

EVB-LAN9252-3PORT Quick Start Guide

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<u>12-Sep-14</u> Date

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EVB-LAN9252-3PORT QUICK START GUIDE

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Preface

NOTICE TO CUSTOMERS

All documentation becomes dated, and this manual is no exception. Microchip tools and documentation are constantly evolving to meet customer needs, so some actual dialogs and/or tool descriptions may differ from those in this document. Please refer to our web site (www.microchip.com) to obtain the latest documentation available.

Documents are identified with a "DS" number. This number is located on the bottom of each page, in front of the page number. The numbering convention for the DS number is "DSXXXXA", where "XXXXX" is the document number and "A" is the revision level of the document.

For the most up-to-date information on development tools, see the MPLAB[®] IDE online help. Select the Help menu, and then Topics to open a list of available online help files.

INTRODUCTION

This chapter contains general information that will be useful to know before using and configuring the EVB-LAN9252-3PORT. Items discussed in this chapter include:

- Document Layout
- Conventions Used in this Guide
- The Microchip Web Site
- Development Systems Customer Change Notification Service
- Customer Support
- Document Revision History

DOCUMENT LAYOUT

This document describes how to configure the EVB-LAN9252-3PORT, such as the GPIO and SPI, as well as various setup options, scanning, and programming. The manual layout is as follows:

- Chapter 1. "Overview" Shows a brief description of the EVB-LAN9252-3PORT board quick setup.
- Chapter 2. "EVB-LAN9252-3PORT" Provides instructions in configuring GPIO.
- Appendix A. "Setting Up Master in Windows®" This appendix shows how to set up Master in Windows.
- **Appendix B. "EEPROM Programming"** This appendix shows how to program EEPROM.
- Appendix C. "Scanning EtherCAT Slaves" This appendix shows how to scan EtherCAT Slaves.
- Appendix D. "Generating SSC Files" This appendix shows how to generate SSC files.
- Appendix E. "Compiling and Programming SoC Firmware" This appendix shows how to compile and program SoC firmware.

• Appendix F. "Programming PIC32 Firmware Using Pre-Built Binaries" – This appendix shows how to change Vendor ID and Object configuration.

CONVENTIONS USED IN THIS GUIDE

This manual uses the following documentation conventions:

DOCUMENTATION CONVENTIONS

Description	Represents	Examples
Arial font:		
Italic characters	Referenced books	MPLAB [®] IDE User's Guide
	Emphasized text	is the only compiler
Initial caps	A window	the Output window
	A dialog	the Settings dialog
	A menu selection	select Enable Programmer
Quotes	A field name in a window or dialog	"Save project before build"
Underlined, italic text with right angle bracket	A menu path	<u>File>Save</u>
Bold characters	A dialog button	Click OK
	A tab	Click the Power tab
N'Rnnnn	A number in verilog format, where N is the total number of digits, R is the radix and n is a digit.	4'b0010, 2'hF1
Text in angle brackets < >	A key on the keyboard	Press <enter>, <f1></f1></enter>
Courier New font:		
Plain Courier New	Sample source code	#define START
	Filenames	autoexec.bat
	File paths	c:\mcc18\h
	Keywords	_asm, _endasm, static
	Command-line options	-Opa+, -Opa-
	Bit values	0, 1
	Constants	OxFF, `A'
Italic Courier New	A variable argument	<i>file.o</i> , where <i>file</i> can be any valid filename
Square brackets []	Optional arguments	mcc18 [options] <i>file</i> [options]
Curly brackets and pipe	Choice of mutually exclusive	errorlevel {0 1}
character: { }	arguments; an OR selection	
Ellipses	Replaces repeated text	<pre>var_name [, var_name]</pre>
	Represents code supplied by user	void main (void) { }

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- Emulators The latest information on Microchip in-circuit emulators. This includes the MPLAB REAL ICE and MPLAB ICE 2000 in-circuit emulators.
- In-Circuit Debuggers The latest information on the Microchip in-circuit debuggers. This includes MPLAB ICD 3 in-circuit debuggers and PICkit 3 debug express.
- **MPLAB IDE** The latest information on Microchip MPLAB IDE, the Windows Integrated Development Environment for development systems tools. This list is focused on the MPLAB IDE, MPLAB IDE Project Manager, MPLAB Editor and MPLAB SIM simulator, as well as general editing and debugging features.
- **Programmers** The latest information on Microchip programmers. These include production programmers such as MPLAB REAL ICE in-circuit emulator, MPLAB ICD 3 in-circuit debugger and MPLAB PM3 device programmers. Also included are nonproduction development programmers such as PICSTART Plus and PIC-kit 2 and 3.

