Double-Balanced Mixer
18 - 46 GHz

MAMX-011074
Rev. V2

Features

- Low Conversion Loss: 7 - 9 dB
- High Linearity: 20 dBm IIP3
- Wide IF Bandwidth: DC to 20 GHz
- High Isolation
- Lead-Free 3 mm, 12-lead PQFN package
- RoHS* Compliant

Applications

- Test & Measurement
- Microwave Radio
- Radar

Description

MAMX-011074 is a GaAs double-balanced passive diode mixer housed in a lead-free 3 mm, 12-lead QFN 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.

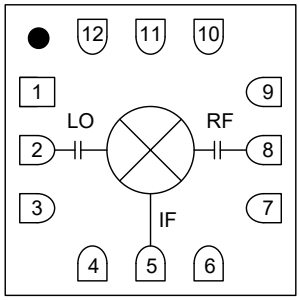
This mixer is well suited for applications such as test and measurement, microwave radio and radar.

Ordering Information[1,2]

Part Number	Package
MAMX-011074	Bulk
MAMX-011074-TR0500	500 Piece Reel[1]
MAMX-011074-SB1	Sample Board[2]

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

Functional Schematic



Pin Configuration

Pin #	Function
1,3,4,6,7,9	GND
2	LO
5	IF
8	RF
10 - 12	NC[3]
13	GND[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.

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

Electrical Specifications[5]: F_{IF} = 1 GHz, P_{LO} = 16 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	—	16	—
Conversion Loss	18 - 24 GHz 24 - 40 GHz 40 - 46 GHz	dB	—	9 7 7	12.5 12 10.5
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	dBm	—	20	—
Input IP2	P_{RF} = -10 dBm/tone, Δf = 1 MHz	dBm	—	50	—
LO-to-RF Isolation	18 - 46 GHz	dB	—	35	—
LO-to-IF Isolation	18 - 24 GHz 24 - 40 GHz 40 - 46 GHz	dB	—	40 40 40	—
RF-to-IF Isolation	18 - 24 GHz 24 - 40 GHz 40 - 46 GHz	dB	—	9 30 35	—
RF Return Loss	RF = 40 GHz	dB	—	10	—
IF Return Loss	IF = 1 GHz	dB	—	12	—

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. Thermal resistance, Θ_{JC} is 85°C/W.

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 JEDEC rating:

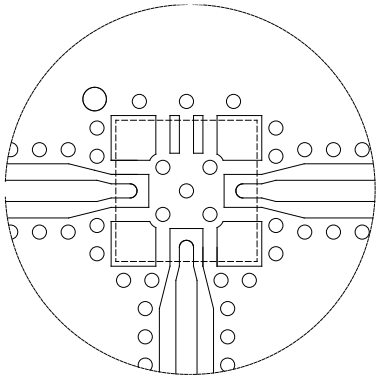
HBM Class 1B
CDM Class 3C

MxN Spurious Rejection at IF Port (dBc IF)

RF = 24 GHz @ -10 dBm
LO = 23 GHz @ +16 dBm

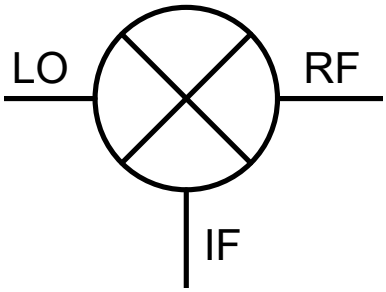
	nxLO				
mxRF	**0**	**1**	**2**	**3**	**4**
0	x	4	44	x	x
1	7	0	64	47	x
2	68	61	60	70	71
3	x	x	83	x	34
4	x	x	x	x	99

PCB Layout



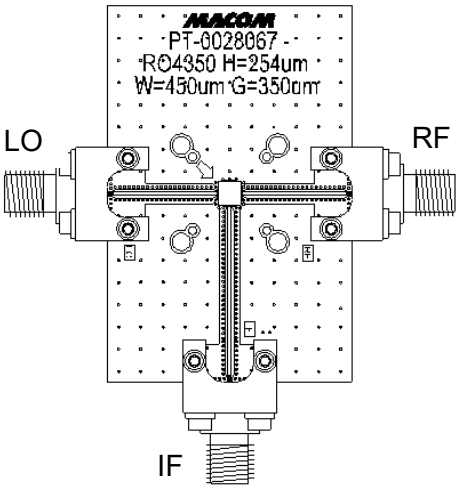
DXF available on request based on 10 mil RO4350 substrate.

