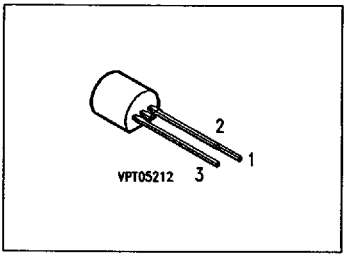
SIEMENS SIEMENS AKTIENGESELLSCHAF

T-29-21

NPN Silicon AF Transistors

BC 237
... BC 239

- High current gain
- Low collector-emitter saturation voltage
- Complementary types: BC 307, BC 308, BC 309 (PNP)



Type	Marking	Ordering Code	Pin Configuration 1	2	3	Package[1]
BC 237	–	Q62702-C697	C	B	E	TO-92
BC 237 A		Q62702-C276				
BC 237 B		Q62702-C277				
BC 238		Q62702-C698				
BC 238 A		Q62702-C278				
BC 238 B		Q62702-C279				
BC 238 C		Q62702-C280				
BC 239		Q62702-C699				
BC 239 B		Q62702-C281				
BC 239 C		Q62702-C282				

[1] For detailed information see chapter Package Outlines.

Maximum Ratings

Parameter	Symbol	Values BC 237	BC 238	BC 239	Unit
Collector-emitter voltage	V_{CEO}	45	20	20	V
Collector-base voltage	V_{CBO}	50	30	30	
Emitter-base voltage	V_{EBO}	6	5	5	
Collector current	I_C	100			mA
Peak collector current	I_{CM}	200			
Peak base current	I_{BM}	200			
Peak emitter current	I_{EM}	200			
Total power dissipation, T_C = 70 °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 [1]	$R_{th\,JC}$	≤ 160	

[1] Mounted on Al-heat sink 15 mm × 25 mm × 0.5 mm.

Electrical Characteristics
at T_A = 25 °C, unless otherwise specified.

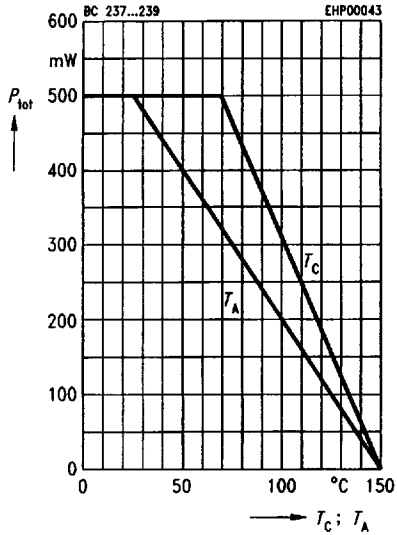
Parameter	Symbol	Values			Unit
		min.	typ.	max.	
DC characteristics					
Collector-emitter breakdown voltage	$V_{(BR)CEO}$				V
I_C = 2 mA					
BC 237		45	–	–	
BC 238		20	–	–	
BC 239		20	–	–	
Collector-base breakdown voltage	$V_{(BR)CBO}$				
I_C = 10 µA					
BC 237		50	–	–	
BC 238		30	–	–	
BC 239		30	–	–	
Emitter-base breakdown voltage	$V_{(BR)EBO}$				
I_E = 1 µA BC 237		6	–	–	
BC 238, BC 239		5	–	–	
Collector cutoff current	I_{CBO}				
V_{CB} = 30 V		–	–	15	nA
V_{CB} = 50 V		–	–	15	nA
V_{CB} = 30 V, T_A = 150 °C		–	–	4	µA
V_{CB} = 50 V, T_A = 150 °C		–	–	4	µA
DC current gain	h_{FE}				–
I_C = 10 µA; V_{CE} = 5 V					
BC 237 A, BC 238 A		–	90	–	
BC 237 B, BC 238 B, BC 239 B		–	150	–	
BC 238 C, BC 239 C		–	270	–	
I_C = 2 mA; V_{CE} = 5 V					
BC 237 A, BC 238 A, BC 239 A		110	180	220	
BC 237 B, BC 238 B, BC 239 B		200	290	450	
BC 238 C, BC 239 C		420	520	800	
Collector-emitter saturation voltage [1]	V_{CEsat}				mV
I_C = 10 mA; I_B = 0.5 mA		–	90	250	
I_C = 100 mA; I_B = 5 mA		–	200	600	
Base-emitter saturation voltage [1]	V_{BEsat}				
I_C = 10 mA; I_B = 0.5 mA		–	700	–	
I_C = 100 mA; I_B = 5 mA		–	900	–	
Base-emitter voltage	$V_{BE\ (on)}$				
I_C = 2 mA; V_{CE} = 5 V		580	660	700	
I_C = 10 mA; V_{CE} = 5 V		–	–	770	

