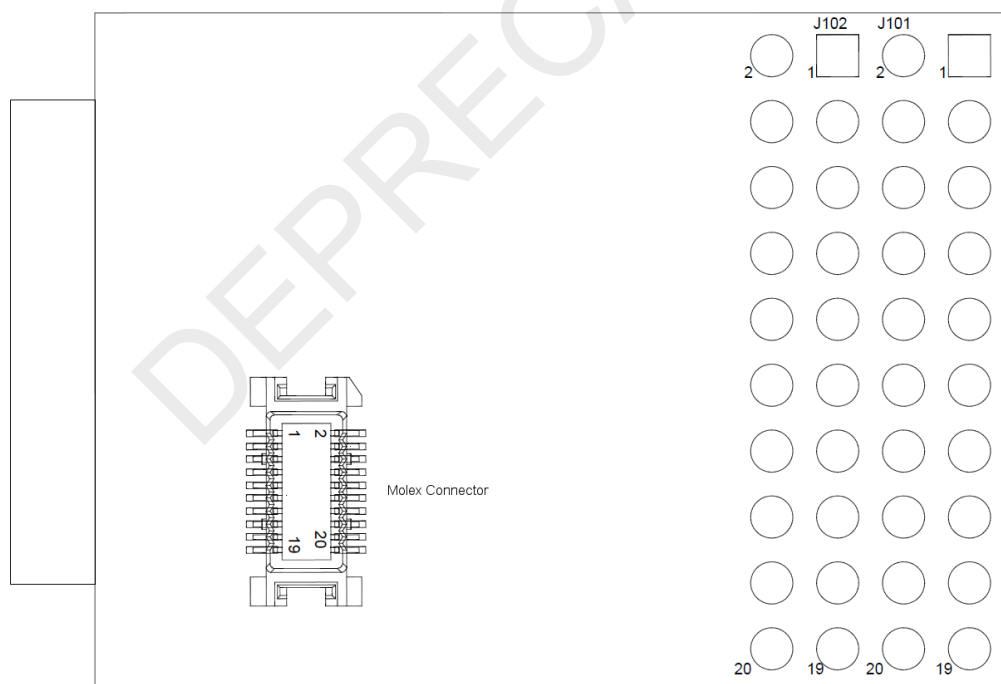


Figure 10: D52Q M6 (including G.FIT, Development Module) - Bottom View

D52Q M4 Pin <sup>8</sup>	D52M M8 Pin	D52Q M6		nRF52832 Pin Name	Description
		Molex Connector	Dev Board Pin		
H201	P230	16	J102.19	SWDIO	Serial Wire Debug I/O for debug and programming
H202	P207	10	J101.06	P021/RESET	General Purpose I/O / System Reset pin
H203	P225, P226, P219, P220	1	J101.01	VCC	Power Supply Pin
H204	P231, P232, P233, P234, P235	19	J101.02, J101.08, J102.20	VSS	Ground
H205	P224	6	J101.07	SWDCLK	Serial Wire Debug clock input for debug and programming
H206	P212	17	J101.09	P006	General Purpose I/O
H207	-	15	J101.10	P007	General Purpose I/O
H208	P208	-	J102.01	P002/AIN0	General Purpose I/O / Analog SAADC/COMP/LPCOMP input
H209	P218	11	J101.17	P008	General Purpose I/O
H210	P201	7	J101.19	P011	General Purpose I/O
H211	-	4	J101.04, J101.15	P017	General Purpose I/O
H212	P221	3	J101.03, J101.11	P016	General Purpose I/O
H213	P228	5	J101.18	P015	General Purpose I/O
H214	P217	9	J101.20	P014	General Purpose I/O
H215	P216	-	J102.17	P013	General Purpose I/O
H216	P205	8	J102.15	P031/AIN7	General Purpose I/O / Analog SAADC/COMP/LPCOMP input
H217	P229	2	J101.05	P012	General Purpose I/O
P201	P222	-	NFC.2	NFC2/P010	NFC antenna connection / General Purpose I/O
P202	-	14	J102.04	P019	General Purpose I/O
P203	P227	13	J102.06	P020	General Purpose I/O
P204	P215	18	J102.08	P022	General Purpose I/O
P205	-	20	J102.10	P023	General Purpose I/O
P206	P223	-	NFC.1	NFC1/P009	NFC antenna connection / General Purpose I/O
P207	P211	-	J102.07	P005/AIN3	General Purpose I/O / Analog SAADC/COMP/LPCOMP input
P208	P214	-	J102.02	P018	General Purpose I/O
P209	P213	12	J102.12	P024	General Purpose I/O
P210	P209	-	J102.05	P004/AIN2	General Purpose I/O / Analog SAADC/COMP/LPCOMP input
P211	P210	-	J102.03	P003/AIN1	General Purpose I/O / Analog SAADC/COMP/LPCOMP input
P212 <sup>8</sup>	-	-	J102.16	P026	General Purpose I/O
P213 <sup>8</sup>	P203	-	J102.11	P029/AIN5	General Purpose I/O / Analog SAADC/COMP/LPCOMP input
P214 <sup>8</sup>	P204	-	J102.13	P030/AIN6	General Purpose I/O / Analog SAADC/COMP/LPCOMP input
P215 <sup>8</sup>	P202	-	J102.09	P028/AIN4	General Purpose I/O / Analog SAADC/COMP/LPCOMP input
P216 <sup>8</sup>	-	-	J102.18	P027	General Purpose I/O
P217 <sup>8</sup>	P206	-	J102.14	P025	General Purpose I/O

Table 5: D52 Module Series (including G.FIT) Pin-Out

<sup>8</sup> See section 3.3.1 for onboard accelerometer pin usage (optional; D52Q models with -A suffix only).

### 3.3.1 (Optional) Accelerometer Specification

The D52QGFM4IA-A is G.FIT module variant that includes an onboard accelerometer accessory. The accelerometer is the LIS2DH by STMicroelectronics. To make use of the accelerometer, the following pins are consumed:

D52QGFM4IA-A Pin	nRF52832 Pin	LIS2DH Pin
P212	P026	INT2
P213	P029/AIN5	SDA/SDI/SDO
P214	P030/AIN6	SCL/SPC
P215	P028/AIN4	SDO/SA0
P216	P027	CS
P217	P025	INT1

Table 6: Accelerometer Pin Assignment

SPI or I<sup>2</sup>C can be used to communicate with the accelerometer. To use I<sup>2</sup>C, pull-up resistors will need to be added to the appropriate pads.

For more information about D52Q pin assignments, refer to **Table 5: D52 Module Series (including G.FIT) Pin-Out**.

For more information about this component including data sheet and errata, please refer to the STMicroelectronics website:

- [http://www.st.com/web/en/catalog/sense\\_power/FM89/SC444/PF252928](http://www.st.com/web/en/catalog/sense_power/FM89/SC444/PF252928).

### 3.4 G.FIT ANT ID and RSSI Calibration Information

G.FIT Modules come from the factory loaded with RSSI calibration information, as well as a unique identifier known as ANT ID. These values are stored in the customer register section of the UICR:

- RSSI Calibration Offset: UICR Customer Register 3, address 0x1000108C
- ANT ID: UICR Customer Register 4, address 0x10001090

The RSSI calibration value is a single byte that is applied to RSSI readings when the module receives packets. It is leveraged by pairing algorithms in the G.FIT Library and Network Processor application. The calibrated RSSI reading can be calculated using the offset as:

$$AdjustedRSSI = RawRSSI - (127 - RSSICalibrationOffset)$$

#### Equation 1: Applying the RSSI Calibration Offset

If the RSSI calibration field reads 0xFF, no calibration value exists and calibration should not be applied.

The ANT ID value is guaranteed to be unique to 20 bits within 1 module family – for example, the lower 20 bits may be identical between G.FIT and D52 Premium modules; however, M8 and M4 modules from the G.FIT family will never have identical lower 20 bits in their ANT IDs. This value is used internally by the G.FIT library and is necessary to guarantee the absence of Device ID collisions between multiple devices operating in close proximity.

More information about reading and writing these values, as well as using ANT ID to automatically assign a unique Device ID to a channel can be obtained from D00001706 – G.FIT and Premium Module Manufacturing Considerations Application Note.

If the module is re-programmed via SWD, the information stored in these locations will be lost, unless the process described by D00001706 – G.FIT and Premium Module Manufacturing Considerations Application Note is followed.

