

SILICON EPITAXIAL BASE POWER TRANSISTORS

PNP silicon transistors in a plastic envelope intended for use in general output stages of amplifier circuits and switching applications. NPN complements are TIP41 series.

QUICK REFERENCE DATA

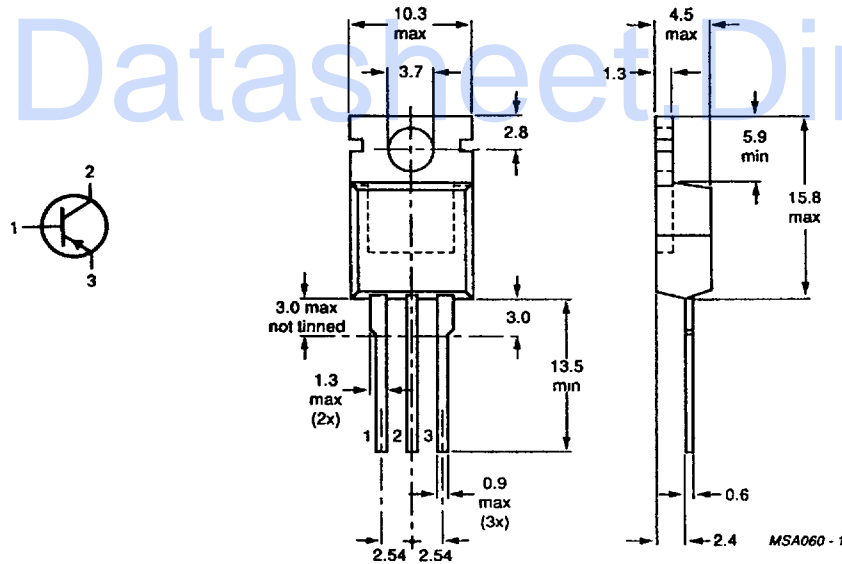
		TIP42				
		A	B	C		
Collector-base voltage	$-V_{CBO}$	max. 80	100	120	140	V
Collector-emitter voltage	$-V_{CEO}$	max. 40	60	80	100	V
Collector current (d.c.)	$-I_C$	max.	6			A
Total power dissipation up to $T_{mb} = 25^\circ\text{C}$	P_{tot}	max.	65			W
Junction temperature	T_j	max.	150			$^\circ\text{C}$
D.C. current gain	h_{FE}		15 to 75			
$-I_C = 3\text{ A}; -V_{CE} = 4\text{ V}$						

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)

		TIP42				
		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.	6			A
Collector current (peak value)	$-I_{CM}$	max.	10			A
Base current (d.c.)	$-I_B$	max.	3			A
Total power dissipation up to $T_{mb} = 25^\circ\text{C}$	P_{tot}	max.	65			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	$R_{th\ j-mb}$	=	1,92	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

		TIP42;A		B;C			
Collector cut-off current							
$I_B = 0; -V_{CE} = 30\text{ V}$	$-I_{CEO}$	<	0,2	-	mA		
$I_B = 0; -V_{CE} = 60\text{ V}$	$-I_{CEO}$	<	-	0,2	mA		
$V_{BE} = 0; -V_{CE} = -V_{CEOmax}$	$-I_{CES}$	<		0,4	mA		
Emitter cut-off current							
$I_C = 0; -V_{EB} = 5\text{ V}$	$-I_{EBO}$	<		0,5	mA		
D.C. current gain*							
$-I_C = 300\text{ mA}; -V_{CE} = 4\text{ V}$	h_{FE}	>		30			
$-I_C = 3\text{ A}; -V_{CE} = 4\text{ V}$	h_{FE}	>		15 to 75			
Base-emitter voltage**							
$-I_C = 6\text{ A}; -V_{CE} = 4\text{ V}$	$-V_{BE}$	<		2	V		
Collector-emitter saturation voltage*							
$-I_C = 6\text{ A}; -I_B = 0,6\text{ A}$	$-V_{CEsat}$	<		1,5	V		
Collector-emitter breakdown voltage*							
$I_B = 0; -I_C = 30\text{ mA}$	$-V_{(BR)CEO}$	>	40	60	80	100	V
Transition frequency at $f = 1\text{ MHz}$							
$-I_C = 500\text{ mA}; -V_{CE} = 10\text{ V}$	f_T	>		3		MHz	
Small signal current transfer ratio							
$-I_C = 0,5\text{ A}; -V_{CE} = 10\text{ V}; f = 1\text{ kHz}$	$ h_{fe} $	>		20			

* 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.

