

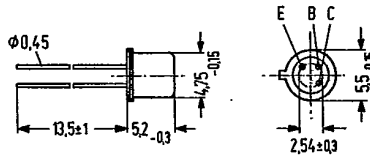
PNP Silicon Transistors

— SIEMENS AKTIENGESELLSCHAFT

BC 177  
BC 178  
BC 179

BC 177, BC 178, and BC 179 are epitaxial PNP silicon planar transistors in TO 18 case (18 A 3 DIN 41876). The collector is electrically connected to the case. The transistors are particularly suitable for use in AF input and driver stages.

Type	Ordering code
BC 177 <sup>1)</sup>	Q62702-C684
BC 177 A	Q62702-C141
BC 177 B	Q62702-C142
BC 178 <sup>1)</sup>	Q62702-C685
BC 178 A	Q62702-C153
BC 178 B	Q62702-C154
BC 178 C	Q62702-C155
BC 179 <sup>1)</sup>	Q62702-C686
BC 179 B	Q62702-C303
BC 179 C	Q62702-C145



Approx. weight 0.33 g Dimension in mm

Maximum ratings ( $T_{amb} = 25^\circ\text{C}$ )		BC 177	BC 178	BC 179	
Collector-emitter voltage	$-V_{CES}$	50	30	25	V
Collector-emitter voltage	$-V_{CEO}$	45	25	20	V
Emitter-base voltage	$-V_{EBO}$	5	5	5	V
Collector current	$-I_C$	100	100	50	mA
Collector peak current	$-I_{CM}$	200	200	—	mA
Base current	$-I_B$	50	50	5	mA
Base peak current	$-I_{BM}$	100	100	—	mA
Junction temperature	$T_j$	175	175	175	$^\circ\text{C}$
Storage temperature range	$T_{stg}$		-55 to +125		$^\circ\text{C}$
Total power dissipation	$P_{tot}$	300	300	300	mW

Thermal resistance

Junction to ambient air	$R_{thJA}$	$\leq 500$	$\leq 500$	$\leq 500$	K/W
Junction to case	$R_{thJC}$	$\leq 200$	$\leq 200$	$\leq 200$	K/W

1) If the order does not include any exact indication of the current amplification group desired, a transistor of a current amplification group just available from stock will be delivered.

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

The transistors are grouped according to the DC current gain  $h_{FE}$  and are marked with A, B, C. At  $-V_{CE} = 5\text{ V}$  and the collector currents indicated below, the following static characteristics apply:

$h_{FE}$ group	A	B	C
Type	BC 177 BC 178 -	BC 177 BC 178 BC 179	- BC 178 BC 179
$-I_C$ mA	$h_{FE}$ $I_C/I_B$	$h_{FE}$ $I_C/I_B$	$h_{FE}$ $I_C/I_B$
0.01	90	150	270
2	170 (120 to 220)	290 (180 to 460)	500 (380 to 800)
100 <sup>1)</sup>	120 <sup>3)</sup>	200 <sup>3)</sup>	400 <sup>3)</sup>

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

Type	BC 177, BC 178, BC 179				
$V_{CE}$ V	$-I_C$ mA	$-I_B$ mA	$-V_{BE}$ V	$-V_{CEsat}$ V	$-V_{BEsat}$ V
5	0.1	-	0.57	-	-
5	2	-	0.62 (0.55 to 0.7)	-	-
5	100	-	0.8	-	-
-	10	0.5	-	0.1 (<0.2) <sup>1)</sup>	0.7 (<0.8)
-	100 <sup>3)</sup>	5	-	0.2 (<0.6) <sup>1)3)</sup>	0.85 (<1) <sup>3)</sup>
5	10	-	-	0.2 (<0.6) <sup>2)</sup>	-

