Evaluation Board for the ADP120

EVAL-ADP120

FEATURES

Input voltage range: 2.3 V to 5.5 V
Output current range: 0 mA to 100 mA
Output voltage accuracy: ±1%
Operating temperature range: −40°C to +125°C

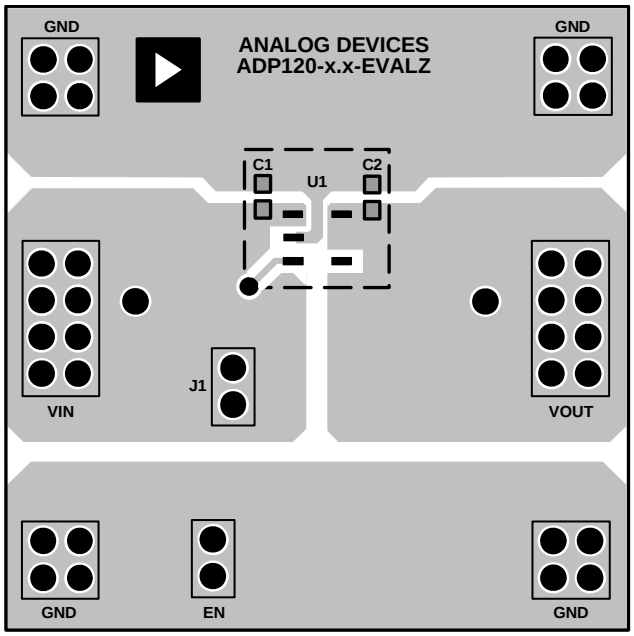
GENERAL DESCRIPTION

The ADP120 evaluation board is used to demonstrate the functionality of the ADP120 series of linear regulators.

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

For more details about the ADP120 linear regulator, see the ADP120 data sheet.

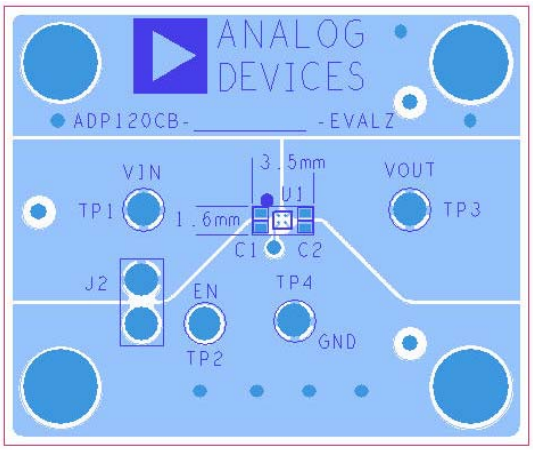
EVALUATION BOARDS



NOTES
1. x.x = 1.2V, 1.5V, 1.8V, AND 3.3V.
2. THE AREA ENCLOSED BY THE DASHED LINES IS APPROXIMATELY 0.047 SQUARE INCHES.

06952-001

Figure 1. TSOT



NOTES
1. ADP120CB EVALUATION BOARD OUTPUT VOLTAGES = 1.2V, 1.5V, 1.8V, 2.5V, AND 2.8V.

06952-015

Figure 2. WLCSP

Rev. 0

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REVISION HISTORY

7/09—Revision 0: Initial Version

EVALUATION BOARD HARDWARE AND SCHEMATIC

EVALUATION BOARD CONFIGURATIONS

The ADP120 evaluation board comes supplied with different components, depending on which version is ordered. Components common to all versions are C1, C2, J1, or J2. Figure 3 and Figure 4 show the schematics of these evaluation board configurations.