### 3.5 G.FIT Preloaded Software and Custom Applications

There are two main ways to leverage G.FIT features:

1. Leverage the preloaded G.FIT Network Processor application from an external MCU via the G.FIT serial interface
2. Leverage the G.FIT SDK and Library to build a custom application, to use the G.FIT module for both communication and MCU responsibilities

There are two different ways to maintain software on G.FIT modules:

1. Load and maintain software on G.FIT modules using the G.FIT Firmware Updater, preloaded on all modules
2. Program and maintain software loads on G.FIT modules using a SWD interface

This section covers the above software configurations for leveraging G.FIT fitness equipment software features, as well as how to load that software on G.FIT modules in manufacturing and service scenarios.

#### 3.5.1 Preloaded Software

G.FIT Modules are pre-loaded with the G.FIT Network Processor application, the S332 ANT/Bluetooth SoftDevice and the G.FIT Firmware Updater. The preloaded code may vary; please refer to Appendix B – G.FIT Module Pre-Loaded Software Versions for further details. Licensing terms for the preloaded software are described in the D52 Module Distribution Agreement, which is referenced in Section 5 - Licensing & Conditions of Use. The components are described below, along with an illustrated memory map.

- **G.FIT Firmware Updater** – Custom updater that facilitates G.FIT firmware updates or custom applications wirelessly or via serial interface. Refer to the G.FIT Firmware Updater application note for more information.
- **G.FIT Network Processor Application** – Fitness equipment specific network processor application that leverages the G.FIT Library, accessed via the G.FIT serial interface. Refer to the G.FIT User Guide and Specification for more information about the G.FIT serial interface. Refer to Appendix A – The G.FIT Network Processor and G.FIT Firmware Updater – for more information about G.FIT hardware configuration.
- **S332 SoftDevice** – ANT/Bluetooth protocol support for nRF52832 SoCs. Refer to the S332 nRF52832 SoftDevice Specification for more information.

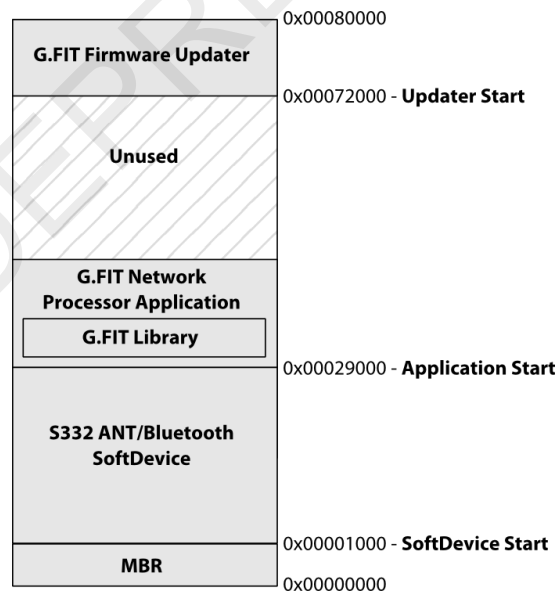


Figure 11: Memory Map of G.FIT Modules with the G.FIT Network Processor Application

### **3.5.2 G.FIT Custom Applications**

The G.FIT Network Processor preloaded on all G.FIT modules (see the previous section) is ideal for use in fitness equipment with an external MCU via a serial interface. A unique opportunity with G.FIT versus other previous fitness equipment modules is to leverage the nRF52832 SoC as both network processor and MCU.

The G.FIT Network Processor Application uses the G.FIT Library to provide ANT+ and Bluetooth fitness equipment features, and that same library can be used with the G.FIT SDK by manufacturers to create custom applications and have the G.FIT module take on MCU responsibilities in their products. They can then leverage the G.FIT Firmware Updater to load the custom application onto G.FIT modules in manufacturing or in the field.

For more information about building custom G.FIT applications, refer to the G.FIT User Guide and Specification. For more information about using the G.FIT Firmware Updater, refer to the G.FIT Firmware Updater application note. The G.FIT Library is available for download from Thisisant.com. Reference code leveraging the G.FIT Library is available in the G.FIT SDK, also available on Thisisant.com.

### **3.5.3 Programming & updating using the G.FIT Firmware Updater**

The G.FIT Firmware Updater allows independent updates of all three software components on the G.FIT module: the application (e.g., G.FIT Network Processor or custom application), the SoftDevice, or the G.FIT Firmware Updater itself. The Updater gives fitness equipment manufacturers two methods to update or program G.FIT firmware in manufacturing or in the field:

1. Wirelessly using Bluetooth
2. Wired via serial interface

For more information about using the G.FIT Firmware Updater in manufacturing or for updating in the field, please refer to the G.FIT Firmware Updater application note.

Refer to “G.FIT Firmware Updater Pin Assignments” in “Appendix A – The G.FIT Network Processor and G.FIT Firmware Updater” for pin assignments for the G.FIT Firmware Updater.

### **3.5.4 Programming via SWD Interface**

**Note:** The G.FIT Firmware Updater is the preferred method for updating software components on the G.FIT module. See section 3.5.3 for more information. Programming via SWD will permanently erase the G.FIT Firmware Updater, RSSI Calibration data, and ANT ID. To learn about how to preserve RSSI Calibration data and the ANT ID, please see section 3.5.4.1, below. The G.FIT firmware updater cannot be preserved on G.FIT modules when programming via SWD.

G.FIT modules support the Serial Wire Debug (SWD) interface, SWDCLK and SWDIO (refer to Table 5: D52 Module Series (including G.FIT) Pin-Out). Programming and debugging of the module only requires commonly available tools, such as the Keil software development environment and the Segger J-Link programmer.

Software components (the SoftDevice and the G.FIT Library and application code) must be version compatible to operate properly. To ensure proper operation after reprogramming, it is recommended that the module undergoes a full erasure (e.g. using the erase-all option in nrfjprog.exe/nRFgo Studio) and all desired software components be explicitly programmed onto the module.

#### **3.5.4.1 Preserving G.FIT RSSI calibration data and ANT ID**

If the module is re-programmed via the SWD interface, the information stored in the factory information locations described in section 3.4 will be lost, unless the process described by D00001706 – G.FIT and Premium Module Manufacturing Considerations Application Note is followed.

### 3.6 Design Considerations

RF performance is always affected by the environment. Good design makes a product less susceptible to adverse conditions. The recommendations in this section are guidelines only; you should thoroughly test your products in the intended use case environments and make necessary modifications and trade-offs.

For assistance in design, a STEP model package and Altium library are available from Dynastream Innovations for all D52 module series models (including G.FIT).

#### 3.6.1 Initializing the SoftDevice

D52 series modules (including G.FIT) come with 20ppm onboard 32 kHz crystals. When initializing the SoftDevice, it is important to set the crystal accuracy to be 20ppm. This clock source is selected when enabling the SoftDevice via the `sd_softdevice_enable` command.

#### 3.6.2 Configuring the DC/DC converter

D52 series modules (including G.FIT) can make use of the DC/DC Converter on nRF52832 chips. This can improve power consumption under certain conditions.

#### 3.6.3 D52Q M6 module mounting

D52QSKM6IA-A modules can be used with development boards/products from Dynastream Innovations when developing with G.FIT. They are equipped with a Molex connector for ease of development. The mating socket is Molex 52991-0208.

#### 3.6.4 D52Q (including G.FIT) M4 Module Mounting

Figure 12 shows D52Q (including G.FIT) component outline and keepout areas in pink. There should not be any exposed copper or routing in the keepout areas, on any layer. The component body is crosshatched pink, and signal pads are red. Please reference the D52Q Altium Footprint for more accurate keepout dimensions and positioning. Figure 13, on the next page, describes mating PCB characteristics.

