# MAAMSS0031



# Broadband CATV Amplifier 50 - 1000 MHz

Rev. V4

#### **Features**

- Low Cost Plastic SOT-89 Package
- 75 Ohm Input / Output Match
- -80 dBc CTB
- 2.7 dB Noise Figure
- 14.8 dB Gain

#### **Description**

M/A-COM's MAAMSS0031 CATV amplifier is a GaAs MMIC which exhibits low distortion in a low-cost miniature surface mount plastic package. The MAAMSS0031 employs a monolithic single stage design featuring a convenient 75  $\Omega$  input/output impedance that minimizes the number of external components required.

The MAAMSS0031 provides low noise and high linearity. It is ideally suited for set top boxes, home gateways, and other broadband internet based appliances.

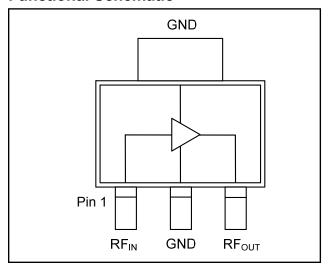
The MAAMSS0031 is fabricated using M/A-COM's PHEMT process to realize low noise and low distortion. The process features full passivation for robust performance and reliability.

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

| Part Number       | Package                  |  |
|-------------------|--------------------------|--|
| MAAMSS0031        | SOT-89 Plastic Package   |  |
| MAAMSS0031TR      | 1000 Piece Tape and Reel |  |
| MAAMSS0031TR-3000 | 3000 Piece Tape and Reel |  |
| MAAMSS0031SMB     | 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 |  |

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

| Parameter                         | Absolute Maximum |  |
|-----------------------------------|------------------|--|
| RF Input Power                    | 15 dBm           |  |
| Voltage                           | 10.0 volts       |  |
| Operating Temperature             | -40°C to +85°C   |  |
| Junction Temperature <sup>6</sup> | +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.
- M/A-COM does not recommend sustained operation near these survivability limits.
- 5. These operating conditions will ensure MTTF >  $1 \times 10^6$  hours.
- 6. Junction Temperature  $(T_J) = T_C + \Theta jc * (V * I)$ Typical thermal resistance  $(\Theta jc) = 75^{\circ}$  C/W.
  - a) For  $T_C = 25^{\circ}C$ ,

T<sub>J</sub> = 85°C @ 8 V, 100 mA

b) For  $T_C = 85^{\circ}C$ ,

T<sub>J</sub> = 139 °C @ 8 V, 90 mA

ADVANCED: Data Sheets contain information regarding a product M/A-COM Technology Solutions is considering for development. Performance is based on target specifications, simulated results, and/or prototype measurements. Commitment to develop is not guaranteed.

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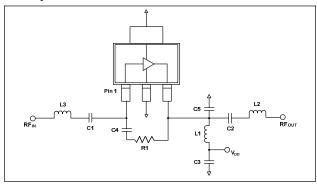
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## Electrical Specifications: $T_A = 25$ °C, Freq: 50 - 1000 MHz, $V_{DD} = +8$ Volts, $Z_0 = 75 \Omega$

| Parameter                   | Test Conditions                               | Units | Min. | Тур. | Max. |
|-----------------------------|---|-------|------|------|------|
| Gain                        |   | dB    | 14.0 | 14.8 | 16.0 |
| Gain Flatness               |   | dB    | _    | 0.5  | 1.0  |
| Noise Figure                |   | dB    | _    | 2.7  | 3.8  |
| Input Return Loss           |   | dB    | _    | 20   | _    |
| 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   | _    | -80  | _    |
| Composite Second Order, CSO | 132 channels, +23 dBmV/channel at the output. | dBc   | _    | -70  | _    |
| P1dB                        |   | dBm   | _    | 23   | _    |
| I <sub>DD</sub>             | + 8 Volts                                     | mA    | _    | 100  | 130  |

# **Schematic Including Off-Chip Components**

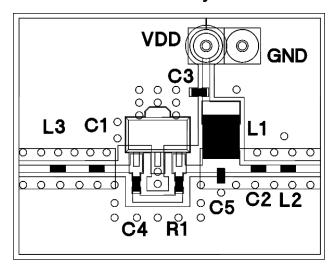


### **Off-Chip Component Values**

| Component       | Value   | Package |
|-----------------|---------|---------|
| C1 - C4         | 0.01 μF | 0402    |
| C5              | 0.5 pF  | 0402    |
| L1 <sup>7</sup> | 1000 nH | 1210    |
| L2              | 8.2 nH  | 0402    |
| L3              | 5.6 nH  | 0402    |
| R1              | 523 Ω   | 0402    |

7. L1 supplied from EPCOS, part number B82422A1102K100.

## **Recommended Board Layout**



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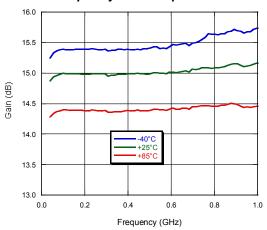


# **Broadband CATV Amplifier** 50 - 1000 MHz

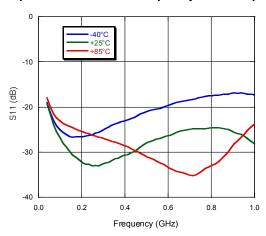
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## **Typical Performance Curves**

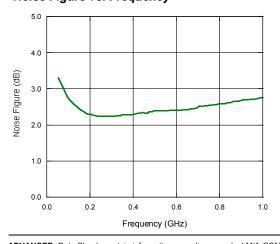
#### Gain vs. Frequency over Temperature to 1 GHz



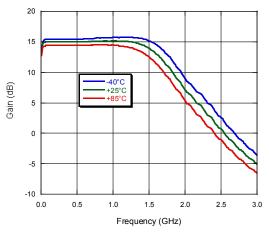
#### Input Return Loss vs. Frequency over Temperature



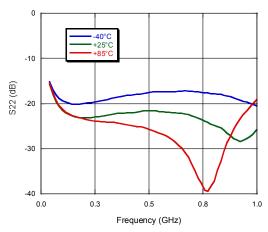
#### Noise Figure vs. Frequency



#### Gain vs. Frequency over Temperature to 3 GHz



#### Output Return Loss vs. Frequency over Temperature



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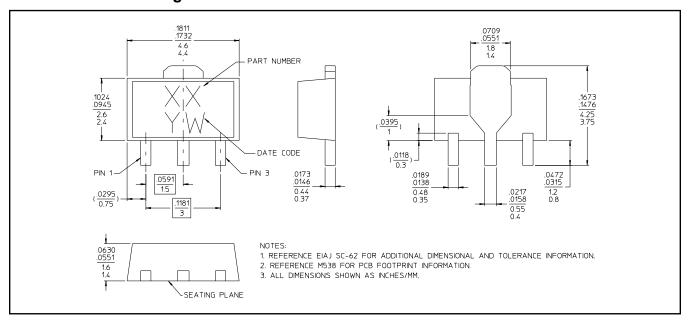
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# SOT-89 Plastic Package<sup>†</sup>



† Meets JEDEC moisture sensitivity level 1 requirements.

### **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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