NPN Silicon Transistors

SIEMENS AKTIENGESELLSCHAF

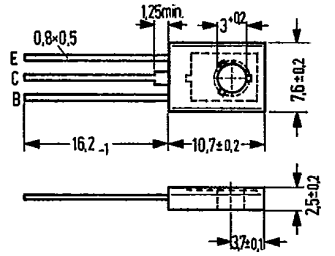
BD 135
BD 137
BD 139

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
BD 135	Q62702-D106
BD 135-6	Q62702-D106-V1
BD 135-10	Q62702-D106-V2
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

Type	Ordering code
Mica washer	Q62902-B62
Spring washer A 3 DIN 137	Q62902-B63



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 ($R_{BE} \leq 1$ kΩ)	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 temperatur range	T_{stg}	−55 to +125			°C
Total power dissipation ($T_{case} \leq 25$°C)	P_{tot}	12,5	12,5	12.5	W
Thermal resistance					
Junction to ambient air	R_{thJA}	≤110	≤110	≤110	K/W
Junction to case bottom	R_{thJC} 1)	≤10	≤10	≤10	K/W

Static characteristics (T_{amb} = 25 °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 °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 °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 °C)					
Transition frequency (I_C = 50 mA; V_{CE} = 10 V; f = 100 MHz)	f_T	>50	>50	>50	MHz

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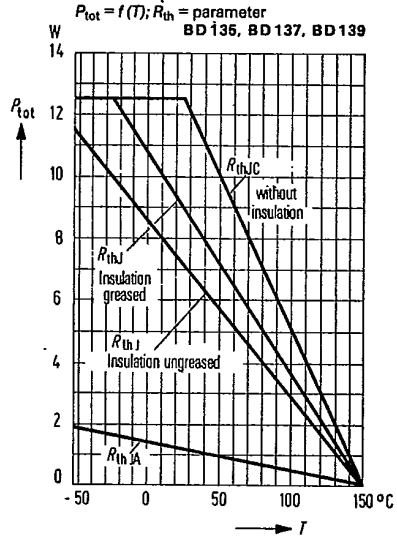
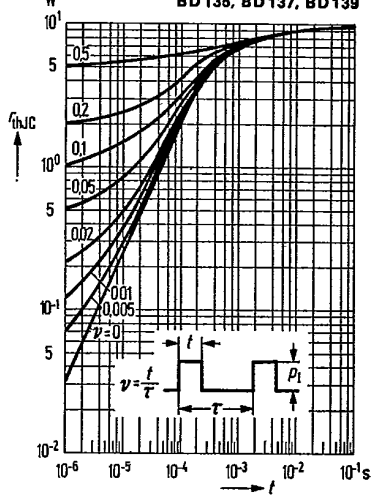
BD 135
BD 137
BD 139

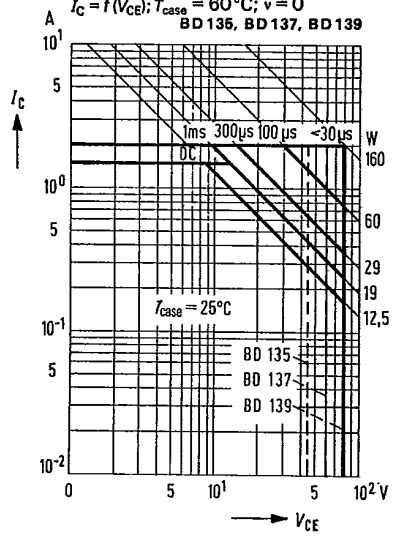
Total perm. power dissipation versus temperature
$P_{tot} = f(T)$; R_{th} = parameter
BD 135, BD 137, BD 139



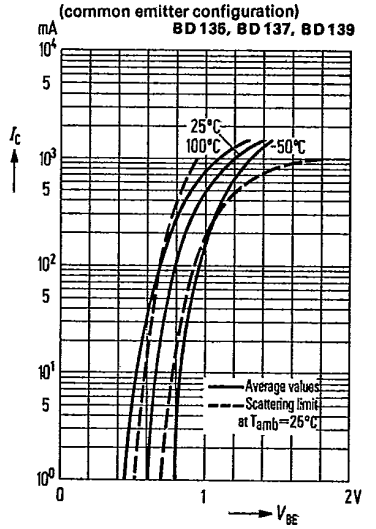
Permissible pulse load
$\frac{K}{W}$ $r_{thJC} = f(t)$; v = parameter
BD 135, BD 137, BD 139



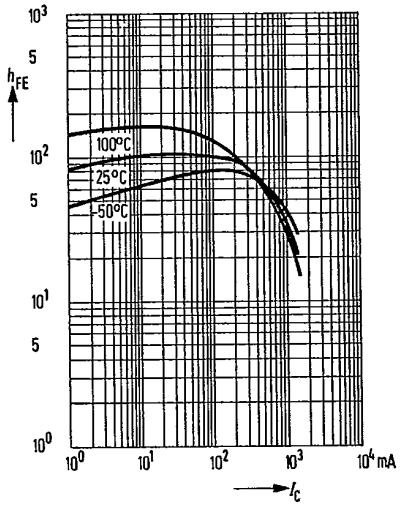
Permissible operating range
$I_C = f(V_{CE})$; $T_{case} = 60°C$; v = 0
BD 135, BD 137, BD 139



