

## PNP Silicon Transistors

BC 556 – BC 560

SIEMENS AKTIENGESELLSCHAFT

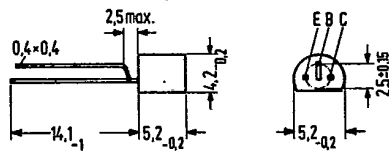
T-29-21

## for AF input and driver stages

BC 556, BC 557, BC 558, BC 559, and BC 560 are epitaxial PNP silicon planar transistors in TO 92 plastic package 10 A 3 DIN 41 868. They are intended for use in AF input and driver stages (BC 559, BC 560 for low-noise input stages) and as complementary transistors to BC 546, BC 547, BC 548, BC 549, and BC 550.

Type	Ordering code
BC 556 <sup>1)</sup>	Q62702-C692
BC 556 VI	Q62702-C692-V3
BC 556 A	Q62702-C692-V1
BC 556 B	Q62702-C692-V2
BC 557 <sup>1)</sup>	Q62702-C693
BC 557 VI	Q62702-C693-V3
BC 557 A	Q62702-C693-V1
BC 557 B	Q62702-C693-V2
BC 558 <sup>1)</sup>	Q62702-C694
BC 558 VI	Q62702-C694-V4
BC 558 A	Q62702-C694-V1
BC 558 B	Q62702-C694-V2
BC 558 C	Q62702-C694-V3

Type	Ordering code
BC 559 <sup>1)</sup>	Q62702-C695
BC 559 A	Q62702-C695-V1
BC 559 B	Q62702-C695-V2
BC 559 C	Q62702-C695-V3
BC 560 <sup>1)</sup>	Q62702-C696
BC 560 A	Q62702-C696-V1
BC 560 B	Q62702-C696-V2
BC 560 C	Q62702-C696-V3



Mounting instruction: Fixing hole dia 0.6  
Approx. weight 0.25 g Dimensions in mm

Maximum ratings		BC 556	BC 557	BC 558	BC 559	BC 560	
Collector-base voltage	$-V_{CBO}$	80	50	30	30	50	V
Collector-emitter voltage	$-V_{CES}$	80	50	30	30	50	V
Collector-emitter voltage	$-V_{CEO}$	65	45	30	30	45	V
Emitter-base voltage	$-V_{EBO}$	5	5	5	5	5	V
Collector current	$-I_C$	100	100	100	100	100	mA
Collector peak current	$-I_{CM}$	200	200	200	200	200	mA
Base peak current	$-I_{BM}$	200	200	200	200	200	mA
Emitter-peak current	$-I_{EM}$	200	200	200	200	200	mA
Junction temperature	$T_j$	150	150	150	150	150	°C
Storage temperature range	$T_{stg}$	-65 to +150					°C
Total power dissipation ( $T_{amb} = 25^\circ\text{C}$ )	$P_{tot}$	500	500	500	500	500	mW

## Thermal resistance

Junction to ambient air	$R_{thJA}$	≤250	≤250	≤250	≤250	≤250	K/W
Junction to case	$R_{thJC}$	≤150	≤150	≤150	≤150	≤150	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.

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

The transistors are grouped in accordance with the DC current gain  $h_{FE}$  and are marked by VI, A, B, and C. At  $-V_{CE} = 5\text{ V}$  and the collector currents tabulated below the following static characteristics apply.

Type	BC 556 BC 557 BC 558	BC 556 BC 557, BC 559 BC 558, BC 560	BC 556 BC 557, BC 559 BC 558, BC 560	BC 558, BC 559, BC 560
$h_{FE}$ group	VI	A	B	C
$-I_C$ mA	$h_{FE}$ $I_C/I_B$	$h_{FE}$ $I_C/I_B$	$h_{FE}$ $I_C/I_B$	$h_{FE}$ $I_C/I_B$
0.01	—	90	150	270
2	110 (75 to 150)	180 (110 to 220)	290 (200 to 450)	500 (420 to 800)
100	—	120 <sup>3)</sup>	200 <sup>3)</sup>	400 <sup>3)</sup>

