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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

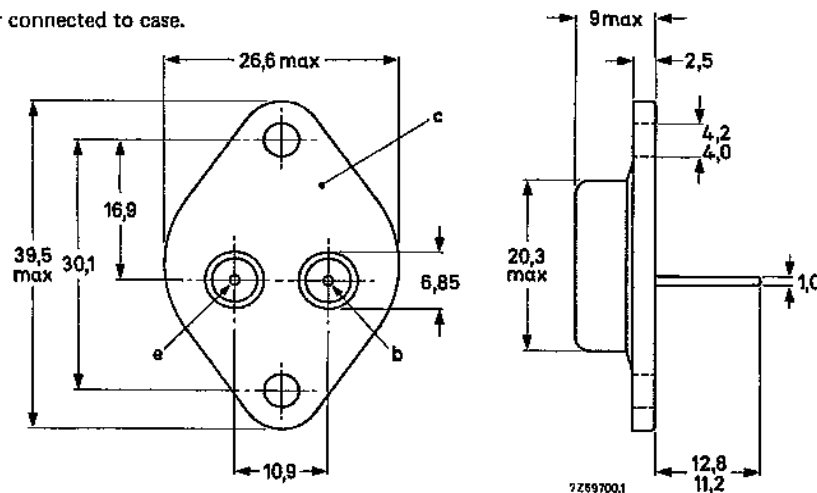
			BDX67	67A	67B	67C
Collector-base voltage (open emitter)	V_{CBO}	max.	80	100	120	140 V
Collector-emitter voltage (open base)	V_{CEO}	max.	60	80	100	120 V
Collector current (peak value)	I_{CM}	max.		20		A
Total power dissipation up to $T_{mb} = 25^\circ\text{C}$	P_{tot}	max.		150		W
Junction temperature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

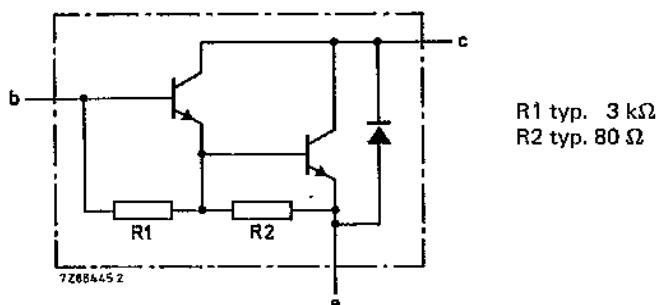


Fig. 2 Circuit diagram.

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 $T_{mb} = 25^\circ\text{C}$	P_{tot}	max.		150		W
Storage temperature	T_{stg}		-65 to + 200			$^\circ\text{C}$
Junction temperature *	T_j	max.		200		$^\circ\text{C}$

THERMAL RESISTANCE *

From junction to mounting base	$R_{th\ j-mb}$	=		1,17		K/W
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* 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

