

## Broadband CATV Single Ended 3-Way Active Splitter 50 - 1100 MHz

Rev. V1

### Features

- 3-Way Splitter
- Single Ended Input and Outputs
- 3.0 dB Gain
- +15 dBmV / Channel Input
- 4.5 dB Noise Figure
- Lead-Free 2 mm 8-Lead PDFN Package
- Halogen-Free “Green” Mold Compound
- RoHS\* Compliant and 260°C Reflow Compatible

### Description

The MAAM-009451 CATV 3-way active splitter is a GaAs MMIC which exhibits low noise figure and distortion in a lead-free 2 mm 8-lead PDFN plastic package. The design features 75  $\Omega$  inputs and outputs.

The MAAM-009451 is ideally suited for multi-tuner set top boxes, home gateways, and other broadband internet based applications.

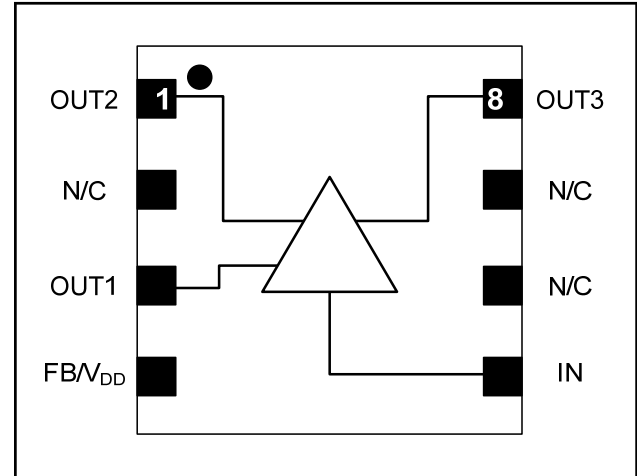
The MAAM-009451 is fabricated using M/A-COM Technology Solutions’ pHEMT process to realize low noise and low distortion. The process features full passivation for robust performance and reliability.

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

| Part Number        | Package           |
|--------------------|-------------------|
| MAAM-009451-TR1000 | 1000 piece reel   |
| MAAM-009451-TR3000 | 3000 piece reel   |
| MAAM-009451-001SMB | 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       | Out2                | RF Output 2      |
| 2       | N/C                 | No Connection    |
| 3       | Out1                | RF Output 1      |
| 4       | FB/V <sub>DD</sub>  | Feedback/Bias    |
| 5       | IN                  | RF Input         |
| 6       | N/C                 | No Connection    |
| 7       | N/C                 | No Connection    |
| 8       | Out3                | RF Output 3      |
| 9       | Paddle <sup>3</sup> | RF and DC Ground |

3. 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: Freq = 1000 MHz, T<sub>A</sub> = 25°C, V<sub>DD</sub> = +3.3 Volts, Z<sub>0</sub> = 75 Ω**

| Parameter                   | Test Conditions                              | Units | Min. | Typ. | Max. |
|-----------------------------|--|-------|------|------|------|
| Gain                        | In to Out1, In to Out2, In to Out3           | dB    | 2.0  | 3.0  | 4.2  |
| Gain Flatness               | In to Out1, In to Out2, In to Out3           | dB    | -    | 1.0  | -    |
| Noise Figure                | In to Out1, In to Out2, In to Out3           | dB    | -    | 4.5  | -    |
| Input Return Loss           | In   | dB    | -    | 15   | -    |
| Output Return Loss          | Out1, Out2, Out3                             | dB    | -    | 8    | -    |
| Output P1dB                 | In to Out1, In to Out2, In to Out3           | dBm   | -    | 4    | -    |
| Output IP3                  | 500 MHz, 2-tone, 6 MHz spacing, -15 dBm Pout | dBm   | -    | 25   | -    |
| Output IP2                  | 500 MHz, 2-tone, 6 MHz spacing, -15 dBm Pout | dBm   | -    | 40   | -    |
| Composite Triple Beat, CTB  | 132 Channels, +15 dBmV/Channel at the input  | dBc   | -    | -67  | -    |
| Composite Second Order, CSO | 132 Channels, +15 dBmV/Channel at the input  | dBc   | -    | -55  | -    |
| Reverse Isolation           | Out1 to In, Out2 to In, Out3 to In           | dB    | -    | 29   | -    |
| Output to Output Isolation  | Out1 to Out2 or Out3; Out2 to Out3           | dB    | -    | 22   | -    |
| I <sub>DD</sub>             | V <sub>DD</sub> = +3.3 Volts                 | mA    | -    | 90   | 110  |

