PT9700B Series

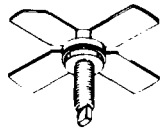
The RF Line
UHF Power Transistors

2

. . . designed primarily for wideband, large-signal output and driver amplifier stages in the 200 to 500 MHz frequency range.

- Designed for Class C or Class AB Power Amplifiers
- Specified 28 Volt, 400 MHz Characteristics:
  - Output Power — 5 to 30 Watts
  - Power Gain — 7 to 9 dB, Min
  - Collector Efficiency — 55 to 60%, Min
- Gold Metallization for Improved Reliability
- Diffused Ballast Resistors

TO 400 MHz
5 TO 30 WATTS
UHF POWER
TRANSISTORS
NPN SILICON



CASE 244C-01, STYLE 1
(.280 SOE)

MAXIMUM RATINGS

Rating	Symbol	9701B	9703B	9702B	9704B	Unit
Collector-Emitter Voltage	V_{CEO}	30				Vdc
Collector-Base Voltage	V_{CES}	60				Vdc
Emitter-Base Voltage	V_{EBO}	4				Vdc
Collector Current — Continuous	I_C	0.75	1.25	2	5	Adc
Total Device Dissipation @ T_C = 25°C Derate above 25°C	P_D	10 0.057	20 0.114	40 0.228	70 0.4	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	4.4	2.5	°C/W

ELECTRICAL CHARACTERISTICS

Characteristic		Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS						
Collector-Emitter Breakdown Voltage (I_C = 5 mA, I_B = 0)	PT9701B	$V_{(BR)CEO}$	30	—	—	Vdc
(I_C = 10 mA, I_B = 0)	PT9703B		30	—	—	
(I_C = 20 mA, I_B = 0)	PT9702B		30	—	—	
(I_C = 30 mA, I_B = 0)	PT9704B		30	—	—	
Collector-Emitter Breakdown Voltage (I_C = 5 mA, V_{BE} = 0)	PT9701B	$V_{(BR)CES}$	60	—	—	Vdc
(I_C = 10 mA, V_{BE} = 0)	PT9703B		60	—	—	
(I_C = 20 mA, V_{BE} = 0)	PT9702B		60	—	—	
(I_C = 30 mA, V_{BE} = 0)	PT9704B		60	—	—	
Emitter-Base Breakdown Voltage (I_E = 0.5 mA, I_C = 0)	PT9701B	$V_{(BR)EBO}$	4	—	—	Vdc
(I_E = 1 mA, I_C = 0)	PT9703B		4	—	—	
(I_E = 2 mA, I_C = 0)	PT9702B		4	—	—	
(I_E = 3 mA, I_C = 0)	PT9704B		4	—	—	
Collector Cutoff Current (V_{CB} = 30 V, I_E = 0)	PT9701B	I_{CBO}	—	—	0.5	mAdc
	PT9703B		—	—	1	
	PT9702B		—	—	2	
	PT9704B		—	—	3	

(continued)

ELECTRICAL CHARACTERISTICS — continued

Characteristic		Symbol	Min	Typ	Max	Unit
ON CHARACTERISTICS						
DC Current Gain (I_C = 100 mA, V_{CE} = 5 V)		h_{FE}	10	—	150	—
DYNAMIC CHARACTERISTICS						
Output Capacitance	PT9701B	C_{ob}	—	—	6	pF
(V_{CB} = 28 V, I_E = 0, f = 1 MHz)	PT9703B		—	—	12	
	PT9702B		—	—	24	
	PT9704B		—	—	36	
FUNCTIONAL TESTS						
Common-Emitter Amplifier Power Gain		G_{PE}				dB
(V_{CE} = 28 V, P_{out} = 5 W, f = 400 MHz)	PT9701B		9	—	—	
(V_{CE} = 28 V, P_{out} = 10 W, f = 400 MHz)	PT9703B		8.2	—	—	
(V_{CE} = 28 V, P_{out} = 20 W, f = 400 MHz)	PT9702B		7	—	—	
(V_{CE} = 28 V, P_{out} = 30 W, f = 400 MHz)	PT9704B		7	—	—	
Collector Efficiency		η_C				%
(V_{CE} = 28 V, P_{out} = 5 W, f = 400 MHz)	PT9701B		55	—	—	
(V_{CE} = 28 V, P_{out} = 10 W, f = 400 MHz)	PT9703B		60	—	—	
(V_{CE} = 28 V, P_{out} = 20 W, f = 400 MHz)	PT9702B		60	—	—	
(V_{CE} = 28 V, P_{out} = 30 W, f = 400 MHz)	PT9704B		60	—	—	
Load Mismatch		ψ				
(V_{CE} = 28 V, f = 400 MHz, Load VSWR = ∞:1, All Phase Angles)			No Degradation in Output Power			
P_{out} = 5 W	PT9701B					
P_{out} = 10 W	PT9703B					
P_{out} = 20 W	PT9702B					
P_{out} = 30 W	PT9704B					
Saturated Output Power	PT9701B	P_{sat}	6	—	—	W
(V_{CE} = 28 V, f = 400 MHz)	PT9703B		12	—	—	
	PT9702B		24	—	—	
	PT9704B		36	—	—	