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- · Distributor or Representative
- Local Sales Office
- Field Application Engineer (FAE)
- Technical Support

Customers should contact their distributor, representative or field application engineer (FAE) for support. Local sales offices are also available to help customers. A listing of sales offices and locations is included in the back of this document.

Technical support is available through the web site at: http://www.microchip.com/support

DOCUMENT REVISION HISTORY

Revisions	Section/Figure/Entry	Correction
50002440A (02-03-16)	Initia	al release of this document.

NOTES:



EVB-LAN9252-3PORT QUICK START GUIDE

Chapter 1. Overview

1.1 INTRODUCTION

This document describes how to use the EVB-LAN9252-3PORT Software Development Kit (SDK) as a development tool for the Microchip EVB-LAN9252 EtherCAT[®] Slave Controller.

Note: All the figures in the document are captured from TwinCAT 3.1.

1.1.1 Abbreviations

IDE - Integrated Development Environment

ESC - EtherCAT Slave Controller

EVB - Evaluation Board

- HAL Hardware Abstraction Layer
- HBI Host Bus Interface
- SPI Serial Protocol Interface
- SSC Slave Stack Code

NOTES:



EVB-LAN9252-3PORT QUICK START GUIDE

Chapter 2. EVB-LAN9252-3PORT

2.1 ETHERCAT MASTER AND SLAVE CONFIGURATION

The following steps describe how to configure EtherCAT Master and Slave:

1. Configure the EtherCAT Master with the TwinCAT[®] driver.

Note: Refer to **Appendix A. "Setting Up Master in Windows**®" for Windows[®] configuration.

2. Download and extract the EVB-LAN9252-3PORT_PIC32_SDK_Vx.x.zip from the Microchip website (http://www.microchip.com/LAN9252-041715a).

Note: x.xx denotes the version number of the SDK.

3. In SDK, the \ESI Files directory contains the ESI files which can be loaded to EVB-LAN9252-3PORT EEPROM using TwinCAT, as seen in Figure 2-1.

FIGURE 2-1: ESI FILES DIRECTORY

Microchip EVB-LAN9252-3PORT.xml

- **Note:** Refer to **Appendix D. "Generating SSC Files**" to change the Vendor ID and slave information in ESI files.
- 4. Copy Microchip EVB-LAN9252-3PORT.xml to the directory path C:\Twin-CAT\3.1\Config\Io\EtherCAT for TwinCAT 3.1.
- Configure the evaluation board as mentioned in "Chapter 3. Board Configuration" of EVB-LAN9252-3PORT EtherCAT[®] ESC PHY Connection Mode User's Guide from the Microchip website (http://ww1.microchip.com/downloads/en/Device-Doc/50002403B.pdf).
- By default, corresponding ESI file of PIC32 firmware is flashed to the delivered EVB-LAN9252-3PORT. To change the firmware in PIC32 SoC, refer to Appendix D. "Generating SSC Files" and Appendix E. "Compiling and Programming SoC Firmware".

Note: The pre-built binaries are available in the "Binaries" directory. This step can be skipped if pre-built binary is used for programming.

- Launch TwinCAT and scan EtherCAT slaves from TwinCAT. Refer to Appendix C. "Scanning EtherCAT Slaves" to scan the slaves.
- 8. Program EEPROM using Microchip EVB-LAN9252-3PORT.xml. Refer to Appendix B. "EEPROM Programming" for EEPROM programming instructions. If the EEPROM is programmed successfully, the device state will enter into 'OP' as displayed in Figure 2-2.

neral Ethe	erCAT Process Data Online		
State Mach Init Pre-Op Op	Bootstrap Safe-Op Clear Error	Current State: Requested State:	OP OP
DLL Status Port A:	Carrier / Open		
DLL Status Port A: Port B:	Carrier / Open No Carrier / Closed		
DLL Status Port A: Port B: Port C:	Carrier / Open No Carrier / Closed No Carrier / Closed		
DLL Status Port A: Port B: Port C: Port D:	Carrier / Open No Carrier / Closed No Carrier / Closed No Carrier / Closed		

2.2 DEMO

The following describes a demo of the EVB-LAN9252-3PORT:

 Follow the steps as mentioned in Section 2.1 "EtherCAT Master and Slave Configuration". Two demo objects can be seen on the left side panel of the TwinCAT as displayed in Figure 2-3.

