

## Features

- 75  $\Omega$  Input / Output Match
- Low Noise Figure: 2.2 dB
- High Gain: 22 dB
- High Linearity: -74 dBc CTB, -62 dBc CSO
- High ESD Threshold: HBM Class 1B
- Lead Free SOT-89 Package
- Halogen-Free “Green” Mold Compound
- RoHS\* Compliant and 260°C Reflow Compatible

## Description

The MAAM-010373 CATV amplifier is a GaAs MMIC that exhibits low distortion and high gain in a lead-free surface mount package.

This broadband amplifier employs a monolithic single stage design featuring a convenient 75  $\Omega$  input/output impedance that minimizes the number of external components required.

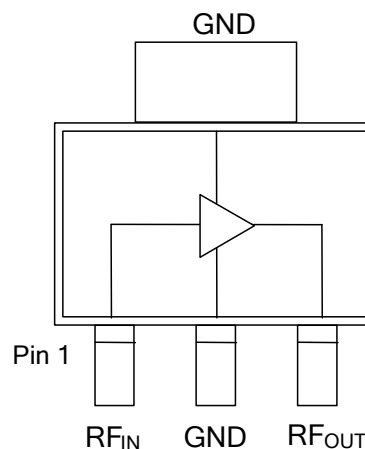
The MAAM-010373 is fabricated using a pHEMT process to realize low noise and low distortion. The process features full passivation for robust performance and reliability.

## Ordering Information <sup>1,2</sup>

Part Number	Package
MAAM-010373-000000	Bulk Packaging
MAAM-010373-TR1000	1000 piece reel
MAAM-010373-TR3000	3000 piece reel
MAAM-010373-001SMB	Sample Test Board

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

## Functional Schematic



## Pin Configuration

Pin No.	Pin Name	Description
1	RF <sub>IN</sub>	RF Input
2	GND	Ground
3	RF <sub>OUT</sub>	RF Output / Drain Supply

\* Restrictions on Hazardous Substances, European Union Directive 2011/65/EU.

## Broadband CATV Amplifier 50 - 1100 MHz

Rev. V4

**Electrical Specifications:**  $T_A = 25^\circ\text{C}$ , Freq: 50 - 1000 MHz,  $V_{DD} = 8\text{ V}$ ,  $Z_0 = 75\ \Omega$

Parameter	Test Conditions	Units	Min.	Typ.	Max.
Gain	—	dB	20	22	24
Gain Flatness	—	dB	—	+/- 0.5	1
Noise Figure	—	dB	—	2.2	3
Input Return Loss	—	dB	—	18	—
Output Return Loss	—	dB	—	20	—
Reverse Isolation	—	dB	—	25	—
Output IP3	6 MHz Spacing, -10 dBm output per tone	dBm	—	40	—
Output IP2	6 MHz Spacing, -10 dBm output per tone	dBm	—	50	—
Composite Triple Beat, CTB	80 ch. NTSC flat, +33 dBmV / ch. at the output	dBc	—	-74	—
Composite Second Order, CSO	80 ch. NTSC flat +33 dBmV / ch. at the output	dBc	—	-62	—
P1dB	403.25 MHz	dBm	—	25	—
$I_{DD}$	8 Volts	mA	—	148	165

### Absolute Maximum Ratings<sup>3,4,5</sup>

Parameter	Absolute Maximum
RF Input Power	6 dBm
Voltage	10 volts
Operating Temperature	-40°C to +85°C
Junction Temperature <sup>6</sup>	+150°C
Storage Temperature	-65°C to +150°C

- Exceeding any one or combination of these limits may cause permanent damage to this device.
- MACOM does not recommend sustained operation near these survivability limits.
- Operating at nominal conditions with  $T_J \leq +150^\circ\text{C}$  will ensure  $\text{MTTF} > 1 \times 10^6$  hours.
- Junction Temperature ( $T_J$ ) =  $T_C + \Theta_{JC} * ((V * I) - (P_{OUT} - P_{IN}))$   
Typical thermal resistance ( $\Theta_{JC}$ ) = 32°C/W.
  - For  $T_C = +25^\circ\text{C}$ ,  
 $T_J = +63^\circ\text{C}$  @ 8 V, 148 mA
  - For  $T_C = +85^\circ\text{C}$ ,  
 $T_J = +123^\circ\text{C}$  @ 8 V, 148 mA

