



TC1301/TC1302 Evaluation Board User's Guide

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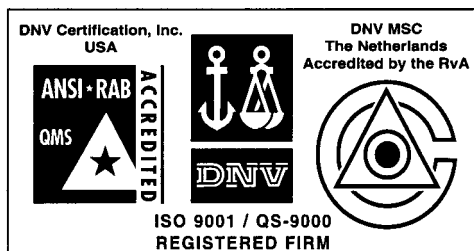
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Notes:



TC1301/TC1302 EVALUATION KIT USER'S GUIDE

Preface

HIGHLIGHTS

This section contains general information that will be useful to know before using the TC1301/TC1302 Evaluation Board and covers the following topics:

- About this Guide
- Recommended Reading
- The Microchip Internet Web Site
- Customer Support

ABOUT THIS GUIDE

Document Layout

The User's Guide layout is as follows:

- **Chapter 1: Product Overview** – Important information about the TC1301/TC1302 Evaluation Board.
- **Chapter 2: TC1301/TC1302 Evaluation Board Installation** – For users evaluating the TC1301A, TC1301B, TC1302A or TC1302B devices, this chapter describes how to use the various features of the hardware.

Appendices:

- **Appendix A: Schematic and Layouts** – Shows the schematic and layout diagrams for the TC1301/TC1302 Evaluation Board.
- **Appendix B: Bill of Materials** – Lists the parts used to build the TC1301/TC1302 Evaluation Board.
- **Worldwide Sales and Service** – Gives the address, telephone and fax number for Microchip Technology Inc. sales and service locations throughout the world.

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RECOMMENDED READING

For more information regarding the TC1301/TC1302 devices, the following is recommended reading.

TC1301 and TC1302 Data Sheets (DS21798 and DS217333)

These data sheets provide detailed information regarding the TC1301/TC1302 Dual Output LDO's with Voltage Detect (V_{DET}) and RESET capability.

Technical Library CD-ROM (DS00161)

This CD-ROM contains comprehensive application notes, data sheets and technical briefs for all Microchip products. To obtain this CD-ROM, contact the nearest Microchip Sales and Service location (see back page).

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- Hot line

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Corporate applications engineers (CAEs) may be contacted at (480) 786-7627.

In addition, there is a Systems Information and Upgrade Line. This line provides system users a listing of the latest versions of all of Microchip's development systems software products. Plus, this line provides information on how customers can receive any currently available upgrade kits.

The Hotline Numbers are:

- 1-800-755-2345 for U.S. and most of Canada, and
- 1-480-786-7302 for the rest of the world.

Chapter 1. Product Overview

1.1 HIGHLIGHTS

This chapter covers the following topics:

- What is the TC1301/TC1302 Evaluation Board?
- TC1301/TC1302 Evaluation Board Kit Components

1.2 WHAT IS THE TC1301/TC1302 EVALUATION BOARD?

The TC1301/TC1302 Evaluation Board is an evaluation and demonstration tool for Microchip Technology's Dual Output LDO with Voltage Detect (V_{DET}) and microcontroller RESET capability.

When connected, this evaluation board allows for the evaluation of the TC1301/TC1302 devices in a variety of applications.

1.3 TC1301/TC1302 EVALUATION BOARD KIT COMPONENTS

The TC1301/TC1302 Evaluation Kit contains:

- TC1301/TC1302 Evaluation Board
- TC1301AFHAVUA (2.8V/2.6V/2.63V) and TC1302BAPVMF (3.3V/1.8V) devices installed on the board.
- TC1301A/TC1301B Data Sheet (DS21798)
- TC1302A/TC1302B Data Sheet (DS21733)
- TC1301/TC1302 Evaluation Kit User's Guide (DS51427)

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NOTES:

Chapter 2. TC1301/TC1302 Evaluation Board Installation

2.1 FEATURES

The TC1301/TC1302 Evaluation Board has the following features:

- Evaluation of the TC1301A and TC1302A in an 8-pin MSOP
- Evaluation of the TC1301B and the TC1302B in 3X3 DFN8 package
- Voltage Detect and $\overline{\text{RESET}}$ Output Capability
- Device Shutdown Capability
- Surface-Mount Design
- Fully Assembled and Tested

2.2 GETTING STARTED

The TC1301/TC1302 Evaluation Board is a fully-functional, assembled and tested surface-mount board for use in evaluation of Microchip's TC1301/TC1302 Dual Output LDO's with voltage detect and microcontroller RESET capability (TC1301).

