The RF Line NPN Silicon High-Frequency Transistor

1.0W, 400MHz, 28V

Designed for wideband amplifier, driver or oscillator applications in military, mobile, and aircraft radio.

- Specified 28 V, 400 MHz characteristics —
  - Output power = 1.0 W
  - Power gain = 15 dB min.
  - Efficiency = 45% typ.
- Emitter ballast and low current density for improved MTBF
- Common emitter for improved stability

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>30</td>
<td>Vdc</td>
</tr>
<tr>
<td>Collector–Base Voltage</td>
<td>( V_{CBO} )</td>
<td>40</td>
<td>Vdc</td>
</tr>
<tr>
<td>Emitter–Base Voltage</td>
<td>( V_{EBO} )</td>
<td>3.0</td>
<td>Vdc</td>
</tr>
<tr>
<td>Collector Current — Continuous</td>
<td>( I_C )</td>
<td>150</td>
<td>mAdc</td>
</tr>
<tr>
<td>Total Device Dissipation ( T_C = 25^\circ C )</td>
<td>( P_D )</td>
<td>6.1</td>
<td>35</td>
</tr>
<tr>
<td>Storage Temperature Range</td>
<td>( T_{W} )</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_{JIC} )</td>
<td>29.5</td>
<td>°C/W</td>
</tr>
</tbody>
</table>

ELECTRICAL CHARACTERISTICS (\( T_C = 25^\circ C \) 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>
<tbody>
<tr>
<td>Collector–Emitter Breakdown Voltage ( I_C = 10 \text{ mAdc, } I_E = 0 )</td>
<td>( V_{BRCEO} )</td>
<td>30</td>
<td>—</td>
<td>—</td>
<td>Vdc</td>
</tr>
<tr>
<td>Collector–Emitter Breakdown Voltage ( I_C = 5.0 \text{ mAdc, } V_{BE} = 0 )</td>
<td>( V_{BRCEES} )</td>
<td>35</td>
<td>—</td>
<td>—</td>
<td>Vdc</td>
</tr>
<tr>
<td>Collector–Base Breakdown Voltage ( I_C = 0.1 \text{ mAdc, } I_E = 0 )</td>
<td>( V_{BRCEBO} )</td>
<td>35</td>
<td>—</td>
<td>—</td>
<td>Vdc</td>
</tr>
<tr>
<td>Emitter–Base Breakdown Voltage ( I_E = 1.0 \text{ mAdc, } I_C = 0 )</td>
<td>( V_{BRCEBO} )</td>
<td>3.0</td>
<td>—</td>
<td>—</td>
<td>Vdc</td>
</tr>
<tr>
<td>Collector Cutoff Current ( V_{CE} = 20 \text{ Vdc, } I_E = 0 )</td>
<td>( I_{CEO} )</td>
<td>—</td>
<td>1.0</td>
<td>—</td>
<td>mAdc</td>
</tr>
</tbody>
</table>

(continued)
MRF313

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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 (I_C = 100 mA dc, V_C = 10 V dc)          | h_FE   | 20  | 60  | 150 | —    |

DYNAMIC CHARACTERISTICS

Current-Gain — Bandwidth Product (I_C = 100 mA dc, V_CE = 20 V dc, f = 200 MHz) | f_T    | —   | 2.5 | —   | GHz  |

Output Capacitance (V_C = 28 V dc, I_E = 0, f = 1.0 MHz)  | C_O     | —   | 3.5 | 5.0 | pF   |

FUNCTIONAL TESTS

Common-Emitter Amplifier Power Gain (1) (V_CC = 28 V dc, P_out = 1.0 W, f = 400 MHz) | G_P_E  | 15  | 16  | —   | dB   |

Collector Efficiency (V_CC = 28 V dc, P_out = 1.0 W, f = 400 MHz) | η       | —   | 45  | —   | %    |

Series Equivalent Input Impedance (V_CC = 28 V dc, P_out = 1.0 W, f = 400 MHz) | Z_in   | —   | 6.4 – j4.8 | — | Ohms |

Series Equivalent Output Impedance (V_CC = 28 V dc, P_out = 1.0 W, f = 400 MHz) | Z_out  | —   | 75 – j45 | — | Ohms |

NOTE:

1. Class C
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Figure 1. 400 MHz Power Gain Test Circuit

C1, C2, C4 — 1.0–20 pF JOHANSON 9063
C3 — 1.0–100 pF JOHANSON
C5 — 150 pF Chip
C6 — 0.1 µF
C7, C8 — 680 pF Feedthru
C9 — 1.0 µF TANTALUM
L1, L3 — 5 Turns, AWG #20, 1/4” I.D.
L2 — Ferrite Bead, FERROXCUBE No. 56–530–65/48
L4 — FERROXCUBE YK200–20/4B
R — 4.7 Ohms, 1/4 W
Z1 — 2.0” x 0.1” MICROSTRIP LINE
Z2, Z3 — 2.6” x 0.1” MICROSTRIP LINE

Board — Glass Teflon, ε = 2.56, t = 0.062”

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

For further information and support please visit:
https://www.macom.com/support