

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

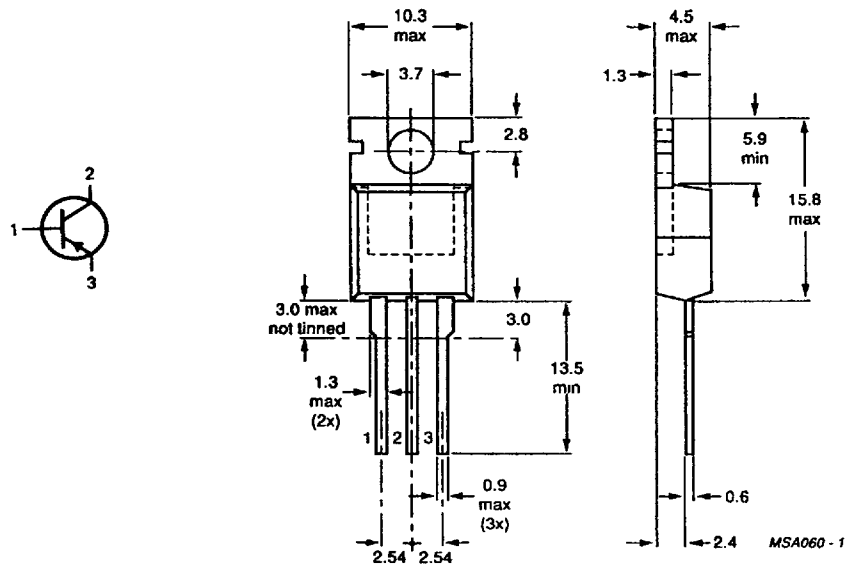
			TIP42	A	B	C	
Collector-base voltage	$-V_{CBO}$	max.	80	100	120	140	V
Collector-emitter voltage	$-V_{CEO}$	max.	40	60	80	100	V
Collector current (d.c.)	$-I_C$	max.		6			A
Total power dissipation up to $T_{mb} = 25^\circ\text{C}$	P_{tot}	max.		65			W
Junction temperature	T_j	max.		150			$^\circ\text{C}$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

			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: $t_p \leq 300\text{ }\mu\text{s}$; $\delta < 2\%$.

** 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

$$-I_{Con} = 6 \text{ A}; -I_{Bon} = I_{Boff} = 0,6 \text{ A}$$

turn-on time

t_{on}	typ.	0,4 μs
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turn-off time

t_{off}	typ.	0,7 μs
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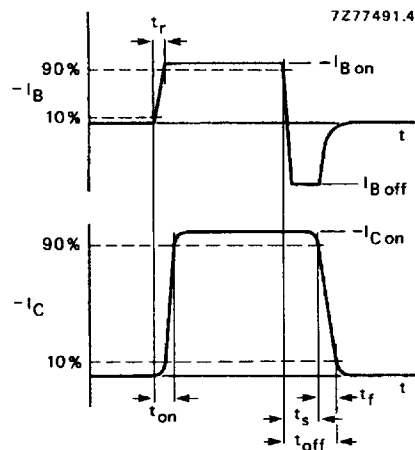


Fig. 2 Switching times waveforms.

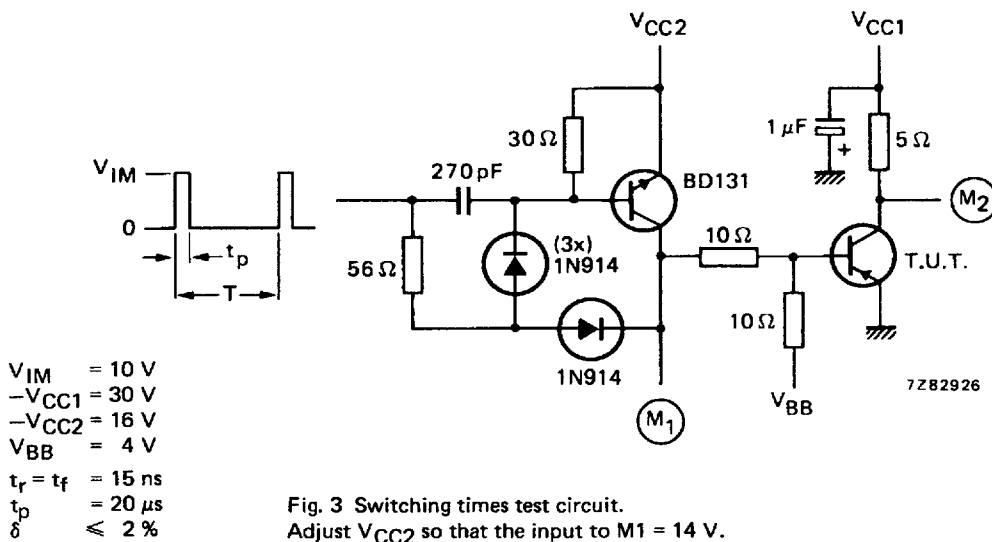


Fig. 3 Switching times test circuit.
Adjust V_{CC2} so that the input to M1 = 14 V.

