MAAP-011027

Amplifier, Power, 8 W
5.2 - 5.9 GHz

Rev. V1

Features

- Linear Gain: 20 dB
- Saturated Output Power: +39 dBm Pulsed
- 50 Ω Input / Output Match
- Lead-Free 5 mm 20-lead PQFN Package
- Halogen-Free “Green” Mold Compound
- RoHS* Compliant and 260°C Reflow Compatible

Description

The MAAP-011027 is a 2-stage, 8 W saturated C-band power amplifier in a 5 mm 20 lead PQFN package, allowing for 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 pulsed applications. It is ideally suited for Point-to-Point Radios and C-band radar applications.

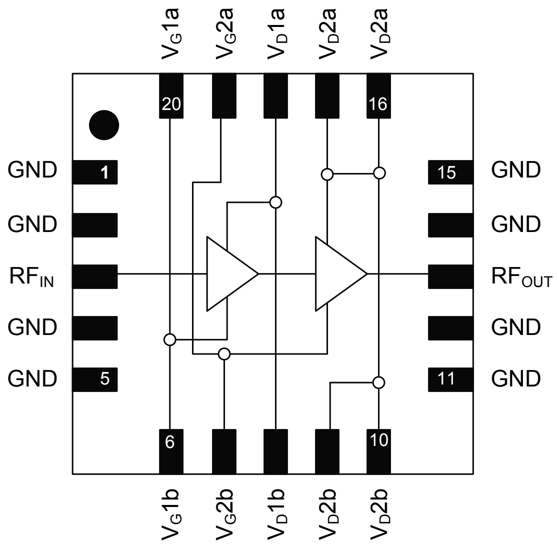
Each device is 100% RF tested to ensure performance compliance.

Ordering Information[1]

Part Number	Package
MAAP-011027-TR0500	500 piece reel
MAAP-011027-TR1000	1000 piece reel
MAAP-011027-001SMB	Sample Board

1. Reference Application Note M513 for reel size information.

Functional Schematic



Pin Configuration[2]

Pin No.	Function	Pin No.	Function
1	Ground	11	Ground
2	Ground	12	Ground
3	RF_{IN}	13	RF_{OUT}
4	Ground	14	Ground
5	Ground	15	Ground
6	V_G1b	16	V_D2a
7	V_G2b	17	V_D2a
8	V_D1b	18	V_D1a
9	V_D2b	19	V_G2a
10	V_D2b	20	V_G1a
		21	Paddle[3]

2. MACOM recommends connecting unused package pins to ground.
3. 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.

Electrical Specifications:

Freq. 5.2 - 5.9 GHz, V_{DD} = 9 V Pulsed, 100 uS Pulse Width,10% Duty Cycle , Z_0 = 50 Ω

Parameter	Units	Min.	Typ.	Max.
Gain	dB	17	20	—
Input Return Loss	dB	—	10	—
Output Return Loss	dB	—	10	—
P_{SAT}	dBm	37	39	—
Pulse Period	µs	—	100	—
Pulse Duty Cycle	%	—	10	—
Efficiency	%	—	37	—
Small Signal Current	A	—	1	—

Maximum Operating Ratings[4,5,6]

Parameter	Absolute Maximum
Input Power	+28 dBm
Supply Voltage	+11 V
Operating Temperature	-40°C to +85°C
Junction Temperature[7]	+150 °C
Storage Temperature	-55°C to +150°C

4. Exceeding any one or combination of these limits may cause permanent damage to this device.
5. MACOM does not recommend sustained operation near these survivability limits.
6. Operating at nominal conditions with $T_J \leq +150°C$ will ensure MTTF > 1×10^6 hours.
7. Junction Temperature (T_J) = $T_C + \Theta_{JC} * (V * I)$
   Typical CW thermal resistance (Θ_{JC}) = 7.7°C/W

