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 BDX67, BDX67A, BDX67B and BDX67C.

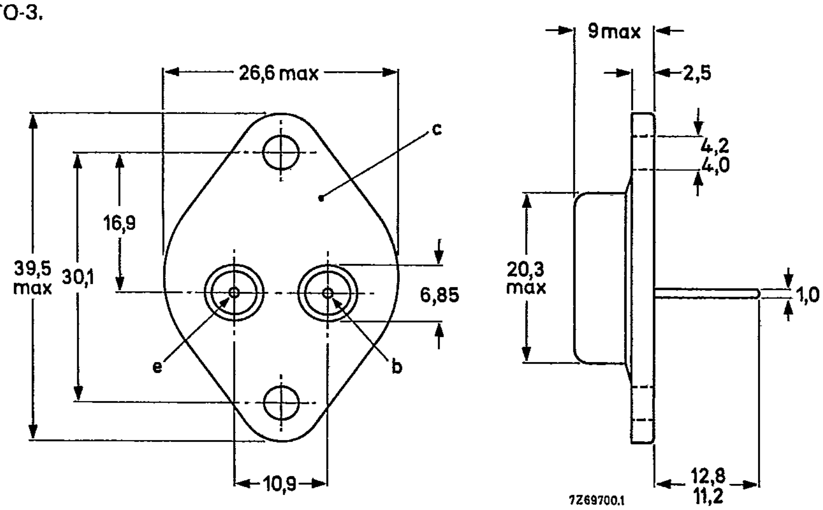
QUICK REFERENCE DATA

			BDX66	66A	66B	66C	
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.	20				A
Total power dissipation up to T_{mb} = 25 °C	P_{tot}	max.	150				W
Junction temperature	T_j	max.	200				°C
D.C. current gain $-I_C$ = 1 A; $-V_{CE}$ = 3 V	h_{FE}	typ.	2000				
$-I_C$ = 10 A; $-V_{CE}$ = 3 V	h_{FE}	>	1000				
Cut-off frequency $-I_C$ = 5 A; $-V_{CE}$ = 3 V	f_{hfe}	typ.	60				kHz

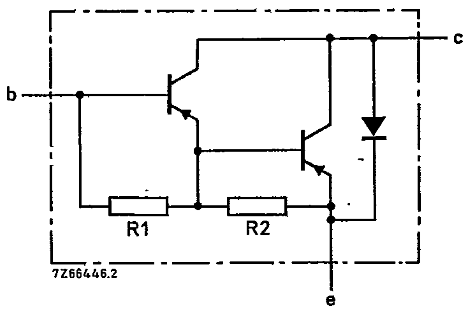
MECHANICAL DATA

Dimensions in mm

Fig. 1 TO-3.



See also chapters Mounting instructions and Accessories.



R1 typ. 3 kΩ
R2 typ. 80 Ω

Fig. 2 Circuit diagram.

RATINGS

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

			BDX66	66A	66B	66C	
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.	16				A
Collector current (peak value)	$-I_{CM}$	max.	20				A
Base current	$-I_B$	max.	250				mA
Total power dissipation up to T_{mb} = 25 °C	P_{tot}	max.	150				W
Storage temperature	T_{stg}		−65 to +200				°C
Junction temperature*	T_j	max.	200				°C

THERMAL RESISTANCE *

From junction to mounting base	$R_{th\ j\text{-}mb}$	=	1,17	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.

T-33-31

CHARACTERISTICS

T_j = 25 °C unless otherwise specified.

