LO Buffer Amplifier, 27 - 42 GHz

MAAM-011338
Rev. V2

Features

- 23 dB Gain
- 11 dBm Output P1dB
- 14 dBm Output Power with -6 dBm Input Power
- 3.3 V Drain Supply
- 2 mm, 8 lead PDFN Package
- RoHS* Compliant

Applications

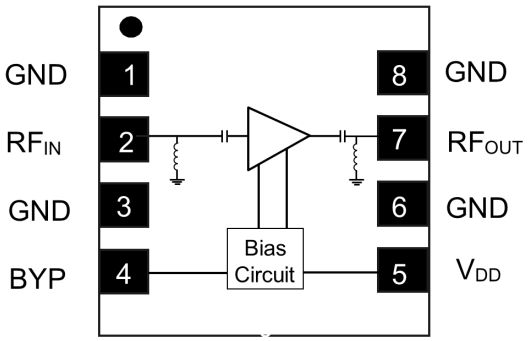
- ISM
- Multimarket

Description

The MAAM-011338 is a Ka-band LO buffer amplifier with an operating frequency range of 27 to 42 GHz. This amplifier typically has 23 dB gain, 12 dBm P1dB, and 14 dBm output power with -6 dBm input power. A 3.3 V supply voltage is required and the typical current draw is only 60 mA.

The MAAM-011338 is designed for Ka-band low noise applications. The 2 mm, 8 lead PDFN package is lead free and RoHS compliant.

Block Diagram



Pin Configuration[1,2]

Pin #	Function
1, 3, 6, 8	Ground
2	RF Input
4	Bypass
5	+3.3 V Voltage Supply
7	RF Output

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

Ordering Information

Part Number	Package
MAAM-011338-TR1000	1000 piece reel
MAAM-011338-TR3000	3000 piece reel
MAAM-011338-SMB	Sample Board

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

Pin Description

Pin #	Name	description
1, 3, 6, 8	GND	RF and DC Ground. Fused to paddle internally
2	RF_{IN}	RF Input. DC shorted to ground.
4	BYP	Requires bypass capacitor.
5	VDD	+3.3 V Supply Pin. Requires bypass capacitor.
7	RF_{OUT}	RF Output. DC shorted to ground.

AC Electrical Specifications: Freq. = 27 to 42 GHz, T_A = 25°C, V_{DD} = +3.3 V, Z_0 = 50 Ω

Parameter	Test Conditions	Units	Min.	Typ.	Max.
Gain	P_{IN} = -25 dBm, 27 GHz P_{IN} = -25 dBm, 32 GHz P_{IN} = -25 dBm, 37 GHz P_{IN} = -25 dBm, 42 GHz	dB	19.0 13.5 15.0 16.0	26.5 25.0 26.0 23.0	—
Gain Flatness	P_{IN} = -25 dBm	dB	—	+/-1	—
Input Return Loss	P_{IN} = -25 dBm	dB	—	13	—
Output Return Loss	P_{IN} = -25 dBm	dB	—	13	—
P1dB	P_{IN} = -25 dBm	dBm	—	12	—
Output Power	P_{IN} = -6 dBm, 27 GHz P_{IN} = -6 dBm, 32 GHz P_{IN} = -6 dBm, 37 GHz P_{IN} = -6 dBm, 42 GHz	dBm	10.5 8.0 8.0 9.5	16.5 15.0 15.5 15.5	—
Power Flatness	P_{IN} = -6 dBm	dB	—	+/-0.5	—
IP3	P_{IN} = -28 dBm/tone, 10 MHz Spacing	dBm	—	22	—

DC Electrical Specifications: V_{CC} = +3.3

Parameter	Test Conditions	Units	Min.	Typ.	Max.
DC Current (I_{DQ})	P_{IN} = -25 dBm	mA	—	60	75
DC Current (I_{DD})	P_{IN} = -6 dBm	mA	—	80	—

Recommended Operating Conditions

Parameter	Symbol	Unit	Min.	Typ.	Max.
RF Input Power	-	dBm	-25	-6	-4
DC Supply	V_{DD}	V	—	3.3	4
Junction Temperature	T_J	°C	—	—	+160
Operating Temperature[9]	T_C	°C	-40	—	+85

