MAMX-011037-DIE

Double-Balanced Mixer
18 - 46 GHz

Rev. V2

Features

- Low Conversion Loss: 6.5 dB
- High Linearity: 20 dBm IIP3
- Wide IF Bandwidth: DC to 20 GHz
- High Isolation
- Die Size: 1.15 × 0.97 × 0.10 mm
- RoHS* Compliant

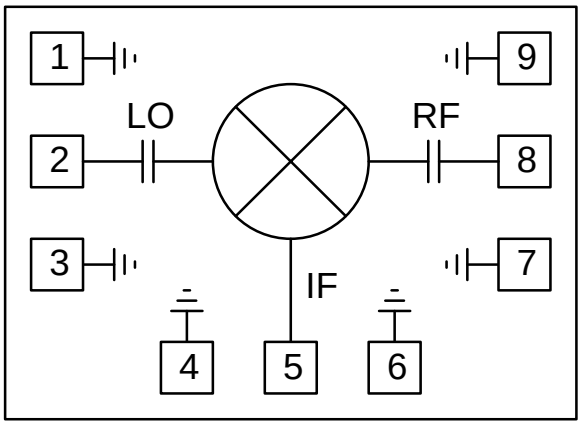
Description

MAMX-011037-DIE is a double-balanced passive diode mixer MMIC. The mixer offers low conversion loss, high linearity and a wide IF bandwidth. The double-balanced circuit configuration provides excellent port isolation while internal 50-ohm matching simplifies its application.

This mixer is well suited for applications such as test and measurement, microwave radio and radar.

MAMX-011037-DIE is also available in a 3 mm QFN package. Refer to datasheet MAMX-011054.

Functional Schematic



Bond-pad Configuration

Pad No.	Function	Pad No.	Function
1	GND[2]	6	GND[2]
2	LO	7	GND[2]
3	GND[2]	8	RF
4	GND[2]	9	GND[2]
5	IF	10	GND[3]

2. These pads are internally connected to ground, and they can be left unconnected.
3. The backside of the die must be connected to RF, DC and thermal ground.

Ordering Information

Part Number	Package
MAMX-011037-DIE	Vacuum Release Gel Pack[1]
MAMX-011037-SB2	Sample Board

1. Die quantity varies.

* Restrictions on Hazardous Substances, European Union Directive 2011/65/EU.

Electrical Specifications[4]: F_{IF} = 1GHz, P_{LO} = +15 dBm, T_A = 25°C, Z_0 = 50 Ω

Parameter	Test Conditions	Units	Min.	Typ.	Max.
LO and RF Frequency	—	GHz	18	—	46
IF Frequency	—	GHz	0	—	20
LO Power	—	dBm	—	15	—
Conversion Loss	18 - 24 GHz 24 - 40 GHz 40 - 46 GHz	dB	—	6.5 6.5 6.5	12 10 11
Input P1dB	—	dBm	—	12	—
Input IP3	P_{RF} = -10 dBm/tone, Δf = 1 MHz	dBm	—	20	—
Input IP2	P_{RF} = -10 dBm/tone, Δf = 1 MHz	dBm	—	50	—
LO-to-RF Isolation	—	dB	—	35	—
LO-to-IF Isolation	18 - 24 GHz 24 - 40 GHz 40 - 46 GHz	dB	25 27 23	37 45 44	—
RF-to-IF Isolation	18 - 24 GHz 24 - 40 GHz 40 - 46 GHz	dB	— 8 13	10 24 27	—
RF Return Loss	RF = 40 GHz	dB	—	5	—
IF Return Loss	IF = 1 GHz	dB	—	15	—

4. All specifications refer to down-conversion operation, unless otherwise noted.

Absolute Maximum Ratings[5,6]

Parameter	Absolute Maximum
LO Power	23 dBm
RF or IF Power	20 dBm
Junction Temperature[7]	+150°C
Operating Temperature	-55°C to +85°C
Storage Temperature	-65°C to +150°C

5. Exceeding any one or combination of these limits may cause permanent damage to this device.
6. MACOM does not recommend sustained operation near these survivability limits.
7. Operating at nominal conditions with T_J ≤ +150°C will ensure MTTF > 1 x 10^6 hours.

