

The RF Line NPN Silicon Power Transistor

250 W, 30 MHz, 50 V

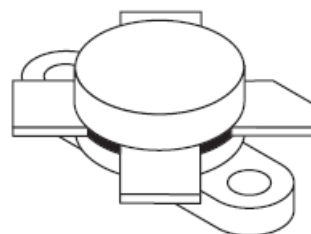
Rev. V1

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 @ $T_c = 25^\circ\text{C}$ (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

Characteristic	Symbol	Min.	Typ.	Max.	Unit
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	—	—	Vdc

(continued)

Note:

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

The RF Line NPN Silicon Power Transistor
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Rev. V1

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

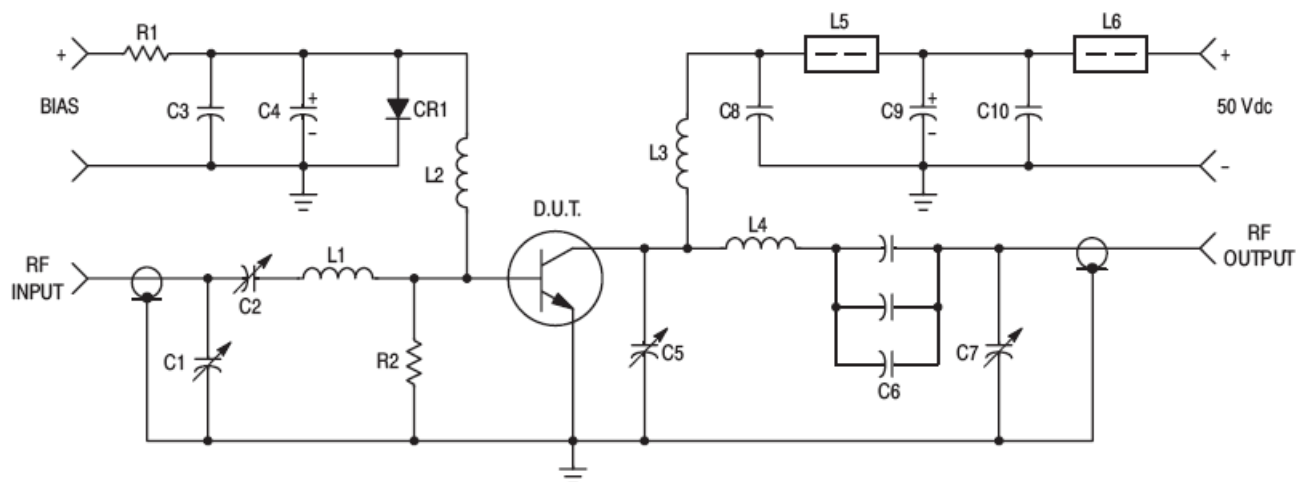
Characteristic	Symbol	Min.	Typ.	Max.	Unit
ON CHARACTERISTICS					
DC Current Gain ($I_C = 5.0 \text{ Adc}$, $V_{CE} = 10 \text{ Vdc}$)	h_{FE}	25	—	50	—
DYNAMIC CHARACTERISTICS					
Output Capacitance ($V_{CB} = 50 \text{ Vdc}$, $I_E = 0$, $f = 1.0 \text{ MHz}$)	C_{ob}	—	350	450	pF
FUNCTIONAL TESTS					
Common-Emitter Amplifier Power Gain ($V_{CC} = 50 \text{ Vdc}$, $P_{out} = 250 \text{ W CW}$, $f = 30 \text{ MHz}$, $I_{CQ} = 250 \text{ mA}$)	G_{PE}	12	14	—	dB
Collector Efficiency ($V_{CC} = 50 \text{ Vdc}$, $P_{out} = 250 \text{ W}$, $f = 30 \text{ MHz}$, $I_{CQ} = 250 \text{ mA}$)	η	— —	45 65	— —	% (PEP) % (CW)
Intermodulation Distortion (2) ($V_{CE} = 50 \text{ Vdc}$, $P_{out} = 250 \text{ W (PEP)}$, $I_{CQ} = 250 \text{ mA}$, $f = 30 \text{ MHz}$)	IMD	—	-33	-30	dB
Electrical Ruggedness ($V_{CC} = 50 \text{ Vdc}$, $P_{out} = 250 \text{ W CW}$, $f = 30 \text{ MHz}$, 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

