Double-Balanced Mixer
18 - 46 GHz

MAMX-011054
Rev. V5

Features

- Low Conversion Loss: 6.5 dB
- High Linearity: 20 dBm IIP3
- Wide IF Bandwidth: DC to 20 GHz
- High Isolation
- Lead-Free 3 mm 12-lead AQFN Package
- RoHS* Compliant

Applications

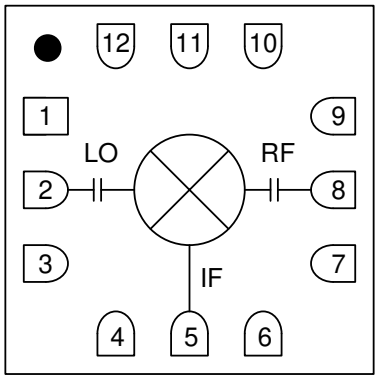
- Test & Measurement,
- Microwave Radio
- Radar

Description

MAMX-011054 is a double-balanced passive diode mixer housed in a 3 mm, 12-lead AQFN package. 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 Ω matching simplifies its application.

MAMX-011054 is also available in die form. Refer to datasheet MAMX-011037-DIE.

Functional Schematic



Pin Configuration[3]

Pin #	Function
1, 3, 4, 6, 7, 9	Ground
2	LO
5	IF
8	RF
10 - 12	No Connection[3]
13	Paddle[4]

3. MACOM recommends connecting unused package pins to ground.
4. The exposed pad centered on the package bottom must be connected to RF, DC and thermal ground.

Ordering Information[1,2]

Part Number	Package
MAMX-011054	Bulk
MAMX-011054-TR0100	100 Piece Reel
MAMX-011054-TR0500	500 Piece Reel
MAMX-011054-SB1	Sample Board

1. Reference Application Note M513 for reel size information.
2. All sample boards include 5 loose parts.

* Restrictions on Hazardous Substances, compliant to current RoHS EU directive.

Electrical Specifications[5]: F_{IF} = 1 GHz, 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 - 46 GHz	dB	—	6.5	9
Input P1dB	18 - 24 GHz 24 - 40 GHz 40 - 46 GHz	dBm	—	10 12 10	—
Input IP3	P_{RF} = -10 dBm/tone, Δf = 1 MHz 18 - 24 GHz 24 - 40 GHz 40 - 46 GHz	dBm	—	 20 21 19	—
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 27	38 45 45	—
RF-to-IF Isolation	18 - 24 GHz 24 - 40 GHz 40 - 46 GHz	dB	— 11 25	9 30 35	—
RF Return Loss	RF = 40 GHz	dB	—	8	—
IF Return Loss	RF = 1 GHz	dB	—	16	—

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

Absolute Maximum Ratings[6,7]

Parameter	Absolute Maximum
LO Power	23 dBm
RF or IF Power	20 dBm
Junction Temperature[8]	+150°C
Operating Temperature	-55°C to +85°C
Storage Temperature	-65°C to +150°C

6. Exceeding any one or combination of these limits may cause permanent damage to this device.
7. MACOM does not recommend sustained operation near these survivability limits.
8. Operating at nominal conditions with $T_J \leq$ +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 devices with the following rating:

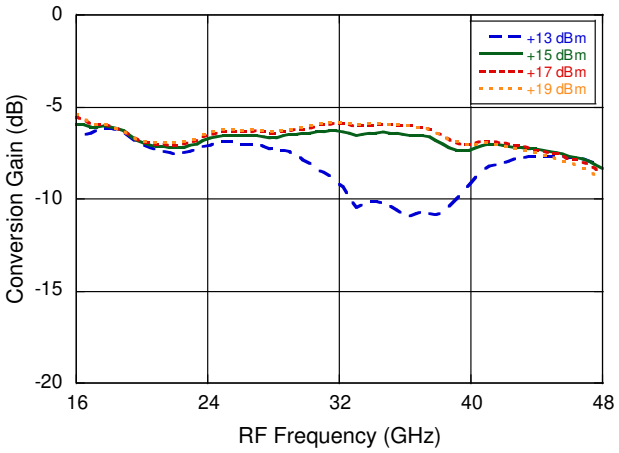
HBM Class 1B
CDM Class C5

Assembly Information

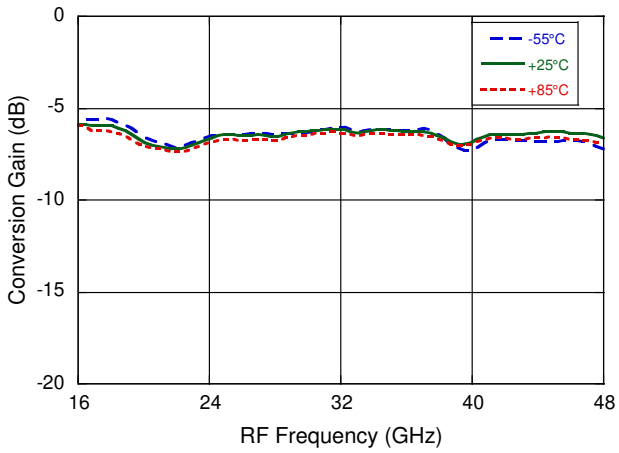
- Do not subject the device to excessive force, especially at elevated temperatures > 60°C.
- No-clean flux is required for assembly. Post SMT washing is not recommended.

