

NPN Silicon Transistors

BD 135

BD 137

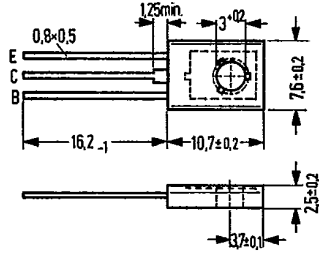
BD 139

SIEMENS AKTIENGESELLSCHAFT

For AF driver and output stages of medium performance

BD 135, BD 137, and BD 139 are epitaxial NPN silicon planar transistors in TO 126 plastic package (12 A 3 DIN 41869, sheet 4). The collector is electrically connected to the metallic mounting area. Together with BD 136, BD 138, and BD 140 as complementary pairs the transistors BD 135, BD 137, and BD 139 are designed for use in driver stages of high performance AF amplifiers.

Type	Ordering code	Type	Ordering code
BD 135	Q62702-D106	Mica washer	Q62902-B62
BD 135-6	Q62702-D106-V1	Spring washer	Q62902-B63
BD 135-10	Q62702-D106-V2	A 3 DIN 137	
BD 135-16	Q62702-D106-V3		
BD 135 paired	Q62702-D106-P		
BD 137	Q62702-D108		
BD 137-6	Q62702-D108-V1		
BD 137-10	Q62702-D108-V2		
BD 137 paired	Q62702-D108-P		
BD 139	Q62702-D110		
BD 139-6	Q62702-D110-V1		
BD 139-10	Q62702-D110-V2		
BD 139 paired	Q62702-D110-P		
BD 135/BD 136 compl. pair.	Q62702-D139-S1		
BD 137/BD 138 compl. pair.	Q62702-D140-S1		
BD 139/BD 140 compl. pair.	Q62702-D141-S1		



Approx. weight 0.5 g Dimensions in mm

Transistor fixing with M 3 screw. Starting torque < 0.8 Nm; washer or spring washer should be used.

1) If a 50 μ mica washer (ungreased) is used, the thermal resistance increases by 8 K/W and in case of a greased one by 4 K/W.

Maximum ratings

	BD 135	BD 137	BD 139	
Collector-emitter voltage ($R_{BE} \leq 1 \text{ k}\Omega$)				
V_{CER}	-	-	100	V
Collector-base voltage	V_{CBO} 45	60	-	V
Collector-emitter voltage	V_{CEO} 45	60	80	V
Emitter-base voltage	V_{EBO} 5	5	5	V
Collector peak current	I_{CM} 2.0	2.0	2.0	A
Collector current	I_C 1.5	1.5	1.5	A
Base current	I_B 0.2	0.2	0.2	A
Junction temperature	T_j 150	150	150	°C
Storage temperature range	T_{stg} -55 to +125			°C
Total power dissipation ($T_{case} \leq 25^\circ\text{C}$)	P_{tot} 12.5	12.5	12.5	W

Thermal resistance

	R_{thJA}	$R_{thJC}^1)$		
Junction to ambient air	≤ 110	≤ 110	≤ 110	K/W
Junction to case bottom	≤ 10	≤ 10	≤ 10	K/W

Static characteristics ($T_{amb} = 25^\circ\text{C}$)

The transistors BD 135, BD 137, and BD 139 are grouped in accordance with the DC current gain h_{FE} , and marked by numerals of the German DIN standard.

h_{FE} group	6	10	16	
Type	BD 135 BD 137 BD 139	BD 135 BD 137 BD 139	BD 135 - -	BD 135 BD 137 BD 139
I_C (mA)	h_{FE} I_C/I_B	h_{FE} I_C/I_B	h_{FE} I_C/I_B	V_{BE} (V)
5	>25	>25	>25	-
150	63 (40 to 100)	100 (63 to 160)	160 (100 to 250)	-
500	>25	>25	>25	1.2

Static characteristics ($T_{amb} = 25^\circ\text{C}$)