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

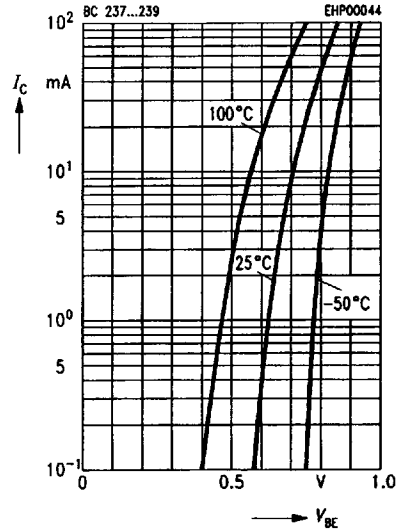
Electrical Characteristics
at T_A = 25 °C, unless otherwise specified.

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
AC characteristics					
Transition frequency I_C = 20 mA, V_{CE} = 5 V, f = 100 MHz	f_T	–	200	–	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}	–	8	–	
Short-circuit input impedance I_C = 2 mA, V_{CE} = 5 V, f = 1 kHz	h_{11e}				kΩ
BC 237 A, BC 238 A		–	2.7	–	
BC 237 B, BC 238 B, BC 239 B		–	4.5	–	
BC 238 C, BC 239 C		–	8.7	–	
Open-circuit reverse voltage transfer ratio I_C = 2 mA, V_{CE} = 5 V, f = 1 kHz	h_{12e}				10^{-4}
BC 237 A, BC 238 A		–	1.5	–	
BC 237 B, BC 238 B, BC 239 B		–	2	–	
BC 238 C, BC 239 C		–	3	–	
Short-circuit forward current transfer ratio I_C = 2 mA, V_{CE} = 5 V, f = 1 kHz	h_{21e}				–
BC 237 A, BC 238 A		–	200	–	
BC 237 B, BC 238 B, BC 239 B		–	330	–	
BC 238 C, BC 239 C		–	600	–	
Open-circuit output admittance I_C = 2 mA, V_{CE} = 5 V, f = 1 kHz	h_{22e}				µS
BC 237 A, BC 238 A		–	18	–	
BC 237 B, BC 238 B, BC 239 B		–	30	–	
BC 238 C, BC 239 C		–	60	–	
Noise figure I_C = 0.2 mA, V_{CE} = 5 V, R_S = 2 kΩ f = 1 kHz, Δf = 200 Hz BC 239	F	–	1.2	4	dB
I_C = 0.2 mA, V_{CE} = 5 V, R_S = 2 kΩ f = 1 kHz, Δf = 200 Hz BC 237, BC 238		–	2	–	

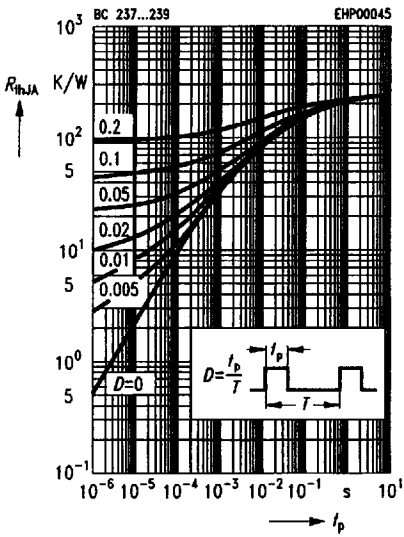
Total power dissipation $P_{tot} = f(T_A; T_C)$



