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 BDX66, BDX66A, BDX66B and BDX66C.

QUICK REFERENCE DATA

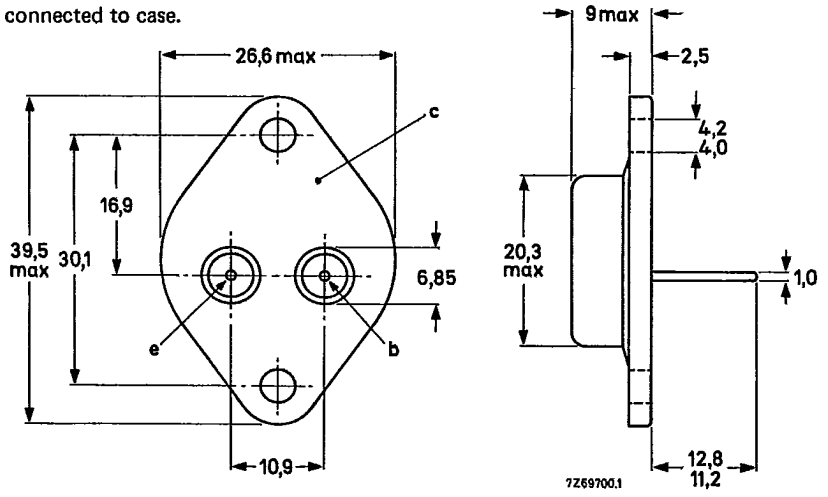
			BDX67	67A	67B	67C	
Collector-base voltage (open emitter)	V_{CBO}	max.	80	100	120	140	V
Collector-emitter voltage (open base)	V_{CEO}	max.	60	80	100	120	V
Collector current (peak value)	I_{CM}	max.		20			A
Total power dissipation up to $T_{mb} = 25\ ^oC$	P_{tot}	max.		150			W
Junction temperature	T_j	max.		200			^oC
D.C. current gain							
$I_C = 1$ A; $V_{CE} = 3$ V	h_{FE}	typ.		5200			
$I_C = 10$ A; $V_{CE} = 3$ V	h_{FE}	>		1000			
Cut-off frequency							
$I_C = 5$ A; $V_{CE} = 3$ V	f_{hfe}	typ.		50			kHz

MECHANICAL DATA

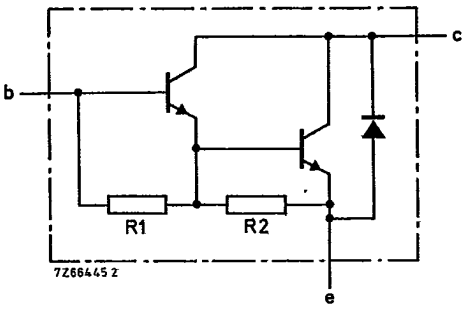
Dimensions in mm

Fig. 1 TO-3.

Collector connected to case.



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)

			BDX67	67A	67B	67C	
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.		16			A
Collector current (peak value)	I_{CM}	max.		20			A
Base current (d.c.)	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.

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Collector cut-off current				
I_E = 0; V_{CB} = V_{CEOmax}	I_{CBO}	<	1	mA
I_E = 0; V_{CB} = ½ V_{CBOmax}; T_j = 200 °C	I_{CBO}	<	5	mA
I_B = 0; V_{CE} = ½ V_{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.	5200	
I_C = 10 A; V_{CE} = 3 V	h_{FE}	>	1000	
I_C = 16 A; V_{CE} = 3 V	h_{FE}	typ.	4000	
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.	50	kHz
Turn-off breakdown energy with inductive load				
$-I_{Boff}$ = 0; I_{CC} = 7,8 A; see Fig. 5	$E_{(BR)}$	>	150	mJ
Small-signal current gain				
I_C = 5 A; V_{CE} = 3 V; f = 1 MHz	h_{fe}	typ.	20	
Diode, forward voltage				
I_F = 10 A	V_F	typ.	2,5	V

