

# MRF428



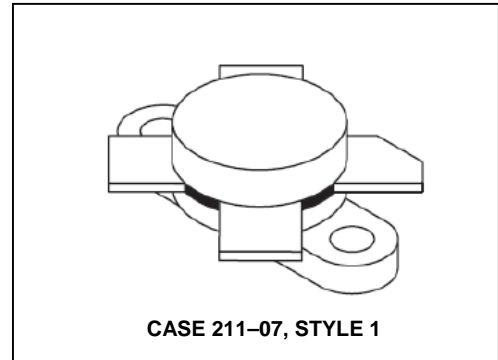
## The RF Line NPN Silicon Power Transistor 150W(PEP), 30MHz, 28V

M/A-COM Products  
Released - Rev. 07.07

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.)
- 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	$V_{CEO}$	55	Vdc
Collector-Base Voltage	$V_{CBO}$	110	Vdc
Emitter-Base Voltage	$V_{EBO}$	4.0	Vdc
Collector Current — Continuous	$I_C$	20	Adc
Withstand Current — 10 s	—	30	Adc
Total Device Dissipation @ $T_C = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	320 1.83	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	$R_{\theta JC}$	0.5	$^\circ\text{C/W}$

### 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 ( $I_C = 200\text{ mAdc}$ , $I_B = 0$ )	$V_{(BR)CEO}$	55	—	—	Vdc
Collector-Emitter Breakdown Voltage ( $I_C = 100\text{ mAdc}$ , $V_{BE} = 0$ )	$V_{(BR)CES}$	110	—	—	Vdc
Collector-Base Breakdown Voltage ( $I_C = 100\text{ mAdc}$ , $I_E = 0$ )	$V_{(BR)CBO}$	110	—	—	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** ( $T_C = 25\text{ }^\circ\text{C}$  unless otherwise noted.)

Characteristic	Symbol	Min	Typ	Max	Unit
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**ON CHARACTERISTICS**

DC Current Gain ( $I_C = 5.0\text{ Adc}$ , $V_{CE} = 5.0\text{ Vdc}$ )	$h_{FE}$	10	30	—	—
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**DYNAMIC CHARACTERISTICS**

Output Capacitance ( $V_{CB} = 50\text{ Vdc}$ , $I_E = 0$ , $f = 1.0\text{ MHz}$ )	$C_{OB}$	—	220	250	pF
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**FUNCTIONAL TESTS**

Common-Emitter Amplifier Gain ( $V_{CC} = 50\text{ Vdc}$ , $P_{OUT} = 150\text{ W (PEP)}$ , $I_C(\text{max}) = 3.32\text{ Adc}$ , $f = 30\text{ MHz}$ )	$G_{PE}$	13	15	—	dB
Output Power ( $V_{CE} = 50\text{ Vdc}$ , $f = 30\text{ MHz}$ )	$P_{OUT}$	150	—	—	W (PEP)
Collector Efficiency ( $V_{CC} = 50\text{ Vdc}$ , $P_{OUT} = 150\text{ W (PEP)}$ , $I_C(\text{max}) = 3.32\text{ Adc}$ , $f = 30\text{ MHz}$ )	$\eta$	45	—	—	%
Intermodulation Distortion (1) ( $V_{CE} = 50\text{ Vdc}$ , $P_{OUT} = 150\text{ W (PEP)}$ , $I_C = 3.32\text{ Adc}$ )	IMD	—	-33	-30	dB
Electrical Ruggedness ( $V_{CC} = 50\text{ Vdc}$ , $P_{OUT} = 150\text{ W (PEP)}$ , $I_C(\text{max}) = 3.32\text{ Adc}$ , VSWR 30:1 at all Phase Angles)	$\Psi$	No Degradation in Output Power			

NOTE:

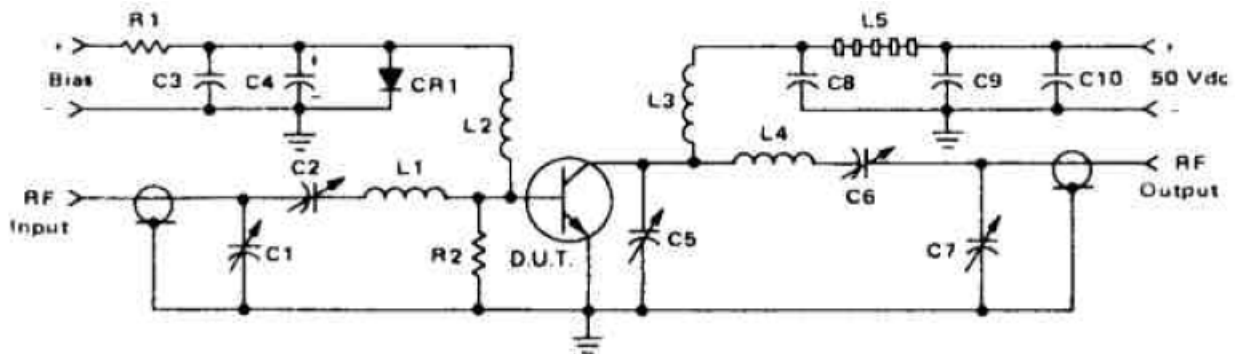
1. To Mil-Std-1311 Version A, Test Method 2204B, Two Tone, Reference each Tone.

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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  
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

