PNP Silicon Transistors

SIEMENS AKTIENGESELLSCHAF

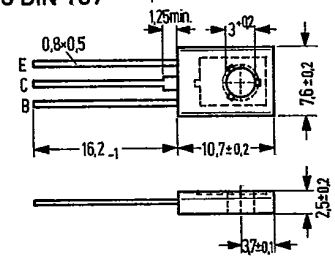
BD 136
BD 138
BD 140

For AF driver and output stages of medium performance

BD 136, BD 138, and BD 140 are epitaxial PNP 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 135, BD 137, and BD 139 as complementary pairs the transistros BD 136, BD 138, and BD 140 are designed for use in driver stages of high performance AF amplifiers.

Type	Ordering code
BD 136	Q62702-D107
BD 136-6	Q62702-D107-V1
BD 136-10	Q62702-D107-V2
BD 136-16	Q62702-D107-V3
BD 136 paired	Q62702-D107-P
BD 138	Q62702-D109
BD 138-6	Q62702-D109-V1
BD 138-10	Q62702-D109-V2
BD 138 paired	Q62702-D109-P
BD 140	Q62702-D111
BD 140-6	Q62702-D111-V1
BD 140-10	Q62702-D111-V2
BD 140 paired	Q62702-D111-P
BD 136/135 compl. paired	Q62702-D139-S1
BD 138/137 compl. paired	Q62702-D140-S1
BD 140/139 compl. paired	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 max 0.8 Nm. Below the screw head, a 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 136	BD 138	BD 140	
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 temperature 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
Juction to case bottom	R_{thJC} [1])	≦10	≦10	≦10	K/W

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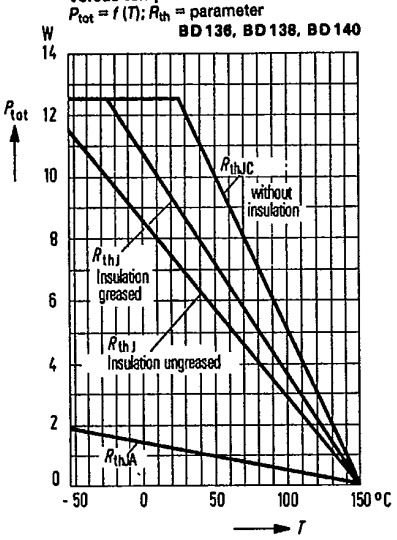
Static characteristics (T_{amb} = 25 °C)

The transistors BD 136, BD 138, and BD 140 are grouped according to the DC current gain h_{FE} and marked by numerals of the German DIN standard.

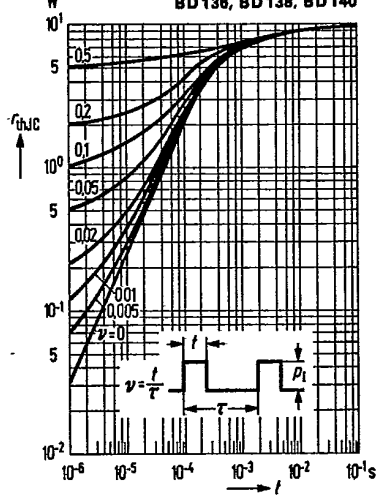
h_{FE} group	6	10	16	
Type	**BD 136** **BD 138** **BD 140**	**BD 136** **BD 138** **BD 140**	**BD 136** – –	**BD 136** **BD 138** **BD 140**
$-I_C$ (mA)	h_{FE} I_C/I_B	h_{FE} I_C/I_B	h_{FE} I_C/I_B	$-V_{BE}$ (V)
5	>25	>25	>25	–
150	63 (40 to 100)	100 (63 to 160)	160 (100 to 250)	–
500	>25	>25	>25	1.2

Static characteristics (T_{amb} = 25 °C)		**BD 136**	**BD 138**	**BD 140**	
Collector-emitter-saturation voltage ($-I_C$ = 500 mA; $-I_B$ = 500 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	>75	>75	>75	MHz

