

PNP Silicon Transistors

- SIEMENS AKTIENGESELLSCHAFT

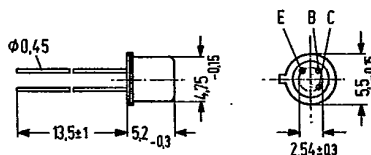
BC 177

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 ¹⁾	Q62702-C684
BC 177 A	Q62702-C141
BC 177 B	Q62702-C142
BC 178 ¹⁾	Q62702-C685
BC 178 A	Q62702-C153
BC 178 B	Q62702-C154
BC 178 C	Q62702-C155
BC 179 ¹⁾	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}	≤ 500	≤ 500	≤ 500	K/W
Junction to case	R_{thJC}	≤ 200	≤ 200	≤ 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.

T-24-17

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 ¹⁾	120 ³⁾	200 ³⁾	400 ³⁾

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) ¹⁾	0.7 (<0.8)
—	100 ³⁾	5	—	0.2 (<0.6) ¹⁾³⁾	0.85 (<1) ³⁾
5	10	—	—	0.2 (<0.6) ²⁾	—

		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	μA
Emitter-base breakdown voltage ($-I_{EB} = 10\text{ }\mu\text{A}$)	$-V_{(BR)EBO}$	>5	>5	>5	V
Collector-emitter breakdown voltage ($-I_{CE} = 2\text{ mA}$)	$-V_{(BR)CEO}$	>45	>25	>20	V
Collector-emitter breakdown voltage ($-I_{CE} = 10\text{ }\mu\text{A}$)	$-V_{(BR)CES}$	>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.

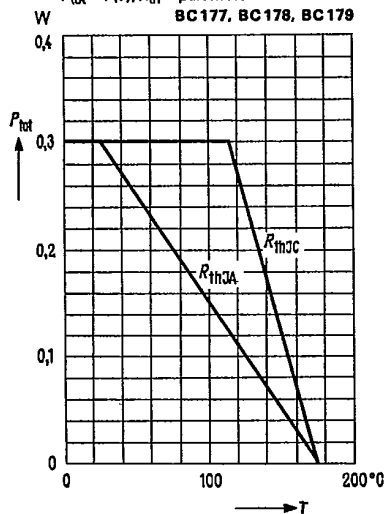
Dynamic characteristics ($T_{amb} = 25^{\circ}\text{C}$)		BC 177	BC 178	BC 179	
Transition frequency ($-I_C = 10\text{ mA}$; $-V_{CE} = 5\text{ V}$; $f = 60\text{ MHz}$)					
f_T		130	130	130	MHz
Collector-base capacitance ($-V_{CBO} = 10\text{ V}$; $f = 1\text{ MHz}$)					
C_{CBO}		4.5 (<7)	4.5 (<7)	4.5 (<7)	pF
Noise figure ($-I_C = 0.2\text{ mA}$; $-V_{CE} = 5\text{ V}$; $R_g = 2\text{ k}\Omega$; $\Delta f = 200\text{ Hz}$; $f = 1\text{ kHz}$)					
NF		<10	<10	<4	dB
$f = 30\text{ to }15000\text{ Hz}$	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 Ω
h_{12e}	1.5	2	3	10^{-4}
h_{21e}	220	330	600	—
h_{22e}	18 (<30)	35 (<60)	60 (<110)	μS

