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Evaluating the ADRF5042 Nonreflective, 100 MHz to 44 GHz, Silicon SP4T Switch

FEATURES

Contains the ADRF5042 device and application circuitry
2.4 mm RF connectors
DC test points for supply and control
Through line for calibration

EQUIPMENT NEEDED

DC power supplies
Network analyzer

GENERAL DESCRIPTION

The ADRF5042-EVALZ (see Figure 1) is designed to evaluate the features and performance of the ADRF5042 100 MHz to 44 GHz, nonreflective, SP4T switch manufactured in the silicon on insulator (SOI) process.

For full details on the ADRF5042, see the ADRF5042 data sheet, which must be consulted in conjunction with this user guide when using the ADRF5042-EVALZ.

ADRF5042-EVALZ EVALUATION BOARD PHOTOGRAPH

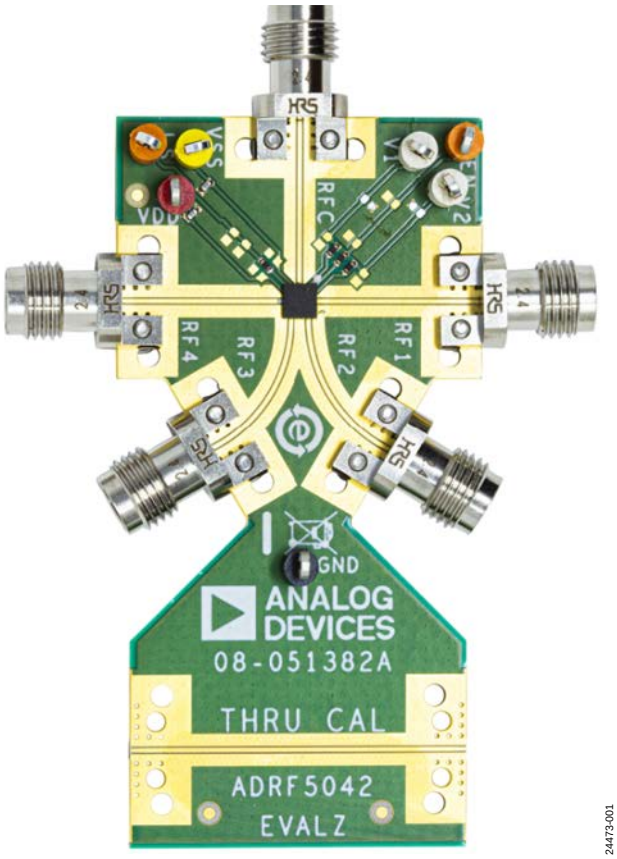

Figure 1.

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REVISION HISTORY

7/2020—Revision 0: Initial Version

EVALUATION BOARD HARDWARE

The ADRF5042-EVALZ is a connectorized evaluation board assembled with the ADRF5042 device and application circuitry. All components are placed on the primary side of evaluation board. An assembly drawing for the evaluation board is shown in Figure 5. An evaluation board schematic is provided in Figure 4. Table 1 provides the bill of materials (BOM) list for the evaluation board components.

RF INPUTS AND OUTPUTS

The RF input and output ports (RFC, RF1 to RF4) are connected through 50 Ω transmission lines to the 2.4 mm RF connectors.

The through calibration line, THRU CAL, calibrates out the board loss effects from the ADRF5042-EVALZ measurements to determine the device performance at the pins of the IC. Figure 2 shows the typical through calibration line loss for the ADRF5042-EVALZ at room temperature, as well as the embedded and de-embedded insertion loss for the ADRF5042.

POWER SUPPLY AND CONTROL INPUTS

Two power supply ports are connected to the VDD and VSS test points on the ADRF5042-EVALZ, and the ground reference is connected to the GND test point. On the VDD and VSS supply traces, a 100 pF bypass capacitor filters high frequency noise. Unpopulated component positions are available for applying extra bypass capacitors.

Four control ports are connected to the EN, LS, V1, and V2 test points. The ADRF5042-EVALZ has provisions for the RC filter to eliminate dc-coupled noise, if needed by the application.

