# nRF24LU1+ Development Kit

# User Guide v1.1


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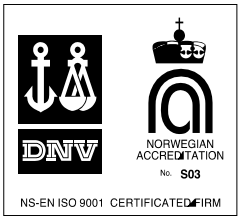


### Revision History

| Date | Version | Description |
|---|---|---|
| November 2008 | 1.0 | Initial release |
| March 2012 | 1.1 | Updated introduction and images |

## Contents

# 1 Introduction

The nRF24LU1+ is a highly integrated, ultra low power (ULP) 2.4 GHz RF System on Chip (SoC) for the 2.4 GHz ISM (Industrial, Scientific and Medical) band. It includes a 2.4 GHz RF transceiver core, 8 bit CPU, full-speed USB 2.0 device controller, and embedded flash memory. An integrated voltage regulator allows the nRF24LU1+ to be powered directly from a USB VBUS, making it ideal for ultra compact USB dongles for wireless peripherals. The on-chip flash can also be upgraded over the USB interface enabling easy deployment of bug fixes and new features to end users.

## 1.1 Required reading

The nRFgo Starter Kit User Guide must be read before reading this document.

## 1.2 Hardware requirements

- nRfgo Starter Kit

## 1.3 Writing conventions

This user guide follows a set of typographic rules that makes the document consistent and easy to read. The following writing conventions are used:

- Commands are written in `Courier New`.
- Pin names are written in **`bold Courier New`**.
- File names and User Interface components are written in **bold**.
- Cross references are underlined and highlighted in blue.

# 2 Kit content

The nRFgo compatible nRF24LU1+ Development Kit consists of hardware and a product key to access software components, reference design files, and documentation from www.nordicsemi.com.