Collector cut-off current			
$I_E = 0; -V_{CB} = -V_{CBOmax}$	$-I_{CBO}$	<	1 mA
$I_E = 0; -V_{CB} = 40$ V; $T_j = 200$ °C; BDX66	$-I_{CBO}$	<	5 mA
$I_E = 0; -V_{CB} = 50$ V; $T_j = 200$ °C; BDX66A	$-I_{CBO}$	<	5 mA
$I_E = 0; -V_{CB} = 60$ V; $T_j = 200$ °C; BDX66B	$-I_{CBO}$	<	5 mA
$I_E = 0; -V_{CB} = 70$ V; $T_j = 20$ °C; BDX66C	$-I_{CBO}$	<	5 mA
$I_B = 0; -V_{CE} = -½V_{CEOmax}$	$-I_{CEO}$	<	1 mA ←
Emitter cut-off current			
$I_C = 0; -V_{EB} = 5$ V	$-I_{EBO}$	<	5 mA
D.C. current gain *			
$-I_C = 1$ A; $-V_{CE} = 3$ V	h_{FE}	typ.	2000
$-I_C = 10$ A; $-V_{CE} = 3$ V	h_{FE}	>	1000
$-I_C = 16$ A; $-V_{CE} = 3$ V	h_{FE}	typ.	1000
Base-emitter voltage *			
$-I_C = 10$ A; $-V_{CE} = 3$ V	$-V_{BE}$	<	2,5 V
Collector-emitter saturation voltage *			
$-I_C = 10$ A; $-I_B = 40$ mA	$-V_{CEsat}$	<	2 V
Collector capacitance at f = 1 MHz			
$I_E = I_e = 0; -V_{CB} = 10$ V	C_c	typ.	300 pF
Cut-off frequency			
$-I_C = 5$ A; $-V_{CE} = 3$ V	f_{hfe}	typ.	60 kHz
Small-signal current gain			
$-I_C = 5$ A; $-V_{CE} = 3$ V; f = 1 MHz	h_{fe}	typ.	50
Diode, forward voltage			
$I_F = 10$ A	V_F	typ.	2 V

* Measured under pulse conditions: $t_p < 300$ µs, $\delta < 2\%$.

CHARACTERISTICS (continued)

T_j = 25 °C unless otherwise specified

Switching times
(between 10% and 90% levels)

$-I_{Con}$ = 10 A; $-I_{Bon}$ = I_{Boff} = 40 mA

turn-on time	t_{on}	typ.	1 μs
turn-off time	t_{off}	typ.	3,5 μs

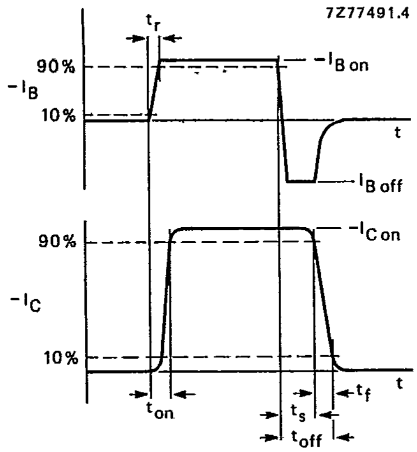
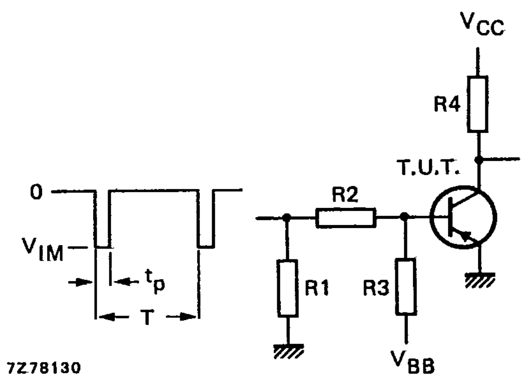


Fig. 3 Switching times waveforms.



$-V_{IM}$	=	18 V
$-V_{CC}$	=	12 V
$+V_{BB}$	=	3 V
R1	=	56 Ω
R2	=	220 Ω
R3	=	180 Ω
R4	=	1 Ω
$t_r = t_f$	=	15 ns
t_p	=	10 μs
T	=	500 μs

Fig. 4 Switching times test circuit.

