21 dB Gain Amplifier
0.4 - 6 GHz

MAAM-011326
Rev. V2

Features

- Wideband Performance
- Noise Figure: 1.5 dB @ 3 GHz
- Bias Voltage: 5 V
- Bias Current: 90 mA
- 50 Ω Matched Input / Output
- Positive Voltage Only
- Lead-Free 2 mm 8-LD PDFN Package
- RoHS* Compliant

Applications

- Instrumentation & Communication Systems

Description

MAAM-011326 is a broadband, low noise, high dynamic range, single stage MMIC amplifier covering 0.4 to 6 GHz. It is assembled in a lead-free 2 mm 8-LD PDFN package. The amplifier provides 21 dB gain, 19 dBm output power and 34 dBm OIP3 at 3 GHz. The gain slope is only 1.5 dB over the full bandwidth. It is matched to 50 Ω with typical return losses of 10 dB at the input and 12 dB at the output. The amplifier requires only positive bias voltages and consumes 90 mA from a 5 V supply.

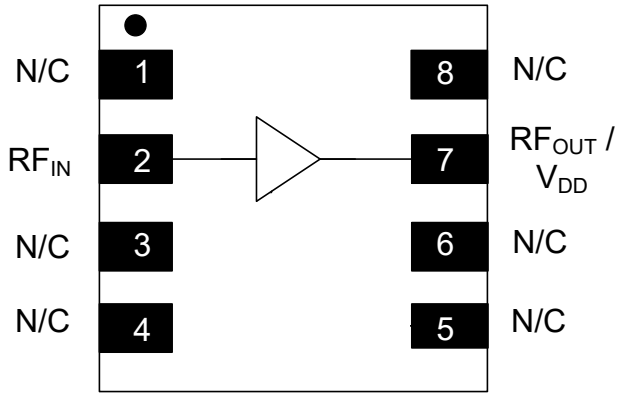
MAAM-011326 is suitable for a wide range of applications in instrumentation and communication systems.

Ordering Information[1,2]

Part Number	Package
MAAM-011326-TR1000	1000 piece reel
MAAM-011326-TR3000	3000 piece reel
MAAM-011326-SMB	Sample Board

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

Functional Schematic



Pin Configuration[3,4]

Pin #	Pin Name	Description
1,3,4,5,6,8	N/C	No Connection
2	RF_{IN}	RF Input
7	RF_{OUT} / V_{DD}	RF Output / Drain Voltage

3. MACOM recommends connecting all No Connection (N/C) 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: T_C = 25°C[5], V_{DD} = +5 V, Z_0 = 50 Ω

Parameter	Test Conditions	Units	Min.	Typ.	Max.
Gain	0.4 - 2 GHz 2 GHz 4 & 6 GHz	dB	— 19 18	21 21 20	—
Gain Variation vs. Temp	0.4 - 3 GHz 3 - 6 GHz	dB/°C	—	0.01 0.02	—
Gain Variation vs. Freq	0.4 - 3 GHz 3 - 6 GHz	dB	—	± 0.5 ± 0.5	—
Noise Figure	0.4 - 3 GHz 3 - 6 GHz	dB	—	1.5 2.0	—
Input Return Loss	0.4 - 6 GHz	dB	—	10	—
Output Return Loss	0.4 - 6 GHz	dB	—	12	—
P1dB	0.4 GHz 2 GHz 3 GHz 4 GHz 5 GHz 6 GHz	dBm	—	20.0 20.0 19.5 18.3 17.5 16.0	—
Saturated Output Power	0.4 - 6 GHz	dBm	—	21	—
Output IP3[6]	0.4 GHz 2 GHz 3 GHz 4 GHz 5 GHz 6 GHz	dBm	— 34 — 30 — 28	42 39 34 33 34 32	—
Output IP2[6]	0.4 GHz 2 GHz 3 GHz 4 GHz 5 GHz 6 GHz	dBm	—	44 39 39 39 45 44	—
Supply Current	Quiescent Bias	mA	—	90	105

