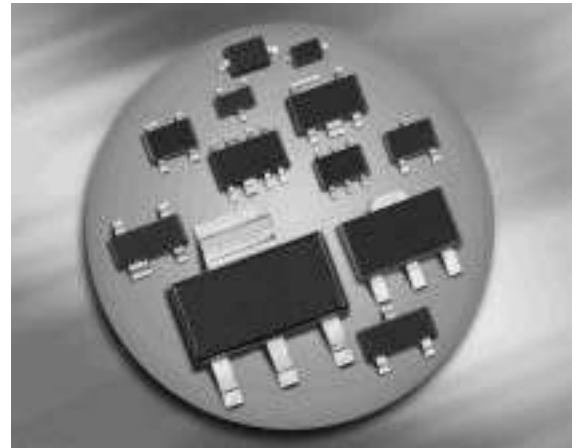


**PNP Silicon AF Transistor**

- For AF input stages and driver applications
- High current gain
- Low collector-emitter saturation voltage
- Low noise between 30 Hz and 15 kHz
- Complementary types:  
BC846...-BC850... (NPN)
- Pb-free (RoHS compliant) package<sup>1)</sup>
- Qualified according AEC Q101



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

Type	Marking	Pin Configuration						Package
		1=B	2=E	3=C	-	-	-	
BC856A	3As	1=B	2=E	3=C	-	-	-	SOT23
BC856B	3Bs	1=B	2=E	3=C	-	-	-	SOT23
BC856BW	3Bs	1=B	2=E	3=C	-	-	-	SOT323
BC857A	3Es	1=B	2=E	3=C	-	-	-	SOT23
BC857B	3Fs	1=B	2=E	3=C	-	-	-	SOT23
BC857BF	3Fs	1=B	2=E	3=C	-	-	-	TSFP-3
BC857BL3	3F	1=B	2=E	3=C	-	-	-	TSLP-3-1
BC857BW	3Fs	1=B	2=E	3=C	-	-	-	SOT323
BC857C	3Gs	1=B	2=E	3=C	-	-	-	SOT23
BC857CW	3Gs	1=B	2=E	3=C	-	-	-	SOT323
BC858A	3Js	1=B	2=E	3=C	-	-	-	SOT23
BC858B	3Ks	1=B	2=E	3=C	-	-	-	SOT23
BC858BL3	3K	1=B	2=E	3=C	-	-	-	TSLP-3-1
BC858BW	3Ks	1=B	2=E	3=C	-	-	-	SOT323
BC858C	3Ls	1=B	2=E	3=C	-	-	-	SOT23
BC858CW	3Ls	1=B	2=E	3=C	-	-	-	SOT323
BC859B	4Bs	1=B	2=E	3=C	-	-	-	SOT23
BC859C	4Cs	1=B	2=E	3=C	-	-	-	SOT23
BC860B	4Fs	1=B	2=E	3=C	-	-	-	SOT23
BC860BW	4Fs	1=B	2=E	3=C	-	-	-	SOT323
BC860CW	4Gs	1=B	2=E	3=C	-	-	-	SOT323

**Maximum Ratings**

Parameter	Symbol	Value	Unit
Collector-emitter voltage	$V_{CEO}$		V
BC856...		65	
BC857..., BC860...		45	
BC858..., BC859...		30	
Collector-base voltage	$V_{CBO}$		
BC856...		80	
BC857..., BC860...		50	
BC858..., BC859...		30	
Emitter-base voltage	$V_{EBO}$	5	
Collector current	$I_C$	100	mA
Peak collector current	$I_{CM}$	200	
Total power dissipation	$P_{tot}$		mW
$T_S \leq 71\text{ °C}$ , BC856-BC860		330	
$T_S \leq 128\text{ °C}$ , BC857BF-BC858BF		250	
$T_S \leq 135\text{ °C}$ , BC857BL3, BC860BL3		250	
$T_S \leq 124\text{ °C}$ , BC856W-BC860W		250	
Junction temperature	$T_j$	150	°C
Storage temperature	$T_{stg}$	-65 ... 150	

**Thermal Resistance**

Parameter	Symbol	Value	Unit
Junction - soldering point <sup>1)</sup>	$R_{thJS}$		K/W
BC856-BC860		$\leq 240$	
BC857BF-BC858BF		$\leq 90$	
BC857BL3, BC858BL3		$\leq 60$	
BC856W-BC860W		$\leq 105$	

<sup>1)</sup>For calculation of  $R_{thJA}$  please refer to Application Note Thermal Resistance