Absolute Maximum Ratings[5,6]

Parameter	Symbol	Unit	Min.	Max.
RF Input Power	-	dBm	—	13
DC Supply	V_{DD}	V	—	4
Junction Temperature[7,8]	T_J	°C	—	+170
Operating Temperature[9]	T_C	°C	-55	+125
Storage Temperature	-	°C	-55	+150

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 $T_J \leq +160C$ will ensure MTTF > 1 x 10^6 hours.
8. Junction Temperature (T_J) = T_C + Θjc * ((V * I) - (P_{OUT} - P_{IN}))
   Typical thermal resistance (Θjc) = 275 °C/W.
   a) For T_C = +25°C,
   T_J = 79.45°C @ 3.3 V, 60 mA
   b) For T_C = +85°C,
   T_J = 136.73 °C @ 3.3V, 57 mA
9. Operating temperature is defined at the back of device paddle.

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 Class 1C HBM and Class C3 CDM devices.

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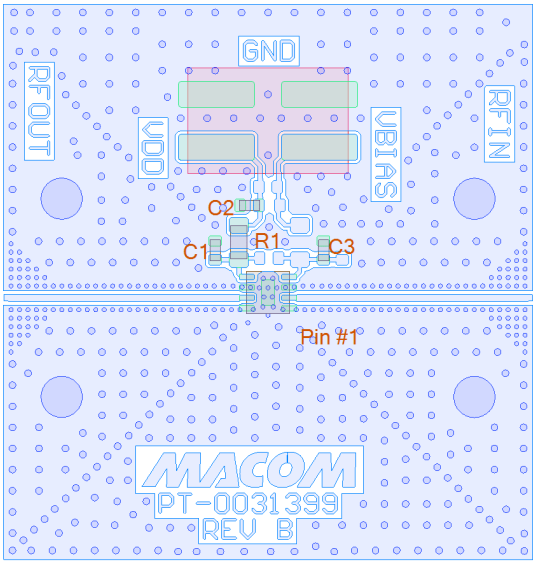
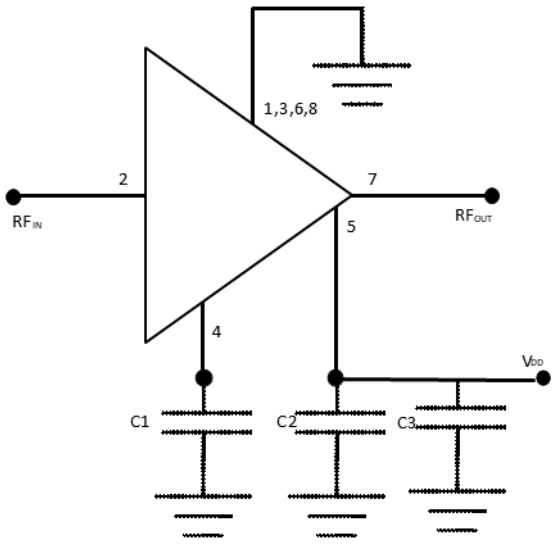
PCB Layout



Parts List

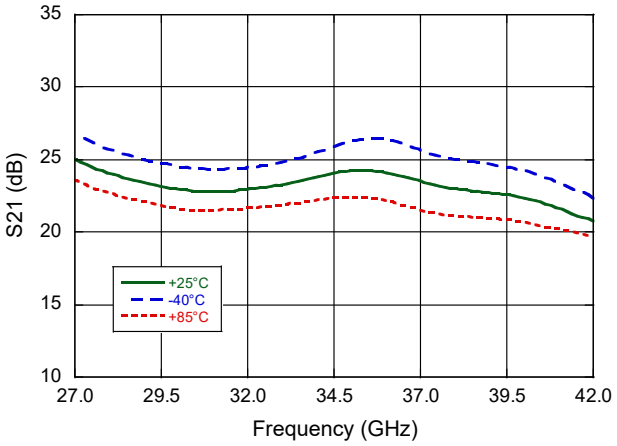
Part	Value	Case Style
C1, C3	100 pF	0402
C2	1000 pF	0402
R1	0 Ω	0603

