Silicon PNP Transistor

BC177

General Purpose

50V / 100mA

DATASHEET

OEM – Siemens

Source: Siemens Databook 1970/71

Datasheet Rev. 1.3 – 02/19 – data without warranty / liability

BC 157, 158, 159, BC 177, 178, 179, BC 257, 258, 259

PNP-Transistoren für NF-Vor- und Treiberstufen sowie für universelle Anwendung

BC 157, BC 158, BC 159, BC 177, BC 178, BC 179, BC 257, BC 258, BC 259 sind epitaktische PNP-Silizium-Planar-Transistoren für NF-Vor- und Treiberstufen.

BC 157, BC 158, BC 159 in Kunststoffumhüllung (SOT 25) als Komplementär-Transistoren zu BC 147, BC 148, BC 149 geeignet.

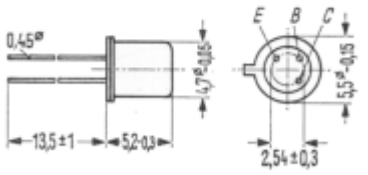
BC 177, BC 178, BC 179 im Gehäuse 18 A 3, DIN 41876 (TO 18) als Komplementär-Transistoren zu BC 107, BC 108, BC 109 geeignet.

BC 257, BC 258, BC 259 in Kunststoffumhüllung (TO 92) als Komplementär-Transistoren zu BC 167, BC 168, BC 169 geeignet.

BC 159, BC 179, BC 259 sind besonders für rauscharme Vorstufen vorgesehen.

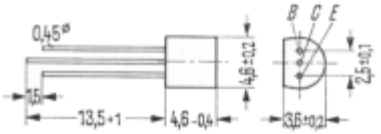
Typ	Bestellnummer	Typ	Bestellnummer
BC 157 A	Q62702-C162	BC 178 A	Q62702-C153
BC 157 B	Q62702-C163	BC 178 B	Q62702-C154
BC 157 VI	Q62702-C165	BC 178 VI	Q62702-C156
		BC 179 A	Q62702-C208
BC 158 A	Q62702-C157	BC 179 B	Q62702-C144
BC 158 B	Q62702-C158		
BC 158 VI	Q62702-C160	BC 257 A	Q62702-C184
		BC 257 B	Q62702-C206
BC 159 A	Q62702-C207	BC 257 VI	Q62702-C186
BC 159 B	Q62702-C161	BC 258 A	Q62702-C187
		BC 258 B	Q62702-C188
BC 177 A	Q62702-C141	BC 258 VI	Q62702-C190
BC 177 B	Q62702-C142	BC 259 A	Q62702-C191
BC 177 VI	Q62702-C140	BC 259 B	Q62702-C192

BC 177, BC 178, BC 179



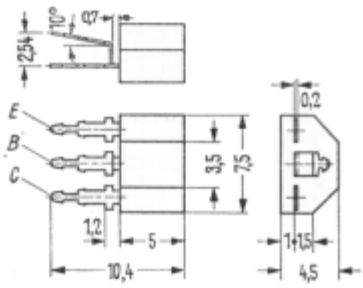
Gewicht etwa 0,33 g Maße in mm

BC 257, BC 258, BC 259



Gewicht etwa 0,25 g Maße in mm

BC 157, BC 158, BC 159



Gewicht etwa 0,33 g Maße in mm

BC 157, 158, 159, BC 177, 178, 179, BC 257, 258, 259

Grenzdaten		BC 177	BC 178	BC 179	BC 157 257	BC 158 258	BC 159 259	
Kollektor-Emitter-Spannung	$-U_{CES}$	50	30	25	50	30	25	V
Kollektor-Emitter-Spannung	$-U_{CEO}$	45	25	20	45	25	20	V
Emitter-Basis-Spannung	$-U_{EBO}$	5	5	5	5	5	5	V
Kollektorstrom	$-I_C$	100	100	50	100	100	50	mA
Kollektor-Spitzenstrom	$-I_{CM}$	200	200	—	200	200	—	mA
Basisstrom	$-I_B$	50	50	5	50	50	5	mA
Basis-Spitzenstrom	$-I_{BM}$	100	100	—	100	100	—	mA
Sperrschichttemperatur	T_j	175	175	175	150	150	150	°C
Lagertemperatur	T_s	– 55 bis + 125			– 55 bis + 150			°C
Gesamtverlustleistung	P_{tot}	300	300	300	300	300	300	mW
Wärmewiderstand								
Kollektorsperrschicht – Luft	R_{thJU}	≦ 500	≦ 500	≦ 500	≦ 420	≦ 420	≦ 420	grd/W
Kollektorsperrschicht – Transistorgehäuse	R_{thJG}	< 200	< 200	< 200	–	–	–	grd/W

Statische Kenndaten (T_U = 25 °C)

Die Transistoren werden nach der statischen Stromverstärkung B gruppiert und mit VI, A, B. gekennzeichnet.

Bei $-U_{CE}$ = 5 V und untenstehenden Kollektorströmen gelten folgende statische Werte.

