Microwave Pulse Power Silicon NPN Transistor
4.0W (peak), 960–1215MHz

Designed for Class B and C common base amplifier applications in short and long pulse TACAN, IFF, DME, and radar transmitters.

- Guaranteed performance @ 1090 MHz, 35 Vdc
  Output power = 4.0 W Peak
  Minimum gain = 10 dB
- 100% Tested for load mismatch at all phase angles with 10:1 VSWR
- Industry standard package
- Nitride passivated
- Gold metallized, emitter ballasted for long life and resistance to metal migration
- Internal input matching for broadband operation

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>20</td>
<td>Vdc</td>
</tr>
<tr>
<td>Collector–Base Voltage</td>
<td>V_{CBO}</td>
<td>50</td>
<td>Vdc</td>
</tr>
<tr>
<td>Emitter–Base Voltage</td>
<td>V_{EBO}</td>
<td>3.5</td>
<td>Vdc</td>
</tr>
<tr>
<td>Collector Current — Continuous</td>
<td>I_C</td>
<td>250</td>
<td>mAdc</td>
</tr>
<tr>
<td>Total Device Dissipation @ T_C = 25°C (1)</td>
<td>P_D</td>
<td>7.0</td>
<td>Watts</td>
</tr>
<tr>
<td>Derate above 25°C</td>
<td></td>
<td>40</td>
<td>mW/°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 (2)</td>
<td>R_{JAC}</td>
<td>25</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 = 5.0 mAdc, I_B = 0)</td>
<td>V_{(BR)CEO}</td>
<td>20</td>
<td>—</td>
<td>—</td>
<td>Vdc</td>
</tr>
<tr>
<td>Collector–Emitter Breakdown Voltage (I_C = 5.0 mAdc, V_{BE} = 0)</td>
<td>V_{(BR)CES}</td>
<td>50</td>
<td>—</td>
<td>—</td>
<td>Vdc</td>
</tr>
<tr>
<td>Collector–Base Breakdown Voltage (I_C = 5.0 mAdc, I_E = 0)</td>
<td>V_{(BR)CBO}</td>
<td>50</td>
<td>—</td>
<td>—</td>
<td>Vdc</td>
</tr>
<tr>
<td>Emitter–Base Breakdown Voltage (I_E = 1.0 mAdc, I_C = 0)</td>
<td>V_{(BR)EBO}</td>
<td>3.5</td>
<td>—</td>
<td>—</td>
<td>Vdc</td>
</tr>
<tr>
<td>Collector Cutoff Current (I_{CBO} = 35 Vdc, I_C = 0)</td>
<td>I_{CBO}</td>
<td>—</td>
<td>—</td>
<td>0.5</td>
<td>mAdc</td>
</tr>
</tbody>
</table>

OFF CHARACTERISTICS

ON CHARACTERISTICS

| DC Current Gain (I_C = 75 mAdc, V_{OE} = 5.0 Vdc) | h_{FE} | 10   | 100  |

NOTES:
1. These devices are designed for RF operation. The total device dissipation rating applies only when the device is operated as RF amplifiers.
2. Thermal Resistance is determined under specified RF operating conditions by infrared measurement techniques.

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ELECTRICAL CHARACTERISTICS — continued  \( (T_C = 25^\circ C \text{ unless otherwise noted}) \)

<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>Output Capacitance ( (V_{CB} = 35 \text{ Vdc}, I_E = 0, f = 1.0 \text{ MHz}) )</td>
<td>( C_{eb} )</td>
<td>—</td>
<td>3.3</td>
<td>5.0</td>
<td>pF</td>
</tr>
</tbody>
</table>

FUNCTIONAL TESTS (Pulse Width = 10 \( \mu \text{s} \), Duty Cycle = 1.0\%)

| Common–Base Amplifier Power Gain \( (V_{CC} = 35 \text{ Vdc}, P_{out} = 4.0 \text{ W pk, } f = 1090 \text{ MHz}) \) | \( G_{PB} \) | 10  | 11  | —   | dB   |
| Collector Efficiency \( (V_{CC} = 35 \text{ Vdc}, P_{out} = 4.0 \text{ W pk, } f = 1090 \text{ MHz}) \) | \( \eta \) | 40  | 45  | —   | dB   |
| Load Mismatch \( (V_{CC} = 35 \text{ Vdc}, P_{out} = 4.0 \text{ W pk, } f = 1090 \text{ MHz, VSWR = 10:1 All Phase Angles}) \) | \( \psi \) | No Degradation in Power Output |

![Figure 1 1000 MHz Test Circuit](image)

C1 — 0.1 \( \mu \text{F} \)
C2, C4 — 220 pF Chip Capacitor
C3 — 20 \( \mu \text{F} \), 50 V Electrolytic
L1, L2 — 3 Turns \#18 AWG, 1/8" ID
Z1–Z6 Distributed Microstrip Elements, See Photomaster
Board Material — 0.031" Thick Glass Teflon

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TYPICAL CHARACTERISTICS

Figure 2. Output Power versus Input Power

Figure 3. Output Power versus Frequency

Figure 4. Output Power versus Supply Voltage

Figure 5. Power Gain versus Frequency

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MRF1004MB

TYPICAL CHARACTERISTICS

\[ P_{\text{out}} = 4 \text{ W pk} \]
\[ V_{\text{CC}} = 35 \text{ V} \]
\[ t_{\text{p}} = 1 \text{ ms} \]
\[ D = 10\% \]
\[ f = 1090 \text{ MHz} \]

Figure 7. Typical Long Pulse Performance
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