SILICON DARLINGTON POWER TRANSISTORS

N-P-N epitaxial base transistors in monolithic Darlington circuit for audio output stages and general amplifier and switching applications; TO-3 envelope, P-N-P complements are BDX62, BDX62A, BDX62B and BDX62C.

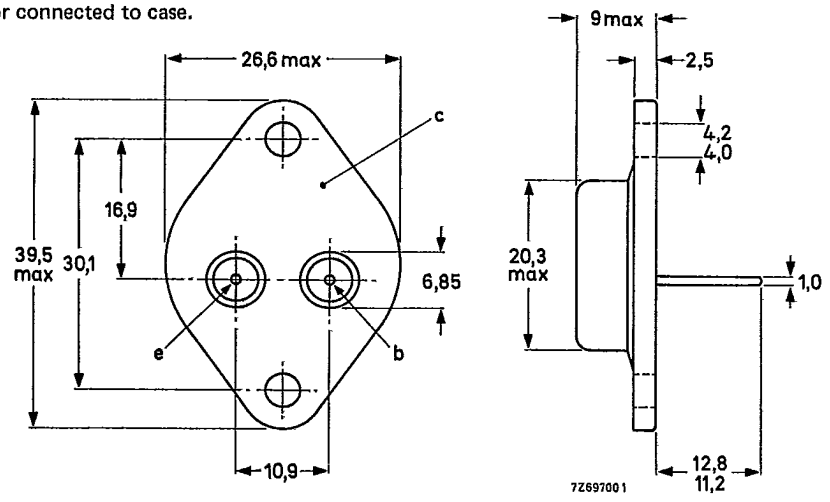
QUICK REFERENCE DATA

			BDX63	63A	63B	63C	
Collector-base voltage (open emitter)	V_{CBO}	max.	80	100	120	140	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 °C	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.		2500			
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

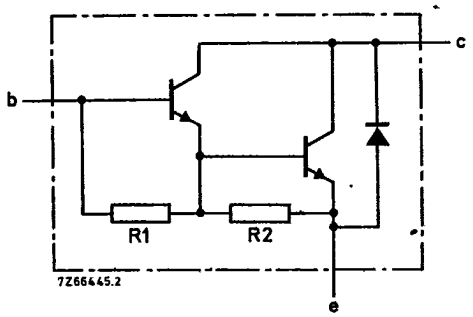
MECHANICAL DATA

Dimensions in mm

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



See also chapters Mounting Instructions and Accessories.



R1 typ. 8 kΩ
R2 typ. 100 Ω

Fig. 2 Circuit diagram.

RATINGS

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

			BDX63	63A	63B	63C	
Collector-base voltage (open emitter)	V_{CBO}	max.	80	100	120	140	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_{CEOmax}	I_{CBO}	<	0,2	mA
I_E = 0; V_{CB} = ½V_{CBOmax}; T_j = 200 °C	I_{CBO}	<	2	mA
I_B = 0; V_{CE} = ½V_{CEOmax}	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.	2500	
I_C = 3 A; V_{CE} = 3 V	h_{FE}	>	1000	
I_C = 8 A; V_{CE} = 3 V	h_{FE}	typ.	2600	
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
Turn-off breakdown energy with inductive load (Fig. 4)				
$-I_{Boff}$ = 0; I_{Con} = 4,5 A; t_p = 1 ms; T = 100 ms	$E_{(BR)}$	>	50	mJ
Small signal current gain				
I_C = 3 A; V_{CE} = 3 V; f = 1 MHz	h_{fe}	typ.	100	
Diode, forward voltage				
I_F = 3 A	V_F	typ.	1,2	V

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.	5 μs

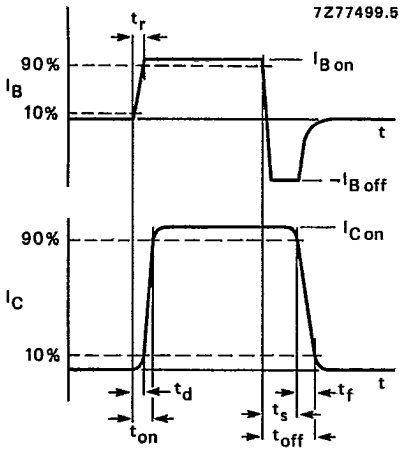
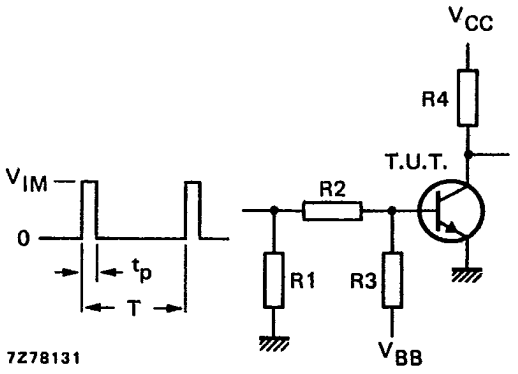


