MECGaNX27
8.5 to 10.2 GHz GaN HEMT Power Amplifier

Main Features

- 0.25µm GaN HEMT Technology
- 8.5 – 10.2 GHz full performances Frequency Range
- 27W Output Power @ Pin 27 dBm
- 36% PAE @ Pin 27 dBm
- 24 dB Small Signal Gain
- Bias: Vd = 30V, Id = 1A, Vg = -2.85V (Typ.)
- Chip Size: 5.5 x 4.0 x 0.1 mm

Product Description

MECGaNX27 is a GaN HEMT based High Power Amplifier designed by MEC for X-Band applications and fabricated on 0.25µm GaN on SiC process.

The MECGaNX27 provides more than 27 W of saturated output power in the frequency range from 8.5 GHz to 10.2 GHz with a PAE higher than 35% and 24 dB of small signal Gain.

The MECGaNX27 is fully matched to 50 Ω with DC decoupling capacitors on both Input and Output ports. Bond Pad are gold plated for compatibility with thermo-compression bonding process.

Applications

- Radar
- Telecom
# Main Characteristics

Test Conditions:  $T_{\text{base_plate}} = 25^\circ\text{C}$, $V_d = 30\ \text{V}$, $I_{\text{dq}} = 1\ \text{A}$, Pulse Width = 50 $\mu\text{s}$, Duty Cycle = 15%

<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>8.5</td>
<td>24</td>
<td>10.2</td>
<td>GHz</td>
</tr>
<tr>
<td>Small Signal Gain</td>
<td>21</td>
<td>24</td>
<td>27</td>
<td>dB</td>
</tr>
<tr>
<td>Input Return Loss</td>
<td>7</td>
<td>10</td>
<td>10</td>
<td>dB</td>
</tr>
<tr>
<td>Output Return Loss</td>
<td>8</td>
<td>10</td>
<td>10</td>
<td>dB</td>
</tr>
<tr>
<td>Saturated Output Power</td>
<td>44.5</td>
<td>45.2</td>
<td>dBm</td>
<td></td>
</tr>
<tr>
<td>Power Added Efficiency $@ P_{out} = P_{sat}$</td>
<td>35</td>
<td>38</td>
<td>%</td>
<td></td>
</tr>
<tr>
<td>Gain $@ P_{out} = P_{sat}$</td>
<td>17</td>
<td>19</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drain Supply Voltage</td>
<td>30</td>
<td></td>
<td>V</td>
<td></td>
</tr>
<tr>
<td>Supply Quiescent Drain Current</td>
<td>1</td>
<td></td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>Supply Drain Current</td>
<td>2.0</td>
<td>3.0</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>Gate Voltage</td>
<td>-2.85</td>
<td></td>
<td>V</td>
<td></td>
</tr>
</tbody>
</table>

* Performances described in this document are based on preliminary on-jig characterization. More details and new parameter will be carried out by the ongoing test campaign.

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**Typical Measured Performances**

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Preliminary Data Sheet
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Linear Gain Vs. Frequency

Output Power Vs. Input Power @ Frequency [8.5-10.2]GHz

PAE Vs. Input Power @ Frequency [8.5-10.2]GHz

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Gain Vs. Input Power @ Frequency [8.5-10.2]GHz

Drain Current Vs. Input Power @ Frequency [8.5-10.2]GHz
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Saturated Output Power and PAE @ Pin=27dBm Vs. Frequency

Gain and Drain Current @ Psat, Pin=27dBm Vs. Frequency
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Gain [dB] vs Frequency [GHz]

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A tolerance of ± 35µm has to be considered for chip dimensions.
- Chip Thickness is 100 µm ± 10 µm
- RF Pads [IN, OUT] = 100µm x 200µm
- DC Pads [1, 3, 4, 5, 8, 9, 10, 12] = 100µm x 100µm
- DC Pads [2, 11] = 200µm x 100µm
- DC Pads [6, 7] = 550µm x 100µm

<table>
<thead>
<tr>
<th>Bond Pad #</th>
<th>Symbol</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>IN</td>
<td>RFin</td>
<td>Input RF Port</td>
</tr>
<tr>
<td>OUT</td>
<td>RFout</td>
<td>Output RF Port</td>
</tr>
<tr>
<td>1, 4, 9, 12</td>
<td>Vg</td>
<td>Gate Negative Supply Voltage</td>
</tr>
<tr>
<td>2, 6, 7, 11</td>
<td>Vd</td>
<td>Drain Positive Supply Voltage</td>
</tr>
<tr>
<td>3, 5, 8, 10</td>
<td>GND</td>
<td>Ground Pads – Not Connected</td>
</tr>
</tbody>
</table>
Assembly Recommendations

- Eutectic Die bond using AuSn (80/20) solder is recommended.
- Great care must be used for thermal dimensioning.
- 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 +30 V.
3. Adjust Vg until quiescent Id is 1 A (Vg = -2.85 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. Set Vg to 0 V.
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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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