

SILICON DARLINGTON POWER TRANSISTORS

N-P-N epitaxial-base transistors in monolithic Darlington circuit for audio output stages and general amplifier and switching applications. SOT-93 plastic envelope. P-N-P complements are TIP145, TIP146 and TIP147.

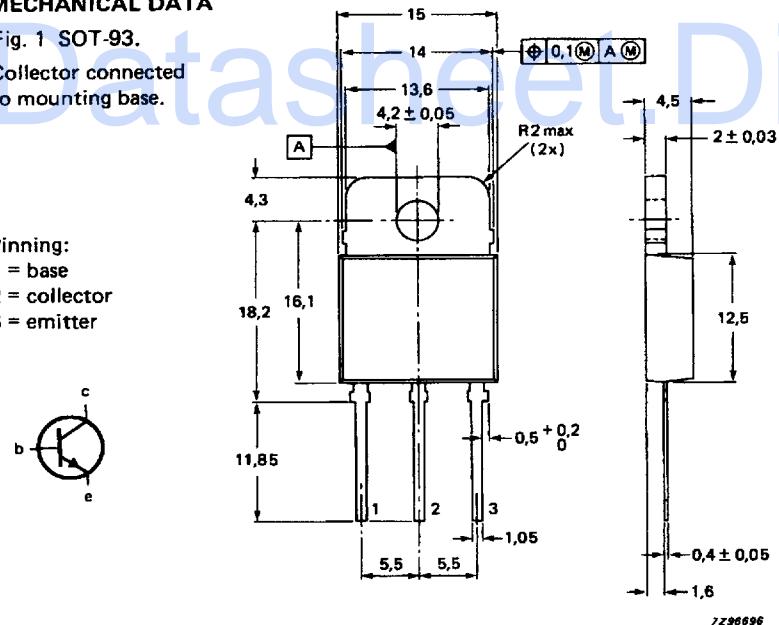
QUICK REFERENCE DATA

			TIP140	TIP141	TIP142	
Collector-base voltage (open emitter)	V _{CBO}	max.	60	80	100	V
Collector-emitter voltage (open base)	V _{CEO}	max.	60	80	100	V
Collector current (d.c.)	I _C	max.		10		A
Collector current (peak value); t _p ≤ 0,3 ms	I _{CM}	max.		15		A
Total power dissipation up to T _{mb} = 25 °C	P _{tot}	max.		125		W
D.C. current gain V _{CE} = 4 V; I _C = 5 A	h _{FE}	>		1000		
Collector-emitter saturation voltage I _C = 5 A; I _B = 10 mA	V _{CEsat}	<		2,0		V

MECHANICAL DATA

Fig. 1 SOT-93.

Collector connected
to mounting base.



Dimensions in mm

April 1988

873

■ 6653931 0035005 958 ■

CIRCUIT DIAGRAM

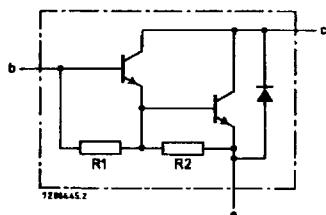


Fig. 2.
R1 typ. 5 kΩ
R2 typ. 80 Ω

RATINGS

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

		TIP140	TIP141	TIP142		
Collector-base voltage ($I_E = 0$)	V_{CBO}	max.	60	80	100	V
Collector-emitter voltage ($I_B = 0$)	V_{CEO}	max.	60	80	100	V
Emitter-base voltage ($I_C = 0$)	V_{EBO}	max.		5		V
Collector current (d.c.)	I_C	max.		10		A
Collector current (peak value); $t_p \leq 0,3$ ms	I_{CM}	max.		15		A
Base current (d.c.)	I_B	max.		0,5		A
Total power dissipation up to $T_{mb} = 25$ °C	P_{tot}	max.		125		W
Total power dissipation in free air	P_{tot}	max.		3,5		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
From junction to ambient in free air	$R_{th\ j\text{-}a}$	=	35,7	K/W

