

The RF Line NPN Silicon Power Transistor

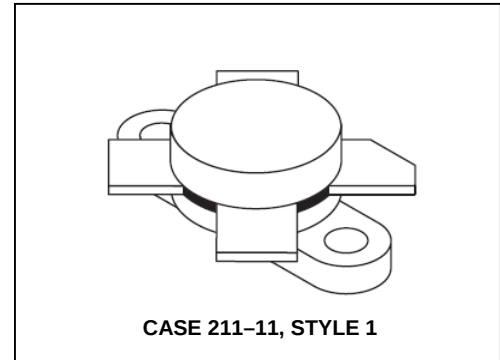
100W(PEP), 30MHz, 28V

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

(continued)

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ELECTRICAL CHARACTERISTICS – continued ($T_C = 25^\circ\text{C}$ 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	70	—	—
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DYNAMIC CHARACTERISTICS

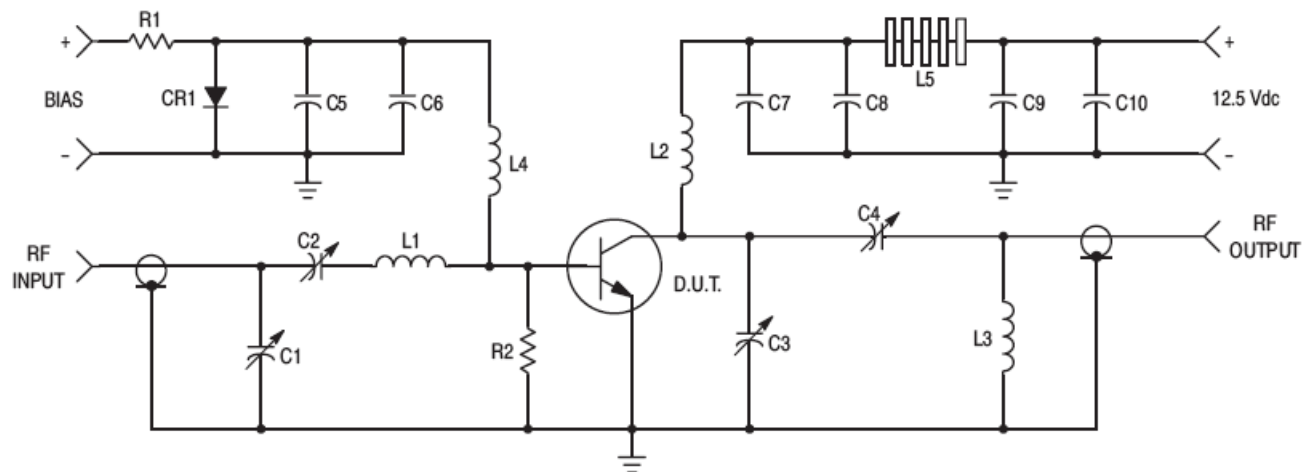
Output Capacitance ($V_{CB} = 12.5 \text{ Vdc}$, $I_E = 0$, $f = 1.0 \text{ MHz}$)	C_{ob}	—	550	800	pF
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FUNCTIONAL TESTS

Common-Emitter Amplifier Power Gain ($V_{CC} = 12.5 \text{ Vdc}$, $P_{out} = 100 \text{ W}$, $I_{C(max)} = 10 \text{ Adc}$, $I_{CQ} = 150 \text{ mA}$, $f = 30, 30.001 \text{ MHz}$)	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

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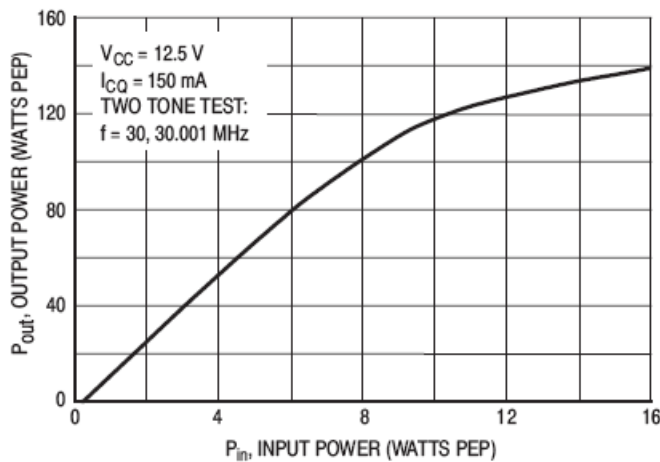