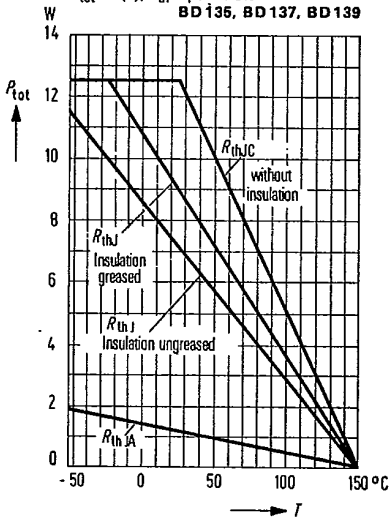
	BD 135	BD 137	BD 139		
Collector-emitter saturation voltage ($I_C = 500$ mA; $I_B = 50$ mA)	V_{CEsat}	<0.5	<0.5	<0.5	V
Collector cutoff current ($V_{CB} = 30$ V)	I_{CBO}	<100	<100	<100	nA
Collector cutoff current ($V_{CB} = 30$ V; $T_{amb} = 125^\circ\text{C}$)	I_{CBO}	≤ 10	≤ 10	≤ 10	μA
Emitter cutoff current ($V_{EB} = 5$ V)	I_{EBO}	≤ 10	≤ 10	≤ 10	μA
Collector-emitter breakdown voltage ($I_{CEO} = 50$ mA)	$V_{(BR)CEO}$	>45	>60	>80	V
Condition for matching pairs ($I_C = 150$ mA; $V_{CE} = 2$ V)	$\frac{h_{FE1}}{h_{FE2}}$	≤ 1.41	≤ 1.41	≤ 1.41	-

Dynamic characteristics ($T_{amb} = 25^\circ\text{C}$)

Transition frequency ($I_C = 50$ mA; $V_{CE} = 10$ V; $f = 100$ MHz)	f_T	>50	>50	>50	MHz
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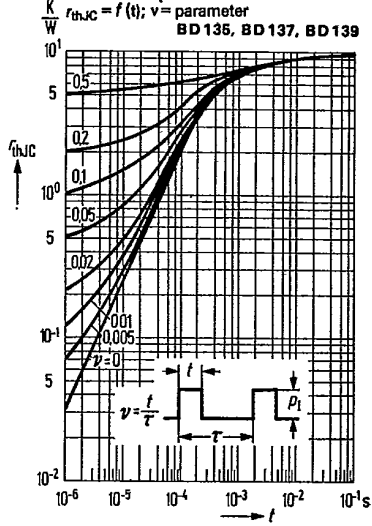
Total perm. power dissipation versus temperature
 $P_{tot} = f(T); R_{th} = \text{parameter}$

BD 135, BD 137, BD 139



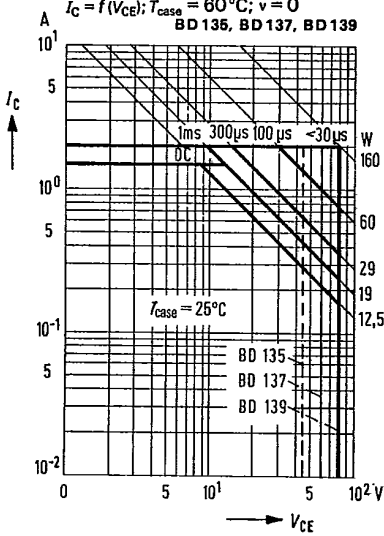
Permissible pulse load
 $r_{thJC} = f(t); v = \text{parameter}$

BD 135, BD 137, BD 139



Permissible operating range
 $I_C = f(V_{CE}); T_{case} = 60^\circ\text{C}; v = 0$

BD 135, BD 137, BD 139

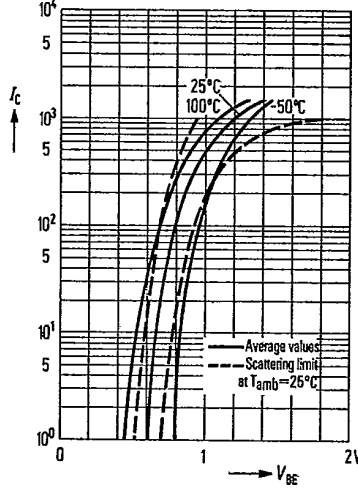


Collector current $I_C = f(V_{BE})$

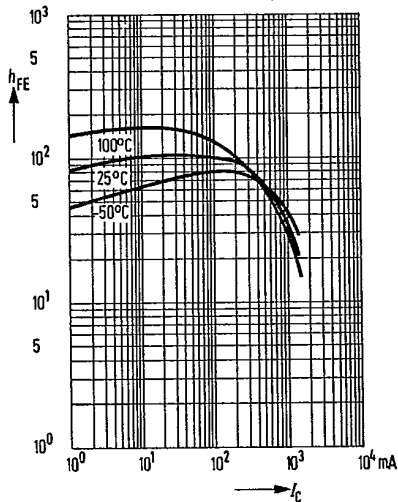
$V_{CE} = 2\text{V}; T_{amb} = \text{parameter}$

(common emitter configuration)