$T_J = 25^\circ\text{C}$ unless otherwise specified

Collector cut-off current

$I_E = 0; V_{CB} = V_{CEOmax}$

$I_{CBO} < 1 \text{ mA}$

$I_E = 0; V_{CB} = \frac{1}{2} V_{CB0max}; T_J = 200^\circ\text{C}$

$I_{CBO} < 5 \text{ mA}$

$I_B = 0; V_{CE} = \frac{1}{2} V_{CEOmax}$

$I_{CEO} < 1 \text{ mA}$ ←

Emitter cut-off current

$I_C = 0; V_{EB} = 5 \text{ V}$

$I_{EBO} < 5 \text{ mA}$

D.C. current gain *

$I_C = 1 \text{ A}; V_{CE} = 3 \text{ V}$

$h_{FE} \text{ typ. } 5200$

$I_C = 10 \text{ A}; V_{CE} = 3 \text{ V}$

$h_{FE} > 1000$

$I_C = 16 \text{ A}; V_{CE} = 3 \text{ V}$

$h_{FE} \text{ typ. } 4000$

Base-emitter voltage *

$I_C = 10 \text{ A}; V_{CE} = 3 \text{ V}$

$V_{BE} < 2,5 \text{ V}$

Collector-emitter saturation voltage *

$I_C = 10 \text{ A}; I_B = 40 \text{ mA}$

$V_{CEsat} < 2 \text{ V}$

Collector capacitance at $f = 1 \text{ MHz}$

$I_E = I_C = 0; V_{CB} = 10 \text{ V}$

$C_c \text{ typ. } 300 \text{ pF}$

Cut-off frequency

$I_C = 5 \text{ A}; V_{CE} = 3 \text{ V}$

$f_{hfe} \text{ typ. } 50 \text{ kHz}$

Turn-off breakdown energy with inductive load

$-I_{Boff} = 0; I_{CC} = 7,8 \text{ A}; \text{ see Fig. 5}$

$E(BR) > 150 \text{ mJ}$

Small-signal current gain

$I_C = 5 \text{ A}; V_{CE} = 3 \text{ V}; f = 1 \text{ MHz}$

$h_{fe} \text{ typ. } 20$

Diode, forward voltage

$I_F = 10 \text{ A}$

$V_F \text{ typ. } 2,5 \text{ V}$

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

CHARACTERISTICS (continued)

$T_j = 25^\circ\text{C}$ unless otherwise specified

Switching times

(between 10% and 90% levels)

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

turn-on time

turn-off time

t_{on}	typ.	$1\ \mu\text{s}$
t_{off}	typ.	$3,5\ \mu\text{s}$

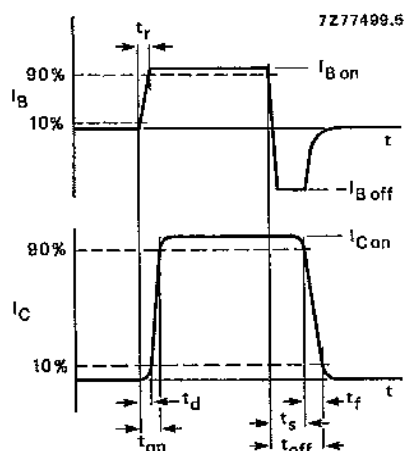


Fig. 3 Switching times waveforms.

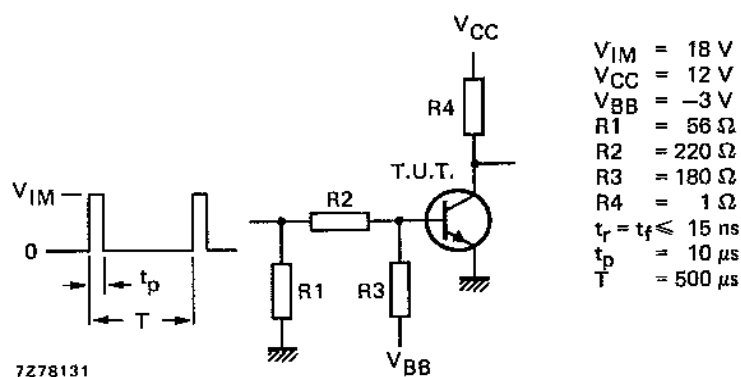


Fig. 4 Switching times test circuit.

CHARACTERISTICS (continued)

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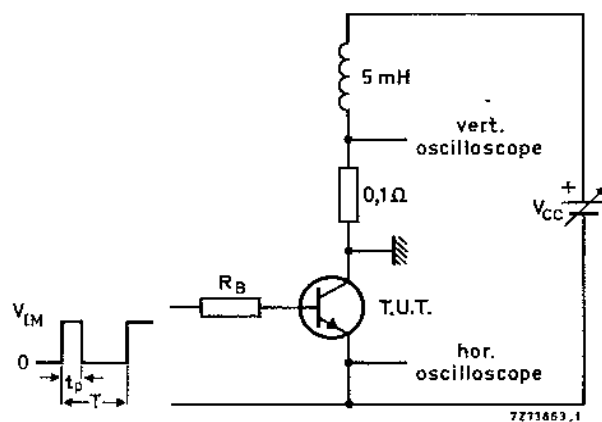


Fig. 5 Test circuit for turn-off breakdown energy. $V_{IM} = 12$ V; $R_B = 270$ Ω ; $I_{CC} = 7,8$ A; $t_p = 1$ ms; $\delta = 1\%$.