FIGURE 2-3: GPIO INPUTS AND OUTPUTS

▲ 🕎 I/O
Devices
🔺 📑 Device 2 (EtherCAT)
🚔 Image
🚔 Image-Info
SyncUnits
Inputs
Outputs
👂 🛄 InfoData
🔺 🚳 Box 1 (PIC32 EtherCAT Slave)
Inputs
🔁 GPIO_INPUTS
Outputs
GPIO_OUTPUTS
WcState
InfoData
📸 Mappings

 As part of this demo, two object variables GPIO_INPUTS and GPIO_OUTPUTS are mapped to PIC32 GPIOs as mentioned below.
 GPIO_OUTPUTS - PIC32 RD2 GPIO_INPUTS - PIC32 RD3

3. Interconnect RD2 and RD3 hardware pins for demo purpose, as in Figure 2-5.



4. To change GPIO_OUTPUTS, double-click the GPIO_OUTPUTS option under Outputs in the Solution Explorer, as displayed in Figure 2-3.

The TwinCAT project window displays.

5. Click the **Online** tab in TWINCAT project window and select the Write option to change GPIO outputs, as displayed in Figure 2-5.

FIGURE 2-5: GPIO OUTPUTS

TwinCAT Project3	😕 🔀 Solution Explorer
Variable Flags	Dnine
Value:	Set Value Dialog
New Value:	Force Release Write Dec: 1 OK
Comment:	Hex 0x01 Cancel
	Float
	Bool: 0 1 Hex Edit
	Binary: 01
	Bit Size:

- 6. To view GPIO_INPUTS, double-click GPIO_INPUTS under Inputs in the Solution Explorer, as displayed in Figure 2-3.
- 7. Click the **Online** tab in the TwinCAT explorer window as displayed in Figure 2-6.

/aria	ble	Flag	js	On	line										
Valu	ue:			0			 	 		 	 	 	 		
Nev	w Vali	ue:			Forc	e		Rele	ase				W	/rite.	
Con	nmen	t:													
															Ŧ
															-
															•
															-0
															-0
															0
															-0
															•
															-0-

FIGURE 2-6: GPIO INPUTS



Appendix A. Setting Up Master in Windows[®]

A.1 INTRODUCTION

This appendix shows how to set up Master in Windows.

Download and install TwinCAT on Windows from http://beckhoff.com.

A.1.1 TwinCAT Ethernet Driver - Installation

To install the TwinCAT Ethernet Driver, do the following:

1. If TwinCAT installed successfully, a TwinCAT icon will display in the bottom-right corner of the desktop. Click the TwinCAT icon.

A pop-up menu displays.

2. Select TwinCAT XAE (VS XXXX), as displayed in Figure A-1.

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

FIGURE A-1: SYSTEM MANAGER

0	About TwinCAT
M	TwinCAT XAE (VS 2013)
	Tools •
.e	<u>R</u> ealtime Settings
	Rou <u>t</u> er •
	<u>S</u> ystem
• E	12/16/2015

3. Go to <u>TWINCAT>Show Real Time Ethernet Compatible Devices...</u> as in Figure A-2.

FIGURE A-2: SHOW REAL TIME ETI	HERNET COMPATIBLE DEVICES
TwinCAT Project11 - Microsoft Visual Studio	
FILE EDIT VIEW PROJECT BUILD DEBU	UG TWINCAT PLC TEAM TOOLS TEST SCOPE ANAI
🛛 🖸 🕶 🖸 🗸 🖆 🖆 🕌 💾 🔏 🗇 🏦	1 Activate Configuration
🛚 🔐 🧱 🥩 📉 🎯 😚 🛼 🛛 <local></local>	🥵 Restart TwinCAT System
	🗱 Restart TwinCAT (Config Mode)
	🗢 Reload Devices
	🔆 Scan
	Constant Con
	රිග් Show Online Data
	Show Sub Items
	😣 Security Management
	Access Bus Coupler/IP Link Register
	Update Firmware/EEPROM
	Show Realtime Ethernet Compatible Devices
	EtherCAT Devices
	About TwinCAT

