MAAMSS0044

Push Pull CATV Amplifier
50 - 1000 MHz

Rev. V1

Features

- Low Distortion
- Low Noise Figure
- Push Pull Design
- Single Positive Supply
- Lead-Free 4 mm 20-Lead PQFN package
- Halogen-Free "Green" Mold Compound
- RoHS* Compliant and 260°C Reflow Compatible

Description

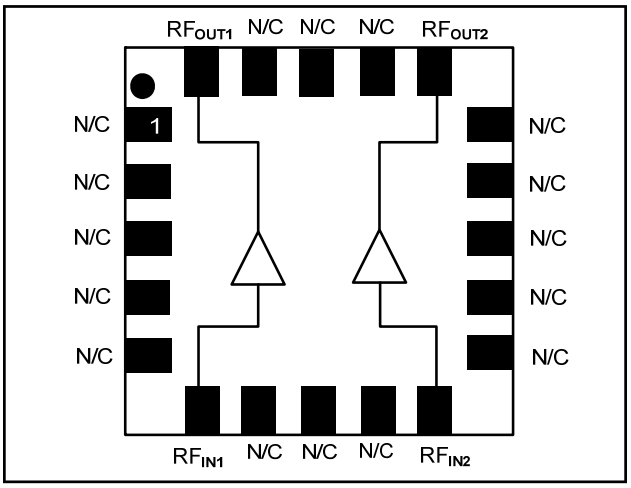
M/A-COM's MAAMSS0044 is a GaAs PHEMT MMIC amplifier in a lead-free 4 mm 20-lead PQFN package. The MMIC design is configured as a pair of cascode PHEMT amplifiers for broadband performance. It is designed for integration in a 75 Ω push-pull, low distortion, amplifier circuit. The device is ideally suited for use in CATV, FTTX, DBS, and HDTV applications where low noise figure and low distortion are required.

Ordering Information [1,2]

Part Number	Package
MAAMSS0044	Bulk Packaging
MAAMSS0044TR	1000 Piece Reel
MAAMSS0044TR-3000	3000 Piece Reel
MAAMSS0044SMB	Sample Board 50 - 1000 MHZ Tuning

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

Functional Schematic



Pin Configuration [3]

Pin No.	Pin Name	Description
1	N/C[4]	No Connection
2	N/C	No Connection
3	N/C	No Connection
4	N/C	No Connection
5	N/C	No Connection
6	RF_{IN1}	RF Input 1
7	N/C	No Connection
8	N/C	No Connection
9	N/C	No Connection
10	RF_{IN2}	RF Input 2
11	N/C	No Connection
12	N/C	No Connection
13	N/C	No Connection
14	N/C	No Connection
15	N/C	No Connection
16	RF_{OUT2}	RF Output 2
17	N/C	No Connection
18	N/C	No Connection
19	N/C	No Connection
20	RF_{OUT1}	RF Output 1

3. The exposed pad centered on the package bottom must be connected to RF and DC ground.
4. It is recommended, but not absolutely compulsory, that all No Connections (N/C) within the IC are connected to the ground on the printed circuit board.

* Restrictions on Hazardous Substances, European Union Directive 2002/95/EC.

- **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

Visit www.macomtech.com for additional data sheets and product information.

Electrical Specifications: T_A = 25°C, Freq: 50 - 1000 MHz, V_{DD} = +5 Volts, Z_0 = 75 Ω, Test Circuit with M/A-COM Balun MABACT0069

Parameter	Test Conditions	Units	Min.	Typ.	Max.
Gain	—	dB	11	12.5	13.5
Gain Flatness	—	dB	—	0.8	1.3
Noise Figure	—	dB	—	3.7	5
Input Return Loss	—	dB	—	15	—
Output Return Loss	—	dB	—	15	—
Output IP2	400 MHz, +4 dBm output	dBm	—	75	—
Output IP3	Two tones at 397 & 403 MHz, +8 dBm output/tone	dBm	—	42	—
Composite Triple Beat, CTB	79 Channels, +34 dBmV / Channel at the output 77 Channels, +39 dBmV / Channel at the output	dBc dBc	— —	-75 -65	-70 —
Composite Second Order, CSO	79 Channels, +34 dBmV / Channel at the output 77 Channels, +39 dBmV / Channel at the output	dBc dBc	— —	-85 -75	-80 —
Cross modulation	79 Channels, +34 dBmV / Channel at the output 77 Channels, +39 dBmV / Channel at the output	dBc dBc	— —	-75 -65	— —
P1dB	400 MHz	dBm	—	24	—
I_{DD}	+5 Volts	mA	—	225	280

