

SILICON EPITAXIAL-BASE POWER TRANSISTORS

N-P-N transistors in a SOT-32 plastic envelope intended for use in television and audio amplifier circuits where high peak powers can occur. P-N-P complements are BD234, BD236 and BD238. Matched pairs can be supplied.

QUICK REFERENCE DATA

			BD233	BD235	BD237	
Collector-base voltage (open emitter)	V_{CBO}	max.	45	60	100	V
Collector-emitter voltage (open base)	V_{CEO}	max.	45	60	80	V
Collector-emitter voltage ($R_{BE} = 1\text{ k}\Omega$)	V_{CER}	max.	45	60	100	V
Collector current (peak value)	I_{CM}	max.	6			A
Total power dissipation up to $T_{mb} = 25\text{ }^\circ\text{C}$	P_{tot}	max.	25			W
Junction temperature	T_j	max.	150			$^\circ\text{C}$
D.C. current gain	h_{FE}	>	25			
$I_C = 1\text{ A}; V_{CE} = 2\text{ V}$						
Transition frequency	f_T	>	3			MHz
$I_C = 250\text{ mA}; V_{CE} = 10\text{ V}$						

MECHANICAL DATA

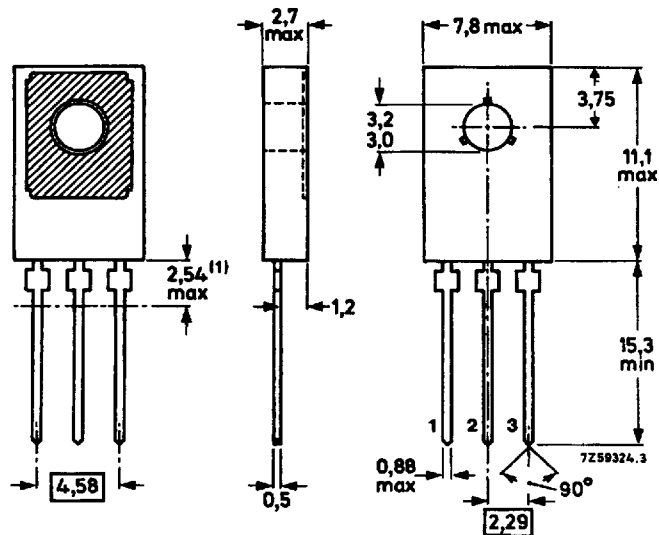
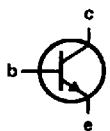
Dimensions in mm

Fig. 1 TO-126 (SOT-32).

Collector connected to metal part of mounting surface

Pinning

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



(1) Within this region the cross-section of the leads is uncontrolled.

See also chapters Mounting Instructions and Accessories.

RATINGS

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

			BD233	BD235	BD237	
Collector-base voltage (open emitter)	V_{CBO}	max.	45	60	100	V
Collector-emitter voltage (open base)	V_{CEO}	max.	45	60	80	V
Collector-emitter voltage ($R_{BE} = 1 \text{ k}\Omega$)	V_{CER}	max.	45	60	100	V
Emitter-base voltage (open collector)	V_{EBO}	max.	5	5	5	V
Collector current (d.c.)	I_C	max.		2		A
Collector current (peak value)	I_{CM}	max.		6		A
Base current (d.c.)	I_B	max.		0,5		A
Total power dissipation up to $T_{mb} = 25 \text{ }^\circ\text{C}$	P_{tot}	max.		25		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 ambient in free air	$R_{th \text{ j-a}}$	=		100		K/W
From junction to mounting base	$R_{th \text{ j-mb}}$	=		5		K/W

