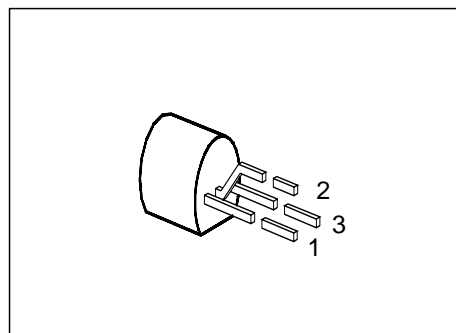


## NPN Silicon AF Transistors

**BCX 58**  
**BCX 59**

- High current gain
- Low collector-emitter saturation voltage
- Complementary types: BCX 78, BCX 79 (PNP)



Type	Marking	Ordering Code	Pin Configuration			Package <sup>1)</sup>
			1	2	3	
BCX 58 VIII BCX 58 IX BCX 58 X BCX 59 VIII BCX 59 IX BCX 59 X	–	Q62702-C619 Q62702-C620 Q62702-C621 Q62702-C623 Q62702-C624 Q62702-C625	C	B	E	TO-92

### Maximum Ratings

Parameter	Symbol	Values		Unit
		BCX 58	BCX 59	
Collector-emitter voltage	$V_{CE0}$	32	45	V
Collector-base voltage	$V_{CB0}$	32	45	
Emitter-base voltage	$V_{EB0}$	7		
Collector current	$I_C$	100		mA
Peak collector current	$I_{CM}$	200		
Peak base current	$I_{BM}$	200		
Total power dissipation, $T_C = 70\text{ °C}$	$P_{tot}$	500		mW
Junction temperature	$T_j$	150		°C
Storage temperature range	$T_{stg}$	– 65 ... + 150		

### Thermal Resistance

Junction - ambient	$R_{th\ JA}$	≤ 250	K/W
Junction - case <sup>2)</sup>	$R_{th\ JC}$	≤ 160	

1) For detailed information see chapter Package Outlines.

2) Mounted on Al heat sink 15 mm × 25 mm × 0.5 mm.

## Electrical Characteristics

at  $T_A = 25\text{ °C}$ , unless otherwise specified.

Parameter	Symbol	Values			Unit
		min.	typ.	max.	

### DC characteristics

Collector-emitter breakdown voltage $I_C = 2\text{ mA}$	$V_{(BR)CEO}$	32 45	— —	— —	V
Collector-base breakdown voltage $I_C = 10\text{ }\mu\text{A}$	$V_{(BR)CB0}$	32 45	— —	— —	
Emitter-base breakdown voltage $I_E = 1\text{ }\mu\text{A}$	$V_{(BR)EB0}$	7	—	—	
Collector cutoff current $V_{CB} = 32\text{ V}$ BCX 58 $V_{CB} = 45\text{ V}$ BCX 59 $V_{CB} = 32\text{ V}, T_A = 150\text{ °C}$ BCX 58 $V_{CB} = 45\text{ V}, T_A = 150\text{ °C}$ BCX 59	$I_{CB0}$	— — — —	— — — —	20 20 10 10	nA nA $\mu\text{A}$ $\mu\text{A}$
Collector cutoff current $V_{CE} = 32\text{ V}, V_{BE} = 0.2\text{ V}, T_A = 100\text{ °C}$ $V_{CE} = 45\text{ V}, V_{BE} = 0.2\text{ V}, T_A = 100\text{ °C}$	$I_{CEX}$	— —	— —	20 20	$\mu\text{A}$
Emitter cutoff current $V_{EB} = 4\text{ V}$	$I_{EB0}$	—	—	20	nA
DC current gain $I_C = 10\text{ }\mu\text{A}, V_{CE} = 5\text{ V}$ BCX 58 VII, BCX 59 VII BCX 58 VIII, BCX 59 VIII BCX 58 IX, BCX 59 IX BCX 58 X, BCX 59 X $I_C = 2\text{ mA}, V_{CE} = 5\text{ V}$ BCX 58 VII, BCX 59 VII BCX 58 VIII, BCX 59 VIII BCX 58 IX, BCX 59 IX BCX 58 X, BCX 59 X $I_C = 100\text{ mA}, V_{CE} = 1\text{ V}^1)$ BCX 58 VII, BCX 59 VII BCX 58 VIII, BCX 59 VIII BCX 58 IX, BCX 59 IX BCX 58 X, BCX 59 X	$h_{FE}$	20 20 40 100 120 180 250 380 40 45 60 60	78 145 220 300 170 250 350 500 — — — —	— — — — 220 310 460 630 — — — —	—

1) Pulse test:  $t \leq 300\text{ }\mu\text{s}$ ,  $D \leq 2\%$ .

