

## SILICON EPITAXIAL BASE POWER TRANSISTORS

NPN silicon transistors in a plastic envelope intended for use in output stages of audio and television amplifier circuits where high peak powers can occur. PNP complements are TIP30 series.

### QUICK REFERENCE DATA

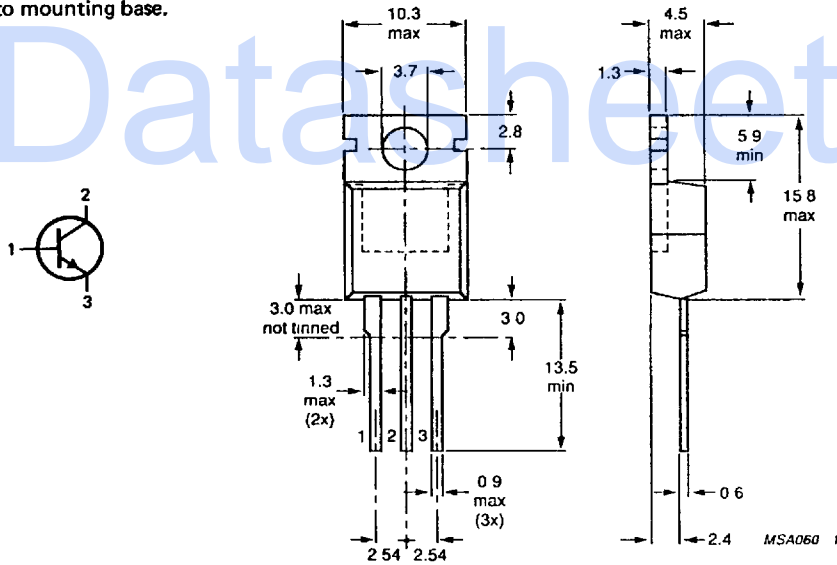
		TIP29	A	B	C	
Collector-base voltage	$V_{CBO}$	max.	80	100	120	140 V
Collector-emitter voltage	$V_{CEO}$	max.	40	60	80	100 V
Collector current (d.c.)	$I_C$	max.	1			A
Total power dissipation up to $T_{mb} = 25^\circ\text{C}$	$P_{tot}$	max.	30			W
Junction temperature	$T_j$	max.	150			$^\circ\text{C}$
D.C. current gain	$h_{FE}$	>	40			
$I_C = 200\text{ mA}; V_{CE} = 4\text{ V}$	$h_{FE}$		15 to 75			
$I_C = 1\text{ A}; V_{CE} = 4\text{ V}$						
Transition frequency at $f = 1\text{ MHz}$	$f_T$	>	3			MHz
$I_C = 200\text{ mA}; V_{CE} = 10\text{ V}$						

### MECHANICAL DATA

Dimensions in mm

Fig. 1 TO-220.

Collector connected to mounting base.



See also chapters Mounting Instructions and Accessories.

**RATINGS**

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

			TIP29	A	B	C	
Collector-base voltage (open emitter)	$V_{CBO}$	max.	80	100	120	140	V
Collector-emitter voltage (open base)	$V_{CEO}$	max.	40	60	80	100	V
Emitter-base voltage (open collector)	$V_{EBO}$	max.	5				V
Collector current (d.c.)	$I_C$	max.	1				A
Collector current (peak value)	$I_{CM}$	max.	3				A
Base current (d.c.)	$I_B$	max.	0,4				A
Total power dissipation up to $T_{mb} = 25\text{ }^\circ\text{C}$	$P_{tot}$	max.	30				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	$R_{thj-mb}$	=	4,17			K/W
From junction to ambient in free air	$R_{thj-a}$	=	70			K/W

**CHARACTERISTICS**

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

			TIP29;A	TIP29B;C			
Collector cut-off current $I_B = 0; V_{CE} = 30\text{ V}$	$I_{CEO}$	<	0,1	—	mA		
$I_B = 0; V_{CE} = 60\text{ V}$	$I_{CEO}$	<	—	0,1	mA		
$V_{BE} = 0; V_{CE} = V_{CEOmax}$	$I_{CES}$	<	0,2		mA		
Emitter cut-off current $I_C = 0; V_{EB} = 5\text{ V}$	$I_{EBO}$	<	0,2		mA		
D.C. current gain* $I_C = 200\text{ mA}; V_{CE} = 4\text{ V}$	$h_{FE}$	>	40				
$I_C = 1\text{ A}; V_{CE} = 4\text{ V}$	$h_{FE}$	>	15 to 75				
Base-emitter voltage** $I_C = 1\text{ A}; V_{CE} = 4\text{ V}$	$V_{BE}$	<	1,3		V		
Collector-emitter saturation voltage* $I_C = 1\text{ A}; I_B = 0,125\text{ A}$	$V_{CEsat}$	<	0,7		V		
Collector-emitter breakdown voltage* $I_B = 0; I_C = 30\text{ mA}$	$V_{(BR)CEO}$	>	TIP29	A	B	C	
			40	60	80	100	V
Small-signal current gain $I_C = 0,2\text{ A}; V_{CE} = 10\text{ V}; f = 1\text{ kHz}$	$ h_{fe} $	>	20				
Turn off breakdown energy $L = 20\text{ mH}; I_{CC} = 1,8\text{ A}$	$E_{(BR)}$	>	32				mJ

\* Measured under pulse conditions:  $t_p \leq 300\text{ }\mu\text{s}; \delta < 2\%$ .

\*\*  $V_{BE}$  decreases by about 2,3 mV/K with increasing temperature.

