



**MICROCHIP**

---

**MCP1501  
Evaluation Board  
User's Guide**

---

**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.

---

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 Information regarding device applications is provided only for your convenience and may be superseded by updates.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 <https://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.

For information regarding Microchip's Quality Management Systems, please visit [www.microchip.com/quality](http://www.microchip.com/quality).

**Trademarks**

The Microchip name and logo, the Microchip logo, Adaptec, AVR, AVR logo, AVR Freaks, BesTime, BitCloud, CryptoMemory, CryptoRF, dsPIC, flexPWR, HELDO, IGL00, JukeBlox, KeeLoq, Kleer, LANCheck, LinkMD, maXStylus, maXTouch, MediaLB, megaAVR, Microsemi, Microsemi logo, MOST, MOST logo, MPLAB, OptoLyzer, PIC, picoPower, PICSTART, PIC32 logo, PolarFire, Prochip Designer, QTouch, SAM-BA, SenGenuity, SpyNIC, SST, SST Logo, SuperFlash, Symmetricom, SyncServer, Tachyon, TimeSource, tinyAVR, UNI/O, Vectron, and XMEGA are registered trademarks of Microchip Technology Incorporated in the U.S.A. and other countries.

AgileSwitch, APT, ClockWorks, The Embedded Control Solutions Company, EtherSynch, Flashtec, Hyper Speed Control, HyperLight Load, Libero, motorBench, mTouch, Powermite 3, Precision Edge, ProASIC, ProASIC Plus, ProASIC Plus logo, Quiet-Wire, SmartFusion, SyncWorld, Temux, TimeCesium, TimeHub, TimePictra, TimeProvider, TrueTime, and ZL are registered trademarks of Microchip Technology Incorporated in the U.S.A.

Adjacent Key Suppression, AKS, Analog-for-the-Digital Age, Any Capacitor, AnyIn, AnyOut, Augmented Switching, BlueSky, BodyCom, Clockstudio, CodeGuard, CryptoAuthentication, CryptoAutomotive, CryptoCompanion, CryptoController, dsPICDEM, dsPICDEM.net, Dynamic Average Matching, DAM, ECAN, Espresso T1S, EtherGREEN, GridTime, IdealBridge, In-Circuit Serial Programming, ICSP, INICnet, Intelligent Paralleling, IntelliMOS, Inter-Chip Connectivity, JitterBlocker, Knob-on-Display, KoD, maxCrypto, maxView, memBrain, Mindi, MiWi, MPASM, MPF, MPLAB Certified logo, MPLIB, MPLINK, MultiTRAK, NetDetach, Omniscient Code Generation, PICDEM, PICDEM.net, PICkit, PICtail, PowerSmart, PureSilicon, QMatrix, REAL ICE, Ripple Blocker, RTAX, RTG4, SAM-ICE, Serial Quad I/O, simpleMAP, SimpliPHY, SmartBuffer, SmartHLS, SMART-I.S., storClad, SQI, SuperSwitcher, SuperSwitcher II, Switchtec, SynchroPHY, Total Endurance, Trusted Time, TSHARC, USBCheck, VariSense, VectorBlox, VeriPHY, ViewSpan, WiperLock, XpressConnect, and ZENA are trademarks of Microchip Technology Incorporated in the U.S.A. and other countries.

SQTP is a service mark of Microchip Technology Incorporated in the U.S.A.

The Adaptec logo, Frequency on Demand, Silicon Storage Technology, and Symmcom are registered trademarks of Microchip Technology Inc. in other countries.

GestIC is a registered trademark of Microchip Technology Germany II GmbH & Co. KG, a subsidiary of Microchip Technology Inc., in other countries.

All other trademarks mentioned herein are property of their respective companies.

© 2022, Microchip Technology Incorporated and its subsidiaries.

All Rights Reserved.

ISBN: 978-1-6683-1186-8



---

---

## **Table of Contents**

---

---

<b>Preface</b> .....	<b>5</b>
<b>Chapter 1. Product Overview</b>	
1.1 Introduction .....	9
1.2 MCP1501 Device Overview .....	9
1.3 MCP1501 Evaluation Board Overview .....	10
1.4 MCP1501 Evaluation Board Kit Contents .....	11
<b>Chapter 2. Installation and Operation</b>	
2.1 Configuration Requirements .....	13
2.2 Getting Started .....	13
<b>Appendix A. Schematic and Layouts</b>	
A.1 Introduction .....	17
A.2 Board – Schematic .....	18
A.3 Board – Top Silk Layer .....	19
A.4 Board – Top Copper and Silk Layer .....	19
A.5 Board – Top Copper Layer .....	20
A.6 Board – Bottom Copper Layer .....	20
A.7 Board – Bottom Copper and Silk Layer .....	21
A.8 Board – Bottom Silk Layer .....	21
<b>Appendix B. Bill of Materials (BOM)</b> .....	<b>23</b>
<b>Worldwide Sales and Service</b> .....	<b>26</b>

# MCP1501 Evaluation Board User's 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 website ([www.microchip.com](http://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 “DSXXXXXXXXA”, where “XXXXXXXX” 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 MCP1501 Evaluation Board. Items discussed in this chapter include:

- [Document Layout](#)
- [Conventions Used in this Guide](#)
- [Recommended Reading](#)
- [The Microchip Website](#)
- [Product Change Notification Service](#)
- [Customer Support](#)
- [Document Revision History](#)

## DOCUMENT LAYOUT

This document describes how to use the MCP1501 Evaluation Board to demonstrate the performance of the MCP1501 device family. The manual layout is as follows:

- **Chapter 1. “Product Overview”** – Important information about the MCP1501 Evaluation Board.
- **Chapter 2. “Installation and Operation”** – Includes instructions on how to get started with the MCP1501 Evaluation Board.
- **Appendix A. “Schematic and Layouts”** – Shows the schematic and layout diagrams for the MCP1501 Evaluation Board.
- **Appendix B. “Bill of Materials (BOM)”** – Lists the parts used to build the MCP1501 Evaluation Board.

# MCP1501 Evaluation Board User's Guide

## CONVENTIONS USED IN THIS GUIDE

This manual uses the following documentation conventions:

### DOCUMENTATION CONVENTIONS

Description	Represents	Examples
<b>Arial font:</b>		
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</i></u> >Save
Bold characters	A dialog button	Click <b>OK</b>
	A tab	Click the <b>Power</b> 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>
<b>Courier New font:</b>		
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) { ... }

## RECOMMENDED READING

This User's Guide describes how to use the MCP1501 Evaluation Board. Another useful document is listed below. The following Microchip document is available and recommended as a supplemental reference resource:

**MCP1501 Data Sheet – “High-Precision Buffered Voltage Reference” (DS20005474).**

## THE MICROCHIP WEBSITE

Microchip provides online support via our website at [www.microchip.com](http://www.microchip.com). This website is used as a means to make files and information easily available to customers. Accessible by using your favorite Internet browser, the website 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

## PRODUCT CHANGE NOTIFICATION SERVICE

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

To register, access the Microchip website at [www.microchip.com](http://www.microchip.com), click on **Product Change Notification** and follow the registration instructions.

## 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 website at:  
<https://www.microchip.com/support>.

## DOCUMENT REVISION HISTORY

### Revision A (September 2022)

- Initial release of this document.

# **MCP1501 Evaluation Board User's Guide**

---

NOTES:



---

---

## Chapter 1. Product Overview

---

---

### 1.1 INTRODUCTION

This chapter provides an overview of the MCP1501 Evaluation Board and covers the following topics:

- [MCP1501 Device Overview](#)
- [MCP1501 Evaluation Board Overview](#)
- [MCP1501 Evaluation Board Kit Contents](#)

### 1.2 MCP1501 DEVICE OVERVIEW

The MCP1501 is a high-precision, buffered voltage reference capable of sinking and sourcing 20 mA of current. The voltage reference is a low-drift band gap-based reference. The band gap uses chopper-based amplifiers, effectively reducing the drift to zero. The MCP1501 band gap is based on a second-order temperature compensated circuit. This allows the MCP1501 to achieve high initial accuracy and low temperature coefficient operation across voltage and temperature. The band gap curvature compensation is determined during device characterization and is trimmed for optimal accuracy. The MCP1501 includes a chopper-based amplifier architecture that ensures excellent low-noise operation, further reduces temperature dependent offsets that would otherwise increase the temperature coefficient of the MCP1501 and significantly improves long-term drift performance.

The MCP1501 is offered in following packages and is specified over an extended temperature range from -40°C to +125°C.

