

## Features

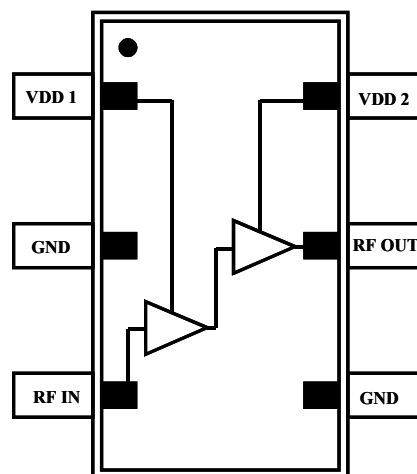
- Low Cost Plastic SOT-26 Package
- Adjustable Current
- Single +3V to +5V Supply Voltage
- Output Power of +10 dBm
- Good 50  $\Omega$  Input / Output Match

## Description

M/A-COM's MAALSS0013 LNA is a GaAs MMIC low noise amplifier in a low-cost miniature 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 usable performance from 2.2 to 2.4 GHz.

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

## Functional Schematic



## Ordering Information

Part Number	Package
MAALSS0013	SOT-26 Plastic Package
MAALSS0013TR	1000 Piece Tape and Reel*
MAALSS0013TR-3000	3000 Piece Tape and Reel*
MAALSS0013SMB	Sample Test Board (Includes 5 Samples)

\* Reference Application Note M513 for reel size information.

## Electrical Specifications<sup>1</sup>: $T_A = 25^\circ\text{C}$ , $V_{dc} = 5\text{V}$ , $I_{ds} = 26\text{ mA}$

Parameter	Test Conditions	Frequency	Units	Min	Typ	Max	3.3V Typ.
Gain	varies at $-0.008\text{ dB}/^\circ\text{C}$ typical	2.3 GHz	dB	15	17	19	16
Noise Figure	varies at $0.007\text{ dB}/^\circ\text{C}$ typical	2.3 GHz	dB	—	1.1	1.5	1.1
Input Return Loss	—	2.3 GHz	dB	—	15	—	14
Output Return Loss	—	2.3 GHz	dB	—	15	—	10
1 dB Compression	—	2.3 GHz	dBm	—	10.0	—	10
Output IP3	—	2.3 GHz	dBm	20	25.0	—	22
Current	$V_{ds} = 5\text{V}$	—	mA	—	26	—	23
Parts List	—	—	—	—	PL2	—	PL3

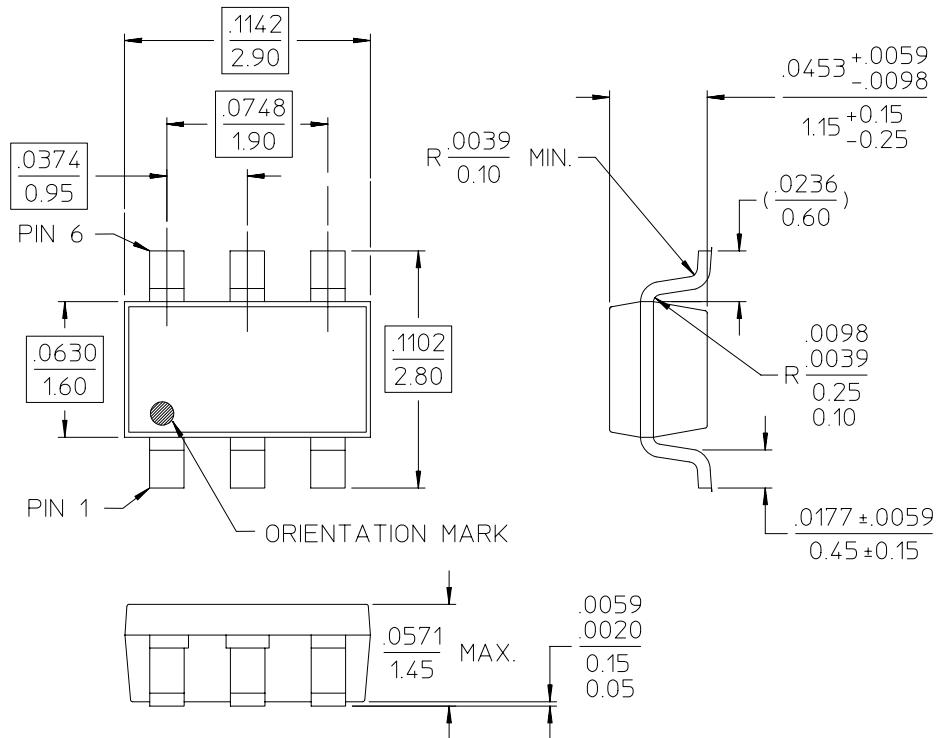
1. All measurements taken in a 50  $\Omega$  system.

