ADM7150CP-EVALZ/ADM7151CP-02-EVALZ User Guide
UG-553

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Evaluating the ADM7150 and ADM7151 Linear Regulators

REGULATOR FEATURES

Input voltage range: 4.5 V to 16 V
Maximum output current: 800 mA
Low noise
- **1.2 µV$_{RMS}$ total integrated noise from 100 Hz to 100 kHz**
- **2 µV$_{RMS}$ from 10 Hz to 100 kHz**

Initial accuracy: ±1%
Fixed 5 V (ADM7150) and adjustable (ADM7151) output versions
8-lead LFCSP package and SOIC package

EVALUATION KIT CONTENTS

ADM7150CP-EVALZ or ADM7151CP-02-EVALZ evaluation board

ADDITIONAL EQUIPMENT NEEDED

DC power supply
Multimeters for voltage and current measurements
Electronic or resistive loads

GENERAL DESCRIPTION

The ADM7150CP-EVALZ and ADM7151CP-02-EVALZ evaluation boards are used to demonstrate the functionality of the ADM7150 and ADM7151 linear regulators, respectively.

Simple device measurements, such as line and load regulation, dropout, and ground current, can be demonstrated with just a single voltage source, a voltmeter, an ammeter, and load resistors.

For more details about the linear regulators, refer to the ADM7150 and ADM7151 data sheets.

EVALUATION BOARD

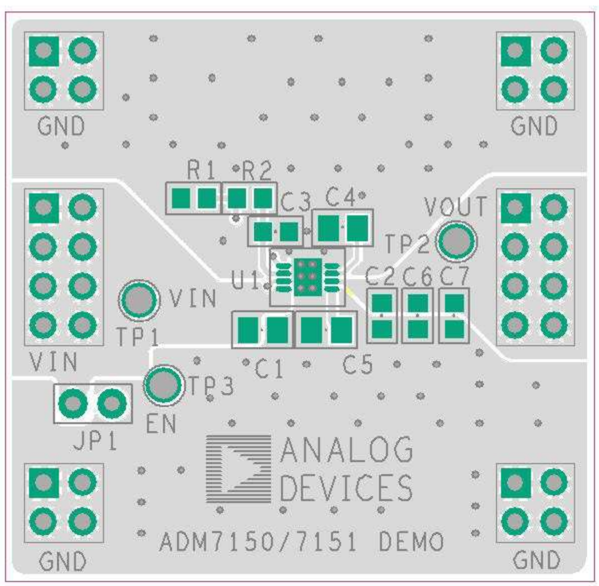

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Figure 1. ADM7150CP-EVALZ/ADM7151CP-02-EVALZ LFCSP Evaluation Board

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REVISION HISTORY

6/14—Rev. 0 to Rev. A

Changes to Table 2 ... 8

11/13—Revision 0: Initial Version

EVALUATION BOARD HARDWARE

EVALUATION BOARD CONFIGURATIONS

The evaluation boards arrive supplied with different components depending on which version is ordered. Components common to both versions are C1, C2, R3, J1, and J2.

Resistors R1 and R2 are used for the ADM7151 adjustable output option. The output voltage is set by

$$V_{OUT} = 1.5\text{ V} \times (1 + R1/R2).$$

Table 1. Evaluation Board Hardware Components

Component	Function	Description
U1[1]	Linear regulator	ADM7150ACPZ-5 or ADM7151ACPZ-02 linear regulator.
C1	Input capacitor	10 µF input bypass capacitor.
C2	Output capacitor	10 µF output capacitor. Required for stability and transient performance.
C3	V_{REF} capacitor	1 µF V_{REF} bypass capacitor.
C4	BYP capacitor	1 µF bypass capacitor.
C5	V_{REG} capacitor	10 µF V_{REG} bypass capacitor.
C6 and C7	Output capacitor	Optional output capacitors.
R1	Output divider	Sets output voltage with R2 in adjustable option. Short R1 for fixed output voltages.
R2	Output divider	Sets output voltage with R1 in adjustable option.
JP1	Jumper	Jumper. Connects EN to VIN for automatic startup.

[1] Component varies depending on the evaluation board ordered.

