



AUT-T4981 Hands-On Workshop: Transform Ideas into Embedded Applications with NXP's S32K39 Family with Model-Based Design Toolbox (MBDT)

Lab Guide: Pre-requisite Installation

Oct 2024

Objectives

These are the pre-requisite steps to install and prepare your PC, before the hands-on training session "Transform Ideas into Embedded Applications with NXP's S32K39 Family with Model-Based Design Toolbox (MBDT)"

| | |
|---|----|
| Model-Based Design Toolbox Community Space | 2 |
| Software Requirements:..... | 2 |
| 1. Install MATLAB & Simulink R2024a | 3 |
| Install MATLAB R2024a | 4 |
| Install additional dependencies | 7 |
| MATLAB Support for MinGW-w64 C/C++/Fortran Compiler | 7 |
| Embedded Coder Support Package for ARM Cortex-M Processors..... | 7 |
| 2. Install Model-Based Design Toolbox for S32K3 1.5.0 | 9 |
| Quick Notes and Suggestions..... | 9 |
| Testing MBDT Installation | 9 |
| 3. Install FreeMASTER | 12 |
| 5. Install PEmicro Drivers..... | 17 |



Model-Based Design Toolbox Community Space

This community is handling all the questions related to the upcoming MBDT hands-on workshops, in terms of software requirements and setup. Attendees can get the setup guide and post any questions/issues they might face, so that everything can be ready, on time, for the event.

<https://community.nxp.com/t5/MBDT-hands-on-workshop-software/gh-p/60834>

Software Requirements:

For attending the NXP's MBDT Hands-On training the following software is required

- Windows 10/11 Machines
- MATLAB R2024a (Please check the MathWorks Requirements [here](#))
- [Model-Based Design Toolbox for S32K3 v1.5.0](#)
- [FreeMASTER Tool v3.2 or newer](#)
- [PEmicro Hardware Interface Drivers](#)

The following chapters guide on how to install the Software, required for attending the Hands-On Workshop.



1. Install MATLAB & Simulink R2024a

To attend this Hands-On, all participants are required to install on their machine MATLAB version R2024a and Simulink, alongside additional toolboxes from MathWorks, before the session takes place.

Due to the licensing requirements for MATLAB and Simulink, MathWorks will provide trial licenses to all participants, valid before and throughout the NXP Tech Days 2024 event.

Requested and provided toolboxes are:

- MATLAB
- Simulink
- Stateflow
- MATLAB Coder
- Simulink Coder
- Embedded Coder
- Simulink Test
- Simulink Coverage



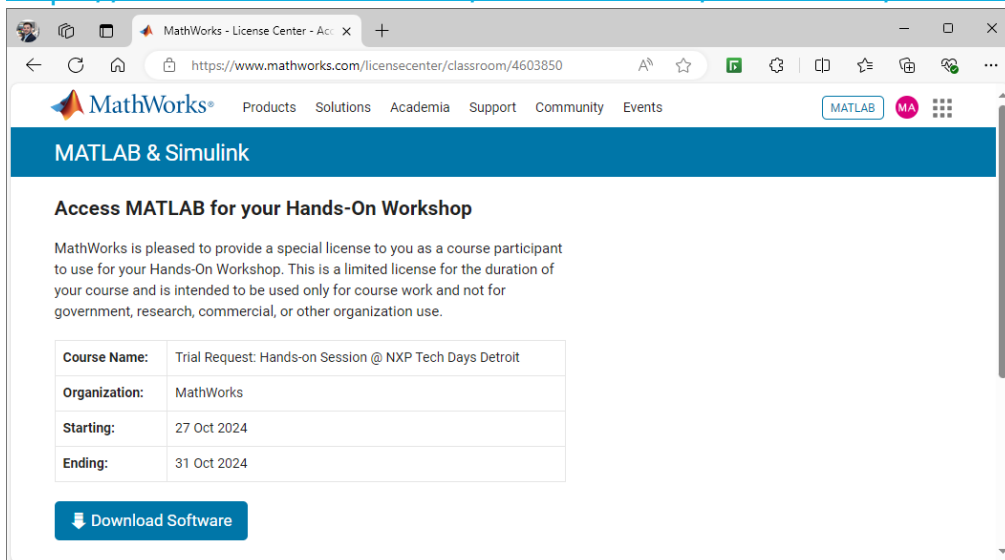
Install MATLAB R2024a

Note: To download MATLAB and Simulink, MathWorks requires to log in on the MathWorks website. Please create an account or login with an existing account on www.mathworks.com!

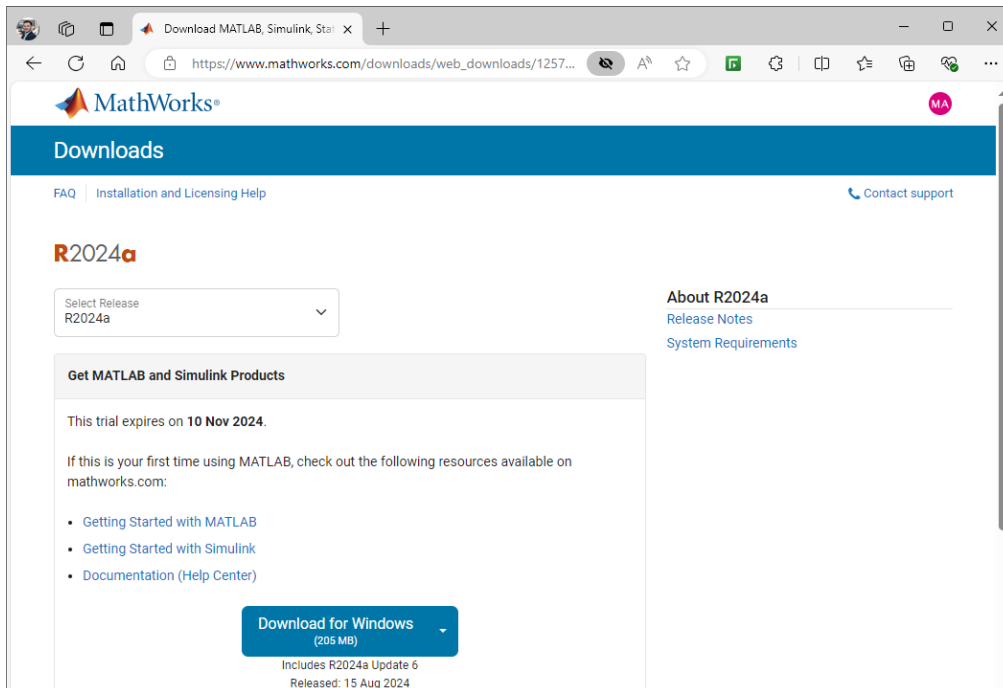
To download the trial license and install MATLAB, please follow the next steps:

1. Access the link below and press **Download Software**:

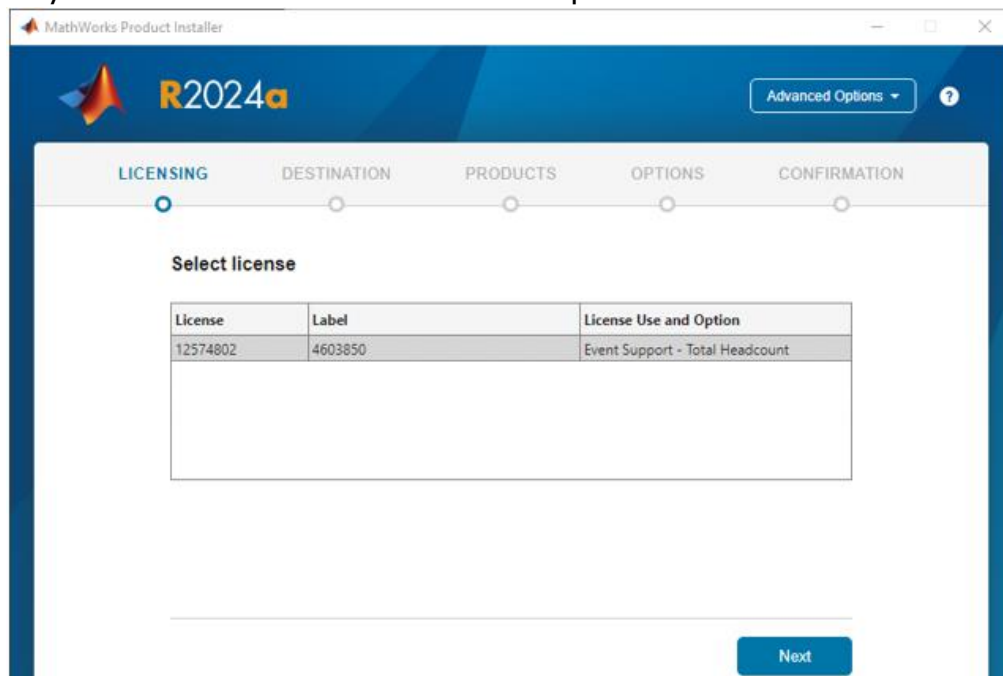
<https://www.mathworks.com/licensecenter/classroom/4603850/>



2. Make sure the **R2024a** version is selected and press the **Download for Windows** button. This action is downloading the installer in the browser's download folder.



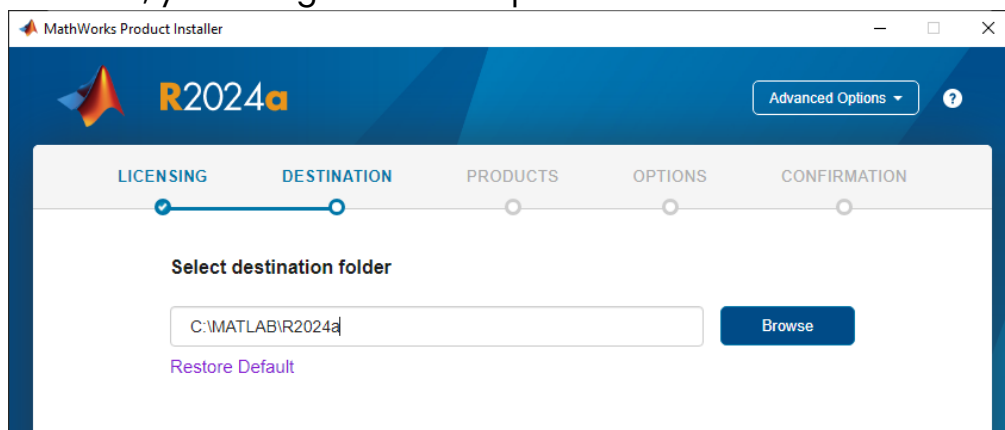
3. Run the matlab_R2024a_Windows.exe installer, Log In and Review and accept the license.
4. Select the **Event Support** License which has been automatically linked to your account when the link from point 1 was accessed.



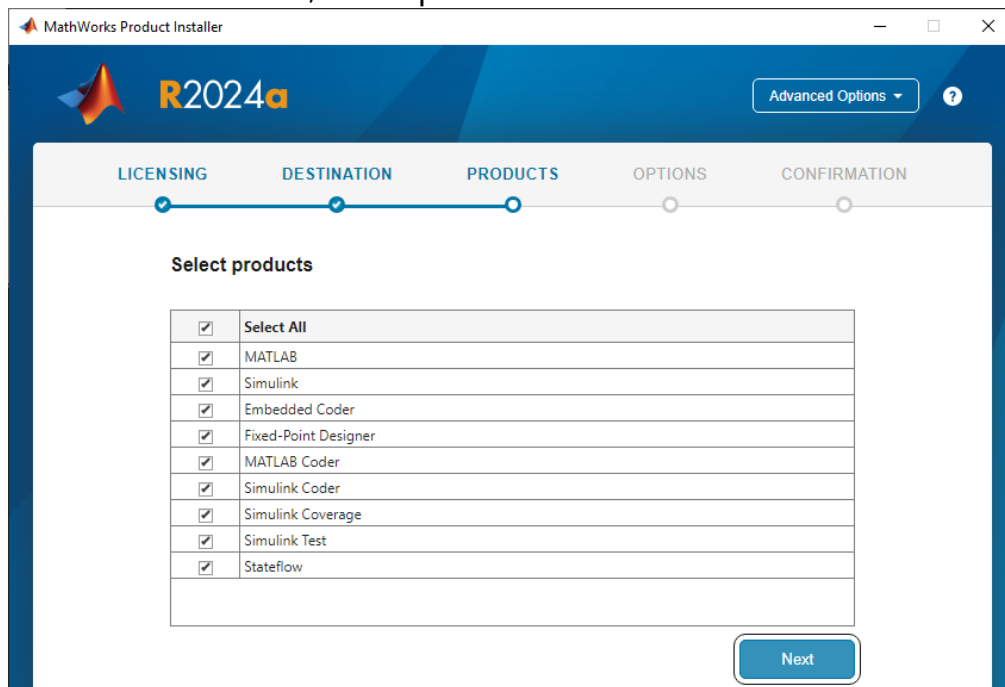


In case you encounter any issues at this step, or the license does not appear in the installer window, please contact us on the MBDT Community, at the link provided on page 2.

