

Setting Up the Evaluation Board for the ADP122/ADP123

FEATURES

Input voltage range: 2.3 V to 5.5 V

Output current range: 0 mA to 300 mA

Output voltage accuracy: $\pm 1\%$

Operating temperature range: -40°C to $+125^{\circ}\text{C}$

GENERAL DESCRIPTION

This user guide explains the functionality of the [ADP122/ADP123](#) linear regulators.

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

For more information about the ADP122/ADP123 linear regulators, see the ADP122/ADP123 data sheets.

EVALUATION BOARD CONNECTION DIAGRAMS

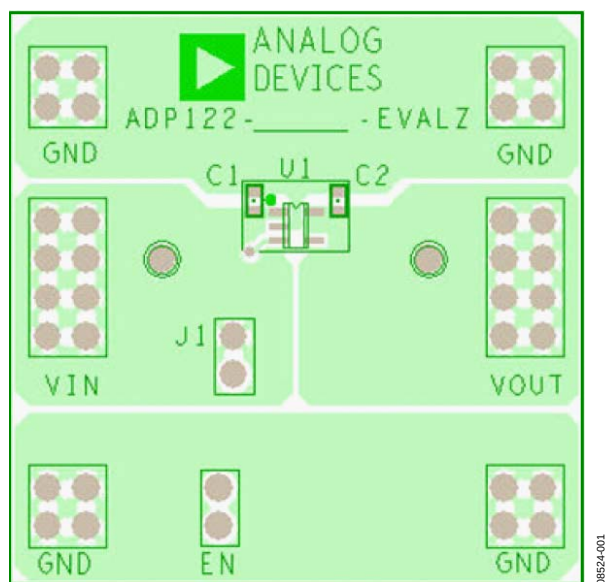


Figure 1. ADP122 PCB Layout

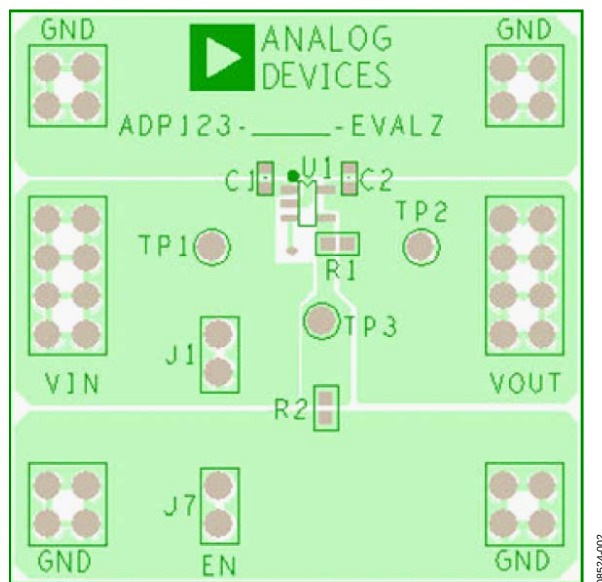


Figure 2. ADP123 PCB Layout

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REVISION HISTORY

6/10—Rev. 0 to Rev. A

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3/10—Revision 0: Initial Version

EVALUATION BOARD HARDWARE

EVALUATION BOARD CONFIGURATIONS

The [ADP122/ADP123](#) evaluation boards are supplied with different components, depending on the version that is ordered. Components common to both versions are C1, C2, TP1, TP2, and J1. Figure 3 and Figure 4 show the schematics of the ADP122 and ADP123 evaluation board configurations. Table 1 describes the components.

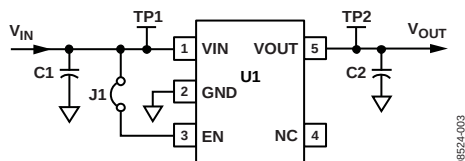


Figure 3. ADP122 Evaluation Board Schematic

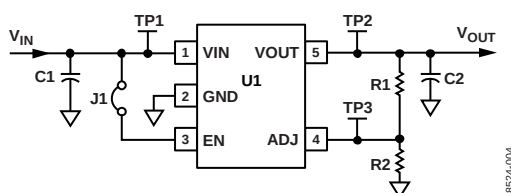


Figure 4. ADP123 Evaluation Board Schematic

Table 1. Evaluation Board Hardware Components

Component	Description
U1 ¹	ADP122/ADP123 low dropout linear regulators
C1	Input bypass capacitor, 1 μ F, 0603 size
C2	Output capacitor, 1 μ F, 0603 size
J1	Jumper (connects EN to VIN for automatic startup)
TP1	Test point closer to VIN
TP2	Test point closer to VOUT
TP3	Test point closer to ADJ (ADP123 evaluation board only)
R1, R2	0603 size feedback resistors between VOUT and ADJ (ADP123 evaluation board only)

¹ Component depends on evaluation board type ordered.