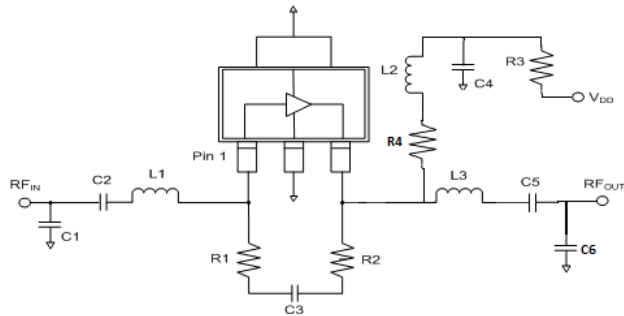
### Handling Procedures

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.

## Schematic Including Off-Chip Components

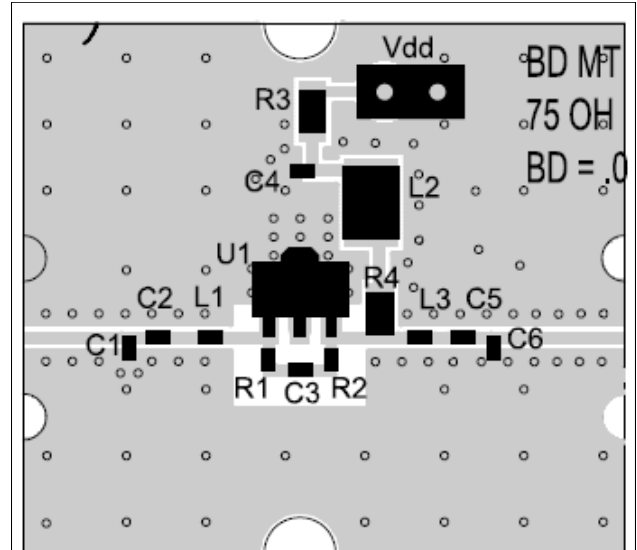


## Off-Chip Component Values

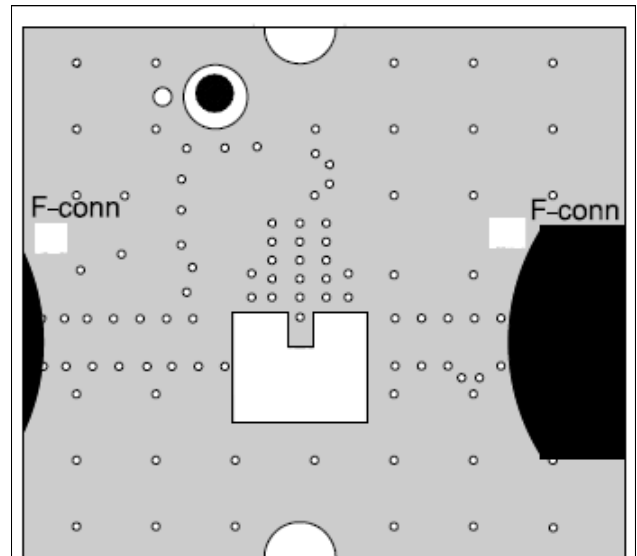
Component	Value	Package
C1	1.5 pF	0402
C2, C3, C4	0.01 $\mu$ F	0402
C5	270 pF	0402
C6	0.5 pF	0402
L1	10 nH	0402
L2 <sup>7</sup>	1 $\mu$ H	1210
L3	8.2 nH	0402
R1	360 $\Omega$	0402
R2	715 $\Omega$	0402
R3	0 $\Omega$	0805
R4	2 $\Omega$	0805

