

## Active Bias Controller

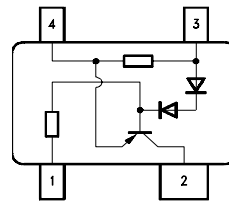
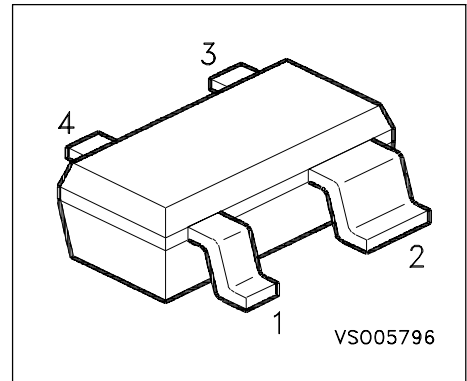
### Characteristics

- Supplies stable bias current even at low battery voltage and extreme ambient temperature variation

- Low voltage drop of 0.7V

### Application notes

- Stabilizing bias current of NPN transistors and FETs from from less than 0.2mA up to more than 200mA
- Ideal supplement for SIEGET and other RF transistors
- also usable as current source up to 5mA



EHA07188

Type	Marking	Ordering Code	Pin Configuration				Package
BCR 400R	W4s	Q62702-C2479	1 GND/E <sub>NPN</sub>	2 Contr/B <sub>NPN</sub>	3 V <sub>S</sub>	4 Rext/C <sub>NPN</sub>	SOT-143R

(E<sub>NPN</sub>, B<sub>NPN</sub>, C<sub>NPN</sub> are electrodes of a stabilized NPN transistor)

### Maximum Ratings

Parameter	Symbol	Values	Unit
Supply voltage	V <sub>S</sub>	18	V
Control current	I <sub>Contr.</sub>	10	mA
Control voltage	V <sub>Contr.</sub>	16	V
Reverse voltage between all terminals	V <sub>R</sub>	0.5	
Total power dissipation, T <sub>S</sub> = 83°C	P <sub>tot</sub>	330	mW
Junction temperature	T <sub>j</sub>	150	°C
Storage temperature	T <sub>stg</sub>	- 65 ... + 150	

### Thermal Resistance

Junction ambient <sup>1)</sup>	R <sub>thJA</sub>	≤ 280	K/W
Junction - soldering point	R <sub>thJS</sub>	≤ 190	

1) Package mounted on pcb 40mm x 40mm x 1.5mm / 6cm<sup>2</sup> Cu

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

Parameter	Symbol	Values			Unit
		min.	typ.	max.	

#### DC Characteristics

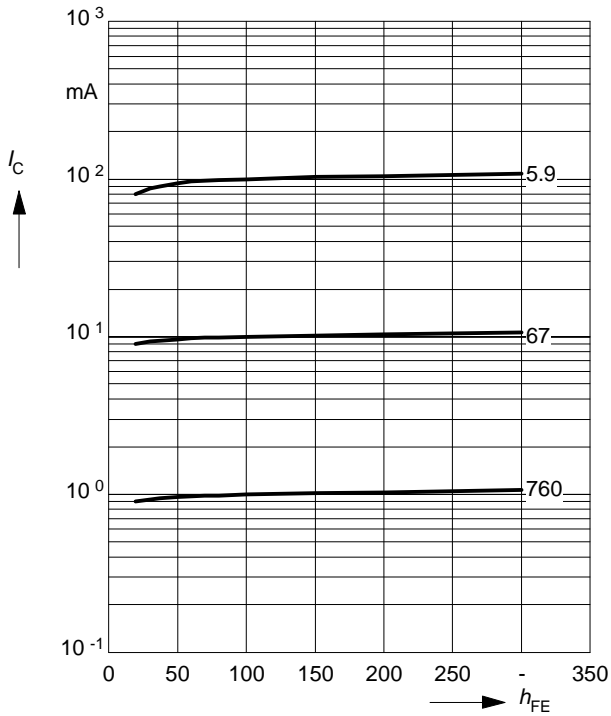
Additional current consumption $V_S = 3\text{ V}$	$I_0$	-	20	40	$\mu\text{A}$
Lowest stabilizing current $V_S = 3\text{ V}$	$I_{\text{min}}$	-	0.1	-	$\text{mA}$