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

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
<b>DC Characteristics</b>					
Collector-emitter breakdown voltage $I_C = 10\text{ mA}$ , $I_B = 0$ , BC856... $I_C = 10\text{ mA}$ , $I_B = 0$ , BC857..., BC860... $I_C = 10\text{ mA}$ , $I_B = 0$ , BC858..., BC859...	$V_{(BR)CEO}$	65 45 30	- - -	- - -	V
Collector-base breakdown voltage $I_C = 10\text{ }\mu\text{A}$ , $I_E = 0$ , BC856... $I_C = 10\text{ }\mu\text{A}$ , $I_E = 0$ , BC857..., BC860... $I_C = 10\text{ }\mu\text{A}$ , $I_E = 0$ , BC858..., BC859...	$V_{(BR)CBO}$	80 50 30	- - -	- - -	
Emitter-base breakdown voltage $I_E = 1\text{ }\mu\text{A}$ , $I_C = 0$	$V_{(BR)EBO}$	5	-	-	
Collector-base cutoff current $V_{CB} = 45\text{ V}$ , $I_E = 0$ $V_{CB} = 30\text{ V}$ , $I_E = 0$ , $T_A = 150\text{ }^\circ\text{C}$	$I_{CBO}$	- -	- -	0.015 5	$\mu\text{A}$
DC current gain <sup>1)</sup> $I_C = 10\text{ }\mu\text{A}$ , $V_{CE} = 5\text{ V}$ , $h_{FE}$ -grp.A $I_C = 10\text{ }\mu\text{A}$ , $V_{CE} = 5\text{ V}$ , $h_{FE}$ -grp.B $I_C = 10\text{ }\mu\text{A}$ , $V_{CE} = 5\text{ V}$ , $h_{FE}$ -grp.C $I_C = 2\text{ mA}$ , $V_{CE} = 5\text{ V}$ , $h_{FE}$ -grp.A $I_C = 2\text{ mA}$ , $V_{CE} = 5\text{ V}$ , $h_{FE}$ -grp.B $I_C = 2\text{ mA}$ , $V_{CE} = 5\text{ V}$ , $h_{FE}$ -grp.C	$h_{FE}$	- - - 125 220 420	140 250 480 180 290 520	- - - 250 475 800	-
Collector-emitter saturation voltage <sup>1)</sup> $I_C = 10\text{ mA}$ , $I_B = 0.5\text{ mA}$ $I_C = 100\text{ mA}$ , $I_B = 5\text{ mA}$	$V_{CEsat}$	- -	75 250	300 650	mV
Base emitter saturation voltage <sup>1)</sup> $I_C = 10\text{ mA}$ , $I_B = 0.5\text{ mA}$ $I_C = 100\text{ mA}$ , $I_B = 0.5\text{ mA}$	$V_{BEsat}$	- -	700 850	- -	
Base-emitter voltage <sup>1)</sup> $I_C = 2\text{ mA}$ , $V_{CE} = 5\text{ V}$ $I_C = 10\text{ mA}$ , $V_{CE} = 5\text{ V}$	$V_{BE(ON)}$	600 -	650 -	750 820	

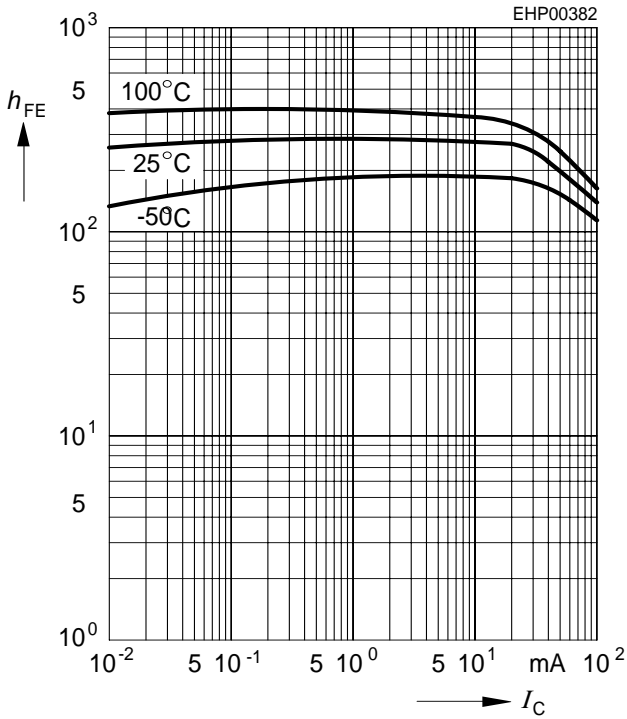
<sup>1)</sup>Pulse test:  $t < 300\mu\text{s}$ ;  $D < 2\%$

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

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
<b>AC Characteristics</b>					
Transition frequency $I_C = 20\text{ mA}$ , $V_{CE} = 5\text{ V}$ , $f = 100\text{ MHz}$	$f_T$	-	250	-	MHz
Collector-base capacitance $V_{CB} = 10\text{ V}$ , $f = 1\text{ MHz}$	$C_{cb}$	-	1.5	-	pF
Emitter-base capacitance $V_{EB} = 0.5\text{ V}$ , $f = 1\text{ MHz}$	$C_{eb}$	-	8	-	
Short-circuit input impedance $I_C = 2\text{ mA}$ , $V_{CE} = 5\text{ V}$ , $f = 1\text{ kHz}$ , $h_{FE}\text{-grp.A}$ $I_C = 2\text{ mA}$ , $V_{CE} = 5\text{ V}$ , $f = 1\text{ kHz}$ , $h_{FE}\text{-grp.B}$ $I_C = 2\text{ mA}$ , $V_{CE} = 5\text{ V}$ , $f = 1\text{ kHz}$ , $h_{FE}\text{-grp.C}$	$h_{11e}$	-	2.7 4.5 8.7	-	k $\Omega$
Open-circuit reverse voltage transf. ratio $I_C = 2\text{ mA}$ , $V_{CE} = 5\text{ V}$ , $f = 1\text{ kHz}$ , $h_{FE}\text{-grp.A}$ $I_C = 2\text{ mA}$ , $V_{CE} = 5\text{ V}$ , $f = 1\text{ kHz}$ , $h_{FE}\text{-grp.B}$ $I_C = 2\text{ mA}$ , $V_{CE} = 5\text{ V}$ , $f = 1\text{ kHz}$ , $h_{FE}\text{-grp.C}$	$h_{12e}$	-	1.5 2 3	-	$10^{-4}$
Short-circuit forward current transf. ratio $I_C = 2\text{ mA}$ , $V_{CE} = 5\text{ V}$ , $f = 1\text{ kHz}$ , $h_{FE}\text{-grp.A}$ $I_C = 2\text{ mA}$ , $V_{CE} = 5\text{ V}$ , $f = 1\text{ kHz}$ , $h_{FE}\text{-grp.B}$ $I_C = 2\text{ mA}$ , $V_{CE} = 5\text{ V}$ , $f = 1\text{ kHz}$ , $h_{FE}\text{-grp.C}$	$h_{21e}$	-	200 330 600	-	-
Open-circuit output admittance $I_C = 2\text{ mA}$ , $V_{CE} = 5\text{ V}$ , $f = 1\text{ kHz}$ , $h_{FE}\text{-grp.A}$ $I_C = 2\text{ mA}$ , $V_{CE} = 5\text{ V}$ , $f = 1\text{ kHz}$ , $h_{FE}\text{-grp.B}$ $I_C = 2\text{ mA}$ , $V_{CE} = 5\text{ V}$ , $f = 1\text{ kHz}$ , $h_{FE}\text{-grp.C}$	$h_{22e}$	-	18 30 60	-	$\infty\text{ S}$
Noise figure $I_C = 0.2\text{ mA}$ , $V_{CE} = 5\text{ V}$ , $f = 1\text{ kHz}$ , <b>D</b> $f = 200\text{ Hz}$ , $R_S = 2\text{ k}\Omega$ , BC859, BC850	$F$	-	1	4	dB
Equivalent noise voltage $I_C = 200\text{ mA}$ , $V_{CE} = 5\text{ V}$ , $R_S = 2\text{ k}\Omega$ , $f = 10\text{...}50\text{ Hz}$ , BC860	$V_n$	-	-	0.11	$\mu\text{V}$

