MOTOROLA

MRF428A

The RF Line

150 W (PEP) – 30 MHz

RF POWER TRANSISTOR

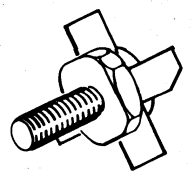
NPN SILICON

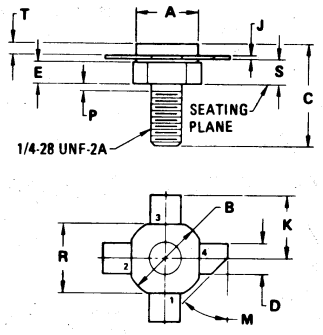
4

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 = -30 dB (Max)
- 100% Tested for Load Mismatch at all Phase Angles with 30:1 VSWR





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

DIM	MILLIMETERS MIN	MILLIMETERS MAX	INCHES MIN	INCHES MAX
A	12.45	12.95	0.490	0.510
B	15.62	16.13	0.615	0.635
C	18.92	21.46	0.745	0.845
D	6.10	6.60	0.240	0.260
E	4.06	4.57	0.160	0.180
J	0.08	0.18	0.003	0.007
K	12.32	13.08	0.485	0.515
M	45° NOM		45° NOM	
P	–	1.27	–	0.050
R	13.72	14.22	0.540	0.560
S	4.83	5.33	0.190	0.210
T	2.03	2.54	0.080	0.100

CASE 307-01

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 @ $T_C = 25^oC$ Derate above 25^oC	P_D	320 1.83	Watts $W/^oC$
Storage Temperature Range	T_{stg}	-65 to +200	^oC

THERMAL CHARACTERISTICS

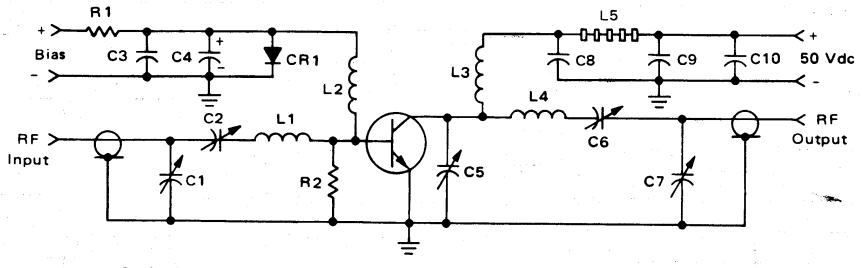
Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$	0.5	$^oC/W$

ELECTRICAL CHARACTERISTICS (T_C = 25°C unless otherwise noted.)

Characteristic	Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS					
Collector-Emitter Breakdown Voltage (I_C = 200 mAdc, I_B = 0)	BV_{CEO}	55	–	–	Vdc
Collector-Emitter Breakdown Voltage (I_C = 100 mAdc, V_{BE} = 0)	BV_{CES}	110	–	–	Vdc
Collector-Base Breakdown Voltage (I_C = 100 mAdc, I_E = 0)	BV_{CBO}	110	–	–	Vdc
Emitter-Base Breakdown Voltage (I_E = 10 mAdc, I_C = 0)	BV_{EBO}	4.0	–	–	Vdc
ON CHARACTERISTICS					
DC Current Gain (I_C = 5.0 mAdc, V_{CE} = 5.0 Vdc)	h_{FE}	10	30	–	–
DYNAMIC CHARACTERISTICS					
Output Capacitance (V_{CB} = 50 Vdc, I_E = 0, f = 1.0 MHz)	C_{ob}	–	200	250	pF
FUNCTIONAL TESTS					
Common-Emitter Amplifier Gain (V_{CC} = 50 Vdc, P_{out} = 150 W (PEP) I_C(max) = 3.32 Adc, f = 30 MHz)	G_{PE}	13	15	–	dB
Output Power (V_{CE} = 50 Vdc, f = 30 MHz)	P_{out}	150	–	–	W PEP
Collector Efficiency (V_{CC} = 50 Vdc, P_{out} = 150 W (PEP), I_C(max) = 3.32 Adc, f = 30 MHz)	η	45	–	–	%
Intermodulation Distortion (1) (V_{CE} = 50 Vdc, P_{out} = 150 W (PEP), I_C = 3.32 Adc)	IMD	–	-33	-30	dB
Electrical Ruggedness (V_{CC} = 50 Vdc, P_{out} = 150 W (PEP), I_C(max) = 3.32 Adc, f = 30 MHz) VSWR 30:1 at all Phase Angles	No Degradation in Output Power				

(1) To Mil Std 1311 Version A, Test Method 2204B, Two Tone, Reference Each Tone.

