

Low Noise Amplifier 1.575 GHz

Rev. V1

Features

- Low Noise Figure: 1.15 dB
- High Gain: 27 dB
- Low Power Consumption: 5V, 20 mA
- High Dynamic Range
- Lead-Free SOIC-8 Package
- 100% Matte Tin Plating over Copper
- Halogen-Free "Green" Mold Compound
- 260°C Reflow Compatible
- RoHS* Compliant Version of AM50-0002

Description

M/A-COM's MAALSS0042 is a high performance GaAs MMIC low noise amplifier in a lead-free SOIC 8-lead surface mount plastic package. The MAALSS0042 employs a monolithic 3-stage self-bias design and a simple external matching network to obtain minimum noise figure.

The MAALSS0042 is ideally suited for use where low noise figure, high gain, high dynamic range and low power consumption are required. Typical applications include receiver front ends in the Global Positioning System (GPS) market, as well as standard gain blocks, buffer amps, driver amps, and IF amps in both fixed and portable systems.

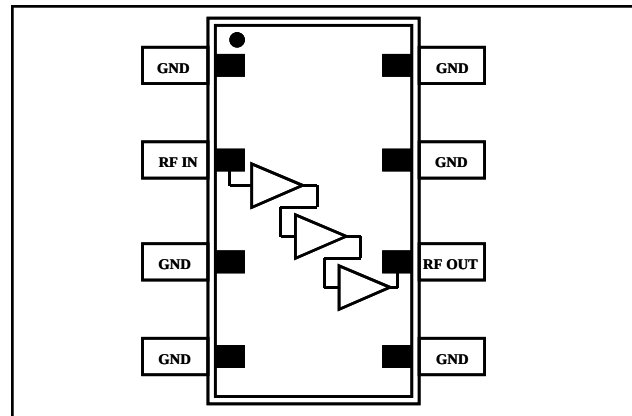
M/A-COM'S MAALSS0042 is fabricated using a mature 0.5-micron gate length GaAs process. The process features full passivation for increased performance reliability.

Ordering Information ^{1,2}

Part Number	Package
MAALSS0042	Bulk Packaging
MAALSS0042TR-3000	3000 piece reel
MAALSS0042SMB	Sample Test Board

1. Reference Application Note M513 for reel size information.
2. Die quantity varies.

Functional Diagram



Pin Configuration ^{3,4,5}

Pin No.	Pin Name	Description
1	GND	Ground
2	RF IN	RF Input
3	GND	Ground
4	GND	Ground
5	GND	Ground
6	RF OUT	RF Output, V _{DD}
7	GND	Ground
8	GND	Ground

3. Pins 1, 3, 4, 5, 7, and 8 must be RF and DC grounded (see Recommended PCB Configuration).
4. Pin 2 is the RF input and must be connected to the simple matching network shown in the Application Schematic.
5. Pin 6 is the RF output. V_{DD} is also applied on Pin 6.

Absolute Maximum Ratings ^{6,7}

Parameter	Absolute Maximum
V _{DD}	+10 VDC
Input Power	17 dBm
Channel Temperature ⁸	+150 °C
Operating Temperature	-40 °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. M/A-COM does not recommend sustained operation near these survivability limits.
8. Typical thermal resistance (θ_{JC}) = +165 °C/W

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

ADVANCED: Data Sheets contain information regarding a product M/A-COM Technology Solutions is considering for development. Performance is based on target specifications, simulated results, and/or prototype measurements. Commitment to develop is not guaranteed.