Fig. 3 Switching time waveforms.



V_{IM}	=	10 V
V_{CC}	=	10 V
V_{BB}	=	−4 V
R1	=	56 Ω
R2	=	410 Ω
R3	=	560 Ω
R4	=	3 Ω
$t_r = t_f$	⩽	15 ns
t_p	=	10 μs
T	=	500 μs

Fig. 4 Switching times test circuit.

Diode, forward voltage
I_F = 3 A

V_F typ. 1,2 V

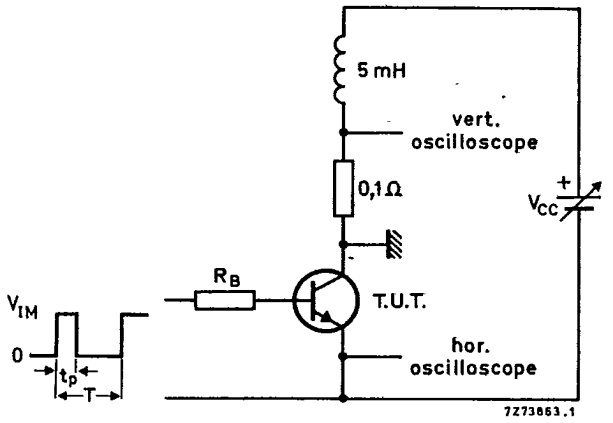


Fig. 5 Test circuit for turn-off breakdown energy.
V_{IM} = 12 V; R_B = 270 Ω; I_{CC} = 4,5 A; t_p = 1 ms; δ = 1%.

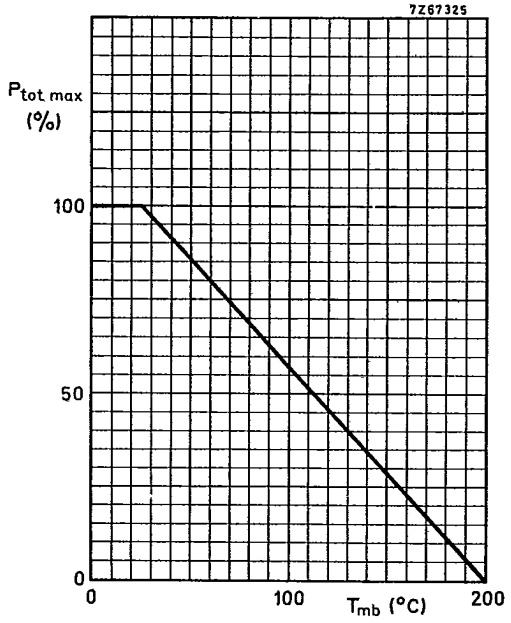


Fig. 6 Power derating curve.

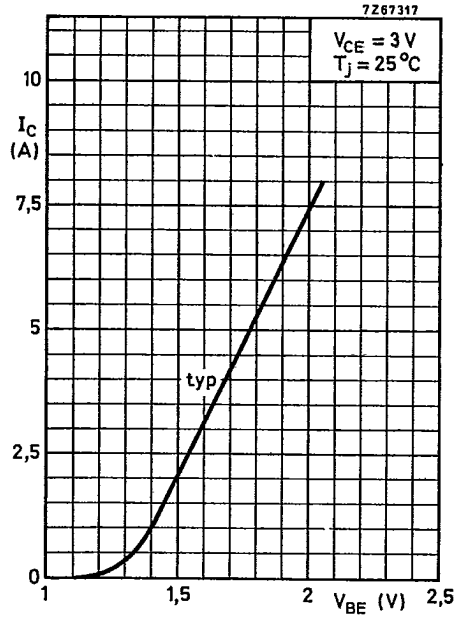


Fig. 7.

