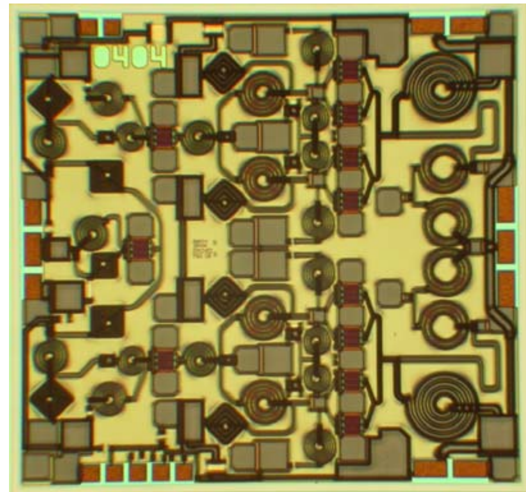
Amplifier, Power, 2 W
2.5-6.0 GHz

MAAPGM0066-DIE
Rev C
Preliminary Datasheet

Features

- ♦ **2.5 Watt Saturated Output Power Level**
- ♦ **Variable Drain Voltage (4-10V) Operation**
- ♦ **MSAG® Process**



Description

The MAAPGM0066-DIE is a 3-stage 2 W power amplifier with on-chip bias networks. 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.

Fabricated using M/A-COM's repeatable, high performance and highly reliable GaAs Multifunction Self-Aligned Gate (MSAG™)Process, each device is 100% RF tested on wafer to ensure performance compliance.

M/A-COM's MSAG™ process features robust silicon-like manufacturing processes, planar processing of ion implanted transistors, multiple implant capability enabling power, low-noise, switch and digital FETs on a single chip, and polyimide scratch protection for ease of use with automated manufacturing processes. The use of refractory metals and the absence of platinum in the gate metal formulation prevents hydrogen poisoning when employed in hermetic packaging.

Primary Applications

- ♦ **Point-to-Point Radios**
- ♦ **Point-to-Multipoint Radios**
- ♦ **SatCom**
- ♦ **Broadband Wireless Access**

Also Available in:

		SAMPLES	
Description	**Plastic**	**Sample Board (Die)**	**Mechanical Sample (Die)**
Part Number	MAAP-000066-PKG003	MAAP-000066-SMB004	MAAP-000066-MCH000

Electrical Characteristics: $T_B = 30°C^1$, $Z_0 = 50\Omega$, $V_{DD} = 8V$, $I_{DQ} = 650mA^2$, $P_{in} = 6$ dBm

Parameter	Symbol	Typical	Units
Bandwidth	f	2.5-6.0	GHz
Output Power	P_{OUT}	33.5	dBm
1-dB Compression Point	P1dB	33.3	dBm
Small Signal Gain	G	33.5	dB
Power Added Efficiency	PAE	35	%
Input VSWR	VSWR	1.4:1	
Output VSWR	VSWR	2.4:1	
Output Third Order Intercept	TOI	42	dBm
Output Third Order Intermod, P_{out} = 26 dBm (DCL)	IMD3	40	dBc
Gate Current	I_{GG}	10	mA
Drain Current	I_{DD}	810	mA

1. **T_B = MMIC Base Temperature**
2. **Adjust V_{GG} between –2.6 and –1.2V to achieve specified Idq.**

- **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]

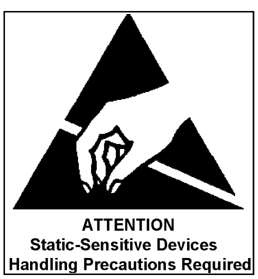
Parameter	Symbol	Absolute Maximum	Units
Input Power	P_{IN}	16.0	dBm
Drain Supply Voltage	V_{DD}	+12.0	V
Gate Supply Voltage	V_{GG}	-3.0	V
Quiescent Drain Current (No RF)	I_{DQ}	1.04	A
Quiescent DC Power Dissipated (No RF)	P_{DISS}	10.4	W
Junction Temperature	T_J	170	°C
Storage Temperature	T_{STG}	-55 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 Voltage	V_{DD}	4.0	8.0	10.0	V
Gate Voltage	V_{GG}	-2.6	-2.0	-1.2	V
Input Power	P_{IN}		6.0	13.0	dBm
Thermal Resistance	Θ_{JC}		14.0		°C/W
MMIC Base Temperature	T_B			Note 5	°C