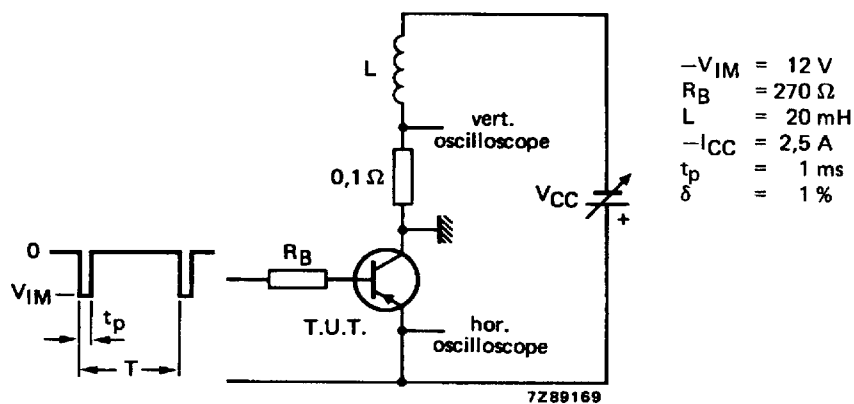


Fig. 4 Test circuit for turn-off breakdown energy.

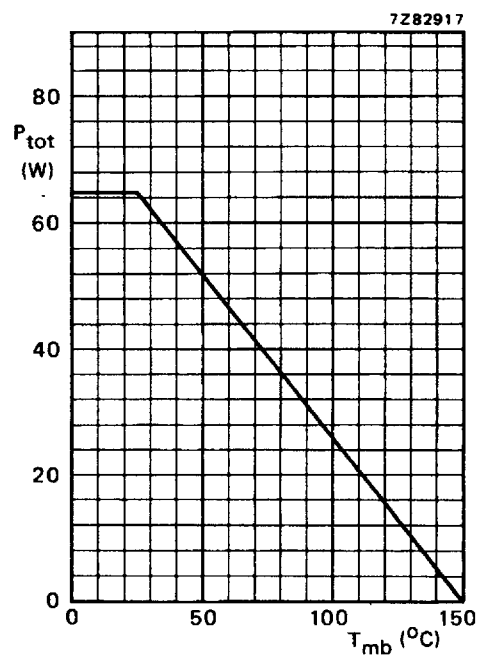


Fig. 5 Power derating curve.

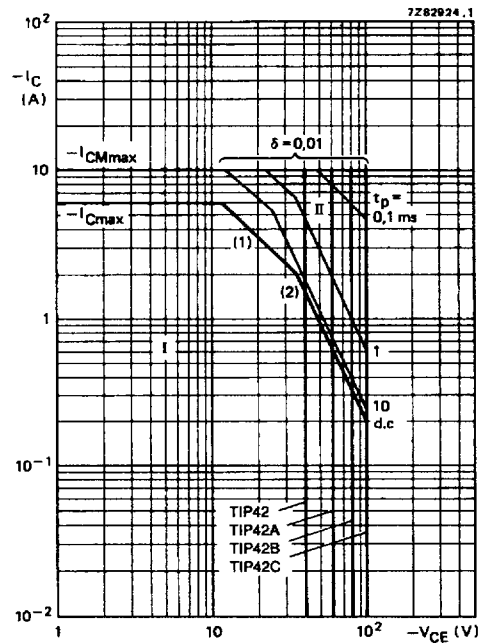


Fig. 6 Safe Operating Area; $T_{mb} = 25^{\circ}\text{C}$.

- 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.