Figure 2. Output Power versus Input Power

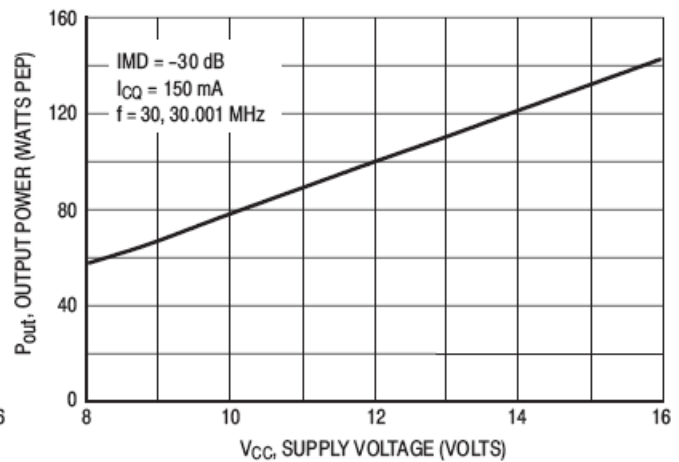


Figure 3. Output Power versus Supply Voltage

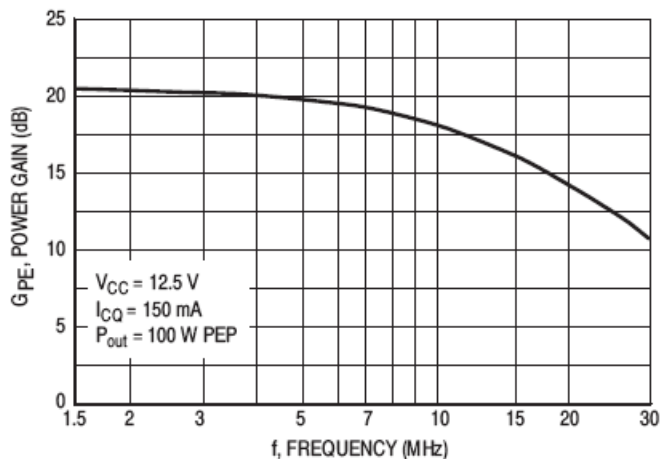


Figure 4. Power Gain versus Frequency

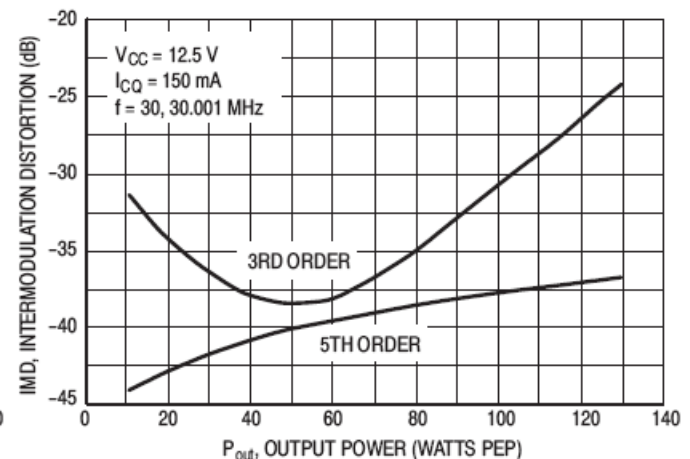


Figure 5. Intermodulation Distortion versus Output Power

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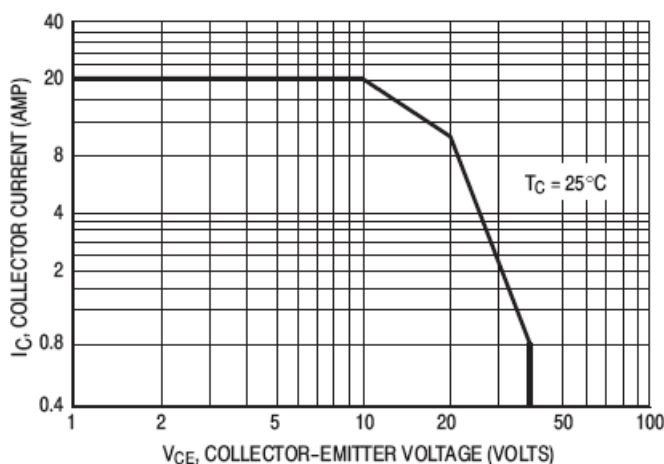


