

Model-Based Design Toolbox LAX

Quick Start Guide

**Automatic Code Generation for the LAX accelerator
Version 1.2.0**

Target Based Automatic Code Generation Tools
For MATLAB™ models working with MATLAB Coder™ and Embedded Coder®

Model-Based Design Toolbox LAX
Quick Start Guide

Summary

1	Installation	1-3
1.1	System Requirements	1-3
1.2	Installation Steps.....	1-3
1.2.1	Run Add-on installer (offline)	1-4
1.2.2	Install NXP Support Package for LAX (online)	1-7
1.2.3	Install NXP Model-Based Design Toolbox for LAX.....	1-11
1.2.4	Generate and Activate NXP Model-Based Design Toolbox for LAX license...	1-17
1.2.5	Model-Based Design Toolbox Configuration	1-22
1.2.6	Setting the Path for Model-Based Design Toolbox and Toolchain Generation.	1-29
2	How to create, run and build LAX example applications	2-30
2.1.1	S32R45 Linux Setup	2-30
2.1.2	Create LAX example.....	2-30
2.1.3	Run LAX example.....	2-31

1 Installation

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

The LAX Model-Based Design Toolbox supports code generation for:

- ARM Cortex-A53 core
- NXP LAX accelerator

1.1 System Requirements

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

- *Windows® 10 OS*
- At least 4 GB of RAM
- At least 6 GB of free disk space.
- Internet connectivity for web downloads.

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. This document shows how to install the offline/online package.

For the offline package, to have the toolbox installed and configured properly the following actions should be executed, assuming you have already downloaded the file:

1. Run the MATLAB toolbox package file *.mltbx.
2. Configure the external tools dependencies, such as the S32 Design Studio and Radar SDK.
3. Set up the MATLAB path for the Model-Based Design Toolbox and generate the right toolchain setting for the user MATLAB environment.

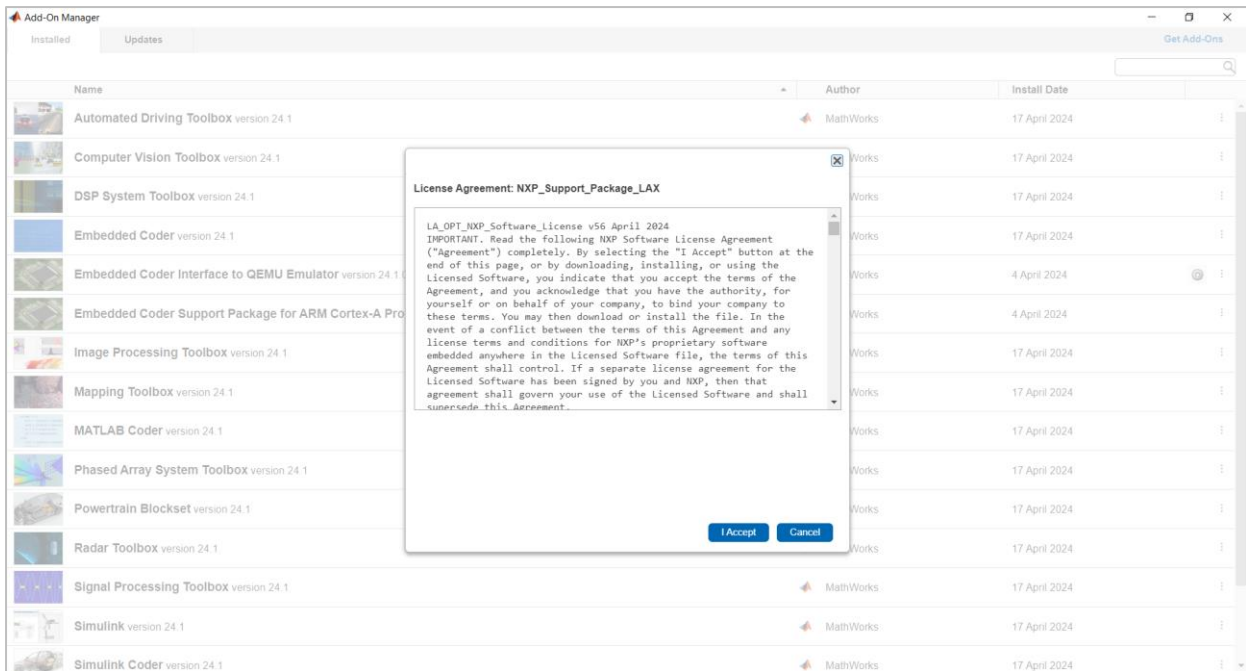
Each of these actions is explained in the following sub-chapters.

1.2.1 Run Add-on installer (offline)

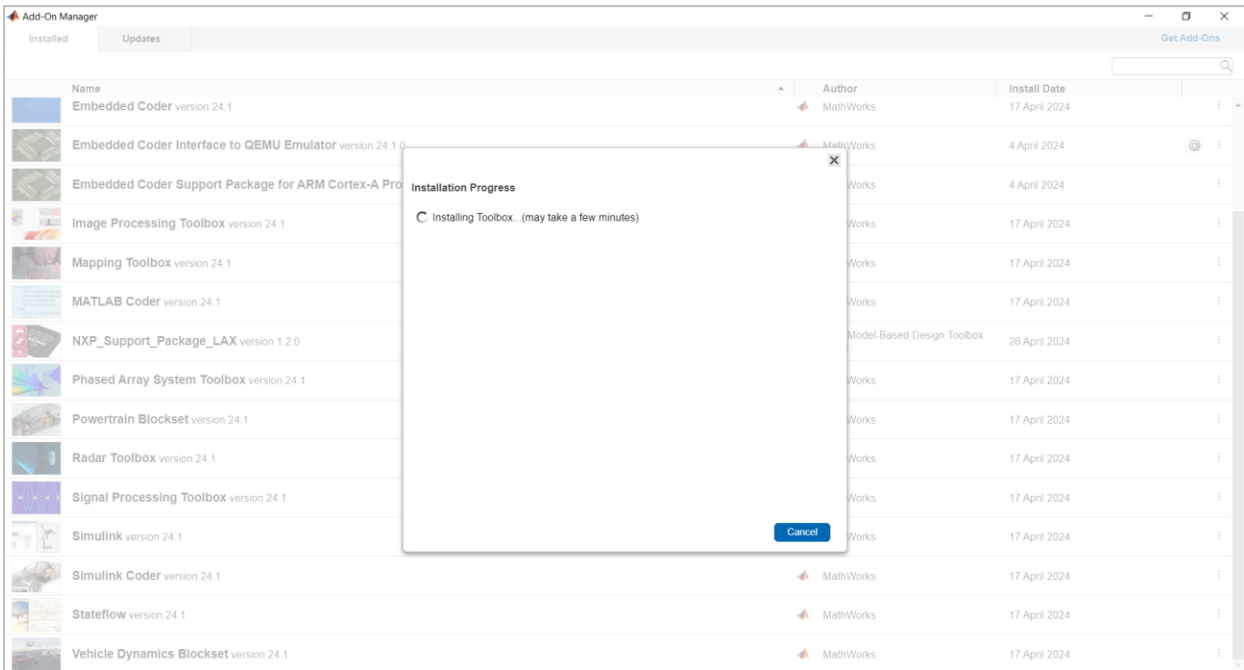
Install the NXP's Model-Based Design Toolbox by double-clicking the *.mltbx file. This will activate the MATLAB Add-ons installer that will automatically start the installation process.

After the MATLAB opens, you will be prompted with the following options:

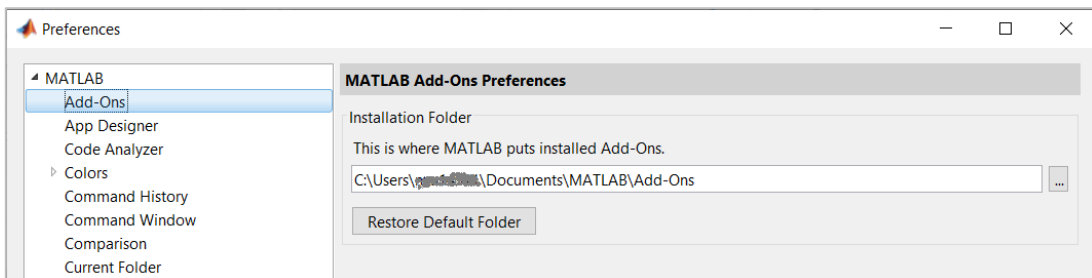
1. Indicate acceptance of the NXP Software License Agreement by selecting “I Accept” to proceed.



- The rest of the process is silent and under MATLAB control. All the files will be automatically copied into the default Add-Ons folder within MATLAB.

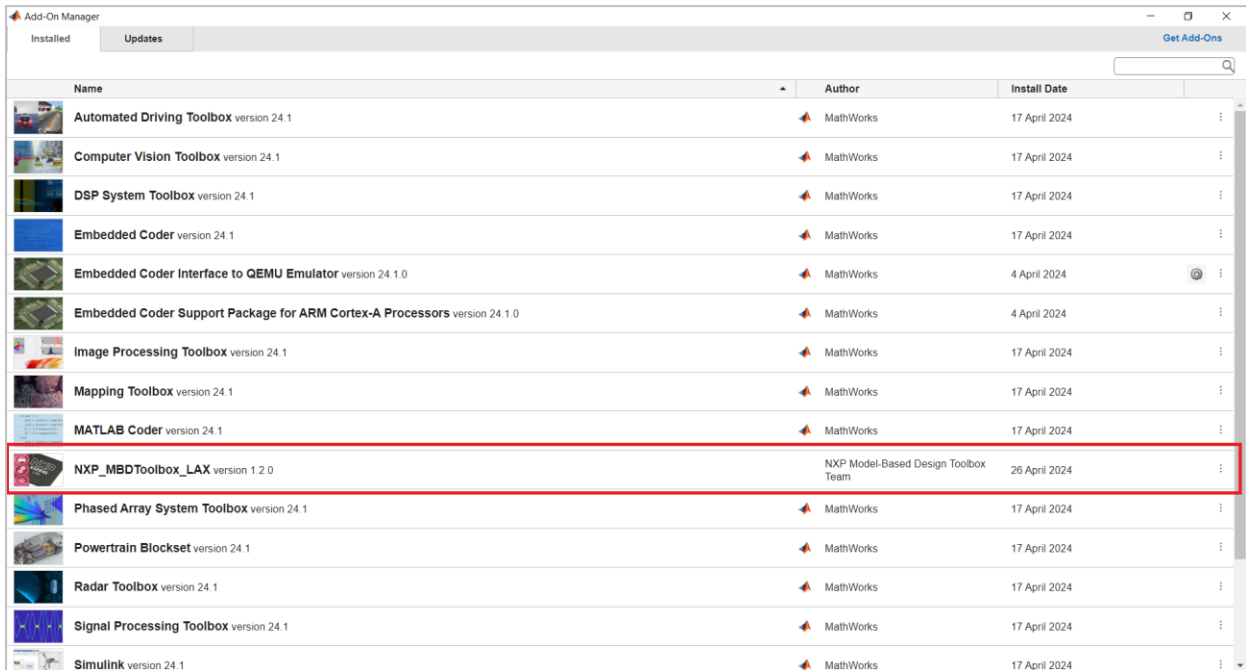


The default Add-Ons Installation Folder can be changed from MATLAB Preferences.



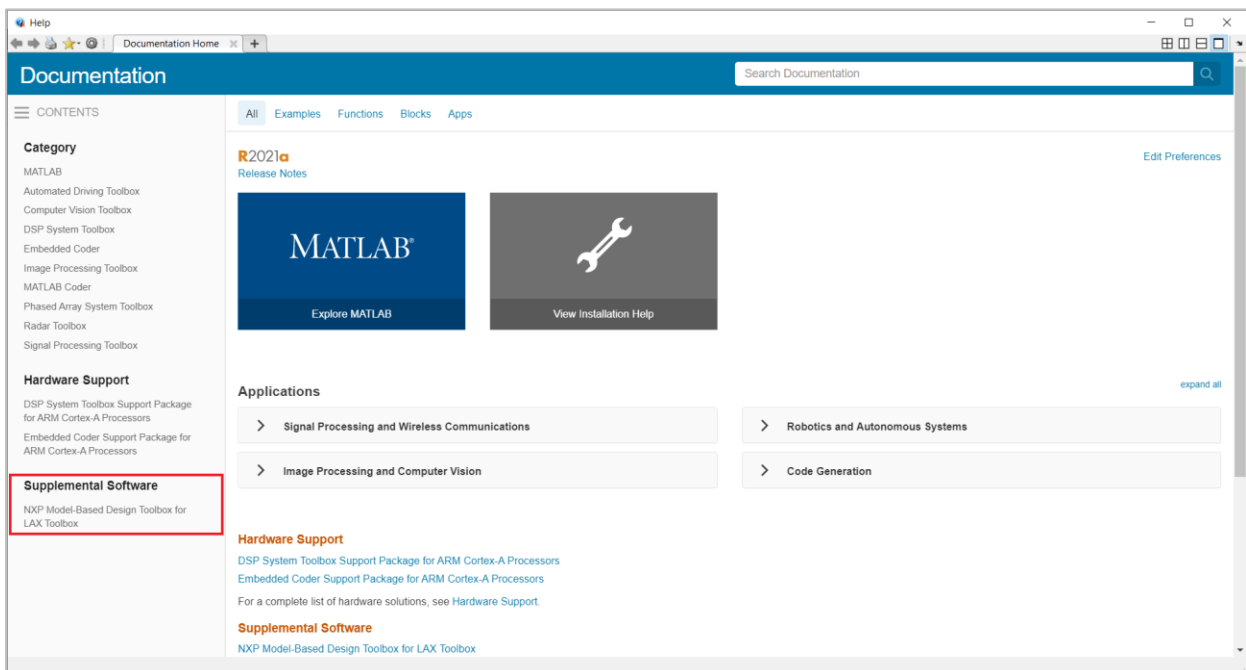
Note: It is recommended to install the MATLAB and NXP Toolbox in a location that does not contain special characters, empty spaces, or mapped drives.