This evaluation board has both a TC1301A, in an 8-pin MSOP package, and a TC1302B, packaged in a 3X3 8-pin DFN package. The TC1301A/B integrates two Low Drop Out Linear Regulators with a voltage detect monitor and RESET output, while the TC1302A/B integrates two Low Drop Out Linear Regulators. For the A version, Output Voltage #1 (V_{OUT1}) does not have shutdown capability (the output is present when the input voltage is applied), while Output Voltage #2 (V_{OUT2}) has shutdown capability. For the B version, both V_{OUT1} and V_{OUT2} have independent shutdown capability, while V_{OUT1} is connected internally to the voltage detect monitor (V_{DET}). The TC1301A, which is populated on the evaluation board, is in a MSOP package and has an output configuration of $V_{\text{OUT1}} = 2.8\text{V}$, $V_{\text{OUT2}} = 2.6\text{V}$ and $V_{\text{DET}} = 2.63\text{V}$. The TC1302B device is packaged in a 3X3 DFN8 and has an output configuration of $V_{\text{OUT1}} = 3.3\text{V}$ and $V_{\text{OUT2}} = 1.8\text{V}$. Since there are many combinations available for the TC1301/TC1302 product line, one should consult the product data sheets for more information regarding all output voltage and detect voltage options. The TC1302B position has the RESET pin tied to pin number 1 so that a TC1301A or TC1301B can be evaluated using this board.

The TC1301A Evaluation Board was designed to be flexible so that all TC1301A/B and TC1302A/B options could be evaluated using this board. The left position is used to evaluate the A version of TC1301 or TC1302 (no RESET capability). It is populated with small 1 μF ceramic capacitors. The right position is used to evaluate the B version of the TC1301 or TC1302. It is populated with 4.7 μF tantalum capacitors. The TC1301/TC1302 is stable with ceramic or electrolytic capacitors (Tantalum and Aluminum).

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TC1301A MSOP8 Description

The TC1301A MSOP8 application is located on the left side of the evaluation board. There are eight test points and a two-position switch that are used to apply input voltage to the TC1301A, connect loads for V_{OUT1} and V_{OUT2} , monitor the $\overline{\text{RESET}}$ output pin and provide shutdown capability for V_{OUT2} .

TC1302B 3X3DFN8 Description

The TC1302B DFN8 (labeled "TC1301B DFN8" on the test board) is located on the right side of the board. There are seven test points and a two position switch that is used to apply input voltage to the TC1302B, connect loads for V_{OUT1} and V_{OUT2} and provide for independent shutdown of both V_{OUT1} and V_{OUT2} .

