SILICON DARLINGTON POWER TRANSISTORS

NPN epitaxial base transistors in monolithic Darlington circuit for audio output stages and general amplifier and switching applications. PNP complements are BDV64, 64B and 64C.

QUICK REFERENCE DATA

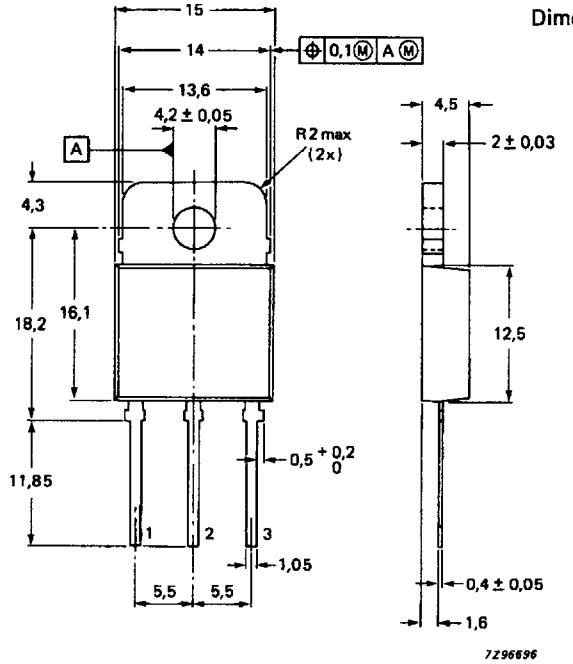
			BDV65	A	B	C	
Collector-base voltage (open emitter	V_{CBO}	max.	60	80	100	120	V
Collector-emitter voltage (open base)	V_{CEO}	max.	60	80	100	120	V
Collector current (DC)	I_C	max.		12			A
Total power dissipation up to T_{mb} = 25 °C	P_{tot}	max.		125			W
Junction temperature	T_j	max.		150			°C
D.C. current gain							
I_C = 1 A; V_{CE} = 4 V	h_{FE}	typ.		1500			
I_C = 5 A; V_{CE} = 4 V	h_{FE}	>		1000			
Cut-off frequency							
I_C = 5 A; V_{CE} = 4 V	f_{hfe}	typ.		70			kHz

MECHANICAL DATA

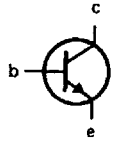
Dimensions in mm

Fig. 1 SOT-93.

Collector connected to mounting-base.



Pinning:
1 = base
2 = collector
3 = emitter



See also chapters Mounting instructions and Accessories.

CIRCUIT DIAGRAM

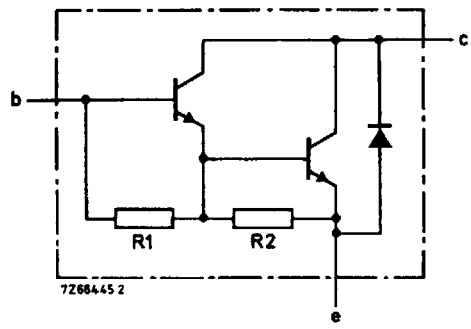


Fig. 2.
R1 typical 5 kΩ
R2 typical 80 Ω.

RATINGS

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

			BDV65	A	B	C	
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.	20				A
Base current (d.c.)	I_B	max.	0,5				A
Total power dissipation up to T_{mb} = 25 °C	P_{tot}	max.	125				W
Storage temperature	T_{stg}		−65 to + 150				°C
Junction temperature	T_j	max.	150				°C*

THERMAL RESISTANCE

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

CHARACTERISTICS

T_j = 25 °C unless otherwise specified.

Collector cut-off currents				
I_E = 0; V_{CB} = V_{CBOmax}	I_{CBO}	<	400	μA
I_E = 0; V_{CB} = ½V_{CBOmax}; T_j = 150 °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

* 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.

