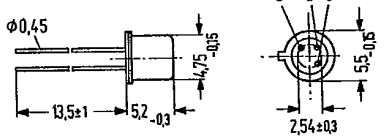
NPN Silicon Transistors

BC 107
BC 108
BC 109

BC 107, BC 108, and BC 109 are epitaxial NPN silicon planar transistors in TO 18 metal 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 107[1]	Q62702-C680
BC 107 A	Q60203-X107-A
BC 107 B	Q60203-X107-B
BC 108[1]	Q60203-X108
BC 108 A	Q60203-X108-A
BC 108 B	Q60203-X108-B
BC 108 C	Q60203-X108-C
BC 109[1]	Q60203-X109
BC 109 B	Q60203-X109-B
BC 109 C	Q60203-X109-C



Approx. weight 0.3 g

Dimensions in mm

Maximum ratings		BC 107	BC 108	BC 109	
Collector-emitter voltage	V_{CES}	50	30	30	V
Collector-emitter voltage	V_{CEO}	45	20	20	V
Emitter-base voltage	V_{EBO}	6	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
Junction temperature	T_j	175	175	175	°C
Storage temperature range	T_{stg}		−55 to +175		°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 marked by 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 107** **BC 108** **–**	**BC 107** **BC 108** **BC 109**	**–** **BC 108** **BC 109**
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[2]	120	200[2]	400[2]

	BC 107 BC 108 BC 109				
I_C mA	V_{BE} V	I_C mA	I_B mA	V_{CEsat}[1] V	V_{BEsat}[1] V
0.1	0.55	10	0.5	0.07 (<0.2)	0.73 (<0.83)
2	0.62 (0.55 to 0.7)				
100[2]	0.83[2]	100[2]	5	0.2 (<0.6)[2]	0.87 (<1.05)[2]

Static characteristics (T_{amb} = 25 °C)		BC 107	BC 108	BC 109	
Collector cutoff current (V_{CES} = 50 V)	I_{CES}	0.2 (<15)	–	–	nA
Collector cutoff current (V_{CES} = 30 V)	I_{CES}	–	0.2 (<15)	0.2 (<15)	nA
Collector cutoff current (V_{CES} = 50 V; T_{amb} = 125 °C)	I_{CES}	0.2 (<4)	–	–	µA
Collector cutoff current (V_{CES} = 30 V; T_{amb} = 125 °C)	I_{CES}	–	0.2 (<4)	0.2 (<4)	µA
Emitter-base breakdown voltage (I_{EBO} = 1 µA)	$V_{(BR)EBO}$	>6	>5	>5	V
Collector-emitter breakdown voltage (I_{CEO} = 2 mA)	$V_{(BR)CEO}$	>45	>20	>20	V

1) The transistor is overloaded to such an extent that the DC current gain decreases to h_{FE} = 20
2) These values do not apply to BC 109.

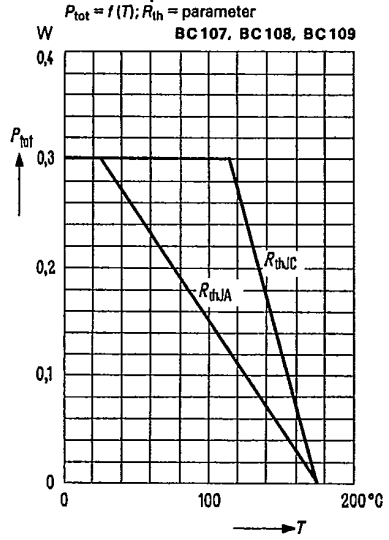
Dynamic characteristics (T_{amb} = 25°C)		BC 107	BC 108	BC 109	
Transition frequency (I_C = 0.5 mA; V_{CE} = 3 V)	f_T	85	85	85	MHz
Transition frequency (I_C = 10 mA; V_{CE} = 5 V; f = 100 MHz)	f_T	250 (>150)	250 (>150)	300 (<150)	MHz
Collector-base capacitance (V_{CBO} = 10 V; f = 1 MHz)	C_{CBO}	3.5 (<6)	3.5 (<6)	3.5 (<6)	pF
Emitter-base capacitance (V_{EBO} = 0.5 V; f = 1 MHz)	C_{EBO}	8	8	8	pF
Noise figure (I_C = 0.2 mA; V_{CE} = 5 V; R_g = 2 kΩ; Δf = 30 Hz to 15 kHz)	NF	–	–	<4	dB
Noise figure (I_C = 0.2 mA V_{CE} = 5 V; R_g = 2 kΩ, f = 1 kHz; Δf = 200 Hz)	NF	2 (<10)	2 (<10)	<4	dB