Application Schematic

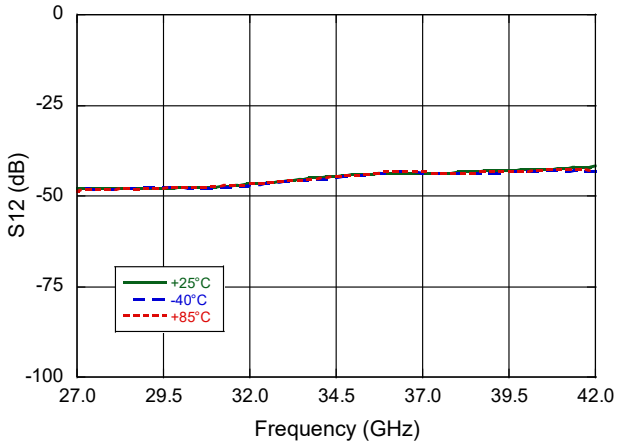


Typical Performance Curves

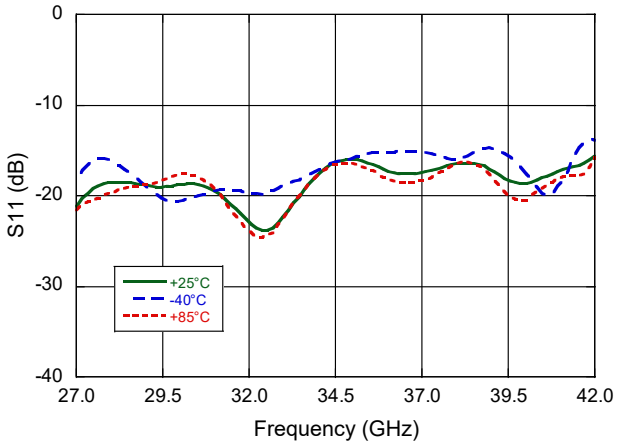
Gain



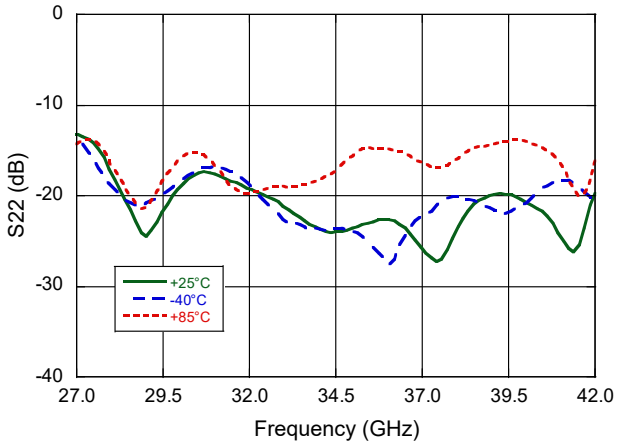
Reverse Isolation



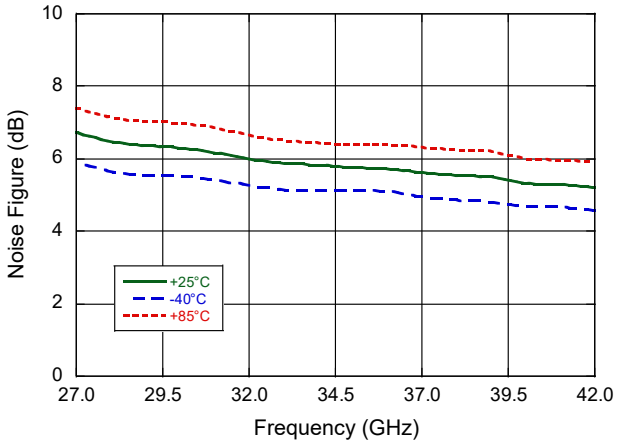
Input Return Loss



Output Return Loss

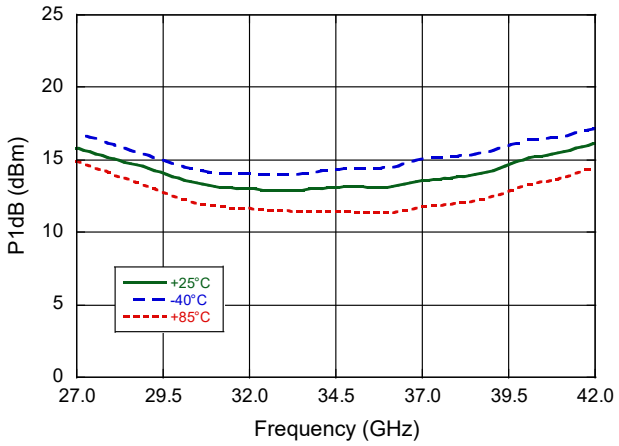


