

MOTOROLA

SEMICONDUCTOR

TECHNICAL DATA

The RF Line

UHF Power Transistors

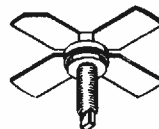
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... designed primarily for wideband, large-signal output and driver amplifier stages in the 200 to 500 MHz frequency range.

- 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

PT9700B Series

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				V _{dc}
Collector-Base Voltage	V _{CES}	60				V _{dc}
Emitter-Base Voltage	V _{EBO}	4				V _{dc}
Collector Current — Continuous	I _C	0.75	1.25	2	5	A _{dc}
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 _{θJC}	17.5	8.8	4.4	2.5	°C/W

ELECTRICAL CHARACTERISTICS

Characteristic	Symbol	Min	Typ	Max	Unit
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OFF CHARACTERISTICS

Collector-Emitter Breakdown Voltage (I _C = 5 mA, I _B = 0)	PT9701B	V _{(BR)CEO}	30	—	—	V _{dc}
(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	—	—	V _{dc}
(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	—	—	V _{dc}
(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	mA _{dc}
	PT9703B		—	—	1	
	PT9702B		—	—	2	
	PT9704B		—	—	3	

(continued)

MOTOROLA RF DEVICE DATA

2-1116

ELECTRICAL CHARACTERISTICS — continued

Characteristic	Symbol	Min	Typ	Max	Unit
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ON CHARACTERISTICS

DC Current Gain ($I_C = 100 \text{ mA}$, $V_{CE} = 5 \text{ V}$)	h_{FE}	10	—	150	—
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DYNAMIC CHARACTERISTICS

Output Capacitance ($V_{CB} = 28 \text{ V}$, $I_E = 0$, $f = 1 \text{ MHz}$)	PT9701B PT9703B PT9702B PT9704B	C_{ob}	— — — —	— — — —	6 12 24 36	pF
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FUNCTIONAL TESTS

Common-Emitter Amplifier Power Gain ($V_{CE} = 28 \text{ V}$, $P_{out} = 5 \text{ W}$, $f = 400 \text{ MHz}$) ($V_{CE} = 28 \text{ V}$, $P_{out} = 10 \text{ W}$, $f = 400 \text{ MHz}$) ($V_{CE} = 28 \text{ V}$, $P_{out} = 20 \text{ W}$, $f = 400 \text{ MHz}$) ($V_{CE} = 28 \text{ V}$, $P_{out} = 30 \text{ W}$, $f = 400 \text{ MHz}$)	PT9701B PT9703B PT9702B PT9704B	G_{PE}	9 8.2 7 7	— — — —	— — — —	dB
Collector Efficiency ($V_{CE} = 28 \text{ V}$, $P_{out} = 5 \text{ W}$, $f = 400 \text{ MHz}$) ($V_{CE} = 28 \text{ V}$, $P_{out} = 10 \text{ W}$, $f = 400 \text{ MHz}$) ($V_{CE} = 28 \text{ V}$, $P_{out} = 20 \text{ W}$, $f = 400 \text{ MHz}$) ($V_{CE} = 28 \text{ V}$, $P_{out} = 30 \text{ W}$, $f = 400 \text{ MHz}$)	PT9701B PT9703B PT9702B PT9704B	η_c	55 60 60 60	— — — —	— — — —	%
Load Mismatch ($V_{CE} = 28 \text{ V}$, $f = 400 \text{ MHz}$, Load VSWR = $\infty:1$, All Phase Angles) $P_{out} = 5 \text{ W}$ $P_{out} = 10 \text{ W}$ $P_{out} = 20 \text{ W}$ $P_{out} = 30 \text{ W}$	PT9701B PT9703B PT9702B PT9704B	ϕ	No Degradation in Output Power			
Saturated Output Power ($V_{CE} = 28 \text{ V}$, $f = 400 \text{ MHz}$)	PT9701B PT9703B PT9702B PT9704B	P_{sat}	6 12 24 36	— — — —	— — — —	W

