T-33-31

SILICON DARLINGTON POWER TRANSISTORS

P-N-P epitaxial base transistors in monolithic Darlington circuit for audio output stages and general amplifier and switching applications: TO-3 envelope, N-P-N complements are BDX63, BDX63A, BDX63B and BDX63C.

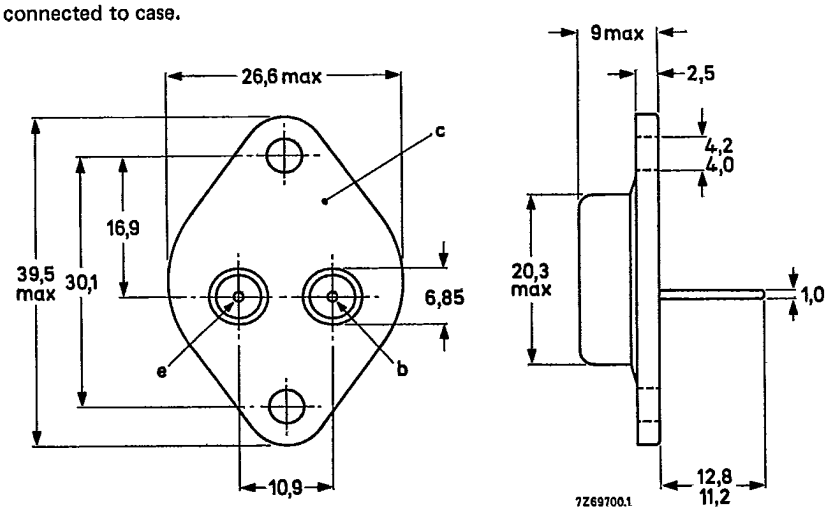
QUICK REFERENCE DATA

			BDX62	62A	62B	62C	
Collector-base voltage (open emitter)	$-V_{CBO}$	max.	60	80	100	120	V
Collector-emitter voltage (open base)	$-V_{CEO}$	max.	60	80	100	120	V
Collector current (peak value)	$-I_{CM}$	max.			12		A
Total power dissipation up to $T_{mb} = 25\ ^oC$	P_{tot}	max.			90		W
Junction temperature	T_j	max.			200		°C
D.C. current gain							
$-I_C = 0,5$ A; $-V_{CE} = 3$ V	h_{FE}	typ.			1500		
$-I_C = 3,0$ A; $-V_{CE} = 3$ V	h_{FE}	>			1000		
Cut-off frequency							
$-I_C = 3$ A; $-V_{CE} = 3$ V	f_{hfe}	typ.			100		kHz

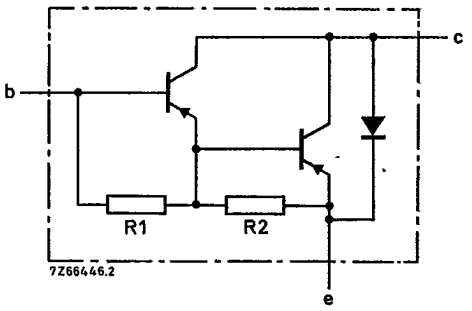
MECHANICAL DATA

Dimensions in mm

Fig. 1 TO-3.
Collector connected to case.



See also chapters Mounting instructions and Accessories.



R_1 typ. 6 kΩ
R_2 typ. 80 Ω

Fig. 2 Circuit diagram.

RATINGS

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

			BDX62	62A	62B	62C	
Collector-base voltage (open emitter)	$-V_{CBO}$	max.	60	80	100	120	V
Collector-emitter voltage (open base)	$-V_{CEO}$	max.	60	80	100	120	V
Emitter-base voltage (open collector)	$-V_{EBO}$	max.	5	5	5	5	V
Collector current (d.c.)	$-I_C$	max.			8		A
Collector current (peak value)	$-I_{CM}$	max.			12		A
Base current (d.c.)	$-I_B$	max.			150		mA
Total power dissipation up to T_{mb} = 25 °C	P_{tot}	max.			90		W
Storage temperature	T_{stg}				−65 to +200		°C
Junction temperature*	T_j	max.			200		°C

THERMAL RESISTANCE*

From junction to mounting base	$R_{th\ j\text{-}mb}$	=	1,94 K/W

* Based on maximum average junction temperature in line with common industrial practice. The resulting higher junction temperature of the output transistor part is taken into account.

