

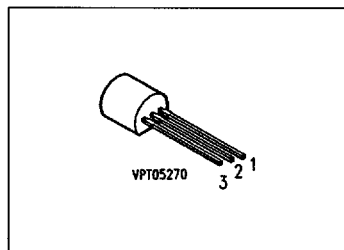
SIEMENS

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T-29-21

NPN Silicon AF Transistors**BC 167
... BC 169**

- High current gain
- Low collector-emitter saturation voltage
- Complementary types: BC 257, BC 258,
BC 259 (PNP)



Type	Marking	Ordering Code	Pin Configuration			Package ¹⁾
			1	2	3	
BC 167	—	Q62702-C706	E	C	B	TO-92
BC 167 A		Q62702-C74				
BC 167 B		Q62702-C75				
BC 168		Q62702-C707				
BC 168 A		Q62702-C76				
BC 168 B		Q62702-C77				
BC 168 C		Q62702-C78				
BC 169		Q62702-C708				
BC 169 B		Q62702-C79				
BC 169 C		Q62702-C80				

¹⁾ For detailed information see chapter Package Outlines.

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Maximum Ratings

Parameter	Symbol	Values			Unit
		BC 167	BC 168	BC 169	
Collector-emitter voltage	V_{CE0}	45	20	20	V
Collector-base voltage	V_{CB0}	50	30	30	
Emitter-base voltage	V_{EB0}	6	5	5	
Collector current	I_C	100			mA
Peak collector current	I_{CM}	200			
Peak base current	I_{BM}	200			
Total power dissipation, $T_C = 70\text{ }^{\circ}\text{C}$	P_{tot}	500			mW
Junction temperature	T_j	150			$^{\circ}\text{C}$
Storage temperature range	T_{stg}	− 65 ... + 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 × 25 mm × 0.5 mm.

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

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
DC characteristics					
Collector-emitter breakdown voltage $I_C = 2\text{ mA}$	$V_{(BR)CE0}$				V
BC 167		45	—	—	
BC 168		20	—	—	
BC 169		20	—	—	
Collector-base breakdown voltage $I_C = 10\text{ }\mu\text{A}$	$V_{(BR)CB0}$				
BC 167		50	—	—	
BC 168		30	—	—	
BC 169		30	—	—	
Emitter-base breakdown voltage $I_E = 1\text{ }\mu\text{A}$	$V_{(BR)EB0}$				
BC 167		6	—	—	
BC 168, BC 169		5	—	—	
Collector cutoff current $V_{CB} = 30\text{ V}$ $V_{CB} = 30\text{ V}$, $T_A = 150\text{ }^\circ\text{C}$	I_{CB0}				nA μA
		—	—	15 4	
DC current gain $I_C = 10\text{ }\mu\text{A}$; $V_{CE} = 5\text{ V}$	h_{FE}				—
BC 167 A, BC 168 A		—	90	—	
BC 167 B, BC 168 B, BC 169 B		—	150	—	
BC 168 C, BC 169 C		—	270	—	
$I_C = 2\text{ mA}$; $V_{CE} = 5\text{ V}$					
BC 167 A, BC 168 A		110	180	220	
BC 167 B, BC 168 B, BC 169 B		200	290	450	
BC 168 C, BC 169 C		420	520	800	
Collector-emitter saturation voltage ¹⁾ $I_C = 10\text{ mA}$; $I_B = 0.5\text{ mA}$ $I_C = 100\text{ mA}$; $I_B = 5\text{ mA}$	V_{CEsat}				mV
		— —	90 200	250 600	
Base-emitter saturation voltage ¹⁾ $I_C = 10\text{ mA}$; $I_B = 0.5\text{ mA}$ $I_C = 100\text{ mA}$; $I_B = 5\text{ mA}$	V_{BEsat}				
		— —	700 900	— —	
Base-emitter voltage $I_C = 2\text{ mA}$; $V_{CE} = 5\text{ V}$ $I_C = 10\text{ mA}$; $V_{CE} = 5\text{ V}$	$V_{BE(on)}$				
		580 —	660 —	700 770	

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

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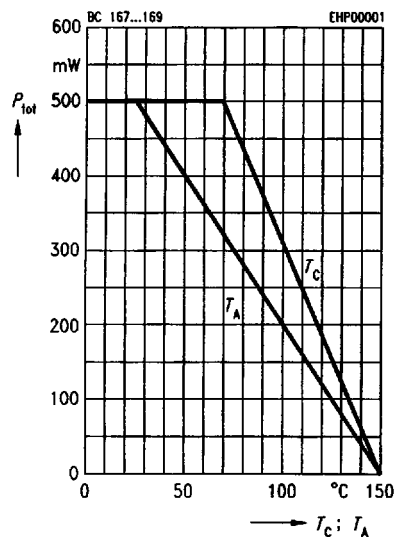
Electrical Characteristicsat $T_A = 25^\circ\text{C}$, unless otherwise specified.