D.C. current gain*			
I_C = 1 A; V_{CE} = 4 V	h_{FE}	typ.	1500
I_C = 5 A; V_{CE} = 4 V	h_{FE}	>	1000
I_C = 10 A; V_{CE} = 4 V	h_{FE}	typ.	1750
Base-emitter voltage*			
I_C = 5 A; V_{CE} = 4 V	V_{BE}	<	2,5 V**
Collector-emitter saturation voltage*			
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.	150 pF
Cut-off frequency			
I_C = 5 A; V_{CE} = 4 V	f_{hfe}	typ.	70 kHz
Diode, forward voltage			
I_F = 5 A	V_F	typ.	1,2 V
I_F = 12 A	V_F	typ.	2 V
Switching times (see also Fig. 4)			
I_{Con} = 5 A; $I_{Bon} = -I_{Boff}$ = 20 mA; V_{CC} = 16 V			
Turn-on time	t_{on}	typ.	1 μs
Fall time	t_f	typ.	3 μs
Turn-off time	t_{off}	typ.	6 μs

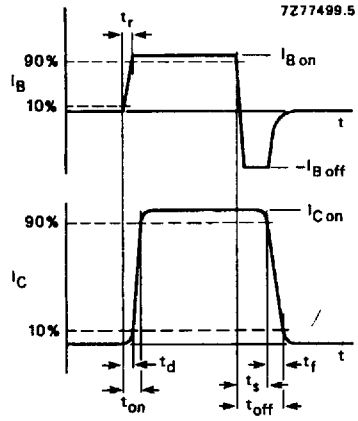


Fig. 3 Waveforms showing t_{on}; $t_s + t_f = t_{off}$.

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

** V_{BE} decreases by about 3,6 mV/K with increasing temperature.

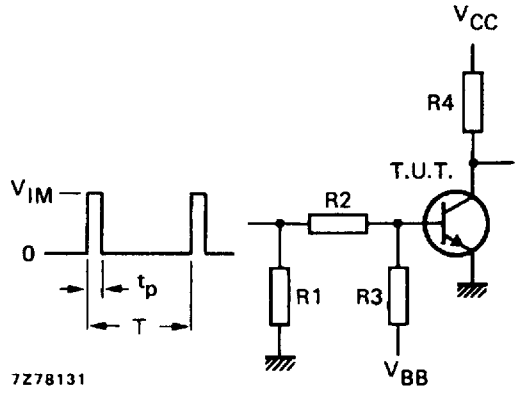


Fig. 4 Switching times test circuit.

Turn-off breakdown energy with inductive load (see also Fig. 5).

I_{Con} = 6,3 A; $-I_{Boff}$ = 0; t_p = 1 ms; T = 100 ms $E_{(BR)} > 100$ mJ

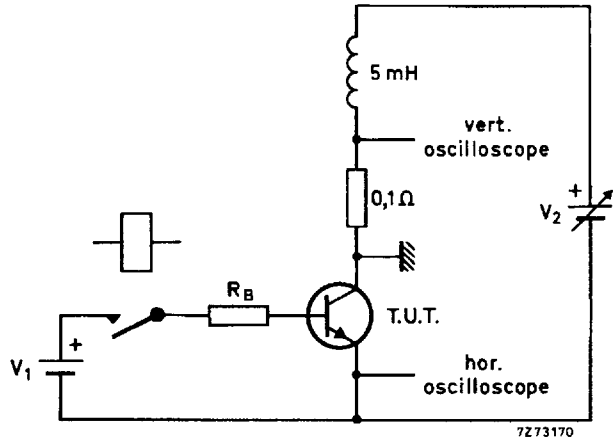


Fig. 5 Test circuit; V_1 = 12 V; R_B = 270 Ω.

