

## Features

- Linear Output Power: 33 dBm
- Gain with Saw Filter on Input: 30 dB
- ACPR = -34.0 dBc @ 41.67 kHz offset,  $P_{OUT} = 33$  dBm
- High PAE: >30%
- Integrated Active Bias Circuit
- Power-Down Function
- InGaP HBT device technology
- Rugged single supply power amplifier design
- High Peak-Power Efficiency
- Lead-Free 6 mm 12-Lead LGA package
- Halogen-Free “Green” Mold Compound
- RoHS\* Compliant and 260°C Reflow Compatible

## Description

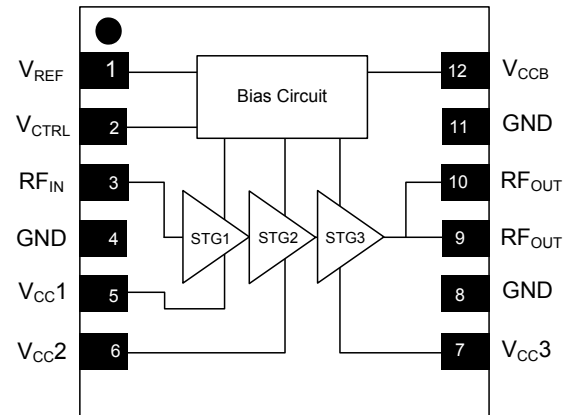
The MAAP-011060 is a power amplifier module assembled in a 6 mm land grid array (LGA) that is self-contained with 50  $\Omega$  input and output terminals. The input and output ports are also DC blocked.

This device utilizes a GaAs HBT process for optimal 5 V performance in 1.6 GHz satellite applications.

## Ordering Information

| Part Number        | Package           |
|--------------------|-------------------|
| MAAP-011060        | Bulk Packaging    |
| MAAP-011060-TR0500 | 500 Piece Reel    |
| MAAP-011060-001SMB | Sample Test Board |

## Functional Schematic



## Pin Configuration

| Pin No.             | Pin Name   | Description                 |
|---------------------|------------|-----------------------------|
| 1                   | $V_{REF}$  | Reference Voltage           |
| 2                   | $V_{CTRL}$ | Control Voltage             |
| 3                   | $RF_{IN}$  | RF Input                    |
| 4                   | GND        | Ground                      |
| 5                   | $V_{CC1}$  | Supply Voltage 1            |
| 6                   | $V_{CC2}$  | Supply Voltage 2            |
| 7                   | $V_{CC3}$  | Supply Voltage 3            |
| 8                   | GND        | Ground                      |
| 9                   | $RF_{OUT}$ | RF Output                   |
| 10                  | $RF_{OUT}$ | RF Output                   |
| 11                  | GND        | Ground                      |
| 12                  | $V_{CCB}$  | Supply Voltage Bias Circuit |
| Paddle <sup>1</sup> |            | RF and DC Ground            |

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

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

## Power Amplifier Module 1616 - 1626.5 MHz, 2 Watts

Rev. V2

**Electrical Specifications: Freq: 1621.25 MHz, V<sub>CC</sub> = 5 Volts, V<sub>REF</sub> = 3 Volts, V<sub>ctrl</sub> = 1.35V T<sub>A</sub> = 25°C**

