

SILICON PLANAR NPN

BC 107
BC 108
BC 109

LOW NOISE GENERAL PURPOSE AUDIO AMPLIFIERS

The BC 107, BC 108 and BC 109 are silicon planar epitaxial NPN transistors in TO-18 metal case. They are suitable for use in driver stages, low noise input stages and signal processing circuits of television receivers.

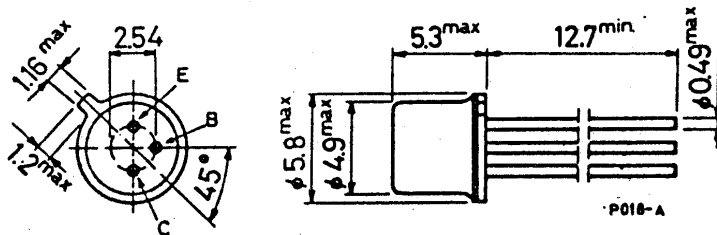
The complementary PNP types are respectively the BC 177, BC 178 and BC 179.

ABSOLUTE MAXIMUM RATINGS

		BC 107	BC 108	BC 109
V_{CB0}	Collector-base voltage ($I_E = 0$)	50 V	30 V	30 V
V_{CE0}	Collector-emitter voltage ($I_B = 0$)	45 V	20 V	20 V
V_{EBO}	Emitter-base voltage ($I_C = 0$)	6 V	5 V	5 V
I_C	Collector current	100 mA		
P_{tot}	Total power dissipation at $T_{amb} \leq 25^\circ\text{C}$	0.3 W		
	at $T_{case} \leq 25^\circ\text{C}$	0.75 W		
T_{stg}	Storage temperature	-55 to 175 °C		
T_j	Junction temperature	175 °C		

MECHANICAL DATA

Dimensions in mm



(sim. to TO-18)

BC 107
BC 108
BC 109

THERMAL DATA

$R_{th\ j-case}$	Thermal resistance junction-case	max	200	°C/W
$R_{th\ j-amb}$	Thermal resistance junction-ambient	max	500	°C/W

ELECTRICAL CHARACTERISTICS ($T_{amb} = 25^\circ\text{C}$ unless otherwise specified)

Parameter	Test conditions	Min.	Typ.	Max.	Unit
I_{CBO} Collector cutoff current ($I_E = 0$)	for BC 107 $V_{CB} = 40\text{ V}$ $V_{CB} = 40\text{ V}$ $T_{amb} = 150^\circ\text{C}$ for BC 108 - BC 109 $V_{CB} = 20\text{ V}$ $V_{CB} = 20\text{ V}$ $T_{amb} = 150^\circ\text{C}$			15 15 15 15	nA μA nA μA
$V_{(BR)CBO}$ Collector-base breakdown voltage ($I_E = 0$)	$I_C = 10\ \mu\text{A}$ for BC 107 for BC 108 for BC 109	50 30 30			V V V
$V_{(BR)CEO}$ *Collector-emitter breakdown voltage ($I_B = 0$)	$I_C = 10\text{ mA}$ for BC 107 for BC 108 for BC 109	45 20 20			V V V
$V_{(BR)EBO}$ Emitter-base breakdown voltage ($I_C = 0$)	$I_E = 10\ \mu\text{A}$ for BC 107 for BC 108 for BC 109	6 5 5			V V V
$V_{CE(sat)}$ * Collector-emitter saturation voltage	$I_C = 10\text{ mA}$ $I_B = 0.5\text{ mA}$ $I_C = 100\text{ mA}$ $I_B = 5\text{ mA}$		70 200	250 600	mV mV
V_{BE} * Base-emitter voltage	$I_C = 2\text{ mA}$ $V_{CE} = 5\text{ V}$ $I_C = 10\text{ mA}$ $V_{CE} = 5\text{ V}$	550	650 700	700 770	mV mV
$V_{BE(sat)}$ * Base-emitter saturation voltage	$I_C = 10\text{ mA}$ $I_B = 0.5\text{ mA}$ $I_C = 100\text{ mA}$ $I_B = 5\text{ mA}$		750 900		mV mV

BC 107
BC 108
BC 109

ELECTRICAL CHARACTERISTICS (continued)

Parameter	Test conditions	Min.	Typ.	Max.	Unit	
h_{FE} DC current gain	$I_C = 2 \text{ mA}$ $V_{CE} = 5 \text{ V}$ for BC 107 for BC 107 Gr. A for BC 107 Gr. B for BC 108 for BC 108 Gr. A for BC 108 Gr. B for BC 108 Gr. C for BC 109 for BC 109 Gr. B for BC 109 Gr. C	110	230	450	—	
		110	180	220	—	
		200	290	450	—	
		110	350	800	—	
		110	180	220	—	
		200	290	450	—	
		420	520	800	—	
		200	350	800	—	
		200	290	450	—	
		420	520	800	—	
		$I_C = 10 \mu\text{A}$ $V_{CE} = 5 \text{ V}$ for BC 107 for BC 107 Gr. A for BC 107 Gr. B for BC 108 for BC 108 Gr. A for BC 108 Gr. B for BC 108 Gr. C for BC 109 for BC 109 Gr. B for BC 109 Gr. C	—	120	—	—
			—	90	—	—
			40	150	—	—
			—	120	—	—
			—	90	—	—
			40	150	—	—
			100	270	—	—
70	210	—	—			
40	150	—	—			
100	270	—	—			
h_{fe} Small signal current gain	$I_C = 2 \text{ mA}$ $V_{CE} = 5 \text{ V}$ $f = 1 \text{ kHz}$ for BC 107 for BC 107 Gr. A for BC 107 Gr. B for BC 108 for BC 108 Gr. A for BC 108 Gr. B for BC 108 Gr. C for BC 109 for BC 109 Gr. B for BC 109 Gr. C	—	250	—	—	
		—	190	—	—	
		—	300	—	—	
		—	370	—	—	
		—	190	—	—	
		—	300	—	—	
		—	500	—	—	
		—	370	—	—	
		—	300	—	—	
		—	550	—	—	
C_{cbo} Collector-base capacitance	$I_E = 0$ $V_{CB} = 10 \text{ V}$ $f = 1 \text{ MHz}$	—	2	—	—	
		—	4	6	pF	

* Pulsed: pulse duration = 300 μs , duty factor = 1%.

