Development Environment Setup Guide

WISOL

January 10, 2017

Contents

Development Environment Setup Guide

Revision history

Revision	Date	Description
1.0	2017.01.10	Initial release
1.2	2017.01.31	Add to SDK compile & download guide
1.3	2017.02.08	Add bootloader build and flash map
1.4	2017.03.07	Add GCC compile
1.5	2017.03.10	Removed CSR
2.0	2017.03.21	Add DFU
2.01	2017.04.18	Add Setup SDK Source
2.02	2017.07.10	update " Setup SDK Source"

Development Environment Setup Guide

1. Introduction

1.1 Purpose

Software Development Kits (SDK) are your starting point for software development on the sigfox config2. Setting up the nRF52 Development Kit is as easy as connecting it by a USB cable to a computer.

Development environment for Cortex and ARM devices.

1.2 Model & Firmware Version

Model	Firmware
CONFIG2	SFM20R1

1.3 Setting up the development kit

- nRFgo Studio

Download and install nRFgo Studio (which includes the nRF Tools package; JLinkARM, JLink CDC, nRFjprog, and mergehex) from nRFgo Studio.

- Keil MDK-ARM

Download and install the latest Keil MDK-ARM from Keil MDK-ARM Development Kit.

- nRF5 SDK

Download and extract the latest nRF5 SDK found on developer.nordicsemi.com.

- Keil Device Family Pack

Install the Device Family Pack that is shipped with the SDK, or let Keil install it automatically.

- SDK documentation

Read the information in the SDK Release Notes, and check the nRF5 SDK documentation.

2. Setup SDK Source

The source is distributed via AWS (git).

When you buy product, you can get an AWS account.

(http://support.wisol.co.kr) -> Ordering

3. nRFgo Studio

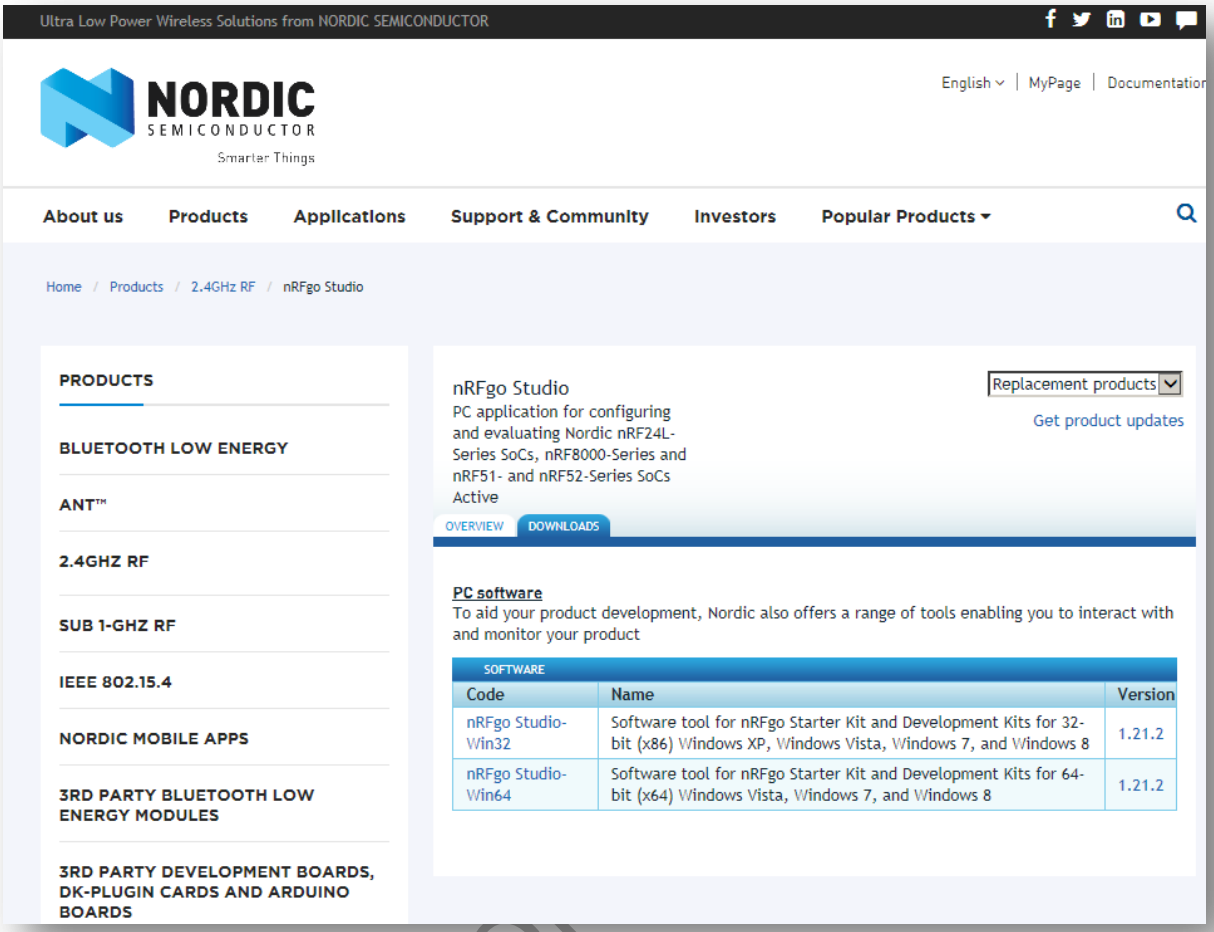
The Nordic nRFgo Studio is a Windows® application that enables engineers to quickly explore and evaluate radio performance and functionality. The application supports a range of radio testing, including output power and sensitivity. Engineers can also easily configure and set-up the tests to match their own specific application requirements.

nRFgo Studio is designed to be used in conjunction with the Nordic nRFgo Starter Kit and Nordic nRFgo-compatible development kits. It supports auto detection of Nordic nRFgo motherboard and radio modules. It also support the nRF51 and nRF52 evaluation kits and programming nRF5x devices through SEGGER J-Link®.

nRFgo Studio download

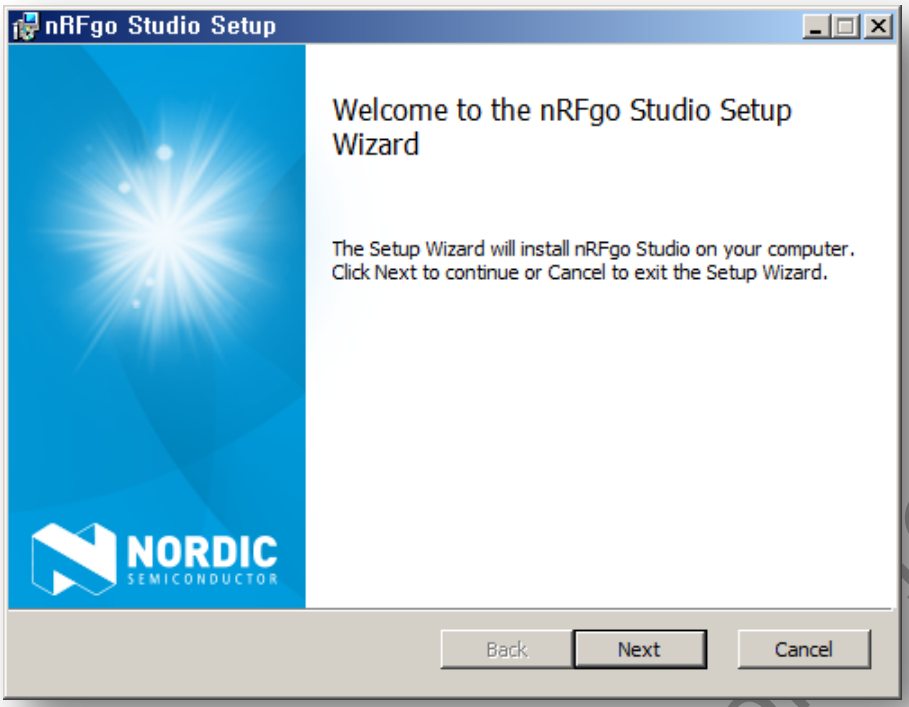
URL : https://www.nordicsemi.com/eng/Products/2.4GHz-RF/nRFgo-Studio/

DOWNLOADS Tab – Download tool (nRFgo Studio-Winxx)

