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 BDX65, BDX65A, BDX65B and BDX65C.

QUICK REFERENCE DATA

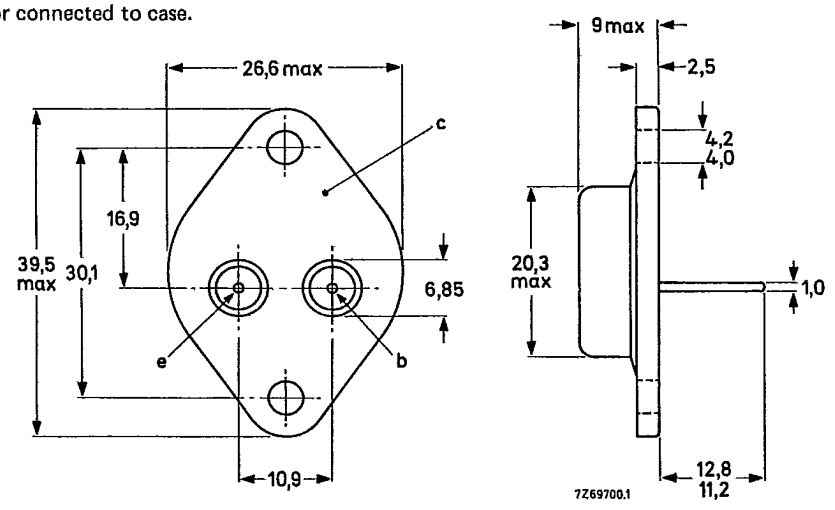
			BDX64	64A	64B	64C	
Collector-base voltage (open emitter)	$-V_{CBO}$	max.	60	80	100	120	V
Collector-emitter voltage (open base)	$-V_{CEO}$	max.	60	80	100	120	V
Collector current (peak value)	$-I_{CM}$	max.		16			A
Total power dissipation up to T_{mb} = 25 °C	P_{tot}	max.		117			W
Junction temperature	T_j	max.		200			°C
D.C. current gain							
$-I_C$ = 1 A; $-V_{CE}$ = 3 V	h_{FE}	typ.		1500			
$-I_C$ = 5 A; $-V_{CE}$ = 3 V	h_{FE}	>		1000			
Cut-off frequency							
$-I_C$ = 5 A; $-V_{CE}$ = 3 V	f_{hfe}	typ.		80			kHz

MECHANICAL DATA

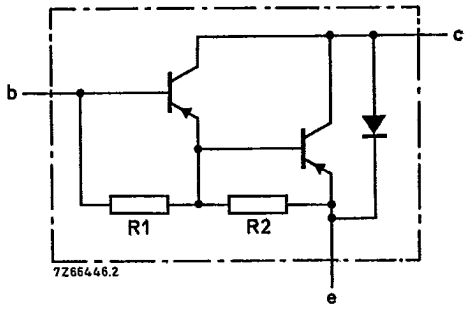
Dimensions in mm

Fig. 1 TO-3.

Collector connected to case.



See also chapters Mounting instructions and Accessories.



R1 typ. 5 kΩ
R2 typ. 80 Ω

Fig. 2 Circuit diagram.

RATINGS

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

			BDX64	64A	64B	64C	
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.		12			A
Collector current (peak value)	$-I_{CM}$	max.		16			A
Base current (d.c.)	$-I_B$	max.		200			mA
Total power dissipation up to T_{mb} = 25 °C	P_{tot}	max.		117			W
Storage temperature	T_{stg}			−65 to + 200			°C
Junction temperature*	T_j	max.		200			°C

