

# emSTAMP-Neon Developer Kit

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Software Manual

Rev06 / 01.02.2022



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Revision: **06 / 01.02.2022**

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

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## 2 Introduction

Welcome to emSTAMP-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 emSTAMP-Neon available on the emtrion support website (<http://support.emtrion.de>) for more detailed info of the capability of the product.

## 3 Hardware requirement

### 3.1 JTAG debugger/programmer

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

## 4 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](http://www.st.com)).

### 4.1 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)

### 4.2 STM32 ST-LINK utility

STM32 ST-LINK Utility is a full-featured software interface for programming STM32 microcontrollers (<https://www.st.com/en/development-tools/stsw-link004.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. STM32 ST-LINK Utility is delivered as a graphical user interface (GUI) with a command line interface (CLI).

### 4.3 STM32CubeIDE for development

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> )

### 4.4 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/nuA1rFRjFY9JaCu/download>

## 5 Testing your in-circuit Debugger/programmer on your emSTAMP-Neon

It is strongly advice to test the communication between your workstation and your target using the ST-LINK utility tool before starting any debugging and/or programming with SW4STM32.

The output of a good communication should look like this:

The screenshot shows the STM32 ST-LINK Utility application window. At the top, there is a menu bar (File, Edit, View, Target, ST-LINK, External Loader, Help) and a toolbar with various icons. Below the toolbar, there are two main sections:

- Memory display:** Includes fields for Address (0x90000000), Size (0x2000), and Data Width (16 bits).
- Device Information:** A table showing:
 

Device	STM32F469x/F479x
Device ID	0x434
Revision ID	Rev A
Flash size	2MBytes

Below these sections is a table for **Target memory, Address range: [0x90000000 0x90002000]**. The table has columns for Address, 0, 2, 4, 6, 8, A, C, E, and ASCII. The data rows show hexadecimal values (0000) in the numeric columns and dots in the ASCII column.

At the bottom, there is a log window showing the following messages:

```

16:38:37 : ST-LINK SN : 31FF6F064D4E353849390943
16:38:37 : ST-LINK Firmware version : V2J29S7
16:38:37 : Connected via JTAG.
16:38:37 : JTAG Frequency = 9 MHz.
16:38:37 : Connection mode : Connect Under Reset.
16:38:37 : Debug in Low Power mode enabled.
16:38:38 : Device ID:0x434
16:38:38 : Device flash Size : 2MBytes
16:38:38 : Device family :STM32F469x/F479x
  
```

At the very bottom of the window, there are three status indicators: "Debug in Low Power mode enabled.", "Device ID:0x434", and "Core State : Live Update Disabled".

