

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 Ω inputs and outputs.

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

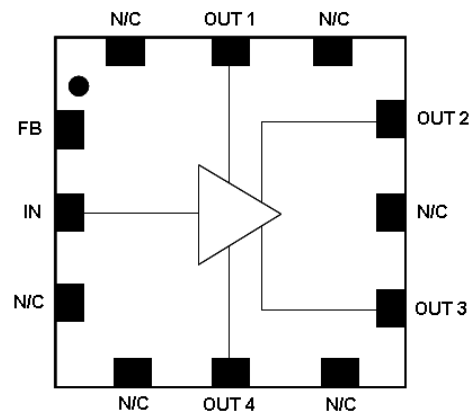
The MAAM-008820 is fabricated using MACOM's pHEMT process to realize low noise and low distortion. The process features full passivation for robust performance and reliability.

Ordering Information ^{1,2}

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 ³	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_A = 25°C, V_{DD} = 5 Volts, Z₀ = 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 _{OUT}	dBm	-	25	-
OIP2	500 MHz, 2-tone, 6 MHz spacing, -15 dBm P _{OUT}	dBm	-	48	-
I _{DD}	V _{DD} = +5 Volts	mA	-	120	150

Absolute Maximum Ratings^{4,5,6}

Parameter	Absolute Maximum
Input Power	12 dBm
V _{BIAS}	10 V
Operating Temperature	-20°C to +85°C
Junction Temperature ⁷	+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 10⁵ hours
7. Junction Temperature (T_J) = T_C + Θ_{JC} * ((V * I) - (P_{OUT} - P_{IN}))
Typical thermal resistance (Θ_{JC}) = 77° C/W.
a) For T_C = 25°C,
T_J = 71 °C @ 5 V, 120 mA
b) For T_C = 85°C,
T_J = 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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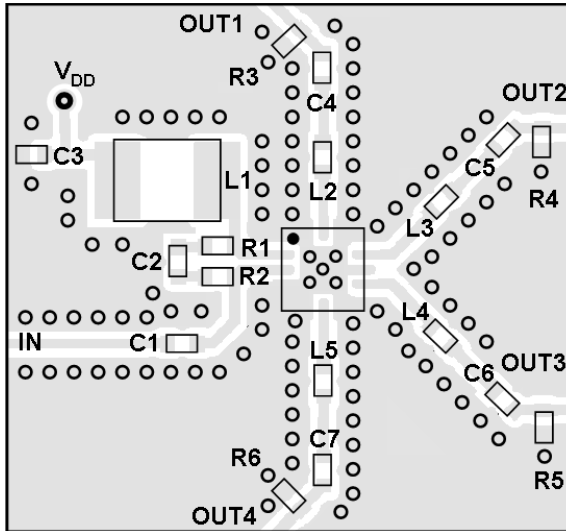
Electrical Specifications: Freq. = 50 - 1000 MHz, V_{DD} = 8 Volts, Z_0 = 75 Ω

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	-	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

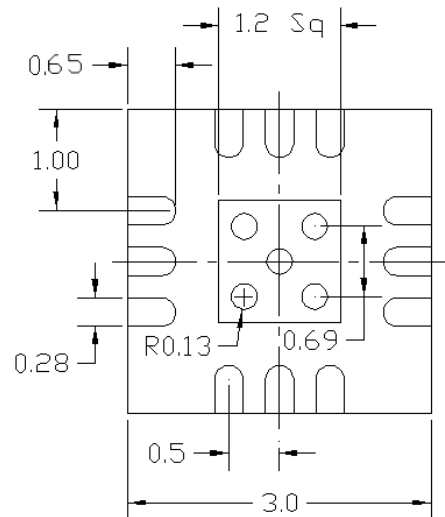
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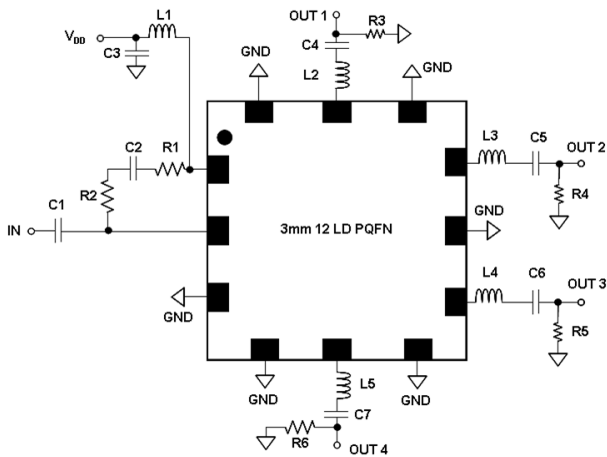
Recommended PCB



PCB Land Pattern



Schematic Including Off-Chip Components⁸



Off-Chip Component Values

Component	Value	Package
C1 - C7	0.01 μ F	0402
L1 ⁹	1 μ H	1210
L2 - L5	6.8 nH	0402
R1, R2	180 Ω	0402
R3 - R6	750 Ω	0402