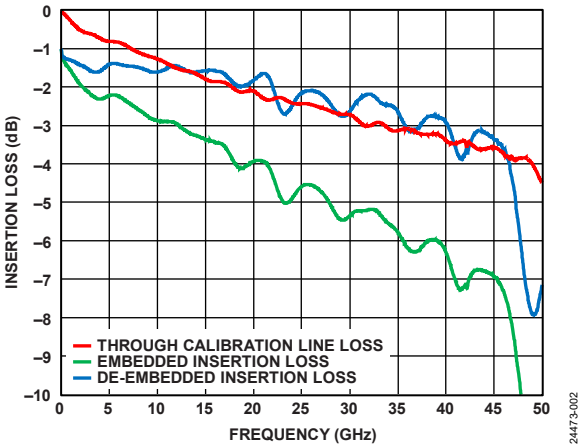

Figure 2. Insertion Loss vs. Frequency

TEST PROCEDURE

The ADRF5042-EVALZ is shipped assembled and tested. Figure 3 provides a basic test setup diagram to measure the scattering parameter response of the ADRF5042. To complete the test setup and verify the operation of the ADRF5042-EVALZ, follow these steps:

1. Connect the GND test point to the ground terminal of all power supplies.
2. Connect the VDD and VSS test points to the voltage output terminal of the +3.3 V and −3.3 V dc power supplies, respectively.
3. Connect the EN, LS, V1, and V2 test points to the voltage output or ground terminal of another 3.3 V dc power supply.
4. Connect the RFC, RF1, RF2, and RF3 ports to a calibrated four-port network analyzer. Terminate the RF4 port with a 50 Ω load.
5. Turn on the power supplies connected to the VDD and VSS test points.
6. Turn on the power supply connected to the EN, LS, V1, and V2 test points.
7. Measure the scattering parameters.

