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

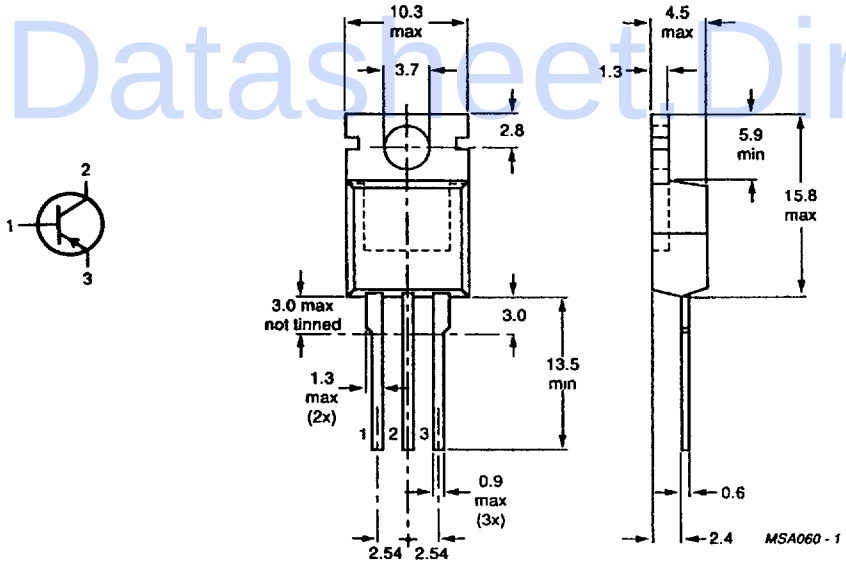
			TIP42	A	B	C	
Collector-base voltage	$-V_{CBO}$	max.	80	100	120	140	V
Collector-emitter voltage	$-V_{CEO}$	max.	40	60	80	100	V
Collector current (d.c.)	$-I_C$	max.		6			A
Total power dissipation up to T_{mb} = 25 °C	P_{tot}	max.		65			W
Junction temperature	T_j	max.		150			°C
D.C. current gain $-I_C$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

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 $T_{mb} = 25\ ^oC$	P_{tot}	max.		65			W
Storage temperature	T_{stg}			−65 to + 150			°C
Junction temperature	T_j	max.		150			°C

THERMAL RESISTANCE

From junction to mouting base	$R_{th\ j\text{-}mb}$	=	1,92	K/W
From junction to ambient in free air	$R_{th\ j\text{-}a}$	=	70	K/W

CHARACTERISTICS

$T_j = 25\ ^oC$ unless otherwise specified

			TIP42;A	B;C	
Collector cut-off current					
$I_B = 0$; $-V_{CE} = 30$ V	$-I_{CEO}$	<	0,2	–	mA
$I_B = 0$; $-V_{CE} = 60$ V	$-I_{CEO}$	<	–	0,2	mA
$V_{BE} = 0$; $-V_{CE} = -V_{CEOmax}$	$-I_{CES}$	<	0,4		mA
Emitter cut-off current					
$I_C = 0$; $-V_{EB} = 5$ V	$-I_{EBO}$	<	0,5		mA
D.C. current gain*					
$-I_C = 300$ mA; $-V_{CE} = 4$ V	h_{FE}	>	30		
$-I_C = 3$ A; $-V_{CE} = 4$ V	h_{FE}		15 to 75		
Base-emitter voltage**					
$-I_C = 6$ A; $-V_{CE} = 4$ V	$-V_{BE}$	<	2		V
Collector-emitter saturation voltage*					
$-I_C = 6$ A; $-I_B = 0{,}6$ A	$-V_{CEsat}$	<	1,5		V

			TIP42	A	B	C	
Collector-emitter breakdown voltage*							
$I_B = 0$; $-I_C = 30$ mA	$-V_{(BR)CEO}$	>	40	60	80	100	V
Transition frequency at f = 1 MHz							
$-I_C = 500$ mA; $-V_{CE} = 10$ V	f_T	>		3			MHz
Small signal current transfer ratio							
$-I_C = 0{,}5$ A; $-V_{CE} = 10$ V; f = 1 kHz	$\lvert h_{fe} \rvert$	>		20			

* Measured under pulse conditions: $t_p \leqslant 300\ \mu s$; $\delta < 2\%$.