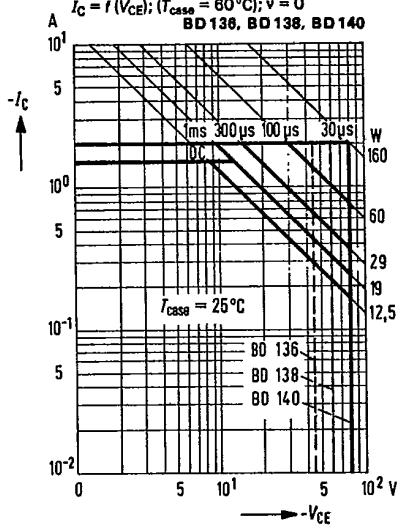
Total perm. power dissipation versus temperature
$P_{tot} = f(T)$; R_{th} = parameter
BD 136, BD 138, BD 140



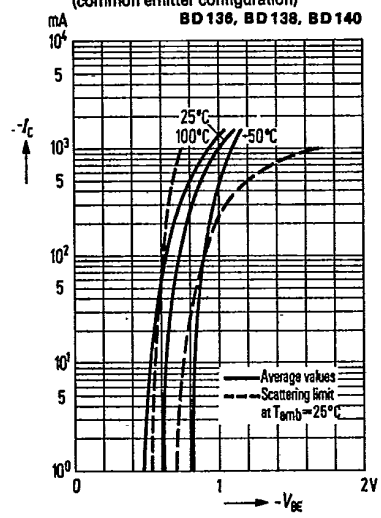
Permissible pulse load
$\frac{K}{W}$ $r_{thJC} = f(t)$; v = parameter
BD 136, BD 138, BD 140



Permissible operating range
$I_C = f(V_{CE})$; (T_{case} = 60 °C); v = 0
BD 136, BD 138, BD 140



Collector current $I_C = f(V_{BE})$
V_{CE} = 2 V; T_{amb} = parameter
(common emitter configuration)
BD 136, BD 138, BD 140



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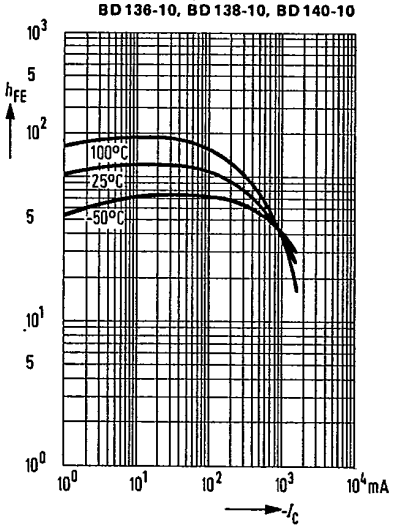
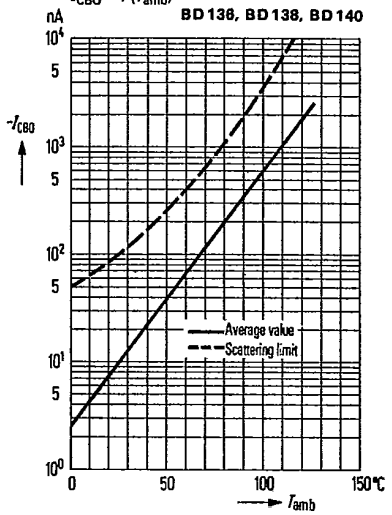
BD 136
BD 138
BD 140

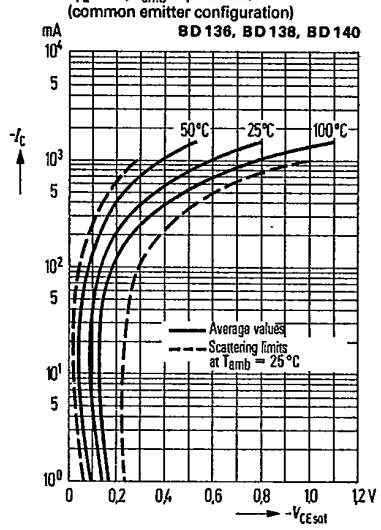
DC current gain $h_{FE} = f(I_C)$
$V_{CE} = 2$ V; T_{amb} = parameter
BD 136-10, BD 138-10, BD 140-10



