

Features

- 75 Ω Input / Output Match
- CTB: -75 dBc
- Noise Figure: 1.8 dB
- Gain: 17 dB, 20 dB
- Lead Free SOT-89 Package
- Halogen-Free “Green” Mold Compound
- RoHS* Compliant and 260°C Reflow Compatible

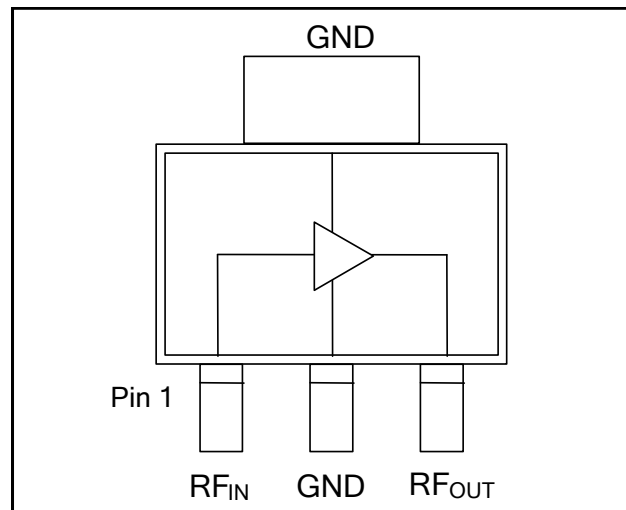
Description

M/A-COM's MAAMSS0060 CATV amplifier is a GaAs MMIC which exhibits low distortion in a lead free miniature surface mount plastic package. The MAAMSS0060 employs a monolithic single stage design featuring a convenient 75 Ω input/output impedance that minimizes the number of external components required.

The MAAMSS0060 provides low noise and high linearity. It is ideally suited for set top boxes, home gateways, FTTX, Drop Amplifiers, and other broadband internet based applications.

The MAAMSS0060 is fabricated using M/A-COM's PHEMT process to realize low noise and low distortion. The process features full passivation for robust performance and reliability.

Functional Schematic



Pin Configuration

| Pin No. | Pin Name | Description |
|---------|-------------------|--------------------------|
| 1 | RF _{IN} | RF Input |
| 2 | GND | Ground |
| 3 | RF _{OUT} | RF Output / Drain Supply |

Ordering Information ^{1,2}

| Part Number | Package |
|---------------------------------|--------------------------|
| MAAMSS0060 | Bulk Packaging |
| MAAMSS0060TR | 1000 piece reel |
| MAAMSS0060TR-3000 | 3000 piece reel |
| MAAM-000060-001SMB ² | 17 dB Gain Configuration |
| MAAM-000060-002SMB ² | 20 dB Gain Configuration |

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 |
|-----------------------------------|------------------|
| RF Input Power | 6 dBm |
| Voltage | 10.0 volts |
| Operating Temperature | -40°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 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) = $T_C + \Theta_{jc} * (V * I)$
 Typical thermal resistance (Θ_{jc}) = 58° C/W.
 - a) For $T_C = 25^\circ\text{C}$,
 $T_J = 81^\circ\text{C} @ 8 \text{ V}, 120 \text{ mA}$
 - b) For $T_C = 85^\circ\text{C}$,
 $T_J = 136^\circ\text{C} @ 8 \text{ V}, 110 \text{ mA}$

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

17 dB Gain Configuration

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

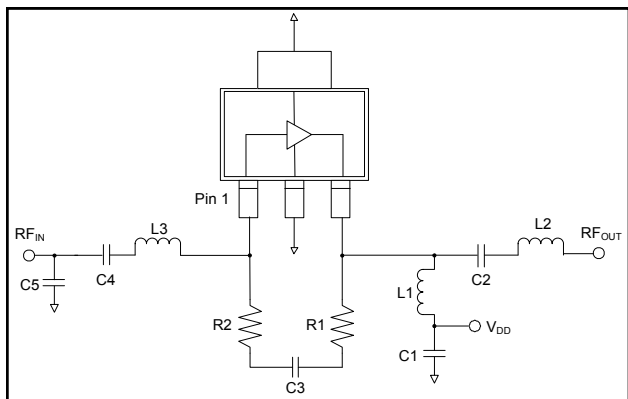
| Parameter | Test Conditions | Units | Min. | Typ. | Max. |
|-----------------------------|---|-------|------|------|------|
| Gain | | dB | 15.8 | 17 | 17.8 |
| Gain Flatness | | dB | — | 0.5 | 1.0 |
| Noise Figure | | dB | — | 1.8 | 3.5 |
| Input Return Loss | | dB | — | 20 | — |
| Output Return Loss | | dB | — | 20 | — |
| Output IP3 | 6 MHz Spacing, -10 dBm output per tone | dBm | — | 37 | — |
| Composite Triple Beat, CTB | 132 channels, +30 dBmV / channel at the output. | dBc | — | -75 | — |
| Composite Second Order, CSO | 132 channels, +30 dBmV / channel at the output. | dBc | — | -60 | — |
| P1dB | | dBm | — | 23 | — |
| I_{DD} | 8 Volts | mA | — | 120 | 140 |