7. L2 is EPCOS part number B82422A1102K100.

## Recommended PCB Layout



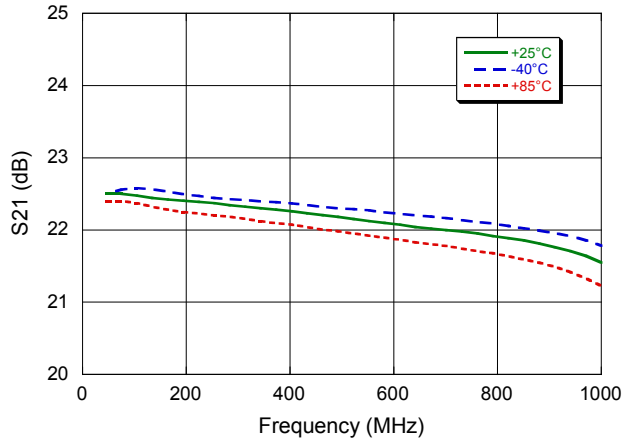
**Component Side Metal Layer**  
(Viewed from Top)



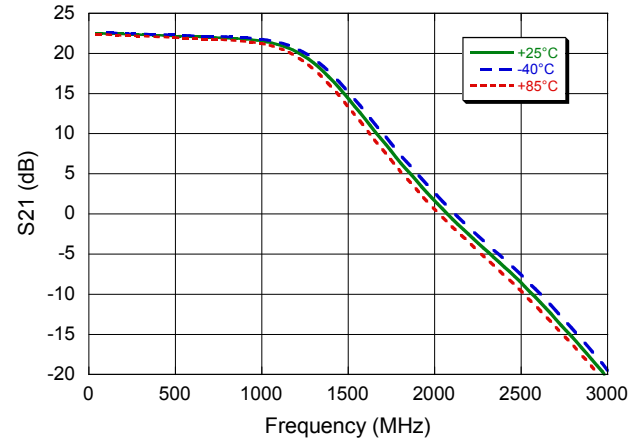
**Bottom Side Metal Layer**  
(Viewed from Bottom)

