

Linear Power Amplifier
2.4 - 2.5 GHz, 802.11b/g

MAAP-008015
V1

Features

- Ideal for 802.11b/g
- +23 dBm P1dB typical at 3.3 V
- 31 dB Gain typical
- 802.11b compliant to 20 dBm P_{OUT}
- 802.11g compliant to 16 dBm P_{OUT}
- Micro-Amp Shutdown
- Integrated Detector
- SiGe Process: Lowest Cost Solution
- Operates from 1.5 V to 4.0 V
- Lead-Free 3 mm 12-Lead PQFN Package
- 100% Matte Tin Plating over Copper
- Halogen-Free "Green" Mold Compound
- RoHS* Compliant 260°C Reflow Compatible

Description

The MAAP-008015 is a three stage power amplifier, designed for 2.4 GHz linear applications. This power amplifier is available in a lead free 3 mm 12-lead PQFN plastic package. The MAAP-008015 also features an integrated power detector.

Ordering Information¹

Part Number	Package
MAAP-008015-TR3000	3000 piece reel
MAAP-008015-001SMB	Sample Test Board (Includes 5 Samples)

1. Reference Application Note M513 for reel size information.

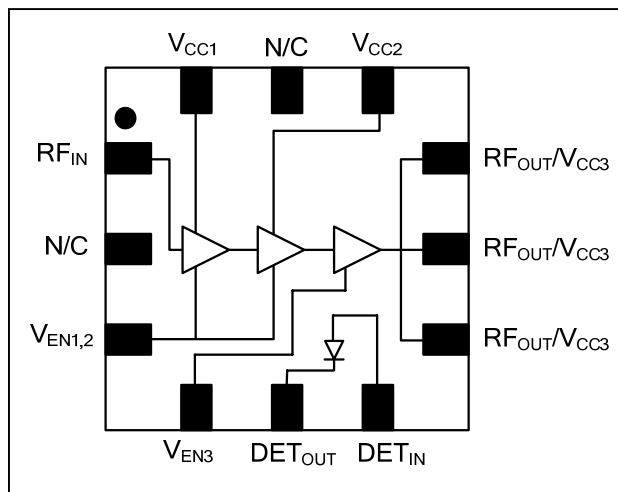
Handling Procedures

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 devices.

Functional Schematic



Pin Configuration

Pin No.	Pin Name	Description
1	RF _{IN}	RF Input
2	N/C	No Connect
3	V _{EN1,2}	Power Enable
4	V _{EN3}	Power Enable
5	DET _{OUT}	Detector Output
6	DET _{IN}	Detector Input
7	RF _{OUT} / V _{CC3}	RF Output, 3rd Stage Supply
8	RF _{OUT} / V _{CC3}	RF Output, 3rd Stage Supply
9	RF _{OUT} / V _{CC3}	RF Output, 3rd Stage Supply
10	V _{CC2}	2nd Stage Supply
11	N/C	No Connect
12	V _{CC1}	1st Stage Supply
Pad	Paddle ²	RF & DC Ground

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

* Restrictions on Hazardous Substances, European Union Directive 2002/95/EC.

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Electrical Specifications: $F = 2.45 \text{ GHz}$, $V_{CC} = 3.3 \text{ V}$, $V_{EN} = 2.5 \text{ V}$, $T_A = 25^\circ\text{C}$, $Z_0 = 50 \Omega$

Parameter	Test Conditions	Units	Min.	Typ.	Max.
Gain		dB	29	31	33
Input Return Loss		dB	—	9	—
Forward Isolation		dB	—	50	—
P1dB		dBm	—	23	—
Supply Voltage	V_{CC1} , V_{CC2} , V_{CC3}	V	—	3.3	—
Bias Voltage	V_{EN}	V	—	2.5	—
Current	Idle	mA	30	43	55
	$P_{OUT} = 16 \text{ dBm}$, Modulated ³	mA	—	65	—
	$P_{OUT} = 16 \text{ dBm}$, C.W.	mA	60	85	100
Off Current	$V_{EN} = 0 \text{ V}$	μA	—	3	20
Control Current	V_{EN} Current	mA	—	3	5
Harmonics	2fo @ -15 dBm Input Power	dBc	—	-26	—
	3fo @ -15 dBm Input Power	dBc	—	-75	—
Duty Cycle		%	—	100	—
Linear Output Power	DSS source; compliance with 802.11b EVM=2.5%, OFDM, QAM-64, 54 Mbps	dBm	—	20	—
		dBm	—	16	—
Detector Output	$P_{OUT} = 16 \text{ dBm}$, C.W.	V	1.35	1.5	1.75
Detector Sensitivity	Up to $P_{OUT} = 16 \text{ dBm}$	mV/dB	—	110	—