5. Case temperature.
6. Output IP3 tested with two input tones of -18 dBm each with 10 MHz spacing.

Maximum Operating Conditions

Parameter	Rating
Input Power	5 dBm
IC	120 mA
Junction Temperature[7,8]	+150°C
Operating Temperature	-40°C to +105°C

7. Operating at nominal conditions with junction temperature ≤ 130°C will ensure MTTF > 1 x 10^6 hours.
8. Junction Temperature (T_J) = T_C + Θjc * (V * I)
   Typical thermal resistance (Θjc) = 65 °C/W.
   a) For T_C = +25°C,
   T_J = 55 °C @ 5 V, 90 mA
   b) For T_C = +105°C,
   T_J = 135 °C @ 5 V, 90 mA

Absolute Maximum Ratings[9,10]

Parameter	Absolute Maximum
V_{DD}	8 V
Input Power	20 dBm
Junction Temperature[11]	+150°C
Storage Temperature	-65°C to +125°C

9. Exceeding any one or combination of these limits may cause permanent damage to this device.
10. MACOM does not recommend sustained operation near these survivability limits.
11. Junction temperature directly effects device MTTF. Junction temperature should be kept as low as possible to maximize lifetime.

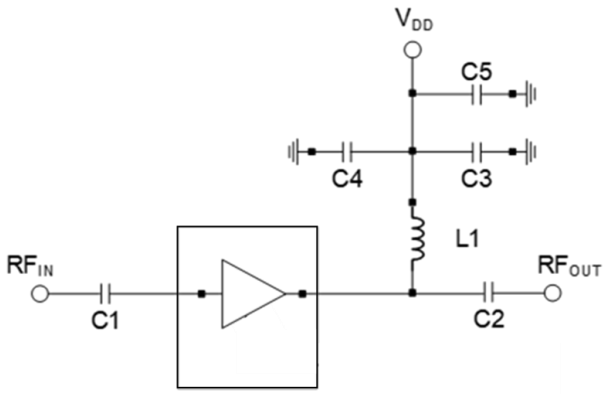
Handling Procedures

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.

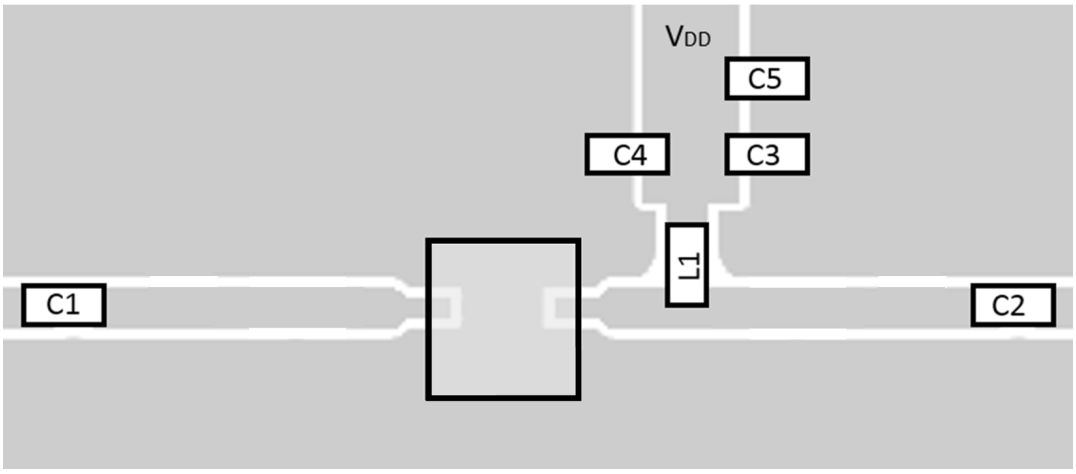
Typical Application Circuit



Typical Parts List, V_{DD} = 5 V

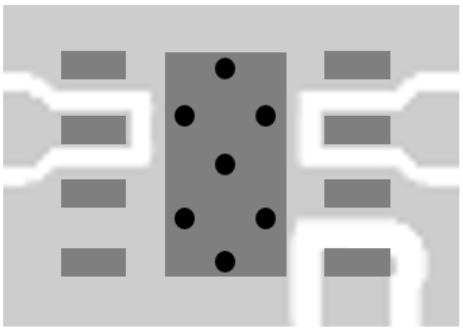
Component	Value	Package
C1 - C3	1000 pF	0402
C4	47 pF	0402
C5	0.1 µF	0402
L1	22 nH	0402

