

# **RADAR Toolbox for MATLAB**

## **Quick Start Guide**

Version 1.8.0  
Date 27 May 2024



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# 1 Introduction

This Quick Start Guide is designed to get you up and running in a matter of minutes with the concepts used by the NXP RADAR Toolbox for S32R. This toolbox is designed to be used from MATLAB.

The first part of this document covers the toolbox installation while the second part shows how to run a simple application.

## 1.1 Purpose

The purpose of this document is to demonstrate how to install the toolbox and run an example application using it.

## 1.2 Audience

This document is intended to NXP S32R users that need to simulate applications run on SPT accelerator.

## 1.3 Definitions, Acronyms and Abbreviations

Acronym	Description
SPT	Signal Processing Toolbox

## 2 Installation

Installing the NXP RADAR Toolbox for S32R is the first step. The next sections present all the steps required to have the toolbox installed successfully and ready for running the first application.

### 2.1 System Requirements

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

- Windows® 10 64bit Operating System or Red Hat® Enterprise Linux®
- At least 2 GHz CPU Speed
- At least 4 GB of RAM
- At least 20 GB of free disk space

### 2.2 Mandatory Software

NXP RADAR Toolbox is delivered as MATLAB Toolbox Package (MLTBX) that can be installed:

- Online from MathWorks File Exchange [website](#). For convenience, a NXP Support Package for S32R is available to assist throughout the installation process of the NXP SPT Toolbox and supplementary software;
- Offline from NXP [website](#) as a MATLAB Add-on;

This section shows how to install the NXP RADAR Toolbox using online approach directly from MathWorks Add-ons File Exchange website. In case you have already downloaded the NXP RADAR Toolbox for S32R MLTB file from NXP's official web page then jump directly to section 2.2.2.

To have the NXP RADAR Toolbox installed and configured properly the following actions should be executed:

- Use Get Add-ons menu from MATLAB to search for “S32R Support Package” online and install the toolbox;
- Start the NXP Support Package for S32R and follow the steps indicated in the user interface;
- Download and install the NXP RADAR Toolbox for S32R from NXP [website](#)
- Register and activate the NXP RADAR Toolbox license

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

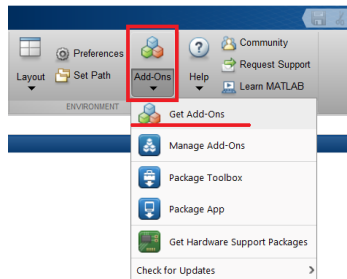
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<b>NOTE</b>	It is recommended to install all the software (MATLAB, and NXP Toolboxes) into system paths without spaces.
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## 2.2.1 NXP Support Package for S32R

For convenience a step-by-step installer guide is available on MathWorks's File Exchange website. Open MATLAB and select Get Add-Ons:

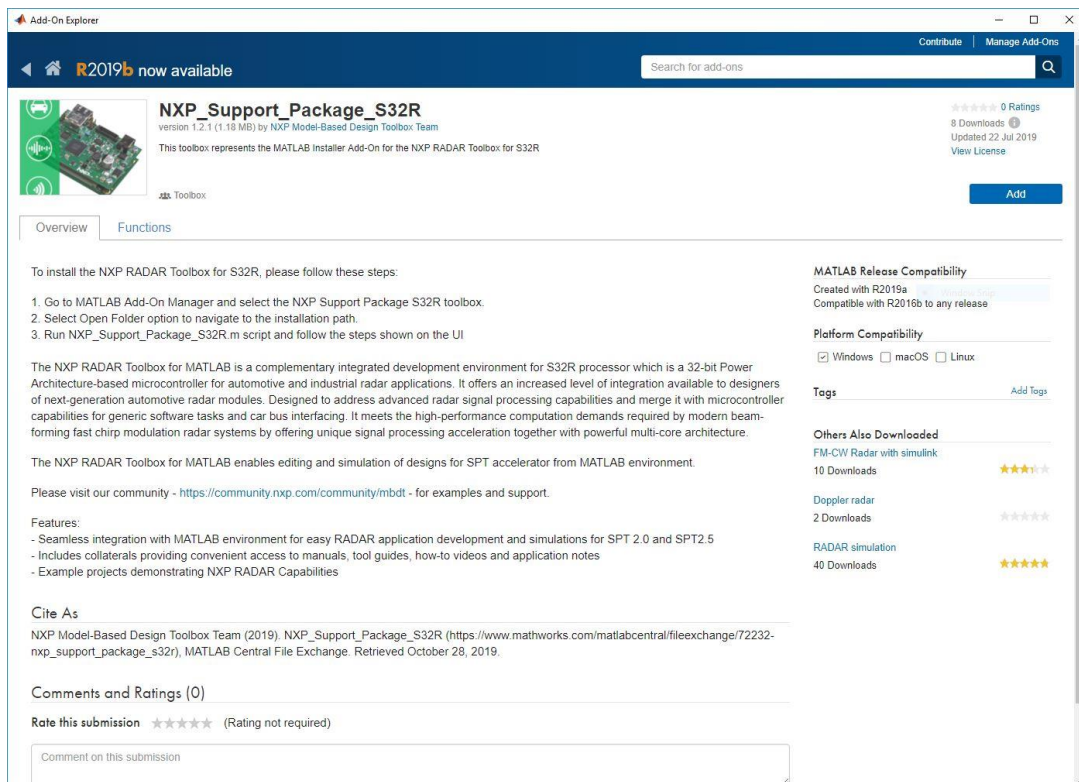


**NOTE** The screenshots below have been taken for an existing release of NXP RADAR supporting S32R processor family since the final version was not yet published on the website at the time when this document was created. However, the entire process for RADAR Toolbox revision 1.8.0 RTM will be identical with the one presented below.

