MAAP-011060

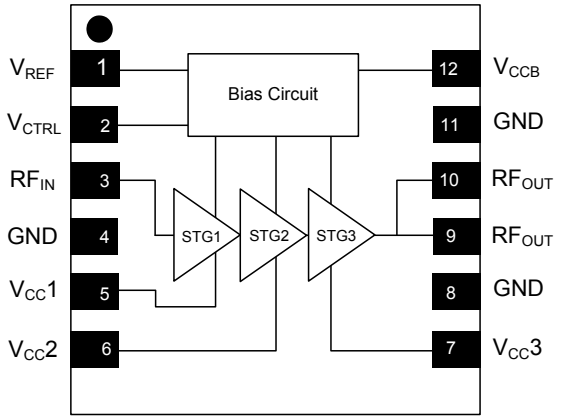
Power Amplifier Module
1616 - 1626.5 MHz, 2 Watts

Rev. V2

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

Functional Schematic



Description

The MAAP-011060 is a power amplifier module assembled in a 6 mm land grid array (LGA) that is self-contained with 50 Ω 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.

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	$V_{CC}1$	Supply Voltage 1
6	$V_{CC}2$	Supply Voltage 2
7	$V_{CC}3$	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[1]	RF and DC Ground	

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

Ordering Information

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

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

ADVANCE: Data Sheets contain information regarding a product MACOM is considering for development. Performance is based on target specifications, simulated results, and/or prototype measurements. Commitment to develop is not guaranteed.
PRELIMINARY: Data Sheets contain information regarding a product MACOM has under development. Performance is based on engineering tests. Specifications are typical. Mechanical outline has been fixed. Engineering samples and/or test data may be available. Commitment to produce in volume is not guaranteed.

• **North America** Tel: 800.366.2266 • **Europe** Tel: +353.21.244.6400
• **India** Tel: +91.80.43537383 • **China** Tel: +86.21.2407.1588
Visit www.macomtech.com for additional data sheets and product information.

M/A-COM Technology Solutions Inc. (MACOM) and its affiliates reserve the right to make changes to the product(s) or information contained herein without notice.

Power Amplifier Module
1616 - 1626.5 MHz, 2 Watts

Rev. V2

Electrical Specifications: Freq: 1621.25 MHz, V_{CC} = 5 Volts, V_{REF} = 3 Volts, Vctrl = 1.35V T_A = 25°C

Parameter	Test Conditions	Units	Min.	Typ.	Max.
Rated Output Power	V_{CC} = 5 Volts, 5.5 Volts V_{CC} = 4.5 Volts	dBm	33 32.6	33 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 = $2f_0$, $3f_0$	dBm	—	-16	—
Adjacent Channel Power	+/- 41.67 kHz offset, BW[2] = 41.67 kHz @ Rated Pout	dBc	—	-35	-30
Adjacent Channel Power, Extreme Conditions	+/- 41.67 kHz offset, BW = 25 kHz @ Rated Pout, Over Freq. and Temp. Range, VSWR = 1.7:1	dBc	—	-28	-27
Alternate Channel Power	+/- 83.33 kHz offset, BW[2] = 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[3,4,5]

Parameter	Absolute Maximum
DC Supply Voltage	5.5 V
RF Input Power	9 dBm
Junction Temperature[6]	150°C
Operating Temperature	-40°C to +85°C
Storage Temperature	-55°C to +150°C

3. Exceeding any one or combination of these limits may cause permanent damage to this device.
4. MACOM does not recommend sustained operation near these survivability limits.
5. Operating at nominal conditions with $T_J \leq$ +150°C will ensure MTTF > 1 x 10^6 hours.
6. Junction Temperature (T_J) = T_C + Θjc * ((V * I) - (P_{OUT} - P_{IN}))
   Typical thermal resistance (Θjc) = 10.8° C/W.
   a) For T_C = 25°C,
   T_J = 74°C @ 5 V, 1300 mA
   b) For T_C = 85°C,
   T_J = 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.

