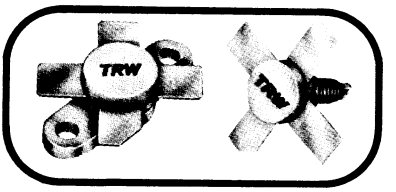
SSB Power Transistors

PT 9780/A - 100 W
PT 9783/A - 50 W
PT 9788/A - 20 W
PT 9787/A - 8 W
∞ VSWR

The PT 9780 SSB/VHF Series features both high gain and high power, providing the desired power output with fewer devices. These power transistors are ballasted for ruggedness and will withstand infinite VSWR at all phase angles. A unique emitter structure provides high gain with wider emitter and base fingers resulting in high reliability. Diffused ballast resistors design enables operation at Class A, AB, and C. These rugged units are suitable for both narrow band and broadband SSB and VHF communications and instrumentation service. They are suitable for the following applications :

2-30 MHz	SSB, FM, AM
2-76 MHz	SSB, FM, AM
2-100 MHz	Linear Class A, SSB, FM, AM



Electrical Characteristics (T_{flange} = 25 °C)

	SYMBOL	CHARACTERISTICS	CONDITIONS	PT 9787/A	PT 9788/A	PT9783 A	PT 9780/A	UNIT
D C Tests	BV_{CBO}	Collector to Base Breakdown Voltage	I_C = 100 mA, I_E = 0	70	70	70	70	V Min
	BV_{CEO}	Collector to Emitter Breakdown Voltage	I_C = 50 mA, I_B = 0	40	40	40	40	V Min
	I_{CES}	Collector - Emitter Cutoff Current	V_{CE} = 28 V	25	50	100	100	mA Max
	I_{EBO}	Emitter - Base Leakage Current	V_{BE} = 4 V	1.0	1.0	2.5	5.0	mA Max
	H_{FE}	D.C Current Gain	V_{CE} = 5 V	10-100	10-100	10-100	10-100	
	ΔH_{FE}	Matched Pairs	I_C = 1 A	Δ 5	Δ 5	Δ 5	Δ 5	
R F Tests	G_P	Power Gain	V_{CE} = 28 V, F = 28 MHz, PEP: 8 W / 20 W / 50 W / 100 W	14	14	14	14	dB Min
	IMD	Intermodulation Distortion	V_{CE} = 28 V, F = 28 MHz, PEP: 8 W / 20 W / 50 W / 100 W	— 32	— 32	— 32	— 32	dB Max
	VSWR	Mismatch Tolerance	V_{CE} = 28 V, F = 28 MHz, PEP: 8 W / 20 W / 50 W / 100 W	∞	∞	∞	∞	—

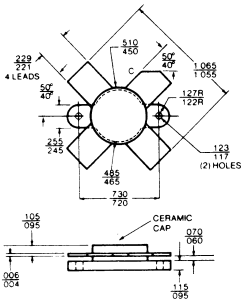
Absolute Maximum Ratings (T_{CASE} = 25°C)

Part Number*	V_{CBO} Volts	V_{CEO} Volts	V_{EBO} Volts	I_C Max Amps	P_T @ 25°C Watts	θ_{JC} °C/W	$T_{STORAGE}$ °C
PT9780	70	40	4.0	20.0	350	0.50	-65 to 200
PT9780A	70	40	4.0	20.0	250	0.70	-65 to 200
PT9783	70	40	4.0	10.0	175	1.0	-65 to 200
PT9783A	70	40	4.0	10.0	100	1.75	-65 to 200
PT9788/A	70	40	4.0	4.0	70	2.5	-65 to 200
PT9787/A	60	40	4.0	2.0	25	7.0	-65 to 200

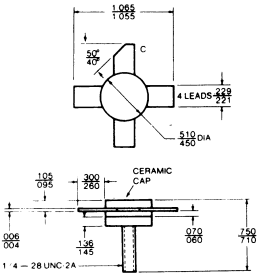
*The "A" suffix on part number denotes stud package.