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## SOT-26 Plastic Package



## Operating the MAALSS0013

The MAALSS0013 is static sensitive. Please handle with care. 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 sequence in reverse.

## Handling Procedures

Please observe the following precautions to avoid damage to the MAALSS0013:

## Static Sensitivity

Gallium arsenide integrated circuits are ESD sensitive and can be damaged by static electricity. Use proper ESD precautions when handling these devices.

Absolute Maximum Ratings<sup>2</sup>

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

2. Exceeding any one or combination of these limits may cause permanent damage.

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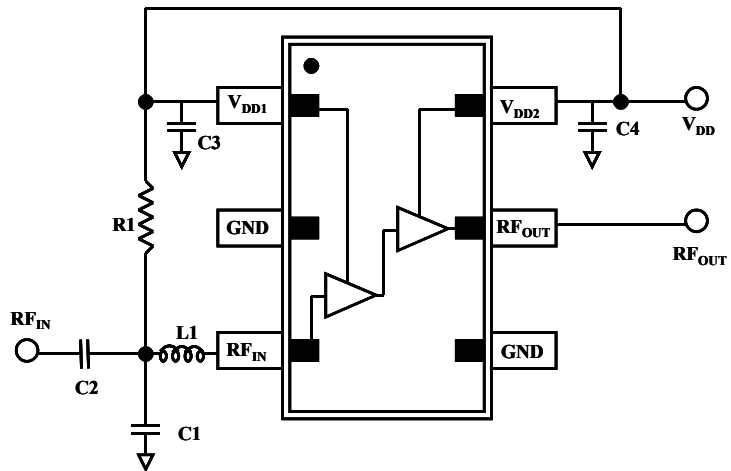
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# Application Schematic



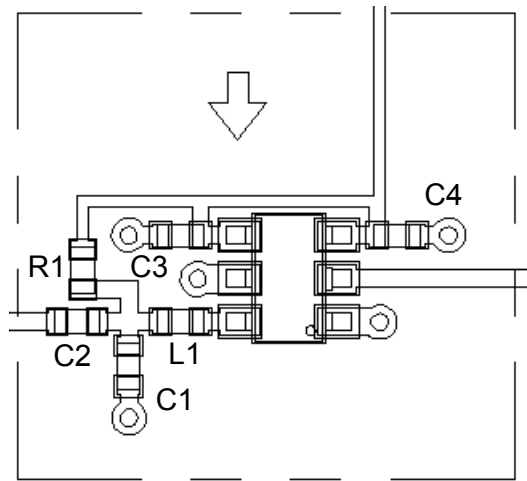
## Recommended Tuning for Broadband @ 5 V, 26 mA (typ) - Parts List (PL) #1

Qty	Description
1	Inductor, 5.6nH, 0402, SMT, 5% (L1)
1	P2212LCT-ND, 22.1K Ohms, 0402, 1% (R1)
1	Capacitor, 0.5pF, 0402, SMT, 5% (C1)
3	Capacitor, 0.1uF, 0402, SMT, 5% (C2-C4)

