

# MRF421



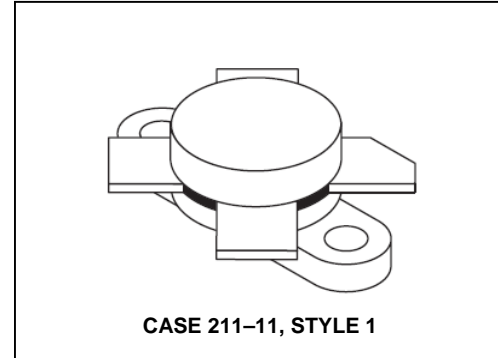
## The RF Line NPN Silicon Power Transistor 100W(PEP), 30MHz, 28V

M/A-COM Products  
Released - Rev. 07.07

Designed primarily for application as a high-power linear amplifier from 2.0 to 30 MHz.

- Specified 12.5 V, 30 MHz characteristics —  
Output power = 100 W (PEP)  
Minimum gain = 10 dB  
Efficiency = 40%
- Intermodulation distortion @ 100 W (PEP) — IMD = -30 dB (min.)
- 100% tested for load mismatch at all phase angles with 30:1 VSWR

### Product Image



### MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	$V_{CEO}$	20	Vdc
Collector-Base Voltage	$V_{CBO}$	45	Vdc
Emitter-Base Voltage	$V_{EBO}$	3.0	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 $25^\circ\text{C}$	$P_D$	290 1.66	Watts $\text{W}/^\circ\text{C}$
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
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### OFF CHARACTERISTICS

Collector-Emitter Breakdown Voltage ( $I_C = 50 \text{ mAdc}$ , $I_B = 0$ )	$V_{(BR)CEO}$	20	—	—	Vdc
Collector-Emitter Breakdown Voltage ( $I_C = 200 \text{ mAdc}$ , $V_{BE} = 0$ )	$V_{(BR)CES}$	45	—	—	Vdc
Collector-Base Breakdown Voltage ( $I_C = 200 \text{ mAdc}$ , $I_E = 0$ )	$V_{(BR)CBO}$	45	—	—	Vdc
Emitter-Base Breakdown Voltage ( $I_E = 10 \text{ mAdc}$ , $I_C = 0$ )	$V_{(BR)EBO}$	3.0	—	—	Vdc
Collector Cutoff Current ( $V_{CE} = 16 \text{ Vdc}$ , $V_{BE} = 0$ , $T_C = 25^\circ\text{C}$ )	$I_{CES}$	—	—	10	mAdc

(continued)

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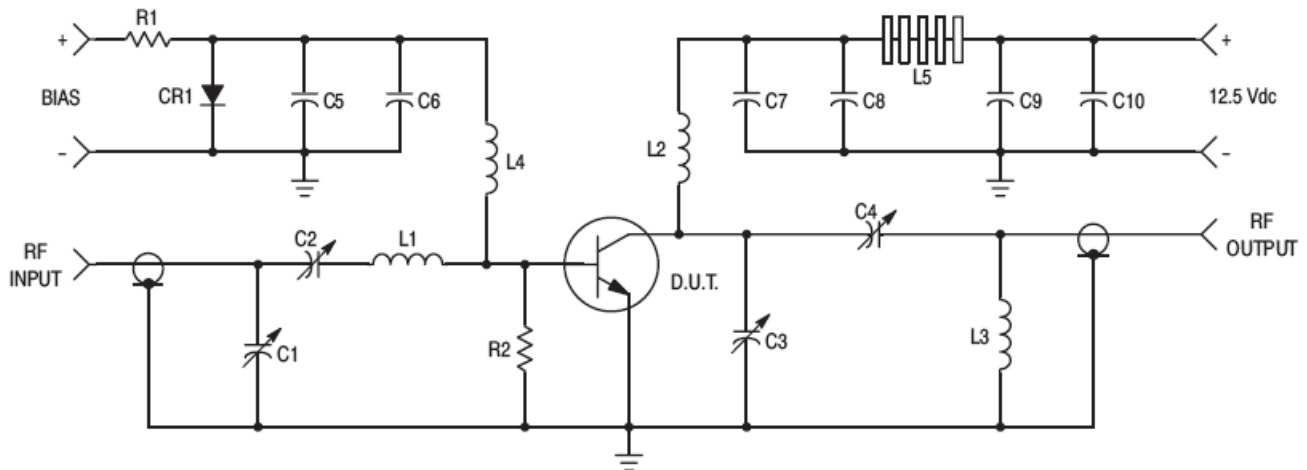
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### ELECTRICAL CHARACTERISTICS – continued ( $T_C = 25^\circ\text{C}$ unless otherwise noted.)