### Absolute Maximum Ratings<sup>4,5,6</sup>

| Parameter                         | Absolute Maximum |
|-----------------------------------|------------------|
| RF Input Power                    | 12 dBm           |
| Voltage                           | 10.0 volts       |
| Operating Temperature             | -20°C to +85°C   |
| Junction Temperature <sup>7</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.
- M/A-COM Technology Solutions does not recommend sustained operation near these survivability limits.
- These operating conditions will ensure MTTF > 1 x 10<sup>6</sup> hours.
- Junction Temperature (T<sub>J</sub>) = T<sub>C</sub> + Θ<sub>JC</sub> \* (V \* I)  
Typical thermal resistance (Θ<sub>JC</sub>) = 101° C/W.
  - For T<sub>C</sub> = 25°C,  
T<sub>J</sub> = 62°C @ 3.3 V, 110 mA
  - For T<sub>C</sub> = 85°C,  
T<sub>J</sub> = 120 °C @ 3.3 V, 105 mA

### Handling Procedures

Please observe the following precautions to avoid damage:

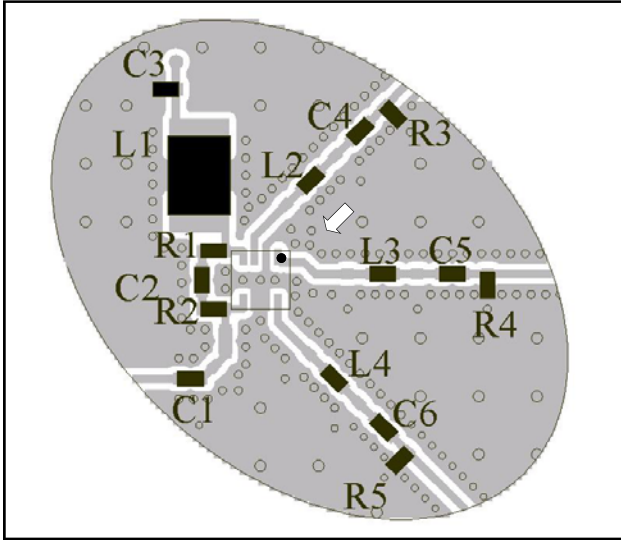
### Static Sensitivity

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.

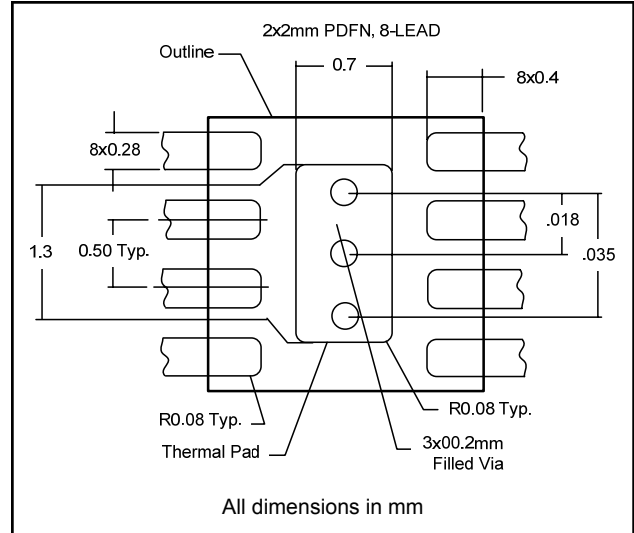
An external protection circuit using an inexpensive anti-parallel diode pair can be used to protect the IC.