B-Gruppe	VI	A	B
Typ	BC 157, 177, 257	BC 157, 177, 257	—
	BC 158, 178, 258	BC 158, 178, 258	BC 158, 178, 258
	—	BC 159, 179, 259	BC 159, 179, 259
$-I_C$ (mA)	B I_C/I_B	B I_C/I_B	B I_C/I_B
0,01	55	90	270
2	100 (70 bis 140)	170 (120 bis 220)	290 (180 bis 460)
100*)	70	120*)	400*)

*) Diese Werte gelten nicht für BC 159, BC 179, BC 259

BC 157, 158, 159, BC 177, 178, 179, BC 257, 258, 259

Statische Kenndaten (T_U = 25 °C)

Typ			BC 157, 158, 159,	BC 177, 178, 179,	BC 257, 258, 259
U_{CE} (V)	$-I_C$ (mA)	$-I_B$ (mA)	$-U_{BE}$ V	$-U_{CEsat}$ V	$-U_{BEsat}$ V
5	0,1	–	0,57	–	–
5	2	–	0,62 (0,55 bis 0,7)	–	–
5	10	0,5	–	0,1 (< 0,2)[1]	0,7 (< 0,8)
5	100	–	0,8	–	–
–	100[3]	5	–	0,2 (< 0,5)[1][3]	0,85 (< 1)[3]
–	10	–	–	0,3 (< 0,6)[2]	–

Statische Kenndaten (T_U = 25 °C)		BC 157 BC 177 BC 257	BC 158 BC 178 BC 258	BC 159 BC 179 BC 259	
Kollektor-Emitter-Reststrom ($-U_{CES}$ = 20 V)	$-I_{CES}$	2 (<100)	2 (<100)	2 (<100)	nA
Kollektor-Emitter-Reststrom ($-U_{CES}$ = 20 V; T_U = 125 °C)	$-I_{CES}$	< 4	< 4	< 4	µA
Emitter-Basis-Durchbruchspannung ($-I_{EB}$ = 10 µA)	$-U_{(BR)EBO}$	> 5	> 5	> 5	V
Kollektor-Emitter-Durchbruchspannung ($-I_{CE}$ = 2 mA)	$-U_{(BR)CEO}$	> 45	> 25	> 20	V
Kollektor-Emitter-Durchbruchspannung ($-I_{CE}$ = 10 µA)	$-U_{(BR)CES}$	> 50	> 30	> 25	V

Dynamische Kenndaten (T_U = 25 °C)		BC 157 BC 257	BC 158 BC 258	BC 159 BC 259	
Transitfrequenz ($-I_C$ = 10 mA; $-U_{CE}$ = 5 V; f = 50 MHz)	f_T	130	130	130	MHz
Kollektor-Basis-Kapazität ($-U_{CBO}$ = 10 V; f = 1 MHz)	C_{CBO}	< 6	< 6	< 6	pF
Rauschmaß ($-I_C$ = 0,2 mA; $-U_{CE}$ = 5 V; R_G = 2 kΩ; Δf = 200 Hz;					
f = 1 kHz	F	< 10	< 10	< 4	dB
f = 30 bis 15000 Hz	F	–	–	2 (< 4)	dB

[1] Der Transistor ist so weit übersteuert, daß die statische Stromverstärkung auf einen Wert von B = 20 abgesunken ist.

[2] I_C = 10 mA für die Kennlinie, welche bei konstantem Basisstrom durch den Kennlinienpunkt I_C = 11 mA; U_{CE} = 1 V geht.

[3] Diese Werte gelten nicht für BC 159, BC 179, BC 259

BC 157, 158, 159, BC 177, 178, 179, BC 257, 258, 259

Dynamische Kenndaten T_U = 25 °C)		BC 177	BC 178	BC 179	
Transitfrequenz ($-I_C$ = 10 mA; $-U_{CE}$ = 5 V; f = 50 MHz)	f_T	130	130	130	MHz
Kollektor-Basis-Kapazität ($-U_{CBO}$ = 10 V; f = 1 MHz)	C_{CBO}	4,5 (< 7)	4,5 (< 7)	4,5 (< 7)	pF
Rauschmaß ($-I_C$ = 0,2 mA; $-U_{CE}$ = 5 V) R_G = 2 kΩ; Δf = 200 Hz;					
f = 1 kHz	F	< 10	< 10	< 4	dB
f = 30 bis 15000 Hz	F	–	–	2 (< 4)	dB

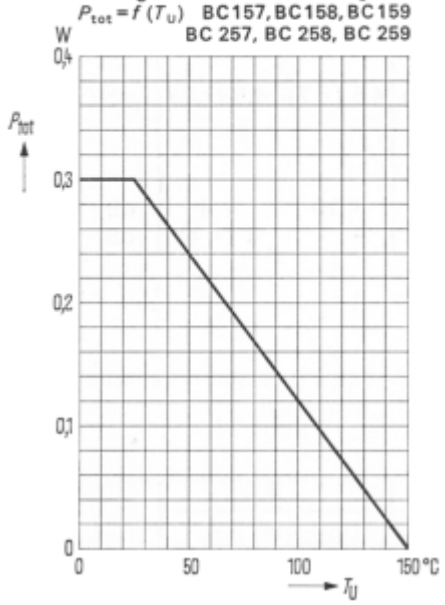
Dynamische Kenndaten (T_U = 25 °C)