| Parameter                                     | Test Conditions  | Units | Min.       | Typ.     | Max. |
|---|--|-------|------------|----------|------|
| Rated Output Power                            | V <sub>CC</sub> = 5 Volts, 5.5 Volts<br>V <sub>CC</sub> = 4.5 Volts                            | dBm   | 33<br>32.6 | 33<br>32 | —    |
| Gain @ Rated pout                             | VSWR = 1:1   | dB    | 30         | 30.5     | —    |
| Gain Variation over Freq                      | VSWR = 1:1, 1616 MHz - 1626.5 MHz  | dB    | -2         | +/-0.5   | 2    |
| Gain Variation over Temperature               | VSWR = 1:1   | dB    | -2         | +/-2.5   | 2    |
| Gain Variation vs. Load Phase Angle           | VSWR = 1.7:1   | dB    | -2         | +/-1     | 2    |
| Harmonic Suppression Power                    | Freq = 2f <sub>0</sub> , 3f <sub>0</sub>   | dBm   | —          | -16      | —    |
| Adjacent Channel Power                        | +/- 41.67 kHz offset,<br>BW <sup>2</sup> = 41.67 kHz @ Rated Pout                              | dBc   | —          | -35      | -30  |
| Adjacent Channel Power,<br>Extreme Conditions | +/- 41.67 kHz offset,<br>BW = 25 kHz @ Rated Pout,<br>Over Freq. and Temp. Range, VSWR = 1.7:1 | dBc   | —          | -28      | -27  |
| Alternate Channel Power                       | +/- 83.33 kHz offset,<br>BW <sup>2</sup> = 41.67 kHz @ Rated Pout                              | dBc   | —          | -47      | -44  |
| Power Added Efficiency                        | @ Rated Pout   | %     | 27         | 30       | —    |
| Pulse Period                                  | —  | ms    | —          | 8.28     | —    |
| Pulse Duty Cycle                              | —  | ms    | —          | 90       | —    |
| Reference Voltage Sink Current                | —  | mA    | —          | 6.5      | 10   |

2. Using DQPSK Signal with PAR = 2.78 dB, main channel BW = 41.67 kHz

### Absolute Maximum Ratings<sup>3,4,5</sup>

| Parameter                         | Absolute Maximum |
|-----------------------------------|------------------|
| DC Supply Voltage                 | 5.5 V            |
| RF Input Power                    | 9 dBm            |
| Junction Temperature <sup>6</sup> | 150°C            |
| Operating Temperature             | -40°C to +85°C   |
| Storage Temperature               | -55°C to +150°C  |

- 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.
- Operating at nominal conditions with T<sub>J</sub> ≤ +150°C will ensure MTTF > 1 x 10<sup>6</sup> hours.
- Junction Temperature (T<sub>J</sub>) = T<sub>C</sub> + Θ<sub>jc</sub> \* ((V \* I) - (P<sub>OUT</sub> - P<sub>IN</sub>))  
Typical thermal resistance (Θ<sub>jc</sub>) = 10.8° C/W.
  - For T<sub>C</sub> = 25°C,  
T<sub>J</sub> = 74°C @ 5 V, 1300 mA
  - For T<sub>C</sub> = 85°C,  
T<sub>J</sub> = 134°C @ 5 V, 1300 mA

### 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 1B devices.

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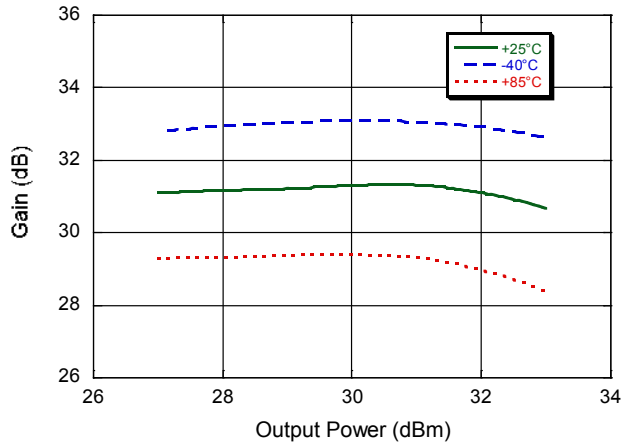
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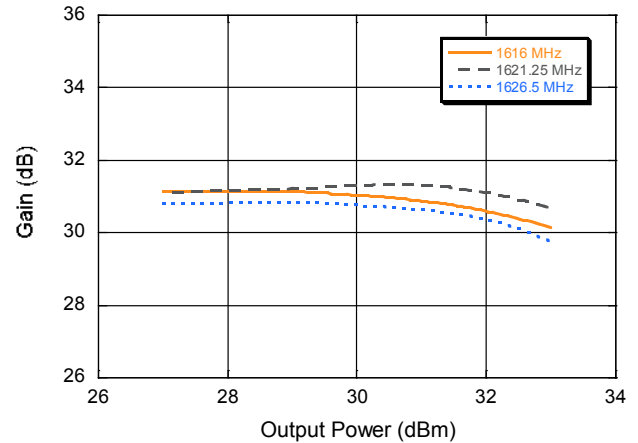
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**Typical Performance Curves: DQPSK Signal with 2.78 dB PAR**

