

Satellite Radio Low Noise Amplifier  
2.2 - 2.4 GHz

MAALSS0013  
V6

**Features**

- Low Noise Figure: 0.9 dB
- High Gain: 17 dB
- Low Cost Plastic SOT-26 Package
- Adjustable Current
- Single +3 V to +5 V Bias
- Output Power: +10 dBm
- 50 Ω Input / Output Match

**Description**

M/A-COM's MAALSS0013 LNA is a GaAs MMIC low noise amplifier in a low-cost SOT-26 surface mount plastic package. The MAALSS0013 employs a monolithic 2-stage design featuring a convenient 50-ohm input/output impedance that minimizes the number of external components required. The device typically runs off a single 3 volt to 5 volt supply and has an off chip resistor that can be used to improve the linearity performance. The design provides excellent performance from 2.2 to 2.4 GHz.

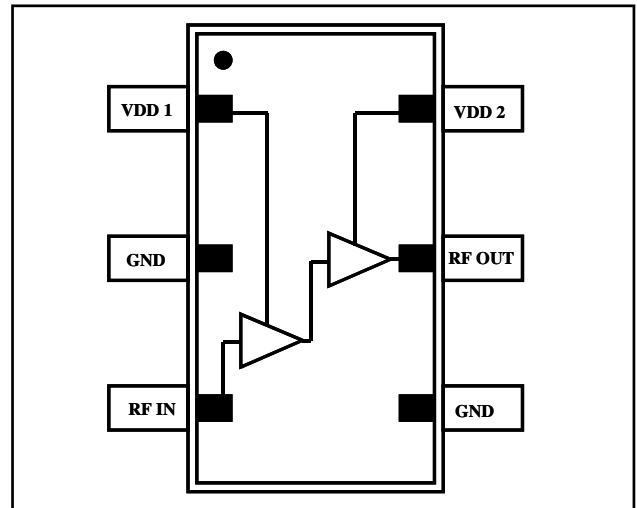
The MAALSS0013 is fabricated using M/A-COM's E/D process to realize low noise and high dynamic range. The process features full passivation for increased performance and reliability.

**Ordering Information**<sup>1</sup>

Part Number	Package
MAALSS0013	Bulk Packaging
MAALSS0013TR	1000 Piece Tape and Reel
MAALSS0013TR-3000	3000 Piece Tape and Reel
MAALSS0013SMB	Sample Test Board (Includes 5 Samples)

1. Reference Application Note M513 for reel size information.

**Functional Schematic**



**Pin Configuration**

Pin	Pin Name	Description
1	V <sub>DD1</sub>	Stage 1 Voltage
2	GND	Ground
3	RF IN	RF input
4	GND	Ground
5	RF OUT	RF output
6	V <sub>DD2</sub>	Stage 2 Voltage

**Absolute Maximum Ratings**<sup>2,3</sup>

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

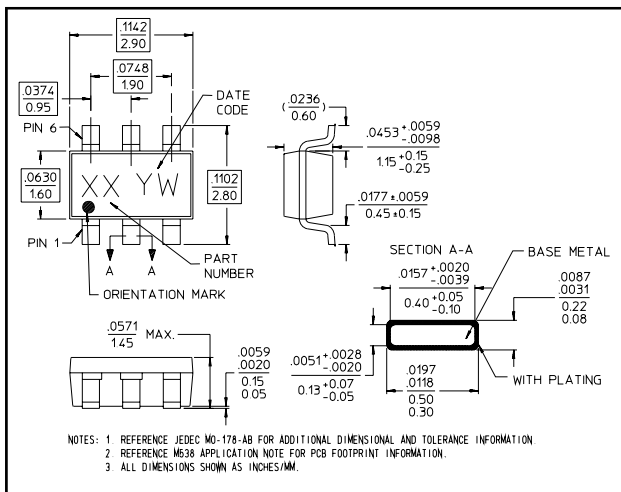
Satellite Radio Low Noise Amplifier  
2.2 - 2.4 GHz

