

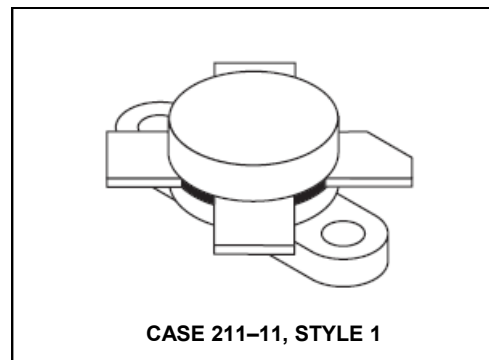
## The RF Line NPN Silicon Power Transistor 150W(PEP), 30MHz, 50V

Rev. V1

Designed primarily for high-voltage applications as a high-power linear amplifier from 2.0 to 30 MHz. Ideal for marine and base station equipment.

- Specified 50 V, 30 MHz Characteristics —  
Output power = 150 W (PEP)  
Minimum gain = 13 dB  
Efficiency = 45%
- Intermodulation distortion @ 150 W (PEP) —  
IMD = -32 dB (Max)
- Diffused emitter resistors for superior ruggedness
- 100% tested for load mismatch at all phase angles with 30:1 VSWR @ 150 W CW

### Product Image



### MAXIMUM RATINGS

| Rating                                                                                 | Symbol    | Value       | Unit                         |
|----------------------------------------------------------------------------------------|-----------|-------------|------------------------------|
| Collector-Emitter Voltage                                                              | $V_{CEO}$ | 50          | Vdc                          |
| Collector-Base Voltage                                                                 | $V_{CBO}$ | 100         | Vdc                          |
| Emitter-Base Voltage                                                                   | $V_{EBO}$ | 4.0         | Vdc                          |
| Collector Current — Continuous                                                         | $I_C$     | 16          | Adc                          |
| Withstand Current — 10 s                                                               | —         | 20          | Adc                          |
| Total Device Dissipation @ $T_C = 25^\circ\text{C}$<br>Derate above $25^\circ\text{C}$ | $P_D$     | 233<br>1.33 | 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 | $R_{\theta JC}$ | 0.75 | $^\circ\text{C/W}$ |

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

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

### OFF CHARACTERISTICS

|                                                                                 |               |     |   |   |     |
|---------------------------------------------------------------------------------|---------------|-----|---|---|-----|
| Collector-Emitter Breakdown Voltage ( $I_C = 200 \text{ mAdc}$ , $I_E = 0$ )    | $V_{(BR)CEO}$ | 50  | — | — | Vdc |
| Collector-Emitter Breakdown Voltage ( $I_C = 100 \text{ mAdc}$ , $V_{BE} = 0$ ) | $V_{(BR)CES}$ | 100 | — | — | Vdc |
| Collector-Base Breakdown Voltage ( $I_C = 100 \text{ mAdc}$ , $I_E = 0$ )       | $V_{(BR)CBO}$ | 100 | — | — | Vdc |
| Emitter-Base Breakdown Voltage ( $I_E = 10 \text{ mAdc}$ , $I_C = 0$ )          | $V_{(BR)EBO}$ | 4.0 | — | — | Vdc |

(continued)

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

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

#### ON CHARACTERISTICS

|                                                                             |          |    |    |    |   |
|-----------------------------------------------------------------------------|----------|----|----|----|---|
| DC Current Gain<br>( $I_C = 5.0 \text{ Adc}$ , $V_{CE} = 5.0 \text{ Vdc}$ ) | $h_{FE}$ | 10 | 30 | 80 | — |
|-----------------------------------------------------------------------------|----------|----|----|----|---|

#### DYNAMIC CHARACTERISTICS

|                                                                                         |          |   |     |     |    |
|-----------------------------------------------------------------------------------------|----------|---|-----|-----|----|
| Output Capacitance<br>( $V_{CB} = 50 \text{ Vdc}$ , $I_E = 0$ , $f = 1.0 \text{ MHz}$ ) | $C_{ob}$ | — | 220 | 300 | pF |
|-----------------------------------------------------------------------------------------|----------|---|-----|-----|----|

