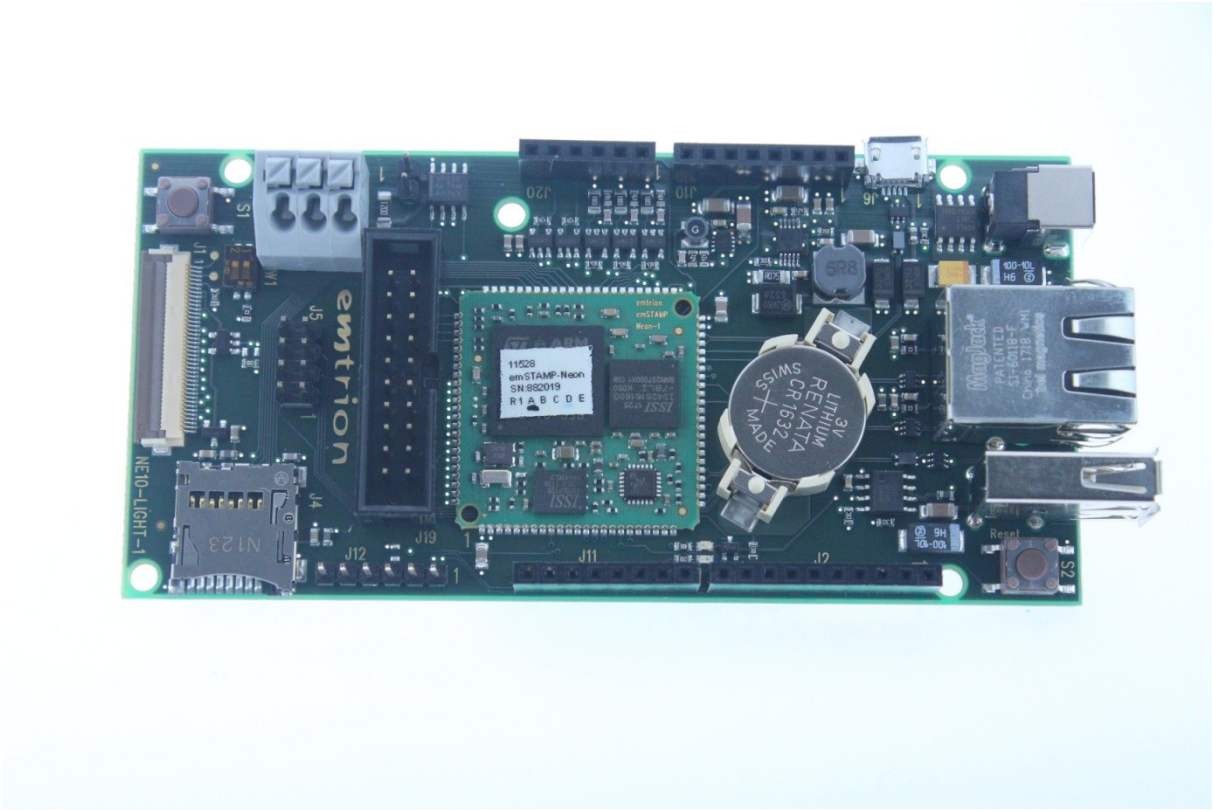
emSBC-Neon Developer Kit

Software Manual

Rev07 / **02.12.2025**



emtrion GmbH

Revision: 07 / **12.11.2025**

Rev	Date/ Signature	Changes
1	01.08.2018/ Ha	Initial release
2	27.09.2018/ Ha	Minor change, fix typo
3	23.03.2020/ Ha	Change for CM769+ STM32CubeIDE
4	13.05.2020/ Ha	Add Link for the IOC file
5	27.04.2021/ Sre	TouchGFX Demo Project
6	01.02.2022/ Bue	Linkt to TouchGFX Demo Project corrected
7	02.12.2025/Rr	Porting to STM32CubeIDE 1.19.0 and TouchGFX 4.26.0

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Table of contents

1 Introduction

Welcome to emSBC-Neon documentation. This manual will give you a startup software guideline of our developer kit. It will describe how to use the different free software to program your developer kit.

It is assumed that users of emtrion developer kits are already familiar with software development. Programming knowledge are out of the scope of this document. emtrion will gladly assist you in acquiring this knowledge. If you are interested in training courses or getting support, please contact the emtrion sales department.

The examples in this manual are demonstrated on specific hardware but if not mentioned otherwise they all work on all supported emtrion devices.

Please refer to the “Hardware Description” of emSBC-Neon available on the emtrion support website (http://support.emtrion.de) for more detailed info of the capability of the product.

2 Hardware requirement

2.1 JTAG debugger/programmer

In this manual, the in-circuit debugger/programmer ST-LINK/V2 (https://www.st.com/en/development-tools/st-link-v2.html) and ST-LINK/V3SET (https://www.st.com/en/development-tools/stlink-v3set.html) is used.

3 Workstation Software installation

Before starting you need to prepare your workstation. In order to build an image that runs on the target, you need to install the following set of free software available online on the ST microelectronics, the microcontroller manufacturer (www.st.com).

3.1 STM32CubeMX initialization code generator

STM32CubeMX is a graphical tool that allows a very easy configuration of STM32 microcontrollers and the generation of the corresponding initialization C code through a step-by-step process.
(https://www.st.com/en/development-tools/stm32cubemx.html)

Note: STM32CubeMX is a stand alone application but it is also part of the STM32CubeIDE (see below)

3.2 STM32Cube Programmer (v2.20.0)

STM32CubeProgrammer is a full-featured software interface for programming STM32 microcontrollers
(https://www.st.com/en/development-tools/stm32cubeprog.html)

The tool offers a wide range of features to program STM32 internal memories (Flash, RAM, OTP and others), external memories, to verify the programming content (checksum, verify during and after programming, compare with file) and to automate STM32 programming.STM32CubeProgrammer is delivered as a graphical user interface (GUI) with a command line interface (CLI).

3.3 STM32CubeIDE for development (v1.19.0)

STM32CubeIDE is an advanced C/C++ development platform with peripheral configuration, code generation, code compilation, and debug features for STM32 microcontrollers and microprocessors. It is based on the ECLIPSE™/CDT framework and GCC toolchain for the development, and GDB for the debugging.
(https://www.st.com/en/development-tools/stm32cubeide.html)

3.4 The IOC File

emtrion is providing an ioc file that is compliant with the developer kit and let you generate the MCU peripheral (GPIO, USART, Pin MUX ...) and the middleware (USB, TCP/IP, FreeRTOS...). The output will be a bundle of initialization file in C code and all project files that allow you to create your main project.

The Link to download the IOC file:

https://cloud.emtrion.de/index.php/s/ThWLpLuaCnrVIUg/download

3.5 External Loader

On the module emSBC_Neon a qspi nor flash is soldered. For programming this chip an external loader is necessary.

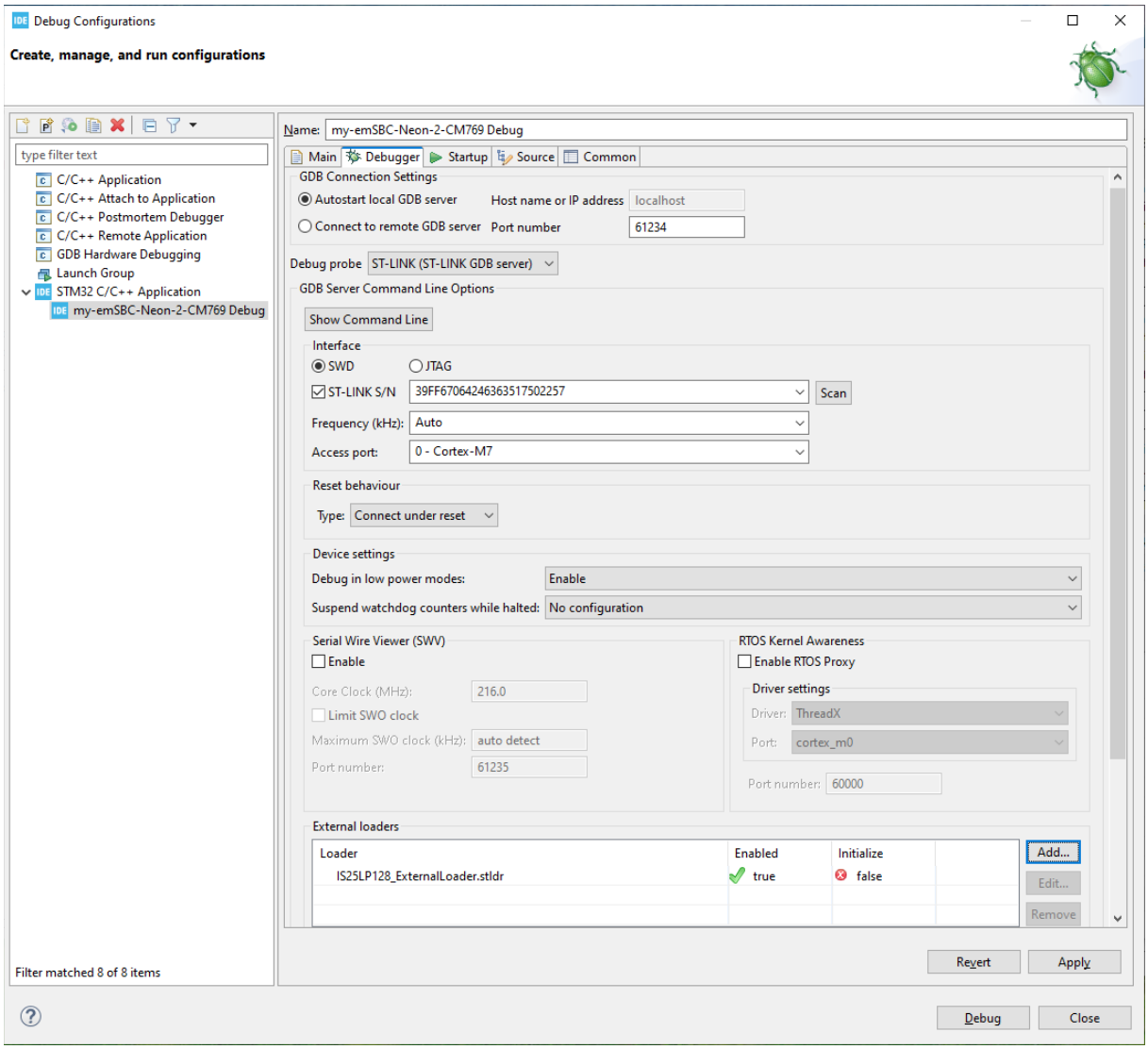
The Link to download the loader file:

https://cloud.emtrion.de/index.php/s/z3pmhE90nvOOJOC/download

For using this file with STM32CubeIDE, copy this file to the directory:

c:\ST\STM32CubeIDE_1.19.0\STM32CubeIDE\plugins\
com.st.stm32cube.ide.mcu.externaltools.cubeprogrammer.win32_2.2.200.20250304
1107\tools\bin\ExternalLoader\