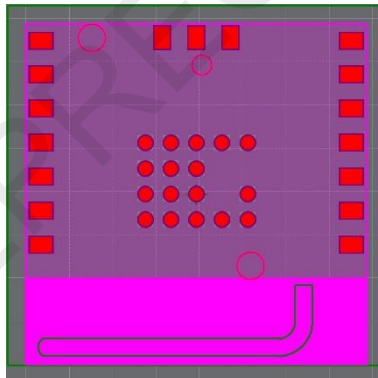


Figure 12: D52Q (including G.FIT) signal pads, component outline and keepout areas



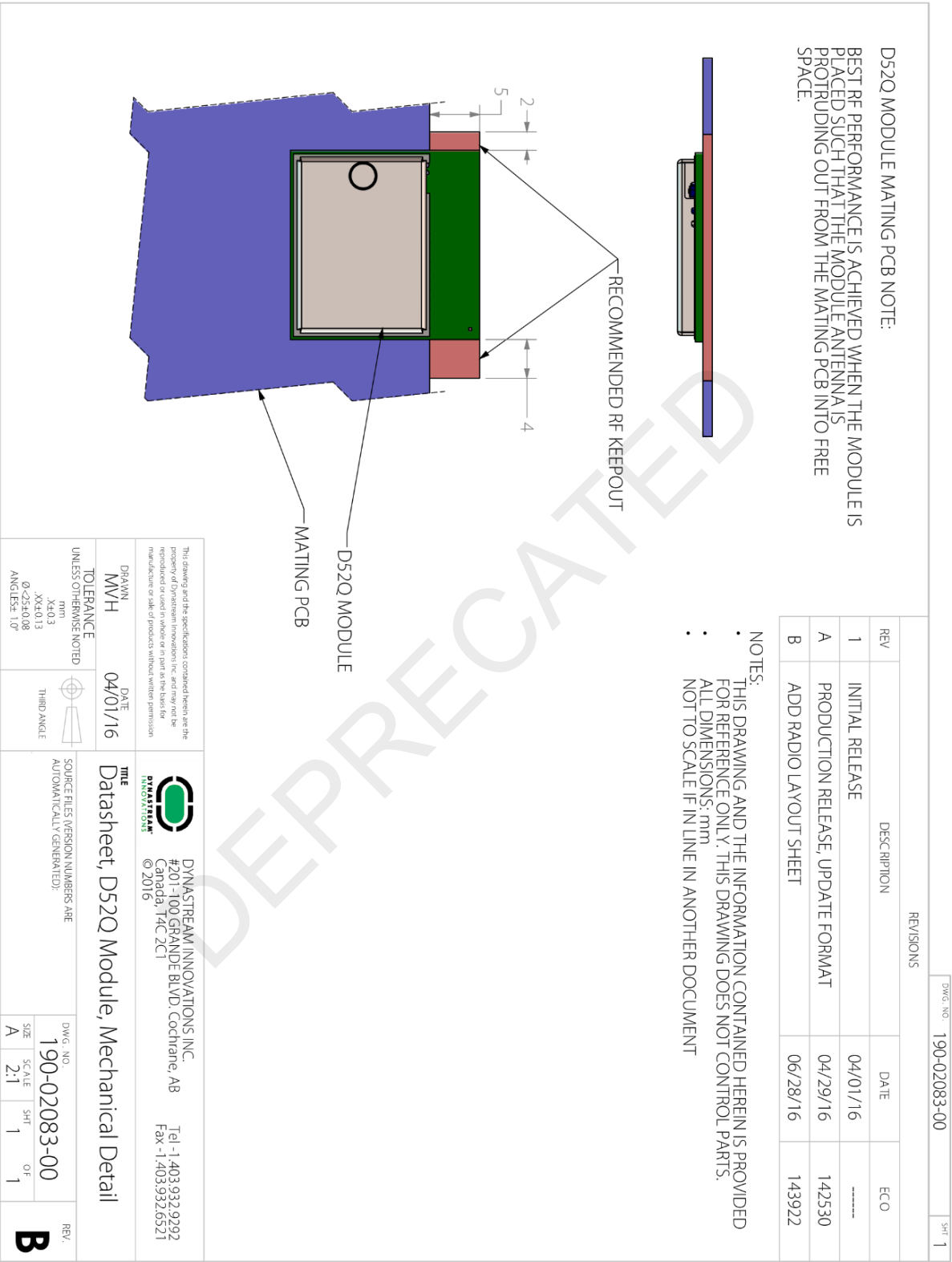


Figure 13: D52Q (including G.FIT) Module Mounting

3.6.5 D52M (including G.FIT) M8 Module Mounting

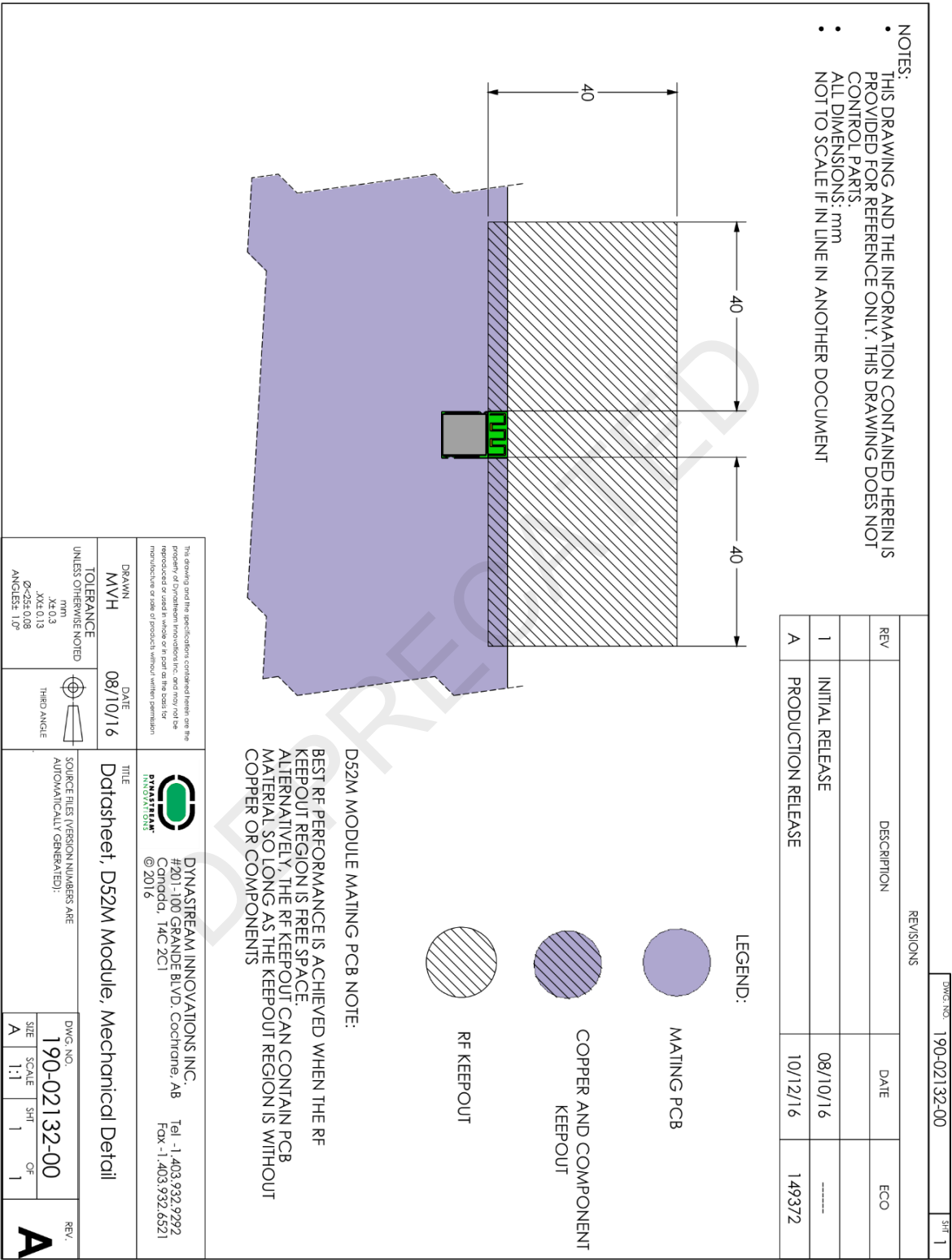


Figure 14: D52M (including G.FIT) Module Mounting

Figure 15, below, shows D52M (including G.FIT) component outline and keepout areas in pink. There should not be any exposed copper or routing in the keepout areas, on any layer. The component body is crosshatched pink, and signal pads are shown in red. Please reference the D52M Altium Footprint for more accurate keepout dimensions and positioning. Figure 14, on the previous page, describes mating PCB characteristics.

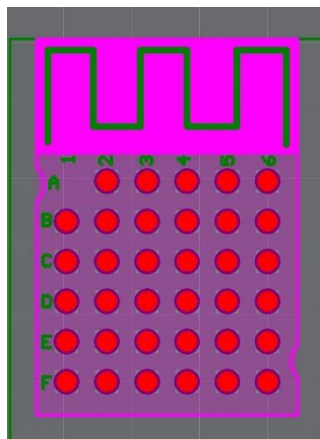


Figure 15: D52M (including G.FIT) signal pads, component outline and keepout areas

### 3.7 Assembly Considerations

#### 3.7.1 Moisture Control

D52 series modules (including G.FIT) are rated at different levels as defined by IPC/JEDEC J-STD-020:

G.FIT Model	Moisture Control Level
D52QGFM4IA-A	3
D52QGFM4IA	2
D52MGFM8IA	1

Table 7: G.FIT Fitness Equipment Module Moisture Control Levels

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.

