

Evaluating the ADL8108 1 GHz to 8 GHz, Low Noise Amplifier with Integrated Temperature Sensor and Enable and Disable Function

FEATURES

- ▶ 4-layer, Rogers 4350B and Isola 370HR evaluation board
- ▶ End launch, 2.92 mm RF connectors
- ▶ Through calibration path (depopulated)

EVALUATION KIT CONTENTS

- ▶ ADL8108-EVALZ evaluation board

EQUIPMENT NEEDED

- ▶ RF signal generator
- ▶ RF spectrum analyzer
- ▶ RF network analyzer
- ▶ 5 V, 300 mA power supply

GENERAL DESCRIPTION

The ADL8108-EVALZ is a 4-layer printed circuit board (PCB) fabricated from 10 mil thick, Rogers 4350B and Isola 370HR, copper clad, forming a nominal thickness of 62 mils. The RFIN and RFOUT ports on the ADL8108-EVALZ are populated with 2.92 mm, female coaxial connectors, and the corresponding RF traces have a 50 Ω characteristic impedance. The ADL8108-EVALZ is populated with components suitable for use over the entire -40°C to $+85^{\circ}\text{C}$ operating temperature range of the [ADL8108](#). To calibrate board trace losses, a through calibration path is provided between the J1 and J2 connectors. J1 and J2 must be populated with RF connectors to use the through calibration path. Refer to [Table 1](#) and [Figure 4](#) for the through calibration path performance.

Access the ADL8108-EVALZ ground path and VDD pin through the surface-mount technology (SMT) test point connectors, GND and VDD. A supplementary test point for VRBIAS is included for simple access on the RBIAS pin (see [Figure 6](#) for the test point locations).

The RF traces on the ADL8108-EVALZ are 50 Ω , grounded, coplanar waveguide. The package ground leads and the exposed pad connect directly to the ground plane. Multiple vias connect the top and bottom ground planes with particular focus on the area directly beneath the ground paddle to provide adequate electrical conduction and thermal conduction.

The power supply decoupling capacitors on the ADL8108-EVALZ represent the configuration used to characterize and qualify the device.

For full details on the ADL8108, see the ADL8108 data sheet, which must be consulted in conjunction with this user guide when using the ADL8108-EVALZ.