		BC 177	BC 178	BC 179	
Collector cutoff current ( $-V_{CES} = 20\text{ V}$ )	$-I_{CES}$	2 (<100)	2 (<100)	2 (<100)	nA
Collector cutoff current ( $-V_{CES} = 20\text{ V}; T_{amb} = 125^{\circ}\text{C}$ )	$-I_{CES}$	<4	<4	<4	$\mu\text{A}$
Emitter-base breakdown voltage ( $-I_{EB} = 10\ \mu\text{A}$ )	$-V_{(BR)EBO}$	>5	>5	>5	V
Collector-emitter breakdown voltage ( $-I_{CE} = 2\text{ mA}$ )	$-V_{(BR)CEO}$	>45	>25	>20	V
Collector-emitter breakdown voltage ( $-I_{CE} = 10\ \mu\text{A}$ )	$-V_{(BR)CES}$	>50	>30	>25	V

1) The transistor is overloaded to such an extent that the DC current gain decreases to  $h_{FE} = 20$ .  
 2)  $I_C = 10\text{ mA}$  for the characteristics, which passes at constant base current the point  $I_C = 11\text{ mA}; V_{CE} = 1\text{ V}$ .  
 3) These values do not apply to BC 179.

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BC 177  
BC 178  
BC 179

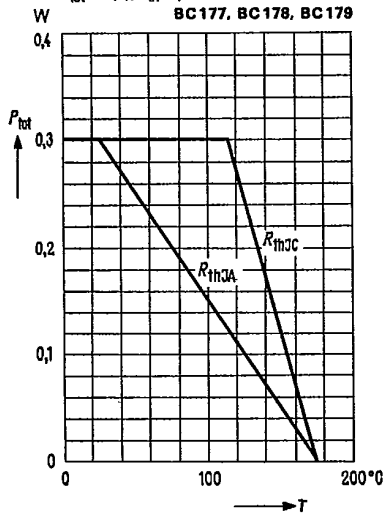
Dynamic characteristics ( $T_{amb} = 25^\circ\text{C}$ )		BC 177	BC 178	BC 179		
Transition frequency ( $-I_C = 10\text{ mA}$ ; $-V_{CE} = 5\text{ V}$ ; $f = 50\text{ MHz}$ )		$f_T$	130	130	130	MHz
Collector-base capacitance ( $-V_{CB0} = 10\text{ V}$ ; $f = 1\text{ MHz}$ )		$C_{CB0}$	4.5 (<7)	4.5 (<7)	4.5 (<7)	pF
Noise figure ( $-I_C = 0.2\text{ mA}$ ; $-V_{CE} = 5\text{ V}$ ; $R_g = 2\text{ k}\Omega$ ; $\Delta f = 200\text{ Hz}$ ; $f = 1\text{ kHz}$ ; $f = 30\text{ to }15000\text{ Hz}$ )		NF	<10	<10	<4	dB
		NF	-	-	2 (<4)	dB

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

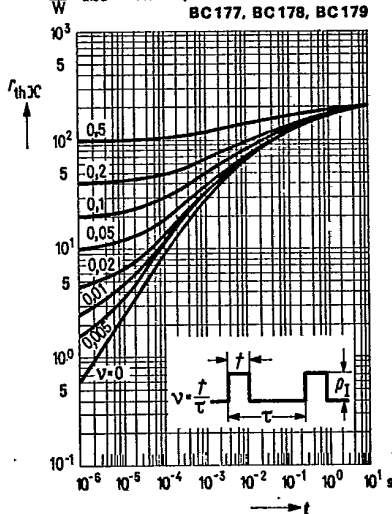
$I_C = 2\text{ mA}$ ;  $V_{CB} = 5\text{ V}$ ;  $f = 1\text{ kHz}$