Package Outlines

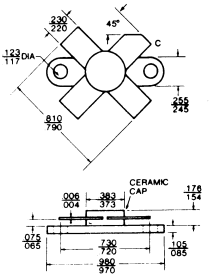
PT9780



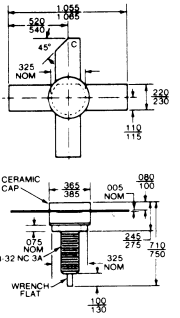
PT9780A



PT9783
PT9788
PT9787



PT9783A
PT9788A
PT9787A

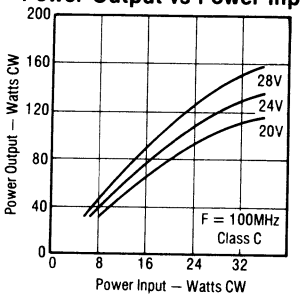


Mechanical Specifications

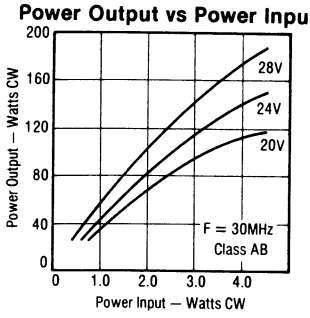
- Stud Torque, 10 in. lbs., max.
- Lead Soldering, 300°C, 15 sec. max.
- Lead Fatique, 3 bends @ 90°
- Flange Flatness, 0.0008 in. typ.

