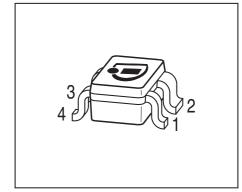


#### **Active Bias Controller**

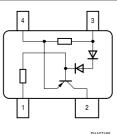
#### **Characteristics**

- 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 FET's from less than 0.2mA up to more than 200mA
- Ideal supplement for Sieget and other transistors
- also usable as current source up to 5mA



- Pb-free (RoHS compliant) package<sup>1)</sup>
- Qualified according AEC Q101





Type	Marking		Package			
BCR400W	W4s	1=GND/ <b>E</b> <sub>NPN</sub>	2=Contr/ <b>B</b> <sub>NPN</sub>	3V <sub>S</sub>	4=Rext/ <b>C</b> <sub>NPN</sub>	SOT343

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

#### **Maximum Ratings**

Parameter	Symbol	Value	Unit	
Source 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, $T_S$ = 117 °C	P <sub>tot</sub>	330	mW	
Junction temperature	T <sub>j</sub>	150	°C	
Storage temperature	T <sub>stg</sub>	-65 150		

Junction - soldering point <sup>2)</sup>	R <sub>thJS</sub>	≤ 100	K/W
candidit coldoning point	າ "ແນວ		

<sup>&</sup>lt;sup>1</sup>Pb-containing package may be available upon special request

<sup>&</sup>lt;sup>2</sup>For calculation of R<sub>th,IA</sub> please refer to Application Note Thermal Resistance



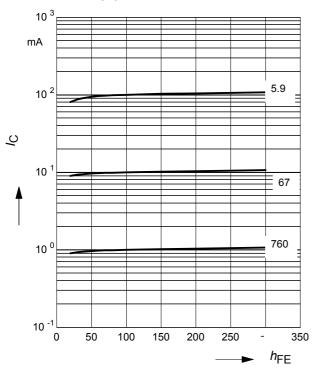
**Electrical Characteristics** at  $T_A$ =25°C, unless otherwise specified

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
DC Characteristics	•			•	•
Additional current consumption	10	-	20	40	μA
<i>V</i> <sub>S</sub> = 3 V					
Lowest stabilizing current	<i>I</i> <sub>min</sub>	-	0.1	-	mA
<i>V</i> <sub>S</sub> = 3 V					
DC Characteristics with stabilized NPI	N-Transistors				
Lowest sufficient battery voltage	V <sub>Smin</sub>	-	1.6	_	V
$I_{\rm B}$ (NPN) < 0.5mA					
Voltage drop (V <sub>S</sub> - V <sub>CE</sub> )	$V_{ m drop}$	-	0.65	-	
$I_{\rm C}$ = 25 mA					
Change of $I_{\mathbb{C}}$ versus $h_{FE}$	$\Delta I_{\rm C}/I_{\rm C}$	-	0.08	-	Δh <sub>FE</sub> /
h <sub>FE</sub> = 50					h <sub>FE</sub>
Change of $I_{\mathbb{C}}$ versus $V_{\mathbb{S}}$	$\Delta I_{\rm C}/I_{\rm C}$	-	0.15	-	$\Delta V_{\rm S}/V_{\rm S}$
<i>V</i> <sub>S</sub> = 3 V					
Change of $I_{\mathbb{C}}$ versus $T_{\mathbb{A}}$	$\Delta I_{\rm C}/I_{\rm C}$	-	0.2	-	%/K

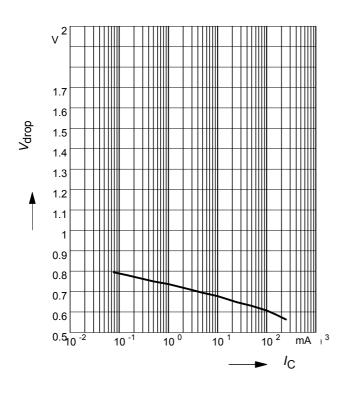


## Collector current $I_{C} = f(h_{FE})$

 $I_{\mathbb{C}}$  and  $h_{\mathsf{FE}}$  refer to stabilized NPN Transistor Parameter  $R_{\mathsf{ext.}}$  ( $\Omega$ )



