Evaluation Board User Guide

ADPL40502 RedyKit

Evaluates ADPL40502

General Description

The ADPL40502UJZ-RedyKit and ADPL40502CPZ-RedyKit allow simplified prototyping and evaluation for every standard fixed output voltage option in the ADPL40502 product family. The kits allow the user to evaluate the voltage options with one easy-to-order kit.

All surface-mount ADPL40502 parts are sorted and stored in the kits with the Analog Devices, Inc., part number and fixed output voltage clearly printed on each zip-top bag. The kits are used in the engineering lab to evaluate required voltage options. If other voltage options must be evaluated, a different part from the kits can be easily soldered onto one of the evaluation boards supplied with the kit.

The ADPL40502UJZ-RedyKit and ADPL40502CPZ-RedyKit are available with fixed 3.3V and 1.8V evaluation boards. The kits contain additional parts for prototyping. For more information, refer to the ADPL40502 data sheet.

Features

- All-Voltage Option for Evaluation
- Surface-Mount ADPL40502 Parts that can be easily Soldered
- Additional Parts for Prototyping

Required Equipment

- ADPL40502 evaluation board
- 5.5V, 300mA DC power supply
- Electronic load up to 200mA
- Digital voltmeter (DVM)

***Ordering Information* appears at end of data sheet.**

ADPL40502 Evaluation Board Configuration

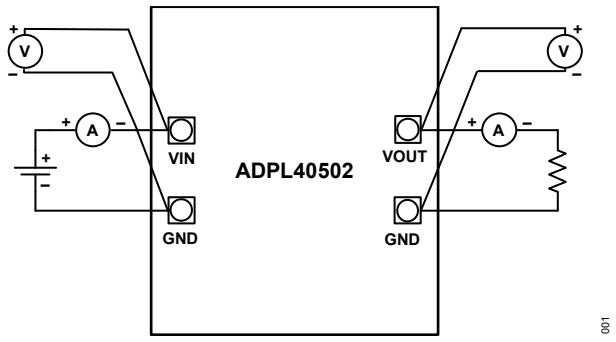


Figure 1. Output Voltage Measurement

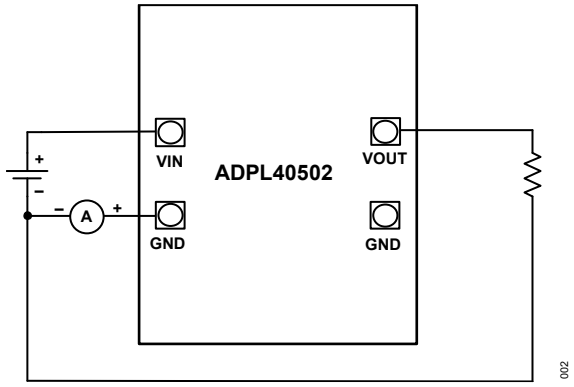


Figure 2. Ground Current Measurement

One Analog Way, Wilmington, MA 01887-2356, U.S.A. | Tel: 781.329.4700

Procedure

Measuring Output Voltage

Figure 1 shows how the evaluation board can be connected to a voltage source and a voltmeter for basic output voltage accuracy measurements. A resistor can be used as the load for the regulator. Ensure that the resistor has a power rating that is adequate to handle the power that is expected to be dissipated across it. An electronic load can also be used as an alternative. Ensure that the voltage source can supply enough current for the expected load levels.

Use the following steps to connect to a voltage source and voltmeter:

1. Connect the negative terminal (−) of the voltage source to one of the GND pads on the evaluation board.
2. Connect the positive terminal (+) of the voltage source to the V_{IN} pad of the evaluation board.
3. Connect a load between the V_{OUT} pad and one of the GND pads.
4. Connect the negative terminal (−) of the voltmeter to one of the GND pads.
5. Connect the positive terminal (+) of the voltmeter to the V_{OUT} pad.

When these steps are completed, the voltage source can be turned on. If J1 is inserted (connecting EN to V_{IN} for automatic startup), the regulator powers up.

If the load current is large, the user must connect the voltmeter as close as possible to the output capacitor to reduce the effects of IR drops.