OUTPUT VOLTAGE MEASUREMENTS

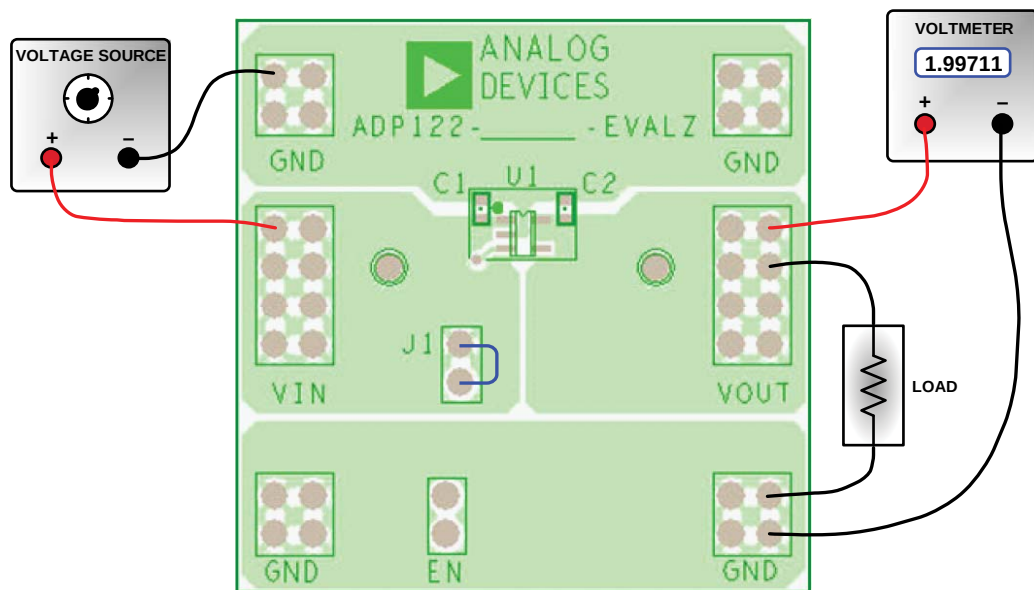


Figure 5. ADP122 Output Voltage Measurement Setup

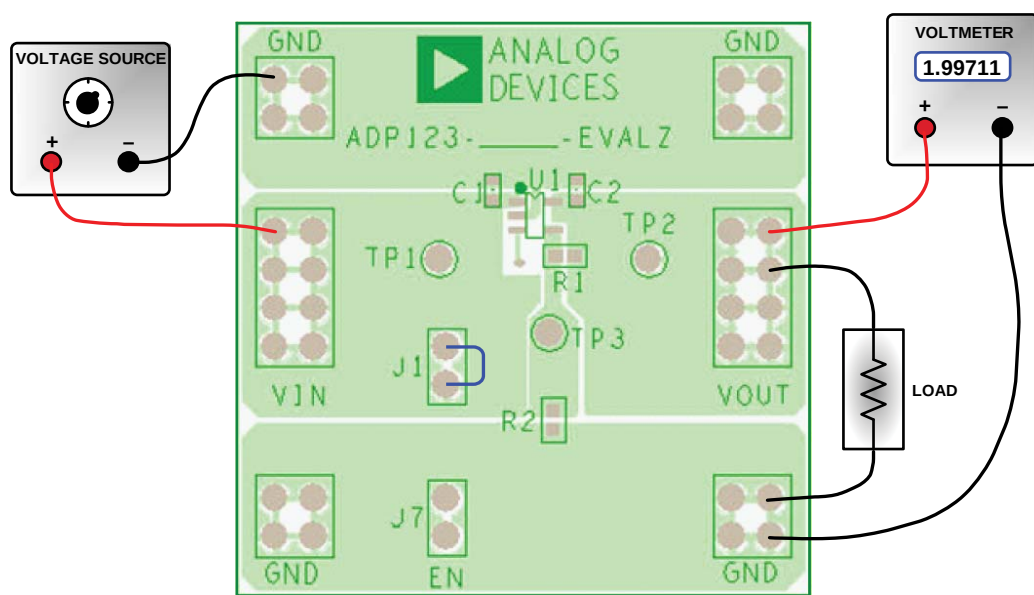


Figure 6. ADP123 Output Voltage Measurement Setup

Figure 5 and Figure 6 show how the evaluation boards can be connected to a voltage source and a voltage meter 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 dissipate 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 voltage meter:

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 VIN pad of the evaluation board.
3. Connect a load between the VOUT 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 VOUT pad.