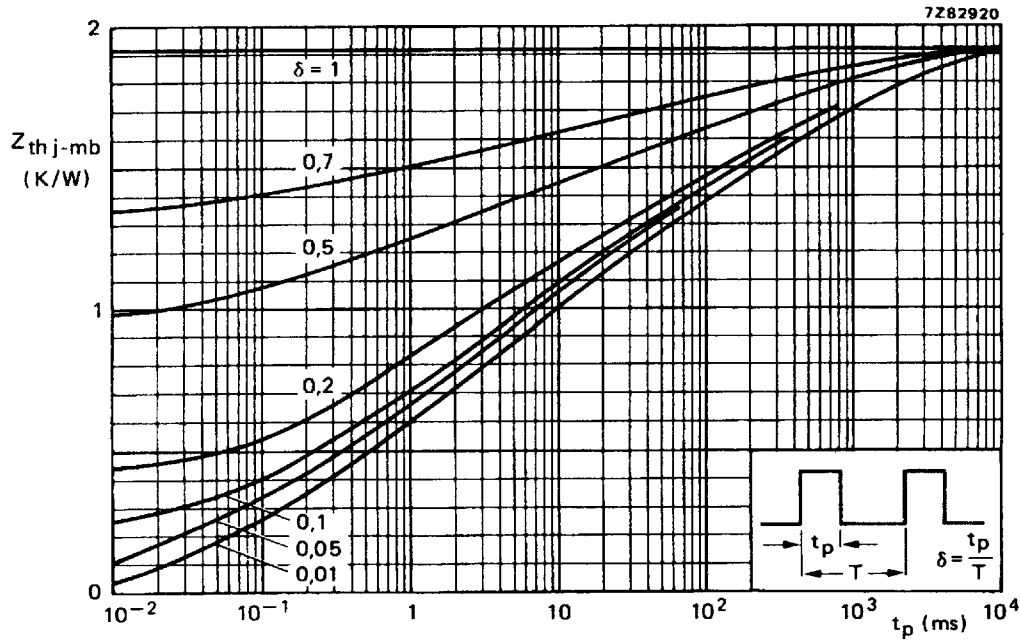


Fig. 7 Pulse power rating chart.

