

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

Rev. V4

### 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

The 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  $\Omega$  inputs and outputs.

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

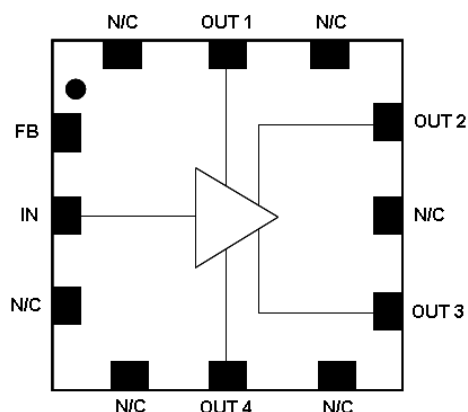
The MAAM-008820 is fabricated using MACOM's pHEMT process to realize low noise and low distortion. The process features full passivation for robust performance and reliability.

### 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, DC and thermal ground.

\* Restrictions on Hazardous Substances, European Union Directive 2011/65/EU.

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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	500 MHz, 2-tone, 6 MHz spacing, -15 dBm P <sub>OUT</sub>	dBm	-	25	-
OIP2	500 MHz, 2-tone, 6 MHz spacing, -15 dBm P <sub>OUT</sub>	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
Input Power	12 dBm
V <sub>BIAS</sub>	10 V
Operating Temperature	-20°C to +85°C
Junction Temperature <sup>7</sup>	+160°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 > 8 x 10<sup>5</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.

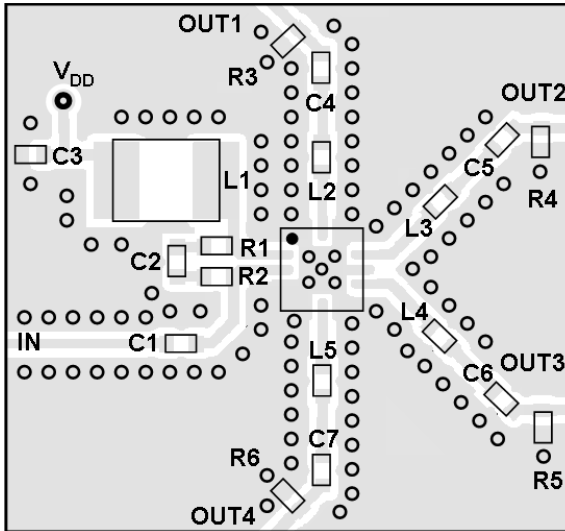
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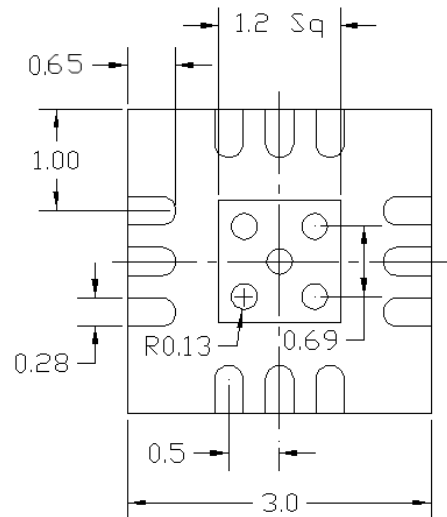
**Electrical Specifications: Freq. = 50 - 1000 MHz,  $V_{DD} = 8$  Volts,  $Z_0 = 75 \Omega$**

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	-	4.0	-
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	-	-71	-
Composite Second Order, CSO	132 channels, 15 dBmV/channel at the input	dBc	-	-63	-
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	-	12	-
OIP3	500 MHz, 2-tone, 6 MHz spacing, -15 dBm $P_{OUT}$	dBm	-	27	-
OIP2	500 MHz, 2-tone, 6 MHz spacing, -15 dBm $P_{OUT}$	dBm	-	49	-
Harmonics	Third Harmonic of 470 MHz at input, $P_{IN} = 0$ dBm	dBm	-	-70	-
Harmonics	Third Harmonic of 700 MHz at input, $P_{IN} = 0$ dBm	dBm	-	-70	-
$I_{DD}$	$V_{DD} = 8$ Volts	mA	-	120	150