20 dB Gain Configuration

Typical Performance: $T_A = 25^\circ\text{C}$, Freq: 50 - 1000 MHz, $V_{DD} = 8$ Volts, $Z_0 = 75 \Omega$

| Parameter | Test Conditions | Units | Min. | Typ. | Max. |
|-----------------------------|---|-------|------|------|------|
| Gain | | dB | — | 20 | — |
| Gain Flatness | | dB | — | 1 | — |
| Noise Figure | | dB | — | 1.6 | — |
| Input Return Loss | | dB | — | 12 | — |
| Output Return Loss | | dB | — | 12 | — |
| Output IP3 | 6 MHz Spacing, -10 dBm output per tone | dBm | — | 35 | — |
| Composite Triple Beat, CTB | 132 channels, +33 dBmV / channel at the output. | dBc | — | -66 | — |
| Composite Second Order, CSO | 132 channels, +33 dBmV / channel at the output. | dBc | — | -55 | — |
| P1dB | | dBm | — | 21 | — |
| I_{DD} | 8 Volts | mA | — | 120 | — |

17 & 20 dB Gain Configuration Schematic Including Off-Chip Components

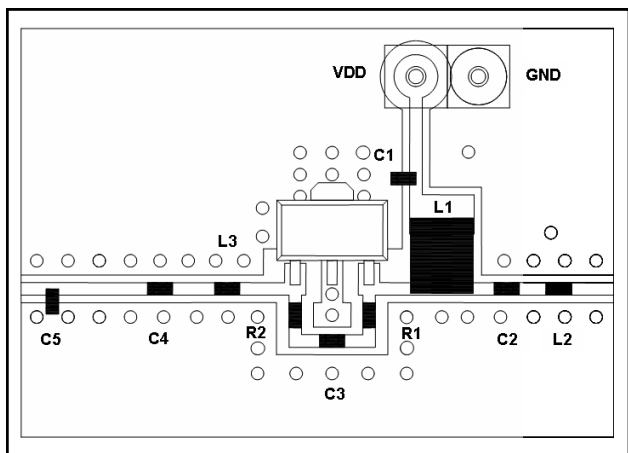


17 dB Gain Configuration Off-Chip Component Values

| Component | Value | Package |
|-----------------|--------------|---------|
| C1,C3,C4 | 0.01 μ F | 0402 |
| C2 | 470 pF | 0402 |
| C5 | 0.7 pF | 0402 |
| L1 ⁷ | 1 μ H | 1210 |
| L2 | 4.7 nH | 0402 |
| L3 | 8.2 nH | 0402 |
| R1 | 560 Ω | 0402 |
| R2 | 91 Ω | 0402 |

7. L1 supplied from EPCOS, part number B82422A1102K100

17 & 20 dB Gain Configuration Recommended Board Layout



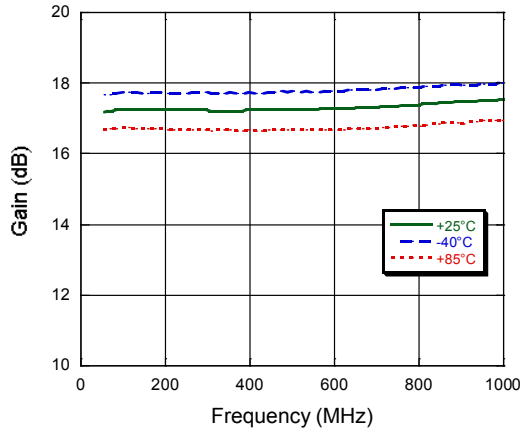
20 dB Gain Configuration Off-Chip Component Values

| Component | Value | Package |
|-----------------|--------------|---------|
| C1,C2,C3,C4 | 0.01 μ F | 0402 |
| C5 | 0.75 pF | 0402 |
| L1 ⁸ | 1.5 μ H | 1210 |
| L2 | 10 nH | 0402 |
| L3 | 12 nH | 0402 |
| R1 | 750 Ω | 0402 |
| R2 | 360 Ω | 0402 |