BC 107
BC 108
BC 109

ELECTRICAL CHARACTERISTICS (continued)

Parameter	Test conditions	Min.	Typ.	Max.	Unit
C_{EBO} Emitter-base capacitance	$I_C = 0$ $V_{EB} = 0.5$ V $f = 1$ MHz		11.5		pF
NF Noise figure	$I_C = 0.2$ mA $V_{CE} = 5$ V $R_g = 2$ k Ω $f = 1$ kHz $B = 200$ Hz		2	10	dB
	for BC 107 for BC 108 for BC 109		2	10	dB
h_{ie} Input impedance	$I_C = 0.2$ mA $V_{CE} = 5$ V $R_g = 2$ k Ω $f = 10$ Hz to 10 kHz $B = 15.7$ kHz		1.5	4	dB
	for BC 109		1.5	4	dB
h_{ie} Input impedance	$I_C = 2$ mA $V_{CE} = 5$ V $f = 1$ kHz				
	for BC 107		4		k Ω
	for BC 107 Gr. A		3		k Ω
	for BC 107 Gr. B		4.8		k Ω
	for BC 108		5.5		k Ω
	for BC 108 Gr. A		3		k Ω
	for BC 108 Gr. B		4.8		k Ω
	for BC 108 Gr. C		7		k Ω
	for BC 109		5.5		k Ω
	for BC 109 Gr. B		4.8		k Ω
	for BC 109 Gr. C		7		k Ω
h_{re} Reverse voltage ratio	$I_C = 2$ mA $V_{CE} = 5$ V $f = 1$ kHz				
	for BC 107		2.2×10^{-4}		—
	for BC 107 Gr. A		1.7×10^{-4}		—
	for BC 107 Gr. B		2.7×10^{-4}		—
	for BC 108		3.1×10^{-4}		—
	for BC 108 Gr. A		1.7×10^{-4}		—
	for BC 108 Gr. B		2.7×10^{-4}		—
	for BC 108 Gr. C		3.8×10^{-4}		—
	for BC 109		3.1×10^{-4}		—
	for BC 109 Gr. B		2.7×10^{-4}		—
	for BC 109 Gr. C		3.8×10^{-4}		—

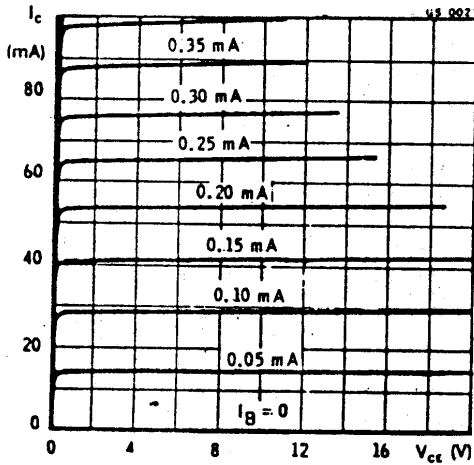
BC 107
BC 108
BC 109

ELECTRICAL CHARACTERISTICS (continued)

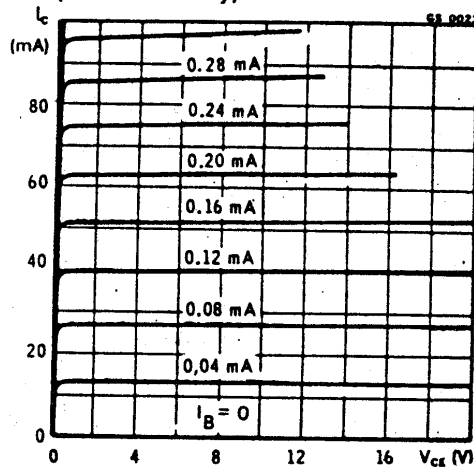
Parameter	Test conditions	Min.	Typ.	Max.	Unit	
h_{oe} Output admittance	$I_C = 2 \text{ mA}$ $V_{CE} = 5 \text{ V}$ $f = 1 \text{ kHz}$					
		for BC 107		20		μS
		for BC 107 Gr. A		13		μS
		for BC 107 Gr. B		26		μS
		for BC 108		30		μS
		for BC 108 Gr. A		13		μS
		for BC 108 Gr. B		26		μS
		for BC 108 Gr. C		34		μS
		for BC 109		30		μS
		for BC 109 Gr. B		26		μS
for BC 109 Gr. C		34		μS		

32 K

Typical output characteristics
(for BC 107 only)

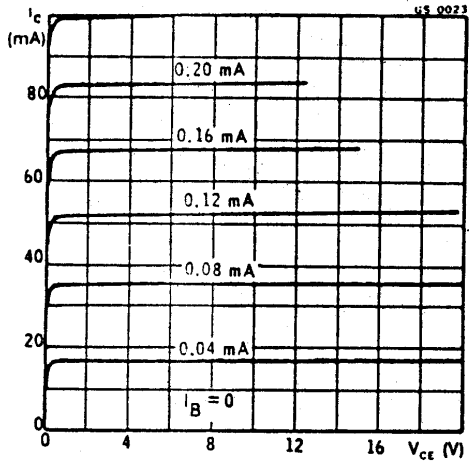


Typical output characteristics
(for BC 108 only)

