Microwave Power Silicon Bipolar Transistor
5.0 W, 960–1215 MHz, 28V

Features
- Guaranteed performance @1.215GHz, 28Vdc
- Output power: 5.0W CW
- Minimum gain = 8.5dB, 10.3dB (Typ.)
- RF performance curves for 28 Vdc and 36 Vdc operation
- 100% tested for load mismatch at all phase angles with 10:1 VSWR
- Hermetically sealed industry standard package
- Silicon nitride passivated
- Gold metallized, emitter ballasted for long life and resistance to metal migration
- Internal input matching for broadband operation

Description and Applications
Designed for CW and long-pulsed common base amplifier applications, such as JTIDS and Mode S, in the 0.96 to 1.215 GHz frequency range with high overall duty cycles.

Maximum Ratings

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Symbol</th>
<th>Value</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Collector–Emitter Voltage</td>
<td>V_{CES}</td>
<td>55</td>
<td>Vdc</td>
</tr>
<tr>
<td>Collector–Base Voltage</td>
<td>V_{CEO}</td>
<td>55</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 (1)</td>
<td>I_{C}</td>
<td>1.25</td>
<td>mA\text{dc}</td>
</tr>
<tr>
<td>Total Device Dissipation @ T_{A} = 25°C (1)</td>
<td>P_{0}</td>
<td>25</td>
<td>Watt \text{mW/°C}</td>
</tr>
<tr>
<td>Derate above 25°C</td>
<td></td>
<td>143</td>
<td></td>
</tr>
<tr>
<td>Storage Temperature Range</td>
<td>T_{stg}</td>
<td>–65 to +200</td>
<td>°C</td>
</tr>
<tr>
<td>Junction Temperature</td>
<td>T_{J}</td>
<td>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 (2)</td>
<td>R_{JUC}</td>
<td>7.0</td>
<td>°C/W</td>
</tr>
</tbody>
</table>

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

OFF CHARACTERISTICS

Collector–Emitter Breakdown Voltage (I_C = 25 mAdc, V_BE = 0)  \( V_{BR,CESS} \)

Collector–Base Breakdown Voltage (I_C = 25 mAdc, I_E = 0)  \( V_{BR,CEO} \)

Emitter–Base Breakdown Voltage (I_E = 0.5 mAdc, I_C = 0)  \( V_{BR,CEO} \)

Collector Cutoff Current (V_CE = 28 Vdc, I_E = 0)  \( I_{CEO} \)

ON CHARACTERISTICS

DC Current Gain (I_C = 500 mAdc, V_CE = 5.0 Vdc)  \( h_{FE} \)

DYNAMIC CHARACTERISTICS

Output Capacitance (V_CE = 28 Vdc, I_E = 0, f = 1.0 MHz)  \( C_{CE} \)

FUNCTIONAL TESTS

Common–Base Amplifier Power Gain
(V_CC = 28 Vdc, P_out = 5.0 W, f = 1215 MHz)  \( G_{FB} \)

Collector Efficiency
(V_CC = 28 Vdc, P_out = 5.0 W, f = 1215 MHz)  \( \eta \)

Load Match
(V_CC = 28 Vdc, P_out = 5.0 W, f = 1215 MHz, VSWR = 10:1 All Phase Angles)  \( \psi \)

Miscellaneous:

220 pF 100 ml Chip Capacitor
0.1 µF
47 µF/50 V Electrolytic
3 turn #18 AWG, 1/8" ID, 0.18" Long

Z1–Z10 — Microstrip, see details below
Board Material — 0.030" Glass Teflon,
2.0 oz. Copper, \( \kappa_p = 2.55 \)
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Figure 1. Test Circuit

Figure 2. Output Power versus Input Power

Figure 3. Output Power versus Input Power

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$P_{\text{out}} = 5 \text{ W}, V_{\text{CC}} = 28 \text{ V}$

<table>
<thead>
<tr>
<th>$f$</th>
<th>$Z_{\text{in}}$</th>
<th>$Z_{\text{OL}}^*$</th>
</tr>
</thead>
<tbody>
<tr>
<td>960</td>
<td>6.5 + j8.5</td>
<td>7.4 - j18.9</td>
</tr>
<tr>
<td>1025</td>
<td>10.0 + j7.0</td>
<td>7.2 - j17.4</td>
</tr>
<tr>
<td>1090</td>
<td>11.2 + j4.9</td>
<td>7.1 - j16.3</td>
</tr>
<tr>
<td>1150</td>
<td>10.8 + j2.0</td>
<td>7.15 - j14.3</td>
</tr>
<tr>
<td>1215</td>
<td>7.8 + j0.0</td>
<td>7.8 - j11.2</td>
</tr>
</tbody>
</table>

$Z_{\text{OL}}^*$ = Conjugate of the optimum load impedance into which the device output operates at a given output power, voltage and frequency.

Figure 4. Series Equivalent Input/Output Impedances
PACKAGE DIMENSIONS

CASE 336E–02
ISSUE B

NOTES:
2. CONTROLLING DIMENSION: INCH.
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