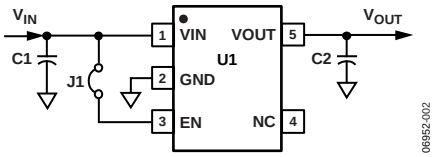

Figure 3. Evaluation Board Schematic, TSOT

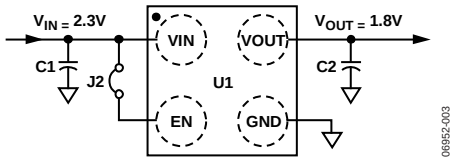

Figure 4. Evaluation Board Schematic, WLCSP

Table 1. Evaluation Board Hardware Components

Component	Function	Description
U1[1]	Linear regulator	ADP120 low dropout linear regulator
C1	Input capacitor	1 µF input bypass capacitor
C2	Output capacitor	1 µF output capacitor (required for stability and transient performance)
J2	Jumper	The jumper connects EN to VIN for automatic startup

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

OUTPUT VOLTAGE MEASUREMENTS

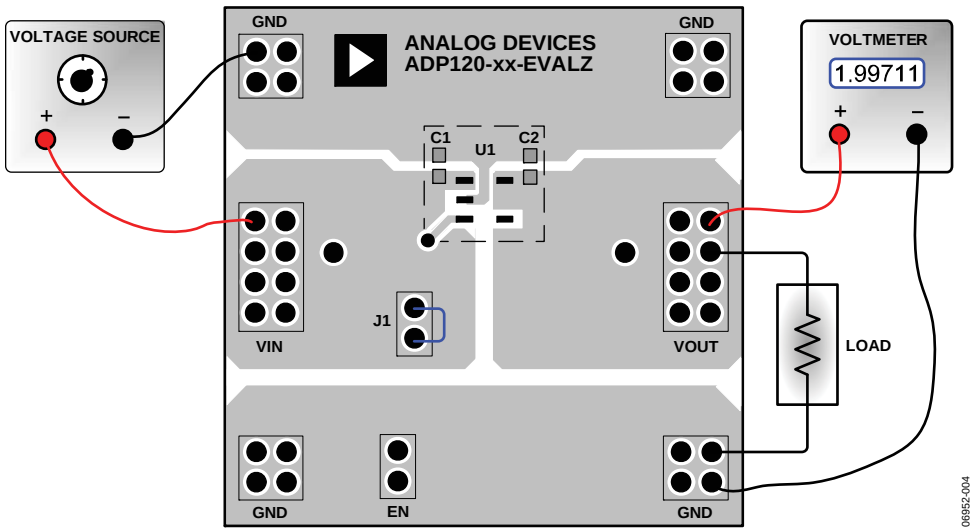

Figure 5. Output Voltage Measurement Setup, TSOT

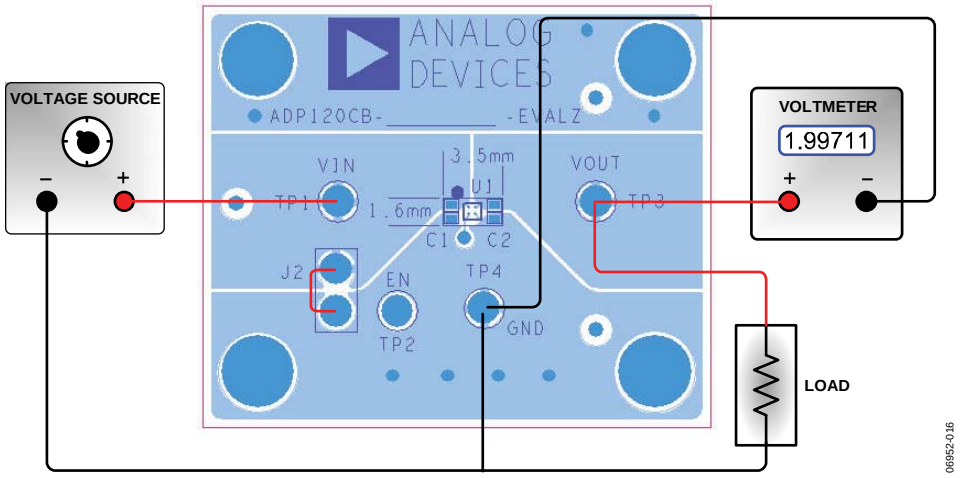

Figure 6. Output Voltage Measurement Setup, WLCSP

Figure 5 and Figure 6 show how the evaluation board 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 adequate to handle the power that is expected to be dissipated across it. An electronic load can also be used as an alternative. In addition, 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 voltage meter to one of the GND pads.
5. Connect the positive terminal (+) of the voltage meter to the VOUT pad.