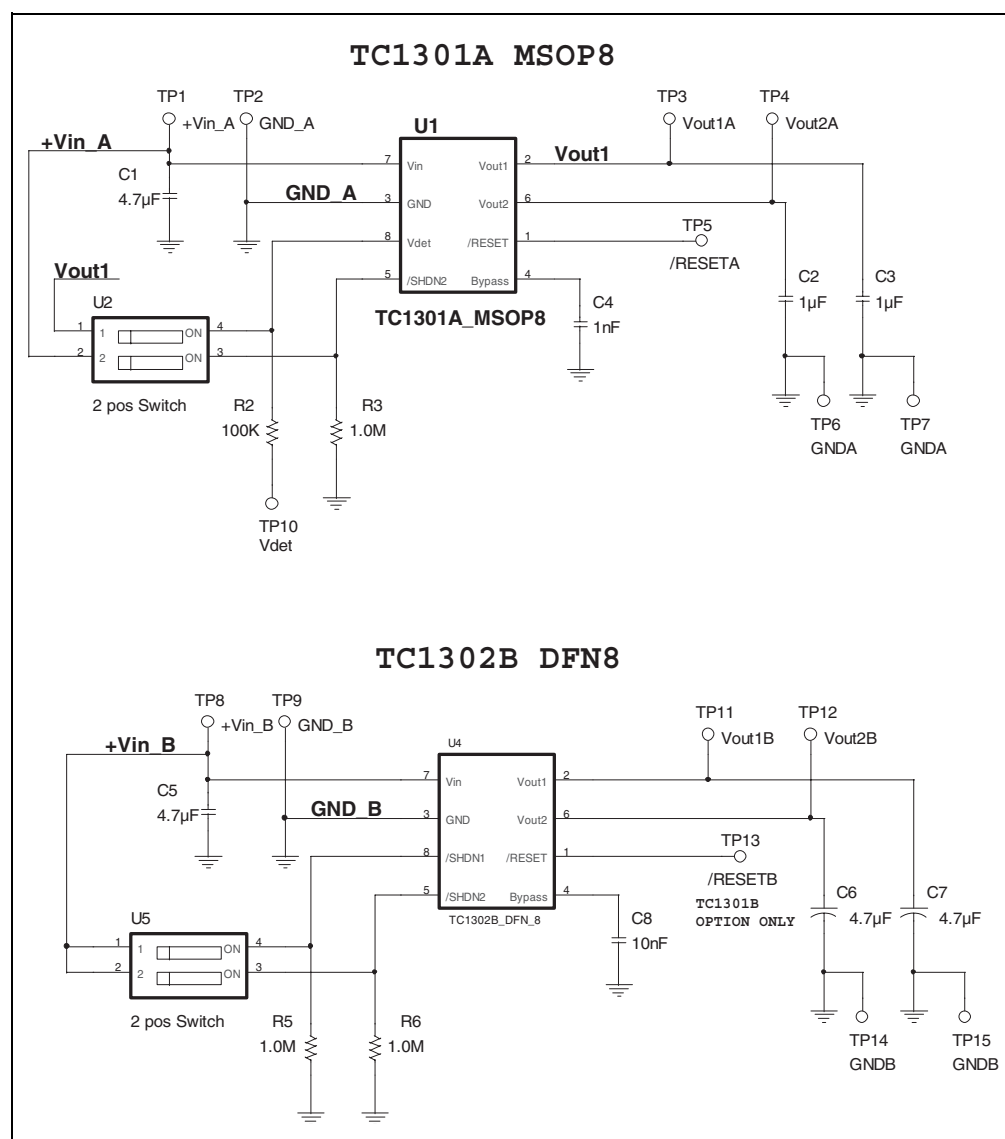


FIGURE 2-1: TC1301/TC1302 Evaluation Board Schematic

2.3 APPLYING POWER TO THE BOARD

Each application (TC1301A and TC1302B) has separate input surface mount test points that are used to apply power to the input pin. The TC1301A and TC1302B can be powered independently or from the same source, if desired.

For the TC1301A

Connect the positive (+) side of the input voltage source (2.7V to 6.0V) to the V_{IN} test point (TP1) while connecting the negative side of the input voltage supply (-) to the GND test point (TP2).

For the TC1302B

Connect the positive (+) side of the input voltage source (2.7V to 6.0V) to the V_{IN} test point (TP8) while connecting the negative side of the input voltage supply (-) to the GND test point (TP9).

2.4 CONNECTING LOADS TO THE EVALUATION BOARD

Load connections are provided by the board's additional surface-mount test points for the TC1301A application V_{OUT1} and V_{OUT2} and the TC1302B V_{OUT1} and V_{OUT2} application.

For the TC1301A

1. V_{OUT1} - connect the positive (+) side of the load to the V_{OUT1} test point (TP3) while connecting the negative side of the load (-) to the GND test point (TP7).
2. V_{OUT2} - connect the positive (+) side of the load to the V_{OUT2} test point (TP4) while connecting the negative side of the load (-) to the GND test point (TP6).