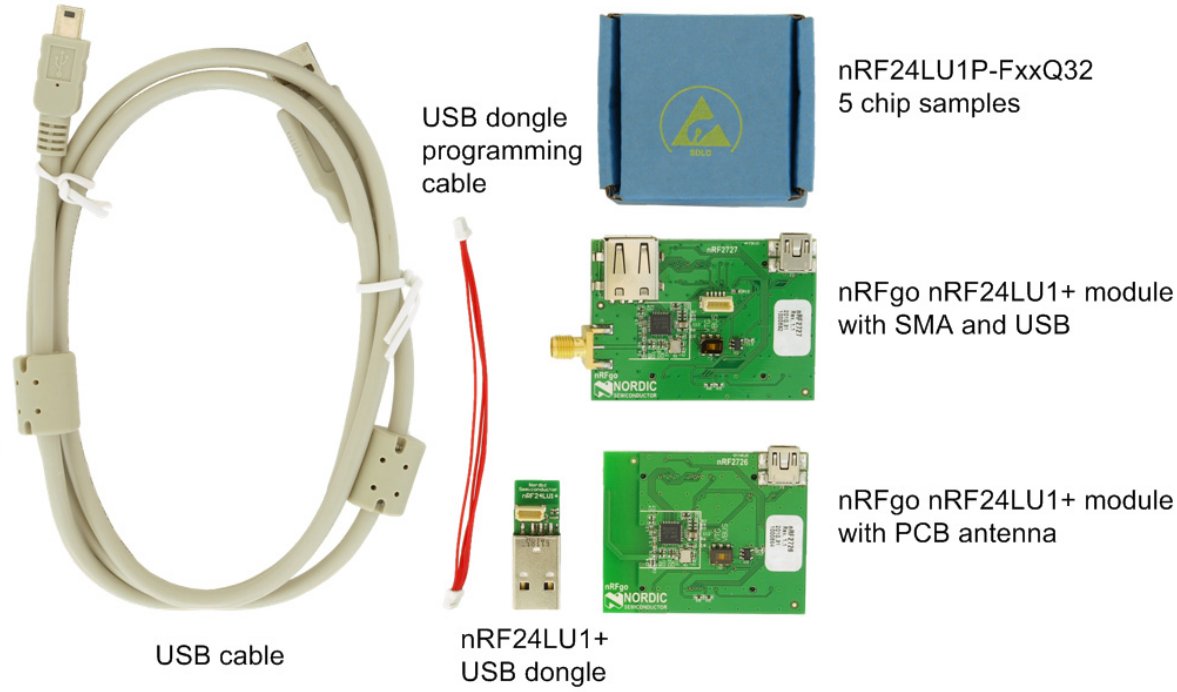


*Figure 1. Development Kit content*

## 2.1 Software content

The following software can be downloaded from http://www.nordicsemi.com/eng/Products/2.4GHz-RF/nRF24LU1-Programming-Kit by selecting the **Downloads** tab to see the list of available software.

- nRFgo Studio
- nRFProbe HW debugger
- nRFgo Software Development Kit (SDK)

## 2.2 Documentation

- This User Guide
- Getting Started Guide
- Development Kit hardware schematics and PCB layout files

# 3 nRF2726 module

The core circuitry of the nRF24LU1+ is shown below in Figure 2.. Gerber files for the core circuitry are available for download from our website.

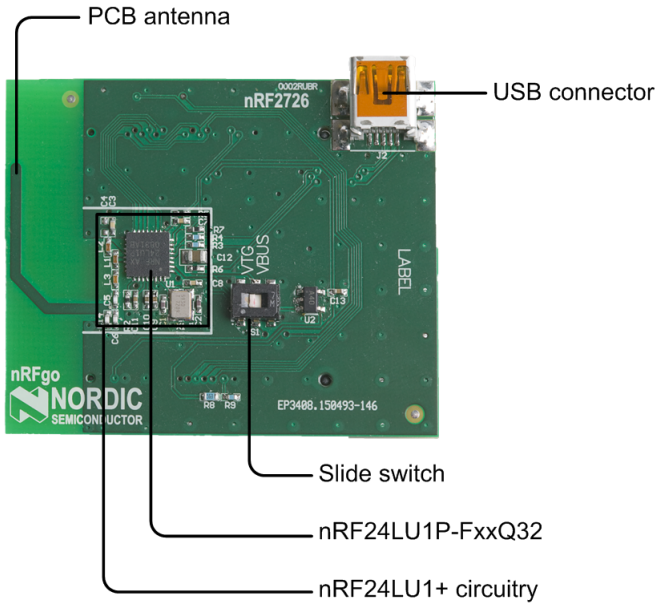


*Figure 2. nRF2726 module*

When switch **S1** is set to **VTG**, nRF2726 is powered from the nRFgo Motherboard. When it is set to **VBUS**, the nRF2726 is powered from the USB connection at the **J2** connector, see chapter 8 on page 13.

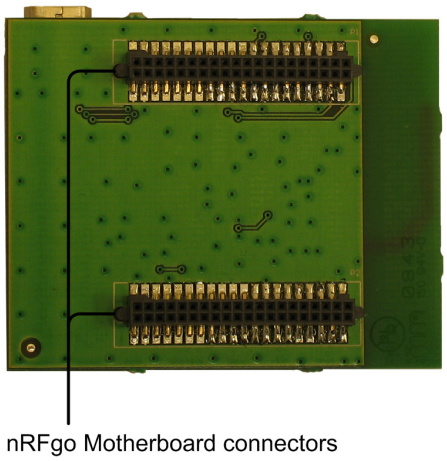


*Figure 3. nRF2726 module bottom side*

# 4 nRF2727 module

The nRF2727 module is identical to the nRF2726 module, with the addition of an RF interface SMA connector and an added USB dongle programming interface. The USB dongle programming interface has been added to enable programming of the nRF24LU1+ flash memory on the nRF2728 USB dongle, see chapter 9 on page 14.

