

Low Noise FTTx Amplifier 50 - 1000 MHz

Rev. V1

Features

- Low Distortion
- Low Noise Figure
- Lead-Free 4 mm 20-Lead PQFN Package
- Halogen-Free “Green” Mold Compound
- 260°C Reflow Compatible

Description

The MAAM-010239 is a GaAs pHEMT MMIC amplifier in a lead-free 4mm 20-lead PQFN package. The amplifier is designed to meet the high gain, high linearity and low noise requirements of FTTx receivers.

Ordering Information ^{1,2}

Part Number	Package
MAAM-010239-TR1000	1000 piece reel
MAAM-010239-TR3000	3000 piece reel
MAAM-010239-001SMB	Sample Test Board

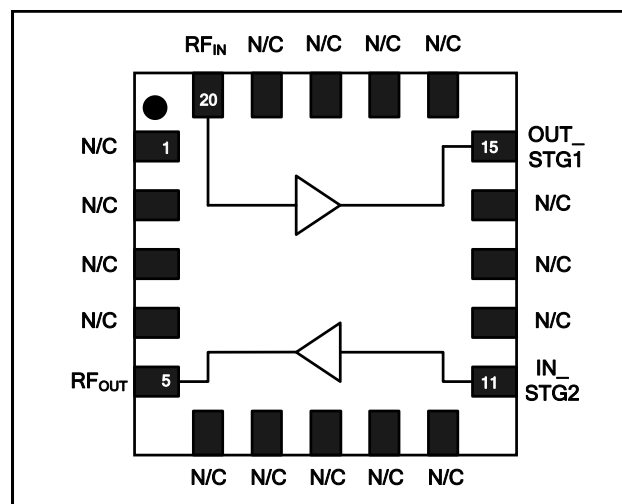
1. Reference Application Note M513 for reel size information.
2. All sample boards include 5 loose parts.

Absolute Maximum Ratings ^{3,4,5}

Parameter	Absolute Maximum
Max Input Power	-5 dBm
Operating Voltage	+10.0 V
Operating Temperature	-20°C to +85°C
Junction Temperature ⁶	+150°C
Storage Temperature	-65°C to +150°C

3. Exceeding any one or combination of these limits may cause permanent damage to this device.
4. M/A-COM Technology Solutions does not recommend sustained operation near these survivability limits.
5. These operating conditions will ensure MTTF > 1 x 10⁶ hours.
6. Junction Temperature (T_J) = $T_A + \theta_{jc} * (V * I)$
Typical thermal resistance (θ_{jc}) = 51 °C/W.
a) For $T_A = 25^\circ\text{C}$,
 $T_J = 80^\circ\text{C} @ 5.0 \text{ V}, 215 \text{ mA}$
b) For $T_A = 85^\circ\text{C}$,
 $T_J = 140^\circ\text{C} @ 5.0 \text{ V}, 215 \text{ mA}$

Functional Schematic



Pin Configuration

Pin No.	Pin Name	Description
1	N/C	No Connection
2	N/C	No Connection
3	N/C	No Connection
4	N/C	No Connection
5	RF_OUT	RF Output
6	N/C	No Connection
7	N/C	No Connection
8	N/C	No Connection
9	N/C	No Connection
10	N/C	No Connection
11	IN_STG2	STAGE 2 RF Input
12	N/C	No Connection
13	N/C	No Connection
14	N/C	No Connection
15	OUT_STG1	STAGE 1 RF Output
16	N/C	No Connection
17	N/C	No Connection
18	N/C	No Connection
19	N/C	No Connection
20	RF_IN	RF Input
21	Paddle ⁷	RF and DC Ground