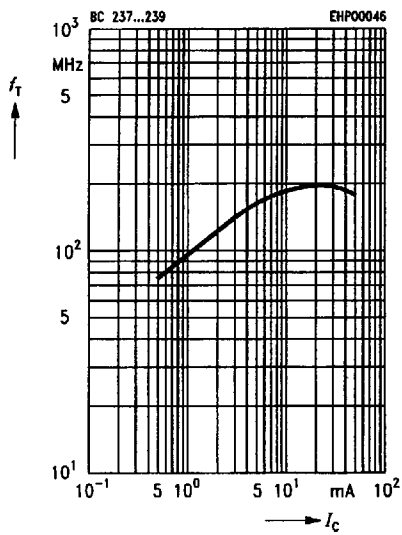
Collector current $I_C = f(V_{BE})$
V_{CE} = 5 V



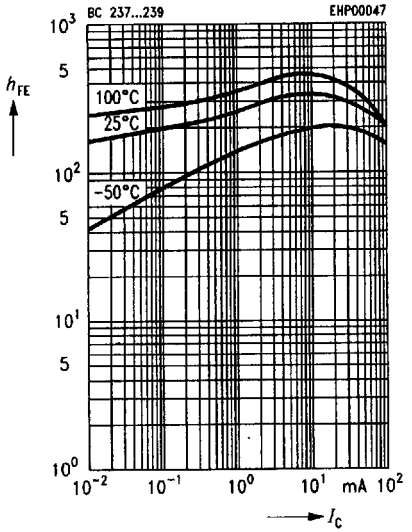
Permissible pulse load $R_{thJA} = f(t_p)$



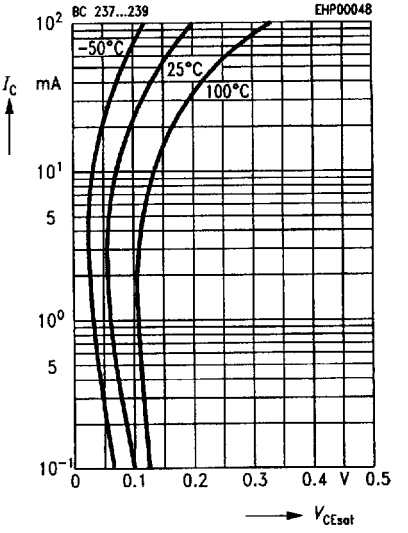
Transition frequency $f_T = f(I_C)$
V_{CE} = 5 V, f = 100 MHz



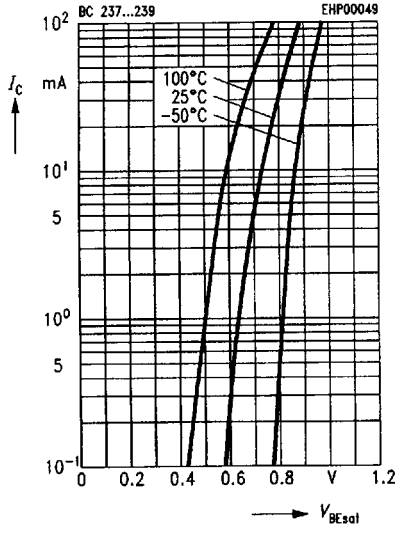
DC current gain $h_{FE} = f(I_C)$
V_{CE} = 5 V (common emitter configuration)



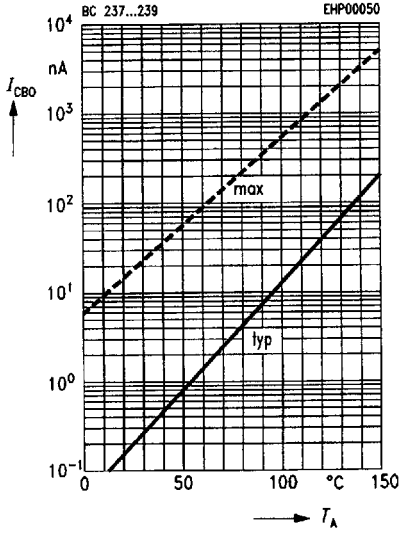
Collector-emitter saturation voltage
$V_{CEsat} = f(I_C)$
h_{FE} = 20



