

# Silicon NPN Transistor

## **BC238**

30V / 100mA

# DATASHEET

OEM – Telefunken

Source: Telefunken Databook 1972/73

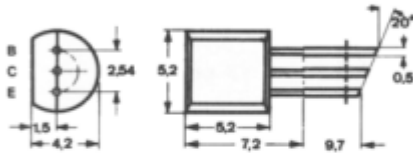
## BC 167 · BC 168 · BC 169 · BC 237 · BC 238 · BC 239

**Silizium-NPN-Epitaxial-Planar-Transistoren für NF-Vor- und Treiberstufen. BC 169 und BC 239 für rauscharme Vorstufen. Die Transistoren BC 237, BC 238, BC 239 sind komplementär zu BC 307, BC 308, BC 309.**

Silicon NPN epitaxial planar transistors for AF input stages and driver stages, BC 169 and BC 239 for low noise input stages. The transistors BC 237, BC 238, BC 239 are complementary to BC 307, BC 308, BC 309.

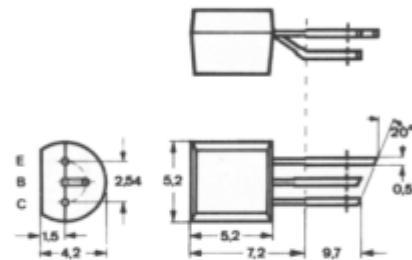
### Abmessungen · Dimensions

Maße in mm  
M 2:1



#### BC 167, BC 168, BC 169

Kunststoffgehäuse  
JEDEC TO 92  
Gewicht · Weight  
max. 0,2 g

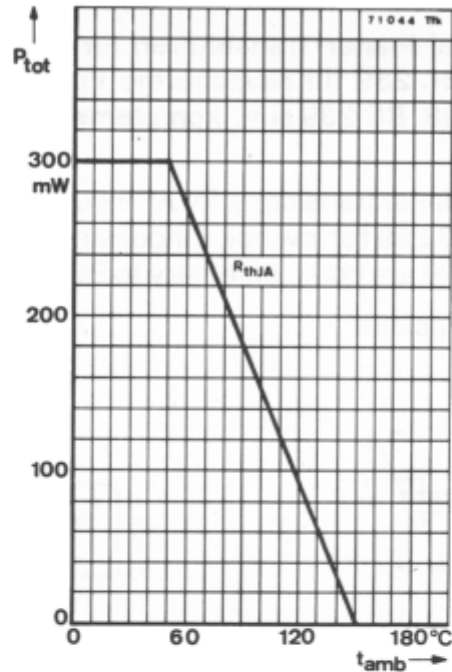


#### BC 237, BC 238, BC 239

Kunststoffgehäuse  
≈ JEDEC TO 92  
Gewicht · Weight  
max. 0,2 g

### Absolute Grenzdaten · Absolute maximum ratings

		BC 167	BC 168	BC 169	
		BC 237	BC 238	BC 239	
Kollektor-Basis-Sperrspannung	$U_{CBO}$	50	30	30	V
Kollektor-Emitter-Sperrspannung	$U_{CEO}$	45	20	20	V
Emitter-Basis-Sperrspannung	$U_{EBO}$	6	5	5	V
Kollektorstrom	$I_C$	100	100	100	mA
Kollektorspitzenstrom	$I_{CM}$	200	200	200	mA
Basisstrom	$I_B$	50	50	50	mA
Gesamtverlustleistung $t_{amb} \leq 50^\circ C$	$P_{tot}$	300	300	300	mW
Sperrschichttemperatur	$t_j$	150	150	150	$^\circ C$
Lagerungstemperatur	$t_{stg}$	-55...+150			$^\circ C$

**BC 167 · BC 168 · BC 169 BC 237 · BC 238 · BC 239**

Min. Typ. Max.

