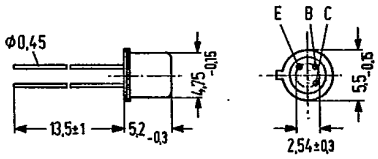
PNP Silicon Transistors

– SIEMENS AKTIENGESELLSCHAF

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 °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	°C
Storage temperature range	T_{stg}		−55 to +125		°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.

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

The transistors are grouped according to the DC current gain h_{FE} and are marked with A, B, C. At $-V_{CE}$ = 5 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 2 100[1]	90 170 (120 to 220) 120[3]	150 290 (180 to 460) 200[3]	270 500 (380 to 800) 400[3]

Static characteristics (T_{amb} = 25 °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 V)	$-I_{CES}$	2 (<100)	2 (<100)	2 (<100)	nA
Collector cutoff current ($-V_{CES}$ = 20 V; T_{amb} = 125 °C)	$-I_{CES}$	<4	<4	<4	µA
Emitter-base breakdown voltage ($-I_{EB}$ = 10 µA)	$-V_{(BR)EBO}$	>5	>5	>5	V
Collector-emitter breakdown voltage ($-I_{CE}$ = 2 mA)	$-V_{(BR)CEO}$	>45	>25	>20	V
Collector-emitter breakdown voltage ($-I_{CE}$ = 10 µA)	$-V_{(BR)CES}$	>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 mA for the characteristics, which passes at constant base current the point I_C = 11 mA; V_{CE} = 1 V.
3) These values do not apply to BC 179.

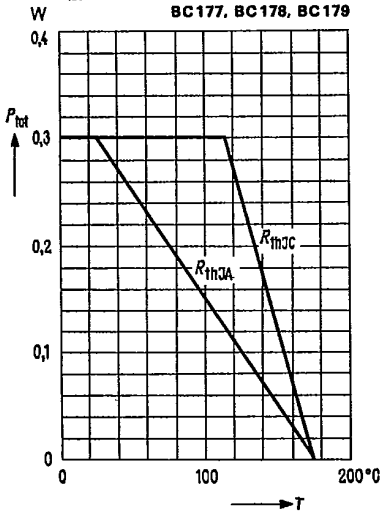
Dynamic characteristics (T_{amb} = 25 °C)		BC 177	BC 178	BC 179	
Transition frequency ($-I_C$ = 10 mA; $-V_{CE}$ = 5 V; f = 50 MHz)	f_T	130	130	130	MHz
Collector-base capacitance ($-V_{CBO}$ = 10 V; f = 1 MHz)	C_{CBO}	4.5 (<7)	4.5 (<7)	4.5 (<7)	pF
Noise figure ($-I_C$ = 0.2 mA; $-V_{CE}$ = 5 V)					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

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

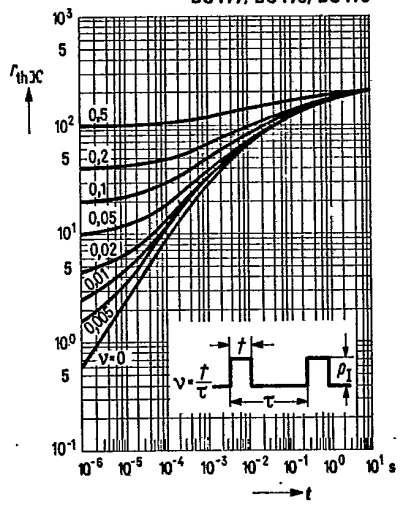
I_C = 2 mA; V_{CB} = 5 V; f = 1 kHz

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)	kΩ
h_{12e}	1.5	2	3	10^{-4}
h_{21e}	220	330	600	–
h_{22e}	18 (<30)	35 (<60)	60 (<110)	μS

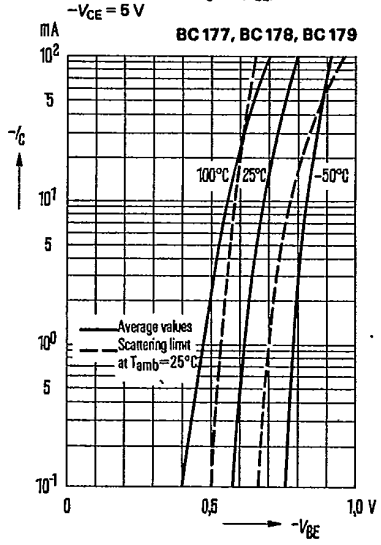
Total perm. power dissipation versus temperature
$P_{tot} = f(T)$; R_{th} = parameter
BC 177, BC 178, BC 179