Line Regulation Measurements

For line regulation measurements, the output of the regulator is monitored while its input is varied. For good line regulation, the output must change as little as possible with varying input levels. To ensure that the device is not in dropout mode during this measurement, V_{IN} must be varied between V_{OUT} nominal + 0.4V (or 2.2V, whichever is greater) and V_{IN} maximum. For example, for an ADPL40502 with a 1.8V output, V_{IN} needs to be varied between 2.3V and 5.5V.

This measurement can be repeated under different load conditions. *Figure 3* shows the typical line regulation performance of an ADPL40502 with a 1.8V output.

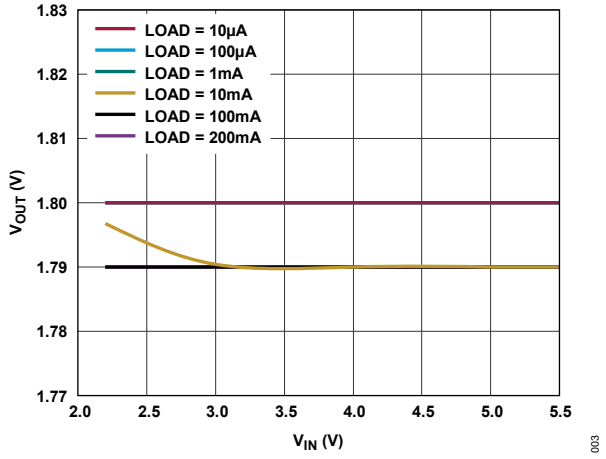


Figure 3. Output Voltage (V_{OUT}) vs. Input Voltage (V_{IN}) at T_A = 25°C

Load Regulation Measurements

For load regulation measurements, the output of the regulator is monitored while the load is varied. For good load regulation, the output must change as little as possible with varying load. The input voltage must be held constant during this measurement. The load current can be varied from 0mA to 200mA. *Figure 4* shows the typical load regulation performance of an ADPL40502 with a 1.8V output for an input voltage of 2.3V.

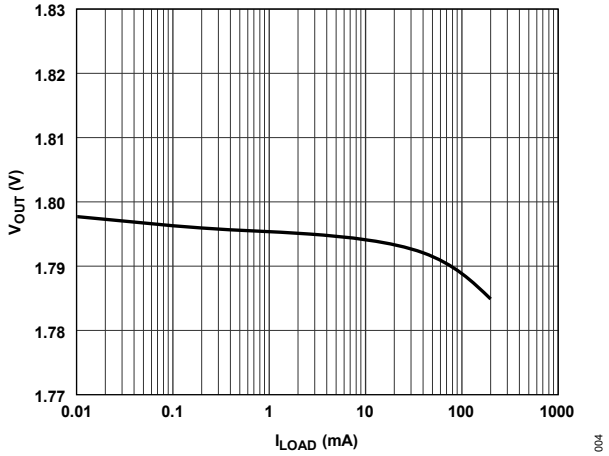


Figure 4. Output Voltage, V_{OUT} vs. Load Current, I_{OUT} at V_{IN} = 2.3V, V_{OUT} =1.8V, T_A = 25°C

Dropout Voltage Measurements

Dropout voltage can be measured using the configurations shown in *Figure 1*. Dropout voltage is defined as the input-to-output voltage differential when the input voltage is set to the nominal output voltage. This applies only to output voltages above 2.2V. Dropout voltage increases with larger loads.

For more accurate measurements, a second voltmeter can be used to monitor the input voltage across the input capacitor. The input supply voltage may need to be adjusted to account for IR drops, especially if large load currents are used. *Figure 5* shows the typical curve of dropout voltage measurements with different load currents.