**Wärmewiderstand · Thermal resistance**

Sperrschicht-Umgebung

 $R_{thJA}$ 

330 °C/W

**Statische Kenngrößen · DC characteristics**Umgebungstemperatur  $t_{amb} = 25^\circ\text{C}$ , falls nicht anders angegeben

Kollektorruhestrom

 $U_{CB} = 20\text{ V}$ ,  $t_{amb} = 125^\circ\text{C}$  $I_{CBO}$ 5  $\mu\text{A}$ 

Kollektor-Emitter-Durchbruchspannung

 $I_C = 2\text{ mA}$ **BC 167, BC 237** $U_{(BR)CEO}^{1)}$ 

45

V

**BC 168, BC 169, BC 238, BC 239** $U_{(BR)CEO}^{1)}$ 

20

V

Emitter-Basis-Durchbruchspannung

 $I_E = 1\ \mu\text{A}$ **BC 167, BC 237** $U_{(BR)EBO}$ 

6

V

**BC 168, BC 169, BC 238, BC 239** $U_{(BR)EBO}$ 

5

V

1)  $t_p = 0,01$ ,  $t_p = 0,3\text{ ms}$

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**BC 167 · BC 168 · BC 169 · BC 237 · BC 238 · BC 239**


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		Min.	Typ.	Max.
<b>Kollektor-Sättigungsspannung</b>				
$I_C = 10 \text{ mA}, I_B = 0,5 \text{ mA}$	$U_{CEsat}$		90	250 mV
$I_C = 10 \text{ mA}, (U_{CE} = 1 \text{ V}, I_C' = 11 \text{ mA})$	$U_{CEsat}^{2)}$		300	600 mV
$I_C = 100 \text{ mA}, I_B = 5 \text{ mA}$	$U_{CEsat}^{1)}$		200	mV
<b>Basis-Sättigungsspannung</b>				
$I_C = 10 \text{ mA}, I_B = 0,5 \text{ mA}$	$U_{BEsat}$		700	mV
$I_C = 100 \text{ mA}, I_B = 5 \text{ mA}$	$U_{BEsat}^{1)}$		900	mV
<b>Basis-Emitterspannung</b>				
$U_{CE} = 5 \text{ V}, I_C = 0,1 \text{ mA}$	$U_{BE}$		550	mV
$U_{CE} = 5 \text{ V}, I_C = 2 \text{ mA}$	$U_{BE}$		620	700 mV
$U_{CE} = 5 \text{ V}, I_C = 10 \text{ mA}$	$U_{BE}$		675	mV
<b>Kollektor-Basis-Gleichstromverhältnis</b>				
$U_{CE} = 5 \text{ V}, I_C = 10 \mu\text{A}$				
<b>Gruppe A:</b>	<b>BC 167, BC 168</b>			
	<b>BC 237, BC 238</b>	$h_{FE}$	90	
<b>Gruppe B:</b>	<b>BC 167, BC 168, BC 169</b>			
	<b>BC 237, BC 238, BC 239</b>	$h_{FE}$	40	150
<b>Gruppe C:</b>	<b>BC 168, BC 169</b>			
	<b>BC 238, BC 239</b>	$h_{FE}$	100	270
$U_{CE} = 5 \text{ V}, I_C = 2 \text{ mA}$				
<b>Gruppe A:</b>	<b>BC 167, BC 168</b>			
	<b>BC 237, BC 238</b>	$h_{FE}$	180	
<b>Gruppe B:</b>	<b>BC 167, BC 168, BC 169</b>			
	<b>BC 237, BC 238, BC 239</b>	$h_{FE}$	290	
<b>Gruppe C:</b>	<b>BC 168, BC 169</b>			
	<b>BC 238, BC 239</b>	$h_{FE}$	520	

**Dynamische Kenngrößen · AC characteristics**Umgebungstemperatur  $t_{amb} = 25^\circ \text{C}$ 

Transitfrequenz

 $U_{CE} = 5 \text{ V}, I_C = 0,5 \text{ mA}, f = 30 \text{ MHz}$   $f_T$  85 MHz $U_{CE} = 5 \text{ V}, I_C = 10 \text{ mA}, f = 100 \text{ MHz}$   $f_T$  300 MHz

