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**EVB-LAN7800LC
Evaluation Board
User's Guide**

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Object of Declaration: EVB-LAN7800LC

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Signed for and on behalf of Microchip Technology Inc. at Chandler, Arizona, USA.


Derek Carlson

VP Development Tools

11-NOV-16
Date

EVB-LAN7800LC Evaluation Board User's Guide

NOTES:

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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 LAN7800. 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 use the EVB-LAN7800LC Evaluation Board as a development tool for the LAN7800, USB 3.0 to Gigabit Ethernet Controller.

- **Chapter 1. “Overview”** – Provides a brief description of the EVB-LAN7800LC Evaluation Board.
- **Chapter 2. “Board Details & Configuration”** – Includes instructions on how to get started with the EVB-LAN7800LC Evaluation Board.
- **Appendix A. “EVB-LAN7800LC Evaluation Board”** – This appendix shows the physical EVB-LAN7800LC Evaluation Board.
- **Appendix B. “EVB-LAN7800LC Schematics”** – This appendix shows the EVB-LAN7800LC Evaluation Board schematics.
- **Appendix C. “EVB-LAN7800LC BOM”** – This appendix includes the EVB-LAN7800LC Evaluation Board Bill of Materials (BOM).
- **Appendix D. “EVB-LAN7800LC Silk Screen”** – This appendix includes the EVB-LAN7800LC Evaluation Board silk screen.

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>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>
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) { ... }

THE MICROCHIP WEB SITE

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The Development Systems product group categories are:

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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.

CUSTOMER SUPPORT

Users of Microchip products can receive assistance through several channels:

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

EVB-LAN7800LC Evaluation Board User's Guide

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
Rev. x (12-07-16)	Initial release.	