#### FUNCTIONAL TESTS

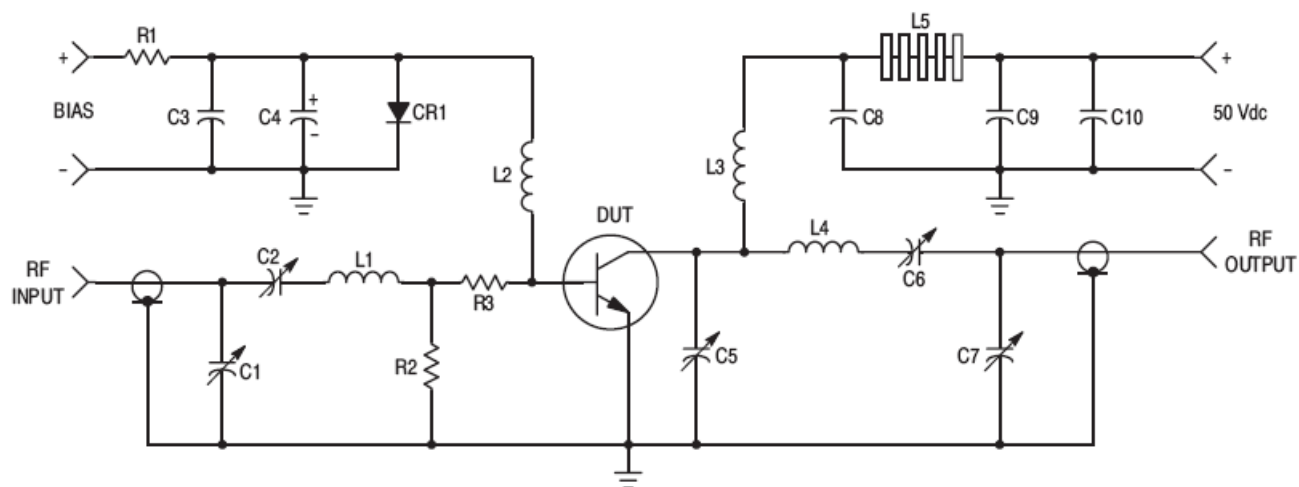
|                                                                                                                                                                   |           |                                |     |     |         |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|--------------------------------|-----|-----|---------|
| Common-Emitter Amplifier Gain<br>( $V_{CC} = 50 \text{ Vdc}$ , $P_{out} = 150 \text{ W (PEP)}$ , $I_C(\text{max}) = 3.32 \text{ Adc}$ ,<br>$f = 30$ ; 30.001 MHz) | $G_{PE}$  | 13                             | 15  | —   | dB      |
| Output Power<br>( $V_{CE} = 50 \text{ Vdc}$ , $f = 30$ ; 30.001 MHz)                                                                                              | $P_{out}$ | 150                            | —   | —   | W (PEP) |
| Collector Efficiency<br>( $V_{CC} = 50 \text{ Vdc}$ , $P_{out} = 150 \text{ W (PEP)}$ , $I_C(\text{max}) = 3.32 \text{ Adc}$ ,<br>$f = 30$ , 30.001 MHz)          | $\eta$    | 45                             | —   | —   | %       |
| Intermodulation Distortion (1)<br>( $V_{CE} = 50 \text{ Vdc}$ , $P_{out} = 150 \text{ W (PEP)}$ , $I_C = 3.32 \text{ Adc}$ )                                      | IMD       | —                              | -35 | -32 | dB      |
| Electrical Ruggedness<br>( $V_{CC} = 50 \text{ Vdc}$ , $P_{out} = 150 \text{ W CW}$ , $f = 30 \text{ MHz}$ ,<br>VSWR 30:1 at all Phase Angles)                    | $\Psi$    | No Degradation in Output Power |     |     |         |

