

Evaluating the ADL8130 GaAs, pHEMT, MMIC, 0.01GHz to 8GHz, Low Noise Amplifier

FEATURES

- ▶ 4-layer, Rogers 4003C evaluation board
- ▶ End launch, 2.9mm RF connectors
- ▶ Through calibration path (depopulated connectors)

EVALUATION KIT CONTENTS

- ▶ ADL8130-EVALZ evaluation board

EQUIPMENT NEEDED

- ▶ RF signal generator
- ▶ RF spectrum analyzer
- ▶ RF network analyzer
- ▶ 5V, 500mA power supply

GENERAL DESCRIPTION

The ADL8130-EVALZ is a 4-layer printed circuit board (PCB) fabricated from 0.254mm (10mil) thick, Rogers 4003C, copper clad, forming a nominal thickness of 1.58mm (62mils). The ADL8130-EVALZ is designed to operate from 0.01GHz to 8GHz. The RFIN and RFOUT ports on the ADL8130-EVALZ are populated with 2.9mm, female coaxial connectors. The ADL8130-EVALZ is populated with components suitable for use over the entire -55°C to $+125^{\circ}\text{C}$ operating temperature range.

To calibrate out 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 [Figure 5](#) and [Table 1](#) for the through calibration path performance for the ADL8130-EVALZ.

Access the ADL8130-EVALZ ground and drain voltage 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](#) and [Figure 7](#) for the test point locations).

The RF traces on the ADL8130-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 ADL8130-EVALZ represent the configuration used to characterize and qualify the device.

For full details on the [ADL8130](#), see the ADL8130 data sheet, which must be consulted in conjunction with this user guide when using the ADL8130-EVALZ.

EVALUATION BOARD PHOTOGRAPHS

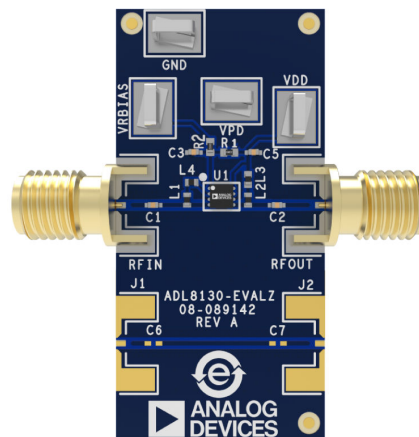


Figure 1. ADL8130-EVALZ Component Side

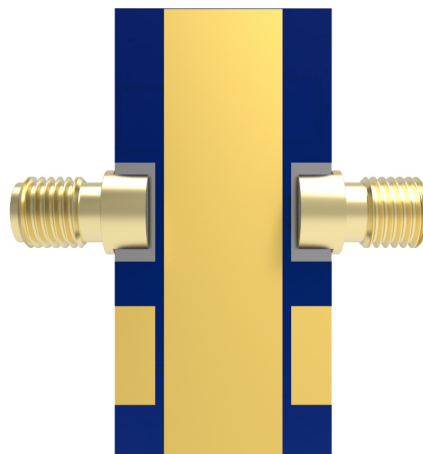


Figure 2. ADL8130-EVALZ Bottom Side

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REVISION HISTORY

9/2026—Revision 0: Initial Version

EVALUATION BOARD HARDWARE

OPERATING THE ADL8130-EVALZ

A 5V, 500mA power supply is required to provide the bias to the ADL8130. Connect the 5V power supply to the SMT test point, VDD. Connect the ground reference to the GND test point.

Refer to the ADL8130 data sheet for the recommended resistor values to achieve different supply currents. The default value of the bias resistor, R1, connected on the ADL8130-EVALZ is 835Ω , which is the same value used to characterize the ADL8130.

The following bias conditions are recommended to achieve the performance specified in the ADL8130 data sheet: supply voltage (V_{DD}) = 5V, supply current (I_{DQ}) = 90mA, and bias resistance (R_{BIAS}) = 835Ω . V_{DD} refers to the VDD1 and VDD2 drain bias voltages.