Chapter 1. Overview

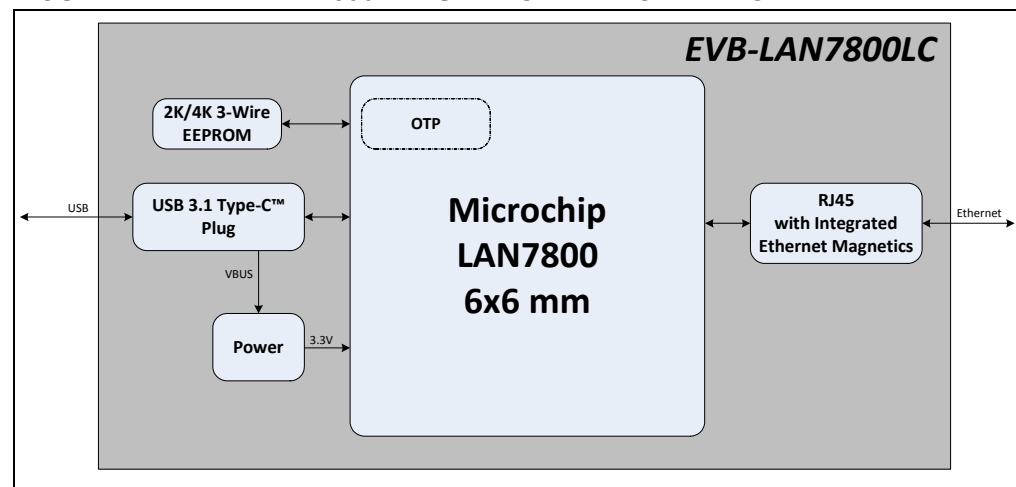
1.1 INTRODUCTION

The EVB-LAN7800LC is a USB Type-C™ dongle for demonstration and evaluation of the LAN7800 USB 3.1 Gen 1 Gigabit Ethernet Controller on a 4-layer RoHS-compliant Printed Circuit Board (PCB). This board has been developed to allow the user to gain an understanding of the product and accelerate the integration of the LAN7800 into their design. The LAN7800 is compliant with the USB 3.1 USB Specification and supports Super-Speed (SS), High-Speed (HS), Full-Speed (FS), and Low-Speed (LS) USB signaling for complete coverage of all defined USB operation speeds. It also supports 10BASE-T/100BASE-TX/1000BASE-T Ethernet (Full-Duplex Support), 802.3az Energy Efficient Ethernet, VLAN tagging, and is available in commercial and industrial temperature ranges. The EVB-LAN7800LC is configured for operation through internal default settings and supports custom configurations through the external 4Kbit EEPROM device or internal OTP. The EVB-LAN7800LC demonstrates driver compatibility with Microsoft® Windows® 10, Windows 8x, Windows 7, Mac OS® X 10.4+, and Linux® hub drivers.

The EVB-LAN7800LC provides the following features:

- LAN7800 in a 48-pin SQFN 6x6 mm RoHS compliant package
- USB 3.1 Gen 1 compliant (SS, HS, FS, and LS operation)
- 10BASE-T/100BASE-TX/1000BASE-T Ethernet support
- Optional on-board EEPROM for external downloadable firmware
- USB Type-C connector for USB 3.1
- Low-cost 4-layer space-saving design
- Operates from VBUS
- On-board 25 MHz crystal
- Power, Ethernet link/activity and duplex/collision LED indicators
- PME event also available in hardware for Wake-on-LAN

FIGURE 1-1: EVB-LAN7800LC FUNCTIONAL BLOCK DIAGRAM



1.2 REFERENCES

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

- LAN7800 Datasheet
- EVB-LAN7800LC Schematics

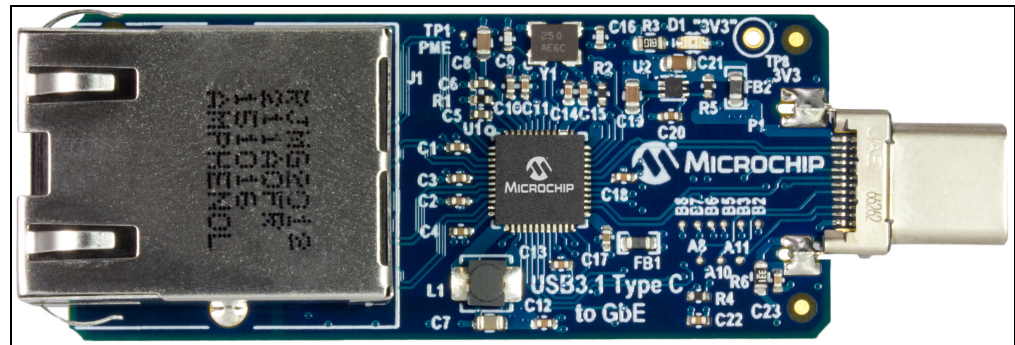
Chapter 2. Board Details & Configuration

2.1 INTRODUCTION

The Microchip EVB-LAN7800LC is designed for flexible configuration solutions. It can be configured via default internal register settings or by downloadable external firmware to an on-board EEPROM.

Figure 2-1 displays the EVB-LAN7800LC evaluation board.

FIGURE 2-1: EVB-LAN7800LC



2.2 POWER SOURCE

The EVB-LAN7800LC is designed for bus-powered operation. There are no configuration jumpers on the board.