#### NOTE:

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

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C1, C2, C7 — 170–780 pF, Arco 469  
C3, C8, C9 — 0.1  $\mu$ F, 100 V Erie  
C4 — 500  $\mu$ F @ 6.0 V  
C5 — 9.0–180 pF, Arco 463  
C6 — 80–480 pF, Arco 466  
C10 — 30  $\mu$ F, 100 V  
R1 — 10  $\Omega$ , 10 Watt

R2 — 10  $\Omega$ , 1.0 Watt  
R3 — 5.0 – 3.3  $\Omega$  1/2 Watt Carbon Resistors in Parallel  
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 Closewound, 1/4" I.D.  
L4 — 5 Turns, 1/8" Copper Tubing, 9/16" I.D., 3/4" Long  
L5 — 10 Ferrite Beads — Ferroxcube #56–590–65/3B

Figure 1. 30 MHz Test Circuit Schematic

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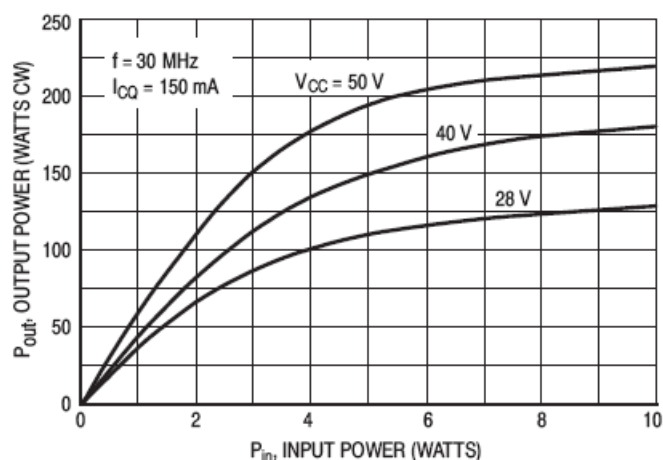