CHARACTERISTICS

T_j = 25 °C unless otherwise specified.

Collector cut-off current				
$I_E = 0$; $-V_{CB} = -V_{CBOmax}$	$-I_{CBO}$	<	0,2	mA
$I_E = 0$; $-V_{CB} = 40$ V; $T_j = 200$ °C; BDX62	$-I_{CBO}$	<	2	mA
$I_E = 0$; $-V_{CB} = 50$ V; $T_j = 200$ °C; BDX62A				
$I_E = 0$; $-V_{CB} = 60$ V; $T_j = 200$ °C; BDX62B				
$I_E = 0$; $-V_{CB} = 70$ V; $T_j = 200$ °C; BDX62C				
$I_B = 0$; $-V_{CE} = -\frac{1}{2}V_{CEO}$	$-I_{CEO}$	<	0,2	mA
Emitter cut-off current				
$I_C = 0$; $-V_{EB} = 5$ V	$-I_{EBO}$	<	5	mA
D.C. current gain (note 1)				
$-I_C = 0{,}5$ A; $-V_{CE} = 3$ V	h_{FE}	typ.	1500	
$-I_C = 3$ A; $-V_{CE} = 3$ V	h_{FE}	>	1000	
$-I_C = 8$ A; $-V_{CE} = 3$ V	h_{FE}	typ.	750	
Base-emitter voltage (notes 1 and 2)				
$-I_C = 3$ A; $-V_{CE} = 3$ V	$-V_{BE}$	<	2,5	V
Collector-emitter saturation voltage (note 1)				
$-I_C = 3$ A; $-I_B = 12$ mA	$-V_{CEsat}$	<	2	V
Collector capacitance at f = 1 MHz				
$I_E = I_e = 0$; $-V_{CB} = 10$ V	C_c	typ.	100	pF
Cut-off frequency				
$-I_C = 3$ A; $-V_{CE} = 3$ V	f_{hfe}	typ.	100	kHz
Small-signal current gain				
$-I_C = 3$ A; $-V_{CE} = 3$ V; f = 1 MHz	h_{fe}	typ.	100	

Notes

1. Measured under pulse conditions: $t_p < 300\ \mu s$, $\delta < 2\%$.
2. $-V_{BE}$ decreases by about 3,6 mV/K with increasing temperature.

CHARACTERISTICS (continued)

Switching times
(between 10% and 90% levels)
$-I_{Con} = 3$ A; $-I_{Bon} = I_{Boff} = 12$ mA

turn-on time	t_{on}	typ. 0,5 μs
turn-off time	t_{off}	typ. 2,5 μs

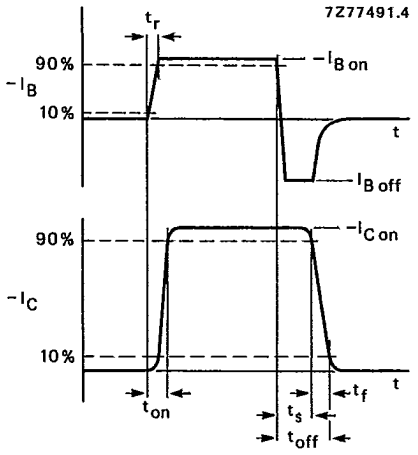


Fig. 3 Switching times waveforms.

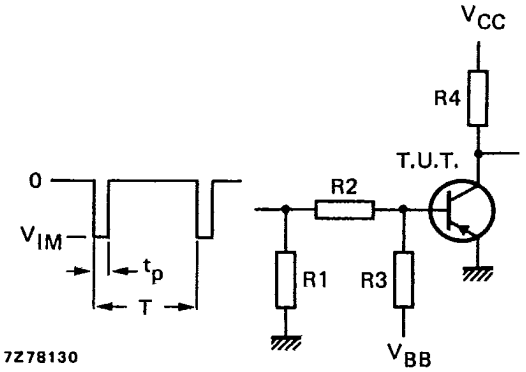


Fig. 4 Switching times test circuit.

