



EVB-LAN9252 Quick Start Guide


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REV	DATE	ORIGINATOR	DESCRIPTION OF CHANGE
1.0	6/24/2015	VishnuP	SDK release 1.0
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1 Introduction

The scope of this document is to describe the EVB-LAN9252-DIGIO quick setup which supports a Digital I/O PDI Interface and the EVB-LAN9252-HBI quick setup which supports a HBI/SPI+GPIO Interface.

1.1 Abbreviations

IDE - Integrated Development Environment

ESC - EtherCAT® Slave Controller

EVB - Engineering Validation Board

HAL - Hardware Abstraction Layer

HBI - Host Bus Interface

SPI - Serial Protocol Interface

SSC - Slave Stack Code

2 Legal Information

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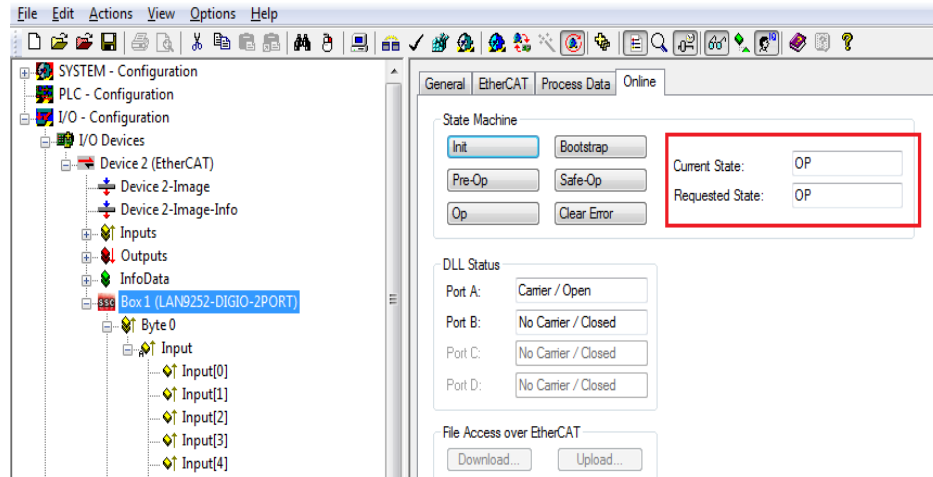
3 EVB-LAN9252-DIGIO

3.1 Master Configuration

1. Refer “Appendix A” to configure TwinCAT in windows.
2. Download and Extract “LAN9252-PIC32_SDK_Vx.x.zip” from Microchip website.(Note : Vx.x denotes the version number of the SDK)
3. In SDK, “\ESI Files” directory contains the ESI files which can be loaded to LAN9252 EEPROM using TwinCAT.

 Dig_8IN_8OUT	7/17/2014 12:53 PM	XML Document	4 KB
 Dig_BIDIR	7/11/2014 3:14 PM	XML Document	16 KB
 Indexed_8	4/21/2015 4:05 PM	XML Document	48 KB
 Indexed_16	4/21/2015 4:06 PM	XML Document	48 KB
 Multiplexed_Dual_8	4/21/2015 4:05 PM	XML Document	48 KB
 Multiplexed_Dual_16	4/21/2015 4:04 PM	XML Document	48 KB
 Multiplexed_Single_16	4/21/2015 4:03 PM	XML Document	48 KB
 SPI-withGPIO-2PortMode	4/21/2015 4:06 PM	XML Document	48 KB

4. Digital IO ESI files
Dig_8IN_8OUT.xml - Configures LAN9252 in DIG-IO with 8 pins as input and 8 pins as output.
Dig_BIDIR.xml - Configures LAN9252 in DIG-IO bidirectional mode.
5. Copy Digital-IO ESI files to the directory path
“C:\TwinCAT\Io\EtherCAT” then launch TwinCAT system manager.
6. Launch TwinCAT and scan EtherCAT slaves from TwinCAT. Refer Appendix C to scan the slaves.
7. Program “9252 8 Ch. Dig. In-/Output 2xMII (No DC)” EEPROM configuration. Refer Appendix B for EEPROM programming. If the EEPROM is programmed successfully, the device state will enter into ‘OP’ mode as shown below.

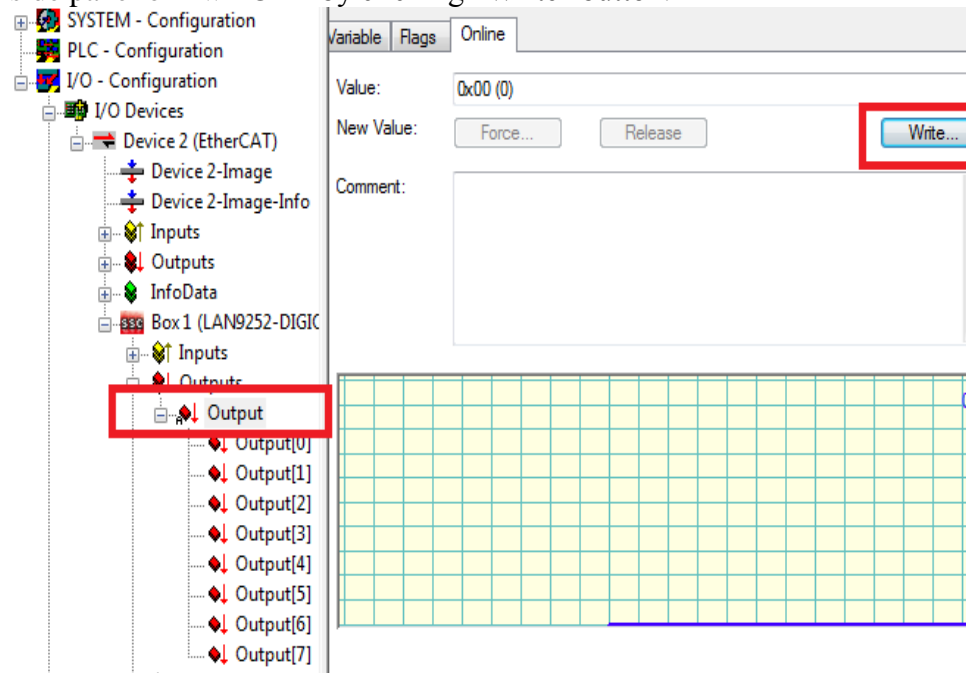


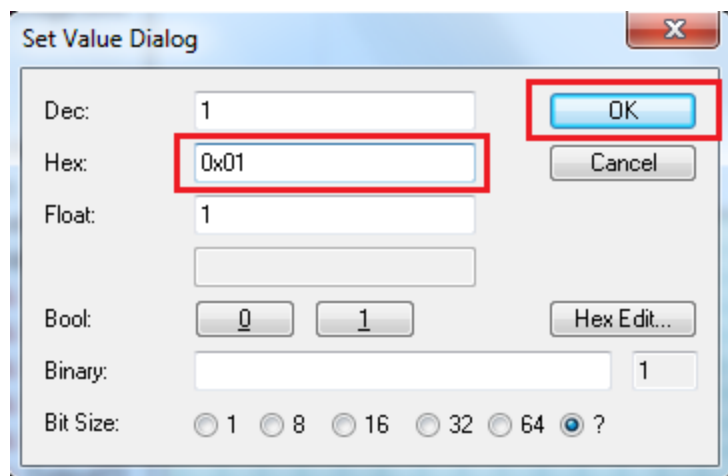
If it changes to OP mode as highlighted above, then the device is in operational state. Otherwise there is an issue with the setup.

3.2 DIGIO Demo

3.2.1 DIGIO Outputs

1. Follow the steps as mentioned in the Section 3.1 to configure the master.
2. Click on the “Output” as highlighted below and then write values on the right side panel of TwinCAT by clicking “Write” button.

