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>VCEO</td>
<td>50</td>
<td>Vdc</td>
</tr>
<tr>
<td>Collector–Base Voltage</td>
<td>VCEO</td>
<td>100</td>
<td>Vdc</td>
</tr>
<tr>
<td>Emitter–Base Voltage</td>
<td>VCEO</td>
<td>4.0</td>
<td>Vdc</td>
</tr>
<tr>
<td>Collector Current — Continuous</td>
<td>IC</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_T</td>
<td>233</td>
<td>Watts</td>
</tr>
<tr>
<td>Derate above 25°C</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 mAdc, I_E = 0)</td>
<td>V_BRECEO</td>
<td>50</td>
<td>—</td>
<td>—</td>
<td>Vdc</td>
</tr>
<tr>
<td>Collector–Emitter Breakdown Voltage (I_C = 100 mAdc, V_BE = 0)</td>
<td>V_BRECES</td>
<td>100</td>
<td>—</td>
<td>—</td>
<td>Vdc</td>
</tr>
<tr>
<td>Collector–Base Breakdown Voltage (I_C = 100 mAdc, I_E = 0)</td>
<td>V_BRECEO</td>
<td>100</td>
<td>—</td>
<td>—</td>
<td>Vdc</td>
</tr>
<tr>
<td>Emitter–Base Breakdown Voltage (I_E = 10 mAdc, I_C = 0)</td>
<td>V_BRECEO</td>
<td>4.0</td>
<td>—</td>
<td>—</td>
<td>Vdc</td>
</tr>
</tbody>
</table>

(Note: additional information continues on the next page.)
### 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><strong>DC Current Gain</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(I_C = 5.0 Adc, V_CE = 5.0 Vdc)</td>
<td>h_FE</td>
<td>10</td>
<td>30</td>
<td>80</td>
<td>—</td>
</tr>
<tr>
<td><strong>Dynamic Characteristics</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Output Capacitance</td>
<td></td>
<td></td>
<td>220</td>
<td>300</td>
<td>pF</td>
</tr>
<tr>
<td>(V_CE = 50 Vdc, I_E = 0, f = 1.0 MHz)</td>
<td>C_0b</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Functional Tests</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Common–Emitter Amplifier Gain</td>
<td></td>
<td>13</td>
<td>15</td>
<td>—</td>
<td>dB</td>
</tr>
<tr>
<td>(V_CC = 50 Vdc, P_out = 150 W (PEP), I_C(max) = 3.32 Adc, f = 30; 30.001 MHz)</td>
<td>G_FE</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Output Power</td>
<td></td>
<td>150</td>
<td></td>
<td></td>
<td>W (PEP)</td>
</tr>
<tr>
<td>(V_CE = 50 Vdc, f = 30; 30.001 MHz)</td>
<td>P_out</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Collector Efficiency</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>%</td>
</tr>
<tr>
<td>(V_CC = 50 Vdc, P_out = 150 W (PEP), I_C(max) = 3.32 Adc, f = 30; 30.001 MHz)</td>
<td>η</td>
<td>45</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intermodulation Distortion (1)</td>
<td></td>
<td></td>
<td>−35</td>
<td>−32</td>
<td>dB</td>
</tr>
<tr>
<td>(V_CE = 50 Vdc, P_out = 150 W (PEP), I_C = 3.32 Adc)</td>
<td>IMD</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electrical Ruggedness</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(V_CC = 50 Vdc, P_out = 150 W CW, f = 30 MHz, VSWR 30:1 at all Phase Angles)</td>
<td>Ψ</td>
<td></td>
<td></td>
<td></td>
<td>No Degradation in Output Power</td>
</tr>
</tbody>
</table>

**Note:**
1. To MIL–STD–1311 Version A, Test Method 2204, Two Tone, Reference each Tone.
MRF429

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Rev. V1

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Figure 1. 30 MHz Test Circuit Schematic

C1, C2, C7 — 170–780 pF, Arco 459
C3, C8, C9 — 0.1 μF, 100 V Emtc
C4 — 500 μF @ 6.0 V
C5 — 9.0–180 pF, Arco 463
C6 — 80–480 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 Closedwound, 1/4" I.D.
L4 — 5 Turns, 1/8" Copper Tubing, 9/16" I.D., 3/4" Long
L5 — 10 Ferrite Beads — Ferroxcube #56-590-6538

RF INPUT

RF OUTPUT

L5

C8

C9

C10

50 Vdc

C6

L4

C5

DUT

R3

L3

C2

L1

R2

RF INPUT

C1

C7

R1

Bias

C3

C4

CR1
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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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Unless otherwise noted, tolerances are inches ±0.005" [millimeters ±0.13mm]