

Features

- Linear Gain: 27 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

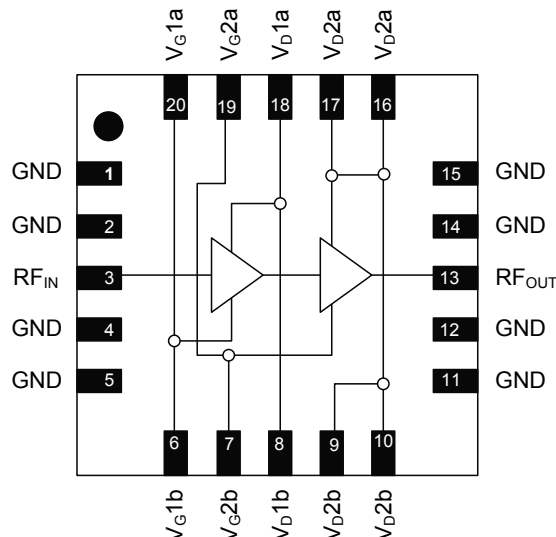
Description

The MAAP-010171 is a 2-stage, 8 W saturated S-band power amplifier in a 5mm 20 lead PQFN package, allowing 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 Air Traffic Control, Weather, Military and S-band radar applications.

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

Functional Schematic



Pin Configuration²

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 _G 1b	16	V _D 2a
7	V _G 2b	17	V _D 2a
8	V _D 1b	18	V _D 1a
9	V _D 2b	19	V _G 2a
10	V _D 2b	20	V _G 1a
		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, DC and thermal ground.

Ordering Information¹

Part Number	Package
MAAP-010171-TR0500	500 piece reel
MAAP-010171-TR1000	1000 piece reel
MAAP-010171-000SMB	Sample Board

1. Reference Application Note M513 for reel size information.

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

Electrical Specifications:

Freq. 2.5 - 3.5 GHz, $V_{DD} = 9\text{ V}$ Pulsed, 100 μs Pulse Width, 10% Duty Cycle, $Z_0 = 50\ \Omega$

Parameter	Units	Min.	Typ.	Max.
Gain	dB	25	27	—
Input Return Loss	dB	—	10	—
Output Return Loss	dB	—	10	—
P_{SAT}	dBm	37	39	—
Small Signal Current (I_{DD})	A	—	1	—
Efficiency	%	—	38	—

Absolute Maximum Ratings^{4,5}

Parameter	Absolute Maximum
Input Power	22 dBm
Supply Voltage	11 V
Gate Current	25 mA
Duty Cycle	50 %
Operating Temperature	-40°C to +85°C
Junction Temperature ^{6,7}	+150°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 $T_J \leq 150^\circ\text{C}$ will ensure $MTTF > 1 \times 10^6$ hours.
- Junction Temperature (T_J) = $T_C + \Theta_{JC} * (V * I)$.
Typical thermal resistance (Θ_{JC}) = 5.75°C/W

