MOTOROLA
SEMICONDUCTOR
TECHNICAL DATA

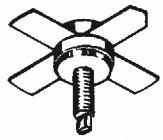
PT9730 Series

The RF Line
VHF Power Transistors

. . . designed primarily for wideband, large-signal output amplifier stages in the 30–200 MHz frequency range.

- Guaranteed Performance at 175 MHz, 28 Vdc
  - Output Power — 4 to 25 Watts
  - Minimum Gain — 10 to 13 dB
  - Collector Efficiency — 60%, Min
- 100% Tested for Load Mismatch at All Phase Angles with 30:1 VSWR
- Gold Metallization for Improved Reliability
- Diffused Ballast Resistors

TO 200 MHz
4 TO 25 WATTS
VHF POWER
TRANSISTORS
NPN SILICON



CASE 145D-01, STYLE 1
(.380 SOE)

2

MAXIMUM RATINGS

Rating	Symbol	9730	9732	9734	9731	Unit
Collector-Emitter Voltage	V_{CEO}	35				Vdc
Collector-Base Voltage	V_{CES}	60				Vdc
Emitter-Base Voltage	V_{EBO}	4				Vdc
Collector Current — Continuous	I_C	1	1.25	2.5	4	Adc
Total Device Dissipation @ T_C = 25°C Derate above 25°C	P_D	10 0.06	20 0.114	30 0.173	45 0.257	Watts W/°C
Operating Junction Temperature	T_J	200				°C
Storage Temperature Range	T_{stg}	−65 to +150				°C

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max				Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$	17.5	8.8	5.8	3.9	°C/W

ELECTRICAL CHARACTERISTICS

Characteristic		Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS						
Collector-Emitter Breakdown Voltage (I_C = 25 mA, I_B = 0)		$V_{(BR)CEO}$	35	—	—	Vdc
Collector-Emitter Breakdown Voltage (I_C = 50 mA, V_{BE} = 0)		$V_{(BR)CES}$	60	—	—	Vdc
Emitter-Base Breakdown Voltage (I_E = 1 mA, I_C = 0)		$V_{(BR)EBO}$	4	—	—	Vdc
Collector Cutoff Current (V_{CE} = 25 V, V_{BE} = 0)	PT9730 PT9732 PT9734 PT9731	I_{CES}	— — — —	— — — —	0.5 1 1.5 2	mAdc
ON CHARACTERISTICS						
DC Current Gain (I_C = 500 mA, V_{CE} = 10 V)		h_{FE}	20	—	150	—
DYNAMIC CHARACTERISTICS						
Output Capacitance (V_{CB} = 28 V, I_E = 0, f = 1 MHz)	PT9730 PT9732 PT9734 PT9731	C_{ob}	— — — —	— — — —	12 18 24 40	pF

(continued)

ELECTRICAL CHARACTERISTICS — continued

Characteristic		Symbol	Min	Typ	Max	Unit
FUNCTIONAL TESTS						
Common-Emitter Amplifier Power Gain (V_{CE} = 28 V, P_{out} = Rated, f = 175 MHz)	PT9730	G_{PE}	13	—	—	dB
	PT9732		12	—	—	
	PT9734		11.8	—	—	
	PT9731		10	—	—	
Collector Efficiency (V_{CE} = 28 V, P_{out} = Rated, f = 175 MHz)		η_C	60	—	—	%
Load Mismatch (V_{CE} = 28 V, P_{out} = Rated, f = 175 MHz, Load VSWR = ∞:1, All Phase Angles)		ψ	No Degradation in Output Power			
Saturated Output Power (V_{CE} = 28 V, f = 175 MHz)	PT9730	P_{sat}	6	—	—	W
	PT9732		10	—	—	
	PT9734		18	—	—	
	PT9731		30	—	—	