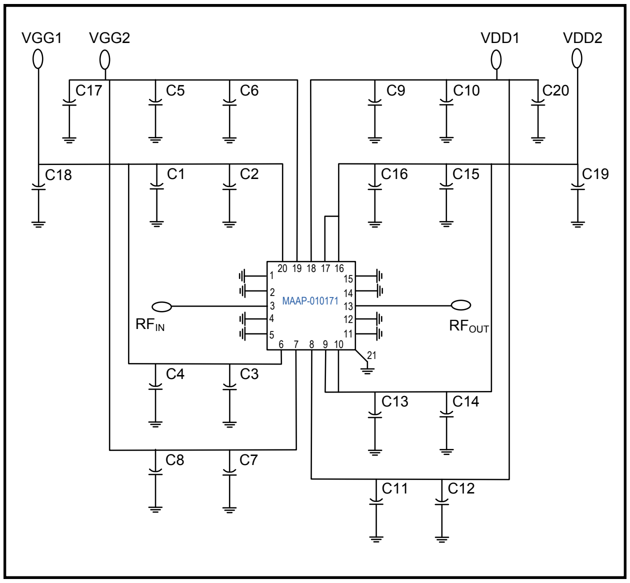
Handling Procedures

Please observe the following precautions to avoid damage:

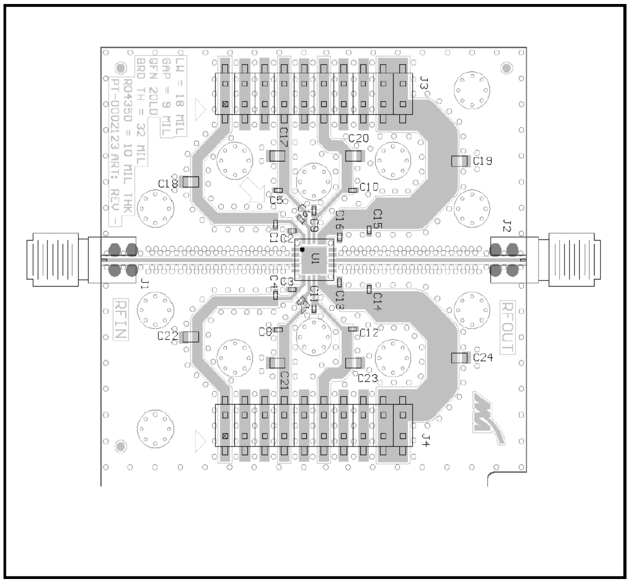
Static Sensitivity

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 devices.

Schematic



Recommended PCB Layout



Parts List

Component	Value	Package
C2, C3, C5, C7, C9, C11, C13, C16	100 pF	0402
C1, C4, C6, C8, C10, C12, C14	1000 pF	0402
C17, C18, C21, C22	1 µF	0805
C19, C20, C23, C24	10 nF	0805

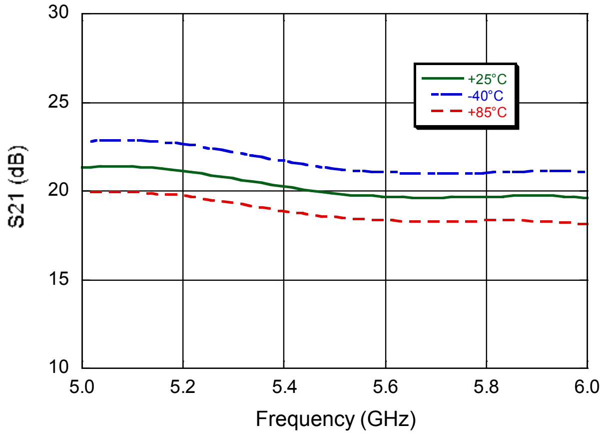
Operating the MAAP-011027

To operate the MAAP-011027, follow these steps. Ramp down or shut down in reverse order.

