



MICROCHIP

EVB-LAN8870B-MC
Evaluation Board
User Guide

Microchip Information

Trademarks

The “Microchip” name and logo, the “M” logo, and other names, logos, and brands are registered and unregistered trademarks of Microchip Technology Incorporated or its affiliates and/or subsidiaries in the United States and/or other countries (“Microchip Trademarks”). Information regarding Microchip Trademarks can be found at <https://www.microchip.com/en-us/about/legal-information/microchip-trademarks>.

ISBN: 979-8-3371-2592-3

Legal Notice

This publication and the information herein may be used only with Microchip products, including to design, test, and integrate Microchip products with your application. Use of this information in any other manner violates these terms. Information regarding device applications is provided only for your convenience and may be superseded by updates. It is your responsibility to ensure that your application meets with your specifications. Contact your local Microchip sales office for additional support or, obtain additional support at www.microchip.com/en-us/support/design-help/client-support-services.

THIS INFORMATION IS PROVIDED BY MICROCHIP "AS IS". MICROCHIP MAKES NO REPRESENTATIONS OR WARRANTIES OF ANY KIND WHETHER EXPRESS OR IMPLIED, WRITTEN OR ORAL, STATUTORY OR OTHERWISE, RELATED TO THE INFORMATION INCLUDING BUT NOT LIMITED TO ANY IMPLIED WARRANTIES OF NON-INFRINGEMENT, MERCHANTABILITY, AND FITNESS FOR A PARTICULAR PURPOSE, OR WARRANTIES RELATED TO ITS CONDITION, QUALITY, OR PERFORMANCE.

IN NO EVENT WILL MICROCHIP BE LIABLE FOR ANY INDIRECT, SPECIAL, PUNITIVE, INCIDENTAL, OR CONSEQUENTIAL LOSS, DAMAGE, COST, OR EXPENSE OF ANY KIND WHATSOEVER RELATED TO THE INFORMATION OR ITS USE, HOWEVER CAUSED, EVEN IF MICROCHIP HAS BEEN ADVISED OF THE POSSIBILITY OR THE DAMAGES ARE FORESEEABLE. TO THE FULLEST EXTENT ALLOWED BY LAW, MICROCHIP'S TOTAL LIABILITY ON ALL CLAIMS IN ANY WAY RELATED TO THE INFORMATION OR ITS USE WILL NOT EXCEED THE AMOUNT OF FEES, IF ANY, THAT YOU HAVE PAID DIRECTLY TO MICROCHIP FOR THE INFORMATION.

Use of Microchip devices in life support and/or safety applications is entirely at the buyer's risk, and the buyer agrees to defend, indemnify and hold harmless Microchip from any and all damages, claims, suits, or expenses resulting from such use. No licenses are conveyed, implicitly or otherwise, under any Microchip intellectual property rights unless otherwise stated.

Microchip Devices Code Protection Feature

Note the following details of the code protection feature on Microchip products:

- Microchip products meet the specifications contained in their particular Microchip Data Sheet.
- Microchip believes that its family of products is secure when used in the intended manner, within operating specifications, and under normal conditions.
- Microchip values and aggressively protects its intellectual property rights. Attempts to breach the code protection features of Microchip product is strictly prohibited and may violate the Digital Millennium Copyright Act.
- Neither Microchip nor any other semiconductor manufacturer can guarantee the security of its code. Code protection does not mean that we are guaranteeing the product is “unbreakable”. Code protection is constantly evolving. Microchip is committed to continuously improving the code protection features of our products.

Table of Contents

Preface	5
Chapter 1. Overview	
1.1 Introduction	9
1.2 Block Diagram	9
1.3 References	10
Chapter 2. Getting Started	
2.1 Introduction	11
2.2 Physical Setup	11
2.3 EVB-LAN8870B-MC Configuration Tool Software	12
2.4 Quick Start	16
Chapter 3. Hardware Configuration	
3.1 Introduction	17
3.2 Hardware Configuration Options	17
3.2.1 Jumpers and Headers	17
3.2.2 Status LEDs	18
3.2.3 100BASE-T1/1000BASE-T1 Single-Pair Ethernet Connector	19
3.2.4 Reset Push Button	19
Appendix A. Schematics	
A.1 Introduction	21
Appendix B. Bill of Materials	
B.1 Introduction	25
Appendix C. Silk Screens	
C.1 Introduction	29
Appendix D. PIC MCU Programming	
D.1 Introduction	31
D.2 Setting up MPLAB X IDE and MPLAB XC8 Compiler	31
D.3 Setting up Project in MPLAB X IDE	32
D.4 Programming the PIC	33

EVB-LAN8870B-MC Evaluation Board User Guide

NOTES:

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 “XXXX” 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 the EVB-LAN8870B-MC Evaluation Board User Guide. Items discussed in this chapter include:

- [Document Layout](#)
- [Conventions Used in this Guide](#)
- [Warranty Registration](#)
- [The Microchip Web Site](#)
- [Development Systems Customer Change Notification Service](#)
- [Customer Support](#)
- [Document Revision History](#)

DOCUMENT LAYOUT

This document describes EVB-LAN8870B-MC evaluation board as a development tool for the LAN8870B, 1000BASE-T1 Type B Ethernet Transceiver. The manual layout is as follows:

- **Chapter 1. “Overview”** – This chapter shows a brief description of the EVB-LAN8870B-MC.
- **Chapter 2. “Getting Started”** – This chapter provides information about setup and operation of the EVB-LAN8870B-MC.
- **Chapter 3. “Hardware Configuration”** – This chapter includes information about the hardware configuration of the EVB-LAN8870B-MC.
- **Appendix A. “Schematics”** – This appendix shows the EVB-LAN8870B-MC schematics.
- **Appendix B. “Bill of Materials”** – This appendix includes the EVB-LAN8870B-MC Bill of Materials.
- **Appendix C. “Silk Screens”** – This appendix includes the EVB-LAN8870B-MC

EVB-LAN8870B-MC Evaluation Board User Guide

silk screen.

- **Appendix D. “PIC MCU Programming”** – This appendix includes information on programming EVB-LAN8870B-MC’s PIC18 MCU through MPLAB IDE.

CONVENTIONS USED IN THIS GUIDE

This manual uses the following documentation conventions:

DOCUMENTATION CONVENTIONS

Description	Represents	Examples
Arial font:		
Italic characters	Referenced books	<i>MPLAB[®] IDE User’s Guide</i>
	Emphasized text	...is the <i>only</i> 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><i>File>Save</i></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>
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	0xFF, '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 character: { }	Choice of mutually exclusive arguments; an OR selection	errorlevel {0 1}
Ellipses...	Replaces repeated text	var_name [, var_name...]
	Represents code supplied by user	void main (void) { ... }

WARRANTY REGISTRATION

Please complete the enclosed Warranty Registration Card and mail it promptly. Sending the Warranty Registration Card entitles users to receive new product updates. Interim software releases are available at the Microchip web site.

THE MICROCHIP WEB SITE

Microchip provides online support via our web site at www.microchip.com. This web site is used as a means to make files and information easily available to customers. Accessible by using your favorite Internet browser, the web site contains the following information:

- **Product Support** – Data sheets and errata, application notes and sample programs, design resources, user's guides and hardware support documents, latest software releases and archived software
- **General Technical Support** – Frequently Asked Questions (FAQs), technical support requests, online discussion groups, Microchip consultant program member listing
- **Business of Microchip** – Product selector and ordering guides, latest Microchip press releases, listing of seminars and events, listings of Microchip sales offices, distributors and factory representatives

DEVELOPMENT SYSTEMS CUSTOMER CHANGE NOTIFICATION SERVICE

Microchip's customer notification service helps keep customers current on Microchip products. Subscribers will receive e-mail notification whenever there are changes, updates, revisions or errata related to a specified product family or development tool of interest.

To register, access the Microchip web site at www.microchip.com, click on Customer Change Notification and follow the registration instructions.

The Development Systems product group categories are:

- **Compilers** – The latest information on Microchip C compilers, assemblers, linkers and other language tools. These include all MPLAB C compilers; all MPLAB assemblers (including MPASM assembler); all MPLAB linkers (including MPLINK object linker); and all MPLAB librarians (including MPLIB object librarian).
- **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.

CUSTOMER SUPPORT

Users of Microchip products can receive assistance through several channels:

- 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
DS50004032A (12-19-25)	Initial release	

Chapter 1. Overview

1.1 INTRODUCTION

The EVB-LAN8870B-MC evaluation board is a 100BASE-T1/1000BASE-T1 (Single-Pair Ethernet) to 100BASE-TX/1000BASE-T (Gigabit Ethernet) media converter, for use in evaluating the LAN8870B 100BASE-T1/1000BASE-T1 Ethernet transceiver.

The 100BASE-TX/1000BASE-T side of the EVB-LAN8870B-MC uses a LAN8830 transceiver and a conventional RJ-45 jack with integrated magnetics. It features auto-negotiation and auto-crossover.

The 100BASE-T1/1000BASE-T1 side uses a LAN8870B transceiver, with all necessary external filtering and isolation components and an automotive single-pair Ethernet connector. The LAN8870B is configured in RGMII mode, and connects to the RGMII interface of the LAN8830.

