MRF448A

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

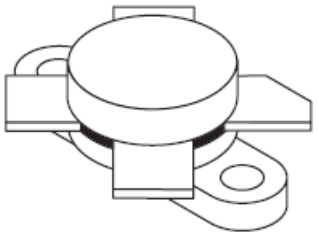
Rev. V1

Description

Designed primarily for high voltage applications as a high power linear amplifiers from 2 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	Vdc
Collector Current - Continuous	I_C	16	Adc
Withstand Current - 10 s	-	20	Adc
Total Device Dissipation @ Tc =25°C (1) Derate above 25°C	P_D	290 1.67	Watts W/°C
Storage Temperature Range	T_{stg}	-65 to +150	°C

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max.	Unit
Thermal Resistance, Junction to Case	R_{eJC}	0.6	°C/W

ELECTRICAL CHARACTERISTICS

Characteristic	Symbol	Min.	Typ.	Max.	Unit
OFF CHARACTERISTICS					
Collector-Emitter Breakdown Voltage (I_C = 200 mAdc, I_B = 0)	$V_{(BR)CEO}$	50	—	—	Vdc
Collector-Emitter Breakdown Voltage (I_C = 100 mAdc, V_{BE} = 0)	$V_{(BR)CES}$	100	—	—	Vdc
Collector-Base Breakdown Voltage (I_C = 100 mAdc, I_E = 0)	$V_{(BR)CBO}$	100	—	—	Vdc
Emitter-Base Breakdown Voltage (I_E = 10 mAdc, I_C = 0)	$V_{(BR)EBO}$	4	—	—	Vdc

(continued)

Note:
1. PD is a measurement reflecting short term maximum condition. See SOAR curve for operating conditions.

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ELECTRICAL CHARACTERISTICS - *continued* (T_C = 25°C unless otherwise noted)

Characteristic	Symbol	Min.	Typ.	Max.	Unit
ON CHARACTERISTICS					
DC Current Gain (I_C = 5.0 Adc, V_{CE} = 10 Vdc)	h_{FE}	25	—	50	—
DYNAMIC CHARACTERISTICS					
Output Capacitance (V_{CB} = 50 Vdc, I_E = 0, f = 1.0 MHz)	C_{ob}	—	350	450	pF
FUNCTIONAL TESTS					
Common-Emitter Amplifier Power Gain (V_{CC} = 50 Vdc, P_{out} = 250 W CW, f = 30 MHz, I_{CQ} =250 mA)	G_{PE}	12	14	—	dB
Collector Efficiency (V_{CC} = 50 Vdc, P_{out} = 250 W, f = 30 MHz, I_{CQ} = 250 mA)	η	— —	45 65	— —	% (PEP) % (CW)
Intermodulation Distortion (2) (V_{CE} = 50 Vdc, P_{out} = 250 W (PEP), I_{CQ} = 250mA, f = 30 MHz)	IMD	—	-33	-30	dB
Electrical Ruggedness (V_{CC} = 50 Vdc, P_{out} = 250 W CW, f =30 MHz, VSWR 3:1 at all Phases Angles)	Ψ	No Degradation in Output Power			

Note:
2. To Mil–Std-1311 Version A, Test Method 2204, Two Tone, Reference Each Tone

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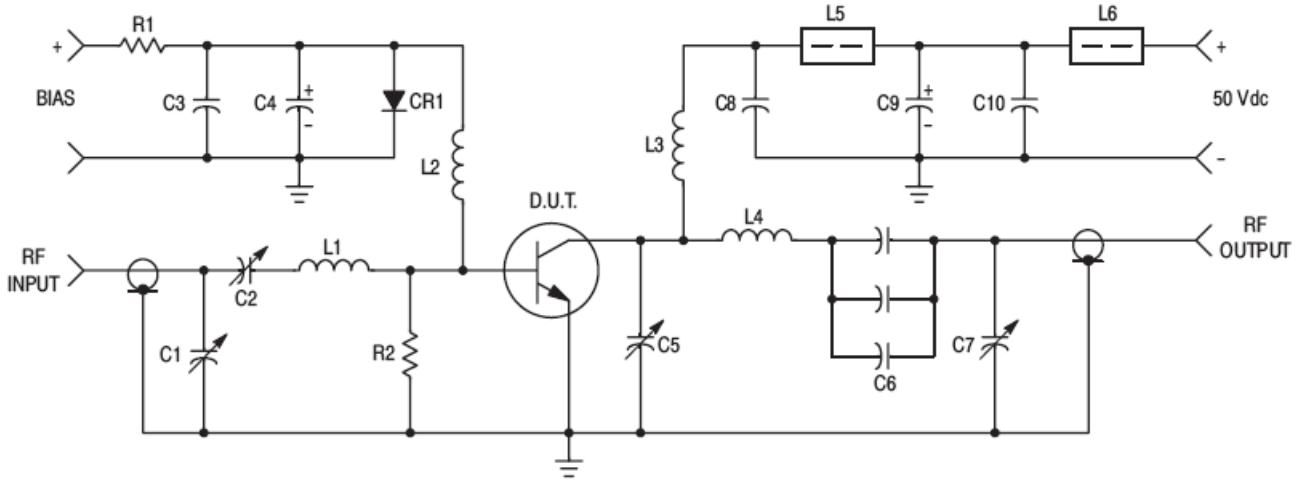

