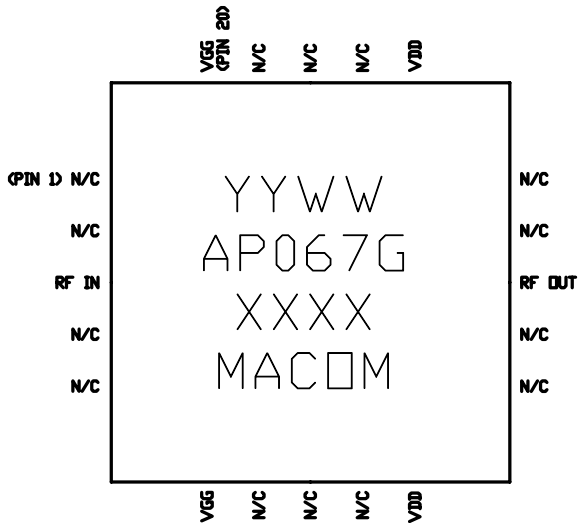
Amplifier, Power, 2W 5.7-8.5 GHz

Features

- **2 Watt Saturated Output Power Level**
- **Variable Drain Voltage (6-10V) Operation**
- **MSAG™ Process**
- **5x5 mm 20 Lead PQFN Package**



Description

The MAAP-000067-PKG0003 is a 3-stage 2 W power amplifier with on-chip bias networks in a 20 lead MLP package, allowing easy assembly. This product is fully matched to 50 ohms on both the input and output. It can be used as a power amplifier stage or as a driver stage in high power applications.

Each device is 100% RF tested to ensure performance compliance. The part is fabricated using M/A-COM's GaAs Multifunction Self-Aligned Gate (MSAG™) Process.

Primary Applications:

- **Point-to-Point Radio**
- **SatCom**

Also Available in:

	SAMPLES			
Description	**Die**	**Sample Board (Die)**	**Sample Board (Package)**	**Mechanical Sample (Die)**
Part Number	MAAPGM0067-DIE	MAAP-000067-SMB004	MAAP-000067-SMB003	MAAP-000067-MCH000

Electrical Characteristics: T_C = 35°C[1], Z_0 = 50Ω, V_{DD} = 8V, I_{DQ} = 640mA[2], P_{in} = 12dBm, R_G=150Ω

Parameter	Symbol	Typical	Units
Bandwidth	f	5.7-8.5	GHz
Output Power	P_{OUT}	33	dBm
1-dB Compression Point	P1dB	33	dBm
Small Signal Gain	G	26	dB
Power Added Efficiency	PAE	30	%
Input VSWR	VSWR	1.7:1	
Output VSWR	VSWR	2.5:1	
Gate Supply Current	I_{GG}	7	mA
Drain Supply Current, under RF Drive	I_{DD}	900	mA
Output Third Order Intercept	TOI	41	dBm
Output Third Order Intermod, Single Carrier Level = 23 dBm	IM3	35	dBc

1. **T_C = Case Temperature**
2. **Adjust V_{GG} between –2.6 and –1.2V to achieve specified I_{DQ}.**

• **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.macom.com for additional data sheets and product information.

Maximum Ratings[3]

Parameter	Symbol	Absolute Maximum	Units
Input Power	P_{IN}	17	dBm
Drain Supply Voltage	V_{DD}	+12.0	V
Gate Supply Voltage	V_{GG}	-3.0	V
Quiescent Drain Current (No RF)	I_{DQ}	1.02	A
Quiescent DC Power Dissipated (No RF)	P_{DISS}	10.2	W
Junction Temperature	T_J	170	°C
Storage Temperature	T_{STG}	-55 to +150	°C

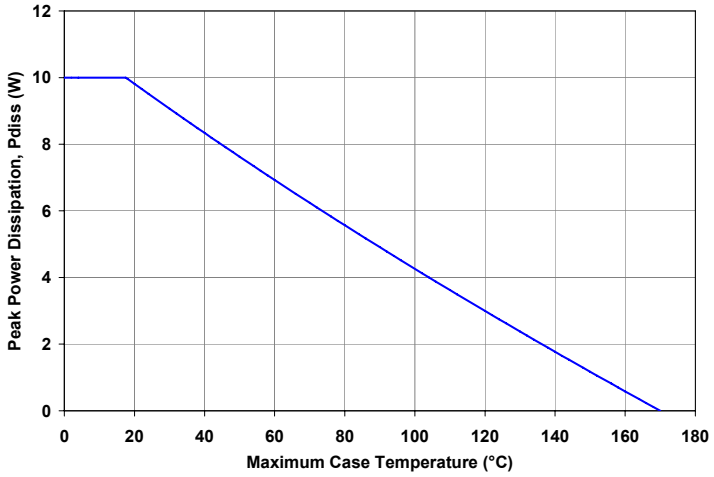
3. Operation beyond these limits may result in permanent damage to the part.

Recommended Operating Conditions[4]

Characteristic	Symbol	Min	Typ	Max	Unit
Drain Supply Voltage	V_{DD}	6.0	8.0	10.0	V
Gate Supply Voltage	V_{GG}	-2.6	-2.0	-1.2	V
Input Power	P_{IN}		12.0	15.0	dBm
Thermal Resistance	Θ_{JC}		15.6		°C/W
Case Temperature	T_C			Note 5	°C

4. Operation outside of these ranges may reduce product reliability.
5. Case Temperature = 170°C — Θ_{JC}* V_{DD} * I_{DQ}

Power Derating Curve, Quiescent (No RF)



Operating Instructions

This device is static sensitive. Please handle with care. To operate the device, follow these steps.

1. Apply V_{GG} = -2.7V, V_{DD}= 0 V.
2. Ramp V_{DD} to desired voltage, typically 8.0 V.
3. Adjust V_{GG} to set I_{DQ}, (approximately @ –2.0 V).
4. Set RF input.
5. Power down sequence in reverse. Turn V_{GG} off last.

- **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.macom.com for additional data sheets and product information.