Absolute Maximum Ratings [5,6,7]

Parameter	Absolute Maximum
Input Power	+20 dBm
Operating Voltage	+10 volts
Operating Temperature	-40°C to +85°C
Junction Temperature[8]	150°C
Storage Temperature	-65°C to +150°C

5. Exceeding any one or combination of these limits may cause permanent damage to this device.
6. M/A-COM does not recommend sustained operation near these survivability limits.
7. These operating conditions will ensure MTTF > 1 x 10^6 hours.
8. Junction Temperature (T_J) = T_C + Θjc * ((V * I) - (P_{OUT} - P_{IN}))
   Typical thermal resistance (Θjc) = 39° C/W.
   a) For T_C = 25°C,
   T_J = 69 °C @ 5 V, 225 mA
   b) For T_C = 85°C,
   T_J = 129 °C @ 5 V, 225 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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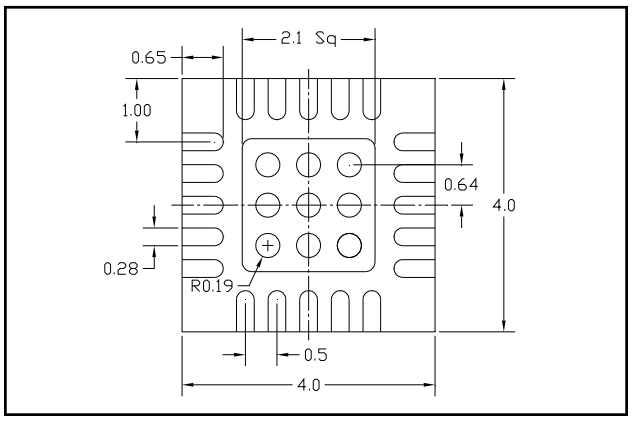
PCB Land Pattern

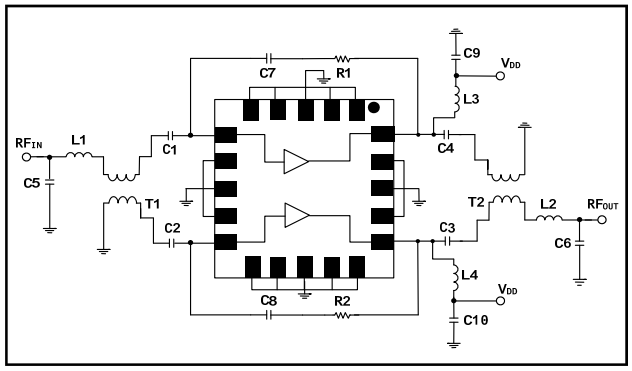


Parts List[9]

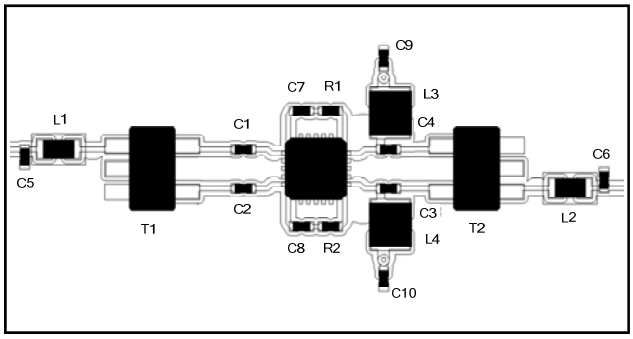
Component	Value	Package
C1 - C4	0.01 µF	0402
C5	0.8 pF	0402
C6	1 pF	0402
C7 - C10	0.01 µF	0402
L1	5.6 nH	0402
L2	6.8 nH	0402
L3, L4	470 nH	1008
R1, R2	300 Ω	0402