- 6-Lead SOT-23 (AEC-Q100 automotive qualified)
- 8-Lead SOIC
- 8-Lead WDFN (2 mm x 2 mm)

MCP1501 voltage reference is available in 10 voltage options:

- 1.024V
- 1.250V
- 1.800V
- 2.048V
- 2.500V
- 3.000V
- 3.300V
- 4.096V
- 4.500V (6-Lead SOT-23 package only)
- 5.000V (6-Lead SOT-23 package only)

# MCP1501 Evaluation Board User's Guide

## 1.3 MCP1501 EVALUATION BOARD OVERVIEW

The MCP1501 Evaluation Board provides the possibility to evaluate the performance of all 10 voltage options of the MCP1501. It also provides the external filter circuit with the option to connect each voltage option exclusively and evaluate the output. It gives additional 8-lead WDFN and 8-lead SOIC package footprints to work with different package options as well.

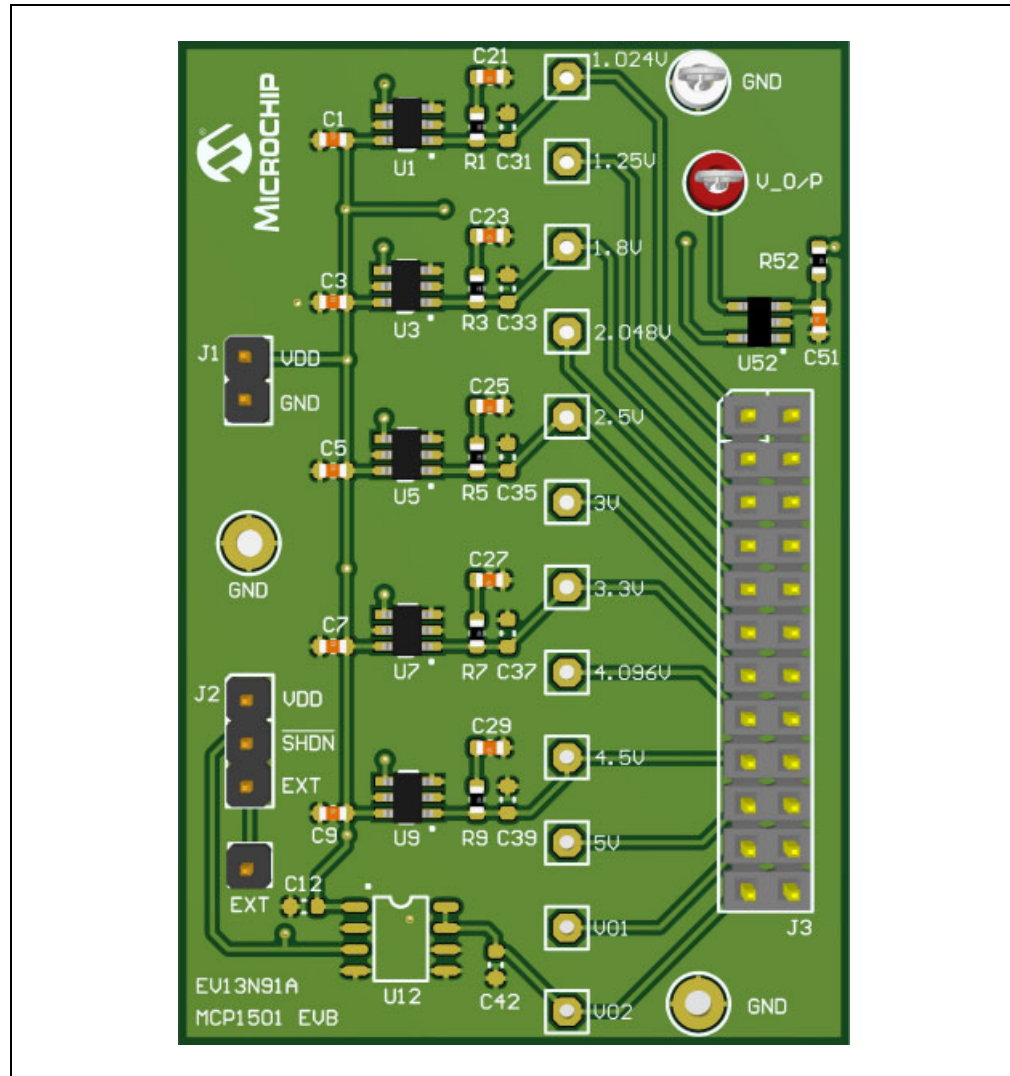
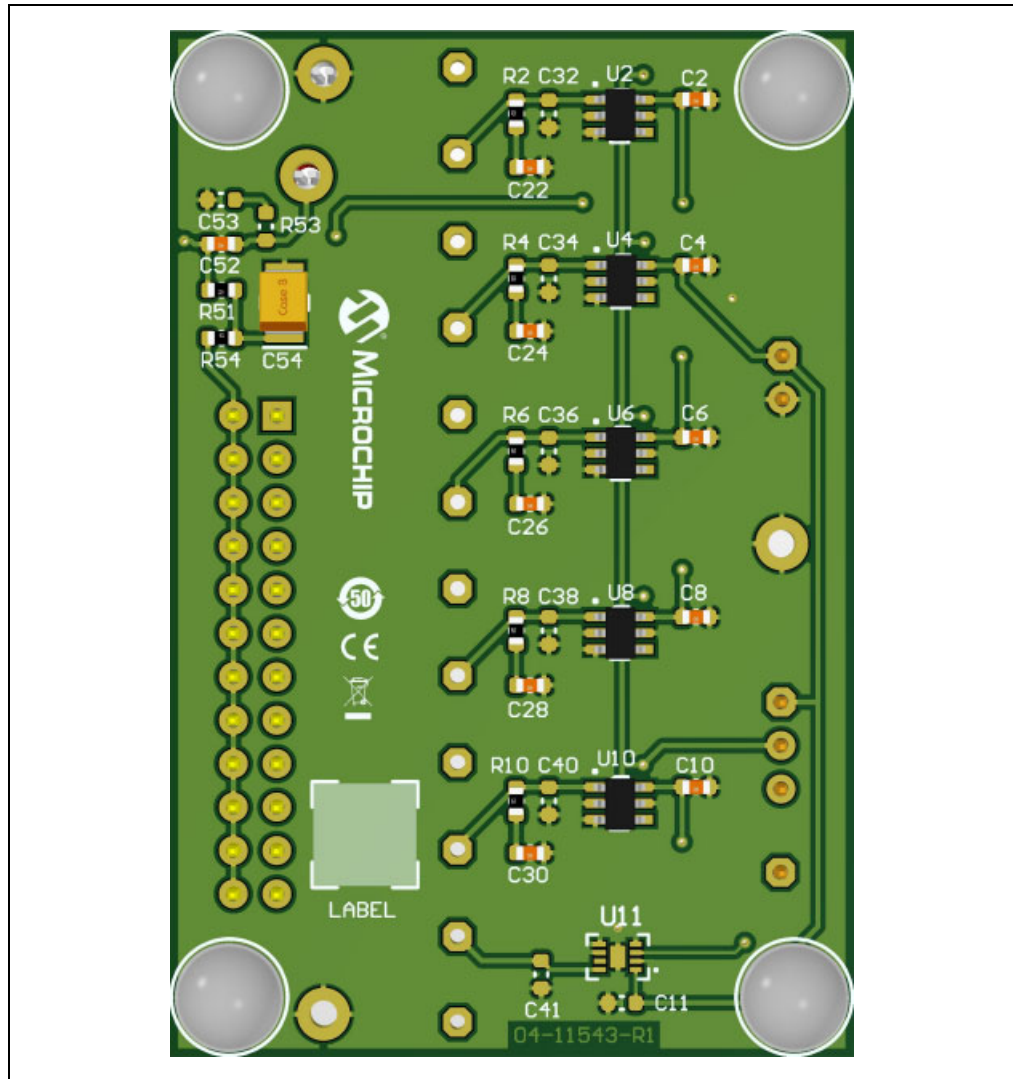


FIGURE 1-1: MCP1501 Evaluation Board Top View.



**FIGURE 1-2:** MCP1501 Evaluation Board Bottom View.

## 1.4 MCP1501 EVALUATION BOARD KIT CONTENTS

The MCP1501 Evaluation Board kit includes:

- MCP1501 Evaluation Board (EV13N91A)
- Jumper
- Important Information Sheet.

