

T- 23-//

## SILICON EPITAXIAL BASE POWER TRANSISTORS

N-P-N silicon transistors in a plastic envelope intended for use in audio output stages, general amplifier and high-speed switching applications. P-N-P complements are BD242; 242A; 242B; and 242C.

### QUICK REFERENCE DATA

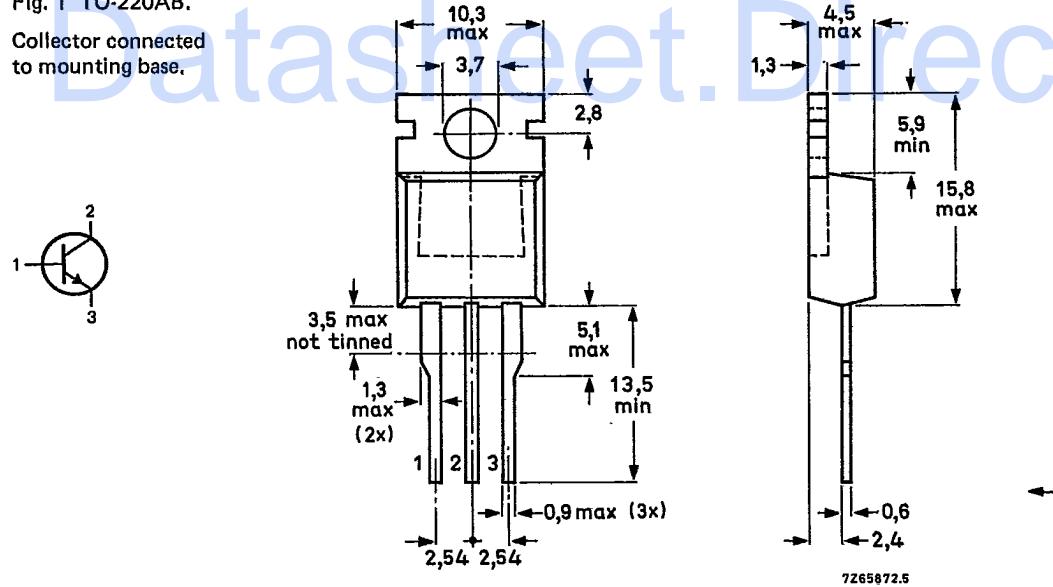
	BD241	A	B	C
Collector-base voltage	$V_{CBO}$	max. 45	60	80
Collector-emitter voltage	$V_{CEO}$	max. 45	60	80
Collector current (d.c.)	$I_C$	max.	5	A
Total power dissipation up to $T_{mb} = 25^\circ\text{C}$	$P_{tot}$	max.	40	W
Junction temperature	$T_j$	max.	150	$^\circ\text{C}$
D.C. current gain $I_C = 1 \text{ A}; V_{CE} = 4 \text{ V}$	$h_{FE}$	>	25	
Transition frequency at $f = 1 \text{ MHz}$ $I_C = 500 \text{ mA}; V_{CE} = 10 \text{ V}$	$f_T$	>	3	MHz

### MECHANICAL DATA

Fig. 1 TO-220AB.

Collector connected to mounting base.

Dimensions in mm



See also chapters Mounting instructions and Accessories.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

		BD241	A	B	C
Collector-base voltage (open emitter)	V <sub>CBO</sub>	max.	45	60	80
Collector-emitter voltage (open base)	V <sub>CEO</sub>	max.	45	60	80
Collector-emitter voltage ( $R_{BE} = 100 \Omega$ )	V <sub>CER</sub>	max.	55	70	90
Emitter-base voltage (open collector)	V <sub>EBO</sub>	max.		5	V
Collector current (d.c.)	I <sub>C</sub>	max.		5	A
Collector current (peak value)	I <sub>CM</sub>	max.		8	A
Base current (d.c.)	I <sub>B</sub>	max.		1	A
Total power dissipation up to $T_{mb} = 25^\circ\text{C}$	P <sub>tot</sub>	max.		40	W
Storage temperature	T <sub>stg</sub>		-65 to +150		°C
Junction temperature	T <sub>j</sub>	max.	150		°C

THERMAL RESISTANCE

From junction to mounting base	R <sub>thj-mb</sub> =	3, 12	K/W
From junction to ambient in free air	R <sub>thj-a</sub> =	70	K/W

