



MICROCHIP

**MCP39F511
Power Monitor
Demonstration Board
User's Guide**

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

- Microchip products meet the specification contained in their particular Microchip Data Sheet.
- Microchip believes that its family of products is one of the most secure families of its kind on the market today, when used in the intended manner and under normal conditions.
- There are dishonest and possibly illegal methods used to breach the code protection feature. All of these methods, to our knowledge, require using the Microchip products in a manner outside the operating specifications contained in Microchip's Data Sheets. Most likely, the person doing so is engaged in theft of intellectual property.
- Microchip is willing to work with the customer who is concerned about the integrity of their code.
- Neither Microchip nor any other semiconductor manufacturer can guarantee the security of their code. Code protection does not mean that we are guaranteeing the product as "unbreakable."

Code protection is constantly evolving. We at Microchip are committed to continuously improving the code protection features of our products. Attempts to break Microchip's code protection feature may be a violation of the Digital Millennium Copyright Act. If such acts allow unauthorized access to your software or other copyrighted work, you may have a right to sue for relief under that Act.

Information contained in this publication regarding device applications and the like is provided only for your convenience and may be superseded by updates.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. 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 ITS CONDITION, QUALITY, PERFORMANCE, MERCHANTABILITY OR FITNESS FOR PURPOSE. Microchip disclaims all liability arising from this information and its use. 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.

Trademarks

The Microchip name and logo, the Microchip logo, dsPIC, FlashFlex, flexPWR, JukeBlox, KEELOQ, KEELOQ logo, Kleer, LANCheck, MediaLB, MOST, MOST logo, MPLAB, OptoLyzer, PIC, PICSTART, PIC³² logo, RightTouch, SpyNIC, SST, SST Logo, SuperFlash and UNI/O are registered trademarks of Microchip Technology Incorporated in the U.S.A. and other countries.

The Embedded Control Solutions Company and mTouch are registered trademarks of Microchip Technology Incorporated in the U.S.A.

Analog-for-the-Digital Age, BodyCom, chipKIT, chipKIT logo, CodeGuard, dsPICDEM, dsPICDEM.net, ECAN, In-Circuit Serial Programming, ICSP, Inter-Chip Connectivity, KleerNet, KleerNet logo, MiWi, MPASM, MPF, MPLAB Certified logo, MPLIB, MPLINK, MultiTRAK, NetDetach, Omniscient Code Generation, PICDEM, PICDEM.net, PICkit, PICtail, RightTouch logo, REAL ICE, SQI, Serial Quad I/O, Total Endurance, TSHARC, USBCheck, VariSense, ViewSpan, WiperLock, Wireless DNA, 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.

Silicon Storage Technology is a registered trademark of Microchip Technology Inc. in other countries.

GestIC is a registered trademarks 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.

© 2015, Microchip Technology Incorporated, Printed in the U.S.A., All Rights Reserved.

ISBN: 978-1-63277-203-9

**QUALITY MANAGEMENT SYSTEM
CERTIFIED BY DNV
= ISO/TS 16949 =**

Microchip received ISO/TS-16949:2009 certification for its worldwide headquarters, design and wafer fabrication facilities in Chandler and Tempe, Arizona; Gresham, Oregon and design centers in California and India. The Company's quality system processes and procedures are for its PIC[®] MCUs and dsPIC[®] DSCs, KEELOQ[®] code hopping devices, Serial EEPROMs, microperipherals, nonvolatile memory and analog products. In addition, Microchip's quality system for the design and manufacture of development systems is ISO 9001:2000 certified.

Object of Declaration: MCP39F511 Power Monitor Demonstration Board

EU Declaration of Conformity

Manufacturer: Microchip Technology Inc.
2355 W. Chandler Blvd.
Chandler, Arizona, 85224-6199
USA

This declaration of conformity is issued by the manufacturer.

The development/evaluation tool is designed to be used for research and development in a laboratory environment. This development/evaluation tool is not intended to be a finished appliance, nor is it intended for incorporation into finished appliances that are made commercially available as single functional units to end users. This development/evaluation tool complies with EU EMC Directive 2004/108/EC and as supported by the European Commission's Guide for the EMC Directive 2004/108/EC (8th February 2010).

This development/evaluation tool complies with EU RoHS2 Directive 2011/65/EU.

This development/evaluation tool, when incorporating wireless and radio-telecom functionality, is in compliance with the essential requirement and other relevant provisions of the R&TTE Directive 1999/5/EC and the FCC rules as stated in the declaration of conformity provided in the module datasheet and the module product page available at www.microchip.com.

For information regarding the exclusive, limited warranties applicable to Microchip products, please see Microchip's standard terms and conditions of sale, which are printed on our sales documentation and available at www.microchip.com.

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


Derek Carlson
VP Development Tools

12-Sep-14
Date

MCP39F511 Power Monitor Demonstration Board User's Guide

NOTES:



MCP39F511 POWER MONITOR DEMONSTRATION BOARD USER'S GUIDE

Table of Contents

Preface	7
Introduction.....	7
Document Layout	7
Conventions Used in this Guide	8
Recommended Reading.....	9
The Microchip Web Site	9
Customer Support	9
Document Revision History	9
Chapter 1. Product Overview	
1.1 Introduction	11
1.2 What Does the MCP39F511 Power Monitor Demonstration Board Kit Include?	12
Chapter 2. Installation and Operation	
2.1 Getting Started	13
Chapter 3. Hardware Description	
3.1 Input and Analog Front End	17
3.2 Power Supply Circuit	18
Appendix A. Schematic and Layouts	
A.1 Introduction	19
A.2 Schematics and PCB Layout	19
A.3 Board – Schematic	20
A.3 Board – Schematic (Continued)	21
A.4 Board – Top Silk	22
A.5 Board – Top Copper and Silk	23
A.6 Board – Top Copper	24
A.7 Board – Bottom Copper	25
A.8 Board – Bottom Copper and Silk	26
A.9 Board – Bottom Silk	27
Appendix B. Bill of Materials (BOM)	
Worldwide Sales and Service	32

MCP39F511 Power Monitor Demonstration Board User's Guide

NOTES:



MCP39F511 POWER MONITOR DEMONSTRATION BOARD USER'S GUIDE

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 “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 MCP39F511 Power Monitor Demonstration Board. Items discussed in this chapter include:

- [Document Layout](#)
- [Conventions Used in this Guide](#)
- [Recommended Reading](#)
- [The Microchip Web Site](#)
- [Customer Support](#)
- [Document Revision History](#)

DOCUMENT LAYOUT

This document describes how to use the MCP39F511 Power Monitor Demonstration Board as a demonstration board to evaluate the MCP39F511 device. The manual layout is as follows:

- **Chapter 1. “Product Overview”** – Provides important information about the MCP39F511 Power Monitor Demonstration Board
- **Chapter 2. “Installation and Operation”** – Provides information on using the MCP39F511 Power Monitor Demonstration Board, including **Section 2.1.1 “Step 1: Wiring connections”** that describes wiring the line and load connections
- **Chapter 3. “Hardware Description”** – Provides details on the functional blocks of the power monitor, including the analog front-end design and power supply design
- **Appendix A. “Schematic and Layouts”** – Shows the schematic and layout diagrams
- **Appendix B. “Bill of Materials (BOM)”** – Lists the parts used to build the MCP39F511 Power Monitor Demonstration Board

MCP39F511 Power Monitor Demonstration Board User's Guide

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) { ... }

RECOMMENDED READING

This user's guide describes how to use MCP39F511 Power Monitor Demonstration Board. Another useful document is listed below. The following Microchip document is available and recommended as a supplemental reference resource.

MCP39F511 Data Sheet – “Power-Monitoring IC with Calculation with Energy Accumulation” (DS20005393)

This data sheet provides detailed information regarding the MCP39F511 device.

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

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://support.microchip.com>

DOCUMENT REVISION HISTORY

Revision A (March 2015)

- Initial Release of this Document.

MCP39F511 Power Monitor Demonstration Board User's Guide

NOTES:

Chapter 1. Product Overview

1.1 INTRODUCTION

The MCP39F511 Power Monitor Demonstration Board is a fully functional single-phase power and energy monitor. The system calculates active power, reactive power, RMS current, RMS voltage, active energy, (both import and export), reactive energy and other typical power quantities, as defined in the MCP39F511 data sheet.

The “MCP39F511 Power Monitor Utility” software is used to calibrate and monitor the system, and can be used to create custom calibration setups. For most accuracy requirements, only a single-point calibration is needed. The energy meter software offers an automated step-by-step calibration process that can be used to quickly calibrate energy meters.

This demonstration board uses the MCP39F511 Power Monitor Utility software for evaluation via a USB connection to the board. A download link for this software can be found on the evaluation board’s web page. For instructions on how to use the software, refer to the software’s supporting documentation included within the application install package.