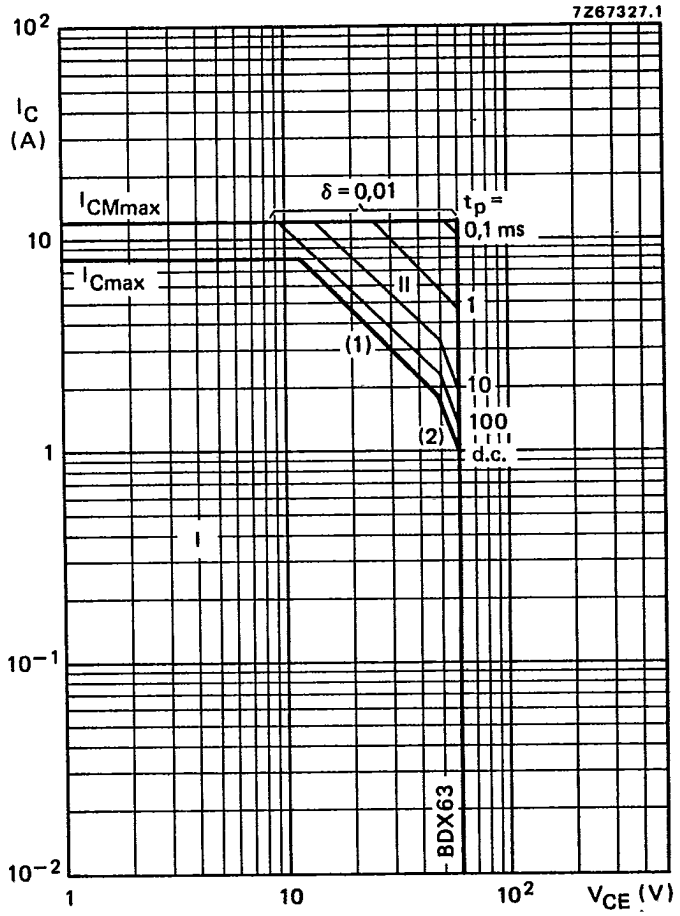


Fig. 8 Safe Operating ARea, $T_{mb} \leqslant 25$ °C.

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.

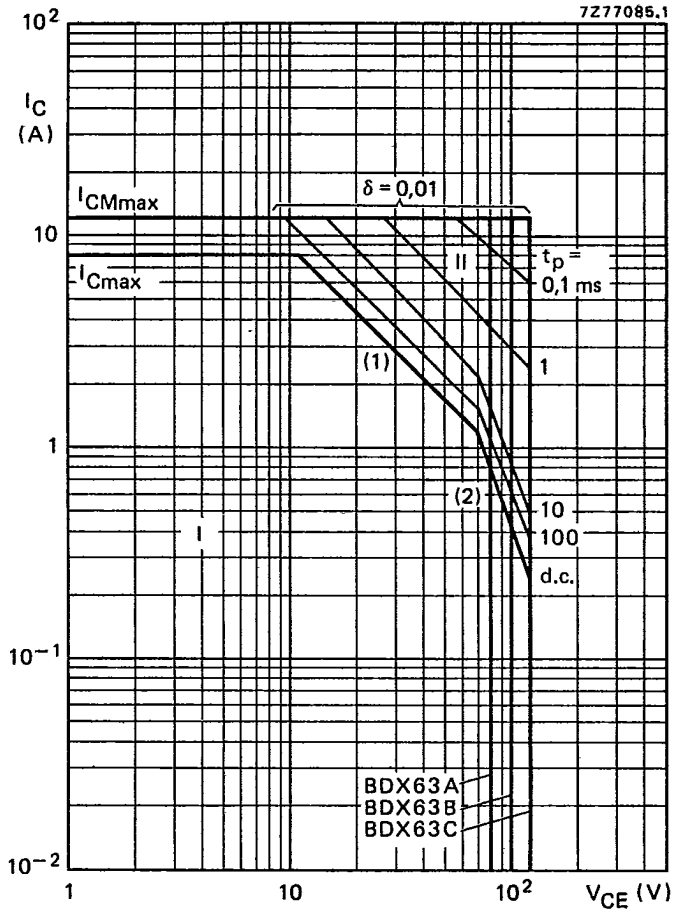


Fig. 9 Safe Operating AREa, $T_{mb} \leqslant 25\ ^oC$.

