One Technology Way • P.O. Box 9106 • Norwood, MA 02062-9106, U.S.A. • Tel: 781.329.4700 • Fax: 781.461.3113 • www.analog.com

Setting Up the Evaluation Board for the ADP172

FEATURES

Input voltage range: 1.6 V to 3.6 V
Output current range: 0 mA to 300 mA
Output voltage accuracy: ±1%
Operating temperature range: −40°C to +125°C

GENERAL DESCRIPTION

The ADP172 evaluation board is used to demonstrate the functionality of the ADP172 series of linear regulators.

Simple device measurements such as line and load regulation, dropout voltage, and ground current can be demonstrated with only a single voltage supply, a voltmeter, a current meter, and load resistors.

For more information about the ADP172 linear regulator, see the ADP172 data sheet.

EVALUATION BOARD

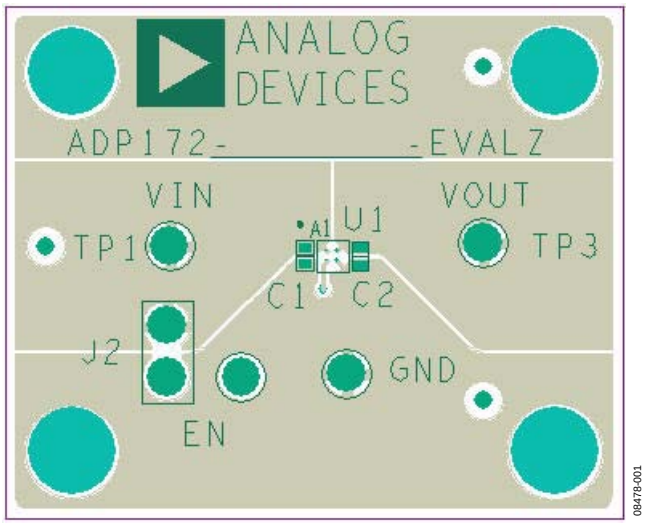

Figure 1. WLCSP PCB

TABLE OF CONTENTS

REVISION HISTORY

4/10—Revision 0: Initial Version

EVALUATION BOARD HARDWARE

EVALUATION BOARD CONFIGURATIONS

The ADP172 evaluation board comes supplied with all components required for operation. Figure 2 shows the schematic of the evaluation board configuration. Table 1 describes the components.

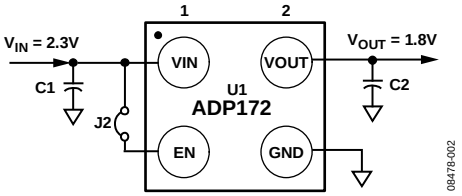

Figure 2. Evaluation Board Schematic, WLCSP

Table 1. Evaluation Board Hardware Components

Component	Description
U1	ADP172 low dropout linear regulator
C1	Input bypass capacitor, 1 µF, 0402 size
C2	Output capacitor, 1 µF, 0402 size
J2	Jumper (connects EN to VIN for automatic startup)

OUTPUT VOLTAGE MEASUREMENTS

Figure 3 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.

Follow these steps to connect to a voltage source and voltmeter:

1. Connect the negative terminal (−) of the voltage source to the GND pad on the evaluation board.
2. Connect the positive terminal (+) of the voltage source to the VIN pad of the evaluation board.
3. Connect a load between the VOUT pad and the GND pad.
4. Connect the negative terminal (−) of the voltmeter to the GND pad.
5. Connect the positive terminal (+) of the voltmeter to the VOUT pad.

When these steps are completed, the voltage source can be turned on. If J2 is inserted (connecting EN to VIN 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.