TYPICAL CHARACTERISTICS

PT9701B — 5 WATTS

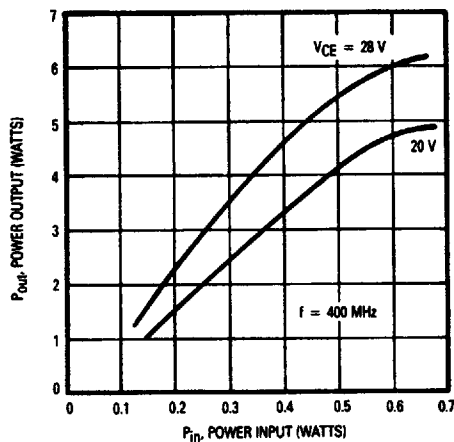


Figure 1. Output Power versus Input Power

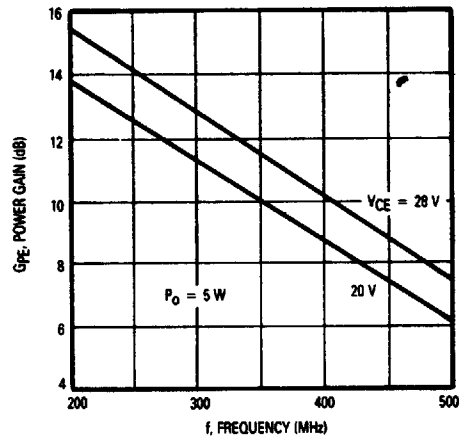


Figure 2. Power Gain versus Frequency

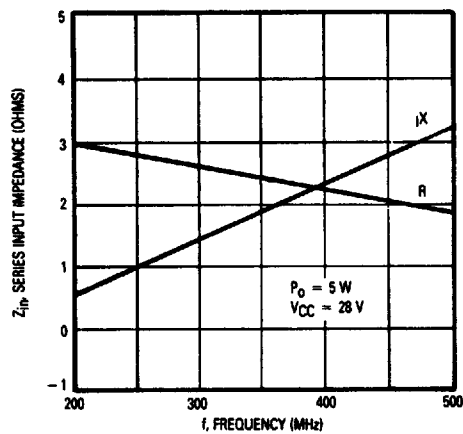


Figure 3. Series Input Impedance versus Frequency

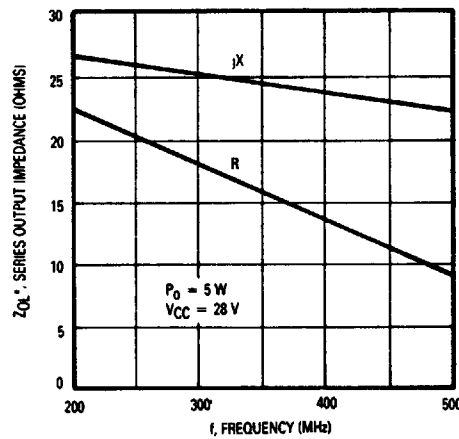


Figure 4. Series Output Impedance versus Frequency

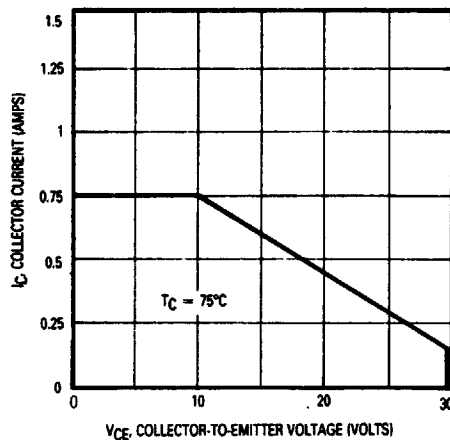


Figure 5. Safe Operating Area

PT9703B — 10 WATTS

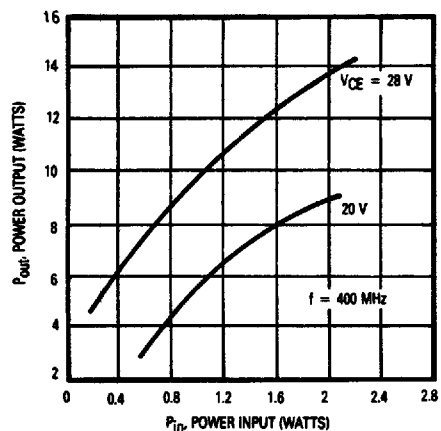


Figure 6. Output Power versus Input Power

