

SIEMENS

BCR 400R

Active Bias Controller

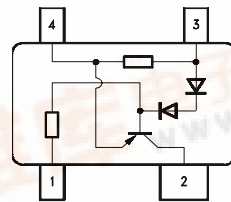
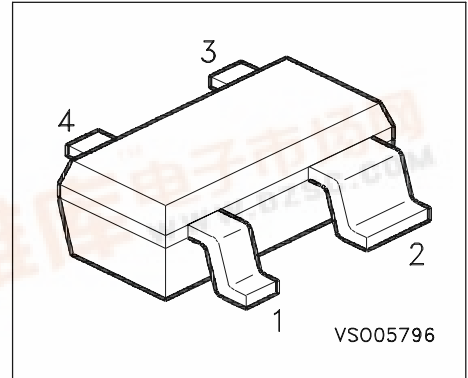
Characteristics

- 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 _{NPN} | 2 Contr/B _{NPN} | 3 V _S | 4 Rext/C _{NPN} | SOT-143R |

(E_{NPN}, B_{NPN}, C_{NPN} are electrodes of a stabilized NPN transistor)

Maximum Ratings

| Parameter | Symbol | Values | Unit |
|--|---------------------|----------------|------|
| Supply voltage | V _S | 18 | V |
| Control current | I _{Contr.} | 10 | mA |
| Control voltage | V _{Contr.} | 16 | V |
| Reverse voltage between all terminals | V _R | 0.5 | |
| Total power dissipation, T _S = 83°C | P _{tot} | 330 | mW |
| Junction temperature | T _j | 150 | °C |
| Storage temperature | T _{stg} | - 65 ... + 150 | |

Thermal Resistance

| | | | |
|--------------------------------|-------------------|-------|-----|
| Junction ambient ¹⁾ | R _{thJA} | ≤ 280 | K/W |
| Junction - soldering point | R _{thJS} | ≤ 190 | |

1) Package mounted on pcb 40mm x 40mm x 1.5mm / 6cm² Cu



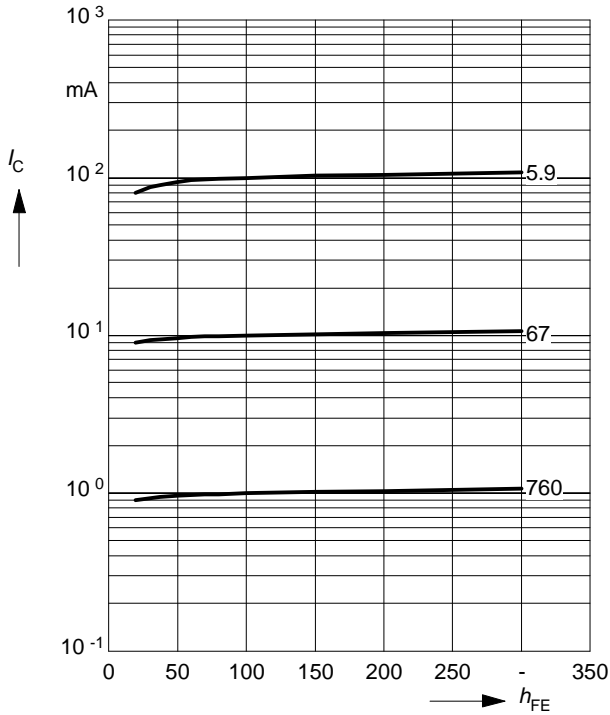
Electrical Characteristics at $T_A=25^\circ\text{C}$, unless otherwise specified

| Parameter | Symbol | Values | | | Unit |
|--|------------------|--------|------|------|---------------|
| | | min. | typ. | max. | |
| DC Characteristics | | | | | |
| Additional current consumption $V_S = 3\text{ V}$ | I_0 | - | 20 | 40 | μA |
| Lowest stabilizing current $V_S = 3\text{ V}$ | I_{min} | - | 0.1 | - | mA |