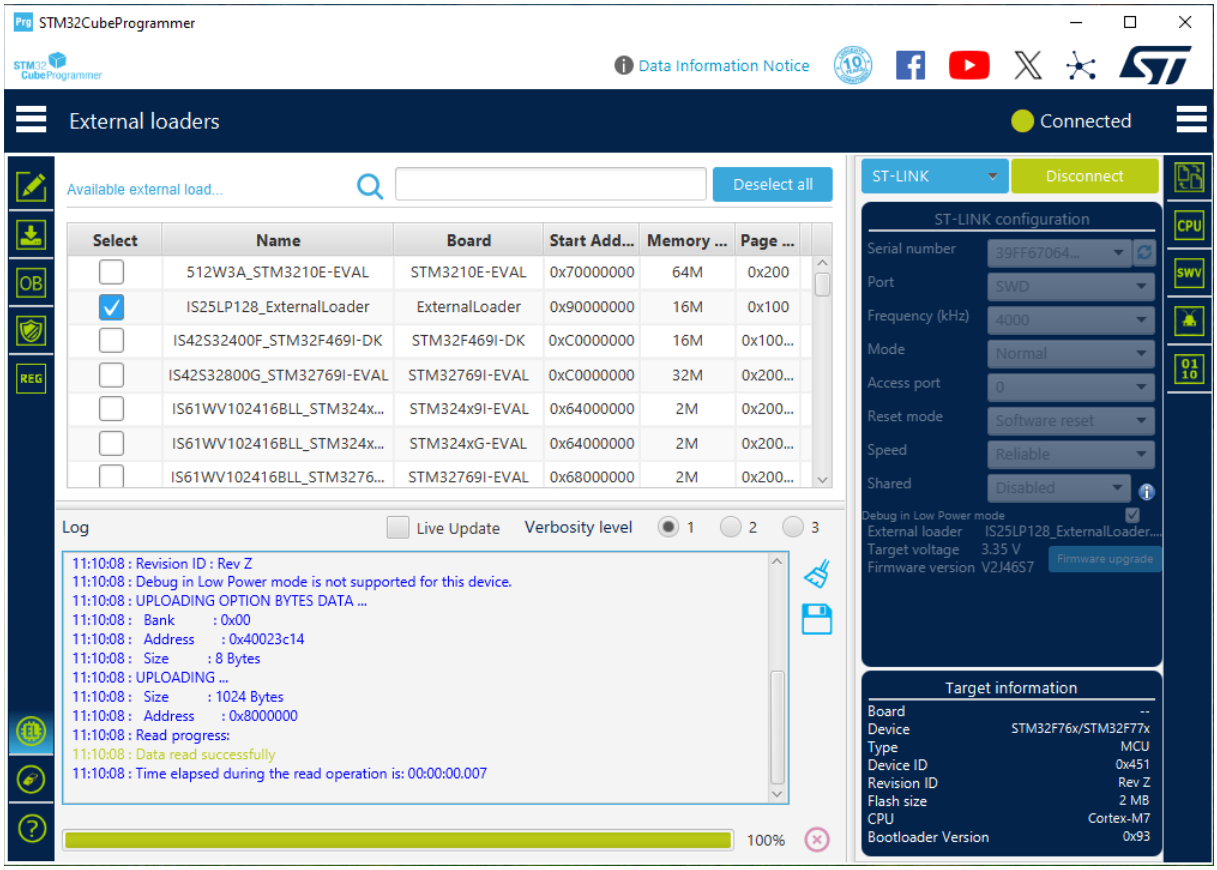
The configuation dialog is shown below:



For using this loader with STM32CubeProgrammer, copy this file to the directory:

c:\Program Files (x86)\STMicroelectronics\STM32Cube\STM32CubeProgrammer\bin\
ExternalLoader\

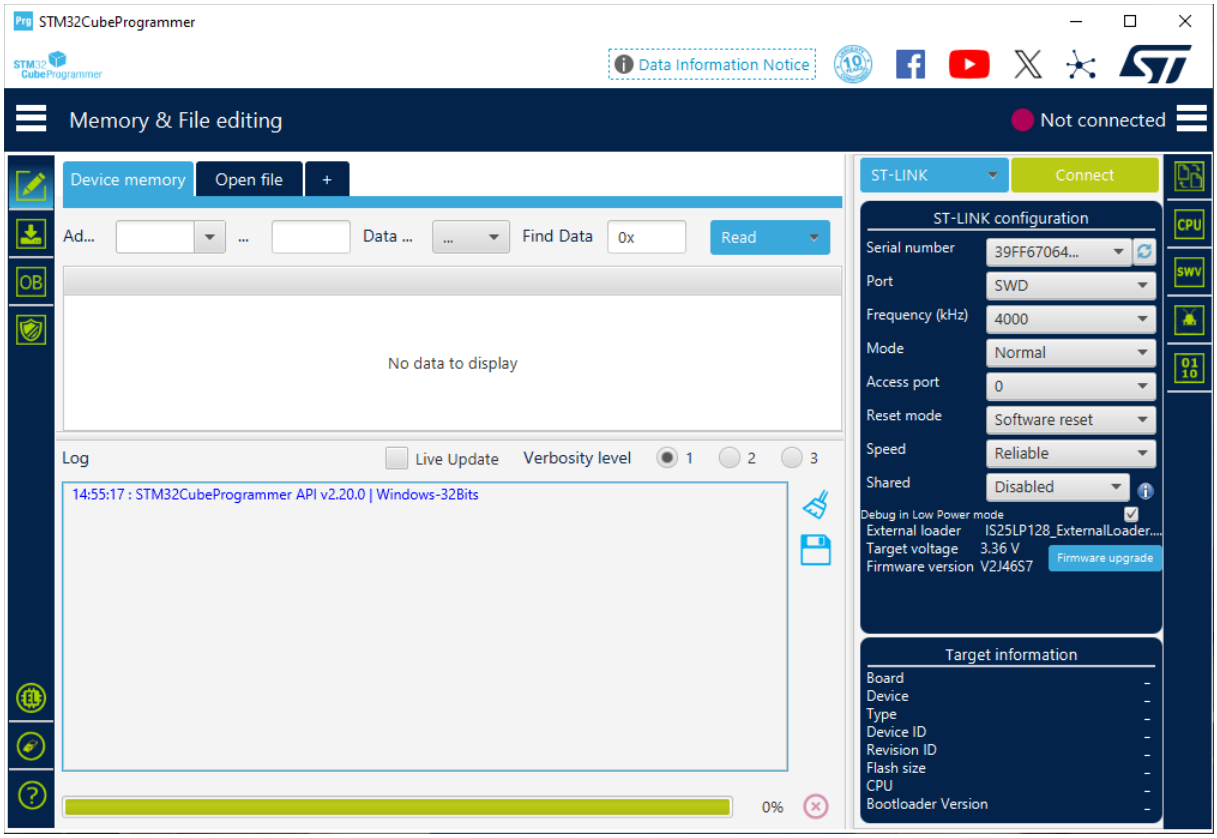
The configuration dialog is shown below.