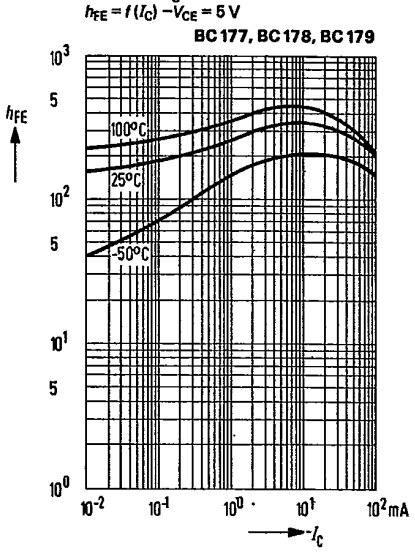
Permissible pulse load
$\frac{K}{W}$ $r_{thJC} = f(t)$; v = parameter
BC 177, BC 178, BC 179



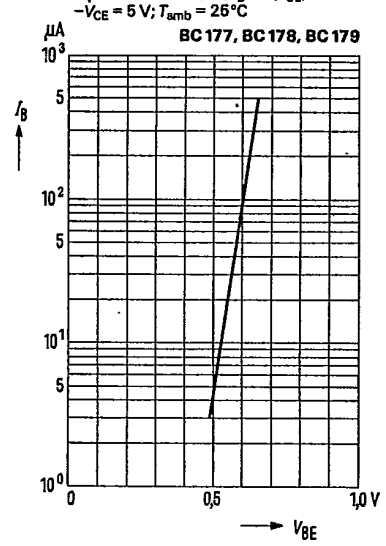
Collector current $I_C = f(V_{BE})$
$-V_{CE} = 5$ V



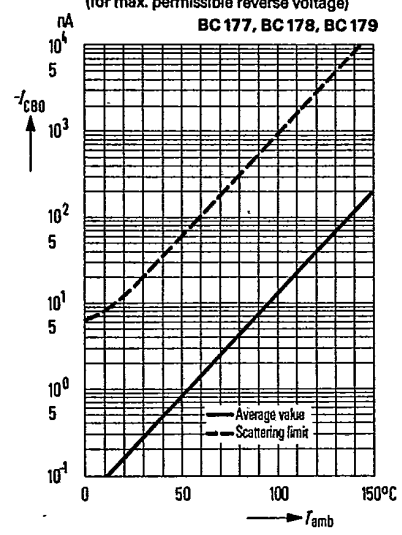
DC current gain
$h_{FE} = f(I_C)$ $-V_{CE} = 5$ V



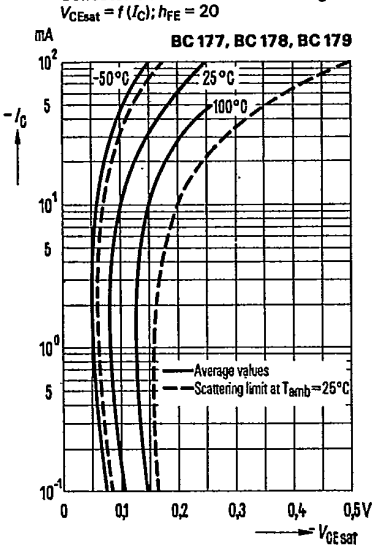
Input characteristic; $I_B = f(V_{BE})$
$-V_{CE} = 5$ V; $T_{amb} = 25$°C

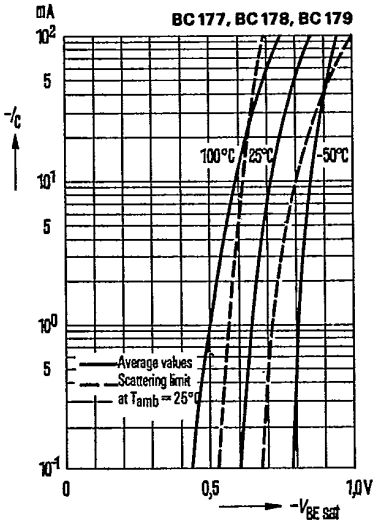


Collctor cutoff current versus temperature $I_{CBO} = f(T_{amb})$
(for max. permissible reverse voltage)



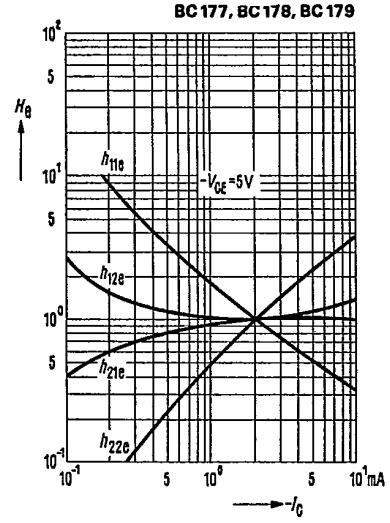
Collector-emitter saturation voltage
$V_{CEsat} = f(I_C)$; $h_{FE} = 20$