3. After several minutes, the NXP's Model-Based Design Toolbox should be visible as a new Add-on.

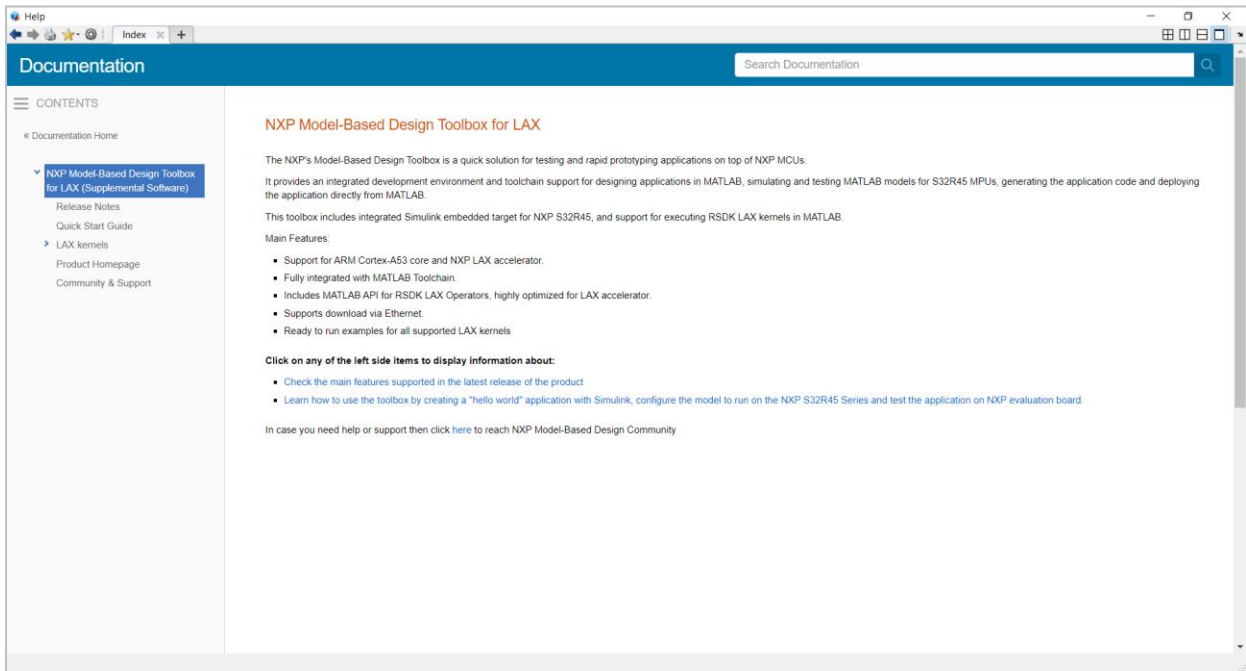


Name	Author	Install Date
Automated Driving Toolbox version 24.1	MathWorks	17 April 2024
Computer Vision Toolbox version 24.1	MathWorks	17 April 2024
DSP System Toolbox version 24.1	MathWorks	17 April 2024
Embedded Coder version 24.1	MathWorks	17 April 2024
Embedded Coder Interface to QEMU Emulator version 24.1.0	MathWorks	4 April 2024
Embedded Coder Support Package for ARM Cortex-A Processors version 24.1.0	MathWorks	4 April 2024
Image Processing Toolbox version 24.1	MathWorks	17 April 2024
Mapping Toolbox version 24.1	MathWorks	17 April 2024
MATLAB Coder version 24.1	MathWorks	17 April 2024
NXP_MBDToolbox_LAX version 1.2.0	NXP Model-Based Design Toolbox Team	26 April 2024
Phased Array System Toolbox version 24.1	MathWorks	17 April 2024
Powertrain Blockset version 24.1	MathWorks	17 April 2024
Radar Toolbox version 24.1	MathWorks	17 April 2024
Signal Processing Toolbox version 24.1	MathWorks	17 April 2024
Simulink version 24.1	MathWorks	17 April 2024

4. NXP's Model-Based Design Toolbox documentation, help, and examples are fully integrated with the MATLAB development environment. Get more details by accessing the standard Help and **Supplemental Software** section.



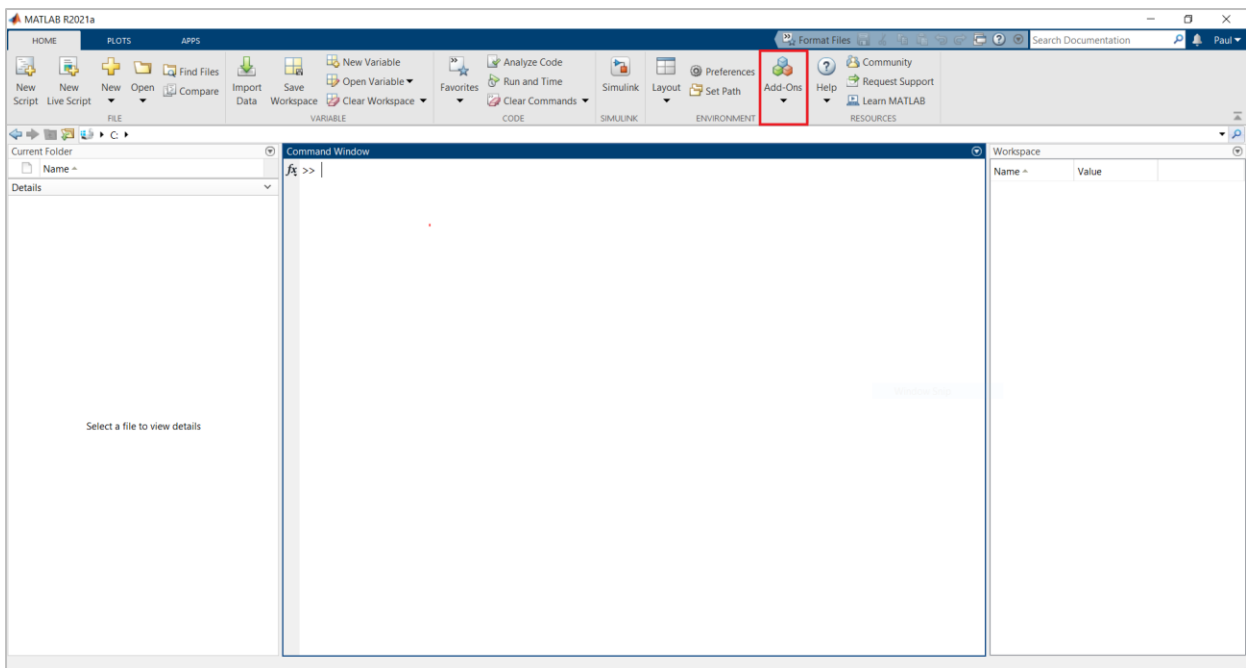
The screenshot shows the MATLAB Documentation Home page. The left sidebar contains a 'CONTENTS' menu with categories like MATLAB, Hardware Support, and Supplemental Software. The 'Supplemental Software' category is highlighted with a red box, showing the 'NXP Model-Based Design Toolbox for LAX Toolbox'. The main content area features a search bar, a 'MATLAB' logo with an 'Explore MATLAB' button, a 'View Installation Help' button, and a list of applications including 'Signal Processing and Wireless Communications', 'Robotics and Autonomous Systems', and 'Code Generation'. Below this, there is a 'Hardware Support' section with links to 'DSP System Toolbox Support Package for ARM Cortex-A Processors' and 'Embedded Coder Support Package for ARM Cortex-A Processors'. At the bottom, there is a 'Supplemental Software' section with a link to 'NXP Model-Based Design Toolbox for LAX Toolbox'.



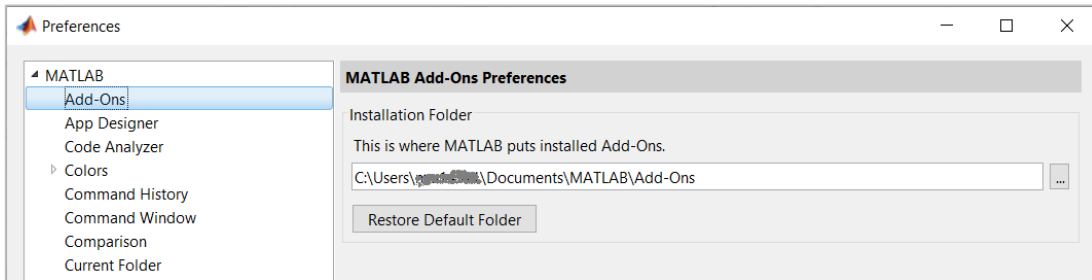
1.2.2 Install NXP Support Package for LAX (online)

This package will guide you through the download, installation, and activation process of the MBDT for LAX online package.

1. Go to MATLAB Add-Ons

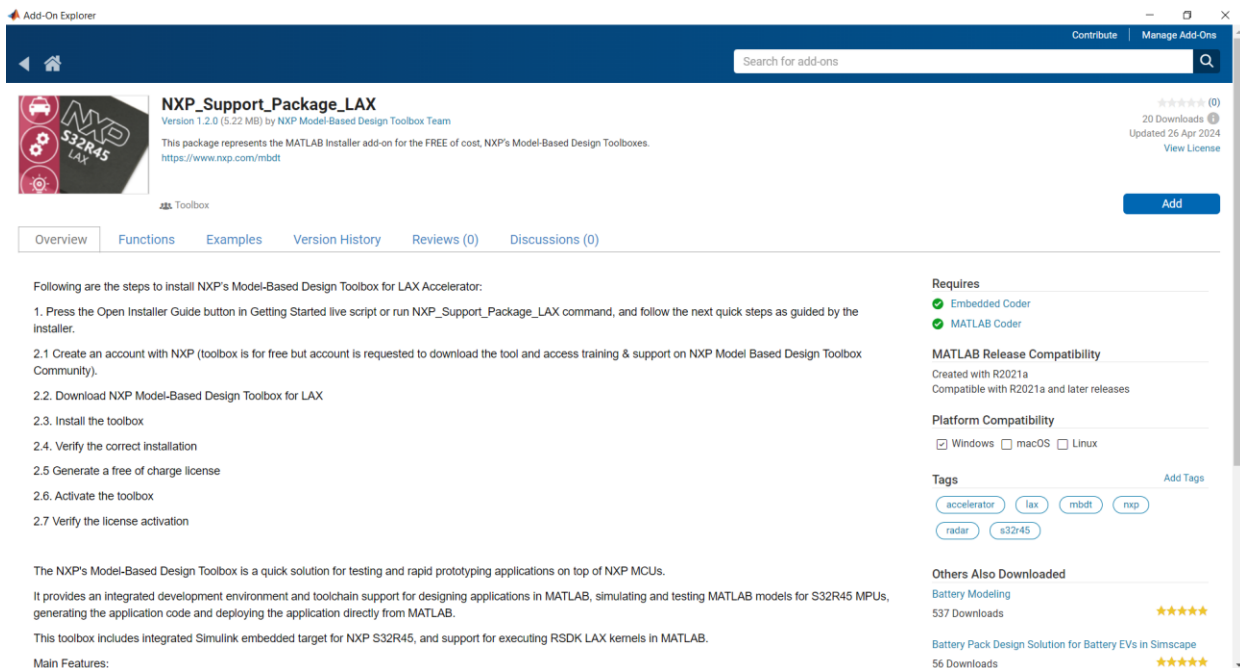


The default Add-Ons Installation Folder can be changed from MATLAB Preferences.

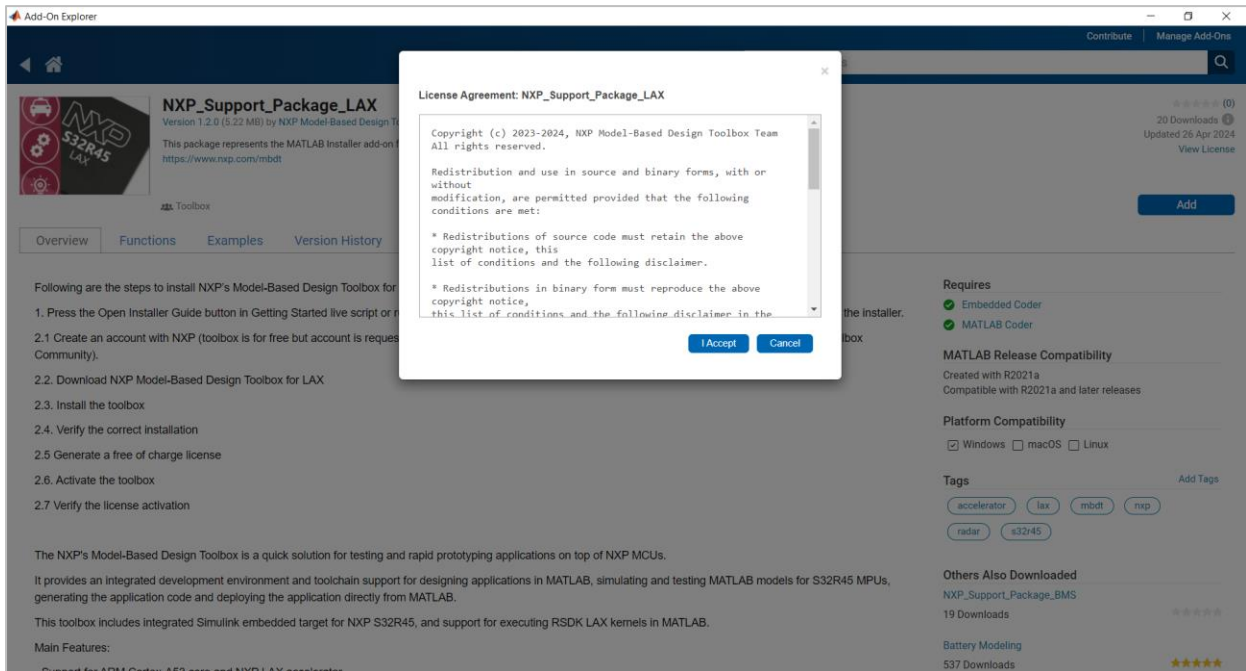


Note: It is recommended to install the MATLAB and NXP Toolbox in a location that does not contain special characters, empty spaces, or mapped drives.

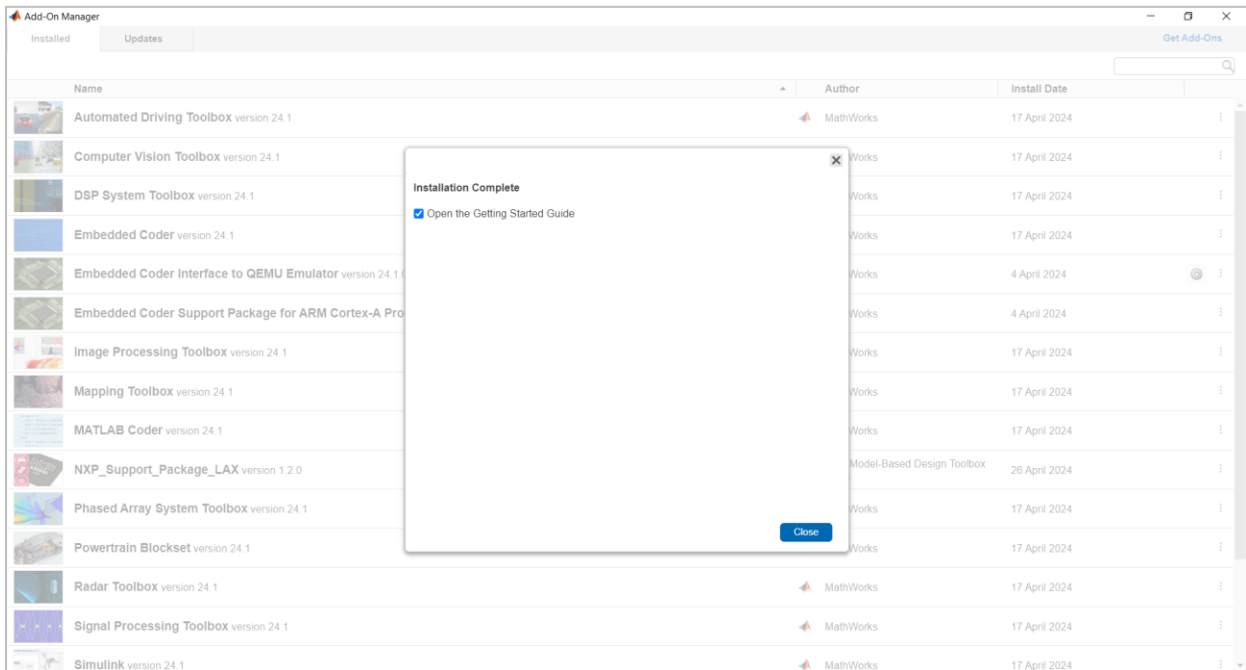
2. Search for the “NXP Support Package LAX”
3. Install the “NXP Support Package LAX” by pressing the **Add** button.