When the five steps are completed, the voltage source can be turned on. If J1 or J2 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 voltage meter as close as possible to the output capacitor to reduce the effects of IR drops.

LINE REGULATION

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} + 0.4 V (or 2.3 V, whichever is greater) and V_{INMAX}. For example, for an ADP120 with a fixed 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 7 shows the typical line regulation performance of an ADP120 with a fixed 1.8 V output.

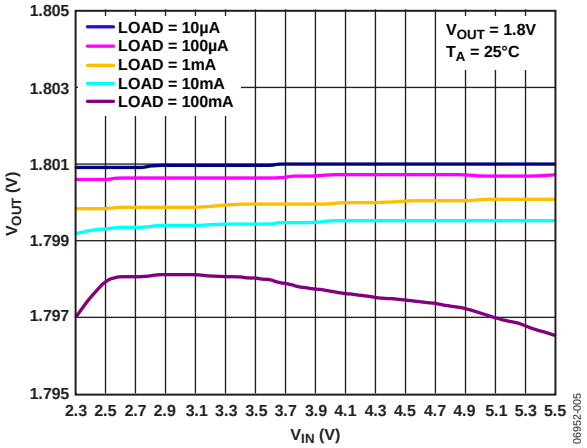

Figure 7. Output Voltages, V_{OUT} vs. Input Voltages, V_{IN}

LOAD REGULATION

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 100 mA. Figure 8 shows the typical load regulation performance of an ADP120 with a fixed 1.8 V output for an input voltage of 2.3 V.

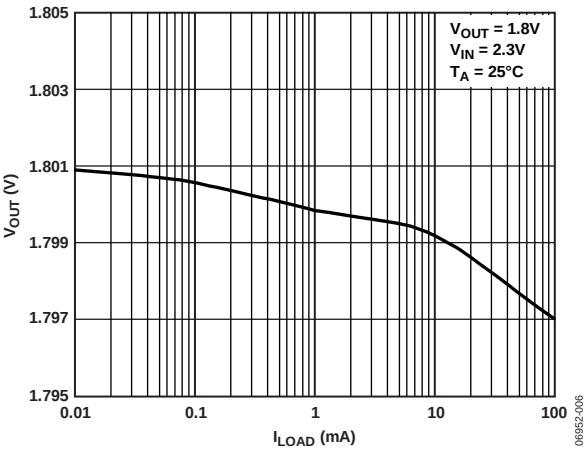

Figure 8. Output Voltage, V_{OUT} vs. Load Current, I_{LOAD}

DROPOUT VOLTAGE

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 for output voltages above 2.3 V. Dropout voltage increases with larger loads. For more accurate measurements, a second voltage meter 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 and Figure 10 show the typical curves of dropout voltage measurements with different load currents for different output voltages.

