# Low Noise CATV Amplifier 50 - 1000 MHz

### Features

- Low Distortion
- Low Noise Figure
- Push Pull Design
- Single Positive Supply
- Lead-Free 4 mm 20-Lead PQFN Package
- 100% Matte Tin Plating over Copper
- Halogen-Free "Green" Mold Compound
- 260°C Reflow Compatible
- RoHS\* Compliant Version of MAAMSS0003

### Description

M/A-COM's MAAMSS0067 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-ohm push-pull, low distortion, amplifier circuit. The device is ideally suited for use in CATV, DBS, and HDTV applications where low noise figure and low distortion are required.

# Ordering Information<sup>1</sup>

Part Number	Package	
MAAMSS0067	Bulk Packaging	
MAAMSS0067TR-3000	3000 piece reel	
MAAMSS0067SMB	Sample Test Board (Includes 5 Samples)	

1. Reference Application Note M513 for reel size information.

# Absolute Maximum Ratings <sup>2,3</sup>

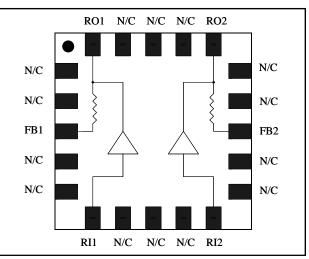
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Parameter	Absolute Maximum	
Input Power	+20 dBm	
Operating Voltage	+10 volts	
Operating Temperature	-40°C to +85°C	
Storage Temperature	-65°C to +150°C	

2. Exceeding any one or combination of these limits may cause permanent damage to this device.

 M/A-COM does not recommend sustained operation near these survivability limits.

# Functional Schematic



# Pin Configuration<sup>4</sup>

Pin No.	Pin Name Description			
1	N/C	No Connection		
2	N/C	No Connection		
3	FB1	Feedback 1		
4	N/C	No Connection		
5	N/C	No Connection		
6	RI1	RF Input 1		
7	N/C	No Connection		
8	N/C	No Connection		
9	N/C	No Connection		
10	RI2	RF Input 2		
11	N/C	No Connection		
12	N/C	No Connection		
13	FB2	Feedback 2		
14	N/C	No Connection		
15	N/C	No Connection		
16	RO2	RF Output 2		
17	N/C	No Connection		
18	N/C	No Connection		
19	N/C	No Connection		
20	RO1	RF Output 1		

4. 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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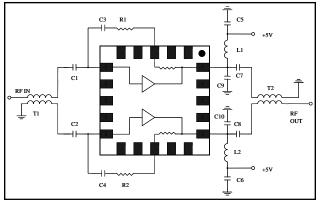
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# Electrical Specifications: $T_A = 25^{\circ}$ C, Freq: 50 - 1000 MHz, $V_{DD} = +5$ Volts, $Z_0 = 75$ ohms Test Circuit with M/A-COM Balun ETN1-1-13

Parameter	Test Conditions	Units	Min.	Тур.	Max.
Gain	—	dB	11.5	12.2	13.0
Gain Flatness	—	dB	—	0.4	1.0
Noise Figure	—	dB	—	3.3	4.0
Input VSWR	—	Ratio	—	1.3:1	
Output VSWR	—	Ratio	—	1.5:1	
Output IP3	Two tones at 397 & 403 MHz, +4 dBm output per tone	dBm	—	32	
Composite Triple Beat, CTB	135 Channels, +13 dBmV/Channel at the input	dBc	—	-78	-70
Composite Second Order, CSO	135 Channels, +13 dBmV/Channel at the input	dBc	—	-78	-70
Cross modulation	135 Channels, +13 dBmV/Channel at the input	dBc	—	-73	-64
P1dB	400 MHz	dBm	_	24	_
I <sub>DD</sub>	+5 Volts	mA	_	190	225

