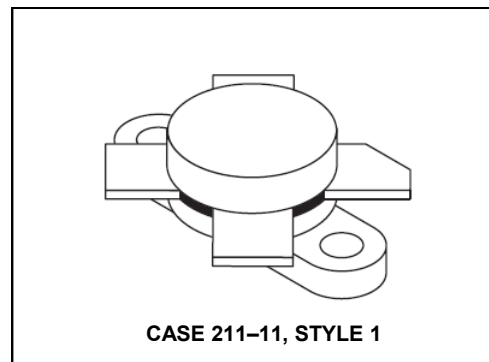


## The RF Line NPN Silicon Power Transistor 150W(PEP), 30MHz, 28V

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 @ $T_C = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	290 1.66	Watts 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	$^\circ\text{C/W}$

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

Characteristic	Symbol	Min	Typ	Max	Unit
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### OFF CHARACTERISTICS

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

(continued)

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

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

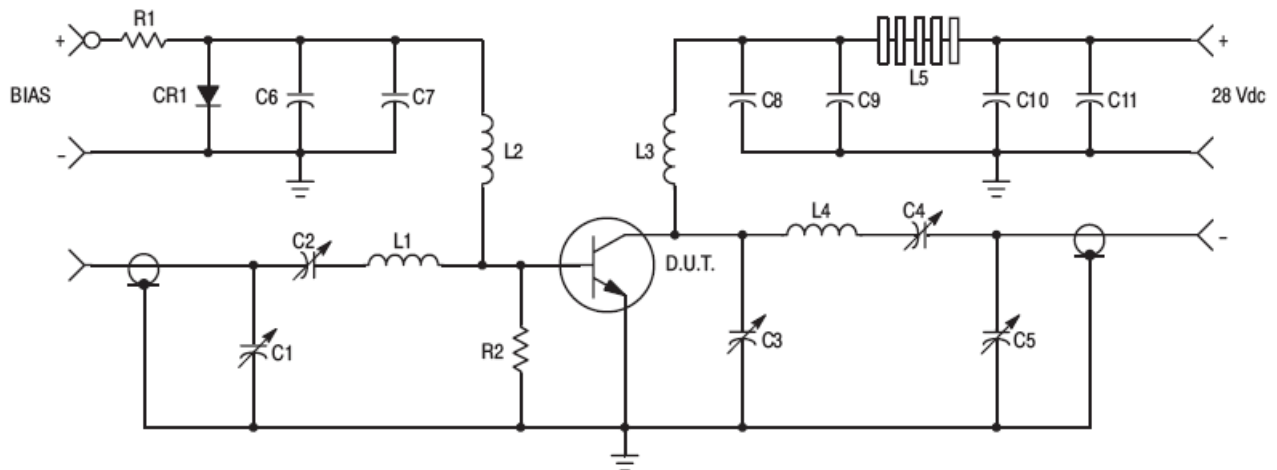
Characteristic	Symbol	Min	Typ	Max	Unit
<b>ON CHARACTERISTICS</b>					
DC Current Gain ( $I_C = 5.0 \text{ Adc}$ , $V_{CE} = 5.0 \text{ Vdc}$ )	$h_{FE}$	15	30	120	—
<b>DYNAMIC CHARACTERISTICS</b>					
Output Capacitance ( $V_{CB} = 28 \text{ Vdc}$ , $I_E = 0$ , $f = 1.0 \text{ MHz}$ )	$C_{ob}$	—	420	—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

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

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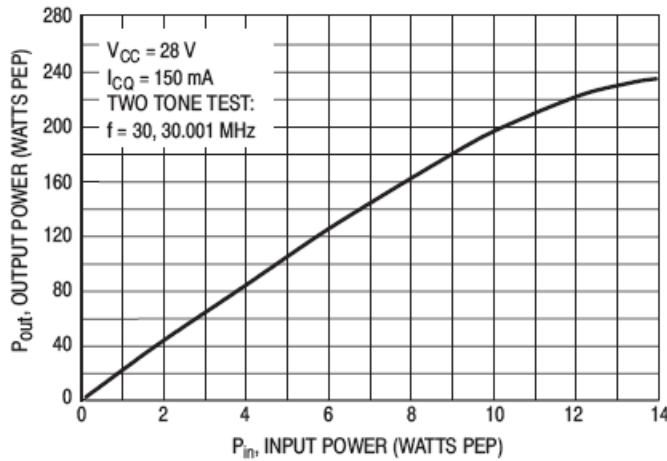


