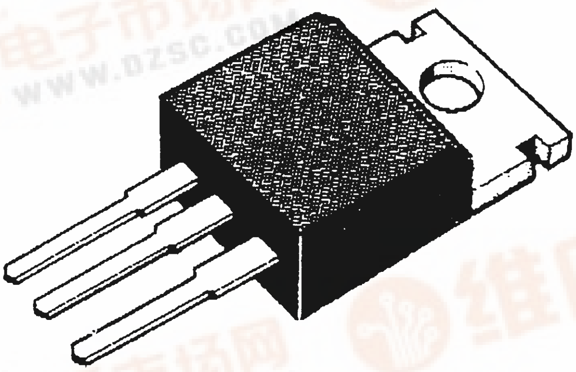
BDT63; 63A
BDT63B; 63C

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.

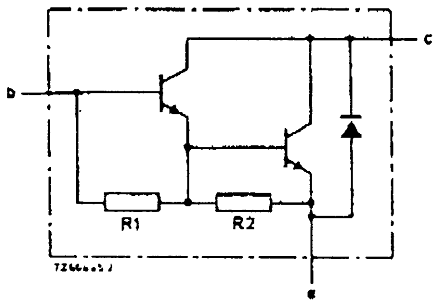
QUICK REFERENCE DATA

			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; $\delta = 10\%$	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

BDT63; 63A
BDT63B; 63C



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

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 μs; δ ≤ 2%.

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

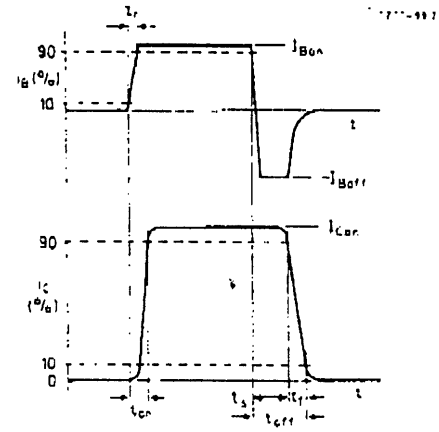
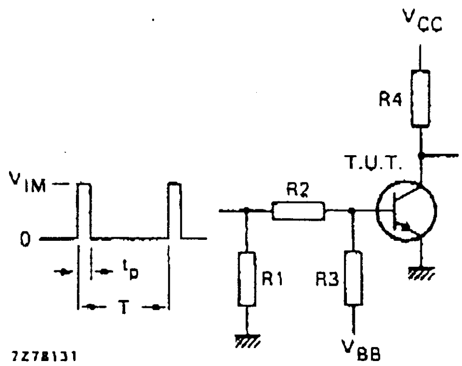


Fig. 3 Switching times waveforms.



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.

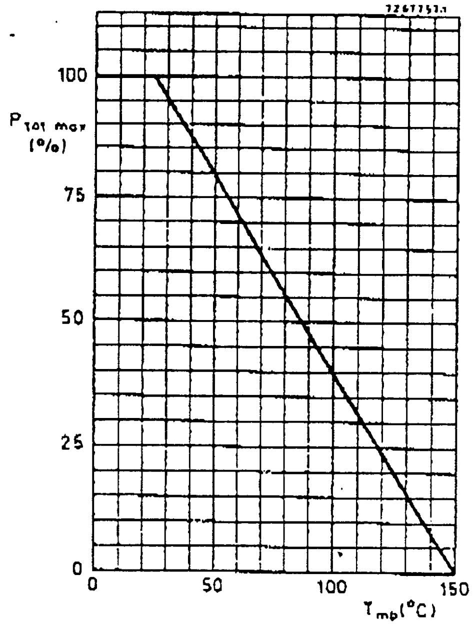


Fig. 5 Power derating curve.

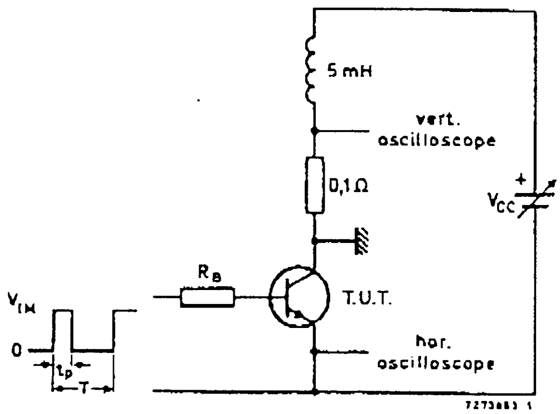


Fig. 6 Turn-off breakdown energy with inductive load.
V_{IM} = 12 V; R_B = 270 Ω, $\delta = \frac{t_p}{T} \times 100\% = 1\%$; I_{CC} = 6,3 A.