Application Schematic

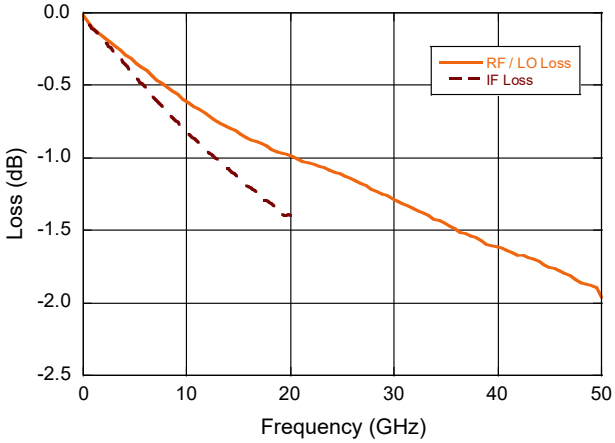


No external parts required for operation of MAMX-011074.

Evaluation Board

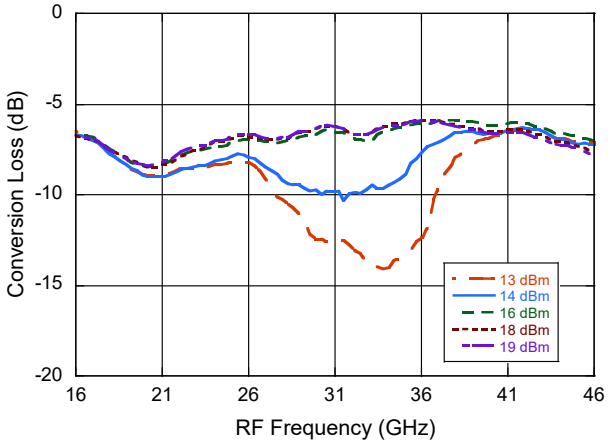


Evaluation Board Losses

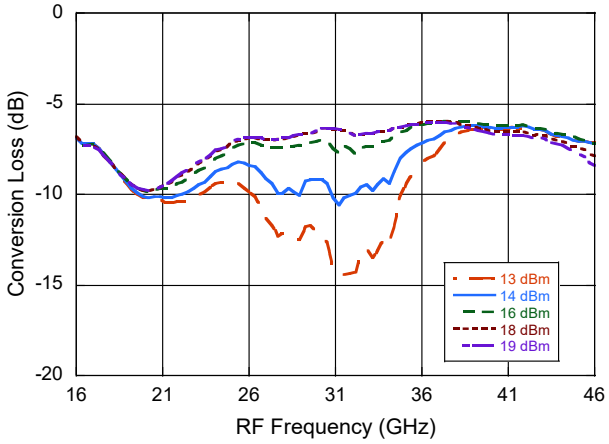


Typical Performance Curves

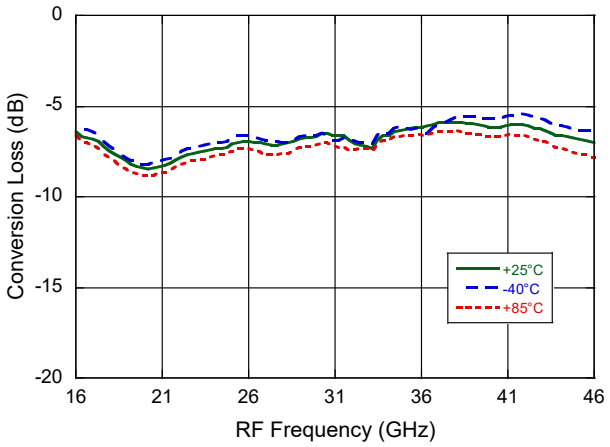
Conversion Loss USB (Down Conversion)
@ +25°C, I_F = 1 GHz



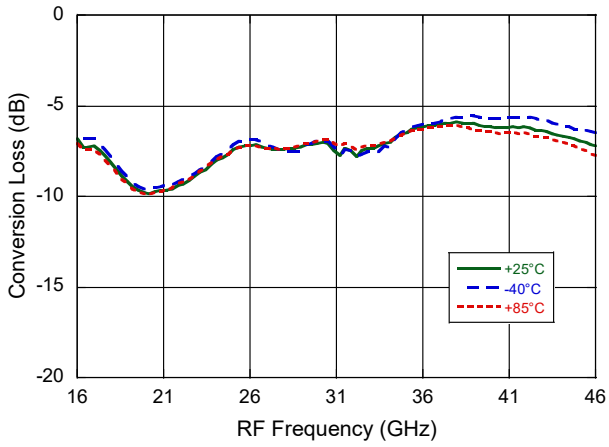
Conversion Loss LSB (Down Conversion)
@ +25°C, I_F = 1 GHz



