

## Broadband CATV Single Ended 4-Way Active Splitter 50 - 1100 MHz

Rev. V2

### Features

- 4-Way Splitter
- Single Ended Input and Outputs
- 3.0 dB Gain
- +15 dBmV / Channel Input
- 3.8 dB Noise Figure
- Single +5 Volt Supply
- Lead-Free 3 mm 12-Lead PQFN Package
- RoHS\* Compliant and 260°C Reflow Compatible

### Description

M/A-COM's MAAM-008820 CATV 4-way active splitter is a GaAs MMIC which exhibits low noise figure and distortion in a lead-free 3 mm 12-lead PQFN plastic package. The design features 75 Ω inputs and outputs.

The MAAM-008820 is ideally suited for multi-tuner set top boxes, home gateways, and other broadband internet based appliances.

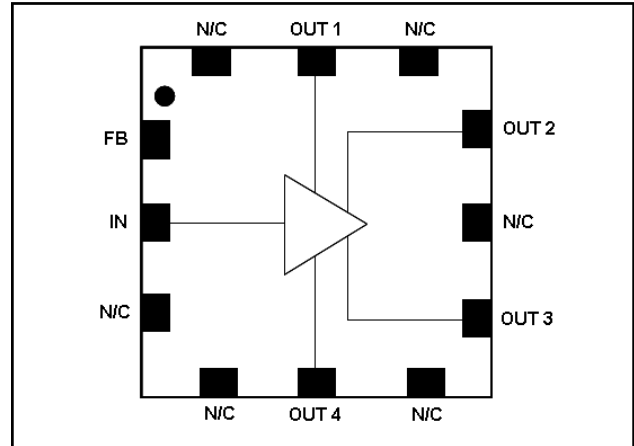
The MAAM-008820 is fabricated using M/A-COM's PHEMT process to realize low noise and low distortion. The process features full passivation for robust performance and reliability.

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

| Part Number        | Package           |
|--------------------|-------------------|
| MAAM-008820-TR1000 | 1000 piece reel   |
| MAAM-008820-TR3000 | 3000 piece reel   |
| MAAM-008820-001SMB | 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       | FB                  | Feedback/Bias    |
| 2       | IN                  | RF Input         |
| 3       | N/C                 | No Connection    |
| 4       | N/C                 | No Connection    |
| 5       | OUT4                | RF Output 4      |
| 6       | N/C                 | No Connection    |
| 7       | OUT3                | RF Output 3      |
| 8       | N/C                 | No Connection    |
| 9       | OUT2                | RF Output 2      |
| 10      | N/C                 | No Connection    |
| 11      | OUT1                | RF Output 1      |
| 12      | N/C                 | No Connection    |
| 13      | 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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- **North America** Tel: 800.366.2266 / Fax: 978.366.2266
  - **Europe** Tel: 44.1908.574.200 / Fax: 44.1908.574.300
  - **Asia/Pacific** Tel: 81.44.844.8296 / Fax: 81.44.844.8298
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**Electrical Specifications: Freq. = 50 - 1000 MHz, T<sub>A</sub> = 25°C, V<sub>DD</sub> = +5 Volts, Z<sub>0</sub> = 75 Ω**