MAALSS0013  
V6

Electrical Specifications:  $T_A = 25^\circ\text{C}$ ,  $V_{DD} = 5\text{ V}$ ,  $Z_0 = 50\Omega$

Parameter	Frequency	Units	Min.	Typ.	Max.
Gain	2.3 GHz	dB	15	17	19
Noise Figure	2.3 GHz	dB	—	0.9	1.5
Input Return Loss	2.3 GHz	dB	—	12	—
Output Return Loss	2.3 GHz	dB	—	13	—
1 dB Compression	2.3 GHz	dBm	—	10	—
Output IP3	2.3 GHz	dBm	20	26	—
Current	—	mA	—	26	30

SOT-26 Plastic Package



Operating the MAALSS0013

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:

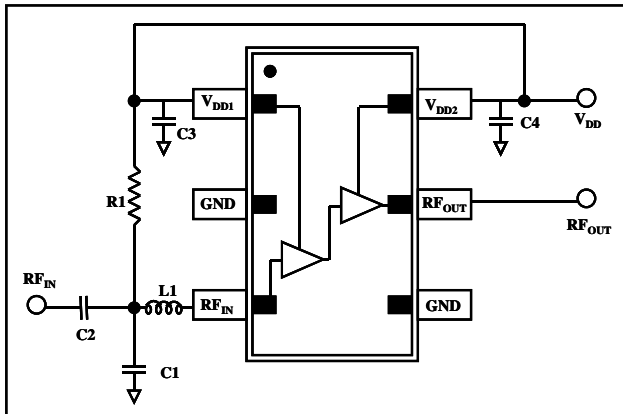
Static Sensitivity

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.

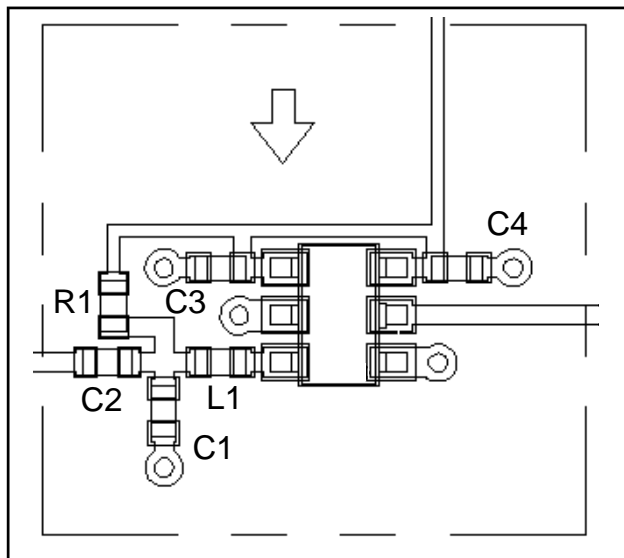
Satellite Radio Low Noise Amplifier  
2.2 - 2.4 GHz

MAALSS0013  
V6

**Application Schematic**



**Recommended PCB Configuration**



**Component List - Broadband**

Part	Value	Case Size	Manufacturer
C1	0.5 pF	0402	Murata
C2-C4	0.1 μF	0402	Murata
L1 <sup>4</sup>	5.6 nH	0402	Coilcraft
R1 <sup>5</sup>	22.1K	0402	Panasonic

**Component List - Satellite Radio @ 5 V**

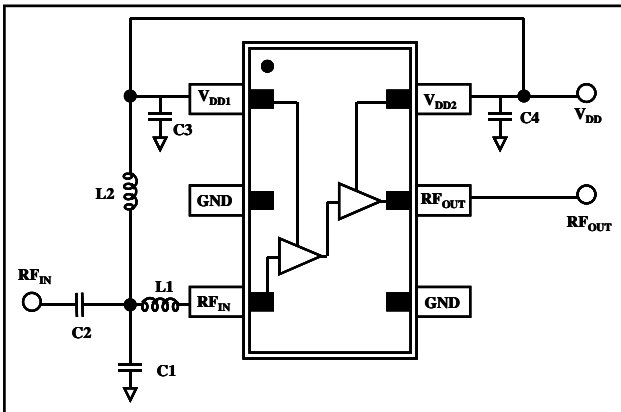
Part	Value	Case Size	Manufacturer
C1	0.5 pF	0402	Murata
C2	3.9 pF	0402	Murata
C3-C4	0.01 μF	0402	Murata
L1 <sup>4</sup>	5.6 nH	0402	Coilcraft
R1 <sup>5</sup>	22.1K	0402	Panasonic

