

SILICON EPITAXIAL BASE POWER TRANSISTORS

PNP transistors in a plastic TO-220 envelope. They are intended for use in a wide range of power amplifiers and for switching applications. NPN complements are TIP31 series.

QUICK REFERENCE DATA

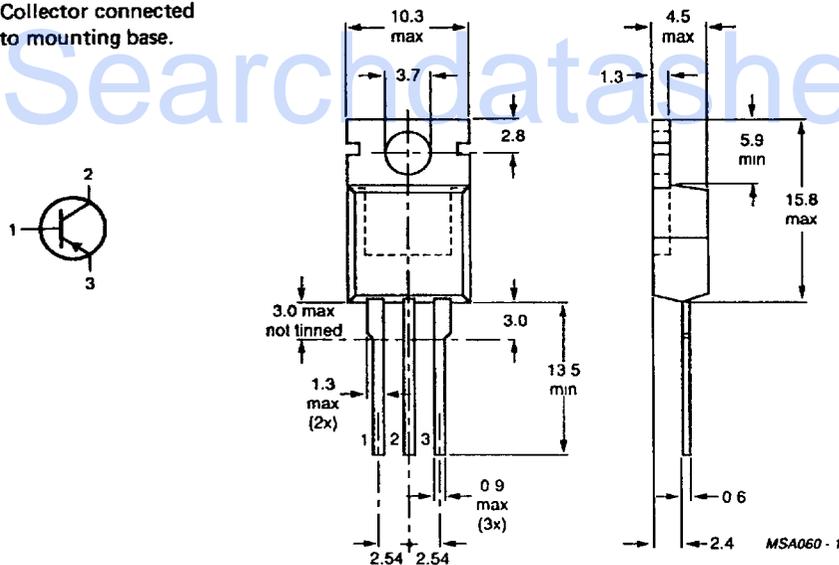
		TIP32			
		A	B	C	
Collector-base voltage (open emitter)	$-V_{CB0}$ max.	80	100	120	140 V
Collector-emitter voltage (open base)	$-V_{CEO}$ max.	40	60	80	100 V
Collector current (d.c.)	$-I_C$ max.	3			A
Collector current (peak value)	$-I_{CM}$ max.	5			A
Total power dissipation up to $T_{mb} = 25^\circ\text{C}$	P_{tot} max.	40			W
Junction temperature	T_j max.	150			$^\circ\text{C}$
D.C. current gain	h_{FE} >	25			
$-I_C = 1\text{ A}; -V_{CE} = 4\text{ V}$	h_{FE}	10 to 50			
$-I_C = 3\text{ A}; -V_{CE} = 4\text{ V}$	h_{FE}				

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)

			TIP32	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.			3	A
Collector current (peak value)	$-I_{CM}$	max.			5	A
Base current	$-I_B$	max.			1	A
Total power dissipation up to $T_{mb} = 25^\circ\text{C}$	P_{tot}	max.			40	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	$R_{th\ j-mb}$	=		3,12		K/W
from junction to ambient (in free air)	$R_{th\ j-a}$	=		70		K/W

CHARACTERISTICS

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

			TIP32;A	TIP32B;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
$V_{EB} = 0; -V_{CE} = -V_{CEO}$	$-I_{CES}$	<	0,2	mA
Emitter cut-off current				
$I_C = 0; -V_{EB} = 5\text{ V}$	$-I_{EBO}$	<	0,2	mA
D.C. current gain *				
$-I_C = 1\text{ A}; -V_{CE} = 4\text{ V}$	h_{FE}	>		25
$-I_C = 3\text{ A}; -V_{CE} = 4\text{ V}$	h_{FE}	>		10 to 50
Base-emitter voltage * **				
$-I_C = 3\text{ A}; -V_{CE} = 4\text{ V}$	$-V_{BE}$	<	1,8	V
Collector-emitter saturation voltage				
$-I_C = 3\text{ A}; -I_B = 0,375\text{ A}$	$-V_{CEsat}$	<	1,2	V
Collector-emitter breakdown voltage *				
$I_B = 0; -I_C = 30\text{ mA}$	$-V_{(BR)CEO}$	>	40	60 80 100 V
Small signal current transfer ratio				
$-I_C = 0,5\text{ A}; -V_{CE} = 10\text{ V}; f = 1\text{ kHz}$	$ h_{fe} $	>		20
$-I_C = 0,5\text{ A}; -V_{CE} = 10\text{ V}; f = 1\text{ MHz}$	$ h_{fe} $	>		3
Turn-off breakdown energy				
$L = 20\text{ mH}; I_{CC} = 1,22\text{ A}$	$E_{(BR)}$	>	15	mJ