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

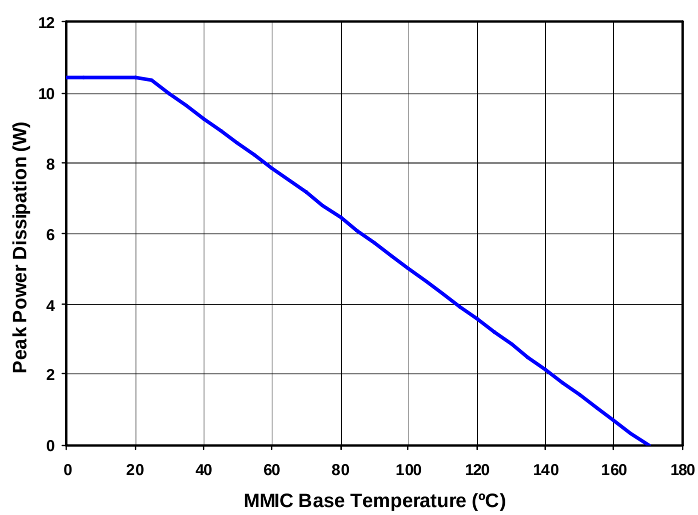


Operating Instructions

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

1. Apply V_{GG} = -2.7 V, 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.

Power Derating Curve, Quiescent (No RF)



• **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.

All Data is at 30°C MMIC base temperature, CW stimulus, unless otherwise noted.

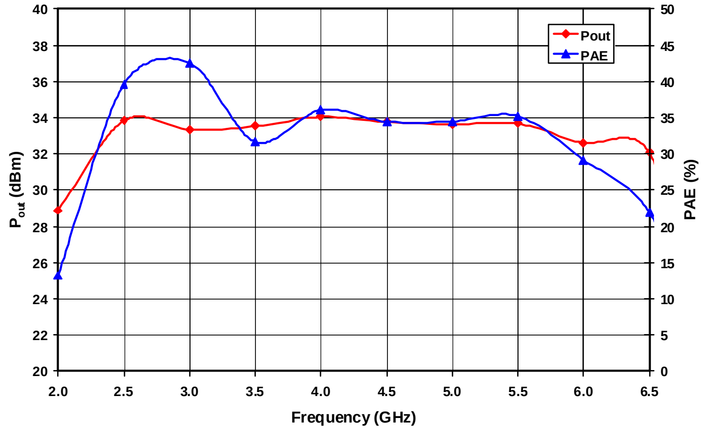


Figure 1. Output Power and Power Added Efficiency at V_D = 8V, P_{in} = 6dBm, and I_{DSQ}=650mA

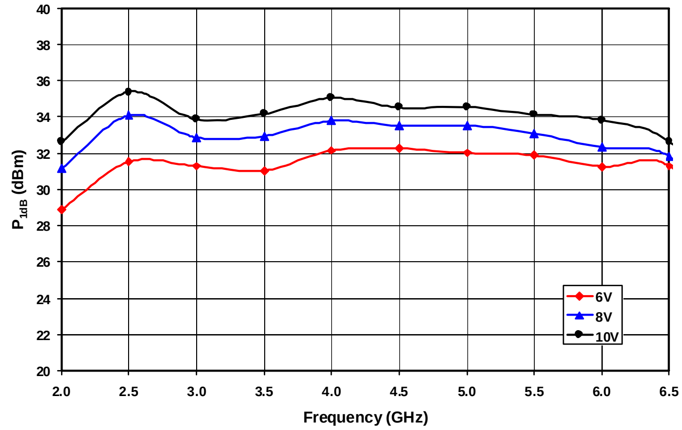


Figure 2. 1dB Compression Point and Drain Voltage at I_{DSQ}=650mA

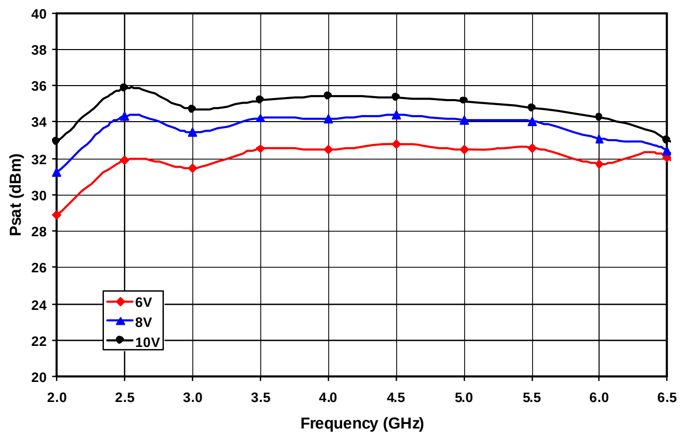


Figure 3. Saturated Output Power and Drain Voltage at I_{DSQ}=650mA.