Typical Performance Curves

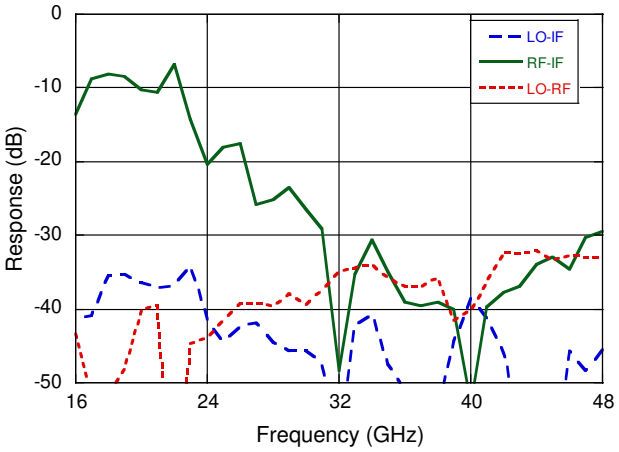
Conversion Gain vs. LO Drive



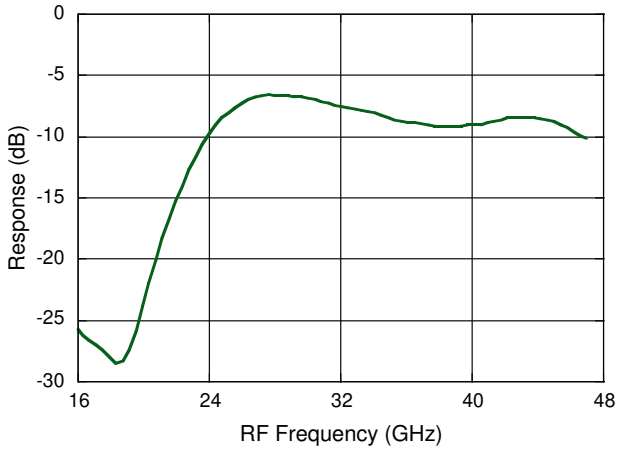
Conversion Gain vs. Temperature



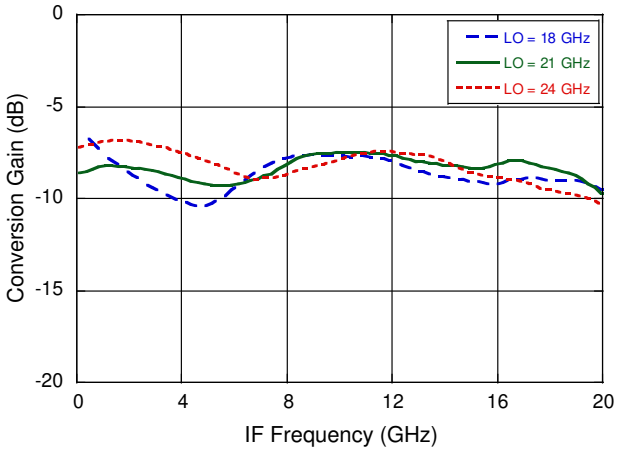
Isolation



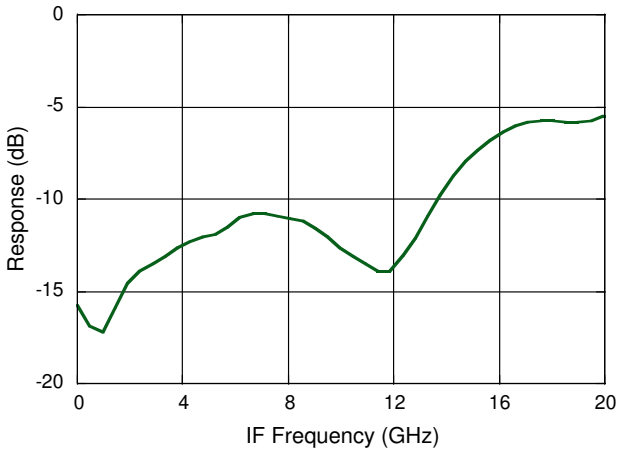
RF Return Loss



IF Bandwidth

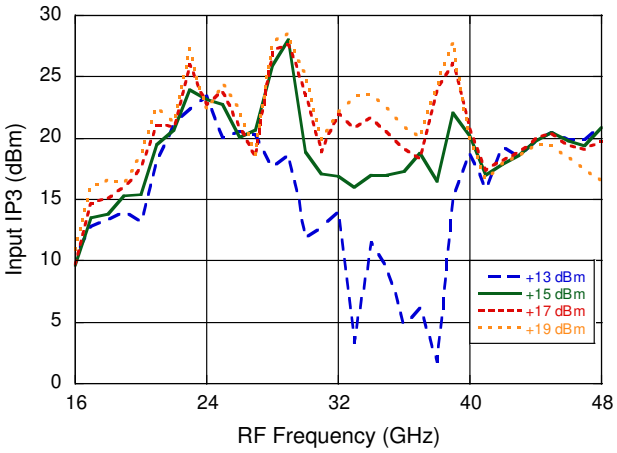


IF Return Loss

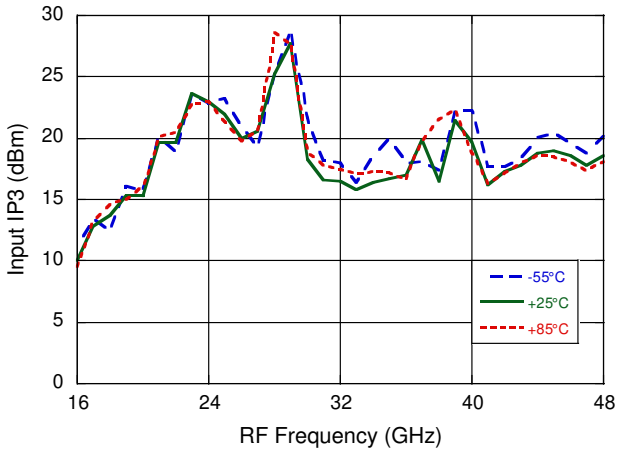


Typical Performance Curves

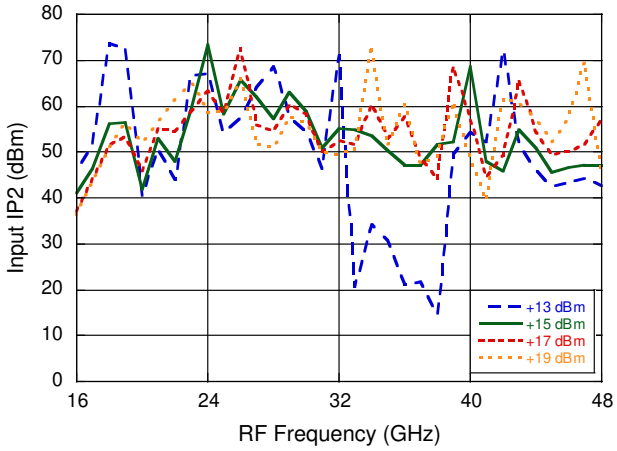
Input IP3 vs. LO Drive



