

AVT9152 EVB

Programming Guide

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1.0	04 Dec 2020	First Release

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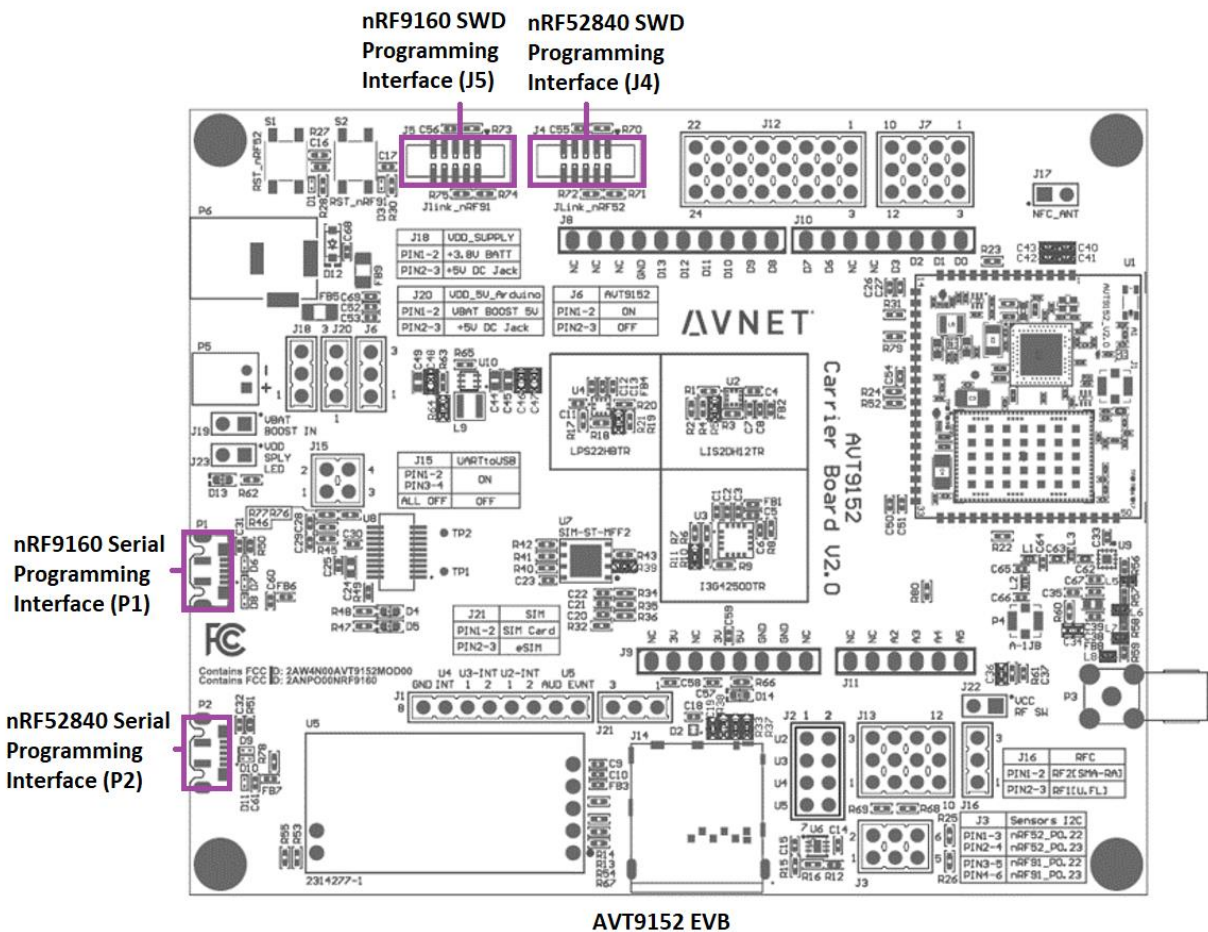
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1 Introduction

This guide provides details on how to program the following:

- nRF9160 cellular modem firmware
- nRF9160 application
- nRF52840 application

The AVT9152 EVB picture below highlights the programming interfaces (SWD/Serial) for nRF9160 and nRF52840.

