SILICON DARLINGTON POWER TRANSISTORS

NPN epitaxial base transistors in monolithic Darlington circuit for audio output stages and general purpose amplifier and switching applications. TO-220 plastic envelope. PNP complements are BDT64; BDT64A; BDT64B and BDT64C.

QUICK REFERENCE DATA

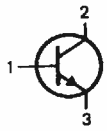
			BDT65	65A	65B	65C	
Collector-base voltage (open emitter)	V_{CBO}	max.	60	80	100	120	V
Collector-emitter voltage (open base)	V_{CEO}	max.	60	80	100	120	V
Emitter-base voltage (open collector)	V_{EBO}	max.	5	5	5	5	V
Collector current (d.c.)	I_C	max.		12			A
Total power dissipation up to T_{mb} = 25 °C	P_{tot}	max.		125			W
Junction temperature	T_j	max.		150			°C
D.C. current gain I_C = 5 A; V_{CE} = 4 V	h_{FE}	>		1000			

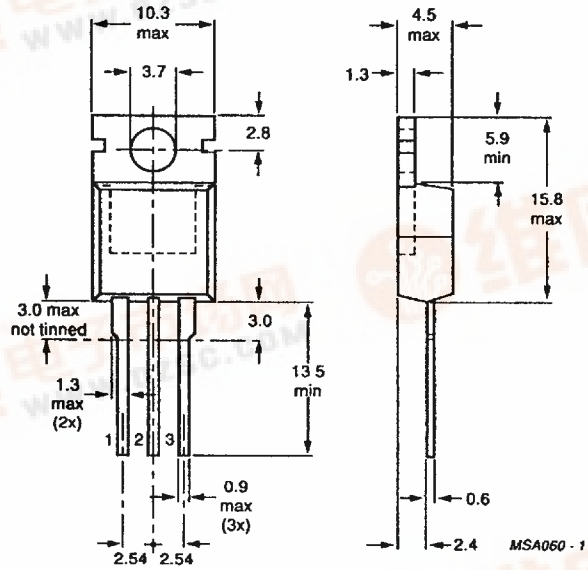
MECHANICAL DATA

Dimensions in mm

Fig. 1 TO-220.

Collector connected to mounting base.





See also chapters Mounting instructions and Accessories.

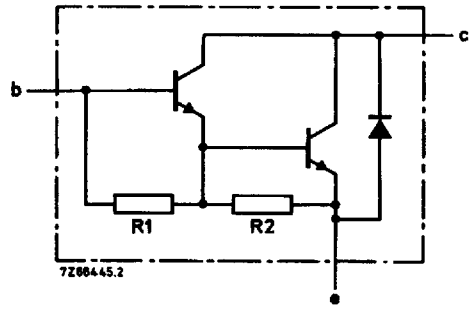


Fig. 2 Circuit diagram. R1 typ. 5 kΩ; R2 typ. 80 Ω.

RATINGS

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

			BDT65	65A	65B	65C	
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.		500			mA
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 current			
$V_{CB} = V_{CBOmax}$; I_E = o	I_{CBO}	<	0,4 mA
$V_{CB} = ½V_{CBOmax}$; $I_E = 0$; 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
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 = 12 A; V_{CE} = 4 V	h_{FE}	typ.	1000
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
I_C = 10 A; I_B = 100 mA	V_{CEsat}	<	3 V
Diode, forward voltage			
I_F = 5 A	V_F	<	2 V
I_F = 12 A	V_F	typ.	2 V
Collector capacitance at f = 1 MHz			
V_{CB} = 10 V; $I_E = I_e = 0$	C_c	typ.	200 pF
Second-breakdown collector current non-repetitive; without heatsink			
V_{CE} = 60 V; t_p = 0,1 s	I_{SB}	>	2 A
Turn-off breakdown energy with inductive load; $-I_{Boff} = 0$; I_{CM} = 6,3 A L = 5 mH (see Fig. 3)	$E_{(BR)}$	>	100 mJ
Switching times (see Figs 4 and 5)			
I_{Con} = 5 A; $I_{Bon} = -I_{Boff}$ = 20 mA			
turn-on time	t_{on}	typ.	1 μs
		<	2,5 μs
turn-off time	t_{off}	typ.	6,0 μs
		<	10 μs
Small-signal current gain			
I_C = 5 A; V_{CE} = 3 V; f = 1 MHz	h_{fe}	>	10