TYPICAL CHARACTERISTICS

PT9701B — 5 WATTS

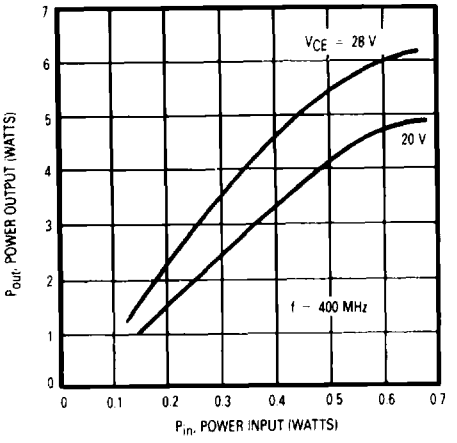


Figure 1. Output Power versus Input Power

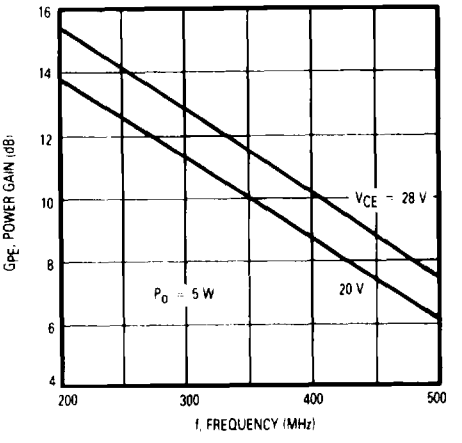


Figure 2. Power Gain versus Frequency

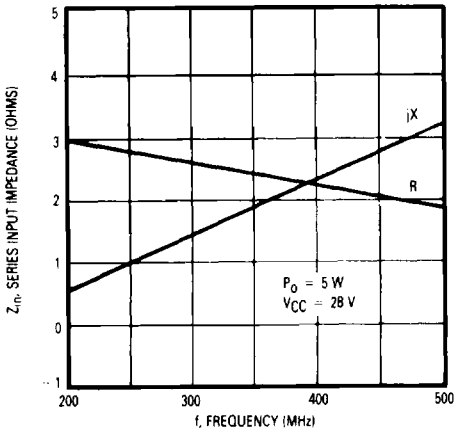


Figure 3. Series Input Impedance versus Frequency

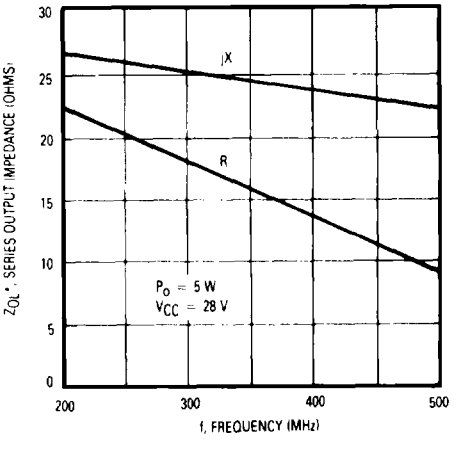


Figure 4. Series Output Impedance versus Frequency

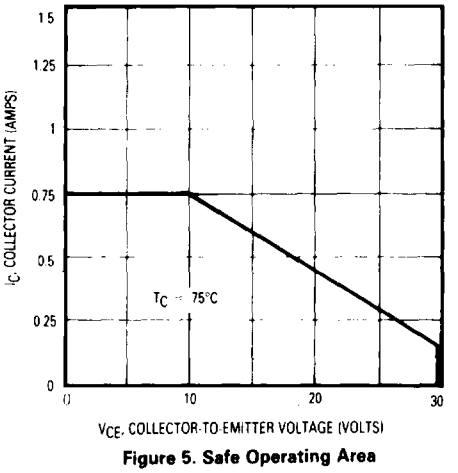


Figure 5. Safe Operating Area

PT9703B — 10 WATTS

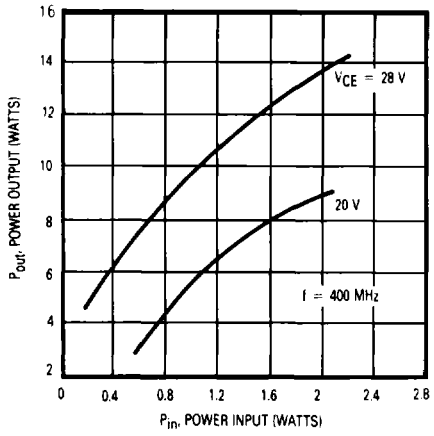


Figure 6. Output Power versus Input Power

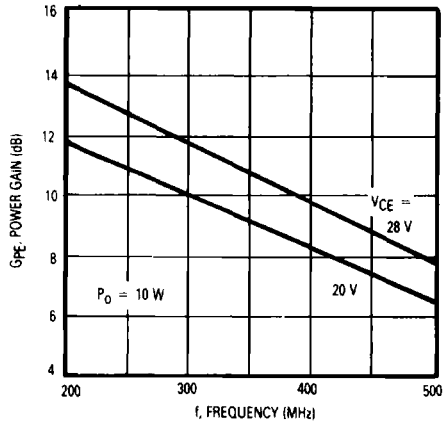


Figure 7. Power Gain versus Frequency

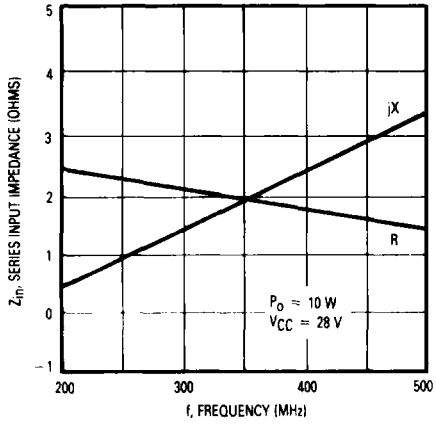


