GPS Low Noise Amplifier
1.5 - 1.7 GHz

MAALSS0049
V1

Features

- High Gain: 20 dB
- Low Noise Figure: 1.5 dB
- Good 50 Ω Input / Output Match
- Single +3 V to +5 V Bias
- Adjustable Current
- Lead-Free SOT-26 Package
- 100% Matte Tin Plating over Copper
- Halogen-Free "Green" Mold Compound
- 260°C Reflow Compatible
- RoHS* Compliant Version of MAALSS0027

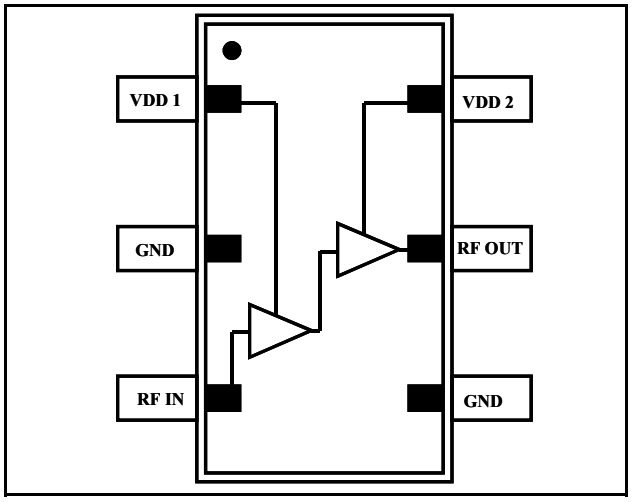
Description

M/A-COM's MAALSS0049 is a GaAs MMIC low noise amplifier in a lead-free SOT-26 surface mount plastic package. It employs a monolithic 2-stage design featuring a convenient 50-ohm input/output impedance that minimizes the number of external components required.

The MAALSS0049 is optimized for the GPS frequency of 1.575 GHz. It operates with a single 3 volt to 5 volt supply and has an off chip resistor that can be used to improve the linearity performance.

The MAALSS0049 is fabricated using M/A-COM's E/D process to realize low noise and high dynamic range. The process features full passivation for increased performance and reliability.

Functional Schematic



Pin Configuration

Pin	Pin Name	Description
1	V_{DD1}	Stage 1 Voltage
2	GND	Ground
3	RF IN	RF input
4	GND	Ground
5	RF OUT	RF output
6	V_{DD2}	Stage 2 Voltage

Ordering Information

Part Number	Package
MAALSS0049	Bulk Packaging
MAALSS0049TR-3000	3000 piece reel
MAALSS0049SMB	Sample Test Board

Note: Reference Application Note M513 for reel size information.

Absolute Maximum Ratings[1,2]

Parameter	Absolute Maximum
Input Power	+8 dBm
Operating Voltage	+6 Volts
Operating Temperature	-40°C to +85°C
Storage Temperature	-40°C to +150°C

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

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

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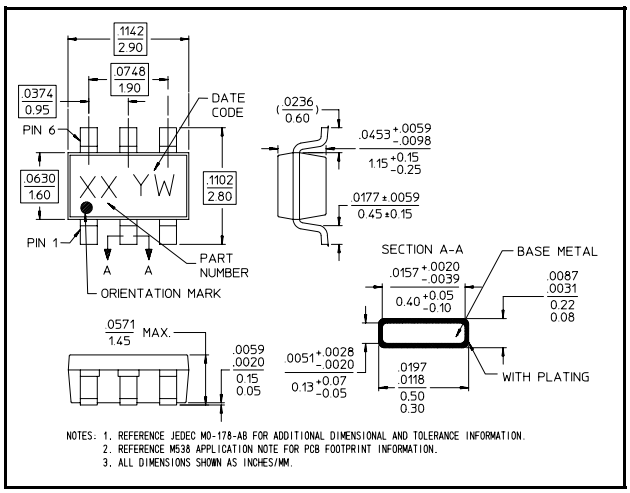
Electrical Specifications: T_A = 25°C, V_{DD} = 3 V, Z_0 = 50 Ω