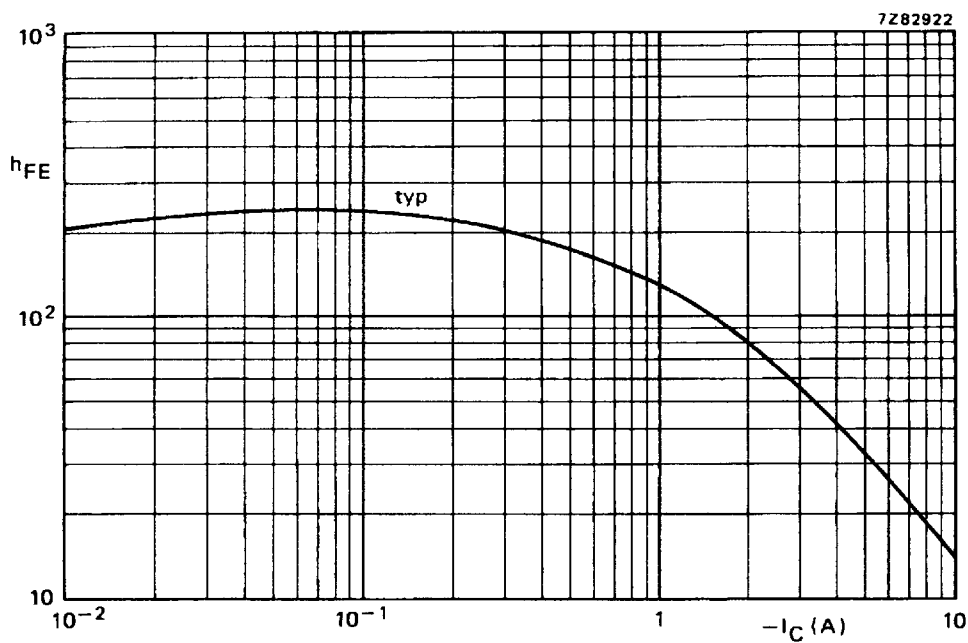
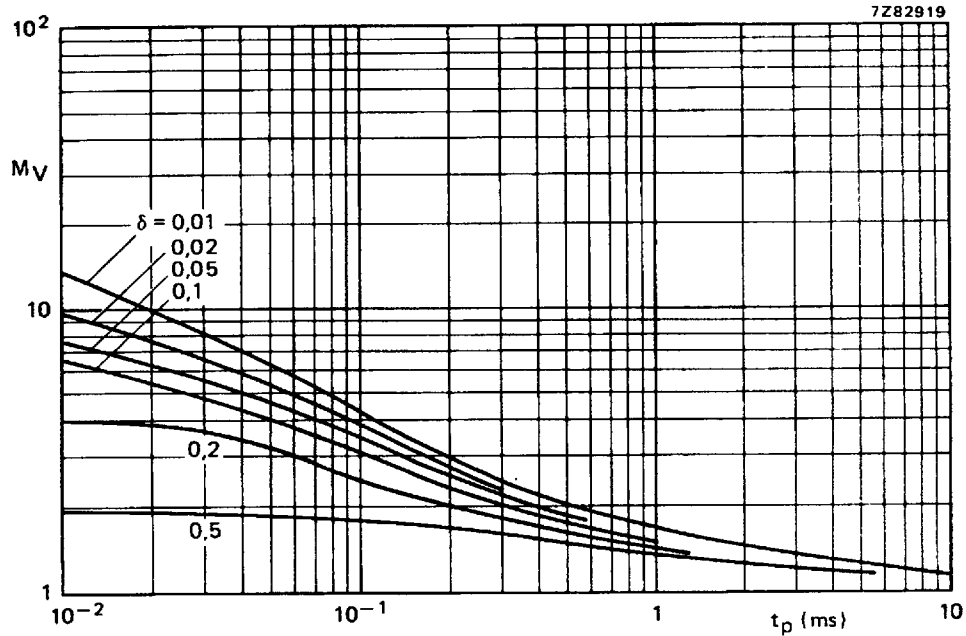
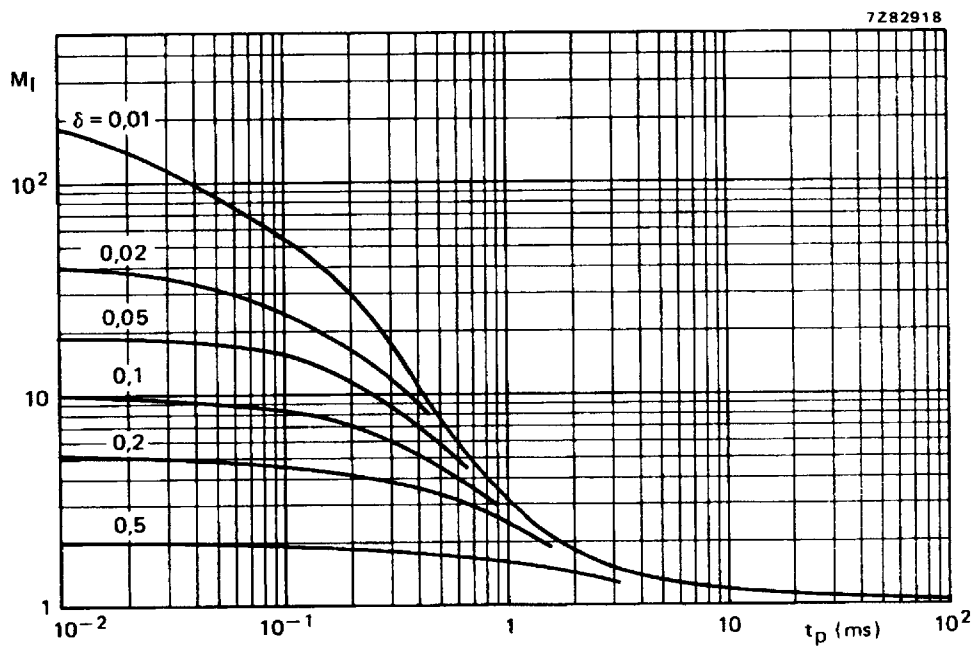


Fig. 8 Typical values d.c. current gain. $-V_{CE} = 4$ V; $T_i = 25$ °C.

Fig. 9 Second breakdown voltage multiplying factor at the I_{Cmax} level.Fig. 10 Second breakdown current multiplying factor at the V_{CE0max} level.

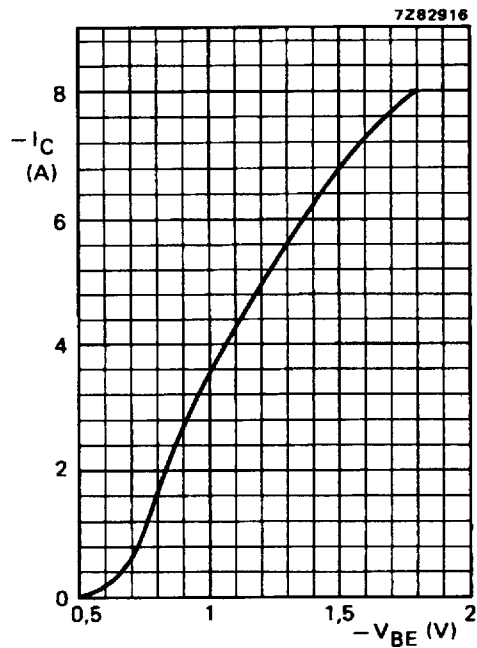


Fig. 11 Typical collector current.
 $-V_{CE} = 4 \text{ V}$; $T_j = 25^\circ\text{C}$.