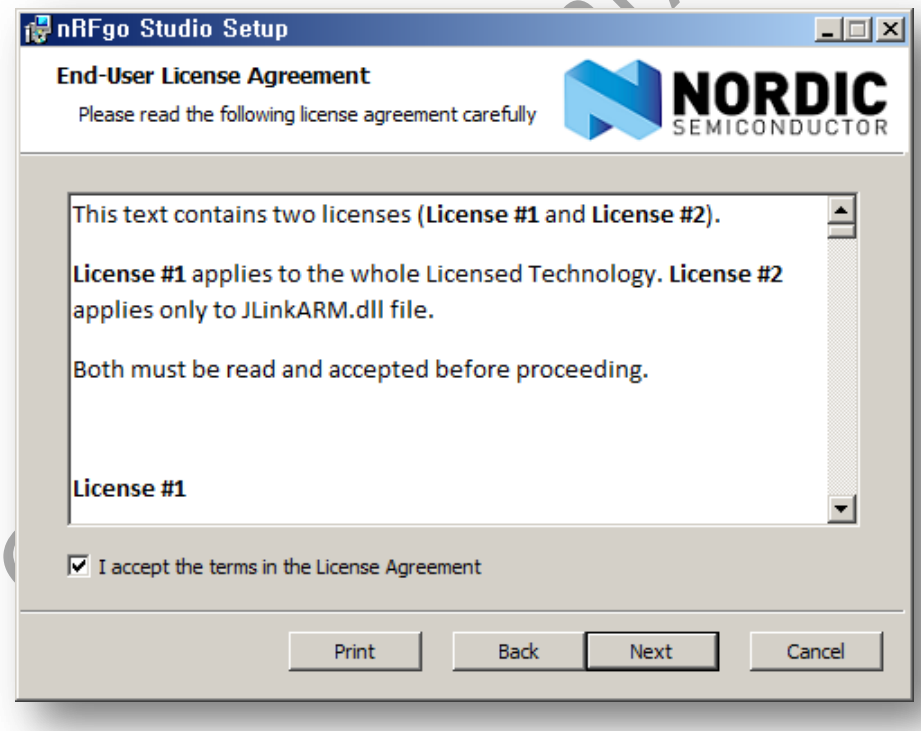


nRFgo Studio installation

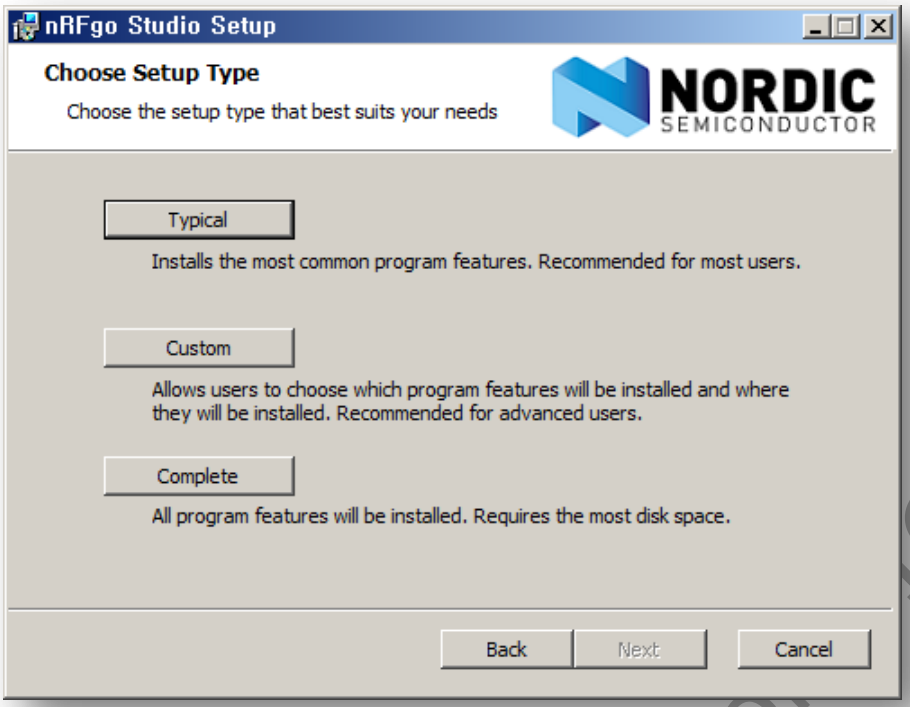
nRFgo Studio Setup



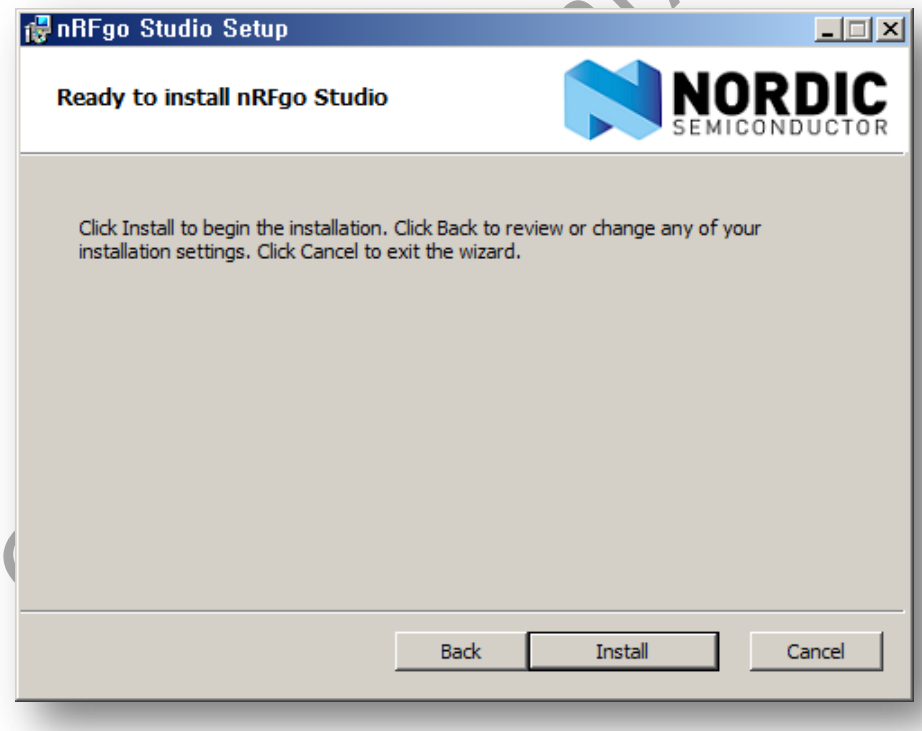
Read following license agreement



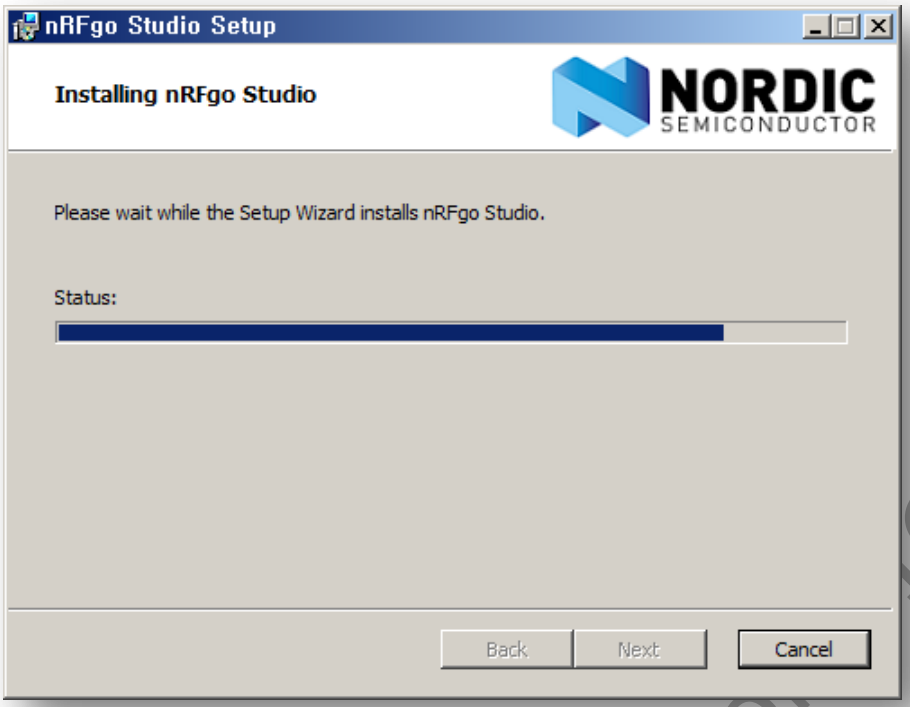
Choose setup type



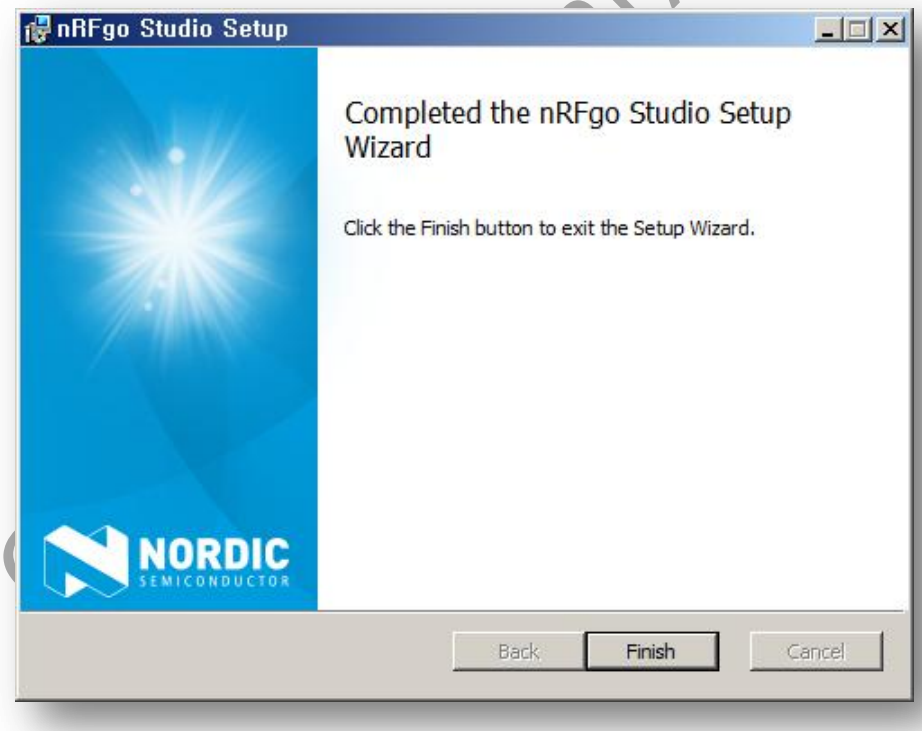
Ready to install nRFgo Studio



Installing nRFgo Studio

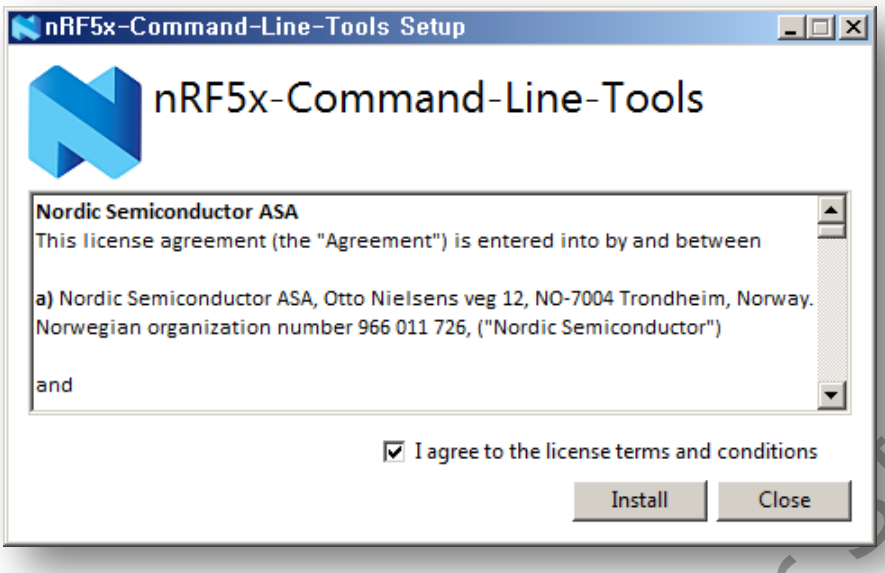


Completed the nRFgo Studio Setup

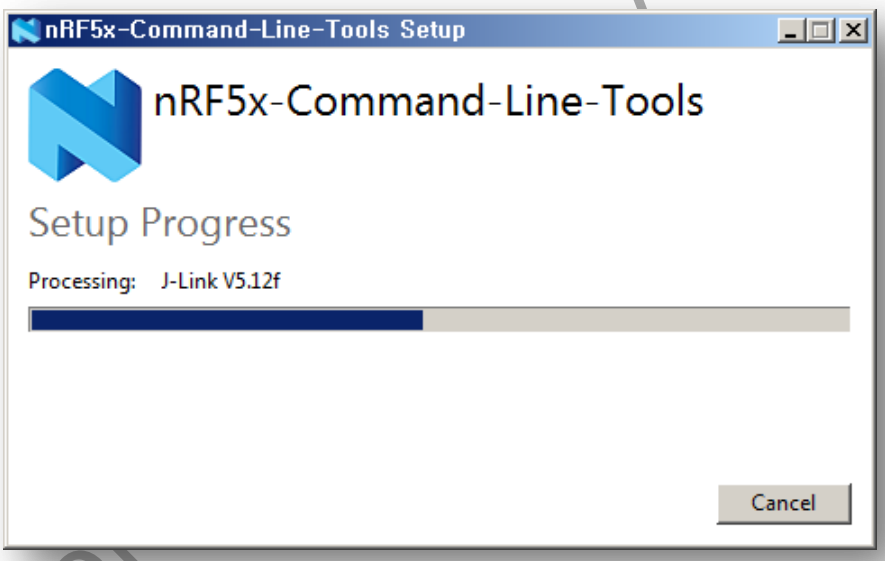


nRF5x-Command-Line-Tools

nRF5x-Command-Line_Tools Setup - 1

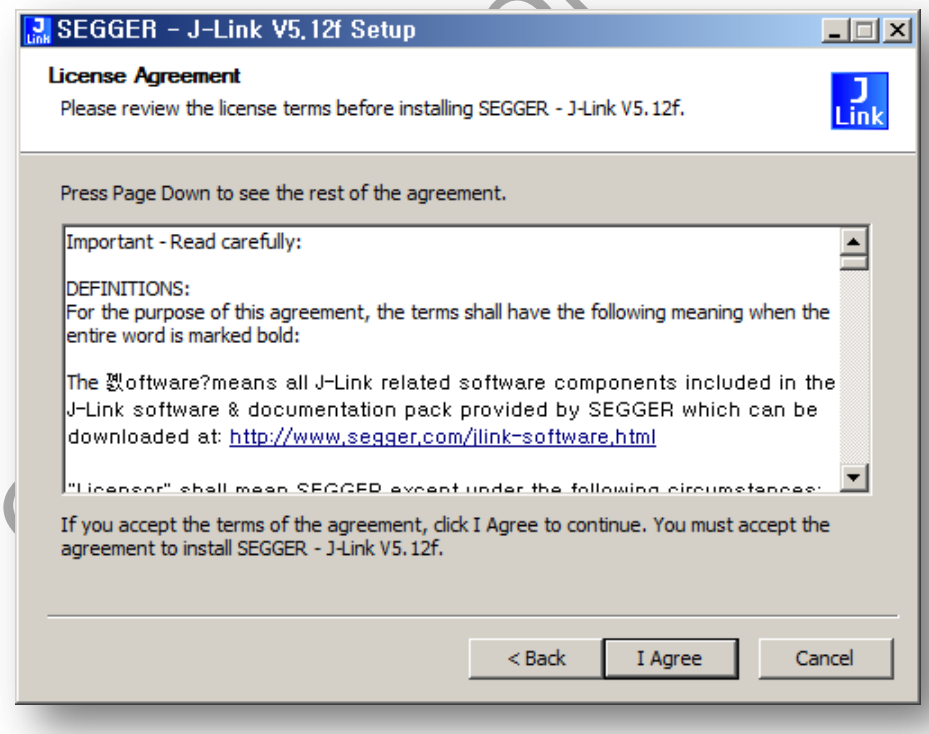


RF5x-Command-Line_Tools Setup – 2

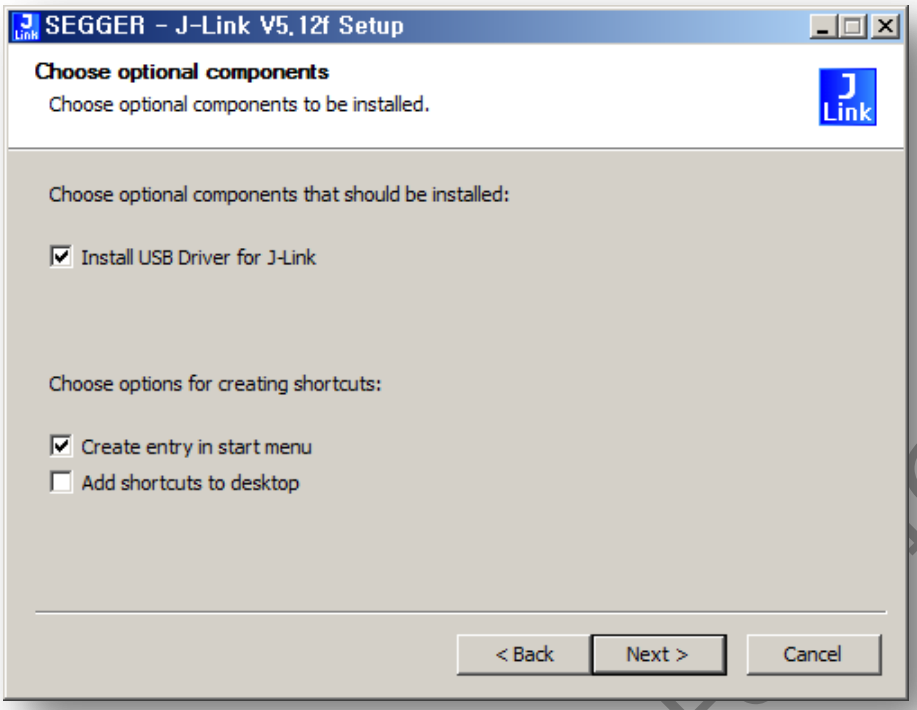


SEGGER – J-Link V5.12f Setup

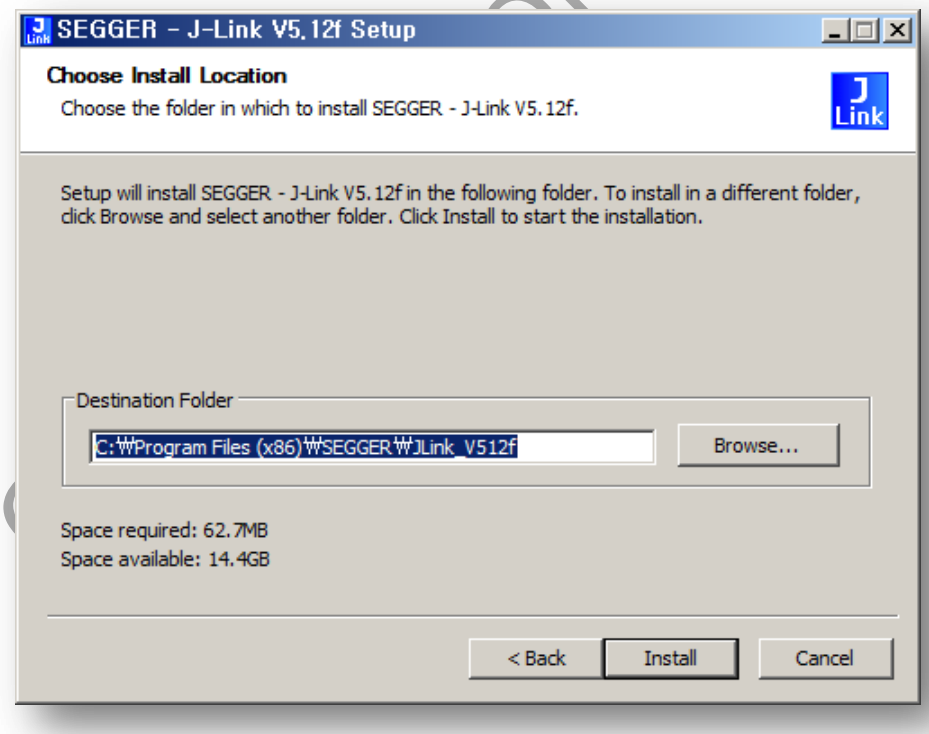