3. EVM=2.5%, OFDM, QAM-64, 54 Mbps.

Absolute Maximum Ratings^{4,5}

Parameter	Absolute Maximum
Input Power	+ 5 dBm
Operating Supply Voltage	+4.0 Volts
Operating Control Voltage	+3.0 Volts
Operating Temperature	-20°C to +85°C
Channel Temperature	+150°C
Storage Temperature	-40°C to +150°C

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

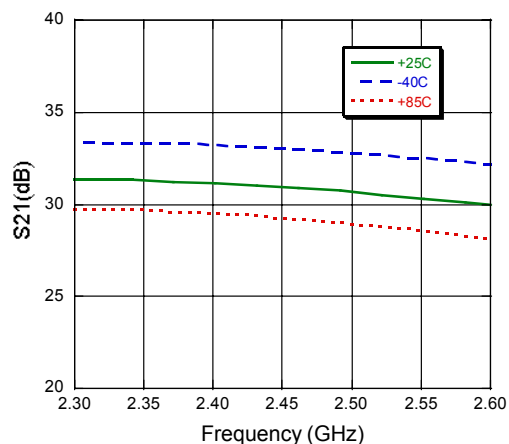
5. M/A-COM does not recommend sustained operation near these survivability limits.

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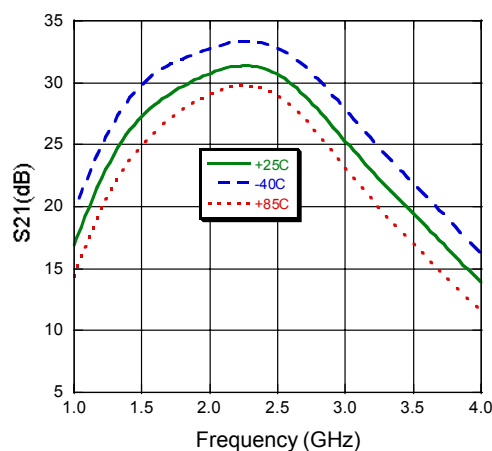
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Typical Performance Curves: $V_{CC} = 3.3\text{ V}$, $V_{EN} = 2.5\text{ V}$, over Temperature

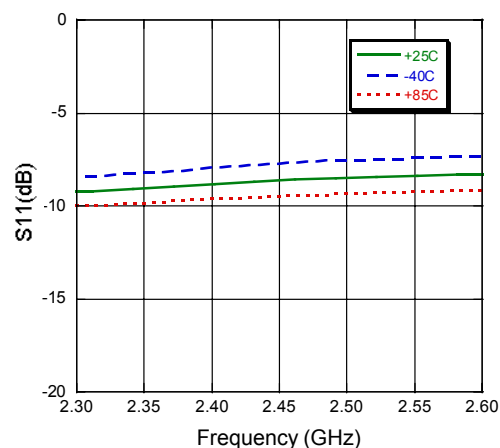
S_{21} vs. Frequency (2.3 GHz - 2.6 GHz) -Gain