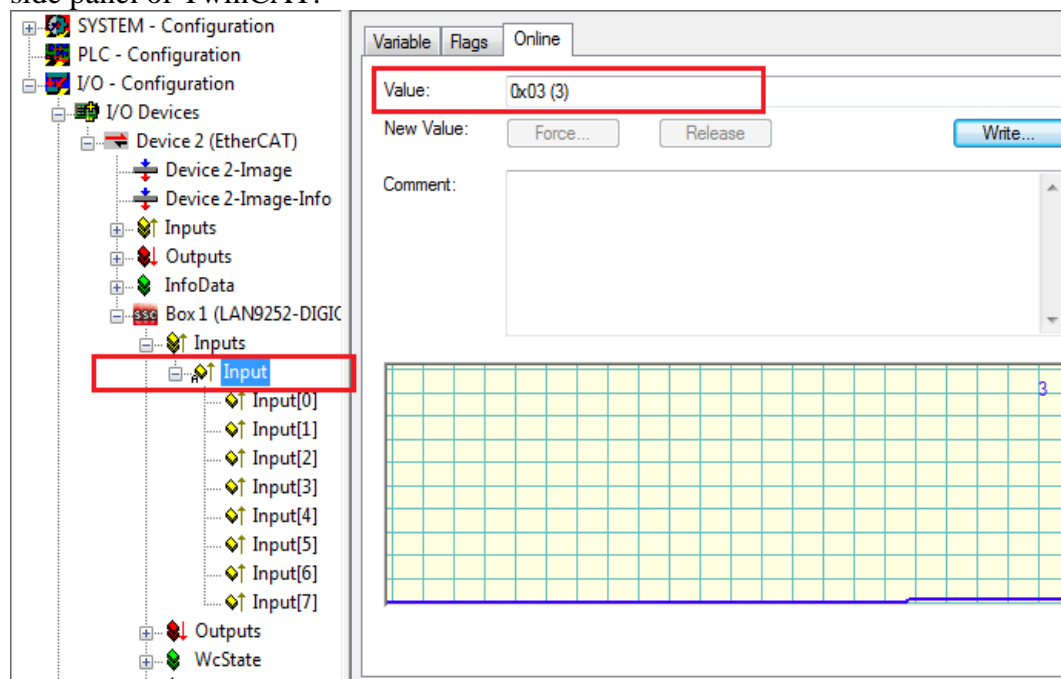




3. Once the values are written corresponding DIGIO LED's should get change to ON/OFF state.

3.2.2 DIGIO Inputs

1. Follow the steps as mentioned in the Section 3.1 to configure the master.
2. Click on the "Input" as highlighted below and then read values on the right side panel of TwinCAT.



3. Change the state of the switch(SW4) to ON/OFF then the values will be displayed accordingly in TwinCAT as highlighted above.









4 EVB-LAN9252-HBI

4.1 LAN9252-HBI

4.1.1 Master Configuration

1. Refer “Appendix A” to configure TwinCAT in windows.
2. Download and Extract “LAN9252-PIC32_SDK_Vx.x.zip” from Microchip website.(Note : Vx.x denotes the version number of the SDK)
3. In SDK, “\ESI Files” directory contains the ESI files which can be loaded to LAN9252 EEPROM using TwinCAT.

S

 Dig_8IN_8OUT	7/17/2014 12:53 PM	XML Document	4 KB
 Dig_BIDIR	7/11/2014 3:14 PM	XML Document	16 KB
 Indexed_8	4/21/2015 4:05 PM	XML Document	48 KB
 Indexed_16	4/21/2015 4:06 PM	XML Document	48 KB
 Multiplexed_Dual_8	4/21/2015 4:05 PM	XML Document	48 KB
 Multiplexed_Dual_16	4/21/2015 4:04 PM	XML Document	48 KB
 Multiplexed_Single_16	4/21/2015 4:03 PM	XML Document	48 KB
 SPI-withGPIO-2PortMode	4/21/2015 4:06 PM	XML Document	48 KB

4. HBI ESI files

Indexed_16.xml - Configures LAN9252 in HBI - Indexed 16 bit mode.

Indexed_8.xml - Configures LAN9252 in HBI - Indexed 8 bit mode.

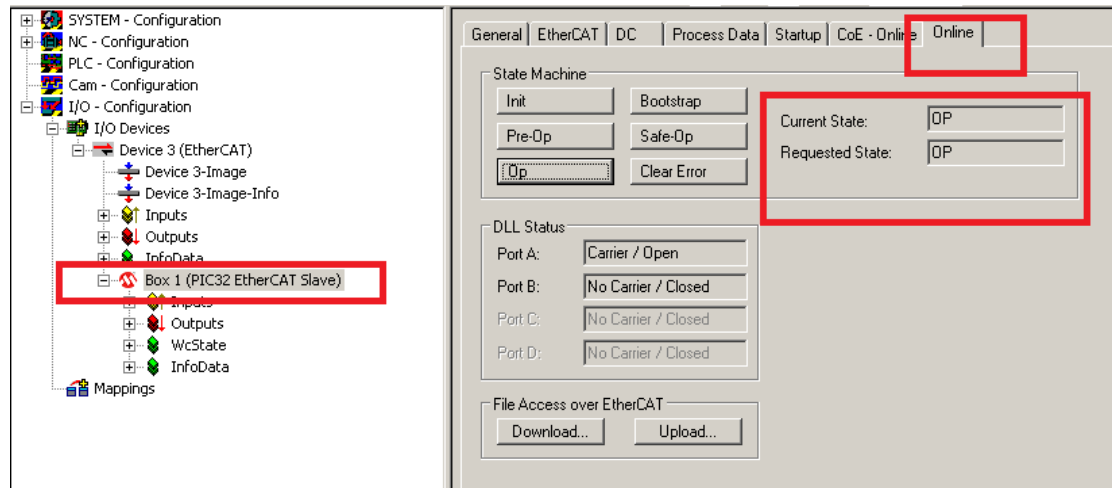
Multiplexed_Dual_16.xml - Configures LAN9252 in HBI - Multiplexed dual phase 16 bit mode.

Multiplexed_Dual_8.xml - Configures LAN9252 in HBI - Multiplexed dual phase 8 bit mode.

Multiplexed_Single_16.xml - Configures LAN9252 in HBI - Multiplexed single phase 16 bit mode.

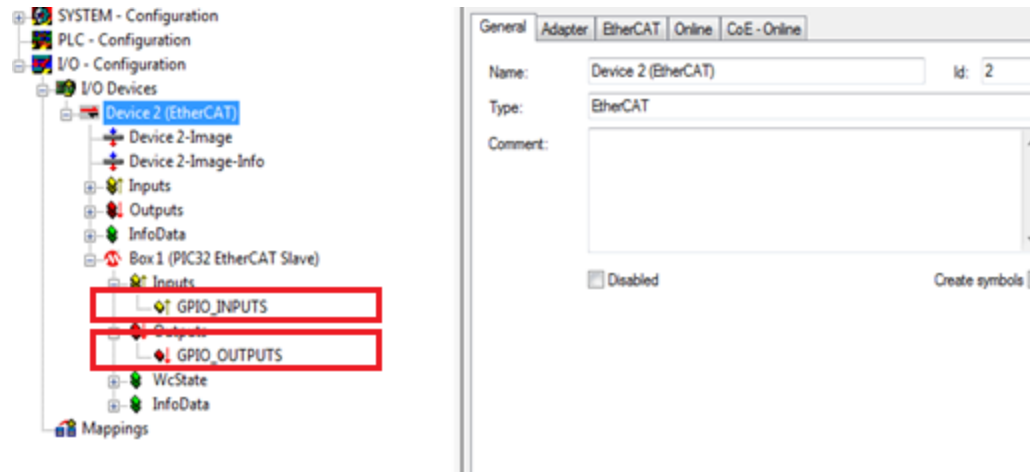
Note: Refer Appendix D to change the Vendor ID and slave information's in ESI files.

5. Copy Multiplexed_Single_16.xml to the directory path
“C:\TwinCAT\Io\EtherCAT” then launch TwinCAT system manager.
 6. By default, corresponding ESI file of PIC32 firmware is flashed to the delivered LAN9252 EVB. To change the firmware in PIC32 SOC, refer “EVB-LAN9252-HBI-SPI-SQI-GPIO EtherCAT User's Guide.pdf” from Microchip website and also refer Appendix D.
- Note: The pre-built binaries (Microchip Vendor ID with default sample application for different modes) are available at “Binaries” directory from SDK 1.1 release onwards. This step can be skipped if pre-built binary is used for programming.**
7. Launch TwinCAT and scan EtherCAT slaves from TwinCAT. Refer Appendix C to scan the slaves.
 8. Program “Multiplexed_Single_16” EEPROM configuration. Refer Appendix before EEPROM programming. If the EEPROM is programmed successfully, the device state will enter into ‘OP’ mode as shown below.
 9. Once the EEPROM programming is successful, state will change to OP mode. If it changes to OP mode, then the device is in operational state. Otherwise there is an issue with the setup.