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

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

Switching times
(between 10% and 90% levels)
 $-I_{C on} = 1 \text{ A}; -I_{B on} = I_{B off} = 0,1 \text{ A}$
Turn-on time
Turn-off time

t_{on} typ. $0,3 \mu\text{s}$
 t_{off} typ. $1 \mu\text{s}$

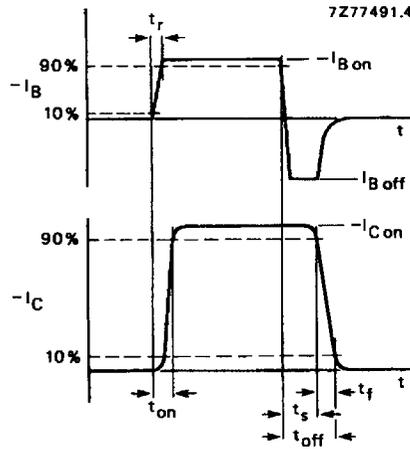


Fig. 2 Switching times waveforms.

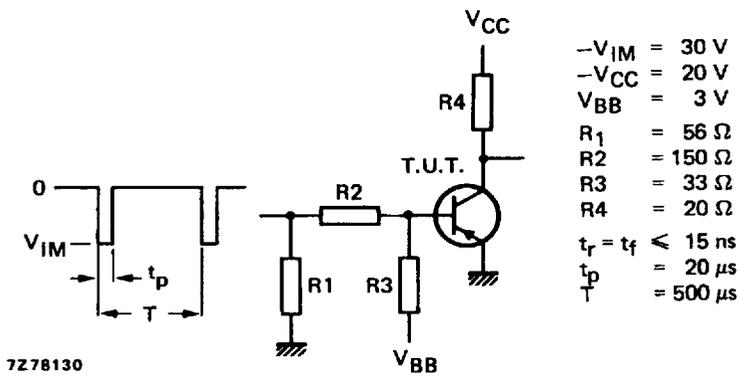


Fig. 3 Switching times test circuit.

$-V_{IM} = 30 \text{ V}$
 $-V_{CC} = 20 \text{ V}$
 $V_{BB} = 3 \text{ V}$
 $R_1 = 56 \Omega$
 $R_2 = 150 \Omega$
 $R_3 = 33 \Omega$
 $R_4 = 20 \Omega$
 $t_r = t_f \leq 15 \text{ ns}$
 $t_p = 20 \mu\text{s}$
 $T = 500 \mu\text{s}$

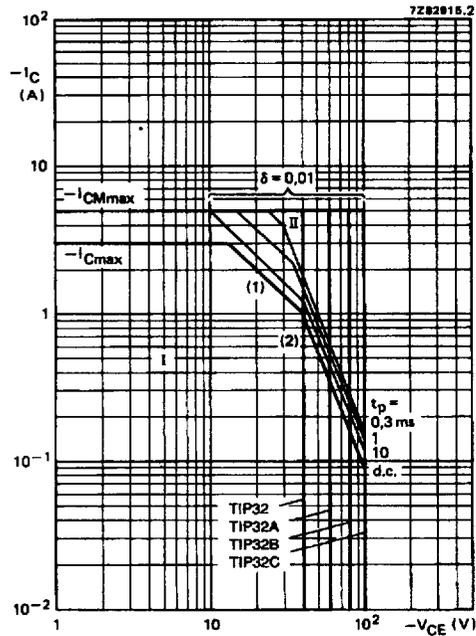


Fig. 4 Safe Operating Area. $T_{mb} \leq 25^\circ\text{C}$.

