

## SILICON DARLINGTON POWER TRANSISTORS

P-N-P epitaxial-base transistors in monolithic Darlington circuit for audio output stages and general amplifier and switching applications. SOT-93 plastic envelope. N-P-N complements are TIP140, TIP141 and TIP142.

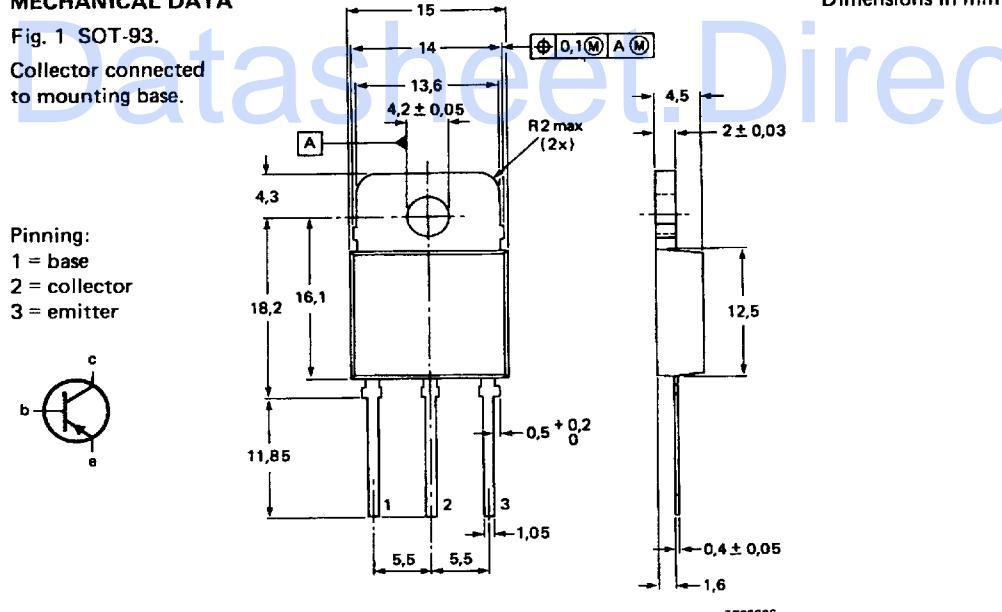
### QUICK REFERENCE DATA

			TIP145	TIP146	TIP147	
Collector-base voltage (open emitter)	-V <sub>CBO</sub>	max.	60	80	100	V
Collector-emitter voltage (open base)	-V <sub>CEO</sub>	max.	60	80	100	V
Collector current (d.c.)	-I <sub>C</sub>	max.		10		A
Collector current (peak value); t <sub>p</sub> ≤ 0,3 ms	-I <sub>CM</sub>	max.		15		A
Total power dissipation up to T <sub>mb</sub> = 25 °C	P <sub>tot</sub>	max.		125		W
D.C. current gain -V <sub>CE</sub> = 4 V; -I <sub>C</sub> = 5 A	h <sub>FE</sub>	>		1000		
Collector-emitter saturation voltage -I <sub>C</sub> = 5 A; -I <sub>B</sub> = 10 mA	-V <sub>CEsat</sub>	<		2,0		V

### MECHANICAL DATA

Fig. 1 SOT-93.

Collector connected to mounting base.



7296696

April 1988

879

■ 6653931 0035010 215 ■

CIRCUIT DIAGRAM

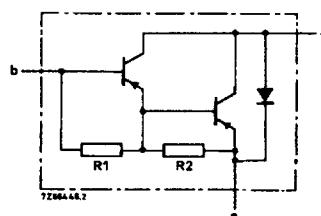


Fig. 2.  
R1 typ. 5 kΩ  
R2 typ. 80 Ω

RATINGS

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

		TIP145	TIP146	TIP147	
Collector-base voltage ( $I_E = 0$ )	$-V_{CBO}$	max.	60	80	100
Collector-emitter voltage ( $I_B = 0$ )	$-V_{CEO}$	max.	60	80	100
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 up to $T_{amb} = 25$ °C	$P_{tot}$	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	mA
$-V_{CE} = 1/2 V_{CEO\text{max}}; I_B = 0$	$-I_{CEO}$	<	0,2	mA

**Emitter cut-off current**

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

**Collector-emitter sustaining voltage**

$-I_C = 30 \text{ mA}; I_B = 0$	TIP145	$-V_{CEO\text{sust}}$	>	60	V
	TIP146	$-V_{CEO\text{sust}}$	>	80	V
	TIP147	$-V_{CEO\text{sust}}$	>	100	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	V
--	-----------	---	---	---

**Collector-emitter saturation voltage**

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

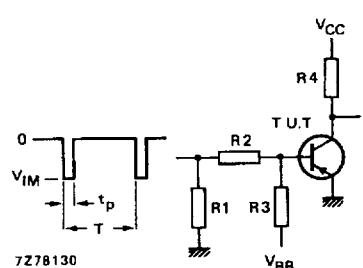
**Switching times (see Figs 3 and 4)** $-I_C = 10 \text{ A}; -I_{B\text{on}} = I_{B\text{off}} = 40 \text{ mA}$  $-V_{CC} = 30 \text{ V}$ turn-on time  $t_{\text{on}}$  typ. 0,9  $\mu\text{s}$ turn-off time  $t_{\text{off}}$  typ. 11  $\mu\text{s}$ 

Fig. 3 Switching times test circuit.

