# Family of New Wideband Power Amplifiers

## DC-40 GHz

<table>
<thead>
<tr>
<th>Part Number and Frequency</th>
<th>Power (dBm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAAP-011247, 2 W, DC-22 GHz</td>
<td>33</td>
</tr>
<tr>
<td>MAAP-011248, 1 W, DC-22 GHz</td>
<td>30</td>
</tr>
<tr>
<td>MAAP-011249, 1/2 W, DC-27 GHz</td>
<td>27</td>
</tr>
<tr>
<td>MAAM-011242, 1/4 W, DC-26.5 GHz</td>
<td>24</td>
</tr>
<tr>
<td>MAAM-011243, 1/4 W, DC-40 GHz</td>
<td></td>
</tr>
</tbody>
</table>

*All Parts listed above are also available in Bare Die*
MAAP-011247-000, DC-22 GHz 2W Driver

2 W Psat distributed amplifier operates from 100KHz to 22 GHz and provides 12dB of linear gain. Fully matched across the band. Device can be used in Test & Measurement, EW, ECM, and Radar applications. US ECCN EAR99.

Features

- High Gain: 12 dB
- $P_{\text{SAT}}$: 33 dBm
- Output IP3: +40 dBm
- DIE and 5 mm AQFN Package
- Integrated output power detector

S-parameters (dB)
MAAP-011248-DIE, DC-22 GHz 1W Driver

1 W Psat distributed amplifier operates from 100KHz to 22 GHz and provides 12.5 dB of linear gain. Fully matched across the band. Device can be used in Test & Measurement, EW, ECM, and Radar applications. US ECCN EAR99.

Features

- High Gain: 12.5 dB
- $P_{SAT}$: 30 dBm
- Output IP3: +40 dBm
- DIE and 5 mm AQFN Package
- Integrated output power detector

S-parameters (dB)

Psat (dBm)

HMC797 Drop In
E-mode Darlington gain block offers high performance across broad frequency band. Fully matched, with 15dB gain, 20dBm Pout on a +5V single bias & also features a current adjust pin. ECCN EAR99

**Features:**
- DC – 15 GHz Operation
- 20.5 dBm Psat
- 14 dB Gain
- 4 dB Noise Figure
- Single +5V supply
- 1.2 x 1.5 mm DFN Package

**Key Applications:**
- Test & Measurement
- Communication Networks
- A&D Gain Blocks
Family of New Wideband Low Noise Amplifiers
DC-40 GHz

- Fully Matched Across band
- Positive Bias Operation
- 2 mm and 5 mm QFN Packages
MAAL-011141: 100KHz-26.5 GHz Wideband LNA

Wideband LNA with single positive bias covering 0.01-26.5 GHz. Offers exceptional low noise figure performance over broadband frequency range. US ECCN EAR99

Features:
- 100KHz-26.5 GHz operation
- High Gain: 17 dB
- Low Noise: 1.5 dB Typical
- Single positive bias supply
- DIE or 5 mm QFN Package

Key Applications:
- Test and Measurement
- Wideband Receivers
MADT-011000: 5-45 GHz Wideband Detector

Fully matched, wideband detector can be implemented through external directional coupler. Excellent return loss, temperature compensated and broad dynamic range.

Features:
- Wideband Operation
- Fully matched across band
- Broad Dynamic Range: 30 dB
- Bare Die and 3mm PQFN

Key Applications:
- Test and Measurement
- Network Communications
- Aerospace and Defense
Family of New Broadband VCOs

- Best in Class Phase Noise
- Excellent Temperature Stability
- +5 V Bias Operation
- Low Current Consumption
- Lead-Free 24-Lead 4 mm QFN Package

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Frequency (GHz)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAOC-415000</td>
<td>10-20 GHz</td>
</tr>
<tr>
<td>MAOC-410100</td>
<td>7-14 GHz</td>
</tr>
<tr>
<td>MAOC-409000</td>
<td>6-12 GHz</td>
</tr>
<tr>
<td>MAOC-407500</td>
<td>5-10 GHz</td>
</tr>
<tr>
<td>MAOC-406000</td>
<td>4-8 GHz</td>
</tr>
<tr>
<td>MAOC-404500</td>
<td>3-6 GHz</td>
</tr>
<tr>
<td>MAOC-403000</td>
<td>2-4 GHz</td>
</tr>
</tbody>
</table>

4 x 4 mm QFN Package

Vtune

RF

Vcc
**MAOC-415000: 10-20 GHz Octave VCO**

Octave tuning with very low phase noise and excellent temperature stability. Fully matched with stable output power over temperature and offered in 4 mm PQFN package.