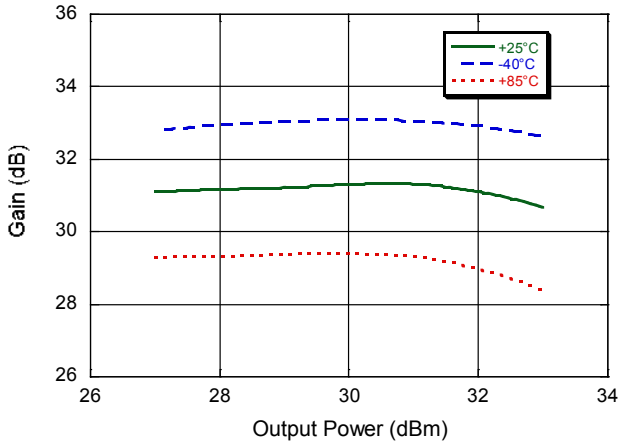
ADVANCE: Data Sheets contain information regarding a product MACOM is considering for development. Performance is based on target specifications, simulated results, and/or prototype measurements. Commitment to develop is not guaranteed.
PRELIMINARY: Data Sheets contain information regarding a product MACOM has under development. Performance is based on engineering tests. Specifications are typical. Mechanical outline has been fixed. Engineering samples and/or test data may be available. Commitment to produce in volume is not guaranteed.

• **North America** Tel: 800.366.2266 • **Europe** Tel: +353.21.244.6400
• **India** Tel: +91.80.43537383 • **China** Tel: +86.21.2407.1588
Visit www.macomtech.com for additional data sheets and product information.

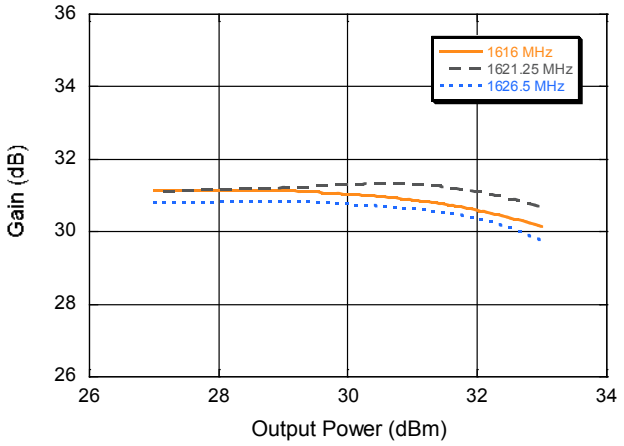
M/A-COM Technology Solutions Inc. (MACOM) and its affiliates reserve the right to make changes to the product(s) or information contained herein without notice.

