

T-33-19

SILICON EPITAXIAL POWER TRANSISTORS

PNP silicon epitaxial power transistors, each in a SOT186 envelope with an electrically insulated mounting base.

NPN complements are TIP41F, TIP41AF, TIP41BF and TIP41CF.

QUICK REFERENCE DATA

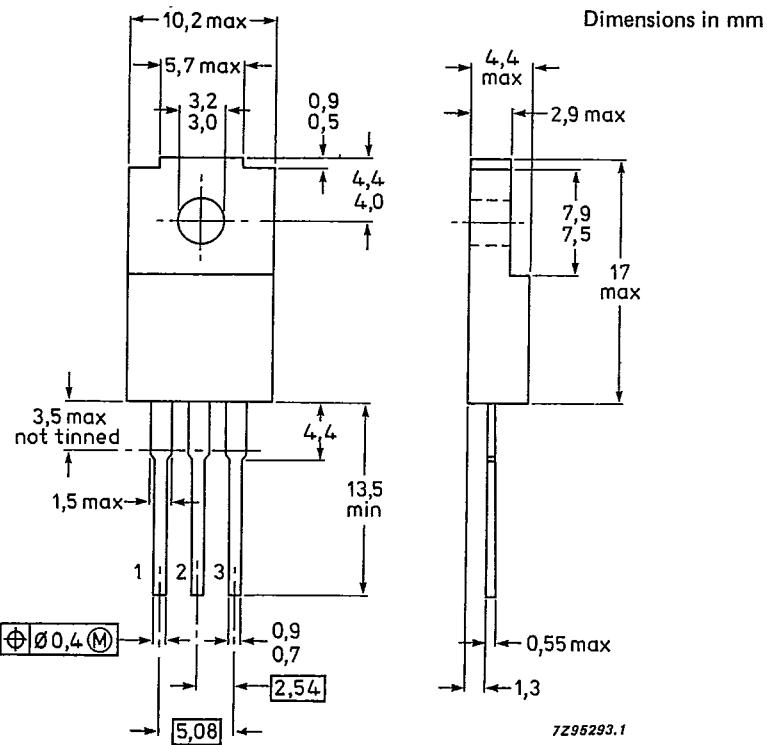
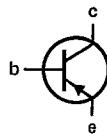
		TIP42F	AF	BF	CF
Collector-base voltage (open emitter)	-V _{CBO}	max.	80	100	120
Collector-emitter voltage (open base)	-V _{CEO}	max.	40	60	80
DC collector current	-I _C	max.	6	8	10
Peak collector current	I _{CM}	max.			A
Total power dissipation up to T _h = 25 °C	P _{tot}	max.		32	W
Junction temperature	T _j	max.		150	°C
DC current gain -I _C = 3 A; -V _{CE} = 4 V	h _{FE}	min. max.		15 75	

MECHANICAL DATA

Fig.1 SOT186.

Pinning

- 1 = base
- 2 = collector
- 3 = emitter



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TIP42F; 42AF
TIP42BF; 42CF

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RATINGS

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

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		TIP42F	AF	BF	CF	
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
DC collector current	-I _C	max.			6	A
Peak collector current	-I _{CM}	max.			10	A
DC base current	-I _B	max.			3	A
Total power dissipation up to T _h = 25 °C (note 1)	P _{tot}	max.			20	W
up to T _h = 25 °C (note 2)	P _{tot}	max.			32	W
Storage temperature range	T _{stg}				-65 to 150	°C
Junction temperature	T _j	max.			150	°C

THERMAL RESISTANCE

From junction to internal heatsink	R _{th j-mb}	=	1.6	K/W
From junction to external heatsink (note 1)	R _{th j-h}	=	6.3	K/W
From junction to external heatsink (note 2)	R _{th j-h}	=	3.9	K/W

INSULATION

Voltage allowed between all terminals and external heatsink, peak value	V _{insul}	max.	1000	V
Isolation capacitance from collector to external heatsink	C _{isol}	typ.	12	pF

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

		TIP42F	AF	BF	CF	
Collector cut-off currents						
-I _B = 0; -V _{CE} = 30 V	-I _{CEO}	max.	0.2	0.2	-	mA
-I _B = 0; -V _{CE} = 60 V	-I _{CEO}	max.	-	-	0.2	mA
-V _{BE} = 0; -V _{CE} = -V _{CEO} max	-I _{CES}	max.		0.4	-	mA
Emitter cut-off current						
-I _C = 0; -V _{EB} = 5 V	-I _{EBO}	max.		0.5		mA

Notes

1. Mounted without heatsink compound and 30 ± 5 newtons pressure on centre of envelope.
2. Mounted with heatsink compound and 30 ± 5 newtons pressure on centre of envelope.

