MRF410
MRF410A

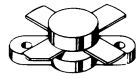
10 W–30 MHz RF POWER TRANSISTORS NPN SILICON

The RF Line

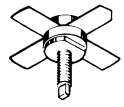
NPN Silicon RF Power Transistors

. . . designed for high gain driver and output linear amplifier stages in 1.5 to 30 MHz HF/SSB equipment.

- Specified 28 Volt, 30 MHz Characteristics —
  Output Power = 10 W
  Minimum Gain = 13 dB
  Efficiency = 40%
- Intermodulation Distortion @ 10 W (PEP) —
  IMD = −30 dB (Max)
- 100% Tested for Load Mismatch at All Phase Angles With 30:1 VSWR
- Direct Replacement for 2N6370



MRF410
CASE 211-07



MRF410A
CASE 145A-09

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MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V_{CEO}	35	Vdc
Collector-Base Voltage	V_{CBO}	65	Vdc
Emitter-Base Voltage	V_{EBO}	4	Vdc
Collector Current — Continuous	I_C	1.5	Adc
Total Device Dissipation @ T_C = 25°C (1) Derate above 25°C	P_D	40 0.23	Watts W/°C
Storage Temperature Range	T_{stg}	−65 to +150	°C
Operating Junction Temperature	T_J	200	°C

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$	4.35	°C/W

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

Characteristic	Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS					
Collector-Emitter Breakdown Voltage (I_C = 20 mAdc, I_B = 0)	$V_{(BR)CEO}$	35	—	—	Vdc
Collector-Base Breakdown Voltage (I_C = 50 mAdc, I_E = 0)	$V_{(BR)CES}$	65	—	—	Vdc
Emitter-Base Breakdown Voltage (I_E = 10 mAdc, I_C = 0)	$V_{(BR)EBO}$	4	—	—	Vdc
Collector Cutoff Current (V_{CE} = 28 Vdc, V_{BE} = 0)	I_{CES}	—	—	5	mAdc
ON CHARACTERISTICS					
DC Current Gain (I_C = 1 Adc, V_{CE} = 5 Vdc)	h_{FE}	10	35	100	—
DYNAMIC CHARACTERISTICS					
Output Capacitance (V_{CB} = 28 Vdc, I_E = 0, f = 1 MHz)	C_{ob}	—	85	100	pF

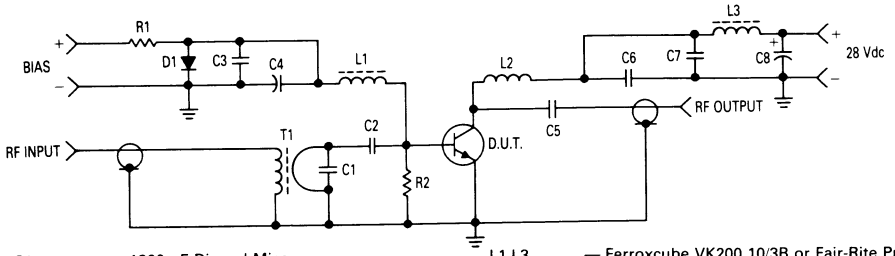
(1) These devices are designed for RF operation. The total device dissipation rating applies only when the devices are operated as RF amplifiers.

(continued)

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

Characteristic	Symbol	Min	Typ	Max	Unit
FUNCTIONAL TESTS (SSB)					
Common-Emitter Amplifier Gain (V_{CC} = 28 Vdc, P_{out} = 10 W (PEP), f1 = 30 MHz, f2 = 30.001 MHz, I_{CQ} = 25 mA)	G_{PE}	13	16	—	dB
Collector Efficiency (V_{CC} = 28 Vdc, P_{out} = 10 W (PEP), f1 = 30 MHz, f2 = 30.001 MHz, I_{CQ} = 25 mA)	η	40	—	—	%
Intermodulation Distortion (1) (V_{CC} = 28 Vdc, P_{out} = 10 W (PEP), f1 = 30 MHz, f2 = 30.001 MHz, I_{CQ} = 25 mA)	$IMD_{(d3)}$	—	−35	−30	dB
Load Mismatch (V_{CC} = 28 Vdc, P_{out} = 10 W (PEP), f1 = 30 MHz, f2 = 30.001 MHz, I_{CQ} = 25 mA, VSWR 30:1 at All Phase Angles)		No Degradation in Output Power			
CLASS A PERFORMANCE					
Power Gain and Intermodulation Distortion (1) (V_{CC} = 28 Vdc, P_{out} = 4 W (PEP), I_{CQ} = 500 mA, f1 = 30 MHz, f2 = 30.001 MHz)	G_{PE} $IMD_{(d3)}$ $IMD_{(d5)}$	— — —	17 40 65	— — —	dB dB dB

(1) To MIL-STD-1311 Version A, Test Method 2204B, Two Tone, Reference each tone.



C1 — 1300 pF Dipped Mica
C2,C3,C5,C6 — 0.1 μF Type 1812 Chip or Equivalent
C4 — 100 μF/16 V Electrolytic
C7 — 0.01 μF Type 1812 Chip or Equivalent
C8 — 10 μF/35 V Electrolytic
R1 — 5 Ohms/5 W
R2 — 10 Ohms/½ W Carbon
D1 — MR820–826 or Equivalent

L1,L3 — Ferroxcube VK200 10/3B or Fair-Rite Products Corporation 2843003102
L2 — 15 Turns #22 AWG Enameled Wire, Close Wound, ¼" ID
T1 — RF Transformer 9:1 Impedance Ratio. See Motorola Application Note AN749, Figure 4 for Details. Ferrite Material: 2 each Fair-Rite Products Corporation 2643006801

Figure 1. 30 MHz Test Circuit

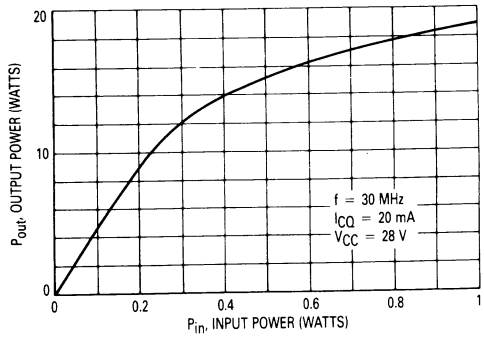


Figure 2. Output Power versus Input Power

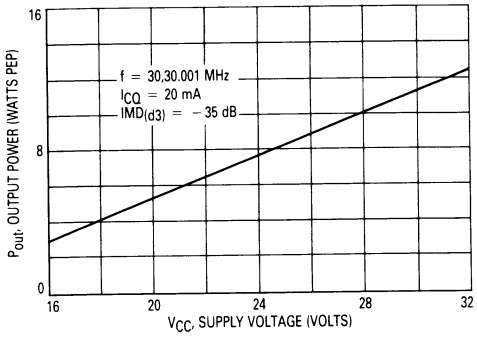


Figure 3. Output Power versus Supply Voltage

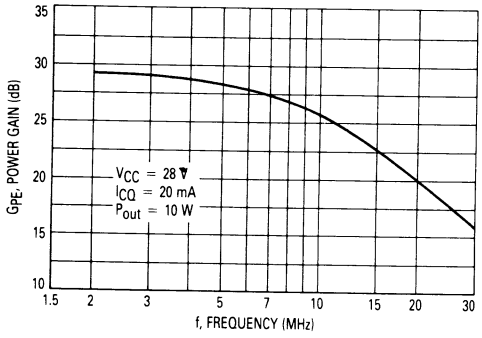


Figure 4. Power Gain versus Frequency

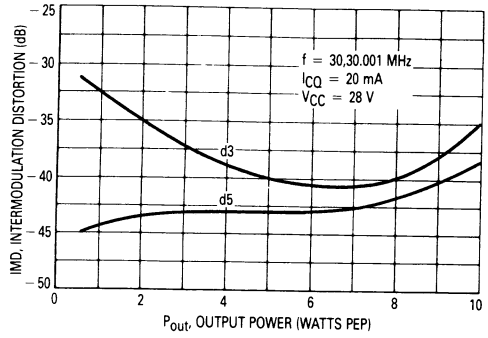


Figure 5. Intermodulation Distortion versus Output Power

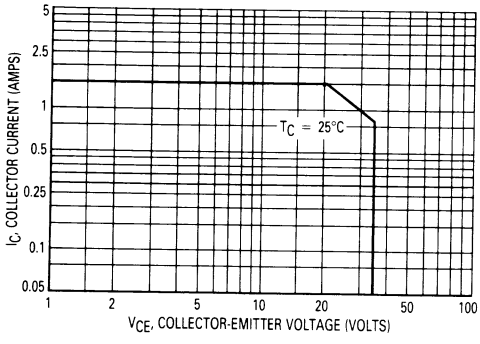


Figure 6. D.C. Safe Operating Area

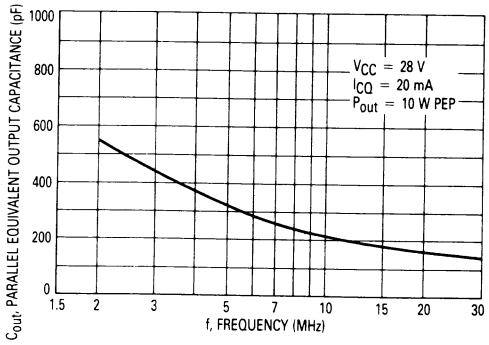


Figure 7. Output Capacitance versus Frequency

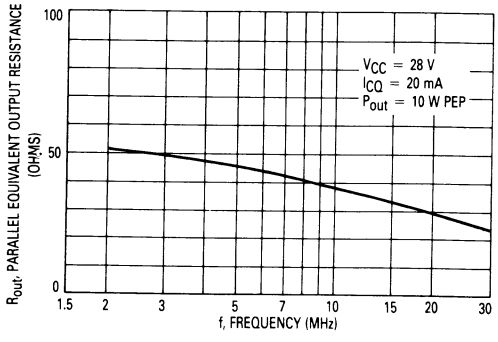


Figure 8. Output Resistance versus Frequency

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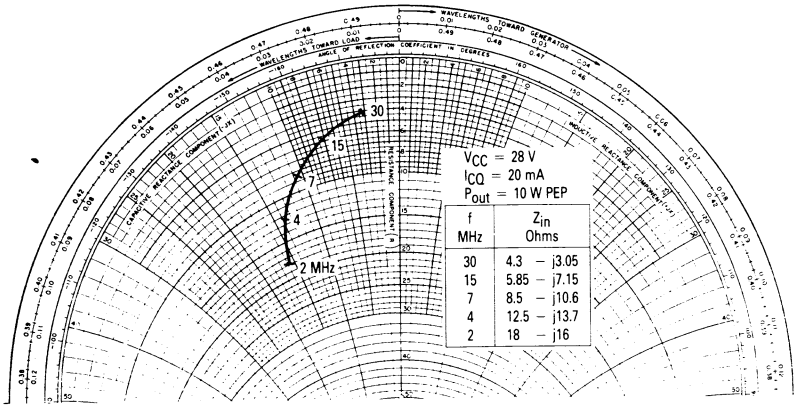
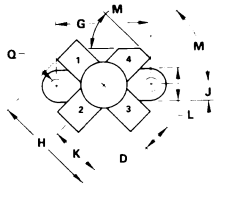
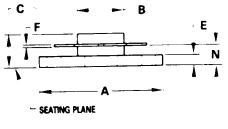


Figure 9. Series Equivalent Input Impedance

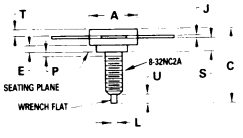
OUTLINE DIMENSIONS

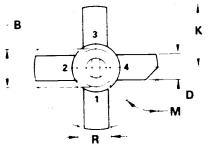




DIM	MILLIMETERS MIN	MAX	INCHES MIN	MAX
A	24.38	25.15	0.960	0.990
B	9.40	9.91	0.370	0.390
C	5.82	7.14	0.229	0.281
D	5.46	5.97	0.215	0.235
E	2.16	2.67	0.085	0.105
F	0.10	0.15	0.004	0.006
G	18.29	18.54	0.720	0.730
H	20.07	20.57	0.790	0.810
K	10.03	10.29	0.395	0.405
L	6.22	6.48	0.245	0.255
M	40°	50°	40°	50°
N	3.81	4.57	0.150	0.180
Q	2.87	3.30	0.113	0.130

CASE 211-07





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

DIM	MILLIMETERS MIN	MAX	INCHES MIN	MAX
A	9.40	9.78	0.370	0.385
B	8.13	8.38	0.320	0.330
C	17.02	20.07	0.670	0.790
D	5.46	5.97	0.215	0.235
E	1.78	—	0.070	—
J	0.08	0.18	0.003	0.007
K	12.45	—	0.490	—
L	1.40	1.78	0.055	0.070
M	45° NOM		45° NOM	
P	—	1.27	—	0.050
R	7.59	7.80	0.299	0.307
S	4.01	4.52	0.158	0.178
T	2.11	2.54	0.083	0.100
U	2.49	3.35	0.098	0.132

CASE 145A-09

MRF412

The RF Line

70 W (PEP) — 30 MHz

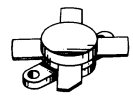
RF POWER TRANSISTOR

NPN SILICON

NPN SILICON RF POWER TRANSISTOR

. . . designed primarily for applications as a high-power amplifier from 2.0 to 30 MHz, in single sideband mobile, marine and base station equipment where superior ruggedness is required.