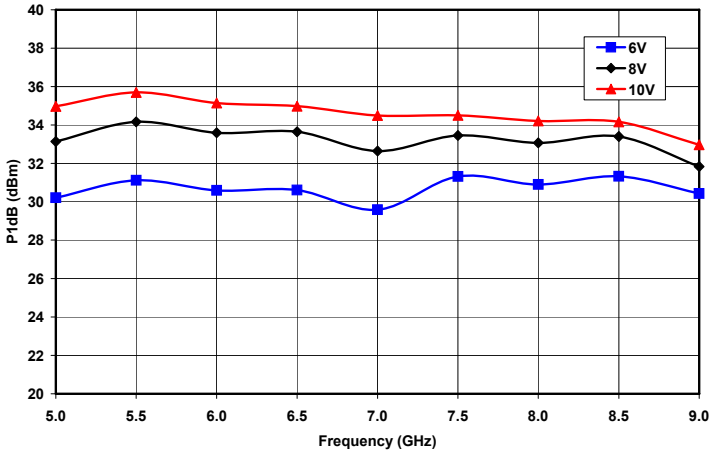


Figure 1. 1dB Compression Point vs. Frequency and Drain Voltage at IDQ = 640mA

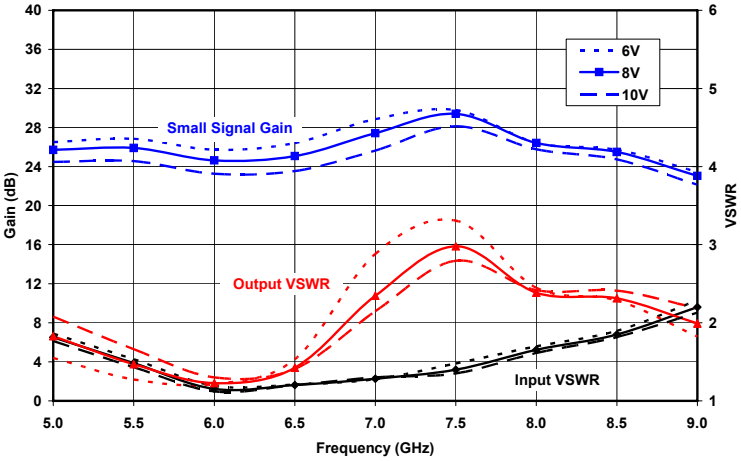


Figure 2. Small Signal Gain and Input & Output VSWR vs. Frequency and Drain Voltage at IDQ = 640 mA

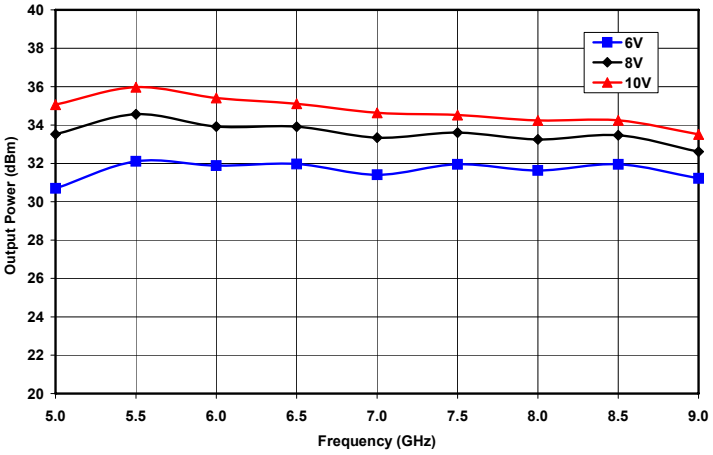


Figure 3. Saturated Output Power vs. Frequency and Drain Voltage at IDQ = 640mA

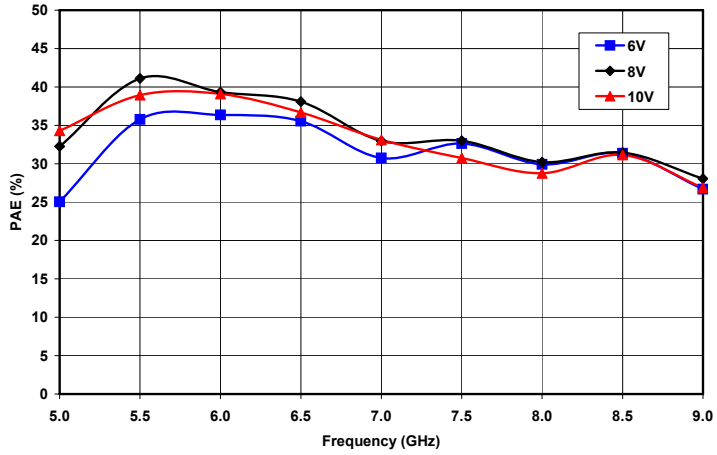


Figure 4. Saturated Power Added Efficiency vs. Frequency and Drain Voltage at IDQ = 640mA

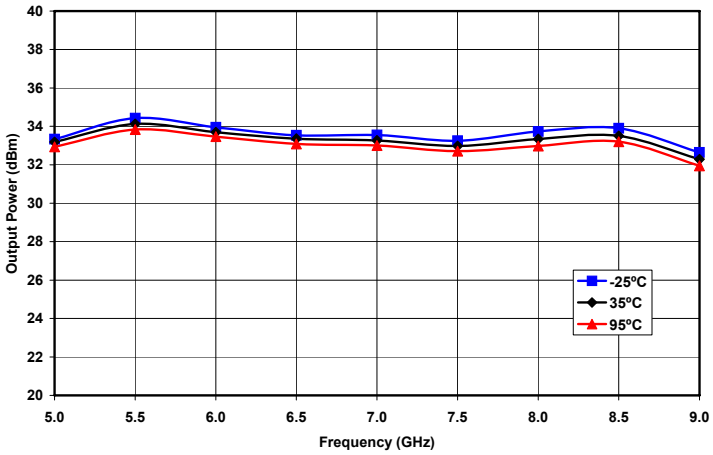


Figure 5. Saturated Output Power vs Frequency and Case Temperature at Vd = 8V and IDQ = 640mA

