# SIEMENS

PNP Silicon AF Transistors　　　　　　　　　　　　　　　　**BCX 78**

　　　　　　　　　　　　　　　　　　　　　　　　　　　　BCX 79

- High current gain
- Low collector-emitter saturation voltage
- Low noise at 1 kHz
- Low noise at low frequencies
- Complementary types: BCX 58, BCX 59 (NPN)
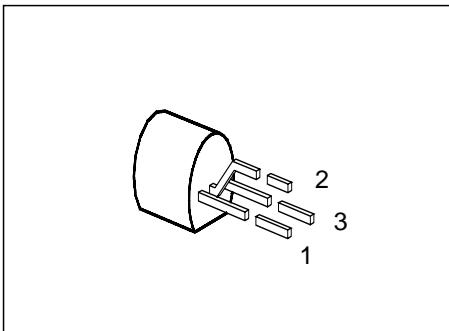
Type	Marking	Ordering Code	Pin Configuration			Package[1]
			1	**2**	**3**	
BCX 78	–	Q62702-C717	C	B	E	TO-92
BCX 78-VII		Q62702-C626				
BCX 78-VIII		Q62702-C627				
BCX 78-IX		Q62702-C628				
BCX 78-X		Q62702-C629				
BCX 79		Q62702-C718				
BCX 79-VII		Q62702-C630				
BCX 79-VIII		Q62702-C631				
BCX 79-IX		Q62702-C632				
BCX 79-X		Q62702-C633				

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[1] For detailed information see chapter Package Outlines.

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Maximum Ratings

Parameter	Symbol	Values BCX 78	BCX 79	Unit
Collector-emitter voltage	V_{CE0}	32	45	V
Collector-base voltage	V_{CB0}	32	45	
Emitter-base voltage	V_{EB0}	5		
Collector current	I_C	100		mA
Peak collector current	I_{CM}	200		
Peak base current	I_{BM}	200		
Total power dissipation, $T_C = 70\ ^\circ C$	P_{tot}	500		mW
Junction temperature	T_j	150		$^\circ C$
Storage temperature range	T_{stg}	$-65 \ldots +150$		

Thermal Resistance

Junction - ambient	$R_{th\ JA}$	≤ 250	K/W
Junction - case[1]	$R_{th\ JC}$	≤ 160	

[1] Mounted on Al heat sink 15 mm $\times$ 25 mm $\times$ 0.5 mm.

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Electrical Characteristics

at T_A = 25 °C, unless otherwise specified.

Parameter	Symbol	Values			Unit
		min.	typ.	max.	

DC characteristics

Parameter	Symbol	min.	typ.	max.	Unit
Collector-emitter breakdown voltage I_C = 2 mA BCX 78 BCX 79	$V_{(BR)CE0}$	32 45	– –	– –	V
Collector-base breakdown voltage I_C = 10 μA BCX 78 BCX 79	$V_{(BR)CB0}$	32 45	– –	– –	
Emitter-base breakdown voltage I_E = 1 μA	$V_{(BR)EB0}$	5	–	–	
Collector cutoff current V_{CB} = 32 V BCX 78 V_{CB} = 45 V BCX 79 V_{CB} = 32 V, T_A = 150 °C BCX 78 V_{CB} = 45 V, T_A = 150 °C BCX 79	I_{CB0}	– – – –	– – – –	20 20 10 10	nA nA μA μA
Collector cutoff current V_{CB} = 32 V, V_{BE} = 0.2 V, T_A = 100 °C V_{CB} = 45 V, V_{BE} = 0.2 V, T_A = 100 °C	I_{CE0}	– –	– –	20 20	μA
Emitter cutoff current V_{EB} = 4 V	I_{EB0}	–	–	20	nA

DC current gain
I_C = 10 μA, V_{CE} = 5 V
  BCX 78 VII, BCX 79 VII
  BCX 78 VIII, BCX 79 VIII
  BCX 78 IX,   BCX 79 IX
  BCX 78 X,   BCX 79 X
I_C = 2 mA, V_{CE} = 5 V
  BCX 78 VII, BCX 79 VII
  BCX 78 VIII, BCX 79 VIII
  BCX 78 IX,   BCX 79 IX
  BCX 78 X,   BCX 79 X
I_C = 100 mA, V_{CE} = 1 V[1]
  BCX 78 VII, BCX 79 VII
  BCX 78 VIII, BCX 79 VIII
  BCX 78 IX,   BCX 79 IX
  BCX 78 X,   BCX 79 X
	h_{FE}	
		
		20
		30
		40
		100
		
		120
		180
		250
		380
		
		40
		45
		60
		60
			
			140
			200
			270
			340
			
			170
			250
			350
			500
			
			–
			–
			–
			–
				
				–
				–
				–
				–
				
				220
				310
				460
				630
				
				–
				–
				–
				–
					–

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[1] Pulse test: $t \leq 300$ μs, $D \leq 2$ %.