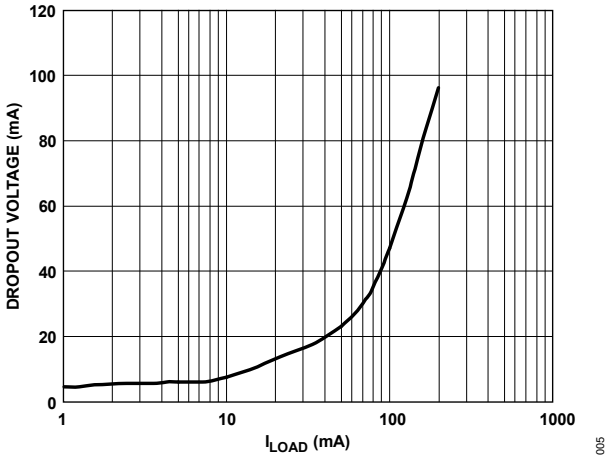


Figure 5. Dropout Voltage vs. Load Currents (I_{LOAD}) V_{OUT} = 3.3V, T_A = 25°C

Measuring Ground Current

Figure 2 shows how the evaluation board can be connected to a voltage source and an ammeter for ground current measurements. A resistor can be used as the load for the regulator. Ensure that the resistor has a power rating that is adequate to handle the power expected to be dissipated across it. An electronic load can be used as an alternative. Ensure that the voltage source can supply enough current for the expected load levels.

Use the following steps to connect to a voltage source and ammeter:

1. Connect the positive terminal (+) of the voltage source to the V_{IN} pad on the evaluation board.
2. Connect the positive terminal (+) of the ammeter to one of the GND pads of the evaluation board.
3. Connect the negative terminal (−) of the ammeter to the negative (−) terminal of the voltage source.
4. Connect a load between the V_{OUT} pad of the evaluation board and the negative (−) terminal of the voltage source.

When these connection steps are completed, the voltage source can be turned on. If J1 is inserted (connecting EN to V_{IN} for automatic startup), the regulator powers up.

Ground Current Consumption

Ground current measurements can determine how much current the internal circuits of the regulator consume while the circuits perform the regulation function. To be efficient, the regulator must consume as little current as possible. Typically, the regulator uses the maximum current when supplying its largest load level (200mA). *Figure 6* shows the typical ground current consumption for various load levels at V_{OUT} = 1.8V and T_A = 25°C.

When the device is disabled (EN = GND), ground current drops to less than 1µA.

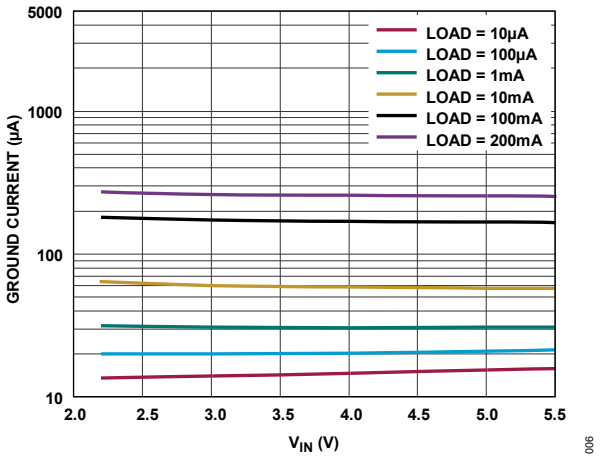


Figure 6. Ground Current vs. Input Voltage, V_{OUT} = 1.8V, T_A = 25°C

Detailed Description of Hardware

The ADPL40502 evaluation board is supplied with different components, depending on the version ordered. Components common to all versions are CIN and COUT. *Table 1* describes the components.

Table 1. Evaluation Board Hardware Components

COMPONENT	DESCRIPTION
U1[1]	ADPL40502 ultra-low noise, low dropout linear regulator
EVAL-ADPL40502AUJZ-1.8-AZ/3.3-AZ	
C2[2]	Input bypass capacitor, 1µF, 0603 size (MURATA GRM188R61C105KA12D)
C4[2]	Output capacitor, 1µF, 0603 size (MURATA GRM188R61C105KA12D)
EVAL-ADPL40502ACPZ-1.8-AZ/3.3-AZ	
C1[2]	Input bypass capacitor, 1µF, 0603 size (MURATA GRM188R61C105KA12D)
C2[2]	Output capacitor, 1µF, 0603 size (MURATA GRM188R61C105KA12D)

[1] *The evaluation board with the LFCSP package is the EVAL-ADPL40502ACPZ-1.8-AZ/3.3-AZ. The evaluation board with the TSOT package is the EVAL-ADPL40502AUJZ-1.8-AZ/3.3-AZ.*

[2] *The ADPL40502 evaluation board requires only one input bypass capacitor and one output capacitor for stable operation.*

