Evaluating the ADA4510-2 Precision, 40 V, ±70 nV/°C, Rail-to-Rail Input and Output Op Amp with DigiTrim

FEATURES

- Full featured evaluation board for the ADA4510-2, a dual-channel, low input bias current amplifier available in an 8-lead narrow-body SOIC
- Enables quick prototyping
- User defined circuit configuration
- Edge mounted SMA connectors
- Connects easily to test equipment and other circuits
- Available provisions for photodiode sensors for quick evaluation
  - Connections available for photodiode bias
  - Guard traces to minimize leakage

GENERAL DESCRIPTION

The EVAL-ADA4510-2ARZ is an evaluation board used to test the ADA4510-2, a dual-channel, low input bias current amplifier that comes in an 8-lead, standard small outline package (SOIC_N). The design of this evaluation board emphasizes simplicity and ease of use. Provisions are available on the board to interface easily to test equipment.

The EVAL-ADA4510-2ARZ uses surface-mount components (SMT) in case size 0603, except for bypass capacitors and termination resistors. The EVAL-ADA4510-2ARZ features a variety of unpopulated resistor and capacitor footprints that provide the user with multiple choices and extensive flexibility for different application circuits.

The evaluation board has provisions for photodiode sensors that allow for easy configuration of a transimpedance amplifier (TIA). The layout is optimized with provisions for guarding to ensure low leakage and low parasitic capacitance for TIA applications.

Additionally, the evaluation board has provisions to build different types of filters. For selecting specific component values and designing filters, refer to https://tools.analog.com/en/filterwizard/.

Full details about the part are available in the ADA4510-2 data sheet, which must be consulted when using the EVAL-ADA4510-2ARZ.

EVALUATION BOARD PHOTOGRAPH

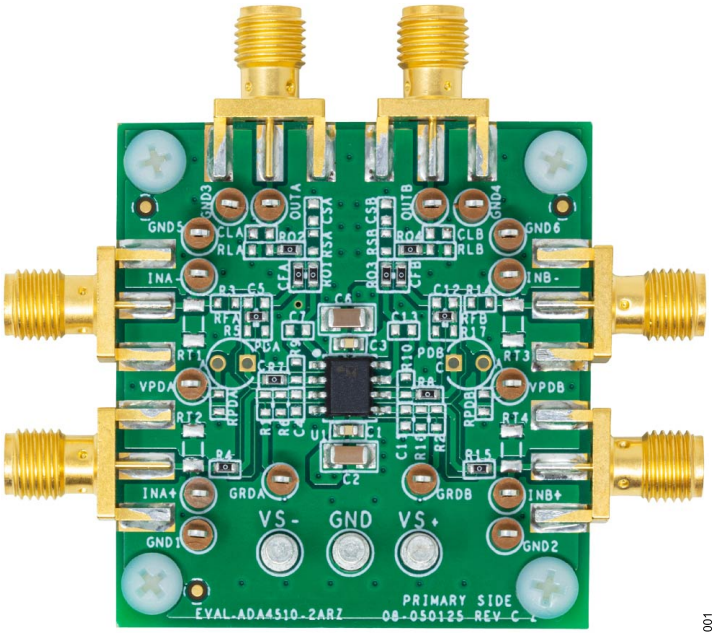

Figure 1. EVAL-ADA4510-2ARZ Evaluation Board Photograph

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REVISION HISTORY

7/2023—Revision 0: Initial Version

EVALUATION BOARD QUICK START OPERATION

OVERVIEW

This section outlines the basic configuration of the EVAL-ADA4510-2ARZ board to test basic functionality of the device. Provisions are included on the board so that it is highly configurable for any application. The connectors available on the board provide an easy interface to various bench equipment.

POWER SUPPLY

The EVAL-ADA4510-2ARZ uses turret connectors for the power supply connections. The board comes installed with 0.1 µF and 10 µF decoupling capacitors on both supplies. Apply the positive supply to the VS+ connector and the negative supply to the VS− connector.

AMPLIFIER CONFIGURATION

Both channels on the EVAL-ADA4510-2ARZ board are configured in a noninverting configuration with a gain of +1 by default. Preinstalled resistors accommodate this configuration. Figure 2 shows the default connections on the board.