- Specified 13.6 V, 30 MHz Characteristics —
  Output Power = 70 W PEP or CW
  Minimum Gain = 13 dB
  Efficiency = 40%
  Intermodulation Distortion d_3 = -33 dB Typ
- Guaranteed Ruggedness @ 3.0 dB Overdrive and 15.5 V Supply



MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V_{CEO}	18	Vdc
Collector-Base Voltage	V_{CBO}	36	Vdc
Emitter-Base Voltage	V_{EBO}	4.0	Vdc
Collector-Current — Continuous	I_C	20	Adc
Total Device Dissipation @ T_C = 25°C (1) Derate above 25°C	P_D	250 1.43	Watts mW/°C
Storage Temperature Range	T_{stg}	-65 to +150	°C

THERMAL CHARACTERISTICS

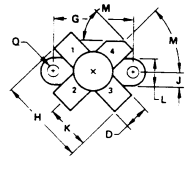
Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case (2)	$R_{\theta JC}$	0.7	°C/W

(1) These devices are designed for RF operation. The total device dissipation rating applies only when the devices are operated as RF amplifiers.
(2) Thermal Resistance is determined under specified RF operating conditions by infrared measurement techniques.

MATCHING PROCEDURE

In the push-pull circuit configuration it is preferred that the transistors are used as matched pairs to obtain optimum performance.

The matching procedure used by Motorola consists of measuring h_{FE} at the data sheet conditions and color coding the device to predetermined h_{FE} ranges within the normal h_{FE} limits. A color dot is added to the marking on top of the cap. Any two devices with the same color dot can be paired together to form a matched set of units.



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

DIM	MILLIMETERS MIN	MILLIMETERS MAX	INCHES MIN	INCHES MAX
A	24.38	25.15	0.960	0.990
B	9.40	9.91	0.370	0.390
C	5.82	7.14	0.229	0.281
D	5.46	5.97	0.215	0.235
E	2.16	2.67	0.085	0.105
F	0.10	0.15	0.004	0.006
G	18.29	18.54	0.720	0.730
H	20.07	20.57	0.790	0.810
K	10.03	10.28	0.395	0.405
L	6.22	6.48	0.245	0.255
M	40°	50°	40°	50°
N	3.81	4.57	0.150	0.180
Q	2.87	3.30	0.113	0.130

CASE 211-11

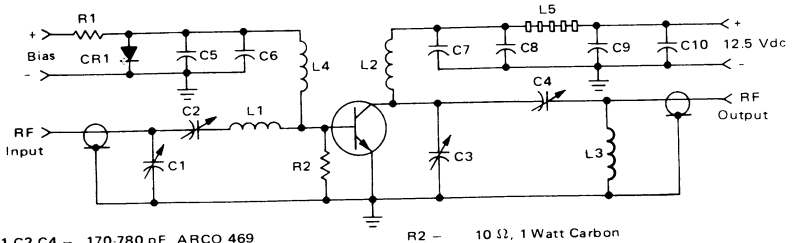
3

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

Characteristic	Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS					
Collector-Emitter Breakdown Voltage (I_C = 100 mAdc, I_B = 0)	$V_{(BR)CEO}$	18	—	—	Vdc
Collector-Emitter Breakdown Voltage (I_C = 50 mAdc, V_{BE} = 0)	$V_{(BR)CES}$	36	—	—	Vdc
Emitter-Base Breakdown Voltage (I_E = 10 mAdc, I_C = 0)	$V_{(BR)EBO}$	4.0	—	—	Vdc
Collector Cutoff Current (V_{CE} = 13.6 Vdc, V_{BE} = 0)	I_{CES}	—	—	20	mAdc
ON CHARACTERISTICS					
DC Current Gain (I_C = 5.0 Adc, V_{CE} = 5.0 Vdc)	h_{FE}	10	—	150	—
DYNAMIC CHARACTERISTICS					
Output Capacitance (V_{CB} = 15 Vdc, I_E = 0, f = 1.0 MHz)	C_{ob}	—	—	450	pF
FUNCTIONAL TESTS (SSB)					
Common-Emitter Amplifier Power Gain (V_{CC} = 13.6 Vdc, P_{out} = 70 W (PEP), f1 = 30 MHz, f2 = 30.001 MHz, I_{CQ} = 100 mA)	G_{PE}	13	16	—	dB
Collector Efficiency (V_{CC} = 13.6 Vdc, P_{out} = 70 W (PEP), f1 = 30 MHz, f2 = 30.001 MHz, I_{CQ} = 100 mA)	η	40	—	—	%
Intermodulation Distortion (1) (PEP) (V_{CC} = 13.6 Vdc, P_{out} = 70 W (PEP), f1 = 30 MHz, f2 = 30.001 MHz, I_{CQ} = 100 mA)	$IMD_{(d3)}$	—	-33	-28	dB
Load Mismatch (V_{CC} = 15.5 Vdc, P_{in} = 7.0 W (CW), f = 30 MHz, VSWR = 30:1 All Angles)	ψ	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



C1,C2,C4 — 170-780 pF, ARCO 469
C3 — 80-480 pF, ARCO 466
C5,C7,C10 — ERIE 0.1 μF, 100 V
C6 — MALLORY 500 μF @ 15 V Electrolytic
C9 — 100 μF, 15 V Electrolytic
C8 — 1000 pF, 350 V UNDERWOOD
R1 — 10 Ω, 25 Watt Wirewound
R2 — 10 Ω, 1 Watt Carbon
CR1 — IN4997
L1 — 3 Turns, #16 Wire, 5/16" I.D., 5/16" Long
L2 — 12 Turns, #16 Enamaled Wire Closewound, 1/4" I.D.
L3 — 1 3/4 Turns, 1/8" Tubing, 3/8" I.D., 3/8" Long
L4 — 10 μH Molded Choke
L5 — 10 Ferrite Beads - FERROXCUBE #56-590-65/3B

FIGURE 2 – OUTPUT POWER versus INPUT POWER

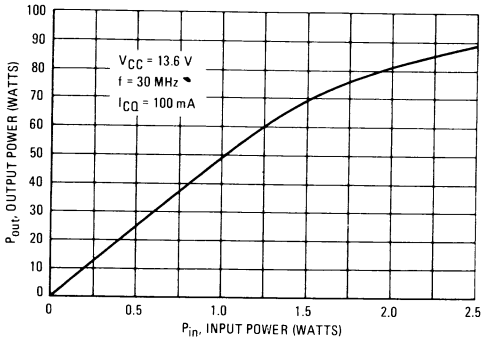


FIGURE 3 – POWER GAIN versus FREQUENCY

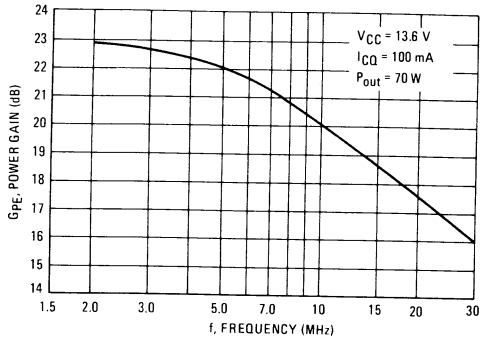


FIGURE 4 – OUTPUT POWER versus SUPPLY VOLTAGE

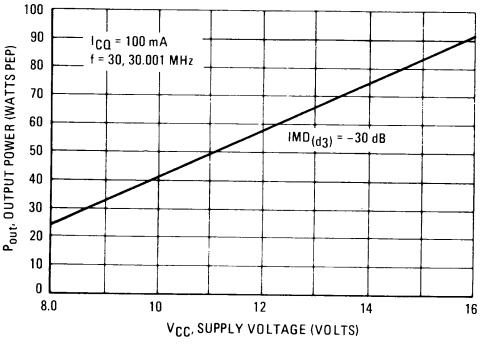


FIGURE 5 – INTERMODULATION DISTORTION versus OUTPUT POWER

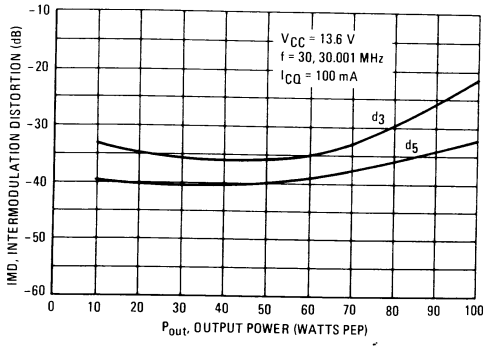


FIGURE 6 – OUTPUT CAPACITANCE versus FREQUENCY

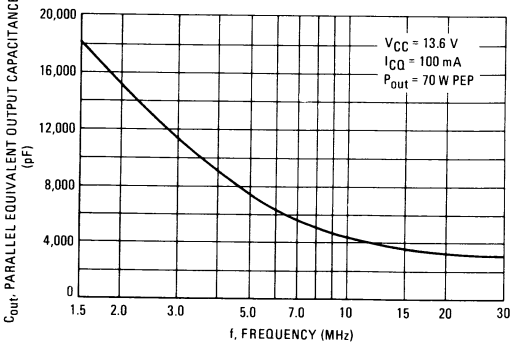


FIGURE 7 – OUTPUT RESISTANCE versus FREQUENCY

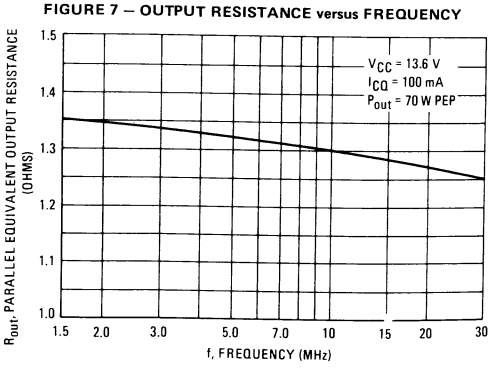


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FIGURE 8 – SAFE OPERATING AREA

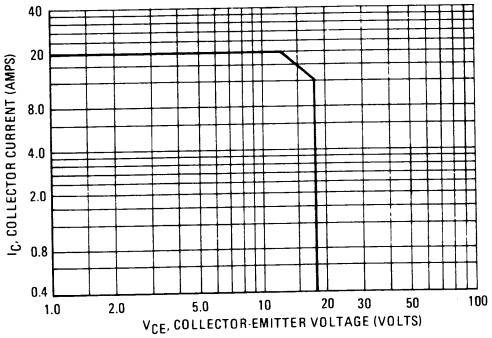
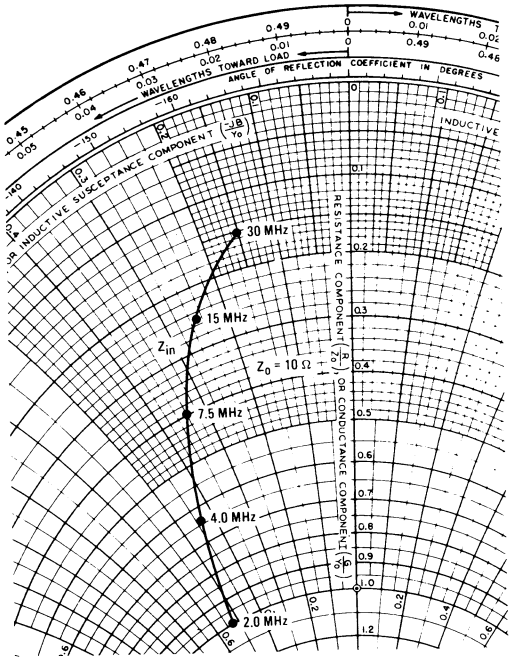


FIGURE 9 – SERIES INPUT IMPEDANCE



V_{CC} = 13.6 V
I_{CQ} = 100 mA
P_{out} = 70 W PEP

f MHz	Z_{in} Ohms
30	1.5 – j1.5
15	2.4 – j2.6
7.5	4.0 – j3.4
4.0	6.3 – j4.6
2.0	9.9 – j5.3

MRF421
MRF421MP

The RF Line

100 W(PEP) – 30 MHz

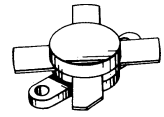
RF POWER TRANSISTORS

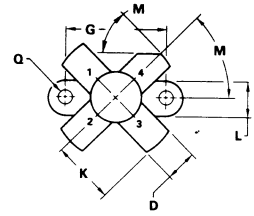
NPN SILICON

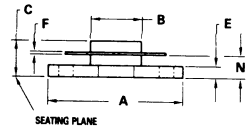
NPN SILICON RF POWER TRANSISTOR

. . . designed primarily for application as a high-power linear amplifier from 2.0 to 30 MHz.