Handling Procedures

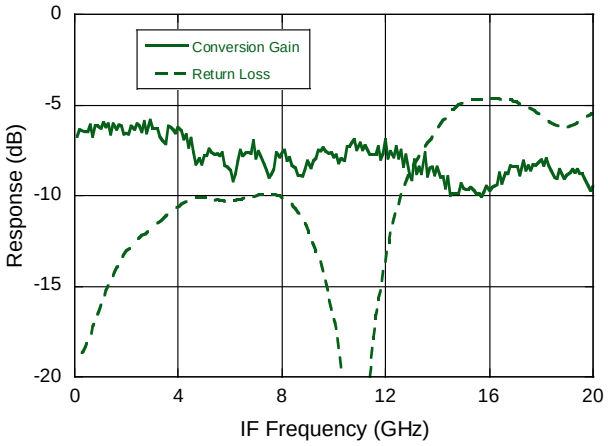
Please observe the following precautions to avoid damage:

Static Sensitivity

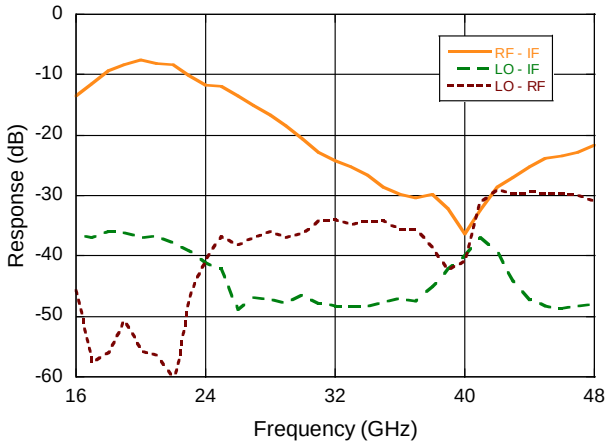
These electronic devices are sensitive to electrostatic discharge (ESD) and can be damaged by static electricity. Proper ESD control techniques should be used when handling these HBM Class 1B devices.