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

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

$I_{Boff} = 0$; $-I_{CC} = 2{,}5$ A — $E_{(BR)} > 62{,}5$ mJ

Switching times

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

turn-on time	t_{on}	typ.	0,4 μs
turn-off time	t_{off}	typ.	0,7 μs

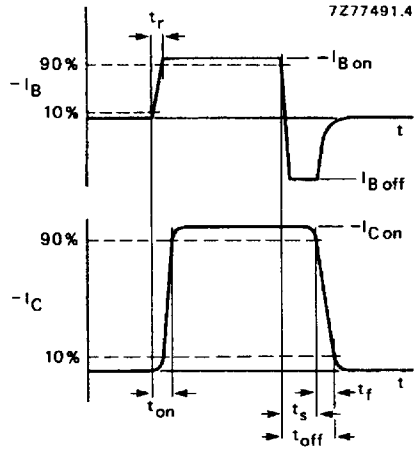
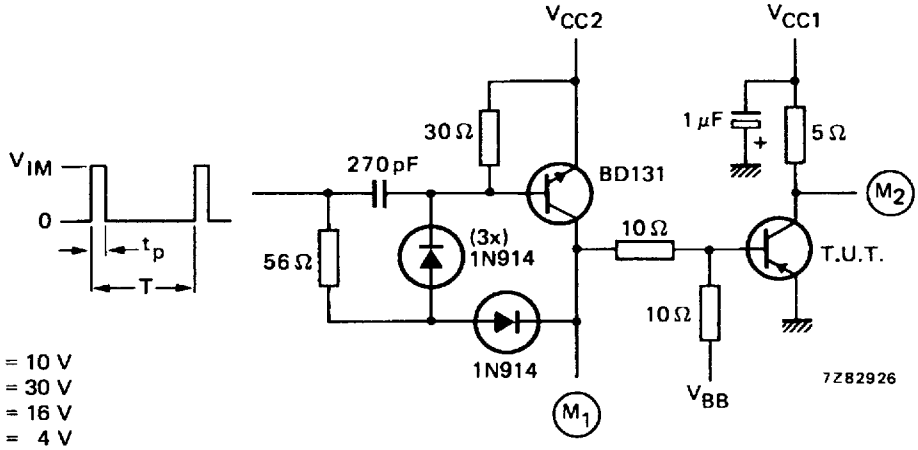
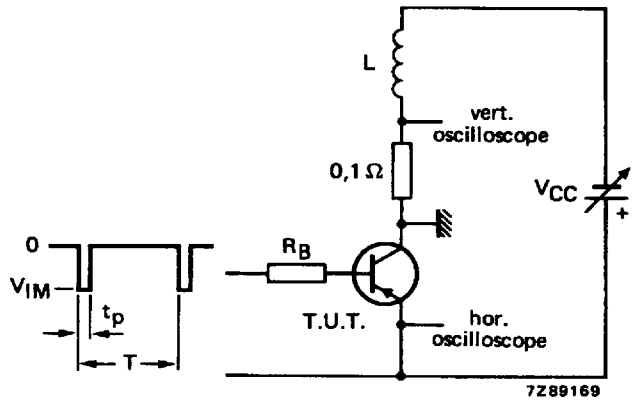


Fig. 2 Switching times waveforms.



V_{IM} = 10 V
$-V_{CC1}$ = 30 V
$-V_{CC2}$ = 16 V
V_{BB} = 4 V
$t_r = t_f$ = 15 ns
t_p = 20 μs
$\delta \leqslant$ 2 %

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.