4. Must have a tolerance of 2%.  
5. Must have a tolerance of 1%.

Satellite Radio Low Noise Amplifier  
2.2 - 2.4 GHz

MAALSS0013  
V6

**Application Schematic**

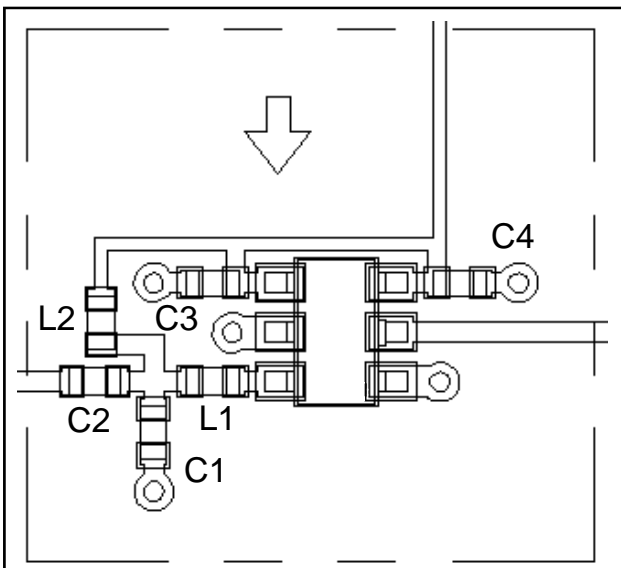


**Component List - Satellite Radio @ 3.3 V**

Part	Value	Case Size	Manufacturer
C1	0.5 pF	0402	Murata
C2	3.9 pF	0402	Murata
C3-C4	0.01 μF	0402	Murata
L1 <sup>6</sup>	5.6 nH	0402	Coilcraft
L2	100 nH	0402	Coilcraft

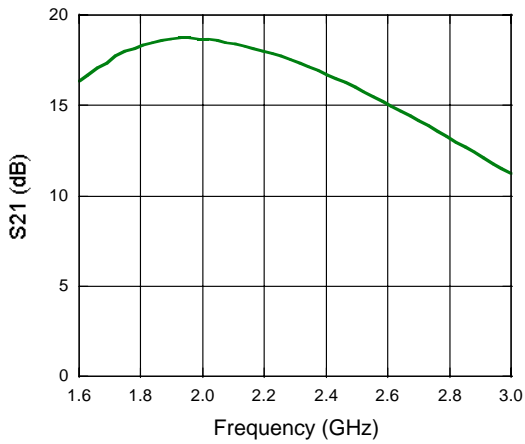
6. Must have a tolerance of 1%.

