The RF Line NPN Silicon Power Transistor
30W, 30-200MHz, 28V

Designed primarily for wideband large–signal driver and output amplifier stages in the 30–200 MHz frequency range.

- Guaranteed performance at 150 MHz, 28 Vdc
  - Output power = 30 W
  - Minimum gain = 10 dB
- 100% tested for load mismatch at all phase angles with 30:1 VSWR
- Gold metallization system for high reliability applications

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>35</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_{EBO}</td>
<td>4.0</td>
<td>Vdc</td>
</tr>
<tr>
<td>Collector Current — Continuous</td>
<td>I_{C}</td>
<td>3.4</td>
<td>Adc</td>
</tr>
<tr>
<td>Total Device Dissipation @ T_{C} = 25°C (1)</td>
<td>P_{D}</td>
<td>0.2</td>
<td>Watts</td>
</tr>
<tr>
<td>Derate above 25°C</td>
<td></td>
<td>0.47</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_{jc}</td>
<td>2.13</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} = 30 mAdc, I_{B} = 0)</td>
<td>V_{BR1CEO}</td>
<td>35</td>
<td>—</td>
<td>—</td>
<td>Vdc</td>
</tr>
<tr>
<td>Collector–Emitter Breakdown Voltage (I_{C} = 30 mAdc, V_{BE} = 0)</td>
<td>V_{BR1CES}</td>
<td>65</td>
<td>—</td>
<td>—</td>
<td>Vdc</td>
</tr>
<tr>
<td>Collector–Base Breakdown Voltage (I_{C} = 30 mAdc, I_{C} = 0)</td>
<td>V_{BR1CBO}</td>
<td>65</td>
<td>—</td>
<td>—</td>
<td>Vdc</td>
</tr>
<tr>
<td>Emitter–Base Breakdown Voltage (I_{E} = 3.0 mAdc, I_{C} = 0)</td>
<td>V_{BR1EBO}</td>
<td>4.0</td>
<td>—</td>
<td>—</td>
<td>Vdc</td>
</tr>
<tr>
<td>Collector Cutoff Current (V_{CB} = 30 Vdc, I_{E} = 0)</td>
<td>I_{CBO}</td>
<td>—</td>
<td>—</td>
<td>3.0</td>
<td>mAdc</td>
</tr>
</tbody>
</table>

ON CHARACTERISTICS

<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>DC Current Gain (I_{C} = 1.5 mAdc, V_{CE} = 5.0 Vdc)</td>
<td>h_{FE}</td>
<td>20</td>
<td>—</td>
<td>80</td>
<td>—</td>
</tr>
</tbody>
</table>

NOTE:
1. These devices are designed for RF operation. The total device dissipation rating applies only when the devices are operated as RF amplifiers.
The RF Line NPN Silicon Power Transistor
30W, 30–200MHz, 28V

**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>
<tbody>
<tr>
<td>Output Capacitance <em>(V_CE = 30 Vdc, I_E = 0, f = 1.0 MHz)</em></td>
<td>C_0b</td>
<td>—</td>
<td>30</td>
<td>40</td>
<td>pF</td>
</tr>
</tbody>
</table>

**FUNCTIONAL TESTS (Figure 1)**

- Common–Emitter Amplifier Power Gain *(V_CC = 28 Vdc, P_out = 30 W, f = 150 MHz)*
  - G_FE
  - 10
  - 13.5
  - —
  - dB

- Collector Efficiency *(V_CC = 28 Vdc, P_out = 30 W, f = 150 MHz)*
  - η
  - 50
  - —
  - —
  - %

- Load Mismatch *(V_CC = 28 Vdc, P_out = 30 W, f = 150 MHz, VSWR = 30:1 all phase angles)*
  - Ψ
  - No Degradation in Power Output

![Figure 1. 150 MHz Test Circuit](image)

- C1, C7 — 18 pF, 100 mil ATC
- C2 — 56 pF, 100 mil ATC
- C3, C6 — Johnson JMC 5501
- C4 — 270 pF, 100 mil ATC
- C5 — 240 pF, 100 mil ATC
- C8, C9 — 100 pF Underwood
- C10 — 1.0 μF Tantalum
- L1 — 2 Turns, 2.5” #20 Wire, ID = 0.275”
- R1, R2 — 10 Ω, 1.0 W
- RFC1 — 15 μH Molded Coil
- RFC2 — 2 Turns, 2.5” #20 Wire, ID = 0.2”
- RFC3 — Ferroxcube VK200–1948
- Z1 — Microstrip, 0.168” W x 1.6” L
- Z2 — Microstrip, 0.168” W x 1.2” L
- Board — Glass Teflon ε_r = 2.55

MACOM Technology Solutions Inc. (MACOM) and its affiliates reserve the right to make changes to the product(s) or information contained herein without notice.