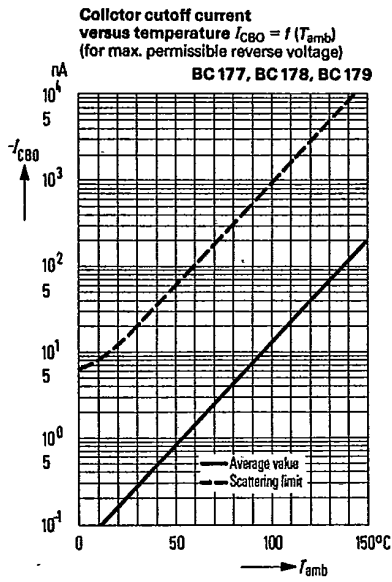
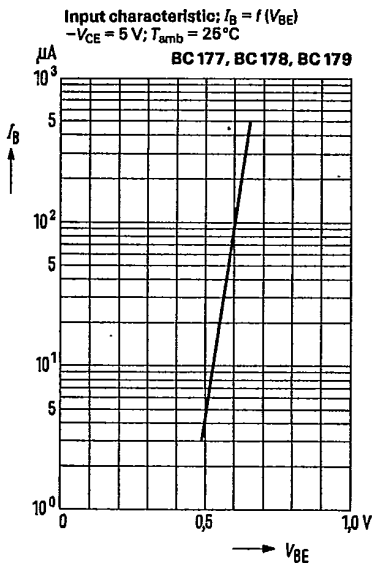
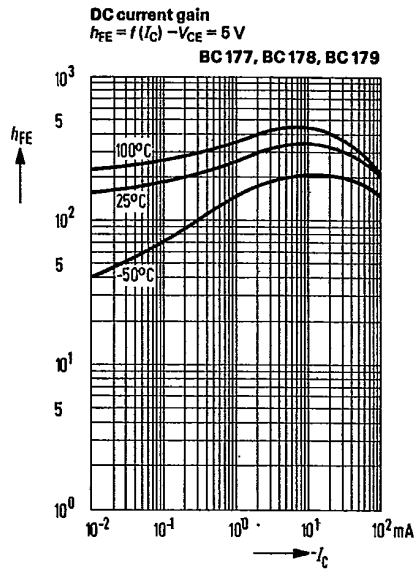
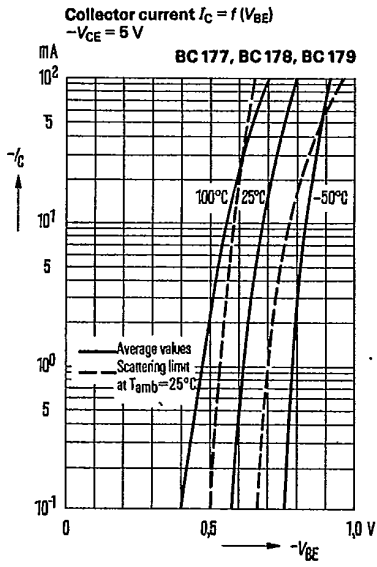
$h_{FE}$ group	A	B	C	
Type	BC 177 BC 178 -	BC 177 BC 178 BC 179	- BC 178 BC 179	
$h_{11e}$	2.7 (1.6 to 4.5)	4.5 (3.2 to 8.5)	8.7 (6 to 15)	k $\Omega$
$h_{12e}$	1.5	2	3	$10^{-4}$
$h_{21e}$	220	330	600	-
$h_{22e}$	18 (<30)	35 (<60)	60 (<110)	$\mu\text{S}$

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



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

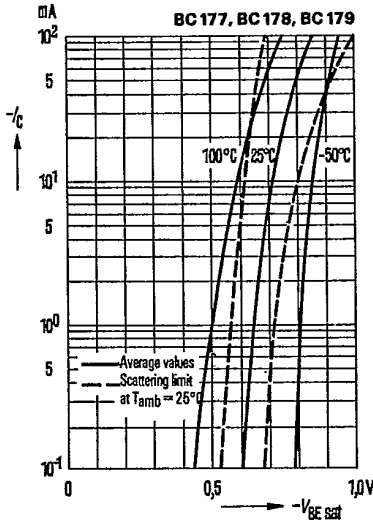
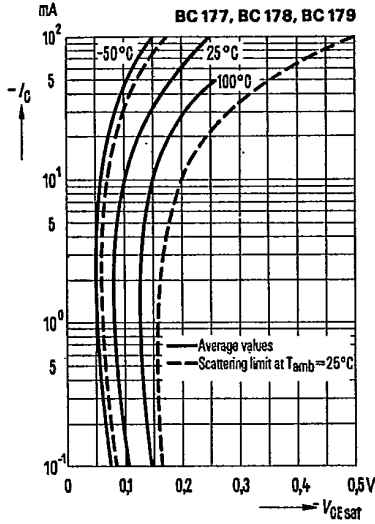