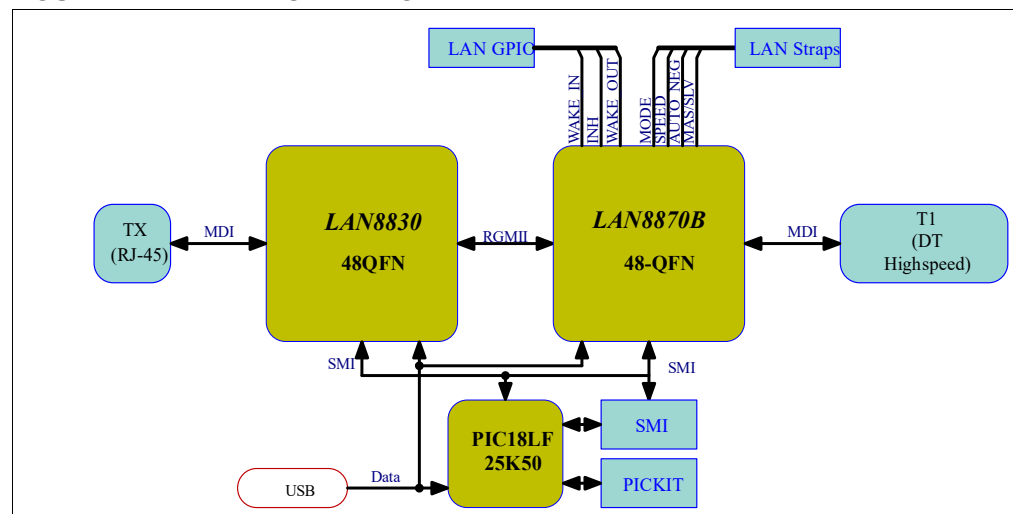
The Microchip LAN8870B device provides a compact, cost-effective, single-port 100BASE-T1/1000BASE-T1 Ethernet physical layer transceiver solution compliant with the IEEE 802.3bw-2015 and IEEE 802.3bp-2016 specifications. The LAN8870B also supports extended cable reach as defined in IEEE 802.3bp-2016. The device has a link segment supporting up to four in-line connectors using a single twisted-pair copper cable for up to at least 40 meters (referred to as link segment type B).

Software is provided to allow users to access the LAN8870B registers from a PC via the EVB-LAN8870B-MC's USB port and an on-board PIC microcontroller. The board can be powered from either the EVB-LAN8870B-MC's USB port, external 5V or a 5V power supply.

This document describes setup and use of the hardware and software. This document also explains how to optionally reprogram the preprogrammed on-board microcontroller. A simplified block diagram of the board is shown in [Figure 1-1](#).

1.2 BLOCK DIAGRAM

FIGURE 1-1: BLOCK DIAGRAM



1.3 REFERENCES

Concepts and materials available in the following documents may be helpful when reading this document. Visit www.microchip.com for the latest documentation.

- *LAN8870 Data Sheet*
- *LAN8830 Data Sheet*
- *PIC18LF25K50 Data Sheet*
- *MCP1726 Data Sheet*
- *VMX7 Data Sheet*

Chapter 2. Getting Started

2.1 INTRODUCTION

This chapter outlines the steps for setting up and using the EVB-LAN8870B-MC. It also provides guidelines on configuring the device with the EVB-LAN8870B-MC Configuration Tool Software.

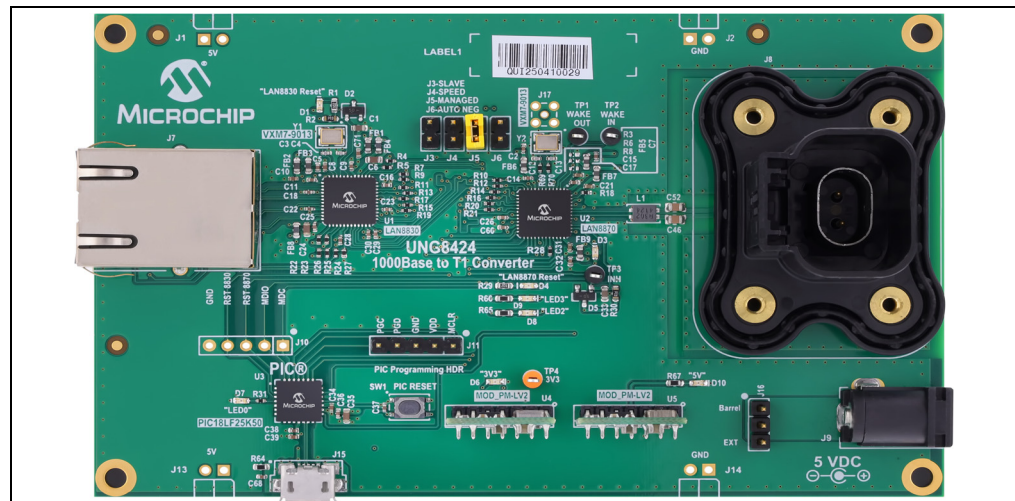
2.2 PHYSICAL SETUP

The Microchip EVB-LAN8870B-MC media converter is simple to set up, as shown in [Figure 2-1](#). Take note of the following guidelines:

- To configure the LAN8870B to 1000BASE-T1 and slave, J4/J5/J6 must be open and J3 must be closed. To configure LAN8870B to 1000BASE-T1 and master, J3/J4/J5/J6 must be open.
- To configure the LAN8870B to 100BASE-T1 and slave, J5/J6 must be open and J3/J4 must be closed. To configure LAN8870B to 100BASE-T1 and master, J3/J5/J6 must be open and J4 must be closed.
- The board is powered via a micro USB cable by default (no shunt on J16). Board can be optionally powered by either external 5V (J16 pos 2-3) or by 5V power supply to J9 (J16 pos 1-2).
- A CAT5 Ethernet cable can be connected to the RJ45 jack for 100BASE-TX/1000BASE-T.
- For 100BASE-T1/1000BASE-T1, connect the cable to sealed Ethernet connector J8.
- For 100BASE-T1/1000BASE-T1 connection, J8 is TE DT High-speed connector (TE P/N: 9-2367359-1) with Type-A keying.

Note: EVB-LAN8870B-MC is in Auto-Negotiation when in Managed mode (J5 closed).

FIGURE 2-1: EVAL BOARD CONNECTIONS



EVB-LAN8870B-MC Evaluation Board User Guide

The PIC checks for LAN8870 speed and adjusts the LAN8830 speed to match the LAN8870 speed.

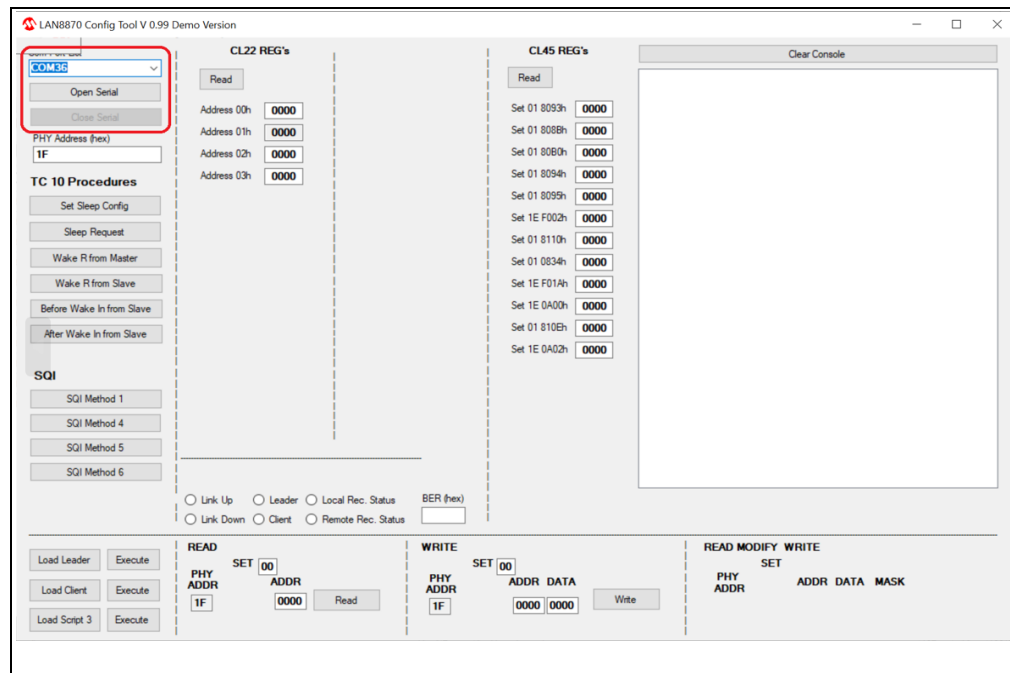
2.3 EVB-LAN8870B-MC CONFIGURATION TOOL SOFTWARE

The optional EVB-LAN8870B-MC Configuration Tool Software is available to monitor and configure the LAN8870B transceiver. Microsoft .Net 4.5 or newer must be installed on the PC. The software comes as an executable (.exe) file for Windows. No installation is required. To run it, just double click on the file.

The PIC microcontroller on the board is running as a CDC device, so it sets up a serial communication port on the PC.

Once the software is started and the application window has opened, select the appropriate COM port for the evaluation board, and press the connect button as shown in Figure 2-2.