### 3.7.2 D52Q (including G.FIT) M4 Module Solder Stencil

The following reference example is used to build the D52QSKM6IA-A development modules:

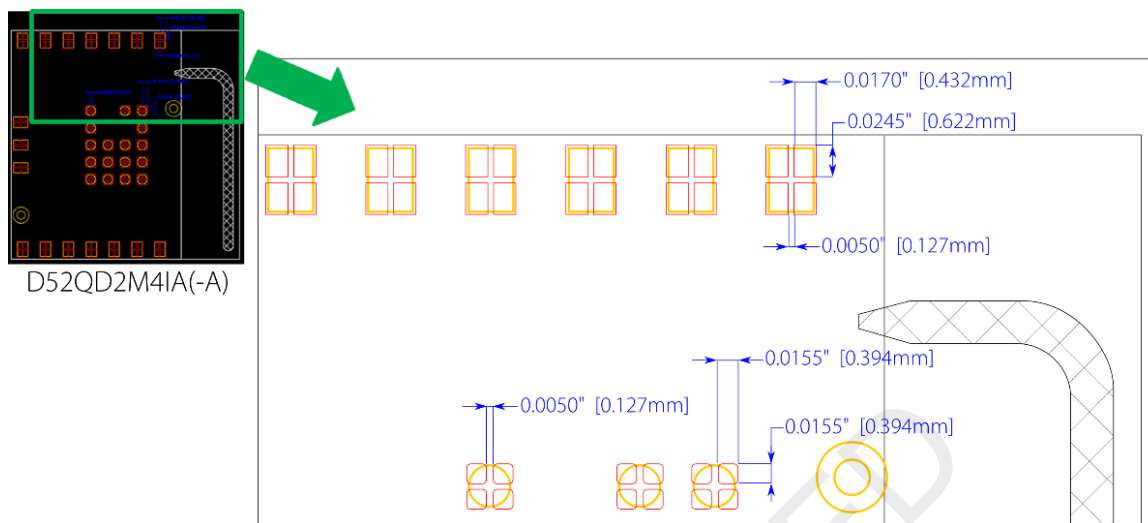


Figure 16: D52Q (including G.FIT) M4 Solder Stencil

### 3.7.3 D52M (including G.FIT) M8 Module Solder Stencil

Below is a diagram describing a solder stencil for Dynastream M8 modules, including the D52M:

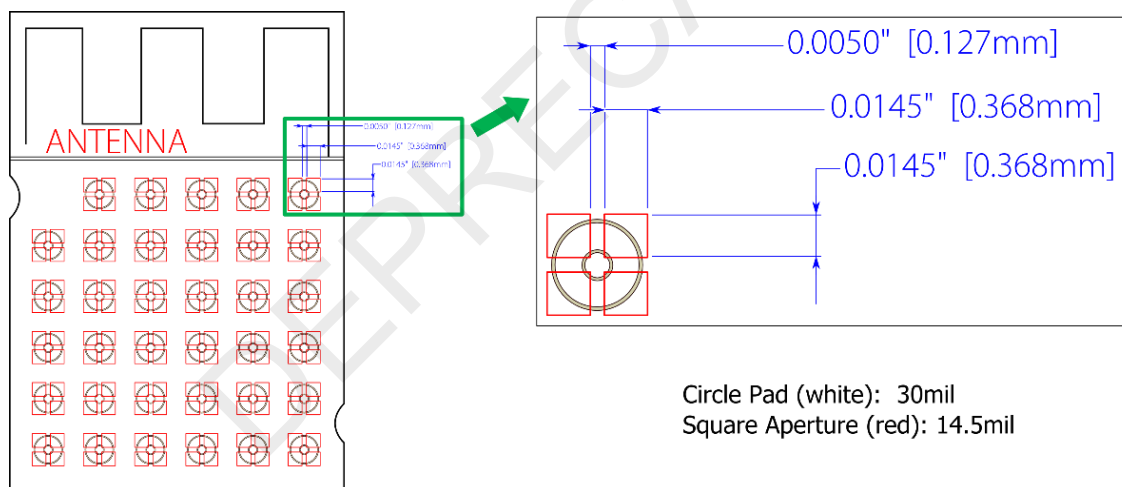


Figure 17: D52M (including G.FIT) M8 Solder Stencil

### 3.7.4 Cleaning Process

D52 series modules (including G.FIT) are made using no-clean solder paste. No-clean process is recommended.

## 4 Regulatory Approvals and Compliance

Modules in the D52 ANT SoC Module Series (including G.FIT), when loaded with an ANT and/or BLUETOOTH low energy stack<sup>9</sup>, have received regulatory approvals in the United States (FCC) and Canada (IC), and have been verified to conform to the appropriate regulations in Europe, Australia and New Zealand, Japan and South Korea. The modules have been qualified by BLUETOOTH SIG. Such approvals and qualification allow the user to place the module inside a finished product and, in many 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.

### 4.1 United States

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.

A host product manufacturer is responsible for ensuring compliance with the module(s) installed and fully operational. For example, if a host product was previously authorized as an unintentional radiator under the Declaration of Conformity procedure without containing a certified transmitter module, then a module is added, the host manufacturer is responsible for ensuring that the host continues to be compliant with the Part 15 subpart B unintentional radiator requirements after the module is installed and operational. Because this may depend on the details of how the module is integrated within the host, the module grantee (the party responsible for the module grant) shall provide guidance to the host manufacturer for ensuring compliance with the Part 15 Subpart B requirements.

This module is limited to OEM installation ONLY. The OEM Integrator is responsible for ensuring that the end-user has no manual instructions to remove or install the module. Changes or modifications not expressly approved by Dynastream could void the user's authority to operate the equipment.

If (1) the module's FCC ID is not visible when installed in the host, or (2) if the host is marketed so that end users do not have straightforward commonly used methods for access to remove the module so that the FCC ID of the module is visible; then an additional permanent label referring to the enclosed module must be used:

- For **D52Q** modules: "Contains Transmitter Module FCC ID: 06R3067" or "Contains FCC ID: 06R3067"
- For **D52M** modules: "Contains Transmitter Module FCC ID: 06R3153" or "Contains FCC ID: 06R3153"

The host OEM user manual must also contain clear instructions on how end users can find and/or access the module and the FCC ID.

### 4.2 Canada

This device complies with Industry Canada's license-exempt RSSs. 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.

---

<sup>9</sup> Refer to section 5

To comply with Industry Canada regulations, it is required that products containing the D52 module series display a label referring to the enclosed module. This exterior label can use wording similar to the following:

- For **D52Q** modules: "Contains IC: 3797A-3067"
- For **D52M** modules: "Contains IC: 3797A-3153"

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.

#### 4.3 European Economic Area

D52 series modules (including G.FIT) are declared to be category 2 receivers in conformance with the essential requirements and other relevant provisions of Directive 2015/53/EU and 2011/65/EU, as a low-powered unlicensed transmitter:



IEC 60950-1:2005(2 <sup>nd</sup> Edition) + A1:2009 + A2:2013	Information technology equipment – Safety – Part 1: General requirements
EN 60950-1: 2006 + A11:2009 + A1:2010 + A12:2011 + A2:2013	
EN 62479:2010	Assessment of the compliance of low power electronic and electrical equipment with the basic restrictions related to human exposure to electromagnetic fields (10 MHz to 300 GHz)
EN 300 328 v2.1.1 2016-11	Wideband transmission systems; Data transmission equipment operating in the 2,4 GHz ISM band and using wide band modulation techniques
EN 300 440 v2.1.1 2017-03	Short Range Devices (SRD); Radio equipment to be used in the 1 GHz to 40 GHz frequency range
EN 301 489-1 v2.1.1 2017-02	ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements; Part 3: Specific conditions for Short-Range Devices (SRD) operating on frequencies between 9 kHz and 246 GHz; Part 17: Specific conditions for Broadband Data Transmission Systems
EN 301 489-3 v2.1.1 2017-03	
EN 301 489-17 v3.1.1 2017-02	

#### 4.4 Australia and New Zealand

The D52 ANT SoC module series (including G.FIT) has been tested and found to comply with:



ACMA Radiocommunications (Short Range Devices) Standards 2014; 2400 and 5700 MHz bands only
<b>EN 60950-1: (2nd Edition)</b> Information technology equipment. Safety. General requirements
<b>AS/NZS CISPR 22:2009</b> Information technology equipment. Radio disturbance characteristics. Limits and methods of measurement
<b>AS/NZS 4268:2012</b> – Radio equipment and systems – Short Range Devices – Limits and methods of measurement
<b>EN 301 489-1/-3/-17</b> Electromagnetic compatibility and Radio spectrum Matters (ERM); ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements ; Part 3: Specific conditions for Short-Range Devices (SRD); Part 17: Specific conditions for Broadband Data Transmission systems
<b>EN 300 440</b> Electromagnetic compatibility and Radio spectrum Matters (ERM); Short range devices; Radio equipment to be used in the 1 GHz to 40 GHz frequency range
<b>EN 300 328</b> Electromagnetic compatibility and Radio spectrum Matters (ERM); Wideband transmission systems

The ACMA supplier code number is N20233

#### 4.5 Japan

D52Q and D52M models (including G.FIT) have been granted type certificate (mark numbers below). Standard applied: 2.4GHz band wide-band low-power data communication system (item 19 of Article 2 paragraph 1).