- Specified 12.5 Volt, 30 MHz Characteristics –
  Output Power = 100 W(PEP)
  Minimum Gain = 10 dB
  Efficiency = 40%
- Intermodulation Distortion @ 100 W (PEP) –
  IMD = -30 dB (Min)
- 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	MAX	INCHES MIN	MAX
A	24.38	25.15	0.960	0.990
B	11.81	12.95	0.465	0.510
C	5.82	6.98	0.229	0.275
D	5.46	5.97	0.216	0.235
E	2.13	2.79	0.084	0.110
F	0.08	0.18	0.003	0.007
G	18.29	18.54	0.720	0.730
K	11.05	—	0.435	—
L	6.22	6.48	0.246	0.255
M	45° NOM		45° NOM	
N	3.66	4.52	0.144	0.178
Q	2.92	3.30	0.115	0.130

CASE 211-11

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V_{CEO}	20	Vdc
Collector-Base Voltage	V_{CBO}	45	Vdc
Emitter-Base Voltage	V_{EBO}	3.0	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	290 1.66	Watts $W/^oC$
Storage Temperature Range	T_{stg}	–65 to +150	^oC

MRF421MP is for ordering an h_{FE} matched pair.

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$	0.6	$^oC/W$

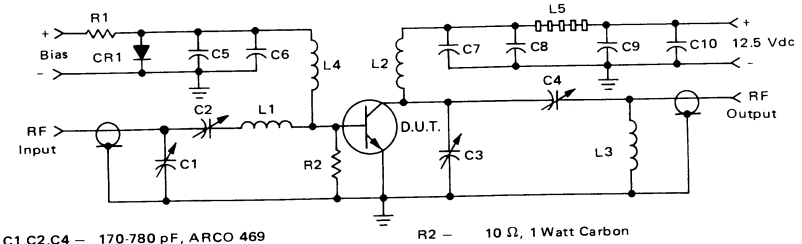
3

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

Characteristic	Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS					
Collector-Emitter Breakdown Voltage (I_C = 50 mAdc, I_B = 0)	$V_{(BR)CEO}$	20	–	–	Vdc
Collector-Emitter Breakdown Voltage (I_C = 200 mAdc, V_{BE} = 0)	$V_{(BR)CES}$	45	–	–	Vdc
Collector-Base Breakdown Voltage (I_C = 200 mAdc, I_E = 0)	$V_{(BR)CBO}$	45	–	–	Vdc
Emitter-Base Breakdown Voltage (I_E = 10 mAdc, I_C = 0)	$V_{(BR)EBO}$	3.0	–	–	Vdc
Collector Cutoff Current (V_{CE} = 16 Vdc, V_{BE} = 0, T_C = 25°C)	I_{CES}	–	–	10	mAdc
ON CHARACTERISTICS					
DC Current Gain (I_C = 5.0 Adc, V_{CE} = 5.0 Vdc)	h_{FE}	10	30	–	–
DYNAMIC CHARACTERISTICS					
Output Capacitance (V_{CB} = 12.5 Vdc, I_E = 0, f = 1.0 MHz)	C_{ob}	—	650	800	pF
FUNCTIONAL TESTS					
Common-Emitter Amplifier Power Gain (V_{CC} = 12.5 Vdc, P_{out} = 100 W, $I_{C(max)}$ = 10 Adc, I_{CQ} = 150 mAdc, f = 30, 30.001 MHz)	G_{PE}	10	12	–	dB
Collector Efficiency (V_{CC} = 12.5 Vdc, P_{out} = 100 W, $I_{C(max)}$ = 10 Adc, I_{CQ} = 150 mA, f = 30, 30.001 MHz)	η	40	–	–	%
Intermodulation Distortion (1) (V_{CE} = 12.5 Vdc, P_{out} = 100 Watts, I_C = 10 Adc, I_{CQ} = 150 mA, f = 30, 30.001 MHz)	IMD	–	-33	-30	dB

(1) To proposed EIA measurement technique.

FIGURE 1 – 30 MHz TEST CIRCUIT SCHEMATIC



C1,C2,C4 – 170-780 pF, ARCO 469
C3 – 80-480 pF, ARCO 466
C5,C7,C10 – ERIE 0.1 μF, 100 V
C6 – MALLORY 500 μF @ 15 V Electrolytic
C9 – 100 μF, 15 V Electrolytic
C8 – 1000 pF, 350 V UNDERWOOD
R1 – 10 Ω, 25 Watt Wirewound
R2 – 10 Ω, 1 Watt Carbon
CR1 – IN4997
L1 – 3 Turns, #16 Wire, 5/16" I.D., 5/16" Long
L2 – 12 Turns, #16 Enamaled Wire Closewound, 1/4" I.D.
L3 – 1 3/4 Turns, 1/8" Tubing, 3/8" I.D., 3/8" Long
L4 – 10 μH Molded Choke
L5 – 10 Ferrite Beads - FERROXCUBE #56-590-65/3B

FIGURE 2 – OUTPUT POWER versus INPUT POWER

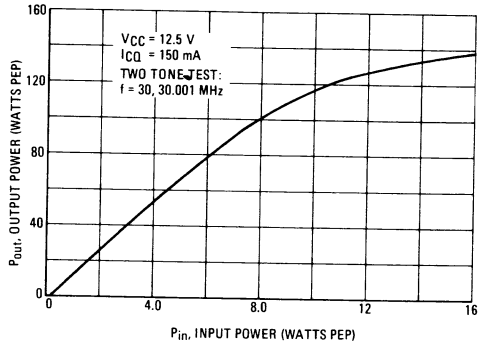


FIGURE 3 – OUTPUT POWER versus SUPPLY VOLTAGE

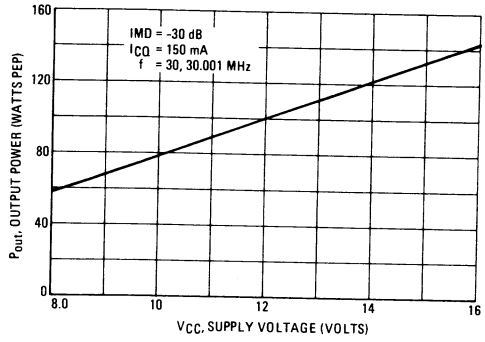


FIGURE 4 – POWER GAIN versus FREQUENCY

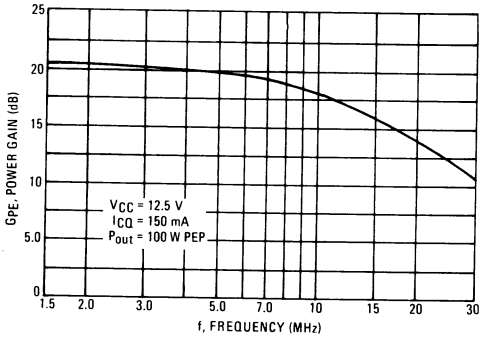


FIGURE 5 – INTERMODULATION DISTORTION versus OUTPUT POWER

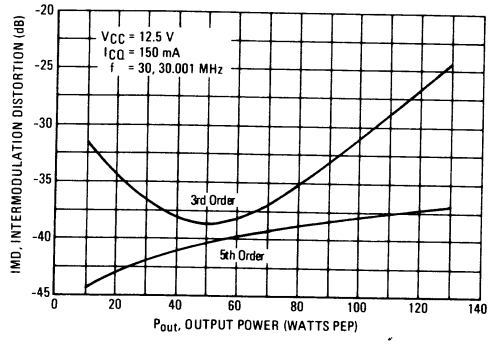


FIGURE 6 – DC SAFE OPERATING AREA

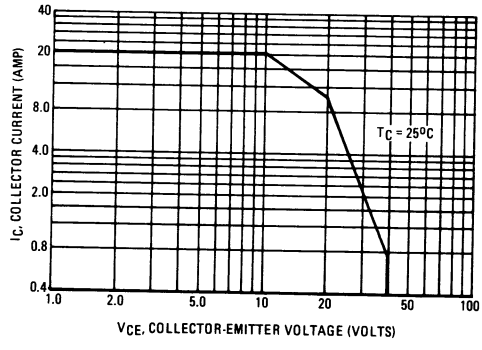
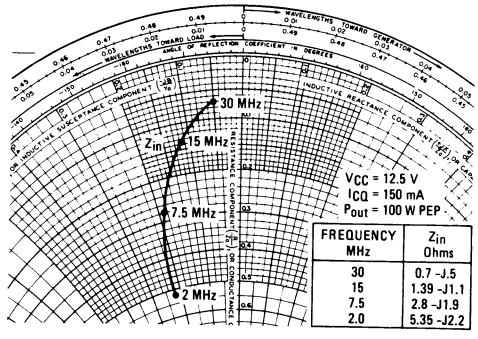


FIGURE 7 – SERIES EQUIVALENT IMPEDANCE



FREQUENCY MHz	Zin Ohms
30	0.7 -J.5
15	1.39 -J1.1
7.5	2.8 -J1.9
2.0	5.35 -J2.2

FIGURE 8 – OUTPUT CAPACITANCE versus FREQUENCY

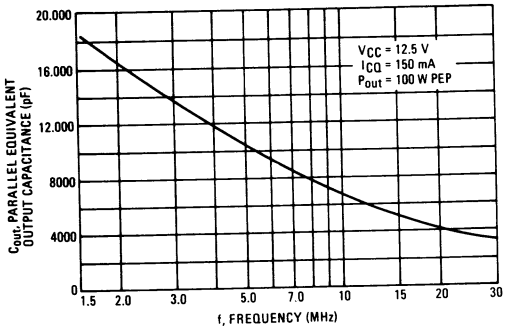
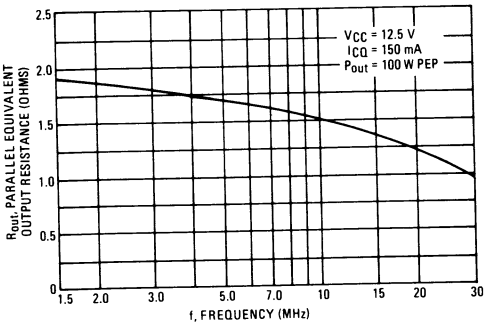


FIGURE 9 – OUTPUT RESISTANCE versus FREQUENCY



3

MRF422
MRF422MP

The RF Line

NPN SILICON RF POWER TRANSISTOR

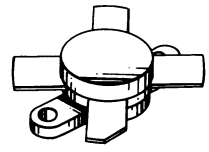
. . . designed primarily for applications as a high-power linear amplifier from 2.0 to 30 MHz.

