



**Voltage Supervisor SOT23  
Evaluation Board  
User's Guide**

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# VOLTAGE SUPERVISOR SOT23 EVALUATION BOARD USER'S GUIDE

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## Preface

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### 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](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 "DSXXXXA", where "XXXX" is the document number and "A" is the revision level of the document.

## INTRODUCTION

This chapter contains general information that will be useful to know before using the Voltage Supervisor SOT23 Evaluation Board. Items discussed in this chapter include:

- About This Guide
- Recommended Reading
- The Microchip Web Site
- Customer Support

## ABOUT THIS GUIDE

### Document Layout

This document describes how to use the Voltage Supervisor SOT23 Evaluation Board as a development tool to emulate and debug firmware on a target board. The manual layout is as follows:

- **Chapter 1: Product Overview** – Important information about the Voltage Supervisor SOT23 Evaluation Board.
- **Chapter 2: Voltage Supervisor SOT23 Evaluation Board** – Includes instructions on how to get started with this evaluation board.
- **Appendix A: Schematic and Layouts** – Shows the schematic and layout diagrams for the Voltage Supervisor SOT23 Evaluation Board.
- **Appendix B: Bill of Materials** – Lists the parts used to build the Voltage Supervisor SOT23 Evaluation Board.
- **Appendix C: Microchip Analog SOT-23 Device Compatibility** – Explains how this board (PCB) may be used with other Microchip Analog devices in the SOT-23-3 package.
- **Appendix D: Revision History** – Lists the revision history of this document.

# Voltage Supervisor SOT23 Evaluation Board User's Guide

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## 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<sup>®</sup> IDE User's Guide</i>
	Emphasized text	...is the <b>only</b> compiler...

## RECOMMENDED READING

For more information regarding the Voltage Supervisor and Voltage Detector devices, the specific device data sheet is recommended reading. Table 1 shows the device and associated Data Sheet literature number. These documents can be downloaded from the Microchip web site at: [www.microchip.com](http://www.microchip.com).

**TABLE 1: DEVICES AND DATA SHEET LITERATURE NUMBERS**

Device	Literature #	Device	Literature #	Device	Literature #
<b>MCP100</b>	DS11187	<b>MCP809</b>	DS11194	<b>TC1277</b>	DS21383
<b>MCP101</b>	DS11187	<b>MCP810</b>	DS11194	<b>TC1278</b>	DS21384
<b>MCP102</b>	DS21906	<b>TC51</b>	DS21429	<b>TC1279</b>	DS21384
<b>MCP103</b>	DS21906	<b>TC54</b>	DS21434	<b>TCM809</b>	DS21661
<b>MCP111</b>	DS21889	<b>TC1272</b>	DS21382	<b>TCM810</b>	DS21661
<b>MCP112</b>	DS21889	<b>TC1272A</b>	DS21877		
<b>MCP120</b>	DS11184	<b>TC1273</b>	DS21382		
<b>MCP121</b>	DS21906	<b>TC1274</b>	DS21382		
<b>MCP130</b>	DS11184	<b>TC1275</b>	DS21383		
<b>MCP131</b>	DS21906	<b>TC1276</b>	DS21383		

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- **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 (FAQ), 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.

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## CUSTOMER SUPPORT

Users of Microchip products can receive assistance through several channels:

- Distributor or Representative
- Local Sales Office
- Field Application Engineer (FAE)
- Technical Support
- Development Systems Information Line

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>

In addition, there is a Development Systems Information Line which lists the latest versions of Microchip's development systems software products. This line also provides information on how customers can receive currently available upgrade kits.

The Development Systems Information Line numbers are:

1-800-755-2345 – United States and most of Canada

1-480-792-7302 – Other International Locations





# VOLTAGE SUPERVISOR SOT23 EVALUATION BOARD USER'S GUIDE

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## Chapter 1. Product Overview

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### 1.1 INTRODUCTION

This chapter provides an overview of the Voltage Supervisor SOT23 Evaluation Board and covers the following topics:

- What is the Voltage Supervisor SOT23 Evaluation Board?
- What the Voltage Supervisor SOT23 Evaluation Board kit includes

### 1.2 WHAT IS THE VOLTAGE SUPERVISOR SOT23 EVALUATION BOARD?

The Voltage Supervisor SOT23 Evaluation Board allows the system designer to quickly evaluate the operation of Microchip Technology's Voltage Supervisors and Voltage Detectors in the SOT-23-3 (3-pin SOT-23) package.

The Voltage Supervisor SOT23 Evaluation Board PCB supports the four different SOT-23-3 pinouts for the product family. This board has been made generic so that other devices may be supported with this board.

### 1.3 WHAT THE VOLTAGE SUPERVISOR SOT23 EVALUATION BOARD KIT INCLUDES

This Voltage Supervisor SOT23 Evaluation Board Kit includes:

- Five Voltage Supervisor SOT23 Evaluation Board Printed Circuit Boards (PCBs)
- Five MCP112 device samples (MCP112T-270E/TT) that can be installed on the Voltage Supervisor SOT23 Evaluation Board PCBs
  - 2.63V Trip Point (Typical)
  - Extended Temperature
  - SOT-23-3 Package
- Voltage Supervisor SOT23 Evaluation Board User's Guide (Electronic Version on CD)

# Voltage Supervisor SOT23 Evaluation Board User's Guide

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**Chapter 2. Voltage Supervisor SOT23 Evaluation Board**

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**2.1 INTRODUCTION**

The blank Printed Circuit Board (PCB) allows the desired voltage supervisor or voltage detector device to be installed along with other desired passive components (resistor and capacitors) and connection posts.

