Evaluating the ADA4523-1 36 V, Low Noise, Zero Drift, Operational Amplifier

FEATURES

- Full featured evaluation board for the ADA4523-1
- Enables efficient prototyping
- User defined circuit configuration
- Edge mounted SMA connector provisions
- Shutdown function for low power application

EVALUATION KIT CONTENTS

- EVAL-ADA4523-1BRMZ

EQUIPMENT NEEDED

- Dual output power supply
- Signal generator
- Oscilloscope
- 3 banana jack to grabber cables
- 2 SMA to BNC male cables

DOCUMENTS NEEDED

- ADA4523-1 data sheet

EVALUATION BOARD PHOTOGRAPHS

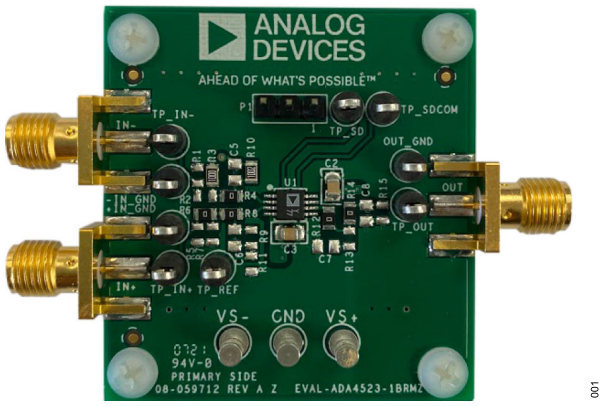

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Figure 1. EVAL-ADA4523-1BRMZ, Primary Side

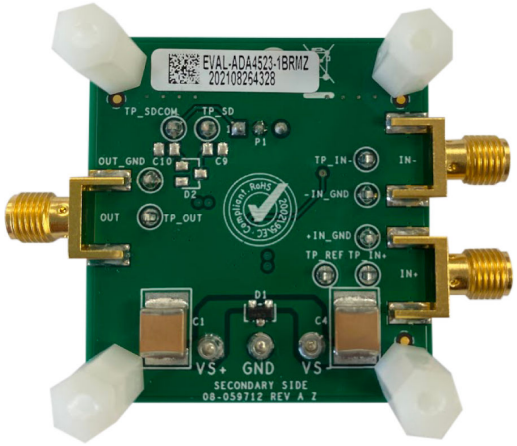

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Figure 2. EVAL-ADA4523-1BRMZ, Secondary Side

GENERAL DESCRIPTION

The EVAL-ADA4523-1BRMZ allows the evaluation of the ADA4523-1 single-channel, 8-lead, micro small outline package (MSOP) operational amplifier. The ADA4523-1 in this evaluation board is configured as a noninverting amplifier with a gain of 101. The ADA4523-1 has a typical gain bandwidth product of 4 MHz. When using a gain of 101, the useable bandwidth of the ADA4523-1 is limited to approximately 39.6 kHz. This limitation in bandwidth acts as a low-pass filter that rejects the artifacts generated by the 330 kHz internal chopping frequency of the ADA4523-1.

The EVAL-ADA4523-1BRMZ layout lessens the thermocouple effects of the trace and components that introduce offset voltages greater than the maximum offset voltage of the ADA4523-1 by carefully constructing the nodes connected to the inverting and noninverting inputs. The ADA4523-1 also features a shutdown mode for low power applications. Test point provisions for the $\overline{SD}$ and SD_COM pins are placed on the EVAL-ADA4523-1BRMZ to easily use the shutdown function.

The EVAL-ADA4523-1BRMZ mainly consists of 0805 sized resistors and capacitors to ensure simple installation except for the bypass capacitors. The 10 µF bypass capacitors (C1 and C4) have a 2220 package size to accommodate a higher voltage rating because the ADA4523-1 has a maximum supply of 55 V.

For full details on the ADA4523-1, see the ADA4523-1 data sheet, which must be consulted in conjunction with this user guide when using the EVAL-ADA4523-1BRMZ.

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REVISION HISTORY

12/2022—Rev. 0 to Rev. A

Changed EVAL-ADA4523-1ARMZ to EVAL-ADA4523-1BRMZ (Throughout) ... 1
Changes to Figure 1 and Figure 2 ... 1
Changes to Figure 3, Figure 4 Caption, Figure 5, and Figure 6 ... 4
Changes to Figure 7 ... 5

2/2020—Revision 0: Initial Version

EVALUATION BOARD QUICK START PROCEDURE

The following sections outline the basic prepopulated configuration of the EVAL-ADA4523-1BRMZ required to test the basic functionality of the ADA4523-1.