Typical Performance Curves: DQPSK Signal with 2.78 dB PAR

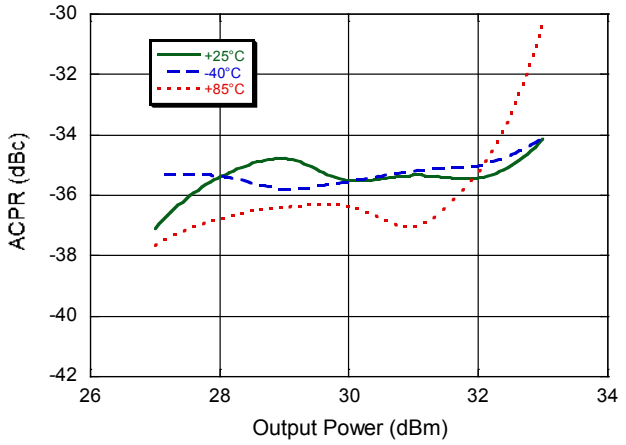
Gain vs. Pout over Temperature



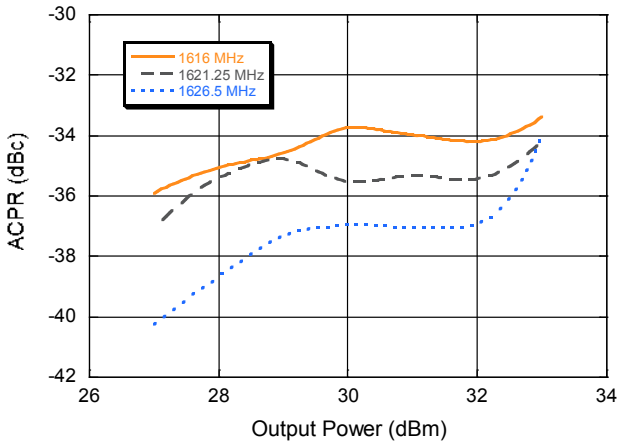
Gain vs. Pout over Frequency Band



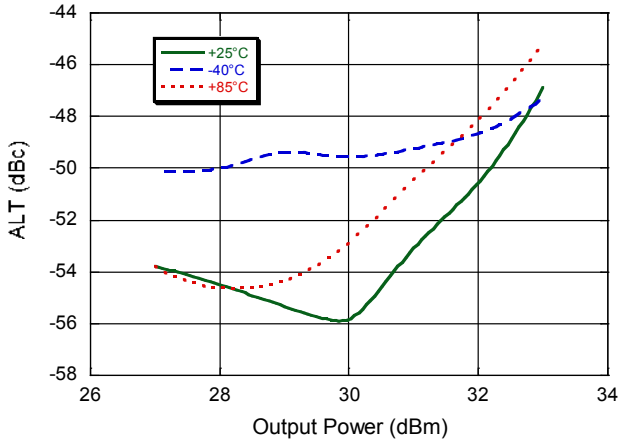
Adjacent Channel Power vs. Pout over Temperature



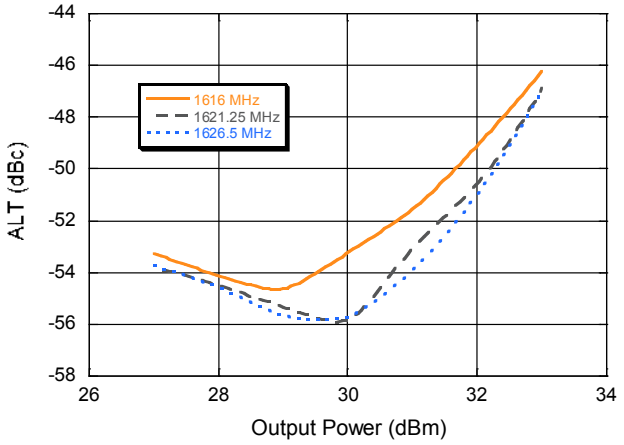
Adjacent Channel Power vs. Pout over Frequency Band