THERMAL RESISTANCE*

From junction to mounting base	$R_{th\ j\text{-}mb}$	=	1,5	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				
$I_E = 0$; $-V_{CB} = -V_{CBOmax}$	$-I_{CBO}$	<	0,4	mA
$I_E = 0$; $-V_{CB} = 40$ V; $T_j = 200$ °C: BDX64 $I_E = 0$; $-V_{CB} = 50$ V; $T_j = 200$ °C: BDX64A $I_E = 0$; $-V_{CB} = 60$ V; $T_j = 200$ °C: BDX64B $I_E = 0$; $-V_{CB} = 70$ V; $T_j = 200$ °C: BDX64C	$-I_{CBO}$	<	3	mA
$I_B = 0$; $-V_{CE} = -½ V_{CEOmax}$	$-I_{CEO}$	<	0,2	mA
Emitter cut-off current				
$I_C = 0$; $-V_{EB} = 5$ V	$-I_{EBO}$	<	5	mA
D.C. current gain (note 1)				
$-I_C = 1$ A; $-V_{CE} = 3$ V	h_{FE}	typ.	1500	
$-I_C = 5$ A; $-V_{CE} = 3$ V	h_{FE}	>	1000	
$-I_C = 12$ A; $-V_{CE} = 3$ V	h_{FE}	typ.	750	
Base-emitter voltage (notes 1 and 2)				
$-I_C = 5$ A; $-V_{CE} = 3$ V	$-V_{BE}$	<	2,5	V
Collector-emitter saturation voltage (note 1)				
$-I_C = 5$ A; $-I_B = 20$ mA	$-V_{CEsat}$	<	2	V
Collector capacitance at f = 1 MHz				
$I_E = I_e = 0$; $-V_{CB} = 10$ V	C_c	typ.	200	pF
Cut-off frequency				
$-I_C = 5$ A; $-V_{CE} = 3$ V	f_{hfe}	typ.	80	kHz
Small-signal current gain				
$-I_C = 5$ A; $-V_{CE} = 3$ V; f = 1 MHz	h_{fe}	typ.	30	

Notes

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

CHARACTERISTICS (continued)

Diode, forward voltage			
I_F = 5 A	V_F	<	1,8 V
Switching times			
(between 10% and 90% levels)			
$-I_{Con}$ = 5 A; $-I_{Bon} = I_{Boff}$ = 20 mA			
turn-on time	t_{on}	typ.	1 μs
turn-off time	t_{off}	typ.	2,5 μs

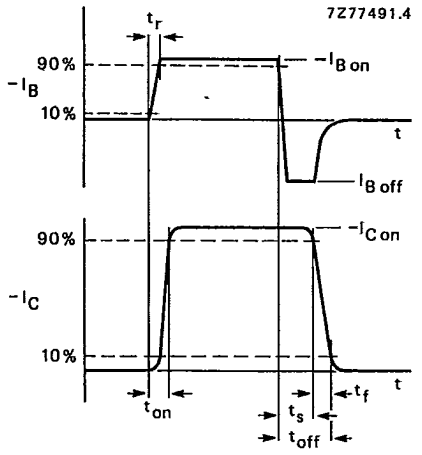


Fig. 3 Switching times waveforms.

$-V_{IM}$	=	16,5 V
$-V_{CC}$	=	16 V
$+V_{BB}$	=	6,5 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

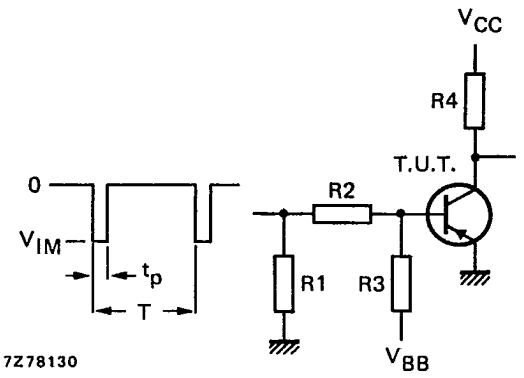


Fig. 4 Switching times test circuit.