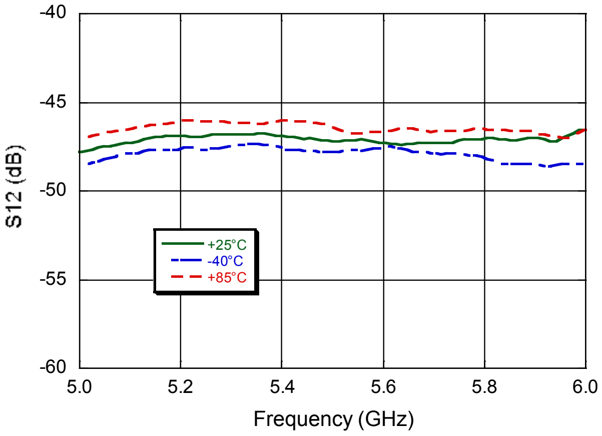
1. Apply V_G between -1 V and -0.5 V to set IDQ to 1 A
2. Apply RF Power ON
3. Apply V_{DD} Pulsed

Typical Performance Curves over Temperature

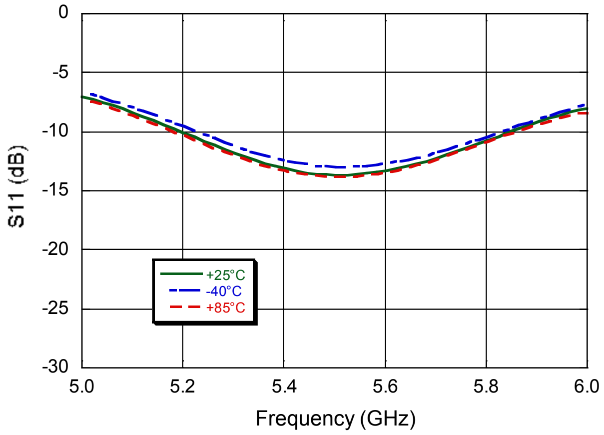
Gain



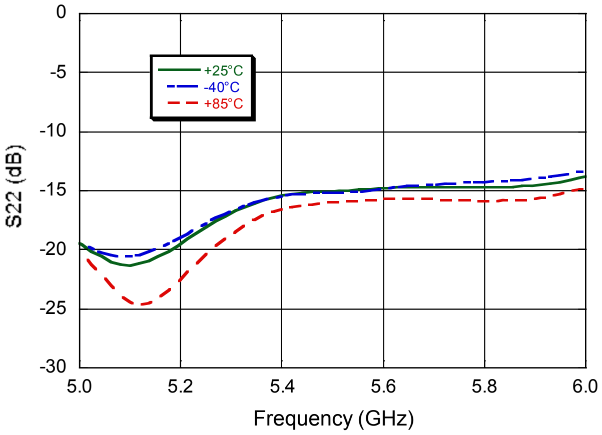
Reverse Isolation



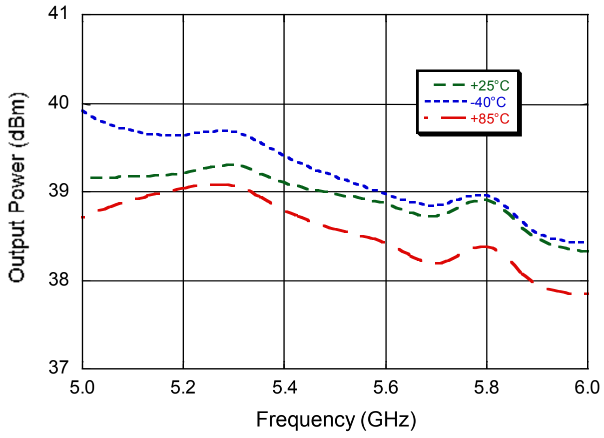
Input Return Loss



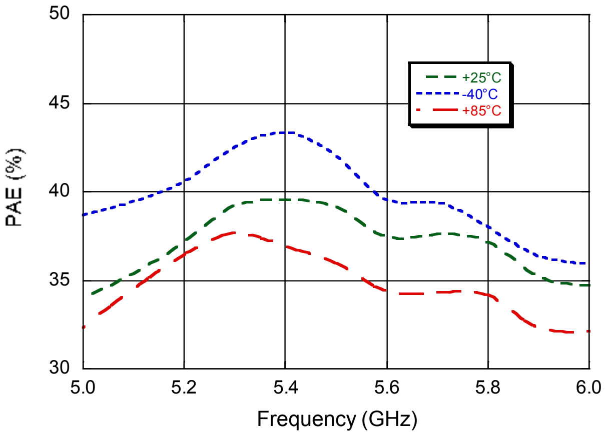
Output Return Loss



Output Power (dBm)