| Parameter                   | Test Conditions                             | Units | Min. | Typ. | Max. |
|-----------------------------|---|-------|------|------|------|
| Gain                        | IN to OUT1, OUT2, OUT3 & OUT4               | dB    | 1.8  | 3.0  | 3.8  |
| Gain Flatness               | IN to OUT1, OUT2, OUT3 & OUT4               | dB    | -    | 0.5  | 1.0  |
| Noise Figure                | IN to OUT1, OUT2, OUT3 & OUT4               | dB    | -    | 3.8  | -    |
| Input Return Loss           | IN  | dB    | -    | 15   | -    |
| Output Return Loss          | OUT1, OUT2, OUT3, OUT4                      | dB    | -    | 11   | -    |
| Composite Triple Beat, CTB  | 132 channels, +15 dBmV/channel at the input | dBc   | -    | -70  | -    |
| Composite Second Order, CSO | 132 channels, +15 dBmV/channel at the input | dBc   | -    | -62  | -    |
| Reverse Isolation           | OUT1, OUT2, OUT3 & OUT4 to IN               | dB    | -    | 29   | -    |
| Output to Output Isolation  | Isolation between all RF outputs            | dB    | -    | 21   | -    |
| P1dB                        | IN to OUT1, OUT2, OUT3, OUT4                | dB    | -    | 10   | -    |
| OIP3                        | 500MHz, 2-tone, 6MHz spacing, -15 dBm Pout  | dBm   | -    | 25   | -    |
| OIP2                        | 500MHz, 2-tone, 6MHz spacing, -15 dBm Pout  | dBm   | -    | 48   | -    |
| I <sub>DD</sub>             | V <sub>DD</sub> = +5 Volts                  | mA    | -    | 120  | 150  |

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

| Parameter                         | Absolute Maximum |
|-----------------------------------|------------------|
| Max Input Power                   | +12 dBm          |
| V <sub>bias</sub>                 | +10.0 V          |
| Operating Temperature             | -20°C to +85°C   |
| Junction Temperature <sup>7</sup> | 150°C            |
| Storage Temperature               | -65°C to +150°C  |

4. Exceeding any one or combination of these limits may cause permanent damage to this device.
5. M/A-COM does not recommend sustained operation near these survivability limits.
6. These operating conditions will ensure MTTF > 1 x 10<sup>6</sup> hours.
7. Junction Temperature (T<sub>J</sub>) = T<sub>C</sub> + Θ<sub>JC</sub> \* ((V \* I) - (P<sub>OUT</sub> - P<sub>IN</sub>))  
Typical thermal resistance (Θ<sub>JC</sub>) = 77° C/W.
  - a) For T<sub>C</sub> = 25°C,  
T<sub>J</sub> = 71 °C @ 5 V, 120 mA
  - b) For T<sub>C</sub> = 85°C,  
T<sub>J</sub> = 127 °C @ 5 V, 110 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.

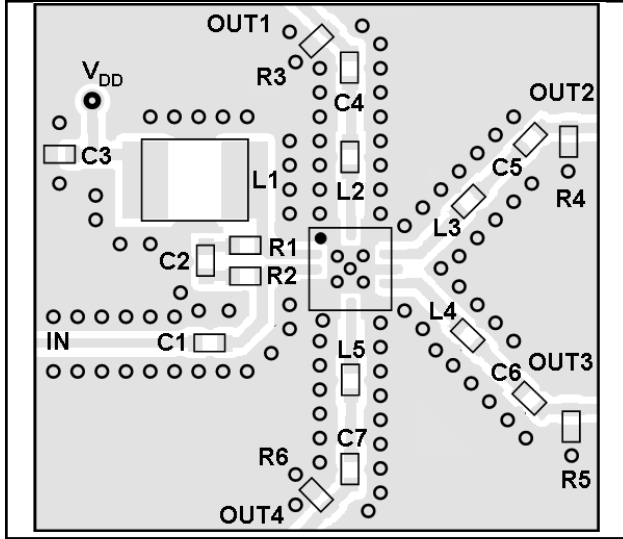
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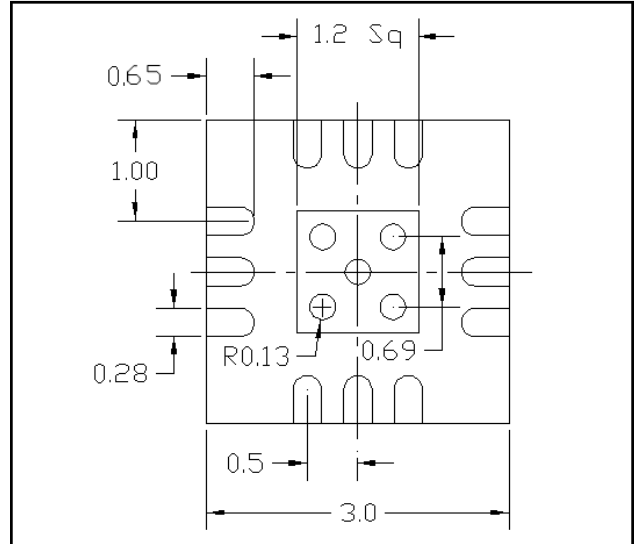
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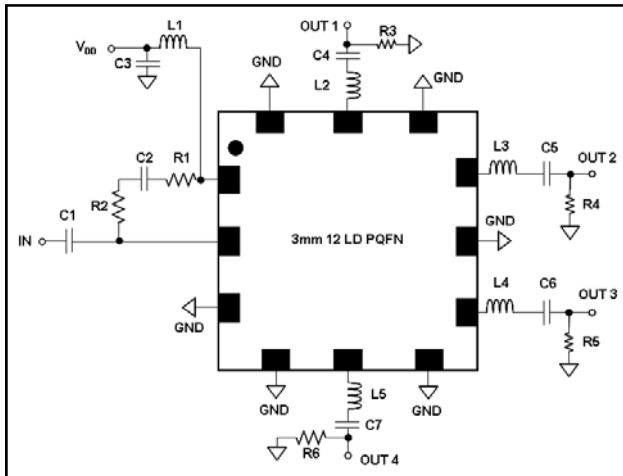
## Recommended PCB