FIGURE 2 — OUTPUT POWER versus INPUT POWER

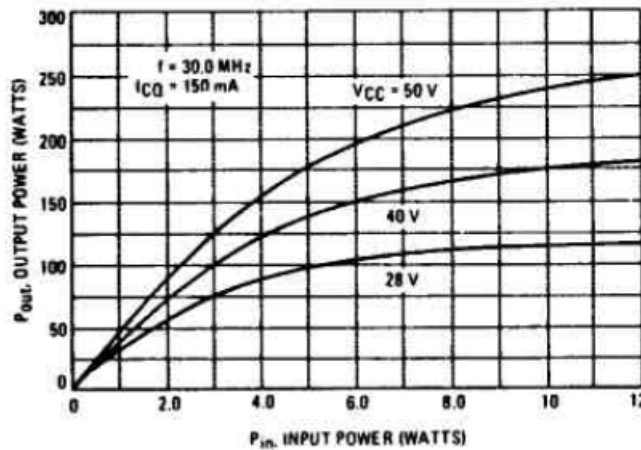


FIGURE 3 — OUTPUT POWER versus SUPPLY VOLTAGE

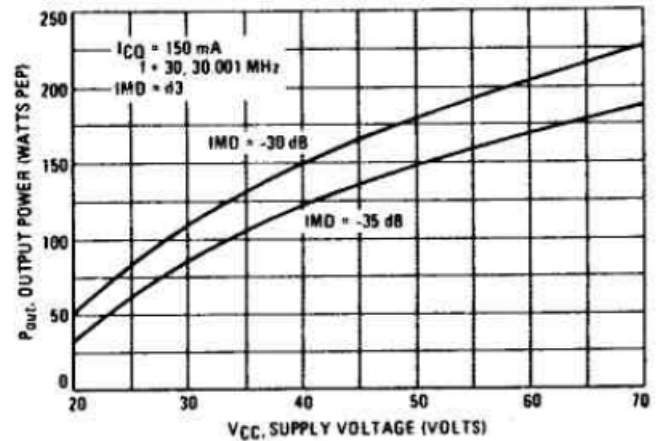


FIGURE 4 – POWER GAIN versus FREQUENCY

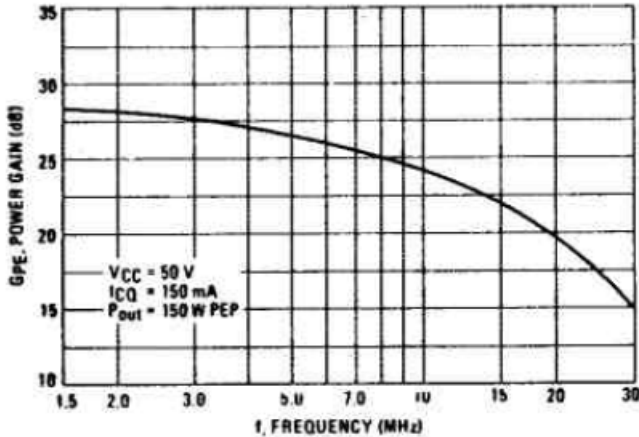
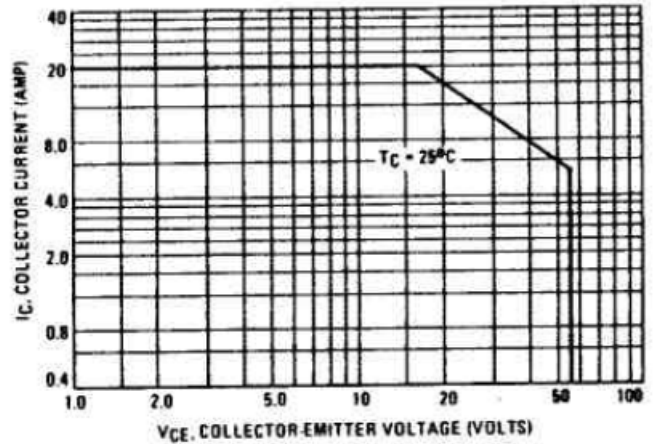