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DC current gain (note 1)

 $-I_C = 0.3 \text{ A}; -V_{CE} = 4 \text{ V}$ h_{FE} 30 $-I_C = 3 \text{ A}; -V_{CE} = 4 \text{ V}$ h_{FE} min. 15

max. 75

Base-emitter voltage (note 2)

 $-I_C = 6 \text{ A}; -V_{CE} = 4 \text{ V}$ $-V_{BE}$ max. 2 V

Collector-emitter saturation voltage (note 1)

 $-I_C = 6 \text{ A}; -I_B = 0.6 \text{ A}$ $-V_{CEsat}$ max. 1.5 V

Collector-emitter breakdown voltage (note 1)

 $-I_C = 30 \text{ mA}; -I_B = 0$ $-V_{(BR)CEO}$ max. 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} min. 20

Transition frequency

 $-I_C = 0.5 \text{ A}; -V_{CE} = 10 \text{ V}; f = 1 \text{ kHz}$ f_T min. 3 MHz

Turn-off breakdown energy

with inductive load (Fig.4)

 $-I_B \text{ off} = 0; -I_{CC} = 2.5 \text{ V}$ $E_{(BR)}$ min. 62.5 mJ

Switching times (Figs 2 and 3)

(between 10% and 90% levels)

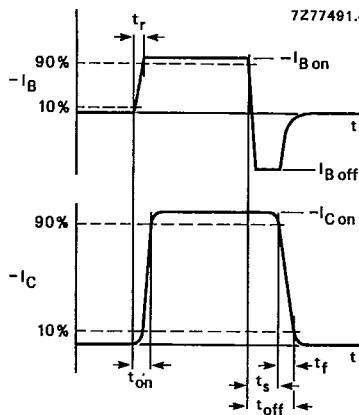
 $-I_C \text{ on} = 6 \text{ A}; -I_B \text{ on} = I_B \text{ off} = 0.6 \text{ A}$ turn-on time t_{on} typ. 0.6 μs turn-off time t_{off} typ. 1 μs 

Fig.2 Switching times waveform.

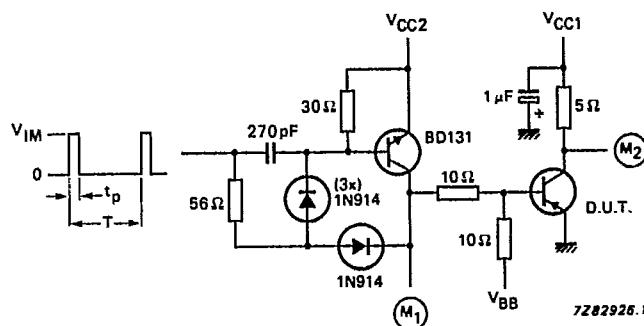
Notes1. Measured under pulse conditions: t_p max. 300 μs ; δ max. 2%.2. V_{BE} decreases by about 2.3 mV/K with increasing temperature.

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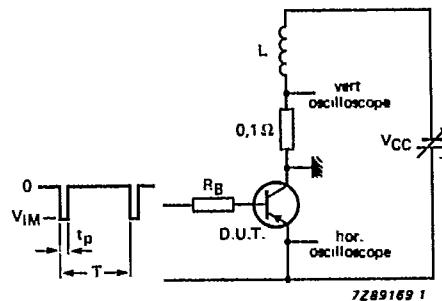
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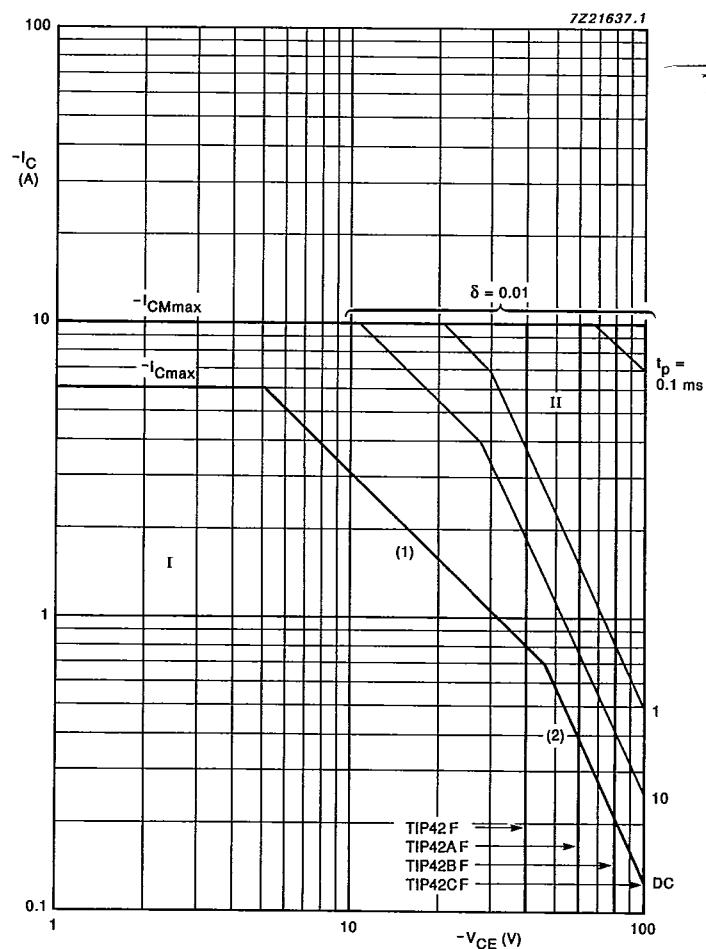
$V_{IM} = 10 \text{ V}$
 $-V_{CC1} = 30 \text{ V}$
 $-V_{CC2} = 16 \text{ V}$
 $V_{BB} = 4 \text{ V}$
 $t_r = t_f = 15 \text{ ns}$
 $t_p = 20 \mu\text{s}$
 $\delta \text{ max. } 2\%$

