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Evaluating the HMC1106LG 15 GHz to 36 GHz, Double-Balanced Mixer

FEATURES

Fully featured evaluation board for the HMC1106LG
No dc biasing required
2.4 mm connector provisions
Easy connections to test equipment and other circuits

GENERAL DESCRIPTION

The EV1HMC1106LG evaluates the HMC1106LG 15 GHz to 36 GHz, double-balanced mixer.

The EV1HMC1106LG has at least three 2.4 mm end launch connectors to allow an efficient connection to the test equipment and other circuitry on the device. The printed circuit board (PCB) used ensures low noise, high speed operation, and a lowest possible loss of up to 50 GHz of operation.

All board components are located on the primary side of the PCB. No components are located on the secondary side (see Figure 1 and Figure 2).

For full specifications on the HMC1106LG, see the HMC1106LG data sheet, which must be consulted in conjunction with this user guide when using the EV1HMC1106LG.

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REVISION HISTORY

9/2019—Revision 0: Initial Version

EVALUATION BOARD PHOTOGRAPHS

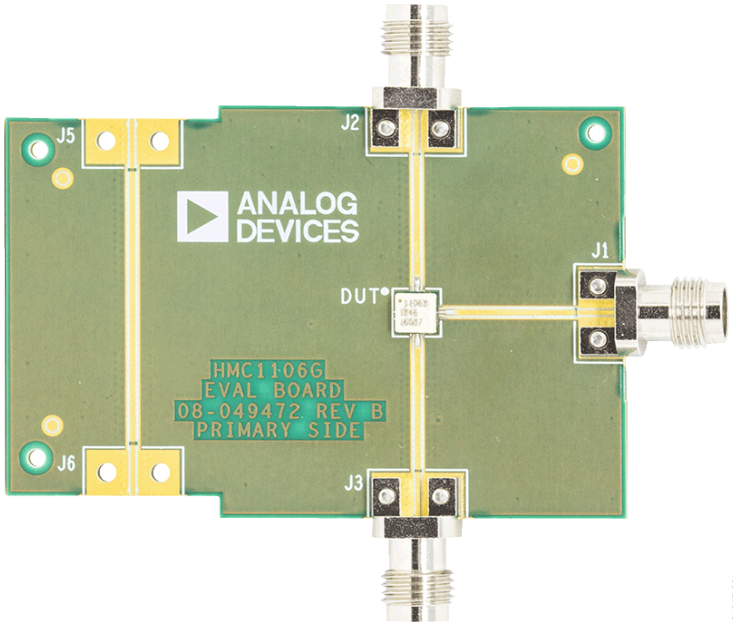

Figure 1. EV1HMC1106LG, Primary Side

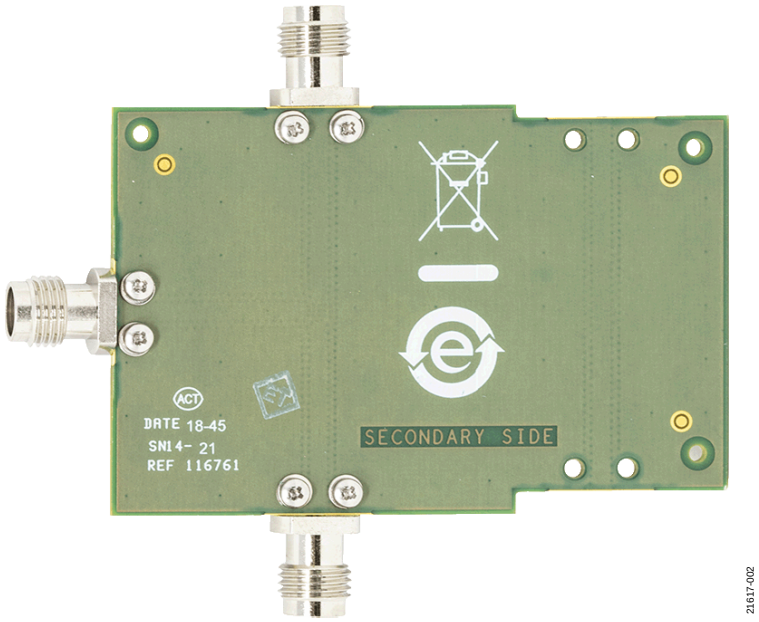

Figure 2. EV1HMC1106LG, Secondary Side

EVALUATION BOARD HARDWARE

RF CONNECTORS

To access the radio frequency (RF) inputs and output of the HMC1106LG, connect the device to all available ports on the PCB, including J1 (RF port), J2 (LO port), and J3 (IF port). A through calibration trace is also available on the EV1HMC1106LG. To access the trace, install end launch connectors on J5 and J6.