**Typical Performance Curves:**

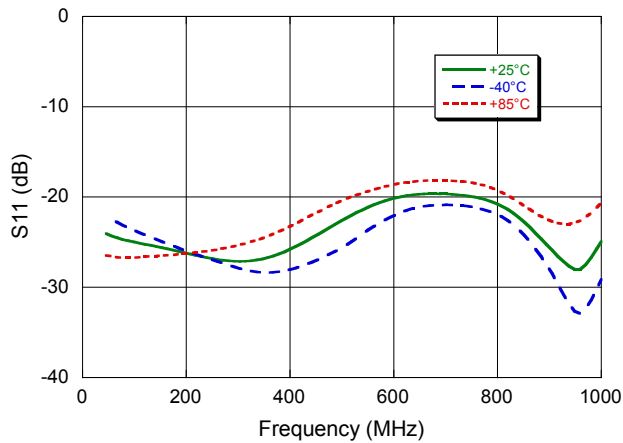
**Gain to 1000 MHz**



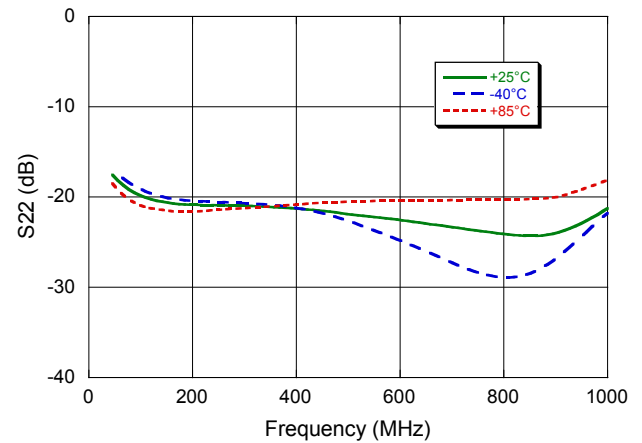
**Gain to 3000 MHz**



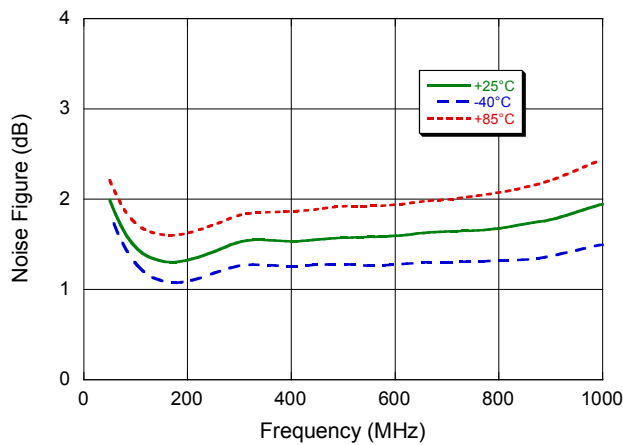
**Input Return Loss**



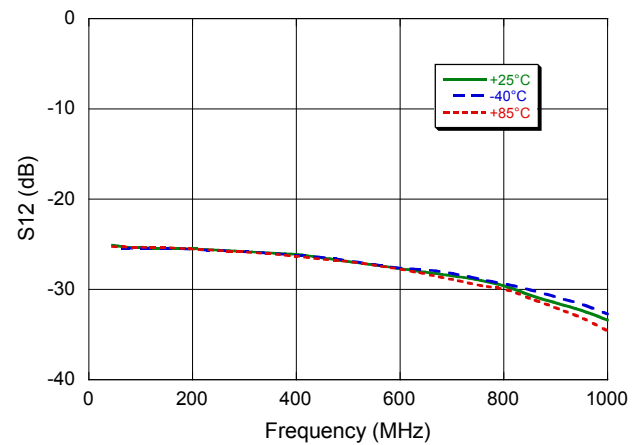
**Output Return Loss**



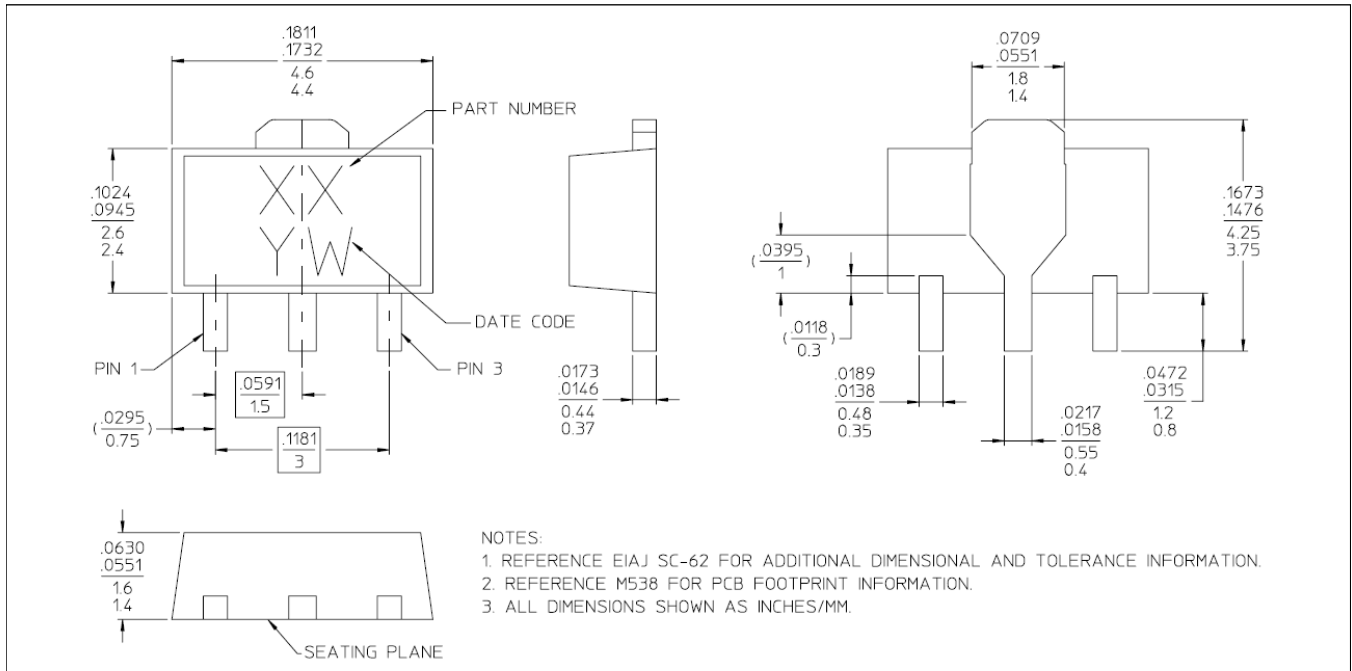
**Noise Figure**



**Reverse Isolation**



## Lead-Free SOT-89 Plastic Package<sup>†</sup>



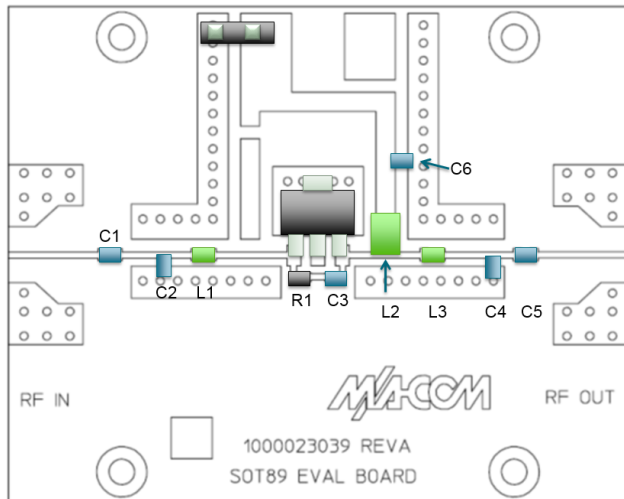
<sup>†</sup> Reference Application Note M538 for lead-free solder reflow recommendations.  
 Meets JEDEC moisture sensitivity level 1 requirements.  
 Plating is 100% matte tin over copper.