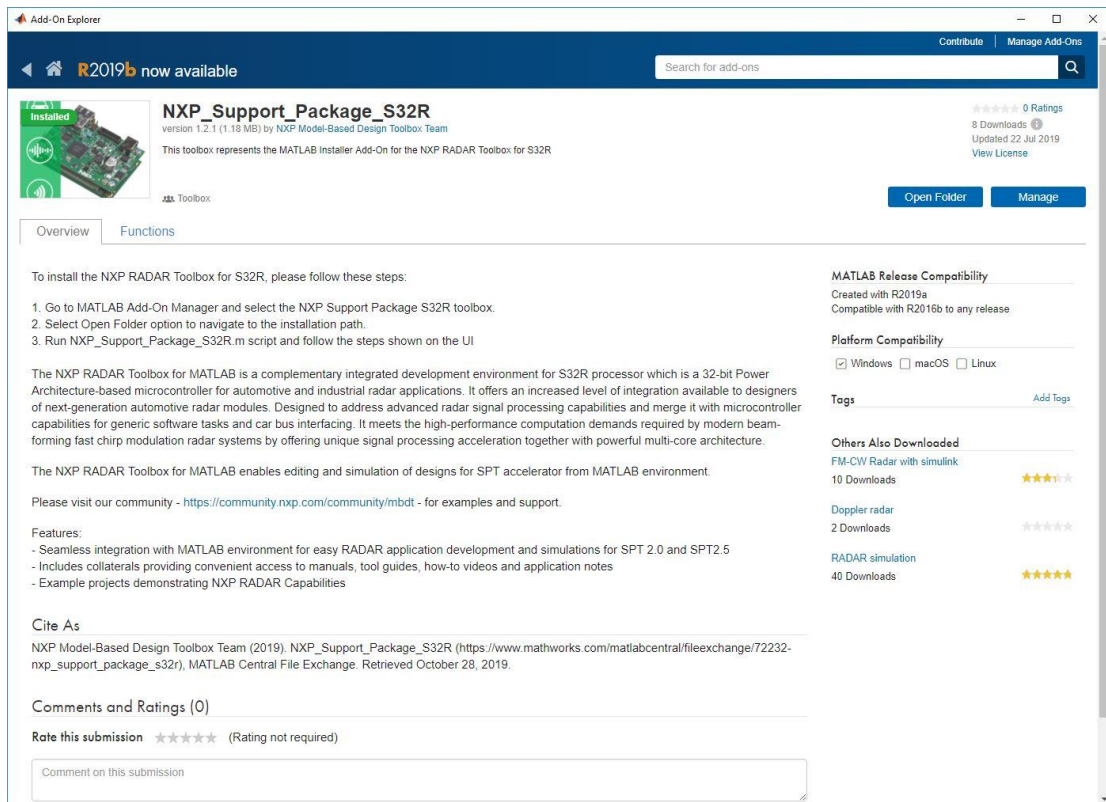
1. Once the Add-On Explorer window opens, search for “npx radar toolbox s32r”



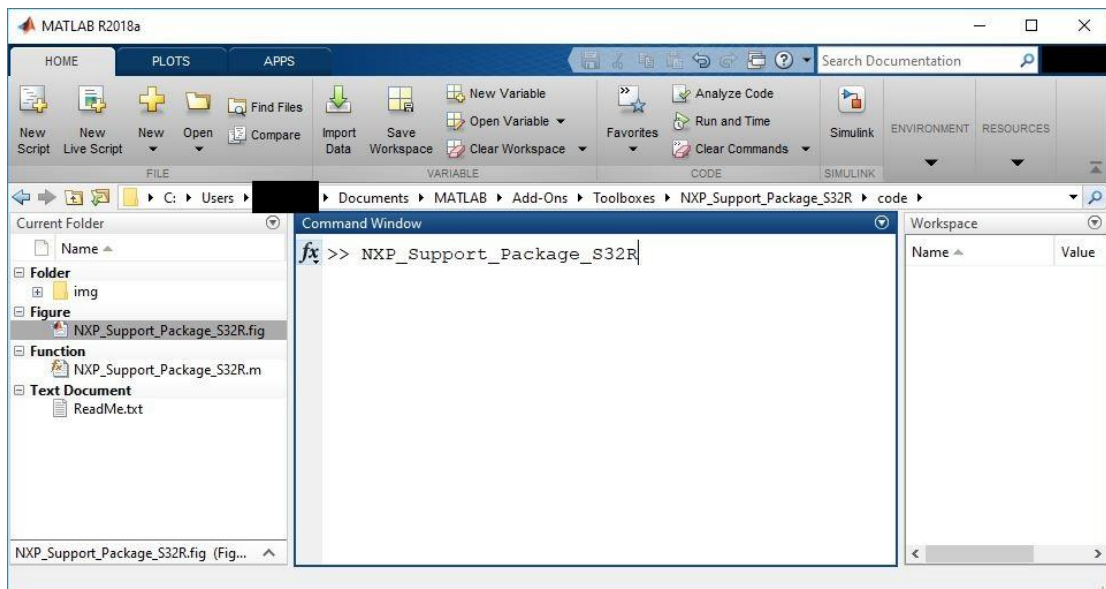
2. Select the NXP Support Package for S32R and click on Add button to start the installation of the installer guide into your MATLAB instance.



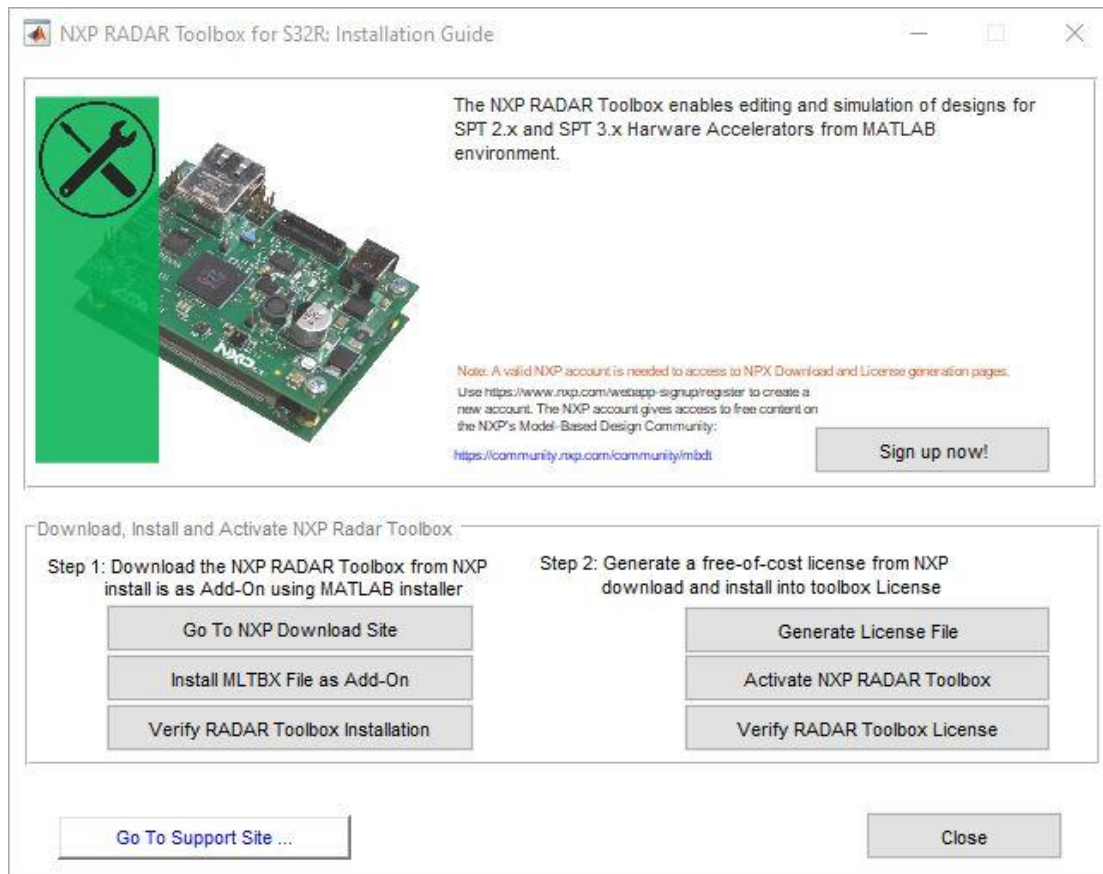
- Wait until the toolbox is installed and then click on Open Folder button.



- Run the `NXP_Support_Package_S32R` command in your MATLAB console to start the Installer Guide.