Parameter	Symbol	Values			Unit
		min.	typ.	max.	

AC characteristics

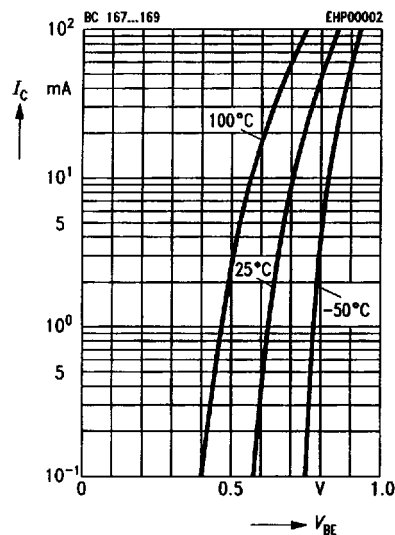
Transition frequency $I_C = 20\text{ mA}$, $V_{CE} = 5\text{ V}$, $f = 100\text{ MHz}$	f_T	—	200	—	MHz
Output capacitance $V_{CB} = 10\text{ V}$, $f = 1\text{ MHz}$	C_{obo}	—	3	—	pF
Input capacitance $V_{EB} = 0.5\text{ V}$, $f = 1\text{ MHz}$	C_{ibo}	—	8	—	
Short-circuit input impedance $I_C = 2\text{ mA}$, $V_{CE} = 5\text{ V}$, $f = 1\text{ kHz}$ BC 167 A, BC 168 A BC 167 B, BC 168 B, BC 169 B BC 168 C, BC 169 C	h_{11e}	— — —	2.7 4.5 8.7	— — —	k Ω
Open-circuit reverse voltage transfer ratio $I_C = 2\text{ mA}$, $V_{CE} = 5\text{ V}$, $f = 1\text{ kHz}$ BC 167 A, BC 168 A BC 167 B, BC 168 B, BC 169 B BC 168 C, BC 169 C	h_{12e}	— — —	1.5 2 3	— — —	10^{-4}
Short-circuit forward current transfer ratio $I_C = 2\text{ mA}$, $V_{CE} = 5\text{ V}$, $f = 1\text{ kHz}$ BC 167 A, BC 168 A BC 167 B, BC 168 B, BC 169 B BC 168 C, BC 169 C	h_{21e}	— — —	200 330 600	— — —	—
Open-circuit output admittance $I_C = 2\text{ mA}$, $V_{CE} = 5\text{ V}$, $f = 1\text{ kHz}$ BC 167 A, BC 168 A BC 167 B, BC 168 B, BC 169 B BC 168 C, BC 169 C	h_{22e}	— — —	18 30 60	— — —	μS
Noise figure $I_C = 0.2\text{ mA}$, $V_{CE} = 5\text{ V}$, $R_S = 2\text{ k}\Omega$ $f = 1\text{ kHz}$, $\Delta f = 200\text{ Hz}$ BC 167, BC 168 BC 169	F	— —	2 1	— 4	dB