Turn-off breakdown energy with inductive load (Fig. 4)

$I_{B\text{off}} = 0; -I_{CC} = 2,5 \text{ A}$

$E_{(BR)} > 62,5 \text{ mJ}$

Switching times

$-I_{C\text{on}} = 6 \text{ A}; -I_{B\text{on}} = I_{B\text{off}} = 0,6 \text{ A}$

$t_{\text{on}} \text{ typ. } 0,4 \mu\text{s}$

turn-on time

$t_{\text{off}} \text{ typ. } 0,7 \mu\text{s}$

turn-off time

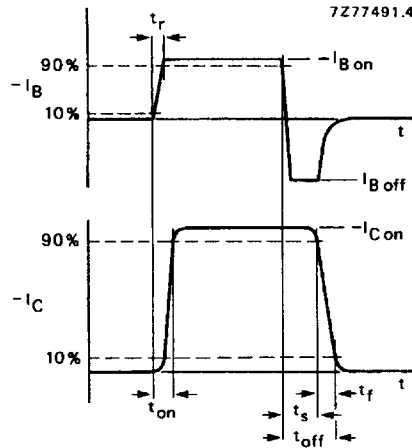


Fig. 2 Switching times waveforms.

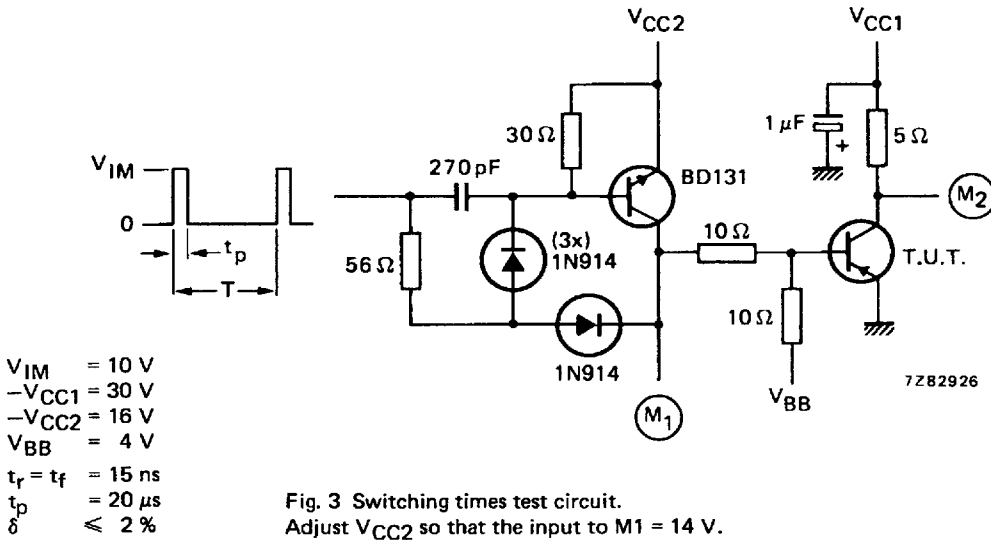
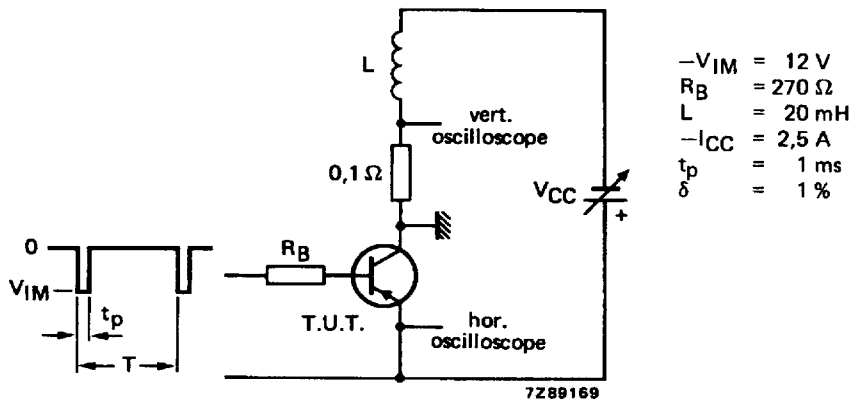


Fig. 3 Switching times test circuit.
Adjust V_{CC2} so that the input to M1 = 14 V.



