

M/A-COM 50 mW Ka-Band Power Amplifier

31.5-36.0 GHz

Preliminary Information

MAAPGM0012-DIE

Features

- ◆ 50 mW Output Power Level
- ◆ 31.5 - 36.0 GHz Operation
- ◆ Variable Drain Voltage (4-6V) Operation
- ◆ Single Voltage Operation
- ◆ Self-Aligned MSAG[®] MESFET Process

Primary Applications

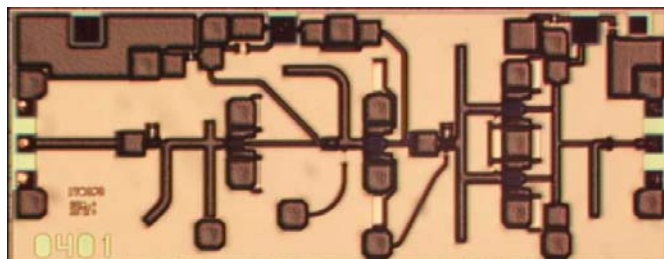
- ◆ Radar Applications
- ◆ Satellite Communications

Description

The MAAPGM0012-DIE is a 3-stage, 50 mW, Ka-Band 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[®]) MESFET Process. This process provides polyimide scratch protection.

31.5-36.0 GHz GaAs MMIC Amplifier



Electrical Characteristics: $T_B = 40^\circ\text{C}^1$, $Z_0 = 50 \Omega$, $V_{DD} = 5\text{V}$, $P_{in} = 5 \text{ dBm}$

Parameter	Symbol	Typical	Units
Bandwidth	f	31.5-36.0	GHz
Output Power	P_{OUT}	17	dBm
Power Added Efficiency	PAE	5	%
1-dB Compression Point	P_{1dB}	16	dBm
Small Signal Gain	G	16	dB
Input VSWR	VSWR	2.5:1	
Output VSWR	VSWR	1.8:1	
Drain Current	I_{DD}	< 200	mA

1. T_B = MMIC Base Temperature

Maximum Operating Conditions ¹

Parameter	Symbol	Absolute Maximum	Units
Input Power	P_{IN}	10	dBm
Drain Supply Voltage	V_{DD}	6.5	V
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

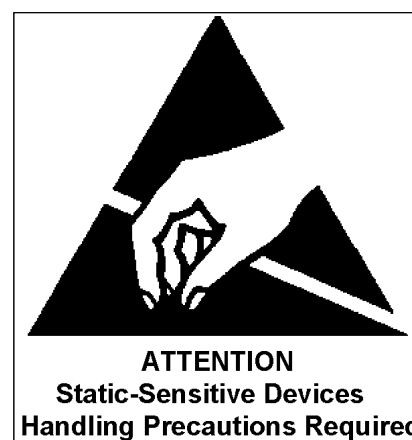
Characteristic	Symbol	Min	Typ	Max	Unit
Drain Voltage	V_{D1}, V_{D2}	4.0	5.0	6.0	V
Input Power	P_{IN}			7.0	dBm
Junction Temperature	T_J			150	°C
MMIC Base Temperature	T_B			Note 2	°C

2. Maximum MMIC Base Temperature = $150^{\circ}\text{C} - 61^{\circ}\text{C} * V_{dd} * I_D$

Operating Instructions

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

1. Ramp V_{DD} to desired voltage, typically 5.0 V.
2. Set RF input.
3. Power down sequence in reverse.



Specifications subject to change without notice.