C1, C2, C5, C7 — 170–780 pF, Arco 469
C3, C8, C9 — 0.1 µF, 100 V Erie
C4 — 500 µF @ 6.0 V
C6 — 360 pF, 3 x 120 pF 3.0 kV in parallel
C10 — 10 µF, 100 V
R1 — 10 Ω, 10 Watt
R2 — 10 Ω, 1.0 Watt

CR1 — 1N4997 or equivalent
L1 — 3 Turns, #16 Wire, 0.4″ I.D., 0.3″ Long
L2 — 0.8 µH, 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 µH, Fair–Rite 2643021801 Ferrite bead each or equivalent

Figure 1. 30 MHz Test Circuit Schematic

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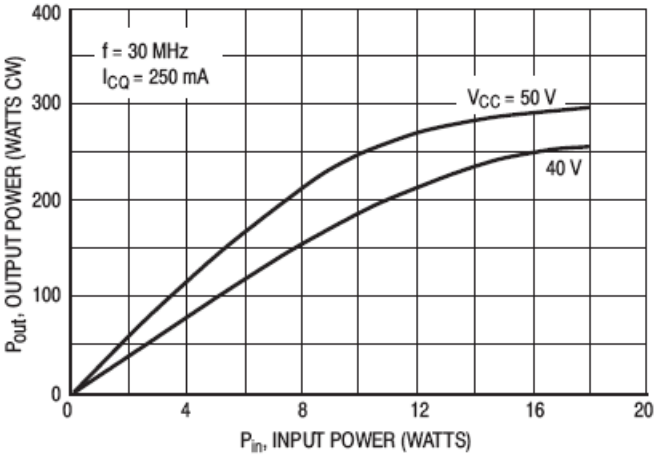