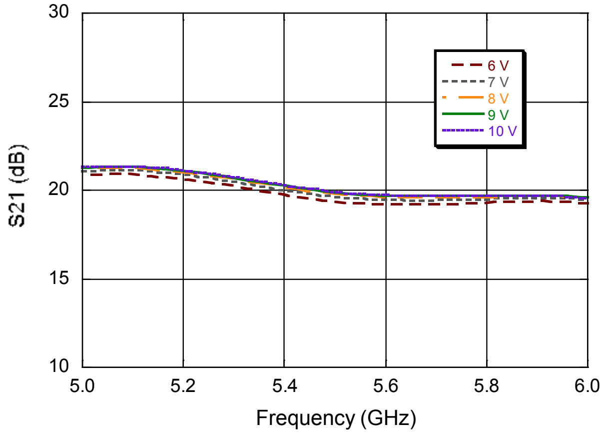


Power Added Efficiency

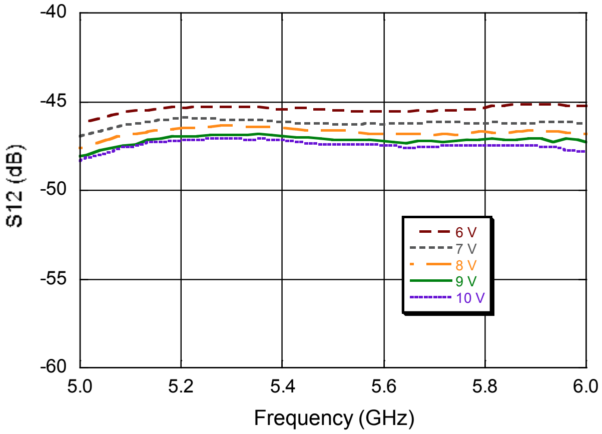


Typical Performance Curves over Voltage

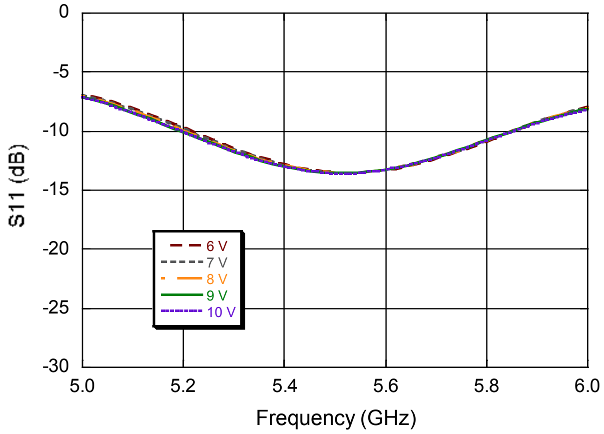
Gain



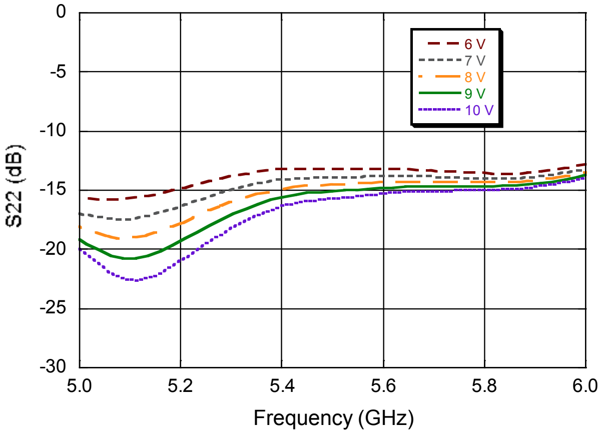
Reverse Isolation



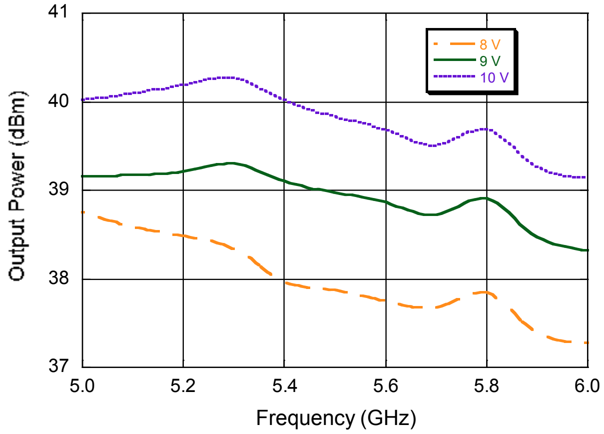
Input Return Loss



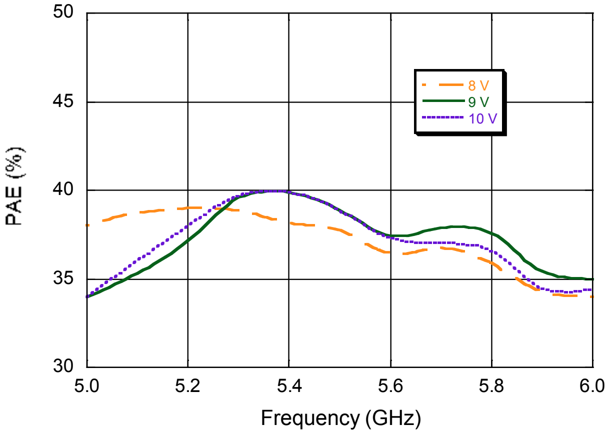
Output Return Loss



Output Power (dBm)

