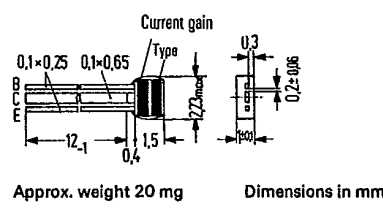


**NPN Silicon Transistors SIEMENS AKTIENGESELLSCHAFT C 121**  
**BC 122**  
**BC 123**

BC 121, BC 122, and BC 123 are miniature epitaxial NPN silicon planar transistors in U 32 plastic encapsulation. The types are marked by a color line on the case: BC 121 yellow, BC 122 white, BC 123 red. The transistors are particularly intended for use in low noise AF amplifier stages and as complementary transistors to BC 201, BC 202, and BC 203.

Type	Ordering code
BC 121 <sup>1)</sup>	Q60203-X121
BC 121 white	Q60203-X121-X9
BC 121 yellow	Q60203-X121-X4
BC 121 green	Q60203-X121-S6
BC 121 blue	Q60203-X121-X6
BC 122 <sup>1)</sup>	Q60203-X122
BC 122 white	Q60203-X122-X9
BC 122 yellow	Q60203-X122-X4
BC 122 green	Q60203-X122-X10
BC 122 blue	Q60203-X122-X6
BC 123 <sup>1)</sup>	Q60203-X123
BC 123 white	Q60203-X123-X9
BC 123 yellow	Q60203-X123-X4
BC 123 green	Q60203-X123-X5



Maximum ratings		BC 121	BC 122	BC 123	
Collector-emitter voltage	$V_{CE0}$	5	20	30	V
Collector-base voltage	$V_{CBO}$	5	30	45	V
Emitter-base voltage	$V_{EBO}$	5	5	5	V
Collector current	$I_C$	75	75	75	mA
Emitter current	$I_E$	85	85	85	mA
Base current	$I_B$	10	10	10	mA
Junction temperature	$T_j$	150	150	150	°C
Storage temperature range	$T_{stg}$	-55 to +125	-55 to +125	-55 to +125	°C
<sup>a</sup> Total power dissipation Lead length $L = 2$ mm; see diagram <sup>2)</sup> $R_{th} = f(L)$	$P_{tot}$	250	250	250	mW
<b>Thermal resistance</b> see diagram <sup>2)</sup> $R_{th} = f(L)$	$R_{thJA}$	≤1000	≤1000	≤1000	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.  
 2) (page 146)

**Static characteristics ( $T_{amb} = 25^{\circ}\text{C}$ )**

The transistors are grouped according to the small signal current gain  $h_{fe}$  and marked by a color line. At a voltage of  $V_{CE} = 2\text{ V}$  and the collector currents listed below, the following static characteristics apply:

$h_{fe}$ groups	white	yellow	green	blue	
Type	BC 121 BC 122 BC 123	BC 121 BC 122 BC 123	BC 121 BC 122 BC 123	BC 121 BC 122 -	BC 121 BC 122 BC 123
$I_C$ mA	$h_{FE}$ $I_C/I_B$	$h_{FE}$ $I_C/I_B$	$h_{FE}$ $I_C/I_B$	$h_{FE}$ $I_C/I_B$	$V_{BE}$ mV
0.01	63	110	180	330	530
0.25	100	175	290	520	560 (500-630)
10	125	220	320	620	610

**Static characteristics ( $T_{amb} = 25^{\circ}\text{C}$ )**

Saturation voltages

( $I_C = 10\text{ mA}$ ;  $I_B = 0.5\text{ mA}$ )  
( $I_C = 50\text{ mA}$ ;  $I_B = 2.5\text{ mA}$ )

	$V_{CEsat}$	$V_{BEsat}$	
( $I_C = 10\text{ mA}$ ; $I_B = 0.5\text{ mA}$ )	0.07 (<0.2)	0.73 (<0.83)	V
( $I_C = 50\text{ mA}$ ; $I_B = 2.5\text{ mA}$ )	0.13 (<0.4)	0.82 (>0.95)	V