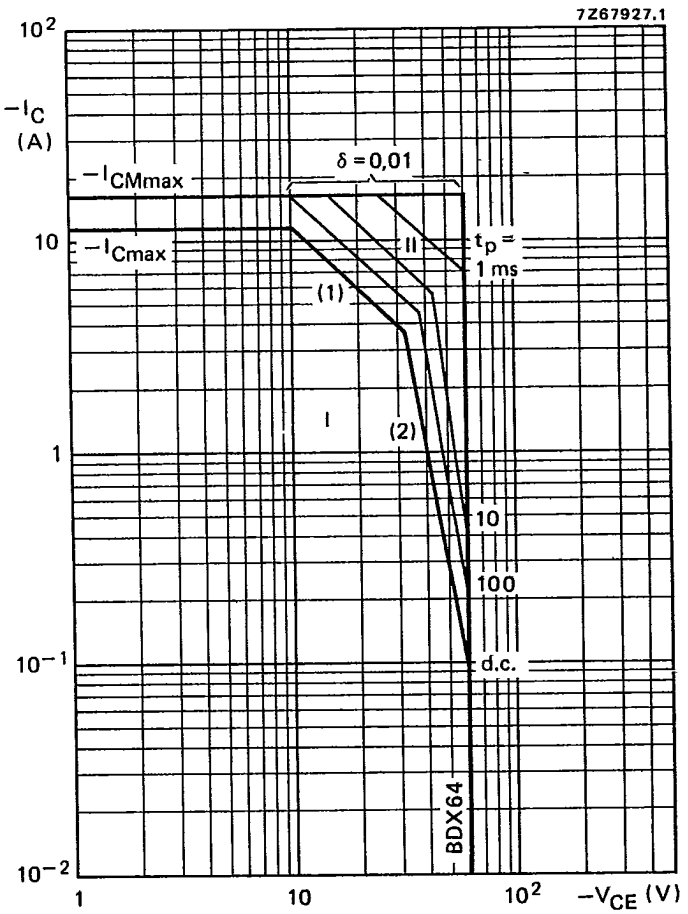


Fig. 5 Safe Operating ARea; $T_{mb} \leqslant 25\ ^{o}C$.

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.

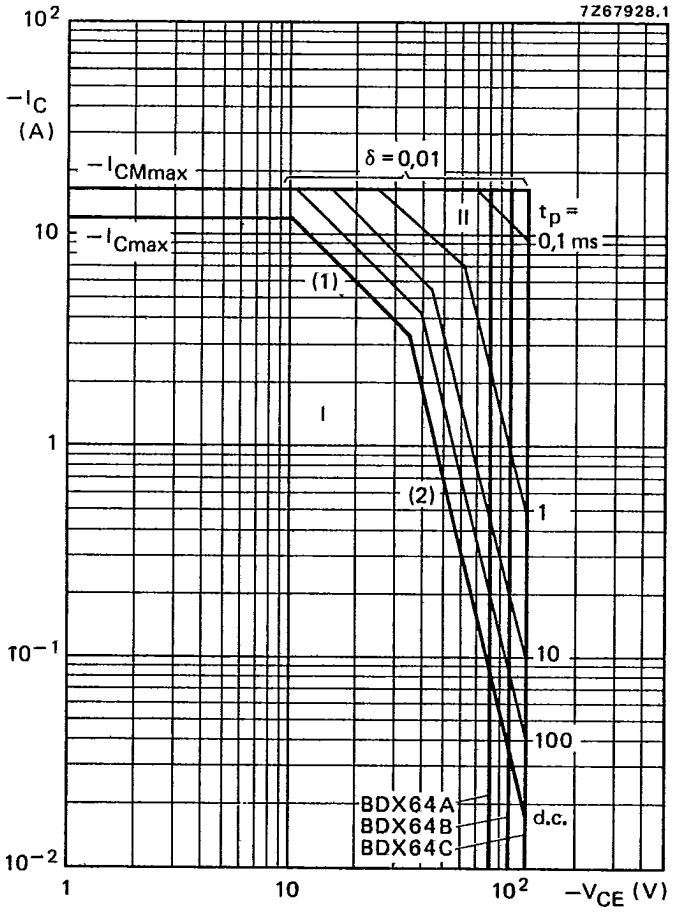


Fig. 6 Safe Operating ARea; $T_{mb} \leqslant 25\ ^oC$.

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.

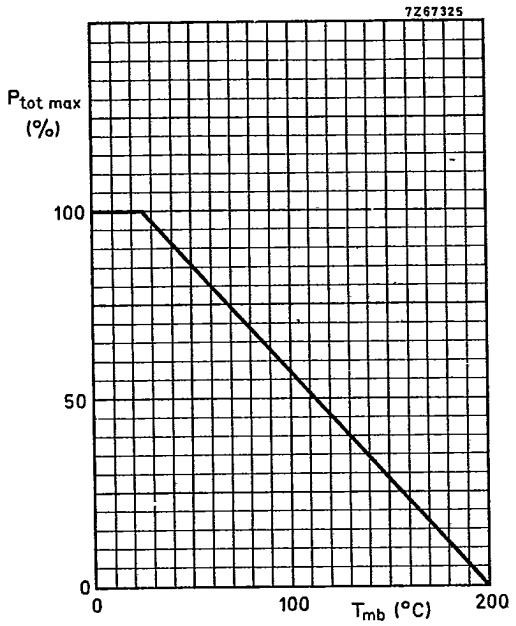


Fig. 7 Power derating curve.