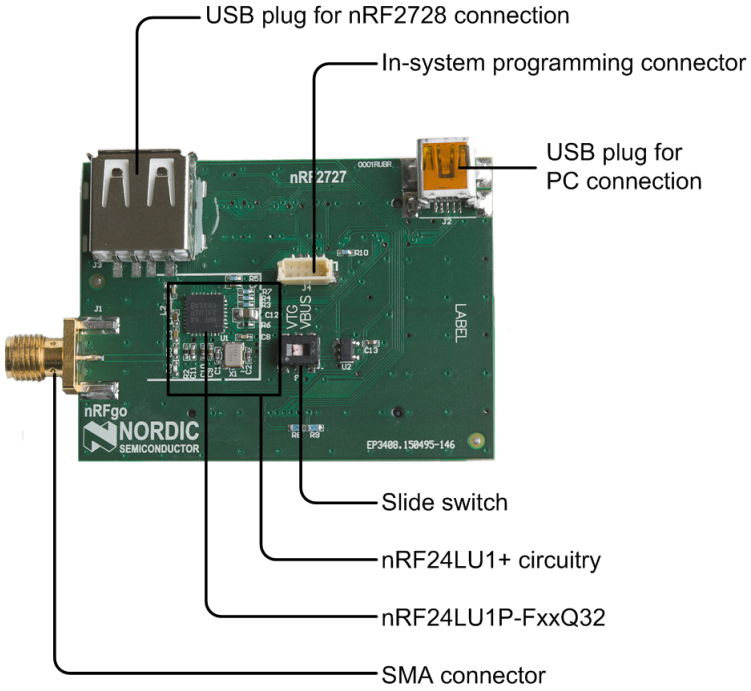


*Figure 4. nRF2727 module*

When switch **S1** is set to **VTG**, the nRF2727 is powered from the nRFgo Motherboard. When it is set to **VBUS**, the nRF2727 is powered from the USB connection at the **J2** connector, see chapter 8 on page 13. When programming flash memory on the nRF2728 USB dongle using connector **J3** (see chapter 9 on page 14) switch **S1** must be set to **VBUS**.

# 5 nRF2728, nRF24LU1+ USB dongle

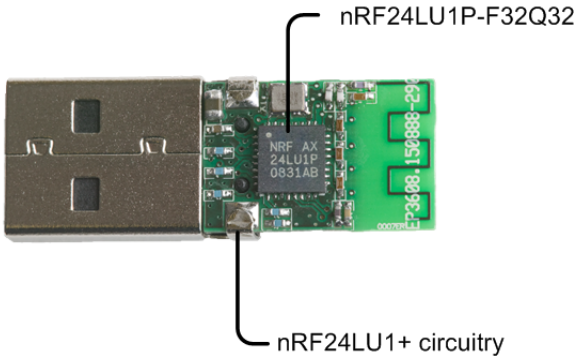


*Figure 5. nRF2728 top side*

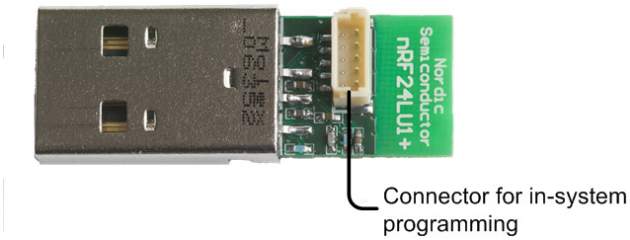


*Figure 6. nRF2728 bottom side*

# 6 nRF module motherboard connectors

Connect the nRF module to the nRFgo Starter Kit Motherboard by inserting its connectors into the slots **MOD A** and **MOD B** located on the Motherboard. Once you have inserted your nRF module you can begin testing and developing.

**Note:** When inserting the module into the Motherboard do not apply too much downward pressure on the antenna end of the module as this may distort the pins in the nRFgo Motherboard connectors. Always remove the module by pulling it straight up.