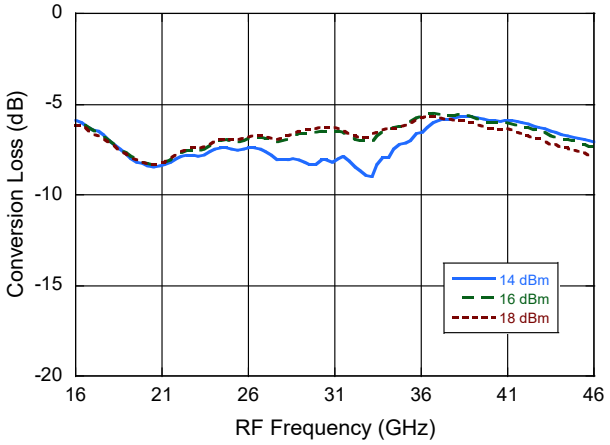
Conversion Loss USB
Over Temperature @ P_{LO} = 16 dBm, I_F = 1 GHz



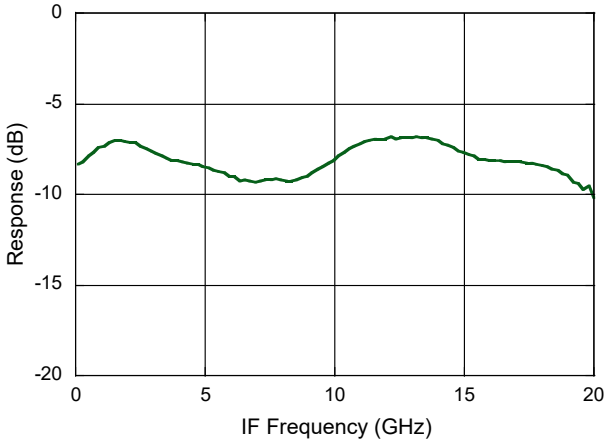
Conversion Loss LSB
Over Temperature @ P_{LO} = 16 dBm, I_F = 1 GHz