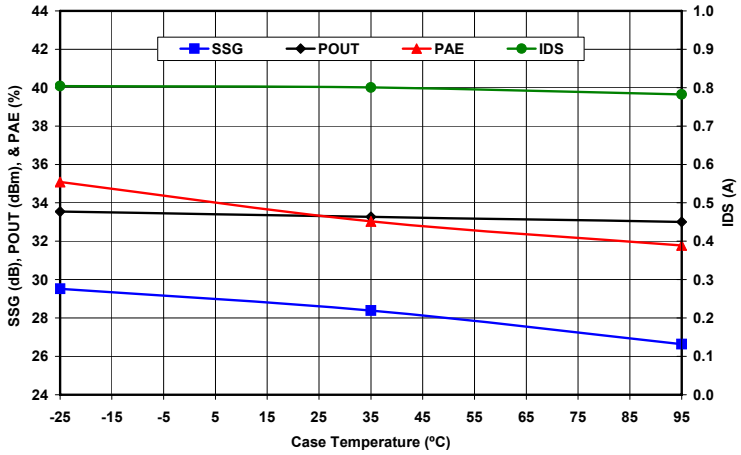


Figure 6. Small Signal Gain & Saturated Output Power, Power Added Efficiency, and Drain Current vs Case Temperature at 7GHz, VD = 8V and IDQ = 640mA

- **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.macom.com for additional data sheets and product information.