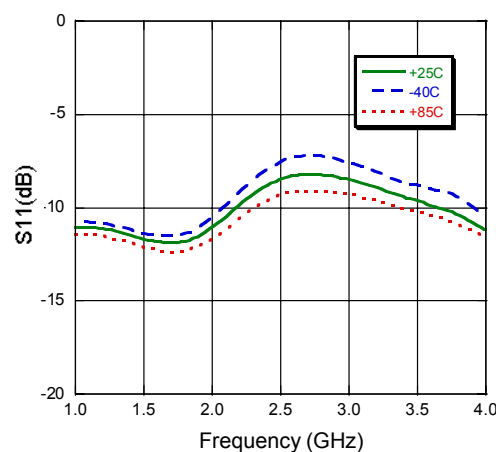
S_{21} vs. Frequency -Gain



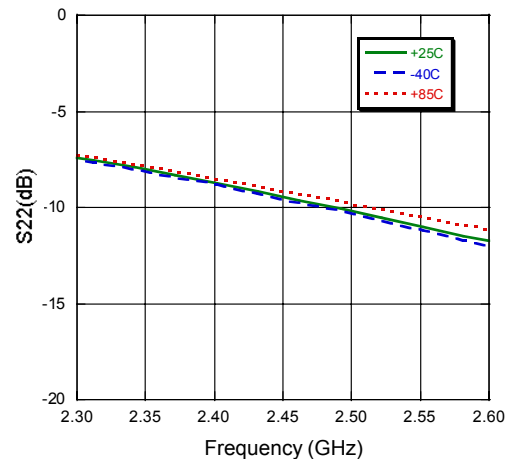
S_{11} vs. Frequency (2.3 GHz - 2.6 GHz)



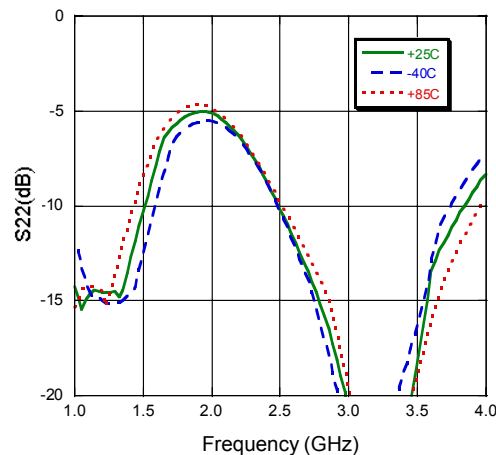
S_{11} vs. Frequency



S_{22} vs. Frequency (2.3 GHz - 2.6 GHz)



S_{22} vs. Frequency

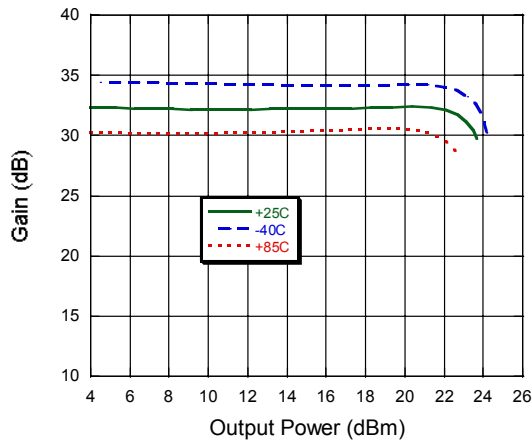


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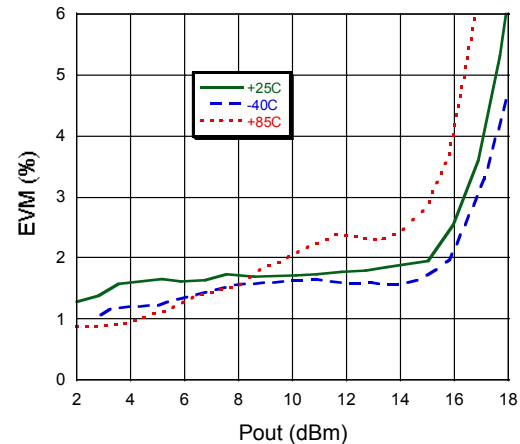
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Typical Performance Curves: $V_{CC} = 3.3\text{ V}$, $V_{EN} = 2.5\text{ V}$