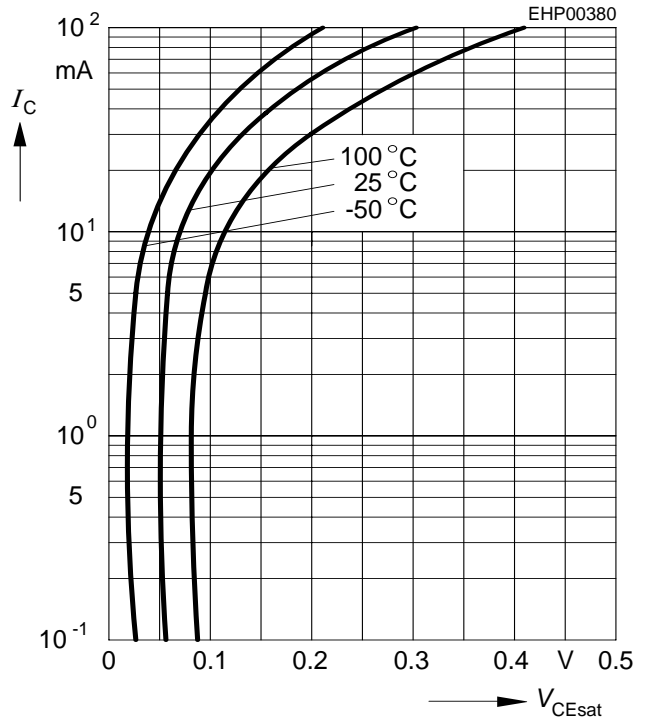
**DC current gain  $h_{FE} = f(I_C)$**

$V_{CE} = 1\text{ V}$



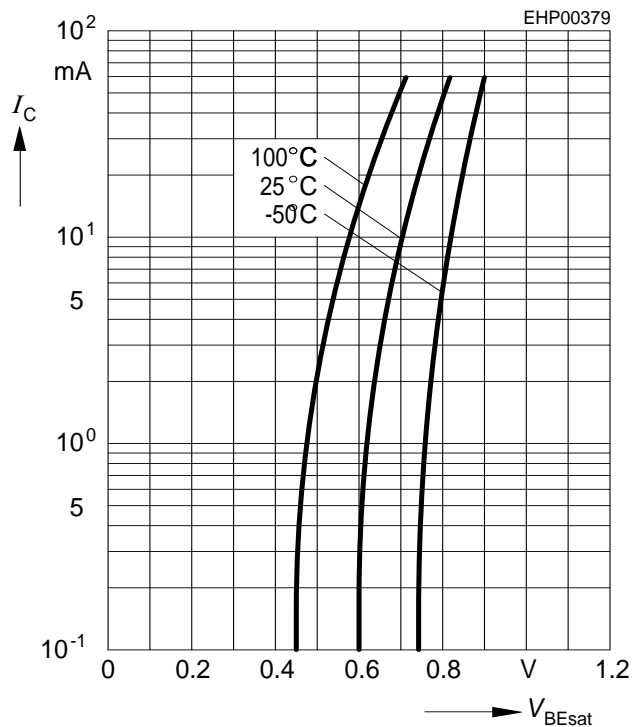
**Collector-emitter saturation voltage**