The Voltage Supervisor SOT23 Evaluation Board PCB supports four different SOT-23-3 pinouts. Three of these pinouts are used by the Voltage Supervisor or Voltage Detector product family, while the fourth is used by other Microchip analog products (see **Appendix C. "Microchip Analog SOT-23 Device Compatibility"**). This board has been made generic so that other devices may be supported with this board. However, the silk-screen markings are designed for ease-of-use with the voltage supervisor devices.

**2.2 FEATURES**

The Voltage Supervisor SOT23 Evaluation Board has the following features:

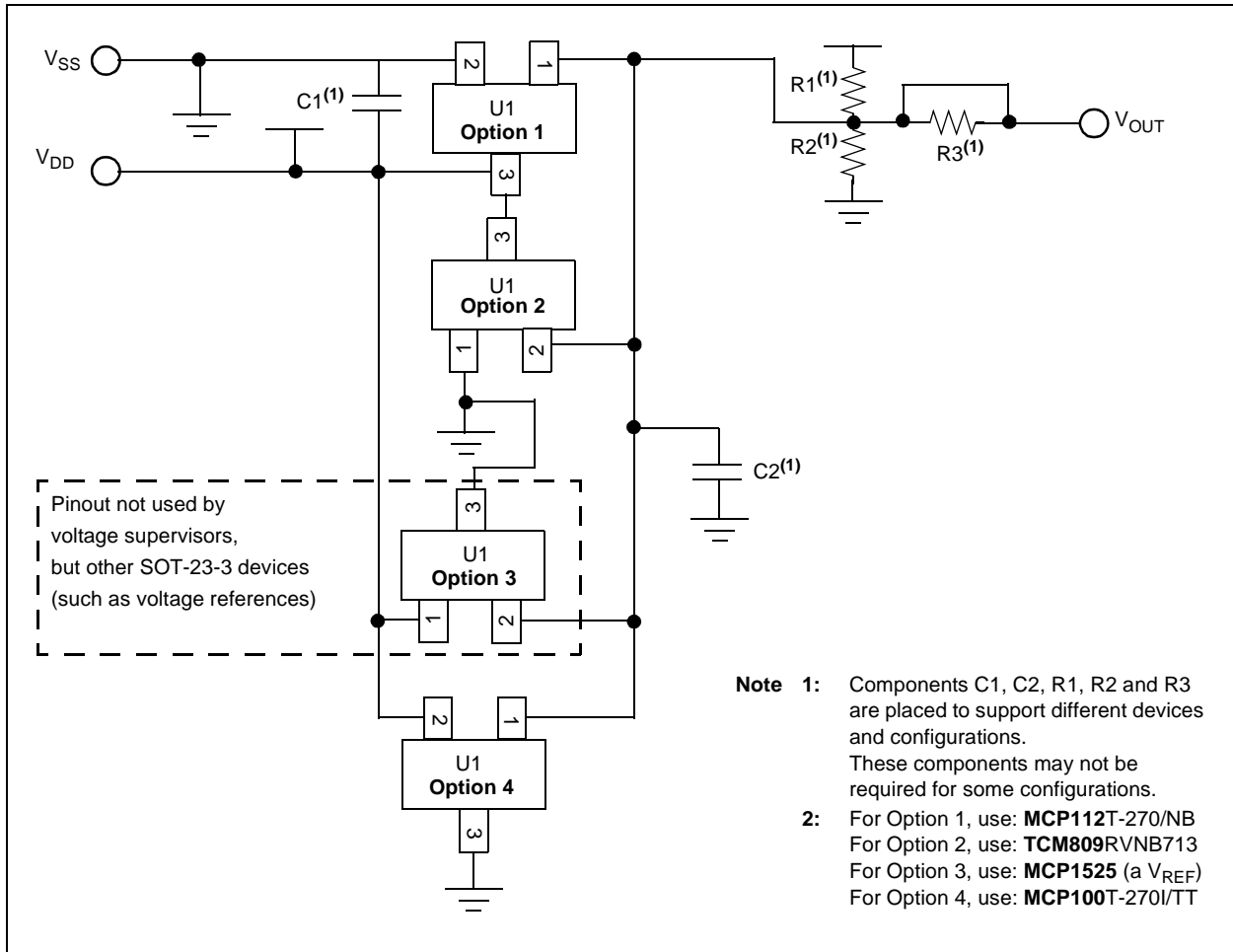
- Connection terminals may be either through-hole or surface-mount
- Four SOT-23-3 pinouts supported
- Optional passive components for:
  - Power Supply Filtering
  - Output Filtering
  - Output Pull-up Resistor
  - Output Pull-down Resistor
  - Output Loading Resistor
  - Output Series Resistor
- Silk-screen area to write specifics of implemented circuit , such as MCP111, 2.7V, 10 k $\Omega$  (to indicate that the device is the MCP111 with the 2.7V trip point and an external 10 k $\Omega$  pull-up resistor on the output)

# Voltage Supervisor SOT23 Evaluation Board User's Guide

## 2.3 GETTING STARTED

The Voltage Supervisor SOT23 Evaluation Board is a blank PCB that allows the user to configure the circuit to their exact requirements. The Passive components use the surface mount 805 package layout. Figure 2-1 shows the board circuit. Table 2-1 shows which circuit option needs to be used for a given voltage supervisor/voltage detector. There are currently no voltage supervisors/voltage detectors that use the Option 3 pinout. For other Microchip Analog Devices, please refer to **Appendix C. "Microchip Analog SOT-23 Device Compatibility"**.