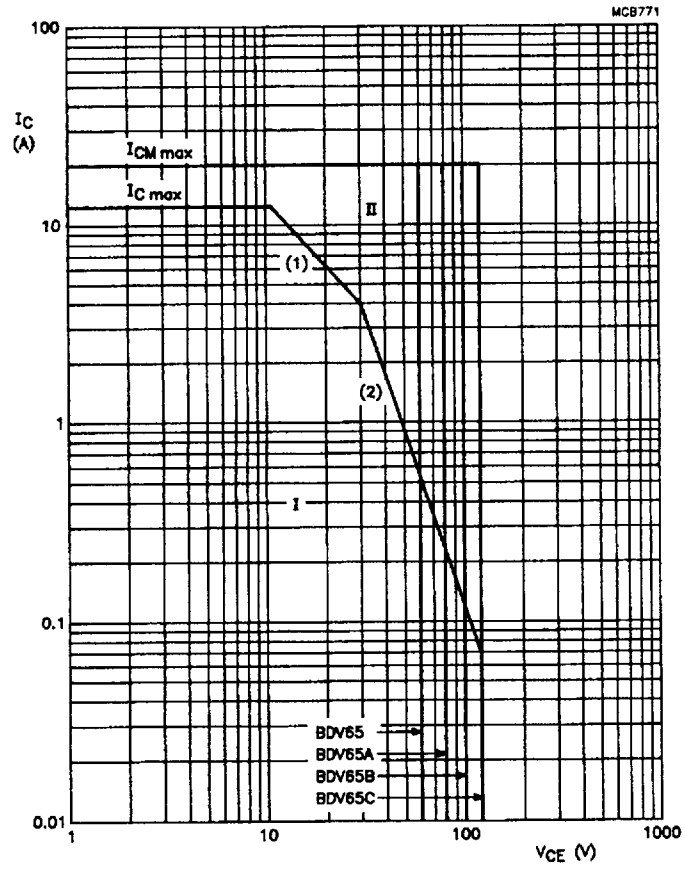


Fig. 6 Safe Operating Area; $T_{mb} \leqslant 25\ ^{o}C$.

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.

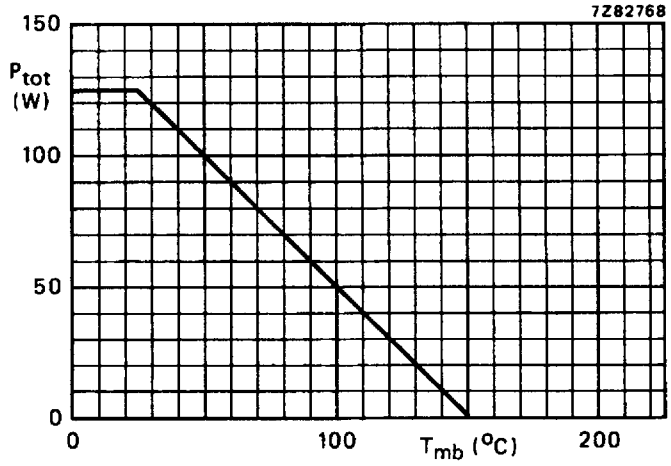


Fig. 7 Power derating curve.

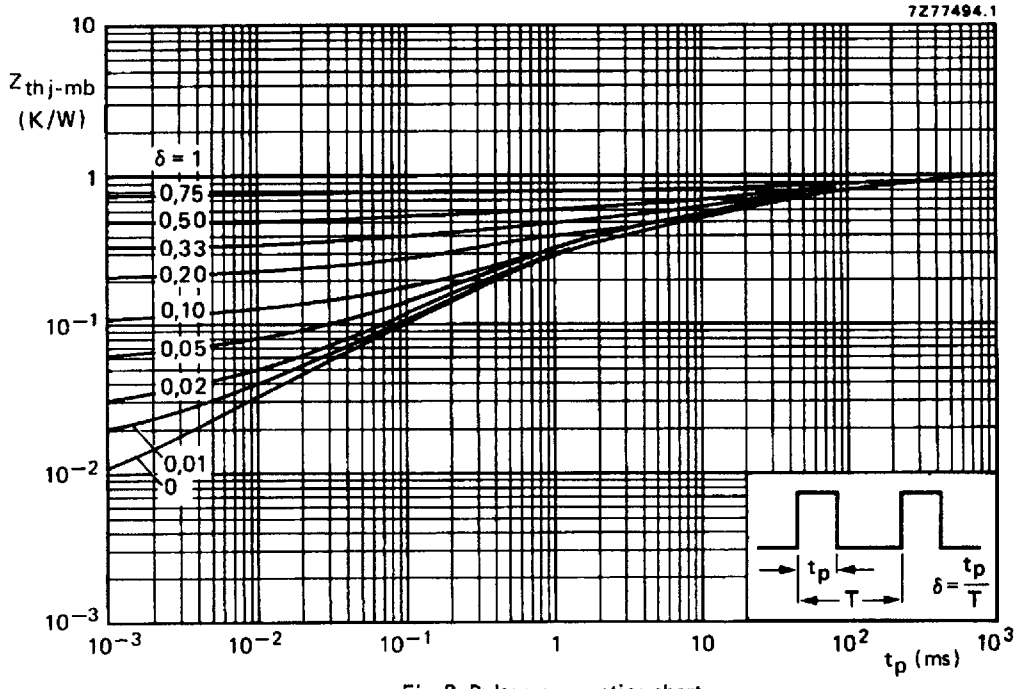


Fig. 8 Pulse power rating chart.