Ordering Information

PART	TYPE
ADPL40502CPZ-REDYKIT	RedyKit
ADPL40502UJZ-REDYKIT	RedyKit

ADPL40502 Evaluation RedyKit Bill of Materials

ADPL40502UJZ-REDYKIT

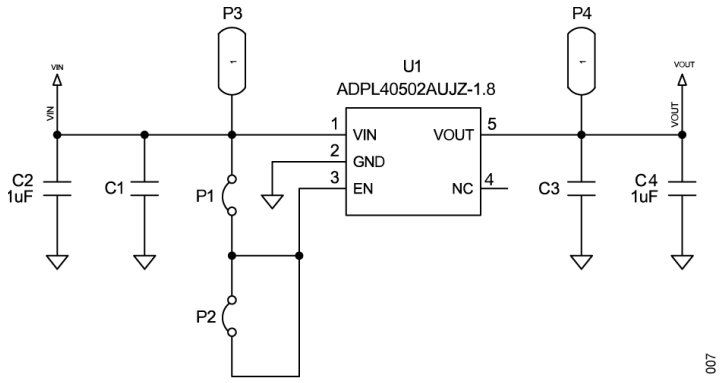
QTY	MODEL	OUTPUT VOLTAGE (V_{OUT})	MAXIMUM CURRENT	DESCRIPTION
1	EVAL-ADPL40502AUJZ-1.8-AZ	1.8V	200mA	Evaluation Board
1	EVAL-ADPL40502AUJZ-3.3-AZ	3.3V	200mA	Evaluation Board
3	ADPL40502AUJZ-2.5-R7	2.5V	200mA	5-lead TSOT
3	ADPL40502AUJZ-3.0-R7	3.0V	200mA	5-lead TSOT
3	ADPL40502AUJZ-2.8-R7	2.8V	200mA	5-lead TSOT
3	ADPL40502AUJZ-1.5-R7	1.5V	200mA	5-lead TSOT
3	ADPL40502AUJZ-1.2-R7	1.2V	200mA	5-lead TSOT

ADPL40502CPZ-REDYKIT

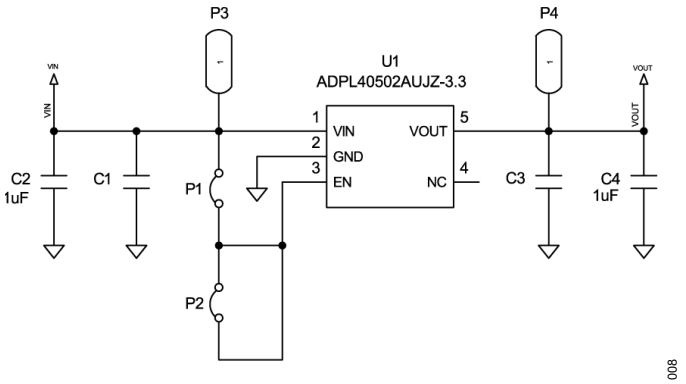
QTY	MODEL	OUTPUT VOLTAGE (V_{OUT})	MAXIMUM CURRENT	DESCRIPTION
1	EVAL-ADPL40502ACPZ-1.8-AZ	1.8V	200mA	Evaluation Board
1	EVAL-ADPL40502ACPZ-3.3-AZ	3.3V	200mA	Evaluation Board
3	ADPL40502ACPZ-1.2-R7	1.2V	200mA	6-lead LFCSP
3	ADPL40502ACPZ-2.5-R7	2.5V	200mA	6-lead LFCSP
3	ADPL40502ACPZ-3.0-R7	3.0V	200mA	6-lead LFCSP