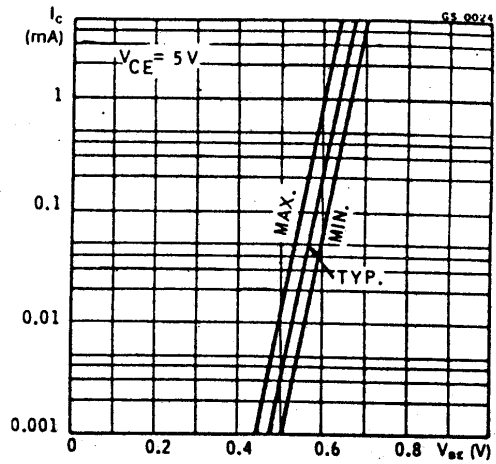


BC 107
BC 108
BC 109

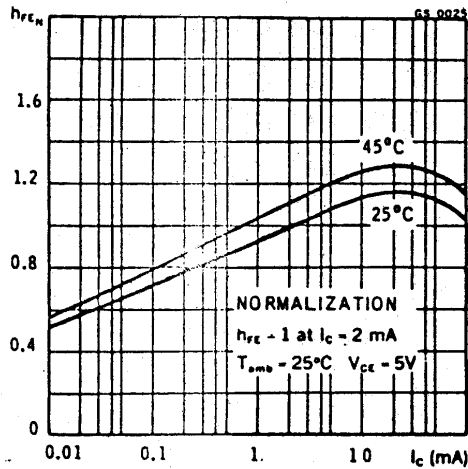
Typical output characteristics
 (for BC 109 only)



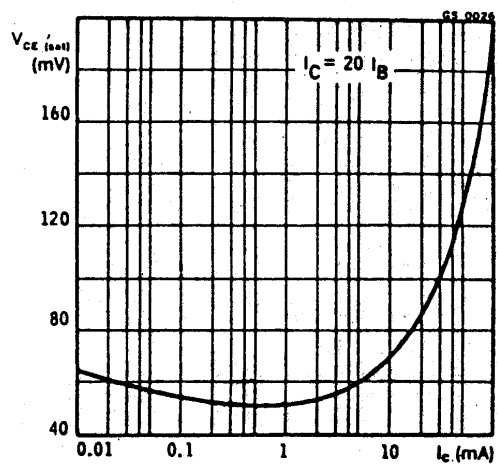
DC transconductance



DC normalized current gain

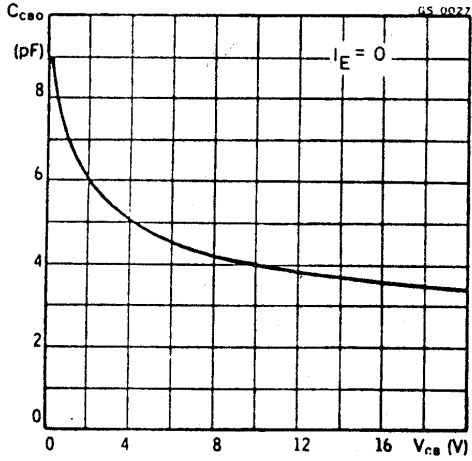


Collector-emitter saturation voltage

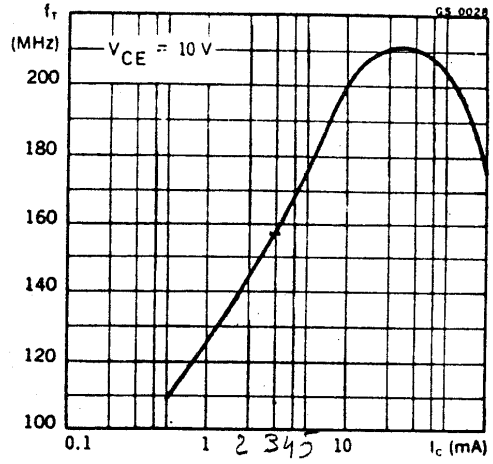


BC 107
BC 108
BC 109

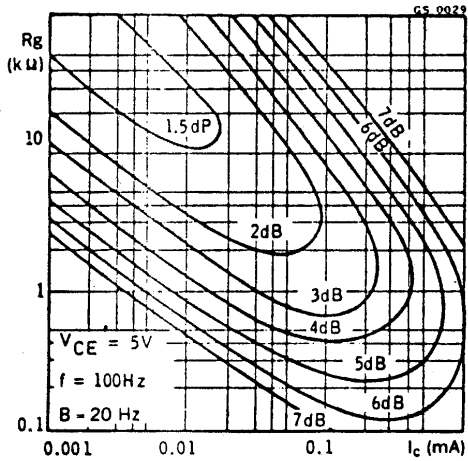
Collector-base capacitance



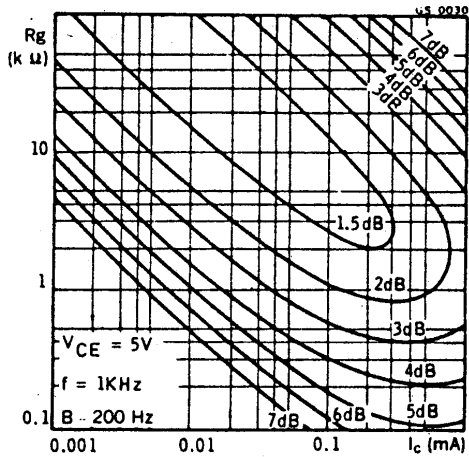
Transition frequency



Noise figure (for BC 109 only)

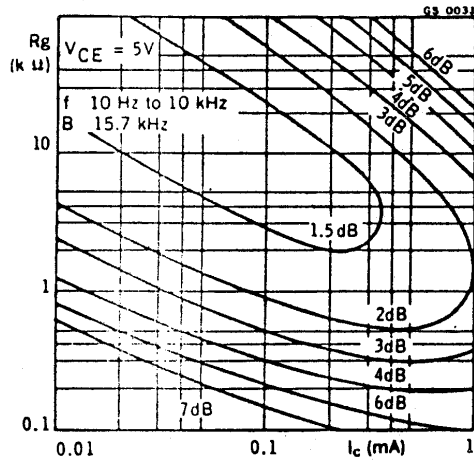


Noise figure (for BC 109 only)