Conversion Loss USB (Up Conversion)
@ +25°C, I_F = 1 GHz

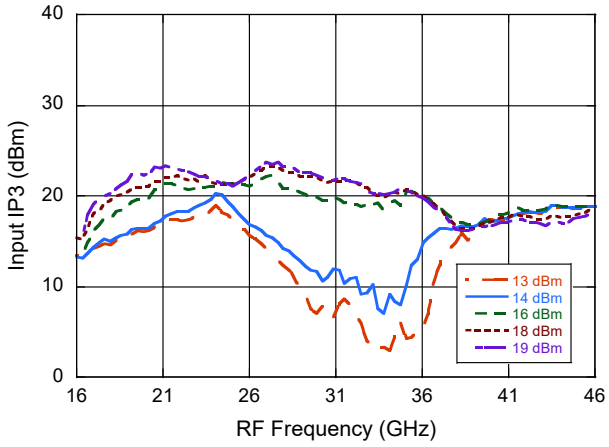


IF Bandwidth
@ +25°C, F_{LO} = 24 GHz, P_{LO} = 16 dBm

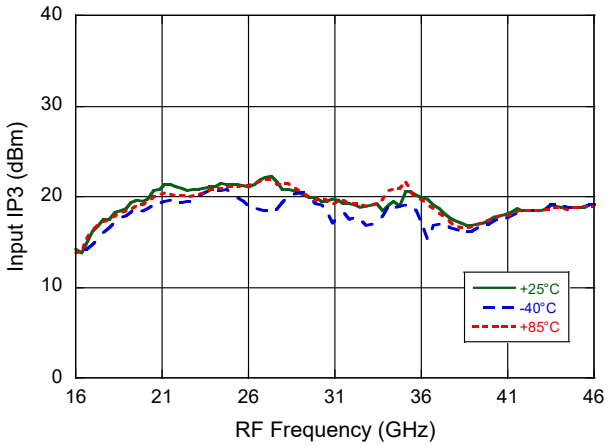


Typical Performance Curves

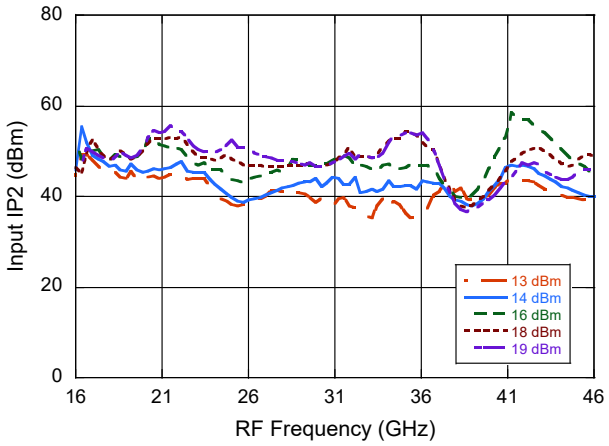
IIP3 vs. LO Drive, I_F = 1 GHz



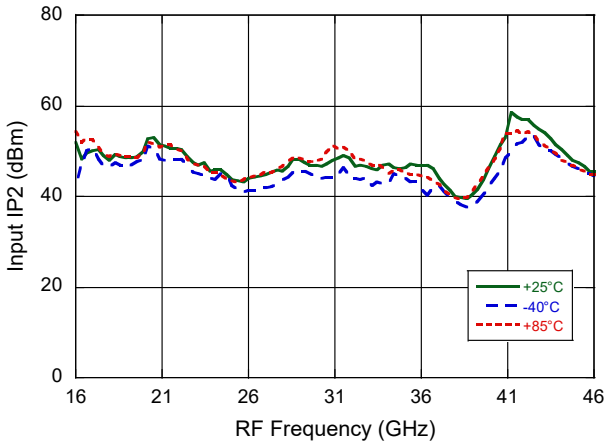
IIP3 vs. Temperature @ P_{LO} = 16 dBm, I_F = 1 GHz



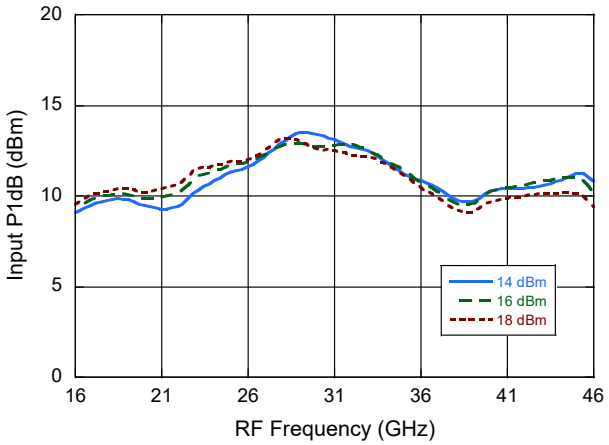
IIP2 vs. LO Drive I_F = 1 GHz



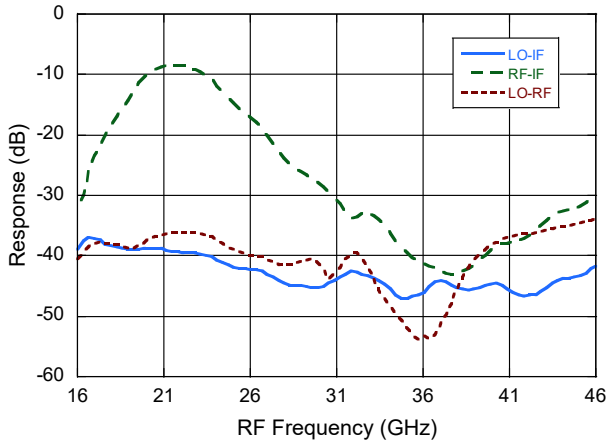
IIP2 vs. Temperature @ P_{LO} = 16 dBm, I_F = 1 GHz



