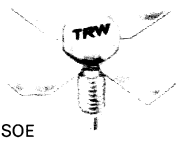
VHF Linear Transistor

- 5 W at - 58 dB IMD
- 16 dB Gain
- TV Transposer and Transmitter
- Band 3



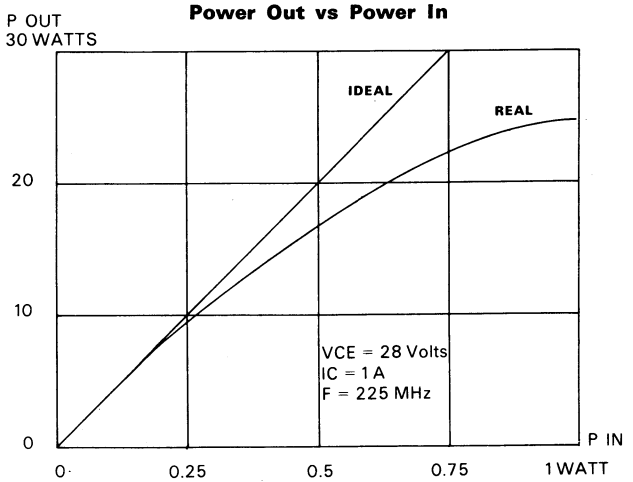
280 SOE

The TPV 394 is a NPN gold metallized transistor using diffused ballast resistors for super linearity. This transistor is designed for **medium power band 3 TV transposers.** The TPV 394 is used in the output stage of 10 W transposers or in the driver stages of higher power transposers and transmitters. Its exceptional **high gain** reduces the complexity of driver stages.

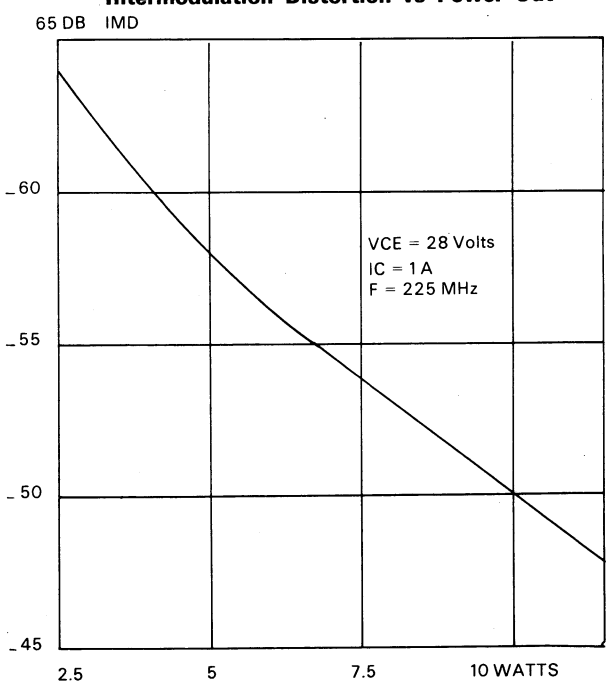
Electrical Characteristics (T_{CASE} = 25 °C)

	SYMBOL	CHARACTERISTICS	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
DC Test	BV_{EBO}	Emitter - Base Breakdown Voltage	I_E = 2 mA	4			V
	BV_{CEO}	Collector - Emitter Breakdown Voltage	I_C = 50 mA	30			V
	BV_{CER}	Collector - Emitter Breakdown Voltage	I_C = 50 mA R_{BE} = 10 ohms	55			V
	BV_{CBO}	Collector - Base Breakdown Voltage	I_C = 20 mA	55			V
	h_{FE}	D.C. Current Gain	V_{CE} = 5 V I_C = 100 mA	10			
RF Test	IMD 1	Intermodulation Distortion - 3 Tone Vision Carrier = Reference - 8 dB Sound Carrier = Reference - 7 dB Sideband Carrier = Reference - 16 dB	F = 225 MHz V_{CE} = 28 V I_E = 1 A P_{REF} = 5 W **TRW DOCUMENT 05001**			— 58	dB
	IMD 2	Idem	F = 225 MHz V_{CE} = 28 V I_E = 1 A P_{REF} = 10 W			— 50	dB
	P_G	Power Gain	F = 225 MHz V_{CE} = 28 V I_E = 1 A P_{REF} = 5 W	15	16		dB
	VSWR	Mismatch Tolerance	F = 225 MHz V_{CE} = 28 V I_E = 1 A P_{REF} = 5 W		∞		
	C_{OB}	Collector - Base Capacitance	V_{CB} = 28 V F = 1 MHz			35	pF
Thermal	I_C	Maximum Collector Current				4	A
	θ_{JC}	Thermal Resistance Junction - Case	T_{CASE} = 70 °C			2.5	°C/W
	θ_{CH}	Thermal Resistance Case - Heatsink				1.0	°C/W
	P_T	Dissipated Power	$T_{HEATSINK}$ = 25 °C			50	W
	T_{STG} T_J	Storage Temperature Junction Temperature		— 65		+ 200	°C

Power Out vs Power In

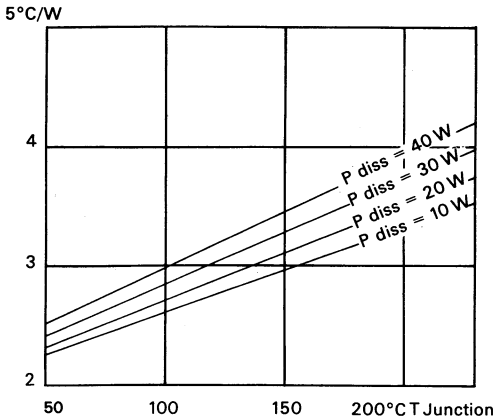


Intermodulation Distortion vs Power Out

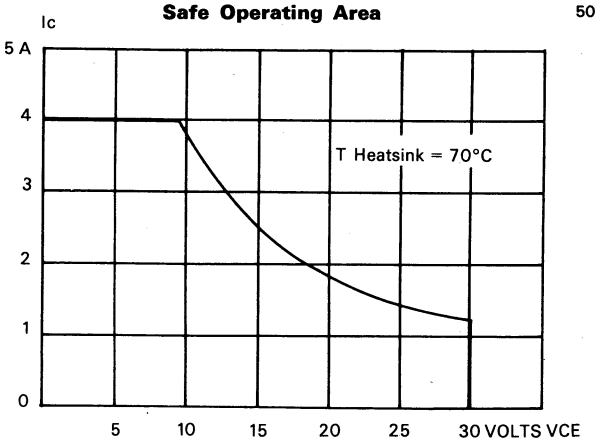


D

Thermal Resistance Junction Heatsink vs Temperature of Junction for Various Power's Dissipated

