

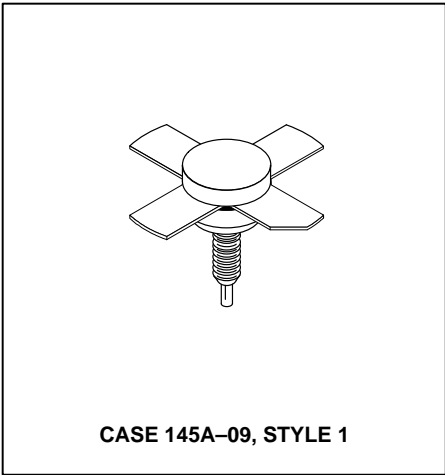
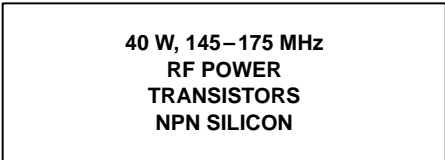
# The RF Line

## 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 $25^\circ\text{C}$	$P_D$	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.)

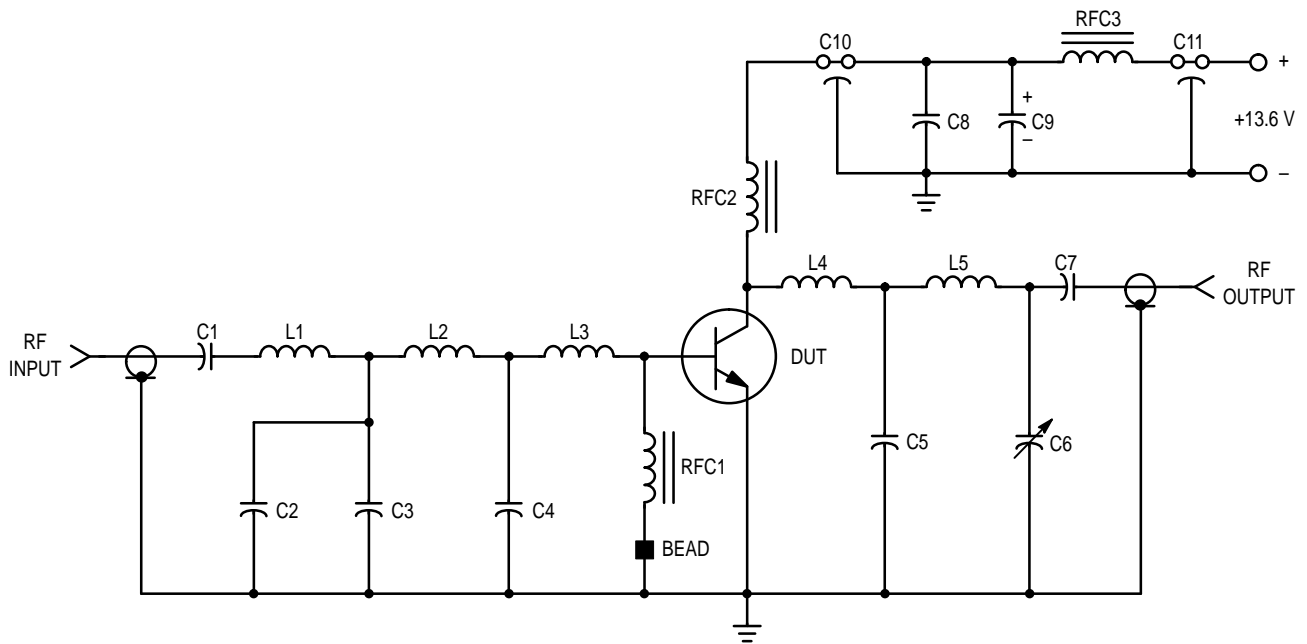
Characteristic	Symbol	Min	Typ	Max	Unit
<b>FUNCTIONAL TESTS</b>					
Common-Emitter Amplifier Power Gain ( $V_{CC} = 13.6\text{ Vdc}$ , $P_{Out} = 40\text{ W}$ , $f = 160\text{ MHz}$ )	GPE	9.0	10	—	dB
Collector Efficiency ( $V_{CC} = 13.6\text{ Vdc}$ , $P_{Out} = 40\text{ W}$ , $f = 160\text{ MHz}$ )	$\eta$	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
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**NOTE:**

- 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  $\mu\text{F}$  ERIE Disc Ceramic  
 C9 — 1.0  $\mu\text{F}$  TANTALUM

C10, C11 — 680 pF ALLEN BRADLEY Feedthru  
 RFC1 — 0.15  $\mu\text{H}$  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**