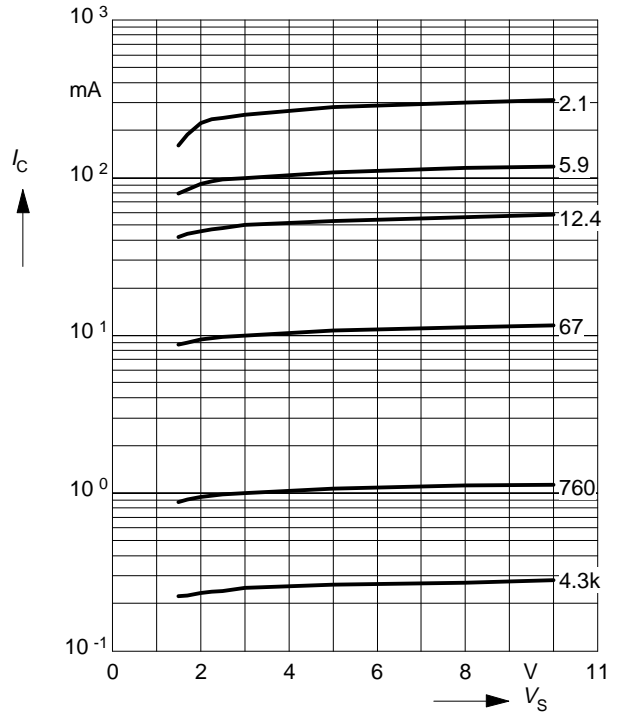
DC Characteristics with stabilized NPN-Transistors

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

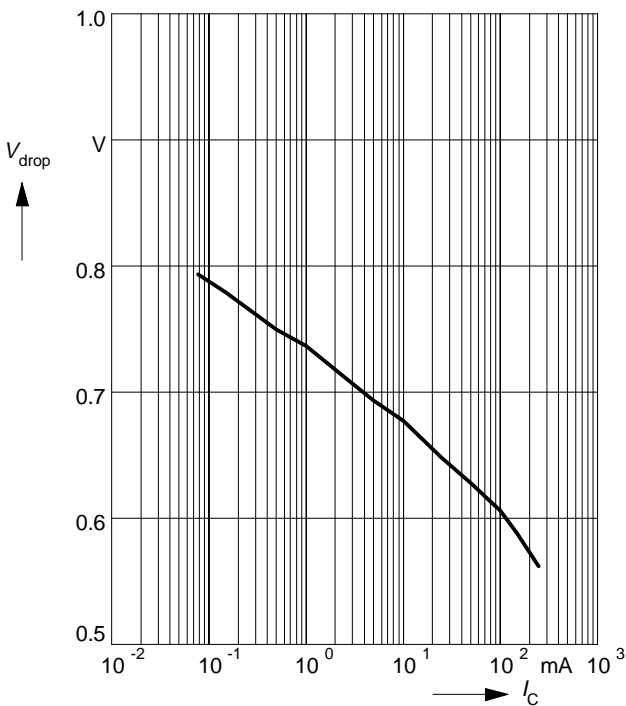
Collector current $I_C = f(h_{FE})$
 I_C and h_{FE} refer to stabilized NPN Transistor
 Parameter $R_{ext.} (\Omega)$



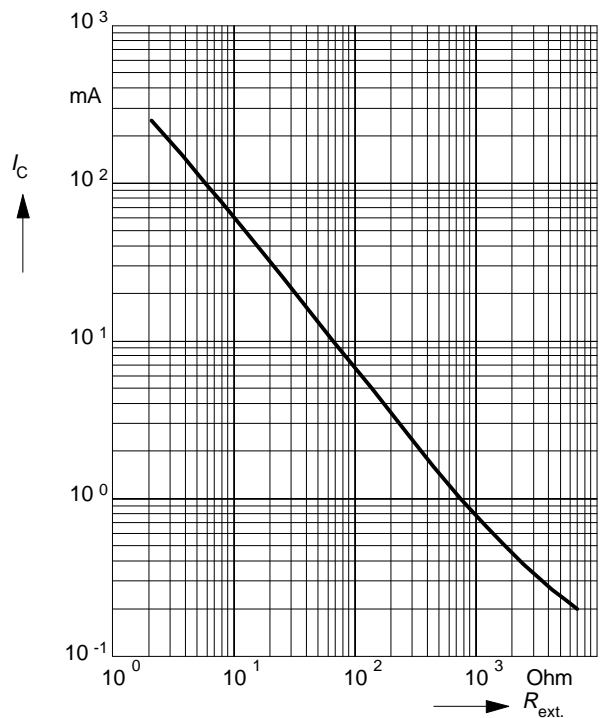
Collector Current $I_C = f(V_S)$
 of stabilized NPN Transistor
 Parameter $R_{ext.} (\Omega)$



