MRF454

The RF Line NPN Silicon Power Transistor
80W, 30MHz, 12.5V

Designed for power amplifier applications in industrial, commercial and amateur radio equipment to 30 MHz.

- Specified 12.5 V, 30 MHz characteristics
- Output power = 80 W
- Minimum gain = 12 dB
- Efficiency = 50%

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>25</td>
<td>Vdc</td>
</tr>
<tr>
<td>Collector-Base Voltage</td>
<td>$V_{CBO}$</td>
<td>45</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>Total Device Dissipation @ $T_C = 25^\circ C$</td>
<td>$P_D$</td>
<td>250</td>
<td>Watts</td>
</tr>
<tr>
<td>Derate above 25°C</td>
<td></td>
<td>1.43</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>0.7</td>
<td>°C/W</td>
</tr>
</tbody>
</table>

ELECTRICAL CHARACTERISTICS ( $T_A = 25^\circ C$ 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 ($I_C = 100 \text{ mAdc}, I_B = 0$) | $V_{BR,CEO}$ | 18   | —    | —    | Vdc  |
- Collector-Emitter Breakdown Voltage ($I_C = 50 \text{ mAdc}, V_{BE} = 0$) | $V_{BR,CES}$ | 36   | —    | —    | Vdc  |
- Emitter–Base Breakdown Voltage ($I_E = 10 \text{ mAdc}, I_C = 0$) | $V_{BR,EBO}$ | 4.0  | —    | —    | Vdc  |

ON CHARACTERISTICS

- DC Current Gain ($I_C = 5.0 \text{ Adc}, V_{CE} = 5.0 \text{ Vdc}$) | $h_{FE}$ | 40   | —    | 150  | —    |

DYNAMIC CHARACTERISTICS

- Output Capacitance ($V_{CB} = 15 \text{ Vdc}, I_B = 0, f = 1.0 MHz$) | $C_{oD}$ | —    | —    | 250  | pF   |
### The RF Line NPN Silicon Power Transistor

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<table>
<thead>
<tr>
<th>Functional Tests (Figure 1)</th>
<th>$G_{pc}$</th>
<th>12</th>
<th>—</th>
<th>—</th>
<th>dB</th>
</tr>
</thead>
<tbody>
<tr>
<td>Common-Emitter Amplifier Power Gain ($V_{CC} = 12.5$ Vdc, $P_{out} = 80$ W, $f = 30$ MHz)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Collector Efficiency ($V_{CC} = 12.5$ Vdc, $P_{out} = 80$ W, $f = 30$ MHz)</td>
<td>$\eta$</td>
<td>50</td>
<td>—</td>
<td>—</td>
<td>%</td>
</tr>
<tr>
<td>Series Equivalent Input Impedance ($V_{CC} = 12.5$ Vdc, $P_{out} = 80$ W, $f = 30$ MHz)</td>
<td>$Z_{in}$</td>
<td></td>
<td>0.938-j3.41</td>
<td>—</td>
<td>Ohms</td>
</tr>
<tr>
<td>Series Equivalent Output Impedance ($V_{CC} = 12.5$ Vdc, $P_{out} = 80$ W, $f = 30$ MHz)</td>
<td>$Z_{out}$</td>
<td></td>
<td>1.16-j2.01</td>
<td>—</td>
<td>Ohms</td>
</tr>
<tr>
<td>Parallel Equivalent Input Impedance ($V_{CC} = 12.5$ Vdc, $P_{out} = 80$ W, $f = 30$ MHz)</td>
<td></td>
<td></td>
<td>1.06 $\Omega$</td>
<td>1817 pF</td>
<td>—</td>
</tr>
<tr>
<td>Parallel Equivalent Output Impedance ($V_{CC} = 12.5$ Vdc, $P_{out} = 80$ W, $f = 30$ MHz)</td>
<td></td>
<td></td>
<td>1.19 $\Omega$</td>
<td>777 pF</td>
<td>—</td>
</tr>
</tbody>
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**Figure 1. 30 MHz Test Circuit Schematic**

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

- **C1, C2, C4** — ARCO 489
- **C3** — ARCO 466
- **C5** — 1000 pF, UNELCO
- **C6, C7** — 0.1 µF Disc Ceramic
- **C8** — 1000 µF/15 V Electrolytic
- **R1** — 10 Ohm 1/4 Watt, Carbon
- **L1** — 3 Turns, #18 AWG, 5/16“ I.D., 5/16“ Long
- **L2** — VK200-20/4B, FERROXCUBE
- **L3** — 12 Turns, #18 AWG Enamelled Wire, 1/4“ I.D., Close Wound
- **L4** — 3 Turns 1/8“ O.D. Copper Tubing, 3/8“ I.D., 3/4“ Long
- **L5** — 7 FERRITE Beads, FERROXCUBE #56-590-65/38
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Figure 2. Output Power versus Input Power

Figure 3. Output Power versus Supply Voltage
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Rev. V1

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Unless otherwise noted, tolerances are inches ±0.005” (millimeters ±0.13mm)
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