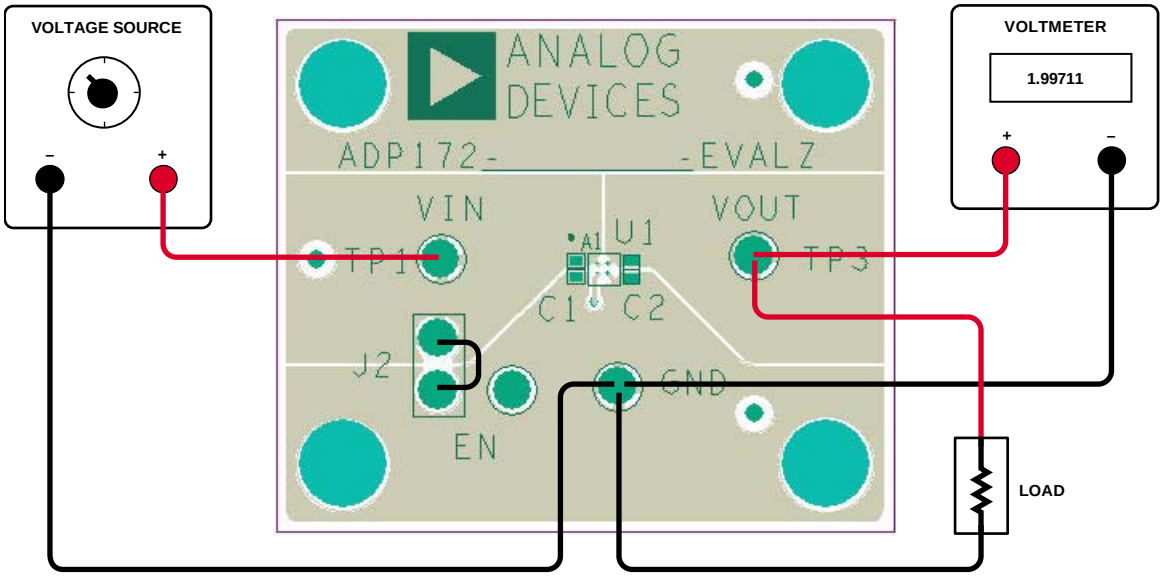

Figure 3. Output Voltage Measurement Setup, WLCSP

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_{OUTNOM} + 0.5 V (or 2.2 V, whichever is greater) and V_{INMAX}. For example, for an ADP172 with a 1.8 V output, V_{IN} needs to be varied between 2.3 V and 5.5 V. This measurement can be repeated under different load conditions. Figure 4 shows the typical line regulation performance of an ADP172 with a 1.8 V output.

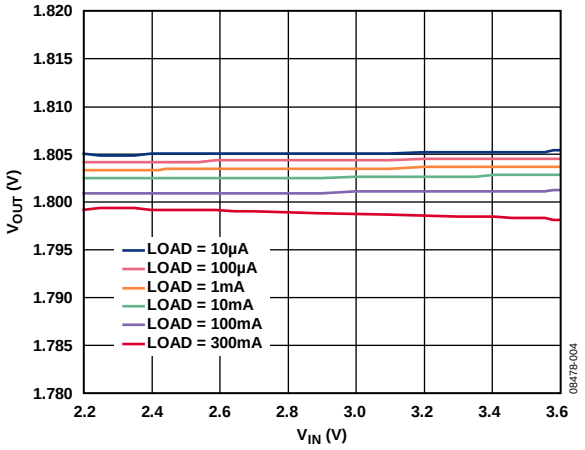

Figure 4. Output Voltage (V_{OUT}) vs. Input Voltage (V_{IN}) at T_A = 25°C

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 0 mA to 300 mA. Figure 5 shows the typical load regulation performance of an ADP172 with a 1.8 V output for an input voltage of 2.3 V.

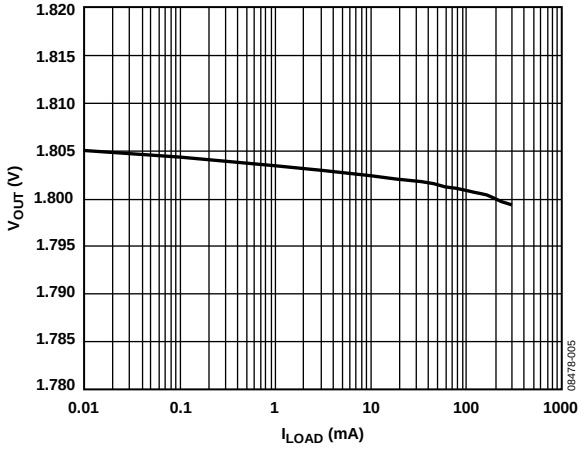

Figure 5. Output Voltage, V_{OUT} vs. Load Current, I_{OUT} at V_{IN} = 2.3 V, V_{OUT} = 1.8 V, T_A = 25°C

DROPOUT VOLTAGE MEASUREMENTS

Dropout voltage can be measured using the configurations shown in Figure 3. 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 2.2 V. 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 6 shows the typical curve of dropout voltage measurements with different load currents.

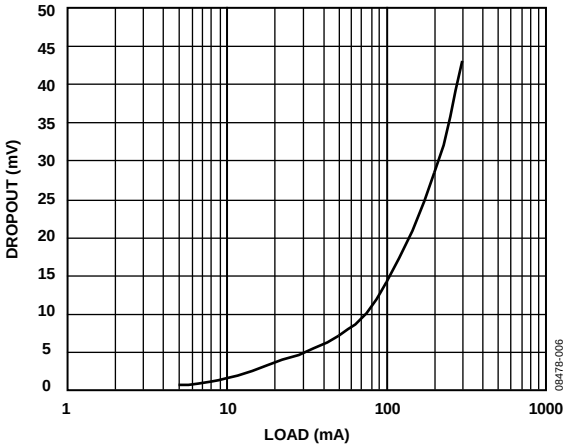

Figure 6. Dropout Voltage vs. Load Currents (I_{LOAD}) V_{OUT} = 2.5 V, T_A = 25°C

GROUND CURRENT MEASUREMENTS

Figure 8 show 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.