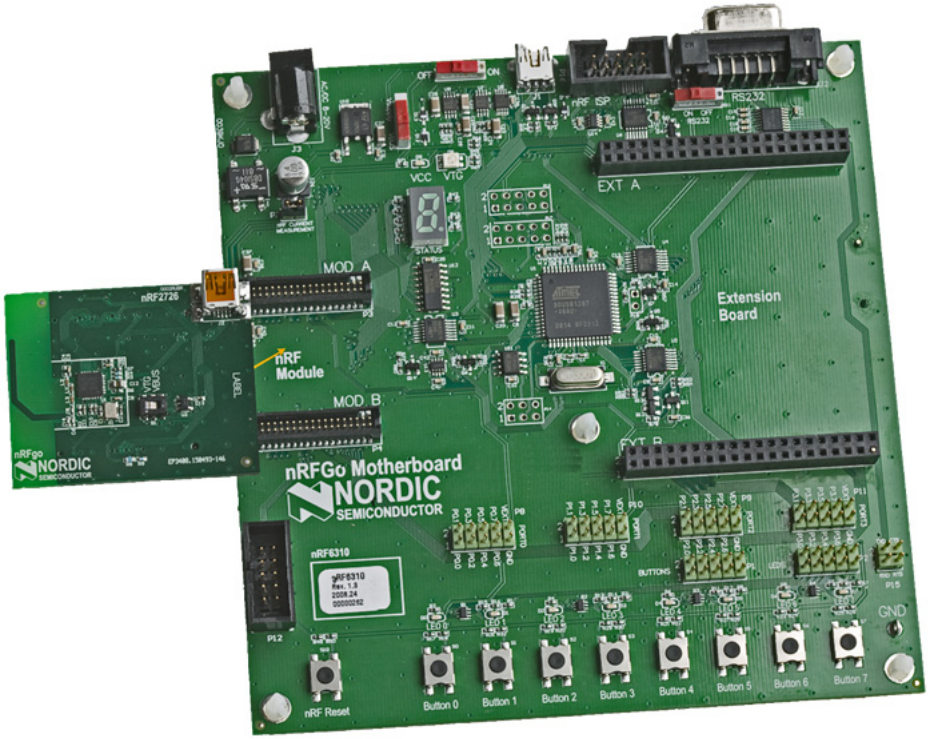


*Figure 7. Plugging in a nRFgo compatible development kit module*

The nRF module connectors, P1 and P2, have all the I/Os required for communicating with the nRFgo Motherboard.

