

The RF Line

NPN Silicon

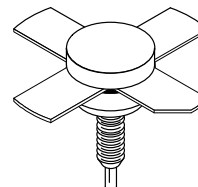
RF Power Transistors

... designed for 13.6 volt VHF large-signal class C and class AB linear power amplifier applications in commercial and industrial equipment.

- High Common Emitter Power Gain
- Specified 13.6 V, 160 MHz Performance:
 - Output Power = 40 Watts
 - Power Gain = 9.0 dB Min
 - Efficiency = 55% Min
- Load Mismatch Capability at Rated Voltage and RF Drive
- Silicon Nitride Passivated
- Low Intermodulation Distortion, $d_3 = -30$ dB Typ

MRF240

40 W, 145–175 MHz
RF POWER
TRANSISTORS
NPN SILICON



CASE 145A-09, STYLE 1

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector–Emitter Voltage	V_{CEO}	16	Vdc
Collector–Base Voltage	V_{CBO}	36	Vdc
Emitter–Base Voltage	V_{EBO}	4.0	Vdc
Collector Current — Continuous	I_C	8.0	Adc
Total Device Dissipation @ $T_C = 25^\circ\text{C}$ (1) Derate above 25°C	P_D	100 0.57	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 (2)	$R_{\theta JC}$	1.75	$^\circ\text{C}/\text{W}$

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 ($I_C = 20$ mAdc, $I_B = 0$)	$V_{(BR)CEO}$	16	—	—	Vdc
Collector–Emitter Breakdown Voltage ($I_C = 20$ mAdc, $V_{BE} = 0$)	$V_{(BR)CES}$	36	—	—	Vdc
Emitter–Base Breakdown Voltage ($I_E = 5.0$ mAdc, $I_C = 0$)	$V_{(BR)EBO}$	4.0	—	—	Vdc
Collector Cutoff Current ($V_{CB} = 15$ Vdc, $I_E = 0$)	I_{CBO}	—	—	10	mAdc

ON CHARACTERISTICS

DC Current Gain ($I_C = 4.0$ Adc, $V_{CE} = 5.0$ Vdc)	h_{FE}	10	70	150	—
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DYNAMIC CHARACTERISTICS

Output Capacitance ($V_{CB} = 12.5$ Vdc, $I_E = 0$, $f = 1.0$ MHz)	C_{ob}	—	90	125	pF
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NOTES:

(continued)

1. This device is designed for RF operation. The total device dissipation rating applies only when the device is operated as an RF amplifier.
2. Thermal Resistance is determined under specified RF operating conditions by infrared measurement techniques.

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

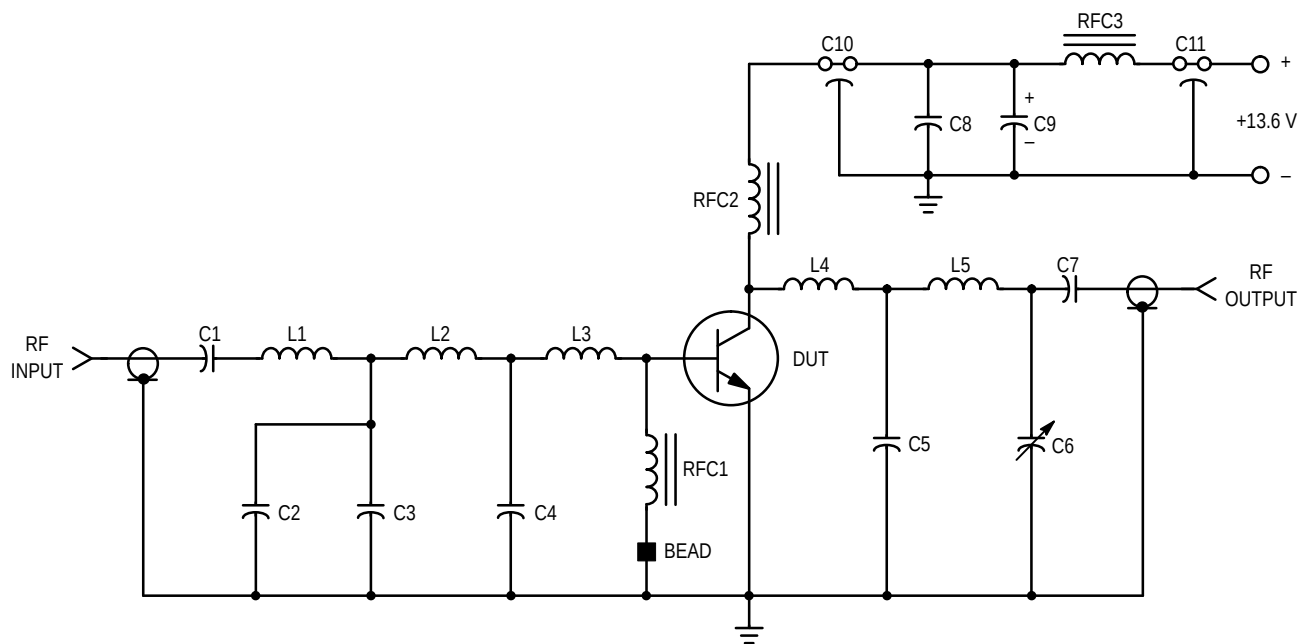
Characteristic	Symbol	Min	Typ	Max	Unit
FUNCTIONAL TESTS					
Common-Emitter Amplifier Power Gain ($V_{CC} = 13.6\text{ Vdc}$, $P_{out} = 40\text{ W}$, $f = 160\text{ MHz}$)	G_{PE}	9.0	10	—	dB
Collector Efficiency ($V_{CC} = 13.6\text{ Vdc}$, $P_{out} = 40\text{ W}$, $f = 160\text{ MHz}$)	η	55	—	—	%