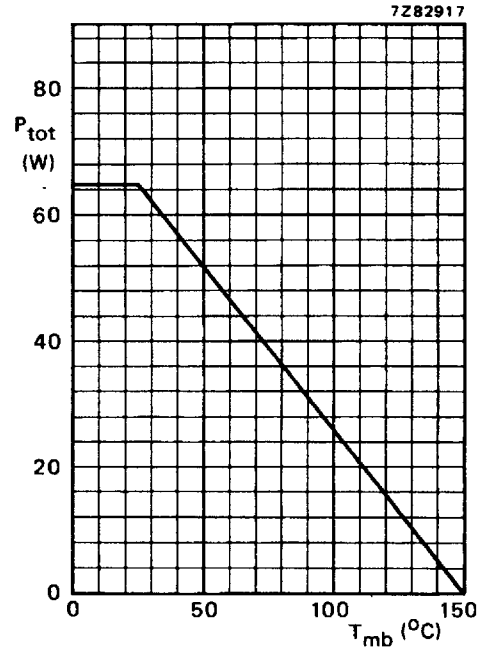


Fig. 5 Power derating curve.

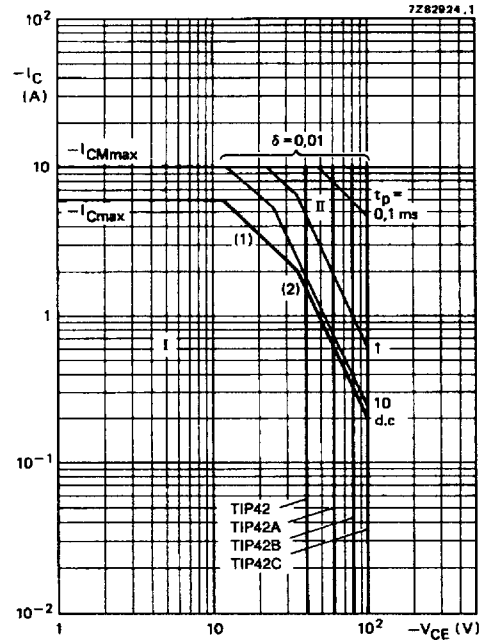


Fig. 6 Safe Operating Area; T_{mb} = 25 °C.

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.

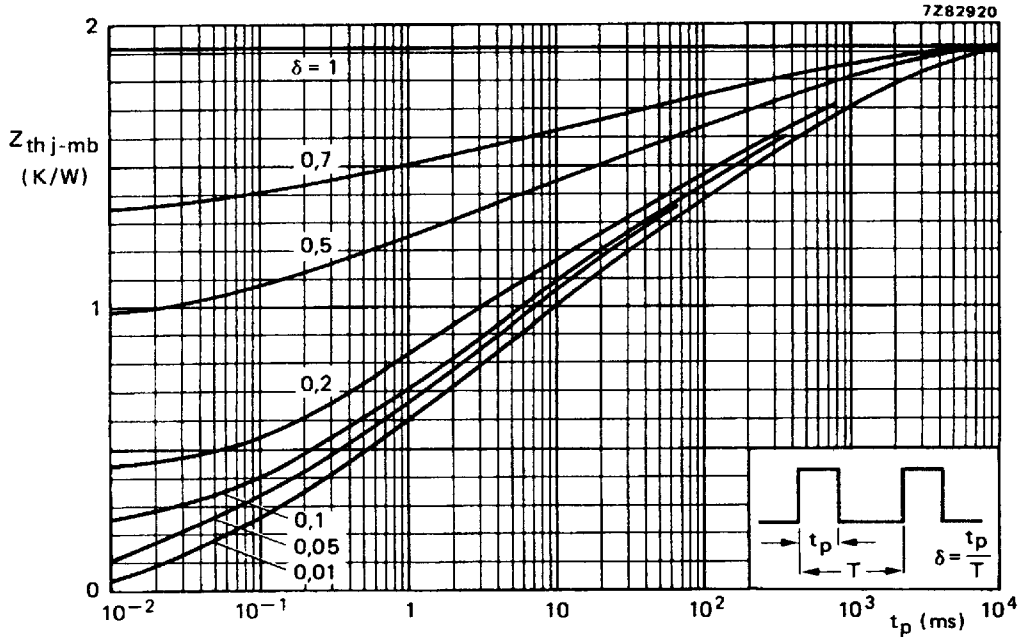


Fig. 7 Pulse power rating chart.