- The NXP Support Package for S32R – Installer Guide User Interface is started



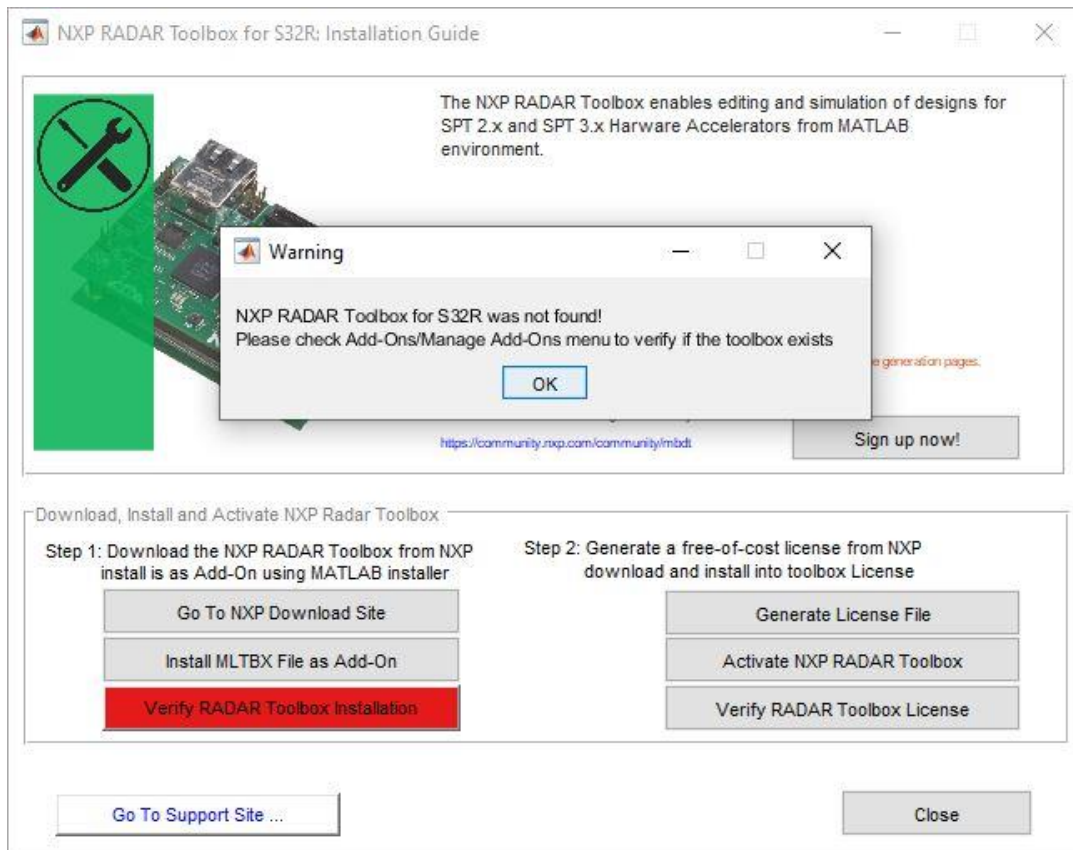
The Installer Guide contains instructions for downloading, installing and verification of all software components required for being able to develop RADAR application with MATLAB for NXP S32R automotive RADAR processors:

- Steps to download, install and verification of the NXP RADAR Toolbox for S32R
- Steps to generate, activate and verification of the license for NXP RADAR Toolbox for S32R

There are 2 main advantages of using this Installer Guide:

- Each step completion is automatically checked by the tool. If the action is completed successfully, then the tool is going to mark it as green. If a particular step cannot be verified, then the tool will issue a warning or error and is going to highlight in red that particular step that needs more attention for user side.
- Future updates will be made available via this online toolbox. In case you wish to keep your software up to date, then please install this into your MATLAB Add-ons and once a new update will be available your MATLAB instance will notify you.

The next screen capture shows how the Installer Guide notify user of successful or failed actions. At the end of installation all push buttons should be green.

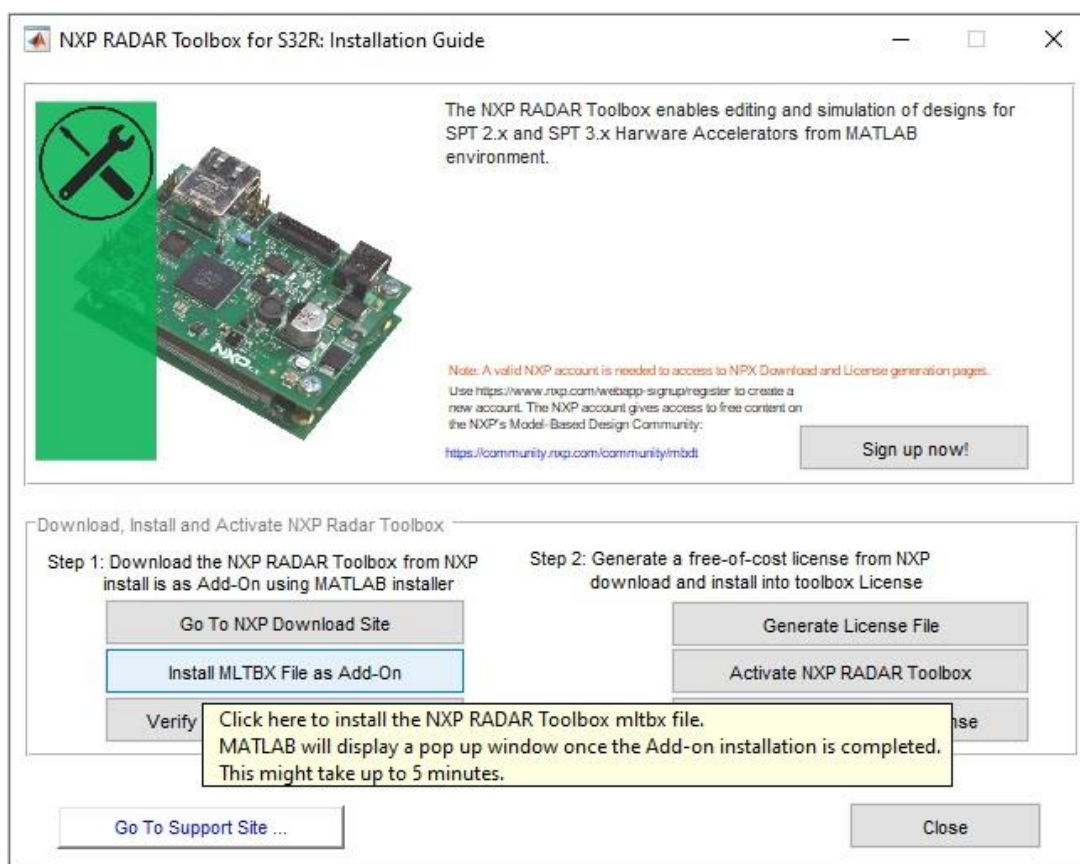


## 2.2.2 NXP RADAR Toolbox for S32R

You can obtain the NXP RADAR Toolbox for S32R by:

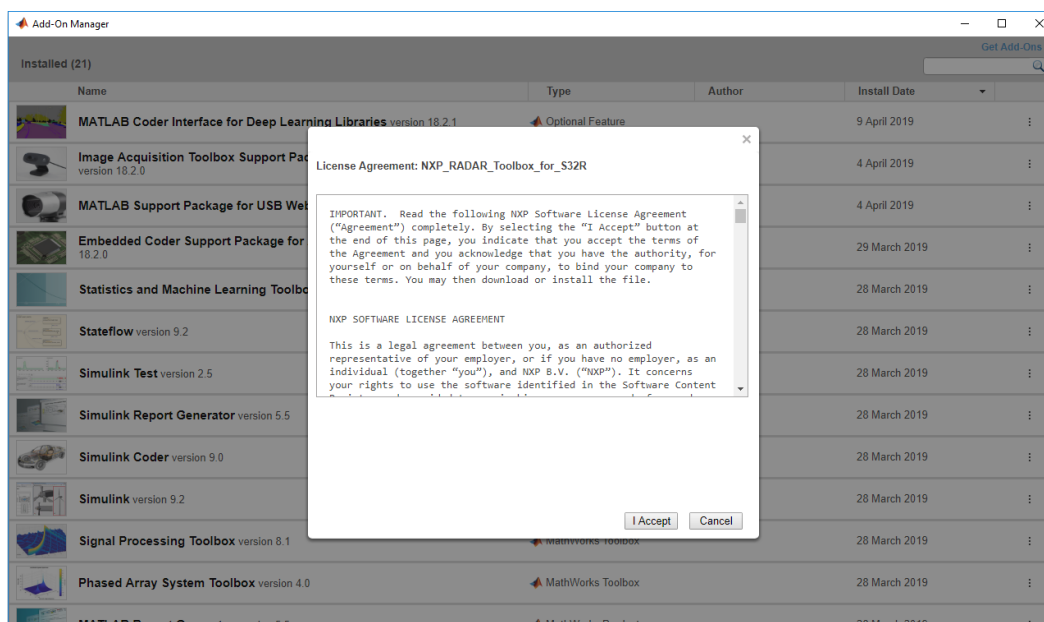
- Using the Installer guide “Go To NXP Download Site” button
- Go directly into your NXP Software Account and download the toolbox



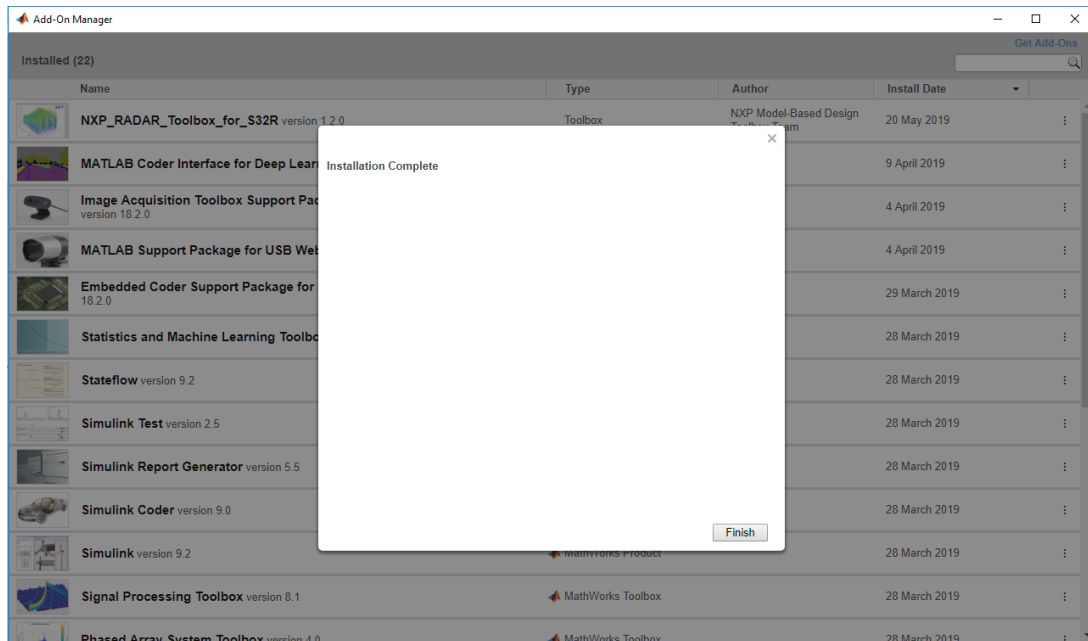


You will be prompted with the following options:


1. Accept the NXP Software License Agreement by clicking “I Accept” to start toolbox installation.



- Click “Finish” and NXP’s RADAR Toolbox should be visible as a new Add-ons. The default location can be changed prior to installation by changing the Add-Ons path from MATLAB Preferences



- More details about the NXP’s RADAR Toolbox can be found by clicking on View Details



**NXP\_RADAR\_Toolbox\_for\_S32R** version 1.7.0 by NXP ... installed on 22 December 2022  
Emulate the NXP's SPT accelerator from S32R Automotive RADAR Microcontrollers  
Toolbox

[Open Folder](#) [Learn More](#) [Uninstall...](#)

**Description**

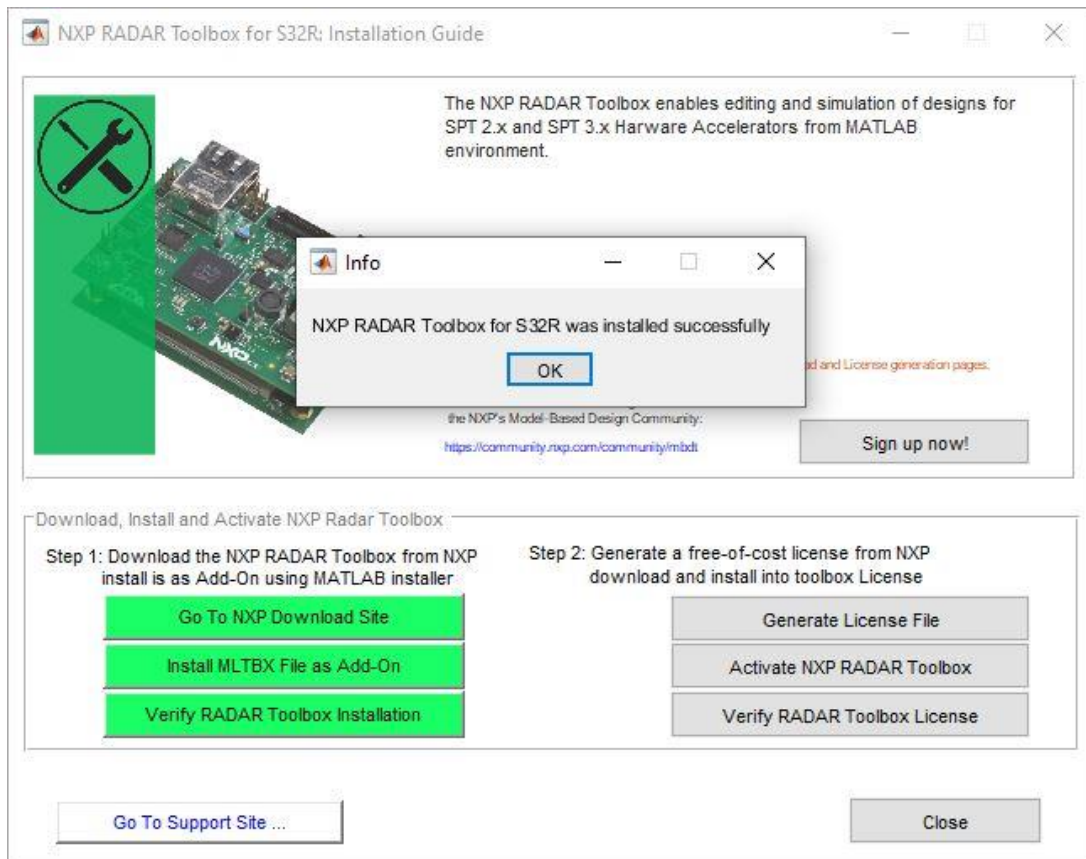
The NXP RADAR Toolbox for MATLAB is a complimentary integrated development environment for S32R processor which is a high-performance automotive processor designed to support safe computation-intensive applications in the area of RADAR.