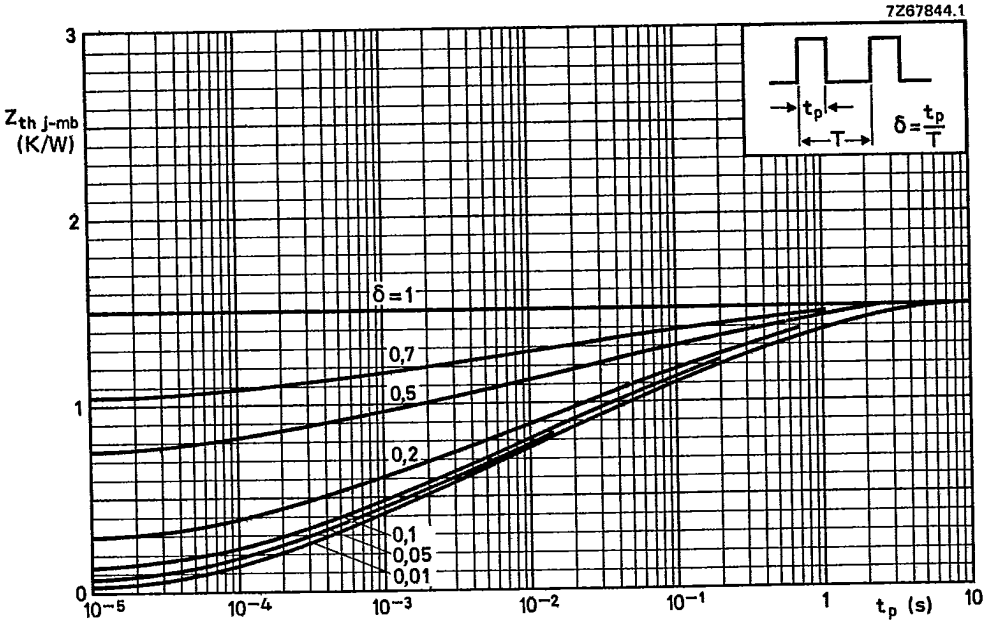


Fig. 8 Pulse power rating chart.

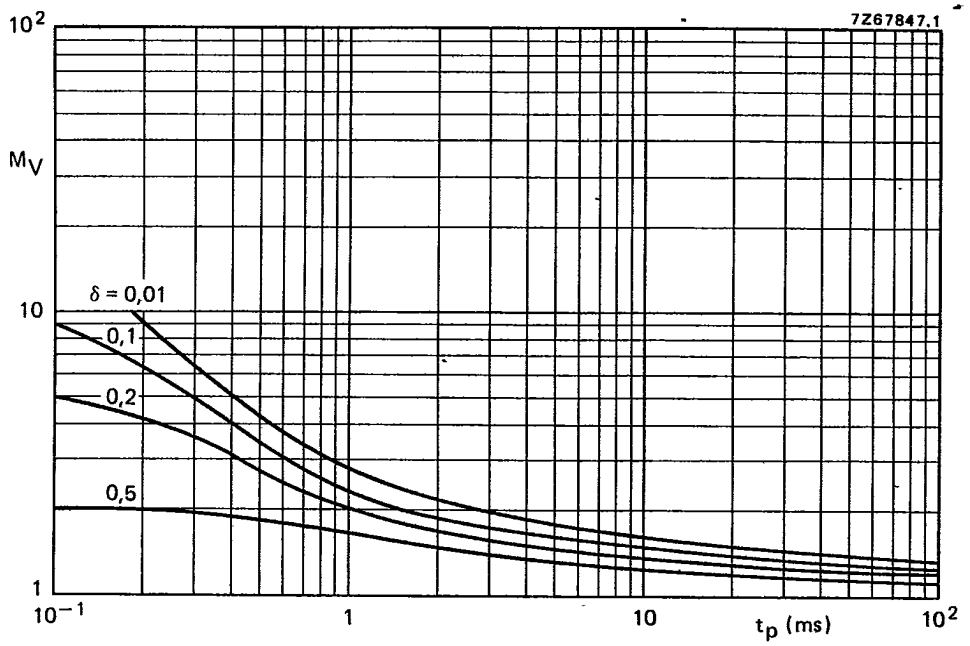


Fig. 9 S.B. voltage multiplying factor at the $-I_{C\,max}$ level.