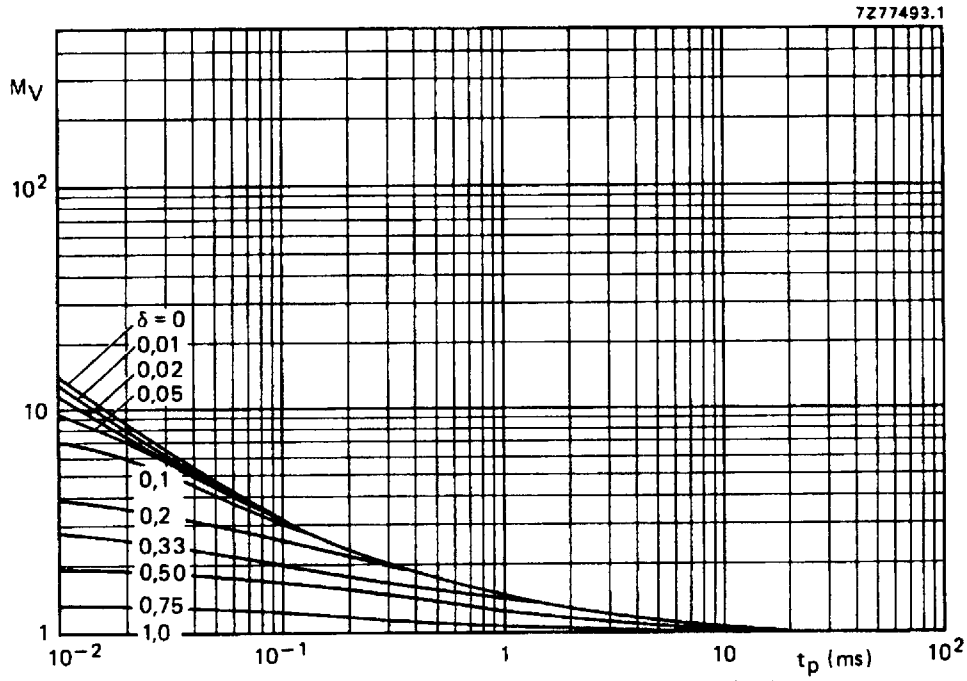


Fig. 9 S.B. voltage multiplying factor at the I_{Cmax} level.

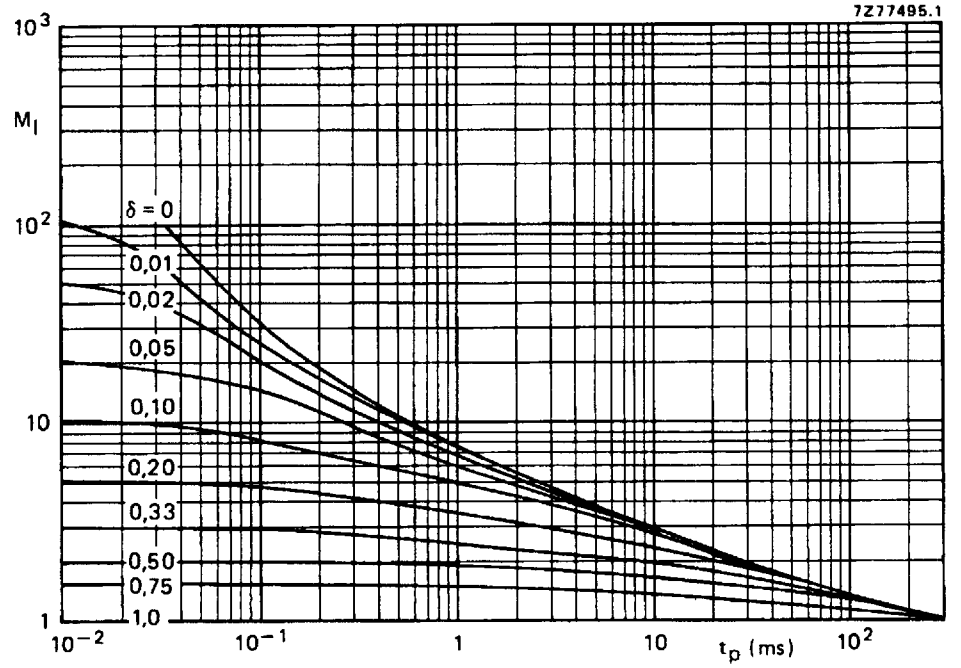


Fig. 10 S.B. current multiplying factor at the V_{CEOmax} level (100 V).