$I_C = f(V_{CEsat}), h_{FE} = 20$



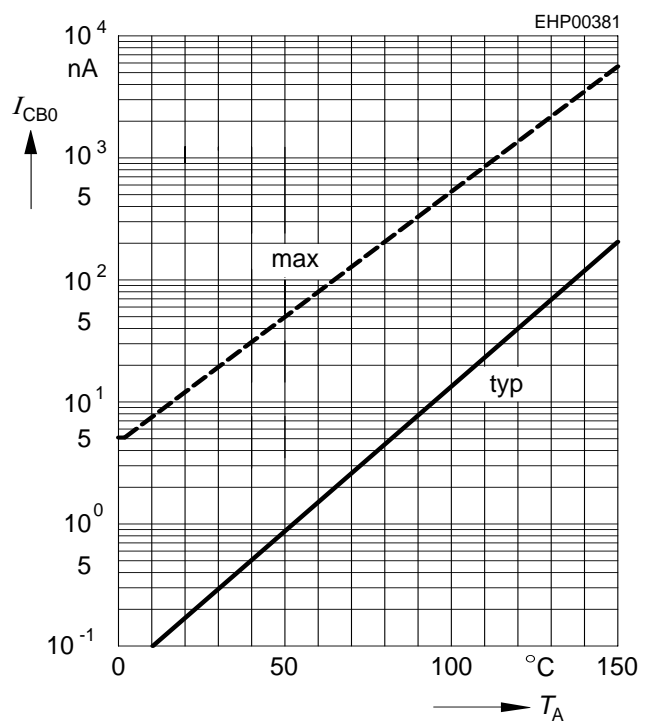
**Base-emitter saturation voltage**

$I_C = f(V_{BEsat}), h_{FE} = 20$



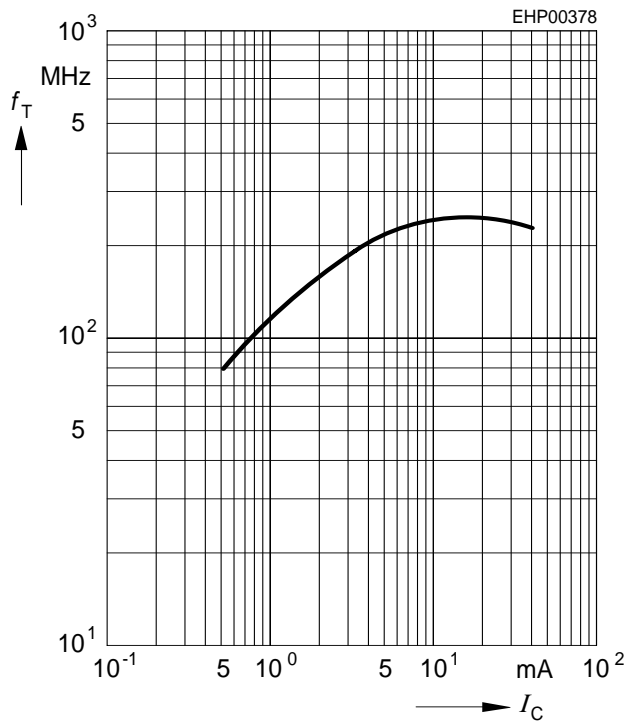
**Collector cutoff current  $I_{CBO} = f(T_A)$**

$V_{CBO} = 30\text{ V}$



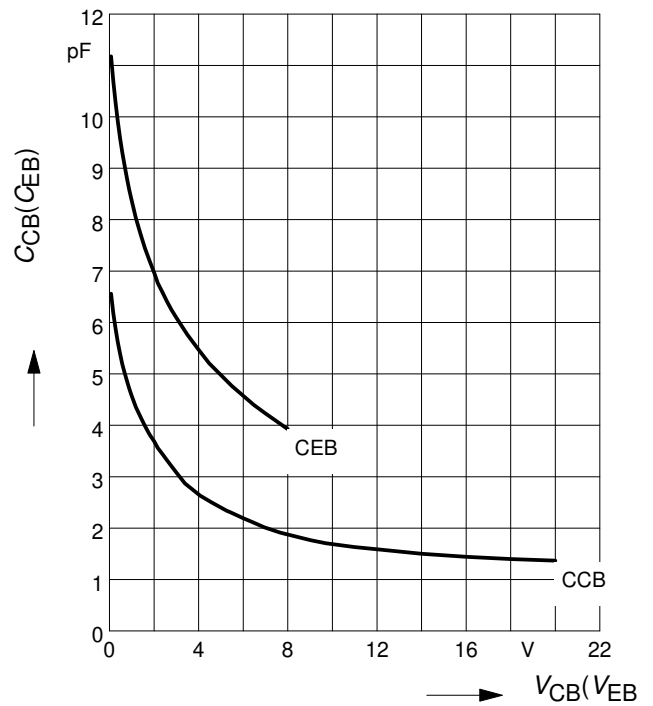
Transition frequency  $f_T = f(I_C)$

$V_{CE} = 5\text{ V}$



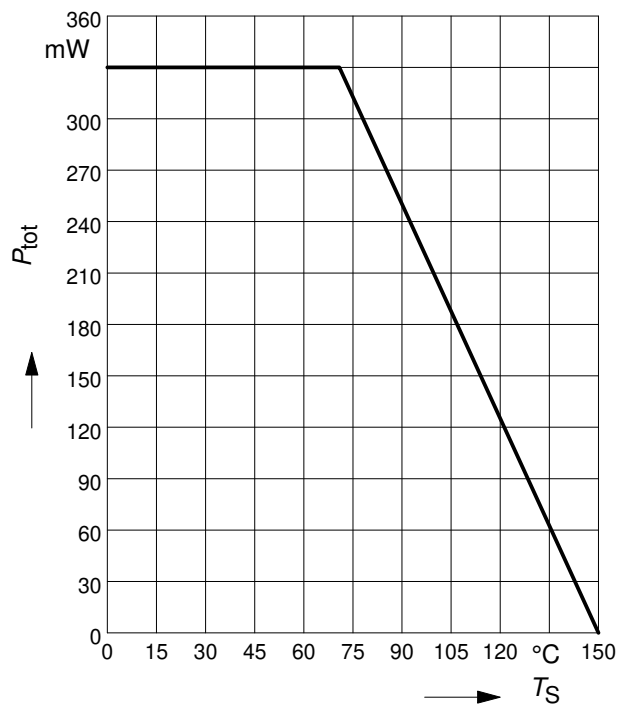
Collector-base capacitance  $C_{cb} = f(V_{CB})$