PT9780 and PT9780A

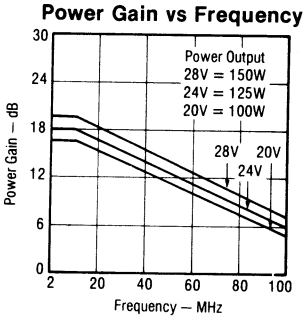
Power Output vs Power Input



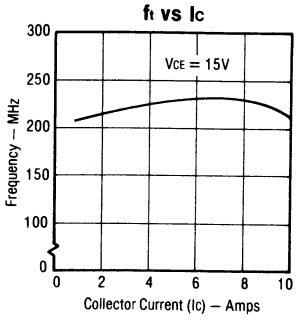
Power Output vs Power Input



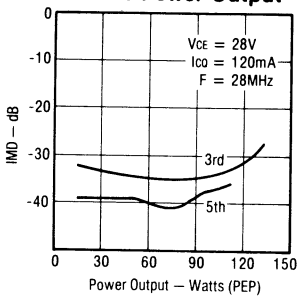
Power Gain vs Frequency



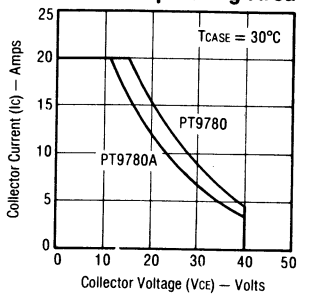
ft vs Ic



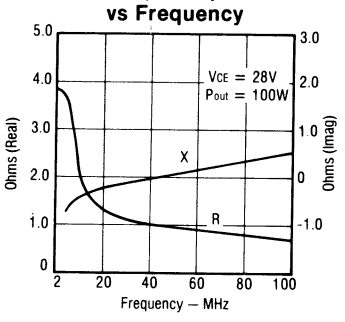
IMD vs Power Output



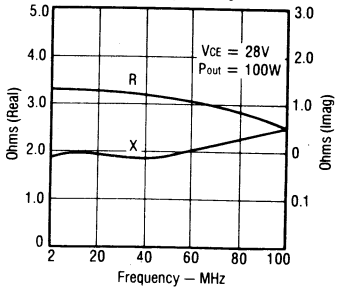
DC Safe Operating Area



Series Input Impedance vs Frequency

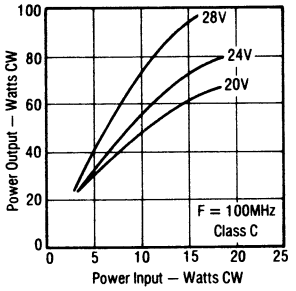


Series Load Impedance vs Frequency

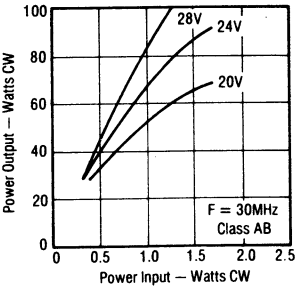


PT9783 and PT9783A

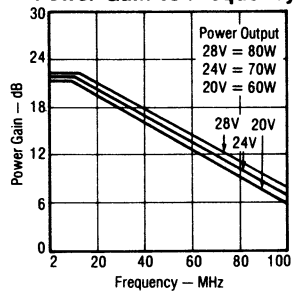
Power Output vs Power Input



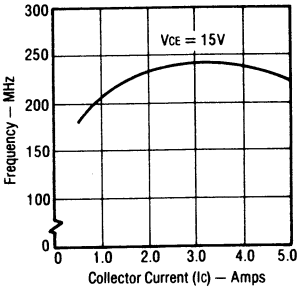
Power Output vs Power Input



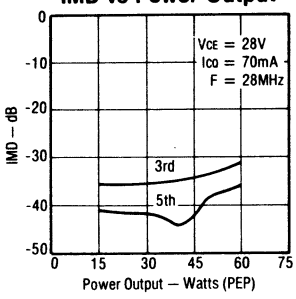
Power Gain vs Frequency



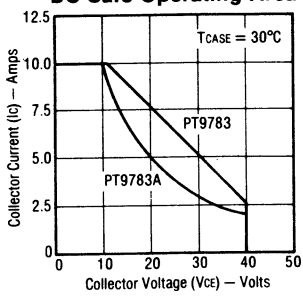
ft vs Ic



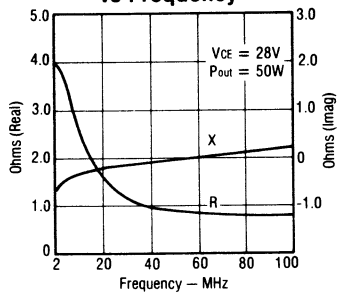
IMD vs Power Output



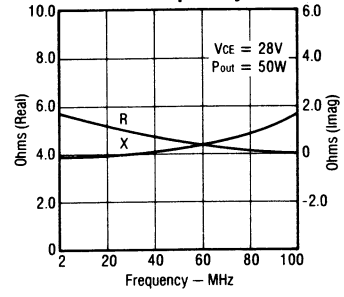
DC Safe Operating Area



Series Input Impedance vs Frequency

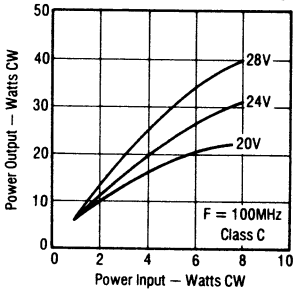


Series Load Impedance vs Frequency

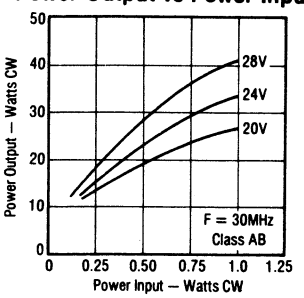