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

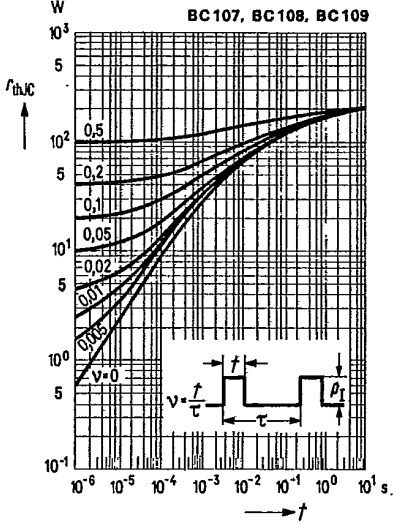
I_C = 2 mA; V_{CE} = 5 V; f = 1 kHz

h_{FE} group	A	B	C	
Type	**BC 107** **BC 108** –	**BC 107** **BC 108** **BC 109**	– **BC 108** **BC 109**	
h_{11e}	2.7 (1.6 to 4.5)	4.5 (3.2 to 8.5)	8.7 (6 to 16)	kΩ
h_{12e}	1.5	2	3	10^{-4}
h_{21e}	220	330	600	–
h_{22e}	18 (<30)	30 (<60)	60 (<110)	μS

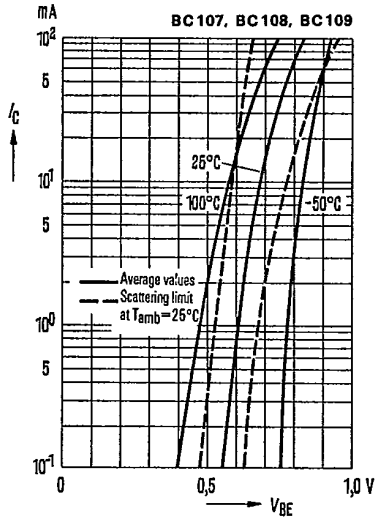
Total perm. power dissipation versus temperature
$P_{tot} = f(T)$; R_{th} = parameter



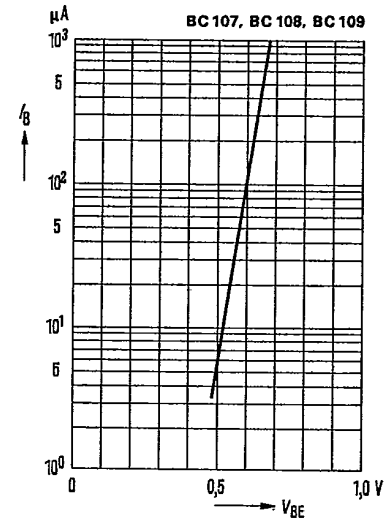
Permissible pulse load
$r_{thJC} = f(t)$; v = parameter