4. Select the Network adapter and install the TwinCAT driver as in Figure A-3.

FIGURE A-3: ETHERNET ADAPTERS DIALOG



5. Once the TwinCAT driver is installed successfully, the driver is compatible with the TwinCAT master. The network adapter will then be moved to "Installed and ready to use devices" as displayed in

Figure A-4.

FIGURE A-4: INSTALLED AND READY TO USE DEVICES

Installation of TwinCAT RT-Ethernet Adapters	×
Ethernet Adapters	Update List
Local Area Connection - Realtek PCIe GBE Family Controller Compatible devices	Install Bind
Disabled devices	Unbind
	Enable
	Disable
	🔲 Show Bindings

6. Go to the corresponding network adapter properties and then select TwinCAT drivers as displayed in Figure A-5 and Figure A-6.

FIGURE A-5: NETWORK ADAPTER PROPERTIES MENU

Diagnose this connection Re	name	this connection	View status
Local Area Connection			Wireless Networ
TwinCAT-Intel PCI Ethern	۲	Disable	/ir
		Status	
		Diagnose	
	۲	Bridge Connec	tions
		Create Shortcur	t l
		Delete	
	۲	Rename	
	0	Properties	

FIGURE A-6: LC	CAL AREA CONNECTION PROPERTIES
	Local Area Connection Properties
	Networking Sharing
	Connect using:
	TwinCAT-Intel PCI Ethemet Adapter (Gigabit)
	Configure
	This connection uses the following items:
	Glient for Microsoft Networks Gos Packet Scheduler
	🗆 📮 File and Printer Sharing for Microsoft Networks
	V TwinCAT Ethernet Protocol
	Li Internet Protocol Version 6 (TCP/IPv6)
	A Link Laws Teachers Discourse Manage I/O Drives
	A Link-Layer Topology Discovery Mapper I/O Driver
	Description
	Allows your computer to access resources on a Microsoft network.
	OK Cancel
Note 1: Only sele	ct TwinCAT drivers.
2: If TwinCA	T cannot find the EtherCAT slaves after following the steps in Appendix
C. "Scan	ning EtherCAT Slaves", restart the computer and attempt to scan again.



Appendix B. EEPROM Programming

B.1 INTRODUCTION

This appendix shows how to program EEPROM.

B.1.1 EEPROM Programming

To program EEPROM:

1. After a successful scan, click the "Device 2 (EtherCAT)" drop-down bar from the Solution Explorer of the TwinCAT tool, as displayed in Figure B-1.

The TwinCAT Explorer window displays.

FIGURE B-1: DEVICE 2 (ETHERCAT)



- 2. Click the **Online** tab in the TwinCAT project window.
- 3. Right-click the LAN9252 listing and select "EEPROM Update" from the contextual menu, as displayed in Figure B-2.

The Write EEPROM window displays.

FIGURE B-2: EEPROM UPDATE

No	Addr	Name				Sta	ite	CRC	
SSE 1	1001	Box 1 (L	AN925	2-DIGIO	2PORT)		Request 'INIT'	state	
							Request 'PREO	P' state	
							Request 'SAFE	OP' state	
							Request 'OP' st	tate	
							Request 'BOOT	TSTRAP' state	
							Clear 'ERROR'	state	
							EEPROM Upda	ite	
							Firmware Upda	ate	
							Advanced Sett	ings	
							Properties		
							Export		

4. Select the corresponding EEPROM configuration and then click **OK** to initiate EEPROM programming.

For example, Figure B-3 shows LAN9252 one of DIGIO configuration is selected for EEPROM programming in the TwinCAT.

FIGURE B-3: WRITE EEPROM DIALC)G	
Write EEPROM		×
Available EEPROM Descriptions:	Show Hidden Devices	OK
 Microchip Technology Inc Microchip PIC32 Slaves LAN9252-DIGIO Microchip 9252 8 Ch. Dig. In-/Output 2xMII (No DI 	C) (1371)	Cancer
		Browse

NOTES:



Appendix C. Scanning EtherCAT Slaves

C.1 INTRODUCTION

This appendix shows how to scan EtherCAT Slaves.