TYPICAL SSB PERFORMANCE

Intermodulation Distortion (3) ($V_{CC} = 13.6\text{ Vdc}$, $P_{out} = 35\text{ W (PEP)}$, $f_1 = 146\text{ MHz}$, $f_2 = 146.002\text{ MHz}$, $I_{CQ} = 50\text{ mAdc}$)	IMD (d_3)	—	-30	—	dB
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NOTE:

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



C1 — 200 pF, 350 Vdc, UNELCO
C2 — 100 pF, 350 Vdc, UNELCO
C3 — 40 pF, 350 Vdc, UNELCO
C4, C5 — 80 pF, 350 Vdc, UNELCO
C6 — 1.0–20 pF, ARCO Trimmer
C7 — 100 pF 350 Vdc, UNELCO
C8 — 0.1 μF ERIE Disc Ceramic
C9 — 1.0 μF TANTALUM

C10, C11 — 680 pF ALLEN BRADLEY Feedthru
RFC1 — 0.15 μH Molded Choke
RFC2 — 10 Turns, #18 AWG on 470 Ohm,
1.0 Watt Resistor
Bead — FERROXCUBE Bead
RFC3 — FERROXCUBE Choke, VK200-4B
L1 — 3.3 x 0.2 cm AIRLINE Inductor
L2 — 1.0 x 0.2 cm AIRLINE Inductor

L3 — 1.2 x 0.6 cm Brass Pad
L4 — 1.2 x 0.6 cm Brass Pad and
2.0 x 0.2 cm AIRLINE Inductor
Board — G10, $\epsilon_r = 5$, $t = 62\text{ mils}$
2 sided, 2 oz. Clad
Connectors: Type N