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

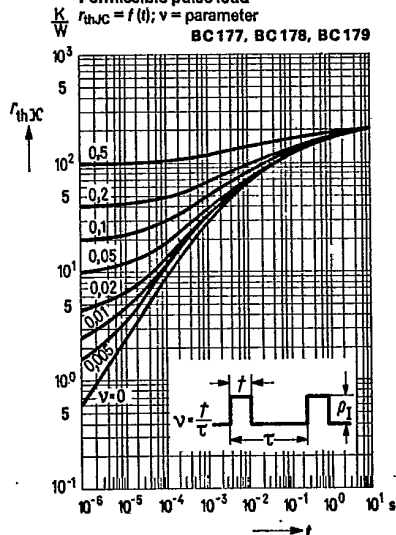
BC177, BC178, BC179



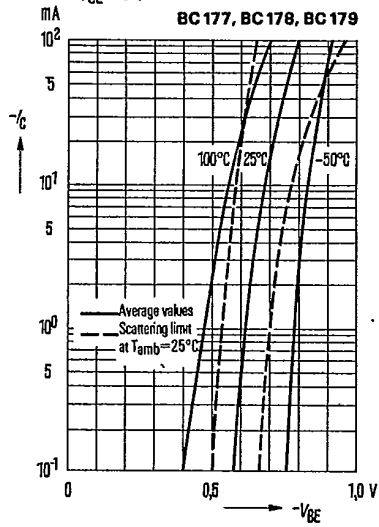
Permissible pulse load

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

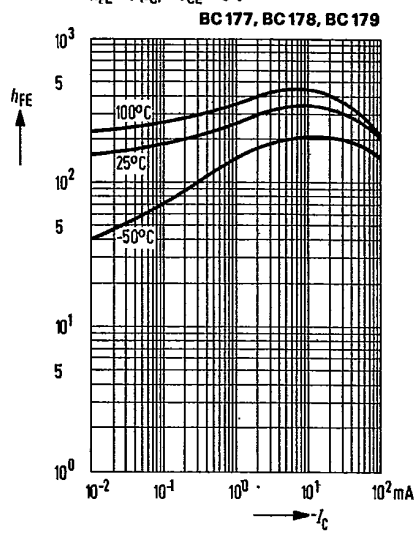
BC177, BC178, BC179



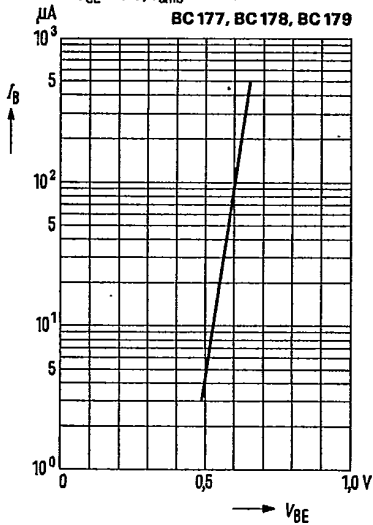
Collector current $I_C = f(V_{BE})$
 $-V_{CE} = 5\text{ V}$



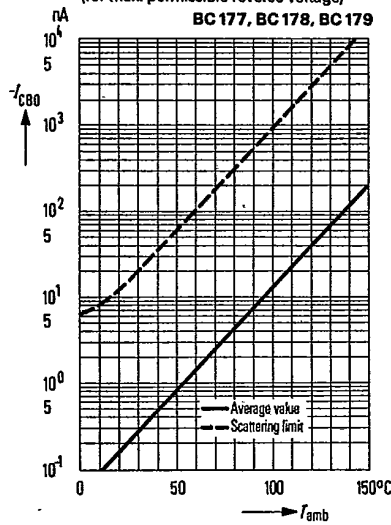
DC current gain
 $h_{FE} = f(I_C) - V_{CE} = 5\text{ V}$



Input characteristic: $I_B = f(V_{BE})$
 $-V_{CE} = 5\text{ V}; T_{amb} = 25^\circ\text{C}$



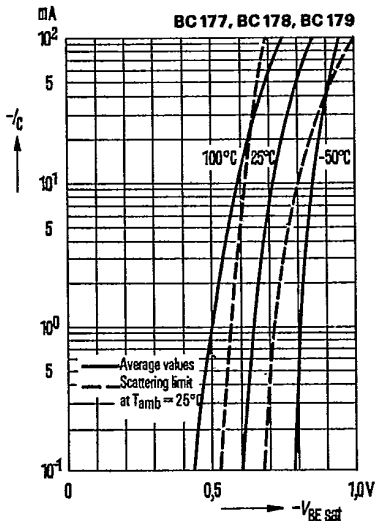
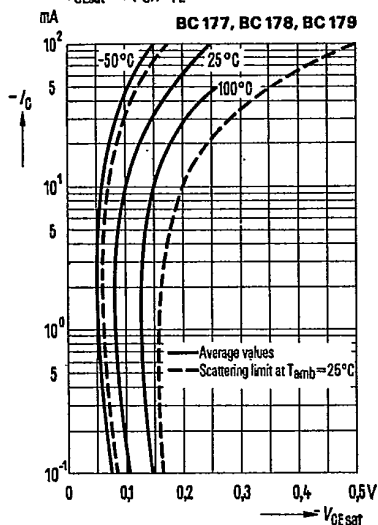
Collector cutoff current
versus temperature $I_{CBO} = f(T_{amb})$
(for max. permissible reverse voltage)



