

EVB-LAN9252-SPI-dsPIC33 Quick Start Guide

|  |  |  |  |
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# Introduction

This document describes how to use the EVB-LAN9252-SPI Software development kit as a development tool for the Microchip EVB LAN9252 EtherCAT® slave controller.

## Abbreviations

IDE - Integrated Development Environment

ESC - EtherCAT® Slave Controller

EVB - Engineering Validation Board

HAL - Hardware Abstraction Layer

SPI - Serial Protocol Interface

SSC - Slave Stack Code

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# EVB LAN9252-SPI

## EVB LAN9252-SPI in SPI Mode

### EtherCAT Master and Slave Configuration

The following steps describe how to configure the EtherCAT master and slave.

Configure the Master with the TwinCAT driver.

**Note:** Refer to [Appendix A](#_Appendix_A_1) for Windows configuration

1. Download and Extract “*LAN9252-dsPIC33-SDK-Vx.x.zip”* from Microchip website. ([www.microchip.com/LAN9252-041715a](http://www.microchip.com/LAN9252-041715a)).

**Note:** Vx.x denotes the version number of the SDK

1. In SDK, “\*ESI Files*” directory contains the ESI files which can be loaded to EVB LAN9252-SPI EEPROM using TwinCAT, as shown below.



**Note**: Refer [Appendix D](#_Appendix_D) to change the Vendor ID and slave information’s in ESI files.

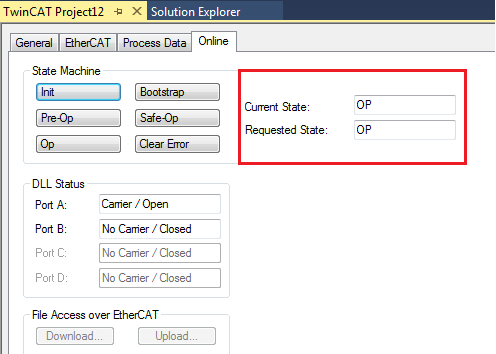
1. Copy *Microchip\_LAN9252\_dsPIC33\_SSC\_Config.xml* to the directory path

“C:\TwinCAT\3.1\Config\Io\EtherCAT” for TwinCAT 3.1

1. Configure the evaluation board in SPI mode.
2. By default, corresponding ESI file of dsPIC33 firmware is flashed to the delivered EVB LAN9252-SPI. To change the firmware in dsPIC33 SOC, refer [Appendix D](#_Appendix_D) and [Appendix E](#_Appendix_E).

**Note:** The pre-built binaries are available at “Binaries” directory. This step can be skipped if pre-built binary is going to be used for programming.

1. Launch TwinCAT and scan EtherCAT slaves from TwinCAT. Refer [Appendix C](#_Appendix_C_1) to scan the slaves.
2. Program EEPROM using *dsPIC33 EtherCAT Slave*.*xml*. Refer [Appendix B](#_Appendix_B) before EEPROM programming. If the EEPROM is programmed successfully, the device state will enter into ‘OP’ mode as shown below

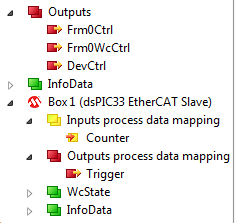


1. Once the EEPROM programming is successful, state will change to OP mode. **Note:** If it changes to OP mode, then the device is in operational state. Otherwise there is an issue with the setup.

### Demo

This describes a demo of the EVB- LAN9252-SPI in SPI Mode

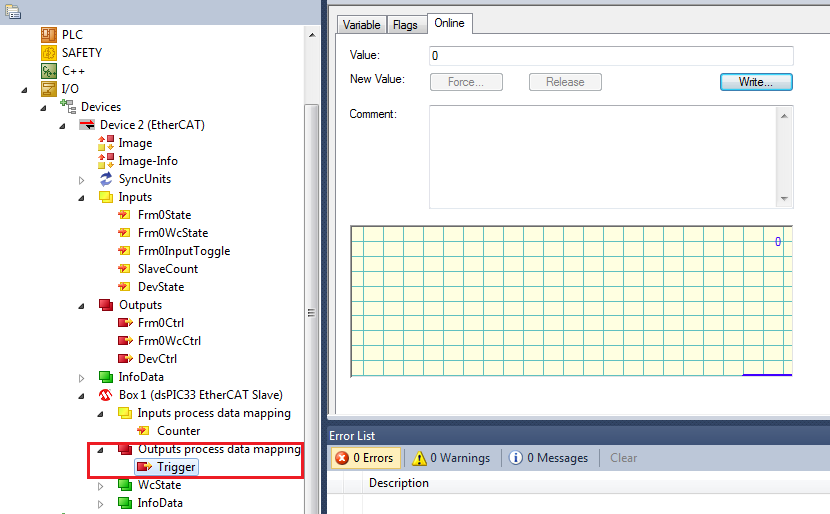
1. Follow the steps as provided in section 3.1.1. There is 1 input and 1 outputs object variables can be seen on the solution explorer of the TwinCAT as shown below.



