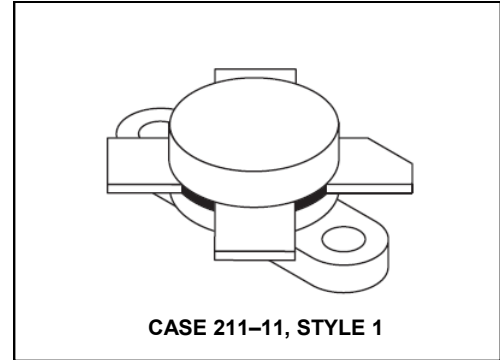


## The RF Line NPN Silicon Power Transistor 150W(PEP), 30MHz, 28V

Rev. V1

Designed primarily for applications as a high-power linear amplifier from 2.0 to 30 MHz. **Product Image**

- Specified 28 V, 30 MHz characteristics —  
Output power = 150 W (PEP)  
Minimum gain = 10 dB  
Efficiency = 40%
- Intermodulation distortion @ 150 W (PEP) —IMD = -30 dB (min.)
- 100% tested for load mismatch at all phase angles with 30:1 VSWR



### MAXIMUM RATINGS

| Rating   | Symbol    | Value       | Unit                         |
|--|-----------|-------------|------------------------------|
| Collector-Emitter Voltage  | $V_{CEO}$ | 40          | Vdc                          |
| Collector-Base Voltage   | $V_{CBO}$ | 85          | Vdc                          |
| Emitter-Base Voltage   | $V_{EBO}$ | 3.0         | Vdc                          |
| Collector Current — Continuous   | $I_C$     | 20          | Adc                          |
| Withstanding Current — 10 s  | —         | 30          | Adc                          |
| Total Device Dissipation @ $T_C = 25^\circ\text{C}$<br>Derate above $25^\circ\text{C}$ | $P_D$     | 290<br>1.66 | Watts<br>W/ $^\circ\text{C}$ |
| Storage Temperature Range  | $T_{stg}$ | -65 to +150 | $^\circ\text{C}$             |

### THERMAL CHARACTERISTICS

| Characteristic                       | Symbol          | Max | Unit                      |
|--------------------------------------|-----------------|-----|---------------------------|
| Thermal Resistance, Junction to Case | $R_{\theta JC}$ | 0.6 | $^\circ\text{C}/\text{W}$ |

### ELECTRICAL CHARACTERISTICS ( $T_C = 25^\circ\text{C}$ unless otherwise noted.)

| Characteristic | Symbol | Min | Typ | Max | Unit |
|----------------|--------|-----|-----|-----|------|
|----------------|--------|-----|-----|-----|------|

### OFF CHARACTERISTICS

|  |               |     |   |    |      |
|--|---------------|-----|---|----|------|
| Collector-Emitter Breakdown Voltage ( $I_C = 200 \text{ mAdc}$ , $I_B = 0$ )                     | $V_{(BR)CEO}$ | 35  | — | —  | Vdc  |
| Collector-Emitter Breakdown Voltage ( $I_C = 100 \text{ mAdc}$ , $V_{BE} = 0$ )                  | $V_{(BR)CES}$ | 85  | — | —  | Vdc  |
| Collector-Base Breakdown Voltage ( $I_C = 100 \text{ mAdc}$ , $I_E = 0$ )                        | $V_{(BR)CBO}$ | 85  | — | —  | Vdc  |
| Emitter-Base Breakdown Voltage ( $I_E = 10 \text{ mAdc}$ , $I_C = 0$ )                           | $V_{(BR)EBO}$ | 3.0 | — | —  | Vdc  |
| Collector Cutoff Current ( $V_{CE} = 28 \text{ Vdc}$ , $V_{BE} = 0$ , $T_C = 25^\circ\text{C}$ ) | $I_{CES}$     | —   | — | 20 | mAdc |

(continued)

**The RF Line NPN Silicon Power Transistor  
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**ELECTRICAL CHARACTERISTICS — continued** ( $T_C = 25^\circ\text{C}$  unless otherwise noted.)

