Model-Based Design Toolbox S32M2 Series

Quick Start Guide

Automatic Code Generation for the S32M2 Family of Processors
Version 1.2.0

Target Based Automatic Code Generation Tools
For MATLAB™/Simulink™/Stateflow™ Models working with Simulink Coder ™ and Embedded Coder®

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1 Installation

Installing the Model-Based Design Toolbox is the first step in setting up and running automatic C code generation from MATLAB/Simulink for NXP's embedded target processors and development boards.

1.1 System Requirements

For a flawless development experience the minimum recommended PC platform is:

- *Windows® OS*: any x64 processor
- At least 4 GB of RAM
- At least 6 GB of free disk space.
- Internet connectivity for web downloads.

Operating System Supported

	SP Level	64-bit
Windows 10		X
Windows 11		X

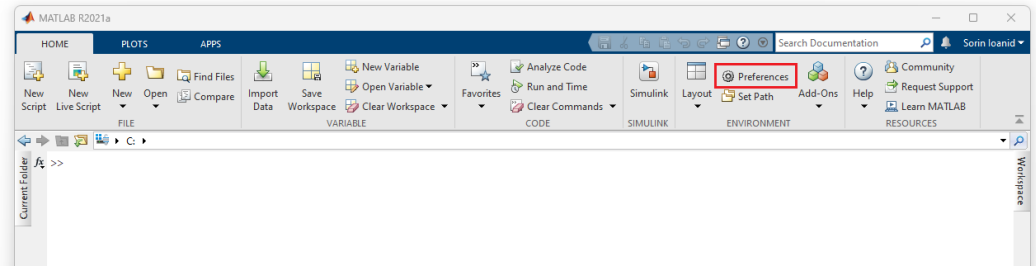
1.2 Installation Steps

NXP's Model-Based Design Toolbox is delivered as MATLAB Toolbox Package that can be installed offline or online from MathWorks Add-ons.

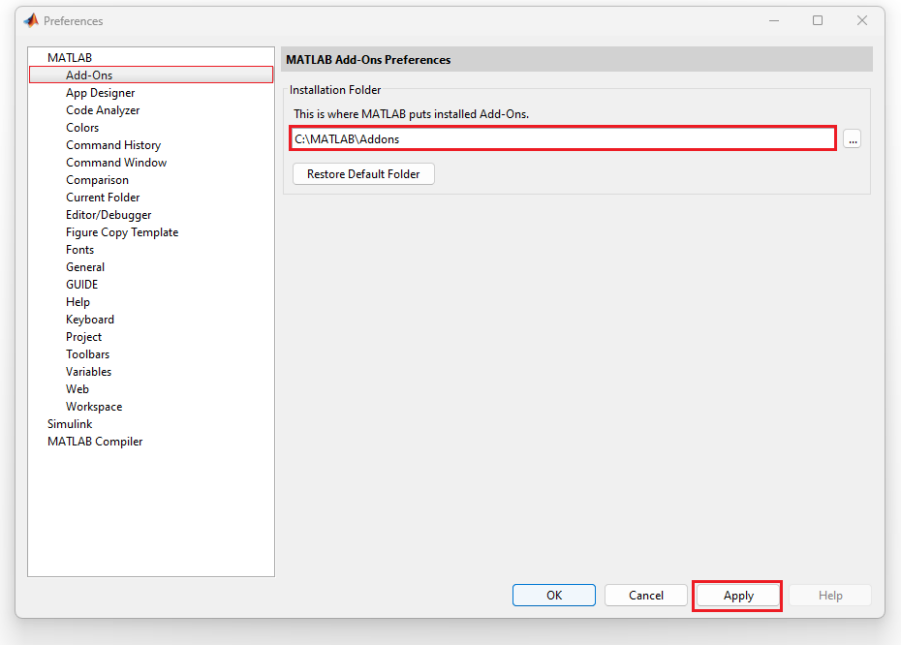
1.2.1 Configure Installation Folder

By default, the add-ons installation folder in MATLAB includes whitespaces, may have a long path length, which can cause issues when using NXP toolboxes. To avoid potential problems, it is strongly recommended to change the installation path to a shorter, simpler location—such as C:\MATLAB\Addons—and ensure it contains no spaces, special characters, or parentheses.

To change the default installation folder, please go to ENVIRONMENT -> Preferences.



In the Preferences window, navigate to MATLAB -> Add-Ons and modify the installation folder following the recommendation **mentioned above. In the end, do not forget to click on the Apply button.**

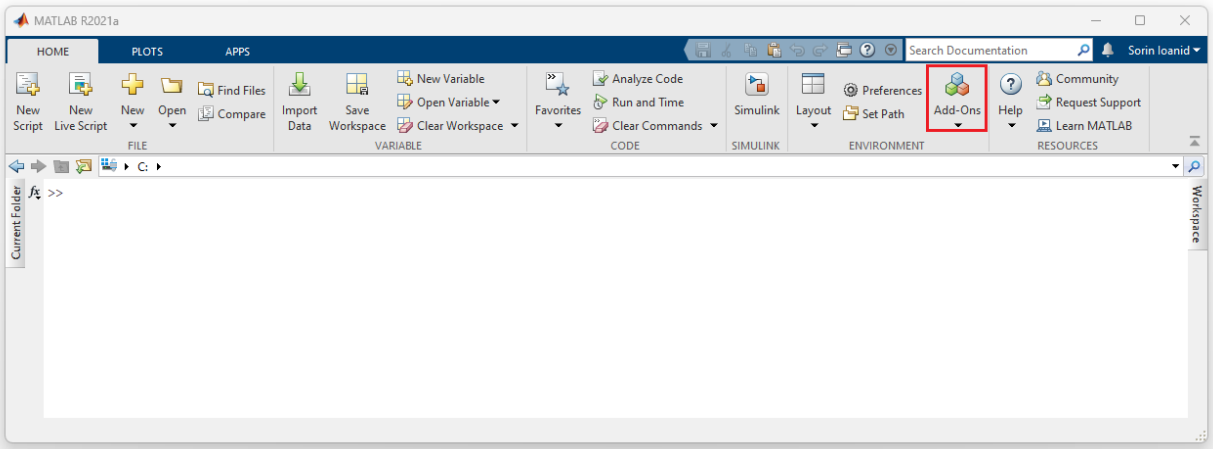


1.2.2 **Install NXP Support Package for S32M2**

The NXP Support Package for S32M2 is a graphical user interface that guides you through the download, installation and activation process of the MBDT for S32M2. Moreover, it offers possible solutions to problems you might encounter during the installation process.

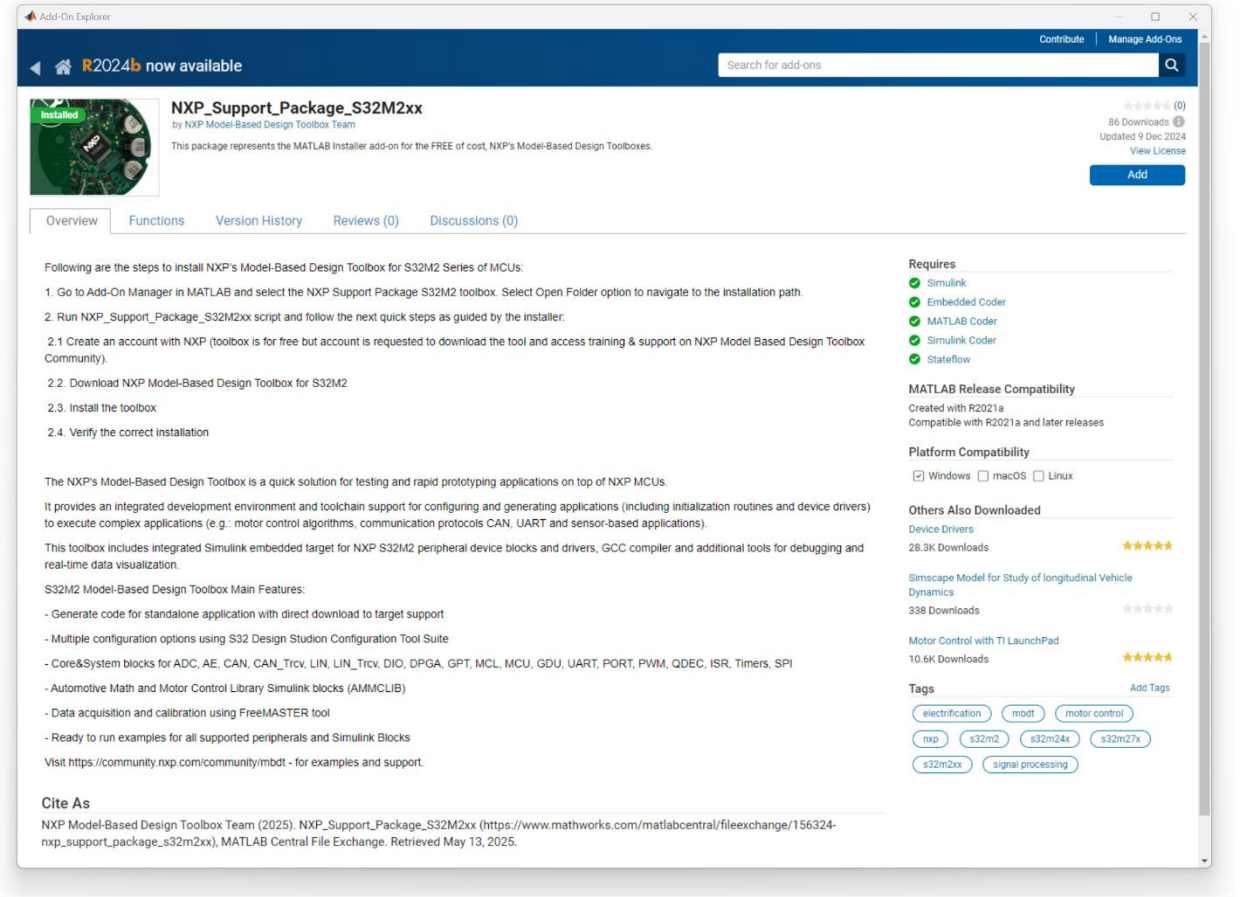
For demonstration purpose only, the 1.2.0 version has been used throughout the following steps.