Figure 1. 160 MHz Test Circuit Schematic

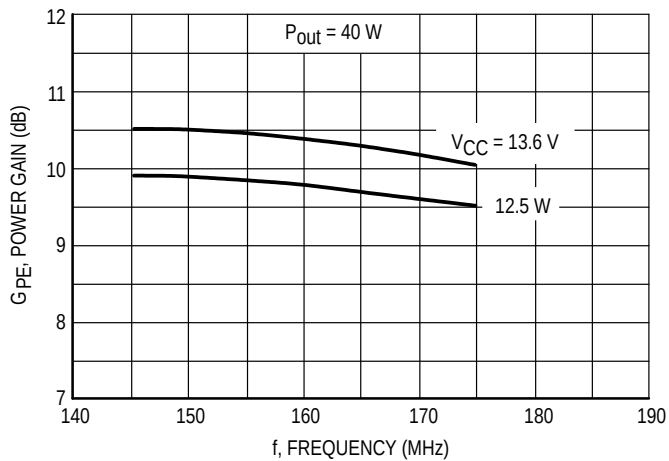


Figure 2. Power Gain versus Frequency

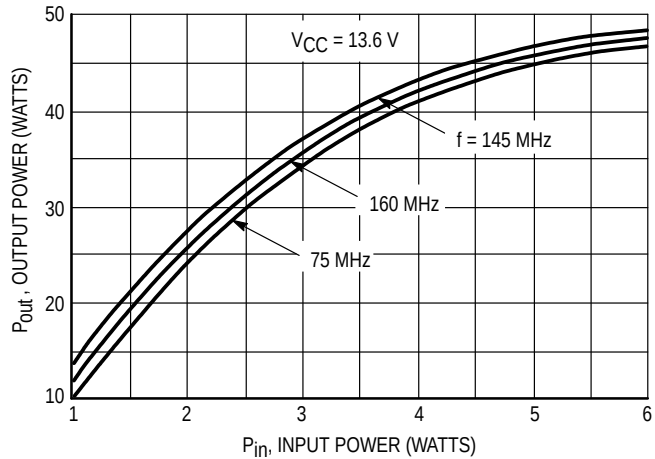


Figure 3. Output Power versus Input Power

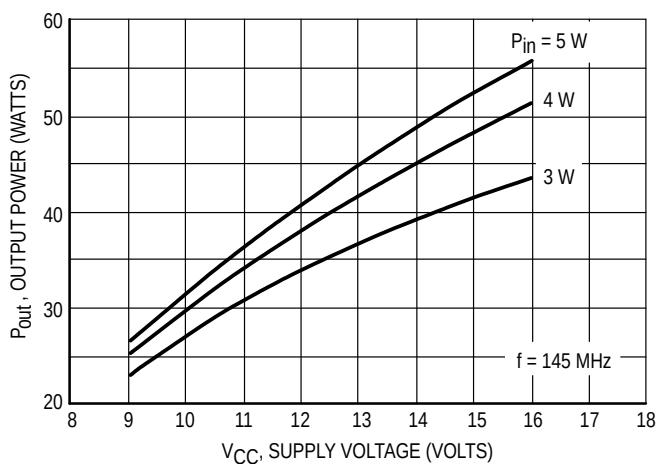


Figure 4. Output Power versus Supply Voltage

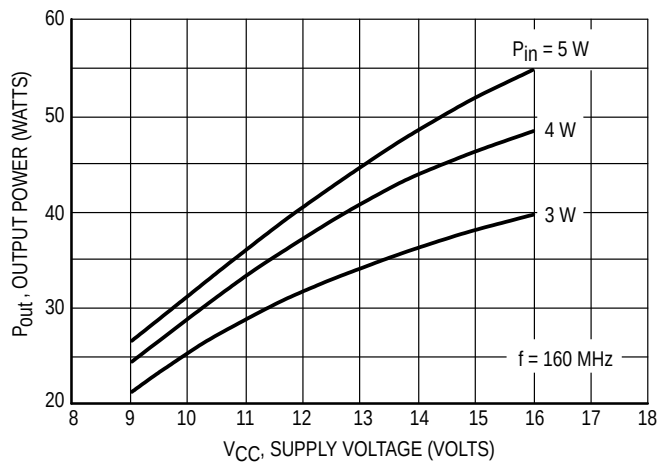


Figure 5. Output Power versus Supply Voltage

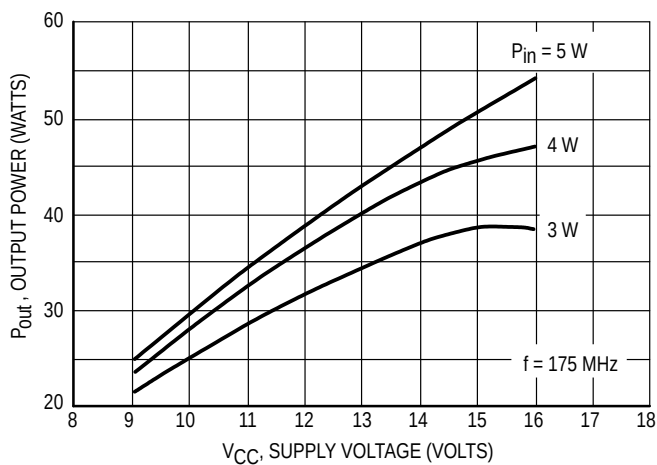


