

PNP Silicon Transistors

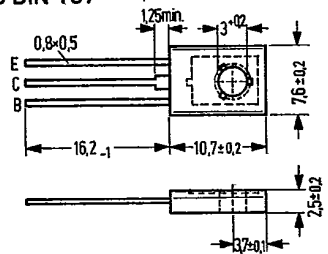
SIEMENS AKTIENGESELLSCHAFT

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 transistors BD 136, BD 138, and BD 140 are designed for use in driver stages of high performance AF amplifiers.

Type	Ordering code	Type	Ordering code
BD 136	Q62702-D107	Mica washer	Q62902-B62
BD 136-6	Q62702-D107-V1	Spring washer	Q62902-B63
BD 136-10	Q62702-D107-V2	A 3 DIN 137	
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		



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 60 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 ( $R_{BE} \leq 1 \text{ k}\Omega$ )	-	-	100	V
Collector-base voltage	45	60	-	V
Collector-emitter voltage	45	60	80	V
Emitter-base voltage	5	5	5	V
Collector peak current	2.0	2.0	2.0	A
Collector current	1.5	1.5	1.5	A
Base current	0.2	0.2	0.2	A
Junction temperature	150	150	150	°C
Storage temperature range	-55 to +125			°C
Total power dissipation ( $T_{case} \leq 25^\circ\text{C}$ )	12.5	12.5	12.5	W

Thermal resistance

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

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

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

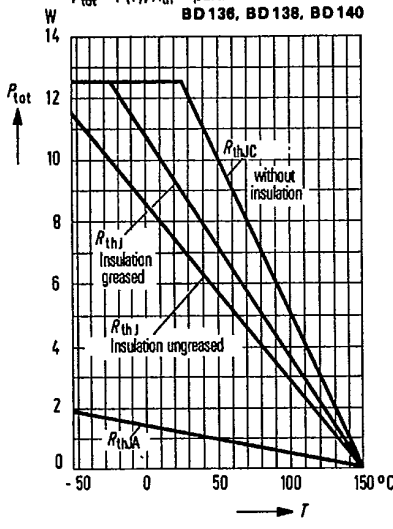
		BD 136	BD 138	BD 140	
Collector-emitter-saturation voltage ( $-I_C = 500\text{ mA}$ ; $-I_B = 500\text{ mA}$ )	$-V_{CEsat}$	<0.5	>0.5	<0.5	V
Collector cutoff current ( $-V_{CB} = 30\text{ V}$ )	$-I_{CBO}$	<100	<100	<100	nA
Collector cutoff current ( $-V_{CB} = 30\text{ V}$ ; $T_{amb} = 125^{\circ}\text{C}$ )	$-I_{CBO}$	$\leq 10$	$\leq 10$	$\leq 10$	$\mu\text{A}$
Emitter cutoff current ( $-V_{EB} = 5\text{ V}$ )	$-I_{EBO}$	$\leq 10$	$\leq 10$	$\leq 10$	$\mu\text{A}$
Collector-emitter breakdown voltage ( $-I_{CEO} = 50\text{ mA}$ )	$-V_{(BR)CEO}$	>45	>60	>80	V
Condition for matching pairs ( $-I_C = 150\text{ mA}$ ; $-V_{CE} = 2\text{ V}$ )	$\frac{h_{FE1}}{h_{FE2}}$	$\leq 1.41$	$\leq 1.41$	$\leq 1.41$	-

