MRF316

The RF Line NPN Silicon Power Transistor
80W, 3.0-200MHz, 28V

Designed primarily for wideband large-signal output amplifier stages in the 30–200 MHz frequency range.

- Guaranteed performance at 150 MHz, 28 Vdc
  - Output power = 80 W
  - Minimum gain = 10 dB
- Built-in matching network for broadband operation
- 100% tested for load mismatch at all phase angles with 30:1 VSWR
- Gold metallization system for high reliability applications

**MAXIMUM RATINGS**

<table>
<thead>
<tr>
<th>Rating</th>
<th>Symbol</th>
<th>Value</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Collector–Emitter Voltage</td>
<td>VCEO</td>
<td>35</td>
<td>Vdc</td>
</tr>
<tr>
<td>Collector–Base Voltage</td>
<td>VCEO</td>
<td>65</td>
<td>Vdc</td>
</tr>
<tr>
<td>Emitter–Base Voltage</td>
<td>VEB0</td>
<td>4.0</td>
<td>Vdc</td>
</tr>
<tr>
<td>Collector Current — Continuous Peak</td>
<td>IC</td>
<td>9.0</td>
<td>Adc</td>
</tr>
<tr>
<td></td>
<td></td>
<td>13.5</td>
<td></td>
</tr>
<tr>
<td>Total Device Dissipation @ Tc = 25°C (1) Derate above 25°C</td>
<td>P0</td>
<td>220</td>
<td>Watts</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1.25</td>
<td>W/°C</td>
</tr>
<tr>
<td>Storage Temperature Range</td>
<td>Tstg</td>
<td>-65 to +150</td>
<td>°C</td>
</tr>
</tbody>
</table>

**THERMAL CHARACTERISTICS**

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Symbol</th>
<th>Max</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thermal Resistance, Junction to Case</td>
<td>RjJC</td>
<td>0.8</td>
<td>°C/W</td>
</tr>
</tbody>
</table>

**ELECTRICAL CHARACTERISTICS** (Tc = 25°C unless otherwise noted.)

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Symbol</th>
<th>Min</th>
<th>Typ</th>
<th>Max</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Collector–Emitter Breakdown Voltage</td>
<td>VBRCCEO</td>
<td>35</td>
<td></td>
<td></td>
<td>Vdc</td>
</tr>
<tr>
<td>(Ic = 50 mA, Ie = 0)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Collector–Emitter Breakdown Voltage</td>
<td>VBRCIES</td>
<td>65</td>
<td></td>
<td></td>
<td>Vdc</td>
</tr>
<tr>
<td>(Ic = 50 mA, VBE = 0)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Collector–Base Breakdown Voltage</td>
<td>VBRCBO</td>
<td>65</td>
<td></td>
<td></td>
<td>Vdc</td>
</tr>
<tr>
<td>(Ic = 50 mA, Ie = 0)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emitter–Base Breakdown Voltage</td>
<td>VBREBO</td>
<td>4.0</td>
<td></td>
<td></td>
<td>Vdc</td>
</tr>
<tr>
<td>(Ie = 5.0 mA, Ic = 0)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Collector Cutoff Current</td>
<td>ICB0</td>
<td></td>
<td></td>
<td>5.0</td>
<td>mAdc</td>
</tr>
<tr>
<td>(VCE = 30 Vdc, Ie = 0)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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<table>
<thead>
<tr>
<th>ON CHARACTERISTICS</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>DC Current Gain</td>
<td>hFE</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>(Ice = 4.0 A, VCE = 5.0 V)</td>
<td></td>
<td>80</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DYNAMIC CHARACTERISTICS</th>
<th>Coss</th>
<th>100</th>
<th>130</th>
<th>pF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output Capacitance</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(VCE = 28 V, Ice = 0, f = 1.0 MHz)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**NOTE:**
1. This device is designed for RF operation. The total device dissipation rating applies only when the device is operated as an RF amplifier.