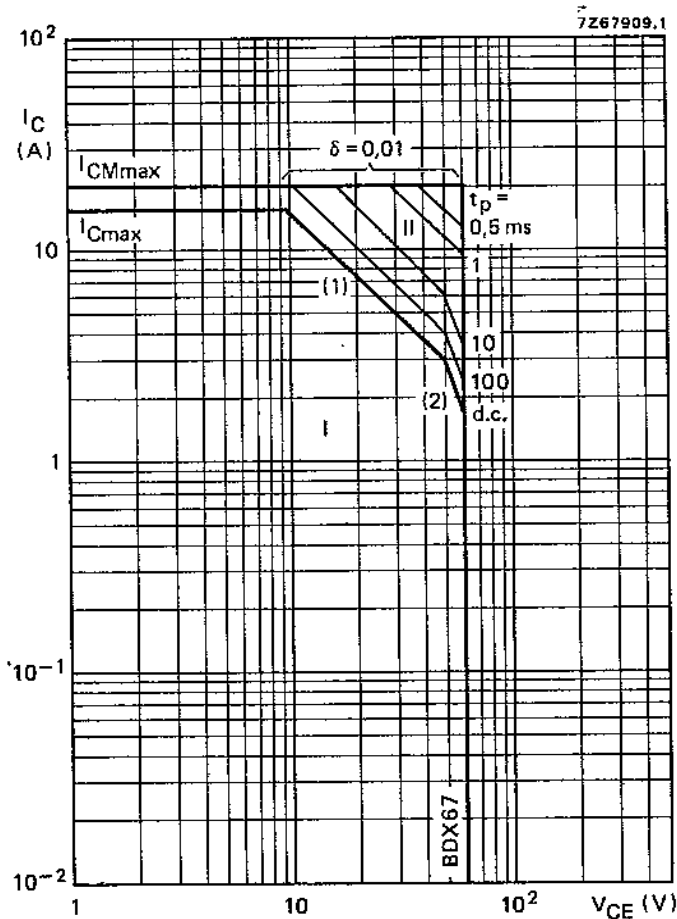


Fig. 6 Safe Operating Area at $T_{mb} = 25^{\circ}\text{C}$ of BDX67.

- I Region of permissible d.c. operation.
- II Permissible extension for repetitive pulse operation.
- (1) $P_{tot \text{ max}}$ and $P_{tot \text{ peak max}}$ lines.
- (2) Second breakdown limits.

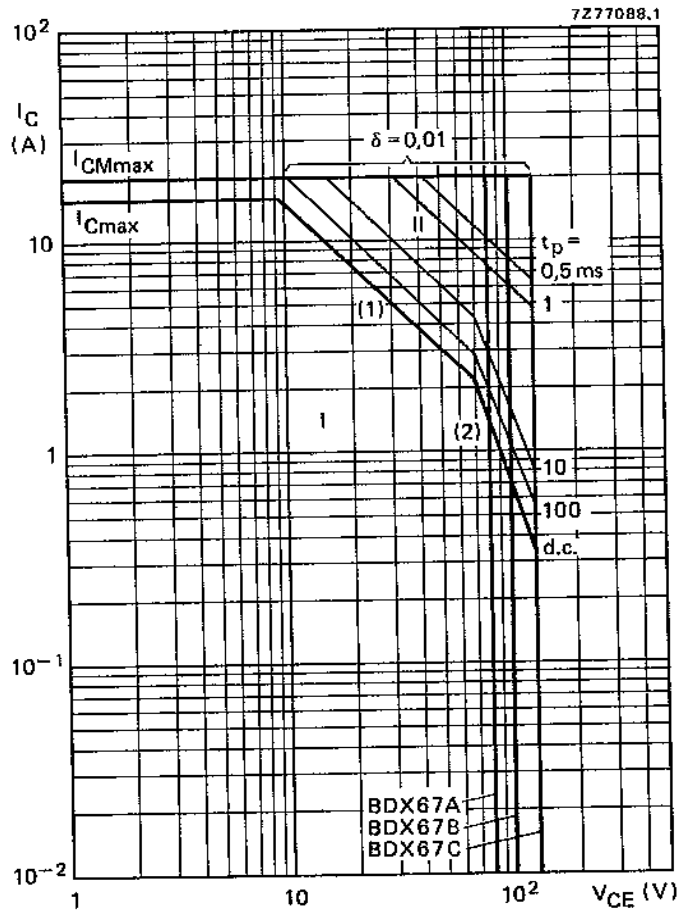


Fig. 7 Safe Operating Area at $T_{mb} = 25^{\circ}\text{C}$.