7. The exposed pad centered on the package bottom must be connected to RF and DC ground.

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

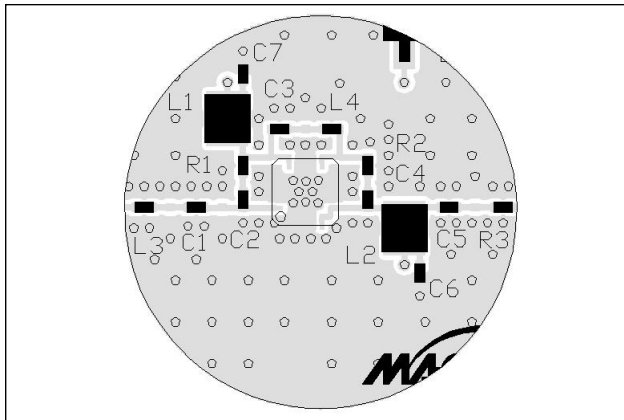
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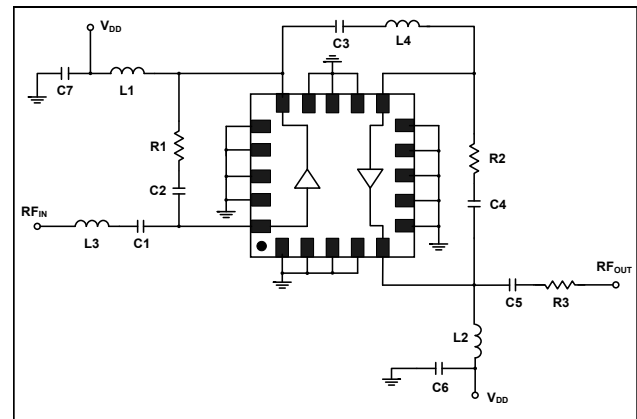
Electrical Specifications: $T_A = 25^\circ\text{C}$, Freq: 50 - 1000 MHz, $V_{DD} = +5$ Volts, $Z_0 = 75\ \Omega$

Parameter	Test Conditions	Units	Min.	Typ.	Max.
Gain	RF_{IN} to RF_{OUT} 51 MHz 1 GHz	dB	29 29.5	30 30.5	31 31.5
Gain Flatness	RF_{IN} to RF_{OUT}	dB	-	0.5	1
Noise Figure	RF_{IN} to RF_{OUT}	dB	-	3.5	4.5
Input Return Loss	RF_{IN}	dB	-	15	-
Output Return Loss	RF_{OUT}	dB	-	15	-
Reverse Isolation	RF_{OUT} to RF_{IN}	dB	-	37	-
P1dB	400 MHz	dBm	-	20	-
Output IP2	Two tones, 400 MHz, +5 dBm output per tone	dBm	-	62	-
Output IP3	Two tones, 400 MHz, +5 dBm output per tone	dBm	-	35	-
Composite Triple Beat, CTB	132 Channels, +30 dBmV/Channel at the Output	dBc	-60	-65	-
Composite Second Order, CSO	132 Channels, +30 dBmV/Channel at the Output	dBc	-55	-60	-
Cross modulation	132 Channels, +30 dBmV/Channel at the Output	dBc	-	-65	-
I_{DD}	$V_{DD} = +5$ Volts	mA	-	215	250

Recommended PCB Layout



Test Circuit Schematic



Off-Chip Component Values

Component	Value	Package
C1-C7	0.01 μF	0402
L1, L2 ⁸	1.0 μH	1210
L3	6.8 nH	0402
L4	1.8 nH	0402
R1	470 Ω	0402
R2	430 Ω	0402
R3	0 Ω	0402

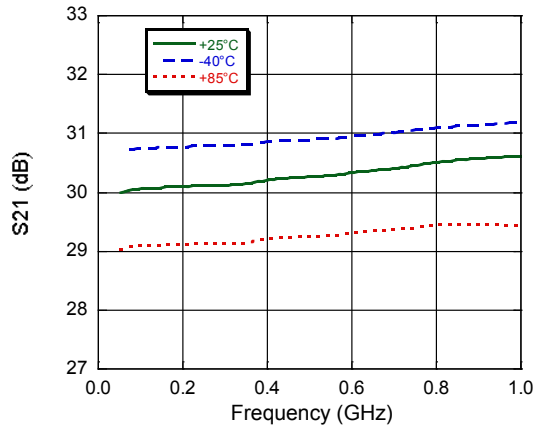
8. L1 and L2 supplied from EPCOS, part number B82422A1102K100.