Parameter	Test Conditions	Units	Min.	Typ.	Max.
Gain	1.575 GHz	dB	17	20	22
Noise Figure	1.575 GHz	dB	—	1.5	1.9
Input Return Loss	1.575 GHz	dB	—	15	—
Output Return Loss	1.575 GHz	dB	—	15	—
Output 1 dB Compression	1.575 GHz	dBm	—	8.5	—
Output IP3	-28 dBm Input Power, 1 MHz tone separation 1.575 GHz	dBm	12	17	—
Reverse Isolation	1.575 GHz	dB	—	34	—
Current	—	mA	—	9.5	16

Lead-Free SOT-26 Plastic Package†



† Reference Application Note M538 for lead-free solder reflow recommendations.

Operating the MAALSS0049

To operate the device, follow these steps:

1. Ramp V_{DD} to desired voltage, typically 3 to 5 V.
2. Set RF input.
3. Power down in reverse sequence.

Handling Procedures

Please observe the following precautions to avoid damage:

Static Sensitivity

Gallium Arsenide Integrated Circuits are sensitive to electrostatic discharge (ESD) and can be damaged by static electricity. Proper ESD control techniques should be used when handling these devices.

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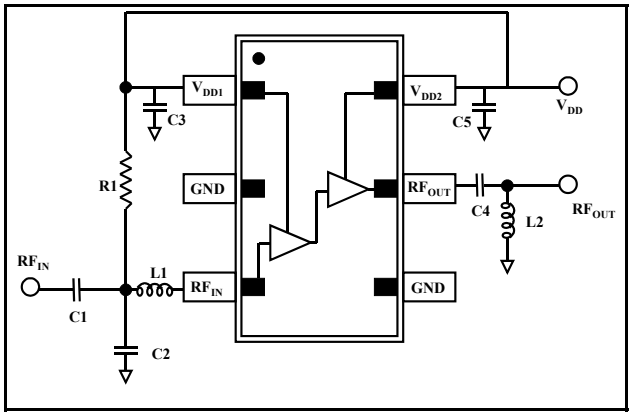
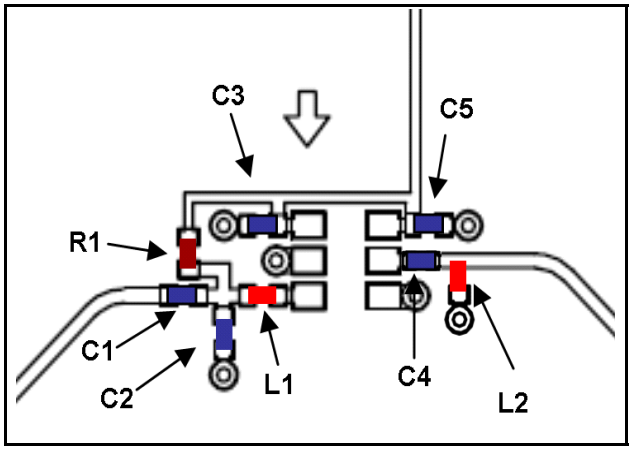
Application Schematic



Recommended PCB Configuration



Recommended Tuning for 1.575 GHz

Item	Description	Manufacturer
C1	27 pF Capacitor, 0402 Package, 5%	Murata
C2	1.5 pF Capacitor, 0402 Package, 5%	Murata
C3,C5	0.1 µF Capacitor, 0402 Package, 5%	Murata
C4	10 pF Capacitor, 0402 Package, 5%	Murata
L1	12 nH Inductor, 0402 Package, 2%	Coilcraft
L2	3.9 nH Inductor, 0402 Package, 2%	Coilcraft
R1	23.7 KOhm Resistor, 0402 Package, 1%	Panasonic