Typical Performance Curves, P_{LO} = +15 dBm, T_A = 25°C

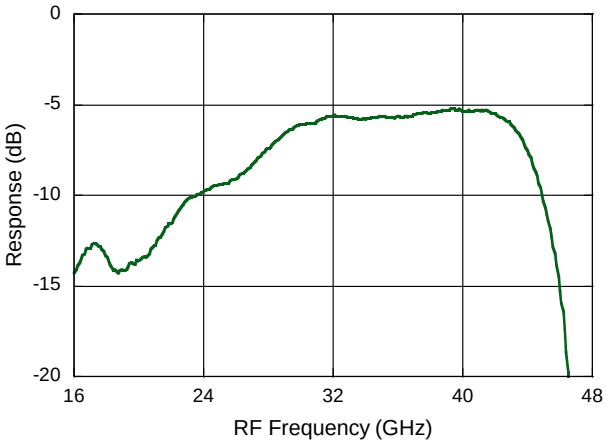
IF Bandwidth & Return Loss



Isolation

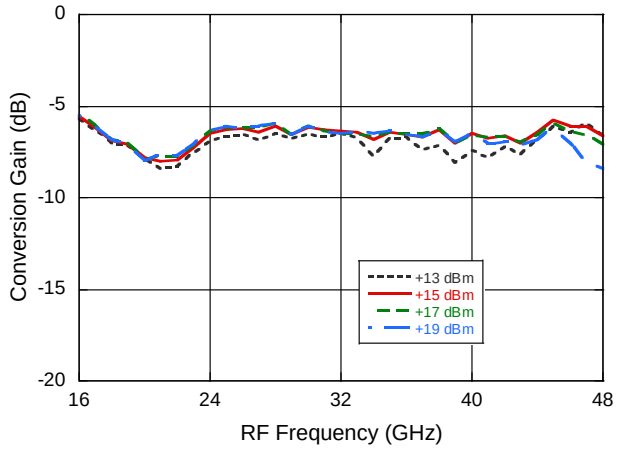


RF Return Loss

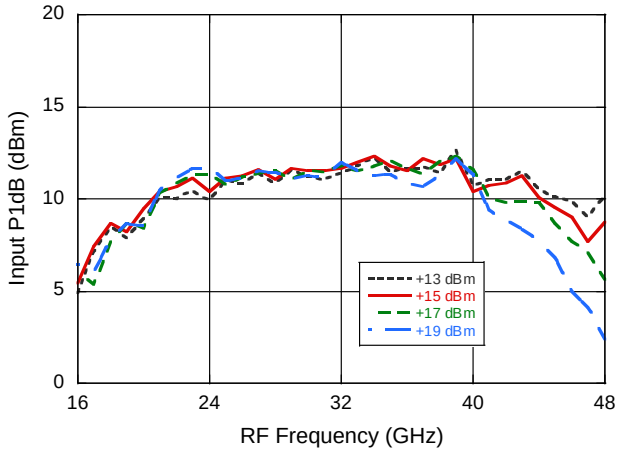


Typical Performance Curves vs. LO Power, T_A = 25°C

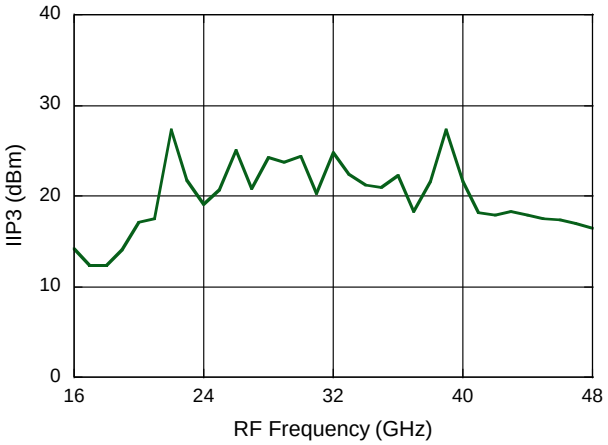
Conversion Gain



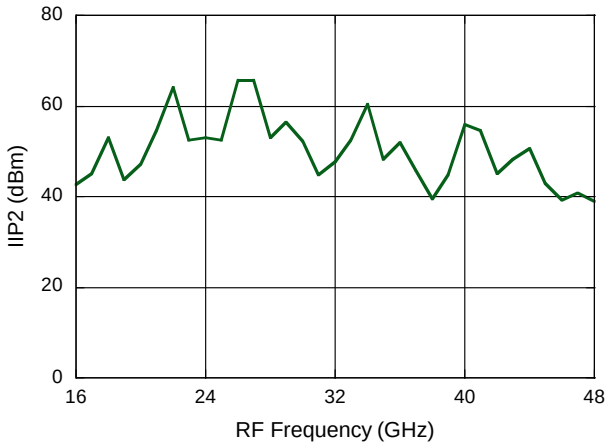
Input P1dB



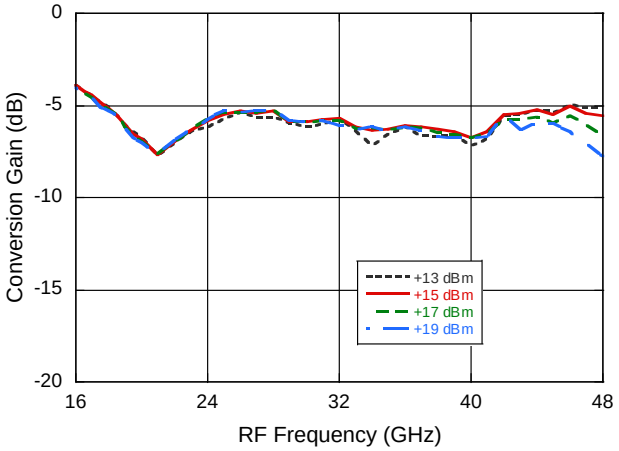
Input IP3 at P_{LO} = +15 dBm



Input IP2 at P_{LO} = +15 dBm



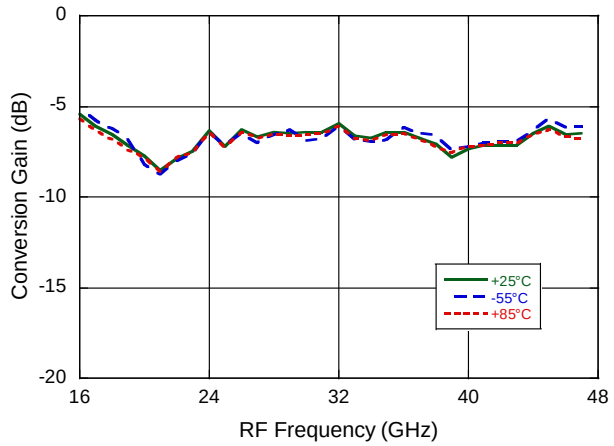