**FIGURE 2-1: VOLTAGE SUPERVISOR SOT23 EVALUATION BOARD SCHEMATIC**



**TABLE 2-1: VOLTAGE SUPERVISOR / VOLTAGE DETECTOR DEVICES AND EVAL BOARD CIRCUIT/FOOTPRINT OPTION**

Device	Supported on	Output Signal (Active State)	Output Type	Comment/Recommended component values
<b>MCP111</b>	Option 1	V <sub>OUT</sub> (L)	Open-Drain	R1 = 100 kΩ
<b>MCP112</b>	Option 1	V <sub>OUT</sub> (L)	Push-Pull	
<b>TC54VC</b>	Option 1	V <sub>OUT</sub> (L)	Push-Pull	
<b>TC54VN</b>	Option 1	V <sub>OUT</sub> (L)	Open-Drain	R1 = 270Ω
<b>TC51</b>	Option 1	$\overline{V_{OUT}}$ (L)	Open-Drain	R1 = 47 kΩ
<b>MCP103</b>	Option 2	$\overline{RST}$ (L)	Push-Pull	
<b>TCM809</b>	Option 2	$\overline{RESET}$ (L)	Push-Pull	
<b>TCM810</b>	Option 2	RESET (H)	Push-Pull	
<b>MCP809</b>	Option 2	$\overline{RESET}$ (L)	Push-Pull	C1 = 0.1 μF
<b>MCP810</b>	Option 2	$\overline{RESET}$ (L)	Push-Pull	C1 = 0.1 μF
<b>MCP102</b>	Option 4	$\overline{RST}$ (L)	Push-Pull	
<b>MCP121</b>	Option 4	$\overline{RST}$ (L)	Open-Drain	with Internal Pull-up
<b>MCP131</b>	Option 4	$\overline{RST}$ (L)	Open-Drain	R1 = 100 kΩ
<b>TC1275</b>	Option 4	$\overline{RESET}$ (L)	Push-Pull	C1 = 0.1 μF
<b>TC1276</b>	Option 4	$\overline{RESET}$ (L)	Open-Drain	C1 = 0.1 μF R1 = 47 kΩ
<b>TC1277</b>	Option 4	RESET (H)	Push-Pull	C1 = 0.1 μF
<b>TC1278</b>	Option 4	RESET (H)	Open-Drain	with Internal Pull-up
<b>TC1279</b>	Option 4	$\overline{RESET}$ (L)	Open-Drain	with Internal Pull-up
<b>TC1272</b>	Option 4	$\overline{RESET}$ (L)	Push-Pull	C1 = 0.1 μF
<b>TC1272A</b>	Option 4	$\overline{RESET}$ (L)	Push-Pull	C1 = 0.1 μF
<b>TC1273</b>	Option 4	$\overline{RESET}$ (L)	Open-Drain	C1 = 0.1 μF R1 = 47 kΩ
<b>TC1274</b>	Option 4	RESET (H)	Push-Pull	C1 = 0.1 μF
<b>MCP100</b>	Option 4	$\overline{RESET}$ (L)	Push-Pull	
<b>MCP101</b>	Option 4	RESET (H)	Push-Pull	
<b>MCP120</b>	Option 4	$\overline{RESET}$ (L)	Open-Drain	C1 = 0.1 μF R1 = 47 kΩ
<b>MCP130</b>	Option 4	$\overline{RESET}$ (L)	Open-Drain	with Internal Pull-up C1 = 0.1 μF