**Recommended PCB Configuration**

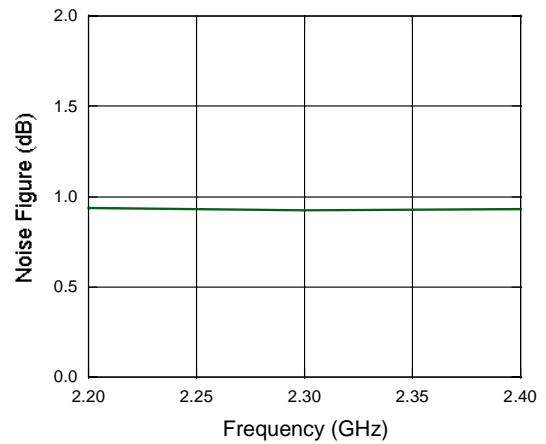


**Typical Performance Curves: Broadband Tuning, 5 Volts, +25°C**

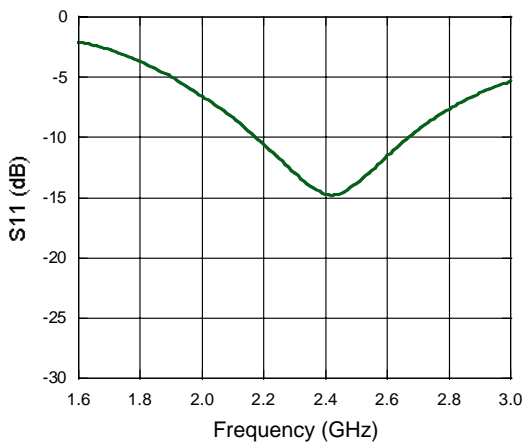
**Gain**



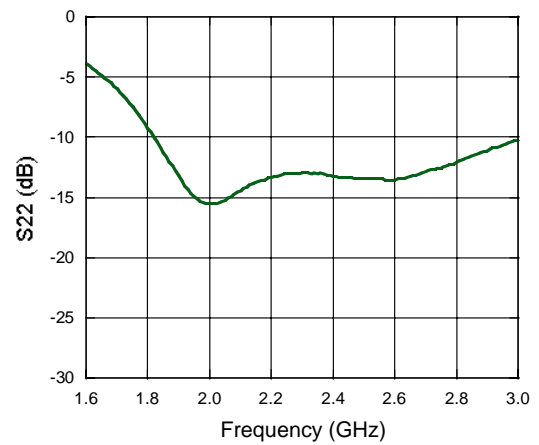
**Noise Figure**



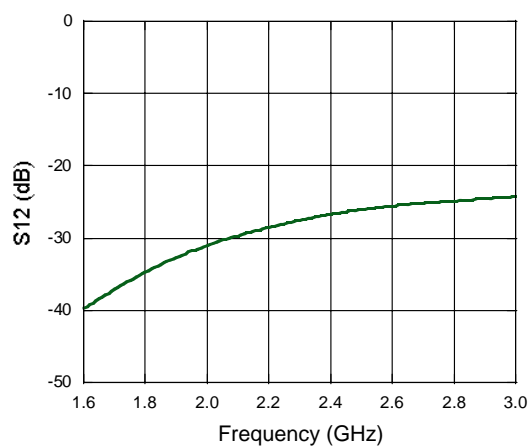
**Input Return Loss**



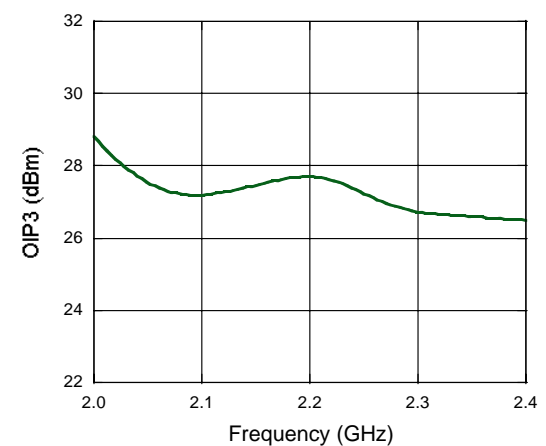
**Output Return Loss**



**S12**

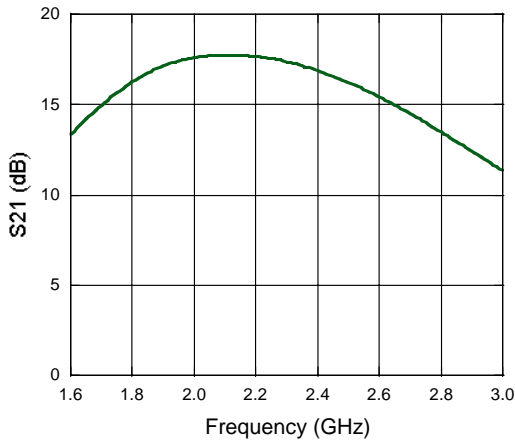