4.1.2 Demo

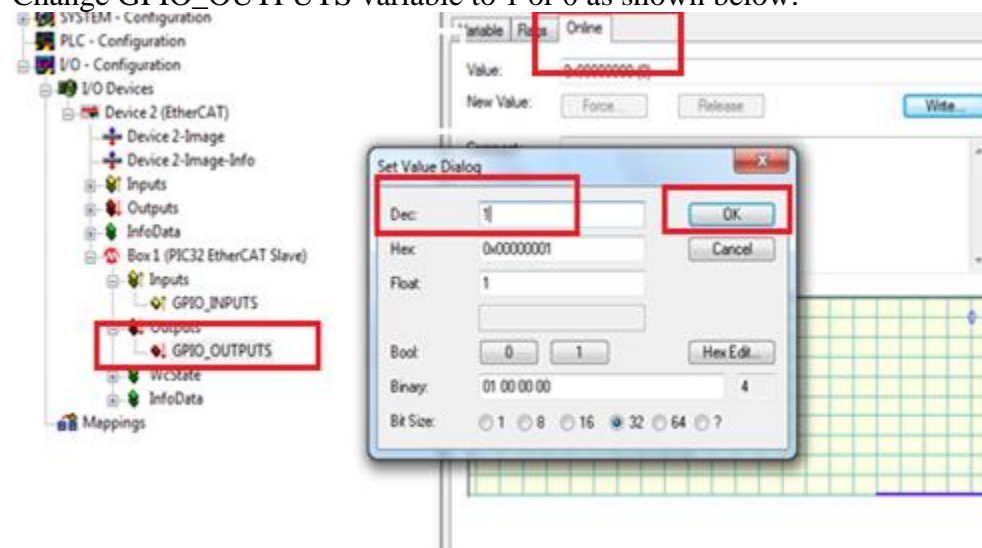
1. Follow the steps as provided in section 4.1.1. Two demo objects can be seen on the left side panel of the TwinCAT as shown below.



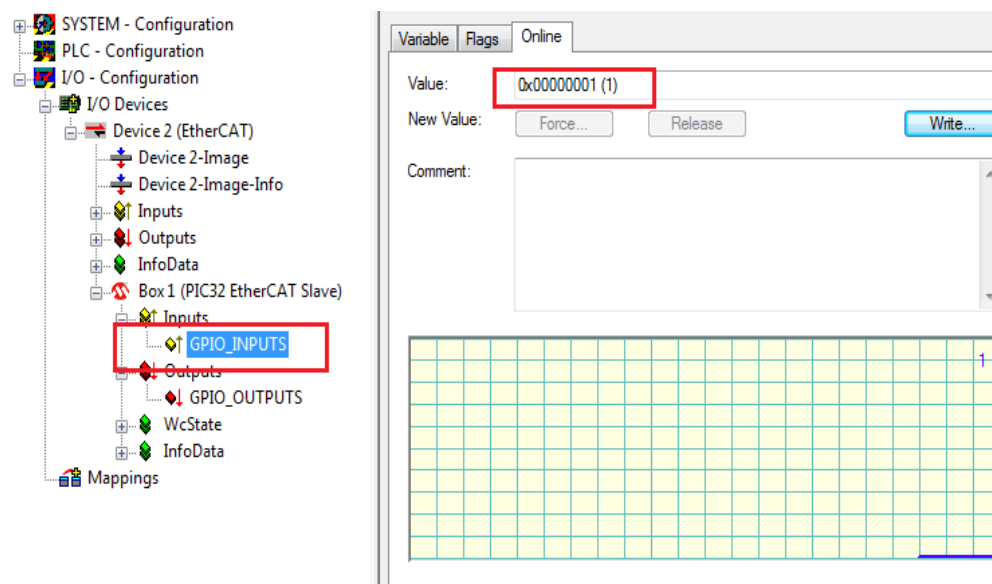
- As part of this demo, two object variables GPIO_INPUTS and GPIO_OUTPUTS are mapped to PIC32 GPIO's as mentioned below.

GPIO_OUTPUTS	PIC32 RD2
GPIO_INPUTS	PIC32 RD3

- Interconnect RD2 and RD3 hardware pins for demo purpose.
- Change GPIO_OUTPUTS variable to 1 or 0 as shown below.



Same value will be reflected in GPIO_INPUTS variable.



4.2 LAN9252-SPI

4.2.1 Master Configuration

1. Refer “Appendix A” to configure TwinCAT in windows.
2. Download and Extract “LAN9252-PIC32_SDK_Vx.x.zip” from Microchip website.(Note : Vx.x denotes the version number of the SDK)
3. In SDK, “\ESI Files” directory contains the ESI files which can be loaded to LAN9252 EEPROM using TwinCAT.

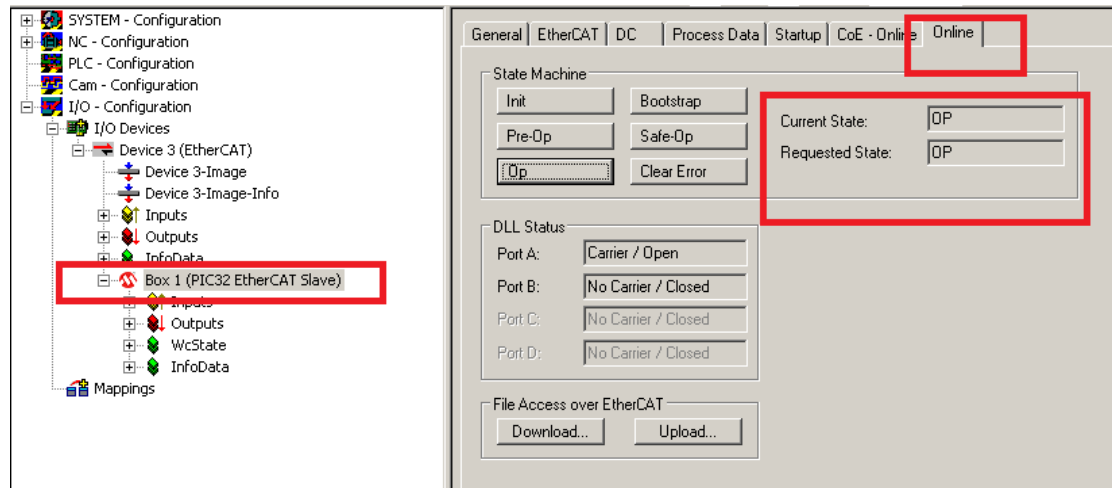
Dig_8IN_8OUT	7/17/2014 12:53 PM	XML Document	4 KB
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Multiplexed_Dual_16	4/21/2015 4:04 PM	XML Document	48 KB
Multiplexed_Single_16	4/21/2015 4:03 PM	XML Document	48 KB
SPI-withGPIO-2PortMode	4/21/2015 4:06 PM	XML Document	48 KB

4. SPI ESI files

SPI-withGPIO-2PortMode.xml	Configures LAN9252 in SPI with GPIO - 2 port mode.
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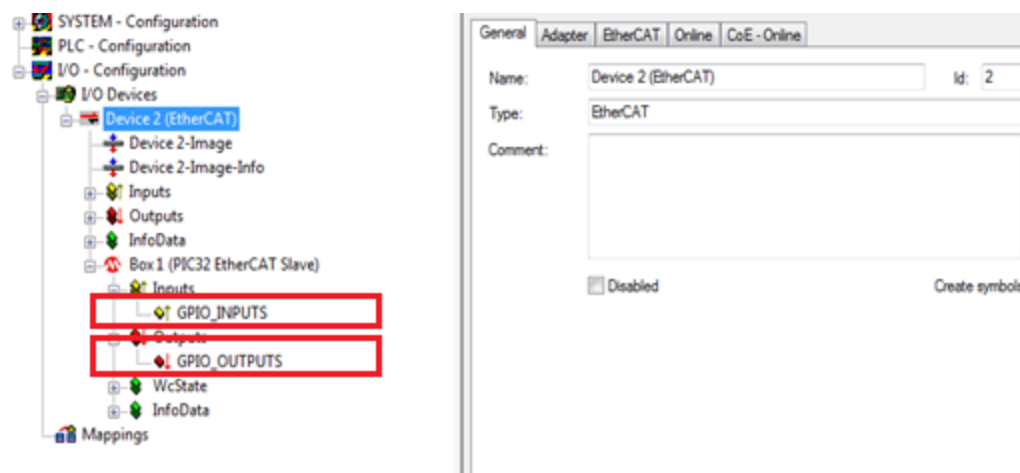
Note: Refer Appendix D to change the Vendor ID and slave information’s in ESI files.