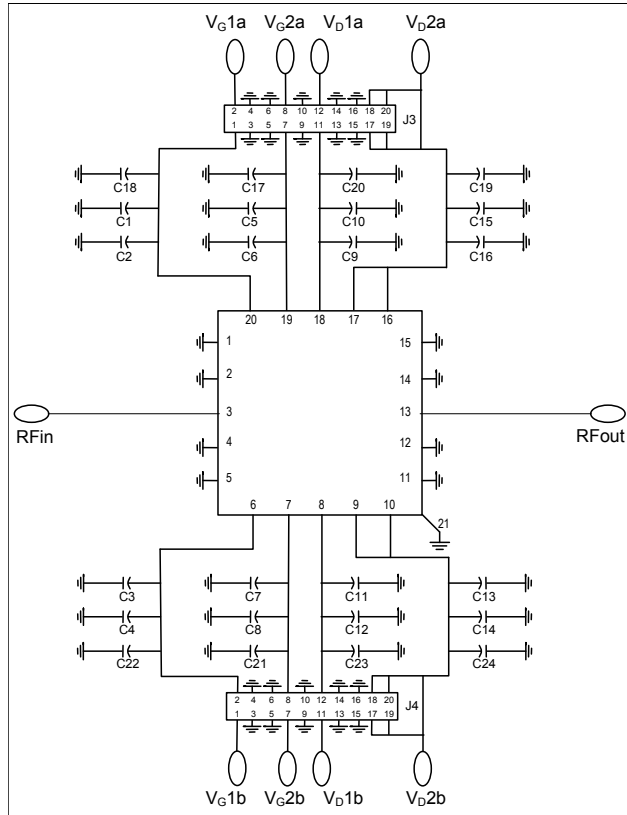
Handling Procedures

Please observe the following precautions to avoid damage:

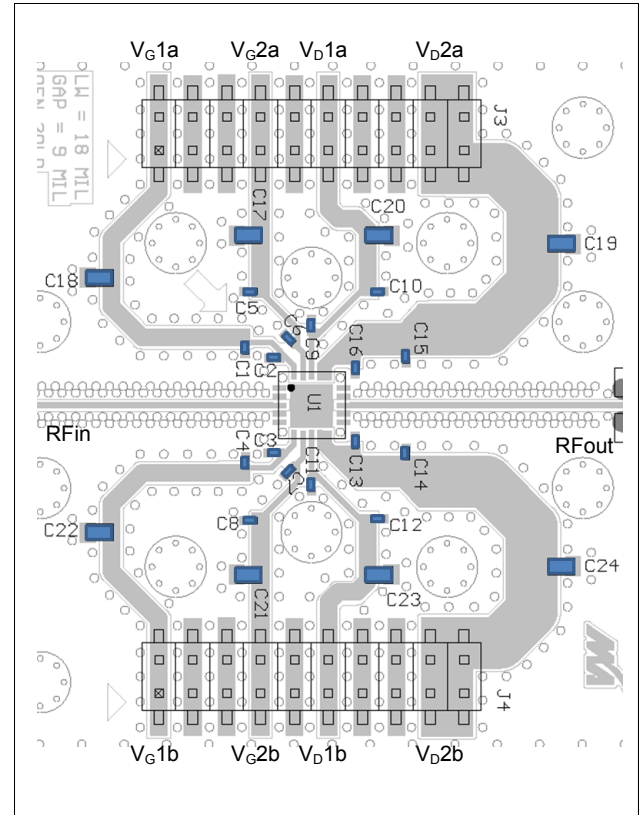
Static Sensitivity

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
C1, C4, C5, C8, C10, C12, C14, C15	1000 pF	0402
C2, C3, C6, C7, C9, C11, C13, C16	100 pF	0402
C17, C18, C21, C22	1 μ F	0805
C19, C20, C23, C24	10 nF	0805

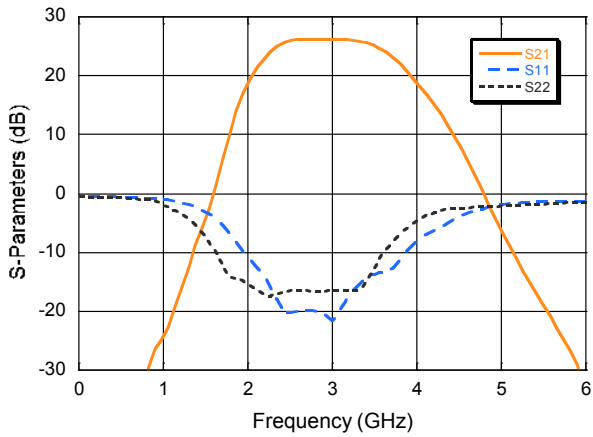
Operating the MAAP-010171

To operate, follow these steps.