ADPL40502UJZ-REDYKIT TSOT Schematic

EVAL-ADPL40502AUJZ-1.8-AZ

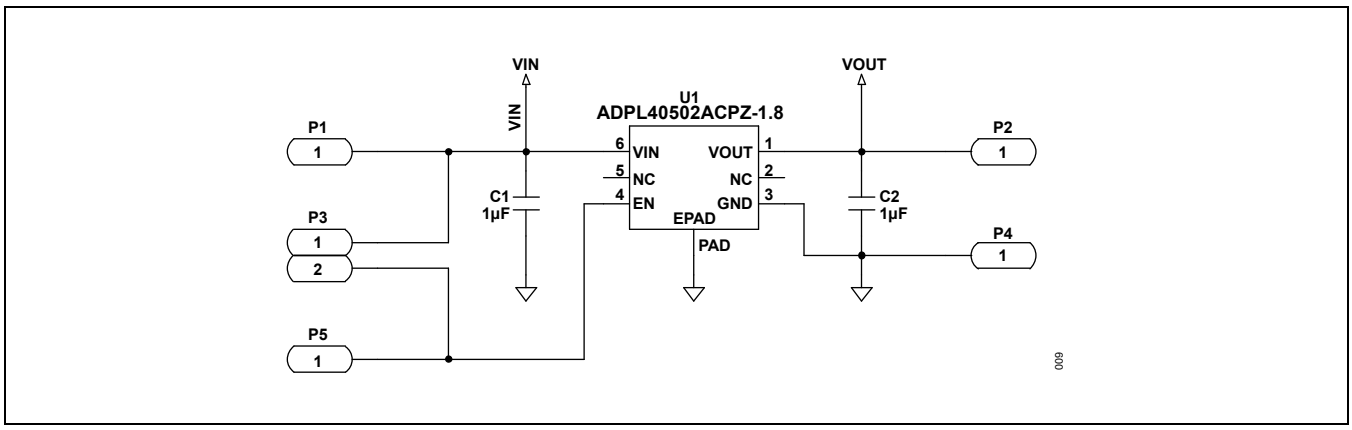


EVAL-ADPL40502AUJZ-3.3-AZ

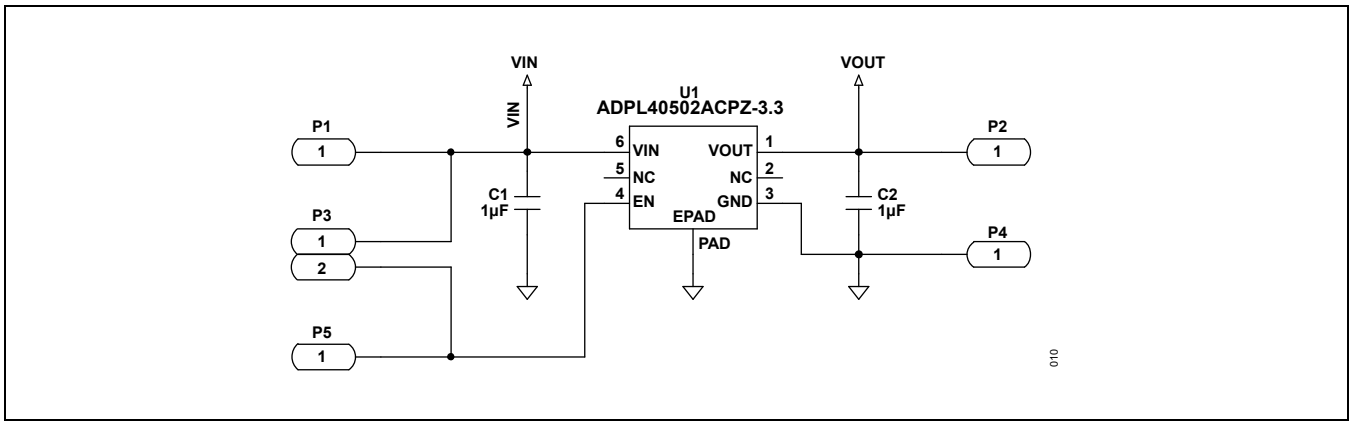


ADPL40502CPZ-REDYKIT LFCSP Schematic