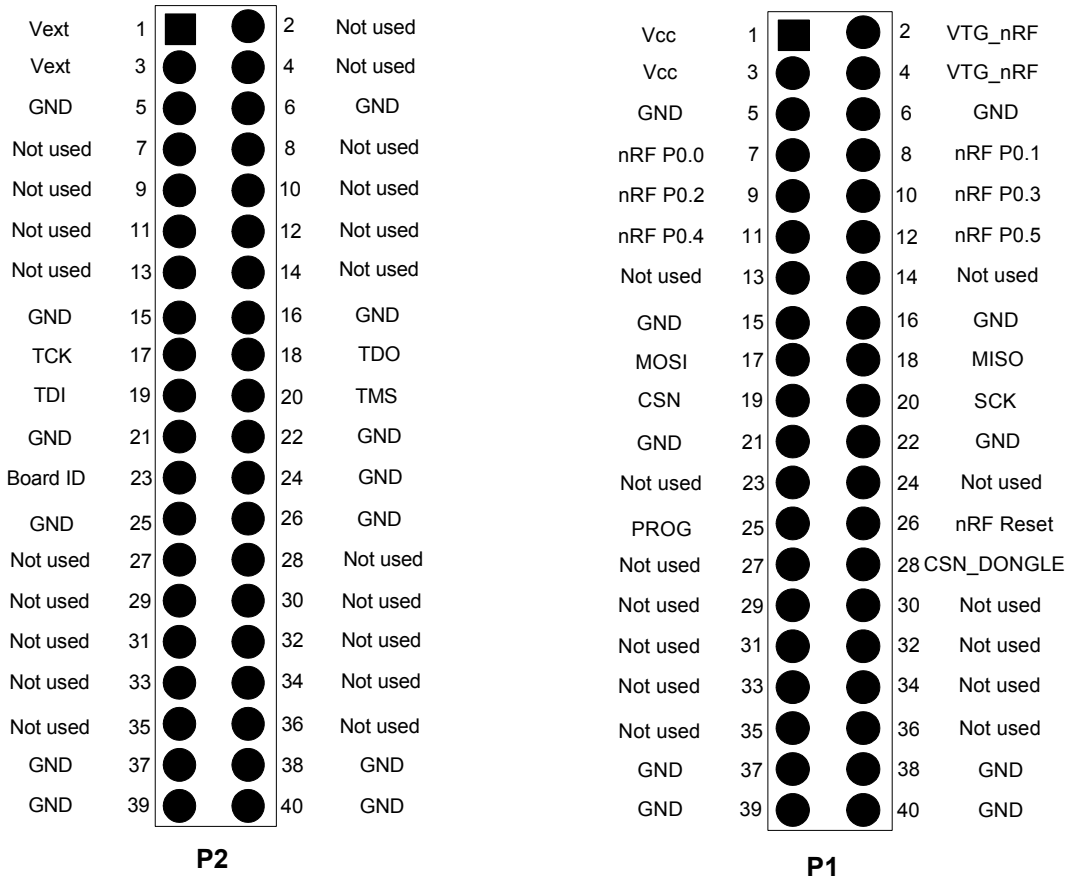


*Figure 8. nRFmodule connectors – P2 and P1*

| Pin numbers | P2 | | P1 | |
|---|---|---|---|---|
| | Name | Function | Name | Function |
| 1, 3 | VEXT | Power supply output for circuitry on nRFgo Motherboard | VCC | nRFgo Motherboard main power supply. |
| 2, 4 | | Not used | VTG_nRF | Target Power supply for nRF devices on the development kit module. |
| 7 - 14 | | Not used | P0.x[1] | nRF device port 0 |
| 15 - 16 | GND | Ground | GND | Ground |
| 17 - 20 | TCK,TDI, TDO, TMS | nRFprobe HW debugger JTAG interface | MOSI,MISO, CSN SCK[2] | nRFgo Motherboard main MCU SPI control interface |
| 21 - 22 | GND | Ground | GND | Ground |
| 23 | Board ID[3] | Development kit ID | | Not used |
| 24 | GND | Ground | | Not used |
| 25-26 | GND | Ground | PROG[3] nRF Reset[3] | nRFgo Motherboard main MCU program enable and reset control of nRFgo Development Kit module |
| 27 | | Not used | | Not used |
| 28 | | Not used | CSN_DONGLE | USB dongle SPI chip select |
| 29 - 36 | | Not used | | Not used |
| 37 - 40 | GND | Ground | GND | Ground |

1. P0.6 and P0.7 are not used.
2. nRFgo Motherboard main MCU control interfaces only. nRF device SPI is available in the nRF device port P0.x (pin 7 to 10).
3. Used by nRFgo Motherboard only

*Table 1. Description of the nRF module connectors pins*

**Note:** In P2 Pins 17 to 20 are connected to the flash SPI or slave SPI depending on the state of the PROG.

# 7 nRF2726/nRF2727 flash memory programming

You can program your flash memory through the nRFgo Starter Kit Motherboard. To do this, you must have the USB cable connected from your PC to the nRFgo Starter Kit Motherboard. Ensure that switch **S1** on your nRF module is set to **VTG**.

# 8 nRF2726/nRF2727 stand-alone operation

If you have programmed either the nRF2726 or nRF2727 module with an application program it is then possible to run the module directly to the PC with a USB connection from the **J2** connector. Make sure switch **S1** on nRF2726/nRF2727 is set to **VBUS**. With switch **S1** set to **VBUS**, the nRF2726/nRF2727 is powered from the USB connection at the **J2** connector.

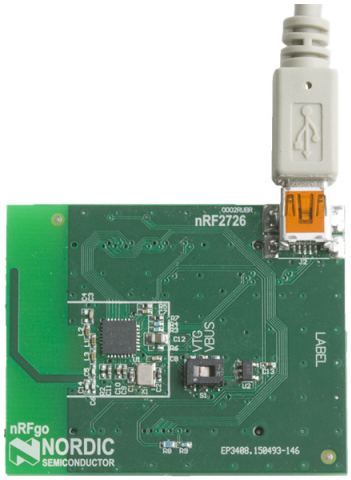


*Figure 9. nRF2726/nRF2727 stand-alone operation*

# 9 USB dongle flash memory programming

The nRF24LU1+ flash memory on the nRF2728 USB dongle can be programmed using the nRF2727 module. See Figure 10. below.