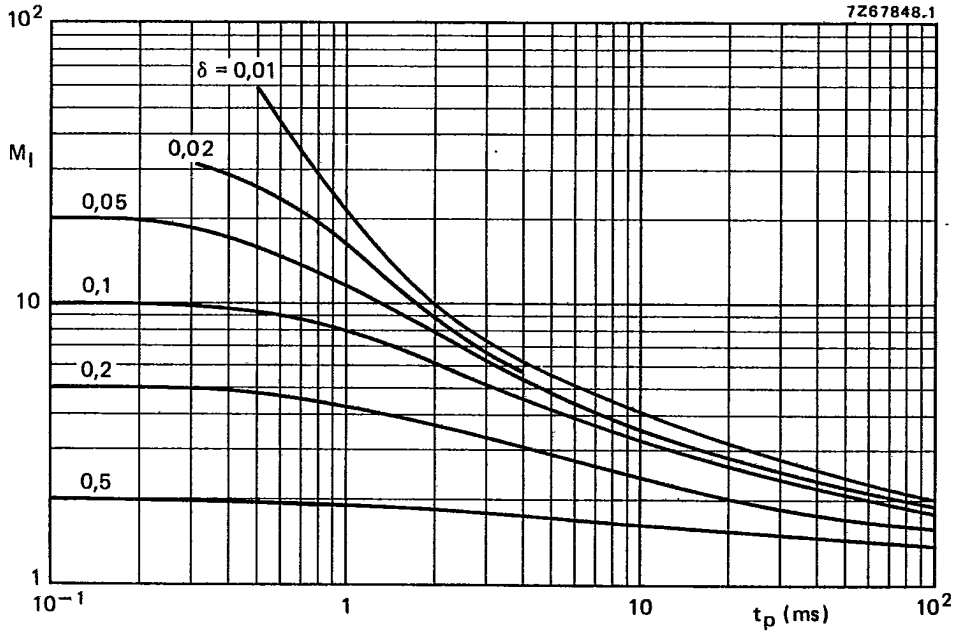


Fig. 10 S.B. current multiplying factor at $-V_{CEO}$ 100 V and 60 V level.

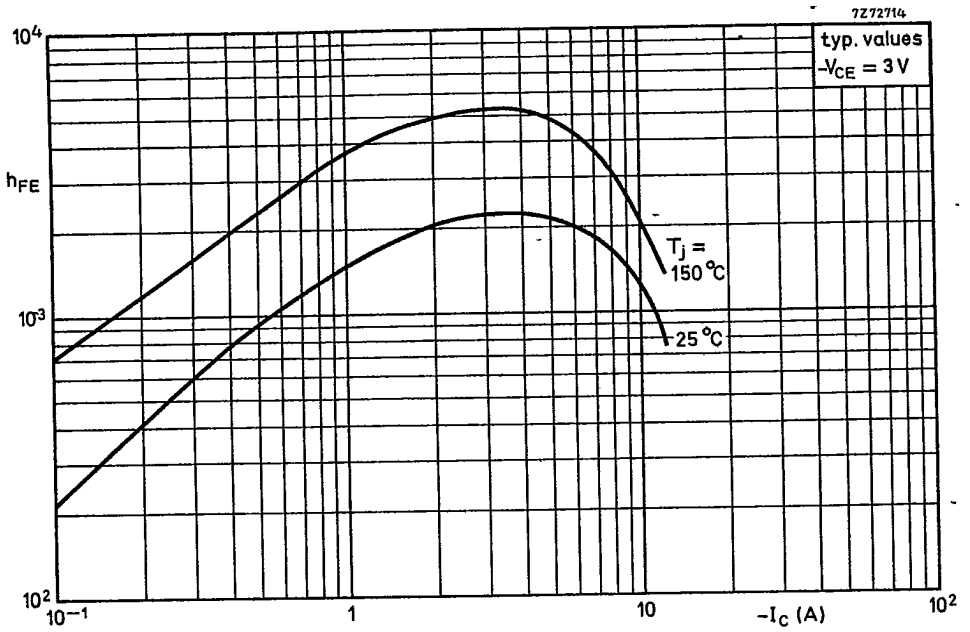


Fig. 11 D.C. current gain.

