

MRF448



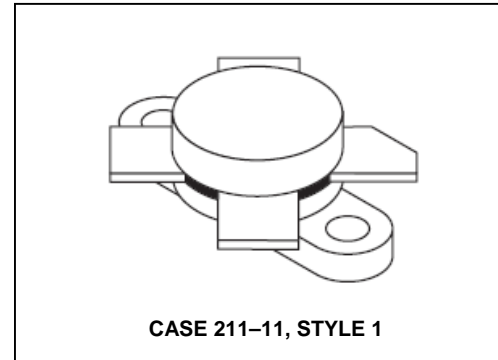
The RF Line NPN Silicon Power Transistor 250W, 30MHz, 50V

M/A-COM Products
Released - Rev. 07.07

Designed primarily for high-voltage applications as a high-power linear amplifiers from 2.0 to 30 MHz. Ideal for marine and base station equipment.

- Specified 50 V, 30 MHz characteristics
 - Output power = 250 W
 - Minimum gain = 12 dB
 - Efficiency = 45%
- Intermodulation distortion @ 250 W (PEP) —
 - IMD = -30 dB (max)
- 100% tested for load mismatch at all phase angles with 3:1 VSWR

Product Image



MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V_{CEO}	50	Vdc
Collector-Base Voltage	V_{CBO}	100	Vdc
Emitter-Base Voltage	V_{EBO}	4.0	Vdc
Collector Current — Continuous	I_C	16	Adc
Withstand Current — 10 s	—	20	Adc
Total Device Dissipation @ $T_C = 25^\circ\text{C}$ (1) Derate above 25°C	P_D	290 1.67	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 ($I_C = 200 \text{ mAdc}$, $I_B = 0$)	$V_{(BR)CEO}$	50	—	—	Vdc
Collector-Emitter Breakdown Voltage ($I_C = 100 \text{ mAdc}$, $V_{BE} = 0$)	$V_{(BR)CES}$	100	—	—	Vdc
Collector-Base Breakdown Voltage ($I_C = 100 \text{ mAdc}$, $I_E = 0$)	$V_{(BR)CBO}$	100	—	—	Vdc
Emitter-Base Breakdown Voltage ($I_E = 10 \text{ mAdc}$, $I_C = 0$)	$V_{(BR)EBO}$	4.0	—	—	Vdc

NOTE:

- P_D is a measurement reflecting short term maximum condition. See SOAR curve for operating conditions.

(continued)

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

Characteristic	Symbol	Min	Typ	Max	Unit
ON CHARACTERISTICS					
DC Current Gain ($I_C = 5.0 \text{ A dc}, V_{CE} = 10 \text{ V dc}$)	h_{FE}	10	30	—	—
DYNAMIC CHARACTERISTICS					
Output Capacitance ($V_{CB} = 50 \text{ V dc}, I_E = 0, f = 1.0 \text{ MHz}$)	C_{ob}	—	350	450	pF
FUNCTIONAL TESTS					
Common-Emitter Amplifier Power Gain ($V_{CC} = 50 \text{ V dc}, P_{out} = 250 \text{ W CW}, f = 30 \text{ MHz}, I_{CQ} = 250 \text{ mA}$)	G_{PE}	12	14	—	dB
Collector Efficiency ($V_{CC} = 50 \text{ V dc}, P_{out} = 250 \text{ W}, f = 30 \text{ MHz}, I_{CQ} = 250 \text{ mA}$)	η	—	45 65	—	% (PEP) % (CW)
Intermodulation Distortion (2) ($V_{CE} = 50 \text{ V dc}, P_{out} = 250 \text{ W (PEP)}, I_{CQ} = 250 \text{ mA}, f = 30 \text{ MHz}$)	IMD	—	-33	-30	dB
Electrical Ruggedness ($V_{CC} = 50 \text{ V dc}, P_{out} = 250 \text{ W CW}, f = 30 \text{ MHz},$ $V_{SWR} 3:1$ at all Phase Angles)	ψ	No Degradation in Output Power			

NOTE:

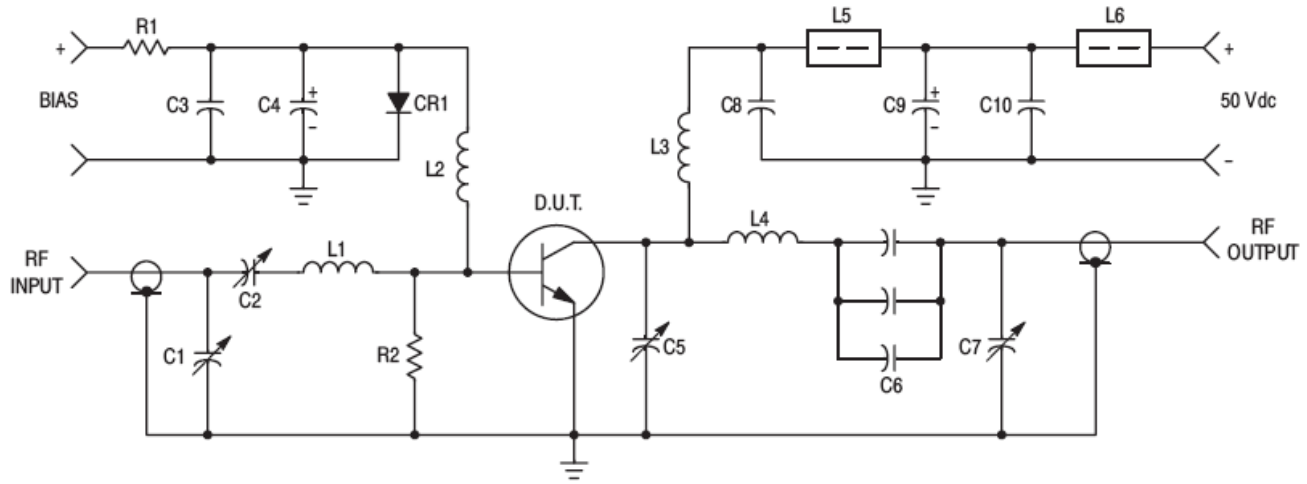
2. To Mil-Std-1311 Version A, Test Method 2204, Two Tone, Reference each Tone.

ADVANCED: Data Sheets contain information regarding a product M/A-COM Technology Solutions is considering for development. Performance is based on target specifications, simulated results, and/or prototype measurements. Commitment to develop is not guaranteed.

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C1, C2, C5, C7 — 170–780 pF, Arco 469
 C3, C8, C9 — 0.1 μ F, 100 V Erie
 C4 — 500 μ F @ 6.0 V
 C6 — 360 pF, 3 x 120 pF 3.0 kV in parallel
 C10 — 10 μ F, 100 V
 R1 — 10 Ω , 10 Watt
 R2 — 10 Ω , 1.0 Watt

CR1 — 1N4997 or equivalent
 L1 — 3 Turns, #16 Wire, 0.4" I.D., 0.3" Long
 L2 — 0.8 μ H, Ohmite Z-235 or equivalent
 L3 — 12 Turns, #16 Enameled Wire Closewound 0.25" I.D.
 L4 — 4 Turns, 1/8" Copper Tubing, 0.6" I.D., 1.0" Long
 L5, L6 — 2.0 μ H, Fair-Rite 2643021801 Ferrite bead each or equivalent