#### DC Characteristics with stabilized NPN-Transistors

Lowest sufficient battery voltage $I_B (\text{NPN}) < 0.5\text{ mA}$	$V_{S\text{min}}$	-	1.6	-	$\text{V}$
Voltage drop ( $V_S - V_{CE}$ ) $I_C = 25\text{ mA}$	$V_{\text{drop}}$	-	0.65	-	
Change of $I_C$ versus $h_{FE}$ $h_{FE} > 50$	$\Delta I_C / I_C$	-	0.08	-	$\Delta h_{FE} / h_{FE}$
Change of $I_C$ versus $V_S$ $V_S > 3\text{ V}$	$\Delta I_C / I_C$	-	0.15	-	$\Delta V_S / V_S$
Change of $I_C$ versus $T_A$	$\Delta I_C / I_C$	-	0.2	-	$\% / \text{K}$

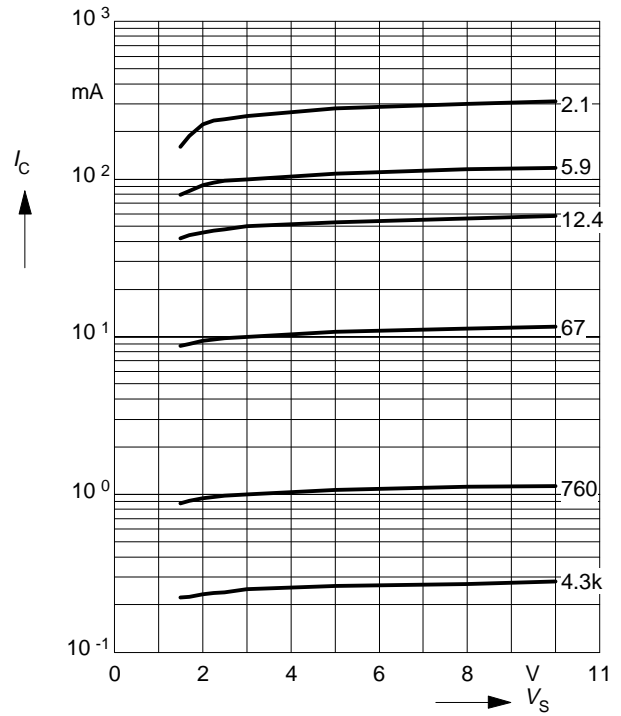
### Collector current $I_C = f(h_{FE})$

$I_C$  and  $h_{FE}$  refer to stabilized NPN Transistor  
Parameter  $R_{ext.}$  ( $\Omega$ )