- I Region of permissible d.c. operation.
- II Permissible extension for repetitive pulse operation.
- (1) $P_{tot \max}$ and $P_{tot \text{ peak max}}$ lines.
- (2) Second breakdown limits.

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BDX67B; 67C

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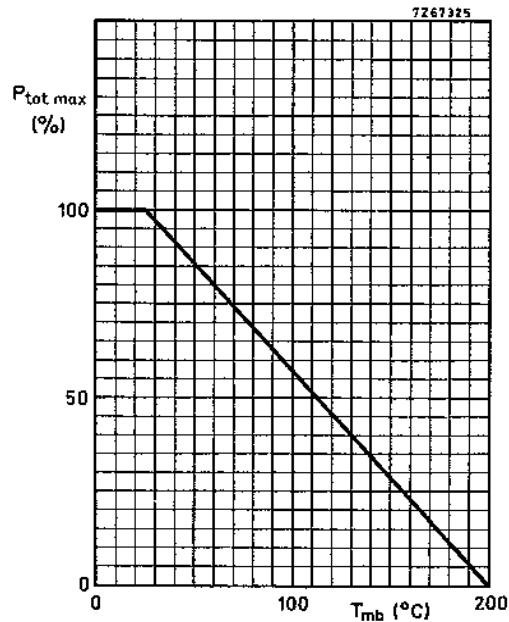


Fig. 8 Power derating curve.

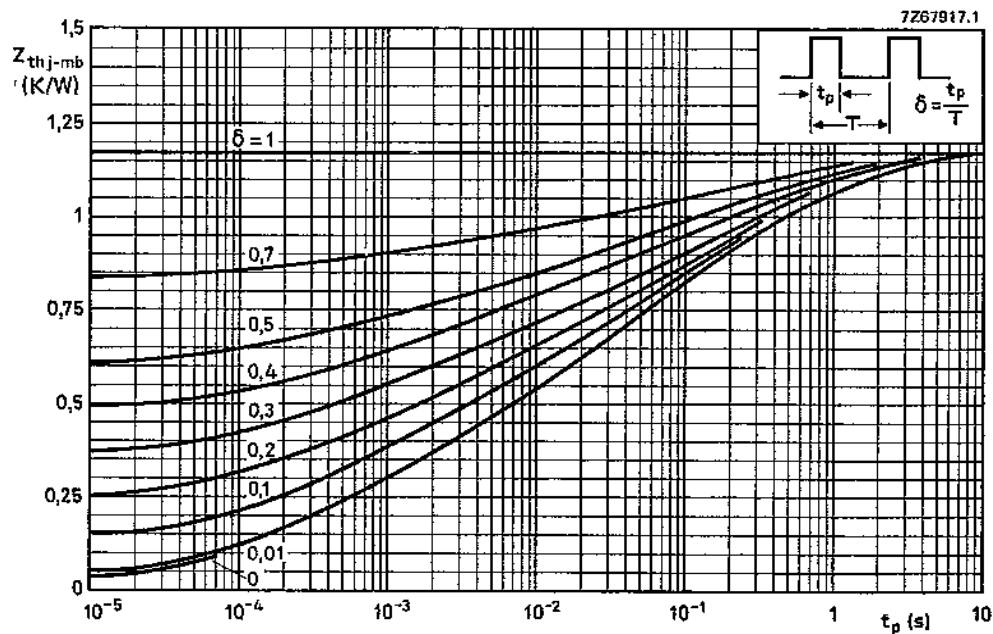


Fig. 9 Pulse power rating chart.