CHARACTERISTICS

T<sub>j</sub> = 25 °C unless otherwise specified

		BD241; A	BD241B; C	
→ Collector cut-off current	I <sub>CEO</sub>	< 0,1	—	mA
I <sub>B</sub> = 0; V <sub>CE</sub> = 30 V	I <sub>CEO</sub>	—	0,1	mA
I <sub>B</sub> = 0; V <sub>CE</sub> = 60 V	I <sub>CES</sub>	< 0,2	—	mA
V <sub>BE</sub> = 0; V <sub>CE</sub> = V <sub>CEO</sub> max	I <sub>EBO</sub>	< 1	—	mA
→ Emitter cut-off current	I <sub>EBO</sub>	< 1	—	mA
I <sub>C</sub> = 0; V <sub>EB</sub> = 5 V	h <sub>FE</sub>	> 25	—	
D.C. current gain*	h <sub>FE</sub>	> 10	—	
I <sub>C</sub> = 1 A; V <sub>CE</sub> = 4 V	V <sub>BE</sub>	< 1,8	—	V
I <sub>C</sub> = 3 A; V <sub>CE</sub> = 4 V	V <sub>CEsat</sub>	< 1,2	—	V
Base-emitter voltage**	h <sub>FE</sub>	> 20	—	
I <sub>C</sub> = 3 A; V <sub>CE</sub> = 4 V	E <sub>(BR)</sub>	> 32	—	mJ
Collector-emitter saturation voltage*	I <sub>C</sub> = 3 A; I <sub>B</sub> = 0,6 A			
Small-signal current gain	I <sub>C</sub> = 0,5 A; V <sub>CE</sub> = 10 V; f = 1 kHz			
Turn off breakdown energy	L = 20 mH; I <sub>CC</sub> = 1,8 A			

\* Measured under pulse conditions: t<sub>p</sub> ≤ 300 μs; δ < 0,02.

\*\* V<sub>BE</sub> decreases by about 2,3 mV/K with increasing temperature.

T-33-11

Transition frequency at  $f = 1$  MHz

$I_C = 0,5$  A;  $V_{CE} = 10$  V

$f_T > 3$  MHz

Switching times

(between 10% and 90% levels)

$I_{Con} = 1$  A;  $I_{Bon} = -I_{Boff} = 0,1$  A

Turn-on time

$t_{on}$  typ. 0,3  $\mu$ s

Turn-off time

$t_{off}$  typ. 1  $\mu$ s

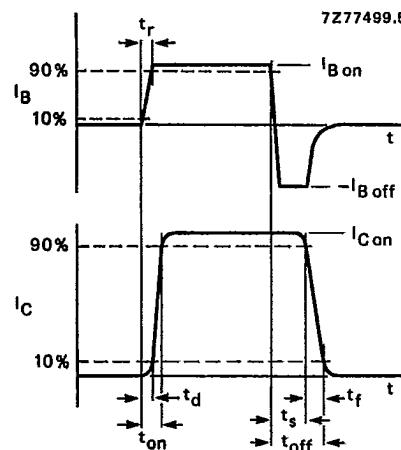


Fig. 2 Switching times waveforms.

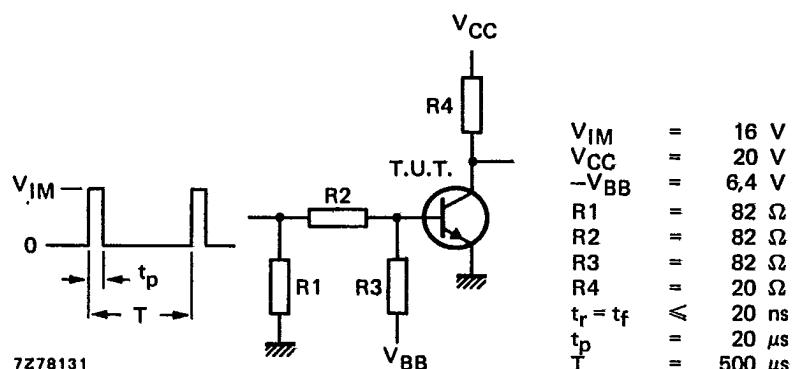


Fig. 3 Switching times test circuit.

