

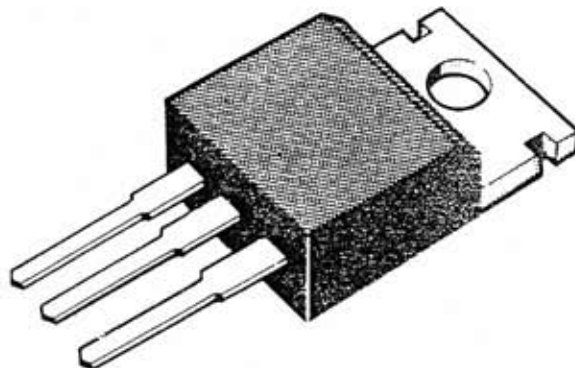
BDT63; 63A
BDT63B; 63C

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_{CB0}	max. 60	80	100	120 V
Collector-emitter voltage (open base)	V_{CE0}	max. 60	80	100	120 V
Collector current (d.c.)	I_C	max. 10			A
Collector current (peak value) $t_p = 0,3 \text{ ms}; \delta = 10\%$	I_{CM}	max. 15			A
Total power dissipation up to $T_{mb} = 25 \text{ }^\circ\text{C}$	P_{tot}	max. 90			W
Junction temperature	T_j	max. 150			$^\circ\text{C}$
D.C. current gain $I_C = 3 \text{ A}; V_{CE} = 3 \text{ V}$	h_{FE}	> 1000			



TO-220

CHARACTERISTICS

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

Collector cut-off current

 $I_E = 0; V_{CB} = V_{CB0max}$ $I_E = 0; V_{CB} = \frac{1}{2}V_{CB0max}; T_j = 150\text{ }^\circ\text{C}$ $I_B = 0; V_{CE} = \frac{1}{2}V_{CE0max}$

I_{CBO}	<	0,2 mA
I_{CBO}	<	2 mA
I_{CEO}	<	0,5 mA

Emitter cut-off current

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

I_{EBO}	<	5 mA
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Forward-bias second-breakdown collector current

 $V_{CE} = 60\text{ V}; t = 0,1\text{ s};$ non-repetitive
(without heatsink)

$I_{(SB)}$	>	1,5 A ←
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D.C. current gain*

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

h_{FE}	>	1000
h_{FE}	typ.	3000

Base-emitter voltage*

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

V_{BE}	<	2,5 V
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Collector-emitter saturation voltage*

 $I_C = 3\text{ A}; I_B = 12\text{ mA}$ $I_C = 8\text{ A}; I_B = 80\text{ mA}$

V_{CEsat}	<	2 V
V_{CEsat}	<	2,5 V

Diode, forward voltage

 $I_F = 3\text{ A}$

V_F	<	2 V
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Turn-off breakdown energy with inductive load (Fig. 6)

 $-I_{Boff} = 0; L = 5\text{ mH}$

$E_{(BR)}$	>	100 mJ
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Small-signal current gain at $f = 1\text{ MHz}$ $I_C = 3\text{ A}; V_{CE} = 3\text{ V}$

h_{fe}	>	25
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Cut-off frequency

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

f_{hfe}	typ.	50 kHz
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Collector capacitance

 $V_{CB} = 10\text{ V}; f = 1\text{ MHz}$

C_{ob}	typ.	100 pF
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D.C. current gain ratio of matched complementary pairs

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

h_{FE1}/h_{FE2}	<	2,5
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* Measured under pulse conditions; $t_p < 300\text{ }\mu\text{s}; \delta < 2\%$.

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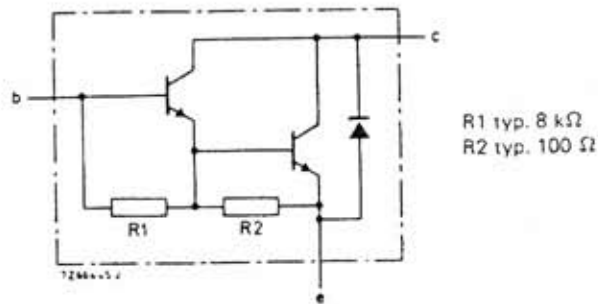


Fig. 2 Circuit diagram.