C.1.1 Scanning EtherCAT Slaves

To scan EtherCAT slaves:

- Connect Port 0 of the device to master using RJ45 Ethernet cable, and 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 displayed in Figure C-1.



3. Scan for EtherCAT slave devices by right-clicking Devices under I/O and then selecting Scan, as displayed in Figure C-2.

FIGURE C-2:	SCAN DEVICES MEN	۱U					
	Solution 'TwinCAT Project12' (1 project)						
	TwinCAT Project12						
	SYSTEM						
	A MOTION						
	🛄 PLC						
	Ø SAFETY						
	\$ ₆₊ C++						
	▲ 🛃 I/O						
	📲 Devices						
	📸 Mappings 🤺		Add New Item	Ins			
	1		Add Existing Item	Shift+Alt+A			
			Export EAP Config File				
	*	Ś	Scan				
	ć	ĵ	Paste	Ctrl+V			
			Paste with Links				
		_	Paste with Links				

4. Click OK to continue scanning, as in Figure C-3.

FIGURE C-3: DEVICE DIALOG

Device 2 (EtherCA)) [Local Area Connection (TwinCAT-Intel PCI Ethernet A]ОК
		Cancel
		Select All
		Unselect All

If the check box is not checked, as displayed in Figure C-4, then either the device is not functional or driver is not installed properly.

1 new I/O devices found Dr vice 1 (RT-Ethernet) [Local Area Connection (Realtek RTL8168B/8111B Famil) OK Cancel Select All Unselect All Unselect All	JRE C-4:	DEVICE DIALOG	, UNCHECKED		
Device 1 (RT-Ethernet) [Local Area Connection (Realtek RTL81688/81118 Famil] OK Cancel Select All Unselect All	1 new I/O dev	vices found			x
	Device 1	(RT-Ethernet) [Local	Area Connection (Realt	ek RTL81688/81118 Fan	nil] OK Cancel Select All Unselect All

FIGURE C-4: DEVICE DIALOG, UNCHECKED

5. Click **Yes** as displayed in Figure C-5 to scan for boxes.

FIGURE C-5: CONFIRMATION DIALOG

Microsoft Visual Studio
Scan for boxes
Yes <u>N</u> o

The device list displays, as in Figure C-6.

FIGURE C-6: DEVICE LIST



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



Appendix D. Generating SSC Files

D.1 INTRODUCTION

This appendix shows how to generate SSC files.

D.1.1 Generating SSC Files

To generate SSC files:

1. Start the SSC Tool from the Windows Start menu, as displayed in Figure D-1.

퉬 EtherCAT Slave Stack Code Tool	
EEPROM Programmer	
EtherCAT Development Documents	
SSC Tool	

2. From the menu bar, click *<u>File>New</u>*, as displayed in Figure D-2.

FIGURE D-2: NEW ETHERCAT SLAVE



3. Click Import to import the SSC Tool configuration file Microchip EVB-LAN9252-3PORT-SSC-CONFIG.xml from the directory {SDK_INSTALL_PATH}/ EVB-LAN9252_SDK_VX.X\EVB-LAN9252-3PORT_PIC32_SDK_VX.X/ as displayed in Figure D-3.

FIGURE D-3: IMPORT PROJECT

Slave Stack Code Tool New Project	
Oefault	
Custom EL9800 2Axis CiA402 Sample 👻	
Default SlaveStackCode configuration. All settings are available.	
Import OK	
<u>ا</u>	

- 4. After selecting the file, click **Open** to import the SSC Tool configuration file.
- 5. Once imported, check the "Custom" drop-down box, select "Microchip-EVB-LAN9252-3PORT" configuration, as displayed in Figure D-4.
- 6. Click **OK**.