RECOMMENDED BIAS SEQUENCING FOR THE ADL8130-EVALZ

To power up the ADL8130-EVALZ, follow the recommended power-up sequence:

1. Connect V_{DD} .
2. Set V_{DD} to 5V.
3. Set power-down voltage (V_{PD}) to 0V.
4. Apply the RF signal.

To power down the ADL8130-EVALZ, follow the recommended power-down sequence:

1. Turn off the RF signal.
2. Set V_{PD} to 5V.
3. Set V_{DD} to 0V.

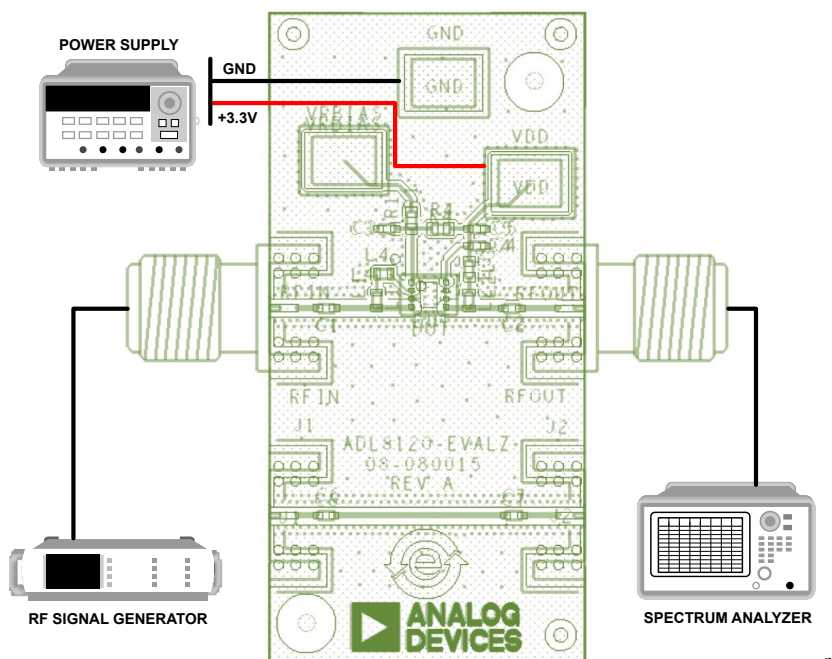


Figure 3. ADL8130-EVALZ Operating Block Diagram

EVALUATION BOARD HARDWARE

PERFORMANCE COMPARISON OF THE ADL8130-EVALZ

Figure 4 shows the gain, input return loss, and output return loss for the ADL8130-EVALZ at frequencies up to 8GHz. For the ADL8130-EVALZ, the performance of the device experiences a cutoff around 100MHz. This roll-off is caused by the biasing network.

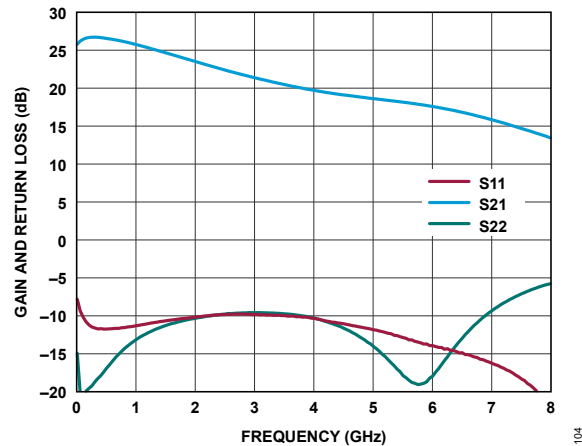


Figure 4. Gain (S21) and Return Loss (Input (S11) and Output (S22)) of ADL8130-EVALZ

THROUGH CALIBRATION PATH

The ADL8130-EVALZ includes a calibration path (see Figure 5 and Table 1). THRU_CAL (J1 and J2) must be populated with RF connectors to use the through calibration path. For the ADL8130-EVALZ, the through calibration paths include two AC coupling capacitors (populated) to mimic the AC coupling capacitors in the main signal path.