1. Go to MATLAB Add-Ons

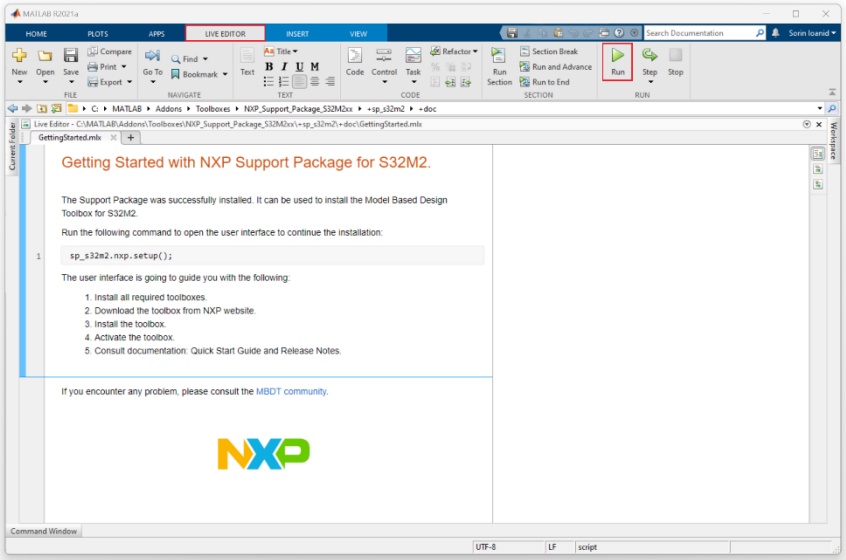


2. Search for **NXP Support Package S32M2**

Please check that all the required toolboxes are installed to be able to use the S32M2 toolbox at full potential, any missing toolbox might lead to errors and undefined behaviours.



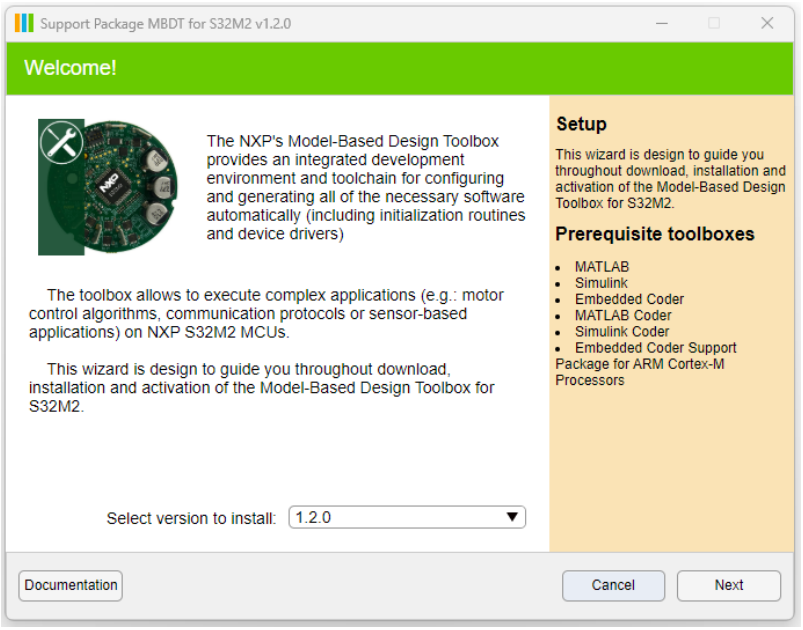
3. Install the Support Package by clicking on Add button.
4. Read the License Agreement and click on I accept to continue.
5. Once the process is finished, a window pops up. Please check the “Open The Getting Started Guide” checkbox and close the window.
6. In the MATLAB editor, the content of the GettingStarted.mlx is displayed. To run the included commands, please go to Live Editor and click on Run.



1.2.3 **Install NXP Model-Based Design Toolbox for S32M2**

After clicking on Run, the following window pops up. On the first page, a short description of the toolbox is displayed on the left, while on the right, the user can always find valuable information about the current step, and possible solutions to problems that might appear during the installation.

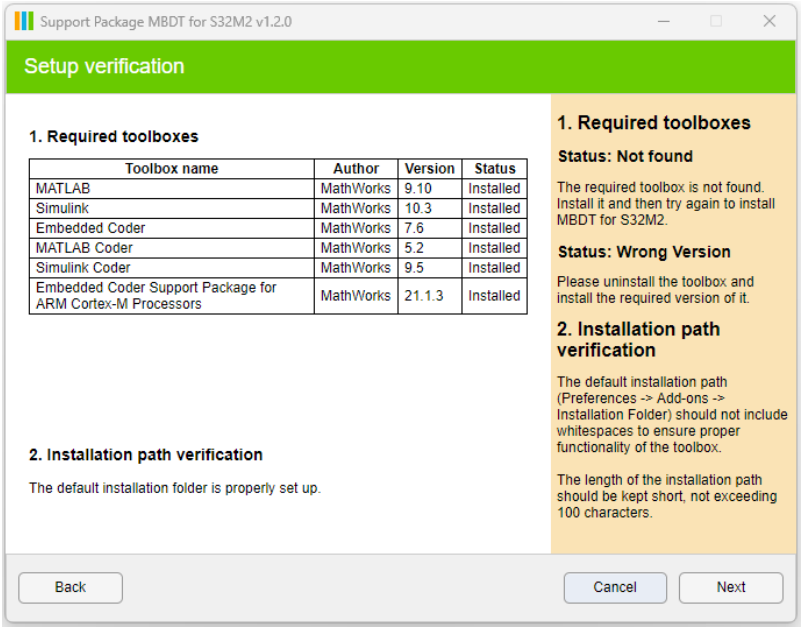
At this step, the user must select the version of the toolbox to be installed. By default, the latest version available is selected.



Moreover, it is possible to go directly to the documentation page; however, full access to all documents is only available after the toolbox has been installed.

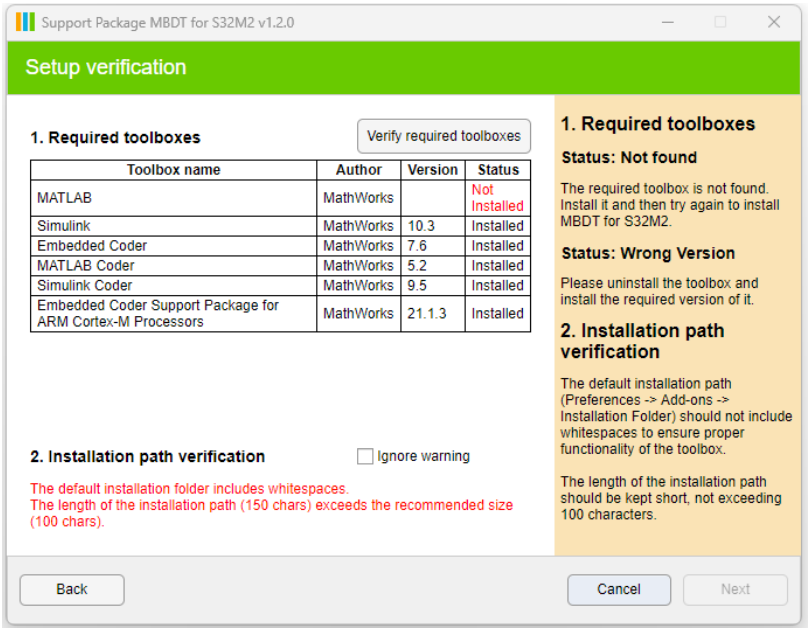
1. Setup verification

At this stage, the support package verifies if all the required toolboxes are installed. There is also a verification on the default installation folder set up in MATLAB. Refer to 1.2.0 Configure Installation Folder for further details. If all required dependencies are correctly installed the "Next" button will become active, allowing you to proceed to the next step.



If at least one required toolbox is not installed, its corresponding row in the table is highlighted in red, and the Verify required toolboxes button becomes available. Please install the required toolbox (usually from the MATLAB Add-ons) and click on the Verify required toolboxes to confirm the installation.