Please reference application note AN3028 on <http://www.macomtech.com> for further detail.

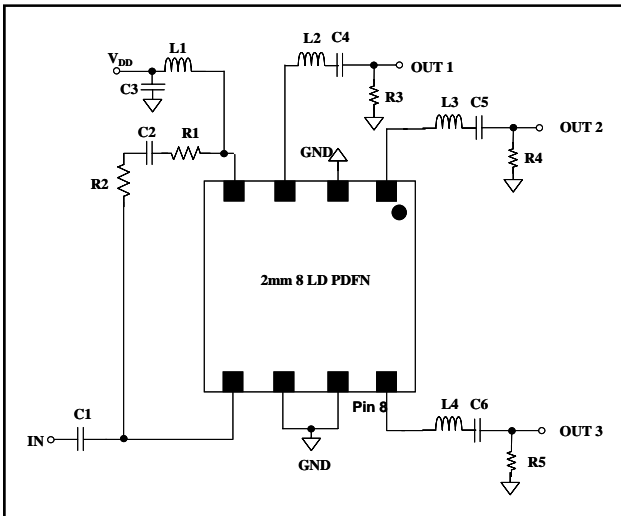
## Recommended PCB



## PCB Land Pattern



## Schematic Including Off-Chip Components<sup>8</sup>



8. The exposed pad centered on the package bottom must be connected to ground for RF, DC and thermal considerations.

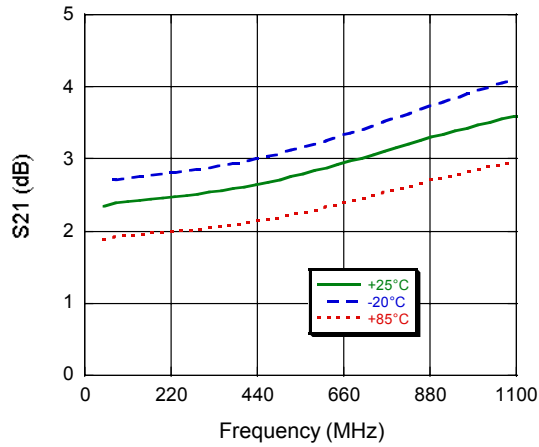
## Off-Chip Component Values

| Component       | Value        | Package |
|-----------------|--------------|---------|
| C1 - C6         | 0.01 $\mu$ F | 0402    |
| L1 <sup>9</sup> | 1 $\mu$ H    | 1210    |
| L2-L4           | 10 nH        | 0402    |
| R1, R2          | 240 $\Omega$ | 0402    |
| R3 - R5         | 560 $\Omega$ | 0402    |

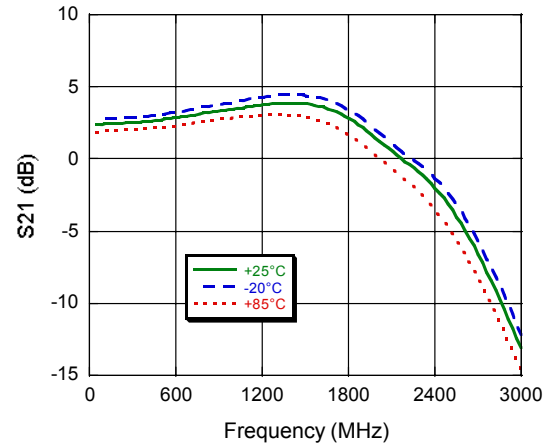
9. L1 supplied from EPCOS, part number B82422A1102K100