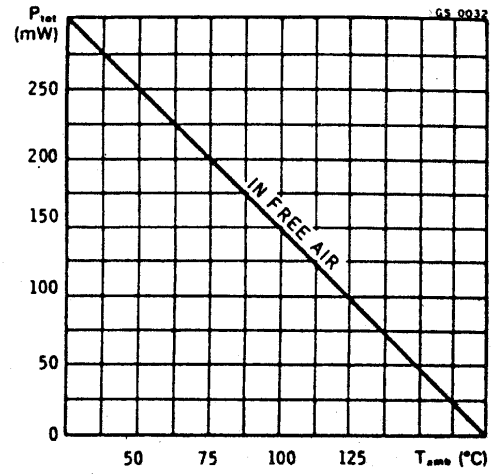


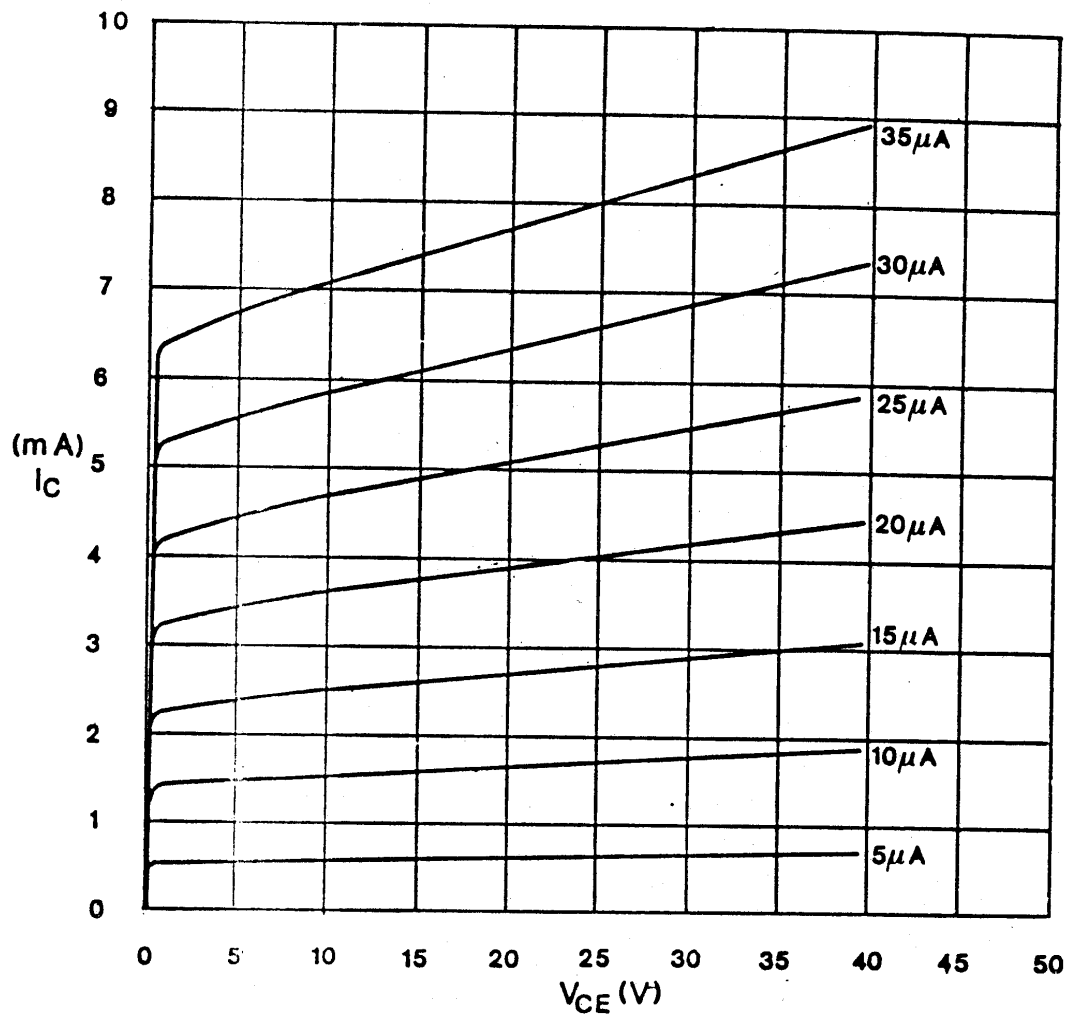
BC 107
BC 108
BC 109

Noise figure (for BC 109 only)

