MRF448A

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

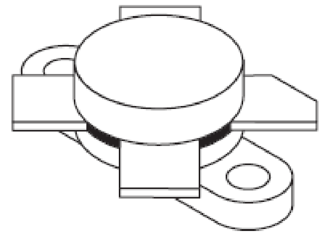
Rev. V1

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	$R_{\theta JC}$	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)

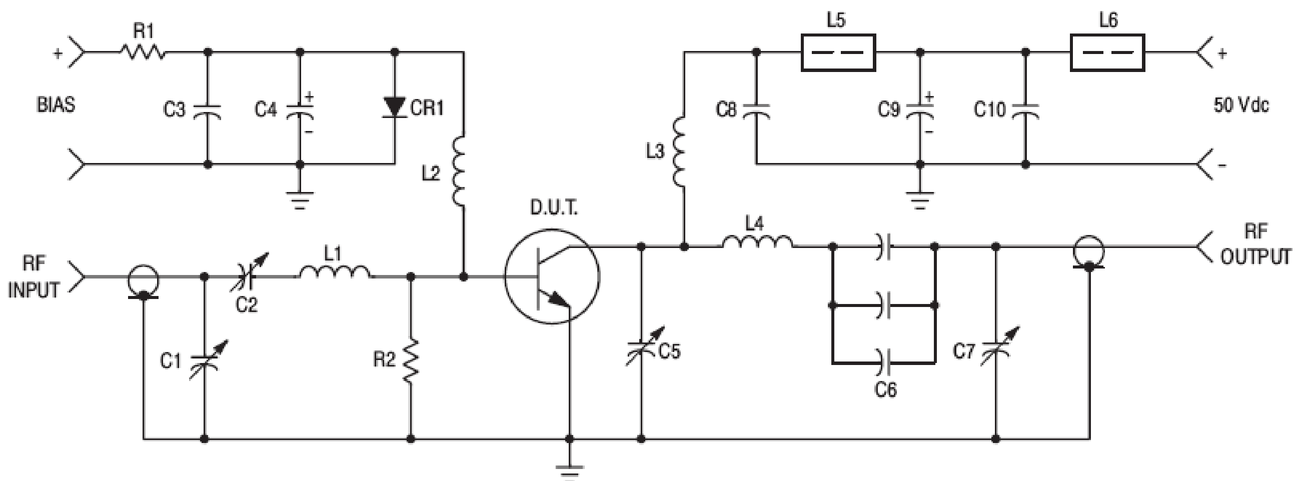
Note:
1. PD is a measurement reflecting short term maximum condition. See SOAR curve for operating conditions.

