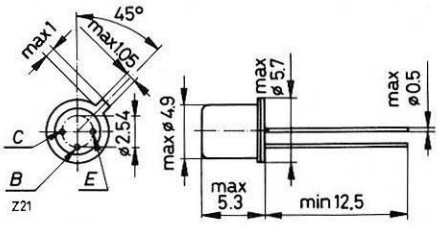
NPN Silicon Planar Epitaxial Transistors

intended for use in AF pre-amplifier and driver stages as well as for general purposes. The BC 109 is primarily used for low-noise pre-amplifiers. The collector is electrically connected to the case. BC 107, BC 108 and BC 109 are complementary pairs with BC 177, BC 178 and BC 179 together, respectively.

Dimensions in mm



Case: TO-18

Mass: approx. 0.33 g

Absolute 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
Peak collector current	I_{CM}	200	200	–	mA
Base current	I_B	50	50	5	mA
Junction temperature	T_j		175		°C
Storage temperature	T_s		–55 . . . + 175		°C
Total power dissipation[1]	P_{tot}		300		mW
Thermal resistance					
junction to case	R_{thjc}		= 200		K/W
junction to ambient	R_{thja}		= 500		K/W
Static characteristics[2]					
T_{amb} = 25°C					
Collector-emitter cut-off current					
V_{CE} = 50 V	I_{CES}	0.2 (≤15)	–	–	nA
V_{CE} = 30 V	I_{CES}	–	0.2 (≤15)	0.2 (≤15)	nA
V_{CE} = 50 V, T_{amb} = 125°C	I_{CES}	0.2 (≤4)	–	–	µA
V_{CE} = 30 V, T_{amb} = 125°C	I_{CES}	–	0.2 (≤4)	0.2 (≤4)	µA
Collector-emitter breakdown voltage					
I_C = 2 mA	$V_{(BR)CEO}$	≥45	≥20	≥20	V
Emitter-base breakdown voltage					
I_E = 1 µA	$V_{(BR)EBO}$	≥6	≥5	≥5	V

[1] T_{amb} ≤25°C

[2] measured under pulsed conditions

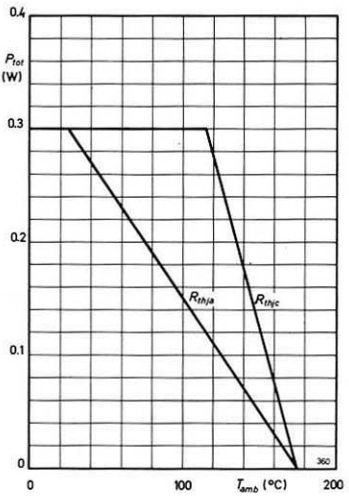
		BC 107	BC 108	BC 109	
DC forward current transfer ratio[1]					
V_{CE} = 5 V, I_C = 0.01 mA	h_{21E}	90	90	–	in group A
	h_{21E}	150	150	150	in group B
	h_{21E}	–	270	270	in group C
V_{CE} = 5 V, I_C = 2 mA	h_{21E}	170 (120 . . . 220)	170 (120 . . . 220)	–	in group A
	h_{21E}	290 (180 . . . 460)	290 (180 . . . 460)	290 (180 . . . 460)	in group B
	h_{21E}	–	500 (380 . . . 800)	500 (380 . . . 800)	in group C
V_{CE} = 5 V, I_C = 100 mA	h_{21E}	120	120	–	in group A
	h_{21E}	200	200	–	in group B
	h_{21E}	–	400	–	in group C
Collector-emitter saturation voltage					
I_C = 10 mA, I_B = 0.5 mA	V_{CEsat}	0.07 (≤0.2)	0.07 (≤0.2)	0.07 (≤0.2)	V
I_C = 100 mA, I_B = 5 mA	V_{CEsat}	0.2 (≤0.6)	0.2 (≤0.6)	–	V
Base-emitter saturation voltage					
I_C = 10 mA, I_B = 0.5 mA	V_{BEsat}	0.73 (≤0.83)	0.73 (≤0.83)	0.73 (≤0.83)	V
I_C = 100 mA, I_B = 5 mA	V_{BEsat}	0.87 (≤1.05)	0.87 (≤1.05)	–	V
Base-emitter voltage					
V_{CE} = 5 V, I_C = 0.1 mA	V_{BE}	0.55	0.55	0.55	V
V_{CE} = 5 V, I_C = 2 mA	V_{BE}	0.62 (0.55 . . . 0.7)	0.62 (0.55 . . . 0.7)	0.62 (0.55 . . . 0.7)	V
V_{CE} = 5 V, I_C = 100 mA	V_{BE}	0.83	0.83	–	V
Dynamic characteristics					
T_{amb} = 25 °C					
Transition frequency					
V_{CE} = 3 V, I_C = 0.5 mA	f_T	85	85	85	MHz
V_{CE} = 5 V, I_C = 10 mA, f = 100 MHz	f_T	250 (≥150)	250 (≥150)	300 (≥150)	MHz
Collector-base capacitance					
V_{CB} = 10 V, f = 1 MHz	C_{CBO}	3.5 (≤6)	3.5 (≤6)	3.5 (≤6)	pF
Emitter-base capacitance					
V_{EB} = 0.5 V, f = 1 MHz	C_{EBO}	8	8	8	pF
Noise figure					
V_{CE} = 5 V, I_C = 0.2 mA, R_G = 2 kΩ, f = 30 Hz . . . 15 kHz	F	–	–	≤4	dB
V_{CE} = 5 V, I_C = 0.2 mA, R_G = 2 kΩ, f = 1 kHz, B = 200 Hz	F	2 (≤10)	2 (≤10)	≤4	dB