For the TC1302B

1. V_{OUT1} - connect the positive (+) side of the load to the Vout1 test point (TP11) while connecting the negative side of the load (-) to the GND test point (TP15).
2. V_{OUT2} - connect the positive (+) side of the load to the Vout2 test point (TP12) while connecting the negative side of the load (-) to the GND test point (TP14).

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2.5 EVALUATION BOARD FEATURES

A two-position switch is used in each application (TC1301A and TC1302B) for feature demonstration.

For the TC1301A

Switch U2's position 1 is used to connect V_{OUT1} to the voltage detect input. The voltage detect input is available on a test point (TP10). With U2's position 1 OFF (slide to the left), the detect input is only connected to the surface mount test point V_{DET} (TP10). An external voltage can be connected to the V_{DET} pin to evaluate the operation of the $\overline{RESET}$ function. For the TC1301A, the V_{DET} input is independent of both V_{OUT1} and V_{OUT2} . With U2 position 2 ON (Slide to the right), the SHDN2 input is pulled high enabling Vout2.

The surface mount RESET test point (TP5) is used to monitor the $\overline{RESET}$ output function of the TC1301A device. If the V_{DET} voltage is below the factory-set threshold (consult Microchip for V_{DET} set point options), the $\overline{RESET}$ output will be active-low. If the V_{DET} input is above the V_{DET} threshold for approximately 300ms, the $\overline{RESET}$ output will be high. A 1 nF capacitor is connected from bypass (pin 4) to ground. This optional bypass capacitor is used to improve PSRR and noise characteristics of the LDO outputs.

For the TC1302B

Switch U5's position 1 is used to turn V_{OUT1} ON and OFF. If position 1 is slid to the left, V_{OUT1} is OFF, if it is slide to the right, V_{OUT1} is ON.

Switch U5's position 2 is used to turn V_{OUT2} ON and OFF. If position 2 is slid to the left, V_{OUT2} is OFF, if it is slide to the right, V_{OUT2} is ON.

The RESET test point (TP13) is connected to Pin 1 of the TC1302B (No Connect). This is done so that a TC1301B DFN8 can be evaluated using the same application as the T1302B. In this case, it is not used. A 10 nF capacitor is connected from bypass (pin 4) to ground. This optional bypass capacitor is used to improve PSRR and noise characteristics of the LDO outputs.

TABLE 2-1: TEST POINT REFERENCE

Test Point #	Application	TP Name	Description
TP1	TC1301A MSOP	Vin	+ Input Voltage
TP2	TC1301A MSOP	GND	- Input Voltage
TP3	TC1301A MSOP	V_{OUT1}	+ V_{OUT1}
TP4	TC1301A MSOP	V_{OUT2}	+ V_{OUT2}
TP5	TC1301A MSOP	RESET	RESET Output
TP6	TC1301A MSOP	GND	- V_{OUT2}
TP7	TC1301A MSOP	GND	- V_{OUT1}
TP8	TC1302B DFN	V_{IN}	+ Input Voltage
TP9	TC1302B DFN	GND	- Input Voltage
TP10	TC1301A MSOP	V_{DET}	V_{DET} Input
TP11	TC1302B DFN	V_{OUT1}	+ V_{OUT1}
TP12	TC1302B DFN	V_{OUT2}	+ V_{OUT2}
TP13	TC1302B DFN	RESET	RESET Output
TP14	TC1302B DFN	GND	- V_{OUT2}
TP15	TC1302B DFN	GND	- V_{OUT1}

Appendix A. Schematic and Layouts

A.1 INTRODUCTION

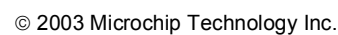
This appendix contains the schematics and layouts for the TC1301/TC1302 Evaluation Board.