Kollektor-Basis-Kapazität

 $U_{CB} = 10 \text{ V}, f = 1 \text{ MHz}$   $C_{CBO}$  2,5 4,5 pF

1)  $t_p = 0,01, t_p = 0,3 \text{ ms}$  2) siehe Seite A 67  
see page

## BC 167 · BC 168 · BC 169 · BC 237 · BC 238 · BC 239

		Min.	Typ.	Max.	
Rauschmaß					
$U_{CE} = 5\text{ V}, I_C = 200\ \mu\text{A}, R_G = 2\text{ k}\Omega,$					
$f = 1\text{ kHz}, \Delta f = 200\text{ Hz}$					
<b>BC 167, BC 168, BC 237, BC 238</b>	F		3	10	dB
<b>BC 169, BC 239</b>	F			4	dB
$U_{CE} = 5\text{ V}, I_C = 200\ \mu\text{A}, R_G = 2\text{ k}\Omega,$					
$f = 30\text{ Hz} \dots 15\text{ kHz}$					
<b>BC 169, BC 239</b>	F			4	dB
Kurzschluß-Stromverstärkung					
$U_{CE} = 5\text{ V}, I_C = 2\text{ mA}, f = 1\text{ kHz}$					
<b>Gruppe A:</b>					
<b>BC 167, BC 168</b>					
<b>BC 237, BC 238</b>	$h_{fe}$	125	220	260	
<b>Gruppe B:</b>					
<b>BC 167, BC 168, BC 169</b>					
<b>BC 237, BC 238, BC 239</b>	$h_{fe}$	240	330	500	
<b>Gruppe C:</b>					
<b>BC 168, BC 169</b>					
<b>BC 238, BC 239</b>	$h_{fe}$	450	600	900	

### Vierpol Kenngrößen · Two port characteristics

Umgebungstemperatur  $t_{amb} = 25^\circ\text{C}$

#### Emitterschaltung

$U_{CE} = 5\text{ V}, I_C = 2\text{ mA}, f = 1\text{ kHz}$

Kurzschluß-Eingangswiderstand

<b>Gruppe A</b>	$h_{ie}$	1,6	2,7	4,5	k $\Omega$
<b>Gruppe B</b>	$h_{ie}$	3,2	4,5	8,5	k $\Omega$
<b>Gruppe C</b>	$h_{ie}$	6	8,7	15	k $\Omega$

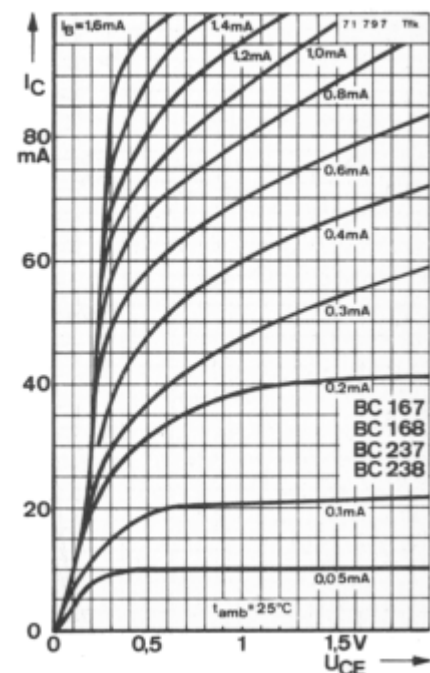
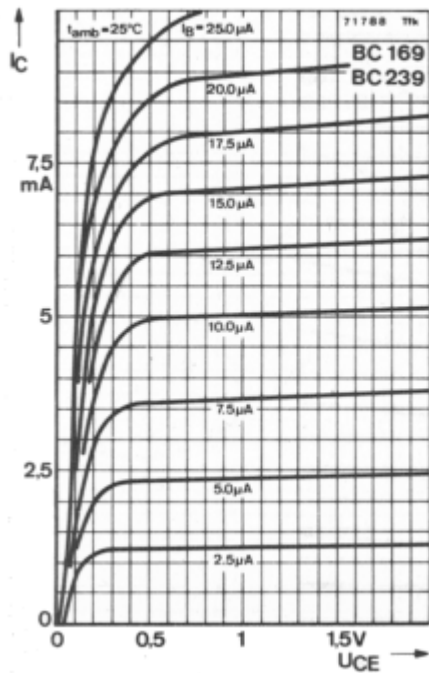
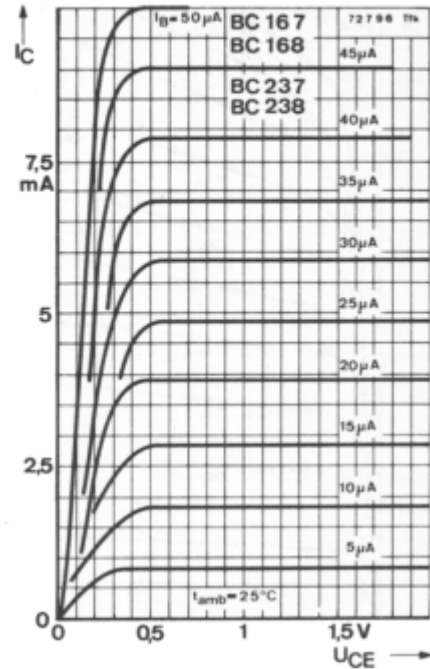
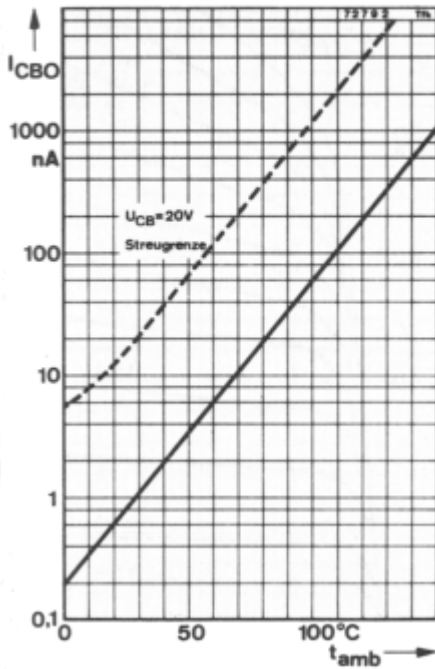
Leerlauf-Spannungsrückwirkung