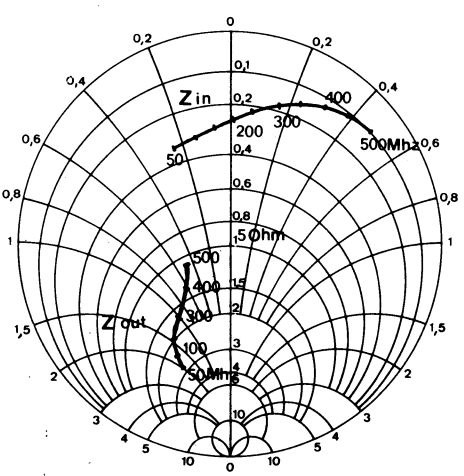


Safe Operating Area

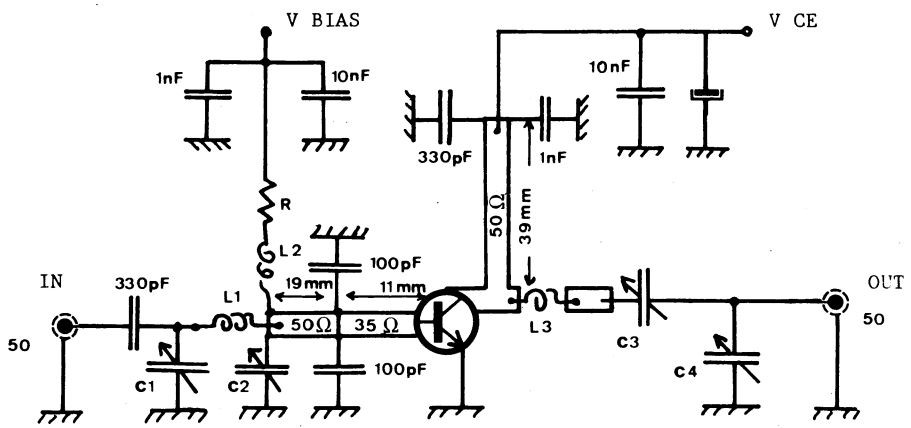


Large Signal Impedances vs Frequency

V_{CE} = 28 V - I_C = 1 A



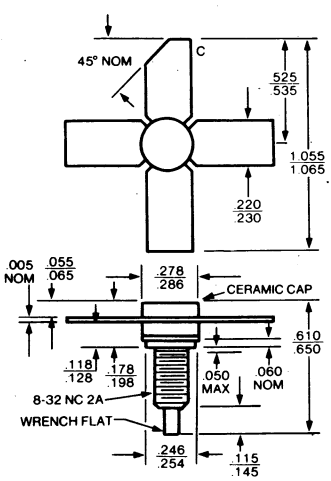
TEST CIRCUIT AT F = 225 MHz



Lines are printed on G 10 epoxy glass material

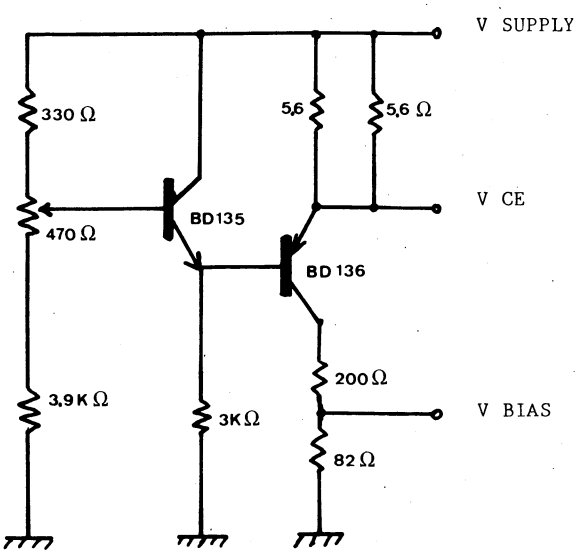
$C_{1,4}$ ARCO 403
C_2 ARCO 404
C_3 ARCO 423
L_1 1 turn 1/2 I.D. = 5 mm
L_2 RFC 10 turns I.D. = 5 mm
L_3 1.5 mm shaped :

Package Outline



To convert inches to millimeters multiply by 2.54.

CLASS A BIAS CIRCUIT



VHF Linear Transistor

- 10 W at - 55 dB IMD
- 10 dB Gain
- TV Transposer and Transmitter
- Band 3

380 SOE

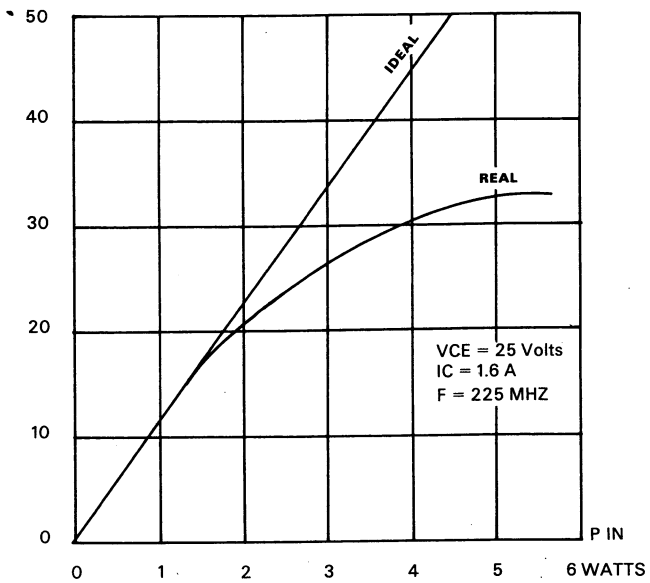
The TPV 364 is a NPN gold metallized transistor using diffused ballast resistors for super linearity. This transistor is designed for high power band 3 TV transposers and transmitters.

The TPV 364 is used in the final stages of 20 W transposers or in the driver stages of 100 W plus transposers and transmitters. Its high gain allows to reduce the complexity of lower power stages.

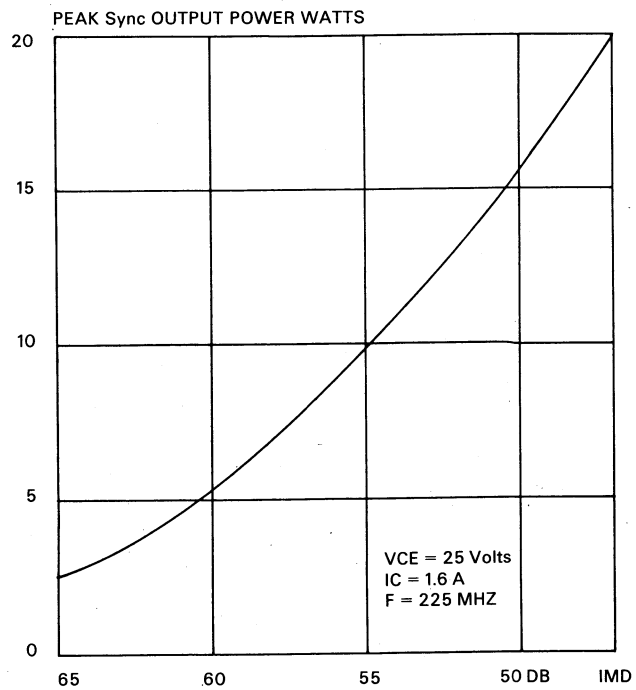
Electrical Characteristics (T_{CASE} = 25 °C)

	SYMBOL	CHARACTERISTICS	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
DC Test	BV_{EBO}	Emitter - Base Breakdown Voltage	I_E = 10 mA	4			V
	BV_{CEO}	Collector - Emitter Breakdown Voltage	I_C = 50 mA	35			V
	BV_{CER}	Collector - Emitter Breakdown Voltage	I_C = 50 mA R_{BE} = 10 ohms	65			V
	BV_{CBO}	Collector - Base Breakdown Voltage	I_C = 50 mA	65			V
	h_{FE}	D.C Current Gain	V_{CE} = 5 V I_C = 1000 mA	20		120	
RF Test	IDM_1	Intermodulation Distortion - 3 Tone Vision Carrier = Reference - 8 dB Sound Carrier = Reference - 7 dB Sideband Carrier = Reference - 16 dB	F = 225 MHz V_{CE} = 25 V I_E = 1.6 A P_{REF} = 10 W **TRW DOCUMENT 05001**			- 54	dB
	IMD 2	Idem	F = 225 MHz V_{CE} = 25 V I_E = 1.6 A P_{REF} = 15 W			— 52	dB
	P_G	Power Gain 10 REF	F = 225 MHz V_{CE} = 25 V I_E = 1.6 A	10			dB
	VSWR	Mismatch Tolerance	P_{REF} = 20 W F = 225 MHz V_{CE} = 25 V I_E = 1.6 A P_{REF} = 15 W		∞		
	C_{OB}	Collector - Base Capacitance	V_{CB} = 30 V F = 1 MHz		58	85	pF
Thermal	I_C	Maximum collector current				9	A
	θ_{JC}	Thermal Resistance Junction - Case	T_{CASE} = 70 °C			2.0	°C/W
	θ_{CH}	Thermal Resistance Case - Heatsink				0.5	°C/W
	P_T	Dissipated Power	$T_{HEATSINK}$ = 25 °C			70	W
	T_{STG} T_J	Storage Temperature Junction Temperature		— 65		+ 200	°C

