Features

- Low Noise Figure: 1.0 dB typical at 12 GHz
- High Associated Gain: 10.0 dB typical at 12 GHz
- High Output Power: 17.5 dBm typical P1dB at 12 GHz
- Hermetic Gold-Ceramic Microstrip Package

Description

The ATF-13170 is a high performance gallium arsenide Schottky-barrier-gate field effect transistor housed in a hermetic, high reliability package. Its premium noise figure makes this device appropriate for use in low noise amplifiers operating in the 2-16 GHz frequency range.

This GaAs FET device has a nominal 0.3 micron gate length with a total gate periphery of 250 microns. Proven gold based metallization systems and nitride passivation assure a rugged, reliable device.

Noise Parameters: VDS = 3 V, IDS = 20 mA

<table>
<thead>
<tr>
<th>Freq. GHz</th>
<th>NFO dB</th>
<th>Gamma Opt Mag</th>
<th>Gamma Opt Ang</th>
<th>Rn/50</th>
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</thead>
<tbody>
<tr>
<td>4.0</td>
<td>0.5</td>
<td>.62</td>
<td>56</td>
<td>.44</td>
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<tr>
<td>6.0</td>
<td>0.7</td>
<td>.47</td>
<td>81</td>
<td>.34</td>
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<tr>
<td>8.0</td>
<td>0.8</td>
<td>.53</td>
<td>116</td>
<td>.19</td>
</tr>
<tr>
<td>12.0</td>
<td>1.0</td>
<td>.44</td>
<td>157</td>
<td>.12</td>
</tr>
<tr>
<td>14.0</td>
<td>1.3</td>
<td>.43</td>
<td>179</td>
<td>.07</td>
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Electrical Specifications, TA = 25°C

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Parameters and Test Conditions</th>
<th>Units</th>
<th>Min.</th>
<th>Typ.</th>
<th>Max.</th>
</tr>
</thead>
<tbody>
<tr>
<td>NFO</td>
<td>Optimum Noise Figure: VDS = 2.5 V, IDS = 20 mA</td>
<td>dB</td>
<td>0.8</td>
<td>1.1</td>
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<tr>
<td></td>
<td>f = 8.0 GHz</td>
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</tr>
<tr>
<td></td>
<td>f = 12.0 GHz</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>f = 14.0 GHz</td>
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<tr>
<td>GA</td>
<td>Gain @ NFO: VDS = 2.5 V, IDS = 20 mA</td>
<td>dB</td>
<td>9.0</td>
<td>12.0</td>
<td>10.0</td>
</tr>
<tr>
<td></td>
<td>f = 8.0 GHz</td>
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<tr>
<td></td>
<td>f = 12.0 GHz</td>
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<tr>
<td></td>
<td>f = 14.0 GHz</td>
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<td></td>
</tr>
<tr>
<td>P1 dB</td>
<td>Output Power @ 1 dB Gain Compression: VDS = 4 V, IDS = 40 mA</td>
<td>dbm</td>
<td>17.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>f = 12.0 GHz</td>
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<td></td>
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<tr>
<td>G1 dB</td>
<td>1 dB Compressed Gain: VDS = 4 V, IDS = 40 mA</td>
<td>dB</td>
<td>8.5</td>
<td></td>
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<tr>
<td></td>
<td>f = 12.0 GHz</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>gm</td>
<td>Transconductance: VDS = 2.5 V, VGS = 0 V</td>
<td>mmho</td>
<td>30</td>
<td>55</td>
<td></td>
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<tr>
<td>Idss</td>
<td>Saturated Drain Current: VDS = 2.5 V, VGS = 0 V</td>
<td>mA</td>
<td>40</td>
<td>50</td>
<td>90</td>
</tr>
<tr>
<td>Vp</td>
<td>Pinchoff Voltage: VDS = 2.5 V, IDS = 1 mA</td>
<td>V</td>
<td>-3.0</td>
<td>-1.5</td>
<td>-0.8</td>
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</table>
Absolute Maximum Ratings

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Absolute Maximum</th>
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<tbody>
<tr>
<td>Drain-Source Voltage</td>
<td>VDS</td>
<td>+5 V</td>
</tr>
<tr>
<td>Gate-Source Voltage</td>
<td>VGS</td>
<td>-4 V</td>
</tr>
<tr>
<td>Drain Current</td>
<td>IDS</td>
<td>Idss</td>
</tr>
<tr>
<td>Power Dissipation²³</td>
<td>P_t</td>
<td>225 mW</td>
</tr>
<tr>
<td>Channel Temperature</td>
<td>TCH</td>
<td>175°C</td>
</tr>
<tr>
<td>Storage Temperature</td>
<td>TSTG</td>
<td>-65°C to +175°C</td>
</tr>
</tbody>
</table>

Notes:
1. Operation of this device above any one of these parameters may cause permanent damage.
2. Case Temperature = 25°C.
3. Derate at 2.9 mW/°C for T_C > 96°C.
4. The small spot size of this technique results in a higher, though more accurate determination of θJC than do alternate methods. See MEASUREMENTS section for more information.

Typical Performance, T_A = 25°C
(unless otherwise noted)

Typical Scattering Parameters: Common Source, Z0 = 50 Ω

<table>
<thead>
<tr>
<th>Freq. GHz</th>
<th>S_{11} Mag</th>
<th>S_{21} Mag</th>
<th>S_{12} Mag</th>
<th>S_{22} Mag</th>
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<tr>
<td></td>
<td>Ang</td>
<td>Ang</td>
<td>Ang</td>
<td>Ang</td>
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<td>.35</td>
<td>8.2</td>
<td>-14.0</td>
<td>.17</td>
</tr>
</tbody>
</table>

A model for this device is available in the DEVICE MODELS section.