Figure 2. Output Power versus Input Power

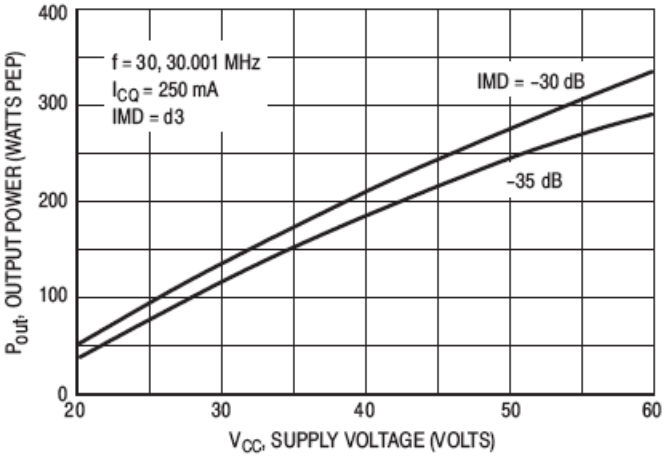

Figure 3. Output Power versus Supply Voltage

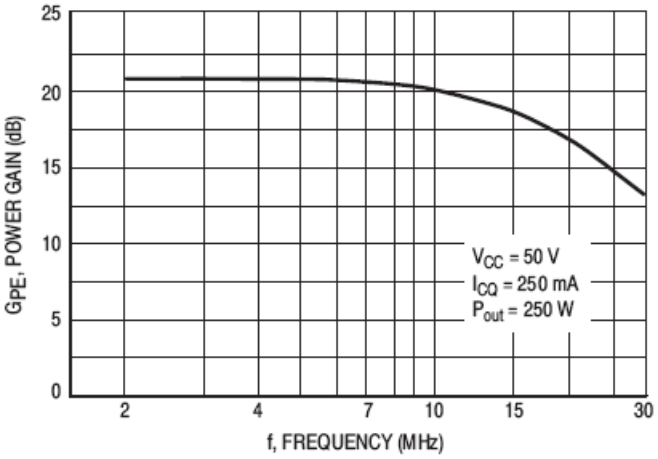

Figure 4. Power Gain versus Frequency

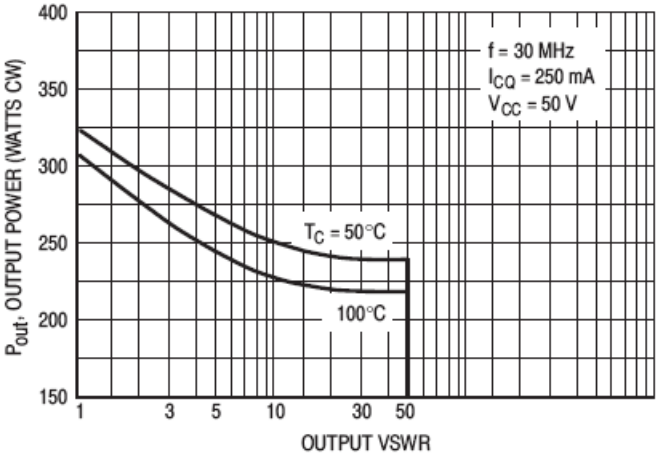

Figure 5. RF SOAR (Class AB)
P_{out} versus Output VSWR

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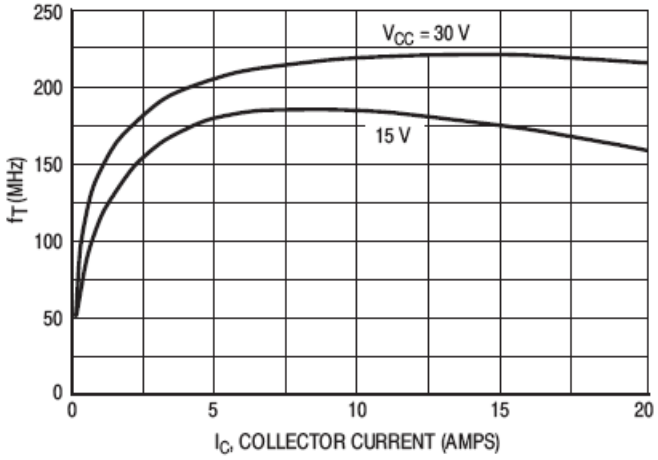

Figure 6. f_T versus Collector Current

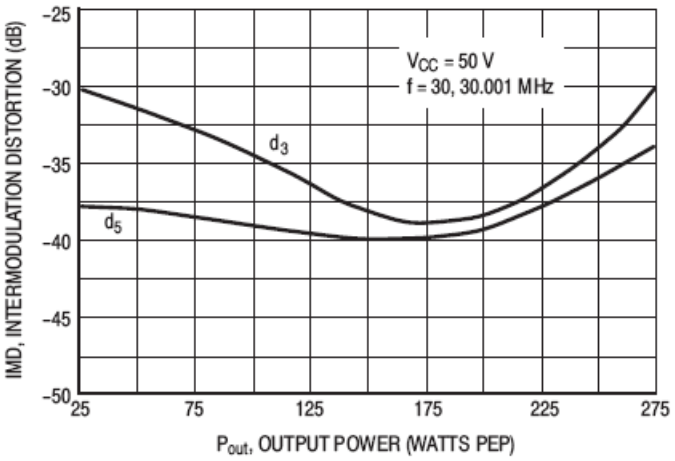

Figure 7. IMD versus P_{out}

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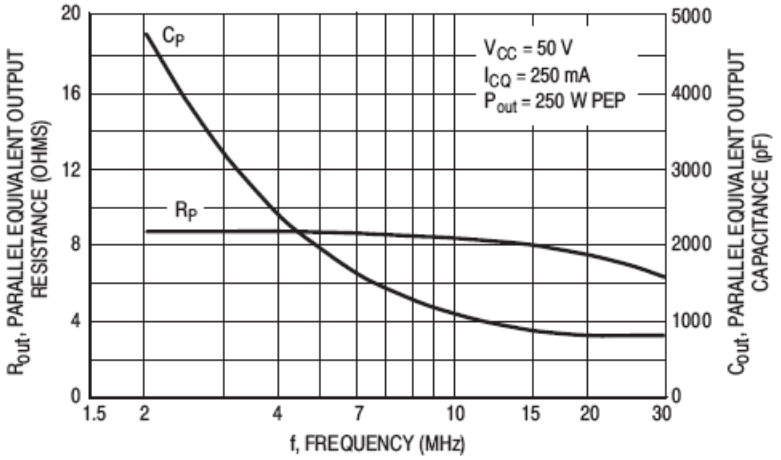
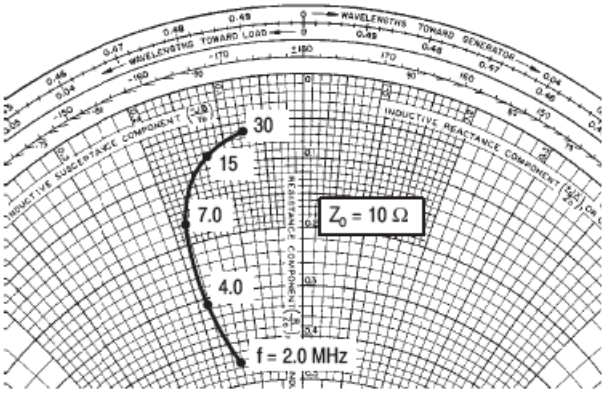