T-33-31

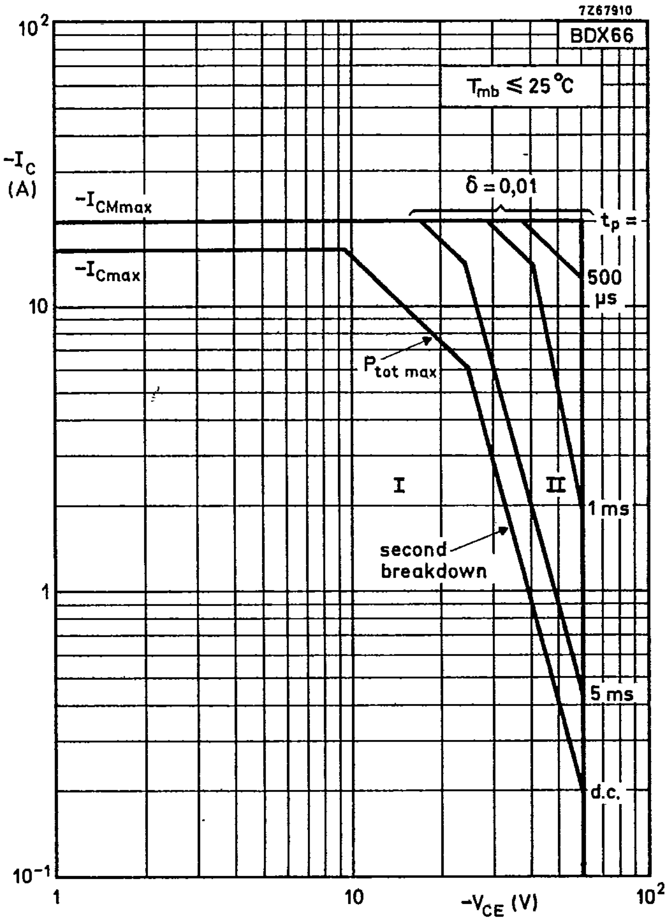


Fig. 5 Safe Operating ARea with the transistor forward biased.
I Region of permissible d.c. operation.
II Permissible extension for repetitive pulse operation.

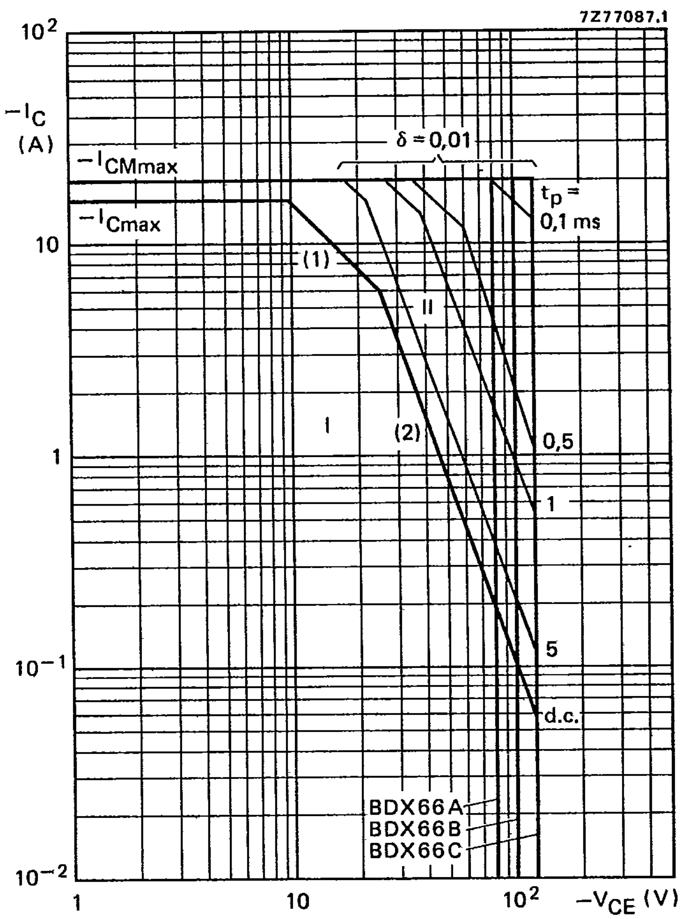


Fig. 6 Safe Operating ARea.