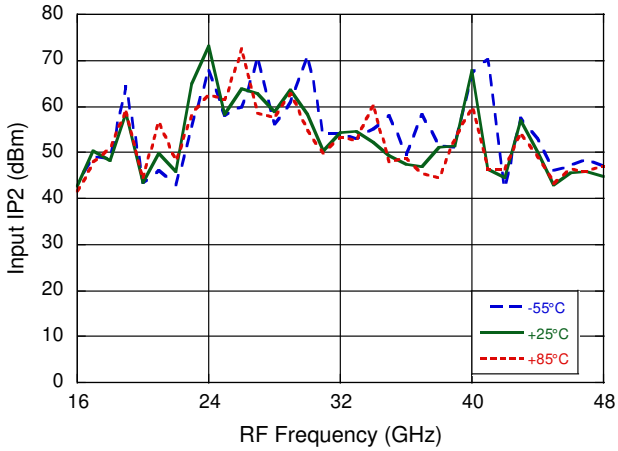
Input IP3 vs. Temperature



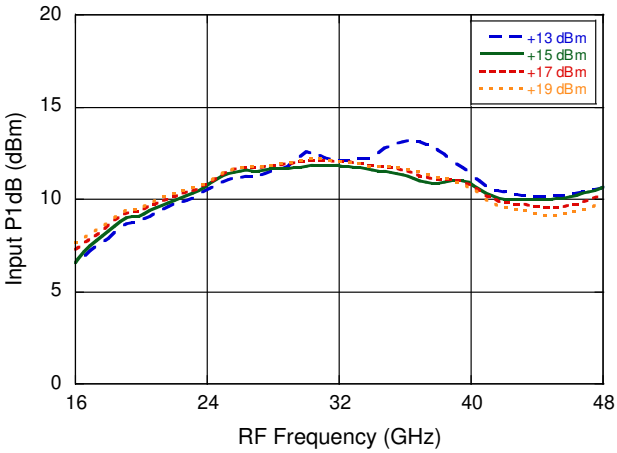
Input IP2 vs. LO Drive



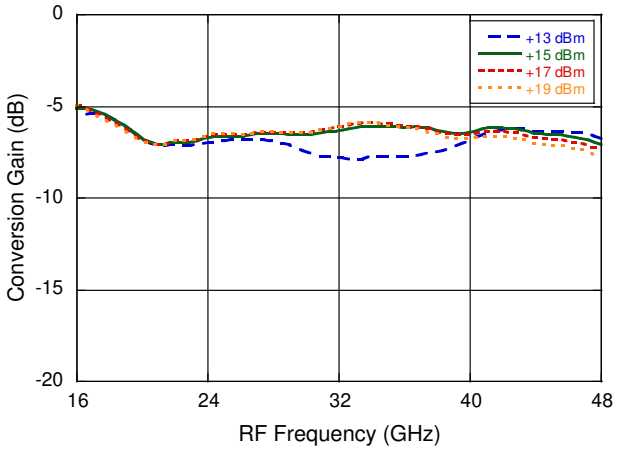
Input IP2 vs. Temperature



Input P1dB vs. LO Drive



Up Conversion Gain vs. LO Drive

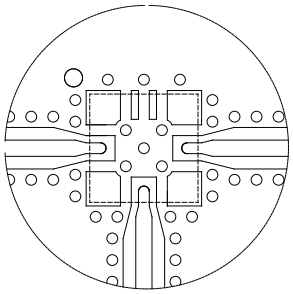


MxN Spurious Rejection at IF Port (dBc IF)

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

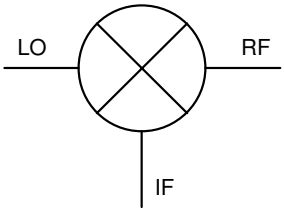
	NxLO				
MxRF	**0**	**1**	**2**	**3**	**4**