5. Change the default installation path in a place with no spaces, like for example `C:\MATLAB\R2024a`. If you already have MATLAB R2024a installed, you can go to next step.



6. Select all the available toolboxes associated with the provided evaluation license, and proceed with the rest of the installation.



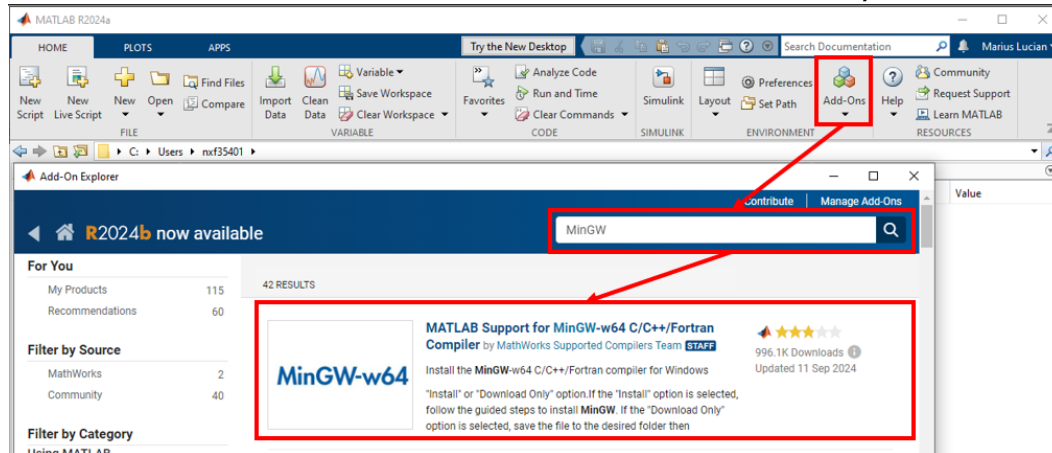
7. Once installed, please launch the **Activate MATLAB R2024a** recently installed, and follow the activation steps.



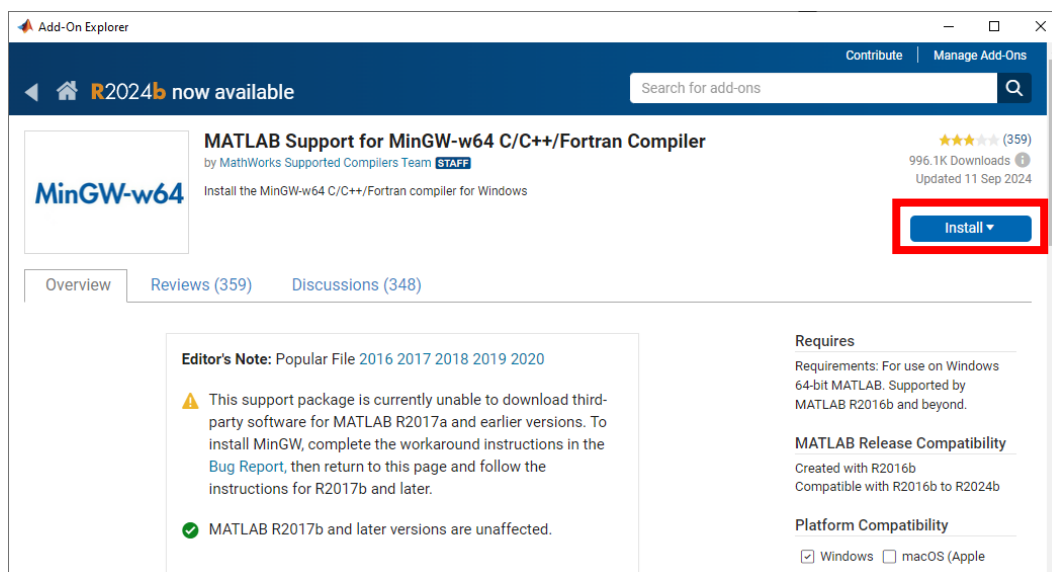
Install additional dependencies

[MATLAB Support for MinGW-w64 C/C++/Fortran Compiler](#)

Go to MATLAB Add-Ons, and search for the **MinGW** key word.

