**MECGaNLNAX**

X-Band GaN HEMT Low Noise Amplifier

**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**
**Main Characteristics**

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

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Min</th>
<th>Typ</th>
<th>Max</th>
<th>Unit</th>
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</thead>
<tbody>
<tr>
<td>Operating frequency</td>
<td>7.4</td>
<td>11.6</td>
<td>GHz</td>
<td></td>
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<tr>
<td>Small Signal Gain</td>
<td>23</td>
<td></td>
<td></td>
<td>dB</td>
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<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>
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<td></td>
<td>dBm</td>
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<tr>
<td>Output Power at Saturation*</td>
<td>26.5</td>
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<td></td>
<td>dBm</td>
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<tr>
<td>Max. Overdrive Input Power</td>
<td></td>
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<td>24</td>
<td>dBm</td>
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<tr>
<td>Drain Supply Voltage</td>
<td>10</td>
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<td></td>
<td>V</td>
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<tr>
<td>Supply Quiescent Drain Current</td>
<td>120</td>
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<td></td>
<td>mA</td>
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<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:  $T_{\text{base,plate}} = 25^\circ\text{C}$, $V_d = 10$ V, $I_{\text{dq}} = 120$ mA

Linear Gain and Noise Figure

Input and Output Return Loss

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Broadband Small Signal Measurements

Input and Output Return Loss

Frequency [GHz]
S11, S22 [dB]

Linear and Reverse Gain

Frequency [GHz]
S21, S12 [dB]
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Measured Performances Vs. Pin @ Freq. [8.6, 9, 9.4, 10.2, 10.6] GHz

Test Conditions: \( T_{\text{base, plate}} = 25 \, ^\circ\text{C} \), \( V_d = 10 \, \text{V} \), \( I_{d\text{q}} = 120 \, \text{mA} \)

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**
X-Band GaN HEMT Low Noise Amplifier

Measured Performances Vs. Frequency

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

- P1dB condition reached at $\text{Pin} = 0 \, \text{dBm}$
- P3dB condition reached at $\text{Pin} = 5 \, \text{dBm}$
- PSat condition reached at $\text{Pin} = 10 \, \text{dBm}$
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### Bond Pad Configuration & Assembly Recommendations

#### Bond Pad # | Connection | External Components
---|---|---
IN and OUT | 2 Bonding Wires
L_bond = 0.3\(\text{nH}\) |  
1, 3, 5 Vg | L_bond \(\leq 1\) \(\text{nH}\) | C1 = 100\(\text{pF}/10\text{V}\)
C2 = 10\(\text{nF}/10\text{V}\) |  
2, 4, 6 Vd | L_bond \(\leq 1\) \(\text{nH}\) | C1 = 100\(\text{pF}/50\text{V}\)
C2 = 10\(\text{nF}/50\text{V}\)

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**Bias Procedure**

**Bias-Up**

1. Vg set to -5 V.
2. Vd set to +10 V.
3. Adjust Vg until quiescent Id is 120 mA (Vg = -2.7 V Typical).
4. Apply RF signal.

**Bias-Down**

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

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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.
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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