- Specified 28 Volt, 30 MHz Characteristics –
  Output Power = 150 W(PEP)
  Minimum Gain = 10 dB
  Efficiency = 40%
- Intermodulation Distortion @ 150 W(PEP) –
  IMD = -30 dB (Min)
- 100% Tested for Load Mismatch at all Phase Angles with 30:1 VSWR

150 W(PEP) – 30 MHz

RF POWER TRANSISTOR

NPN SILICON



3

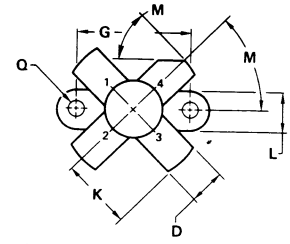
MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V_{CEO}	40	Vdc
Collector-Base Voltage	V_{CBO}	85	Vdc
Emitter-Base Voltage	V_{EBO}	3.0	Vdc
Collector Current – Continuous	I_C	20	Adc
Withstanding Current – 10 s	–	30	Adc
Total Device Dissipation @ T_C = 25°C Derate above 25°C	P_D	290 1.66	Watts W/°C
Storage Temperature Range	T_{stg}	−65 to +150	°C

MRF422MP is for ordering a HFE matched pair.

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$	0.6	°C/W



SEATING PLANE

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

DIM	MILLIMETERS MIN	MILLIMETERS MAX	INCHES MIN	INCHES MAX
A	24.38	25.15	0.960	0.990
B	11.81	12.95	0.465	0.510
C	5.82	6.98	0.229	0.275
D	5.46	5.97	0.216	0.235
E	2.13	2.79	0.084	0.110
F	0.08	0.18	0.003	0.007
G	18.29	18.54	0.720	0.730
K	11.05	–	0.435	–
L	6.22	6.48	0.246	0.255
M	45° NOM		45° NOM	
N	3.66	4.52	0.144	0.178
Q	2.92	3.30	0.115	0.130

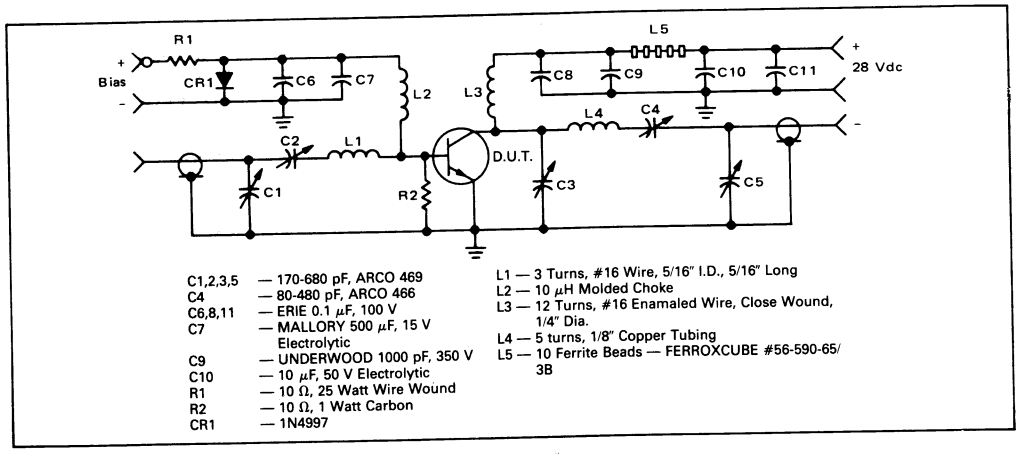
CASE 211-11

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)	$V_{(BR)CEO}$	35	–	–	Vdc
Collector-Emitter Breakdown Voltage (I_C = 100 mAdc, V_{BE} = 0)	$V_{(BR)CES}$	85	–	–	Vdc
Collector-Base Breakdown Voltage (I_C = 100 mAdc, I_E = 0)	$V_{(BR)CBO}$	85	–	–	Vdc
Emitter-Base Breakdown Voltage (I_E = 10 mAdc, I_C = 0)	$V_{(BR)EBO}$	3.0	–	–	Vdc
Collector Cutoff Current (V_{CE} = 28 Vdc, V_{BE} = 0, T_C = 25°C)	I_{CES}	–	–	20	mAdc
ON CHARACTERISTICS					
DC Current Gain (I_C = 5.0 Adc, V_{CE} = 5.0 Vdc)	h_{FE}	10	30	–	–
DYNAMIC CHARACTERISTICS					
Output Capacitance (V_{CB} = 28 Vdc, I_E = 0, f = 1.0 MHz)	C_{ob}	–	420	–	pF
FUNCTIONAL TESTS					
Common-Emitter Amplifier Power Gain (V_{CC} = 28 Vdc, P_{out} = 150 W(PEP), $I_{C(max)}$ = 6.7 Adc, I_{CQ} = 150 mAdc, f = 30, 30.001 MHz)	G_{PE}	10	13	–	dB
Collector Efficiency (V_{CC} = 28 Vdc, P_{out} = 150 W(PEP), $I_{C(max)}$ = 6.7 Adc, I_{CQ} = 150 mAdc, f = 30, 30.001 MHz)	η	–	45	–	%
Intermodulation Distortion * (V_{CE} = 28 Vdc, P_{out} = 150 Watts(PEP), I_C = 6.7 Adc, I_{CQ} = 150 mAdc, f = 30, 30.001 MHz)	IMD	—	-33	-30	dB
Output Power (V_{CE} = 28 Vdc, f = 30 MHz)	P_{out}	150	–	–	Watts PEP

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

FIGURE 1 – 30 MHz TEST CIRCUIT SCHEMATIC



C1,2,3,5 — 170-680 pF, ARCO 469
C4 — 80-480 pF, ARCO 466
C6,8,11 — ERIE 0.1 μF, 100 V
C7 — MALLORY 500 μF, 15 V Electrolytic
C9 — UNDERWOOD 1000 pF, 350 V
C10 — 10 μF, 50 V Electrolytic
R1 — 10 Ω, 25 Watt Wire Wound
R2 — 10 Ω, 1 Watt Carbon
CR1 — 1N4997

L1 — 3 Turns, #16 Wire, 5/16" I.D., 5/16" Long
L2 — 10 μH Molded Choke
L3 — 12 Turns, #16 Enamaled Wire, Close Wound, 1/4" Dia.
L4 — 5 turns, 1/8" Copper Tubing
L5 — 10 Ferrite Beads — FERROXCUBE #56-590-65/3B

FIGURE 2 – OUTPUT POWER versus INPUT POWER

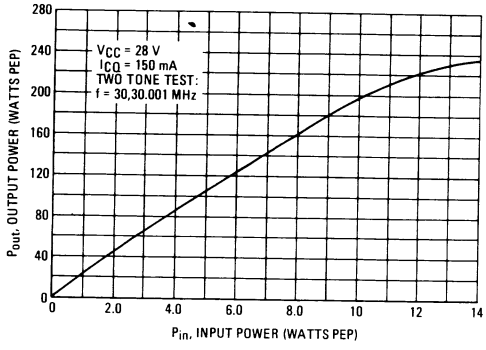


FIGURE 3 – POWER GAIN versus FREQUENCY

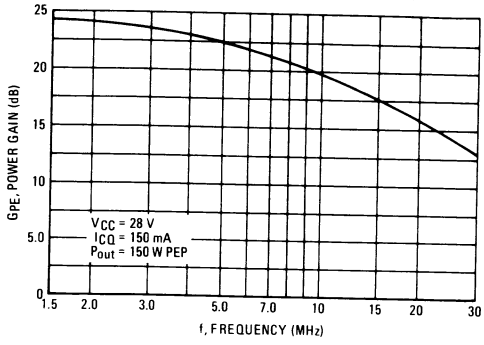


FIGURE 4 – LINEAR OUTPUT POWER versus SUPPLY VOLTAGE

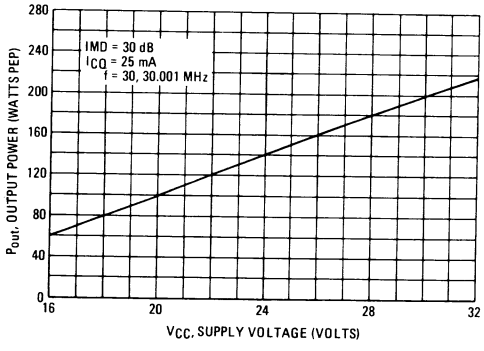


FIGURE 5 – INTERMODULATION DISTORTION versus OUTPUT POWER

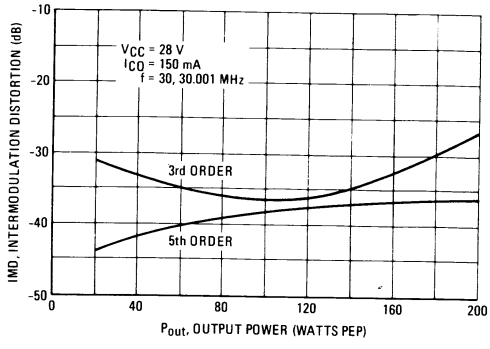


FIGURE 6 – DC SAFE OPERATING AREA

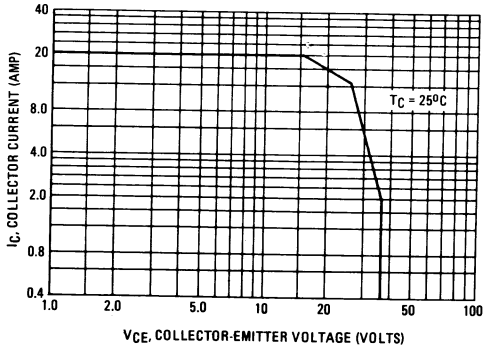
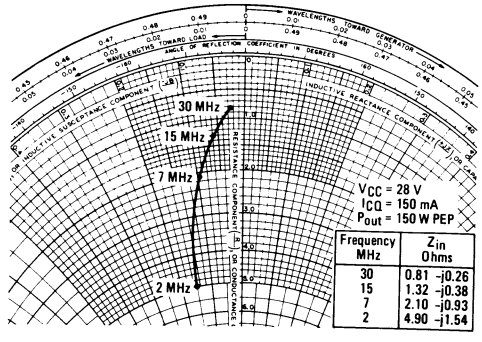


FIGURE 7 – SERIES INPUT IMPEDANCE



Frequency MHz	Z_{in} Ohms
30	0.81 -j0.26
15	1.32 -j0.38
7	2.10 -j0.93
2	4.90 -j1.54

3

FIGURE 8 – OUTPUT RESISTANCE versus FREQUENCY

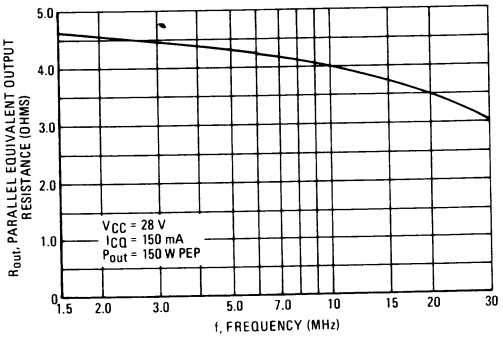
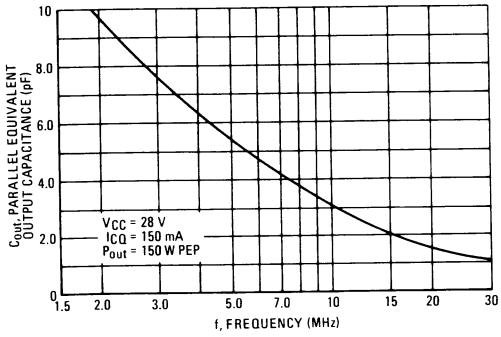


FIGURE 9 – OUTPUT CAPACITANCE versus FREQUENCY



3

MRF426
MRF426A

The RF Line

25 W (PEP) – 30 MHz

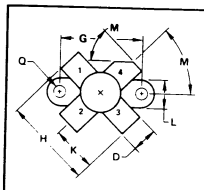
RF POWER TRANSISTOR

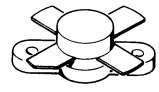
NPN SILICON

NPN SILICON RF POWER TRANSISTOR

. . . designed for high gain driver and output linear amplifier stages in 1.5 to 30 MHz HF/SSB equipment.