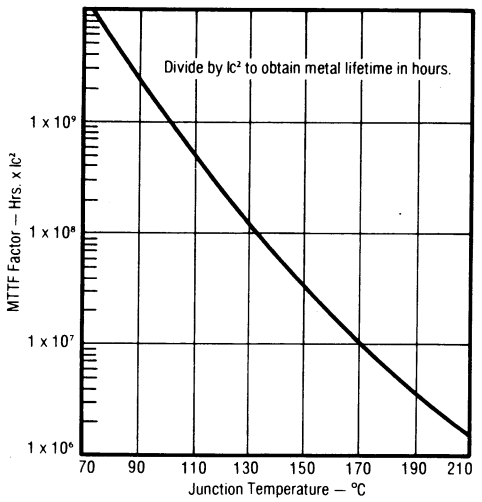
Power Input vs Power Output



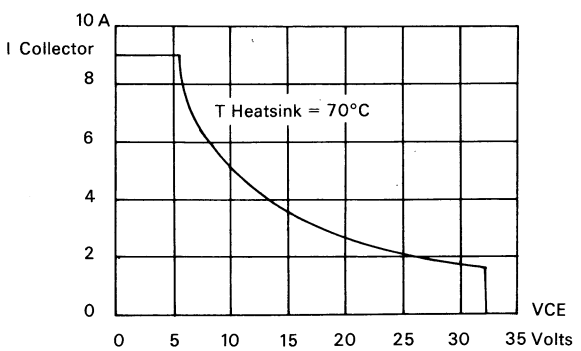
IMD vs Peak Sync Output Power



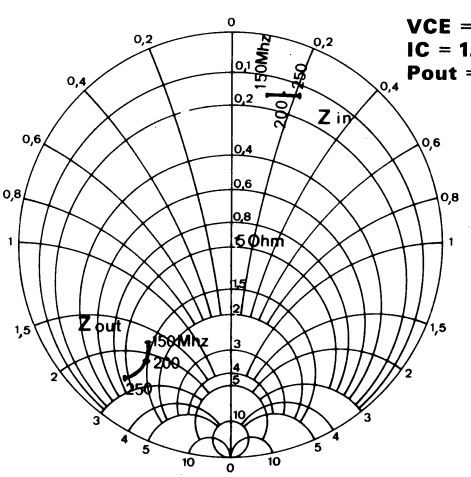
MTTF Factor vs Tj



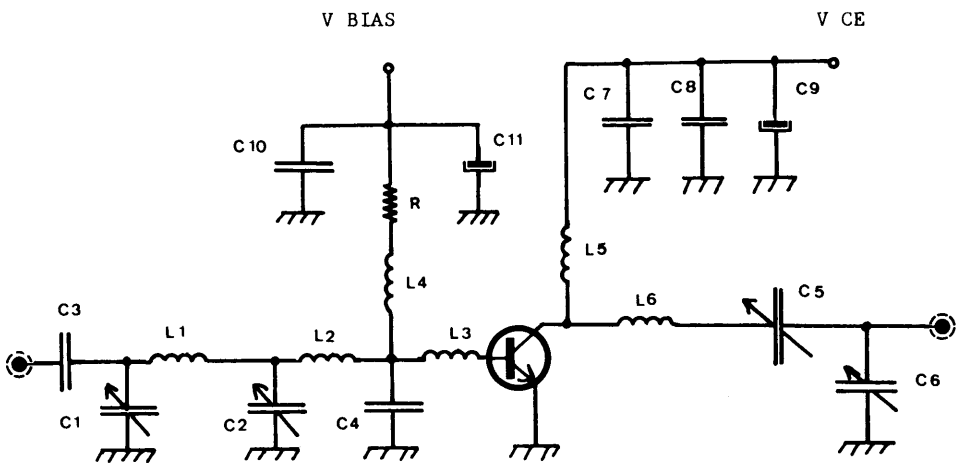
Safe Operating Area



Large Signal Impedances vs Frequency



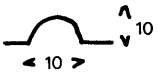
TEST CIRCUIT FOR 225 MHz



C_1 ARCO 403
$C_{2,6}$ ARCO 404
C_5 ARCO 423
$C_{3,7}$ chip capacitor 470 pF
C_4 UNELCO-capacitor 80 pF
$C_{8,10}$ UNELCO-capacitor 1000 pF
$C_{9,11}$ 100 µF electrolytic - 63 V

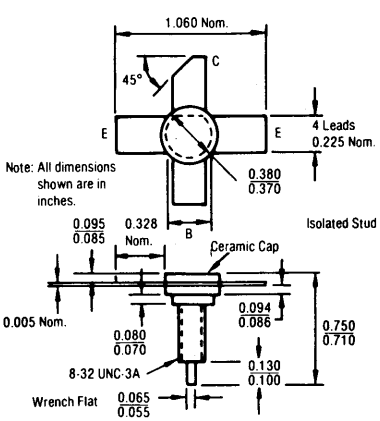
R 4.7 ohms - 1/2 W

L_1 1.5 turns closely wound - Cu wire 1 mm - I.D. 5 mm
L_2 2.5 cm - 50 ohms line
L_3 length of the base lead
L_6 Cu wire 1.5 mm

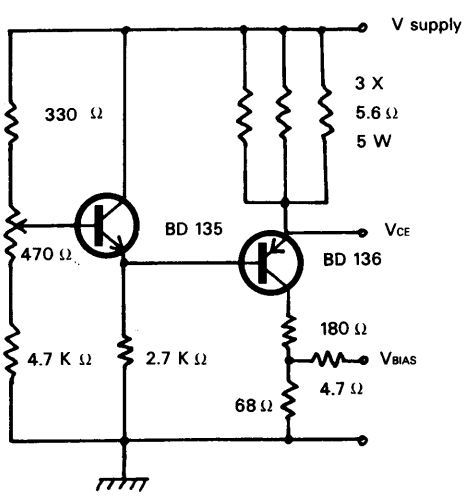


L_5 3 cm - 50 ohms line
L_4 5 turns closely wound - Cu wire 8 mm - I.D. 5 mm

380 SOE

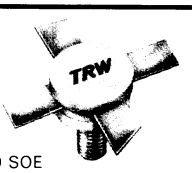


BIAS CIRCUIT



VHF Linear Transistor

- 20 W at - 51 dB IMD
- 14 W at - 55 dB IMD
- High Saturation Power
- TV Transposer and Transmitter
- Band 3



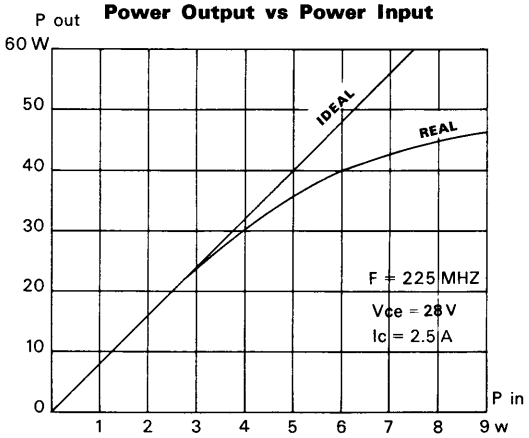
500 SOE

The TPV 375 is a NPN gold metallized transistor using diffused ballast resistors for super linearity. The TPV 375 is specifically designed for **high power band 3. TV transposers and transmitters amplifiers.** Due to its high saturation power (over 70 watts), the TPV 375 shows good linearity characteristics at powers over 25 W. This performance allows to build a 50 W transposer using 2 TPV 375 in parallel with linearity correction circuit.

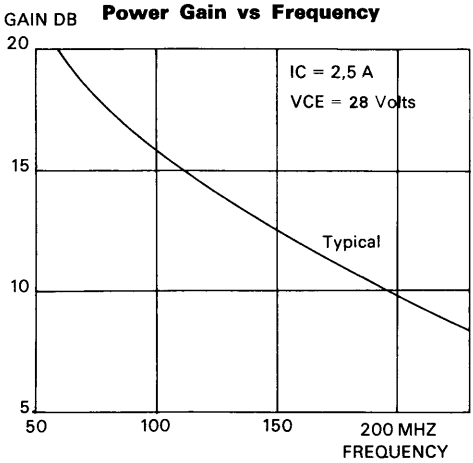
Electrical Characteristics (T_{CASE} = 25 °C)

