**MECGaNLNACX**

C- to X-Band GaN HEMT Low Noise Amplifier

---

**Main Features**

- 0.25µm GaN HEMT Technology
- 5–12 GHz full performance Frequency Range
- Small Signal Gain > 21 dB
- Noise Figure: <1.8 (6 - 9 GHz)
- Noise Figure: <2.1 (5 - 12 GHz)
- P1dB > 18 dBm, Psat > 23 dBm
- Overdrive Pin: 25 dBm
- Bias: Vd = 10 ÷ 15V, Id = 90mA, Vg = -2.7V (Typ.)
- Chip Size: 3.00 x 1.35 x 0.10 mm³

**Product Description**

**MECGaNLNACX** is a 0.25µm GaN HEMT Low Noise Amplifier designed and tested by MEC for C- to X-Band applications.

In the frequency range from 5 GHz to 12 GHz MECGaNLNACX provides at least 22dB of linear gain, less than 2 dB of noise figure and a P1dB of at least 18 dBm.

In addition to the high electrical performances, this GaN LNA is capable of working in safe operation up to 20÷27 dB of gain compression (26 dBm of CW overdrive power).

**Typical Applications**

- Commercial and Military Radar
- Communications
- Test Instrumentation

**Measured Data**

![Graph showing measured data for Vd = 10 V, Idq = 90 mA, and T = 25 degC](image_url)

**Vd = 10 V - Idq = 90 mA - T = 25 degC**

- S21
- NF
- S22
- S11

*Frequency (GHz)*

---

- 1/9 -

Preliminary Data Sheet

MEC – Microwave Electronics for Communications

www.mec-mmic.com

Rev. A 07/05/15
### Main Characteristics

Test Conditions: $T_{\text{base, plate}} = 25^\circ\text{C}$, $V_d = 10$ V, $I_{dq} = 90$ mA - CW

<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>5</td>
<td>11</td>
<td>GHz</td>
<td></td>
</tr>
<tr>
<td>Small Signal Gain</td>
<td>22</td>
<td>24</td>
<td>dB</td>
<td></td>
</tr>
<tr>
<td>Noise Figure</td>
<td>1.5</td>
<td>2.0</td>
<td>dB</td>
<td></td>
</tr>
<tr>
<td>Input Return Loss</td>
<td>-9</td>
<td></td>
<td>dB</td>
<td></td>
</tr>
<tr>
<td>Output Return Loss</td>
<td>-9</td>
<td></td>
<td>dB</td>
<td></td>
</tr>
<tr>
<td>Output Power at 1 dB of Gain Compression</td>
<td>19.5</td>
<td></td>
<td>dBm</td>
<td></td>
</tr>
<tr>
<td>Output Power at Saturation</td>
<td>23</td>
<td></td>
<td>dBm</td>
<td></td>
</tr>
<tr>
<td>Overdrive Input Power (CW)</td>
<td>25</td>
<td></td>
<td>dBm</td>
<td></td>
</tr>
<tr>
<td>Overdrive Gain Compression Level</td>
<td>25</td>
<td></td>
<td>dB</td>
<td></td>
</tr>
<tr>
<td>Drain Supply Voltage</td>
<td>10</td>
<td></td>
<td>V</td>
<td></td>
</tr>
<tr>
<td>Supply Quiescent Drain Current</td>
<td>90</td>
<td></td>
<td>mA</td>
<td></td>
</tr>
<tr>
<td>DC Power Consumption</td>
<td>0.90</td>
<td></td>
<td>W</td>
<td></td>
</tr>
<tr>
<td>DC Power Consumption at 1 dB of Gain Compr.</td>
<td>1.50</td>
<td></td>
<td>W</td>
<td></td>
</tr>
</tbody>
</table>

Test Conditions: $T_{\text{base, plate}} = 25^\circ\text{C}$, $V_d = 15$ V, $I_{dq} = 90$ mA - CW