- Specified 28 Volt, 30 MHz Characteristics –
  Output Power = 25 W (PEP)
  Minimum Gain = 22 dB
  Efficiency = 35%
- Intermodulation Distortion @ 25 W (PEP) –
  IMD = –30 dB (Max)
- 100% Tested for Load Mismatch at All Phase Angles With 30:1 VSWR
- Class A and AB Characterization
- BLX 13 Equivalent





MRF426

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

DIM	MILLIMETERS MIN	MILLIMETERS MAX	INCHES MIN	INCHES MAX
A	24.64	24.89	0.970	0.980
B	9.40	9.91	0.370	0.390
C	5.82	7.14	0.229	0.281
D	5.46	5.97	0.215	0.235
E	2.16	2.67	0.085	0.105
F	0.10	0.15	0.004	0.006
G	18.29	18.54	0.720	0.730
H	20.07	20.57	0.790	0.810
K	10.03	10.29	0.395	0.405
L	6.22	6.48	0.245	0.255
M	40°	50°	40°	50°
N	3.81	4.57	0.150	0.180
Q	2.87	3.30	0.113	0.130

CASE 211-07

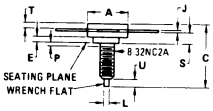
MAXIMUM RATINGS

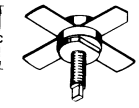
Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V_{CEO}	35	Vdc
Collector-Base Voltage	V_{CBO}	65	Vdc
Emitter-Base Voltage	V_{EBO}	4.0	Vdc
Collector Current – Continuous	I_C	3.0	Adc
Withstand Current – 5 s	–	6.0	Adc
Total Device Dissipation @ T_C = 25°C (1) Derate above 25°C	P_D	70 0.4	Watts W/°C
Storage Temperature Range	T_{stg}	–65 to +150	°C

THERMAL CHARACTERISTICS

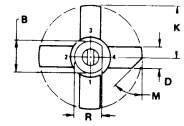
Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$	2.5	°C/W

(1) These devices are designed for RF operation. The total device dissipation rating applies only when the devices are operated as RF amplifiers.





MRF426A



STYLE 1
PIN 1 EMITTER
2 BASE
3 EMITTER
4 COLLECTOR

DIM	MILLIMETERS MIN	MILLIMETERS MAX	INCHES MIN	INCHES MAX
A	9.40	9.78	0.370	0.385
B	8.13	8.38	0.320	0.330
C	17.02	20.07	0.670	0.790
D	5.46	5.97	0.215	0.235
E	1.78	–	0.070	–
J	0.08	0.18	0.003	0.007
K	12.45	–	0.490	–
L	1.40	1.78	0.055	0.070
M	45° NOM		45° NOM	
P	–	1.27	–	0.050
R	7.59	7.80	0.298	0.307
S	4.01	4.52	0.158	0.178
T	2.11	2.54	0.083	0.100
U	2.49	3.35	0.098	0.132

CASE 145A-09

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

Characteristic	Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS					
Collector-Emitter Breakdown Voltage (I_C = 50 mAdc, I_B = 0)	$V_{(BR)CEO}$	35	–	–	Vdc
Collector-Base Breakdown Voltage (I_C = 50 mAdc, I_E = 0)	$V_{(BR)CBO}$	65	–	–	Vdc
Emitter-Base Breakdown Voltage (I_E = 10 mAdc, I_C = 0)	$V_{(BR)EBO}$	4.0	–	–	Vdc
Collector Cutoff Current (V_{CE} = 28 Vdc, V_{BE} = 0)	I_{CES}	–	–	10	mAdc
ON CHARACTERISTICS					
DC Current Gain (I_C = 1.0 Adc, V_{CE} = 5.0 Vdc	h_{FE}	10	35	–	–
DYNAMIC CHARACTERISTICS					
Output Capacitance (V_{CB} = 30 Vdc, I_E = 0, f = 1.0 MHz)	C_{ob}	–	60	80	pF
FUNCTIONAL TESTS (SSB)					
Common-Emitter Amplifier Gain (V_{CC} = 28 Vdc, P_{out} = 25 W (PEP), f1 = 30 MHz, f2 = 30.001 MHz, I_{CQ} = 25 mA)	G_{PE}	22	25	–	dB
Collector Efficiency (V_{CC} = 28 Vdc, P_{out} = 25 W (PEP), f1 = 30 MHz, f2 = 30.001 MHz, I_{CQ} = 25 mA)	η	35	–	–	%
Intermodulation Distortion (1) (V_{CC} = 28 Vdc, P_{out} = 25 W (PEP), f1 = 30 MHz, f2 = 30.001 MHz, I_{CQ} = 25 mA)	IMD(d3)	–	–35	–30	dB
Load Mismatch (V_{CC} = 28 Vdc, P_{out} = 25 W (PEP), f1 = 30 MHz, f2 = 30.001 MHz, I_{CQ} = 25 mA, VSWR 30:1 at All Phase Angles	ψ	No Degradation in Output Power			
CLASS A PERFORMANCE					
Intermodulation Distortion (1) and Power Gain (V_{CC} = 28 Vdc, P_{out} = 8 W (PEP), f1 = 30 MHz, f2 = 30.001 MHz, I_{CQ} = 1.2 Adc)	G_{PE} IMD(d3) IMD(d5)	– – –	23.5 –40 –55	– – –	dB

(1) To MIL-STD-1311 Version A, Test Method 2204B, Two Tone, Reference Each Tone.

