



# 200mW Ka-Band Power Amplifier

## 32.0-36.0 GHz

Preliminary Information

MAAPGM0013-DIE

### Features

- ◆ 200mW Output Power Level
- ◆ 32.0-36.0 GHz Operation
- ◆ Variable Drain Voltage (5-6V) Operation
- ◆ Self-Aligned MSAG<sup>®</sup> MESFET Process
- ◆ Balanced Configuration, Excellent Input and Output VSWR

### Primary Applications

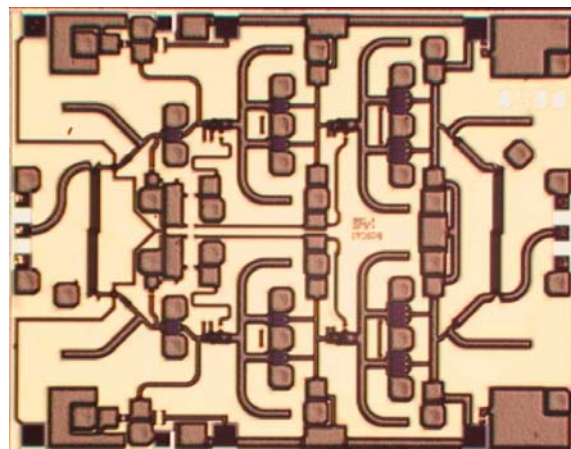
- ◆ Radar Applications
- ◆ Satellite Communications

### Description

The MAAPGM0012-DIE is a 3-stage, 200mW 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.

Each device is 100% RF tested on wafer to ensure performance compliance. The part is fabricated using M/A-COM's repeatable, high performance and highly reliable GaAs Multifunction Self-Aligned Gate (MSAG<sup>®</sup>) MESFET

### 32.0-36.0 GHz GaAs MMIC Amplifier



**Electrical Characteristics:**  $T_B = 40^\circ\text{C}^1$ ,  $Z_0 = 50 \Omega$ ,  $V_{GG} = -1.5\text{V}$ ,  $V_{DD} = 6\text{V}$ ,  $P_{in} = 14 \text{ dBm}$

Parameter	Symbol	Typical	Units
Bandwidth	f	32.0-36.0	GHz
Output Power	$P_{OUT}$	23	dBm
1-dB Compression Point	$P_{1dB}$	22	dBm
Small Signal Gain	G	13	dB
Input VSWR	VSWR	1.3:1	
Output VSWR	VSWR	1.3:1	
Drain Current	$I_{DD}$	< 700	mA

1.  $T_B$  = MMIC Base Temperature

## Maximum Operating Conditions <sup>1</sup>

Parameter	Symbol	Absolute Maximum	Units
Input Power	$P_{IN}$	19.0	dBm
Drain Supply Voltage	$V_{DD}$	8.0	V
Quiescent Drain Current (No RF)	$I_{DQ}$	500	mA
Quiescent DC Power Dissipated (No RF)	$P_{DISS}$	3.0	W
Junction Temperature	$T_J$	180	°C
Storage Temperature	$T_{STG}$	-55 to +150	°C

1. Operation outside of these ranges may reduce product reliability. Operation at other than the typical values may result in performance outside the guaranteed limits.

## Recommended Operating Conditions

Characteristic	Symbol	Min	Typ	Max	Unit
Drain Voltage	$V_{DD}$	5.0	6.0	6.0	V
Input Power	$P_{IN}$			14.0	dBm
Junction Temperature	$T_J$			150	°C
MMIC Base Temperature	$T_B$			Note 2	°C

2. Maximum MMIC Base Temperature =  $150^{\circ}\text{C} - 38.0^{\circ}\text{C/W} * V_{DD} * I_{DQ}$

## Operating Instructions

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

1. Apply  $V_{GG} = -1.5\text{ V}$ ,  $V_{DD} = 0\text{ V}$ .
2. Ramp  $V_{DD}$  to desired voltage, typically 6.0 V.
3. Adjust  $V_{GG}$  to set  $I_{DQ}$ , (approximately @ 1.5 V).
4. Set RF input.
5. Power down sequence in reverse. Turn gate voltage off last.