Diode forward voltage
$I_F = 3$ A

	V_F	typ. 1,8 V

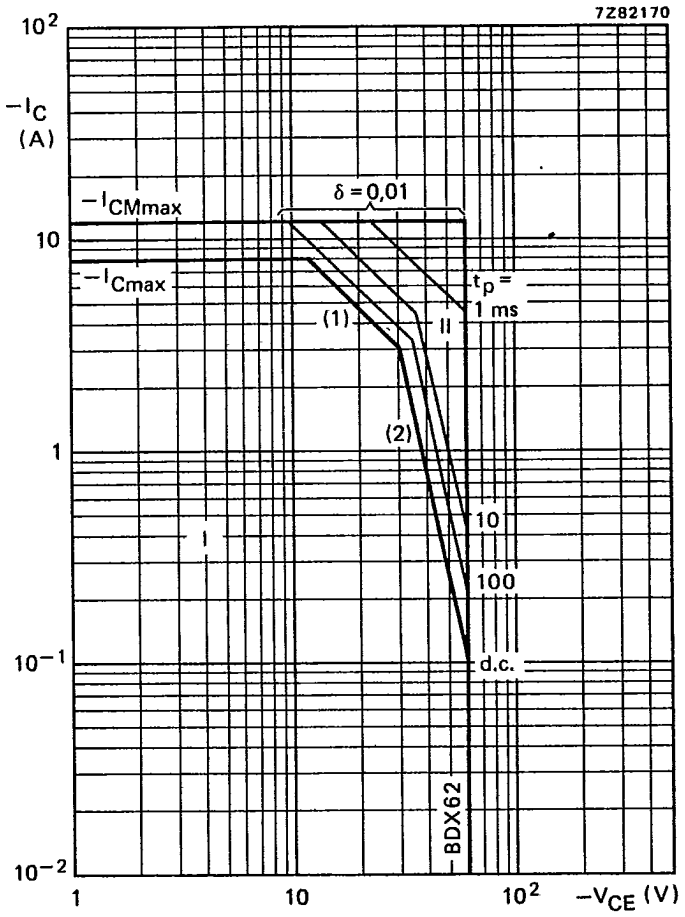


Fig. 5 Safe Operating ARea; $T_{mb} = 25\ ^oC$.

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.

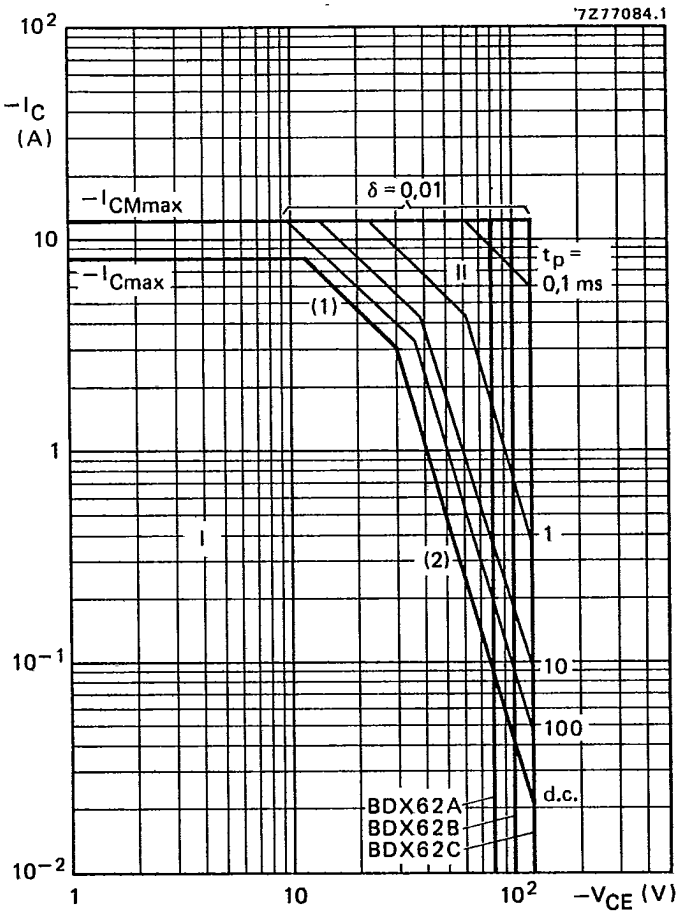


Fig. 6 Safe Operating AREa; T_{mb} = 25 °C.

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.