<b>Gruppe A</b>	$h_{re}$	$1,5 \cdot 10^{-4}$			
<b>Gruppe B</b>	$h_{re}$	$2 \cdot 10^{-4}$			
<b>Gruppe C</b>	$h_{re}$	$3 \cdot 10^{-4}$			

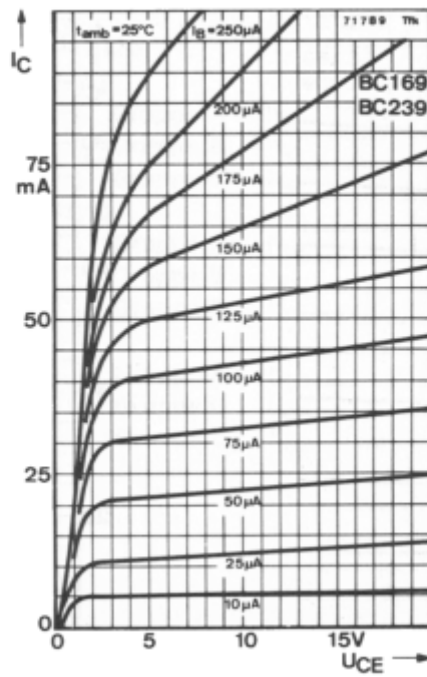
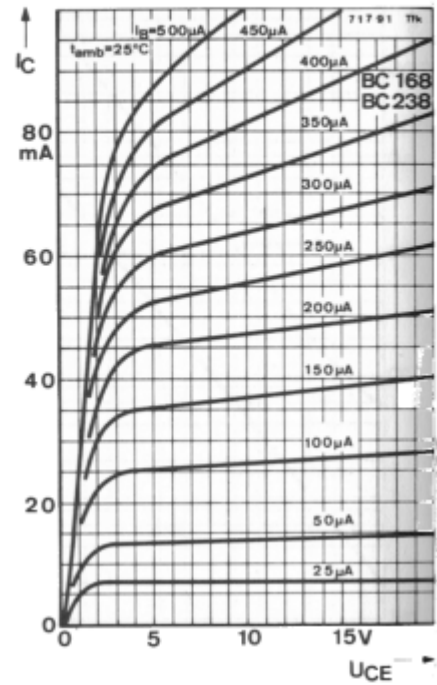
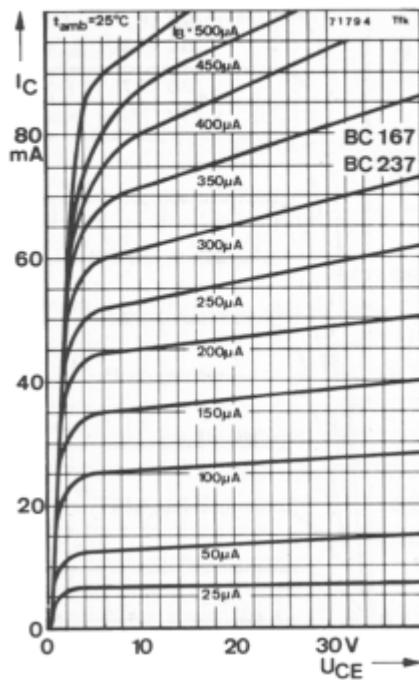
Leerlauf-Ausgangsleitwert