Figure 1. 30 MHz Test Circuit Schematic

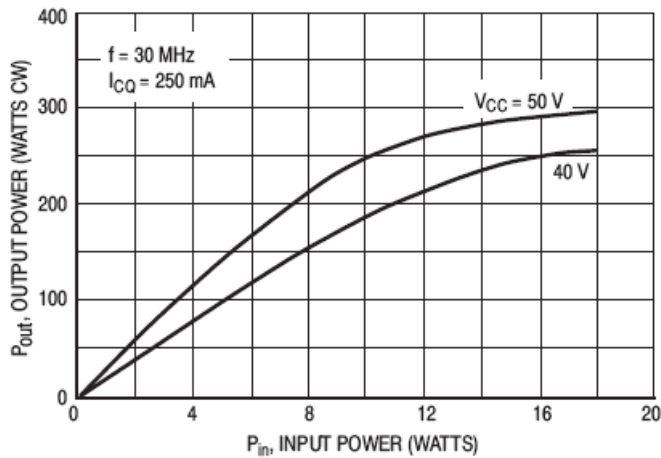


Figure 2. Output Power versus Input Power

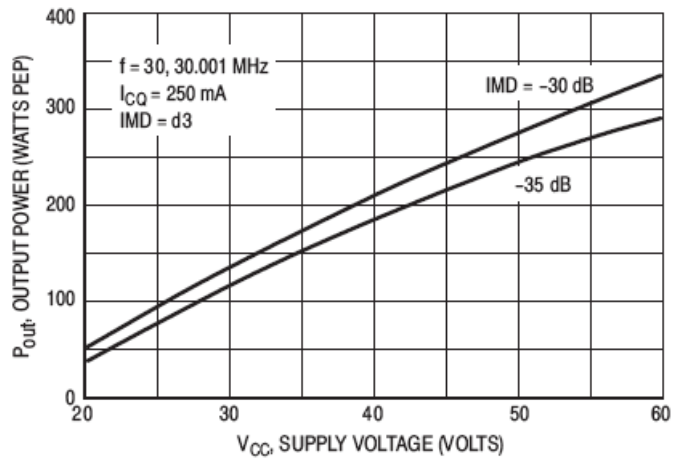


Figure 3. Output Power versus Supply Voltage

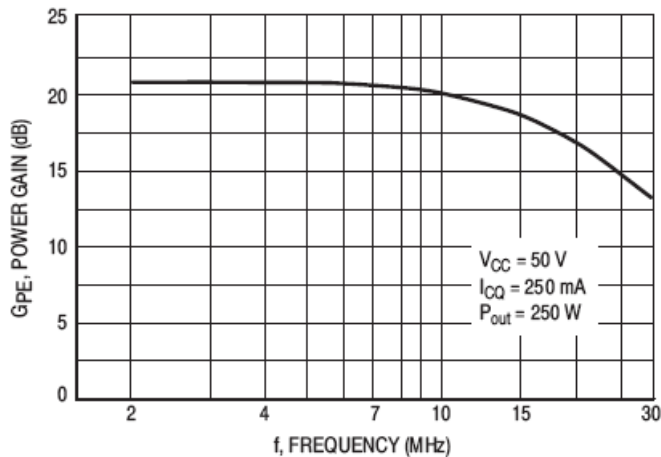


Figure 4. Power Gain versus Frequency

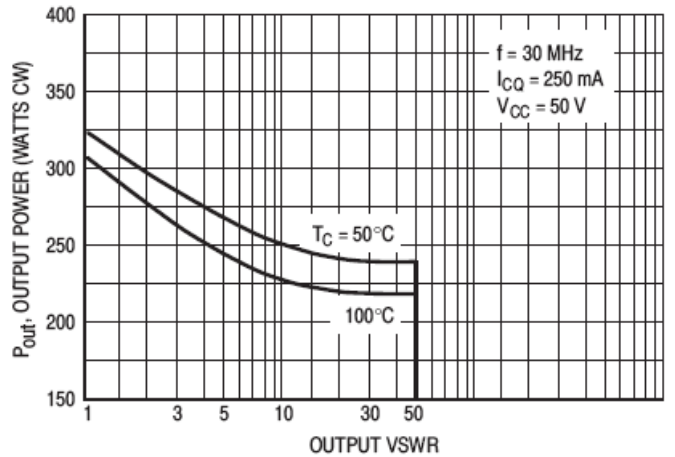


Figure 5. RF SOAR (Class AB)
P_{out} versus Output VSWR

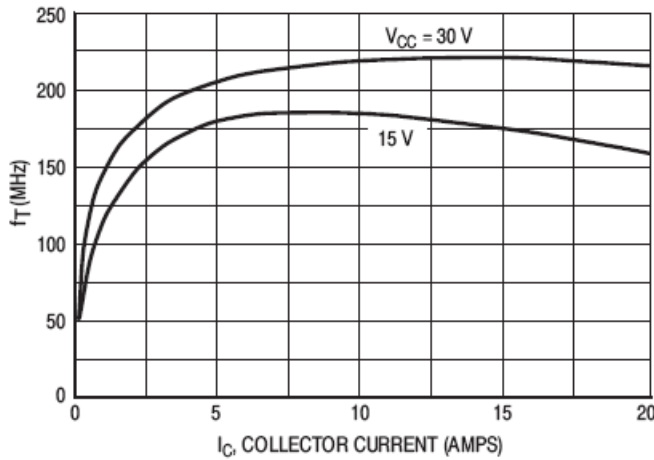


