PHILIPS INTERNATIONAL 56E D 7110826 0043230 793 PHIN

SILICON DARLINGTON POWER TRANSISTORS

T-33-29

NPN silicon power transistors in a monolithic Darlington circuit and housed in a SOT186 envelope with an electrically insulated mounting base.

They are recommended for applications such as audio output stages and general purpose amplifiers.

PNP complements are BDT60F, BDT60AF, BDT60BF and BDT60CF.

QUICK REFERENCE DATA

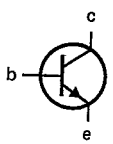
			BDT61F	61AF	61BF	61CF	
Collector-base voltage (open emitter)	V_{CBO}	max.	60	80	100	120	V
Collector-emitter voltage (open base)	V_{CEO}	max.	60	80	100	120	V
Collector current							
DC	I_C	max.		4			A
peak value	I_{CM}			6			A
Total power dissipation up to T_h = 25 °C	P_{tot}	max.		25			W
DC current gain							
I_C = 0.5 A; V_{CE} = 3 V	h_{FE}	typ.		2000			

MECHANICAL DATA

Dimensions in mm

Pinning

1 = base
2 = collector
3 = emitter



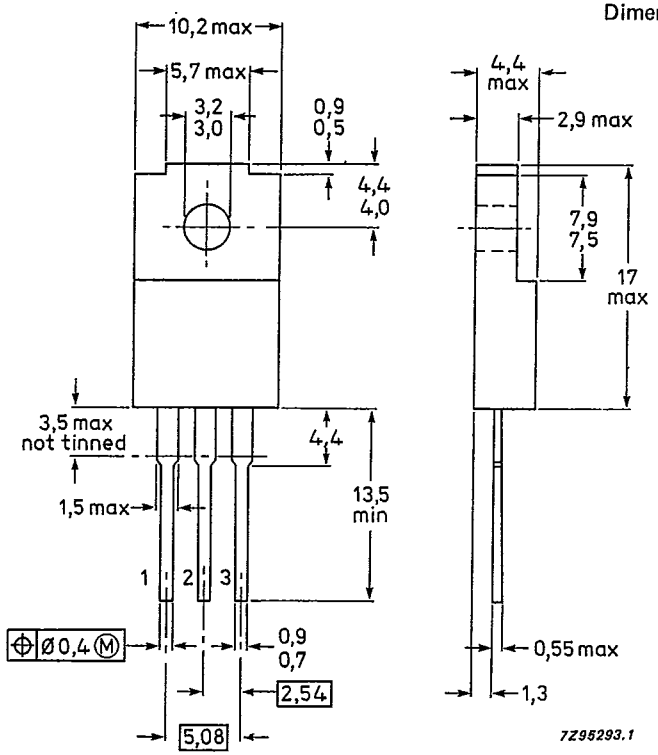
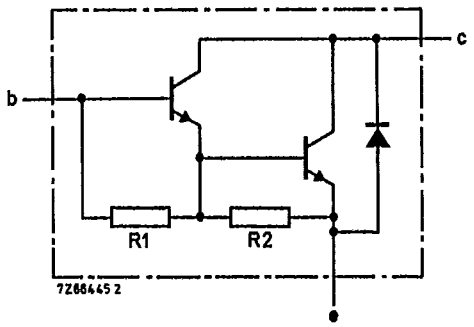


Fig.1 SOT186.



R1 typ. 3500 Ω
R2 typ. 150 Ω

Fig. 2 Circuit diagram.

RATINGS

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

			BDT61F	61AF	61BF	61CF	
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							
DC	I_C	max.		4			A
peak value	I_{CM}	max.		6			A
Reverse diode current	I_R	max.		4			A
Base current (DC)	I_B	max.		100			mA
Total power dissipation							
up to T_h = 25 °C*	P_{tot}	max.		17			W
up to T_h = 25 °C**		max.		25			W
Storage temperature range	T_{stg}			−65 to 150			°C
Junction temperature	T_j	max.		150			°C

THERMAL RESISTANCE

From junction to internal heatsink	$R_{th\,j\text{-}mb}$	=	2.7	K/W
From junction to external heatsink**	$R_{th\,j\text{-}h}$	=	5	K/W
From junction to external heatsink*	$R_{th\,j\text{-}h}$	=	7.35	K/W

* Mounted without heatsink compound and 30 ± 5 newton pressure on centre of envelope.
** Mounted with heatsink compound and 30 ± 5 newton pressure on centre of envelope.

