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Electronics

RoHS Compliant

MACOM

MAAP-000073-PKG003

Preliminary Datasheet

Rev -

Amplifier, Power, 1.0 W 4.4-7.0 GHz

Features

- 1.0 Watt Saturated Output Power Level
- Variable Drain Voltage (6-10V) Operation
- MSAG[™] Process

Description

The MAAP-000073-PKG003 is a 3-stage 1.0 W power amplifier with on-chip bias networks in a 20 lead, 5 mm PQFN 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.

The 5 mm PQFN package has a lead-free finish of leads that are RoHS compliant and is compatible with a 260°C reflow temperature. The package also features low lead inductance and an excellent thermal path. The MTTF is 1,000,000 hours at 170°C.

Also Available in:



Primary Applications

- Point-to-Point Radio
 - ♦ 5 and 6 GHz Bands

Description	Die	Ceramic Package	Ceramic Pkg Sample Board	Die Sample Board
Part Number	MAAPGM0073-DIE	MAAPGM0073	MAAP-000073-SMB003	MAAP-000073-SMB004

Electrical Characteristics: $T_c = 35^{\circ}C^1$, $Z_0 = 50 \Omega$, $V_{DD} = 8V$, $I_{DQ} = 330 \text{mA}^2$, $P_{in} = 8 \text{dBm}$, $R_G = 220 \Omega$

Parameter	Symbol	Typical	Units	
Bandwidth	f	4.4-7.0	GHz	
Output Power	P _{OUT}	30	dBm	
1-dB Compression Point	P1dB	29	dBm	
Small Signal Gain	G	26	dB	
Input VSWR	VSWR	1.3:1		
Output VSWR	VSWR	2.5:1		
Gate Current	I _{GG}	5.0	mA	
Drain Current	I _{DD}	460	mA	
Output Third Order Intercept	ΤΟΙ	38	dBm	
Output Third Order Intermod, P _{out} = 19 dBm (DCL)	IMD3	40	dBc	

1. T_c = Case Temperature

2. Adjust V_{GG} between –2.5 and –1.2V to achieve specified Idq.

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Maximum Ratings³

Parameter	Symbol	Absolute Maximum	Units	
Input Power	P _{IN}	12.0	dBm	
Drain Supply Voltage	V _{DD}	+12.0	V	
Gate Supply Voltage	V _{GG}	-3.0	V	
Quiescent Drain Current (No RF)	I _{DQ}	520	mA	
Quiescent DC Power Dissipated (No RF)	P _{DISS}	2.8	W	
Junction Temperature	TJ	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 Conditions⁴

Characteristic	Symbol	Min	Тур	Мах	Unit
Drain Voltage	V _{DD}	6.0	8.0	10.0	V
Gate Voltage	V_{GG}	-2.5	-2.0	-1.2	V
Input Power	P _{IN}		6.0	8.0	dBm
Thermal Resistance	Θ _{JC}		34.8		°C/W
Case Temperature	T _C			Note 5	°C

4. Operation outside of these ranges may reduce product reliability.

5. Case Temperature = $170^{\circ}C - \Theta_{JC} V_{DD} * I_{DQ}$



Operating Instructions

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

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

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Power Derating Curve, Quiescent (No RF)



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Figure 5. Saturated Output Power vs. Frequency and Case Temperature at VD = 8V and IDQ = 0.33A

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Figure 2. Small Signal Gain and Input & Output VSWR vs. Frequency and Quiescent Bias (Vdd / IDQ)



Figure 4. Saturated Power Added Efficiency vs. Frequency and Quiescent Bias Condition (VDD / IDQ)



Figure 6. Small Signal Gain & Saturated Output Power, Power Added Efficiency and Drain Current vs. Case Temperature at 6.0 GHZ, VD = 8V, and IDQ = 0.33A

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Figure 25. Third Order Intercept vs. Case Temperature and Frequency at Single Carrier Output Power Level = 19 dBm, VD = 8V and IDQ = 0.33A

Figure 26. Third Order Intermod vs. Case Temperature and Frequency at Single Carrier Output Power Level = 19 dBm, VD = 8V and IDQ = 0.33A

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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 125°C 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.

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Figure 29. Demonstration Board P/N MAAP-000073-SMB003 (available upon request).

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