Features:

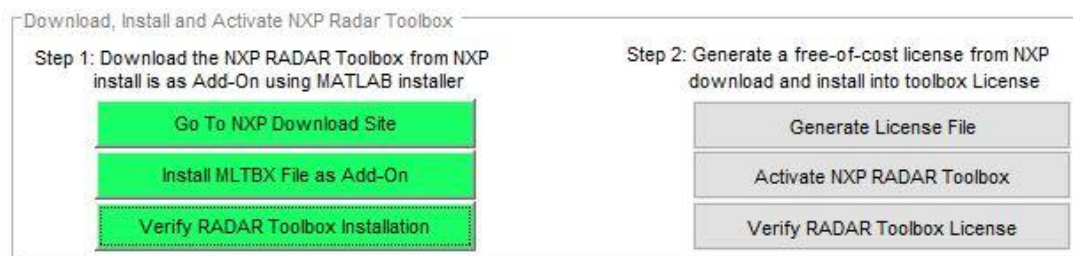
▼ **View File List**

- \\examples\\advanced\\object\_detection\\common\\spt2x\_FFT1.m
- \\examples\\advanced\\object\_detection\\common\\spt2x\_FFT2.m
- \\examples\\advanced\\object\_detection\\common\\spt2x\_FFT3.m

- NXP RADAR Toolbox documentation, help and examples are fully integrated with MATLAB development environment. Get more details by accessing the standard Help and Supplemental Software section
- In case you are using the Installer Guide, then you have the option to check if the NXP RADAR Toolbox is installed correctly on your MATLAB environment by simply clicking on “Verify RADAR Toolbox Installation” button



After this step you should see all button related with RADAR Toolbox Step 1, green

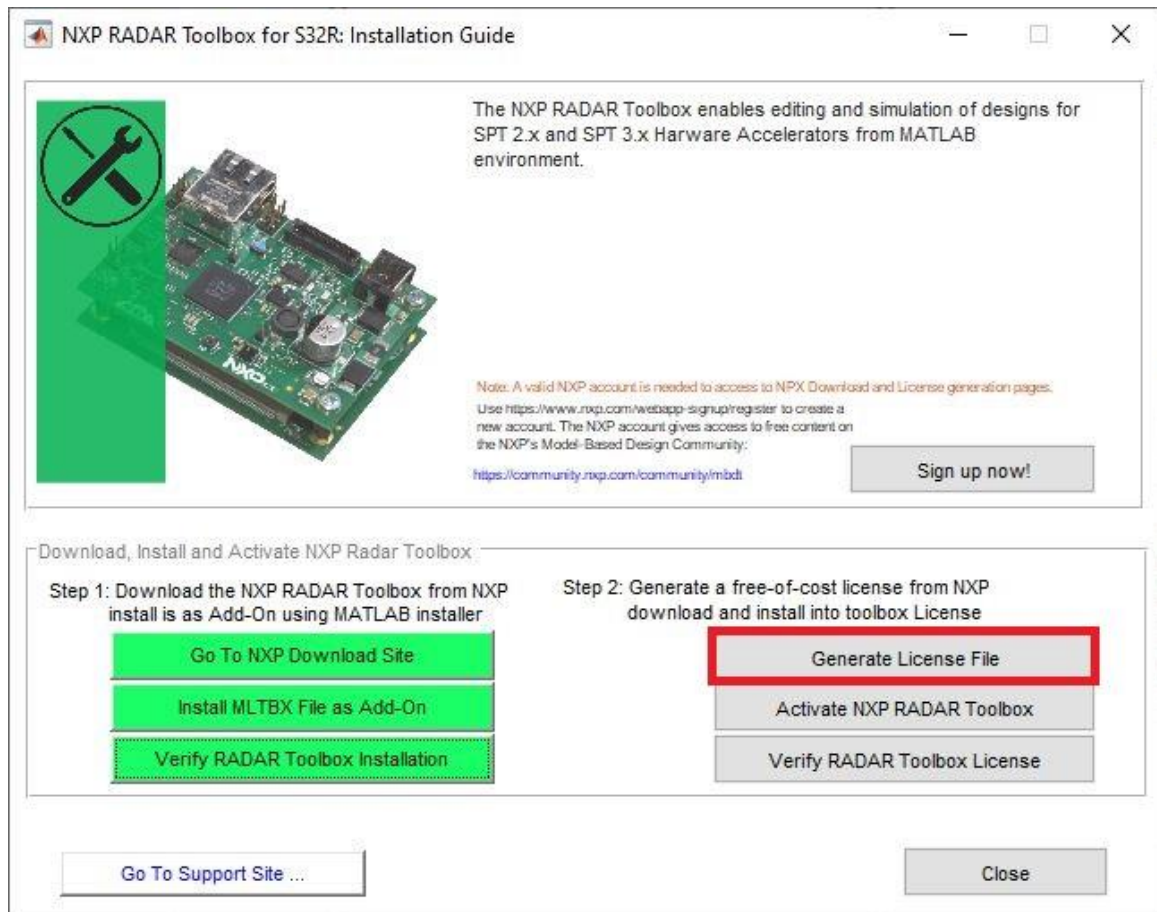


### 2.2.3 License Generation and Activation

The NXP RADAR Toolbox for S32R is available free of charge, however, a valid license is required.