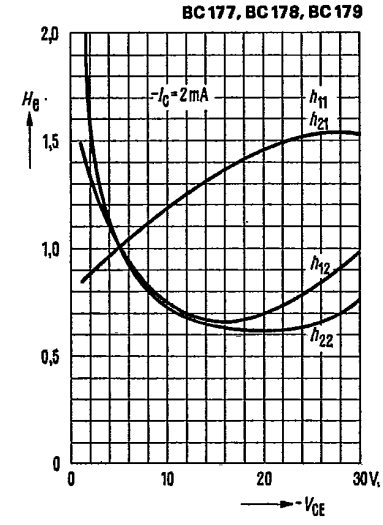
***h*-parameter vs. collector current**
$-V_{CE} = 5$ V; $T_{amb} = 25$°C

$$H_e = \frac{h_e\,(I_C)}{h_e\,(I_C = 2\text{ mA})} = f(I_C)$$



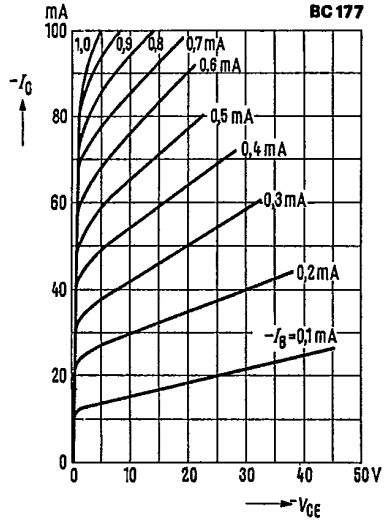
***h*-parameter vs. collector-emitter voltage**
$-I_C = 2$ mA; $T_{amb} = 25$°C

$$H_e = \frac{h_e\,(V_{CE})}{h_e\,(V_{CE} = 5\text{ V})} = f(V_{CE})$$

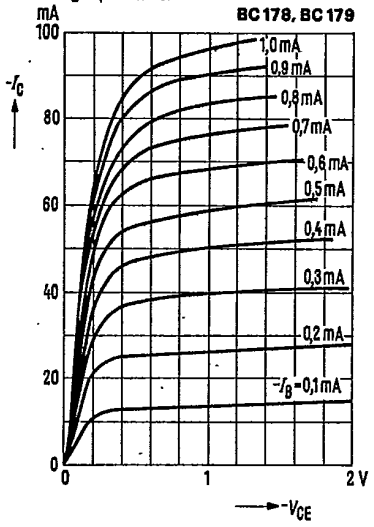


BC 177
BC 178
BC 179

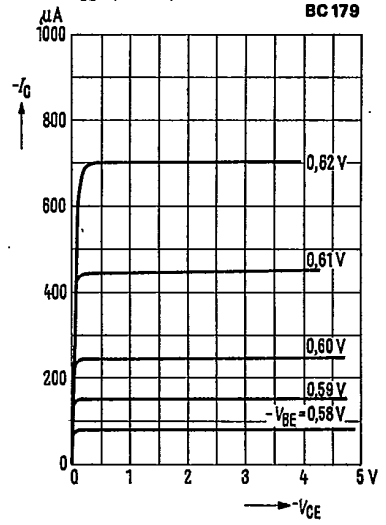
Output characteristics $I_C = f(V_{CE})$
I_B = parameter



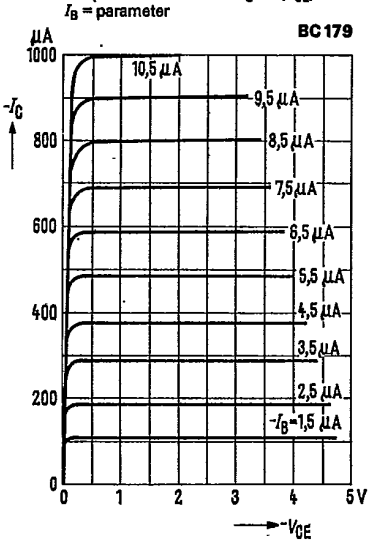
Output characteristics $I_C = f(V_{CE})$
I_B = parameter



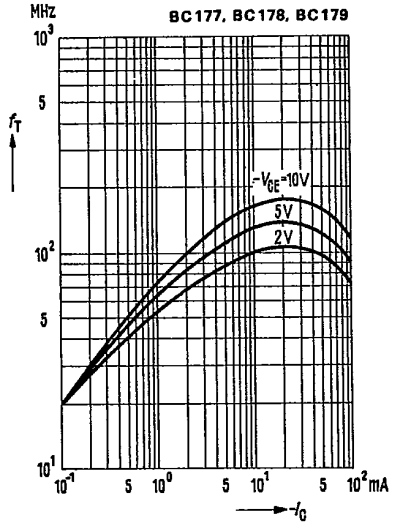
Output characteristics $I_C = f(V_{CE})$
V_{BE} = parameter