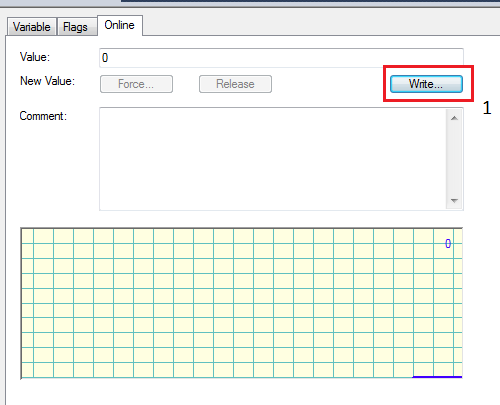
As part of this demo, two object variables are available and it is described in the below table

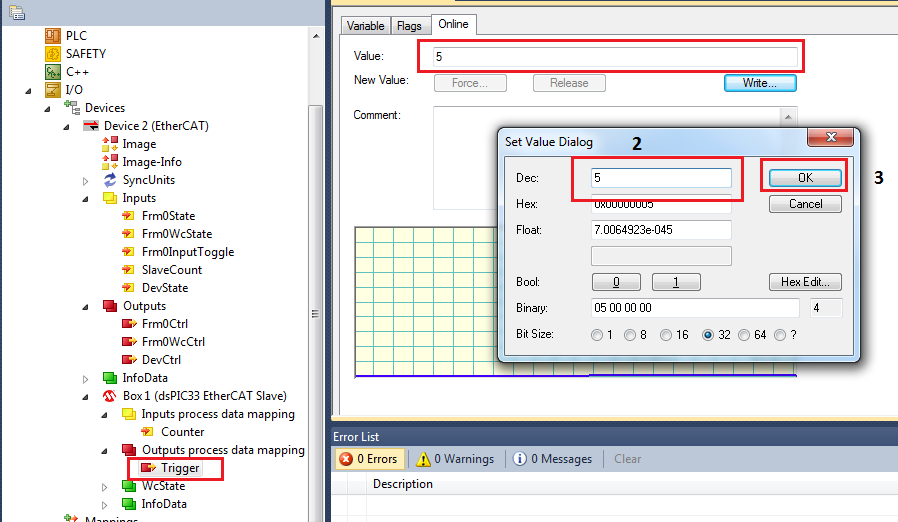
|  |  |
| --- | --- |
| Counter | Value of Counter is determined based on Trigger value. If Trigger value is 0, then Counter is cleared |
| Trigger | Trigger value is used to determine value of Counter |

To Change the Trigger value, click on the Trigger under “Output Process data mapping” in solution explorer and TwinCAT project window will be displayed.

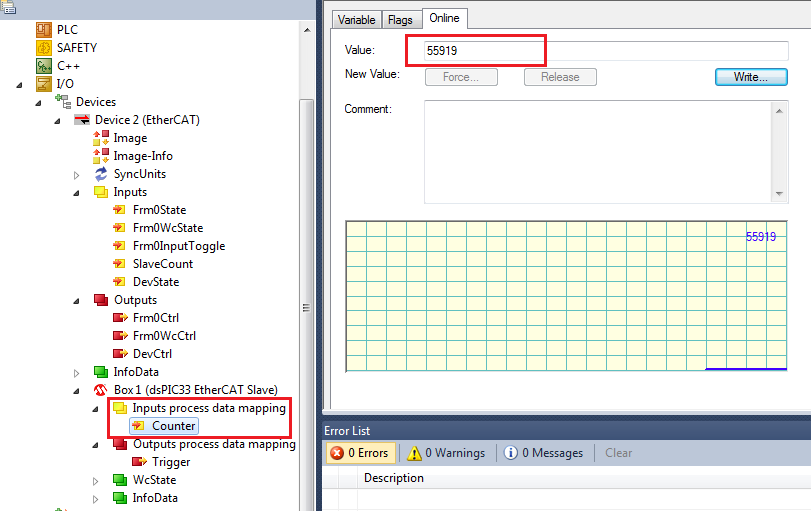


Change Trigger value to 5 or 0 as shown below. (Trigger value can be anything. Trigger value used here is only for example.)



