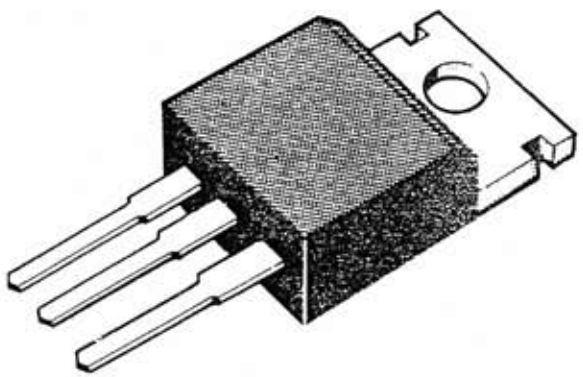
BDT63; 63A
BDT63B; 63C

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-220 plastic envelope. P-N-P complements are BDT62, BDT62A; BDT62B and BDT62C.

QUICK REFERENCE DATA

			BDT63	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 (d.c.)	I_C	max.		10			A
Collector current (peak value) t_p = 0,3 ms; δ = 10%	I_{CM}	max.		15			A
Total power dissipation up to T_{mb} = 25 °C	P_{tot}	max.		90			W
Junction temperature	T_j	max.		150			°C
D.C. current gain I_C = 3 A; V_{CE} = 3 V	h_{FE}	>		1000			



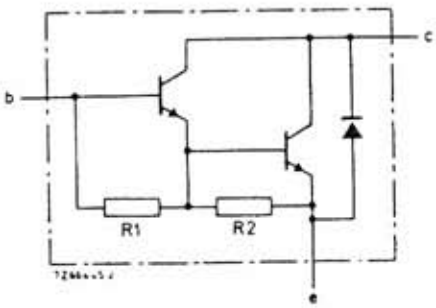
TO-220

CHARACTERISTICS

T_j = 25 °C unless otherwise specified.

Collector cut-off current				
I_E = 0; V_{CB} = V_{CBOmax}	I_{CBO}	<	0,2	mA
I_E = 0; V_{CB} = ½V_{CBOmax}; T_j = 150 °C	I_{CBO}	<	2	mA
I_B = 0; V_{CE} = ½V_{CEOmax}	I_{CEO}	<	0,5	mA
Emitter cut-off current				
I_C = 0; V_{EB} = 5 V	I_{EBO}	<	5	mA
Forward-bias second-breakdown collector current				
V_{CE} = 60 V; t = 0,1 s; non-repetitive (without heatsink)	$I_{(SB)}$	>	1,5	A
D.C. current gain*				
I_C = 3 A; V_{CE} = 3 V	h_{FE}	>	1000	
I_C = 10 A; V_{CE} = 3 V	h_{FE}	typ.	3000	
Base-emitter voltage*				
I_C = 3 A; V_{CE} = 3 V	V_{BE}	<	2,5	V
Collector-emitter saturation voltage*				
I_C = 3 A; I_B = 12 mA	V_{CEsat}	<	2	V
I_C = 8 A; I_B = 80 mA	V_{CEsat}	<	2,5	V
Diode, forward voltage				
I_F = 3 A	V_F	<	2	V
Turn-off breakdown energy with inductive load (Fig. 6)				
$-I_{Boff}$ = 0; L = 5 mH	$E_{(BR)}$	>	100	mJ
Small-signal current gain at f = 1 MHz				
I_C = 3 A; V_{CE} = 3 V	h_{fe}	>	25	
Cut-off frequency				
I_C = 3 A; V_{CE} = 3 V	f_{hfe}	typ.	50	kHz
Collector capacitance				
V_{CB} = 10 V; f = 1 MHz	C_{ob}	typ.	100	pF
D.C. current gain ratio of matched complementary pairs				
I_C = 3 A; V_{CE} = 3 V	h_{FE1}/h_{FE2}	<	2,5	

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



R1 typ. 8 kΩ
R2 typ. 100 Ω

Fig. 2 Circuit diagram.

RATINGS

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

			BDT63	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			V
Collector current (d.c.)	I_C	max.		10			A
Collector current (peak value) t_p = 0,3 ms, δ = 10%	I_{CM}	max.		15			A
Base current (d.c.)	I_B	max.		250			mA
Total power dissipation up to T_{mb} = 25 °C	P_{tot}	max.		90			W
Storage temperature	T_{stg}			−65 to + 150			°C
Junction temperature*	T_j	max.		150			°C

THERMAL RESISTANCE *

From junction to mounting base	$R_{th\ j\text{-}mb}$	=	1,39	K/W
From junction to ambient (in free air)	$R_{th\ j\text{-}a}$	=	70	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 (continued)