## Applications Section @ 13.56 MHz

**Electrical Specifications:**  $T_A = 25^\circ\text{C}$ , Freq: 13.56 MHz,  $V_{DD} = 9\text{ V}$ ,  $Z_0 = 50\ \Omega$

Parameter	Units	Min.	Typ.	Max.
Gain	dB	—	21.8	—
Input Return Loss	dB	—	12.5	—
Output Return Loss	dB	—	13.5	—
Noise Figure	dB	—	4.8	—
P1dB	dBm	—	26.7	—
Output IP3 (6 MHz Spacing, -10 dBm input per tone)	dBm	—	37	—
$I_{DD}$	mA	—	190	—

### Recommended PCB Layout



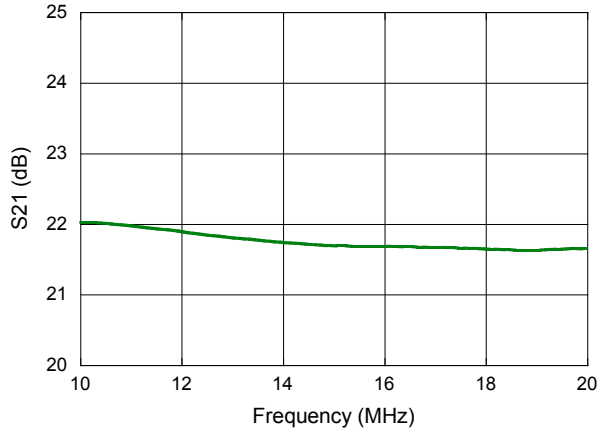
### Off-Chip Component Values

Component	Value	Package
C1, C5	1000 pF	0402
C2, C3, C4	20 pF	0402
C6	0.1 $\mu\text{F}$	0402
L1	10 nH	0402
L2	3.9 $\mu\text{H}$	0805
L3	8.2 nH	0402
R1	910 $\Omega$	0402