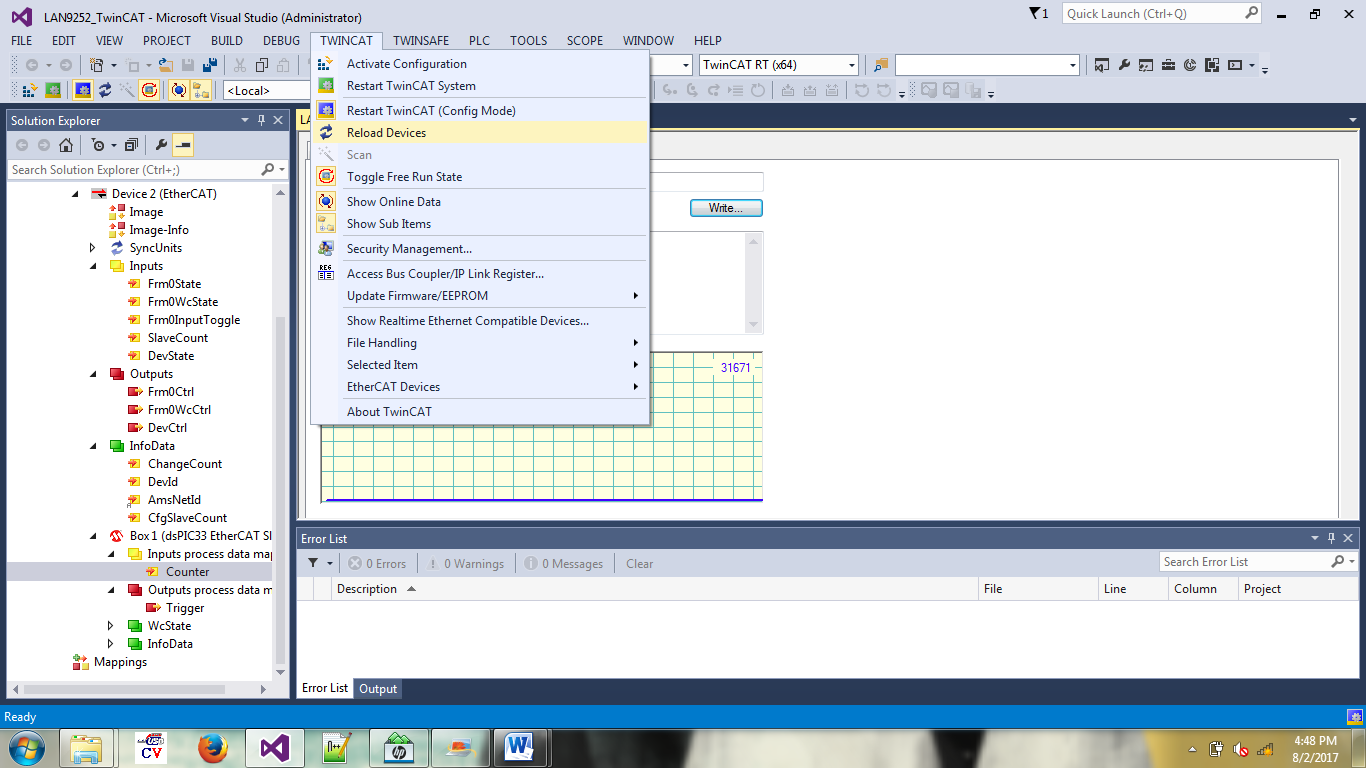


Counter value will be incremented based on trigger value as shown below. (Counter value will not be a stable value. It will keep on increment based on trigger value. Picture shown below is only for example. )



NOTE: If you don’t see the counter incremented then try the following steps.

1. In TwinCAT software visit TWINCAT > Reload Devices as shown in the following picture.



1. Restart the board and try again section 3.1.2 Demo.

# Appendix A

This appendix shows how to set up Master in Windows.

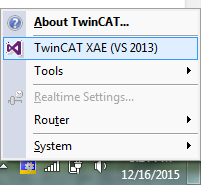
## Setting up Master in windows

To setup the Master in Windows,

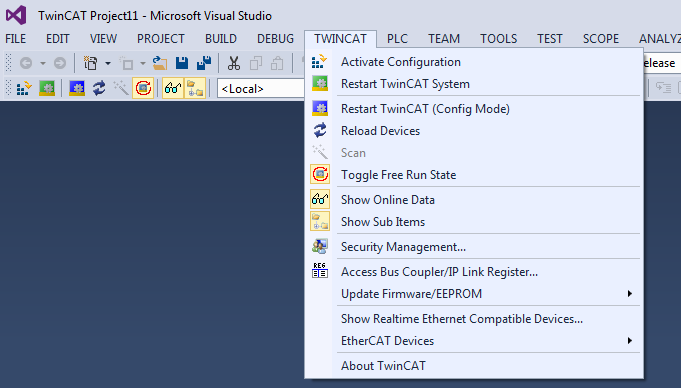
1. Download and Install TwinCAT 3.1 on windows from [*http://beckhoff.com/*](http://beckhoff.com/)
2. TwinCAT Ethernet Driver – Installation

If TwinCAT installed successfully, a TwinCAT icon will be shown in bottom-right corner of the desktop. After clicking the icon, a pop-up list will display. Select “TwinCAT XAE (VS XXXX)”, as shown below.

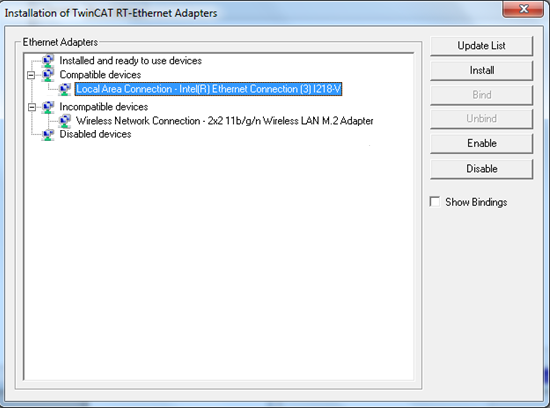
**Note**: VS XXXX refers to version of the Visual studio installed on the computer.