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

Rev. V1



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

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Rev. V1

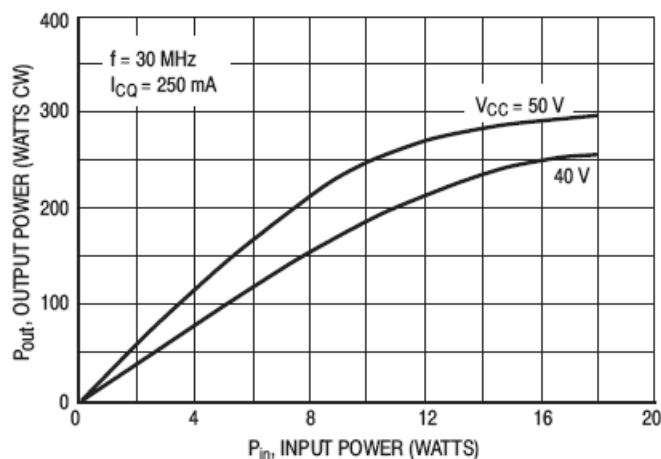


Figure 2. Output Power versus Input Power

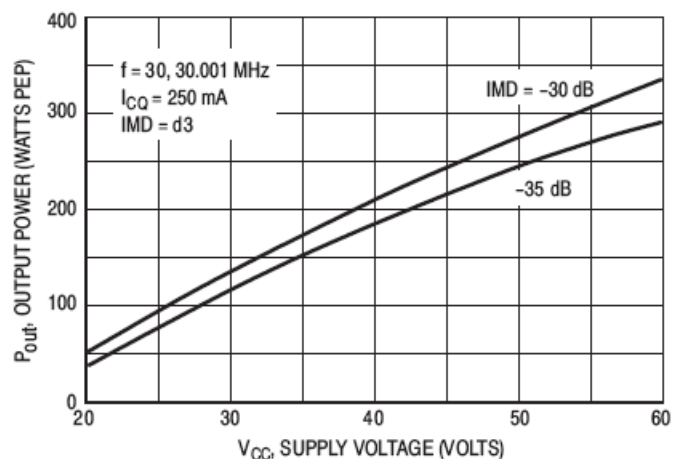


Figure 3. Output Power versus Supply Voltage

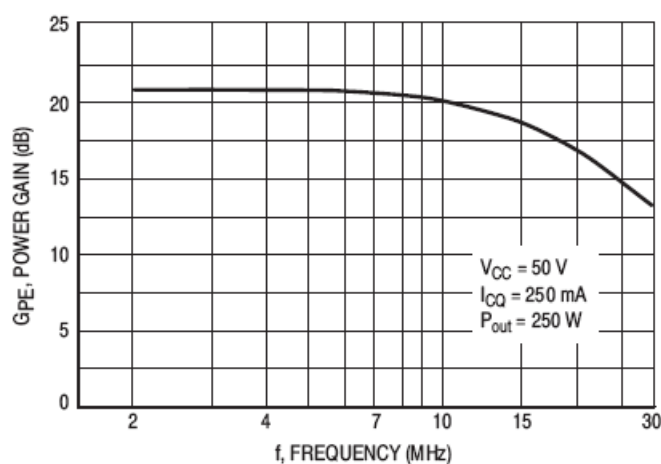


Figure 4. Power Gain versus Frequency