T-33-11

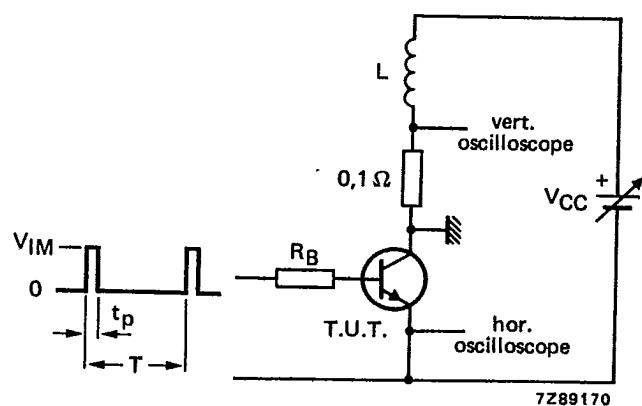


Fig. 4 Test circuit for turn-off breakdown energy.  
 $V_{IM} = 12 \text{ V}$ ;  $R_B = 270 \Omega$ ;  $I_{CC} = 1.8 \text{ A}$ ;  $t_p = 1 \text{ ms}$ ;  $\delta = 0.01$ .

T-33-11

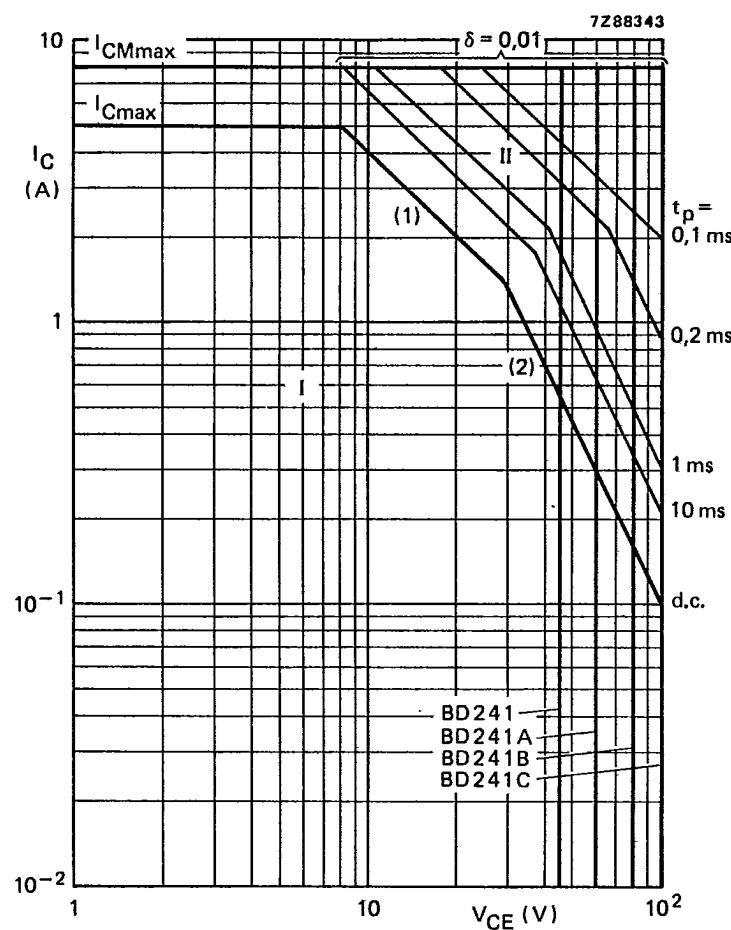


Fig. 5 Safe Operating ARea;  $T_{mb} = 25^\circ\text{C}$ .

- I Region of permissible d.c. operation.
- II Permissible extension for repetitive pulse operation.
- (1)  $P_{tot \max}$  and  $P_{peak \max}$  lines.
- (2) Second breakdown limits.

