Double-Balanced Mixer
8 - 36 GHz

MAMX-011071
Rev. V4

Features

- Low Conversion Loss: 9.5 dB
- High Linearity: 20 dBm IIP3
- Wide IF Bandwidth: DC to 8 GHz
- High Isolation
- Lead-Free 3 mm, 12-lead PQFN package
- RoHS* Compliant

Applications

- Test & Measurement
- Microwave Radio
- Radar

Description

MAMX-011071 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.

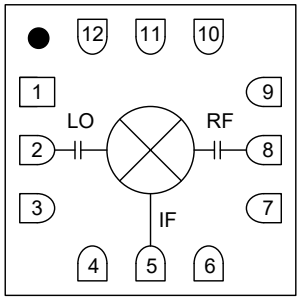
This mixer is well suited for applications such as test and measurement, microwave radio and radar.

Ordering Information

Part Number	Package
MAMX-011071	Bulk
MAMX-011071-TR0100	100 Piece Reel[1]
MAMX-011071-TR0500	500 Piece Reel[1]
MAMX-011071-SB1	Sample Board[2]

1. Reference Application Note M513 for reel size information.
2. All sample boards include 3 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} = 500 MHz, P_{LO} = 15 dBm, T_A = +25°C, Z_0 = 50 Ω

Parameter	Test Conditions	Units	Min.	Typ.	Max.
LO and RF Frequency	—	GHz	8	—	36
IF Frequency	—	GHz	0	—	10
LO Power	—	dBm	—	15	—
Conversion Loss	8 - 20 GHz 20 - 36 GHz	dB	—	9.5 10.0	12
Input P1dB	8 - 36 GHz	dBm	—	13	—
Input IP3	P_{RF} = -10 dBm/tone, Δf = 1 MHz	dBm	—	20	—
Input IP2	P_{RF} = -10 dBm/tone, Δf = 1 MHz	dBm	—	45	—
LO-to-RF Isolation	8 - 36 GHz	dB	—	35	—
LO-to-IF Isolation	8 - 20 GHz 20 - 36 GHz	dB	—	34 30	—
RF-to-IF Isolation	8 - 20 GHz 20 - 36 GHz	dB	—	9 20	—
RF Return Loss	RF = 25 GHz	dB	—	7	—
IF Return Loss	IF = 500 MHz	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

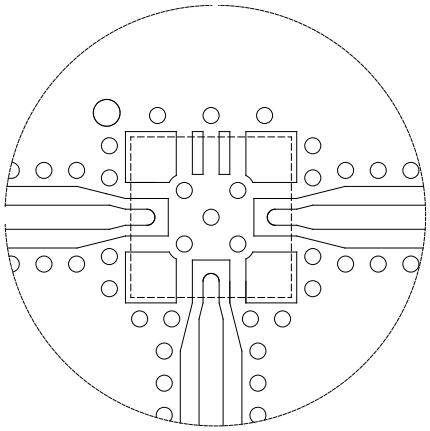
These electronic devices are sensitive to electrostatic discharge (ESD) and can be damaged by static electricity. Proper ESD control techniques should be used when handling these HBM Class 1B and CDM Class C3 devices.

MxN Spurious Rejection at IF Port (dBc IF)

RF = 17.5 GHz @ -10 dBm
LO = 18.0 GHz @ +15 dBm

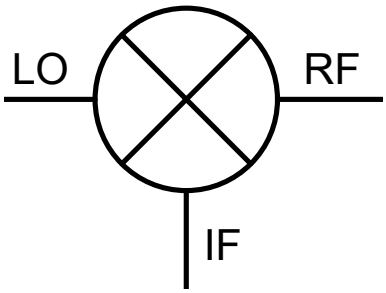
	nxLO				
mxRF	**0**	**1**	**2**	**3**	**4**
0	x	20	32	x	x
1	4	0	31	53	x
2	61	80	61	63	75
3	x	78	81	70	88
4	x	x	x	105	90

PCB Layout



DXF available on request based on 10 mil RO4350 substrate.