9. The 1:1 Baluns, T1 &T2 are M/A-COM part number MABACT0069

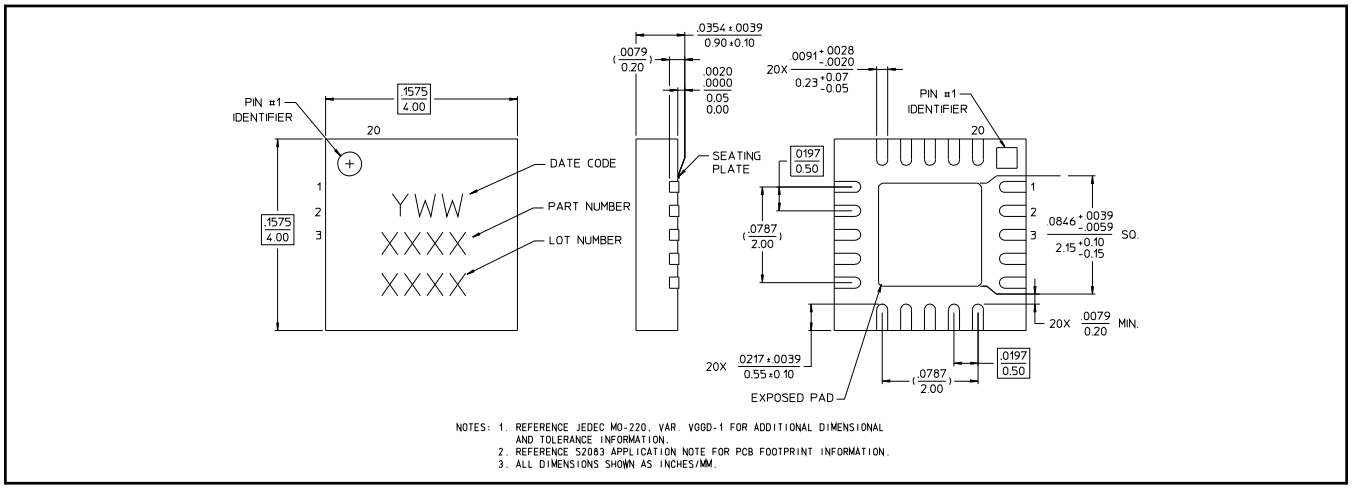
Application Schematic



Sample Board



Lead Free 4 mm 20-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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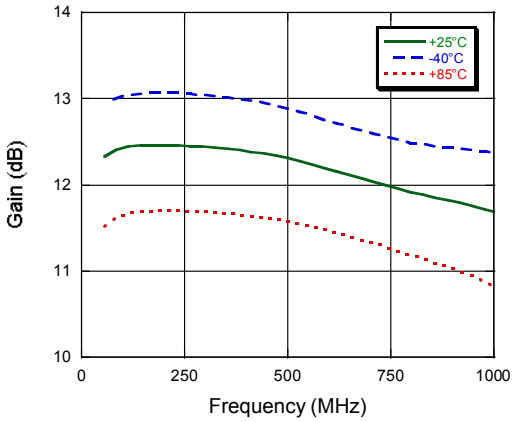
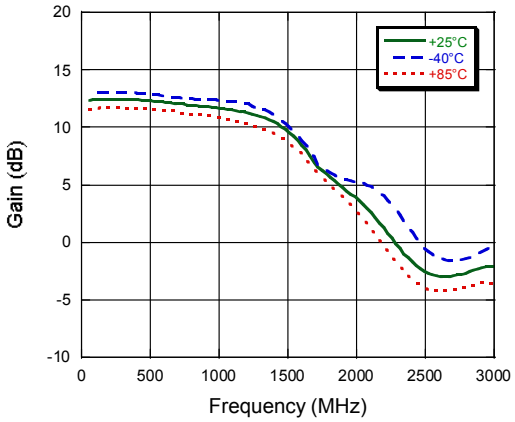
Typical Performance Curves

