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Broadband CATV Single Ended 5-Way Active Splitter 50 - 1100 MHz

Rev. V1

Features

- 5-Way Splitter
- Single Ended Input and Outputs
- 3.5 dB Gain
- +15 dBmV /Channel Input
- 3.8 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

The MAAM-008821 CATV 5-way active splitter is a GaAs MMIC which exhibits low noise figure and distortion in a lead-free 3mm 12-lead PQFN plastic package. The design features 75 Ω inputs and outputs.

The MAAM-008821 is ideally suited for multi-tuner set top boxes, home gateways, and other broadband internet based appliances.

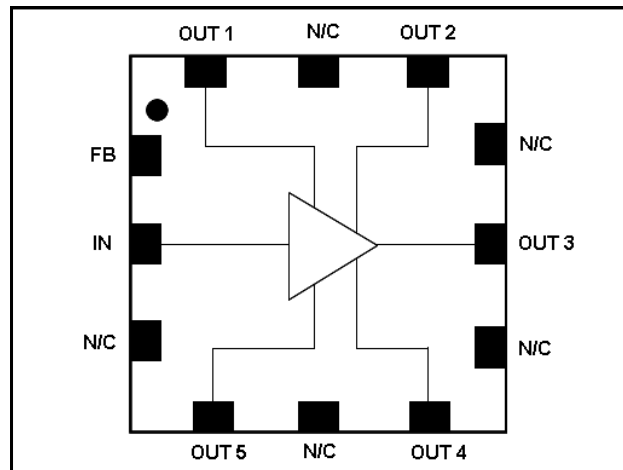
The MAAM-008821 is fabricated using M/A-COM Technology’s pHEMT process to realize low noise and low distortion. The process features full passivation for robust performance and reliability.

Ordering Information ^{1,2}

Part Number	Package
MAAM-008821-TR1000	1000 piece reel
MAAM-008821-TR3000	3000 piece reel
MAAM-008821-001SMB	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	OUT5	RF Output 5
5	N/C	No Connection
6	OUT4	RF Output 4
7	N/C	No Connection
8	OUT3	RF Output 3
9	N/C	No Connection
10	OUT2	RF Output 2
11	N/C	No Connection
12	OUT1	RF Output 1
13	Paddle ³	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.

Broadband CATV Single Ended 5-Way Active Splitter 50 - 1100 MHz

Rev. V1

Electrical Specifications: Freq. 50 - 1000 MHz, $T_A = 25^\circ\text{C}$, $V_{DD} = +5$ Volts, $Z_0 = 75 \Omega$

Parameter	Test Conditions	Units	Min.	Typ.	Max.
Gain	IN to All Outputs	dB	2	3.5	4
Gain Flatness	IN to All Outputs	dB	-	1.0	1.2
Noise Figure	IN to All Outputs	dB	-	3.8	-
Input Return Loss	IN	dB	-	15	-
Output Return Loss	All Outputs	dB	-	12	-
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	-	-60	-
Reverse Isolation	All Outputs to IN	dB	-	30	-
Output to Output Isolation	Isolation between all RF outputs	dB	-	20	-
Output Power at 1dB Compression, P1dB	IN to All Outputs	dB	-	9	-
Output 3rd Order Intercept Point, OIP3	500 MHz, 2-tone, 6 MHz spacing, -15 dBm Pout	dBm	-	24	-
Output 2nd Order Intercept Point, OIP2	500 MHz, 2-tone, 6 MHz spacing, -15 dBm Pout	dBm	-	48	-
I_{DD}	$V_{DD} = +5$ Volts	mA	-	120	150

Absolute Maximum Ratings ^{4,5,6}

Parameter	Absolute Maximum
Max Input Power	+12 dBm
Vbias	+10.0 V
Operating Temperature	-20°C to +85°C
Junction Temperature ⁷	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 does not recommend sustained operation near these survivability limits.
6. These operating conditions will ensure MTTF > 1×10^6 hours.
7. Junction Temperature (T_J) = $T_C + \Theta_{jc} * (V * I)$
Typical thermal resistance (Θ_{jc}) = 77° C/W.
 - a) For $T_C = 25^\circ\text{C}$,
 $T_J = 71^\circ\text{C} @ 5 \text{ V}, 120 \text{ mA}$
 - b) For $T_C = 85^\circ\text{C}$,
 $T_J = 127^\circ\text{C} @ 5 \text{ V}, 110 \text{ mA}$

Handling Procedures

Please observe the following precautions to avoid damage:

Static Sensitivity

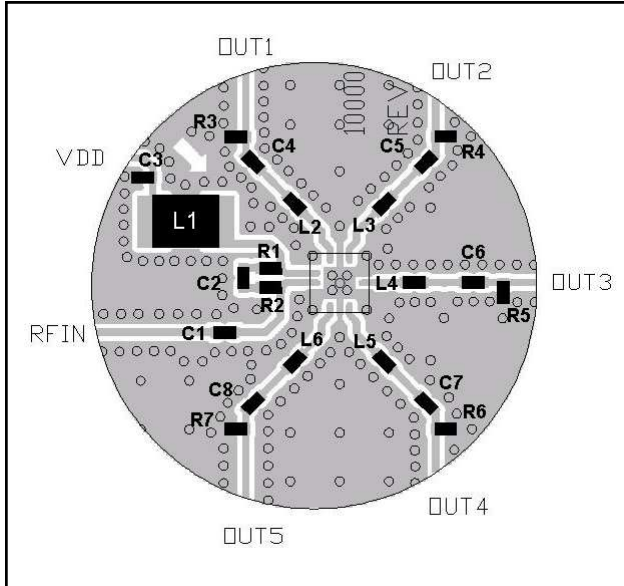
Gallium Arsenide Integrated Circuits are sensitive to electrostatic discharge (ESD) and can be damaged by static electricity. Proper ESD control techniques should be used when handling these devices. An external protection circuit using an inexpensive anti-parallel diode pair can be used to protect the IC.

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

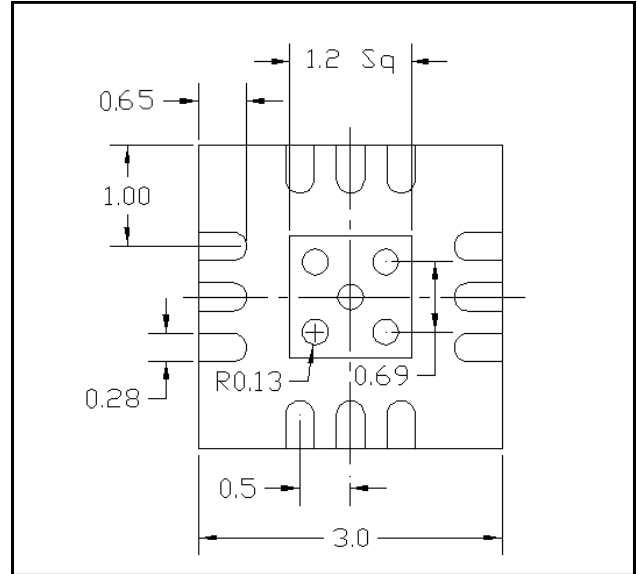
Broadband CATV Single Ended 5-Way Active Splitter 50 - 1100 MHz

Rev. V1

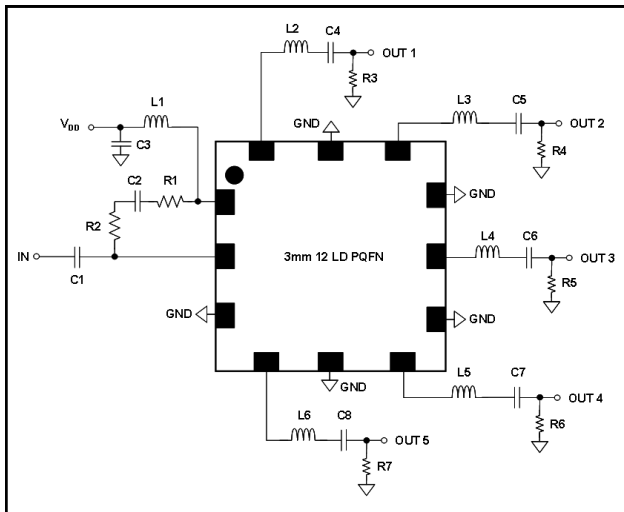
Recommended PCB



PCB Land Pattern



Schematic Including Off-Chip Components⁸



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

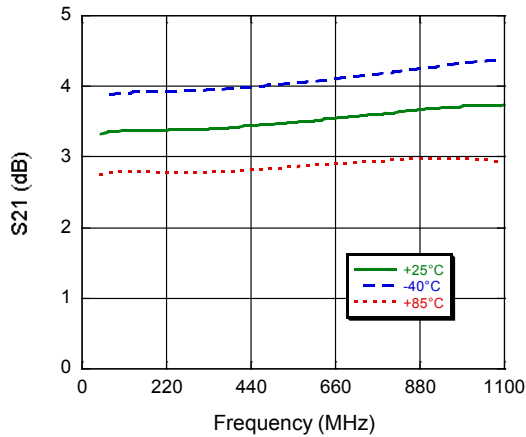
Off-Chip Component Values

Component	Value	Package
L1 ⁹	1 μ H	1210
L2 - L6	10 nH	0402
R1, R2	220 Ω	0402
R3 - R7	910 Ω	0402
C1 - C8	0.01 μ F	0402