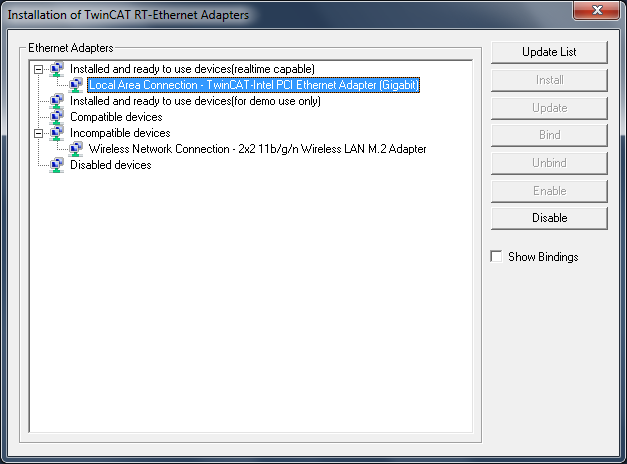
1. Go to “TwinCAT->Show Real Time Ethernet Compatible Devices…”



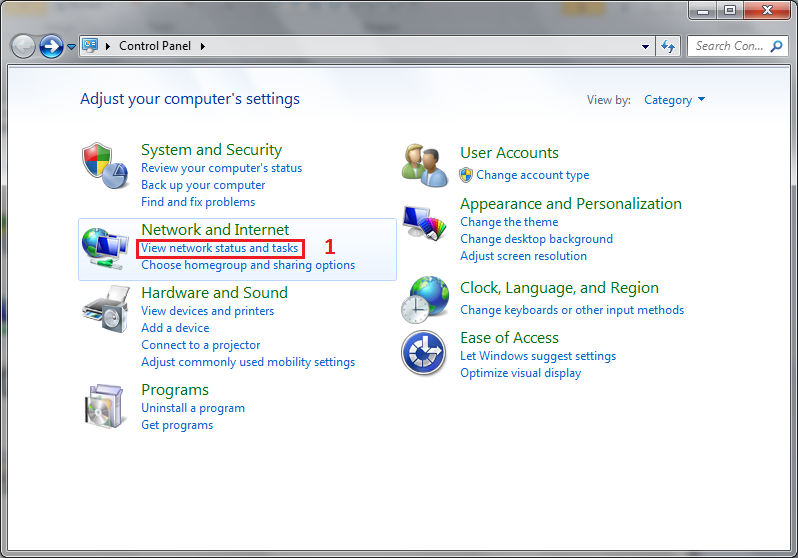
1. Select the Network adaptor and install the TwinCAT driver.

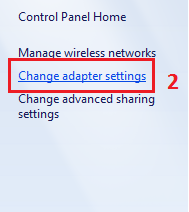


1. Once the TwinCAT driver is installed successfully, the driver is compatible with the TwinCAT master. Now the network adaptor will be moved to “Installed and ready to use devices” as shown below.

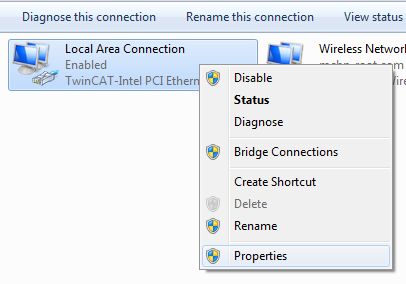


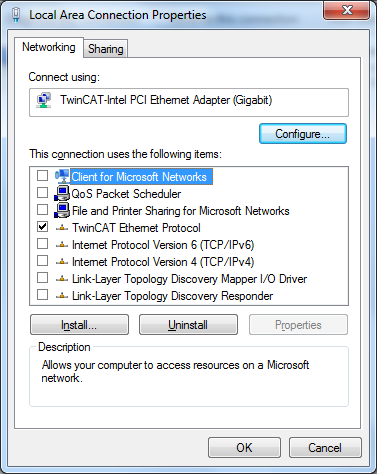
1. Go to corresponding network adaptor properties by clicking “View network status and tasks” and “Change adapter settings” in Control Panel.





1. And then select TwinCAT drivers as shown below.





**Note**: Only Select TwinCAT drivers. If the TwinCAT cannot find the EtherCAT slaves after following the steps in Appendix C, restart the computer and attempt for scanning again.

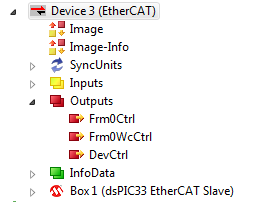
# Appendix B

This appendix shows how to program EEPROM.

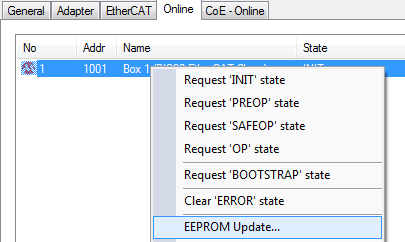
## EEPROM Programming

To program EEPROM:

1. After a successful scan, click the “Device 2 (EtherCAT)” on the solution explorer of the TwinCAT tool as shown below.

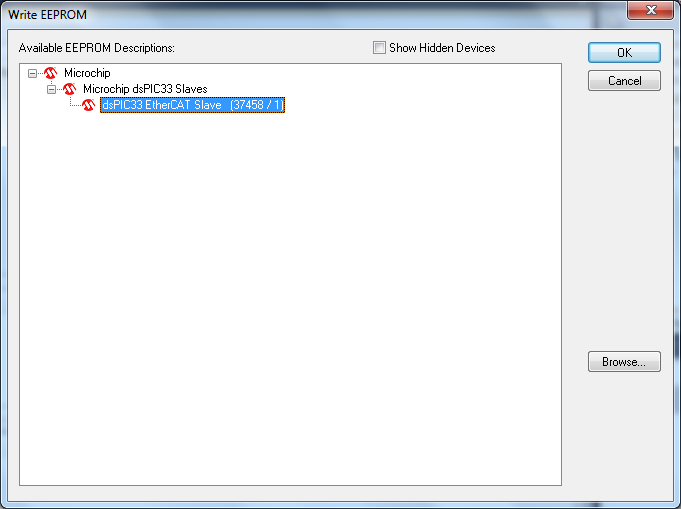


1. Click the “Online” tab in TwinCAT project window.
2. Right click the LAN9252 listings and select “EEPROM Update” from the contextual menu.