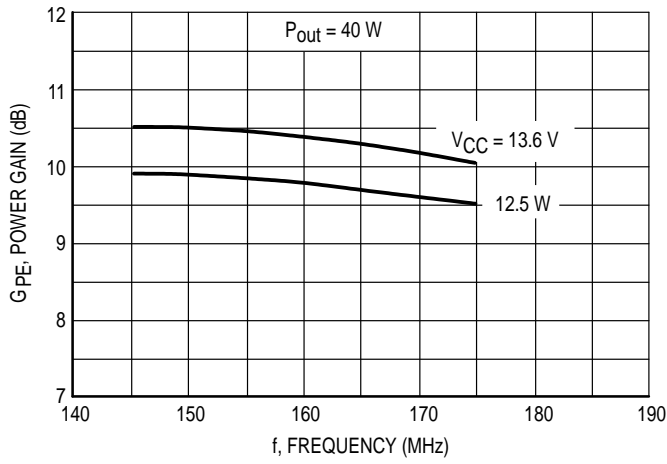


Figure 2. Power Gain versus Frequency

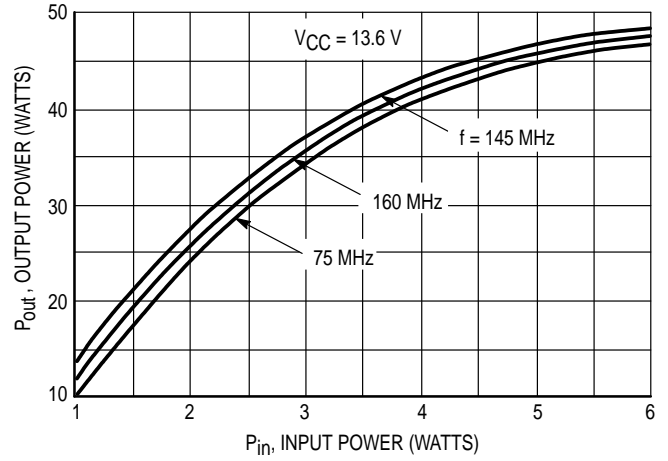


Figure 3. Output Power versus Input Power

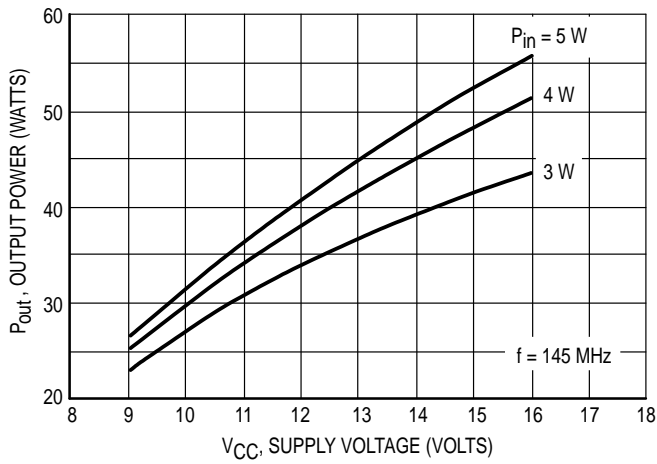


Figure 4. Output Power versus Supply Voltage

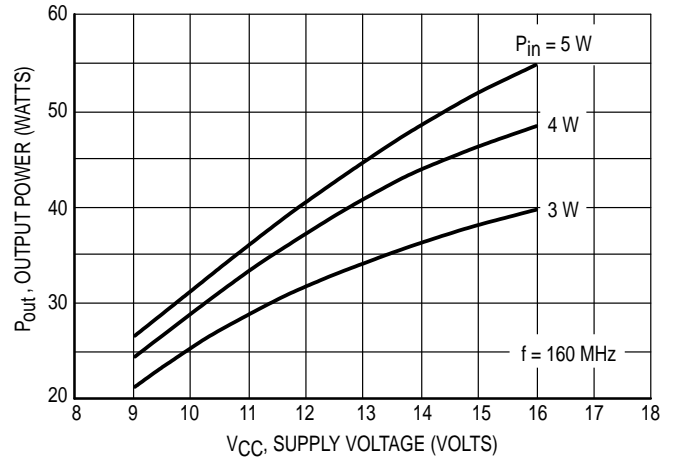


Figure 5. Output Power versus Supply Voltage