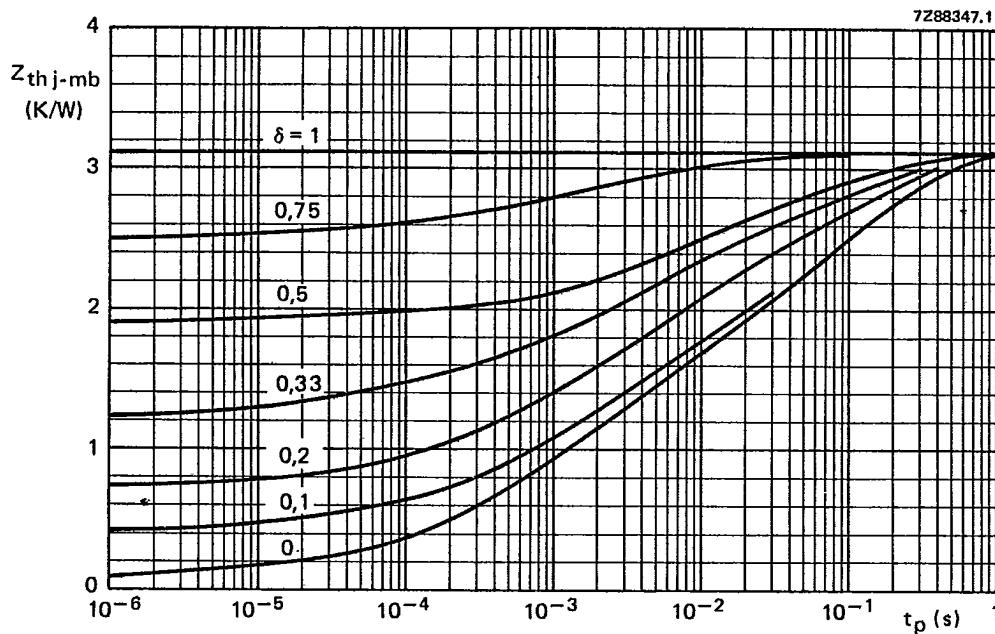
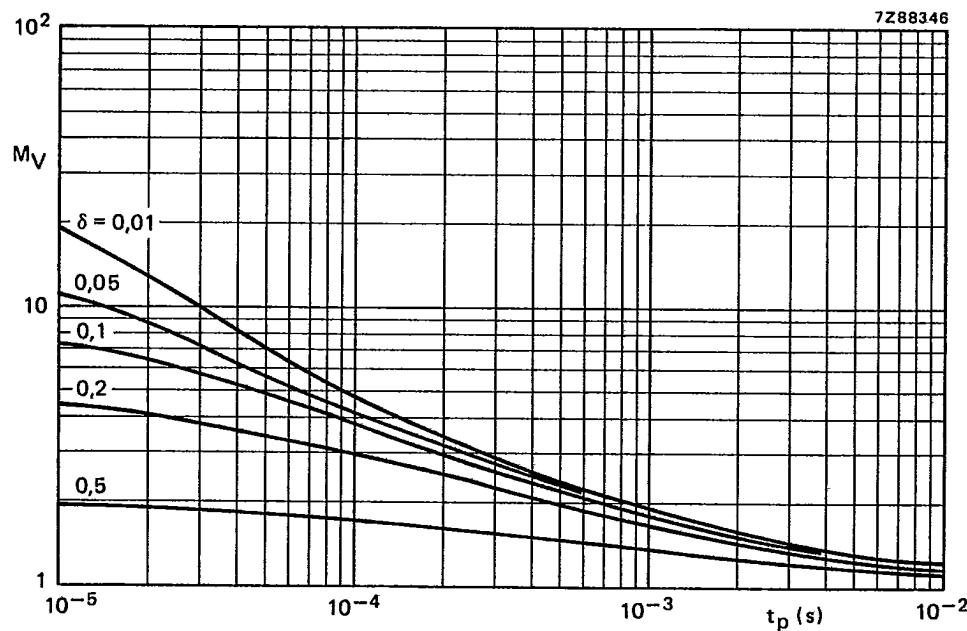