	SYMBOL	CHARACTERISTICS	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
DC Test	BV_{EBO}	Emitter - Base Breakdown Voltage	I_E = 10 mA	4			V
	BV_{CEO}	Collector - Emitter Breakdown Voltage	I_C = 50 mA	35			V
	BV_{CER}	Collector - Emitter Breakdown Voltage	I_C = 50 mA R_{BE} = 10 ohms	60			V
	BV_{CBO}	Collector - Base Breakdown Voltage	I_C = 50 mA	65			V
	h_{FE}	D.C. Current Gain	V_{CE} = 5 V I_C = 1000 mA	20		120	
RF Test	IMD 1	Intermodulation Distortion - 3 Tone Vision Carrier = Reference - 8 dB Sound Carrier = Reference - 7 dB Sideband Carrier = Reference - 16 dB	F = 225 MHz V_{CE} = 28 V I_E = 2.5 A P_{REF} = 14 W **TRW DOCUMENT 05001**			— 55	dB
	IMD 2	Idem	F = 225 MHz V_{CE} = 28 V I_E = 2.5 A P_{REF} = 20 W			— 51	dB
	P_G	Power Gain	F = 225 MHz V_{CE} = 28 V I_E = 2.5 A P_{REF} = 20 W	8	9		dB
	VSWR	Mismatch Tolerance	F = 225 MHz V_{CE} = 28 V I_E = 2.5 A P_{REF} = 20 W		∞		
	C_{OB}	Collector - Base Capacitance	V_{CB} = 30 V F = 1 MHz		58	85	pF
Thermal	I_C	Maximum Collector Current				10	A
	θ_{JC}	Thermal Resistance Junction - Case	T_{CASE} = 70 °C			1.5	°C/W
	θ_{CH}	Thermal Resistance Case - Heatsink				0.25	°C/W
	P_T	Dissipated Power	$T_{HEATSINK}$ = 25 °C			100	W
	T_{STG} T_J	Storage Temperature Junction Temperature		— 65		+ 200	°C

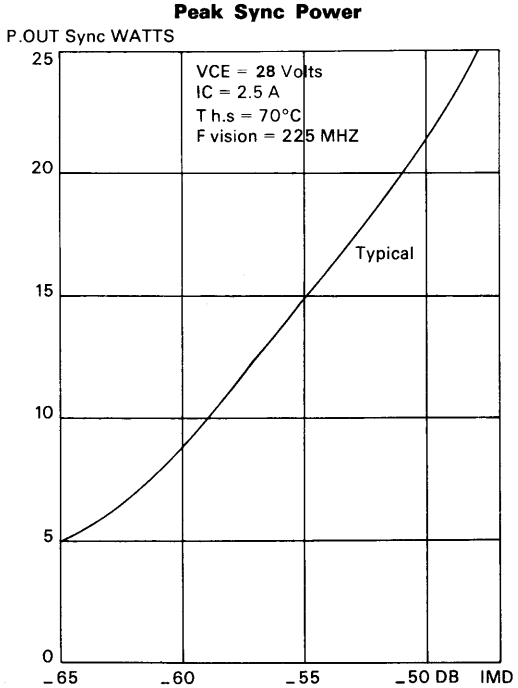
Power Output vs Power Input



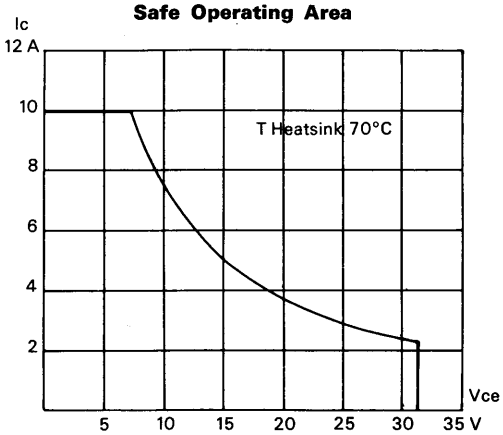
Power Gain vs Frequency



Intermodulation Distortion vs Peak Sync Power



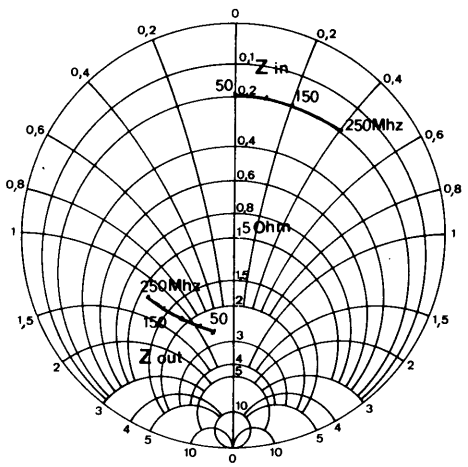
Safe Operating Area



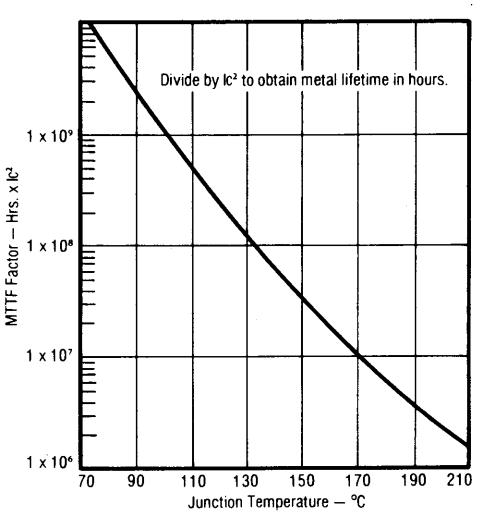
D

Large signal Impedances vs Frequency

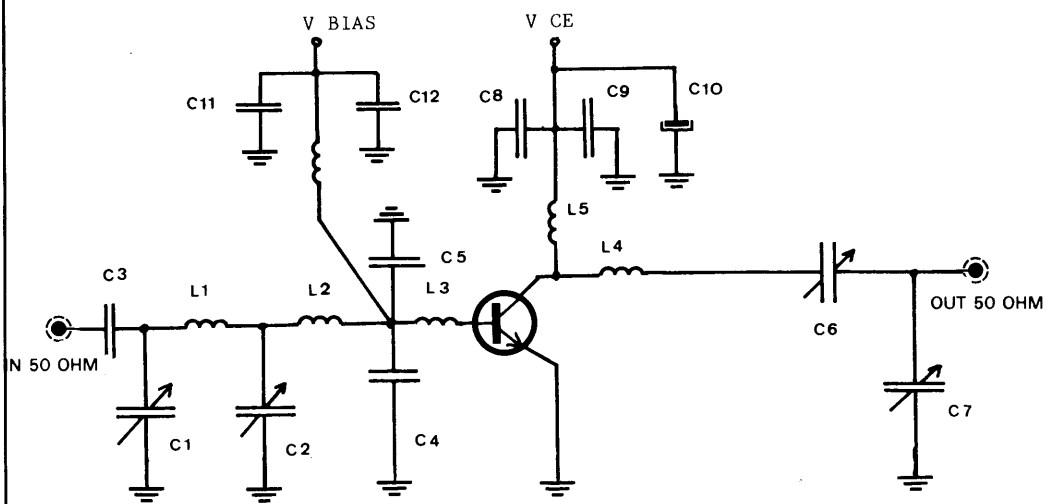
V_{CE} = 28 V - I_C = 2.5 A



MTTF Factor vs Tj

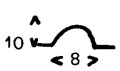


TEST CIRCUIT FOR F = 225 MHz



$C_{1,7}$ ARCO 403
C_2 ARCO 404
$C_{3,8}$ chip capacitor 470 pF
$C_{4,5}$ UNELCO 80 pF
C_6 ARCO 423
$C_{9,11}$ UNELCO 1000 pF
C_{10} 470 µF electrolytic
C_{12} 10 nF

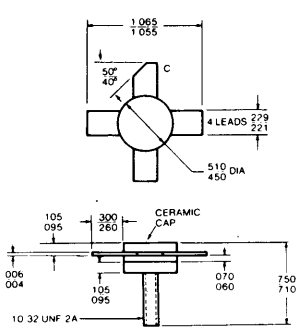
L_1 1.5 turns closely wound. Cu wire 0.7 mm I.D. 4.5 mm
L_2 2.1 cm - 50 ohms - line
L_3 length of the base lead
L_4 Cu wire 1.6 mm



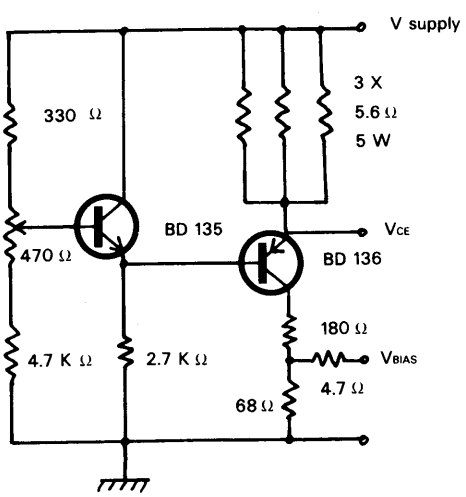
L_5 3.5 cm - 50 ohms line
L_6 4 turns closely wound Cu wire 0.8 mm I.D. 4.5 mm