Specifications subject to change without notice.

Customer Service: Tel. (888)-563-3949

Email: [macom\\_adbu\\_ics@tycoelectronics.com](mailto:macom_adbu_ics@tycoelectronics.com)

- **North America:** Tel. (800) 366-2266
- **Asia/Pacific:** Tel. +81-44-844-8296, Fax +81-44-844-8298
- **Europe:** Tel. +44 (1344) 869 595, Fax+44 (1344) 300 020

**tyco** / Electronics

**MACOM**

Visit [www.macom.com](http://www.macom.com) for additional data sheets and product information.

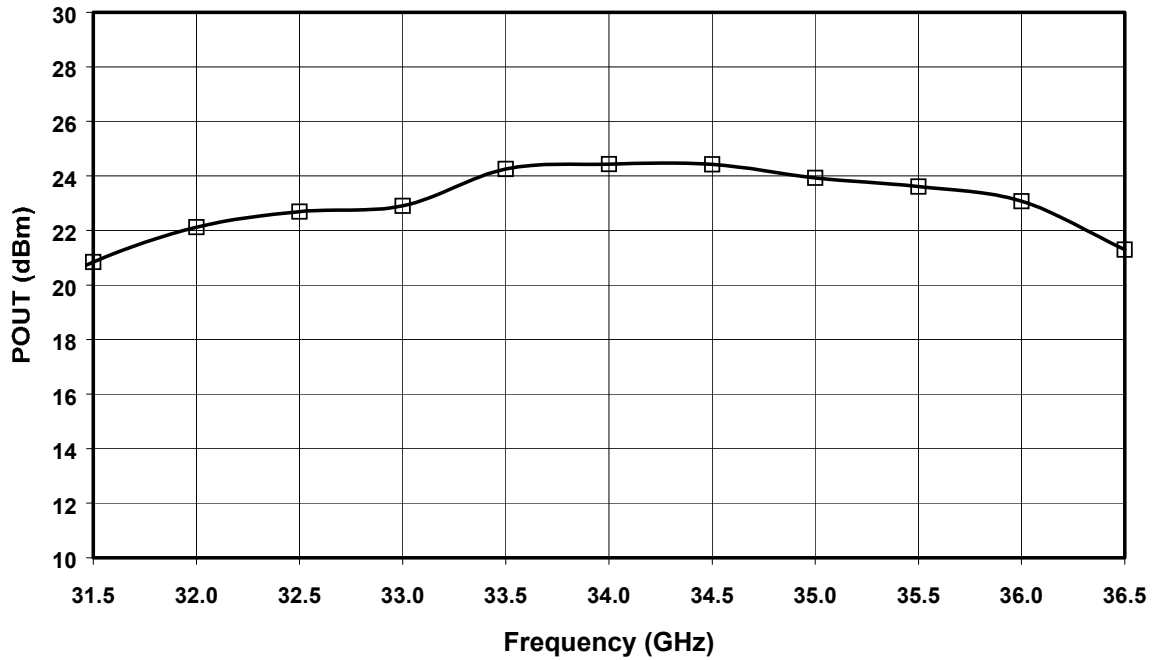


Figure 1. Output Power vs. Frequency at  $V_{DD} = 6V$  and  $Pin = 14$  dBm.