## 6 Working with STM32CubeIDE to develop your application

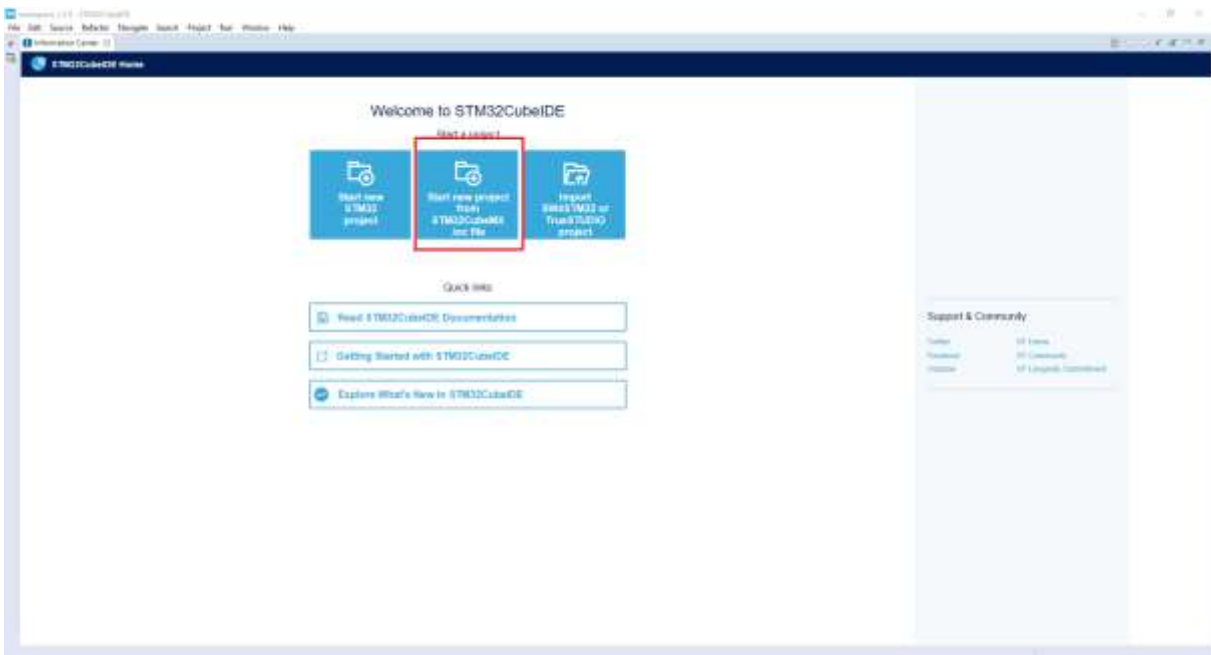
Emtrion is providing the configuration file that gives you the possibility to load the entire pin muxing, clock configuration and middleware of the MCU STM32F769NIHx used in the emSTAMP-Neon. To proceed to the generation, load the project file called *emSBC-Neon-2-CM769-Pinmux-V01-Release-emSTAMP-Neon-ed16511-v01en.ioc*

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

To import a project, open STM32CubeIDE:



Then click on the following icon:



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

IDE STM32 Project From STM32CubeMX .ioc File

Setup STM32 project

IDE

STM32CubeMX .ioc file

File: C:\ST\emstamp-neon-479.ioc

Project

Project Name: emstamp-neon-479

Use default location

Location: C:/Users/anthony/STM32CubeIDE/workspace\_1.3.0

Options

Targeted Language

C  C++

Targeted Binary Type

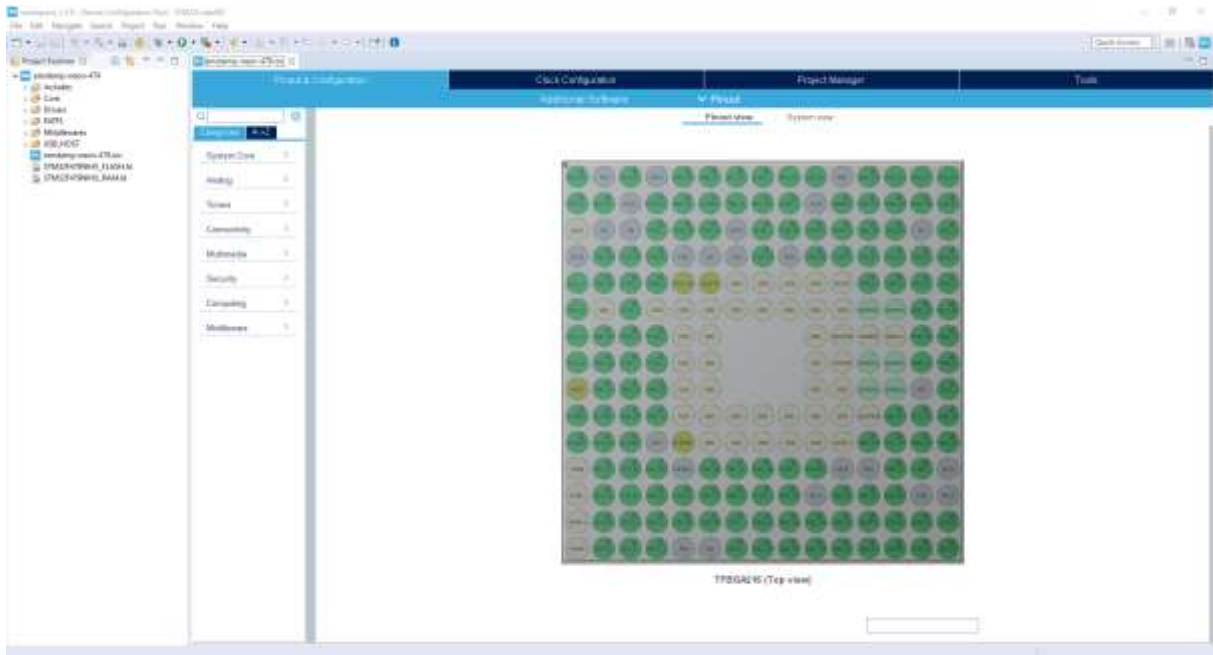
Executable  Static Library

Targeted Project Type

STM32Cube  Empty

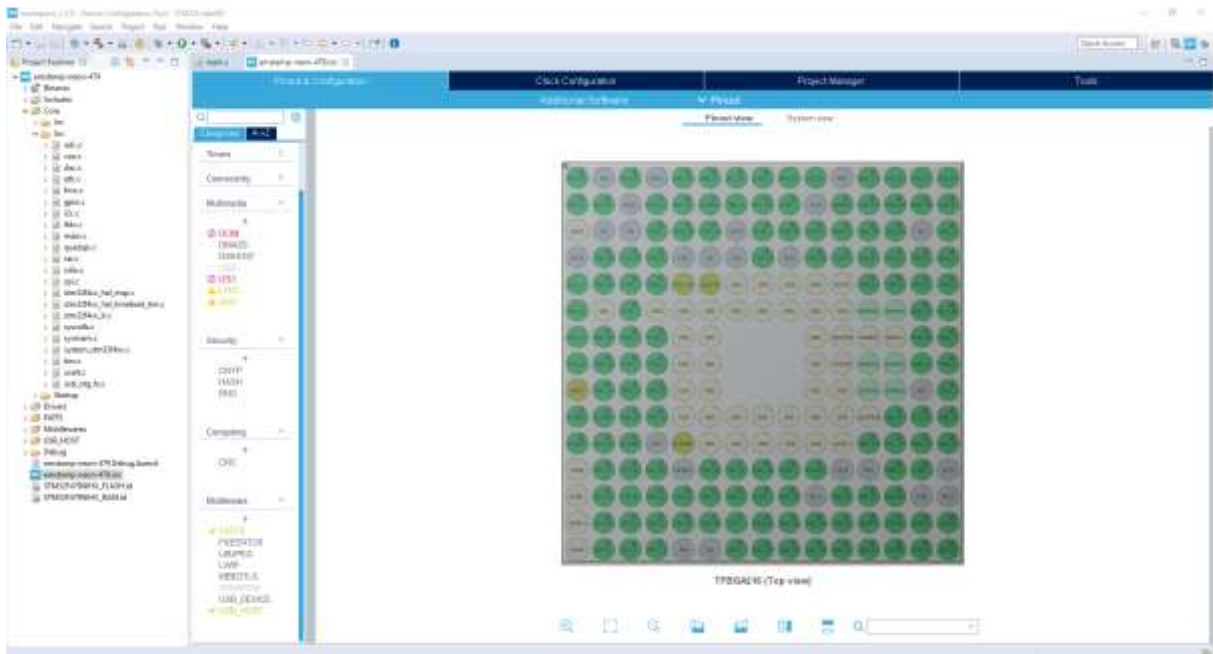


Once imported you should see the IDE like this:



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:

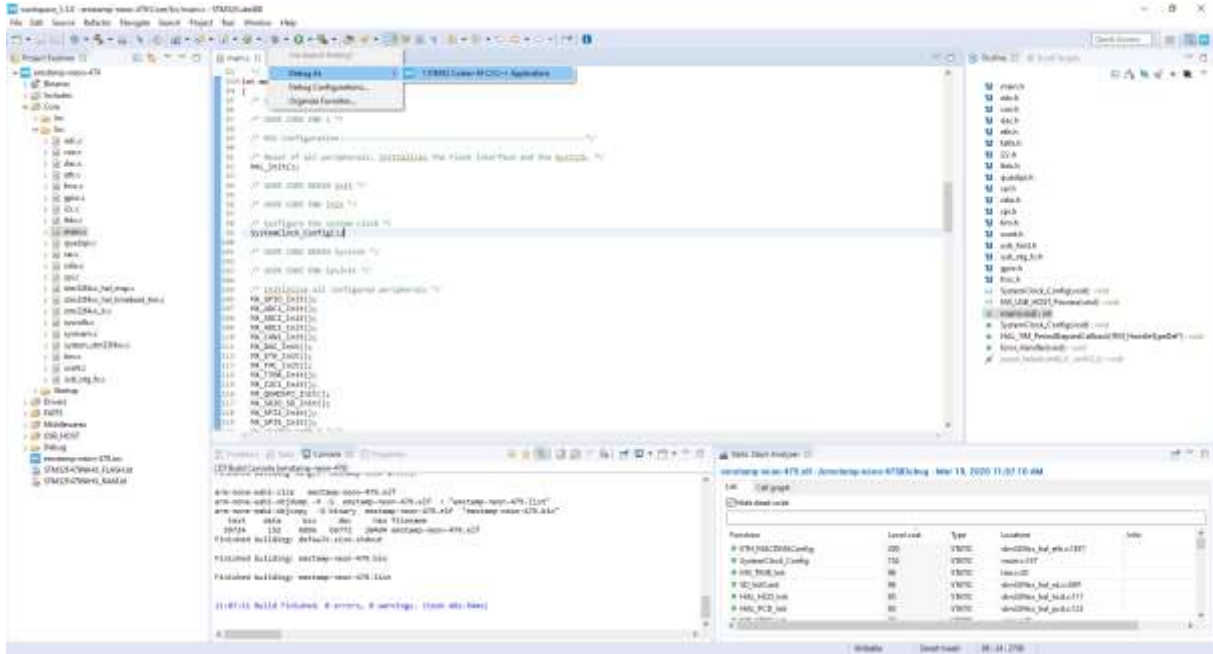
Double click on the ioc file:





You are now ready to debug your application.

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





## 7 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.

### 7.1 Downloading TouchGFX

TouchGFX version 1.5 is used in the Demo project from emtrion.

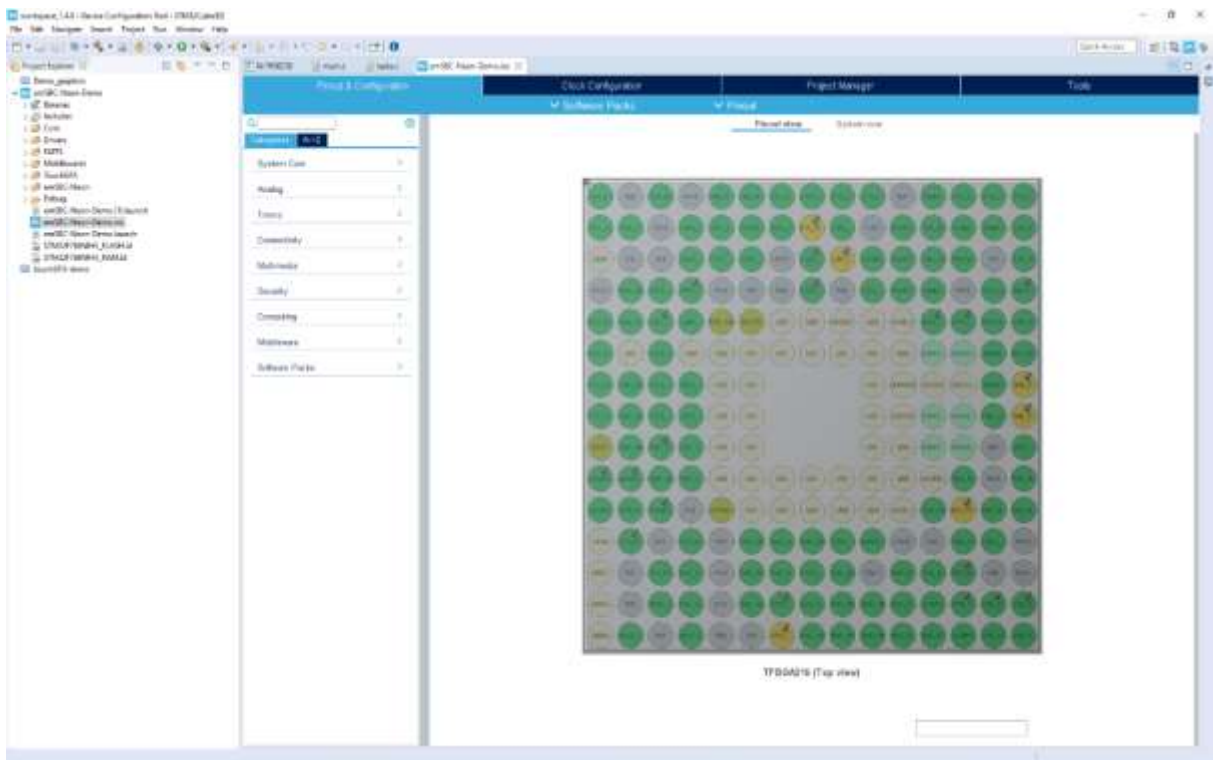
TouchGFX can be download from the following link