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

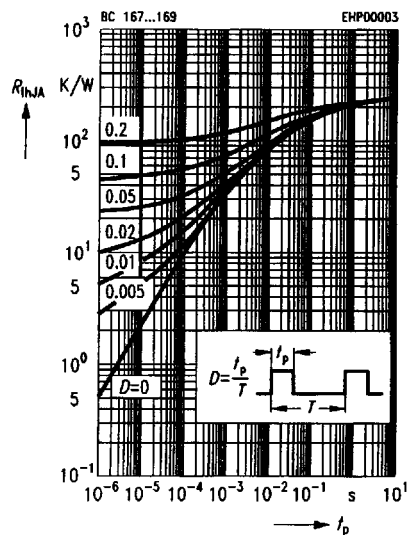


Collector current $I_C = f(V_{\text{BE}})$

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

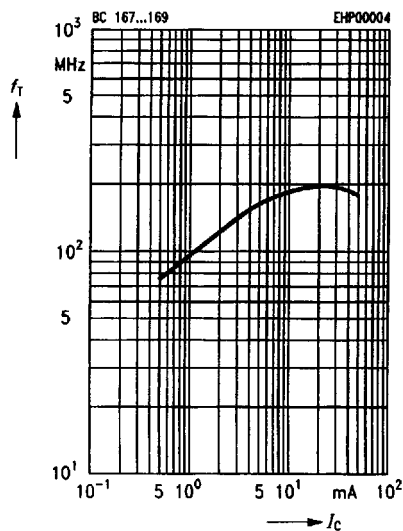


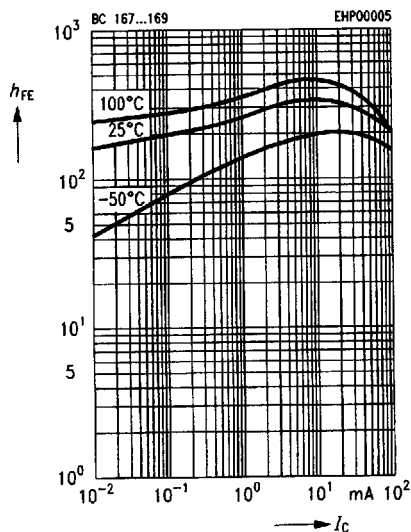
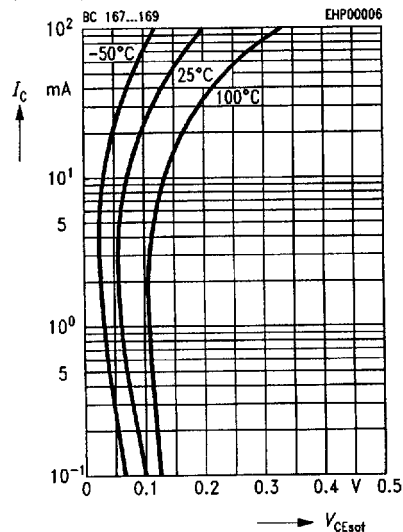
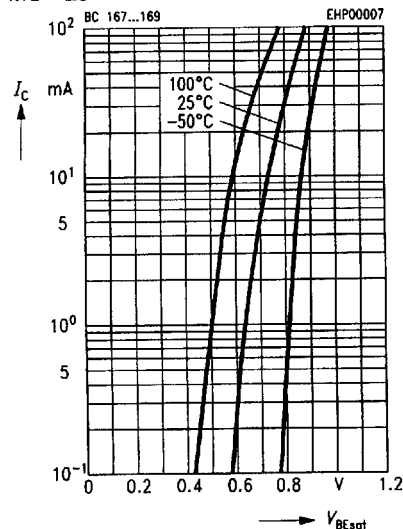
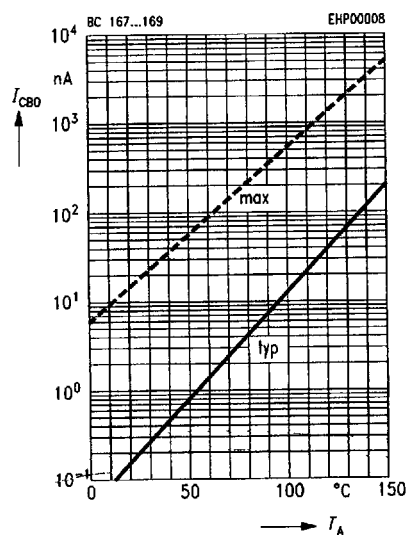
Permissible pulse load $R_{\text{thJA}} = f(t_p)$