Noise Figure

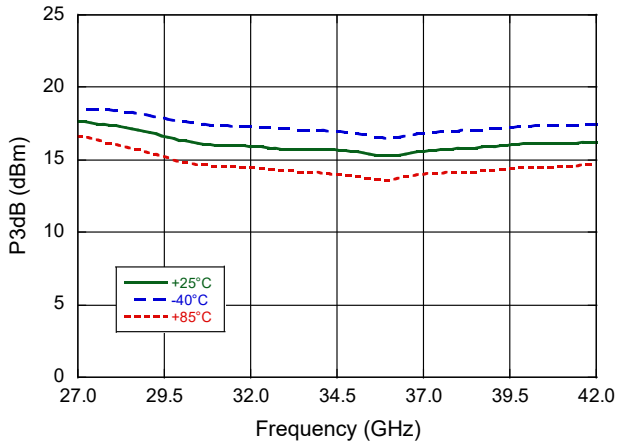


Typical Performance Curves

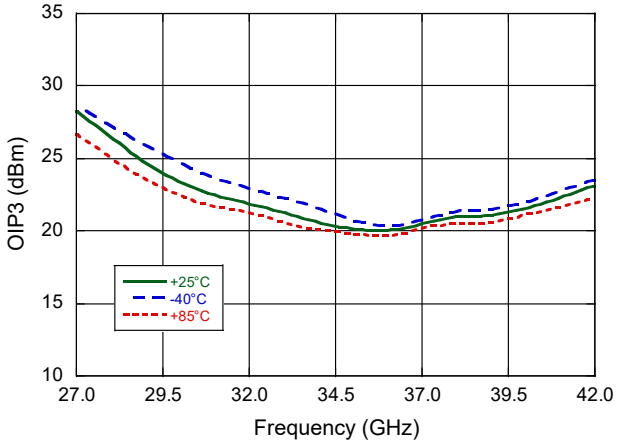
P1dB



P3dB

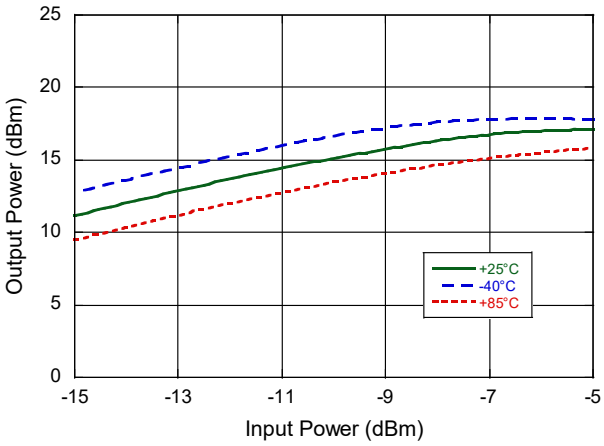


OIP3

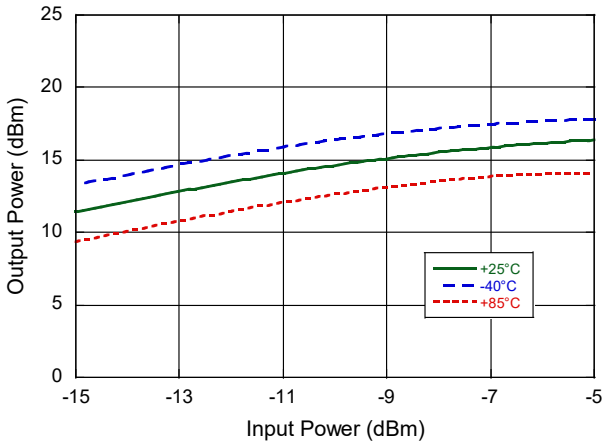


Typical Performance Curves

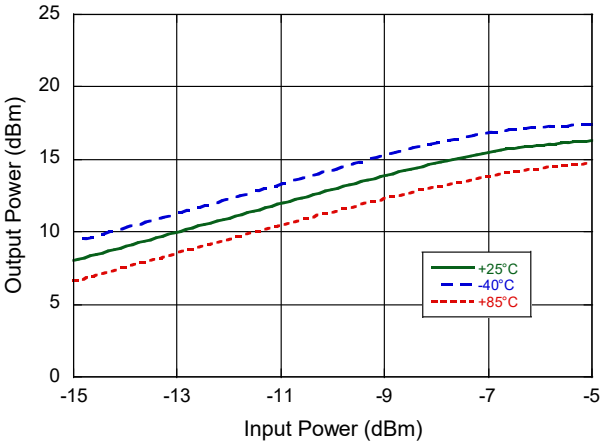