DC-0017303

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



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

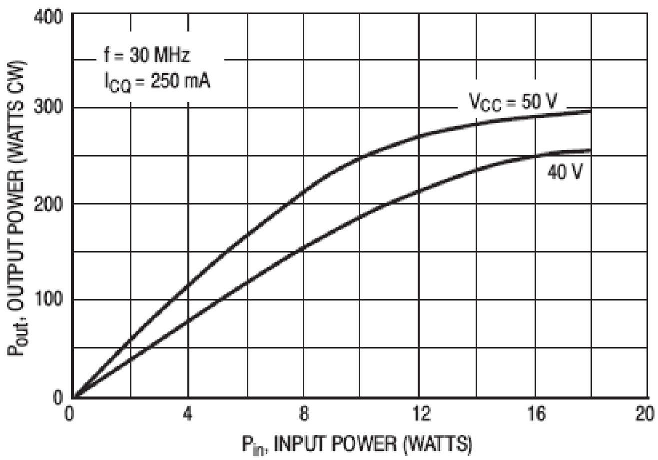


Figure 2. Output Power versus Input Power

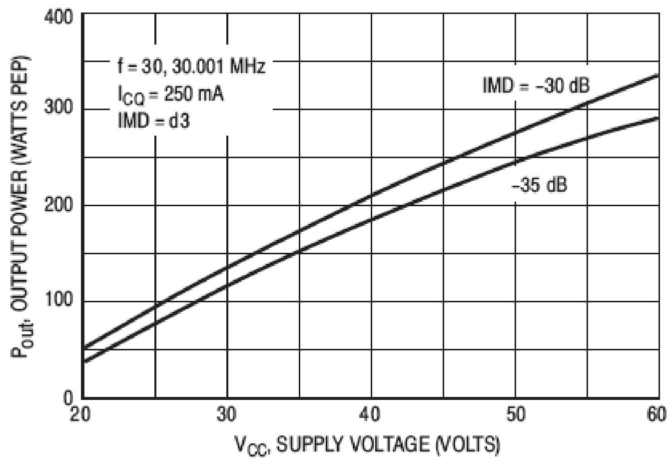


Figure 3. Output Power versus Supply Voltage

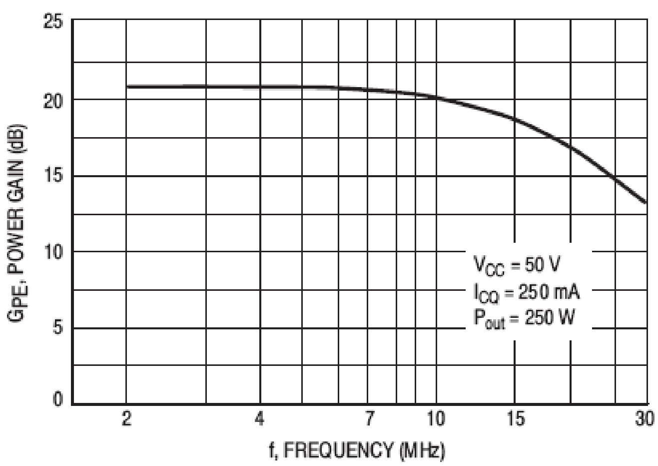


Figure 4. Power Gain versus Frequency

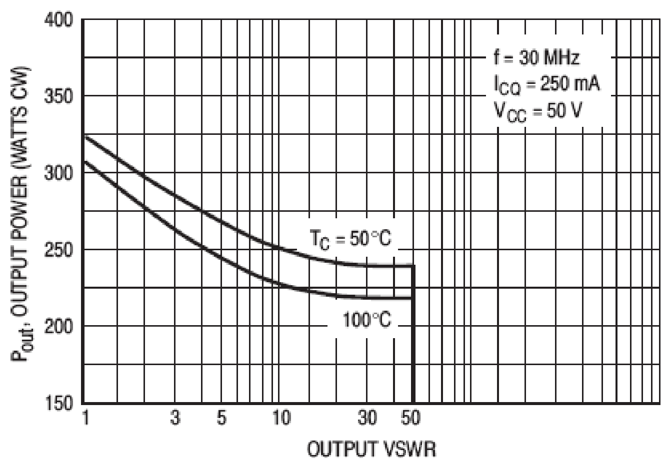


Figure 5. RF SOAR (Class AB) P_{out} versus Output VSWR

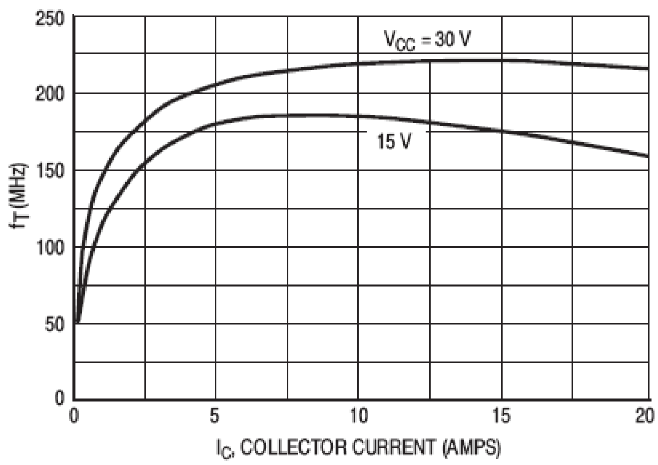


Figure 6. f_T versus Collector Current

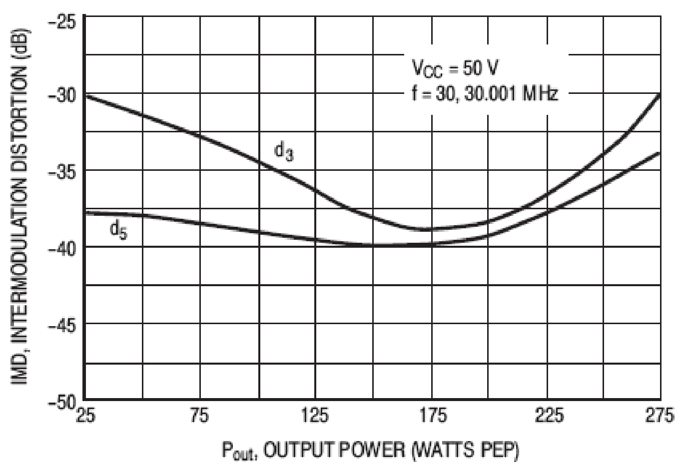


Figure 7. IMD versus P_{out}

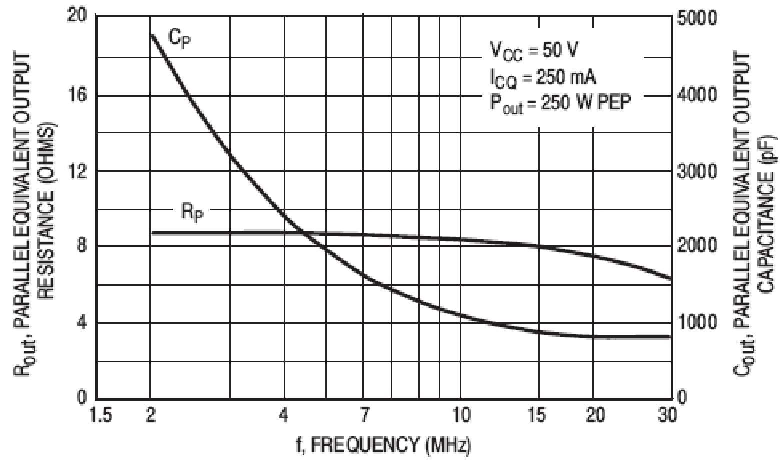
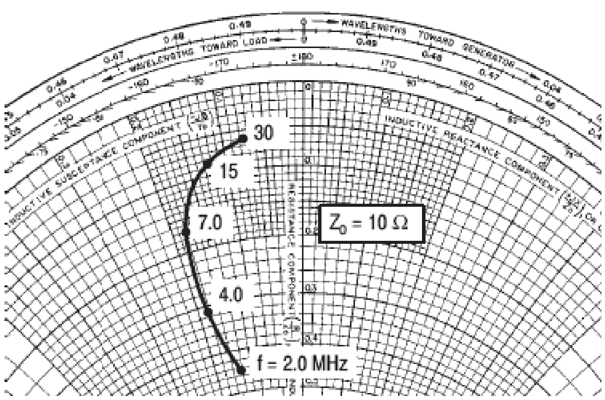