License Agreement



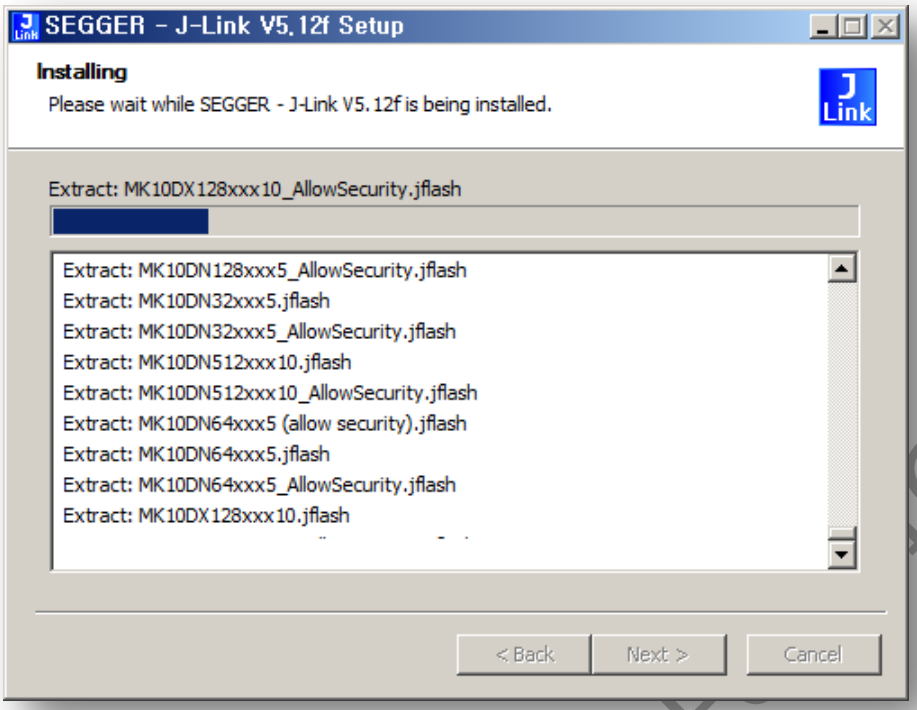
Chose optional components



Choose Install Location

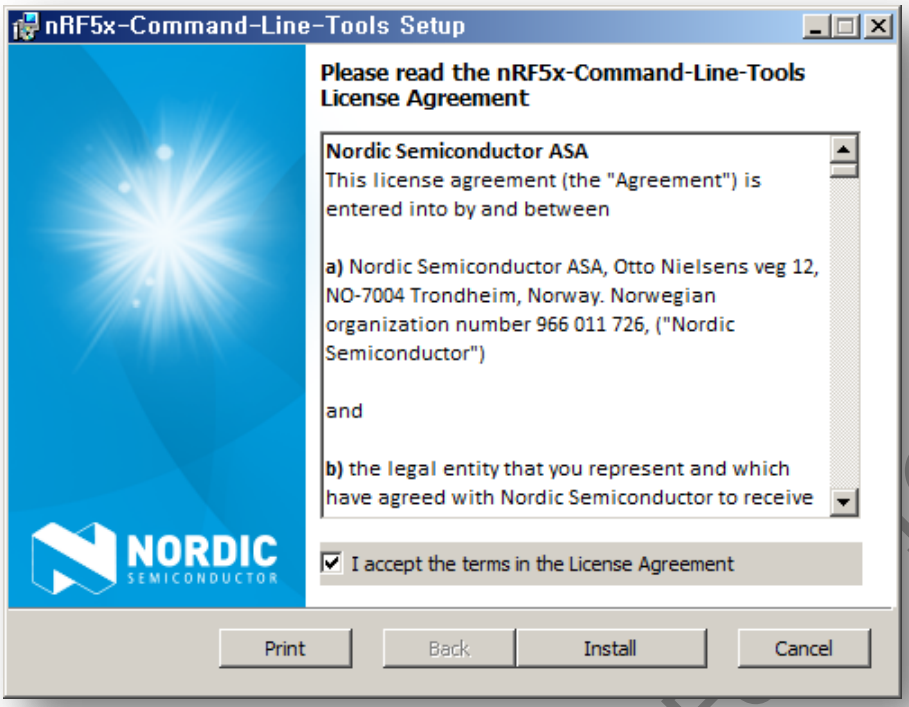


Installing

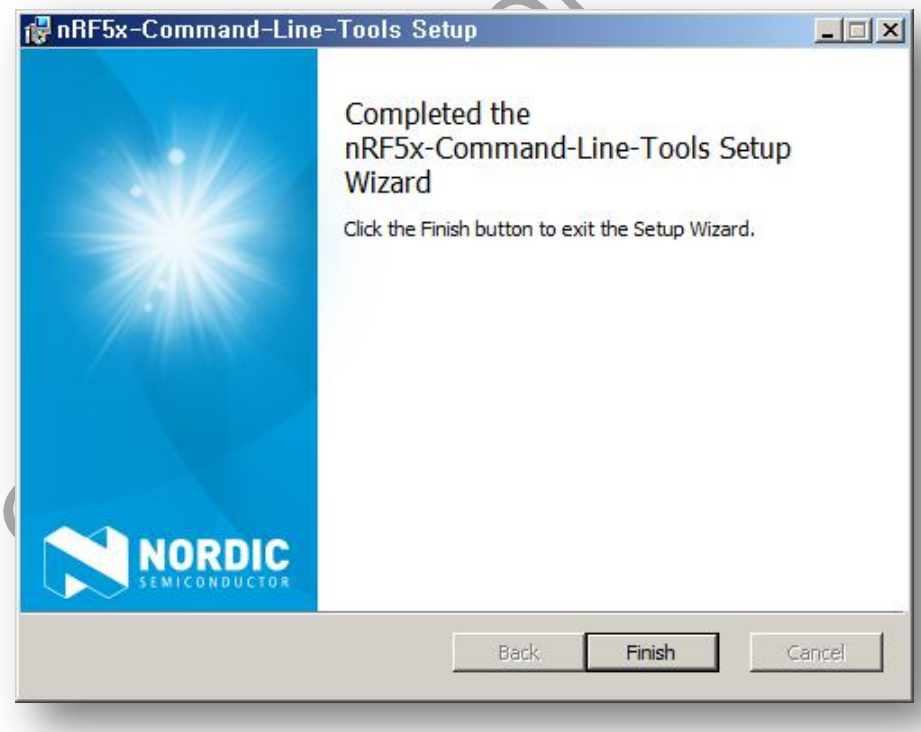


Completing SEGGER – J-Link V5.12f Setup

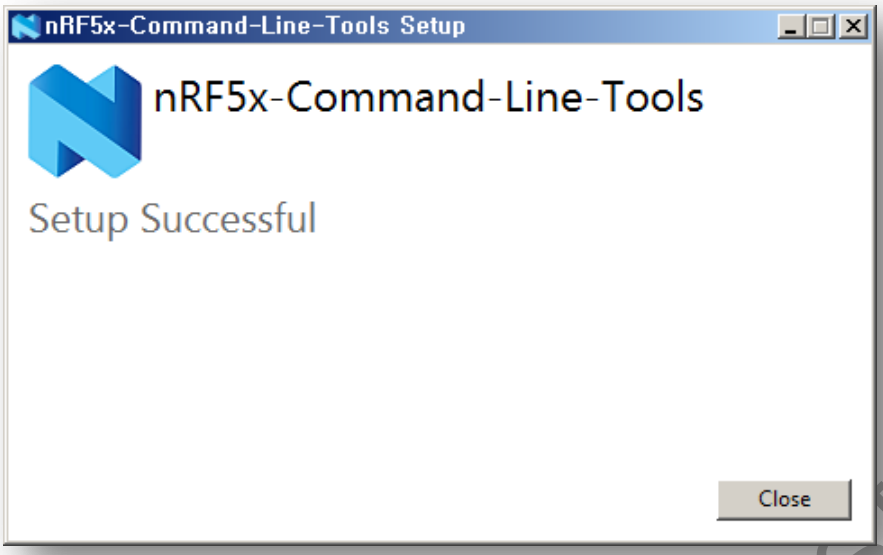
Read nRF5x-Command-Line-Tools License Agreement & Accept



Completed the nRF5x-Command-Line-Tools Setup Wizard



Setup Successful



4. Keil MDK-ARM

Keil MDK Version 5 is the latest release of our complete software development environment for a wide range of ARM Cortex-M based microcontroller devices. MDK includes the µVision IDE/Debugger, ARM C/C++ Compiler, and essential middleware components. It's easy to learn and use.