1. Upon selecting “EEPROM Update”, the Write EEPROM window will open. Choose corresponding EEPROM configuration then Click the “OK” button to initiate EEPROM programming.

For example, the following figure shows LAN9252 SPI configuration is selected for EEPROM programming in the TwinCAT



NOTE: If you cannot find the **dsPIC33 EtherCAT Slave** file as shown in the above figure then make sure you copy the **dsPIC33 EtherCAT Slave.xml** file in the **[TwinCAT Install Directory]\TwinCAT\3.1\Config\Io\EtherCAT** directory. The dsPIC33 EtherCAT Slave.xml file is generated after running the SSC Slave tool. Once the dsPIC33 EtherCAT Slave.xml file is copied, restart your PC and TwinCAT software.

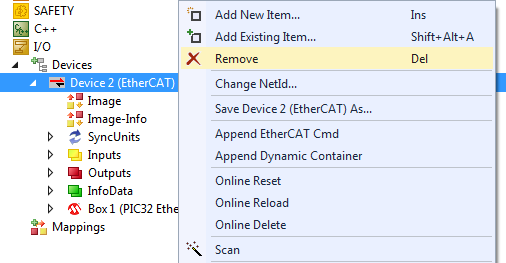
# Appendix C

This appendix shows how to scan EtherCAT Slaves

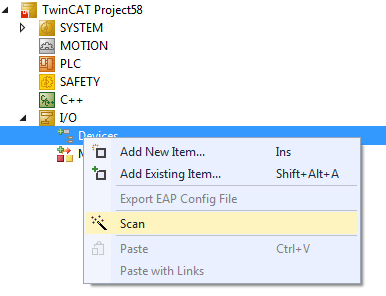
## Scan EtherCAT Slaves

To scan EtherCAT Slaves,

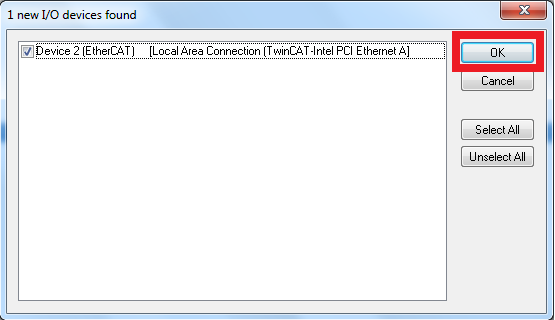
1. Connect Port 0 of the device to master using RJ45 Ethernet cable then power up the board. The Link/Act LED should be ON at Port 0 when the cable is present. If the Link/Act LED is not ON, it indicates there is an issue with the connection or cable.
2. If any devices are present, delete them accordingly by right clicking the device and selecting “Remove” as shown below. If no devices are present in the solution explorer then skip is step.



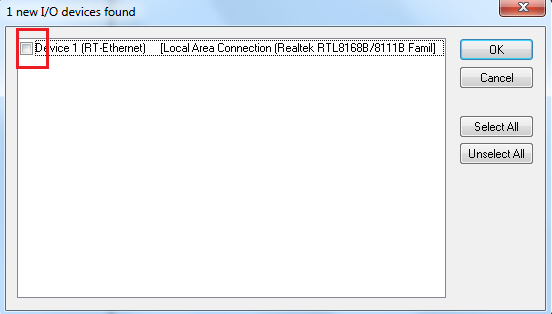
3. Scan for EtherCAT® slave devices by right clicking “Devices” and selecting “Scan” as shown below



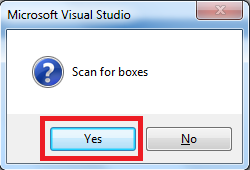
4. Click to OK to continue scanning

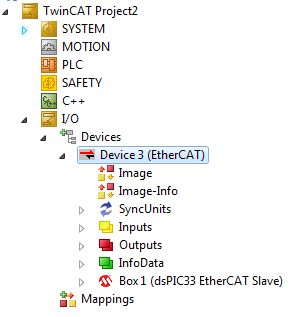


5. If the check box is not checked as shown below then either the device is not functional or driver is not installed properly.