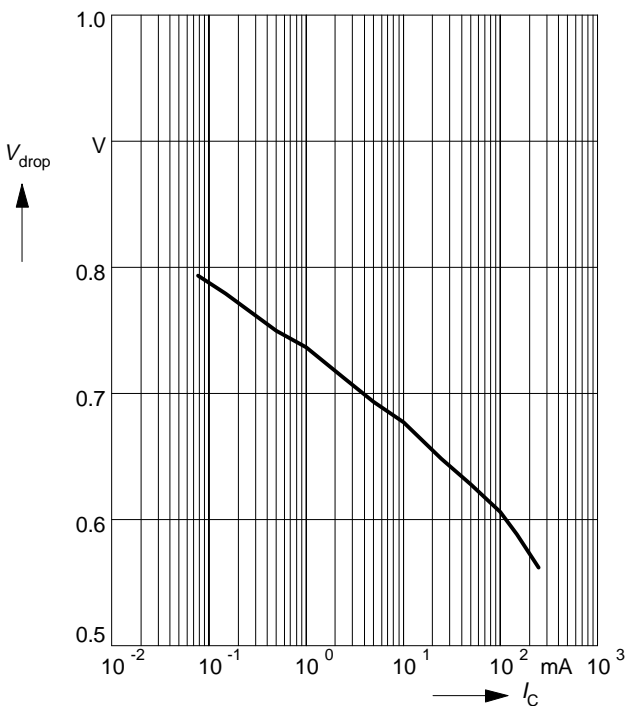


### Collector Current $I_C = f(V_S)$

of stabilized NPN Transistor  
Parameter  $R_{ext.}$  ( $\Omega$ )

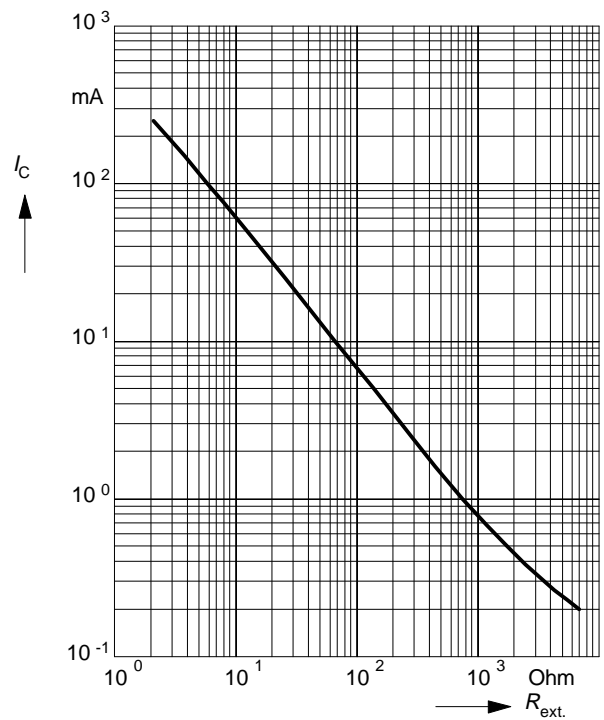


### Voltage drop $V_{drop} = f(I_C)$



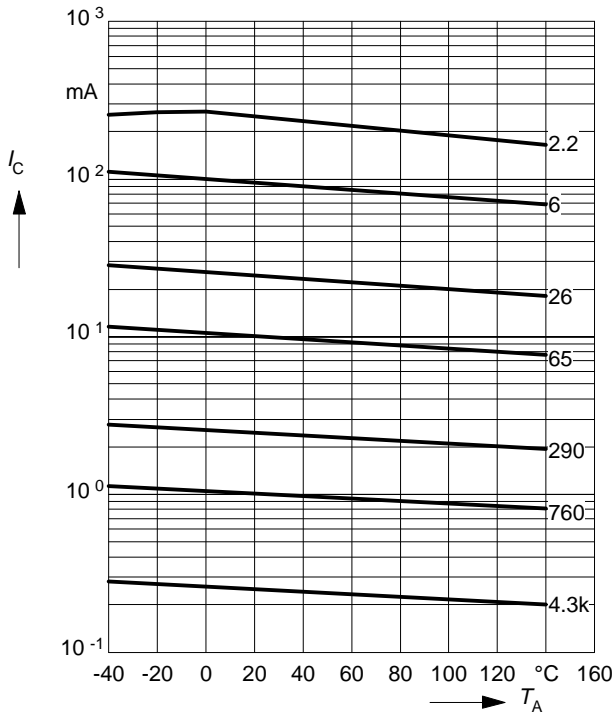
### Collector current $I_C = f(R_{ext.})$

