

BD233
BD235
BD237

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T-33-09

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 $T_{mb} = 25^\circ\text{C}$	P_{tot}	max.	25		W
Junction temperature	T_j	max.	150		$^\circ\text{C}$
D.C. current gain $I_C = 1 \text{ A}; V_{CE} = 2 \text{ V}$	h_{FE}	>	25		
Transition frequency $I_C = 250 \text{ mA}; V_{CE} = 10 \text{ V}$	f_T	>	3		MHz

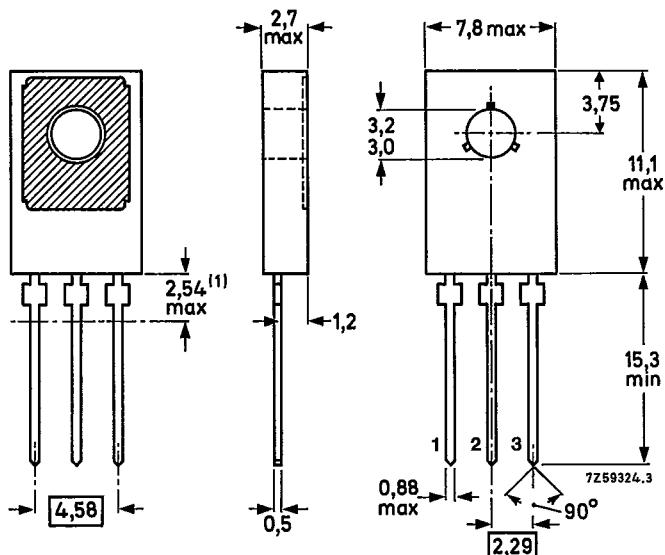
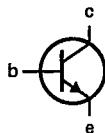
MECHANICAL DATA

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

Collector connected to metal part of mounting surface

Dimensions in mm

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.

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

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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 $T_{mb} = 25^\circ\text{C}$	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	$R_{th j-a}$	=	100	K/W
From junction to mounting base	$R_{th j-mb}$	=	5	K/W

CHARACTERISTICS

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

Collector cut-off current

$I_E = 0; V_{CB} = V_{CBOmax}$	I_{CBO}	<	50	μA
$I_E = 0; V_{CB} = V_{CBOmax}; T_j = 150^\circ\text{C}$	I_{CBO}	<	1	mA

Emitter cut-off current

$I_C = 0; V_{EB} = 5 \text{ V}$	I_{EBO}	<	0,2	mA
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Second-breakdown collector current

$V_{CE} = 40 \text{ V}; t_p = 20 \text{ ms}$	$I_{(SB)C}$	<	0,5	A
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Base-emitter voltage*

$I_C = 1 \text{ A}; V_{CE} = 2 \text{ V}$	V_{BE}	<	1,3	V
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Saturation voltage*

$I_C = 1 \text{ A}; I_B = 0,1 \text{ A}$	V_{CEsat}	<	0,6	V
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D.C. current gain*

$I_C = 150 \text{ mA}; V_{CE} = 2 \text{ V}$	h_{FE}		40 to 250	
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$I_C = 1 \text{ A}; V_{CE} = 2 \text{ V}$	h_{FE}	>	25	
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Transition frequency at $f = 1 \text{ MHz}$

$I_C = 250 \text{ mA}; V_{CE} = 10 \text{ V}$	f_T	>	3	MHz
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* Measured under pulse conditions: $t_p < 300 \mu\text{s}$, $\delta < 2\%$.

CHARACTERISTICS (continued)

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

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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

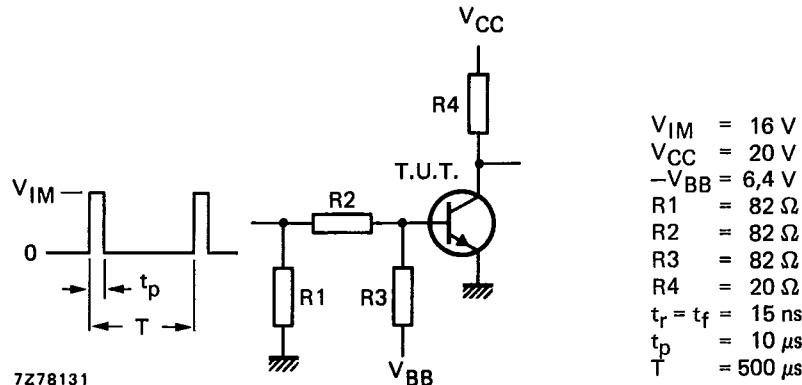
 t_{off} typ. $1,5 \mu\text{s}$ $< 3 \mu\text{s}$ 

Fig. 2 Test circuit.

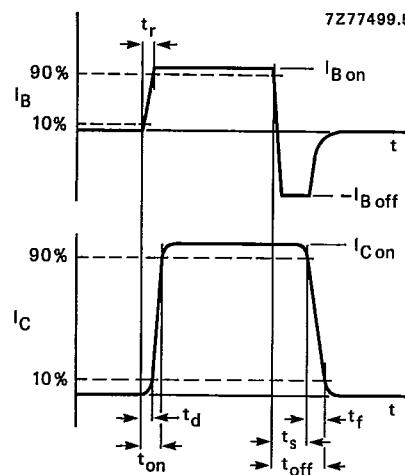


Fig. 3 Switching times waveforms.