T-29-17

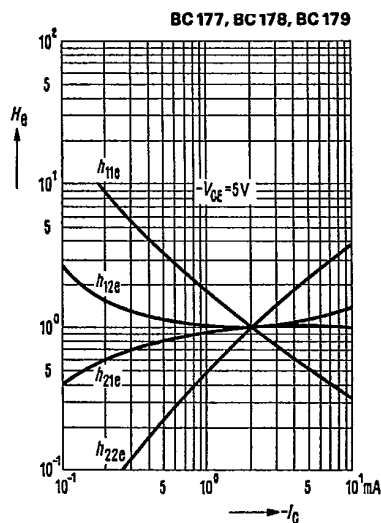
BC 177
BC 178
BC 179

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



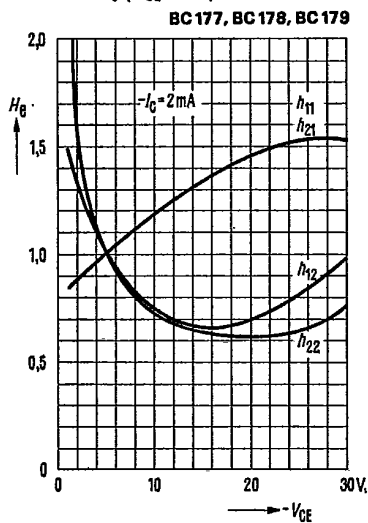
h -parameter vs. collector current
 $-V_{CE} = 5\text{ V}; T_{amb} = 25^\circ\text{C}$

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



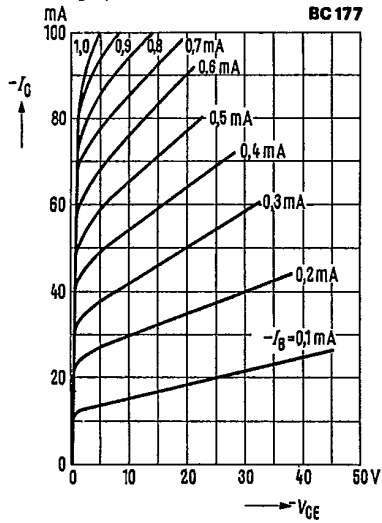
h -parameter vs. collector-emitter voltage
 $-I_C = 2\text{ mA}; T_{amb} = 25^\circ\text{C}$