FIGURE D-4: CUSTOM SSC FILE SELECTED

Slave Stack Code Tool New Project
Default
Custom Microchip-EVB-LAN9252-3PORT <microchip></microchip>
Vendor: Microchip (0xE00004D8). Version: 0.0.1.2 NOTE: This configuration is not provided by Beckhoff Automation and files or file fragments may be added which are NOT covered by the license from Beckhoff Automation GmbH
be added which are non covered by the license from becknon Automation diribiti.
Shall be set if the Slave code executes on an Microchip development board for the PIC32
Import OK

7. All listed parameters under the Slave Information tab can be changed as displayed in Figure D-5.

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

FIGURE D-5: SLAVE SETTINGS

EtherCAT Slave* - Slave Stack Code Tool							
<u>F</u> ile <u>P</u> roject <u>T</u> ool <u>H</u> elp							
Slave Project Navigation	Slave Settings						
⊡- EtherCAT Slave	Name	Value					
SlaveInformation	VENDOR_ID	0x4D8					
Generic Hardware	VENDOR_NAME	Microchip					
EtherCAT State Machine	PRODUCT_CODE	0x26483052					
Synchronisation	REVISION_NUMBER	0x0000000					
Application	SERIAL_NUMBER	0x0000000					
Mailbox	DEVICE_PROFILE_TYPE	0x00001389					
I Compiler	DEVICE_NAME	SSC-Device					
	DEVICE_HW_VERSION	n.a.					
	DEVICE_SW_VERSION	5.11					

8. Click <u>Tool>Application>Import</u> from the menu bar, as displayed in Figure D-6.

FIGURE D-6: IMPORT MENU

PIC32 EtherCAT	Slave - Slave Sta	ick Code Tool	-	
File Project	Tool Help		_	
Slave Project Naviga	 Show Conf 	lict Window		
□- PIC32 EtherCA1	Options		5.11	
Generic	EEPROM P	rogrammer	1.3.3.0	
Hardware	Application	ı ►	Create new	
Svnchronisat	ion	BIC32 EtherCAT	Import	TSlave_la
- Application		PIC32 EtherCAT	Slave_la	
Process[Data	PIC32 EtherCAT	Slave_la	
···· Mailbox		aoeappl.c	AoE ADS ove	r EtherCA
complici		aoeappl.h		

9. Select the file pic32_mchp_gpio_sample_app.xlsx which can be found in the directory {SDK_INSTALL_PATH}/EVB-LAN9252_SDK_VX.X\EVB-LAN9252-3PORT_PIC32_SDK_VX.X/. 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 displays, as in Figure D-7.

FIGURE D-7: STATUS MESSAGE

mport Application	C:\EVB-LAN9252-PIC32 SDK\pic32_mchp_gpio_sample_app.xls	x
Application name Logger Create Excel file pa Parse 'C:\EVB-LAN Excel parser open	pic32_mchp_gpio_sample_app rser 19252-PIC32 SDK\pic32_mchp_gpio_sample_app xlsx' 1°C\EVB-LAN9252-PIC32 SDK\pic32_mchp_gpio_sample_app xlsx'	
Excel Parser Pars 1 Profile Ranges fo 5001.0.0 'Modular Excel Parser Pars >>>> Modular Devi	e the worksheet 'Profile'. und. Device Profile' Columns 2 - 16 e the column 'Modular Device Profile' (column 2 to 16). ce Profile	
Create RxPdo map 1 RxPdo mapping (Create TxPdo mapping (1 TxPdo mapping o Check objects	bing objects object(s) are created. object(s) are created. object(s) are created.	
Check objects finis	hed.	
		Cancel OK

10. Click **OK** to continue.

11. Click the "Project" drop-down menu in the tool bar and select Create New Slave Files.

The Create new Slave Files window displays, as in Figure D-8.

FIGURE D-8:	CREA	TE NEW SLAVE F	ILES			
Create new Slav	ve Files					×
Project File		E DATH				
r oject r lie	Source Folder					Change
		SSRC_FILE_PATH/SIC				
		SESI_FILE_PATH				Change
Deserves	Doc Folder					Change
Progress]
<u> </u>						
					Cancel	<u>S</u> tart
						.#
Note: Th	e above valu	es signify the follow	ing:			
- \$proje0	CT_FILE_PA	TH - The location w	here the SSC pro	oject file is save	d.	
- \$SRC_FI	[LE_PATH - [Default path is <code>\$PRO</code>	JECT_FILE_PA	тн. It can be ch	anged by clic	king its
correspo	nding Chang	e button.				
- \$ESI_FI	ILE_PATH - [Default path is \$PRO	JECT_FILE_PA	TH. It can be ch	anged by clic	king its
correspo	nding Chang	e button.				
12. Click Star	rt to create a	new project file, Src	folder, and ESI	file (Slave Inforr	mation file) in	the desired
directory	path.					
A pop-up	window displ	ays to indicate that	the files have be	en successfully	created.	
13. Click OK	to continue.					
Alona witl	h generated r	new slave files. ESI	file (.xml file) also	o will be generat	ed. This ESI	file will have
informatio	on about new	Vendor ID and obje	ect configuration.			