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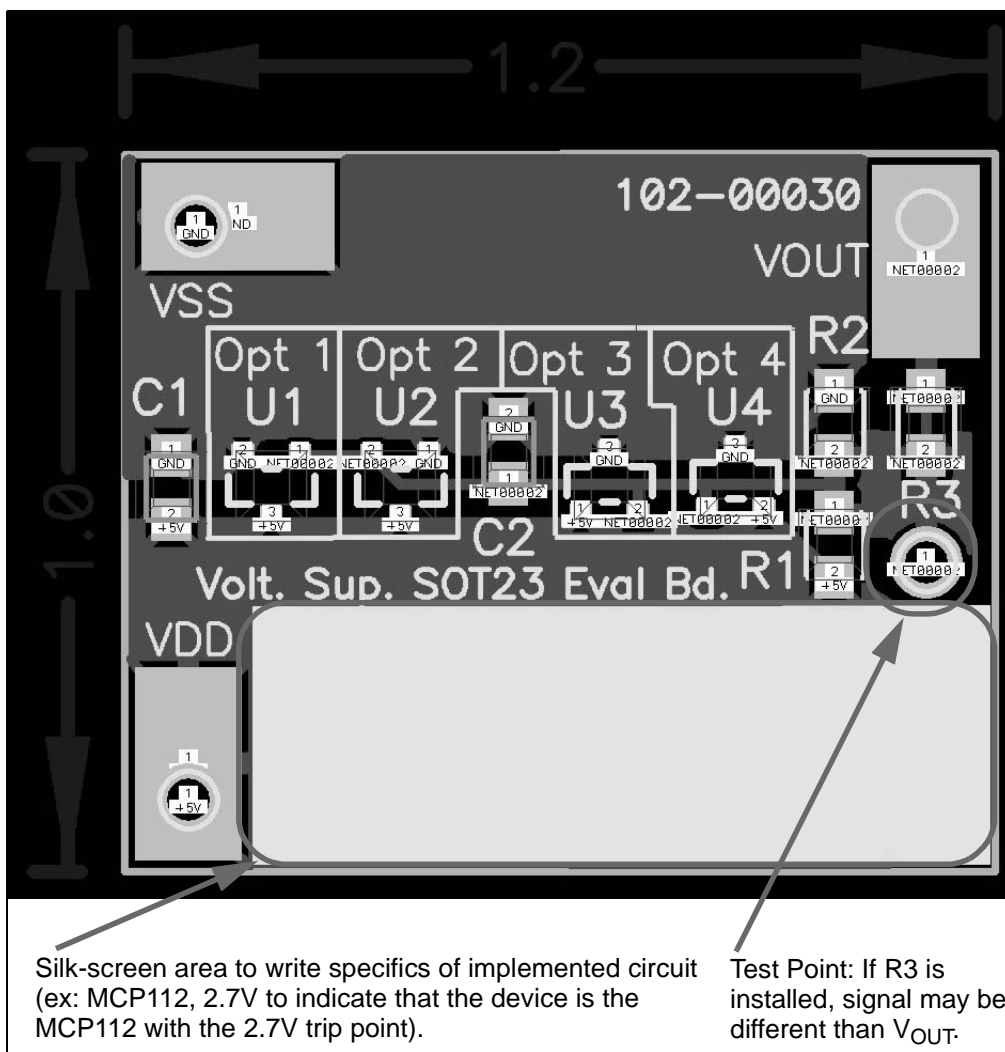
## 2.3.1 The Hardware

Figure 2-2 shows the layout of the Voltage Supervisor SOT23 Evaluation Board. This is a small board (1"x1.2" (25.4 mm x 30.5 mm)) that is single-sided. There are three connection points ( $V_{DD}$ ,  $V_{SS}$  and  $V_{OUT}$ ) that can use either through-hole or surface-mount connector posts. Additionally, a test point is available on the device  $V_{OUT}$ , which may be useful if Resistor R3 is installed.

The different SOT-23-3 layout options are outlined in the diagram below, with Opt 1, Opt 2, Opt 3 and Opt 4 indicating the layout option of that SOT-23-3 footprint.

Resistor R1 is a pull-up resistor that may need to be installed for devices with an open-drain output. Though resistor R2 is not currently required, it was placed for possible future requirements. Resistor R3, too, is not required, but may be useful if this board is to be interfaced into existing circuits. If resistor R3 is to be installed, remember to cut the trace that "shorts out" R3. Capacitors C1 and C2 are bypass capacitors that may be required to be installed, depending on the device selected and the system requirements (such as the noise present on the power supply). Table 2-2 describes the components.

**FIGURE 2-2: VOLTAGE SUPERVISOR SOT23 EVALUATION BOARD LAYOUT**



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**TABLE 2-2: OPTIONAL PASSIVE COMPONENTS**

<b>Device</b>	<b>Comment</b>
C1	Power Supply Bypass Capacitor
C2	Output Filter Capacitor
R1	Pull-up Resistor
R2	Pull-down Resistor
R3	Inline Resistance of Device output

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## 2.4 VOLTAGE SUPERVISOR SOT23 EVALUATION BOARD DESCRIPTION

The Voltage Supervisor SOT23 Evaluation Board PCB is designed to be flexible in the type of device evaluation that can be implemented.

The following sections describe each element of this evaluation board in further detail.

### 2.4.1 Power and Ground

The Voltage Supervisor SOT23 Evaluation Board can have connection posts installed for the power ( $V_{DD}$ ) and ground ( $V_{SS}$ ) planes. The layout allows either through-hole or surface-mount connectors.

For device evaluation, the use of an external variable power supply or waveform generator is required. The type of equipment used will determine the evaluation that may be performed.

### 2.4.2 Output ( $V_{OUT}$ )

The Voltage Supervisor SOT23 Evaluation Board can have a connection post installed for the output ( $V_{OUT}$ ) signal. The layout allows either a through-hole connector or a surface mount connector.