Figure 2. Output Power versus Input Power

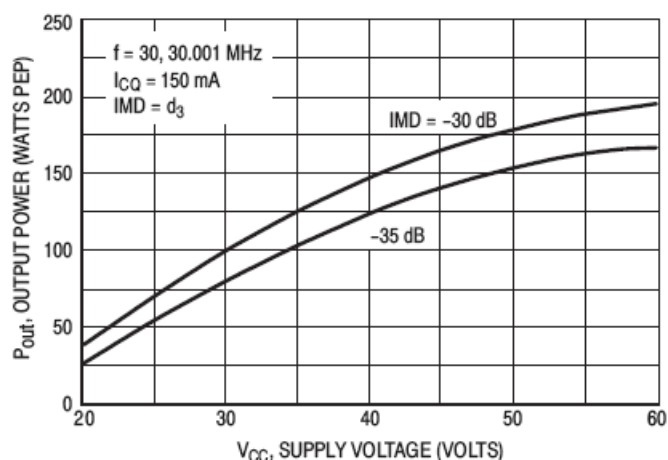


Figure 3. Output Power versus Supply Voltage

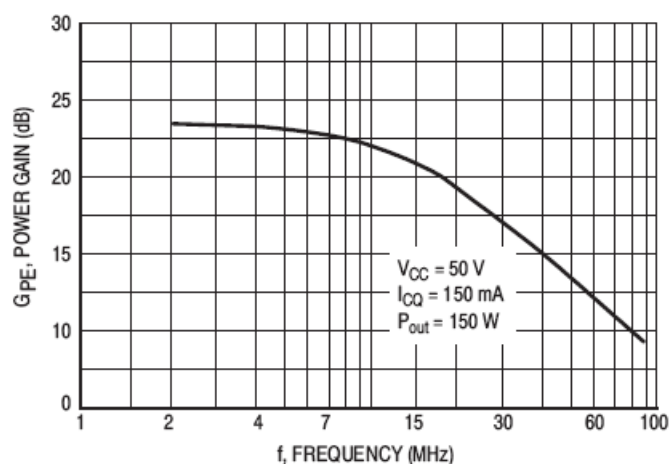


Figure 4. Power Gain versus Frequency

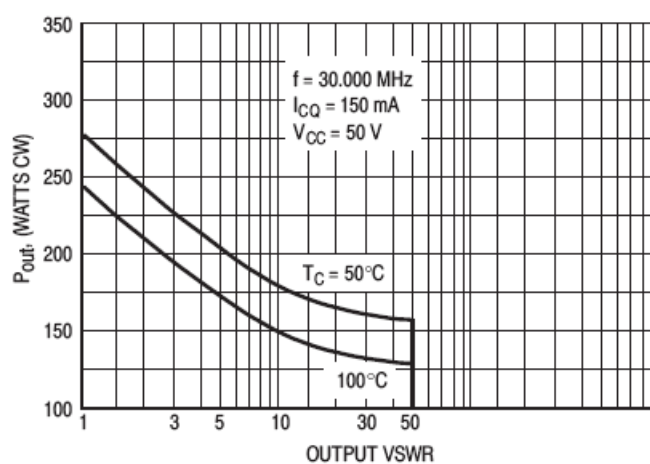


Figure 5. RF Safe Operating Area (SOAR)

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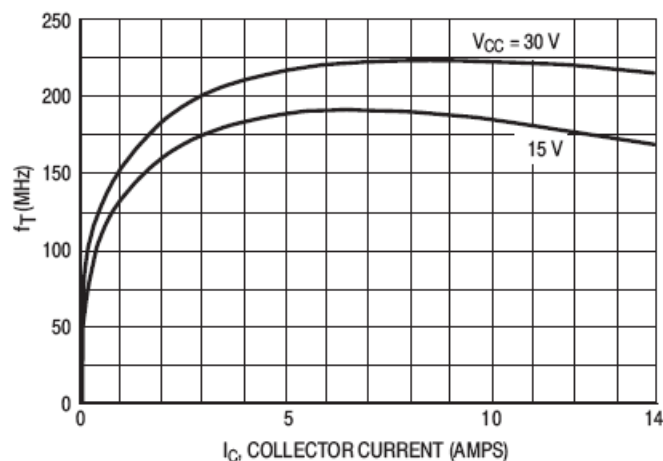