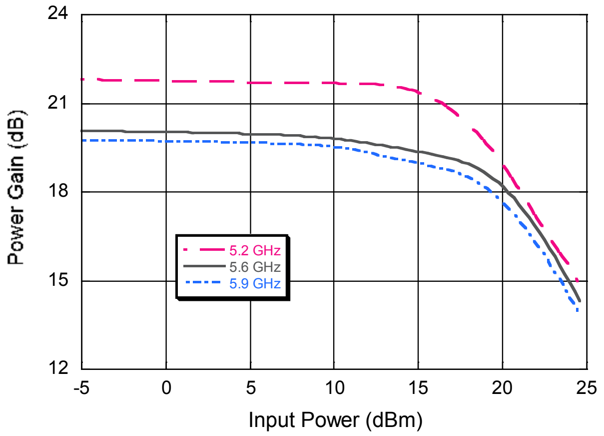


Power Added Efficiency

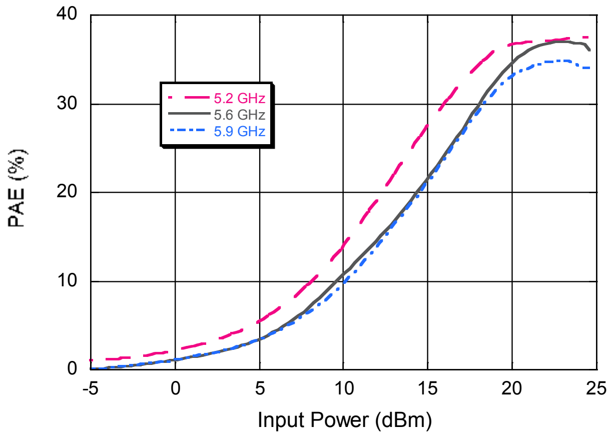


Typical Performance Curves

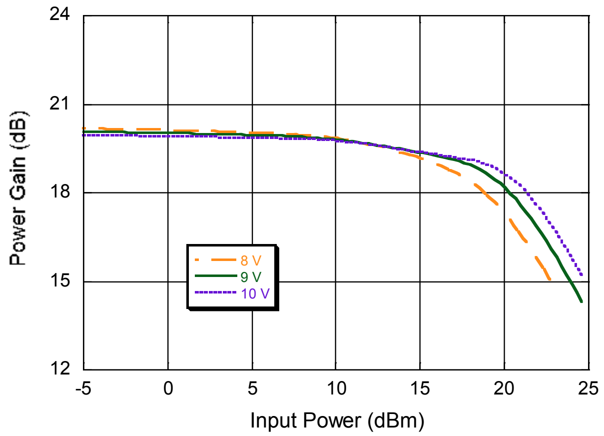
Power Gain vs. Input Power



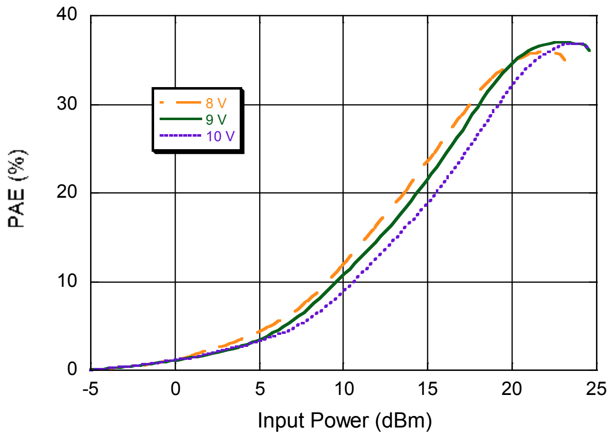