Characteristic	Symbol	Min	Typ	Max	Unit
<b>ON CHARACTERISTICS</b>					
DC Current Gain ( $I_C = 5.0 \text{ Adc}$ , $V_{CE} = 5.0 \text{ Vdc}$ )	$h_{FE}$	10	70	—	—
<b>DYNAMIC CHARACTERISTICS</b>					
Output Capacitance ( $V_{CB} = 12.5 \text{ Vdc}$ , $I_E = 0$ , $f = 1.0 \text{ MHz}$ )	$C_{ob}$	—	550	800	pF
<b>FUNCTIONAL TESTS</b>					
Common-Emitter Amplifier Power Gain ( $V_{CC} = 12.5 \text{ Vdc}$ , $P_{out} = 100 \text{ W}$ , $I_{C(max)} = 10 \text{ Adc}$ , $I_{CQ} = 150 \text{ mAdc}$ , $f = 30, 30.001 \text{ MHz}$ )	$G_{PE}$	10	12	—	dB
Collector Efficiency ( $V_{CC} = 12.5 \text{ Vdc}$ , $P_{out} = 100 \text{ W}$ , $I_{C(max)} = 10 \text{ Adc}$ , $I_{CQ} = 150 \text{ mA}$ , $f = 30, 30.001 \text{ MHz}$ )	$\eta$	40	—	—	%
Intermodulation Distortion (1) ( $V_{CE} = 12.5 \text{ Vdc}$ , $P_{out} = 100 \text{ W}$ , $I_C = 10 \text{ Adc}$ , $I_{CQ} = 150 \text{ mA}$ , $f = 30, 30.001 \text{ MHz}$ )	IMD	—	-33	-30	dB

**NOTE:**

- To proposed EIA method of measurement. Reference peak envelope power.



C1, C2, C4 — 170–780 pF, ARCO 469  
 C3 — 80–480 pF, ARCO 466  
 C5, C7, C10 — ERIE 0.1  $\mu\text{F}$ , 100 V  
 C6 — MALLORY 500  $\mu\text{F}$  @ 15 V Electrolytic  
 C9 — 100  $\mu\text{F}$ , 15 V Electrolytic  
 C8 — 1000 pF, 350 V UNDERWOOD  
 R1 — 10  $\Omega$ , 25 Watt Wirewound

R2 — 10  $\Omega$ , 1.0 Watt Carbon  
 CR1 — 1N4997  
 L1 — 3 Turns, #16 Wire, 5/16" I.D., 5/16" Long  
 L2 — 12 Turns, #16 Enameled Wire Closewound, 1/4" I.D.  
 L3 — 1–3/4 Turns, 1/8" Tubing, 3/8" I.D., 3/8" Long  
 L4 — 10  $\mu\text{H}$  Molded Choke  
 L5 — 10 Ferrite Beads — FERROXCUBE #56–590–65/3B