Emitter-base capacitance  $C_{eb} = f(V_{EB})$



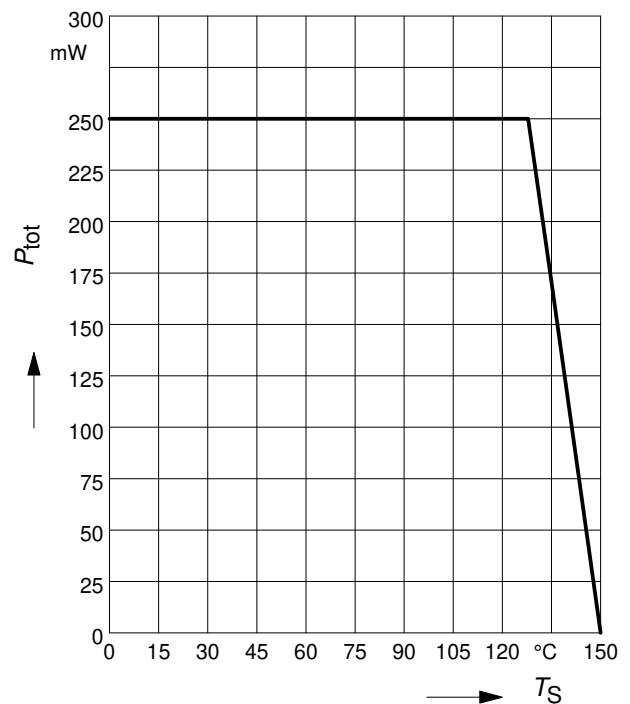
Total power dissipation  $P_{tot} = f(T_S)$

BC856-BC860



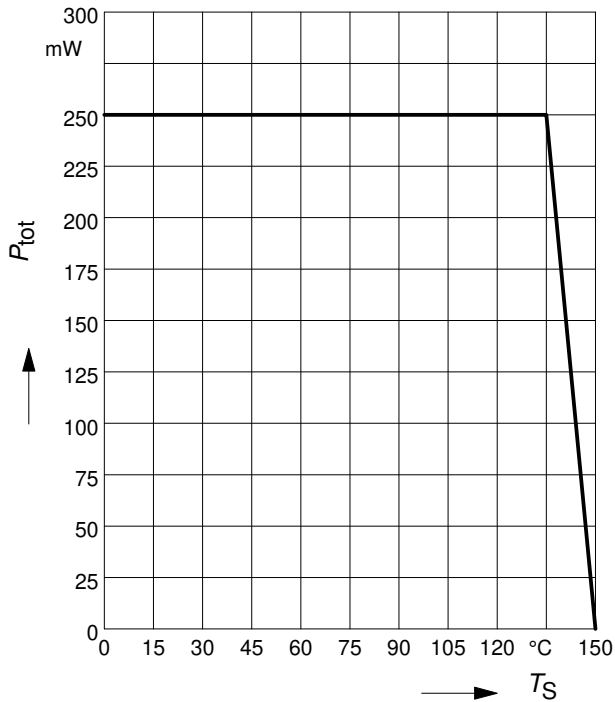
Total power dissipation  $P_{tot} = f(T_S)$

BC857BF, BC858BF



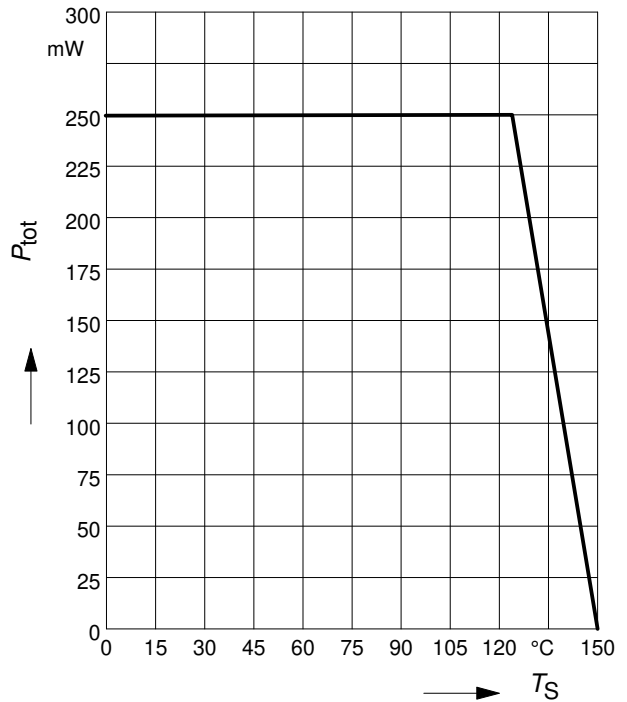
**Total power dissipation  $P_{tot} = f(T_S)$**