## 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.

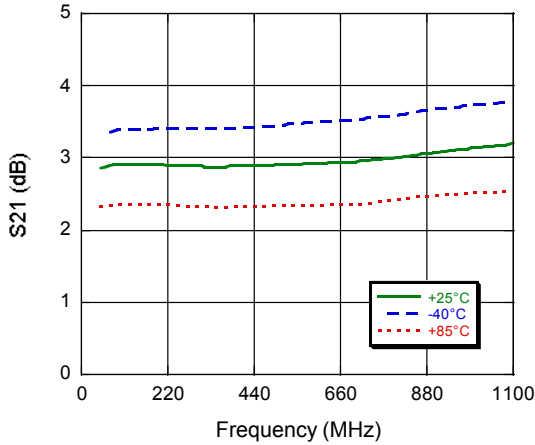
## Off-Chip Component Values

| Component       | Value        | Package |
|-----------------|--------------|---------|
| C1 - C7         | 0.01 $\mu$ F | 0402    |
| L1 <sup>9</sup> | 1 $\mu$ H    | 1210    |
| L2 - L5         | 6.8 nH       | 0402    |
| R1, R2          | 180 $\Omega$ | 0402    |
| R3 - R6         | 750 $\Omega$ | 0402    |

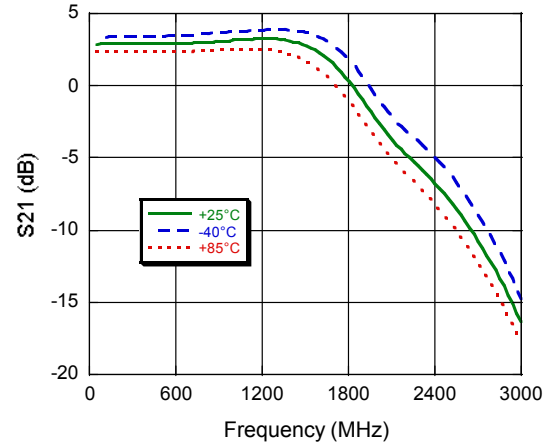
9. L1 supplied from EPCOS, part number B82422A1102K100