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

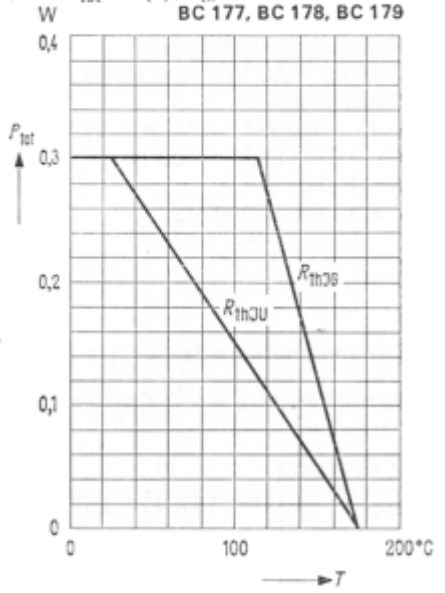
B-Gruppe	VI	A	B	
Typ	BC 157, 177, 257	BC 157, 177, 257	—	
	BC 158, 178, 258	BC 158, 178. 258	BC 158, 178, 258	
	—	BC 159, 179, 259	BC 159, 179, 259	
h_{11e}	1,2 (0,4 bis 2,2)	2,7 (1,2 bis 4,5)	4,5 (3,0 bis 8)	kΩ
h_{12e}	2,5	3	3,5	10^{-4}
h_{21e}	110 (75 bis 150)	222 (125 bis 260)	330 (240 bis 500)	–
h_{22e}	20 (< 40)	25 (< 50)	35 (< 70)	µS

BC 157, 158, 159, BC 177, 178, 179, BC 257, 258, 259

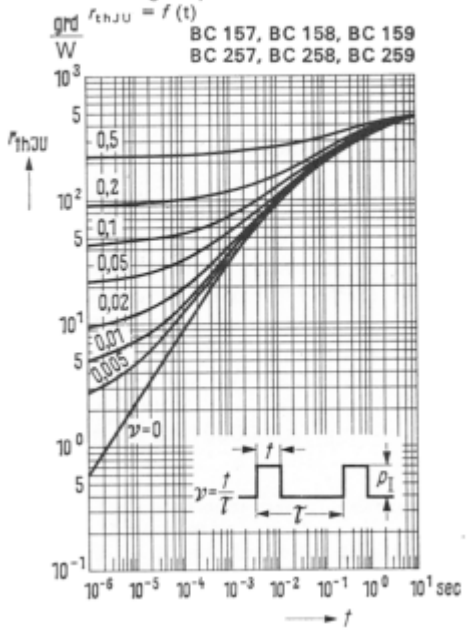
Temperaturabhängigkeit der zulässigen Gesamtverlustleistung
$P_{tot} = f(T_U)$ BC157, BC158, BC159
BC 257, BC 258, BC 259



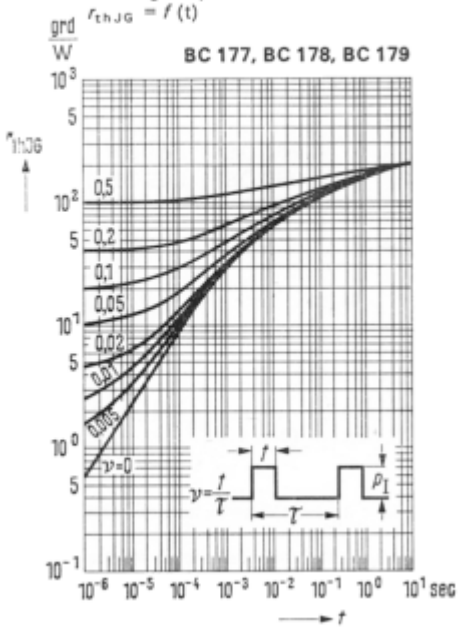
Temperaturabhängigkeit der zulässigen Gesamtverlustleistung
$P_{tot} = f(T)$; R_{th} = Parameter
BC 177, BC 178, BC 179



Zulässige Impulsbelastbarkeit
$r_{thJU} = f(t)$
BC 157, BC 158, BC 159
BC 257, BC 258, BC 259

