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_{j} = 25 ºC</td>
<td>P_{D}</td>
<td>320</td>
<td>Watts</td>
</tr>
<tr>
<td>Donor above 25 ºC</td>
<td></td>
<td>1.83</td>
<td>W/ºC</td>
</tr>
<tr>
<td>Storage Temperature Range</td>
<td>T_{sg}</td>
<td>-65 to +150</td>
<td>ºC</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_{ej}</td>
<td>0.5</td>
<td>*CW</td>
</tr>
</tbody>
</table>

ELECTRICAL CHARACTERISTICS (T_{j} = 25 ºC 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_{BRCEO}</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_{BRCES}</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_{BRCEO}</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_{BRHB}</td>
<td>4.0</td>
<td>—</td>
<td>—</td>
<td>Vdc</td>
</tr>
</tbody>
</table>

(continued)
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**ELECTRICAL CHARACTERISTICS — continued** (T<sub>c</sub> = 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  
(I<sub>c</sub> = 5.0 Adc, V<sub>CE</sub> = 5.0 Vdc)  
| h<sub>FE</sub> | 10 | 30 | — | — |

**DYNAMIC CHARACTERISTICS**

Output Capacitance  
(V<sub>CB</sub> = 50 Vdc, I<sub>B</sub> = 0, f = 1.0 MHz)  
| C<sub>OG</sub> | — | 220 | 250 | pF |

**FUNCTIONAL TESTS**

Common-Emitter Amplifier Gain  
(V<sub>CE</sub> = 50 Vdc, P<sub>OUT</sub> = 150 W (PEP), I<sub>C</sub>(max) = 3.32 Adc,  
 f = 30 MHz)  
| G<sub>PE</sub> | 13 | 15 | — | dB |

Output Power  
(V<sub>CE</sub> = 50 Vdc, f = 30 MHz)  
| P<sub>OUT</sub> | 150 | — | — | W (PEP) |

Collector Efficiency  
(V<sub>CE</sub> = 50 Vdc, P<sub>OUT</sub> = 150 W (PEP), I<sub>C</sub>(max) = 3.32 Adc,  
 f = 30 MHz)  
| η | 45 | — | — | % |

Intermodulation Distortion (1)  
(V<sub>CE</sub> = 50 Vdc, P<sub>OUT</sub> = 150 W (PEP), I<sub>C</sub> = 3.32 Adc)  
| IMD | — | -33 | -30 | dB |

Electrical Ruggedness  
(V<sub>CE</sub> = 50 Vdc, P<sub>OUT</sub> = 150 W (PEP), I<sub>C</sub>(max) = 3.32 Adc,  
 VSWR 30:1 at all Phase Angles)  
| ¥ | No Degradation in Output Power |

**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

C1, C2, C7 — 170-780 pF, Arco 469
C3, C6, C9 — 0.1μF, 100 V Erics
C4 — 500 μF @ 5.0 V
C5 — 9.0-180 pF, Arco 463
C8 — 80-480 pF, Arco 466
C10 — 30 μF, 100 V
R1 — 10 Ω, 10 Watt
R2 — 10 Ω, 1.0 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 #55-590-55/3B

Visit www.macom.com for additional data sheets and product information.

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Figure 4 – Power Gain versus Frequency

Figure 5 – DC Safe Operating Area

Figure 6 – \( V_{CC} = 40 \text{ Vdc} \)

Figure 7 – \( V_{CC} = 50 \text{ Vdc} \)

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Figure 8 – Output Capacitance versus Frequency

Figure 9 – Output Resistance versus Frequency

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

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