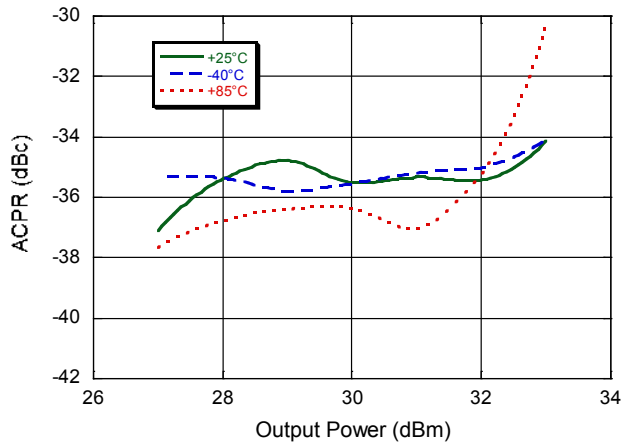
**Gain vs. Pout over Temperature**



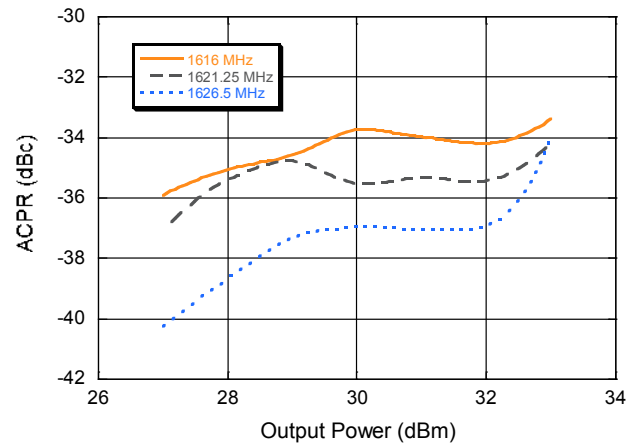
**Gain vs. Pout over Frequency Band**



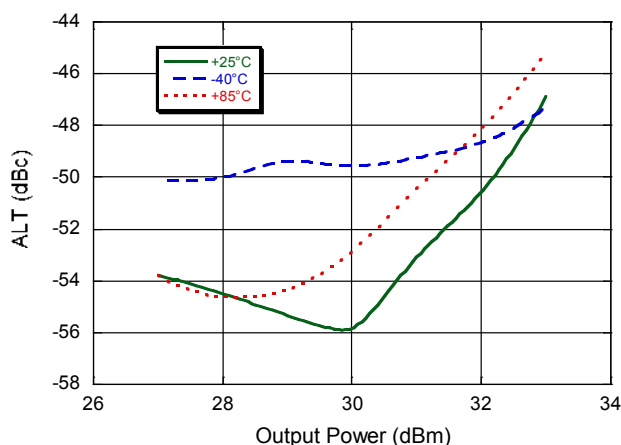
**Adjacent Channel Power vs. Pout over Temperature**



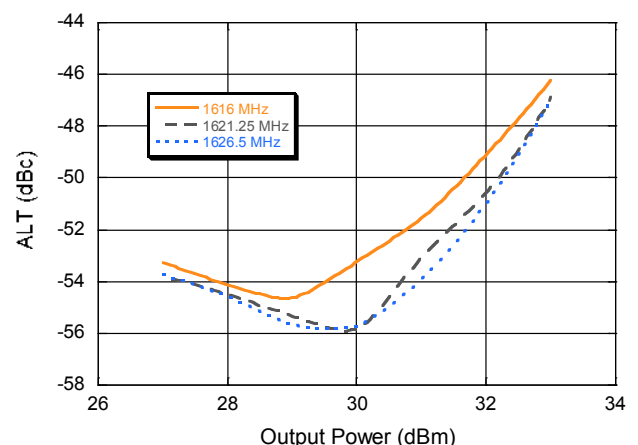
**Adjacent Channel Power vs. Pout over Frequency Band**