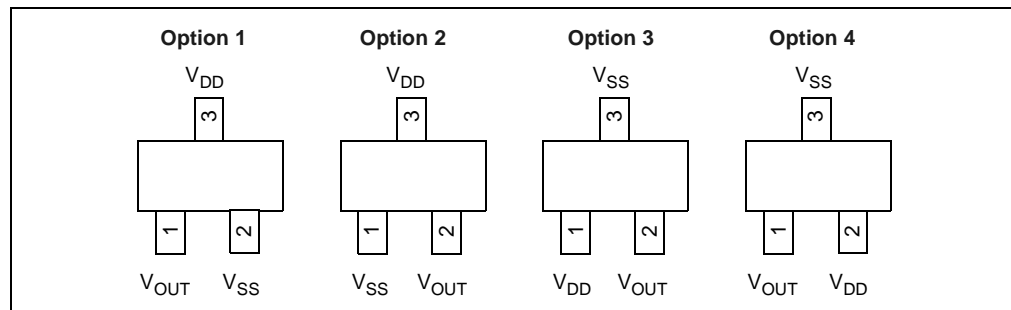
For device evaluation, the use of an oscilloscope or digital volt meter (DVM) is required. The type of equipment used will determine the evaluation that may be performed.

### 2.4.3 SOT-23-3 Footprints

There are four SOT-23-3 pinout options that the Voltage Supervisor SOT23 Evaluation Board PCB supports. Figure 2-3 shows these four pinouts. Some devices may use different nomenclature for the pin names, such as GND instead of  $V_{SS}$ ,  $V_{IN}$  instead of  $V_{DD}$  and RESET (or  $\overline{\text{RESET}}$ ) or  $\overline{\text{RST}}$  instead of  $V_{OUT}$ .

Other Microchip analog devices may be used with this PCB if the power and ground pins match one of these four options. **Appendix C. "Microchip Analog SOT-23 Device Compatibility"** discusses other Microchip analog devices that may be used with this PCB.

FIGURE 2-3: PINOUT OPTIONS



### 2.4.4 Passive Components (C1, C2, R1, R2 and R3)

The footprints for these components are present to allow maximum flexibility in the use of this PCB to evaluate a wide range of SOT-23-3 devices. The purpose of these components may vary depending on the device under evaluation and how it is to be used in the desired circuit. Please refer to the device data sheet for the components that should be used when using that device.



## 2.5 EVALUATING THE DEVICE

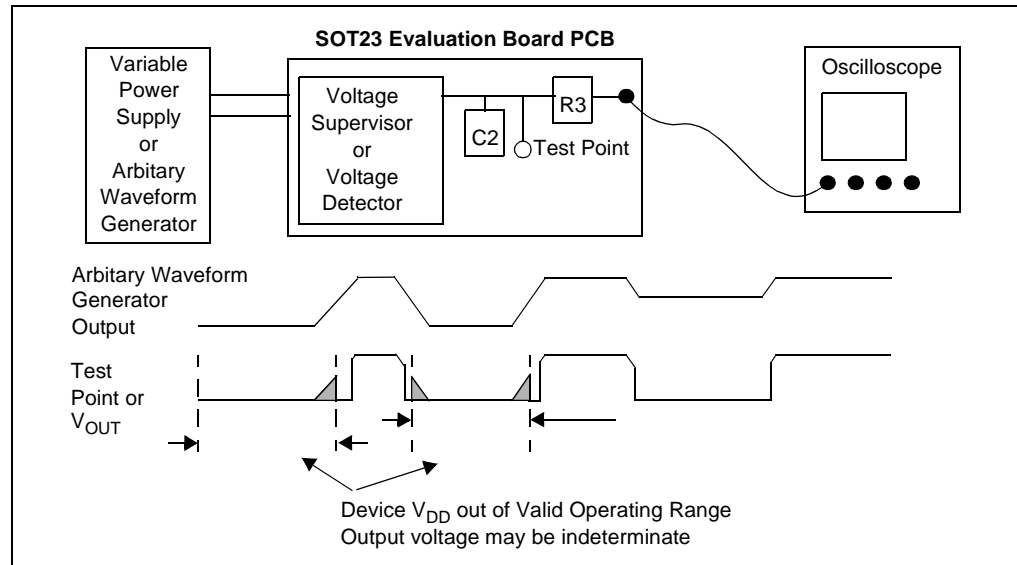
When evaluating a Voltage Supervisor or Voltage Detector device, a minimum set of test equipment should be available. Table 2-3 shows the recommended test equipment.

**TABLE 2-3: TEST EQUIPMENT**

Hardware	Connect to:	Comment
Variable Power Supply	$V_{DD}$ , $V_{SS}$	This allows the voltage to the SOT23 Evaluation Board to be varied so the device output can be monitored.
Arbitrary Waveform Generator	$V_{DD}$ , $V_{SS}$	This is like a variable power supply, but allows programmability into the input signal that the device will be subjected to. This also allows a particular waveform to be repeated (such as a 60 Hz sine wave that varies from 1V to 5V)
Digital Multi-Meter (D.M.M.)	$V_{OUT}$	Used to indicate the output state (Low or High) of the Voltage Supervisor/Voltage Detector.
Oscilloscope	$V_{OUT}$	Allows the device conditions and response to be better evaluated due to the ability to capture this information. This is useful for faster signals and cases where small spikes need to be detected.
Test Light (LED)	$V_{OUT}$	Used to visually indicate the output state (low or high) of the Voltage Supervisor/Voltage Detector. Ensure that the current requirements of this light can be supplied by the device's output pin.

A typical system that would be used to evaluate the voltage supervisor or voltage detector device is shown in Figure 2-4. Figure 2-4 also shows an example input and output waveforms for a voltage supervisor or voltage detector device.