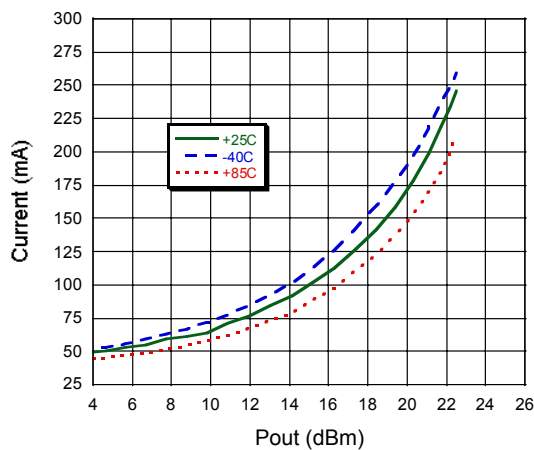
P_{1dB} at 2.45 GHz



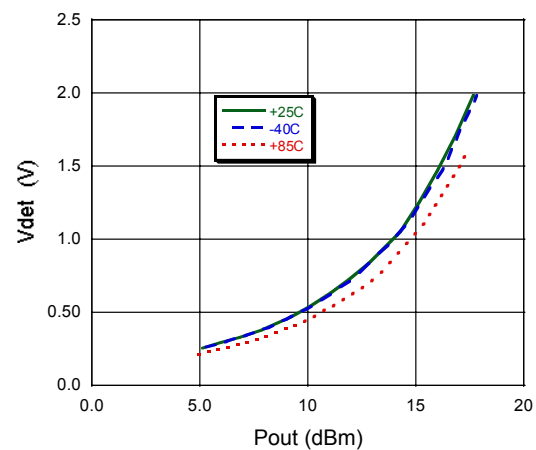
EVM vs. P_{OUT} , OFDM, QAM-64, 54 Mbps



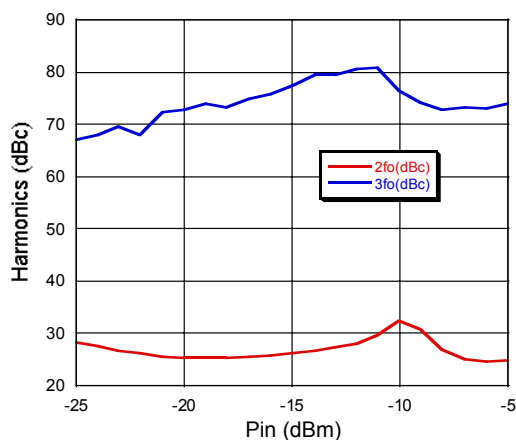
C.W. Current vs. P_{OUT} over Temperature at 2.45 GHz



