

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

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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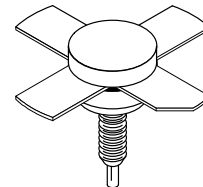
DYNAMIC CHARACTERISTICS

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

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.

(continued)

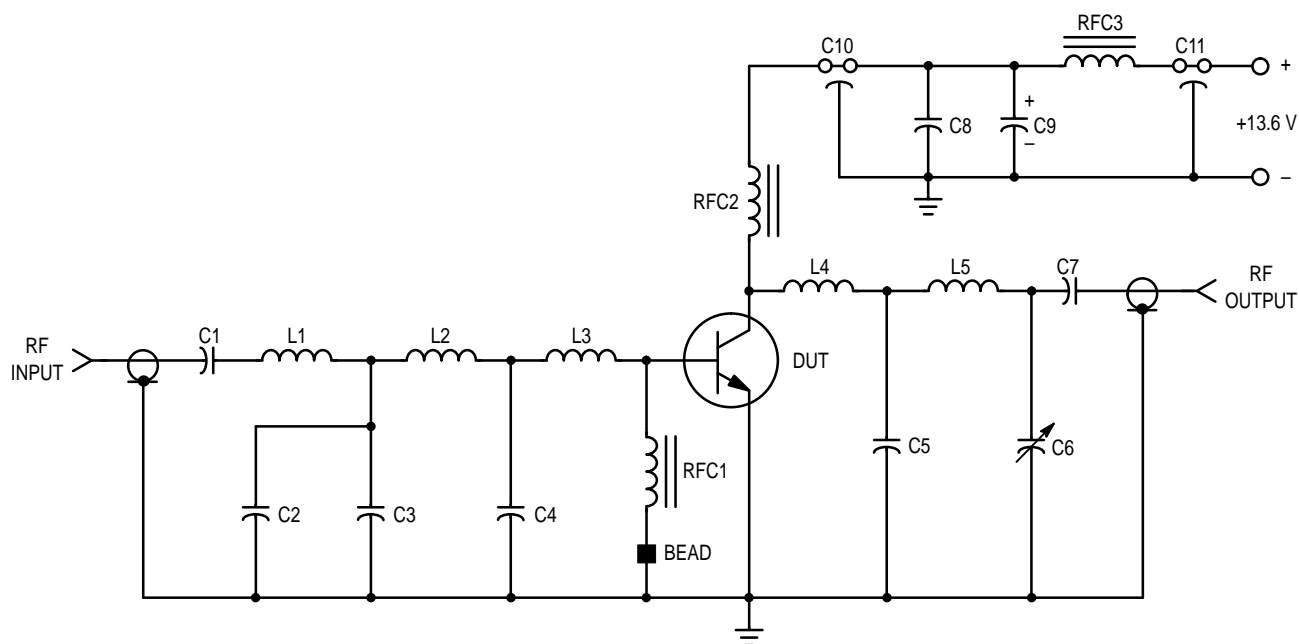
MRF240
40 W, 145–175 MHz
RF POWER
TRANSISTORS
NPN SILICON

CASE 145A-09, STYLE 1

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 ($V_{CC} = 13.6\text{ Vdc}$, $P_{Out} = 40\text{ W}$, $f = 160\text{ MHz}$)	GPE	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 (d3)	—	-30	—	dB