**FIGURE 2-4: EVALUATION SYSTEM**



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

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### **A.1 INTRODUCTION**

This appendix contains the schematics and layouts for the Voltage Supervisor SOT23 Evaluation Board. Diagrams included in this appendix:

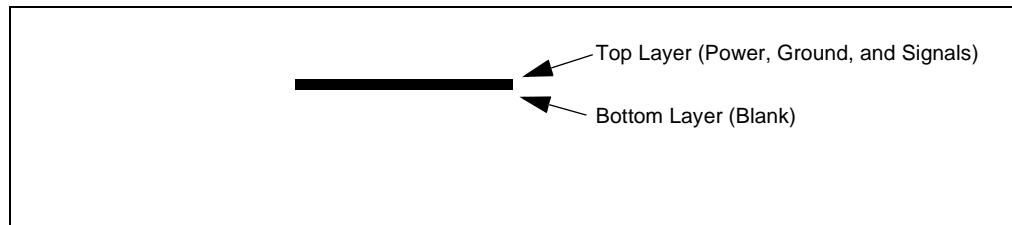
- Board Schematic - Digital Circuitry
- Board - Top Layer

### **A.2 SCHEMATICS AND PCB LAYOUT**

Figure A-2 shows the schematic of the Voltage Supervisor SOT23 Evaluation Board.

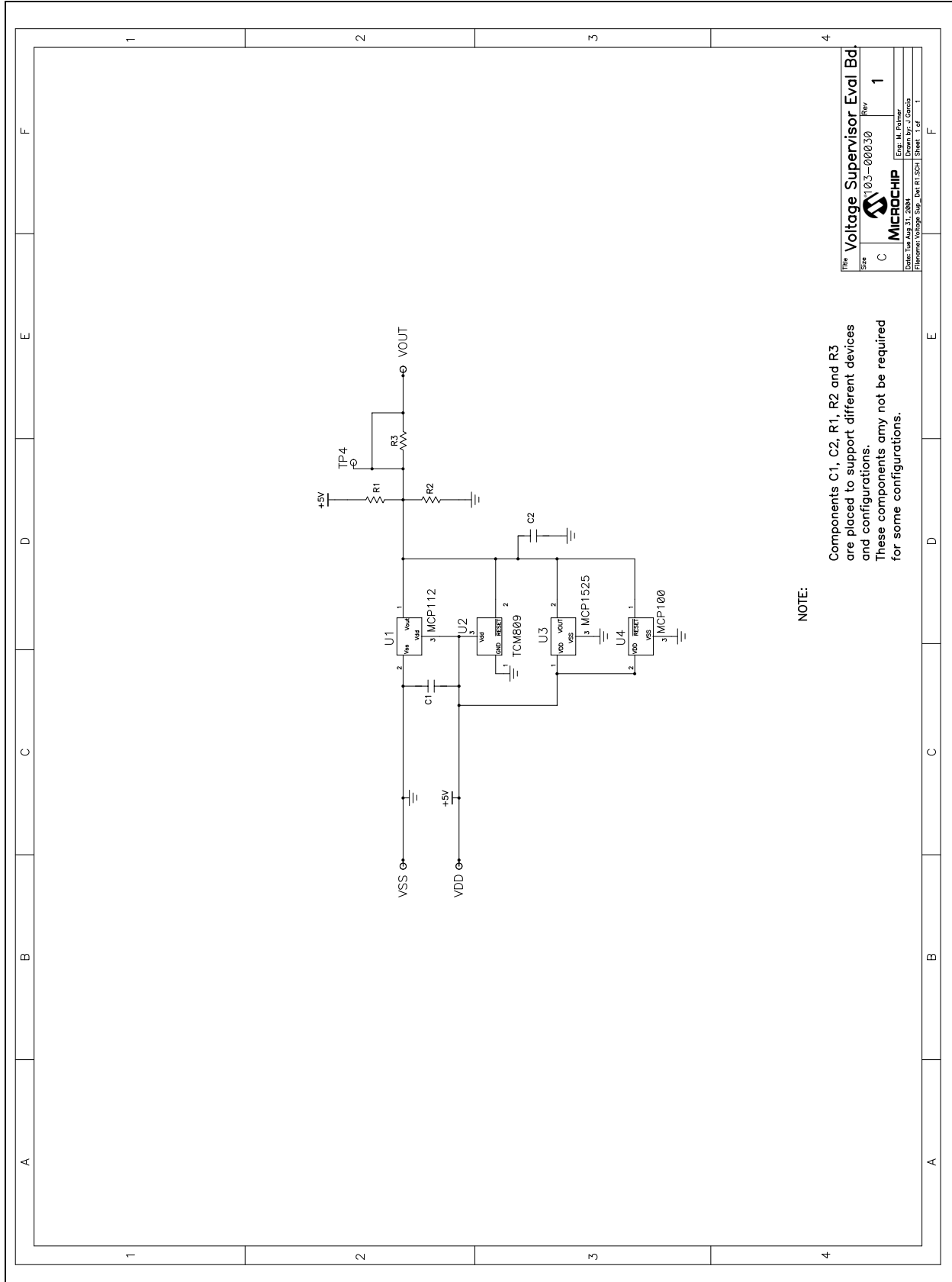
Figure A-3 shows the layout for the top layer of the Voltage Supervisor SOT23 Evaluation Board. The layer order is shown in Figure A-1.