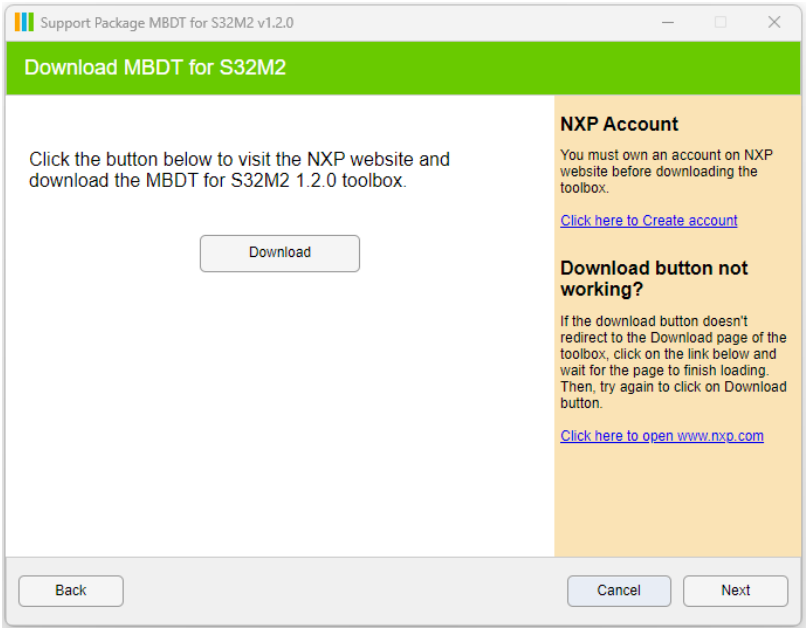
If the installation folder path is too long or includes whitespaces, a warning message appears under Installation path verification. The user can ignore the warning but it is strongly discouraged to do so.



2. Download MBD Toolbox for S32M2

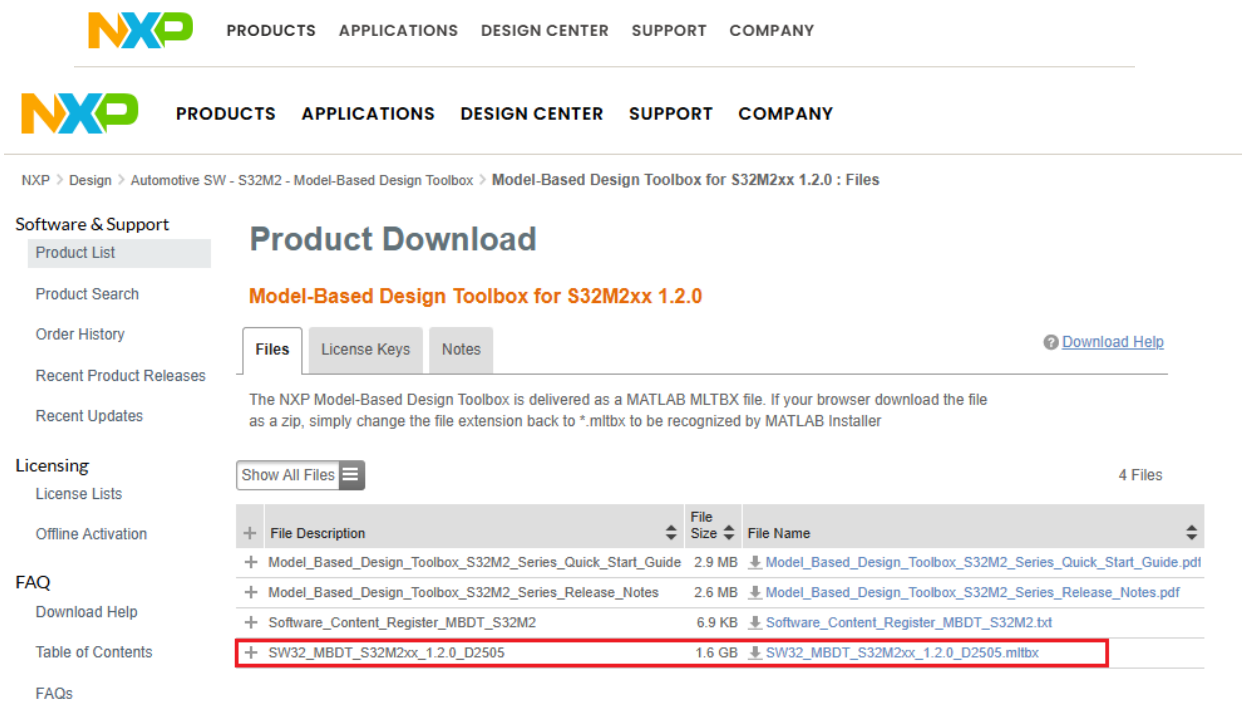
To download the toolbox, click the "Download" button. This will open your default web browser and take you to the download page. Please note that you must have an active NXP account and be logged in to access the download.

Note! It is sometimes possible that the button doesn’t work properly (due to the way the website works). If that happens, please click on the second link in the Help section, wait for the page to load up, then click on the Download button again.



If the Download button still doesn't work, please go to NXP Flexnet , navigate to **Automotive SW – S32M2 Standard Software -> Automotive SW – S32M2 – Model-Based Design Toolbox** and select the latest release available.

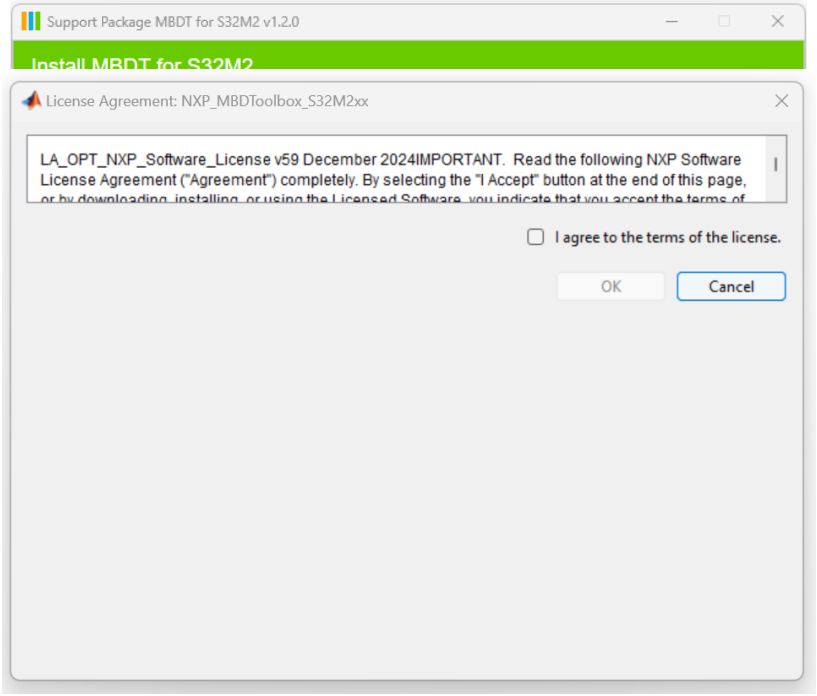
Read the License Agreement and click on 'I agree' if you accept the terms of the Agreement.



Select the SW32_MBDT_S32M2xx_1.2.0_D2505.mltbx file to download the toolbox.

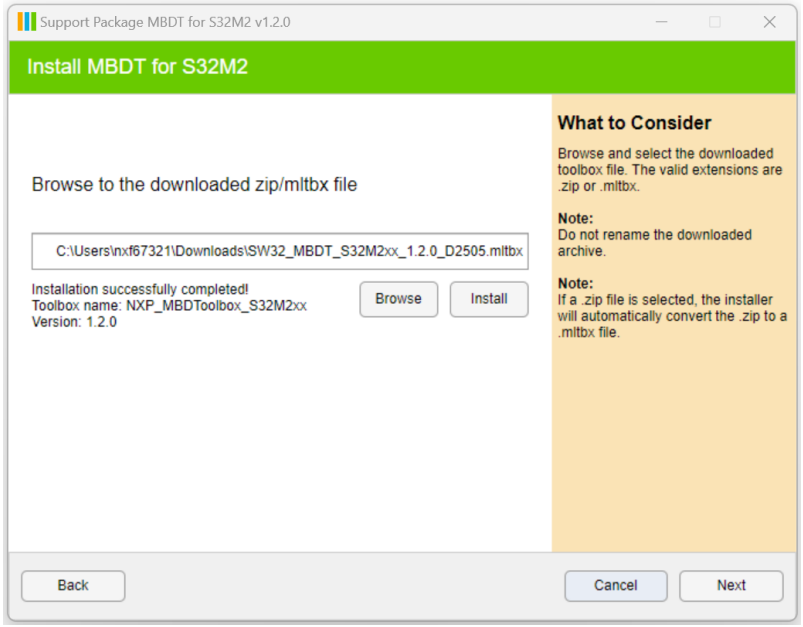
3. Install MBD Toolbox for S32M2

In the Install MBDT for S32M2 page, please first click on Browse button and select the freshly downloaded mltbx file from NXP website. Then click on the Install button.