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

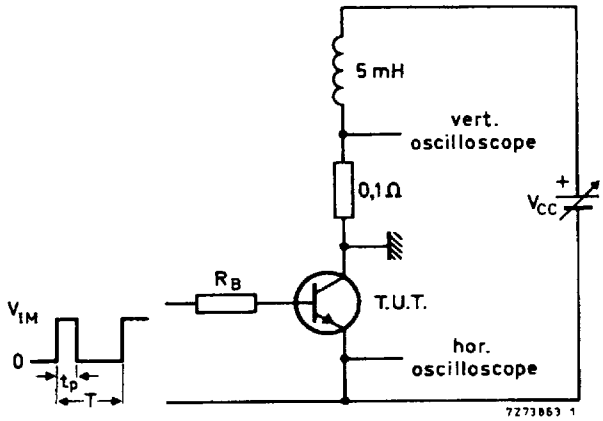


Fig. 3 Test circuit for turn-off breakdown energy.
V_{IM} = 12 V; R_B = 270 Ω;
t_p = 1 ms; δ = 1%.

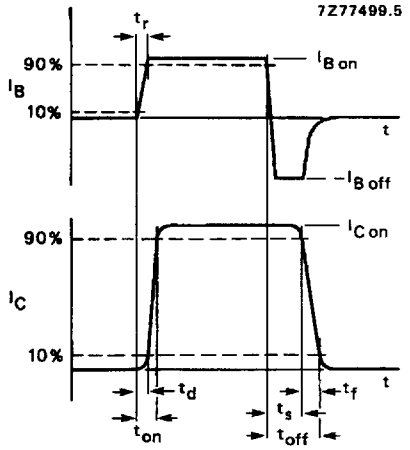
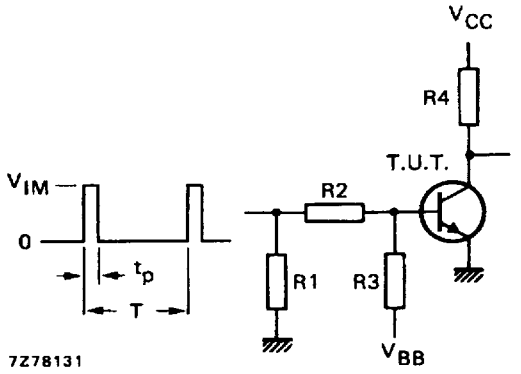


Fig. 4 Switching times waveforms.



V_{CC} = 30 V
V_{IM} = 15 V
$-V_{BB}$ = 4 V
R1 = 56 Ω
R2 = 410 Ω
R3 = 560 Ω
R4 = 6 Ω
$t_r = t_f$ = 15 ns
t_p = 10 μs
T = 500 μs

Fig. 5 Switching times test circuit.

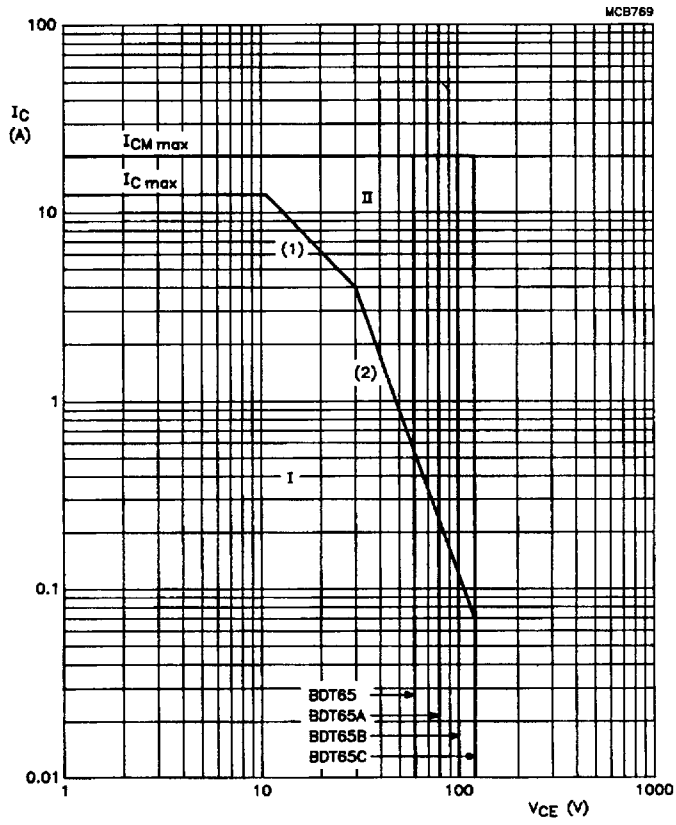


Fig. 6 Safe Operating Area; T_{mb} = 25 °C.

