Electrical Characterization of the MAAMSS0031 16 dB Gain Application Circuit

Rev. V2

Abstract

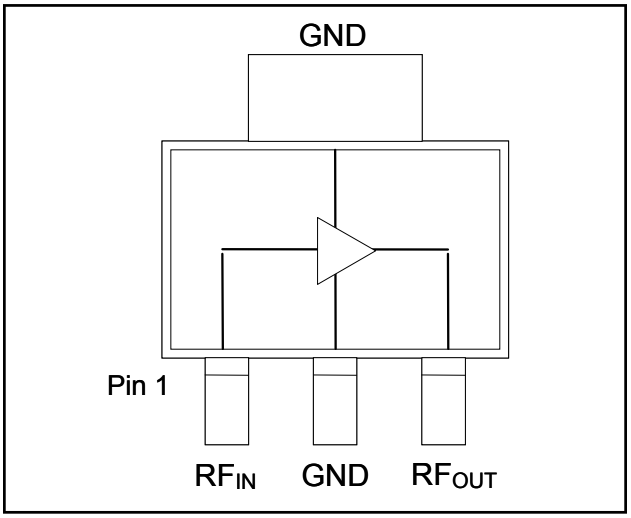
The MAAMSS0031 CATV amplifier is a GaAs MMIC which exhibits low noise and high linearity. It is ideally suited for set top boxes, home gateways, and other broadband internet based appliances.

This amplifier is a monolithic single stage design in a 75 ohm input/output impedance environment. It is designed to have a reduced number of external matching components.

Introduction

The purpose of this application note is to present the typical performance of the MAAMSS0031 amplifier when it is operated at +8 Volts and tuned to provide a small and large signal gain of 16 dB . It is intended as an aid to engineers for the implementation of the MAAMSS0031 in such a gain requirement circuit and provides even lower noise figure than that obtained using the nominal tuning.

Functional Schematic



Electrical Specifications: T_A = 25°C, Freq. = 50 - 1000 MHz, V_{DD} = +8 Volts, Z_0 = 75 Ω

Parameter	Test Conditions	Units	Min.	Typ.	Max.
Gain	—	dB	—	16	—
Gain Flatness	—	dB	—	0.5	—
Noise Figure	—	dB	—	2.5	—
Input Return Loss	—	dB	—	17	—
Output Return Loss	—	dB	—	18	—
Output IP3	6 MHz Spacing, -10 dBm output per tone	dBm	—	36	—
Composite Triple Beat, CTB	132 channels, +23 dBmV/channel at the output.	dBc	—	-75	—
Composite Second Order, CSO	132 channels, +23 dBmV/channel at the output.	dBc	—	-66	—
P1dB	—	dBm	—	18	—
I_{DD}	+ 8 Volts	mA	—	100	—

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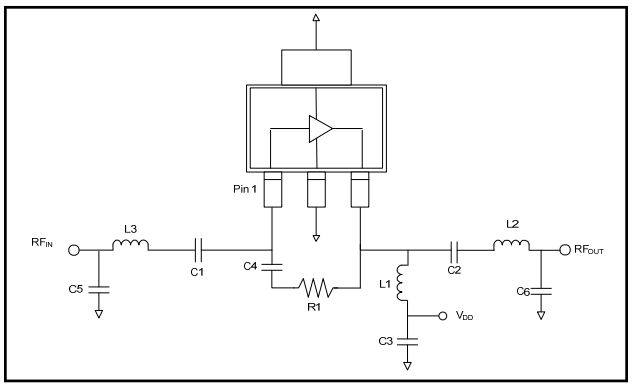
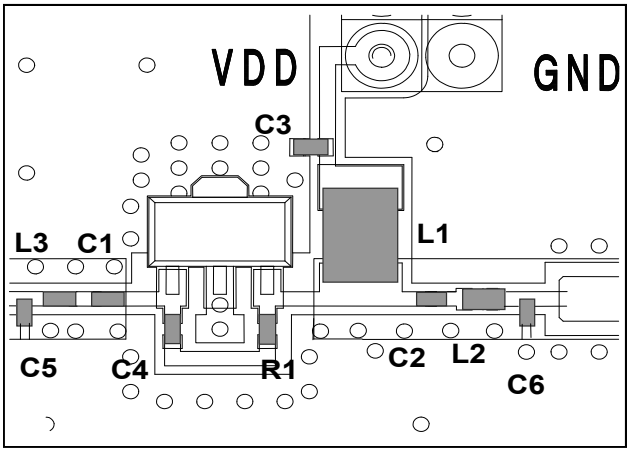
Schematic Including Off-Chip Components