Follow these steps to connect to a voltage source and ammeter:

1. Connect the positive terminal (+) of the voltage source to the VIN pad on the evaluation board.
2. Connect the positive terminal (+) of the ammeter to the GND pad 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 VOUT 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 J2 is inserted (connecting EN to VIN 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 (100 mA). Figure 7 shows the typical ground current consumption for various load levels at V_{OUT} = 1.8 V and T_A = 25°C.

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

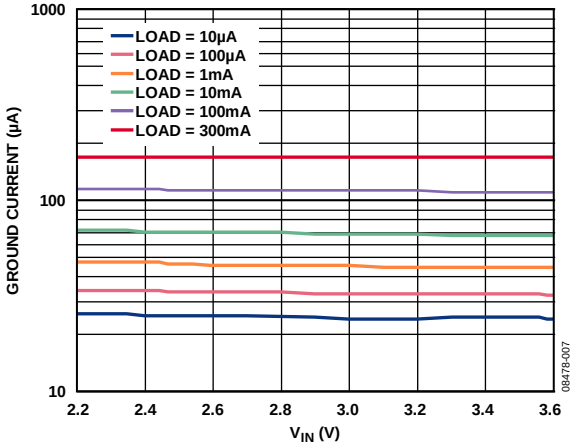

Figure 7. Ground Current vs. Input Voltage, V_{OUT} = 2.5 V, T_A = 25°C

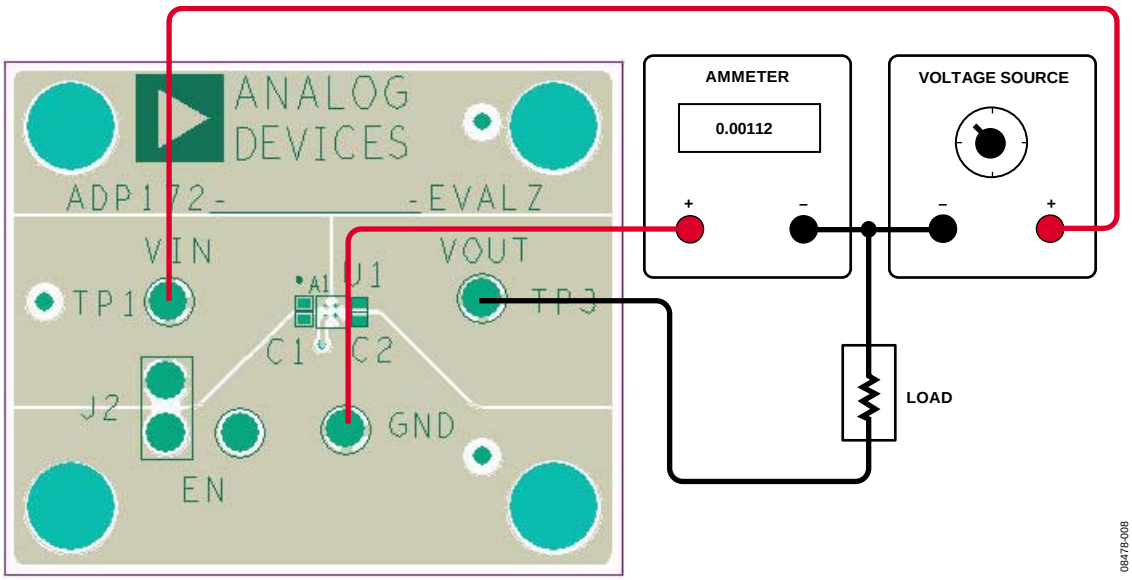

Figure 8. Ground Current Measurement Setup, WLCSP

ORDERING INFORMATION

BILL OF MATERIALS

Table 2.

Reference Designator	Description	Manufacturer	Part No.
C1, C2	Capacitor, MLCC, 1 µF, 10 V, 0402, X5R	Murata (or equivalent)	
J2	Header, single, STR, 2 pins	Sullins Connector Solutions	PEC02SAAN
U1	IC, LDO regulator	Analog Devices, Inc.	ADP172ACBZ-x.x

RELATED LINKS

Resource	Description
ADP172	Product Page, ADP172 low voltage, micropower, low dropout linear regulator

NOTES

NOTES

ESD Caution

ESD (electrostatic discharge) sensitive device. Charged devices and circuit boards can discharge without detection. Although this product features patented or proprietary protection circuitry, damage may occur on devices subjected to high energy ESD. Therefore, proper ESD precautions should be taken to avoid performance degradation or loss of functionality.

UG08478-0-4/10(0)

www.analog.com