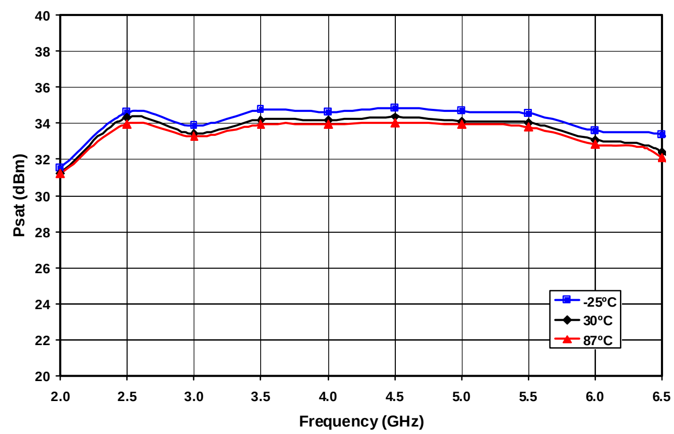


Figure 4. Saturated Output Power and Temperature at V_D=8V and I_{DSQ}=650mA

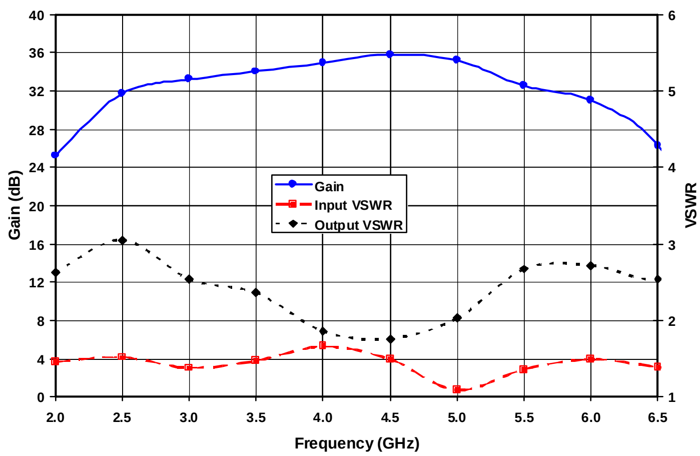


Figure 5. Small Signal Gain and Input and Output VSWR at V_D = 8V and I_{DSQ}=650mA

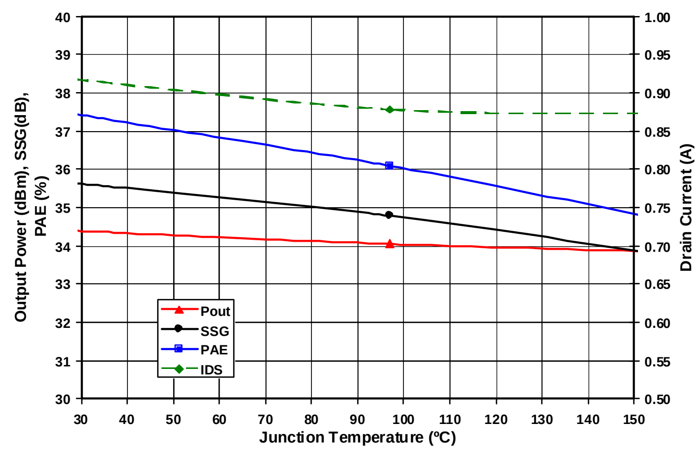


Figure 6. Output Power, Small Signal Gain, Power Added Efficiency, and Drain Current vs. Junction Temperature at 8V, 4 GHz, and I_{DSQ}=650mA

- **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.

All Data is at 30ºC MMIC base temperature, CW stimulus, unless otherwise noted.

