MRF428

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</td>
</tr>
<tr>
<td>Derate above 25 °C</td>
<td></td>
<td>1.83</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_{AIC}</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>
<tbody>
<tr>
<td>Collector-Emitter Breakdown Voltage (I_{C} = 200 mA, I_{B} = 0)</td>
<td>V_{BB,CEO}</td>
<td>55</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_{BB,CES}</td>
<td>110</td>
<td>—</td>
<td>—</td>
<td>Vdc</td>
</tr>
<tr>
<td>Collector-Base Breakdown Voltage (I_{C} = 100 mA, I_{B} = 0)</td>
<td>V_{BB,CBO}</td>
<td>110</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_{BB,EBO}</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>
</table>

**ON CHARACTERISTICS**

| DC Current Gain                      | h_FE   | 10  | 30  | —   | —    |

| Output Capacitance                   | C_OO   | —   | 220 | 250 | pF   |

**DYNAMIC CHARACTERISTICS**

| Common-Emitter Amplifier Gain        | G_Pe   | 13  | 15  | —   | dB   |

| Output Power                         | P_Out  | 150 | —   | —   | W (PEP) |

| Collector Efficiency                  | η       | 45  | —   | —   | %    |

| Intermodulation Distortion (1)       | IMD     | —   | -33 | -30 | dB   |

| Electrical Ruggedness                | Ψ       | No Degradation in Output Power |

**FUNCTIONAL TESTS**

| Note: 1. To Mil-Std-1311 Version A, Test Method 22045, Two Tone, Reference each Tone. |
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**Rev. V1**

![Circuit Diagram]

C1, C2, C7 — 170-780 pF, Arco 469
C3, C6, C9 — 0.1µF, 100 V Elko
C4 — 500 µF @ 5.0 V
C5 — 9.0-180 pF, Arco 463
C5 — 80-480 pF, Arco 466
C10 — 30 µF, 100 V
R1 — 10 Ω, 10 Watt
R2 — 10 Ω, 1.0 Watt
CR1 — 1N4947
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 #55-590-65/3B

**Figure 1. 30 MHz Test Circuit Schematic**

**Figure 2 — Output Power versus Input Power**

**Figure 3 — Output Power versus Supply Voltage**

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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

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