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

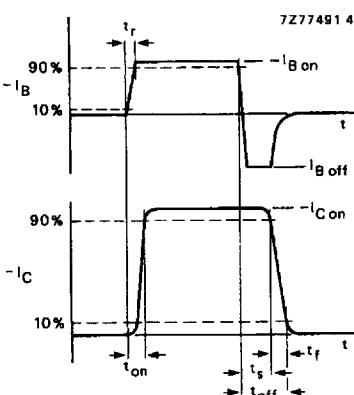


Fig. 4 Switching times waveforms.

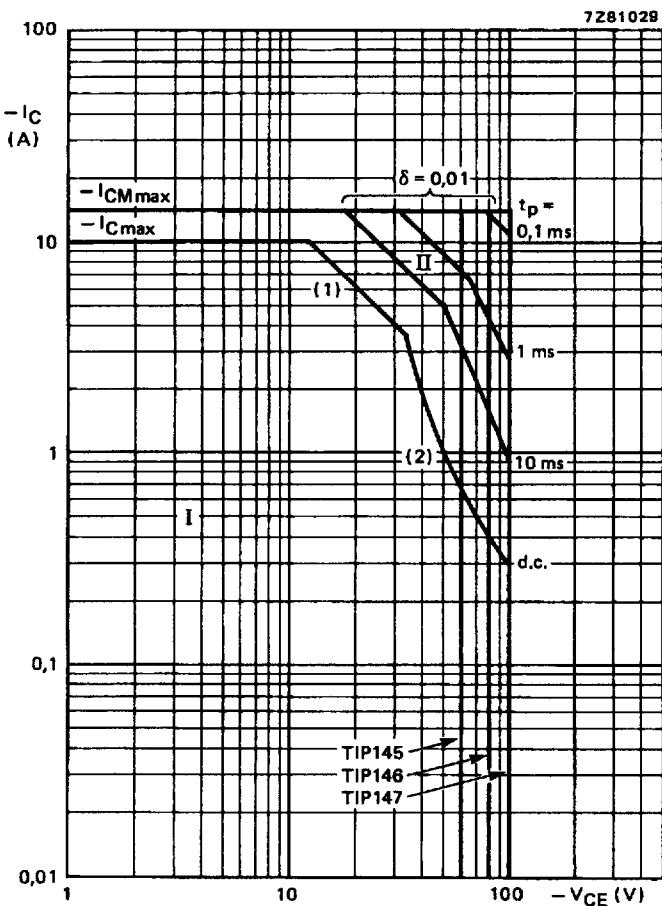


Fig. 5 Safe Operating Area;  $T_{mb} \leq 25^\circ\text{C}$ .

- 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.

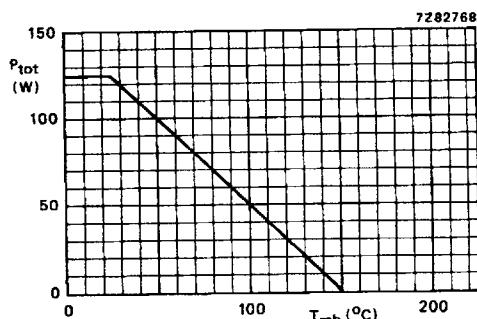
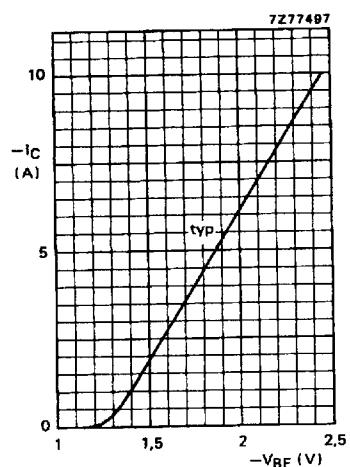
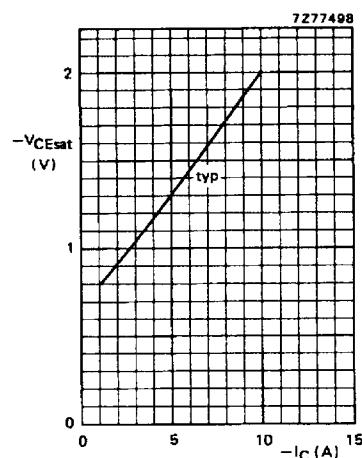
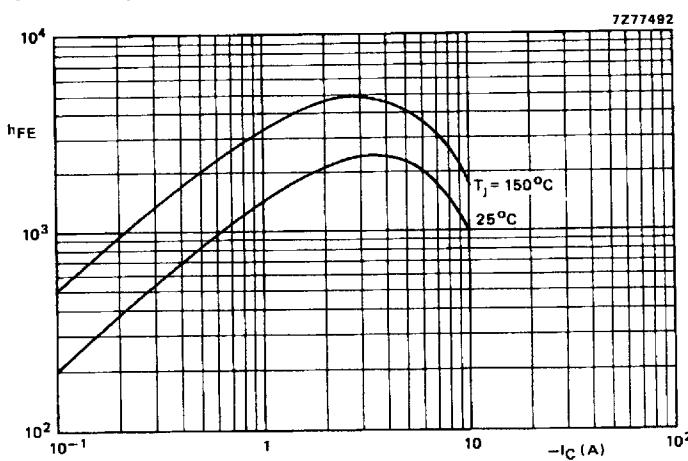


Fig. 6 Power derating curve.

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 0035014 960 ■