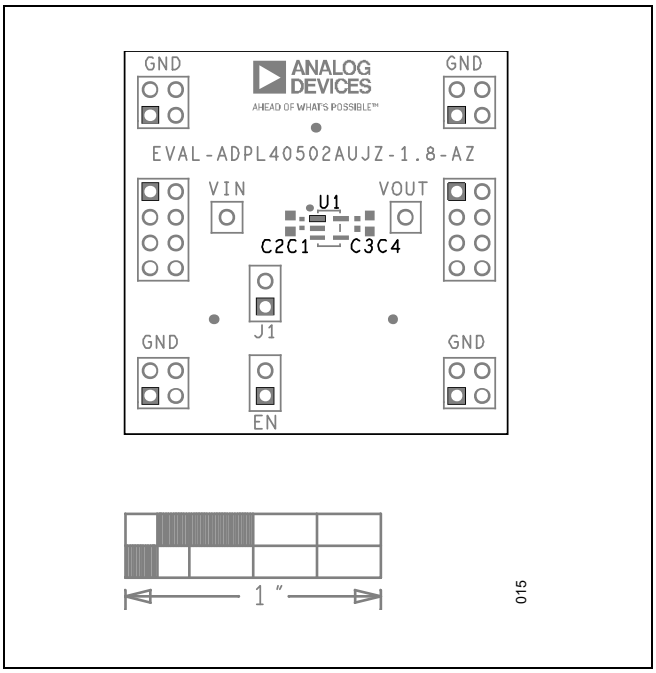
EVAL-ADPL40502ACPZ-1.8-AZ



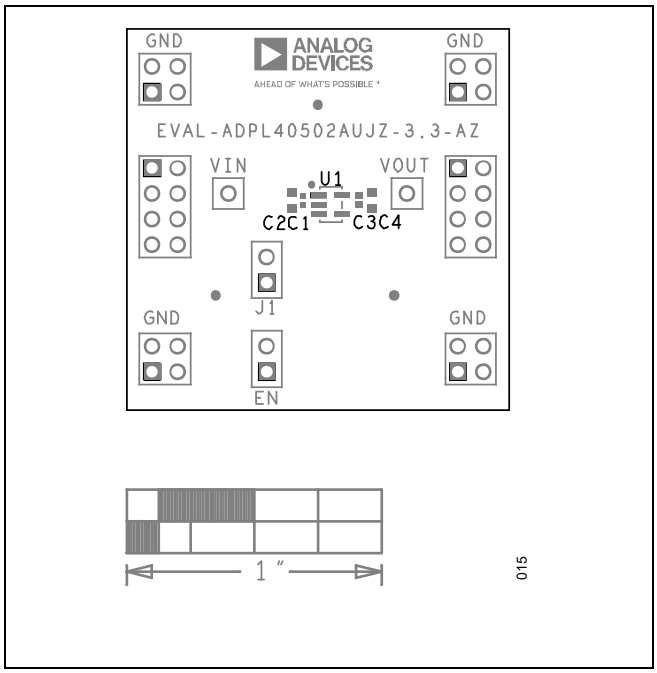
EVAL-ADPL40502ACPZ-3.3-AZ



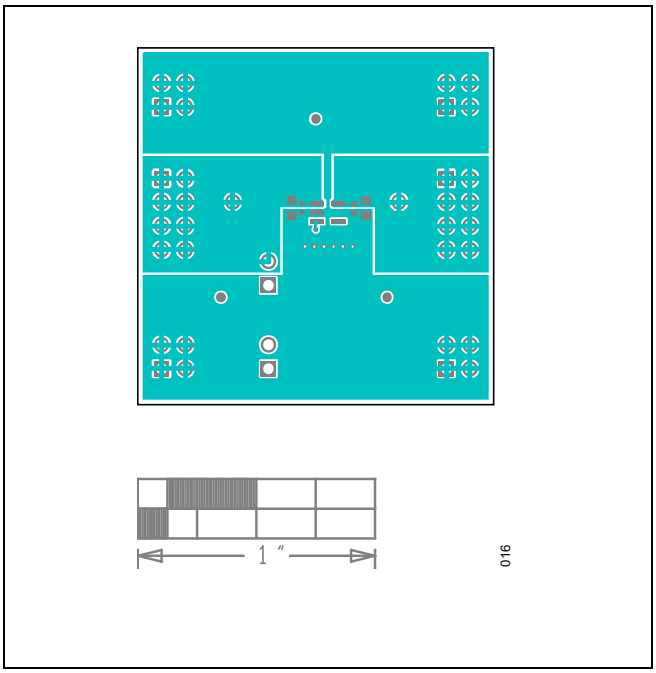
ADPL40502AUJZ TSOT Package Evaluation Board PCB Layout



