

The RF Line

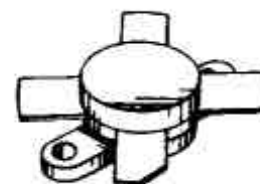
NPN Silicon RF Power Transistor

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)
- 100% Tested for Load Mismatch at all Phase Angles with 30:1 VSWR @ 150 W CW

MRF428

**150 W (PEP), 30 MHz
RF POWER
TRANSISTOR
NPN SILICON**



MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V_{CEO}	55	Vdc
Collector-Base Voltage	V_{CBO}	110	Vdc
Emitter-Base Voltage	V_{EBO}	4.0	Vdc
Collector Current — Continuous	I_C	20	Adc
Withstand Current — 10 s	—	30	Adc
Total Device Dissipation @ $T_C = 25^\circ\text{C}$ Derate above 25°C	P_D	320 1.83	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	$R_{\theta JC}$	0.5	$^\circ\text{C/W}$

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 ($I_C = 200\text{ mAdc}$, $I_B = 0$)	$V_{(BR)CEO}$	55	—	—	Vdc
Collector-Emitter Breakdown Voltage ($I_C = 100\text{ mAdc}$, $V_{BE} = 0$)	$V_{(BR)CES}$	110	—	—	Vdc
Collector-Base Breakdown Voltage ($I_C = 100\text{ mAdc}$, $I_E = 0$)	$V_{(BR)CBO}$	110	—	—	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
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ON CHARACTERISTICS

DC Current Gain ($I_C = 5.0\text{ Adc}$, $V_{CE} = 5.0\text{ Vdc}$)	h_{FE}	10	30	—	—
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DYNAMIC CHARACTERISTICS

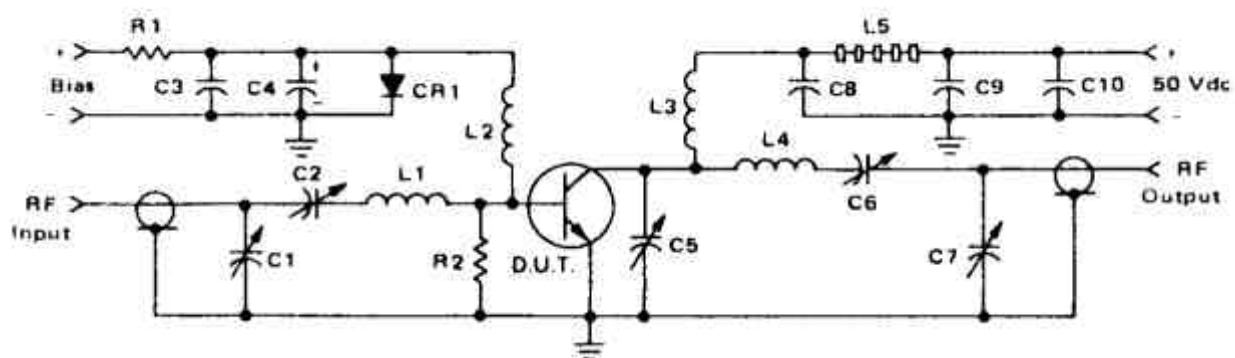
Output Capacitance ($V_{CB} = 50\text{ Vdc}$, $I_E = 0$, $f = 1.0\text{ MHz}$)	C_{OB}	—	220	250	pF
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FUNCTIONAL TESTS

Common-Emitter Amplifier Gain ($V_{CC} = 50\text{ Vdc}$, $P_{OUT} = 150\text{ W (PEP)}$, $I_C(\text{max}) = 3.32\text{ Adc}$, $f = 30\text{ MHz}$)	G_{PE}	13	15	—	dB
Output Power ($V_{CE} = 50\text{ Vdc}$, $f = 30\text{ MHz}$)	P_{OUT}	150	—	—	W (PEP)
Collector Efficiency ($V_{CC} = 50\text{ Vdc}$, $P_{OUT} = 150\text{ W (PEP)}$, $I_C(\text{max}) = 3.32\text{ Adc}$, $f = 30\text{ MHz}$)	η	45	—	—	%
Intermodulation Distortion (1) ($V_{CE} = 50\text{ Vdc}$, $P_{OUT} = 150\text{ W (PEP)}$, $I_C = 3.32\text{ Adc}$)	IMD	—	-33	-30	dB
Electrical Ruggedness ($V_{CC} = 50\text{ Vdc}$, $P_{OUT} = 150\text{ W (PEP)}$, $I_C(\text{max}) = 3.32\text{ Adc}$, VSWR 30:1 at all Phase Angles)	Ψ	No Degradation in Output Power			