- V_{IM} = 12 V
- R_B = 270 Ω
- L = 20 mH
- I_{CC} = 2,5 A
- t_p = 1 ms
- δ = 1 %

Fig. 4 Test circuit for turn-off breakdown energy.

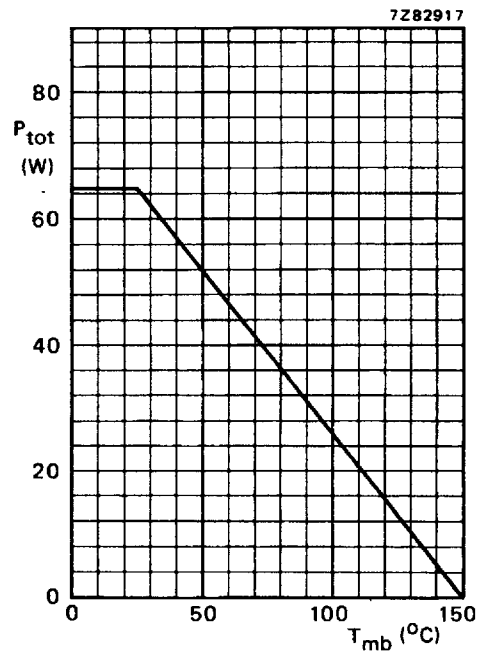


Fig. 5 Power derating curve.

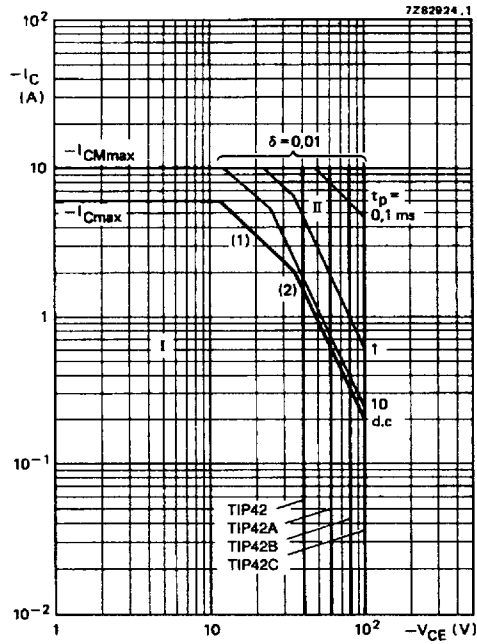


Fig. 6 Safe Operating Area; $T_{mb} = 25\text{ }^{\circ}\text{C}$.

- I Region of permissible d.c. operation.
- II Permissible extension for repetitive pulse operation.
- (2) $P_{tot\ max}$ and $P_{peak\ max}$ lines.
- (3) Second-breakdown limits.