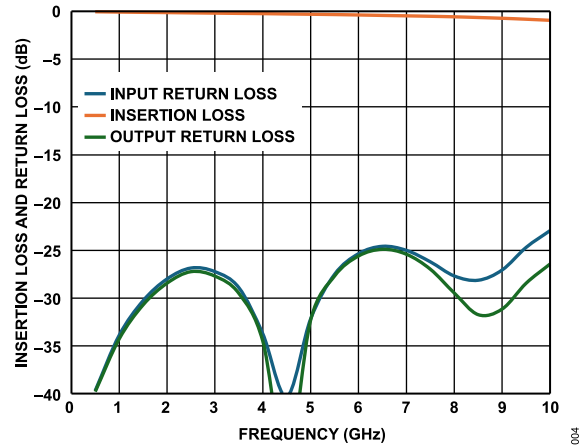


Figure 5. Insertion Loss and Return Loss (Input and Output) of the Through Calibration Path (ADL8130-EVALZ)

Table 1. Insertion Loss of the Through Calibration Path (ADL8130-EVALZ)	
Frequency (GHz)	Insertion Loss (dB)
0.5	0.02
1	0.06
1.5	0.09
2	0.11
2.5	0.14
3	0.17
3.5	0.2
4	0.22
4.5	0.26
5	0.29
5.5	0.32
6	0.37
6.5	0.41
7	0.46
7.5	0.51
8	0.56
8.5	0.64
9	0.72
9.5	0.82
10	0.94