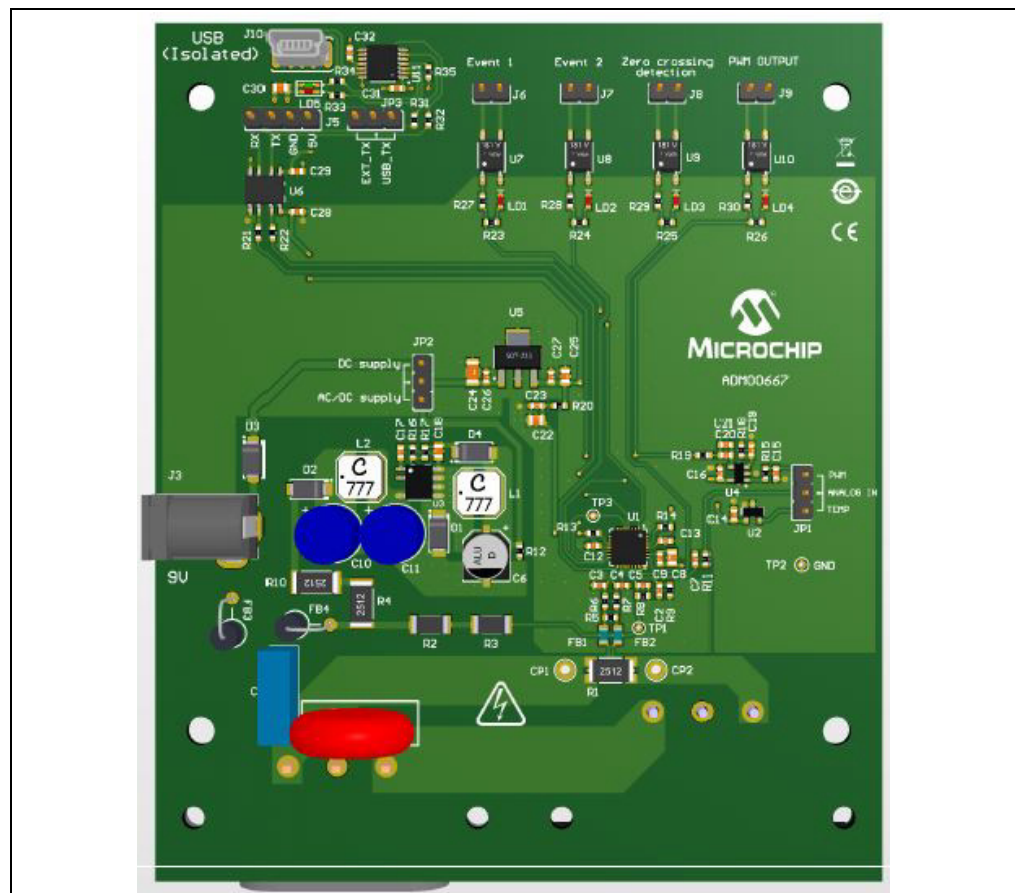


FIGURE 1-1: MCP39F511 Power Monitor Demonstration Board.

1.2 WHAT DOES THE MCP39F511 POWER MONITOR DEMONSTRATION BOARD KIT INCLUDE?

This MCP39F511 Power Monitor Demonstration Board kit includes:

- MCP39F511 Power Monitor Demonstration Board (ADM00667)
- AC Line Cable
- IEC to Female AC Load Cable
- Mini-USB Cable
- Important Information Sheet

Chapter 2. Installation and Operation

2.1 GETTING STARTED

To use the MCP39F511 Power Monitor Demonstration Board, follow the steps described in the sections below. The meter design uses a 5A load for calibration current and a maximum current (I_{MAX}) of 15A.

It is not recommended to put more than 15A through the AC plugs mounted on the Printed Circuit Board (PCB).

To test the calibrated meter, the following connections can be made:

2.1.1 Step 1: Wiring connections

Figure 2-1 identifies the line and load connections of the MCP39F511 Power Monitor Demonstration Board.



FIGURE 2-1: Connecting the MCP39F511 Power Monitor Demonstration Board.

2.1.2 Step 2: Turn on line/load power to the meter (power the meter)

The meter will turn on when the line connection has between 90V to 220V connected.

2.1.3 Step 3: Connect the USB cable to a PC with the installed “MCP39F511 Power Monitor Utility” software

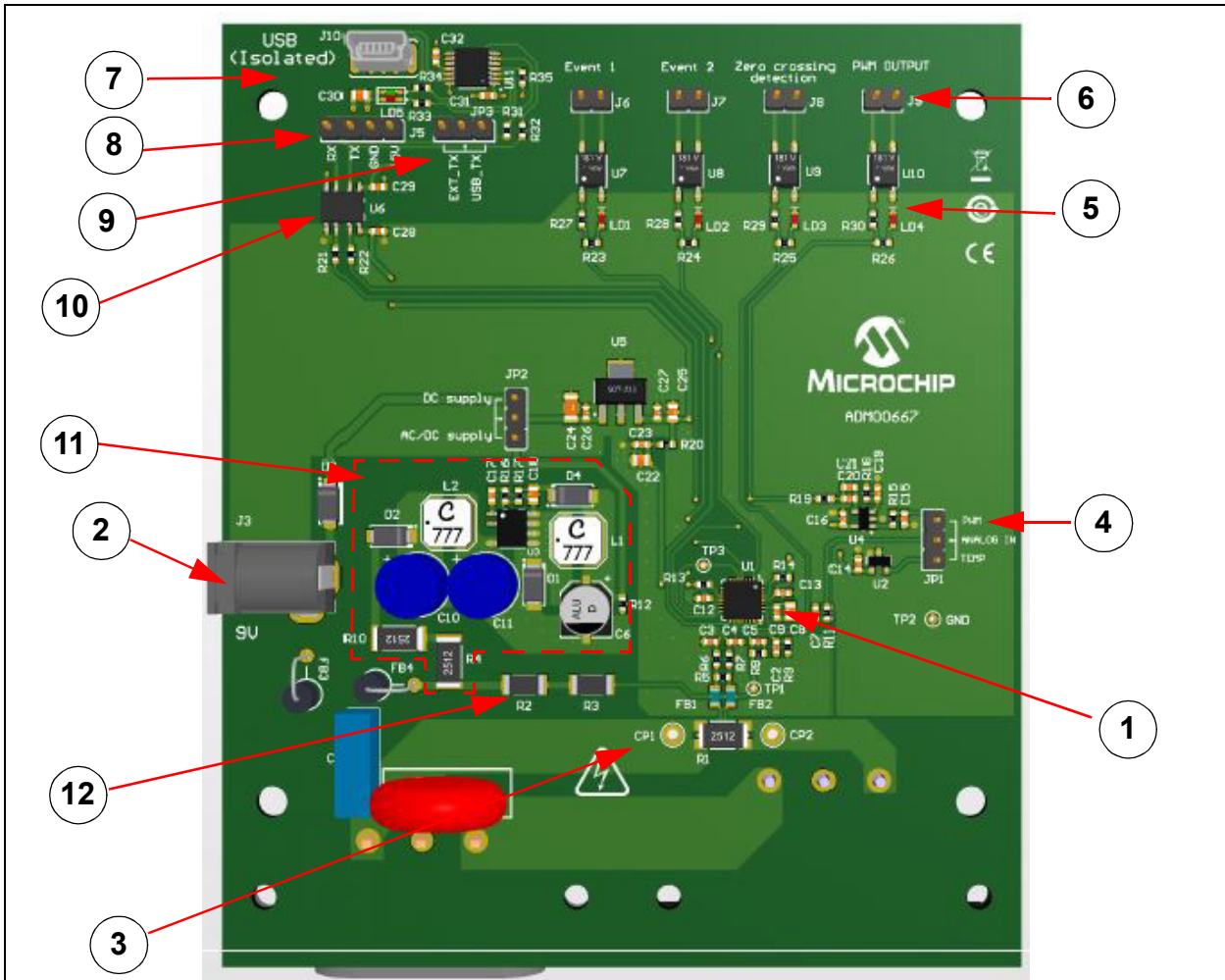
Select the appropriate COM port. If the meter is connected correctly, the connection status in the bottom-left corner of the software will display “Meter Connected”. If no meter is found, the status will be “Meter Disconnected”. Check that the correct COM port was selected and try again. Press the “Start” icon to begin showing output data and UART transmission between the PC and the MCP39F511

Note: For instructions on using the software GUI, please refer to the help file located in the program installation directory and also on the website: MCP39F511 Power Monitor Software User Manual.pdf

MCP39F511 Power Monitor Demonstration Board User's Guide

NOTES:

Chapter 3. Hardware Description



Legend:

- | | |
|------------------------------------------------------------|--------------------------------------------------------------|
| 1 = MCP39F511 | 8 = Header for connection to external master MCU (isolated) |
| 2 = +9V DC Input (non-isolated) | 9 = Jumper selection for external MCU or USB (GUI) operation |
| 3 = Connections to external shunt current sensing resistor | 10 = Isolation IC |
| 4 = Configuration jumper for analog input | 11 = Switching AC/DC Power Supply |
| 5 = Output LEDs for digital I/O | 12 = 1000:1 Voltage Divider for Voltage Input |
| 6 = Headers for pulse testing (isolated) | 13 = Jumper for DC or Switching AC/DC Supply |
| 7 = USB Connection (isolated) | |

FIGURE 3-1: MCP39F511 Power Monitor Demonstration Board Top View.