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

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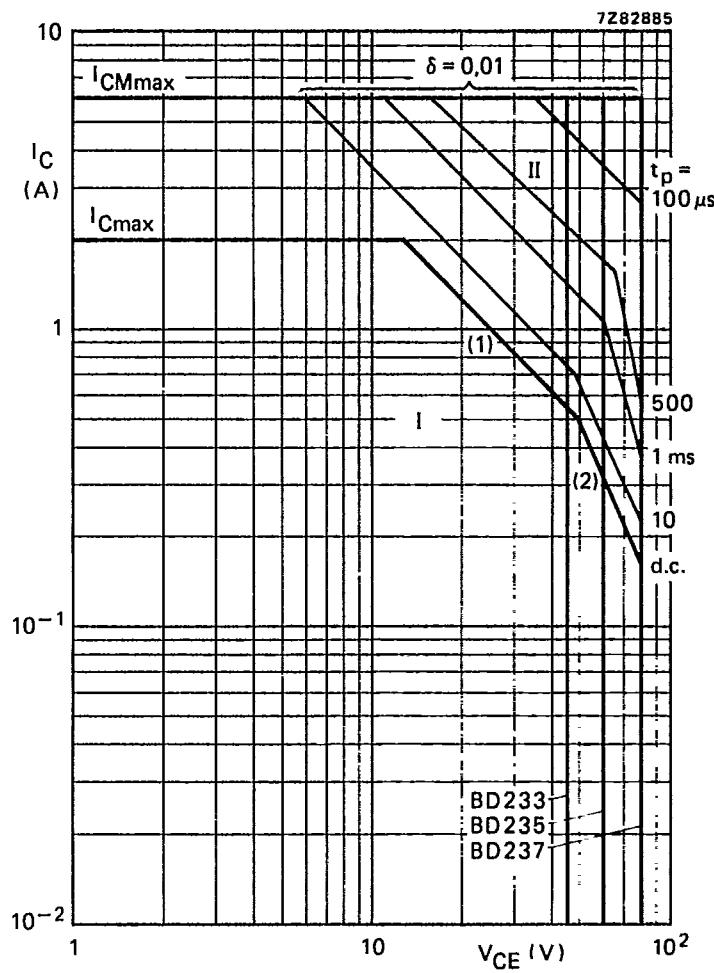


Fig. 4 Safe Operating Area with the transistor forward biased, $T_{mb} \leq 25^\circ C$.

- 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.

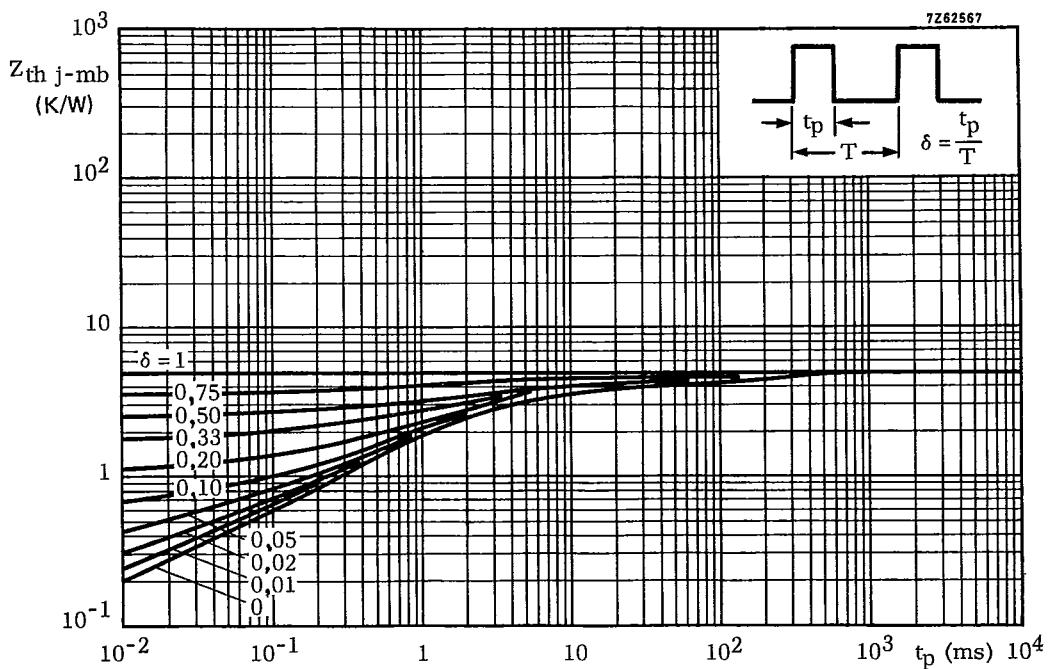
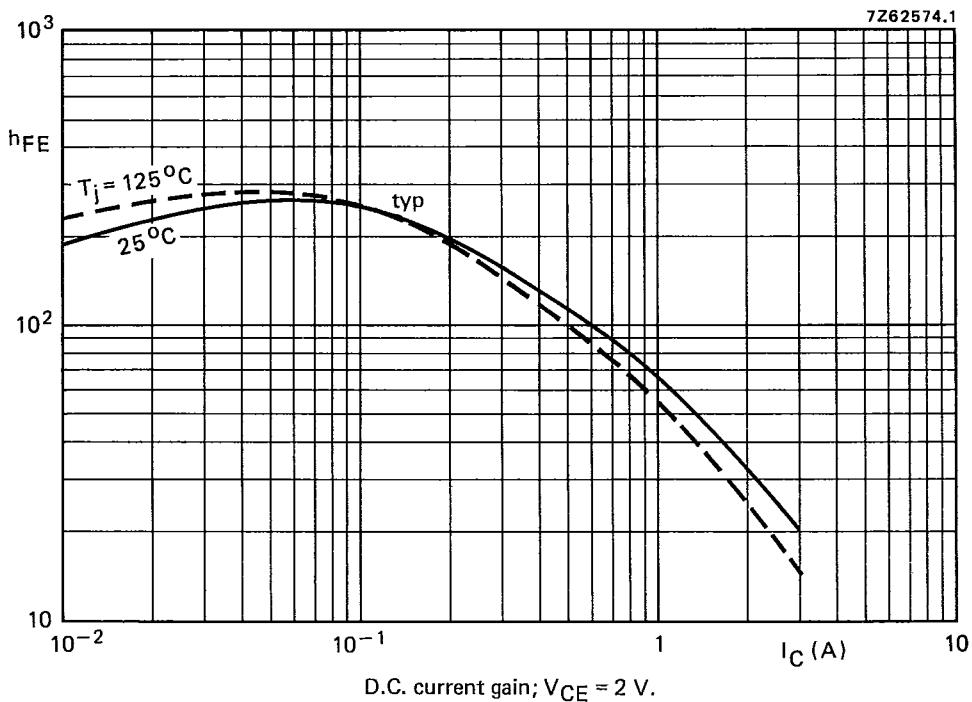