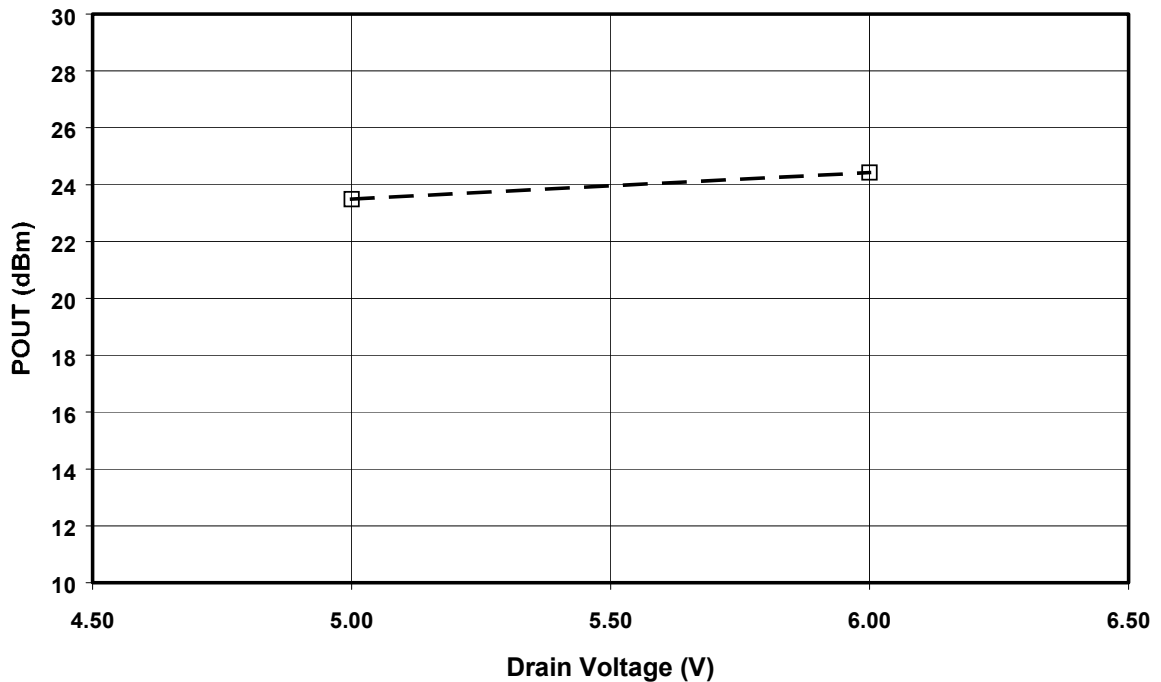


Figure 2. Output Power vs. Drain Voltage at  $f_o = 34$  GHz and a  $Pin = 14$  dBm.

Specifications subject to change without notice.

Customer Service: Tel. (888)-563-3949

Email: [macom\\_adbu\\_ics@tycoelectronics.com](mailto:macom_adbu_ics@tycoelectronics.com)

- North America: Tel. (800) 366-2266
- Asia/Pacific: Tel.+81-44-844-8296, Fax +81-44-844-8298
- Europe: Tel. +44 (1344) 869 595, Fax+44 (1344) 300 020

**tyco** / Electronics

**MACOM**

Visit [www.macom.com](http://www.macom.com) for additional data sheets and product information.