The Keil ARM Evaluation Kit allows you to create programs for ARM7, ARM9, Cortex-M and MCU devices.

Minimum Hardware Requirements

- 1 GHz 32-bit or 64-bit processor
- 2 GB of system memory (RAM)
- 3 GB of available disk space

Recommended Hardware Requirements

- 2+ GHz 64-bit processor
- 4 GB of system memory (RAM)
- 6 GB of available disk space
- 2 Mpbs or higher Internet connection for software activation, product updates and online services like the PackInstaller

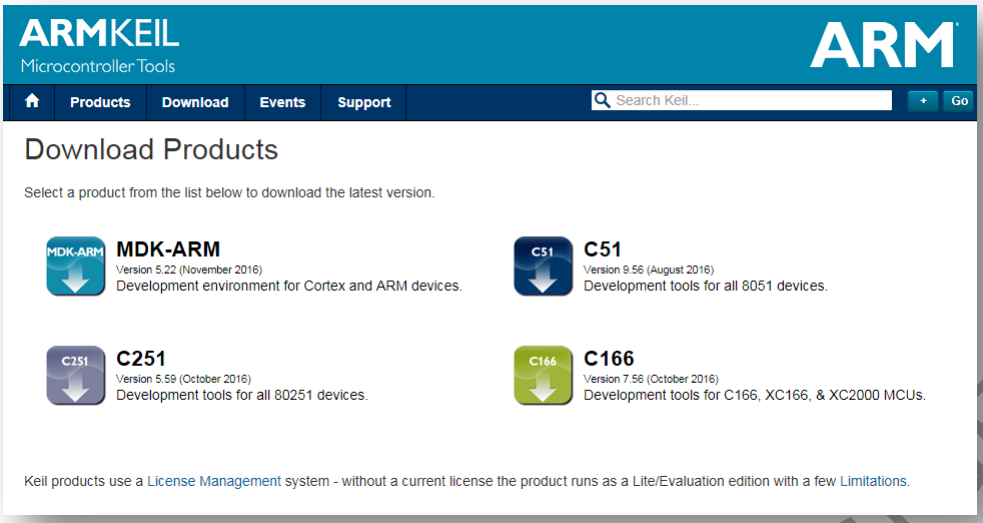
Supported Operating Systems

32-bit and 64-bit variants of Microsoft Windows are supported:

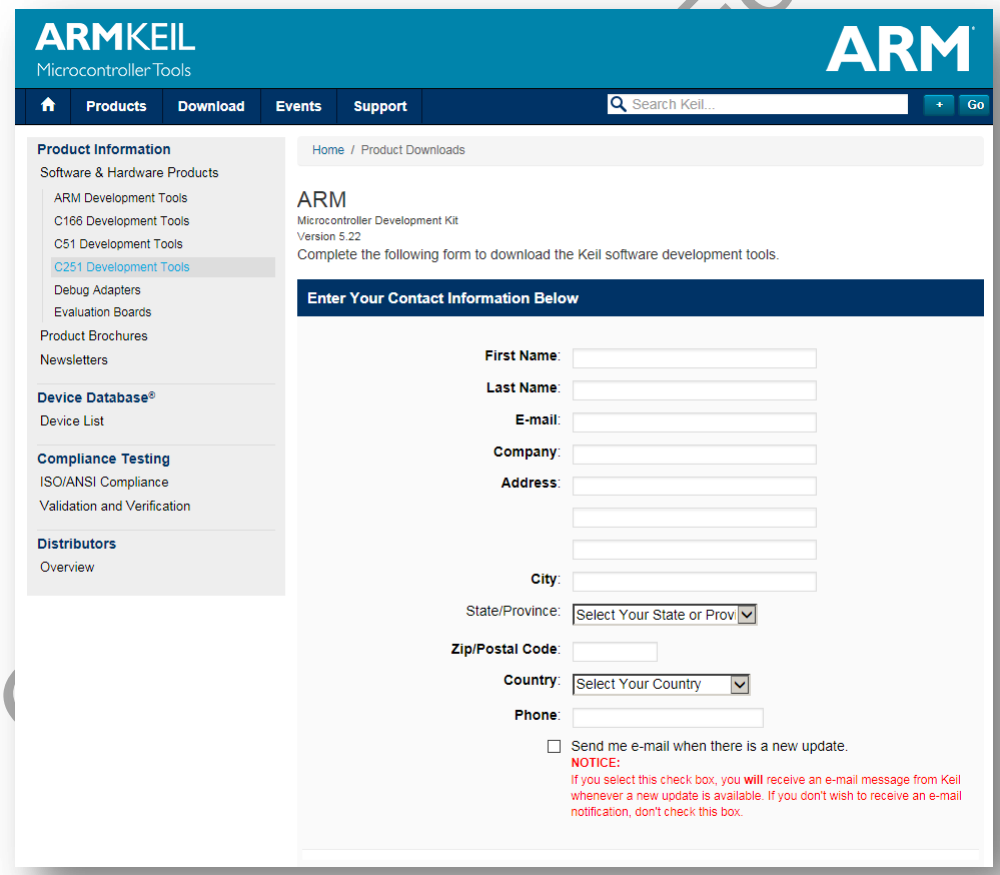
- Windows 10
- Windows 8
- Windows 7
- Windows Vista

URL : https://www.keil.com/download/product/

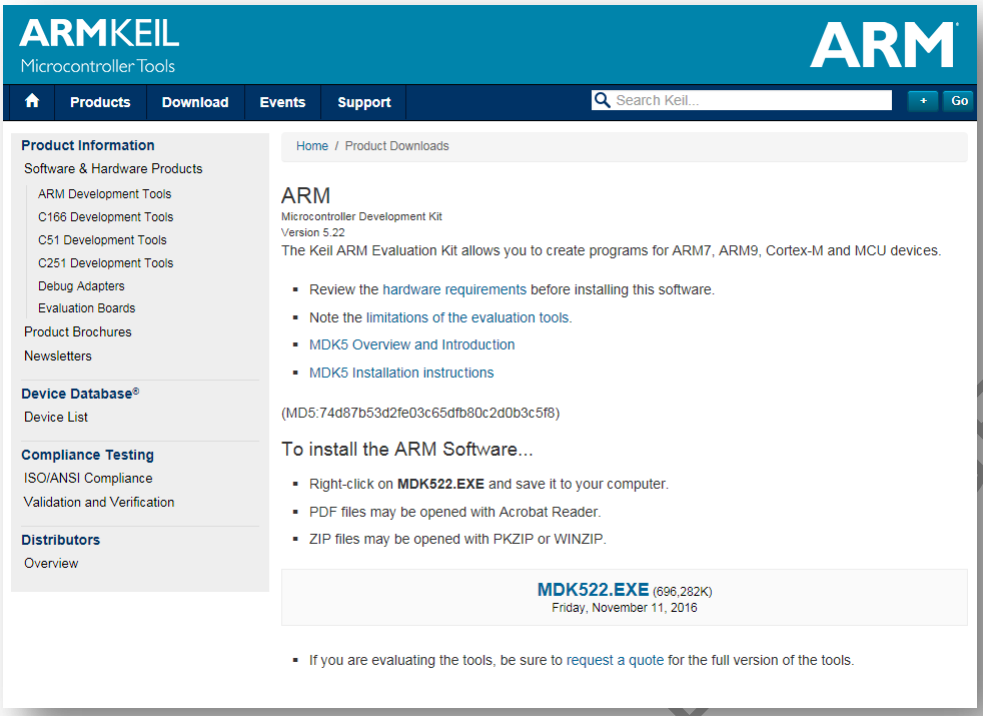
✓ Keil MDK-ARM



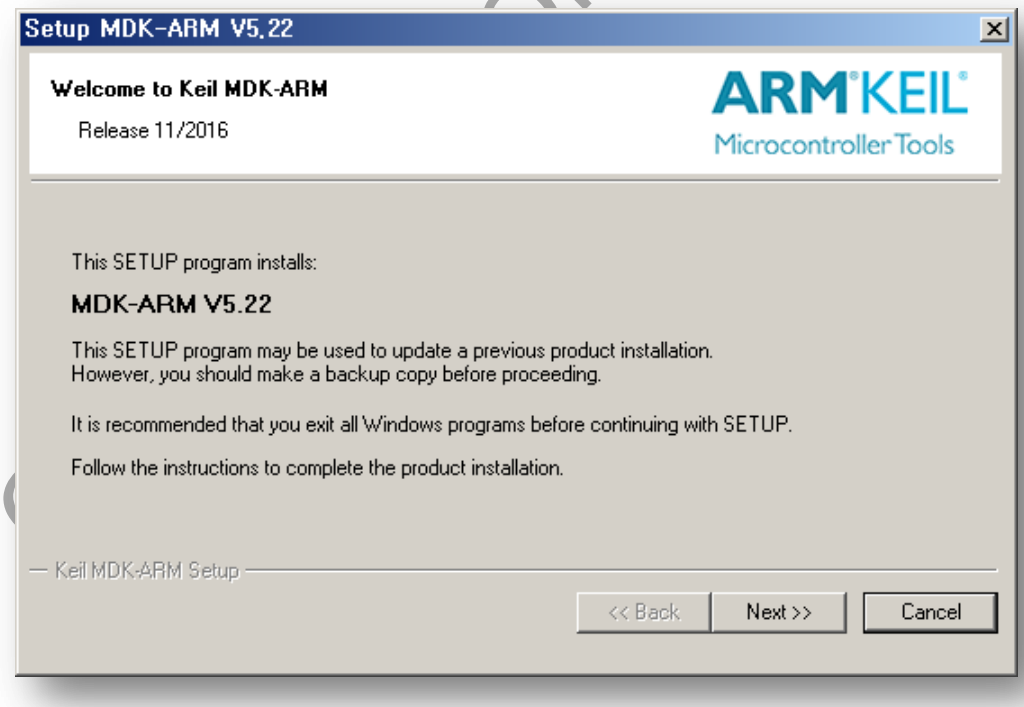
✓ Enter Your Contact Information Below(Enter information & Submit)



