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 = –32 dB (Max)
- Diffused emitter resistors for superior ruggedness
- 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>50</td>
<td>Vdc</td>
</tr>
<tr>
<td>Collector–Base Voltage</td>
<td>V_{CEO}</td>
<td>100</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>16</td>
<td>Adc</td>
</tr>
<tr>
<td>Withstand Current — 10 s</td>
<td></td>
<td>20</td>
<td>Adc</td>
</tr>
<tr>
<td>Total Device Dissipation @ T_{C} = 25°C</td>
<td>P_{D}</td>
<td>233</td>
<td>Watts</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1.33</td>
<td>W/°C</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>0.75</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>
<tbody>
<tr>
<td>Collector–Emitter Breakdown Voltage (I_{C} = 200 mA, I_{E} = 0)</td>
<td>V_{BRIEEO}</td>
<td>50</td>
<td>—</td>
<td>—</td>
<td>Vdc</td>
</tr>
<tr>
<td>Collector–Emitter Breakdown Voltage (I_{C} = 100 mA, V_{BE} = 0)</td>
<td>V_{BRIEES}</td>
<td>100</td>
<td>—</td>
<td>—</td>
<td>Vdc</td>
</tr>
<tr>
<td>Collector–Base Breakdown Voltage (I_{C} = 100 mA, I_{E} = 0)</td>
<td>V_{BRIBEO}</td>
<td>100</td>
<td>—</td>
<td>—</td>
<td>Vdc</td>
</tr>
<tr>
<td>Emitter–Base Breakdown Voltage (I_{E} = 10 mA, I_{C} = 0)</td>
<td>V_{BRIEBO}</td>
<td>4.0</td>
<td>—</td>
<td>—</td>
<td>Vdc</td>
</tr>
</tbody>
</table>

(continued)
## 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>DC Current Gain</td>
<td>h_FE</td>
<td>10</td>
<td>30</td>
<td>80</td>
<td>—</td>
</tr>
</tbody>
</table>

## DYNAMIC CHARACTERISTICS

| Output Capacitance                     | C_{ob} | 220 | 300 | pF  |

## FUNCTIONAL TESTS

| Common–Emitter Amplifier Gain
  (V_CE = 50 Vdc, I_C = 3.32 A, f = 30; 30,000 MHz) | G_{FE} | 13  | 15  | —   | dB   |
| Output Power                            | P_{out} | 150 | —   | —   | W (PEP) |
| Collector Efficiency
  (V_CE = 50 Vdc, P_{out} = 150 W (PEP), I_C(max) = 3.32 A, f = 30, 30,000 MHz) | η      | 45  | —   | —   | %    |
| Intermodulation Distortion (1)
  (V_CE = 50 Vdc, P_{out} = 150 W (PEP), I_C = 3.32 A) | IMD    | —   | —35 | —32 | dB   |
| Electrical Ruggedness
  (V_CE = 50 Vdc, P_{out} = 150 W CW, f = 30 MHz, VSWR 3:1 at all Phase Angles) | Ψ      | No Degradation in Output Power |

**NOTE:**
1. To Mil–Std–1311 Version A, Test Method 2204, Two Tone, Reference each Tone.
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C1, C2, C7 — 170–780 pF, Arco 459
C3, C8, C9 — 0.1 µF, 100 V Erte
C4 — 500 µF @ 6.0 V
C5 — 9.0–180 pF, Arco 463
C6 — 60–480 pF, Arco 465
C10 — 30 µF, 100 V
R1 — 10 Ω, 10 Watt
R2 — 10 Ω, 1.0 Watt
R3 — 5.0 – 3.3 Ω 1/2 Watt Carbon Resistors in Parallel
CR1 — 1N4997
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 #56–590–653B

Figure 1. 30 MHz Test Circuit Schematic
The RF Line NPN Silicon Power Transistor
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Figure 2. Output Power versus Input Power

Figure 3. Output Power versus Supply Voltage

Figure 4. Power Gain versus Frequency

Figure 5. RF Safe Operating Area (SOAR)

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Figure 6. $f_t$ versus Collector Current

Figure 7. IMD versus $P_{out}$

Figure 8. Output Capacitance versus Frequency

Figure 9. Output Resistance versus Frequency
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Figure 10. Series Equivalent Impedance
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Rev. V1

MRF429

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Unless otherwise noted, tolerances are inches ±0.005" [millimeters ±0.13mm]
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