	BC 121	BC 122	BC 123	
Collector cutoff current ( $V_{CBO} = 25\text{ V}$ )	-	-	<10	nA
Collector cutoff current ( $V_{CBO} = 15\text{ V}$ )	-	<10	-	nA
Collector cutoff current ( $V_{CBO} = 2\text{ V}$ )	<10	-	-	nA
Collector-emitter breakdown voltage ( $I_{CEO} = 100\text{ }\mu\text{A}$ )	$V_{(BR)CEO} > 5$	$> 20$	$> 30$	V
Collector-base breakdown voltage ( $I_{CBO} = 100\text{ }\mu\text{A}$ )	$V_{(BR)CBO} > 5$	$> 30$	$> 45$	V
Emitter-base breakdown voltage ( $I_{EBO} = 100\text{ }\mu\text{A}$ )	$V_{(BR)EBO} > 5$	$> 5$	$> 5$	V

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Dynamic characteristics ( $T_{amb} = 25^{\circ}\text{C}$ )		BC 121	BC 122	BC 123	
Transition frequency ( $I_C = 250 \mu\text{A}$ ; $V_{CE} = 0.5 \text{ V}$ )	$f_T$	50	50	50	MHz
Transition frequency ( $I_C = 10 \text{ mA}$ ; $V_{CE} = 0.5 \text{ V}$ )	$f_T$	250	250	250	MHz
Collector-base capacitance ( $V_{CBO} = 2 \text{ V}$ ; $f = 1 \text{ MHz}$ )	$C_{CBO}$	4.4 (<11)	-	-	pF
Collector-base capacitance ( $V_{CBO} = 10 \text{ V}$ ; $f = 1 \text{ MHz}$ )	$C_{CBO}$	-	3.5 (<7)	3.5 (<7)	pF
Noise figure ( $I_C = 200 \mu\text{A}$ ; $V_{CE} = 0.5 \text{ V}$ ; $f = 1 \text{ kHz}$ ; $\Delta f = 200 \text{ Hz}$ ; $R_g = 2 \text{ k}\Omega$ )	NF	2.5 (<5)	2.5 (<5)	2.5 (<5)	dB

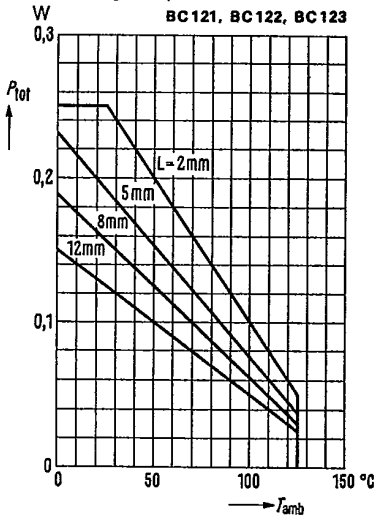
Current gain groups

The transistors BC 121, BC 122, BC 123 are grouped according to the small signal current gain  $h_{fe}$  and are marked by a color line.

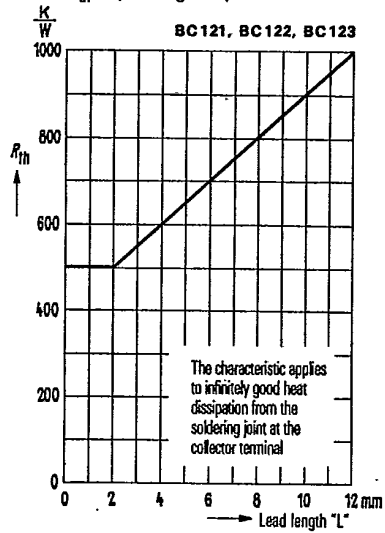
Operating point:  $V_{CE} = 0.5 \text{ V}$ ;  $I_C = 250 \mu\text{A}$ ;  $f = 1 \text{ kHz}$