Figure 8. Series Input Impedance versus Frequency

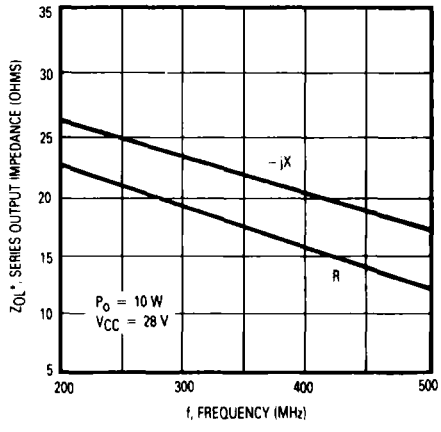


Figure 9. Series Output Impedance versus Frequency

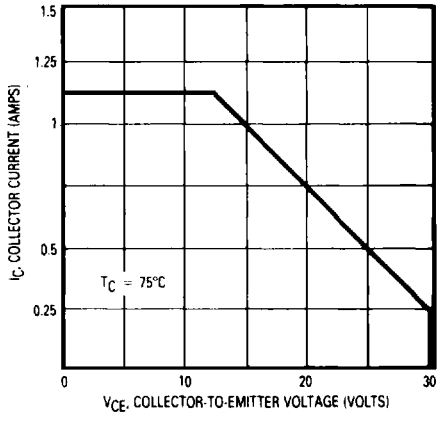


Figure 10. Safe Operating Area

TYPICAL CHARACTERISTICS

PT9702B — 20 WATTS

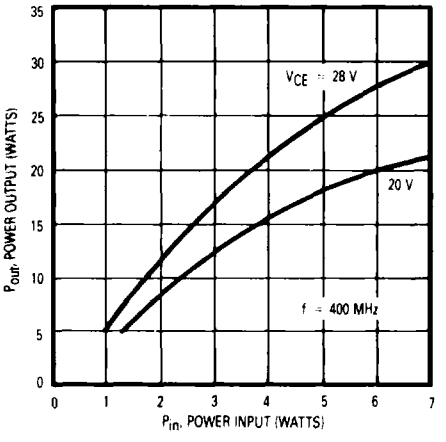


Figure 11. Output Power versus Input Power

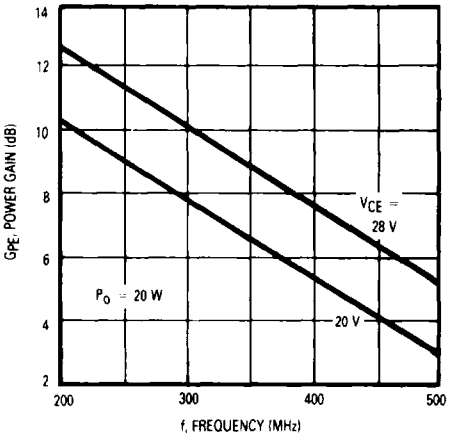


Figure 12. Power Gain versus Frequency

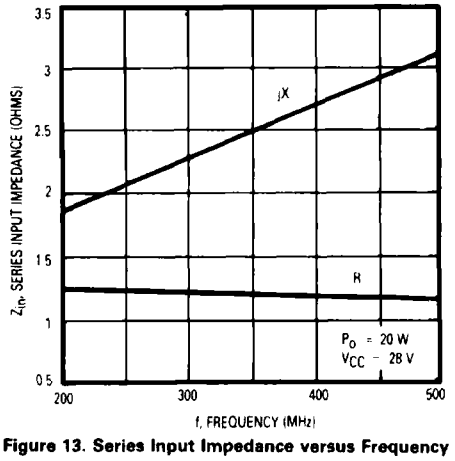


Figure 13. Series Input Impedance versus Frequency

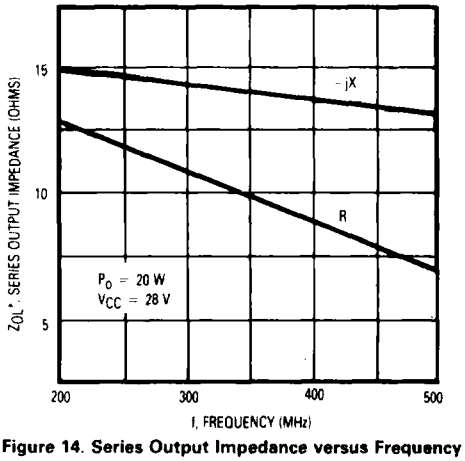


Figure 14. Series Output Impedance versus Frequency

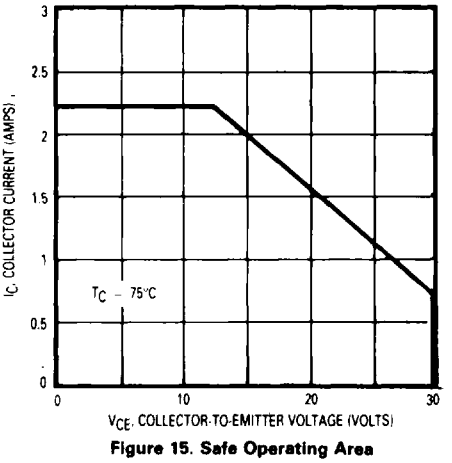