PORT CONFIGURATION

It is recommended not to exceed the operating frequency range of the RF inputs and output port. The RF port frequency range is from 15 GHz to 36 GHz, the LO port frequency range is from 20 GHz to 50 GHz, and the IF port operates from dc to 24 GHz.

For applications not requiring operation to dc, dc block the IF port externally using a series capacitor of a value chosen to pass the necessary IF frequency range. When IF operation to dc is required, do not exceed the IF source and sink current rating specified in the HMC1106LG data sheet.

EVALUATION BOARD STACKUP

All RF traces are routed on Layer 1 (primary side), and all other layers are ground planes that provide a solid ground for RF transmission lines, as shown in Figure 3. The top dielectric material is Rogers 4350B, offering low loss performance. The prepreg material in Layer 2 attaches the core layers together, which include a 370HR laminate with copper traces above and below. The prepreg material and the Isola 370HR core layer are used to achieve the required board finish thickness.

The PCB used in this application uses RF circuit design techniques. Ensure that the signal lines have a 50 Ω impedance, and that the package ground leads and exposed pad are connected directly to the ground plane (see Figure 4). Use a sufficient number of via holes to connect the top and bottom ground planes.

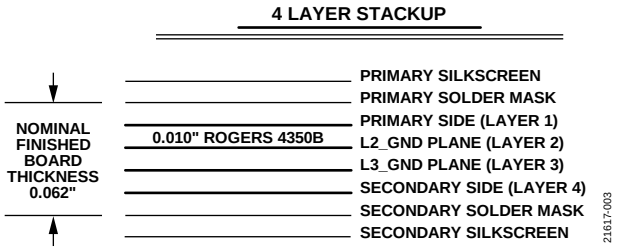

Figure 3. 4-Layer Stackup

EVALUATION BOARD SCHEMATIC AND ARTWORK

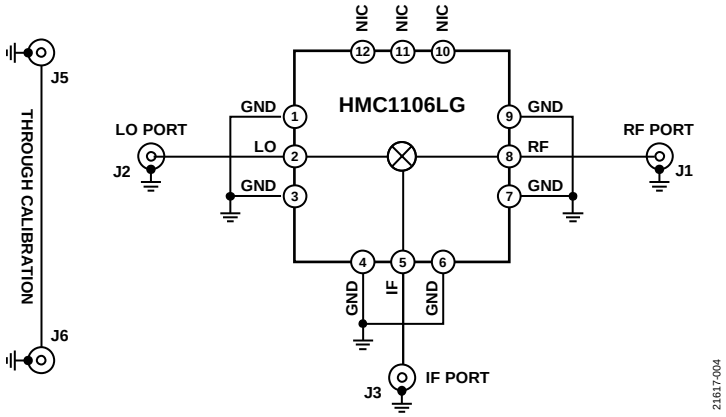

Figure 4. EV1HMC1106LG Schematic

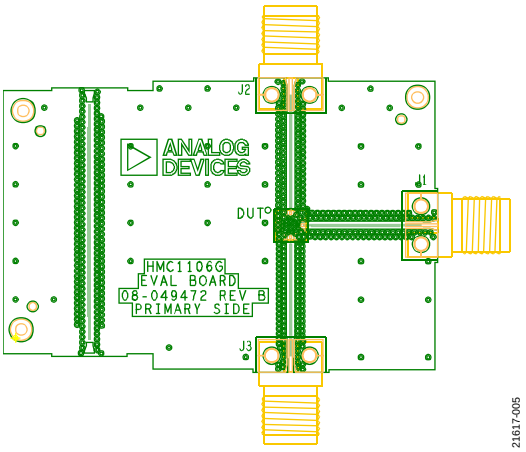

Figure 5. EV1HMC1106LG, Top Layer

ORDERING INFORMATION

BILL OF MATERIALS

Table 1.

Qty	Reference Designator	Description	Manufacturer	Part Number
3	J1, J2, J3	2.4 mm end launch connectors (RF, LO, and IF ports)	Hirose Electric	H2.4-LR-SR2(12)
2	J5, J6	Unpopulated 2.4 mm end launch connectors	Hirose Electric	H2.4-LR-SR2(12)
1	E024062	Support plate	Analog Devices	131970
1	U1	HMC1106LG	Analog Devices	HMC1106LG
1	08_049473[1]	Evaluation PCB[2]	Analog Devices	Rogers 4350

[1] Circuit board material is ROGERS 4350 AND ISOLA 370HR.
[2] 08_049473 is the raw, bare PCB identifier.