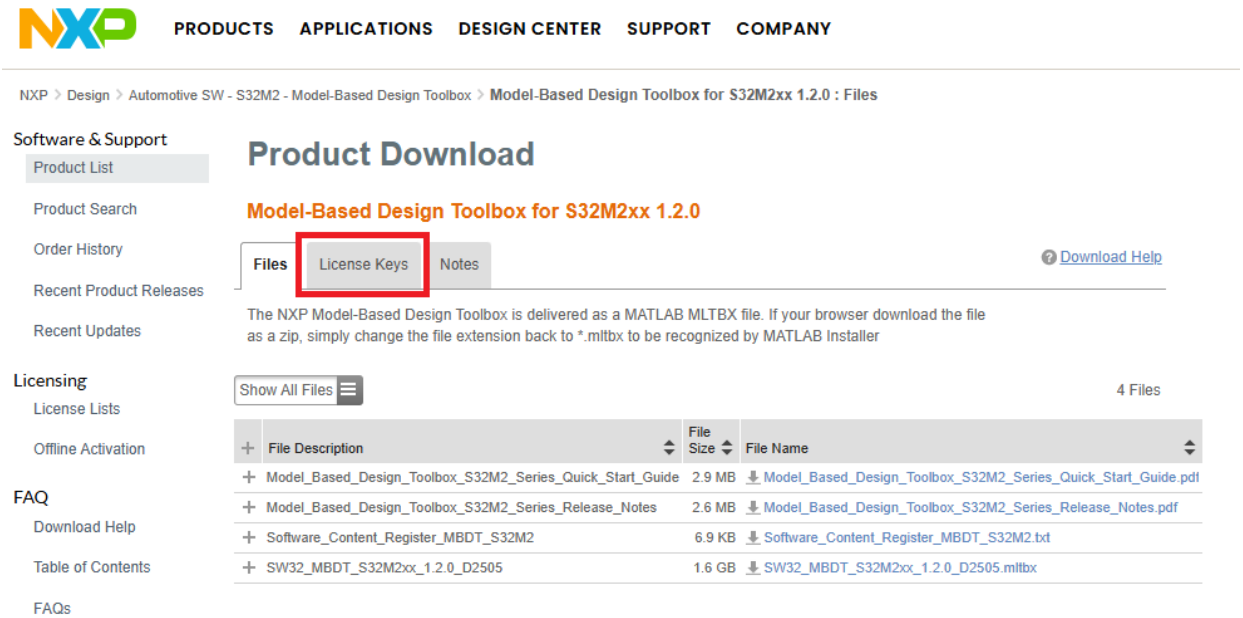
Review the License Agreement carefully. Check the box labeled “I agree to the terms of the license” and press the OK button.

Once the installation is complete, a confirmation message will appear.



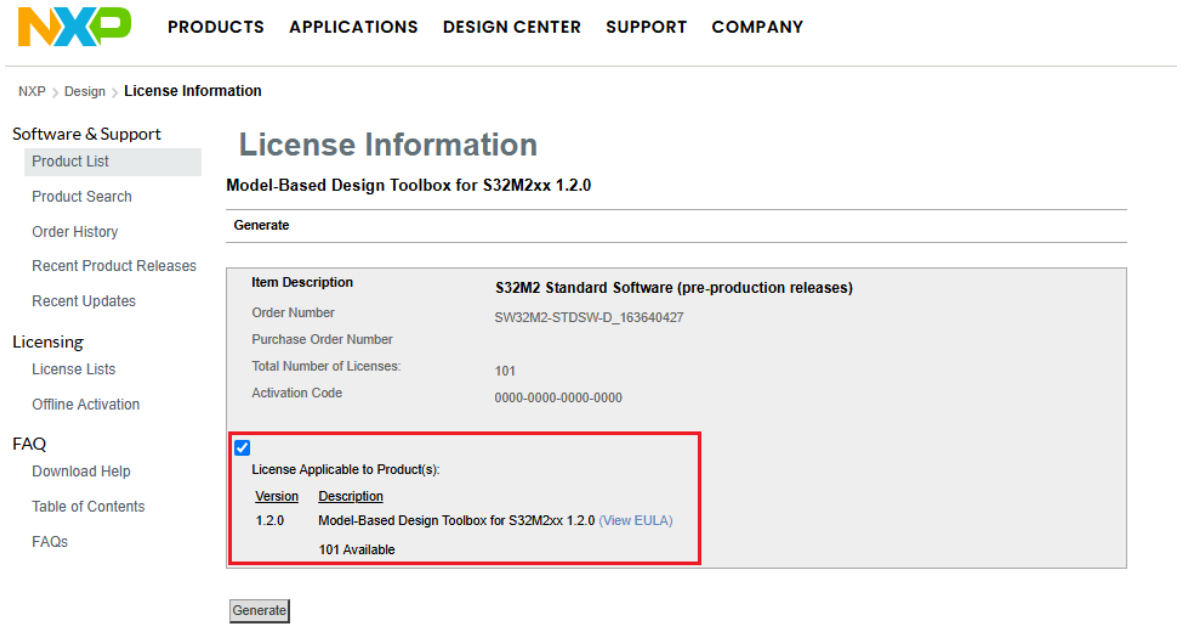
4. Activate MBD Toolbox for S32M2

To use the MBDT for S32M2, a free license from the NXP website must be generated. This can be done on the NXP page described in section 2: *Download MBD Toolbox for S32M2*.

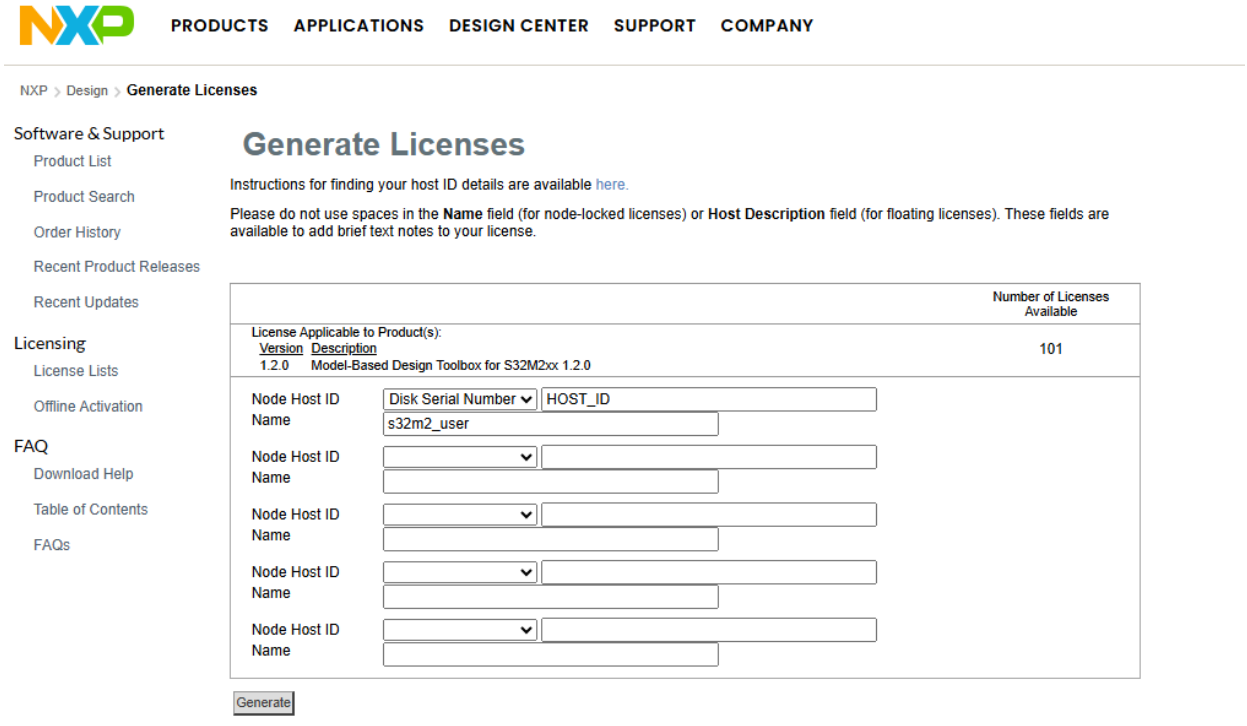


Navigate to the product page and click on the **"License Keys"** tab to begin the license generation process.

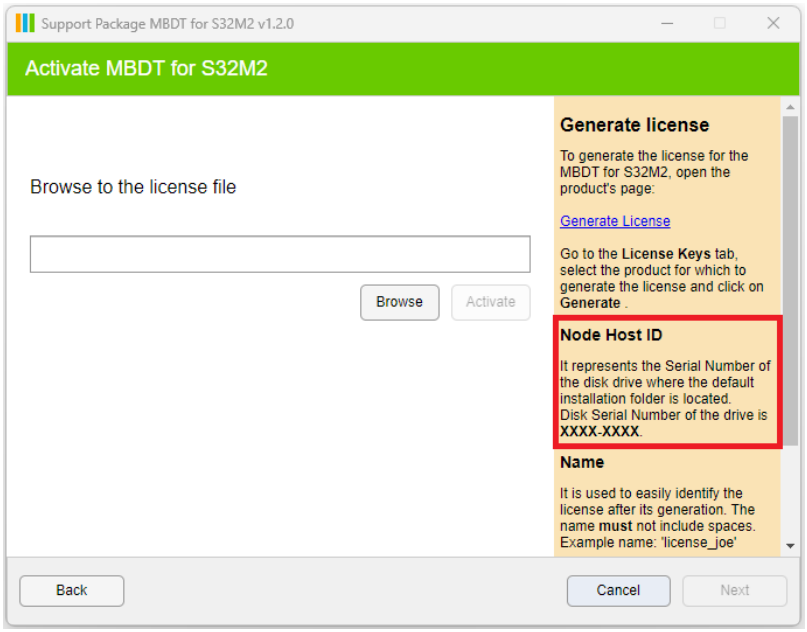
Select the license applicable to the product and click generate.