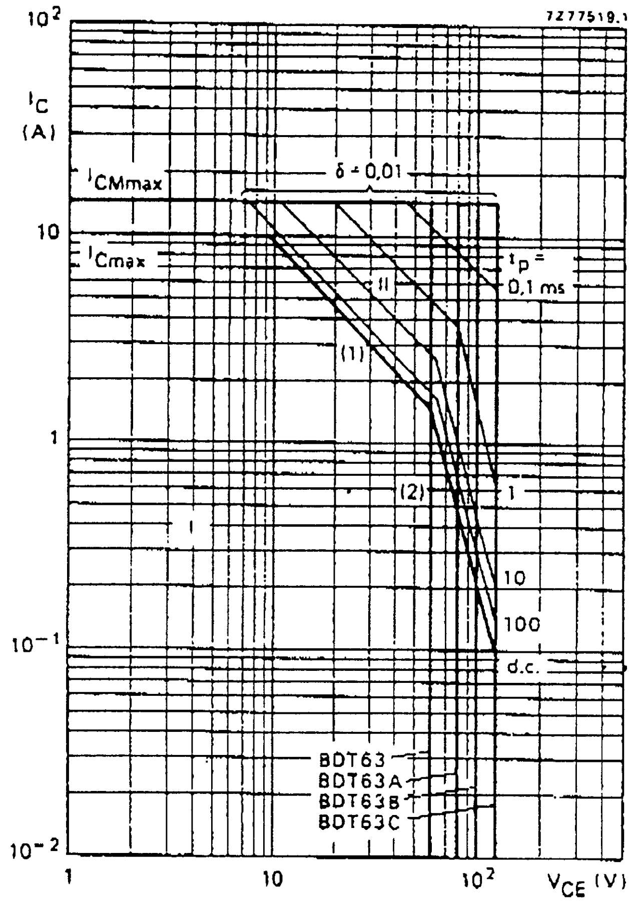


Fig. 7 Safe Operating ARea; T_{mb} = 25 °C.

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).

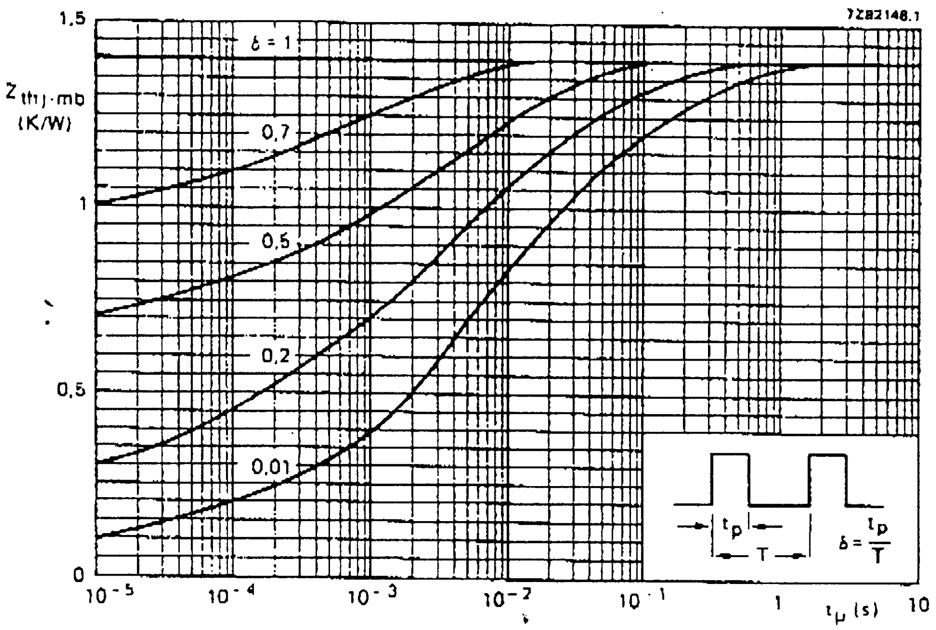


Fig. 8 Pulse power rating chart.