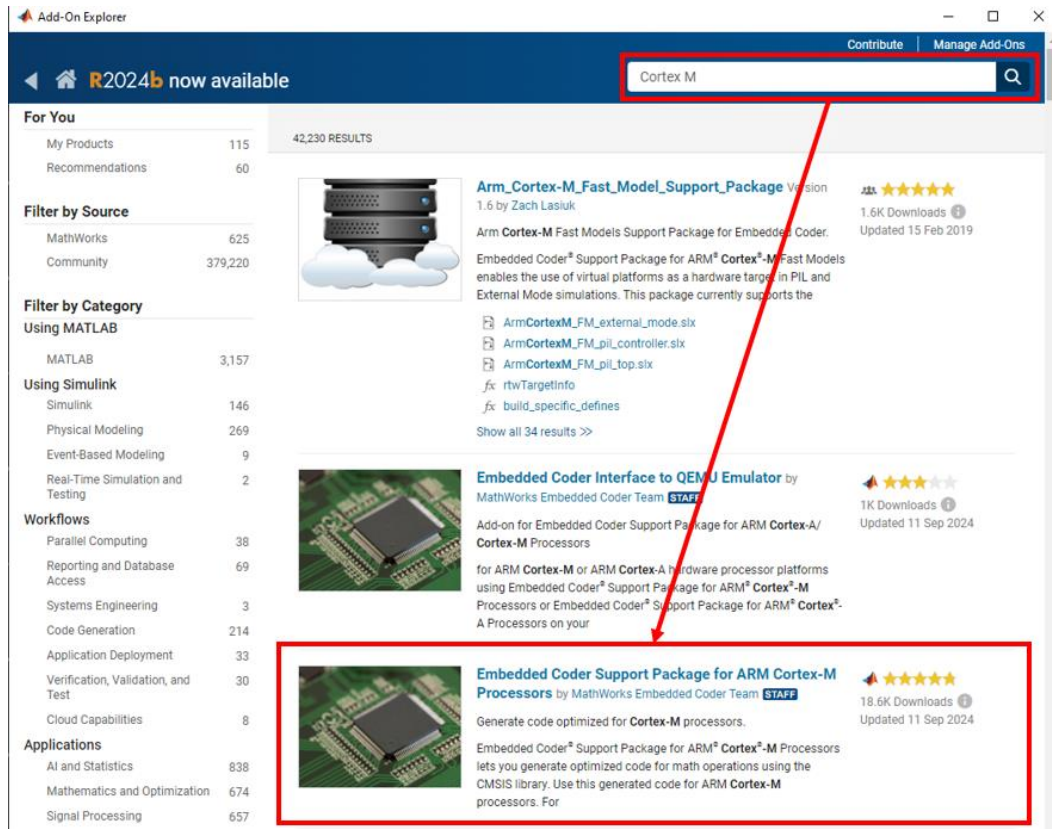


Open **MATLAB Support for MinGW-w64 C/C++/Fortran Compiler** package and press the **Install** button.

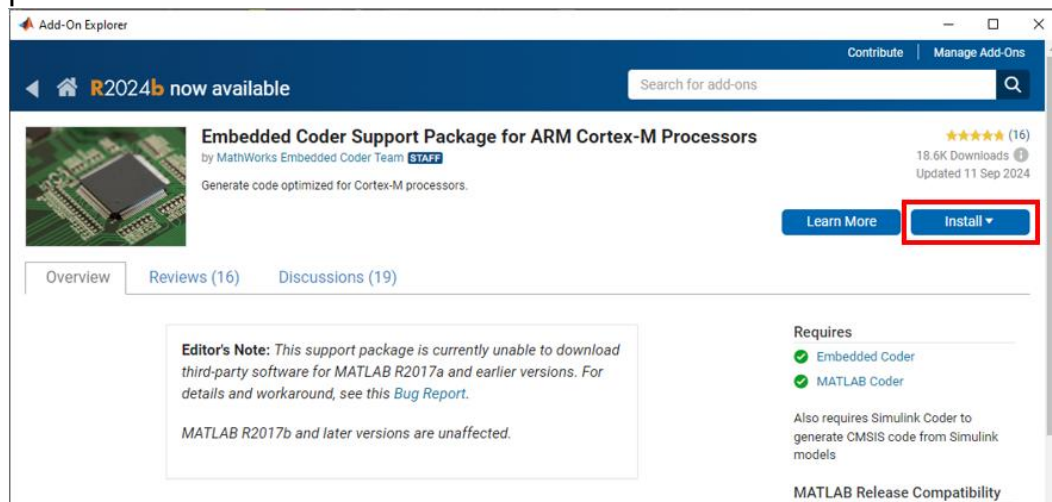


[Embedded Coder Support Package for ARM Cortex-M Processors](#)

Go to MATLAB Add-Ons, search for the **Cortex M** key word and scroll down for the **Embedded Coder Support Package for ARM Cortex-M**.



Open **Embedded Coder Support Package for ARM Cortex-M** package and press Install button.





2. Install Model-Based Design Toolbox for S32K3 1.5.0

Model-Based Design Toolbox for S32K3 enables rapid prototyping of complex algorithms on NXP S32K3xx family of microcontrollers from MATLAB and Simulink.

To install the Model-Based Design Toolbox from S32K3, please follow the steps described in the

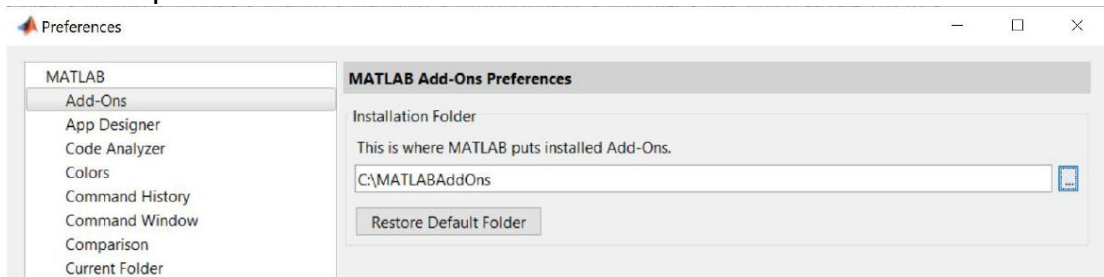
Model_Based_Design_Toolbox_S32K3xx_Series_Quick_Start_Guide.pdf document, chapter **1.2 Installation Steps (1.2.1 to 1.2.4)**.

As described in the attached document, MBDT for S32K3 is free of charge, users need to generate and install a free license on the NXP website.

Quick Notes and Suggestions

1. It is recommended to install the MATLAB and NXP Toolbox into a location that does not contain special characters, empty spaces, or mapped drives. Also, consider choosing a short path like *C:/MATLABAddOns*, like in the screenshot below.

The default location can be changed before installation by changing the Add-Ons path from MATLAB Preferences.