<b>Gruppe A</b>	$h_{oe}$		18		$\mu\text{S}$
<b>Gruppe B</b>	$h_{oe}$		30		$\mu\text{S}$
<b>Gruppe C</b>	$h_{oe}$		60		$\mu\text{S}$

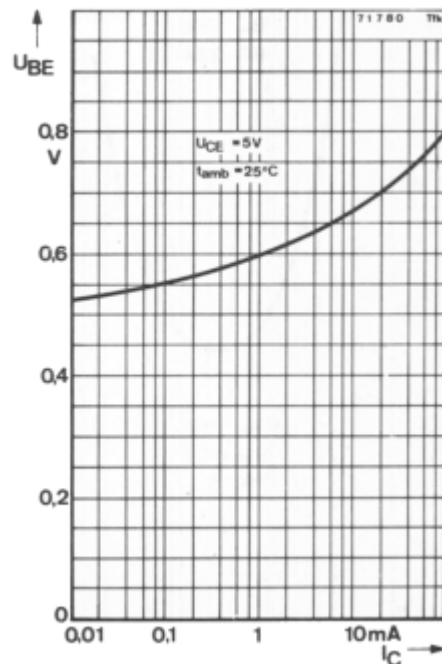
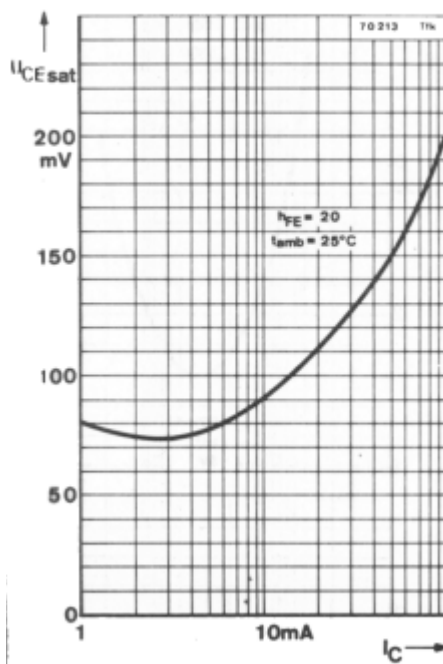
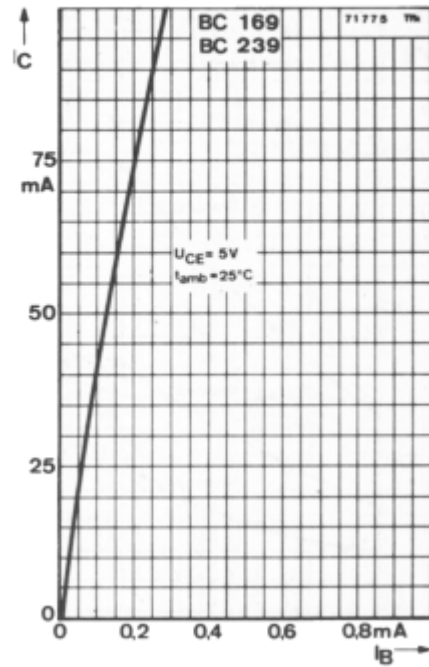
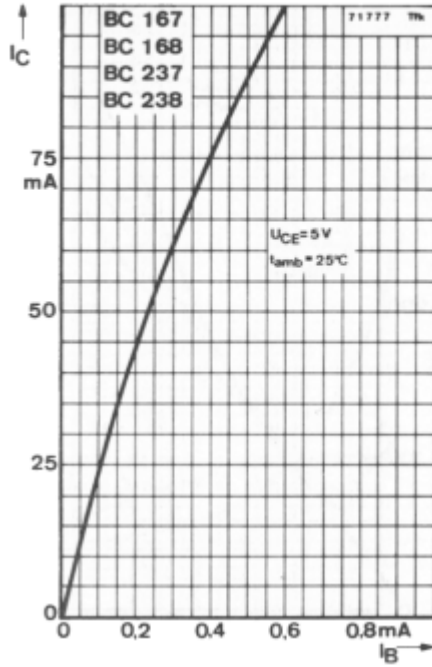
**BC 167 · BC 168 · BC 169 · BC 237 · BC 238 · BC 239**