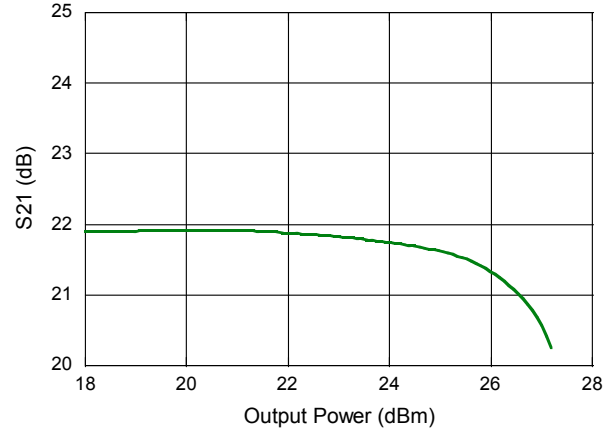
## Applications Section @ 13.56 MHz

### Typical Performance Curves:

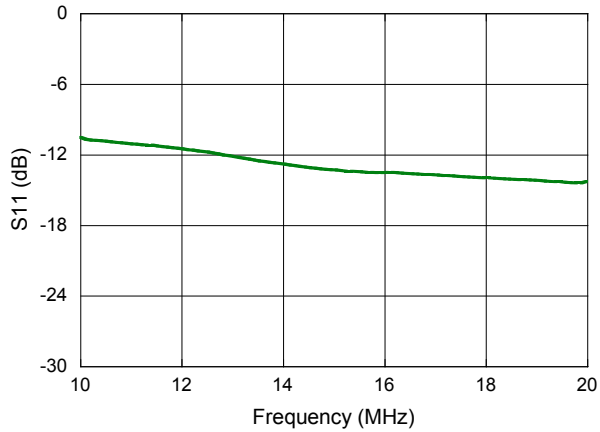
**Gain**



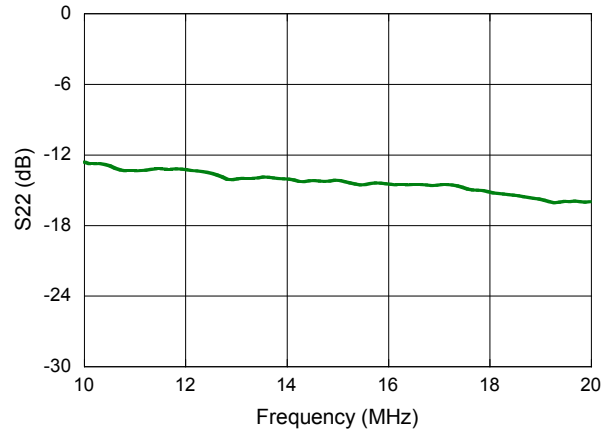
**Compression**



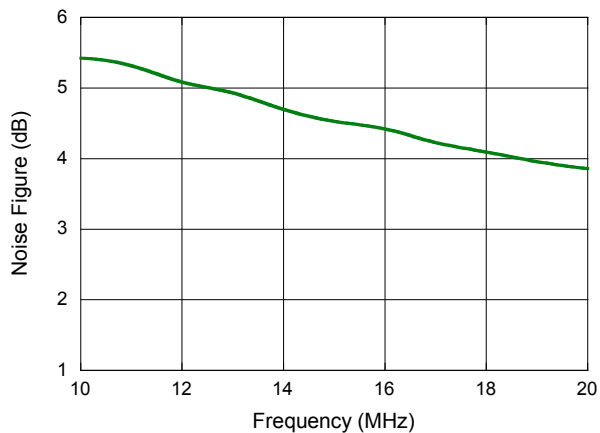
**Input Return Loss**



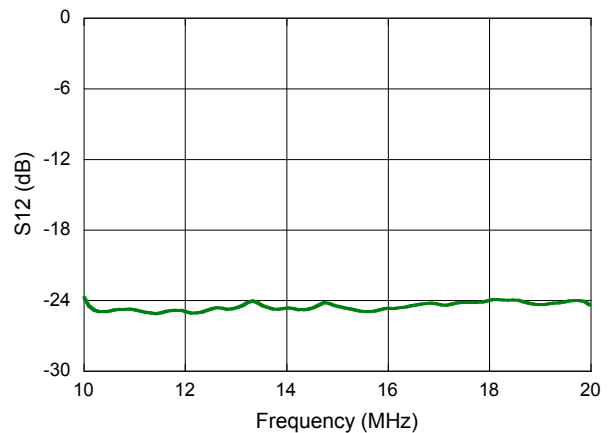
**Output Return Loss**



**Noise Figure**



**Reverse Isolation**



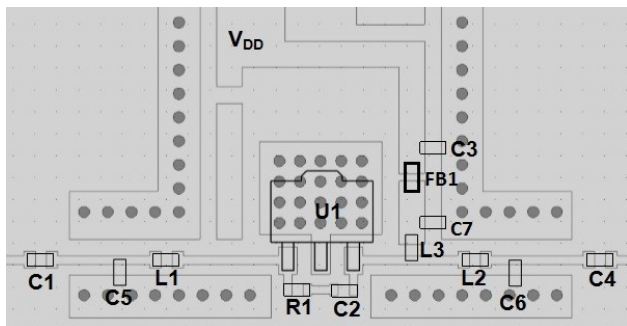
## Applications Section: 30 - 800 MHz, 50 Ω

The MAAM-010373 is designed to work as a low noise gain block over a wide range of frequencies. Input and output can be tuned for 50 Ω applications, the 30 - 800 MHz band 50 Ω application circuit is shown below.