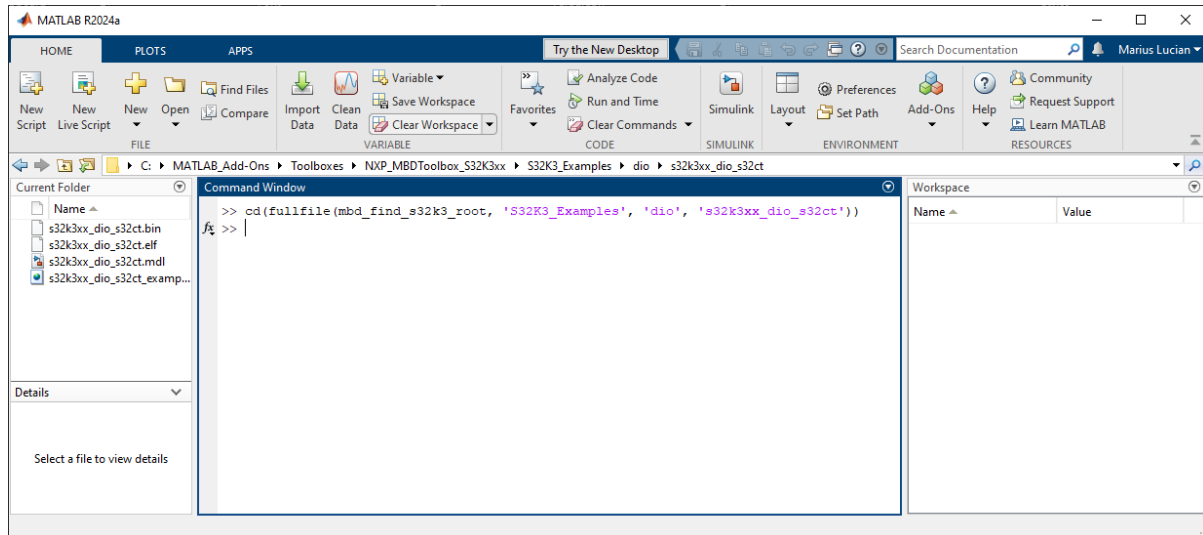
2. Installing EB Tresos (chapter 1.2.5) is not required, since for the Hands-On we will use the S32 Configuration Tools as the hardware configuration tool. The S32 Configuration Tools is delivered within Model-Based Design Toolbox package. More details during the Hands-On session.

Testing MBDT Installation

Once the MBDT for S32K3 is installed and activated, generate code for DIO model targeting the S32K396 MCU.

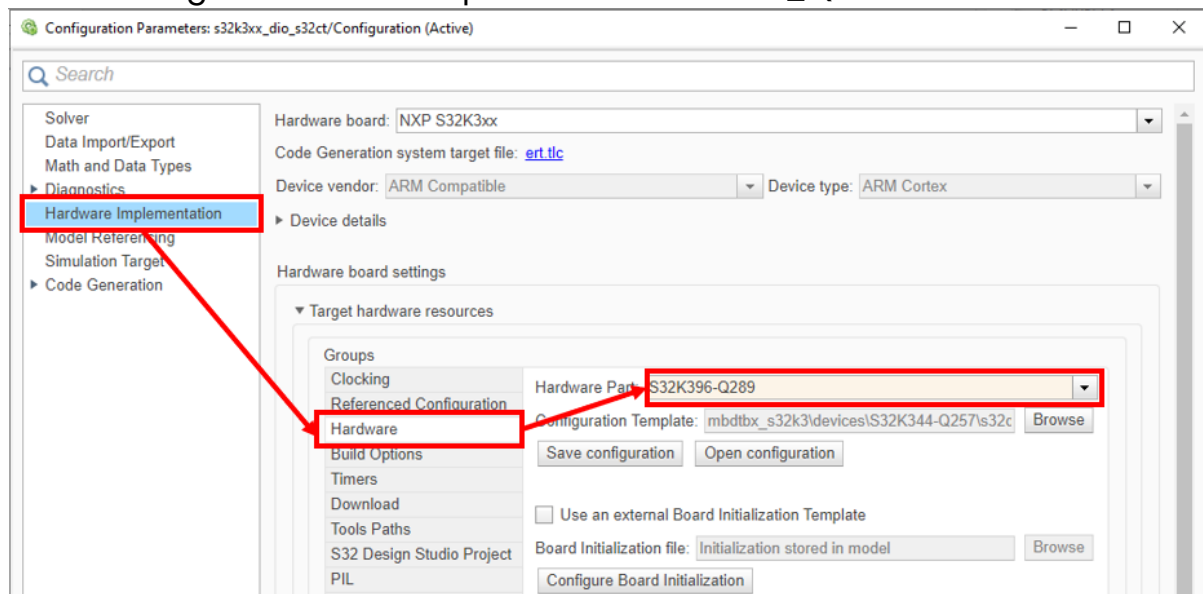
1. In MATLAB Command Window, run the following command

```
>> cd(fullfile(mbd_find_s32k3_root, 'S32K3_Examples', 'dio',  
's32k3xx_dio_s32ct'))
```

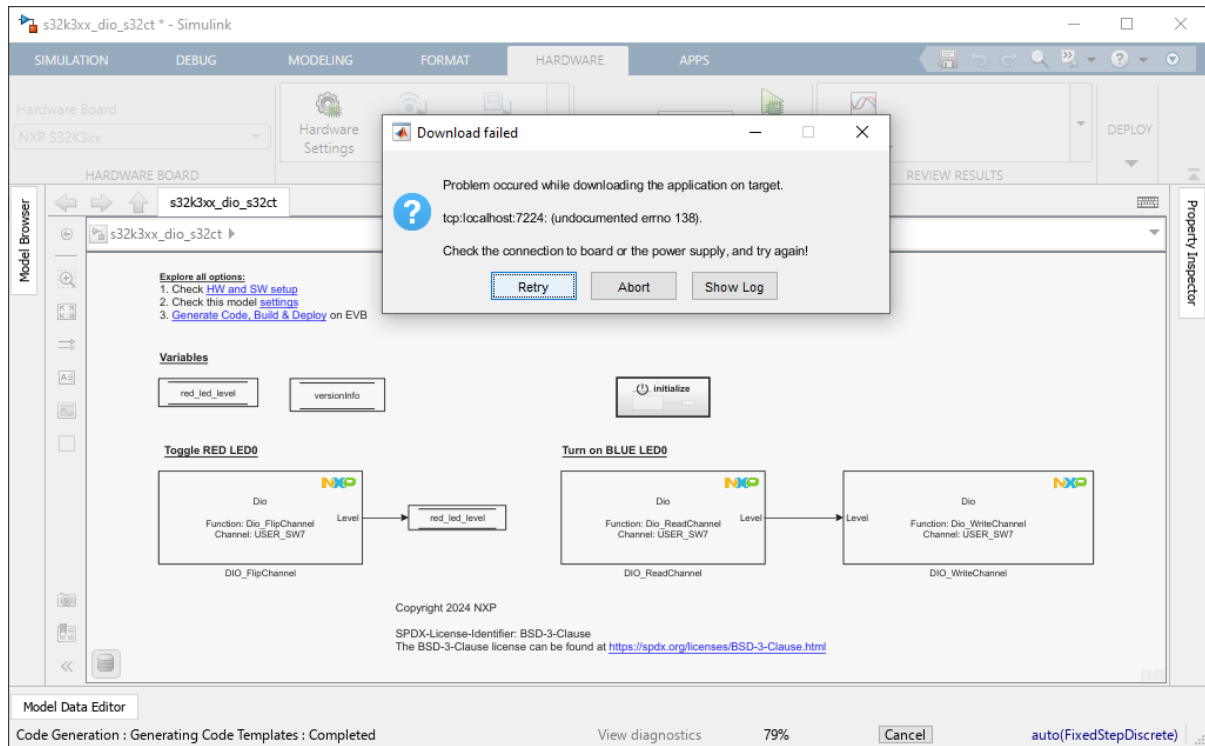


2. Open the S32k3xx_dio_s32ct.mdl Simulink example.
3. Open the Model Settings.

Under *Hardware Implementation* -> *Hardware* -> *Hardware Part* change the Hardware part for the S32K396_Q289.