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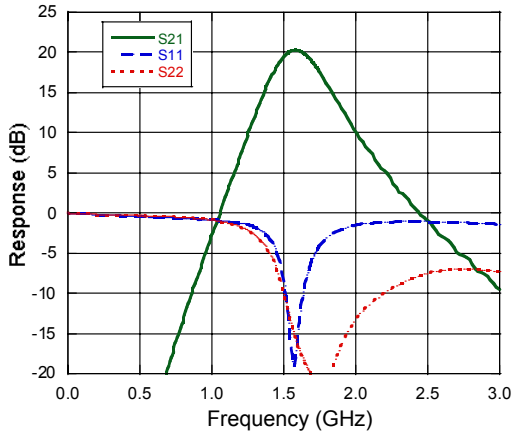
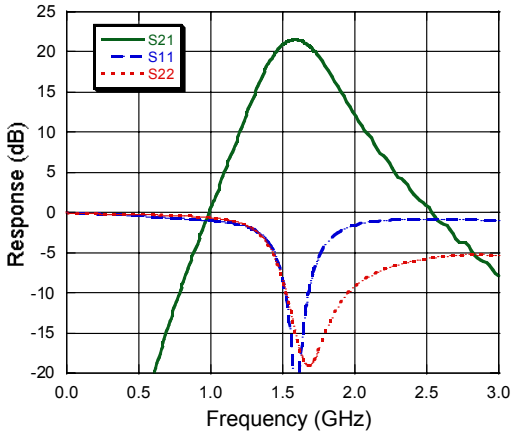
Typical Performance Curves

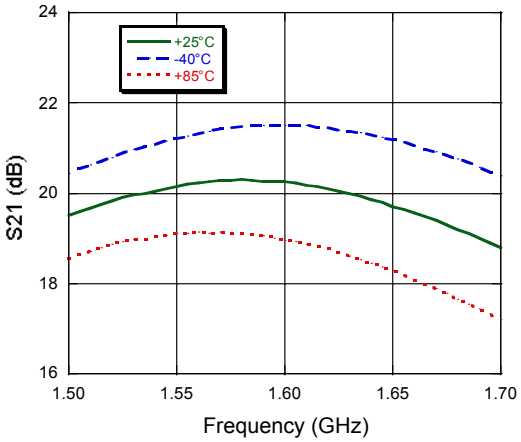
Broadband Gain and Return Loss @ 3 Volts



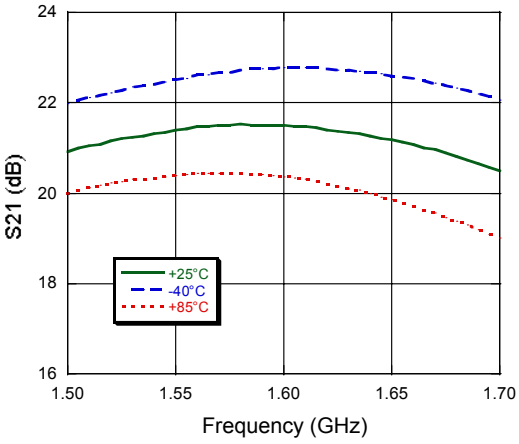
Broadband Gain and Return Loss @ 5 Volts