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.

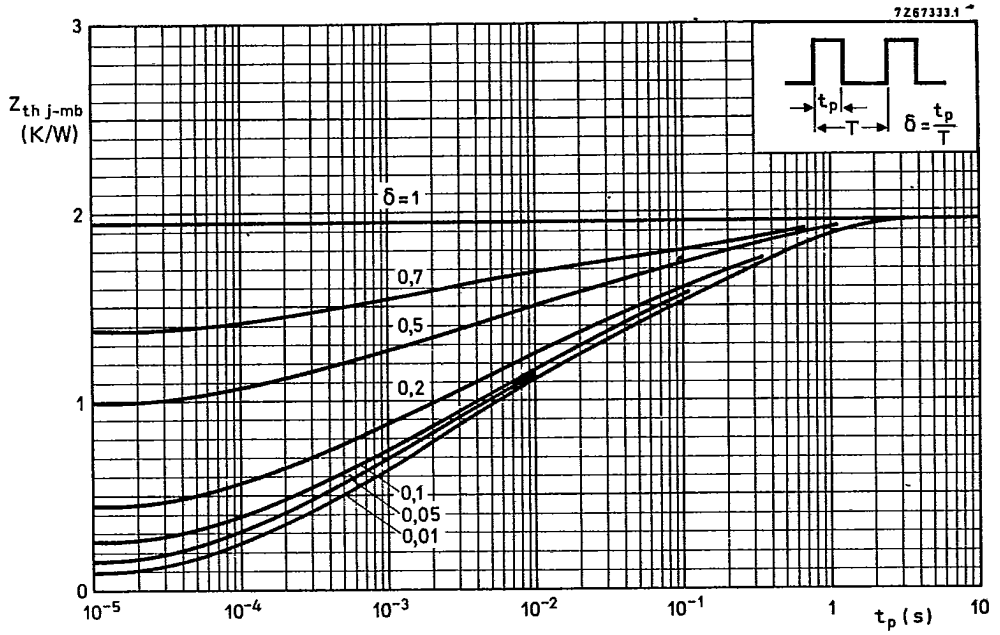


Fig. 10 Pulse power rating chart.

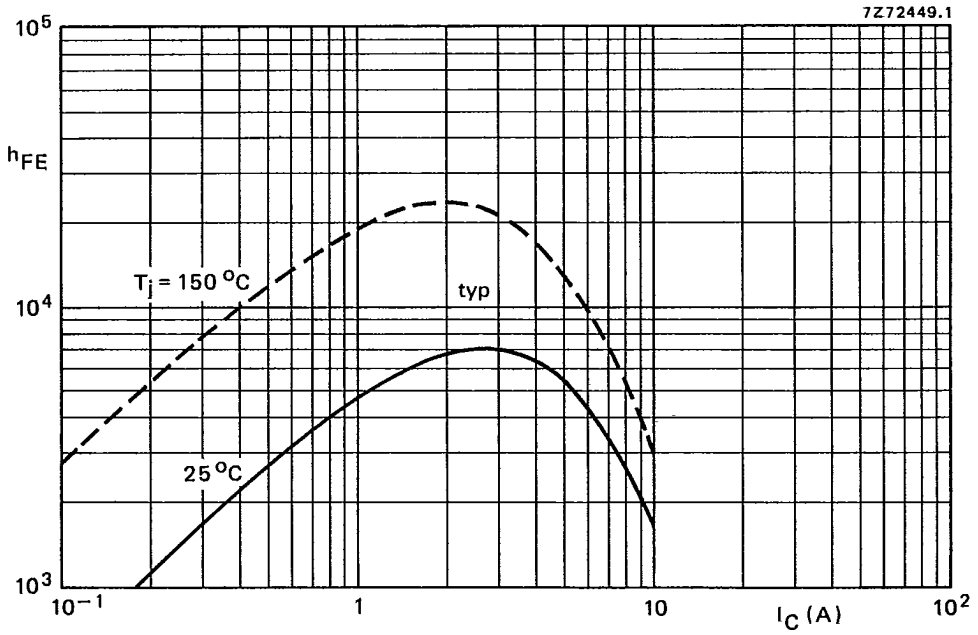


Fig. 11 Typical values d.c. current gain at V_{CE} = 3 V.