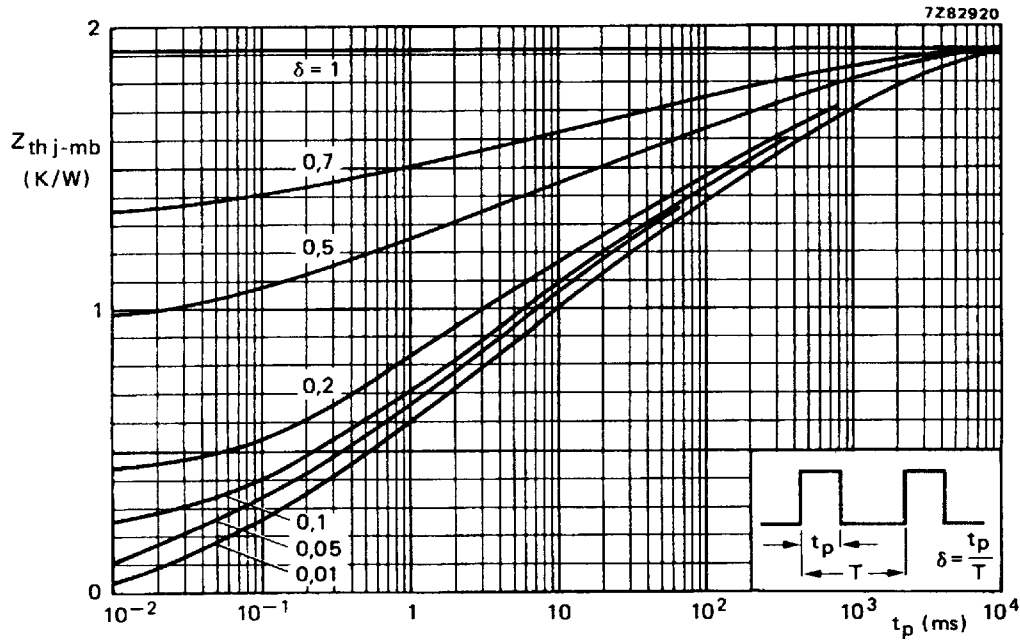


Fig. 7 Pulse power rating chart.

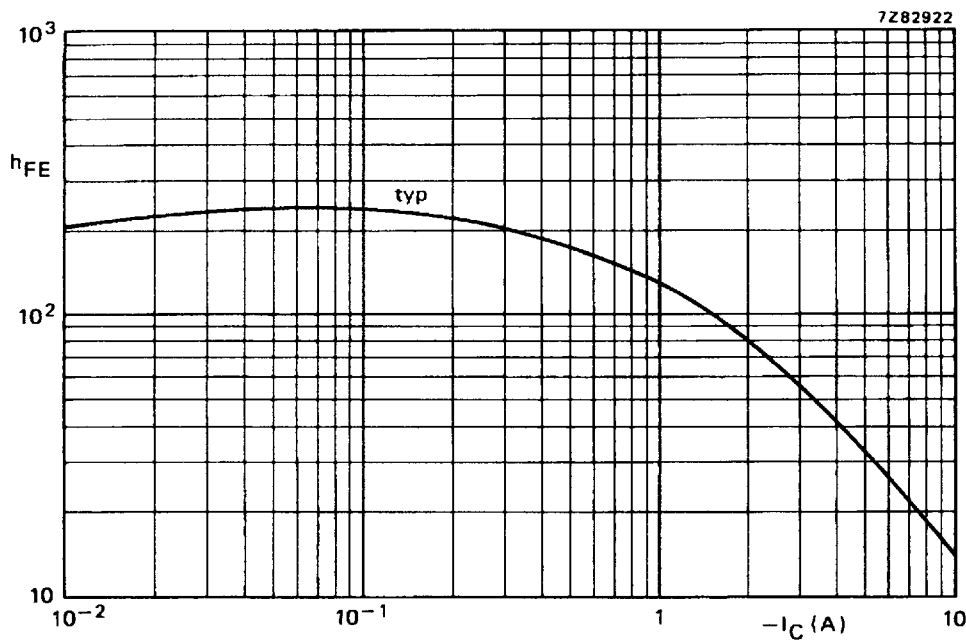


Fig. 8 Typical values d.c. current gain. $-V_{CE} = 4\text{ V}$; $T_i = 25\text{ }^\circ\text{C}$.