## Recommended Tuning for Satellite Radio @ 5 V, 26 mA (typ) - Parts List (PL) #2

Qty	Description
1	Inductor, 5.6nH, 0402, SMT, 5% (L1)
1	P2212LCT-ND, 22.1K Ohms, 0402, 1% (R1)
1	Capacitor, 0.6pF, 0402, SMT, 5% (C1)
1	Capacitor, 3.9pF, 0402, SMT, 5% (C2)
2	Capacitor, 0.01uF, 0402, SMT, 5% (C3-C4)

## Recommended PCB Configuration

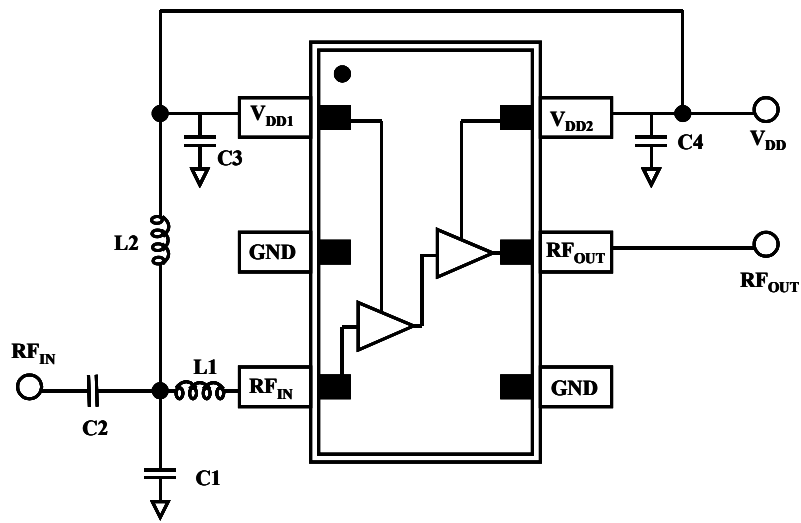


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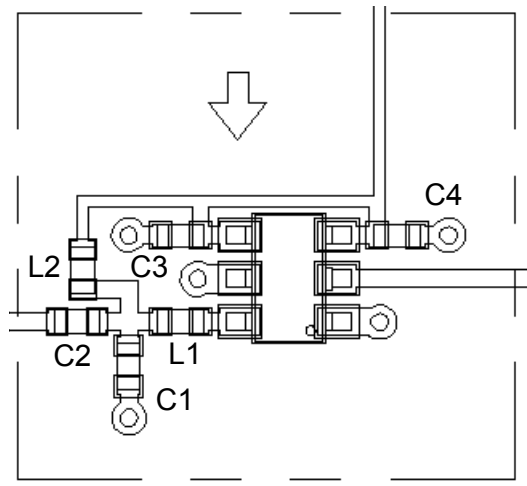
# Application Schematic



## Recommended Tuning for Satellite Radio @ 3.3 V, 23 mA (typ) - Parts List (PL) #3

Qty	Description
1	Inductor, 5.6nH, 0402, SMT, 5% (L1)
1	Inductor, 100nH, 0402, SMT, 5% (L2)
1	Capacitor, 0.6pF, 0402, SMT, 5% (C1)
1	Capacitor, 3.9pF, 0402, SMT, 5% (C2)
2	Capacitor, 0.01uF, 0402, SMT, 5% (C3-C4)