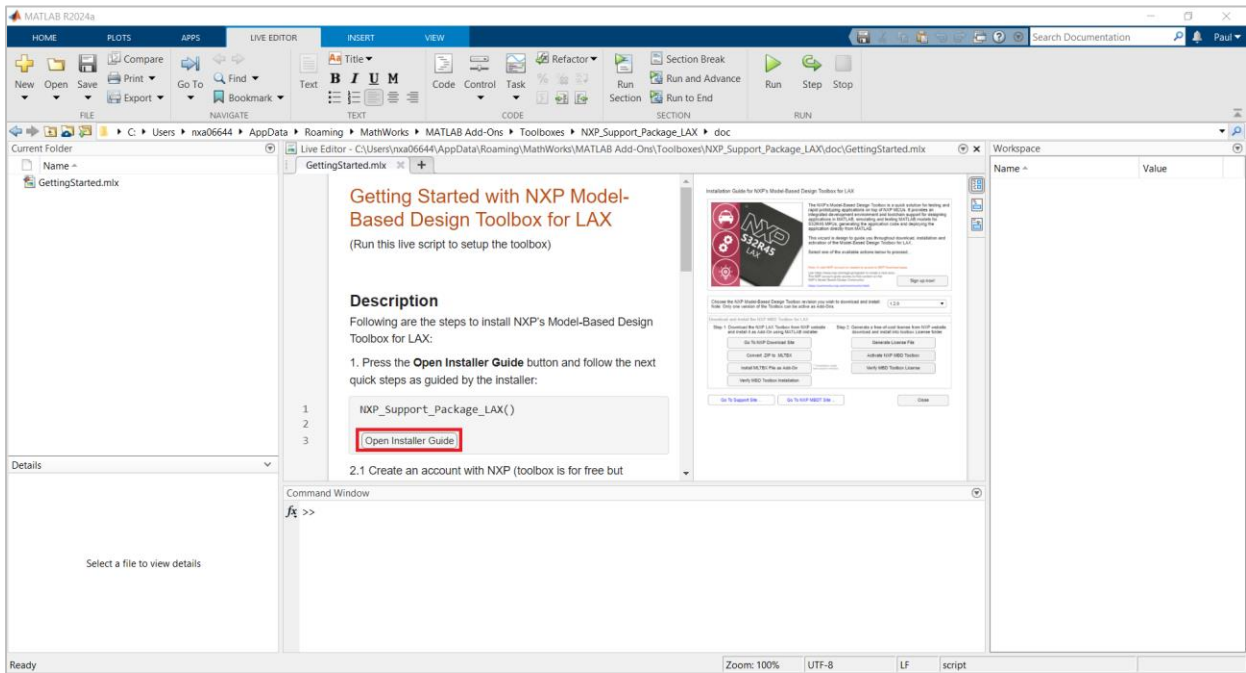
4. Read the License Agreement and press **I Accept**.



5. Once the process is successful, press the **Close** button.



6. Press the **Open Installer Guide** button on the newly opened **Getting Started** page.



7. The **Toolbox Installation Guide** will be opened.

1.2.3 Install NXP Model-Based Design Toolbox for LAX

NXP Toolbox Installation Guide is a graphical user interface guide that helps to download and install the Model-Based Design Toolbox and generate and install the license from the NXP website.

NXP's Model-Based Design Toolbox for LAX: Installation Guide

Installation Guide for NXP's Model-Based Design Toolbox for LAX

The NXP's Model-Based Design Toolbox is a quick solution for testing and rapid prototyping applications on top of NXP MCUs. It provides an integrated development environment and toolchain support for designing applications in MATLAB, simulating and testing MATLAB models for S32R45 MPUs, generating the application code and deploying the application directly from MATLAB.

This wizard is design to guide you throughout download, installation and activation of the Model-Based Design Toolbox for LAX.

Select one of the available actions below to proceed...

Note: A valid NXP account is needed to access to NXP Download page.
Use <https://www.nxp.com/signup/register> to create a new acco...
The NXP account gives access to free content on the NXP's Model-Based Design Community:
<https://community.nxp.com/community/mbdt>

Sign up now!

Choose the NXP Model-Based Design Toolbox revision you wish to download and install:
Note: Only one version of the Toolbox can be active as Add-Ons.

1.2.0

Download and Install the NXP MBD Toolbox for LAX

Step 1: Download the NXP LAX Toolbox from NXP website and install it as Add-On using MATLAB installer.

Go To NXP Download Site

Convert .ZIP to .MLTBX

Install MLTBX File as Add-On

Verify MBD Toolbox Installation

***Installation might take several minutes

Step 2: Generate a free-of-cost license from NXP website, download and install into toolbox License folder.

Generate License File

Activate NXP MBD Toolbox

Verify MBD Toolbox License

Go To Support Site ...

Go To NXP MBDT Site ...

Close

1. Press **Go to NXP Download Site** Button. In the newly opened window, Review the Terms and Conditions as you scroll down, and press the **I Agree** Button.

Note: If the page is not displayed as below, please go to the location presented in chapter 1.2.4 License activation, section 4, Select **Automotive SW – S32R45 Standard Software -> Model-Based Design Toolbox for LAX**, and select the latest release available.

[PRODUCTS](#)
[APPLICATIONS](#)
[DESIGN CENTER](#)
[SUPPORT](#)
[COMPANY](#)

[NXP](#) > [Design](#) > [Software Terms and Conditions](#)

Software & Support

[Product List](#)
[Product Search](#)
[Order History](#)
[Recent Product Releases](#)
[Recent Updates](#)

Licensing

[License Lists](#)
[Offline Activation](#)

FAQ

[Download Help](#)
[Table of Contents](#)
[FAQs](#)

Software Terms and Conditions

Model-Based Design Toolbox for LAX 1.1.0

Please read the following agreement and click "I AGREE" at the bottom before downloading your software.

LA_OPT_NXP_Software_License v53 December 2023

IMPORTANT. Read the following NXP Software License Agreement ("Agreement") completely. By selecting the "I Accept" button at the end of this page, or by downloading, installing, or using the Licensed Software, you indicate that you accept the terms of the Agreement, and you acknowledge that you have the authority, for yourself or on behalf of your company, to bind your company to these terms. You may then download or install the file. In the event of a conflict between the terms of this Agreement and any license terms and conditions for NXP's proprietary software embedded anywhere in the Licensed Software file, the terms of this Agreement shall control. If a separate license agreement for the Licensed Software has been signed by you and NXP, then that agreement shall govern your use of the Licensed Software and shall supersede this Agreement.

[NXP SOFTWARE LICENSE AGREEMENT](#)

This is a legal agreement between your employer, of which you are an authorized representative, or, if you have no

[I Agree](#)
[Cancel](#)

2. Download the **MBDToolbox_LAX_1.2.0.RTM_D2404.mltbx** file.

Note: The downloaded file has the **.zip** extension instead of **.mltbx**. The next step helps to convert to the right format.

Software & Support

[Product List](#)
[Product Search](#)
[Order History](#)
[Recent Product Releases](#)
[Recent Updates](#)

Licensing

[License Lists](#)
[Offline Activation](#)

FAQ

[Download Help](#)
[Table of Contents](#)
[FAQs](#)

Product Download

Model-Based Design Toolbox for LAX 1.1.0

[Files](#)
[License Keys](#)
[Notes](#)

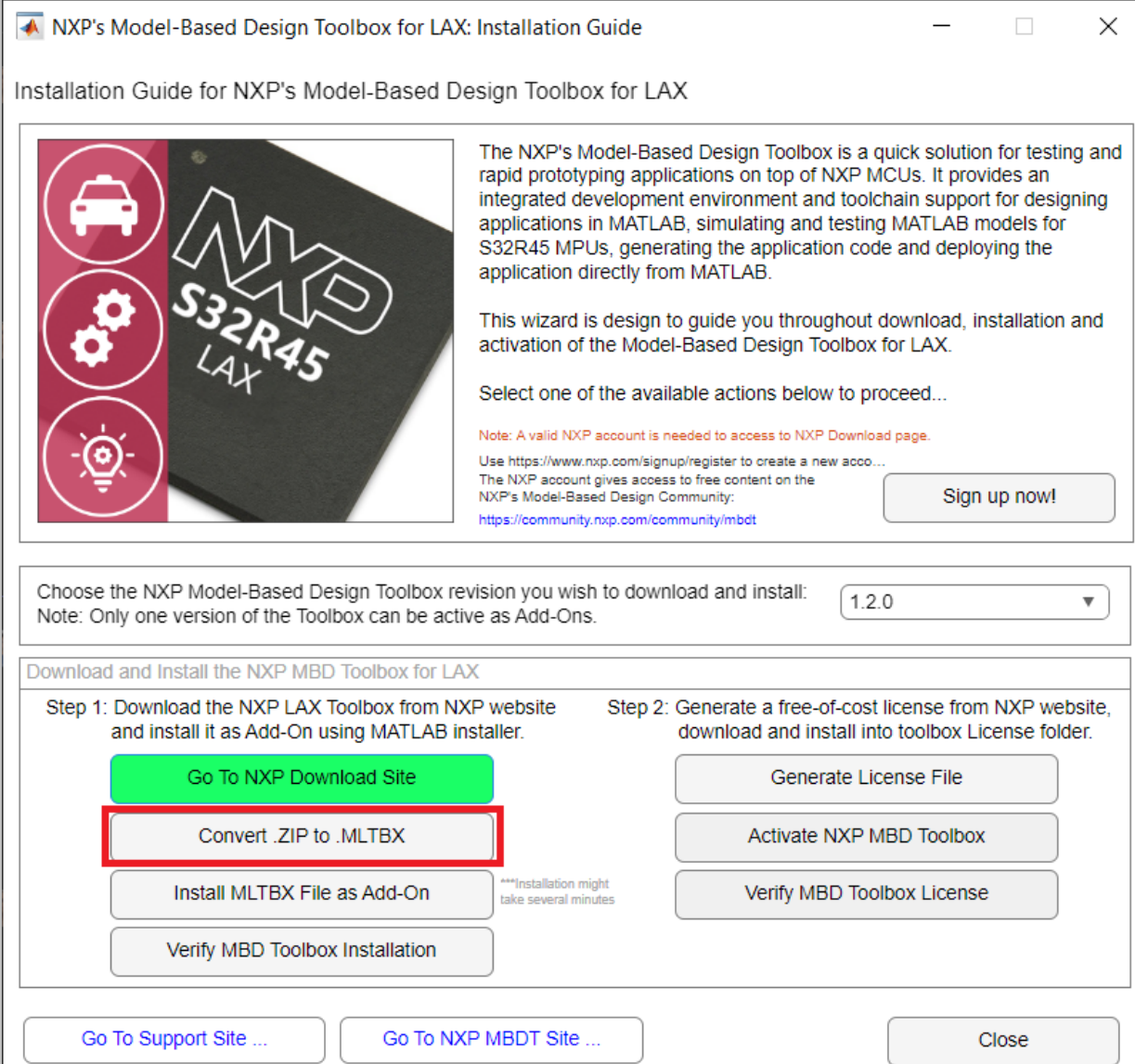
[Download Help](#)

The LAX Toolbox is delivered as a MATLAB MLTBX file. Your browser might download it as a zip file. Rename the file to *.mltbx to make it compatible with MATLAB Add-on Installer

[Show All Files](#)
4 Files

+	File Description	File Size	File Name
+	Model_Based_Design_Toolbox_LAX_Quick_Start_Guide	2.9 MB	Model_Based_Design_Toolbox_LAX_Quick_Start_Guide.pdf
+	Model_Based_Design_Toolbox_LAX_Release_Notes	510.5 KB	Model_Based_Design_Toolbox_LAX_Release_Notes.pdf
+	NXP_MBDToolbox_LAX_1.1.0_20231127	25.2 MB	NXP_MBDToolbox_LAX_1.1.0.RTM_20231127.mltbx
+	Software_Content_Register_MBDT_LAX	1.1 KB	Software_Content_Register_MBDT_LAX.txt


3. Go back to **NXP Toolbox Installation Guide** and press the **Convert .ZIP to .MLTBX** button. In the newly opened Browsing window, select the file downloaded and press **Open**.



The screenshot shows a window titled "NXP's Model-Based Design Toolbox for LAX: Installation Guide". The window contains an introduction to the toolbox, a sign-up prompt, a version selection dropdown set to "1.2.0", and two columns of installation steps. The "Convert .ZIP to .MLTBX" button in Step 1 is highlighted with a red rectangle. At the bottom are links to support and NXP MBDT sites, and a close button.

NXP's Model-Based Design Toolbox for LAX: Installation Guide

Installation Guide for NXP's Model-Based Design Toolbox for LAX



The NXP's Model-Based Design Toolbox is a quick solution for testing and rapid prototyping applications on top of NXP MCUs. It provides an integrated development environment and toolchain support for designing applications in MATLAB, simulating and testing MATLAB models for S32R45 MPUs, generating the application code and deploying the application directly from MATLAB.

This wizard is design to guide you throughout download, installation and activation of the Model-Based Design Toolbox for LAX.

Select one of the available actions below to proceed...

Note: A valid NXP account is needed to access to NXP Download page.

Use <https://www.nxp.com/signup/register> to create a new acco...

The NXP account gives access to free content on the NXP's Model-Based Design Community:

<https://community.nxp.com/community/mbdt>

Sign up now!

Choose the NXP Model-Based Design Toolbox revision you wish to download and install:
Note: Only one version of the Toolbox can be active as Add-Ons. 1.2.0

Download and Install the NXP MBD Toolbox for LAX

Step 1: Download the NXP LAX Toolbox from NXP website and install it as Add-On using MATLAB installer.

Go To NXP Download Site

Convert .ZIP to .MLTBX

Install MLTBX File as Add-On ***Installation might take several minutes

Verify MBD Toolbox Installation

Step 2: Generate a free-of-cost license from NXP website, download and install into toolbox License folder.