14. Program this ESI file into EEPROM, as mentioned in Appendix B. "EEPROM Programming". 15. Replace generated application files with SDK application files as displayed in Figure D-9.

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

FIGURE D-9:	SDK APPLICATION FILES

Name	Date modified	Туре	Size
9252_HW.c	4/22/2015 3:07 PM	C Source	26 KB
<u>ท</u> ี่ 9252 HW.h	4/21/2015 6:45 PM	C/C++ Header	9 KB
c pic32_mchp_gpio_sample_app.c	6/24/2015 5:06 PM	C Source	13 KB
nic32_mchp_gpio_sample_app.h	6/24/2015 5:06 PM	C/C++ Header	2 KB
h pic32_mchp_gpio_sample_appObje	ects.h 6/24/2015 5:06 PM	C/C++ Header	9 KB
h pic32_mchp_gpio_sample_app.h h pic32_mchp_gpio_sample_appObje	6/24/2015 5:06 PM ects.h 6/24/2015 5:06 PM	C/C++ Header C/C++ Header	2 KB 9 KB

Note: Application files would be named as pic32_mchp_gpio_sample_app as in Figure D-10. This is because in this demo, input object file is given as pic32_mchp_gpio_sample_app.xlsx as provided in step 2.

FIGU	RE D-10: APPLICATION FILE:	5		
ĥ	ecatslv.h	6/24/2015 5:06 PM	C/C++ Header	30 KB
C	emcy.c	6/24/2015 5:06 PM	C Source	10 KB
ĥ	emcy.h	6/24/2015 5:06 PM	C/C++ Header	5 KB
C	eoeappl.c	6/24/2015 5:06 PM	C Source	11 KB
ĥ	eoeappl.h	6/24/2015 5:06 PM	C/C++ Header	10 KB
ĥ	esc.h	6/24/2015 5:06 PM	C/C++ Header	13 KB
C	foeappl.c	6/24/2015 5:06 PM	C Source	11 KB
h	foeappl.h	6/24/2015 5:06 PM	C/C++ Header	2 KB
C	mailbox.c	6/24/2015 5:06 PM	C Source	39 KB
h	mailbox.h	6/24/2015 5:06 PM	C/C++ Header	9 KB
C	objdef.c	6/24/2015 5:06 PM	C Source	74 KB
h	obidef.h	6/24/2015 5:06 PM	C/C++ Header	15 KB
C	pic32_mchp_gpio_sample_app.c	6/24/2015 5:06 PM	C Source	13 KB
h	pic32_mchp_gpio_sample_app.h	6/24/2015 5:06 PM	C/C++ Header	2 KB
h	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
C	sdoserv.c	6/24/2015 5:06 PM	C Source	60 KB
ĥ	sdoserv.h	6/24/2015 5:06 PM	C/C++ Header	33 KB

16. 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.
- Microchip PIC32 Slaves (ESP): This is the SSC Tool project file.
- Microchip PIC32 Slaves (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.
- 17. Copy all the files inside the Src folder to the following directory:

{SDK_INSTALL_PATH}/EVB-LAN9252-3PORT_PIC32_SDK_VX.X/SSC/Common

D.1.1.1 WHY REPLACE IS REQUIRED

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



Appendix E. Compiling and Programming SoC Firmware

E.1 INTRODUCTION

This appendix shows how to compile and program SoC firmware.

E.1.1 Compiling and Programming SoC Firmware

To compile and program SoC firmware:

- Open the MPLAB[®] IDE and import the SSC project. The MPLAB project file is located under {SDK_INSTALL_-PATH}/EVB-LAN9252-3PORT_PIC32_SDK_VX.X/SSC/.
- 2. Compile the source code as displayed in Figure E-1.