Recommended PCB Layout



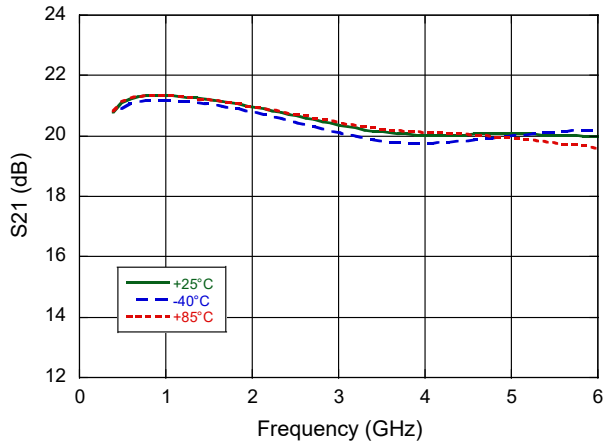
FR4, RF Layer Thickness = 0.711 mm, Trace = 0.55 mm, Gap = 0.18 mm

PCB Land Pattern

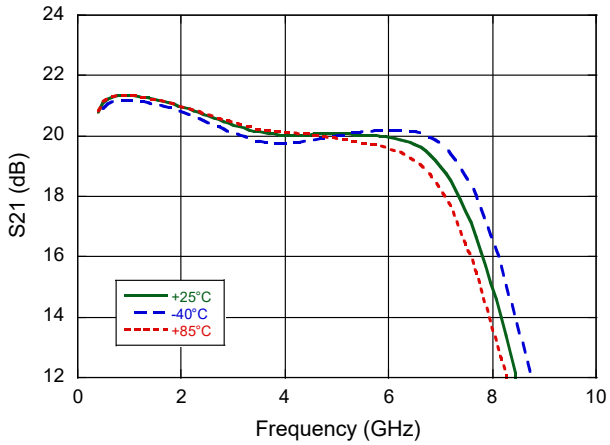


Typical Performance Curves @ 5 V / 90 mA, Z_0 = 50 Ω

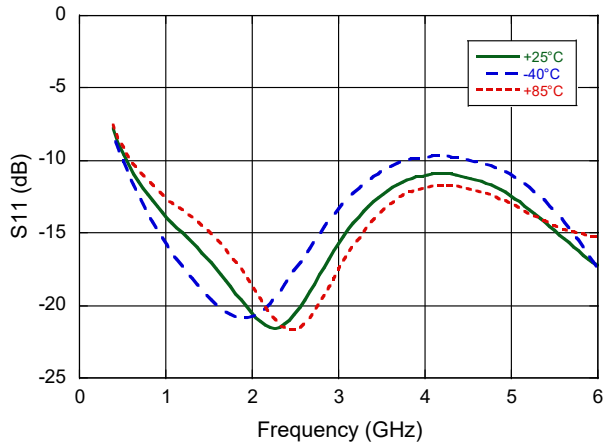
Gain



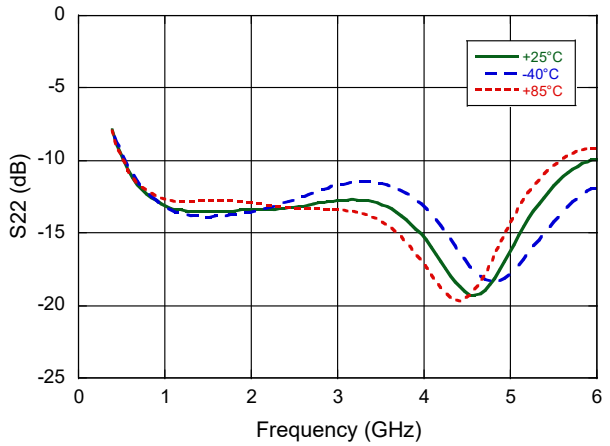
Gain to 10 GHz