EVALUATION BOARD PHOTOGRAPHS

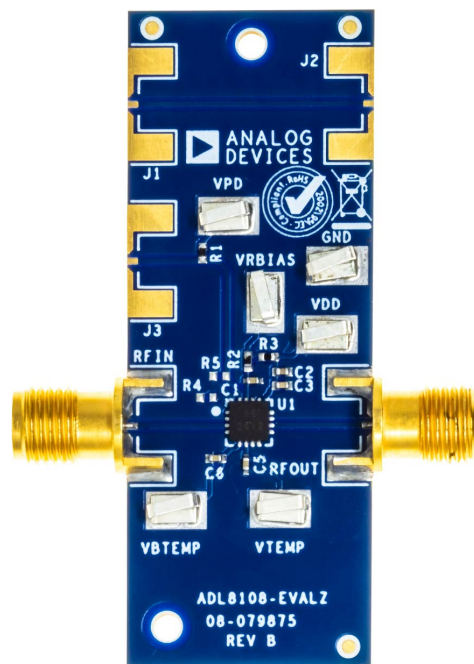


Figure 1. ADL8108-EVALZ Primary Side

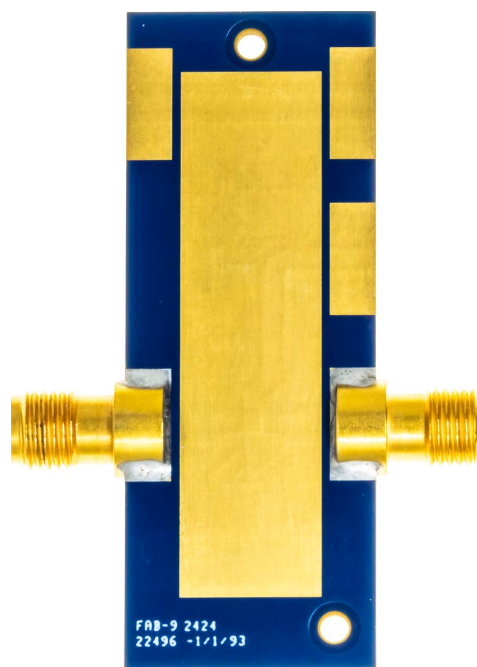


Figure 2. ADL8108-EVALZ Secondary Side

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REVISION HISTORY

10/2024—Revision 0: Initial Version

OPERATING THE ADL8108-EVALZ

A 5 V, 300 mA power supply is required to provide the bias to the [ADL8108](#) when using the ADL8108-EVALZ. Connect the 5 V power supply to the SMT test points, VDD and VBTEMP. Connect the ground reference to the GND test point. To measure the output voltage of the integrated temperature sensor, connect a digital voltage meter to the VTEMP SMT test point. To disable the ADL8108 using the VPD pin of the ADL8108-EVALZ, increase the voltage on the VPD pin to at least 1.9 V. To dynamically evaluate the enable or disable response time, remove R1, install a Subminiature Version A (SMA) connector on J3, and install a 50 Ω resistor on R5.

Then, apply an enable or disable signal to J3 from a digital pulse generator.

Refer to the ADL8108 data sheet for the recommended resistor values to achieve different supply currents. The default value of the external resistor, R3, connected on the ADL8108-EVALZ is 1270 Ω , which is the same value used to characterize the ADL8108.

The following bias conditions are recommended to achieve the performance specified in the ADL8108 data sheet: $V_{DD} = 5$ V, total supply current (I_{DQ}) = 90 mA, and bias resistance (R_{BIAS}) = 1270 Ω .

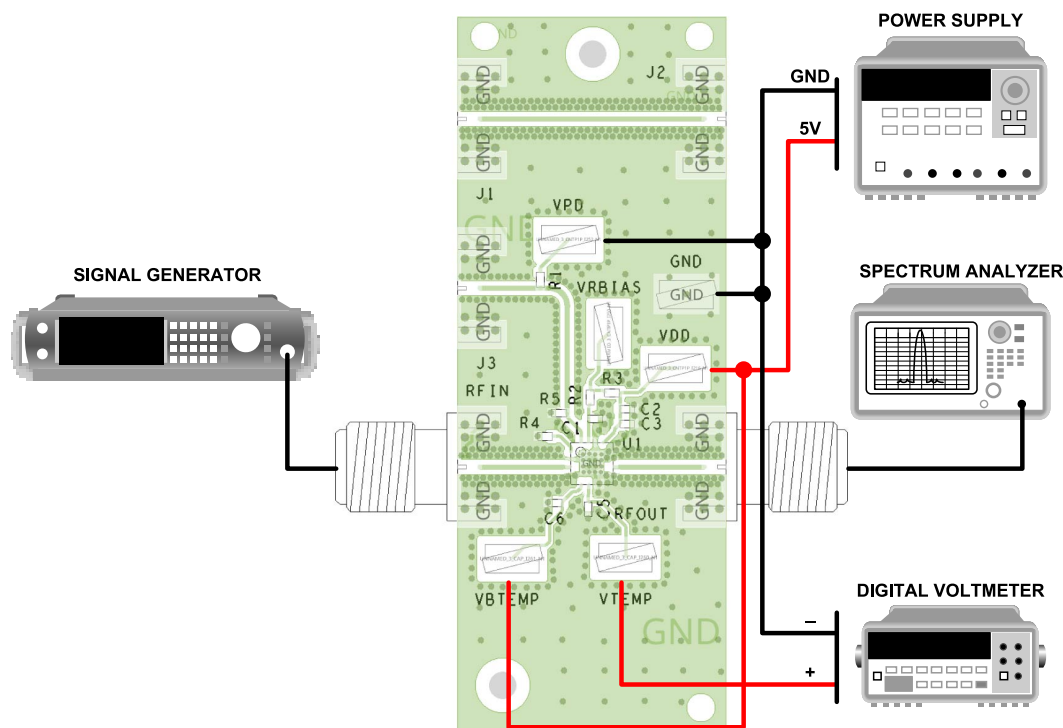


Figure 3. ADL8108-EVALZ Operating Block Diagram

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OPERATING THE ADL8108-EVALZ

RECOMMENDED BIAS SEQUENCING

During Power-Up

To power up the ADL8108-EVALZ, take the following bias sequencing steps:

- 1. Connect the power supply to VDD and VBTEMP.
- 2. Set the VDD and VBTEMP supply to 5 V.
- 3. Apply the RF input signal.

During Power-Down

To power down the ADL8108-EVALZ, take the following bias sequencing steps:

- 1. Turn off the RF input signal.
- 2. Set the VDD and VBTEMP supply to 0 V.

