EVB-LAN9500A-LC Evaluation Board User's 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 "DSXXXXXA", 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 the EVB-LAN9500A-LC Evaluation Board. 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-LAN9500A-LC Evaluation Board as a high-performance and low-cost USB/Ethernet connectivity solution.

The manual layout is as follows:

- **Chapter 1. "Overview"** – Shows a brief description of the EVB-LAN9500A-LC Evaluation Board.
- **Chapter 2. "Getting Started"** – Includes information about the EVB-LAN9500A-LC Evaluation Board.
- **Appendix A. "EVB-LAN9500A-LC Evaluation Board"** – This appendix shows the EVB-LAN9500A-LC Evaluation Board.
- **Appendix B. "Schematics"** – This appendix shows the EVB-LAN9500A-LC Evaluation Board schematic.
- **Appendix C. "Bill of Materials"** – This appendix includes the EVB-LAN9500A-LC Evaluation Board Bill of Materials (BOM).

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	*File>Save*
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	*`file`*`.o`, where *`file`* can be any valid filename
Square brackets [ ]	Optional arguments	`mcc18 [options]` *`file`* `[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) { ... }`

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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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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
DS50002241B (09-12-18)	Figure 2-1 and Figure A-1	Updated and made changes to the board.
	Figure 2-2	Updated the figure.
	Figure B-1	Updated the schematics diagram.
	Table C-1	Updated the Bill of Materials section.
	Section 1.2 "References"	Moved the References section to Chapter 1 and removed the Appendix D. References section.
	All	Made minor text changes throughout.
DS50002241A (01-18-14)	Initial release	

Chapter 1. Overview

1.1 INTRODUCTION

The LAN9500A is a high-performance, small form factor solution for USB to 10/100 Ethernet port bridging. With applications ranging from embedded systems, set-top boxes, and PVRs, to USB port replicators, USB to Ethernet adapters, PC docking stations, and test instrumentation, the LAN9500A is targeted as a high-performance and low-cost USB/Ethernet connectivity solution.

The LAN9500A contains an integrated 10/100 Ethernet PHY, USB PHY, Hi-Speed USB 2.0 device controller, 10/100 Ethernet MAC, TAP controller, EEPROM controller, and a FIFO controller with a total of 30 KB of internal packet buffering. The LAN9500A complies with the IEEE 802.3 (full-/half-duplex 10BASE-T and 100BASE-TX) Ethernet protocol and USB 2.0 specification, enabling compatibility with industry standard Fast Ethernet and USB 2.0 applications.

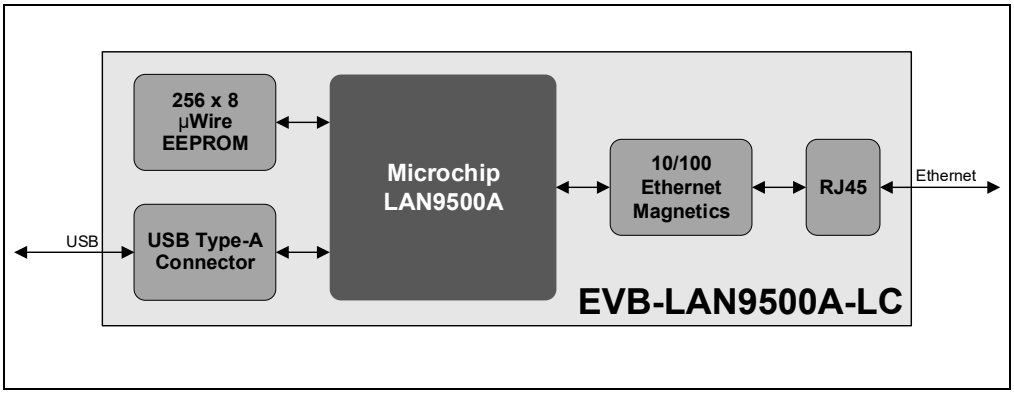
The EVB-LAN9500A-LC is an evaluation board that utilizes the LAN9500A to provide a fully-functional, bus-powered USB to Ethernet interface. The EVB-LAN9500A-LC provides fully-integrated Ethernet and USB ports via the on-board RJ45 and USB Type-A connectors. The on-board 256x8 EEPROM is used to load the EVB-LAN9500A-LC's USB configuration parameters and MAC address.