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

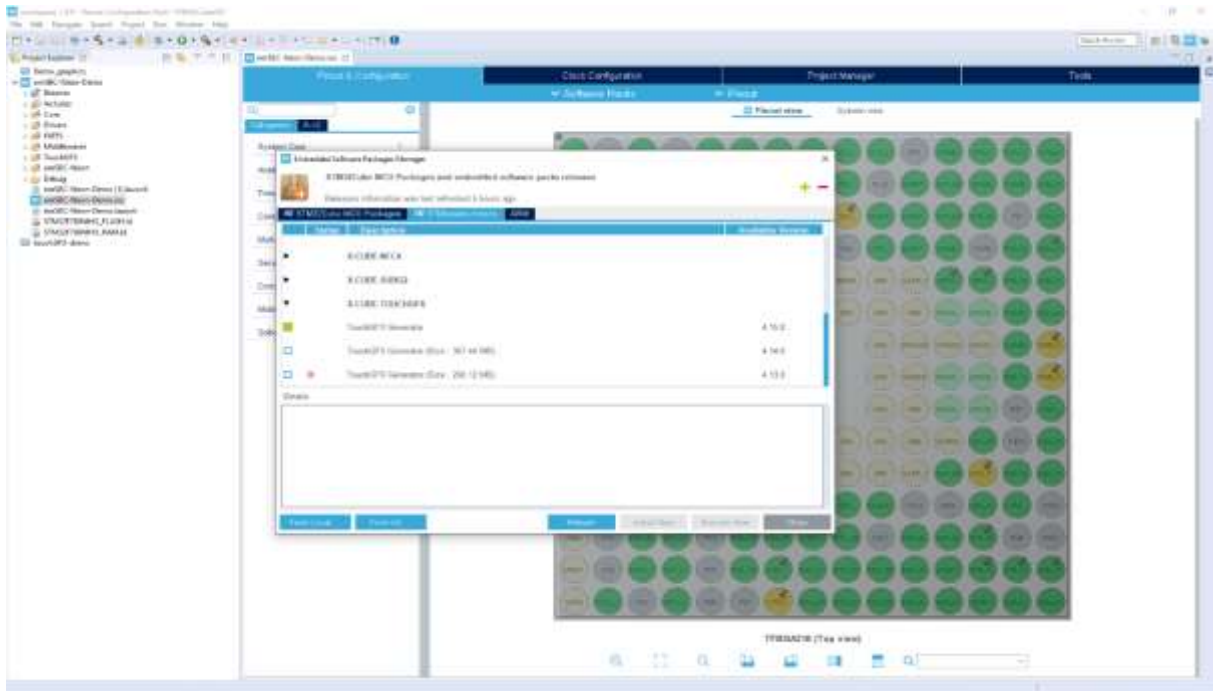
After downloading, install the TouchGFX application as per the guidance given in readme file in the downloaded and unzipped folder