- 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.

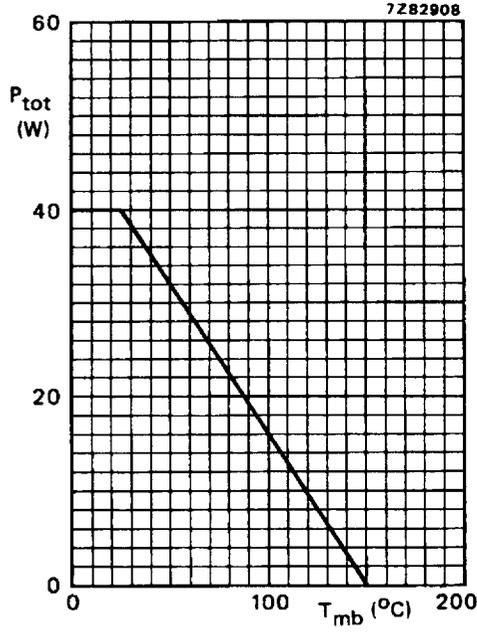


Fig. 5 Power derating curve.

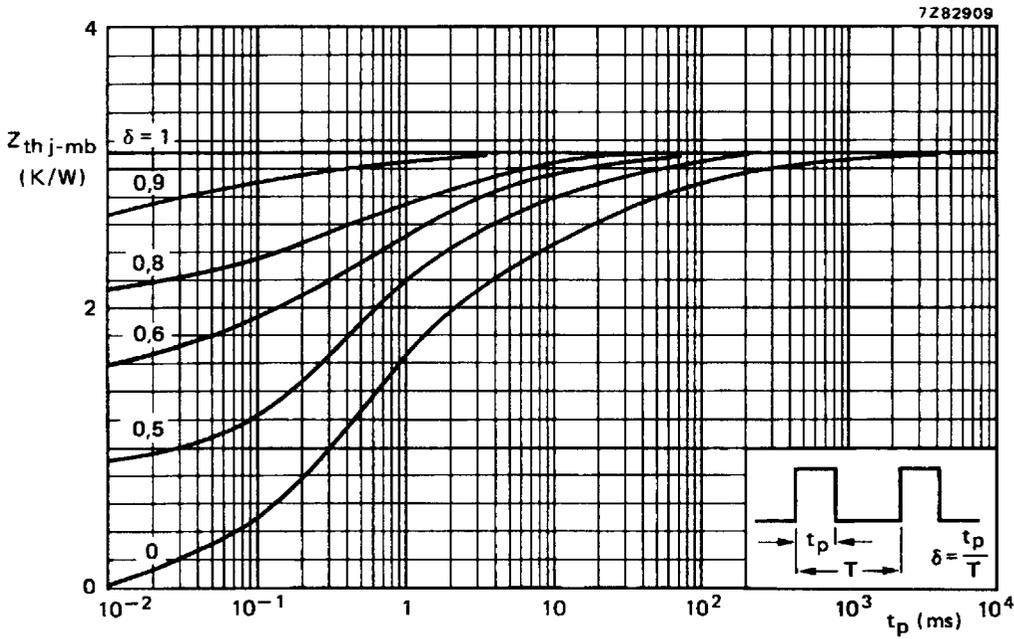


Fig. 6 Pulse power rating chart.