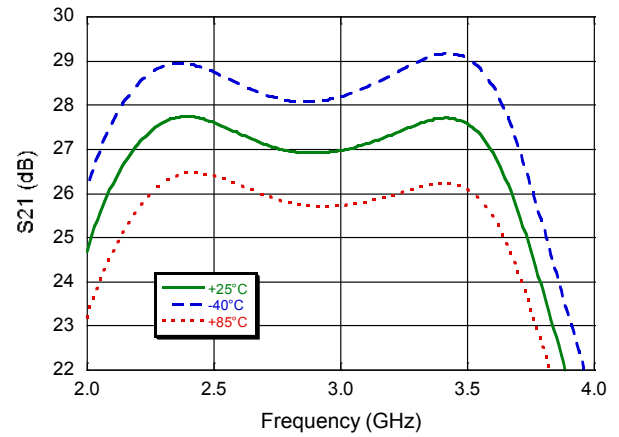
1. Apply V_G between -1 V and -0.5 V to set IDQ to 1 A
2. Apply V_{DD} Pulsed
3. Apply RF Power ON
4. The RF ports (pins 3 & 13) are not DC blocked.
Do not apply DC voltage directly onto these pins.
5. Ramp down or shut down in reverse order.

Typical Performance Curves

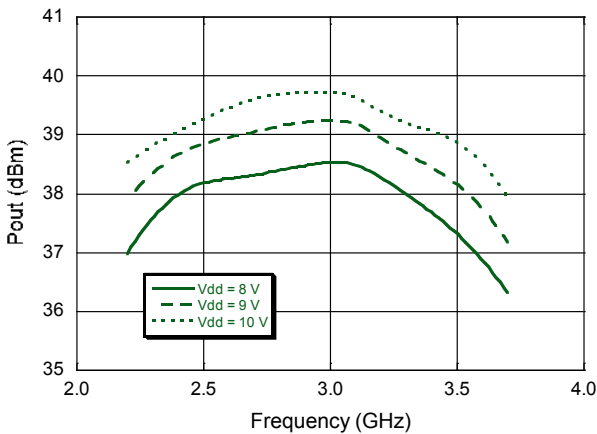
S-Parameters



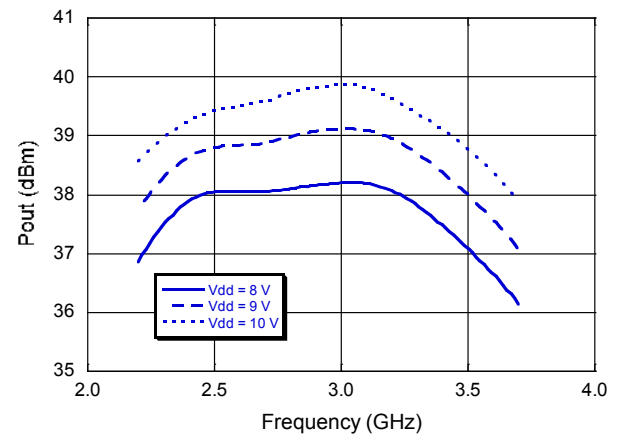
Small Signal Gain



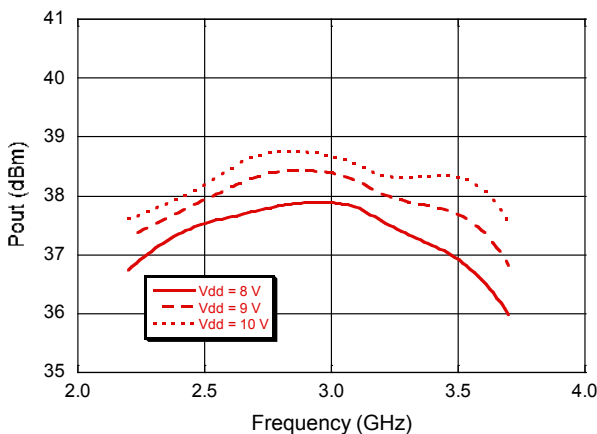
Output Power, Pin = 19 dBm @ +25°C



Output Power, Pin = 19 dBm @ -40°C



Output Power, Pin = 19 dBm @ +85°C

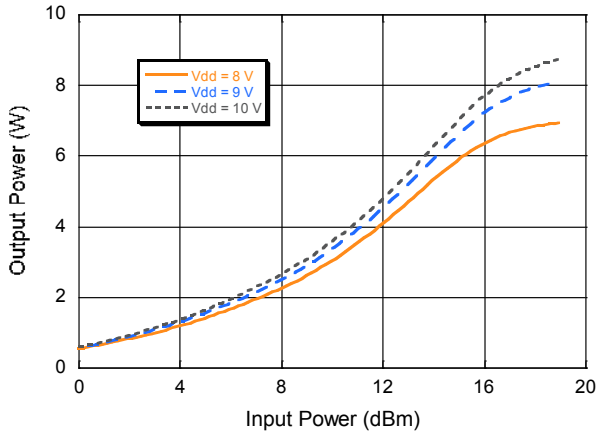


Amplifier, Power, 8 W 2.5 - 3.5 GHz

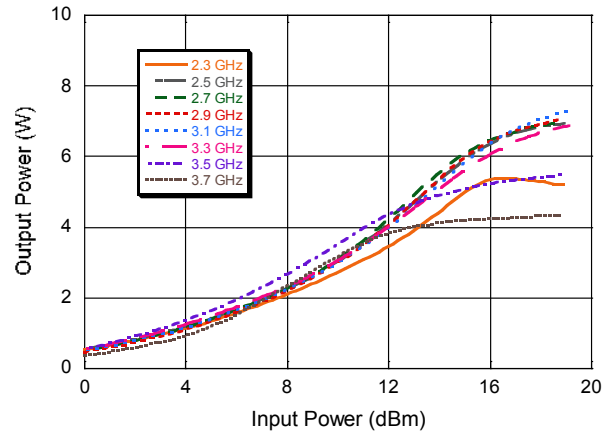