Figure 6. f_T versus Collector Current

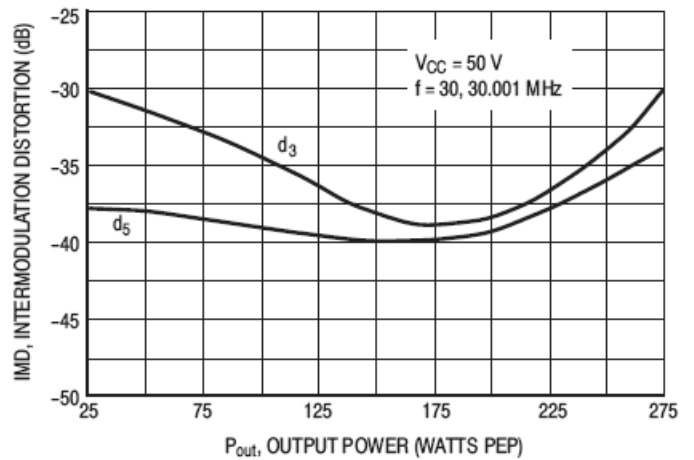


Figure 7. IMD versus P_{Out}

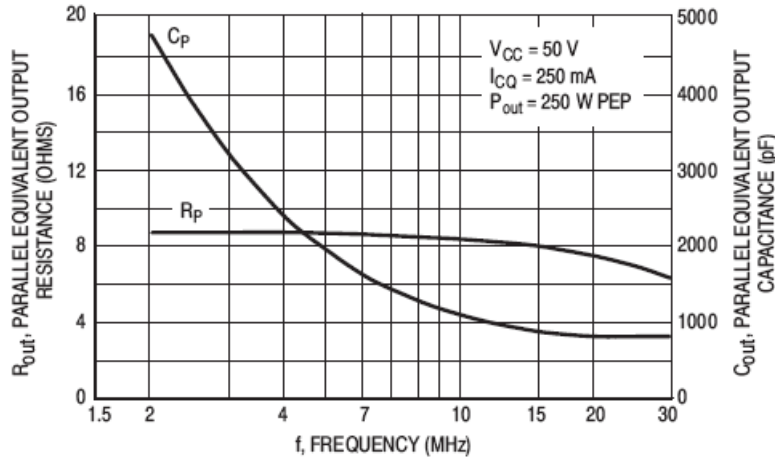
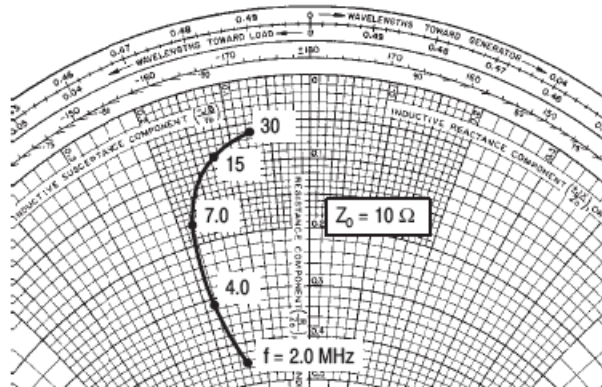


Figure 8. Output Resistance and Capacitance versus Frequency



$V_{CC} = 50\text{ V}$
 $I_{CQ} = 150\text{ mA}$
 $P_{out} = 250\text{ W PEP}$

f MHz	Z_{in} Ohms
2.0	4.50 - j1.40
4.0	3.10 - j1.80
7.0	1.70 - j1.75
15	0.80 - j1.25
30	0.60 - j0.75