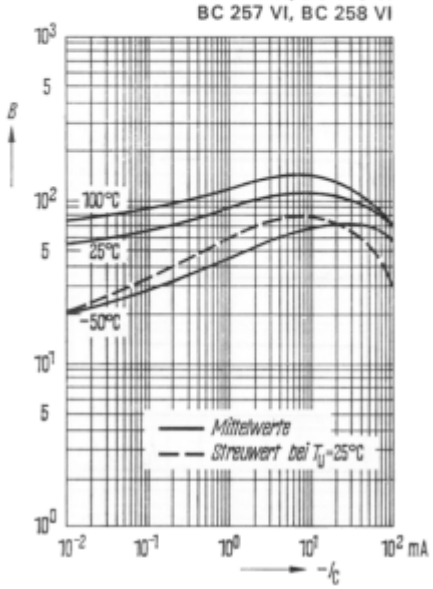


Zulässige Impulsbelastbarkeit
$r_{thJG} = f(t)$
BC 177, BC 178, BC 179

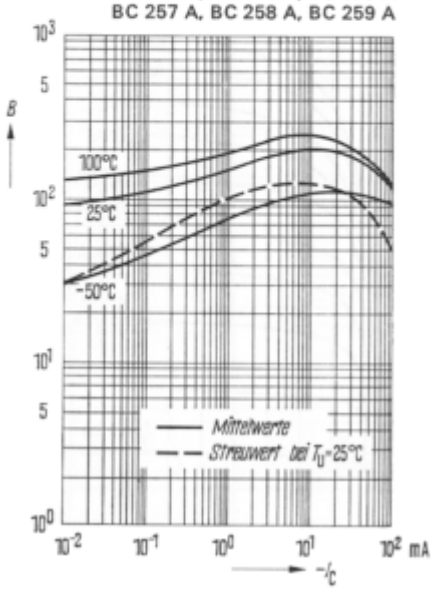


BC 157, 158, 159, BC 177, 178, 179, BC 257, 258, 259

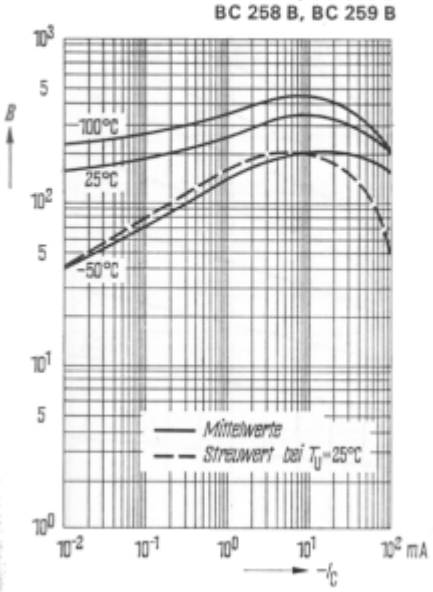
Stromverstärkung $B = f(I_C)$; $U_{CE} = 5$ V
BC 157 VI, BC 158 VI
BC 177 VI, BC 178 VI
BC 257 VI, BC 258 VI



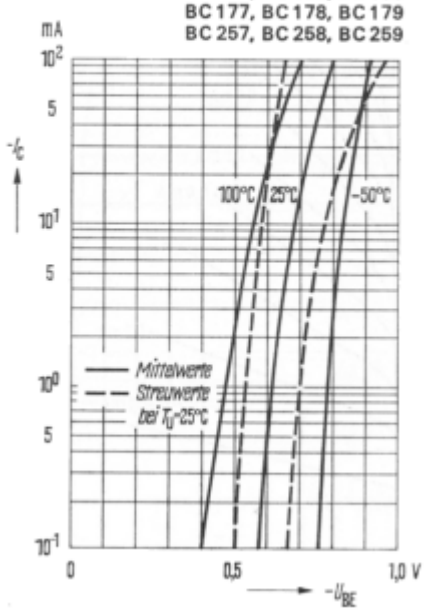
Stromverstärkung $B = f(I_C)$; $U_{CE} = 5$ V
BC 157 A, BC 158 A, BC 159 A
BC 177 A, BC 178 A, BC 179 A
BC 257 A, BC 258 A, BC 259 A



Stromverstärkung $B = f(I_C)$; $U_{CE} = 5$ V
BC 158 B, BC 159 B
BC 178 B, BC 179 B
BC 258 B, BC 259 B

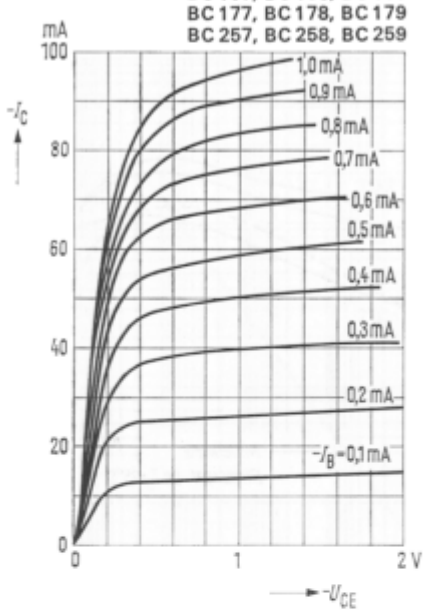


Kollektorstrom $I_C = f(U_{BE})$; $U_{CE} = 5$ V
BC 157, BC 158, BC 159
BC 177, BC 178, BC 179
BC 257, BC 258, BC 259