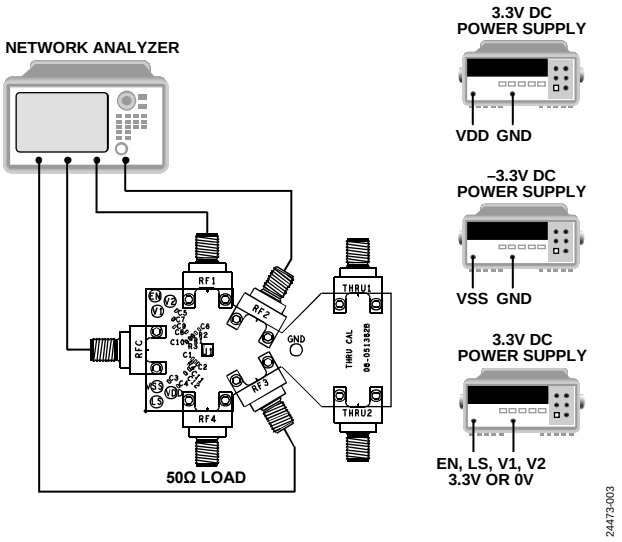

Figure 3. Scattering Parameter Test Setup Diagram

EVALUATION BOARD SCHEMATIC AND ASSEMBLY DRAWING

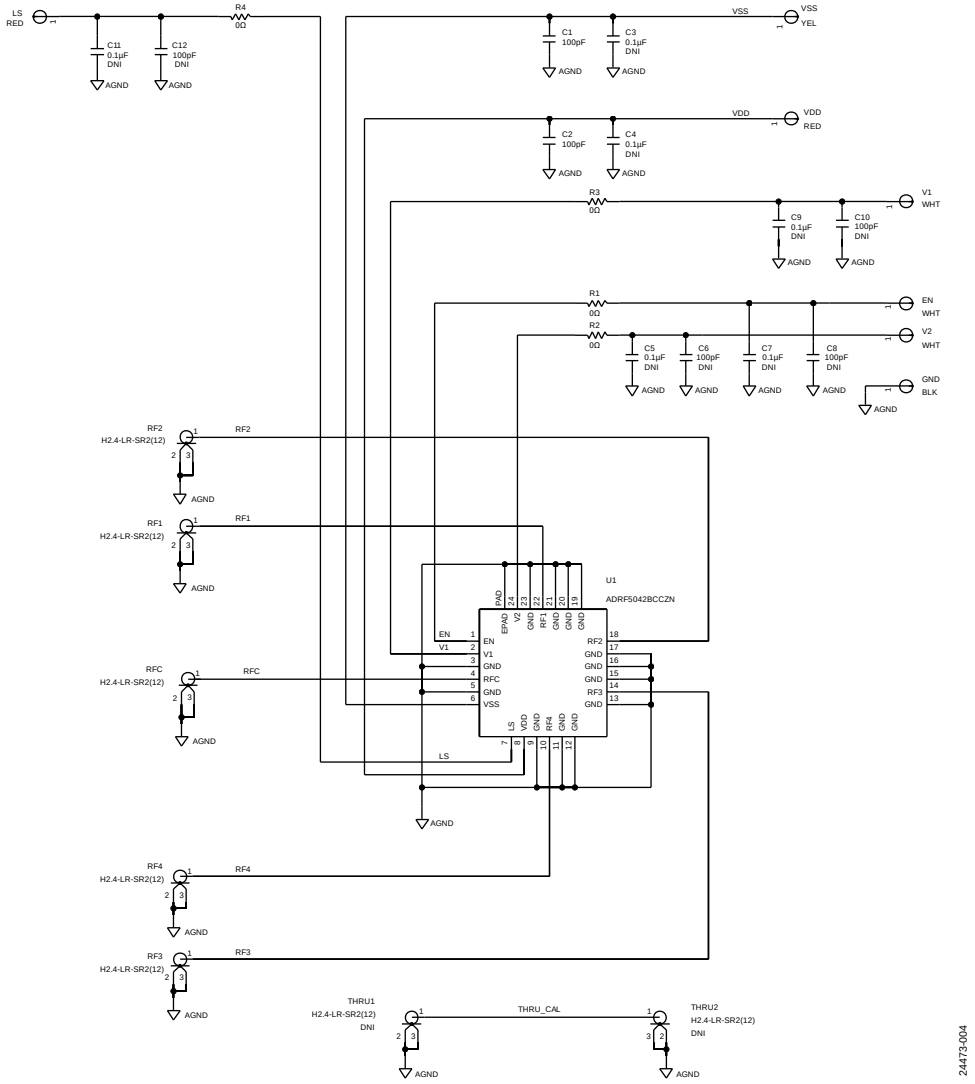

Figure 4. ADRF5042-EVALZ Schematic

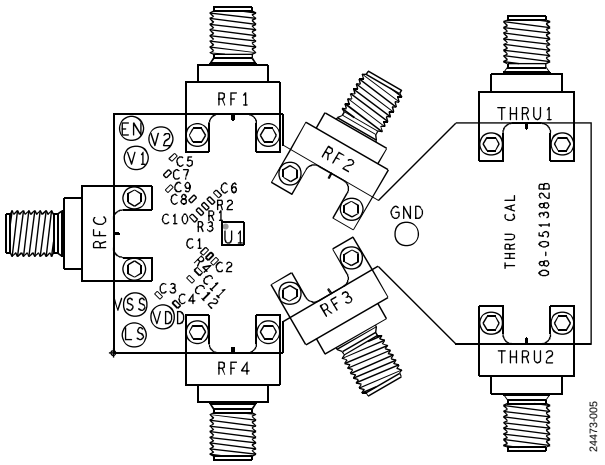

Figure 5. ADRF5042-EVALZ Assembly Drawing

ORDERING INFORMATION

BILL OF MATERIALS

Table 1. Bill of Materials for ADRF5042-EVALZ

Qty	Reference Designator	Description	Manufacturer	Part Number
5	RFC, RF1 to RF4	2.4 mm RF connectors	Hirose	H2.4-LR-SR2(12)
2	THRU1, THRU2	2.4 mm RF connectors (do not insert)	Hirose	H2.4-LR-SR2(12)
7	VDD, VSS, EN, LS, V1, V2, GND	Through hole, hold mount test points (various colors)	Keystone	5005 to 5009
2	C1, C2	100 pF capacitors, 50 V, 0402 package	Murata	GCM1555C1H101JA16D
6	C3, C4, C5, C7, C9, C11	100 pF capacitors, 50 V, 0402 package (do not insert)	Murata	GCM1555C1H101JA16D
4	R1 to R4	0 Ω resistors, 0402 package	Panasonic	C0402C101J5GACTU
1	U1	SP4T switch	Analog Devices, Inc.	ADRF5042
1	PCB	Printed circuit board (PCB)	Analog Devices	08-51382B

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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