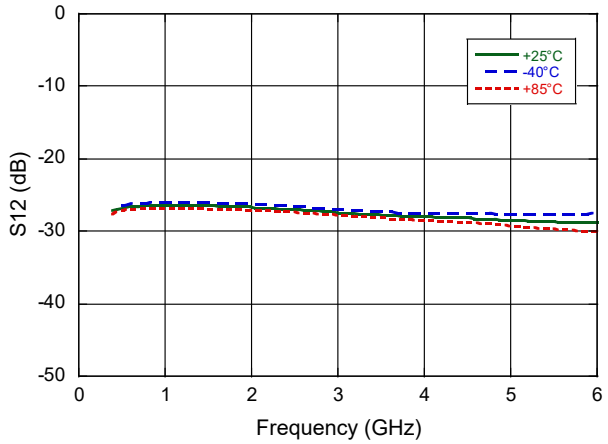
Input Return Loss



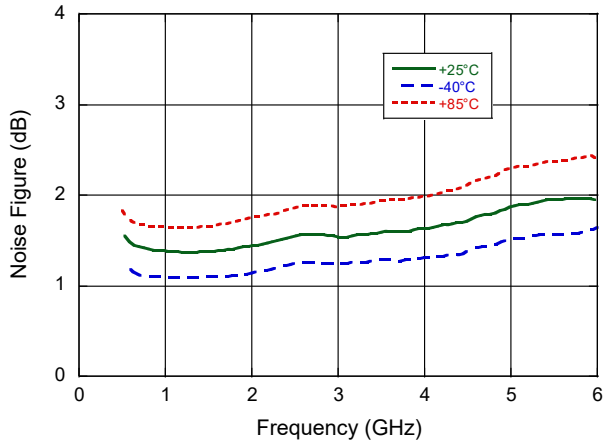
Output Return Loss



Reverse Isolation

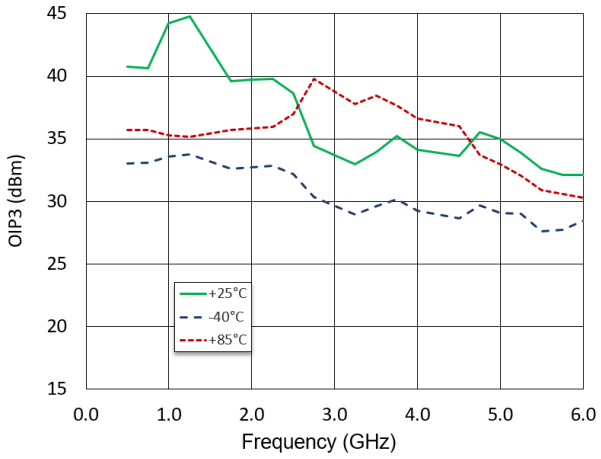


Noise Figure

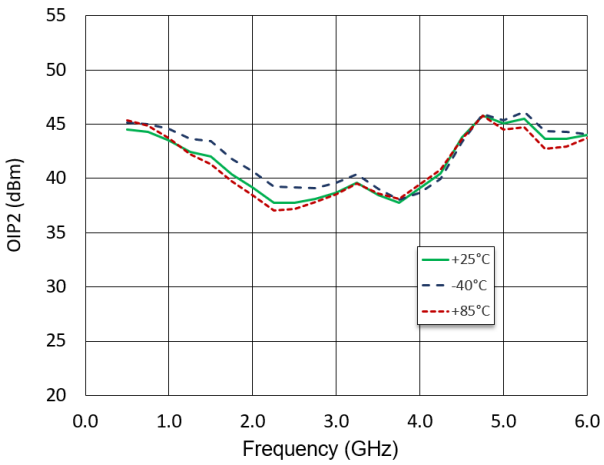


Typical Performance Curves @ 5 V / 90 mA, Z_0 = 50 Ω

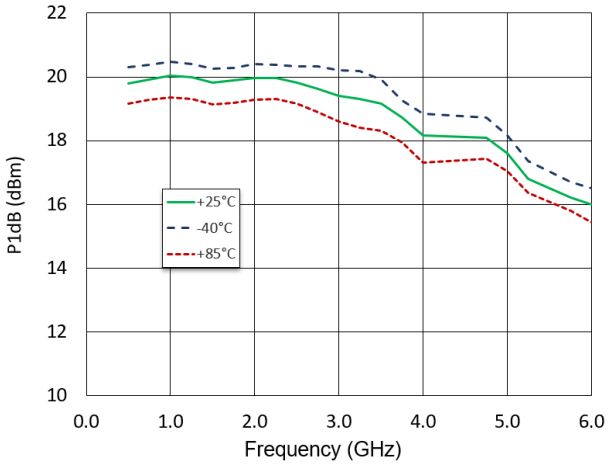