V_{DET} vs. P_{OUT} over Temperature at 2.45 GHz



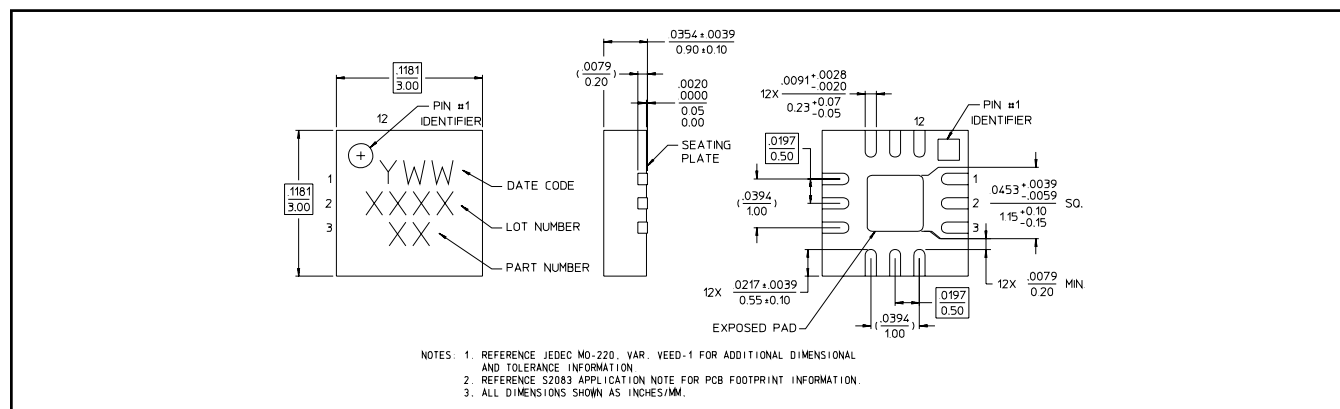
Harmonics



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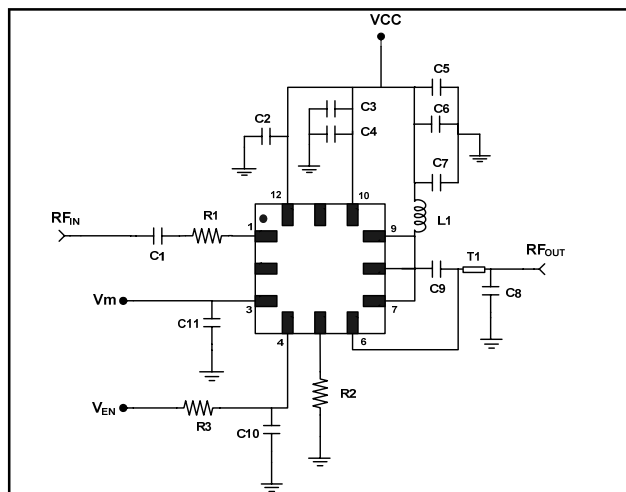
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Lead-Free 3 mm 12-Lead PQFN†

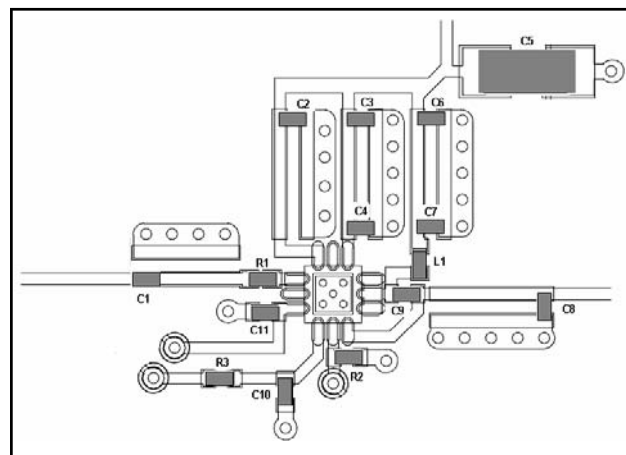


† Reference Application Note M538 for lead-free solder reflow recommendations.
Meets JEDEC moisture sensitivity level 1 requirements.

Evaluation Board Schematic



Recommended PCB Configuration



External Parts List ⁶

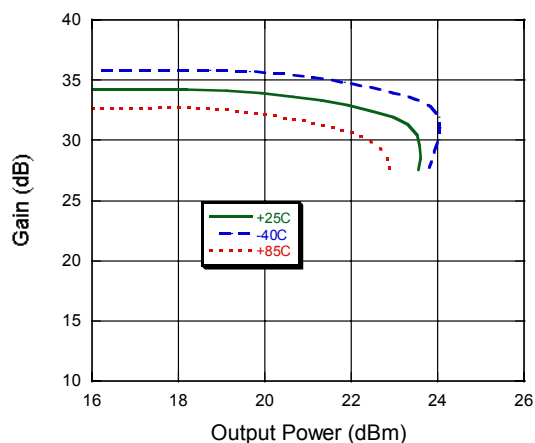
Component	Value	Footprint	Manufacturer
C1	1000 μ F	0402	Murata
C2, C3, C6, C10, C11	0.1 μ F	0402	Murata
C4, C7, C9	47 pF	0402	Murata
C5	10 μ F	1206	AVX
C8	1.0 pF	0402	Murata
L1	10 nH	0402	Coilcraft
R1	10 Ω	0402	Panasonic
R2	1000 Ω	0402	Panasonic
R3	619 Ω	0402	Panasonic
T1	48.8 Ω , 29.04° @ 2400 MHz		

6. Equivalent components can be substituted.

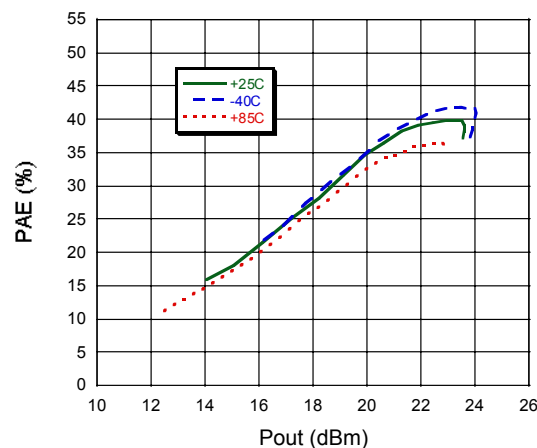
Applications Section

Typical Performance Curves, 900 MHz Configuration

P1dB



PAE



Current