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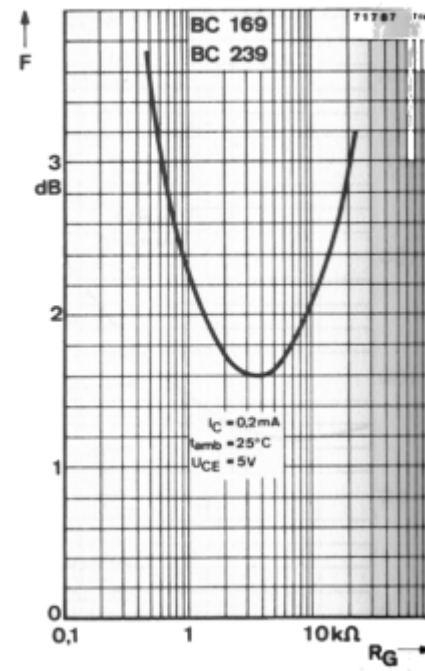
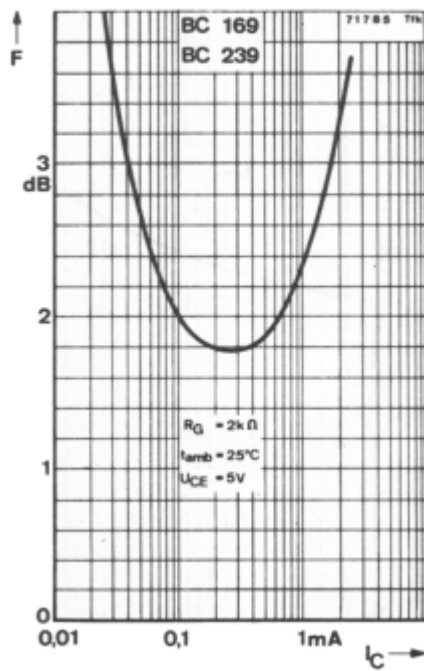
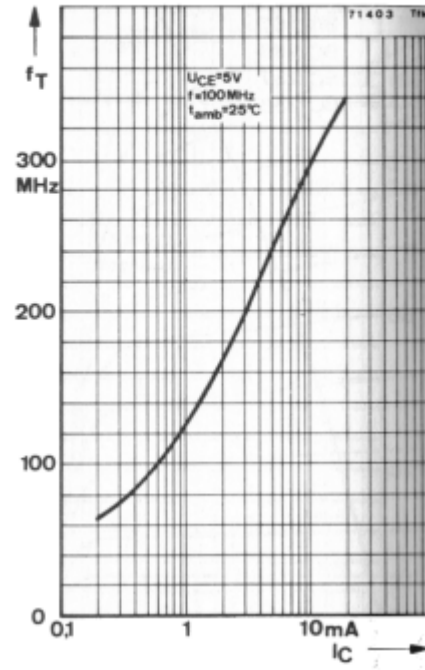
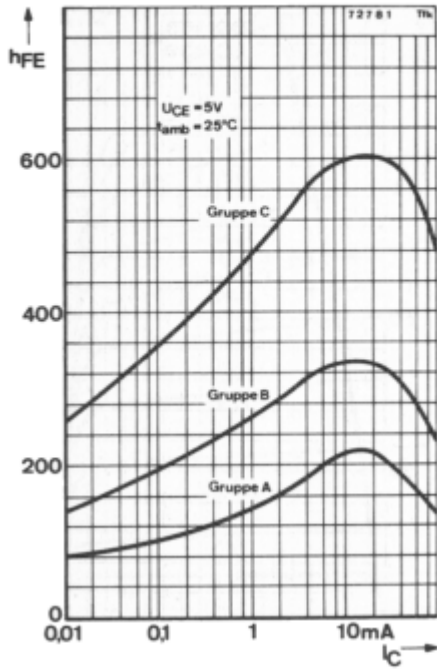


**BC 167 · BC 168 · BC 169 · BC 237 · BC 238 · BC 239**





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