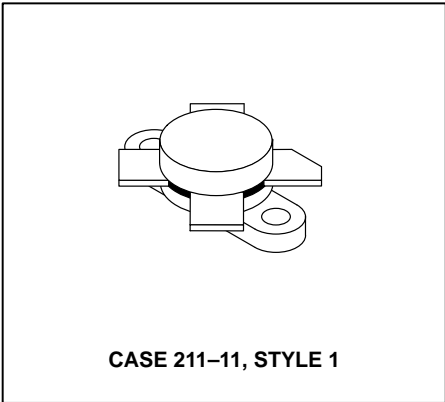
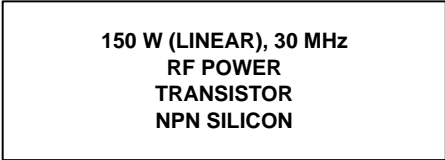


# The RF Line

## NPN Silicon

### RF Power Transistor



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

- Specified 50 Volt, 30 MHz Characteristics —
  - Output Power = 150 W (PEP)
  - Minimum Gain = 13 dB
  - Efficiency = 45%
- Intermodulation Distortion @ 150 W (PEP) —
  - IMD = -32 dB (Max)
- Diffused Emitter Resistors for Superior Ruggedness
- 100% Tested for Load Mismatch at all Phase Angles with 30:1 VSWR @ 150 W CW

#### 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 @ $T_C = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	233 1.33	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	$R_{\theta JC}$	0.75	$^\circ\text{C}/\text{W}$

#### 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

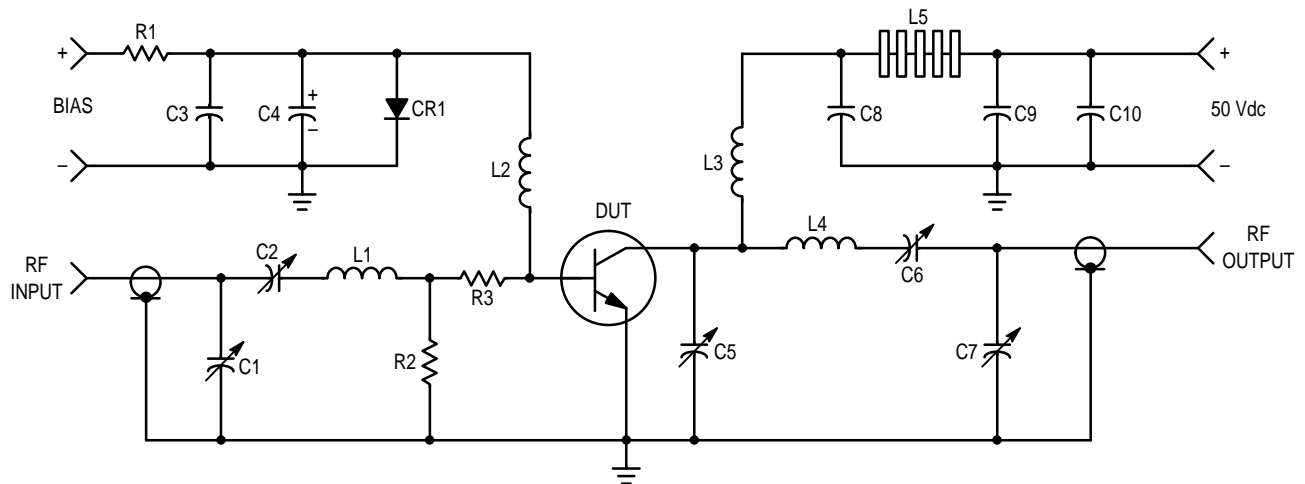
(continued)