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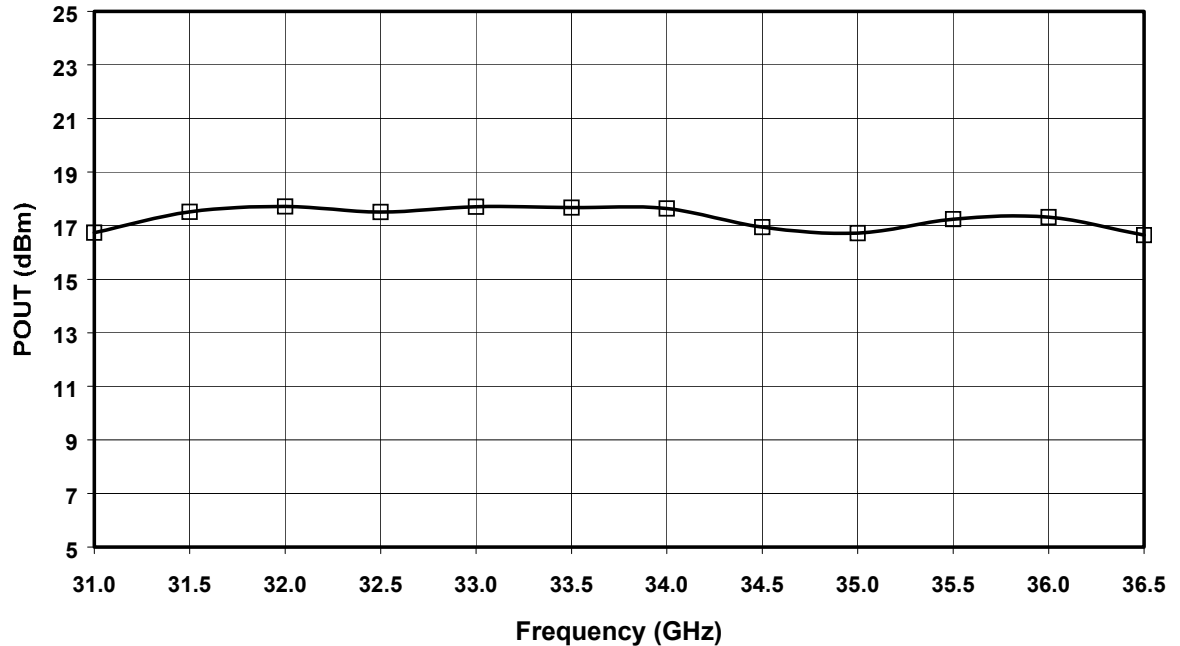


Figure 1. Output Power vs. Frequency at $V_{DD} = 5V$ And $P_{in} = 5dBm$.