VD = 6V

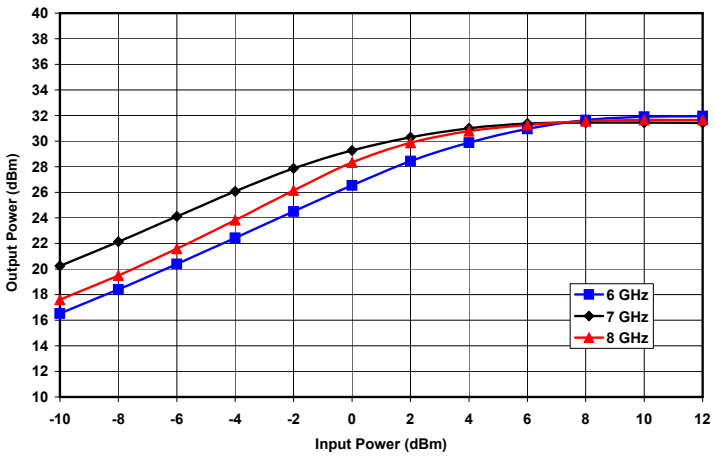


Figure 7. Output Power vs. Input Power and Frequency
at VD = 6V and IDQ = 640mA

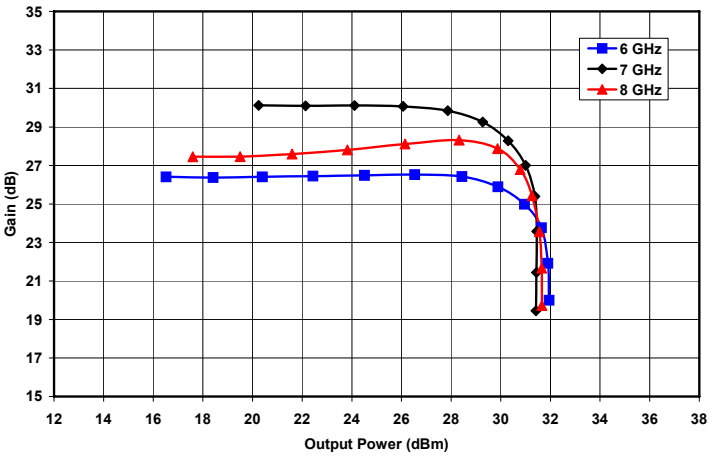


Figure 8. Gain vs. Output Power and Frequency
at VD = 6V and IDQ = 640mA

VD = 8V

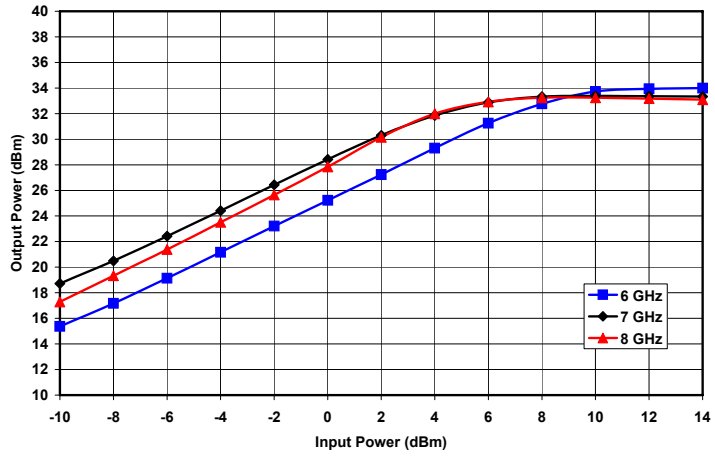


Figure 9. Output Power vs. Input Power and Frequency
at VD = 8V and IDQ = 640mA

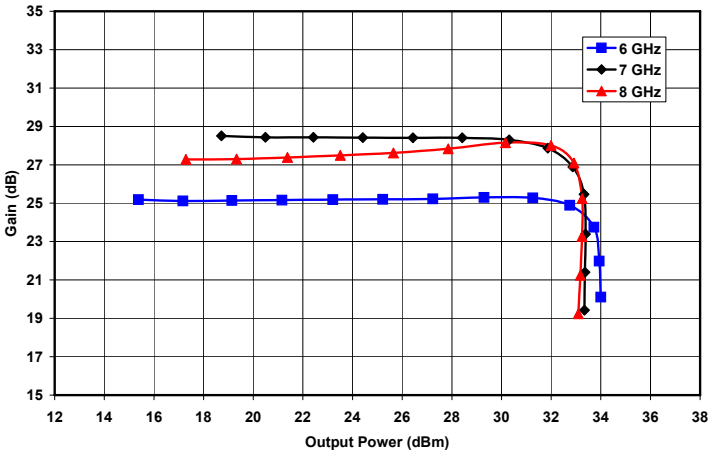


Figure 10. Gain vs. Output Power and Frequency
at VD = 8V and IDQ = 640mA

VD = 10V

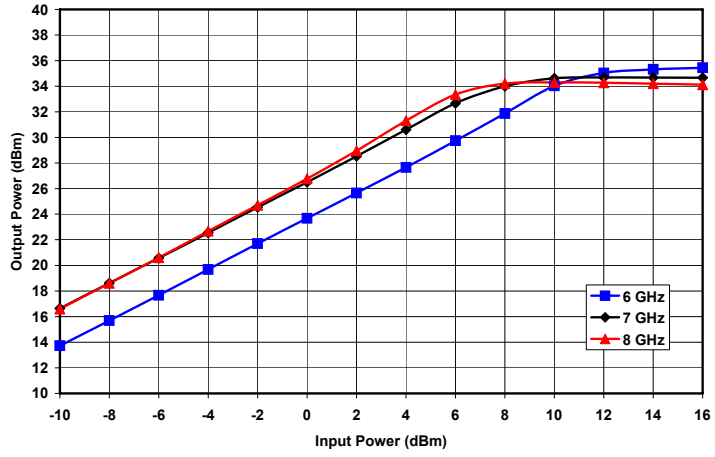


Figure 11. Output Power vs. Input Power and Frequency
at VD = 10V and IDQ = 640mA

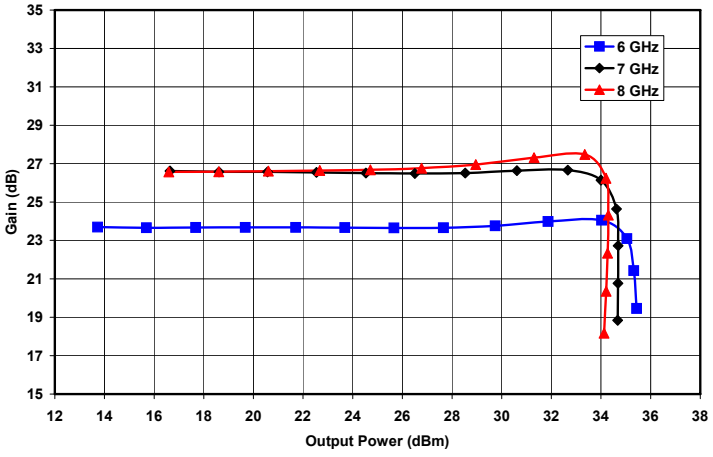


Figure 12. Gain vs. Output Power and Frequency
at VD = 10V and IDQ = 640mA

- **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.macom.com for additional data sheets and product information.

VD = 6V

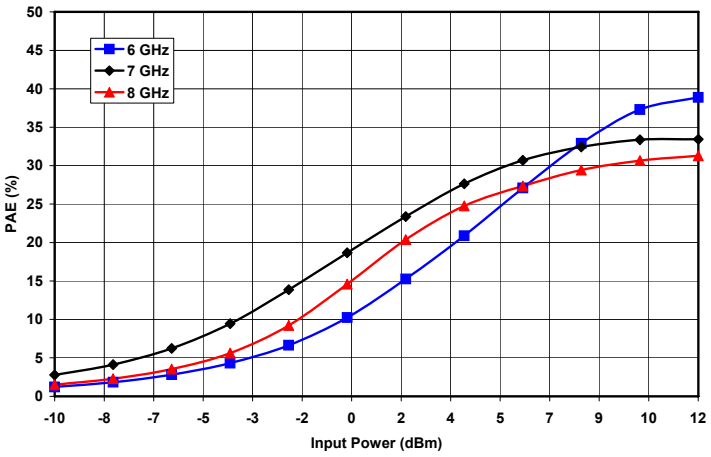


Figure 13. Power Added Efficiency vs. Input Power and Frequency at VD = 6V and IDQ = 640mA

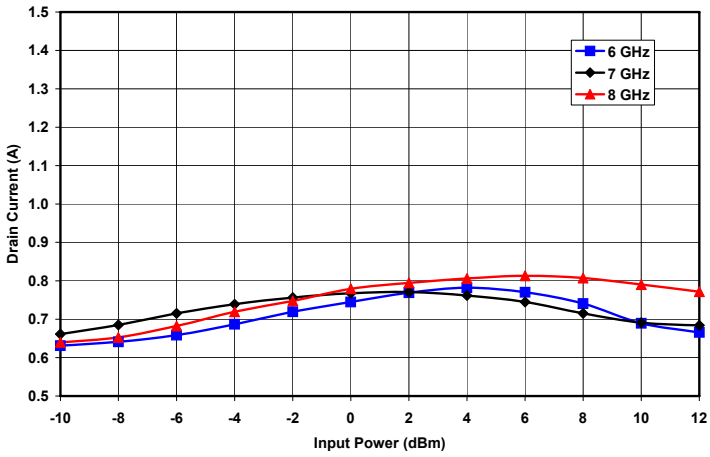


Figure 14. Drain Current vs. Input Power and Frequency at VD = 6V and IDQ = 640mA

VD = 8V

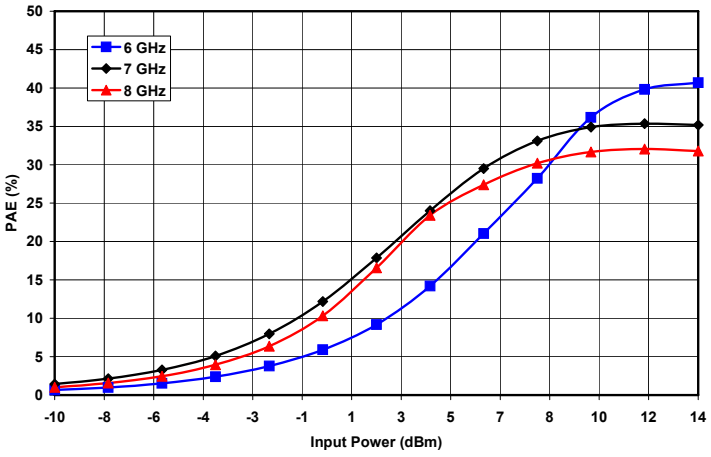


Figure 15. Power Added Efficiency vs. Input Power and Frequency at VD = 8V and IDQ = 640mA