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

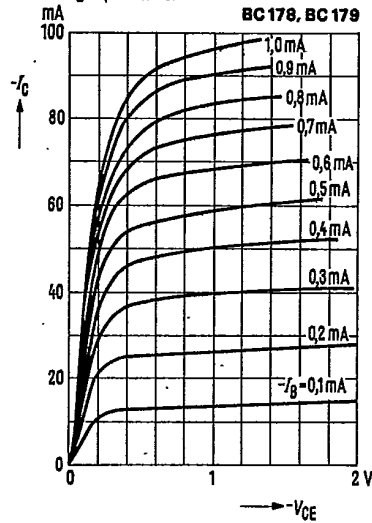


Output characteristics $I_C = f(V_{CE})$
 $I_B = \text{parameter}$

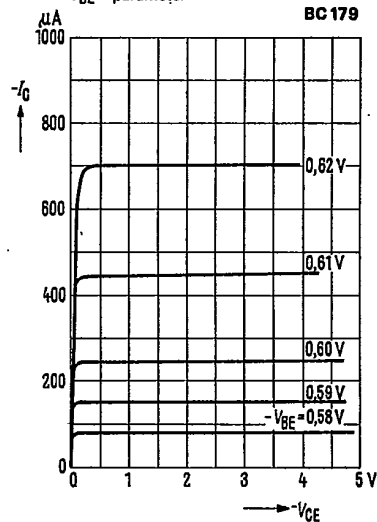
BC 177

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

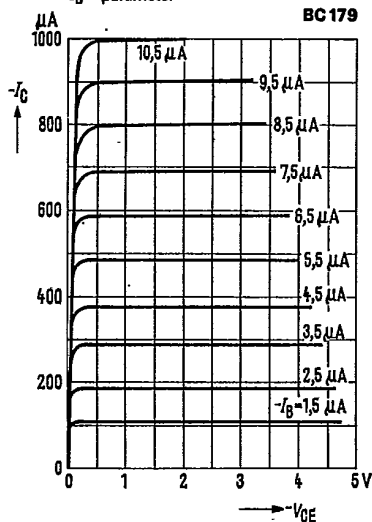
BC 178, BC 179

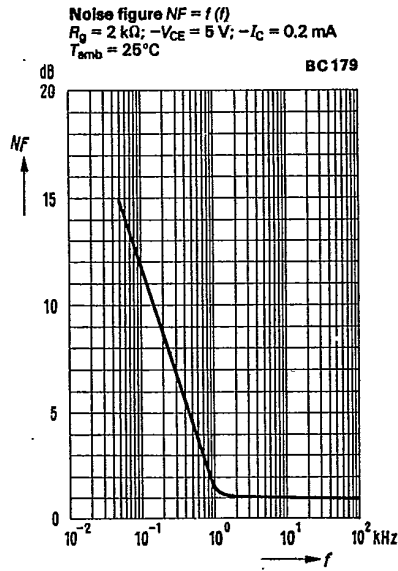
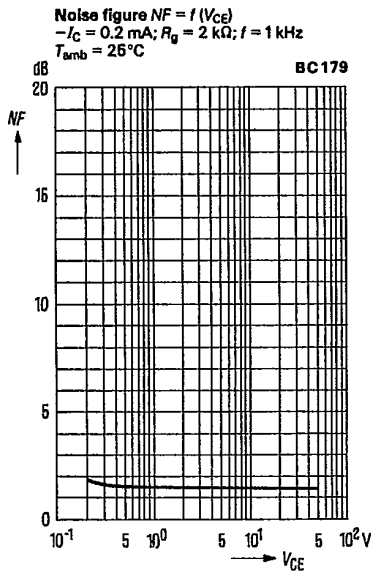
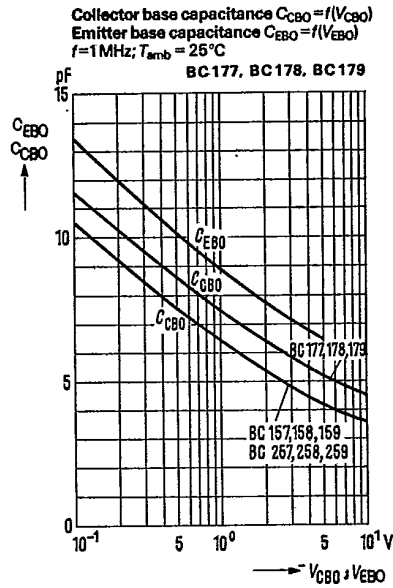
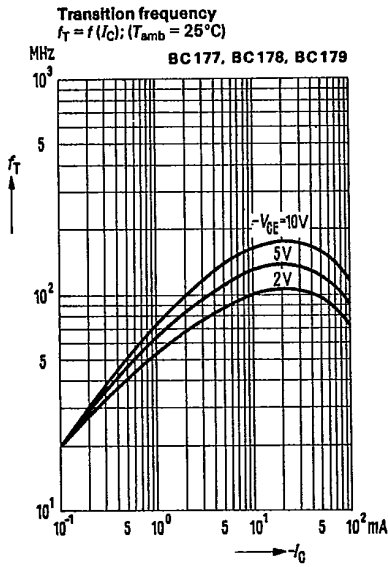
Output characteristics $I_C = f(V_{CE})$
 $V_{BE} = \text{parameter}$

BC 179

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

BC 179

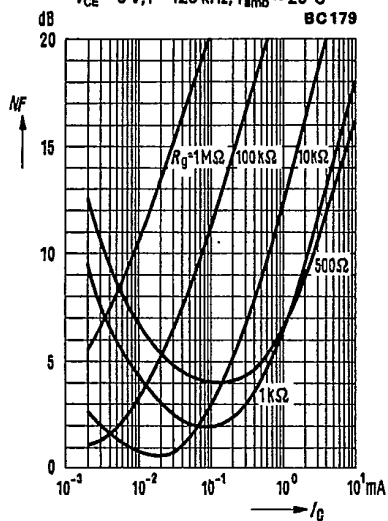




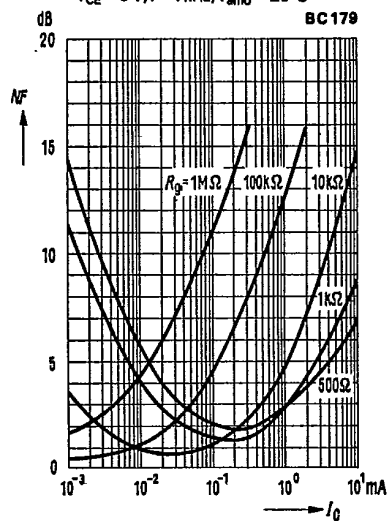
T-29-17

Noise figure $NF = f(I_G)$ $-V_{CE} = 5 \text{ V}; f = 120 \text{ kHz}; T_{amb} = 25^\circ\text{C}$

BC 179

Noise figure $NF = f(I_G)$ $-V_{CE} = 5 \text{ V}; f = 1 \text{ kHz}; T_{amb} = 25^\circ\text{C}$

BC 179

Noise figure $NF = f(I_G)$ $-V_{CE} = 5 \text{ V}; f = 10 \text{ kHz}; T_{amb} = 25^\circ\text{C}$

BC 179