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

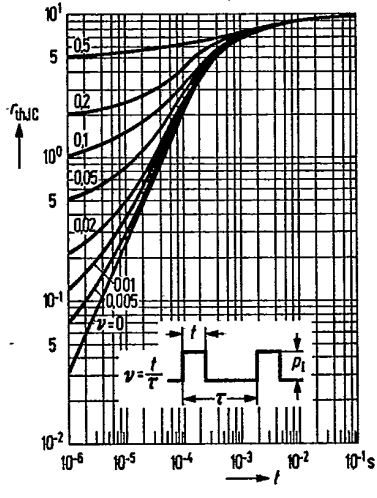
Transition frequency ( $-I_C = 50\text{ mA}$ ; $-V_{CE} = 10\text{ V}$ ; $f = 100\text{ MHz}$ )	$f_T$	>75	>75	>75	MHz
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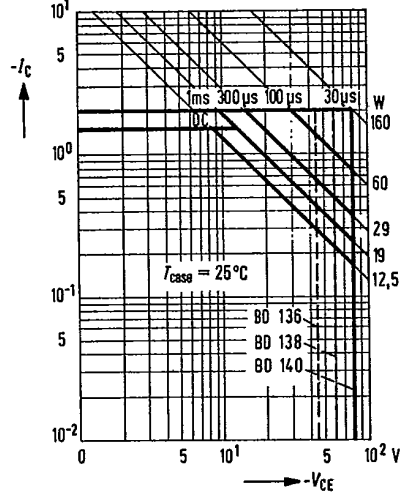
**Total perm. power dissipation versus temperature**  
 $P_{tot} = f(T); R_{th} = \text{parameter}$   
BD 136, BD 138, BD 140



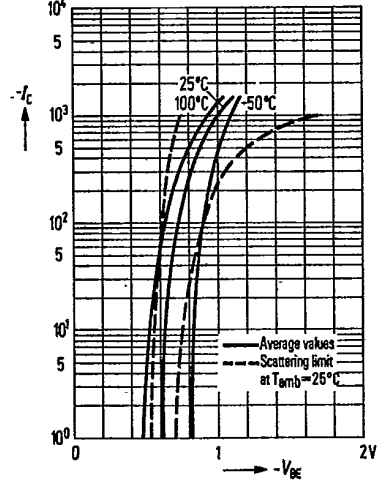
**Permissible pulse load**  
 $r_{thJC} = f(t); v = \text{parameter}$   
BD 136, BD 138, BD 140



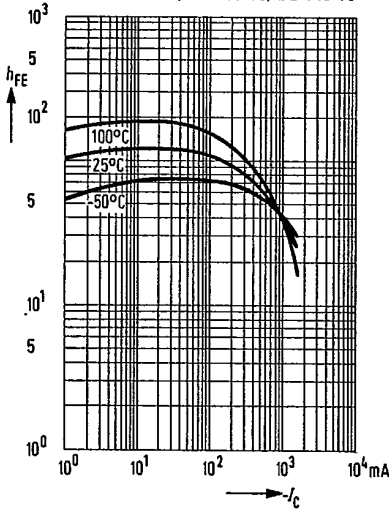
**Permissible operating range**  
 $I_C = f(V_{CE}); (T_{case} = 80^\circ\text{C}); v = 0$   
BD 136, BD 138, BD 140



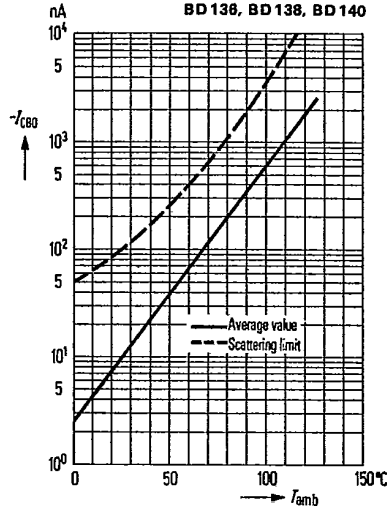
**Collector current  $I_C = f(V_{CE})$**   
 $V_{CE} = 2\text{ V}; T_{amb} = \text{parameter}$   
(common emitter configuration)  
BD 136, BD 138, BD 140



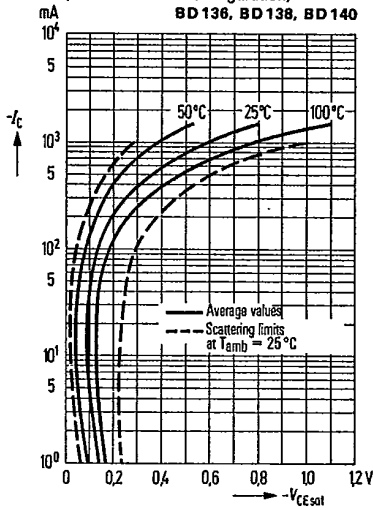
**DC current gain  $h_{FE} = f(I_C)$**   
 $V_{CE} = 2\text{ V}; T_{amb} = \text{parameter}$   
 BD 136-10, BD 138-10, BD 140-10



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



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



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