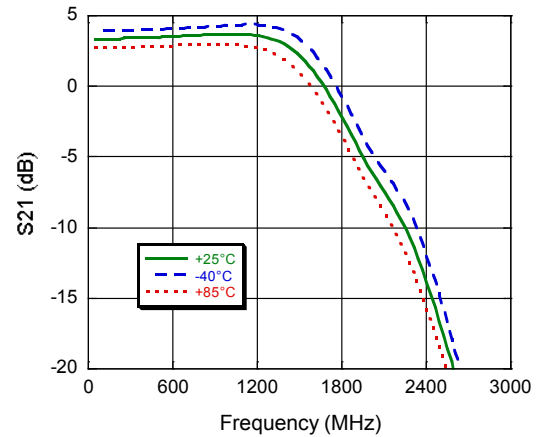
9. L1 supplied from EPCOS, part number B82422A1102K100

Typical Performance Curves

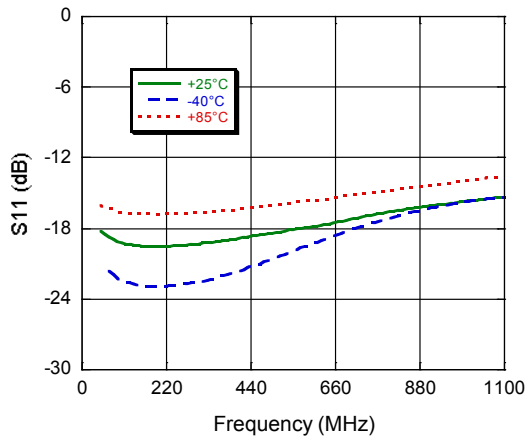
Gain to 1100 MHz
Typical All Outputs



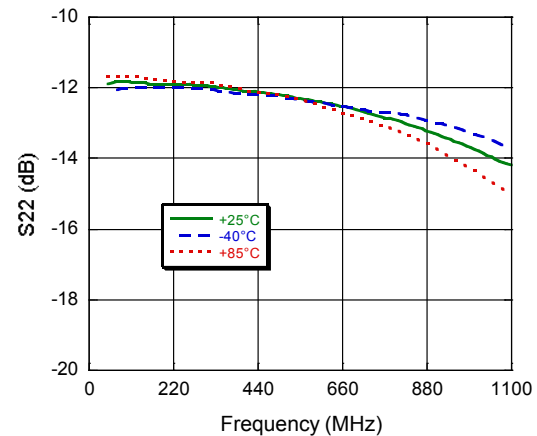
Gain to 3000 MHz
Typical All Outputs



Input Return Loss



Output Return Loss
Typical All Outputs

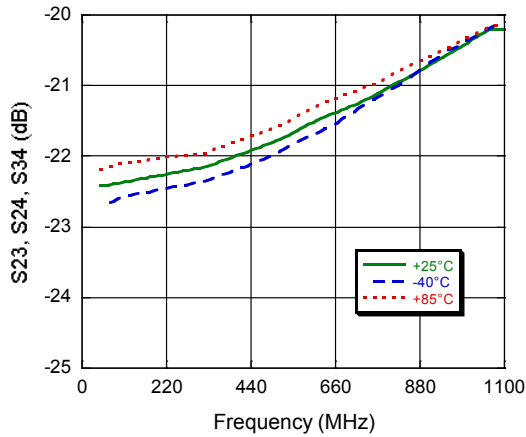


Broadband CATV Single Ended 5-Way Active Splitter 50 - 1100 MHz

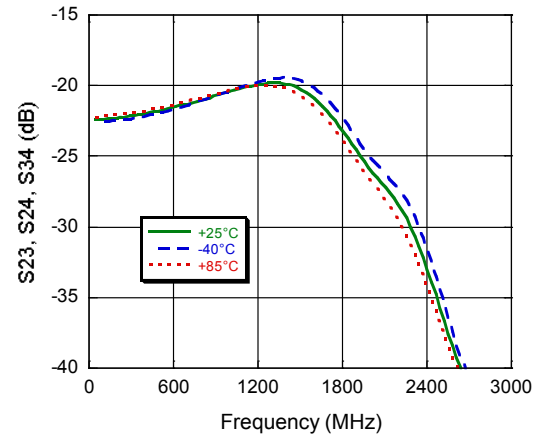
Rev. V1

Typical Performance Curves

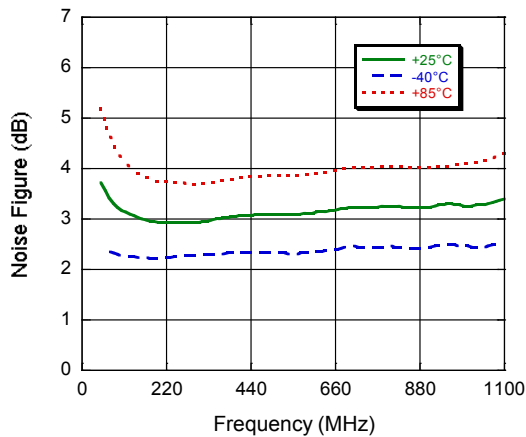
OUT-OUT Isolation to 1100 MHz
