Hittite MICROWAVE CORPORATION v00.0907

HMC-MDB171

GaAs MMIC I/Q MIXER 35 - 45 GHz

Typical Applications

This HMC-MDB171 is ideal for:

- Point-to-Point Radios
- Military Radar, ECM & EW
- Test & Measurement Equipment
- SATCOM
- Sensors

Features

Wide IF Bandwidth: DC - 5 GHz

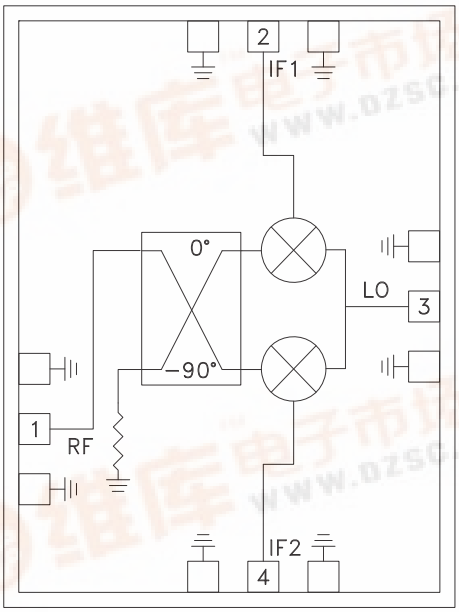
High Image Rejection: 25 dB

High LO to RF Isolation

Passive: No DC Bias Required

Die Size: 1.5 x 2.0 x 0.1 mm

Functional Diagram



General Description

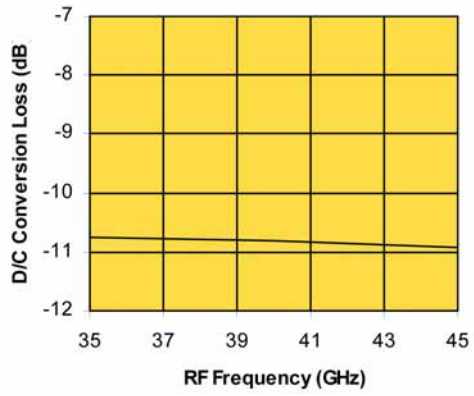
The HMC-MDB171 is a monolithic I/Q Mixer which can be used as either an image reject mixer (IRM) or a single sideband upconverter. This passive MMIC mixer is fabricated with GaAs Heterojunction Bipolar Transistor (HBT) Shottky diode technology. For downconversion applications, an external quadrature hybrid can be used to select the desired sideband while rejecting image signals. All bond pads and the die backside are Ti/Au metallized and the Shottky devices are fully passivated for reliable operation. The HMC-MDB171 I/Q MMIC Mixer is compatible with conventional die attach methods, as well as thermocompression and thermosonic wire bonding, making it ideal for MCM and hybrid microcircuit applications. All data shown herein is measured with the chip in a 50 Ohm environment and contacted with RF probes.

Electrical Specifications,* T_A = 25 °C, IF = 3 GHz, LO = +16 dBm

Parameter	Min.	Typ.	Max.	Units
Frequency Range, RF & LO		35 - 45		GHz
Frequency Range, IF		DC - 5		GHz
Conversion Loss with External Hybrid		8	11	dB
Conversion Loss with out External Hybrid		12.5		dB
1 dB Compression (Input)		8		dB
Image Rejection	20	25		dB
LO to RF Isolation	30	35		dB
LO to IF Isolation	15	20		dB
RF to IF Isolation	20	25		dB
IP3 (Input)		17		dBm

*Unless otherwise indicated, all measurements are from probed die

Downconverter Conversion Loss



Note 1: Measured Performance Characteristics (TOP = 25°C)

Note 2: Single side band measurement without 90ºhybrid, and second IF port terminated.