0	x	7	34	x	x
1	4	0	23	x	x
2	56	59	61	67	x
3	x	56	70	78	67
4	x	x	57	69	74

PCB Layout



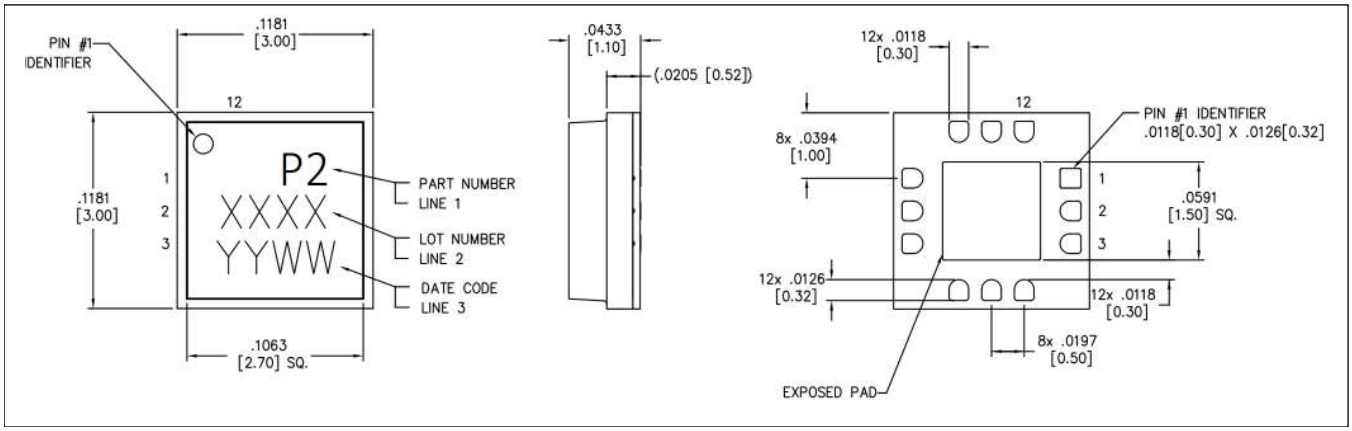
DXF available on request based on 10 mil RO4350 substrate.

Application Schematic



No external parts required for operation of MAMX-011054.

Lead-Free 3 mm 12-Lead AQFN†



† Reference Application Note S2083 for lead-free solder reflow recommendations.
Meets JEDEC moisture sensitivity level 3 requirements.
Plating is NiPdAu.
All dimensions are inches [mm].