### Typical Performance: $T_A = 25^\circ\text{C}$ , $V_{DD} = 8\text{ V}$ , $I_{DD} = 139\text{ mA}$ , $Z_0 = 50\ \Omega$ , 30 - 800 MHz Application

Parameter	Units	Min.	Typ.	Max.
Gain	dB	—	20	—
Reverse Isolation	dB	—	25	—
Input Return Loss	dB	—	10	—
Output Return Loss	dB	—	10	—
Noise Figure	dB	—	1.5	—
P1dB	dBm	—	26	—
$I_{DD}$	mA	—	139	—

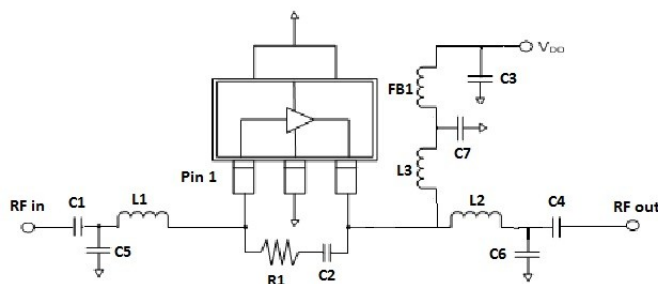
### Recommended PCB Layout



### Off-Chip Component Values

Component	Value	Package
C1	1.5 pF	0402
C2, C3, C4	0.01 μF	0402
C5	270 pF	0402
C6	0.5 pF	0402
L1	10 nH	0402
L2 <sup>7</sup>	1 μH	1210
L3	8.2 nH	0402
R1	360 Ω	0402
R2	715 Ω	0402
R3	0 Ω	0805
R4	2 Ω	0805

