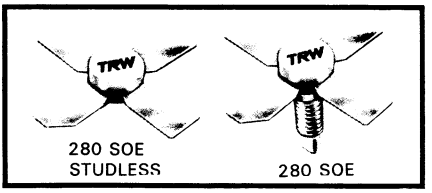
7.5 Volts Transistor

- 1.5 W
- 88 MHz
- 13 dB Gain



Using the latest in TRW technology, this device has been specifically designed and characterized for 7.5 V operation.

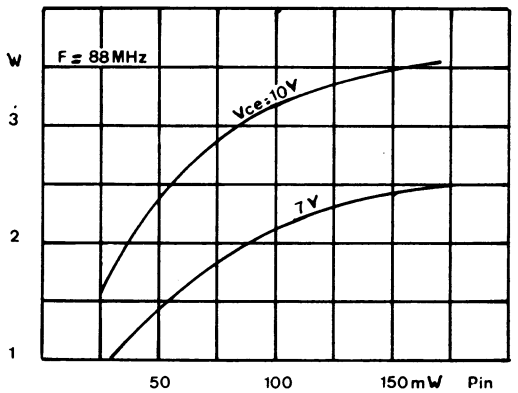
It is ideally suited for use in pocketphone where low battery voltage is used.

Preliminary Electrical Characteristics (T_{case} = 25 °C)

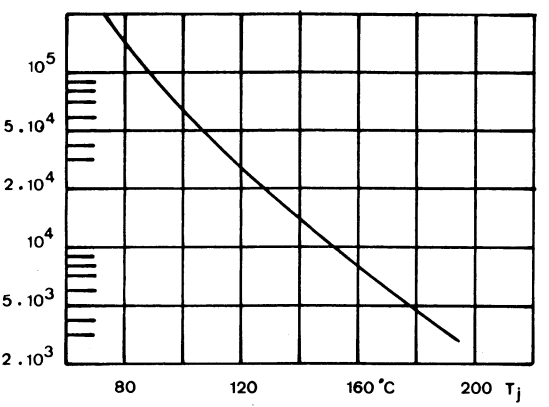
	SYMBOL	CHARACTERISTICS	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
DC TEST	BV_{EBO}	Emitter Base Breakdown Voltage	I_E = 2 mA I_C = 0	4			V
	BV_{CEO}	Collector Emitter Breakdown Voltage	I_C = 50 mA I_B = 0	16			V
	BV_{CBO}	Collector Base Breakdown Voltage	I_C = 10 mA I_E = 0	36			V
	I_{CBO}	Collector Cutoff Current	V_{CB} = 15 V I_E = 0			1	mA
	H_{FE}	DC Current Gain	V_{CE} = 5 V I_C = 200 mA	20			—
RF TEST	P_{GAIN}	Power Gain	V_{CE} = 7.5 V F = 88 MHz P_{in} = 0.075 W	1.5			W
	η	Efficiency	V_{CE} = 7.5 V F = 88 MHz P_{out} = 1.5 W	50	all phase angles : 1		%
	Load VSWR	Mismatch Tolerance	V_{CE} = 10 V F = 88 MHz P_{out} = 1.5 W				
	Z_{in}	Common Emitter Amplifier Input Impedance	V_{CE} = 7.5 V F = 88 MHz P_{in} = 0.075 W		2.54 — j 3.5		Ω
	Z_{Load}	Common Emitter Amplifier Load Impedance	V_{CE} = 7.5 V F = 88 MHz P_{out} = 1.5 W		21.38 + j 10.3		Ω
	C_{OB}	Collector Base Capacitance	V_{CB} = 15 V F = 1 MHz		13	17	pF
OPERATING THERMAL	I_C	Continuous Collector Current				1.7	A
	$\theta_{j\text{-}C}$	Thermal Resistance	T_C = 25 °C			10	°C/W
	T_{STG}	Storage Temperature and Junction Temperature		— 65°		200°	°C
	P_D	Power Dissipation	T_C = 25 °C			17.5	W

B

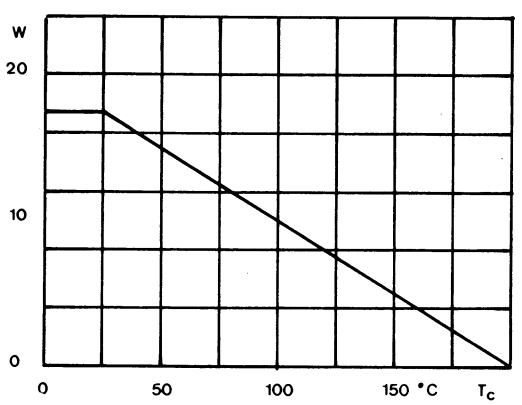
Output Power vs Input Power and Voltage Supply



