

## Broadband CATV Single Ended 2-Way Active Splitter 50 - 1100 MHz

Rev. V2

### Features

- 2-Way Splitter, 8.5 dB Gain
- Single Ended Input and Outputs
- 75  $\Omega$  Impedance
- 4.0 dB Noise Figure
- Single +5 Volt Supply
- Lead-Free 3 mm 12-Lead PQFN Package
- Halogen-Free “Green” Mold Compound
- RoHS\* Compliant and 260°C Reflow Compatible

### Description and Applications

The MAAM-007805 CATV 2-way active splitter is a GaAs MMIC which exhibits low noise figure and distortion in a lead-free PQFN plastic package. This device employs a low noise, high linearity amplifier and power splitter functionality. The design features 75  $\Omega$  input and outputs.

The MAAM-007805 is ideally suited for multi-tuner set top boxes, home gateways, and other broadband internet based appliances.

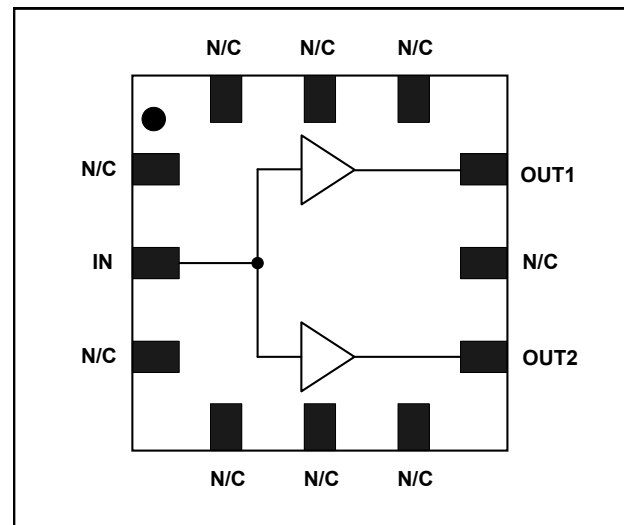
The MAAM-007805 is fabricated using M/A-COM Technology Solutions’ pHEMT process to realize low noise and low distortion. The process features full passivation for robust performance and reliability.

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

| Part Number        | Package                               |
|--------------------|---------------------------------------|
| MAAM-007805-TR1000 | 1000 piece reel                       |
| MAAM-007805-TR3000 | 3000 piece reel                       |
| MAAM-007805-001SMB | Sample Board,<br>50 - 1100 MHz Tuning |

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

### Functional Schematic



### Pin Configuration

| Pin No. | Function                      | Pin No. | Function      |
|---------|-------------------------------|---------|---------------|
| 1       | No Connection                 | 7       | RF Output 2   |
| 2       | RF Input                      | 8       | No Connection |
| 3       | No Connection                 | 9       | RF Output 1   |
| 4       | No Connection                 | 10      | No Connection |
| 5       | No Connection                 | 11      | No Connection |
| 6       | No Connection                 | 12      | No Connection |
| 13      | RF and DC Ground <sup>3</sup> |         |               |

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: F = 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, In to Out2   | dB    | 7.3  | 8.5  | 9.5  |
| Gain Flatness               | In to Out1, In to Out2   | dB    | —    | 0.75 | 1.2  |
| Noise Figure                | In to Out1, In to Out2   | dB    | —    | 4.0  | 4.5  |
| Input Return Loss           | Input  | dB    | —    | 19   | —    |
| Output Return Loss          | Output   | dB    | —    | 18   | —    |
| Composite Triple Beat, CTB  | 132 channels, +15 dBmV/channel at the input.                   | dBc   | —    | -75  | —    |
| Composite Second Order, CSO | 132 channels, +15 dBmV/channel at the input.                   | dBc   | —    | -60  | —    |
| Crossmodulation, XMOD       | 132 channels, +15 dBmV/channel at the input.                   | dBc   | —    | -60  | —    |
| Reverse Isolation           | Out1 to In, Out2 to In   | dB    | —    | 20   | —    |
| Output to Output Isolation  | Out1 to Out2   | dB    | —    | 25   | —    |
| P1dB                        | 400 MHz  | dBm   | —    | 17   | —    |
| OIP3                        | Two tones at 1 MHz spacing, Pin at -10 dBm per tone<br>400 MHz | dBm   | —    | 33   | —    |
| OIP2                        | Two tones at 1 MHz spacing, Pin at -10 dBm per tone<br>400 MHz | dBm   | —    | 55   | —    |
| I <sub>DD</sub>             | V <sub>DD</sub> = + 5 Volts                                    | mA    | —    | 100  | 120  |