STM32CubeProgrammer
Data Information Notice
External loaders
Connected
Available external load...
Deselect all
Select
Name
Board
Start Add...
Memory ...
Page ...
512W3A_STM3210E-EVAL
STM3210E-EVAL
0x70000000
64M
0x200
IS25LP128_ExternalLoader
ExternalLoader
0x90000000
16M
0x100
IS42S32400F_STM32F469I-DK
STM32F469I-DK
0xC0000000
16M
0x100...
IS42S32800G_STM32769I-EVAL
STM32769I-EVAL
0xC0000000
32M
0x200...
IS61WV102416BLL_STM324x...
STM324x9I-EVAL
0x64000000
2M
0x200...
IS61WV102416BLL_STM324x...
STM324xG-EVAL
0x64000000
2M
0x200...
IS61WV102416BLL_STM3276...
STM32769I-EVAL
0x68000000
2M
0x200...
Log
Live Update
Verbosity level
1
2
3
11:10:08 : Revision ID : Rev Z
11:10:08 : Debug in Low Power mode is not supported for this device.
11:10:08 : UPLOADING OPTION BYTES DATA ...
11:10:08 : Bank : 0x00
11:10:08 : Address : 0x40023c14
11:10:08 : Size : 8 Bytes
11:10:08 : UPLOADING ...
11:10:08 : Size : 1024 Bytes
11:10:08 : Address : 0x8000000
11:10:08 : Read progress:
11:10:08 : Data read successfully
11:10:08 : Time elapsed during the read operation is: 00:00:00.007
100%
ST-LINK
Disconnect
ST-LINK configuration
Serial number
39FF67064...
Port
SWD
Frequency (kHz)
4000
Mode
Normal
Access port
0
Reset mode
Software reset
Speed
Reliable
Shared
Disabled
Debug in Low Power mode
External loader
IS25LP128_ExternalLoader...
Target voltage
3.35 V
Firmware version
V2J46S7
Firmware upgrade
Target information
Board
--
Device
STM32F76x/STM32F77x
Type
MCU
Device ID
0x451
Revision ID
Rev Z
Flash size
2 MB
CPU
Cortex-M7
Bootloader Version
0x93

4 Testing your in-circuit Debugger/programmer on your emSBC-Neon

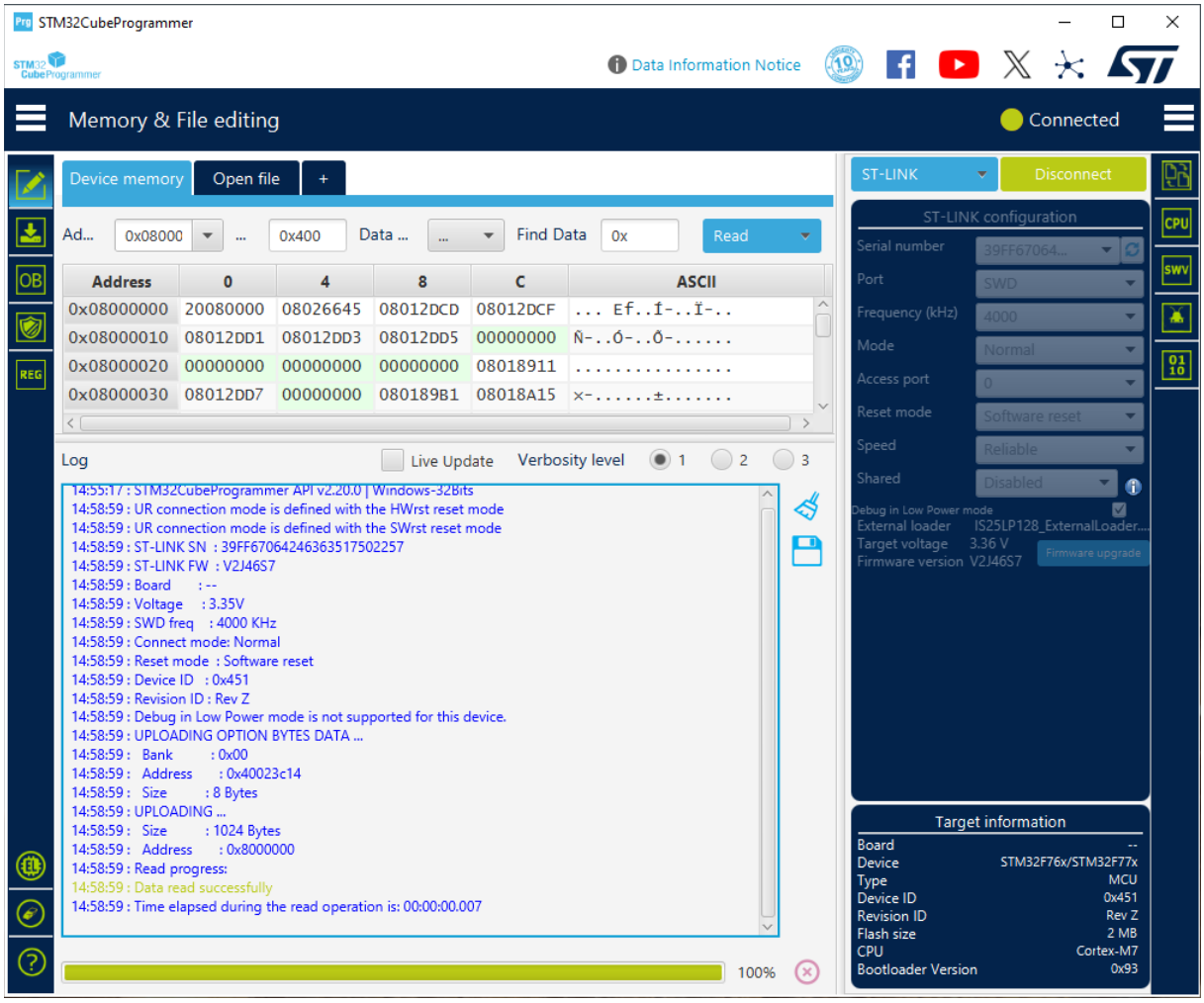
It is strongly advice to test the communication between your workstation and your target using the STM32CubeProgrammer before starting any debugging and/or programming.

After starting the application the window below is shown. As a first step, the correct ST-Link has to be chosen. With the button right to the serial number list box an automatic scan on the USB is started and all connected ST-Link devices are detected. Please note the port configuration.



Choose the one you want to have by the serial number and click on “connect”.

The target device is detected and some information is read from the internal fuses of the processor.



For more details on this utility please read the documentation available on the web sites of STM.

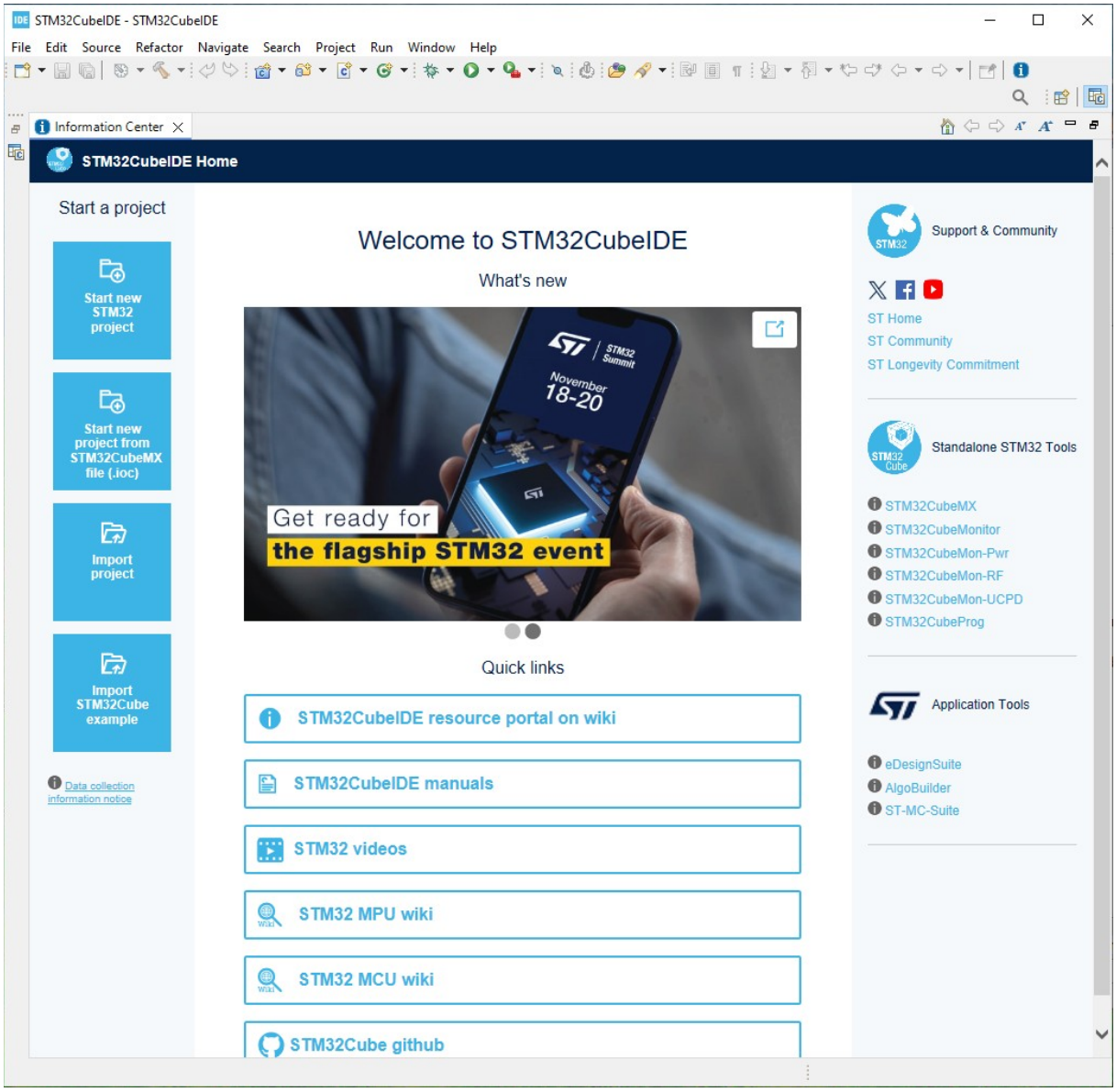
5 Working with STM32CubeIDE to develop your application

Emtrion is providing the configuration file that gives you the possibility to load the entire pin muxing, clock configuration and middleware of the MCU STM32F769NIHx used in the emSBC-Neon. To proceed to the generation, load the project file called *emSBC-Neon-2-CM769-v02.ioc*