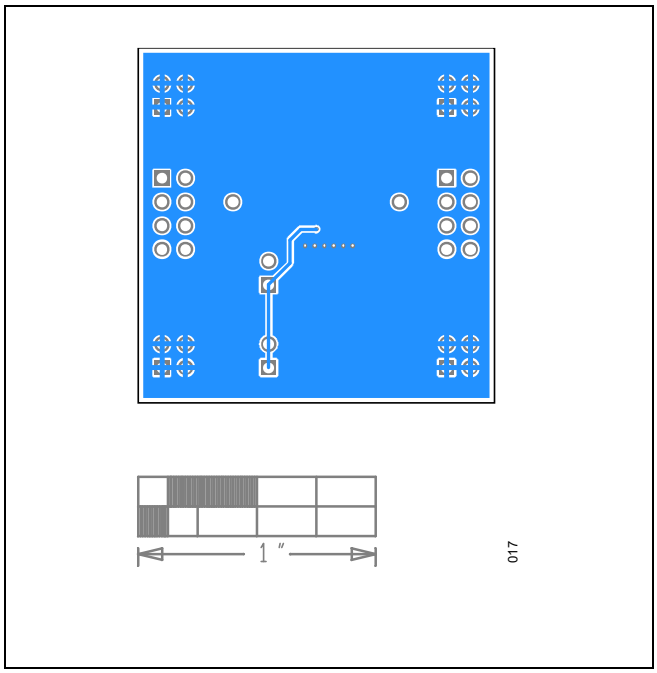
EVAL-ADPL40502AUJZ-1.8-AZ—Top Silkscreen