POWER SUPPLY CONSIDERATION

Use the turret pins, VS+, VS−, and GND, to power up the EVAL-ADA4523-1BRMZ. Always connect the proper polarity to the power supply of the EVAL-ADA4523-1BRMZ. To protect the EVAL-ADA4523-1BRMZ from power supply reversal, a Zener diode was installed. Proper supply levels must be strictly followed with a range from +4.5 V to +36 V for single-supply operation and with a range from ±2.25 V to ±18 V for dual-supply operation. The EVAL-ADA4523-1BRMZ also comes with a preinstalled 10 µF and 0.1 µF decoupling capacitors.

INITIAL BOARD CONFIGURATION

Take the following steps to test the basic functionality of the preinstalled EVAL-ADA4523-1BRMZ circuit, which is a noninverting amplifier with a gain of 101:

1. Before connecting anything to the EVAL-ADA4523-1BRMZ, ensure that the power supply and signal generator are powered down.
2. Use three banana jack to grabber cables to connect the turret pins, VS−, GND, and VS+, to negative ground and the positive supply, respectively.
3. Use a Subminiature Version A (SMA) to bayonet nut connector (BNC) male cable to connect the output of the signal generator to the SMA on the EVAL-ADA4523-1BRMZ, IN+.
4. Use another SMA to BNC male cable to connect the SMA connector output of the EVAL-ADA4523-1BRMZ, OUT, to the oscilloscope.

USING THE INITIAL NONINVERTING CONFIGURATION OF THE EVAL-ADA4523-1BRMZ WITH A GAIN OF 101

When the initial board configuration steps are completed, verify the expected output of the EVAL-ADA4523-1BRMZ when configured as a noninverting amplifier with a gain of 101 as follows:

1. Set the power levels to +15 V for the positive supply rail and −15 V for the negative supply rail.
2. Select a sinewave output for the signal generator. The frequency must be 1 kHz with a magnitude of 40 mV p-p. The offset voltage must be 0 V. Use a high-Z configuration for the output of the signal generator.
3. Set the input or the termination of the oscilloscope to 1 MΩ.
4. Measure or observe the frequency and the peak-to-peak voltage on the oscilloscope.
5. After setting up the connections detailed in the Initial Board Configuration section and applying the different settings for the equipment detailed in Step 1 through Step 4, turn the power supply of the EVAL-ADA4523-1BRMZ on. Ensure that the current consumption is between 1 mA to 3 mA, and that this consumption does not exceed 5 mA.
6. Verify the voltage and current levels of the ADA4523-1.
7. Turn on the signal generator and ensure that the signal generator displays the correct output from Step 2.
8. The oscilloscope then displays the output waveform. Because the EVAL-ADA4523-1BRMZ is configured as a noninverting amplifier with a gain of 101, the output must be a sinewave with a frequency of 1 kHz and a peak-to-peak voltage of approximately 4.04 V.