Output Power vs. Input Power @ 27 GHz



Output Power vs. Input Power @ 35 GHz

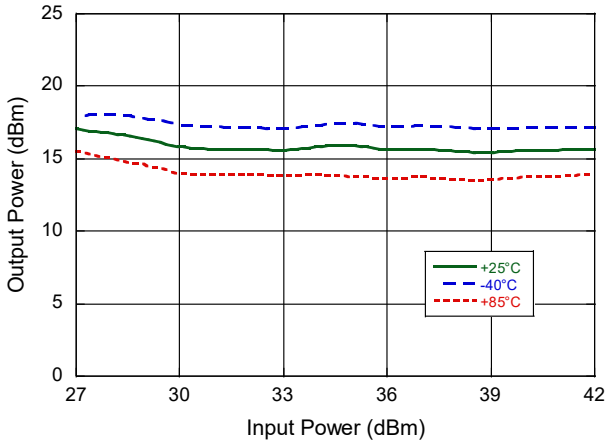


Output Power vs. Input Power @ 42 GHz

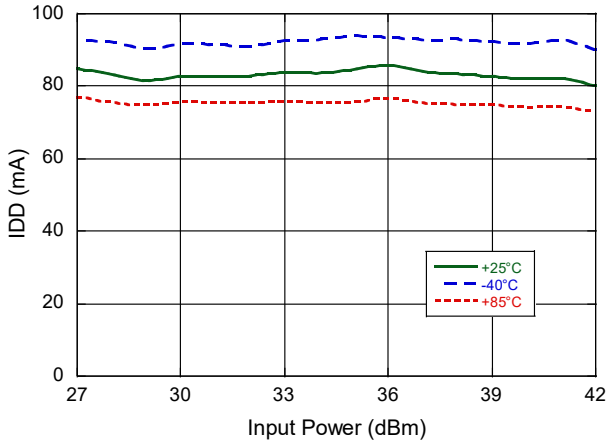


Typical Performance Curves

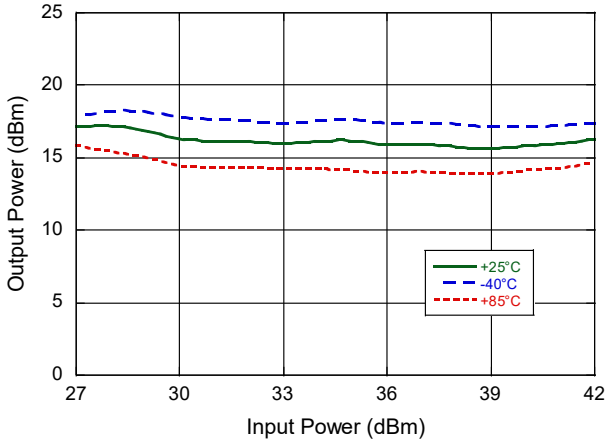
Output Power vs. Frequency @ P_{IN} = -6 dBm



