Wireless Bipolar Power Transistor
2W, 16 -1.7 GHz

Features

- Designed for linear amplifier applications
- Class AB: -33 dBC typ. 3rd IMD at 2 W PEP
- Class A: +44 dBm typ. 3rd order intercept point
- Common emitter configuration
- Internal input impedance matching
- Diffused emitter ballasting

**ABSOLUTE MAXIMUM RATING AT 25°C**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Rating</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Collector-Base Voltage</td>
<td>V_{CB}</td>
<td>65</td>
<td>V</td>
</tr>
<tr>
<td>Collector-Emitter Voltage</td>
<td>V_{CE}</td>
<td>65</td>
<td>V</td>
</tr>
<tr>
<td>Emitter-Base Voltage</td>
<td>V_{EB}</td>
<td>3.0</td>
<td>V</td>
</tr>
<tr>
<td>Collector Current</td>
<td>I_C</td>
<td>2.0</td>
<td>A</td>
</tr>
<tr>
<td>Power Dissipation</td>
<td>P_D</td>
<td>13.5</td>
<td>W</td>
</tr>
<tr>
<td>Junction Temperature</td>
<td>T_J</td>
<td>200</td>
<td>°C</td>
</tr>
<tr>
<td>Storage Temperature</td>
<td>T_{STG}</td>
<td>-55 to +150</td>
<td>°C</td>
</tr>
<tr>
<td>Thermal Resistance</td>
<td>\theta_{JC}</td>
<td>13</td>
<td>°C/W</td>
</tr>
</tbody>
</table>

**ELECTRICAL SPECIFICATIONS AT 25°C**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Min</th>
<th>Max</th>
<th>Units</th>
<th>Test Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Collector-Emitter Breakdown Voltage</td>
<td>B_{VCE}</td>
<td>65</td>
<td>-</td>
<td>V</td>
<td>I_C = 5 mA</td>
</tr>
<tr>
<td>Collector-Emitter Leakage Current</td>
<td>I_{CES}</td>
<td>-</td>
<td>1.0</td>
<td>mA</td>
<td>V_{CE} = 25 V</td>
</tr>
<tr>
<td>Collector-Base Breakdown Voltage</td>
<td>B_{VBE}</td>
<td>22</td>
<td>-</td>
<td>V</td>
<td>I_C = 5 mA</td>
</tr>
<tr>
<td>Collector-Base Breakdown Voltage</td>
<td>B_{VCEO}</td>
<td>30</td>
<td>-</td>
<td>V</td>
<td>I_C = 5 mA, R_{BE}=220 Ω</td>
</tr>
<tr>
<td>Emitter-Base Breakdown Voltage</td>
<td>B_{VBE0}</td>
<td>3.0</td>
<td>-</td>
<td>V</td>
<td>I_B = 5 mA</td>
</tr>
<tr>
<td>DC Forward Current Gain</td>
<td>h_{FE}</td>
<td>15</td>
<td>120</td>
<td>-</td>
<td>V_{CE} = 5 V, I_C = 200 A</td>
</tr>
<tr>
<td>Power Gain</td>
<td>G_{m}</td>
<td>10</td>
<td>-</td>
<td>dB</td>
<td>V_{CC} = 25V, I_{LOD} = 25 mA, P_{out} = 2.0 W, F =1.60, 1.65, 1.70 GHz</td>
</tr>
<tr>
<td>Collector Efficiency</td>
<td>h_{OC}</td>
<td>35</td>
<td>-</td>
<td>%</td>
<td>V_{CE} = 25V, I_{LOD} = 25 mA, P_{out} = 2.0 W, F =1.60, 1.65, 1.70 GHz</td>
</tr>
<tr>
<td>Input Return Loss</td>
<td>RL</td>
<td>10</td>
<td>-</td>
<td>dB</td>
<td>V_{CC} = 25V, I_{LOD} = 25 mA, P_{out} = 2.0 W, F =1.60, 1.65, 1.70 GHz</td>
</tr>
<tr>
<td>Load Mismatch Tolerance</td>
<td>VSWR-T</td>
<td>-</td>
<td>5.1</td>
<td>-</td>
<td>V_{CC} = 25V, I_{LOD} = 25 mA, P_{out} = 2.0 W, F =1.60, 1.65, 1.70 GHz</td>
</tr>
<tr>
<td>3rd Order IMD</td>
<td>IMD_{3}</td>
<td>-32</td>
<td>dBc</td>
<td>V_{CC} = 25V, I_{LOD} = 25 mA, P_{out} = 2.0 W PEP F =1650 MHz, Δ F=100kHz</td>
<td></td>
</tr>
</tbody>
</table>

**TYPICAL OPTIMUM DEVICE IMPEDANCES**

<table>
<thead>
<tr>
<th>F (GHz)</th>
<th>Z_{IN} (Ω)</th>
<th>Z_{LOAD} (Ω)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.60</td>
<td>3.5+j8.2</td>
<td>6.6-j13.5</td>
</tr>
<tr>
<td>1.65</td>
<td>2.0+j5.0</td>
<td>6.4-j13.1</td>
</tr>
<tr>
<td>1.70</td>
<td>4.2+j8.7</td>
<td>6.3-j12.8</td>
</tr>
</tbody>
</table>
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TEST FIXTURE DIMENSIONS