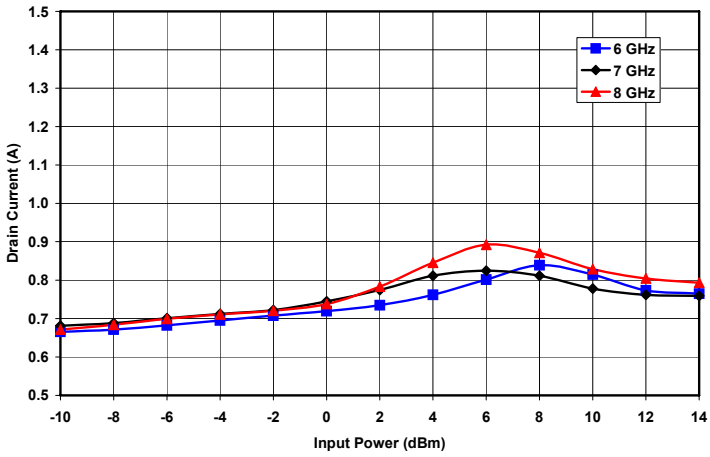


Figure 16. Drain Current vs. Input Power and Frequency at VD = 8V and IDQ = 640mA

VD = 10V

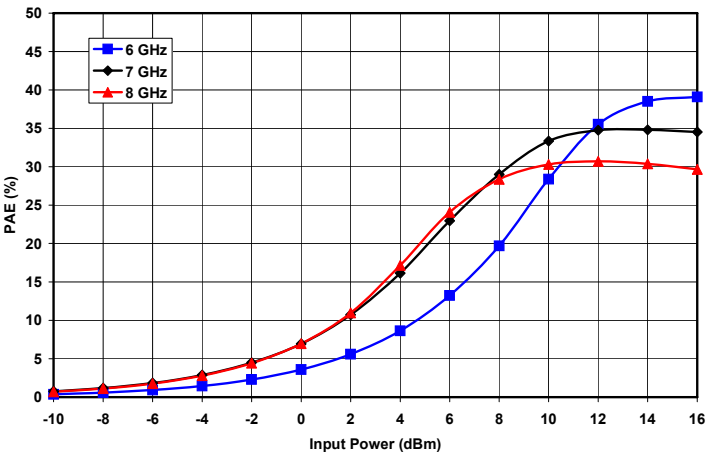


Figure 17. Power Added Efficiency vs. Input Power and Frequency at VD = 10V and IDQ = 640mA

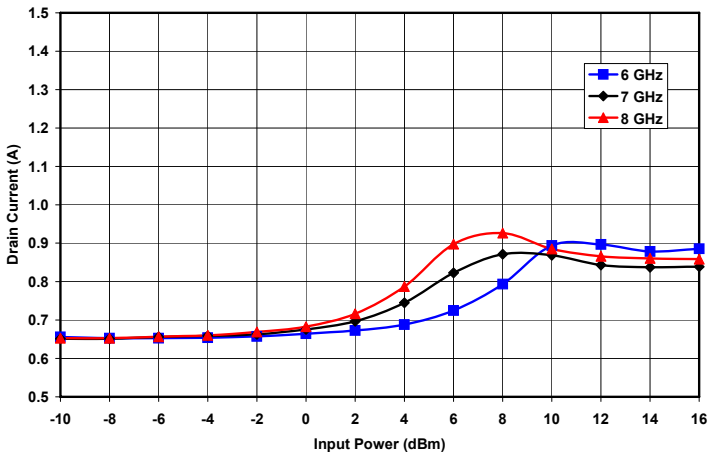


Figure 18. Darin Current vs. Input Power and Frequency at VD = 10V and IDQ = 640mA

- **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.macom.com for additional data sheets and product information.

VD = 6V

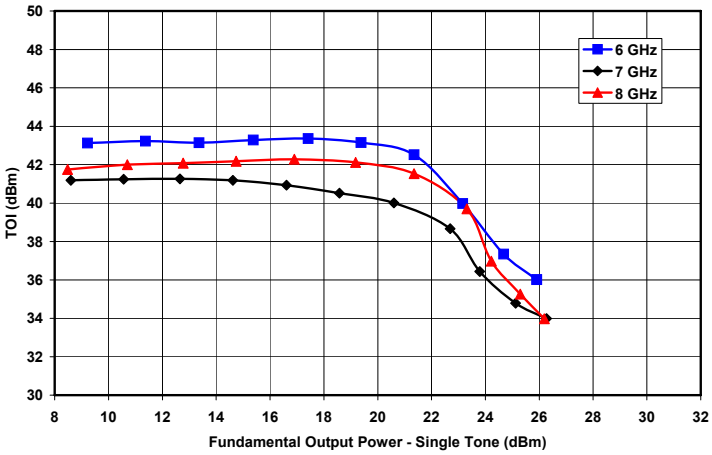


Figure 19. Third Order Intercept vs. Output Power and Frequency at VD = 6V and IDQ = 640mA