**Output IP3**

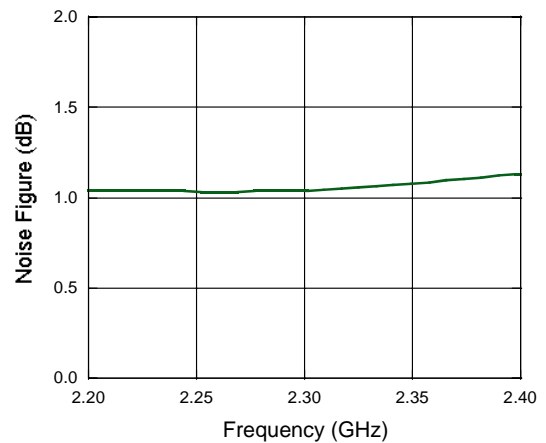


**Typical Performance Curves: Satellite Tuning, 5 Volts, +25°C**

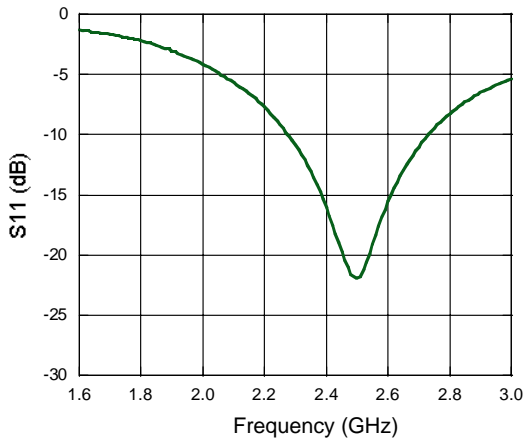
**Gain**



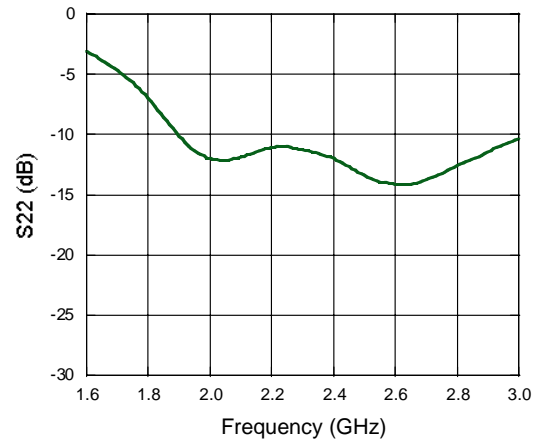
**Noise Figure**



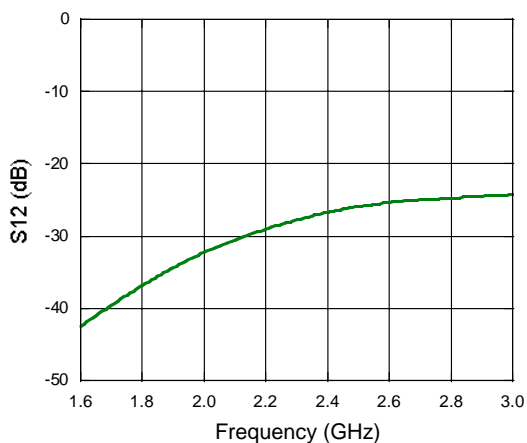
**Input Return Loss**



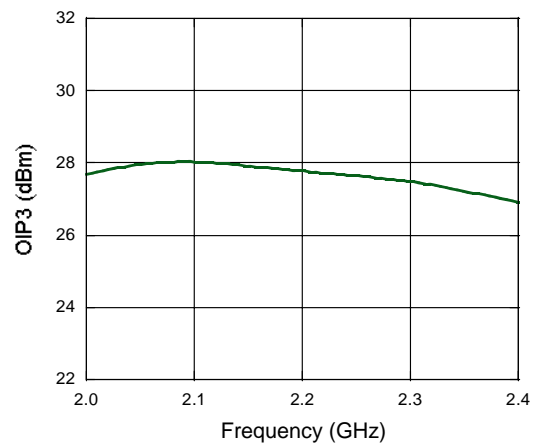
