

The RF Line

NPN Silicon

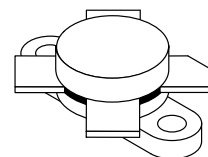
RF Power Transistor

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

- Specified 12.5 Volt, 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

MRF421

**100 W (PEP), 30 MHz
RF POWER
TRANSISTORS
NPN SILICON**



CASE 211-11, STYLE 1

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°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 ($I_C = 50 \text{ mAdc}$, $I_B = 0$)	$V_{(BR)CEO}$	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)

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

Characteristic	Symbol	Min	Typ	Max	Unit
ON CHARACTERISTICS					
DC Current Gain ($I_C = 5.0 \text{ Adc}$, $V_{CE} = 5.0 \text{ Vdc}$)	h_{FE}	10	70	—	—

DYNAMIC CHARACTERISTICS

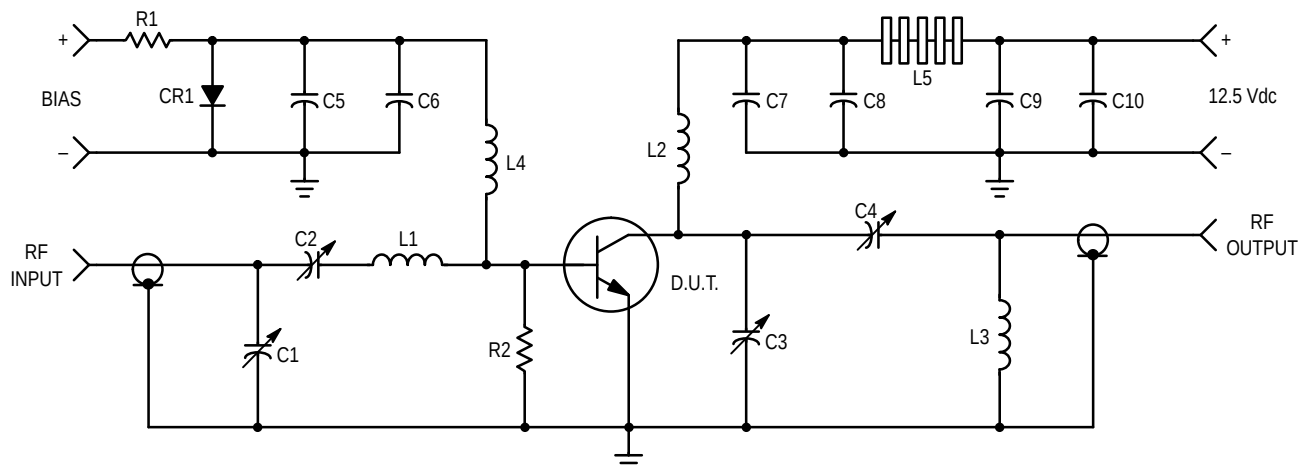
Output Capacitance ($V_{CB} = 12.5 \text{ Vdc}$, $I_E = 0$, $f = 1.0 \text{ MHz}$)	C_{ob}	—	550	800	pF
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FUNCTIONAL TESTS

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 ($V_{CC} = 12.5 \text{ Vdc}$, $P_{out} = 100 \text{ W}$, $I_{C(max)} = 10 \text{ Adc}$, $I_{CQ} = 150 \text{ mA}$, $f = 30, 30.001 \text{ MHz}$)	η	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:

1. 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 μF , 100 V
 C6 — MALLORY 500 μF @ 15 V Electrolytic
 C9 — 100 μF , 15 V Electrolytic
 C8 — 1000 pF, 350 V UNDERWOOD
 R1 — 10 Ω , 25 Watt Wirewound

R2 — 10 Ω , 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 μH Molded Choke
 L5 — 10 Ferrite Beads — FERROXCUBE #56–590–65/3B