## Typical Performance Curves

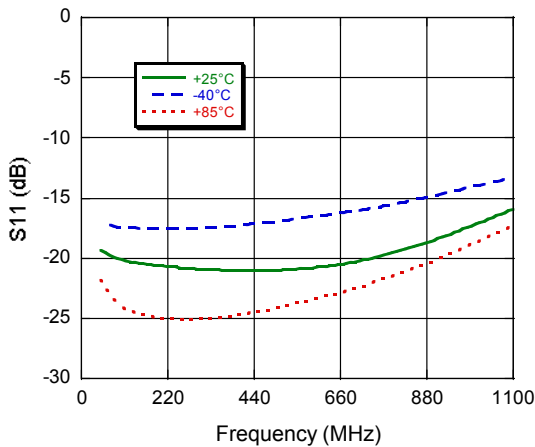
**Gain to 1100 MHz**  
Typical All Outputs



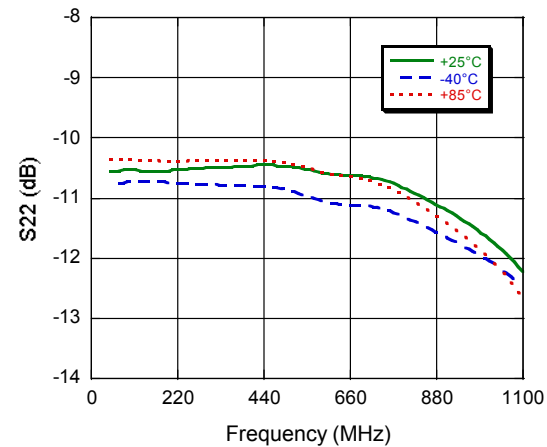
**Gain to 3000 MHz**  
Typical All Outputs



**Input Return Loss**

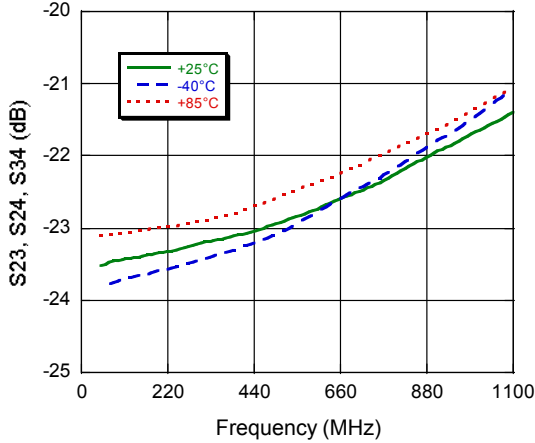


**Output Return Loss**  
Typical All Outputs

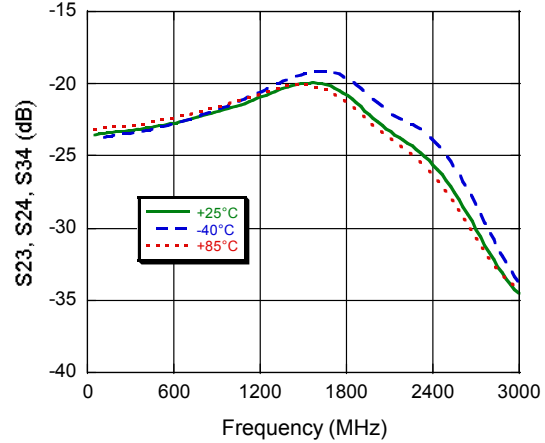


## Typical Performance Curves

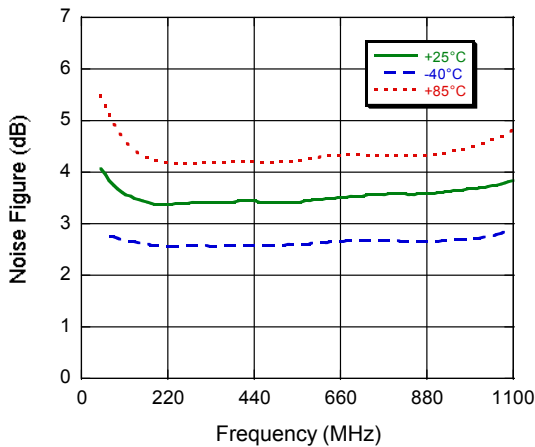
**OUT-OUT Isolation to 1100 MHz**  
Typical Between All Outputs