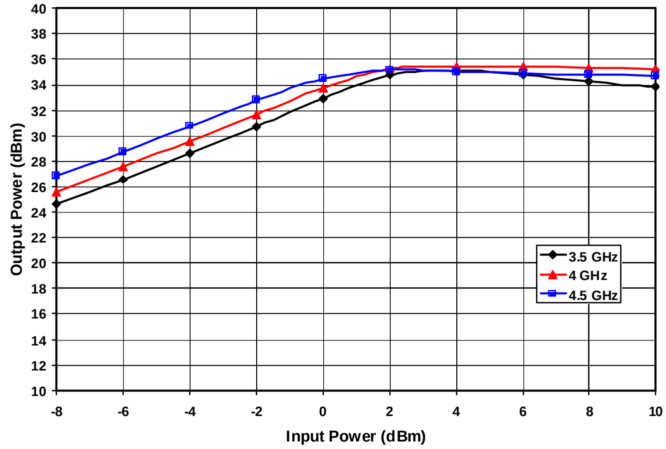


Figure 7. Output Power vs. Input Power and Frequency at 10V and I_{DSQ}=650mA

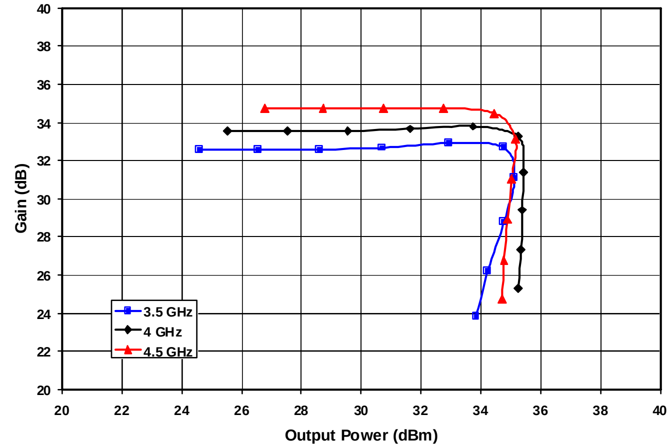


Figure 8. Gain vs. Output Power and Frequency at V_D=10V and I_{DSQ}=650mA.

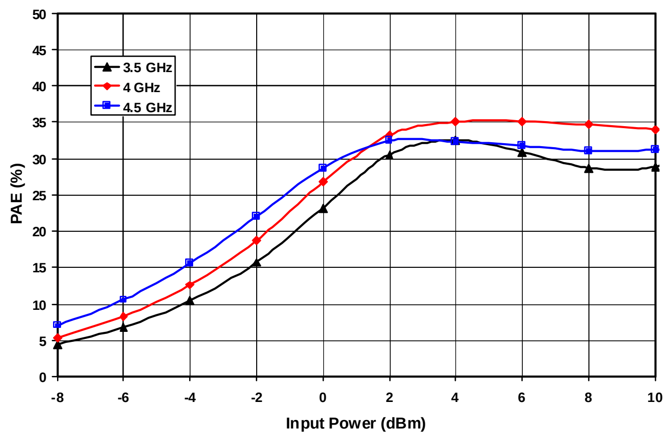


Figure 9. Power Added Efficiency vs. Input Power and Frequency at V_D=10V and I_{DSQ}=650mA

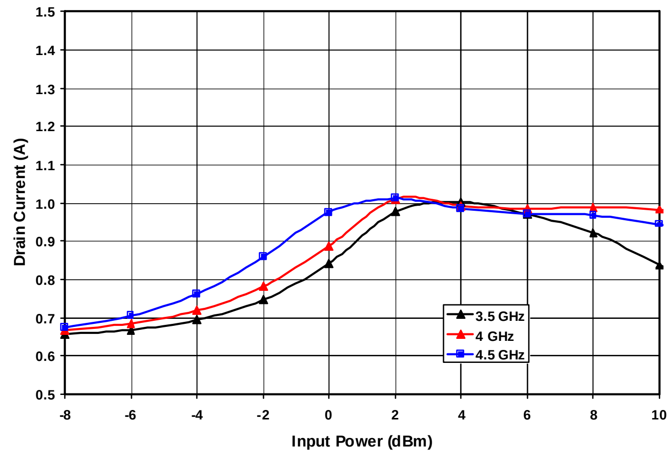


Figure 10. Drain Current vs. Input Power and Frequency at V_D=10V and I_{DSQ}=650mA

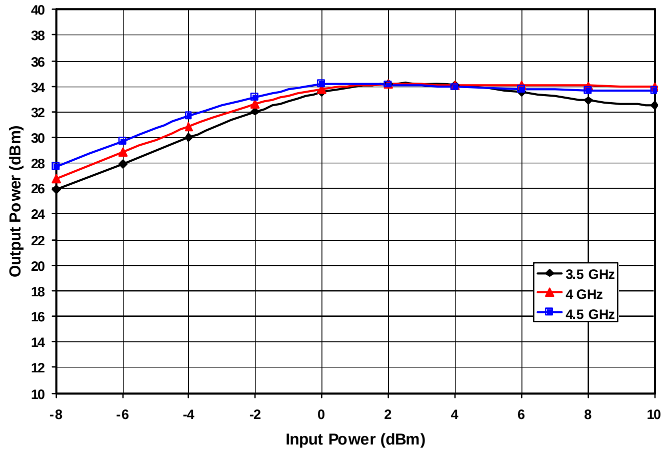


Figure 11. Output Power vs. Input Power and Frequency at V_D=8V and I_{DSQ}=650mA