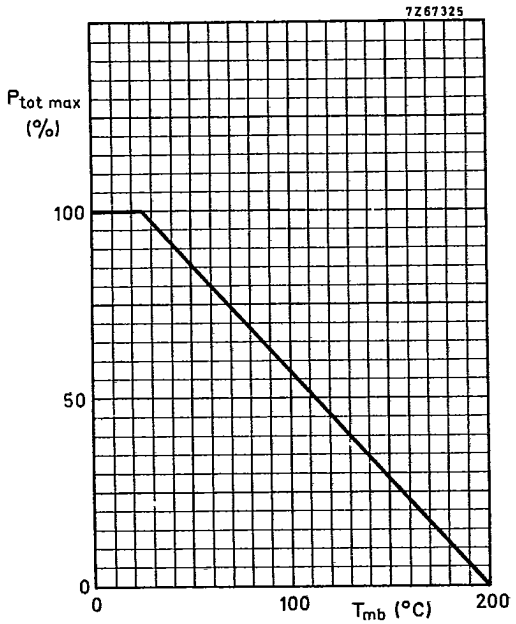


Fig. 7 Power derating curve.

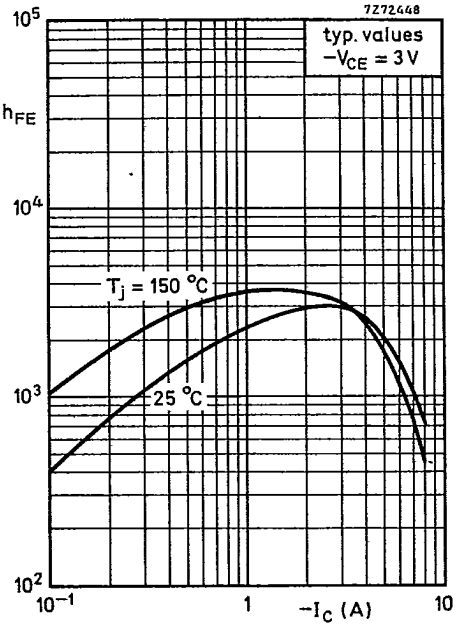


Fig. 8 D.C. current gain.

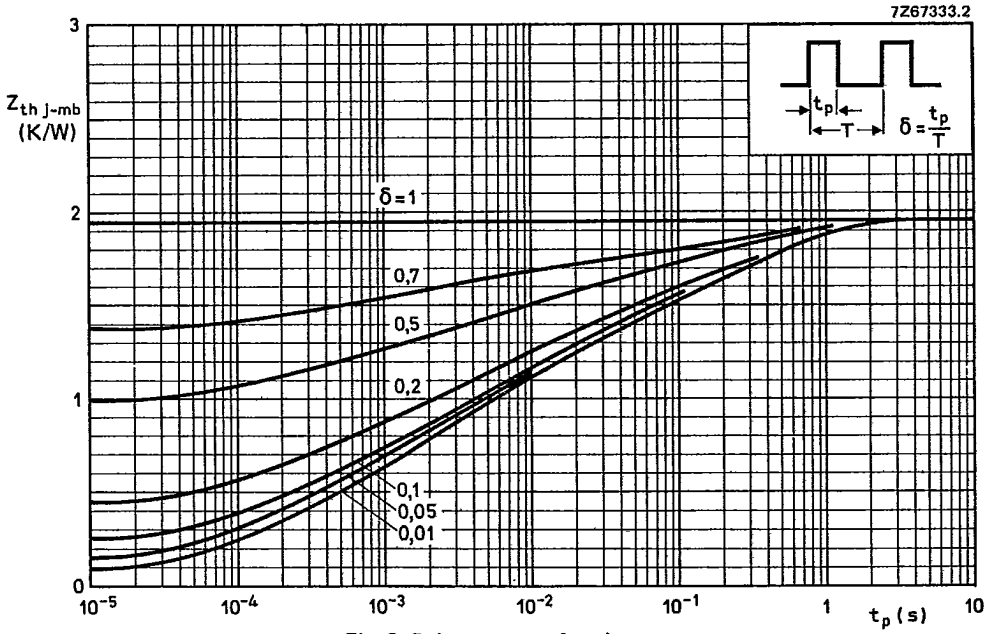


Fig. 9 Pulse power rating chart.