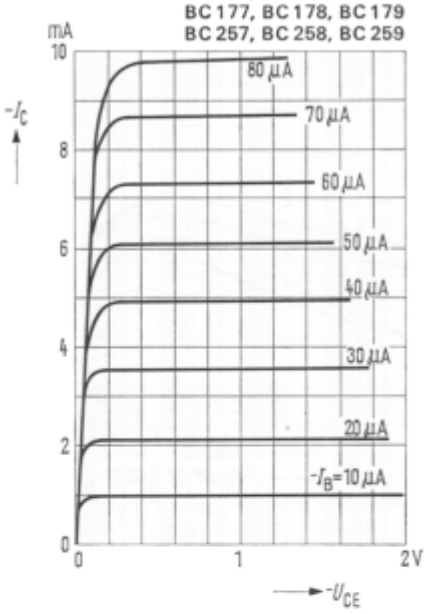


BC 157, 158, 159, BC 177, 178, 179, BC 257, 258, 259

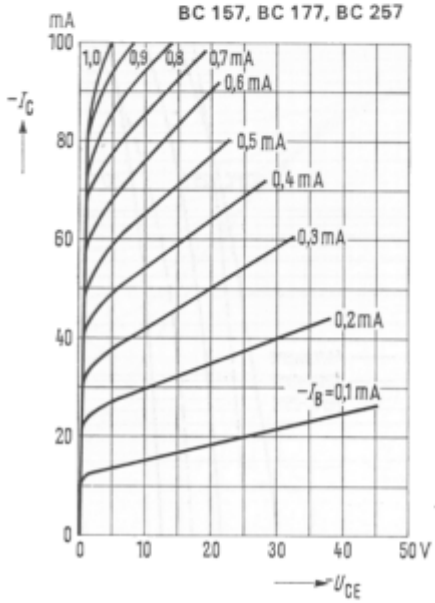
Ausgangskennlinien $I_C = f(U_{CE})$
BC 157, BC 158, BC 159
BC 177, BC 178, BC 179
BC 257, BC 258, BC 259



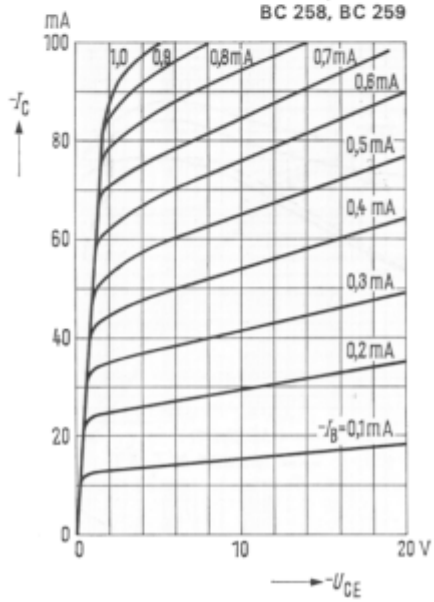
Ausgangskennlinien $I_C = f(U_{CE})$
BC 157, BC 158, BC 159
BC 177, BC 178, BC 179
BC 257, BC 258, BC 259



Ausgangskennlinien $I_C = f(U_{CE})$
I_B = Parameter
BC 157, BC 177, BC 257

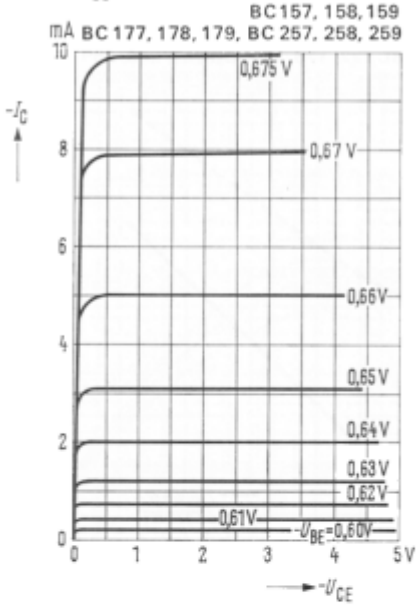


Ausgangskennlinien $I_C = f(U_{CE})$
I_B = Parameter
BC 158, BC 159
BC 178, BC 179
BC 258, BC 259

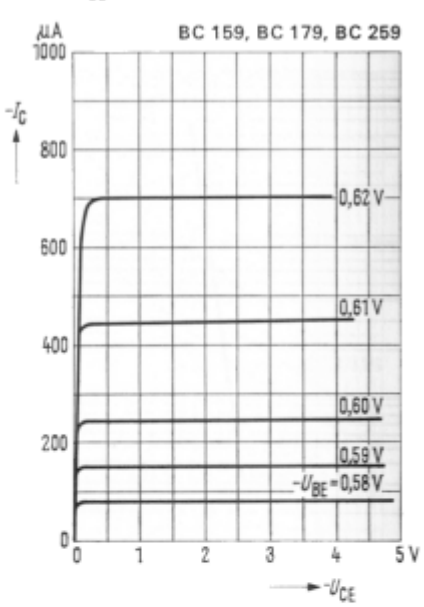


BC 157, 158, 159, BC 177, 178, 179, BC 257, 258, 259

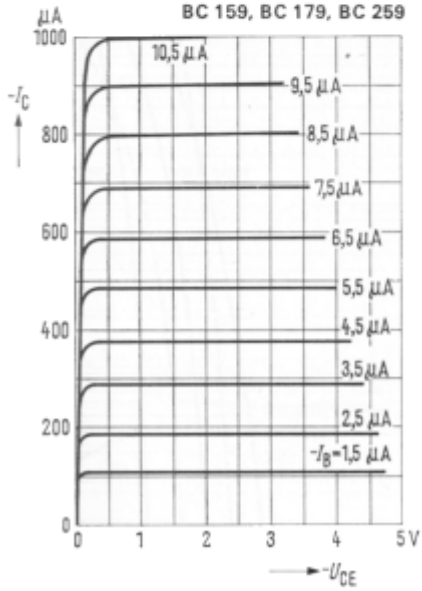
Ausgangskennlinien $I_C = f(U_{CE})$
U_{BE} = Parameter