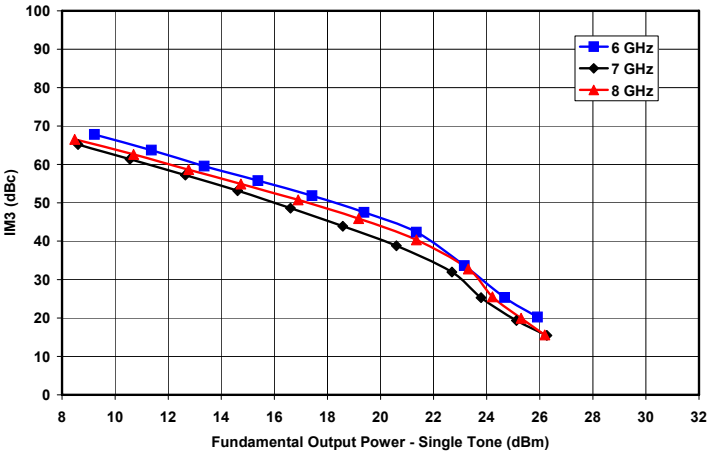


Figure 20. Third Order Intermod vs. Output Power and Frequency at VD = 6V and IDQ = 640mA

VD = 8V

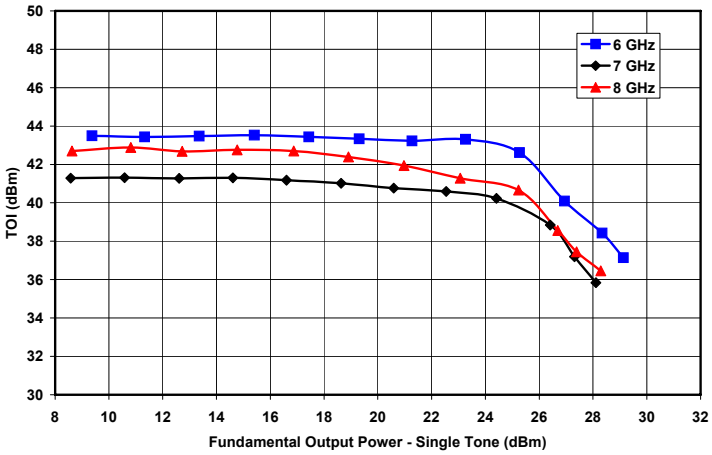


Figure 21. Third Order Intercept vs. Output Power and Frequency at VD = 8V and IDQ = 640mA

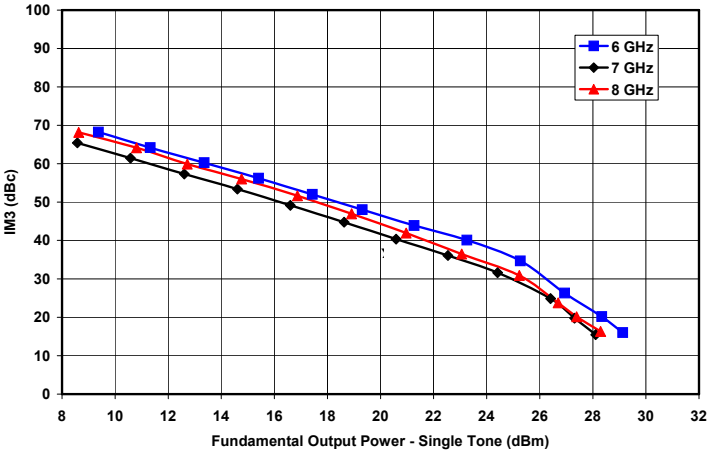


Figure 22. Third Order Intermod vs. Output Power and Frequency at VD = 8V and IDQ = 640mA

VD = 10V

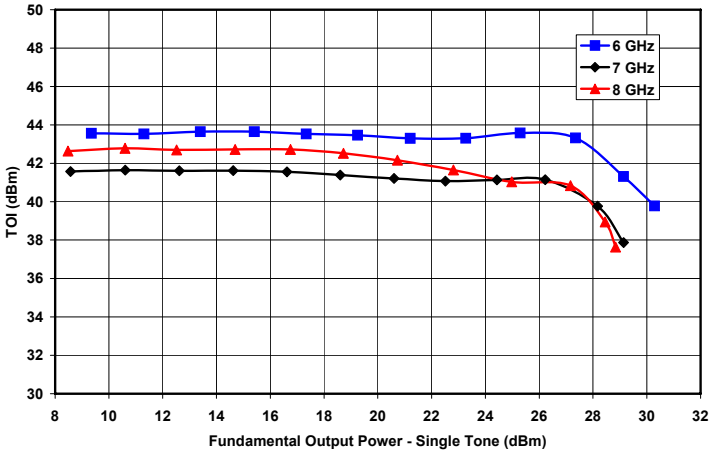


Figure 23. Third Order Intercept vs. Output Power and Frequency at VD = 10V and IDQ = 640mA

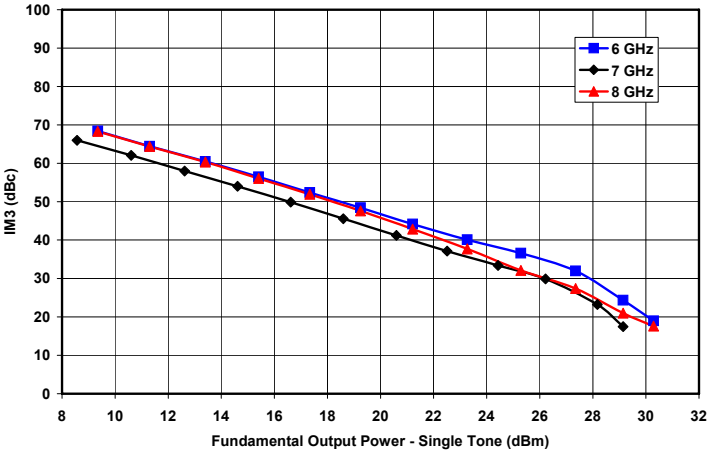


Figure 24. Third Order Intermod vs. Output Power and Frequency at VD = 10V and IDQ = 640mA

- **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.macom.com for additional data sheets and product information.