Electrical Characteristics

at T_A = 25 °C, unless otherwise specified.

Parameter	Symbol	Values			Unit
		min.	typ.	max.	

DC characteristics

Parameter	Symbol	min.	typ.	max.	Unit
Collector-emitter saturation voltage[1] I_C = 100 mA, I_B = 2.5 mA	V_{CEsat}	–	–	0.6	V
Base-emitter saturation voltage[1] I_C = 100 mA, I_B = 2.5 mA	V_{BEsat}	–	–	1.0	
Base-emitter voltage I_C = 10 µA, V_{CE} = 5 V I_C = 2 mA, V_{CE} = 5 V I_C = 100 mA, V_{CE} = 1 V [1]	$V_{BE(on)}$	– 0.55 –	0.52 0.65 0.93	– 0.75 –	

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[1] Pulse test: $t \le 300$ µs, $D \le 2$ %.

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Electrical Characteristics

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

Parameter	Symbol	Values			Unit
		min.	typ.	max.	

AC characteristics

| Parameter	Symbol	Values			Unit
		min.	typ.	max.	
Transition frequency $I_C = 20$ mA, $V_{CE} = 5$ V, $f = 100$ MHz	f_t	–	250	–	MHz
Output capacitance $V_{CB} = 10$ V, $f = 1$ MHz	C_{obo}	–	3	–	pF
Input capacitance $V_{EB} = 0.5$ V, $f = 1$ MHz	C_{ibo}	–	10	–	
Short-circuit input impedance $I_C = 2$ mA, $V_{CE} = 5$ V, $f = 1$ kHz 　　　　　BCX 78 VII,　BCX 79 VII 　　　　　BCX 78 VIII, BCX 79 VIII 　　　　　BCX 78 IX,　BCX 79 IX 　　　　　BCX 78 X,　　BCX 79 X	h_{11e}	 – – – –	 2.7 3.6 4.5 7.5	 – – – –	kΩ
Open-circuit reverse voltage transfer ratio $I_C = 2$ mA, $V_{CE} = 5$ V, $f = 1$ kHz 　　　　　BCX 78 VII,　BCX 79 VII 　　　　　BCX 78 VIII, BCX 79 VIII 　　　　　BCX 78 IX,　BCX 79 IX 　　　　　BCX 78 X,　　BCX 79 X	h_{12e}	 – – – –	 1.5 2 2 3	 – – – –	10^{-4}
Short-circuit forward current transfer ratio $I_C = 2$ mA, $V_{CE} = 5$ V, $f = 1$ kHz 　　　　　BCX 78 VII,　BCX 79 VII 　　　　　BCX 78 VIII, BCX 79 VIII 　　　　　BCX 78 IX,　BCX 79 IX 　　　　　BCX 78 X,　　BCX 79 X	h_{21e}	 – – – –	 200 260 330 520	 – – – –	–
Open-circuit output admittance $I_C = 2$ mA, $V_{CE} = 5$ V, $f = 1$ kHz 　　　　　BCX 78 VII,　BCX 79 VII 　　　　　BCX 78 VIII, BCX 79 VIII 　　　　　BCX 78 IX,　BCX 79 IX 　　　　　BCX 78 X,　　BCX 79 X	h_{22e}	 – – – –	 18 24 30 50	 – – – –	μS
Noise figure $I_C = 0.2$ mA, $V_{CE} = 5$ V, $R_S = 2$ kΩ $f = 1$ kHz, $\Delta f = 200$ Hz	F	–	2	–	dB