FIGURE 5 – DC SAFE OPERATING AREA



INTERMODULATION DISTORTION versus OUTPUT POWER

FIGURE 6 –  $V_{CC} = 40\text{ Vdc}$

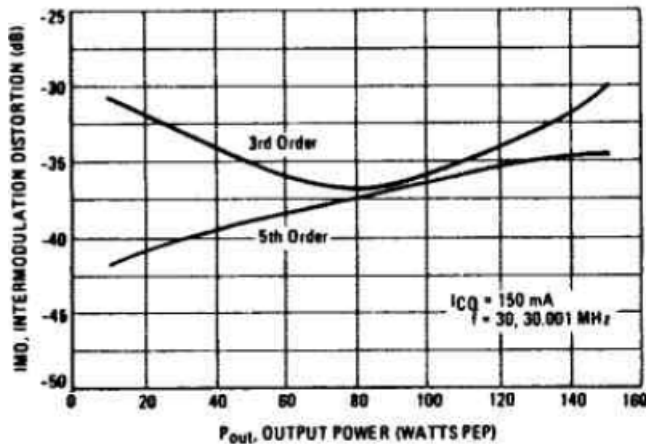


FIGURE 7 –  $V_{CC} = 50\text{ Vdc}$

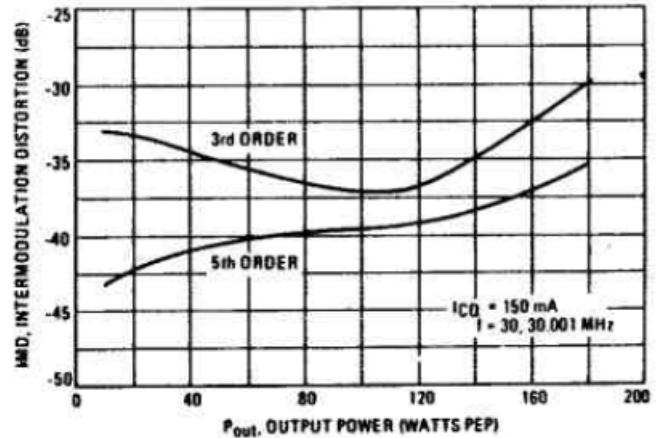




FIGURE 8 – OUTPUT CAPACITANCE versus FREQUENCY

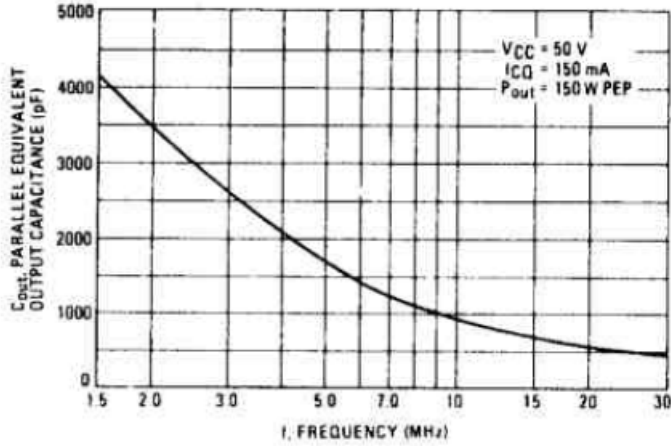
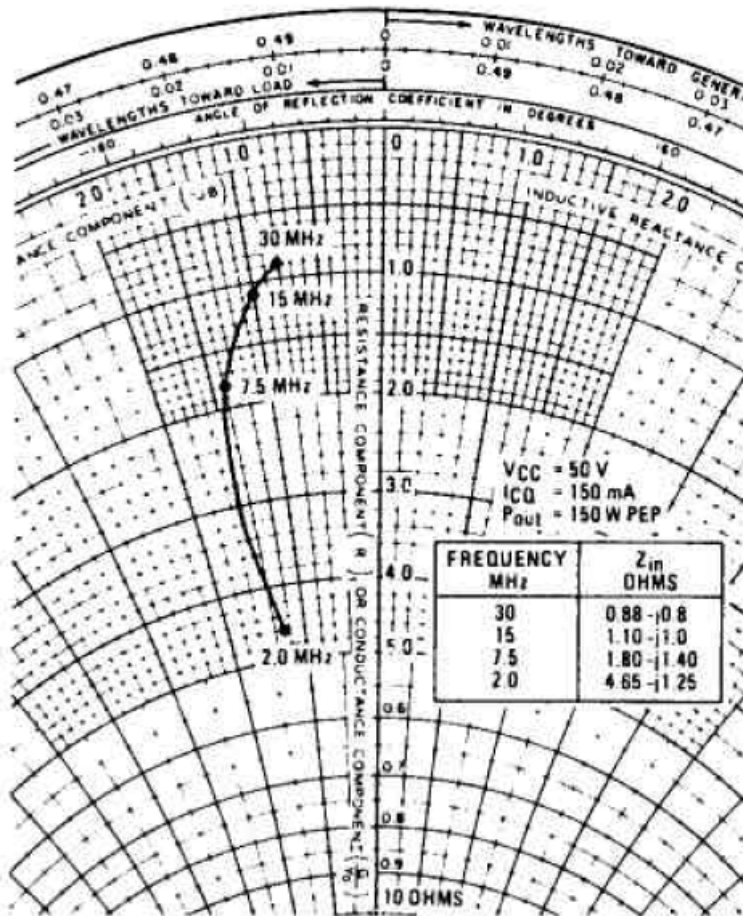
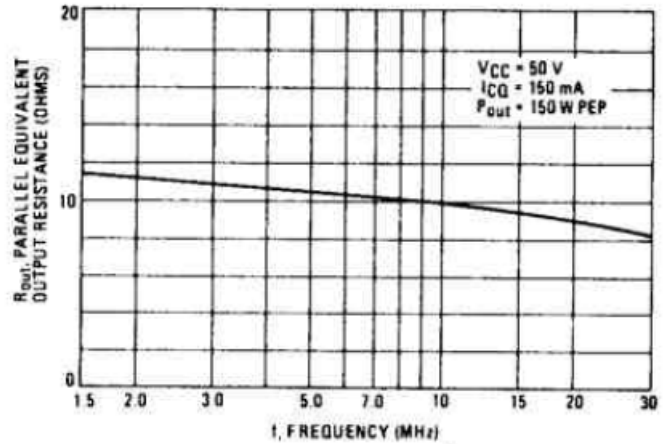