When these steps are completed, the voltage source can be turned on. If J1 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.

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 $V_{OUTNOM} + 0.3 \text{ V}$ (or 2.3 V , whichever is greater) and V_{INMAX} .

For example, for the ADP122 with a fixed 3.3 V output, V_{IN} must be varied between 3.6 V and 5.5 V . This measurement can be repeated under different load conditions. Figure 7 shows the typical line regulation performance of the ADP122 with a fixed 3.3 V output.

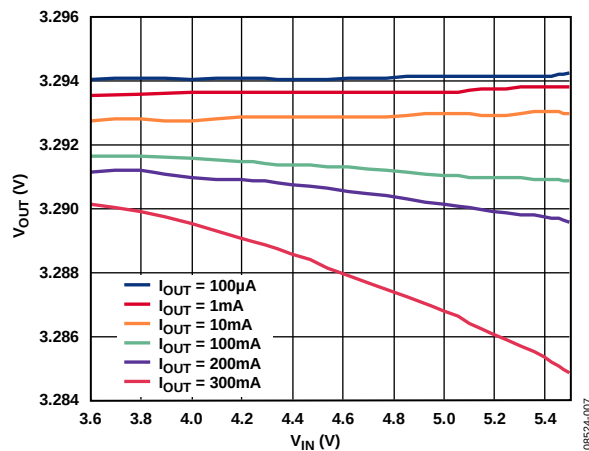


Figure 7. Output Voltage (V_{OUT}) vs. Input Voltage (V_{IN}) at $T_A = 25^\circ\text{C}$

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 8 shows the typical load regulation performance of the ADP122 with a fixed 3.3 V output for an input voltage of 3.6 V .

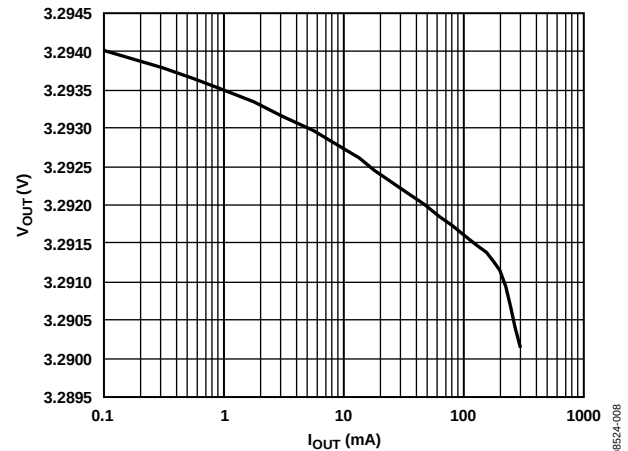


Figure 8. Output Voltage (V_{OUT}) vs. Load Current (I_{OUT}) at $V_{IN} = 3.6 \text{ V}$, $V_{OUT} = 3.3 \text{ V}$, $T_A = 25^\circ\text{C}$

DROPOUT VOLTAGE MEASUREMENTS

Dropout voltage can be measured using the configurations shown in Figure 5 and Figure 6. 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 2.3 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 9 shows the typical curve of dropout voltage measurements with different load currents.

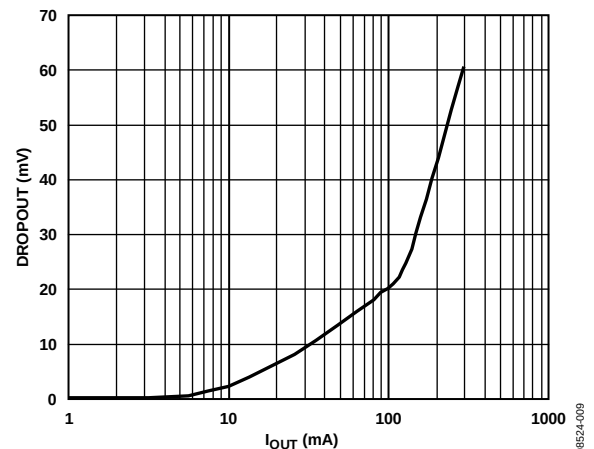


Figure 9. Dropout Voltage vs. Load Current (I_{OUT}) at $V_{OUT} = 3.3 \text{ V}$, $T_A = 25^\circ\text{C}$