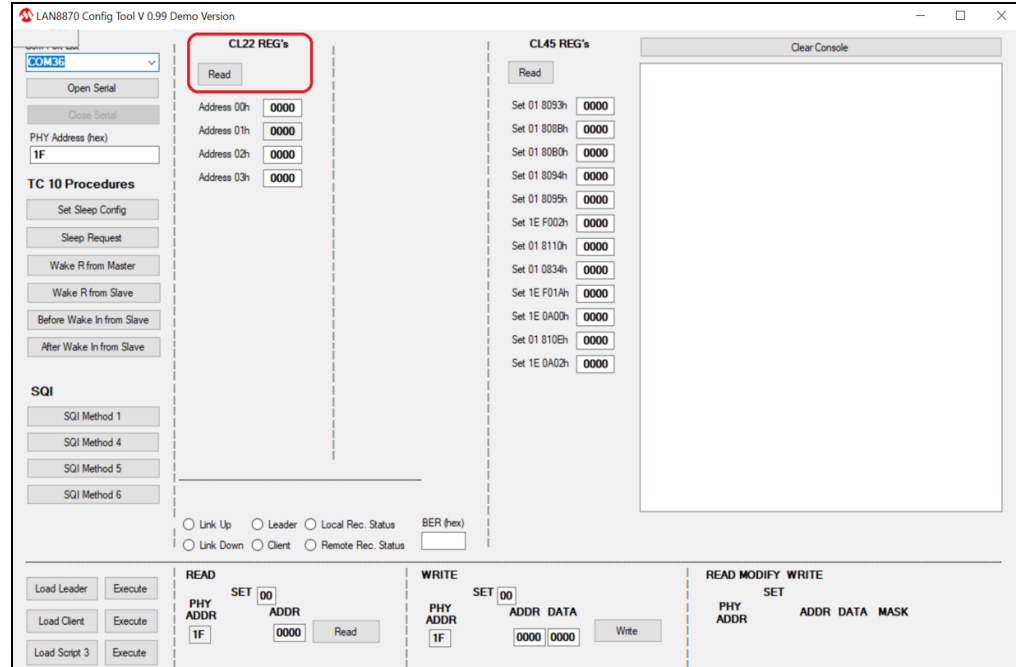
FIGURE 2-2: COM PORT SELECTIONS



The initial condition is a blank form with all values filled in with zero. Press the Read **buttons** to update the registers. With a successful connection to the board, designers should be able to:

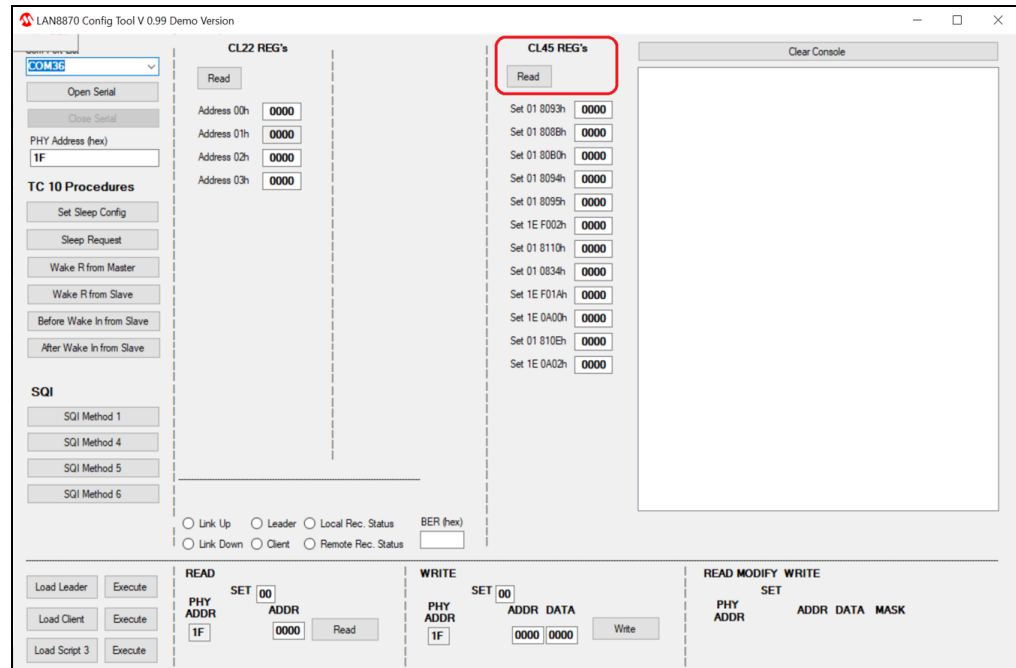
1. Read Clause 22 registers (see [Figure 2-3](#)).

FIGURE 2-3: CLAUSE 22 REGISTER READ



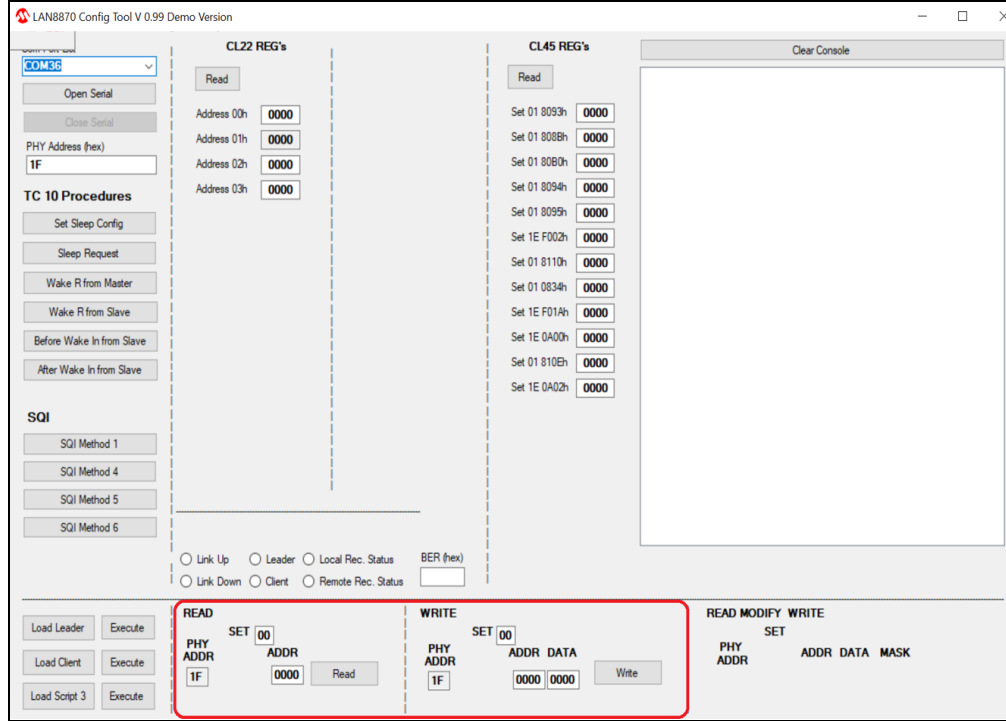
2. Read Clause 45 registers (see [Figure 2-4](#)).

FIGURE 2-4: CLAUSE 45 REGISTER READ



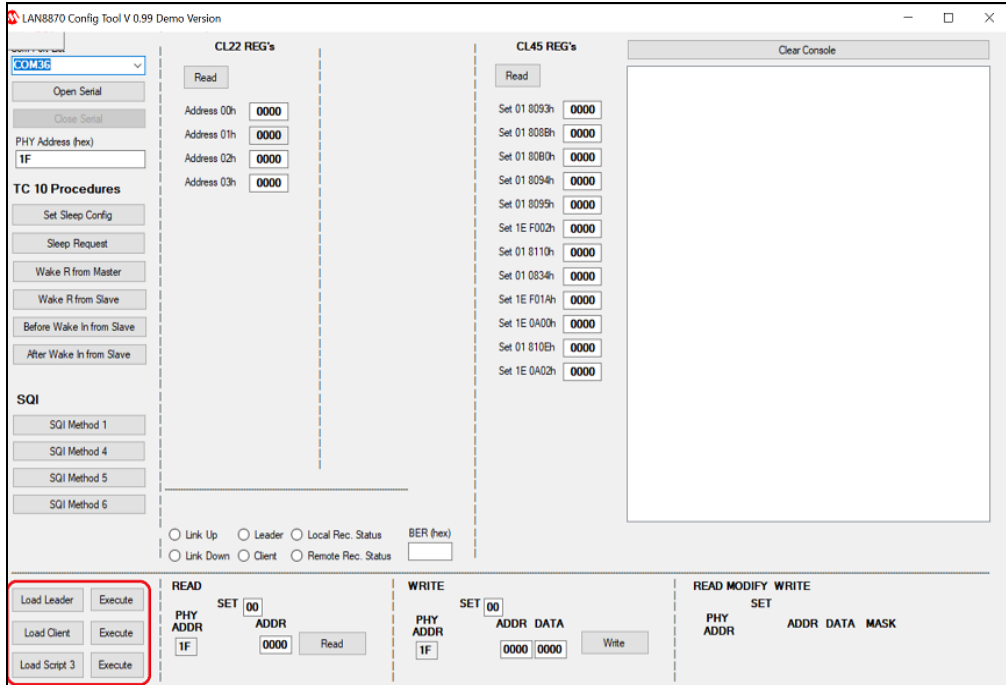
- Easily execute single READ and WRITE commands using the controls highlighted in Figure 2-5. For Clause 22 registers, the set is 00. For Clause 45 registers, the set is the Clause 45 Address Location of the Clause 45 register.

FIGURE 2-5: INDIVIDUAL READ AND WRITE COMMANDS



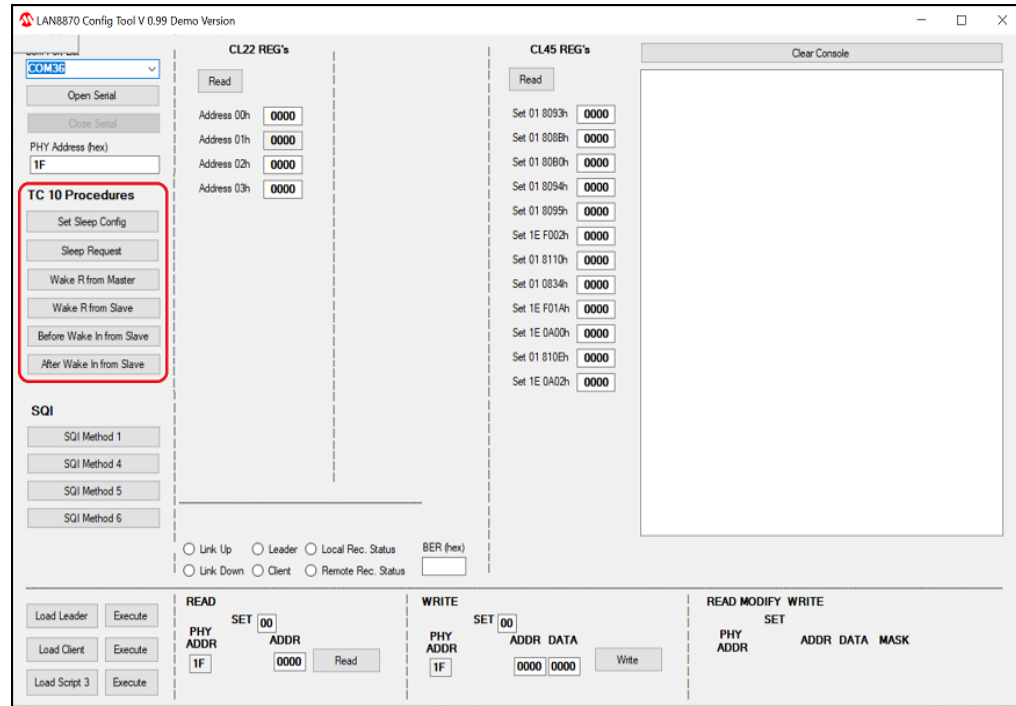
- Load and execute configuration scripts (see Figure 2-6).