TYPICAL CHARACTERISTICS
PT9730 — 4 WATTS

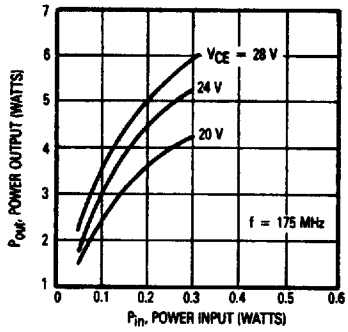


Figure 1. Power Input versus Power Output

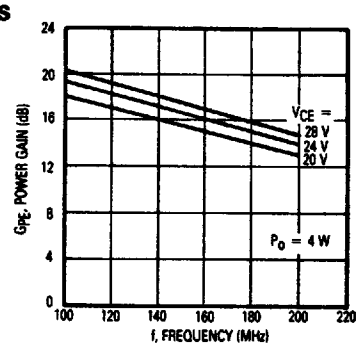


Figure 2. Power Gain versus Frequency

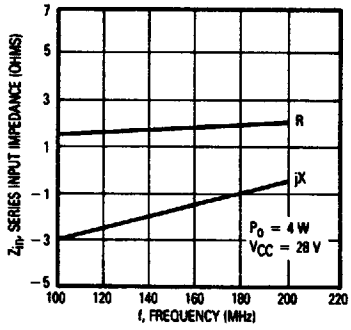


Figure 3. Series Input Impedance versus Frequency

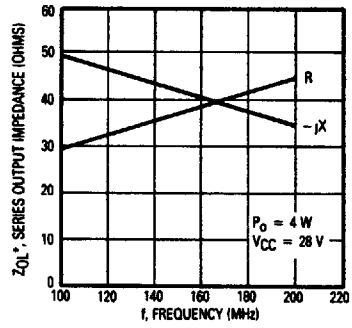


Figure 4. Series Output Impedance versus Frequency

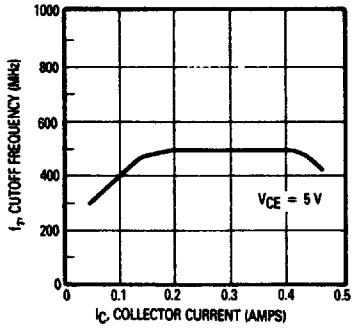


Figure 5. Cutoff Frequency versus Current

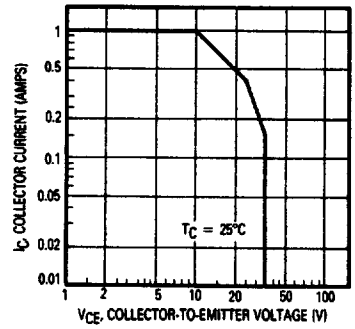


Figure 6. Safe Operating Area

TYPICAL CHARACTERISTICS
PT9732 — 8 WATTS

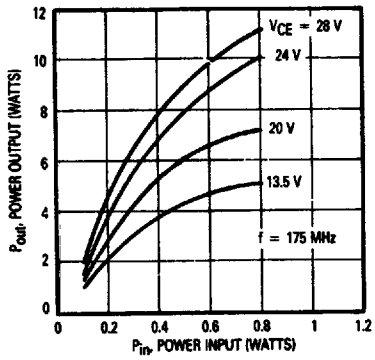


Figure 7. Power Output versus Power Input

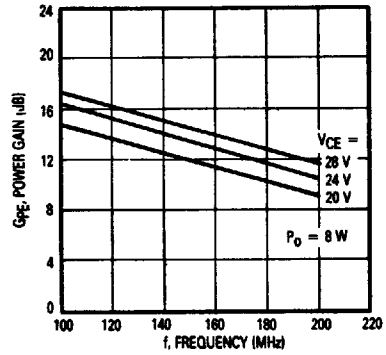


Figure 8. Power Gain versus Frequency

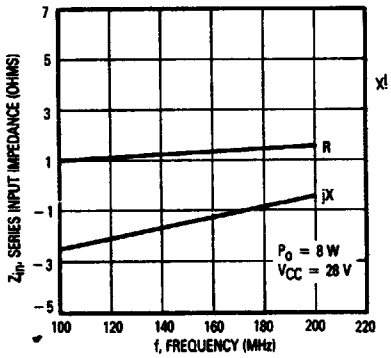


Figure 9. Series Input Impedance versus Frequency