# MCP1501 Evaluation Board User's Guide

---

NOTES:

## Chapter 2. Installation and Operation

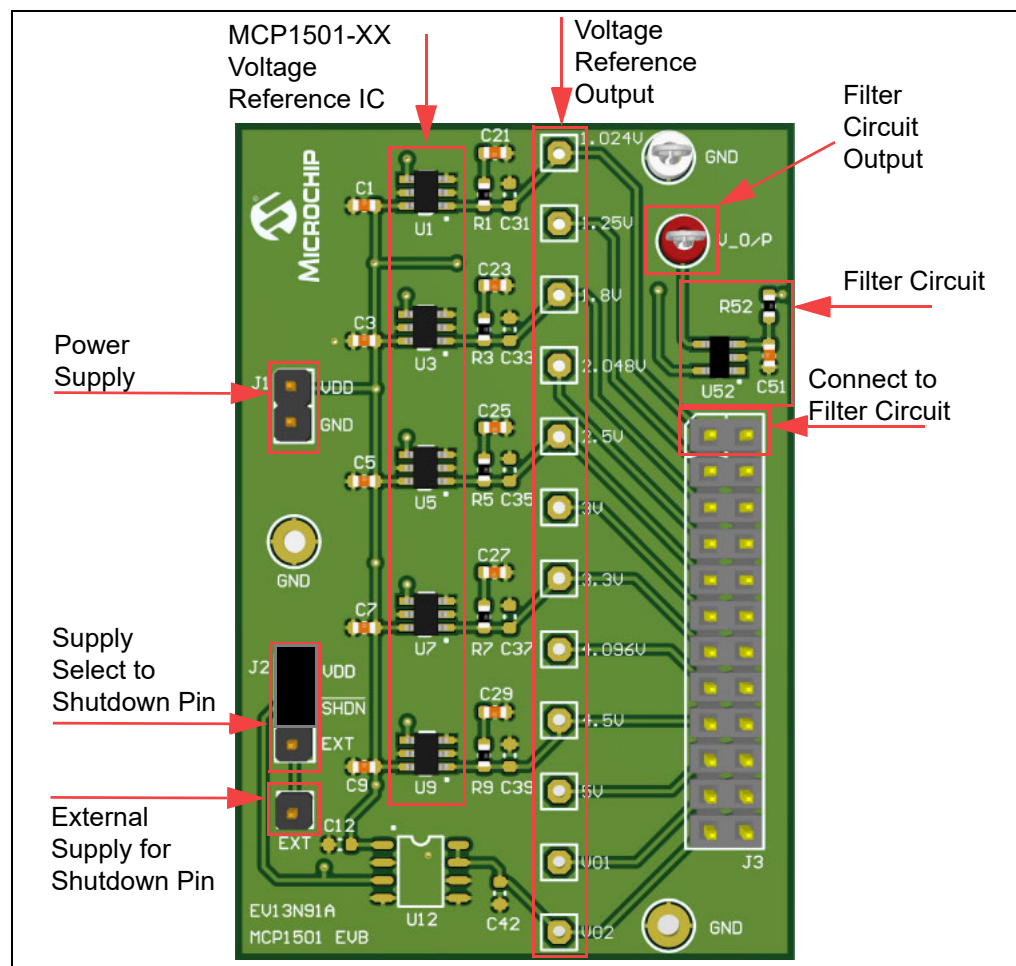
### 2.1 CONFIGURATION REQUIREMENTS

To power up and run the MCP1501 Evaluation Board, the following are required:

- MCP1501 Evaluation Board (EV13N91A)
- Jumper
- External DC power supply.

WARNING
<p><b>Avoid connecting a power supply with a voltage greater than what is recommended in this user's guide. Doing so can damage the voltage reference IC, requiring them to be replaced.</b></p>

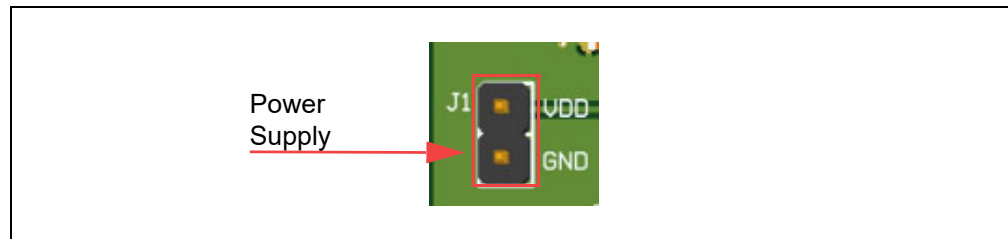
### 2.2 GETTING STARTED



**FIGURE 2-1:** MCP1501 Evaluation Board Connections.

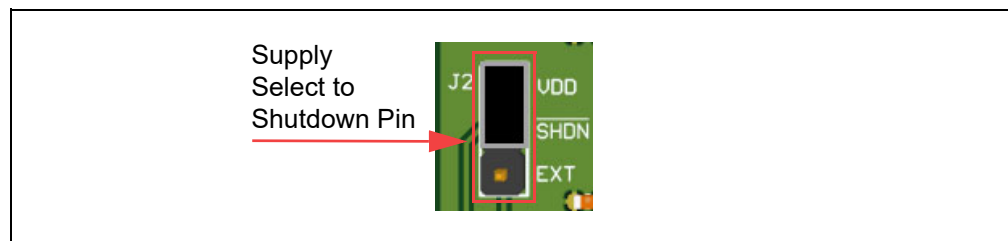
# MCP1501 Evaluation Board User's Guide

1. Connect the +5.5V DC power supply at VDD (J1 Connector) on the MCP1501 Evaluation Board, as shown in [Figure 2-2](#).

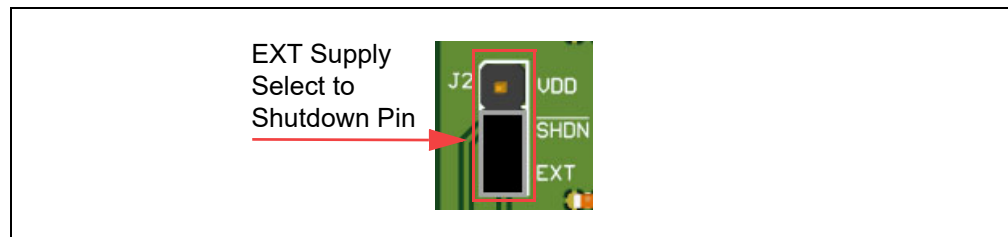


**FIGURE 2-2:** Power Supply Connection.

2. Connect the jumper between VDD and  $\overline{\text{SHDN}}$  (J2 Connector) to provide supply at MCP1501-XX shutdown pin, as shown in [Figure 2-3](#). The J2 connector provides the opportunity to select between VDD and EXT supply for the shutdown pin of MCP1501-XX. [Figure 2-4](#) shows connection to EXT supply.



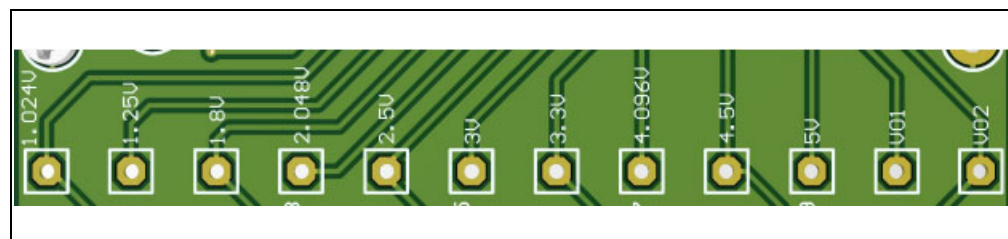
**FIGURE 2-3:** Connect VDD to Shutdown pin.