of stabilized NPN Transistor

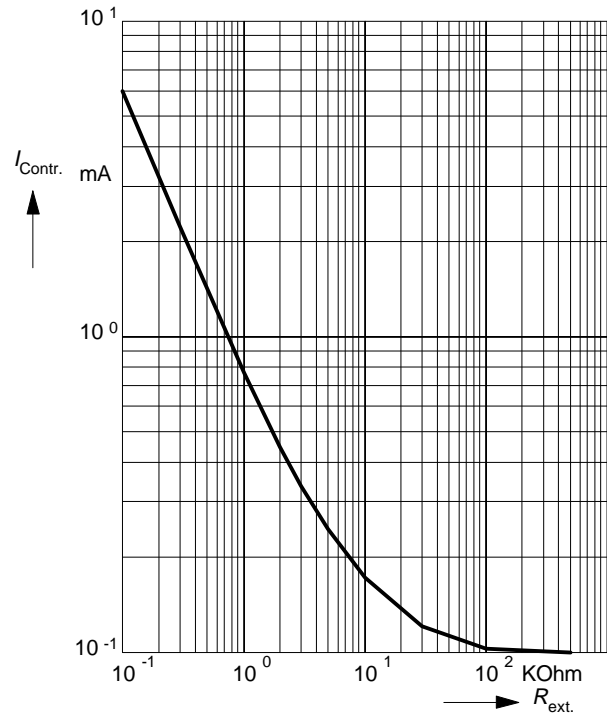


**Collector current  $T_A = f(I_C)$**   
of stabilized NPN Transistor

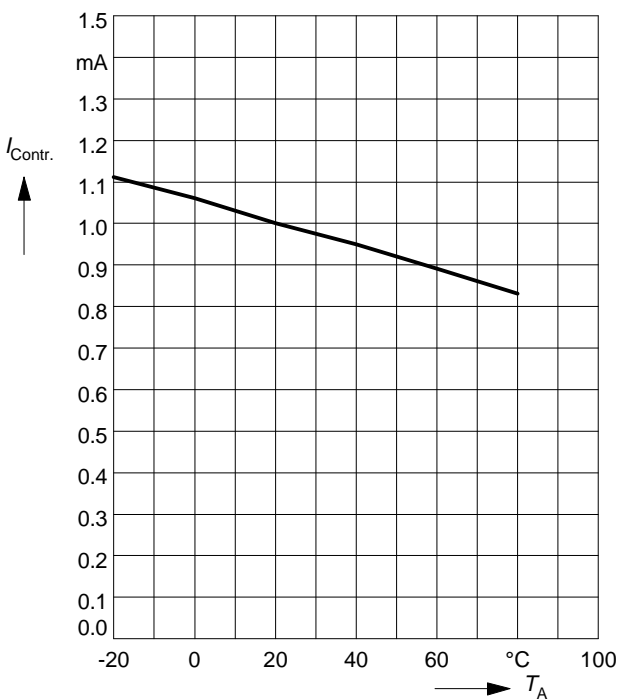
Parameter:  $R_{ext.}(\Omega)$



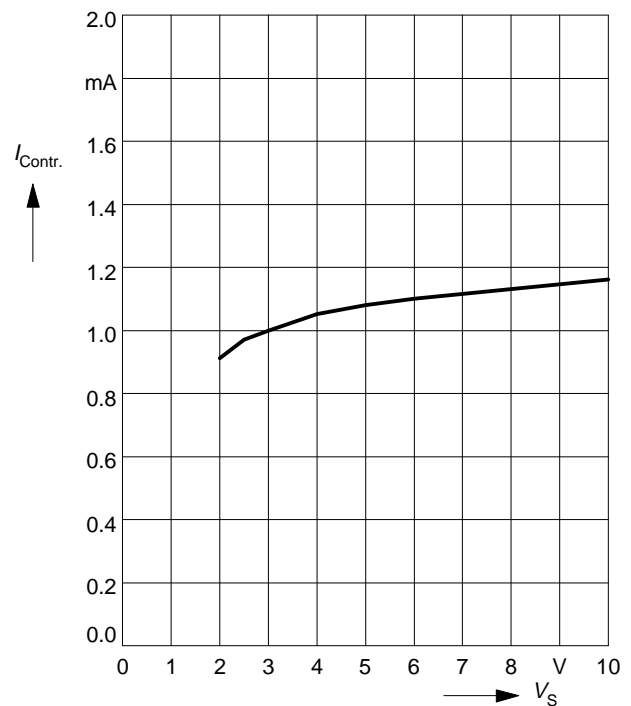
**Control current  $I = f(R_{ext.})$**   
in current source application