### 7.2 Installing TouchGFX from your existing project

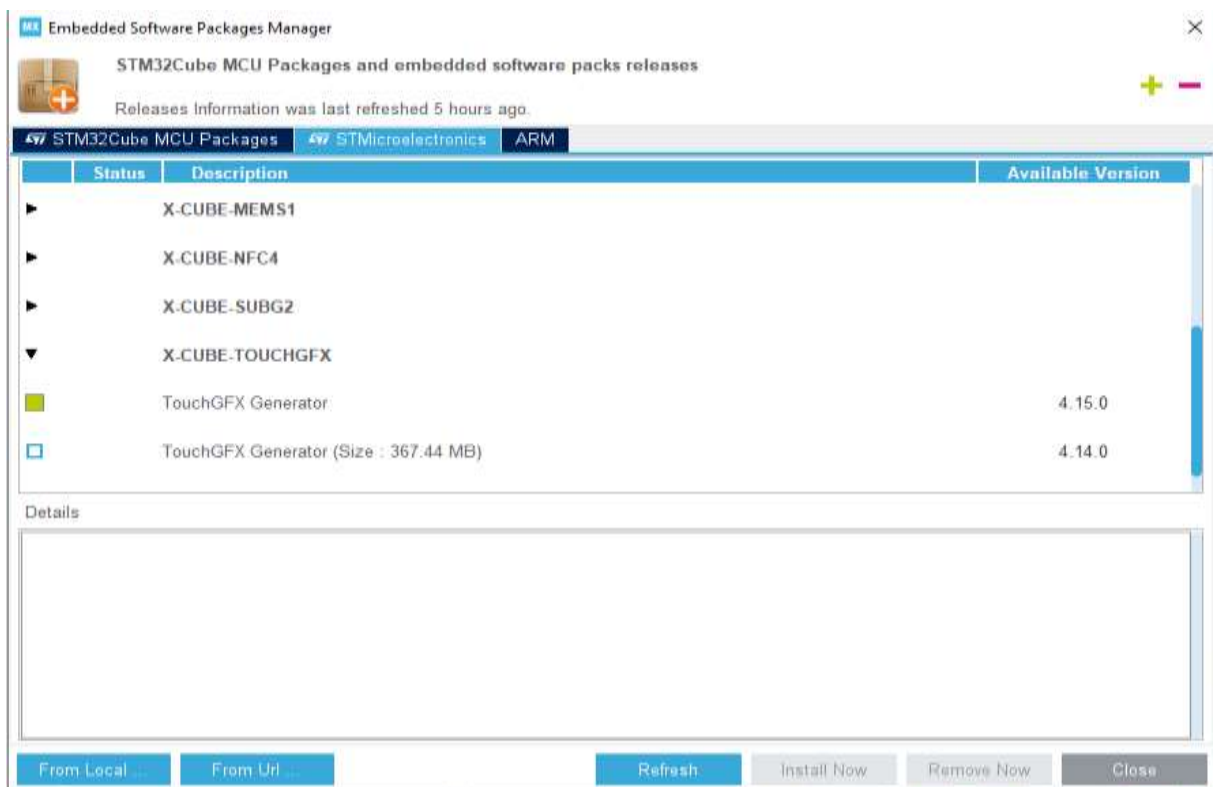
Open the ioc file



Click on Software Packs and select Manage Software Packs



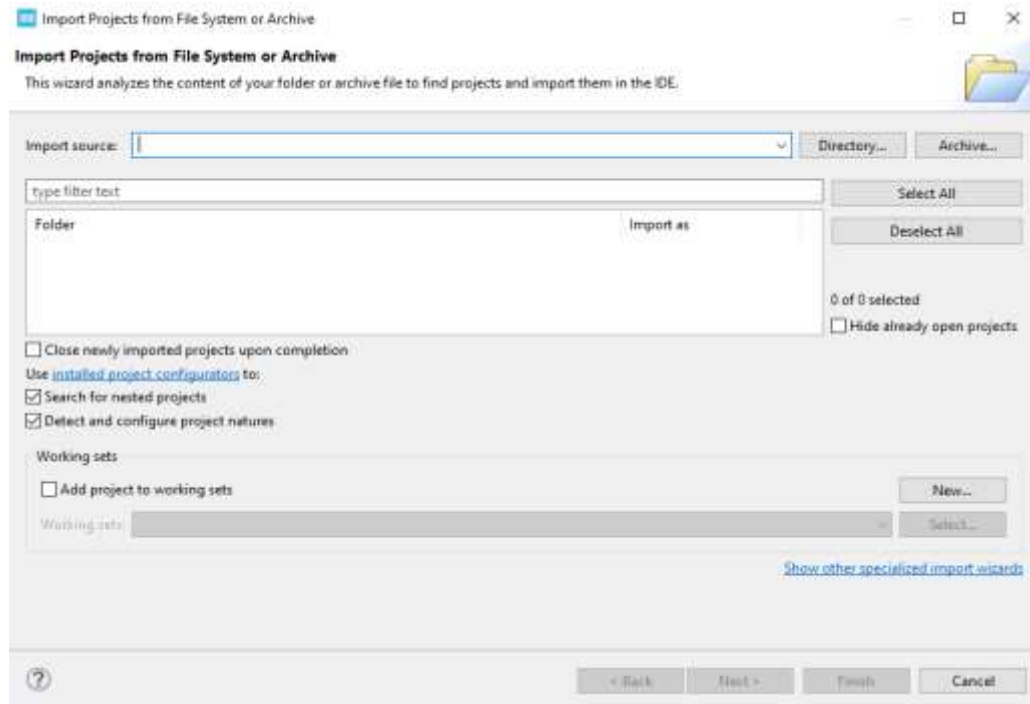
Select STMicroelectronics tab



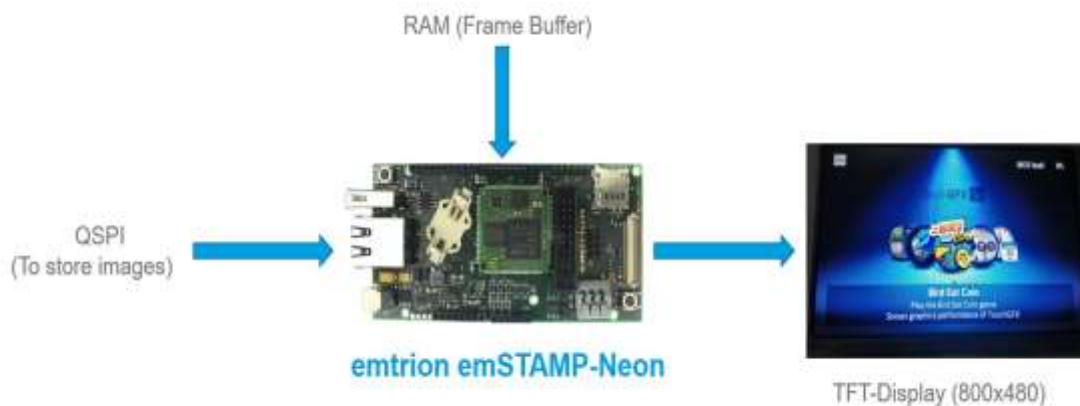
Select the recent version (4.15.0) of TouchGFX and click Install now

## 8 Demo Project

- Import the project in STM32CubeIDE  
Go to File ->Open Projects from File System->Select the project Directory and enter Finish



- To display the demo project included in this file, TouchGFX is required.
- Download and Install TouchGFX as mentioned in section 7.1
- Then, connect TFT LCD display (preferably 800x480) to the Neon board.



- Build and then debug the project as mentioned in Chapter.6.
- The Demo project should be displayed on the LCD connected to the board.



Link to Demo project files: <https://cloud.emtrion.de/index.php/s/X2zqtmvBK2lofYZ>