DESCRIPTION
2SC2539 is a silicon NPN epitaxial planar type transistor designed for RF power amplifiers in VHF band mobile radio applications.

FEATURES
- High power gain: G_\text{pe} \geq 14.5\text{dB}
  \[ V_{CC} = 13.5\text{V}, P_0 = 14\text{W}, f = 175\text{MHz} \]
- Emitter ballasted construction and gold metallization for high reliability and good performances.
- Low thermal resistance ceramic package with flange.
- Ability of withstanding more than 20:1 load VSWR when operated at V_{CC} = 15.2\text{V}, P_0 = 18\text{W}, f = 175\text{MHz}, T_\text{C} = 25^\circ\text{C}.
- Equivalent input/output series impedance:
  \[ Z_{\text{in}} = 1.7 - j4.4\Omega \quad @ P_0 = 14\text{W}, V_{CC} = 13.5\text{V}, f = 175\text{MHz}, Z_{\text{out}} = 6 - j7.4\Omega \]

APPLICATION
10 to 14 watts output power amplifiers in VHF band mobile radio applications.

\begin{table}
\centering
\begin{tabular}{|c|c|c|c|c|}
\hline
Symbol & Parameter & Conditions & Ratings & Unit \\
\hline
V_{CB0} & Collector to base voltage & & 35 & V \\
\hline
V_{EB0} & Emitter to base voltage & & 4 & V \\
\hline
V_{DER} & Collector to emitter voltage & R_{BE} = \infty & 17 & V \\
\hline
I_C & Collector current & & 3.5 & A \\
\hline
P_C & Collector dissipation & T_\text{a} = 25^\circ\text{C} & 2.5 & W \\
\hline
T_1 & Junction temperature & T_\text{C} = 25^\circ\text{C} & 35 & W \\
\hline
J_{stg} & Storage temperature & & -55 to 175 & ^\circ\text{C} \\
\hline
R_{Rn-a} & Thermal resistance & Junction to ambient & 60 & ^\circ\text{C}/W \\
\hline
R_{Rn-c} & Thermal resistance & Junction to case & 4.3 & ^\circ\text{C}/W \\
\hline
\end{tabular}
\caption{ABSOLUTE MAXIMUM RATINGS (T_\text{C} = 25^\circ\text{C} unless otherwise specified)}
\end{table}

Note: Above parameters are guaranteed independently.

\begin{table}
\centering
\begin{tabular}{|c|c|c|c|c|}
\hline
Symbol & Parameter & Test conditions & Limits & Unit \\
\hline
V_{EB0} & Emitter to base breakdown voltage & I_E = 10\text{mA}, I_C = 0 & 4 & V \\
\hline
V_{CE0} & Collector to base breakdown voltage & I_C = 10\text{mA}, I_E = 0 & 35 & V \\
\hline
V_{CE0} & Collector to emitter breakdown voltage & I_C = 50\text{mA}, R_{BE} = \infty & 17 & V \\
\hline
I_{CEO} & Collector cutoff current & V_{CE} = 25\text{V}, I_E = 0 & 1000 & \mu\text{A} \\
\hline
I_{EBO} & Emitter cutoff current & V_{EB} = 3\text{V}, I_C = 0 & 1000 & \mu\text{A} \\
\hline
h_{FE} & DC forward current gain* & V_{CE} = 10\text{V}, I_C = 0.1\text{A} & 10 & 50 & 180 \\
\hline
P_0 & Output power & V_{CE} = 13.5\text{V}, P_{Rn} = 0.5\text{W}, f = 175\text{MHz} & 14 & 17 & W \\
\hline
\eta & Collector efficiency & & 60 & 65 & \% \\
\hline
\end{tabular}
\caption{ELECTRICAL CHARACTERISTICS (T_\text{C} = 25^\circ\text{C} unless otherwise specified)}
\end{table}

Note: * Pulse test, P_{Rn} = 150\text{mW}, duty = 5% 
Above parameters, ratings, limits and conditions are subject to change.
TEST CIRCUIT

L: Length 10mm
RFC: 0.4mm phosphor bronze wire 12T with ferrite bead
C1: 220pF, 2200pF in parallel
C2: 220pF, 2200pF, 10pF in parallel

TYPICAL PERFORMANCE DATA

COLLECTOR DISSIPATION VS. AMBIENT TEMPERATURE

COLLECTOR CURRENT VS. COLLECTOR TO EMITTER VOLTAGE

COLLECTOR TO EMITTER BREAKDOWN VOLTAGE VS. BASE TO_EMITTER RESISTANCE

DC CURRENT GAIN VS. COLLECTOR CURRENT

NOTES:
All coils are made from 1.5mm silver plated copper wire
D: Inner diameter of coil
T: Turn number of coil
P: Pitch of coil
Dimension in millimeter
MITSUBISHI RF POWER TRANSISTOR

2SC2539

NPN EPITAXIAL PLANAR TYPE

COLLECTOR OUTPUT CAPACITANCE VS. COLLECTOR TO BASE VOLTAGE

<table>
<thead>
<tr>
<th>Collector to Base Voltage V_{CB} (V)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
</tr>
<tr>
<td>---</td>
</tr>
<tr>
<td>1000</td>
</tr>
</tbody>
</table>

T_{0} = 25°C, f = 1 MHz

OUTPUT POWER VS. COLLECTOR SUPPLY VOLTAGE

<table>
<thead>
<tr>
<th>Collector Supply Voltage V_{CE} (V)</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
</tr>
<tr>
<td>---</td>
</tr>
<tr>
<td>24</td>
</tr>
</tbody>
</table>

T_{0} = 25°C, f = 175 MHz, V_{DD} = 13.5 V, Adjustment

OUTPUT POWER, COLLECTOR EFFICIENCY VS. INPUT POWER

<table>
<thead>
<tr>
<th>Input Power P_{in} (W)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
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<tr>
<td>0</td>
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</tbody>
</table>

T_{0} = 25°C, f = 175 MHz, V_{DD} = 13.5 V, Efficiency P_{0} (W), Collector Efficiency %