EVALUATION BOARD SCHEMATIC AND ARTWORK

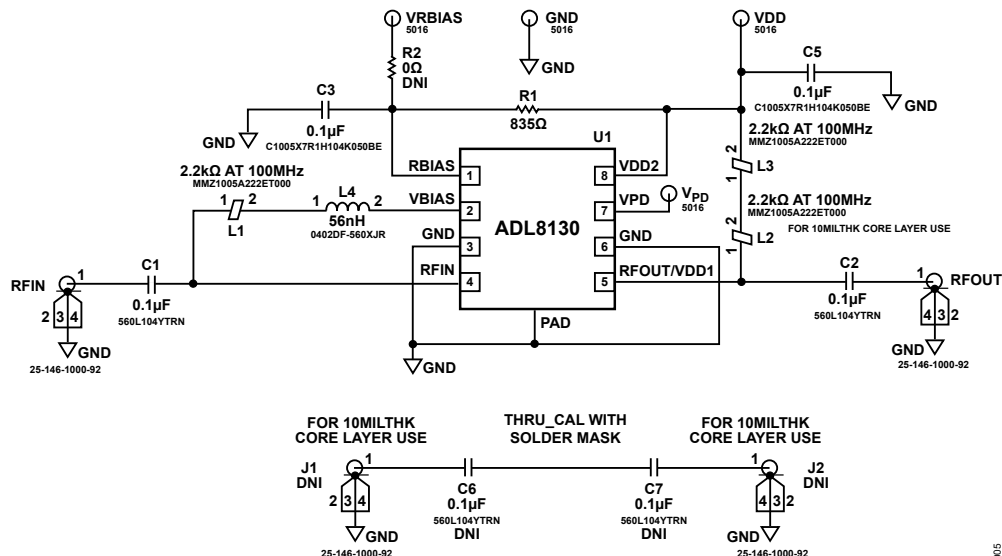


Figure 6. ADL8130-EVALZ Schematic

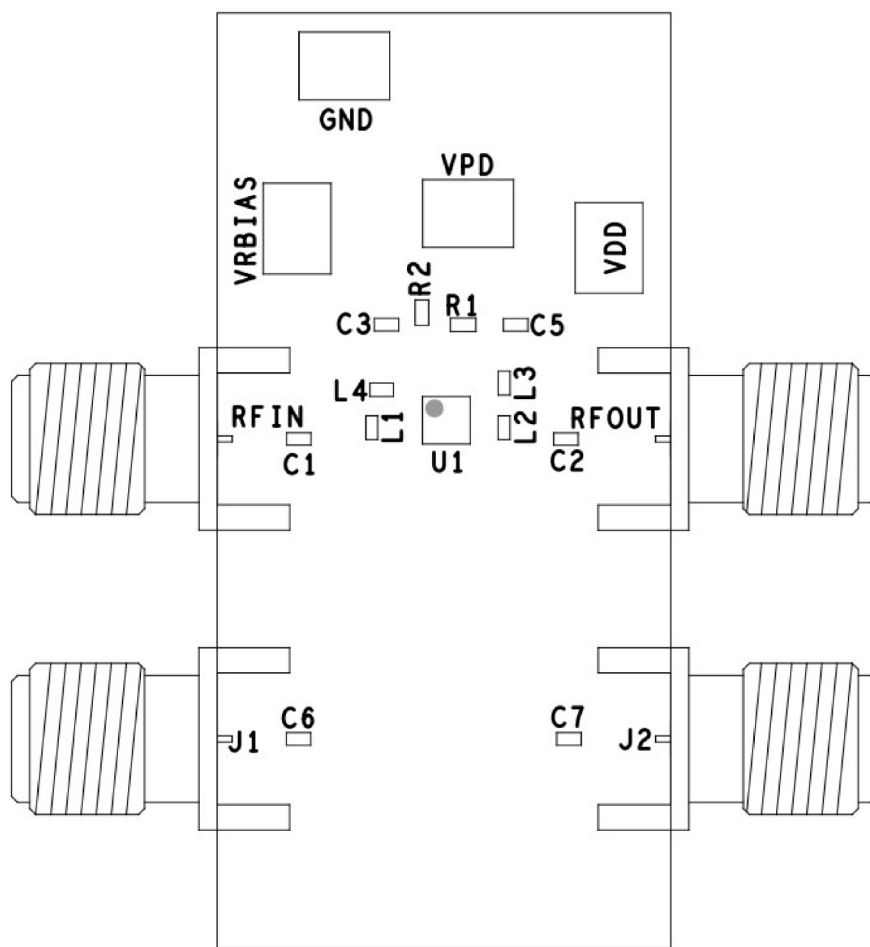


Figure 7. ADL8130-EVALZ Assembly Drawing (J1 and J2 Not Installed)

ORDERING INFORMATION

ORDERING GUIDE

Model ¹	Description
ADL8130-EVALZ	Evaluation Board

¹ Z = RoHS-Compliant Part.

BILL OF MATERIALS

Table 2. ADL8130-EVALZ Bill of Materials

Reference Designator	Description	Manufacturer	Manufacturer Number
C1, C2	Ceramic capacitors, 0.1µF, 16V, 20% to 25%, 0402	American Technical Ceramics	560L104YTRN
C3, C5	Ceramic capacitor, 0.1µF, 50V, 10%, X7R, 0402	TDK	C1005X7R1H104K050BE
C6, C7	Ceramic capacitors, 0.1µF, 16V, 20% to 25%, 0402, do not install (DNI)	American Technical Ceramics	560L104YTRN
L1, L2, L3	Inductors, ferrite bead, 2.2kΩ, 25%, 100MHz, 0.15A, 2.2Ω, 0402	TDK	MMZ1005A222ET000
L4	Inductor chip, 56nH, 5%, 0.061Ω, DCR, 1.2A	Coilcraft, Inc.	0402DF-560XJR
R1	Resistor SMD, 835Ω, 0.1%, 0.13W, 0402	Vishay	TNPW0402542RB EED
R2	Resistor SMD, 0Ω jumper, 1/16W, 0402, DNI	Yageo	RC0402JR-070RL
VRBIAS, GND, VDD, VPD	SMT test points	Keystone Electronics	5016
RFIN, RFOUT	Connectors, K jack edge	SRI Connector Gage Co.	25-146-1000-92
J1, J2	Connectors, K jack edge, unpopulated (DNI)	SRI Connector Gage Co.	25-146-1000-92
U1	Gallium arsenide (GaAs), pseudomorphic high electron mobility transistor (pHEMT), monolithic microwave integrated circuit (MMIC), 0.01GHz to 8GHz, low noise amplifier	Analog Devices, Inc.	ADL8130ACPZN

**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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