Switching times
(between 10% and 90% levels)
I_{Con} = 3 A; I_{Bon} = $-I_{Boff}$ = 12 mA

turn-on time	t_{on}	typ.	1 µs
		<	2,5 µs
turn-off time	t_{off}	typ.	5 µs
		<	10 µs

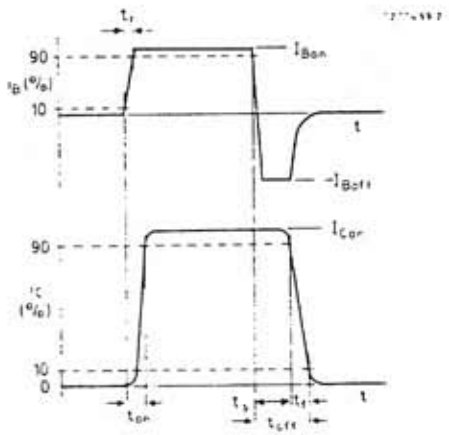
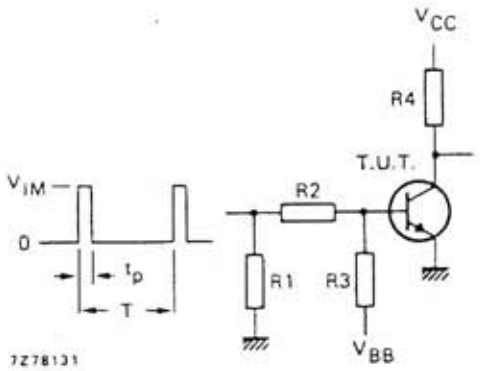


Fig. 3 Switching times waveforms.



V_{IM}	=	10 V
V_{CC}	=	10 V
$-V_{BB}$	=	4 V
R1	=	56 Ω
R2	=	410 Ω
R3	=	560 Ω
R4	=	3 Ω
$t_r = t_f$	=	15 ns
t_p	=	10 µs
T	=	500 µs

Fig. 4 Switching times test circuit.

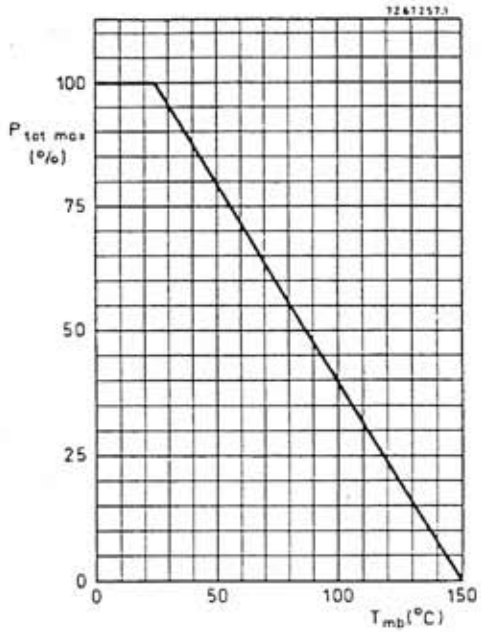


Fig. 5 Power derating curve.

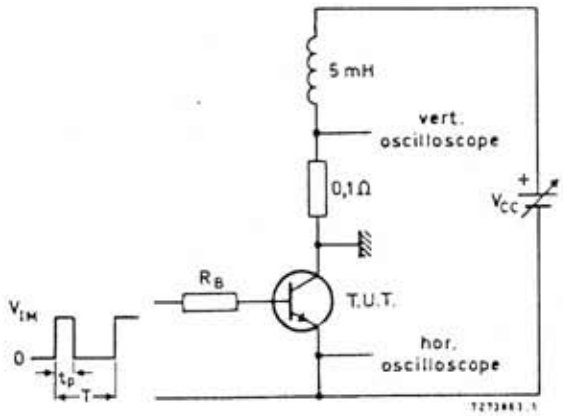


Fig. 6 Turn-off breakdown energy with inductive load.
V_{IM} = 12 V; R_B = 270 Ω; $\delta = \frac{t_p}{T} \times 100\% = 1\%$; I_{CC} = 6,3 A.