## Electrical Characteristics

at  $T_A = 25\text{ }^\circ\text{C}$ , unless otherwise specified.

Parameter	Symbol	Values			Unit
		min.	typ.	max.	

### DC characteristics

Collector-emitter saturation voltage <sup>1)</sup> $I_C = 100\text{ mA}$ , $I_B = 2.5\text{ mA}$	$V_{CEsat}$	–	–	0.5	V
Base-emitter saturation voltage <sup>1)</sup> $I_C = 100\text{ mA}$ , $I_B = 2.5\text{ mA}$	$V_{BEsat}$	–	–	1.0	
Base-emitter voltage $I_C = 10\text{ }\mu\text{A}$ , $V_{CE} = 5\text{ V}$ $I_C = 2\text{ mA}$ , $V_{CE} = 5\text{ V}$ $I_C = 100\text{ mA}$ , $V_{CE} = 1\text{ V}$ <sup>1)</sup>	$V_{BE(on)}$	– 0.55 –	0.52 0.65 0.83	– 0.75 –	

<sup>1)</sup> Pulse test:  $t \leq 300\text{ }\mu\text{s}$ ,  $D \leq 2\text{ }\%$ .

## Electrical Characteristics

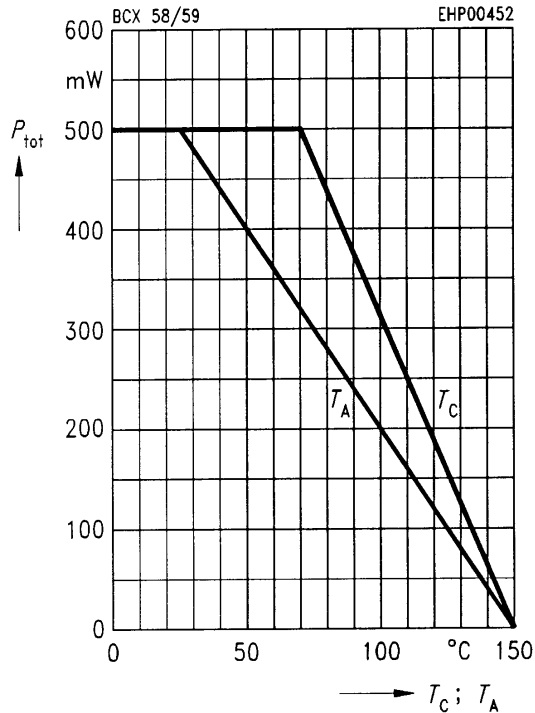
at  $T_A = 25\text{ °C}$ , unless otherwise specified.

Parameter	Symbol	Values			Unit
		min.	typ.	max.	