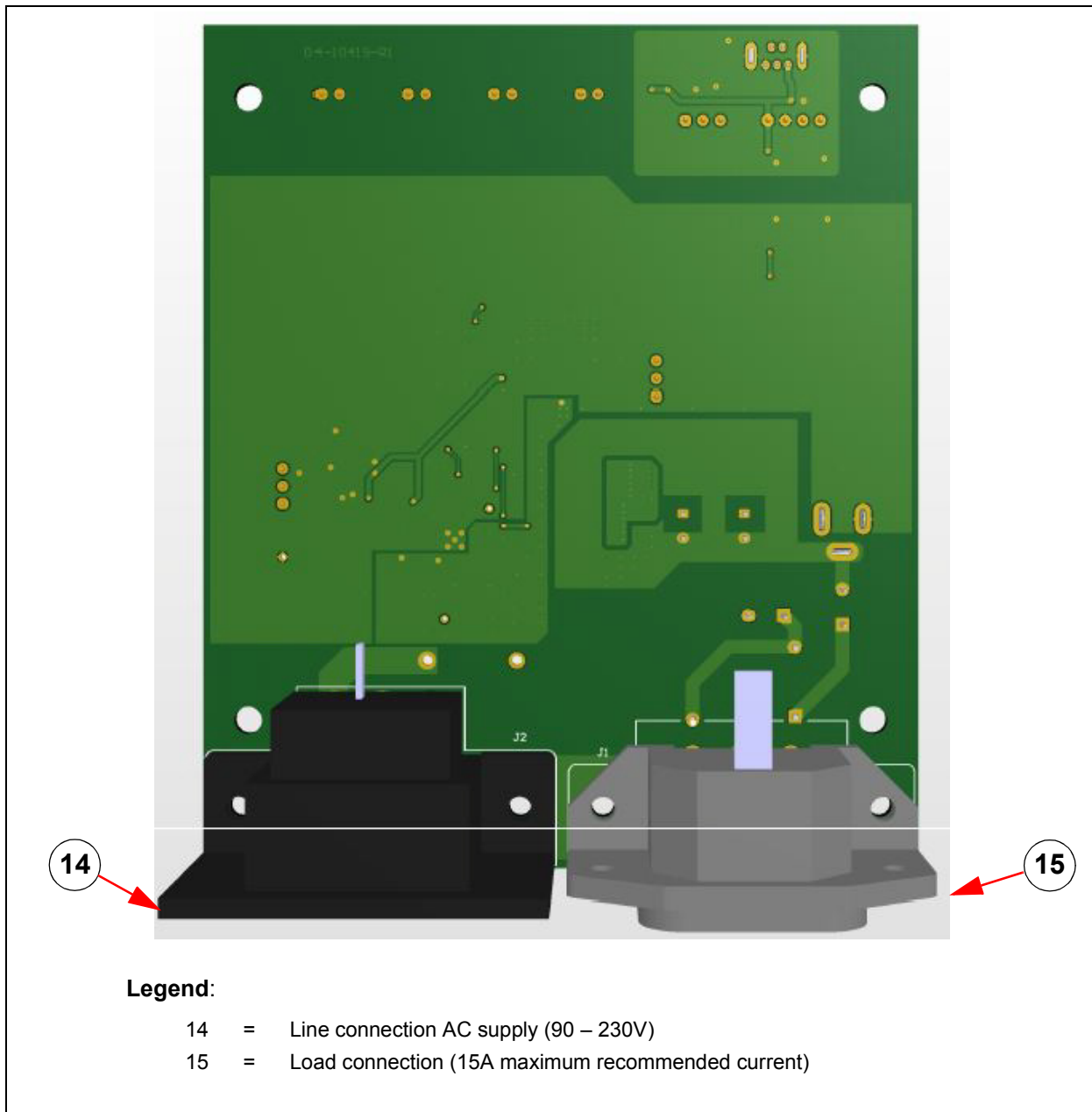


FIGURE 3-2: MCP39F511 Power Monitor Demonstration Board Bottom View.

3.1 INPUT AND ANALOG FRONT END

The MCP39F511 Power Monitor Demonstration Board will operate from 90V to 230V. At the bottom of the main board, there are the high-voltage line and neutral connections. The shunt sits on the neutral or low side of a two-wire system. The board comes populated with a surface mount 2 mΩ shunt. If a lower value external shunt is to be used, the wires going from the external shunt to the CP1 and CP2 connections should be twisted together.

The neutral side of the two-wire system goes into a resistor divider on the voltage channel input, along with a DC offset added from V_{DD} . Anti-aliasing low-pass filters are included. The voltage channel uses two 499 kΩ resistors to achieve a divider ratio of 1000:1. For a line voltage of 220 V_{RMS} , the channel 1 input signal size will be 220 mV_{RMS} .

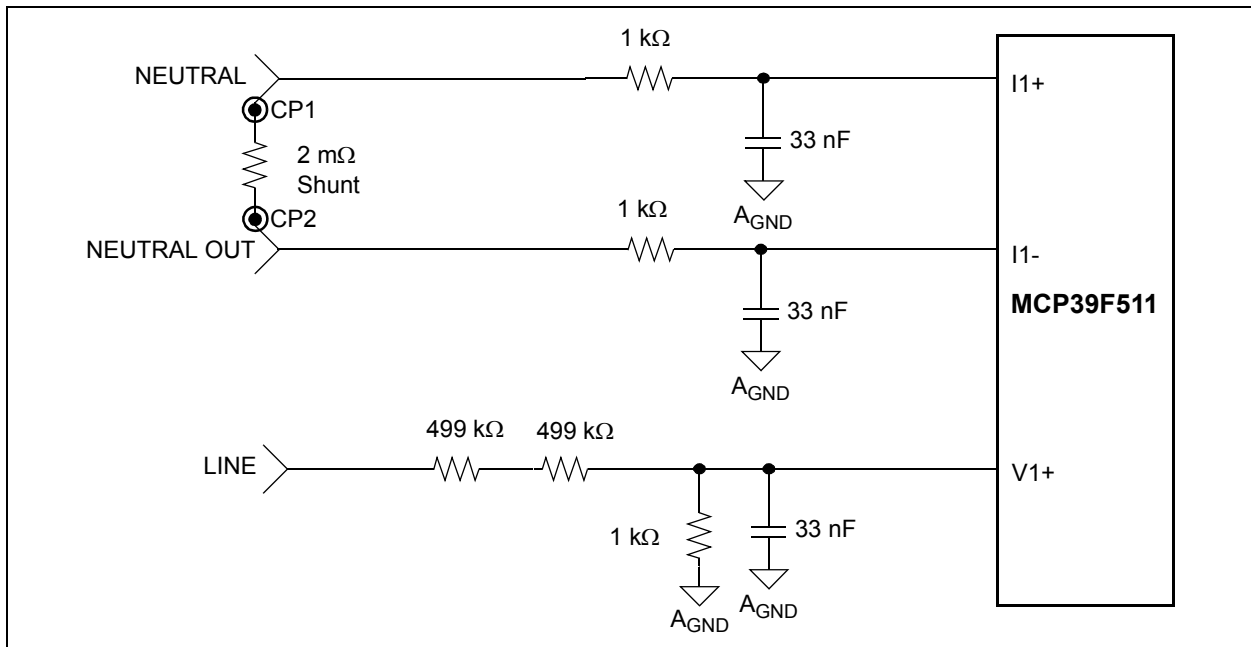


FIGURE 3-3: Analog Front-End Circuitry.

Note that all of the analog circuitry associated with this part of the circuit is connected to the analog ground plane (A_{GND}).

3.2 POWER SUPPLY CIRCUIT

The power supply circuit for the MCP39F511 Power Monitor Demonstration Board is shown in [Figure 3-4](#).