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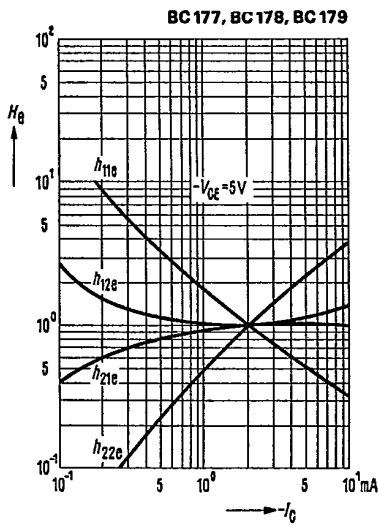
BC 177  
 BC 178  
 BC 179

Collector-emitter saturation voltage  
 $V_{CEsat} = f(I_C); h_{FE} = 20$



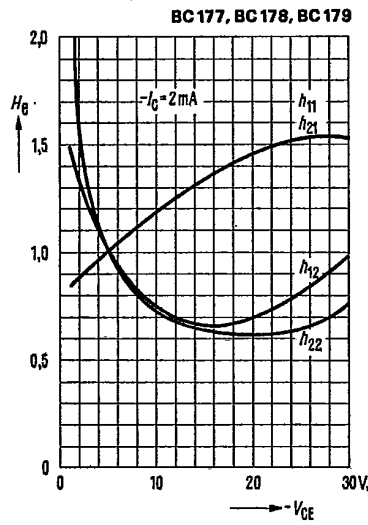
$h$ -parameter vs. collector current  
 $-V_{CE} = 5\text{ V}; T_{amb} = 25^\circ\text{C}$

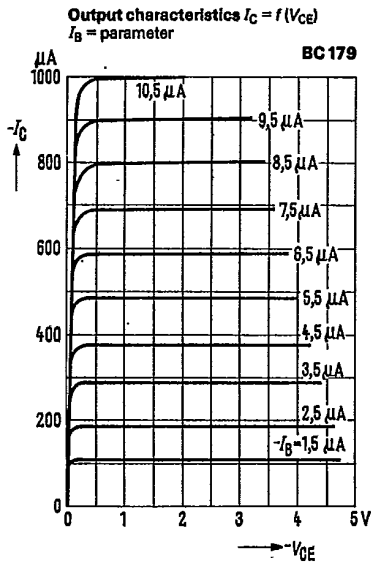
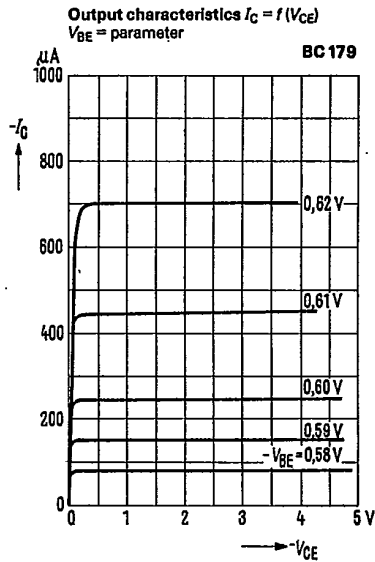
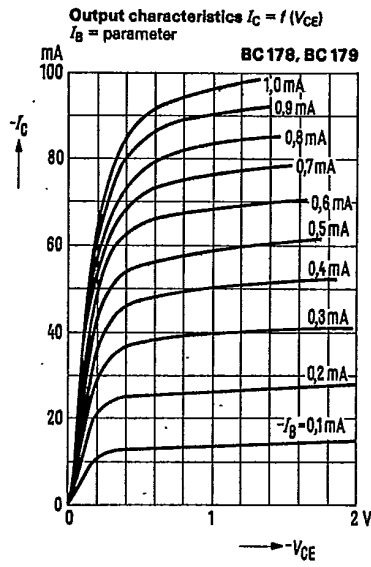
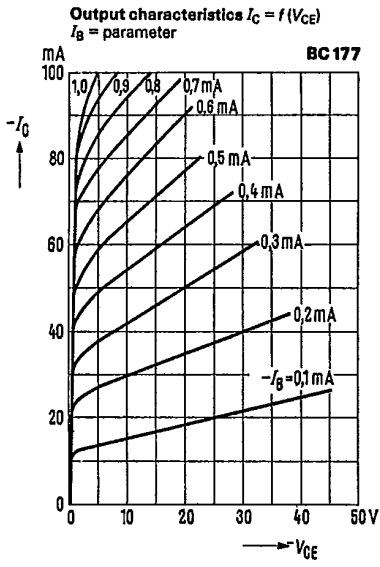
$$H_a = \frac{h_o(I_C)}{h_o(I_C = 2\text{ mA})} = f(I_C)$$