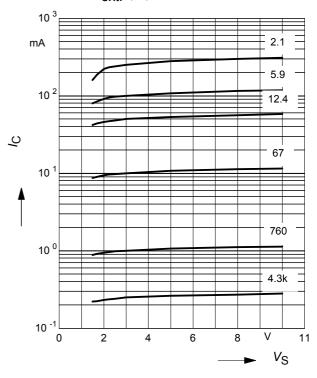
**Voltage drop**  $V_{drop} = f(I_C)$ 



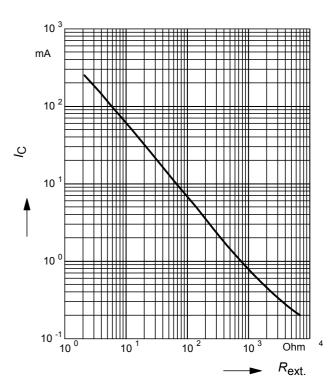
## Collector Current $I_C = f(V_S)$

of stabilized NPN Transistor

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



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



3

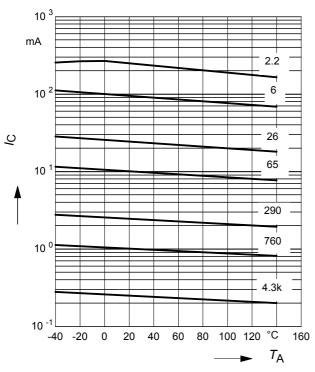
2007-05-29



## Collector current $T_A = f(I_C)$

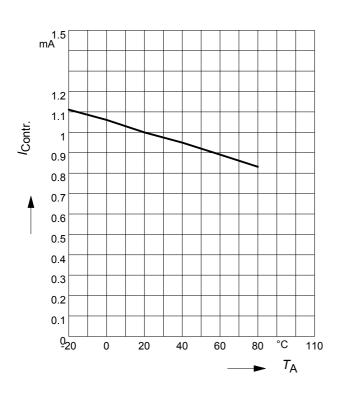
of stabilized NPN Transistor

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



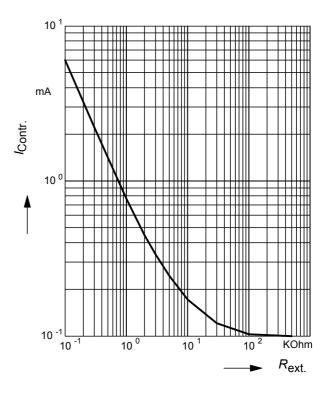
## Control current $I = f(T_A)$

in current source application



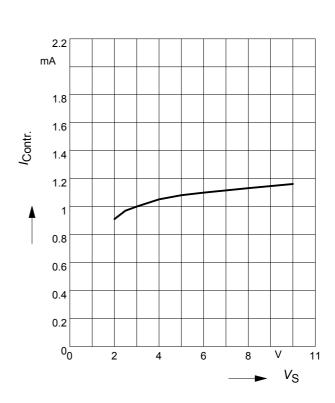
## Control current $I = f(R_{ext.})$

in current source application



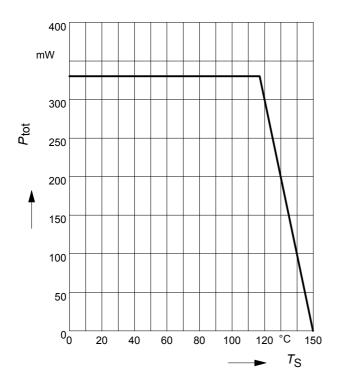
## Control current $I = f(V_S)$

in current source application



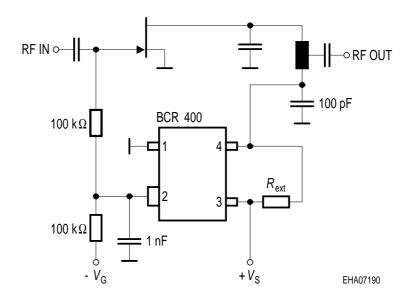


## Total power dissipation $P_{\text{tot}} = f(T_{\text{S}})$



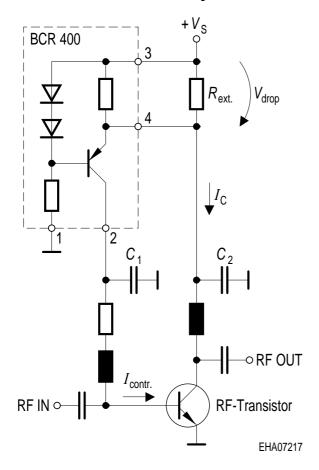
Note that up to  $T_{\rm S}$ =115°C it is not possible to exceed  $P_{\rm tot}$  respecting the maximum ratings of  $V_{\rm S}$  and  $I_{\rm Contr.}$  The collector or drain current (respectively) of the stabilized RF transistor does not affect BCR 400 directly, as it provides just the base current.