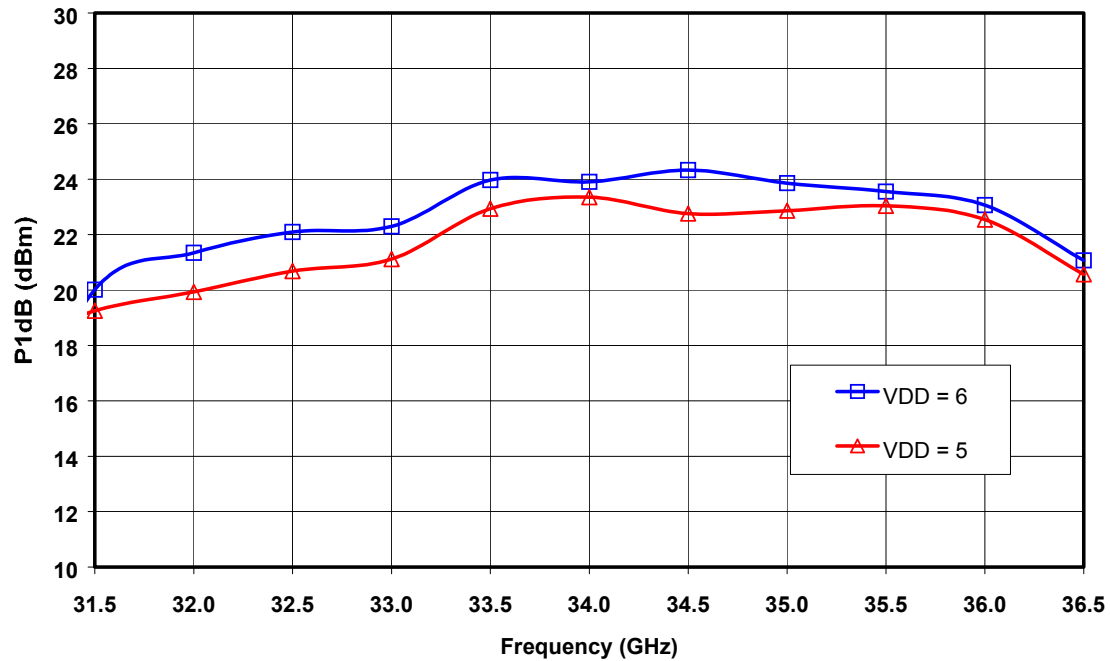
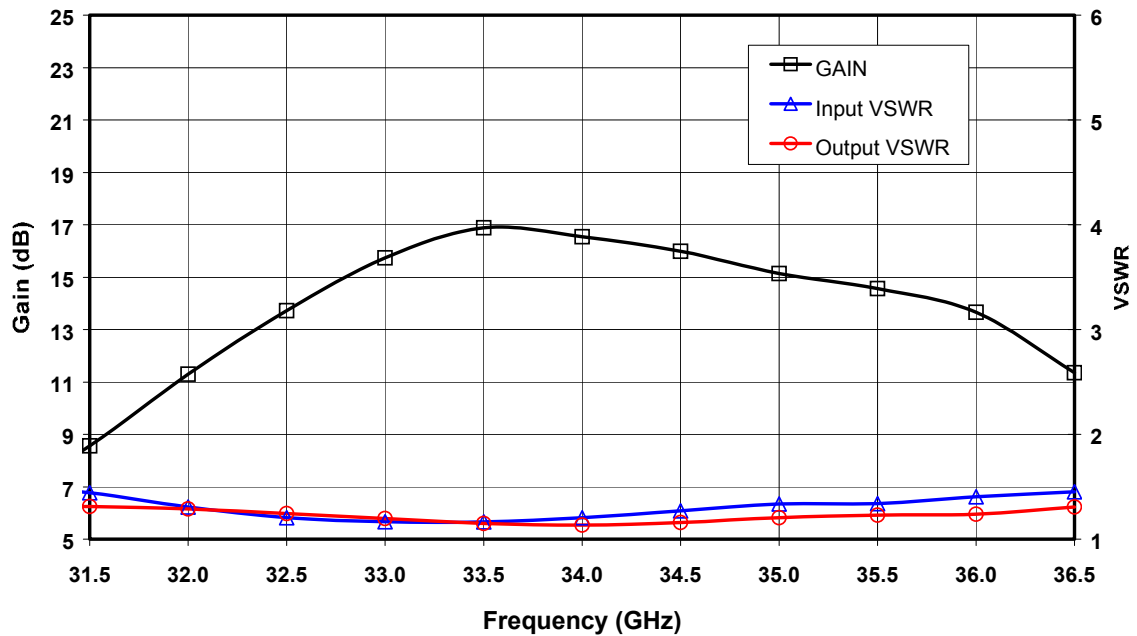


Figure 3. 1dB Compression Point vs. Drain Voltage

Figure 4. Small Signal Gain and VSWR vs. Frequency at  $V_{DD} = 6V$ .