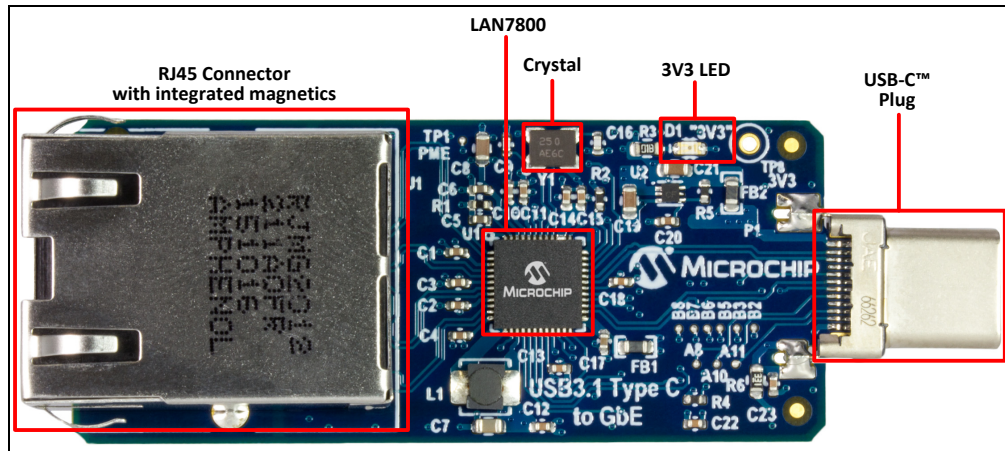
2.3 CLOCK

The EVB-LAN7800LC utilizes an on-board 25 MHz 30 ppm crystal to drive its internal oscillator circuit.

2.4 BOARD FEATURES AND CONFIGURATION

The following sections describe the board connectors and main components. [Figure 2-2](#) provides a top view of the EVB-LAN7800LC.

FIGURE 2-2: EVB-LAN7800LC TOP VIEW



2.4.1 External EEPROM / Internal OTP

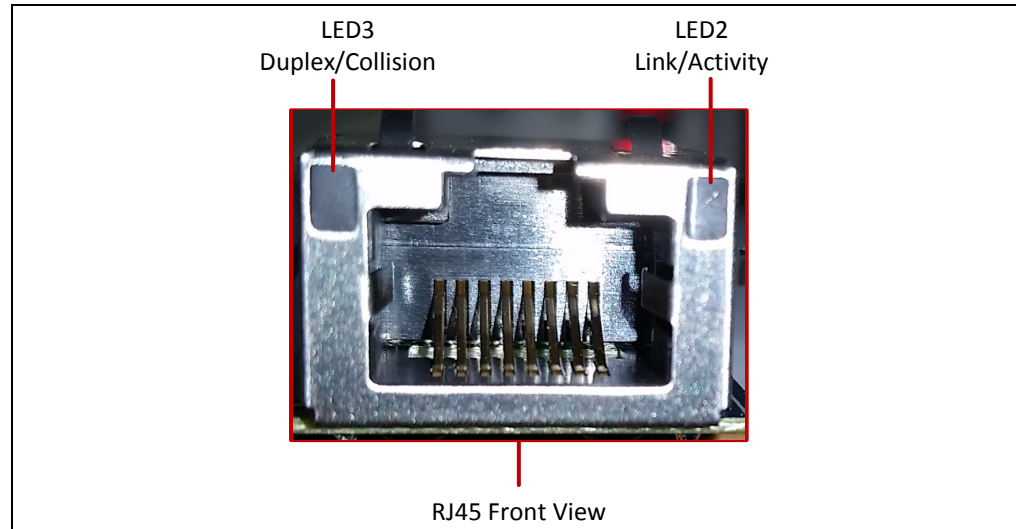
At power-up, the LAN7800 searches for an external EEPROM. If an external EEPROM is detected the LAN7800 configuration is loaded from it. If no EEPROM is found, the device checks for OTP. If there is no OTP, the device will use default CSR settings. The EEPROM stores the default values for the USB descriptors and the MAC address. The EEPROM is always present and enabled in the EVB-LAN7800LC.

2.4.2 Link Status LEDs

There are two LED indicators on the RJ45 connector, as shown in [Figure 2-3](#).

- **Link/Act:** LED is ON with network activity.
- **Duplex/Collision:** LED is ON in full-duplex mode. LED is OFF in half-duplex mode. LED is blinking during collision.