4. Generate code for this model (Ctrl+B). If the code generation process is successful, a Download failed message appears, this means that the code has been generated successfully, but toolbox was unable to deploy the generated binary file on the board. During the Hands On training, we will provide the [S32K396-BGA-DC1](#).



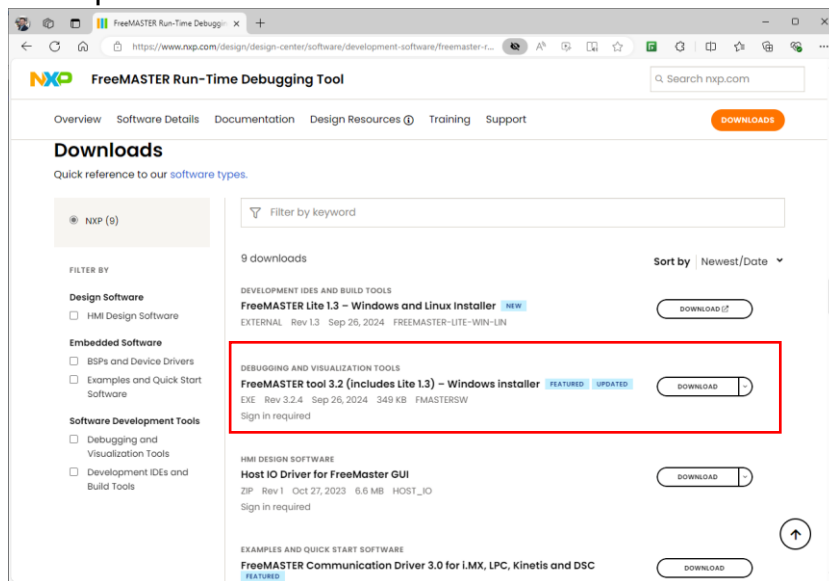


3. Install FreeMASTER

FreeMASTER is a user-friendly real-time debug monitor and data visualization tool that enables runtime configuration and tuning of embedded software applications.

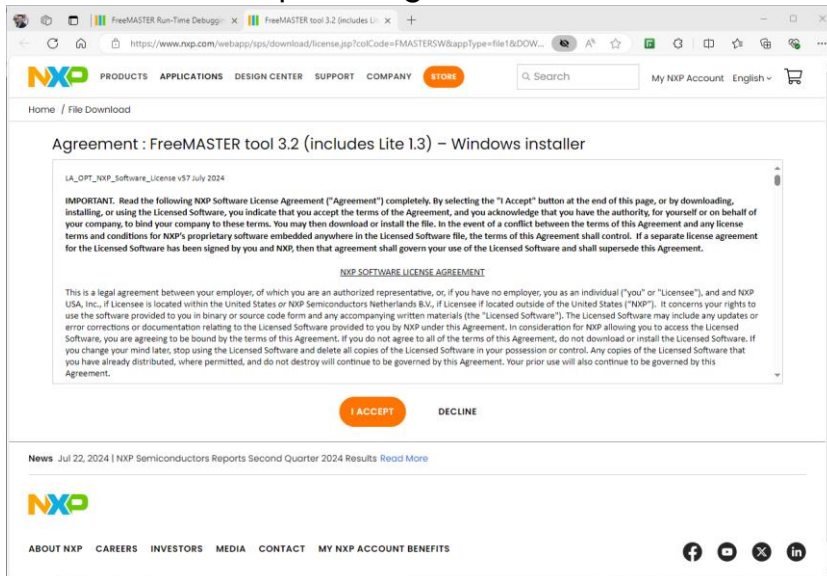
To install FreeMASTER, please follow the steps below:

1. Go to FreeMASTER Run-Time Debugging Tool page accessing the following link: <https://www.nxp.com/design/design-center/software/development-software/freemaster-run-time-debugging-tool:FREEMASTER>
2. Go to Downloads Section, select the **FreeMASTER tool 3.2 (includes Lite 1.3) – Windows installer** and press the **Download** button. Sign in is Required.