FIGURE 2-6: CONFIGURATION LOAD AND EXECUTE



5. Implement TC10 commands for LAN8870B Sleep Setup, Sleep, and Wake Up.

FIGURE 2-7: TC10 SLEEP AND WAKE COMMANDS



The PHY Address is copied from the general setup field (PHY Address (hex)).

The Load Script **buttons** allow users to load three different scripts to execute when the appropriate execute button is clicked. The execution of the script will be displayed inside the console window.

Commands supported inside the script:

- Blank Lines
- # Comment Lines
- sleep command
- r - Read command
- w45 - Write command

The script has to be in `.txt` format. All commands are lowercase letters. The sleep command is followed with a sleep time in [ms] as a decimal value.

The format for a write, of 0xA08F to CL45 Address 0x01, CL45 Register 0x808B is the following:

```
w45 01 0x80 0x8B 0xA08F
```

The format for a read of CL45 Address 0x1F, CL45 Register 0x0A02 for PHY with PHY Address of 0x15 is the following:

```
r 1F 0x0A 0x02 0x15
```

Here is one example of the supported commands:

```
w45 07 0x02 0x00 0x0000
w45 01 0x80 0x93 0x8040
w45 01 0x80 0x8B 0x0084
w45 01 0x80 0xB0 0x001F
w45 01 0x80 0x94 0x0000
r 01 0x08 0x34 0x1F
r 01 0x0A 0x00 0x1F
```

2.4 QUICK START

To quickly start using the board, perform the following steps:

1. If J16 is open, connect USB Micro-A cable to EVB-LAN8870B-MC USB port (J15).
2. If J16 position 1-2 is closed, either connect 5V power supply to J9 or connect USB Micro-A cable to J15.
3. If J16 position 2-3 is closed, connect 5V of an external supply to either J1 or J2 and GND of the external power supply to either J13 or J14.

To perform any configuration changes, launch the MPLAB[®] X IDE software on your management PC and connect a PICKit[™] 4 or newer PICKit to J11 (aligning pin 1).

Chapter 3. Hardware Configuration

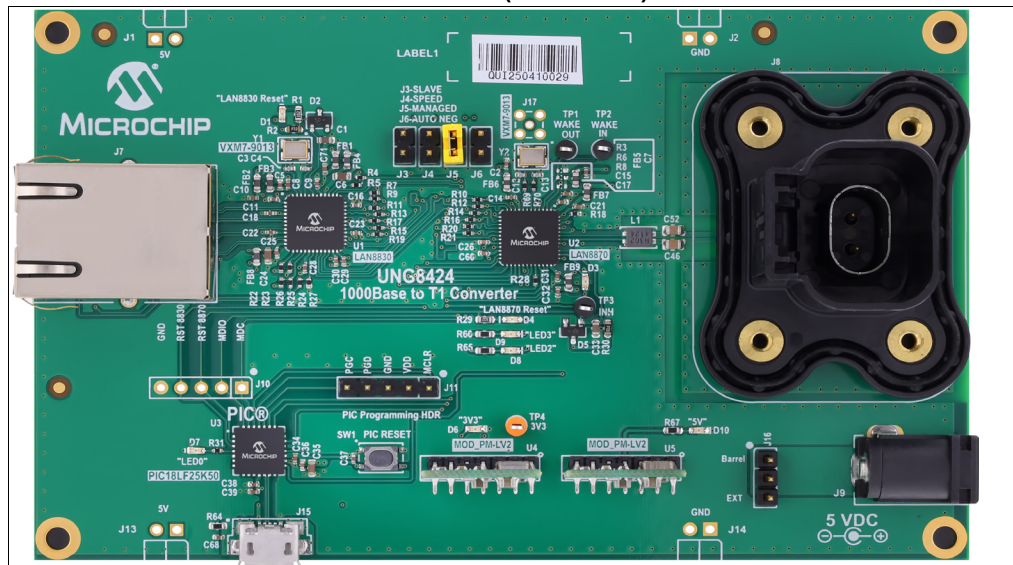
3.1 INTRODUCTION

This chapter features the configuration options for the EVB-LAN8870B-MC as well as detailed information on the jumpers, headers, status LEDs, and other essential parts of the board.

3.2 HARDWARE CONFIGURATION OPTIONS

Figure 3-1 shows the top view of the EVB-LAN8870B-MC.

FIGURE 3-1: EVB-LAN8870B-MC (TOP VIEW)



3.2.1 Jumpers and Headers

The [Section 2.4 “Quick Start”](#) describes the basic setup of the media converter board.

Descriptions of the jumpers are given in [Table 3-1](#), and descriptions of the other headers are given in [Table 3-2](#).

TABLE 3-1: JUMPER DESCRIPTIONS

Jumpers	Description
J3	Master-Slave mode/PHYAD2 Selection. If J5 is open: Open - Master. Closed - Slave If J5 is closed: Open - PHYAD2 = 1. Closed - PHYAD2 = 0
J4	Speed/PHYAD4 Selection. If J5 is open: Open - 1000BASE-T1. Closed - 100BASE-T1 If J5 is closed: Open - PHYAD4 = 1. Closed - PHYAD4 = 0
J5	Managed mode. Open - Autonomous mode. Closed - Managed mode

TABLE 3-1: JUMPER DESCRIPTIONS

Jumpers	Description
J6	Master-Slave mode/PHYAD3 Selection. If J5 is open: Open - Auto-Negotiation Enabled. Closed - Auto-Negotiation Disabled If J5 is closed: Open - PHYAD3 = 1. Closed - PHYAD3 = 0
J9	5V Power Barrel (need J16 in Pos 1-2)
J16	Open: USB Powered. Position 1-2: USB Powered or 5V Power Supply to J9. Position 2-3: Ext 5V Power (Apply positive 5V on either J1 or J13 and GND on either J2 or J14.)

TABLE 3-2: HEADER DESCRIPTIONS

Headers	Description
J1 and J13	+5V power. This is an alternative to powering the board via USB.
J2 and J14	Ground
J4	These signals are controlled by the PIC microcontroller. They should not be controlled externally, but they may be monitored. Pin 1: MDC Pin 2: MDIO Pin 3: LAN8830 Reset Pin 4: LAN8870B Reset Pin 5: Ground
J5	These signals are either controlled by the PIC microcontroller, or are outputs of the LAN8870B. Do not drive them externally. Pin 1: WAKE_IN - Input to the LAN8870B. Pin 2: INH - Output from the LAN8870B.
J11	5-pin PIC programming header
TP1	WAKE OUT Test Point
TP2	WAKE IN Test Point
TP3	INH Test Point
TP4	3.3V Power Test Point
TP5	GND Test Point

3.2.2 Status LEDs

Descriptions of the status LEDs are given in [Table 3-3](#).

TABLE 3-3: LED DESCRIPTIONS

LEDs	Description
D1	LAN8830 Reset Indicator
D3	LAN8870B Link Indicator
D4	LAN8870B Reset Indicator
D6	3V3 Indicator
D7	PIC Programming LED (On = PIC Initialization complete)
D8	Secondary LAN8870B Link Indicator
D9	LAN8870B Master/Slave Indicator
D10	5V Indicator

3.2.3 100BASE-T1/1000BASE-T1 Single-Pair Ethernet Connector

The board comes with a TE DT Highspeed connector for 100BASE-T1/1000BASE-T1 connections. The cable assemblies are TE DT high-speed connectors using Champlain cable P/N 15-09066, which can be found on distributor websites such as Digikey and Mouser.

3.2.4 Reset Push Button

The “SW1 Reset” push button resets the PIC microcontroller, which in turn resets both LAN8830 and LAN8870.

NOTES:



Appendix A. Schematics

A.1 INTRODUCTION

This appendix shows the EVB-LAN8870B-MC schematic.