Figure 2. Output Power versus Input Power

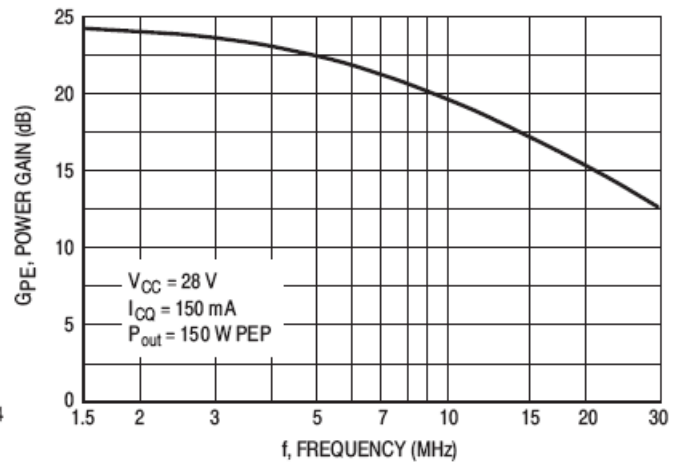


Figure 3. Power Gain versus Frequency

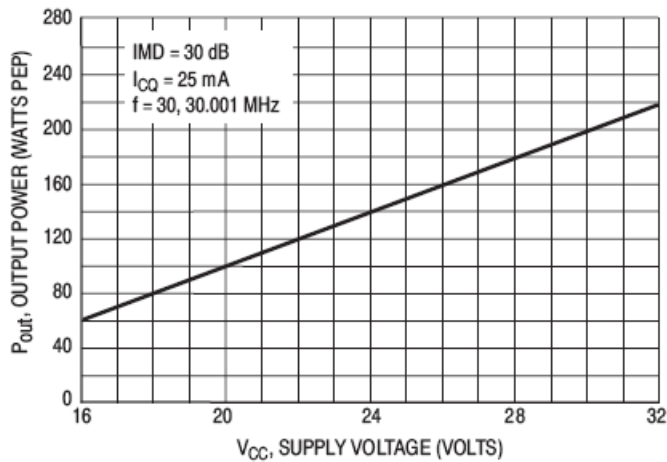


Figure 4. Linear Output Power versus Supply Voltage

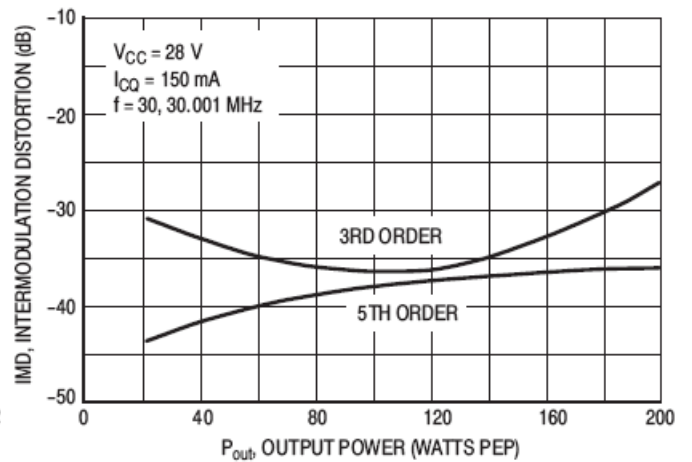


Figure 5. Intermodulation Distortion versus Output Power

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

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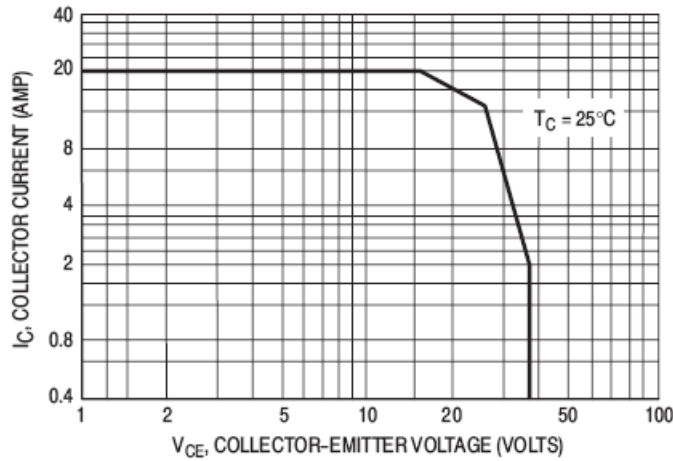