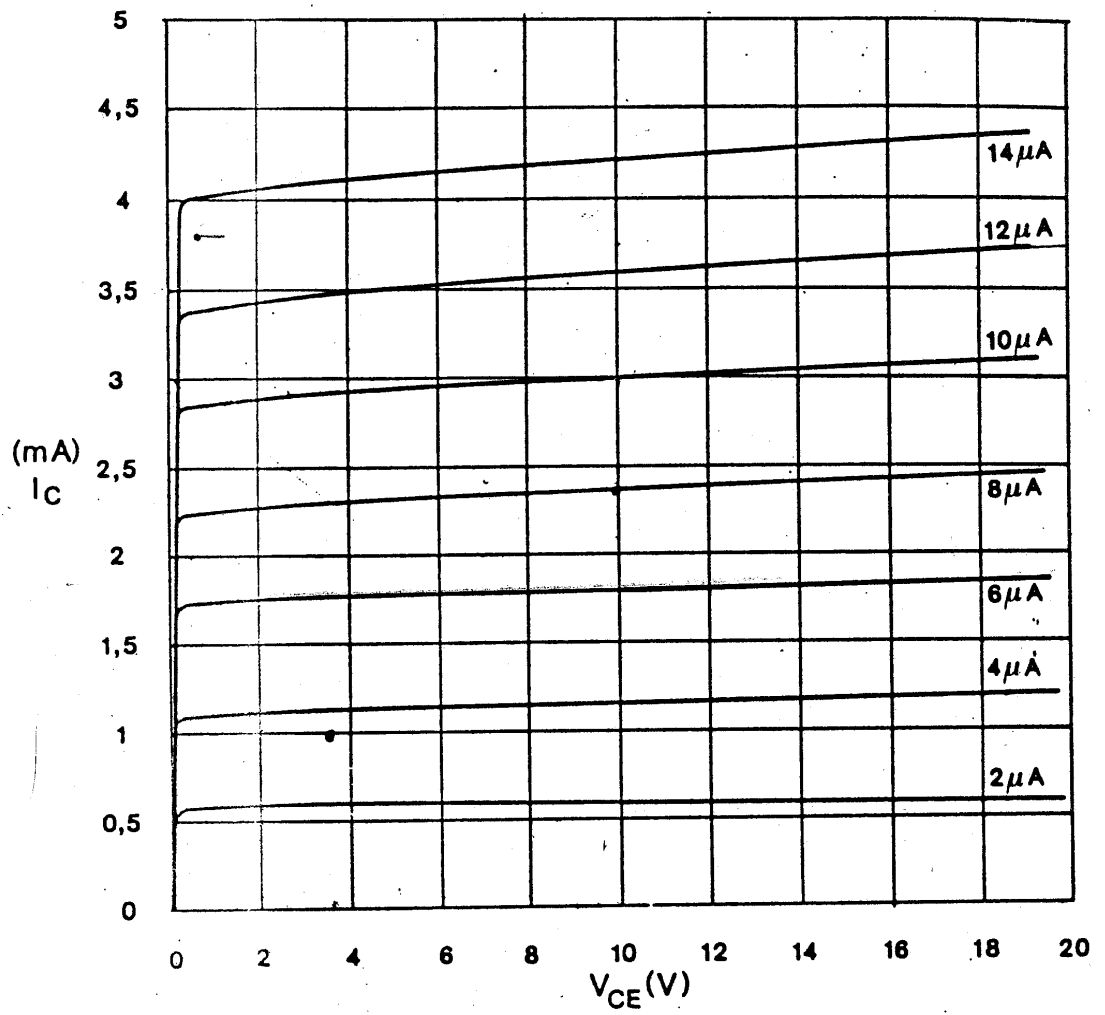


Power rating chart





BC 107 (Caratteristiche rilevate presso l'Istituto di Elettronica)



BC 109 (Caratteristiche rilevate presso l'Istituto di Elettronica) -

SILICON PLANAR PNP

BC 177
BC 178
BC 179

LOW NOISE GENERAL PURPOSE AUDIO AMPLIFIERS

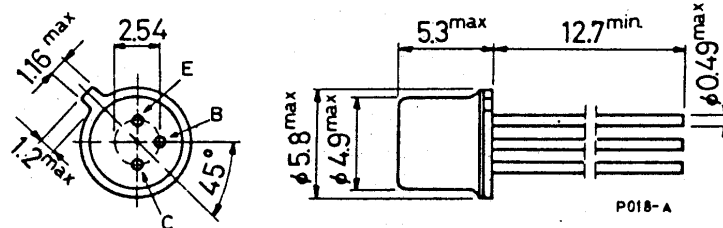
The BC 177, BC 178 and BC 179 are silicon planar epitaxial PNP transistors in TO-18 metal case. They are suitable for use in driver audio stages, low noise input audio stages and as low power, high gain general purpose transistors. The complementary NPN types are respectively the BC 107, BC 108, BC 109.

ABSOLUTE MAXIMUM RATINGS

		BC 177	BC 178	BC 179
V_{CBO}	Collector-base voltage ($I_E = 0$)	-50 V	-30 V	-25 V
$\rightarrow V_{CES}$	Collector-emitter voltage ($V_{BE} = 0$)	-45 V	-25 V	-20 V
V_{CEO}	Collector-emitter voltage ($I_B = 0$)	-45 V	-25 V	-20 V
V_{EBO}	Emitter-base voltage ($I_C = 0$)	-5 V		
$\rightarrow I_{EM}$	Emitter peak current	200 mA		
I_C	Collector current	-100 mA		
$\rightarrow I_{CM}$	Collector peak current	-200 mA		
P_{tot}	Total power dissipation at $T_{amb} \leq 25^\circ\text{C}$ at $T_{case} \leq 115^\circ\text{C}$	300 mW		
T_{stg}	Storage temperature	-65 to 175 °C		
T_j	Junction temperature	175 °C		

MECHANICAL DATA

Dimensions in mm



(sim. to TO-18)

BC 177
BC 178
BC 179

THERMAL DATA

$R_{th\ j-case}$	Thermal resistance junction-case	max	200	°C/W
$R_{th\ j-amb}$	Thermal resistance junction-ambient	max	500	°C/W

ELECTRICAL CHARACTERISTICS ($T_{amb} = 25\text{ °C}$ unless otherwise specified)

Parameter	Test conditions	Min.	Typ.	Max.	Unit
I_{CES} Collector cutoff current ($V_{BE} = 0$)	$V_{CE} = -20\text{ V}$		-1	-100	nA
$V_{(BR)\ CEO}$ Collector-emitter breakdown voltage ($I_B = 0$)	$I_C = -2\text{ mA}$ for BC 177 for BC 178 for BC 179	-45 -25 -20			V V V
$V_{(BR)\ CES}$ Collector-emitter breakdown voltage ($V_{BE} = 0$)	$I_C = -10\text{ }\mu\text{A}$ for BC 177 for BC 178 for BC 179	-50 -30 -25			V V V
$V_{(BR)\ EBO}$ Emitter-base breakdown voltage ($I_C = 0$)	$I_E = -10\text{ }\mu\text{A}$	-5			V
$V_{CE(sat)}$ Collector-emitter saturation voltage	$I_C = -10\text{ mA}$ $I_B = -0.5\text{ mA}$ $I_C = -100\text{ mA}$ $I_B = -5\text{ mA}$		-75	-250	mV mV
V_{BE} Base-emitter voltage	$I_C = -2\text{ mA}$ $V_{CE} = -5\text{ V}$	-600	-640	-750	mV
$V_{BE(sat)}$ Base-emitter saturation voltage	$I_C = -10\text{ mA}$ $I_B = -0.5\text{ mA}$ $I_C = -100\text{ mA}$ $I_B = -5\text{ mA}$		-720		mV mV
h_{FE} DC current gain	$I_C = -10\text{ }\mu\text{A}$ $V_{CE} = -5\text{ V}$	30			—