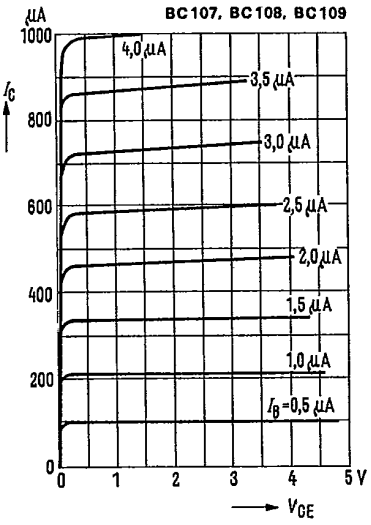
Collector current $I_C = f(V_{BE})$
V_{CE} = 5 V (common emitter configuration)



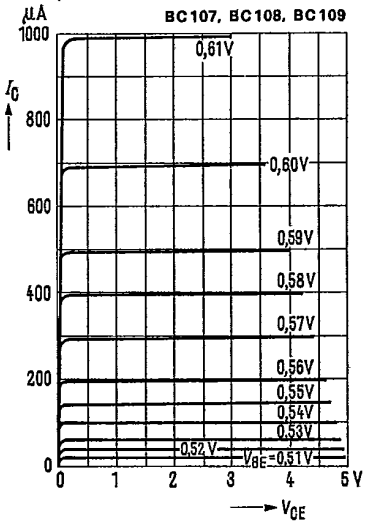
Input characteristic $I_B = f(V_{BE})$
V_{CE} = 5 V (common emitter configuration)



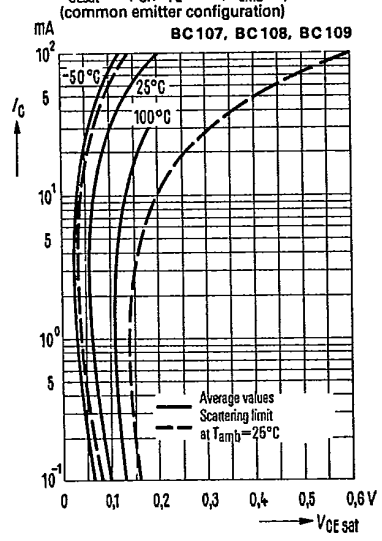
Output characteristics
$I_C = f(V_{CE})$; I_B = parameter
(common emitter configuration)



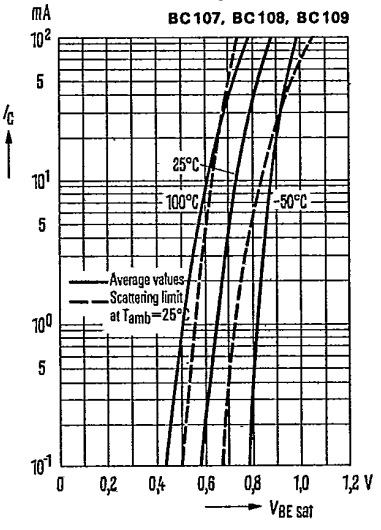
Output characteristics
$I_C = f(V_{CE})$; V_{BE} = parameter
(common emitter configuration)



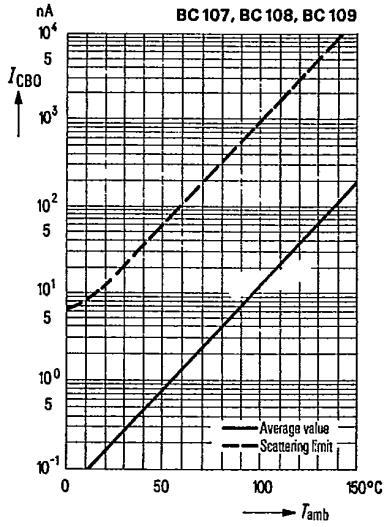
Collector-emitter saturation voltage
$V_{CEsat} = f(I_C)$; h_{FE} = 20; T_{amb} = parameter
(common emitter configuration)