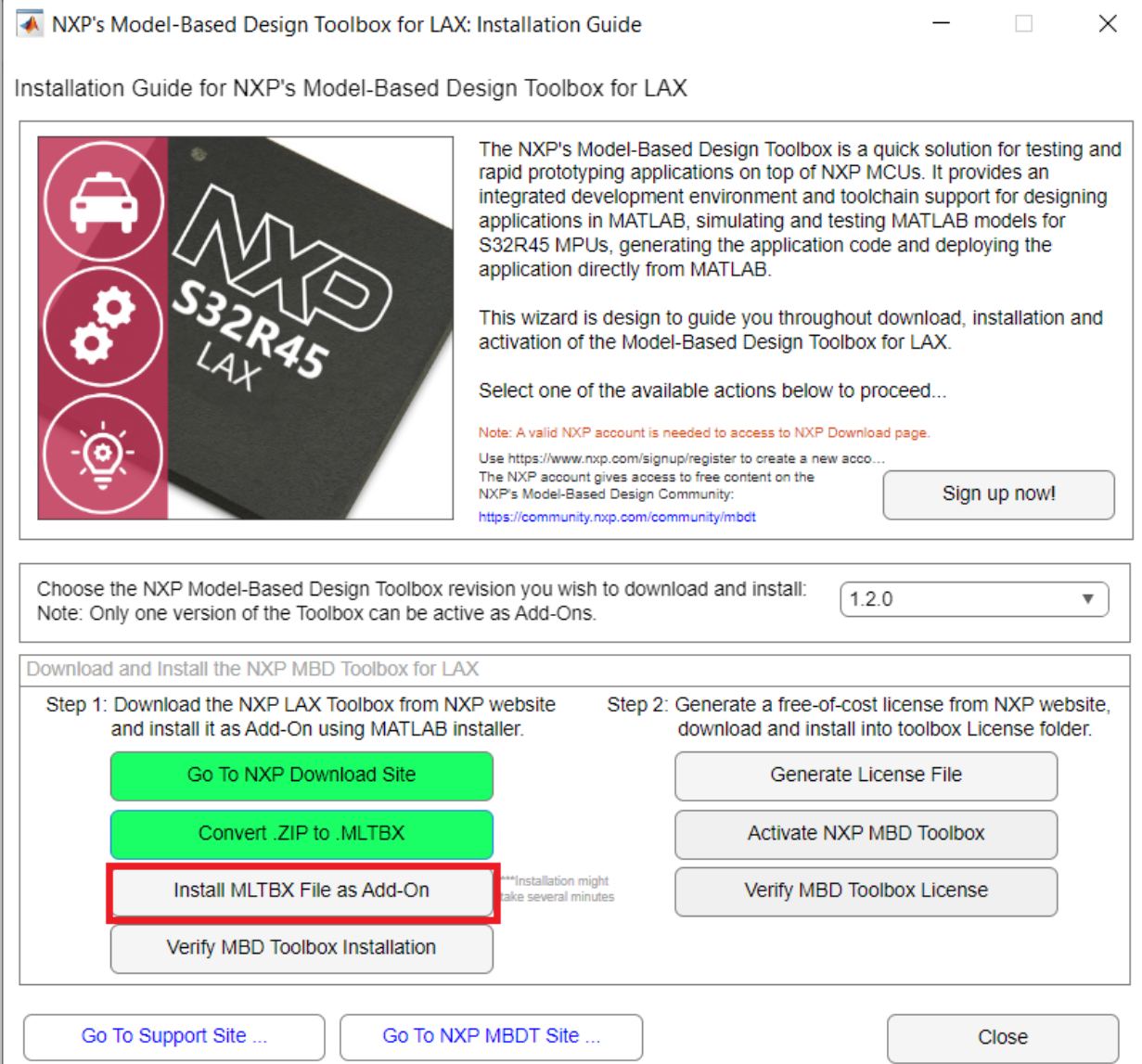
Generate License File

Activate NXP MBD Toolbox

Verify MBD Toolbox License

[Go To Support Site ...](#) [Go To NXP MBDT Site ...](#) **Close**

4. Go back to **NXP Toolbox Installation Guide** and select the **Install MLTBX File as Add-On** button. In the newly opened window, browse for the MLTBX file and press **Open**.



The image shows a screenshot of a software installation window titled "NXP's Model-Based Design Toolbox for LAX: Installation Guide". The window has a standard Windows-style title bar with minimize, maximize, and close buttons. The main content area is divided into several sections. At the top, there's a header "Installation Guide for NXP's Model-Based Design Toolbox for LAX". Below this, on the left, is a graphic with three circular icons (a car, gears, and a lightbulb) and a black box with "NXP S32R45 LAX" text. To the right of this graphic, there's a paragraph describing the toolbox as a quick solution for testing and rapid prototyping applications on top of NXP MCUs. Below this, it says "This wizard is design to guide you throughout download, installation and activation of the Model-Based Design Toolbox for LAX." and "Select one of the available actions below to proceed...". There's a note about needing a valid NXP account to access the download page, with a link to the NXP website and a "Sign up now!" button. Below this, there's a section "Choose the NXP Model-Based Design Toolbox revision you wish to download and install:" with a dropdown menu showing "1.2.0". Below that, there's a section "Download and Install the NXP MBD Toolbox for LAX" which is divided into two columns. The left column is for "Step 1: Download the NXP LAX Toolbox from NXP website and install it as Add-On using MATLAB installer." and contains four buttons: "Go To NXP Download Site", "Convert .ZIP to .MLTBX", "Install MLTBX File as Add-On" (which is highlighted with a red border), and "Verify MBD Toolbox Installation". The right column is for "Step 2: Generate a free-of-cost license from NXP website, download and install into toolbox License folder." and contains three buttons: "Generate License File", "Activate NXP MBD Toolbox", and "Verify MBD Toolbox License". At the bottom of the window, there are three buttons: "Go To Support Site ...", "Go To NXP MBDT Site ...", and "Close".

NXP's Model-Based Design Toolbox for LAX: Installation Guide

Installation Guide for NXP's Model-Based Design Toolbox for LAX

The NXP's Model-Based Design Toolbox is a quick solution for testing and rapid prototyping applications on top of NXP MCUs. It provides an integrated development environment and toolchain support for designing applications in MATLAB, simulating and testing MATLAB models for S32R45 MPUs, generating the application code and deploying the application directly from MATLAB.

This wizard is design to guide you throughout download, installation and activation of the Model-Based Design Toolbox for LAX.

Select one of the available actions below to proceed...

Note: A valid NXP account is needed to access to NXP Download page.
Use <https://www.nxp.com/signup/register> to create a new acco...
The NXP account gives access to free content on the NXP's Model-Based Design Community:
<https://community.nxp.com/community/mbdt>

Sign up now!

Choose the NXP Model-Based Design Toolbox revision you wish to download and install:
Note: Only one version of the Toolbox can be active as Add-Ons.

1.2.0

Download and Install the NXP MBD Toolbox for LAX

Step 1: Download the NXP LAX Toolbox from NXP website and install it as Add-On using MATLAB installer.

Go To NXP Download Site

Convert .ZIP to .MLTBX

Install MLTBX File as Add-On

Verify MBD Toolbox Installation

Step 2: Generate a free-of-cost license from NXP website, download and install into toolbox License folder.

Generate License File

Activate NXP MBD Toolbox

Verify MBD Toolbox License

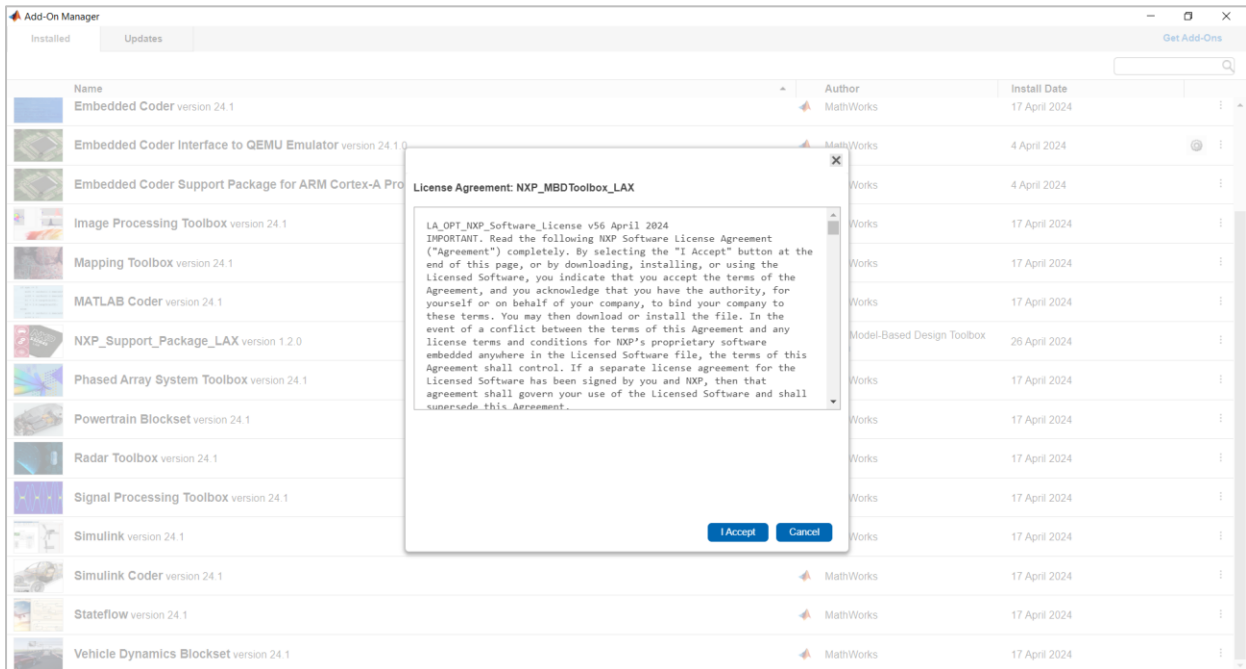
Go To Support Site ...

Go To NXP MBDT Site ...

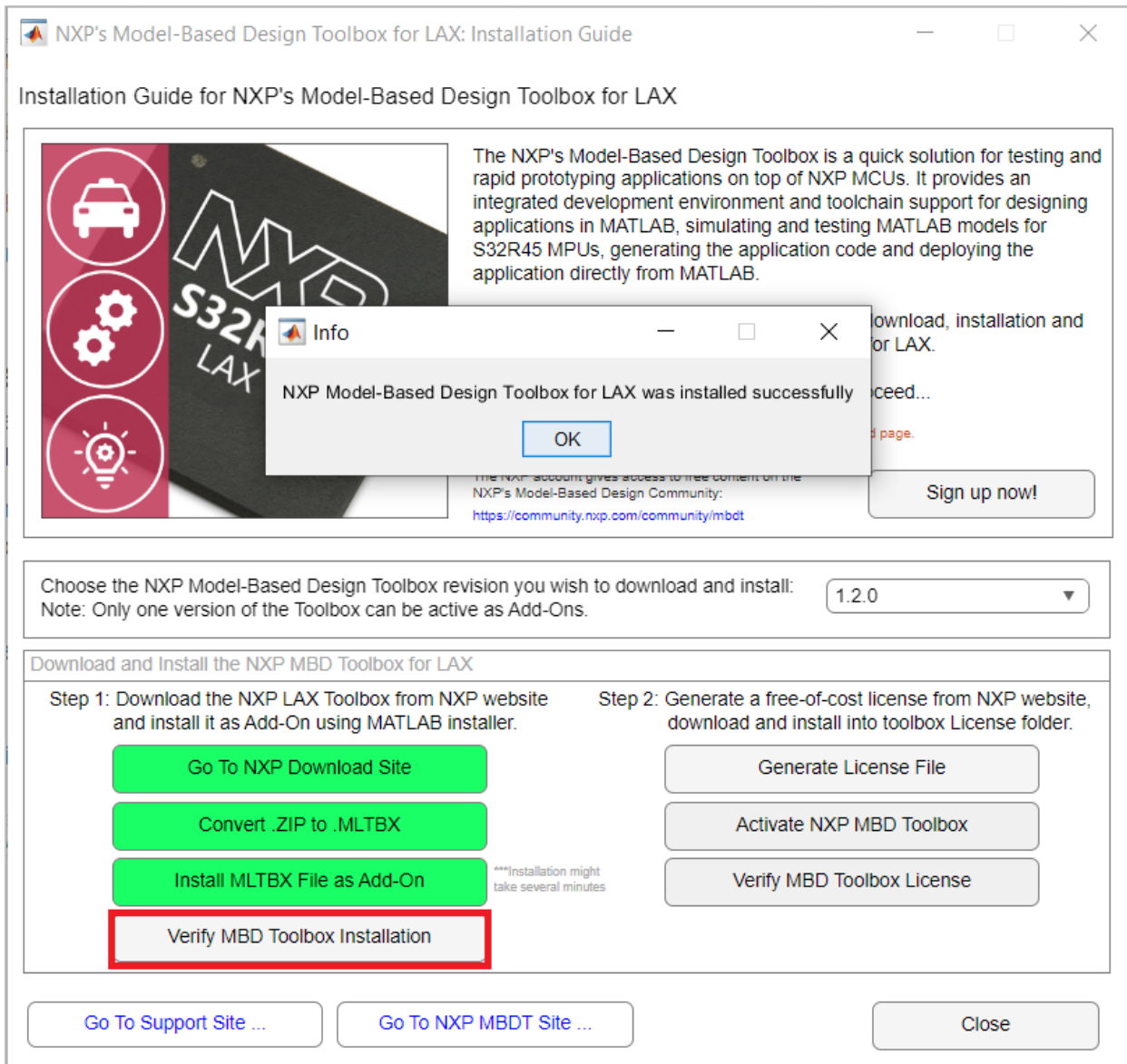
Close

5. In the MATLAB Add-On Manager, Review the Terms and Conditions as you scroll down, and press the **I Accept** Button. This action starts MBDT for the LAX Toolbox installation process.

Note: Installation might take several minutes.



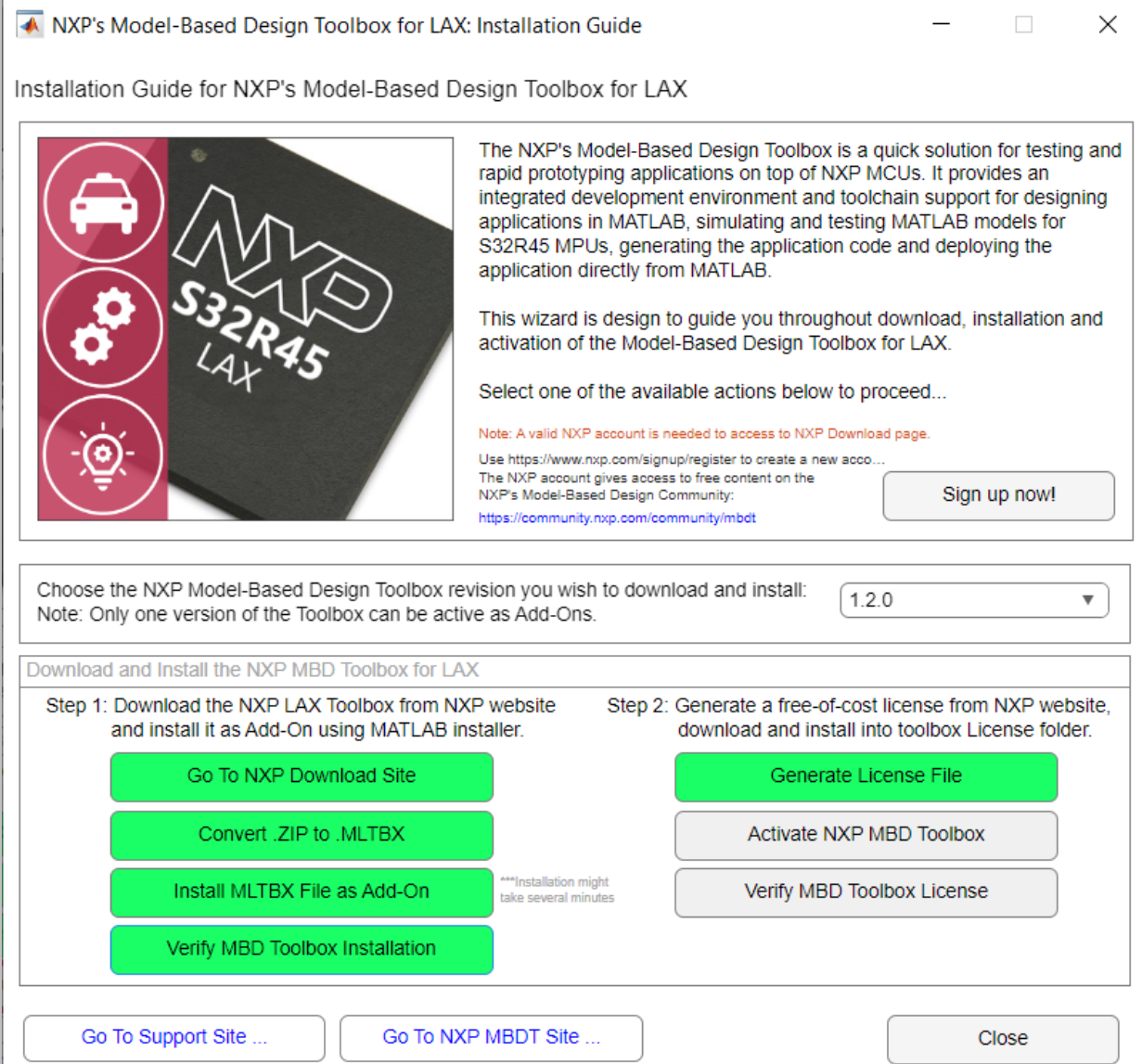
- Once the installation is complete, go back to **NXP Toolbox Installation Guide** and press the **Verify MBD Toolbox Installation** button.