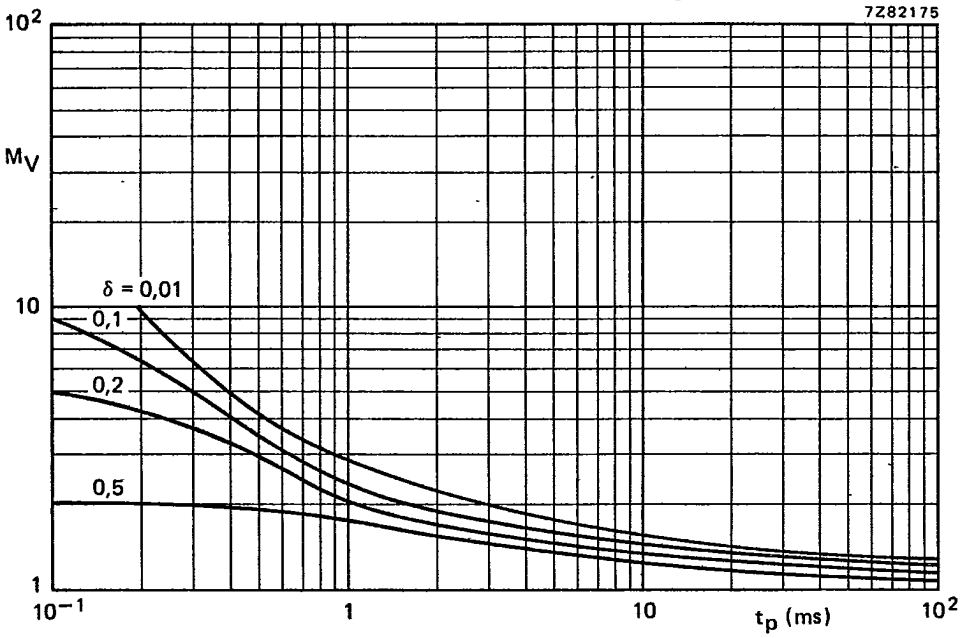


Fig. 10 S.B. voltage multiplying factor at the I_{Cmax} level.

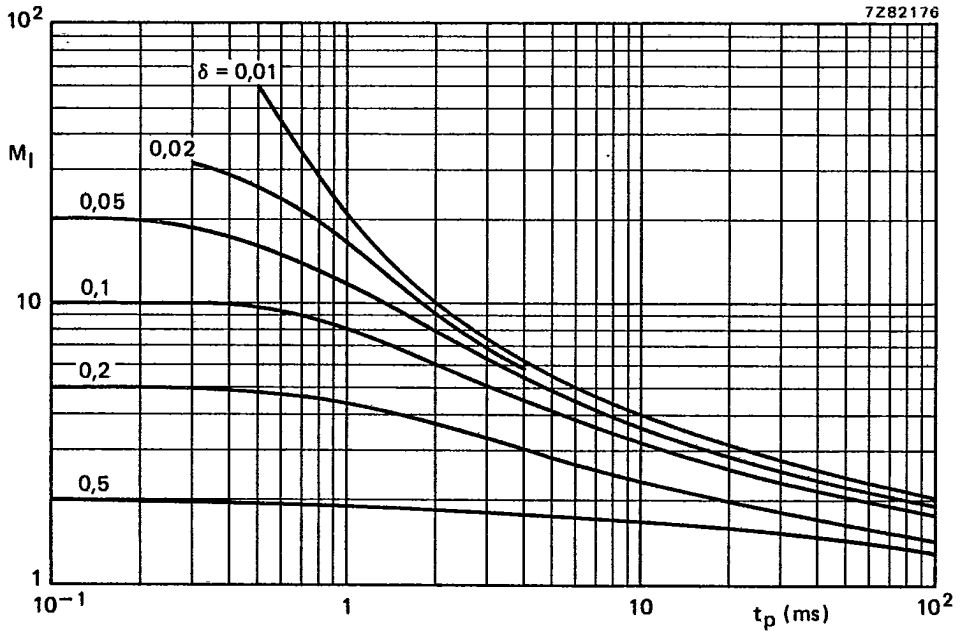


Fig. 11 S.B. current multiplying factor at the V_{CEO} 100 V and 60 V level.