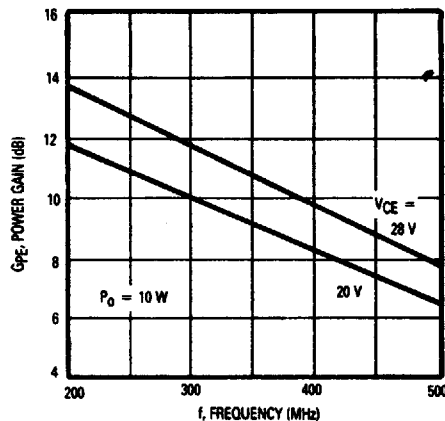


Figure 7. Power Gain versus Frequency

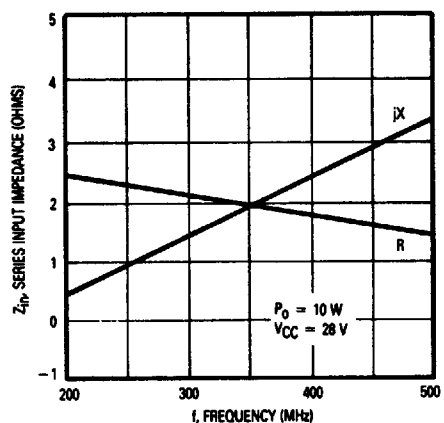


Figure 8. Series Input Impedance versus Frequency

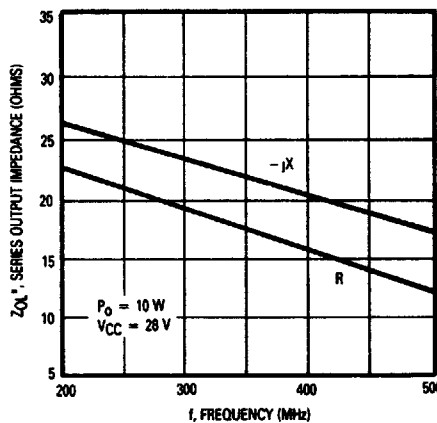


Figure 9. Series Output Impedance versus Frequency

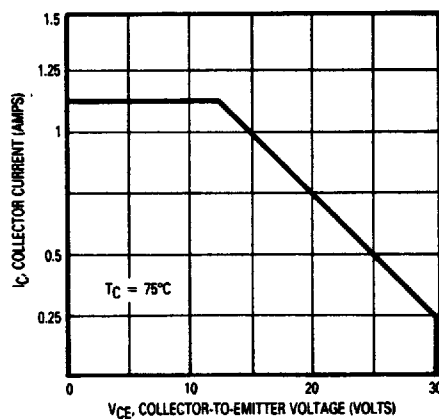


Figure 10. Safe Operating Area

PT9700B Series

TYPICAL CHARACTERISTICS

T-33-01

PT9702B — 20 WATTS

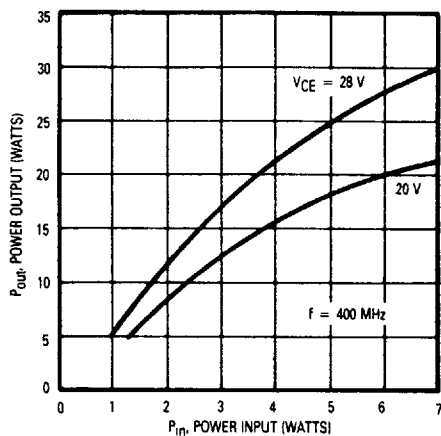


Figure 11. Output Power versus Input Power

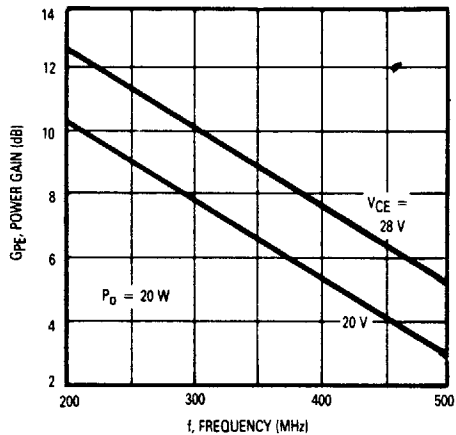


Figure 12. Power Gain versus Frequency

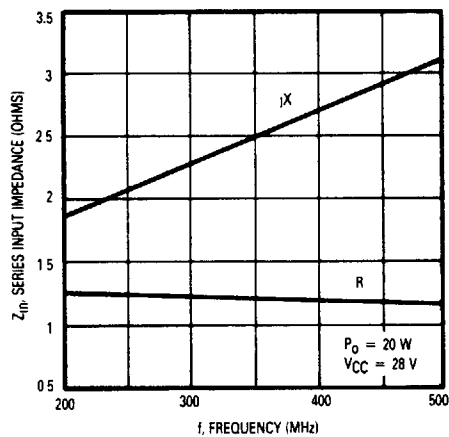