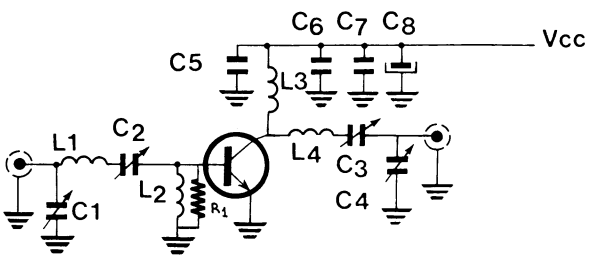
MTTF Factor vs Junction Temperature



Power - Temperature Operating Curve



88 MHz TEST CIRCUIT



$C_1 = C_2 = C_3$ = 24-200 pF ARCO 425
C_4 = 7-100 pF ARCO 423
C_5 = 1000 pF mica capacitor UNELCO
C_6 = 10 nF ceramic disc
C_7 = 0.1 µF ceramic disc
C_8 = 100 µF/35 V electrolytic

$L_1 = L_4$ = 4 turns 14 AWG 1/2" I.D.
L_2 = 0.47 µH
L_3 = 6 turns 14 AWG 1/2" I.D. Close Wound

R_1 = 47 ohms

7.5 Volts Transistor

- 0.2 W
- 400-512 MHz
- 13 dB Gain

200 SOE STUDLESS

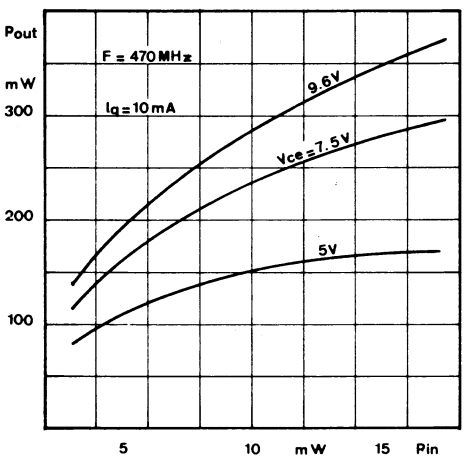
B

The latest in the TRW RF transistor, this device has been specifically designed and characterized for 7.5 V operation. It is ideally suited for use in pocketphones where low battery voltage is used.

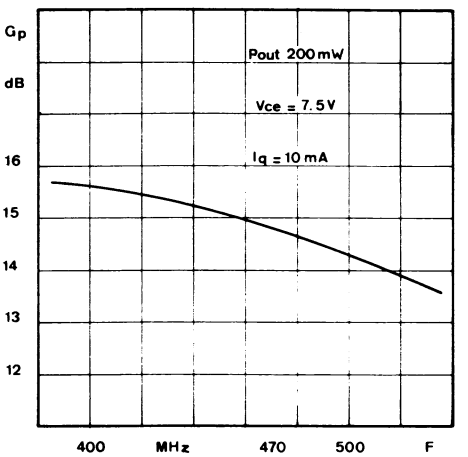
PRELIMINARY

	SYMBOL	CHARACTERISTICS	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
DC Test	BV_{EBO}	Emitter - Base Breakdown Voltage	I_E = 1 mA I_C = 0	4			V
	BV_{CEO}	Collector - Emitter Breakdown Voltage	I_C = 5 mA I_B = 0	18			V
	BV_{CBO}	Collector - Base Breakdown Voltage	I_C = 2 mA I_E = 0	40			V
	I_{CBO}	Collector Cutoff Current	V_{CB} = 15 V I_E = 0			0.5	mA
	H_{FE}	D.C Current Gain	V_{CE} = 5 V I_C = 50 mA	20			—
RF Test	P_{GAIN}	Power Gain	F = 470 MHz I_q = 10 mA V_{CE} = 7.5 V P_{in} = 10 mW V_{CE} = 9.6 V P_{in} = 10 mW	0.175 0.200	0.230 0.290		W
	η	Efficiency	F = 470 MHz I_q = 10 mA V_{CE} = 7.5 V Rated Output Power	35	40		%
	Z_{in}	Common Emitter Amplifier Input Impedance	F = 470 MHz AB Class V_{CE} = 7.5 V P_{in} = 10 mW		5 + j 0.5		Ω
	Z_{Load}	Common Emitter Amplifier Load Impedance	F = 470 MHz AB Class V_{CE} = 7.5 V P_{out} = 0.2 W		47 + j 45		Ω
	C_{OB}	Collector - Base Capacitance	V_{CB} = 10 V F = 1 MHz		1.6	2.5	pF
Operating	I_C	Continous Collector Current				0.2	A
	θ_{j-C}	Thermal Resistance	T_C = 25 °C			60	°C/W
	T_{STG}	Storage Temperature and Junction Temperature		— 65°		200°	°C
	P_D	Power Dissipation	T_C = 25 °C			2.9	W