**FIGURE 2-4:** Connect EXT to Shutdown pin.

**Note:** External supply for shutdown pin can be applied through EXT header provided on board.

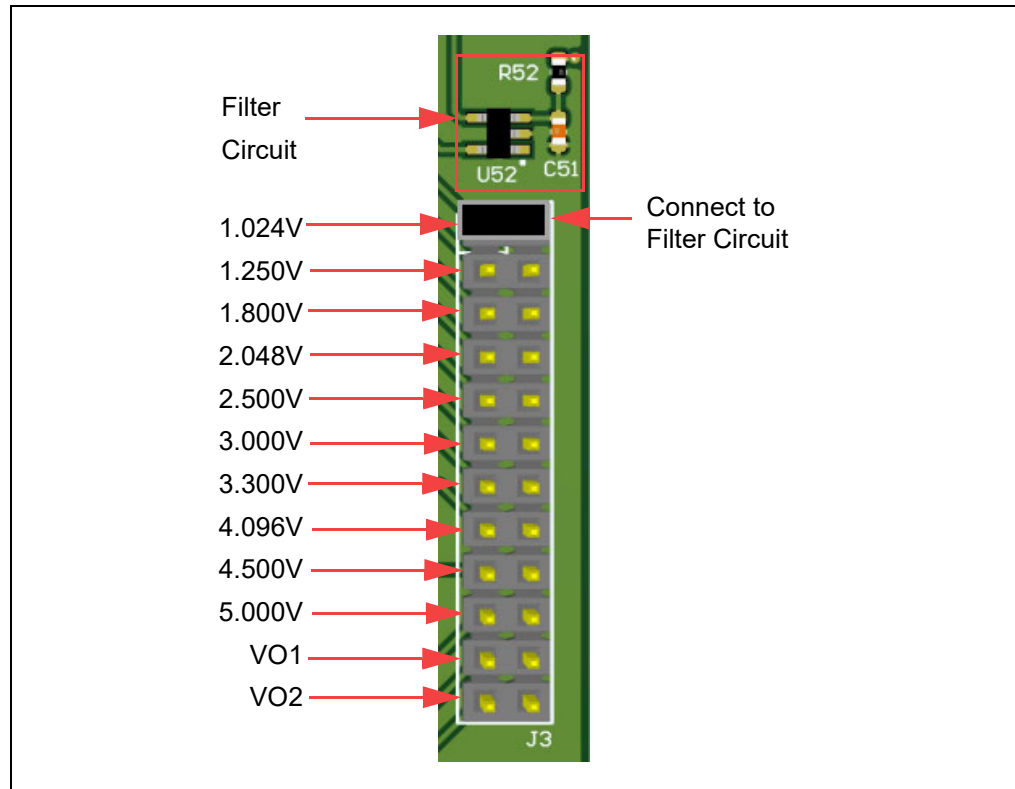
3. Test points with voltage values as shown in [Figure 2-5](#) are provided to check respective output voltage of MCP1501-XX by using digital multimeter.



**FIGURE 2-5:** Test Points.

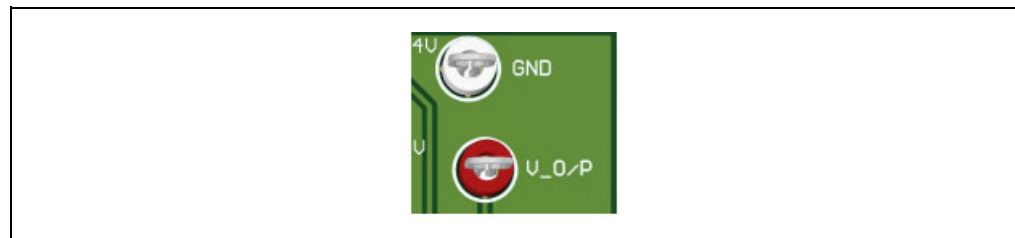
# Installation and Operation

- J3 Connector can be used to connect respective MCP1501-XX outputs to the on-board filter circuit (see [Figure 2-6](#)). For example, in [Figure 2-6](#), the 1.024V output is connected to the Filter circuit. It is possible to connect any of the 12 outputs to the filter circuit one at a time.



**FIGURE 2-6:** Connection to Filter Circuit.

- Filter output can be observed using digital multimeter/oscilloscope at V\_O/P, as shown in [Figure 2-7](#).



**FIGURE 2-7:** Filter Output.

# MCP1501 Evaluation Board User's Guide

---

NOTES:



---

---

## **Appendix A. Schematic and Layouts**

---

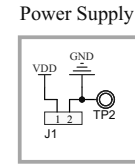
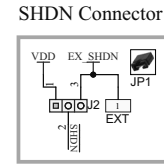
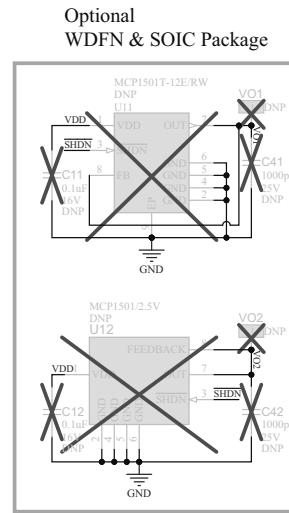
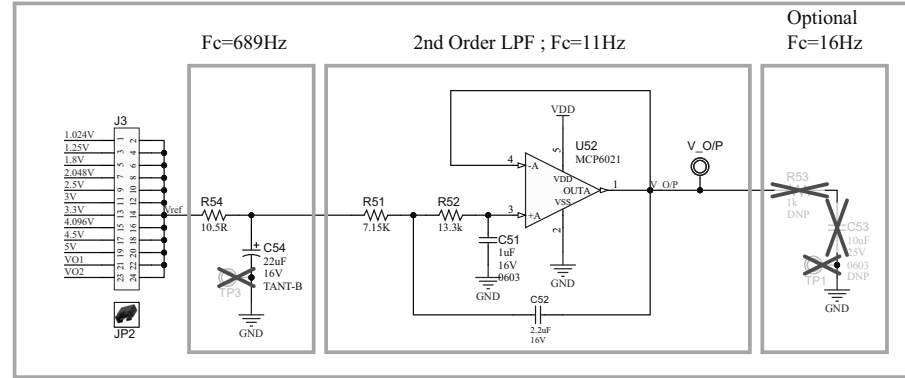
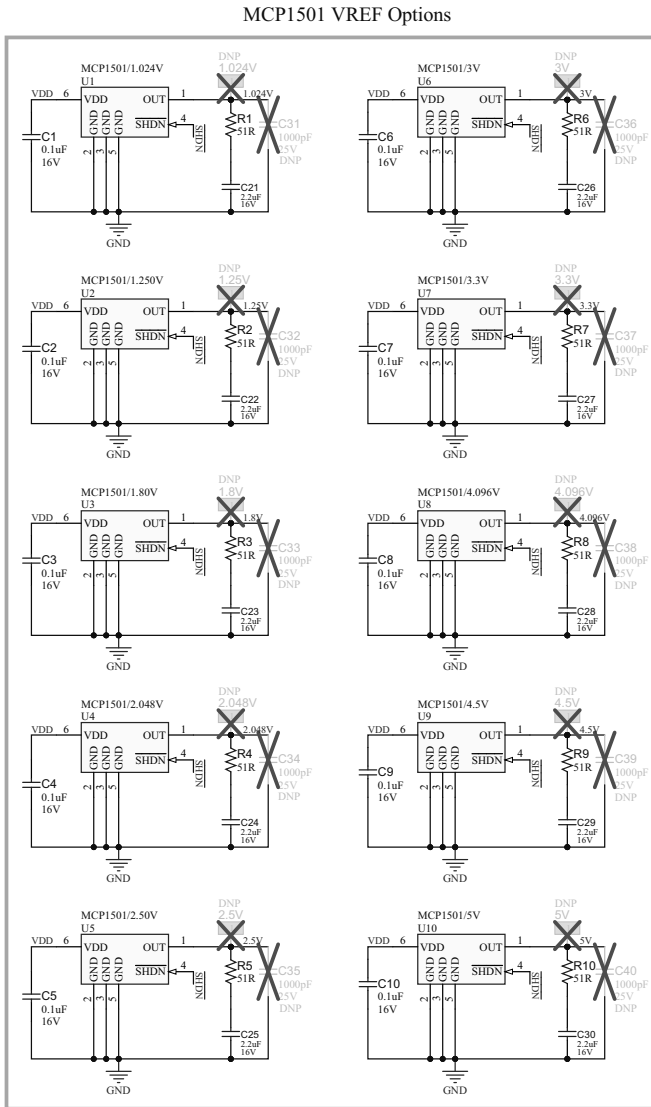
---

### **A.1 INTRODUCTION**

This appendix contains the following schematics and layouts for the MCP16502 Evaluation Board:

- Board – Schematic
- [Board – Top Silk Layer](#)
- [Board – Top Copper and Silk Layer](#)
- [Board – Top Copper Layer](#)
- [Board – Bottom Copper Layer](#)
- [Board – Bottom Copper and Silk Layer](#)
- [Board – Bottom Silk Layer](#)