		BC 556 BC 557 BC 558	BC 559 BC 560	
Collector cutoff current ( $-V_{CBO} = 30\text{ V}$ )	$-I_{CBO}$	$\leq 15$	$\leq 15$	nA
( $-V_{CBO} = 30\text{ V}$ ; $T_{amb} = 150^{\circ}\text{C}$ )	$-I_{CBO}$	$\leq 5$	$\leq 5$	$\mu\text{A}$
Collector-emitter saturation voltage ( $-I_C = 10\text{ mA}$ ; $-I_B = 0.5\text{ mA}$ )	$-V_{CEsat}$	90 (<300)	90 (<300)	mV
( $-I_C = 100\text{ mA}$ ; $-I_B = 5\text{ mA}$ )	$-V_{CEsat}$	250 (<650)	250 (<650)	mV
( $-I_C = 10\text{ mA}$ ) <sup>1)</sup>	$-V_{CEsat}$	300 (<600)	300 (<600)	mV
Base-emitter saturation voltage <sup>2)</sup> ( $-I_C = 10\text{ mA}$ ; $-I_B = 0.5\text{ mA}$ )	$-V_{BEsat}$	700	700	mV
( $-I_C = 100\text{ mA}$ ; $-I_B = 5\text{ mA}$ )	$-V_{BEsat}$	900	900	mV
Base-emitter voltage ( $-V_{CE} = 5\text{ V}$ ; $-I_C = 2\text{ mA}$ )	$-V_{BE}$	660 (600 to 700)	(580 to 700)	mV
Base-emitter voltage ( $-V_{CE} = 5\text{ V}$ ; $-I_C = 10\text{ mA}$ )	$-V_{BE}$	<800	<720	mV

1) For the characteristic which passes through the point  $I_C = 11\text{ mA}$ ;  $V_{CE} = 1\text{ V}$  at constant base current.

2)  $\frac{\Delta V_{BEsat}}{\Delta T_1}$  approx. = 1.7 mV/K;  $\frac{\Delta V_{BE}}{\Delta T_1}$  approx. = -2 mV/K

3) only applies to BC 556, BC 557, BC 558

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

		BC 556 BC 557 BC 558	BC 559	BC 560	
Transition frequency ( $-V_{CE} = 5\text{ V}$ ; $-I_C = 10\text{ mA}$ ; $f = 100\text{ MHz}$ )	$f_T$	150	300	300	MHz
Collector-base capacitance ( $-V_{CBO} = 10\text{ V}$ ; $f = 1\text{ MHz}$ )	$C_{CBO}$	4.5	2.5 (<4.5)	2.5 (<4.5)	pF
Noise figure ( $-V_{CE} = 5\text{ V}$ ; $-I_C = 200\text{ }\mu\text{A}$ ; $R_g = 2\text{ k}\Omega$ $f = 1\text{ kHz}$ ; $\Delta f = 200\text{ Hz}$ )	NF	2 (<10)	1 (<4)	1 (<4)	dB
( $-V_{CE} = 5\text{ V}$ ; $-I_C = 200\text{ }\mu\text{A}$ ; $R_g = 2\text{ k}\Omega$ $f = 30\text{ to }15000\text{ Hz}$ )	NF	-	1.2 (<4)	1.2 (<2)	dB
Equivalent noise voltage ( $-V_{CE} = 5\text{ V}$ ; $-I_C = 200\text{ }\mu\text{A}$ ; $R_g = 2\text{ k}\Omega$ $f = 10\text{ to }50\text{ Hz}$ )	$E_n$	-	$\leq 0.11$	$\leq 0.11$	$\mu\text{V}$

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

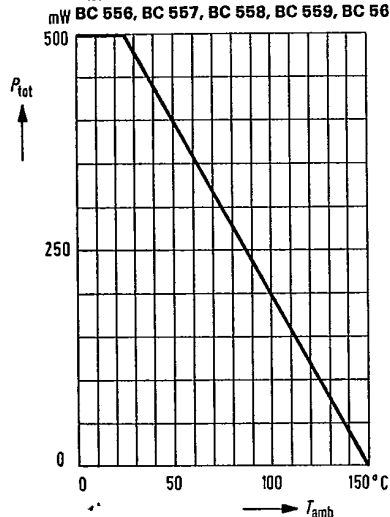
$-I_C = 2\text{ mA}$ ;  $-V_{CE} = 5\text{ V}$ ;  $f = 1\text{ kHz}$

Type	BC 556 BC 557 BC 558	BC 556 BC 557, BC 559 BC 558, BC 560	BC 556 BC 557, BC 559 BC 558, BC 560	BC 558, BC 559, BC 560	
hFE group	VI	A	B	C	
$h_{11e}$	1.2 (0.4 to 2.2)	2.7 (1.6 to 4.5)	4.5 (3.2 to 8.5)	8.7 (6 to 15)	k $\Omega$
$h_{12e}$	2.5	1.5	2	3	$10^{-4}$
$h_{21e}$	110	220	330	600	-
$h_{22e}$	20 (<40)	18 (<30)	30 (<60)	60 (<110)	$\mu\text{S}$