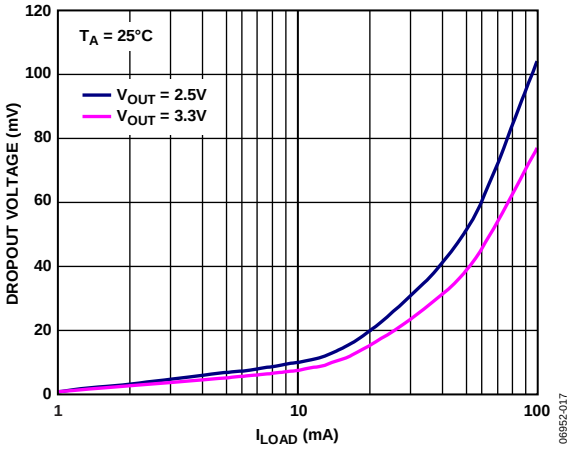

Figure 9. TSOT Dropout Voltages vs. Load Currents, I_{LOAD}

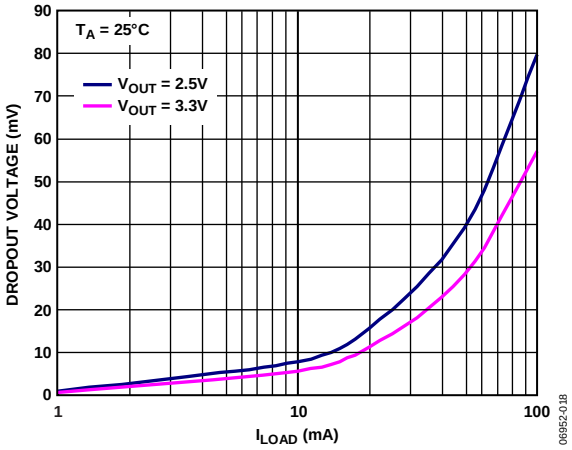

Figure 10. WLCSP Dropout Voltages vs. Load Currents, I_{LOAD}

GROUND CURRENT MEASUREMENTS

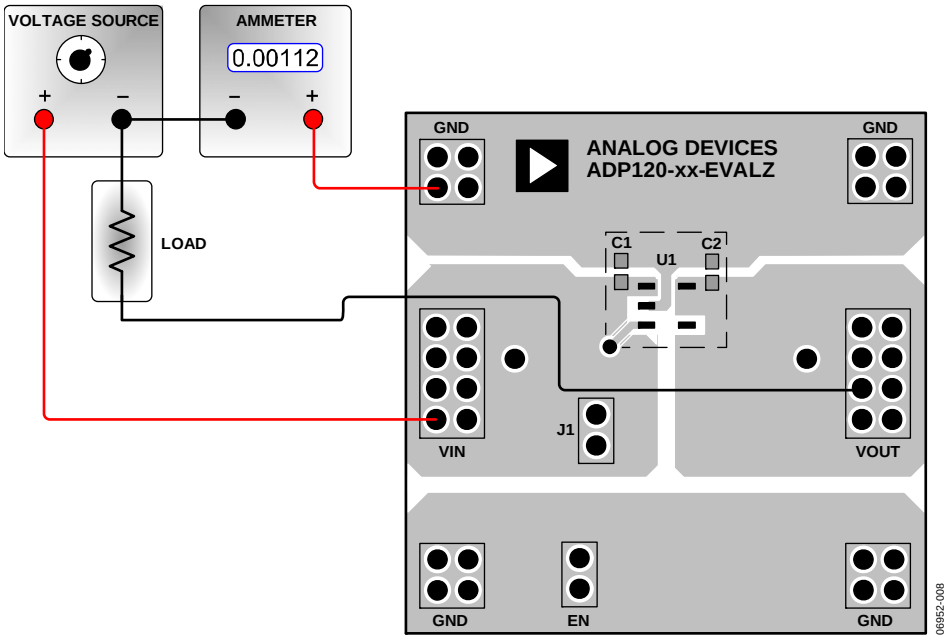

Figure 11. Ground Current Measurement, TSOT

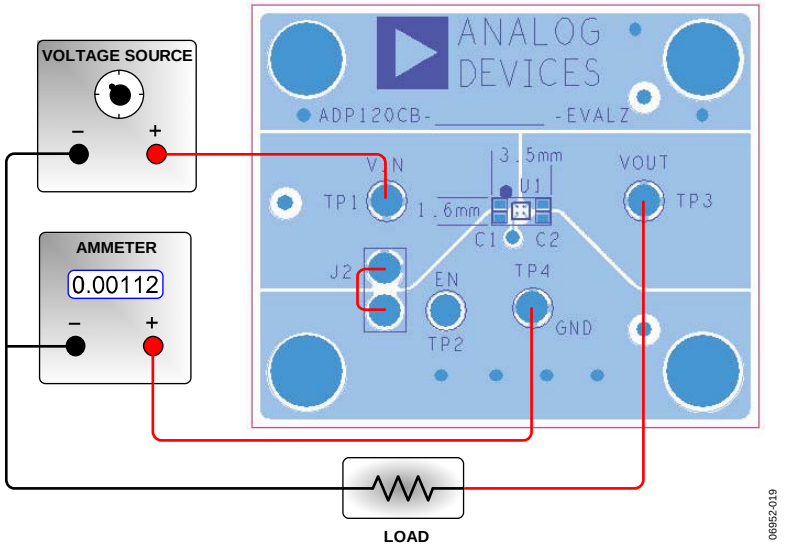

Figure 12. Ground Current Measurement, WLCSP

Figure 11 and Figure 12 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 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 that is used 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 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 VOUT pad of the evaluation board and the negative (−) terminal of the voltage source.

After completing the four connection steps, the voltage source can be turned on. If J1 or 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 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 (100 mA). Figure 13 shows the typical ground current consumption for various load levels at V_{IN} = 2.3 V.

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

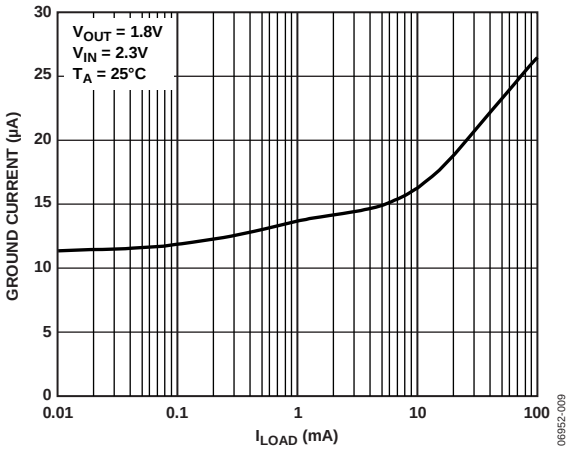

Figure 13. Ground Current vs. Load Current

ORDERING INFORMATION

BILL OF MATERIALS

Table 2.