**FIGURE A-1: LAYER ORDER**

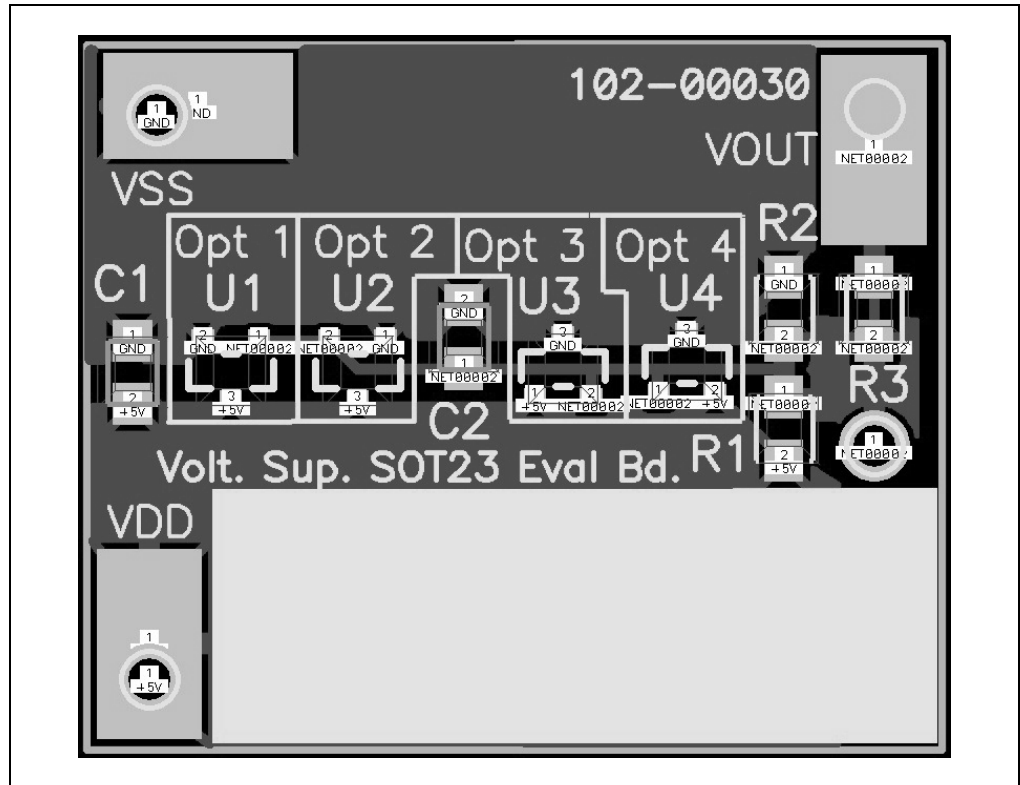


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FIGURE A-2: VOLTAGE SUPERVISOR SOT23 EVALUATION BOARD SCHEMATIC 1



**FIGURE A-3: VOLTAGE SUPERVISOR SOT23 EVALUATION BOARD LAYOUT - TOP LAYER + SILK-SCREEN**



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## Appendix B. Bill-of-Materials (BOM)

TABLE B-1: BILL-OF-MATERIALS

Qty	Reference	Description	Manufacturer	Part Number
1	PCB 103-00030	SOT23 Evaluation Board PCB	Microchip Technology Inc.	103-00030
0	U1, U2, U3, U4	SOT-23-3 Device (Only one of U1 - U4 installed per board)	Microchip Technology Inc.	User-specified
0	C1	Power Supply Bypass Capacitor Surface-mount (805 package) (Optional - Application-dependent)	—	User-specified
0	C2	Output Filter Capacitor Surface-mount (805 package) (Optional - Application-dependent)	—	User-specified
0	R1	Output Pull-up resistor Surface-mount (805 package) (Optional - Application-dependent)	—	User-specified
0	R2	Output Pull-down resistor Surface-mount (805 package) (Optional - Application-dependent)	—	User-specified
0	R3	Output inline resistor Surface-mount (805 package) (Optional - Application-dependent)	—	User-specified
0	V <sub>DD</sub> , V <sub>SS</sub> , V <sub>OUT</sub>	V <sub>DD</sub> , V <sub>SS</sub> and V <sub>OUT</sub> through-hole connector	Keystone Electronics®	5012
0	V <sub>DD</sub> , V <sub>SS</sub> , V <sub>OUT</sub>	V <sub>DD</sub> , V <sub>SS</sub> and V <sub>OUT</sub> surface-mount connector	Keystone Electronics	5016

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**Appendix C. Microchip Analog SOT-23 Device Compatibility**