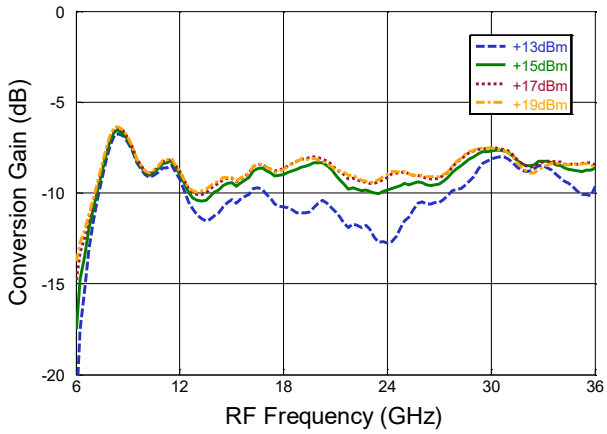
Application Schematic



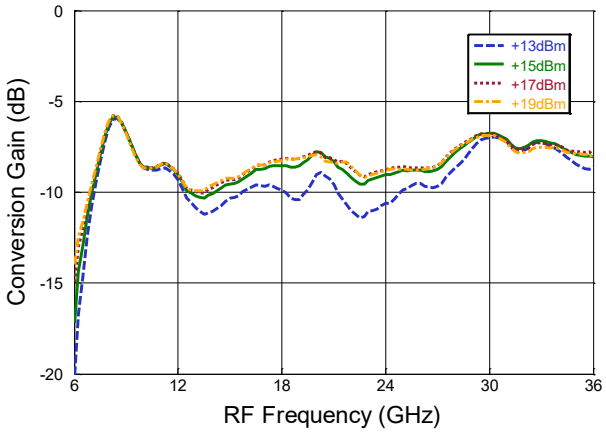
No external parts required for operation of MAMX-011067.

Typical Performance Curves

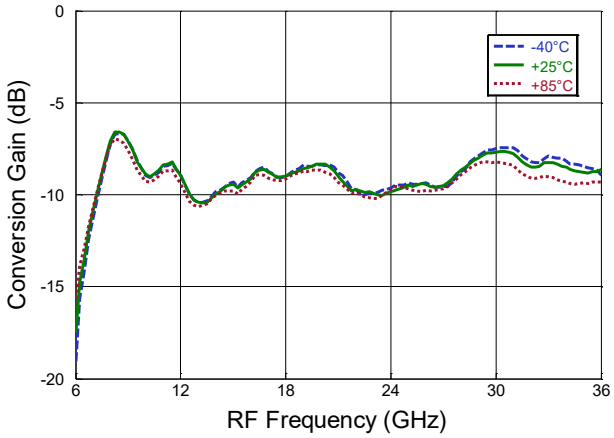
Conversion Loss USB (Down Conversion)
@ +25°C, I_F = 500 MHz



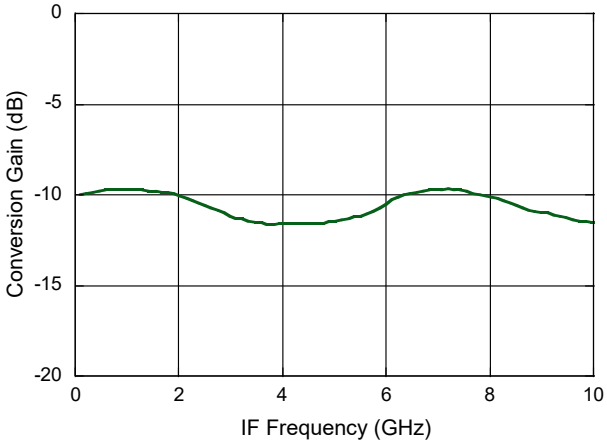
Conversion Loss USB (Up Conversion)
@ +25°C, I_F = 500 MHz



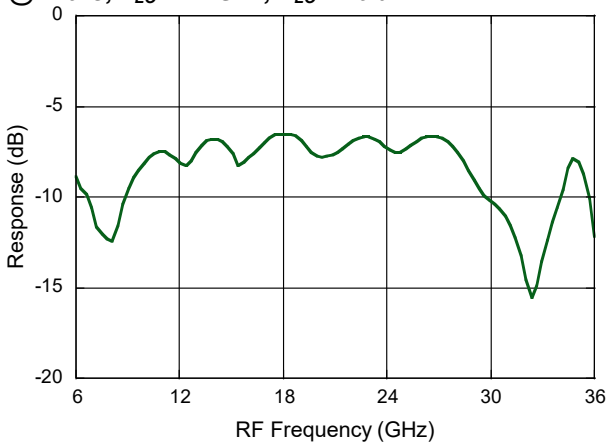
Conversion Loss
Over Temperature @ P_{LO} = 15 dBm, I_F = 500 MHz



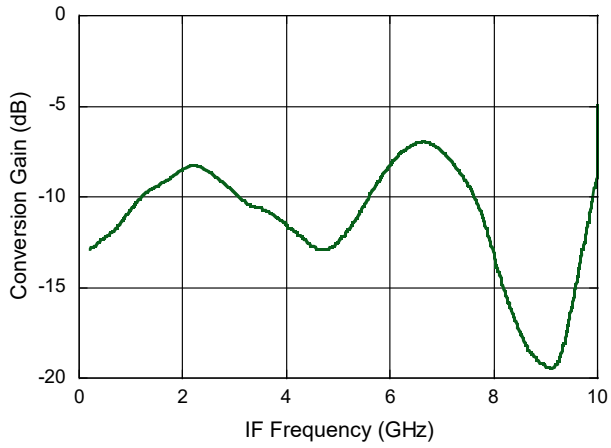
IF Bandwidth
@ +25°C, F_{LO} = 13 GHz, P_{LO} = 15 dBm