Figure 6. DC Safe Operating Area

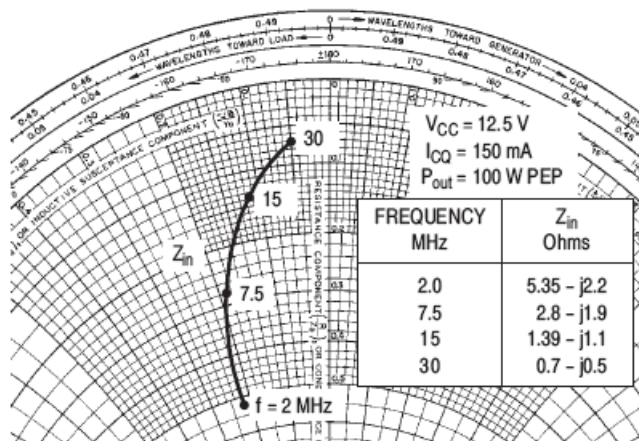


Figure 7. Series Equivalent Impedance

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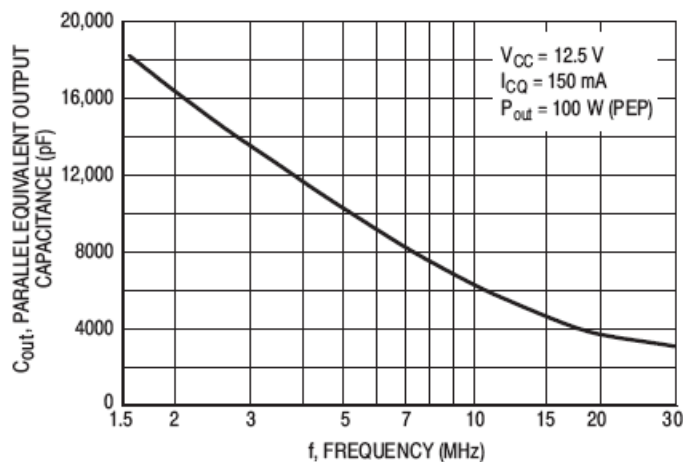


Figure 8. Output Capacitance versus Frequency

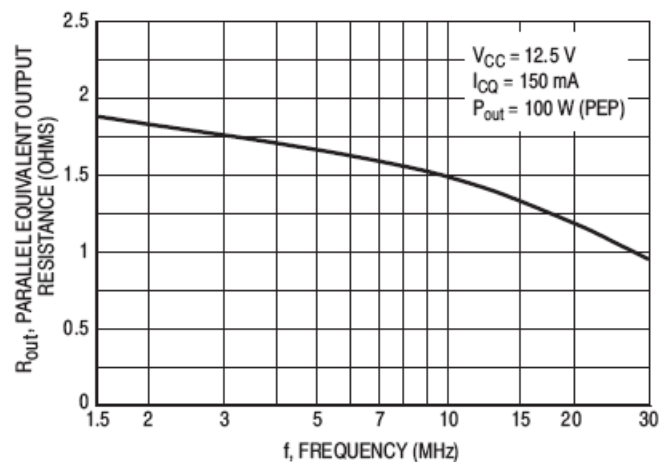
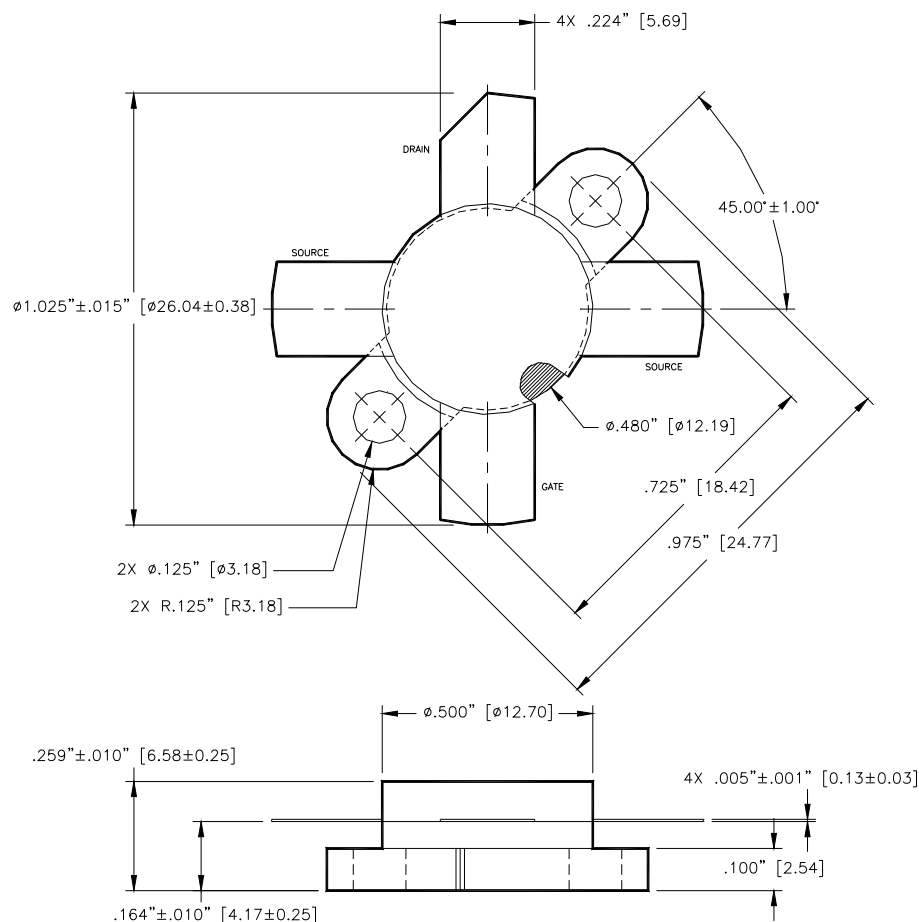


Figure 9. Output Resistance versus Frequency



Unless otherwise noted, tolerances are inches ± 0.005 [millimeters ± 0.13 mm]