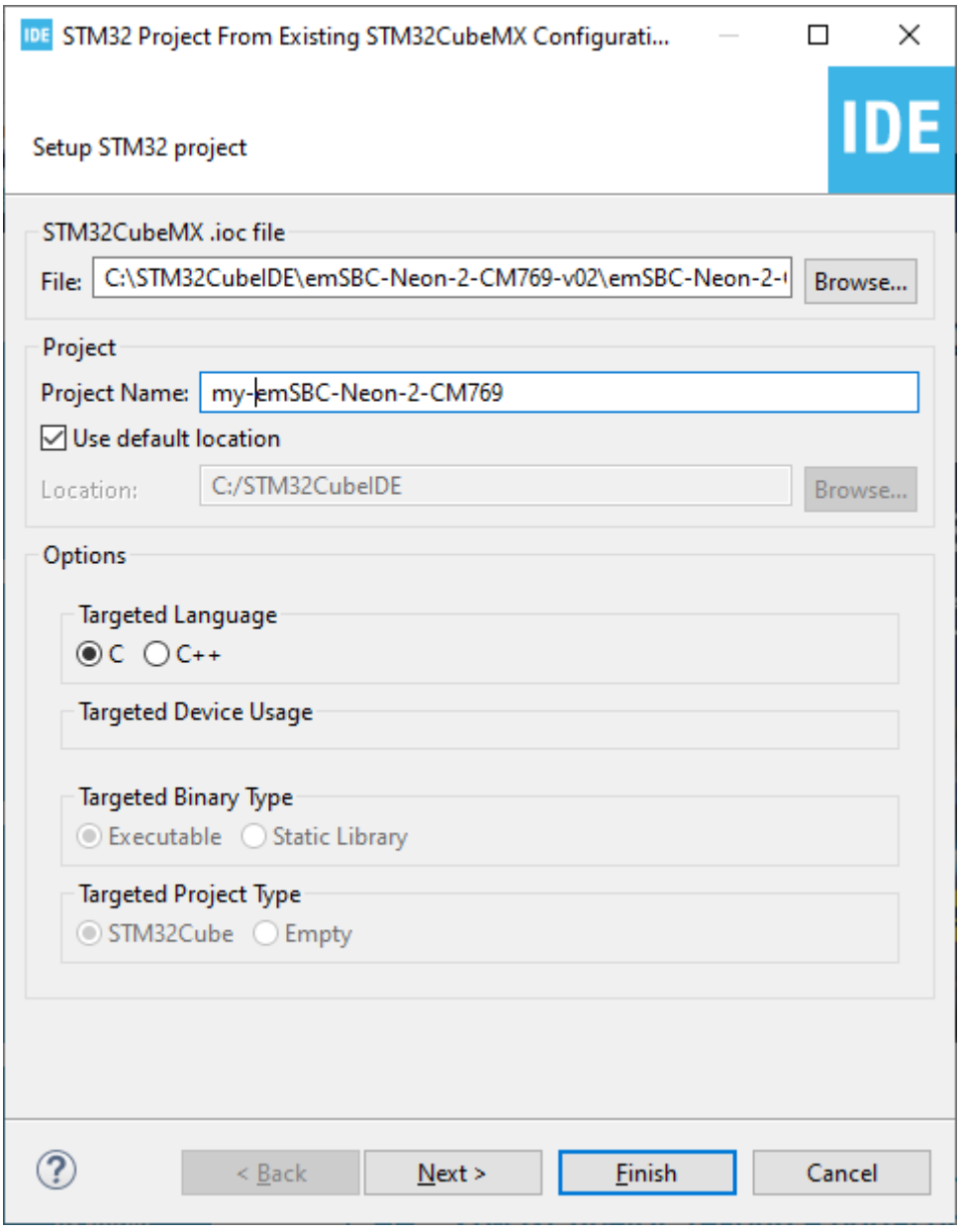
NOTE: This tutorial is written for the CM479 version. Apply the same but with “769” instead of “479”

To create a new project, open STM32CubeIDE:

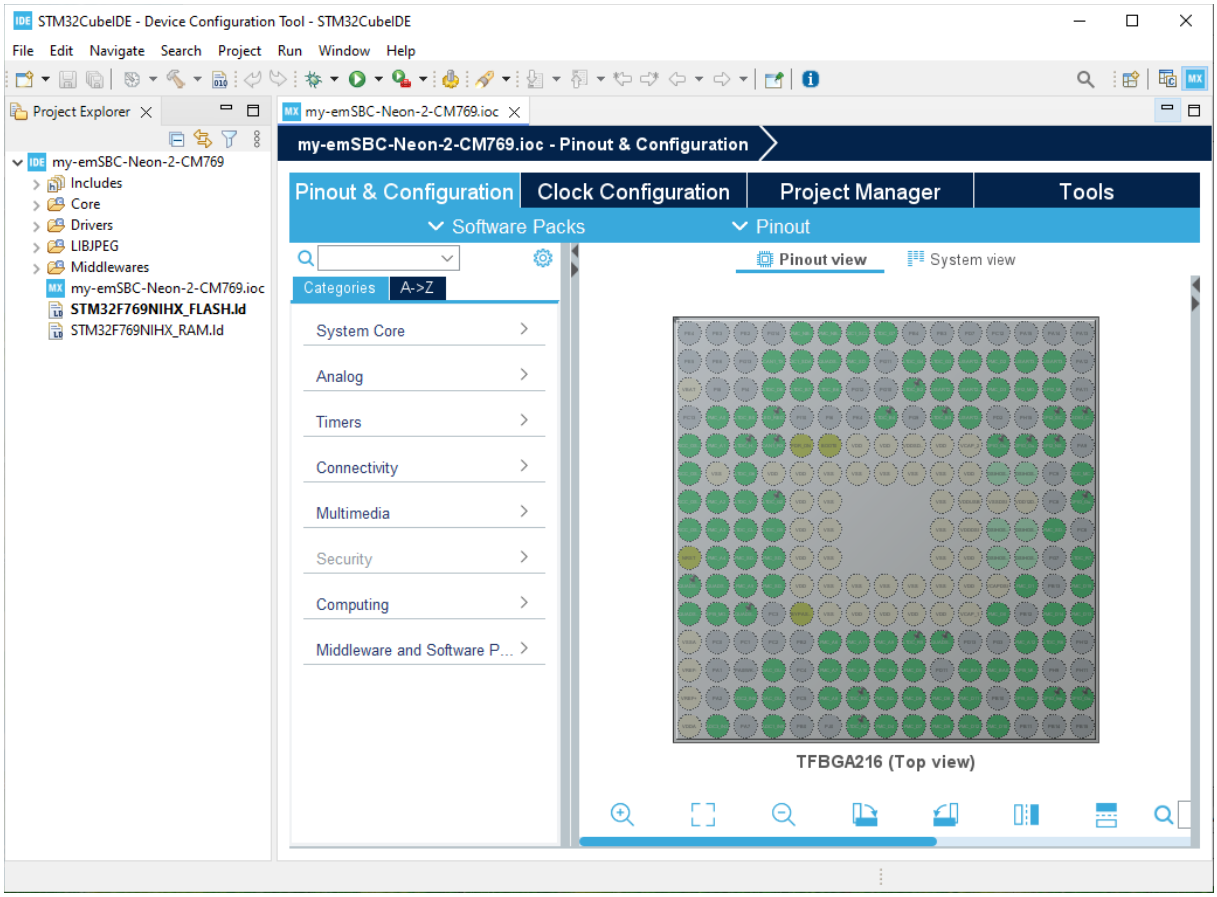
Then click on the icon “Start new project from STM32CubeMX file (.ioc)”:



and select the provided ioc file. Then click on finish and wait for the files generations to finish.



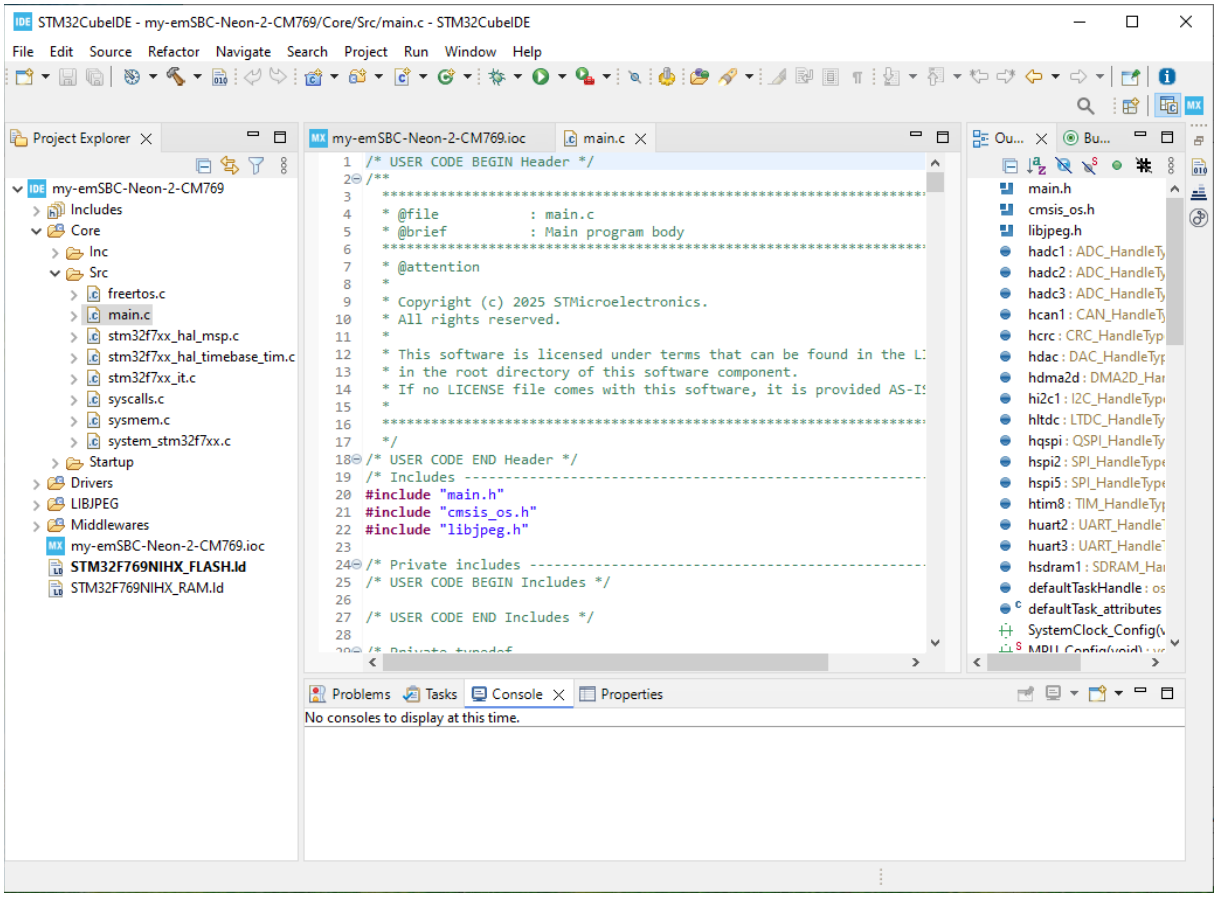
Once imported you should see the IDE like this:



From here you can modify the source code and/or the configuration of the microcontroller. Using the integrated STM32CubeMX, you can modify and regenerate the configuration like this:

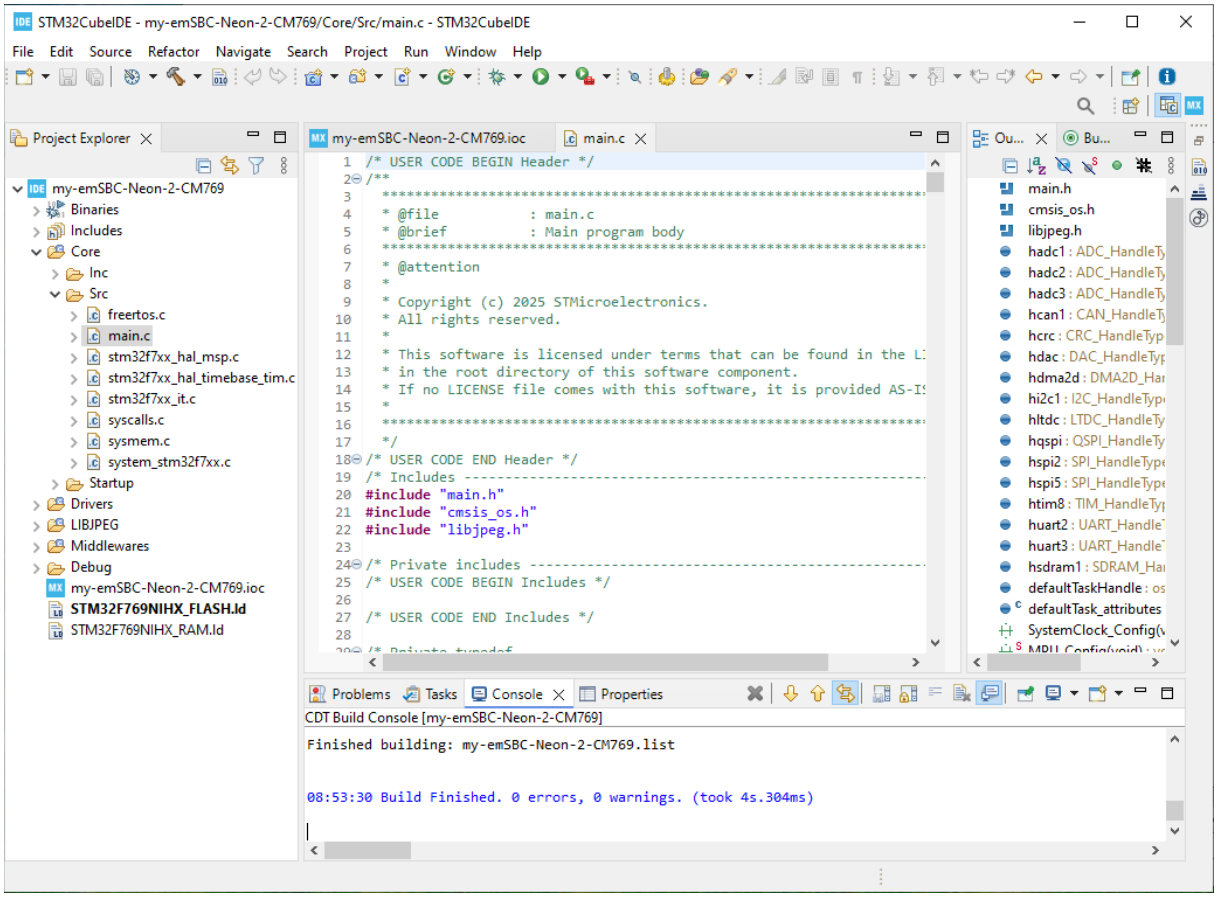
Change a setting in the ioc file and then save the file. It generates the source code automatically. Some firmware will be downloaded from the STM web site before.

Note: This might take a long time if you haven’t already downloaded the firmware package.



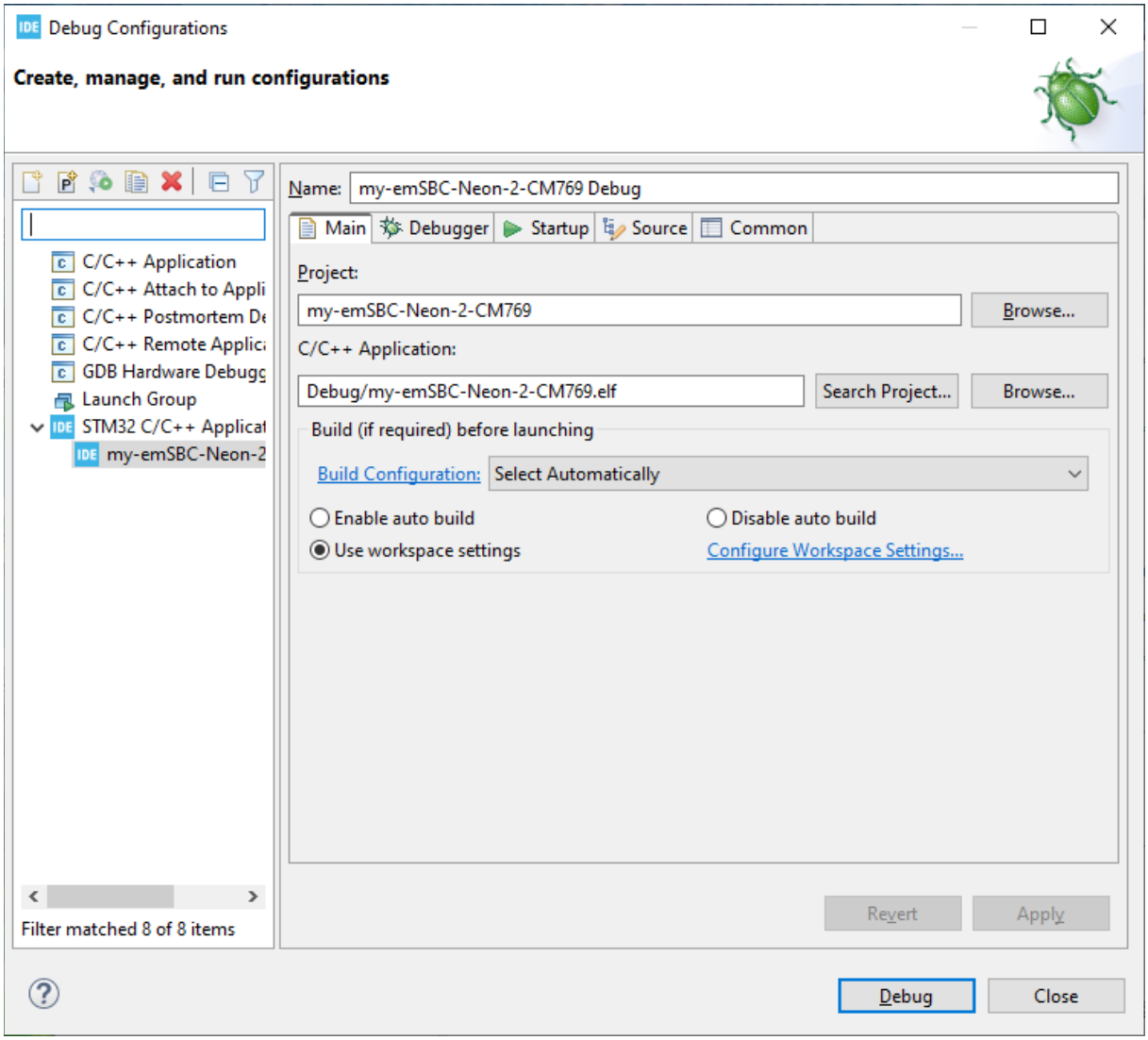
You are now ready to debug your application.