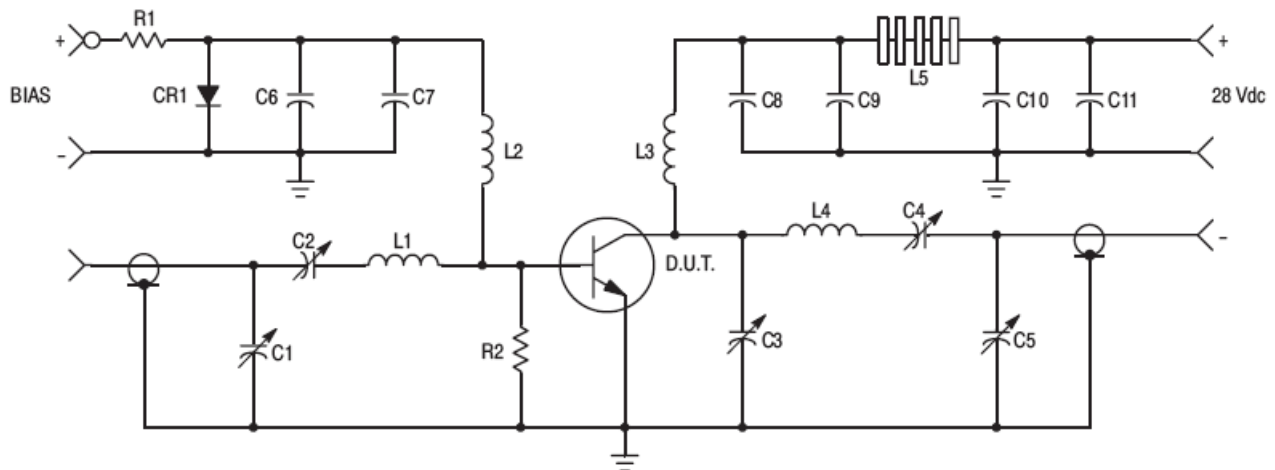
| Characteristic  | Symbol    | Min | Typ | Max | Unit           |
|---|-----------|-----|-----|-----|----------------|
| <b>ON CHARACTERISTICS</b>   |           |     |     |     |                |
| DC Current Gain<br>( $I_C = 5.0 \text{ Adc}$ , $V_{CE} = 5.0 \text{ Vdc}$ )   | $h_{FE}$  | 15  | 30  | 120 | —              |
| <b>DYNAMIC CHARACTERISTICS</b>  |           |     |     |     |                |
| Output Capacitance<br>( $V_{CB} = 28 \text{ Vdc}$ , $I_E = 0$ , $f = 1.0 \text{ MHz}$ )   | $C_{ob}$  | —   | 420 | —   | pF             |
| <b>FUNCTIONAL TESTS</b>   |           |     |     |     |                |
| Common-Emitter Amplifier Power Gain<br>( $V_{CC} = 28 \text{ Vdc}$ , $P_{out} = 150 \text{ W (PEP)}$ , $I_{C(max)} = 6.7 \text{ Adc}$ ,<br>$I_{CQ} = 150 \text{ mAdc}$ , $f = 30, 30.001 \text{ MHz}$ ) | $G_{PE}$  | 10  | 13  | —   | dB             |
| Collector Efficiency<br>( $V_{CC} = 28 \text{ Vdc}$ , $P_{out} = 150 \text{ W (PEP)}$ , $I_{C(max)} = 6.7 \text{ Adc}$ ,<br>$I_{CQ} = 150 \text{ mAdc}$ , $f = 30, 30.001 \text{ MHz}$ )                | $\eta$    | —   | 45  | —   | %              |
| Intermodulation Distortion (1)<br>( $V_{CE} = 28 \text{ Vdc}$ , $P_{out} = 150 \text{ W (PEP)}$ , $I_C = 6.7 \text{ Adc}$ ,<br>$I_{CQ} = 150 \text{ mAdc}$ , $f = 30, 30.001 \text{ MHz}$ )             | IMD       | —   | -33 | -30 | dB             |
| Output Power<br>( $V_{CE} = 28 \text{ Vdc}$ , $f = 30 \text{ MHz}$ )  | $P_{out}$ | 150 | —   | —   | Watts<br>(PEP) |

## NOTE:

- To Mil-Std-1311 Version A, Test Method 2204, Two Tone, Reference each Tone.

