

Satellite Radio Low Noise Amplifier 2.2 - 2.4 GHz

**MAALSS0013
V6**

Features

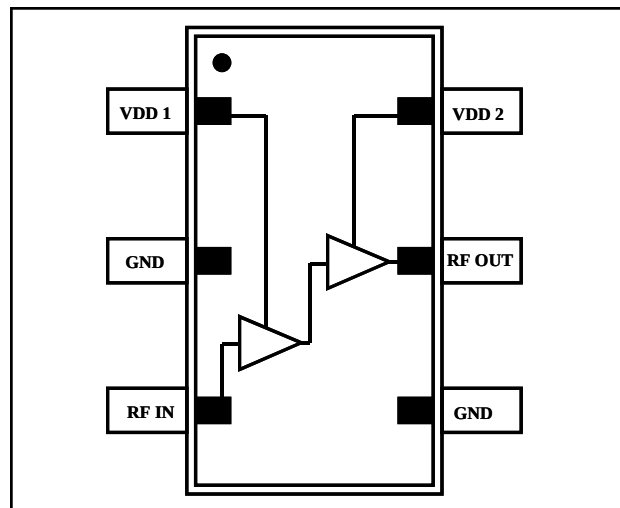
- Low Noise Figure: 0.9 dB
- High Gain: 17 dB
- Low Cost Plastic SOT-26 Package
- Adjustable Current
- Single +3 V to +5 V Bias
- Output Power: +10 dBm
- 50 Ω Input / Output Match

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.

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 ¹

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.

Absolute Maximum Ratings ^{2,3}

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.

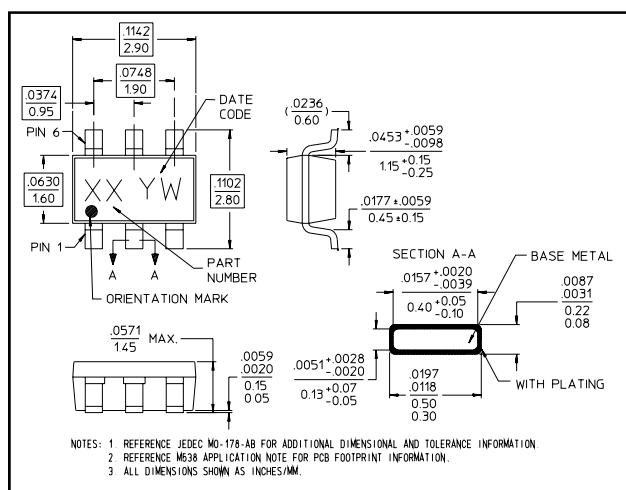
Satellite Radio Low Noise Amplifier 2.2 - 2.4 GHz

**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:

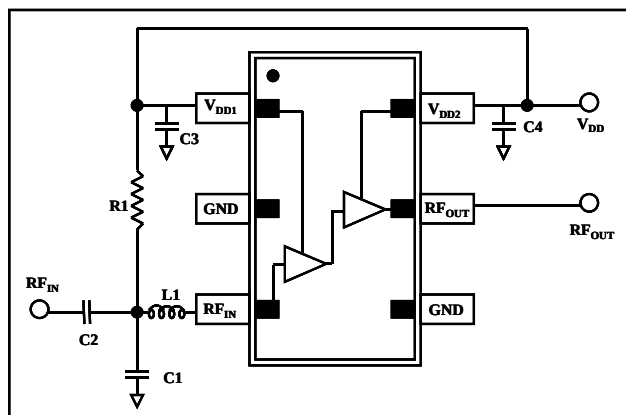
Static Sensitivity

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.

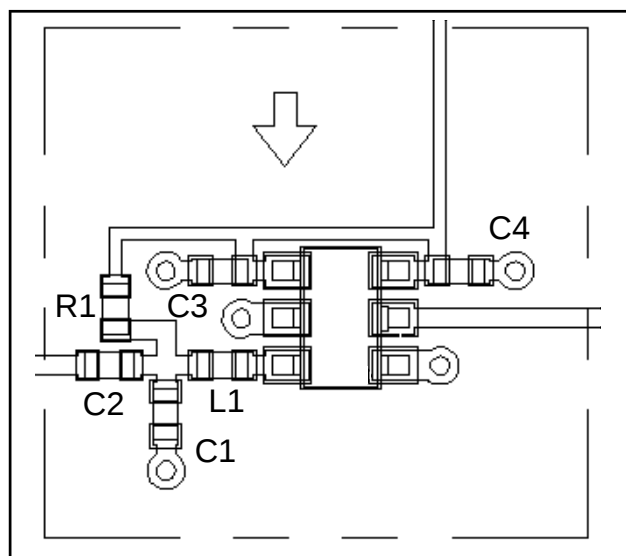
Satellite Radio Low Noise Amplifier 2.2 - 2.4 GHz