RF=35-45 GHz
LO=32-42 GHz
IF=3 GHz
PLO=+16 dBm
PRF=-20 dBm

Absolute Maximum Ratings

Maximum Channel Temperature	180 °C
Storage Temperature	-65 °C to 150 °C
Operating Temperature	-55 °C to 85 °C

ELECTROSTATIC SENSITIVE DEVICE
OBSERVE HANDLING PRECAUTIONS

HMC-MDB171

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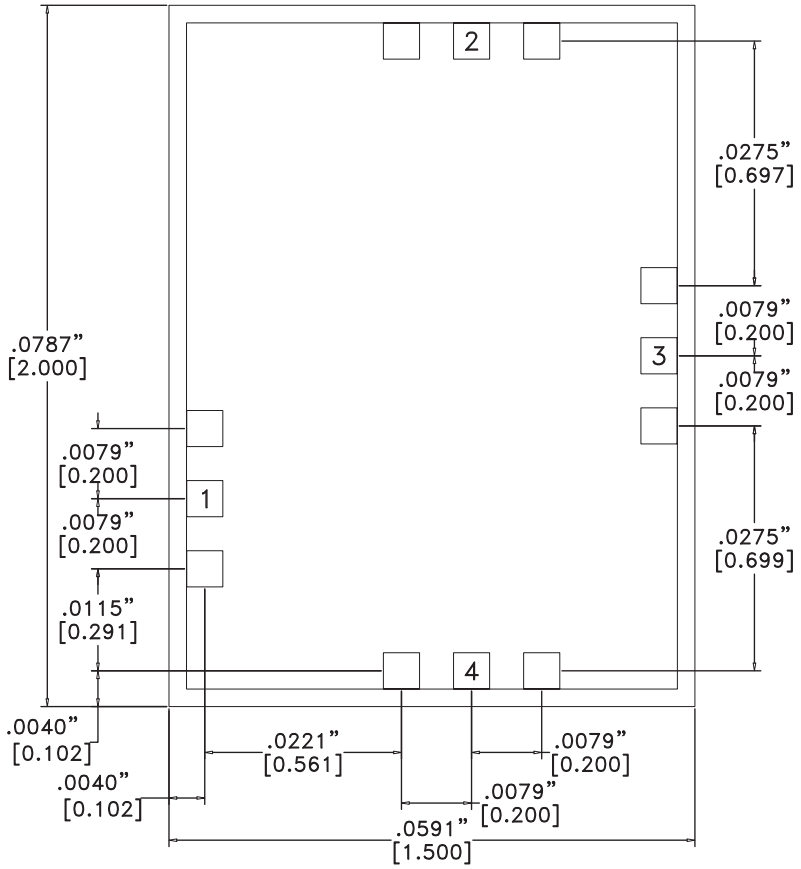
Outline Drawing



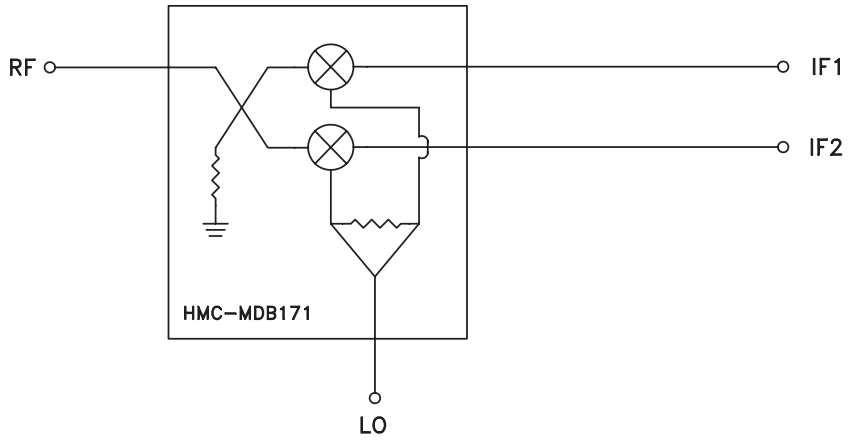
NOTES:

1. ALL DIMENSIONS ARE IN INCHES [MM].
2. TYPICAL BOND PAD IS .004" SQUARE.
3. BACKSIDE METALLIZATION: GOLD.
4. BACKSIDE METAL IS GROUND.
5. BOND PAD METALLIZATION: GOLD.
6. CONNECTION NOT REQUIRED FOR UNLABELED BOND PADS.
7. OVERALL DIE SIZE ±.002"

Application Circuits

Application circuit 1 shows the mixer equivalent circuit. Application Circuit 2 depicts the mixer with a 90° hybrid used to achieve signal image rejection. All RF parameters are specified with an ideal 90° hybrid on IF output ports. Conversion loss is measured (on wafer) at IF1 and/or IF2 (Application Circuit 1) with the second IF port terminated into 50 ohms. Three dB is then added to compensate for an ideal hybrid. The IP3 is stated as an input IP3 number and is obtained via a two-tone measurement.

Application Circuit 1



Application Circuit 2