**Control current  $I = f(T_A)$**   
in current source application

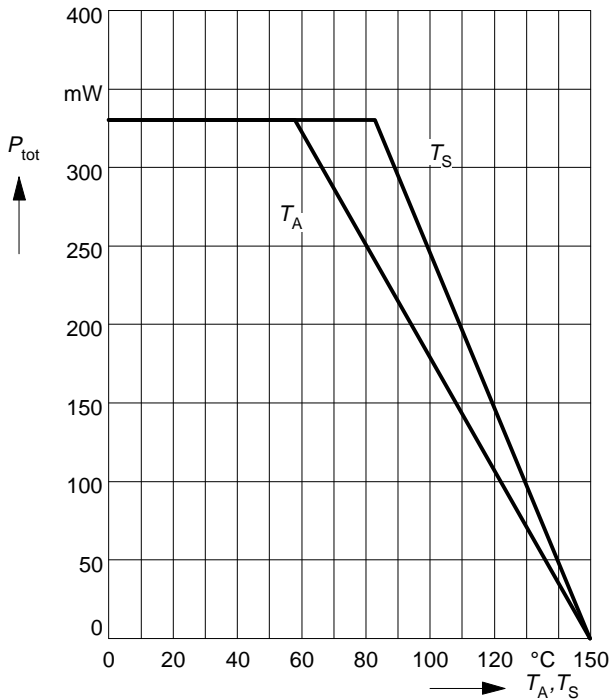


**Control current  $I = f(V_S)$**   
in current source application



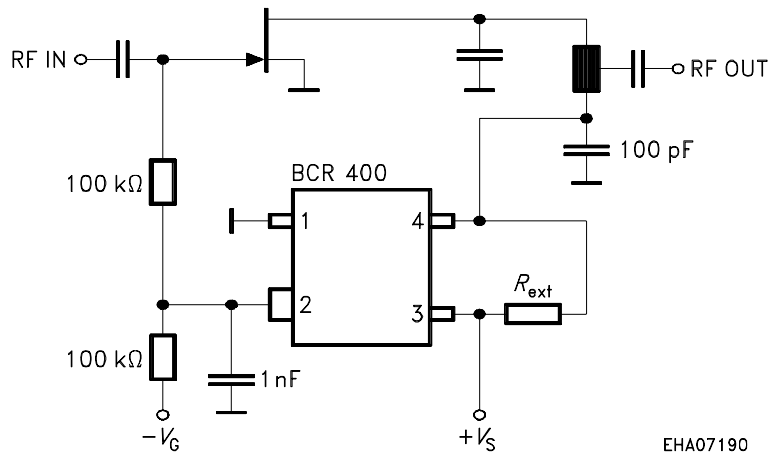
**Total power dissipation**  $P_{tot} = f(T_A^*; T_S)$