**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 μ F	0402	Murata
L1 ⁴	5.6 nH	0402	Coilcraft
R1 ⁵	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 μ F	0402	Murata
L1 ⁴	5.6 nH	0402	Coilcraft
R1 ⁵	22.1K	0402	Panasonic

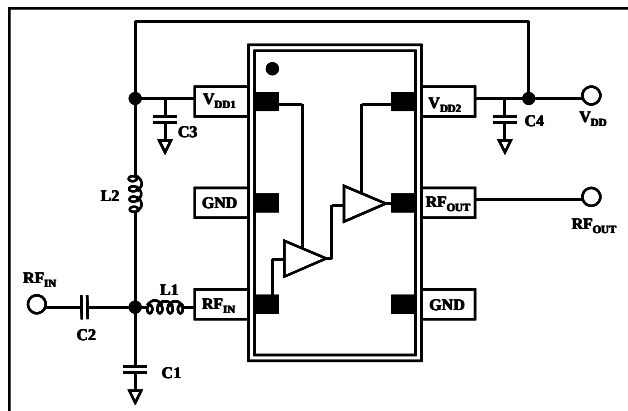
4. Must have a tolerance of 2%.

5. Must have a tolerance of 1%.

Satellite Radio Low Noise Amplifier 2.2 - 2.4 GHz

**MAALSS0013
V6**

Application Schematic

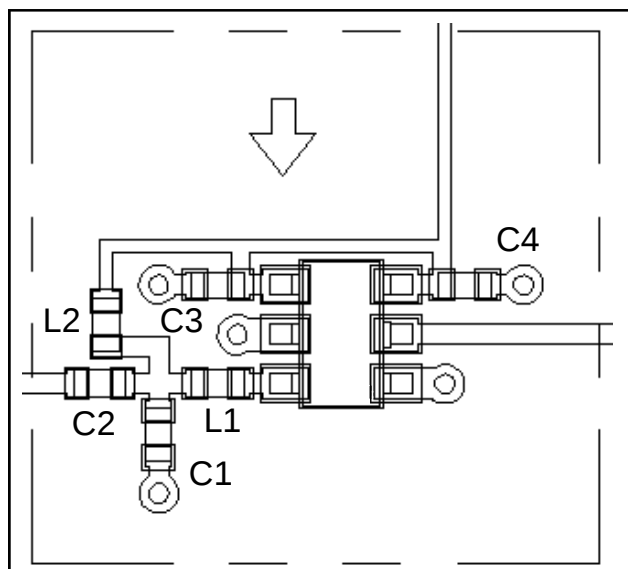


Component List - Satellite Radio @ 3.3 V

Part	Value	Case Size	Manufacturer
C1	0.5 pF	0402	Murata
C2	3.9 pF	0402	Murata
C3-C4	0.01 μ F	0402	Murata
L1 ⁶	5.6 nH	0402	Coilcraft
L2	100 nH	0402	Coilcraft