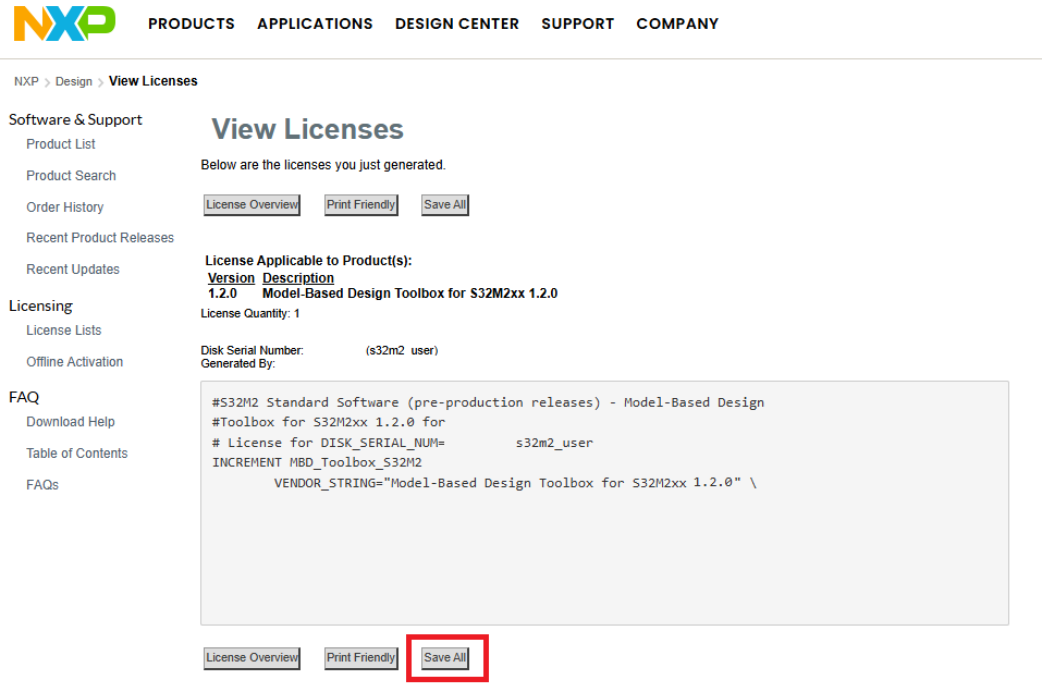
Select the type of the Node Host ID to Disk Serial Number and type the host id number and the name of the license as below. The name shall not contain any spaces!



The host id number has the following format XXXX-XXXX and can be found in the help section of the Activate MBDT for S32M2 page. Alternatively, to find the host ID for your hard drive, please open a Windows Command Prompt and execute the “vol” command on the selected drive.

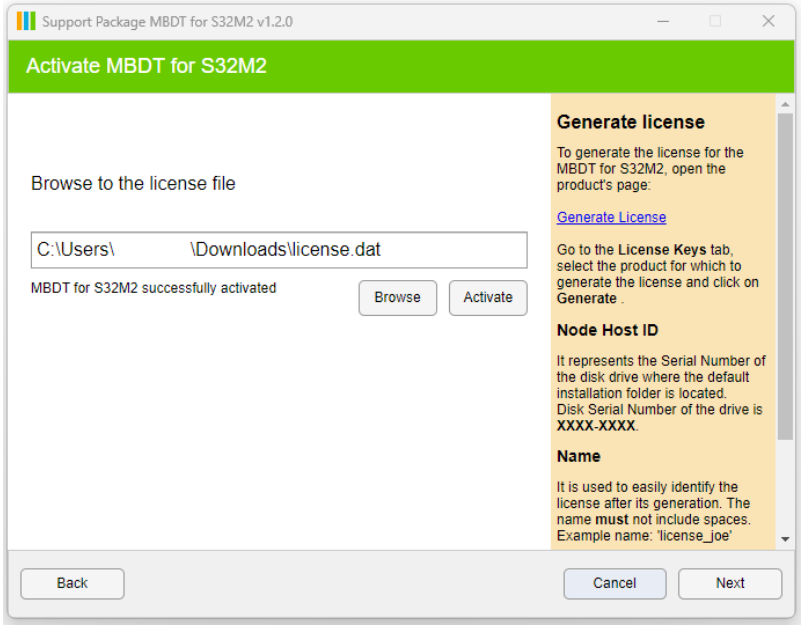


After entering the host id number and license name, click on “Generate” then click on “Save all” to download the license.



In the Support Package application, click on Browse and select the freshly downloaded license, then click Activate.

Note! The license file can be renamed, but the extension must remain .dat.

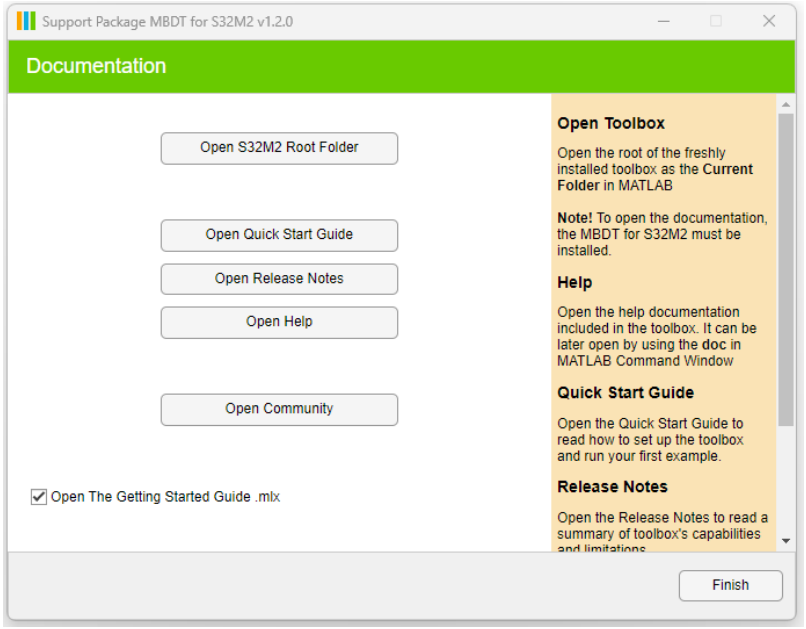


5. Documentation

The last page in the Support package application offers several options:

- Quickly open the MBDT for S32M2 root folder in MATLAB Explorer
- Access the **Quick Start Guide** and **Release Notes** included with the toolbox
- Launch the toolbox documentation via **MATLAB Help**
- Visit the MBDT **Community website** in your default web browser

If the checkbox 'Open The Getting Started Guide .mlx' remains checked when the support package application is closed, the GettingStarted.mlx script is opened in MATLAB editor. This script provides detailed instructions and helpful tips for getting started with the Model-Based Design Toolbox for S32M2.



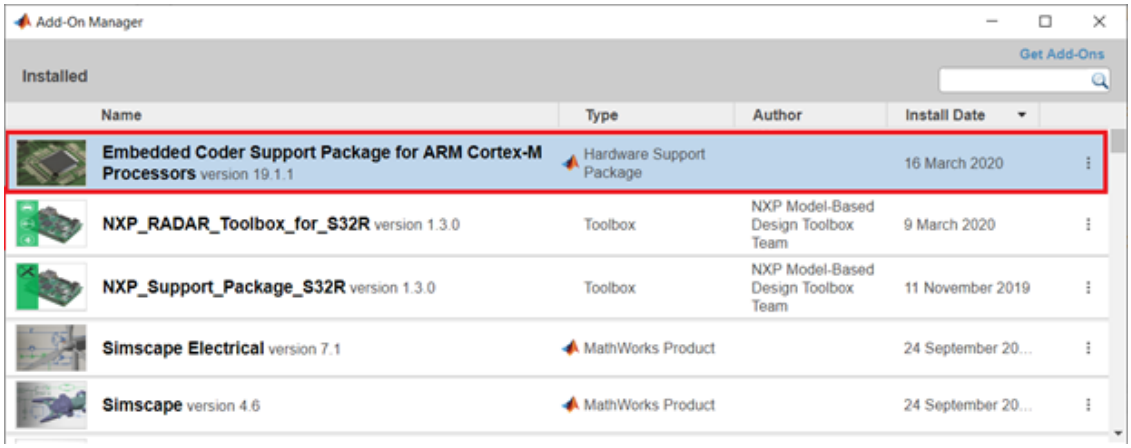
1.2.4 Setting the Path for Model-Based Design Toolbox and Toolchain Generation

The Model-Based Design Toolbox uses the Toolchain mechanism exposed by Simulink to enable automatic code generation with Embedded Coder toolbox. By default, the toolchain is configured for the supported MATLAB versions R2021a - R2024b. For any newer MATLAB releases, the user needs to execute a toolbox m-script to generate the appropriate settings for his/her installation environment.

This is done by changing the MATLAB Current Directory to the toolbox installation directory (e.g.: ..\MATLAB\Add-Ons\Toolboxes\NXP_MBDToolbox_S32M2xx\) and running the "mbd_s32m2_path.m" and "mbd_s32m2.target.create_codertarget" scripts.

```
>> mbd_s32m2_path
Treating 'C[…]\S32M2\src' as MBD Toolbox installation root.
MBD Toolbox path prepended.
Registering the toolchain ...
C:\Windows\System32\where.exe
Successful.
Creating folders for the target 'NXP S32M2xx' in the folder
'C:\[…]\S32M2\src\mbdtbx_s32m2\codertarget\2022a'...
Creating the framework for the target 'NXP S32M2xx'...
Registering the target 'NXP S32M2xx'...
Done.
```

This mechanism requires users to install the Embedded Coder Support Package for ARM Cortex-M Processor as a prerequisite.