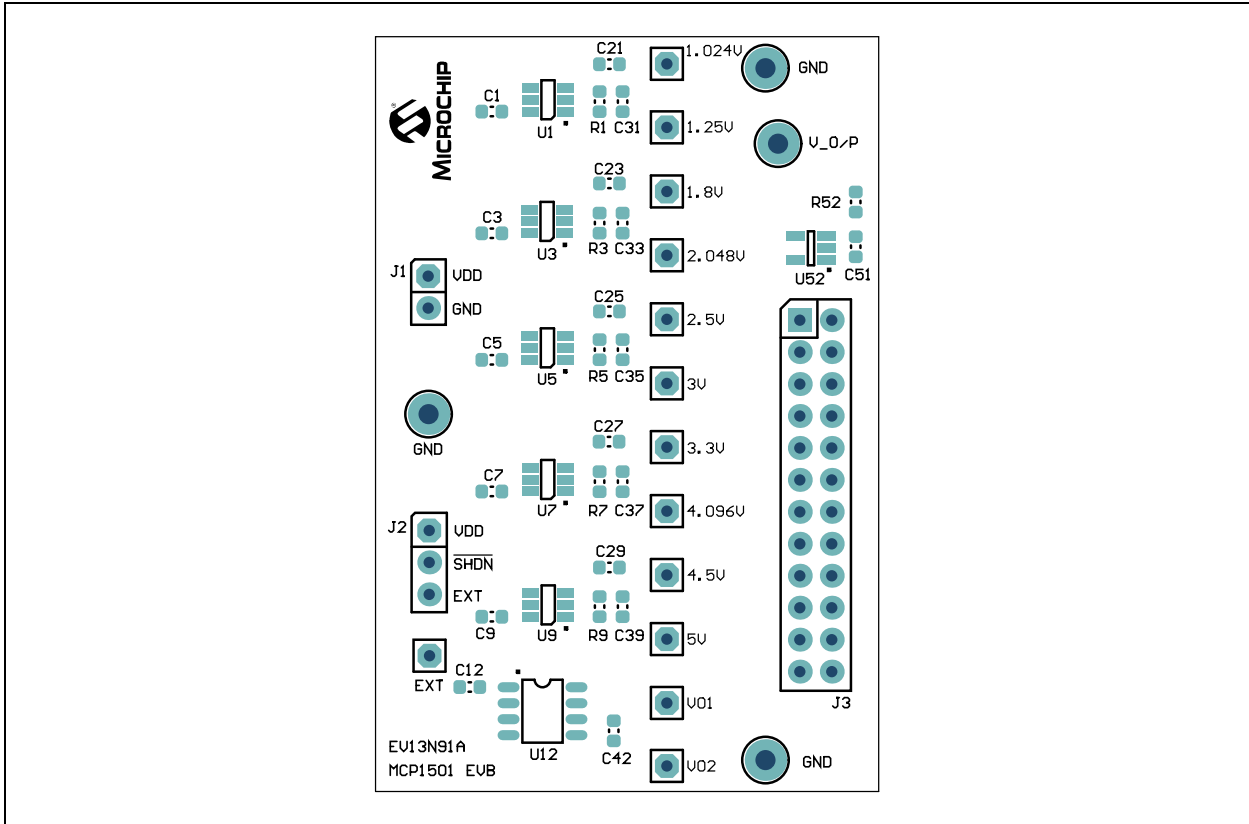
## A.2 BOARD – SCHEMATIC



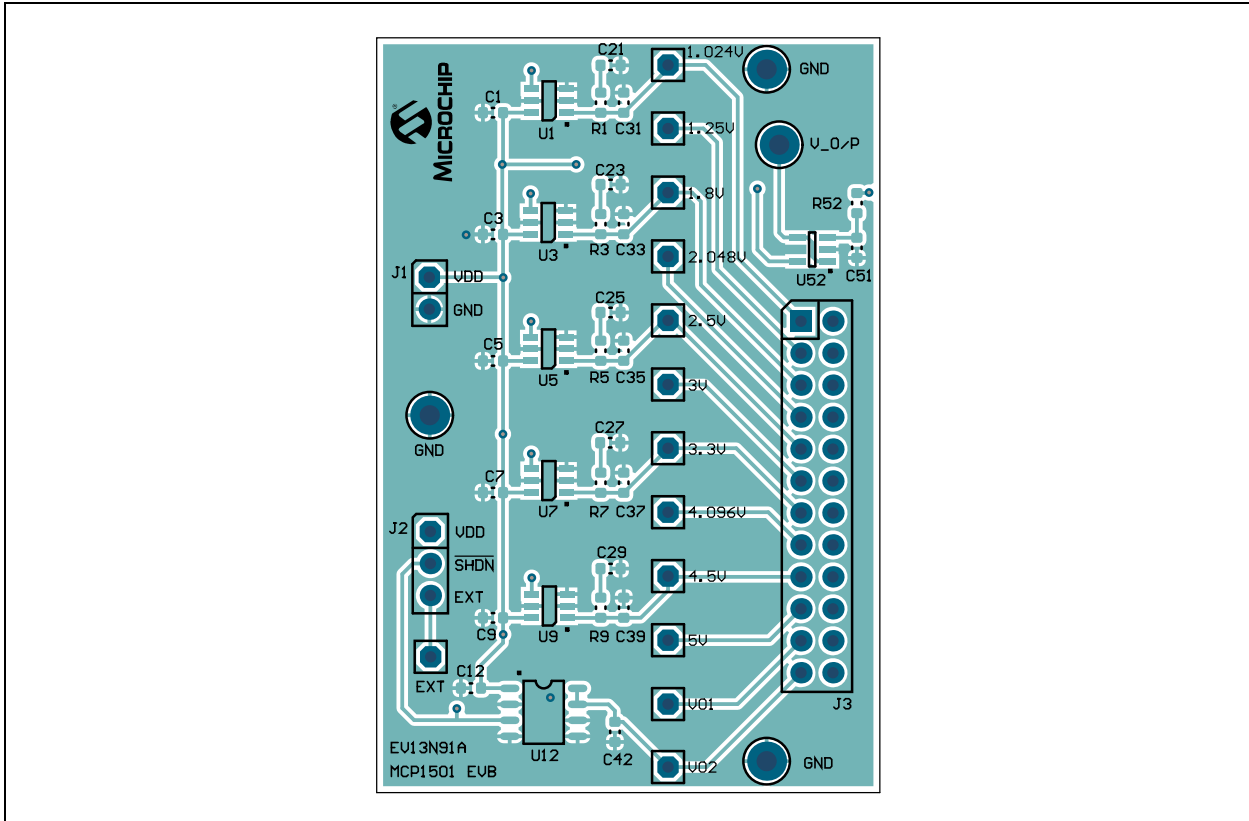
- PAD1**  
RUBBER PAD D6.4 H1.9
- PAD2**  
RUBBER PAD D6.4 H1.9
- PAD3**  
RUBBER PAD D6.4 H1.9
- PAD4**  
RUBBER PAD D6.4 H1.9