Figure 6.  $f_T$  versus Collector Current

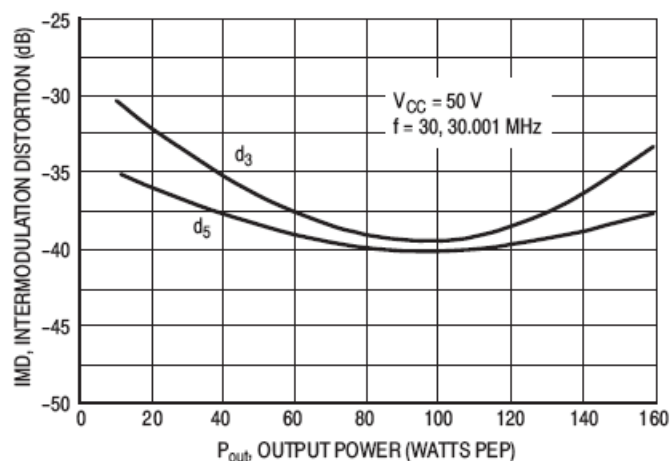


Figure 7. IMD versus  $P_{out}$

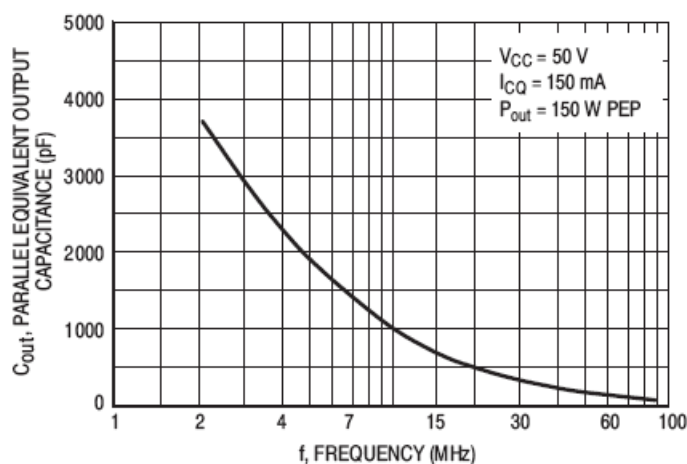


Figure 8. Output Capacitance versus Frequency

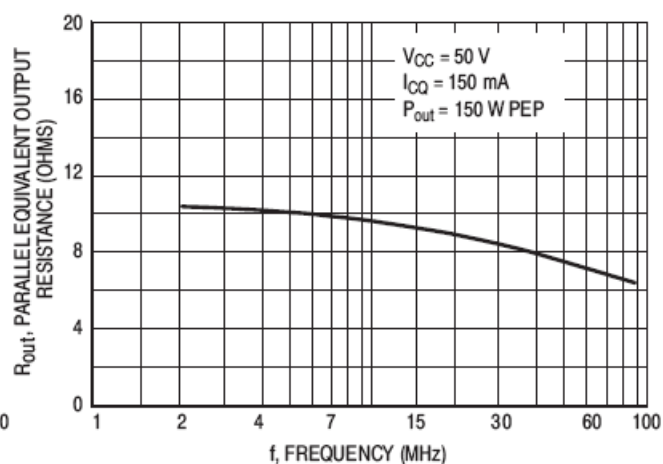


Figure 9. Output Resistance versus Frequency