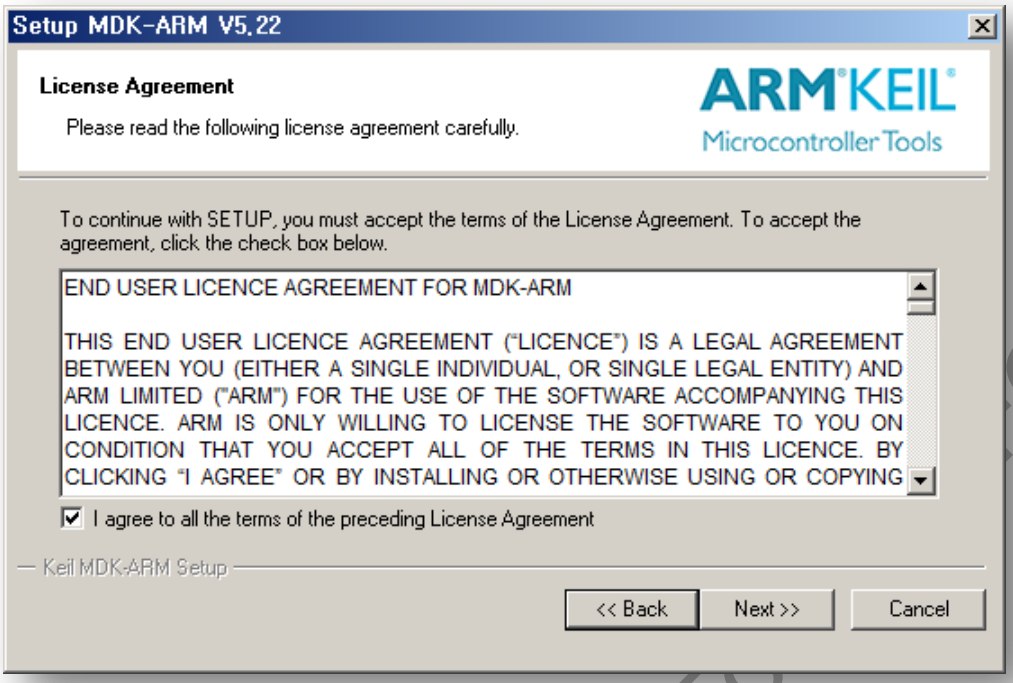
✓ MDK522.EXE download



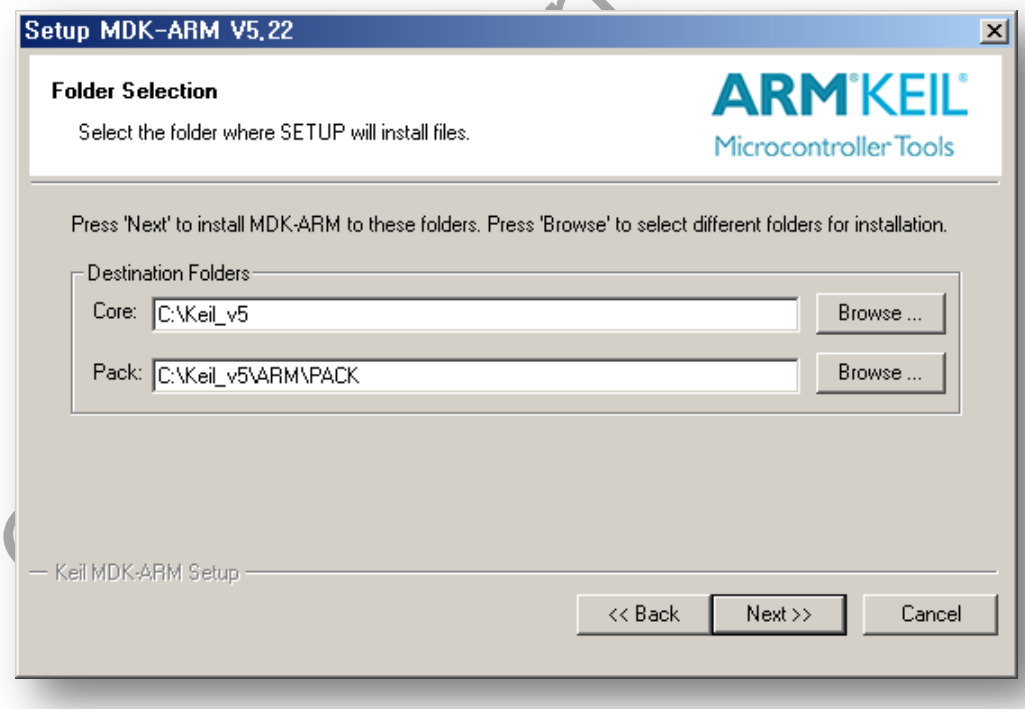
✓ Install MDK-ARM V5.22



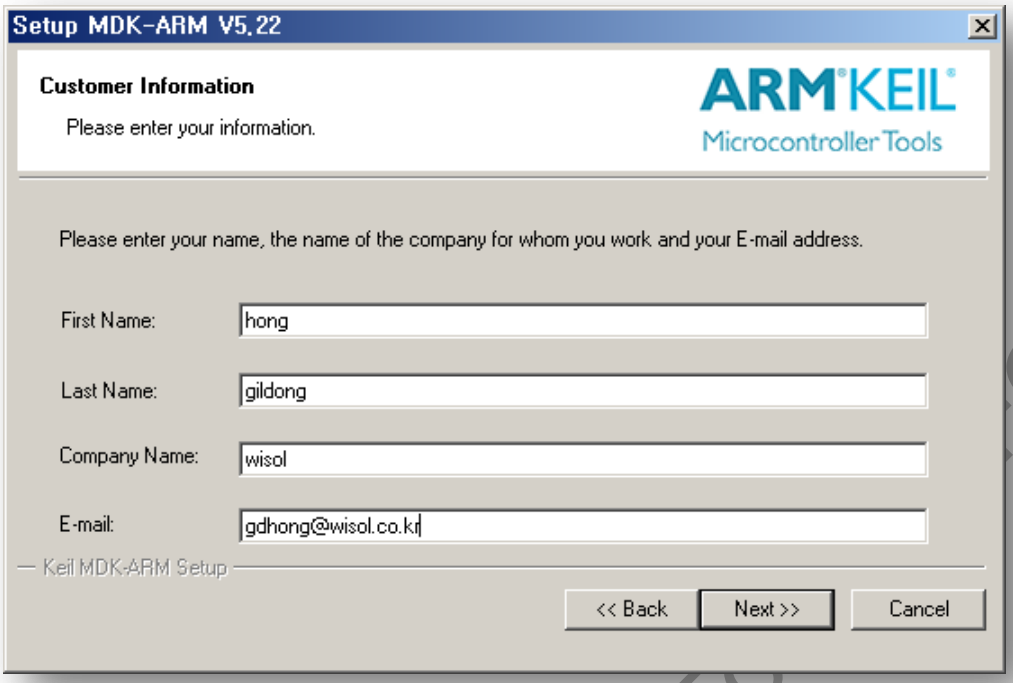
✓ License Agreement



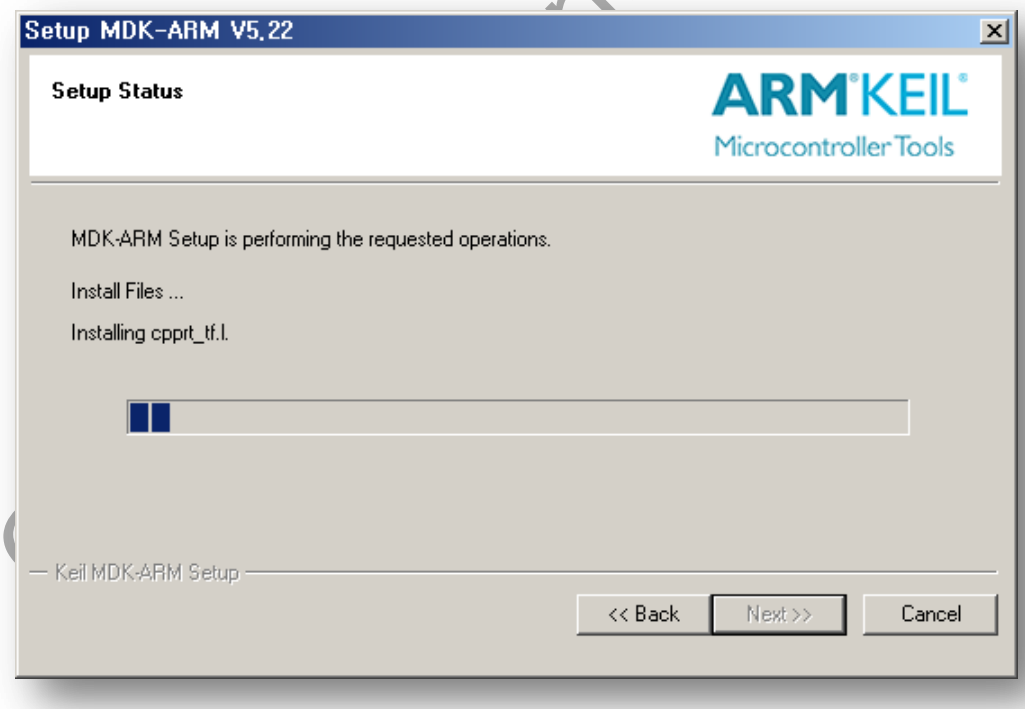
✓ Folder Selection



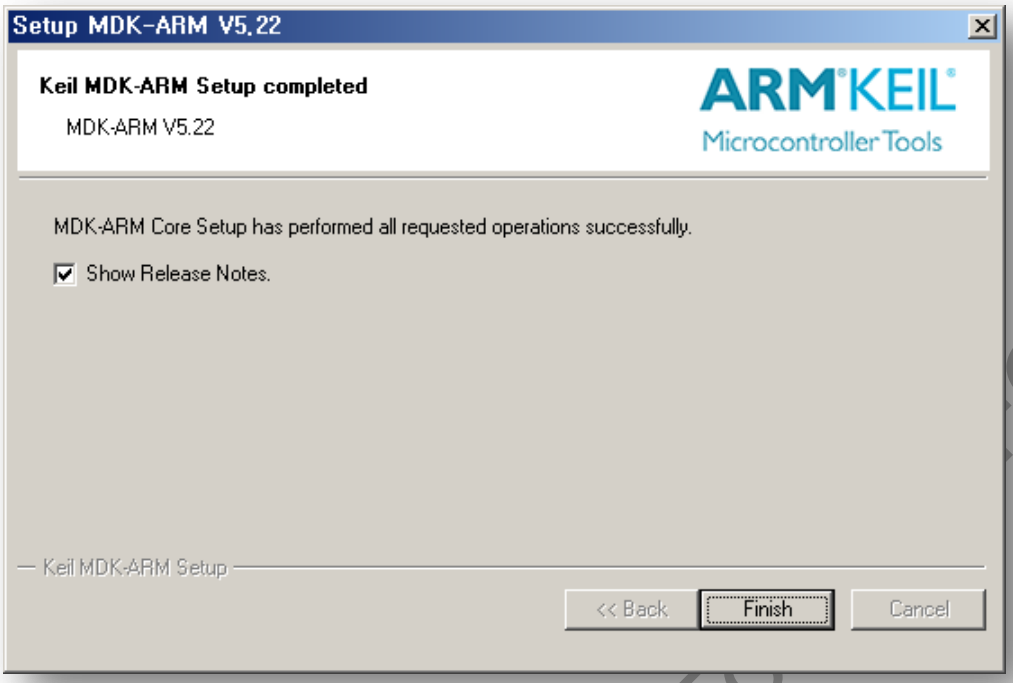
✓ Enter information



✓ Installing



✓ Keil MDK-ARM setup completed



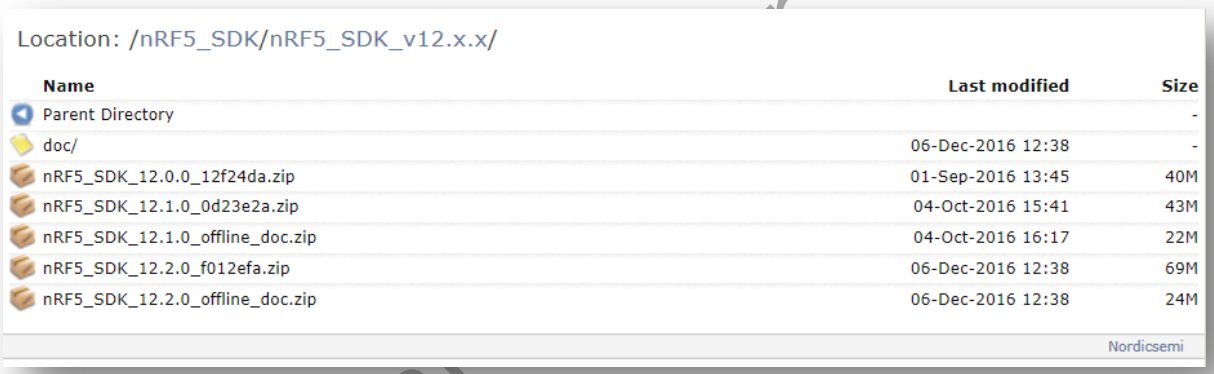
5. nRF SDK

The nRF5 SDK provides a rich developing environment for nRF5 Series devices by including a broad selection of drivers, libraries, examples for peripherals, SoftDevices, and proprietary radio protocols.

