The RF Line NPN Silicon Power Transistor
150W(PEP), 30MHz, 50V

Designed primarily for high-voltage applications as a high-power linear amplifier from 2.0 to 30 MHz. Ideal for marine and base station equipment.

- Specified 50 V, 30 MHz Characteristics —
  Output power = 150 W (PEP)
  Minimum gain = 13 DB
  Efficiency = 45%
- Intermodulation distortion @ 150 W (PEP) —
  IMD = -30 db (max.)
- 100% tested for load mismatch at all phase angles with 30:1 VSWR @ 150 W CW

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>V_{CEO}</td>
<td>55</td>
<td>Vdc</td>
</tr>
<tr>
<td>Collector-Base Voltage</td>
<td>V_{CBO}</td>
<td>110</td>
<td>Vdc</td>
</tr>
<tr>
<td>Emitter-Base Voltage</td>
<td>V_{EBO}</td>
<td>4.0</td>
<td>Vdc</td>
</tr>
<tr>
<td>Collector Current — Continuous</td>
<td>I_{C}</td>
<td>20</td>
<td>Adc</td>
</tr>
<tr>
<td>Withstand Current — 10 s</td>
<td>—</td>
<td>30</td>
<td>Adc</td>
</tr>
<tr>
<td>Total Device Dissipation @ T_{C} = 25 °C</td>
<td>P_{D}</td>
<td>320</td>
<td>Watts W/°C</td>
</tr>
<tr>
<td>Duration above 25 °C</td>
<td></td>
<td>1.83</td>
<td></td>
</tr>
<tr>
<td>Storage Temperature Range</td>
<td>T_{stg}</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>R_{aJC}</td>
<td>0.5</td>
<td>°C/W</td>
</tr>
</tbody>
</table>

ELECTRICAL CHARACTERISTICS (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>
</table>

OFF CHARACTERISTICS

- Collector-Emitter Breakdown Voltage (I_{C} = 200 mA_{dc}, I_{B} = 0) | V_{BRCEO} | 55 | — | — | Vdc |
- Collector-Emitter Breakdown Voltage (I_{C} = 100 mA_{dc}, V_{BE} = 0) | V_{BRCES} | 110 | — | — | Vdc |
- Collector-Base Breakdown Voltage (I_{C} = 100 mA_{dc}, I_{B} = 0) | V_{BRCEO} | 110 | — | — | Vdc |
- Emitter-Base Breakdown Voltage (I_{E} = 10 mA_{dc}, I_{C} = 0) | V_{BRHEO} | 4.0 | — | — | Vdc |

(continued)
### Electrical Characteristics — Continued

<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>DC Current Gain (I_C = 5.0 A, V_CE = 5.0 Vdc)</td>
<td>h_FE</td>
<td>10</td>
<td>30</td>
<td>—</td>
<td>—</td>
</tr>
</tbody>
</table>

### Dynamic Characteristics

<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>Output Capacitance (V_{CB} = 50 Vdc, I_C = 0, f = 1.0 MHz)</td>
<td>C_{OG}</td>
<td>—</td>
<td>220</td>
<td>250</td>
<td>pF</td>
</tr>
</tbody>
</table>

### Functional Tests

<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>Common-Collector Amplifier Gain (V_{CE} = 50 Vdc, P_{OUT} = 150 W (PEP), I_C(max) = 3.32 Adc, f = 30 MHz)</td>
<td>G_{PE}</td>
<td>13</td>
<td>15</td>
<td>—</td>
<td>dB</td>
</tr>
<tr>
<td>Output Power (V_{CE} = 50 Vdc, f = 30 MHz)</td>
<td>P_{OUT}</td>
<td>150</td>
<td>—</td>
<td>—</td>
<td>W (PEP)</td>
</tr>
<tr>
<td>Collector Efficiency (V_{CE} = 50 Vdc, P_{OUT} = 150 W (PEP), I_C(max) = 3.32 Adc, f = 30 MHz)</td>
<td>η</td>
<td>45</td>
<td>—</td>
<td>—</td>
<td>%</td>
</tr>
<tr>
<td>Intermodulation Distortion (1) (V_{CE} = 50 Vdc, P_{OUT} = 150 W (PEP), I_C = 3.32 Adc)</td>
<td>IMD</td>
<td>—</td>
<td>-33</td>
<td>-30</td>
<td>dB</td>
</tr>
<tr>
<td>Electrical Ruggedness (V_{CE} = 50 Vdc, P_{OUT} = 150 W (PEP), I_C(max) = 3.32 Adc, VSWR 3:1 at all Phase Angles)</td>
<td>Ψ</td>
<td>—</td>
<td>No Degradation in Output Power</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**NOTE:**
1. To Mil-Std-1311 Version A, Test Method 2204B, Two Tone, Reference each Tone.
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Figure 1. 30 MHz Test Circuit Schematic

Figure 2 - OUTPUT POWER versus INPUT POWER

Figure 3 - OUTPUT POWER versus SUPPLY VOLTAGE

C1, C2, C7 — 170-730 pF, Arco 469
C3, C8, C9 — 0.1μF, 100 V Elko
C4 — 500 μF @ 6.0 V
C5 — 9.0-180 pF, Arco 463
C6 — 80-480 pF, Arco 466
C10 — 30 μF, 100 V
R1 — 10 Ω, 10 Watt
R2 — 10 Ω, 10 Watt
CR1 — 1N4967
L1 — 3 Turns, #16 Wire, 5/16" I.D., 5/16" Long
L2 — 10 μH Molded Choke
L3 — 12 Turns, #16 Enamelled Wire Closewound, 1/4" I.D.
L4 — 5 Turns, 1/8" Copper Tubing, 9/16" I.D., 3/4" Long
L5 — 10 Ferrite Beads — Ferroxcube #56-590-85/3B

FOR FURTHER INFORMATION AND SUPPORT PLEASE VISIT:
https://www.macom.com/support
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FIGURE 4 – POWER GAIN versus FREQUENCY

FIGURE 5 – DC SAFE OPERATING AREA

FIGURE 6 – VCC = 40 Vdc

FIGURE 7 – VCC = 50 Vdc

INTERMODULATION DISTORTION versus OUTPUT POWER

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