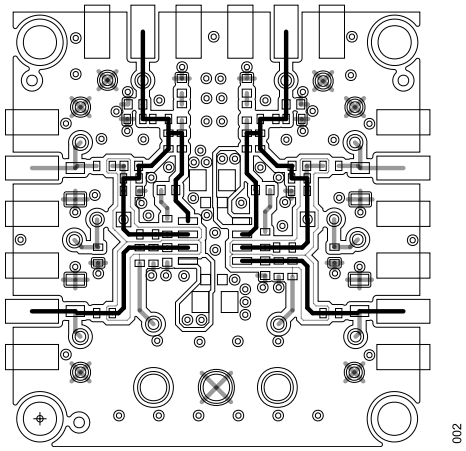

Figure 2. Default Connection

POWER-UP PROCEDURE

To begin using the EVAL-ADA4510-2ARZ board, use the following procedure:

1. Connect the power supply wires to the VS+, VS−, and GND turrets, respectively.
2. Connect an oscilloscope to the OUTA and OUTB Subminiature Version A (SMA) connectors.
3. Connect an input signal source to INA+ and INB+.
4. Set the signal source to the preferred amplitude and frequency while keeping the peak-to-peak input signal within the input voltage range of the device to ensure proper operation.
5. Set the power supplies to 18 V and −18 V.
6. Turn on the power supplies.
7. Turn on the input signal source.

The oscilloscope reads the same amplitude and frequency as the input signal.

TRANSIMPEDANCE AMPLIFIER (TIA) CONFIGURATION

The low input bias current and low input capacitance of the ADA4510-2 amplifier makes the op amp a good choice for transimpedance configurations as shown in Figure 4 and Figure 5. The evaluation board has an on-board provision for a photodiode (radial package) on both channels of the amplifier and is fabricated with a guard trace around the inverting pins (−INA, −INB) to ensure minimal leakage when evaluating in a transimpedance configuration. The R1 connection for Channel A and the R2 connection for Channel B provide quick connections of the guard trace to the noninverting pins (+INA, +INB) of the amplifier.

When operating in a TIA configuration, a bias voltage can be applied to the VPDA pin or to the VPDB pin to bias the anode of the photodiode. If no bias voltage needs to be applied, install a 0 Ω resistor at the RPDA footprint or the RPDB footprint to connect the anode of the photodiode to ground. For this TIA configuration, install the photodiode at either the PDA footprint or the PDB footprint and connect a feedback resistor at the RFA footprint for Channel A or the RFB footprint for Channel B. A feedback capacitor at the C5 footprint or the C12 footprint can be added for stability of the circuit.

CONFIGURATION TABLE

Table 1. Configuration Table

Component	Description
R3, R14	INA− or INB− can be used by installing a resistor on the R3 slot or the R14 slot
R4, R15	INA+ or INB+ can be used by installing a resistor on the R4 or the R15 slot
RT1, RT2, RT3, RT4	Termination resistors
RSA, CSA and RSB, CSB	Snubber circuit
RLA, RLB	Load resistor
CLA, CLB	Load capacitor
PDA, PDB	Photodiode slot
RPDA, RPDB	Set the PDA slot and the PDB slot to photovoltaic mode

EVALUATION BOARD QUICK START OPERATION

BOARD CONFIGURATION

Figure 3 shows the locations of board components described in Table 1.