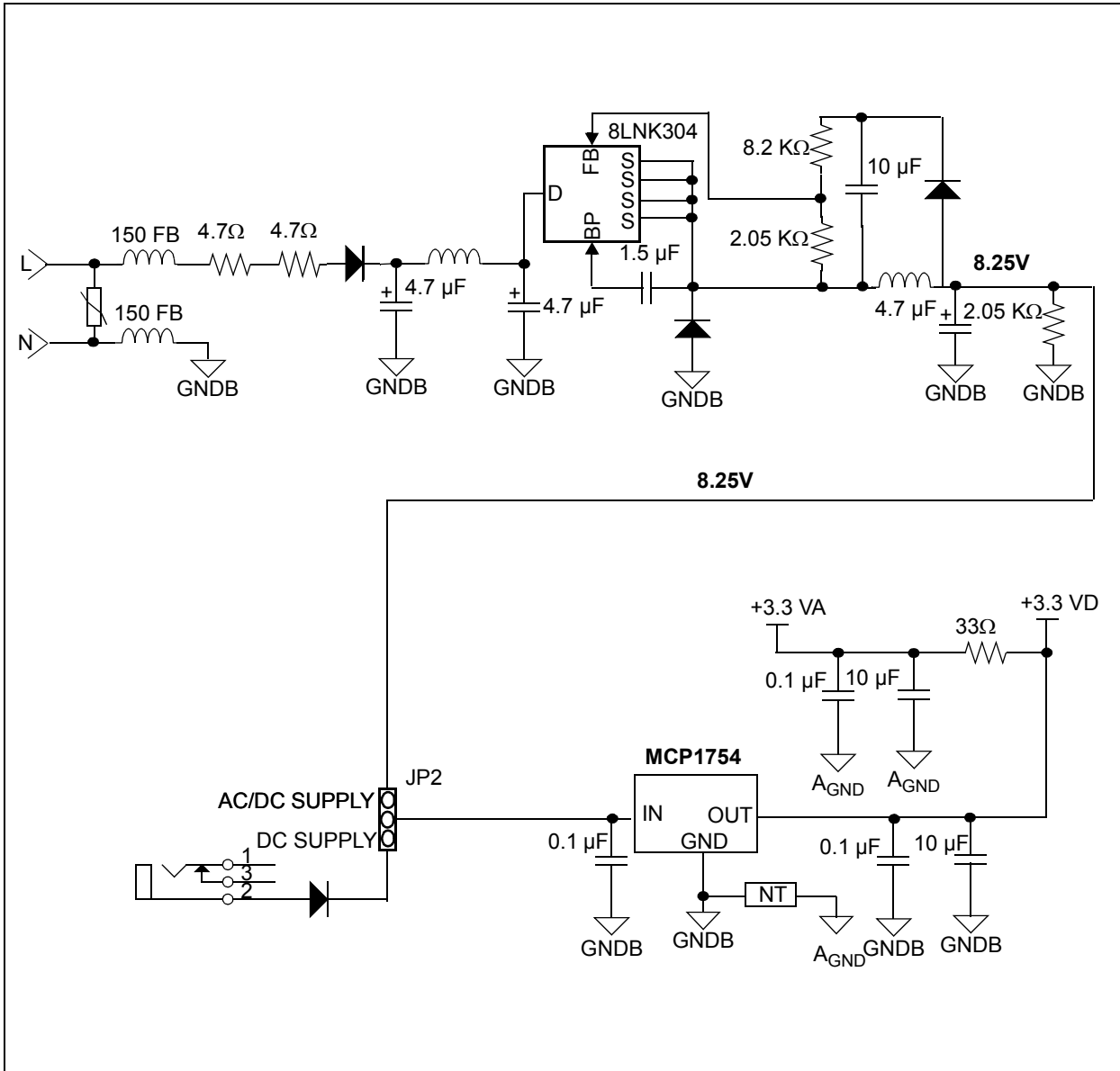


FIGURE 3-4: Power Supply Circuit with Option for AC/DC Switching Supply from Mains or DC Supply.

Appendix A. Schematic and Layouts

A.1 INTRODUCTION

This appendix contains the following schematics and layouts for the MCP39F511 Power Monitor Demonstration Board:

- Board – Schematic
- Board – Schematic (Continued)
- Board – Top Silk
- Board – Top Copper and Silk
- Board – Top Copper
- Board – Bottom Copper
- Board – Bottom Copper and Silk

A.2 SCHEMATICS AND PCB LAYOUT

The layer order is shown in [Figure A-1](#).

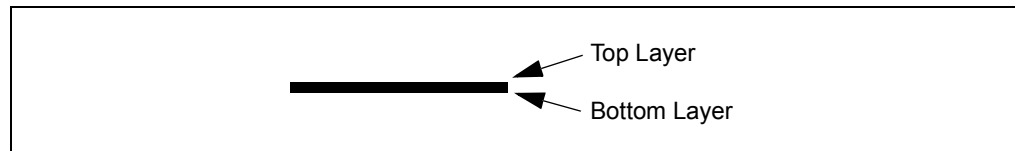
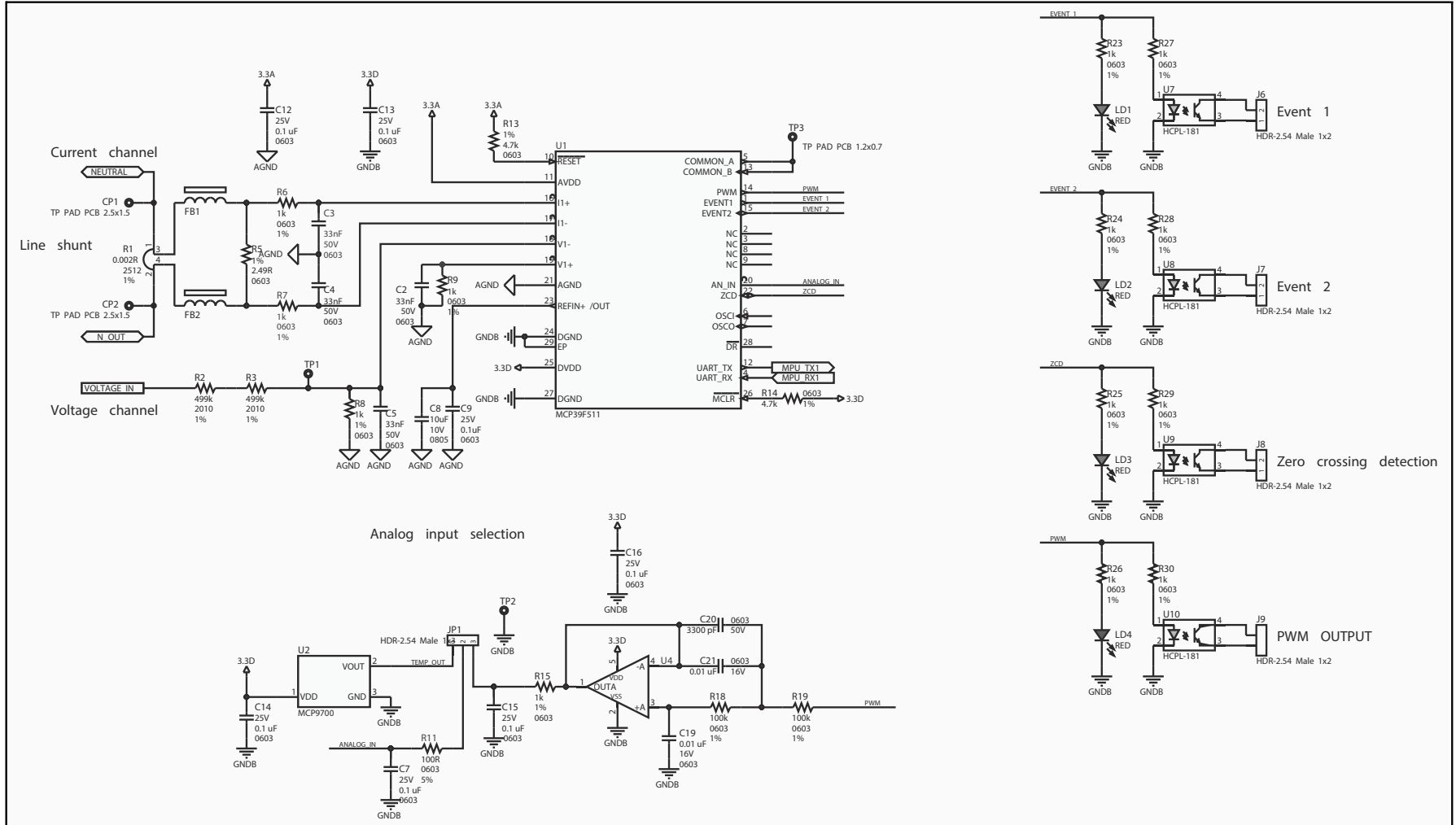
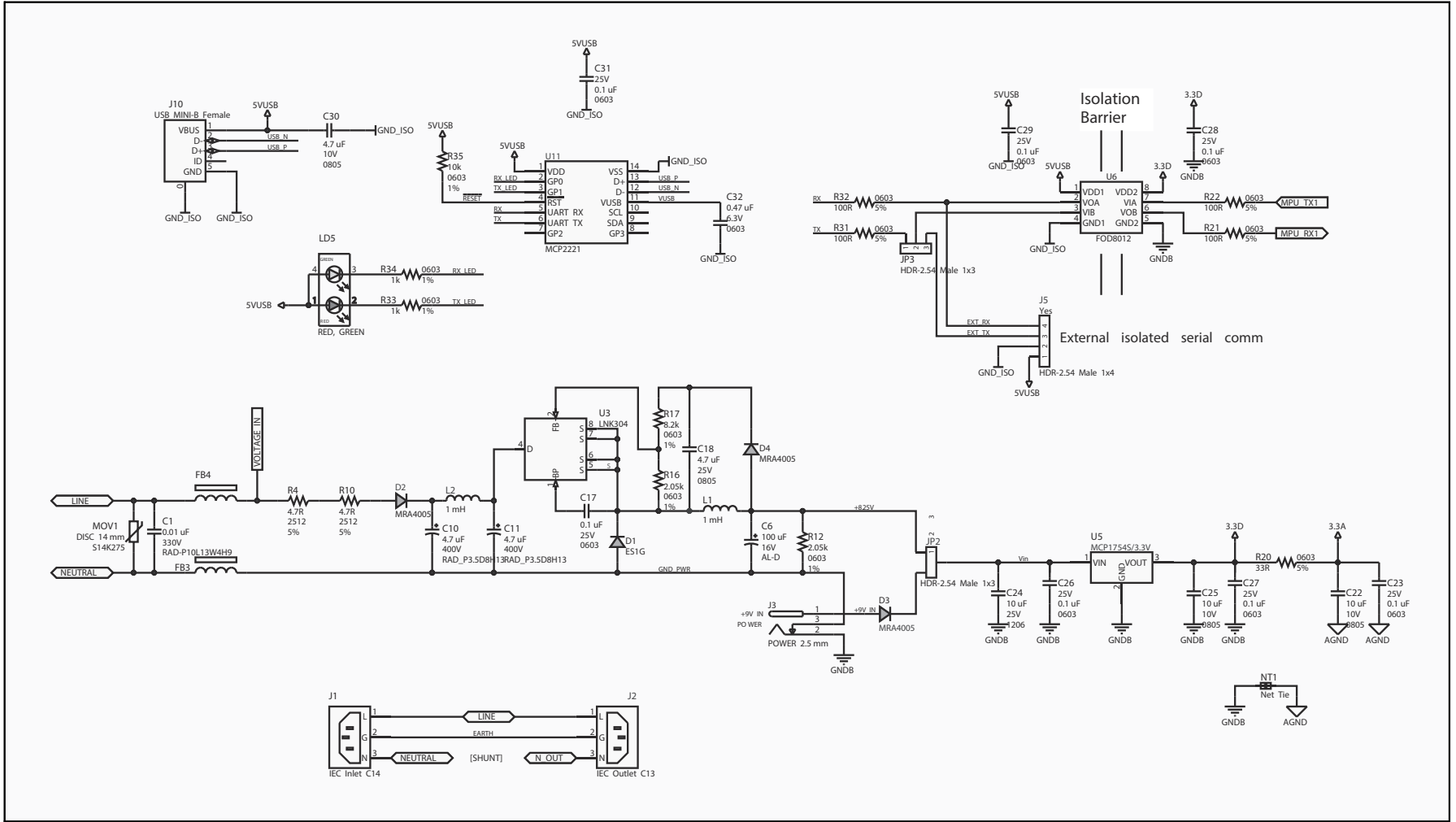


FIGURE A-1: Layer Order.