1.2.4 Generate and Activate NXP Model-Based Design Toolbox for LAX license

The following steps guide you on how to achieve the license for LAX Toolbox.

1. Press the Generate License File button in the **NXP Toolbox Installation Guide**.

The image shows a screenshot of a web browser window titled "NXP's Model-Based Design Toolbox for LAX: Installation Guide". The page content includes a header with the title, a sub-header "Installation Guide for NXP's Model-Based Design Toolbox for LAX", and a main content area. On the left, there is a vertical sidebar with three circular icons: a car, gears, and a lightbulb. Next to these is a black box with "NXP S32R45 LAX" written on it. The main text describes the toolbox as a quick solution for testing and rapid prototyping applications on top of NXP MCUs. It provides an integrated development environment and toolchain support for designing applications in MATLAB, simulating and testing MATLAB models for S32R45 MPUs, generating the application code and deploying the application directly from MATLAB. Below this, it states that the wizard is designed to guide the user throughout download, installation, and activation. A note mentions that a valid NXP account is needed to access the NXP Download page, and provides a link to create a new account. A "Sign up now!" button is present. Further down, there is a section to choose the NXP Model-Based Design Toolbox revision, with a dropdown menu set to "1.2.0". Below this, there is a section titled "Download and Install the NXP MBD Toolbox for LAX" which is divided into two steps. Step 1 involves downloading the NXP LAX Toolbox from the NXP website and installing it as an Add-On using the MATLAB installer. Step 2 involves generating a free-of-cost license from the NXP website, downloading and installing it into the toolbox License folder. Step 1 has four green buttons: "Go To NXP Download Site", "Convert .ZIP to .MLTBX", "Install MLTBX File as Add-On", and "Verify MBD Toolbox Installation". Step 2 has three gray buttons: "Generate License File", "Activate NXP MBD Toolbox", and "Verify MBD Toolbox License". At the bottom of the window, there are three buttons: "Go To Support Site ...", "Go To NXP MBDT Site ...", and "Close".

NXP's Model-Based Design Toolbox for LAX: Installation Guide

Installation Guide for NXP's Model-Based Design Toolbox for LAX

The NXP's Model-Based Design Toolbox is a quick solution for testing and rapid prototyping applications on top of NXP MCUs. It provides an integrated development environment and toolchain support for designing applications in MATLAB, simulating and testing MATLAB models for S32R45 MPUs, generating the application code and deploying the application directly from MATLAB.

This wizard is design to guide you throughout download, installation and activation of the Model-Based Design Toolbox for LAX.

Select one of the available actions below to proceed...

Note: A valid NXP account is needed to access to NXP Download page.
Use <https://www.nxp.com/signup/register> to create a new acco...
The NXP account gives access to free content on the NXP's Model-Based Design Community:
<https://community.nxp.com/community/mbdt>

Sign up now!

Choose the NXP Model-Based Design Toolbox revision you wish to download and install:
Note: Only one version of the Toolbox can be active as Add-Ons.

1.2.0

Download and Install the NXP MBD Toolbox for LAX

Step 1: Download the NXP LAX Toolbox from NXP website and install it as Add-On using MATLAB installer.

Step 2: Generate a free-of-cost license from NXP website, download and install into toolbox License folder.

Go To NXP Download Site

Convert .ZIP to .MLTBX

Install MLTBX File as Add-On

Verify MBD Toolbox Installation

Generate License File

Activate NXP MBD Toolbox

Verify MBD Toolbox License

Go To Support Site ...

Go To NXP MBDT Site ...

Close

2. In the newly opened webpage, select the checkbox as shown below, and press the generate button.

Note: If a similar webpage as shown below is not being displayed, please go to the same page as described in the previous section, bullet 2, where the next tab “License keys”.

Software & Support

Product List

Product Search

Order History

Recent Product Releases

Recent Updates

Licensing

License Lists

Offline Activation

FAQ

Download Help

Table of Contents

FAQs

License Information

Model-Based Design Toolbox for LAX 1.1.0

Generate

Item Description

Order Number

Purchase Order Number

Total Number of Licenses:

Activation Code

S32R45 Standard Software

SW32R4-STD SW-D_66371677

100

☐ License Applicable to Product(s):

Version	Description
1.1.0	Model-Based Design Toolbox for LAX 1.1.0 (View EULA)
100 Available	

Generate

3. Select Disk Serial Number and type the host id number. Give a name to the license and press the Generate button.

Software & Support

Product List

Product Search

Order History

Recent Product Releases

Recent Updates

Licensing

License Lists

Offline Activation

FAQ

Download Help

Table of Contents

FAQs

Generate Licenses

Instructions for finding your host ID details are available [here](#).

Please do not use spaces in the **Name** field (for node-locked licenses) or **Host Description** field (for floating licenses). These fields are available to add brief text notes to your license.

		Number of Licenses Available				
License Applicable to Product(s): <table><thead><tr><th>Version</th><th>Description</th></tr></thead><tbody><tr><td>1.1.0</td><td>Model-Based Design Toolbox for LAX 1.1.0</td></tr></tbody></table>		Version	Description	1.1.0	Model-Based Design Toolbox for LAX 1.1.0	100
Version	Description					
1.1.0	Model-Based Design Toolbox for LAX 1.1.0					

Node Host ID

Node Host ID

Node Host ID

Node Host ID

Node Host ID

Node Host ID

Name

Name

Name

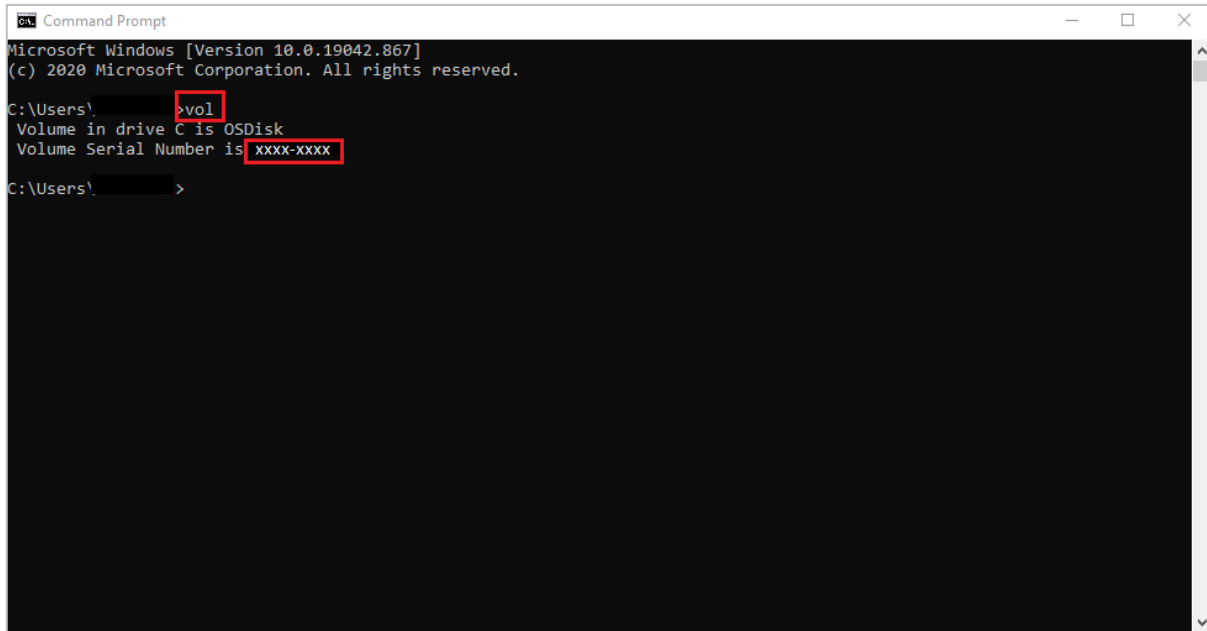
Name

Name

Name

Generate

4. To find the host ID for your hard drive, please open a Windows Command Prompt and execute the “vol” command.

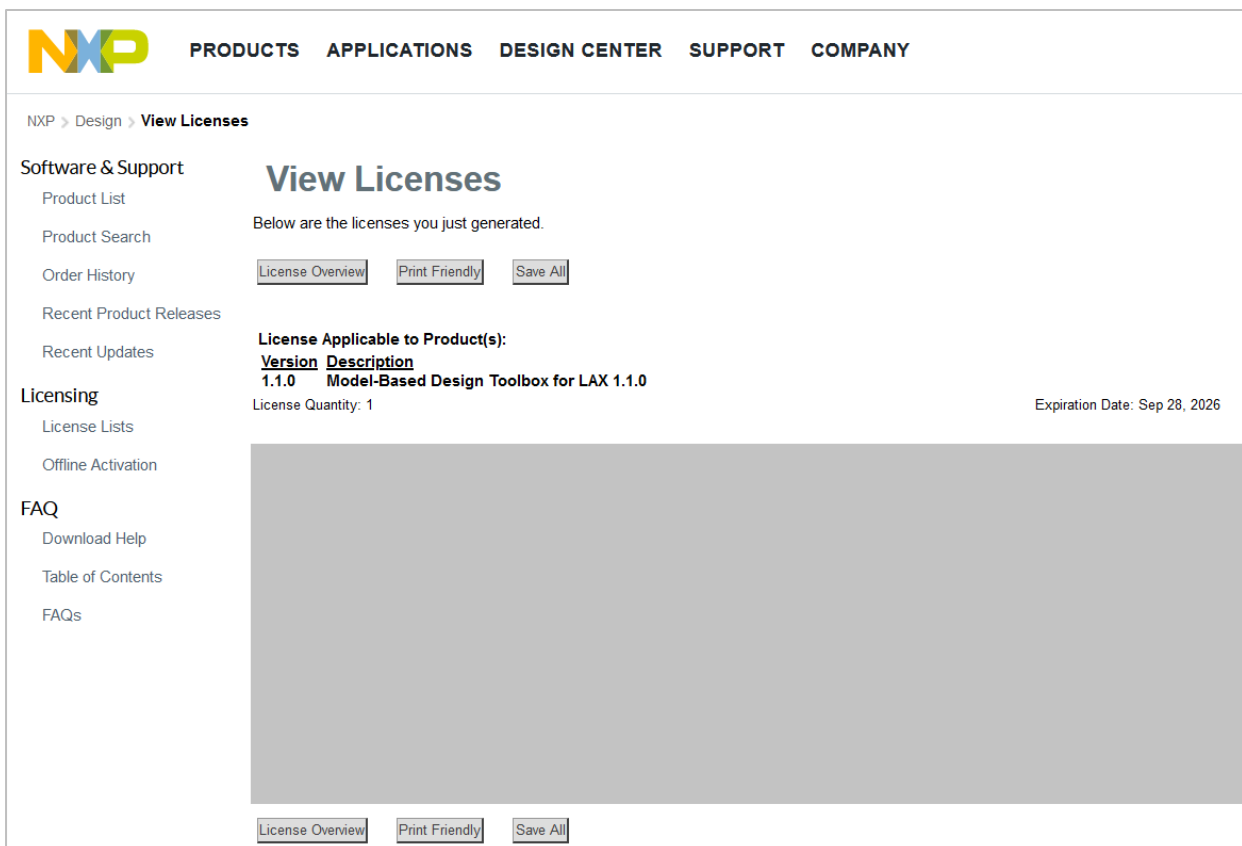


```
Microsoft Windows [Version 10.0.19042.867]
(c) 2020 Microsoft Corporation. All rights reserved.

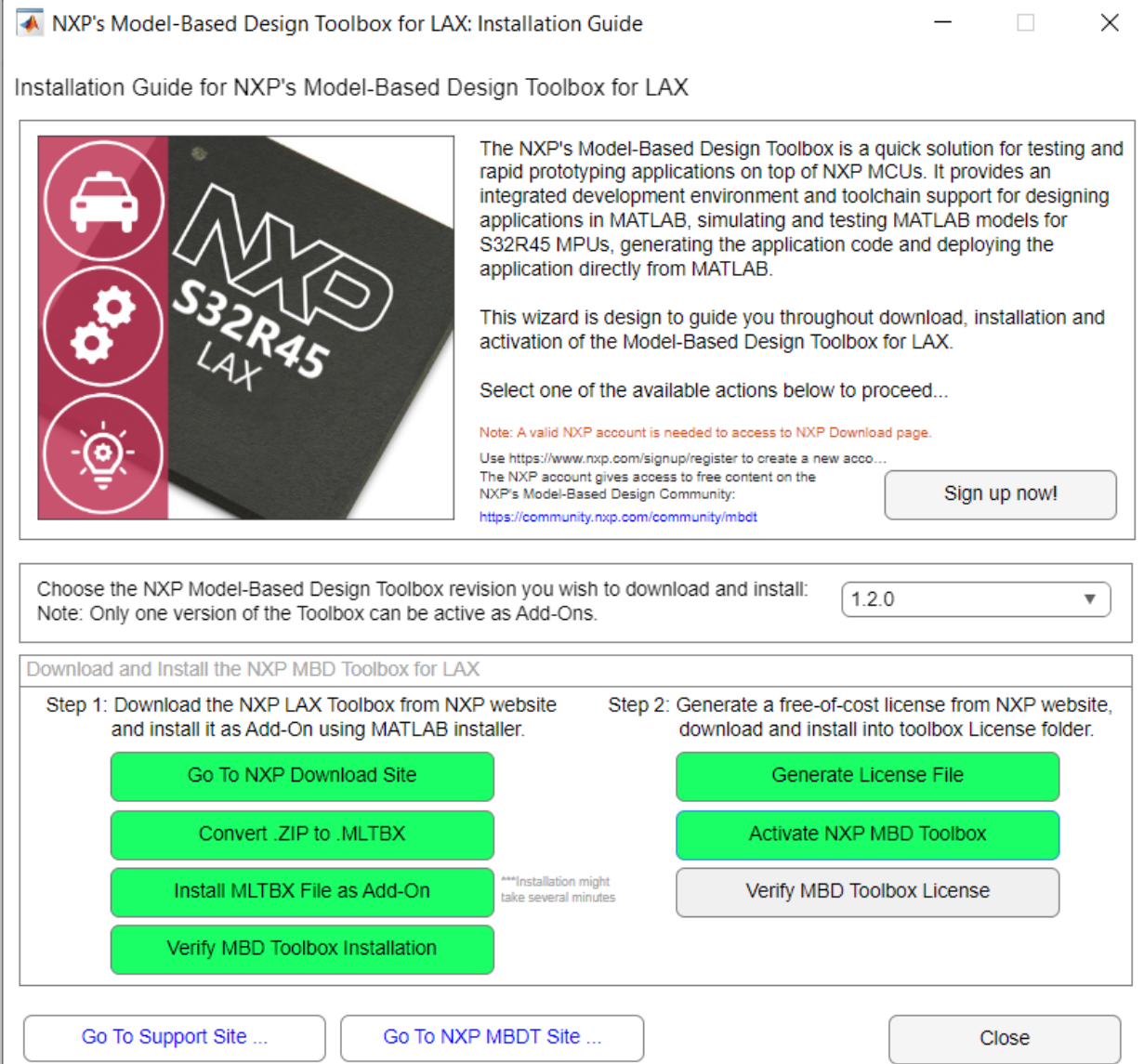
C:\Users\>vol
Volume in drive C is OSDisk
Volume Serial Number is XXXX-XXXX

C:\Users\>
```

5. Now that the license has been successfully generated, press the Save all button.



6. Back to **NXP Toolbox Installation Guide**, press the **Activate NXP MBD Toolbox** button. In the newly opened window, browse for the downloaded license.dat or license.lic file, and press Open.