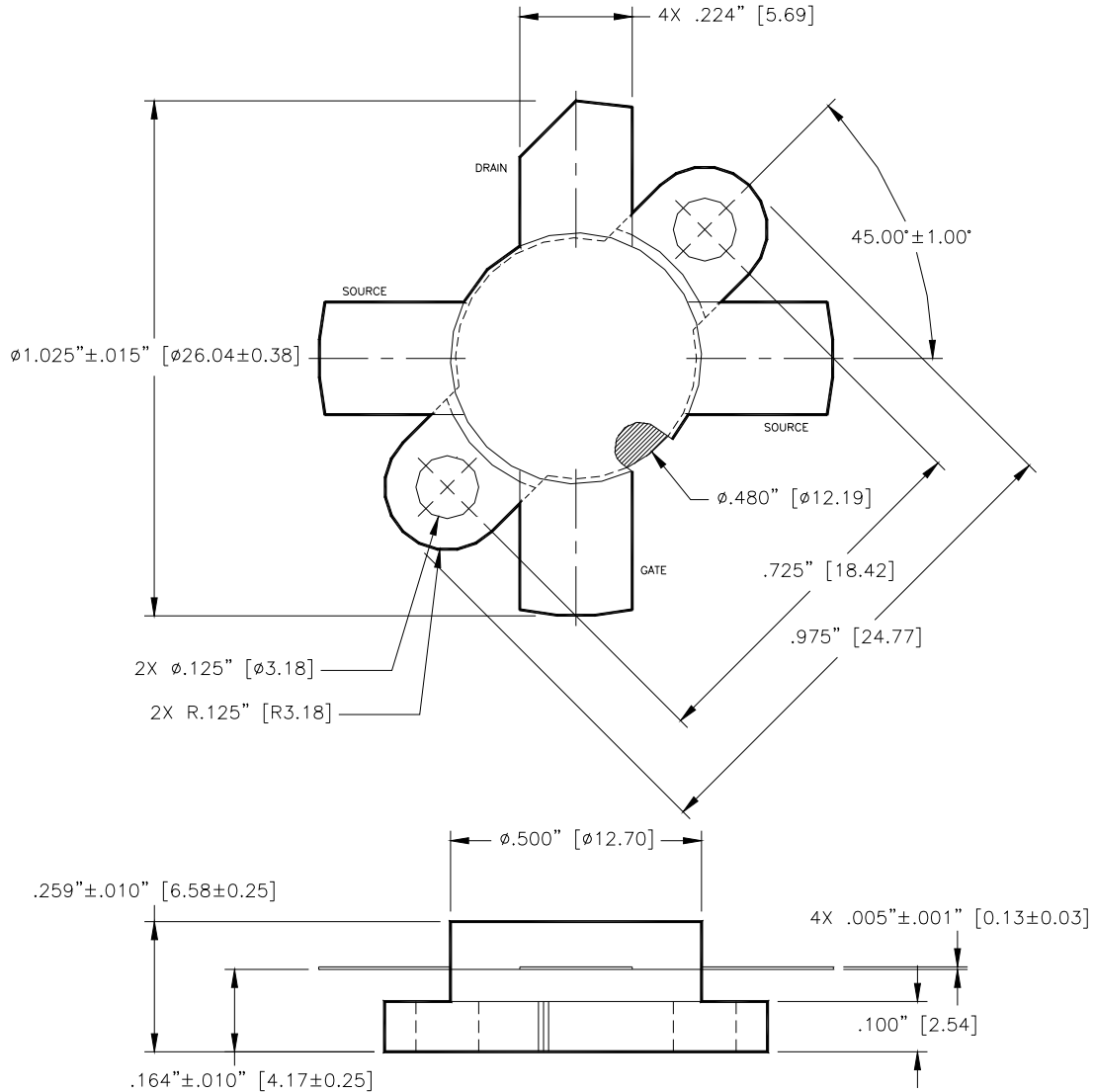
Figure 9. Series Equivalent Impedance

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

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