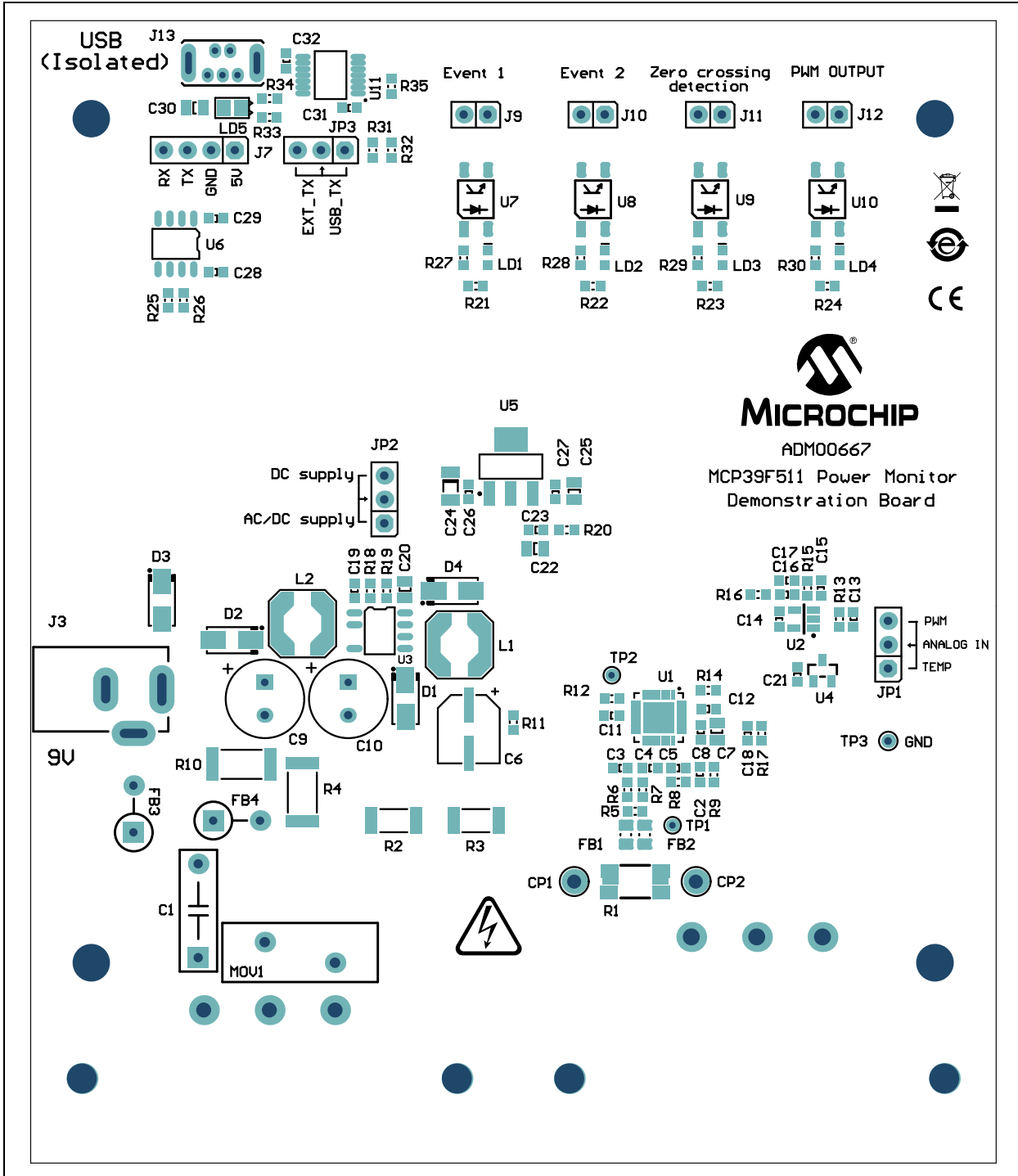
A.3 BOARD – SCHEMATIC



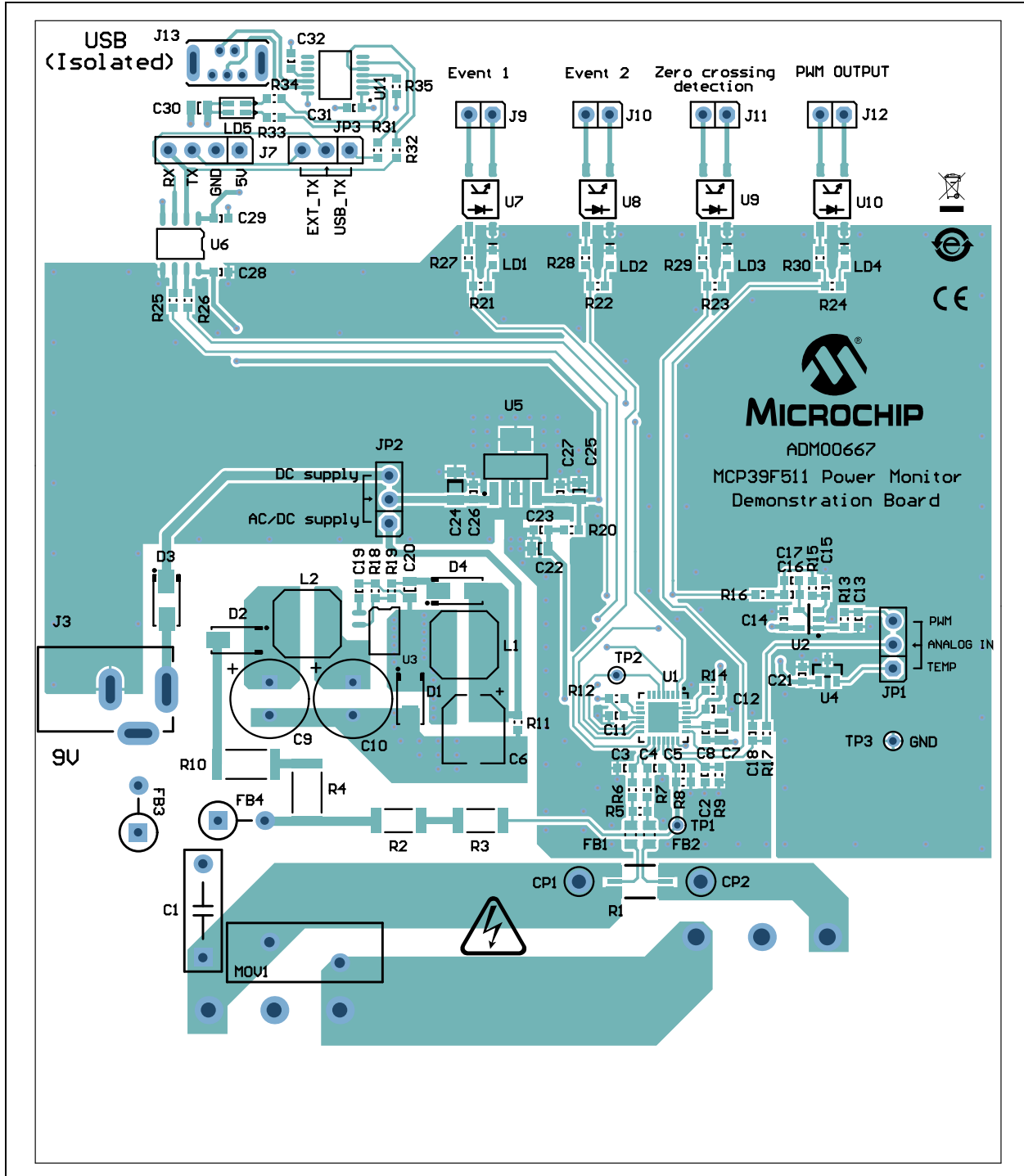
A.3 BOARD – SCHEMATIC (CONTINUED)