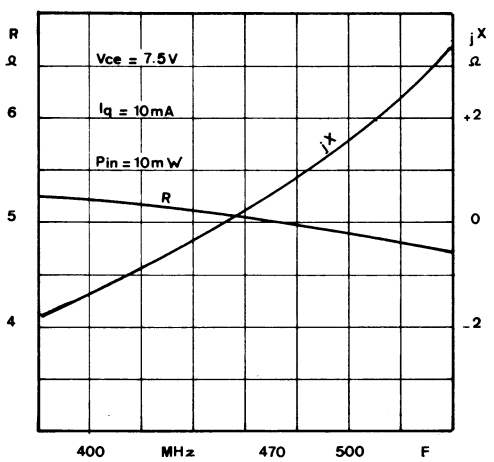
Output Power vs Input Power and V_{CE}



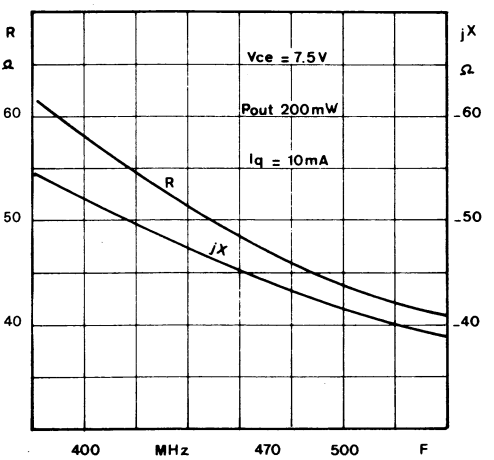
Power Gain vs Frequency



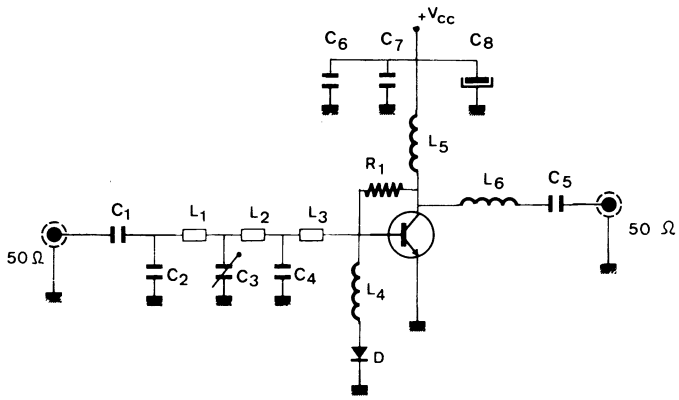
Input Impedance vs Frequency



Output Impedance vs Frequency



400-512 MHz TEST CIRCUIT



C_1 = 27 pF Ceramic 632 RTC
C_2 = 8.2 pF Ceramic 632 RTC
C_3 = 3-20 pF Trimmer Capacitor
C_4 = 22 pF Ceramic 632 RTC
$C_5 = C_6$ = 1000 pF Ceramic 629 RTC
C_7 = 10 nF Ceramic 629 RTC
C_8 = 10 µF/25 V Electrolytic

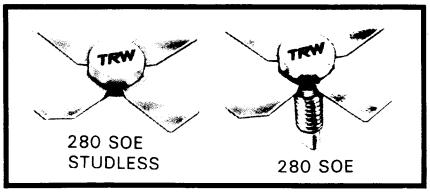
L_1 = Stripline Z_0 = 70 ohms l = 0.061 λ
L_2 = Stripline Z_0 = 70 ohms l = 0.026 λ
L_3 = Stripline Z_0 = 50 ohms l = 0.031 λ
} F_{REF} = 480 MHz

$L_4 = L_5$ = 0.15 µH Molded Coil
L_6 = 3 turns - Silvered Wire 6/10 mm - 4 mm I.D - 8 mm length

R_1 = 5 10 Ω Carbon Composition 1/4 W

7.5 Volts Transistor

- 1.5 W
- 400-512 MHz
- 10 dB Gain



280 SOE STUDLESS

280 SOE

The latest in the TRW RF transistor, this device has been specifically designed and characterized for 7.5 V operation.

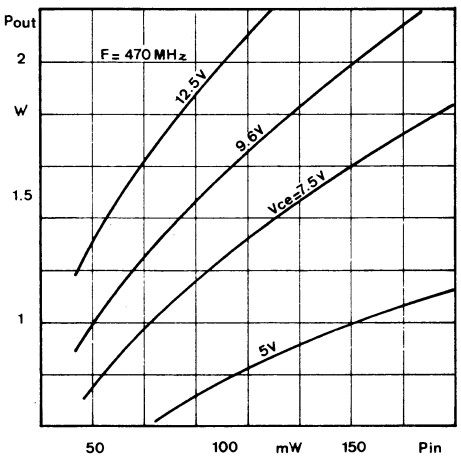
It is ideally suited for use in pocketphone where low battery voltage is used.