5. Copy SPI-withGPIO-2PortMode.xml to the directory path “C:\TwinCAT\Io\EtherCAT” then launch TwinCAT system manager.
 6. By default, corresponding ESI file of PIC32 firmware is flashed to the delivered LAN9252 EVB. To change the firmware in PIC32 SOC, refer “EVB-LAN9252-HBI-SPI-SQI-GPIO EtherCAT User's Guide.pdf” from Microchip website and also refer Appendix D.
- Note: The pre-built binaries (Microchip Vendor ID with default sample application for different modes) are available at “Binaries” directory from SDK 1.1 release onwards. This step can be skipped if pre-built binary is used for programming.**
7. Launch TwinCAT and scan EtherCAT slaves from TwinCAT. Refer Appendix C to scan the slaves.
 8. Program “SPI-withGPIO-2PortMode” EEPROM configuration. Refer Appendix B for EEPROM programming. If the EEPROM is programmed successfully, the device state will enter into ‘OP’ mode as shown below.
 9. Once the EEPROM programming is successful, state will change to OP mode. If it changes to OP mode, then the device is in operational state. Otherwise there is an issue with the setup.



4.2.2 Demo

1. Follow the steps as provided in section 4.2.1. Two demo objects can be seen on the left side panel of the TwinCAT as shown below.

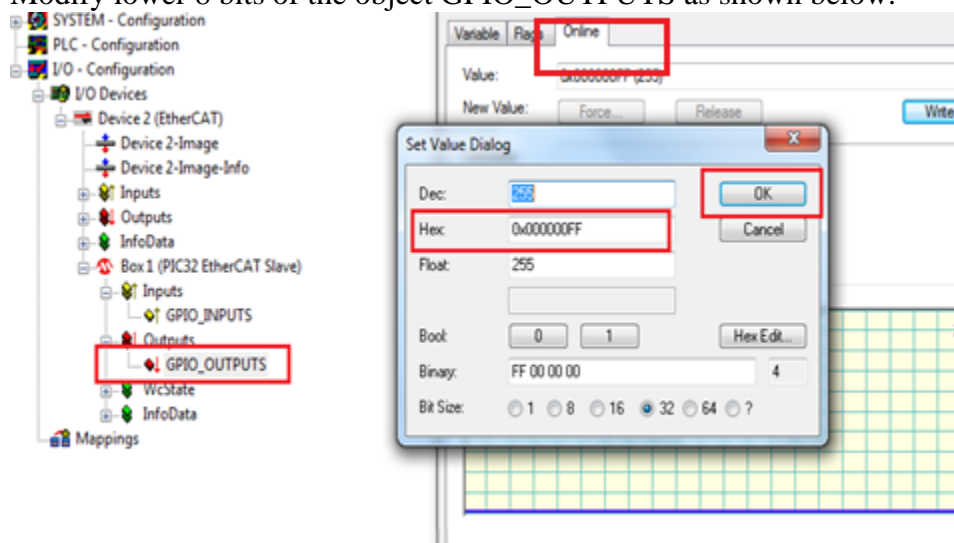


- As part of this demo, two object variables GPIO_INPUTS and GPIO_OUTPUTS are mapped to LAN9252 GPIO's as mentioned below.

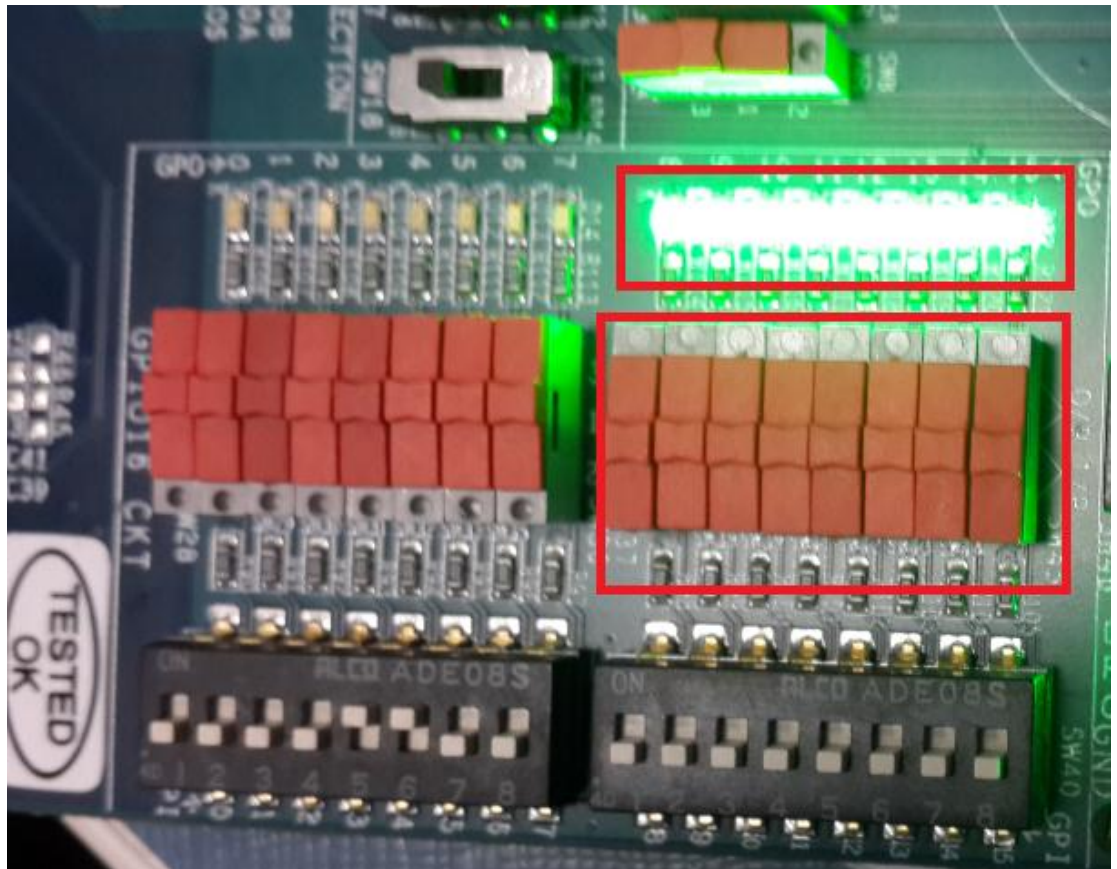
GPIO_OUTPUTS	LAN9252 GPIO[15:8]
GPIO_INPUTS	LAN9252 GPIO[7:0]

4.2.2.1 Outputs

Modify lower 8 bits of the object GPIO_OUTPUTS as shown below.