9. L1 supplied from EPCOS, part number B82422A1102K100

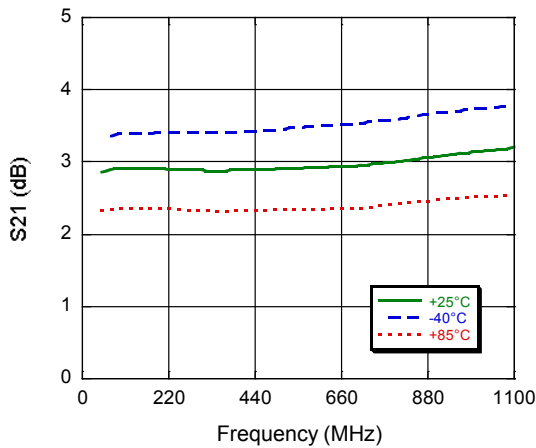
8. The exposed pad centered on the package bottom must be connected to ground for RF, DC and thermal considerations.

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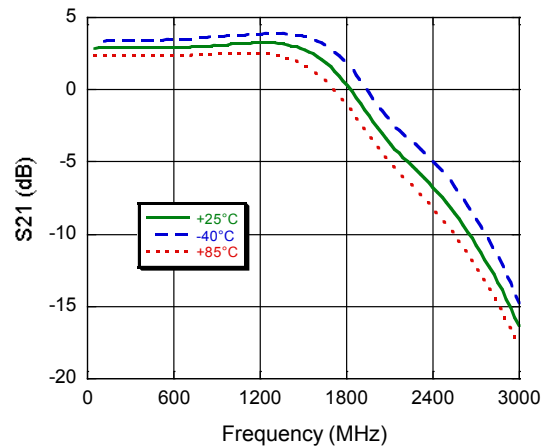
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Typical Performance Curves

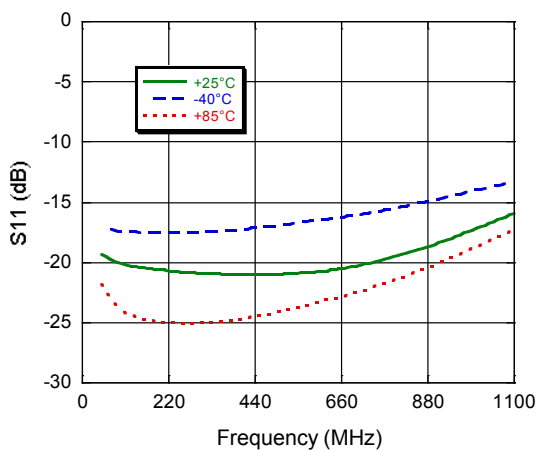
Gain to 1100 MHz
Typical All Outputs



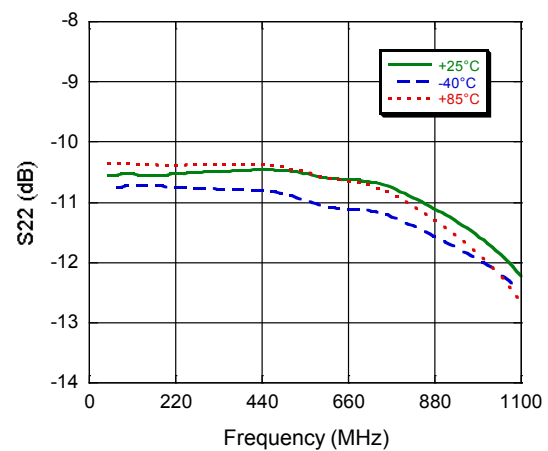
Gain to 3000 MHz
Typical All Outputs



Input Return Loss



Output Return Loss
Typical All Outputs

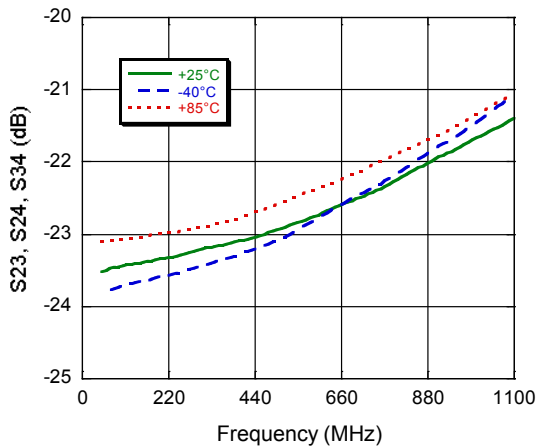


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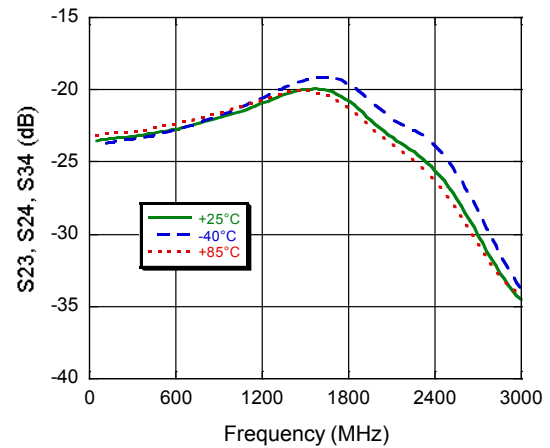
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Typical Performance Curves