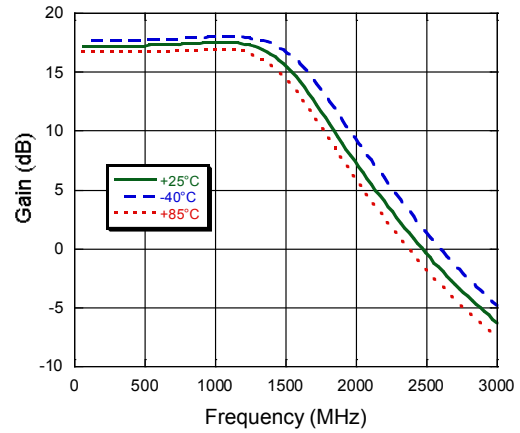
8. L1 supplied from EPCOS, part number B82422A1152K100

Typical Performance Curves: 17dB Gain Configuration

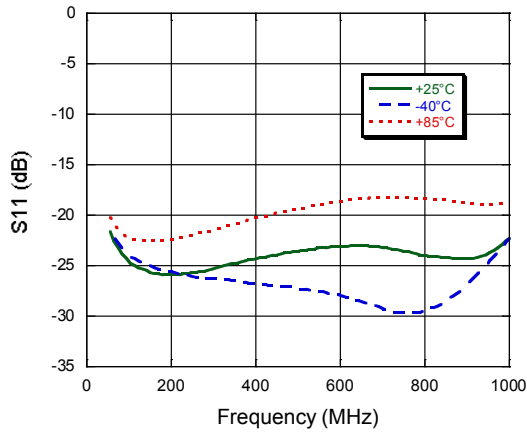
Gain to 1 GHz over Temperature



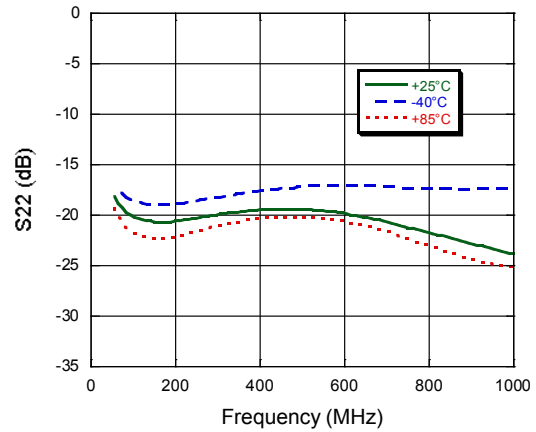
Gain to 3 GHz over Temperature



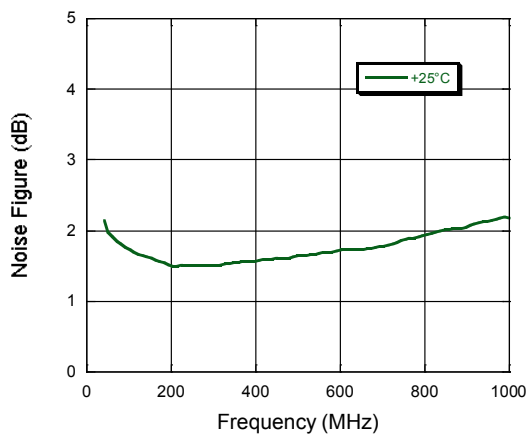
Input Return Loss over Temperature



Output Return Loss over Temperature

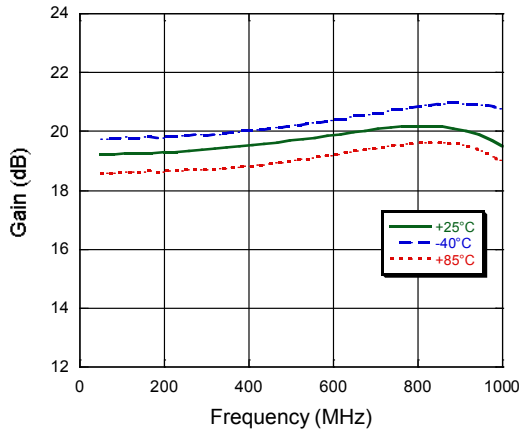


Noise Figure

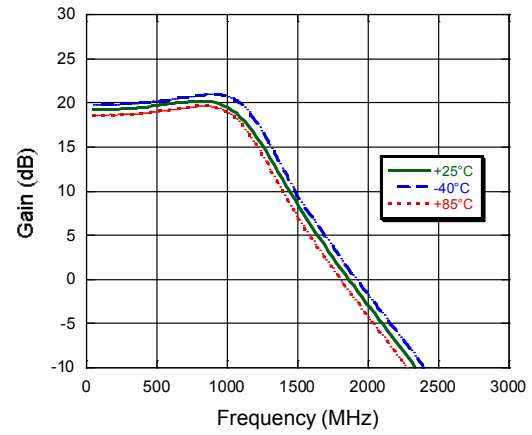