PT9788 and PT9788A

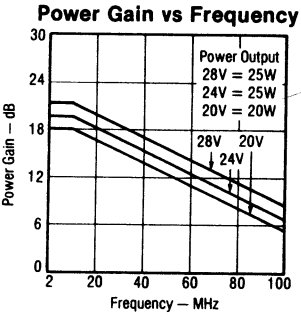
Power Output vs Power Input



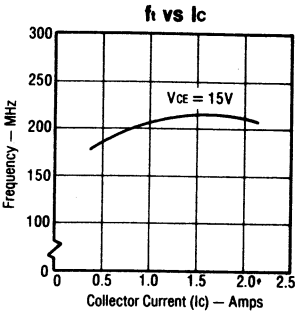
Power Output vs Power Input



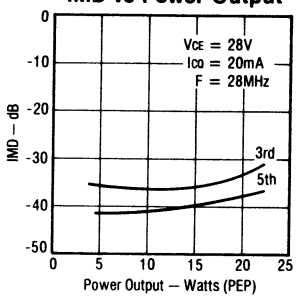
Power Gain vs Frequency



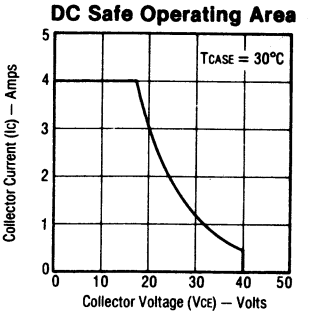
ft vs Ic



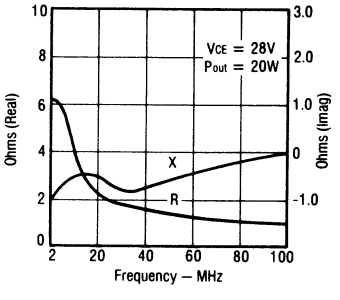
IMD vs Power Output



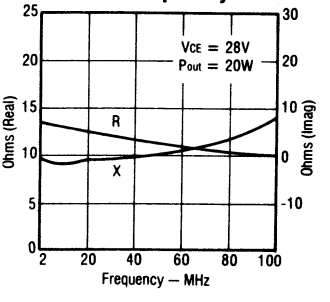
DC Safe Operating Area



Series Input Impedance vs Frequency

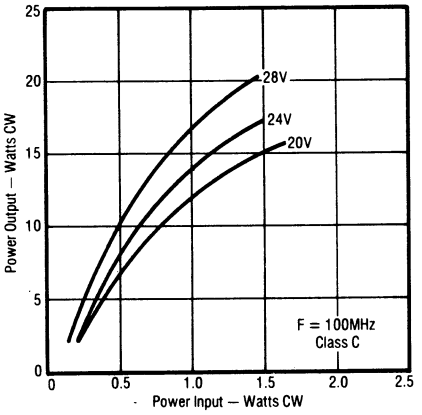


Series Load Impedance vs Frequency

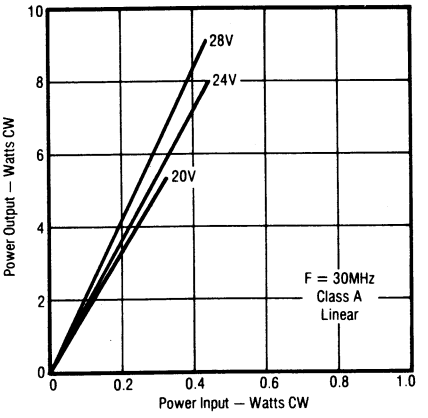


PT9787 and PT9787A

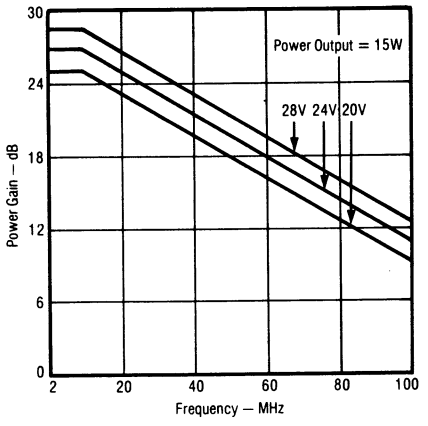
Power Output vs Power Input



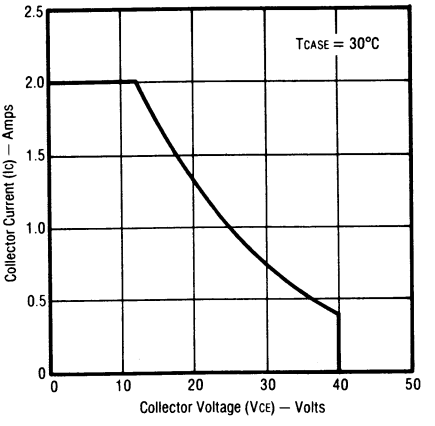
Power Output vs Power Input



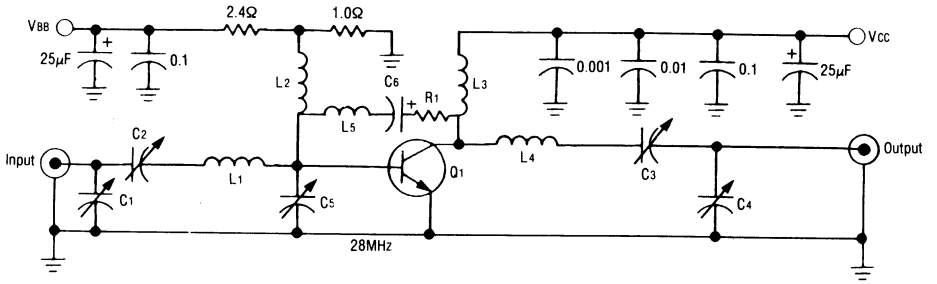
Power Gain vs Frequency



DC Safe Operating Area

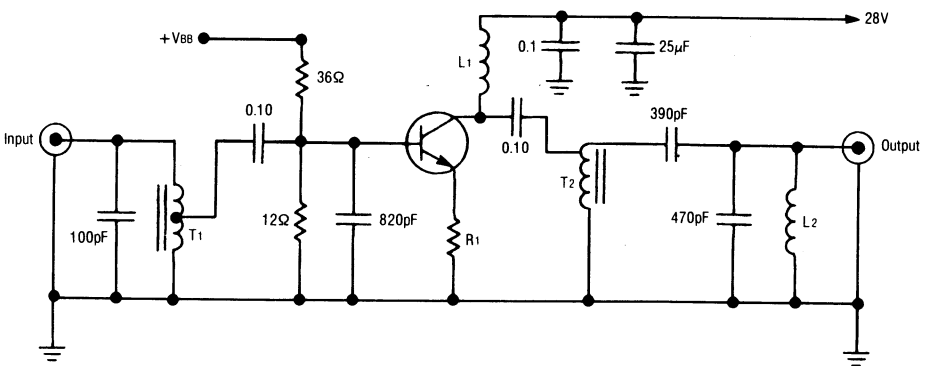


28MHz Test Circuit for PT9780/A, PT9783/A, PT9788/A



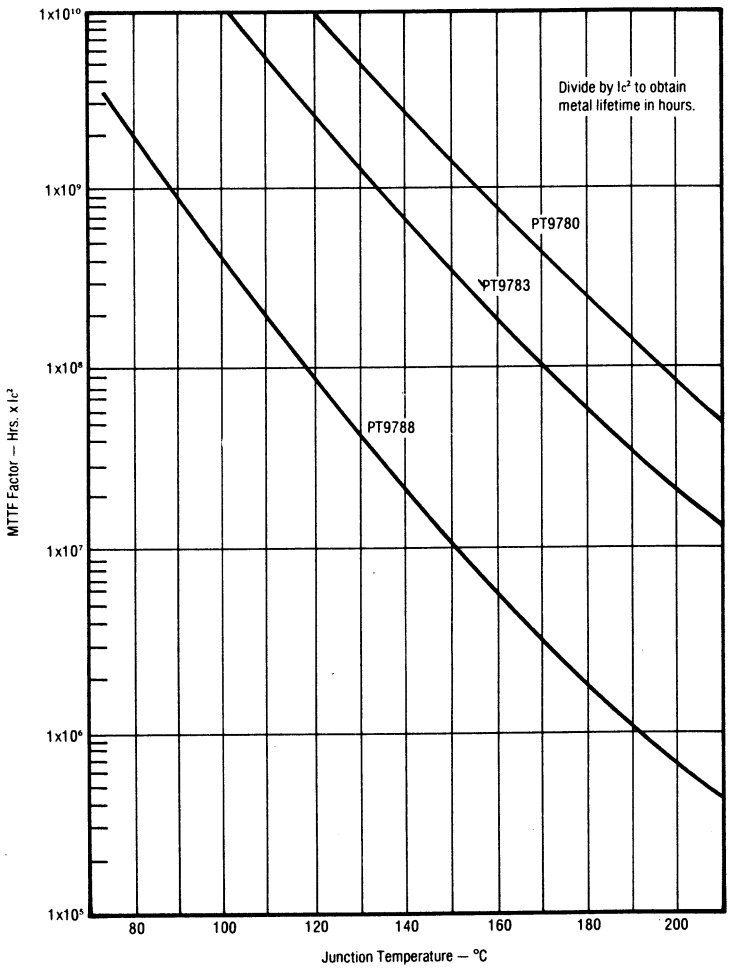
C_1	ARCO #467, 110-580pF
$C_{2,3,4}$	ARCO #466, 80-480pF
C_5	ARCO #469, 170-780pF
C_6	5μF, 50V ELE
R_1	50Ω, 2W
$L_{1,4}$	5 turns #14 tinned copper, 0.5" mean diameter, 1 equals 1.0"