# Test Circuit Schematic<sup>5</sup>

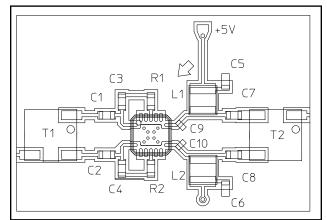


5. The 1:1 baluns, T1 & T2, are M/A-COM part number ETN1-1-13.

# **External Circuitry Parts List**

Qty	Description	
8	Capacitor, 0.01 uF, 0603, SMT, 10% (C1-C8)	
2	Capacitor, 2 pF, 0402, SMT, ± 0.25pF (C9-C10)	
2	Inductor, 390 nH, 1008, SMT, 10% (L1, L2)	
2	Balun, 1:1, M/A-COM, ETN1-1-13, SMT (T1,T2)	
2	Resistor, 0 ohms, 0603, SMT (R1, R2)	

# **Recommended Test Circuit Layout<sup>6</sup>**



6. Reference M/A-COM Application Note S2083 for recommended PCB configuration. R1 and R2 are 0 ohms.

# 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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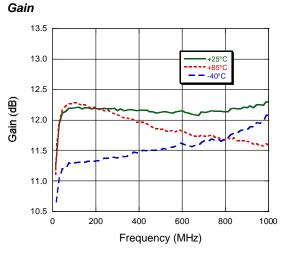
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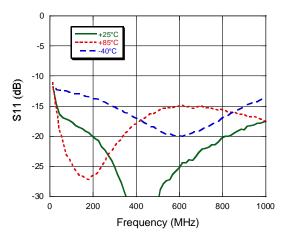


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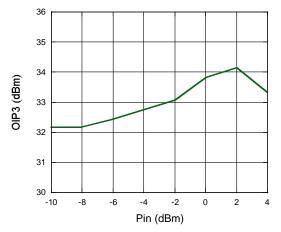




### Input Return Loss

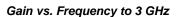


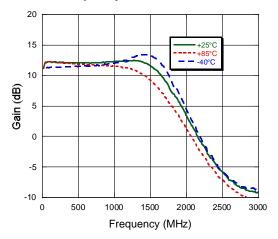
#### OIP3 vs. P<sub>IN</sub> at 400 MHz, 25℃



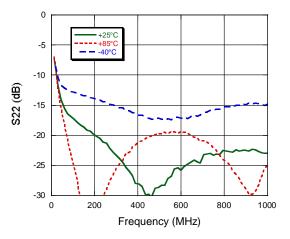
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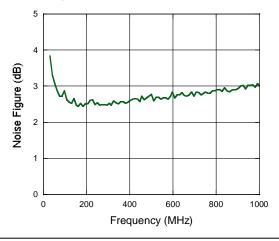




**Output Return Loss** 



Noise Figure vs. Frequency, 25°C



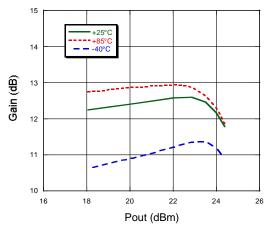
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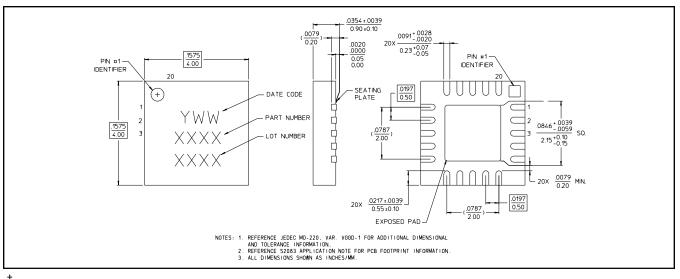
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# **Typical Performance Curves (continued)**

### Gain vs POUT at 400 MHz



# Lead-Free 4 mm 20-lead PQFN<sup>†</sup>



<sup>†</sup> Reference Application Note M538 for lead-free solder reflow recommendations. Meets JEDEC moisture sensitivity level 1 requirements.

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