Let’s compile the project by click on the hammer icon, select Debug:

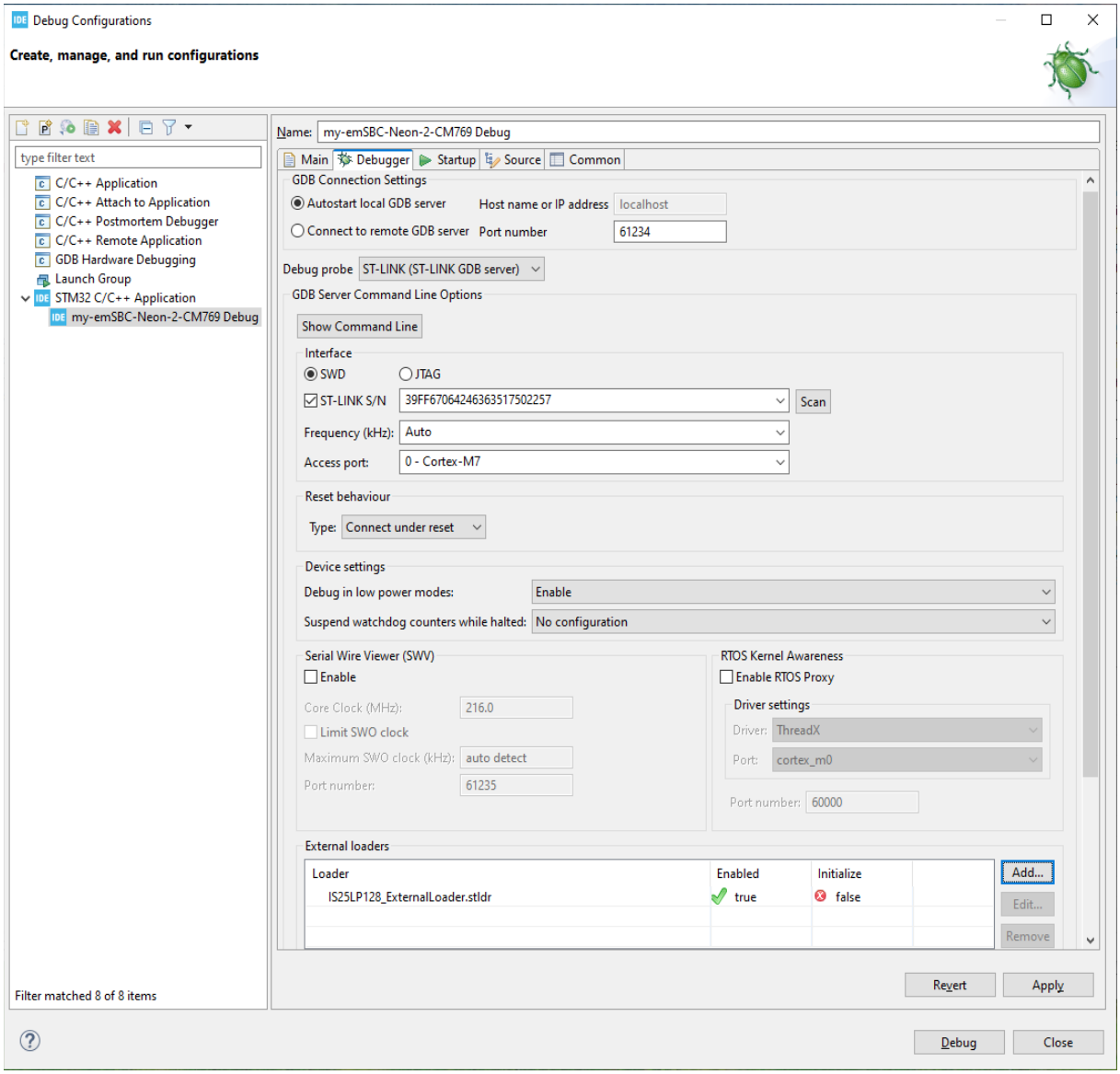


Make sure your target is power up and that the ST-LINK is connected properly and hit the bug icon to debug your project and select *Debug Configurations...*

Double click on *STM32 C/C++ Application* and edit the fields as shown below.

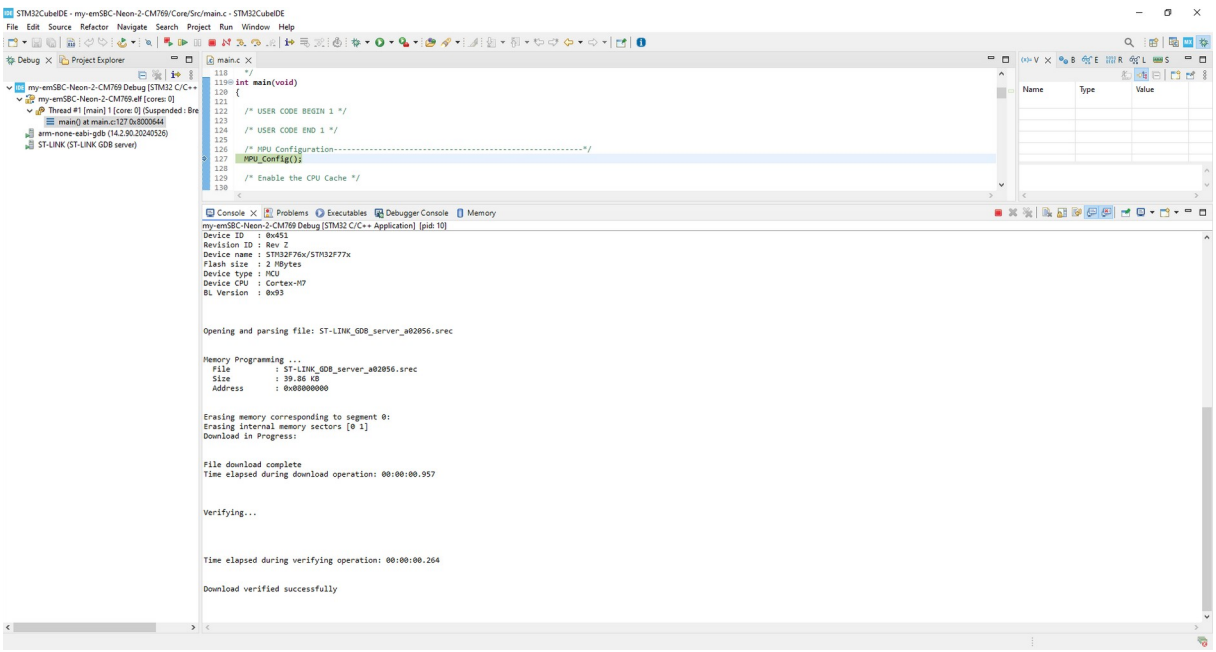


Additionally the debugger has to be configured. Switch to the tab Debugger and add the necessary information:



Click on Apply and afterwards on Debug for starting the debug session.

The IDE is ready to debug the code on the target like this:



6 TouchGFX

TouchGFX is an advanced, free-of-charge GUI optimized for STM32 microcontrollers. Taking advantage of the STM32 graphical hardware acceleration, architecture, and ecosystem, TouchGFX accelerates the HMI-of-Things revolution through the creation of stunning smartphone user interfaces on embedded devices ranging from simple low-color UI applications up to high-resolution and high-color UI applications.

6.1 Downloading TouchGFX

TouchGFX version 4.26 is used in the Demo project from emtrion.

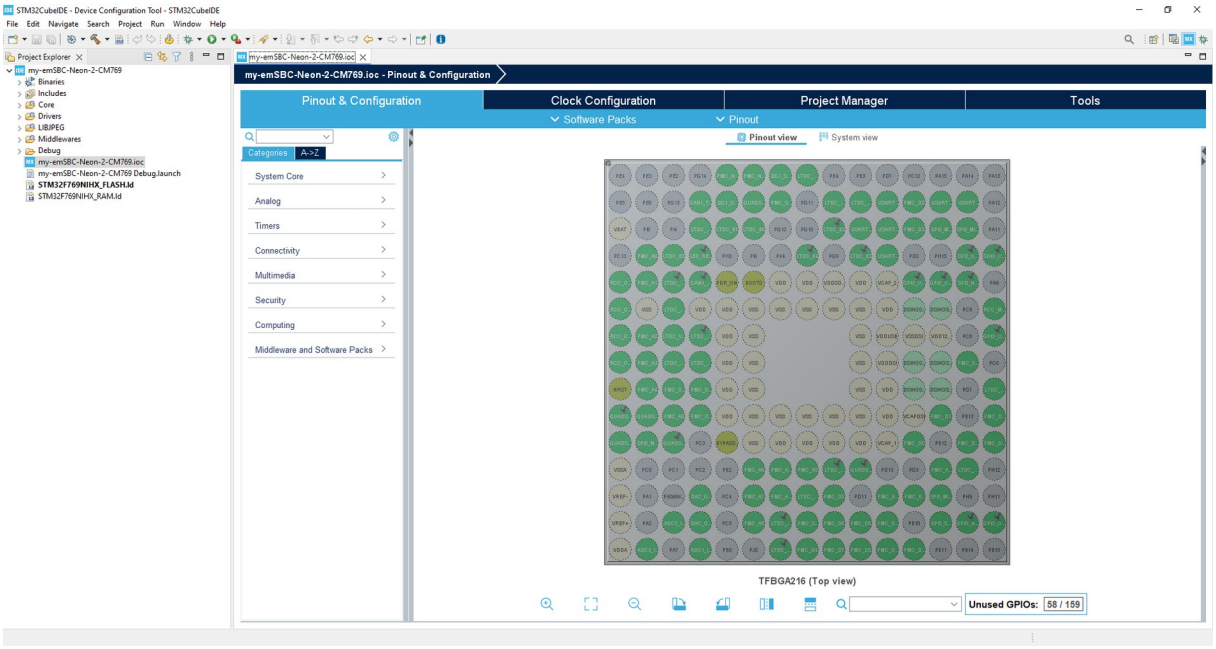
TouchGFX can be download from the following link