- For **D52Q** models: mark number R201-160147
- For **D52M** models: mark number R201-163171

#### 4.6 Korea

D52Q and D52M modules (including G.FIT) have been certificated under the Clause 2, Article 58-2 of Radio Wave Act by Ministry of Science, ICT and future Planning, Republic of Korea. The certification No's. are:



- For **D52Q** models: MSIP-CRM-D23-D52Q
- For **D52M** models: MSIP-CRM-D23-D52M

#### 4.7 ANT+ Certification

All G.FIT modules carry ANT+ certification for the HRM (Heart Rate Monitor) and FE-C (Fitness Equipment) device profiles. Only ANT+ brand certification is required for products that integrate with the G.FIT Network Processor application.

#### 4.8 BLUETOOTH Qualification

D52Q and D52M modules and the G.FIT Library are listed as Bluetooth components (tested) on the Bluetooth SIG Qualified Design List:

- For **G.FIT** profile support: Qualified Design ID 100182; Declaration ID is D036916
- For **D52Q** module models: Qualified Design ID 83227; Declaration ID is D030904
- For **D52M** module models: Qualified Design ID 89214; Declaration ID is D032894

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.



## 5 Licensing & Conditions of Use

Products incorporating D52 series modules (including G.FIT) wishing to make use of the certifications outlined in section 4 must guarantee that they are using an approved ANT and or Bluetooth low energy SoftDevice and have entered into a D52 Series Module Distribution Agreement with Dynastream Innovations. Section 5.1 outlines the conditions of use for D52 modules (which includes the D52 Series Module Distribution Agreement), and Section 5.2 outlines where to obtain licenses for the approved SoftDevices.

### 5.1 Conditions of Use

The D52 Series of modules (including G.FIT) have been designed to support the ANT and/or Bluetooth low energy Protocols and are certified for use in many geographic regions around the globe. However, a product incorporating the D52 series module may carry the certification IDs of the module only if it complies with the restrictions and terms, including use of Dynastream-approved software, provided in the conditions of use available at:

[www.dynastream.com/components/d52/conditions-of-use](http://www.dynastream.com/components/d52/conditions-of-use)

### 5.2 SoftDevice Licensing

The combined ANT and Bluetooth S332 SoftDevice from Dynastream Innovations used for G.FIT applications is approved for use on the D52 Module series (including G.FIT) as referenced in section 5.1 – Conditions of Use – and is licensed from Dynastream Innovations. The S332 SoftDevice is available as part of the G.FIT Library Download Package.

SoftDevice	Protocol(s)	Licensor	Link
S332	ANT and Bluetooth low energy	Dynastream Innovations	<a href="#">G.FIT Library Download Package</a>

Table 8: SoftDevice Licensing and Downloads

## 6 Electrical Specifications

### 6.1 Recommended Operating Conditions

Parameter	Min	Max	Unit
Operating ambient temperature range, $T_A$	-40	+85	°C
Operating supply voltage	1.71 with accelerometer; 1.7 without	3.6	V

Table 9: Recommended Operating Conditions

### 6.2 Absolute Maximum Ratings

Parameter	Test Conditions	Min	Max	Unit
Supply Voltage (VCC)		-0.3	3.9	V
$V_{I/O}$ , VCC $\leq$ 3.6V		-0.3	VCC+0.3	V
$V_{I/O}$ , VCC $>$ 3.6V		-0.3	3.9	V
Storage temperature range		-40	85	°C
ESD	All pads, according to human-body model, JEDEC STD 22, method A114		4 (D52Q) 2 (D52M)	kV
	According to charged-device model, JEDEC STD 22, method C101		1000 (D52Q) 500 (D52M)	V

Table 10: 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.

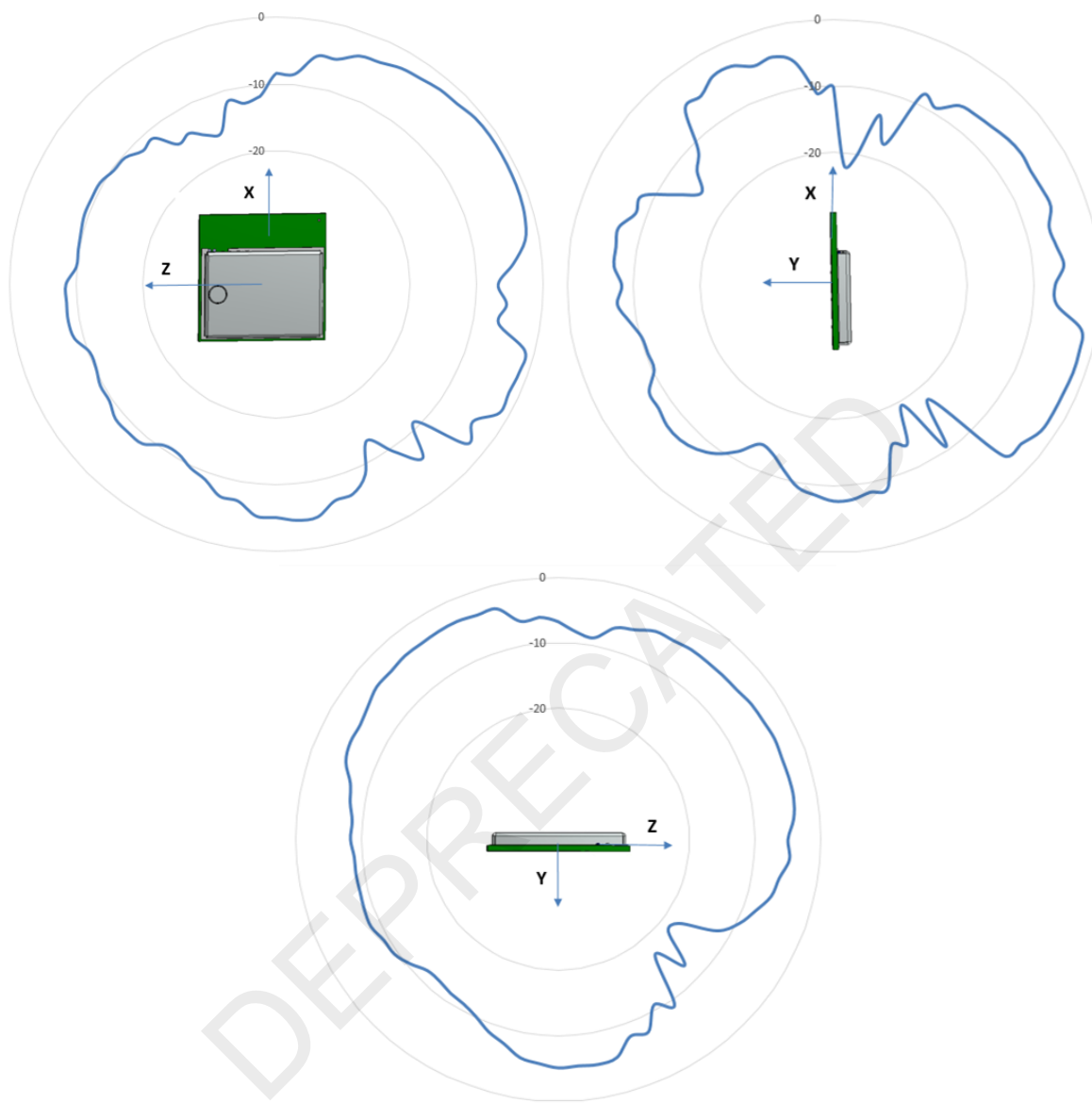
### 6.3 Radio Operation Specifications

nRF52832 Output Setting (dBm)	Typical Peak Radio Current (mA)*
0 (DCDC, 3V)	5.3
0 (LDO, 3V)	11.6
+4 (DCDC, 3V)	7.5
+4 (LDO, 3V)	16.6

Table 11: Current Consumption of Radio Operation

\* For additional information regarding radio current please refer to the nRF52832 product specification from Nordic Semiconductor

The following typical radiation pattern for D52Q (M4) models (including G.FIT) was recorded in an anechoic chamber at 2440MHz and 0dBm output following the recommended mounting guide.