The SDK is delivered as a plain .zip-archive, which makes it easy to install as well as giving you the freedom to choose the IDE and compiler of your choice.

All code examples included in the SDK are tailored to compile for and run on Nordic Semiconductor's nRF5 Development Kits.

For documentation, release notes, and licenses, see the nRF5 SDK documentation overview.


Location: /nRF5_SDK/nRF5_SDK_v12.x.x/

Name	Last modified	Size
Parent Directory		-
doc/	06-Dec-2016 12:38	-
nRF5_SDK_12.0.0_12f24da.zip	01-Sep-2016 13:45	40M
nRF5_SDK_12.1.0_0d23e2a.zip	04-Oct-2016 15:41	43M
nRF5_SDK_12.1.0_offline_doc.zip	04-Oct-2016 16:17	22M
nRF5_SDK_12.2.0_f012efa.zip	06-Dec-2016 12:38	69M
nRF5_SDK_12.2.0_offline_doc.zip	06-Dec-2016 12:38	24M

Nordicsemi

URL : https://developer.nordicsemi.com/

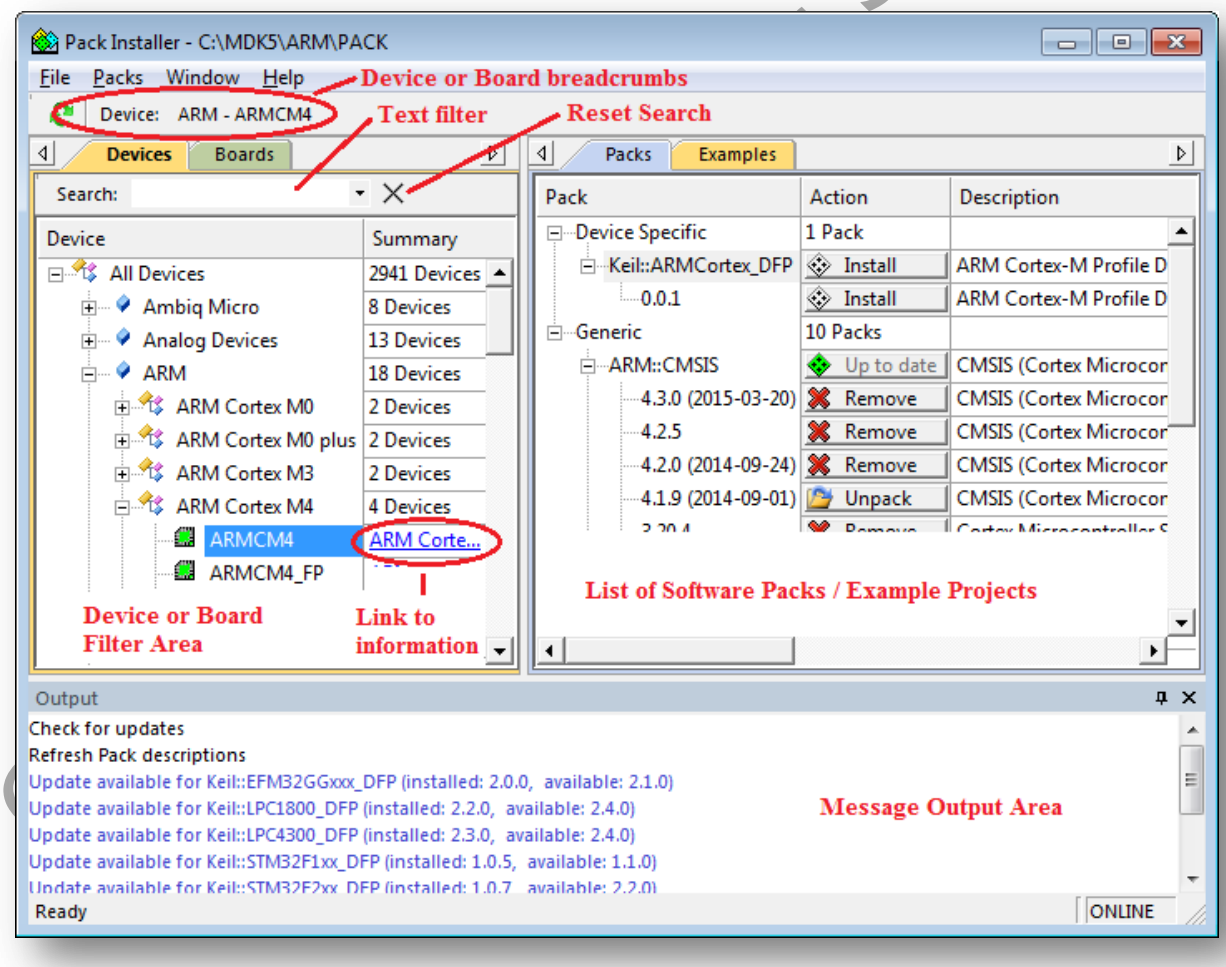
6. Keil Device Family Pack

The **Pack Installer** is a utility for installing, updating, and removing Software Packs, and can be launched from within µVision or standalone, outside of µVision.

The menu **Project - Manage - Pack Installer...** starts the Pack Installer.

The Pack Installer window offers the following functionality:

- Installs, updates, or removes Software Packs and thus, Software Components. Refer to Importing Custom Software Packs, which also explains how Software Components relate to Software Packs.
- Lists installed Software Packs and checks for updates on the Internet. A brief release history might be displayed before updating a Software Pack.
- Lists example projects available from installed Software Packs.
- Offers filters to narrow the list of Software Packs or example projects.
- Displays the progress of the executed function in the status bar at the bottom of the window.



Filters

Select a device or board to narrow the list of Software Packs or Example projects. Device-specific Software Packs are displayed on the top of the list. Software Components from generic Software Packs can be used with any device.

Search

Enter an Regular Search Expression to narrow the list within the filter area.

Reset Search

Resets the filter for the dialog Device or Boards. Resetting the filter for one dialog does not affect the other dialog. For example, resetting the filter for **Devices** keeps the **Boards** filter unchanged.

Device/Board

Lists devices grouped by the manufacturer or board. Click on an entry to narrow the list of Software Packs or Example projects.

Summary

Provides information about the device group. For devices, the field can provide a link to the Internet with additional information about the device, for example, to the Keil web page www.keil.com/dd2/*vendor*/*device*.

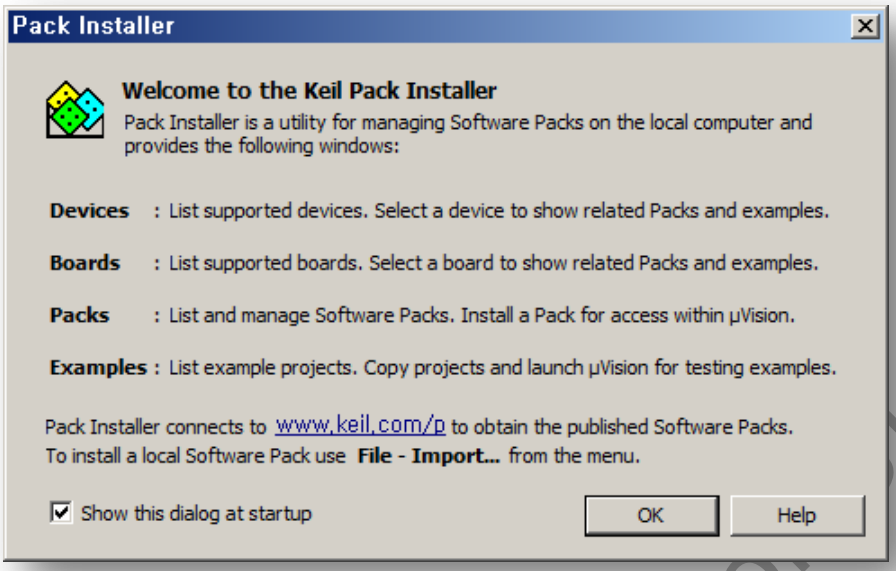
Output Window

Displays messages about executed actions. Messages have different colors.

- **Black** - informative message.
- **Blue** - update message.
- **Red** - error message.

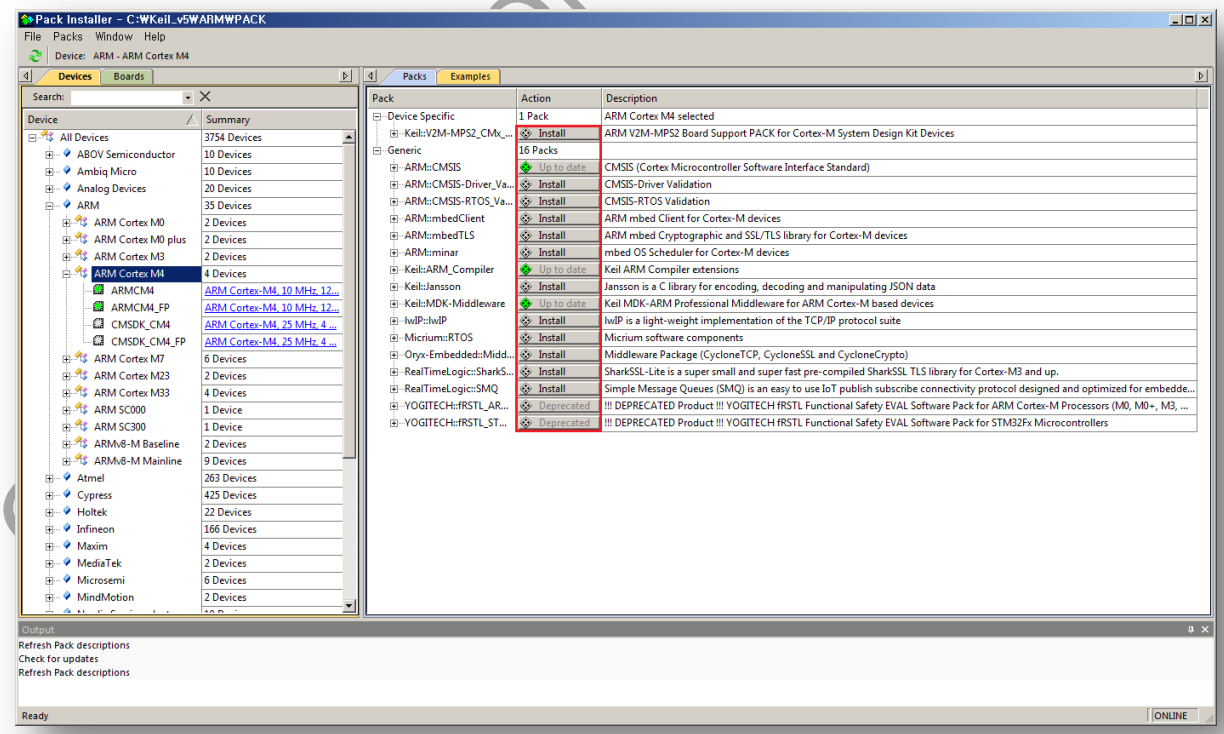
Install the Device Family Pack that is shipped with the SDK, or let Keil install it automatically.