## Recommended PCB Configuration



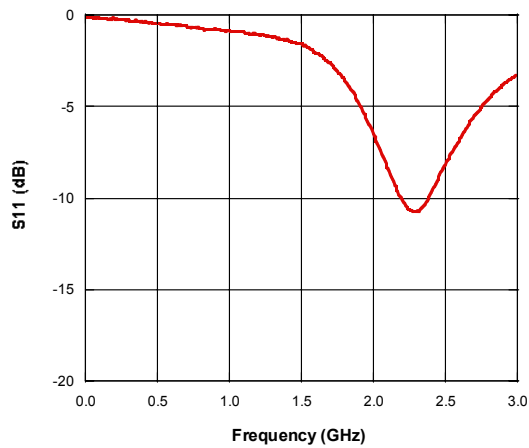
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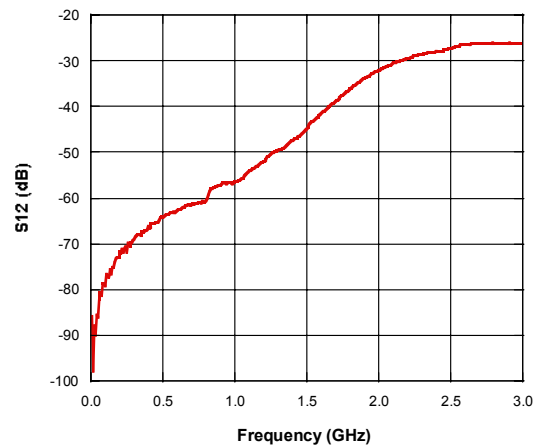
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## Typical Performance Curves

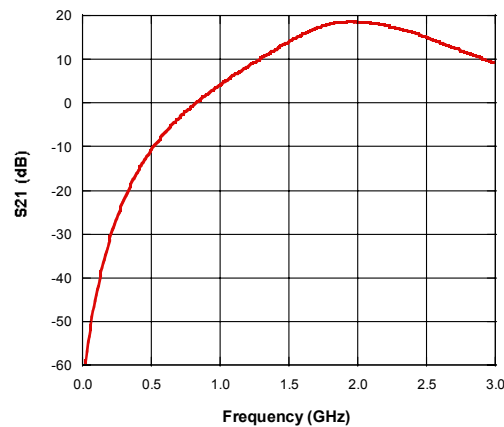
***S11 vs. Frequency 5V, 25°C  
Satellite Radio Tuning (PL2)***



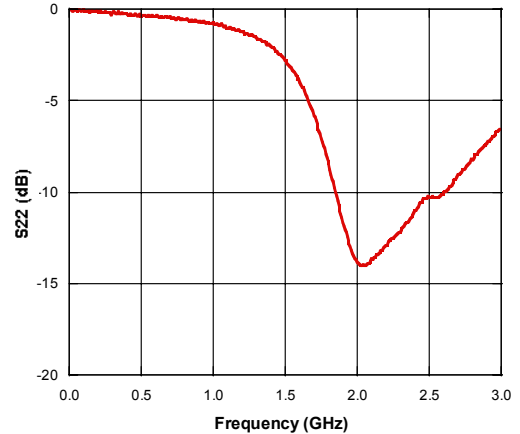
***S12 vs. Frequency 5V, 25°C  
Satellite Radio Tuning (PL2)***



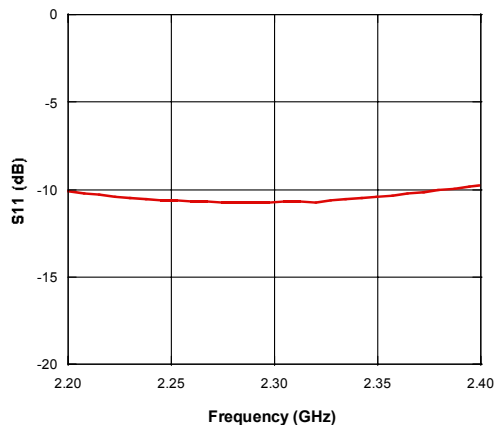
***S21 vs. Frequency 5V, 25°C  
Satellite Radio Tuning (PL2)***