A.2 HIGHLIGHTS

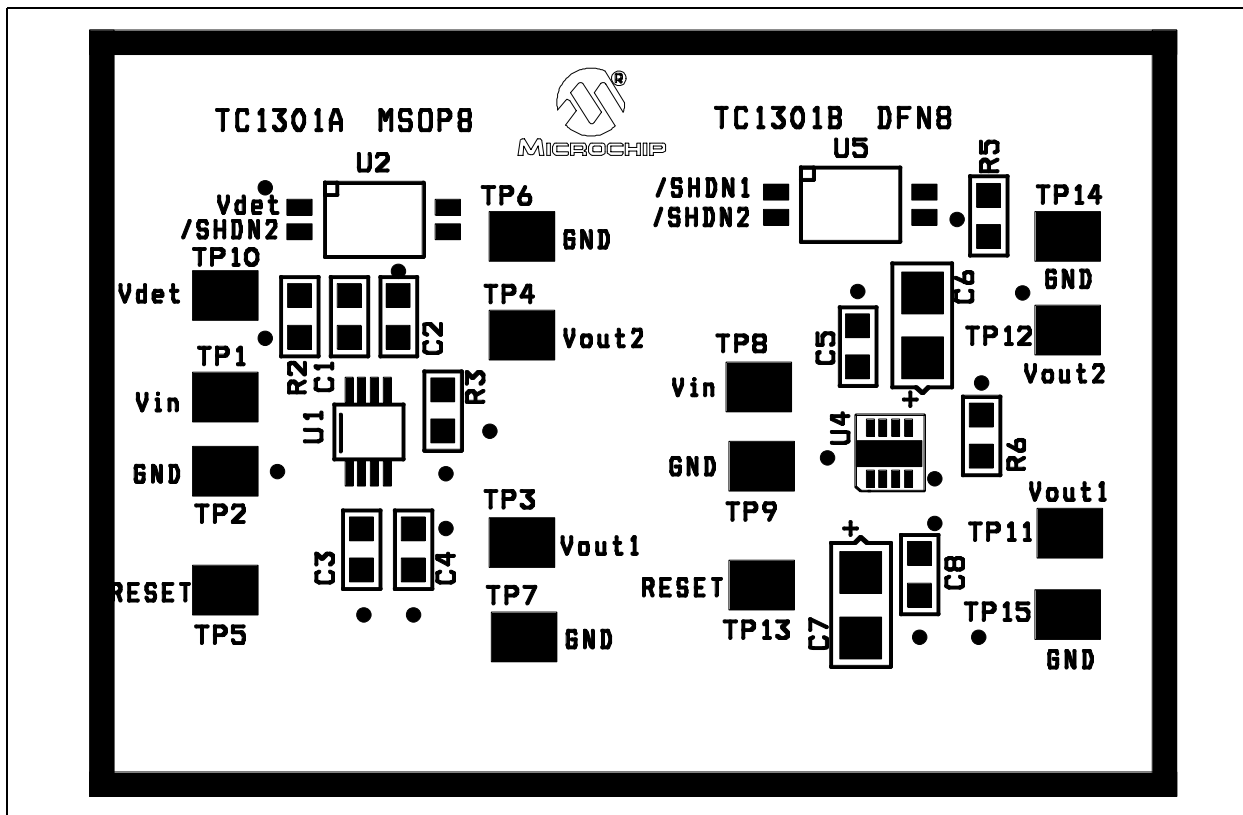
Diagrams included in this appendix:

- Board Schematic
- Board - Top Assembly
- Board - Top Layer
- Board - Bottom Layer