**Figure 18: D52Q M4 Module (including G.FIT) Typical Antenna Gain (dBi)**

To understand and properly use the radiation pattern for your design, please refer to the application note: Interpreting RF Radiation Patterns.

The following typical radiation pattern for D52M (M8) models (including G.FIT) was recorded in an anechoic chamber at 2440MHz and 0dBm output following the recommended mounting guide.

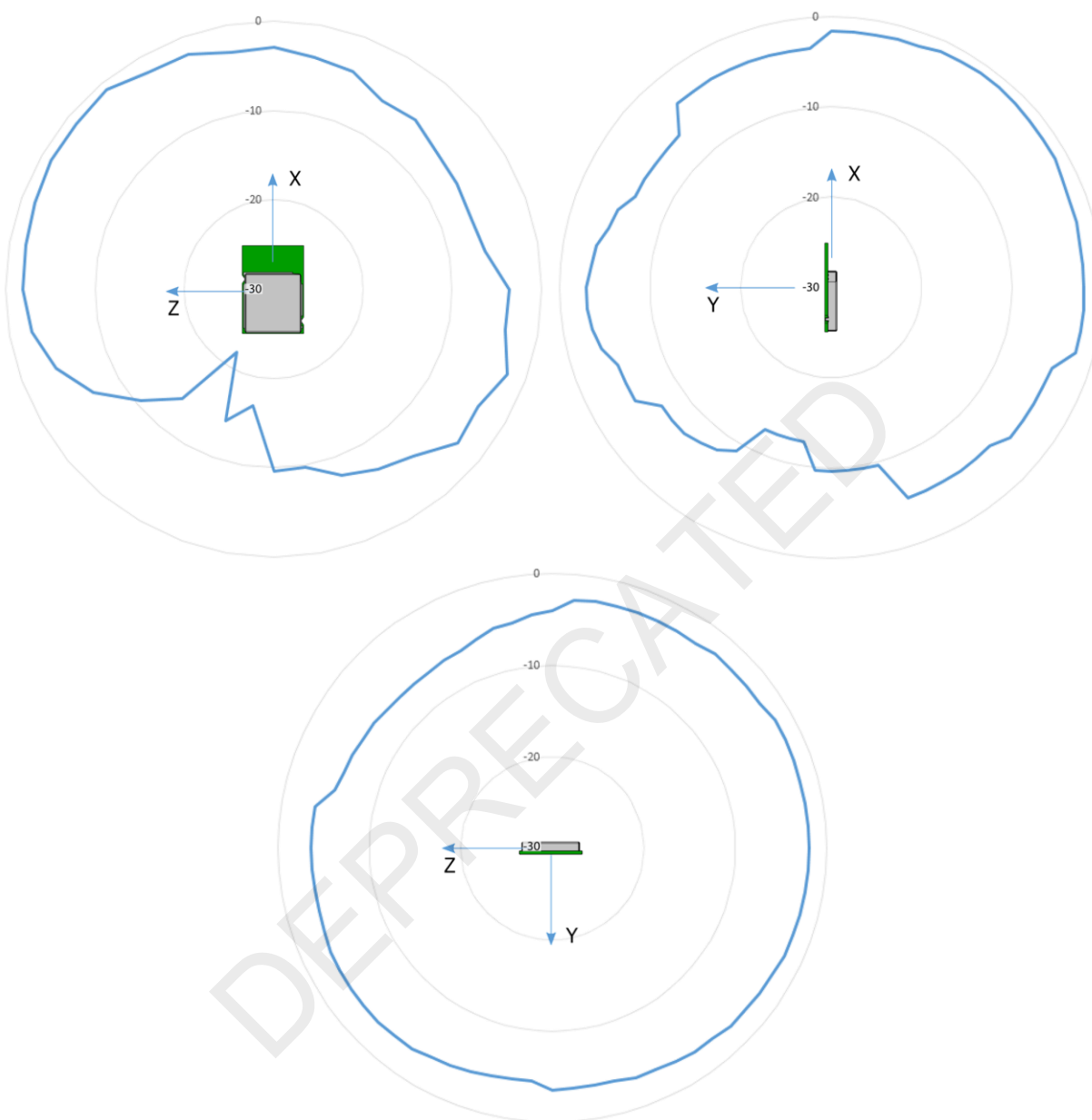


Figure 19: D52M M8 (including G.FIT) Module Typical Antenna Gain (dBi)

## 6.4 Electrical Specifications

Please refer to the nRF52832 Product Specification by Nordic Semiconductor.

## 7 Mechanical Drawings

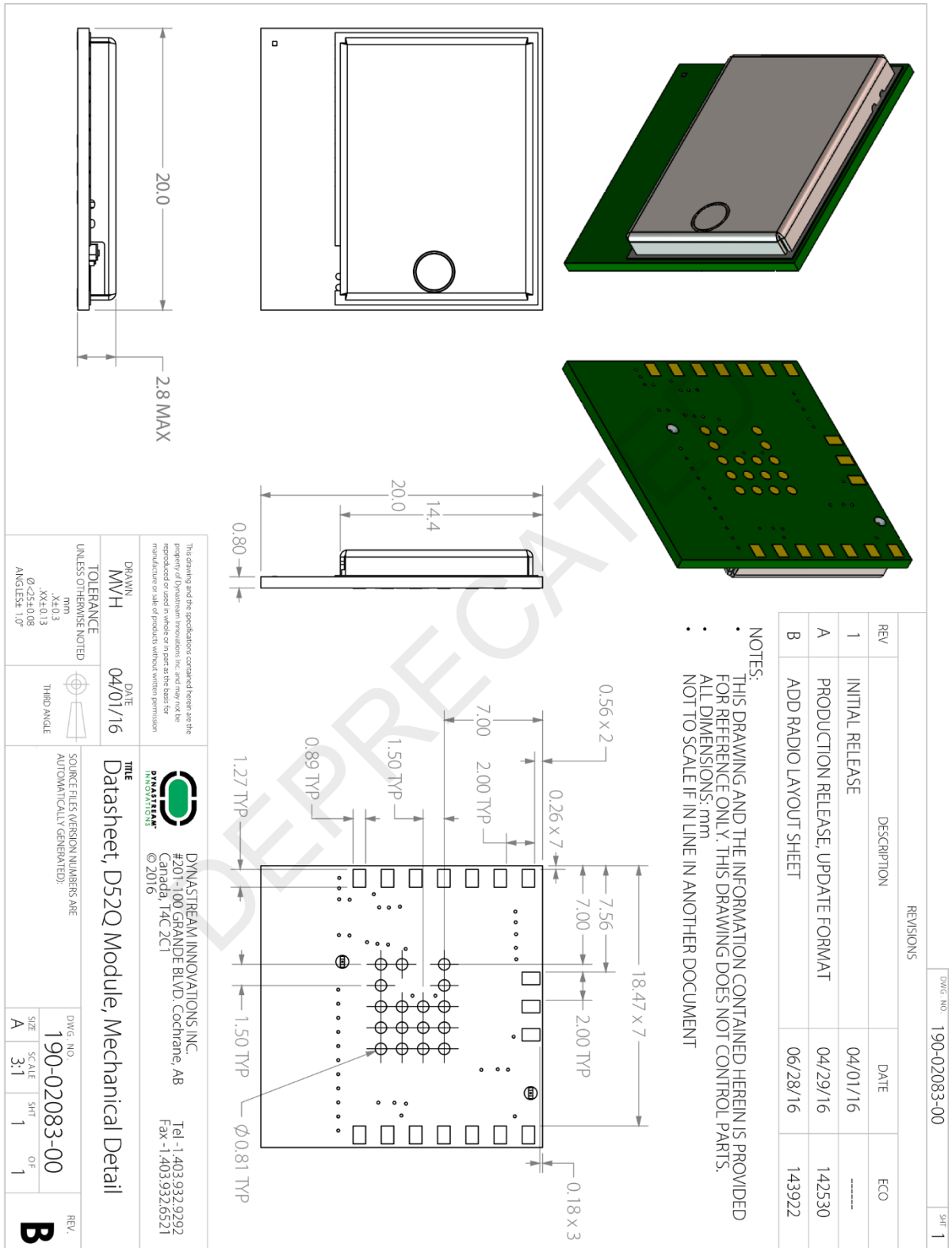
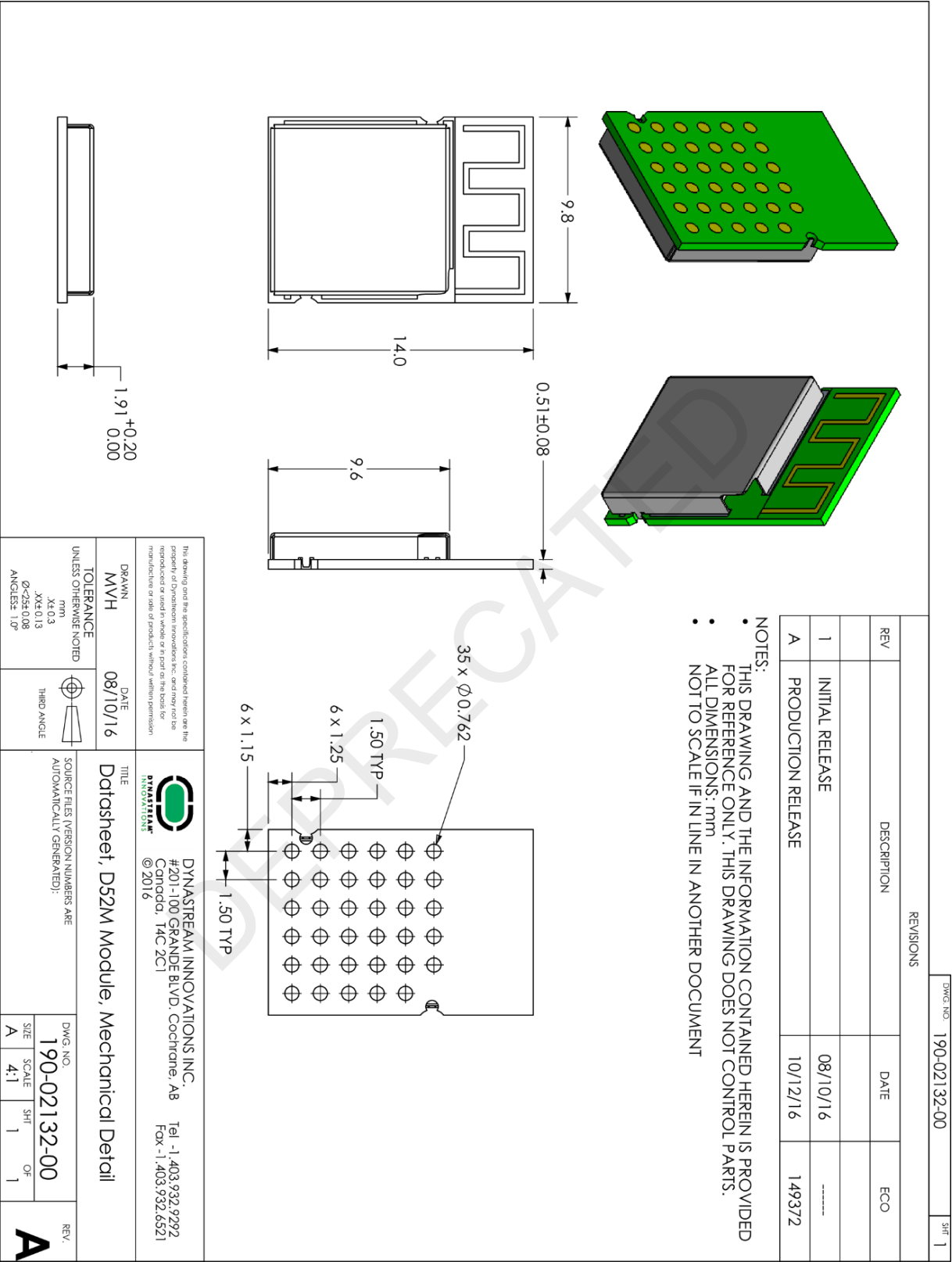