**LABEL**  
Cannot open file  
C:\ALTM  
M\_WOR  
PCBA LABEL 6X6mm

## A.3 BOARD – TOP SILK LAYER

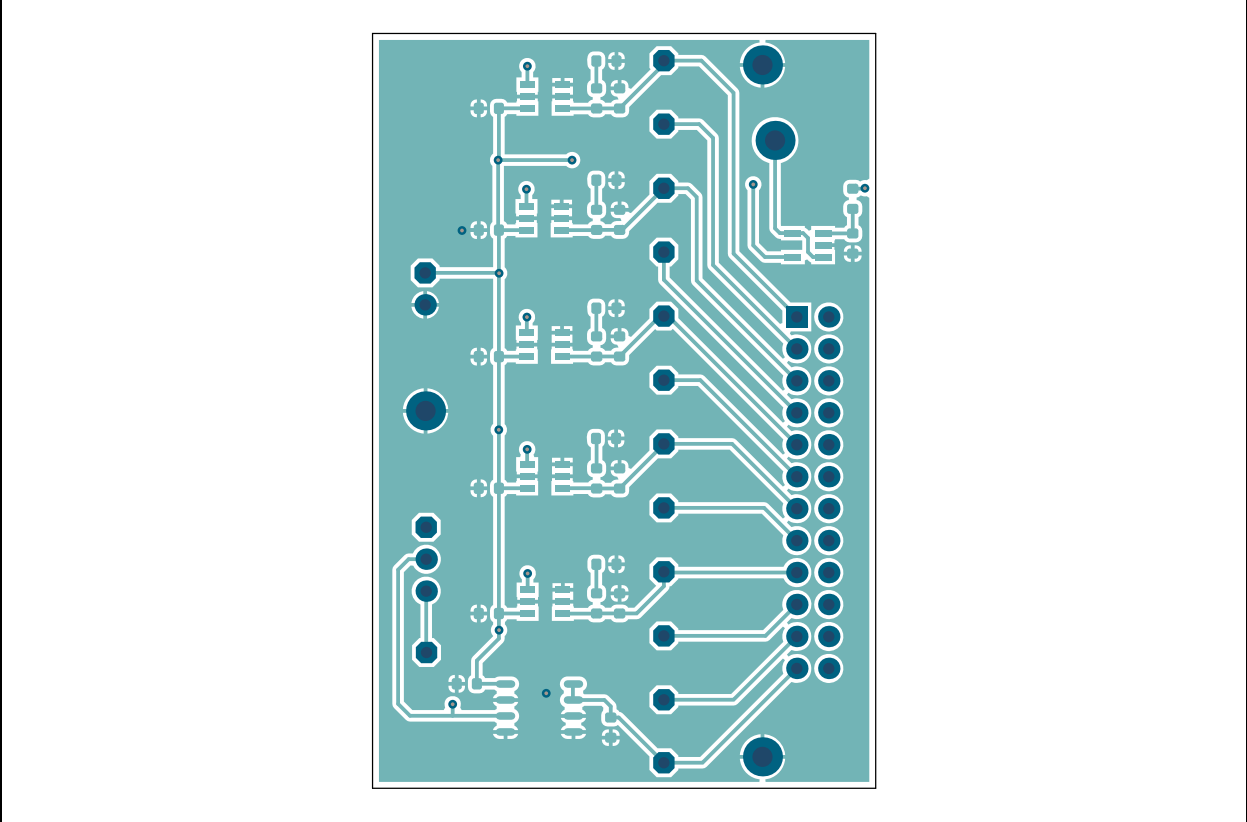


## A.4 BOARD – TOP COPPER AND SILK LAYER

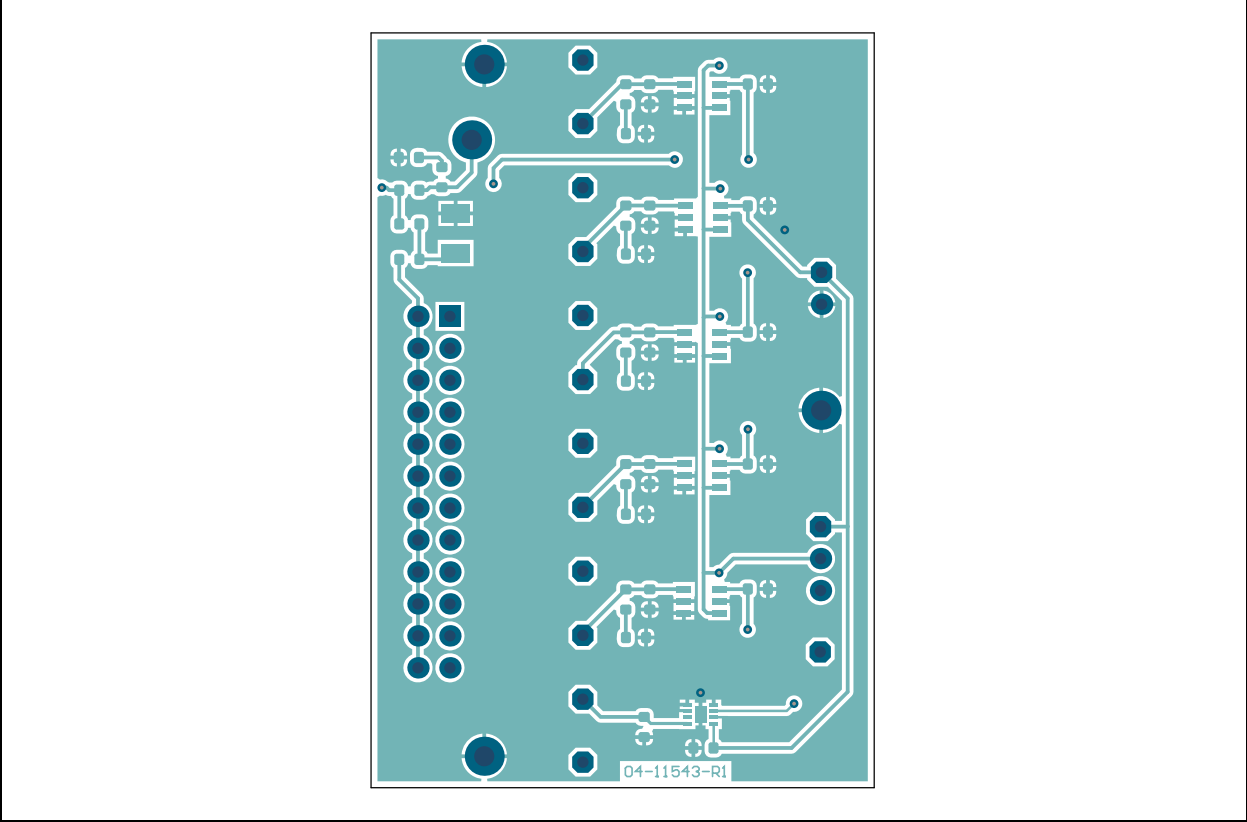


# MCP16502 Evaluation Board User's Guide

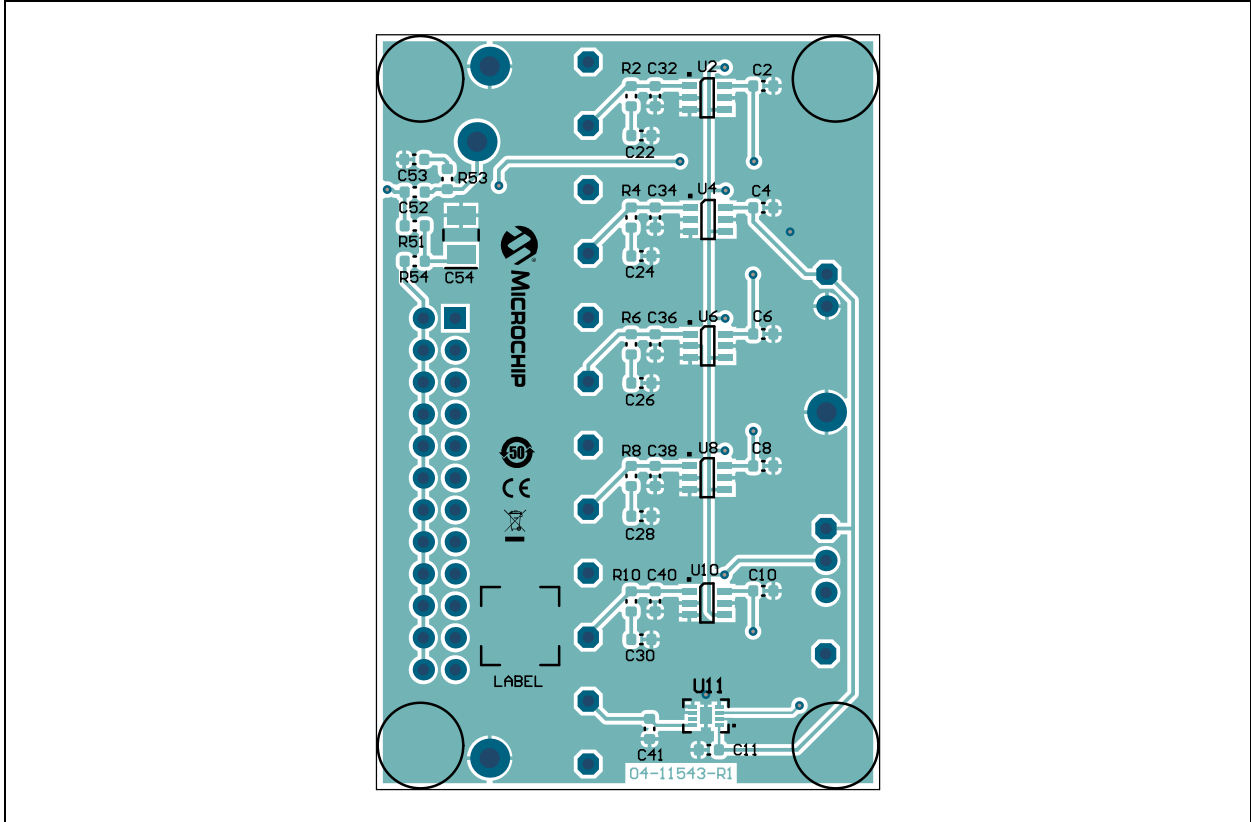
## A.5 BOARD – TOP COPPER LAYER



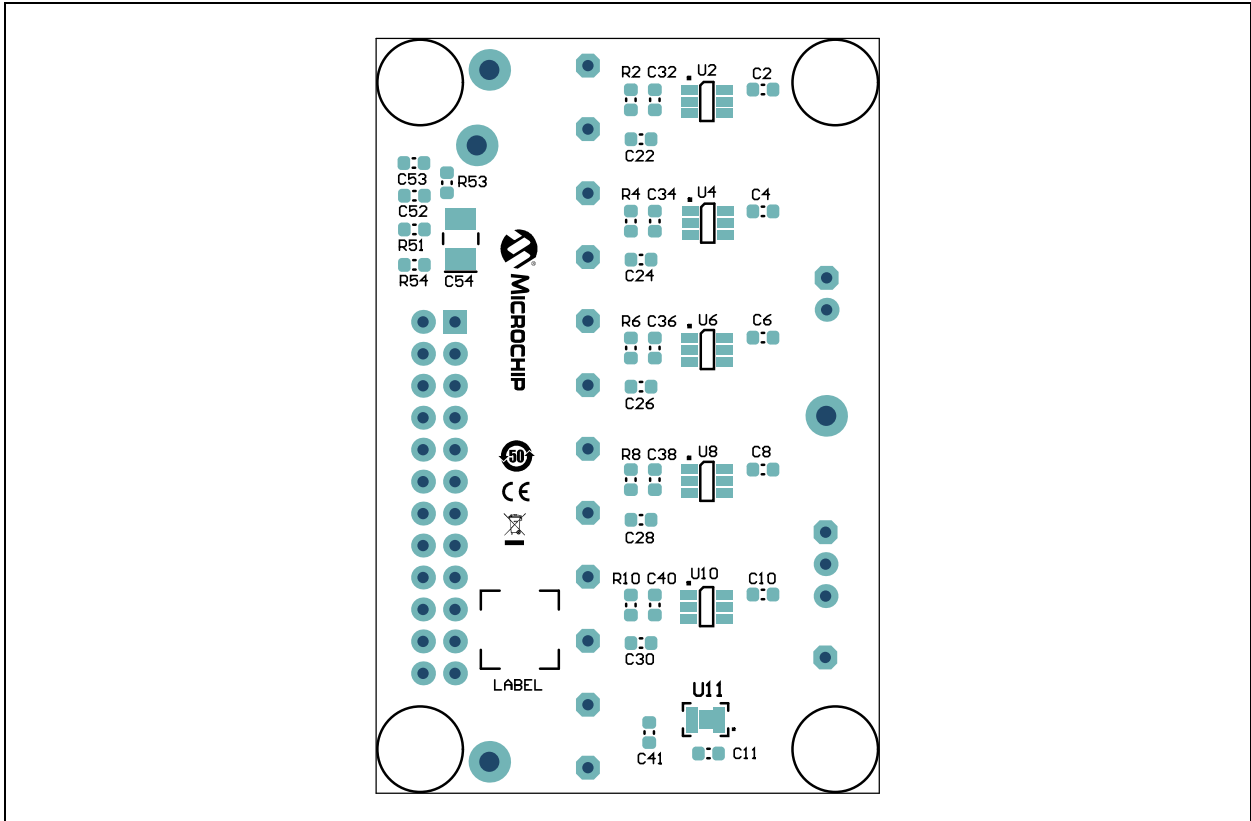
## A.6 BOARD – BOTTOM COPPER LAYER



## A.7 BOARD – BOTTOM COPPER AND SILK LAYER



## A.8 BOARD – BOTTOM SILK LAYER



# MCP16502 Evaluation Board User's Guide

---

NOTES:

**Appendix B. Bill of Materials (BOM)**

**TABLE B-1: MCP1501 EVALUATION BOARD – BILL OF MATERIALS (BOM)**

Qty.	Reference	Description	Manufacturer	Part Number
0	1.024V, 1.25V, 1.8V, 2.048V, 2.5V, 3V, 3.3V, 4.096V, 4.5V, 5V, VO1, VO2	<b>DO NOT POPULATE</b> , connector, header-2.54, male, 1x1, gold, 5.84MH, through-hole, vertical	Samtec, Inc.	TSW-101-07-G-S
10	C1, C2, C3, C4, C5, C6, C7, C8, C9, C10	Ceramic, capacitor, 0.1 $\mu$ F, 16V, 10%, X7R, surface mount, 0603	Samsung Group	CL10B104KO8NNNC
0	C11, C12	<b>DO NOT POPULATE</b> , ceramic, capacitor, 0.1 $\mu$ F, 16V, 10%, X7R, surface mount, 0603	Yageo Corporation	CC0603KRX7R7BB104
11	C21, C22, C23, C24, C25, C26, C27, C28, C29, C30, C52	Ceramic, capacitor, 2.2 $\mu$ F, 16V, 10%, X5R, surface mount, 0603	TDK Corporation	C1608X5R1C225K080AB
