4 W Power Amplifier 7.1 - 7.9 GHz

Features

- 22.0 dB Small Signal Gain
- 46.5 dBm Third Order Intercept Point (OIP3)
- >36.5 dBm Saturated Output Power (P_{SAT})
- Bias 2000 mA at 8 V
- Lead-Free 7mm Copper Coin Air Cavity Package
- RoHS* Compliant

Description

The MAAP-011161 is a packaged linear power amplifier that operates from 7.1 - 7.9 GHz. The device provides 22 dB gain and 46.5 dBm Output Third Order Intercept Point (OIP3) with >35.5 dBm saturated output power (P_{SAT}).

The packaged amplifier comes in an air cavity 7 mm surface mount package with a copper coin paddle and is comprised of a two stage power amplifier MMIC. The device includes on-chip ESD protection structures and DC by-pass capacitors to ease the implementation and volume assembly of the packaged part.

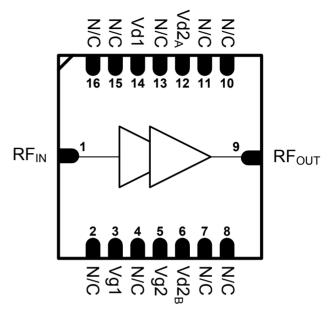
The device is specifically designed for use in 7 GHz point-to-point radios for cellular backhaul applications.

Ordering Information¹

Part Number	Package	
MAAP-011161	Bulk Quantity	
MAAP-011161-TR0500	500 Piece Reel	
MAAP-011161-001SMB	Sample Board	

1. Reference Application Note M513 for reel size information.

Functional Schematic



Pin Configuration³

Pin No.	Function	Pin No.	Function
1	RF Input	9	RF Output
2	No Connection	10	No Connection
3	Gate Stg1 Bias	11	No Connection
4	No Connection	12 ²	Drain Stg2 Bias
5	Gate Stg2 Bias	13	No Connection
6 ²	Drain Stg2 Bias	14	Drain Stg1 Bias
7	No Connection	15	No Connection
8	No Connection	16	No Connection

2. Drain 2 Bias can be connected from either pins 6 or 12

3. The exposed pad centered on the package bottom must be connected to RF and DC ground.

* Restrictions on Hazardous Substances, European Union Directive 2011/65/EU.

1

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4 W Power Amplifier 7.1 - 7.9 GHz

Rev. V1

Electrical Specifications: Freq. = 7.1 - 7.9 GHz, $V_D = 8 V$, $I_{DQ}^4 = 2000 mA$, $T_A = +25^{\circ}C$ Units Parameter Min. Тур. Max. Small Signal Gain dB 22 23.5 18.5 Input Return Loss 12 dB Output Return Loss dB 7 12 ____ Power at 1dB Gain Compression, P1dB dB 35.5 Power at 3dB Gain Compression, P3dB dBm 36 Saturated Output Power, PSAT dBm 35.5 36.5 Output IP3, 25.5 dBm SCL @ Freq = 7.5 GHz dBm 44.5 46.5 V 8.0 Drain Bias voltage ____ _ Drain Current 2000 mΑ V Gate Voltage -1.5 -0.5

4. Adjust V_{G1} and V_{G2} between -1.2 and -0.7V to achieve specified I_{DQ} (I_{DQ} = I_{D1} + I_{D2}). V_{G1} and V_{G2} should be the same voltage.

Absolute Maximum Ratings^{5,6,7}

Parameter	Absolute Max.	
Input Power	18 dBm	
Drain Voltage (V _D 1,2)	+9 V	
Gate Voltage (V _G 1,2)	-3 V	
Continuous Power Dissipation @ 85°C	33.3 W	
Junction Temperature (max.)	+175°C	
Junction Temperature	+150°C	
Operating Temperature	-40°C to +85°C	
Storage Temperature	-65°C to +150°C	

5. Exceeding any one or combination of these limits may cause permanent damage to this device.

- MACOM does not recommend sustained operation near these survivability limits.
- 7. Operating at nominal conditions with $T_J \le 150^{\circ}C$ will ensure MTTF > 1 x 10^{6} hours. Channel temperature should be kept as low as possible to maximize lifetime.