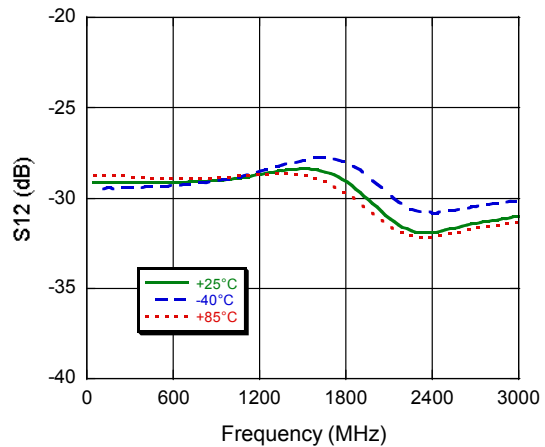
**OUT-OUT Isolation to 3000 MHz**  
Typical Between All Outputs



**Noise Figure**  
Typical All Outputs



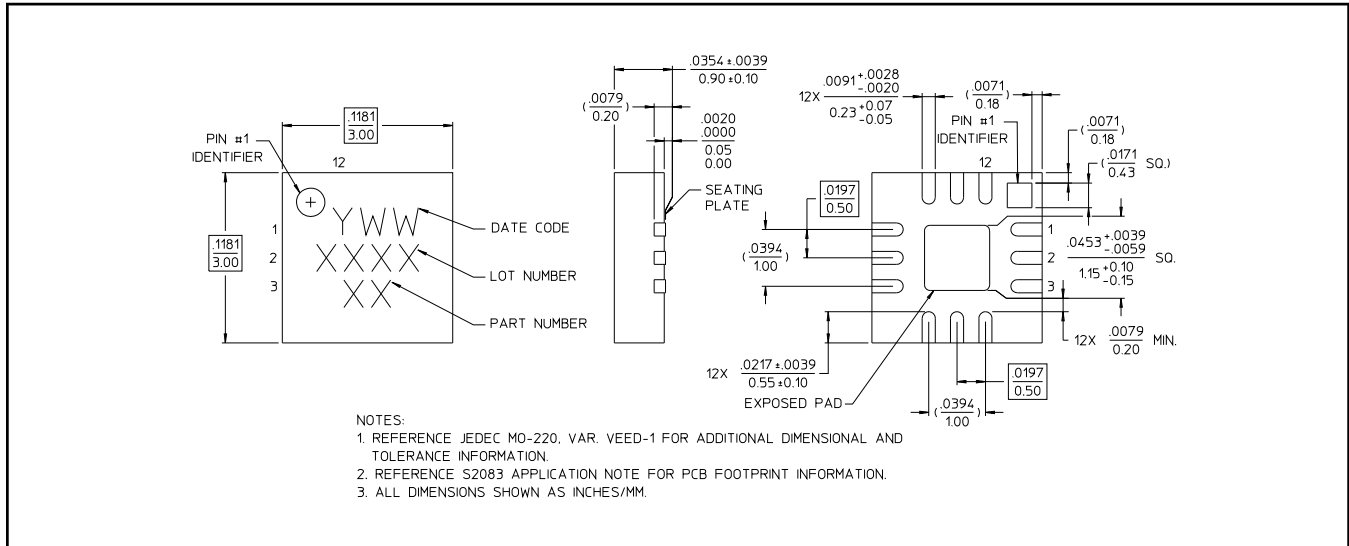
**Reverse Isolation to 3000 MHz**  
Typical From All Outputs to Input



## Broadband CATV Single Ended 4-Way Active Splitter 50 - 1100 MHz

Rev. V2

### Lead-Free 3 mm 12-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.