[1] as requested, the devices are available, at extra charge, selected in group A, B or C according to their DC forward current transfer ratios h_{21E}

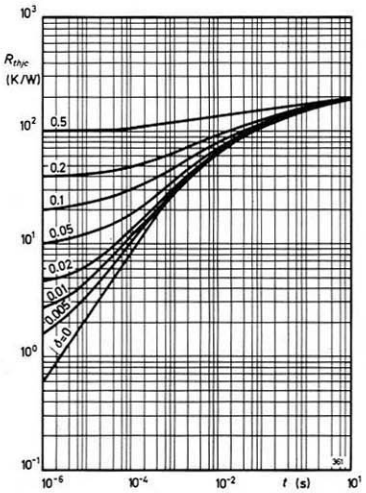
Low frequency small signal hybrid parameters
V_{CE} = 5 V, I_C = 2 mA, f = 1 kHz

h_{21E}-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 . . . 4.5)	4.5 (3.2 . . . 8.5)	8.7 (6 . . . 16)	kΩ
h_{12e}	1.5	2	3	10^{-4}
h_{21e}	220 (125 . . . 260)	330 (240 . . . 500)	600 (450 . . . 900)	
h_{22e}	18 (≤30)	30 (≤60)	60 (≤110)	µS

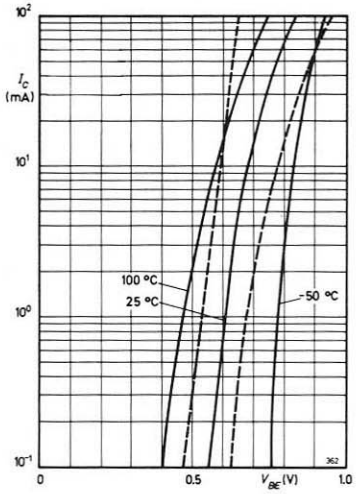
Permissible total power dissipation versus ambient temperature
P_{tot} = f (T_{amb}), R_{th} = parameter



Pulse thermal resistance versus pulse duration
R_{thjc} = f (t), δ = parameter

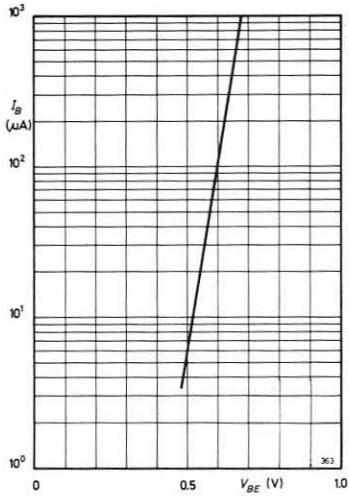


Collector current versus base-emitter voltage
$I_C = f(V_{BE})$, $V_{CE} = 5$ V
T_{amb} = parameter
(common emitter configuration)