Handling Procedures

Please observe the following precautions to avoid damage:

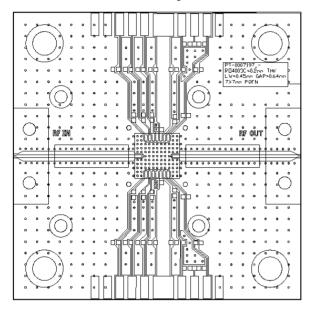
Static Sensitivity

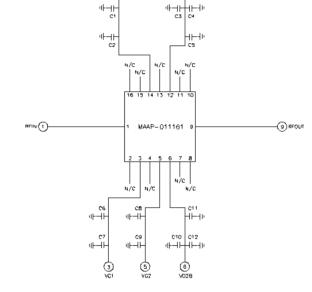
Gallium Arsenide Integrated Circuits are sensitive to electrostatic discharge (ESD) and can be damaged by static electricity. Proper ESD control techniques should be used when handling these Class 1A HBM devices.

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Recommended PCB Layout





V024

VD1

Schematic

Parts List

Component	Value	Package
C1, C4, C7, C9, C12	2.2 µF	0603
C3, C10	0.47 µF	0603
C2, C5, C6, C8, C11	1.0 nF	0603

3

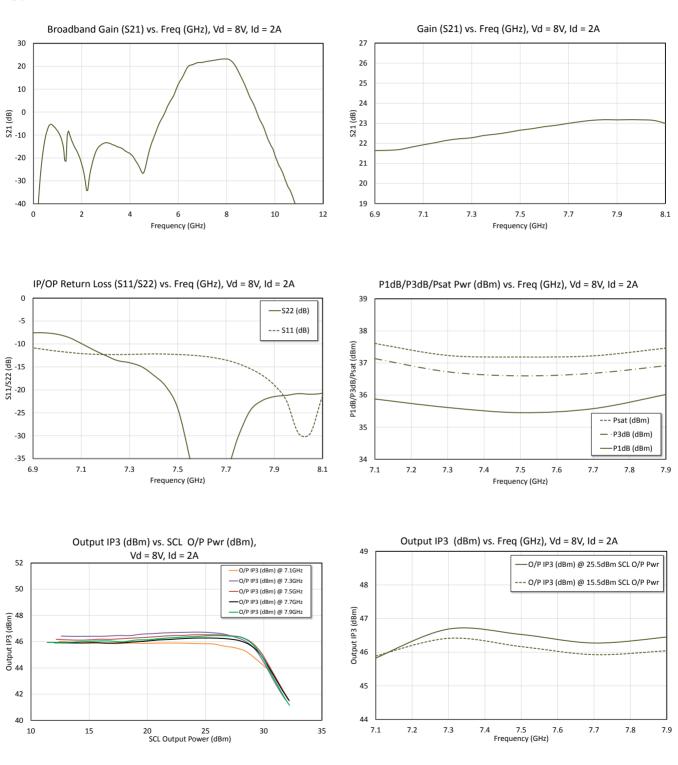
For further information and support please visit: <u>https://www.macom.com/support</u>