Figure 1. 30 MHz Test Circuit Schematic

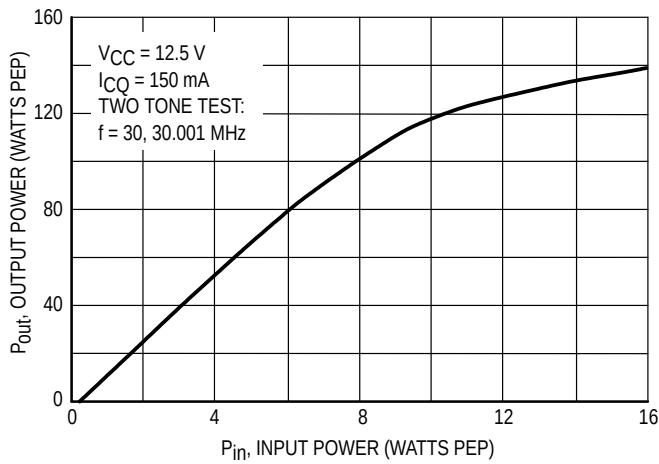


Figure 2. Output Power versus Input Power

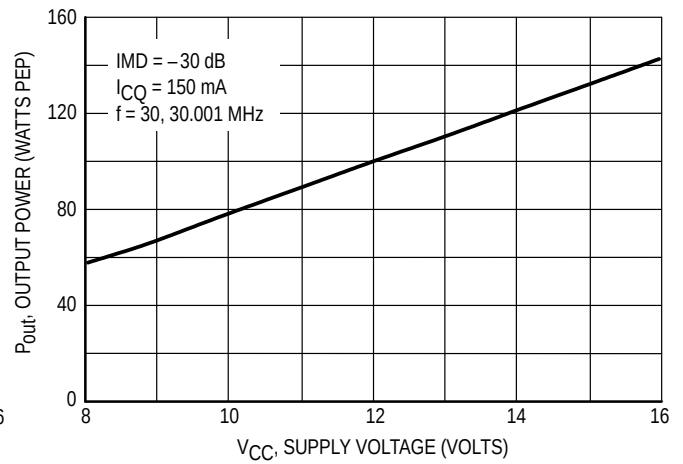


Figure 3. Output Power versus Supply Voltage

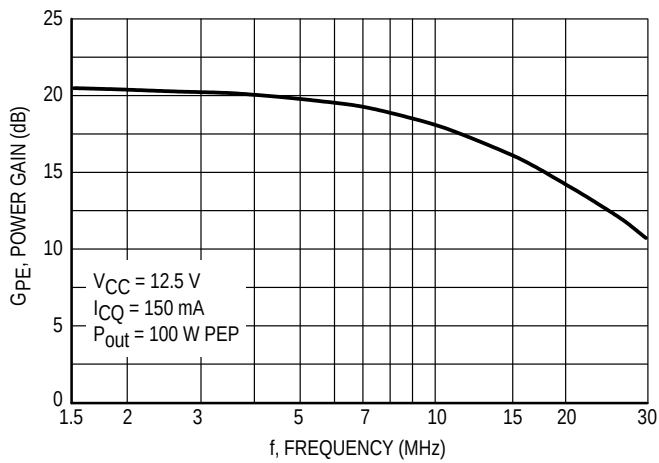


Figure 4. Power Gain versus Frequency