LAN95xx software drivers are available for Windows® XP, Windows Vista, Mac® OS X, Linux®, and Windows CE. Additional manufacturing and diagnostic tools are available for debugging and external EEPROM configuration. For complete details, refer to the *LAN95xx Software User Manual*.

Note: For additional support about the EVB-LAN9500A-LC, contact Microchip's Embedded Solution Engineer (ESE) or refer to Microchip's LANCheck Online Design Review.

A simplified block diagram of the EVB-LAN9500A-LC is illustrated in Figure 1-1.

FIGURE 1-1: EVB-LAN9500A-LC 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.

- *LAN9500A Data Sheet*
- *AN 8.13 Suggested Magnetics*
- *EVB-LAN9500A-LC Evaluation Board Schematic*
- *LAN95xx Software User Manual*

Chapter 2. Getting Started

2.1 BOARD DETAILS

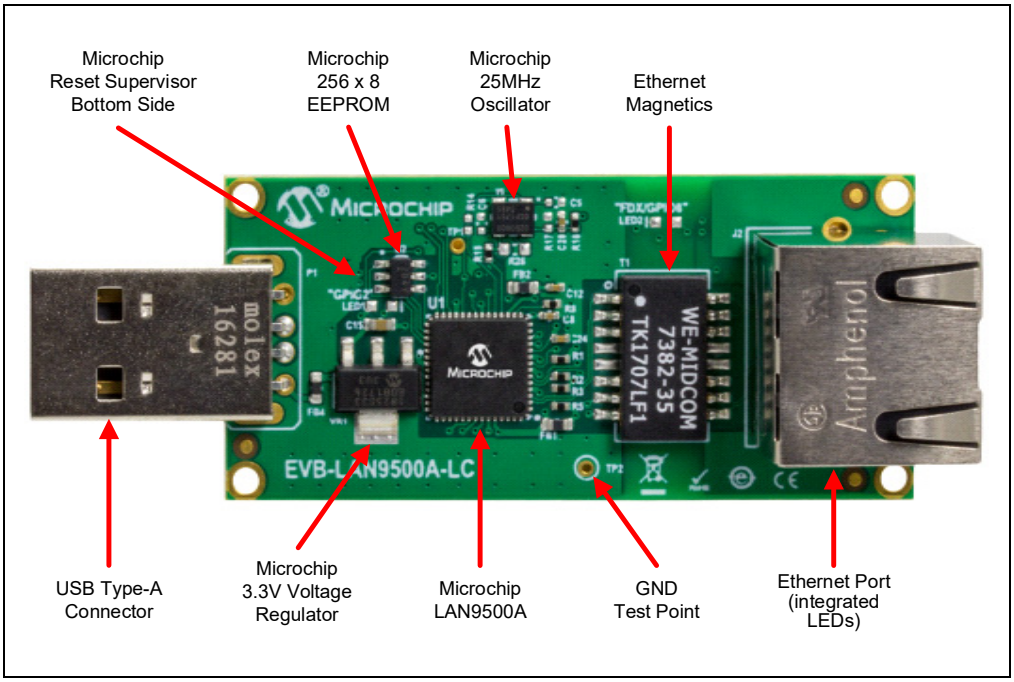
This section includes the following EVB-LAN9500A-LC board details:

- Configuration
- Mechanicals

2.1.1 Configuration

The following sub-sections describe the various board features including LEDs, test points, and system connections. A top view of the EVB-LAN9500A-LC is shown in Figure 2-1.

FIGURE 2-1: EVB-LAN9500A-LC TOP VIEW



2.1.1.1 LEDS

Table 2-1 describes the EVB-LAN9500A-LC LEDs.

TABLE 2-1: LEDS

References	Color	Indication
J2	Green	Ethernet Link/Activity **Solid:** Link established **Blinking:** Link activity **OFF:** No link
	Yellow	Ethernet Speed **ON:** 100BASE-TX **OFF:** 10BASE-T

2.1.1.2 TEST POINTS

Table 2-2 describes the EVB-LAN9500A-LC test point.