https://www.st.com/en/embedded-software/x-cube-touchgfx.html

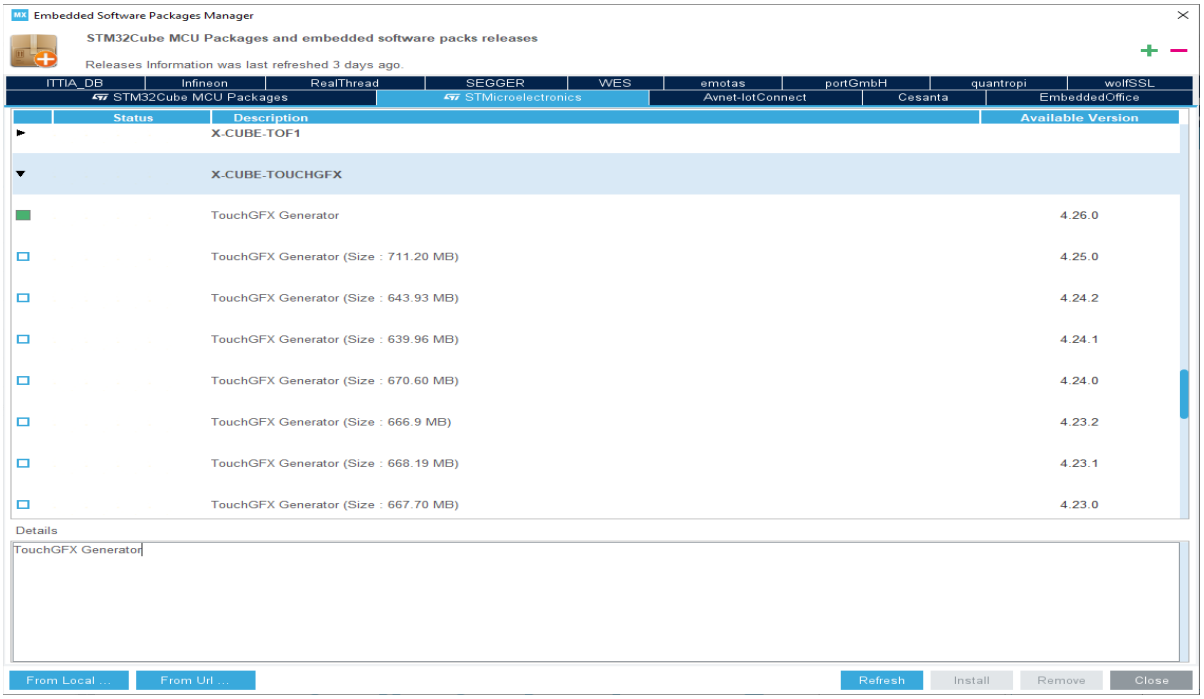
After downloading, install the TouchGFX application as per the guidance given in readme file in the downloaded and unzipped folder

6.2 Installing TouchGFX from your existing project

Open the ioc file



Click on Software Packs, select Manage Software Packs and select STMicroelectronics tab



Select the recent version (4.26.0) of TouchGFX and click Install now

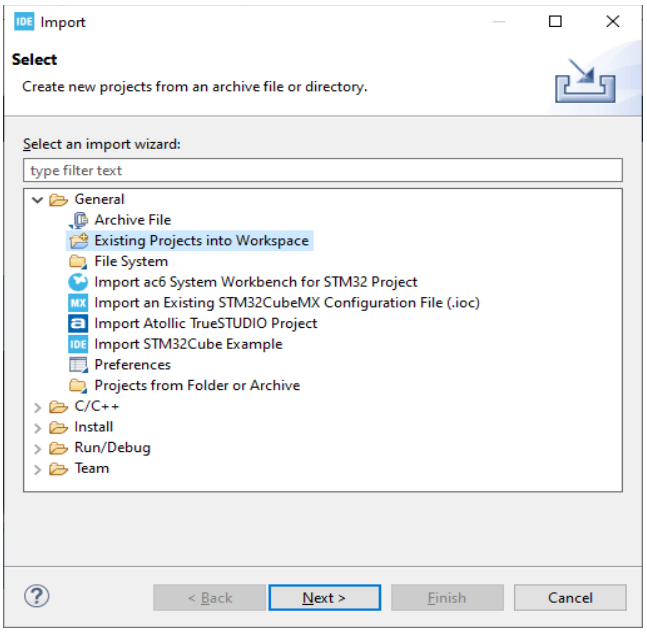
7 TouchGFX Demo Project

There is a TouchGFX demo project available which can be downloaded from here:

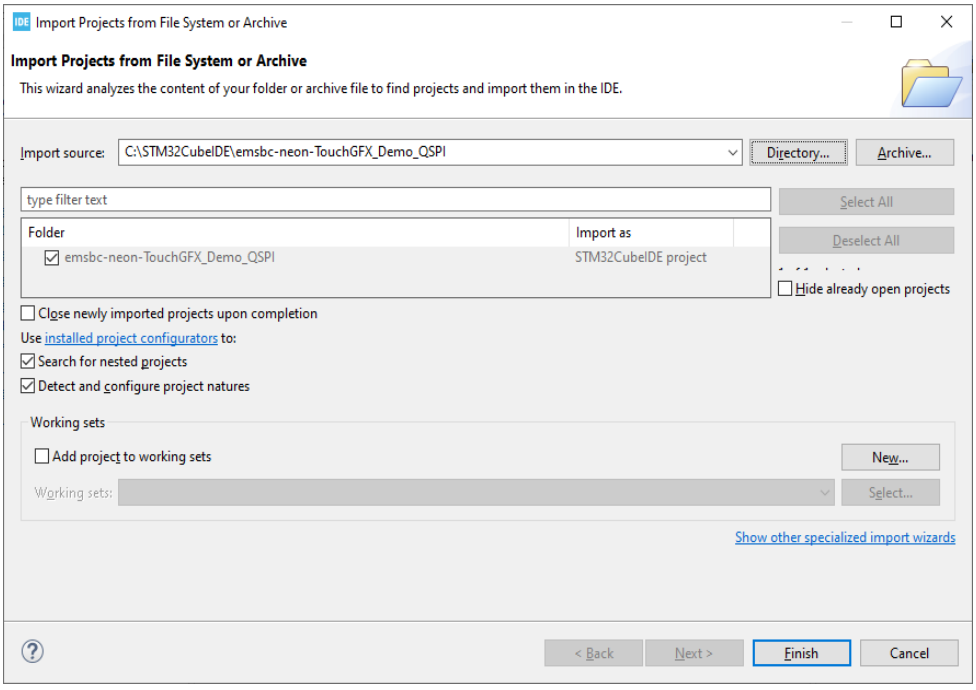
https://cloud.emtrion.de/index.php/s/dKBJdKhu8gwEjhs

This project is an adoption from a project available within the TouchGFX designer. It has been modified so that it fits to the features of emSBC-Neon-2. Have a look into the source code for more details.

- Import the project in STM32CubeIDE
  Go to File →Import and select Existing Projects into Workspace.



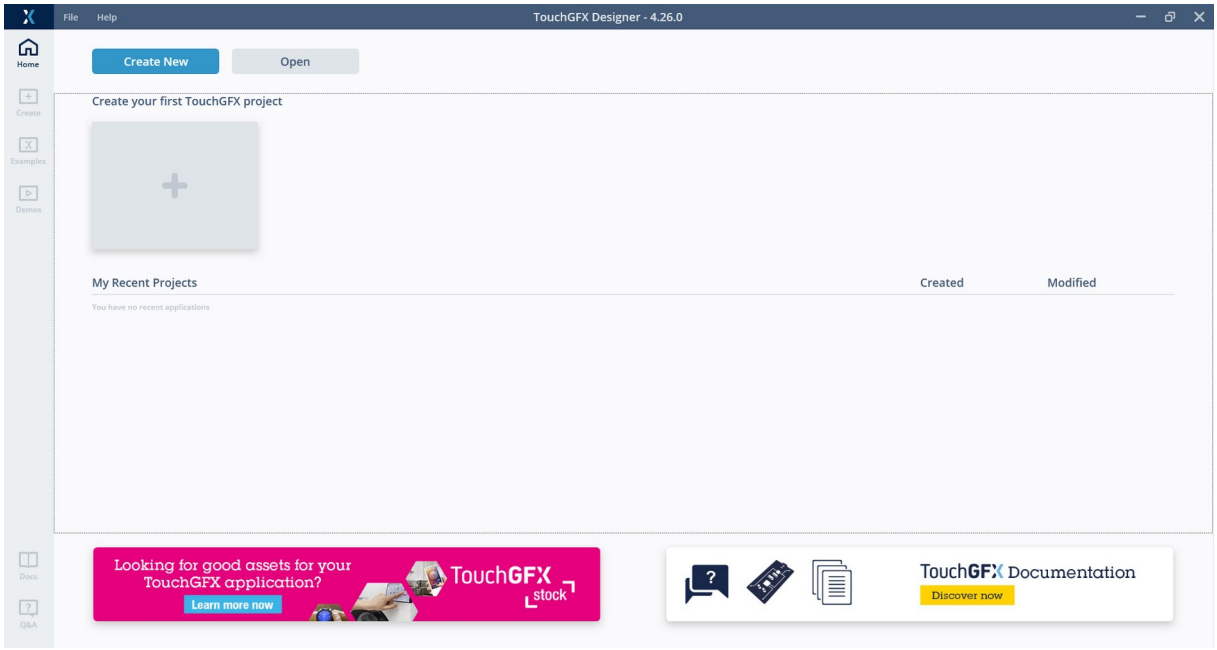
The import source is the project folder you have downloaded before:



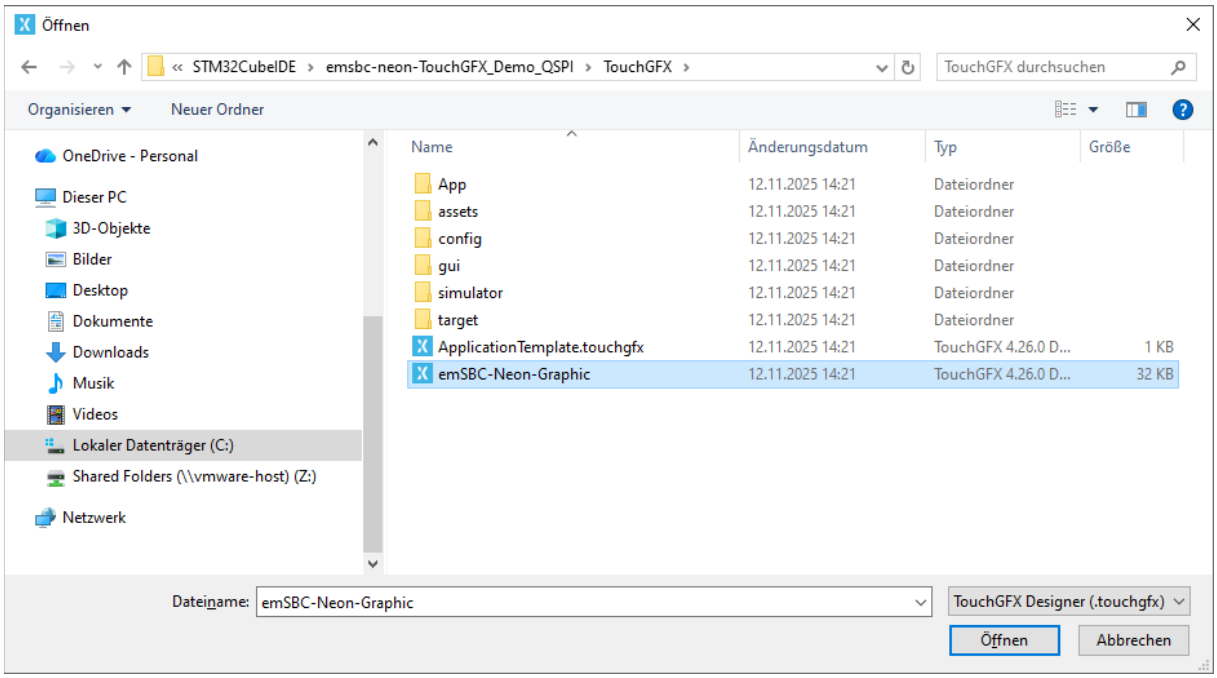
To play the demo project included in this file, TouchGFX is required.

- Download and Install TouchGFX as mentioned in section 7.1

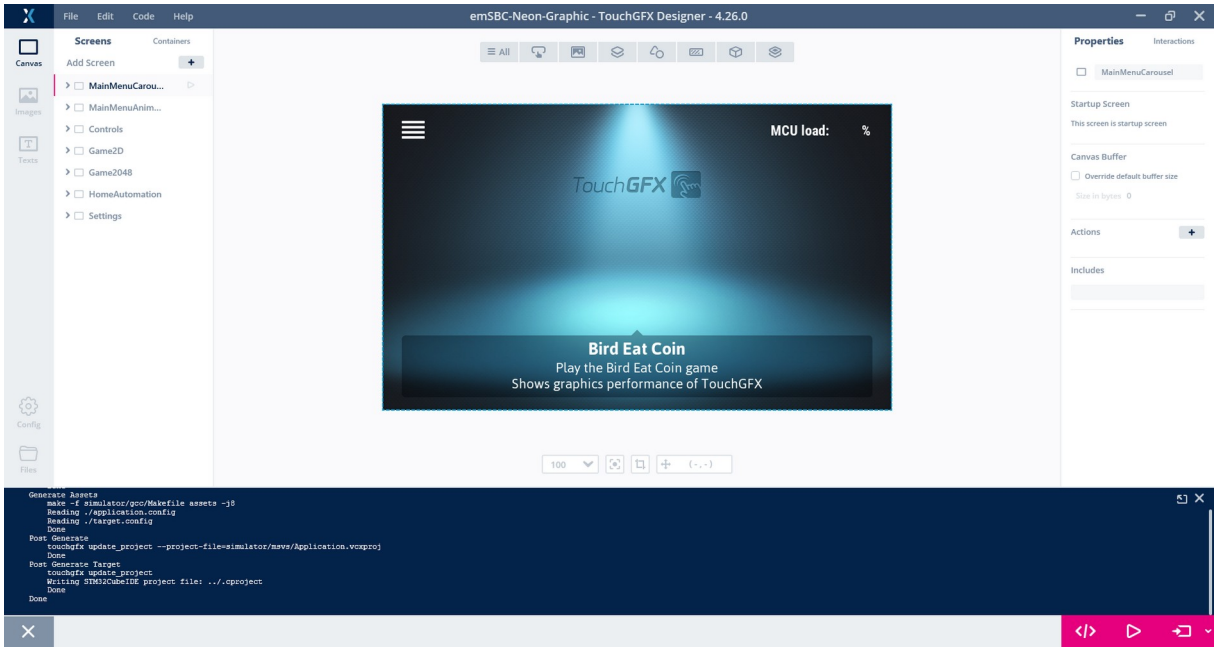
Start the TouchGFX designer and click on open



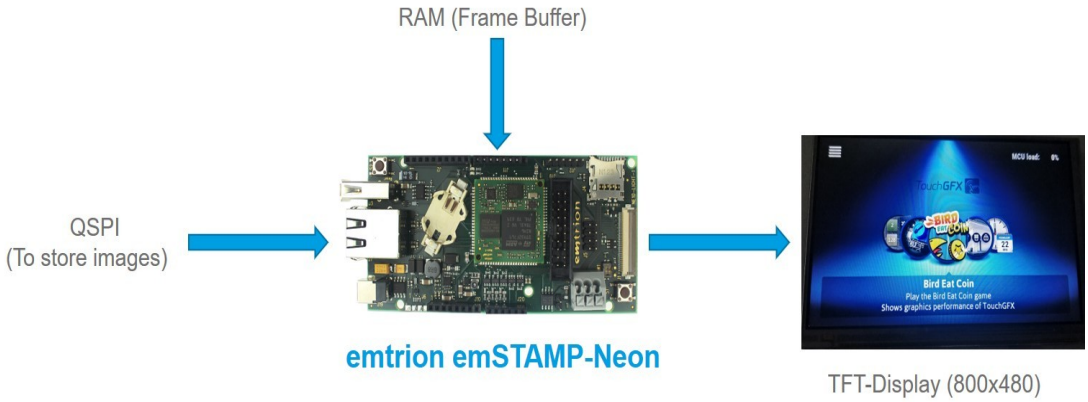
Navigate to the demo project and select the TouchGFX configuration file:



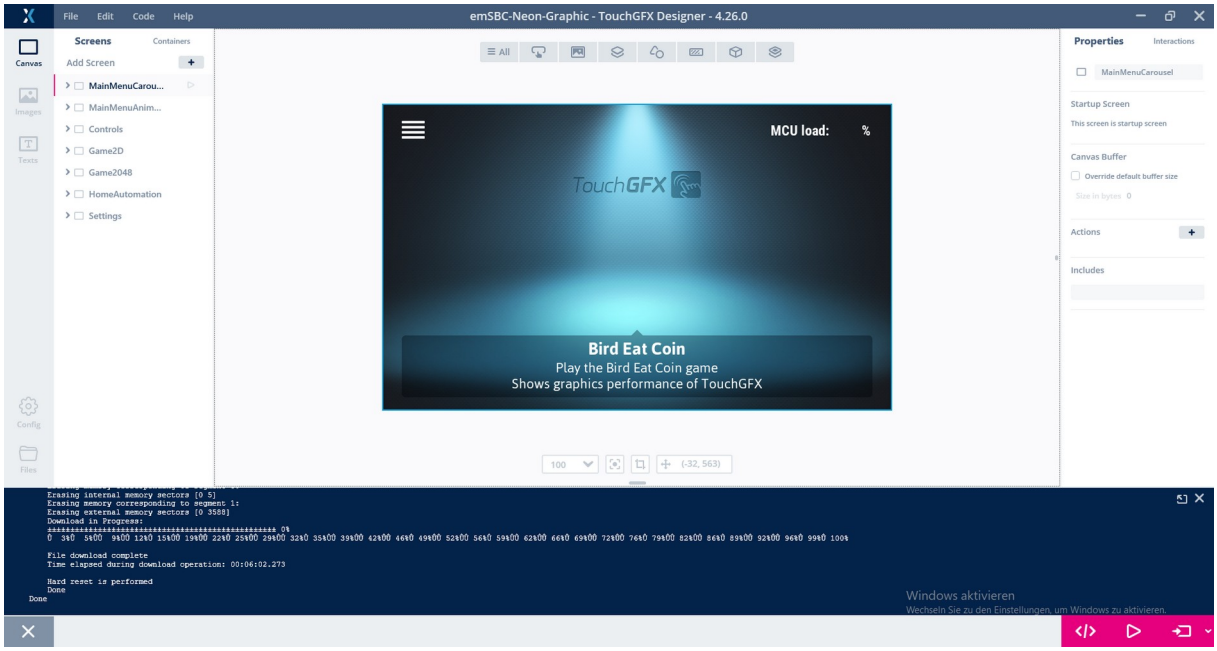
For creating the project files click on Code→Generate Code. In case remove the hidden flags of the files: .cproject, .mxproject and .project



Before programming the SBC please make sure that the TFT LCD display available at emtrion (800x480) is connected to the Neon board.



For programming the internal and external flash click on Code→Program and Run Target. After compiling the code the resulting binaries are copied to the flash devices. This will take some minutes.



The Demo project should be displayed on the LCD connected to the board.

It is also possible to debug the demo project with STM32CubeIDE. Have a look at the official web site of STM for details.

Due to some constraints, which for sure will be fixed with future versions of STM32CubeIDE, compile and program the emSBC_Neon with TouchGFX Designer.