Typical application for GaAs FET with active bias controller





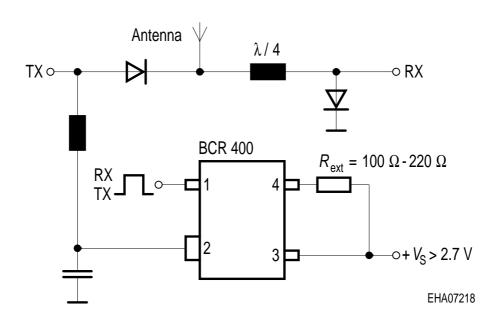
#### RF transistor controlled by BCR400



Be aware that BCR400 stabilized bias current of transistors in an active control loop

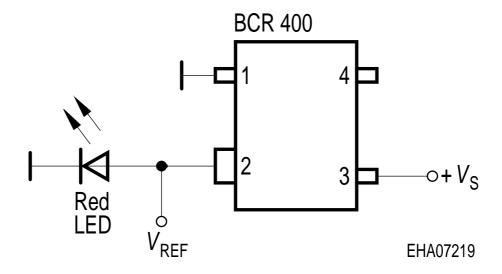
In order to avoid loop ascillation (hunting), time constants must be chosen adequately, i.e. C1 >= 10 x C2

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

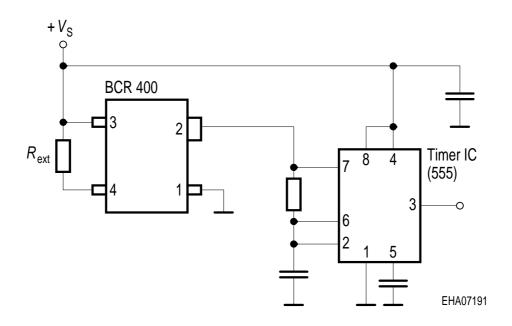




## Low voltage reference



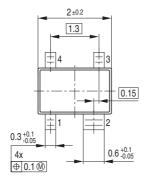
# Precision timer with BCR400 providing constant charge current

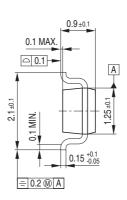




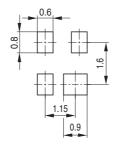
## Package Outline



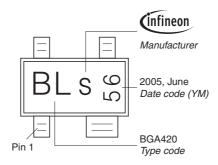




#### Foot Print

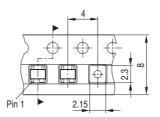


## Marking Layout (Example)



## Standard Packing

Reel ø180 mm = 3.000 Pieces/Reel Reel ø330 mm = 10.000 Pieces/Reel







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9

2007-05-29