TABLE 2-2: TEST POINTS

Test Point	Description	Connection
TP2	Single Pin Gold Post GND Test Point	GND

2.1.1.3 SYSTEM CONNECTIONS

Table 2-3 describes the EVB-LAN9500A-LC system connections.

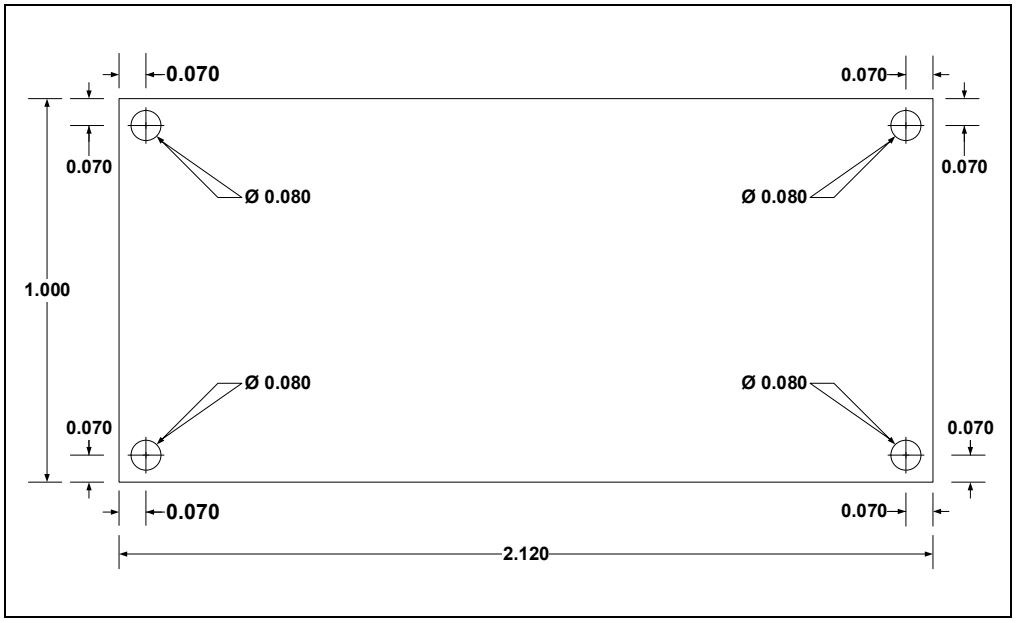
TABLE 2-3: SYSTEM CONNECTIONS

Plug/Header	Description	Part
P1	USB Type-A Plug	Molex® 48037-0001
J2	RJ45 with Integrated LEDs	Amphenol® RJHSE-5281

2.1.2 Mechanicals

Figure 2-2 shows the EVB-LAN9500A-LC mechanical dimensions in detail.

