Microwave Pulse Power Silicon NPN Transistor
150W (peak), 1025–1150MHz

Designed for 1025–1150 MHz pulse common base amplifier applications such as TCAS, TACAN and Mode–S transmitters.

- Guaranteed performance @ 1090 MHz
  - Output power = 150 W Peak
  - Gain = 9.5 dB min, 10.0 dB (typ.)
- 100% tested for load mismatch at all phase angles with 10:1 VSWR
- Hermetically sealed package
- Silicon nitride passivated
- Gold metallized, emitter ballasted for long life and resistance to metal migration
- Internal input and output matching
- Characterized with 10 µs, 10% duty cycle pulses
- Recommended driver for a pair of MRF10500 transistors

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_{CBE}</td>
<td>65</td>
<td>Vdc</td>
</tr>
<tr>
<td>Collector–Base Voltage</td>
<td>V_{CBO}</td>
<td>65</td>
<td>Vdc</td>
</tr>
<tr>
<td>Emitter–Base Voltage</td>
<td>V_{CEO}</td>
<td>3.5</td>
<td>Vdc</td>
</tr>
<tr>
<td>Collector Current — Peak (1)</td>
<td>I_C</td>
<td>14</td>
<td>Adc</td>
</tr>
<tr>
<td>Total Device Dissipation @ T_C = 25°C (1), (2)</td>
<td>P_D</td>
<td>700</td>
<td>Watts</td>
</tr>
<tr>
<td>Derate above 25°C</td>
<td></td>
<td>4.0</td>
<td>W/°C</td>
</tr>
<tr>
<td>Storage Temperature Range</td>
<td>T_{stg}</td>
<td>−65 to +200</td>
<td>°C</td>
</tr>
<tr>
<td>Junction Temperature</td>
<td>T_J</td>
<td>200</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 (3)</td>
<td>R_{JIC}</td>
<td>0.25</td>
<td>°C/W</td>
</tr>
</tbody>
</table>

NOTES:
1. Under pulse RF operating conditions.
2. These devices are designed for RF operation. The total device dissipation rating applies only when the devices are operated as pulsed RF amplifiers.
3. Thermal Resistance is determined under specified RF operating conditions by infrared measurement techniques. (Worst case θ_{jc} value measured @ 10 µs, 10%.)
# MRF10150

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### Electrical Characteristics

(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>
<tbody>
<tr>
<td>Collector–Emitter Breakdown Voltage (I&lt;sub&gt;C&lt;/sub&gt; = 60 mA, V&lt;sub&gt;BE&lt;/sub&gt; = 0)</td>
<td>V&lt;sub&gt;BRICES&lt;/sub&gt;</td>
<td>65</td>
<td>—</td>
<td>—</td>
<td>V&lt;sub&gt;dc&lt;/sub&gt;</td>
</tr>
<tr>
<td>Collector–Base Breakdown Voltage (I&lt;sub&gt;C&lt;/sub&gt; = 60 mA, I&lt;sub&gt;E&lt;/sub&gt; = 0)</td>
<td>V&lt;sub&gt;BRICBO&lt;/sub&gt;</td>
<td>65</td>
<td>—</td>
<td>—</td>
<td>V&lt;sub&gt;dc&lt;/sub&gt;</td>
</tr>
<tr>
<td>Emitter–Base Breakdown Voltage (I&lt;sub&gt;E&lt;/sub&gt; = 10 mA, I&lt;sub&gt;C&lt;/sub&gt; = 0)</td>
<td>V&lt;sub&gt;BRIEBO&lt;/sub&gt;</td>
<td>3.5</td>
<td>—</td>
<td>—</td>
<td>V&lt;sub&gt;dc&lt;/sub&gt;</td>
</tr>
<tr>
<td>Collector Cutoff Current (V&lt;sub&gt;CE&lt;/sub&gt; = 36 Vdc, I&lt;sub&gt;E&lt;/sub&gt; = 0)</td>
<td>I&lt;sub&gt;CBO&lt;/sub&gt;</td>
<td>—</td>
<td>—</td>
<td>25</td>
<td>mA&lt;sub&gt;dc&lt;/sub&gt;</td>
</tr>
</tbody>
</table>

### On Characteristics

| DC Current Gain (I<sub>C</sub> = 5.0 A<sub>dc</sub>, V<sub>CE</sub> = 5.0 V<sub>dc</sub>) | h<sub>FE</sub> | 20  | —   | —   | —     |

### Functional Tests

| Common–Base Amplifier Power Gain  
(V<sub>CC</sub> = 50 Vdc, P<sub>out</sub> = 150 W Peak, f = 1090 MHz) | G<sub>FB</sub> | 9.5 | 10  | —   | dB    |
| Collector Efficiency  
(V<sub>CC</sub> = 50 Vdc, P<sub>out</sub> = 150 W Peak, f = 1090 MHz) | η            | 40  | —   | —   | %     |
| Load Mismatch  
(V<sub>CC</sub> = 50 Vdc, P<sub>out</sub> = 150 W Peak, f = 1090 MHz,  
V<sub>SWR</sub> = 10:1 All Phase Angles) | ψ            | No Degradation in Output Power |
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C1 — 82 pF 100 Mil Chip Capacitor
C2 — 39 pF 100 Mil Chip Capacitor
C3 — 0.1 μF
C4 — 100 μF, 100 Vdc, Electrolytic
L1 — 3 Turns #18 AWG, 1/8” ID, 0.18 Long

Z1–Z9 — Microstrip, See Details
Board Material — Teflon Glass Laminate
Dielectric Thickness = 0.030”

εr = 2.55, 2 Oz. Copper

For further information and support please visit:
https://www.macom.com/support
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Figure 2. Output Power versus Input Power

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Rev. V1

MRF10150

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Figure 3. Series Equivalent Input/Output Impedances

<table>
<thead>
<tr>
<th>f (MHz)</th>
<th>$Z_{in}$ (OHMS)</th>
<th>$Z_{OL}^*$ (Z_{OUT}) (OHMS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1030</td>
<td>3.8 + j3.5</td>
<td>4.5 + j0.7</td>
</tr>
<tr>
<td>1060</td>
<td>4.0 + j3.3</td>
<td>4.5 + j0.3</td>
</tr>
<tr>
<td>1090</td>
<td>4.2 + j3.0</td>
<td>4.1 + j1.0</td>
</tr>
<tr>
<td>1120</td>
<td>4.4 + j2.3</td>
<td>3.8 + j0.8</td>
</tr>
<tr>
<td>1150</td>
<td>4.1 + j1.8</td>
<td>3.5 + j0.3</td>
</tr>
</tbody>
</table>

$Z_{OL}^*$ is the conjugate of the optimum load impedance into which the device operates at a given output power voltage and frequency.
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PACKAGE DIMENSIONS

CASE 376B–02
ISSUE B
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