Power Added Efficiency vs. Output Power



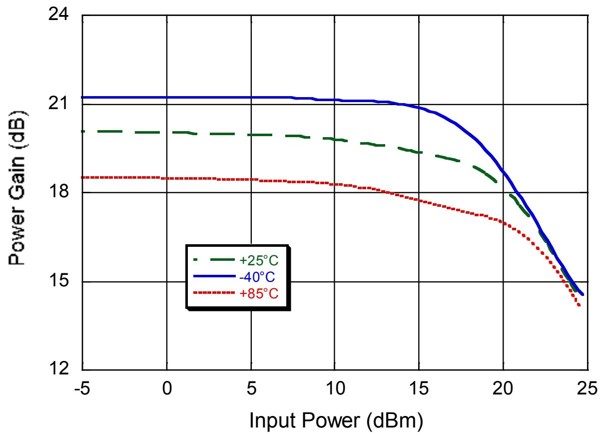
Power Gain vs. Input Power, @ 5.6 GHz



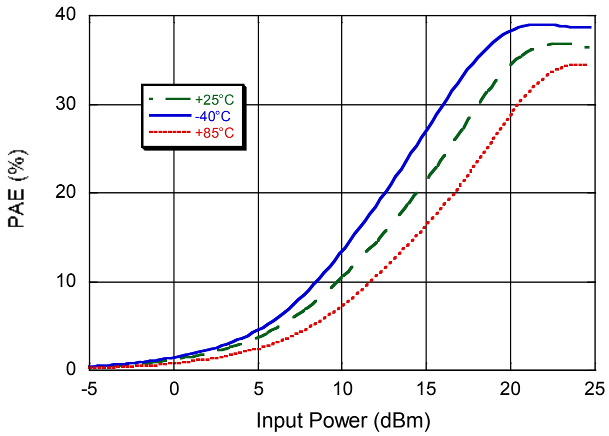
Power Added Efficiency vs. Input Power, @ 5.6 GHz