INSULATION

Voltage allowed between all terminals and external heatsink, peak value	V_{insul}	max.	1000 V
Isolation capacitor from collector to external heatsink	C_{th}	typ.	12 pF

CHARACTERISTICS

T_h = 25 °C unless otherwise specified

Collector cut-off currents			
I_E = 0; V_{CB} = 30 V	I_{CBO}	max.	0.2 mA
I_E = 0; T_j = 150 °C V_{CB} = ½ V_{CBO} max	I_{CBO}	max.	1 mA
I_B = 0 V_{CE} = ½ V_{CEO} max	I_{CEO}	max.	0.2 mA
Emitter cut-off current			
I_C = 0; V_{EB} = 5 V	I_{EBO}	max.	5 mA
Forward bias second breakdown collector current V_{CE} = 50 V t_p = 0.1 s; non-repetitive	$I_{(SB)}$	min.	0.5 A
DC current gain*			
I_C = 0.5 A; V_{CE} = 3 V	h_{FE}	typ.	2000
I_C = 1.5 A; V_{CE} = 3 V	h_{FE}	min.	750
I_C = 4 A; V_{CE} = 3 V	h_{FE}	typ.	1000
Base-emitter voltage*	V_{BE}	max.	2.5 V
Collector-emitter saturation voltage*			
I_C = 1.5 A; I_B = 6 mA	V_{CEsat}	max.	2.5 V
Cut-off frequency			
I_C = 1.5 A; V_{CE} = 3 V	f_{hfe}	min.	25 KHz
Small-signal current gain at f = 1 MHz			
I_C = 1.5 A; V_{CE} = 3 V	h_{fe}	min.	10
Diode forward voltage			
I_F = 1.5 A	V_F	max.	2 V
I_F = 4 A	V_F	typ.	2.1 V

* Measured under pulse conditions: t_p max. 300 μs; δ max. 2%.

CHARACTERISTICS (continued)

Switching times (see Fig. 3)

$I_{C\,on}$ = 1.5 A; $I_{B\,on}$ = $-I_{B\,off}$ = 6 mA

turn-on time	t_{on}	typ.	0.8 μs
		max.	2 μs
turn-off time	t_{off}	typ.	4.5 μs
		max.	8 μs

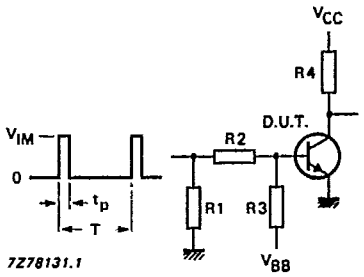
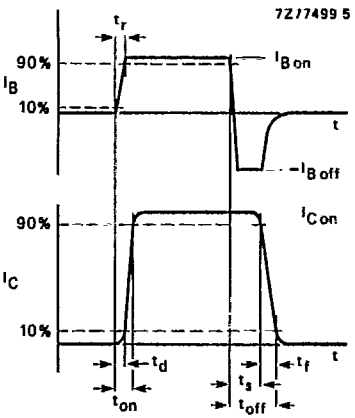
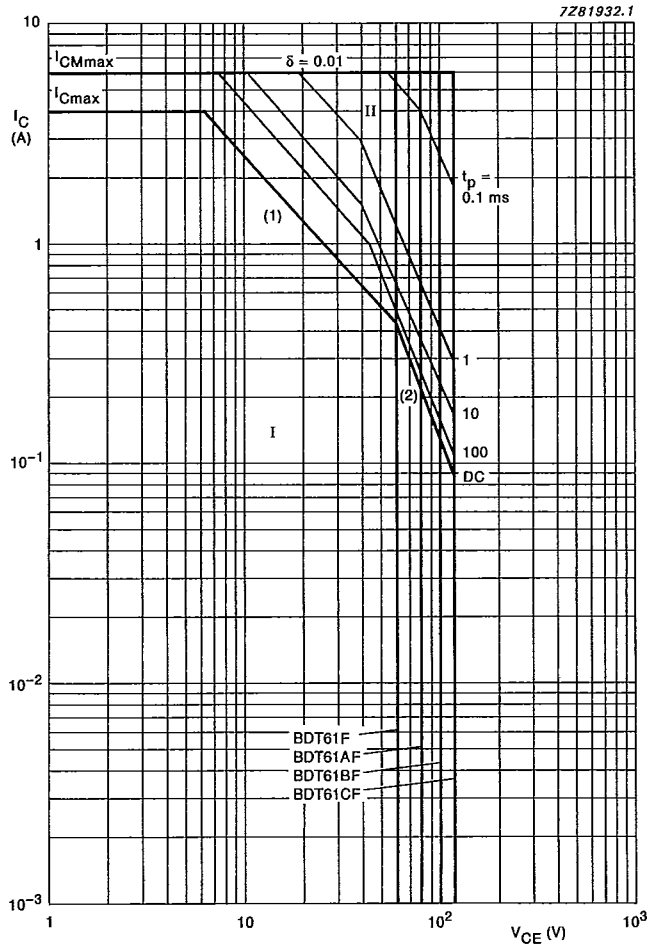


Fig. 3 Switching times waveforms.