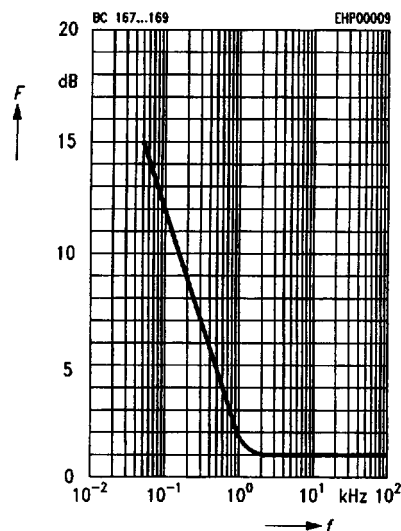
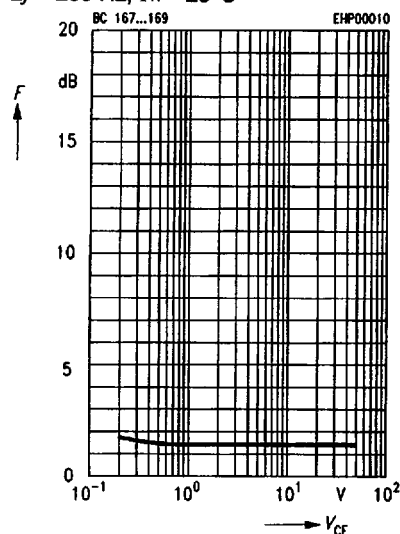
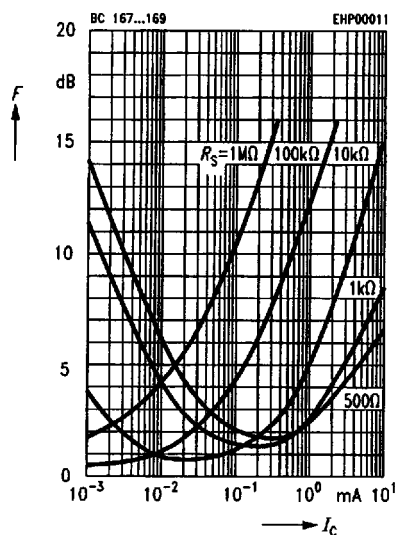
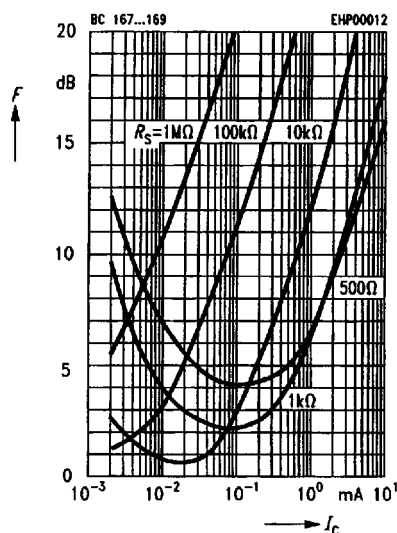


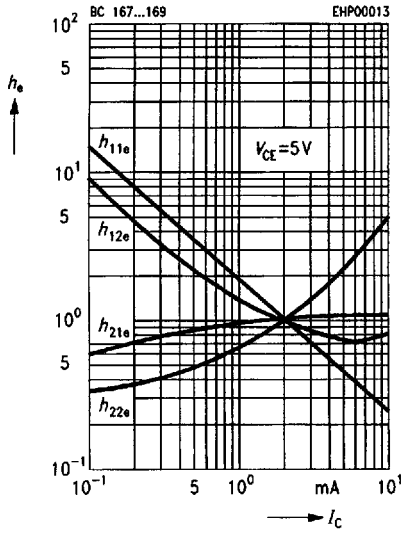
Transition frequency $f_T = f(I_C)$

$V_{\text{CE}} = 5 \text{ V}, f = 100 \text{ MHz}$



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

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

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

Collector cutoff current $I_{CB0} = f(T_A)$
 $V_{CB} = 30 \text{ V}$


Noise figure $F = f(f)$
 $I_C = 0.2 \text{ mA}$, $f = 1 \text{ kHz}$, $R_S = 2 \text{ k}\Omega$

Noise figure $F = f(V_{CE})$
 $I_C = 0.2 \text{ mA}$, $R_S = 2 \text{ k}\Omega$, $f = 1 \text{ kHz}$
 $\Delta f = 200 \text{ Hz}$, $T_A = 25^\circ \text{C}$

Noise figure $F = f(I_C)$
 $V_{CE} = 5 \text{ V}$, $f = 120 \text{ kHz}$

Noise figure $F = f(I_C)$
 $V_{CE} = 5 \text{ V}$, $f = 1 \text{ Hz}$


parameter $h_e = f(I_C)$

Capacitance $C = f(V_{CB}, V_{EB})$