L_2	10 turns #18AWG, 0.5" mean diameter
L_3	4 turns #20AWG through two Stackpole #23-1838 cores
L_5	6.8μH molded
V_{CC}	28V
V_{BB}	1.6 volts (Ic[Quies] = 100mA)

28MHz Test Circuit for PT9787 and PT9787A



R_1	1.0Ω on each emitter (0.5Ω)
T_1	6 turns, #22 wire tapped 2 turns from ground, on Fairrite Products #43 bead.
T_2	4 turns, #20 wire tapped 3½ turns from ground, on Fairrite Products #43 bead.
L_1	1.0μH
L_2	0.05μH

MTTF Factor
vs Junction Temperature



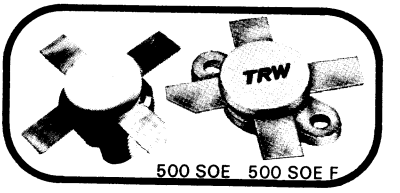
PT 9790
PT 9790 A

SSB POWER TRANSISTORS

The PT 9790 SSB/VHF Series features both high gain and high power, providing the desired power output with fewer devices. These power transistors are ballasted for ruggedness and will withstand infinite VSWR at all phase angles. A unique emitter structure provides high gain with wider emitter and base fingers resulting in high reliability. Diffused ballast resistor design enables operation at Class A, AB, and C. These rugged units are suitable for both narrow band and broadband SSB and VHF communications and instrumentation service. They are suitable for the following applications :