6. Click Yes to choose to scan for boxes





7. After a successful scan, there will be an activity on Link/Act LED at Port 0.

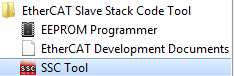
# Appendix D

This appendix shows how to generate [SSC](http://www.ethercat.in/en/products/54FA3235E29643BC805BDD807DF199DE.htm) files

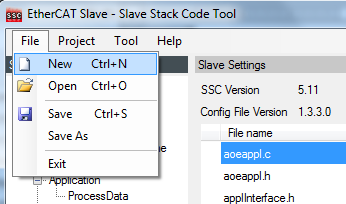
## How to generate SSC files

To generate SSC files, do the following:

1. Start the SSC Tool(Version 5.11) from the start menu, as shown below

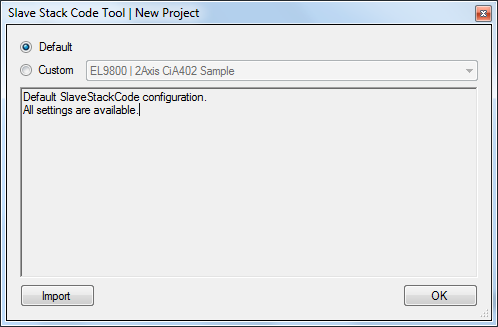


1. In the menu bar, click “File” and then “New” to continue

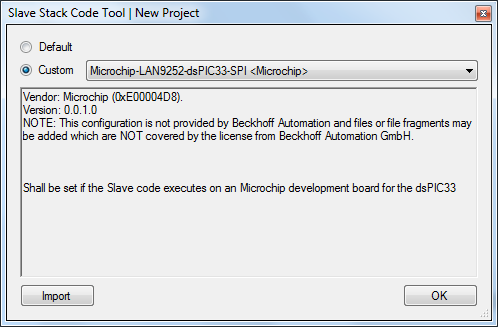


1. Click “Import” to import the SSC Tool configuration file “Microchip\_LAN9252\_dsPIC33\_SSC\_Config.xml” from the directory

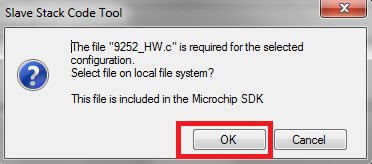
“{SDK\_INSTALL\_PATH}/ LAN9252-dsPIC33-SDK-Vx.x/”

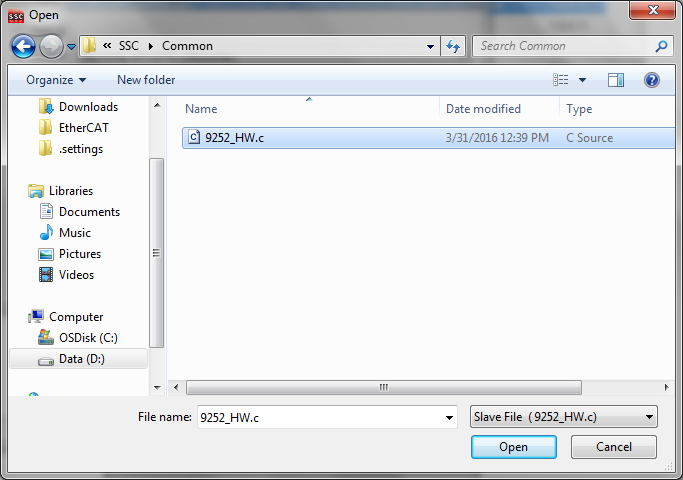


1. After selecting the file, click “Open” to import the SSC Tool configuration file.
2. Once imported, check the “Custom” drop-down box, select “Microchip-LAN9252-dsPIC33-SPI” configuration and then click “OK”.



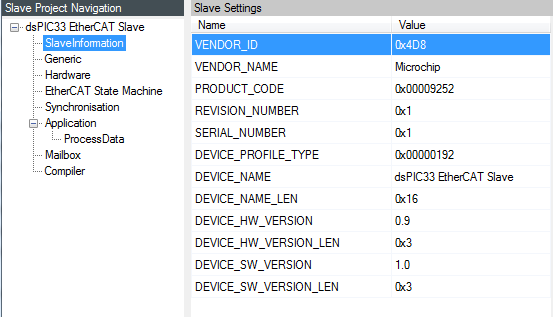
1. After selecting the configuration SSC will prompt for “9252\_HW.c” file. Click “OK” and choose “9252\_HW.c” file from “{SDK\_INSTALL\_PATH}/ LAN9252-dsPIC33-SDK-Vx.x / SSC /Common”.