EVAL-ADPL40502AUJZ-3.3-AZ—Top Silkscreen

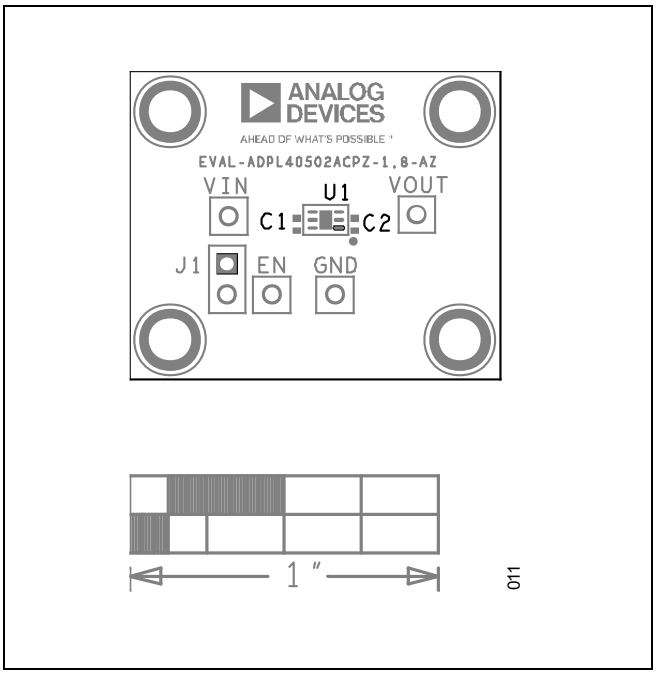


EVAL-ADPL40502AUJZ-1.8-AZ/3.3-AZ—Top

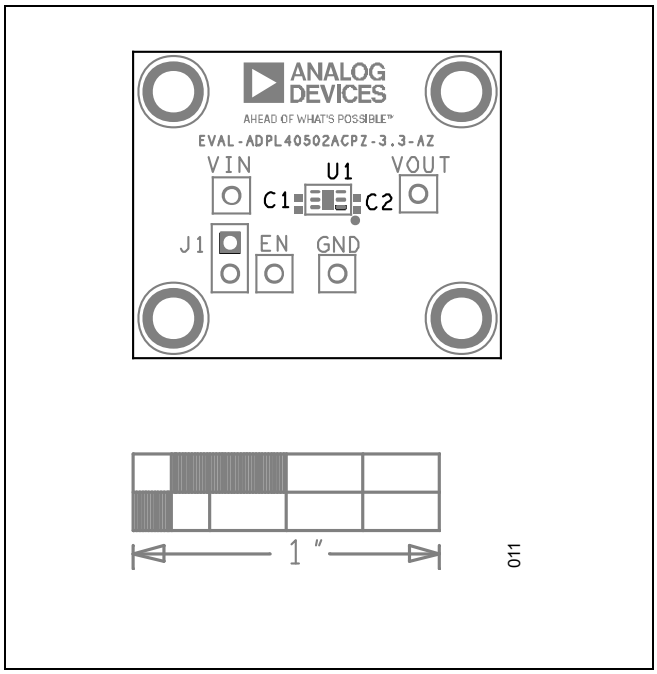


EVAL-ADPL40502AUJZ-1.8-AZ/3.3-AZ—Bottom

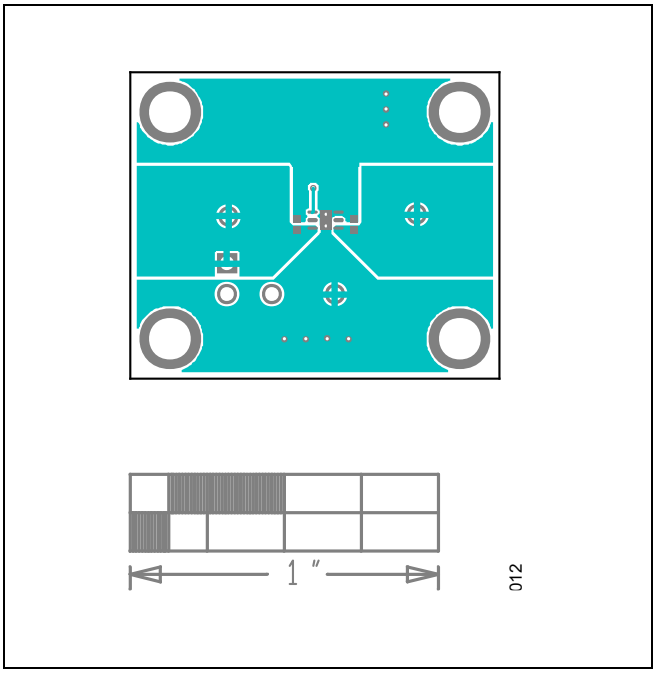
ADPL40502ACPZ LFSCP Package Evaluation Board PCB Layout



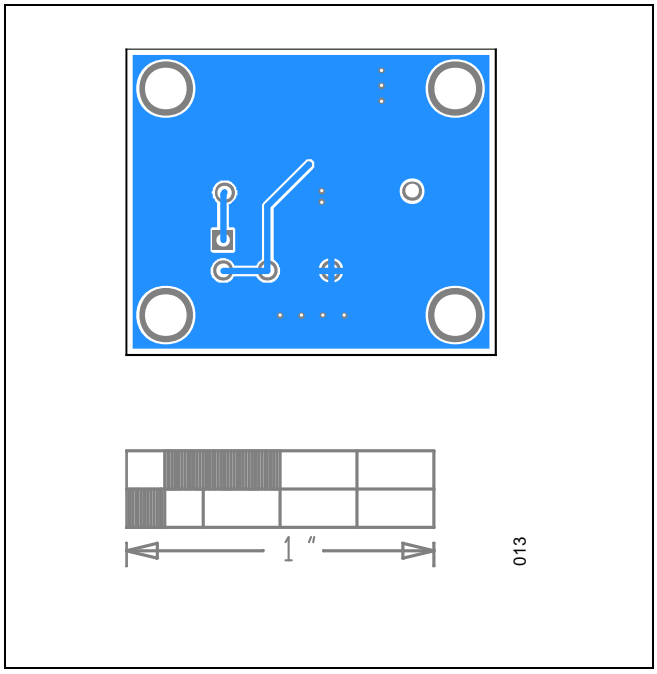
EVAL-ADPL40502ACPZ-1.8-AZ—Top Silkscreen



EVAL-ADPL40502ACPZ-3.3-AZ—Top



EVAL-ADPL40502ACPZ-1.8-AZ/3.3-AZ—Top



EVAL-ADPL40502ACPZ-1.8-AZ/3.3-AZ—Bottom

Revision History

REVISION NUMBER	REVISION DATE	DESCRIPTION	PAGES CHANGED
0	12/24	Initial release	—

Notes