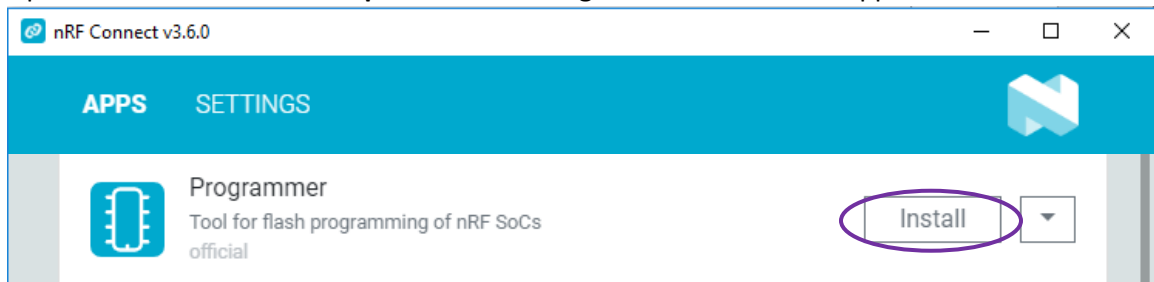


2 Programming AVT9152 via SWD

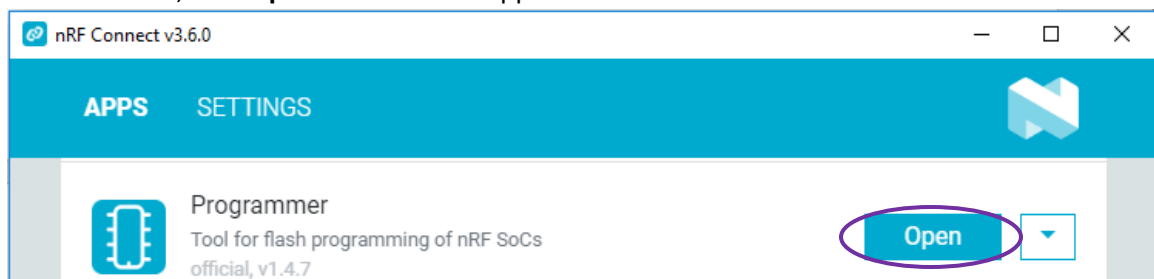
2.1 Software preparation

We will be using **Programmer** app from **Nordic nRF Connect for Desktop** to program firmware to both nRF9160 and nRF52840 chip within the AVT9152 module.

- 1) Download **nRF Connect for Desktop** from <https://www.nordicsemi.com/Software-and-Tools/Development-Tools/nRF-Connect-for-desktop> and install.
- 2) Open **nRF Connect for Desktop** and look for **Programmer** in the list of apps then click **Install**.



- 3) Once installed, click **Open** to launch the app.