Visit [www.macom.com](http://www.macom.com) for additional data sheets and product information.

For further information and support please visit:
[https://www.macom.com/support](https://www.macom.com/support)
MRF314

The RF Line NPN Silicon Power Transistor
30W, 30-200MHz, 28V

Rev. V1

TYPICAL PERFORMANCE CURVES

Figure 2. Output Power versus Input Power

Figure 3. Output Power versus Input Power

Figure 4. Power Gain versus Frequency

Figure 5. Efficiency versus Frequency

M/A-COM Technology Solutions Inc. (MACOM) and its affiliates reserve the right to make changes to the product(s) or information contained herein without notice. Visit www.macom.com for additional data sheets and product information.

For further information and support please visit: https://www.macom.com/support
The RF Line NPN Silicon Power Transistor
30W, 30-200MHz, 28V

Figure 6. Series Equivalent Input/Output Impedance

<table>
<thead>
<tr>
<th>f (MHz)</th>
<th>Z_L (Ω)</th>
<th>Z_{OL*} (Ω)</th>
</tr>
</thead>
<tbody>
<tr>
<td>30</td>
<td>2.4 + j3.4</td>
<td>18.0 - j12.1</td>
</tr>
<tr>
<td>50</td>
<td>1.6 + j2.6</td>
<td>16.5 - j12.1</td>
</tr>
<tr>
<td>70</td>
<td>0.8 + j1.8</td>
<td>15.0 - j11.8</td>
</tr>
<tr>
<td>100</td>
<td>0.7 + j1.5</td>
<td>12.9 - j10.8</td>
</tr>
<tr>
<td>150</td>
<td>0.9 + j0.9</td>
<td>11.9 - j9.4</td>
</tr>
<tr>
<td>200</td>
<td>1.3 + j1.2</td>
<td>11.5 - j8.1</td>
</tr>
</tbody>
</table>

Z_{OL*} = Conjugate of the optimum load impedance into which the device output operates at a given output power, voltage and frequency.
The RF Line NPN Silicon Power Transistor
30W, 30-200MHz, 28V

Rev. V1

MRF314

MACOM

M/A-COM Technology Solutions Inc. (MACOM) and its affiliates reserve the right to make changes to the product(s) or information contained herein without notice. Visit www.macom.com for additional data sheets and product information.

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

Unless otherwise noted, tolerances are inches ±.005" [millimeters ±0.13mm]
The RF Line NPN Silicon Power Transistor
30W, 30-200MHz, 28V

M/A-COM Technology Solutions Inc. All rights reserved.
Information in this document is provided in connection with M/A-COM Technology Solutions Inc ("MACOM") products. These materials are provided by MACOM as a service to its customers and may be used for informational purposes only. Except as provided in MACOM's Terms and Conditions of Sale for such products or in any separate agreement related to this document, MACOM assumes no liability whatsoever. MACOM assumes no responsibility for errors or omissions in these materials. MACOM may make changes to specifications and product descriptions at any time, without notice. MACOM makes no commitment to update the information and shall have no responsibility whatsoever for conflicts or incompatibilities arising from future changes to its specifications and product descriptions. No license, express or implied, by estoppels or otherwise, to any intellectual property rights is granted by this document.

THESE MATERIALS ARE PROVIDED "AS IS" WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, RELATING TO SALE AND/OR USE OF MACOM PRODUCTS INCLUDING LIABILITY OR WARRANTIES RELATING TO FITNESS FOR A PARTICULAR PURPOSE, CONSEQUENTIAL OR INCIDENTAL DAMAGES, MERCHANTABILITY, OR INFRINGEMENT OF ANY PATENT, COPYRIGHT OR OTHER INTELLECTUAL PROPERTY RIGHT. MACOM FURTHER DOES NOT WARRANT THE ACCURACY OR COMPLETENESS OF THE INFORMATION, TEXT, GRAPHICS OR OTHER ITEMS CONTAINED WITHIN THESE MATERIALS. MACOM SHALL NOT BE LIABLE FOR ANY SPECIAL, INDIRECT, INCIDENTAL, OR CONSEQUENTIAL DAMAGES, INCLUDING WITHOUT LIMITATION, LOST REVENUES OR LOST PROFITS, WHICH MAY RESULT FROM THE USE OF THESE MATERIALS.

MACOM products are not intended for use in medical, lifesaving or life sustaining applications. MACOM customers using or selling MACOM products for use in such applications do so at their own risk and agree to fully indemnify MACOM for any damages resulting from such improper use or sale.