**Output Return Loss**



**S12**

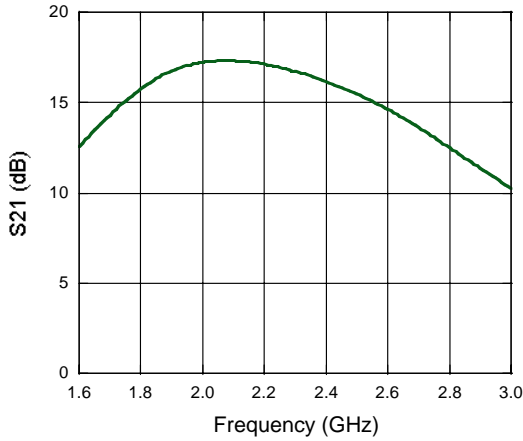


**Output IP3**

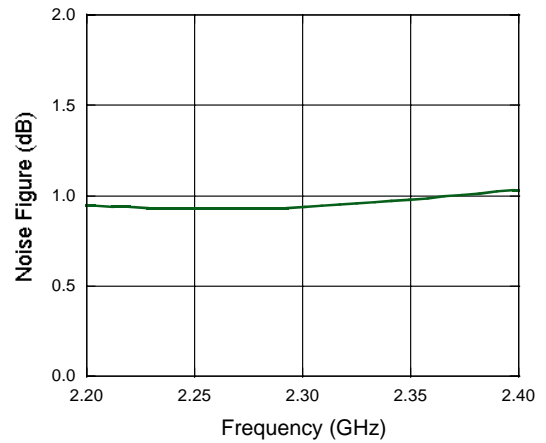


**Typical Performance Curves: Satellite Tuning, 3.3 Volts, +25°C**

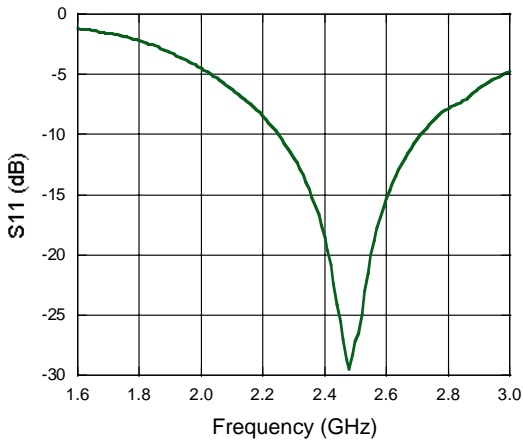
**Gain**



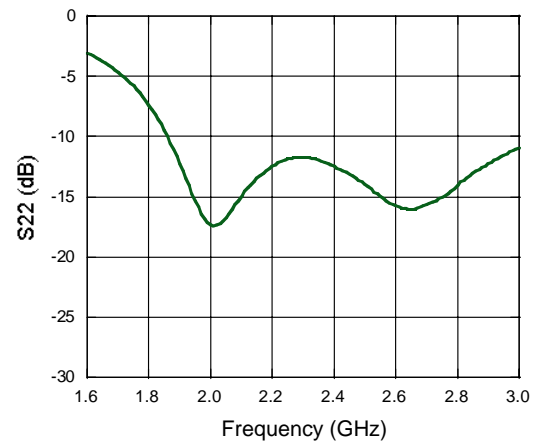
**Noise Figure**



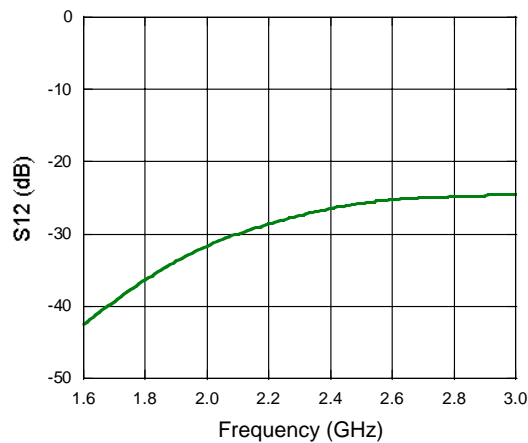
**Input Return Loss**



**Output Return Loss**



**S12**



**Output IP3**