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

Characteristic	Symbol	Min	Typ	Max	Unit
<b>ON CHARACTERISTICS</b>					
DC Current Gain ( $I_C = 5.0 \text{ Adc}$ , $V_{CE} = 5.0 \text{ Vdc}$ )	$h_{FE}$	10	30	80	—
<b>DYNAMIC CHARACTERISTICS</b>					
Output Capacitance ( $V_{CB} = 50 \text{ Vdc}$ , $I_E = 0$ , $f = 1.0 \text{ MHz}$ )	$C_{ob}$	—	220	300	pF
<b>FUNCTIONAL TESTS</b>					
Common-Emitter Amplifier Gain ( $V_{CC} = 50 \text{ Vdc}$ , $P_{out} = 150 \text{ W (PEP)}$ , $I_C(\text{max}) = 3.32 \text{ Adc}$ , $f = 30$ ; 30.001 MHz)	$G_{PE}$	13	15	—	dB
Output Power ( $V_{CE} = 50 \text{ Vdc}$ , $f = 30$ ; 30.001 MHz)	$P_{out}$	150	—	—	W (PEP)
Collector Efficiency ( $V_{CC} = 50 \text{ Vdc}$ , $P_{out} = 150 \text{ W (PEP)}$ , $I_C(\text{max}) = 3.32 \text{ Adc}$ , $f = 30$ , 30.001 MHz)	$\eta$	45	—	—	%
Intermodulation Distortion (1) ( $V_{CE} = 50 \text{ Vdc}$ , $P_{out} = 150 \text{ W (PEP)}$ , $I_C = 3.32 \text{ Adc}$ )	IMD	—	-35	-32	dB
Electrical Ruggedness ( $V_{CC} = 50 \text{ Vdc}$ , $P_{out} = 150 \text{ W CW}$ , $f = 30 \text{ MHz}$ , VSWR 30:1 at all Phase Angles)	$\psi$	No Degradation in Output Power			

**NOTE:**

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



C1, C2, C7 — 170–780 pF, Arco 469  
 C3, C8, C9 — 0.1  $\mu\text{F}$ , 100 V Erie  
 C4 — 500  $\mu\text{F}$  @ 6.0 V  
 C5 — 9.0–180 pF, Arco 463  
 C6 — 80–480 pF, Arco 466  
 C10 — 30  $\mu\text{F}$ , 100 V  
 R1 — 10  $\Omega$ , 10 Watt

R2 — 10  $\Omega$ , 1.0 Watt  
 R3 — 5.0–3.3  $\Omega$  1/2 Watt Carbon Resistors in Parallel  
 CR1 — 1N4997  
 L1 — 3 Turns, #16 Wire, 5/16" I.D., 5/16" Long  
 L2 — 10  $\mu\text{H}$  Molded Choke  
 L3 — 12 Turns, #16 Enameled Wire Closewound, 1/4" I.D.  
 L4 — 5 Turns, 1/8" Copper Tubing, 9/16" I.D., 3/4" Long  
 L5 — 10 Ferrite Beads — Ferroxcube #56–590–65/3B