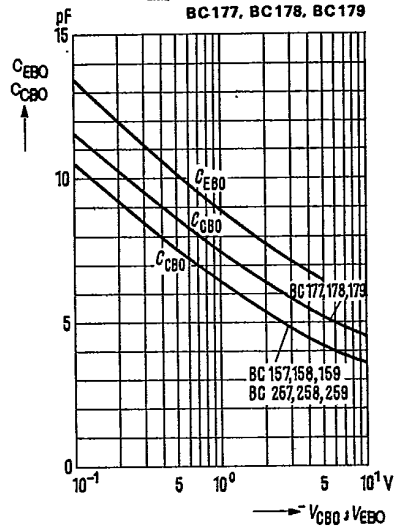
Output characteristics $I_C = f(V_{CE})$
I_B = parameter



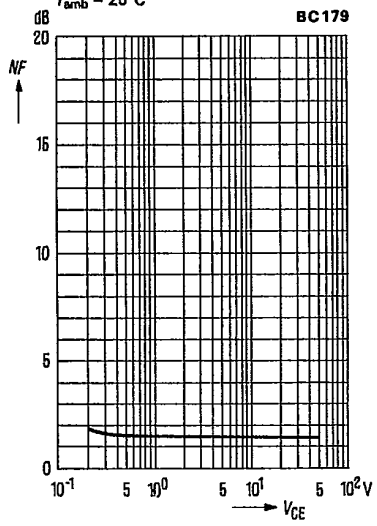
Transition frequency
$f_T = f(I_C)$; (T_{amb} = 25°C)



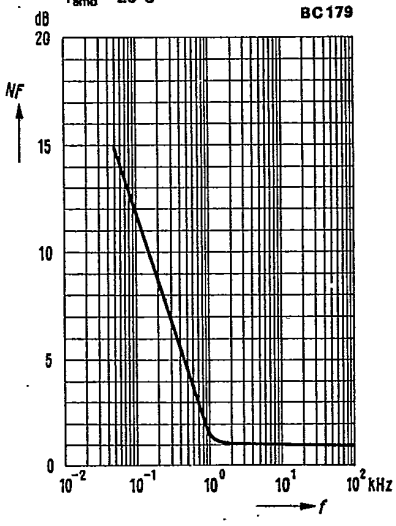
Collector base capacitance $C_{CBO} = f(V_{CBO})$
Emitter base capacitance $C_{EBO} = f(V_{EBO})$
f=1MHz; T_{amb} = 25°C



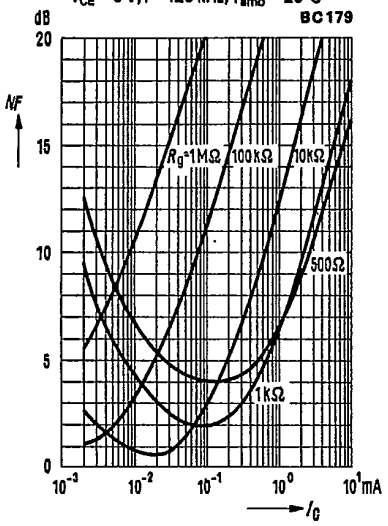
Noise figure $NF = f(V_{CE})$
$-I_C$ = 0.2 mA; R_g = 2 kΩ; f = 1 kHz
T_{amb} = 25°C



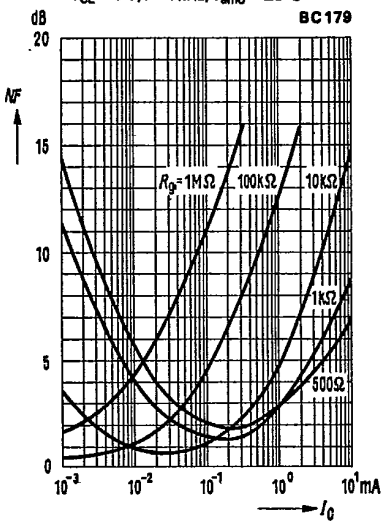
Noise figure $NF = f(f)$
R_g = 2 kΩ; $-V_{CE}$ = 5 V; $-I_C$ = 0.2 mA
T_{amb} = 25°C



Noise figure $NF = f(I_C)$
$-V_{CE} = 5$ V; $f = 120$ kHz; $T_{amb} = 25°C$



Noise figure $NF = f(I_C)$
$-V_{CE} = 5$ V; $f = 1$ kHz; $T_{amb} = 25°C$



Noise figure $NF = f(I_C)$
$-V_{CE} = 5$ V; $f = 10$ kHz; $T_{amb} = 25°C$