## The RF Line NPN Silicon Power Transistor 150W(PEP), 30MHz, 28V

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C1, C2, C3, C5 — 170–680 pF, ARCO 469  
 C4 — 80–480 pF, ARCO 466  
 C6, C8, C11 — ERIE 0.1  $\mu$ F, 100 V  
 C7 — MALLORY 500  $\mu$ F, 15 V Electrolytic  
 C9 — UNDERWOOD 1000 pF, 350 V  
 C10 — 10  $\mu$ F, 50 V Electrolytic  
 R1 — 10  $\Omega$ , 25 Watt Wire Wound  
 R2 — 10  $\Omega$ , 1.0 Watt Carbon  
 CR1 — 1N4997

L1 — 3 Turns, #16 Wire, 5/16" I.D., 5/16" Long  
 L2 — 10  $\mu$ H Molded Choke  
 L3 — 12 Turns, #16 Enameled Wire, Close Wound, 1/4" Dia.  
 L4 — 5 Turns, 1/8" Copper Tubing  
 L5 — 10 Ferrite Beads — FERROXCUBE #56–590–65/3B

Figure 1. 30 MHz Test Circuit Schematic

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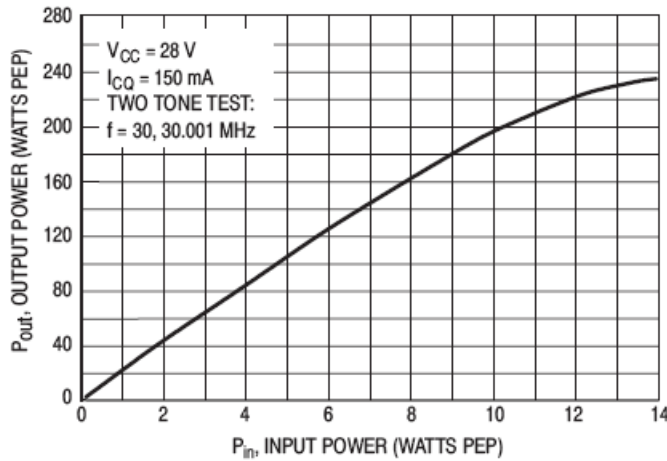