**Features:**
- Octave Band Tuning
- Phase Noise: -95dBc/Hz @ 100kHz
- Excellent Temp. Stability
- +5V Bias Supply
- Lead-Free 4 mm QFN

**Key Applications:**
- Test & Measurement
- Communication Networks
Family of New Wideband Mixers

- Double Balanced and Image Reject Mixers
- Broad RF/LO Frequency Coverage
- High Linearity Performance
- Excellent Isolation
- Bare Die and QFN Packages

### Double Balanced Mixers

<table>
<thead>
<tr>
<th>Model</th>
<th>Frequency (GHz)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAMX-011036</td>
<td>7-43</td>
</tr>
<tr>
<td>MAMX-011037</td>
<td>18-40</td>
</tr>
<tr>
<td>MAMX-011038</td>
<td>6-26</td>
</tr>
<tr>
<td>MAMX-011035</td>
<td>5-16.5</td>
</tr>
<tr>
<td>MAMX-011034</td>
<td>3-12</td>
</tr>
<tr>
<td>MAMX-011033</td>
<td>2-8</td>
</tr>
</tbody>
</table>

### Image Reject Mixers

<table>
<thead>
<tr>
<th>Model</th>
<th>Frequency (GHz)</th>
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<tbody>
<tr>
<td>MAMX-011043</td>
<td>15-45</td>
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<tr>
<td>MAMX-011040</td>
<td>6-26</td>
</tr>
<tr>
<td>MAMX-011046</td>
<td>8-13.5</td>
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<tr>
<td>MAMX-011045</td>
<td>4-8</td>
</tr>
<tr>
<td>MAMX-011044</td>
<td>2-8</td>
</tr>
</tbody>
</table>
MAMX-0111036: 7-40 GHz Double Balanced Mixer

Passive, Double Balanced Mixer with wideband operation covering 7-40 GHz. High linearity performance, broad range of IF frequencies and high levels of isolation. Double-balanced (DBL BAL) passive diode mixer MMIC. Low conversion loss, high linearity and a wide IF bandwidth. The DBL BAL configuration provides excellent port isolation while internal 50-ohm matching simplifies its application. This mixer is well suited for applications such as test and measurement, microwave radio and radar. US ECCN EAR99.

Features:
• 7-40 GHz Operation
• High Linearity with 20 dBm IIP3
• DC-10 GHz IF Bandwidth
• Die or 3 mm QFN Package

Key Applications:
• Test & Measurement
• Network Communications
• Aerospace and Defense
MACOM offers a complete family of high linearity Power Amplifiers for Ka-Band SATCOM and VSAT applications

**New Ka-Band 3 W PA**
**MAAP-011289**
- Saturated Power of 35 dBm
- High Gain with > 20 dB
- 26% Power Added Efficiency
- 5 mm QFN Package
MAAP-011199: 80 – 100 GHz W-Band Power Amplifier

Balanced, 3-Stage high gain MMIC PA. Wideband operation for W-Band mmWave applications with 24.5 dBm output power. Export is “US De Minimis”, minimal US content.

Features:
- $P_{\text{Sat}}$: 24 dBm
- High Gain: 12 dB
- Return Losses: 15 dB
- Bare Die

Key Applications:
- mmWave Communication
- 94 GHz imaging
- Security and Sensors
MAAP-011215: 55 – 70 GHz V-Band Power Amplifier

Balanced 4 stage amplifier covering 55-70 GHz with 25 dBm Psat and excellent return loss. Export Status: De minimis, minimal US content.

Features:
- Psat: 25 dBm
- Gain >20 dB
- OIP3 > 30 dBm
- Return Losses >15 dB
- Variable gain with adjustable bias
- Integrated power detector
- Bare Die MMIC

Key Applications:
- V-Band Communications
- Test and Measurement
- WiGiG Networks
GaN Options

MACOM GEN4 GaN on Si for RF Energy
Pushing 2.45 GHz Efficiencies Beyond 70%
# 915 MHz RF Energy MACOM GaN on Si Portfolio

<table>
<thead>
<tr>
<th>Type Number</th>
<th>$P_{OUT}$ (Watts)</th>
<th>Freq. (MHz)</th>
<th>Gain $^*$1 (dB)</th>
<th>Eff. $^*$1 (%)</th>
<th>Package</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAGe-100825-002</td>
<td>2</td>
<td>896-2500</td>
<td>19.5</td>
<td>73</td>
<td>6x3 mm PDFN-14LD</td>
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<tr>
<td>MAGe-100825-005</td>
<td>5</td>
<td>896-2500</td>
<td>19.5</td>
<td>73</td>
<td>6x3 mm PDFN-14LD</td>
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<tr>
<td>MAGe-100825-010</td>
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<td>896-2500</td>
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<td>7x7 mm PQFN-20</td>
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<tr>
<td>MAGe-100809-600</td>
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<td>896-928</td>
<td>21</td>
<td>73</td>
<td>AC-780S-2</td>
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<tr>
<td>MAGe-100809-1K0</td>
<td>1000</td>
<td>896-928</td>
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<td>72</td>
<td>AC-1230-S4</td>
</tr>
</tbody>
</table>