✓ Pack installer - 1



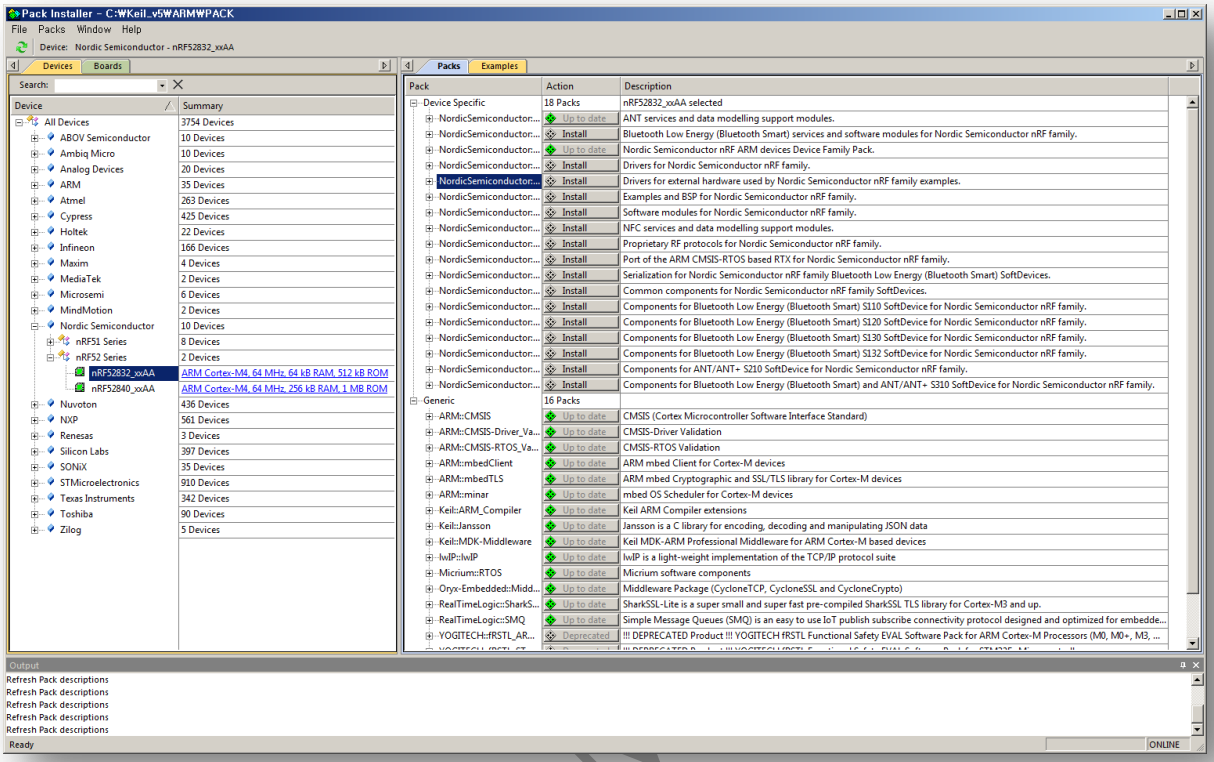
✓ Pack installer (ARM Cortex M4)

- Install all



✓ Pack installer – 3 (Nordic nRF52)

- Install all



7. SDK Documentation

The nRF5 SDK documentation includes descriptions and other reference material to help you understand the various components of the SDK. Examples are provided for development purposes only and should always be tested with your design.

See Getting Started for instructions on how to run the provided examples.

This version of the SDK supports the following SoftDevices:

URL : https://developer.nordicsemi.com/nRF5_SDK/doc/

8. SDK Compile

8.1 Extract the SFM20R1 SDK zip file.

Ex) SFM20R1_Delivery_SDK.zip

8.2 Run the **sigfox_cfg2_pca10040_s132.uvprojx** file from the extracted directory.

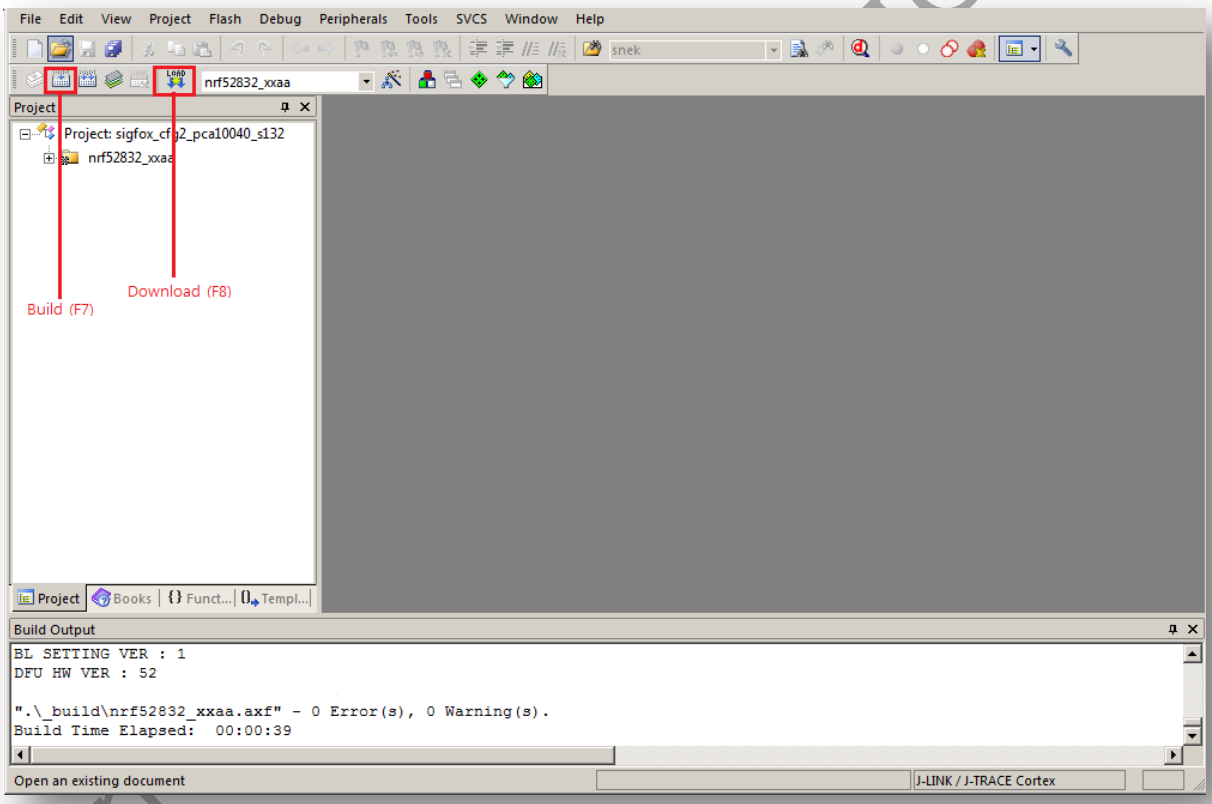
Path : development₩sigfox_cfg2₩source₩pca10040₩s132₩arm5_no_packs

File : sigfox_cfg2_pca10040_s132.uvprojx

⇨ The ARMKEIL tool must already be installed.

* caution

When downloading from the tool, the bootloader is disabled.
Use only during development.



8.3 Build Application

Menu : Project – Build Target (F7) or Rebuild all target files

⇨ Check the build results in the "Build Output window".

8.4 Build bootloader (Use version release)

Path : development₩sigfox_cfg2₩source_bootloader_secure₩pca10040₩arm5_no_packs

File : secure_dfu_secure_dfu_ble_s132_pca10040.uvprojx

8.5 Use GCC for uVision

Path : development₩sigfox_cfg2₩source₩pca10040₩s132₩arm5_no_packs

File : sigfox_cfg2_pca10040_s132_gcc.uvprojx

You can use it similar to the Keil environment.
The boot loader is not supported, but you can get the same result by running sigfox_cfg2_make_factory_image.bat

9. output and flash memory map

9.1 binarys (build application -> build bootloader)

factory image write cmd for windows

SFM20R1_factory_write.cmd

tools for flash download by j-link

jlinkarm_nrf52_nrfjprog.dll

nrfjprog.dll

nrfjprog.exe

nrfjprog.ini

softdevice

s132_nrf52_3.0.0_softdevice.hex

appication

SFM20R1_app_XXX.hex

bootloader

SFM20R1_bootloader_XXX.hex

* caution

Use SFM20R1_bootloader_merged_XXX.hex when downloading factory image

SFM20R1_factory_XXX.hex

etc

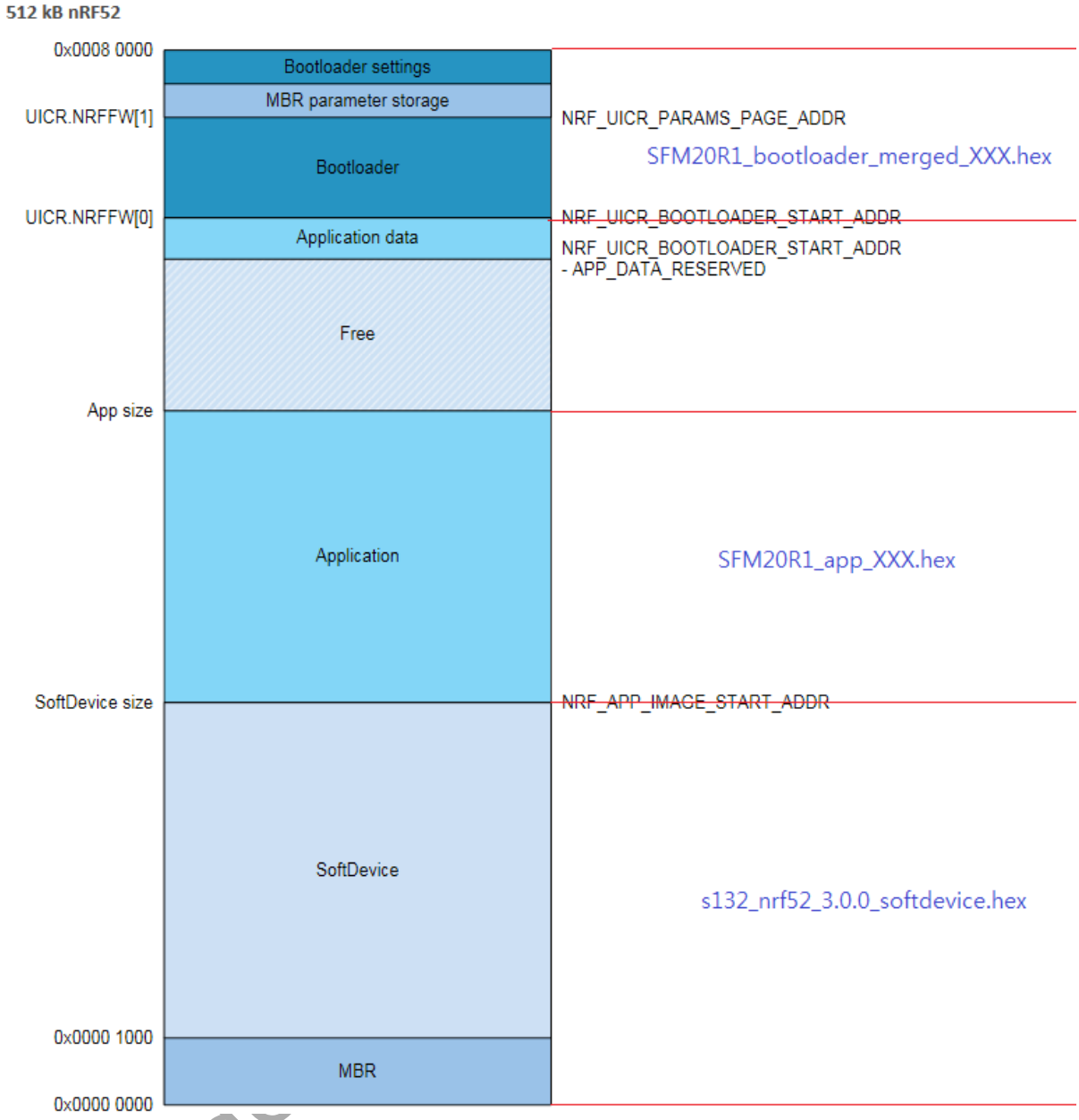
SFM20R1_bl_setting_XXX.hex : bootloader settings (application hash is included)