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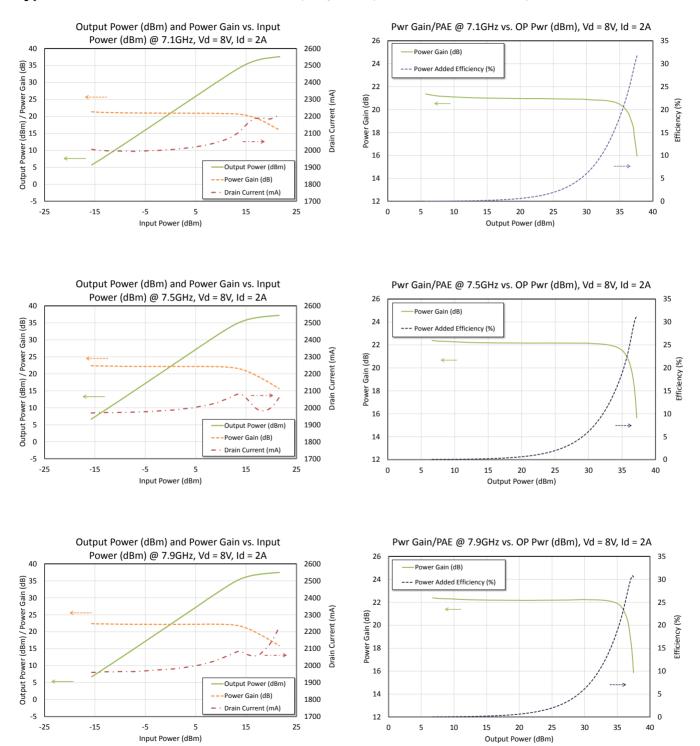
Typical Performance Curves: $V_D = 8 V$, $I_{DQ} = 2 A$, $V_G = -1.05 \sim -0.95 V$, $T_A = +25^{\circ}C$

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Rev. V1



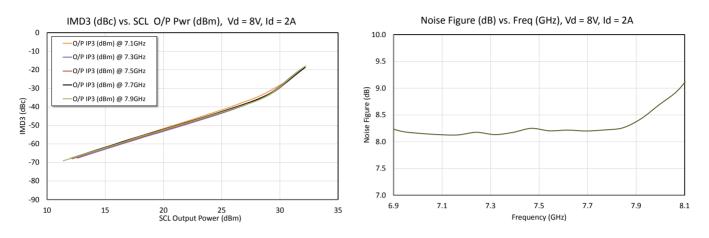
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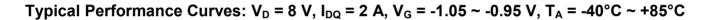


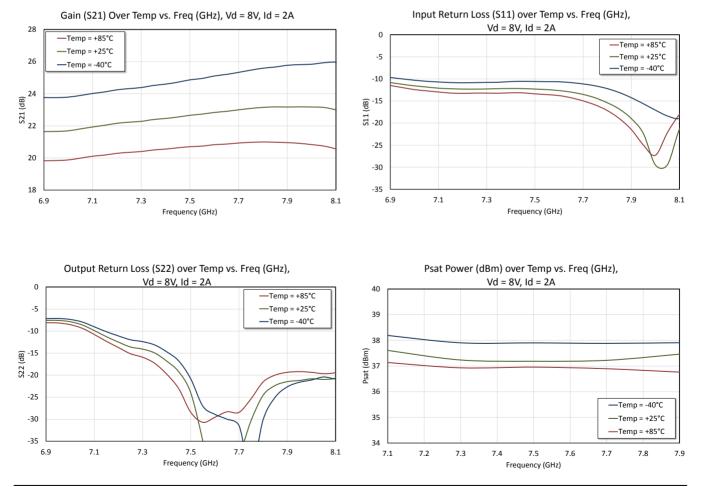
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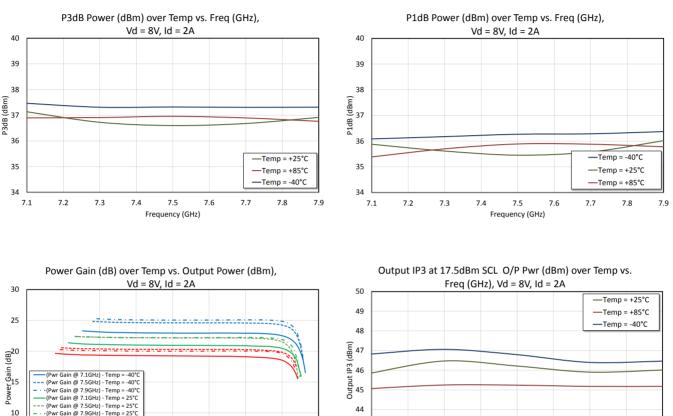