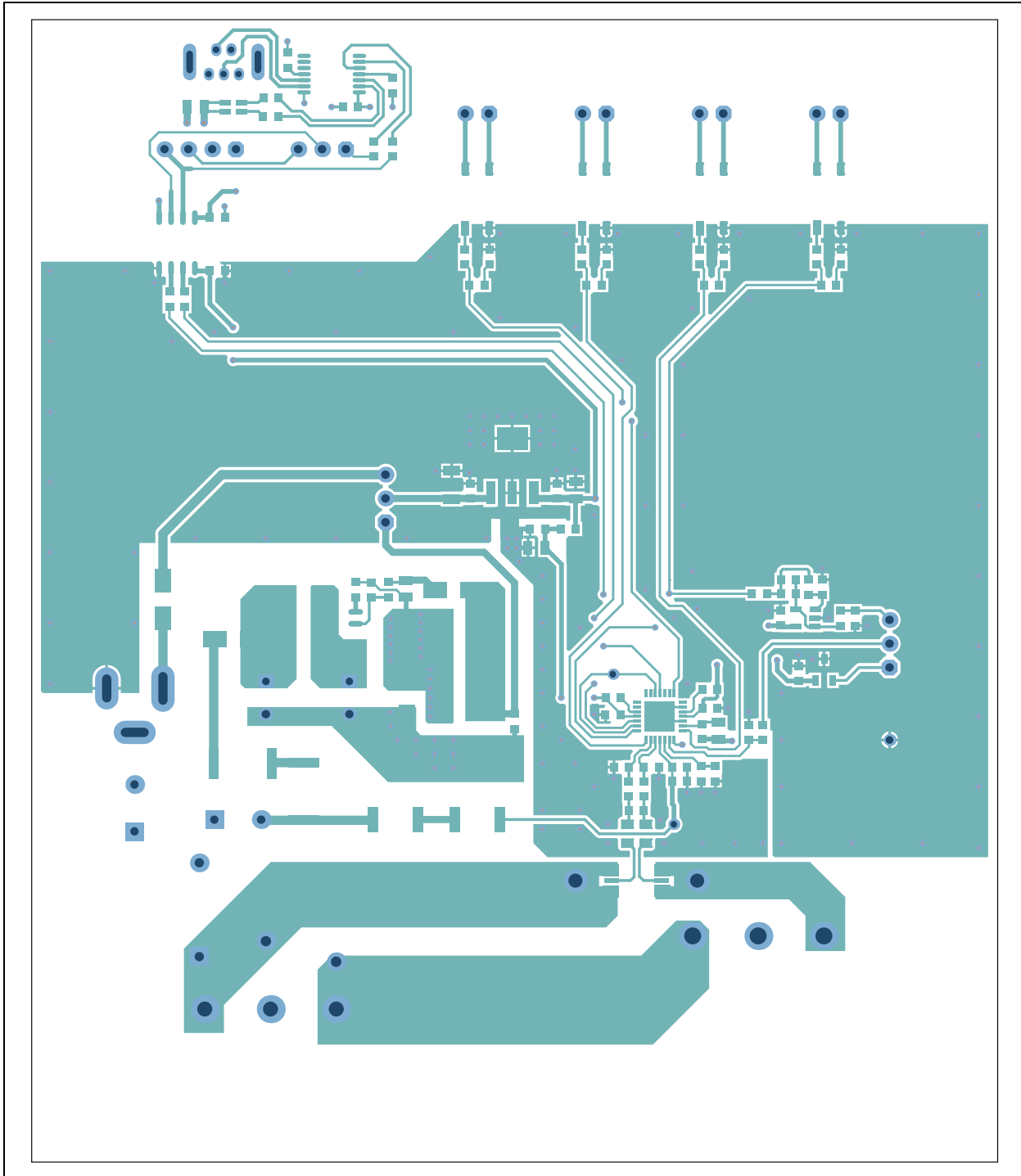
A.4 BOARD – TOP SILK



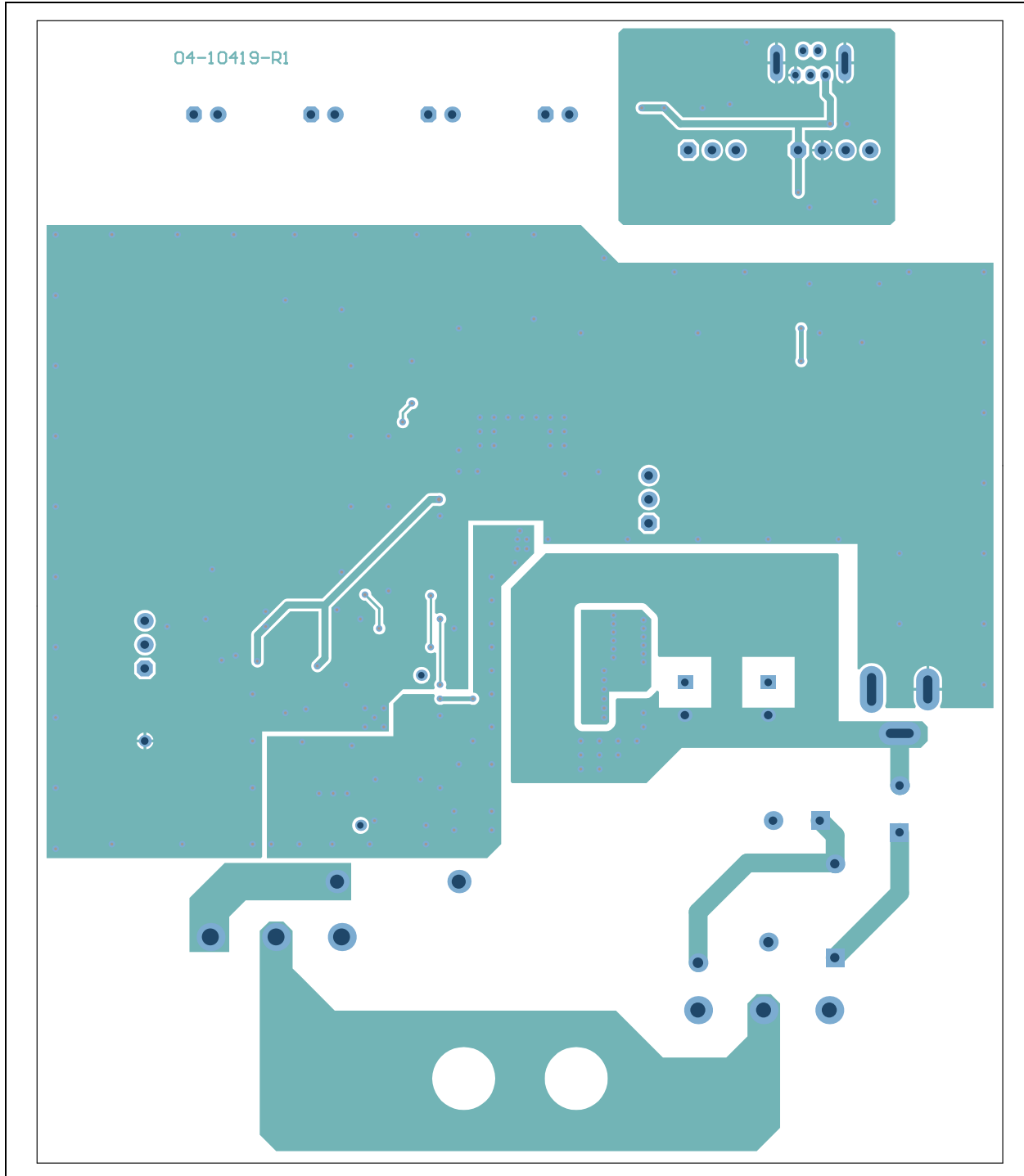
A.5 BOARD – TOP COPPER AND SILK



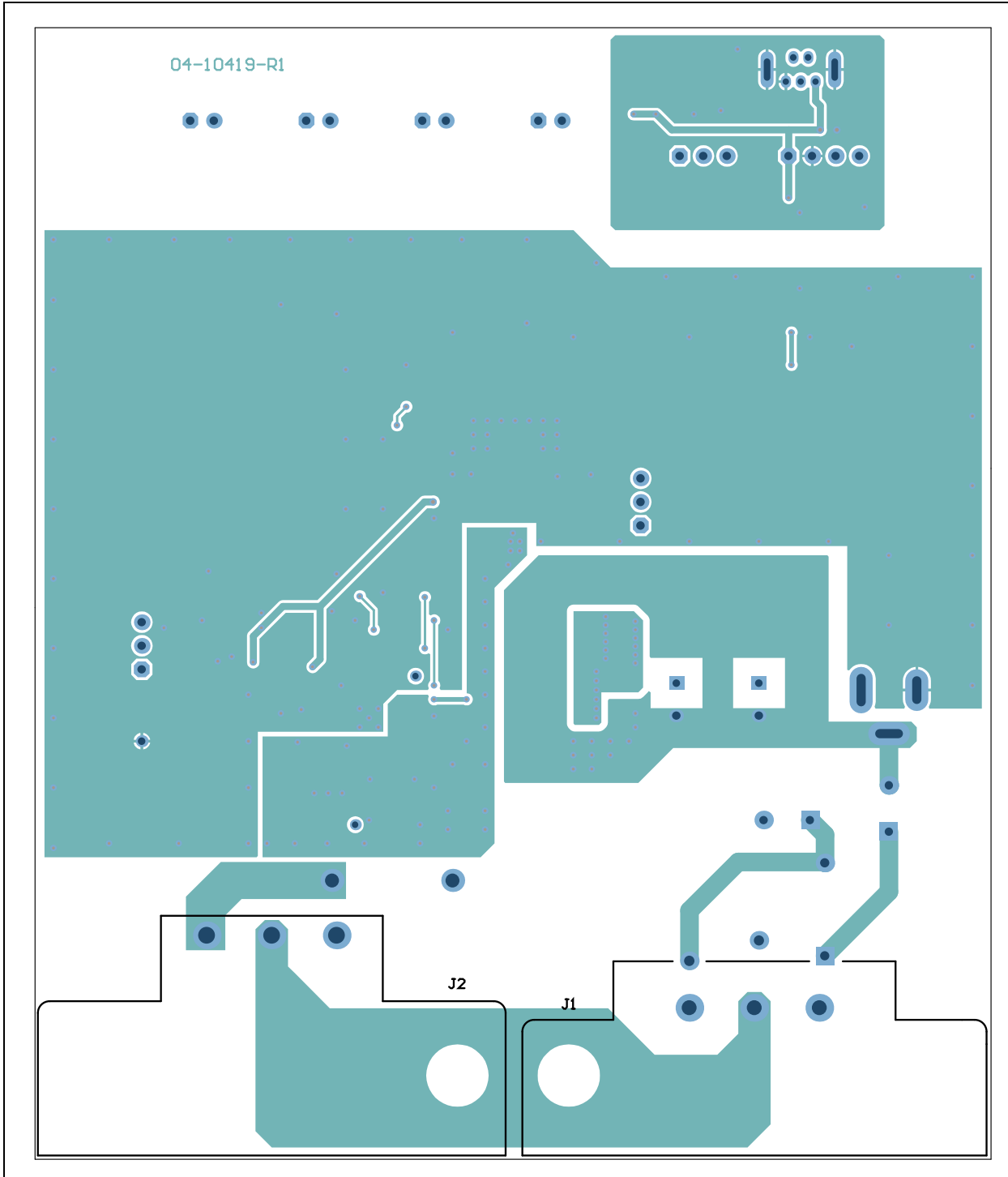
A.6 BOARD – TOP COPPER



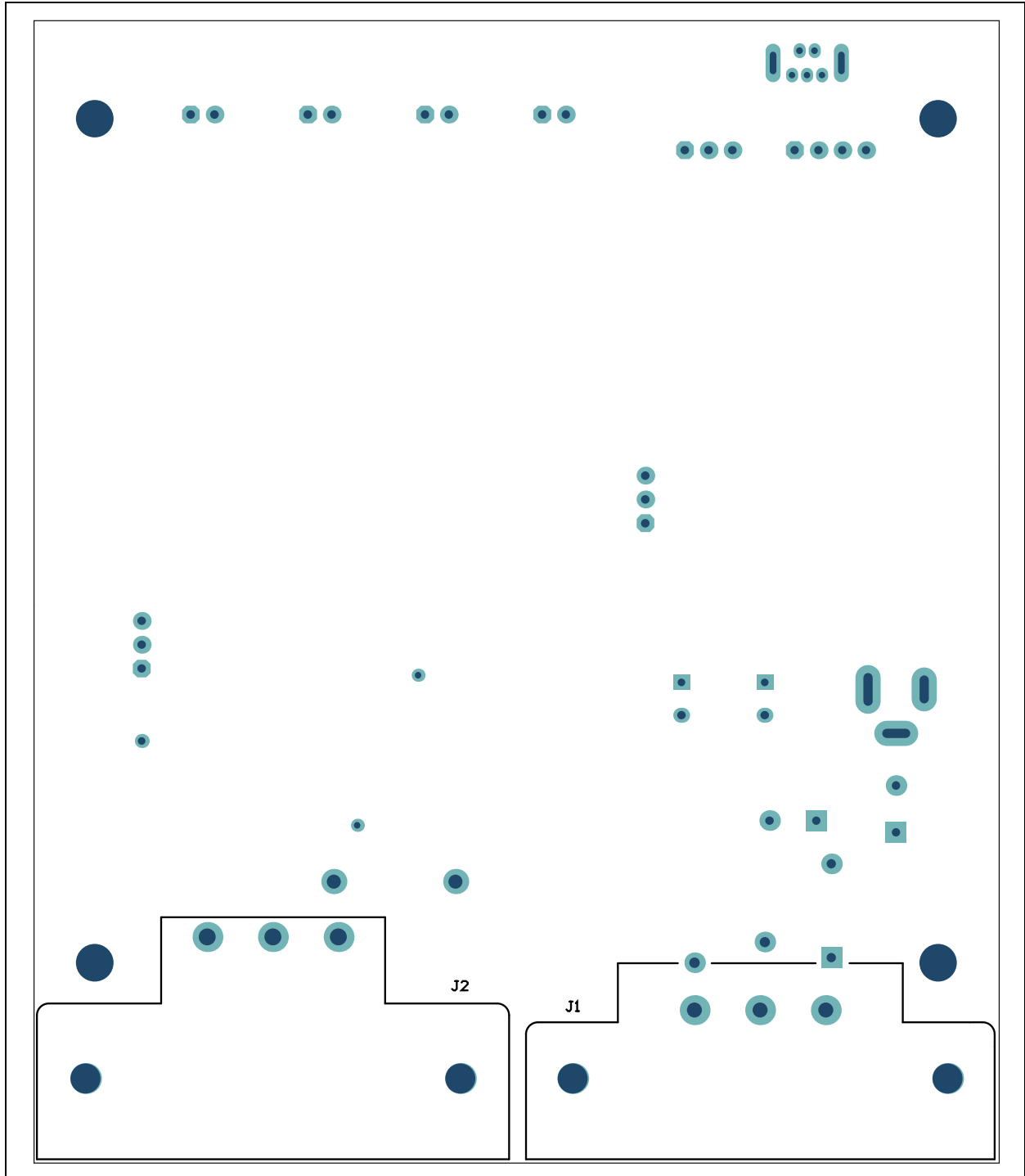
A.7 BOARD – BOTTOM COPPER



A.8 BOARD – BOTTOM COPPER AND SILK



A.9 BOARD – BOTTOM SILK



NOTES:

Appendix B. Bill of Materials (BOM)

TABLE B-1: BILL OF MATERIALS (BOM)

Qty.	Reference	Description	Manufacturer	Part Number
1	C1	Cap. film 0.01 μ F 330V 20% RAD P10L13W4H9	EPCOS AG	B32911A3103M
4	C2, C3, C4, C5	Cap. ceramic 33 nF 50V 10% X7R SMD 0603	TDK Corporation [®]	C1608X7R1H333K
1	C6	Cap. aluminum 100 μ F 16V 20% SMD D	Nichicon Corporation [®]	UWX1C101MCL1GB
14	C7, C9, C12, C13, C14, C15, C16, C17, C23, C26, C27, C28, C29, C31	Cap. ceramic 0.1 μ F 25V 10% X7R SMD 0603	Murata Electronics [®]	GRM188R71E104KA01D
3	C8, C22, C25	Cap. ceramic 10 μ F 10V 10% X7R SMD 0805	TDK Corporation	C2012X7R1A106K125AC
2	C10, C11	Cap. aluminum 4.7 μ F 400V 20% RAD_P3.5D8H13	Nichicon Corporation	UVC2G4R7MPD1TD