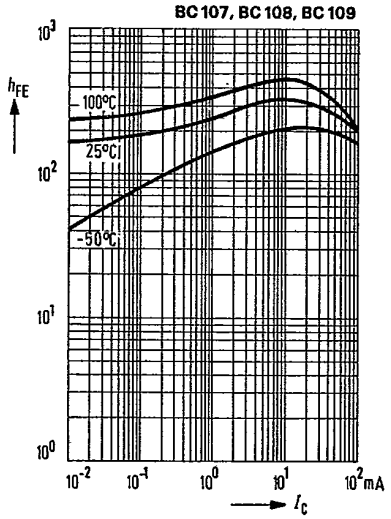
Base-emitter saturation voltage
$V_{BEsat} = f(I_C)$; h_{FE} = 20; T_{amb} = parameter
(common emitter configuration)



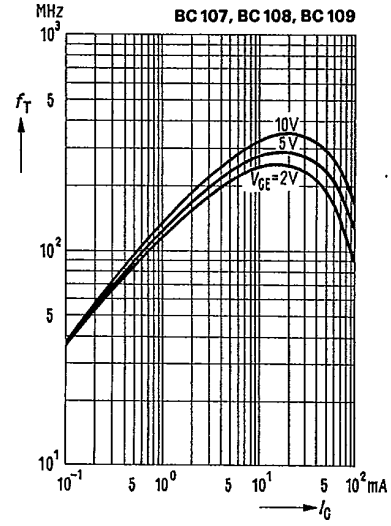
Collector cutoff current versus temperature $I_{CBO} = f(T_{amb})$ for maximum permissible breakdown voltage



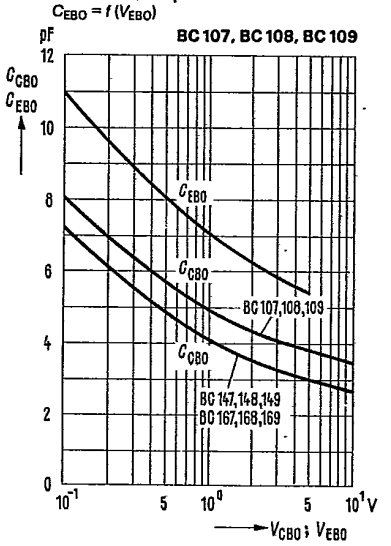
DC current gain $h_{FE} = f(I_C)$; $V_{CE} = 5$ V; T_{amb} = parameter (common emitter configuration)



Transition frequency $f_T = f(I_C)$; V_{CE} = parameter



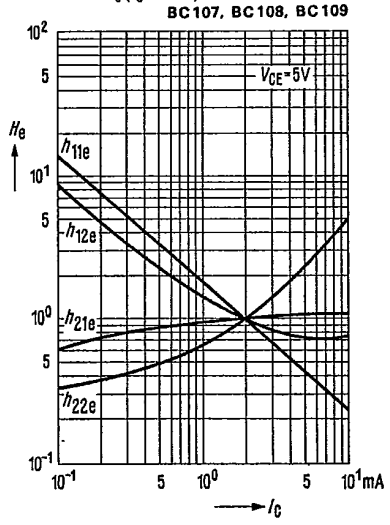
Collector-base capacitance $C_{CBO} = f(V_{CBO})$
Emitter-base capacitance $C_{EBO} = f(V_{EBO})$