GROUND CURRENT MEASUREMENTS

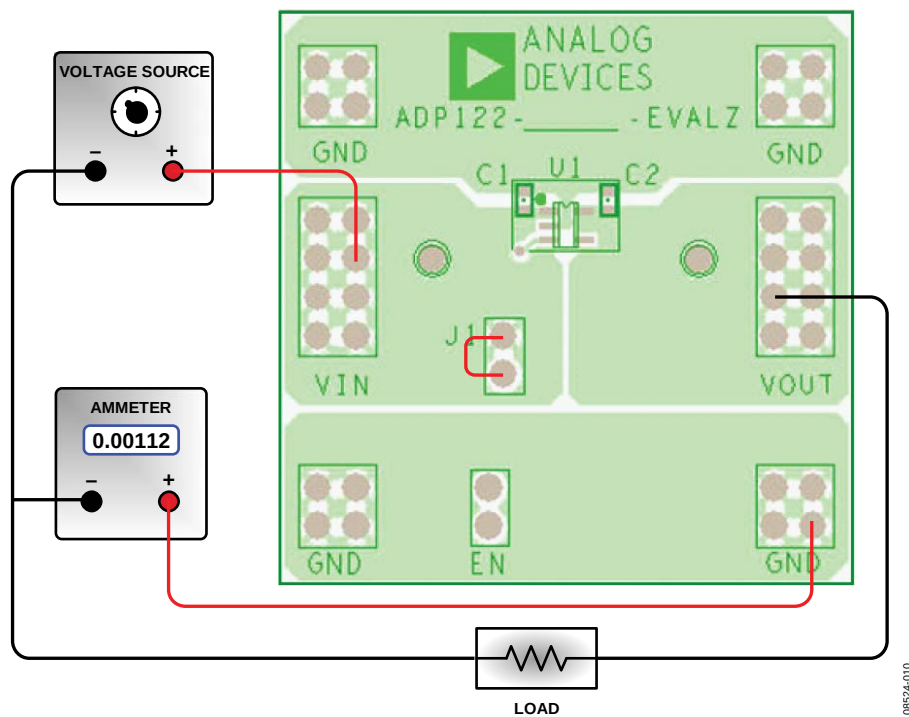


Figure 10. ADP122 Ground Current Measurement Setup

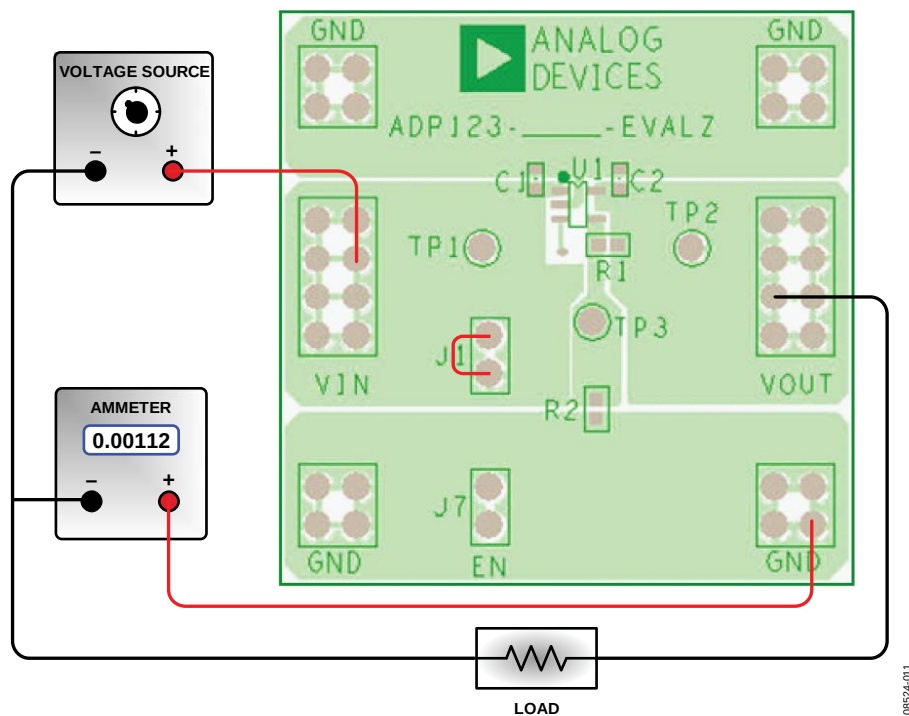


Figure 11. ADP123 Ground Current Measurement Setup

Figure 10 and Figure 11 show how the evaluation boards 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 that is expected to dissipate 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 of the evaluation board.
2. Connect the positive terminal (+) of the ammeter to one of the GND pads on 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 steps are completed, the voltage source can be turned on. If J1 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 (300 mA). Figure 12 shows the typical ground current consumption for various load levels at $V_{OUT} = 3.3\text{ V}$ and $T_A = 25^\circ\text{C}$.

When the device is disabled ($EN = GND$), the ground current drops to less than $1\text{ }\mu\text{A}$.

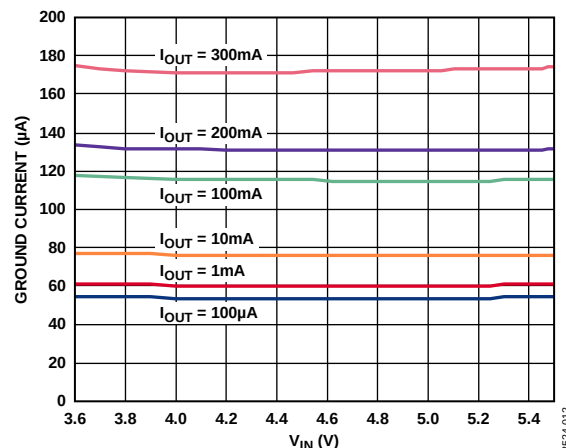


Figure 12. Ground Current vs. Input Voltage (V_{IN}) at $V_{OUT} = 3.3\text{ V}$, $T_A = 25^\circ\text{C}$

ORDERING INFORMATION

To evaluate the [ADP123](#), use the ADP123-EVALZ and change the feedback resistors on the board to meet the output voltage requirement. To evaluate the [ADP122](#), use the ADP122-3.3-EVALZ with a 3.3 V fixed output or the ADP122UJZ-REDYKIT.

The ADP122UJZ-REDYKIT allows simplified prototyping and evaluation and is available for every standard fixed output voltage option in the ADP122 product family. The kit allows the user to evaluate the different voltage options with one easy-to-order kit. RedyKit is a trademark of Analog Devices, Inc.