Figure 13. Series Input Impedance versus Frequency

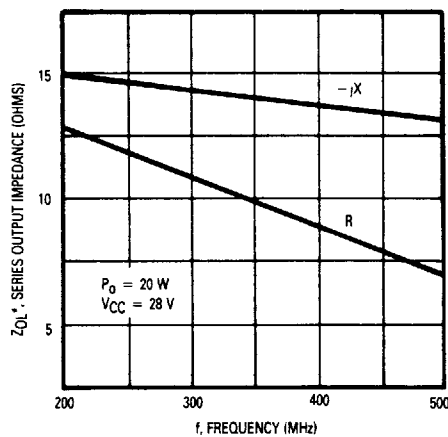


Figure 14. Series Output Impedance versus Frequency

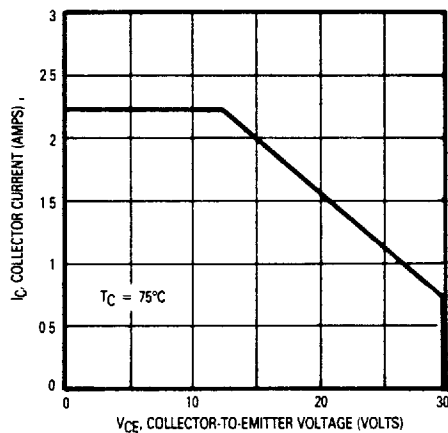


Figure 15. Safe Operating Area

PT9704B — 30 WATTS

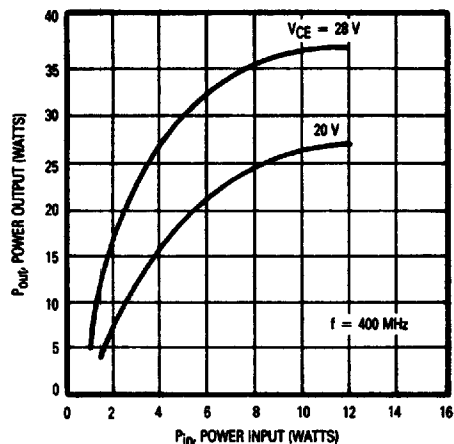


Figure 16. Output Power versus Input Power

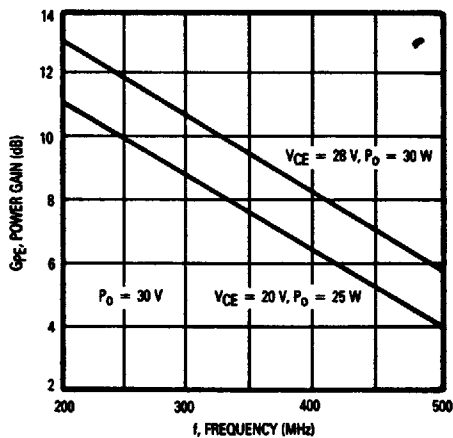


Figure 17. Power Gain versus Frequency

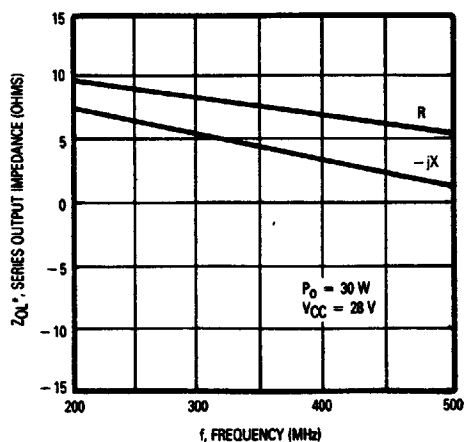


Figure 18. Output Impedance versus Frequency

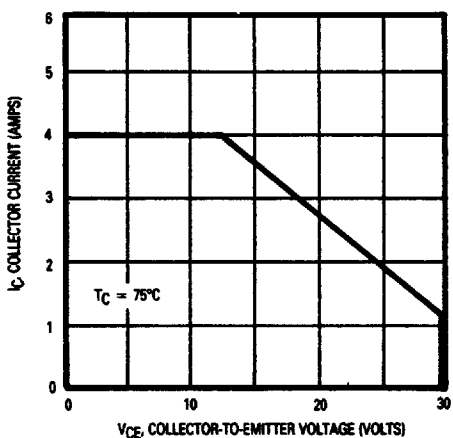


Figure 19. Safe Operating Area