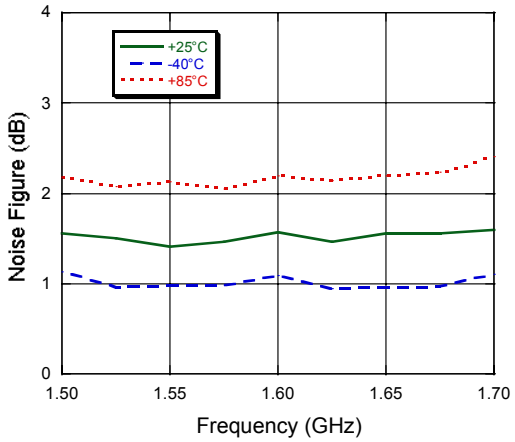
S21 @ 3 Volts



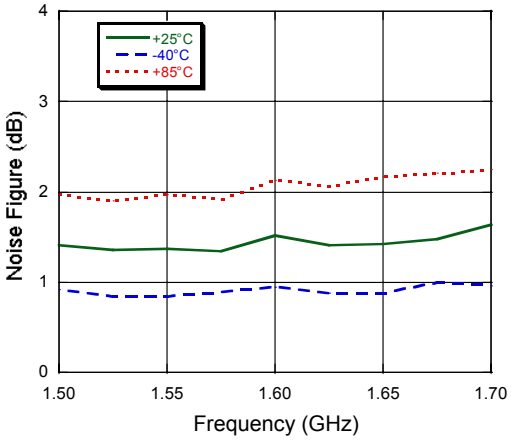
S21 @ 5 Volts



Noise Figure @ 3 Volts



Noise Figure @ 5 Volts



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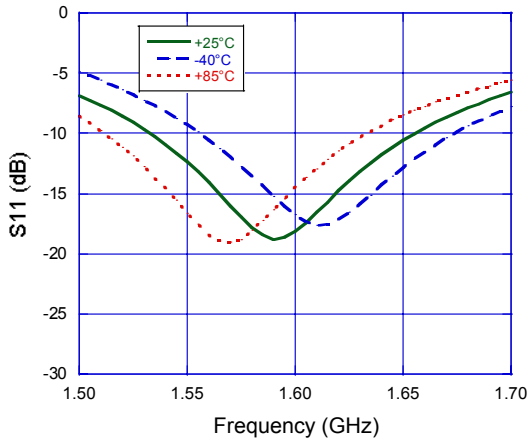
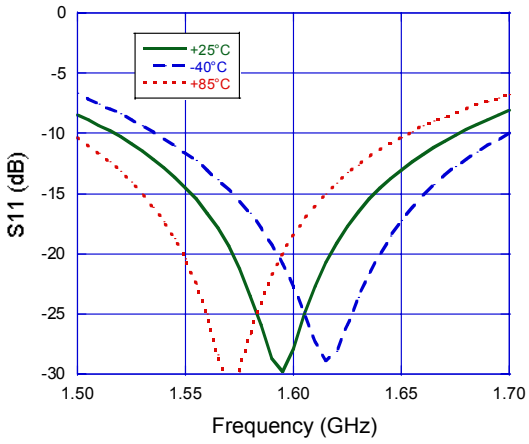
Typical Performance Curves