OIP3 at P_{IN} = -18 dBm/tone, 10 MHz Spacing



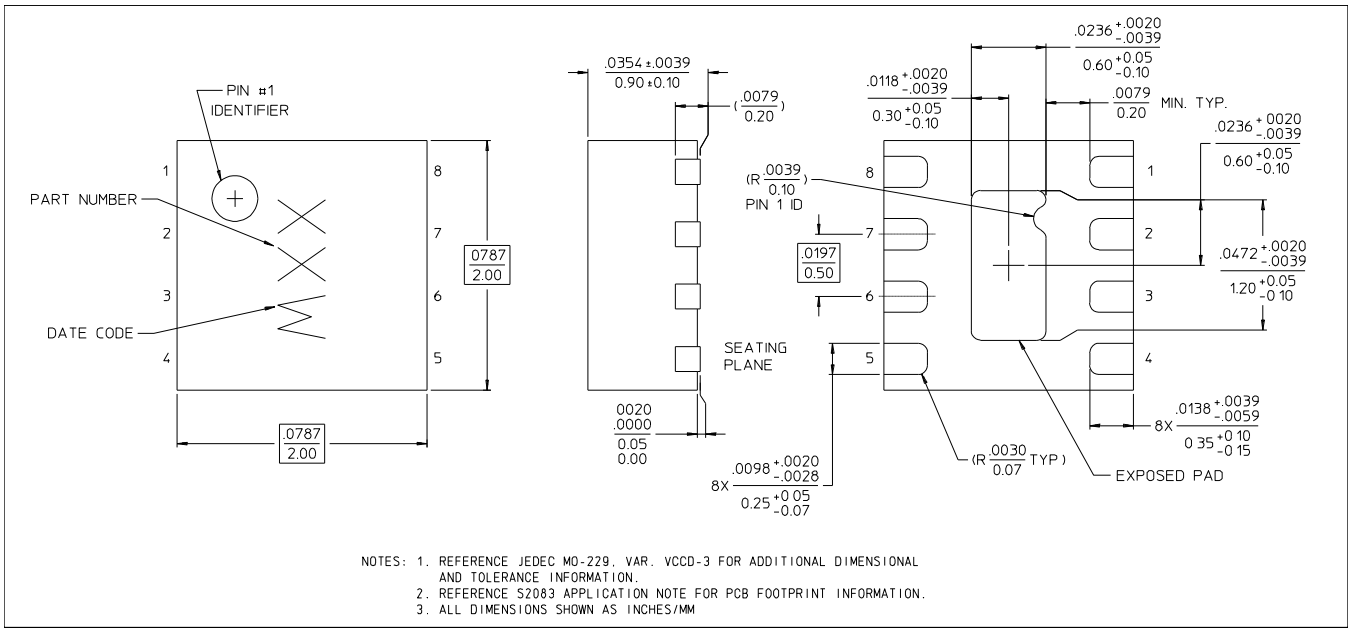
OIP2 at P_{IN} = -18 dBm/tone, 10 MHz Spacing



P1dB



Lead-Free 2 mm 8-Lead PDFN†



† Reference Application Note M2083 for lead-free solder reflow recommendations.
Meets JEDEC moisture sensitivity level (MSL) 1 requirements.
Plating is 100% matte tin over copper.