## Typical Performance Curves

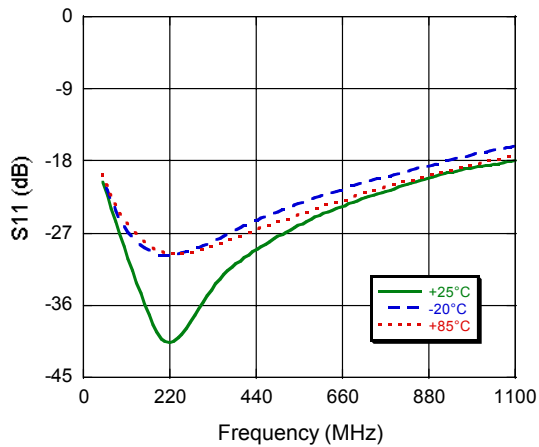
**Gain to 1100 MHz**  
*Typical All Outputs*



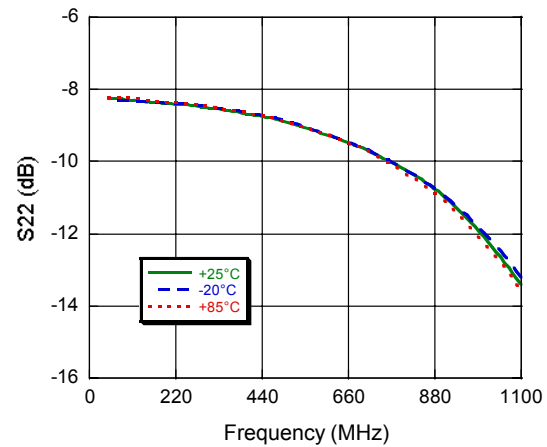
**Gain to 3000 MHz**  
*Typical All Outputs*



**Input Return Loss**

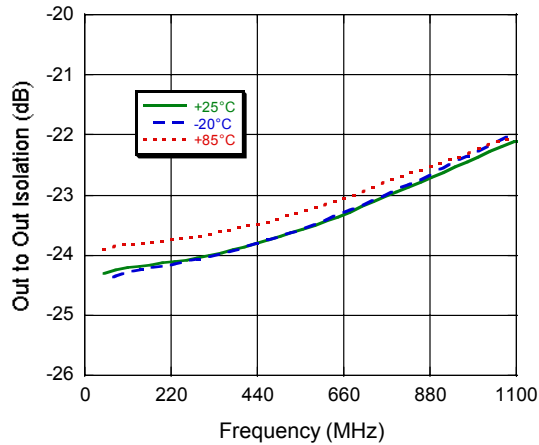


**Output Return Loss**  
*Typical All Outputs*

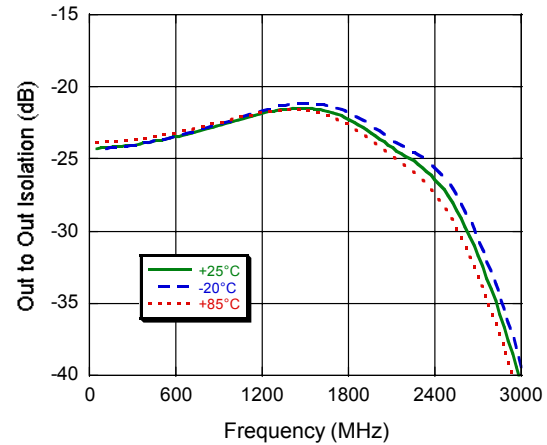


## Typical Performance Curves

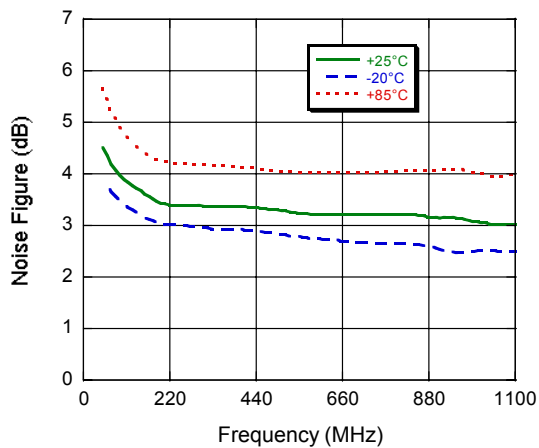
**OUT-OUT Isolation to 1100 MHz**  
Typical Between All Outputs