Figure 2. Output Power versus Input Power

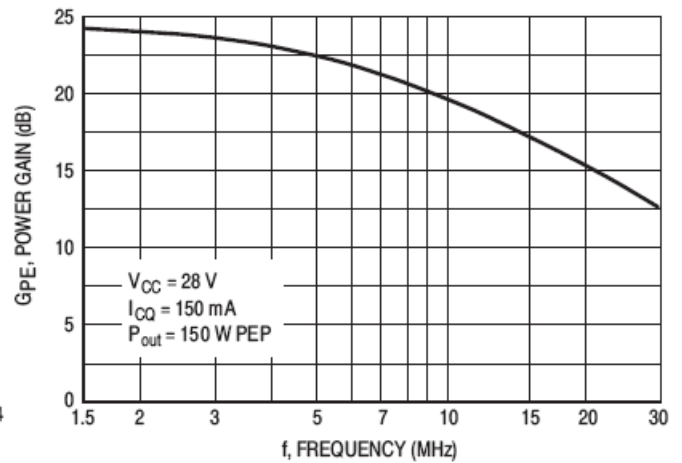


Figure 3. Power Gain versus Frequency

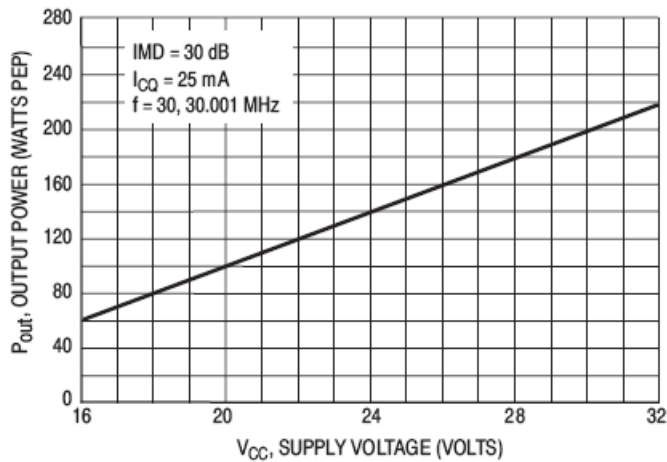


Figure 4. Linear Output Power versus Supply Voltage

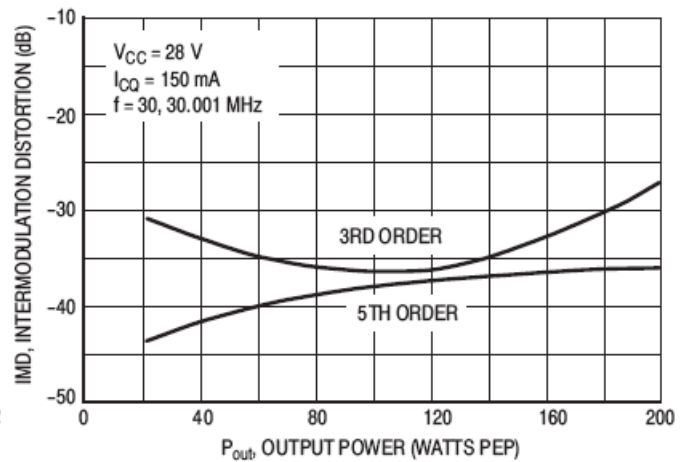


Figure 5. Intermodulation Distortion versus Output Power

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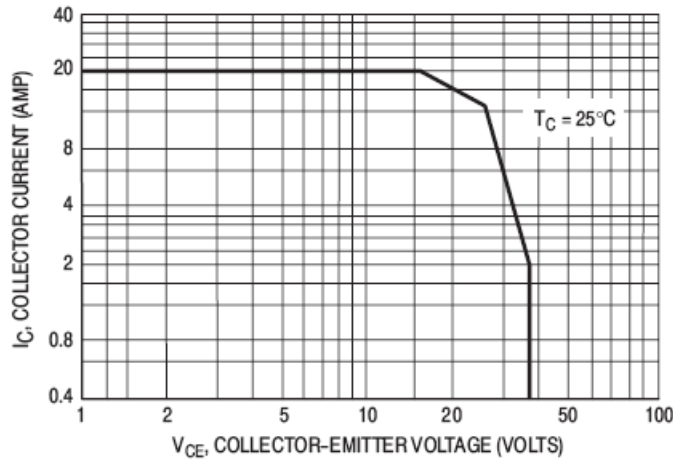


Figure 6. DC Safe Operating Area

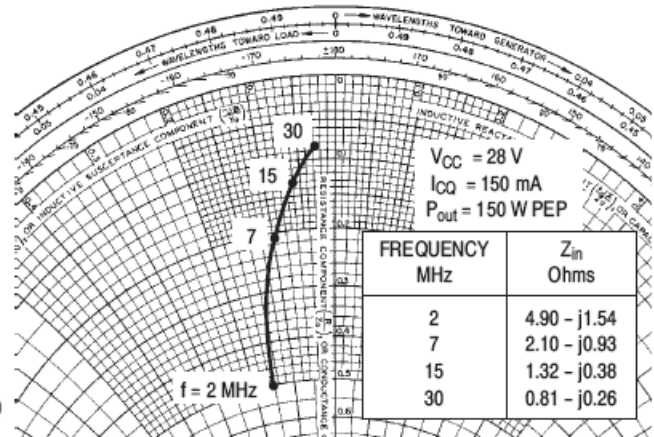


Figure 7. Series Input Impedance

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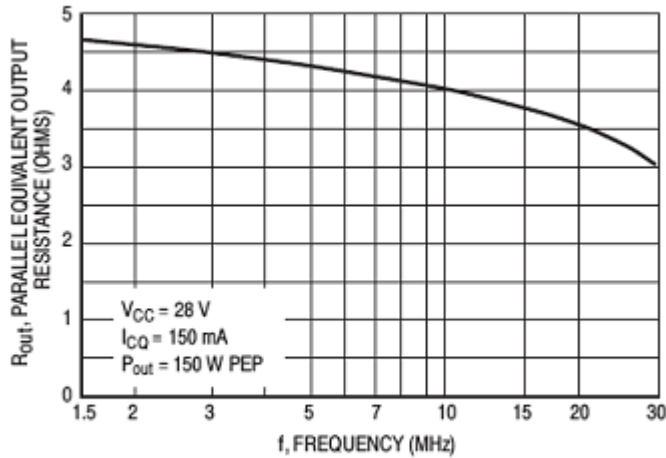


