**Product Description**

**MECKULNA1** is a 0.25µm GaN HEMT based Low Noise Amplifier designed by MEC for Ku-Band applications.

In the frequency range from 12 GHz to 16 GHz MECKULNA1 provides 24dB of linear gain, 1.7 dB of noise figure, P1dB of 21.5 dB and Output TOI of 30 dBm.

In addition to the high electrical performances, this GaN LNA provides an high level of input power robustness being capable of surviving up to 25 dBm without degrading its performance.

**Main Features**

- 0.25µm GaN HEMT Technology
- 12–16 GHz full performance Frequency Range
- Small Signal Gain > 24 dB
- Noise Figure: <1.7 (12 - 15 GHz)
- Noise Figure: <2 (15 - 16 GHz)
- P1dB > 21.5 dBm, Psat > 29 dBm
- Output TOI > 30 dBm
- Overdrive Pin > 25 dBm
- Bias: Vd = 15V, Id = 70mA, Vg = -2.8V (Typ.)
- Chip Size: 4 x 2 x 0.1 mm³

**Typical Applications**

- Radar
- Telecom

**Measured Data**

![Measured Data Graph](image)
## Main Characteristics

Test Conditions: $T_{\text{base_plate}} = 25^\circ\text{C}$, $V_d = 15\ \text{V}$, $I_d = 70\ \text{mA}$

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Min</th>
<th>Typ</th>
<th>Max</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating frequency</td>
<td>12</td>
<td>16</td>
<td>16</td>
<td>GHz</td>
</tr>
<tr>
<td>Small Signal Gain</td>
<td>24</td>
<td>24</td>
<td>24</td>
<td>dB</td>
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<tr>
<td>Noise Figure</td>
<td>1.7</td>
<td>2.0</td>
<td>2.0</td>
<td>dB</td>
</tr>
<tr>
<td>Input Return Loss</td>
<td>-8</td>
<td>-8</td>
<td>-8</td>
<td>dB</td>
</tr>
<tr>
<td>Output Return Loss</td>
<td>-12</td>
<td>-12</td>
<td>-12</td>
<td>dB</td>
</tr>
<tr>
<td>Output Power at 1 dB of Gain Compression</td>
<td>21.5</td>
<td>21.5</td>
<td>21.5</td>
<td>dBm</td>
</tr>
<tr>
<td>Output Power at 5 dB of Gain Compression</td>
<td>29</td>
<td>29</td>
<td>29</td>
<td>dBm</td>
</tr>
<tr>
<td>Max. Overdrive Input Power *</td>
<td>25</td>
<td>25</td>
<td>25</td>
<td>dBm</td>
</tr>
<tr>
<td>Output TOI (1 MHz tone spacing)</td>
<td>30</td>
<td>30</td>
<td>30</td>
<td>dBm</td>
</tr>
<tr>
<td>3rd Order C/I at 8 dB of Backoff (1 MHz tone spacing)</td>
<td>38</td>
<td>38</td>
<td>38</td>
<td>dBc</td>
</tr>
<tr>
<td>3rd Order C/I at 5 dB of Backoff (1 MHz tone spacing)</td>
<td>32</td>
<td>32</td>
<td>32</td>
<td>dBc</td>
</tr>
<tr>
<td>Drain Supply Voltage</td>
<td>15</td>
<td>15</td>
<td>15</td>
<td>V</td>
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<tr>
<td>Supply Quiescent Drain Current</td>
<td>70</td>
<td>70</td>
<td>70</td>
<td>mA</td>
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<tr>
<td>DC Power Consumption</td>
<td>1.05</td>
<td>1.05</td>
<td>1.05</td>
<td>W</td>
</tr>
<tr>
<td>DC Power Consumption at 1 dB of Gain Compr.</td>
<td>1.42</td>
<td>1.42</td>
<td>1.42</td>
<td>W</td>
</tr>
</tbody>
</table>

* LNA ruggedness to overdrive input power data are available upon request.
Linear Gain, Noise Figure, Input and Output Return Loss

Test Conditions: $T_{\text{base_plate}} = 25^\circ\text{C}$, $V_d = 15\, \text{V}$, $I_{dq} = 70\, \text{mA}$
Linear Gain and Noise Figure over Quiescent Drain Current

Test Conditions: $T_{\text{base_plate}} = 25^\circ\text{C}$, $V_d = 15$ V
Nonlinear Measurement: Output Power, OTOI, DC Power

Test Conditions: $T_{\text{base_plate}} = 25°C, V_d = 15\, V, \, I_{dq} = 70\, mA$

- $P_{1\text{dB}}$ condition reached at $P_{in} = 0\, \text{dBm}$
- $P_{5\text{dB}}$ condition reached at $P_{in} = 11\, \text{dBm}$
- OTOI: 2 tone measurements with tone spacing of 1 MHz. Linear regression formula with $P_{in} \, \text{D.C.L.} = [-12, -6] \, \text{dBm}$
Nonlinear Measurement: 3rd Order Inter-Modulation Distortion

Test Conditions: \( T_{\text{base_plate}} = 25^\circ\text{C} \), \( V_d = 15 \text{ V} \), \( I_{dq} = 70 \text{ mA} \),

2-tone measurements with tone spacing of 1 MHz - Centre frequency from 12 GHz to 16 GHz

\[
\begin{align*}
\text{f}_0 &= 12\text{GHz} \\
\text{f}_0 &= 13\text{GHz} \\
\text{f}_0 &= 14\text{GHz} \\
\text{f}_0 &= 15\text{GHz} \\
\text{f}_0 &= 16\text{GHz}
\end{align*}
\]

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Preliminary Data Sheet
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Bond Pad Configuration & Assembly Recommendations

<table>
<thead>
<tr>
<th>Bond Pad #</th>
<th>Connection</th>
<th>External Components</th>
</tr>
</thead>
<tbody>
<tr>
<td>IN and OUT</td>
<td>2 Bonding Wires L_{bond} = 0.3nH</td>
<td></td>
</tr>
<tr>
<td>1, 3, 5 Vg</td>
<td>L_{bond} ≤ 1 nH</td>
<td>C1 = 100pF/10V C2 = 10nF/10V</td>
</tr>
<tr>
<td>2, 4, 6, Vd</td>
<td>L_{bond} ≤ 1nH</td>
<td>C1 = 100pF/50V C2 = 10nF/50V</td>
</tr>
</tbody>
</table>

Eutectic Die bond using AuSn (80/20) solder is recommended.

The backside of the die is the Source (ground) contact.

Thermosonic ball or wedge bonding are the preferred connection methods.

Gold wire must be used for connections.

Bias Procedure

**Bias-Up**

1. Vg set to -4 V.
2. Vd set to +15 V.
3. Adjust Vg until quiescent Id is 70 mA (Vg = -2.8 V Typical).
4. Apply RF signal.

**Bias-Down**

1. Turn off RF signal.
2. Reduce Vg to -4 V (Id0 ≈ 0 mA).
3. Set Vd to 0 V.
4. Turn off Vd.
5. Turn off Vg.
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Notice

The furnished information is believed to be reliable. However, performances and specifications contained herein are based on preliminary characterizations and then susceptible to possible variations. On the basis of customer requirements the product can be tested and characterized in specific operating conditions and, if needed, tuned to meet custom specifications.

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