I Region of permissible d.c. operation.

II Permissible extension for repetitive pulse operation.

(1) $P_{tot\,max}$ and $P_{tot\,peak\,max}$ lines.

(2) Second breakdown limits.

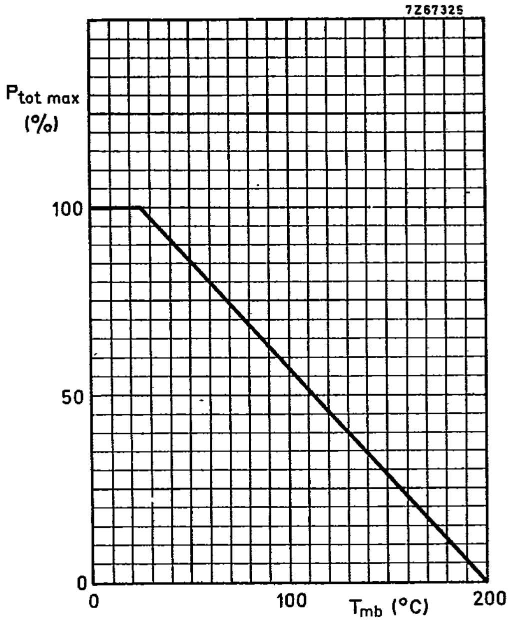


Fig. 7 Power derating curve.

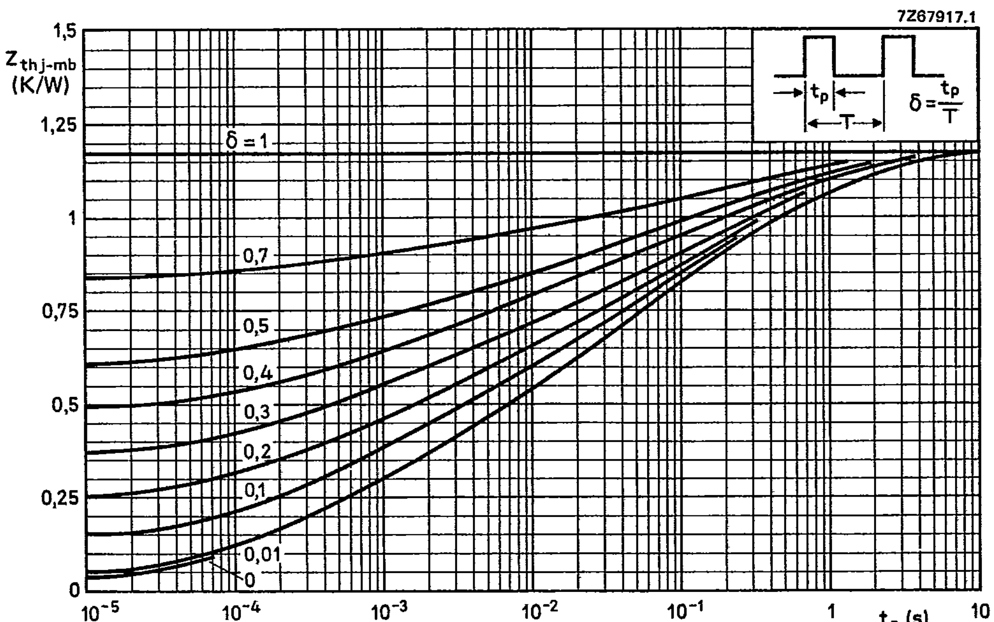


Fig. 8 Pulse power rating chart.