PACKAGE OUTLINE

.500 SOE

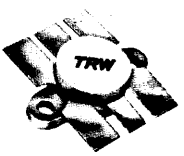


BIAS CIRCUIT



UHF Linear Transistor

- 14 W at - 53 dB
- 14 dB Gain
- TV Transposer and Transmitter
- Band 3



Jϕ 500

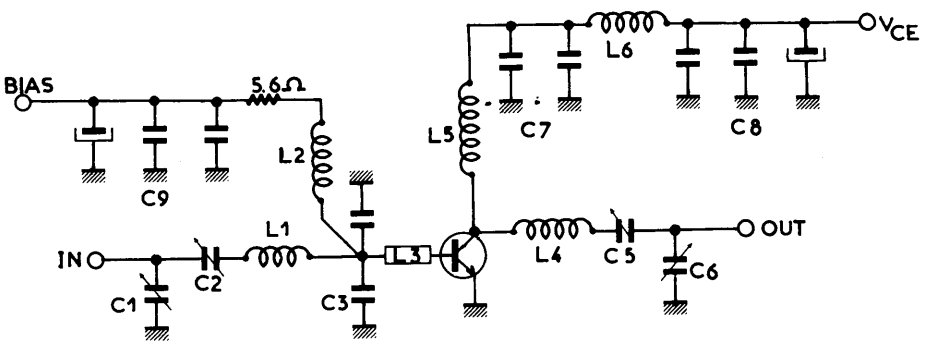
The TPV 385 is a NPN gold metallized transistor using diffused ballast resistors for super linearity. The TPV 385 is specifically designed for high power band III TV transposers and transmitters amplifiers. Due to its very high gain, the number of transistors per line-up is reduced.

Its internal matching makes easier a band III broad-band circuit.

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	4			V
	BV_{CEO}	Collector - Emitter Breakdown Voltage	I_C = 50 mA	35			V
	BV_{CER}	Collector - Emitter Breakdown Voltage	I_C = 50 mA R_{BE} = 10	60			V
	BV_{CBO}	Collector - Base Breakdown Voltage	I_C = 50 mA	65			V
	H_{FE}	D.C Current Gain	V_{CE} = 5 V I_C = 1 A	20		100	
RF Test	IMD	Intermodulation Distortion 3 tone vision = -- 8 dB sound = — 7 dB sideband = — 16 dB	**TRW DOCUMENT 05001** F_O = 225 MHz V_{CE} = 28 V I_E = 2.5 A			— 53	dB
	P_G	Power Gain	P_{REF} = 14 W	14	15		dB
	VSWR	Mismatch Tolerance			∞		
	C_{OB}	Collector - Base Capacitance	V_{CB} = 30 V F = 1 MHz		65	85	pF
Thermal	I_C	Maximum Collector Current				10	A
	θ_{JC}	Thermal Resistance Junction Case	T_{case} = 70 °C			1.5	°C/W
	T_{STG}	Storage Temperature		— 65		+ 200	°C

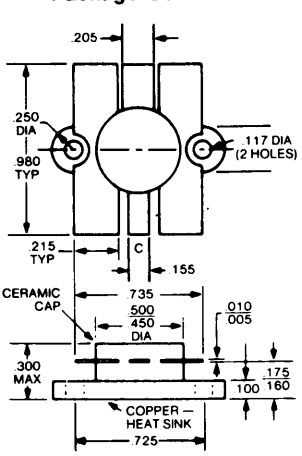
TEST CIRCUIT FOR 225 MHz CLASS A

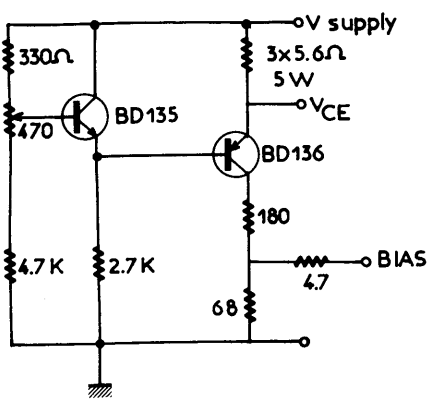


$C_1 = C_6$ = ARCO 404
$C_2 = C_5$ = ARCO 423
$C_3 = C_4$ = UNELCO 80 pF
C_7 = 1 nF + 47 nF
$C_8 = C_9$ = 1 nF + 0.1 μF + 47 μF

L_1 = 2 turns - ID 6 mm - wire 1 mm
L_1 = 1 turn - ID 10 mm - wire 1 mm
L_2 = 6 turns - ID 6 mm - wire .6 mm
L_3 = base inductance PAD - L = 10 mm W = 5 mm
L_5 = 1 turn - ID 6 mm - wire 1.5 mm
L_6 = 2 turns on ferrite core - wire 1.5 mm

J-Zero-C
Package Outline





UHF Linear Transistor

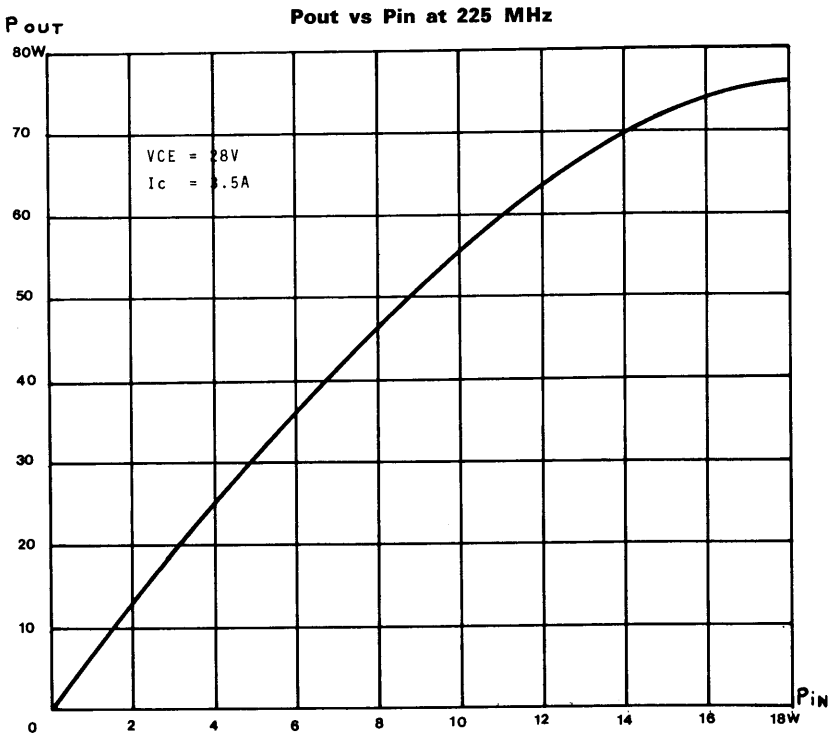
- 30 W at - 53 dB IMD
- 8 dB Gain
- Class A or AB
- Band 3

TPV 376 is a gold metallized NPN silicon transistor using high value diffused emitter ballast resistors. It is packaged in a low thermal resistance header. A combination of state of the art die mounting technique and on-line 100 percent thermal resistance testing ensures unsurpassed long term reliability. The above features make TPV 376 the highest Power transistor available for **class A and class AB band 3 TV transmitters and transposers** applications.