FIGURE 1 – 30 MHz TEST CIRCUIT SCHEMATIC



C1,C2,C7	170-780 pF, ARCO 469	R2	10 Ω, 1 Watt
C3,C8,C9	0.1 μF, 100 V ERIE	CR1	1N4997
C4	500 μF @ 6 V	L1	3 Turns, #16 Wire, 5/16" I.D., 5/16" Long
C5	9.0-180 pF, ARCO 463	L2	10 μH Molded Choke
C6	80-480 pF, ARCO 466	L3	12 Turns, #16 Enamaled Wire Closewound, 1/4" I.D.
C10	30 μF, 100 V	L4	5 Turns, 1/8" Copper Tubing, 9/16" I.D., 3/4" Long
R1	10 Ω, 10 Watt	L5	10 Ferrite Beads – FERROXCUBE #56-590-65/3B

FIGURE 2 – OUTPUT POWER versus INPUT POWER

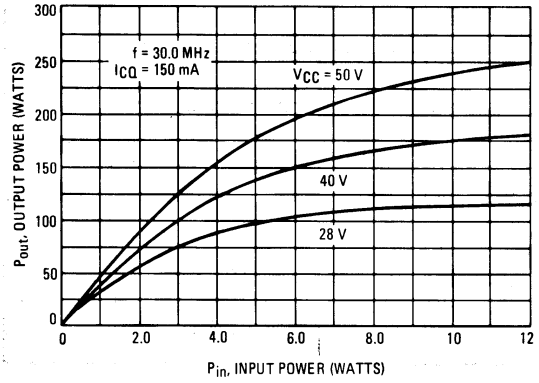


FIGURE 3 – OUTPUT POWER versus SUPPLY VOLTAGE

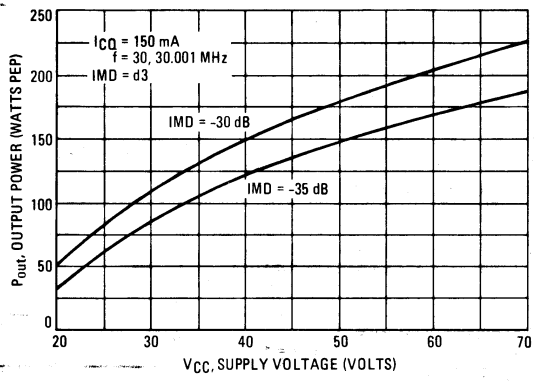


FIGURE 4 – POWER GAIN versus FREQUENCY

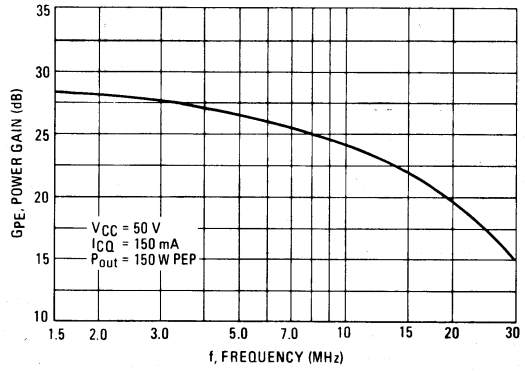
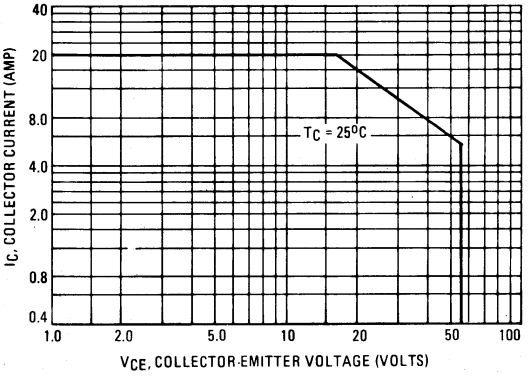