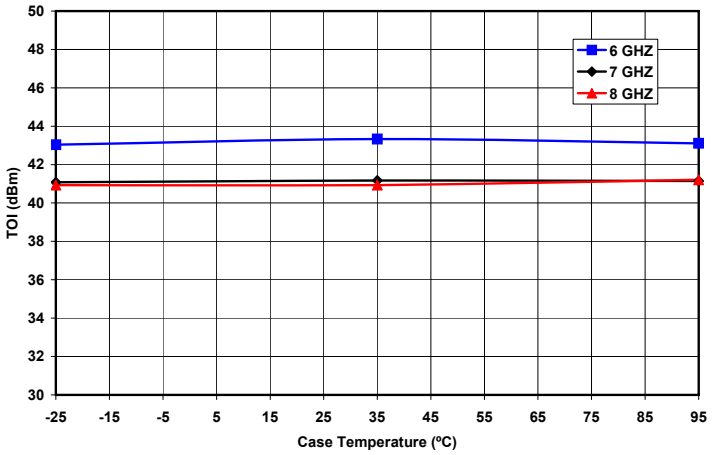


Figure 25. Third Order Intercept vs. Temperature and Frequency
at Single Carrier Output Power Level = 23 dBm, VD = 8V and IDQ = 640mA

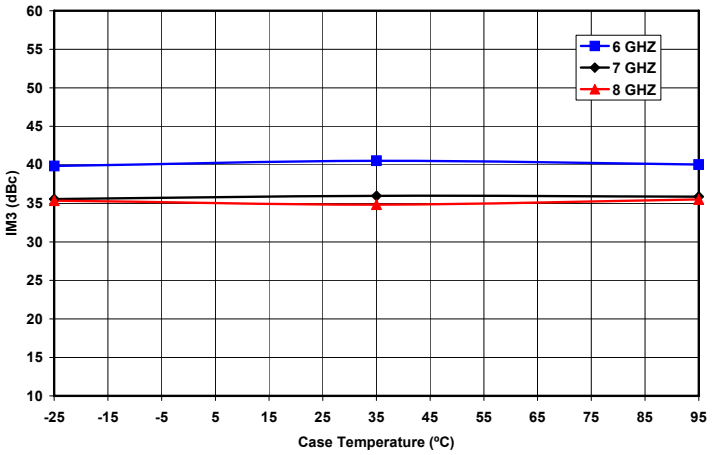


Figure 26. Third Order Intermod vs. Temperature and Frequency
at Single Carrier Output Power Level = 23 dBm, VD = 8V and IDQ = 640mA

- **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.macom.com for additional data sheets and product information.

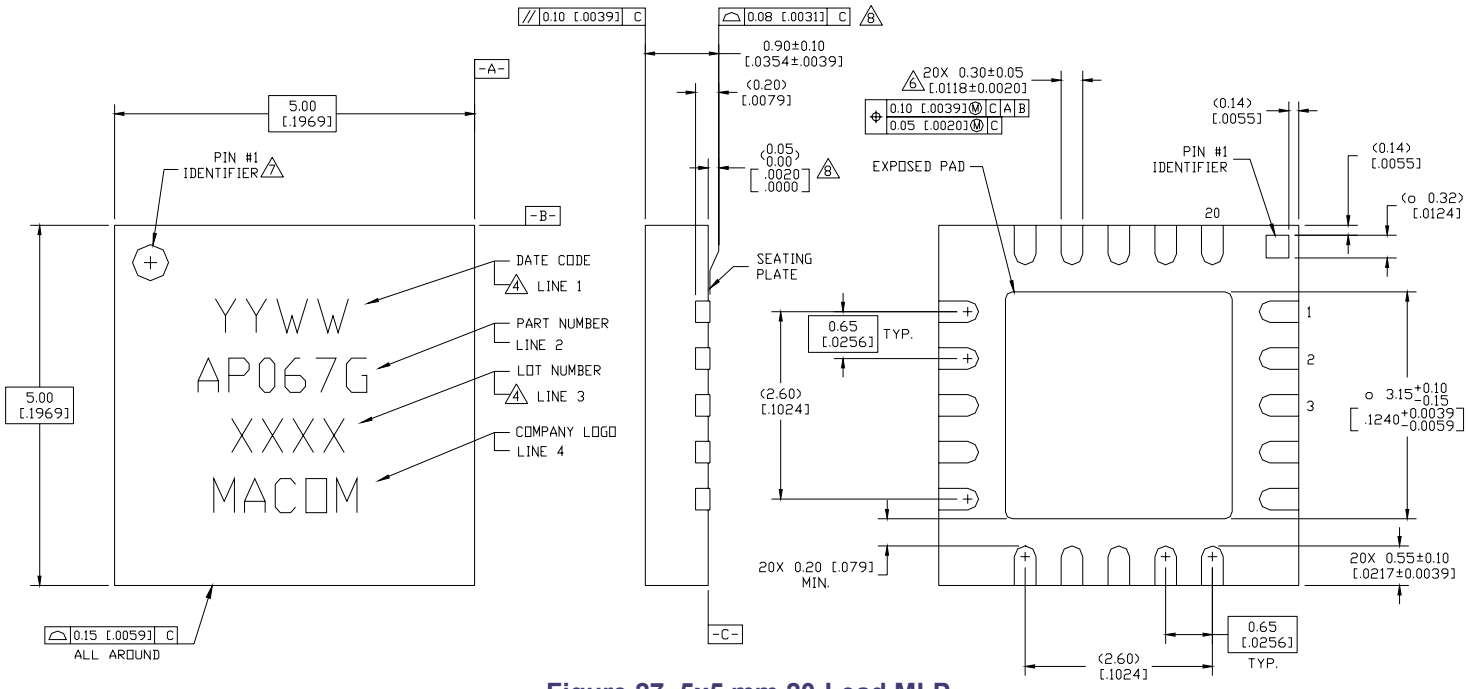


Figure 27. 5x5 mm 20-Lead MLP.