OUTPUT VOLTAGE MEASUREMENTS

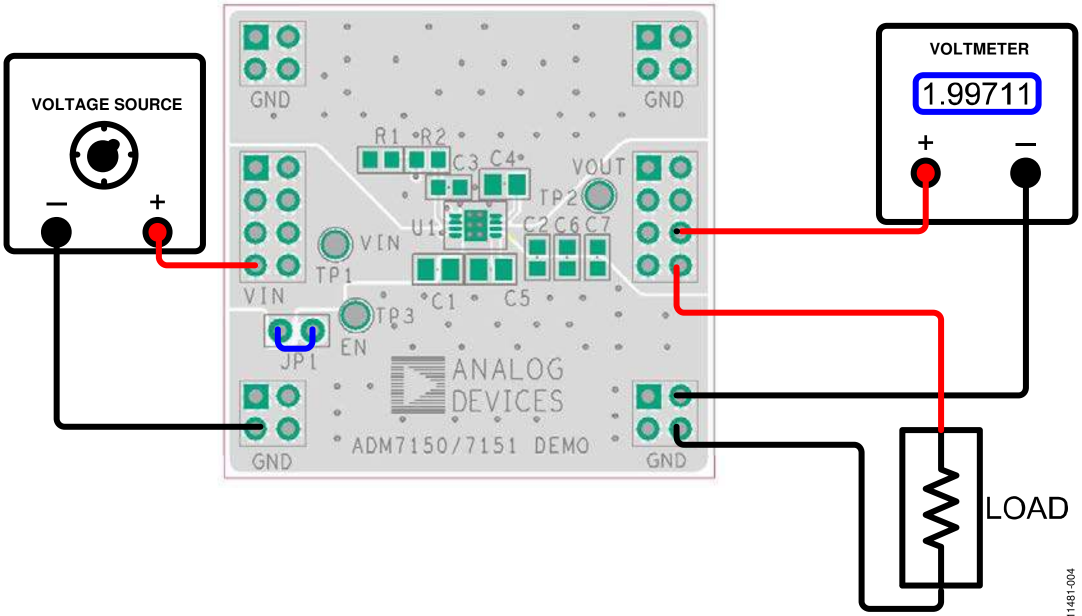

Figure 2. Output Voltage Measurement, LFCSP

Figure 2 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 adequate to handle the power 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 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.

The voltage source can now be turned on. If JP1 is inserted (connecting EN to VIN for automatic startup), the regulator powers up.

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

LINE REGULATION

For line regulation measurements, the regulator's output 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 during this measurement, V_{IN} must be varied between V_{OUTNOM} + 1.5 V (or 4.5 V, whichever is greater) and V_{INMAX}. For example, for an ADM7150 with fixed 5 V output, V_{IN} needs to be varied between 6.5 V and 16 V. This measurement can be repeated under different load conditions. Figure 3 shows the typical line regulation performance of an ADM7150 with fixed 5 V output.

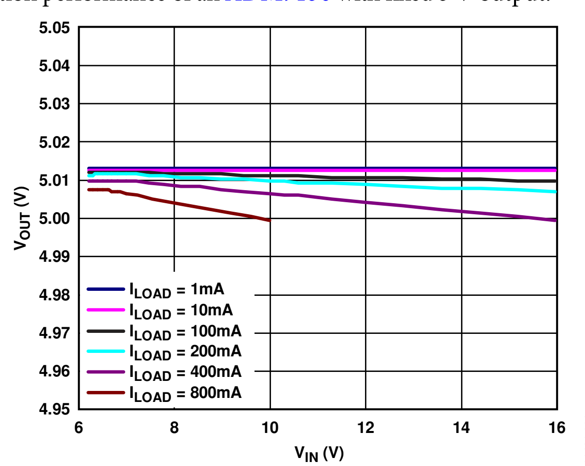

Figure 3. Output Voltage vs. Input Voltage

LOAD REGULATION

For load regulation measurements, the regulator's output is monitored while the load is varied. For good load regulation, the output must change as little as possible with varying loads. The input voltage must be held constant during this measurement. The load current can be varied from 0 mA to 800 mA. Figure 4 shows the typical load regulation performance of an ADM7150 with fixed 5 V output for an input voltage of 6.5 V.