FIGURE A-1: LAN8870 SCHEMATIC 1

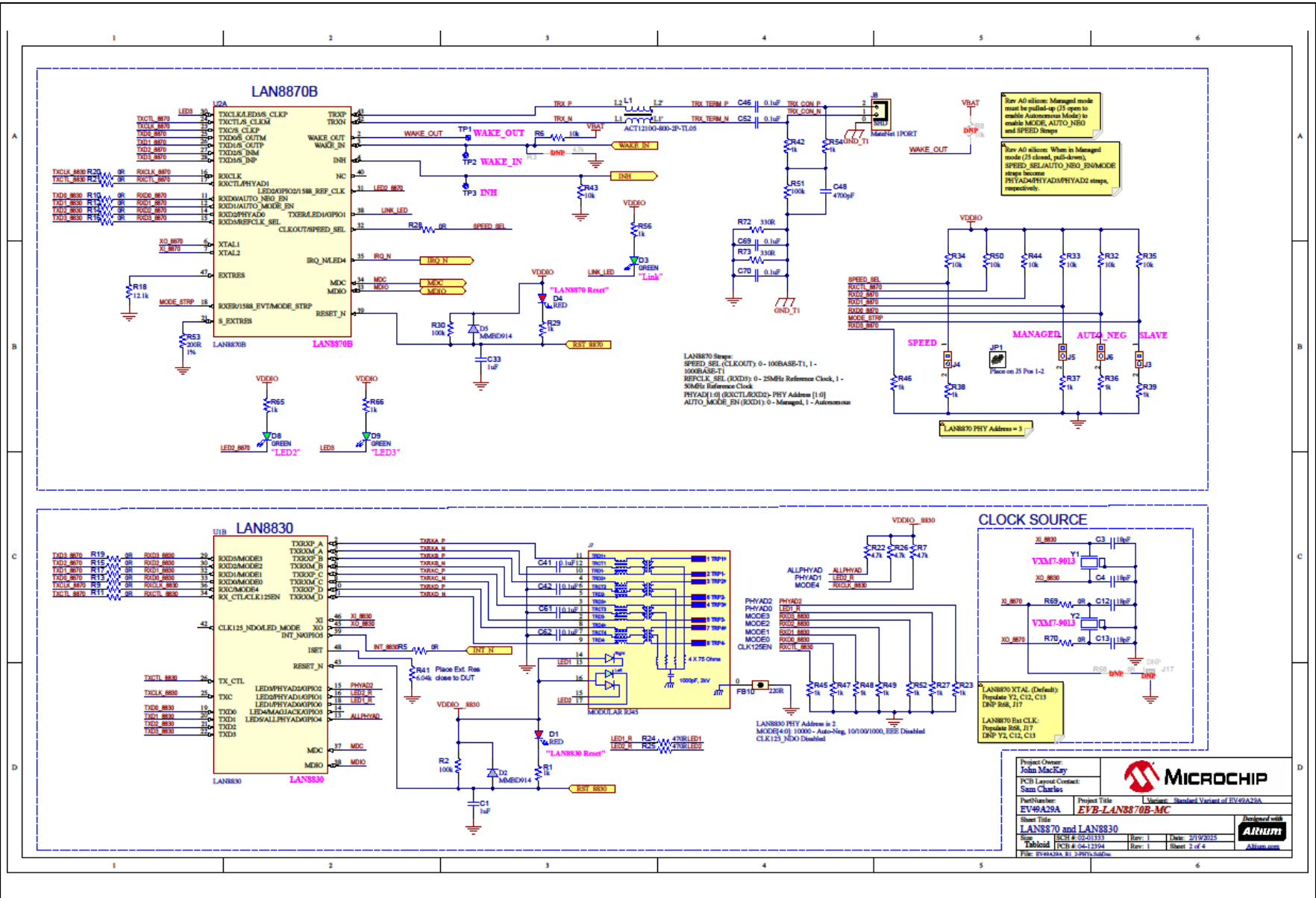
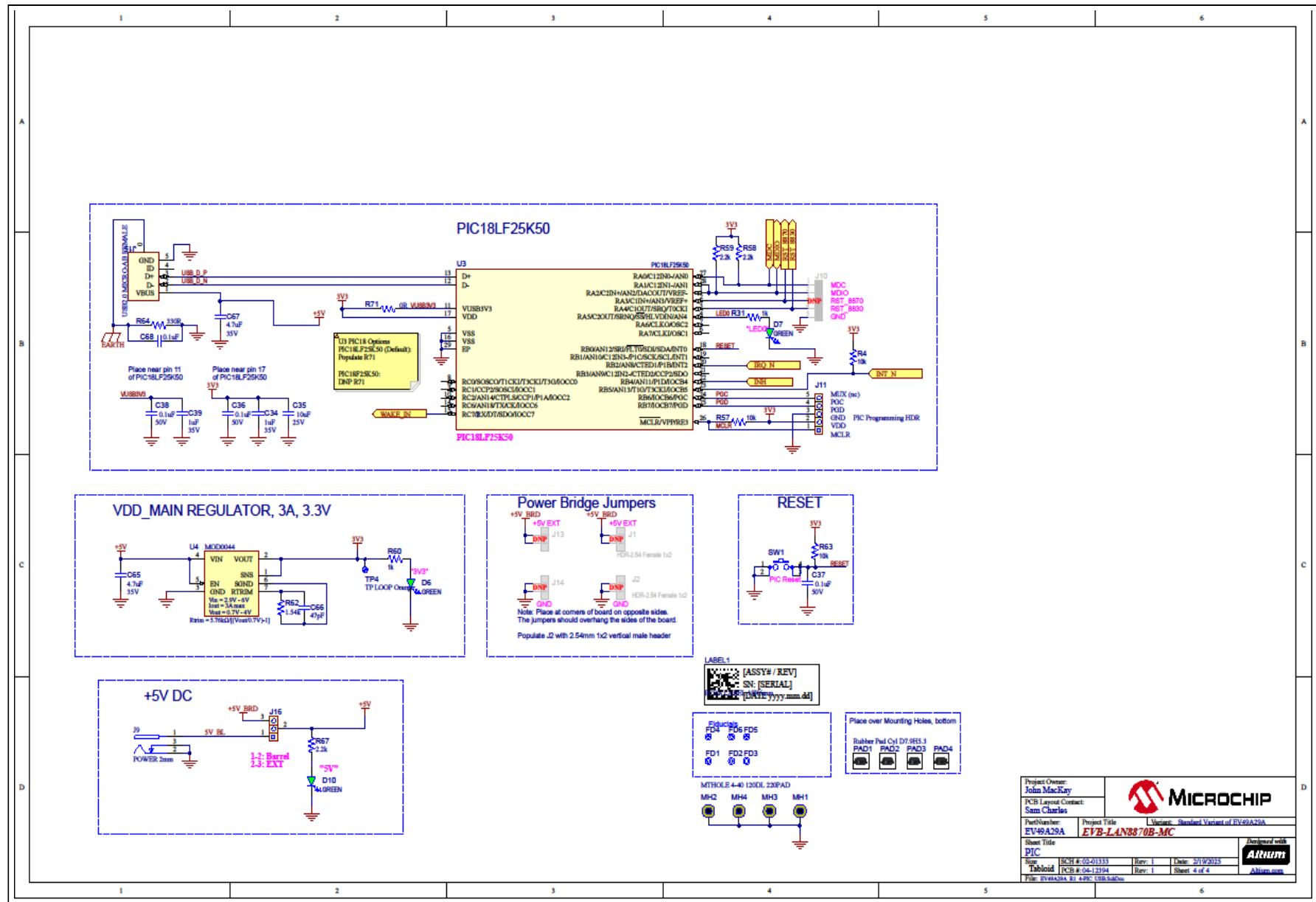


FIGURE A-3: LAN8870 SCHEMATIC 3





Appendix B. Bill of Materials

B.1 INTRODUCTION

This appendix contains the EVB-LAN8870B-MC Bill of Materials (BOM).

TABLE B-1: EVB-LAN8870B-MC BILL OF MATERIALS

Item	Quantity	Designator	Description	Populated	Manufacturer	Manufacturer Part Number
1	2	C1, C33	CAP CER 1uF 16V 10% X5R SMD 0603	YES	AVX	0603YD105KAT2A
2	19	C2, C7, C14, C17, C19, C20, C26, C32, C40, C43, C47, C49, C50, C53, C55, C57, C58, C59, C60	CAP CER 0.1uF 35V 10% X7R SMD 0402	YES	TDK	CGA2B3X7R1V104K050BB
3	4	C3, C4, C12, C13	CAP CER 18pF 50V 5% C0G SMD 0402	YES	Murata	GRM1555C1H180JA01D
4	21	C5, C9, C11, C16, C18, C22, C23, C25, C28, C29, C30, C36, C37, C38, C41, C42, C51, C56, C61, C62, C68	CAP CER 0.1uF 50V 10% X7R SMD 0402	YES	TDK	C1005X7R1H104K050BB
5	3	C6, C24, C35	CAP CER 10UF 25V 20% X5R SMD 0603	YES	Murata Electronics North America	GRM188R61E106MA73D
6	8	C8, C10, C28, C34, C39, C45, C54, C71	CAP CER 1uF 35V 10% X5R SMD 0402	YES	Murata Electronics North America	GRM155R6YA105KE11D
7	5	C15, C21, C27, C31, C44	CAP CER 4.7uF 6.3V 20% X5R SMD 0402	YES	Murata	GRM155R60J475ME47D
8	2	C46, C52	CAP CER 0.1uF 250V 10% X7T SMD 0805	YES	TDK	C2012X7T2E104K125AA
10	1	C48	CAP CER 4700pF 250V 10% X7R SMD 0805	YES	KEMET	C0805C472KARACAUTO
11	3	C63, C65, C67	CAP CER 4.7uF 35V 10% X5R SMD 0603	YES	Murata Electronics North America	GRM188R6YA475KE15D
12	2	C64, C66	CAP CER 47pF 50V 5% NP0 SMD 0603	YES	KEMET	C0603C470J5GACTU
13	2	C69, C70	CAP CER 0.1uF 50V 20% Y5V SMD 0603	YES	KYOCERA AVX	06035G104ZAT2A
14	2	D1, D4	DIO RED 2V 20mA 54mcd CLEAR SMD 0603	YES	Lite-On Inc	LTST-C191KRKT
15	2	D2, D5	DIO RECT MMBD914LT1G 1V 10mA 100V SMD SOT-23-3	YES	ON Semiconductor	MMBD914LT1G
16	6	D3, D6, D7, D8, D9, D10	DIO LED GREEN 2V 30mA 35mcd Clear SMD 0603	YES	Lite-On Inc	LTST-C191KGKT
17	4	FB1, FB2, FB3, FB10	FERRITE 220R@100MHZ 2A SMD 0603	YES	Murata Electronics North America	BLM18EG221SN1D
18	2	FB4, FB8	FERRITE 600mA 120R SMD 0603	YES	TDK	MMZ1608B121CTAH0
19	5	FB5, FB6, FB7, FB9, FB11	FERRITE 600R 500mA SMD 0603	YES	Murata Electronics North America	BLM18AG601SH1D
20	4	J3, J4, J5, J6	CON HDR-2.54 Male 1x2 Gold 5.84MH TH VERT	YES	FCI	77311-118-02LF

TABLE B-1: EVB-LAN8870B-MC BILL OF MATERIALS (CONTINUED)