Specifications subject to change without notice.

Customer Service: Tel. (888)-563-3949

Email: [macom\\_adbu\\_ics@tycoelectronics.com](mailto:macom_adbu_ics@tycoelectronics.com)

- North America: Tel. (800) 366-2266
- Asia/Pacific: Tel. +81-44-844-8296, Fax +81-44-844-8298
- Europe: Tel. +44 (1344) 869 595, Fax+44 (1344) 300 020

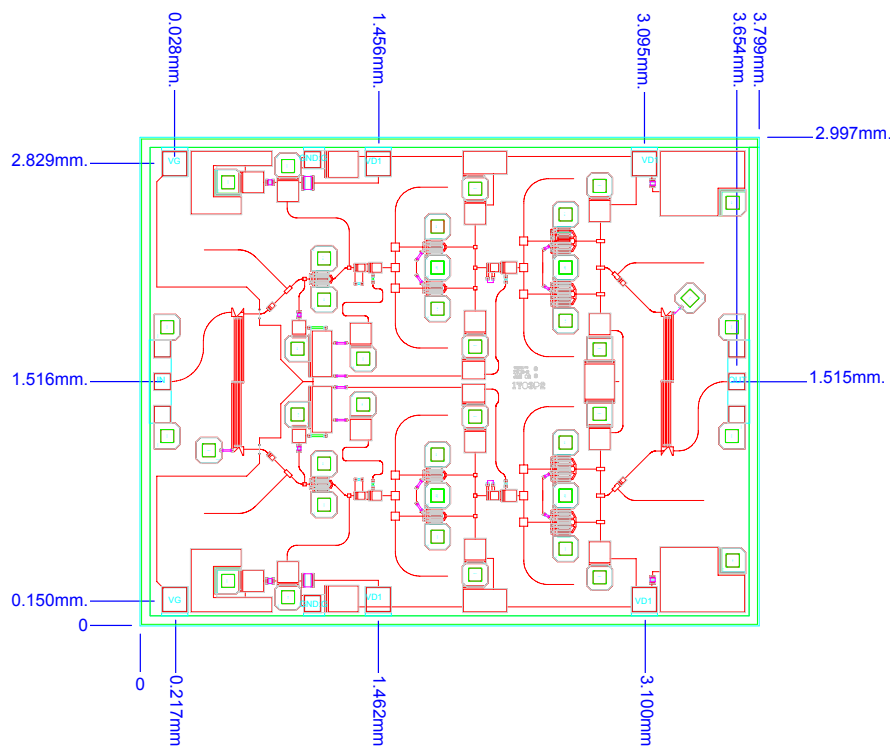
**tyco** / Electronics

**MACOM**

Visit [www.macom.com](http://www.macom.com) for additional data sheets and product information.

## Mechanical Information

Chip Size: 3.799 x 2.997 x 0.075 mm (150 x 118 x 3 mils)



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

Figure 5. Die Layout

## Bond Pad Dimensions

Pad	Size ( $\mu\text{m}$ )	Size (mils)
RF: IN, OUT	100 x 100	4 x 4
DC: VGG, VD1, VD2	150 x 150	6 x 6

Specifications subject to change without notice.

