**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**

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Package</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAAP-011027-TR0500</td>
<td>500 piece reel</td>
</tr>
<tr>
<td>MAAP-011027-TR1000</td>
<td>1000 piece reel</td>
</tr>
<tr>
<td>MAAP-011027-001SMB</td>
<td>Sample Board</td>
</tr>
</tbody>
</table>

1. Reference Application Note M513 for reel size information.

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, compliant to current RoHS EU directive.
Amplifier, Power, 8 W
5.2 - 5.9 GHz

Electrical Specifications:
Freq. 5.2 - 5.9 GHz, \( V_{DD} = 9 \) V Pulsed, 100 \( \mu \)s Pulse Width, 10% Duty Cycle, \( Z_0 = 50 \) Ω

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Units</th>
<th>Min.</th>
<th>Typ.</th>
<th>Max.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gain</td>
<td>dB</td>
<td>17</td>
<td>20</td>
<td>—</td>
</tr>
<tr>
<td>Input Return Loss</td>
<td>dB</td>
<td>—</td>
<td>10</td>
<td>—</td>
</tr>
<tr>
<td>Output Return Loss</td>
<td>dB</td>
<td>—</td>
<td>10</td>
<td>—</td>
</tr>
<tr>
<td>( P_{SAT} )</td>
<td>dBm</td>
<td>37</td>
<td>39</td>
<td>—</td>
</tr>
<tr>
<td>Pulse Period</td>
<td>µs</td>
<td>—</td>
<td>100</td>
<td>—</td>
</tr>
<tr>
<td>Pulse Duty Cycle</td>
<td>%</td>
<td>—</td>
<td>10</td>
<td>—</td>
</tr>
<tr>
<td>Efficiency</td>
<td>%</td>
<td>—</td>
<td>37</td>
<td>—</td>
</tr>
<tr>
<td>Small Signal Current</td>
<td>A</td>
<td>—</td>
<td>1</td>
<td>—</td>
</tr>
</tbody>
</table>

Maximum Operating Ratings\(^{4,5,6}\)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Absolute Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input Power</td>
<td>28 dBm</td>
</tr>
<tr>
<td>Supply Voltage</td>
<td>11 V</td>
</tr>
<tr>
<td>Operating Temperature</td>
<td>-40°C to +85°C</td>
</tr>
<tr>
<td>Junction Temperature(^7)</td>
<td>+150 °C</td>
</tr>
<tr>
<td>Storage Temperature</td>
<td>-55°C to +150°C</td>
</tr>
</tbody>
</table>

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.

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 x 10⁷ hours.
7. Junction Temperature \( (T_J) = T_C + \Theta_{JC} * (V * I) \)
   Typical CW thermal resistance \( (\Theta_{JC}) = 7.7 °C/W \)

MACOM 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.

For further information and support please visit:
https://www.macom.com/support

DC-0004492
Schematic

Recommended PCB Layout

Parts List

<table>
<thead>
<tr>
<th>Component</th>
<th>Value</th>
<th>Package</th>
</tr>
</thead>
<tbody>
<tr>
<td>C2, C3, C5, C7, C9, C11, C13, C16</td>
<td>100 pF</td>
<td>0402</td>
</tr>
<tr>
<td>C1, C4, C6, C8, C10, C12, C14, C15</td>
<td>1000 pF</td>
<td>0402</td>
</tr>
<tr>
<td>C17, C18, C21, C22</td>
<td>1 µF</td>
<td>0805</td>
</tr>
<tr>
<td>C19, C20, C23, C24</td>
<td>10 nF</td>
<td>0805</td>
</tr>
</tbody>
</table>

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
Amplifier, Power, 8 W
5.2 - 5.9 GHz

Typical Performance Curves over Temperature

**Gain**

- S21 (dB)
- Frequency (GHz)

**Reverse Isolation**

- S12 (dB)
- Frequency (GHz)

**Input Return Loss**

- S11 (dB)
- Frequency (GHz)

**Output Return Loss**

- S22 (dB)
- Frequency (GHz)

**Output Power**

- Output Power (dBm)
- Frequency (GHz)

**Power Added Efficiency**

- PAE (%)
- Frequency (GHz)

For further information and support please visit:
https://www.macom.com/support

MACOM 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](http://www.macom.com) for additional data sheets and product information.
Typical Performance Curves over Voltage

**Gain**

![Gain Chart]

**Reverse Isolation**

![Reverse Isolation Chart]

**Input Return Loss**

![Input Return Loss Chart]

**Output Return Loss**

![Output Return Loss Chart]

**Output Power**

![Output Power Chart]

**Power Added Efficiency**

![Power Added Efficiency Chart]
Typical Performance Curves

**Power Gain vs. Input Power**

![Power Gain vs. Input Power](image1)

**Power Added Efficiency vs. Output Power**

![Power Added Efficiency vs. Output Power](image2)

**Power Gain vs. Input Power @ 5.6 GHz**

![Power Gain vs. Input Power @ 5.6 GHz](image3)

**Power Added Efficiency vs. Input Power @ 5.6 GHz**

![Power Added Efficiency vs. Input Power @ 5.6 GHz](image4)

**Power Gain vs. Input Power @ 5.6 GHz**

![Power Gain vs. Input Power @ 5.6 GHz](image5)

**Power Added Efficiency vs. Input Power @ 5.6 GHz**

![Power Added Efficiency vs. Input Power @ 5.6 GHz](image6)

MACOM 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](http://www.macom.com) for additional data sheets and product information.

For further information and support please visit:
[https://www.macom.com/support](https://www.macom.com/support)
Amplifier, Power, 8 W
5.2 - 5.9 GHz

Typical Performance Curves

Small Signal wideband performance

Power Dissipation\(^8\) vs. Case Temperature\(^5,\text{10}\)

 Drain Current vs. Input Power @ \(T=+25^\circ\text{C}, F=5.6\text{ GHz}\)

 Drain Current vs. Input Power @ \(T=+25^\circ\text{C}, V_\text{D} = 9\text{ V}\)

 Drain Current vs. Input Power @ \(F=5.6\text{ GHz}, V_\text{D} = 9\text{ V}\)

8. Average dissipated power: \(P_{\text{Diss}} = P_{\text{DC}} + P_{\text{IN}} - P_{\text{OUT}}\) (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 \(P_{\text{AVERAGE}} = P_{\text{PEAK}}/D\), where \(D\) is duty cycle.
10. For pulses wider than 100 µs self heating during pulse reduces allowable average dissipated power.
Lead-Free 5 mm 20-Lead PQFN†

† Reference Application Note S2083 for lead-free solder reflow recommendations.
Meets JEDEC moisture sensitivity level 3 requirements.
Plating is 100% matte tin over copper.
Amplifier, Power, 8 W
5.2 - 5.9 GHz

MACOM Technology Solutions Inc. All rights reserved.

Information in this document is provided in connection with MACOM 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 estoppels 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.