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

Collector cut-off currents

 $V_{CB} = V_{CBO\text{max}}; I_E = 0$ $I_{CBO} < 0,4 \text{ mA}$ $V_{CE} = 1/2 V_{CEO\text{max}}; I_B = 0$ $I_{CEO} < 0,2 \text{ mA}$

Emitter cut-off current

 $V_{EB} = 5 \text{ V}; I_C = 0$ $I_{EBO} < 5 \text{ mA}$

Collector-emitter sustaining voltage

 $I_C = 30 \text{ mA}; I_B = 0$ TIP140 $V_{CEO\text{sust}} > 60 \text{ V}$ TIP141 $V_{CEO\text{sust}} > 80 \text{ V}$ TIP142 $V_{CEO\text{sust}} > 100 \text{ V}$

D.C. current gain

 $V_{CE} = 4 \text{ V}; I_C = 5 \text{ A}$ $h_{FE} > 1000$ $V_{CE} = 4 \text{ V}; I_C = 10 \text{ A}$ $h_{FE} > 500$

Base-emitter voltage

 $V_{CE} = 4 \text{ V}; I_C = 10 \text{ A}$ $V_{BE} < 3 \text{ V}$

Collector-emitter saturation voltage

 $I_C = 5 \text{ A}; I_B = 10 \text{ mA}$ $V_{CE\text{sat}} < 2 \text{ V}$ $I_C = 10 \text{ A}; I_B = 40 \text{ mA}$ $V_{CE\text{sat}} < 3 \text{ V}$

Switching times (see Figs 3 and 4)

 $I_C = 10 \text{ A}; I_{B\text{on}} = -I_{B\text{off}} = 40 \text{ mA}$ $V_{CC} = 30 \text{ V}$

turn-on time

 $t_{on} \text{ typ. } 0,9 \mu\text{s}$

turn-off time

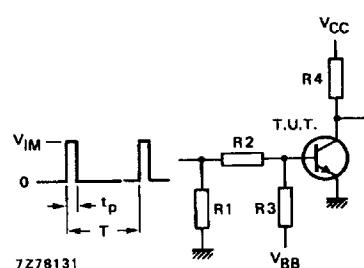
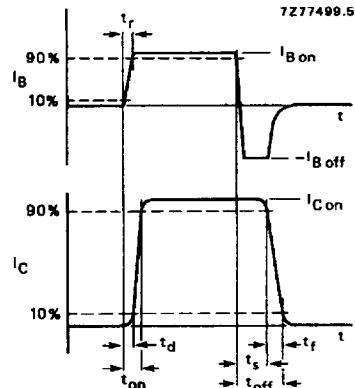
 $t_{off} \text{ typ. } 11 \mu\text{s}$ 

Fig. 3 Switching times test circuit.

$V_{IM} = 33 \text{ V}$	$R_1 = 56 \Omega$	$t_f = t_p = 15 \text{ ns}$
$V_{CC} = 30 \text{ V}$	$R_2 = 410 \Omega$	$t_p = 10 \mu\text{s}$
$V_{BB} = -4,2 \text{ V}$	$R_3 = 150 \Omega$	$T = 500 \mu\text{s}$
	$R_4 = 3 \Omega$	

Fig. 4 Waveforms showing t_{on} ; $t_s + t_f = t_{off}$.