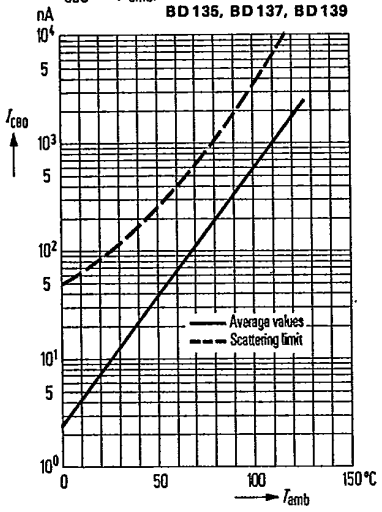
Collector current $I_C = f(V_{BE})$
V_{CE} = 2 V; T_{amb} = parameter
(common emitter configuration)
BD 135, BD 137, BD 139



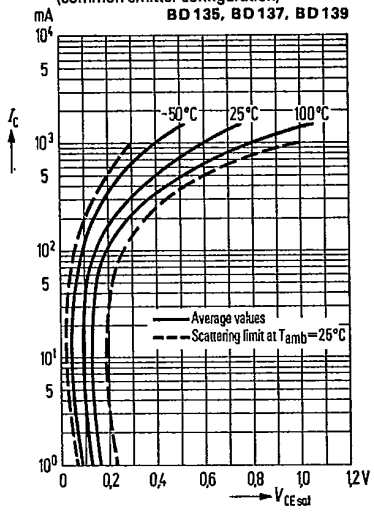
DC current gain $h_{FE} = f(I_C)$
$V_{CE} = 2$ V; T_{amb} = parameter
BD 135-10, BD 137-10, BD 139-10



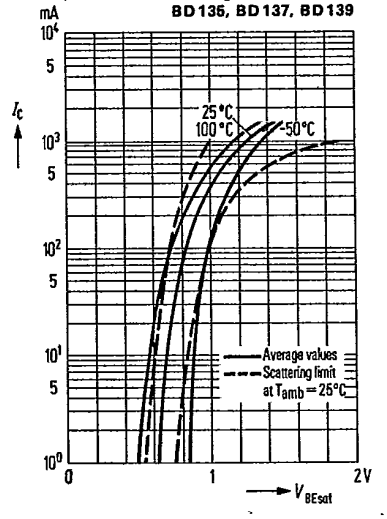
Collector cutoff current versus temperature
$I_{CBO} = f(T_{amb})$
BD 135, BD 137, BD 139



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



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



BD 135
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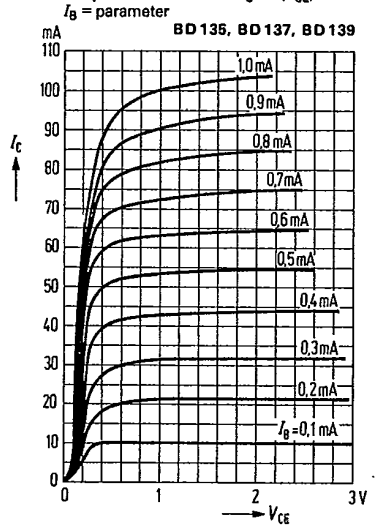
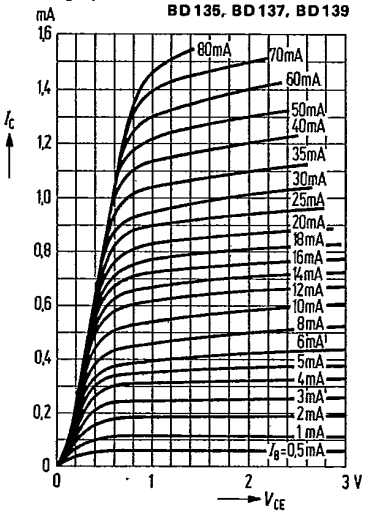
BD 139

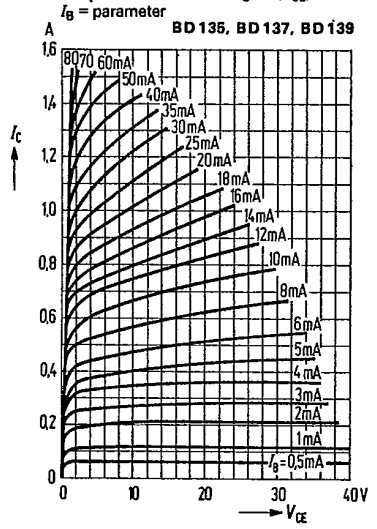
Output characteristics $I_C = f(V_{CE})$
I_B = parameter
BD 135, BD 137, BD 139



Output characteristics $I_C = f(V_{CE})$
I_B = parameter
BD 135, BD 137, BD 139



Output characteristics $I_C = f(V_{CE})$
I_B = parameter
BD 135, BD 137, BD 139



Transition frequency $f_T = f(I_C)$
(V_{CE} = 10 V)
BD 135, BD 137, BD 139