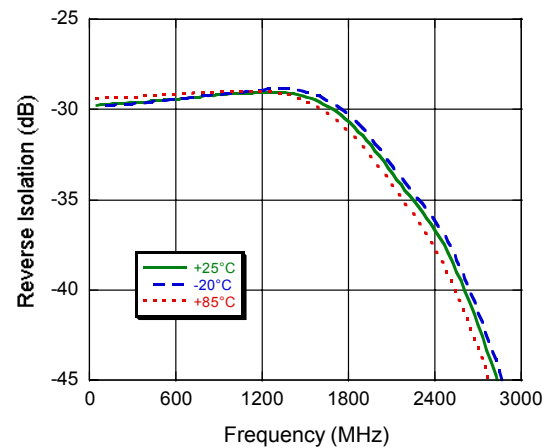
**OUT-OUT Isolation to 3000 MHz**  
Typical Between All Outputs



**Noise Figure**  
Typical All Outputs



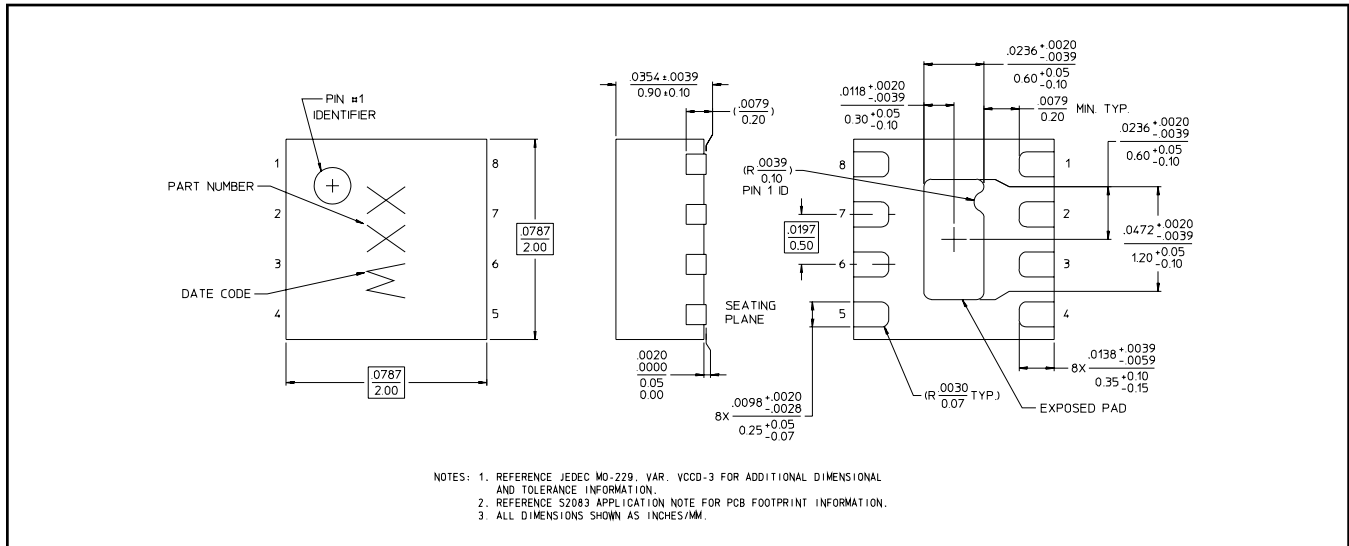
**Reverse Isolation to 3000 MHz**  
Typical From All Outputs to Input



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### Lead-Free 2 mm 8-Lead PDFN<sup>†</sup>



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