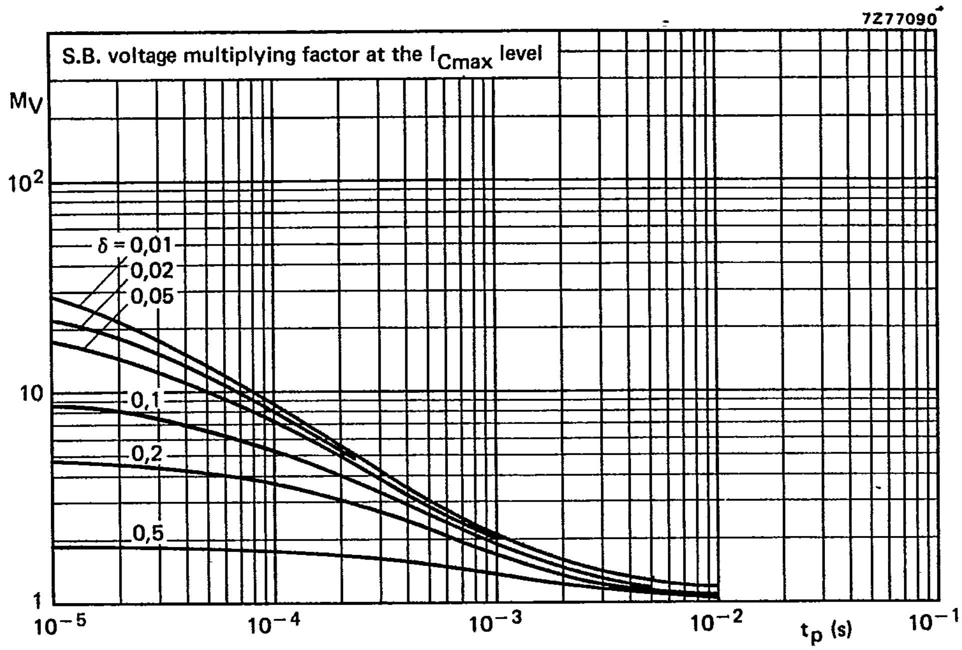


Fig. 9 S.B. voltage multiplying factor at the I_{Cmax} level.

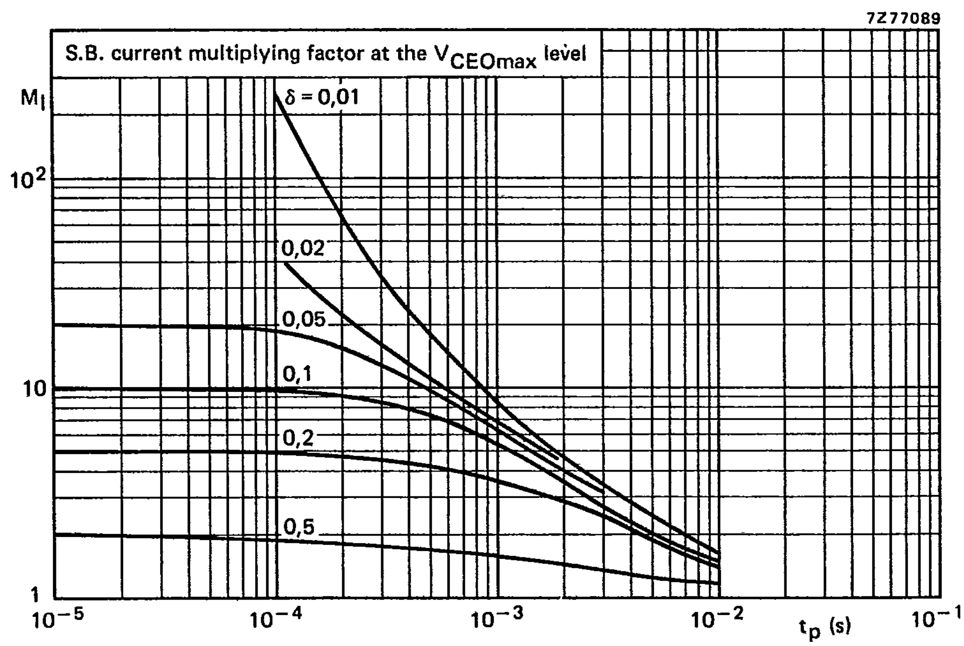


Fig. 10 S.B. current multiplying factor at the V_{CEOmax} level.