RATINGS

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

			BDT63	A	B	C	
Collector-base voltage (open emitter)	V_{CB0}	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) $t_p = 0,3 \text{ ms}, b = 10\%$	I_{CM}	max.		15			A
Base current (d.c.)	I_B	max.		250			mA
Total power dissipation up to $T_{mb} = 25 \text{ }^\circ\text{C}$	P_{tot}	max.		90			W
Storage temperature	T_{stg}			-65 to +150			$^\circ\text{C}$
Junction temperature*	T_j	max.		150			$^\circ\text{C}$

THERMAL RESISTANCE *

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

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CHARACTERISTICS (continued)

Switching times

(between 10% and 90% levels)

$I_{Con} = 3\text{ A}$; $I_{Bon} = -I_{Boff} = 12\text{ mA}$

turn-on time

turn off time

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

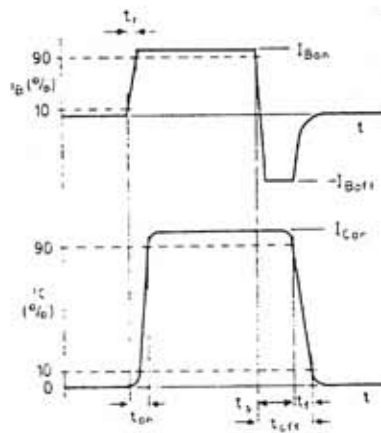
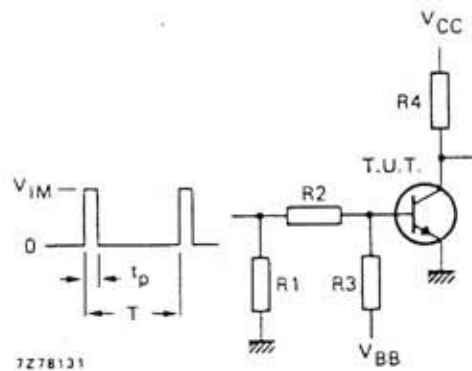


Fig. 3 Switching times waveforms.



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.

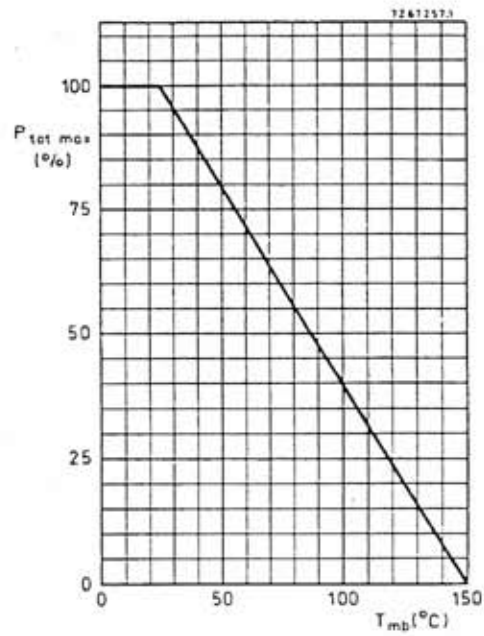


Fig. 5 Power derating curve.

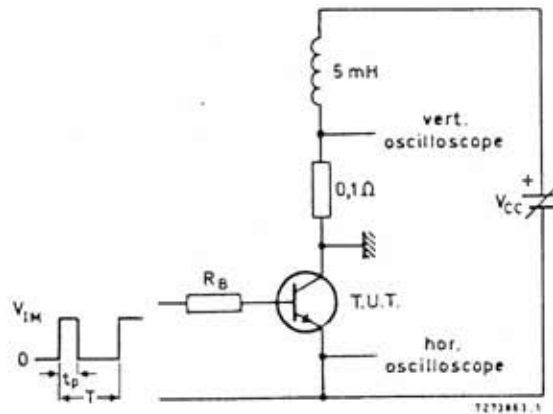


Fig. 6 Turn-off breakdown energy with inductive load.

$V_{IM} = 12\text{ V}; R_B = 270\ \Omega; \delta = \frac{t_p}{T} \times 100\% = 1\%; I_{CC} = 6,3\text{ A.}$