FIGURE 2-3: ENABLE LINK STATUS LEDs



2.4.3 PME Operation

The LAN7800 support PME (Power Management Events) for WoL (Wake-on-LAN). To enable PME operation, follow these steps:

1. TP1 is connected to the PME_MODE pin. Connect this pin to the embedded controller via fly-wire (see [Figure 2-4](#)).
2. Solder a 10 K Ω resistor at R12 and solder a wire from PME_N net to external embedded controller (see [Figure 2-5](#)).

FIGURE 2-4: PME_MODE TEST POINT TP1

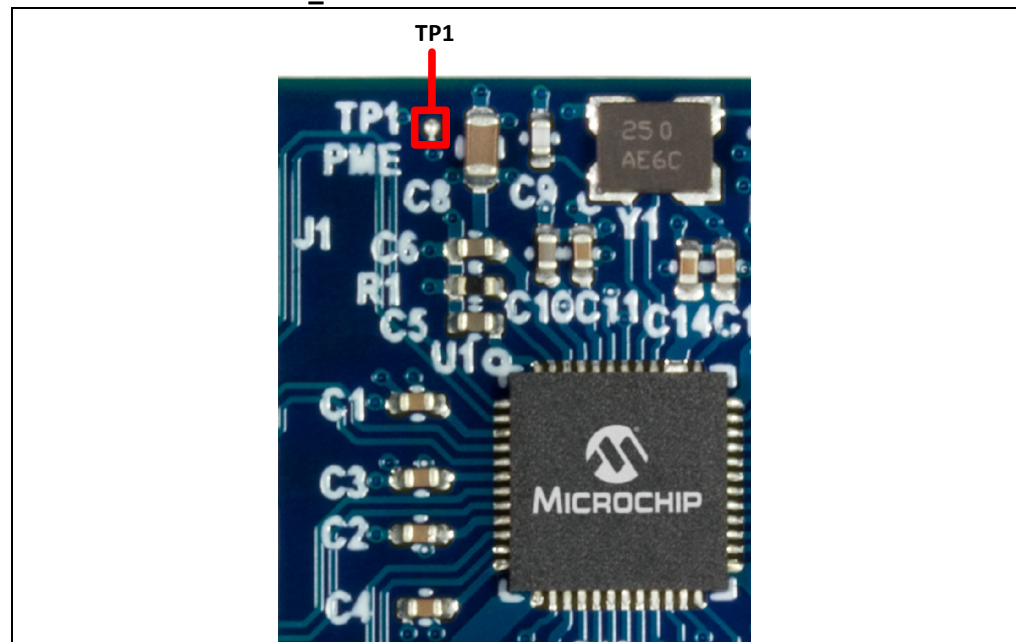
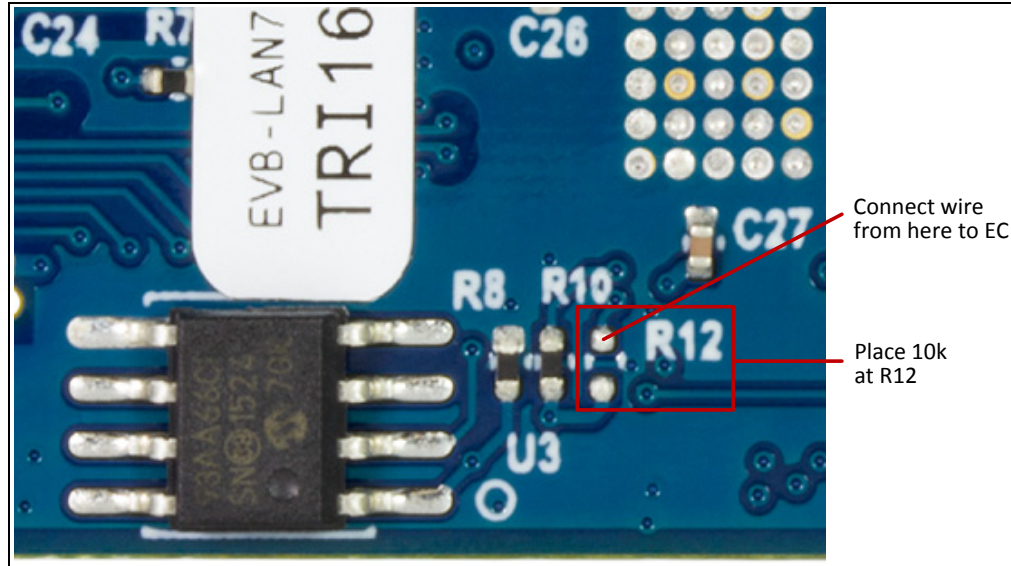