**C.1 INTRODUCTION**

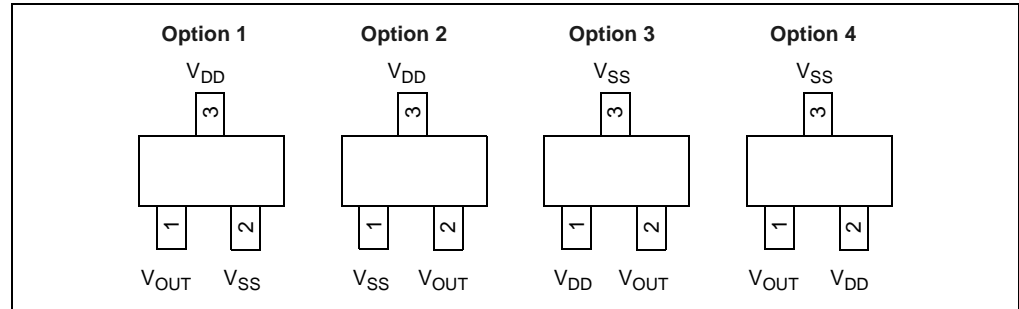
This appendix documents other Microchip analog devices that can be evaluated using this PCB. New devices may be introduced after the publication of this document that may be supported. Compare the pinout of the device to the PCB schematic/layout to determine compatibility of any SOT-23-3 (3-pin SOT-23) packaged device.

**C.2 PCB COMPATIBILITY**

There are four SOT-23-3 (3-pin SOT-23) pinouts that the Voltage Supervisor SOT23 Evaluation Board PCB supports. Figure C-1 shows these four pinouts. Other Microchip analog devices may be used with this PCB if the power and ground pins match one of these four options. Though these devices may use different nomenclature for the pin names, as long as the power and ground signals match one of the four options, this PCB should be able to be used to evaluate that device.

Table C-1 shows the Microchip analog device part number, the analog family the device belongs to, which footprint option to use and the recommended components to use for the circuit. Please refer to the device data sheet for complete information of the application circuit.

**FIGURE C-1: SOT-23-3 PINOUT OPTIONS**



# Voltage Supervisor SOT23 Evaluation Board User's Guide

**TABLE C-1: MICROCHIP ANALOG DEVICES AND SOT23 EVAL BOARD CIRCUIT/FOOTPRINT OPTION SELECTION**

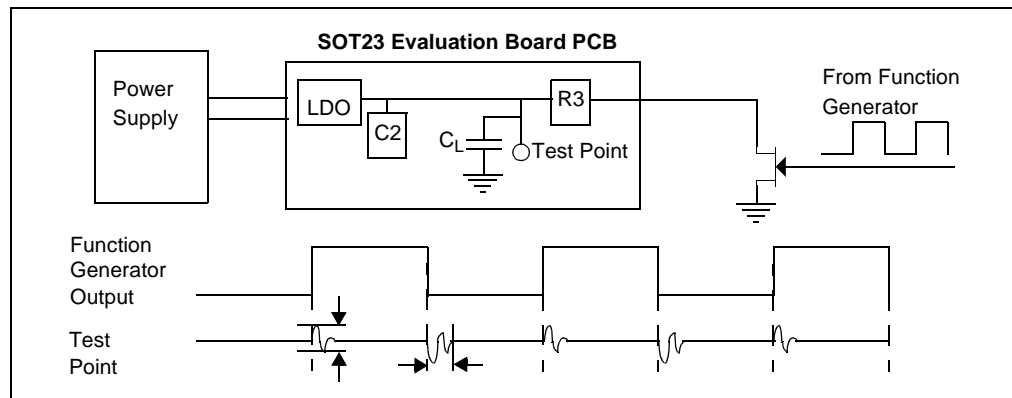
Device	Device Family	Supported on	Comment/ Recommended Component Values:
<b>MCP1700</b>	LDO	Option 2	C1 = 1 $\mu$ F Ceramic C2 = 1 $\mu$ F Ceramic
<b>MCP1701</b>	LDO	Option 2	C1 = 1 $\mu$ F Tantalum C2 = 1 $\mu$ F Tantalum
<b>MCP1525</b>	Voltage Reference	Option 3	C1 = 0.1 $\mu$ F C2 = 1 $\mu$ F to 10 $\mu$ F
<b>MCP1541</b>	Voltage Reference	Option 3	C1 = 0.1 $\mu$ F C2 = 1 $\mu$ F to 10 $\mu$ F
<b>TC59</b>	LDO	Option 4	C1 = 1 $\mu$ F Tantalum C2 = 1 $\mu$ F Tantalum

## C.3 IDEAS ON EVALUATING AN LDO

One of the characteristics that a designer may wish to evaluate on a LDO is how the LDO responds to transient loads. Figure C-2 shows a system block diagram for evaluating a LDO and a typical waveform response (at test point) for the function generator signal. The output of the function generator connects to a BJT transistor to simulate the fast switching loads of the circuit.

The value of C2, R3 and C<sub>L</sub> will depend on the LDO used and the load of the circuit. Look at both the worst-case amplitude load requirements for a loaded and unloaded system. As the output response of the LDOs become faster, the selection of a smaller (cheaper) output load capacitor (C<sub>L</sub>) becomes possible (for the same system performance).

**FIGURE C-2: LDO EVALUATION SYSTEM**





# VOLTAGE SUPERVISOR SOT23 EVALUATION BOARD USER'S GUIDE

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## Appendix D. Revision History

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### D.1 INTRODUCTION

This Appendix documents the Revision History of this document

### D.2 REVISION HISTORY

TABLE D-1: REVISION HISTORY

Rev	Changes
A	Initial Release of the Document



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