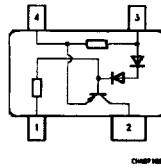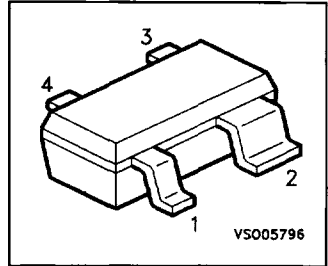# SIEMENS

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

VSO05796

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

SIEMENS

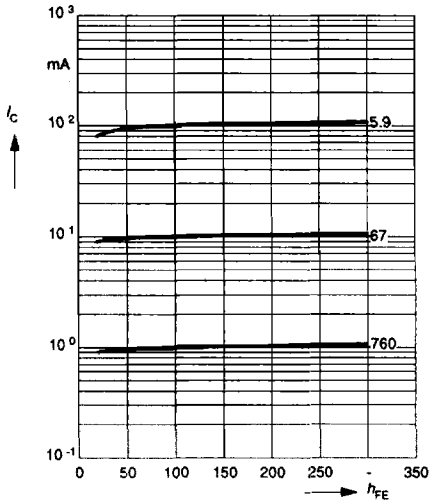**Electrical Characteristics** at T_A=25°C, unless otherwise specified

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

DC Characteristics with stabilized NPN-Transistors

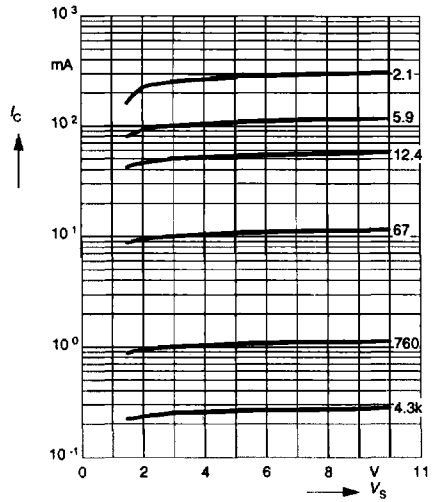| Parameter	Symbol	min.	typ.	max.	Unit
Lowest sufficient battery voltage	V_{Smin}				V
I_B (NPN) < 0.5 mA		-	1.6	-	
Voltage drop $(V_S - V_{CE})$	V_{drop}				
$I_C = 25$ mA		-	0.65	-	
Change of I_C versus h_{FE}	$\Delta I_C / I_C$				ΔhFE/hFE
$h_{FE} > 50$		-	0.08	-	
Change of I_C versus V_S	$\Delta I_C / I_C$				ΔVS/VS
$V_S > 3$ V		-	0.15	-	
Change of I_C versus T_A	$\Delta I_C / I_C$	-	0.2	-	%/K

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

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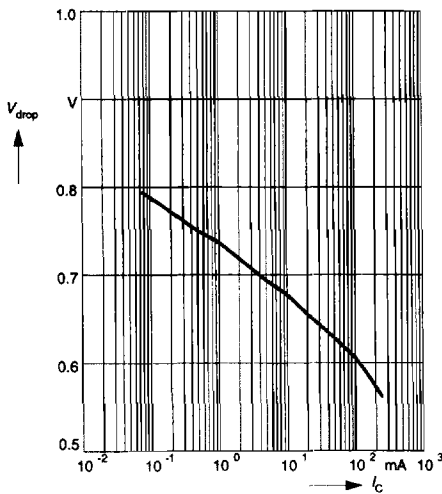Parameter $R_{ext.}$ (Ω)

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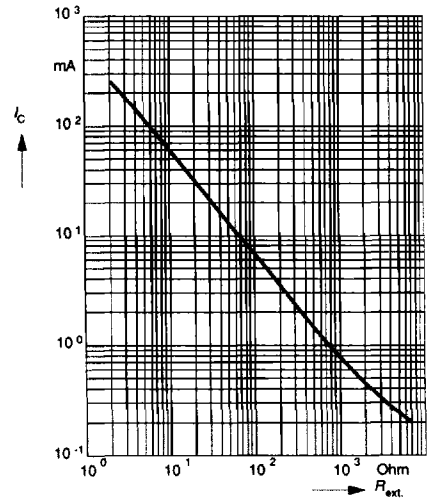Parameter $R_{ext.}$ (Ω)
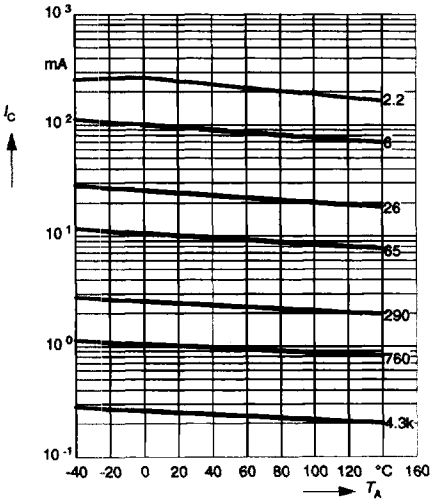