Fig.3 Switching times test circuit.
Adjust V_{CC2} to give $M_1 = 14 \text{ V}$.



$-V_{IM} = 12 \text{ V}$
 $R_B = 270 \Omega$
 $L = 20 \text{ mH}$
 $-I_{CC} = 2.5 \text{ A}$
 $\delta = 1\%$
 $t_p = 1 \text{ ms}$

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



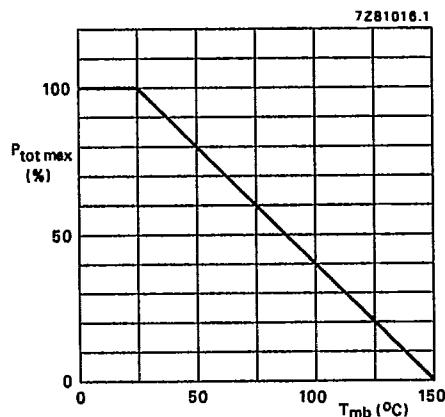
- I Region of permissible DC operation.
- II Permissible extension for repetitive pulse operation.
- (1) $P_{\text{tot max}}$ and $P_{\text{peak max}}$ lines
- (2) Second-breakdown limits.

Fig.5 Safe Operating Area; $T_{mb} = 25^\circ\text{C}$.

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Fig.6 Total power dissipation.

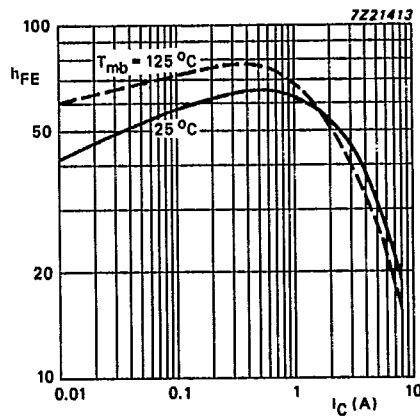


Fig.7 DC current gain; $-V_{CE} = 4$ V; typical values.

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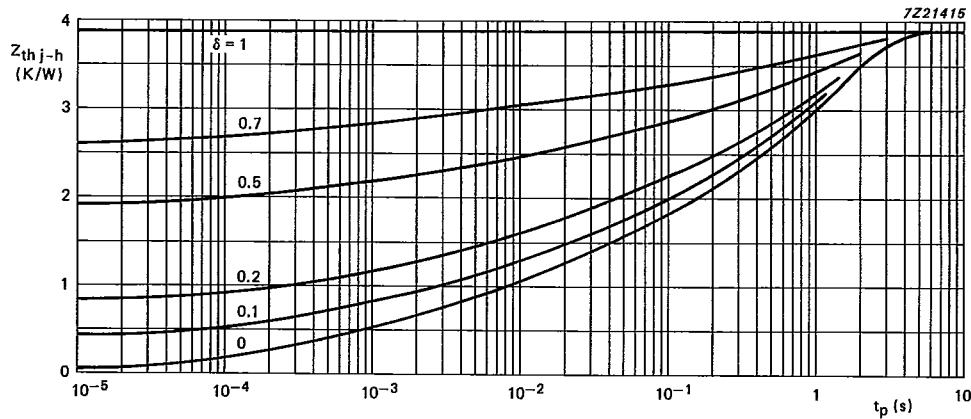
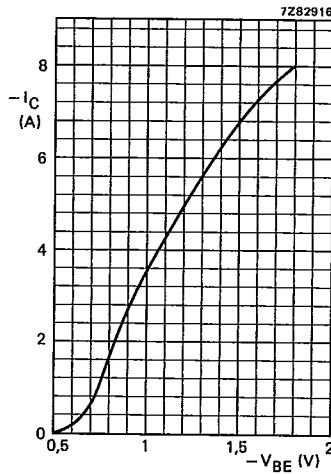


Fig.8 Pulse power rating chart.

Fig.9 Typical collector current; $-V_{CE} = 4$ V; $T_j = 25$ °C.