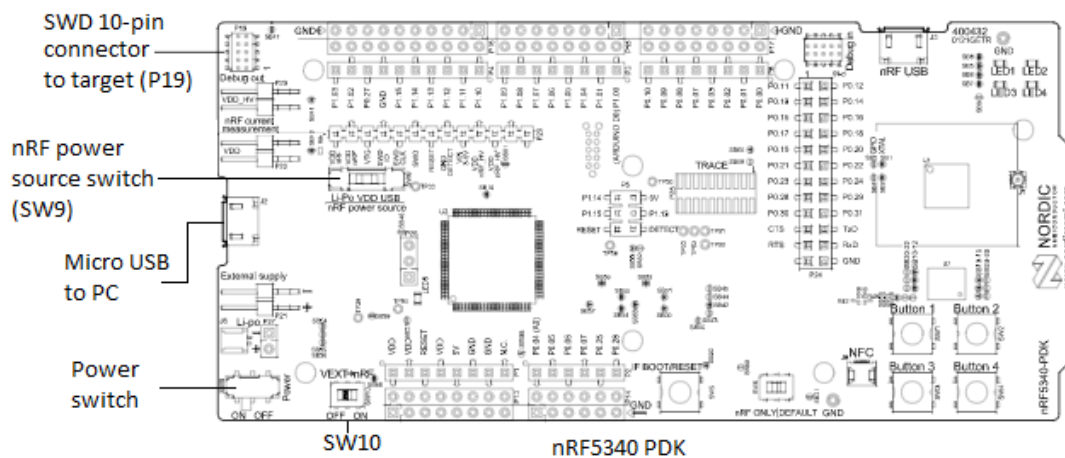
2.2 Hardware preparation

We will need a SWD programmer/debugger (9-pin) to perform the physical programming.

This SWD programmer can be any debug probe or Nordic development kits (DK) with Debug Out feature that supports both ARM Cortex M-33 and M4.

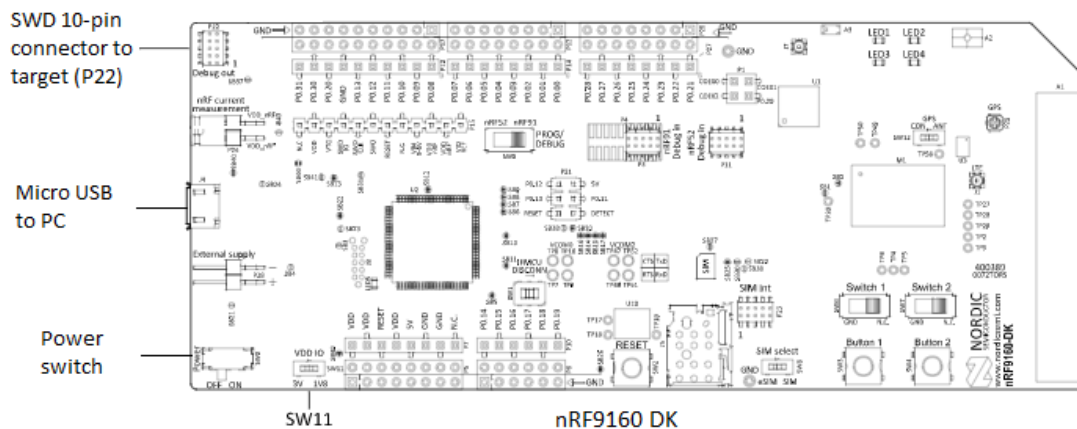
This section covers some of the Nordic DKs available, at the time of this writing, that can be used to program AVT9152.

2.2.1 nRF53 Preview Development Kit (PDK)



- SWD 10-pin connector (P19) to connect to AVT9152 EVB J4 or J5.
- Micro USB connector to connect to PC USB host.
- Make sure SW9 is switched to **VDD** position.
- Make sure SW10 is switched to **OFF** position.
- Make sure **AVT9152 is powered ON** before the PDK. Failure to do so will result in PDK's on-board nRF5340 chip being programmed instead of AVT9152 target chip.

2.2.2 nRF91 Development Kit (DK)

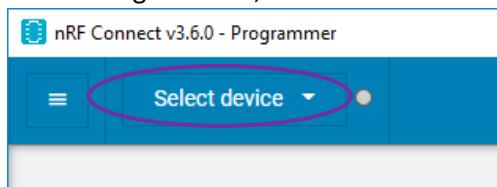


- SWD 10-pin connector (P22) to connect to AVT9152 EVB J4 or J5.
- Micro USB connector to connect to PC USB host.
- Make sure SW11 is switched to **3V** position.
- Make sure **AVT9152 is powered ON** before the DK. Failure to do so will result in DK's on-board nRF9160 chip being programmed instead of AVT9152 target chip.