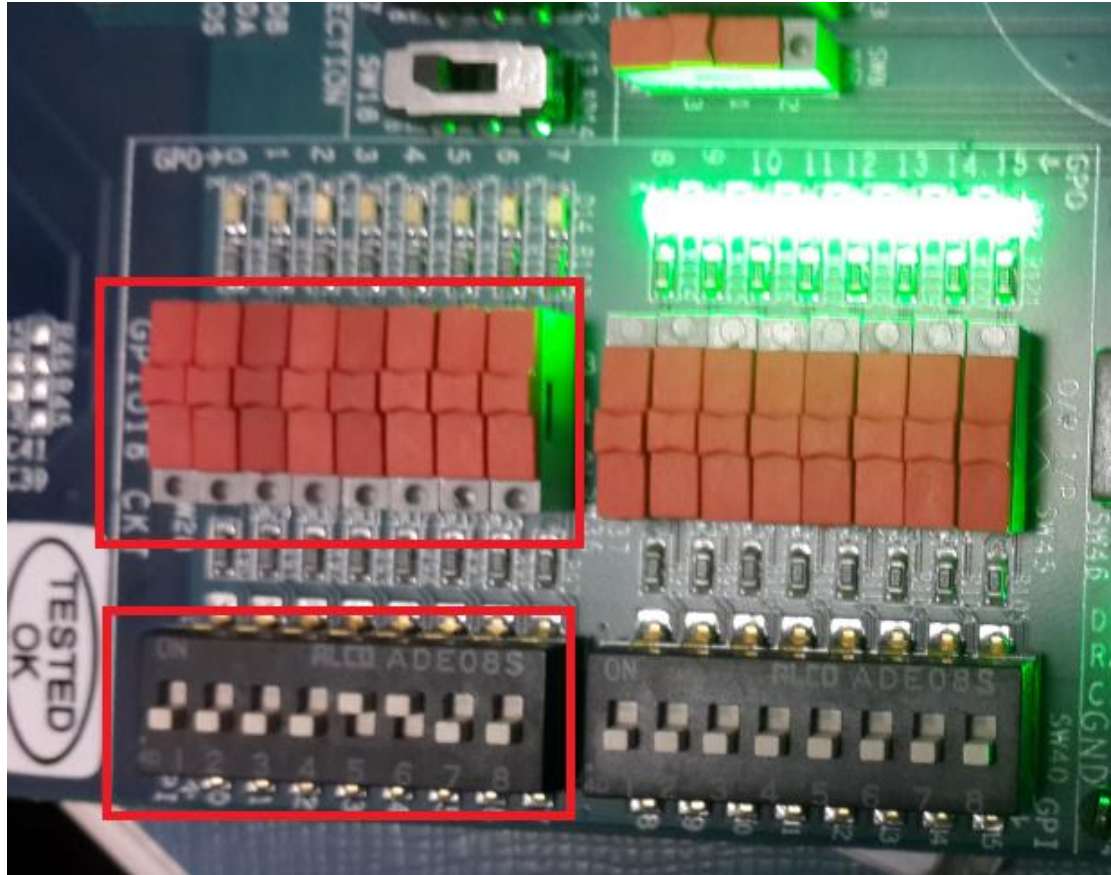


Once the variable is modified in the TwinCAT, corresponding LED's should be ON state in LAN9252 EVB as shown below.

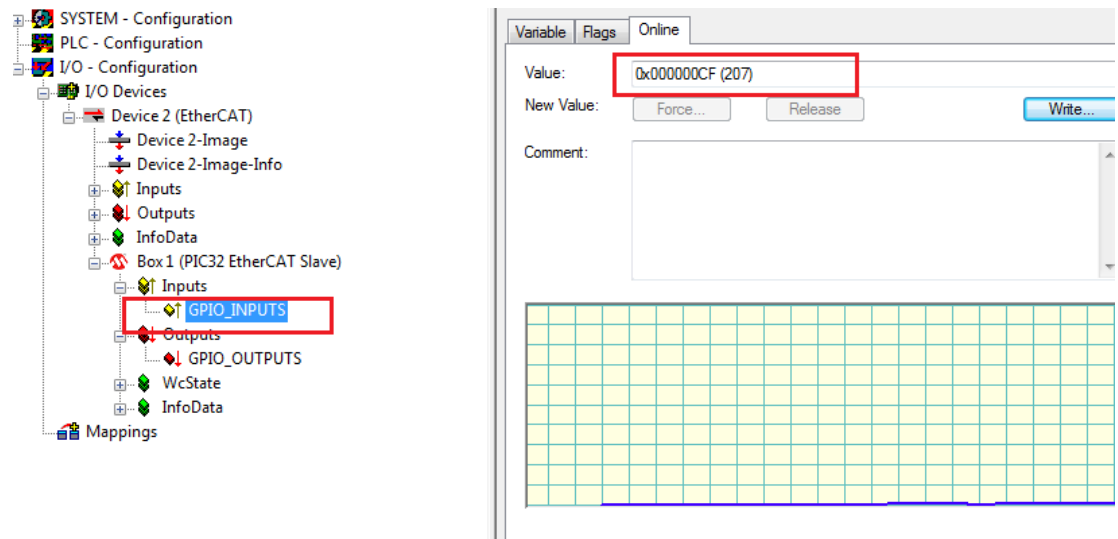


4.2.2.2 Inputs

Change the state of the switch(SW34) to ON/OFF as highlighted below



Once the switch states are modified in the EVB, corresponding values should get change in the TwinCAT as shown below.



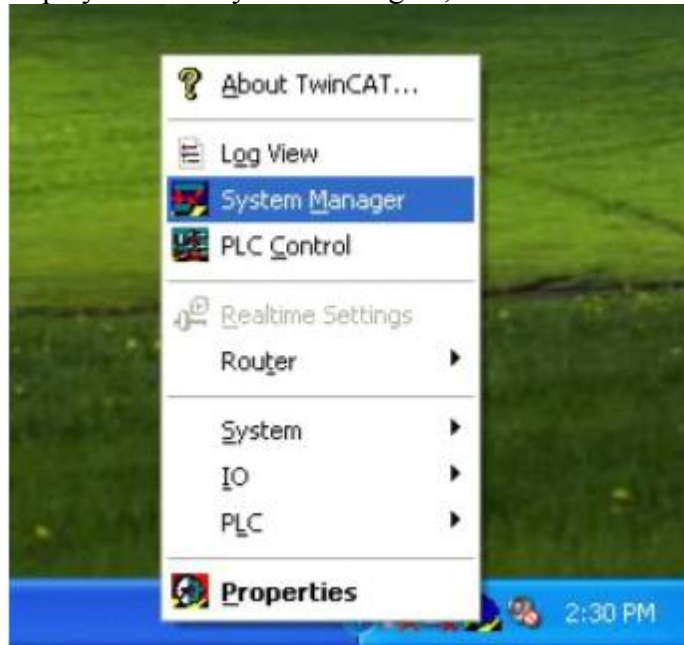
5 Appendix A

5.1.1 Setting up Master in windows

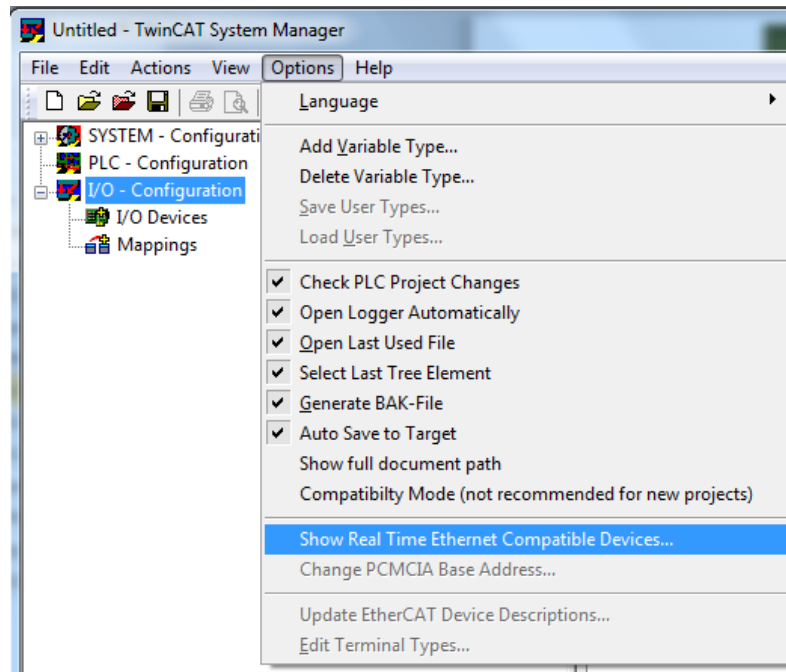
Download and Install TwinCAT on windows from “<http://beckhoff.com/>”.

5.1.1.1 TwinCAT Ethernet Driver – Installation

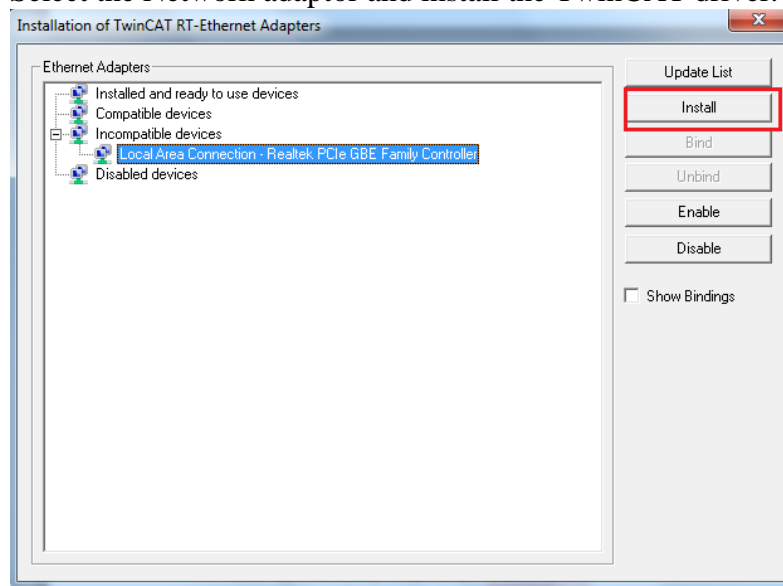
1. If TwinCAT installed successfully, a TwinCAT icon will be shown in the bottom-right corner of the desktop. After clicking the icon, a pop-up list will display. Select “System Manager”, as shown below.