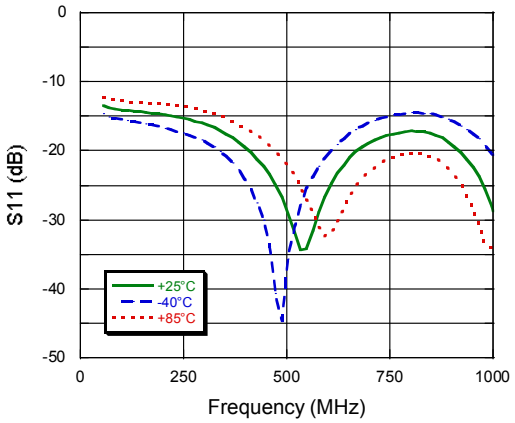
Gain vs. Frequency



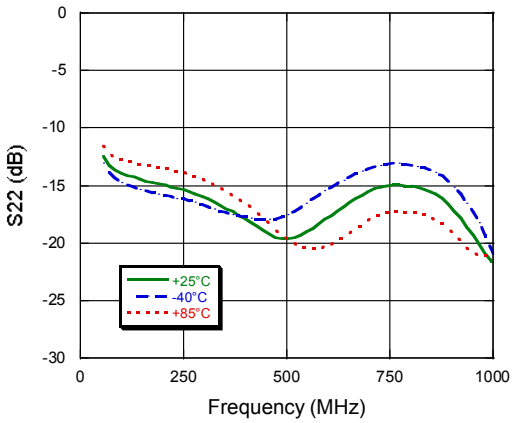
Gain vs. Frequency to 3 GHz



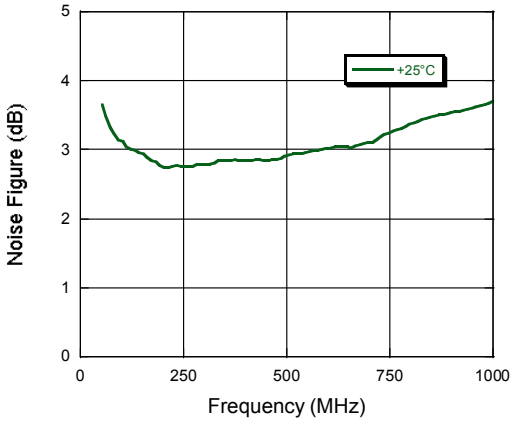
Input Return Loss vs. Frequency



Output Return Loss vs. Frequency



Noise Figure vs. Frequency



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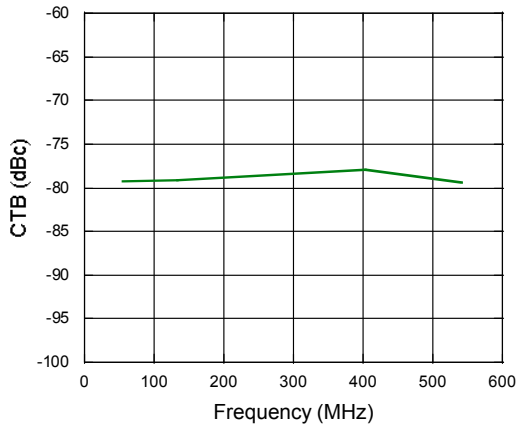
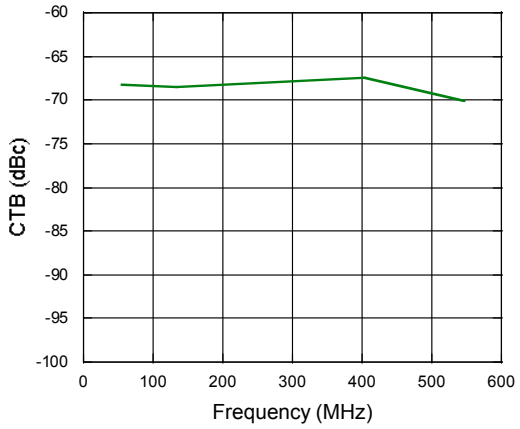
Typical Performance Curves

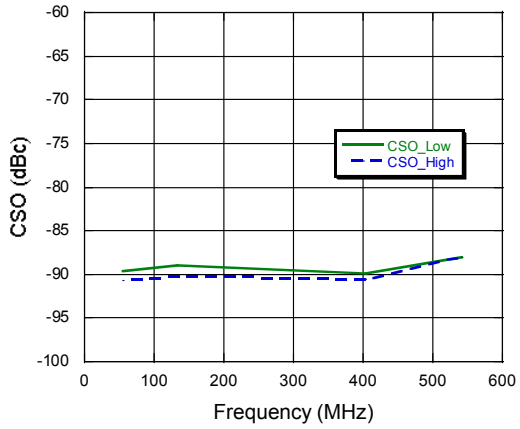
Composite Triple Beat,
79 Channels +34 dBm/channel Output



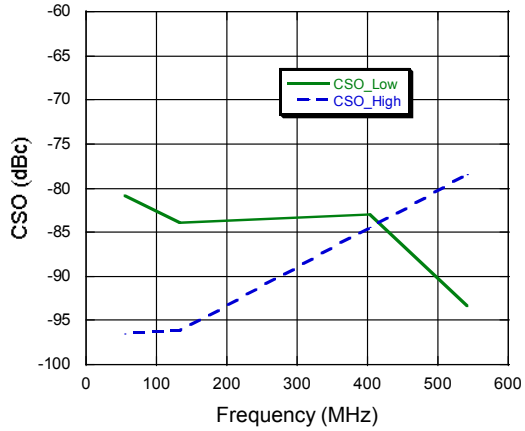
Composite Triple Beat,
77 Channels +39 dBm/channel Output



Composite Second Order Low and High,
79 Channels +34 dBm/channel Output



Composite Second Order Low and High,
77 Channels +39 dBm/channel Output



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