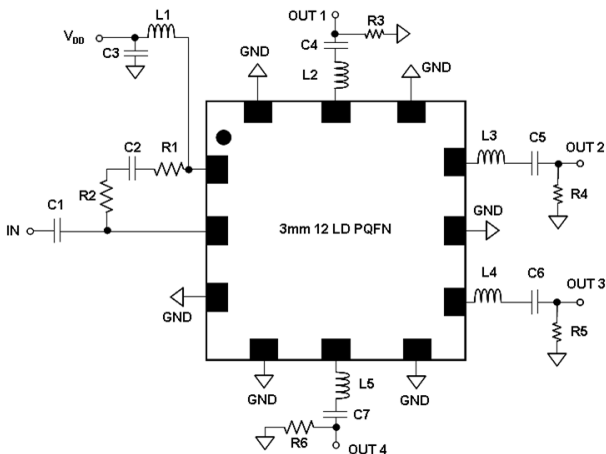
## Recommended PCB



## PCB Land Pattern



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



## Off-Chip Component Values

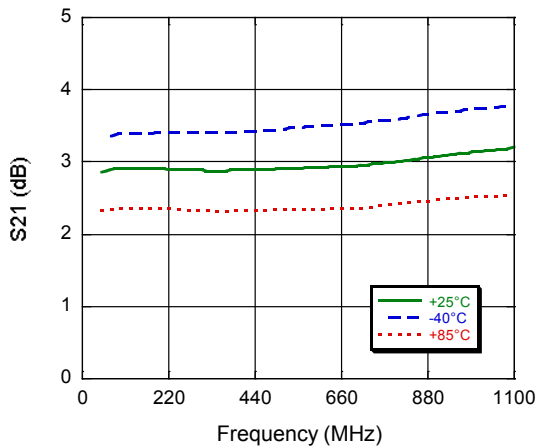
Component	Value	Package
C1 - C7	0.01 $\mu$ F	0402
L1 <sup>9</sup>	1 $\mu$ H	1210
L2 - L5	6.8 nH	0402
R1, R2	180 $\Omega$	0402
R3 - R6	750 $\Omega$	0402

9. L1 supplied from EPCOS, part number B82422A1102K100

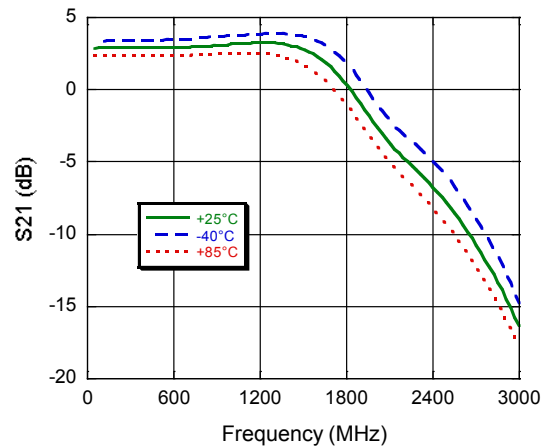
8. The exposed pad centered on the package bottom must be connected to ground for RF, DC and thermal considerations.

## Typical Performance Curves

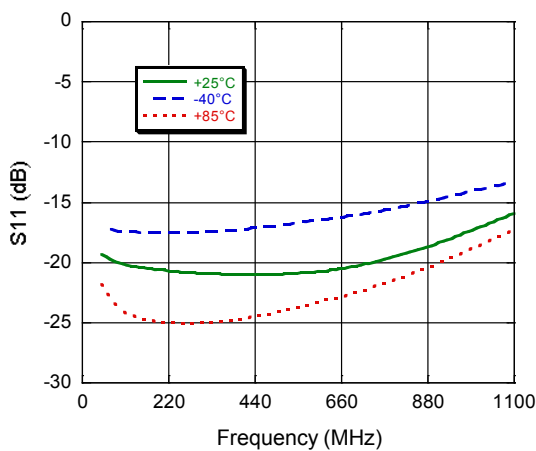
**Gain to 1100 MHz**  
**Typical All Outputs**



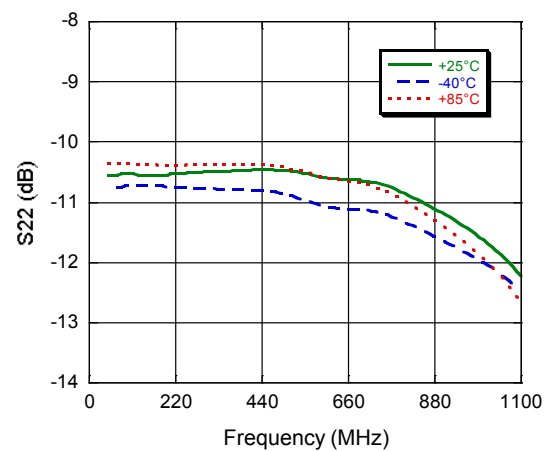
**Gain to 3000 MHz**  
**Typical All Outputs**



**Input Return Loss**



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

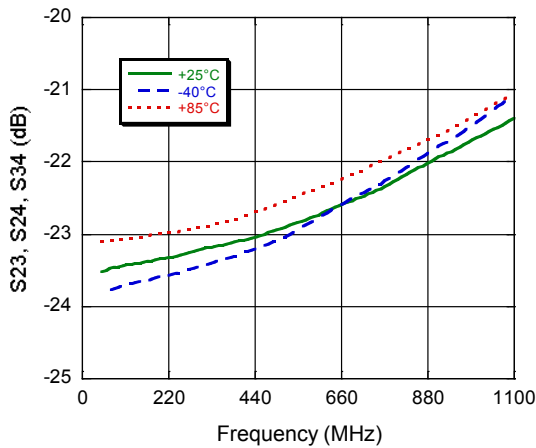


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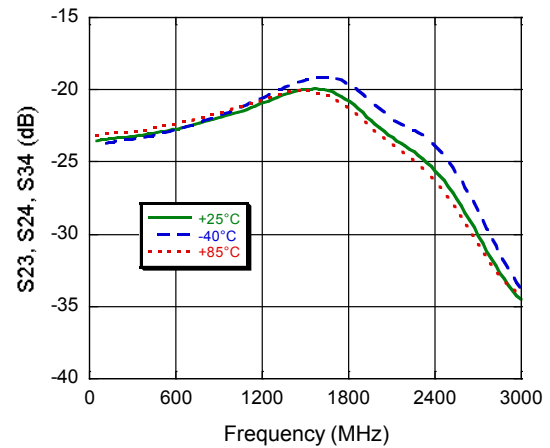
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### Typical Performance Curves