Typical Between All Outputs



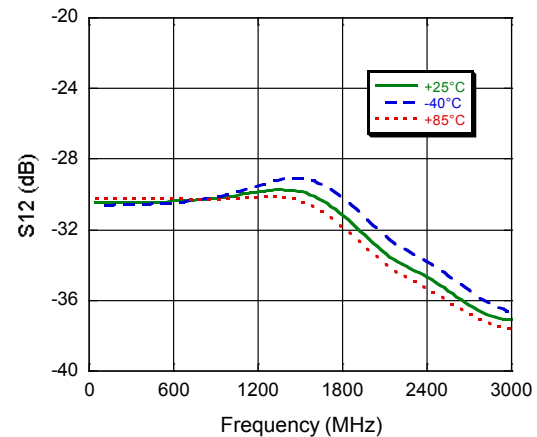
OUT-OUT Isolation to 3000 MHz
Typical Between All Outputs



Noise Figure
Typical All Outputs



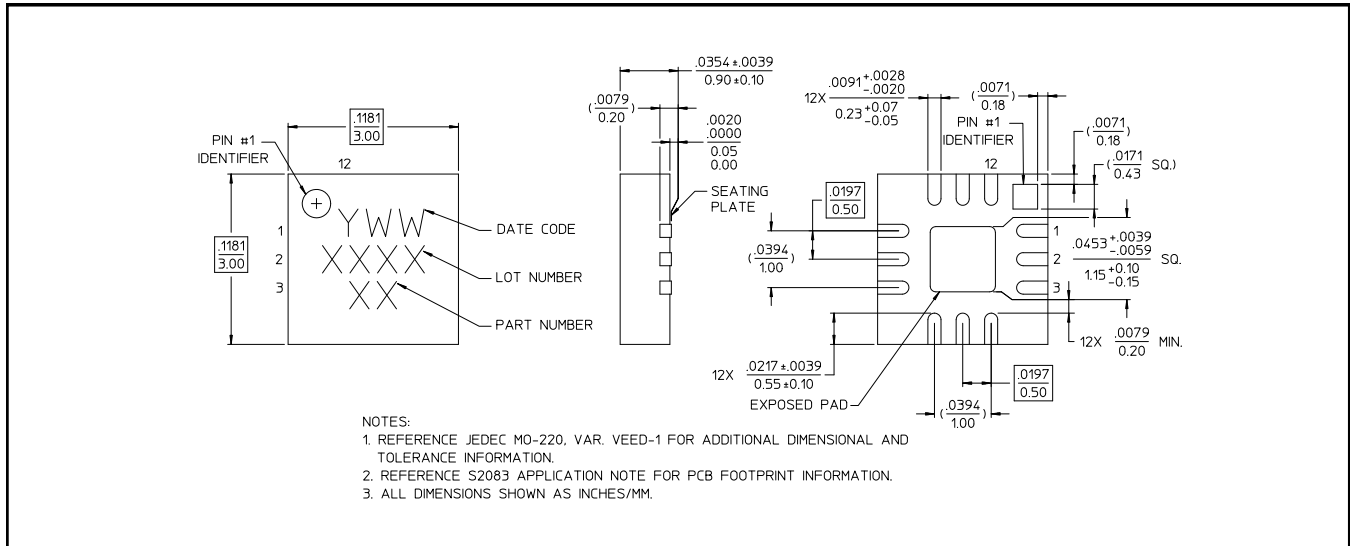
Reverse Isolation to 3000 MHz
Typical From All Outputs to Input



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Lead-Free 3 mm 12-Lead PQFN[†]



[†] Reference Application Note M538 for lead-free solder reflow recommendations.
Meets JEDEC moisture sensitivity level 1 requirements.
Plating is 100% matte tin over copper.

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