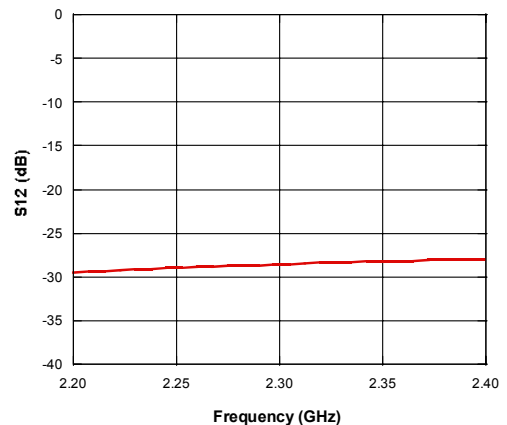
***S22 vs. Frequency 5V, 25°C  
Satellite Radio Tuning (PL2)***



***S11 vs. Frequency 5V, 25°C  
Satellite Radio Tuning (PL2)***



***S12 vs. Frequency 5V, 25°C  
Satellite Radio Tuning (PL2)***



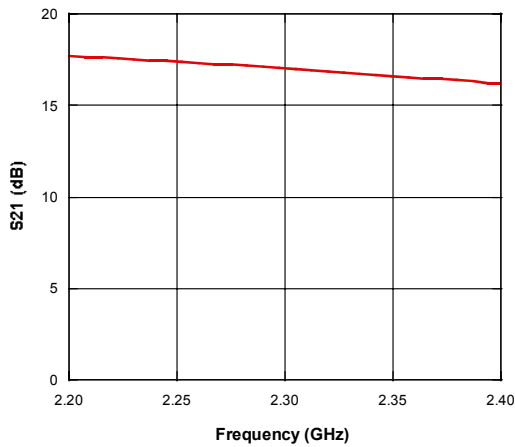
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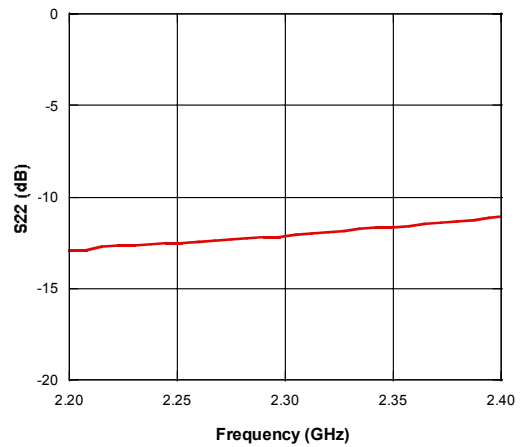
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# Typical Performance Curves (continued)

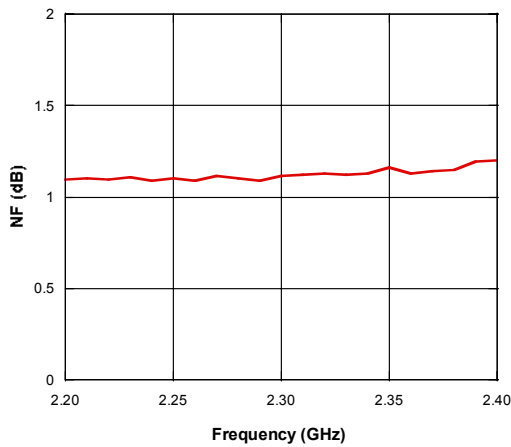
**S21 vs. Frequency 5V, 25°C**  
**Satellite Radio Tuning (PL2)**



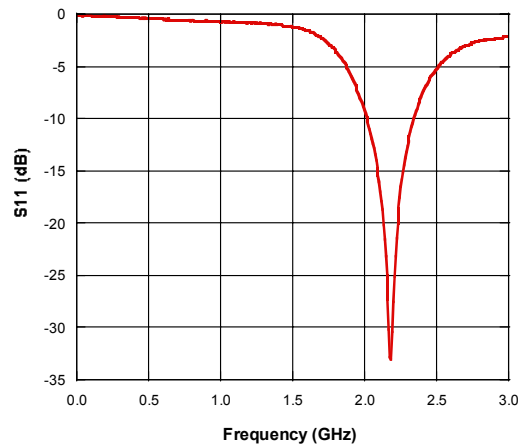
**S22 vs. Frequency 5V, 25°C**  
**Satellite Radio Tuning (PL2)**