Power Gain vs. Input Power, @ 5.6 GHz

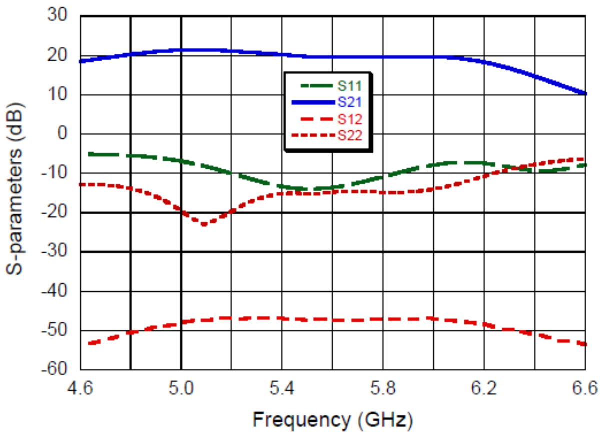


Power Added Efficiency vs. Input Power, @ 5.6 GHz

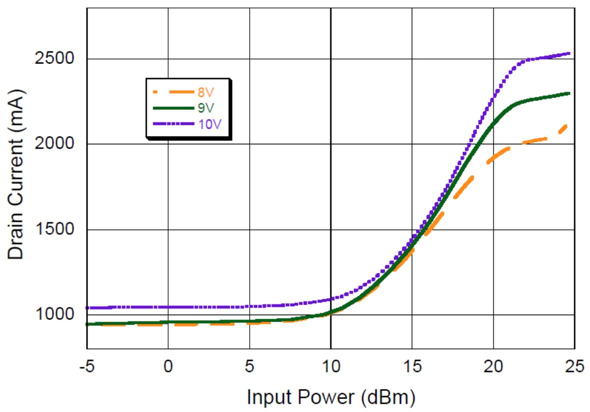


Typical Performance Curves

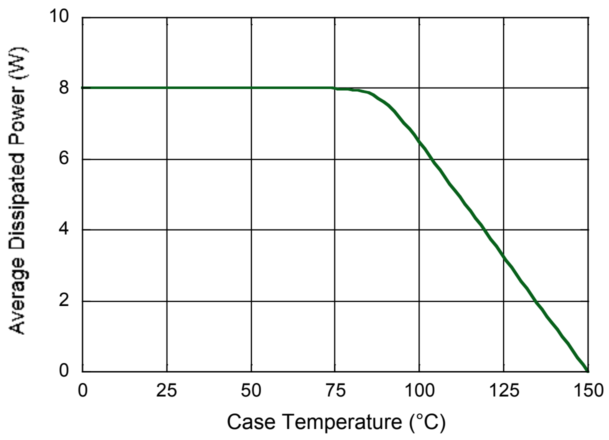
Small Signal wideband performance



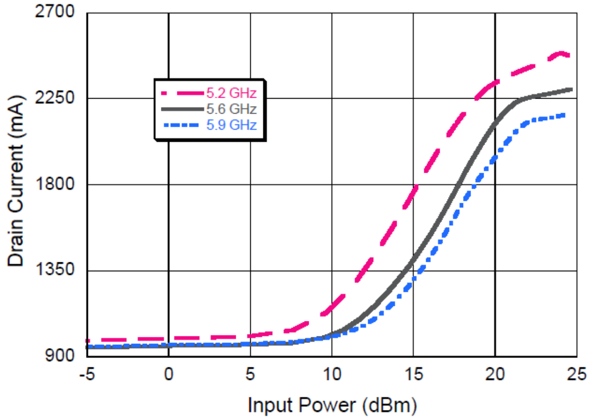
Drain Current vs. Input Power, @ T= +25C, F =5.6GHz



Power Dissipation[8] vs. Case Temperature[9,10]