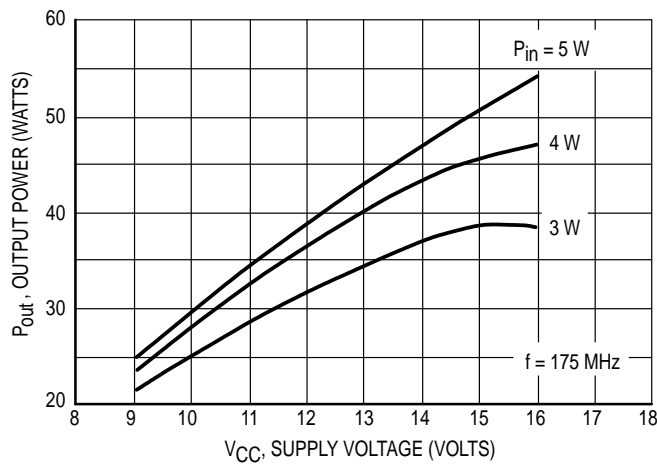


Figure 6. Output Power versus Supply Voltage

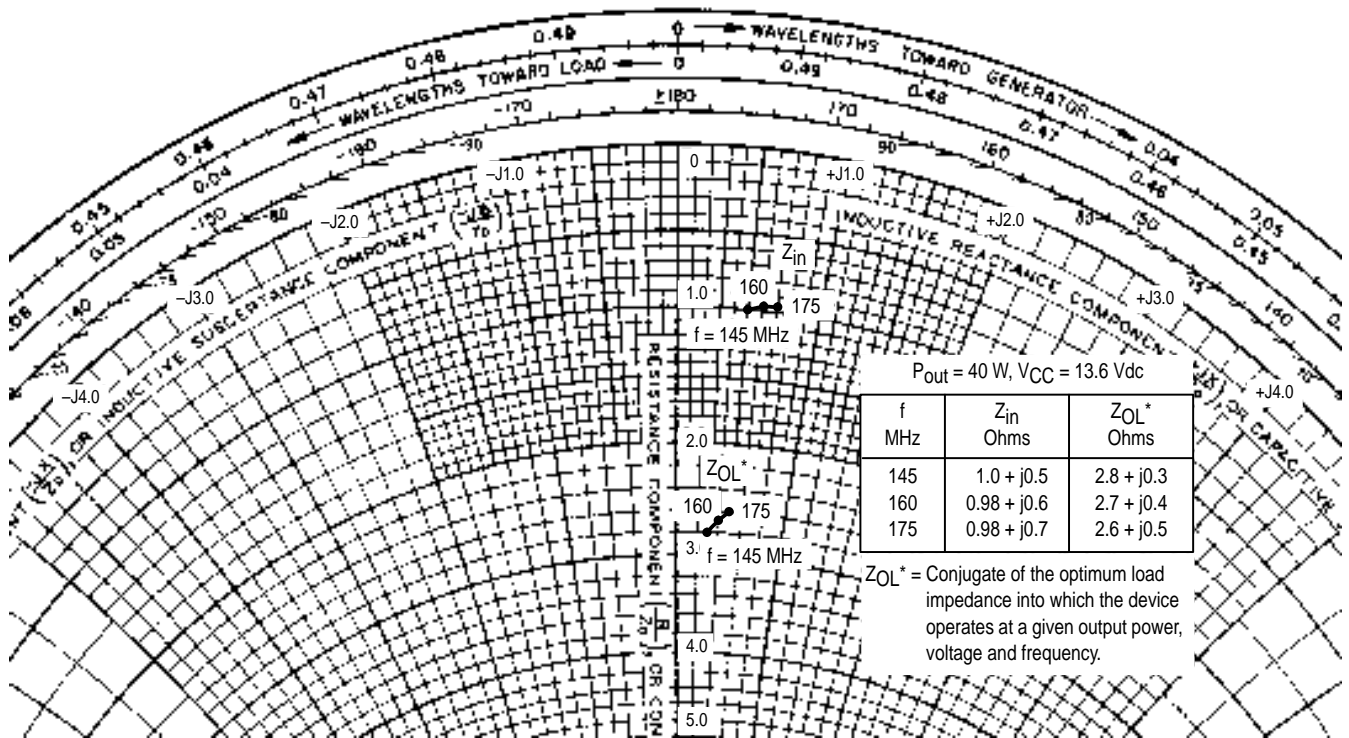
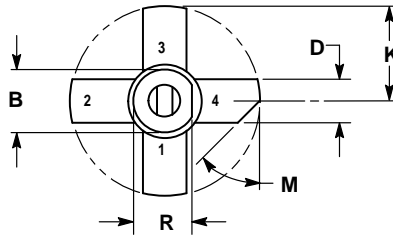
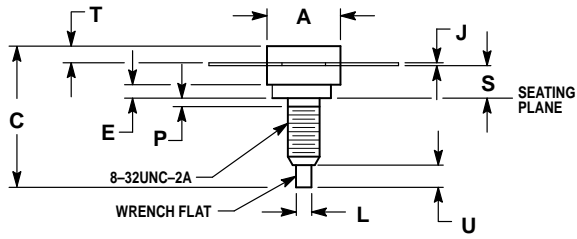


Figure 7. Series Equivalent Input/Output Impedances

## 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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