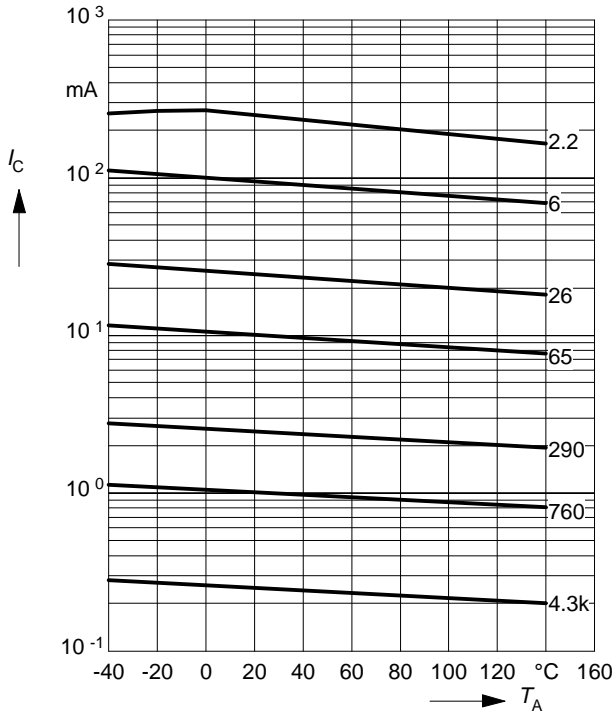
Voltage drop $V_{drop} = f(I_C)$



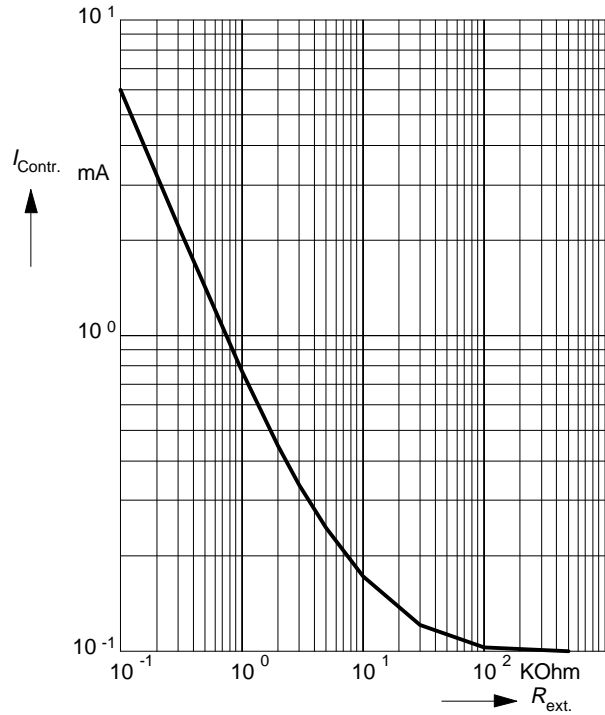
Collector current $I_C = f(R_{ext.})$
 of stabilized NPN Transistor



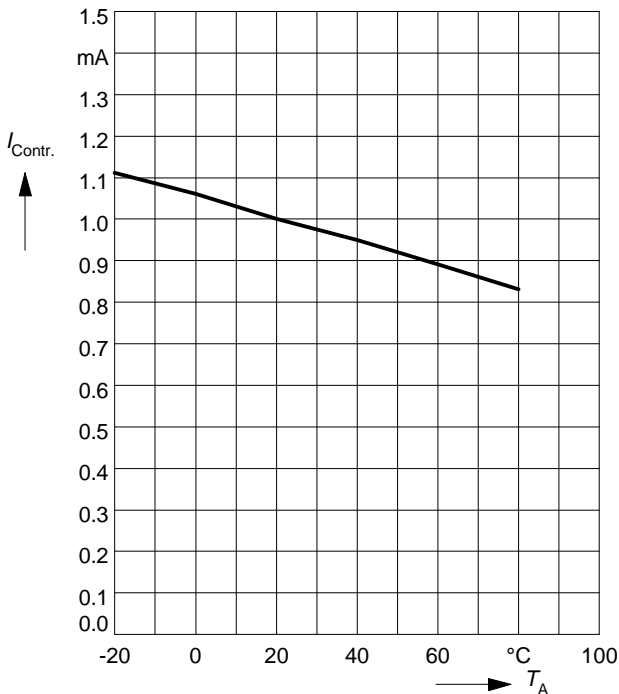
Collector current $T_A = f(I_C)$
of stabilized NPN Transistor
Parameter: $R_{ext.}(\Omega)$