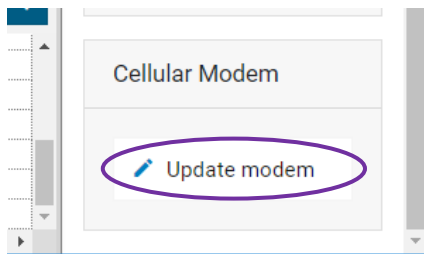
2.3 Programming cellular modem firmware on nRF9160

Cellular modem firmware can be downloaded from <https://www.nordicsemi.com/Products/Low-power-cellular-IoT/nRF9160/Download#infotabs>.

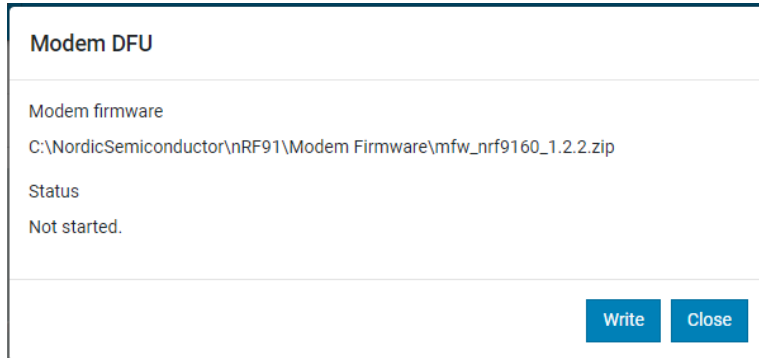
- 1) Open **nRF Connect for Desktop** and launch **Programmer** app.
- 2) Connect the SWD 10-pin connector of your programmer to AVT9152 EVB J5. In the navigation bar, “**No devices available**” changes to “**Select device**”.



- 3) Click **Select device** and select your SWD programmer instance (serial number) from the drop-down list.
- 4) Click **Update modem** under the **Cellular Modem** pane on the lower right and choose the zip file of the target modem release.



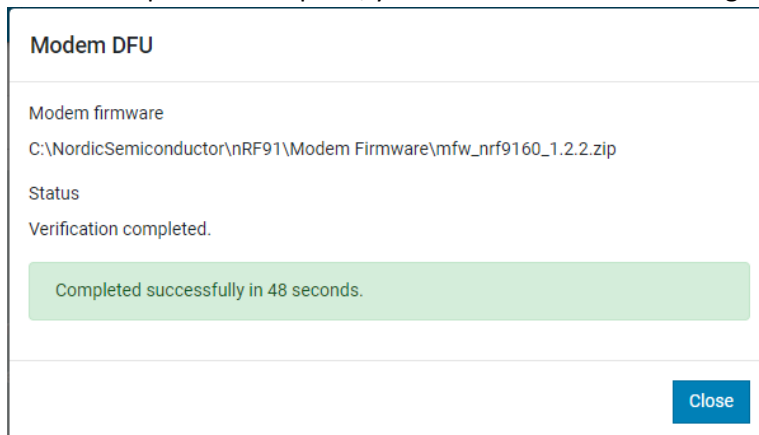
The **Modem DFU** dialog box appears as shown in the following figure.



- 5) Click **Write** in the **Modem DFU** dialog box to update the firmware. Do not unplug or turn off the device during this process.

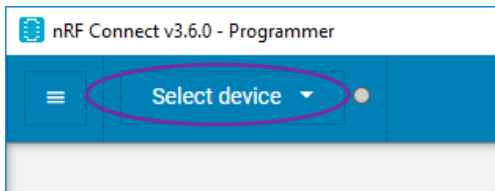
Note: If you have issues updating modem firmware, then click **Erase all** before trying to update the modem again. In this case, the contents of the flash memory are deleted and the applications must be reprogrammed.