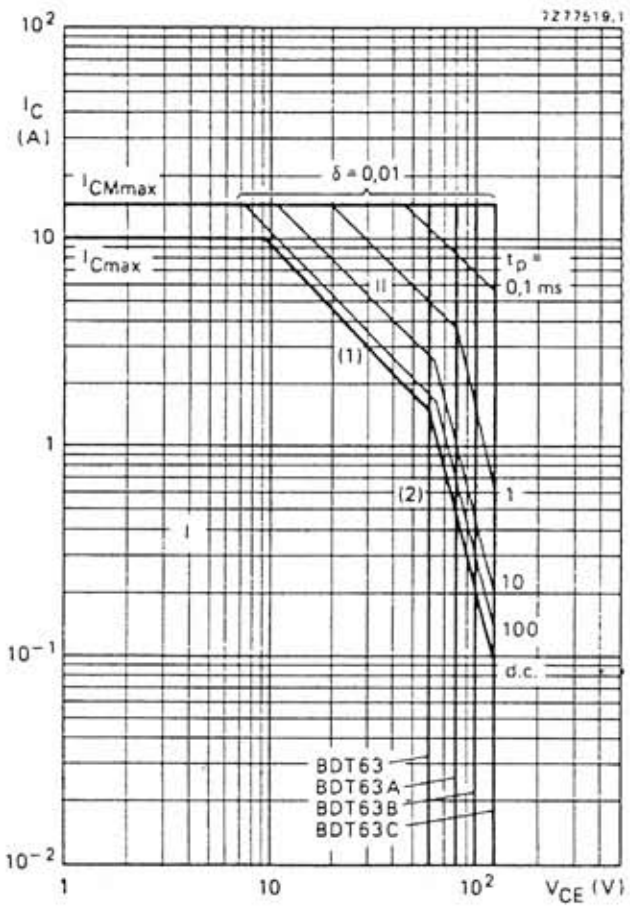


Fig. 7 Safe Operating AREa; T_{mb} = 25 °C.

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 (independent of temperature).

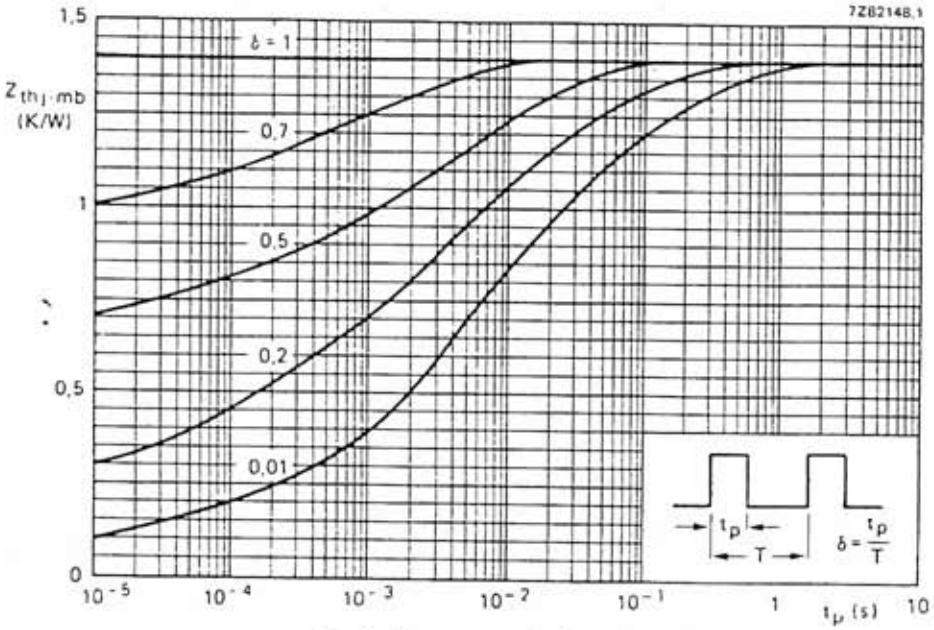


Fig. 8 Pulse power rating chart.

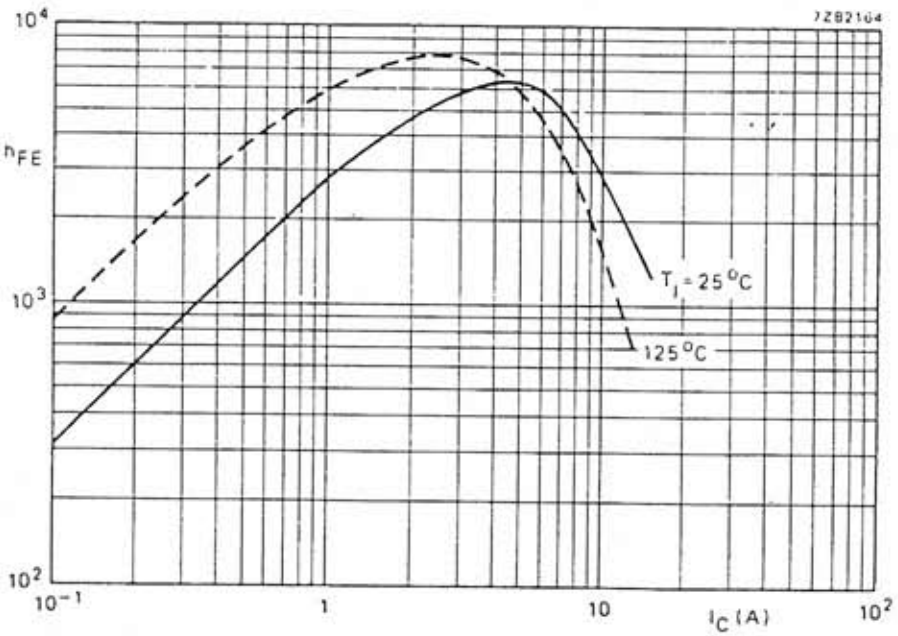


Fig. 9 Typical d.c. current gain at V_{CE} = 3 V.