2-30 MHz	SSB, FM, AM
2-76 MHz	SSB, FM, AM
2-100 MHz	Linear Class A, SSB, FM, AM

HF - SSB
150 W - 50 V
∞ VSWR

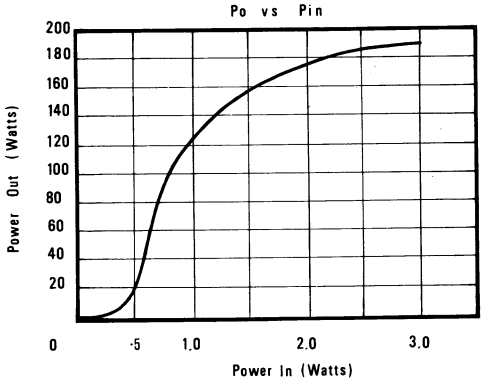


500 SOE 500 SOE F

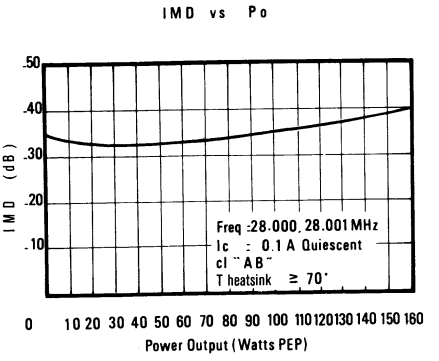
Electrical characteristics (25 °C)

	SYMBOL	CHARACTERISTICS	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
DC Tests	BV_{CBO}	Collector - Base Breakdown	I_C = 100 mA I_E = 0	110			V
	BV_{CEO}	Collector - Emitter Breakdown	I_C = 100 mA I_B = 0	55			V
	BV_{CER}	Collector - Emitter Breakdown	I_C = 100 mA I_B = 0 R_{BE} = 10 Ω	110			V
	BV_{EBO}	Emitter - Base Breakdown	I_E = 20 mA I_C = 0	4.0			V
	H_{FE}	D.C Current Gain	V_{CE} = 6 V I_C = 1.4 A	15		50	
	ΔH_{FE}	Matched Pairs	V_{CE} = 6 V I_C = 1.4 A			Δ 5	
RF Tests	P_G	Power Gain	V_{CE} = 50 V F = 28 MHz P_{out} = 150 W	15	17		dB
	IMD	Intermodulation Distortion	V_{CE} = 50 V F = 28 MHz P_{out} = 150 W PEP		— 35	— 32	dB
	VSWR	Mismatch Tolerance	V_{CE} = 50 V F = 28 MHz P_{out} = 150 W PEP			∞ 3 sec any angle	
Operating	I_{Cmax}	Collector Current				20	A
	θ_{j-c}	Thermal Resistance Junction - Case				0.5	°C/W
	θ_{C-H}	Thermal Resistance Case - Case - Heatsink				0.2	°C/W
	T_{stg}	Storage Temperature		— 65		+ 200	°C