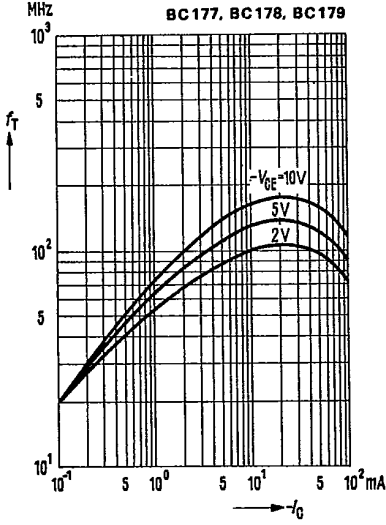
$h$ -parameter vs. collector-emitter voltage  
 $-I_C = 2\text{ mA}; T_{amb} = 25^\circ\text{C}$

$$H_a = \frac{h_o(V_{CE})}{h_o(V_{CE} = 5\text{ V})} = f(V_{CE})$$

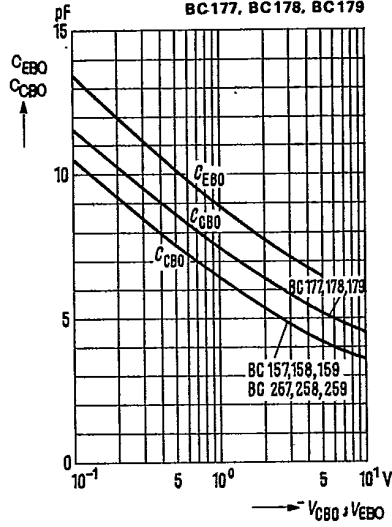




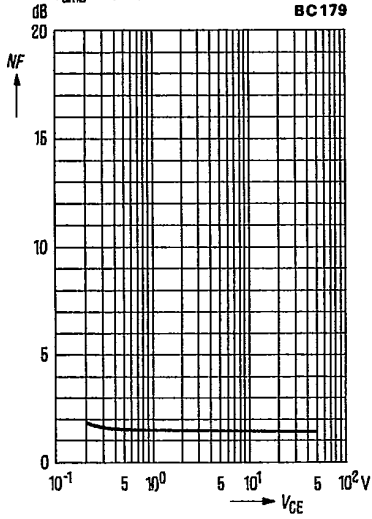
Transition frequency  
 $f_T = f(I_C); (T_{amb} = 25^\circ\text{C})$



Collector base capacitance  $C_{CB0} = f(V_{CB0})$   
 Emitter base capacitance  $C_{EB0} = f(V_{EB0})$   
 $f = 1\text{MHz}; T_{amb} = 25^\circ\text{C}$



Noise figure  $NF = f(V_{CE})$   
 $-I_C = 0.2\text{ mA}; R_G = 2\text{ k}\Omega; f = 1\text{ kHz}$   
 $T_{amb} = 25^\circ\text{C}$



Noise figure  $NF = f(f)$   
 $R_G = 2\text{ k}\Omega; -V_{CE} = 5\text{ V}; -I_C = 0.2\text{ mA}$   
 $T_{amb} = 25^\circ\text{C}$