Figure 8. Output Resistance and Capacitance versus Frequency



V_{CC} = 50 V
I_{CQ} = 150 mA
P_{out} = 250 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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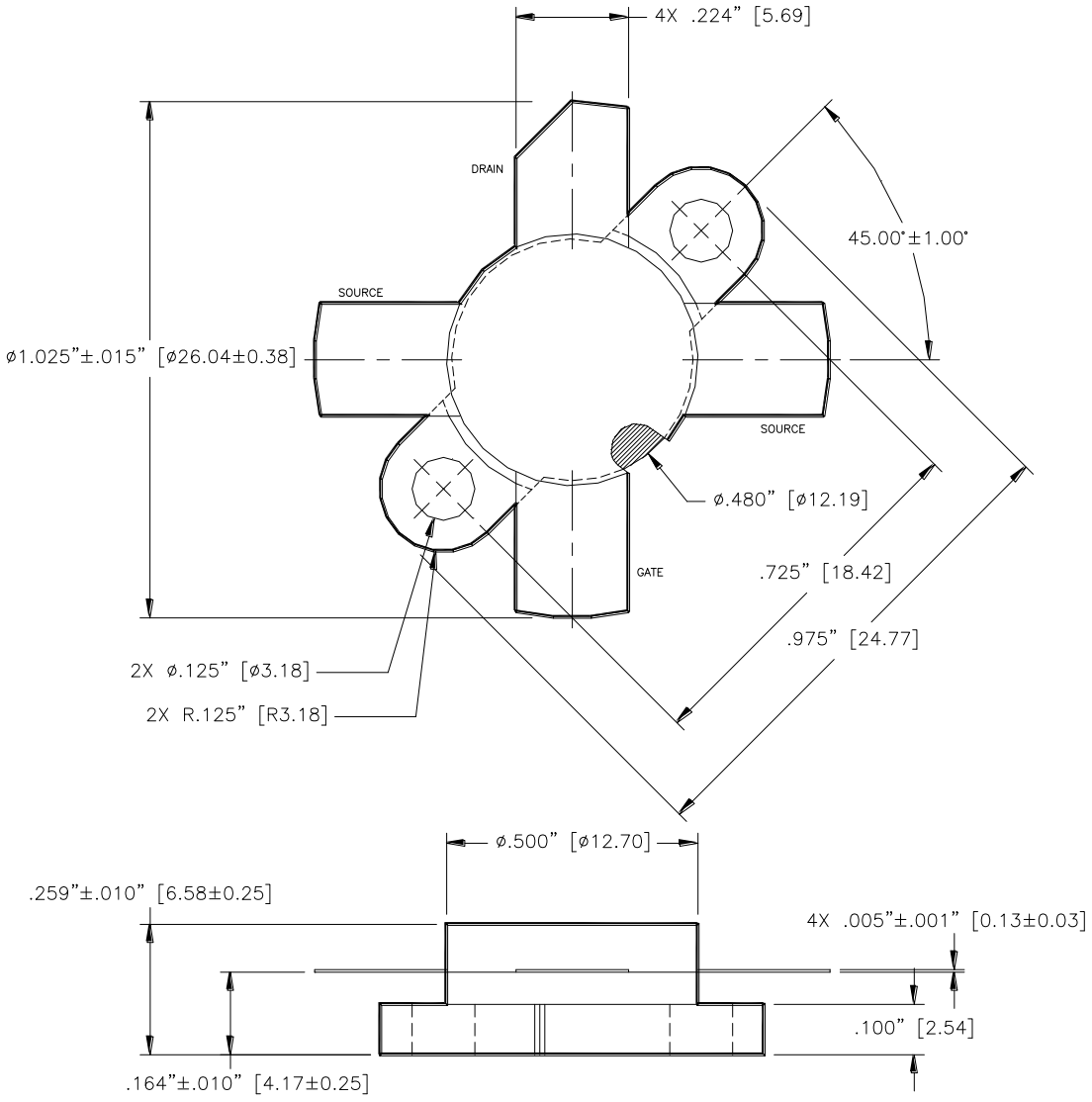

Unless otherwise noted, tolerances are inches ±.005" [millimeters ±0.13mm]

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