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.

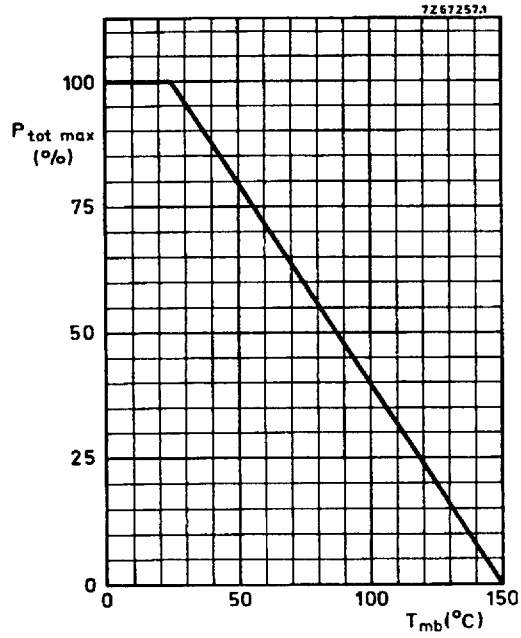


Fig. 7 Power derating curve.

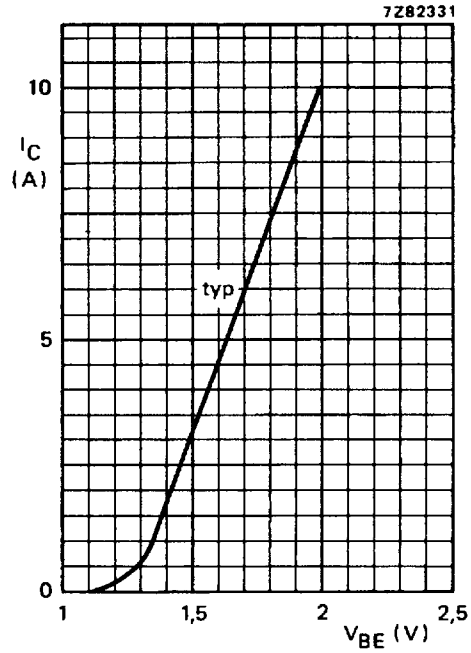


Fig. 8 Base-emitter voltage as a function of collector current. V_{CE} = 3 V; T_{amb} = 25 °C.

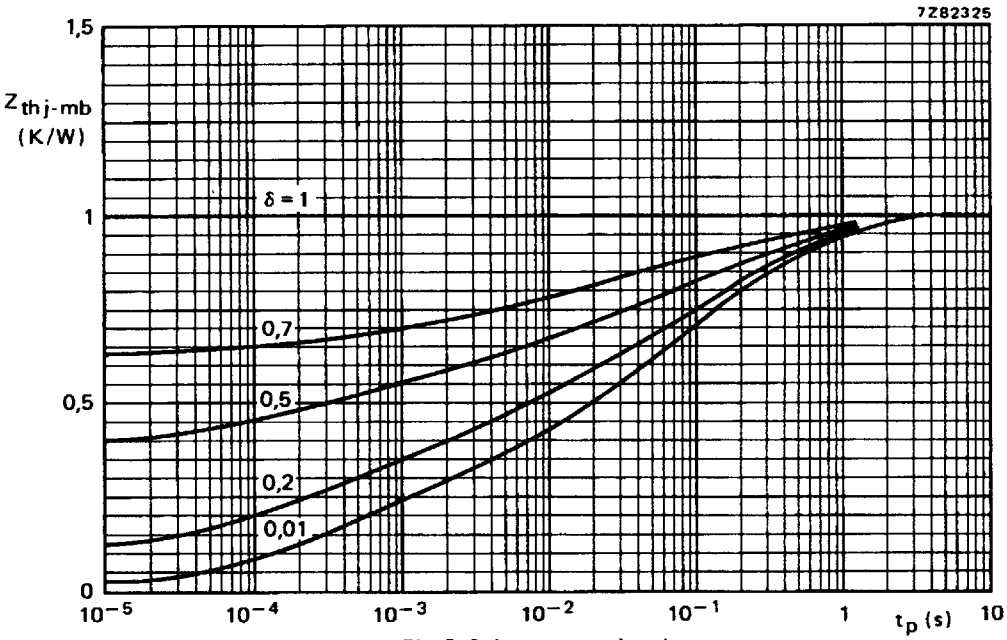


Fig. 9 Pulse power rating chart.