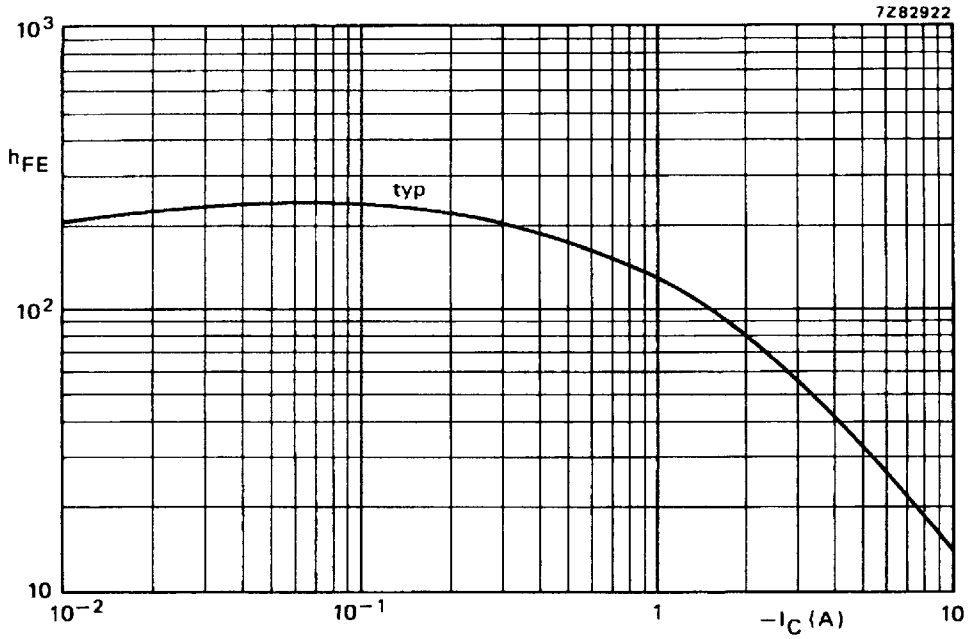


Fig. 8 Typical values d.c. current gain. $-V_{CE}$ = 4 V; T_j = 25 °C.

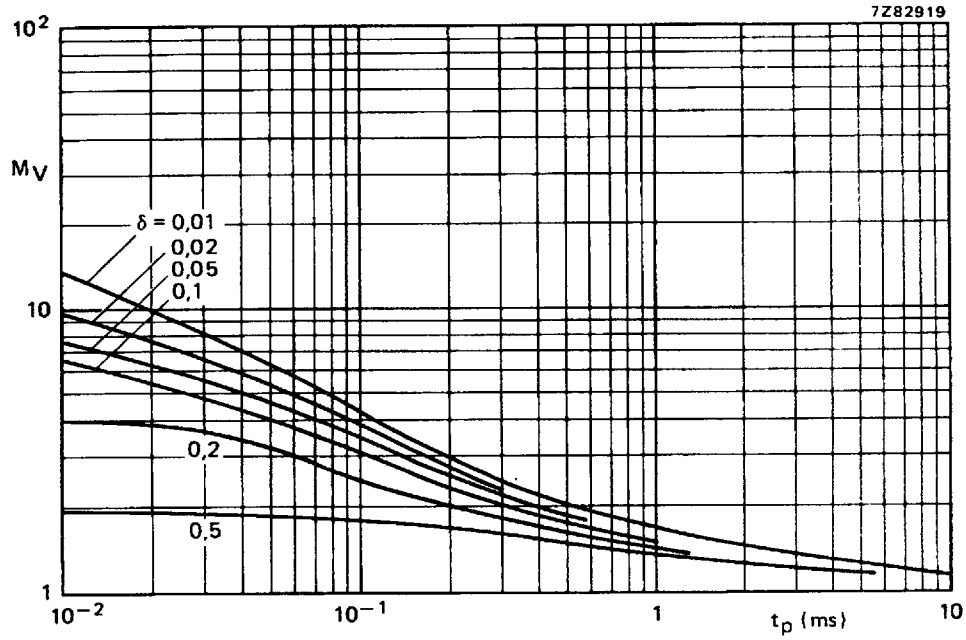


Fig. 9 Second breakdown voltage multiplying factor at the I_{Cmax} level.