PRELIMINARY

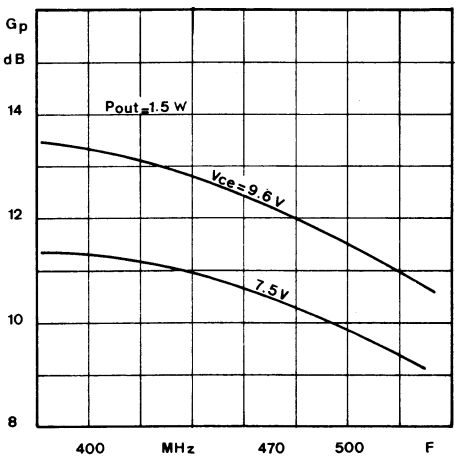
	SYMBOL	CHARACTERISTICS	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
DC Test	BV_{EBO}	Emitter - Base Breakdown Voltage	I_E = 1 mA I_C = 0	4			V
	BV_{CEO}	Collector - Emitter Breakdown Voltage	I_C = 10 mA I_B = 0	14			V
	BV_{CBO}	Collector - Base Breakdown Voltage	I_C = 5 mA I_E = 0	30			V
	I_{CBO}	Collector Cutoff Current	V_{CB} = 15 V I_E = 0			0.5	mA
	H_{FE}	D.C Current Gain	V_{CE} = 5 V I_C = 100 mA	20			—
R F Test	P_{GAIN}	Power Gain	F = 470 MHz V_{CE} = 7.5 V P_{in} = 175 mW V_{CE} = 9.6 V P_{in} = 150 mW	1.5 1.5	1.8 2		W
	η	Efficiency	F = 470 MHz V_{CE} = 7.5 V P_{out} = 1.5 W	50	60		%
	Load VSWR	Mismatch Tolerance	F = 470 MHz V_{CE} = 10 V P_{out} = 1.5 W		∞ : 1 All phases		
	Z_{in}	Common Emitter Amplifier Input Impedance	F = 470 MHz V_{CE} = 7.5 V P_{in} = 150 mW		1.8 + j 3.5		Ω
	Z_{Load}	Common Emitter Amplifier Load Impedance	F = 470 MHz V_{CE} = 7.5 V P_{out} = 1.5 W		11 + j 6		Ω
	C_{OB}	Collector - Base Capacitance	V_{CB} = 10 V F = 1 MHz		5.5	7	pF
Operating	I_C	Continous Collector Current				1	A
	θ_{j-C}	Thermal Resistance	T_C = 25 °C			10	°C/W
	T_{STG}	Storage Temperature and Junction Temperature		— 65°		200°	°C
	P_D	Power Dissipation	T_C = 25 °C			17.5	W

B

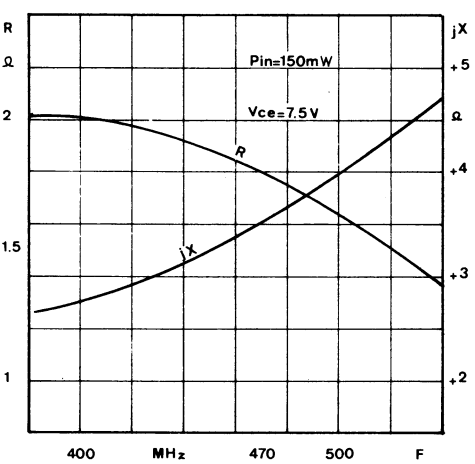
Output Power vs Input Power and V_{CE}



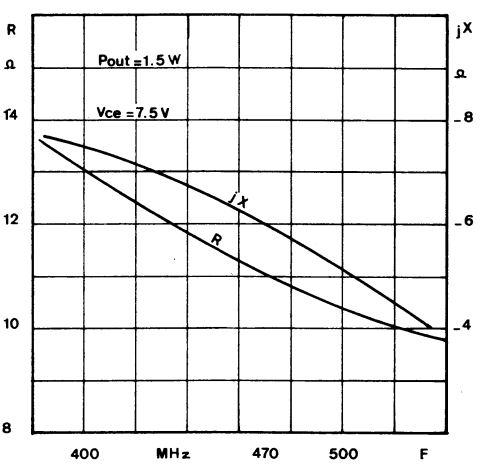
Power Gain vs Frequency and V_{CE}



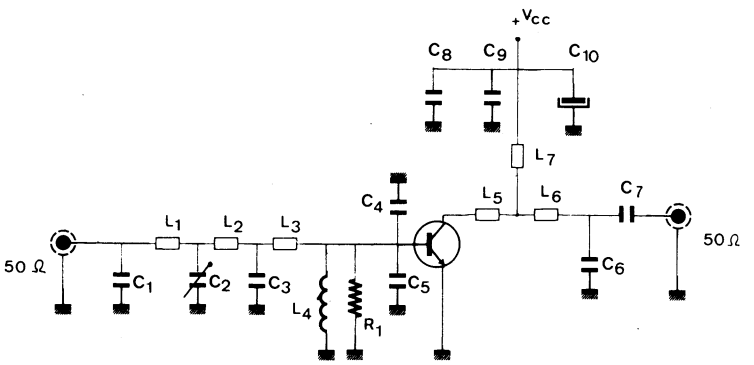
Input Impedance vs Frequency



Output Impedance vs Frequency



400-512 MHz TEST CIRCUIT



C_1 = 4.7 pF Ceramic 632 RTC
C_2 = 2-10 pF Trimmer Capacitor
C_3 = 15 pF Ceramic 632 RTC
$C_4 = C_5$ = 39 pF Ceramic Chip ATC
C_6 = 10 pF Ceramic Chip ATC
$C_7 = C_8$ = 1000 pF Ceramic 629 RTC
C_9 = 10 nF Ceramic 629 RTC
C_{10} = 10 µF/25 V Electrolytic