Figure 1. 30 MHz Test Circuit Schematic

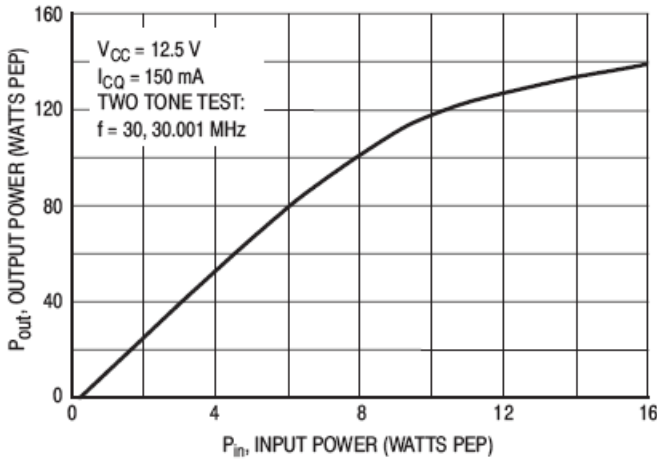


Figure 2. Output Power versus Input Power

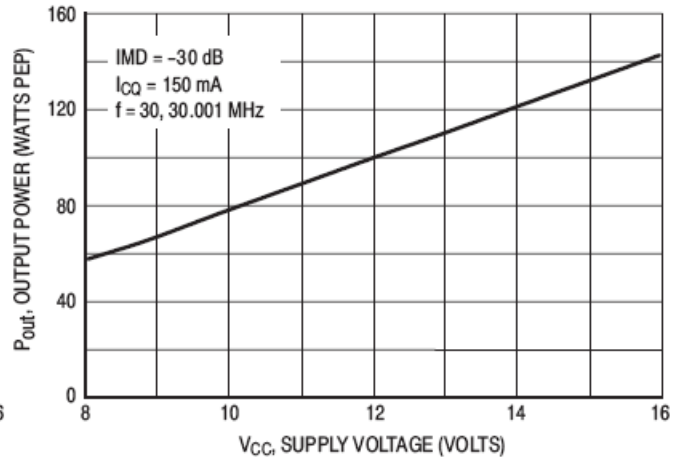


Figure 3. Output Power versus Supply Voltage

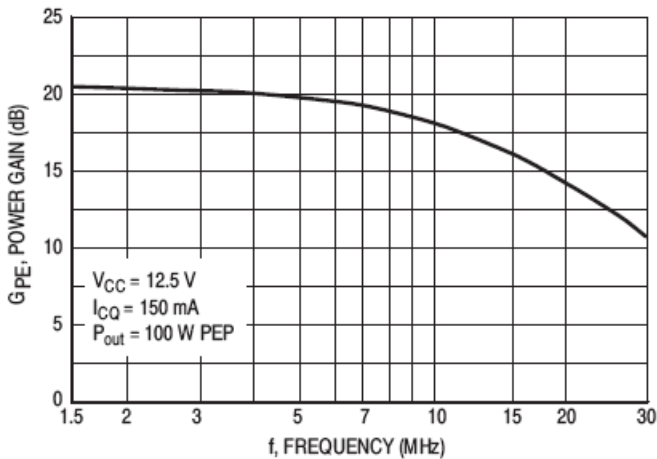


Figure 4. Power Gain versus Frequency

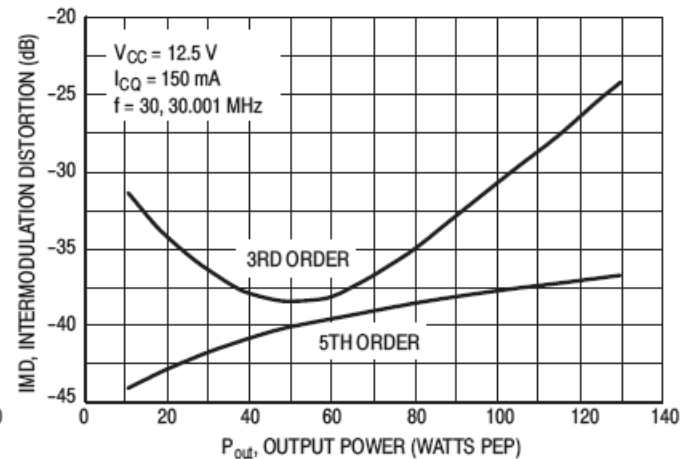


Figure 5. Intermodulation Distortion versus Output Power