RF Return Loss
@ +25°C, F_{LO} = 17 GHz, P_{LO} = 15 dBm

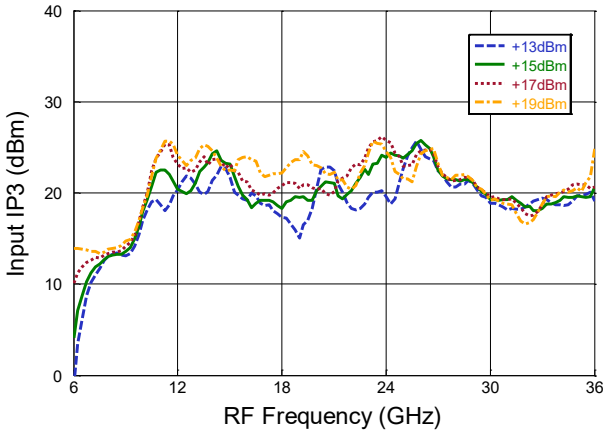


IF Return Loss
@ +25°C, F_{LO} = 17 GHz, P_{LO} = 15 dBm

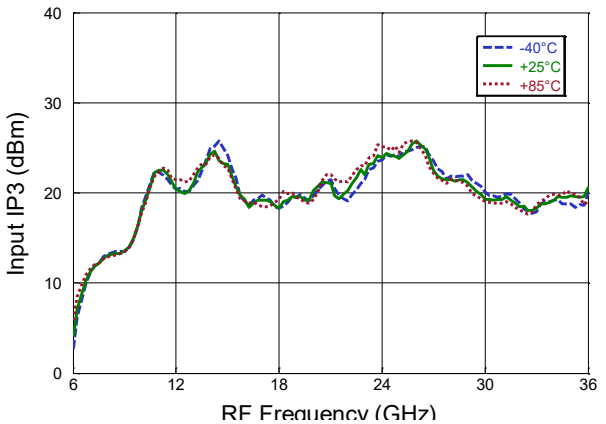


Typical Performance Curves

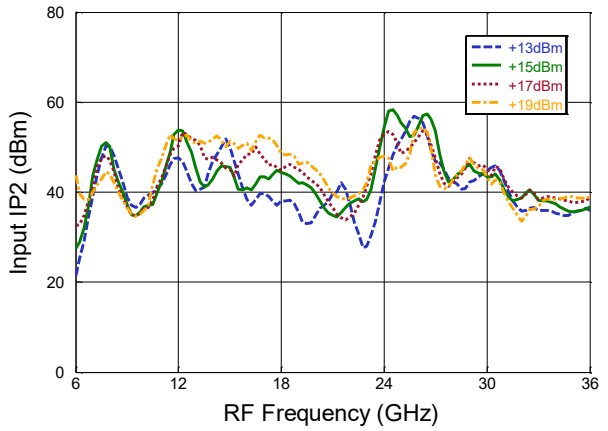
IIP3 vs. LO Drive, I_F = 500 MHz



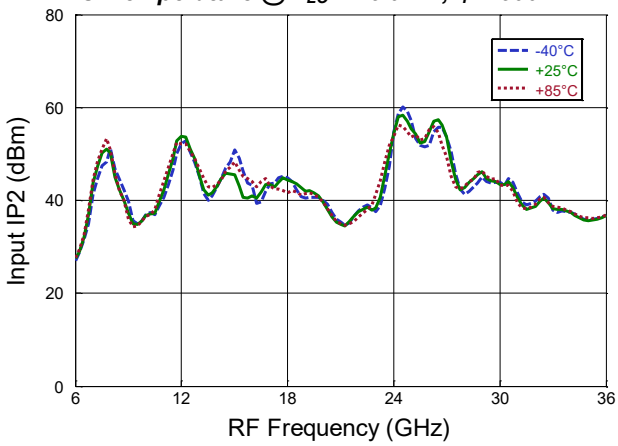
IIP3 vs. Temperature @ P_{LO} = 15 dBm, I_F = 500 MHz