Item	Quantity	Designator	Description	Populated	Manufacturer	Manufacturer Part Number
21	1	J7	CON MODULAR JACK RJ45 10/100/1000 MAGNETICS 2xLEDs SHIELD TH	YES	Bel-Fuse	L829-1J1T-43
22	1	J8	CON HDR-1.8 MALE 1X2 TIN SHROUD 7MH TH R/A	YES	TE Connectivity	9-2367359-1
23	1	J9	CON POWER 2mm 5.5mm SWITCH TH R/A	YES	CUI	PJ-002AH
24	1	J11	CON HDR-2.54 Male 1x5 Gold 5.84MH TH VERT	YES	FCI	68000-105HLF
25	1	J15	CON USB2.0 MICRO-AB FEMALE SMD R/A	YES	Hirose	ZX62-AB-5PA(31)
26	1	J16	CON HDR-2.54 Male 1x3 AU 5.84MH TH VERT	YES	Samtec Inc	TSW-103-07-G-S
27	1	L1	CM CHOKE 2.4R@100kHz 80uH SMD 3.2X2.5MM AEC-Q200	YES	TDK	ACT1210G-800-2P-TL10
28	2	R1, R29	RES TKF 1k 5% 1/10W SMD 0603	YES	Panasonic	ERJ-3GEYJ102V
29	2	R2, R30	RES TKF 100k 1% 1/10W SMD 0603	YES	Stackpole Electronics Inc	RMCF0603FT100K
30	3	R4, R57, R63	RES TKF 10k 5% 1/16W SMD 0402	YES	Vishay	CRCW040210K0JNED
31	16	R5, R9, R10, R11, R12, R13, R14, R15, R16, R17, R19, R20, R21, R28, R69, R70	RES TKF 0R 1/16W SMD 0402	YES	Yageo	RC0402JR-070RL
32	9	R6, R32, R33, R34, R35, R43, R44, R50, R61	RES TKF 10k 1% 1/16W SMD 0402	YES	TE Connectivity Passive Product	CRG0402F10K
33	5	R7, R22, R26, R40	RES TKF 4.7k 1% 1/16W SMD 0402	YES	Yageo	RC0402FR-074K7L
34	1	R18	RES TKF 12.1k 1% 1/16W SMD 0402	YES	Vishay	CRCW040212K1FKEDC
35	14	R23, R27, R31, R36, R37, R38, R39, R45, R46, R47, R48, R49, R52, R60	RES TF 1k 0.1% 1/16W SMD 0402	YES	Yageo	RT0402BRD071KL
36	2	R24, R25	RES TKF 470R 5% 1/16W SMD 0402	YES	Panasonic	ERJ-2GEJ471X
37	7	R6, R32, R33, R34, R35, R43, R44, R50	RES TKF 10k 1% 1/16W SMD 0402	YES	TE Connectivity Passive Product	CRG0402F10K
38	1	R41	RES TKF 6.04k 1% 1/16W SMD 0402	YES	Yageo	RC0402FR-076K04L
39	2	R42, R54	RES TF 1k 1% 1/2W SMD 1206	YES	Stackpole Electronic Inc	RNCP1206FTD1K00
40	1	R51	RES TKF 100k 1% 1/4W SMD 0603	YES	Vishay	CRCW0603100KFKEAHP
41	1	R53	RES TKF 200R 1% 1/10W SMD 0402	YES	Panasonic	ERJ-2RKF2000X
42	2	R55, R71	RES TKF 0R SMD 0402 AEC-Q200	YES	Panasonic	ERJ-2GE0R00X
43	3	R56, R65, R66	RES TKF 1k 1% 1/10W SMD 0603	YES	Panasonic	ERJ-3EKF1001V
44	2	R58, R59	RES TKF 2.2k 1% 1/10W SMD 0402	YES	Panasonic	ERJ-2RKF2201X
45	2	R62	RES TKF 10k 1% 1/10W SMD 0402	YES	Panasonic	ERJ-2RKF1002X
46	1	R64, R72, R73	RES TKF 330R 1% 1/10W SMD 0603	YES	Panasonic	ERJ-3EKF3300V
47	1	R67	RES TKF 2.2k 1% 1/10W SMD 0603	YES	Panasonic	ERJ-3EKF2201V

TABLE B-1: EVB-LAN8870B-MC BILL OF MATERIALS (CONTINUED)

Item	Quantity	Designator	Description	Populated	Manufacturer	Manufacturer Part Number
48	1	SW1	SWITCH TACT SPST 16V 50mA PTS810 SJM 250 SMTR LFS SMD	YES	C&K Components	PTS810 SJM 250 SMTR LFS
49	3	TP1, TP2, TP3	MISC, TEST POINT MULTI PURPOSE MINI BLACK	YES	Keystone	5001
50	1	TP4	CON TP LOOP Orange TH	YES	Keystone Electronics	5003
51	1	U1	MCHP INTERFACE ETHERNET LAN8830 QFN-48	YES	Microchip Technology	LAN8830/PSA
52	1	U2	MCHP INTERFACE LAN8870B 1000BASE-T1 TRANSCEIVER	YES	Microchip Technology	LAN8870B-V/PUAVAO
53	1	U3	MCHP MCU 8-BIT 48MHz 32kB 2kB PIC18LF25K50-I/ML QFN-28	YES	Microchip Technology	PIC18LF25K50-I/ML
54	1	U4, U5	MCHP PM-LV2 REGULATOR PCB MODULE	YES	Microchip Technology	AC59B05A
55	6	Y1, Y2	MCHP CRYSTAL 25Mhz 10pF SMD L3.2W2.5H0.8	YES	Microchip Technology	VXM7-9013-25M0000000

Appendix C. Silk Screens

C.1 INTRODUCTION

This appendix shows the top and bottom silk screen images of the EVB-LAN8870B-MC.

FIGURE C-1: EVB-LAN8870B-MC TOP SILK SCREEN IMAGE

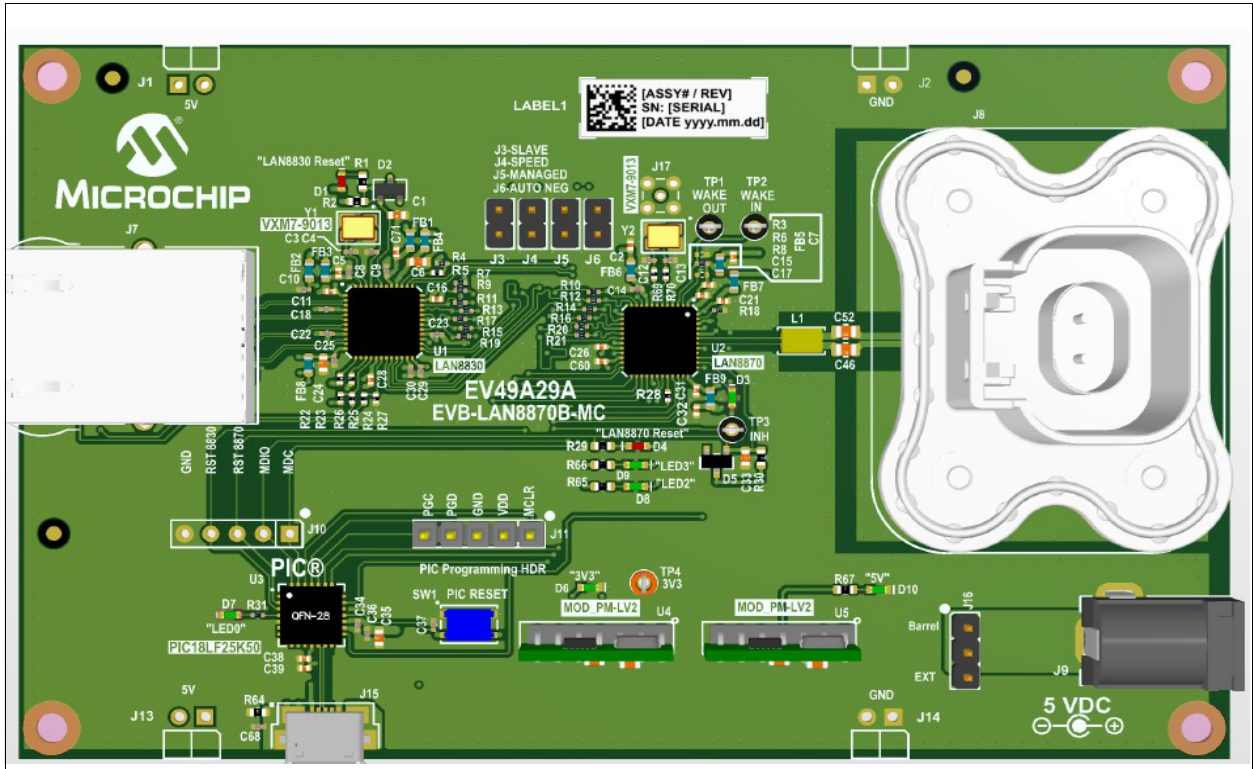
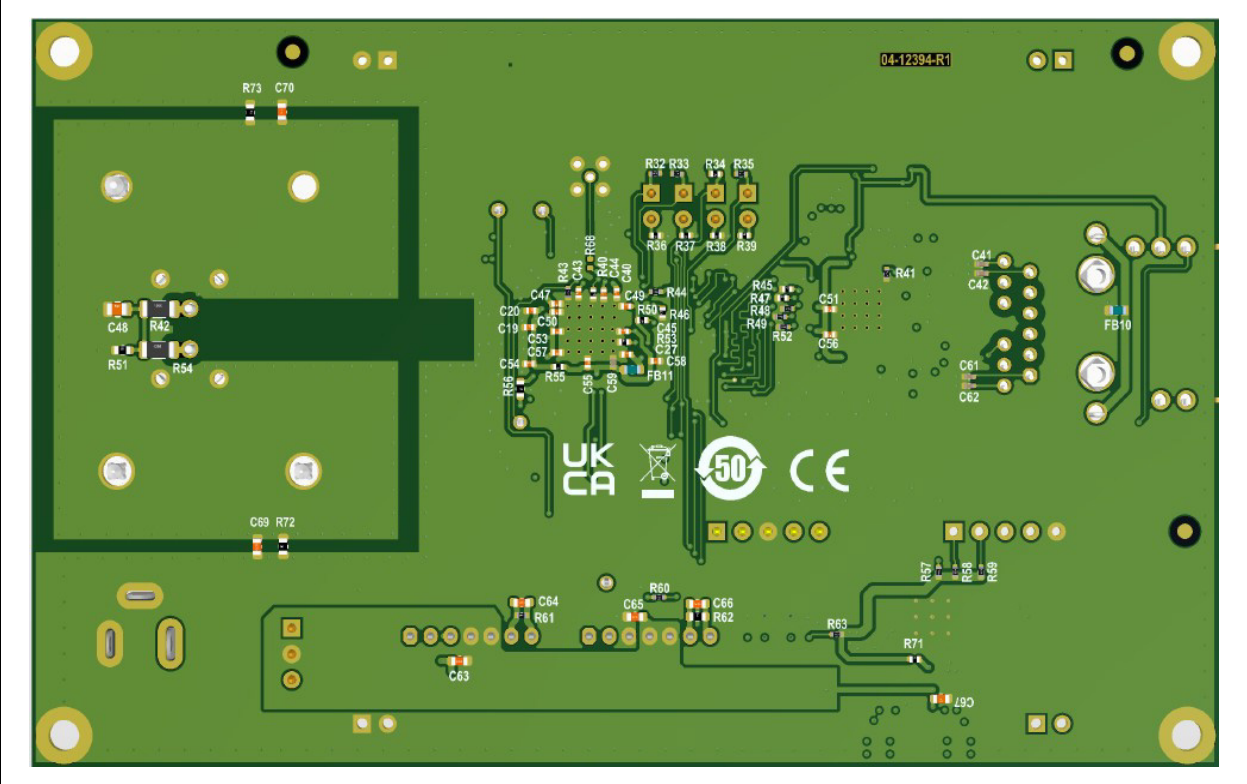