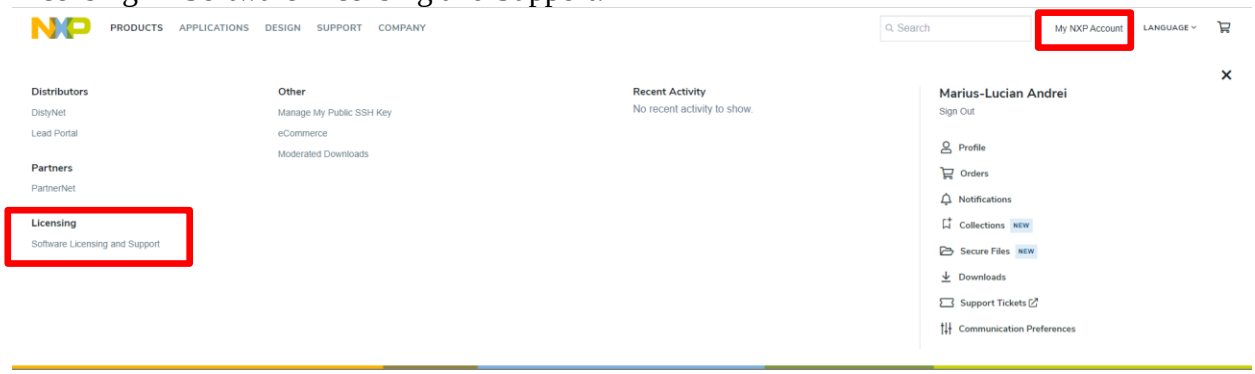


The "mbd_s32m2_path.m" script verifies the user setup dependencies and will issue instructions for a successful installation and configuration of the toolbox.

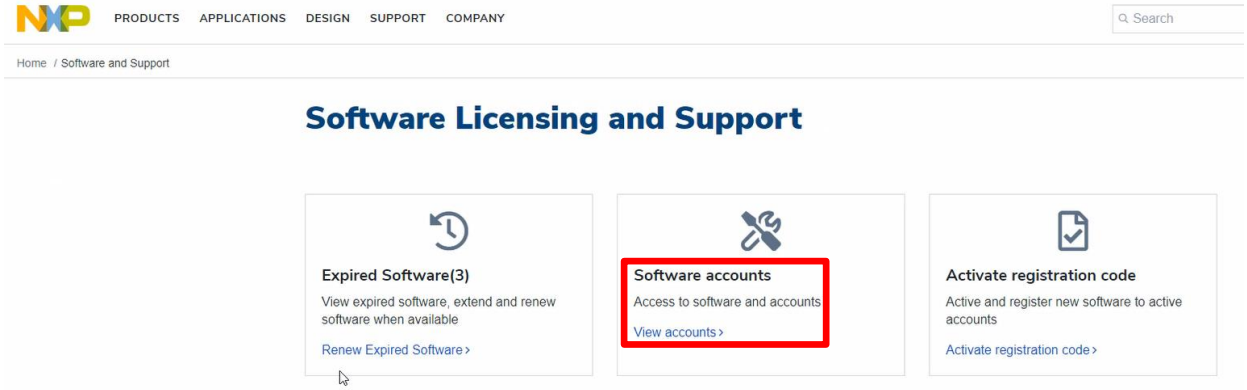
1.2.5 **Installing EB tresos (optional step)**

Model-Based Design Toolbox for S32M2 provides support for 2 external configuration tools – NXP S32Configuration Tools (which is made available directly through the mltbx installer and requires no additional installation) and EB tresos. To install this product, you will need to follow these instructions:

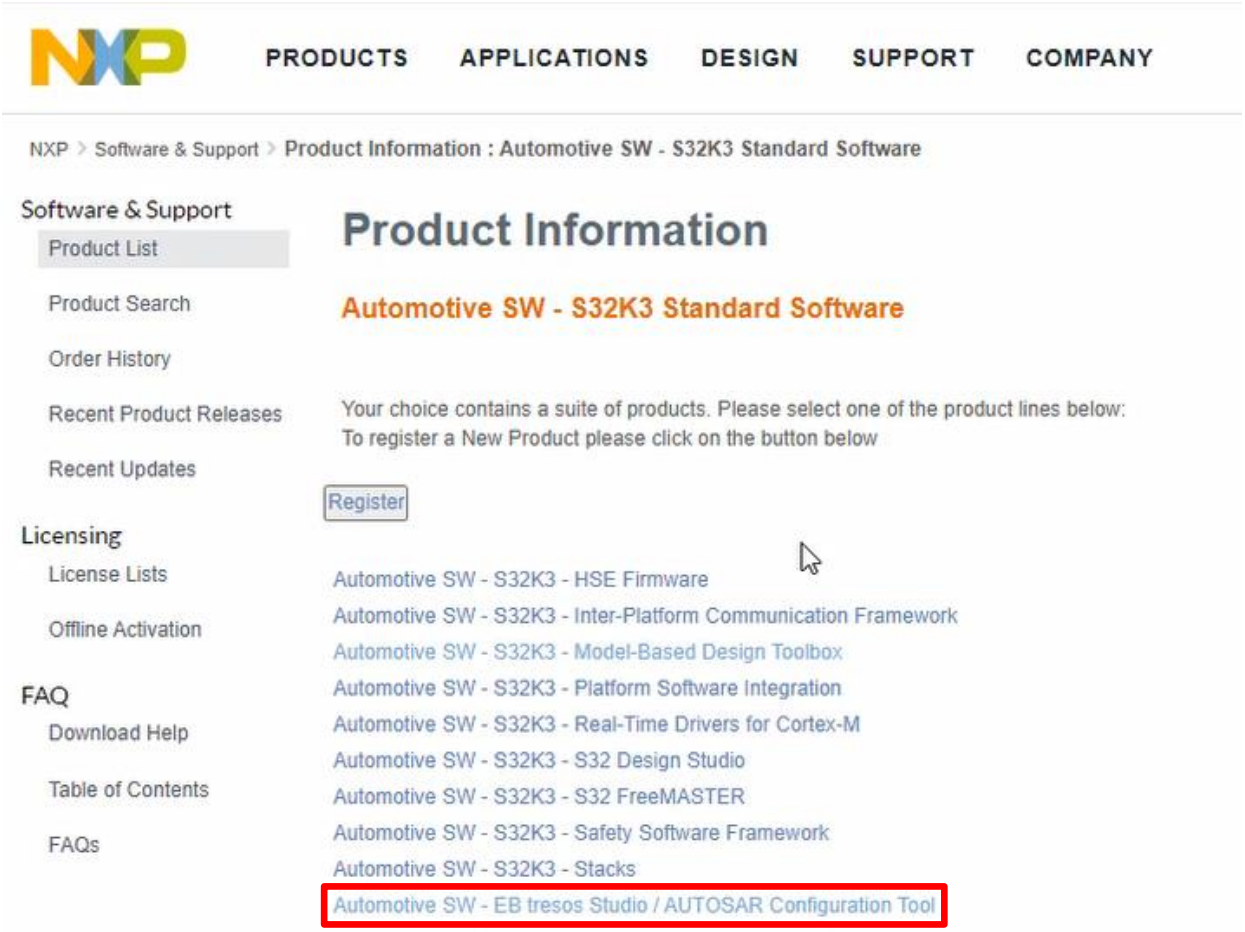
Go to the nxp.com website, log into your account (or make one for free). Then go to My NXP -> Licensing -> Software Licensing and Support:



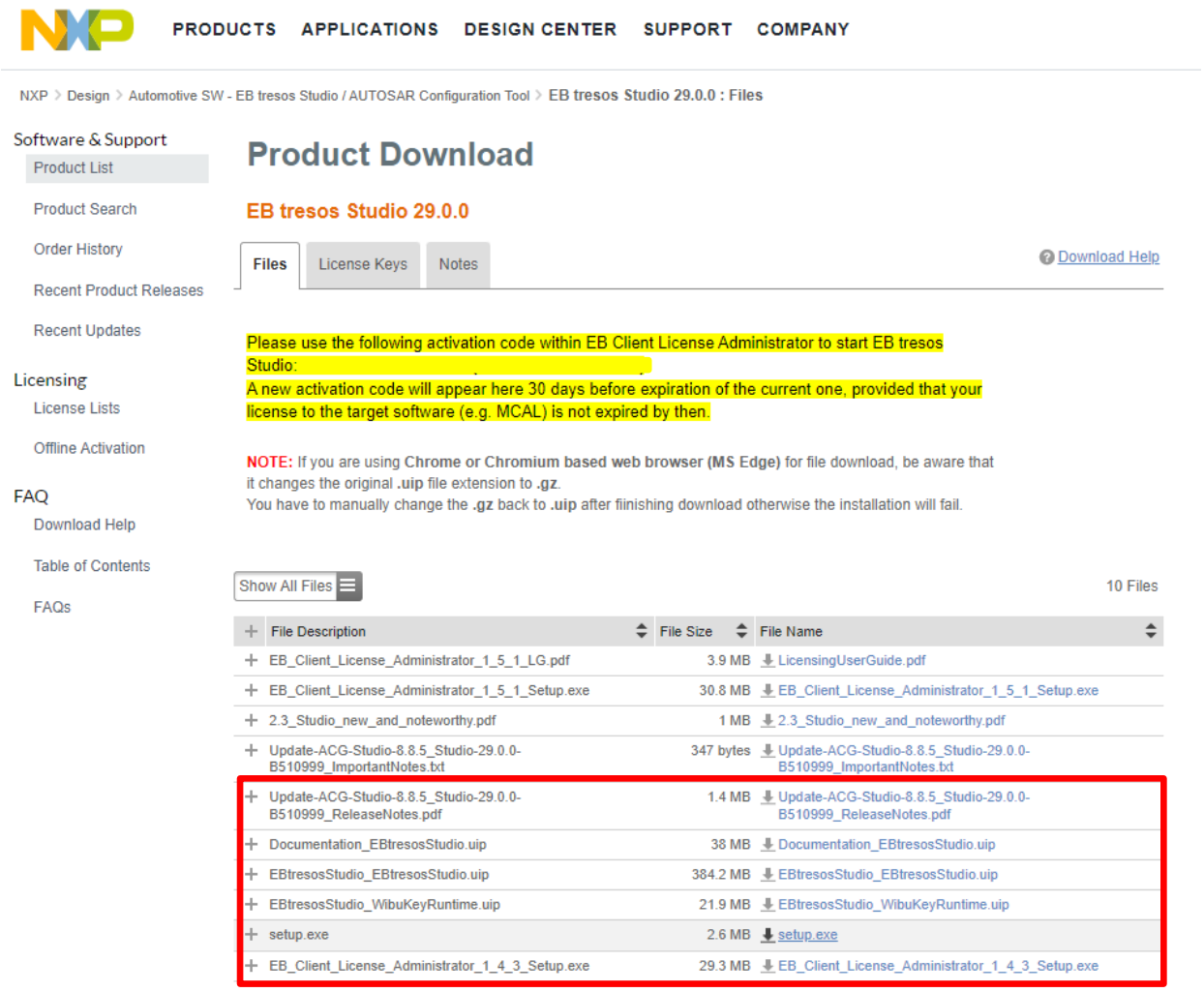
For the next step go to Software accounts -> View accounts