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

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

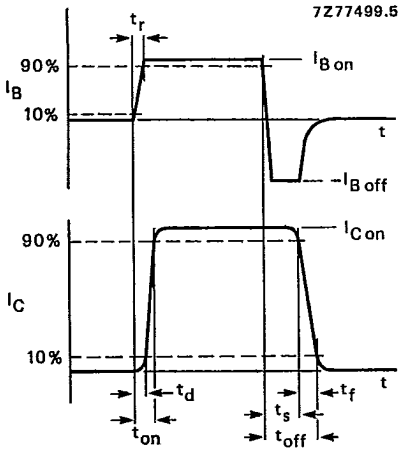
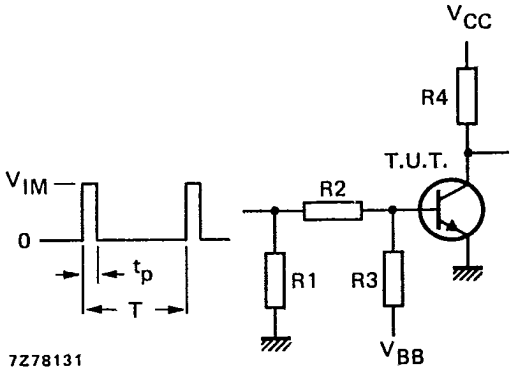


Fig. 3 Switching times waveforms.



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

Fig. 4 Switching times test circuit.

CHARACTERISTICS (continued)

T-33-29

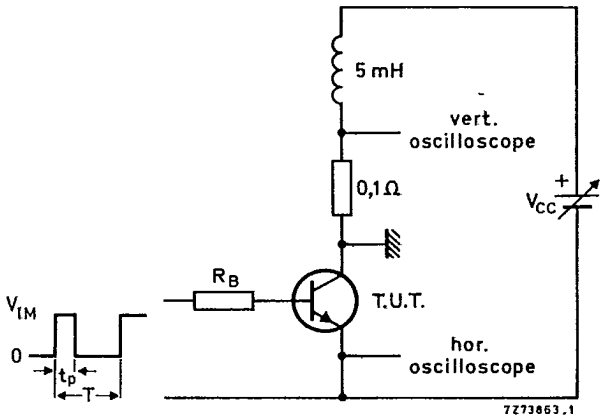


Fig. 5 Test circuit for turn-off breakdown energy. V_{IM} = 12 V; R_B = 270 Ω; I_{CC} = 7,8 A; t_p = 1 ms; δ = 1%.

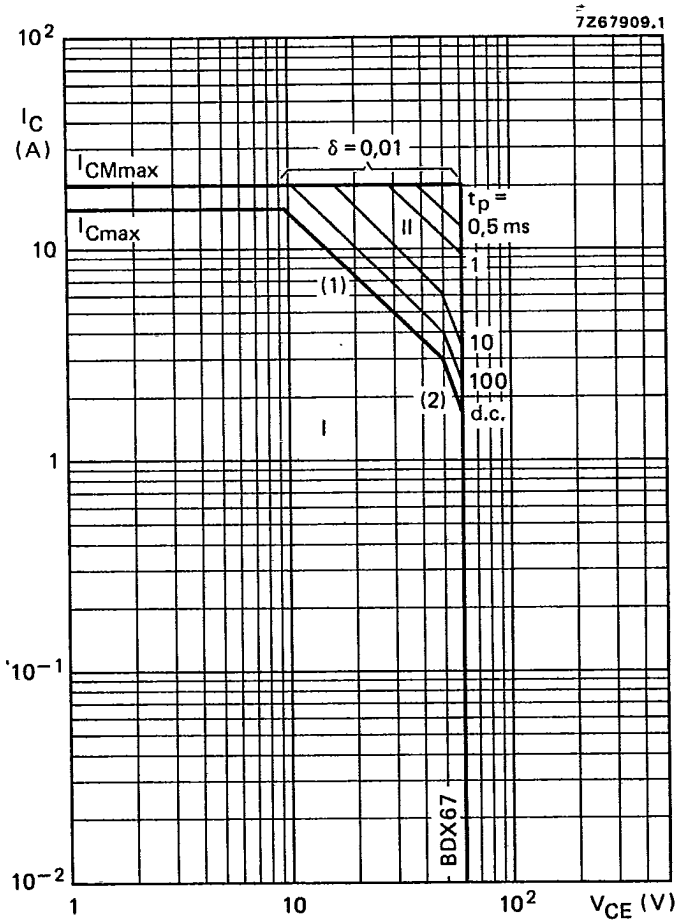


Fig. 6 Safe Operating ARea at T_{mb} = 25 °C of BDX67.

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.

