tyco Electronics

RoHS Compliant

MACOM

Low Noise GaAs MMIC Amplifier
1.2 – 1.75 GHz

MAAM12000
V3

Features

- 1.25 dB Typical Noise Figure
- 26 dB Typical Gain
- On-Chip Bias Network
- DC Decoupled RF Input and Output
- RoHS* Compliant

Description

M/A-COM's MAAM12000 is a wide band, low noise, MMIC amplifier. It includes two integrated gain stages and employs series inductive feedback to obtain excellent noise figure and a good, 50-ohm, input and output impedance match over the 1.2 to 1.75 GHz band. The MAAM12000 is fully monolithic, requires no external components.

The MAAM12000 is ideally suited to receivers in GPS and DGPS applications and operates over both the L1 and L2 frequency bands. Because of its wide bandwidth, the MAAM12000 can also be used as a driver, buffer or IF amplifier in numerous commercial and government system applications that require high gain, excellent linearity and low power consumption.

The MAAM12000-A1 is manufactured in-house using a reliable, 0.5 micron, GaAs MESFET process. This product is 100% RF tested to ensure compliance to performance specifications.

Ordering Information

Part Number	Package
MAAM12000	DIE [1]

1. Die quantity varies.

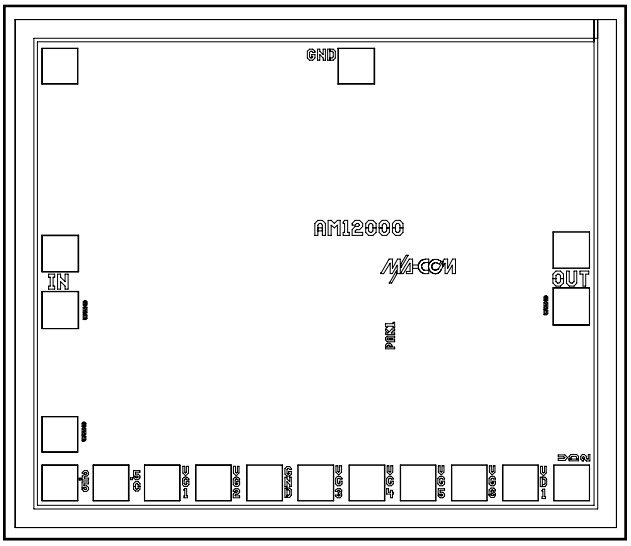
Absolute Maximum Ratings [2,3]

Parameter	Absolute Maximum
Voltage	+7 V @ V_{DD}, -10 V @ V_{GG}
Input Power	+20 dBm
Operating Temperature	-55°C to +125°C
Storage Temperature	-65°C to +150°C

2. Exceeding any one or combination of these limits may cause permanent damage to this device.
3. M/A-COM does not recommend sustained operation near these survivability limits.

* Restrictions on Hazardous Substances, European Union Directive 2002/95/EC.

