Main Features

- 0.25 µm GaN HEMT Technology
- 7.4 – 11.4 GHz full performance Frequency Range
- Small Signal Gain > 23 dB
- Noise Figure: 1.6 dB
- P1dB > 22 dBm, Psat > 26 dBm
- Bias: Vd = 10 V, Id = 120 mA, Vg = -2.7 V (Typ.)
- Chip Size: 3 x 2.02 x 0.1 mm³

Product Description

MECGaNLNAX is a 0.25 µm GaN HEMT based Low Noise Amplifier designed and tested by MEC for X-Band applications.

In the frequency range from 7.4 GHz to 11.6 GHz MECGaNLNAX provides more than 23 dB of linear gain with ±0.5 dB of gain flatness and 1.6 dB of noise figure.

In addition to the high electrical performances, this GaN LNA provides an high level of input power robustness being capable of surviving up to 24 dBm without degrading its performance.

Typical Applications

- Radar
- Telecom

Measured Data

![Linear Gain and Noise Figure](image_url)
# X-Band GaN HEMT Low Noise Amplifier

## Main Characteristics

Test Conditions: $T_{\text{base_plate}} = 25 \, ^\circ\text{C}$, $V_d = 10 \, \text{V}$, $I_{dq} = 120 \, \text{mA}$

<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>7.4</td>
<td>11.6</td>
<td>GHz</td>
<td></td>
</tr>
<tr>
<td>Small Signal Gain</td>
<td>23</td>
<td></td>
<td></td>
<td>dB</td>
</tr>
<tr>
<td>Noise Figure</td>
<td>1.6</td>
<td></td>
<td></td>
<td>dB</td>
</tr>
<tr>
<td>Input Return Loss</td>
<td>-15</td>
<td></td>
<td></td>
<td>dB</td>
</tr>
<tr>
<td>Output Return Loss</td>
<td>-15</td>
<td></td>
<td></td>
<td>dB</td>
</tr>
<tr>
<td>Output Power at 1 dB of Gain Compression*</td>
<td>22.5</td>
<td></td>
<td></td>
<td>dBm</td>
</tr>
<tr>
<td>Output Power at Saturation*</td>
<td>26.5</td>
<td></td>
<td></td>
<td>dBm</td>
</tr>
<tr>
<td>Max. Overdrive Input Power</td>
<td></td>
<td>24</td>
<td></td>
<td>dBm</td>
</tr>
<tr>
<td>Drain Supply Voltage</td>
<td>10</td>
<td></td>
<td></td>
<td>V</td>
</tr>
<tr>
<td>Supply Quiescent Drain Current</td>
<td>120</td>
<td></td>
<td></td>
<td>mA</td>
</tr>
<tr>
<td>DC Power Consumption</td>
<td>1.2</td>
<td></td>
<td></td>
<td>W</td>
</tr>
<tr>
<td>DC Power Consumption at 1 dB of Gain Compr.</td>
<td>1.2</td>
<td></td>
<td></td>
<td>W</td>
</tr>
</tbody>
</table>
Small Signal Measurements

Test Conditions: $T_{\text{base, plate}} = 25^\circ \text{C}$, $V_d = 10 \text{ V}$, $I_{dq} = 120 \text{ mA}$

**Linear Gain and Noise Figure**

- Linear Gain [dB]
- Noise Figure [dB]

**Input and Output Return Loss**

- $S_{11}$, $S_{22}$ [dB]

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Preliminary Data Sheet

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Rev. A 19/05/2015
MECGaNLNAX
X-Band GaN HEMT Low Noise Amplifier

Broadband Small Signal Measurements

**Input and Output Return Loss**

![Graph showing S11 and S22 dB vs Frequency (GHz)]

**Linear and Reverse Gain**

![Graph showing S21 and S12 dB vs Frequency (GHz)]

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Preliminary Data Sheet

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MEC – Microwave Electronics for Communications
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Measured Performances Vs. Pin @ Freq. [8.6, 9, 9.4, 10.2, 10.6] GHz

Test Conditions: $T_{\text{base, plate}} = 25$ °C, $V_d = 10$ V, $I_{dq} = 120$ mA

**Output Power Vs. Input Power**

**Drain Current Vs. Input Power**
Test Conditions: $T_{\text{base_plate}} = 25 \, ^\circ\text{C}$, $V_d = 10 \, \text{V}$, $I_{dq} = 120 \, \text{mA}$

Gain Vs. Input Power

Gain Compression Vs. Input Power

Gain [dB]

Pin [dBm]

Gain Comp. [dB]

Pin [dBm]
Test Conditions: $T_{\text{base, plate}} = 25 \, ^\circ \text{C}$, $V_d = 10 \, \text{V}$, $I_{dq} = 120 \, \text{mA}$

- $P_{1\text{dB}}$ condition reached at $P_{\text{in}} = 0 \, \text{dBm}$
- $P_{3\text{dB}}$ condition reached at $P_{\text{in}} = 5 \, \text{dBm}$
- $P_{\text{Sat}}$ condition reached at $P_{\text{in}} = 10 \, \text{dBm}$
**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</td>
<td></td>
</tr>
<tr>
<td></td>
<td>$L_{\text{bond}} = 0.3,\text{nH}$</td>
<td></td>
</tr>
<tr>
<td>1, 3, 5 Vg</td>
<td>$L_{\text{bond}} \leq 1,\text{nH}$</td>
<td>$C_1 = 100,\text{pF/10V}$</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$C_2 = 10,\text{nF/10V}$</td>
</tr>
<tr>
<td>2, 4, 6, Vd</td>
<td>$L_{\text{bond}} \leq 1,\text{nH}$</td>
<td>$C_1 = 100,\text{pF/50V}$</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$C_2 = 10,\text{nF/50V}$</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. $V_g$ set to -5 V.
2. $V_d$ set to +10 V.
3. Adjust $V_g$ until quiescent $I_d$ is 120 mA ($V_g = -2.7$ V Typical).
4. Apply RF signal.

**Bias-Down**
1. Turn off RF signal.
2. Reduce $V_g$ to -5 V ($I_{d0} \approx 0$ mA).
3. Set $V_d$ to 0 V.
4. Turn off $V_d$.
5. Turn off $V_g$. 
Contact Information

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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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