**Figure 1. 30 MHz Test Circuit Schematic**

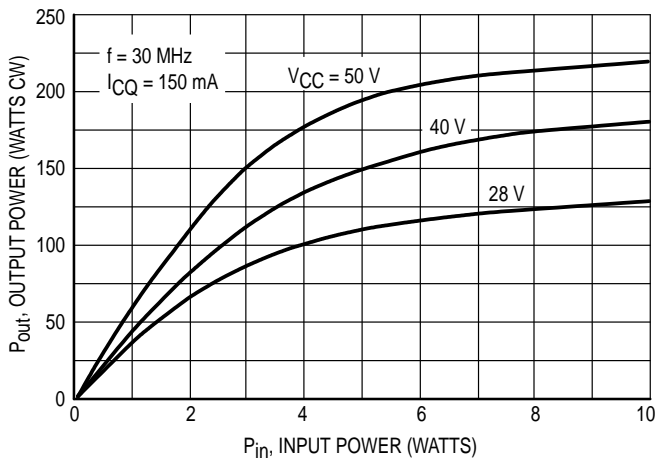


Figure 2. Output Power versus Input Power

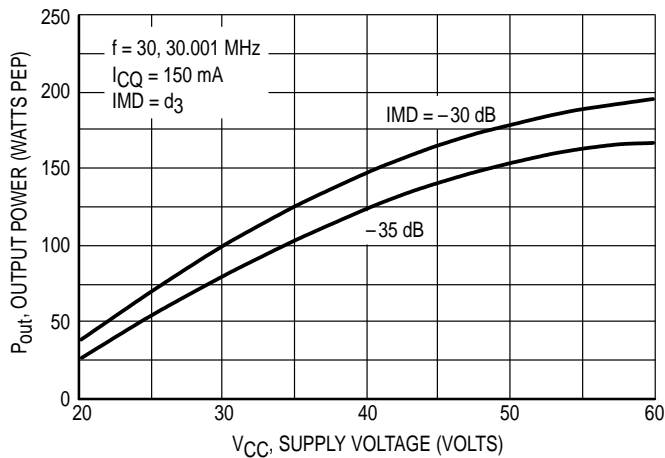


Figure 3. Output Power versus Supply Voltage

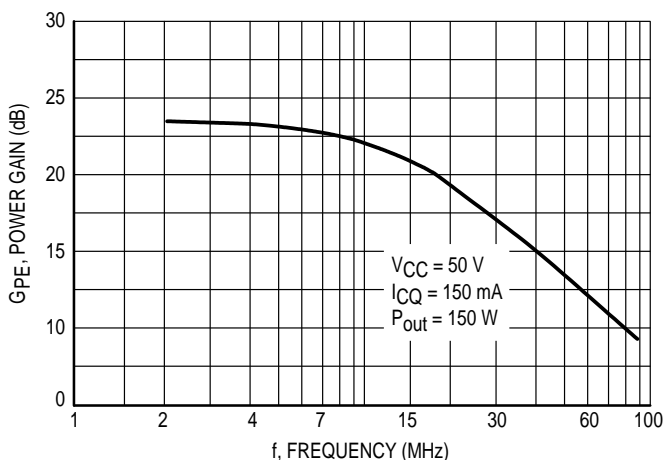


Figure 4. Power Gain versus Frequency

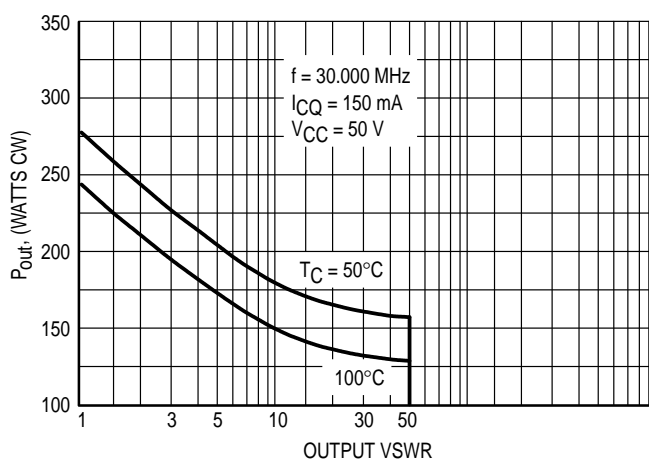


Figure 5. RF Safe Operating Area (SOAR)