FIGURE 9 – OUTPUT RESISTANCE versus FREQUENCY

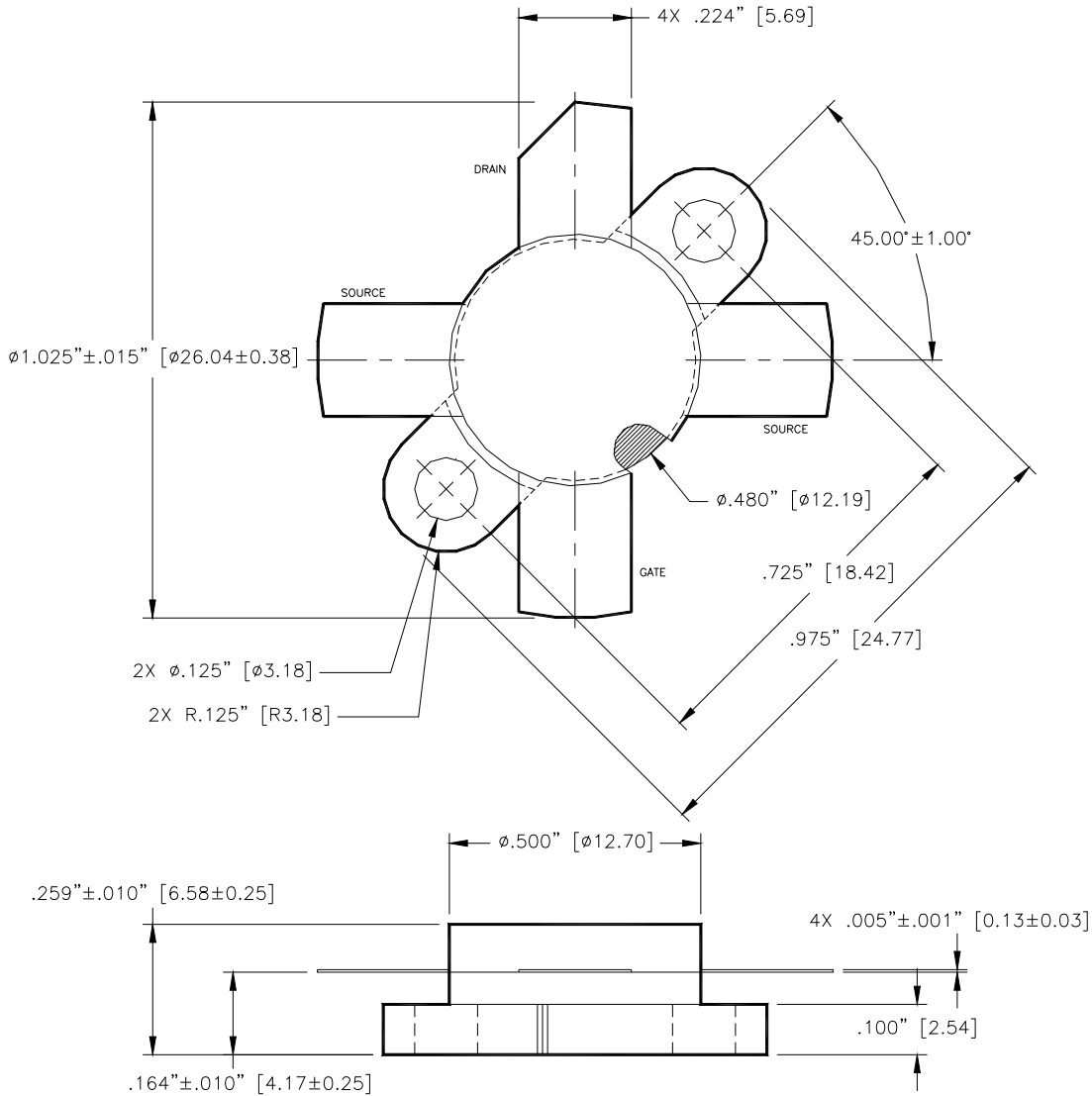


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Unless otherwise noted, tolerances are inches  $\pm 0.005$ " [millimeters  $\pm 0.13$ mm]