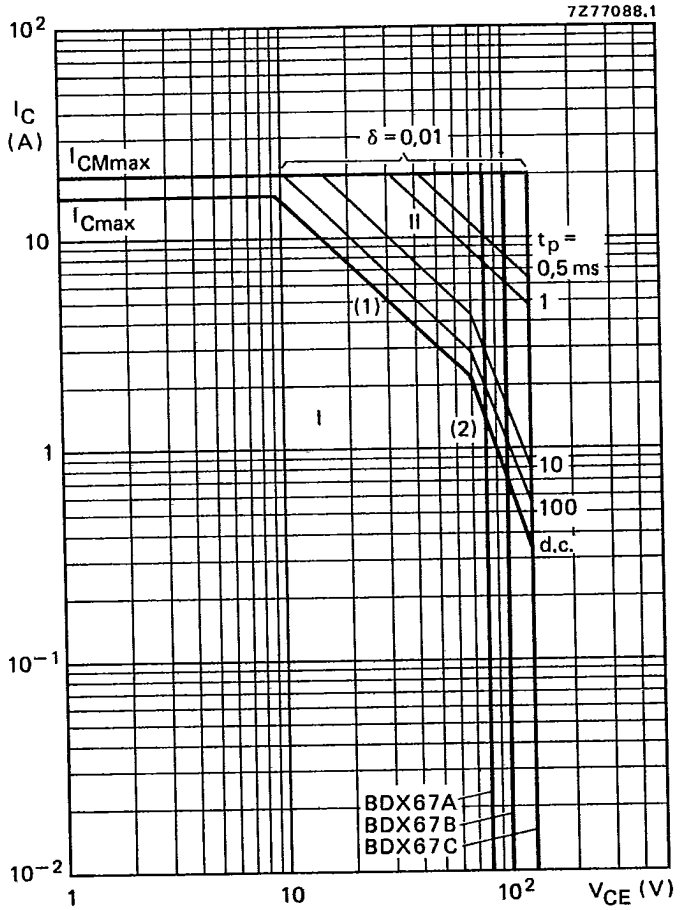


Fig. 7 Safe Operating ARea at T_{mb} = 25 °C.

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.

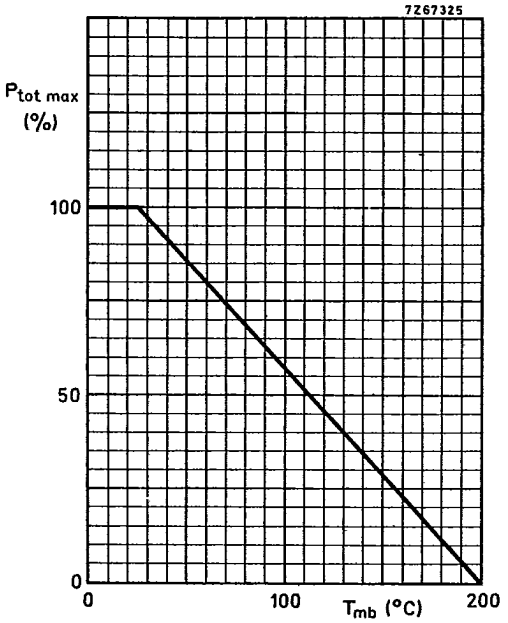


Fig. 8 Power derating curve.

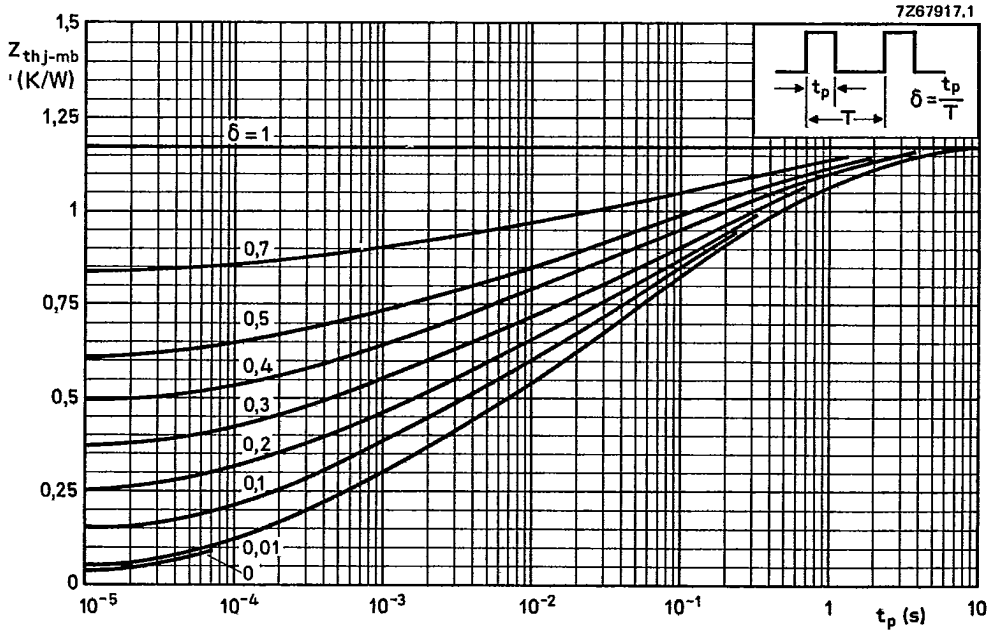


Fig. 9 Pulse power rating chart.