Figure 20: D52Q M4 (including G.FIT) Mechanical Drawing



PGM-4

Figure 21: D52M M8 (including G.FIT) Mechanical Drawing

## 8 Support

The D52 ANT SoC module series (including G.FIT) uses the nRF52832 from Nordic Semiconductor. You can seek technical support from Nordic Semiconductor, [www.nordicsemi.com](http://www.nordicsemi.com). G.FIT application support can be sought from Dynastream Innovations, via [www.thisisant.com](http://www.thisisant.com).

### 8.1 ANT Forum

Customers 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>.

### 8.2 Technical References

#### Documents

1. G.FIT User Guide and Specification
2. G.FIT Firmware Updater Application Note
3. G.FIT and Premium Module Manufacturing Considerations Application Note
4. nRF52832 Product Specification, Nordic Semiconductor
5. nRF52 Series Compatibility Matrix, Nordic Semiconductor Infocenter
6. nRF52832 Objective Product Specification, Nordic Semiconductor
7. nRF52832 S332 SoftDevice Specification, Dynastream Innovations
8. nRF52 Development Kit Documentation, Nordic Semiconductor Infocenter
9. ANT SoC Module Starter Kit User Manual, Dynastream Innovations
10. ANT Message Protocol and Usage, Dynastream Innovations
11. Interfacing with ANT General Purpose Chipsets and Modules, Dynastream Innovations
12. Application Note: Interpreting RF Radiation Patterns, Dynastream Innovations

#### Software

1. G.FIT SDK – simulators, G.FIT, iOS, Connect IQ demo code
2. G.FIT Library – G.FIT Library files, S332 ANT/Bluetooth SoftDevice, Evaluation G.FIT Network Processor binary
3. S332 nRF52832 SoftDevice, Dynastream Innovations
4. nRF5 SDK, Nordic Semiconductor
5. ANTwareII – a system testing and debugging tool, Dynastream Innovations
6. SimulANT+

#### Design models (all apply to G.FIT modules)

1. D52Q Altium library, Dynastream Innovations
2. D52Q module STEP model, Dynastream Innovations
3. D52M Altium library, Dynastream Innovations
4. D52M module STEP model, 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) / [infocenter.nordicsemi.com](http://infocenter.nordicsemi.com). User registration may be required.

### 8.3 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, simulator tools (SimulANT+), ObservANT, embedded reference designs with source code, and more.



#### 8.4 ANT and ANT+ Social Media

Further information, resources and news about ANT can be found in social media:

- 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>

DEPRECATED

## Appendix A – The G.FIT Network Processor and G.FIT Firmware Updater

G.FIT modules are preloaded with the G.FIT Network Processor application in the application code space of the nRF52832. Using this configuration is similar to ANT legacy ICs or modules, as illustrated in the diagram below.

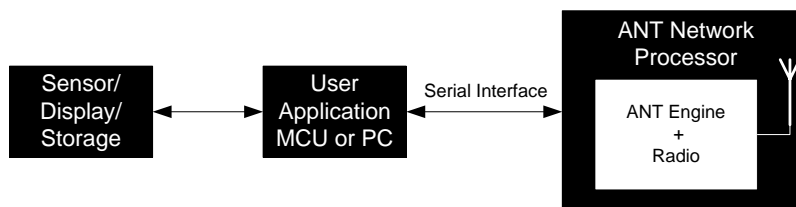


Figure 22: Using an ANT Network Processor

With this configuration, the D52Q M4 model (including G.FIT) is basically hardware drop-in compatible with FIT2, ANT11TS33M4/5IB, ANTAP281M4/5IB, ANTC782M4/5IB modules, N5150M4CD, N550M4CC and N548M4CB modules (see 3.3: Pin-outs for complete details). Please note that C7 and AP2 modules supported bit synchronous, while the D52 Module Series (including G.FIT) does not. UART is the recommended serial interface for working with the G.FIT Network Processor application.

For information regarding the G.FIT serial interfaces, please refer to the G.FIT User Guide and Specification document.