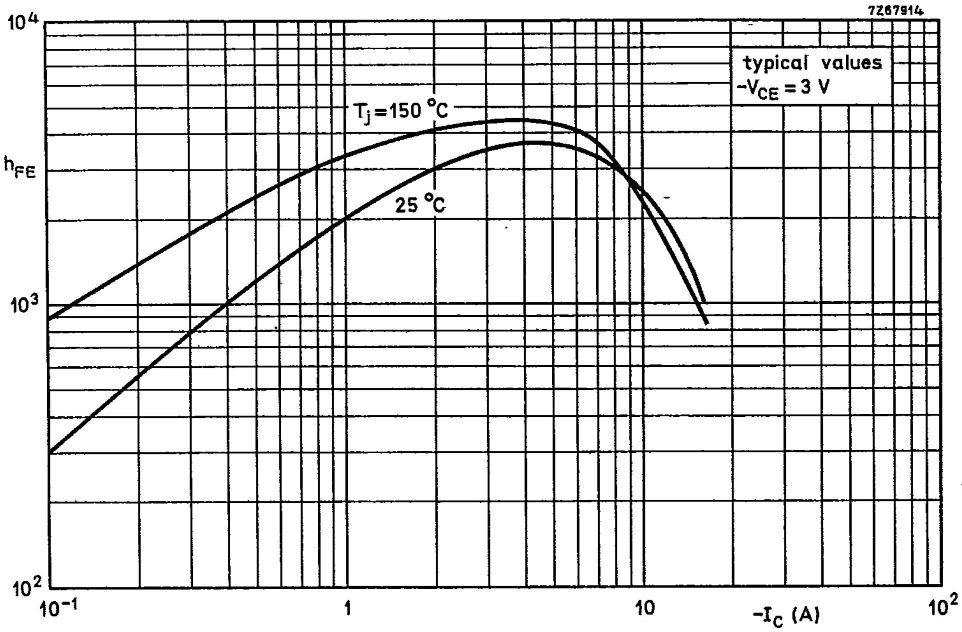


Fig. 11 D.C. current gain.

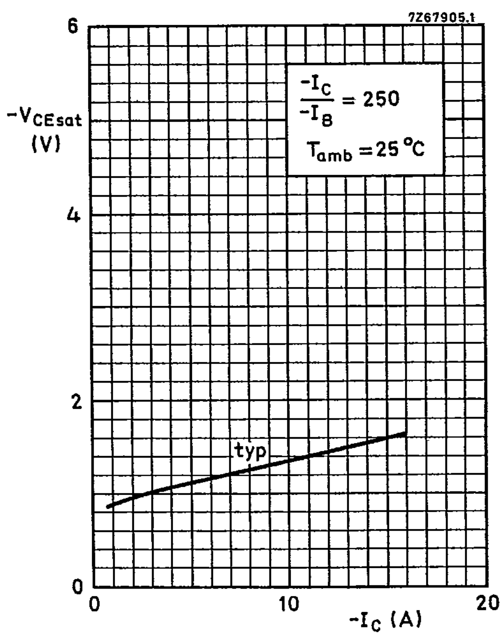


Fig. 12 Collector-emitter saturation voltage.