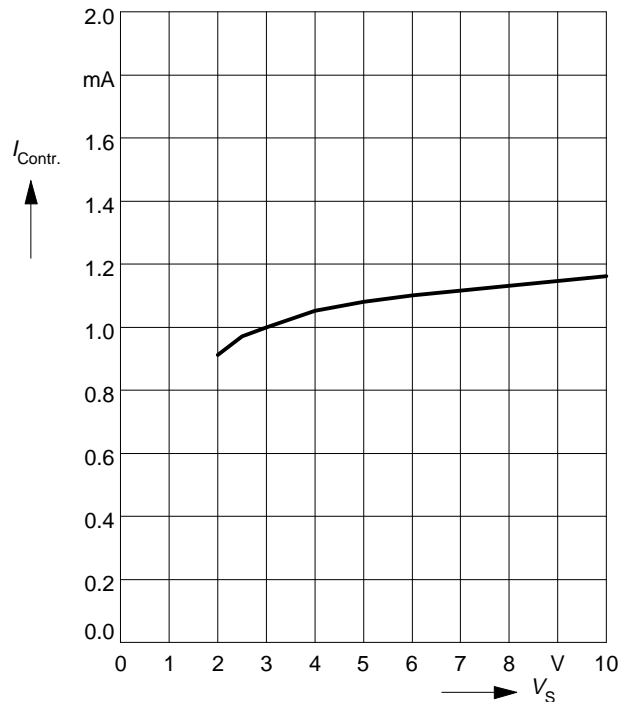
Control current $I = f(R_{ext.})$
in current source application



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

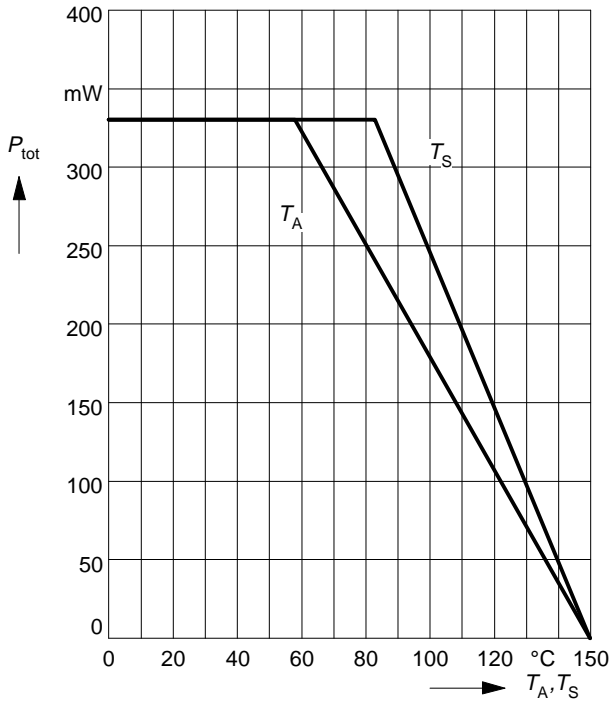


Control current $I = f(V_S)$
in current source application



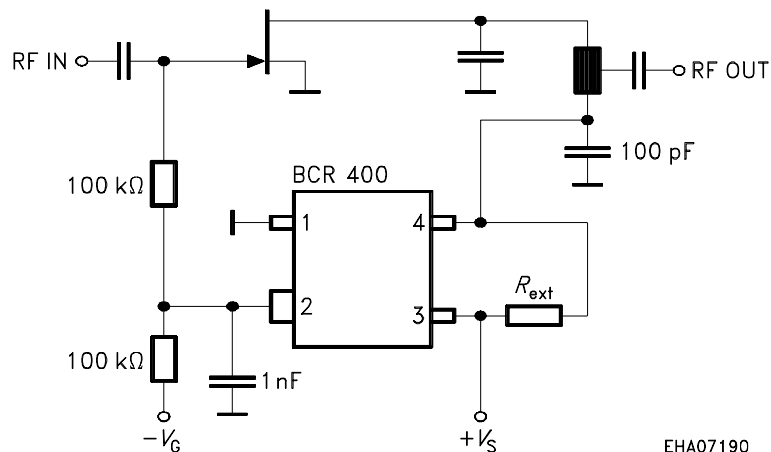
Total power dissipation $P_{\text{tot}} = f(T_A^*; T_S)$