Figure 8. Output Resistance versus Frequency

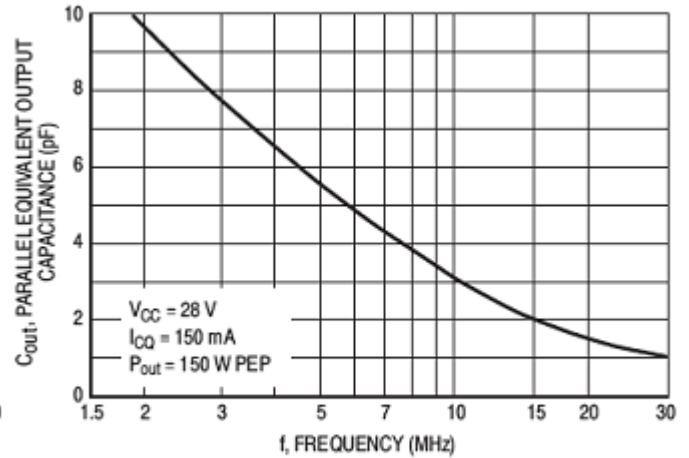
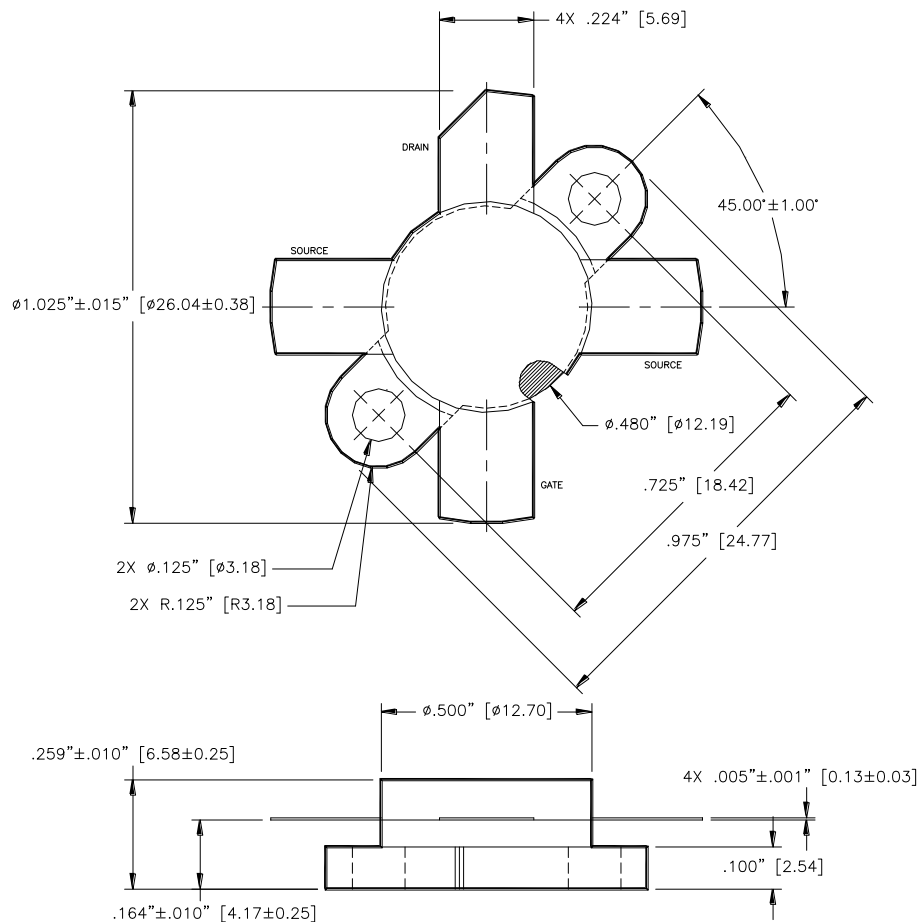


Figure 9. Output Capacitance versus Frequency



Unless otherwise noted, tolerances are inches  $\pm 0.005$  [millimeters  $\pm 0.13$ mm]