1	C18	Cap. ceramic 4.7 μ F 25V 10% X7R SMD 0805	TDK Corporation	C2012X7R1E475K125AB
2	C19, C21	Cap. ceramic 0.01 μ F 16V 5% SMD 0603	Taiyo Yuden Co., Ltd. [®]	EMK107SD103JA-T
1	C20	Cap. ceramic 3300 pF 50V 10% X7R SMD 0603	ROHM Semiconductor [®]	C0603C332K5RACTU
1	C24	Cap. ceramic 10 μ F 25V 10% X7R SMD 1206	Taiyo Yuden Co., Ltd.	TMK316B7106KL-TD
1	C30	Cap. ceramic 4.7 μ F 10V 10% X5R SMD 0805	Taiyo Yuden Co., Ltd.	LMK212BJ475KD-T
1	C32	Cap. ceramic 0.47 μ F 6.3V 10% X5R SMD 0603	Murata Electronics	GRM188R60J474KA01D
1	D1	Diode rec. ES1G 1.25V 1A 400V SMD DO-214AC_SMA	Diodes Incorporated [®]	ES1G-13-F
3	D2, D3, D4	Diode rec. MRA4005 1.1V 1A 600V DO-214AC_SMA	ON Semiconductor [®]	MRA4005T3G
2	FB1, FB2	Ferrite 800 mA 0.15R SMD 0805	Laird Technologies	LI0805H151R-10
2	FB3, FB4	Ferrite 7A 0.01R RAD P5L5.3D3.8	Panasonic [®] – ECG	EXC-ELSR35S
1	J1	Conn. IEC 250V 15A Inlet C14 TH R/A	SCHURTER Inc.	GSP1.9103.1
1	J2	Conn. IEC 250V 15A Outlet C13 TH R/A	SCHURTER Inc.	6182.0033
1	J3	Conn. power 2.5 mm 5.5 mm Switch TH R/A	CUI Inc.	PJ-002B

Note: 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.