6. Must have a tolerance of 1%.

Recommended PCB Configuration

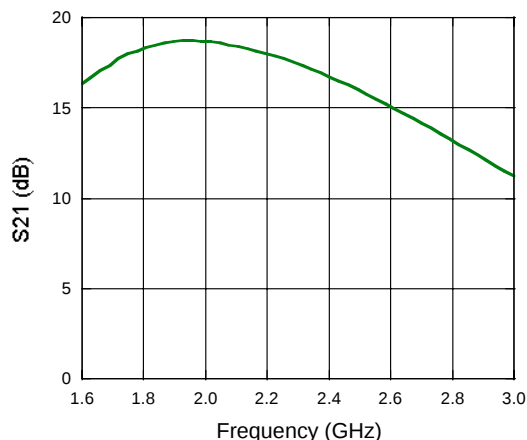


**Satellite Radio Low Noise Amplifier
2.2 - 2.4 GHz**

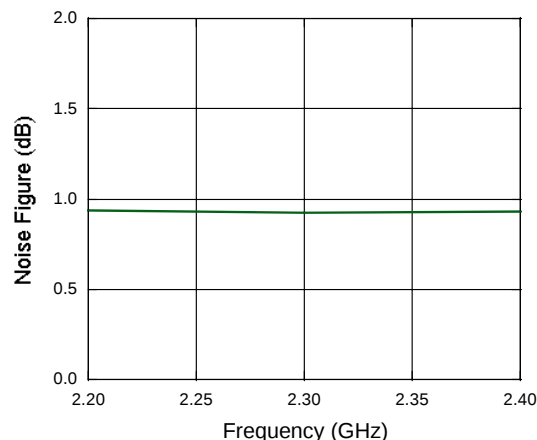
**MAALSS0013
V6**

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

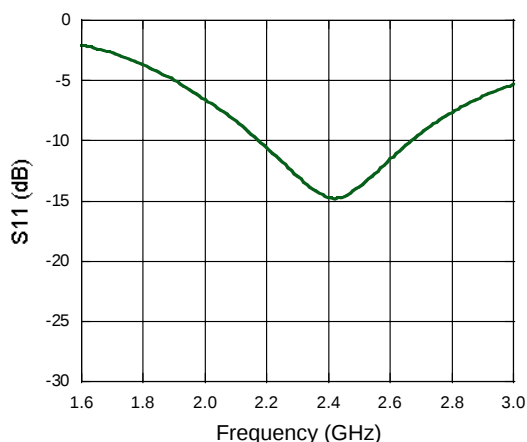
Gain



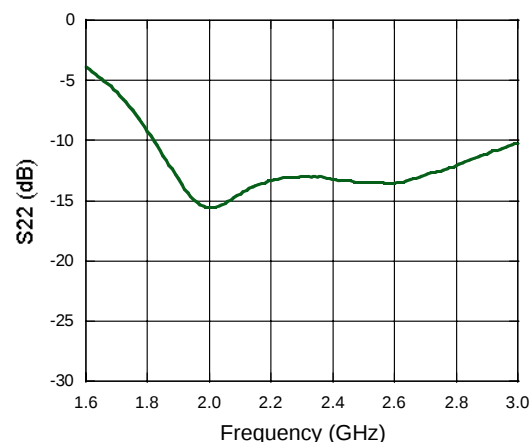
Noise Figure



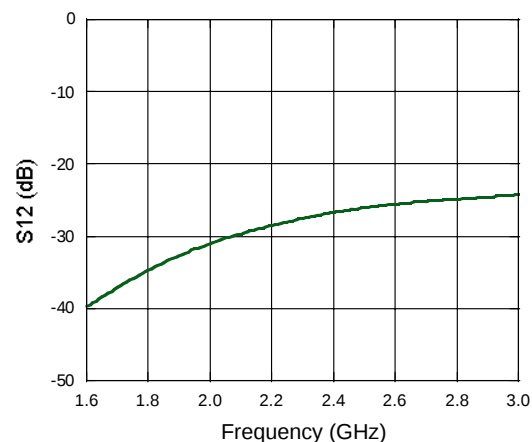
Input Return Loss



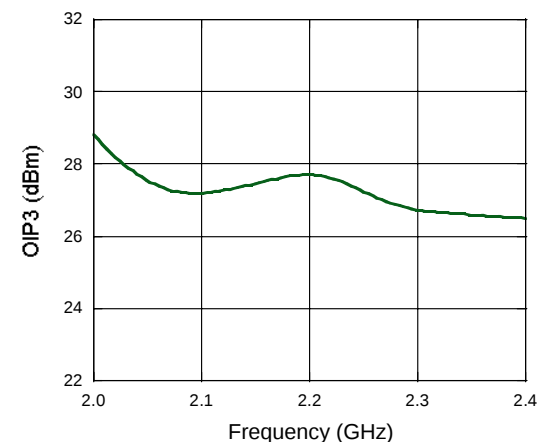