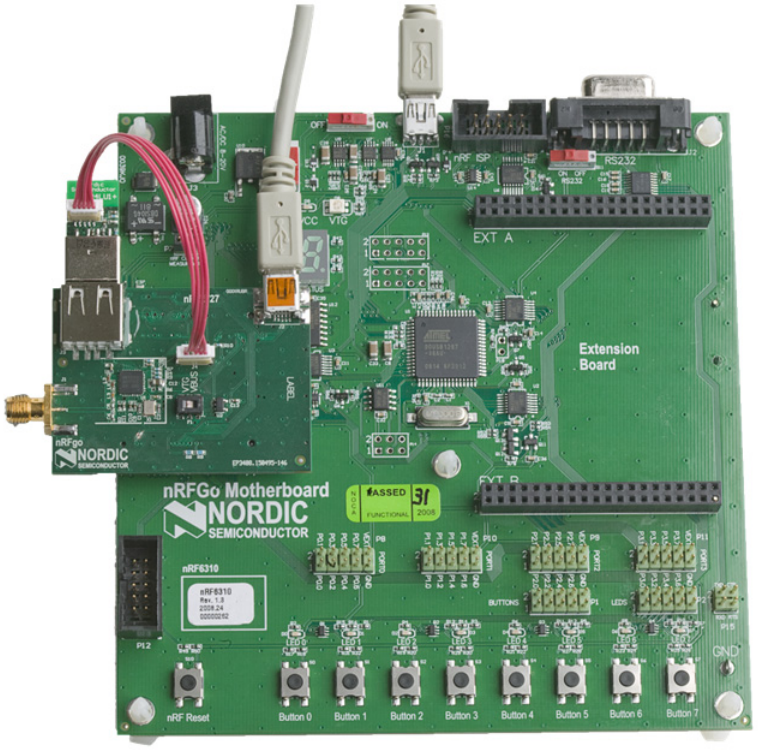


*Figure 10. Programming flash memory on the nRF2728 USB dongle*

1. Plug the USB dongle into connector J3 on nRF2727.
2. Connect the J2 connector on the USB dongle and the J4 connector on nRF2727 using the red dongle programming cable.
3. Connect the nRFgo Starter Kit Motherboard to a free USB port on your PC using a USB cable.
4. Connect the nRF2727 module to a free USB port on your PC using a USB cable.
5. Make sure switch S1 on nRF2727 is set to VBUS.
6. Make sure switch S8 on the Motherboard is set to VBUS and that the Motherboard is switched on at switch S9.
7. In the nRFgo Studio (see Figure 11.) check **Flash dongle**.
8. Choose the .HEX file with the **Browse** button and click **Flash**.