When the update is complete, you shall see a success message.

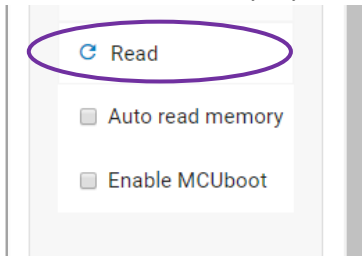


2.4 Programming application on nRF9160

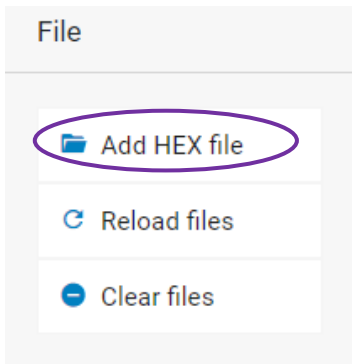
- 1) Open **nRF Connect for Desktop** and launch Programmer app.
- 2) Connect the SWD 10-pin connector of your programmer to AVT9152 EVB J5. In the navigation bar, "**No devices available**" changes to "**Select device**".



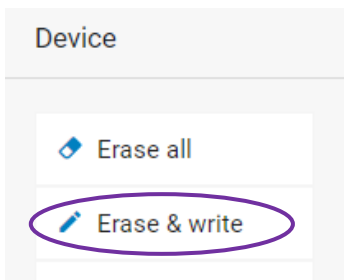
- 3) Click **Select device** and select your SWD programmer instance (serial number) from the drop-down list.
- 4) If you have not ticked the **Auto read memory** option under the **Device** panel on the right and wish to visually see the memory layout before you program, click **Read** in the menu. If you have ticked it, the memory layout will update automatically.



- 5) Click **Add HEX file** under the **File** panel on the right to add the files you want to program.



- 6) Click **Erase & write** under the **Device** panel to program the device.



2.5 Programming applications on nRF52840

Programming applications on nRF52840 is the same as programming nRF9160 except that the SWD 10-pin connector of your programmer shall be connected to AVT9152 EVB J4.

3 Updating application on AVT9152 via MCUboot

Pre-programmed application on AVT9152 EVB supports MCUboot serial recovery which can be used to program nRF9160/nRF52840 via serial interface.

3.1 Software preparation

We will be using **mcumgr** to update the application firmware on both nRF9160 and nRF52840 chips within the AVT9152 module.

- 1) Download and install Go Language version 1.7 or later from <https://golang.org/dl/>.
- 2) Make sure the folder containing **go.exe** is added in your system path.
- 3) Perform the following steps to install mcumgr command line tool:
 - a. Download the source code manually from <https://github.com/apache/mynewt-mcumgr-cli>.
 - b. Unpack the source code and rename the resulting folder to `%USERPROFILE%\go\src\mynewt.apache.org\mcumgr`.
 - c. Open a command console and run the following commands:


```
> cd %USERPROFILE%\go\src\mynewt.apache.org\mcumgr\mcumgr
          > go build
```

mcumgr.exe will be in your `%USERPROFILE%\go\src\mynewt.apache.org\mcumgr\mcumgr` folder.

3.2 Updating application on nRF9160

- 1) Put nRF9160 into serial recovery mode.
 - a. Turn off AVT9152 EVB.
 - b. Assert serial detect pin. (Connect AVT9152 EVB J12-pin6 to GND)