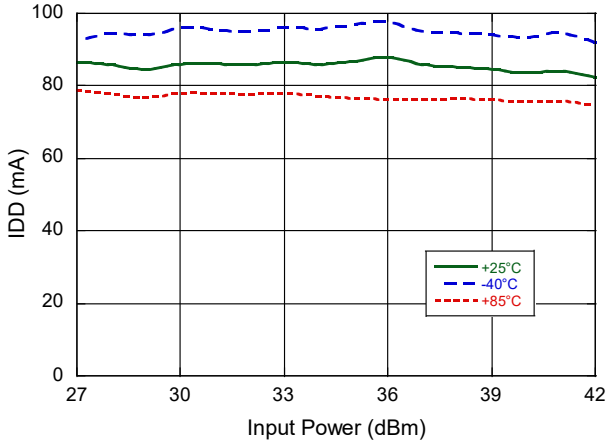
IDD vs. Frequency @ P_{IN} = -6 dBm



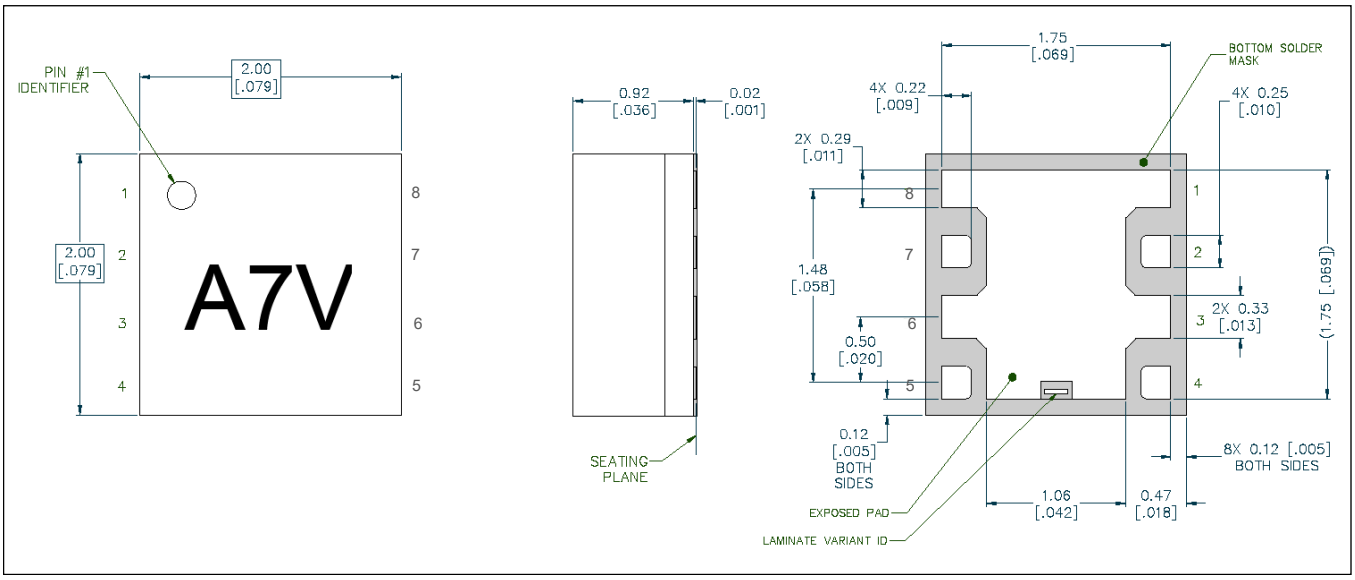
Output Power vs. Frequency @ P_{IN} = -5 dBm



IDD vs. Frequency @ P_{IN} = -5 dBm



Lead-Free 2 mm, 8-Lead PDFN Package†



† Reference Application Note S2083 for lead-free solder reflow recommendations.
Meets JEDEC moisture sensitivity level 3 requirements.
Plating is 100% matte tin over copper.