V_{CC} = 30 V
V_{IM} = 12 V
$-V_{BB}$ = 3 V
R1 = 56 Ω
R2 = 1 kΩ
R3 = 680 Ω
R4 = 22 Ω
$t_r = t_f$ = 15 ns
t_p = 10 μs
T = 500 μs

Fig. 4 Switching times test circuit.



I Region of permissible DC operation.
II Permissible extension for repetitive pulse operation.

(1) $P_{tot\,max}$ and $P_{peak\,max}$ lines.
(2) Second-breakdown limits.

Fig. 5 Safe Operating Area, T_h = 25 °C.

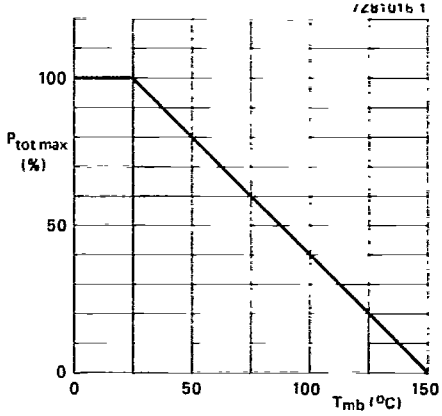


Fig. 6 Total power dissipation.

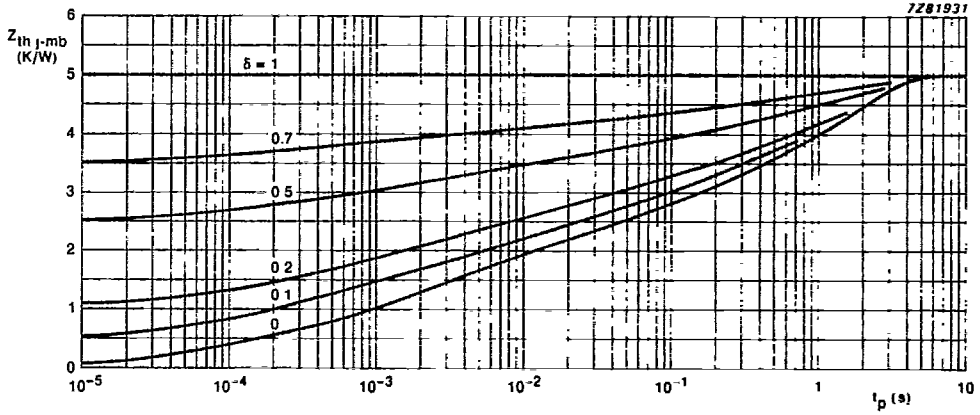


Fig. 7 Pulse power rating chart.

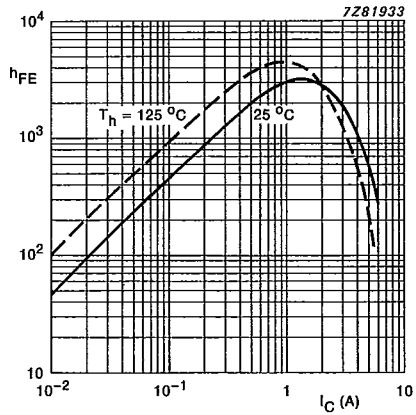


Fig. 8 DC current gain; V_{CE} = 3 V; typical values.

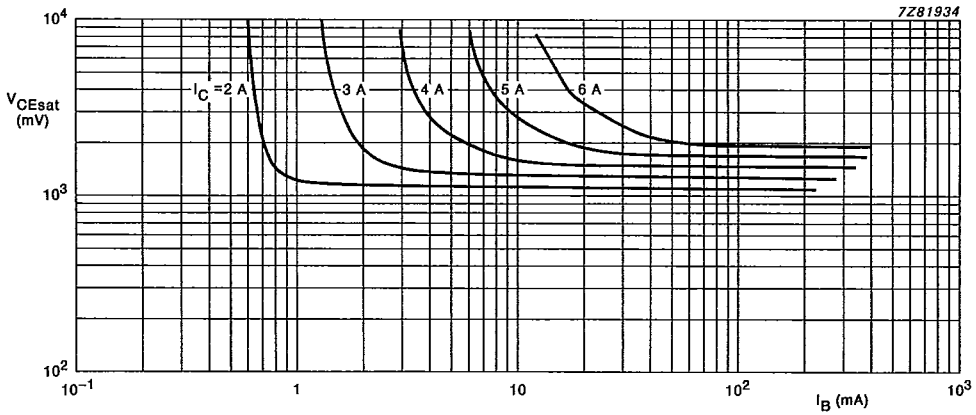


Fig. 9 Collector-emitter saturation voltage; T_h = 25 °C; typical values.