Figure 15. Safe Operating Area

TYPICAL CHARACTERISTICS

PT9704B — 30 WATTS

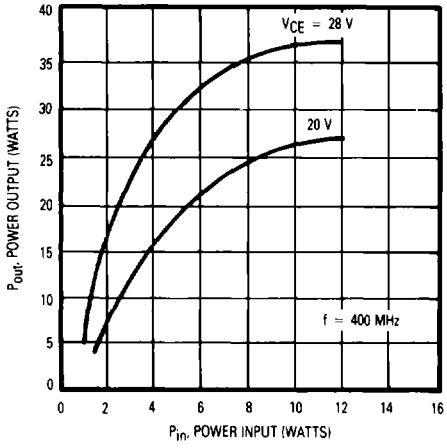


Figure 16. Output Power versus Input Power

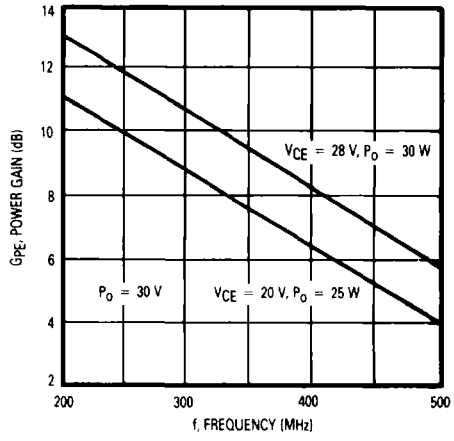


Figure 17. Power Gain versus Frequency

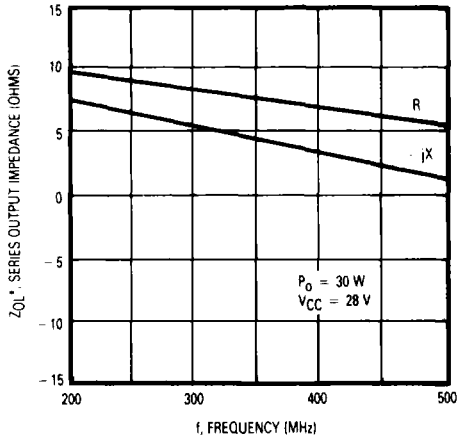


Figure 18. Output Impedance versus Frequency

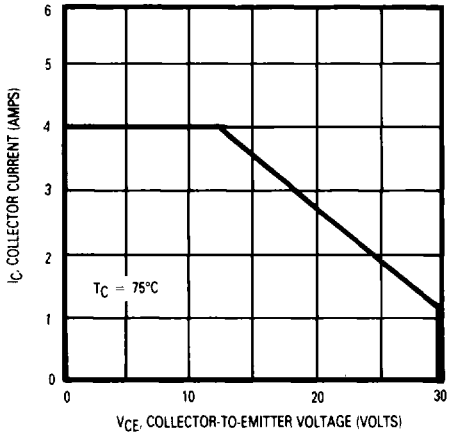
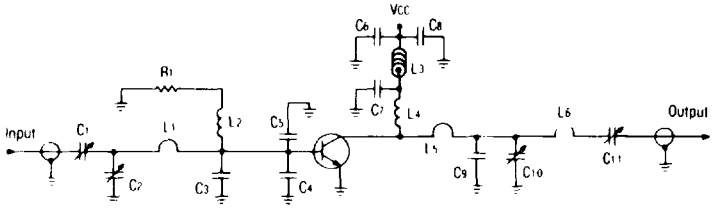


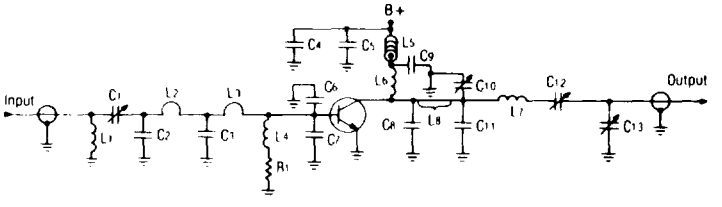
Figure 19. Safe Operating Area



C1 — 3–35 pF ARCO #403
C10 — 0.9–7 pF ARCO #400
C3, C9 — 10 pF UNELCO
C4, C5 — 30 pF UNELCO
C6, C7 — 1000 pF UNELCO
C8 — 100 μF electrolytic
C11 — 0–18 pF ARCO #402

L1 — #22 AWG, 1.2"
L2 — 4 turns #22 AWG, 0.1" I.D.
L3 — 3 Ferrite beads
L4 — 2 turns #22 AWG, 0.1" I.D.
L5 — #22 AWG, 0.5" hairpin
L6 — 3 turns #22 AWG, 0.1" I.D.
R1 — 1 ohm, 1/4 watt carbon resistor

Figure 20. 400 MHz Test Circuit (for PT9701B and PT9703B)



C1, C12 — 1.5–20 pF ARCO #402
C2 — 15 pF UNELCO
C3, C6, C7 — 30 pF UNELCO
C4, C9 — 1000 pF UNELCO
C5 — 100 μF electrolytic
C8 — 35 pF UNELCO
C10, C13 — 0.9–7 pF ARCO #400
C11 — 10 pF UNELCO

L1 — 6 turns #22 AWG, 1/8" I.D.
L2 — #22 AWG, 3/8" hairpin
L3 — 1/8" by 1/4" strap
L4 — 2 turns on resistor lead
L5 — 3 Ferrite beads
L6, L7 — 2 turns #22 AWG, 1/8" I.D.
L8 — #22 AWG, 0.3"
R1 — 1 ohm, 1/2 watt carbon resistor

Figure 21. 400 MHz Test Circuit (for PT9702B and PT9704B)