TEST FIXTURE ASSEMBLY
Typical Broadband Performance Curves

**GAIN-EFFICIENCY vs FREQUENCY**
P_{out}=2.0 W, V_{CC}=25 V, I_{CC}=25 mA

**OUTPUT POWER vs COLLECTOR VOLTAGE**
I_{CC}=25 mA, F=1600 MHz

**GAIN vs P_OUT**
F=1600 MHz, V_{CC}=25 V

**3RD ORDER IMD vs P_OUT**
F1 = 1600.0 MHz, F2 = 1600.1 MHz, V_{CC} = 25 V, ICQ = 25 mA

**IMD vs P_OUT**
F1 = 1500.0 MHz, F2 = 1500.1 MHz, V_{CC} = 25 V, ICQ = 1.0 A

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# TYPICAL S-PARAMETERS

| \( V_{CC} = 25 \, V \), \( I_{CO} = 200 \, mA \) |
|---|---|---|---|---|
| \( F(\text{MHz}) \) | \( S11 \) | \( S21 \) | \( S12 \) | \( S22 \) |
| | MAG | PHASE | MAG | PHASE | MAG | PHASE | MAG | PHASE |
| 100 | 1.10 | 171.5 | 23.80 | 120.3 | 0.012 | -7.4 | 0.32 | -74.5 |
| 200 | 0.75 | 175.1 | 12.15 | 92.1 | 0.014 | -4.7 | 0.22 | -89.6 |
| 300 | 0.79 | -177.9 | 7.79 | 81.2 | 0.016 | -4.5 | 0.20 | -95.7 |
| 400 | 0.84 | -177.4 | 5.77 | 74.4 | 0.016 | -9.8 | 0.23 | -98.7 |
| 500 | 0.87 | -178.5 | 4.65 | 68.4 | 0.017 | -3.7 | 0.26 | -100.5 |
| 600 | 0.89 | 179.8 | 3.96 | 62.6 | 0.018 | -5.9 | 0.27 | -101.4 |
| 700 | 0.89 | 178.3 | 3.49 | 56.7 | 0.018 | -0.7 | 0.29 | -104.4 |
| 800 | 0.91 | 177.4 | 3.08 | 51.1 | 0.019 | -2.7 | 0.33 | -103.3 |
| 900 | 0.91 | 175.4 | 2.89 | 45.4 | 0.017 | -3.4 | 0.36 | -111.0 |
| 1000 | 0.91 | 174.1 | 2.74 | 38.9 | 0.019 | -0.9 | 0.40 | -114.6 |
| 1100 | 0.89 | 171.5 | 2.64 | 28.9 | 0.024 | -6.1 | 0.46 | -117.3 |
| 1200 | 0.87 | 171.7 | 2.45 | 22.8 | 0.024 | -13.6 | 0.53 | -120.8 |
| 1300 | 0.86 | 170.8 | 2.35 | 15.7 | 0.023 | -18.3 | 0.57 | -122.3 |
| 1400 | 0.86 | 170.3 | 2.32 | 7.6 | 0.026 | -21.1 | 0.63 | -145.5 |
| 1450 | 0.85 | 170.1 | 2.30 | 3.4 | 0.026 | -22.9 | 0.65 | -126.2 |
| 1500 | 0.84 | 169.9 | 2.27 | -1.2 | 0.025 | -22.3 | 0.66 | -127.6 |
| 1550 | 0.83 | 169.7 | 2.26 | -6.4 | 0.026 | -31.0 | 0.68 | -129.1 |
| 1600 | 0.82 | 169.7 | 2.24 | -11.5 | 0.030 | -37.3 | 0.71 | -131.9 |
| 1650 | 0.82 | 170.0 | 2.22 | -16.6 | 0.029 | -43.2 | 0.71 | -133.6 |
| 1700 | 0.81 | 170.5 | 2.19 | -22.4 | 0.027 | -48.5 | 0.73 | -137.6 |
| 1750 | 0.80 | 171.1 | 2.14 | -28.4 | 0.025 | -52.2 | 0.76 | -140.1 |
| 1800 | 0.80 | 171.5 | 2.11 | -35.5 | 0.026 | -60.2 | 0.76 | -143.9 |
| 1850 | 0.80 | 171.9 | 2.05 | -40.7 | 0.027 | -60.1 | 0.81 | -147.5 |
| 1900 | 0.81 | 172.6 | 1.99 | -47.4 | 0.024 | -67.1 | 0.81 | -150.1 |
| 2000 | 0.82 | 173.6 | 1.83 | -60.7 | 0.024 | -80.8 | 0.86 | -155.5 |
| 2100 | 0.84 | 174.5 | 1.61 | -74.0 | 0.020 | -94.0 | 0.88 | 160.0 |
| 2200 | 0.88 | 174.2 | 1.40 | -84.6 | 0.019 | 104.7 | 0.87 | 164.5 |
| 2300 | 0.90 | 173.6 | 1.21 | -94.7 | 0.016 | -128.7 | 0.86 | 168.1 |