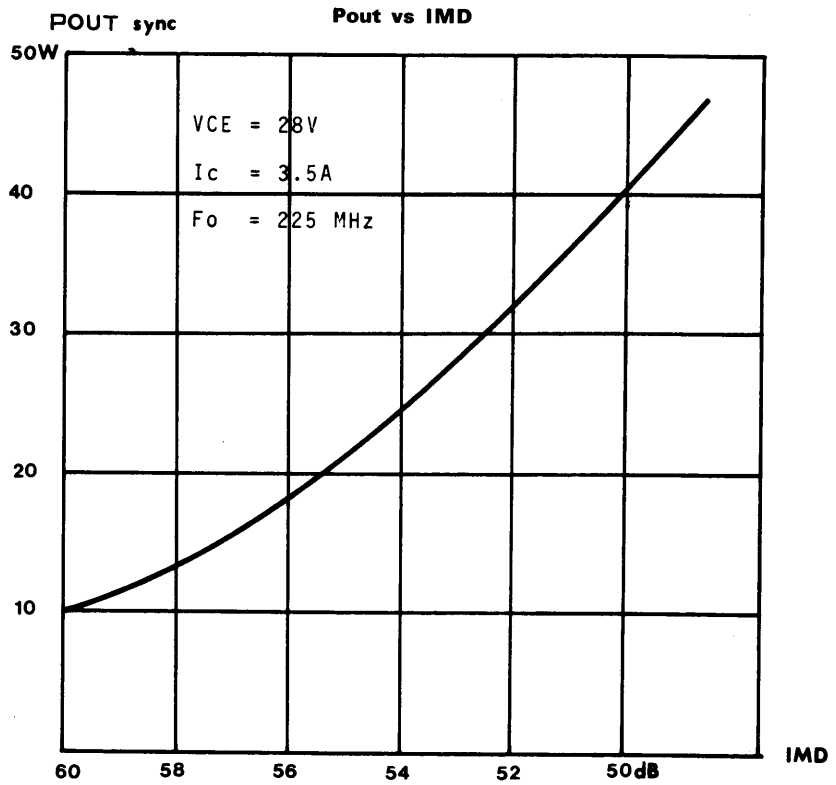
Electrical Characteristics (T_{CASE} = 25 °C)

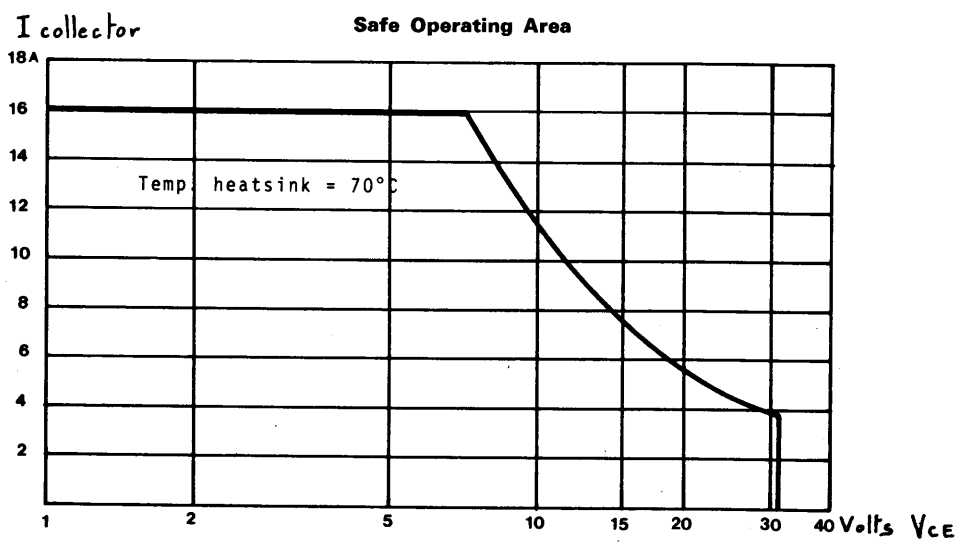
	SYMBOL	CHARACTERISTICS	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
D C Test	BV_{EBO}	Emitter-Base Breakdown Voltage	I_E = 20 mA	4			V
	BV_{CEO}	Collector - Emitter Breakdown Voltage	I_C = 100 mA	35			V
	BV_{CER}	Collector - Emitter Breakdown Voltage	I_C = 100 mA R_{BE} = 10 ohms	60			V
	BV_{CBO}	Collector-Base Breakdown Voltage	I_C = 100 mA	65			V
	h_{FE}	D.C Current Gain	V_{CE} = 5 V I_C = 1000 mA	20		120	
R F Test	IMD 1	Intermodulation Distortion - 3 Tone Vision Carrier = Reference - 8 dB Sound Carrier = Reference - 7 dB Sideband = Reference - 16 dB	F = 225 MHz V_{CE} = 28 V I_E = 3.5 A P_{REF} = 30 W **TRW DOCUMENT 05001**			- 53	dB
	P_G	Power Gain	F = 225 MHz V_{CE} = 28 V I_E = 3.5 A P_{REF} = 20 W	7.5		8	dB
	VSWR	Mismatch Tolerance	F = 225 MHz V_{CE} = 28 V I_E = 3.5 A P_{REF} = 20 W	∞			
	C_{OB}	Collector - Base Capacitance	V_{CB} = 30 V F = 1 MHz		100	150	pF
Thermal	I_C	Maximum Collector Current			16		A
	θ_{JC}	Thermal Resistance Junction - Case	T_{CASE} = 70 °C		0.9	1	°C/W
	θ_{CH}	Thermal Resistance Case - Heatsink					°C/W
	P_T	Dissipated Power	$T_{HEATSINK}$ = 25 °C		150		W
	T_{STG} T_J	Storage Temperature Junction Temperature		— 65		+ 200	°C

Pout vs Pin at 225 MHz



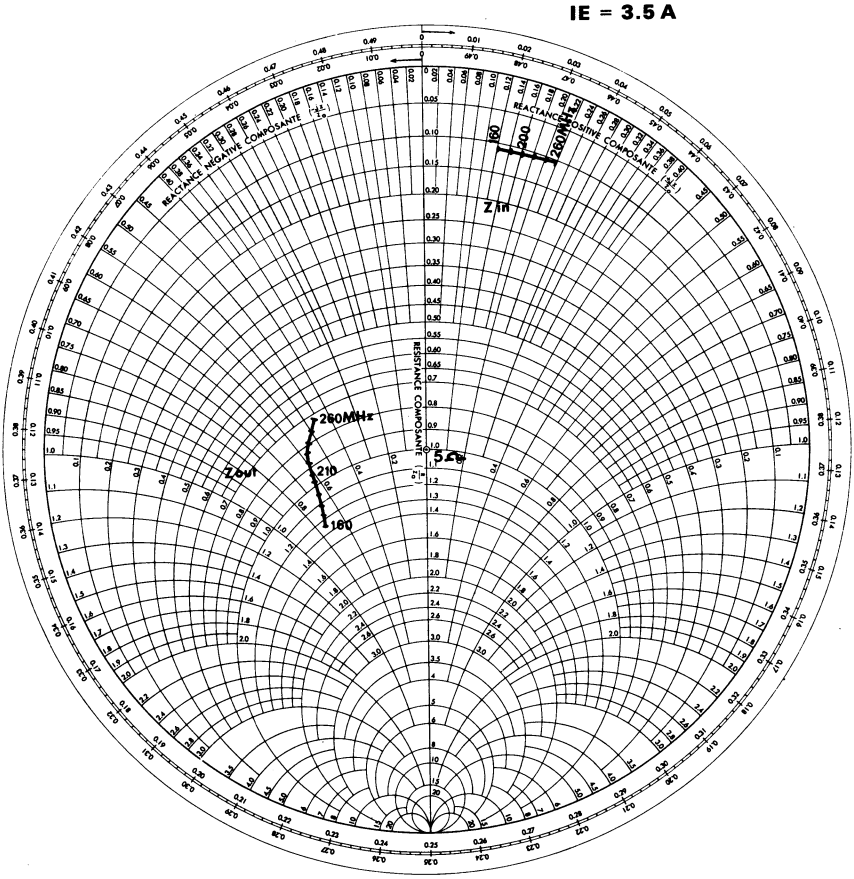
D


POUT sync
Pout vs IMD
50W
40
30
20
10
VCE = 28V
Ic = 3.5A
Fo = 225 MHz
60
58
56
54
52
50dB
IMD


I collector
Safe Operating Area
18A
16
14
12
10
8
6
4
2
Temp. heatsink = 70°C
1
2
5
10
15
20
30
40 Volts VCE

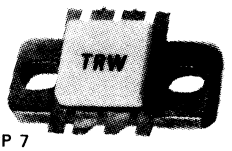
Large Signal Zout Zin

VCE = 28 V
IE = 3.5 A



VHF Linear Power Transistor

- **Band 3**
- **Class A - AB**
- **TV Transmitter**
- **Push-Pull Transistor**
- **High Gain**