You can obtain the NXP RADAR Toolbox for S32R license free of charge by:

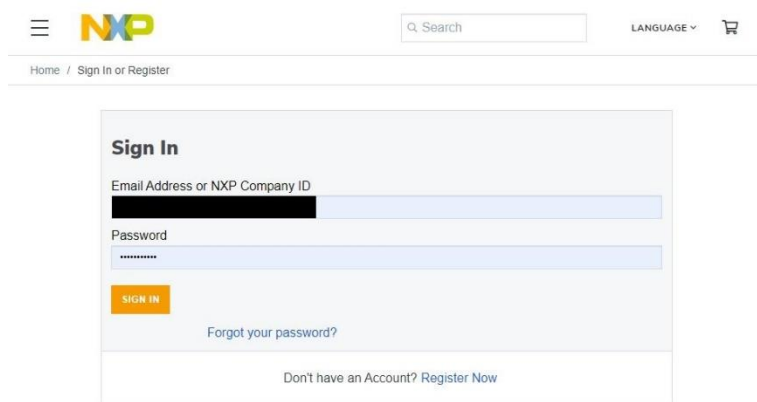
- Using the Installer guide “Generate License File” button



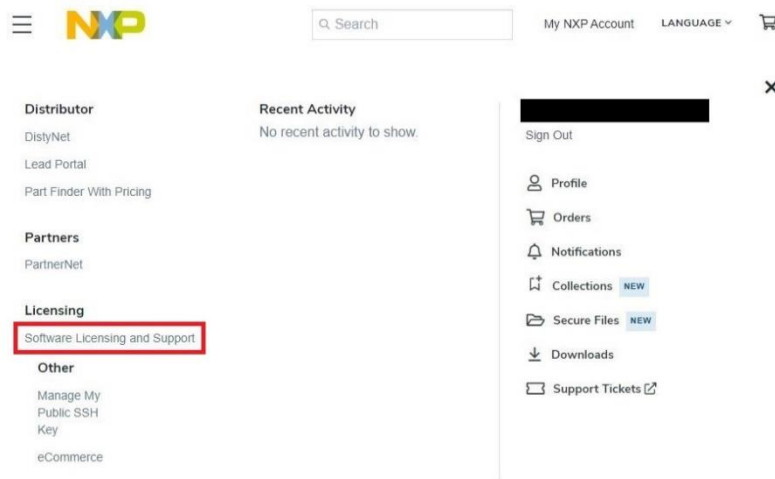
- Go directly into your NXP Software Account and Generate the license

Perform the following steps to obtain the NXP RADAR Toolbox for S32R license:

1. Go to [https://nxp.flexnetoperations.com/control/frse/product?child\\_plneID=782957](https://nxp.flexnetoperations.com/control/frse/product?child_plneID=782957)
2. Sign in. If not registered yet, click the Register button to obtain a NXP account.

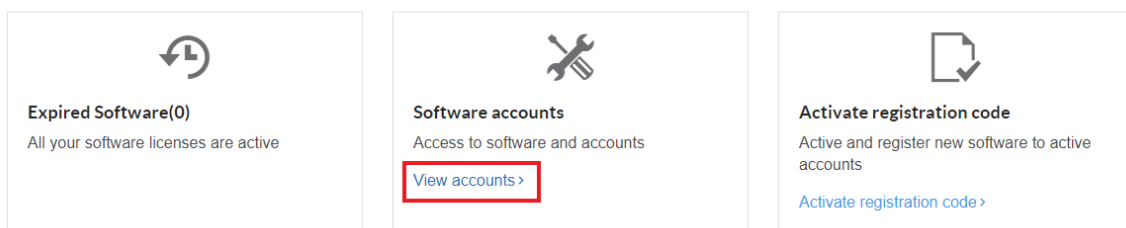


3. Select "Software Licensing and Support" link from "My NXP Account" block

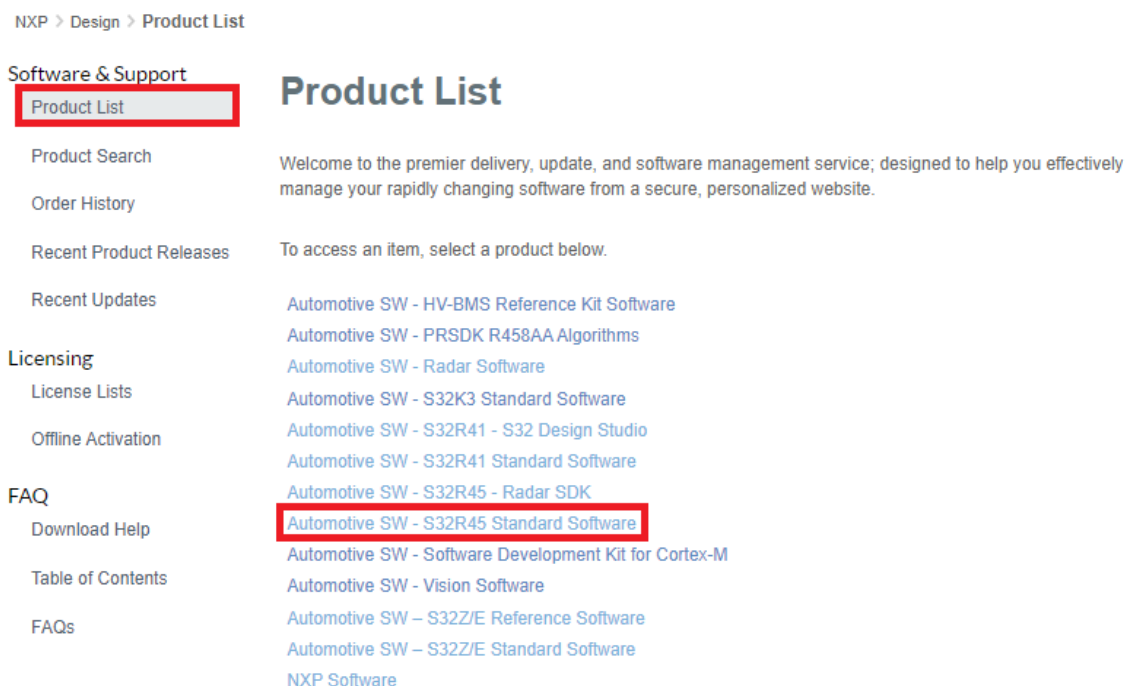


4. Select “View accounts” link from “Software accounts” block

## Software Licensing and Support



5. Select “Product List” option on the left to see all products you are entitled to use. Within Product Information page, select “Automotive SW – S32R45 Standard Software”.





6. Select "SPT Toolbox" link to go to download and license management page .

NXP > Design > Product Information : Automotive SW - S32R45 Standard Software

Software & Support

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## Product Information

### Automotive SW - S32R45 Standard Software

- Automotive SW - S32R45 - FreeRTOS for Cortex-M7
- Automotive SW - S32R45 - HSE Firmware
- Automotive SW - S32R45 - Inter-Platform Communication Framework
- Automotive SW - S32R45 - Linux BSP
- Automotive SW - S32R45 - Platform Software Integration
- Automotive SW - S32R45 - Radar SDK
- Automotive SW - S32R45 - Real Time Drivers
- Automotive SW - S32R45 - S32 Design Studio
- Automotive SW - S32R45 - S32 FreeMASTER
- Automotive SW - S32R45 - Safety Peripheral Drivers (SPD) (Cortex-M7)
- SPT Toolbox**
- Automotive SW - EB tresos Studio / AUTOSAR Configuration Tool
- Automotive SW - S32R45 - S32 Design Studio BBE32 Add-on package
- Automotive SW - BBE32 Licenses
- Automotive SW - S32R45 - TCP/IP Stack (Cortex-M7)
- Automotive SW - S32R45 - SDHC Stack (Cortex-M7)

7. For the first-time log-in, the "Software Terms and Conditions" page will be displayed. Click on "I agree" button to consent to the software license agreement.