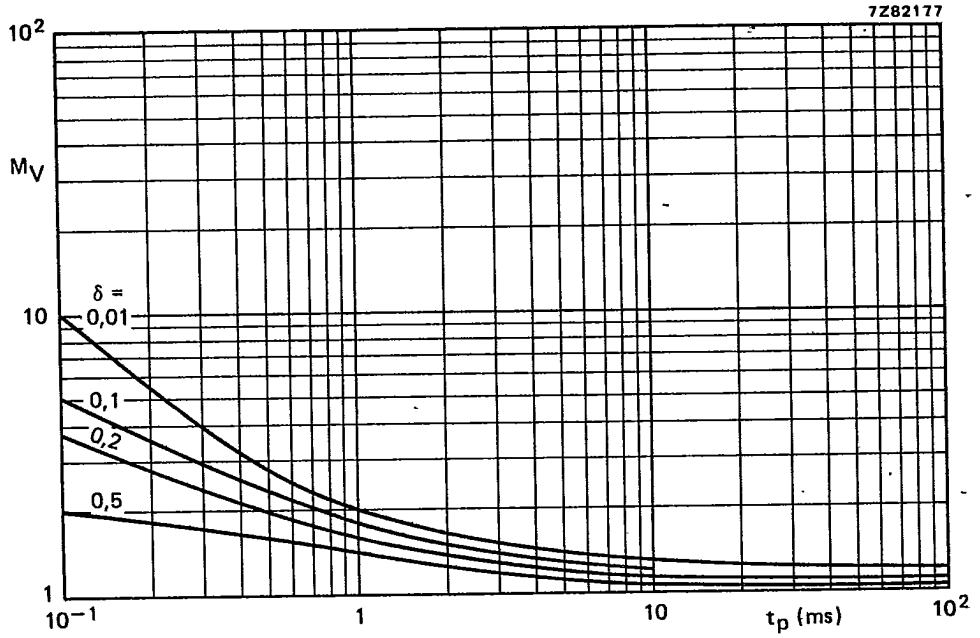


Fig. 10 S.B. voltage multiplying factor at the I_{Cmax} level.

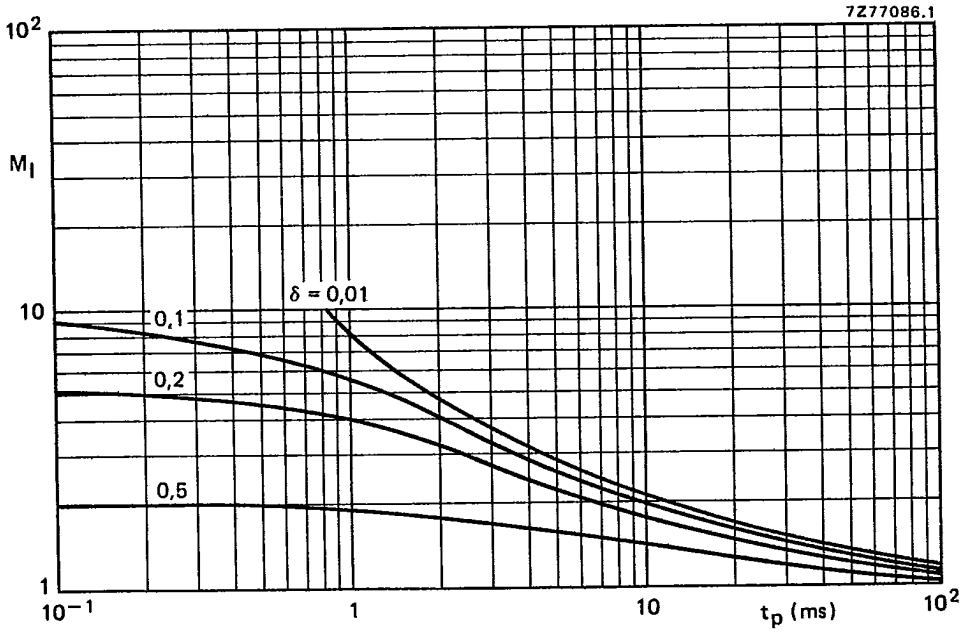


Fig. 11 S.B. current multiplying factor at the V_{CEOmax} level.