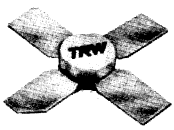
L_1 =	Stripline	Z_0 = 70 ohms	l = 0.032 λ	F_{REF} = 480 MHz
L_2 =	Stripline	Z_0 = 70 ohms	l = 0.029 λ	
L_3 =	Stripline	Z_0 = 25 ohms	l = 0.031 λ	
L_5 =	Stripline	Z_0 = 25 ohms	l = 0.006 λ	
L_6 =	Stripline	Z_0 = 70 ohms	l = 0.052 λ	
L_7 =	Stripline	Z_0 = 70 ohms	l = 0.064 λ	

L_4 = 0.15 µH Molded Coil

R_1 = 47 ohms Carbon Composition - 1/4 W

RF Power Transistor

- 2W
- 12.5 V
- 470 MHz



280 SOE STUDLESS

B

The TP 1045 is designed for 12.5 V VHF and UHF amplifiers.

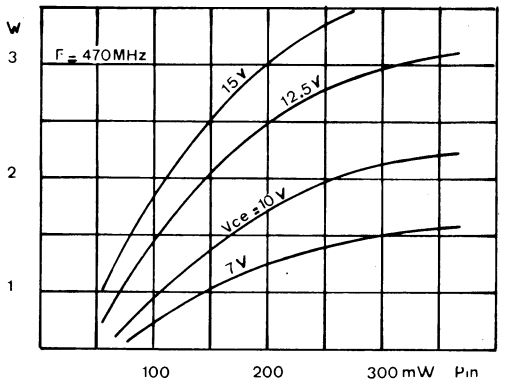
Its high gain at reduced voltage and stripline package make it suitable for use in pocketphone applications.

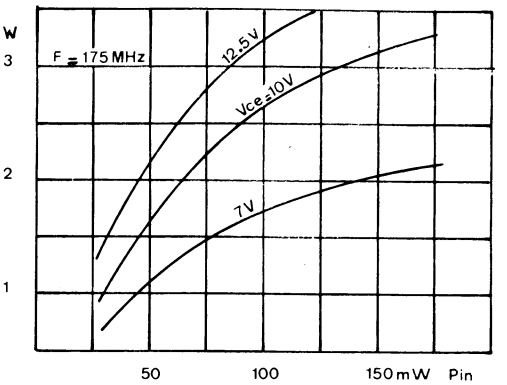
The power output is useable to the top of its ratings and it is able to withstand an infinite VSWR at all phase angles at rated output power.

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

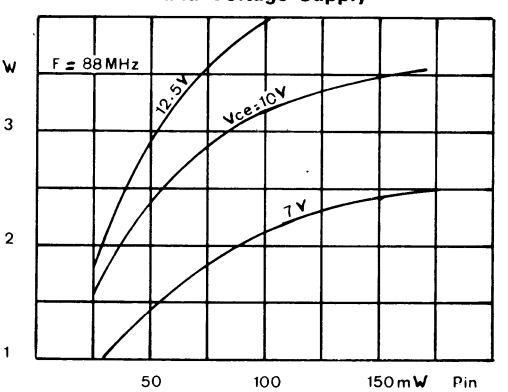
	SYMBOL	CHARACTERISTICS	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
DC Test	BV_{EBO}	Emitter - Base Breakdown Voltage	I_E = 1 mA I_C = 0	4			V
	BV_{CEO}	Collector - Emitter Breakdown Voltage	I_C = 25 mA I_B = 0	16			V
	BV_{CBO}	Collector - Base Beakdown Voltage	I_C = 5 mA I_E = 0	36			V
	I_{CBO}	Collector Cutoff Current	V_{CB} = 15 V I_E = 0			1	mA
	H_{FE}	D.C Current Gain	V_{CE} = 5 V I_C = 100 mA	20			—
RF Test	P_{GAIN}	Power Gain	V_{CE} = 12.5 V F = 470 MHz P_{in} = 0.2 W V_{CE} = 9.5 V F = 175 MHz P_{in} = 0.1 W V_{CE} = 9.5 V F = 88 MHz P_{in} = 0.1 W	2 1.5 1.5	 2.2 2.9		W
	η	Efficiency	V_{CE} = 12.5 V F = 470 MHz P_{out} = 2 W	60			%
	Load VSWR	Mismatch Tolerance	All Phases Angles V_{CE} = 12.5 V F = 470 MHz P_{out} = 2 W		∞ :1		
	Z_{in}	Common Emitter Amplifier Input Impedance	V_{CE} = 12.5 V F = 470 MHz P_{in} = 0.2 W		1.96 + j 2.44		Ω
	Z_{Load}	Common Emitter Amplifier Load Impedance	V_{CE} = 12.5 V F = 470 MHz P_{out} = 2 W		15.2 + j 18.2		Ω
	C_{OB}	Collector - Base Capacitance	V_{CB} = 15 V F = 1 MHz		5	8	pF
Operating	I_C	Continous Collector Current				0.75	A
	θ_{j-C}	Thermal Resistance	T_C = 25 °C			12	°C/W
	T_{STG}	Storage Temperature and Junction Temperature		— 65°		200°	°C
	P_D	Power Dissipation	T_C = 25 °C			14.5	W