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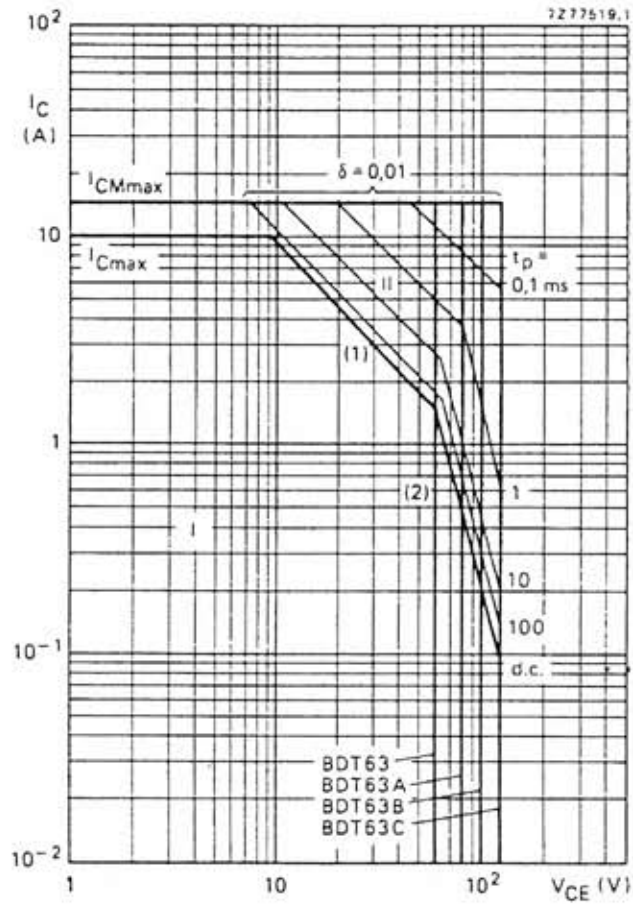


Fig. 7 Safe Operating Area; $T_{mb} = 25$ °C.

- 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).

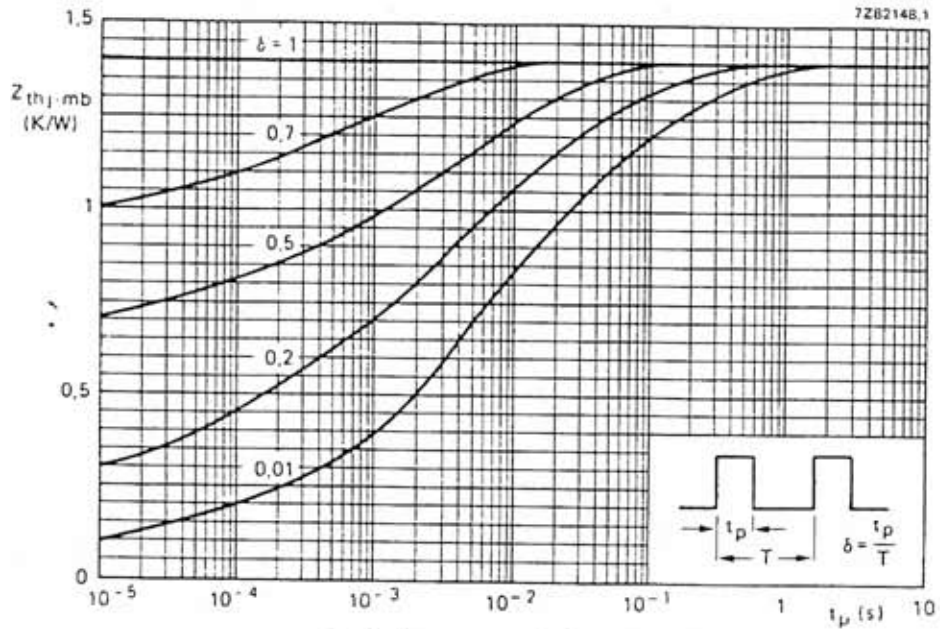


Fig. 8 Pulse power rating chart.

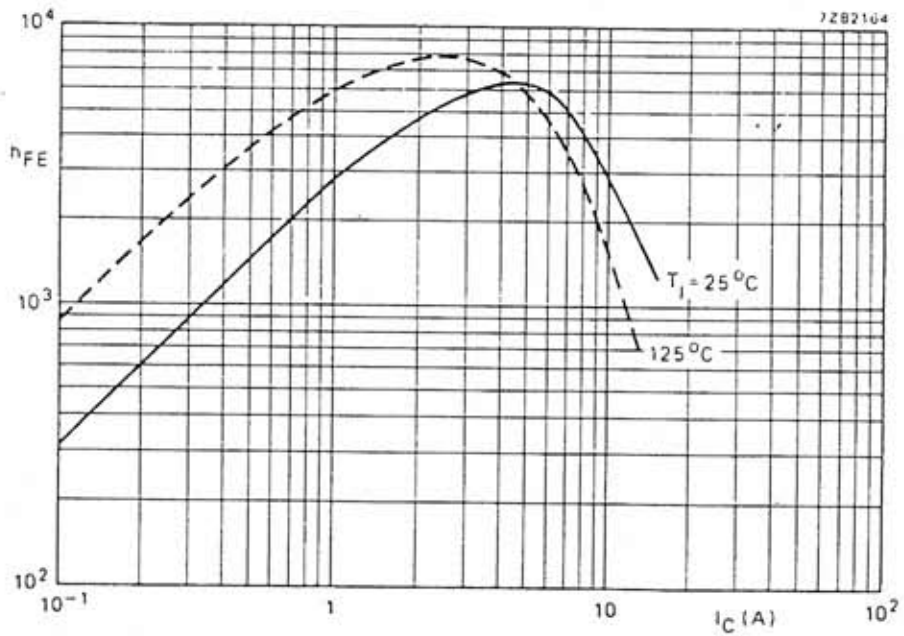


Fig. 9 Typical d.c. current gain at $V_{CE} = 3$ V.