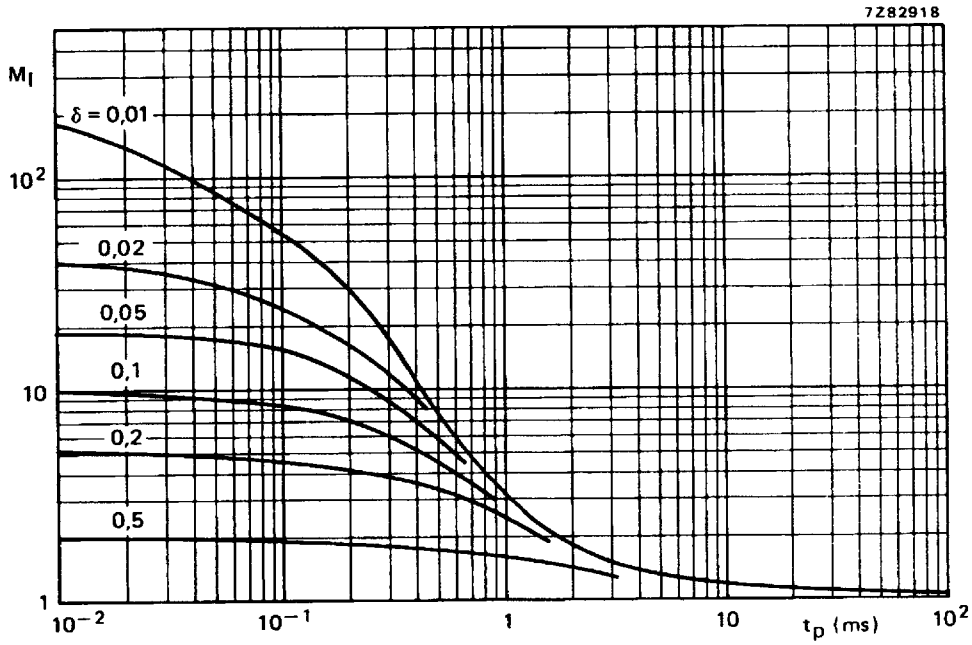


Fig. 10 Second breakdown current multiplying factor at the V_{CEOmax} level.

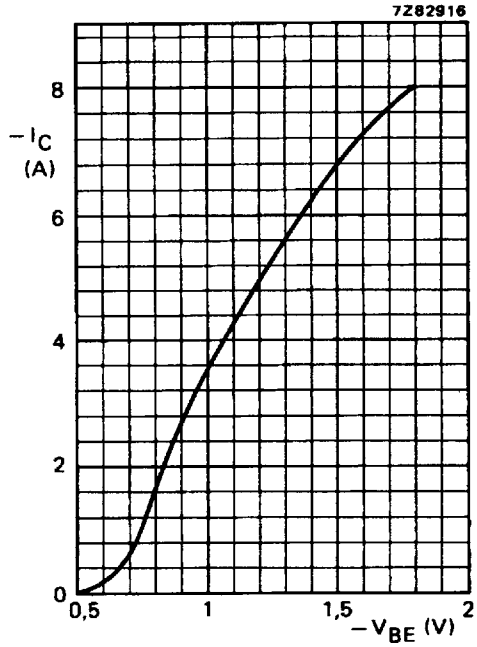


Fig. 11 Typical collector current.
$-V_{CE}$ = 4 V; T_j = 25 °C.