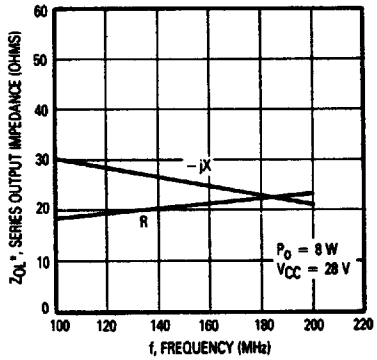


Figure 10. Series Output Impedance versus Frequency

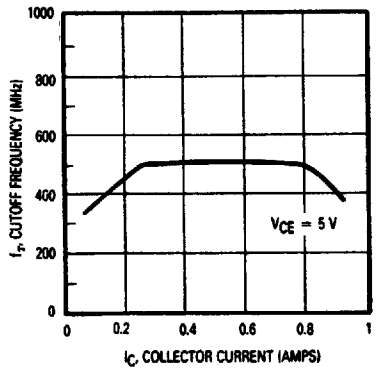


Figure 11. Cutoff Frequency versus Current

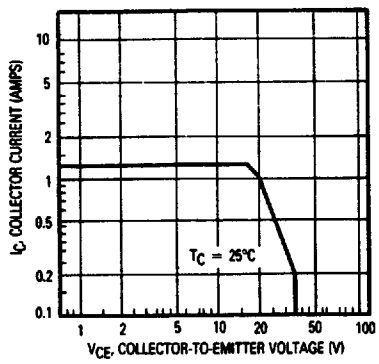


Figure 12. Safe Operating Area

2

TYPICAL CHARACTERISTICS
PT9734 — 15 WATTS

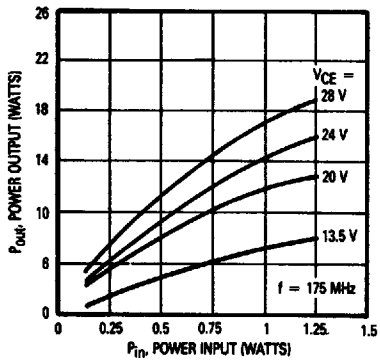


Figure 13. Power Output versus Power Input

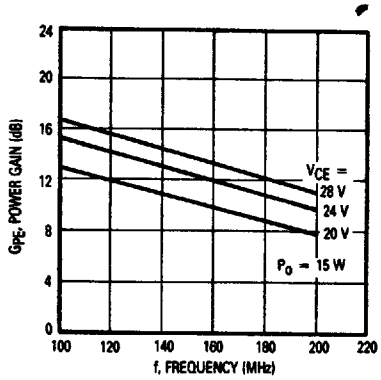


Figure 14. Power Gain versus Frequency

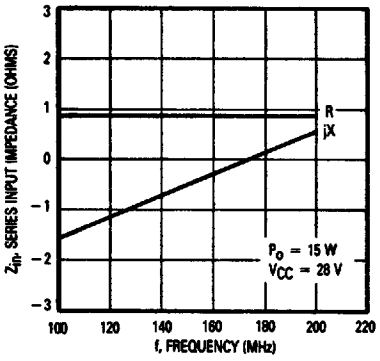


Figure 15. Series Input Impedance versus Frequency

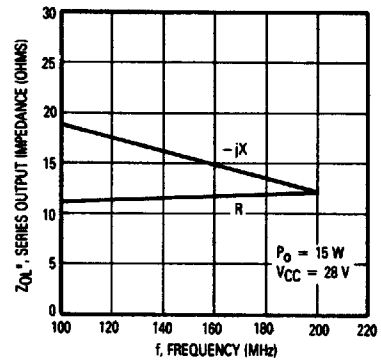


Figure 16. Series Output Impedance versus Frequency

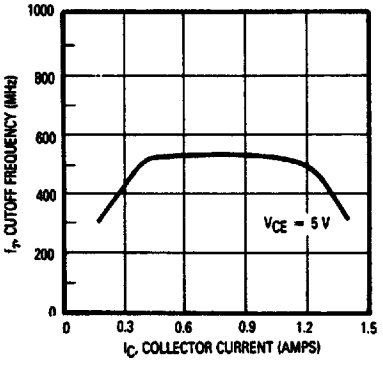


Figure 17. Cutoff Frequency versus Current

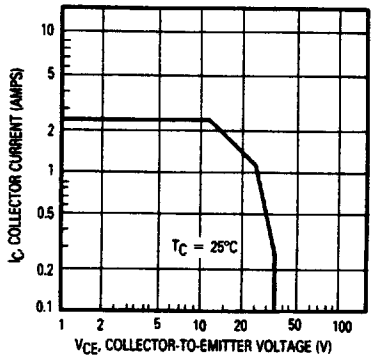


Figure 18. Safe Operating Area

2

TYPICAL CHARACTERISTICS
PT9731 — 25 WATTS