NXP > Design > Software Terms and Conditions

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## Software Terms and Conditions

### Model-Based Design Toolbox for S32 SPT 3.x 1.7.0

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

LA\_OPT\_NXP\_Software\_License v40 December 2022

**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

8. Select the desired release, for example “Model-Based Design for S32 SPT 3.x 1.8.0”.

NXP > Design > Product Information : SPT Toolbox

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## Product Information

### SPT Toolbox

Select a version. To access older versions, click on the “ Previous ” tab

Current Previous

Version	Description	Date Available	
1.7.0	Model-Based Design Toolbox for S32 SPT 3.x 1.7.0 Model-Based Design Toolbox for S32 SPT 3.x 1.7.0	Sep 12, 2022	Download Log
1.6.0	Model-Based Design Toolbox for S32 SPT 3.x 1.6.0 Model-Based Design Toolbox for SPT 3.x 1.6.0 RTM	Dec 1, 2018	Download Log
1.5.0	Model-Based Design Toolbox for S32 SPT 2.x 1.5.0 Model-Based Design Toolbox for SPT 2.x 1.5.0 RTM	May 1, 2018	Download Log

9. Click on “License Keys” tab

NXP > Design > SPT Toolbox > Model-Based Design Toolbox for S32 SPT 3.x 1.7.0 : Files

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## Product Download

### Model-Based Design Toolbox for S32 SPT 3.x 1.7.0

Files License Keys Notes

[Download Help](#)

The SPT 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

5 Files

	File Description	File Size	File Name
+	NXP_RADAR_Toolbox_S32R_1.7.0.RFP_linux_int_14_20220928	17.2 MB	<a href="#">NXP_RADAR_Toolbox_S32R_1.7.0.RFP_linux_int_14_20220928.mltbx</a>
+	NXP_RADAR_Toolbox_S32R_1.7.0.RFP_win_int_10_20220928	24 MB	<a href="#">NXP_RADAR_Toolbox_S32R_1.7.0.RFP_win_int_10_20220928.mltbx</a>
+	SPT_Toolbox_Quick_Start	2.4 MB	<a href="#">SPT_Toolbox_Quick_Start.pdf</a>
+	SPT_Toolbox_Release_Notes	261.2 KB	<a href="#">SPT_Toolbox_Release_Notes.pdf</a>
+	SPT_Toolbox_Software_Content_Register	572 bytes	<a href="#">SPT_Toolbox_Software_Content_Register.txt</a>

10. Verify if the correct tool and version are identified and then check the box and click on “Generate” button.

---

**NOTE** NXP RADAR Toolbox is keeping the same licensing scheme between various releases. If you have a valid license generated for the previous releases then you can use it for the newer version 1.8.0 too

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## License Information

## Model-Based Design Toolbox for S32 SPT 3.x 1.7.0

Generate

View

<b>Item Description</b>	<b>S32R45 Standard Software</b>
Order Number	SW32R4-STDSW-D_101873537
Purchase Order Number	
Total Number of Licenses:	100
Activation Code	[REDACTED]
<input checked="" type="checkbox"/> License Applicable to Product(s):	
<u>Version</u>	<u>Description</u>
1.7.0	Model-Based Design Toolbox for S32 SPT 3.x 1.7.0 ( <a href="#">View EULA</a> )
99 Available	
License Quantity: 1	Expiration Date: Sep 12, 2026
Disk Serial Number: [REDACTED]	<input type="button" value="Return"/>
Generated By: [REDACTED] on Dec 13, 2022	<input checked="" type="checkbox"/>
<a href="#">About Return</a> <a href="#">About Upgrade</a>	

Generate

View

11. Select Disk Serial Number or Ethernet address as the “Node Host ID”. If you do not know your Disk Serial Number nor the Ethernet address then go to paragraph 12. There is also a link available on this page with details about License Generation.

Enter a name for license to help managing them in case you need to use the RADAR Toolbox on multiple computers. (Optional)

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## 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):		99
<u>Version</u>	<u>Description</u>	
1.7.0	Model-Based Design Toolbox for S32 SPT 3.x 1.7.0	
Node Host ID	<input type="text" value="Disk Serial Number"/> [REDACTED]	
Name	[REDACTED]	
Node Host ID	<input type="text"/>	
Name	<input type="text"/>	
Node Host ID	<input type="text"/>	
Name	<input type="text"/>	
Node Host ID	<input type="text"/>	
Name	<input type="text"/>	
Node Host ID	<input type="text"/>	
Name	<input type="text"/>	

Generate



## 12. Locating the Node Host ID

The entire list of possible Host ID can also be found by calling the script `spt_tbx_hostid_list`. Calling the script you can get:

On the machine xxxxxxxx the hostIDs that can be used to generate the license are the following:

- 1) Disk Serial Number = 66B7-2EBD
- 2) Ethernet Address = 28F10E111C1D

## 13. Click on “Generate” button to get the license. Verify if the information is correct: Toolbox version, expiration date, Node Host ID

The screenshot shows the 'View Licenses' page in the NXP Design tool. The left sidebar contains navigation links: Software & Support, Product List, Product Search, Order History, Recent Product Releases, Recent Updates, Licensing, License Lists, Offline Activation, FAQ, Download Help, Table of Contents, and FAQs. The main content area displays the license details for 'Model-Based Design Toolbox for S32 SPT 3.x 1.7.0'. It includes the license quantity (1), expiration date (Sep 12, 2026), disk serial number, and the license key. The license key is highlighted in a red box. Below the license key, there are three buttons: 'License Overview', 'Print Friendly', and 'Save All'.

View Licenses

Below are the licenses you just generated.

License Overview Print Friendly Save All

License Applicable to Product(s):  
Version Description  
1.7.0 Model-Based Design Toolbox for S32 SPT 3.x 1.7.0  
License Quantity: 1 Expiration Date: Sep 12, 2026

Disk Serial Number: [REDACTED]  
Generated By: Iulian Bulancea on Dec 22, 2022

```
#S32R45 Standard Software - Model-Based Design Toolbox for S32 SPT 3.x 1.7.0
#for Iulian Bulancea Software Account
# License for DISK_SERIAL_NUM=[REDACTED]
INCREMENT MBD_Toolbox_SPT_3.0 freescale 1.0 12-sep-2026 uncounted \
VENDOR_STRING="Model-Based Design Toolbox for S32 SPT 3.x \
1.7.0" HOSTID=DISK_SERIAL_NUM=[REDACTED] ISSUER="Freescale \
Semiconductor" ISSUED=22-dec-2022 ck=209 SN="FSL - 41039287" \
TS_OK SIGN="1DC6 7416 3B04 4289 ACB6 1D58 EEAC F859 B3B9 6DA0 \
156D 434A 0D2F 587C 9A43 1CD3 BBD5 058E 5656 661D AE15 E02A \
3346 956E 3288 21E4 9FCD CBE8 1E42 C524"
```