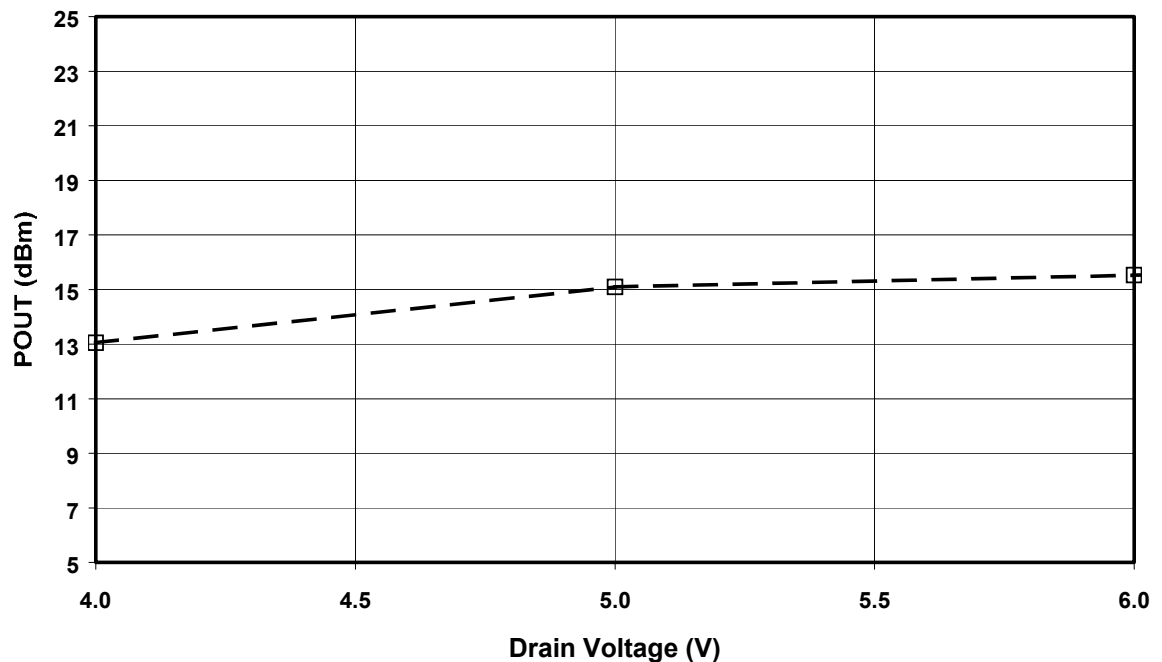


Figure 2. Output Power vs. Drain Voltage at $f_o = 34$ GHz And $P_{in} = 5dBm$.