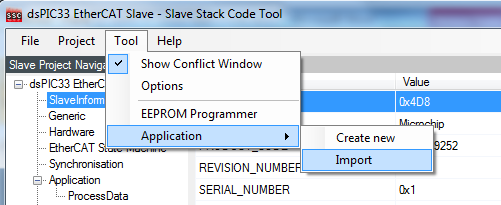


1. All listed parameters under “Slave Information” tab can be changed as shown below

**Note**: By default, SDK ESI files have an object configuration with Microchip Vendor ID**.**

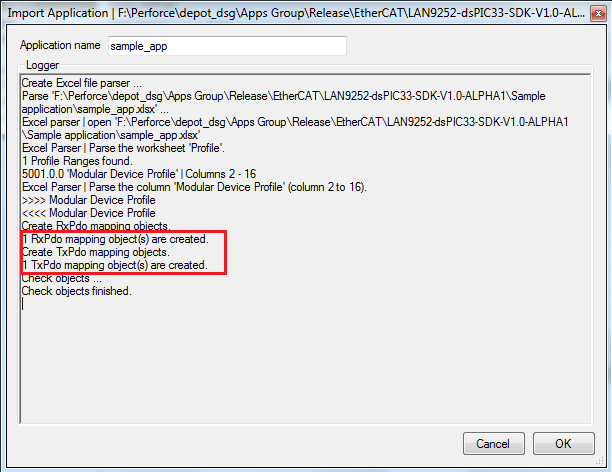


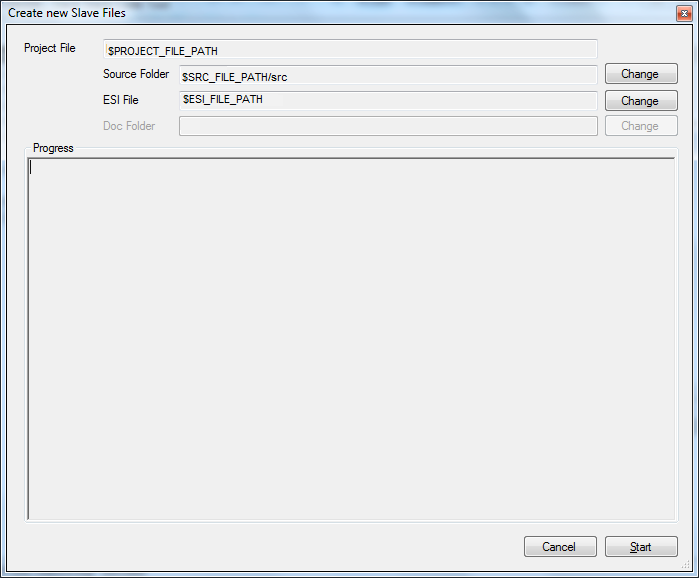
1. Click “Import” option under “Tool- >Application” menu bar.



1. Select the file “sample\_app.xlsx” which can be found in the directory “{SDK\_INSTALL\_PATH}/ LAN9252-dsPIC33-SDK-Vx.x / Sample application”

“sample\_app.xlsx” is an object file which contains the information about application objects.

1. Once the file is selected, status message will be displayed as shown below. Then click OK to continue. 
2. Click the “Project” drop-down menu in the tool bar and select “Create New Slave Files”. The pop-up window

**Note:**

$PROJECT\_FILE\_PATH – The location where the SSC project file is saved.

$SRC\_FILE\_PATH – Default path is $PROJECT\_FILE\_PATH. It can be changed by

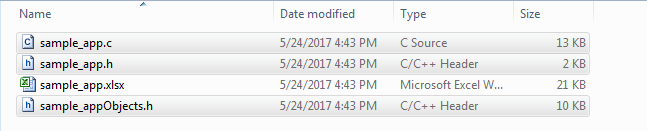
clicking “Change” button in pop up.

$ESI\_FILE\_PATH – Default path is $PROJECT\_FILE\_PATH. It can be changed by

clicking “Change” button in pop up

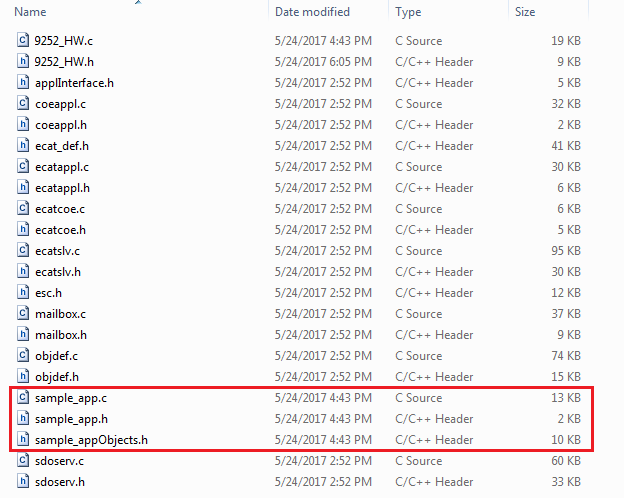
1. Click the “Start” button to create a new project file, Src folder, and ESI file (Slave Information file) in the desired directory path.
2. A pop-up window will indicate that the files have been successfully created. Click “OK” to continue.
3. Along with generated new slave files, ESI file (.xml file) also will be generated. This ESI file will have information about new Vendor ID and object configuration. Program this ESI file into EEPROM as mentioned in [Appendix B](#_Appendix_B).
4. Replace the generated application files in Src folder with SDK application files as shown below.

SDK Application files can be found in “Sample application”.



1. Application files would be named as “sample\_app”.

Because in this demo, input object file is given as “sample\_app.xlsx”.



.

1. Browse to the directory where the new files were created, as shown in the example:

Src (Folder): This folder contains the Beckhoff Slave Stack code.

dsPIC33 EtherCAT Slave (ESP): This is the SSC Tool project file.

dsPIC33 EtherCAT Slave (XML): This is the EtherCAT® slave information file

that must be used as an input to the EtherCAT master tool to configure

EtherCAT® slave controllers.

.

1. Copy all the files inside the **Src** folder to the following directory:

“{SDK\_INSTALL\_PATH}/ LAN9252-dsPIC33-SDK-VX.X /SSC/Common”

**Note:** Why replace is required?

Generated application files will not have the code for modifying the Output Counter. Modifying Output Counter based on Input trigger value is the sample application provided in delivered SDK application files. So it is required to avail the demo application.