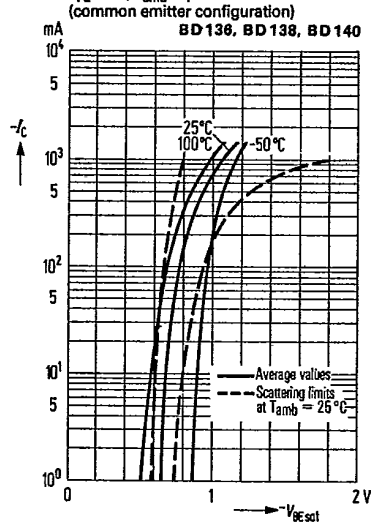
Collector cutoff current versus temperature
$I_{CBO} = f(T_{amb})$
BD 136, BD 138, BD 140



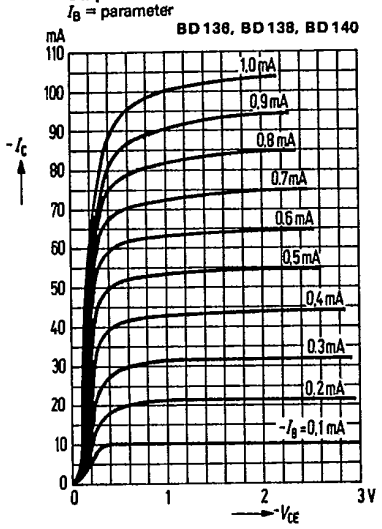
Collector-emitter saturation voltage
$V_{CEsat} = f(I_C)$
$h_{FE} = 10$; T_{amb} = parameter
(common emitter configuration)
BD 136, BD 138, BD 140



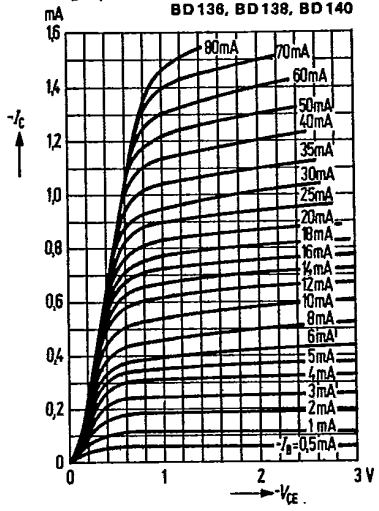
Base-emitter saturation voltage
$V_{BEsat} = f(I_C)$
$h_{FE} = 10$; T_{amb} = parameter
(common emitter configuration)
BD 136, BD 138, BD 140



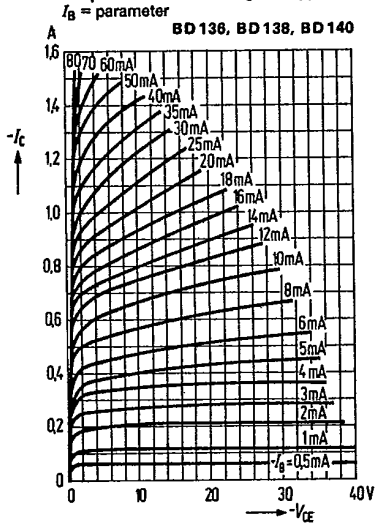
Output characteristics $I_C = f(V_{CE})$
I_B = parameter
BD 136, BD 138, BD 140



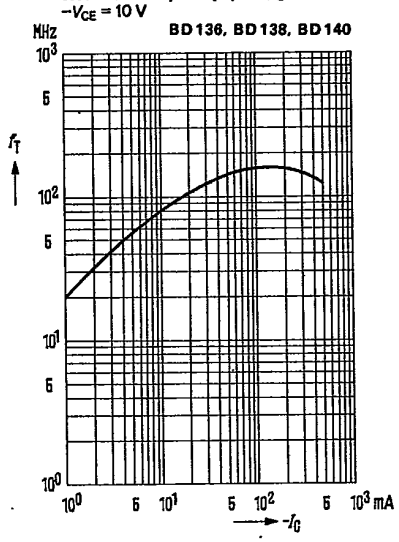
Output characteristics $I_C = f(V_{CE})$
I_B = parameter
BD 136, BD 138, BD 140



Output characteristics $I_C = f(V_{CE})$
I_B = parameter
BD 136, BD 138, BD 140



Transition frequency $f_T = f(I_C)$
$-V_{CE}$ = 10 V
BD 136, BD 138, BD 140



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