You will find a Product list on the next page from which you should select **Automotive SW – S32K3 Standard Software.** From the Product Information page, you should find the item names **Automotive SW – EB tresos Studio / AUTOSAR Configuration Tool**.



From the next page, select **EB tresos Studio 29.0.0**. Read the Software Terms and Conditions on the following page and click on **I Agree**.

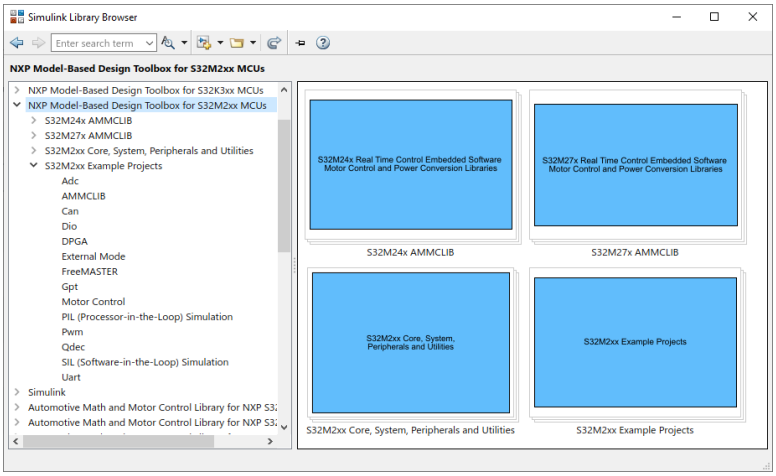


From this page, download (minimum) the files shown in the picture above. Note that when the download is complete, the .uip files might have been renamed to .gz or .zip. You will have to manually change the extensions of those files back to .uip, then simply run the **setup.exe** file. From that step, the EB tresos wizard will guide you through the installation. Additionally, you can download from the same location (shown in the picture above) the EB tresos installation guide (available in .pdf format). Note that you will require a license for this configuration tool, but it is made available on that same page (highlighted in yellow), for free.

2 Run Models

2.1 Examples Library & Help

NXP's Model-Based Design Toolbox comes with an Examples Library collection that lets you test different MCU on-chip modules and run complex applications.



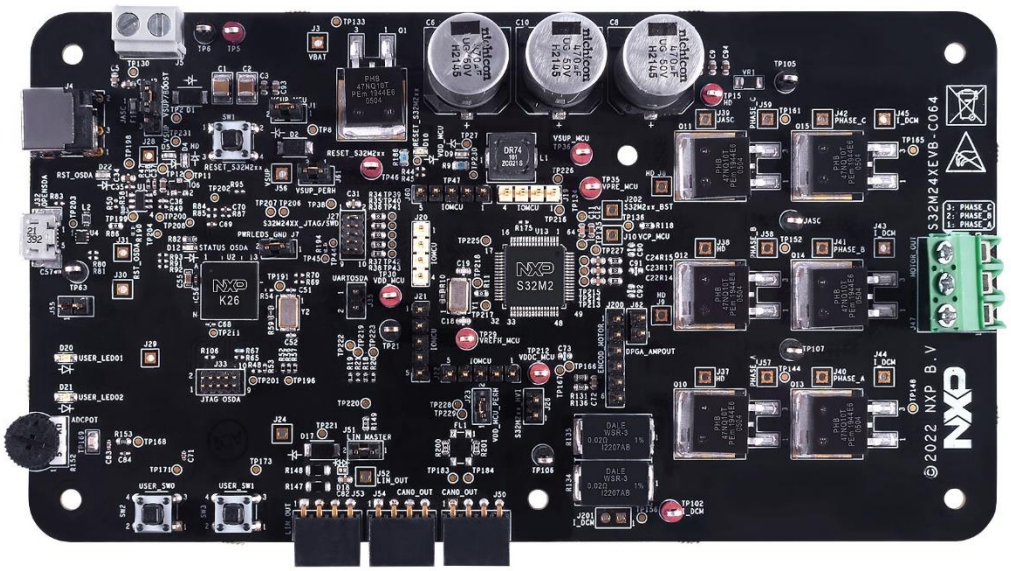
The Examples Library mbd_s32m2_examples.slx can be opened from "{Model Based Design Install Directory}\S32M2_Examples folder or directly from the Simulink Library Browser main window.

Each category contains multiple examples that showcase different Model-Based Design Toolbox capabilities that are categorized into different groups.

The examples are also available from standard MATLAB Help for NXP's Model-Based Design Toolbox Example.

2.2 Hardware Setup

All examples provided with the Model-Based Design Toolbox were developed on **S32M24XEVB** and **S32M27XEVB** as the primary hardware targets. Also, some ready-to-run examples, like CAN communication and Motor control, are available for the **S32M276SFFRD**.

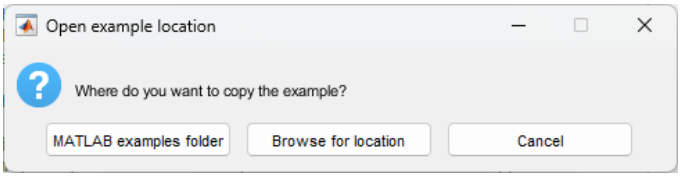


Evaluation boards must be powered via an external 12V power adapter, and an USB cable connected between the host PC and the OpenSDA USB port on the EVB. In case the OpenSDA port is not available, an external probe (P&E Micro Multilink) can be used.