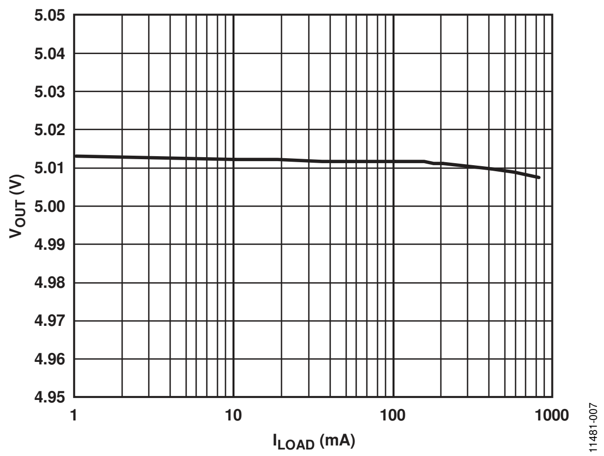

Figure 4. Output Voltage vs. Load Current

DROPOUT VOLTAGE

Dropout voltage can be measured using the configuration shown in Figure 2. 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 for output voltages greater than 4.5 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 5 shows a typical curve of dropout voltage measurements with different load currents.

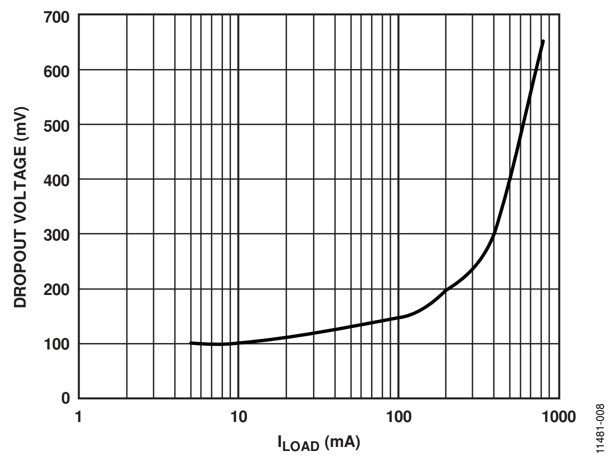

Figure 5. Dropout Voltage vs. Load Current

GROUND CURRENT MEASUREMENTS

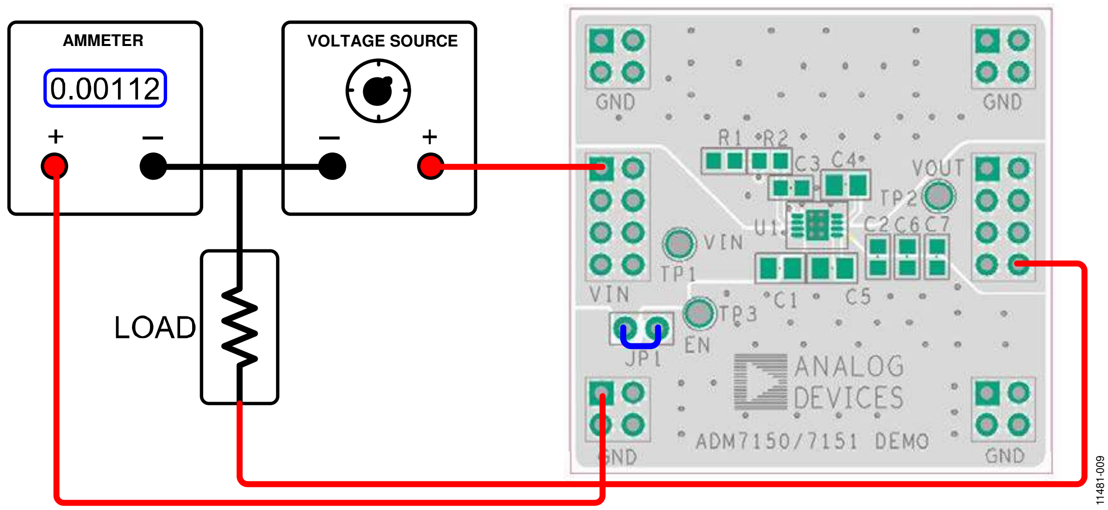

Figure 6. Ground Current Measurement, LFCSP

Figure 6 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 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 used 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 VIN 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 negative (−) terminal of the voltage source and the VOUT pad of the evaluation board.

The voltage source can now be turned on. If JP1 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 regulator's internal circuits are consuming while the circuits perform the regulation function. To be efficient, the regulator needs to consume as little current as possible. Typically, the regulator uses the maximum current when supplying its largest load level (800 mA). Figure 7 shows the typical ground current consumption for various load levels at an input voltage of 6.5 V for an output voltage of 5 V.