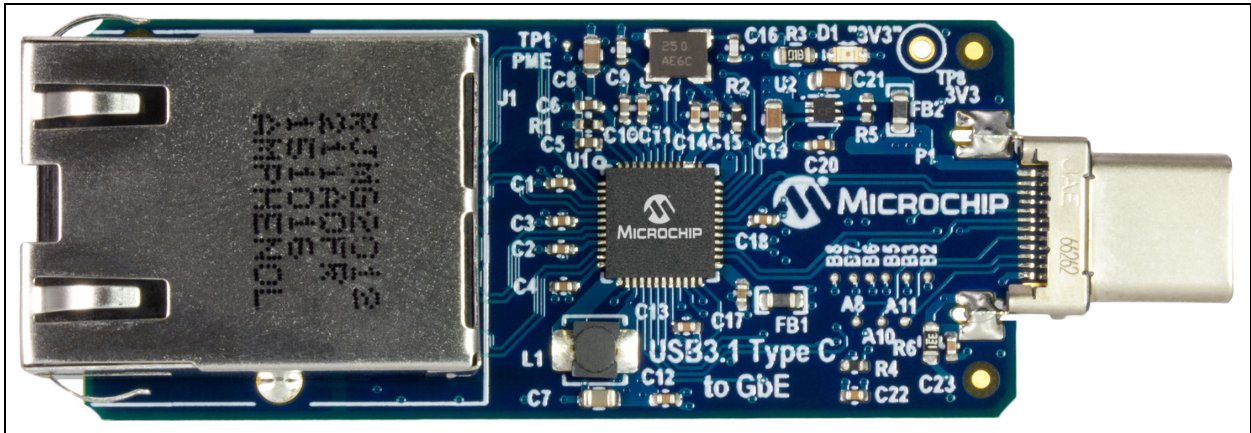
FIGURE 2-5: PME_N PULL-UP



Appendix A. EVB-LAN7800LC Evaluation Board

A.1 INTRODUCTION

This appendix shows the EVB-LAN7800LC Evaluation Board.

FIGURE A-1: EVB-LAN7800LC EVALUATION BOARD

NOTES:

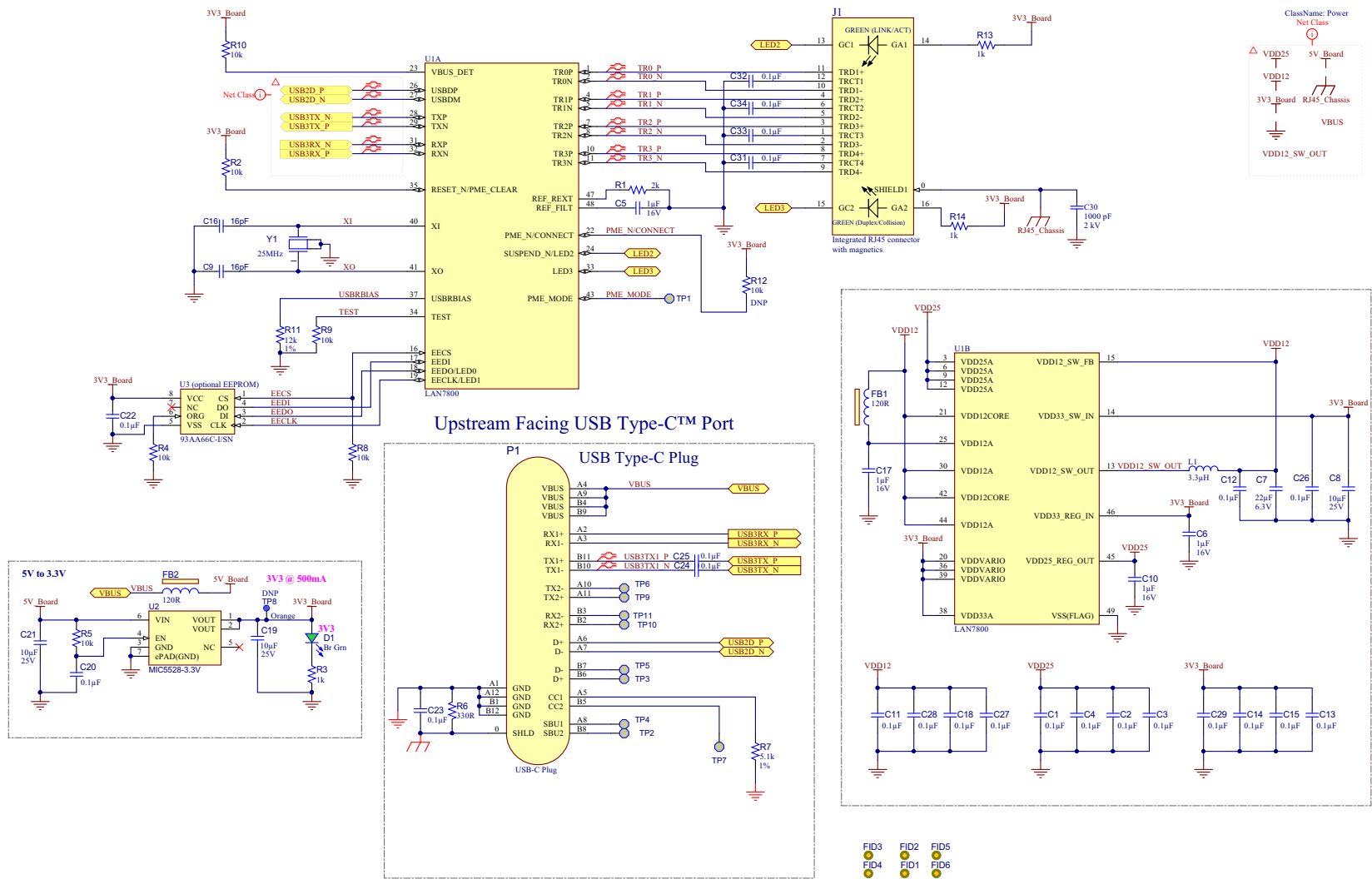


Appendix B. EVB-LAN7800LC Schematics

B.1 INTRODUCTION

This appendix includes the EVB-LAN7800LC Evaluation Board schematics.

FIGURE B-1: EVB-LAN7800LC EVALUATION BOARD SCHEMATIC



Appendix C. EVB-LAN7800LC BOM

C.1 INTRODUCTION

This appendix shows the EVB-LAN7800LC Evaluation Bill of Materials:

TABLE C-1: BILL OF MATERIALS

Designator	Description	Manufacturer	Manufacturer Part Number	Quantity
C1, C2, C3, C4, C11, C12, C13, C14, C15, C18, C20, C22, C23, C24, C25, C26, C27, C28, C29, C31, C32, C33, C34	CAP CER 0.1 µF 35V 10% X7R SMD 0402	TDK Corporation	CGA2B3X7R1V104K050BB	23
C5, C6, C10, C17	CAP CER 1 µF 16V 10% X5R SMD 0402	TDK Corporation	C1005X5R1C105K	4
C7	CAP CER 22 µF 6.3V 20% X5R SMD 0603	Samsung Electro-Mechanics America, Inc	CL10A226MQ8NRNC	1
C8, C19, C21	CAP CER 10 µ 25V 20% X5R SMD 0603	Murata Electronics North America	GRM188R61E106MA73D	3
C9, C16	CAP CER 16 pF 5% 50V NPO 0402	Murata	GRM1555C1H160JA01D	2
C30	CAP CER 1000 pF 2KV 10% X7R 1808	Murata Electronics	GR442QR73D102KW01L	1
D1	LED, Bright Green, 0603	Lite-On	LTST-C191KGKT	1
FB1, FB2	FERRITE 600 mA 120R SMD 0603	TDK Corporation	MMZ1608B121CTAH0	2
J1	CON MODULAR RJ45 MAGJACK® TH R/A	Amphenol Commercial Products	RJMG2012211A0FR	1
J1 (Alternate)	CON MODULAR RJ45 MAGJACK TH R/A	E&E Magnetcs Products	EJFR0108	1
L1	Inductors 3.3 µH 1.23A 20%	TDK	VLF302515MT-3R3M	1
P1	CON USB TYPE-C PLUG USB 3.1 SMD MIDMNT R/A	JAE Electronics	DX07P024MJ1R1500	1
R1	RES TKF 2k 1% 1/10W SMD 0402	Panasonic Electronic Components	ERJ-2RKF2001X	1
R2, R4, R5, R8, R9, R10	RES TKF 10k 1% 1/10W SMD 0402	Panasonic	ERJ-2RKF1002X	6
R3, R13, R14	RES TKF 1k 5% 1/10W SMD 0603	Panasonic	ERJ-3GEYJ102V	3
R6	RES MF 330R 5% 1/16W SMD 0603	Panasonic Electronic Components	ERA-V33J331V	1
R7	RES SMD 5.1 KΩ 1% 1/10W 0402	Panasonic Electronic Components	ERJ-2RKF5101X	1
R11	RES TKF 12k 1% 1/16W SMD 0402	Rohm Semiconductor	MCR01MZPF1202	1
R12	RES TKF 10k 1% 1/10W SMD 0402	Panasonic	ERJ-2RKF1002X	0
TP8	TEST POINT PC MINI .040"D ORANGE	Keystone Electronics	5003	1
U1	LAN7800 SuperSpeed USB 3.1 Gen110/100/1000 Ethernet Controller	Microchip Technology	LAN7800/VSX	1
U2	IC, LDO, 2.5 to 5.5Vin, 3.3Vout, 0.5A, DFN6 1.2 mm X 1.2 mm	Microchip Technology - Micrel	MIC5528-3.3YMT-TR	1
U3	4k 1.8V Microwire Serial EEPROM	Microchip Technology	93AA66C-I/SN	1
Y1	Crystal 25 MHz 6 pF SMD 4Pin DFN LCC	Murata Electronics North America	ABM8G-25.000MHZ-B4Y-T	1

NOTES:

Appendix D. EVB-LAN7800LC Silk Screen

D.1 INTRODUCTION

This appendix shows the EVB-LAN7800LC Top and Bottom Silk Screen images.