BC857BL3, BC858BL3



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

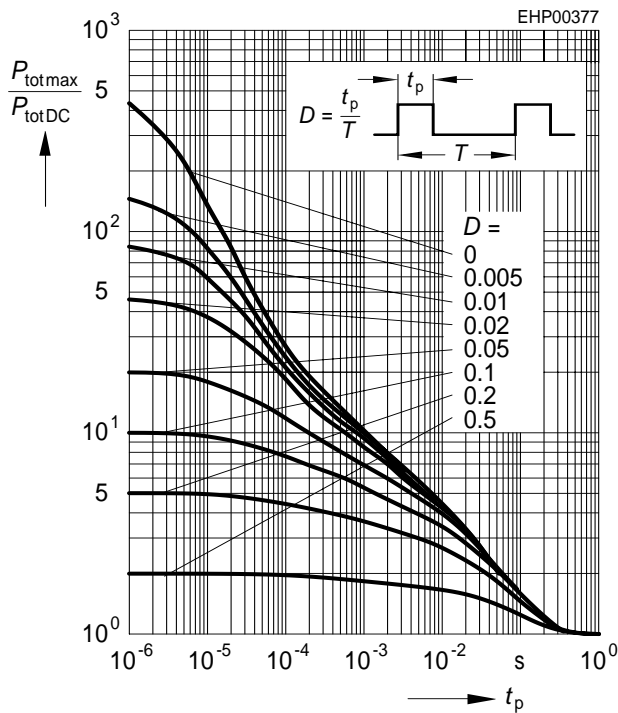
BC856W-BC860W



**Permissible Pulse Load**

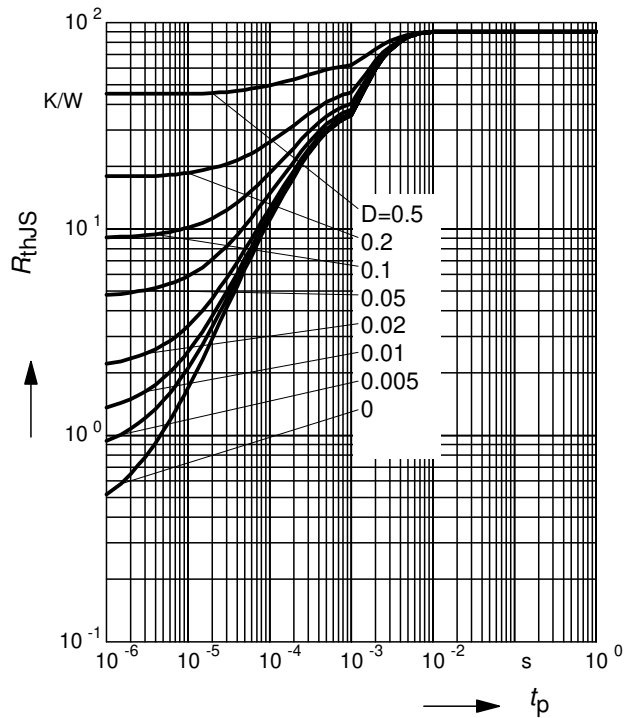
$P_{totmax}/P_{totDC} = f(t_p)$

BC856/W-BC860/W



**Permissible Puls Load  $R_{thJS} = f(t_p)$**

BC857BF, BC858BF

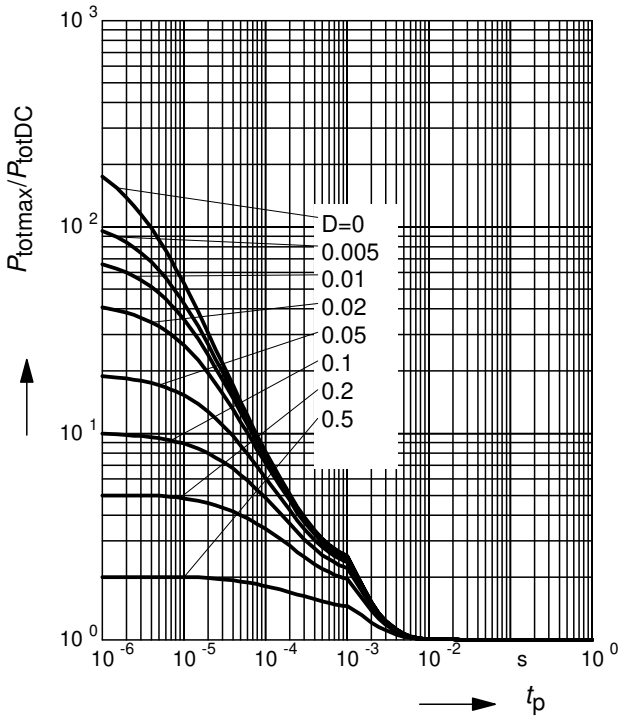




**Permissible Pulse Load**

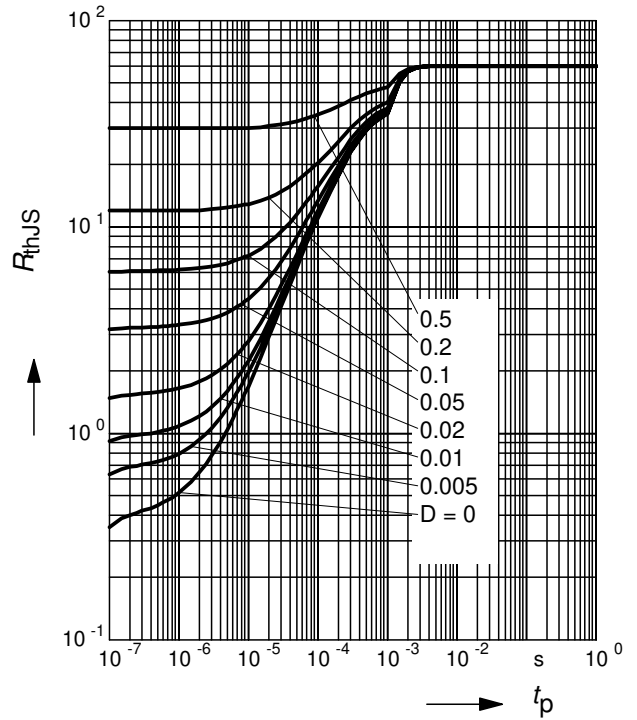
$$P_{\text{totmax}}/P_{\text{totDC}} = f(t_p)$$