BC 177
BC 178
BC 179

ELECTRICAL CHARACTERISTICS (continued)

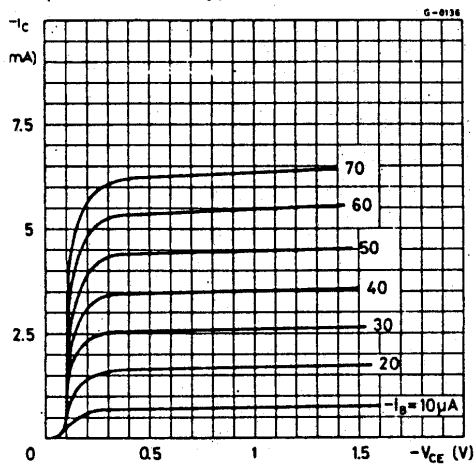
Parameter	Test conditions	Min.	Typ.	Max.	Unit
h_{fe} Small signal current gain	$I_C = -2 \text{ mA}$ $V_{CE} = -5 \text{ V}$ $f = 1 \text{ kHz}$ for BC 177 Gr. 6 for BC 177 Gr. A for BC 178 Gr. 6 for BC 178 Gr. A for BC 178 Gr. B for BC 179 Gr. A for BC 179 Gr. B	75 125 75 125 240 125 240	150 260 150 260 500 260 500	— — — — — — —	
f_T Transition frequency	$I_C = -10 \text{ mA}$ $V_{CE} = -5 \text{ V}$	200			MHz
C_{CB0} Collector-base capacitance	$I_E = 0$ $V_{CB} = -10 \text{ V}$	5.5			pF
NF Noise figure	$I_C = -0.2 \text{ mA}$ $V_{CE} = -5 \text{ V}$ $R_g = 2 \text{ k}\Omega$ $f = 1 \text{ kHz}$ $B = 200 \text{ Hz}$ for BC 177 for BC 178 for BC 179		2 2 1.2	10 10 4	dB dB dB
h_{ie} Input impedance	$I_C = -2 \text{ mA}$ $V_{CE} = -5 \text{ V}$ $f = 1 \text{ kHz}$ for BC 177 Gr. 6 for BC 177 Gr. A for BC 178 Gr. 6 for BC 178 Gr. A for BC 178 Gr. B for BC 179 Gr. A for BC 179 Gr. B	1.5 2.7 1.5 2.7 5.2 2.7 5.2			k Ω k Ω k Ω k Ω k Ω k Ω k Ω
h_{re} Reverse voltage ratio	$I_C = -2 \text{ mA}$ $V_{CE} = -5 \text{ V}$ $f = 1 \text{ kHz}$ for BC 177 Gr. 6 for BC 177 Gr. A for BC 178 Gr. 6 for BC 178 Gr. A for BC 178 Gr. B for BC 179 Gr. A for BC 179 Gr. B	1.8×10^{-4} 2.7×10^{-4} 1.8×10^{-4} 2.7×10^{-4} 4.5×10^{-4} 2.7×10^{-4} 4.5×10^{-4}			— — — — — — —

BC 177
BC 178
BC 179

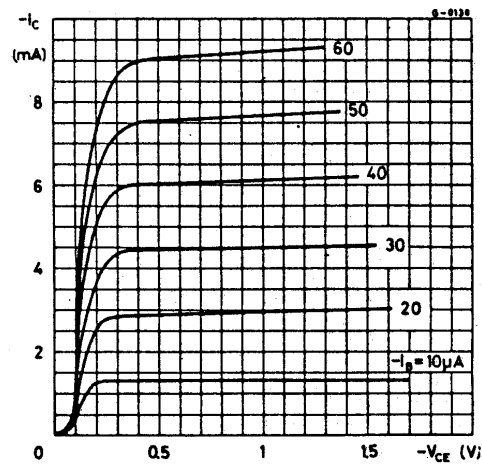
ELECTRICAL CHARACTERISTICS (continued)

Parameter	Test conditions	Min.	Typ.	Max.	Unit
h_{oe} Output admittance	$I_C = -2 \text{ mA}$ $V_{CE} = -5 \text{ V}$ $f = 1 \text{ kHz}$				
		for BC 177 Gr. 6		20	μS
		for BC 177 Gr. A		25	μS
		for BC 178 Gr. 6		20	μS
		for BC 178 Gr. A		25	μS
		for BC 178 Gr. B		35	μS
		for BC 179 Gr. A		25	μS
for BC 179 Gr. B		35	μS		

Typical output characteristics
(for BC 177 only)

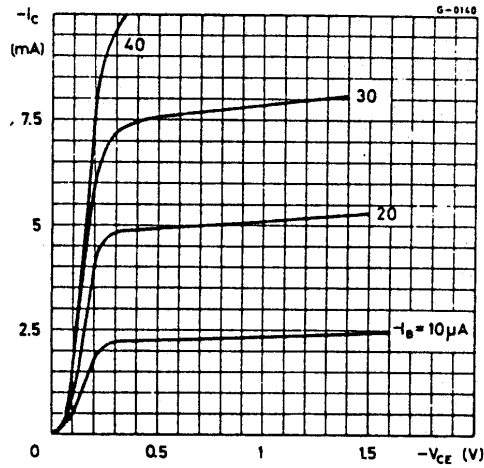


Typical output characteristics
(for BC 178 only)