NOTE:

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



C1,C2,C7 — 170-780 pF, Arco 469
C3,C8,C9 — 0.1 μ F, 100 V Erie
C4 — 500 μ F @ 6.0 V
C5 — 9.0-180 pF, Arco 463
C6 — 80-480 pF, Arco 466
C10 — 30 μ F, 100 V
R1 — 10 Ω , 10 Watt

R2 — 10 Ω , 1.0 Watt
CR1 — 1N4997
L1 — 3 Turns, #16 Wire, 5/16" I.D., 5/16" Long
L2 — 10 μ 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

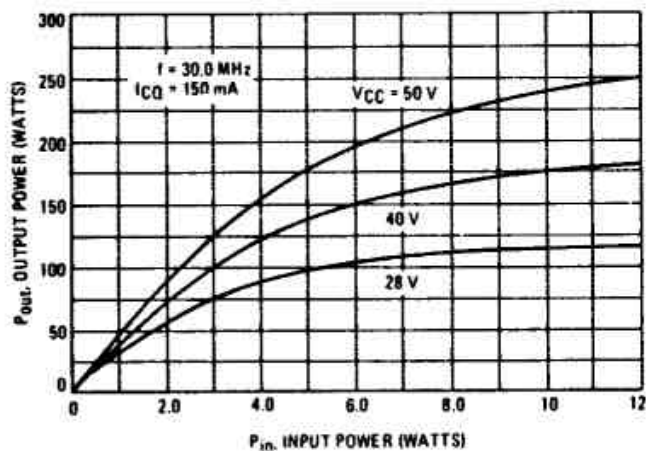


FIGURE 3 – OUTPUT POWER versus SUPPLY VOLTAGE

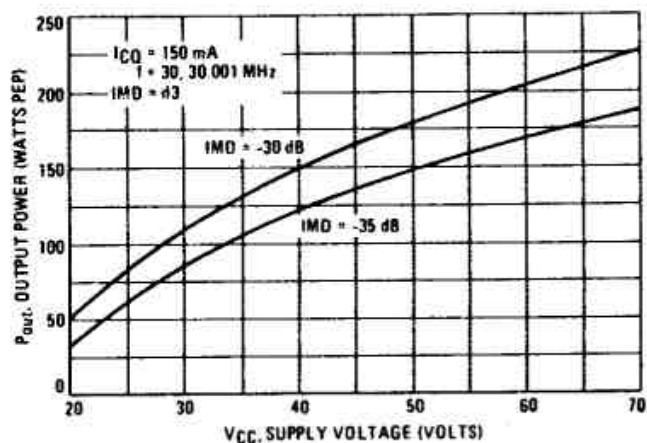


FIGURE 4 – POWER GAIN versus FREQUENCY

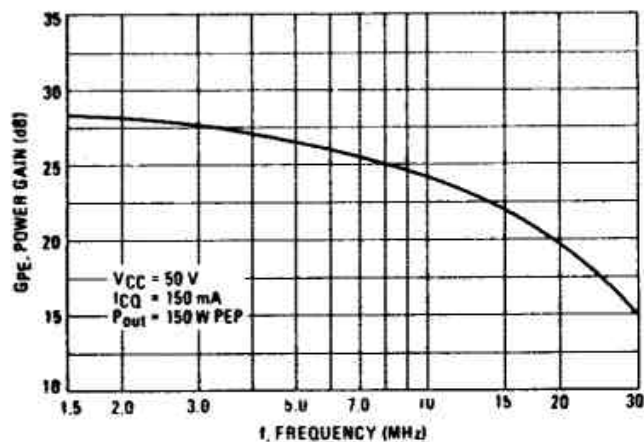
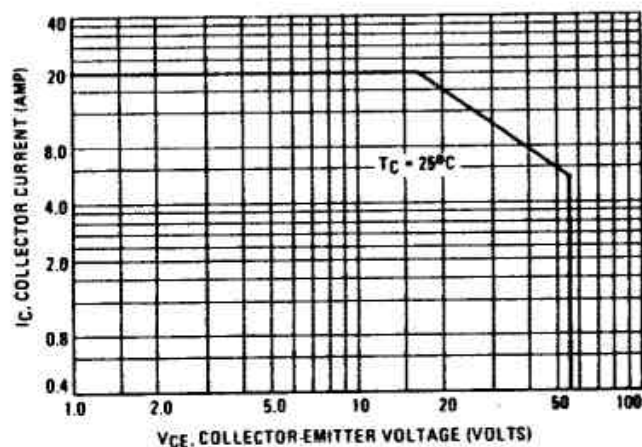