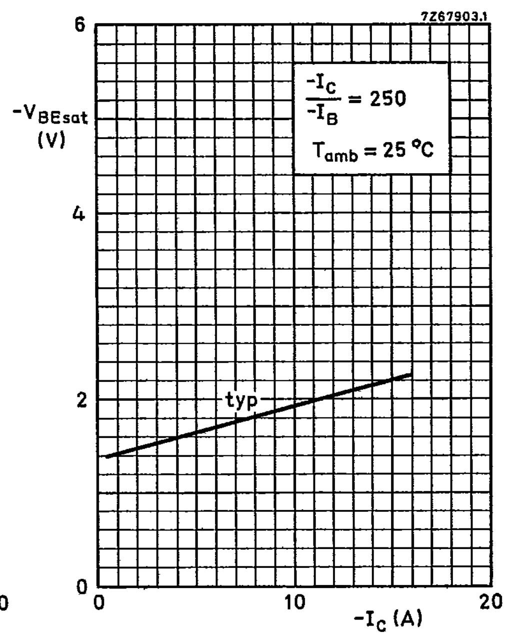


Fig. 13 Base-emitter saturation voltage.

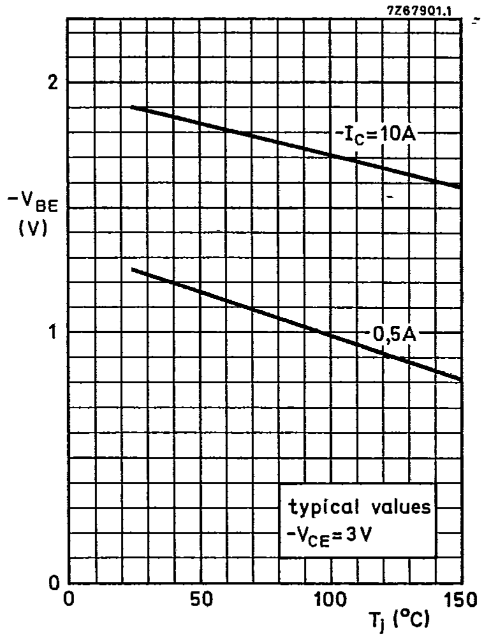


Fig. 14 Typical base-emitter voltage.

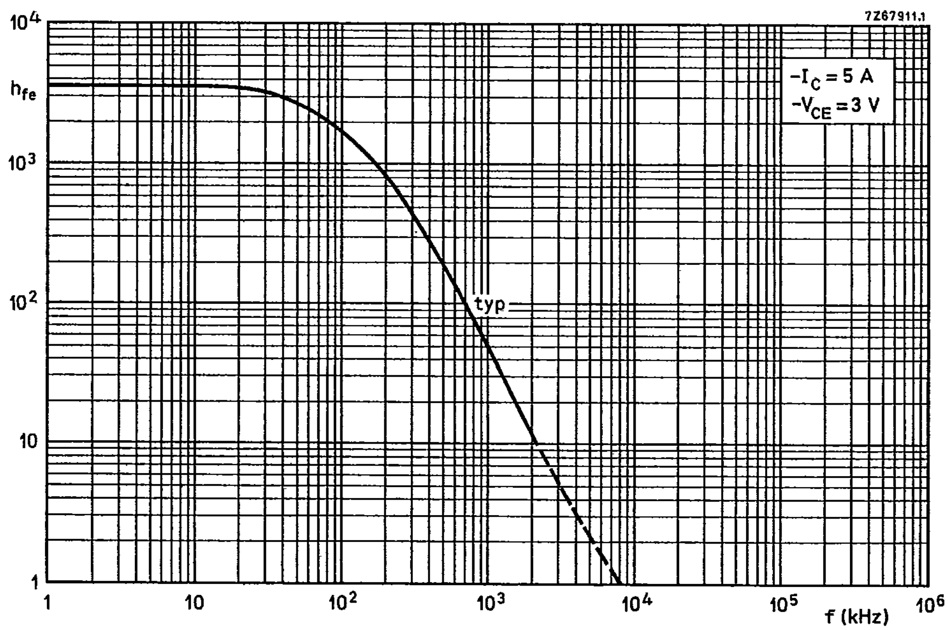


Fig. 15 Small-signal current gain.