* Package mounted on epoxy

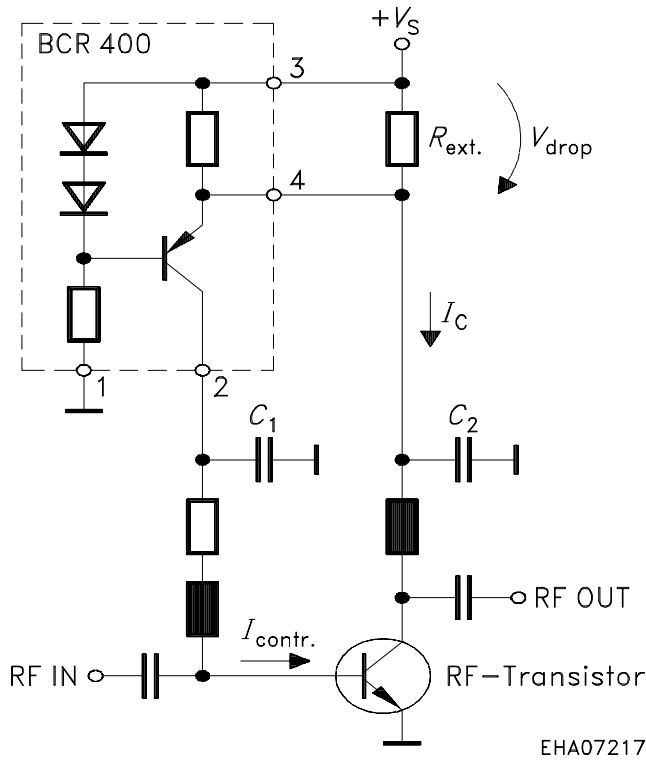


Note that up to $T_S = 115^\circ\text{C}$ it is not possible to exceed P_{tot} respecting the maximum ratings of V_S and I_{Contr} . The collector or drain current (respectively) of the stabilized RF transistor does not affect BCR 400 directly, as it provides just the base current.

Typical application for GaAs FET with active bias controller



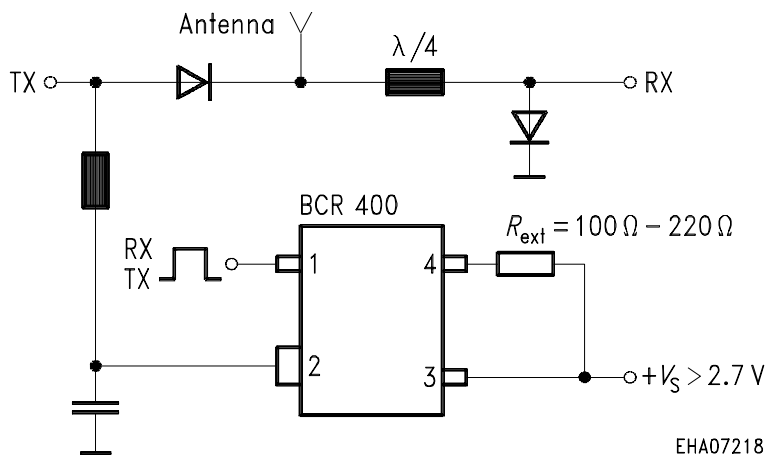
RF transistor controlled by BCR400



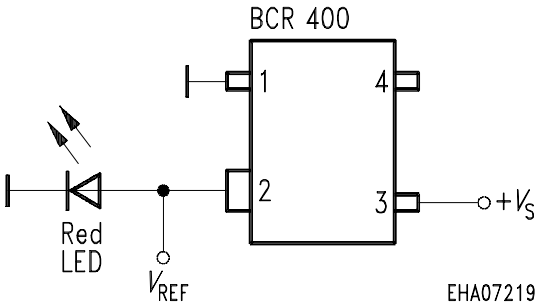
Be aware that BCR 400 stabilizes bias current of transistors in an active control loop.

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