P1dB vs. LO Drive, I_F = 1 GHz

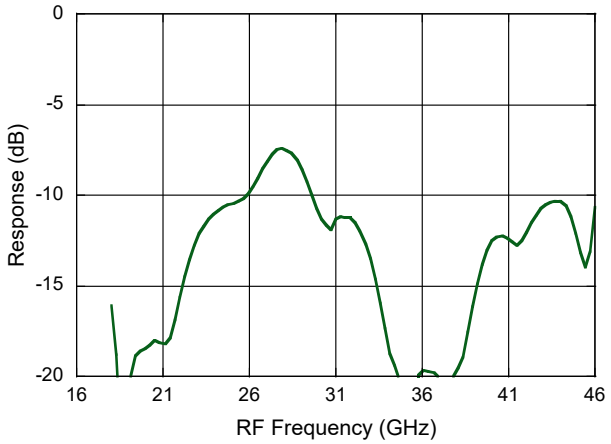


Isolation (Down Conversion)
@ I_F = 1 GHz, P_{LO} = 16 dBm; P_{RF} = -10 dBm

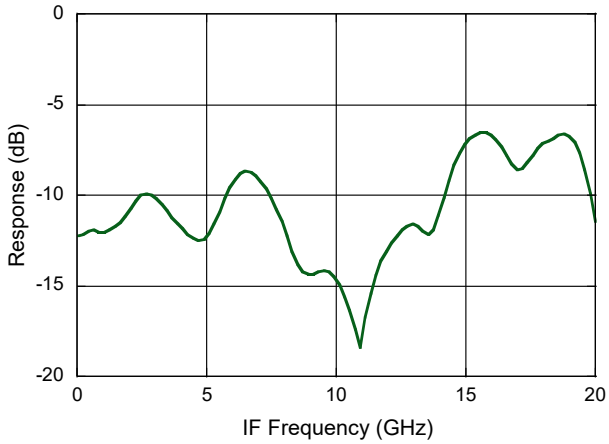


Typical Performance Curves

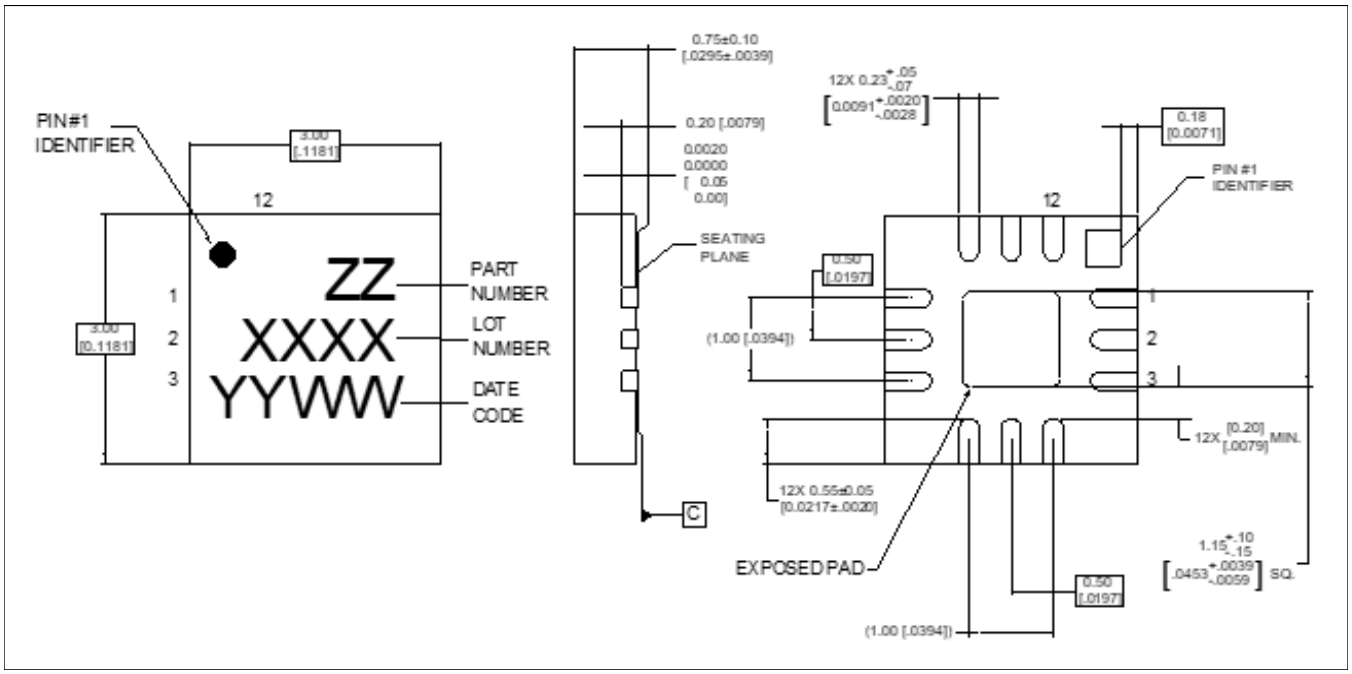
RF Return Loss
@ +25°C, F_{LO} = 28 GHz, P_{LO} = 16 dBm



IF Return Loss
@ +25°C, F_{LO} = 28 GHz, P_{LO} = 16 dBm



Lead-Free 3 mm 12-Lead QFN†



† Reference Application Note S2083 for lead-free solder reflow recommendations.
Meets JEDEC moisture sensitivity level 1 requirements.
Plating is 100% matte tin over copper.