Fig. 5 Pulse power rating chart.



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10²

7262870A

M_I

10

10⁻¹

1

10

t_p (ms)

10²

S.B. current multiplying factor at the V_{CEO} max level

δ = 0,01
0,05
0,10
0,20
0,33
0,50
0,75

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

10²

7262872

M_V

10

10⁻¹

1

10

t_p (ms)

10²

S.B. voltage multiplying factor at the I_C max level

δ = 0,01
0,05
0,10
0,20
0,33
0,50
0,75

Fig. 8 S.B. voltage multiplying factor at the I_Cmax level.

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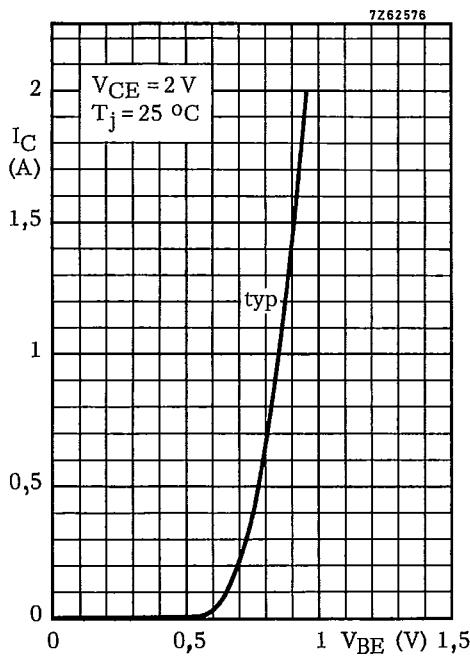


Fig. 9.

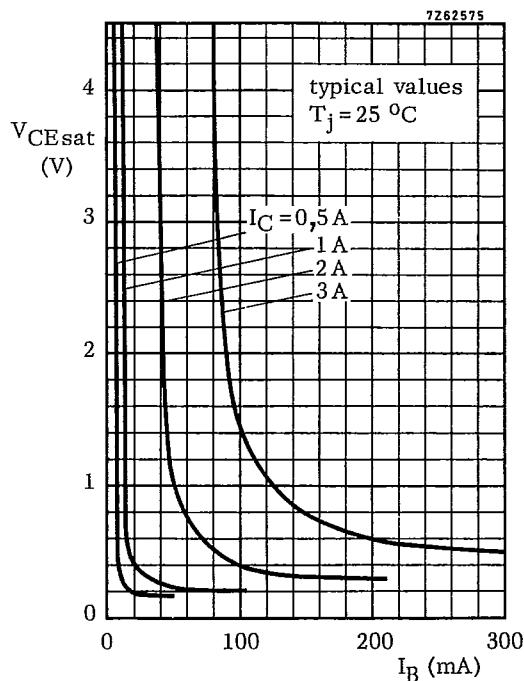


Fig. 10.