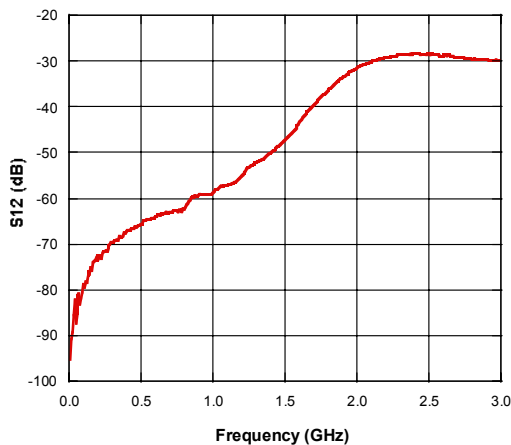
**NF vs. Frequency 5V, 25°C**  
**Satellite Radio Tuning (PL2)**



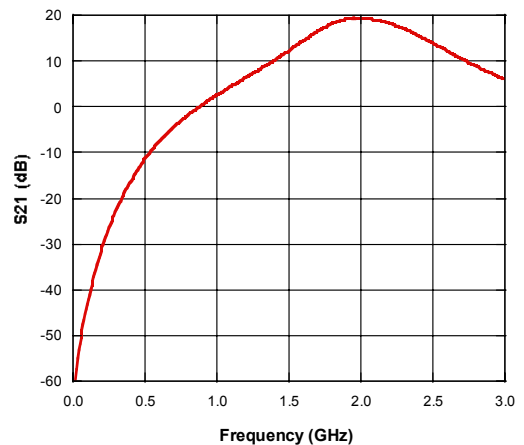
**S11 vs. Frequency 5V, 25°C**  
**Broadband Tuning (PL1)**



**S12 vs. Frequency 5V, 25°C**  
**Broadband Tuning (PL1)**



**S21 vs. Frequency 5V, 25°C**  
**Broadband Tuning (PL1)**



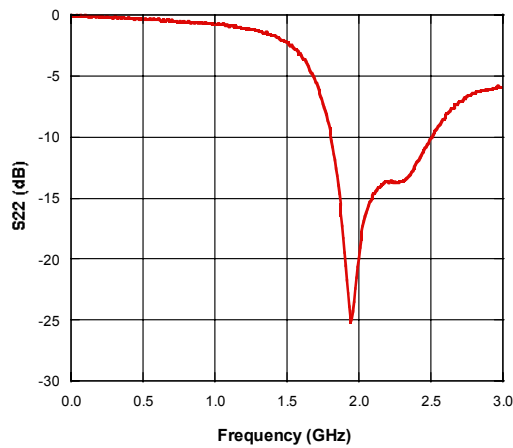
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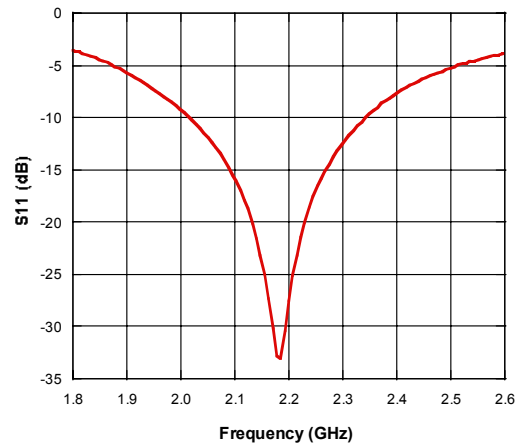
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## Typical Performance Curves (continued)