Typical Performance Curves: 20 dB Gain Configuration

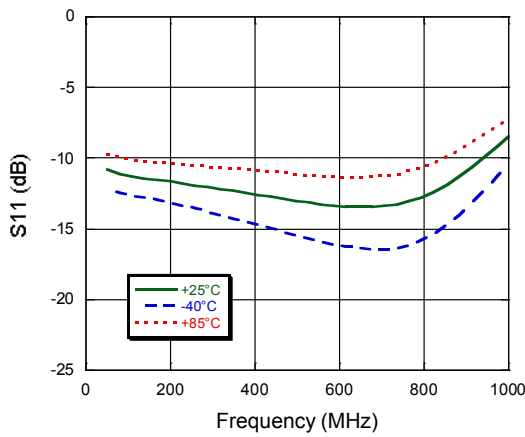
Gain to 1 GHz



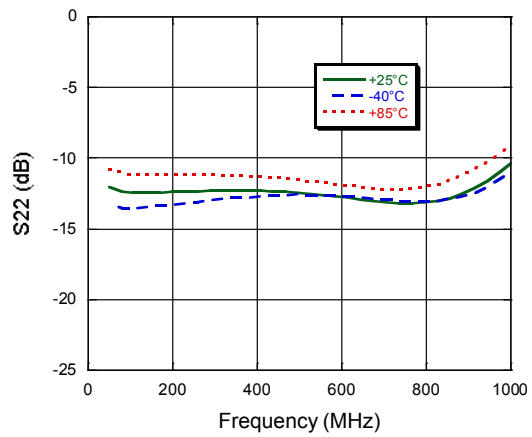
Gain to 3 GHz



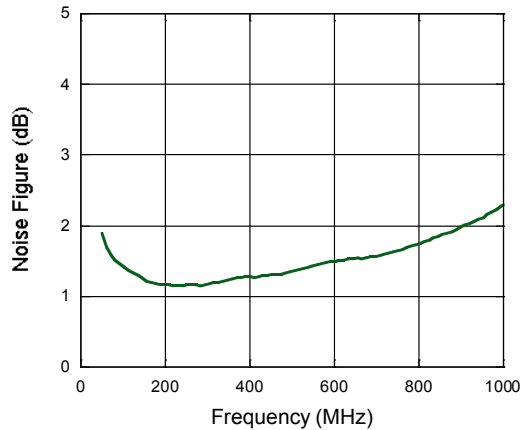
Input Return Loss



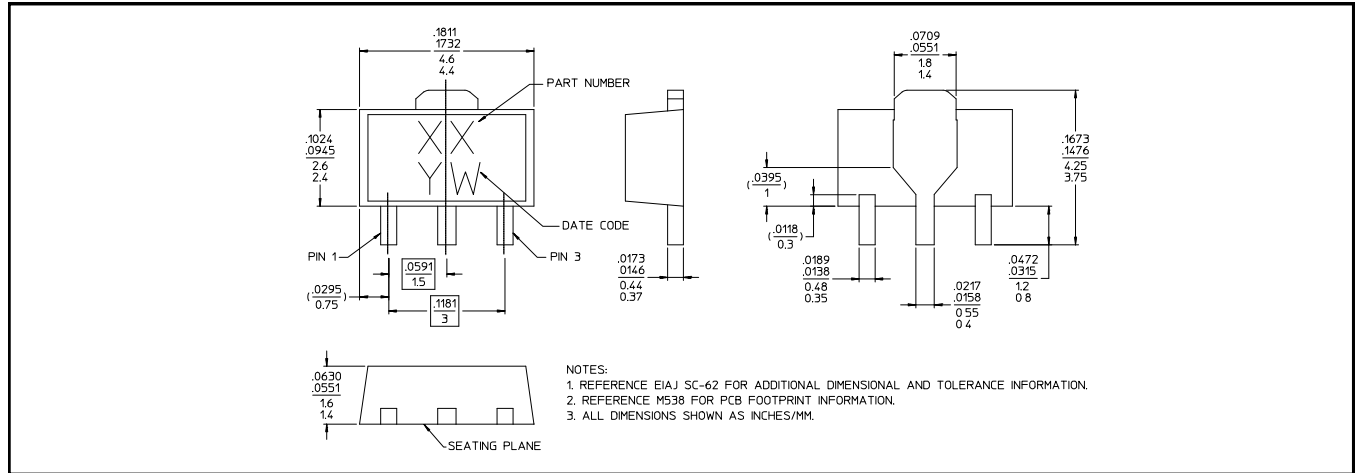
Output Return Loss



Noise Figure



Lead-Free SOT-89 Plastic Package[†]



[†] Reference Application Note M538 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.

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