FIGURE 5 – DC SAFE OPERATING AREA



INTERMODULATION DISTORTION versus OUTPUT POWER

FIGURE 6 – $V_{CC} = 40\text{ Vdc}$

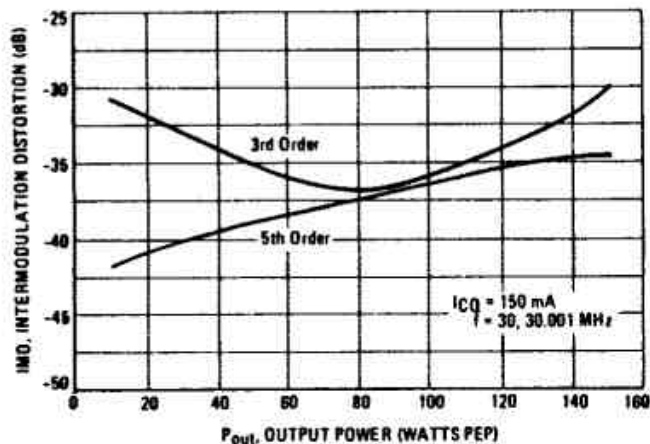


FIGURE 7 – $V_{CC} = 50\text{ Vdc}$

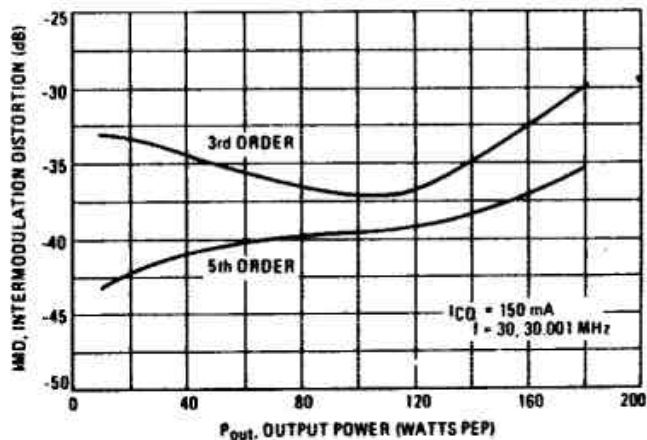


FIGURE 8 – OUTPUT CAPACITANCE versus FREQUENCY

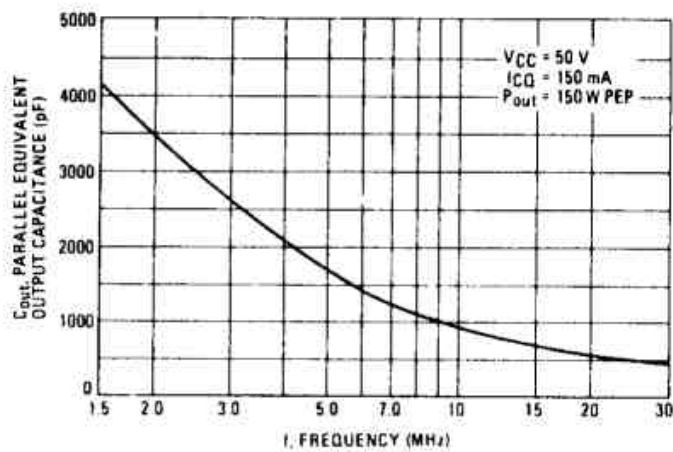


FIGURE 9 – OUTPUT RESISTANCE versus FREQUENCY

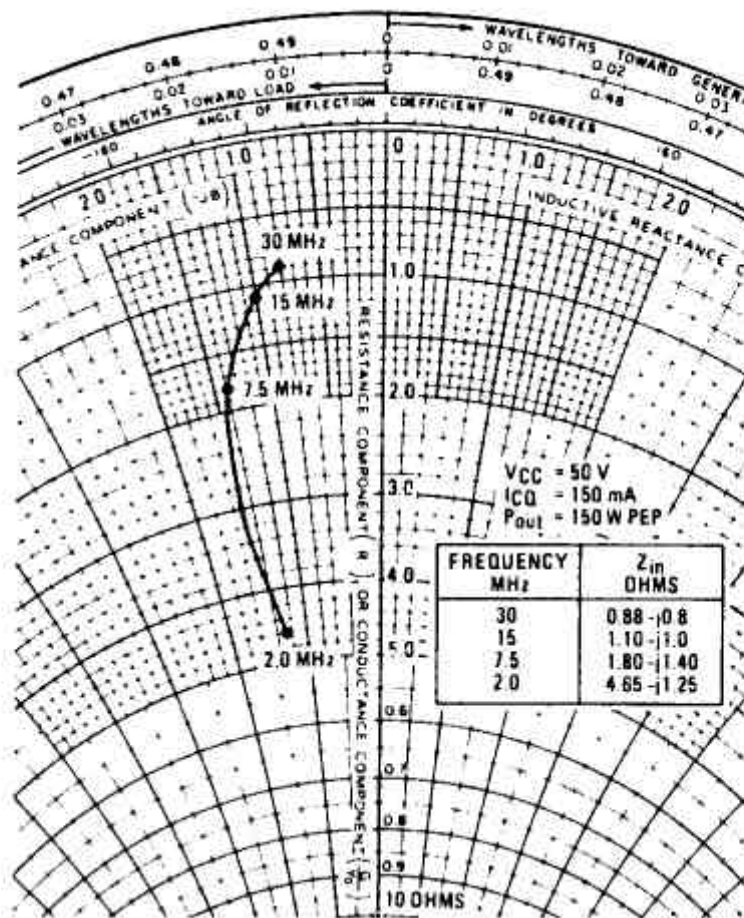
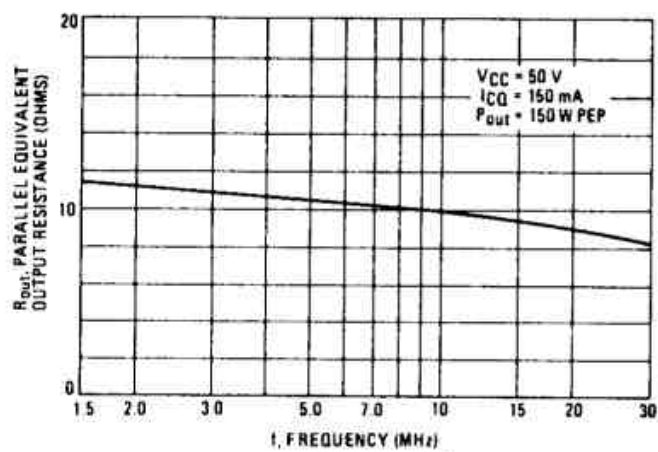
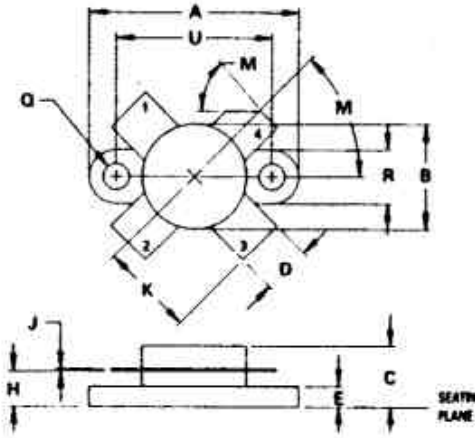


Figure 10. Series Equivalent Impedance

PACKAGE DIMENSIONS

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

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

Case 211-11

Specifications subject to change without notice.

- North America: Tel. (800) 366-2266,
- Asia/Pacific: Tel.+81-44-844-8296, Fax +81-44-844-8298
- Europe: Tel. +44 (1344) 869 595, Fax+44 (1344) 300 020

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