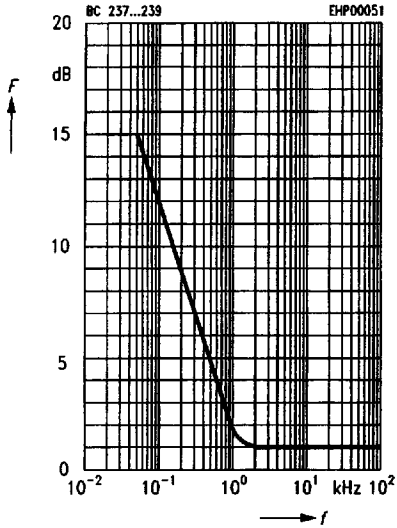
Base-emitter saturation voltage
$V_{BEsat} = f(I_C)$
h_{FE} = 20



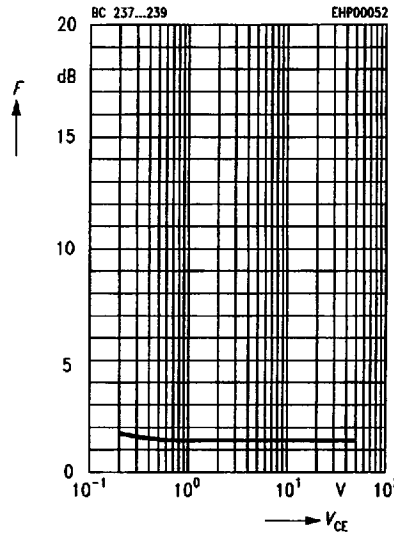
Collector cutoff current $I_{CBO} = f(T_A)$
V_{CB} = 30 V



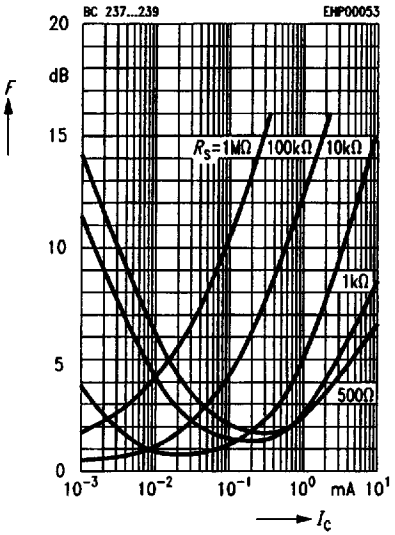
Noise figure $F = f(f)$
I_C = 0.2 mA, f = 1 kHz, R_S = 2 kΩ



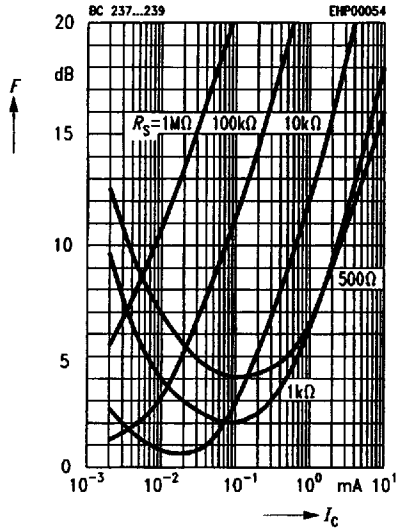
Noise figure $F = f(V_{CE})$
I_C = 0.2 mA, R_S = 2 kΩ, f = 1 kHz
Δf = 200 Hz, T_A = 25 °C



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



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



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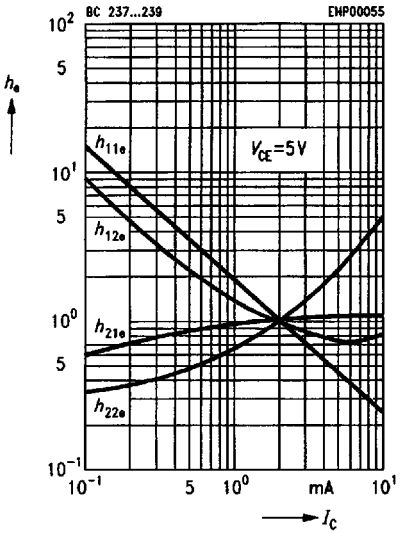
h parameter $h_e = f(I_C)$



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