BC857BF, BC858BF



**Permissible Puls Load  $R_{\text{thJS}} = f(t_p)$**

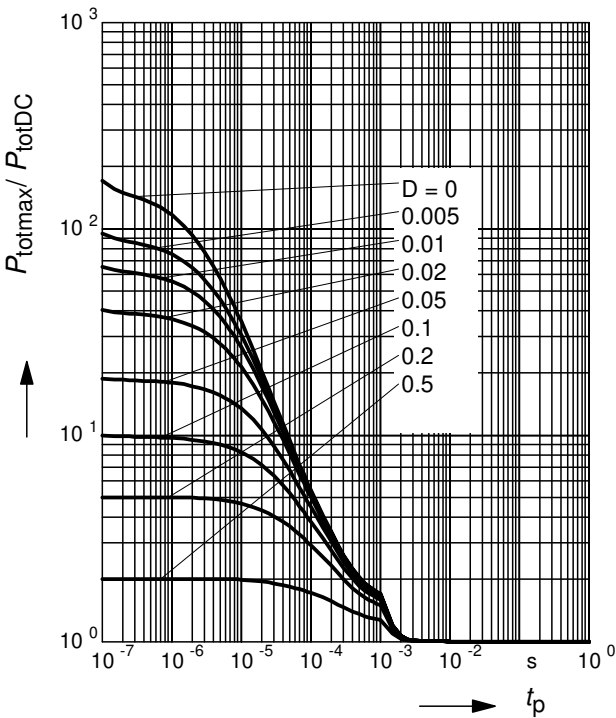
BC857BL3, BC858BL3



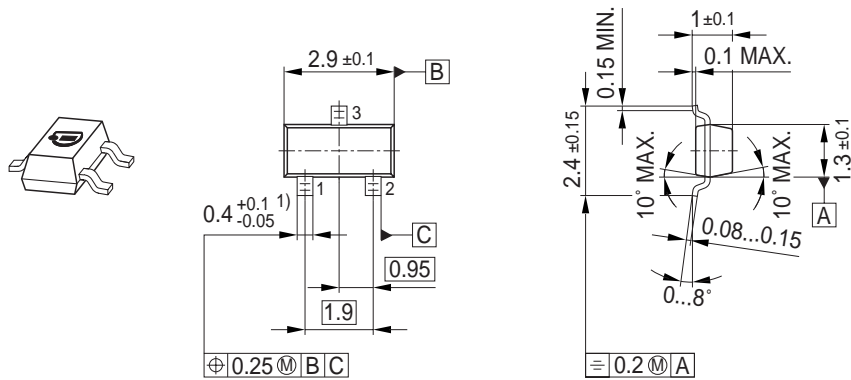
**Permissible Pulse Load**

$$P_{\text{totmax}}/P_{\text{totDC}} = f(t_p)$$

BC857BL3, BC858BL3

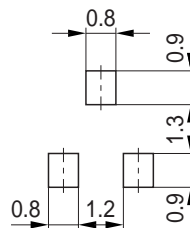


Package Outline

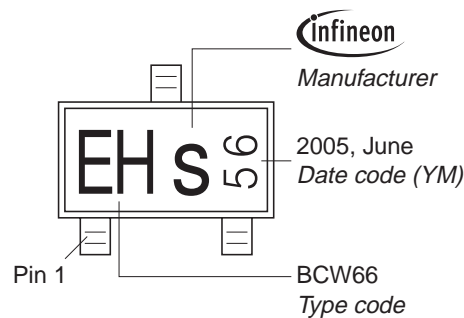


1) Lead width can be 0.6 max. in dambar area

Foot Print

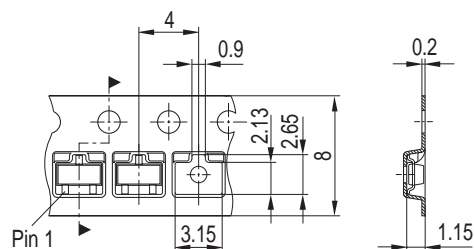


Marking Layout (Example)

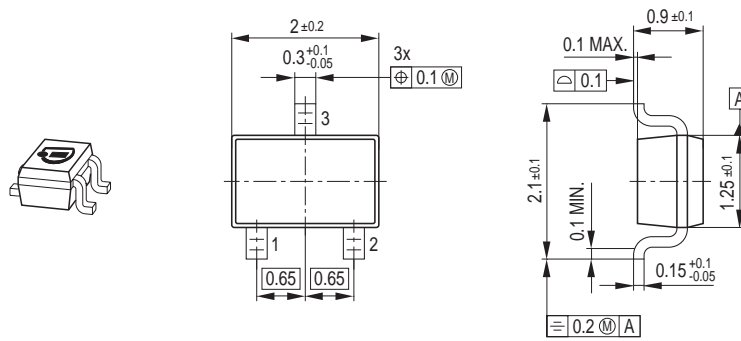


Standard Packing

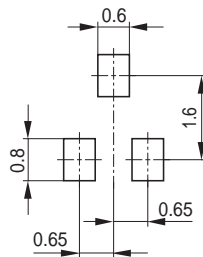
Reel  $\varnothing$ 180 mm = 3.000 Pieces/Reel  
 Reel  $\varnothing$ 330 mm = 10.000 Pieces/Reel