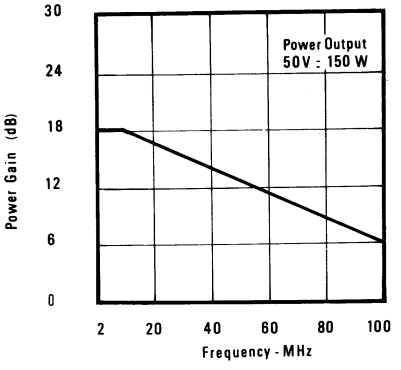
Power Out Put vs Power input



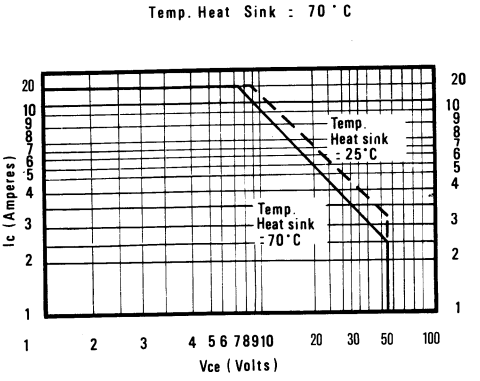
I M D vs Power Output



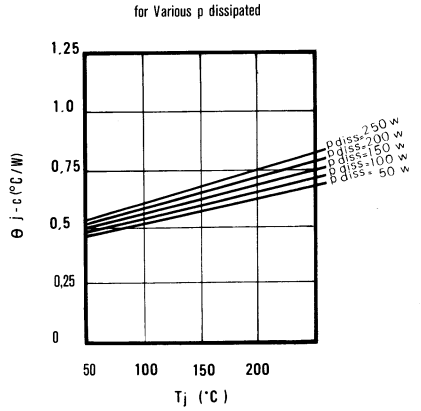
Power Gain vs Frequency



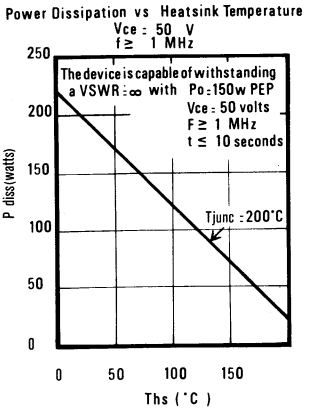
D.C. Safe Operating Area



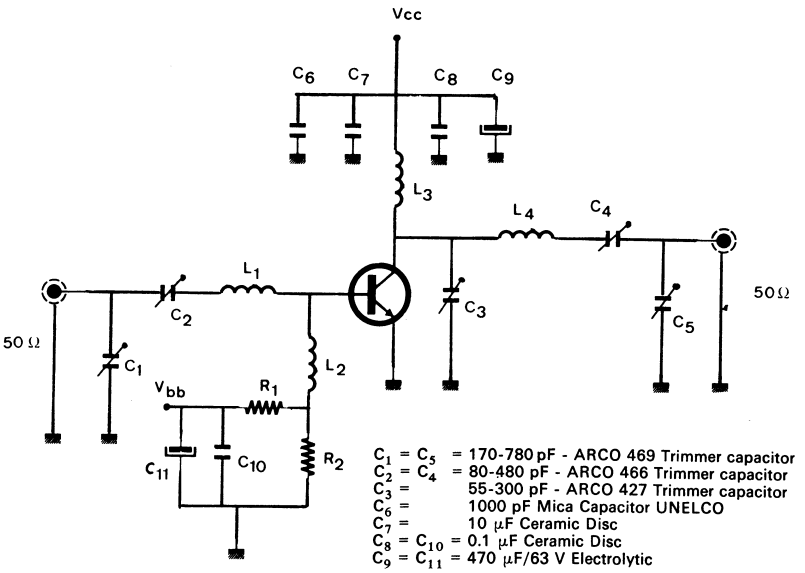
Thermal Resistance VS Junction Temperature



Power Dissipation vs Heatsink Temperature



28 MHz TEST CIRCUIT

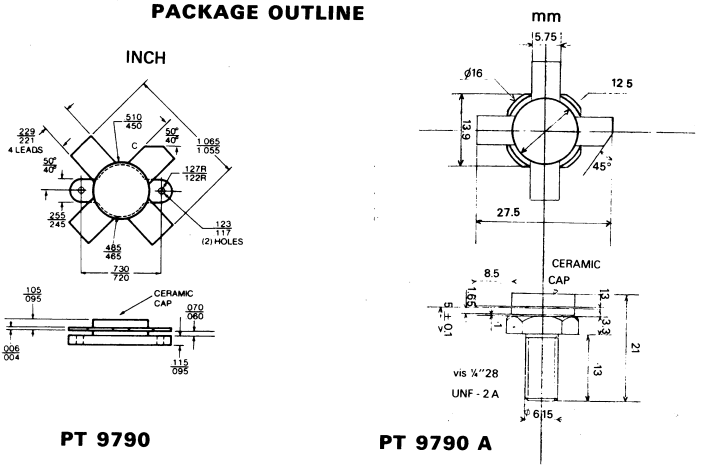


$C_1 = C_5$ = 170-780 pF - ARCO 469 Trimmer capacitor
$C_2 = C_4$ = 80-480 pF - ARCO 466 Trimmer capacitor
C_3 = 55-300 pF - ARCO 427 Trimmer capacitor
C_6 = 1000 pF Mica Capacitor UNELCO
C_7 = 10 µF Ceramic Disc
$C_8 = C_{10}$ = 0.1 µF Ceramic Disc
$C_9 = C_{11}$ = 470 µF/63 V Electrolytic