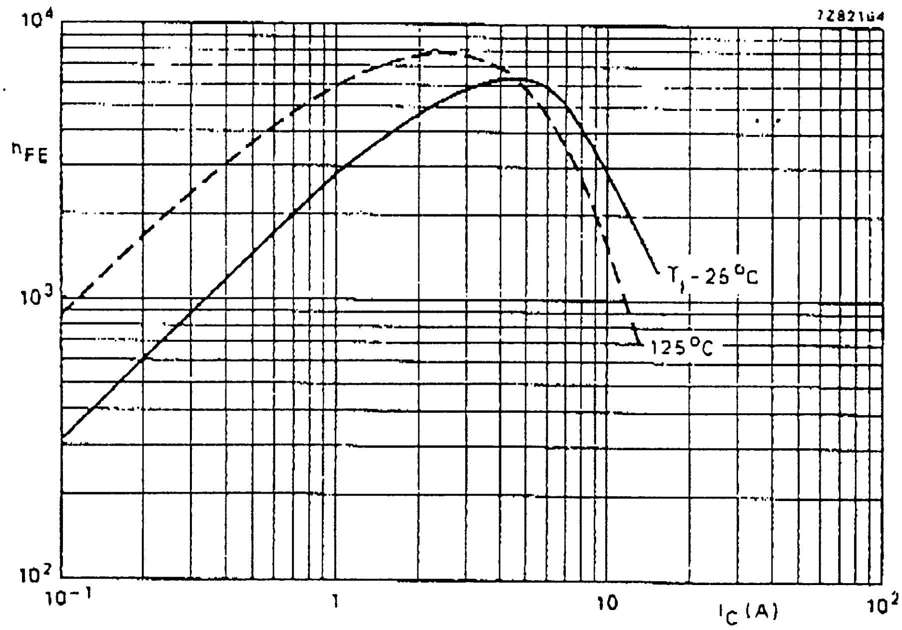


Fig. 9 Typical d.c. current gain at V_{CE} = 3 V.

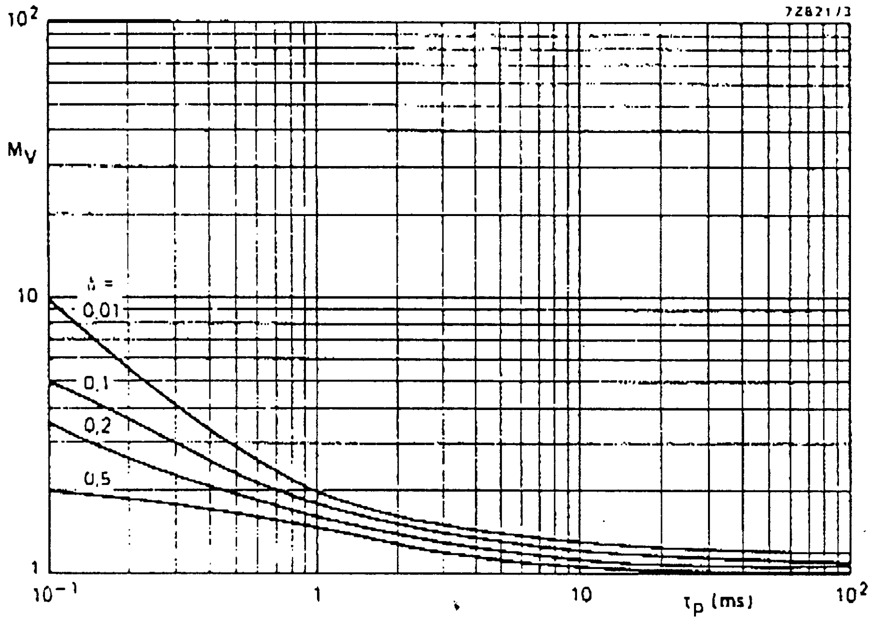


Fig. 10 S.B. voltage multiplying factor at the $I_{C\,max}$ level.

