The RF Line NPN Silicon Power Transistor
6.0W, 1.6GHz, 28V

Designed for 28 V microwave large–signal, common base, Class C, CW amplifier applications in the range 1600 – 1640 MHz.

- Specified 28 V, 1.6 GHz Class C characteristics
  - Output power = 6 W
  - Minimum gain = 7.4 dB, @ 6 W
  - Minimum efficiency = 40% @ 6 W
- Characterized with series equivalent large–signal parameters from 1500 MHz to 1700 MHz
- Silicon nitride passivated
- Gold metalized, emitter ballasted for long life and resistance to metal migration

MAXIMUM RATINGS (Tj = 25°C unless otherwise noted)

<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>VCES</td>
<td>60</td>
<td>Vdc</td>
</tr>
<tr>
<td>Emitter–Base Voltage</td>
<td>VEB0</td>
<td>4.0</td>
<td>Vdc</td>
</tr>
<tr>
<td>Collector–Current</td>
<td>IC</td>
<td>1.0</td>
<td>Adc</td>
</tr>
<tr>
<td>Total Device Dissipation @ TC = 25°C</td>
<td>PD</td>
<td>26</td>
<td>Watts W/C</td>
</tr>
<tr>
<td>Derate above 25°C</td>
<td></td>
<td>0.15</td>
<td></td>
</tr>
<tr>
<td>Storage Temperature Range</td>
<td>Tstg</td>
<td>–65 to +150</td>
<td>°C</td>
</tr>
</tbody>
</table>

THERMAL CHARACTERISTICS

| Thermal Resistance — Junction to Case (1) (2) | RJC    | 6.8   | °C/W   |

(1) Thermal measurement performed using CW RF operating condition.
(2) Thermal resistance is determined under specified RF operating conditions by infrared measurement techniques.
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### ELECTRICAL CHARACTERISTICS ($T_C = 25^\circ\text{C}$ 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 ($I_C = 40\ \text{mA}, V_{BE} = 0$)</td>
<td>$V_{(BR)CE}$</td>
<td>55</td>
<td></td>
<td></td>
<td>Vdc</td>
</tr>
<tr>
<td>Collector–Base Breakdown Voltage ($I_C = 40\ \text{mA}, I_E = 0$)</td>
<td>$V_{(BR)CB}$</td>
<td>55</td>
<td></td>
<td></td>
<td>Vdc</td>
</tr>
<tr>
<td>Emitter–Base Breakdown Voltage ($I_E = 2.5\ \text{mA}, I_C = 0$)</td>
<td>$V_{(BR)EB}$</td>
<td>4.0</td>
<td></td>
<td></td>
<td>Vdc</td>
</tr>
<tr>
<td>Collector Cutoff Current ($V_{CE} = 28\ \text{Vdc}, V_{BE} = 0$)</td>
<td>$I_{CES}$</td>
<td></td>
<td>2.5</td>
<td></td>
<td>mA\text{dc}</td>
</tr>
</tbody>
</table>

### ON CHARACTERISTICS

| DC Current Gain ($I_{CE} = 0.2\ \text{A/c}, V_{CE} = 5.0\ \text{Vdc}$) | $I_{IE}$ | 20   | 80   | —    |

### DYNAMIC CHARACTERISTICS

| Output Capacitance ($V_{CE} = 28\ \text{Vdc}, f = 1.0\ \text{MHz}$) | $C_{ob}$ | 11   |      |      | pf   |

### FUNCTIONAL TESTS

| Common–Base Amplifier Power Gain ($V_{CC} = 28\ \text{Vdc}, P_{out} = 6\ \text{Watts}, f = 1600/1640\ \text{MHz}$) | $G_{be}$ | 7.4  |      |      | dB   |
| Collector Efficiency ($V_{CC} = 28\ \text{Vdc}, P_{out} = 6\ \text{Watts}, f = 1600/1640\ \text{MHz}$)       | $\eta$   | 40   | 45   | —    | %    |
| Return Loss ($V_{CC} = 28\ \text{Vdc}, P_{out} = 6\ \text{Watts}, f = 1600/1640\ \text{MHz}$)            | $L_{RL}$ | —    | 0.0  | —    | dB   |
| Output Mismatch Stress ($V_{CC} = 28\ \text{Vdc}, P_{out} = 6\ \text{Watts}, f = 1600\ \text{MHz}, \text{Load YSWR} = 3:1$ all phase angles at frequency of test) | $\psi$   | No Degradation in Output Power |
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Board Material – Teflon® Glass Laminate Dielectric
Thickness – 0.30", εr = 2.55", 2.0 oz. Copper

B1      1  Fair Rite Bead on #24 Wire
C1, C5  1 00 pF, B Case, ATC Chip Cap
C2      1 0.1 μF, Dipped Mica Cap
C3      1 0.1 μF, Chip Cap
C4      1 47 μF, 50 V, Electrolytic Cap
L1, L2  3 3 Turns, #18, 0.133" ID, 0.15" Long
L3      9  9 Turns, #24 Enamel
R1      1 82 Ω, 1.0 W, Carbon Resistor

Figure 1. MRF16006 Test Fixture Schematic
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<table>
<thead>
<tr>
<th>f (MHz)</th>
<th>$Z_{in}$ (Ohms)</th>
<th>$Z_{OL}^*$ (Ohms)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1500</td>
<td>6.28 + j 8.53</td>
<td>1.22 – j 1.37</td>
</tr>
<tr>
<td>1600</td>
<td>7.04 + j 9.00</td>
<td>1.58 – j 0.53</td>
</tr>
<tr>
<td>1700</td>
<td>9.56 + j 12.86</td>
<td>1.71 + j 0.39</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.

Figure 2. Series Equivalent Input/Output Impedance
Figure 3. Output Power versus Input Power
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PACKAGE DIMENSIONS

CASE 395C-01
ISSUE A
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For further information and support please visit:
https://www.macom.com/support