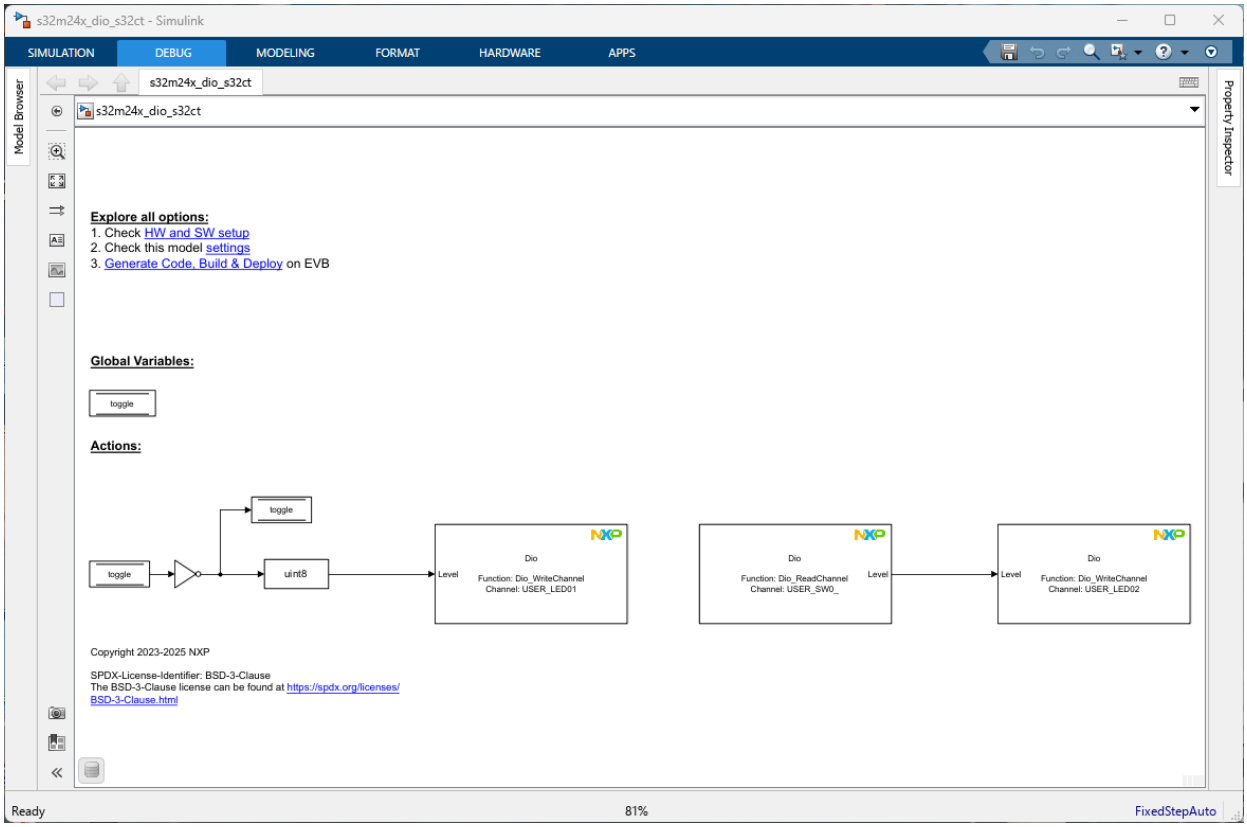
2.3 A “Hello World” Example

Once the software and hardware setup is successfully completed, you can begin running the example projects provided by the **Model-Based Design Toolbox for S32M2.** These examples are specifically designed for the S32M242-Q064, S32M244-Q064, and S32M276-Q064 processors within the S32M2 family. Additionally, for supported derivatives, the toolbox includes examples that demonstrate integration with both **S32 Configuration Tools** and **EB tresos**, showcasing how to interact with these configuration environments.

In MATLAB Command Window, run the following command:
>> mbd_s32m2.nxp.openexample('s32m24x_dio_s32ct')
When this popup appears, please browse for the location on where the example to be copied from the MBDT S32M2 Toolbox Examples.



Once the process is complete, the model will automatically open.

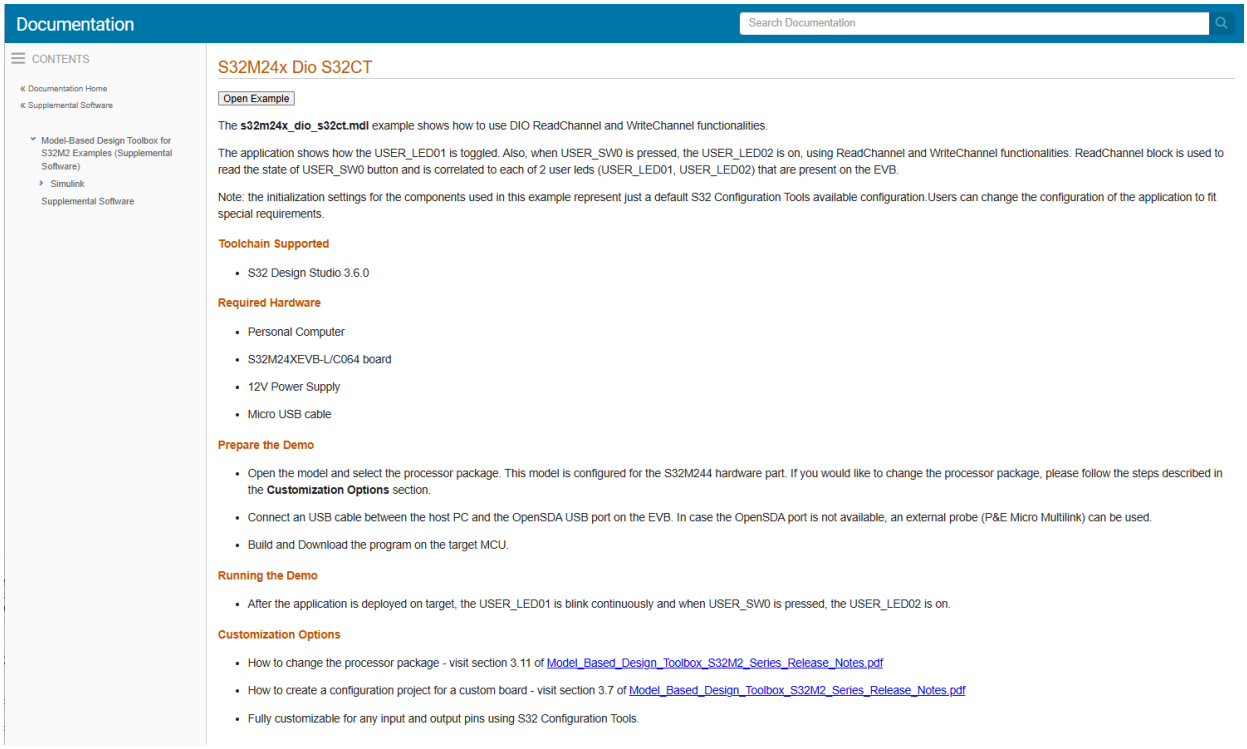


The **s32m24x_dio_s32ct** example targets the S32M24XEVB-C064/S32M24XEVB-L064 EVBs and shows how to use DIO ReadChannel and WriteChannel functionalities. The application shows how the USER_LED01 is toggled. Also, when USER_SW0 is pressed, the USER_LED02 is on, using ReadChannel and WriteChannel functionalities. ReadChannel block is used to read the state

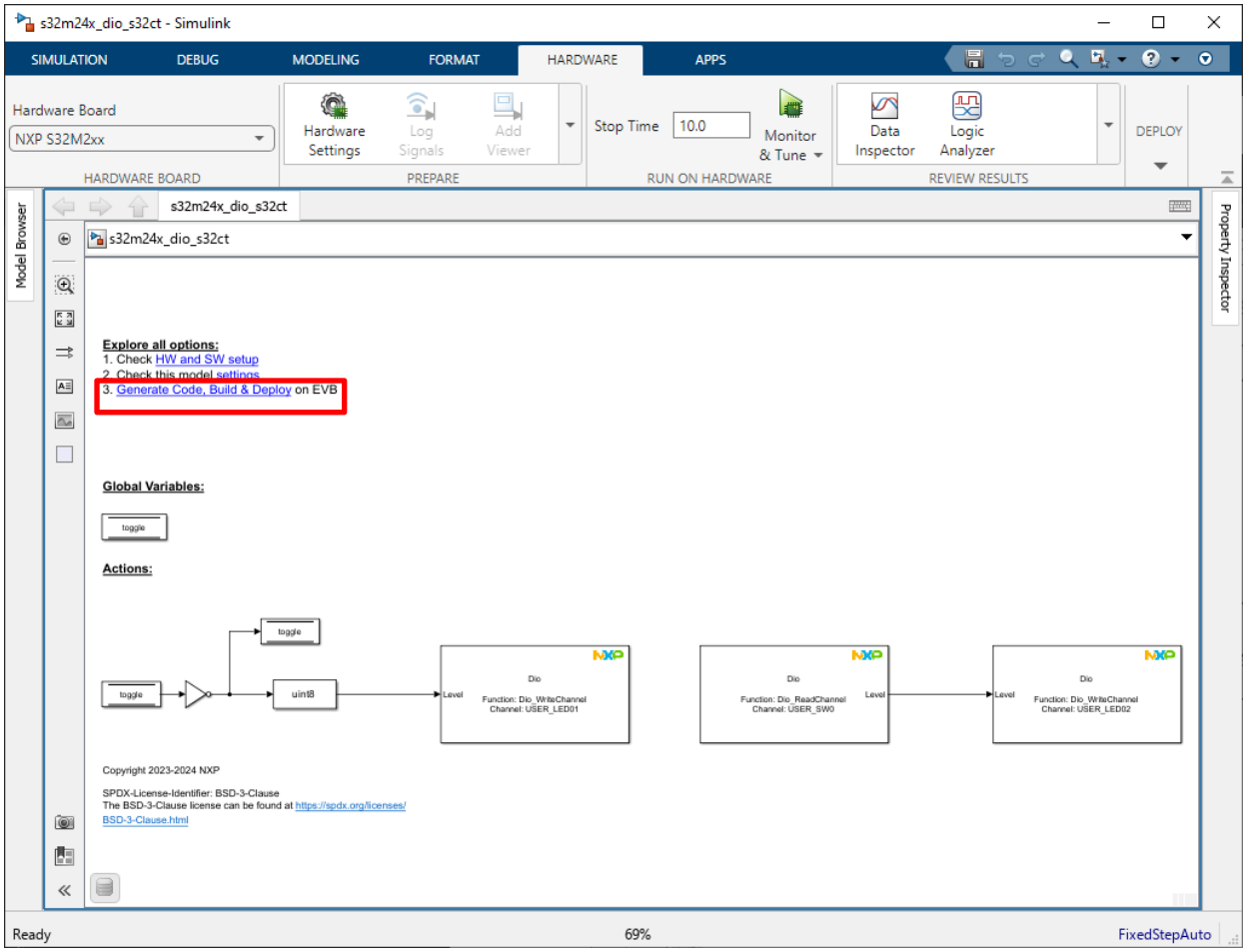
of USER_SW0 button and is correlated to each of 2 user leds (USER_LED01, USER_LED02) that are present on the EVB.

Follow the next steps to run the example:

1. Open and README.html file to understand the hardware and software requirements for running the application.



2. Press the Build Model button and wait until the code is generated, compiled, and downloaded to the evaluation board. Alternatively, you can press on the text highlighted in the model to start the process automatically.



If the LEDs are blinking, Congratulations — your first example using the **Model-Based Design Toolbox for S32M2** is running successfully!

How to Reach Us:

Home Page:
www.nxp.com

Web Support:
www.nxp.com/support

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