Output Return Loss



S12



Output IP3

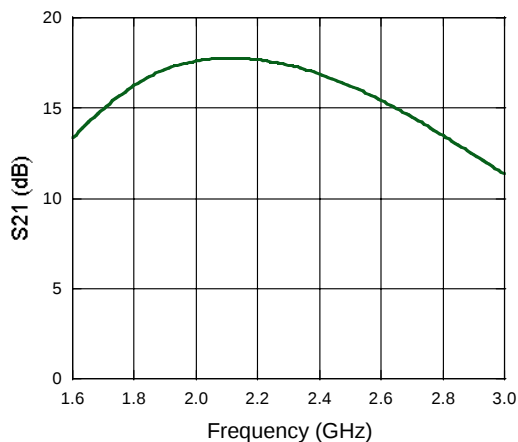


Satellite Radio Low Noise Amplifier 2.2 - 2.4 GHz

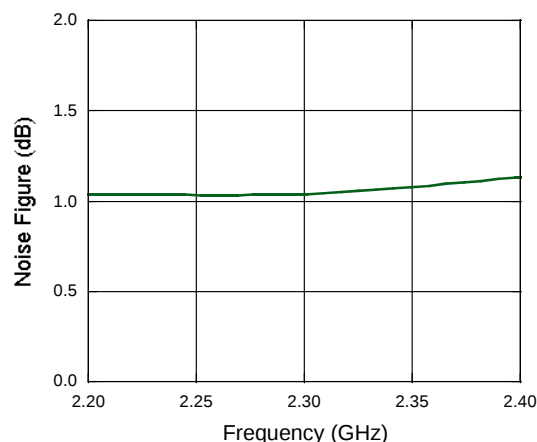
**MAALSS0013
V6**

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

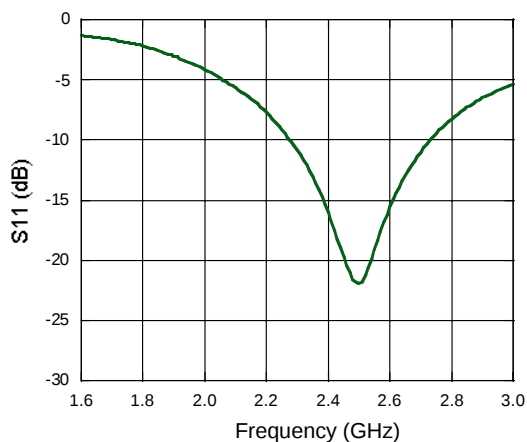
Gain



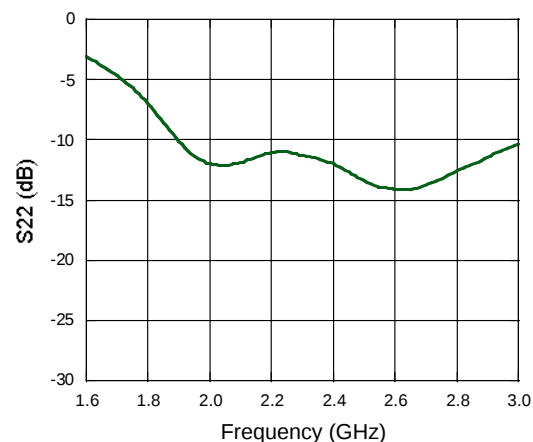
Noise Figure



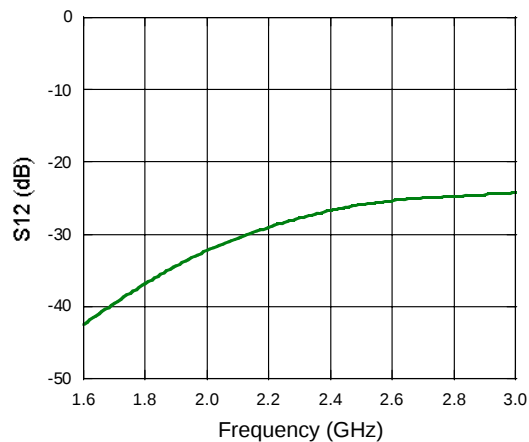
Input Return Loss



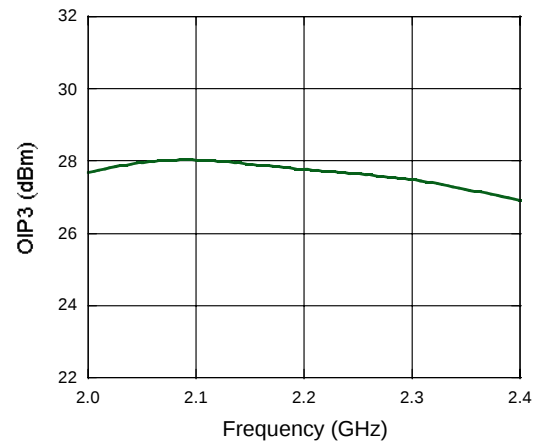