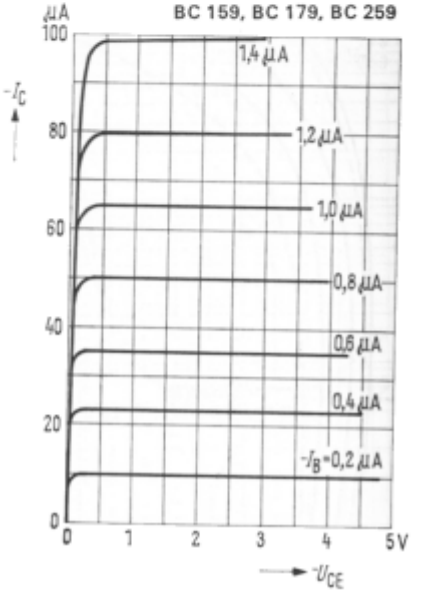
Ausgangskennlinien $I_C = f(U_{CE})$
U_{BE} = Parameter



Ausgangskennlinien $I_C = f(U_{CE})$
I_B = Parameter

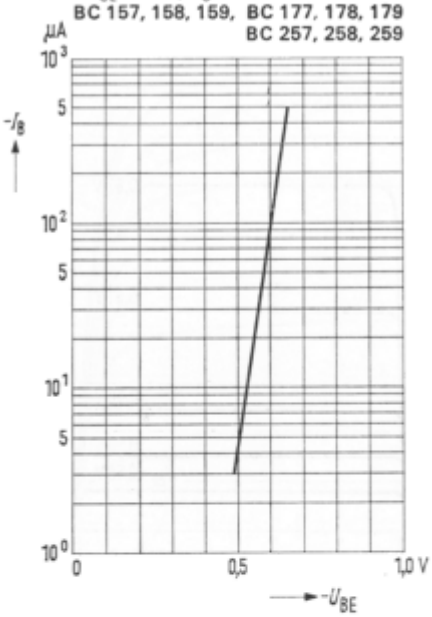


Ausgangskennlinien $I_C = f(U_{CE})$
I_B = Parameter

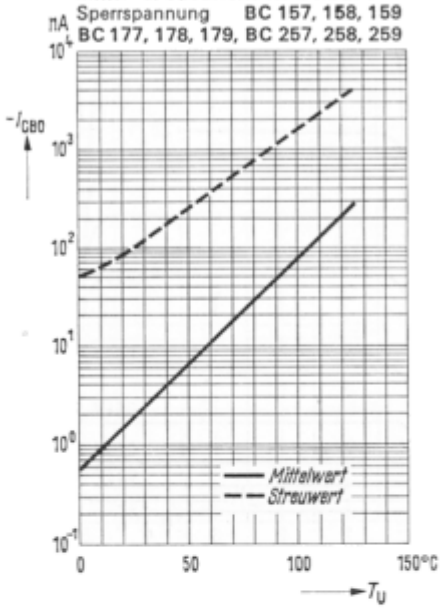


BC 157, 158, 159, BC 177, 178, 179, BC 257, 258, 259

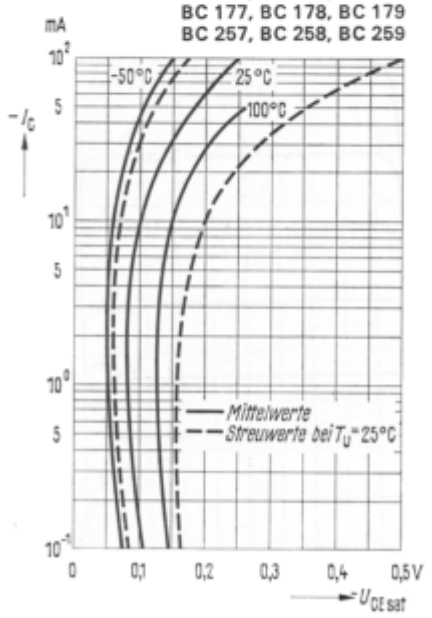
Eingangskennlinie $I_B = f(U_{BE})$
$-U_{CE} = 5$ V; $T_U = 25$ °C
BC 157, 158, 159, BC 177, 178, 179
BC 257, 258, 259