FIGURE E-1: SOURCE CODE

- 🔯 - 🕨 - 🏪 - 🏠 - PC: 0x0
Clean and Build Project (SSC)

If the compilation is successful, the output window will display "BUILD SUCCESSFUL" as in Figure E-2.

FIGURE E-2: BUILD SUCCESSFUL

Sea	rch Results	Output - SSC (Clean, Build,) 8				-
\square	.heap	0xf62 0		0x1000	(4096)	*
		Total data memory used (bytes):		0x1762	(5986) 36%	
	Dynamic N	femory Usage				
	region	address	maximum	length	(dec)	
	heap	0xf62		0x1000	(4096)	
	stack	0x1f62		0x289e	(10398)	
		Maximum dynamic memory (bytes):		0x389e	(14494)	
	"C:\Prog	am Files (x86)\Microchip\xc16\v1.25\bin"\\xc16	-bin2hex	dist/de	fault/production/PIC24-SPI.production.elf -a -omf=elf	
	make[2]:	Leaving directory 'C:/EVB-LAN9252-PIC32 SDK/SS	C/PIC24-S	SPI'		
	make[1]:	Leaving directory 'C:/EVB-LAN9252-PIC32 SDK/SS	C/PIC24-S	SPI'		
	BUILD SUC	CESSFUL (total time: 13s)				Ξ
	Loading o	ode from C:/EVB-LAN9252-PIC32 SDK/SSC/PIC24-SP	I/dist/de	efault/p	roduction/PIC24-SPI.production.hex	
	Loading o	completed				
						Ŧ
	•				4	

3. Before initiating the firmware download, ensure the debugger/programmer is connected to the EVB's JTAG pins.

Note: This demo project is debugged with the PICkit 3 In-Circuit debugger/programmer.

4. To program the PIC32 SoC, click the **Make and Program Device Main Project** button, as displayed in Figure E-3.

FIGURE E-3: MAKE AND PROGRAM DEVICE MAIN PROJECT BUTTON

* 💁 * 🏠 🗊 * PC: 0x0 dc n ov z c oab sab IP0	
Make and Program Device (Project SSC)	

5. To debug the PIC32 SoC, click the **Debug Main Project** button, as displayed in Figure E-4.

FIGURE E-4: DEBUG MAIN PROJECT

D - 💁 - 🏠 - 🍓	PC: 0x0	dc n ov z c oab sab IP0	Ø
	Debug Project	(SSC)	



Appendix F. Programming PIC32 Firmware Using Pre-Built Binaries

F.1 INTRODUCTION

This appendix shows how to program PIC32 firmware.

F.1.1 Programming PIC32 Firmware Using Pre-Built Binaries

Follow these steps to program the PIC32 firmware using pre-built binaries:

1. Download and install MPLAB IPE Vx.xx from the following link: http://microchip.wikidot.com/ipe:installation

Note: x.xx denotes the version number of the MPLAB IPE.

- 2. Before initiating the firmware download, ensure the debugger/programmer is connected to the EVB's JTAG pins.
- 3. Open the MPLAB IPE.

The window displays as in Figure F-1.

FIGURE F-	1:	MPLAE	
			, 🛏

X Integrated Pro	gramming Environment v3.10	And the last	and the same limit.	
File View Setting	is Help			
Select Devic	e and Tool		Results	
Family:	All Families	•	Chadraum	E7002052
Device:	PIC32MX795F512L	- Apply	Pass Count:	0
Tool:	Real ICE S.No : JIT133210349	▼ Connect	Fail Count: Total Count:	0
	Program Erase	Read	Verify	Blank Check
Source: Ple	ase click on browse button to import a hex file	2		Browse
				± Less
Output	59:12+0530- Completed loading IPE.			

- 4. Select the corresponding device from the "Device" drop-down box and then click Apply.
- 5. Select the debugger/programmer from the "Tool" drop-down box and then click **Connect**.
- 6. From "Source," click Browse and select the hex files which can be found in the Binaries directory of EVB-LAN9252-3PORT_PIC32_SDK_VX.X.
- 7. Once the hex files are loaded, click **Program**.



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