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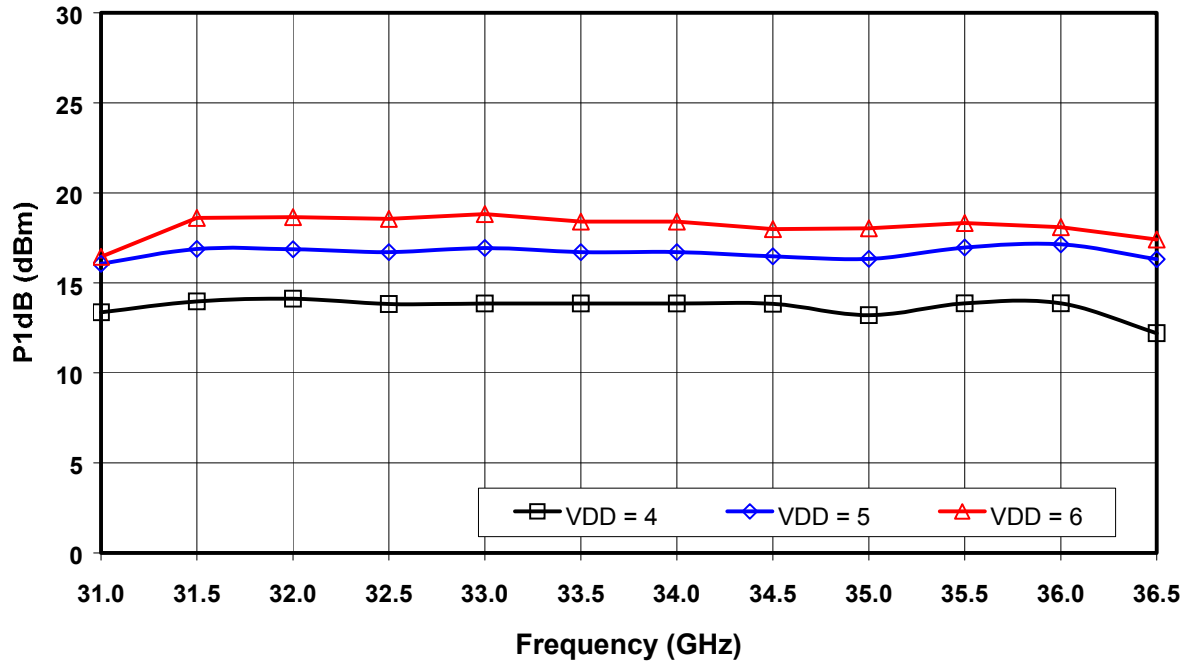
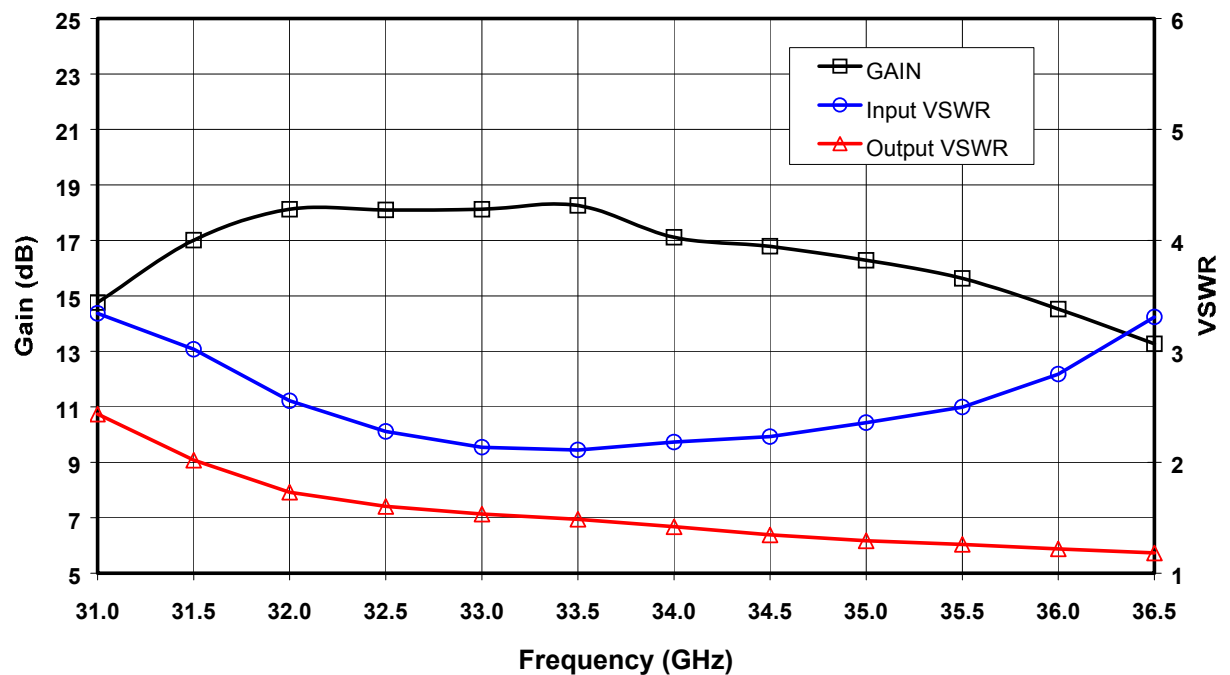