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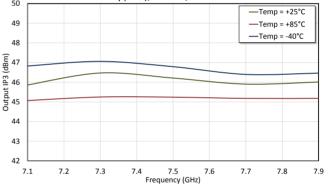
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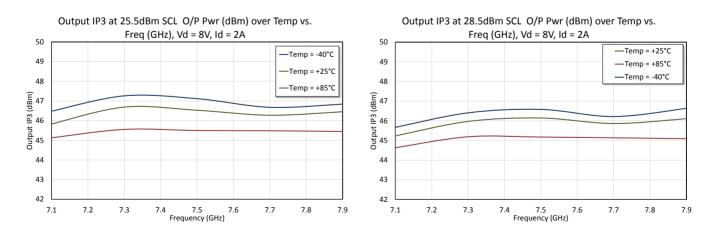
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Typical Performance Curves: $V_D = 8 V$, $I_{DQ} = 2 A$, $V_G = -1.05 \sim -0.95 V$, $T_A = -40^{\circ}C \sim +85^{\circ}C$

(Pwr Gain @ 7.5GHz) - Temp = 25°C (Pwr Gain @ 7.9GHz) - Temp = 25°C 10 (Pwr Gain @ 7.5GHz) - Temp = 25 °C (Pwr Gain @ 7.5GHz) - Temp = 85 °C (Pwr Gain @ 7.5GHz) - Temp = 85 °C (Pwr Gain @ 7.9GHz) - Temp = 85 °C 5 0 5 10 15 20 25 30 35 40 Output Power (dBm)





7

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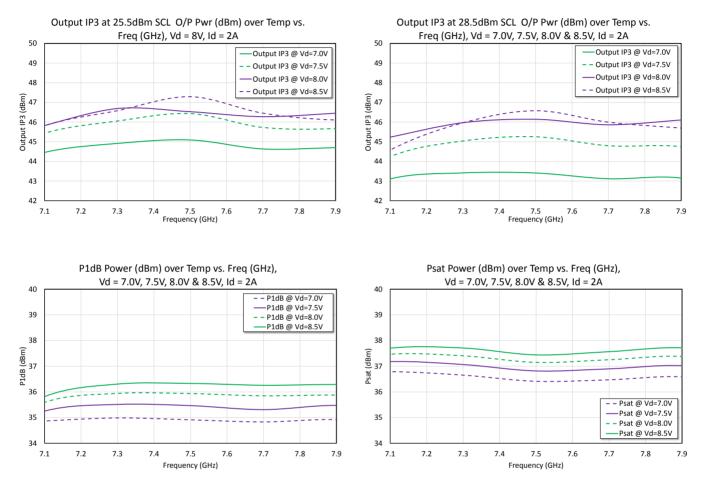
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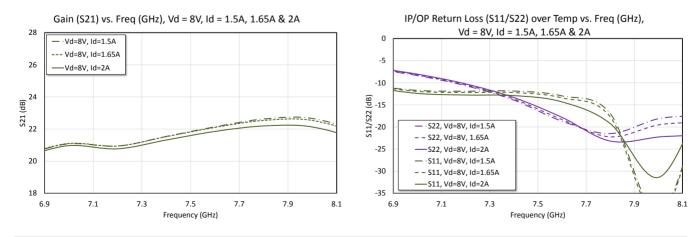
4 W Power Amplifier 7.1 - 7.9 GHz

Rev. V1

Typical Performance Curves: V_D = Various, I_{DQ} = 2 A, V_G = -1.05 ~ -0.95 V, T_A = +25°C



Typical Performance Curves: V_D = Various, I_{DQ} = 1.5 A, 1.65 A, 2.0 A, V_G = -1.15 ~ -0.95 V, T_A = +25°C