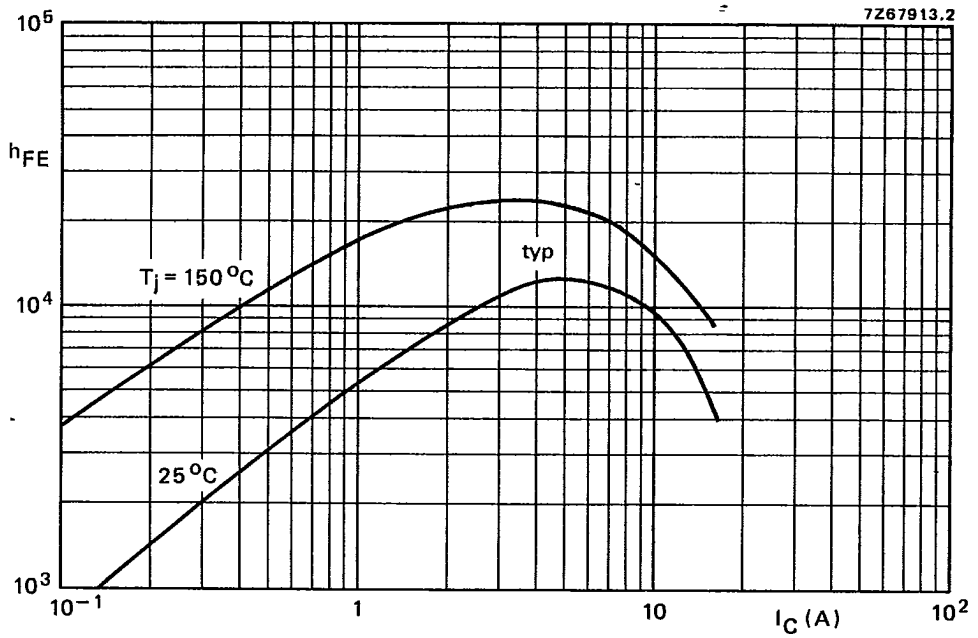


Fig. 12 D.C. current gain.

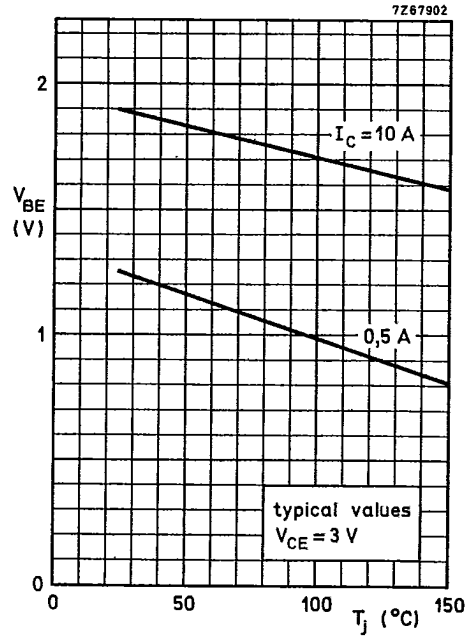


Fig. 13 Typical base-emitter voltage.

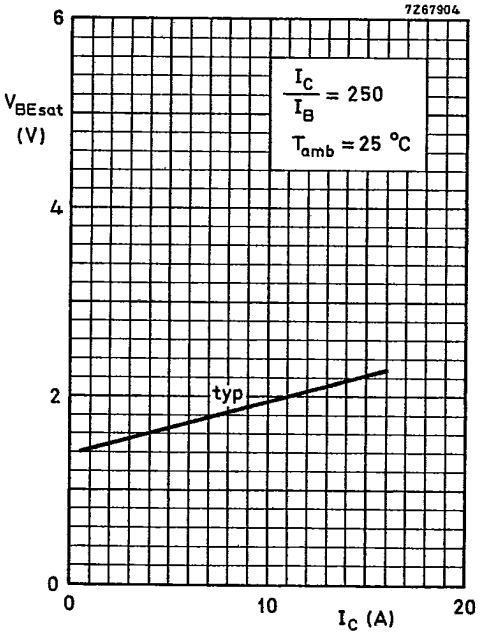


Fig. 14 Base-emitter saturation voltage.