CHARACTERISTICS

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

Collector cut-off current						
$I_E = 0; V_{CB} = V_{CBOmax}$	I_{CBO}	<		50		μA
$I_E = 0; V_{CB} = V_{CBOmax}; T_j = 150 \text{ }^\circ\text{C}$	I_{CBO}	<		1		mA
Emitter cut-off current						
$I_C = 0; V_{EB} = 5 \text{ V}$	I_{EBO}	<		0,2		mA
Second-breakdown collector current						
$V_{CE} = 40 \text{ V}; t_p = 20 \text{ ms}$	$I_{(SB)C}$	<		0,5		A
Base-emitter voltage*						
$I_C = 1 \text{ A}; V_{CE} = 2 \text{ V}$	V_{BE}	<		1,3		V
Saturation voltage*						
$I_C = 1 \text{ A}; I_B = 0,1 \text{ A}$	V_{CEsat}	<		0,6		V
D.C. current gain*						
$I_C = 150 \text{ mA}; V_{CE} = 2 \text{ V}$	h_{FE}			40 to 250		
$I_C = 1 \text{ A}; V_{CE} = 2 \text{ V}$	h_{FE}	>		25		
Transition frequency at $f = 1 \text{ MHz}$						
$I_C = 250 \text{ mA}; V_{CE} = 10 \text{ V}$	f_T	>		3		MHz

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

CHARACTERISTICS (continued)

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

D.C. current gain ratio of matched complementary pairs*

$|I_C| = 150\text{ mA}; |V_{CE}| = 2\text{ V}$

$h_{FE1}/h_{FE2} < 1,6$

Switching times

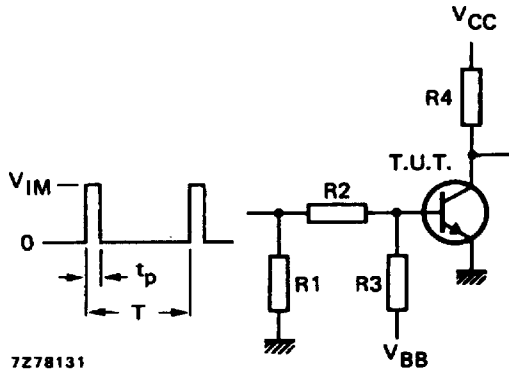
$I_{Con} = 1\text{ A}; I_{Bon} = -I_{Boff} = 0,1\text{ A}$

turn-on time

t_{on} typ. $0,4\ \mu\text{s}$
 $< 1\ \mu\text{s}$

turn-off time

t_{off} typ. $1,5\ \mu\text{s}$
 $< 3\ \mu\text{s}$



- $V_{IM} = 16\text{ V}$
- $V_{CC} = 20\text{ V}$
- $-V_{BB} = 6,4\text{ V}$
- $R1 = 82\ \Omega$
- $R2 = 82\ \Omega$
- $R3 = 82\ \Omega$
- $R4 = 20\ \Omega$
- $t_r = t_f = 15\text{ ns}$
- $t_p = 10\ \mu\text{s}$
- $T = 500\ \mu\text{s}$

Fig. 2 Test circuit.

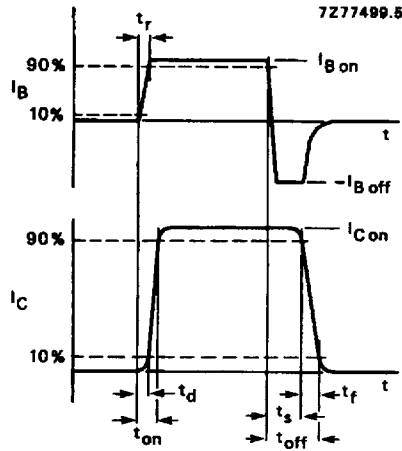


Fig. 3 Switching times waveforms.