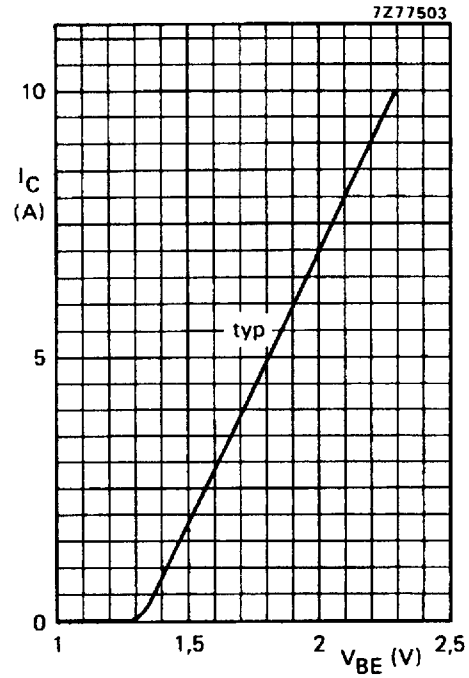


Fig. 11 V_{CE} = 4 V; T_j = 25 °C.

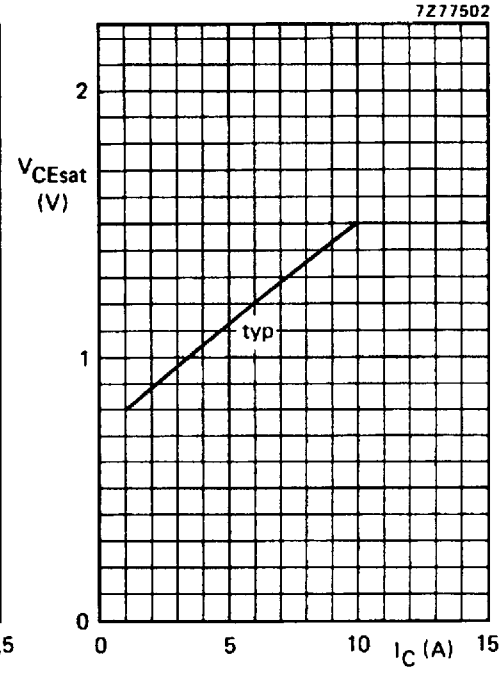


Fig. 12 I_C/I_B = 250; T_j = 25 °C.

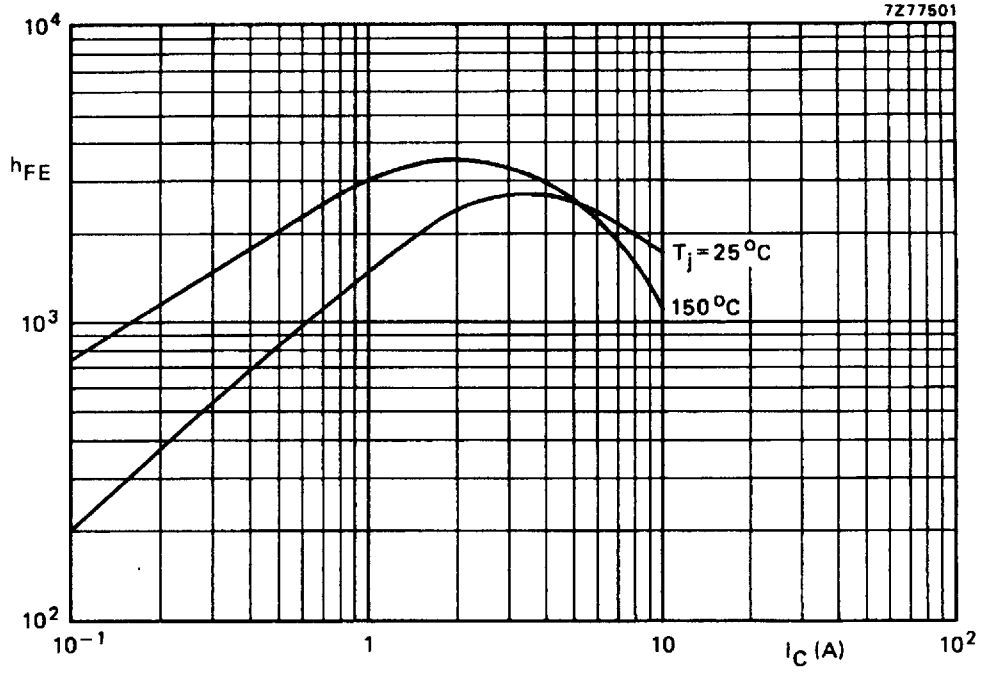


Fig. 13 Typical values; V_{CE} = 4 V.