FIGURE 1 – 30 MHz LINEAR TEST CIRCUIT

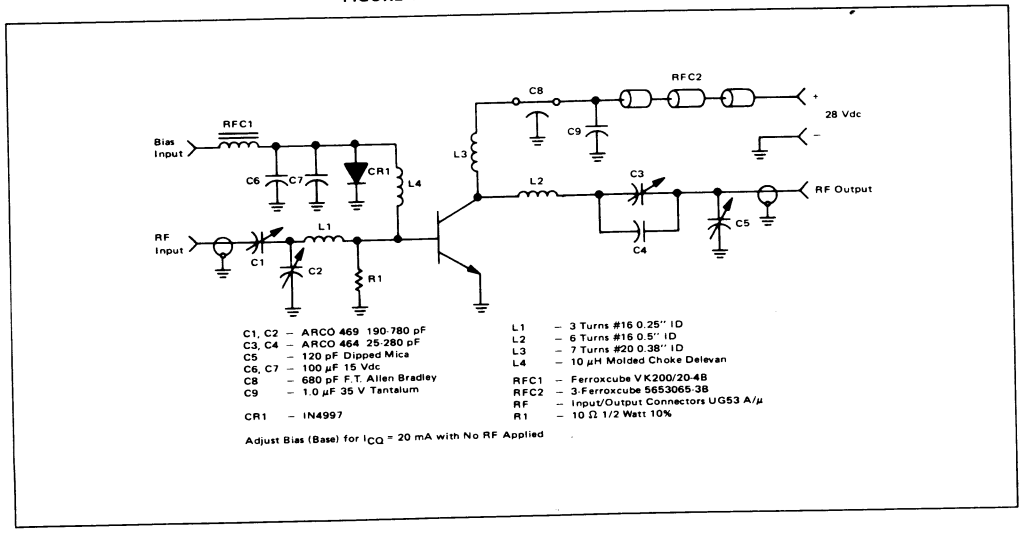


FIGURE 2 – OUTPUT POWER versus INPUT POWER

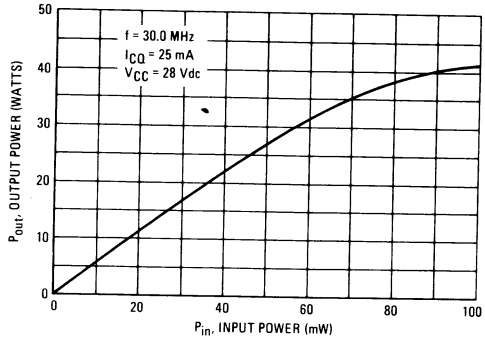


FIGURE 3 – OUTPUT POWER versus SUPPLY VOLTAGE

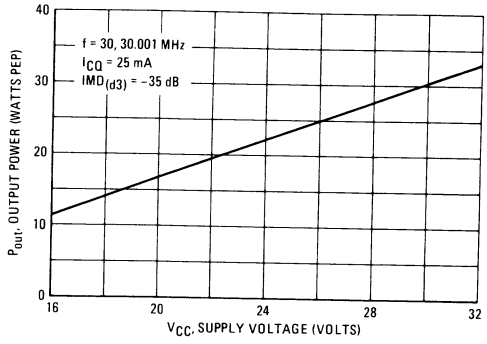


FIGURE 4 – POWER GAIN versus FREQUENCY

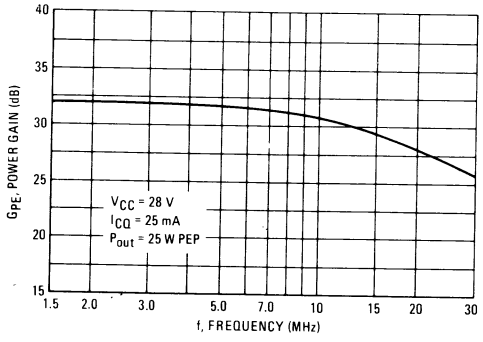


FIGURE 5 – INTERMODULATION DISTORTION versus OUTPUT POWER

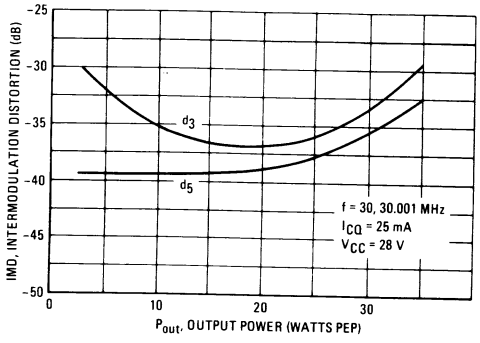


FIGURE 6 – DC SAFE OPERATING AREA

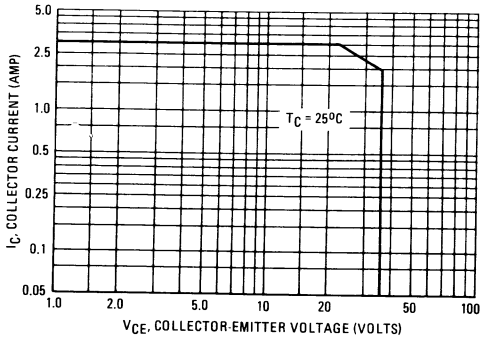


FIGURE 7 – OUTPUT CAPACITANCE versus FREQUENCY

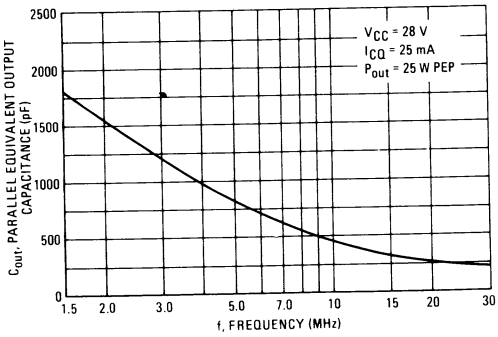


FIGURE 8 – OUTPUT RESISTANCE versus FREQUENCY

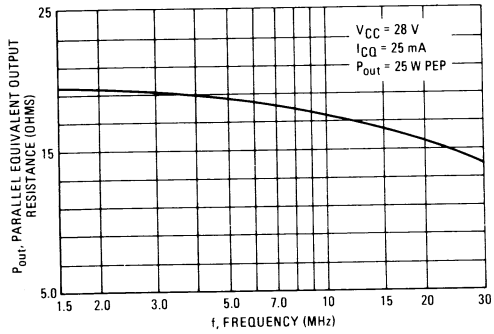
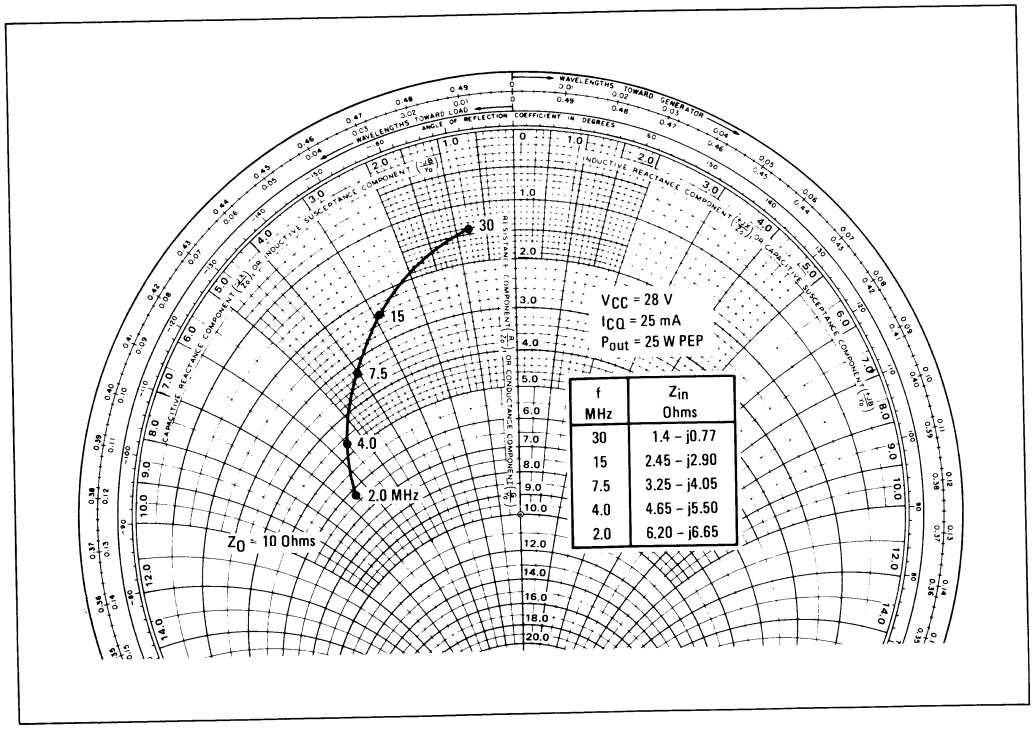


FIGURE 9 – SERIES EQUIVALENT INPUT IMPEDANCE



MRF427
MRF427A

The RF Line

25 W (PEP) – 30 MHz

RF POWER
TRANSISTOR

NPN SILICON

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 = 25 W(PEP)
  Minimum Gain = 18 dB
- Intermodulation Distortion @ 25 W(PEP) –
  IMD = -34 dB (Min)
- 100% Tested for Load Mismatch at all Phase Angles with 30:1 VSWR

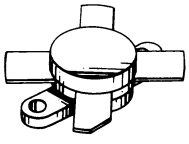
MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V_{CEO}	65	Vdc
Collector-Base Voltage	V_{CBO}	110	Vdc
Emitter-Base Voltage	V_{EBO}	4.0	Vdc
Collector Current – Continuous	I_C	6.0	Adc
Total Device Dissipation @ $T_C = 25^oC$ Derate above 25^oC	P_D	80 0.457	Watts $W/^oC$
Storage Temperature Range	T_{stg}	−65 to +150	^oC

THERMAL CHARACTERISTICS

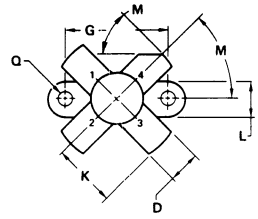
Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$	2.19	$^oC/W$

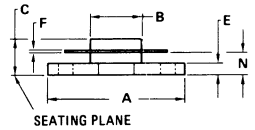
MRF427



CASE 211-11

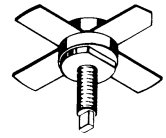
STYLE 1:
PIN 1. EMITTER
2. BASE
3. EMITTER
4. COLLECTOR

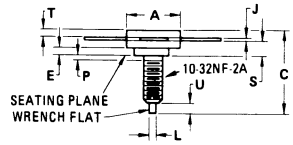


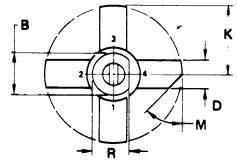


DIM	MILLIMETERS MIN	MAX	INCHES MIN	MAX
A	24.38	25.15	0.960	0.990
B	11.81	12.95	0.465	0.510
C	5.82	6.98	0.229	0.275
D	5.46	5.97	0.216	0.235
E	2.13	2.79	0.084	0.110
F	0.08	0.18	0.003	0.007
G	18.29	18.54	0.720	0.730
K	11.05	–	0.435	–
L	6.22	6.48	0.246	0.255
M	45° NOM		45° NOM	
N	3.66	4.52	0.144	0.178
Q	2.92	3.30	0.115	0.130

MRF427A







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

DIM	MILLIMETERS MIN	MAX	INCHES MIN	MAX
A	12.45	12.95	0.490	0.510
B	10.54	10.80	0.415	0.425
C	19.68	22.73	0.775	0.895
D	5.46	5.97	0.215	0.235
E	1.83	–	0.072	–
J	0.08	0.18	0.003	0.007
K	12.45	–	0.490	–
L	1.65	1.90	0.065	0.075
M	45° NOM		45° NOM	
P	–	1.27	–	0.050
R	9.73	10.06	0.383	0.396
S	3.84	4.50	0.151	0.177
T	2.11	2.54	0.083	0.100
U	2.49	3.35	0.098	0.132

NOTE:
1. 145A-10, USE 10-32NF-2A STUD.

CASE 145A-10

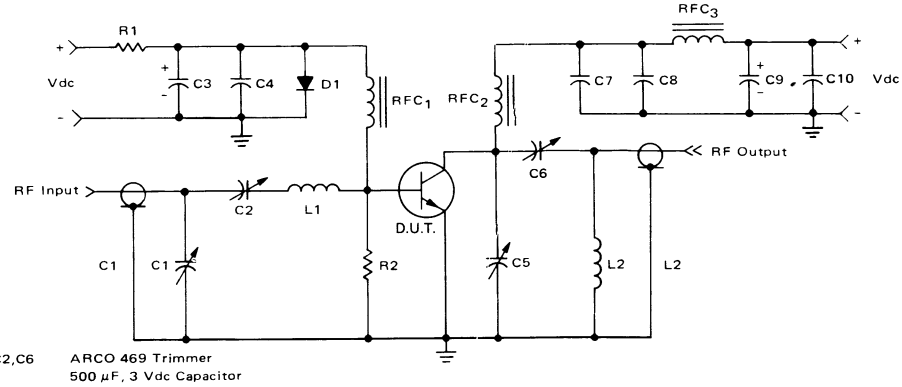
3

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)	$V_{(BR)CEO}$	65	–	–	Vdc
Collector-Emitter Breakdown Voltage (I_C = 100 mAdc, V_{BE} = 0)	$V_{(BR)CES}$	110	–	–	Vdc
Collector-Base Breakdown Voltage (I_C = 100 mAdc, I_E = 0)	$V_{(BR)CBO}$	110	–	–	Vdc
Emitter-Base Breakdown Voltage (I_E = 10 mAdc, I_C = 0)	$V_{(BR)EBO}$	4.0	–	–	Vdc
ON CHARACTERISTICS					
DC Current Gain (I_C = 500 mAdc, V_{CE} = 5.0 Vdc)	h_{FE}	15	–	90	–
DYNAMIC CHARACTERISTICS					
Output Capacitance (V_{CB} = 50 Vdc, I_E = 0, f = 1.0 MHz)	C_{ob}	–	–	60	pF
FUNCTIONAL TESTS					
Common-Emitter Amplifier Power Gain (V_{CC} = 50 Vdc, P_{out} = 25 W(PEP), f = 30 MHz)	G_{pe}	18	20	–	dB
Intermodulation Distortion (V_{CC} = 50 Vdc, P_{out} = 25 W(PEP))	IMD	-34	-37	–	dB
Electrical Ruggedness (V_{CC} = 50 Vdc, P_{out} = 25 W(PEP), f = 30 MHz, VSWR 30:1) All Phase Angles	–	No Degradation in Output Power			

3

FIGURE 1 – 30 MHz TEST CIRCUIT SCHEMATIC



C1,C2,C6	ARCO 469 Trimmer		
C3	500 µF, 3 Vdc Capacitor		
C4,C7,C10	0.1 µF ERIE REDCAP	RFC1	1 µH Molded Choke
C5	ARCO 463 Trimmer	RFC2	20 Turns, #20 AWG, Enameled Wire on 390 Ω, 1 Watt Resistor
C8	1000 pF, UNELCO Capacitor		
C9	47 µF, 50 Vdc Capacitor	RFC3	VK 200-4B FERROXCUBE Choke
R1	20 Ω, 5 Watt Resistor		
R2	10 Ω, ½ Watt Resistor		
L1	0.15 µH Inductor		
L2	0.3 µH Inductor		
D1	1N4997		

FIGURE 2 – OUTPUT POWER versus INPUT POWER

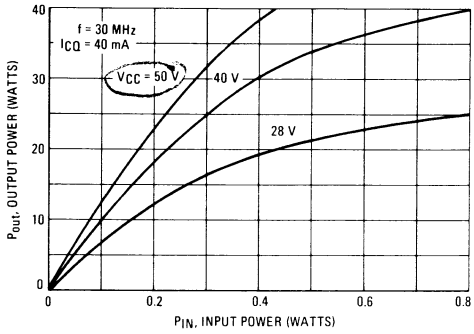


FIGURE 3 – POWER GAIN versus FREQUENCY

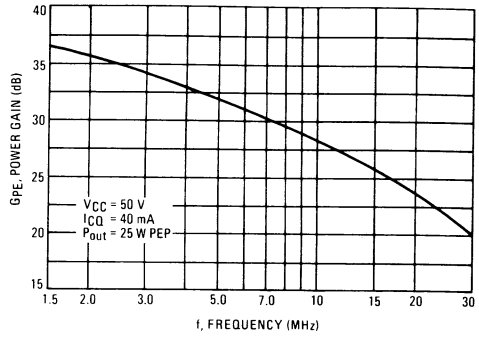


FIGURE 4 – INTERMODULATION DISTORTION versus OUTPUT POWER
VCC = 50 Vdc

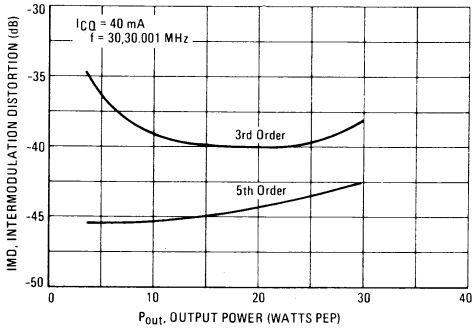


FIGURE 5 – INTERMODULATION DISTORTION versus OUTPUT POWER
VCC = 40 Vdc

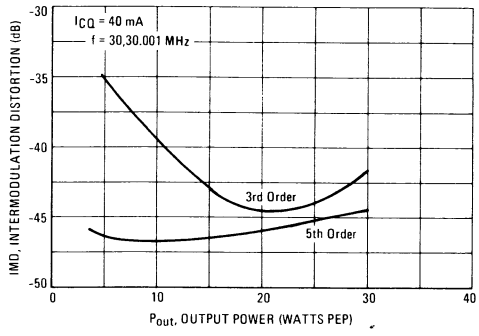


FIGURE 6 – OUTPUT RESISTANCE versus FREQUENCY

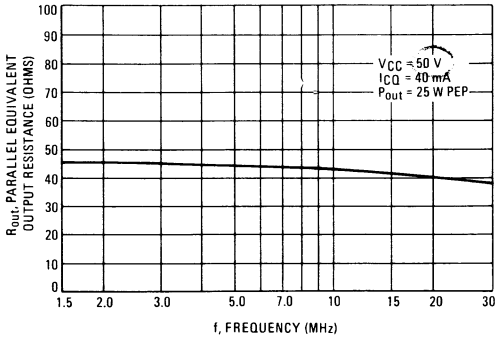


FIGURE 7 – OUTPUT CAPACITANCE versus FREQUENCY

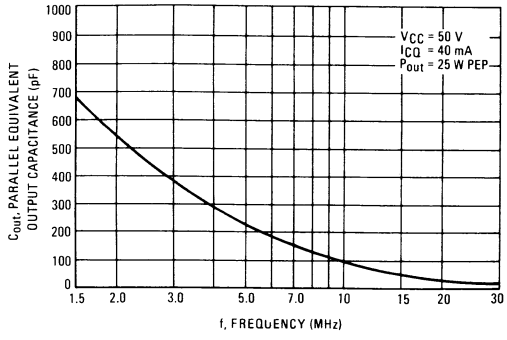


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FIGURE 8 – OUTPUT POWER versus SUPPLY VOLTAGE