EVALUATION BOARD SCHEMATICS AND LAYOUT

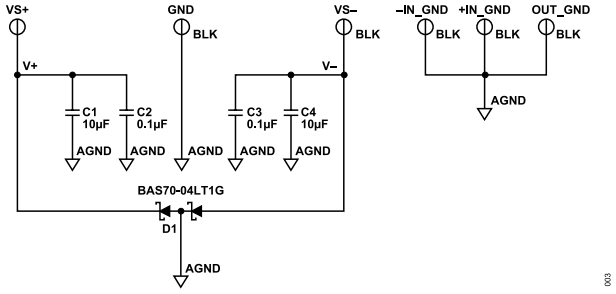

Figure 3. EVAL-ADA4523-1BRMZ Schematic of the Power Supply Pins

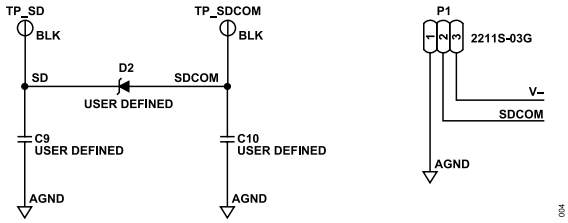

Figure 4. EVAL-ADA4523-1BRMZ Schematic of the Shutdown Circuit

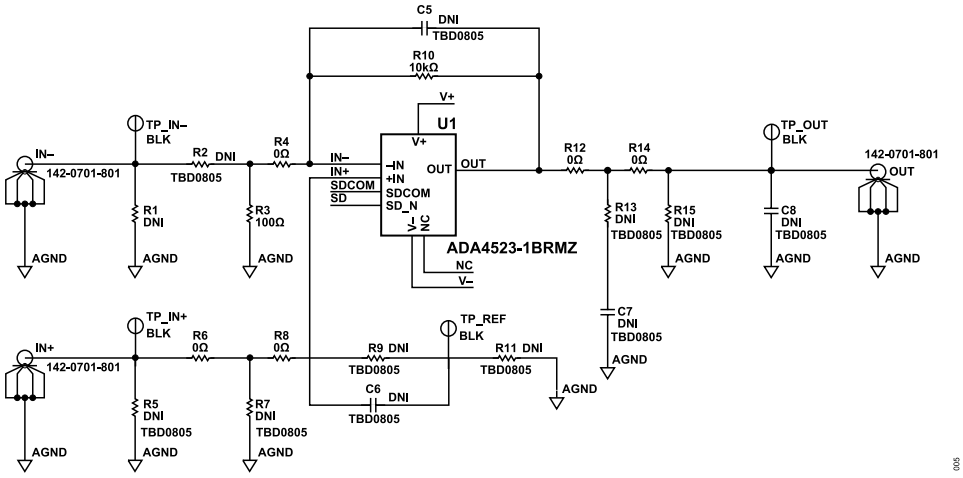

Figure 5. EVAL-ADA4523-1BRMZ Schematic of the Initial Board Configuration (NC Means No Connect)

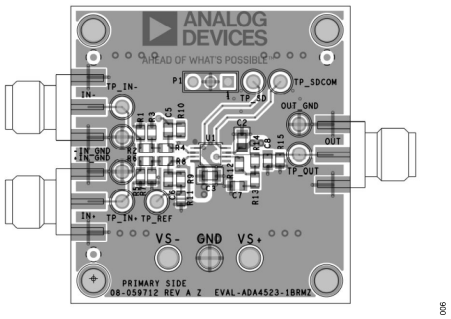

Figure 6. EVAL-ADA4523-1BRMZ Layout, Primary Side

EVALUATION BOARD SCHEMATICS AND LAYOUT

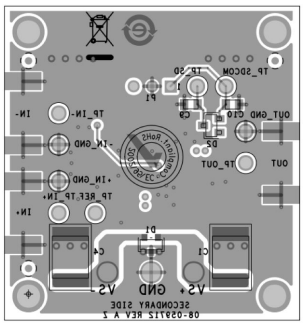

Figure 7. EVAL-ADA4523-1BRMZ Schematic Layout, Secondary Side

ORDERING INFORMATION

BILL OF MATERIALS

Table 1.

Quantity	Reference Designator	Description	Supplier	Part Number
1	U1	36 V, low noise, zero drift op amp	Analog Devices, Inc.	ADA4523-1BRMZ
2	C1, C4	Capacitors, X7R, 10 µF, 2220	AVX Corporation	22201C106MAT2A
2	C2, C3	Capacitors, X7R, 0.1 µF, 0805	AVX Corporation	08051C104JAT2A
6	C5 to C10	Capacitors, user defined, 0805	Not applicable	Not applicable
5	R4, R6, R8, R12, R14	Resistors, thick film, 0 Ω, 0805	Vishay	CRCW08050000Z0EA
1	R3	Resistor, thin film, 100 Ω, 0805	Panasonic	ERA-6AEB101V
1	R10	Resistor, thin film, 10 kΩ, 0805	Panasonic	ERA-6AEB103V
8	R1, R2, R5, R7, R9, R11, R13, R15	Resistors, user defined, 0805	Not applicable	Not applicable
1	D1	Schottky diode, SOT-23	ON Semiconductor	BAS70-04LT1G
1	D2	Zener diode, user defined, SOT-23	Not applicable	Not applicable
3	GND, VS+, VS−	Terminal turrets	Mill-Max	2501-2-00-80-00-00-07-0
9	+IN_GND, −IN_GND, OUT_GND, TP_IN+, TP_IN−, TP_OUT, TP_REF, TP_SD, TP_SDCOM	Test points, black	Keystone Electronics	5006
3	IN+, IN−, OUT	SMA end launch connectors	Cinch Connectivity Solutions	142-0701-801
1	P1	Single row, printed circuit board (PCB) headers, three contacts, 2.54 mm pitch	Multicomp	2211S-03G