Output Power vs Input Power and Voltage Supply

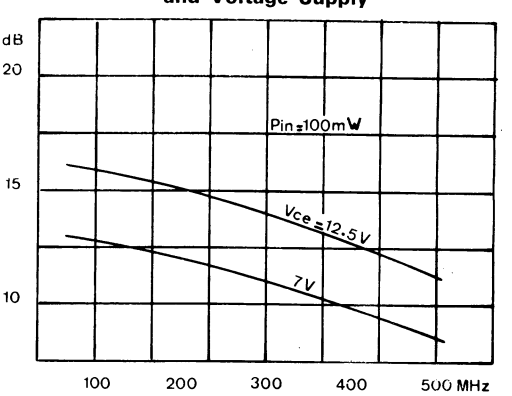




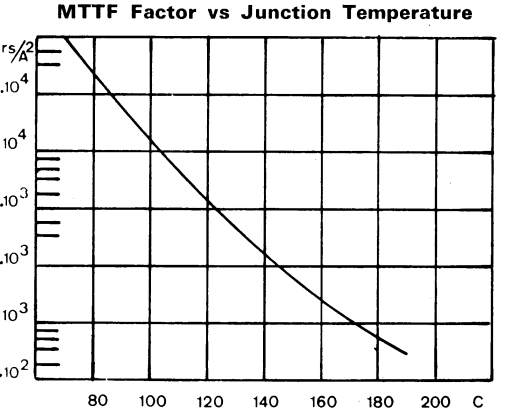
Output Power vs Input Power and Voltage Supply



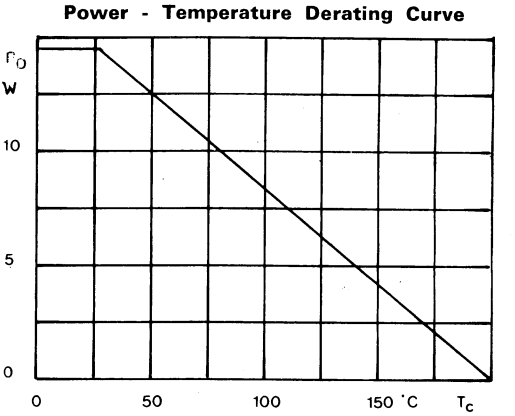
Power Gain vs Frequency and Voltage Supply



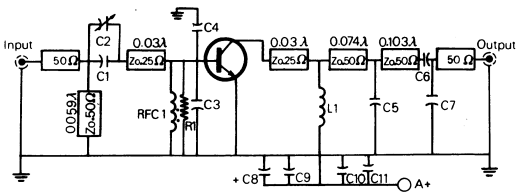
MTTF Factor vs Junction Temperature



Power - Temperature Derating Curve



TEST CIRCUIT BROADBAND (450-510 MHz)

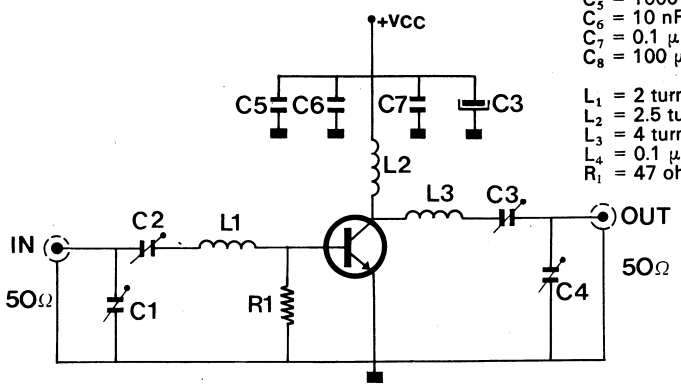


COMPONENT AND MATERIAL LIST

C_1 3.9 pF, ceramic chip
C_2, C_7 0.8-10 pF, Vol ronics AP 10, variable
C_3, C_4 27 pF, ceramic chip
C_5 15 pF, ceramic chip
C_6 470 pF, ceramic chip
C_8 5 µF, electrolytic
C_9 1000 pF, Underwood
C_{10} 0.1 µF, disc-ceramic
C_{11} 0.01 µF, disc-ceramic
L_1 2 turns # 22 enameled, 0.1" I.D.
R_1 270 Ω, ½ watt, carbon
RFC-1 2 ½ turns # 22 AWG on Ferroxcube VK211/17-4B
All transmission lines reference at 480 MHz