Total power dissipation $P_{tot} = f(T_A; T_C)$
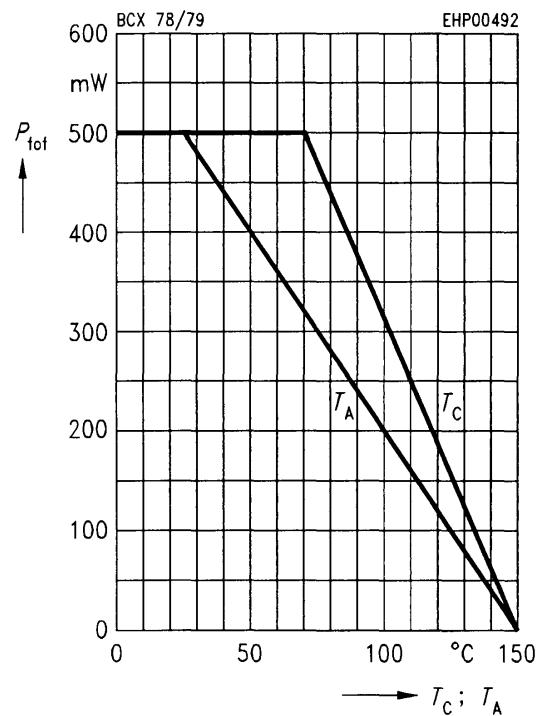
Collector current $I_C = f(V_{BE})$
$V_{CE} = 5$ V
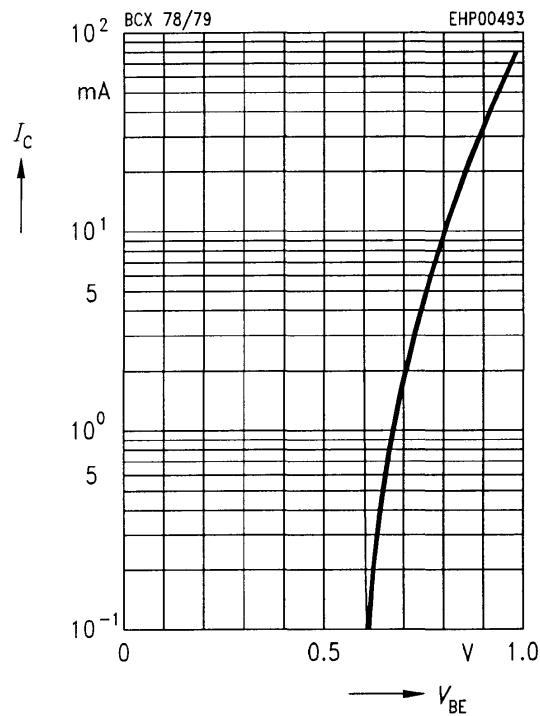
**Permissible pulse load** $R_{thJA} = f(t_p)$
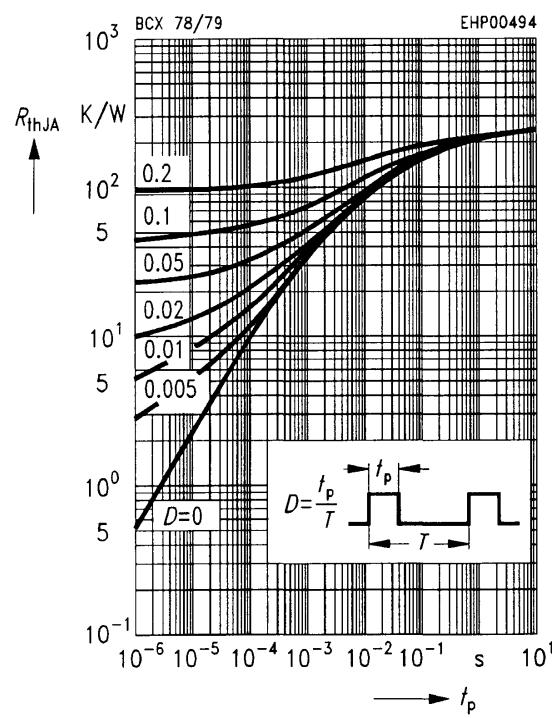
Collector cutoff current $I_{CB0} = f(T_A)$
for max. permissible reverse voltage