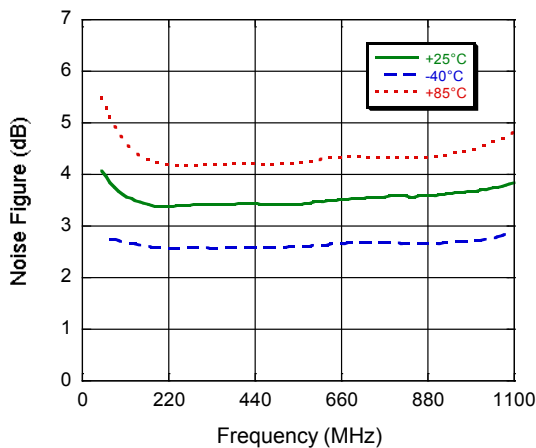
**OUT-OUT Isolation to 1100 MHz**  
Typical Between All Outputs



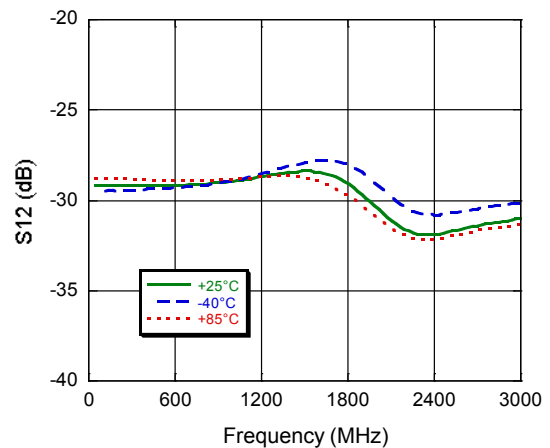
**OUT-OUT Isolation to 3000 MHz**  
Typical Between All Outputs



**Noise Figure**  
Typical All Outputs



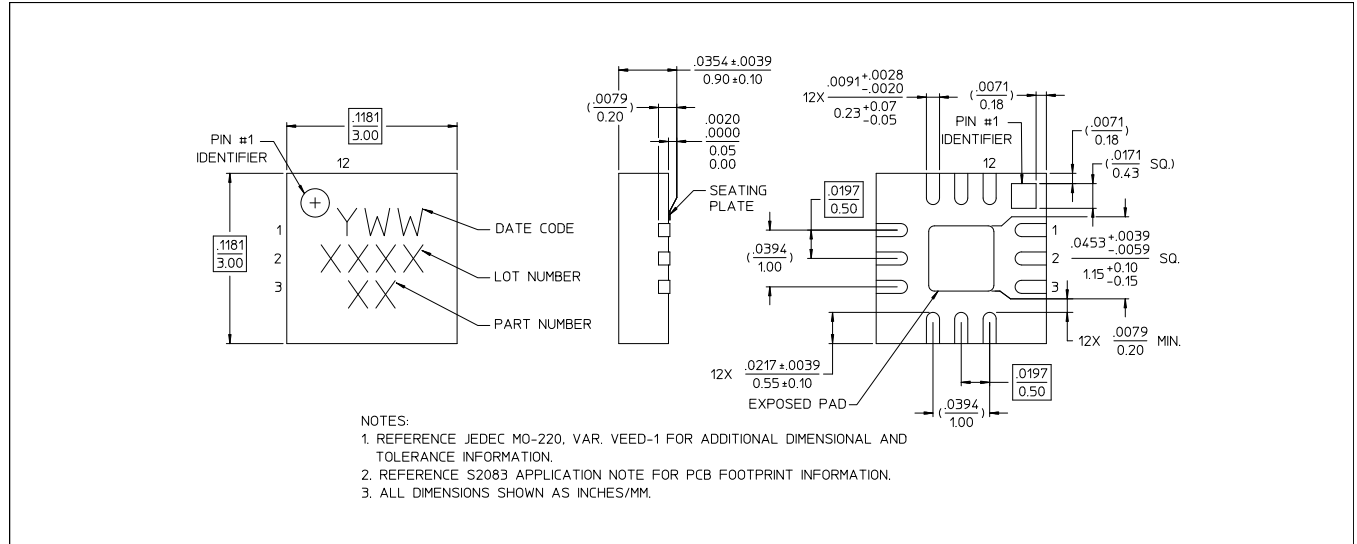
**Reverse Isolation to 3000 MHz**  
Typical From All Outputs to Input



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### Lead-Free 3 mm 12-Lead PQFN<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.

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