Up Conversion Gain



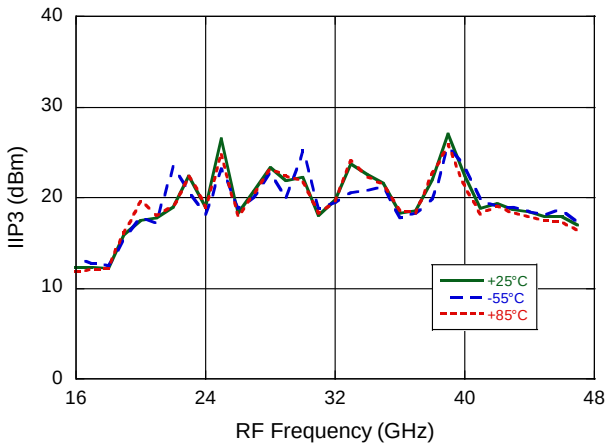
All performance curves refer to down-conversion operation, unless otherwise noted.
Two-tone input power = -10 dBm each tone, 1 MHz spacing.

Typical Performance Curves vs. Temperature, P_{LO} = +15 dBm

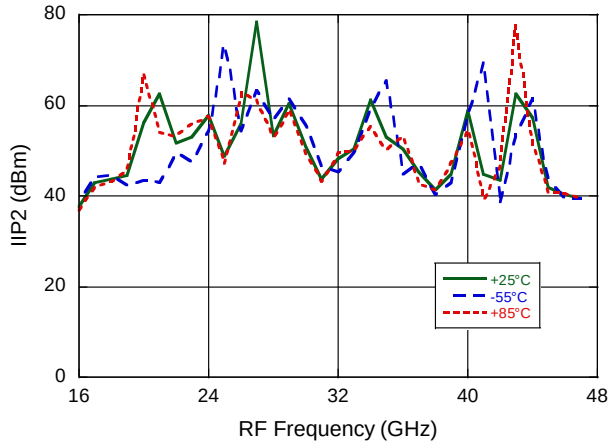
Conversion Gain



Input IP3



Input IP2



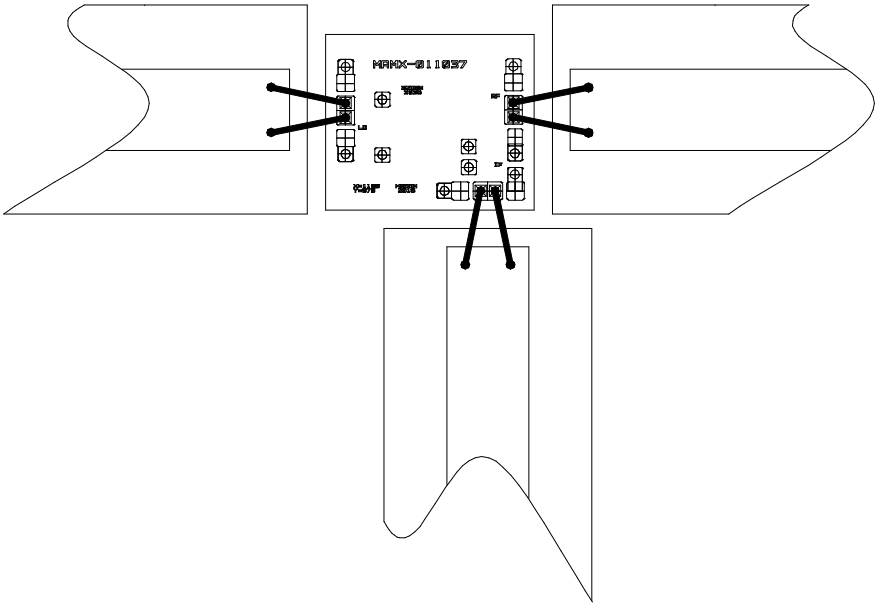
All performance curves refer to down-conversion operation, unless otherwise noted.
Two-tone input power = -10 dBm each tone, 1 MHz spacing.