0	C31, C32, C33, C34, C35, C36, C37, C38, C39, C40, C41, C42	<b>DO NOT POPULATE</b> , ceramic capacitor, 1000 pF, 25V, 5%, C0G/NP0, surface mount, 0603	KEMET	C0603C102J3GACTU
1	C51	Ceramic, capacitor, 1 $\mu$ F, 16V, 10%, X7R, surface mount, 0603	Samsung Group	CL10B105KO8VPNC
0	C53	<b>DO NOT POPULATE</b> , ceramic, capacitor, 10 $\mu$ F, 25V, 20%, X5R, surface mount, 0603	TDK Corporation	C1608X5R1E106M080AC
1	C54	Tantalum, capacitor, 22 $\mu$ F, 16V, 10%, 2.3R, surface mount, B	Kyocera AVX	TAJB226K016RNJ
1	EXT	Connector, header-2.54, male, 1x1, gold, 5.84MH, through-hole, vertical	Samtec, Inc.	TSW-101-07-L-S
1	J1	Connector, header-2.54, male, 1x2, gold, 5.84MH, through-hole, vertical	Multicomp Pro	SPC20481
1	J2	Connector, header-2.54, male, 1x3, tin, 5.84MH, through-hole, vertical	Samtec, Inc.	TSW-103-07-T-S
1	J3	Connector, header-2.54, male, 2x12, gold, 5.84MH, through-hole, vertical	Samtec, Inc.	TSW-112-07-G-D
1	LABEL	Label PCBA, 6x6 mm, Datamatrix	ACT Logimark AS	505462
1	PCB1	MCP1501 Evaluation Board – Printed Circuit Board	Microchip Technology Inc.	<b>04-11543-R1</b>
10	R1, R2, R3, R4, R5, R6, R7, R8, R9, R10	Resistor, thick film, 51R, 5%, 1/10W, surface mount, 0603	Panasonic® - ECG	ERJ-3GEYJ510V

**Note 1:** The components listed in this Bill of Materials are representative of the PCB assembly. The released BOM used in manufacturing uses all RoHS-compliant components.