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

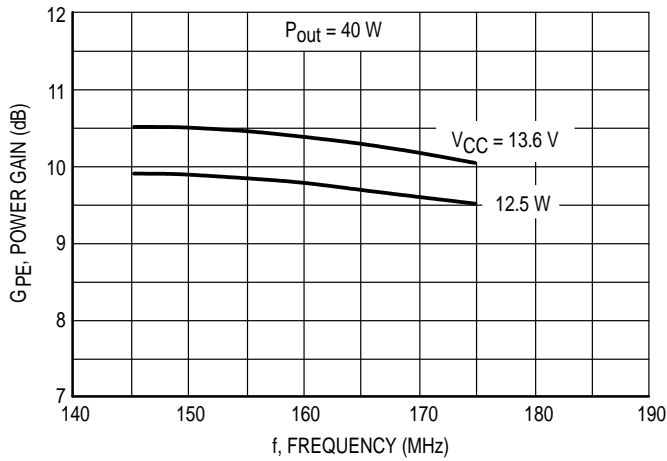


Figure 2. Power Gain versus Frequency

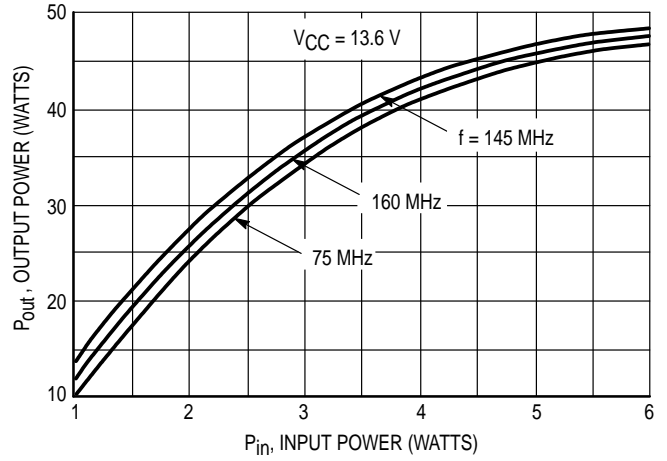


Figure 3. Output Power versus Input Power

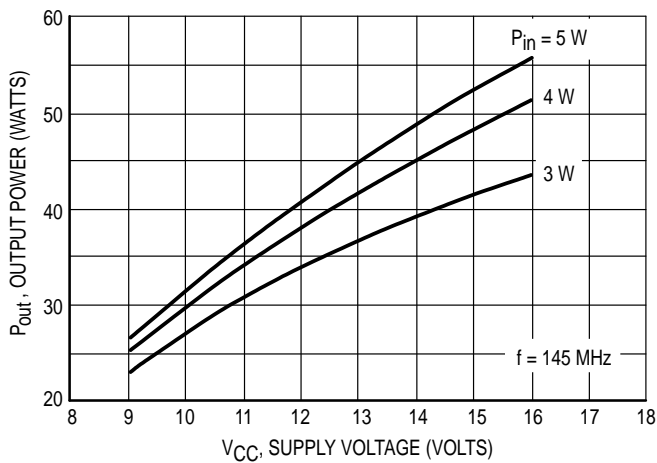


Figure 4. Output Power versus Supply Voltage

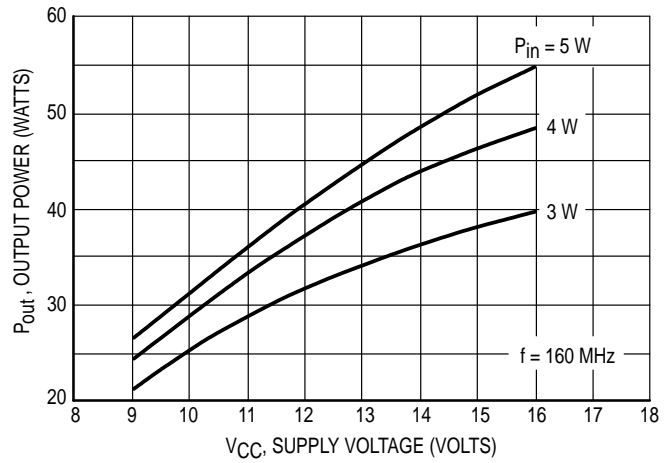


Figure 5. Output Power versus Supply Voltage

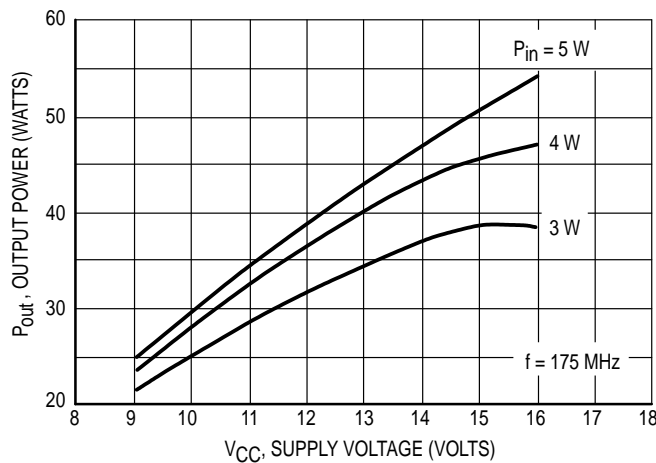


Figure 6. Output Power versus Supply Voltage