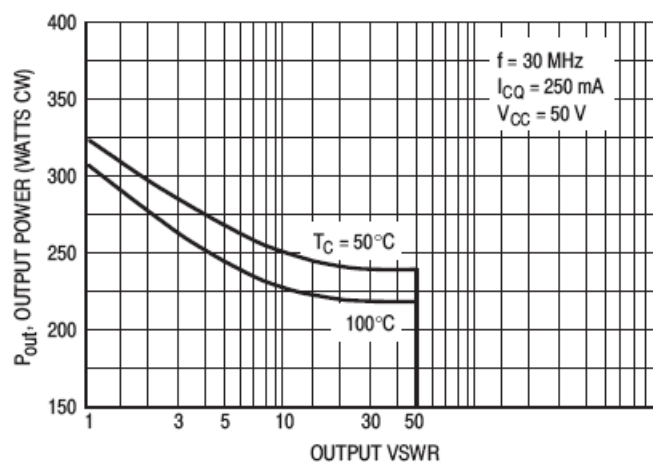


Figure 5. RF SOAR (Class AB)
 P_{out} versus Output VSWR

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

Rev. V1

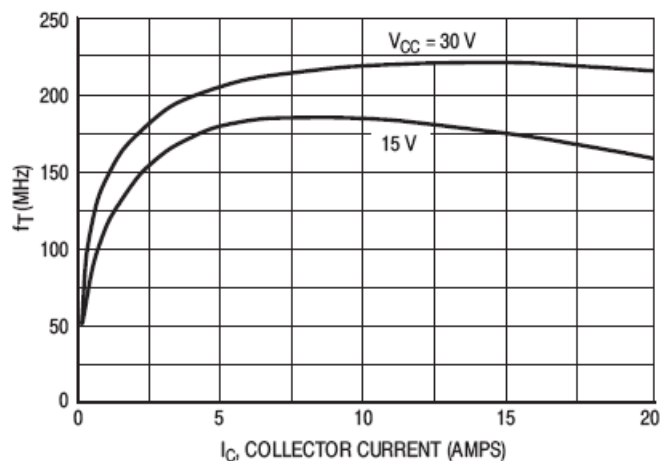


Figure 6. f_T versus Collector Current

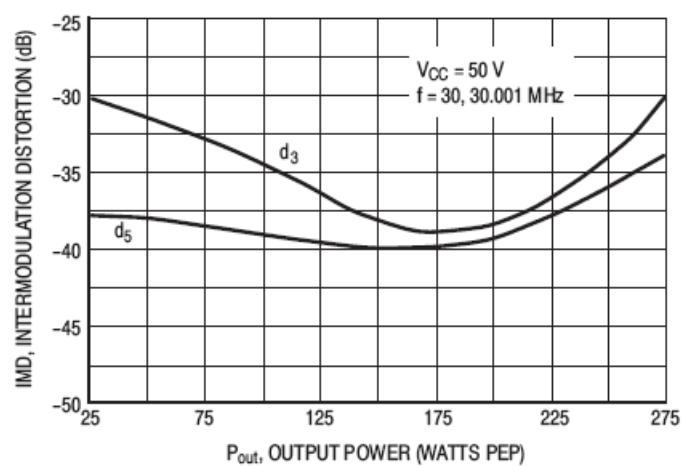


Figure 7. IMD versus P_{out}

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

Rev. V1

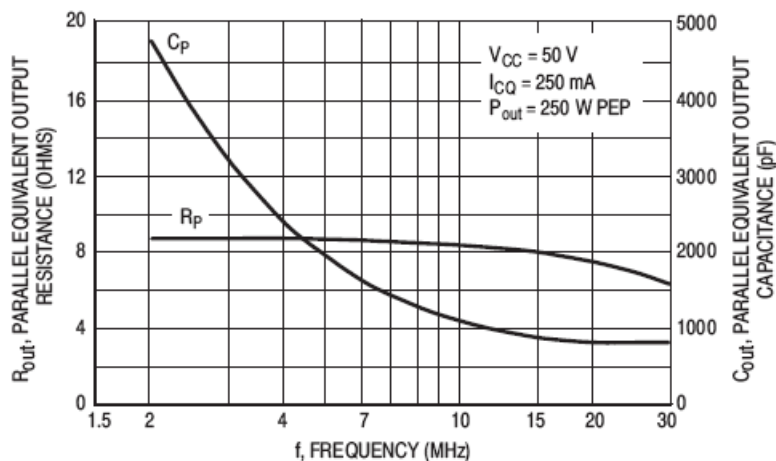
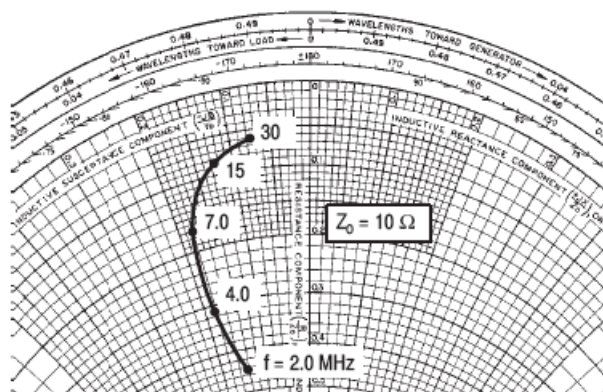