FIGURE C-2: EVB-LAN8870B-MC BOTTOM SILK SCREEN IMAGE



Appendix D. PIC MCU Programming

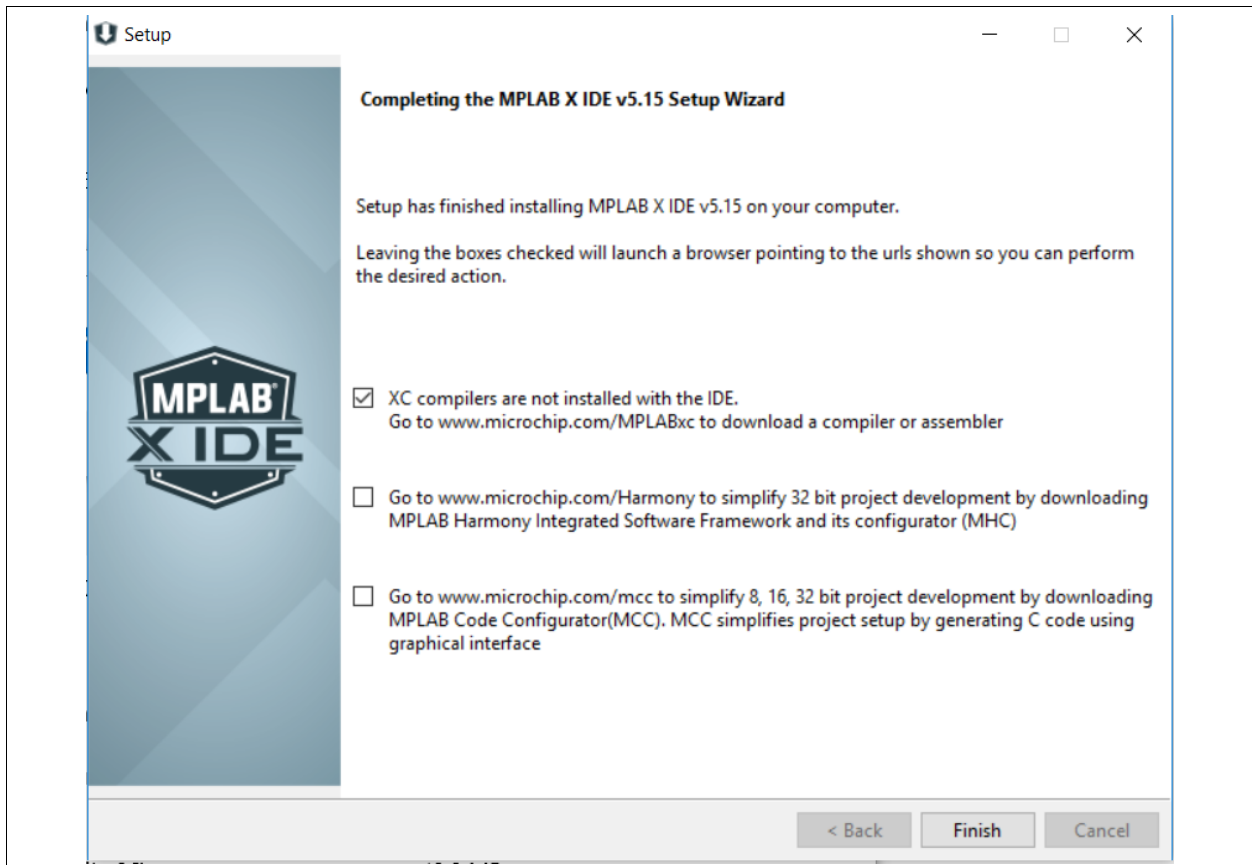
D.1 INTRODUCTION

The EVB-LAN8870B-MC has a PIC18LF25K50 microcontroller that initializes the LAN8870B at power-on and provides user access to the registers via the USB interface. The PIC is already programmed, so users are not expected to reprogram it. However, the following instructions are provided for users who wish to reprogram the PIC with modified initialization code.

D.2 SETTING UP MPLAB X IDE AND MPLAB XC8 COMPILER

1. Download the latest MPLAB X IDE (6.xx) from the Microchip X IDE website.
2. Open the installer. (In Windows®, it will be in the Downloads directory.) Accept the license agreement and click on **Next** on every step to launch the installation.
3. After the installation is finished, the prompt will ask to launch additional items to install. For this, the XC8 Compiler is necessary, but nothing else. See [Figure D-1](#) for items to check and then click on **Finish**. This will open a web page to the Microchip XC Compilers website.

FIGURE D-1: MPLAB X IDE SETUP WIZARD SCREEN



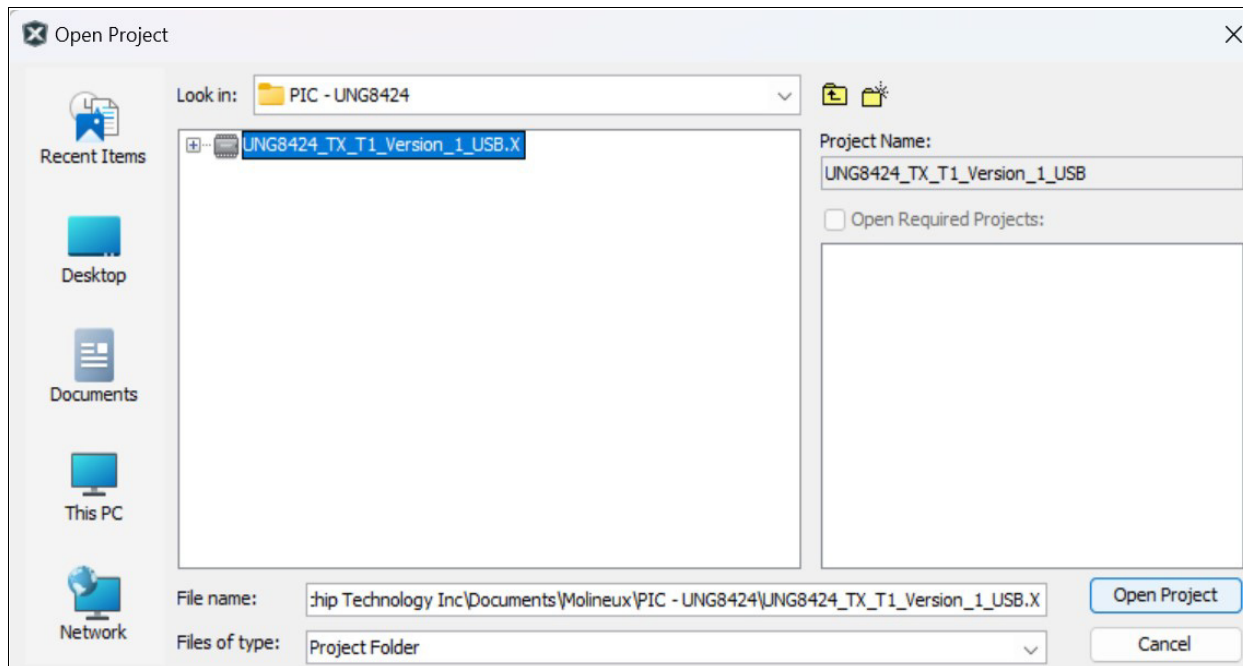
EVB-LAN8870B-MC Evaluation Board User Guide

4. On the Microchip XC Compilers website, download the MPLAB XC8 Compiler.
5. Open the XC8 Compiler installer (same directory as step 2 above). Accept the license agreement and click on **Next** on every step of the installation.
6. Once the installation is complete, click on **Next** (if activating a license, which is not necessary). Activate your license, and then click on **Next**.