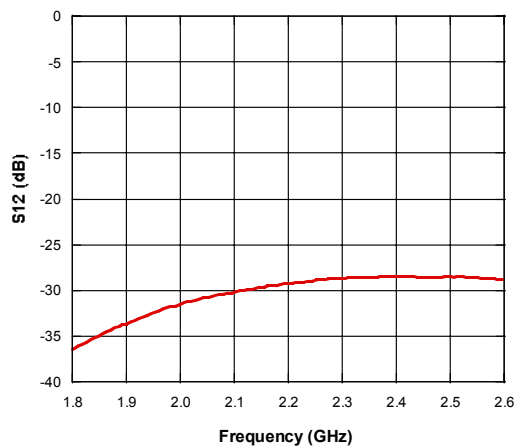
**S22 vs. Frequency 5V, 25°C  
Broadband Tuning (PL1)**



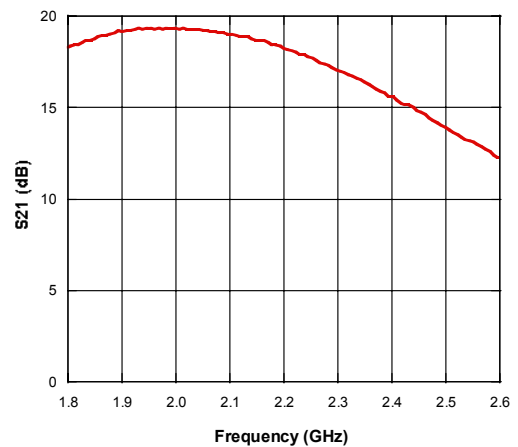
**S11 vs. Frequency 5V, 25°C  
Broadband Tuning (PL1)**



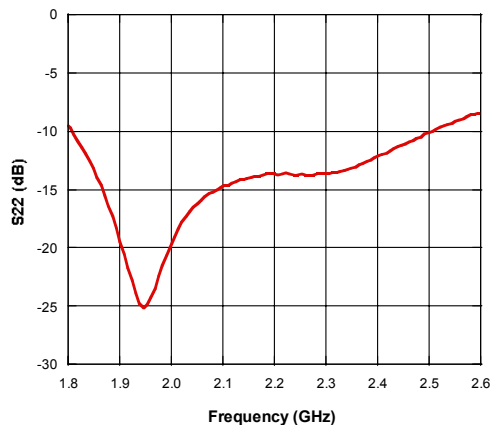
**S12 vs. Frequency 5V, 25°C  
Broadband Tuning (PL1)**



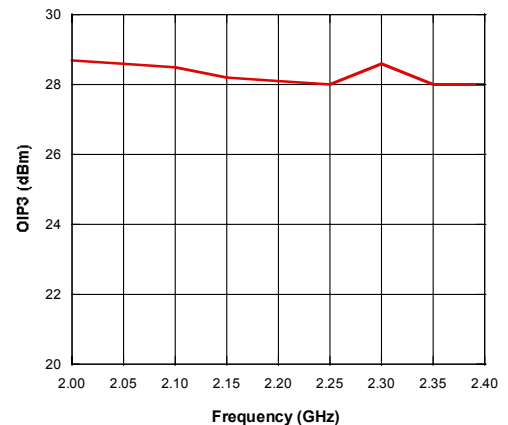
**S21 vs. Frequency 5V, 25°C  
Broadband Tuning (PL1)**