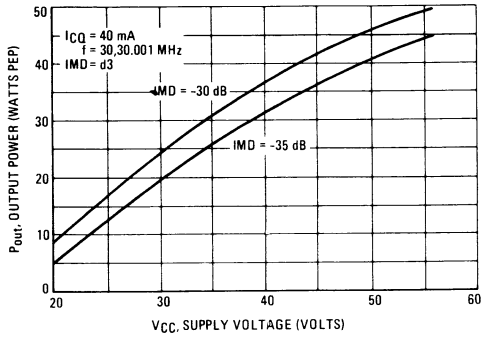


FIGURE 9 – DC SAFE OPERATING AREA

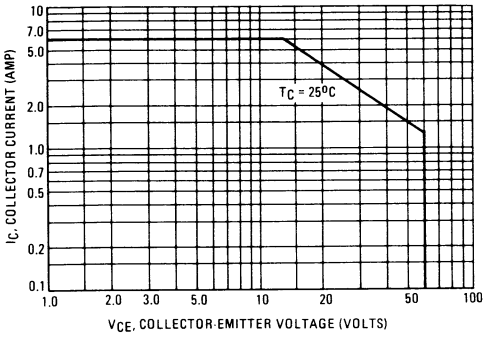
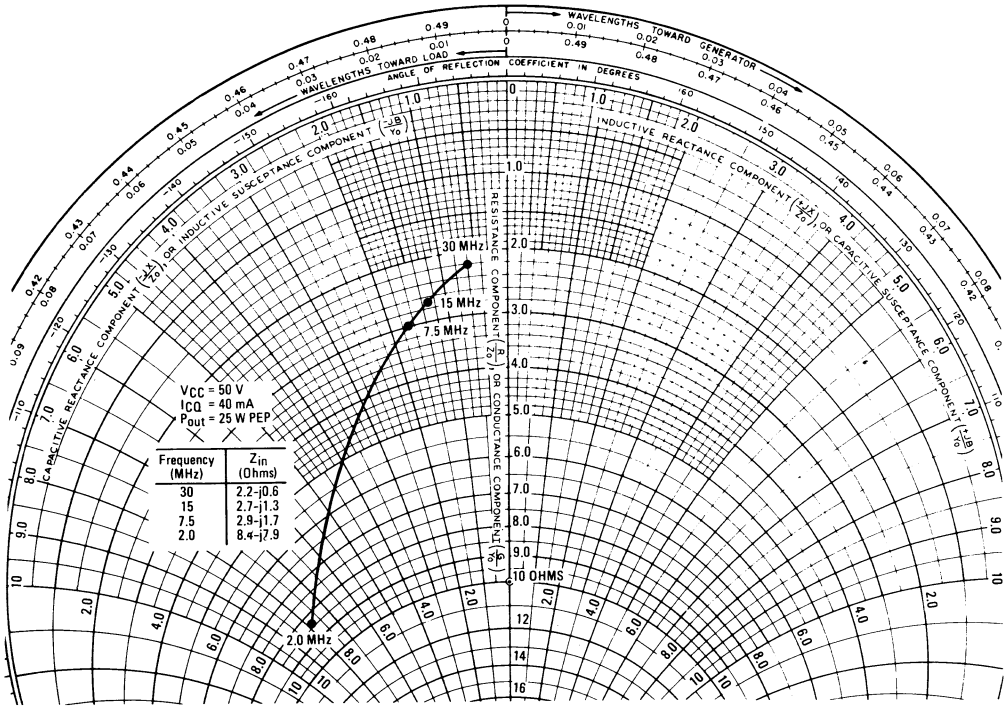


FIGURE 10 – SERIES EQUIVALENT IMPEDANCE



Frequency (MHz)	Z_{in} (Ohms)
30	2.2-j0.6
15	2.7-j1.3
7.5	2.9-j1.7
2.0	8.4-j7.9

MRF428

The RF Line

150 W (PEP) – 30 MHz

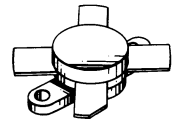
RF POWER
TRANSISTOR

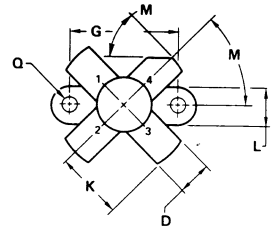
NPN SILICON

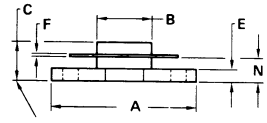
NPN SILICON RF POWER TRANSISTOR

. . . 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







SEATING PLANE

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

DIM	MILLIMETERS MIN	MILLIMETERS MAX	INCHES MIN	INCHES MAX
A	24.38	25.15	0.960	0.990
B	11.81	12.95	0.465	0.510
C	5.82	6.98	0.229	0.275
D	5.46	5.97	0.216	0.235
E	2.13	2.79	0.084	0.110
F	0.08	0.18	0.003	0.007
G	18.29	18.54	0.720	0.730
K	11.05	–	0.435	–
L	6.22	6.48	0.246	0.255
M	45° NOM		45° NOM	
N	3.66	4.52	0.144	0.178
Q	2.92	3.30	0.115	0.130

CASE 211-11

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 +150	^oC

THERMAL CHARACTERISTICS

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

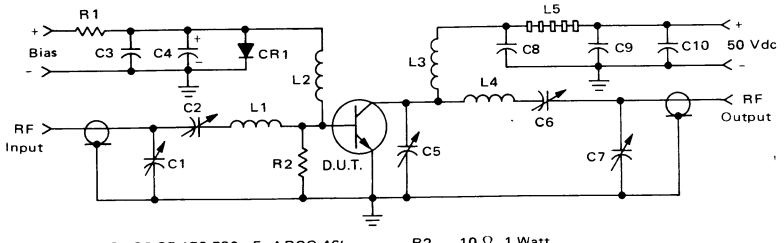
3

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)	$V_{(BR)CEO}$	55	–	–	Vdc
Collector-Emitter Breakdown Voltage (I_C = 100 mAdc, V_{BE} = 0)	$V_{(BR)CES}$	110	–	–	Vdc
Collector-Base Breakdown Voltage (I_C = 100 mAdc, I_E = 0)	$V_{(BR)CBO}$	110	–	–	Vdc
Emitter-Base Breakdown Voltage (I_E = 10 mAdc, I_C = 0)	$V_{(BR)EBO}$	4.0	–	–	Vdc
ON CHARACTERISTICS					
DC Current Gain (I_C = 5.0 Adc, 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 465	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

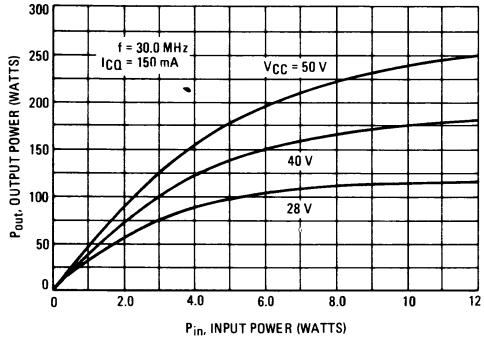


FIGURE 3 – OUTPUT POWER versus SUPPLY VOLTAGE

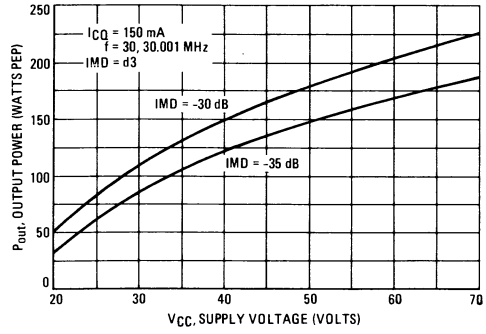


FIGURE 4 – POWER GAIN versus FREQUENCY

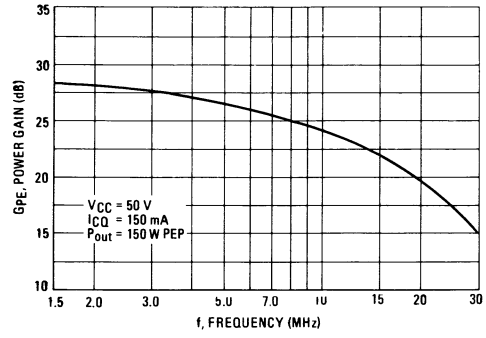
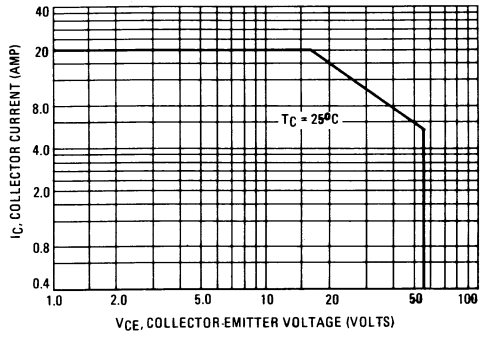


FIGURE 5 – DC SAFE OPERATING AREA



INTERMODULATION DISTORTION versus OUTPUT POWER

FIGURE 6 – V_{CC} = 40 Vdc

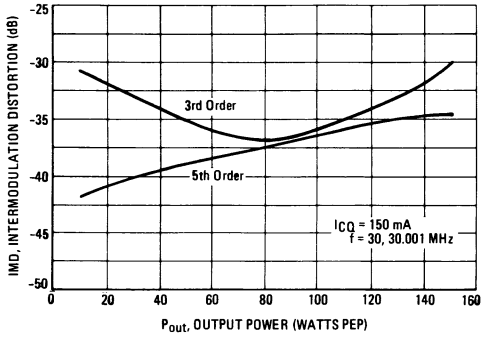


FIGURE 7 – V_{CC} = 50 Vdc

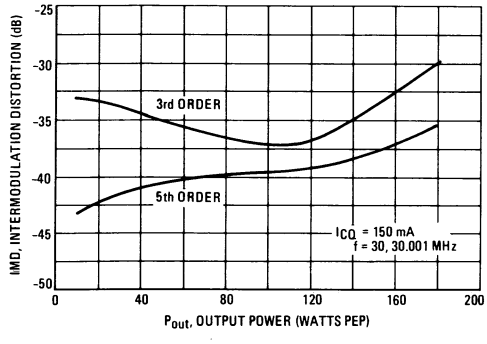


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FIGURE 8 – OUTPUT CAPACITANCE versus FREQUENCY