The screenshot shows a window titled "NXP's Model-Based Design Toolbox for LAX: Installation Guide". The window contains an introduction to the toolbox, a sign-up button, a version selector set to 1.2.0, and two columns of installation steps. Step 1 includes buttons for downloading, converting, installing, and verifying. Step 2 includes buttons for generating a license, activating the toolbox, and verifying the license. At the bottom are links to support and NXP MBDT sites, and a close button.

NXP's Model-Based Design Toolbox for LAX: Installation Guide

Installation Guide for NXP's Model-Based Design Toolbox for LAX

The NXP's Model-Based Design Toolbox is a quick solution for testing and rapid prototyping applications on top of NXP MCUs. It provides an integrated development environment and toolchain support for designing applications in MATLAB, simulating and testing MATLAB models for S32R45 MPUs, generating the application code and deploying the application directly from MATLAB.

This wizard is design to guide you throughout download, installation and activation of the Model-Based Design Toolbox for LAX.

Select one of the available actions below to proceed...

Note: A valid NXP account is needed to access to NXP Download page.
Use <https://www.nxp.com/signup/register> to create a new acco...
The NXP account gives access to free content on the NXP's Model-Based Design Community:
<https://community.nxp.com/community/mbdt>

Sign up now!

Choose the NXP Model-Based Design Toolbox revision you wish to download and install:
Note: Only one version of the Toolbox can be active as Add-Ons.

1.2.0

Download and Install the NXP MBD Toolbox for LAX

Step 1: Download the NXP LAX Toolbox from NXP website and install it as Add-On using MATLAB installer.

Step 2: Generate a free-of-cost license from NXP website, download and install into toolbox License folder.

Go To NXP Download Site

Convert .ZIP to .MLTBX

Install MLTBX File as Add-On

Verify MBD Toolbox Installation

***Installation might take several minutes

Generate License File

Activate NXP MBD Toolbox

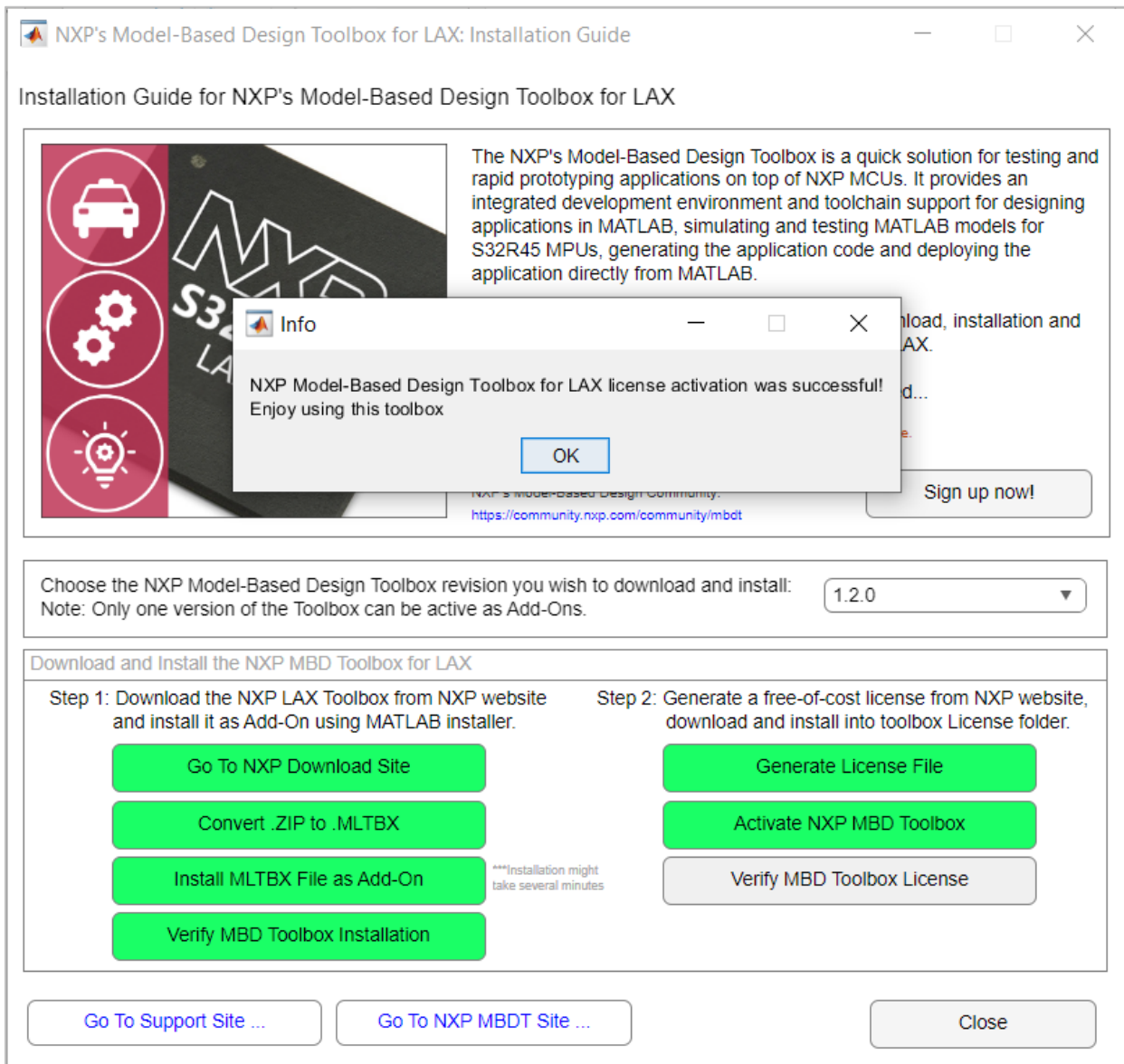
Verify MBD Toolbox License

Go To Support Site ...

Go To NXP MBDT Site ...

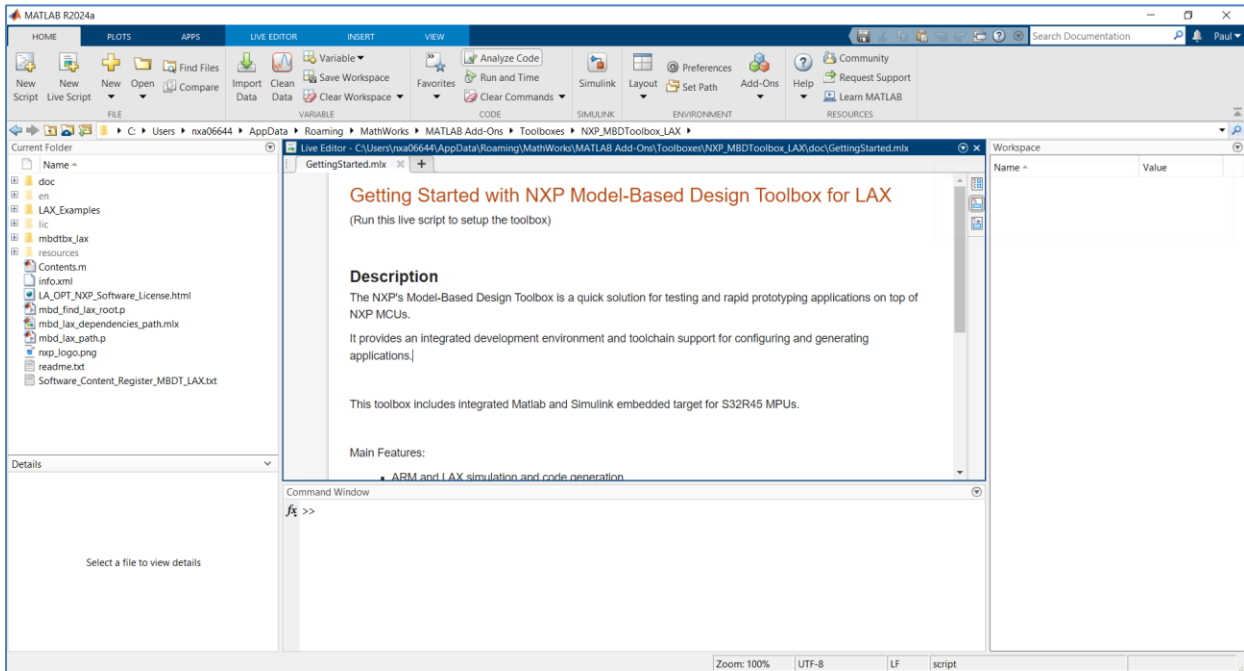
Close

- The last step is to check the license activation status, by pressing the **Verify MBD Toolbox License** button. If everything went well, a similar popup window as below will be displayed.



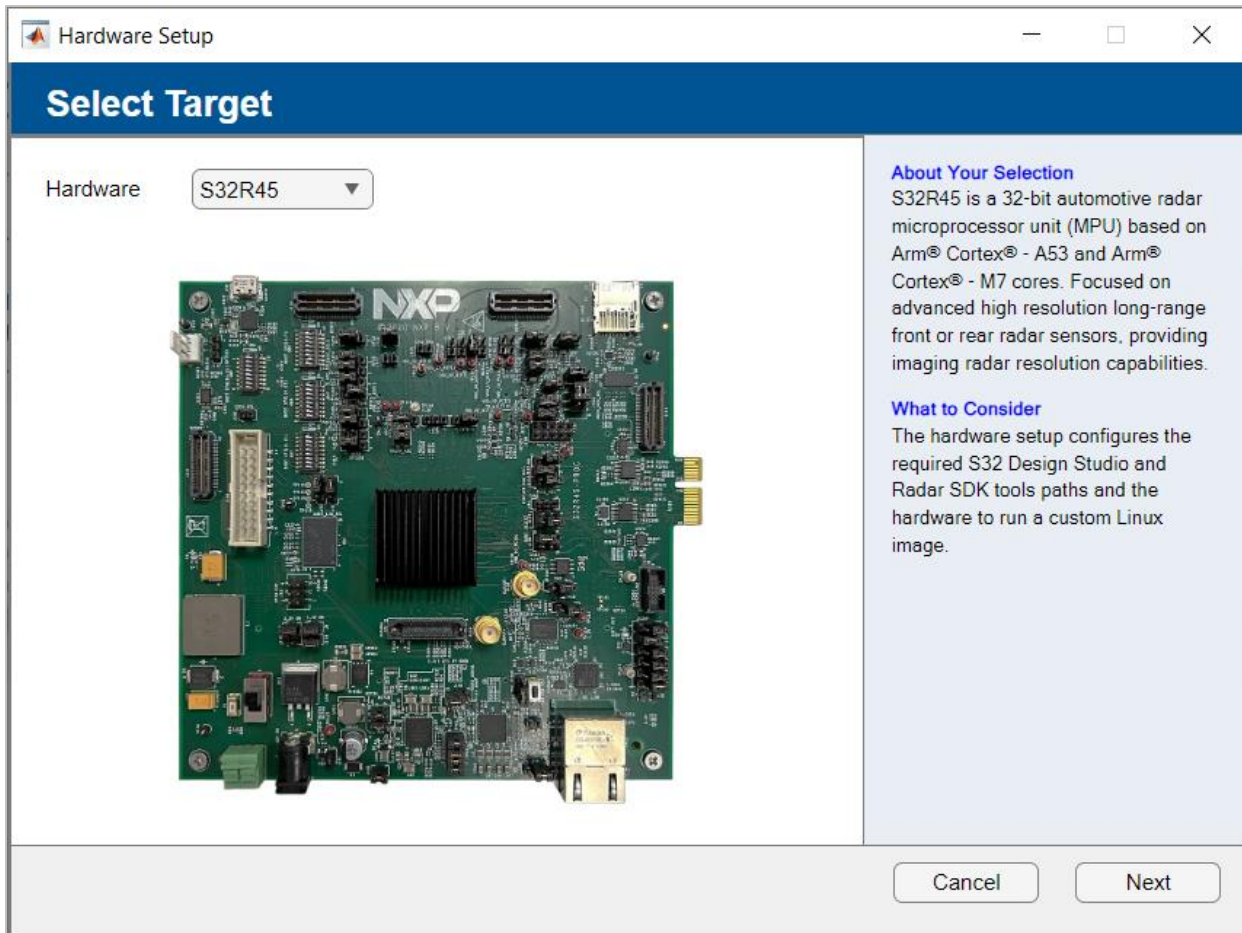
1.2.5 Model-Based Design Toolbox Configuration

After the installation has finished the *GettingStarted.mlx* is opened. To run it go to the LIVE EDITOR tab and push the Run button. Running it will open the Setup GUI that helps the user to configure the toolbox.