Figure 8. Output Resistance and Capacitance versus Frequency



V_{CC} = 50 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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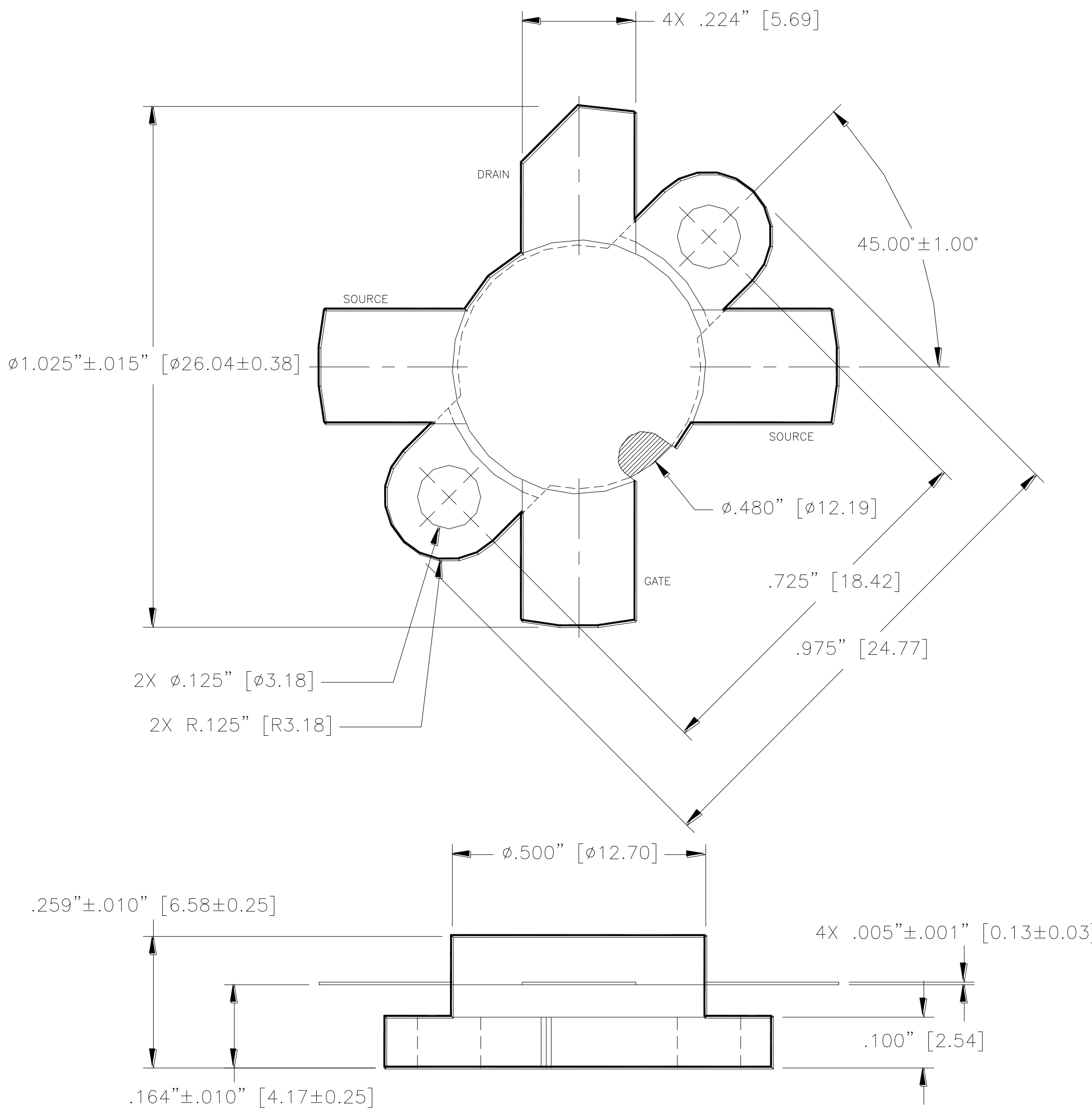

Unless otherwise noted, tolerances are inches ±.005" [millimeters ±0.13mm]

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