<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>5</td>
<td>12.5</td>
<td>GHz</td>
<td></td>
</tr>
<tr>
<td>Small Signal Gain</td>
<td>22</td>
<td>27</td>
<td>dB</td>
<td></td>
</tr>
<tr>
<td>Noise Figure</td>
<td>1.5</td>
<td>2.1</td>
<td>dB</td>
<td></td>
</tr>
<tr>
<td>Input Return Loss</td>
<td>-8</td>
<td></td>
<td>dB</td>
<td></td>
</tr>
<tr>
<td>Output Return Loss</td>
<td>-5</td>
<td></td>
<td>dB</td>
<td></td>
</tr>
<tr>
<td>Output Power at 1 dB of Gain Compression</td>
<td>18</td>
<td></td>
<td>dBm</td>
<td></td>
</tr>
<tr>
<td>Output Power at Saturation</td>
<td>26</td>
<td></td>
<td>dBm</td>
<td></td>
</tr>
<tr>
<td>Overdrive Input Power (CW)</td>
<td>26</td>
<td></td>
<td>dBm</td>
<td></td>
</tr>
<tr>
<td>Overdrive Gain Compression Level</td>
<td>27</td>
<td></td>
<td>dB</td>
<td></td>
</tr>
<tr>
<td>Drain Supply Voltage</td>
<td>15</td>
<td></td>
<td>V</td>
<td></td>
</tr>
<tr>
<td>Supply Quiescent Drain Current</td>
<td>90</td>
<td></td>
<td>mA</td>
<td></td>
</tr>
<tr>
<td>DC Power Consumption</td>
<td>1.35</td>
<td></td>
<td>W</td>
<td></td>
</tr>
<tr>
<td>DC Power Consumption at 1 dB of Gain Compr.</td>
<td>1.95</td>
<td></td>
<td>W</td>
<td></td>
</tr>
</tbody>
</table>
Test Conditions: $T_{\text{base_plate}} = 25^\circ\text{C}$, $V_d = 10$ V, $I_{dq} = 90$ mA

Test Conditions: $T_{\text{base_plate}} = 25^\circ\text{C}$, $V_d = 15$ V, $I_{dq} = 90$ mA
Linear Gain and Noise Figure over Quiescent Drain Current

Test Conditions: $T_{\text{base,plate}} = 25^\circ\text{C}$, $V_d = 10$ V  
Idq = 90mA - Idq = 112mA - Idq = 135mA

Test Conditions: $T_{\text{base,plate}} = 25^\circ\text{C}$, $V_d = 15$ V  
Idq = 90mA - Idq = 112mA - Idq = 135mA

Test Conditions: \( T_{\text{base, plate}} = 25^\circ C \), \( V_d = 10 \text{ V} \), \( I_dq = 90 \text{ mA} \)

Frequency: 5 GHz - 7 GHz - 9 GHz - 11 GHz

Test Conditions: $T_{\text{base, plate}} = 25^\circ\text{C}$, $V_d = 15$ V, $I_{dq} = 90$ mA

Frequency: 6 GHz - 8 GHz - 10 GHz - 12 GHz

Test Conditions: $T_{\text{base, plate}} = 25^\circ C$, $V_d = 10$ V, $I_{dq} = 90$ mA

- Pout and Drain Current at Pin = -1 dBm (1 dB of Gain Compression)
- Pout and Drain Current at Pin = 5 dBm (4 dB of Gain Compression)
- Pout and Drain Current at Pin = 13 dBm (saturation)

Test Conditions: $T_{\text{base, plate}} = 25^\circ C$, $V_d = 15$ V, $I_{dq} = 90$ mA

- Pout and Drain Current at Pin = -2 dBm (1 dB of Gain Compression)
- Pout and Drain Current at Pin = 4 dBm (4 dB of Gain Compression)
- Pout and Drain Current at Pin = 15 dBm (saturation)
**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 -5 V.
2. Vd set to +10 ÷ +15 V.
3. Adjust Vg until quiescent Id is 90 mA (Vg = -2.7 V Typical).
4. Apply RF signal.

**Bias-Down**

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

For additional technical Information and Requirements:
Email: contact.mec@mec-mmic.com   Tel: +39 0516333403

For sales Information and Requirements:
Email: sales@mec-mmic.com   Tel: +39 0637511124

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.

The contents of this document are under the copyright of MEC srl. It is released by MEC srl on condition that it shall not be copied in whole, in part or otherwise reproduced (whether by photographic, reprographic, or any other method) and the contents thereof shall not be divulged to any person other than inside the company at which has been provided by MEC.