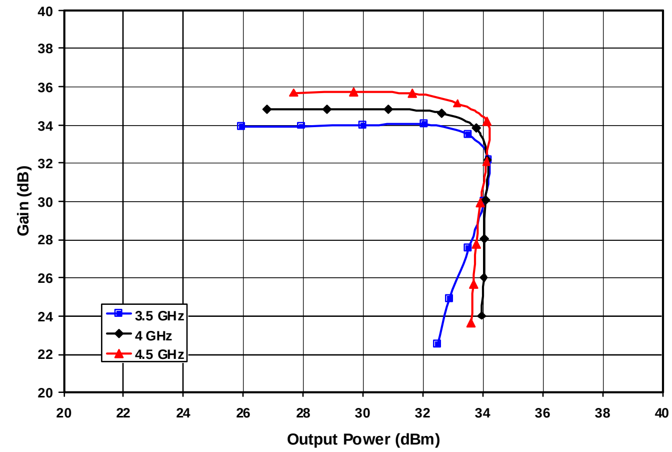


Figure 12. Gain vs. Output Power and Frequency at V_D=8V and I_{DSQ}=650mA.

- **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.

All Data is at 30ºC MMIC base temperature, CW stimulus, unless otherwise noted.

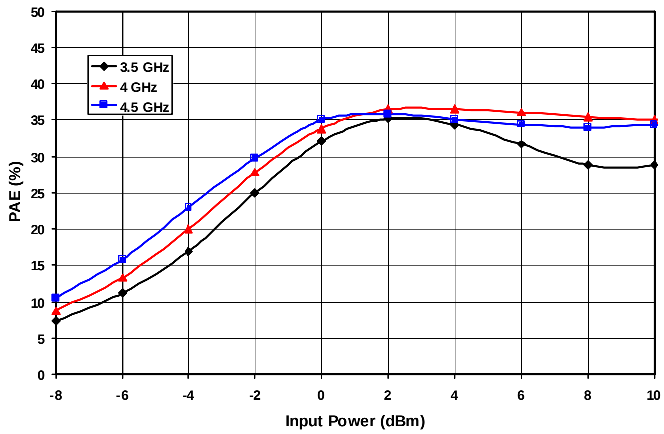


Figure 13. Power Added Efficiency vs. Input Power and Frequency at V_D=8V and I_{DSQ}=650mA

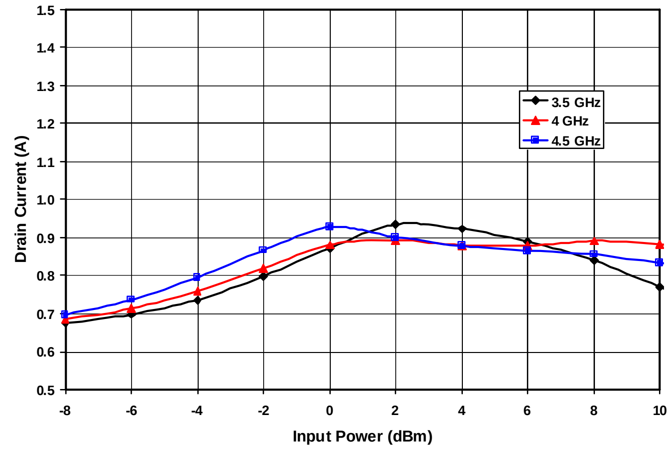


Figure 14. Drain Current vs. Input Power and Frequency at V_D=8V and I_{DSQ}=650mA

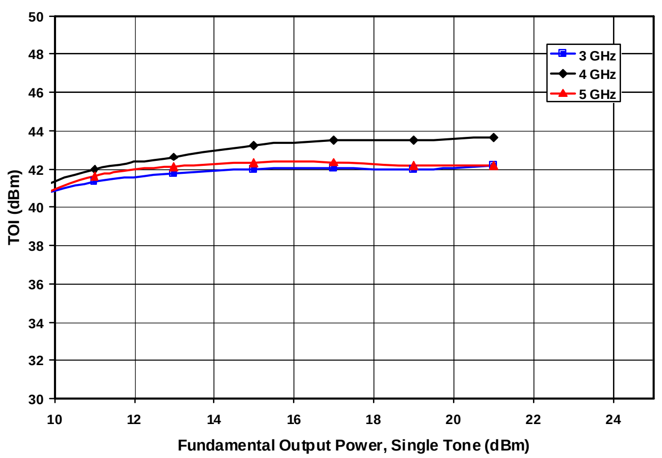


Figure 15. Third Order Intercept vs. Output Power and Frequency at 6V.