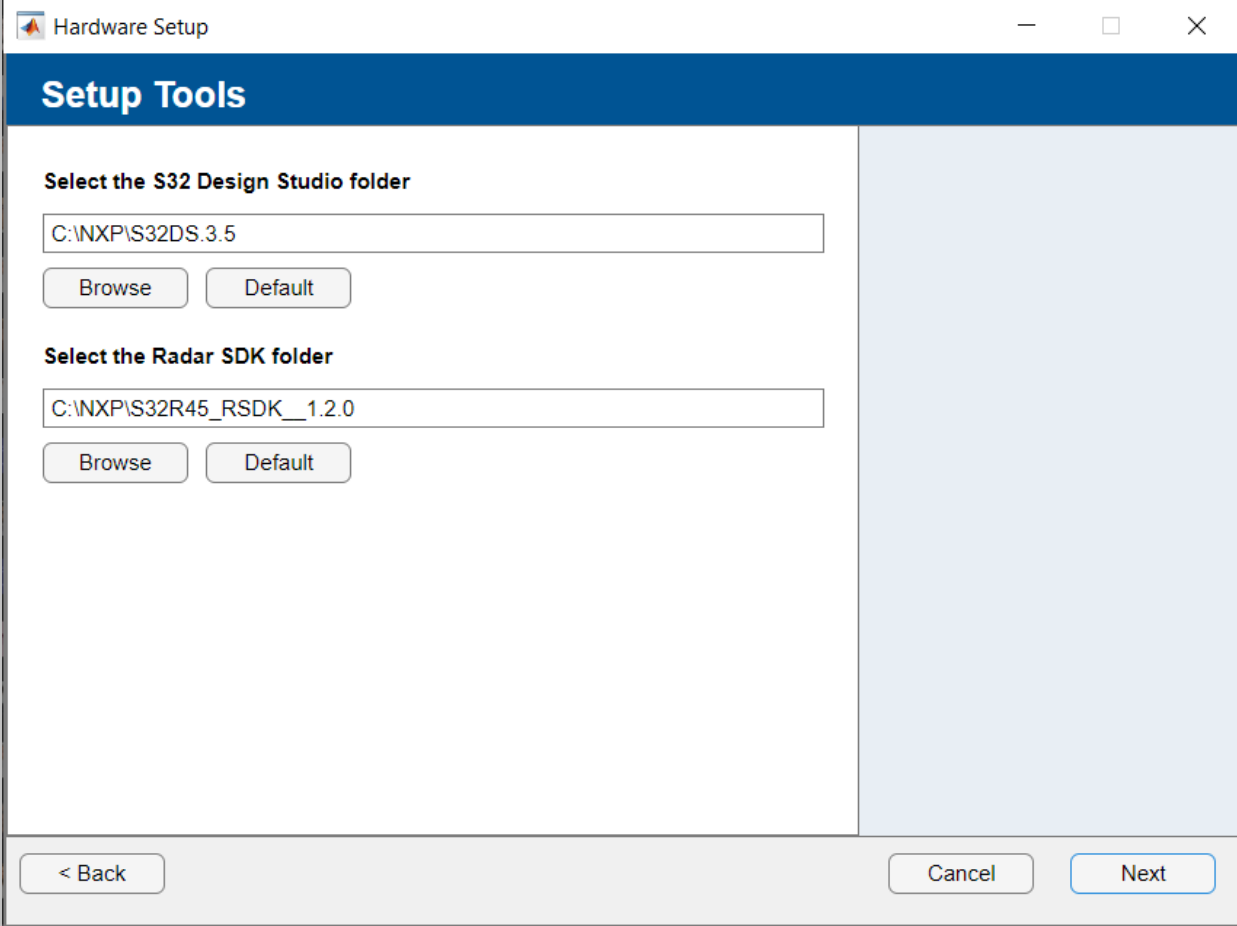
1. Select the hardware board

We are going to select S32R45 and push the Next button.



2. Setup the external tools

Select the needed external tools paths.



The image shows a Windows-style dialog box titled "Hardware Setup". It has a blue header bar with the text "Setup Tools". The main area is divided into two sections. The first section is titled "Select the S32 Design Studio folder" and contains a text input field with the path "C:\NXP\S32DS.3.5". Below the input field are two buttons: "Browse" and "Default". The second section is titled "Select the Radar SDK folder" and contains a text input field with the path "C:\NXP\S32R45_RSDK__1.2.0". Below this input field are also two buttons: "Browse" and "Default". At the bottom of the dialog, there are three buttons: "< Back" on the left, "Cancel" in the center, and "Next" on the right. The "Next" button is highlighted with a blue border.

Hardware Setup

Setup Tools

Select the S32 Design Studio folder

C:\NXP\S32DS.3.5

Browse Default

Select the Radar SDK folder

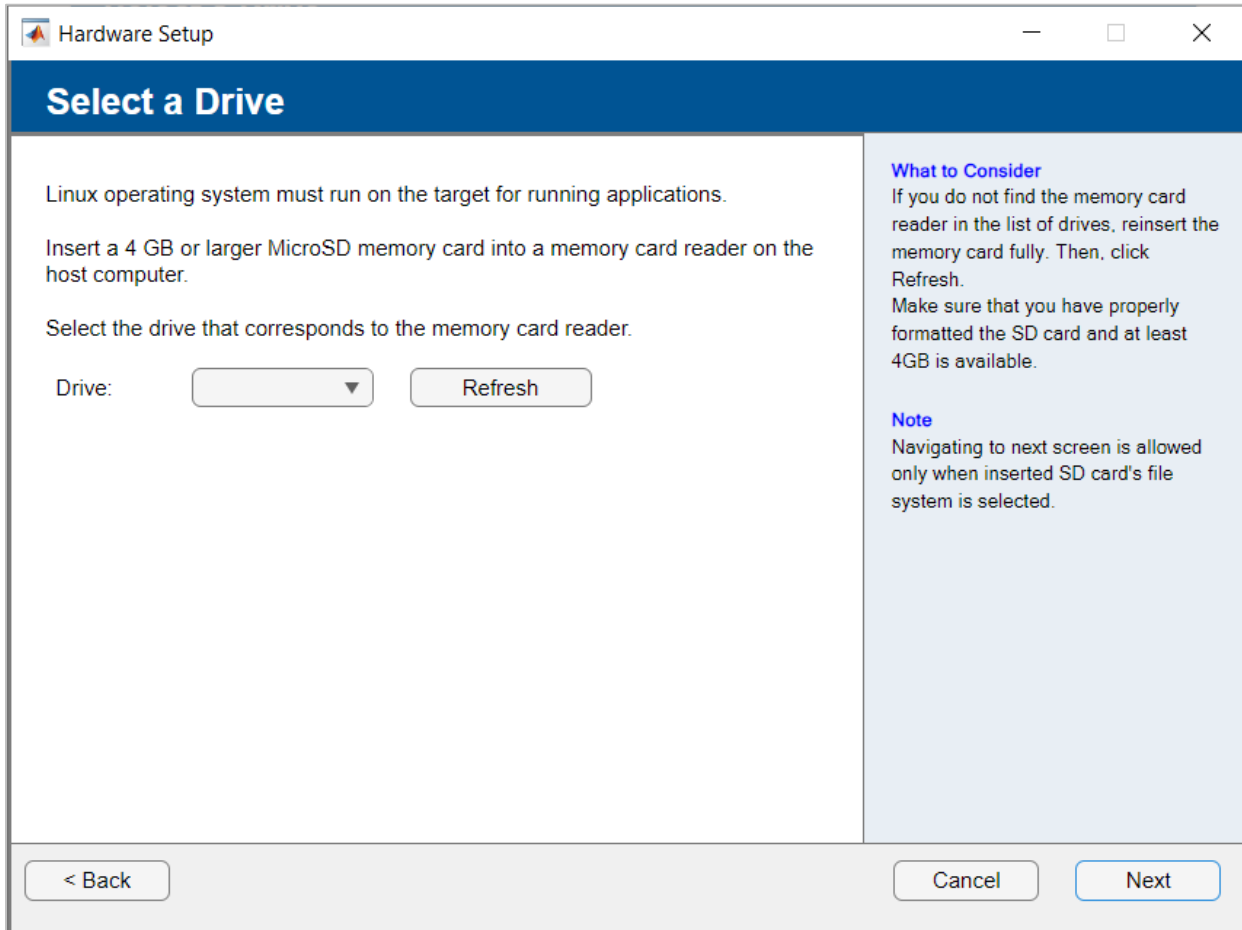
C:\NXP\S32R45_RSDK__1.2.0

Browse Default

< Back Cancel Next

3. Write Linux on microSD card

The next page helps you to write Linux on a microSD card. First, insert the microSD card, then push the Refresh button to actualize the drive list. If the microSD card is available in Windows, the list should not be empty. Select the drive from the list and push the Next button.



The screenshot shows a window titled "Hardware Setup" with a blue header bar that says "Select a Drive". The main content area is divided into two columns. The left column contains instructions: "Linux operating system must run on the target for running applications.", "Insert a 4 GB or larger MicroSD memory card into a memory card reader on the host computer.", and "Select the drive that corresponds to the memory card reader." Below this is a "Drive:" label, a dropdown menu, and a "Refresh" button. The right column has a light blue background and contains two sections: "What to Consider" with advice on reinserting the card and formatting, and a "Note" about navigating to the next screen. At the bottom, there are three buttons: "< Back", "Cancel", and "Next".

Hardware Setup

Select a Drive

Linux operating system must run on the target for running applications.

Insert a 4 GB or larger MicroSD memory card into a memory card reader on the host computer.

Select the drive that corresponds to the memory card reader.

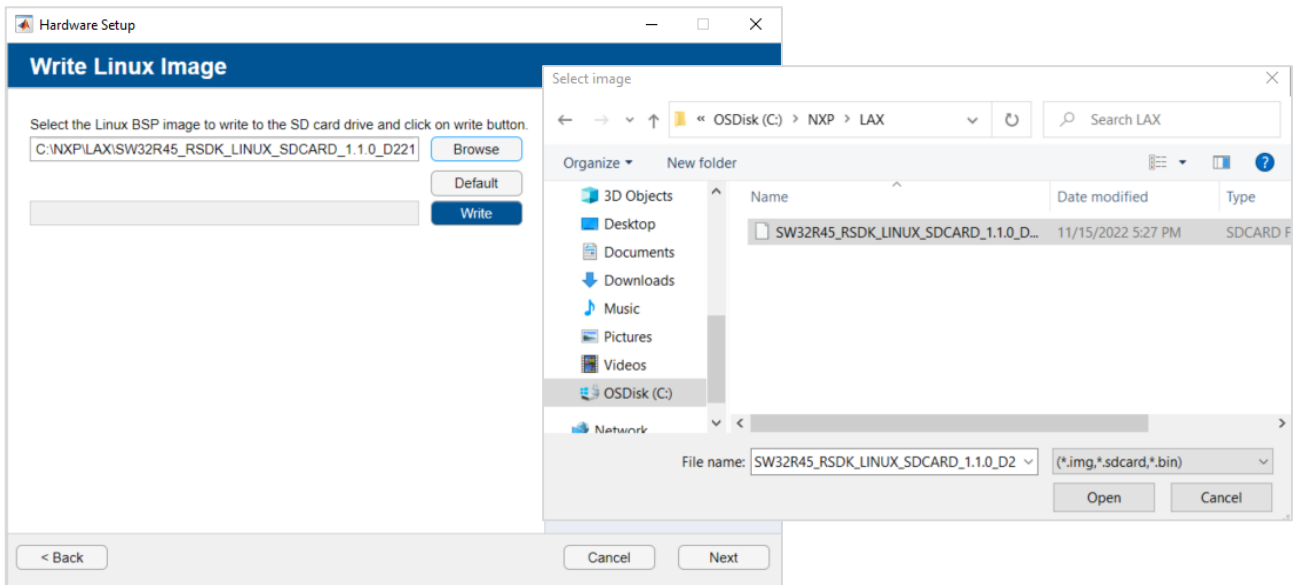
Drive:

What to Consider
If you do not find the memory card reader in the list of drives, reinsert the memory card fully. Then, click Refresh.
Make sure that you have properly formatted the SD card and at least 4GB is available.

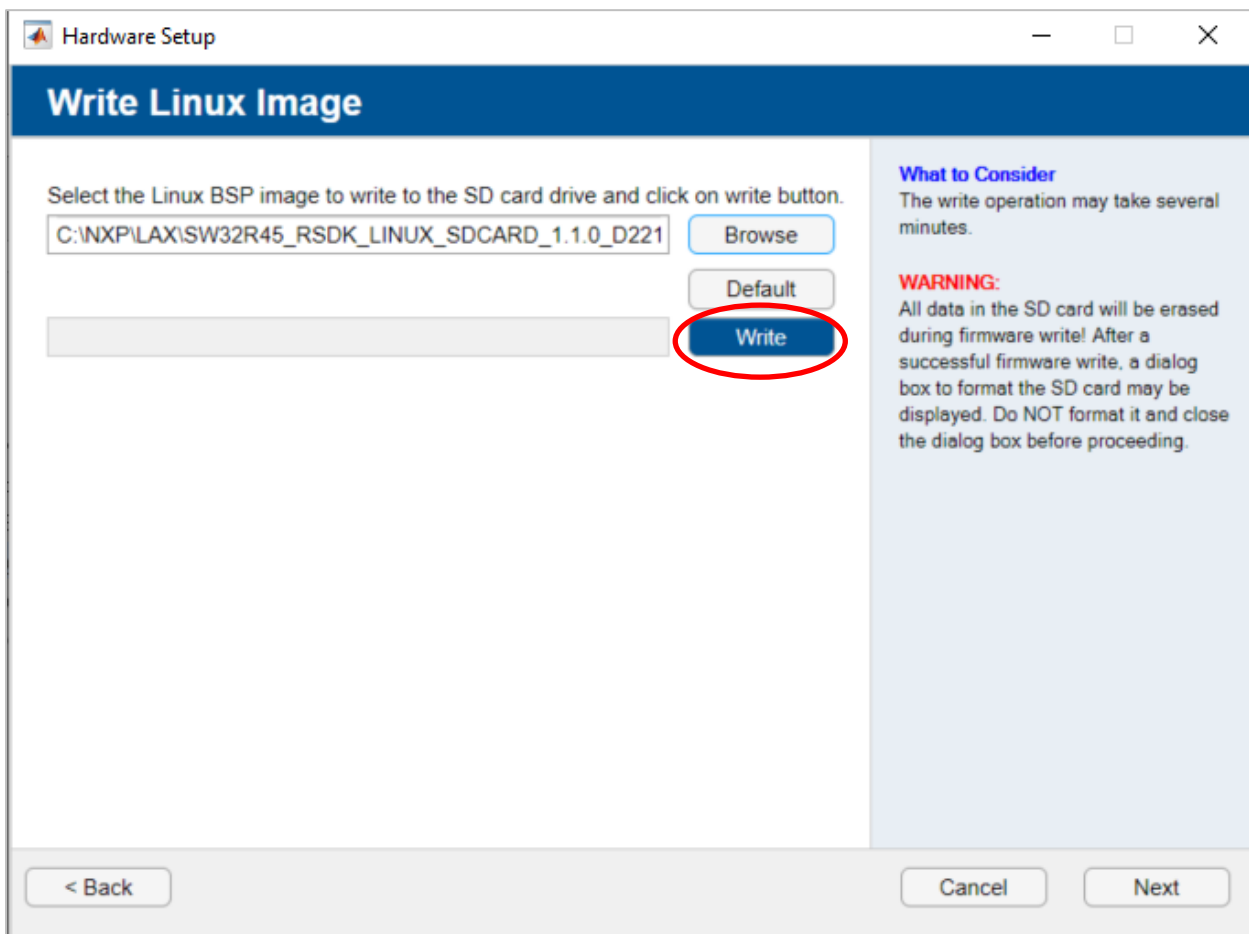
Note
Navigating to next screen is allowed only when inserted SD card's file system is selected.