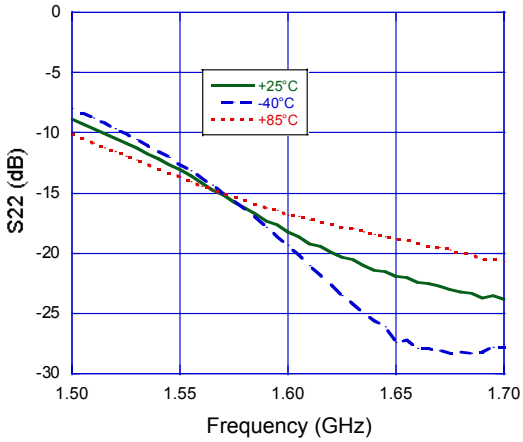
S11 @ 3 Volts



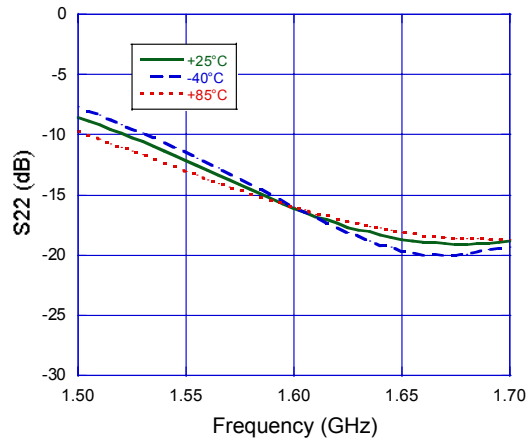
S11 @ 5 Volts



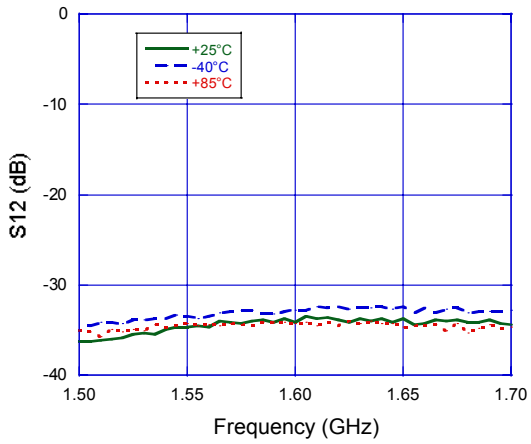
S22 @ 3 Volts



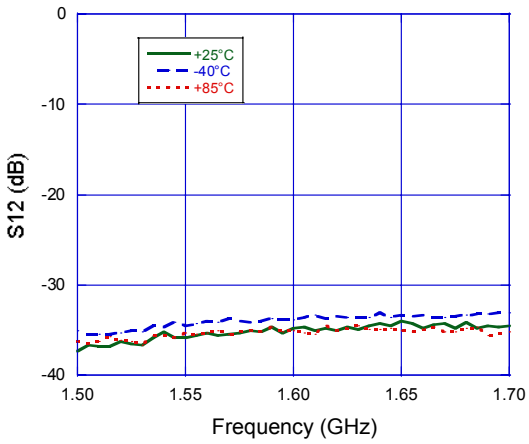
S22 @ 5 Volts



S12 @ 3 Volts



S12 @ 5 Volts



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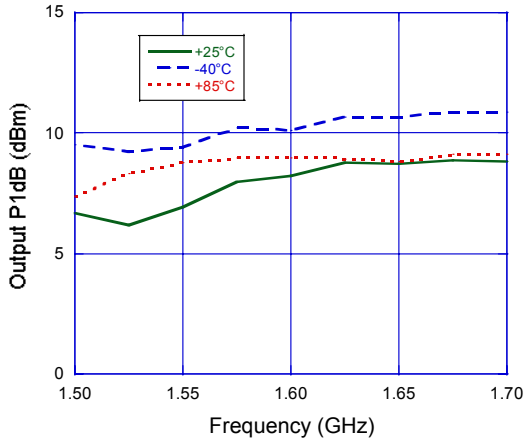
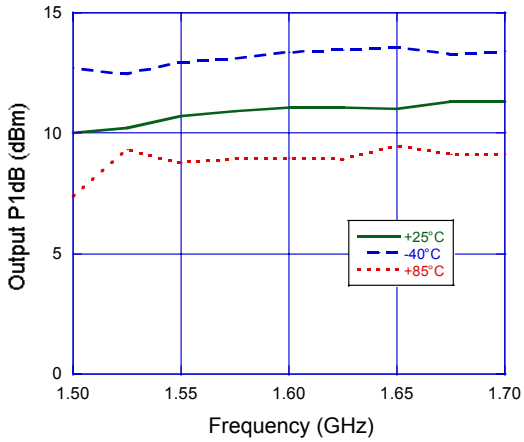
Typical Performance Curves

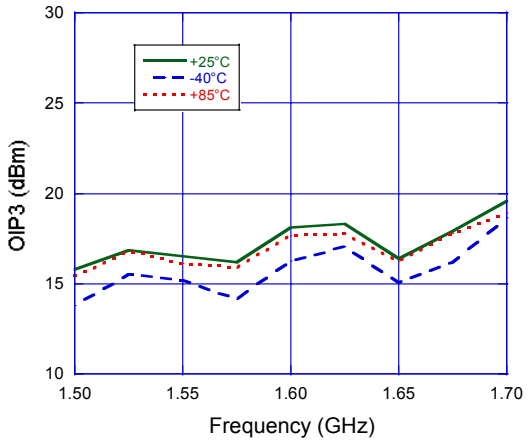
Output P1dB @ 3 Volts



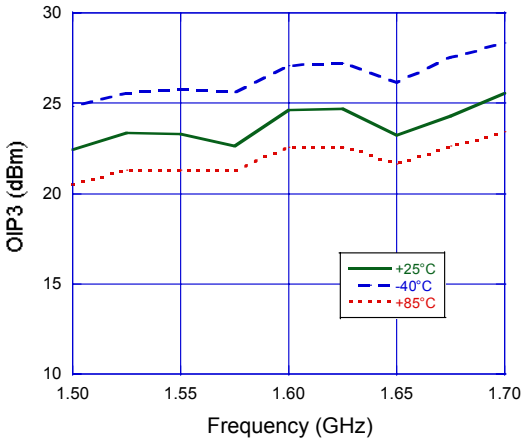
Output P1dB @ 5 Volts



Output IP3 @ 3 Volts



Output IP3 @ 5 Volts



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