MxN Spurious Rejection @ IF Port (dBc IF)

RF = 24 GHz @ -10 dBm
LO = 25 GHz @ +15 dBm

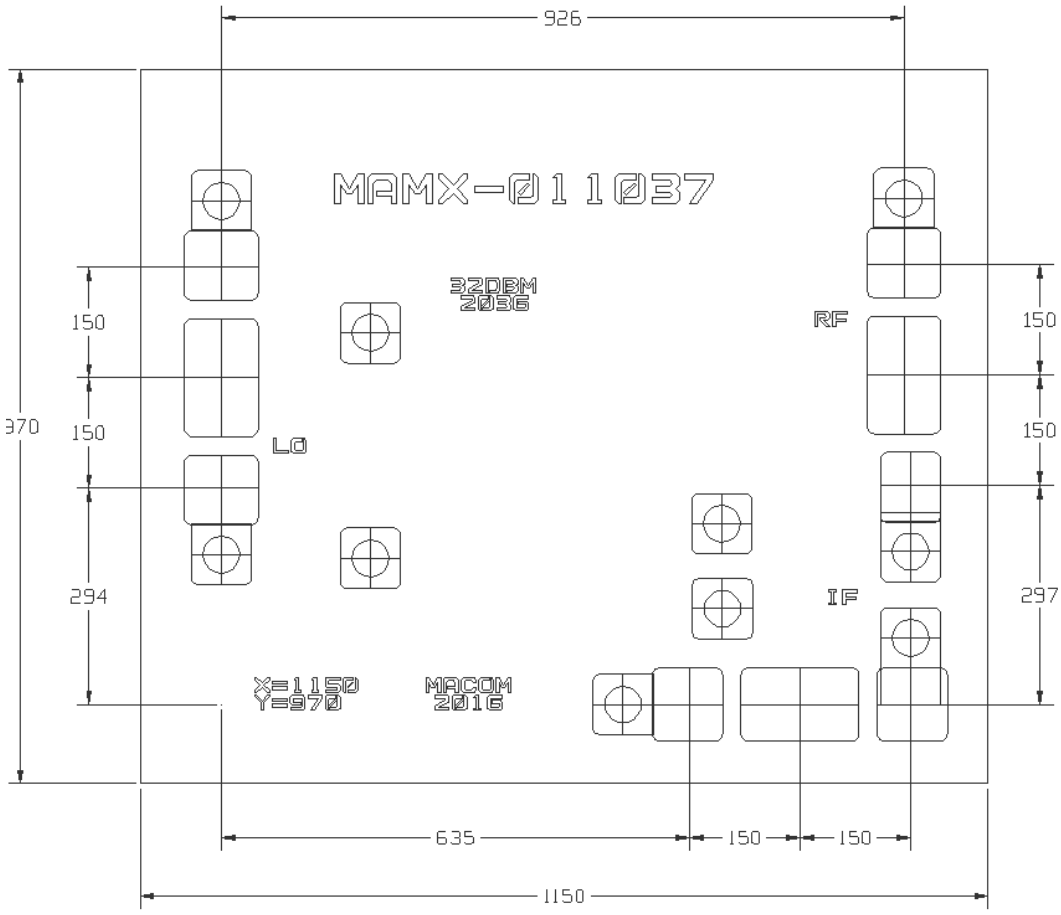
	NxLO				
MxRF	**0**	**1**	**2**	**3**	**4**
0	x	14	24	x	x
1	4	0	22	x	x
2	75	61	67	66	x
3	x	86	66	71	75
4	x	x	88	99	95

Assembly Guideline



Notes:
Attach bare die to PCB or carrier using conductive epoxy. Bond die signal pads to PCB 50 Ω traces using 1.0 mil gold wire. Two bond wires are recommended on each signal pad for optimal performance. There is no need to bond the die GND pads.

Outline Drawing



Notes:
Units are in microns with a tolerance of ±5 µm, except for die exterior dimensions which are street-center-to-street-center – nominal kerf, ±20 µm tolerance.
Die thickness is 100 ±10 µm.
RF, LO and IF Bond-pads are 160 x 100 µm.

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