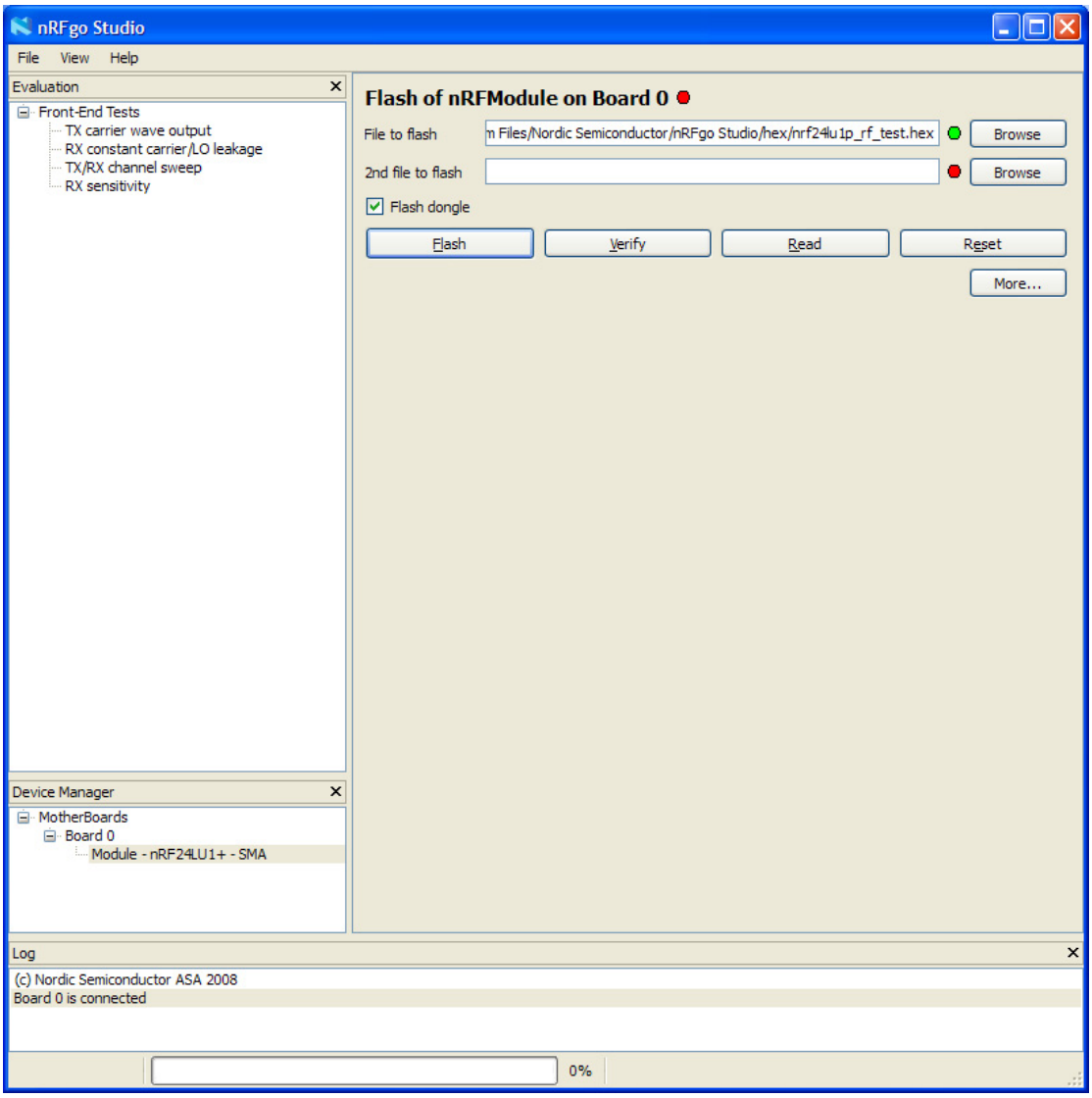


*Figure 11. nRFgo Studio*

# 10 Troubleshooting

**The nRFgo Module doesn't appear in the nRFgo Studio when it is plugged into the nRFgo Motherboard**

- Ensure that the nRFgo Motherboard is present in the nRFgo Studio. If not, refer to troubleshooting of the nRFgo Starter kit user guide.
- Verify that nRF current measurement jumper (P7) on the nRFgo Motherboard is fitted.

**I'm trying to run the Front-End Test from the Evaluation window in nRFgo Studio, but I get the message "Will not start test" in the Log window.**

- Make sure switch S1 on your nRF2726/nRF2727 module is set to VTG.

**I have programmed my nRF2726/nRF2727 module with an application program and I'm trying to run the module as a standalone, but it won't work.**

- Make sure that there is a USB connection from connector J2 on your module to a free USB port on your PC.
- Make sure switch S1 on your module is set to VBUS.

**I am trying to perform flash memory programming of the nRF2728 USB dongle, but it fails.**

- Follow the procedure as described in chapter 9 on page 14.
- Make sure switch S1 on your nRF2727 module is set to VBUS.