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Parameter	Test Conditions	Units	Min.	Typ.	Max.
Gain	F = 1.575 GHz, P _{IN} = -35 dBm	dB	25	27	29
Noise Figure	F = 1.575 GHz, P _{IN} = -35 dBm	dB	-	1.15	1.4
Input VSWR	F = 1.575 GHz, P _{IN} = -35 dBm	Ratio	-	2.0:1	-
Output VSWR	F = 1.575 GHz, P _{IN} = -35 dBm	Ratio	-	1.5:1	-
Output P1dB	F = 1.575 GHz	dBm	-	1	-
Input IP ₃	F = 1.575 GHz, P _{IN} = -35 dBm	dBm	-	-14	-
Reverse Isolation	F = 1.575 GHz, P _{IN} = -35 dBm	dB	-	48	-
Bias Current	—	mA	15	20	25

Technical drawing of a 12x12 inch FR-4 circuit board. The drawing shows a central square area with a circular cutout, surrounded by a border. Dimensions are given in inches (mm). Key features include:

- Overall Dimensions:** 12.000 (304.8) inches by 12.000 (304.8) inches.
- Central Cutout:** 4.000 (101.6) inches by 4.000 (101.6) inches.
- RF IN Port:** Located on the left side, with a width of 0.024 (0.61) inches and a height of 0.109 (2.77) inches.
- RF OUT Port:** Located on the right side, with a width of 0.030 (0.76) inches and a height of 0.109 (2.77) inches.
- Plated Through Holes:** 12 holes, each with a diameter of 0.060 (1.52) inches, arranged in a 3x4 grid.
- Dimensions:**
 - Top: 0.244 (6.20) inches, 0.072 (1.83) inches, 0.112 (2.84) inches, 0.245 (6.22) inches.
 - Bottom: 0.172 (4.37) inches, 0.060 (1.52) inches.
 - Left: 0.060 (1.52) inches, 0.024 (0.61) inches.
 - Right: 0.030 (0.76) inches.
- Notes:**
 - 2X R 0.025 (0.64) PLATED THRU
 - 12 X R 0.008 (0.20) PLATED THRU

FR-4 circuit board, thickness = 0.016 inches (0.41)
 Dimensions in inches (mm).

[illegible]

The drawing illustrates the mechanical specifications of the M538 package. It includes three views: a top view, a side view, and a footprint view.

Top View: Shows a rectangular package with a central label area. The label contains the following information: PART NUMBER (XX-XXX), DATE/LOT CODE (YYWWXXXX), COMPANY LOGO (MACOM), and ORIENTATION MARK. The label dimensions are 1.497/1.574 inches (3.80/4.00 mm). The package width is 0.075/0.098 inches (1.91/2.5 mm). The package height is 0.040/0.098 inches (1.0/2.5 mm). The package is marked with PIN 1 and PIN 8.

Side View: Shows the package profile with a height of 0.016/0.050 inches (0.40/1.27 mm).

Footprint View: Shows the package footprint with a width of 0.532/0.688 inches (1.35/1.75 mm) and a length of 1.890/1.968 inches (4.80/5.00 mm). The footprint is marked with 0.050 inches (1.27 mm) and 8X.

Notes:

1. REFERENCE JEDEC M5-012-AA. FOR ADDITIONAL DIMENSIONAL AND TOLERANCE INFORMATION.
2. REFERENCE M538 APPLICATION NOTE FOR FOOTPRINT INFORMATION.
3. ALL DIMENSIONS SHOWN AS INCHES/MM.

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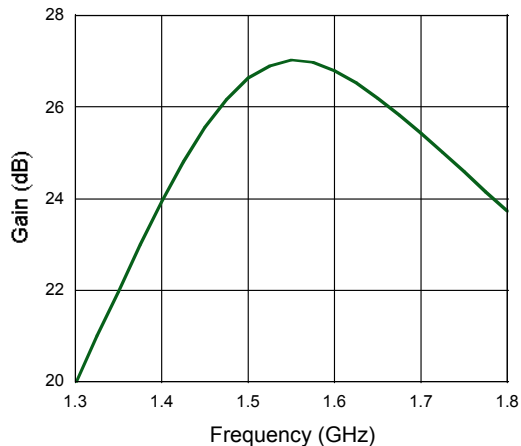
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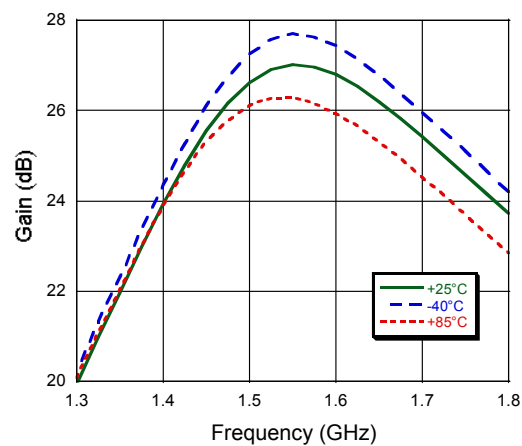
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Typical Performance