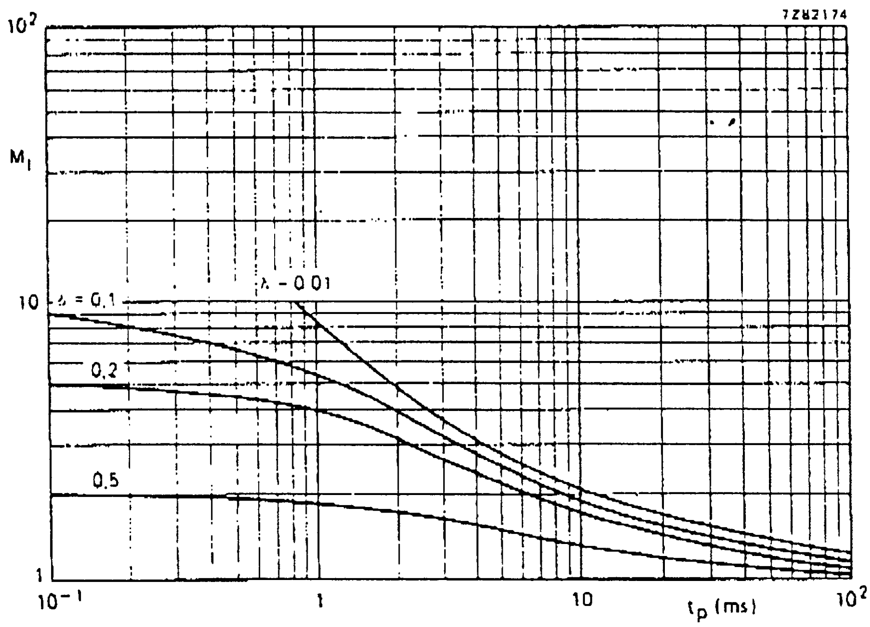


Fig. 11 S.B. current multiplying factor at V_{CEO} level = 60 V and 100 V.

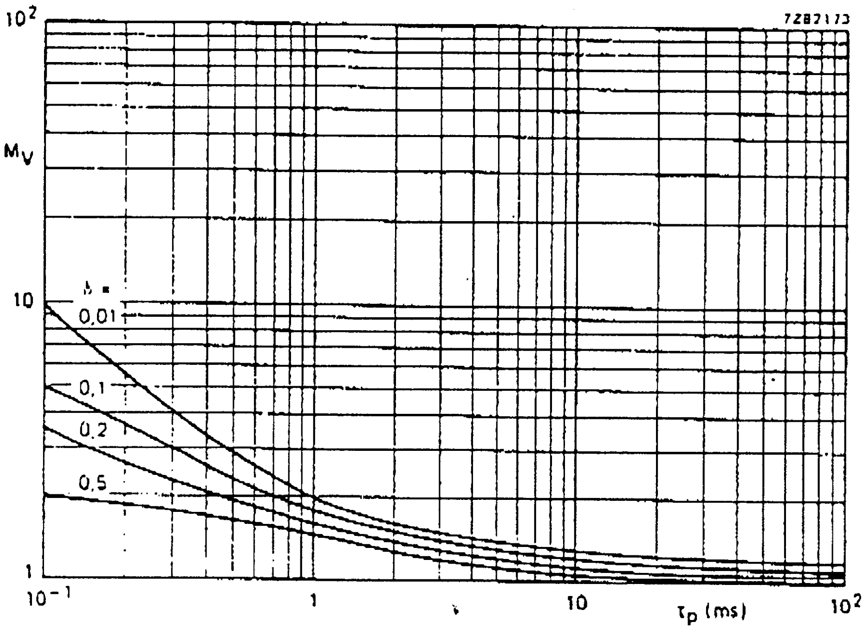


Fig. 10 S.B. voltage multiplying factor at the $I_{C\,max}$ level.

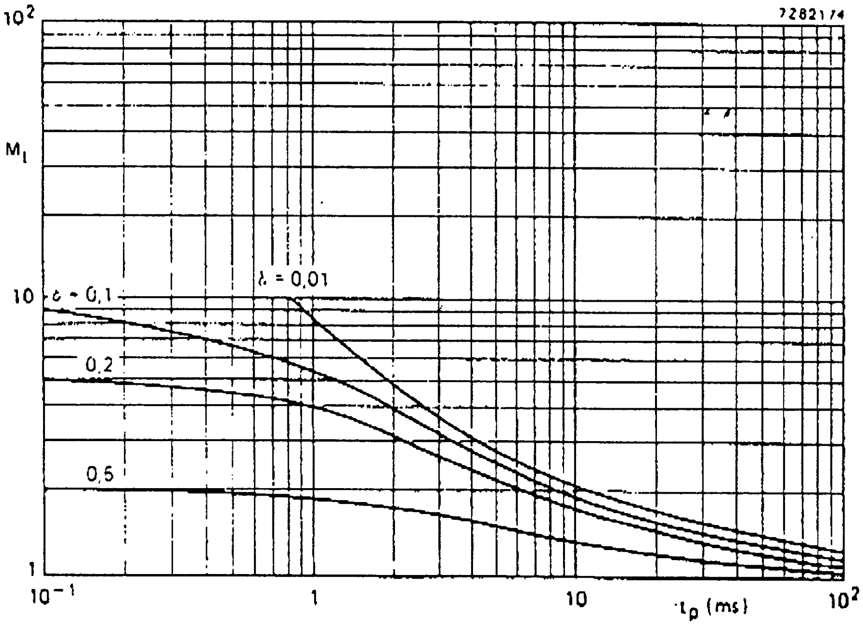


Fig. 11 S.B. current multiplying factor at V_{CEO} level = 60 V and 100 V.