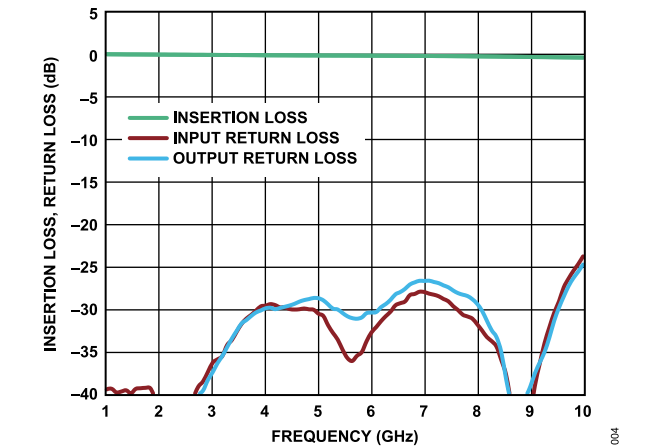


Figure 4. Insertion Loss and Return Loss of the Through Calibration Path

Table 1. Insertion Loss of the Through Calibration Path

Frequency (GHz)	Insertion Loss (dB)
1	-0.005
2	-0.075
3	-0.11
4	-0.154
5	-0.177
6	-0.202
7	-0.235
8	-0.281
9	-0.351
10	-0.424