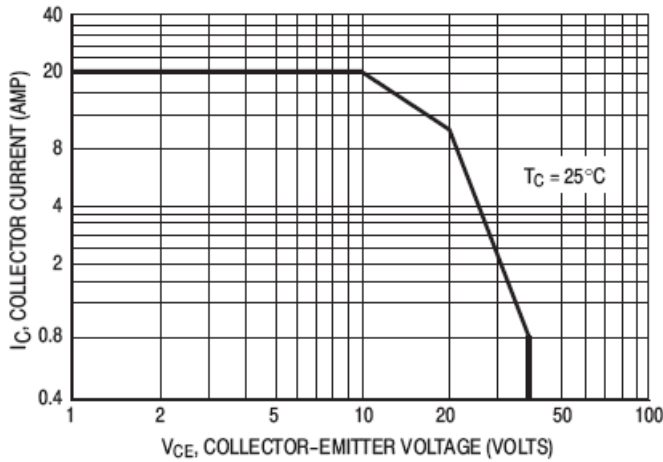


Figure 6. DC Safe Operating Area

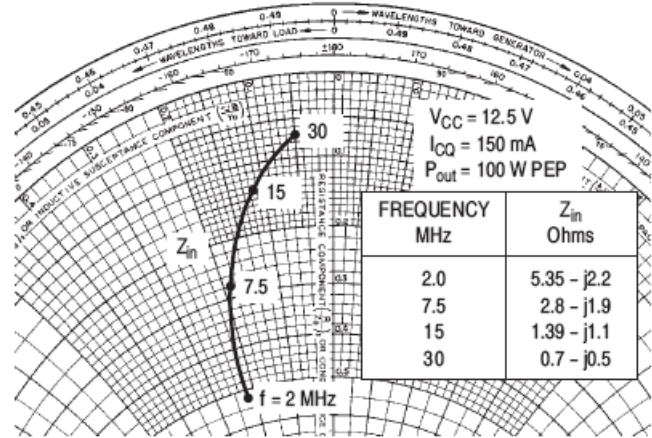


Figure 7. Series Equivalent Impedance

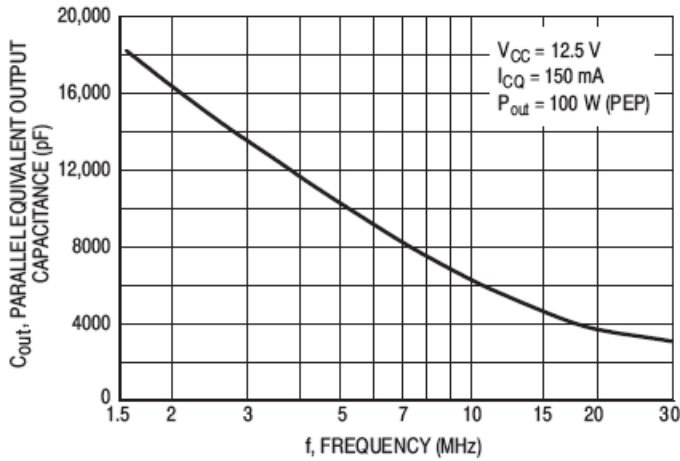


Figure 8. Output Capacitance versus Frequency

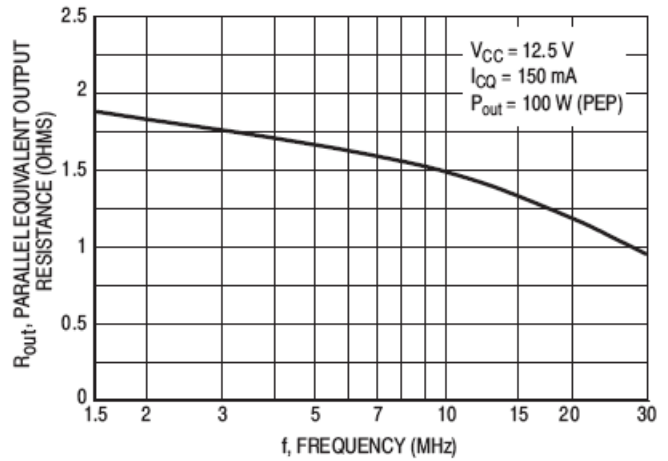
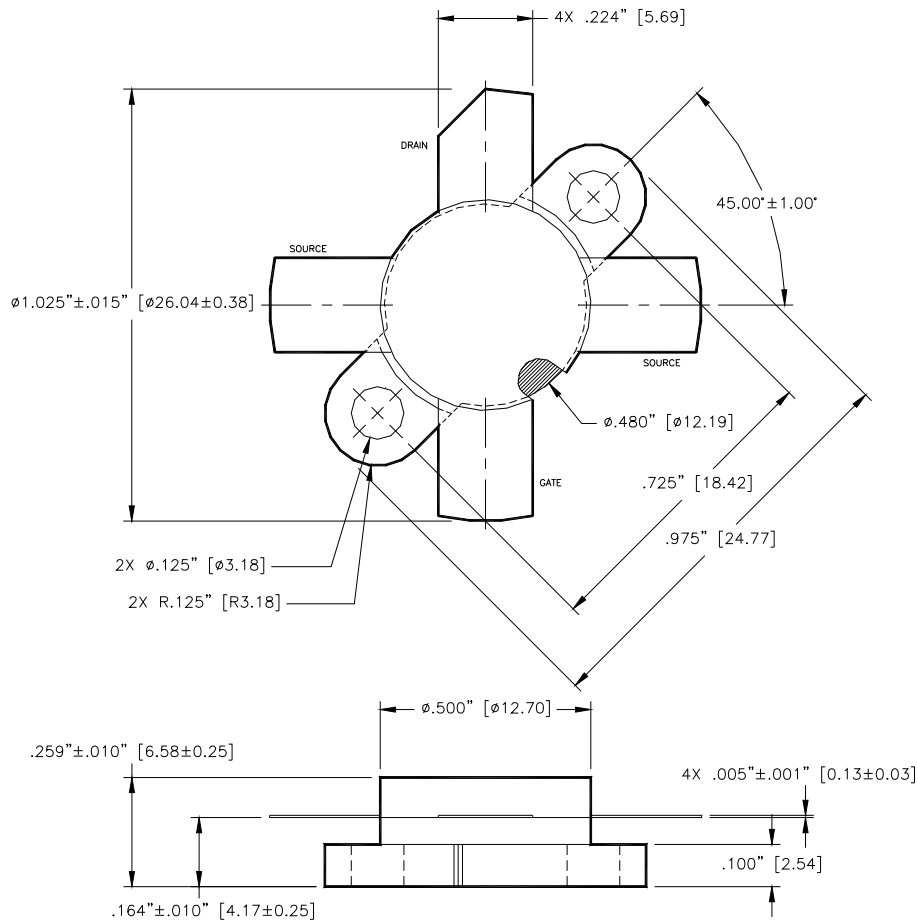


Figure 9. Output Resistance versus Frequency



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