**Total perm. power dissipation  
versus temperature**

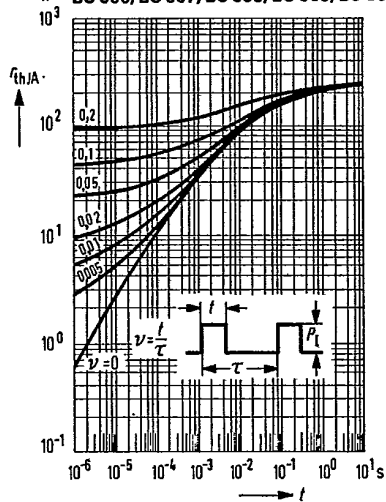
$$P_{\text{tot}} = f(T_{\text{amb}})$$

BC 556, BC 557, BC 558, BC 559, BC 560



**Permissible pulse load**  
 $r_{\text{thJA}} = f(t)$ ;  $v = \text{parameter}$

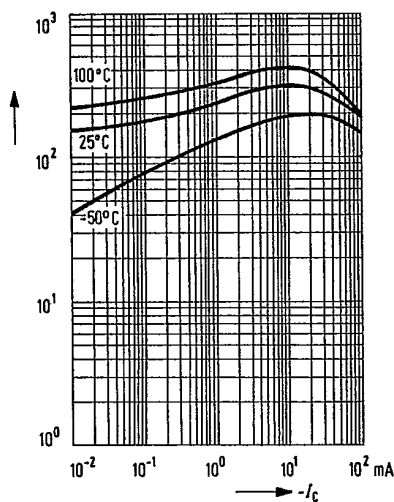
BC 556, BC 557, BC 558, BC 559, BC 560



**DC current gain  $h_{FE} = f(I_C)$**

$V_{CE} = 5 \text{ V}$ ;  $T_{\text{amb}} = \text{parameter}$   
(common emitter configuration)

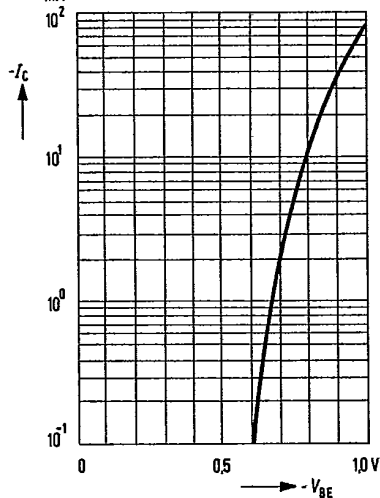
BC 556B, BC 557B, BC 558B, BC 559B, BC 560B



**Collector current  $I_C = f(V_{BE})$**

$-V_{CE} = 5 \text{ V}$

BC 556, BC 557, BC 558, BC 559, BC 560

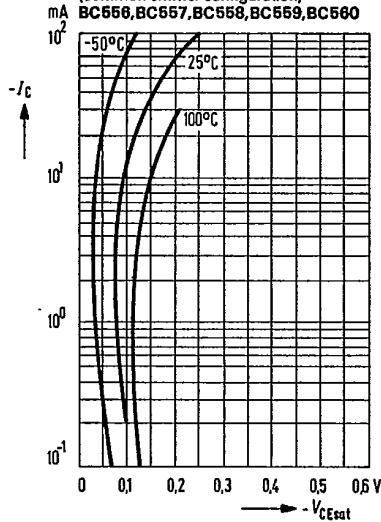


## Collector-emitter saturation voltage

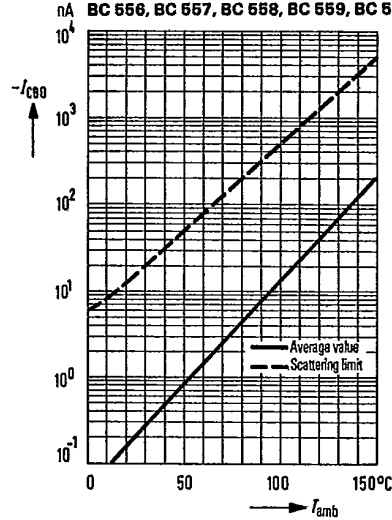
 $V_{CEsat} = f(I_C); h_{FE} = 20;$  $T_{amb} = \text{parameter}$ 

(common emitter configuration)

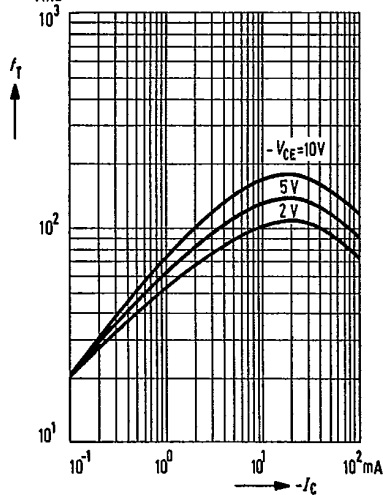
BC 556, BC 557, BC 558, BC 559, BC 560

Collector cutoff current versus temperature  $I_{CBO} = f(T_{amb})$  for max. permissible reverse voltages