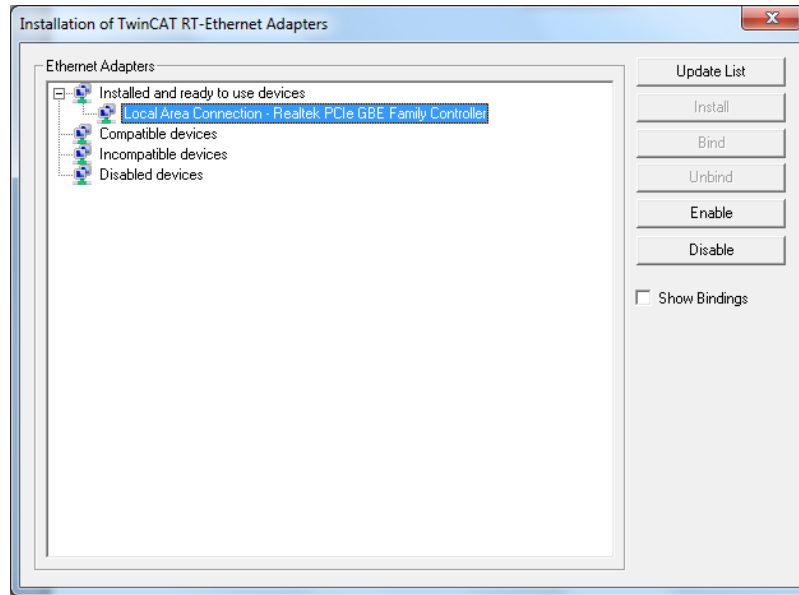
2. Go to “Options->Show Real Time Ethernet Compatible Devices...”



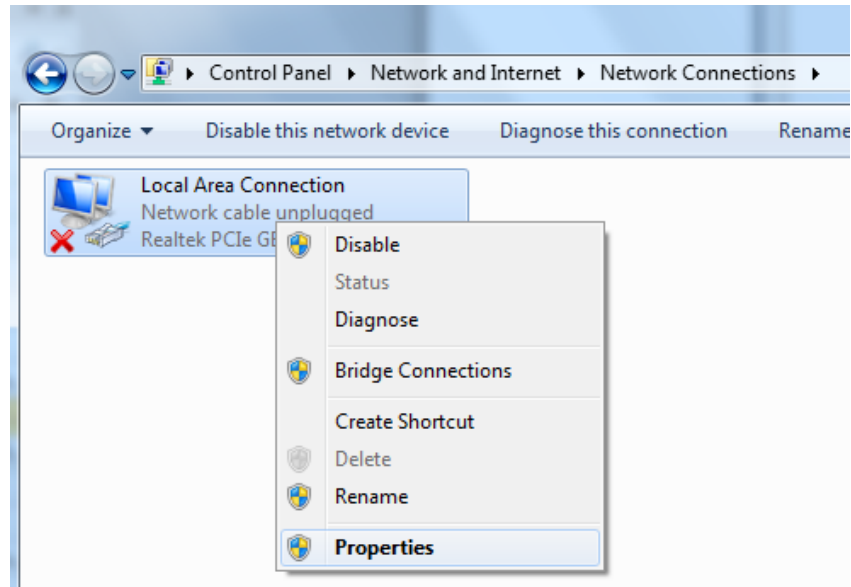
3. Select the Network adaptor and install the TwinCAT driver.

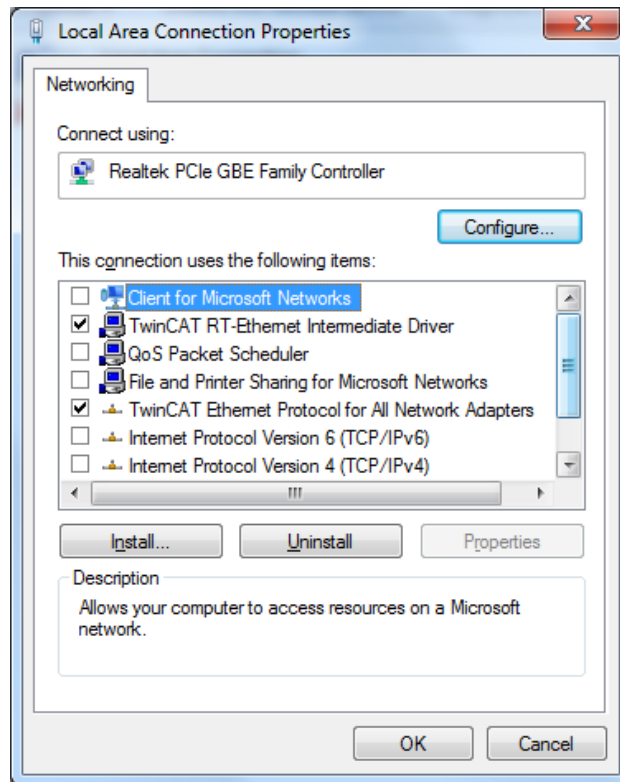


4. Once the TwinCAT driver is installed successfully, the driver is compatible with the TwinCAT master. Now the network adaptor will be moved to “Installed and ready to use devices” as shown below.



5. Go to corresponding network adaptor properties and then select TwinCAT drivers as shown below.





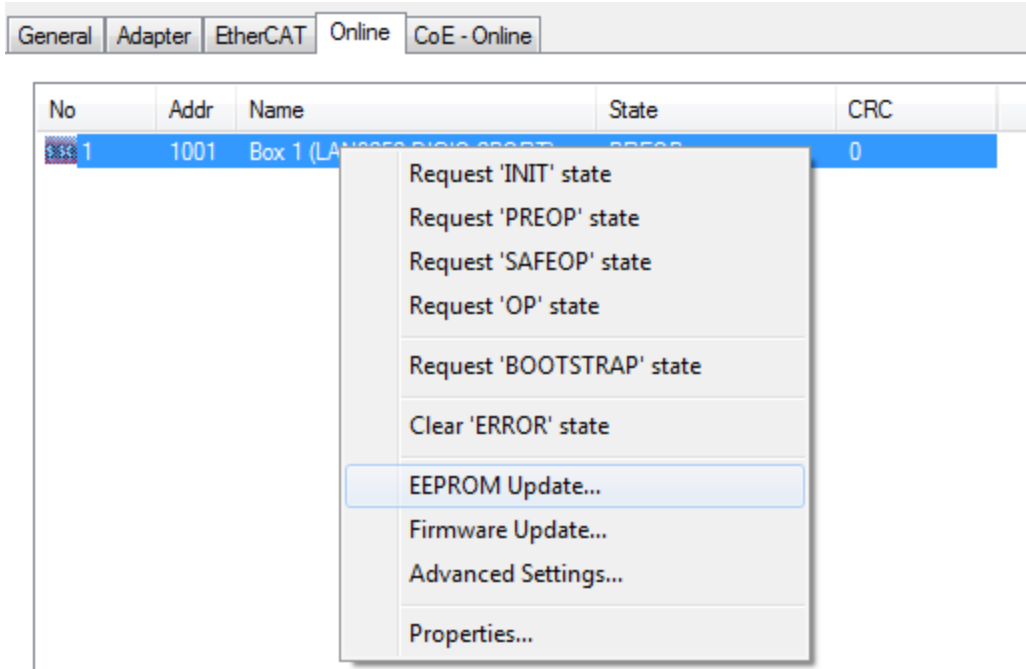
Note: Only Select TwinCAT drivers.

If the TwinCAT cannot find the ethercat slaves after following the steps in Appendix C, restart the computer and attempt for scanning again.