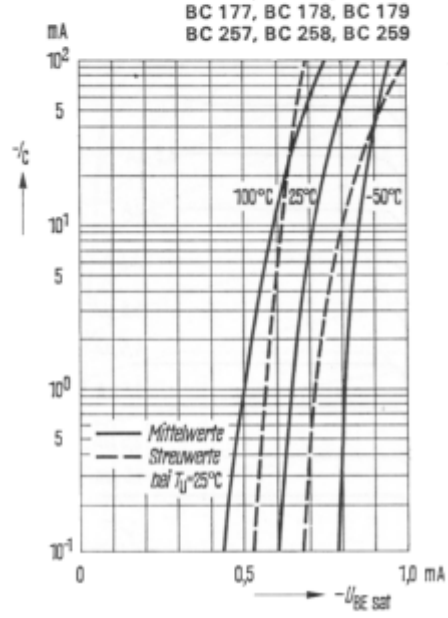
Temperaturabhängigkeit des
Reststromes $I_{CBO} = f(T_U)$
Mittel- u. Streuwerte für max. zul.
Sperrspannung BC 157, 158, 159
BC 177, 178, 179, BC 257, 258, 259



Sättigungsspannung $U_{CEsat} = f(I_C)$
$B = 20$ BC 157, BC 158, BC 159
BC 177, BC 178, BC 179
BC 257, BC 258, BC 259



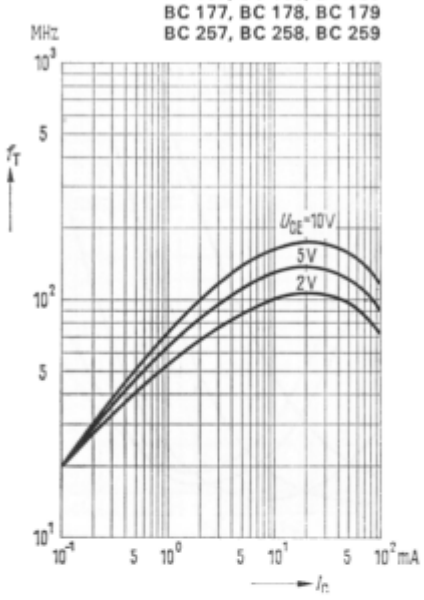
Sättigungsspannung $U_{BEsat} = f(I_C)$
$B = 20$ BC 157, BC 158, BC 159
BC 177, BC 178, BC 179
BC 257, BC 258, BC 259



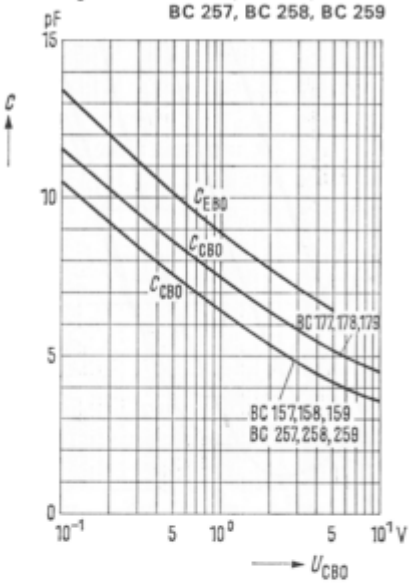
BC 157, 158, 159, BC 177, 178, 179, BC 257, 258, 259

Transitfrequenz $f_T = f(I_C)$
(T_U = 25 °C)

BC 157, BC 158, BC 159
BC 177, BC 178, BC 179
BC 257, BC 258, BC 259



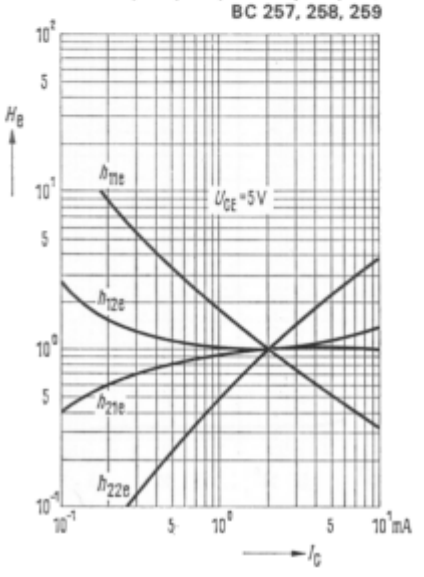
Kollektor-Basis-Kapazität
Emitter-Basis-Kapazität
$C_{CBO}, C_{EBO} = f(U_{CBO}, U_{EBO})$:
f = 1 MHz BC 157, BC 158, BC 159
T_U = 25 °C BC 177, BC 178, BC 179
BC 257, BC 258, BC 259



Stromabhängigkeit der h-Parameter
U_{CE} = 5 V; T_U = 25 °C

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

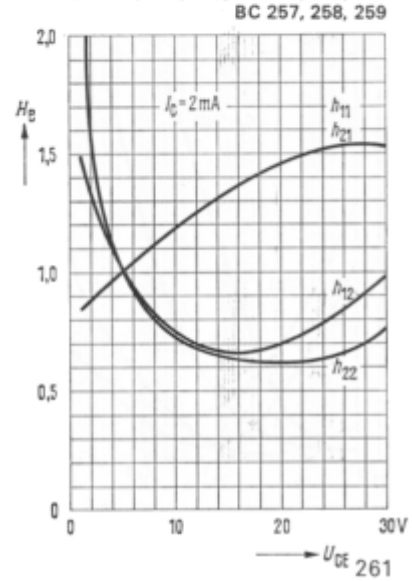
BC 157, 158, 159, BC 177, 178, 179
BC 257, 258, 259