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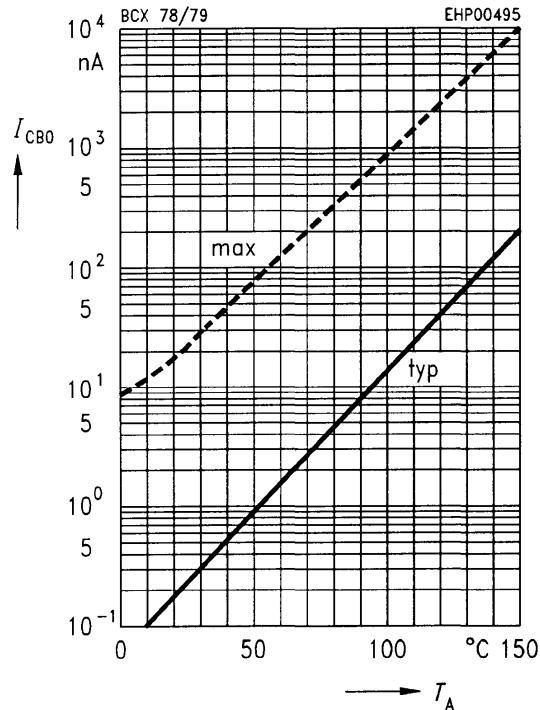
DC current gain $h_{FE} = f(I_C)$
$V_{CE} = 5$ V (common emitter configuration)
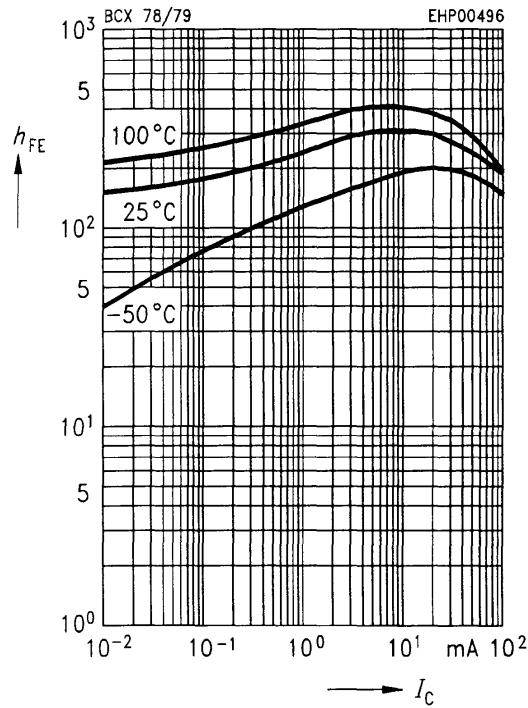
Transition frequency $f_T = f(I_C)$
$V_{CE} = 5$ V
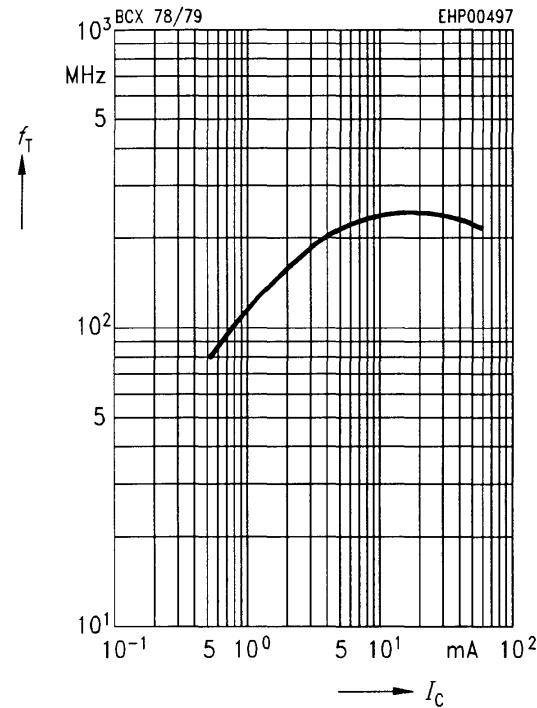
Collector-emitter saturation voltage
$I_C = f(V_{CEsat})$
$h_{FE} = 20$
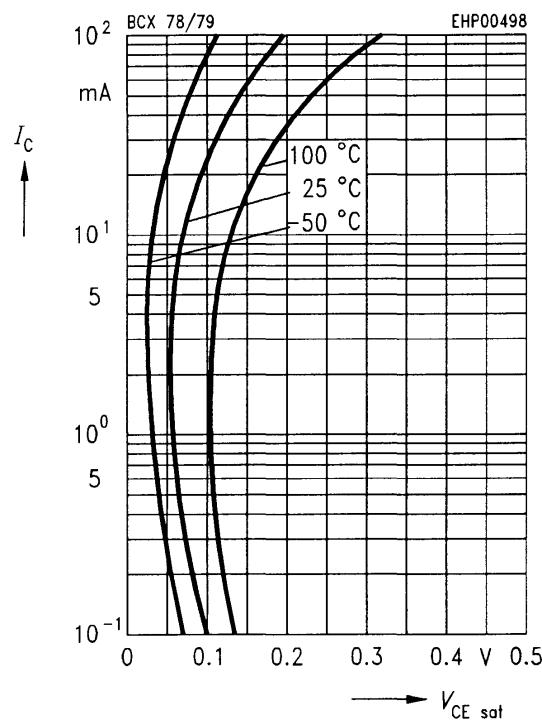
Base-emitter saturation voltage
$I_C = f(V_{BEsat})$
$h_{FE} = 20$