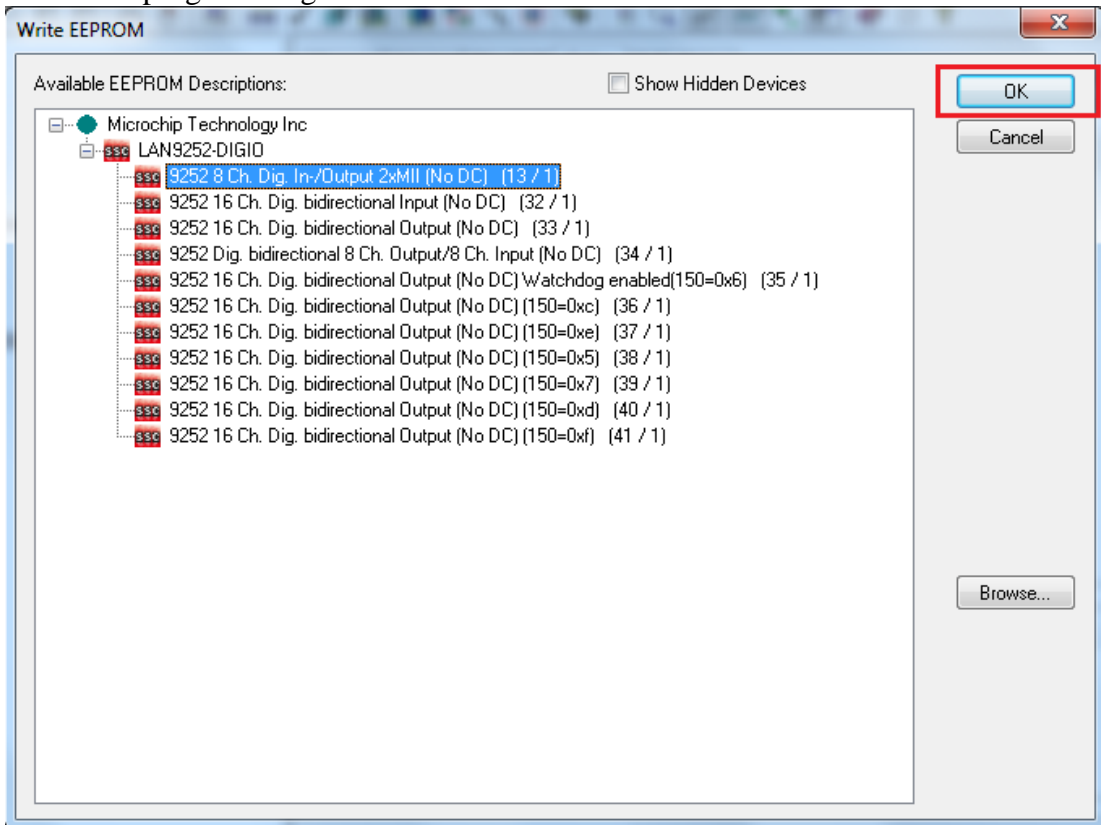
6 Appendix B

6.1 EEPROM Programming

After a successful scan, click the “Device 2 (EtherCAT)” drop down bar on the left panel of the TwinCAT tool (as highlighted in Figure 3-4). Then click the “Online” tab on the right-side panel of the TwinCAT tool, as shown in Figure 3-5. Right click the LAN9252 listing and select “EEPROM Update” from the contextual menu.



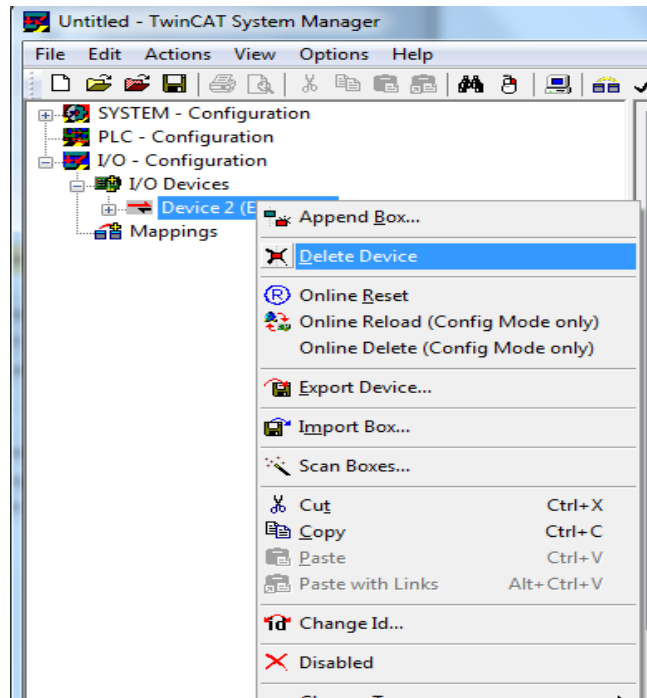
2. Upon selecting “EEPROM Update”, the Write EEPROM window will open. Choose corresponding EEPROM configuration then Click the “OK” button to initiate EEPROM programming.



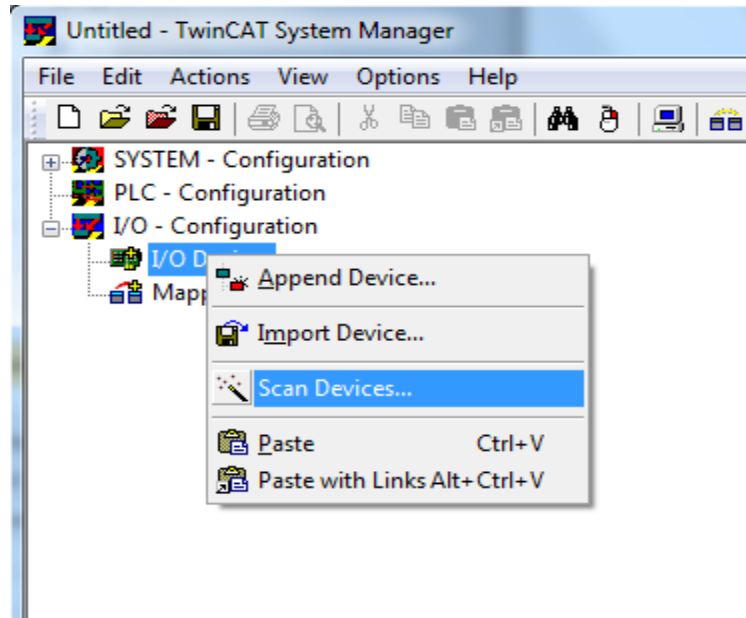
7 Appendix C

7.1 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 clicking the device and selecting “Delete Device” as shown below



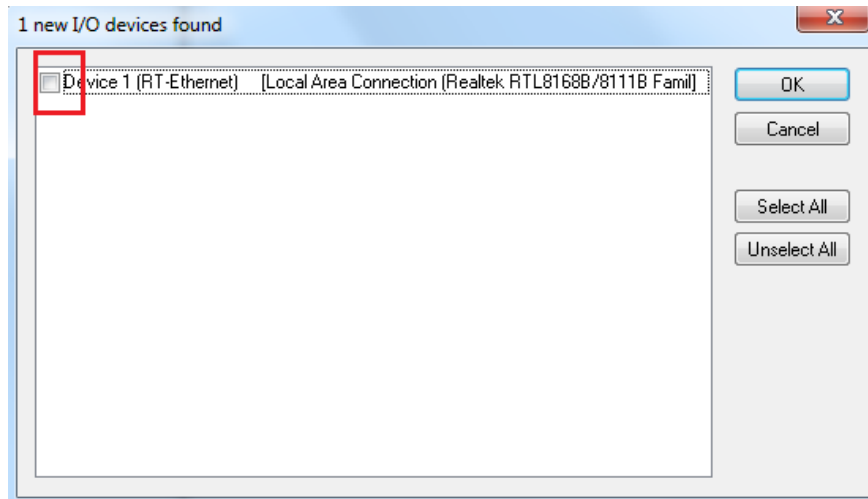
3. Scan for EtherCAT® slave devices by clicking “I/O devices” and selecting “Scan Devices” as shown below



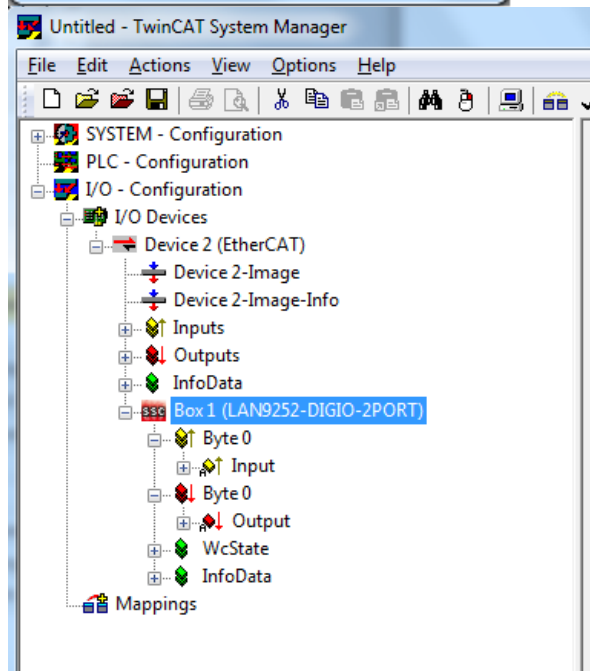
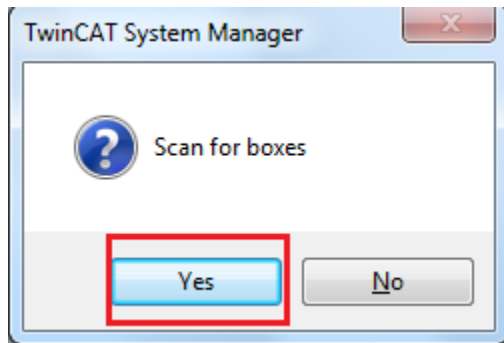
4. Click to OK to continue scanning