**Alternate Channel Power vs. Pout over Temperature**



**Alternate Channel Power vs. Pout over Frequency Band**



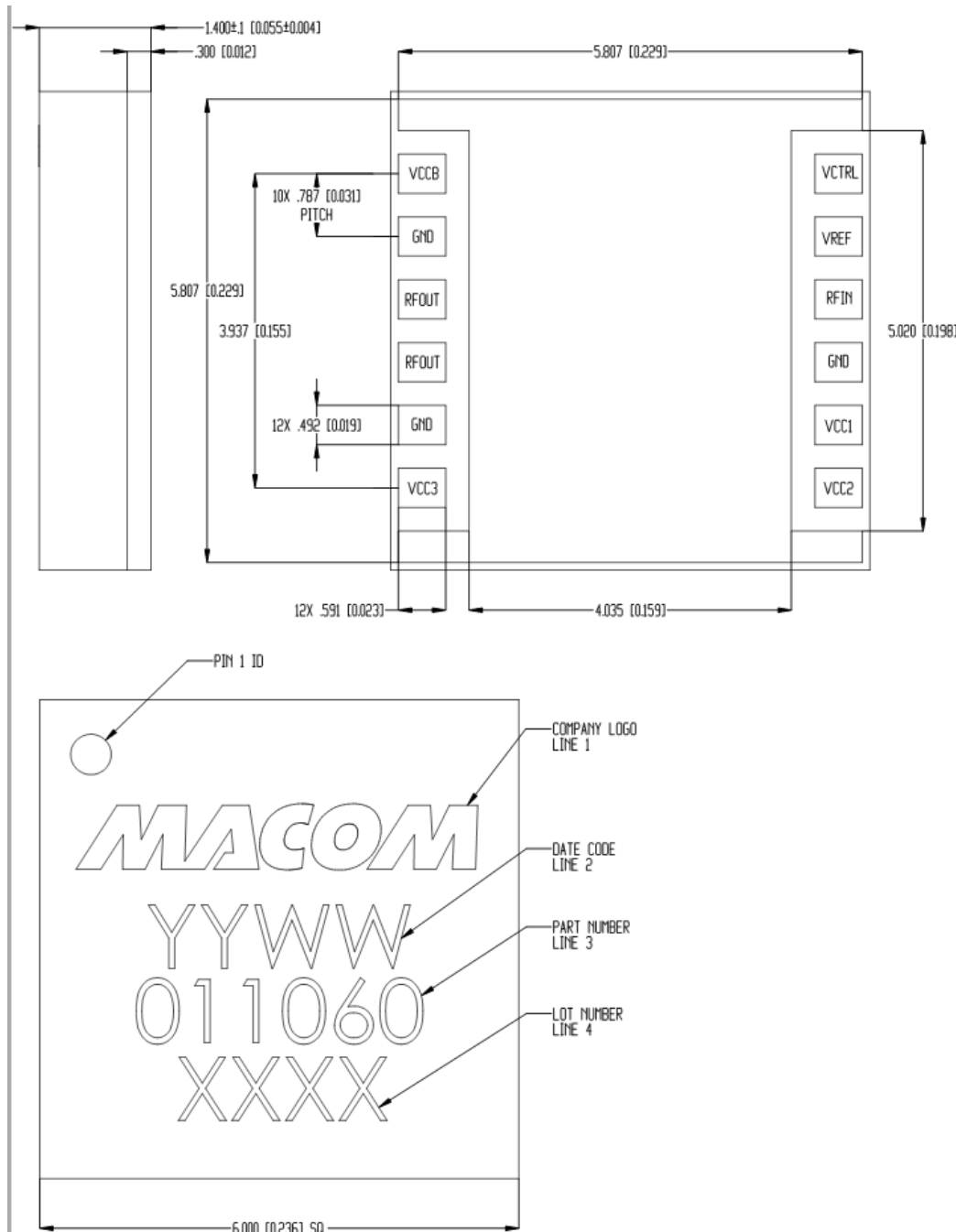
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## Lead Free 6 mm 12-lead LGA<sup>†</sup>



<sup>†</sup> Reference Application Note S2083 for lead-free solder reflow recommendations.  
Meets JEDEC moisture sensitivity level 3 requirements.

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