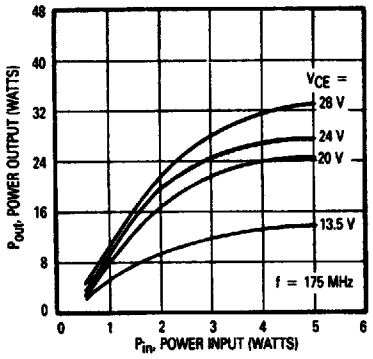


Figure 19. Power Output versus Power Input

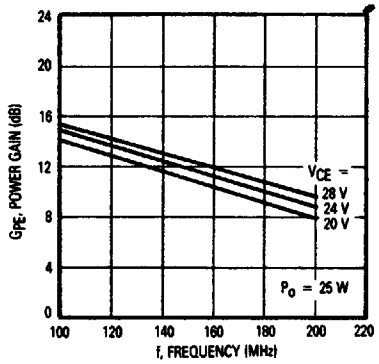


Figure 20. Power Gain versus Frequency

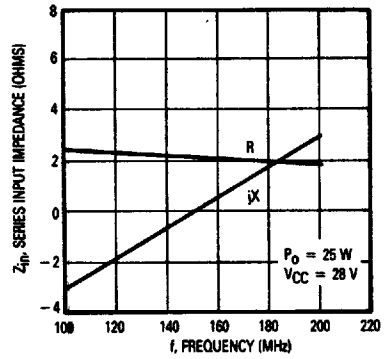


Figure 21. Series Input Impedance versus Frequency

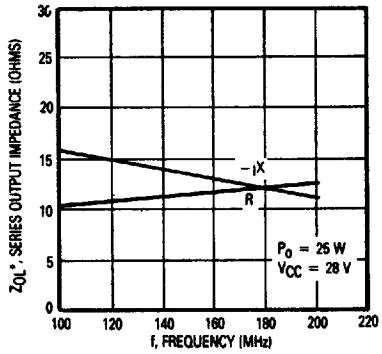


Figure 22. Series Output Impedance versus Frequency

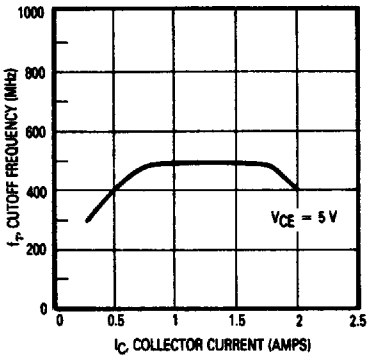


Figure 23. Cutoff Frequency versus Current

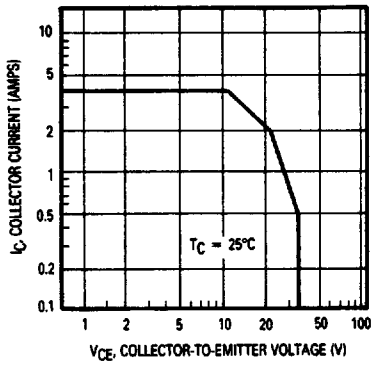
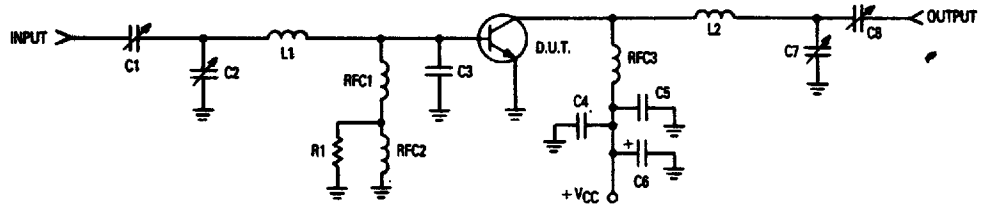


Figure 24. Safe Operating Area



C1, C8 — 7–100 pF ARCO #423
C2 — 8–80 pF ARCO #404
C3 — 90 pF UNELCO
C4 — 1000 pF UNELCO
C5 — 0.1 mF disc capacitor
C6 — 5 mF, 50 V electrolytic
C7 — 5–80 pF ARCO #462

L1 — 2 turns, 0.1" wide by 0.02" thick copper strip, 1/4" I.D.
L2 — 4 turns, 0.1" wide by 0.02" thick copper strip, 1/4" I.D.