EVALUATION BOARD SCHEMATIC AND ARTWORK

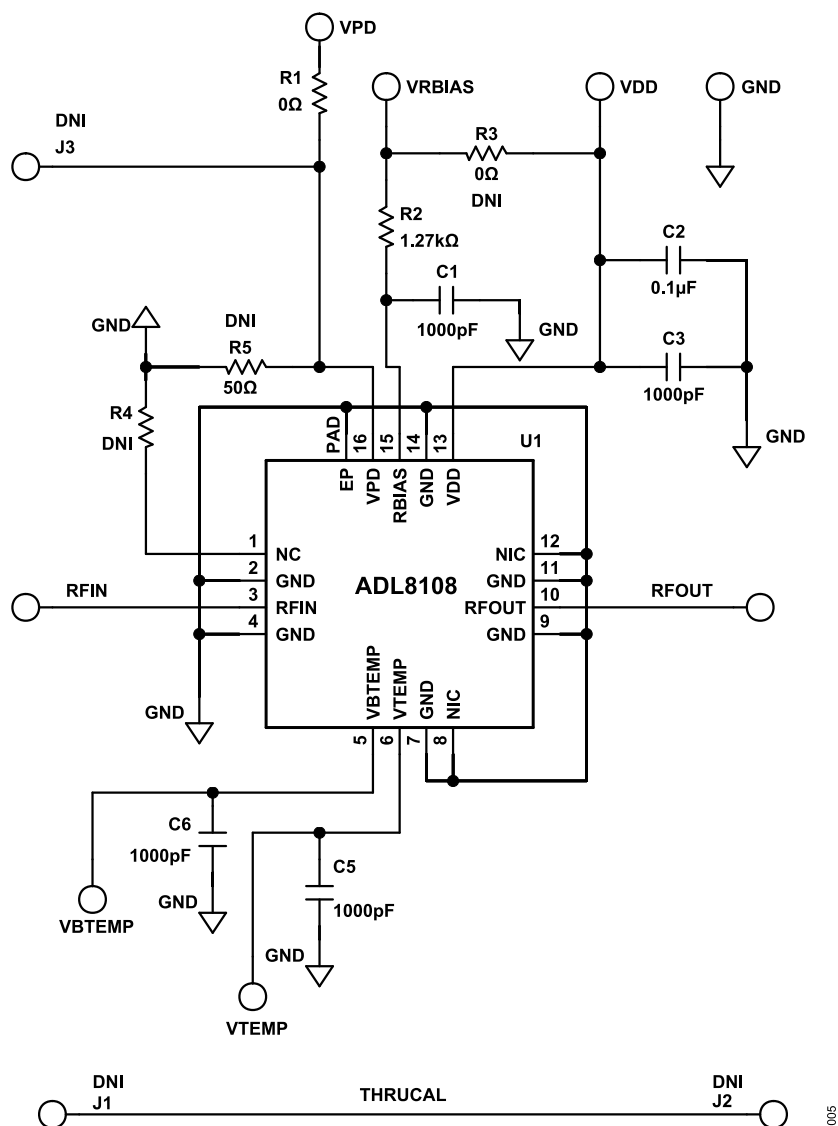


Figure 5. ADL8108-EVALZ Schematic

EVALUATION BOARD SCHEMATIC AND ARTWORK

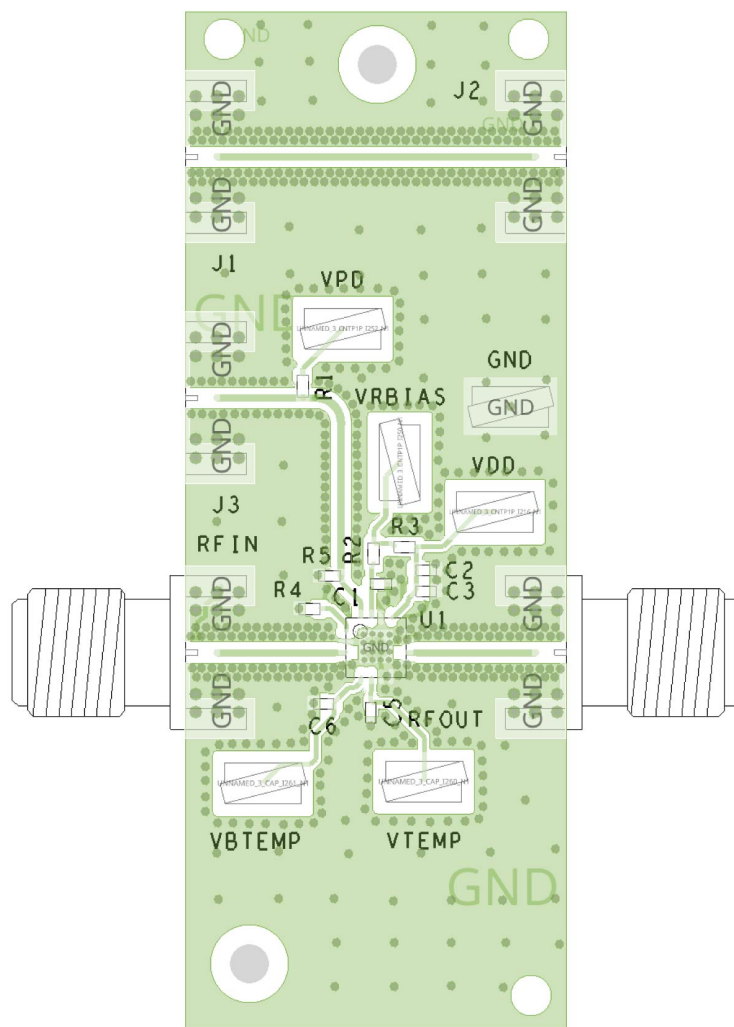


Figure 6. ADL8108-EVALZ Assembly Drawing (J1, J2, and J3 Are Not Installed)

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ORDERING INFORMATION

BILL OF MATERIALS

Table 2. Bill of Materials

Reference Designator	Description	Manufacturer	Part Number
C1, C3, C5, C6	Capacitors, ceramic, 1000 pF, 16 V, 10%, X7R, 0402	Yageo	CC0402KRX7R7BB102
C2	Capacitor, ceramic, 0.1 μ F, 16 V, 10%, X7R, 0402	Kemet	C0402C104K4RACTU
RFIN, RFOUT	Connectors, 2.92 mm, jack edge	SRI Connector Gage Co.	25-146-1000-92
VDD, GND, VRBIAS, VTEMP, VBTEMP, VPD	Connectors, SMT test points	Keystone Electronics	5016
J1, J2, J3	Connectors, 2.92 mm, jack edge, do not install (DNI)	SRI Connector Gage Co.	25-146-1000-92
R1	Resistor, 0402, SMD chip, precision, 0 Ω	Panasonic	ERJ-2GE0R00X
R2	Resistor, 0402, SMD chip, precision, 1.27 k Ω	Panasonic	ERJ-2RK1271X
R3	Resistor, 0402, SMD chip, precision, 0 Ω , DNI	Panasonic	ERJ-2GE0R00X
R4	Resistor, 0402, SMD chip, DNI	Not available	Not available
R5	Resistor, 0402, SMD chip, precision, 50 Ω , DNI	Vishay	FC0402E50R0FST1
U1	1 GHz to 8 GHz, low noise amplifier with integrated temperature sensor and enable and disable function	Analog Devices, Inc.	ADL8108ACPZN

**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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