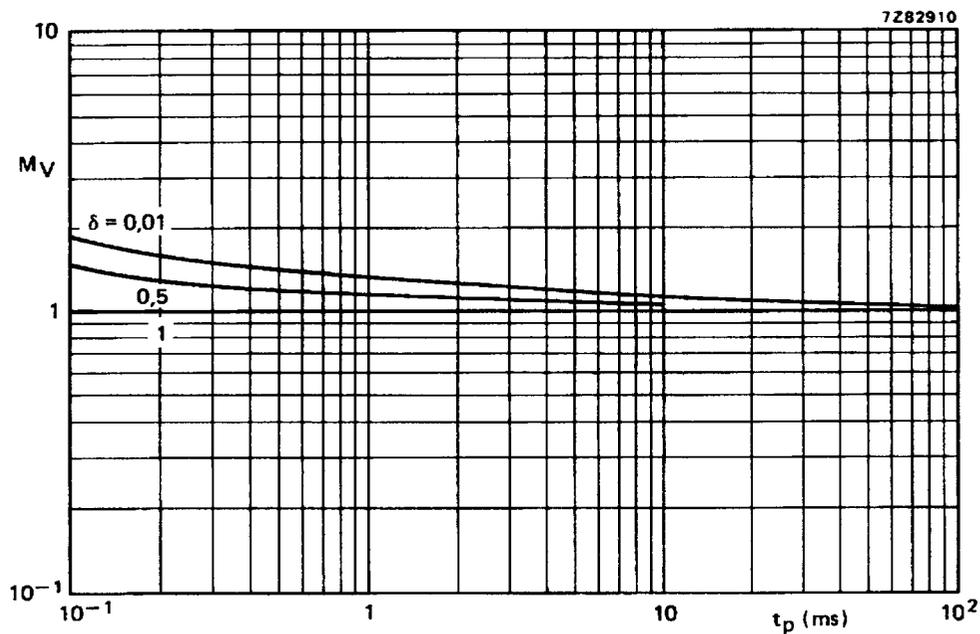


Fig. 7 S.B. voltage multiplying factor at the $-I_{Cmax}$ level.

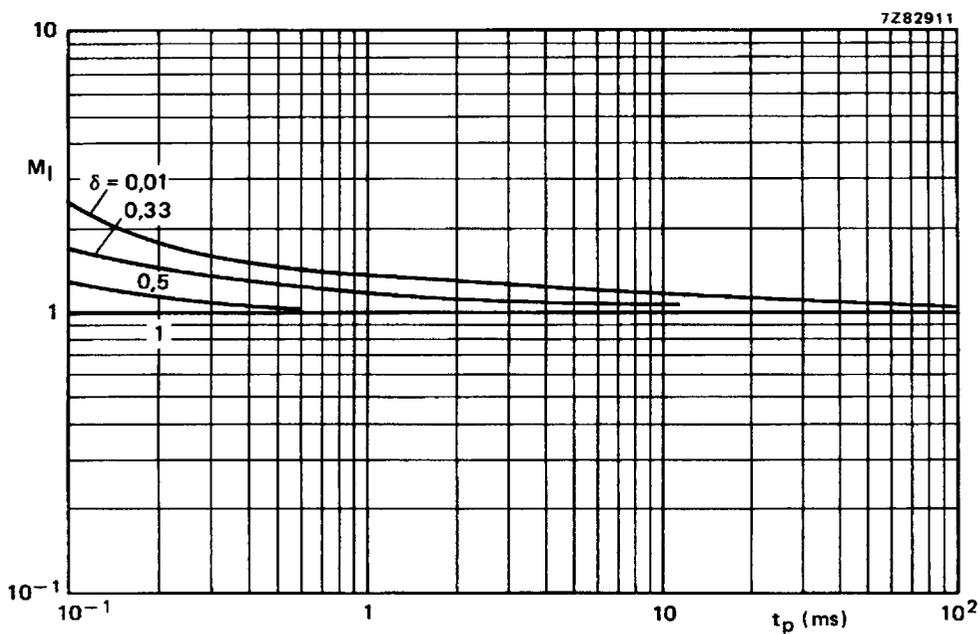


Fig. 8 S.B. current multiplying factor at the $-V_{CEOmax}$ level.