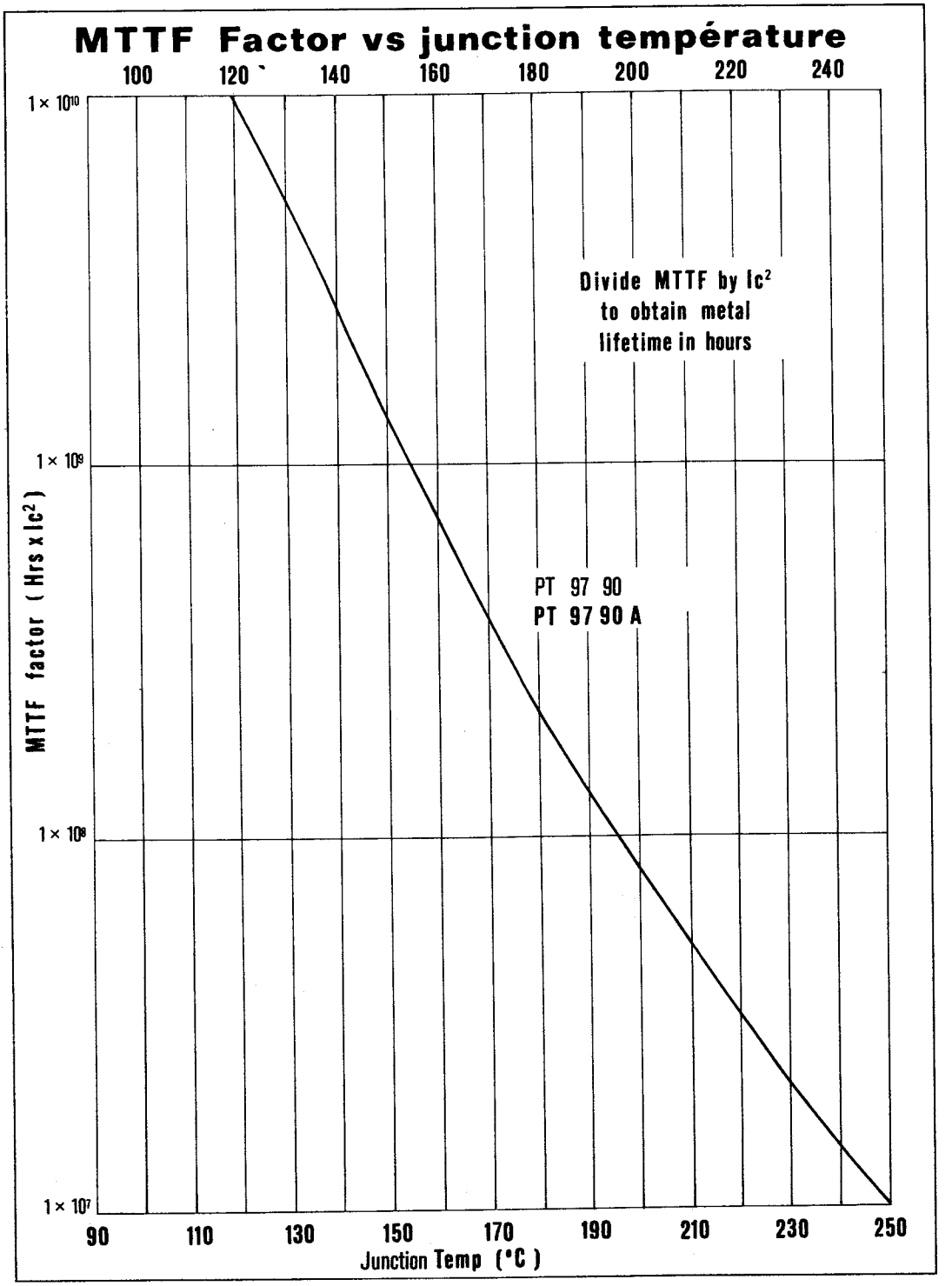
L_1 = 5 turns 15/10 mm Silvered wire - 10 mm I.D. - 25 mm length
L_2 = 10 turns 8/10 mm Enamelled wire - 10 mm I.D.
L_3 = 4 turns 12/10 mm Enamelled wire - 10 mm I.D. - 10 mm length
L_4 = 7 turns 15/10 mm Enamelled wire - 10 mm I.D. - 20 mm length

R_1 = 1 Ω - 2 W
R_2 = 2.7 Ω - 2 W

PACKAGE OUTLINE



PT 9790 PT 9790 A


MTTF Factor vs junction température
100
120
140
160
180
200
220
240
1 × 10¹⁰
1 × 10⁹
1 × 10⁸
1 × 10⁷
MTTF factor (Hrs x Ic²)
Divide MTTF by Ic²
to obtain metal
lifetime in hours
PT 97 90
PT 97 90 A
90
110
130
150
170
190
210
230
250
Junction Temp (°C)