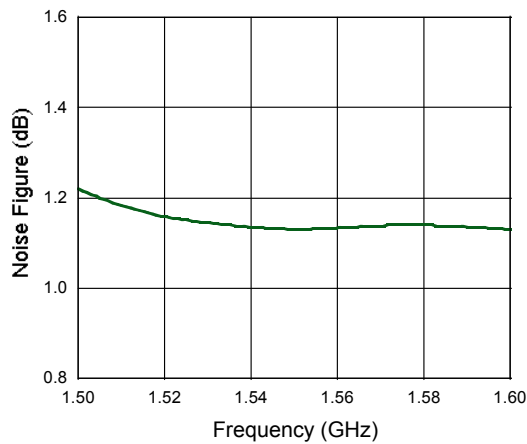
Gain, $T_A = +25^\circ\text{C}$



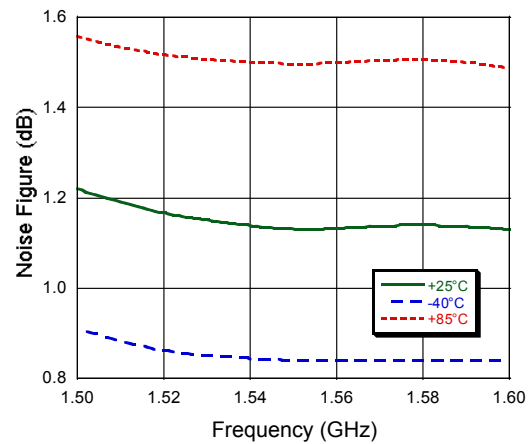
Gain over Temperature



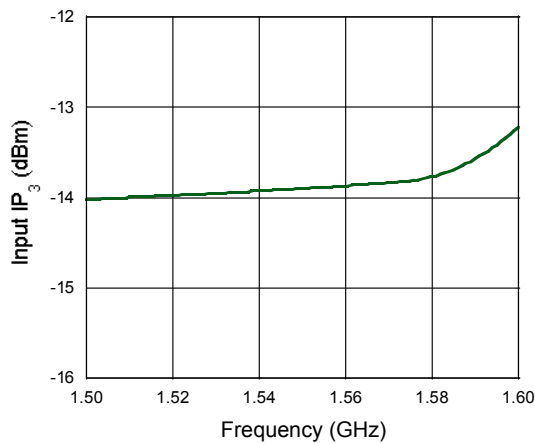
Noise Figure, $T_A = +25^\circ\text{C}$



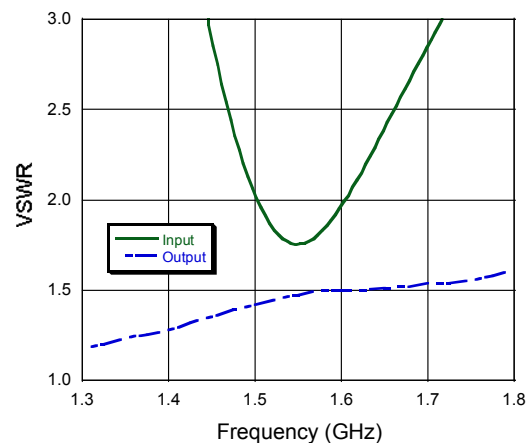
Noise Figure over Temperature



Input IP_3 , $T_A = +25^\circ\text{C}$



VSWR, $T_A = +25^\circ\text{C}$



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