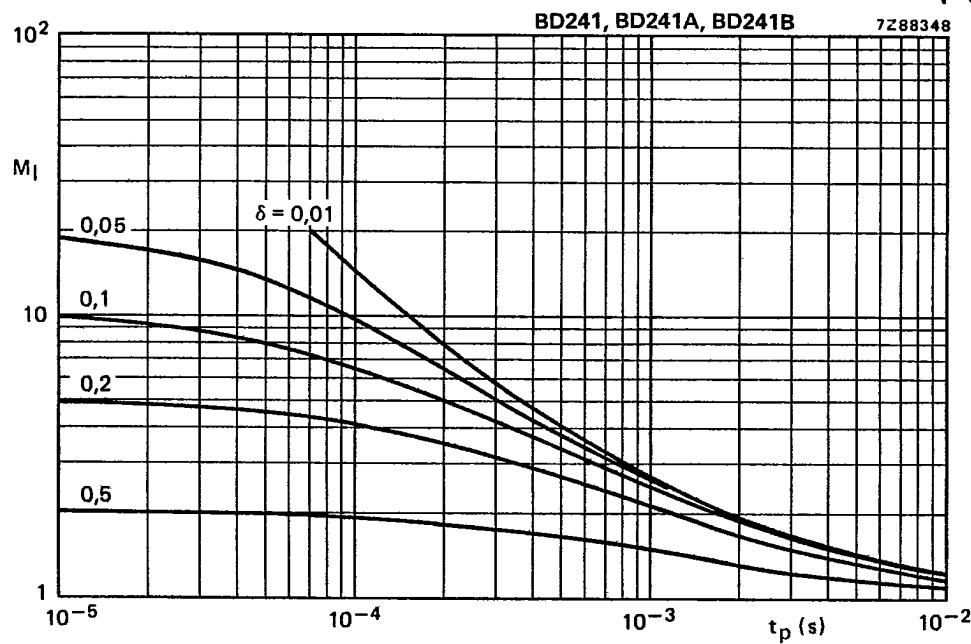
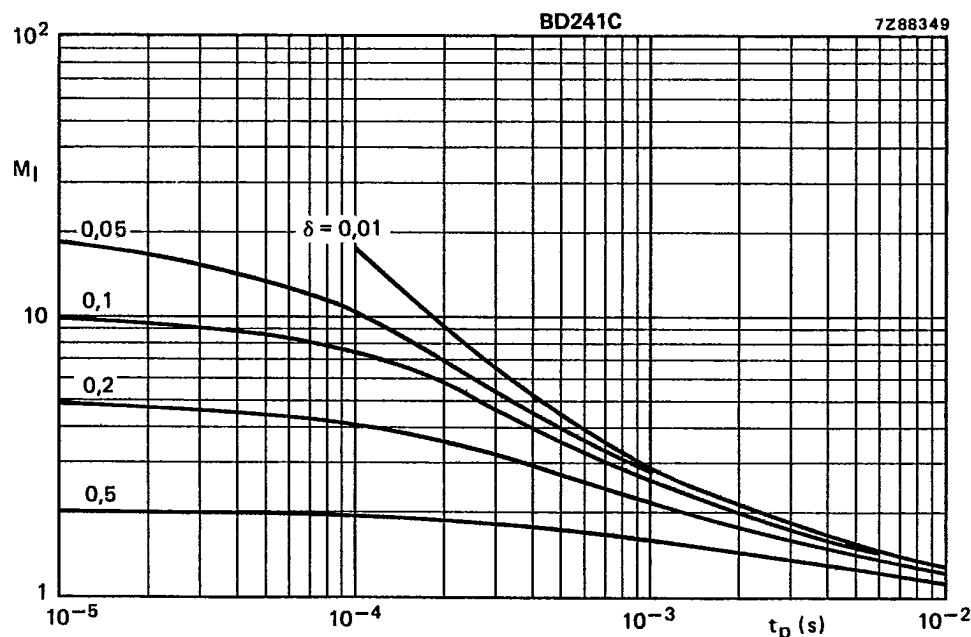