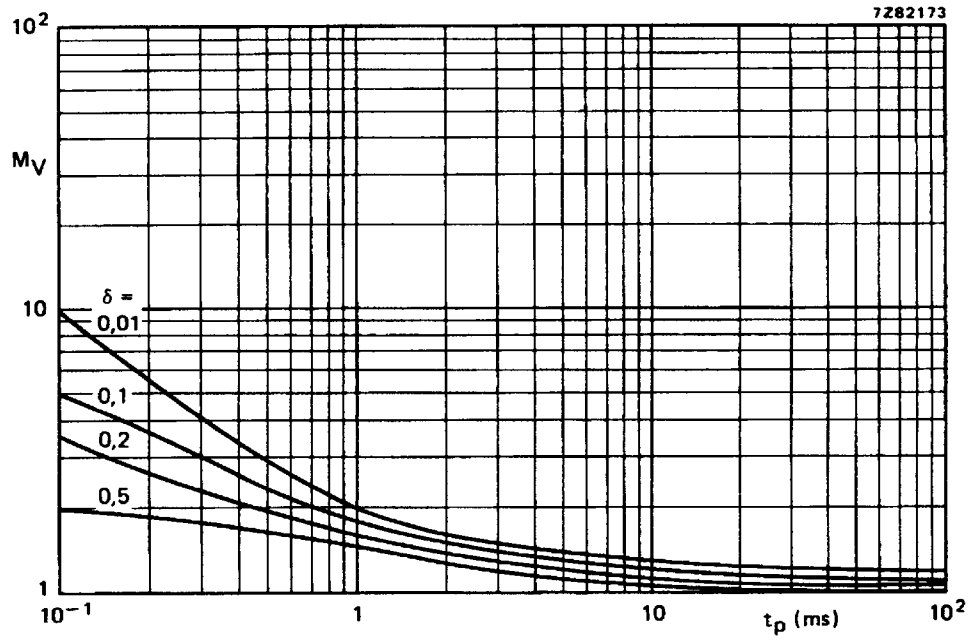


Fig. 10 S.B. voltage multiplying factor at the I_{Cmax} level.

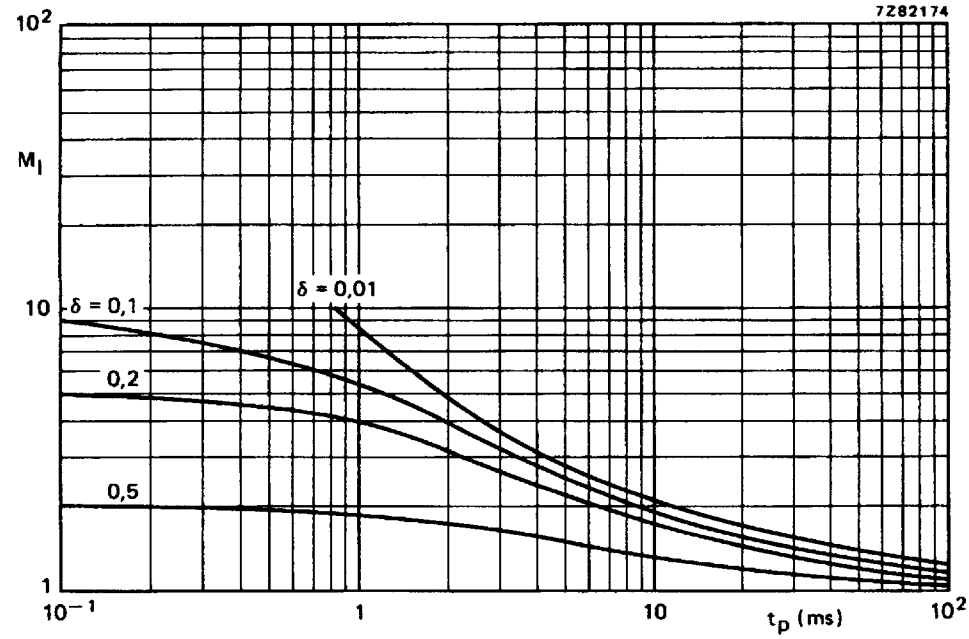


Fig. 11 S.B. current multiplying factor at the V_{CEOmax} level.