### Absolute Maximum Ratings <sup>4,5,6,7</sup>

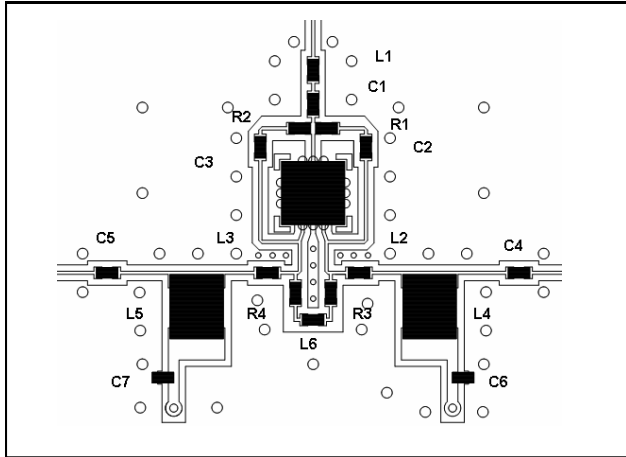
| Parameter                         | Absolute Maximum |
|-----------------------------------|------------------|
| Max Input Power                   | +8 dBm           |
| V <sub>bias</sub>                 | +10.0 V          |
| Operating Temperature             | -40°C to +85°C   |
| Junction Temperature <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 Technology Solutions 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>A</sub> + Θ<sub>jc</sub> \* (V \* I)  
Typical thermal resistance (Θ<sub>jc</sub>) = 85 °C/W.
  - a) For T<sub>C</sub> = 25°C,  
T<sub>J</sub> = 68 °C @ 5.0 V, 100 mA
  - b) For T<sub>C</sub> = 85°C,  
T<sub>J</sub> = 123 °C @ 5.0 V, 90 mA

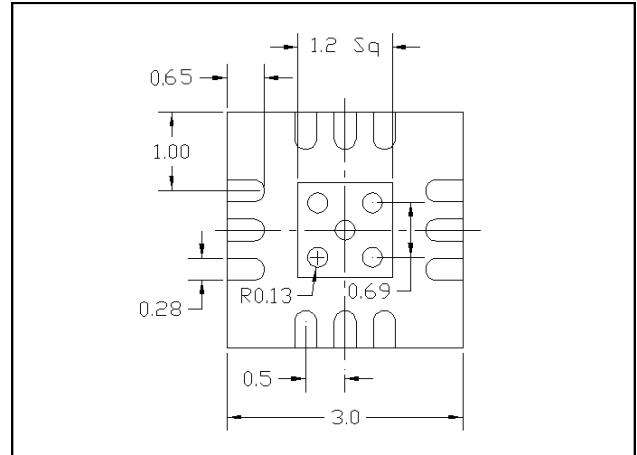
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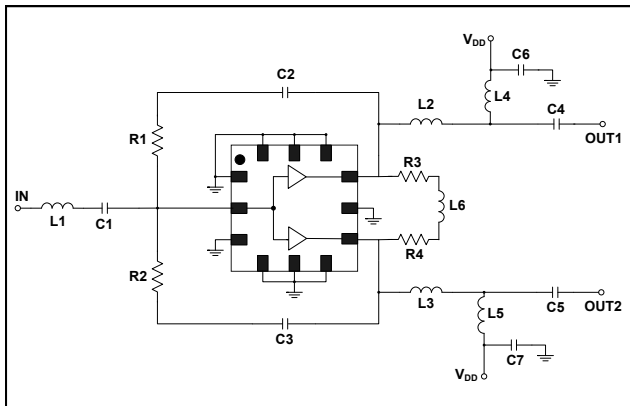
### Recommended PCB Configuration



