The RF Line NPN Silicon Power Transistor
60 W, 225 - 400 MHz, 28 V

- Guaranteed performance in 225 to 400 MHz broadband amplifier @ 28 Vdc
  - Output power = 60 W over 225 to 400 MHz band
  - Minimum gain = 7.8 dB @ 400 MHz
- Built-in matching network for broadband operation using double match technique
- 100% tested for load mismatch at all phase angles with 30:1 VSWR
- Gold metallization system for high reliability applications

Designed primarily for wideband large-signal output amplifier stages in the 225 to 400 MHz frequency range.

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>33</td>
<td>Vdc</td>
</tr>
<tr>
<td>Collector–Base Voltage</td>
<td>V_{CBO}</td>
<td>60</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>Total Device Dissipation @ T_C = 25°C (1)</td>
<td>P_D</td>
<td>146</td>
<td>Watts</td>
</tr>
<tr>
<td>Derate above 25°C</td>
<td></td>
<td>0.83</td>
<td>Watt/W°C</td>
</tr>
<tr>
<td>Storage Temperature Range</td>
<td>T_{stg}</td>
<td>-65 to +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</td>
<td>R_{JIC}</td>
<td>1.2</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 = 50 mA, I_E = 0)</td>
<td>V_{BREO}</td>
<td>33</td>
<td>—</td>
<td>—</td>
<td>Vdc</td>
</tr>
<tr>
<td>Collector–Emitter Breakdown Voltage (I_C = 50 mA, V_{BE} = 0)</td>
<td>V_{BREC}</td>
<td>60</td>
<td>—</td>
<td>—</td>
<td>Vdc</td>
</tr>
<tr>
<td>Emitter–Base Breakdown Voltage (I_E = 5.0 mA, I_C = 0)</td>
<td>V_{BREBO}</td>
<td>4.0</td>
<td>—</td>
<td>—</td>
<td>Vdc</td>
</tr>
<tr>
<td>Collector Cutoff Current (V_{CEB} = 30 Vdc, I_E = 0)</td>
<td>I_{CEO}</td>
<td>—</td>
<td>—</td>
<td>2.0</td>
<td>mA dc</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.

* Indicates JEDEC Registered Data.

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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 = 1.0 A, V_CE = 5.0 Vdc)

h_FE | 10 | — | 100 | — |

DYNAMIC CHARACTERISTICS

Output Capacitance
(V_CB = 28 Vdc, I_E = 0, f = 1.0 MHz)

C_06 | — | 67 | 75 | pF |

BROADBAND FUNCTIONAL TESTS (Figure 6)

Common-Emitter Amplifier Power Gain
(V_CC = 28 Vdc, P_out = 60 W, f = 225–400 MHz)

G_PE | 7.8 | 8.5 | — | dB |

Electrical Ruggedness
(P_out = 60 W, V_CC = 28 Vdc, f = 400 MHz, VSWR 30:1 all phase angles)

Ψ | No Degradation in Output Power | — |

NARROW BAND FUNCTIONAL TESTS (Figure 1)

Common-Emitter Amplifier Power Gain
(V_CC = 28 Vdc, P_out = 60 W, f = 400 MHz)

G_PE | 7.8 | 10 | — | dB |

Collector Efficiency
(V_CC = 28 Vdc, P_out = 60 W, f = 400 MHz)

η | 55 | — | — | % |

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NARROW BAND DATA

Figure 2. $P_{out}$ versus Frequency

Figure 3. Output Power versus Input Power

Figure 4. Power Gain versus Frequency

Figure 5. Output Power versus Supply Voltage

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Figure 6. Output Power versus Supply Voltage

Figure 7. 225 to 400 MHz Broadband Test Circuit Schematic

C1 — 58 pF
C2, C4, C8, C10 — 27 pF
C3, C5, C11 — 10 pF
C6, C7 — 51 pF
C9 — 1.0–10 pF JOHANSON
C12 — 100 pF
C13, C15 — 680 pF
C14, C16 — 1.0 μF, 35 V Tantalum
C17 — 0.1 μF, ERIE Red Cap

RFC1 — Ferrite Bead Choke, Ferroxcube VK200 19/4B
B — Ferroxcube 56-590-65MB Ferrite Bead
T1, T2 — 25 Ohm (UT25) Miniature Coaxial Cable, 1 turn
R1 — 11 Ω, 1.0 W
R2 — 20 Ω, 1/4 W
L1 — 10 Turns, #22 AWG, 1/8” I.D.
L2 — 4 Turns, #16 AWG, 1/4” I.D.
L3 — 6 Turns, #24 AWG, 1/8” I.D.
L4, L5 — 1” x 0.25” Microstrip Line
Board Material: 0.031” Thick Teflon-Fiberglass
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BROADBAND DATA (Circuit, Figure 7)

Figure 8. Power Gain versus Frequency

Figure 9. Efficiency versus Frequency

Figure 10. Input VSWR versus Frequency

Figure 11. Series Equivalent Input-Output Impedance

Rev. V1

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