Output Return Loss



S12



Output IP3

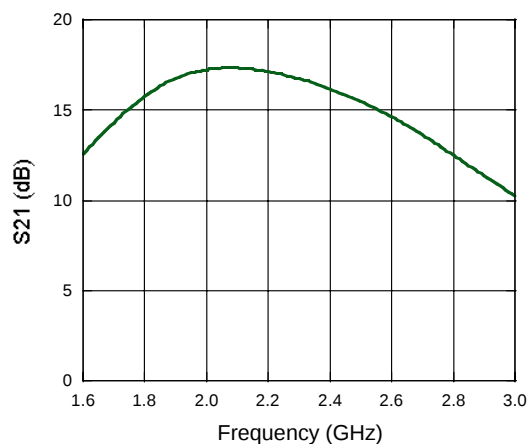


Satellite Radio Low Noise Amplifier 2.2 - 2.4 GHz

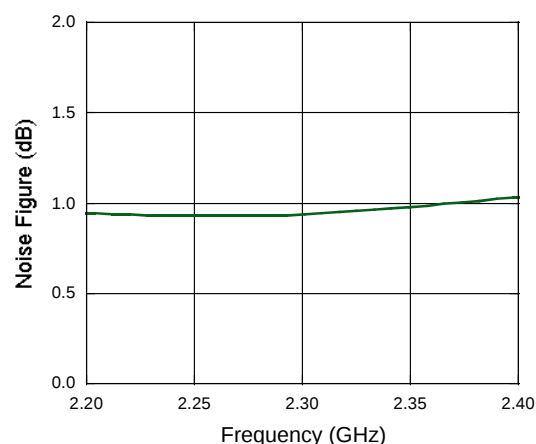
**MAALSS0013
V6**

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

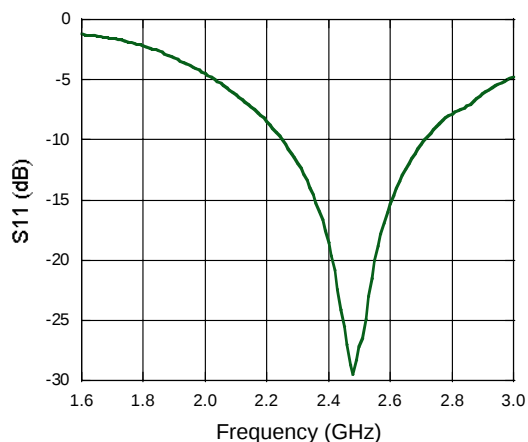
Gain



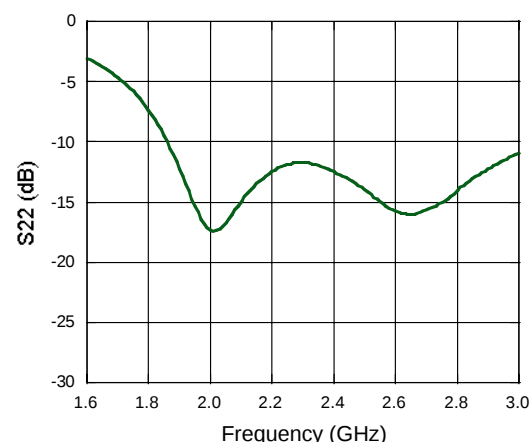
Noise Figure



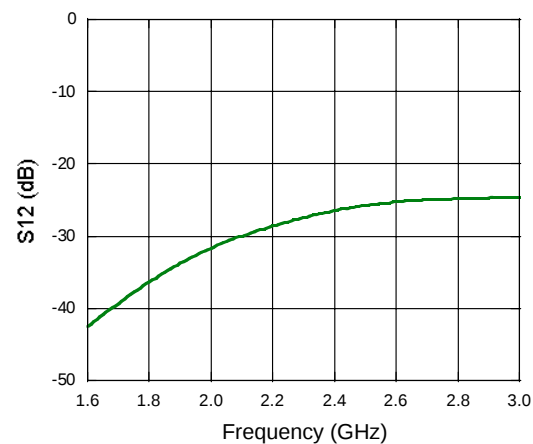
Input Return Loss



Output Return Loss



S12



Output IP3