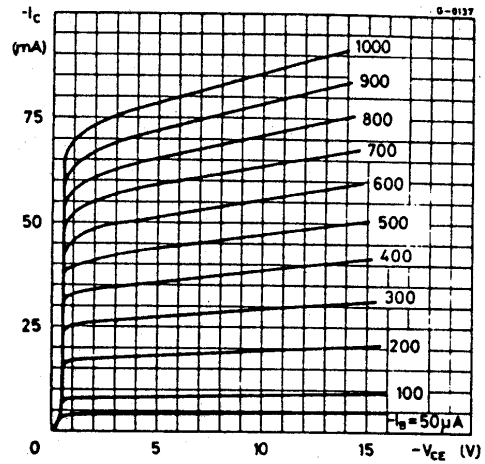


BC 177
BC 178
BC 179

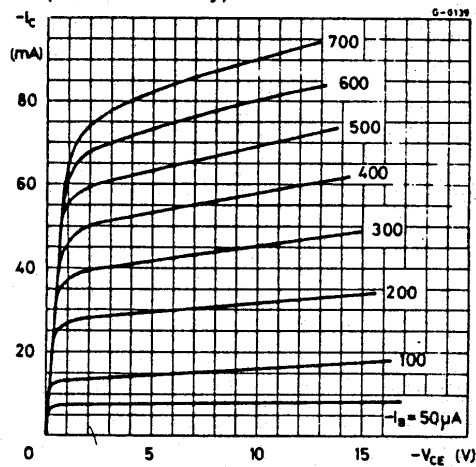
Typical output characteristics
(for BC 179 only)



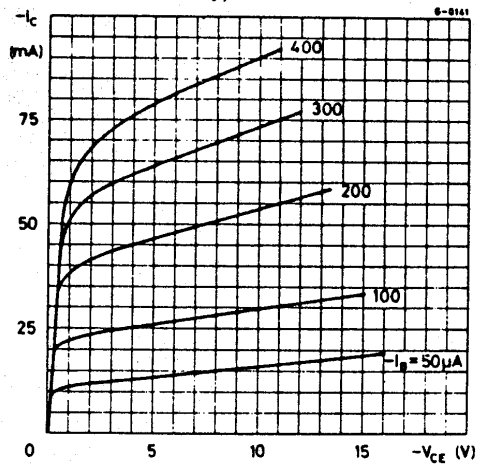
Typical output characteristics
(for BC 177 only)



Typical output characteristics
(for BC 178 only)

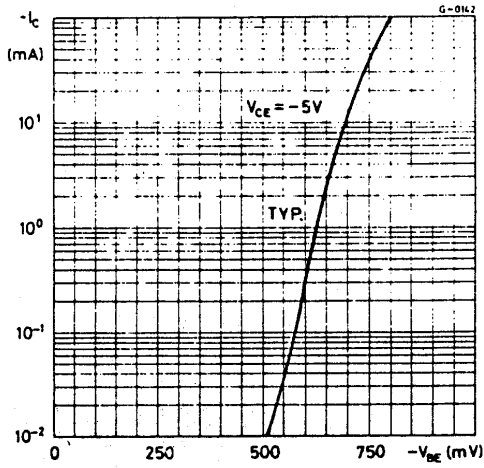


Typical output characteristics
(for BC 179 only)