Silicon Darlington power transistors

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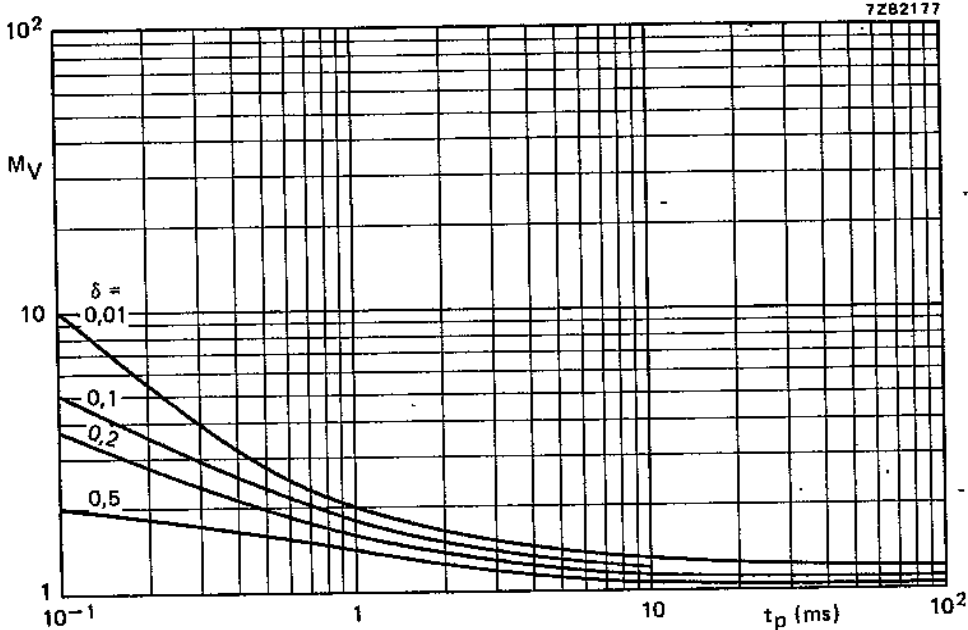


Fig. 10 S.B. voltage multiplying factor at the I_{Cmax} level.

