MAAM-010239

Low Noise FTTx Amplifier
50 - 1000 MHz

Rev. V1

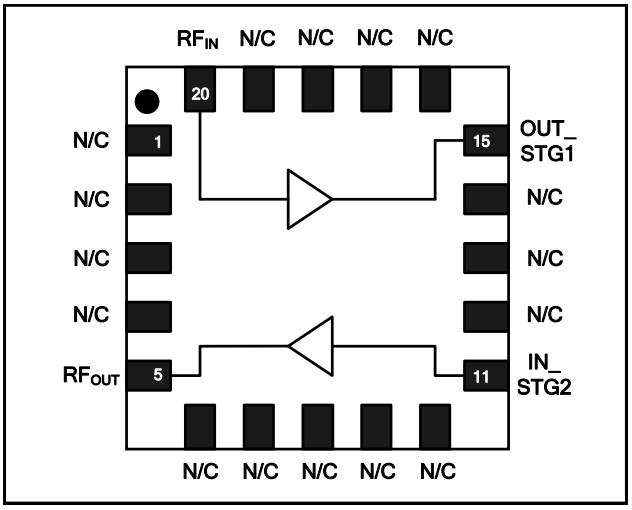
Features

- 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.

Functional Schematic



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 10^6 hours.
6. Junction Temperature (T_J) = T_A + Θjc * (V * I)
   Typical thermal resistance (Θjc) = 51 °C/W.
   a) For T_A = 25°C,
   T_J = 80 °C @ 5.0 V, 215 mA
   b) For T_A = 85°C,
   T_J = 140 °C @ 5.0 V, 215 mA

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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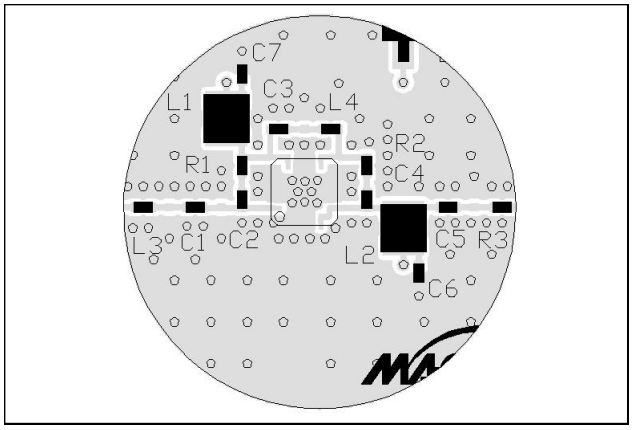
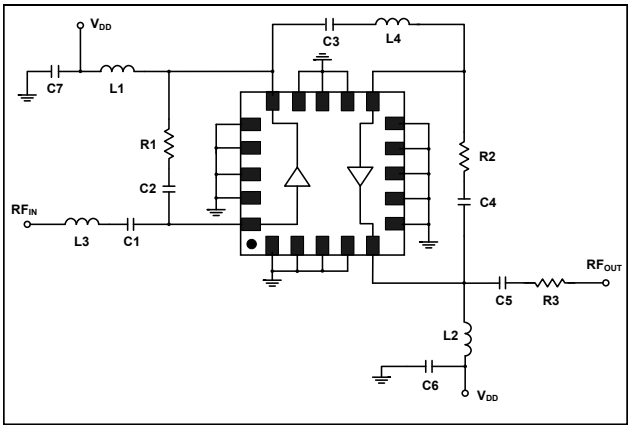
Electrical Specifications: T_A = 25°C, Freq: 50 - 1000 MHz, V_{DD} = +5 Volts, Z_0 = 75 Ω

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



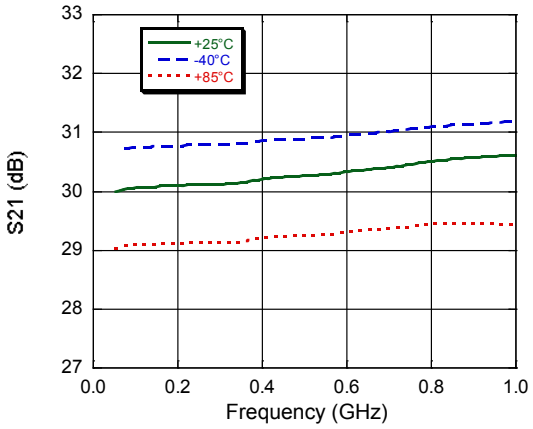
Off-Chip Component Values

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

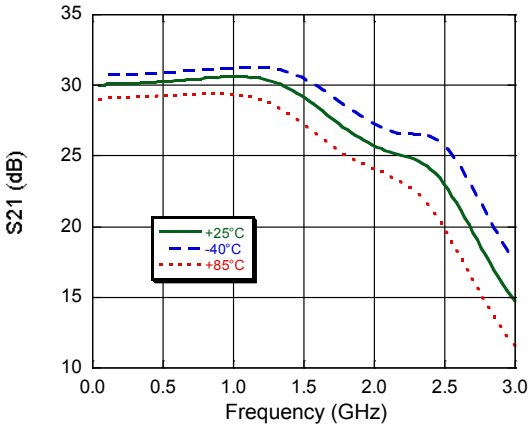
8. L1 and L2 supplied from EPCOS, part number B82422A1102K100.