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

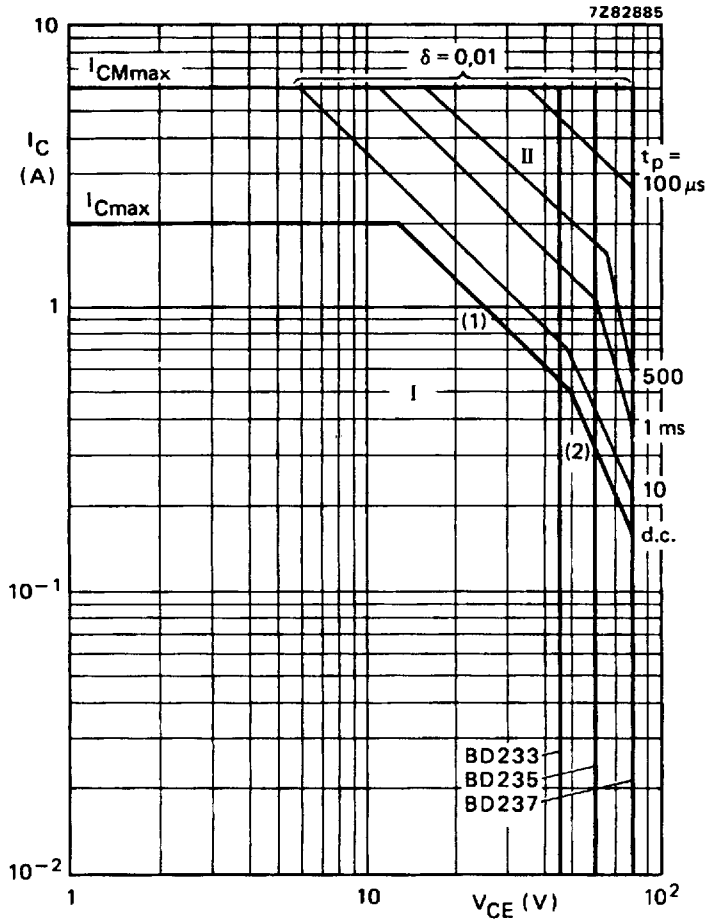


Fig. 4 Safe Operating Area with the transistor forward biased, $T_{mb} \leq 25^\circ\text{C}$.

- 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.

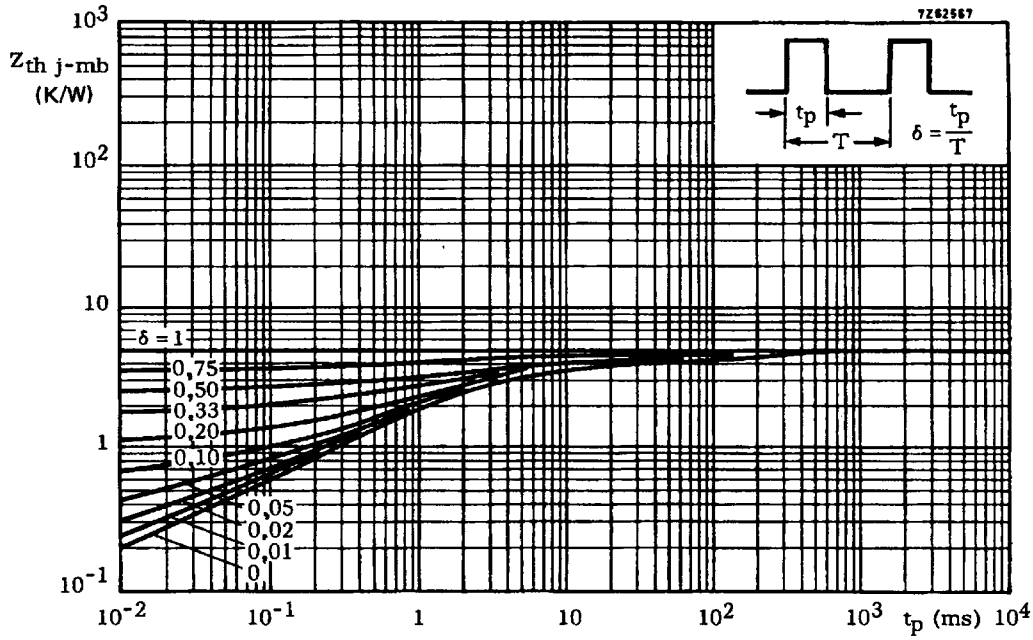
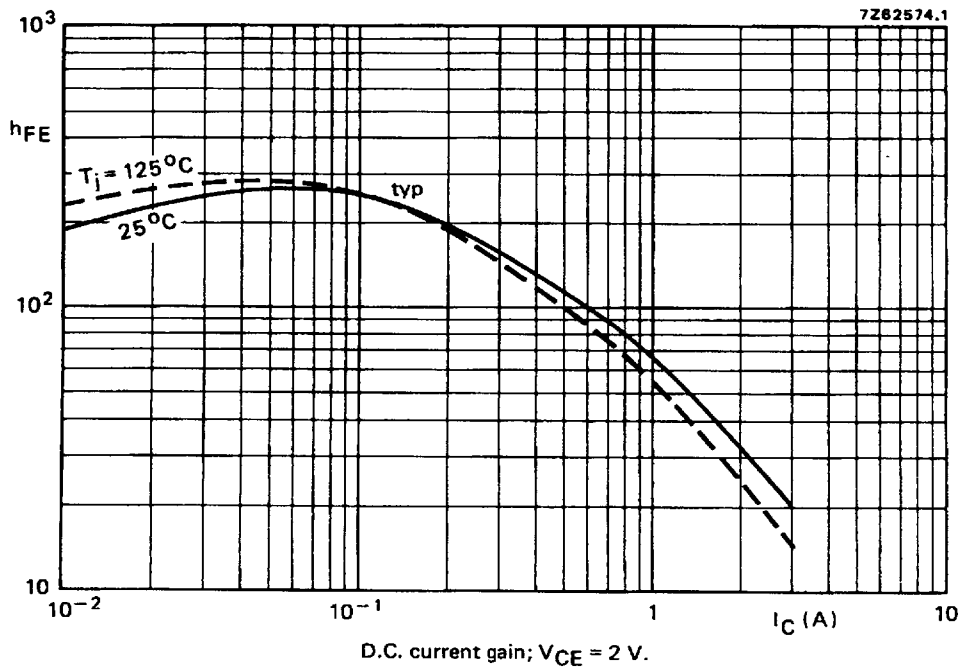