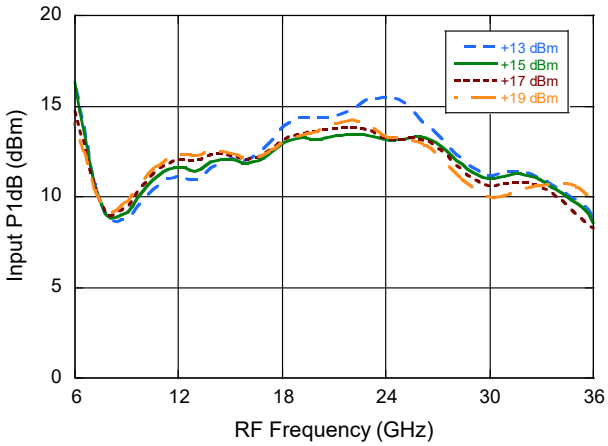
IIP2 vs. LO Drive I_F = 500 MHz



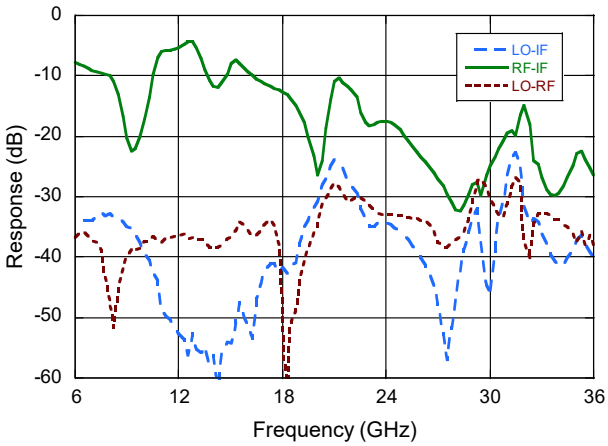
IIP2 vs. Temperature @ P_{LO} = 15 dBm, I_F = 500 MHz



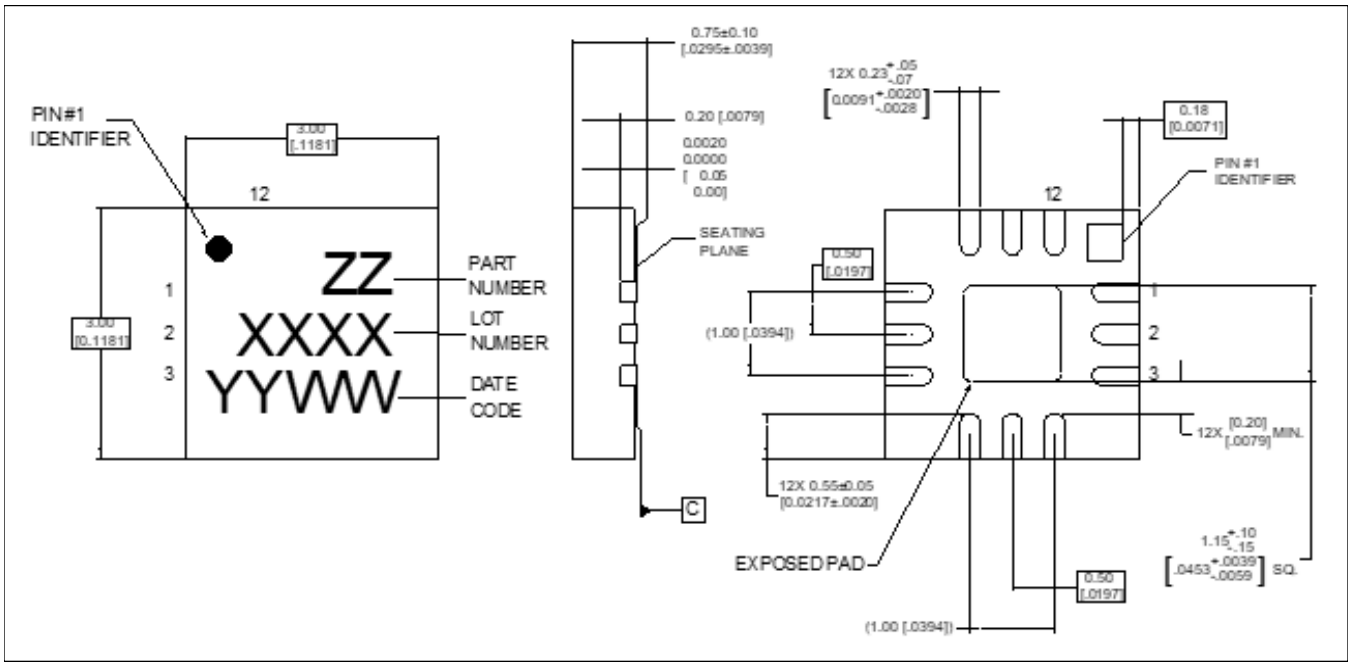
P1dB vs. LO Drive, I_F = 500 MHz



Isolation (Down Conversion)
@ IF = 500 MHz, P_{LO} = 15 dBm; P_{RF} = -10 dBm



Lead-Free 3 mm 12-Lead QFN†



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