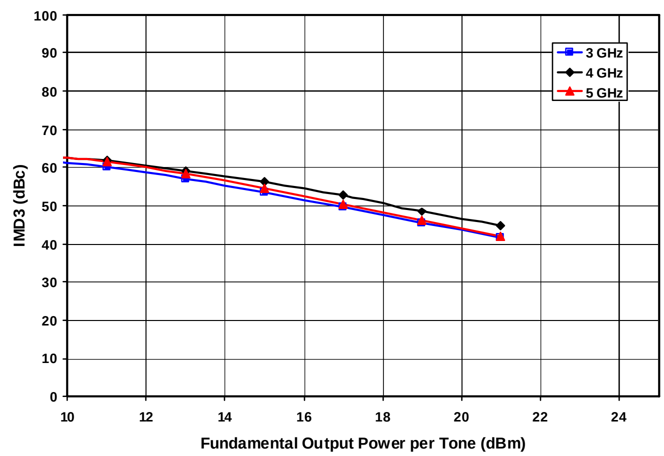


Figure 16. Third Order Intermod vs. Output Power and Frequency at 6V.

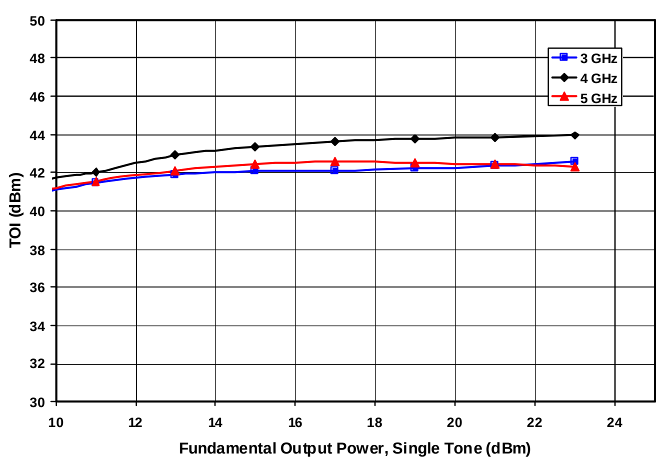


Figure 17. Third Order Intercept vs. Output Power and Frequency at 8V.

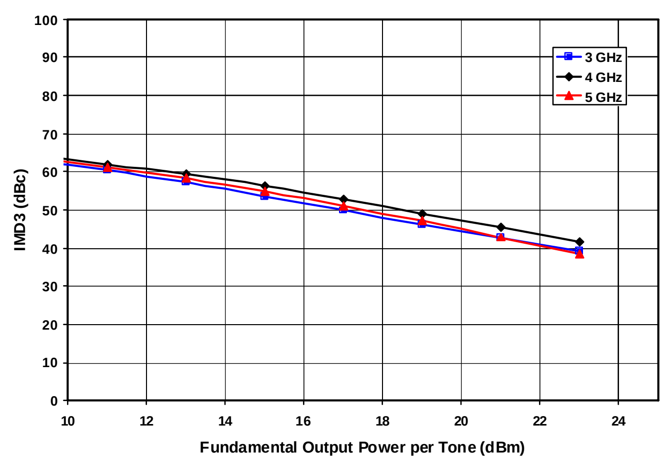


Figure 18. Third Order Intermod vs. Output Power and Frequency at 8V.

- **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.

All Data is at 30ºC MMIC base temperature, CW stimulus, unless otherwise noted.