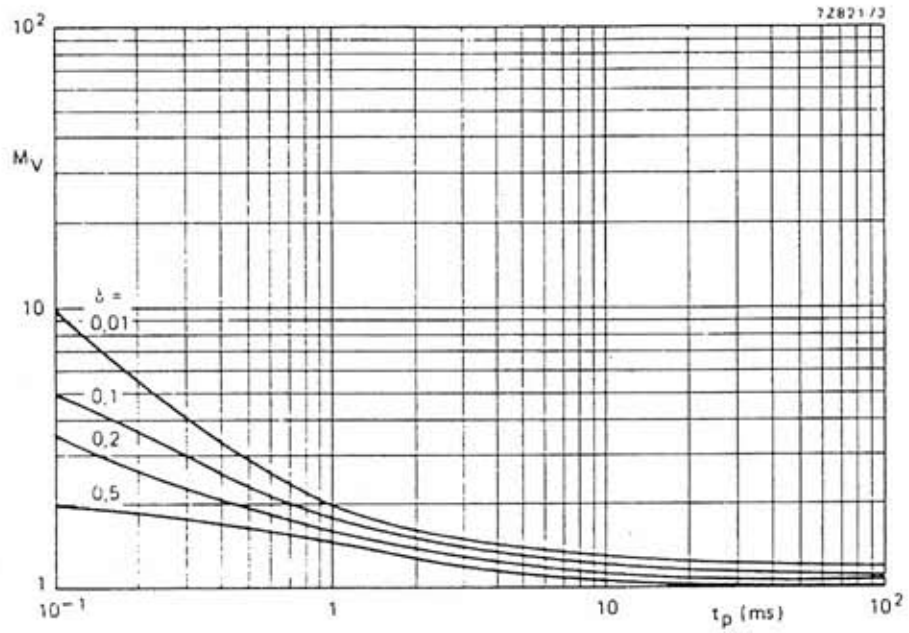


Fig. 10 S.B. voltage multiplying factor at the $I_{C\,max}$ level.

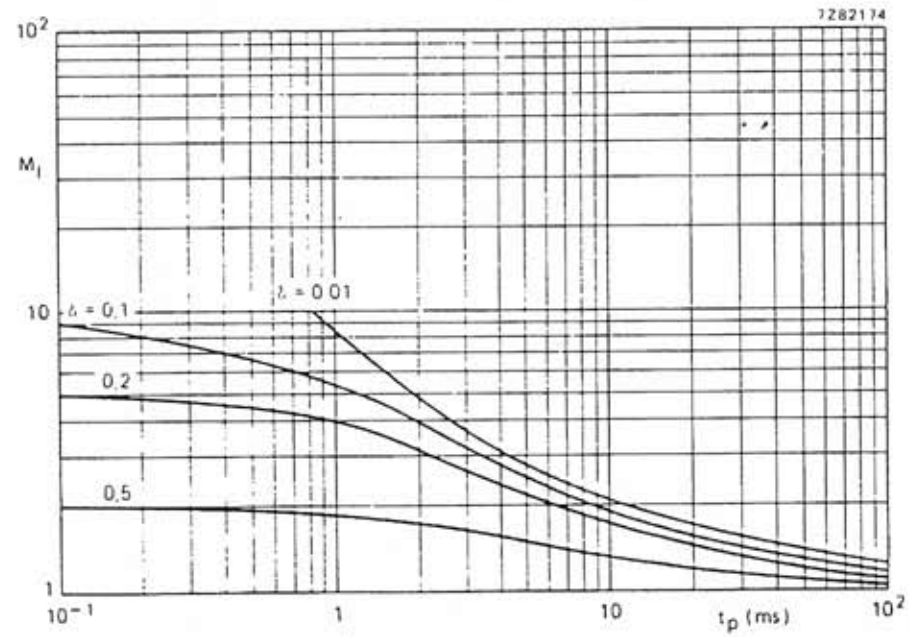


Fig. 11 S.B. current multiplying factor at V_{CEO} level = 60 V and 100 V.