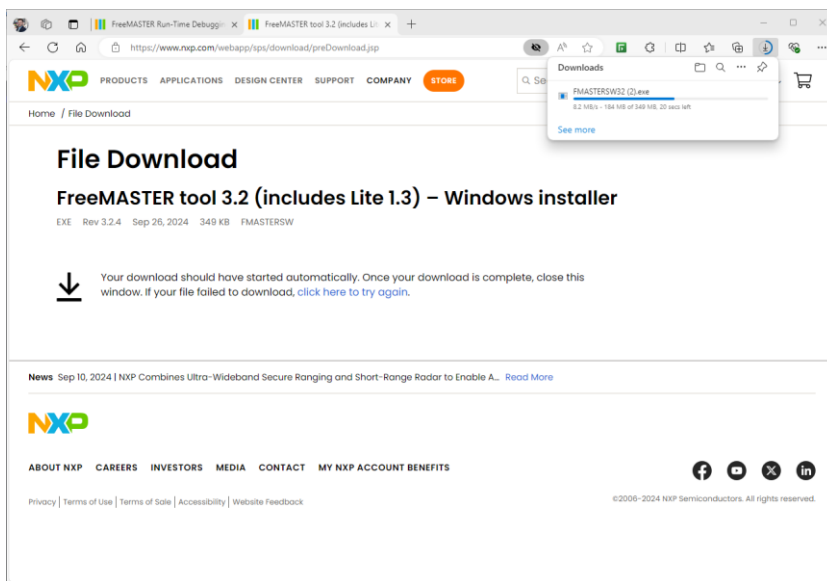




3. Review and accept the Agreement for the FreeMASTER tool.

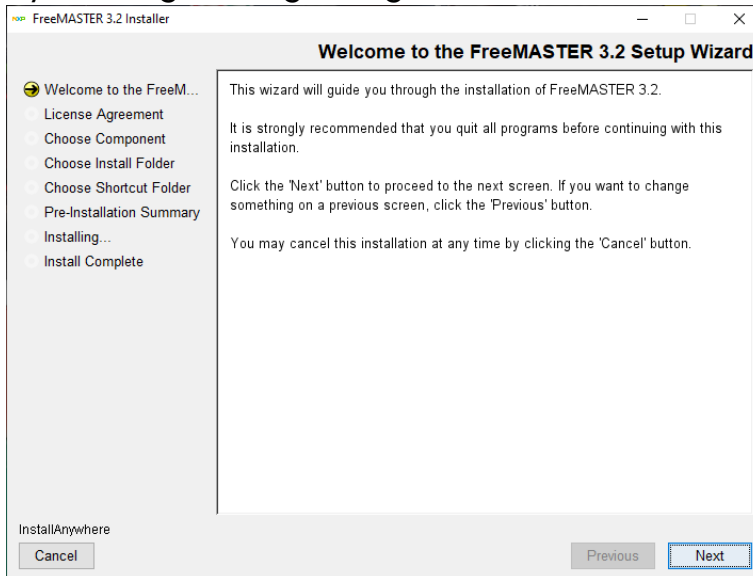


4. Download the **FMASERSW32.exe** executable.

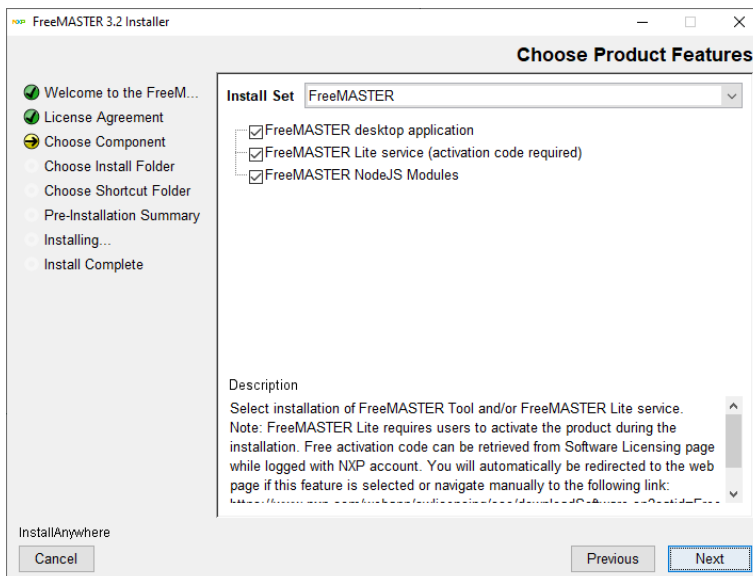




5. Run the **FMASTERSW32.exe** executable. Follow the Installation steps, by reading and agreeing the License.

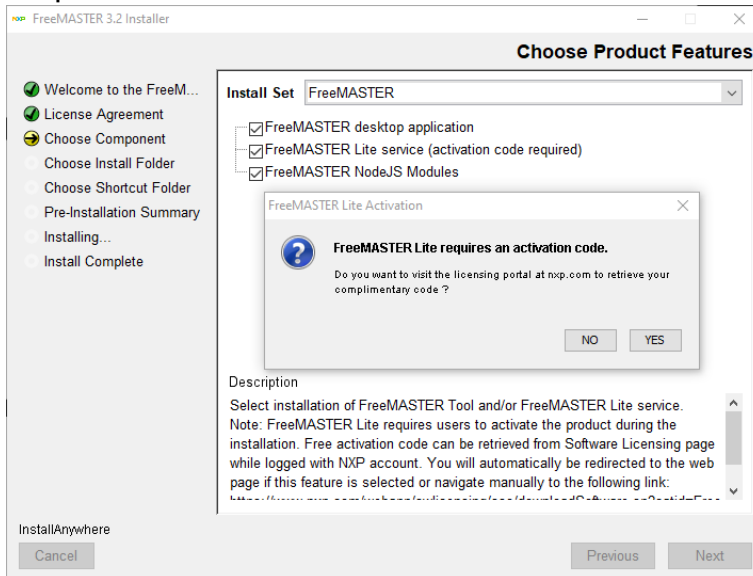


6. At this step, you can select to install the FreeMASTER Lite also. FreeMASTER Lite is a lightweight service leveraging the JSON RPC protocol that can run on Windows or Linux host PC and enables the implementation of custom UI applications on a web browser application (running on a local or remote host computer or mobile device). During the Hands-On training, the **FreeMASTER Lite won't be used**.



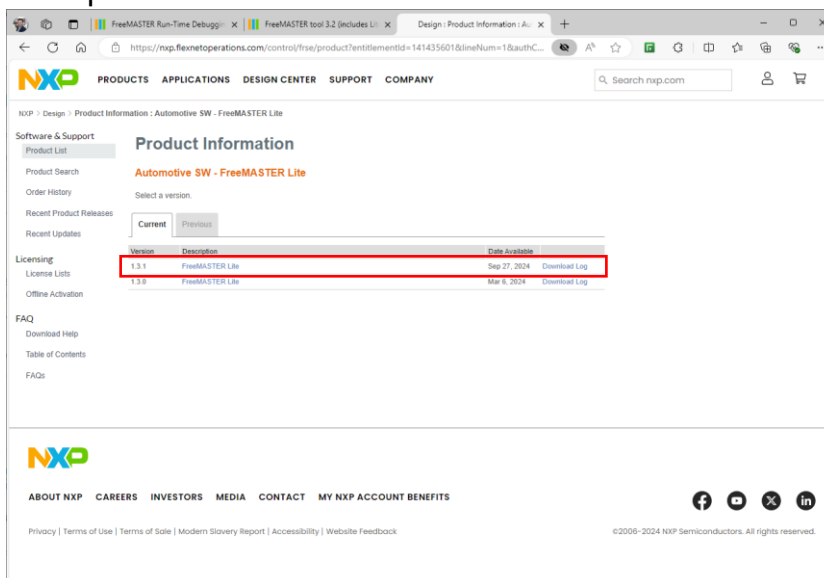


7. In case you continue installing FreeMASTER Lite also, please follow the steps below, because the activation code is required.