SFM20R1_bootloader_merged_XXX.hex : Image with boot loader and settings merged

9.2 flash memory map

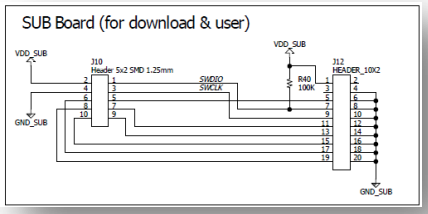
based layout (512 kB nRF52)

https://infocenter.nordicsemi.com/index.jsp?topic=%2Fcom.nordic.infocenter.sdk5.v12.0.0%2Flib_bootloader.html

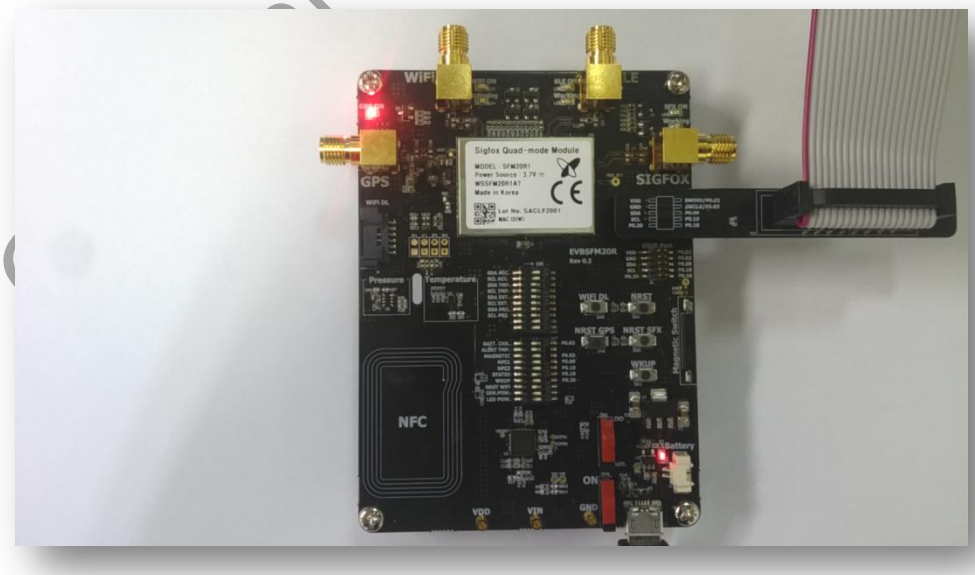

512 kB nRF52
0x0008 0000
Bootloader settings
MBR parameter storage
UICR.NRFFW[1]
NRF_UICR_PARAMS_PAGE_ADDR
Bootloader
SFM20R1_bootloader_merged_XXX.hex
UICR.NRFFW[0]
NRF_UICR_BOOTLOADER_START_ADDR
Application data
NRF_UICR_BOOTLOADER_START_ADDR
- APP_DATA_RESERVED
Free
App size
Application
SFM20R1_app_XXX.hex
SoftDevice size
NRF_APP_IMAGE_START_ADDR
SoftDevice
s132_nrf52_3.0.0_softdevice.hex
0x0000 1000
MBR
0x0000 0000

10. Flash Download

10.1 Download Jig board



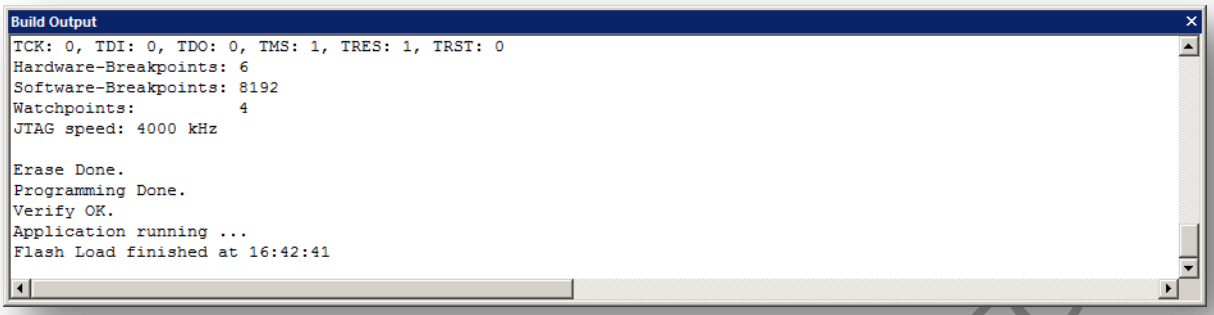
10.2 SEGGER J-Link connection



10.3 Download flash

Menu : Flash – Download (F8)

If it fails, it prints a failure log and pauses.

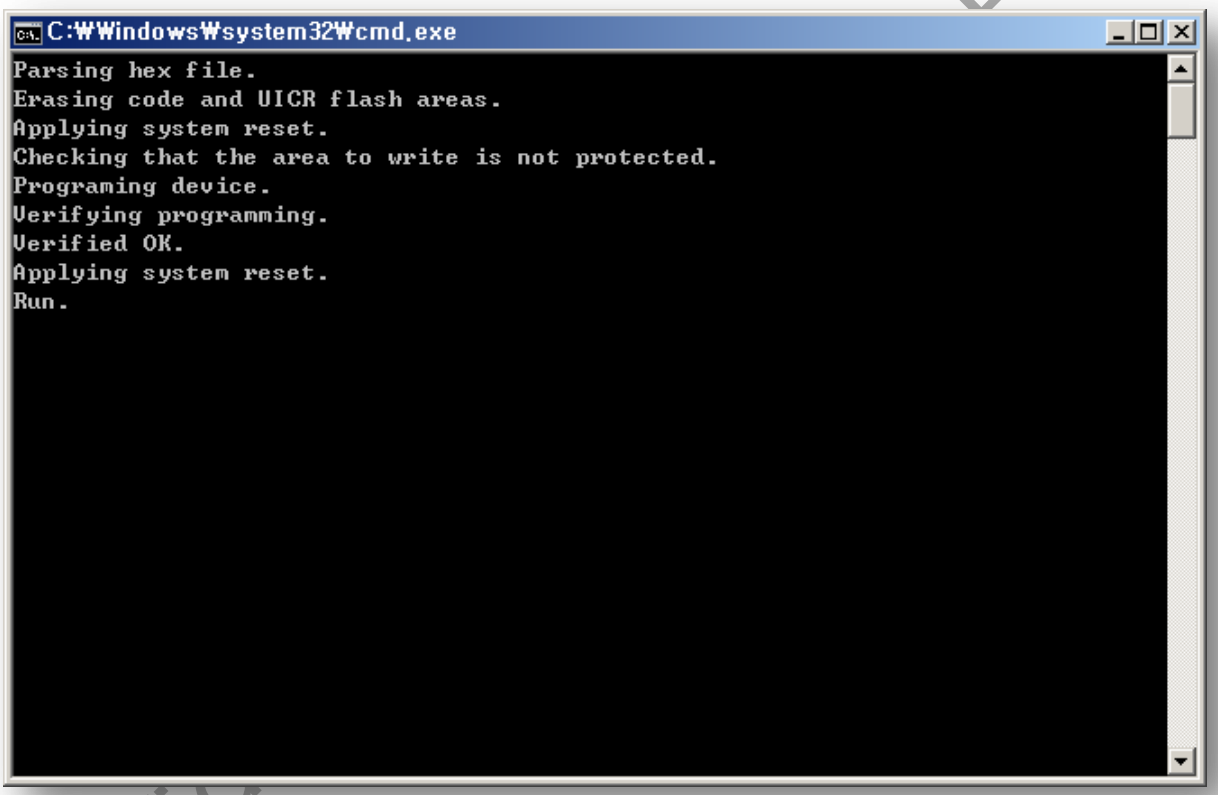


11. Release version download

11.1 Extract the release binary_V10x_UBX.file.
ex) Binary_V10x_UBX.zip.

11.2 SEGGER J-Link connection

11.3 Download
⇨ Run **SFM20R1_factory_write.cmd** command to start the download.
When the download is successful,
the following message is displayed and the command window closes automatically.



12. DFU (Device Firmware Upgrade via BLE)

12.1 Prepare

The bootloader must be installed.

Use sigfox_cfg2_make_factory_image.bat to create the binaries,

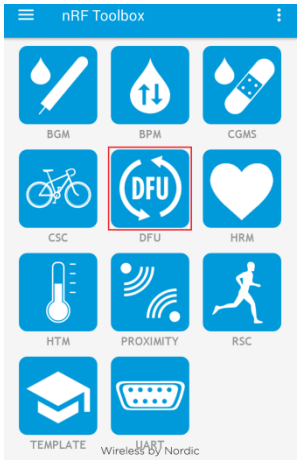
Download the release version using SFM20R1_factory_write.cmd

Copy Update Package to Android Phone

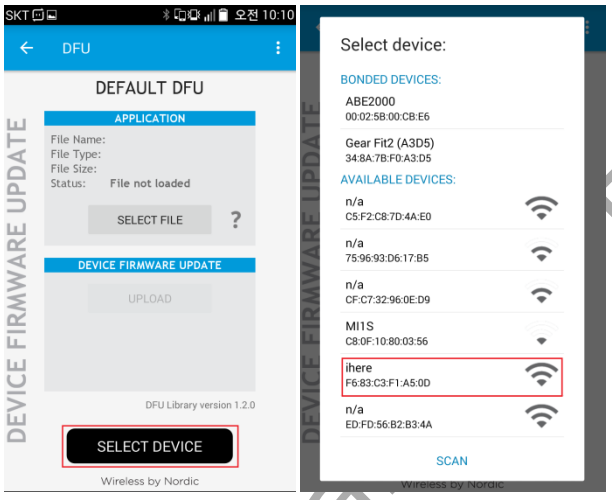
(eg. development₩sigfox_cfg2₩binary₩SFM20R1_app_dfu_package_109_UBX.zip)

12.2 Tag NFC, and run the nRF toolbox (You can download it from PlayStore)

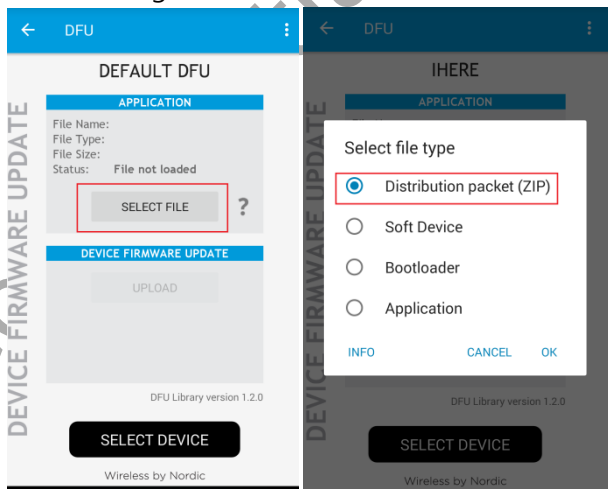
12.3 Run DFU



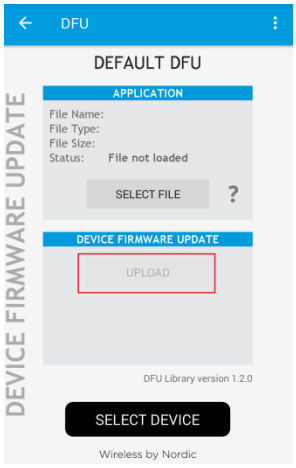
12.4 Select Device



12.5 Select Package file



12.6 Run Upload



12.7 Be sure to turn on the power while downloading (LED blinks)