\* Package mounted on epoxy

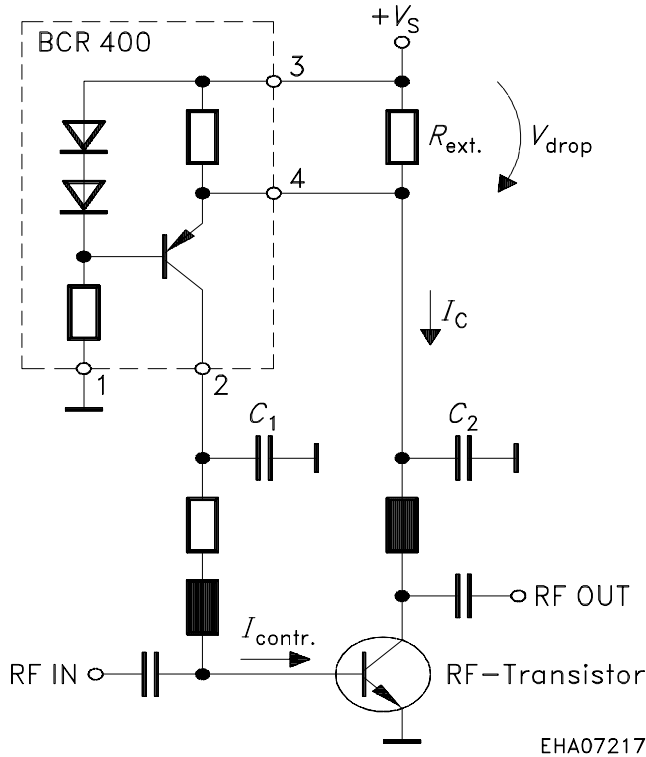


Note that up to  $T_S = 115^\circ\text{C}$  it is not possible to exceed  $P_{tot}$  respecting the maximum ratings of  $V_S$  and  $I_{Contr}$ . The collector or drain current (respectively) of the stabilized RF transistor does not affect BCR 400 directly, as it provides just the base current.

### Typical application for GaAs FET with active bias controller



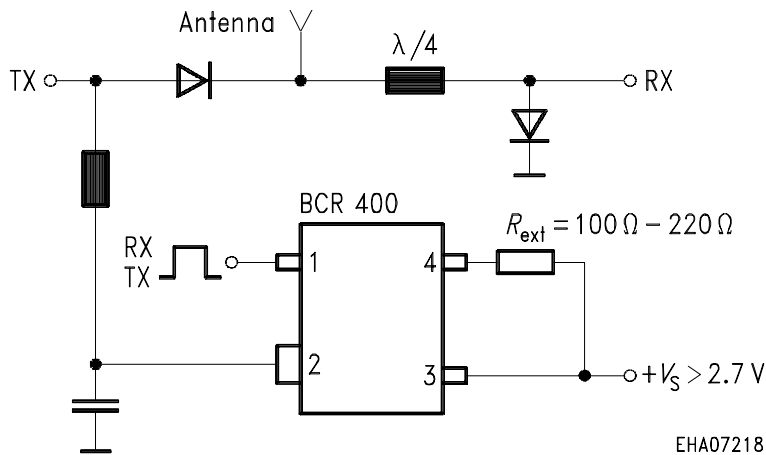
## RF transistor controlled by BCR400



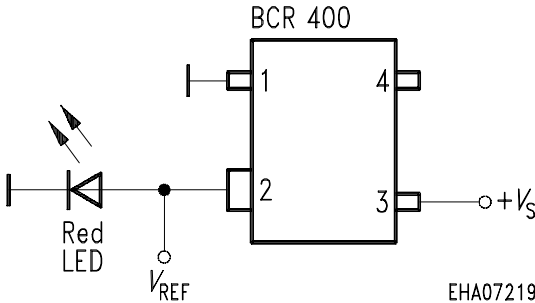
Be aware that BCR 400 stabilizes bias current of transistors in an active control loop.

In order to avoid loop oscillation (hunting), time constants must be chosen adequately, i.e.  $C1 \geq 10 \times C2$

## RX/TX antenna switch, compatible to control logic and working at wide battery voltage range



Low voltage reference



Precision timer with BCR 400 providing constant charge current