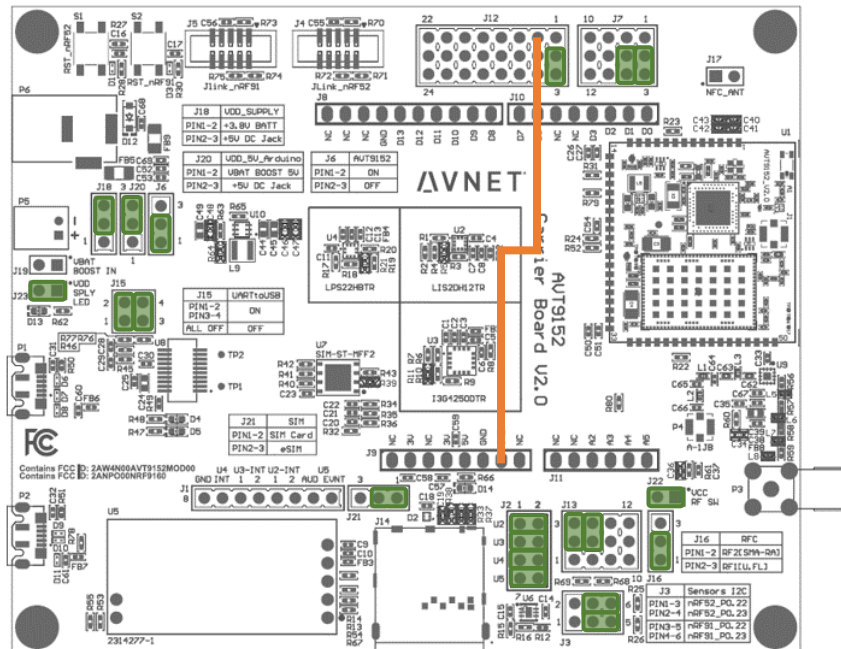
- c. Turn on AVT9152 EVB.

Note: If the application running on nRF52840 was replaced and will reset nRF9160 on power up, assert the serial detect pin then press AVT9152 EVB S2 instead.

- 2) Connect AVT9152 EVB P1 to your PC.
- 3) Check the COM port number assigned to AVT9152 EVB P1 from Device Manager.
- 4) Run **mcumgr.exe --conntype=serial --connstring=COM<port number> image upload <update image>**
 where **<update image>** is a MCUboot-compatible binary file like the app_update.bin file that is generated in *<your build folder>\zephyr* when built with CONFIG_BOOTLOADER_MCUBOOT=y
- 5) Wait for the image uploading to complete.
- 6) De-assert serial detect pin. (Disconnect AVT9152 EVB J12-pin6 from GND)
- 7) Press AVT9152 EVB S2 to reset nRF9160.

3.3 Updating application on nRF52840

- 1) Put nRF52840 into serial recovery mode.
 - a. Assert serial detect pin. (Connect AVT9152 EVB J12-pin4 to GND)



- b. Press AVT9152 EVB S1 to reset nRF52840.
- 2) Connect AVT9152 EVB P2 to your PC.
- 3) Check the COM port number assigned to AVT9152 EVB P2 from Device Manager.
- 4) Run **mcumgr.exe --conntype=serial --connstring=COM<port number> image upload <update image>**
 where **<update image>** is a MCUboot-compatible binary file like the app_update.bin file that is generated in *<your build folder>\zephyr* when built with CONFIG_BOOTLOADER_MCUBOOT=y
- 5) Wait for the image uploading to complete.
- 6) De-assert serial detect pin. (Disconnect AVT9152 EVB J12-pin4 from GND)
- 7) Press AVT9152 EVB S1 to reset nRF52840.

4 References

- nRF_Connect_Programmer_User_Guide_v1.1.pdf
https://infocenter.nordicsemi.com/topic/ug_nc_programmer/UG/nrf_connect_programmer/ncp_introduction.html
- nRF9160 DK Hardware > Hardware description > Debug output
https://infocenter.nordicsemi.com/topic/ug_nrf91_dk/UG/nrf91_DK/hw_debug_out.html?cp=2_0_5_4_9
- nRF5340 PDK > Hardware description > Debug output
https://infocenter.nordicsemi.com/topic/ug_nrf5340_pdk/UG/nrf5340_PDK/hw_debug_out.html?cp=3_0_4_4_9