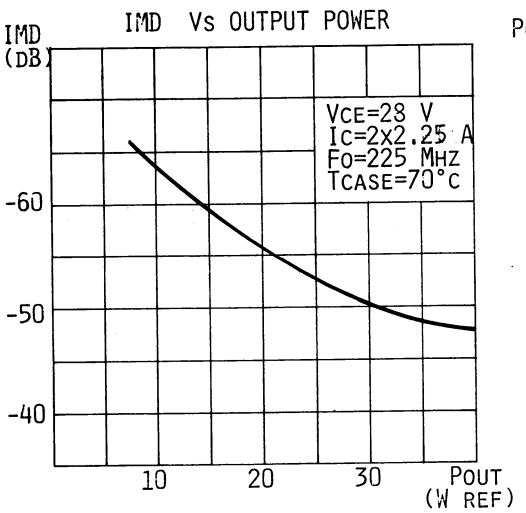
MRP 7

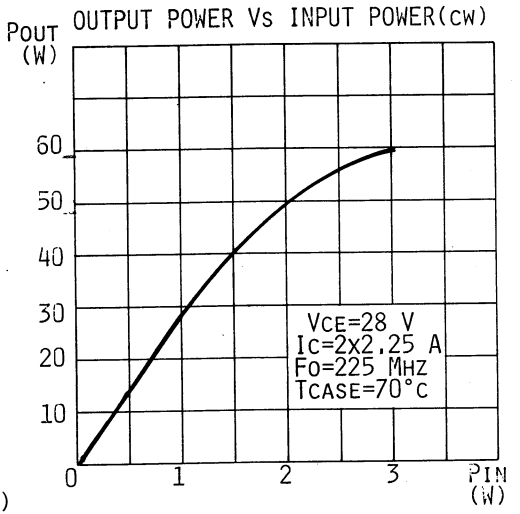
TPV 3100 is a gold metallized NPN silicon push-pull transistor packaged on a very low thermal resistance header.
The use of high value diffused emitter ballast resistors, state of the art die mounting technology and 100 % mechanical thermal and electrical test ensures long term reliability. This devide combines very high gain, easy circuit design, ruggedness and linearity.
It is an ideal candidate for VHF Band III vision and/or sound amplifiers.

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

	SYMBOL	CHARACTERISTICS	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
DC TEST	BV_{EBO}	Emitter - Base Breakdown Voltage	I_C = 5 mA	3.5			V
	BV_{CEO}	Collector - Emitter Breakdown Voltage	I_C = 50 mA	35			V
	BV_{CER}	Collector - Emitter Breakdown Voltage	I_C = 50 mA R_{BE} = 15 Ohms	60			V
	BV_{CBO}	Collector Base Breakdown Voltage	I_C = 50 mA	65			V
	H_{FE}	DC Current Gain	V_{CE} = 28 V, I_C = 0.5 A	20		150	–
RF TEST	P_G	Power Gain	V_{CE} = 28 V, I_C = 4 A 2×2.25 A	14			dB
	I_{MD}	Intermodulation Dist. 3 tones	F = 225 MHz (–8, –7, –16 dB Tones)			–51	dB
	VSWR	Mismatch Tolerance	Pref = 28 W			∞	–
	P_{OUT}	Output Power Class AB 1 dB Gain Compression	V_{CE} = 28 V, F = 225 MHz I_Q = 2×100 mA	100			W
	C_{OB}	Collector Base Capacitance Each side	V_{CB} = 28 V, F = 1 MHz		60		pF
THERMAL	I_C	Maximum Collector Current Each side				8	A
	θJ_C	DC Thermal Resistance Junction Case	T_{CASE} = 70 °C			0.8	°C/W
	T_{STG}	Storage temperature		–65		+200	°C

TYPICAL VALUES CLASS A





IMD: 3 TONES (-8 -7 -16DB)

LARGE SIGNAL IMPEDANCES

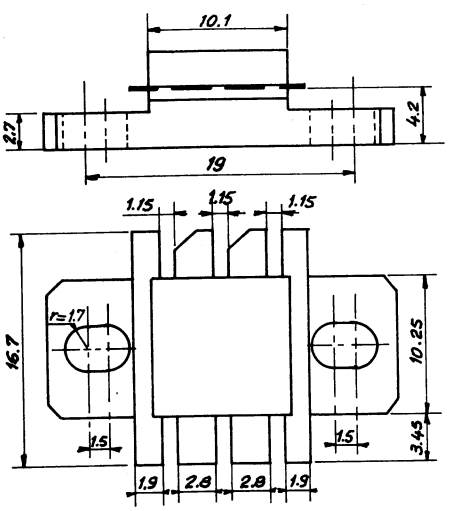
FO(MHZ)	ZIN(OHMS)	ZLOAD(OHMS)
170	1+J0.6	14.5+J10
200	.9+J1	12.5+J7
230	1.2+J2	10.5+J8.2

NOTES: VCE=28V IC=2X2.25 A

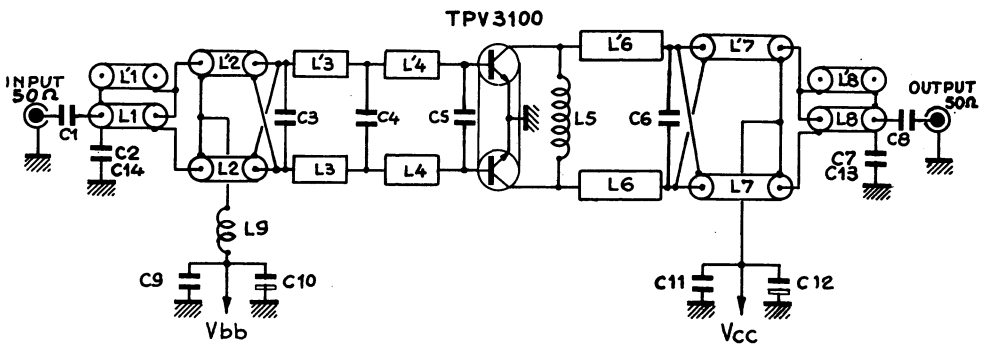
ZIN: VALUES FOR OPTIMUM INPUT RETURN LOSS.

ZLOAD: VALUES FOR BEST IMD AT 28 W REF.

PACKAGE OUTLINE

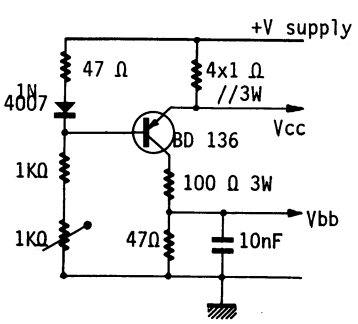


TEST FIXURE CLASS A OPERATION



L_1, L_8	80 mm teflon coaxial cable 50 ohms
L_2, L_7	80 mm teflon coaxial cable 25 ohms
L_3	25 mm line W = 1.5 mm on substrate
L_4	5 mm line W = 1.5 mm on substrate
L_5	5 turns dia 5 mm - 0.8 mm wire - L = 5 mm
L_6	33 mm line W = 2 mm on substrate
L_9	10 turns dia 3 mm - 0.5 mm wire
C_1, C_2	4700 pF chip capacitor
C_7, C_8	4700 pF chip capacitor
C_3	68 pF chip capacitor
C_4	100 pF chip capacitor
C_5	220 pF + 22 pF chip capacitor
C_6	33 pF chip capacitor
C_9, C_{11}	1000 pF + 10 nF + 0.1 µF chip capacitor
C_{10}	1000 µF 5 V
C_{12}	1000 µF 6 V
C_{13}, C_{14}	0.1 µF chip capacitor substrate teflon-glass 1/50 inch.

BIASING CIRCUIT



LARGE SIGNAL IMPEDANCES

CLASS AB

FREQUENCY (MHz)	Z_{in} (Ω)	Z_{Load} (Ω)
170	1.25 + j 0.5	10 + j 10
200	0.9 + j 0.9	9.5 + j 7
230	1 + j 2	6.5 + j 6.5

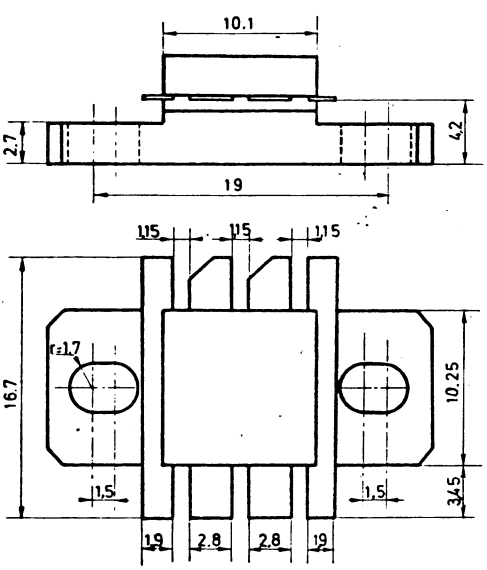
NOTES : V_{CE} = 28 Volts I_q = 2 × 100 mA P_{out} = 100 W