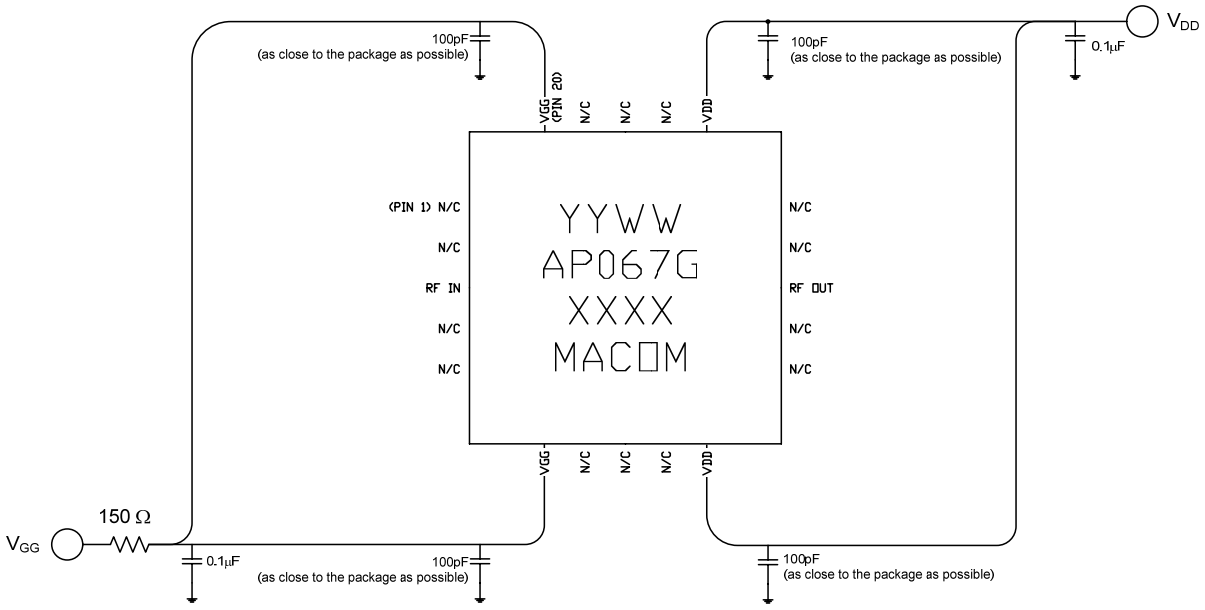


Figure 28. Recommended Bias Configuration.

Note: The exposed pad centered on the package bottom must be connected to RF and dc ground for proper electrical and thermal operation.

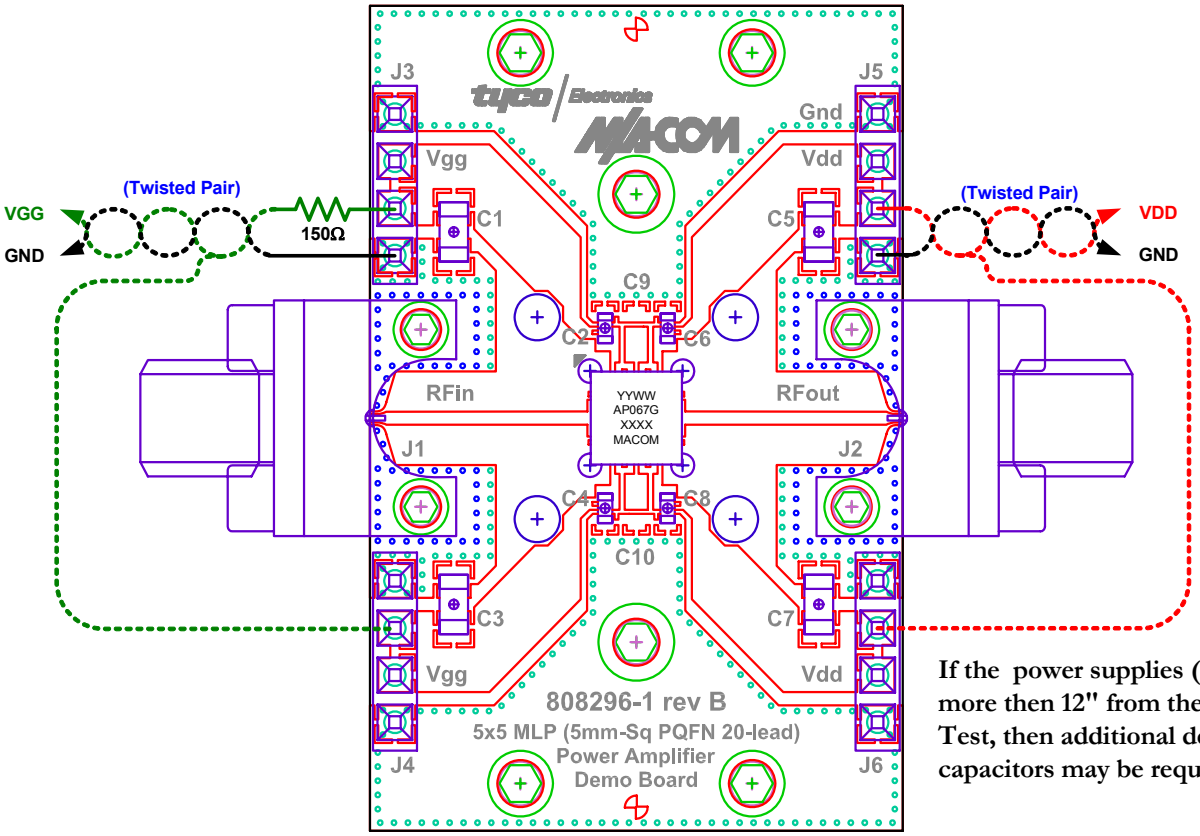
Refer to M/A-COM Application Note ***Surface Mounting Instructions for PQFN Packages #S2083**** for assembly guidelines.

Additional Precaution: All parts must receive a bake-out of 125ºC for 24 hours prior to any solder reflow operation.

*Application Notes can be found by going to the Site Search Page of M/A-COM's web page (http://www.macom.com/Application%20Notes/index.htm) and searching for the required Application Note.

- **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.macom.com for additional data sheets and product information.



If the power supplies (VGG, VDD) are more then 12" from the Device Under Test, then additional decoupling capacitors may be required.

Figure 29. Demonstration Board PN MAAP-000067-SMB003 (available upon request).

- **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.macom.com for additional data sheets and product information.