Fig. 6 Power pulse rating chart.

Fig. 7 S.B. voltage multiplying factor at the  $I_{Cmax}$  level.

Fig. 8 S.B. current multiplying factor at the  $V_{CEOmax}$  level.Fig. 9 S.B. current multiplying factor at the  $V_{CEOmax}$  level.

T-33-11

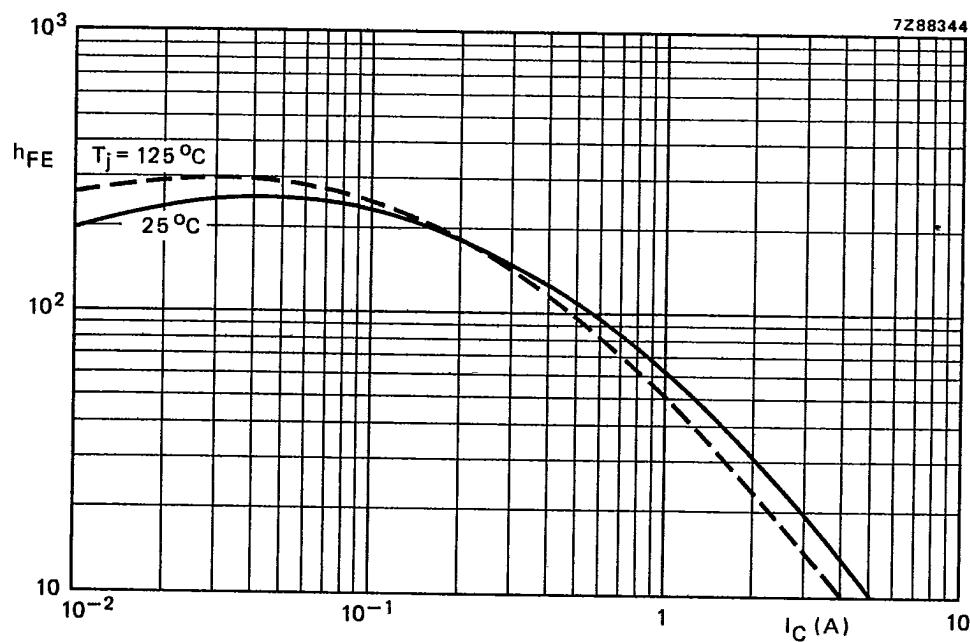


Fig. 10 Typical static forward current transfer ratio as a function of the collector current.  $V_{CE} = 4$  V.

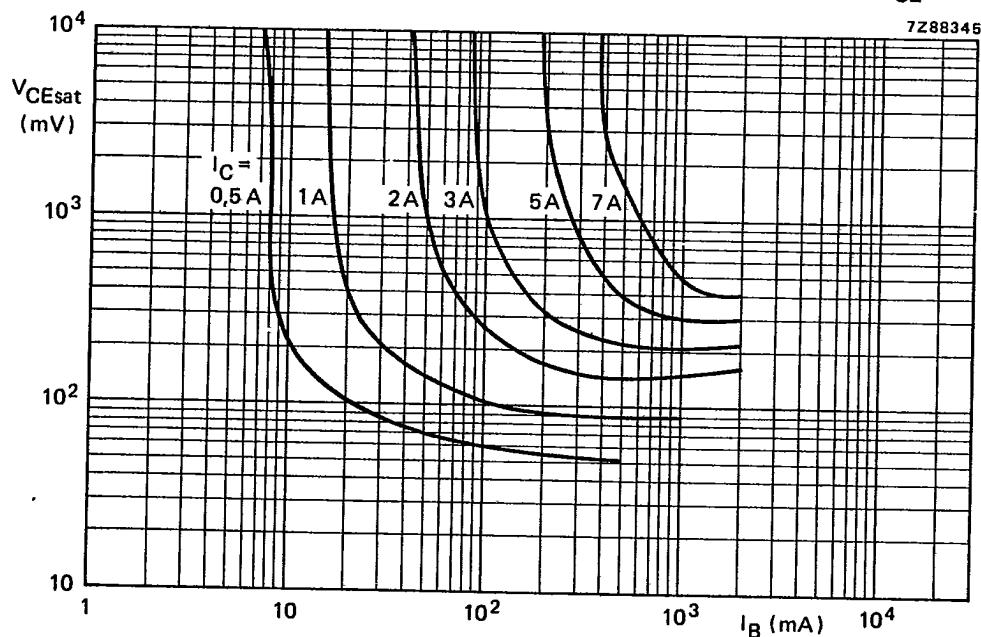


Fig. 11 Typical values collector-emitter saturation voltage at  $T_j = 25^\circ\text{C}$ .

T-33-11

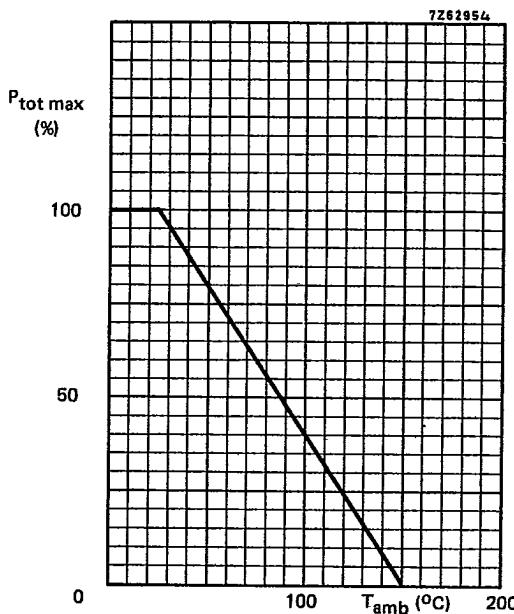


Fig. 12 Power derating curve.