FIGURE D-1: EVB-LAN7800LC TOP SILK SCREEN

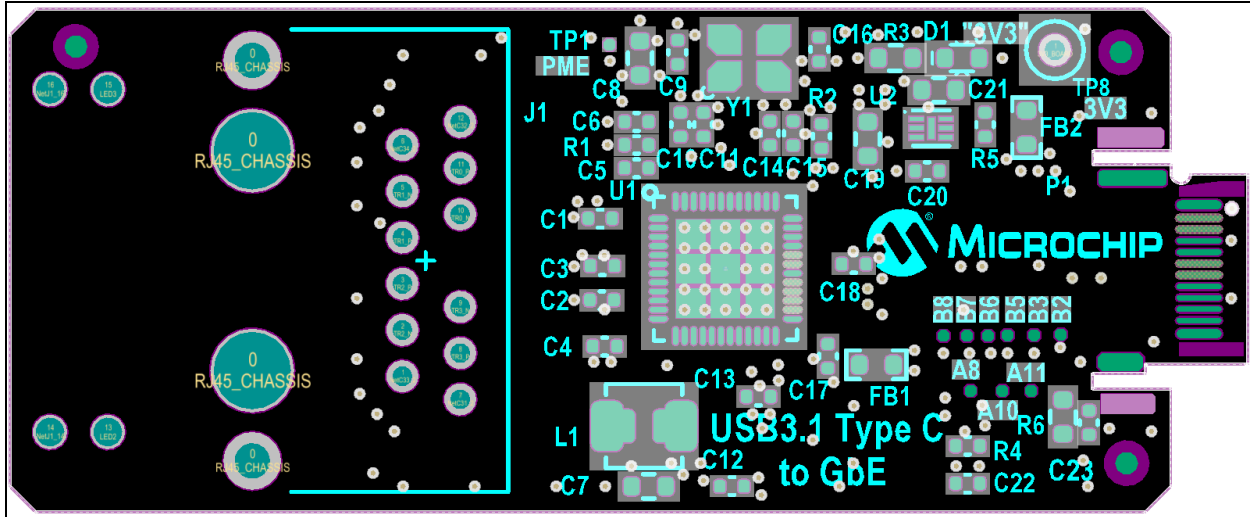
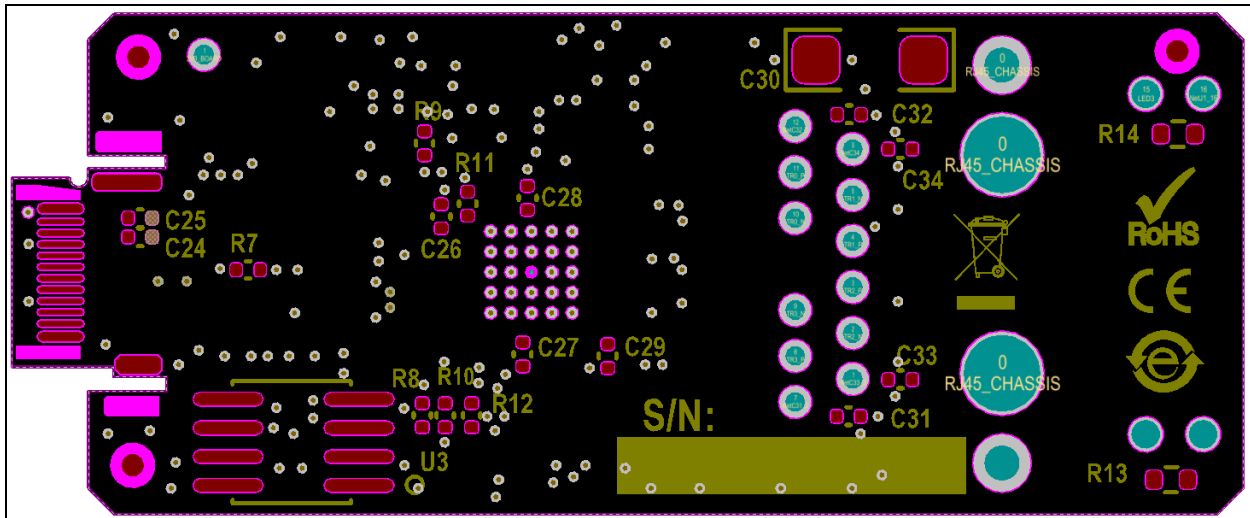


FIGURE D-2: EVB-LAN7800LC BOTTOM SILK SCREEN





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