< Back

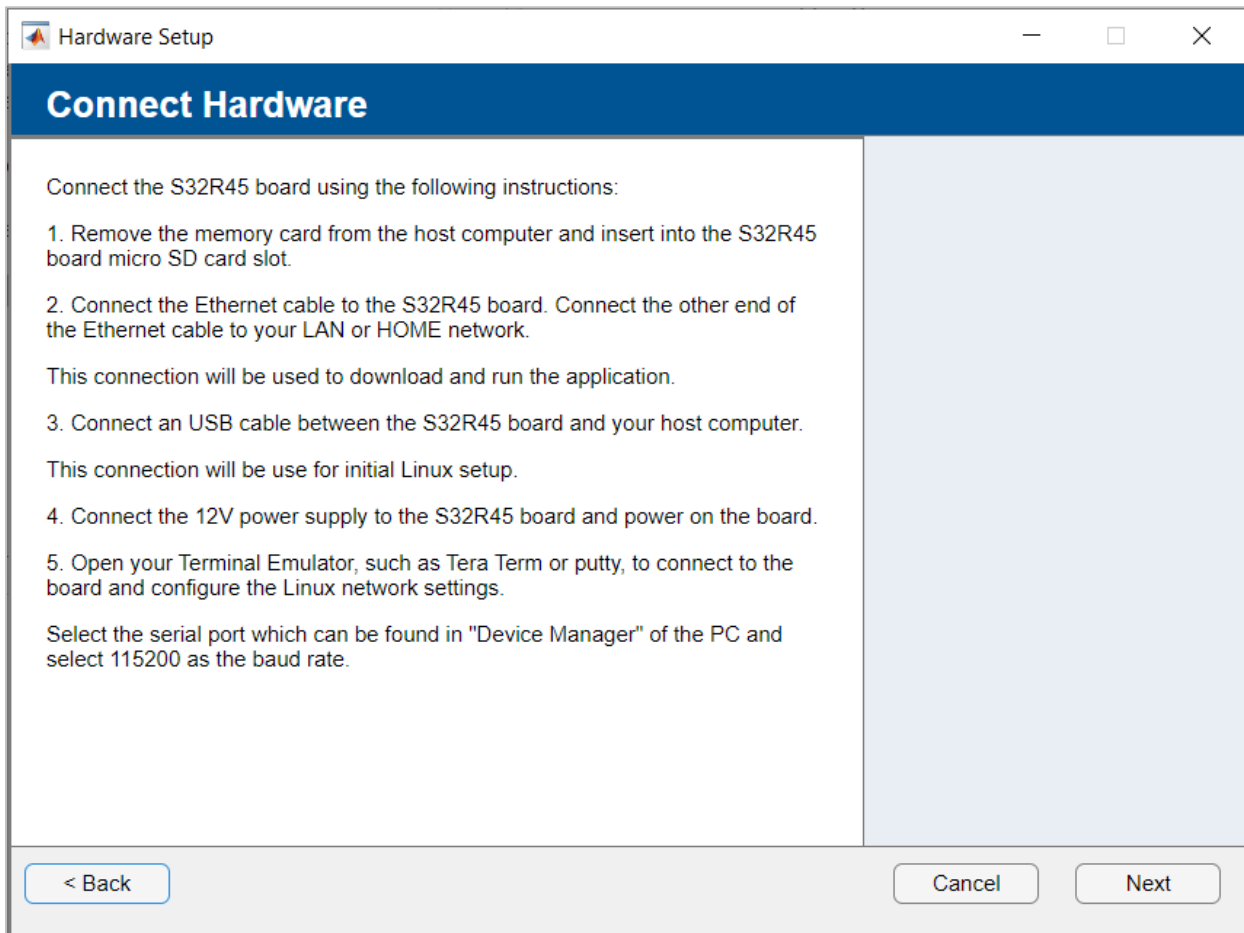
Select the Linux image using the Browse button.



Finally, push the Write button to write the Linux image.

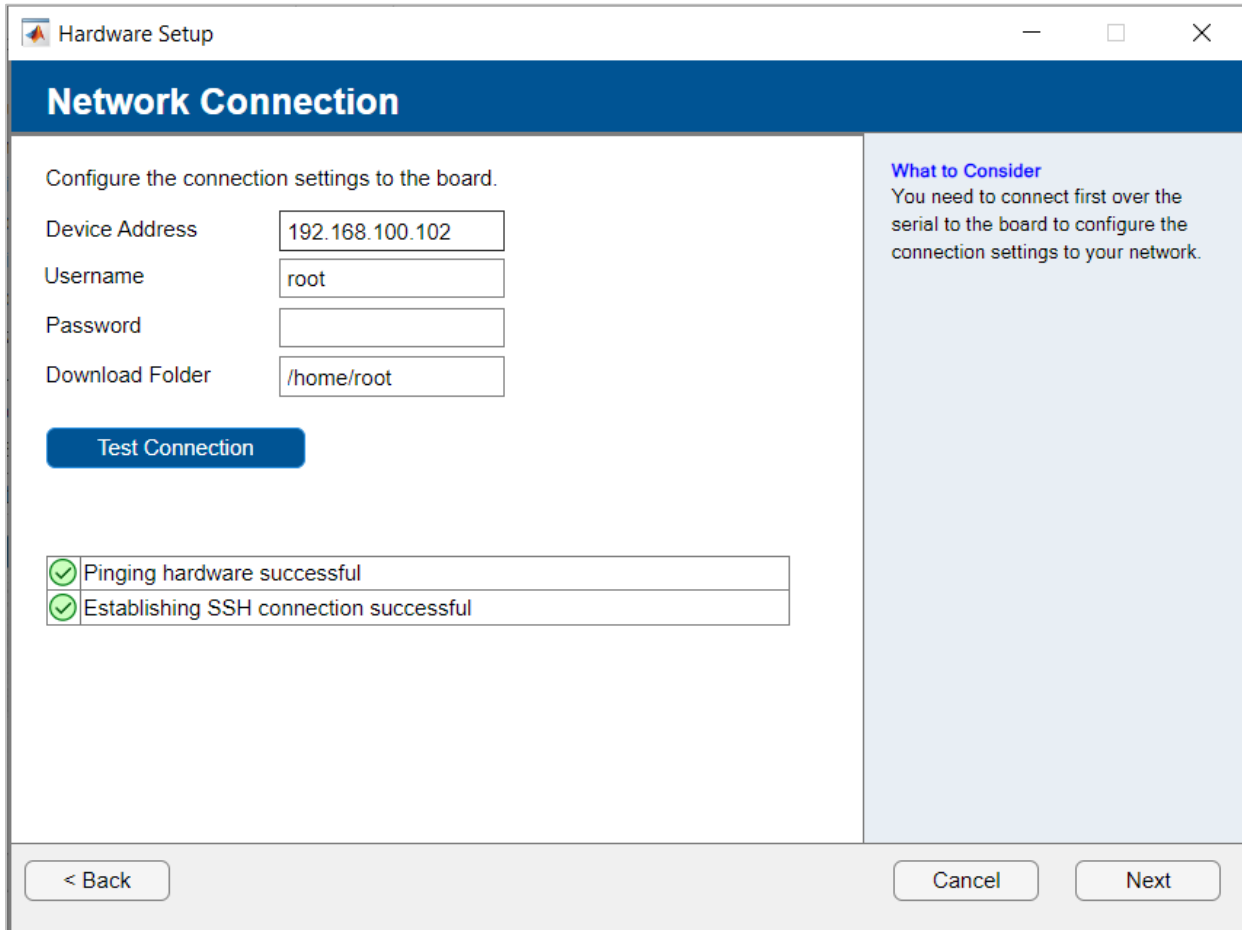


4. Get additional software



5. Setup network connection

Fill in the Device Address, Username, Password, and Download folder, and then push the Test Connection button. This tests if the device address is available and if the SSH commands can be run.



The screenshot shows a 'Hardware Setup' window with a 'Network Connection' section. It contains input fields for Device Address (192.168.100.102), Username (root), Password (empty), and Download Folder (/home/root). A 'Test Connection' button is present. Below the inputs, two success messages are listed: 'Pinging hardware successful' and 'Establishing SSH connection successful'. A 'What to Consider' sidebar on the right advises connecting first over the serial. Navigation buttons at the bottom include '< Back', 'Cancel', and 'Next'.

Network Connection	
Configure the connection settings to the board.	
Device Address	192.168.100.102
Username	root
Password	
Download Folder	/home/root
Test Connection	
<input checked="" type="checkbox"/>	Pinging hardware successful
<input checked="" type="checkbox"/>	Establishing SSH connection successful

What to Consider
You need to connect first over the serial to the board to configure the connection settings to your network.

< Back Cancel Next

Setup done

Congratulations! You are ready to use the Model-Based Design for the LAX toolbox.











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

The Model-Based Design Toolbox for LAX uses the Toolchain mechanism exposed by the MATLAB to enable automatic code generation with the Embedded Coder toolbox. By default, the toolchain is configured for the MATLAB 2021a-2023b releases. For any other MATLAB release, the user needs to execute a toolbox m-script to generate the proper 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_LAX\`) and running the “`mbd_lax_path.m`” script.

```
>> mbd_lax_path
Treating 'C:\repos\mbdt_lax_vm\LAX\src' as MBD Toolbox installation
root.
MBD Toolbox path prepended.
NXP S32 Design Studio GCC (S32R45) toolchain is already registered ...
No compatible target is currently available for NXP S32R45 - A53.
Creating one...
Creating folders for the target 'NXP S32R45 - A53' in the folder
'C:\repos\mbdt_lax_vm\LAX\src\mbdtbx_lax\codertarget\2020a\s32r45'...
Creating the framework for the target 'NXP S32R45 - A53'...
Registering the target 'NXP S32R45 - A53'...
Done.
Successful.
```

This mechanism requires users to install the [Embedded Coder Support Package for ARM Cortex-A Processor](#) as a prerequisite.

	Embedded Coder Support Package for ARM Cortex-R Processors version 20.1.1	 Hardware Support Package	31 March 2022	 
	Embedded Coder Support Package for ARM Cortex-M Processors version 20.1.1	 Hardware Support Package	27 January 2022	
	Embedded Coder Support Package for ARM Cortex-A Processors version 20.1.3	 Hardware Support Package	21 January 2022	

The “`mbd_lax_path.m`” script verifies the user setup dependencies and will issue instructions for a successful installation and configuration of the toolbox.

2 How to create, run and build LAX example applications

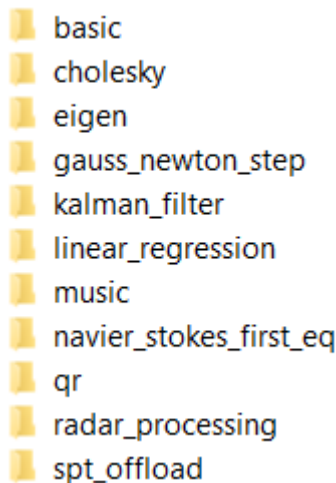
2.1.1 S32R45 Linux Setup

Before running any example on the S32R45 board for the first time, Linux must be configured to load the needed drivers. To do so, after logging into the Linux environment type the following commands. These configurations will be persistent, no need to reproduce them after each Linux reboot.

- `echo "oal_driver" >> /etc/modules`
- `echo "rsdk_lax_driver" >> /etc/modules`
- `echo "rsdk_spt_driver" >> /etc/modules`

2.1.2 Create LAX example

NXP's Model-Based Design Toolbox provides MATLAB code generation/simulation capabilities to run the examples for both A53 and LAX cores. The examples are separated into multiple folders.



Each category contains examples that can be run on the ARM core with graph functions that are running on the LAX accelerator.

Each LAX example contains a main function that will run on the ARM A53 core. The part of the code that will run on the LAX accelerator will be part of the lax graph function defined as **`lax_graphName`**, where *graphName* is the custom name of the graph.

Note*: The **`lax_`** prefix must be added in front of each function that will run on the LAX accelerator.

```

function main_linear_regression()
    x = single([-6 -4 -1 0 3 5 8])';
    y = single([18 13 6 4 -1 -8 -15])';

    % plot the points
    hold on
    plot(x, y, 'x');

    % y = b1*x + b0;
    X = [x ones(size(x))];

    % Call the LAX Graph function
    bLax = lax_linear_regression(X, y);

    % plot the line
    plot(x, X * bLax);
    hold off
end

function b = lax_linear_regression(X,y)
    coder.inline('never');
    X = lax.arm2lax(X);
    y = lax.arm2lax(y); } Inputs Glue Code
    b = inv(X.'*X)*X.'*y; User Code
    b = lax.lax2arm(b); } Outputs Glue Code
end

```

The LAX graph function contains 3 parts that all graph functions need to have, the glue code for inputs and outputs and the user code. For more information about the available MATLAB lax operators see the MATLAB LAX Operators help section within the toolbox.

2.1.3 Run LAX example

To run the LAX examples, the user must go into the example directory and run the *build_example.m* script and this will start the code generation process. The example can be run also in Simulation mode by running the main function script with the example name.

In the *build_example* script, the user can select different options, optimization levels, connectivity settings, IO, etc.

```

config = struct();
config.HardwarePart = 'S32R45';
config.Hostname = '192.168.1.2';
config.Username = 'root';
config.Password = '';
config.Deploy = true;
config.DeployPath = '~/examples/linear_regression/';
config.PutFiles = {};
config.GetFiles = {};
config.BuildConfig = 'Faster Runs';

lax_codegen('main_linear_regression.m', config);

```

How to Reach Us:

Home Page:

www.nxp.com

Web Support:

www.nxp.com/support

Information in this document is provided solely to enable system and software implementers to use NXP Semiconductor products. There are no express or implied copyright licenses granted hereunder to design or fabricate any integrated circuits or integrated circuits based on the information in this document.

NXP Semiconductor reserves the right to make changes without further notice to any products herein. NXP Semiconductor makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does Freescale Semiconductor assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation consequential or incidental damages. "Typical" parameters that may be provided in NXP Semiconductor data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals", must be validated for each customer application by customer's technical experts. NXP Semiconductor does not convey any license under its patent rights nor the rights of others. NXP Semiconductor products are not designed, intended, or authorized for use as components in systems intended for surgical implant into the body, or other applications intended to support or sustain life, or for any other application in which the failure of the NXP Semiconductor product could create a situation where personal injury or death may occur. Should Buyer purchase or use NXP Semiconductor products for any such unintended or unauthorized application, Buyer shall indemnify and hold NXP Semiconductor and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that NXP Semiconductor was negligent regarding the design or manufacture of the part.

MATLAB, Simulink, Stateflow, Handle Graphics, and Real-Time Workshop are registered trademarks, and TargetBox is a trademark of The MathWorks, Inc. Microsoft and .NET Framework are trademarks of Microsoft Corporation. Flexera Software, FlexIm, and FlexNet Publisher are registered trademarks or trademarks of Flexera Software, Inc. and/or InstallShield Co. Inc. in the United States of America and/or other countries.

NXP, the NXP logo, CodeWarrior and ColdFire are trademarks of NXP Semiconductor, Inc., Reg. U.S. Pat. & Tm. Off. Flexis and Processor Expert are trademarks of NXP Semiconductor, Inc. All other product or service names are the property of their respective owners

©2024 NXP Semiconductors. All rights reserved.