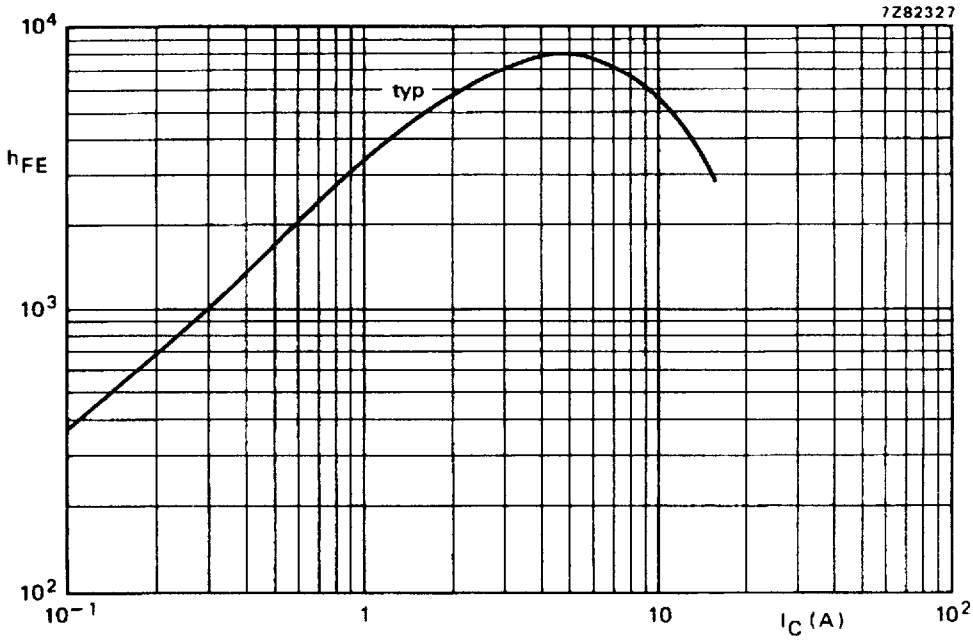


Fig. 12 Typical d.c. current gain as a function of collector current; V_{CE} = 3 V; T_j = 25 °C.

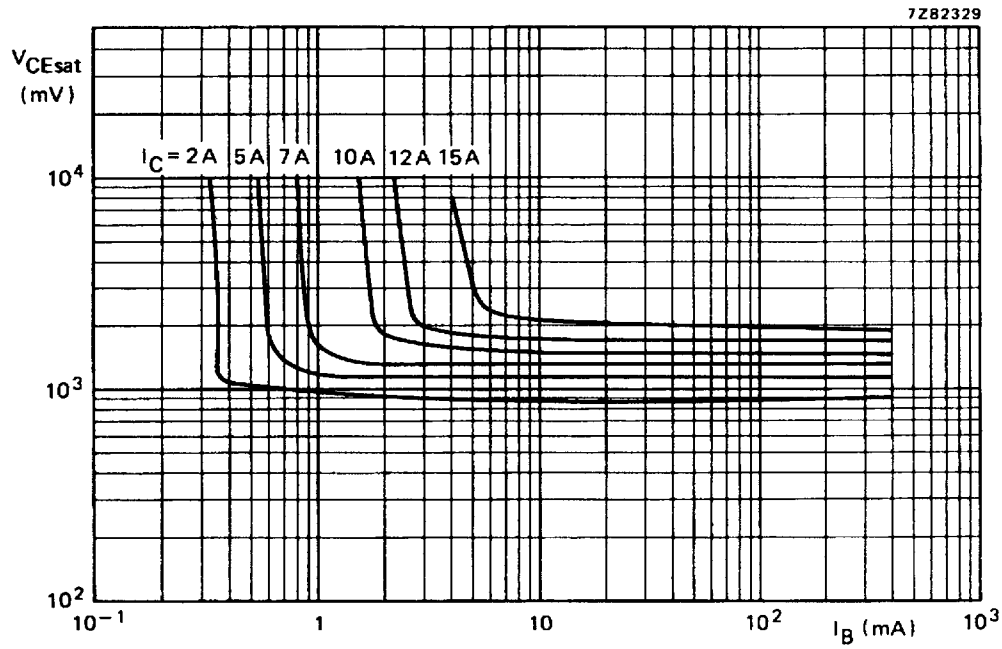


Fig. 13 Typical collector-emitter saturation voltages.