MCP39F511 Power Monitor Demonstration Board Us-

TABLE B-1: BILL OF MATERIALS (BOM) (CONTINUED)

Qty.	Reference	Description	Manufacturer	Part Number
1	J5	Conn. header-2.54 Male 1x4 Tin 5.84MH TH vert.	FCI	68002-404HLF
4	J6, J7, J8, J9	Conn. header-2.54 Male 1x2 Tin 6.10MH TH vert.	Molex®	0022284020
1	J10	Conn. USB Mini-B Female TH vert.	Molex	500075-1517
3	JP1, JP2, JP3	Conn. header-2.54 Male 1x3 Gold 5.84MH TH vert.	FCI	68000-103HLF
2	L1, L2	Inductor 1 mH 240 mA 20% SMD L6W6H2.4	Coilcraft®	LPS6225-105MLB
4	LD1, LD2, LD3, LD4	Diode LED red 1.95V 30 mA 700 mcd Clear SMD 0603	Kingbright Corp.®	APTD1608SURCK
1	LD5	Diode LED bi red, green 1.95V, 2.1V 30mA 0805	Kingbright Corp.	APHBM2012SURKCGKC
1	MOV1	Res. Varistor 275V 130J TH DISC 14 mm	EPCOS AG	S14K275E2K1
1	PCB	Printed Circuit Board – MCP39F501 Power Monitor Demonstration Board	Microchip Technology Inc.®	04-10419
1	R1	Res. Shunt MF 0.002R 1% 2W 2512	Stackpole Electronics, Inc.	CSNL2512FT2L00
2	R2, R3	Res. TKF 499 kΩ 1% 3/4W SMD 2010	Vishay/Dale	CRCW2010499KFKEF
2	R4, R10	Res. TKF 4.7R 5% 1W SMD 2512	Stackpole Electronics, Inc.	RPC2512JT4R70
1	R5	Res. TKF 2.49R 1% 1/10W SMD 0603	Vishay/Dale	CRCW06032R49FKEA
15	R6, R7, R8, R9, R15, R23, R24, R25, R26, R27, R28, R29, R30, R33, R34	Res. TKF 1 kΩ 1% 1/10W SMD 0603	Panasonic – ECG	ERJ-3EKF1001V
5	R11, R21, R22, R31, R32	Res. TKF 100R 5% 1/10W SMD 0603	Vishay/Dale	CRCW0603100RJNEA
2	R12, R16	Res. TKF 2.05 kΩ 1% 1/10W SMD 0603	Yageo Corporation	RC0603FR-072K05L
2	R13, R14	Res. TKF 4.7 kΩ 1% 1/10W SMD 0603	Panasonic – ECG	ERJ-3EKF4701V
1	R17	Res. TKF 8.2 kΩ 1% 1/10W SMD 0603	Panasonic – ECG	ERJ-3EKF8201V
2	R18, R19	Res. TF 100 kΩ 1% 1/8W SMD 0603	Vishay/Dale	MCT06030C1003FP500
1	R20	Res. TKF 33R 5% 1/10W SMD 0603	Yageo Corporation	9C06031A33R0JLHFT
1	R35	Res. TKF 10 kΩ 1% 1/10W SMD 0603	Panasonic – ECG	ERJ-3EKF1002V
1	U3	IC Switcher LNK304 SO-8C	Power Integrations™	LNK304DG-TL
1	U6	IC Photo FOD8012 Bi-Dir 3.3V and 5V SOIC-8	Fairchild Semiconductor®	FOD8012
4	U7, U8, U9, U10	IC Photo HCPL-181 4-SMD	Avago Technologies	HCPL-181-00CE

Note: 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: BILL OF MATERIALS – MICROCHIP CONSIGNED PARTS

Qty.	Reference	Description	Manufacturer	Part Number
1	U1	MCHP Analog Energy Measurement 4000:1 MCP39F511-E/MQ QFN-28	Microchip Technology Inc.	MCP39F511-E/MQ
1	U2	MCHP Analog Temperature Sensor -40°C to +150°C MCP9700T-E/TT SOT-23-3	Microchip Technology Inc.	MCP9700T-E/TT
1	U4	MCHP Analog OPAMP 1-Ch 10 MHz MCP6021T-E/OT SOT-23-5	Microchip Technology Inc.	MCP6021T-E/OT
1	U5	MCHP Analog LDO 3.3V MCP1754ST-3302E/DB SOT-223-3	Microchip Technology Inc.	MCP1754ST-3302E/DB
1	U11	MCHP Interface USB I ² C UART MCP2221-I/ST TSSOP-14	Microchip Technology Inc.	MCP2221-I/ST

Note: 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.



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

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

Cleveland
Independence, OH
Tel: 216-447-0464
Fax: 216-447-0643

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

Los Angeles
Mission Viejo, CA
Tel: 949-462-9523
Fax: 949-462-9608

New York, NY
Tel: 631-435-6000

San Jose, CA
Tel: 408-735-9110

Canada - Toronto
Tel: 905-673-0699
Fax: 905-673-6509

ASIA/PACIFIC

Asia Pacific Office
Suites 3707-14, 37th Floor
Tower 6, The Gateway
Harbour City, Kowloon
Hong Kong
Tel: 852-2943-5100
Fax: 852-2401-3431

Australia - Sydney
Tel: 61-2-9868-6733
Fax: 61-2-9868-6755

China - Beijing
Tel: 86-10-8569-7000
Fax: 86-10-8528-2104

China - Chengdu
Tel: 86-28-8665-5511
Fax: 86-28-8665-7889

China - Chongqing
Tel: 86-23-8980-9588
Fax: 86-23-8980-9500

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

China - Hangzhou
Tel: 86-571-8792-8115
Fax: 86-571-8792-8116

China - Hong Kong SAR
Tel: 852-2943-5100
Fax: 852-2401-3431

China - Nanjing
Tel: 86-25-8473-2460
Fax: 86-25-8473-2470

China - Qingdao
Tel: 86-532-8502-7355
Fax: 86-532-8502-7205

China - Shanghai
Tel: 86-21-5407-5533
Fax: 86-21-5407-5066

China - Shenyang
Tel: 86-24-2334-2829
Fax: 86-24-2334-2393

China - Shenzhen
Tel: 86-755-8864-2200
Fax: 86-755-8203-1760

China - Wuhan
Tel: 86-27-5980-5300
Fax: 86-27-5980-5118

China - Xian
Tel: 86-29-8833-7252
Fax: 86-29-8833-7256

ASIA/PACIFIC

China - Xiamen
Tel: 86-592-2388138
Fax: 86-592-2388130

China - Zhuhai
Tel: 86-756-3210040
Fax: 86-756-3210049

India - Bangalore
Tel: 91-80-3090-4444
Fax: 91-80-3090-4123

India - New Delhi
Tel: 91-11-4160-8631
Fax: 91-11-4160-8632

India - Pune
Tel: 91-20-3019-1500

Japan - Osaka
Tel: 81-6-6152-7160
Fax: 81-6-6152-9310

Japan - Tokyo
Tel: 81-3-6880-3770
Fax: 81-3-6880-3771

Korea - Daegu
Tel: 82-53-744-4301
Fax: 82-53-744-4302

Korea - Seoul
Tel: 82-2-554-7200
Fax: 82-2-558-5932 or
82-2-558-5934

Malaysia - Kuala Lumpur
Tel: 60-3-6201-9857
Fax: 60-3-6201-9859

Malaysia - Penang
Tel: 60-4-227-8870
Fax: 60-4-227-4068

Philippines - Manila
Tel: 63-2-634-9065
Fax: 63-2-634-9069

Singapore
Tel: 65-6334-8870
Fax: 65-6334-8850

Taiwan - Hsin Chu
Tel: 886-3-5778-366
Fax: 886-3-5770-955

Taiwan - Kaohsiung
Tel: 886-7-213-7828

Taiwan - Taipei
Tel: 886-2-2508-8600
Fax: 886-2-2508-0102

Thailand - Bangkok
Tel: 66-2-694-1351
Fax: 66-2-694-1350

EUROPE

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

Denmark - Copenhagen
Tel: 45-4450-2828
Fax: 45-4485-2829

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

Germany - Dusseldorf
Tel: 49-2129-3766400

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

Germany - Pforzheim
Tel: 49-7231-424750

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

Italy - Venice
Tel: 39-049-7625286

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

Poland - Warsaw
Tel: 48-22-3325737

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

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

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

01/27/15

Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

[Microchip:](#)

[ADM00667](#)



Компания «ЭлектроПласт» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Оперативные поставки широкого спектра электронных компонентов отечественного и импортного производства напрямую от производителей и с крупнейших мировых складов;
- Поставка более 17-ти миллионов наименований электронных компонентов;
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- Лицензия ФСБ на осуществление работ с использованием сведений, составляющих государственную тайну;
- Поставка специализированных компонентов (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Aeroflex, Peregrine, Syfer, Eurofarad, Texas Instrument, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Помимо этого, одним из направлений компании «ЭлектроПласт» является направление «Источники питания». Мы предлагаем Вам помощь Конструкторского отдела:

- Подбор оптимального решения, техническое обоснование при выборе компонента;
- Подбор аналогов;
- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.



Как с нами связаться

Телефон: 8 (812) 309 58 32 (многоканальный)

Факс: 8 (812) 320-02-42

Электронная почта: org@eplast1.ru

Адрес: 198099, г. Санкт-Петербург, ул. Калинина, дом 2, корпус 4, литера А.