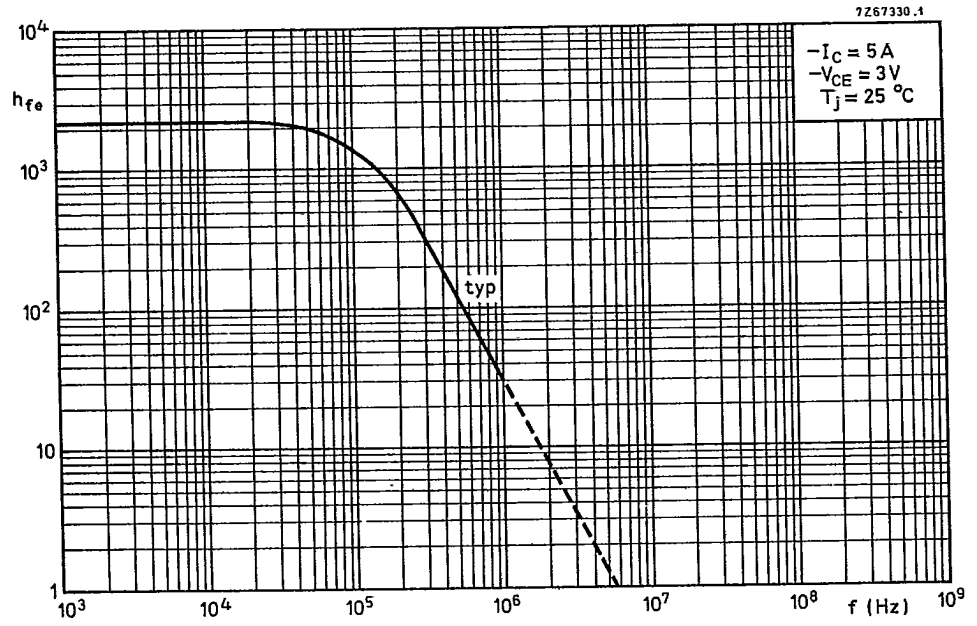


Fig. 12 Small-signal current gain.

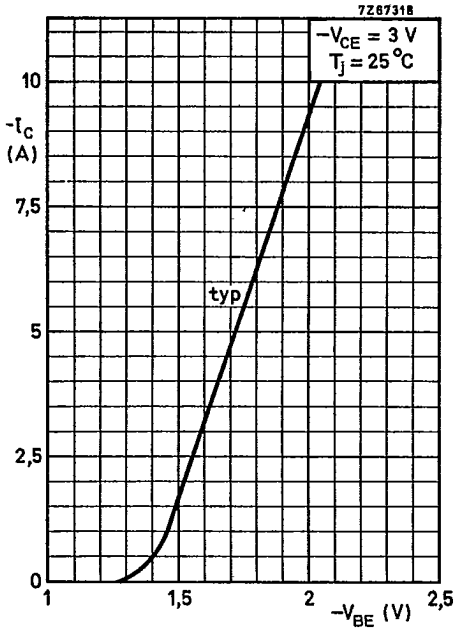


Fig. 13 Typical collector current.

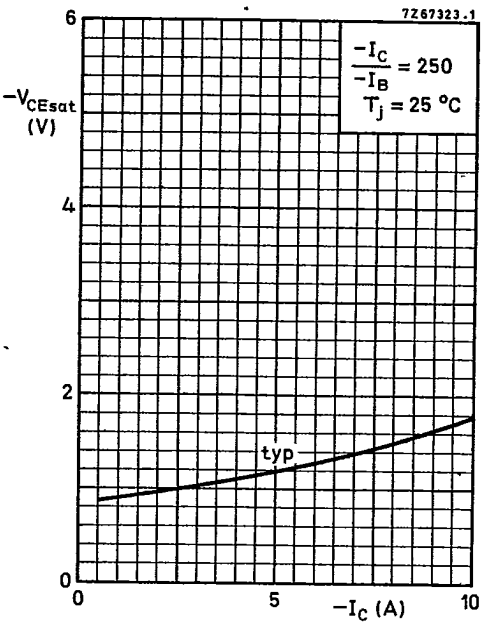


Fig. 14 Typical collector-emitter saturation voltage.