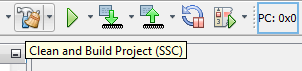
# Appendix E

This appendix shows how to compile and program SOC firmware

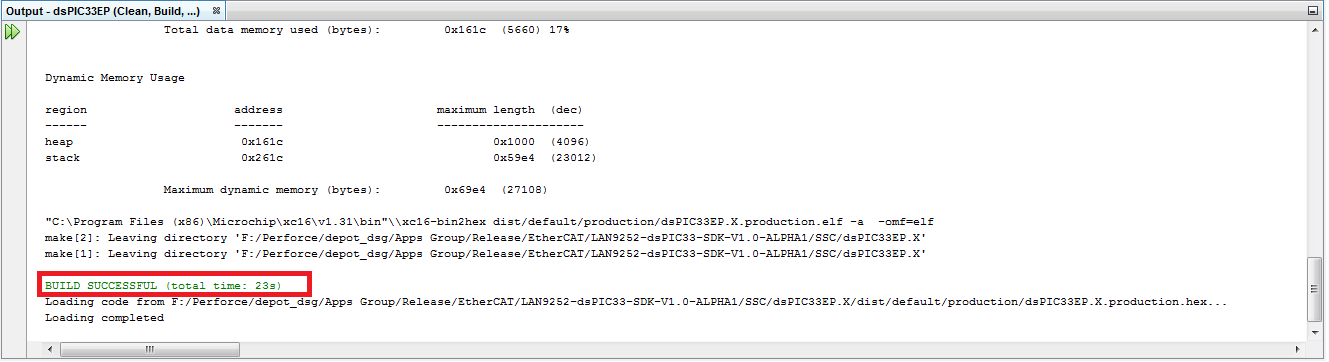
## Compiling and Programming SoC Firmware

To compile and program SOC firmware,

1. Open the MPLAB IDE and import the SSC project into the IDE. MPLAB Project file is located under “{SDK\_INSTALL\_PATH}/ LAN9252-dsPIC33-SDK-VX.X /SSC/”.
2. Compile the source code as shown below



1. If the compilation is successful, the output window will display “BUILD SUCCESSFUL” as shown below.



1. Before initiating the firmware download, ensure the debugger/programmer is connected to the EVB’s JTAG pins. (This demo project is debugged with the MPLAB Real ICE debugger/programmer)
2. To program the dsPIC33 SoC, click the “Make and Program Device Main Project” button.



1. To debug the dsPIC33 SoC, click “Debug Main Project” button.



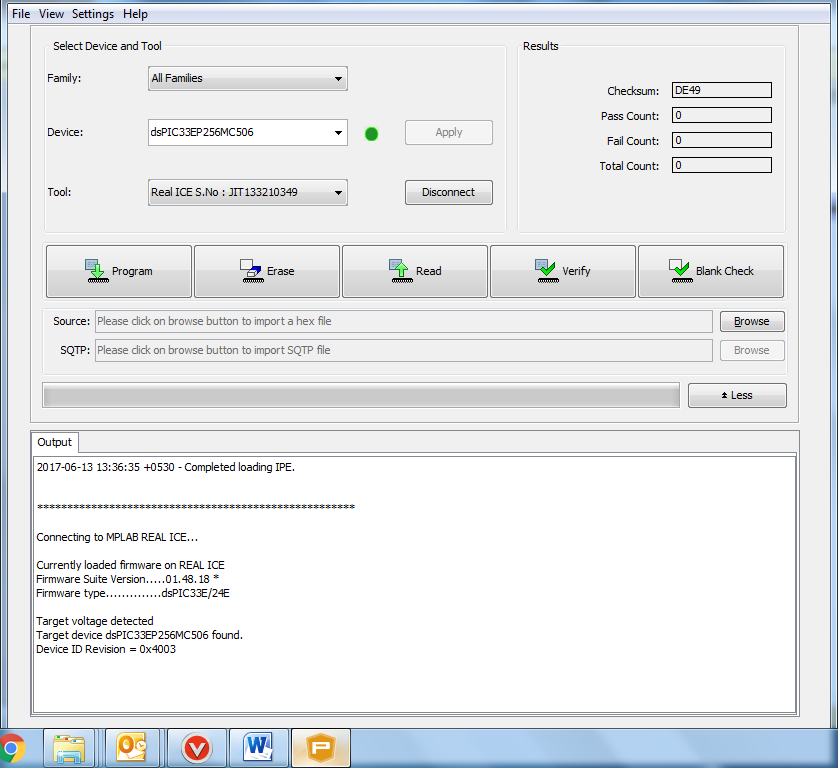
# Appendix F

## ****Programming the dsPIC33 Firmware using pre built binaries****

1. Download and Install MPLAB IPE V X.X from the following link

<http://microchip.wikidot.com/ipe:installation>

1. Before initiating the firmware download, ensure the debugger/programmer is connected to the EVB’s JTAG pins.
2. Open the MPLAB IPE and choose the corresponding device in “Device” drop down box and click “Apply” as shown below.



1. Choose the debugger/programmer in “Tool” drop down box and Click “Connect”.
2. Click “browse” available under the “Source” option and select the hex files which can be found in the “Binaries” directory of “LAN9252-dsPIC33-SDK V X.X”.
3. Once the hex files are loaded, click “Program”.