MACOM GEN4 GaN. All specifications at $V_{DS} = 50$ V, Continuous Wave Operation, $T_C = 25^\circ$C

$^*$1 @ $P_{2db}$
## 2.45 GHz RF Energy MACOM GaN on Si Portfolio

<table>
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<tr>
<th>Type Number</th>
<th>P\text{OUT} (Watts)</th>
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<th>Package</th>
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<td>6x3 mm PDFN-14LD</td>
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<tr>
<td>MAGe-100825-010</td>
<td>10</td>
<td>896-2500</td>
<td>19.5</td>
<td>73</td>
<td>7x7 mm PQFN-20</td>
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<tr>
<td>MAGe-102425-015</td>
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<td>2400-2500</td>
<td>18.5</td>
<td>73</td>
<td>7x7 mm PQFN-20</td>
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<tr>
<td>MAGe-102425-030</td>
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<td>2400-2500</td>
<td>18.3</td>
<td>73</td>
<td>7x7 mm PQFN-20</td>
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<tr>
<td>MAGe-102425-050</td>
<td>50</td>
<td>2400-2500</td>
<td>17.5</td>
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<td>TO-272S-2</td>
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<tr>
<td>MAGe-102425-100</td>
<td>100</td>
<td>2400-2500</td>
<td>17.5</td>
<td>72</td>
<td>TO-272S-2</td>
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<tr>
<td>MAGe-102425-300</td>
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<td>2400-2500</td>
<td>16.5</td>
<td>70</td>
<td>TO-272S-4</td>
</tr>
</tbody>
</table>

MACOM GEN4 GaN. All specifications at \( V_{\text{DS}} = 50 \text{ V} \), Continuous Wave Operation, \( T_C = 25^\circ \text{C} \)

*1 @ \( P_{2\text{dB}} \)

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6x3 mm PDFN-14LD 7x7 mm PQFN-20 TO-272S-2 TO-272S-4
50 W 2.45 GHz RF Energy
MACOM GEN4 GaN on Si Pushing Efficiencies at 2.45 GHz Beyond 70%

MAGe-102425-050

- Plastic TO-272S-2 Package
- $V_{DS} = 30$ V (50 V Capable)
- Freq. = 2.4 – 2.5 GHz
- $P_{OUT} = 30$ W
- Power Gain = 18 dB
- Drain Efficiency = 73%

TO-272S-2
50 W 2.45 GHz RF Energy
MACOM GEN4 GaN on Si Pushing Efficiencies at 2.45 GHz Beyond 70%

MAGe-102425-050
- $V_{DS} = 30$ V
- Freq. = 2.4 – 2.5 GHz
- $P_{OUT} = 30$ W
- Continuous Wave

TO-272S-2
300 W 2.45 GHz RF Energy
High Efficiencies Opens New Opportunities For RF Energy

MAGe-102425-300

- Plastic TO-272S-4 Package
- $V_{DS} = 50\, V$, $I_{DQ} = 200\, mA$
- Freq. $= 2.4 - 2.5\, \mathrm{GHz}$
- $P_{\text{OUT}} > 300\, W$ (Continuous Wave)
- Power Gain $= 16.5\, \mathrm{dB}$ (CW)
- Drain Efficiency $= 70\%$ (CW)
300 W 2.4 5GHz RF Energy
High Efficiencies Opens New Opportunities For RF Energy

MAGe-102425-300
- Plastic TO-272S-4 Package
- $V_{DS} = 50$ V, $I_{DQ} = 200$ mA
- Freq. = 2.45 GHz
- Continuous Wave
2-Stage GEN4 GaN on Si RF Energy Module

MACOM GEN4 GaN on Si

- All Plastic Packaging Lineup
- Driver: MAGe-100825-002
- Final: MAGe-102425-050
- $V_{DS} = 30$ V (50 V Capable)
- Freq. = 2.4 – 2.5 GHz
- $P_{OUT} > 30$ W (Continuous Wave)
- Power Gain = 33 dB (CW)
- Drain Efficiency = 67% (CW)
- Integrated FWD and REV Power Detection
- Off-Board MACOM Proprietary
- Exciter and Controller

Easy To Use GEN4 GaN on Si

DISRUPTIVE TECHNOLOGIES TO GLOBAL MARKETS

Richardson Electronics
POWER & MICROWAVE TECHNOLOGIES

MACOM
 Partners from RF to Light