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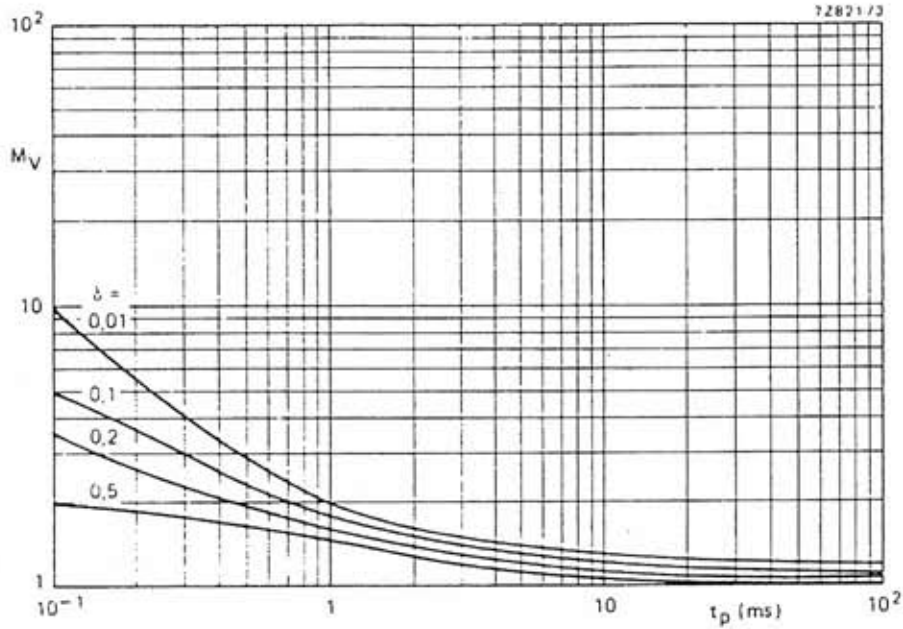


Fig. 10 S.B. voltage multiplying factor at the $I_{C\max}$ level.

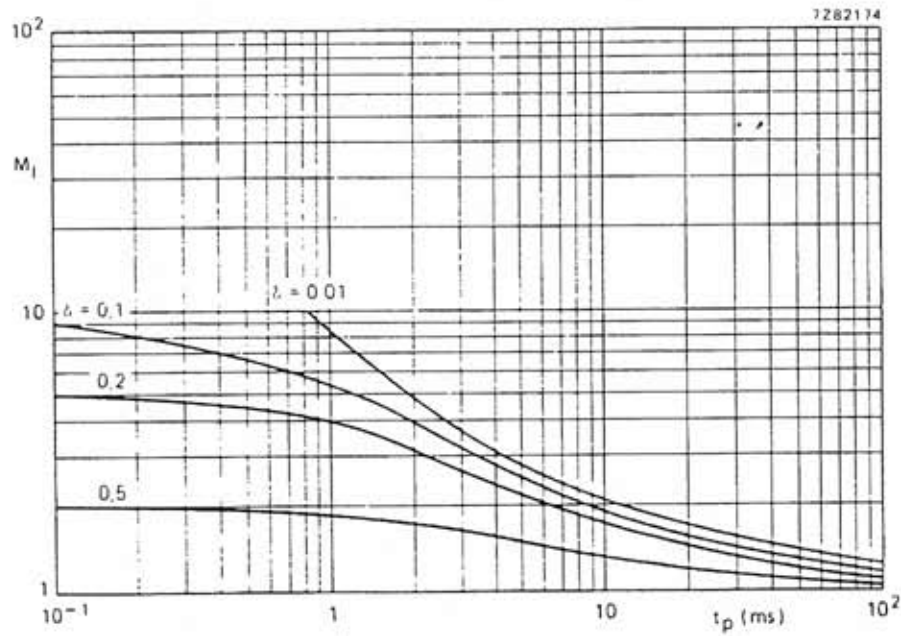


Fig. 11 S.B. current multiplying factor at V_{CE0} level = 60 V and 100 V.