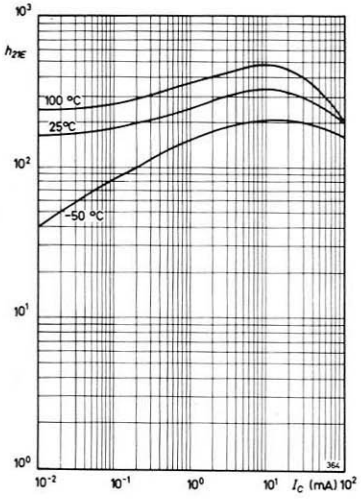


——— Typical
------ Scattering limit at T_{amb} = 25 °C

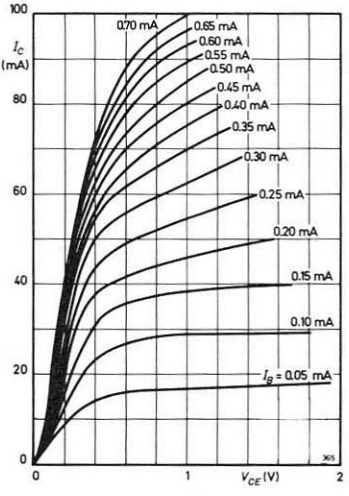
Base current versus base-emitter voltage
$I_B = f(V_{BE})$, $V_{CE} = 5$ V
(common emitter configuration)



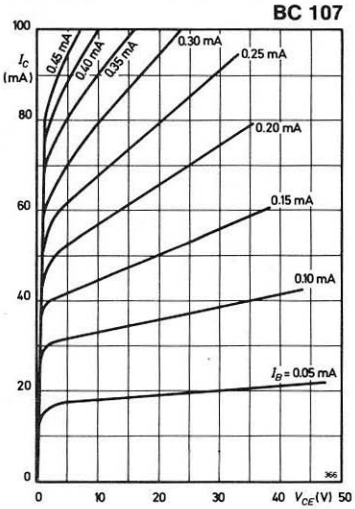
DC forward current transfer ratio versus collector current
$h_{21E} = f(I_C)$
$V_{CE} = 5$ V, T_{amb} = parameter
(common emitter configuration)



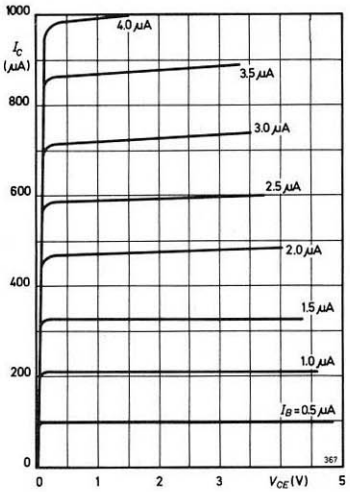
Collector current versus collector-emitter voltage
$I_C = f(V_{CE})$, I_B = parameter
(common emitter configuration)



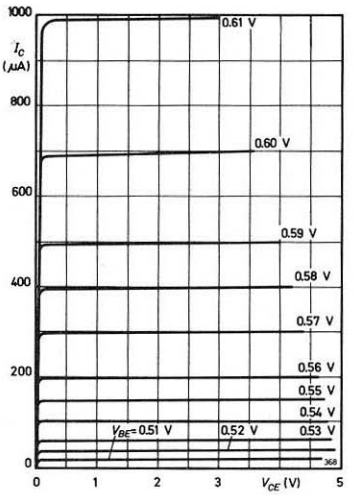
Collector current versus collector-emitter voltage
$I_C = f(V_{CE})$, I_B = parameter
(common emitter configuration)



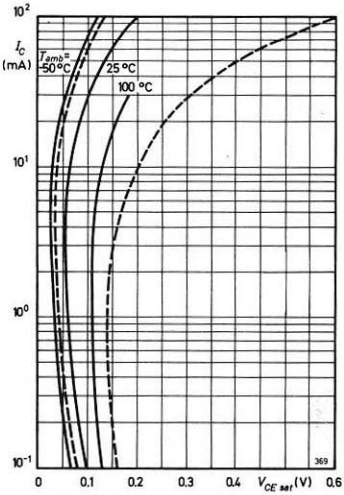
Collector current versus collector-emitter voltage
$I_C = f(V_{CE})$, I_B = parameter
(common emitter configuration)



Collector current versus collector-emitter voltage
$I_C = f(V_{CE})$, V_{BE} = parameter
(common emitter configuration)