# MCP1501 Evaluation Board User's Guide

**TABLE B-1: MCP1501 EVALUATION BOARD – BILL OF MATERIALS (BOM) (CONTINUED)**

Qty.	Reference	Description	Manufacturer	Part Number
1	R51	Resistor, thick film, 7.15 k $\Omega$ , 1%, 1/10W, surface mount, 0603	Panasonic - ECG	ERJ-3EKF7151V
1	R52	Resistor, thick film, 13.3 k $\Omega$ , 1%, 1/10W, surface mount, 0603	Stackpole Electronics	RMCF0603FT13K3
0	R53	<b>DO NOT POPULATE</b> , resistor, TKF, 1 k $\Omega$ , 5%, 1/10W, surface mount, 0603	Panasonic	ERJ-3GEYJ102V
1	R54	Resistor, thick film, 10.5R, 1%, 1/10W, surface mount, 0603	Yageo	RC0603FR-0710R5L
0	TP1, TP3	<b>DO NOT POPULATE</b> , connector, test point, loop, white, through-hole,	Keystone Electronics, Inc.	5012
1	TP2	Connector, test point, loop, white, through-hole	Keystone Electronics, Inc.	5012
1	U1	Microchip, Analog, VREF, 1.024V, MCP1501T-10E/CHY, SOT-23-6	Microchip Technology Inc.	<b>MCP1501T-10E/CHY</b>
1	U10	Microchip, Analog, VREF, 5.0V, MCP1501T-50E/CHY, SOT-23-6	Microchip Technology Inc.	<b>MCP1501T-50E/CHY</b>
0	U11	<b>DO NOT POPULATE</b> , Microchip, Analog, VREF, 1.200V, MCP1501T-12E/RW	Microchip Technology Inc.	<b>MCP1501T-12E/RW</b>
0	U12	<b>DO NOT POPULATE</b> , Microchip, Analog VREF, 2.5V, MCP1501-25E/SN, SOIC-8	Microchip Technology Inc.	<b>MCP1501-25E/SN</b>
1	U2	Microchip, Analog, VREF, 1.25V, MCP1501T-12E/CHY, SOT-23-6	Microchip Technology Inc.	<b>MCP1501T-12E/CHY</b>
1	U3	Microchip, Analog, VREF, 1.80V, MCP1501T-18E/CHY, SOT-23-6	Microchip Technology Inc.	<b>MCP1501T-18E/CHY</b>
1	U4	Microchip, Analog, VREF, 2.048V, MCP1501T-20E/CHY	Microchip Technology Inc.	<b>MCP1501T-20E/CHY</b>
1	U5	Microchip, Analog, VREF, 2.50V, MCP1501T-25E/CHY, SOT-23-6	Microchip Technology Inc.	<b>MCP1501T-25E/CHY</b>
1	U52	Microchip, Analog, OPAMP, 1-Channel, 10MHz, MCP6021T-E/OT, SOT-23-5	Microchip Technology Inc.	<b>MCP6021T-E/OT</b>
1	U6	Microchip, Analog VREF, 3V, MCP1501T-30E/CHY, SOT-23-6	Microchip Technology Inc.	<b>MCP1501T-30E/CHY</b>
1	U7	Microchip, Analog, VREF, 3.3V, MCP1501T-33E/CHY, SOT-23-6	Microchip Technology Inc.	<b>MCP1501T-33E/CHY</b>
1	U8	Microchip, Analog, VREF, 4.096V, MCP1501T-40E/CHY, SOT-23-6	Microchip Technology Inc.	<b>MCP1501T-40E/CHY</b>
1	U9	Microchip, Analog, VREF, 4.5V, MCP1501T-45E/CHY, SOT-23-6	Microchip Technology Inc.	<b>MCP1501T-45E/CHY</b>
1	V_O/P	Connector, test point, loop, red, through-hole	Keystone Electronics, Inc.	5010

**Note 1:** The components listed in this Bill of Materials are representative of the PCB assembly. The released BOM used in manufacturing uses all RoHS-compliant components.



# Bill of Materials (BOM)

---

---

**TABLE B-2: BOM – MECHANICAL PARTS**

Qty.	Reference	Description	Manufacturer	Part Number
2	JP1, JP2	Mechanical, hardware, jumper, 2.54 mm, 1x2 handle, gold	TE Connectivity AMP	881545-2
4	PAD1, PAD2, PAD3, PAD4	Mechanical, hardware, rubber pad, hemisphere, D6.4 H1.9, clear	3M	70070662963



# MICROCHIP

## Worldwide Sales and Service

### AMERICAS

**Corporate Office**  
2355 West Chandler Blvd.  
Chandler, AZ 85224-6199  
Tel: 480-792-7200  
Fax: 480-792-7277  
Technical Support:  
<http://www.microchip.com/support>  
Web Address:  
[www.microchip.com](http://www.microchip.com)

#### Atlanta

Duluth, GA  
Tel: 678-957-9614  
Fax: 678-957-1455

#### Austin, TX

Tel: 512-257-3370

#### Boston

Westborough, MA  
Tel: 774-760-0087  
Fax: 774-760-0088

#### Chicago

Itasca, IL  
Tel: 630-285-0071  
Fax: 630-285-0075

#### Dallas

Addison, TX  
Tel: 972-818-7423  
Fax: 972-818-2924

#### Detroit

Novi, MI  
Tel: 248-848-4000

#### Houston, TX

Tel: 281-894-5983

#### Indianapolis

Noblesville, IN  
Tel: 317-773-8323  
Fax: 317-773-5453  
Tel: 317-536-2380

#### Los Angeles

Mission Viejo, CA  
Tel: 949-462-9523  
Fax: 949-462-9608  
Tel: 951-273-7800

#### Raleigh, NC

Tel: 919-844-7510

#### New York, NY

Tel: 631-435-6000

#### San Jose, CA

Tel: 408-735-9110  
Tel: 408-436-4270

#### Canada - Toronto

Tel: 905-695-1980  
Fax: 905-695-2078

### ASIA/PACIFIC

**Australia - Sydney**  
Tel: 61-2-9868-6733

**China - Beijing**  
Tel: 86-10-8569-7000

**China - Chengdu**  
Tel: 86-28-8665-5511

**China - Chongqing**  
Tel: 86-23-8980-9588

**China - Dongguan**  
Tel: 86-769-8702-9880

**China - Guangzhou**  
Tel: 86-20-8755-8029

**China - Hangzhou**  
Tel: 86-571-8792-8115

**China - Hong Kong SAR**  
Tel: 852-2943-5100

**China - Nanjing**  
Tel: 86-25-8473-2460

**China - Qingdao**  
Tel: 86-532-8502-7355

**China - Shanghai**  
Tel: 86-21-3326-8000

**China - Shenyang**  
Tel: 86-24-2334-2829

**China - Shenzhen**  
Tel: 86-755-8864-2200

**China - Suzhou**  
Tel: 86-186-6233-1526

**China - Wuhan**  
Tel: 86-27-5980-5300

**China - Xian**  
Tel: 86-29-8833-7252

**China - Xiamen**  
Tel: 86-592-2388138

**China - Zhuhai**  
Tel: 86-756-3210040

### ASIA/PACIFIC

**India - Bangalore**  
Tel: 91-80-3090-4444

**India - New Delhi**  
Tel: 91-11-4160-8631

**India - Pune**  
Tel: 91-20-4121-0141

**Japan - Osaka**  
Tel: 81-6-6152-7160

**Japan - Tokyo**  
Tel: 81-3-6880-3770

**Korea - Daegu**  
Tel: 82-53-744-4301

**Korea - Seoul**  
Tel: 82-2-554-7200

**Malaysia - Kuala Lumpur**  
Tel: 60-3-7651-7906

**Malaysia - Penang**  
Tel: 60-4-227-8870

**Philippines - Manila**  
Tel: 63-2-634-9065

**Singapore**  
Tel: 65-6334-8870

**Taiwan - Hsin Chu**  
Tel: 886-3-577-8366

**Taiwan - Kaohsiung**  
Tel: 886-7-213-7830

**Taiwan - Taipei**  
Tel: 886-2-2508-8600

**Thailand - Bangkok**  
Tel: 66-2-694-1351

**Vietnam - Ho Chi Minh**  
Tel: 84-28-5448-2100

### EUROPE

**Austria - Wels**  
Tel: 43-7242-2244-39  
Fax: 43-7242-2244-393

**Denmark - Copenhagen**  
Tel: 45-4485-5910  
Fax: 45-4485-2829

**Finland - Espoo**  
Tel: 358-9-4520-820

**France - Paris**  
Tel: 33-1-69-53-63-20  
Fax: 33-1-69-30-90-79

**Germany - Garching**  
Tel: 49-8931-9700

**Germany - Haan**  
Tel: 49-2129-3766400

**Germany - Heilbronn**  
Tel: 49-7131-72400

**Germany - Karlsruhe**  
Tel: 49-721-625370

**Germany - Munich**  
Tel: 49-89-627-144-0  
Fax: 49-89-627-144-44

**Germany - Rosenheim**  
Tel: 49-8031-354-560

**Israel - Ra'anana**  
Tel: 972-9-744-7705

**Italy - Milan**  
Tel: 39-0331-742611  
Fax: 39-0331-466781

**Italy - Padova**  
Tel: 39-049-7625286

**Netherlands - Drunen**  
Tel: 31-416-690399  
Fax: 31-416-690340

**Norway - Trondheim**  
Tel: 47-7288-4388

**Poland - Warsaw**  
Tel: 48-22-3325737

**Romania - Bucharest**  
Tel: 40-21-407-87-50

**Spain - Madrid**  
Tel: 34-91-708-08-90  
Fax: 34-91-708-08-91

**Sweden - Gothenberg**  
Tel: 46-31-704-60-40

**Sweden - Stockholm**  
Tel: 46-8-5090-4654

**UK - Wokingham**  
Tel: 44-118-921-5800  
Fax: 44-118-921-5820