The RF Line Controlled “Q” Broadband Power Transistor
100W, 30 to 500MHz, 28V

Designed primarily for wideband large–signal output and driver amplifier stages in the 30 to 500 MHz frequency range.

- Specified 28 V, 500 MHz characteristics —
  - Output power = 100 W
  - Typical gain = 9.5 dB (Class AB); 8.5 dB (Class C)
  - Efficiency = 55% (typ.)
- Built–in input impedance matching networks for broadband operation
- Push–pull configuration reduces even numbered harmonics
- Gold metallization system for high reliability
- 100% tested for load mismatch

The MRF393 is two transistors in a single package with separate base and collector leads and emitters common. This arrangement provides the designer with a space saving device capable of operation in a push–pull configuration.

PUSH–PULL TRANSISTORS

**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>VCEO</td>
<td>30</td>
<td>Vdc</td>
</tr>
<tr>
<td>Collector–Base Voltage</td>
<td>VCEO</td>
<td>60</td>
<td>Vdc</td>
</tr>
<tr>
<td>Emitter–Base Voltage</td>
<td>VEBO</td>
<td>4.0</td>
<td>Vdc</td>
</tr>
<tr>
<td>Collector Current — Continuous</td>
<td>IC</td>
<td>16</td>
<td>Adc</td>
</tr>
<tr>
<td>Total Device Dissipation @ T_C = 25°C (1)</td>
<td>PD</td>
<td>270</td>
<td>Watts</td>
</tr>
<tr>
<td>Derate above 25°C</td>
<td></td>
<td>1.54</td>
<td>W/°C</td>
</tr>
<tr>
<td>Storage Temperature Range</td>
<td>Tstg</td>
<td>–65 to +150</td>
<td>°C</td>
</tr>
<tr>
<td>Junction Temperature</td>
<td>TJ</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</td>
<td>RθJC</td>
<td>0.65</td>
<td>°C/W</td>
</tr>
</tbody>
</table>

**NOTE:**
1. This device is designed for RF operation. The total device dissipation rating applies only when the device is operated as an RF push–pull amplifier.
### ELECTRICAL 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>Collector-Emitter Breakdown Voltage ($I_C = 50 , m\text{A}_c$, $I_B = 0$)</td>
<td>$V_{(BR)CEO}$</td>
<td>30</td>
<td>—</td>
<td>—</td>
<td>Vdc</td>
</tr>
<tr>
<td>Collector-Emitter Breakdown Voltage ($I_C = 50 , m\text{A}<em>c$, $V</em>{BE} = 0$)</td>
<td>$V_{(BR)CES}$</td>
<td>60</td>
<td>—</td>
<td>—</td>
<td>Vdc</td>
</tr>
<tr>
<td>Emitter-Base Breakdown Voltage ($I_E = 5.0 , m\text{A}_c$, $I_C = 0$)</td>
<td>$V_{(BR)EBO}$</td>
<td>4.0</td>
<td>—</td>
<td>—</td>
<td>Vdc</td>
</tr>
<tr>
<td>Collector Cutoff Current ($V_{CB} = 30 , V_{dc}$, $I_E = 0$)</td>
<td>$I_{CBO}$</td>
<td>—</td>
<td>—</td>
<td>5.0</td>
<td>m\text{A}_c</td>
</tr>
</tbody>
</table>

### OFF CHARACTERISTICS (1)

### ON CHARACTERISTICS (1)

- DC Current Gain ($I_C = 1.0 \, A_{dc}$, $V_{CE} = 5.0 \, V_{dc}$)
  - $h\text{FE}$

### DYNAMIC CHARACTERISTICS (1)

- Output Capacitance ($V_{CB} = 28 \, V_{dc}$, $I_E = 0$, $f = 1.0 \, MHz$)
  - $C_{ob}$

### FUNCTIONAL TESTS (2) — See Figure 1

- Common-Collector Amplifier Power Gain ($V_{CC} = 28 \, V_{dc}$, $P_{out} = 100 \, W$, $f = 500 \, MHz$)
  - $Q_{pe}$

- Collector Efficiency ($V_{CC} = 28 \, V_{dc}$, $P_{out} = 100 \, W$, $f = 500 \, MHz$)
  - $\eta$

- Load Mismatch ($V_{CC} = 28 \, V_{dc}$, $P_{out} = 100 \, W$, $f = 500 \, MHz$, $V_{SWR} = 30:1$, all phase angles)
  - $\psi$

**NOTES:**

1. Each transistor chip measured separately.
2. Both transistor chips operating in push–pull amplifier.
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Figure 1. 600 MHz Test Fixture
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Figure 2. Output Power versus Input Power

Figure 3. Output Power versus Input Power

Figure 4. Output Power versus Supply Voltage

Figure 5. Output Power versus Supply Voltage
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MRF393

NOTE: $Z_{in}$ & $Z_{OL}$ are given from base-to-base and collector-to-collector respectively.

Figure 6. Series Equivalent Input/Output Impedance

Figure 7. Class AB Output Power versus Input Power
The RF Line Controlled “Q” Broadband Power Transistor
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PACKAGE DIMENSIONS

<table>
<thead>
<tr>
<th>MILLIMETERS</th>
<th>INCHES</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A</strong></td>
<td>22.00</td>
</tr>
<tr>
<td><strong>B</strong></td>
<td>12.00</td>
</tr>
<tr>
<td><strong>C</strong></td>
<td>16.00</td>
</tr>
<tr>
<td><strong>D</strong></td>
<td>10.00</td>
</tr>
<tr>
<td><strong>E</strong></td>
<td>4.00</td>
</tr>
<tr>
<td><strong>F</strong></td>
<td>12.00</td>
</tr>
<tr>
<td><strong>G</strong></td>
<td>24.00</td>
</tr>
<tr>
<td><strong>H</strong></td>
<td>20.00</td>
</tr>
<tr>
<td><strong>J</strong></td>
<td>12.00</td>
</tr>
<tr>
<td><strong>K</strong></td>
<td>22.00</td>
</tr>
<tr>
<td><strong>M</strong></td>
<td>10.00</td>
</tr>
</tbody>
</table>

NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982
2. STYLE 1:
   - PIN 1. Emitter (Common)
   - PIN 2. Collector
   - PIN 3. Collector
   - PIN 4. Emitter (Common)
   - PIN 5. Emitter (Common)
   - PIN 6. Base
   - PIN 7. Base
   - PIN 8. Emitter (Common)

CASE 744A–01
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