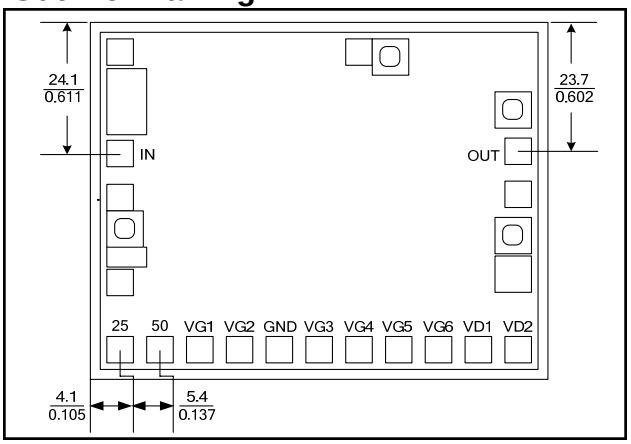
Pad Layout



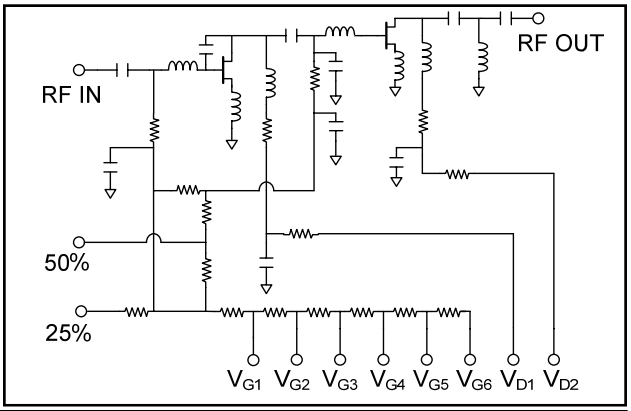
Die Size—Inches (mm)

0.062 x 0.052 x 0.004 (1.580 x 1.330 x 0.102)

Outline Drawing



Schematic



- **North America** Tel: 800.366.2266 / Fax: 978.366.2266
- **Europe** Tel: 44.1908.574.200 / Fax: 44.1908.574.300
- **Asia/Pacific** Tel: 81.44.844.8296 / Fax: 81.44.844.8298

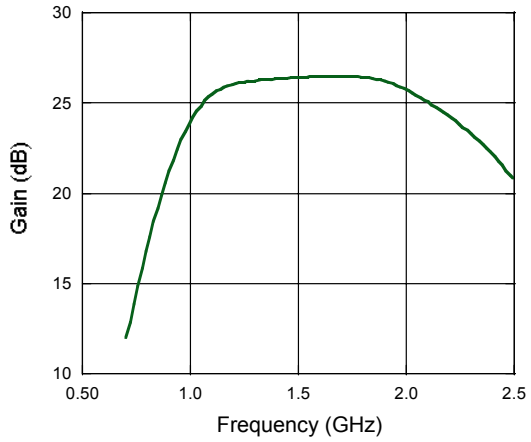
Visit www.macom.com for additional data sheets and product information.

Electrical Specifications: T_A = +25°C, V_{DD} = +5 Vdc, V_{GG} = -5.0 Vdc

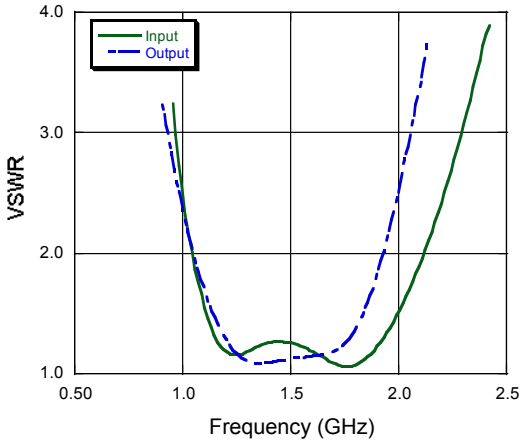
Parameter	Test Conditions	Units	Min.	Typ.	Max.
Frequency Range	—	GHz	1.20	—	1.75
Gain	—	dB	23	26	—
Gain Flatness	—	dB	—	±0.8	—
Noise Figure	—	dB	—	1.25	1.6
VSWR	Input Output	Ratio Ratio	— —	1.4:1 1.5:1	— —
Output Power	@ 1 dB Gain Compression	dBm	—	+14	—
Third Order Intercept	—	dBm	—	+24	—
Reverse Isolation	—	dB	—	40	—
Impedance	—	Ω	—	50	—
Bias Current	I_{DD} I_{GG}	mA mA	— —	80 1.0	110 1.5

Typical Performance @ +25°C

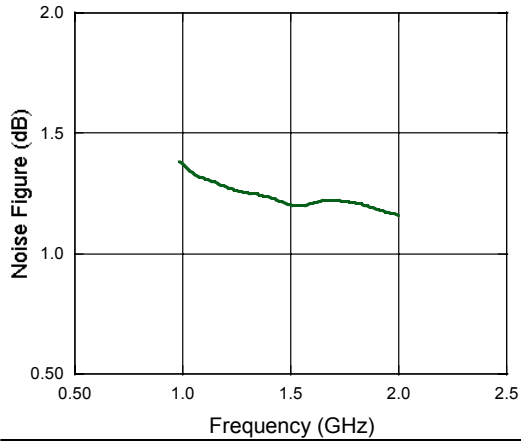
Gain



VSWR



Noise Figure



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Handling

Permanent damage to the MAAM12000 may occur if the following precautions are not adhered to:

A. Cleanliness - The MAAM12000 should be handled in a clean environment. Do not attempt to clean assembly after the MAAM12000 is installed.
B. Static Sensitivity - All die handling equipment and personnel should comply with DOD-STD-1686 Class 1.
C. Transients - Avoid instrument and power supply transients while bias is connected to the MAAM12000. Use shielded signal and bias cables to minimize inductive pick-up.
D. General Handling - DO NOT touch the surface of the die. It is recommended that the MAAM12000 die be handled along the long side with a sharp pair of tweezers.

Mounting

The MAAM12000 is back-metallized with Pd/Ni/Au (100/1,000/30,000Å) metallization. It can be die-mounted using Au/Sn eutectic performs or a thermally and electrically conductive epoxy. The attachment surface should be clean and flat.

Eutectic Die Attach:

A. An 80/20 Au/Sn perform is recommended with a work surface temperature of approximately 225°C and a tool temperature of 265°C. When hot 95/5 nitrogen/hydrogen gas is applied, solder temperature should be approximately 290°C.
B. DO NOT expose the MAAM12000 to a temperature greater than 320°C for more than 20 seconds. No more than 3 seconds of scrubbing should be required for attachment.

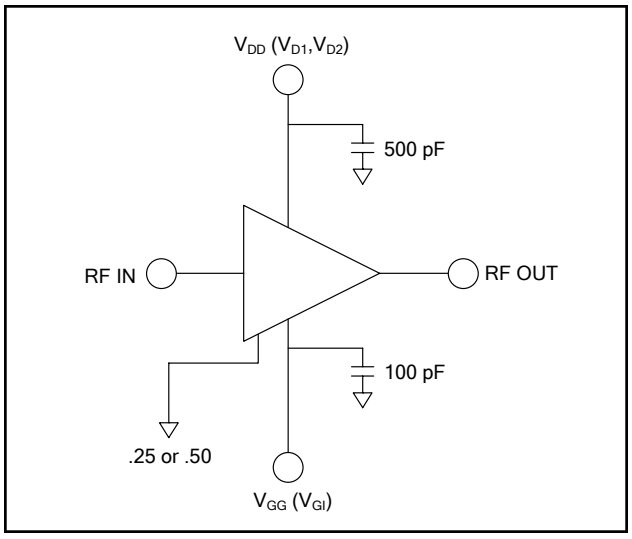
Epoxy Die Attach:

A. Electrically conductive epoxy is required
B. Apply a minimum amount of epoxy and place the MAAM12000 into position. A thin epoxy fillet should be visible around the perimeter of the die.
C. Cure epoxy per manufacturer's recommended schedule.

Bonding

A. Ball or wedge bond with 1.0 mil diameter gold wire or 3.0 mil x 0.5 mil ribbon. Thermosonic bonding with a nominal stage temperature of 150°C and a ball bonding force of 40 to 50 grams or wedge bonding force of 18 to 22 grams is recommended. Ultrasonic energy and time should be adjusted to the minimum levels necessary to achieve reliable bonds.
B. Bonds should be started on the die and terminated on the package.
C. Bonding pads are 4.0 x 4.0 mils.

Typical Bias Configuration [4,5,6]



4. Nominal bias is obtained by grounding pad .50 and connecting V_{GG} to pad V_{G3}.
5. Grounding pad .25, instead of pad .50 will decrease second stage current.
6. Optional biasing can be obtained by connecting V_{GG} to pads V_{G1}, V_{G2}, V_{G4}, V_{G5}, or V_{G6}, instead of V_{G3}. Connecting to V_{G1} results in the lowest current; V_{G6} will yield the highest current. Adjusting the bias can customize performance to suit special requirements.

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