D.3 SETTING UP PROJECT IN MPLAB X IDE

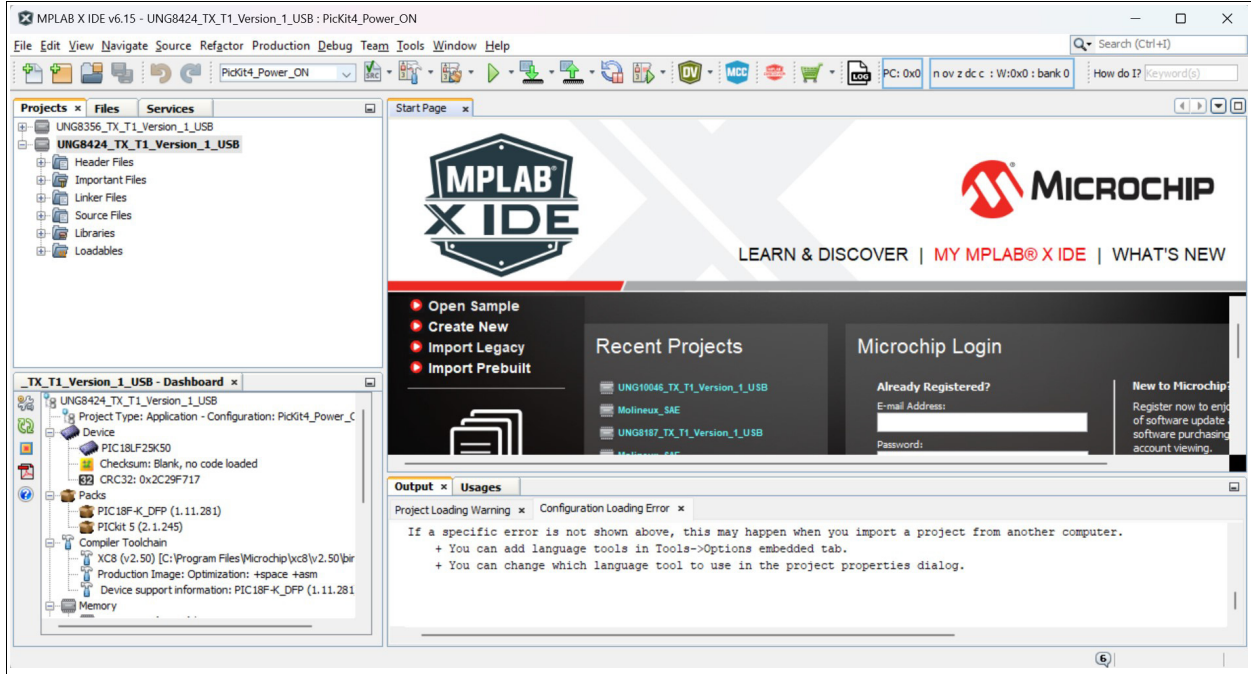
1. Open MPLAB X IDE.
2. Go to *File>Open Project*.
3. Navigate to the folder where UNG8424_TX_T1_Version_1_USB.X folder is located. Highlight and click on **Open Project**.

FIGURE D-2: FOLDER NAVIGATION



4. This will open the project for the 100BASET to 100BASET1 PIC Program. Expand the project in the upper left corner. The PIC is programmed with the register reads and writes in the Initialize_LAN8870() function in the LAN8870.c file (double-click to open). The default programming in this function is to set the LAN8870B to its best interoperability with other 100BASE-T1 link partners, but other reads and writes can be done after the default initialization.

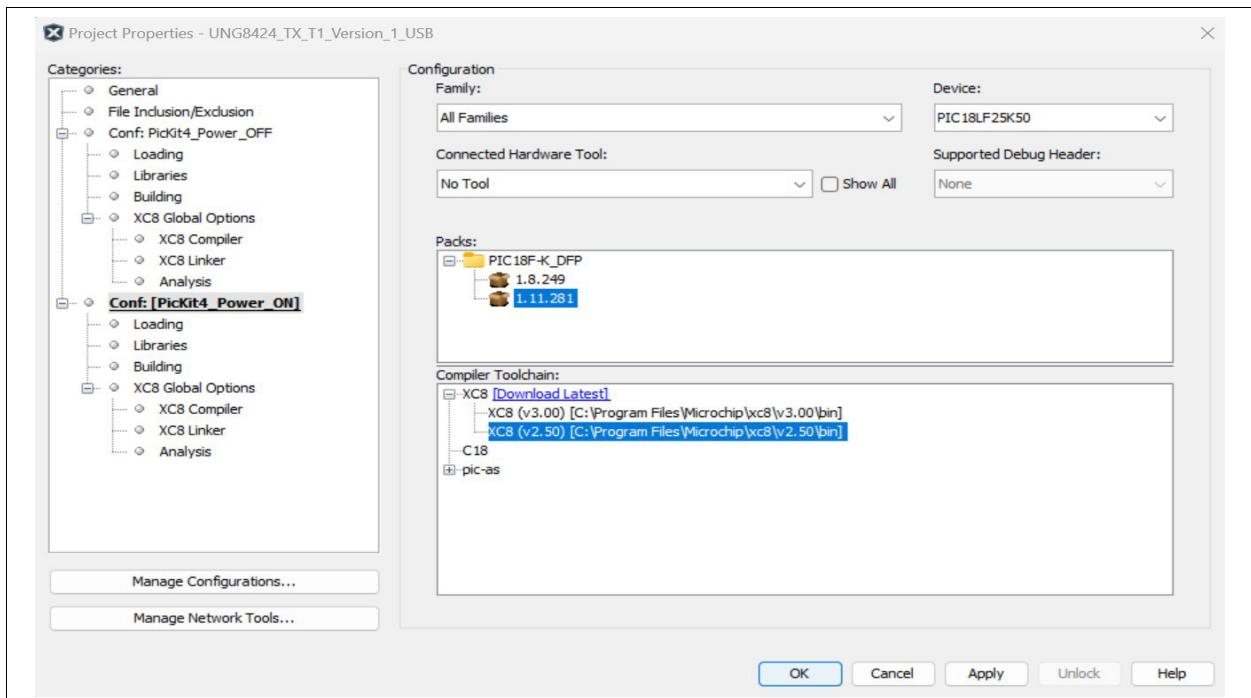
FIGURE D-3: PROJECT SCREEN



D.4 PROGRAMMING THE PIC

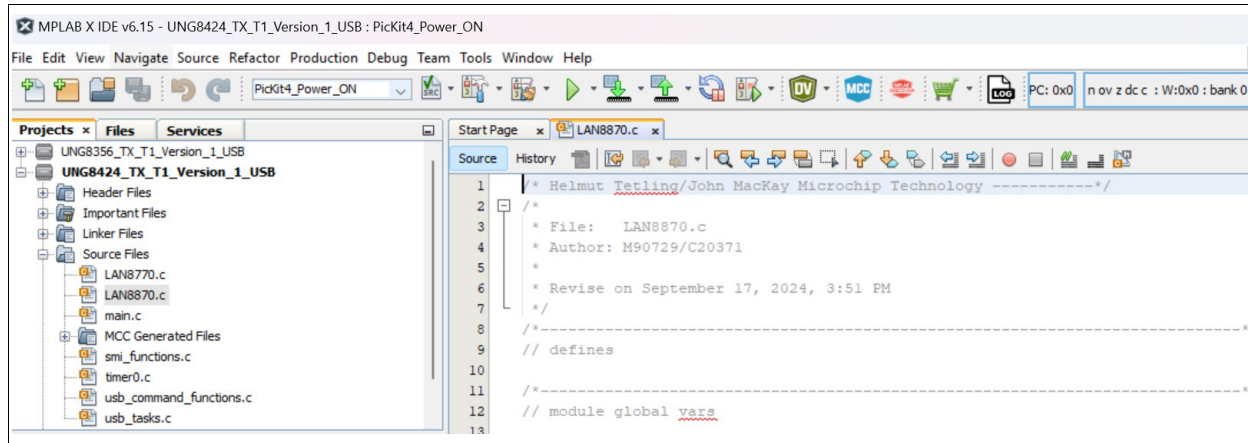
1. To program the PIC microcontroller, connect the programmer to J11 on the EVB-LAN8870B-MC, with pin 1 of J11 lining up with pin 1 of the programmer. Note that the programmer may have additional lines which are not connected to the board's J11 pins. This is acceptable.
2. Go to *Production>Set Project Configuration>Customize*. The window in [Figure D-4](#) will appear. Choose the Hardware Tool (PICKIT4, PICKIT5, etc.) and XC8 compiler. Click on **Apply** and then click on **OK**.

FIGURE D-4: PROJECT CONFIGURATION SCREEN



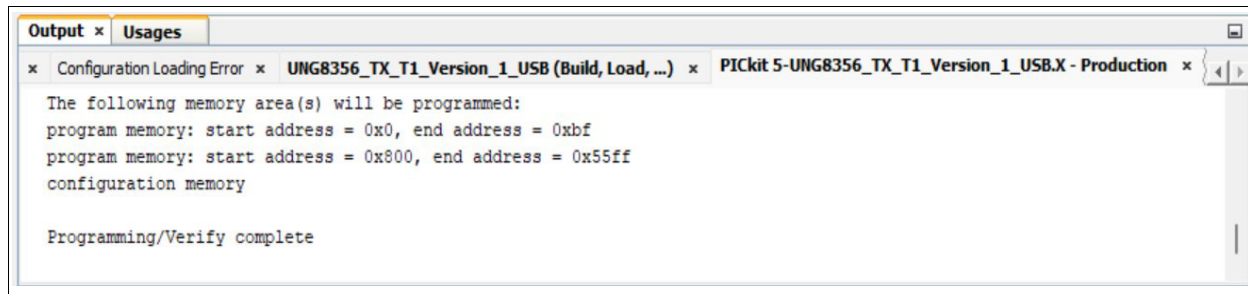
- Click on the green play button in the toolbar to program the PIC.

FIGURE D-5: PROGRAMMING BUTTON IN TOOLBAR



- Check if the bottom right window displays the following when PIC programming is successful:

FIGURE D-6: PROGRAMMING CONFIRMATION



- On the EVB-LAN8870B-MC, press the **Reset** button. This will reset the PIC, which will initialize the LAN8870B registers.