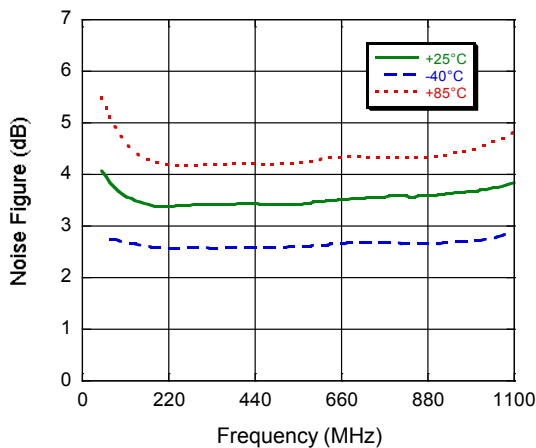
OUT-OUT Isolation to 1100 MHz
Typical Between All Outputs



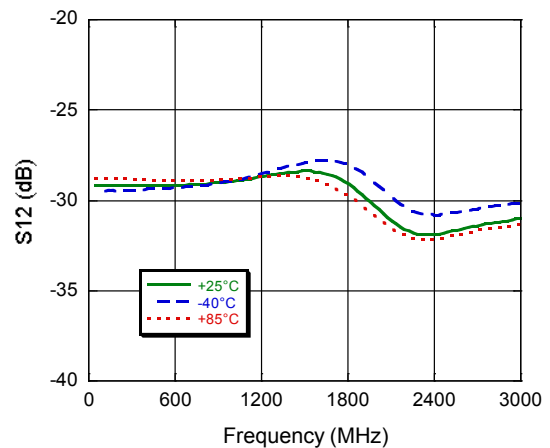
OUT-OUT Isolation to 3000 MHz
Typical Between All Outputs



Noise Figure
Typical All Outputs



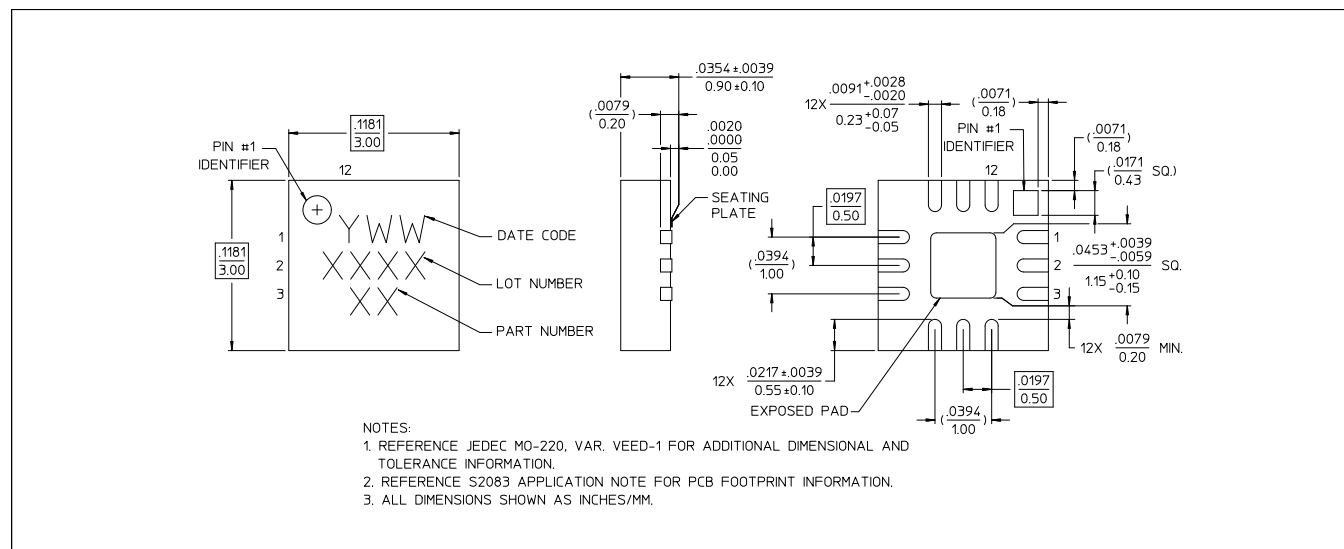
Reverse Isolation to 3000 MHz
Typical From All Outputs to Input



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Lead-Free 3 mm 12-Lead PQFN[†]



[†] 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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