Figure 8. Output Resistance and Capacitance versus Frequency

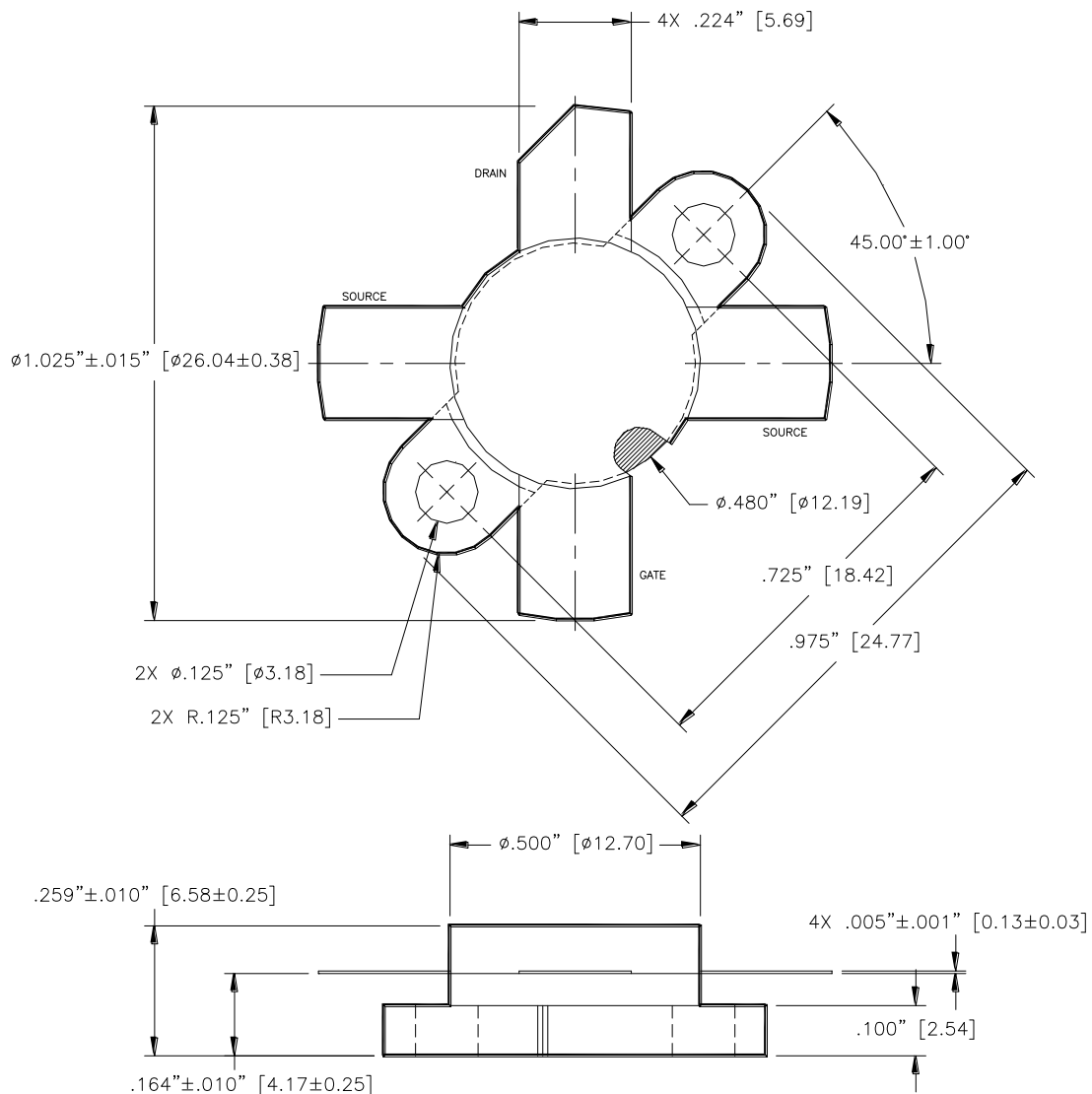


$V_{CC} = 50$ V $I_{CQ} = 150$ mA $P_{out} = 250$ W PEP	
f MHz	Z_{in} Ohms
2.0	4.50 - j1.40
4.0	3.10 - j1.80
7.0	1.70 - j1.75
15	0.80 - j1.25
30	0.60 - j0.75

Figure 9. Series Equivalent Impedance

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Rev. V1



Unless otherwise noted, tolerances are inches $\pm .005''$ [millimeters $\pm 0.13\text{mm}$]

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