License Overview Print Friendly Save All

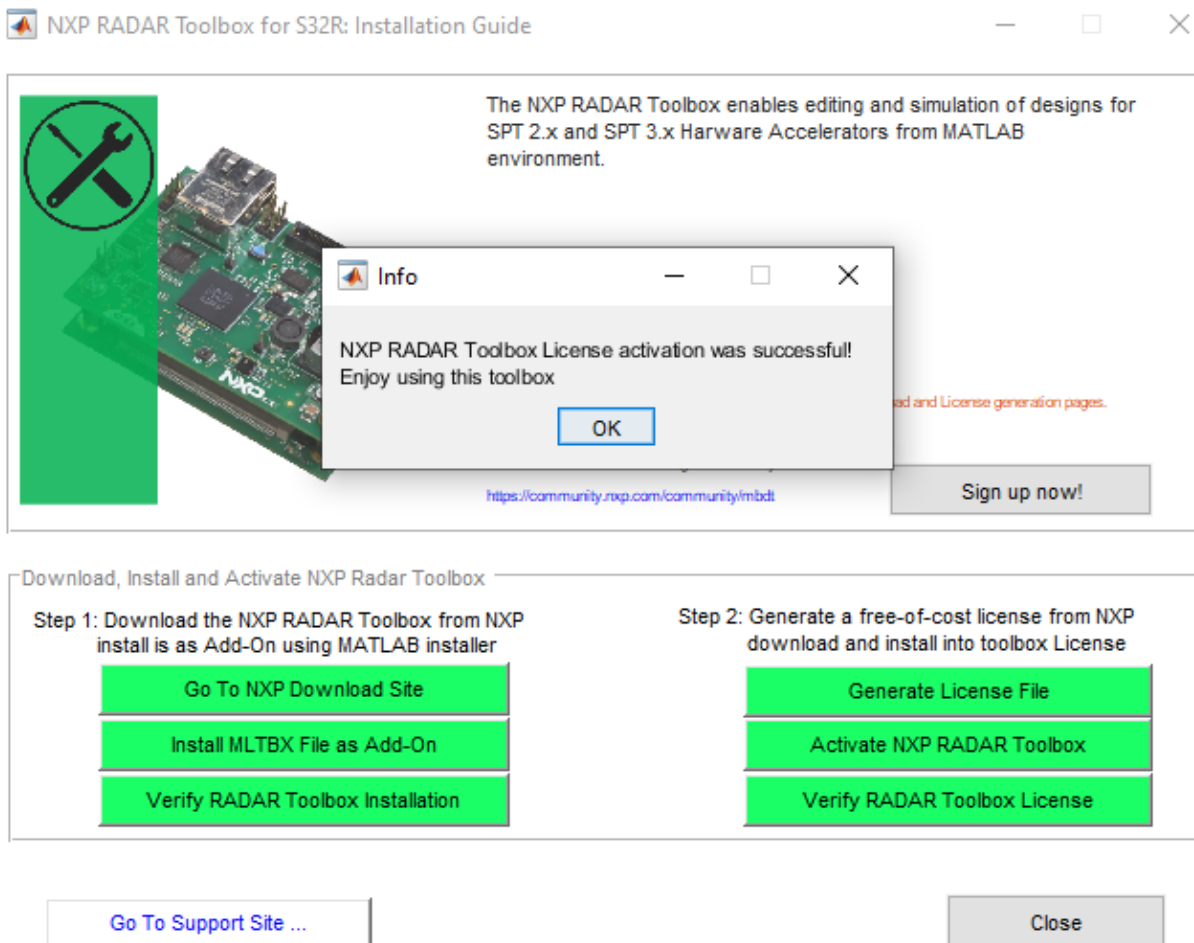
## 14. Either click on “Save All” or copy and paste the file into a text editor and save the file as “license.dat” into the “RADAR Toolbox installed directory\license” folder.

The screenshot shows the MATLAB file explorer. The breadcrumb path is: < MATLAB > Add-Ons > Toolboxes > NXP\_RADAR\_Toolbox\_for\_S32R > code. The 'code' directory is highlighted with a red box. Below the breadcrumb, a table lists the contents of the 'code' directory. The 'license' folder is highlighted with a red box.

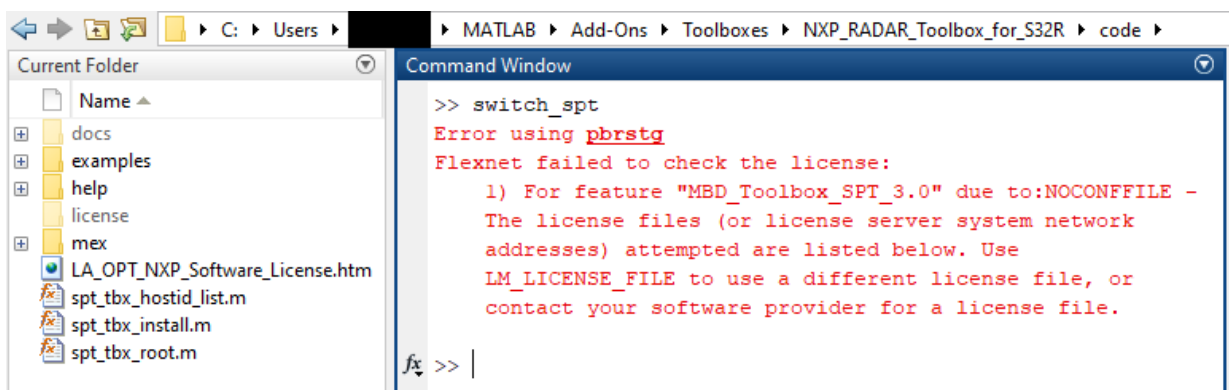
Name	Date modified	Type	Size
docs	17-Dec-21 14:33	File folder	
examples	17-Dec-21 14:33	File folder	
help	17-Dec-21 14:33	File folder	
license	17-Dec-21 14:33	File folder	
mex	17-Dec-21 14:33	File folder	
LA_OPT_NXP_Software_License	20-Sep-21 11:52	Chrome HTML Do...	350 KB
spt_tbx_hostid_list	16-Dec-21 18:34	MATLAB Code	2 KB
spt_tbx_install	16-Dec-21 21:40	MATLAB Code	4 KB
spt_tbx_root	16-Dec-21 18:26	MATLAB Code	1 KB

15. License installation is now complete.

16. Check if the license file is installed correctly by using the “Verify Vision Toolbox License” button. If everything is ok, then the Installer Guide will confirm the action



Alternatively, invoke the `switch_spt` function to verify the license errors.



### 3 RADAR Application

The RADAR application consists on linking of RADAR algorithms:

range FFT, doppler FFT, beam forming, magnitude computation, histogram computation, threshold deduction and peak search.

For each SPT version there is a separate application which will have as result the identification of the objects in front of the RADAR antennas. For each such detected object one can find the distance from the RADAR and the object and the radial velocity of the object.

In order to run the RADAR application called *Object detection* one should change to the folder *NXP\_RADAR\_Toolbox\_for\_S32R\code\examples\advanced\object\_detection\*. To run the object detection application for SPT 2.0 go to folder *spt20* where you are going to find the live script called *object\_detection\_spt20.mlx*. The script is self-expiatory.

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**Home Page:**

[www.nxp.com](http://www.nxp.com)

**Web Support:**

[www.nxp.com/support](http://www.nxp.com/support)

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