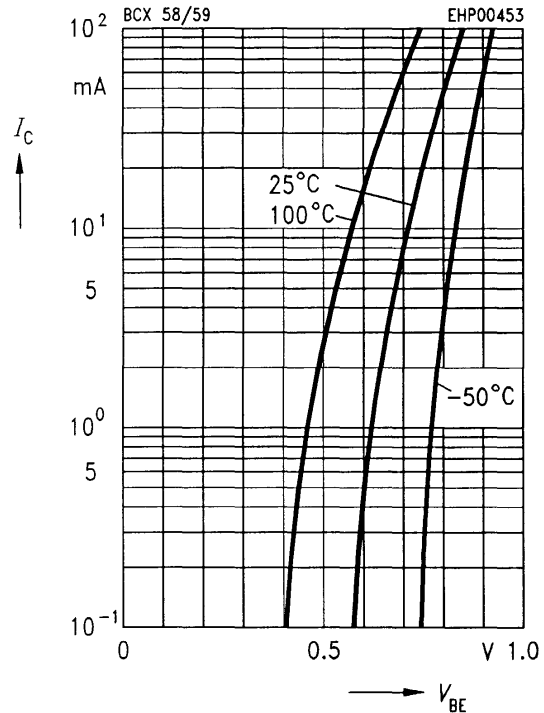
### AC characteristics

Transition frequency $I_C = 20\text{ mA}$ , $V_{CE} = 5\text{ V}$ , $f = 100\text{ MHz}$	$f_T$	–	200	–	MHz
Output capacitance $V_{CB} = 10\text{ V}$ , $f = 1\text{ MHz}$	$C_{obo}$	–	3	–	pF
Input capacitance $V_{CB} = 0.5\text{ V}$ , $f = 1\text{ MHz}$	$C_{ibo}$	–	8	–	
Short-circuit input impedance $I_C = 2\text{ mA}$ , $V_{CE} = 5\text{ V}$ , $f = 1\text{ kHz}$	$h_{11e}$				k $\Omega$
BCX 58 VII, BCX 59 VII		–	2.7	–	
BCX 58 VIII, BCX 59 VIII		–	3.6	–	
BCX 58 IX, BCX 59 IX		–	4.5	–	
BCX 58 X, BCX 59 X		–	7.5	–	
Open-circuit reverse voltage transfer ratio $I_C = 2\text{ mA}$ , $V_{CE} = 5\text{ V}$ , $f = 1\text{ kHz}$	$h_{12e}$				$10^{-4}$
BCX 58 VII, BCX 59 VII		–	1.5	–	
BCX 58 VIII, BCX 59 VIII		–	2.0	–	
BCX 58 IX, BCX 59 IX		–	2.0	–	
BCX 58 X, BCX 59 X		–	3.0	–	
Short-circuit forward current transfer ratio $I_C = 2\text{ mA}$ , $V_{CE} = 5\text{ V}$ , $f = 1\text{ kHz}$	$h_{21e}$				–
BCX 58 VII, BCX 59 VII		–	200	–	
BCX 58 VIII, BCX 59 VIII		–	260	–	
BCX 58 IX, BCX 59 IX		–	330	–	
BCX 58 X, BCX 59 X		–	520	–	
Open-circuit output admittance $I_C = 2\text{ mA}$ , $V_{CE} = 5\text{ V}$ , $f = 1\text{ kHz}$	$h_{22e}$				$\mu\text{S}$
BCX 58 VII, BCX 59 VII		–	18	–	
BCX 58 VIII, BCX 59 VIII		–	24	–	
BCX 58 IX, BCX 59 IX		–	30	–	
BCX 58 X, BCX 59 X		–	50	–	
Noise figure $I_C = 0.2\text{ mA}$ , $V_{CE} = 5\text{ V}$ , $R_S = 2\text{ k}\Omega$ $f = 1\text{ kHz}$ , $\Delta f = 200\text{ Hz}$	$F$	–	2	–	dB

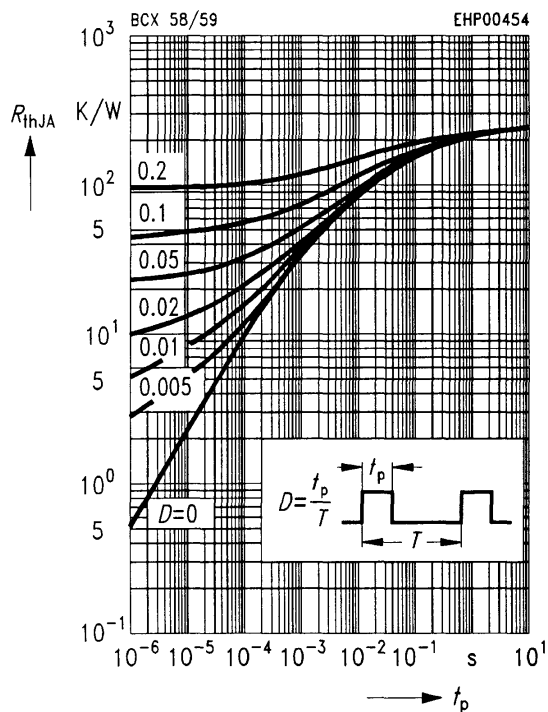
**Total power dissipation**  $P_{tot} = f(T_A; T_C)$



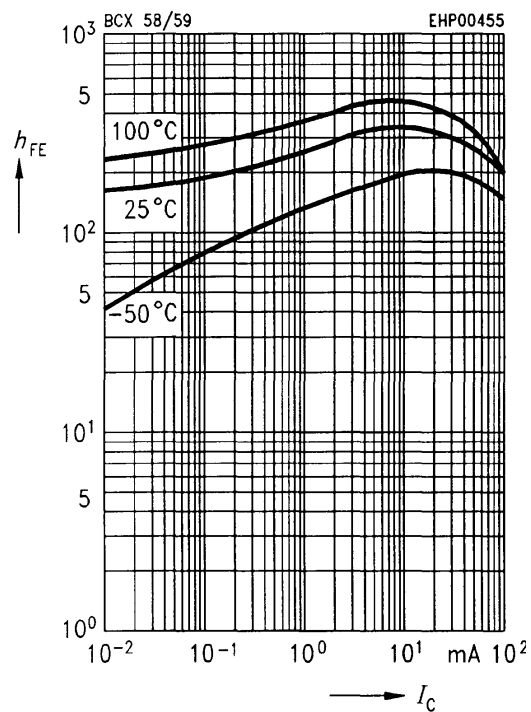
**Collector current**  $I_C = f(V_{BE})$   
 $V_{CE} = 5\text{ V}$  (common emitter configuration)