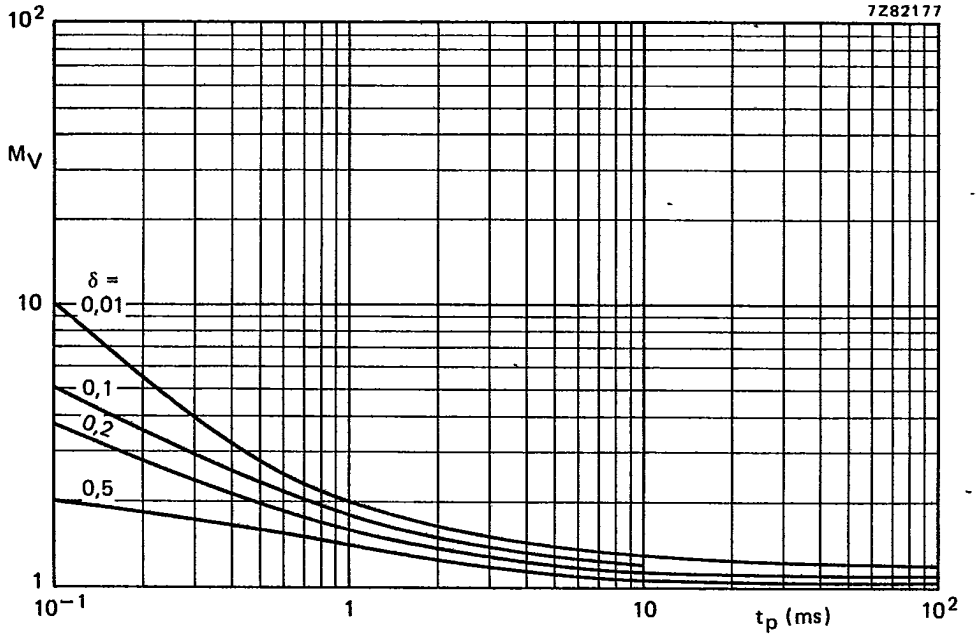


Fig. 12 S.B. voltage multiplying factor at the I_{Cmax} level.

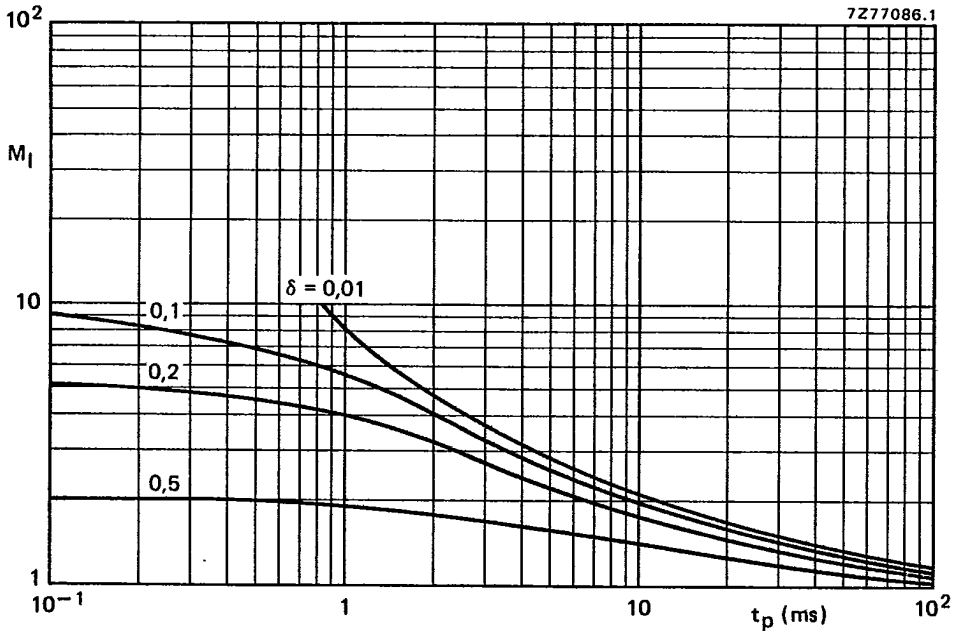


Fig. 13 S.B. current multiplying factor at the V_{CEO} 100 V and 60 V level.