FIGURE 5 – DC SAFE OPERATING AREA



INTERMODULATION DISTORTION versus OUTPUT POWER

FIGURE 6 – V_{CC} = 40 Vdc

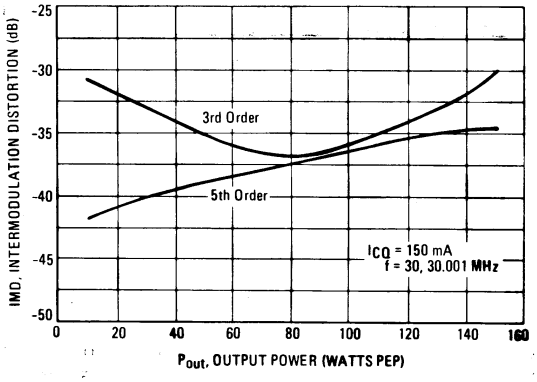


FIGURE 7 – V_{CC} = 50 Vdc

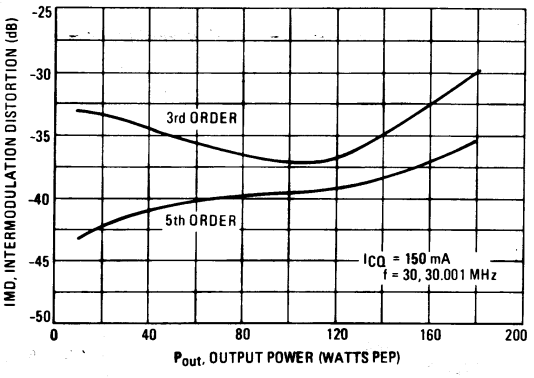


FIGURE 8 – OUTPUT CAPACITANCE versus FREQUENCY

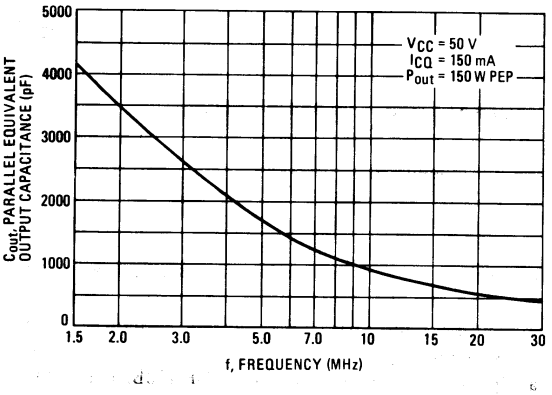


FIGURE 9 – OUTPUT RESISTANCE versus FREQUENCY

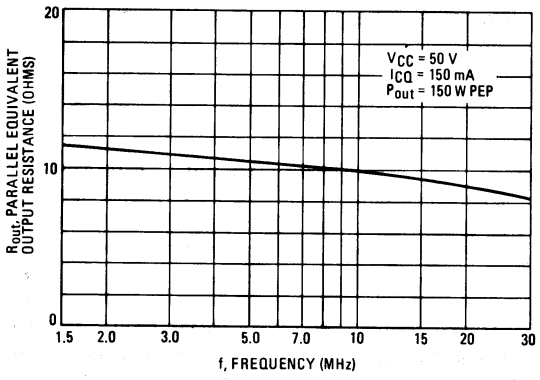
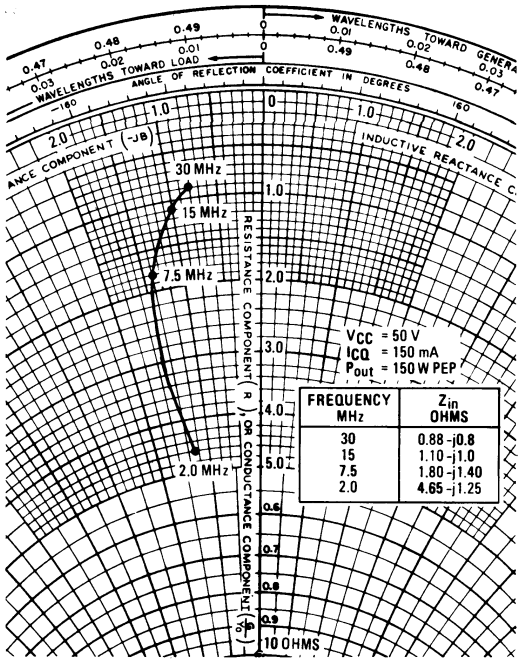


FIGURE 10 – SERIES EQUIVALENT IMPEDANCE



FREQUENCY MHz	Z_{in} OHMS
30	0.88 -j0.8
15	1.10 -j1.0
7.5	1.80 -j1.40
2.0	4.65 -j1.25