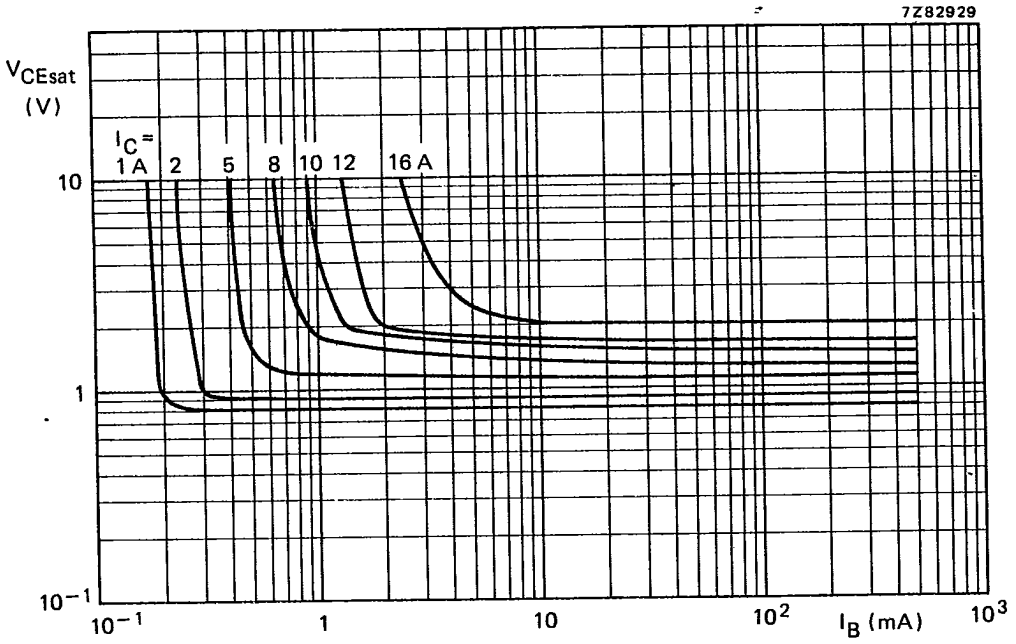


Fig. 15 Typical values collector-emitter saturation voltage at T_j = 25 °C.

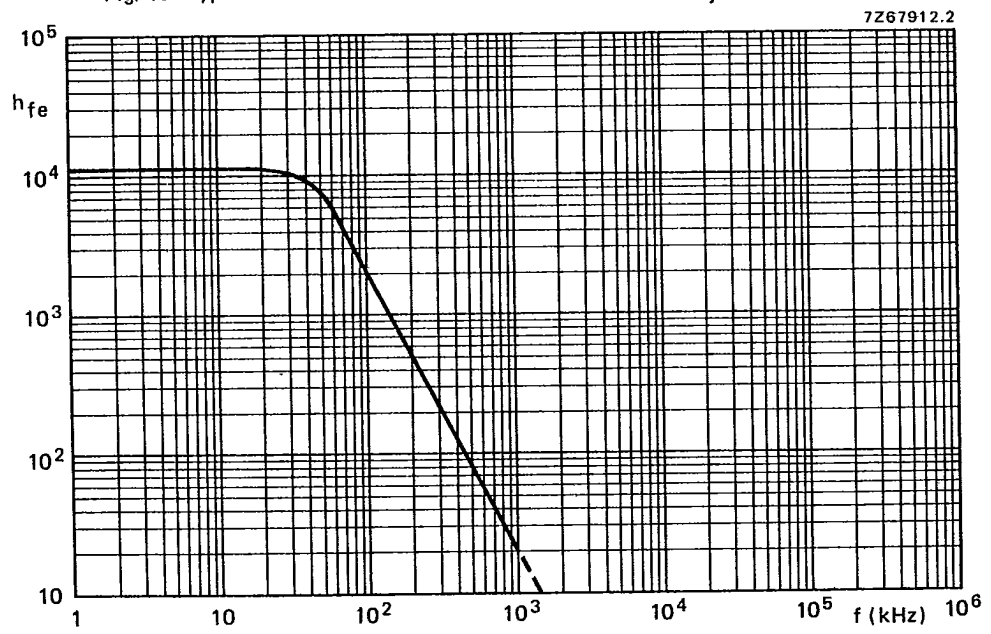


Fig. 16 Small-signal current gain, I_C = 5 A; V_{CE} = 3 V.