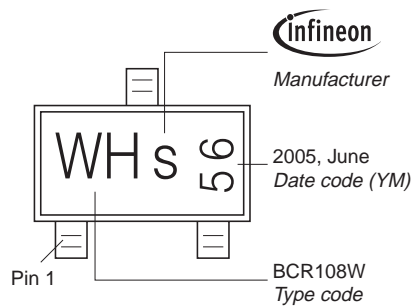
Package Outline



Foot Print

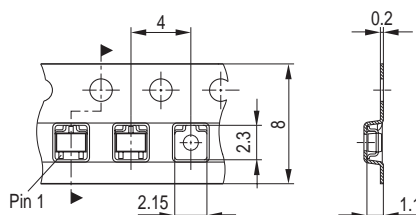


Marking Layout (Example)

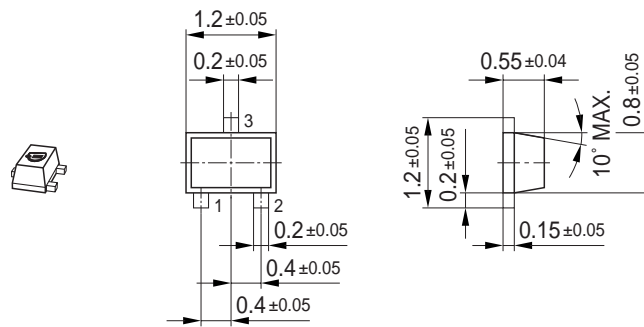


Standard Packing

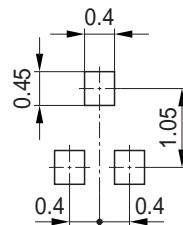
Reel ø180 mm = 3.000 Pieces/Reel  
 Reel ø330 mm = 10.000 Pieces/Reel



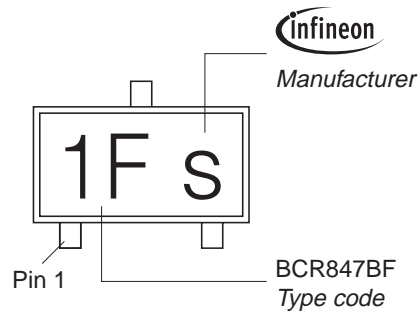
Package Outline



Foot Print

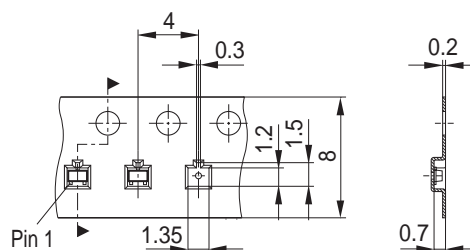


Marking Layout (Example)

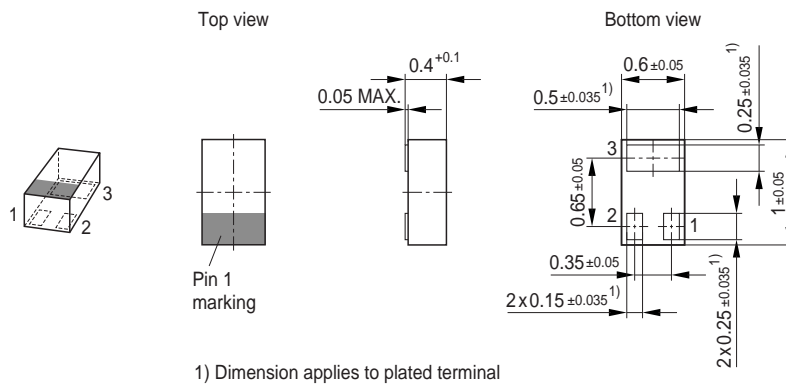


Standard Packing

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

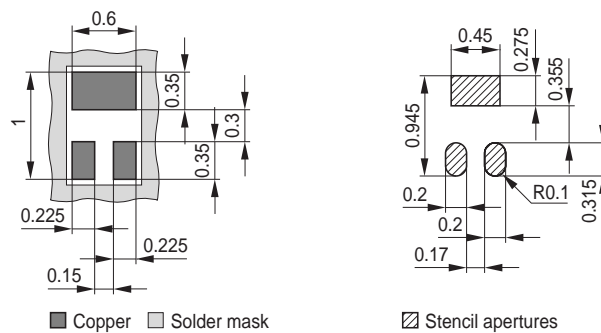


### Package Outline

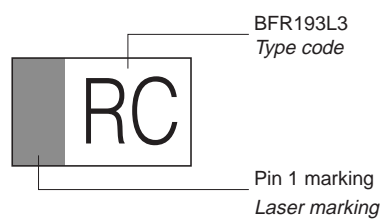


### Foot Print

For board assembly information please refer to Infineon website "Packages"

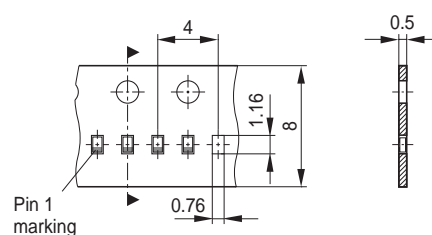


### Marking Layout (Example)



### Standard Packing

Reel ø180 mm = 15.000 Pieces/Reel



Edition 2006-02-01

Published by

Infineon Technologies AG

81726 München, Germany

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