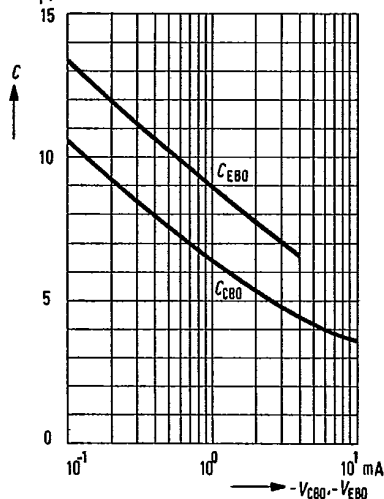
BC 556, BC 557, BC 558, BC 559, BC 560

Transition frequency  $f_T = f(I_C);$  $T_{amb} = 25^\circ\text{C}$  $V_{CE} = \text{parameter}$ 

BC 556, BC 557, BC 558, BC 559, BC 560

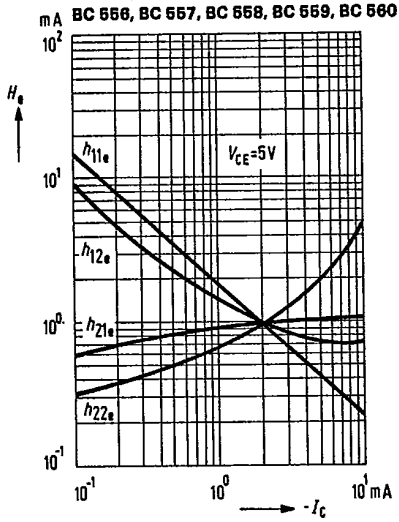
Collector-base capacitance  $C_{CB} = f(V_{CBO})$ Emitter-base capacitance  $C_{EB0} = f(V_{EB0})$  $f = 1\text{ MHz}; T_{amb} = 25^\circ\text{C}$ 

BC 556, BC 557, BC 558, BC 559, BC 560

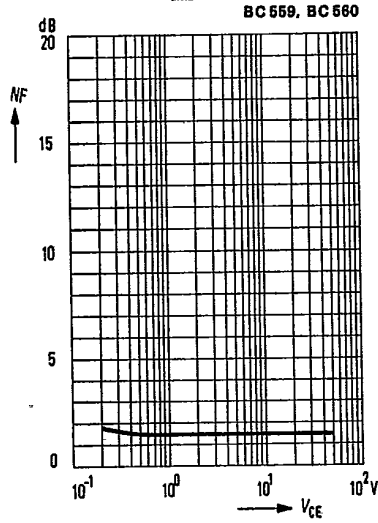


**h-parameter versus collector current**

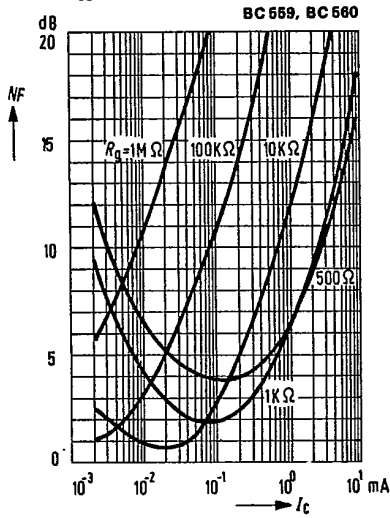
$$H_e = \frac{h_{ie}(I_C)}{h_{ie}(I_C = 2 \text{ mA})} = f(I_C)$$



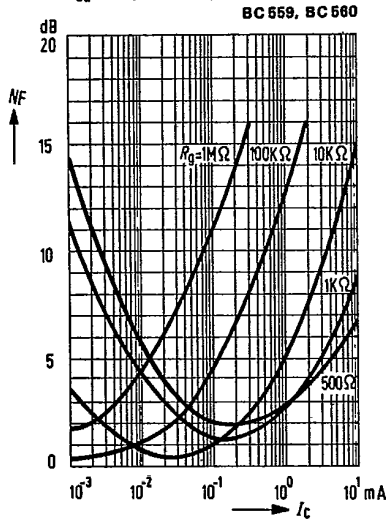
**Noise figure  $NF = f(V_{CE})$**   
 $I_C = 0.2 \text{ mA}$ ;  $R_g = 2 \text{ k}\Omega$ ;  $f = 1 \text{ kHz}$   
 $\Delta f = 200 \text{ Hz}$ ;  $T_{amb} = 25^\circ \text{C}$



**Noise figure  $NF = f(I_C)$**   
 $V_{CE} = 5 \text{ V}$ ;  $f = 1 \text{ kHz}$



**Noise figure  $NF = f(I_C)$**   
 $V_{CE} = 5 \text{ V}$ ;  $f = 120 \text{ Hz}$



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