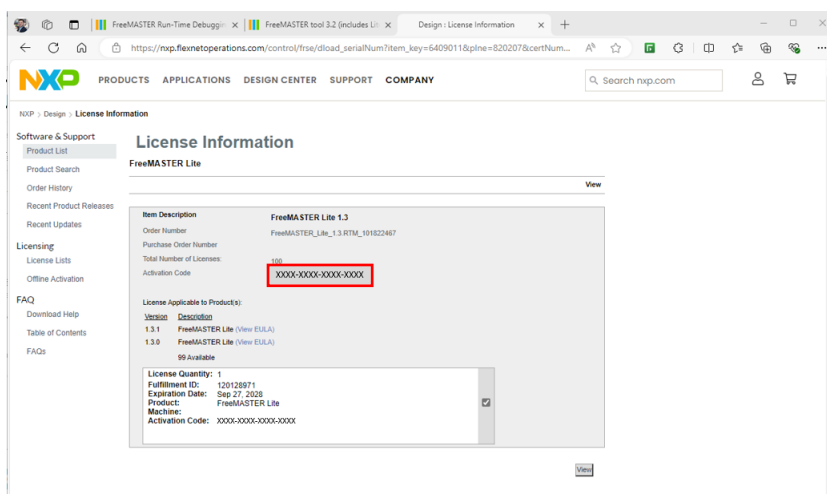
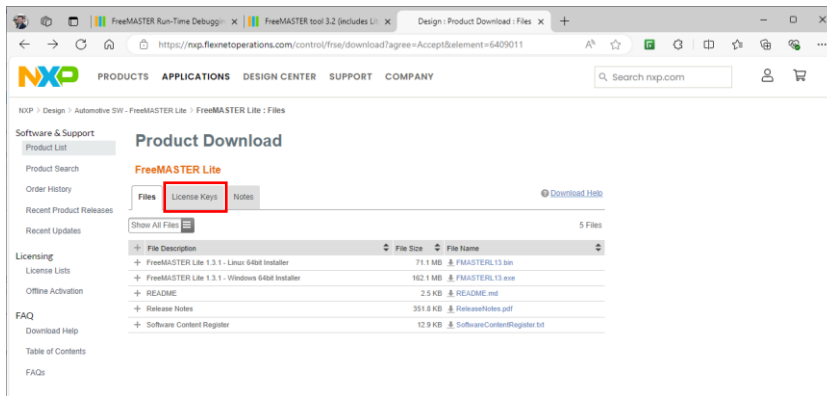


Go to NXP website by pressing **YES** button.

Here, please select the FreeMASTER Lite Version 1.3.1, and review and accept License.

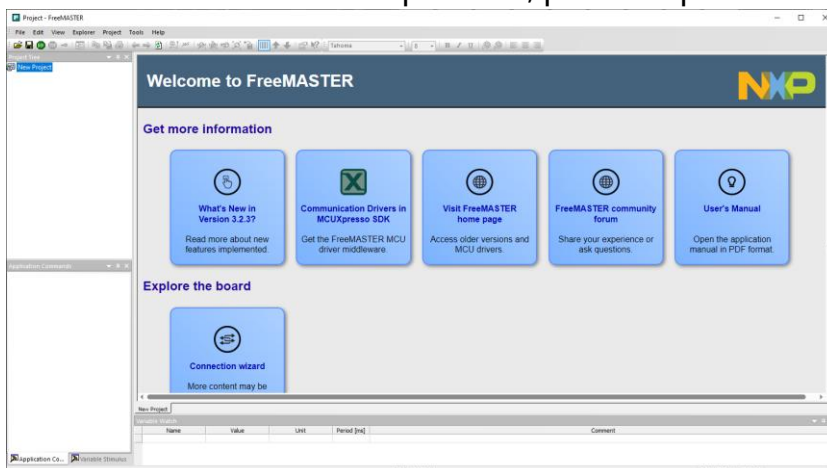


Go to License Keys tab, where the Activation Code is available as shown below.



During the installation process, the installer will require to insert the Activation Code.

8. To check the installation process, please open the FreeMASTER 3.2.





5. Install PEmicro Drivers

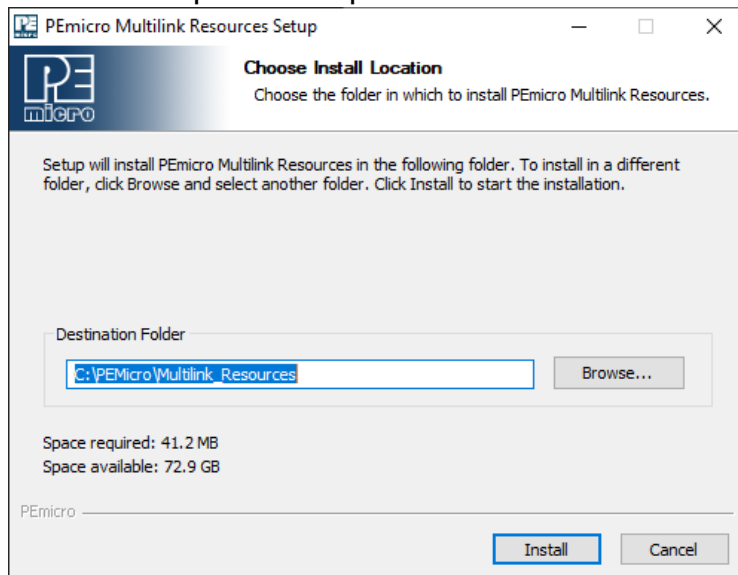
PEmicro drivers are required to be installed for the further use of the OpenSDA on board debugger/USB to serial converter.

To install the PEmicro Drivers, please follow the steps below:

1. Go to the following link and download the USB Multilink Resources Install.

https://www.pemicro.com/downloads/download_file.cfm?download_id=346

2. Run the **multilink_resources_install.exe**, keep the default installation path and press the **Install** button.



Now the pre-requisites are complete. The remaining steps will require the S32K396 evaluation board, which will be available during the Hands-On session.