B

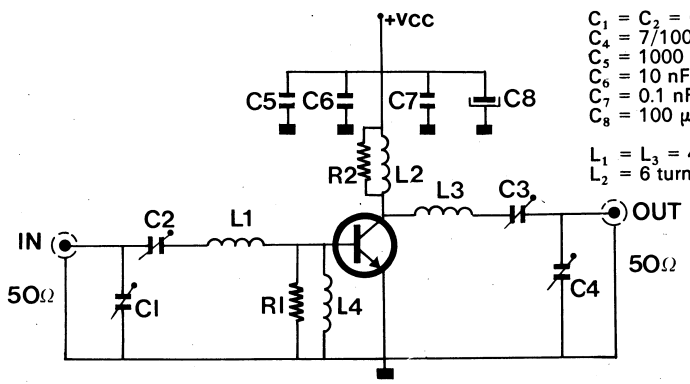
175 MHz TEST CIRCUIT



C_1 = 2-60 pF ARCO 404
C_2 = 24-200 pF ARCO 425
C_3 = 7-100 pF ARCO 425
C_4 = 4-40 pF ARCO 423
C_5 = 1000 pF UNELCO
C_6 = 10 nF ceramic disc
C_7 = 0.1 µF ceramic disc
C_8 = 100 µF/35 V electrolytic

L_1 = 2 turns - 8/10 mm wire - 4 mm I.D.
L_2 = 2.5 turns - 8/10 mm wire on ferrite core
L_3 = 4 turns - 8/10 mm wire - 4 mm I.D.
L_4 = 0.1 µH Molded Coil
R_1 = 47 ohms - 1/2 W carbon

88 MHz TEST CIRCUIT

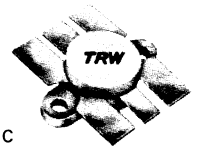


C_1 = C_2 = C_3 = 24/200 pF ARCO 425
C_4 = 7/100 pF ARCO 423
C_5 = 1000 pF UNELCO
C_6 = 10 nF ceramic disc
C_7 = 0.1 nF ceramic disc
C_8 = 100 µF/35 V electrolytic

L_1 = L_3 = 4 turns 14 AWG - 1/2" I.D.
L_2 = 6 turns - 14 AWG - 1/2" I.D. close wound

RF Power Transistor

- 80 W
- 12.5 V
- 88 MHz



J zéro C

The TP 2180 is designed for use in 12.5 V VHF amplifiers operating under class A, B or C conditions.

Its construction which incorporates gold metalization and diffused ballast resistors for longer life, enables the part to be used at its maximum ratings and be able to withstand an infinite VSWR at all phase angles.

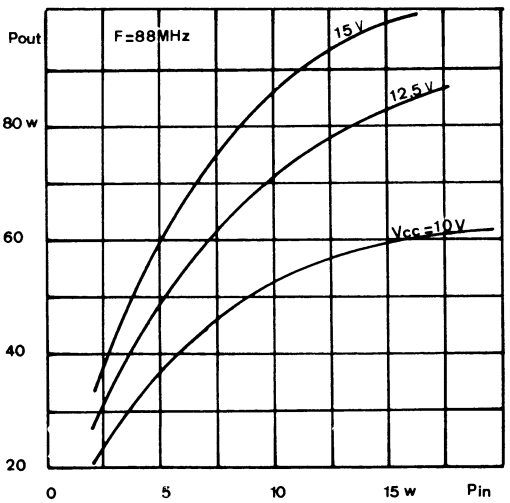
Electrical Characteristics (T_{case} = 25 °C)

	SYMBOL	CHARACTERISTICS	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
DC Test	BV_{EBO}	Emitter - Base Breakdown Voltage	I_E = 10 mA I_C = 0	4			V
	BV_{CEO}	Collector - Emitter Breakdown Voltage	I_C = 200 mA I_B = 0	18			V
	BV_{CBO}	Collector - Base Breakdown Voltage	I_C = 100 mA I_E = 0	40			V
	I_{CBO}	Collector Cutoff Current	V_{CB} = 20 V I_E = 0			5	mA
	H_{FE}	D.C Current Gain	V_{CE} = 5 V I_C = 1000 mA	10			—
RF Test	P_{GAIN}	Power Gain	V_{CE} = 12.5 V F = 88 MHz P_{in} = 16 W	80			W
	η	Efficiency	V_{CE} = 12.5 V F = 88 MHz P_{out} = 80 W	60	70		%
	Load VSWR	Mismatch Tolerance	All Phases Angles V_{CE} = 12.5 V F = 88 MHz P_{out} = 80 W		∞ : 1		
	Z_{in}	Common Emitter Amplifier Input Impedance	V_{CE} = 12.5 V F = 88 MHz P_{in} = 16 W		0.3 — j 0.4		Ω
	Z_{Load}	Common Emitter Amplifier Loac Impedance	V_{CE} = 12.5 V F = 88 MHz P_{out} = 80 W		0.6 + j 0.44		Ω
	C_{OB}	Collector - Base Capacitance	V_{CB} = 20 V F = 1 MHz			180	pF
Operating	I_C	Continous Collector Current				16	A
	θ_{j-C}	Thermal Resistance	T_C = 25 °C			1.25	°C/W
	T_{STG}	Storage Temperature and Junction Temperature		— 65°		200°	°C
	P_D	Power Dissipation	T_C = 25 °C			140	W