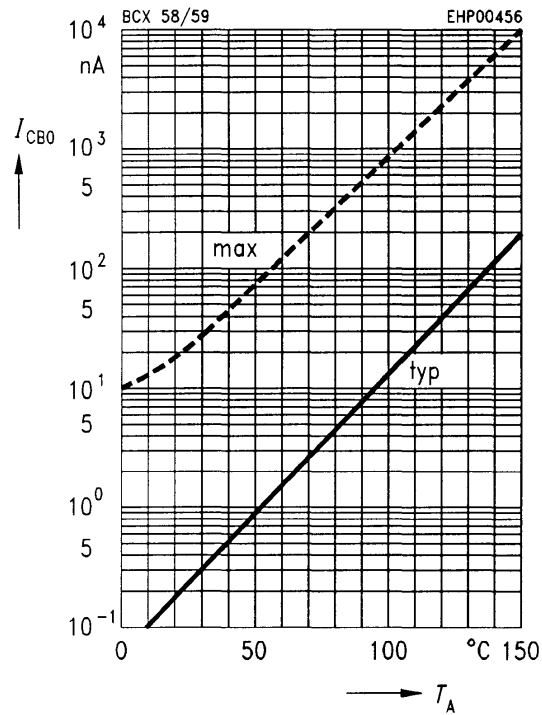
**Permissible pulse load**  $R_{thJA} = f(t_p)$



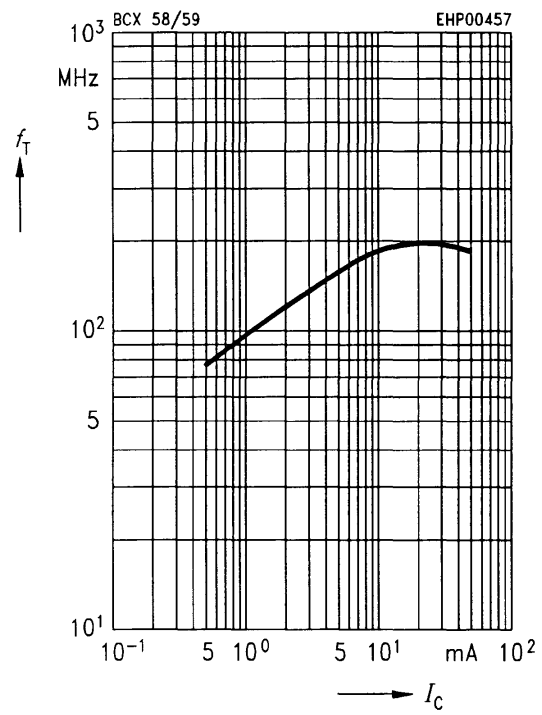
**DC current gain**  $h_{FE} = f(I_C)$   
 $V_{CE} = 5\text{ V}$  (common emitter configuration)



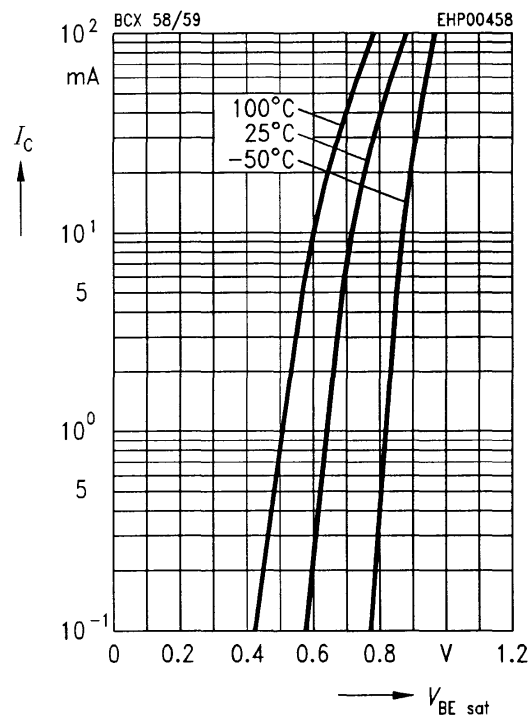
**Collector cutoff current  $I_{CB0} = f(T_A)$**   
 $V_{CB} = 45\text{ V}$



**Transition frequency  $f_T = f(I_C)$**   
 $V_{CE} = 5\text{ V}, f = 100\text{ MHz}$



**Base-emitter saturation voltage**  
 $I_C = f(V_{BEsat})$   
 $h_{FE} = 20$



**Collector-emitter saturation voltage**  
 $I_C = f(V_{CEsat})$   
 $h_{FE} = 20$