Fig. 5 Pulse power rating chart.



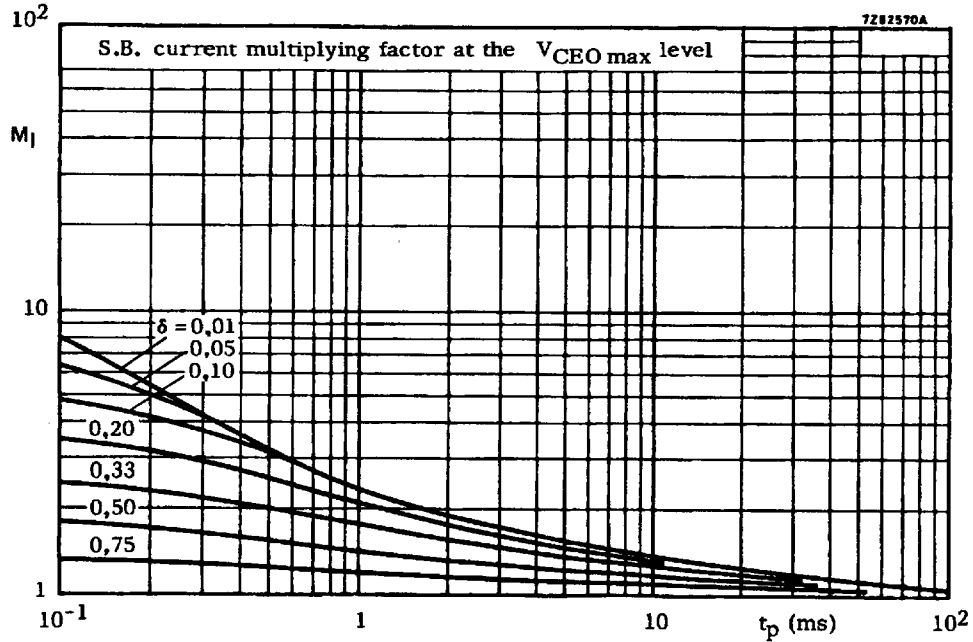


Fig. 7 S.B. current multiplying factor at the V_{CE0max} level.