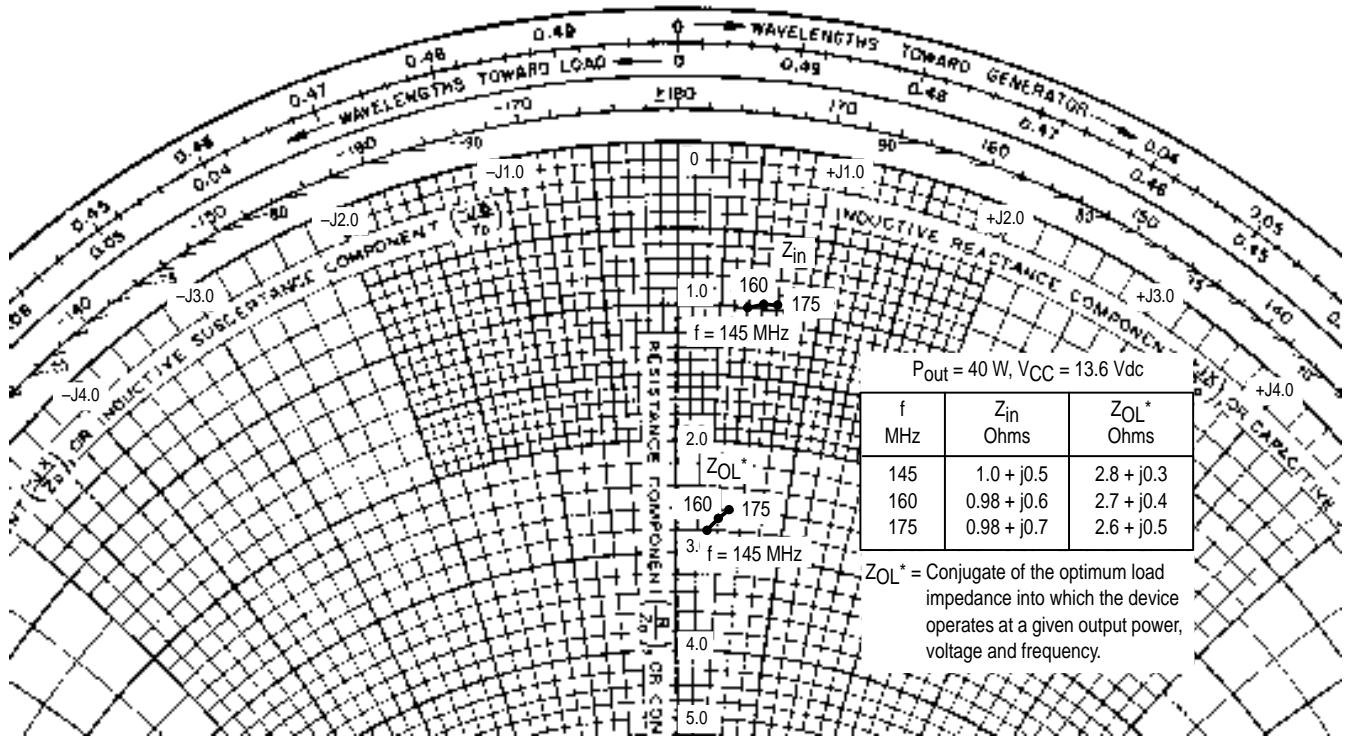
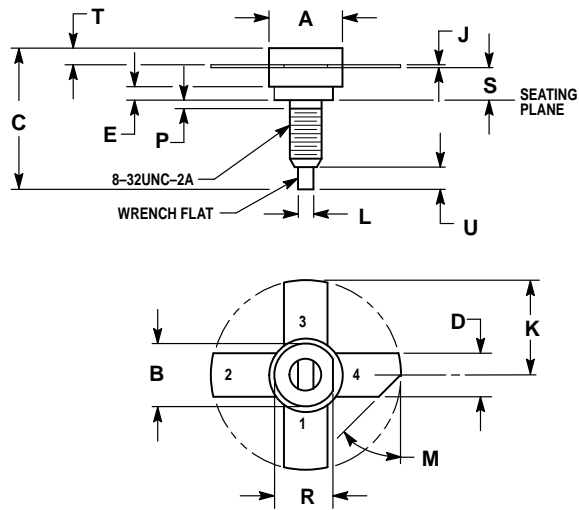


Figure 7. Series Equivalent Input/Output Impedances

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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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
INTERNET: http://Design-NET.com

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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MRF240/D