Color line	white	yellow	green	blue
Type	BC 121 BC 122 BC 123	BC 121 BC 122 BC 123	BC 121 BC 122 BC 123	BC 121 BC 122 -
Small signal current gain $h_{fe}$	75 to 150	125 to 260	240 to 500	450 to 900

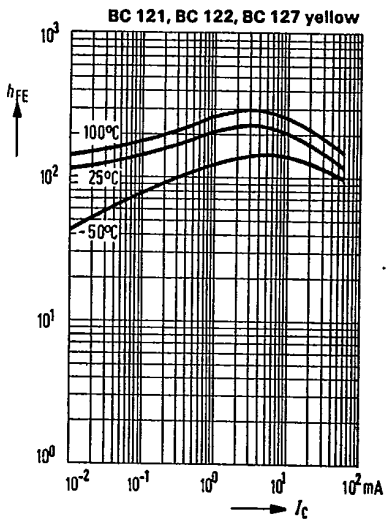
Total perm. power dissipation versus temperature  $P_{tot} = f(T_{amb})$ ; lead length "L"-parameter



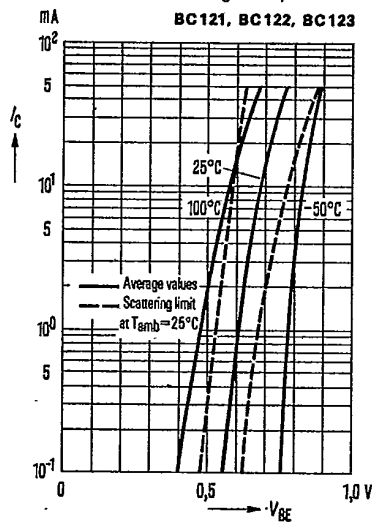
Thermal resistance  $R_{th} = f(\text{lead length "L"})$



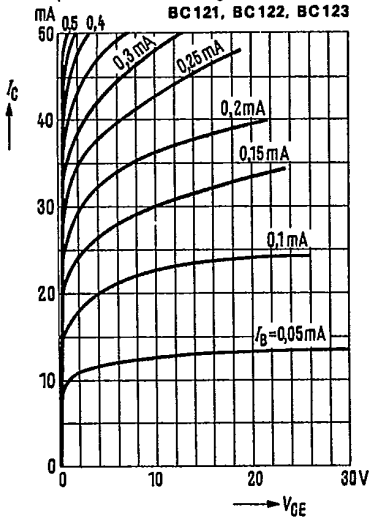
DC current gain  $h_{FE} = f(I_C)$   
 $V_{CE} = 2V, T_{amb} = \text{parameter}$   
 (common emitter configuration)  
 BC 121 yellow, BC 122 yellow,  
 BC 123 yellow



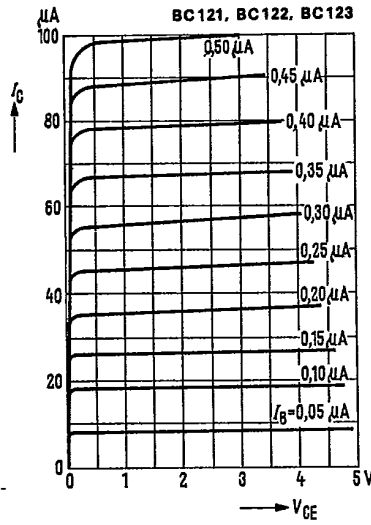
Collector current  $I_C = f(V_{BE})$   
 $T_{amb} = \text{parameter}; V_{CE} = 2V$   
 (common emitter configuration)



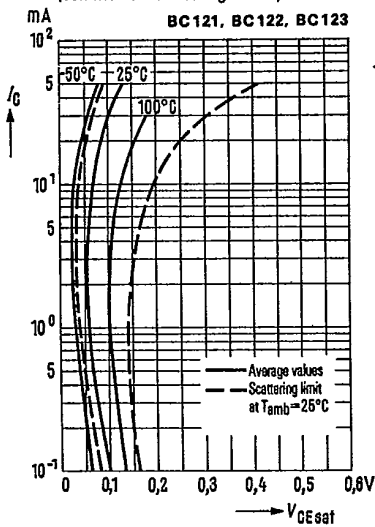
Output characteristics  $I_C = f(V_{CE})$   
 $I_B = \text{parameter}$ ,  $T_{amb} = 25^\circ\text{C}$   
(common emitter configuration)