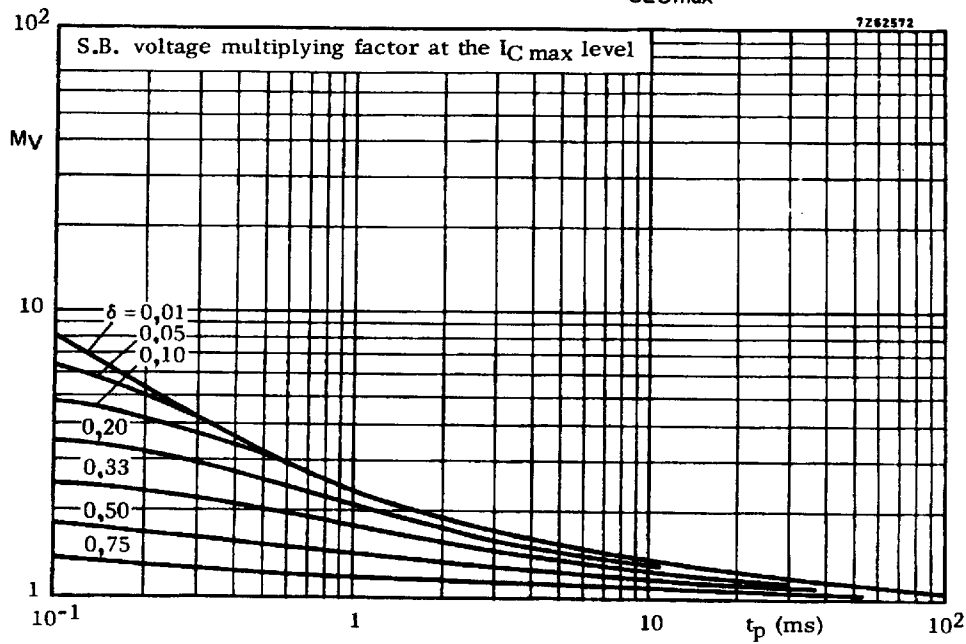


Fig. 8 S.B. voltage multiplying factor at the I_{Cmax} level.

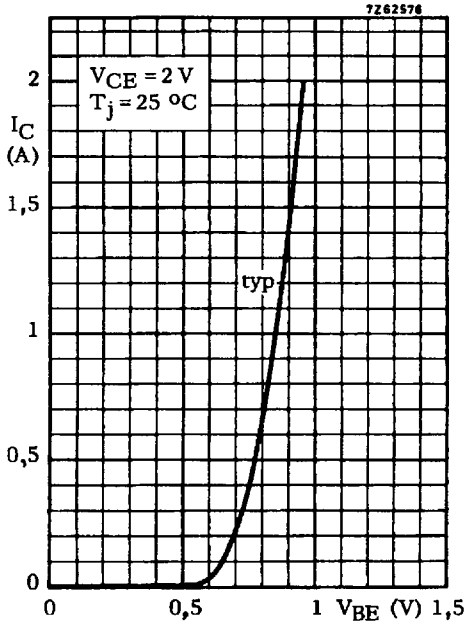


Fig. 9.

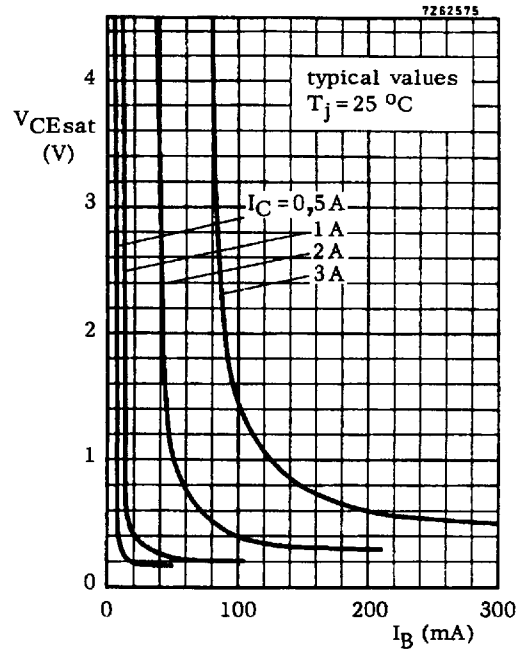


Fig. 10.