Spannungsabhängigkeit der h-Parameter
I_C = 2 mA; T_U = 25 °C

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

BC 157, 158, 159, BC 177, 178, 179
BC 257, 258, 259



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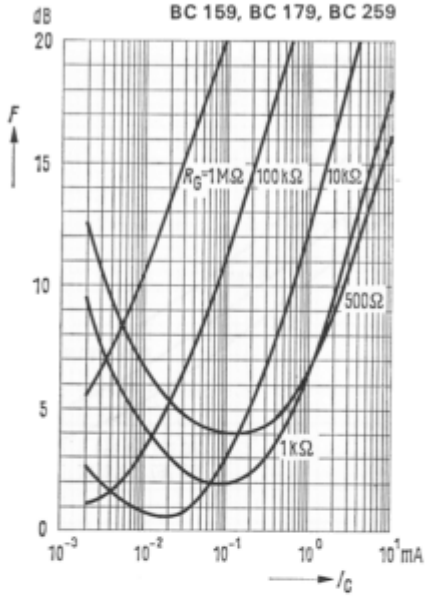
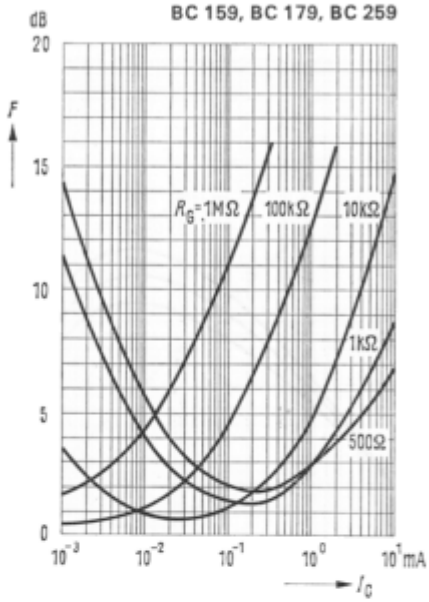
BC 157, 158, 159, BC 177, 178, 179, BC 257, 258, 259

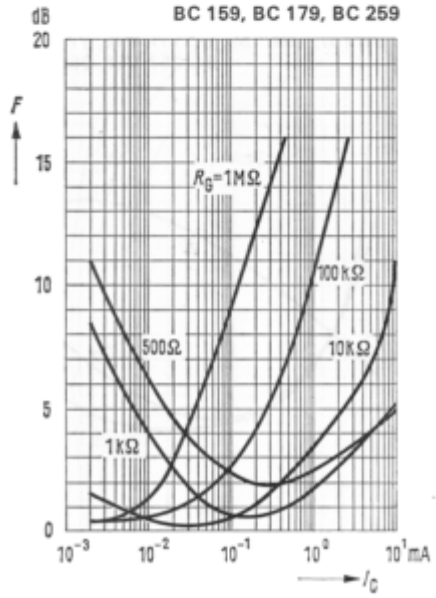
Rauschmaß $F = f(I_C)$
U_{CE} = 5 V; f = 120 Hz; T_U = 25 °C
BC 159, BC 179, BC 259



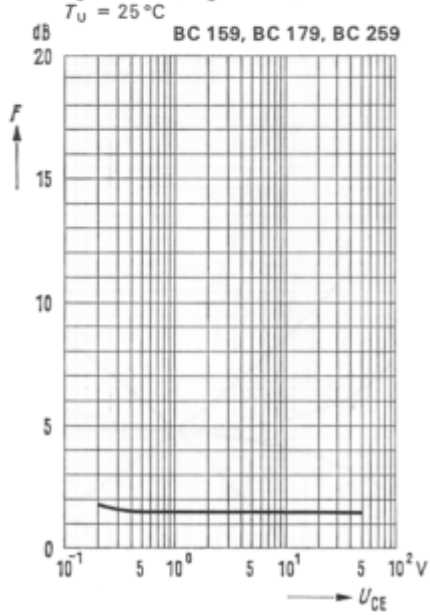
Rauschmaß $F = f(I_C)$
(U_{CE} = 5 V; f = 1 kHz; T_U = 25 °C
BC 159, BC 179, BC 259



Rauschmaß $F = f(I_C)$
U_{CE} = 5 V; f = 10 kHz; T_U = 25 °C
BC 159, BC 179, BC 259



Rauschmaß $F = f(U_{CE})$
I_C = 0,2 mA; R_G = 2 kΩ; f = 1 kHz
T_U = 25 °C
BC 159, BC 179, BC 259



BC 157, 158, 159, BC 177, 178, 179, BC 257, 258, 259

Rauschmaß $F = f(f)$
$R_G = 2\ k\Omega$; $U_{CE} = 5\ V$; $I_C = 0{,}2\ mA$
$T_U = 25\ °C$