R1 — 10 ohms, 0.5 W carbon resistor

RFC1 — 150 nH molded inductor
RFC2 — 10,000 nH molded inductor
RFC3 — 4 turns #16 AWG, 5/16" I.D.

Figure 25. 175 MHz Test Circuit (PT9731)

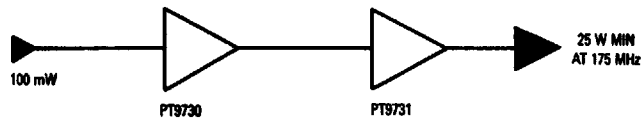
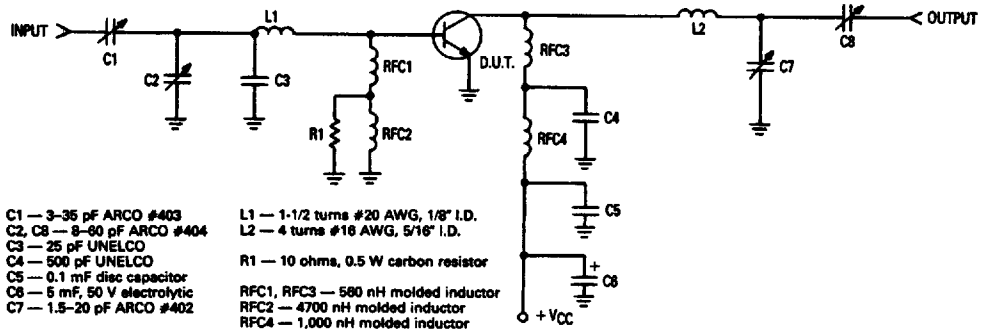


Figure 26. Typical Application
25 Watt VHF 24 V Power Amplifier



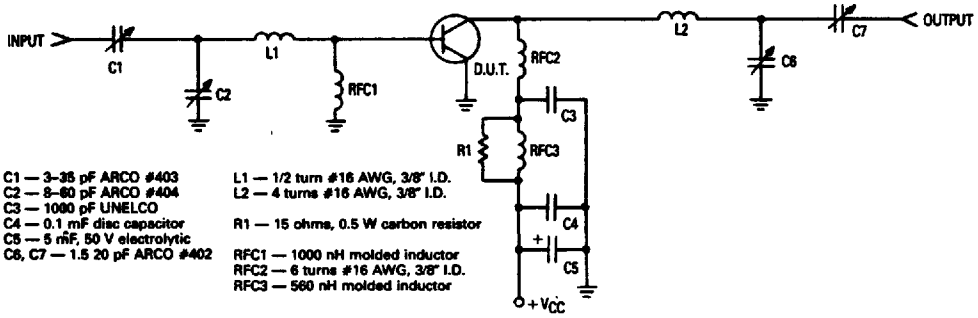
C1 — 3–35 pF ARCO #403
C2, C8 — 8–80 pF ARCO #404
C3 — 25 pF UNELCO
C4 — 500 pF UNELCO
C5 — 0.1 mF disc capacitor
C6 — 5 mF, 50 V electrolytic
C7 — 1.5–20 pF ARCO #402

L1 — 1-1/2 turns #20 AWG, 1/8" I.D.
L2 — 4 turns #16 AWG, 5/16" I.D.

R1 — 10 ohms, 0.5 W carbon resistor

RFC1, RFC3 — 560 nH molded inductor
RFC2 — 4700 nH molded inductor
RFC4 — 1,000 nH molded inductor

Figure 27. 175 MHz Test Circuit (PT9730 and PT9732)



C1 — 3–35 pF ARCO #403
C2 — 8–80 pF ARCO #404
C3 — 1000 pF UNELCO
C4 — 0.1 mF disc capacitor
C5 — 5 mF, 50 V electrolytic
C6, C7 — 1.5 20 pF ARCO #402

L1 — 1/2 turn #16 AWG, 3/8" I.D.
L2 — 4 turns #16 AWG, 3/8" I.D.

R1 — 15 ohms, 0.5 W carbon resistor

RFC1 — 1000 nH molded inductor
RFC2 — 6 turns #16 AWG, 3/8" I.D.
RFC3 — 560 nH molded inductor

Figure 28. 175 MHz Test Circuit (PT9734)