Transition frequency at  $f = 1 \text{ MHz}$   
 $I_C = 0,2 \text{ A}; V_{CE} = 10 \text{ V}$

$f_T > 3 \text{ MHz}$

Switching times  
(between 10% and 90% levels)

$I_{Con} = 1 \text{ A}; I_{Bon} = -I_{Boff} = 0,1 \text{ A}$

Turn-on time

$t_{on}$  typ.  $0,3 \mu\text{s}$

Turn-off time

$t_{off}$  typ.  $1 \mu\text{s}$

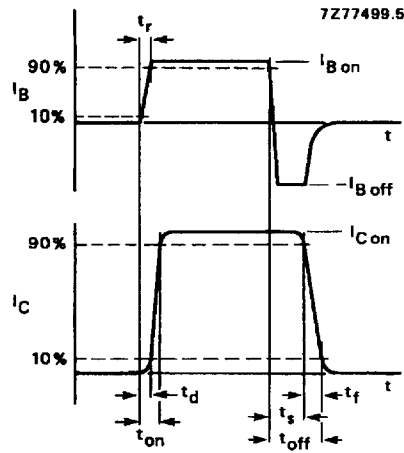


Fig. 2 Switching times waveforms.

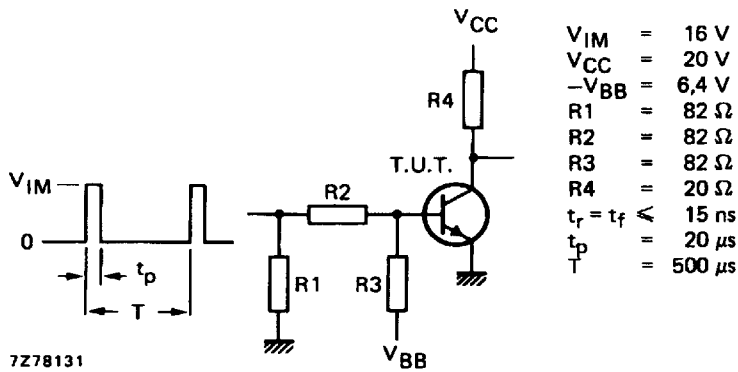


Fig. 3 Switching times test circuit.

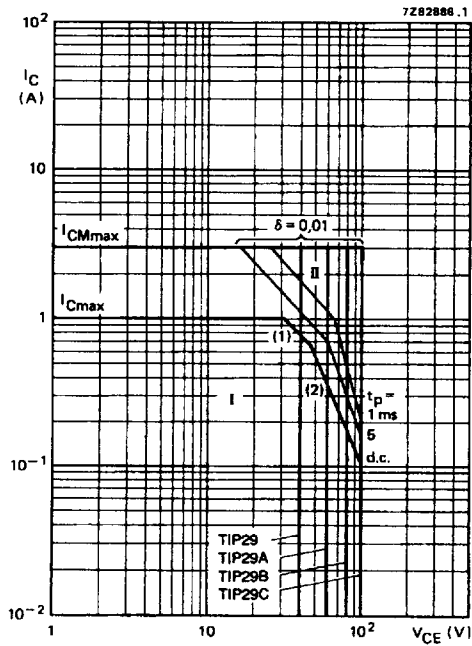


Fig. 4 Safe Operating Area;  $T_{mb} = 25\text{ }^{\circ}\text{C}$ .

- 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.

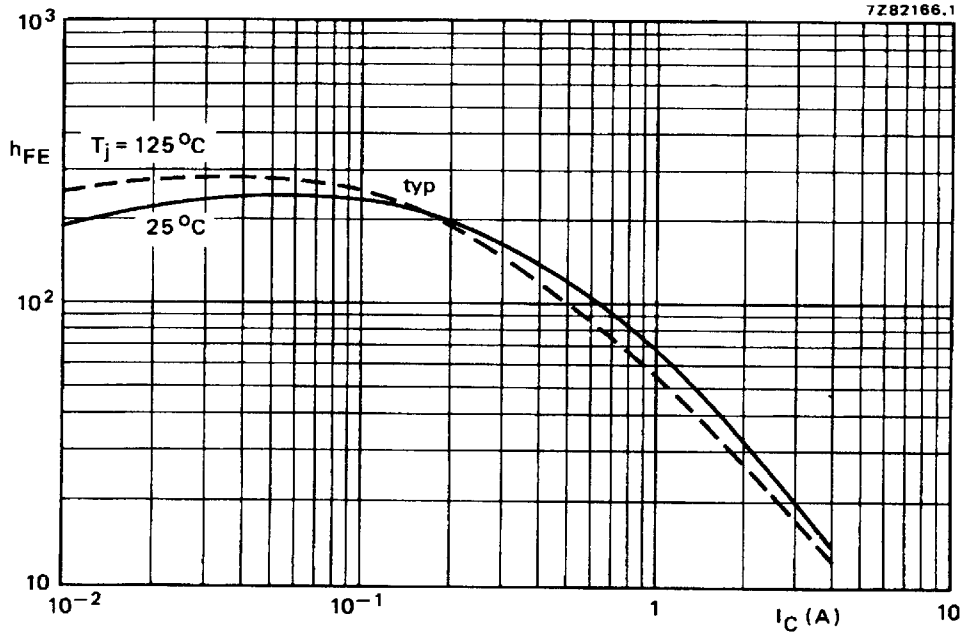


Fig. 5 Typical static forward current transfer ratio as a function of the collector current.  $V_{CE} = 4$  V.