Customer Service: Tel. (888)-563-3949

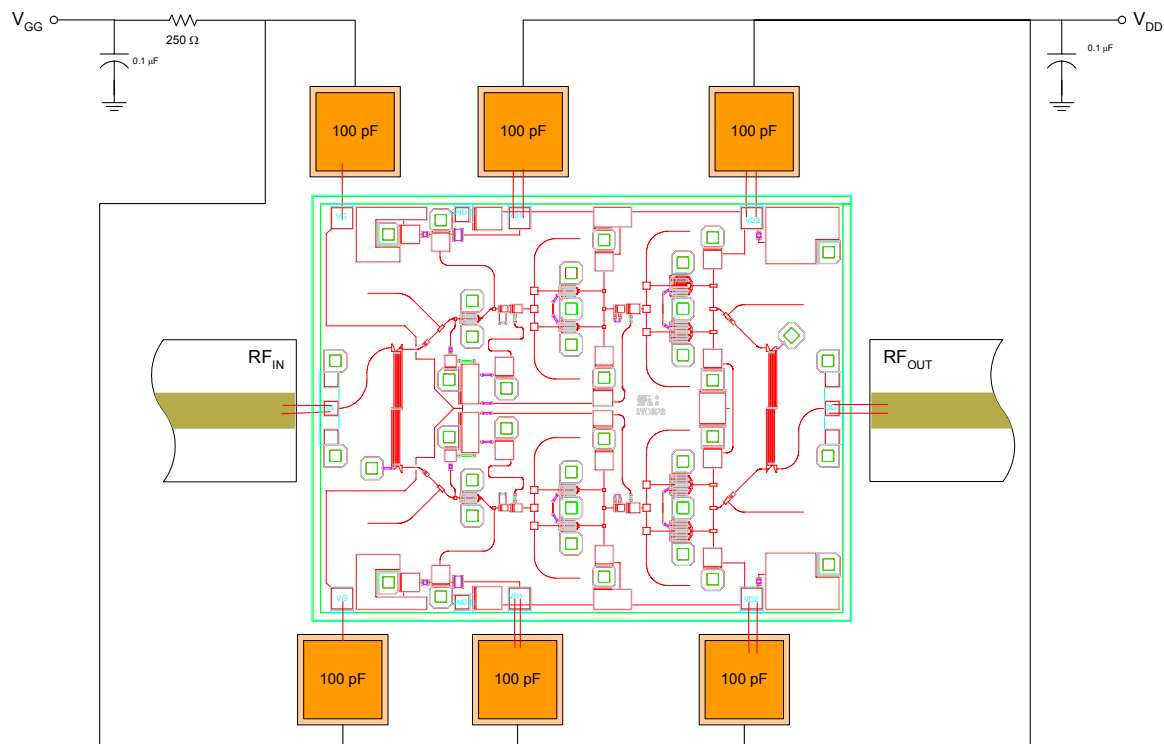
Email: [macom\\_adbu\\_ics@tycoelectronics.com](mailto:macom_adbu_ics@tycoelectronics.com)

- North America: Tel. (800) 366-2266
- Asia/Pacific: Tel. +81-44-844-8296, Fax +81-44-844-8298
- Europe: Tel. +44 (1344) 869 595, Fax+44 (1344) 300 020

**tyco** / Electronics

**MACOM**

Visit [www.macom.com](http://www.macom.com) for additional data sheets and product information.



**Figure 6. Recommended bonding diagram** for pedestal mount. Support circuitry typical of MMIC characterization fixture for CW testing.

#### Assembly Instructions:

**Die attach:** Use AuSn (80/20) 1-2 mil. preform solder. Limit time @ 300 °C to less than 5 minutes.

**Wirebonding:** Bond @ 160 °C using standard wedge bond techniques. For DC pad connections, use either ball or wedge bonds.

**Biasing Note:** Must apply negative bias to  $V_{GG}$  before applying positive bias to  $V_{DD}$  to prevent damage to amplifier.

Specifications subject to change without notice.

Customer Service: Tel. (888)-563-3949

Email: [macom\\_adbu\\_ics@tycoelectronics.com](mailto:macom_adbu_ics@tycoelectronics.com)

- **North America:** Tel. (800) 366-2266
- **Asia/Pacific:** Tel.+81-44-844-8296, Fax +81-44-844-8298
- **Europe:** Tel. +44 (1344) 869 595, Fax+44 (1344) 300 020

**tyco** / Electronics

**MACOM**

Visit [www.macom.com](http://www.macom.com) for additional data sheets and product information.