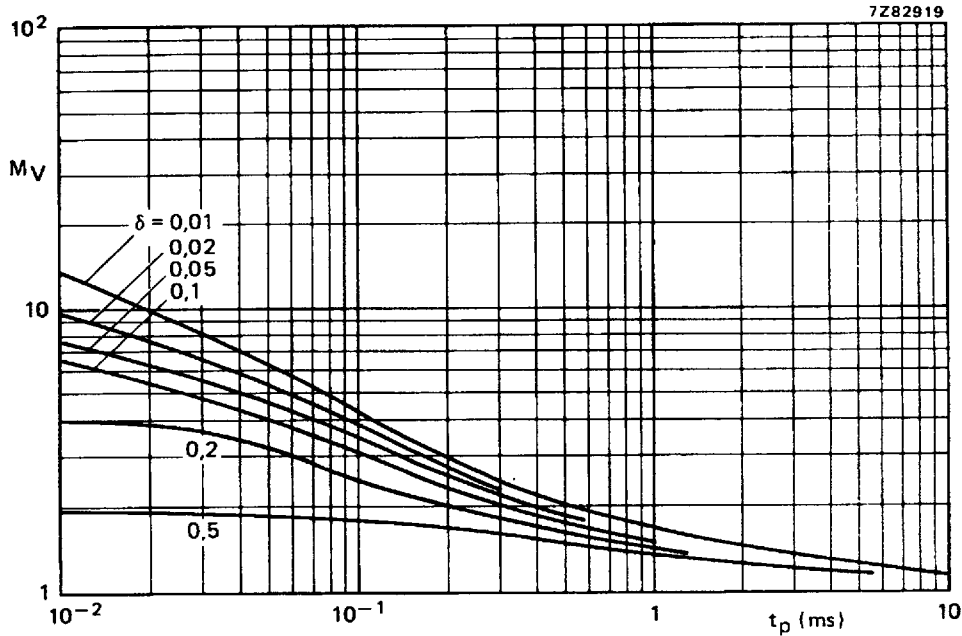


Fig. 9 Second breakdown voltage multiplying factor at the I_{Cmax} level.

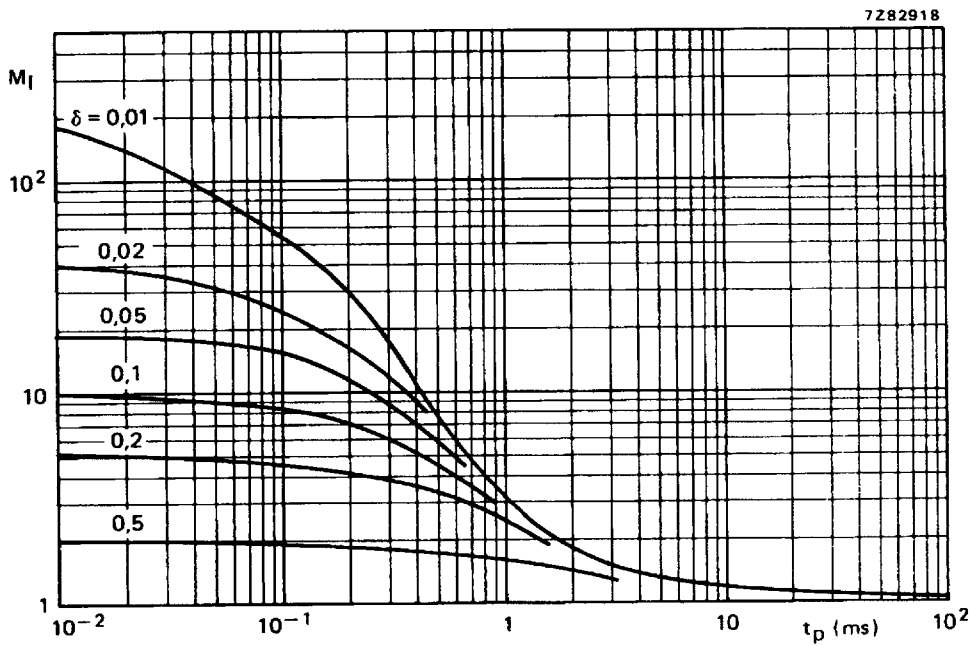


Fig. 10 Second breakdown current multiplying factor at the V_{CE0max} level.

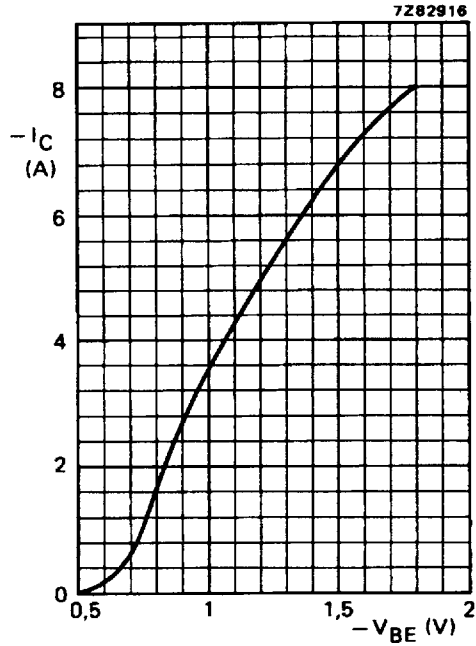


Fig. 11 Typical collector current.
 $-V_{CE} = 4 \text{ V}; T_j = 25 \text{ }^\circ\text{C}.$