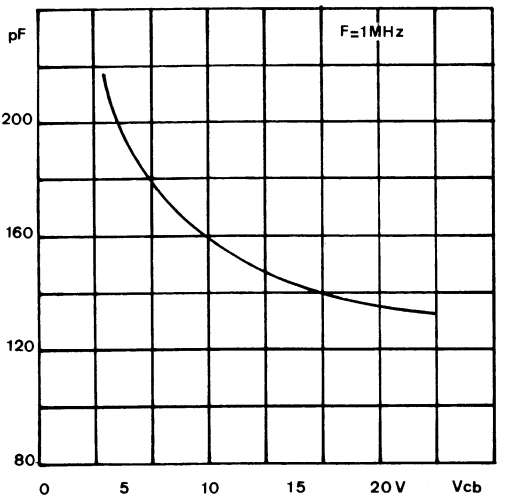
TYPICAL CHARACTERISTICS

B

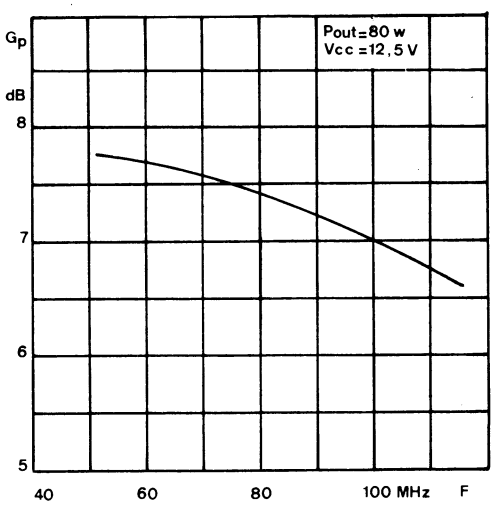
Output power vs input power and voltage supply



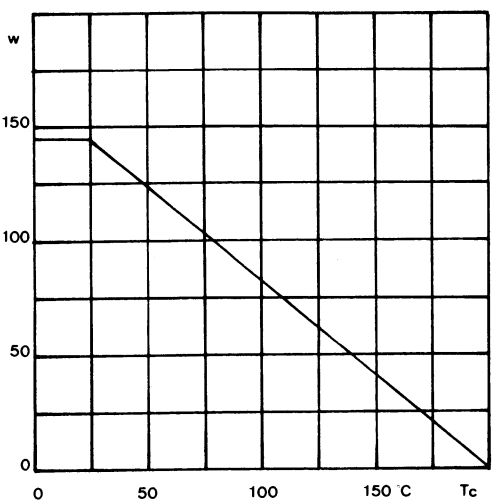
Collector base capacitance



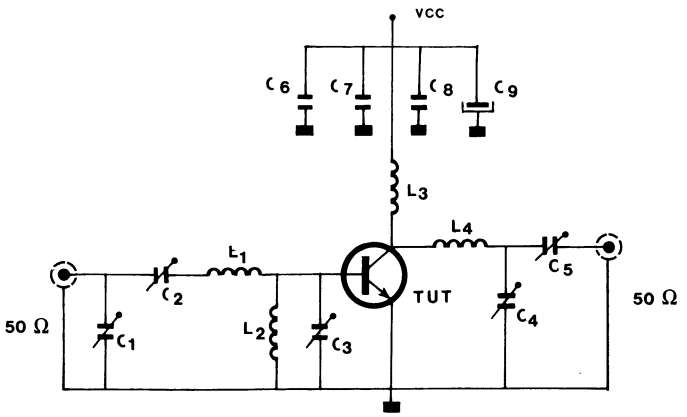
Power gain vs frequency



Power - Temperature operating curve



88 MHz TEST CIRCUIT



$C_1 = C_4 = 24\text{-}200$ pF trimmer capacitor ARCO 425
$C_2 = C_3 = 55\text{-}300$ pF trimmer capacitor ARCO 427
$C_5 = 7\text{-}100$ pF trimmer capacitor ARCO 423
$C_6 = 1000$ pF mica capacitor UNELCO
$C_7 = 10$ nF ceramic disc
$C_8 = 0.1$ µF ceramic disc
$C_9 = 470$ µF/40 V

$L_1 = 3$ turns - 12/10 mm silvered wire - 5 mm I.D.
$L_2 = 0.68$ µH molded coil
$L_3 = 5$ turns - 12/10 mm silvered wire - 12 mm I.D.
$L_4 = 1$ turn - 12/10 mm silvered wire - 6 mm I.D.