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



Click Yes to choose to scan for boxes



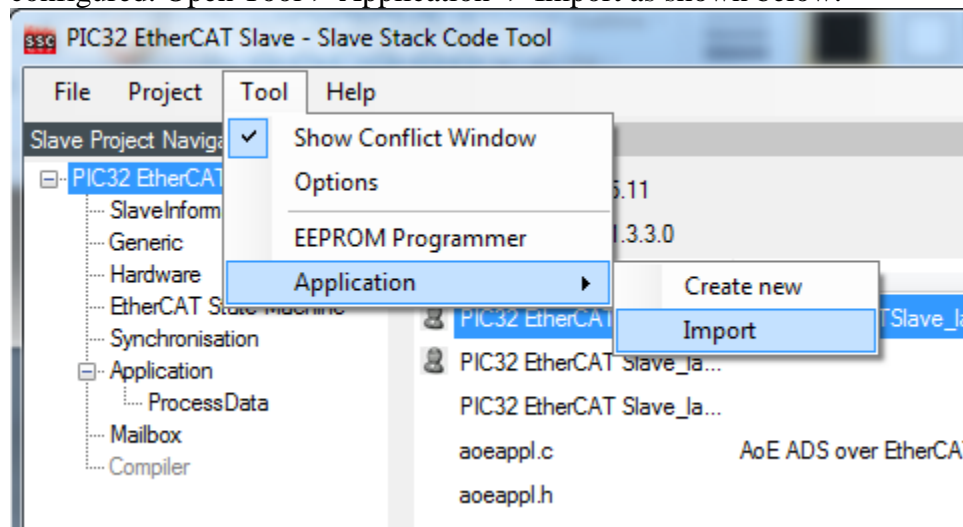
5. After a successful scan, there will be an activity on Link/Act LED at Port 0.

8 Appendix D

8.1 Changing Vendor ID and Object configuration

By default, SDK ESI files have an object configuration with Microchip Vendor ID. If user wants to change the Vendor ID and object configuration, below steps should be followed.

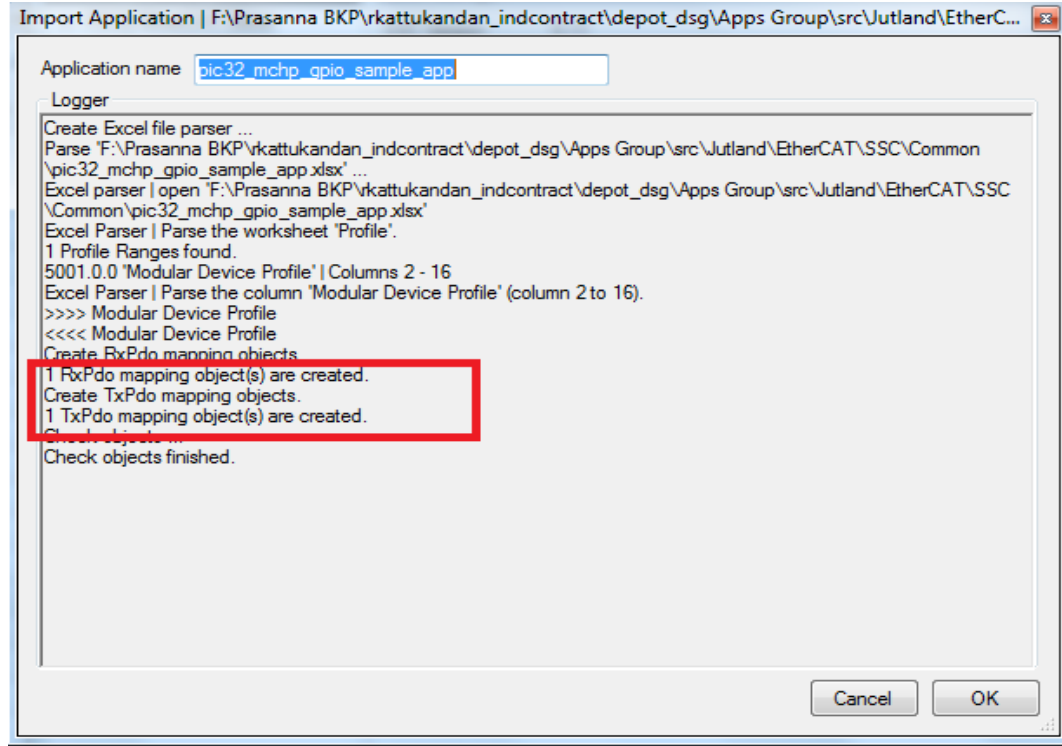
1. Setup and configure SSC tool as mentioned in “AN1916 Integrating Microchip's LAN9252 SDK with Beckhoff's EtherCAT SSC.pdf” from Microchip website.
2. Before generating new slave files, demo application objects should be configured. Open Tool-> Application -> Import as shown below.



Select the file “pic32_mchp_gpio_sample_app.xlsx” which can be found in the SDK directory.

“pic32_mchp_gpio_sample_app.xlsx” is an object file which contains the information about application objects information.

- Once the file is selected, status message will be displayed as shown below. Then click OK to continue.



- Now the new slave files can be generated with object configuration. 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.

- Replace generated application files with SDK application files as shown below.



















SDK Application files can be found under “./Common” directory.

Name	Date modified	Type	Size
9252_HW.c	4/22/2015 3:07 PM	C Source	26 KB
9252_HW.h	4/21/2015 6:45 PM	C/C++ Header	9 KB
pic32_mchp_gpio_sample_app.c	6/24/2015 5:06 PM	C Source	13 KB
pic32_mchp_gpio_sample_app.h	6/24/2015 5:06 PM	C/C++ Header	2 KB
pic32_mchp_gpio_sample_appObjects.h	6/24/2015 5:06 PM	C/C++ Header	9 KB

Application files would be named as “pic32_mchp_gpio_sample_app”.

Because in this demo, input object file is given as

“pic32_mchp_gpio_sample_app.xlsx” as provided in step 2.

	ecatslv.h	6/24/2015 5:06 PM	C/C++ Header	30 KB
	emcy.c	6/24/2015 5:06 PM	C Source	10 KB
	emcy.h	6/24/2015 5:06 PM	C/C++ Header	5 KB
	eoappl.c	6/24/2015 5:06 PM	C Source	11 KB
	eoappl.h	6/24/2015 5:06 PM	C/C++ Header	10 KB
	esc.h	6/24/2015 5:06 PM	C/C++ Header	13 KB
	foeappl.c	6/24/2015 5:06 PM	C Source	11 KB
	foeappl.h	6/24/2015 5:06 PM	C/C++ Header	2 KB
	mailbox.c	6/24/2015 5:06 PM	C Source	39 KB
	mailbox.h	6/24/2015 5:06 PM	C/C++ Header	9 KB
	objdef.c	6/24/2015 5:06 PM	C Source	74 KB
	objdef.h	6/24/2015 5:06 PM	C/C++ Header	15 KB
	pic32_mchp_gpio_sample_app.c	6/24/2015 5:06 PM	C Source	13 KB
	pic32_mchp_gpio_sample_app.h	6/24/2015 5:06 PM	C/C++ Header	2 KB
	pic32_mchp_gpio_sample_appObjects.h	6/24/2015 5:06 PM	C/C++ Header	9 KB
	pic32_mchp_spigpio_sample_app.xml	6/24/2015 5:06 PM	XML Document	42 KB
	sdoserv.c	6/24/2015 5:06 PM	C Source	60 KB
	sdoserv.h	6/24/2015 5:06 PM	C/C++ Header	33 KB

Why replace is required?

Generated application files will not have the code for accessing LAN9252 and PIC32 GPIO lines. GPIO support is provided in delivered SDK application files. Hence the replace is required to avail the demo application.