Figure 3. 1dB Compression Point vs. Drain Voltage

Figure 4. Small Signal Gain and VSWR vs. Frequency at V_{DD} = 5V.

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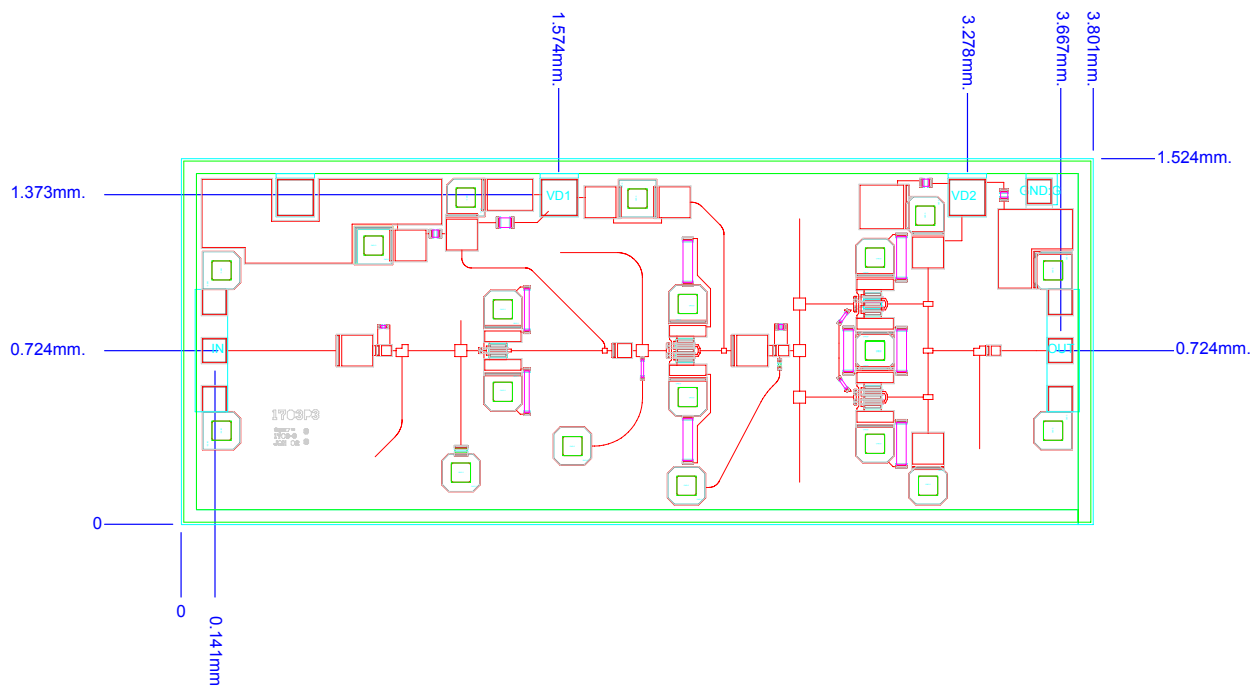
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Mechanical Information

Chip Size: 3.801 x 1.524 x 0.075 mm (150 x 60 x 3 mils)



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

Figure 5. Die Layout

Bond Pad Dimensions

Pad	Size (μm)	Size (mils)
RF: IN, OUT	100 x 100	4 x 4
DC: VD1, VD2	150 x 150	6 x 6

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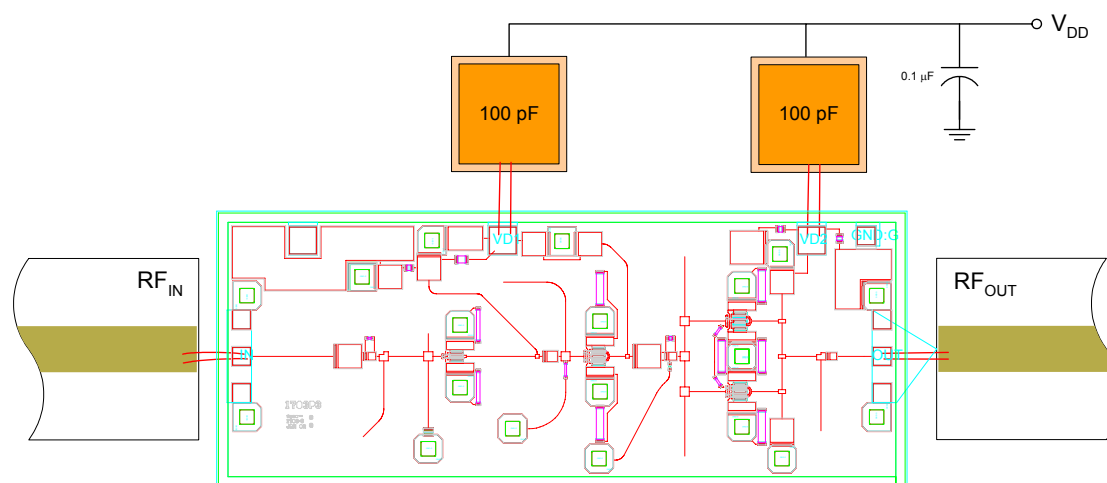


Figure 6. Recommended bonding diagram for pedestal mount.
Support circuitry typical of MMIC characterization fixture for CW testing.

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 or ribbon bond techniques. For DC pad connections, use either ball, ribbon or wedge bonds.

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