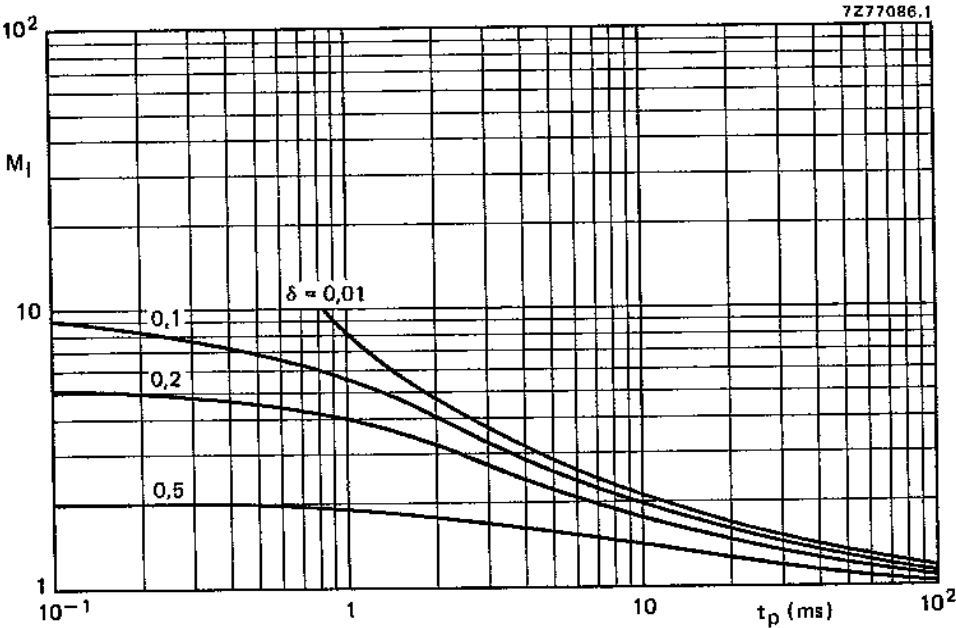
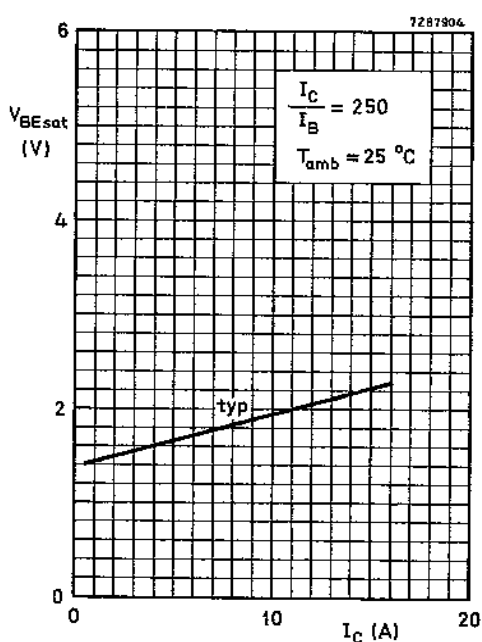
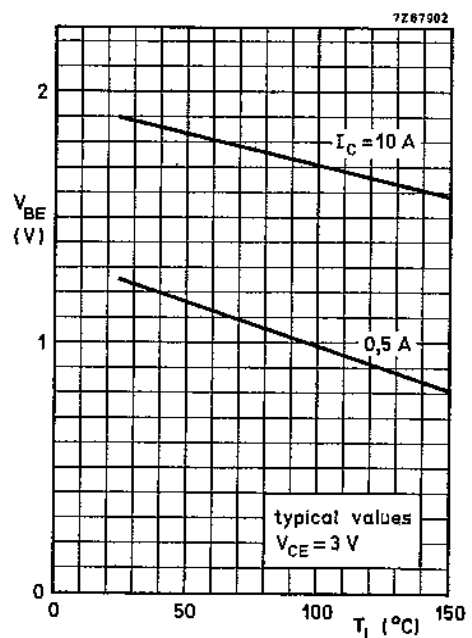
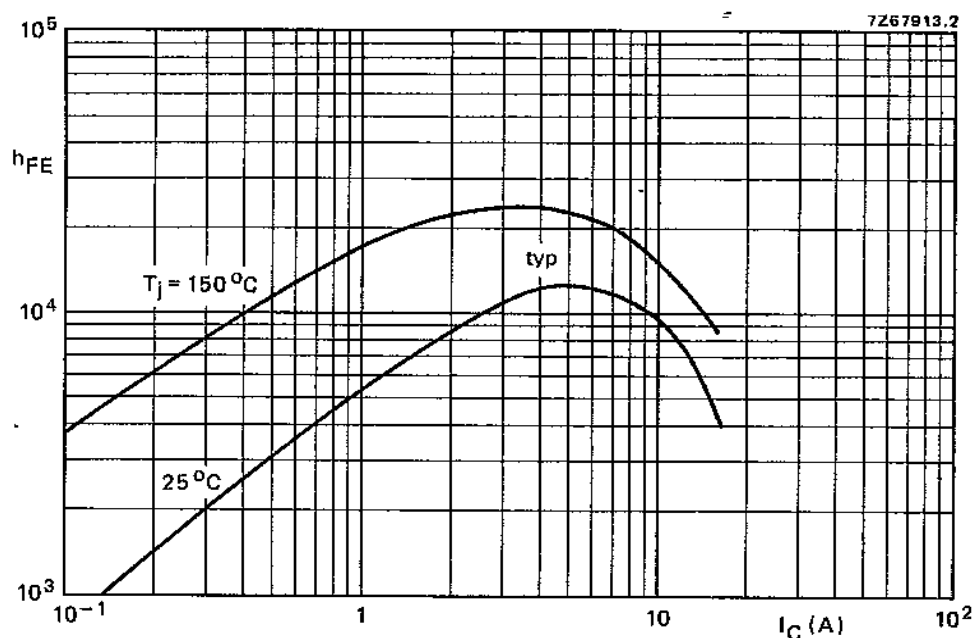
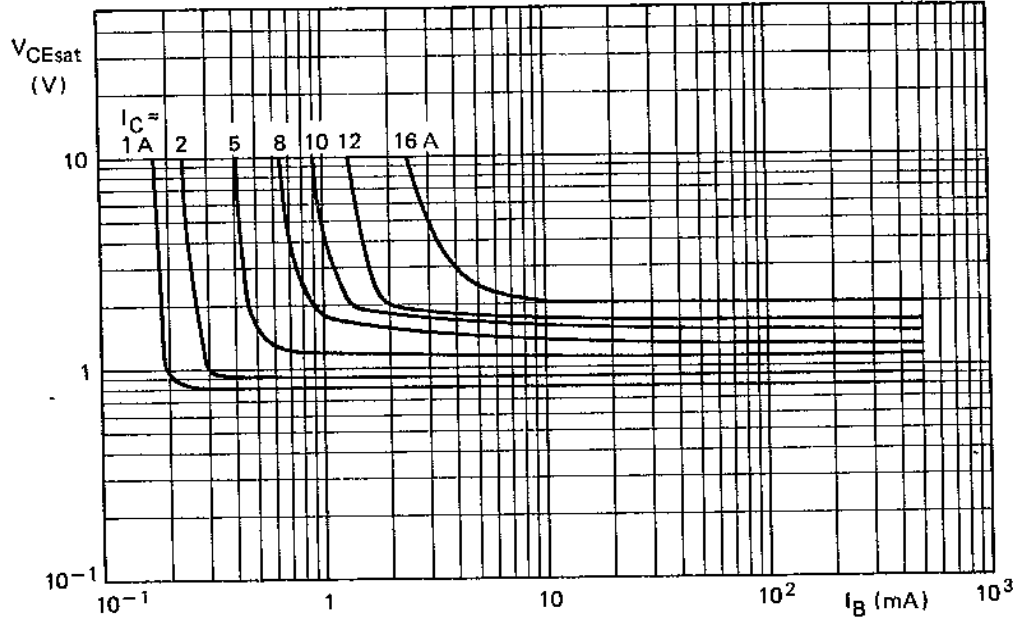
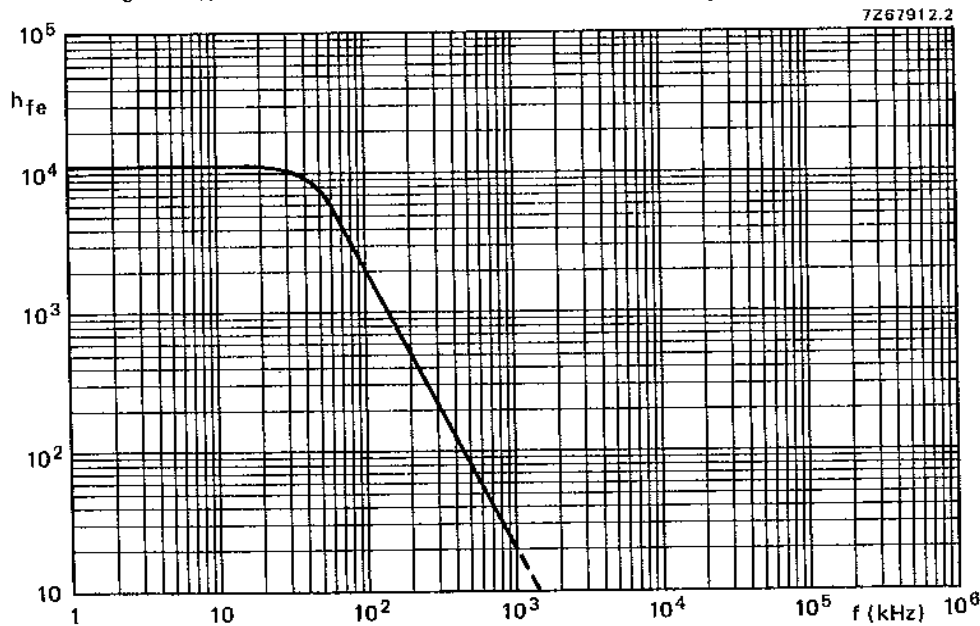


Fig. 11 S.B. current multiplying factor at the V_{CEOmax} level.

BDX67; 67A
BDX67B; 67C

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Fig. 15 Typical values collector-emitter saturation voltage at $T_j = 25^\circ\text{C}$.Fig. 16 Small-signal current gain, $I_C = 5\text{ A}$; $V_{CE} = 3\text{ V}$.