### PCB Land Pattern



### Schematic PWB Layout



### Off-Chip Component Values <sup>8</sup>

| Component | Value        | Package |
|-----------|--------------|---------|
| C1 - C7   | 0.01 $\mu$ F | 0402    |
| L1        | 4.7 nH       | 0402    |
| L2 - L3   | 7.5 nH       | 0402    |
| L4 - L5   | 1.0 $\mu$ H  | 1210    |
| L6        | 18 nH        | 0402    |
| R1 - R2   | 560 ohms     | 0402    |
| R3 - R4   | 91 ohms      | 0402    |

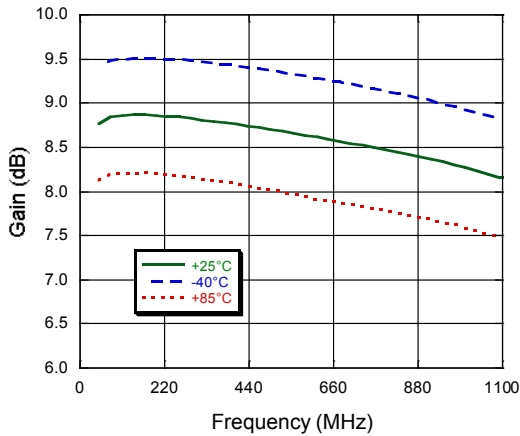
8. L4 - L5 supplied from EPCOS, part number B82422A1102K100.

## Broadband CATV Single Ended 2-Way Active Splitter 50 - 1100 MHz

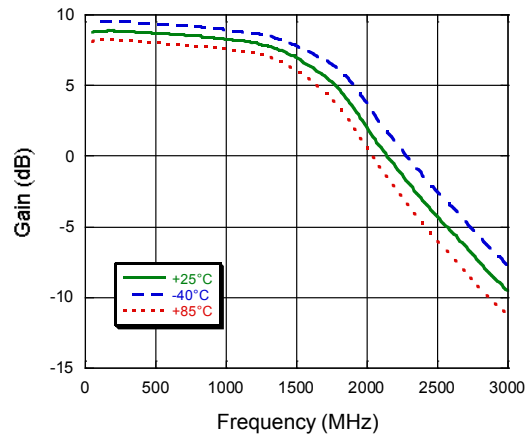
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### Typical Performance Curves

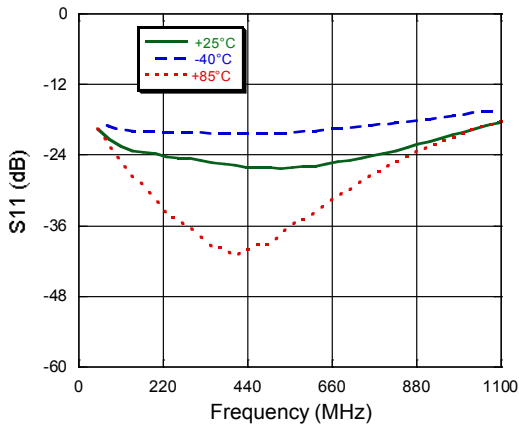
Gain vs. Frequency over Temperature



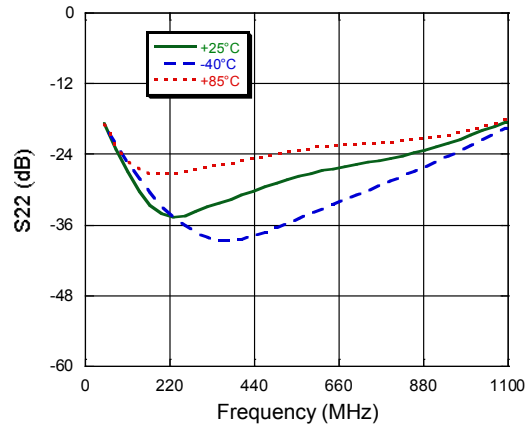
Gain vs. Frequency over Temperature to 3 GHz