Rev. V3

Typical Performance Curves

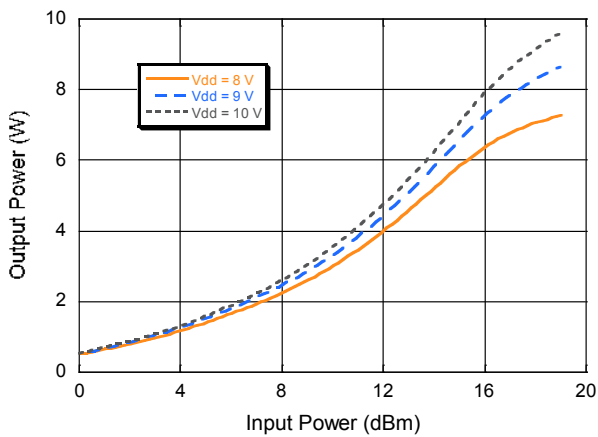
Output Power @ 2.5 GHz



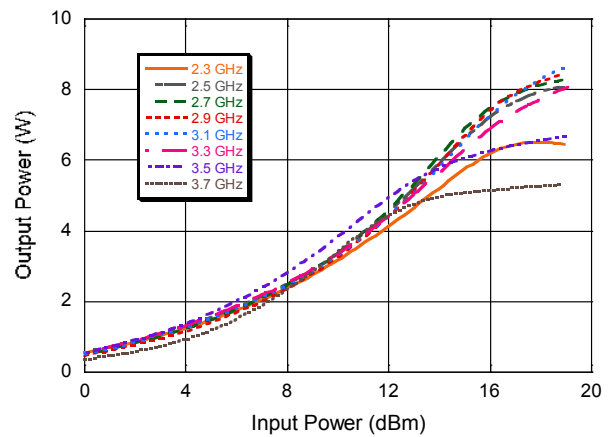
Output Power, V_{DD} = 8 V



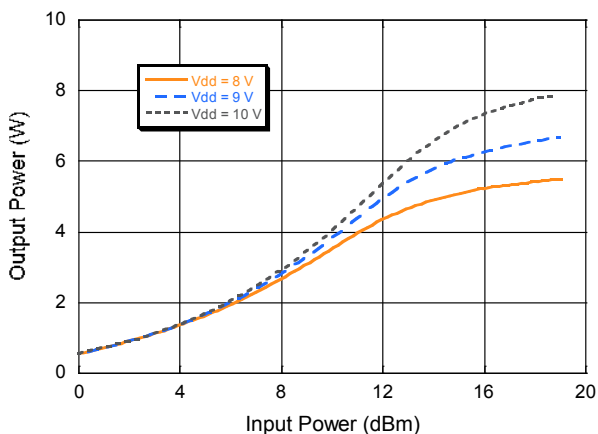
Output Power @ 3.1 GHz



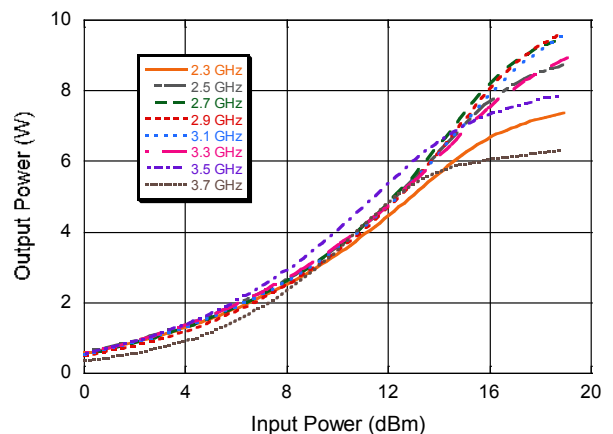
Output Power, V_{DD} = 9 V



Output Power @ 3.5 GHz

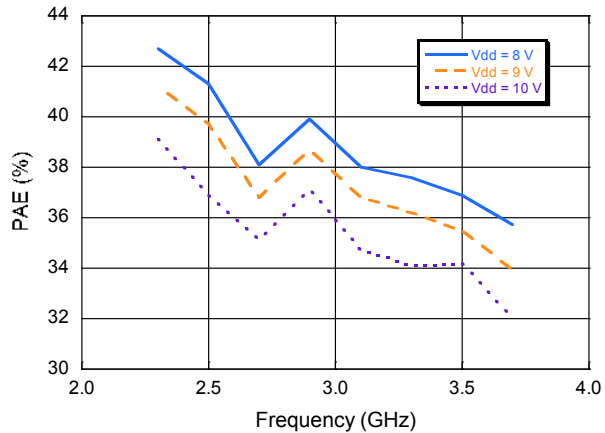


Output Power, V_{DD} = 10 V

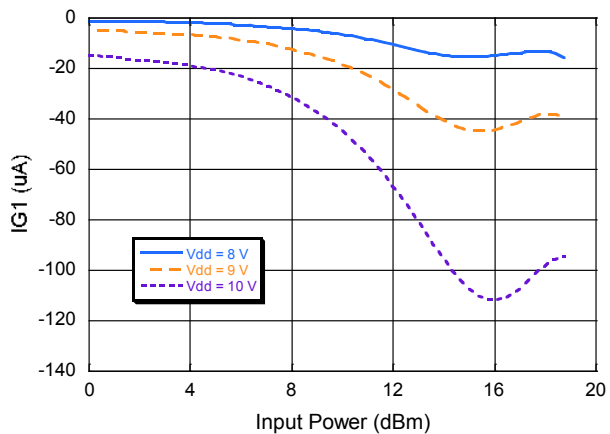


Typical Performance Curves

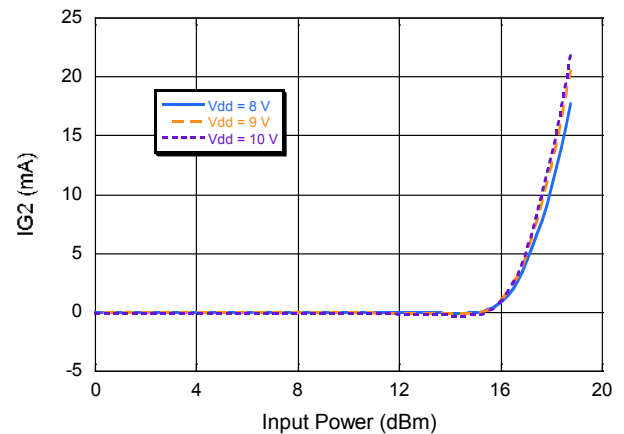
PAE



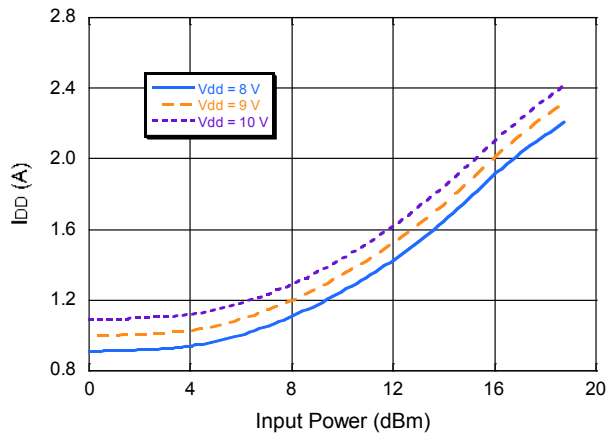
1st Stage Gate Current @ 2.9 GHz



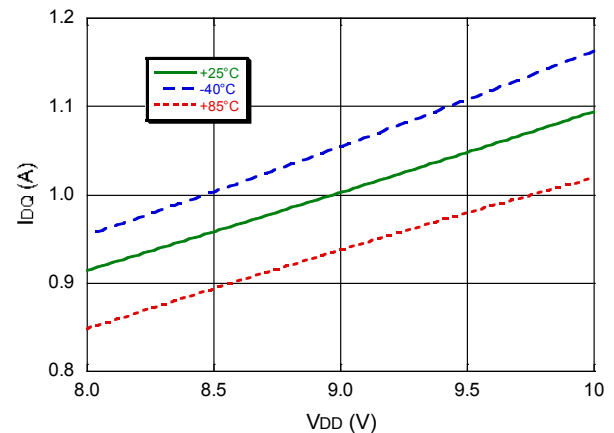
2nd Stage Gate Current @ 2.9 GHz



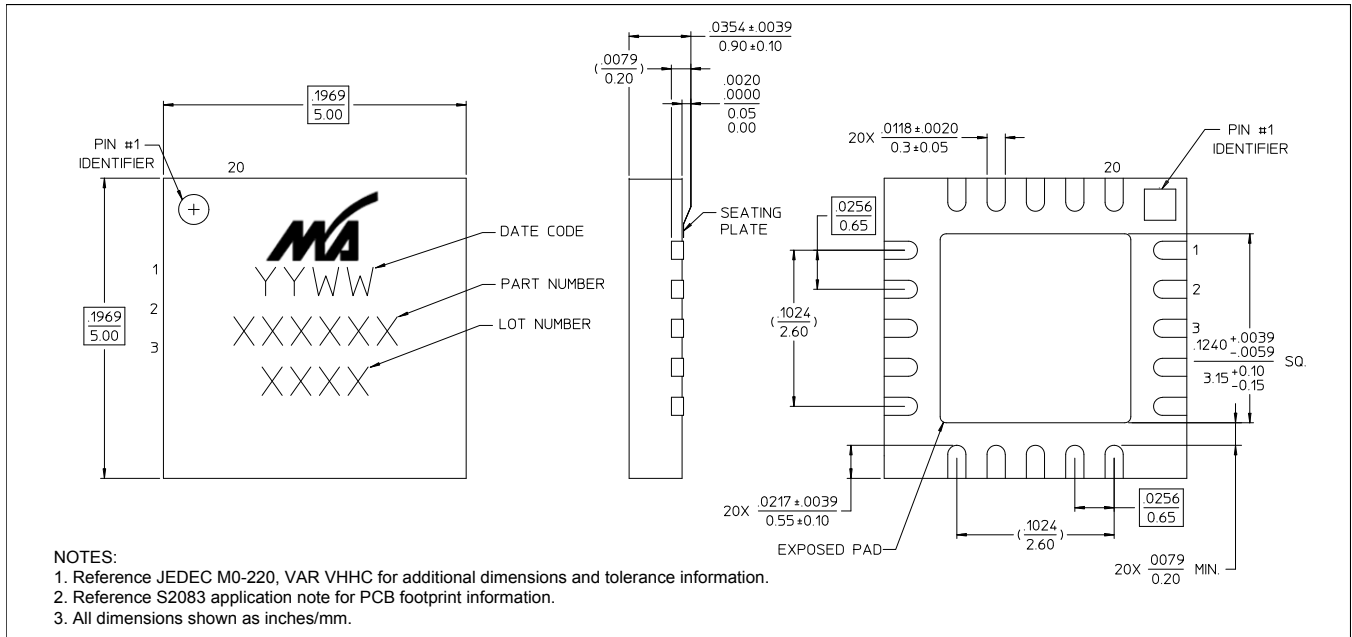