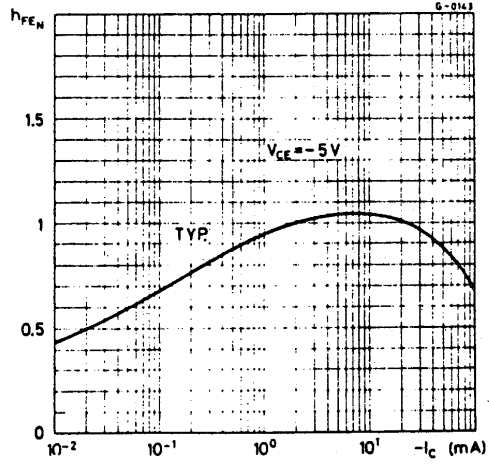


BC 177
BC 178
BC 179

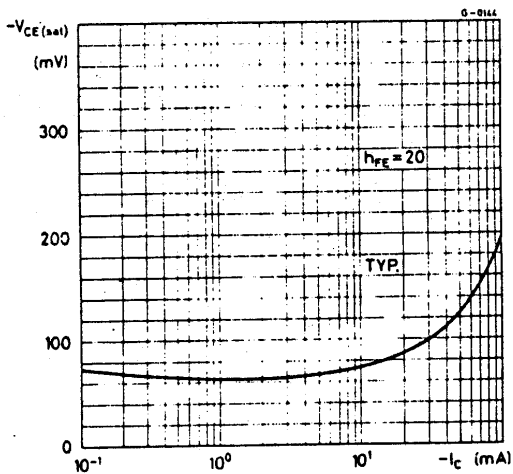
DC transconductance



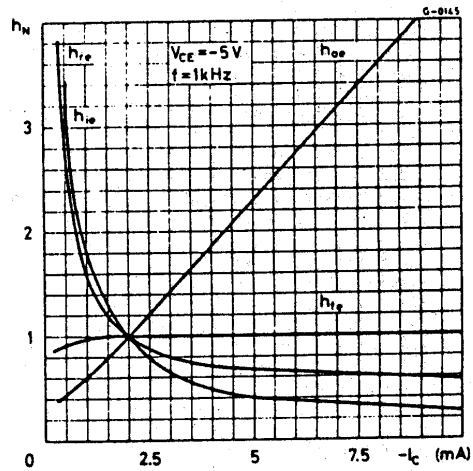
DC normalized current gain



Collector-emitter saturation voltage

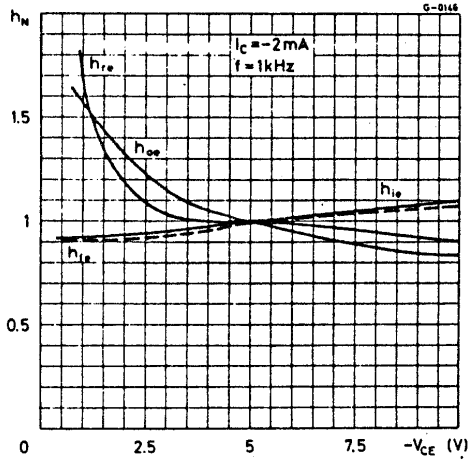


Typical normalized h parameters

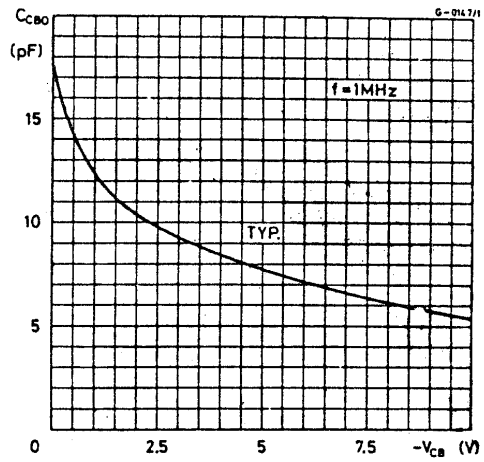


BC 177
BC 178
BC 179

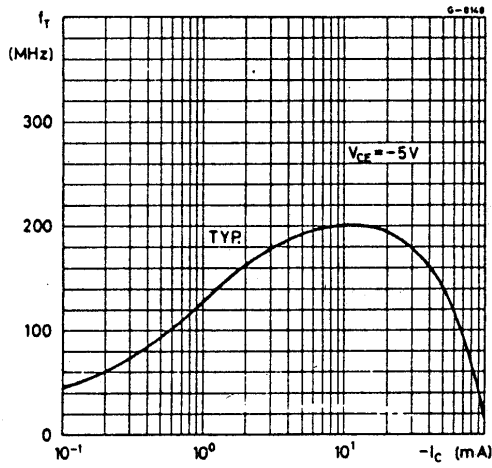
Typical normalized h parameters



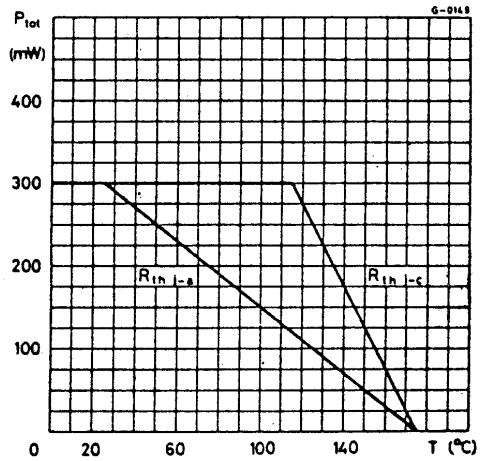
Collector-base capacitance

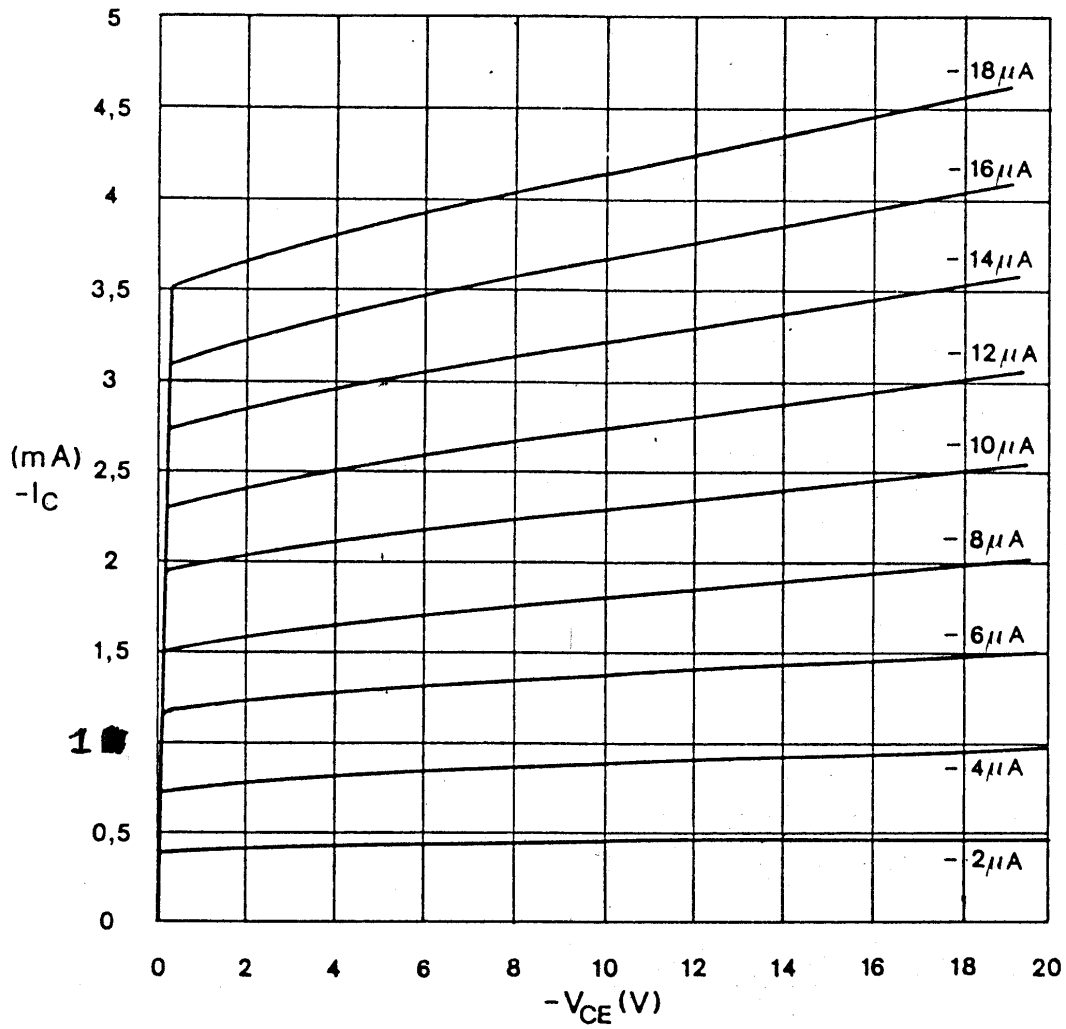


Transition frequency



Power rating chart





BC 179 (Caratteristiche rilevate presso l'Istituto di Elettronica) -

2.33 μA

209.54