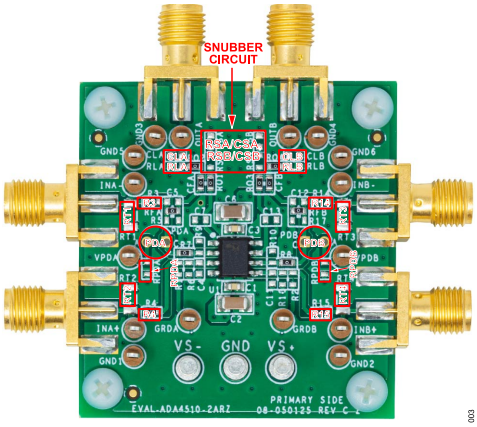

Figure 3. Board Configuration

EVALUATION BOARD SCHEMATICS AND ARTWORK

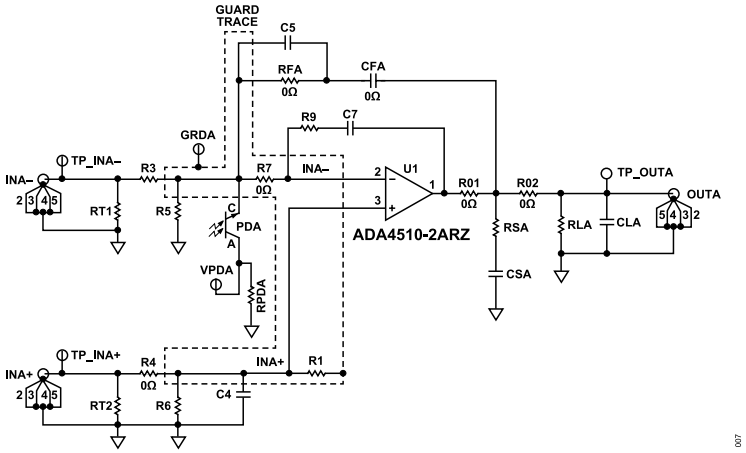

Figure 4. Channel A Circuit Connections

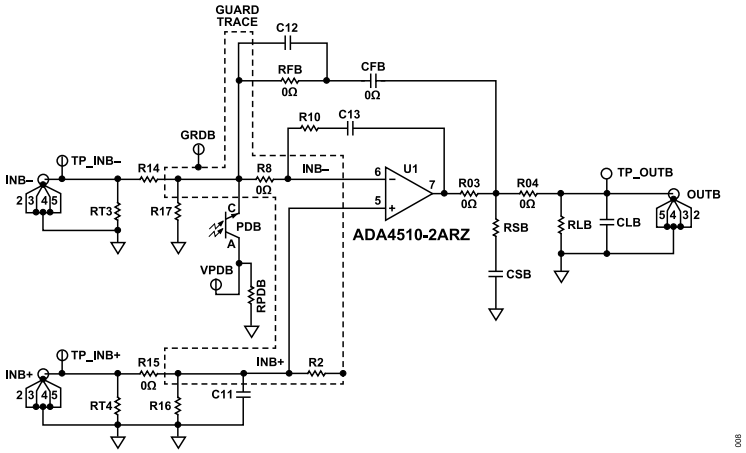

Figure 5. Channel B Circuit Connections

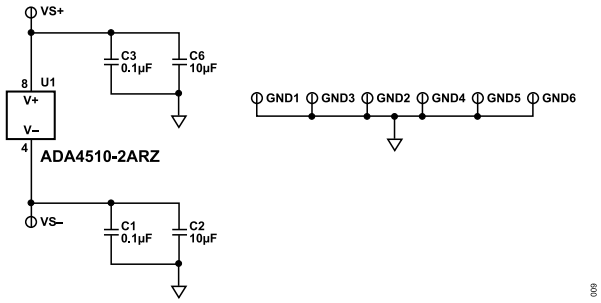

Figure 6. Power and Ground Connections

EVALUATION BOARD SCHEMATICS AND ARTWORK

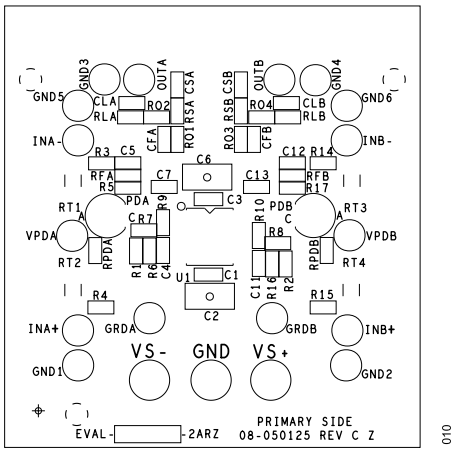

Figure 7. Assembly Drawing, Primary Side

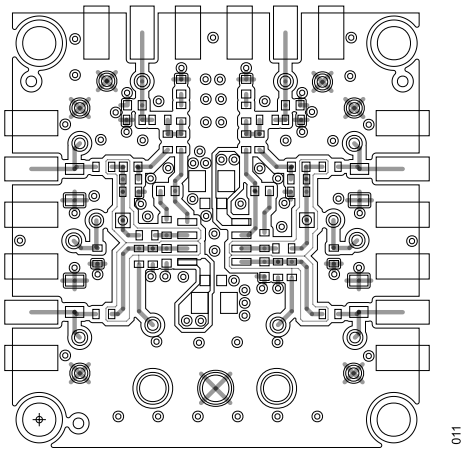

Figure 8. Layout Pattern, Primary Side

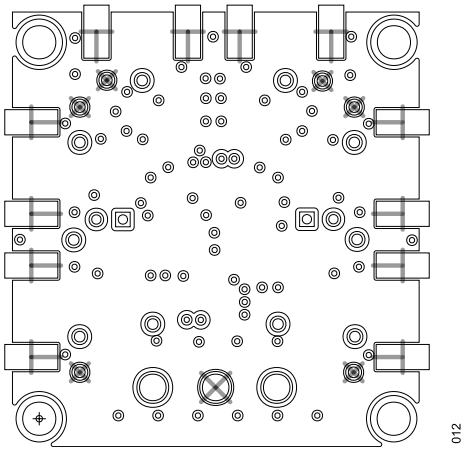

Figure 9. Layout Pattern, Secondary Side