Typical Performance Curves:

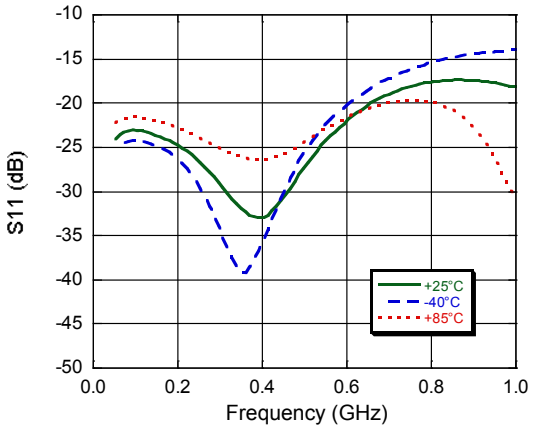
Gain to 1 GHz over Temperature



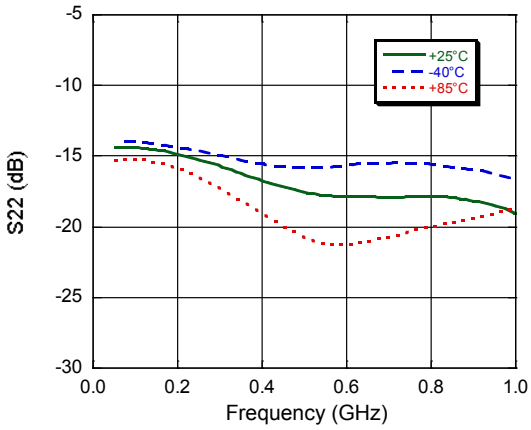
Gain to 3 GHz over Temperature



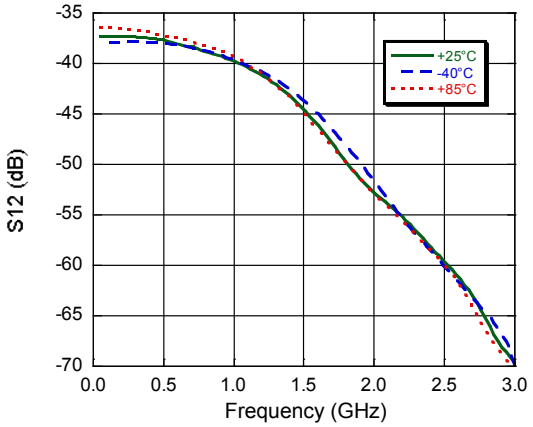
Input Return Loss over Temperature



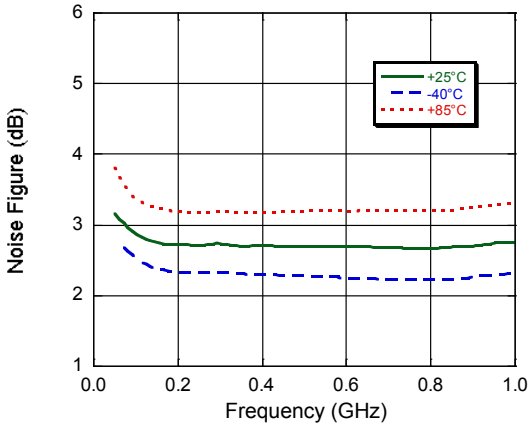
Output Return Loss over Temperature



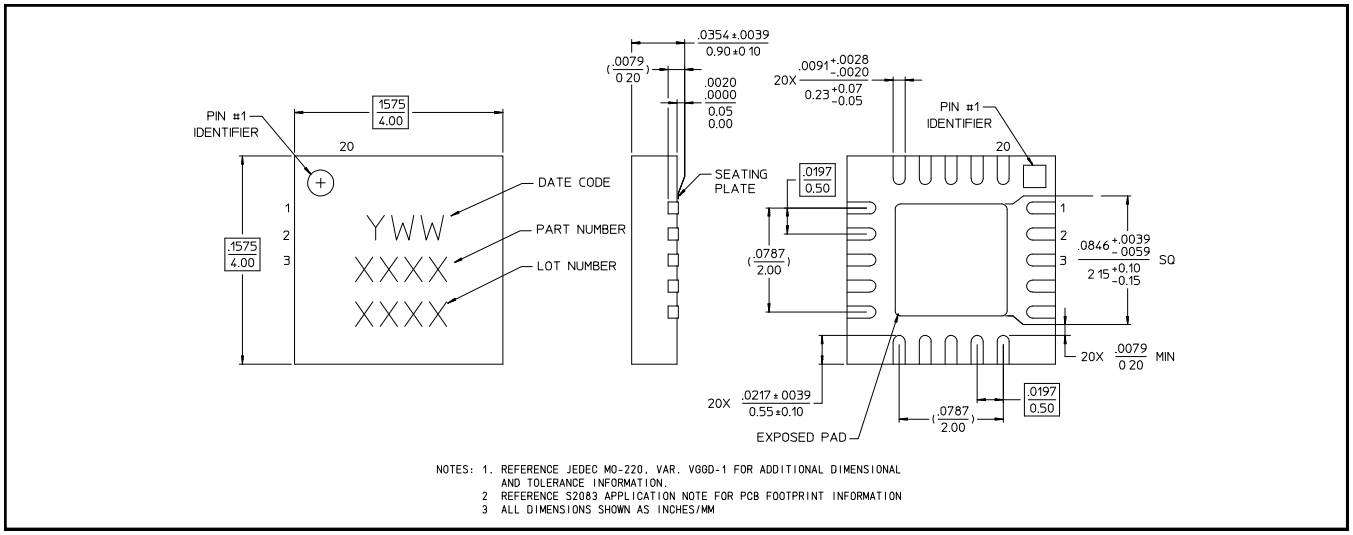
Reverse Isolation



Noise Figure



Lead-Free 4 mm 20-Lead PQFN†



† Reference Application Note S2083 for lead-free solder reflow recommendations.
Meets JEDEC moisture sensitivity level 1 requirements.
Plating is 100% matte tin over copper.

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.

An external protection circuit using an inexpensive anti-parallel diode pair can be used to protect the IC. Please reference application note AN3028 on http://www.macomtech.com for further detail.