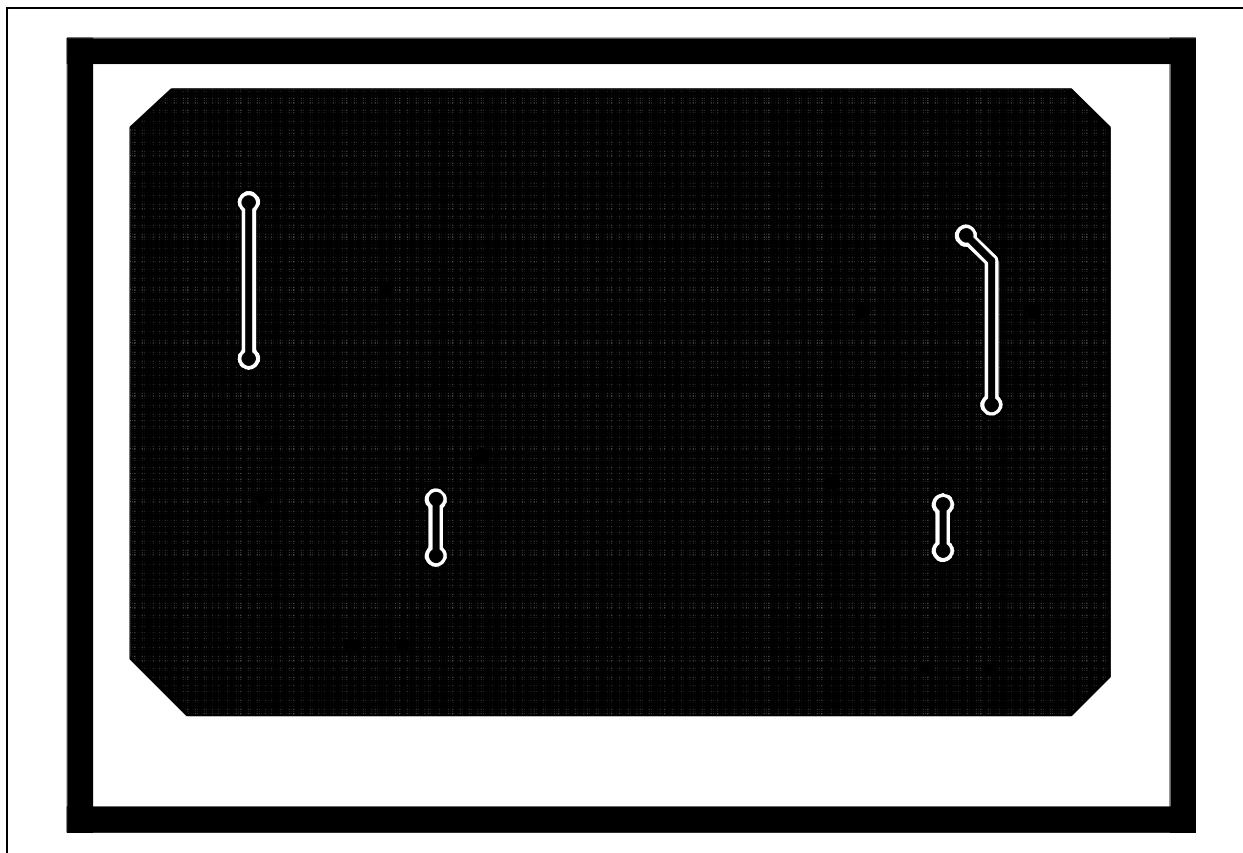
A.3 BOARD SCHEMATIC



A.4 BOARD - TOP ASSEMBLY

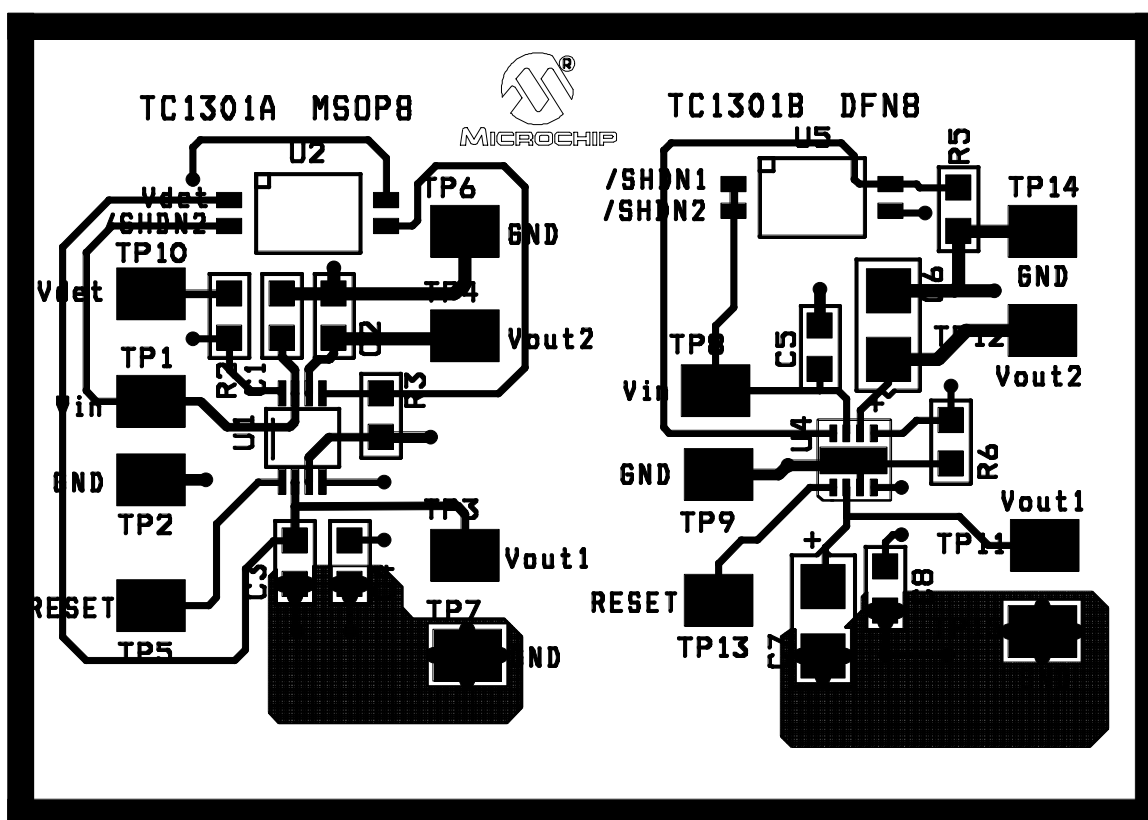


A.5 BOARD - BOTTOM LAYER



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A.6 BOARD - TOP LAYER



Appendix B. Bill-of-Materials (BOM)

TABLE B-1: BILL OF MATERIALS (BOM)

Reference Designator	Quantity	Description	Manufacturer	Manufacturer Part Number
R2	1	100 k Ω , 1/10W, Chip Resistor, 0805	Panasonic [®]	ERJ-6ENF1003V
R3,R5,R6	3	RES 1.00M OHM 1/10W 1% 0805 SMD	Panasonic	ERJ-6ENF1004V
C1,C5	2	CAP 4.7 μ F 6.3V CERAMIC 0805 X5R	Panasonic	ECJ-2FB0J475M
C2,C3	2	CAP 1 μ F 10V CERAMIC X5R 0805	Panasonic	ECJ-2YB1A105K
C4	1	CAP 1000 PF 50V CERM CHIP 0805	Panasonic	ERJ-6ENF1003V
C6,C7	2	CAPACITOR TANT 4.7UF 10V 10% SMT	Kemet [™]	T494B475K010AS
C8	1	CAP 10000 PF 50V CERM CHIP 0805	Panasonic	ECJ-2VB1H103K
U1	1	TC1301A MSOP8 DUAL LDO w/RESET	Microchip Technology Inc.	TC1301AFHAVUA
U2,U5	2	DIP Switches, 2 Position, SPST	C&K [™]	TDA02H0SK1
U4	1	TC1302B 3X3DNF8 DUAL LDO	Microchip Technology Inc.	TC1302BAPVMF
TP1-TP15	15	Surface Mount Test Points	Keystone	5016
	4	Bumpers - Protective Products	3M [®]	SJ5003-0

Note: U2 is populated with the TC1302BAPVMF so TP13 (/RESET) is not used. Position U2 can be populated with a TC1301B part making TP13 active.



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