### Recommended Schematic

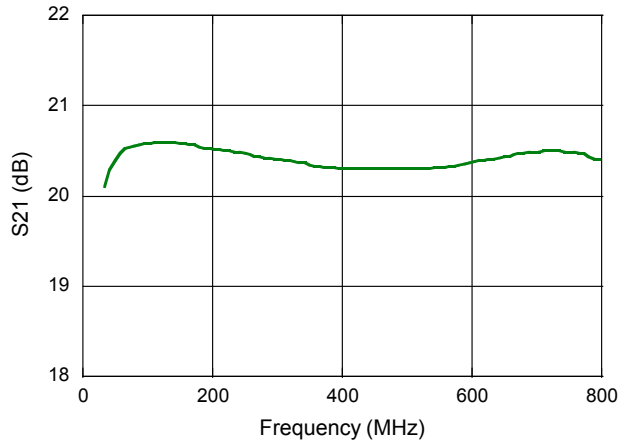




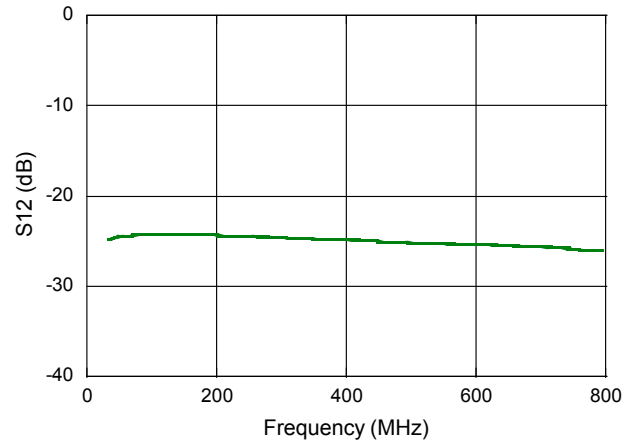
## Applications Section: 30 - 800 MHz, 50 $\Omega$

### Typical Performance Curves @ +25°C:

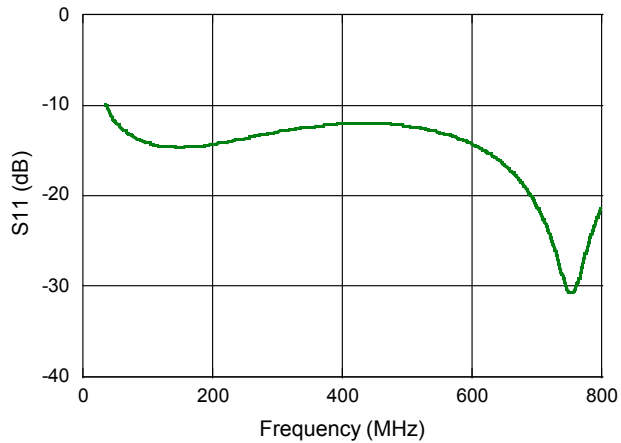
**Gain**



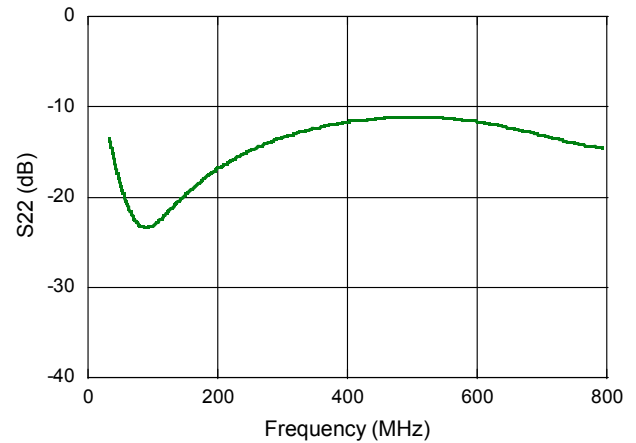
**Reverse Isolation**



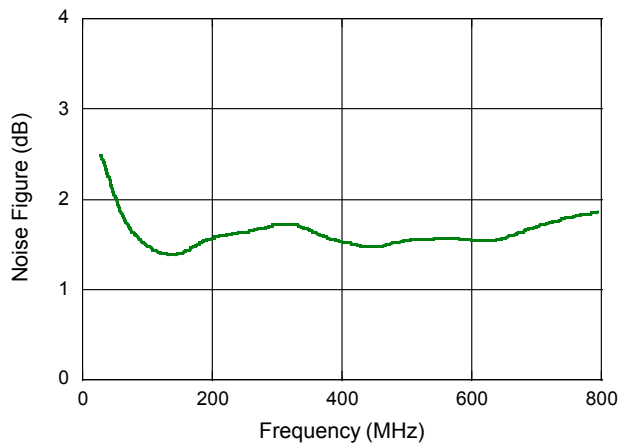
**Input Return Loss**



**Output Return Loss**



**Noise Figure**



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