Alternate Channel Power vs. Pout over Temperature



Alternate Channel Power vs. Pout over Frequency Band



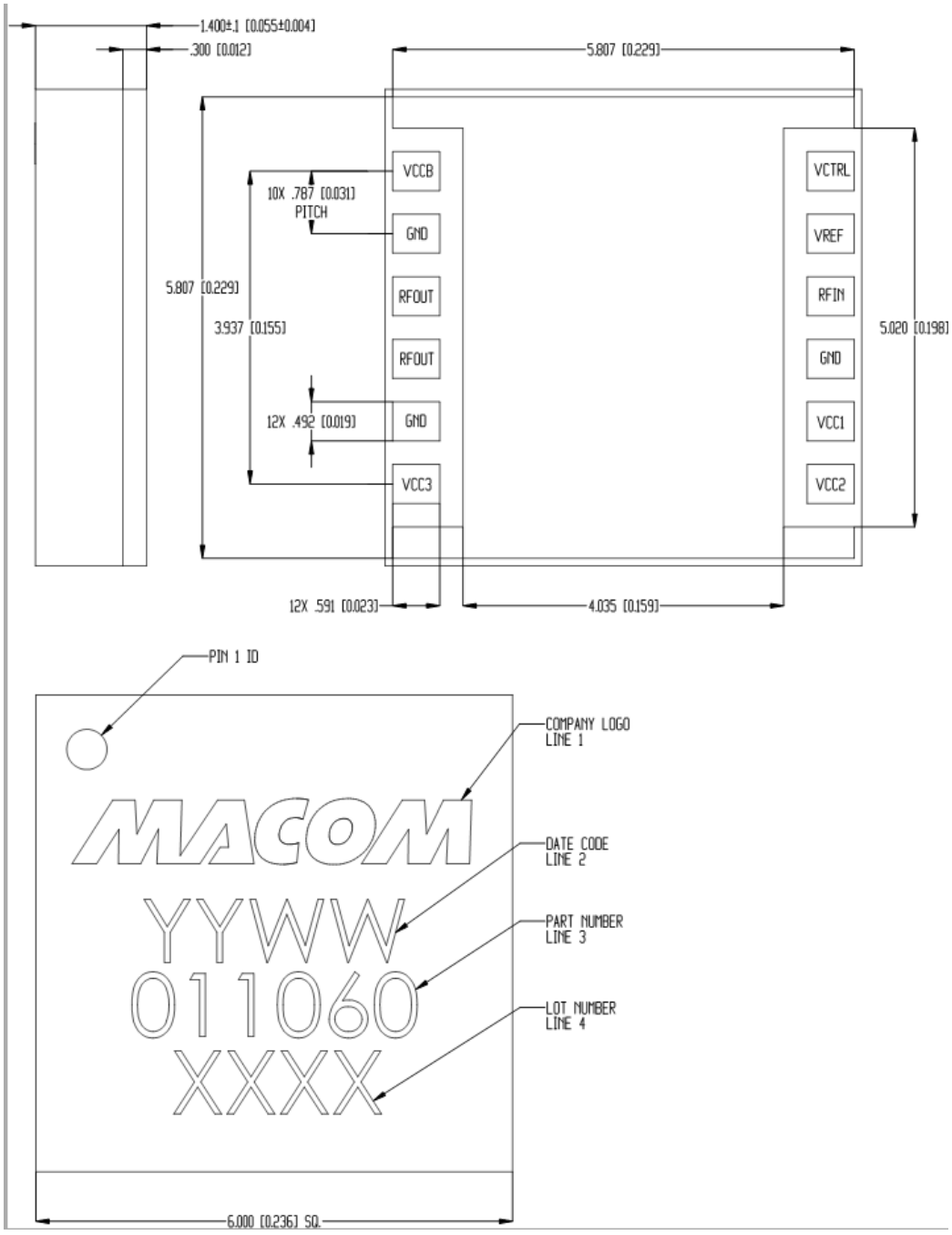
ADVANCE: Data Sheets contain information regarding a product MACOM is considering for development. Performance is based on target specifications, simulated results, and/or prototype measurements. Commitment to develop is not guaranteed.
PRELIMINARY: Data Sheets contain information regarding a product MACOM has under development. Performance is based on engineering tests. Specifications are typical. Mechanical outline has been fixed. Engineering samples and/or test data may be available. Commitment to produce in volume is not guaranteed.

- **North America** Tel: 800.366.2266
- **Europe** Tel: +353.21.244.6400
- **India** Tel: +91.80.43537383
- **China** Tel: +86.21.2407.1588

Visit www.macomtech.com for additional data sheets and product information.

M/A-COM Technology Solutions Inc. (MACOM) and its affiliates reserve the right to make changes to the product(s) or information contained herein without notice.

Lead Free 6 mm 12-lead LGA†



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

ADVANCE: Data Sheets contain information regarding a product MACOM is considering for development. Performance is based on target specifications, simulated results, and/or prototype measurements. Commitment to develop is not guaranteed.
PRELIMINARY: Data Sheets contain information regarding a product MACOM has under development. Performance is based on engineering tests. Specifications are typical. Mechanical outline has been fixed. Engineering samples and/or test data may be available. Commitment to produce in volume is not guaranteed.

- **North America** Tel: 800.366.2266
- **Europe** Tel: +353.21.244.6400
- **India** Tel: +91.80.43537383
- **China** Tel: +86.21.2407.1588

Visit www.macomtech.com for additional data sheets and product information.

M/A-COM Technology Solutions Inc. (MACOM) and its affiliates reserve the right to make changes to the product(s) or information contained herein without notice.