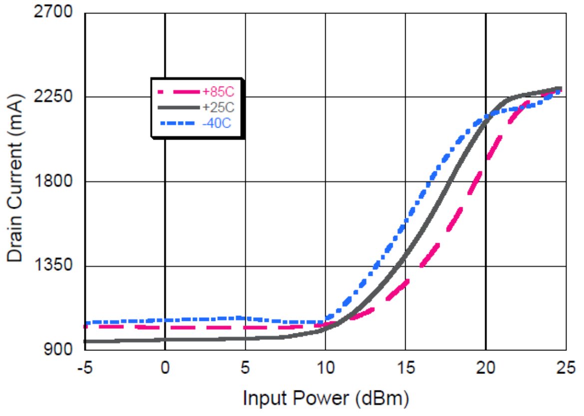


Drain Current vs. Input Power, @ T=+25C, Vd = 9V

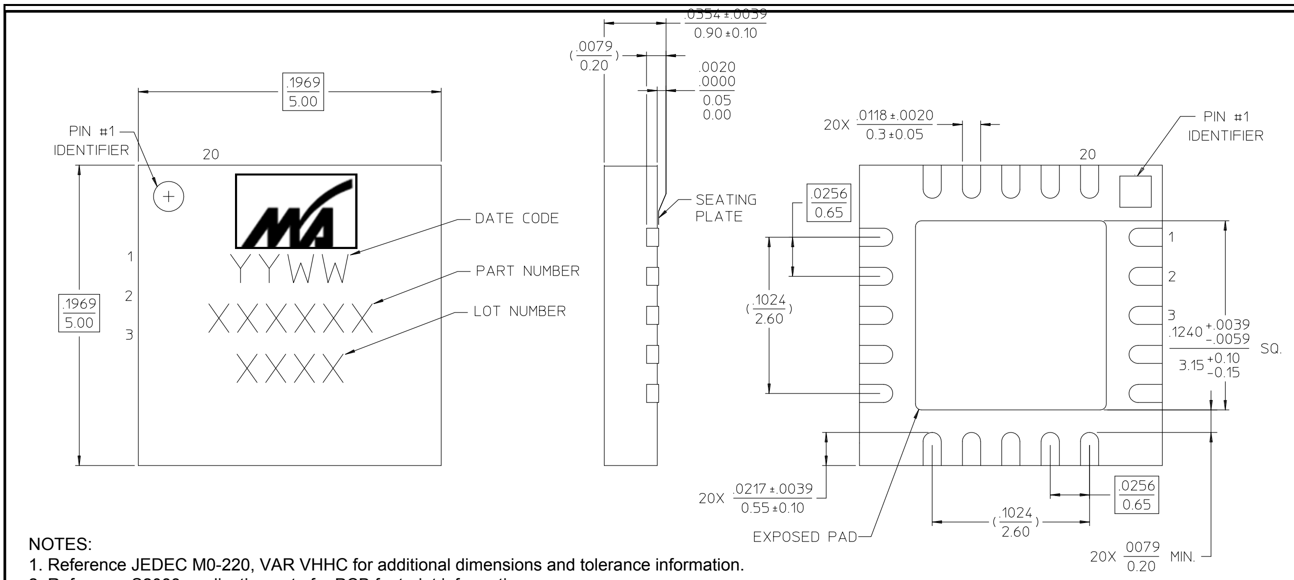


8. Average Dissipated power: Pdiss=Pdc+Pin-Pout (all powers are average in Watts)
9. Average power is integrated over pulse period, for short pulses (not exceeding pulse width of 100 µs), average power can be approximated as Paverage=Ppeak*D, where D is duty cycle.
10. For pulses wider than 100 µs self heating during pulse reduces allowable average dissipated power.

Drain Current vs. Input Power, @ F=5.6 GHz, Vd = 9V



Lead-Free 5 mm 20-Lead PQFN†



NOTES:
1. Reference JEDEC M0-220, VAR VHHC for additional dimensions and tolerance information.
2. Reference S2083 application note for PCB footprint information.
3. All dimensions shown as inches/mm.

† Reference Application Note S2083 for lead-free solder reflow recommendations.
Meets JEDEC moisture sensitivity level 1 requirements.
Plating is 100% matte tin over copper.