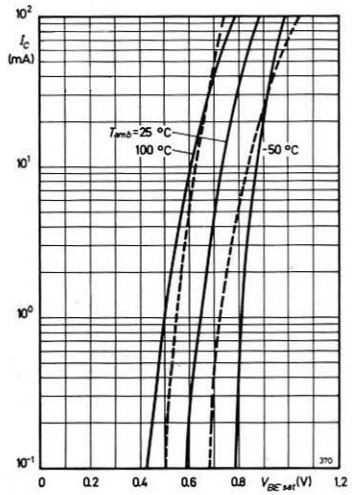


Collector current versus collector-emitter saturation voltage
$I_C = f(V_{CEsat})$
$h_{21E} = 20$; T_{amb} = parameter
(common emitter configuration)



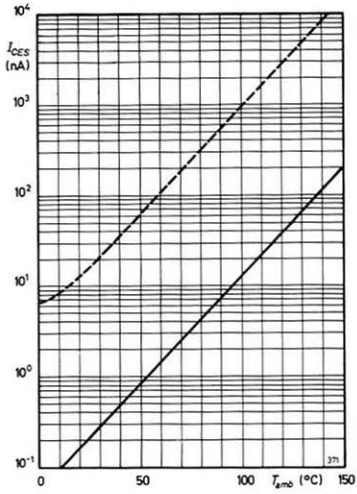
——— Typical
------ Scattering limit at T_{amb} = 25 °C

Collector current versus, base-emitter saturation voltage
$I_C = f(V_{BEsat})$
$h_{21E} = 20$; T_{amb} = parameter
(common emitter configuration)



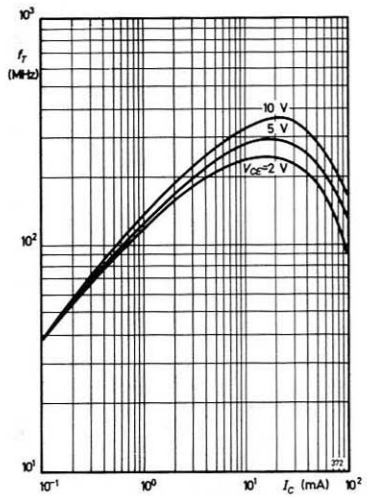
——— Typical
------ Scattering limit at T_{amb} = 25 °C

Collector-base cut-off current versus ambient temperature
$I_{CES} = f(T_{amb})$
at the permissible reverse voltage

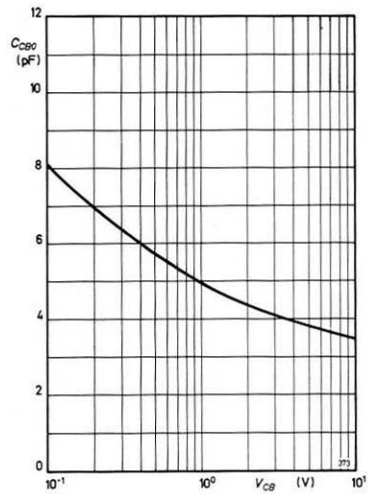


——— Typical
------ Scattering limit

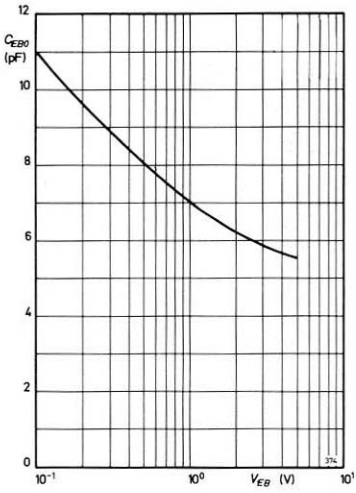
Transition frequency versus collector current
$f_T = f(I_C)$, V_{CE} = parameter



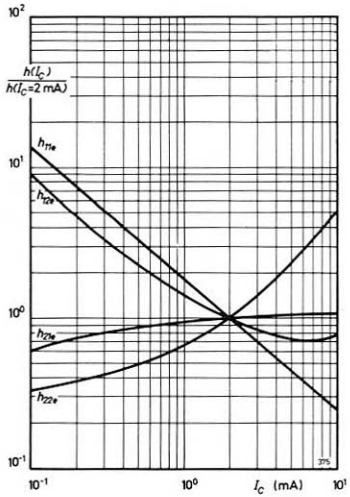
Collector-base capacitance versus collector-base voltage
$C_{CBO} = f(V_{CB})$