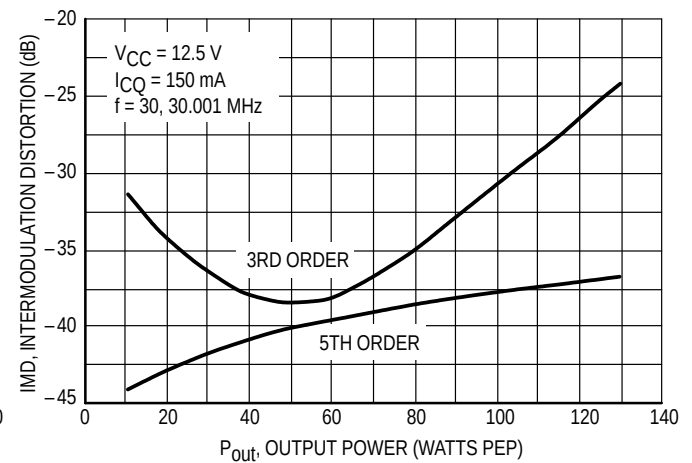


Figure 5. Intermodulation Distortion versus Output Power

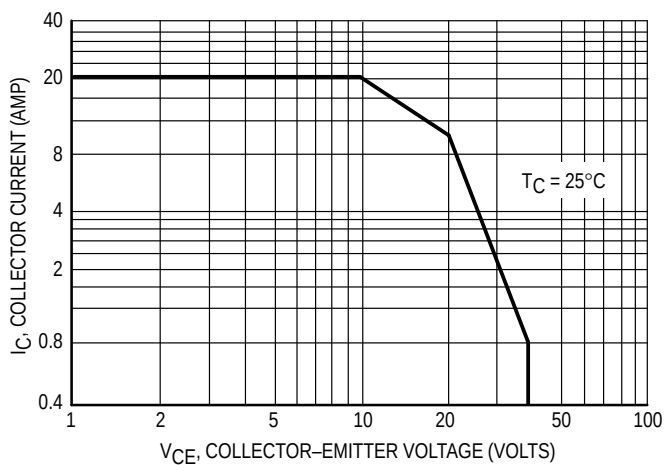


Figure 6. DC Safe Operating Area

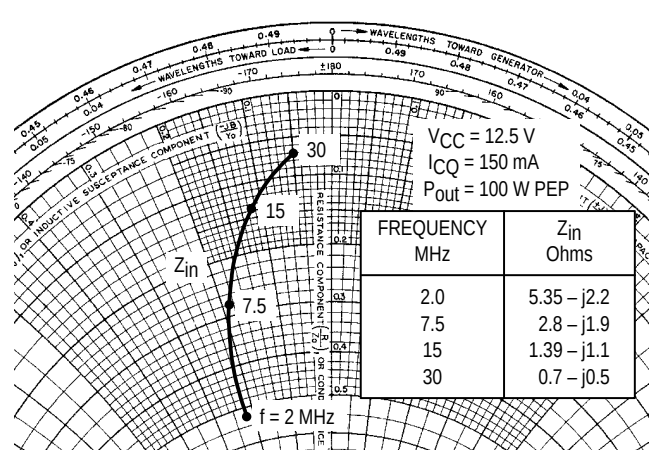


Figure 7. Series Equivalent Impedance