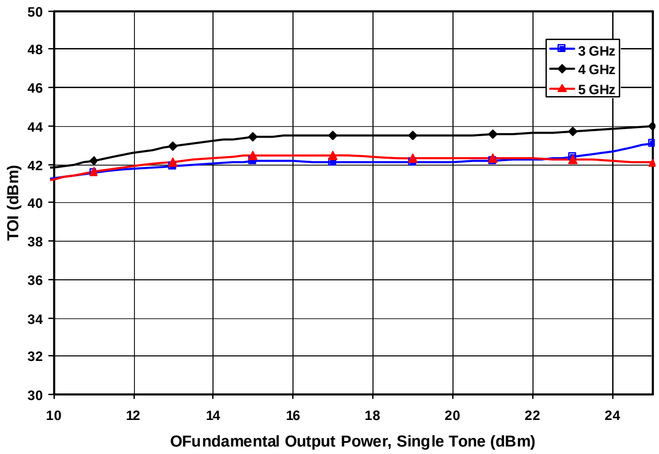


Figure 19. Third Order Intercept vs. Output Power and Frequency at 10V.

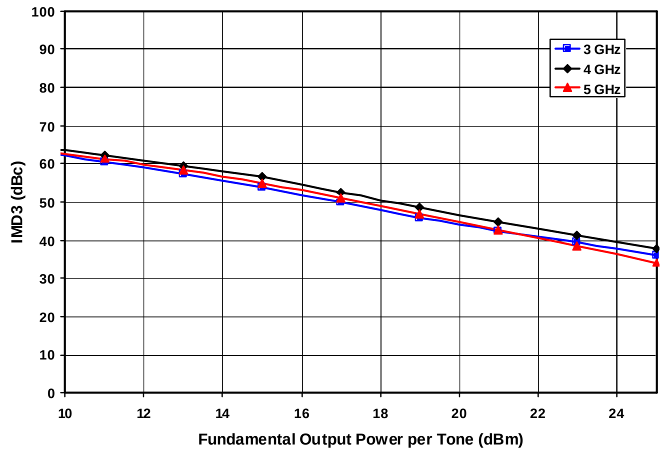


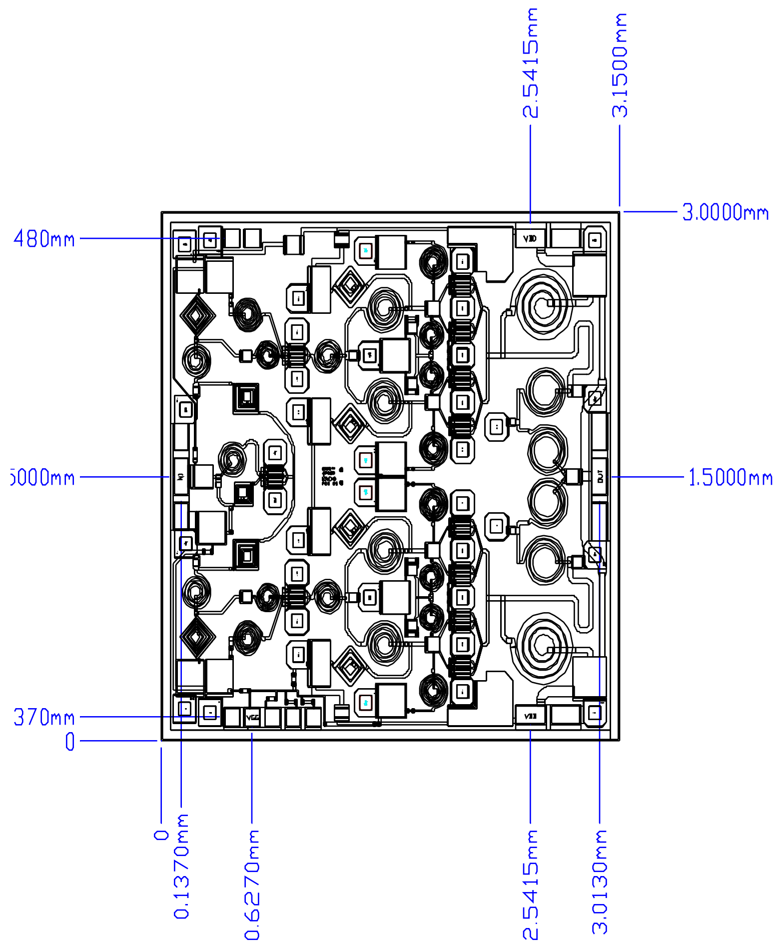
Figure 20. Third Order Intermod vs. Output Power and Frequency at 10V.

- **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.

Mechanical Information

Chip Size: 3.000 x 3.150 x 0.075 mm (118 x 124 x 3 mils)



Chip edge to bond pad dimensions are shown to the center of the bond pad.