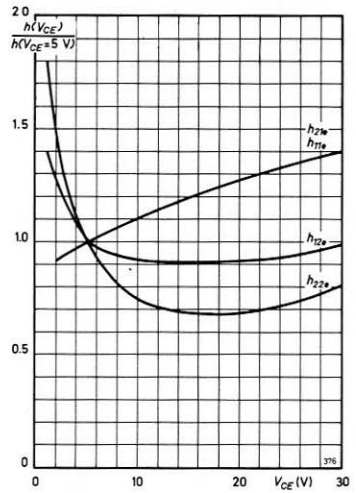
Emitter-base capacitance versus emitter-base voltage
$C_{EBO} = f(V_{EB})$



h-parameters versus collector current
$$\frac{h_e\ (I_C)}{h_e\ (I_C = 2\ mA)} = f(I_C)$$
$V_{CE} = 5$ V

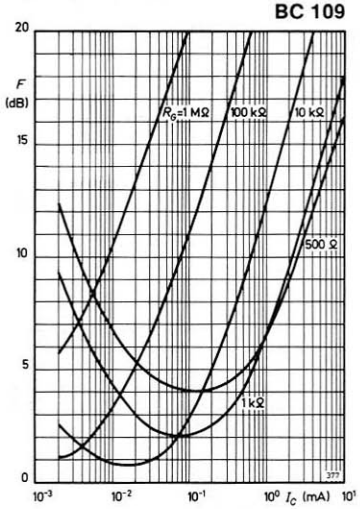


h-parameters versus collector-emitter voltage
$$\frac{h_e\ (V_{CE})}{h_e\ (V_{CE} = 5\ V)} = f(V_{CE})$$
$I_C = 2$ mA

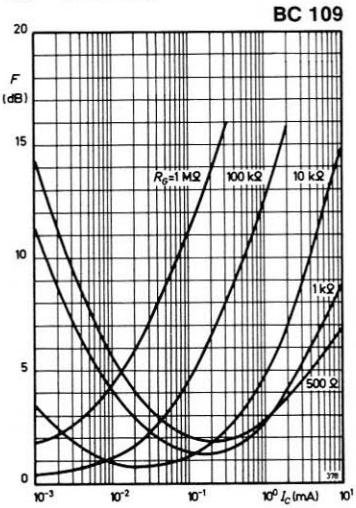


Noise figure versus collector current $F = f(I_C)$
$V_{CE} = 5$ V, $f = 120$ Hz,
R_G = parameter

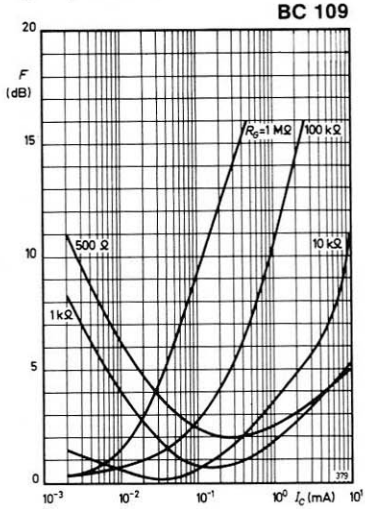
BC 109



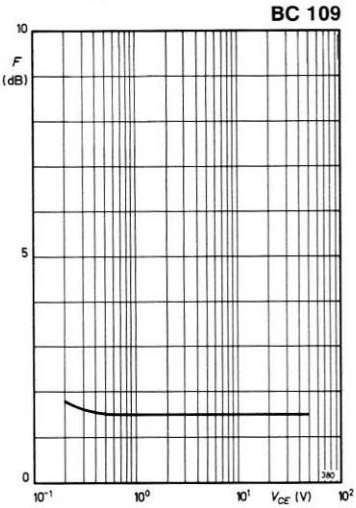
Noise figure versus collector current F = f (I_C)
V_{CE} = 5 V, f = 1 kHz,
R_G = parameter



Noise figure versus collector current F = f (I_C)
V_{CE} = 5 V, f = 10 kHz,
R_G = parameter



Noise figure versus collector-emitter voltage
F = f (V_{CE})
I_C = 0.2 A, R_G = 2 kΩ,
f = 1 kHz, B = 200 Hz



Noise figure versus frequency
F = f (f)
V_{CE} = 5 V, I_C = 0.2 mA,
R_G = 2 kΩ