— Z_{in} values to get optimum input return loss

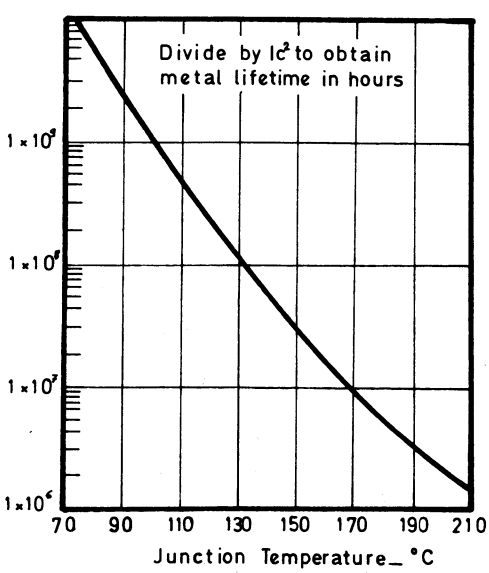
— Z_{Load} values to get optimum output power and efficiency

D

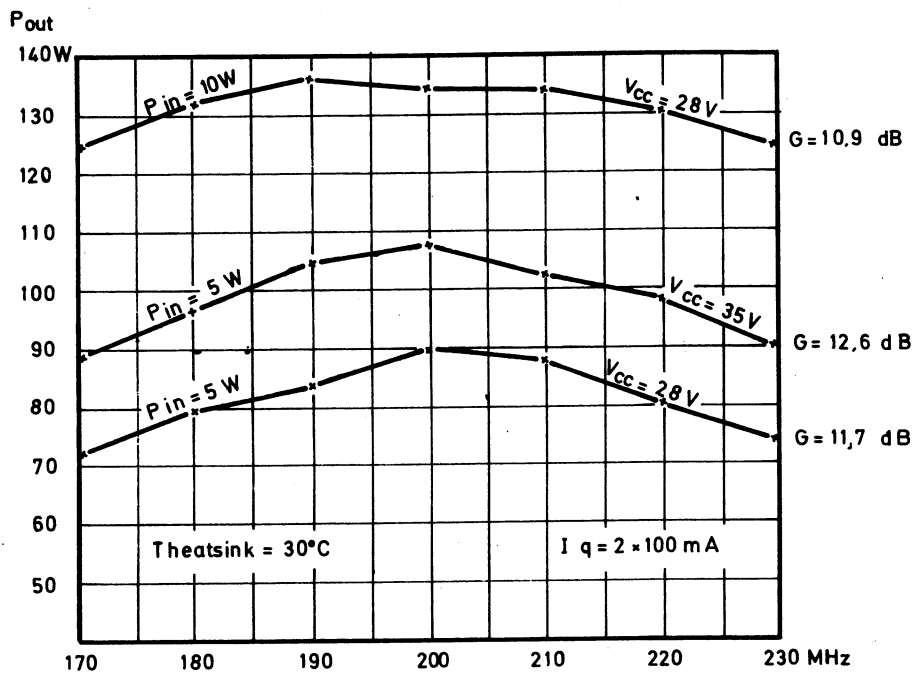
Package Outline



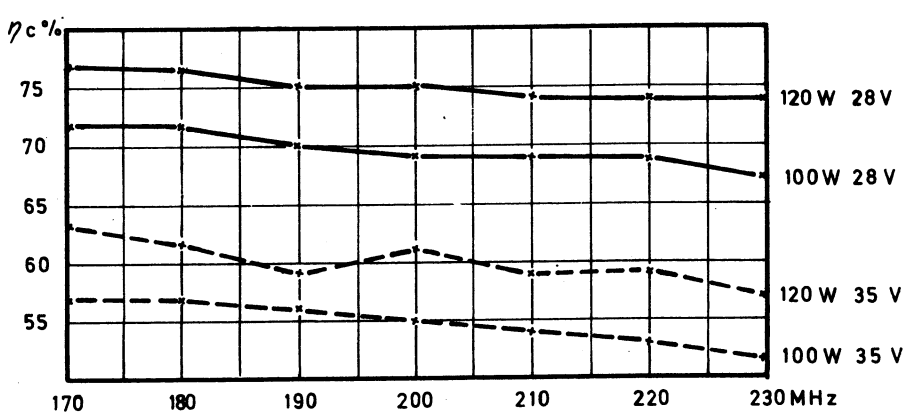
MTTF vs Junction Temperature



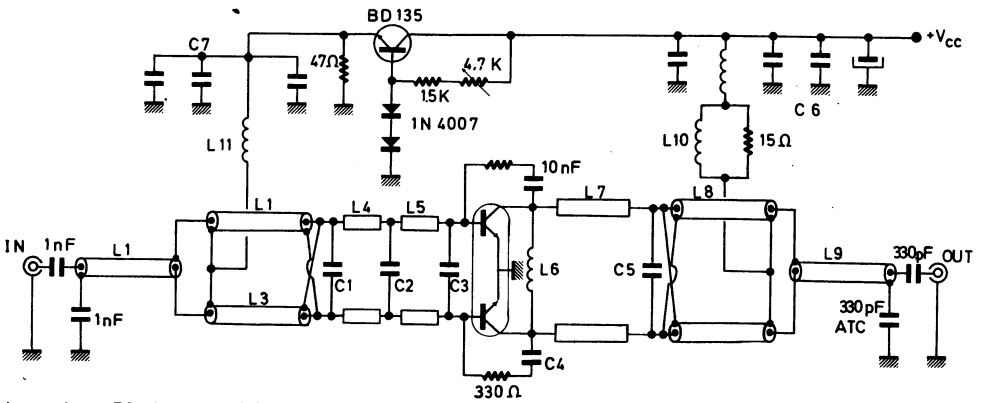
Typical Performances Class AB



Collector Efficiency vs Frequency



170-230 MHz BROADBAND AMPLIFIER CLASS AB

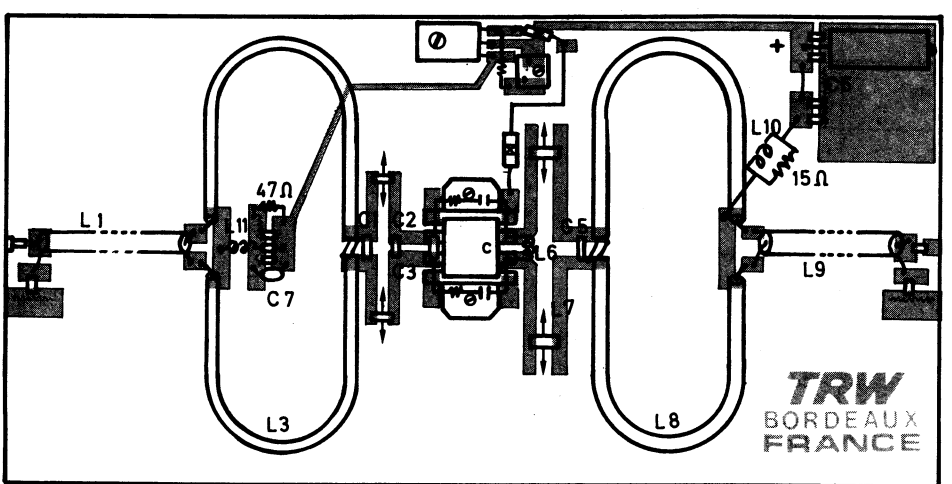


L_1 = L_9 = 50 ohms coaxial 1 = 80 mm
L_2 = L_3 = L_8 = 25 ohms coaxial cable or semi-rigid 1 = 80 mm
L_4 = 40 ohms line 2.5 % of λg 225 MHz or 1 = 23 mm sub 1/50 inch teflon glass
L_5 = 40 ohms line 65 % λg 225 MHz or 1 = 6 mm
L_6 = 3 turns ID 4 mm wire 1 mm ⌀ leads 5 mm long
L_7 = 40 line 3.5 % λg 225 MHz or 1 = 32 mm 1/50 teflon glass
L_{10} = 11 turns ID 4 mm wire 1 mm ⌀
L_{11} = .22 μH molded inductor

C_1 = 68 pF ATC 100B
C_2 = 100 pF ATC 100B
C_3 = 220 pF ATC 100B
C_5 = 27 pF + 33 pF ATC 100A
C_6 = C_7 = 1 nF + 10 nF + .1 μF + ELECTROLYTIC

L_4 has to be adjusted for Gain
L_6 and L_7 have to be adjusted for the best lead

Components Layout



denotes grounding foil