FIGURE 2-2: EVB-LAN9500A-LC MECHANICALS

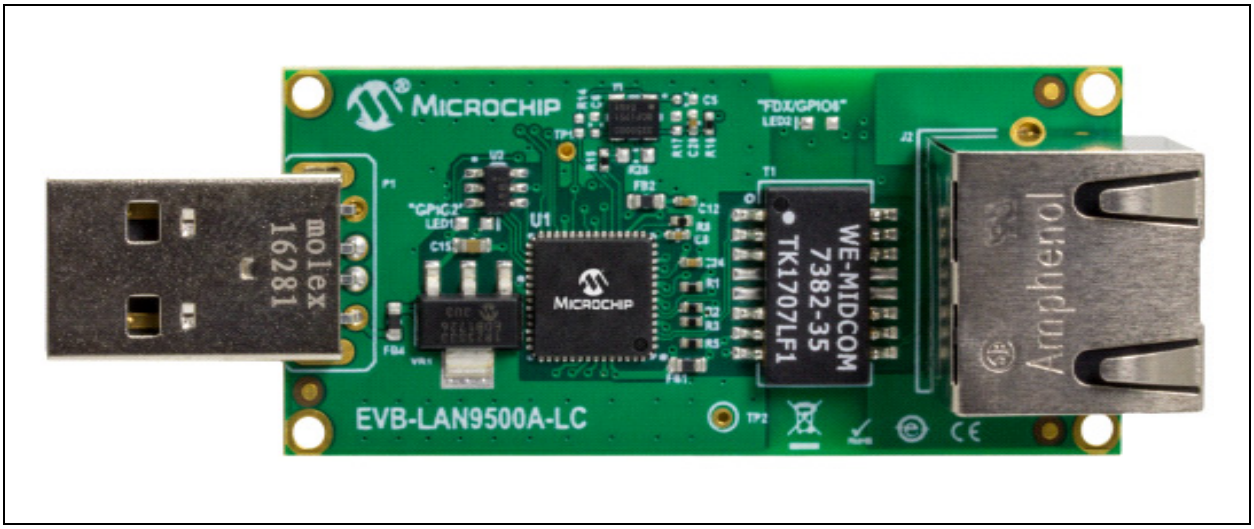


Appendix A. EVB-LAN9500A-LC Evaluation Board

A.1 INTRODUCTION

This appendix shows the EVB-LAN9500A-LC Evaluation Board.

FIGURE A-1: EVB-LAN9500A-LC EVALUATION BOARD



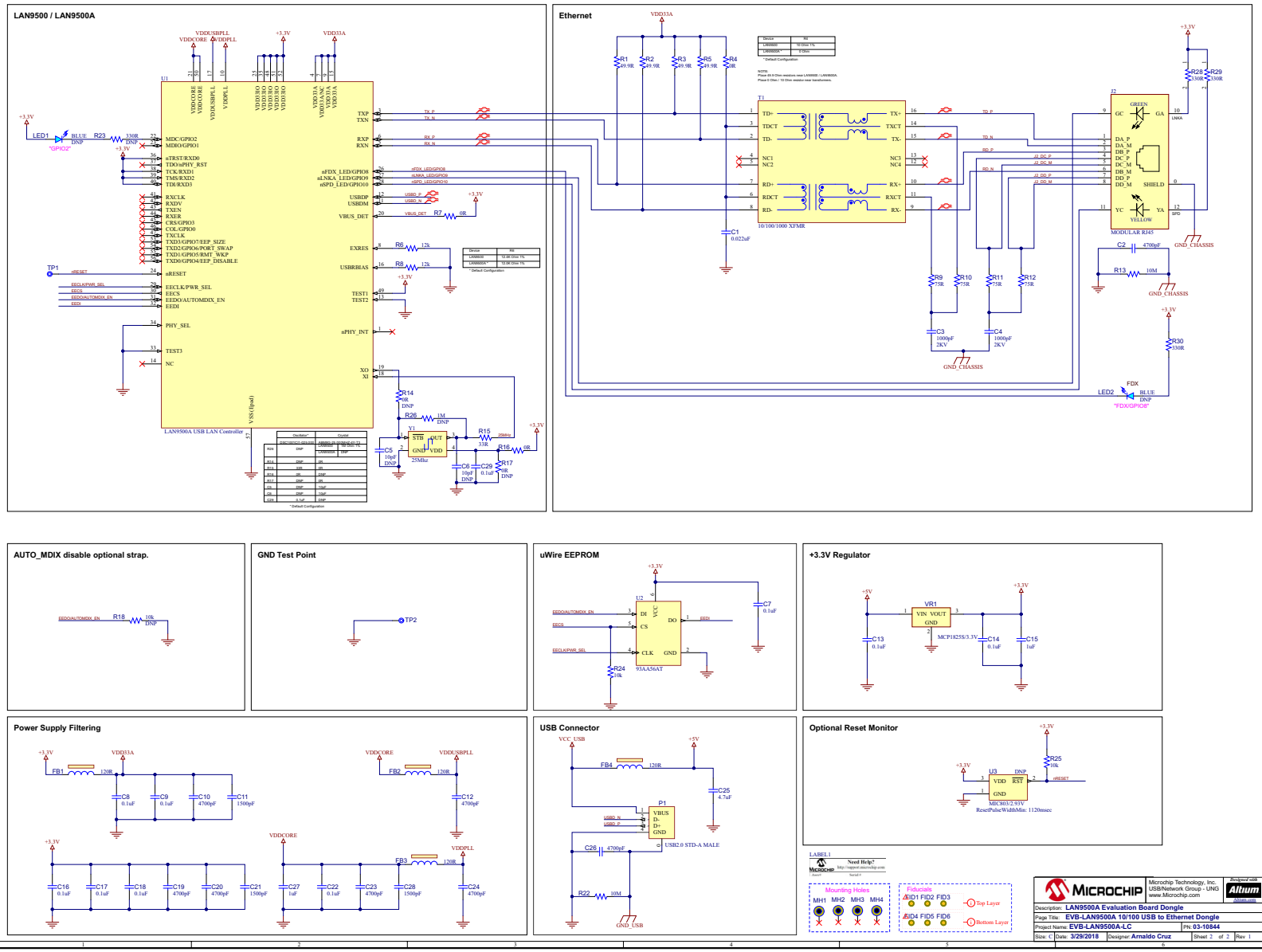
NOTES:

Appendix B. Schematics

B.1 INTRODUCTION

This appendix shows the EVB-LAN9500A-LC Evaluation Board schematic.

FIGURE B-1: EVB-LAN9500A-LC EVALUATION BOARD SCHEMATIC



Appendix C. Bill of Materials

C.1 INTRODUCTION

This appendix includes the EVB-LAN9500A-LC Evaluation Board Bill of Materials (BOM).

TABLE C-1: EVB-LAN9500A-LC EVALUATION BOARD BILL OF MATERIALS

Item	Qty	Designator	Value	Manufacturer	Part Number
1	1	C1	0.022uF	Panasonic	ECJ-2VB1H223K
2	8	C2, C10, C12, C19, C20, C23, C24, C26	4700pF	Murata Electronics	GRM155R71H472KA01J
3	2	C3, C4	1000pF	Johanson Dielectrics Inc	202R18W102KV4E
4	2	C5, C6	10pF	Murata	GRM1555C1H100JZ01D
5	10	C7, C8, C9, C13, C14, C16, C17, C18, C22, C29	0.1uF	Murata	GRM155R71C104KA88D
6	3	C11, C21, C28	1500pF	TDK Corporation	CGA2B2X7R1H152K050BA
7	2	C15, C27	1uF	AVX	0603YD105KAT2A
8	1	C25	4.7uF	TDK Corporation	C1608X5R1C475K080AC
9	4	FB1, FB2, FB3, FB4	120R	TDK Corporation	MMZ1608B121CTAH0
10	1	J2	MODULAR RJ45	Amphenol	RJHSE-5381
11	2	LED1, LED2	BLUE	Lite-On	LTST-C193TBKT-5A
12	1	P1	USB2.0 STD-A MALE	Molex Inc	480370001
13	4	R1, R2, R3, R5	49.9R	Rohm Semiconductor	MCR01MRTF49R9
14	3	R4, R7, R16	0R	Yageo	RC0402JR-070RL
15	2	R6, R8	12k	Rohm Semiconductor	MCR01MZPF1202
16	4	R9, R10, R11, R12	75R	Yageo	RC0402FR-0775RL
17	2	R13, R22	10M	Vishay	CRCW060310M0FKEA
18	2	R14, R17	0R	Yageo	RC0402JR-070RL
19	1	R15	33R	Rohm Semiconductor	MCR01MRTF33R0
20	1	R18	10k	Panasonic	ERJ-2RKF1002X
21	1	R23	330R	Yageo	RC0402FR-07330RL
22	2	R24, R25	10k	Panasonic	ERJ-2RKF1002X
23	1	R26	1M	Panasonic	ERJ-3EKF1004V
24	3	R28, R29, R30	330R	Yageo	RC0402FR-07330RL
25	1	T1	10/100/1000 XFMR	Wurth Electronics Inc.	749020100/749020100A
26	1	U1	LAN9500A USB-LAN	Microchip Technology	LAN9500AI-ABZJ-TR
27	1	U2	93AA56AT	Microchip Technology	93AA56AT-I/OT
28	1	U3	MIC803/2.93V	Microchip Technology	MIC803-29D4VM3-TR
29	1	VR1	MCP1825S/3.3V	Microchip	MCP1825ST-3302E/DB
30	1	Y1	25Mhz	Microchip Technology	DSC1001CI1-025.0000

Note 1: Parts in gray rows are not fitted.

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