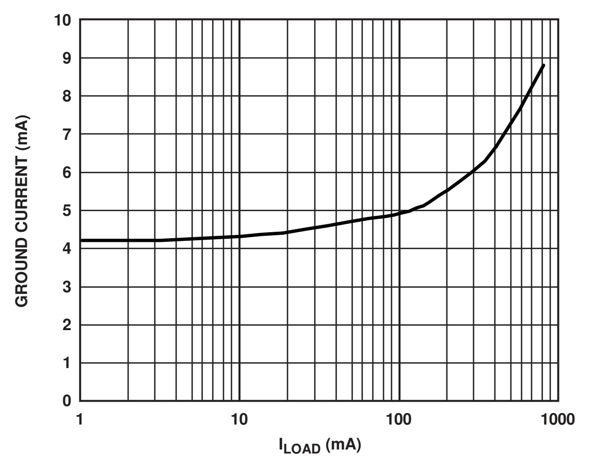

Figure 7. Ground Current vs. Load Current

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

SCHEMATIC

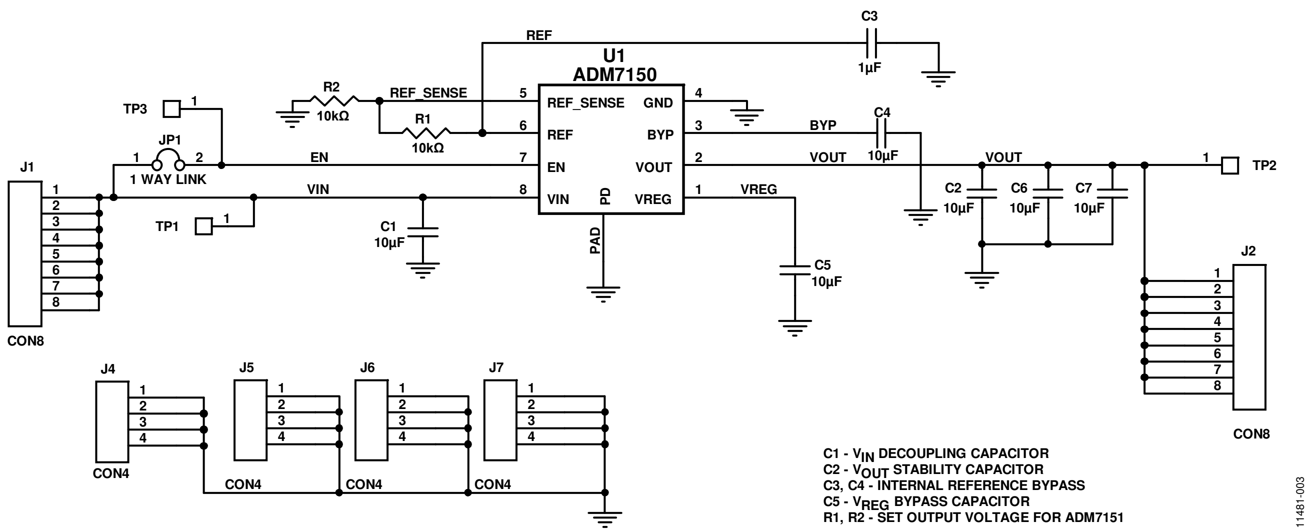

Figure 8. Evaluation Board Schematic

ORDERING INFORMATION

BILL OF MATERIALS

Table 2.

Quantity	Reference Designator	Description	Manufacturer/Vendor	Vendor Part Number
1	U1	ADM7150ACPZ-5 or ADM7151ACPZ-02	Analog Devices, Inc.	ADM7150ACPZ-5 or ADM7151ACPZ-02
3	C1, C2, C5	Capacitor, MLCC, 10 µF, 16 V, 0805, X5R or Capacitor, MLCC, 10 µF, 20 V, 0805, X5R	Murata (or equivalent)	GRM21BR61C106KE15 or GRM21BR61D106KE15
2	C3, C4	Capacitor, MLCC, 1 µF, 25 V, 0805, X5R	Murata (or equivalent)	GRM216R61E105KA12
1	JP1	Header, single, STR, 2 pins	Sullins Connector Solutions	PEC02SAAN
1	R1, R2	Resistor, 1%, 0603 case	Vishay Dale	CRCW0603xxxxF

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