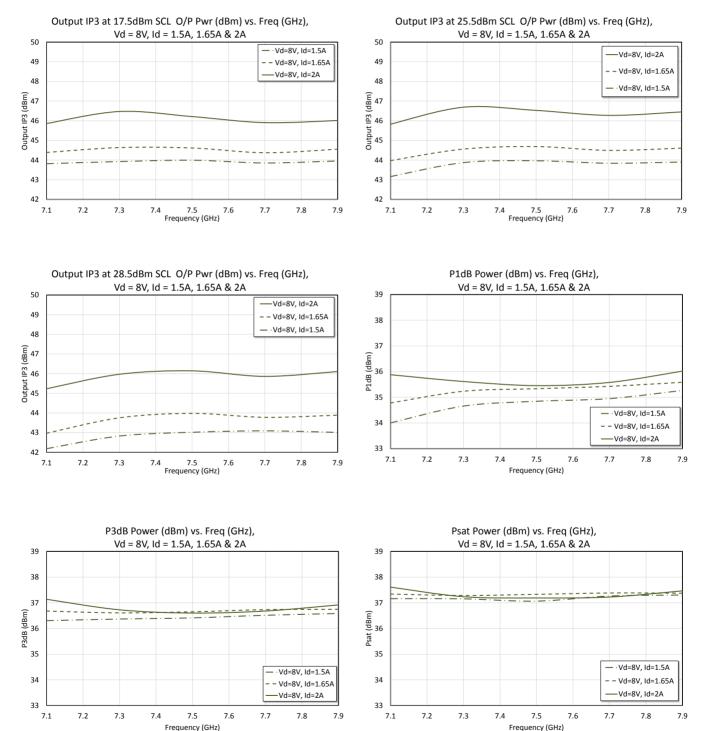
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Typical Performance Curves: V_D = Various, I_{DQ} = 1.5 A, 1.65 A, 2.0 A, V_G = -1.15 ~ -0.95 V, T_A = +25°C

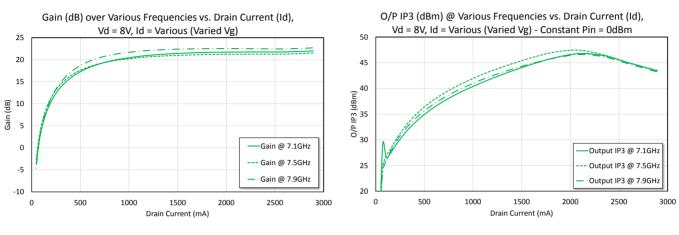


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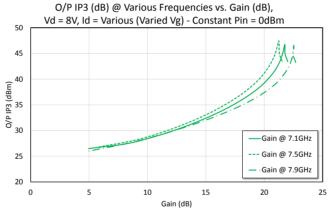


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Typical Performance Curves: $V_D = 8 V$, $I_{DQ} = Various$, $V_G = -0.9 \sim 1.65 V$, $T_A = +25^{\circ}C$



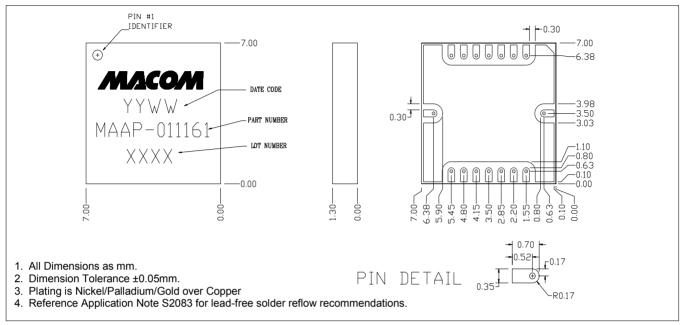
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Lead Free 7 mm Laminate Package (16 pin)[†]



[†] Meets JEDEC moisture sensitivity level 3 requirements.

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