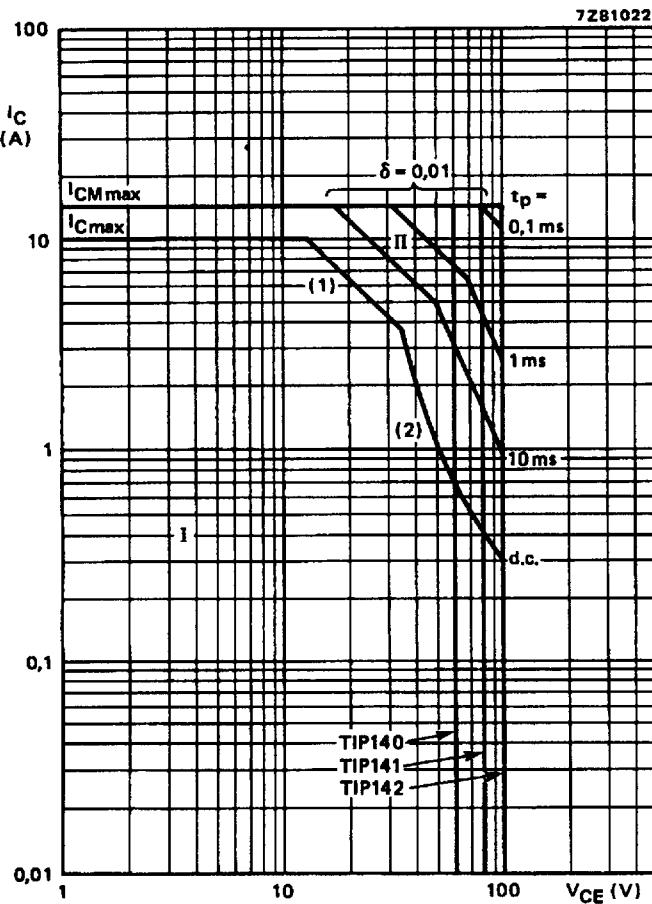


Fig. 5 Safe Operating Area; $T_{mb} \leq 25^\circ\text{C}$.

- 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.

■ 6653931 0035008 667 ■

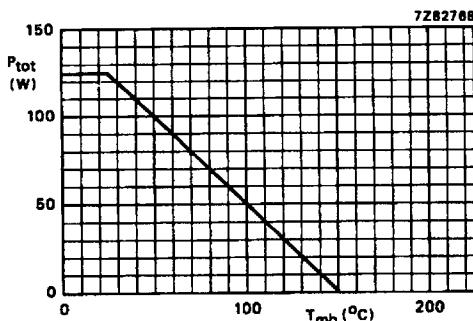
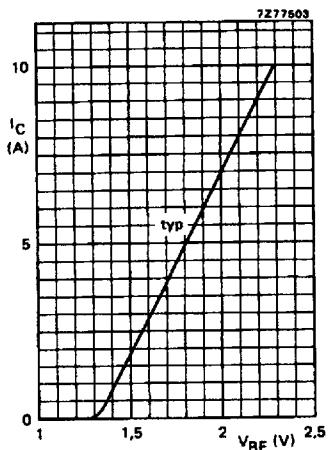
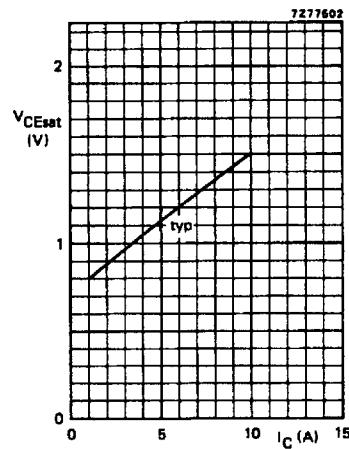
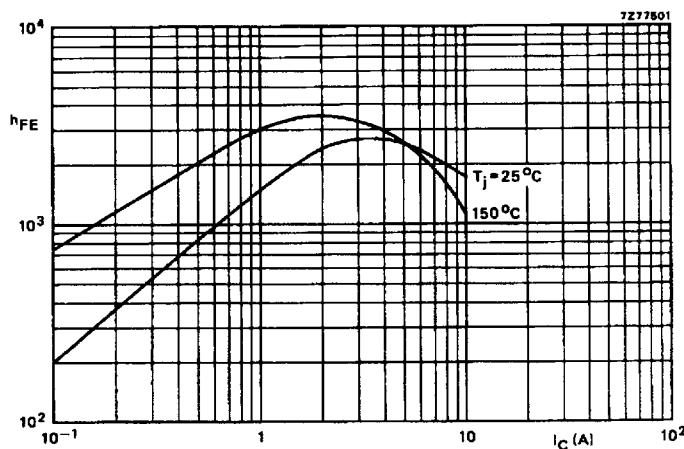


Fig. 6 Power derating curve.

Fig. 7 V_{CE} = 4 V; T_j = 25 °C.Fig. 8 I_C/I_B = 250; T_j = 25 °C.Fig. 9 Typical values; V_{CE} = 4 V.

■ 6653931 0035009 ST3 ■