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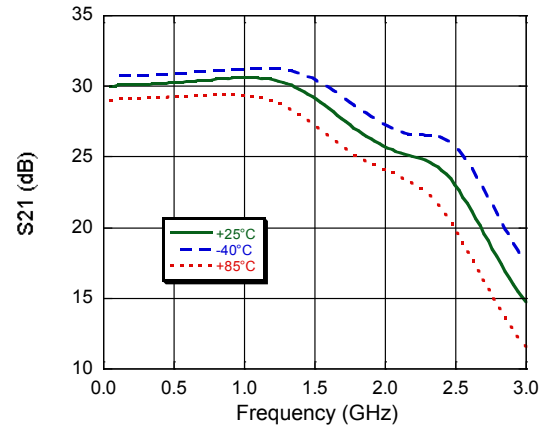
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Typical Performance Curves:

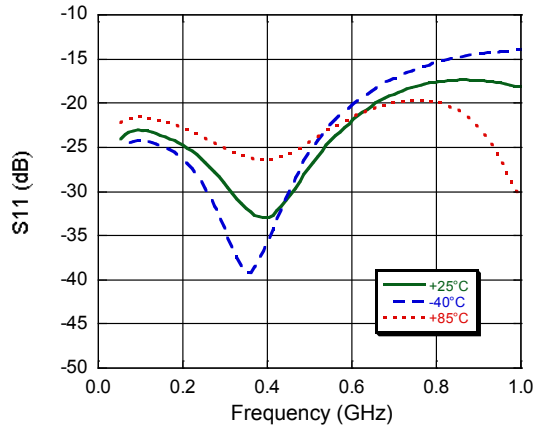
Gain to 1 GHz over Temperature



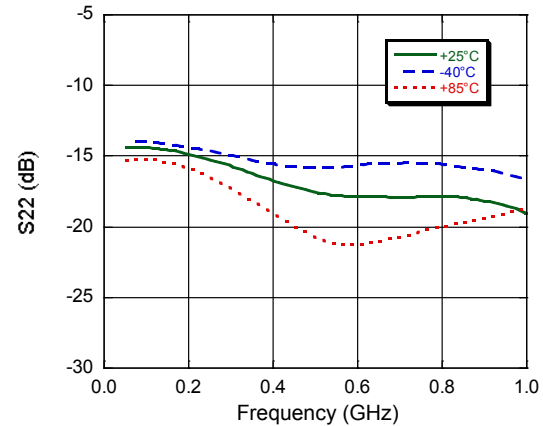
Gain to 3 GHz over Temperature



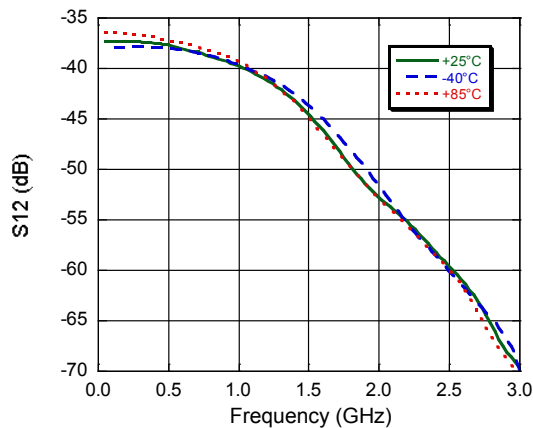
Input Return Loss over Temperature



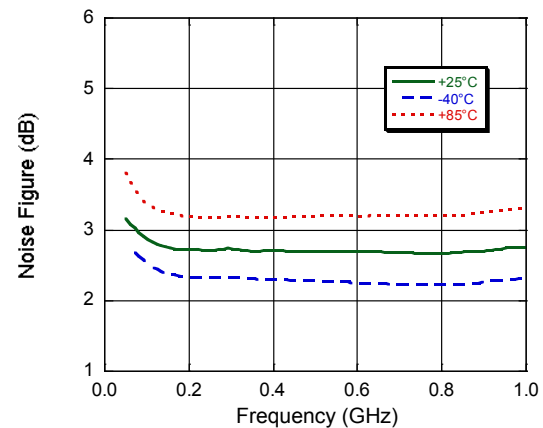
Output Return Loss over Temperature



Reverse Isolation



Noise Figure



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