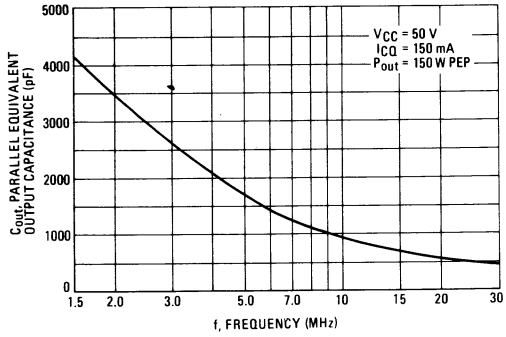


FIGURE 9 – OUTPUT RESISTANCE versus FREQUENCY

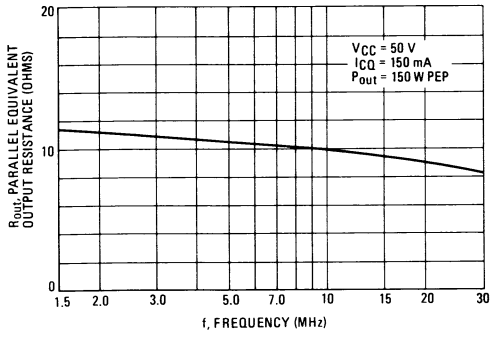
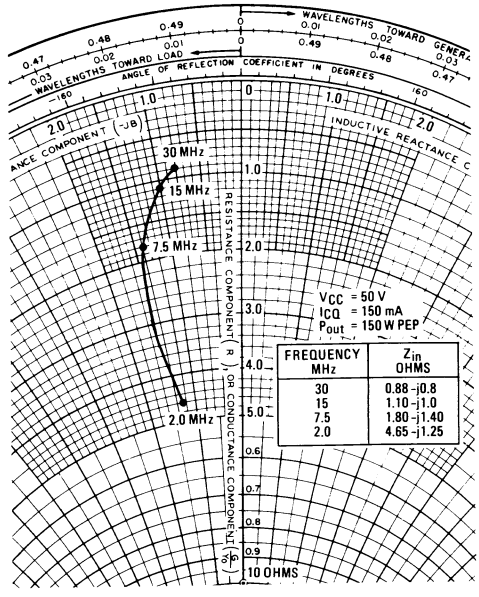


FIGURE 10 – SERIES EQUIVALENT IMPEDANCE



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

MRF429
MRF429MP

The RF Line

150 W (LINEAR) 30 MHz

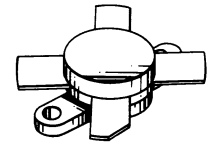
RF POWER TRANSISTOR

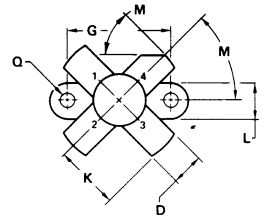
NPN SILICON

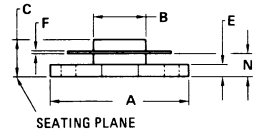
NPN SILICON RF POWER TRANSISTOR

. . . 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







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

DIM	MILLIMETERS MIN	MILLIMETERS MAX	INCHES MIN	INCHES MAX
A	24.38	25.15	0.960	0.990
B	11.81	12.95	0.465	0.510
C	5.82	6.98	0.229	0.275
D	5.46	5.97	0.216	0.235
E	2.13	2.79	0.084	0.110
F	0.08	0.18	0.003	0.007
G	18.29	18.54	0.720	0.730
K	11.05	–	0.435	–
L	6.22	6.48	0.246	0.255
M	45° NOM		45° NOM	
N	3.66	4.52	0.144	0.178
Q	2.92	3.30	0.115	0.130

CASE 211-11

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°C Derate above 25°C	P_D	320 1.33	Watts W/°C
Storage Temperature Range	T_{stg}	−65 to +150	°C

MRF429MP is for ordering an h_{FE} matched pair.

THERMAL CHARACTERISTICS

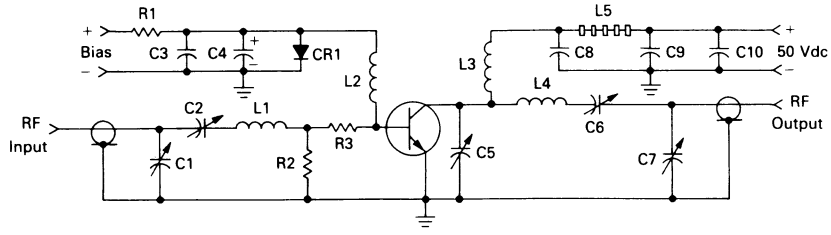
Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$	0.75	°C/W

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)	$V_{(BR)CEO}$	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)	$V_{(BR)EBO}$	4.0	—	—	Vdc
ON CHARACTERISTICS					
DC Current Gain (I_C = 5.0 Adc, V_{CE} = 5.0 Vdc)	h_{FE}	10	30	80	—
DYNAMIC CHARACTERISTICS					
Output Capacitance (V_{CB} = 50 Vdc, I_E = 0, f = 1.0 MHz)	C_{ob}	—	220	300	pF
FUNCTIONAL TESTS					
Common-Emitter Amplifier Gain (V_{CC} = 50 Vdc, P_{out} = 150 W (PEP) I_C(max) = 3.32 Adc, f = 30; 30.001 MHz)	G_{PE}	13	15	—	dB
Output Power (V_{CE} = 50 Vdc, f = 30; 30.001 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; 30.001 MHz)	η	45	—	—	%
Intermodulation Distortion (1) (V_{CE} = 50 Vdc, P_{out} = 150 W (PEP), I_C = 3.32 Adc)	IMD	—	−35	−32	dB
Electrical Ruggedness (V_{CC} = 50 Vdc, P_{out} = 150 W CW, 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	R3	5-3.3 Ω 1/2 Watt Carbon Resistors in Parallel
C4	500 μF @ 6 V	CR1	1N4997
C5	9.0-180 pF, Arco 463	L1	3 Turns, #16 Wire, 5/16" I.D., 5/16" Long
C6	80-480 pF, Arco 466	L2	10 μH Molded Choke
C10	30 μF, 100 V	L3	12 Turns, #16 Enameled Wire Closewound, 1/4" I.D.
R1	10 Ω, 10 Watt	L4	5 Turns, 1/8" Copper Tubing, 9/16" I.D., 3/4" Long
		L5	10 Ferrite Beads — Ferroxcube #56-590-65/3B

FIGURE 2 — OUTPUT POWER versus INPUT POWER

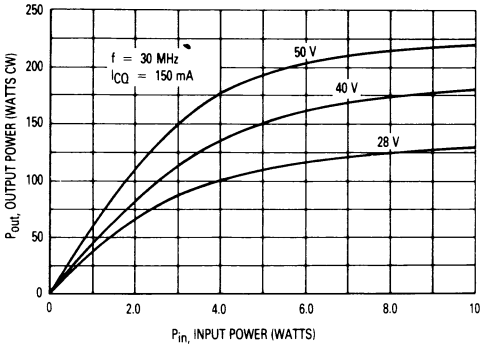


FIGURE 3 — OUTPUT POWER versus SUPPLY VOLTAGE

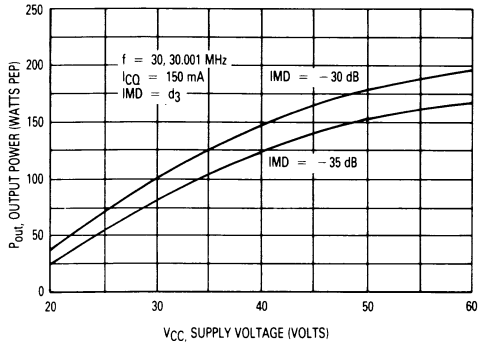


FIGURE 4 — POWER GAIN versus FREQUENCY

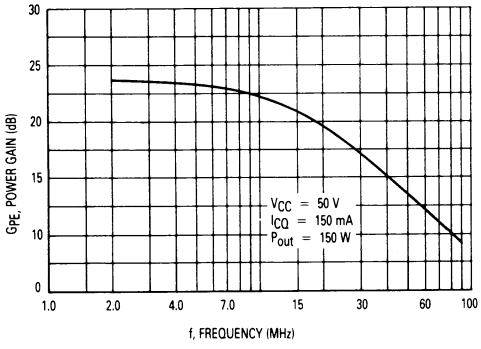


FIGURE 5 — RF SAFE OPERATING AREA (SOAR)

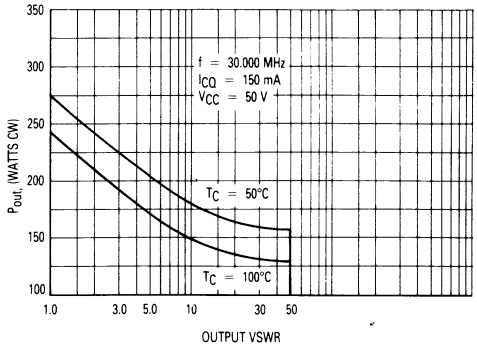


FIGURE 6 — f_T versus COLLECTOR CURRENT

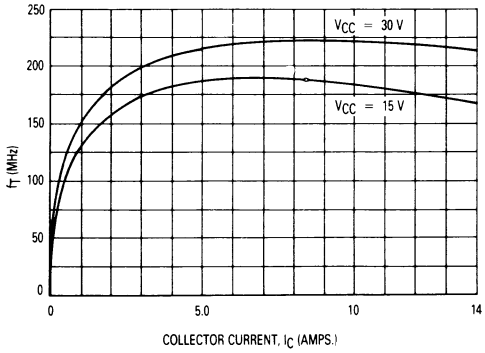


FIGURE 7 — IMD versus P_{out}

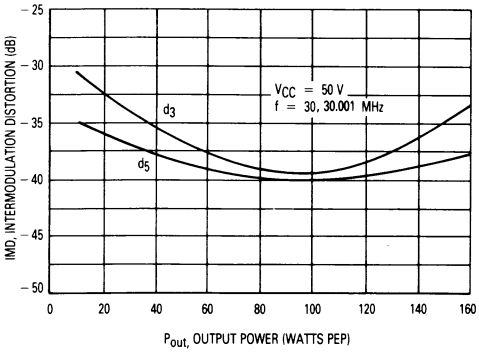


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FIGURE 8 — OUTPUT CAPACITANCE versus FREQUENCY

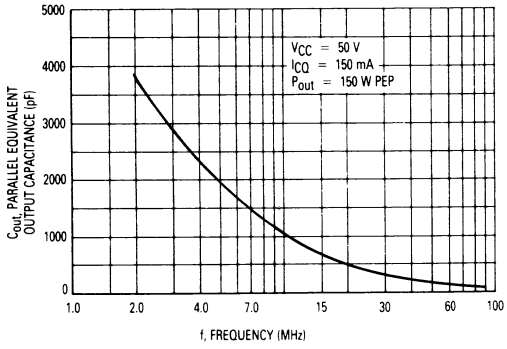


FIGURE 9 — OUTPUT RESISTANCE versus FREQUENCY

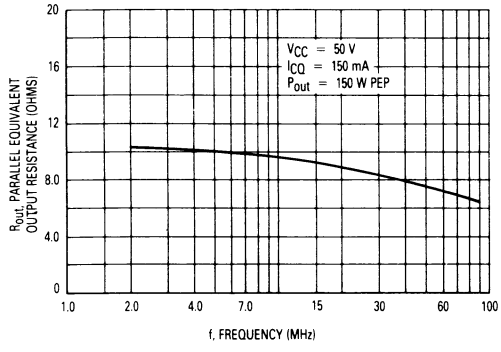
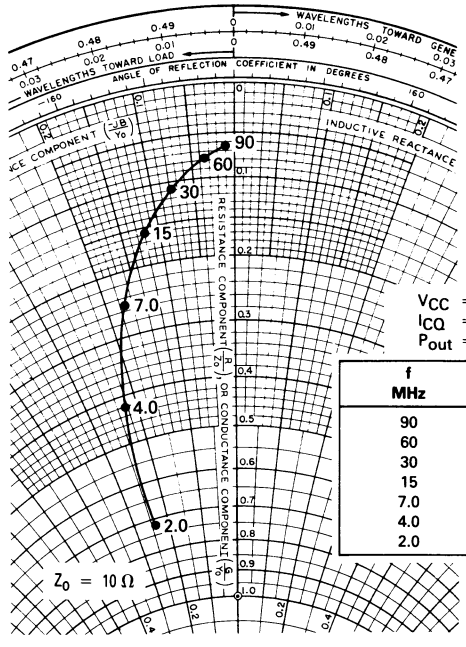


FIGURE 10 — SERIES EQUIVALENT IMPEDANCE



f MHz	Z_{in} Ohms
90	0.67 − J0.10
60	0.78 − J0.30
30	1.10 − J0.70
15	1.60 − J1.15
7.0	2.55 − J1.75
4.0	4.20 − J2.25
2.0	7.15 − J2.40