Figure 6. Output Power versus Supply Voltage

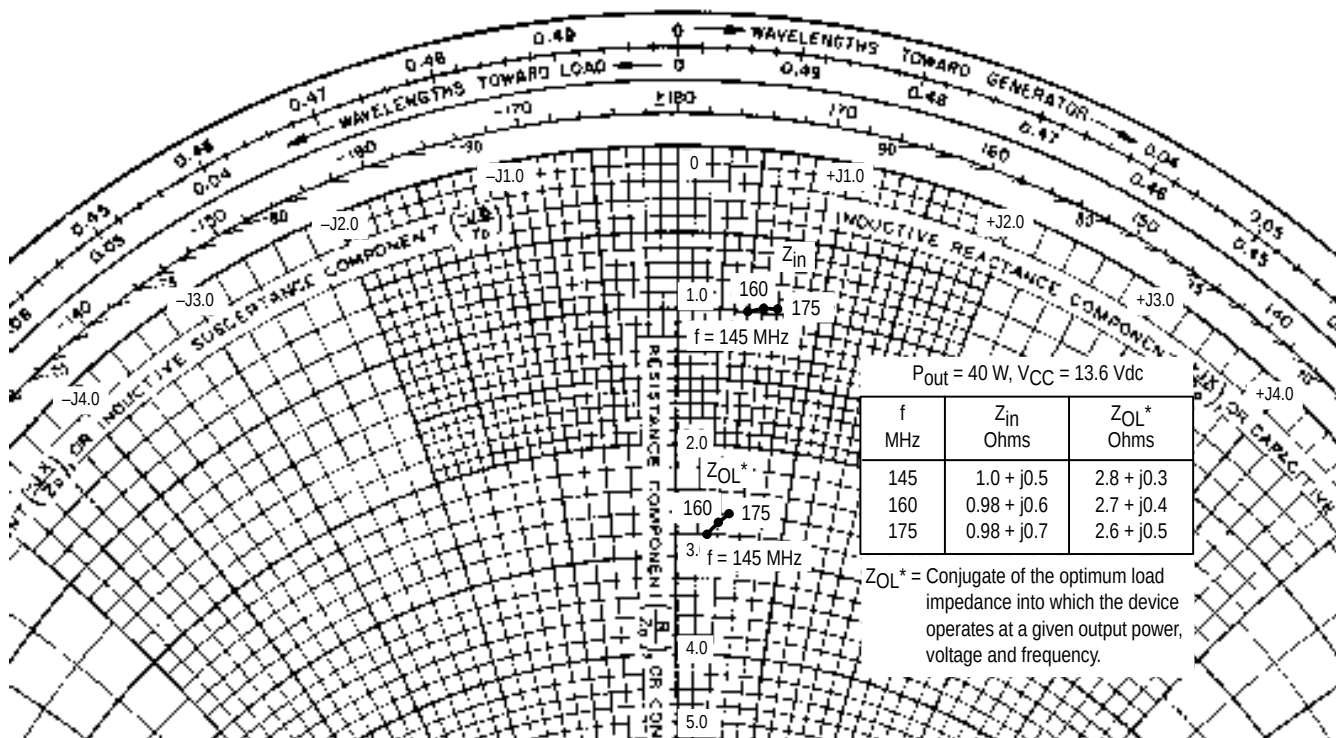
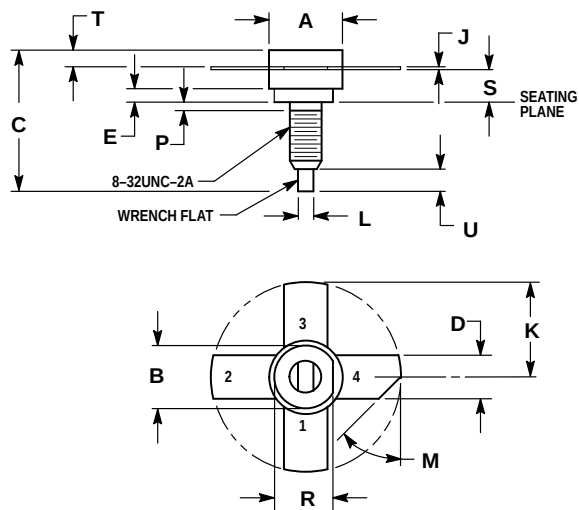


Figure 7. Series Equivalent Input/Output Impedances

PACKAGE DIMENSIONS



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

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

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

CASE 145A-09
ISSUE M

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MRF240/D