Voltage drop $V_{drop} = f(I_C)$
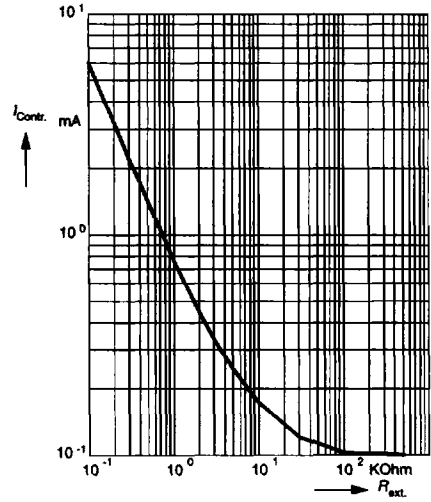

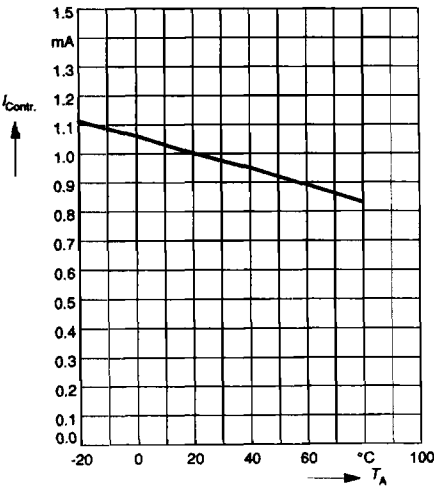**Collector current** $I_C = f(R_{ext.})$
of stabilized NPN Transistor

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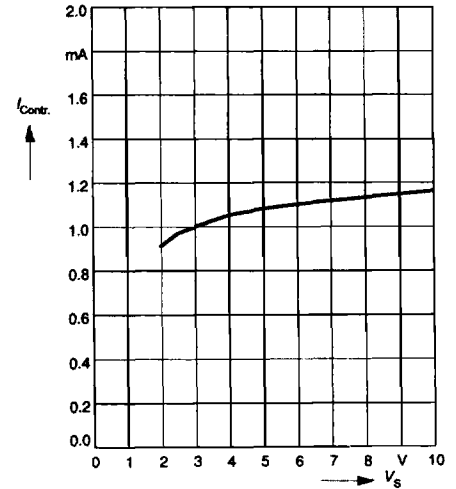of stabilized NPN Transistor
Parameter: $R_{ext.}(\Omega)$

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

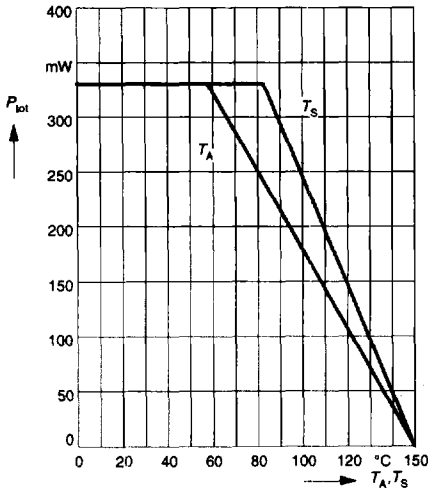**Control current** $I = f(T_A)$
in current source application

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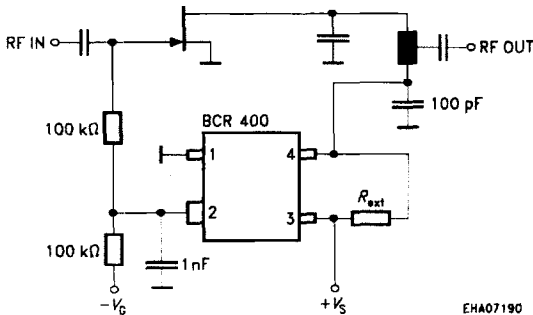in current source application

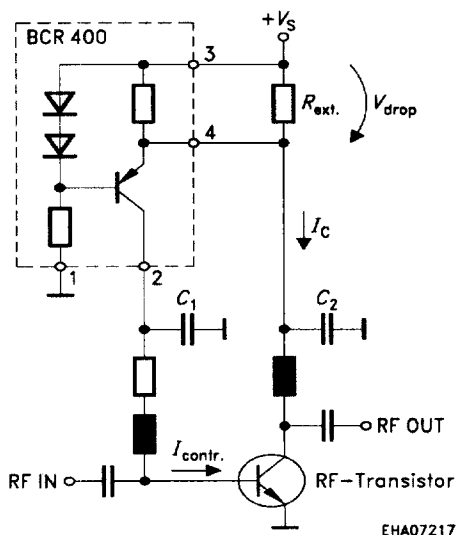## Total power dissipation $P_{tot} = f(T_A^*; T_S)$
* Package mounted on epoxy

Note that up to $T_S = 115°C$ 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.

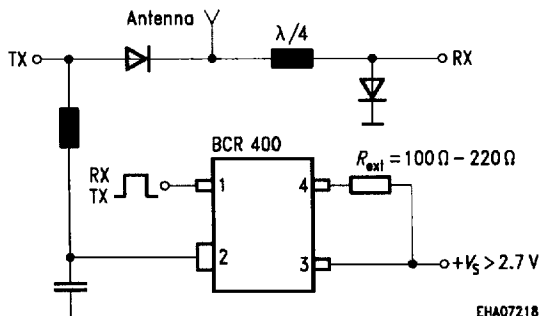### Typical application for GaAs FET with active bias controller

RF transistor controlled by BCR400
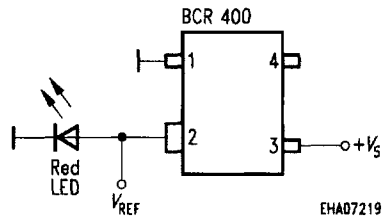

EHA07217

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 >= 10 x C2**

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

EHA07218

Low voltage reference

BCR 400

Red
LED

V_{REF}

$+V_S$

EHA07219

Precision timer with BCR 400
providing constant charge current

$+V_S$

BCR 400

R_{ext}

Timer IC
(555)

EHA07191