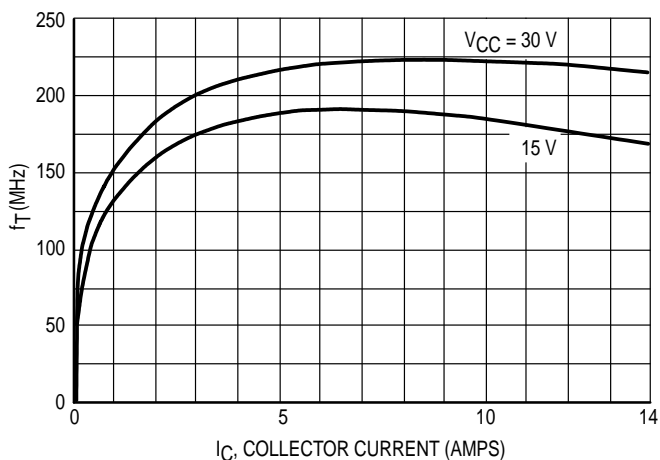


Figure 6.  $f_T$  versus Collector Current

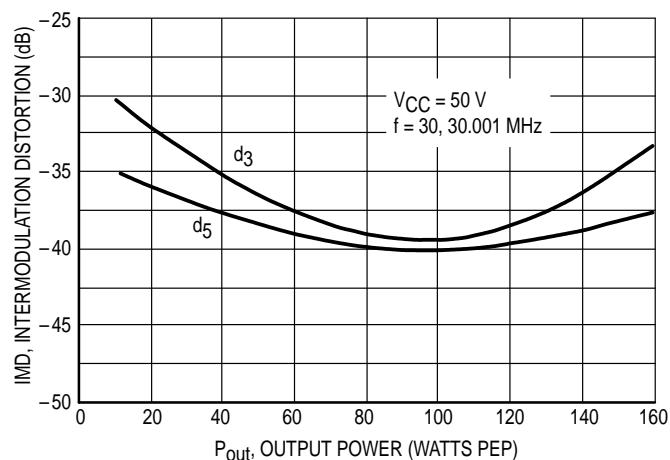


Figure 7. IMD versus  $P_{out}$

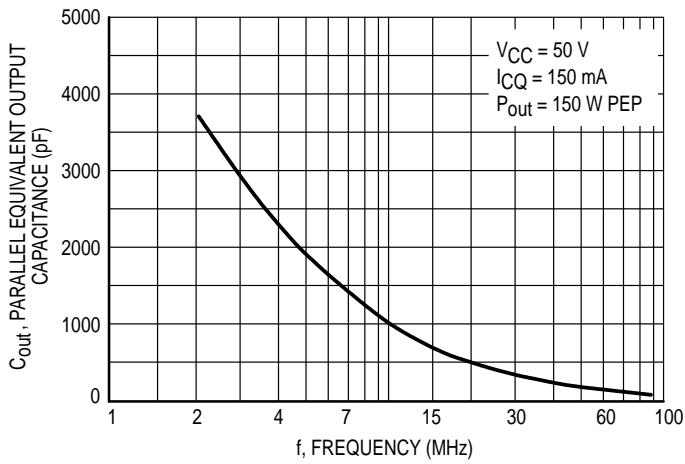


Figure 8. Output Capacitance versus Frequency

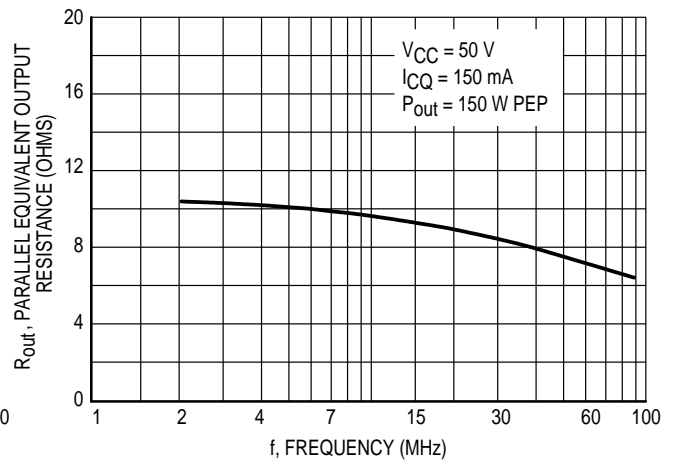


Figure 9. Output Resistance versus Frequency

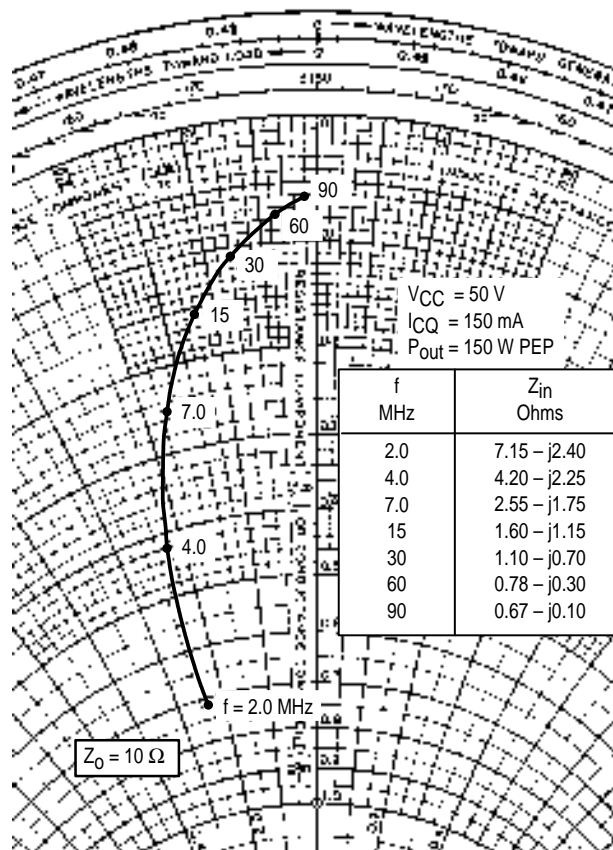
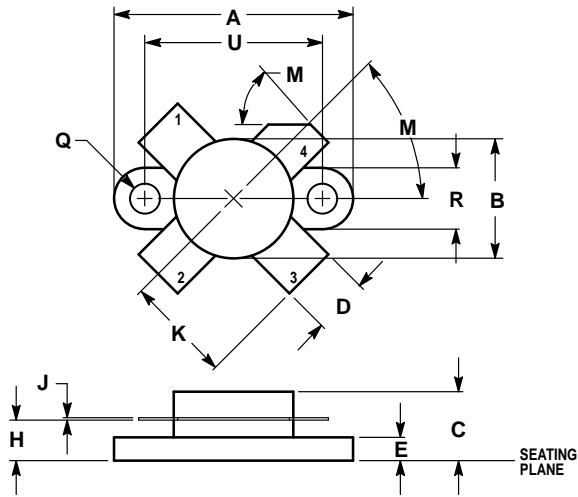


Figure 10. Series Equivalent Impedance

## PACKAGE DIMENSIONS




- NOTES:  
 1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.  
 2. CONTROLLING DIMENSION: INCH.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.960	0.990	24.39	25.14
B	0.465	0.510	11.82	12.95
C	0.229	0.275	5.82	6.98
D	0.216	0.235	5.49	5.96
E	0.084	0.110	2.14	2.79
H	0.144	0.178	3.66	4.52
J	0.003	0.007	0.08	0.17
K	0.435	—	11.05	—
M	45°NOM		45°NOM	
Q	0.115	0.130	2.93	3.30
R	0.246	0.255	6.25	6.47
U	0.720	0.730	18.29	18.54

- STYLE 1:  
 PIN 1. EMITTER  
 2. BASE  
 3. EMITTER  
 4. COLLECTOR

**CASE 211-11  
 ISSUE N**

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**How to reach us:**

**USA / EUROPE:** Motorola Literature Distribution;  
P.O. Box 20912; Phoenix, Arizona 85036. 1-800-441-2447

**JAPAN:** Nippon Motorola Ltd.; Tatsumi-SPD-JLDC, Toshikatsu Otsuki,  
6F Seibu-Butsuryu-Center, 3-14-2 Tatsumi Koto-Ku, Tokyo 135, Japan. 03-3521-8315

**MFAX:** RMFAX0@email.sps.mot.com - TOUCHTONE (602) 244-6609  
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**HONG KONG:** Motorola Semiconductors H.K. Ltd.; 8B Tai Ping Industrial Park,  
51 Ting Kok Road, Tai Po, N.T., Hong Kong. 852-26629298



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