Drain Current @ 2.9 GHz



Small Signal Drain Current @ 2.9 GHz



Lead-Free 5 mm 20-Lead PQFN[†]



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

M/A-COM Technology Solutions Inc. All rights reserved.

Information in this document is provided in connection with M/A-COM Technology Solutions Inc ("MACOM") products. These materials are provided by MACOM as a service to its customers and may be used for informational purposes only. Except as provided in MACOM's Terms and Conditions of Sale for such products or in any separate agreement related to this document, MACOM assumes no liability whatsoever. MACOM assumes no responsibility for errors or omissions in these materials. MACOM may make changes to specifications and product descriptions at any time, without notice. MACOM makes no commitment to update the information and shall have no responsibility whatsoever for conflicts or incompatibilities arising from future changes to its specifications and product descriptions. No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document.

THESE MATERIALS ARE PROVIDED "AS IS" WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, RELATING TO SALE AND/OR USE OF MACOM PRODUCTS INCLUDING LIABILITY OR WARRANTIES RELATING TO FITNESS FOR A PARTICULAR PURPOSE, CONSEQUENTIAL OR INCIDENTAL DAMAGES, MERCHANTABILITY, OR INFRINGEMENT OF ANY PATENT, COPYRIGHT OR OTHER INTELLECTUAL PROPERTY RIGHT. MACOM FURTHER DOES NOT WARRANT THE ACCURACY OR COMPLETENESS OF THE INFORMATION, TEXT, GRAPHICS OR OTHER ITEMS CONTAINED WITHIN THESE MATERIALS. MACOM SHALL NOT BE LIABLE FOR ANY SPECIAL, INDIRECT, INCIDENTAL, OR CONSEQUENTIAL DAMAGES, INCLUDING WITHOUT LIMITATION, LOST REVENUES OR LOST PROFITS, WHICH MAY RESULT FROM THE USE OF THESE MATERIALS.

MACOM products are not intended for use in medical, lifesaving or life sustaining applications. MACOM customers using or selling MACOM products for use in such applications do so at their own risk and agree to fully indemnify MACOM for any damages resulting from such improper use or sale.

8

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