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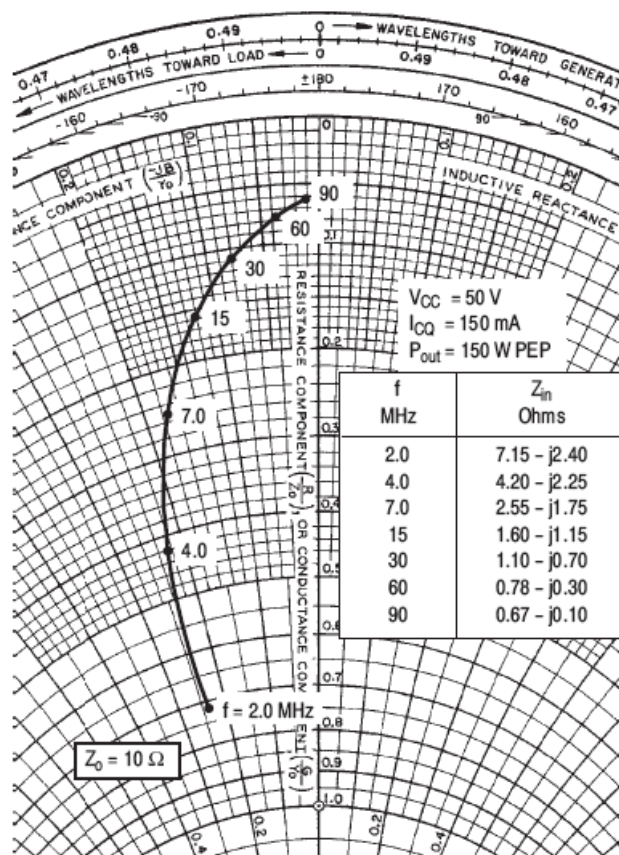
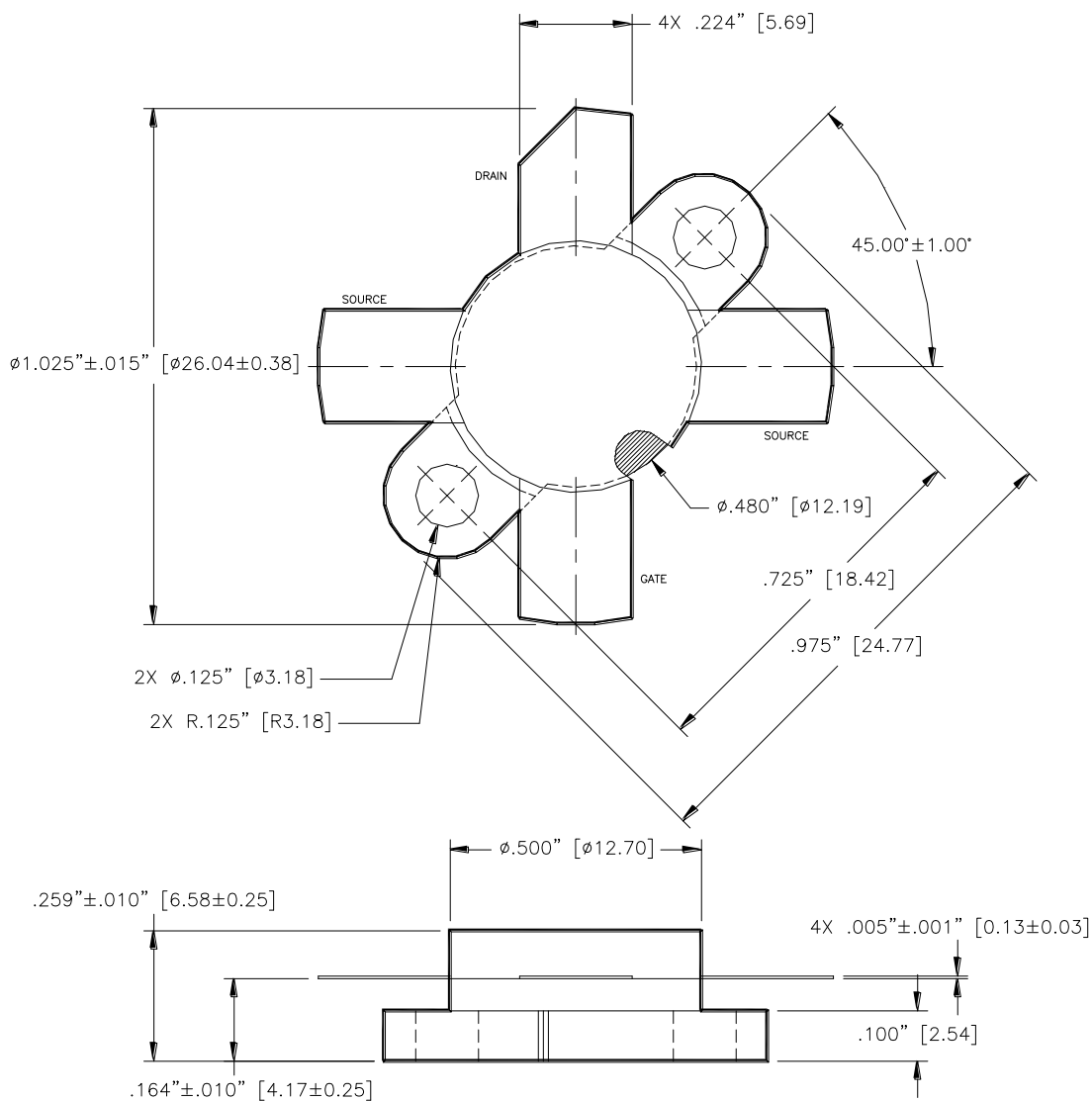


Figure 10. Series Equivalent Impedance

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Unless otherwise noted, tolerances are inches  $\pm .005''$  [millimeters  $\pm 0.13\text{mm}$ ]

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