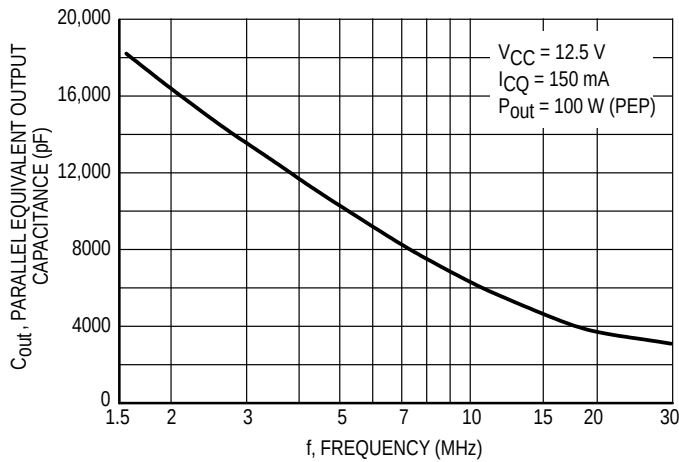


Figure 8. Output Capacitance versus Frequency

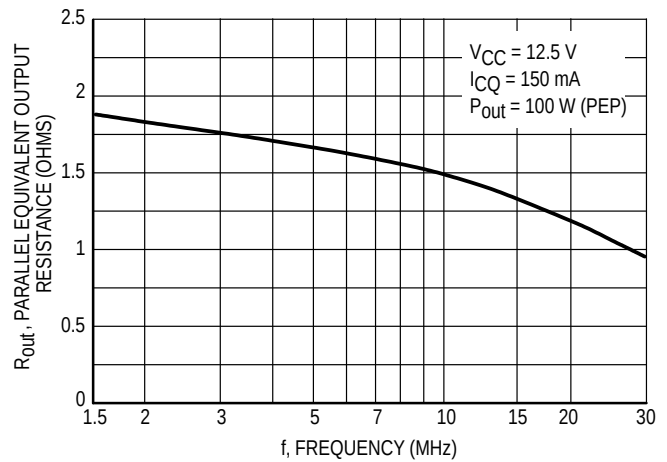
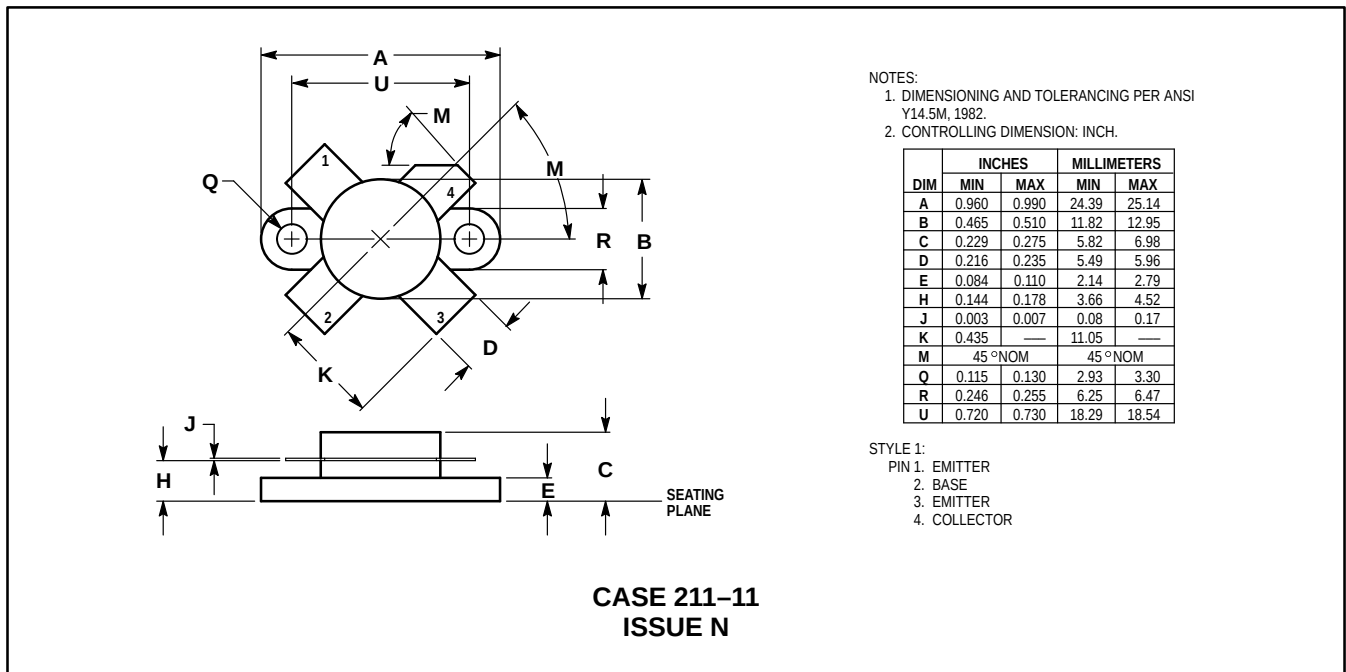


Figure 9. Output Resistance versus Frequency

PACKAGE DIMENSIONS



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