The ADP122UJZ-REDYKIT contains two evaluation boards and additional surface-mount ADP122 parts with different output voltages. The ADP122 parts come sorted and stored in the kit with the Analog Devices, Inc., part number and fixed output voltage clearly printed on each zip-top bag. A different part from the kit can be easily soldered onto one of the evaluation boards supplied with the kit.



Figure 13. ADP122UJZ-REDYKIT

08524-013

BILL OF MATERIALS FOR THE EVALUATION BOARD

Table 2.

Reference Designator	Description	Manufacturer	Part No.
C1, C2	Capacitor, MLCC, 1 μ F, 16 V, 0603, X5R	Murata (or equivalent)	GRM188R61C105KA93
R1, R2 (ADP123 only)	100 k Ω , 0603 size resistors	Vishay	CRCW06031003F
J1	Jumper, single, STR, two pins	Sullins Connector Solutions	PEC02SAAN
U1	IC, LDO regulator	Analog Devices, Inc.	ADP122AUJZ-3.3-R7 ADP123AUJZ-R7

BILL OF MATERIALS FOR THE ADP122UJZ-REDYKIT

Table 3.

Model	Output Voltage (V)	Package Description
ADP122AUJZ-2.5-R7	2.5	5-Lead TSOT
ADP122AUJZ-2.7-R7	2.7	5-Lead TSOT
ADP122AUJZ-2.8-R7	2.8	5-Lead TSOT
ADP122AUJZ-2.85-R7	2.85	5-Lead TSOT
ADP122AUJZ-2.9-R7	2.9	5-Lead TSOT
ADP122AUJZ-3.0-R7	3.0	5-Lead TSOT
ADP122AUJZ-3.3-R7	3.3	5-Lead TSOT
ADP122-BL1-EVZ	2.5	Evaluation Board
ADP122-3.3-EVALZ	3.3	Evaluation Board

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**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.

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