Figure 6. DC Safe Operating Area

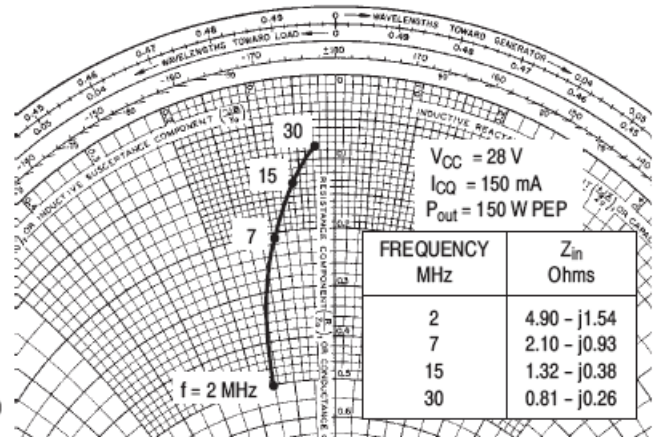


Figure 7. Series Input Impedance

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

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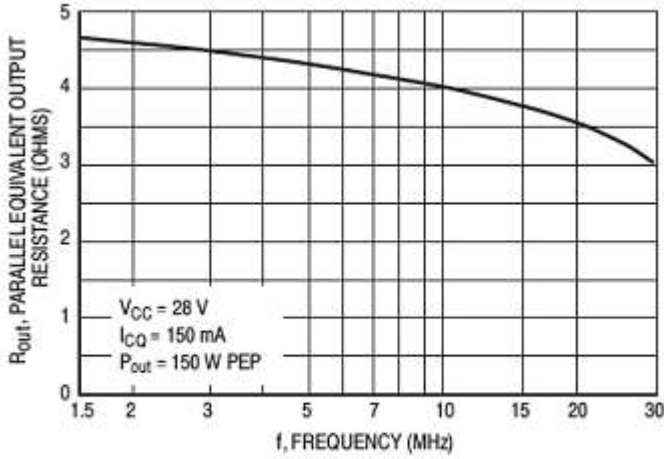


Figure 8. Output Resistance versus Frequency

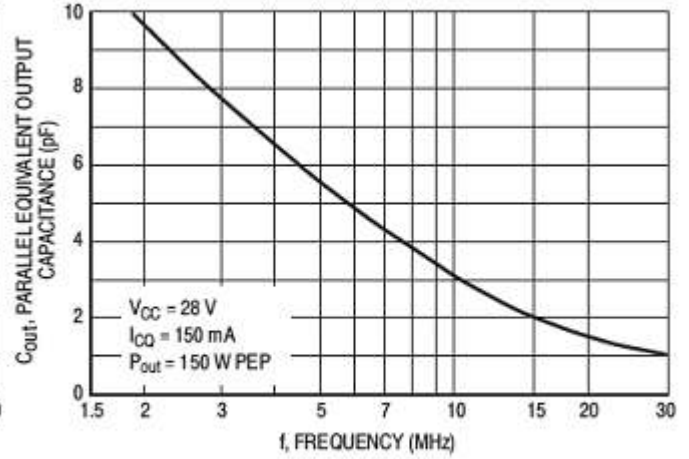
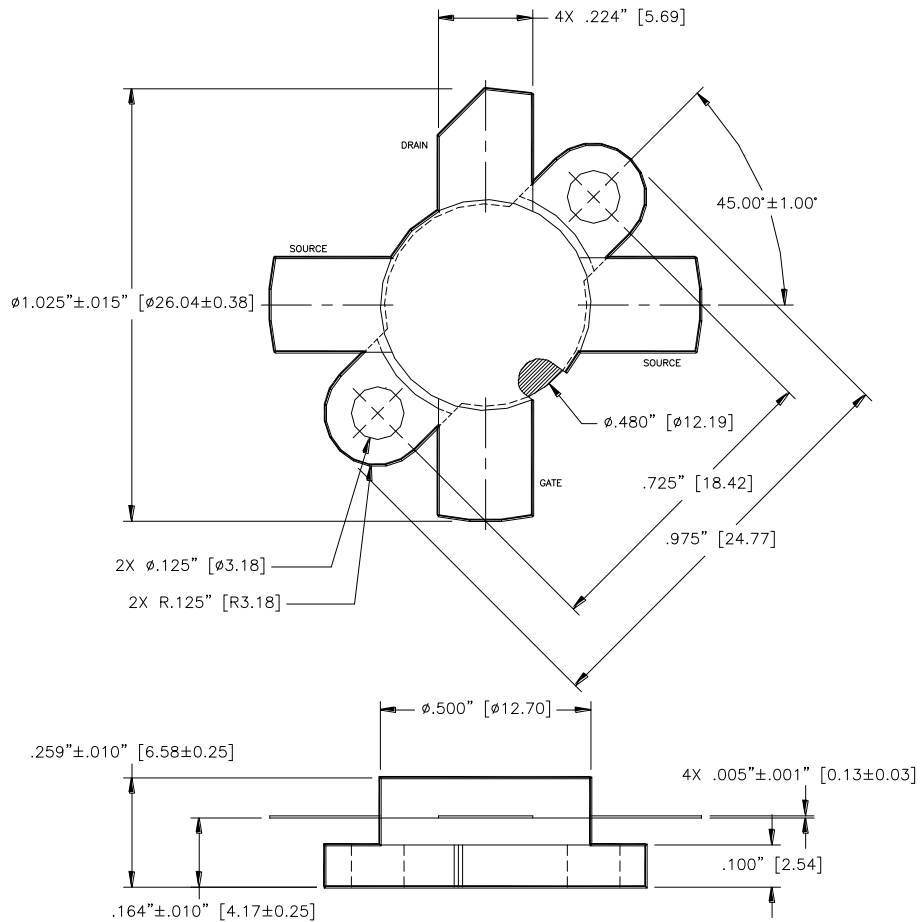


Figure 9. Output Capacitance versus Frequency



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

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