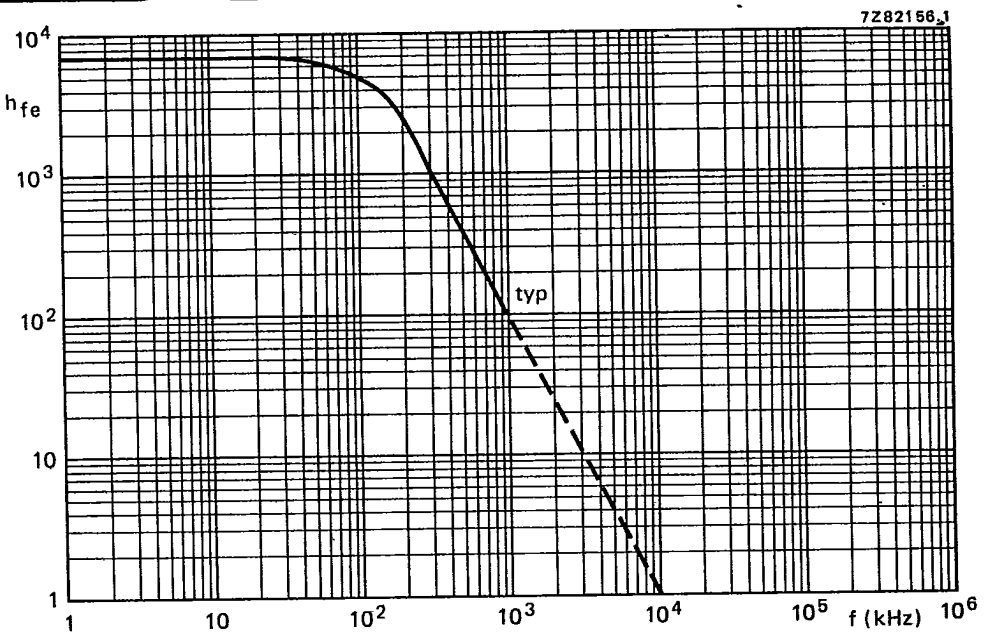


Fig. 14 Small-signal current gain at $I_C = 3$ A; $V_{CE} = 3$ V.

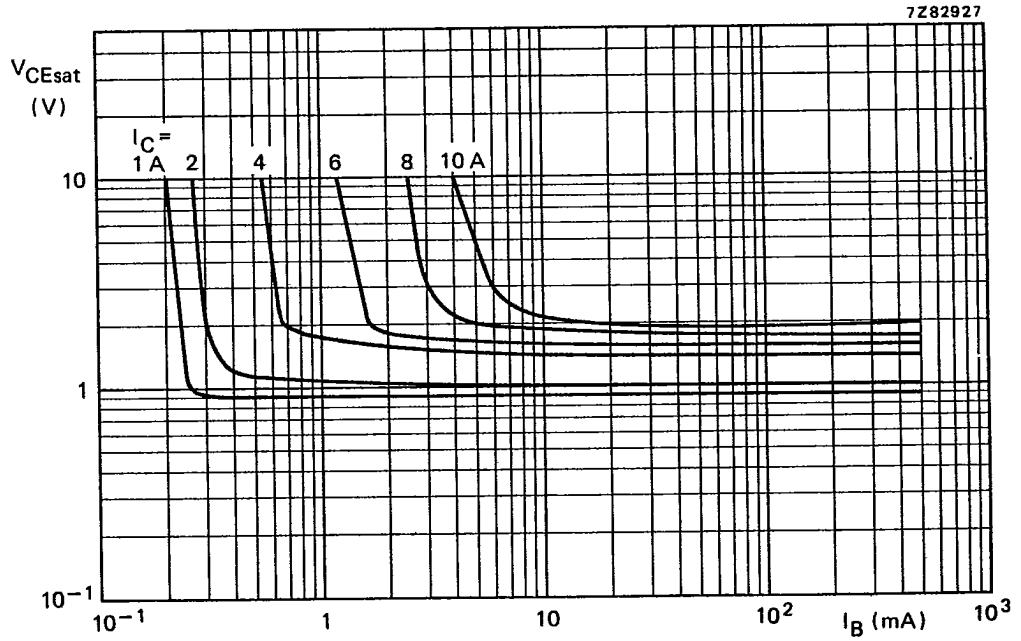


Fig. 15 Typical values collector-emitter saturation voltage at $T_j = 25$ °C.