Figure 1. Die Layout

Bond Pad Dimensions

Pad	Size (µm)	Size (mils)
RF In and Out	100 x 200	4 x 8
DC Drain Supply Voltage VDD	200 x 100	8 x 4
DC Gate Supply Voltage VGG	100 x 100	4 x 4

Assembly

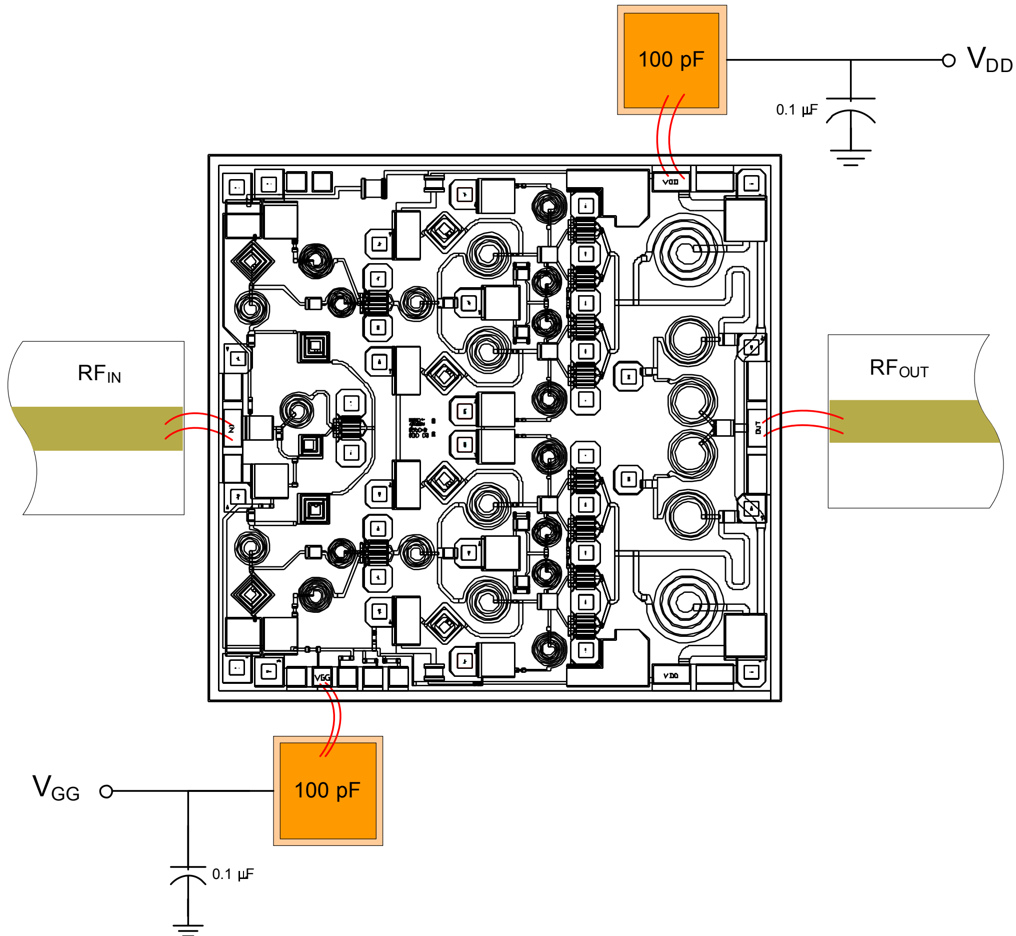


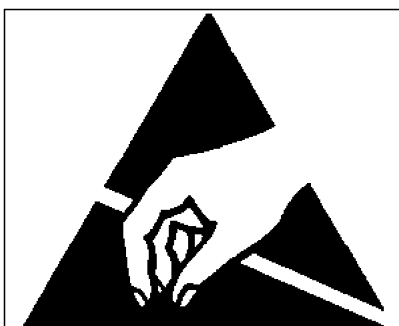
Figure 2. Recommended operational configuration. Wire bond as shown.

Assembly Instructions:

Die attach: Use AuSn (80/20) 1 mil. preform solder. Limit time @ 300 °C to less than 5 minutes.

Wirebonding: Bond @ 160 °C using standard ball or thermal compression wedge bond techniques. For DC pad connections, use either ball or wedge bonds. For best RF performance, use wedge bonds of shortest length, although ball bonds are also acceptable.

Biasing Note: Must apply negative bias to V_{GG} before applying positive bias to V_{DD} to prevent



ATTENTION
Static-Sensitive Devices
Handling Precautions Required

- **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.