**ELECTRICAL CHARACTERISTICS — continued (T_C = 25°C unless otherwise noted.)**

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Symbol</th>
<th>Min</th>
<th>Typ</th>
<th>Max</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>NARROW BAND FUNCTIONAL TESTS (Figure 1)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Common--Emitter Amplifier Power Gain</td>
<td>GPE</td>
<td>10</td>
<td>13</td>
<td>—</td>
<td>dB</td>
</tr>
<tr>
<td>(VCE = 28 V, P_out = 80 W, f = 150 MHz)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Collector Efficiency</td>
<td>η</td>
<td>55</td>
<td>—</td>
<td>—</td>
<td>%</td>
</tr>
<tr>
<td>(VCE = 28 V, P_out = 80 W, f = 150 MHz)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Load Mismatch</td>
<td>Ψ</td>
<td>No Degradation in Output Power</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
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Figure 1. 150 MHz Test Amplifier

C1 — 22 pF 100 mil ATC
C2, C3 — 24 pF 100 mil ATC
C4, C11 — 0.8–20 pF JMC #5501 Johanson
C5 — 200 pF 100 mil ATC
C6 — 240 pF 100 mil ATC
C7 — Dipped Mica 1000 pF
C8 — 0.1 μF Ene Red Cap
C9, C10, C12 — 30 pF 100 mil ATC
C13 — 1.0 μF Tantalum
L1 — 0.8", #20 Wire
L2 — 1.0", #20 Wire
RFC1, RFC4 — 0.15 μH Molded Coil
RFC2, RFC3 — Ferroxcube Bead 56–560–55–3B
RFC5 — 2.5", #20 Wire, 1.5 Turns
RFC6 — Ferroxcube VK200–19/4B
R1 — 10 Ω, 1/2 W
R2, R3 — 10 Ω, 1.0 W

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TYPICAL PERFORMANCE CURVES

Figure 2. Output Power versus Input Power

Figure 3. Power Gain versus Frequency

Figure 4. Output Power versus Supply Voltage

Figure 5. Output Power versus Supply Voltage

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Figure 6. Output Power versus Supply Voltage

Figure 7. Series Equivalent Input–Output Impedance

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PACKAGE DIMENSIONS

NOTES:
1. FLANGE IS ISOLATED IN ALL STYLES.

<table>
<thead>
<tr>
<th>Dimensions</th>
<th>Inches</th>
<th>Millimeters</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>24.0</td>
<td>610</td>
</tr>
<tr>
<td>B</td>
<td>25.1</td>
<td>635</td>
</tr>
<tr>
<td>C</td>
<td>5.39</td>
<td>138</td>
</tr>
<tr>
<td>D</td>
<td>5.28</td>
<td>134</td>
</tr>
<tr>
<td>E</td>
<td>5.06</td>
<td>129</td>
</tr>
<tr>
<td>F</td>
<td>5.35</td>
<td>135</td>
</tr>
<tr>
<td>G</td>
<td>16.1</td>
<td>409</td>
</tr>
<tr>
<td>H</td>
<td>6.15</td>
<td>156</td>
</tr>
<tr>
<td>I</td>
<td>12.06</td>
<td>306</td>
</tr>
<tr>
<td>J</td>
<td>2.81</td>
<td>71</td>
</tr>
<tr>
<td>K</td>
<td>1.17</td>
<td>29</td>
</tr>
<tr>
<td>L</td>
<td>4.96</td>
<td>126</td>
</tr>
<tr>
<td>M</td>
<td>4.15</td>
<td>105</td>
</tr>
<tr>
<td>N</td>
<td>0.19</td>
<td>4.8</td>
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<tr>
<td>O</td>
<td>0.19</td>
<td>4.8</td>
</tr>
<tr>
<td>P</td>
<td>0.19</td>
<td>4.8</td>
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<tr>
<td>Q</td>
<td>0.48</td>
<td>12.2</td>
</tr>
<tr>
<td>R</td>
<td>0.48</td>
<td>12.2</td>
</tr>
<tr>
<td>S</td>
<td>0.48</td>
<td>12.2</td>
</tr>
<tr>
<td>T</td>
<td>0.48</td>
<td>12.2</td>
</tr>
<tr>
<td>U</td>
<td>0.48</td>
<td>12.2</td>
</tr>
</tbody>
</table>

STYLE 1:
1. Emitter
2. Collector
3. Base
4. Emitter

CASE 316-01
ISSUE D

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