Qty	Reference Designator	Description	Manufacturer/Vendor	Vendor Part No.
2	C1, C2	Capacitor, MLCC, 1.0 µF, 10 V, 0402, X5R	Murata or equivalent	GRM155R61A105KE15
1	J1	Header, single, STR, 2 pins	Digi-Key Corp.	S1012E-02-ND
1	U1	IC, LDO regulator	Analog Devices, Inc.	ADP120-AUJZ12R7
				ADP120-AUJZ15R7
				ADP120-AUJZ18R7
				ADP120-AUJZ33R7
				ADP120-ACBZ12R7
				ADP120-ACBZ15R7
				ADP120-ACBZ18R7
				ADP120-ACBZ25R7
				ADP120-ACBZ28R7

ORDERING GUIDE

Model	Output Voltage (V)	Description
ADP120-33-EVALZ[1]	3.3	ADP120 3.3 V Output TSOT Evaluation Board
ADP120-18-EVALZ[1]	1.8	ADP120 1.8 V Output TSOT Evaluation Board
ADP120-15-EVALZ[1]	1.5	ADP120 1.5 V Output TSOT Evaluation Board
ADP120-12-EVALZ[1]	1.2	ADP120 1.2 V Output TSOT Evaluation Board
ADP120CB-2.8-EVALZ[1]	2.8	ADP120 2.8 V Output WLFCSP Evaluation Board
ADP120CB-2.5-EVALZ[1]	2.5	ADP120 2.5 V Output WLFCSP Evaluation Board
ADP120CB-1.8-EVALZ[1]	1.8	ADP120 1.8 V Output Evaluation Board
ADP120CB-1.5-EVALZ[1]	1.5	ADP120 1.5 V Output WLFCSP Evaluation Board
ADP120CB-1.2-EVALZ[1]	1.2	ADP120 1.2 V Output WLFCSP Evaluation Board
ADP120-BL1-EVZ[1]		Blank Circuit Board

[1] Z = RoHS Compliant Part.

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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