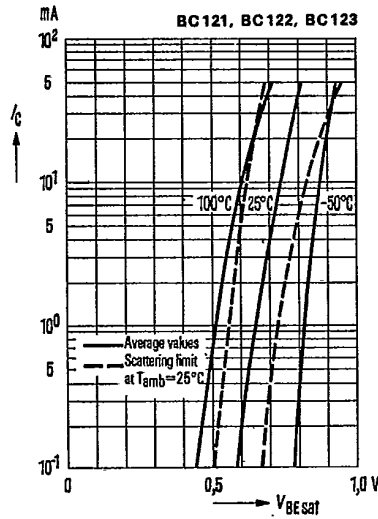
Output characteristics  $I_C = f(V_{CE})$   
 $I_B = \text{parameter}$   
(common emitter configuration)



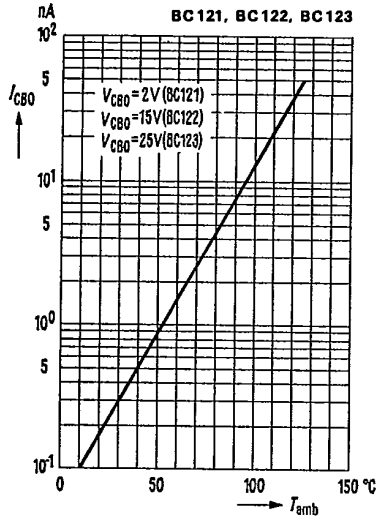
Collector-emitter saturation voltage  
 $V_{CEsat} = f(I_C)$   
 $h_{FE} = 20$ ;  $T_{amb} = \text{parameter}$   
(common emitter configuration)



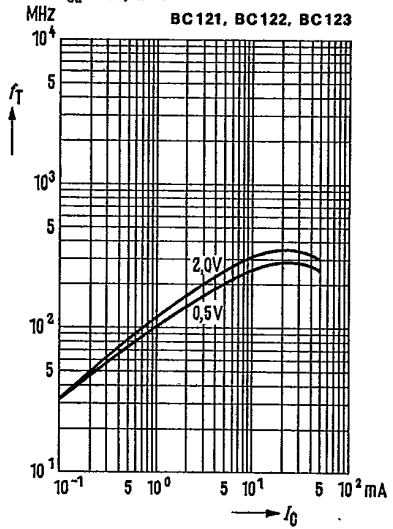
Base-emitter saturation voltage  
 $V_{BEsat} = f(I_C)$   
 $h_{FE} = 20$ ;  $T_{amb} = \text{parameter}$   
(common emitter configuration)



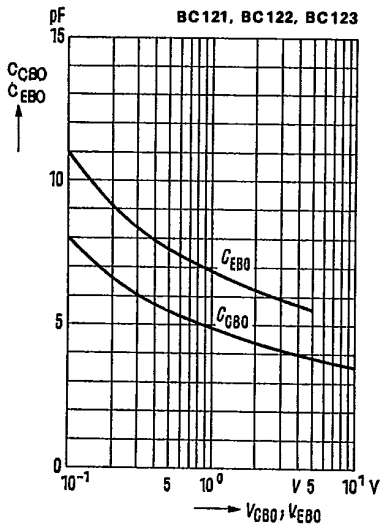
Collector cutoff current versus temperature  
 $I_{CBO} = f(T_{amb})$



Transition frequency  $f_T = f(I_C)$   
 $V_{CE} = 0.5; 2.0V$



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



Input characteristic  $I_B = f(V_{BE})$   
 $V_{CE} = 2V$   
(common emitter configuration)