Recommended Board Layout

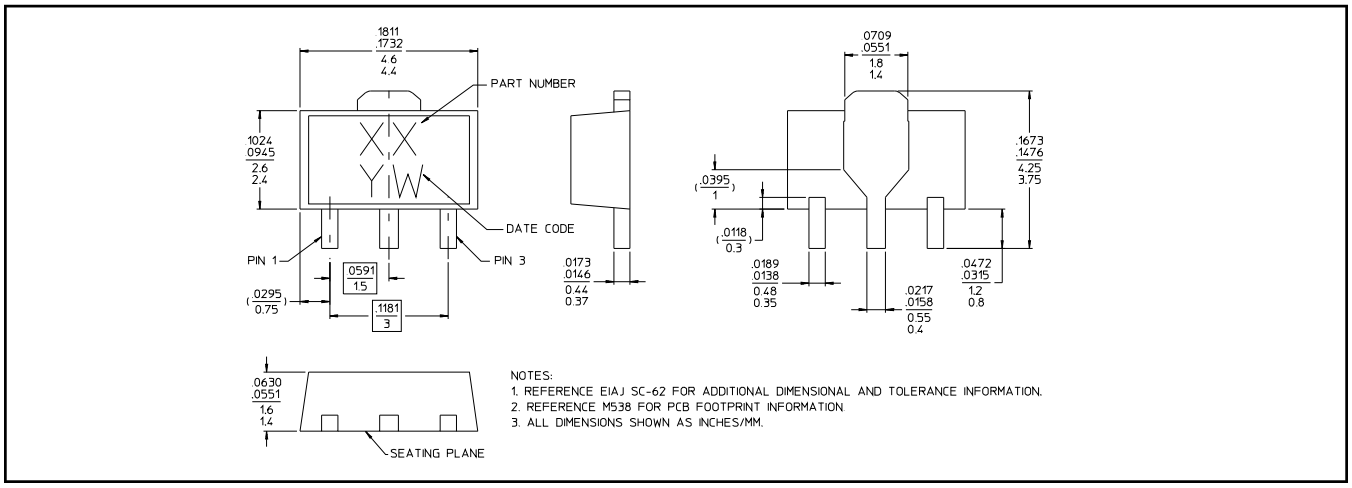


Off-Chip Component Values

Component	Value	Package
C1	0.01 µF	0402
C2	0.01 µF	0402
C3	0.01 µF	0402
C4	0.01 µF	0402
C5	0.5 pF	0402
C6	0.5 pF	0402
L1 *	1000 nH	1210
L2	8.2 nH	0402
L3	8.2 nH	0402
R1	750 Ω	0402

* L1 supplied from EPCOS, part number B82422A1102K100.

SOT-89 Plastic Package



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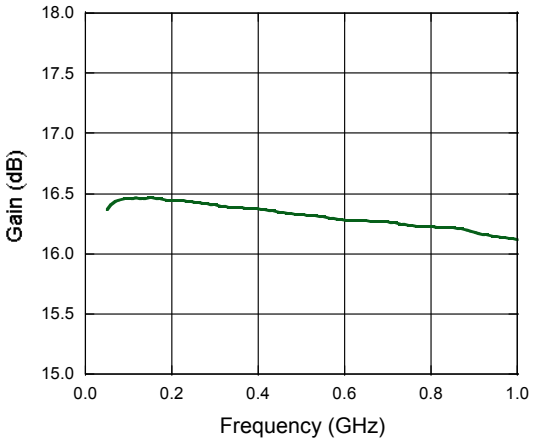
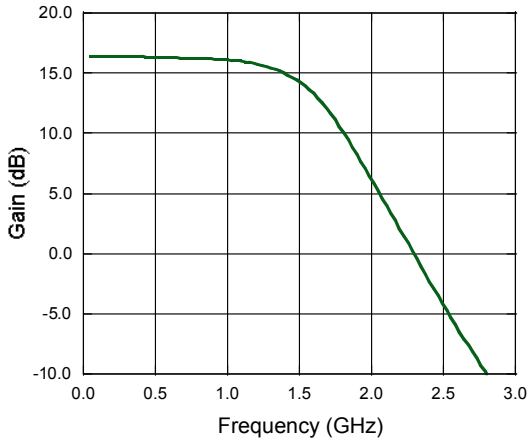
Typical Performance Curves - T_A = 25°C, Freq: 50 - 1000 MHz, V_{DD} = +8 Volts, Z_0 = 75 Ω

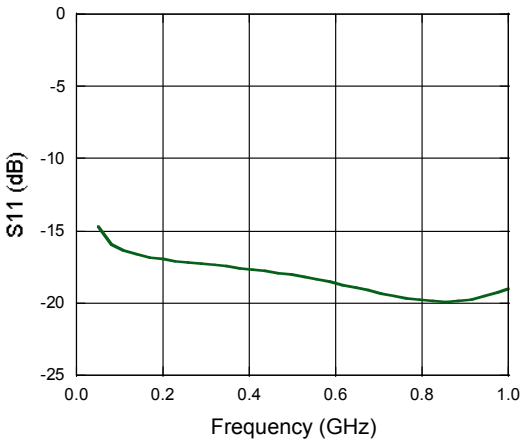
Gain vs. Frequency to 1 GHz



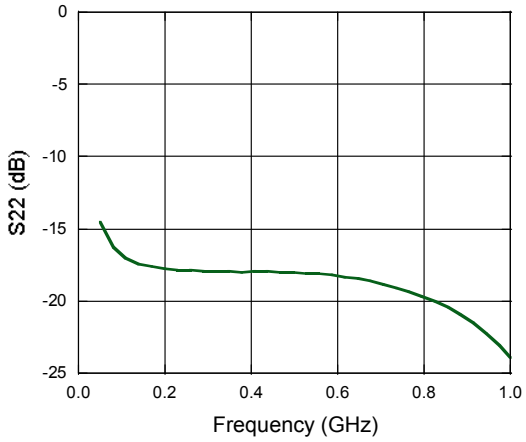
Gain vs. Frequency to 3 GHz



Input Return Loss vs. Frequency



Output Return Loss vs. Frequency



Noise Figure vs. Frequency