### Pin Assignments for the G.FIT Network Processor Configuration

In the pre-loaded G.FIT Network Processor configuration, specific functions are assigned to module pins. Details are summarized below (Table 12 for D52Q pin assignments, Table 13 for D52M pin assignments). **Note:** For the D52Q G.FIT Network Processor configuration, pins P201 – P217 are not used (no connection), but note that P207 and P210 are used by the G.FIT Firmware Updater (see the "G.FIT Firmware Updater Pin Assignments" section, below):

D52Q M4 Pin	D52Q M6 Molex Connector	nRF52832 Pin Name	G.FIT Network Processor Pin Assignments	
			Pin Name	Function
H202	10	P021/nRESET	nRST	Reset the device
H203	1	VCC	VCC	Power supply source
H204	19	VSS	GND	Power supply ground
H206	17	P006	nSUSPEND	Suspend control
H207	15	P007	SLEEP	Sleep mode enable
H209	11	P008	Tie to GND	Port select
H210	7	P011	BR2	Baud rate selection
H211	4	P017	TXD0	Transmit data signal
H212	3	P016	RXD0	Receive data signal
H213	5	P015	BR1	Baud rate selection
H214	9	P014	BR3	Baud rate selection
H217	2	P012	RTS	Request to send

Table 12: G.FIT Network Processor pin assignments on D52Q (M4) models

D52M M8 Pin	nRF52832 Pin Name	G.FIT Network Processor Pin Assignments	
		Pin Name	Function
P207	P021/nRESET	nRST	Reset the device
P225, P226, P219, P220	VCC	VCC	Power supply source
P231, P232, P233, P234, P235	VSS	GND	Power supply ground
P215	P022	nSUSPEND	Suspend control
P202	P028	SLEEP	Sleep mode enable
P208	P002	Tie to GND	Port select
P213	P024	BR2	Baud rate selection
P217	P014	TXD0	Transmit data signal
P218	P008	RXD0	Receive data signal
P210	P003	BR1	Baud rate selection
P212	P006	BR3	Baud rate selection
P205	P031	RTS	Request to send

Table 13: G.FIT Network Processor pin assignments on D52M (M8) models

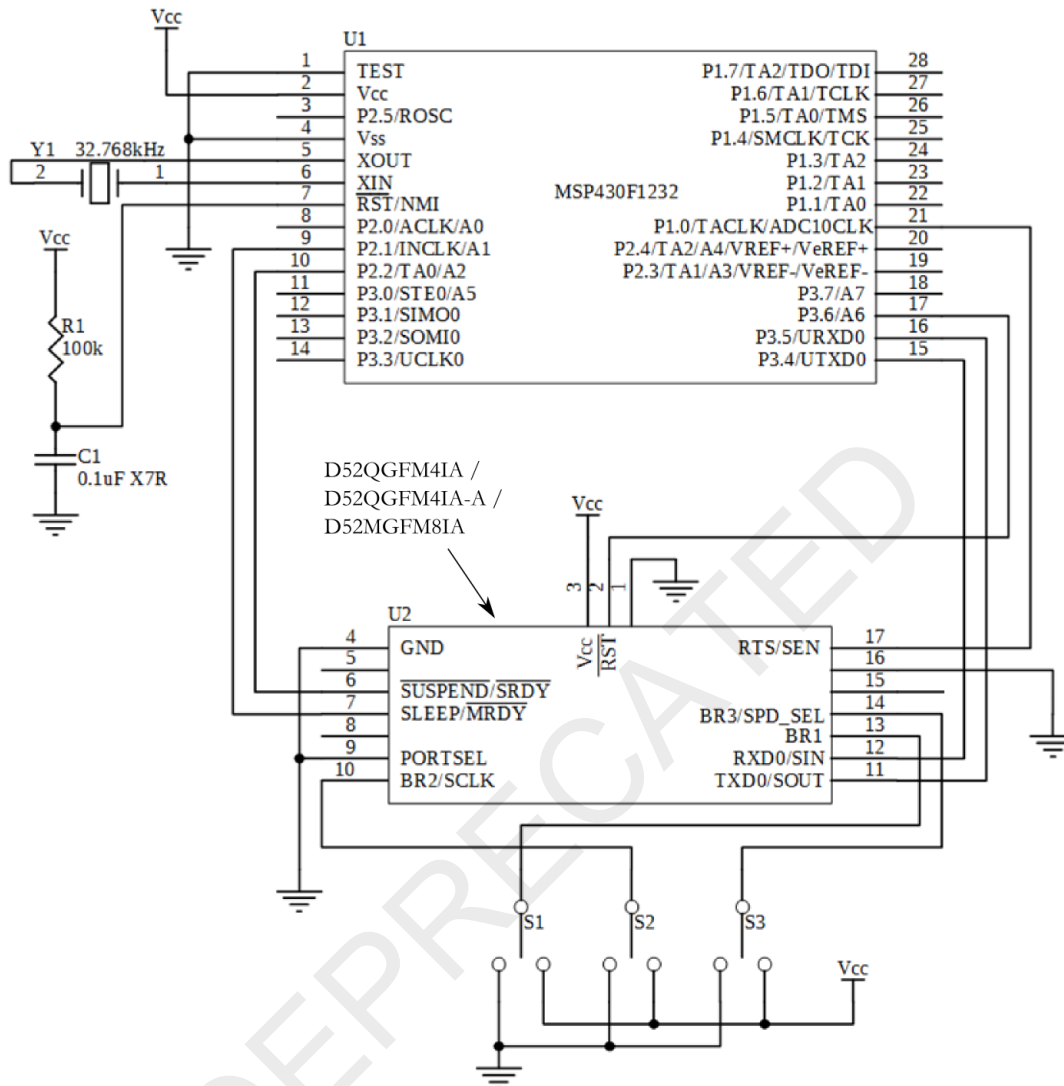
### Asynchronous Serial Mode (UART)

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
1	1	0	2400
0	0	0	4800
1	0	1	9600
0	1	0	19200
0	0	1	38400
0	1	1	57600
1	1	1	57600
1	0	0	115200

Table 14: Asynchronous Serial Mode Baud Rate Select

### Asynchronous Serial Mode Connection Example



**Figure 23: D52Q M4 G.FIT Network Processor Configuration Async Serial 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 D52 series modules (including G.FIT) and follows the RTS behaviour described in the nRF52 Series Reference Manual. In addition, RTS is toggled by the network processor application during message processing. 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.

## DC/DC Configuration

The pre-programmed G.FIT Network Processor Application provides a method of configuring the DC/DC converter on the module via Serial Command. This allows modules featuring compatible ICs to use the DC/DC features of the nRF52832. Please refer to the nRF52832 Product Specification for details on the DC/DC. DC/DC should only be used on appropriate modules.

The following serial command message has been defined in the G.FIT network processor code. A host microcontroller can issue this command to the G.FIT network processor application to configure the DC/DC operation on the D52Q module.

Sync	Length	MsgID		Payload	Chksum
	0x02	0xE4	0x01	0x00 – DC/DC Disable 0x01 – DC/DC Enable	

**Table 15: ANT DC/DC Configuration Command**

After issuing the command, the following response is generated.

Sync	Length	MsgID				Response	Chksum
	0x04	0xE0	0x00	0xE4	0x01	0x00	

**Table 16: ANT DC/DC Configuration Response**

Note: Sync and Chksum values are defined in the document “Interfacing with ANT General Purpose Chipsets and Modules”.

A response of 0x00 indicates successful configuration of the DC/DC.

## G.FIT Firmware Updater Pin Assignments

When in use, the G.FIT Firmware Updater has specific functions are assigned to module pins. Details are summarized below (Table 17 for D52Q model pin assignments, Table 18 for D52M model pin assignments).

D52Q M4 Pin	D52Q M6 Molex Connector	nRF52832 Pin Name	G.FIT Firmware Updater Pin Assignments	
			Pin Name	Function
H212	3	P016	RXD0	Receive data signal
H211	4	P017	TXD0	Transmit data signal
H217	2	P012	RTS	Request to send signal
P207	-	P005	CTS	Clear to send signal
P210	-	P004	BOOT	Enter G.FIT Firmware Updater on reset

**Table 17: G.FIT Firmware Updater pin assignments on D52Q (M4) models**

D52M M8 Pin	nRF52832 Pin Name	G.FIT Firmware Updater Pin Assignments	
		Pin Name	Function
P218	P008	RXD0	Receive data signal
P217	P014	TXD0	Transmit data signal
P205	P031	RTS	Request to send signal
P211	P005	CTS	Clear to send signal
P209	P004	BOOT	Enter G.FIT Firmware Updater on reset

**Table 18: G.FIT Firmware Updater pin assignments on D52M (M8) models**

## Appendix B – G.FIT Module Pre-Loaded Software Versions

G.FIT Model	Tracking Code <sup>10</sup>	G.FIT Firmware Updater Version	G.FIT Network Processor Version	S332 ANT/Bluetooth SoftDevice Version
D52QGF2M4IA, D52QGFM4IA-A	7RA	0.2.0	3.0.0	4.0.2
D52MGFM8IA	7RA	0.2.0	3.0.0	4.0.2

Table 19: G.FIT Preloaded Software Versions

<sup>10</sup> YW refers to the year and week of manufacture, the third character represents the revision. See section 2.2 - Production Tracking Code for more information. Modules bearing tracking codes *matching and after* those listed in the table are loaded with the corresponding software versions.