h-parameter versus collector current

$H_e = \frac{h_e(I_C)}{h_e(I_C=2\,mA)} = f(I_C);\ V_{CE}=5V$

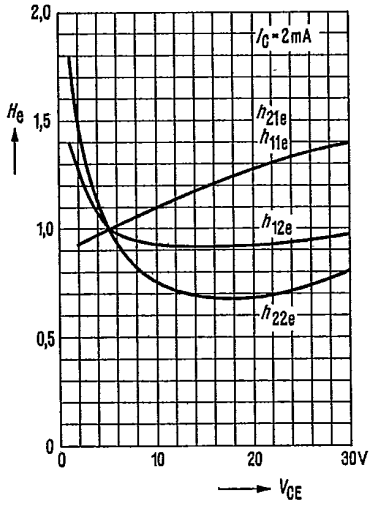
BC 107, BC 108, BC 109



h-parameter versus collector-emitter voltage

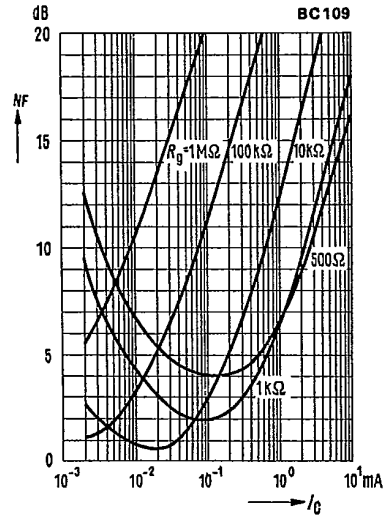
$H_e = \frac{h_e(V_{CE})}{h_e(V_{CE}=5V)} = f(V_{CE});\ I_C=2\,mA$

BC 107, BC 108, BC 109

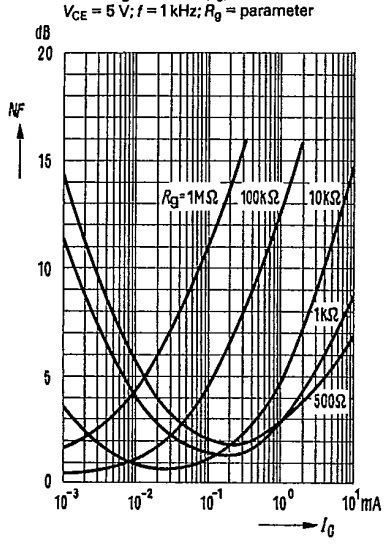


Noise figure $NF = f(I_C)$
V_{CE} = 5 V; f = 120 Hz; R_g = parameter

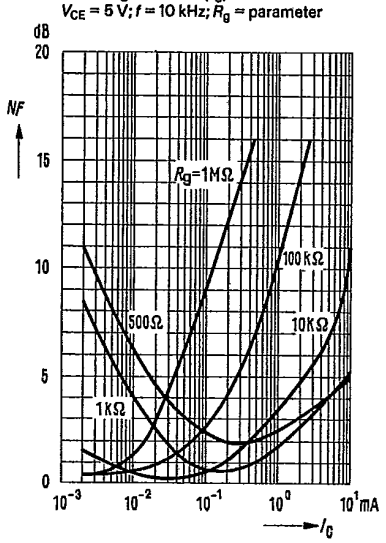
BC 109



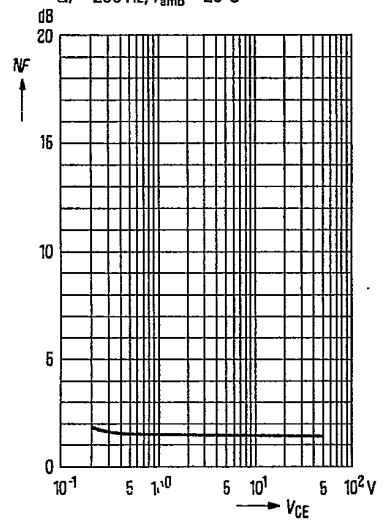
Noise figure $NF = f(I_C)$
$V_{CE} = 5$ V; $f = 1$ kHz; R_g = parameter



Noise figure $NF = f(I_C)$
$V_{CE} = 5$ V; $f = 10$ kHz; R_g = parameter



Noise figure $NF = f(V_{CE})$
$I_C = 0.2$ mA; $R_g = 2$ kΩ; $f = 1$ kHz
$\Delta f = 200$ Hz; $T_{amb} = 25°C$



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