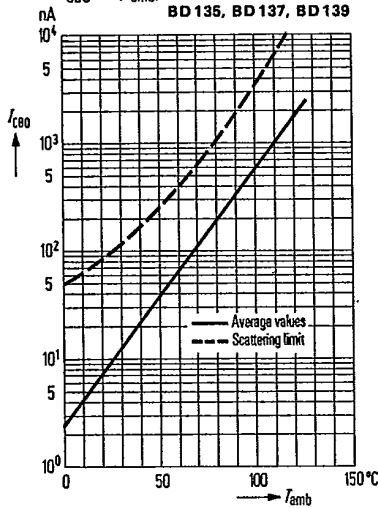
BD 135, BD 137, BD 139



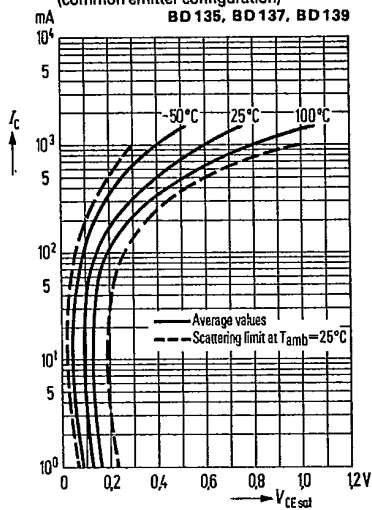
DC current gain $h_{FE} = f(I_C)$
 $V_{CE} = 2\text{ V}; T_{amb} = \text{parameter}$
 BD 135-10, BD 137-10, BD 139-10



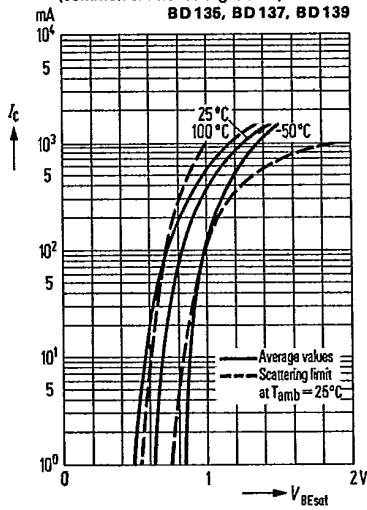
Collector cutoff current versus temperature
 $I_{CBO} = f(T_{amb})$
 BD 135, BD 137, BD 139



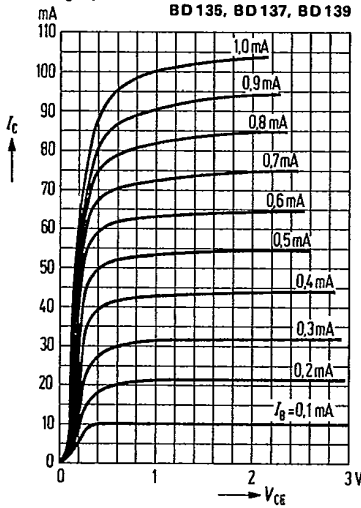
Collector-emitter saturation voltage
 $V_{CEsat} = f(I_C)$
 $h_{FE} = 10; T_{amb} = \text{parameter}$
 (common emitter configuration)
 BD 135, BD 137, BD 139



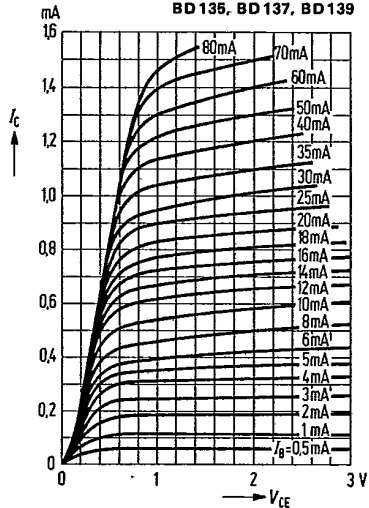
Base-emitter saturation voltage
 $V_{BEsat} = f(I_C)$
 $h_{FE} = 10; T_{amb} = \text{parameter}$
 (common emitter configuration)
 BD 135, BD 137, BD 139



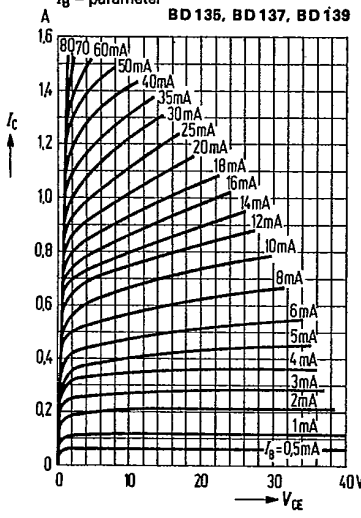
Output characteristics $I_C = f(V_{CE})$
 $I_B = \text{parameter}$



Output characteristics $I_C = f(V_{CE})$
 $I_B = \text{parameter}$



Output characteristics $I_C = f(V_{CE})$
 $I_B = \text{parameter}$



Transition frequency $f_T = f(I_C)$
 $(V_{CE} = 10 \text{ V})$