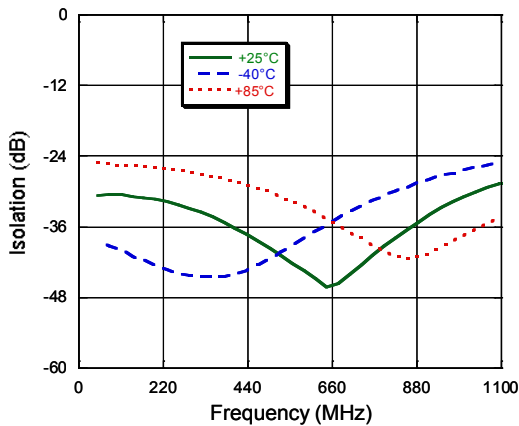
S11 vs. Frequency over Temperature



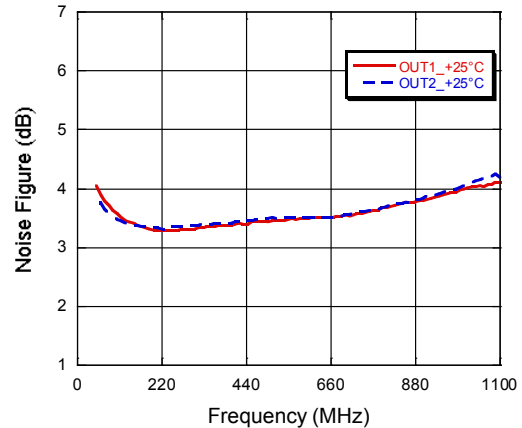
S22 vs. Frequency over Temperature



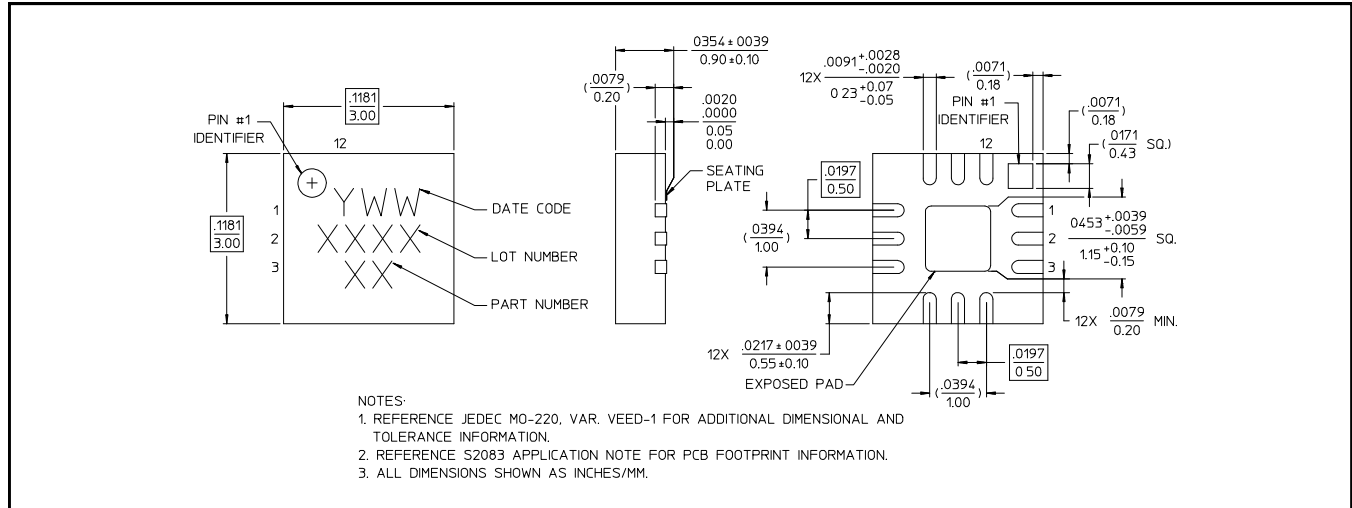
Isolation vs. Frequency over Temperature



Noise Figure



## Lead-Free 3 mm 12-Lead PQFN<sup>†</sup>



<sup>†</sup> Reference Application Note S2083 for lead-free solder reflow recommendations.  
 Meets JEDEC moisture sensitivity level1 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. An external protection circuit using an anti-parallel diode pair can be used to protect the IC.

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

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