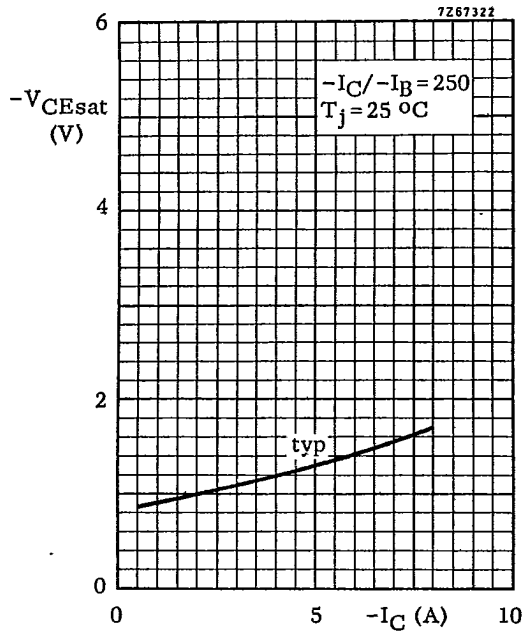


Fig. 12.

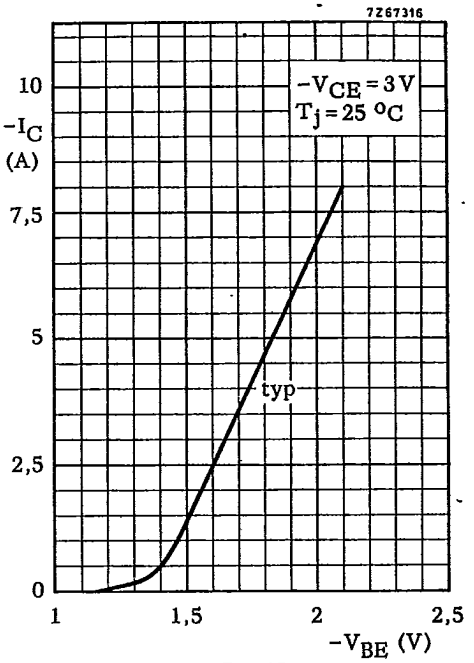


Fig. 13.

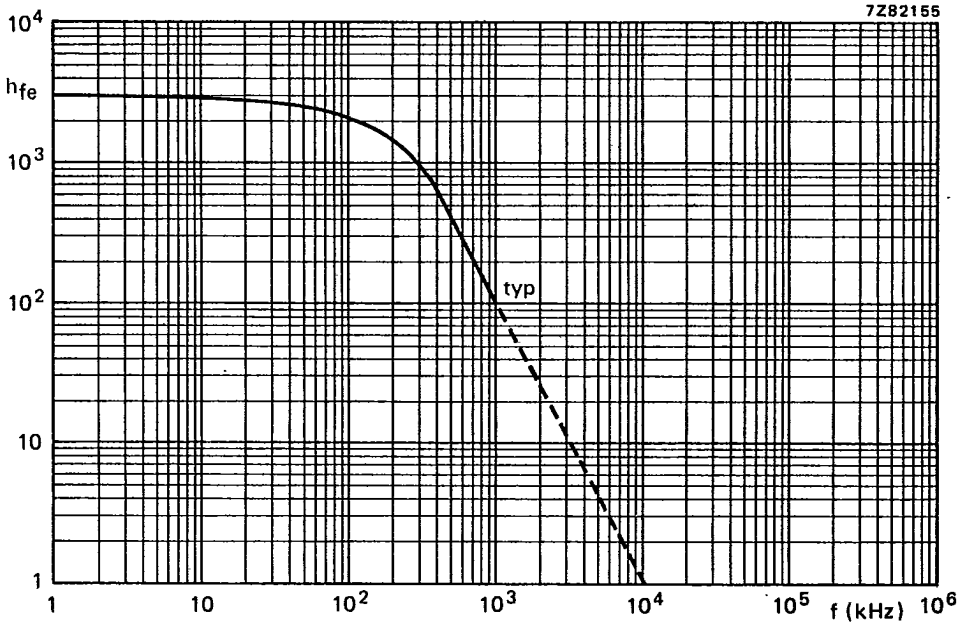


Fig. 14 Small signal current gain at $-I_C = 3$ A; $-V_{CE} = 3$ V.