**S22 vs. Frequency 5V, 25°C  
Broadband Tuning (PL1)**



**OIP3 vs. Frequency 5V, 25°C  
Broadband Tuning (PL1)**

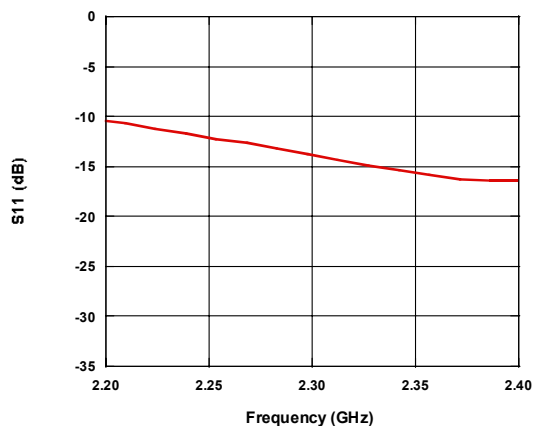


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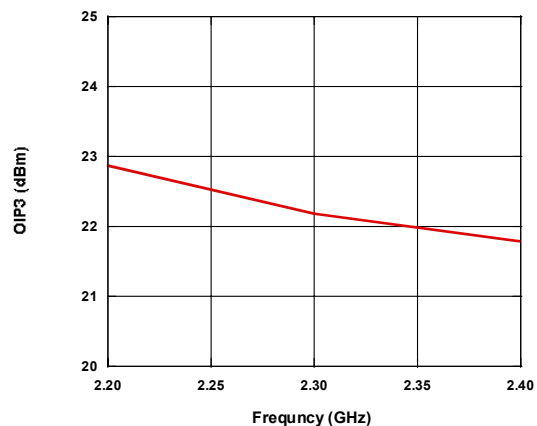
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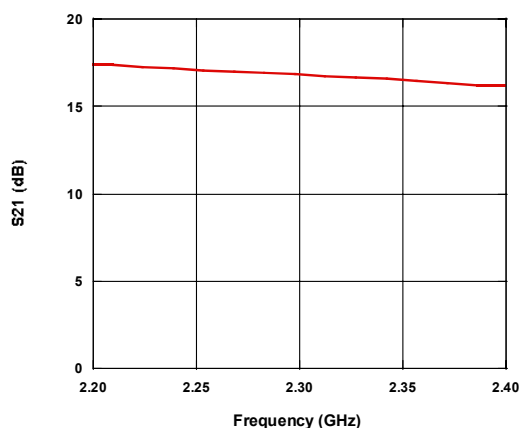
**S11 vs. Frequency 3.3V, 25°C**  
**Satellite Radio Tuning with L2 (PL3)**



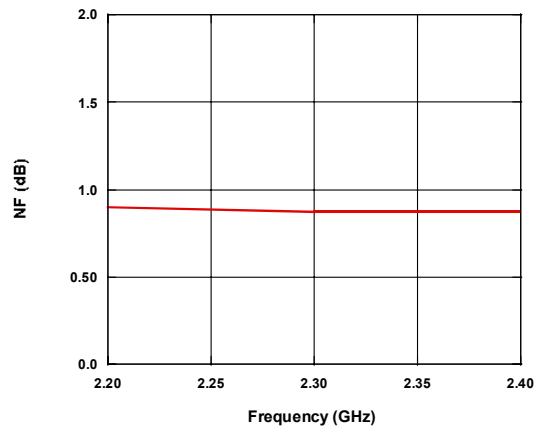
**OIP3 vs. Frequency 3.3V, 25°C**  
**Satellite Radio Tuning with L2 (PL3)**



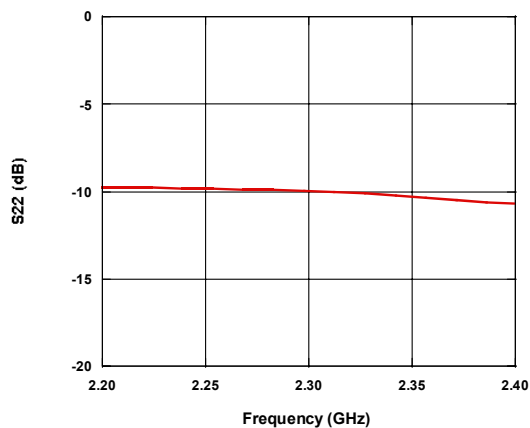
**S21 vs. Frequency 3.3V, 25°C**  
**Satellite Radio Tuning with L2 (PL3)**



**NF vs. Frequency 3.3V, 25°C**  
**Satellite Radio Tuning with L2 (PL3)**



**S22 vs. Frequency 3.3V, 25°C**  
**Satellite Radio Tuning with L2 (PL3)**



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