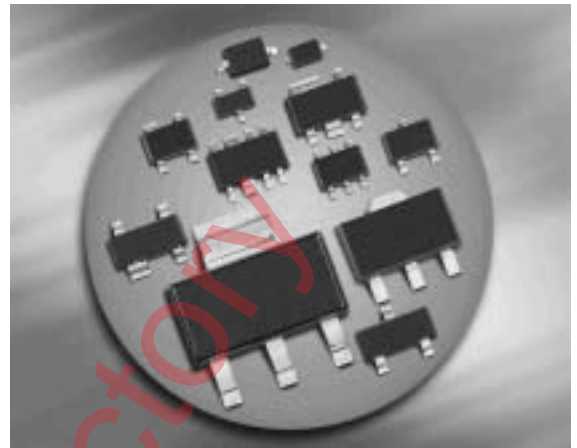


**NPN Silicon AF Transistors**

- 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:  
BC856...-BC860...(PNP)
- Pb-free (RoHS compliant) package<sup>1)</sup>
- Qualified according AEC Q101



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

[www.datasheet.directory](http://www.datasheet.directory)

Type	Marking	Pin Configuration						Package
		1=B	2=E	3=C	-	-	-	
BC846A	1As	1=B	2=E	3=C	-	-	-	SOT23
BC846B	1Bs	1=B	2=E	3=C	-	-	-	SOT23
BC846BW	1Bs	1=B	2=E	3=C	-	-	-	SOT323
BC847A	1Es	1=B	2=E	3=C	-	-	-	SOT23
BC847B	1Fs	1=B	2=E	3=C	-	-	-	SOT23
BC847BF	1Fs	1=B	2=E	3=C	-	-	-	TSFP-3
BC847BL3	1F	1=B	2=E	3=C	-	-	-	TSLP-3-1
BC847BT	1F	1=B	2=E	3=C	-	-	-	SC75
BC847BW	1Fs	1=B	2=E	3=C	-	-	-	SOT323
BC847C	1Gs	1=B	2=E	3=C	-	-	-	SOT23
BC847CW	1Gs	1=B	2=E	3=C	-	-	-	SOT323
BC848A	1Js	1=B	2=E	3=C	-	-	-	SOT23
BC848AW	1Js	1=B	2=E	3=C	-	-	-	SOT323
BC848B	1Ks	1=B	2=E	3=C	-	-	-	SOT23
BC848BF	1Ks	1=B	2=E	3=C	-	-	-	TSFP-3
BC848BL3	1K	1=B	2=E	3=C	-	-	-	TSLP-3-1
BC848BW	1Ks	1=B	2=E	3=C	-	-	-	SOT323
BC848C	1Ls	1=B	2=E	3=C	-	-	-	SOT23
BC848CW	1Ls	1=B	2=E	3=C	-	-	-	SOT323
BC849B	2Bs	1=B	2=E	3=C	-	-	-	SOT23
BC849BF	2Bs	1=B	2=E	3=C	-	-	-	TSFP-3
BC849C	2Cs	1=B	2=E	3=C	-	-	-	SOT23
BC849CW	2Cs	1=B	2=E	3=C	-	-	-	SOT323
BC850B	2Fs	1=B	2=E	3=C	-	-	-	SOT23
BF850BF	2Fs	1=B	2=E	3=C	-	-	-	TSFP-3
BC850BW	2Fs	1=B	2=E	3=C	-	-	-	SOT323
BC850C	2Gs	1=B	2=E	3=C	-	-	-	SOT23
BC850CW	2Gs	1=B	2=E	3=C	-	-	-	SOT323

**Maximum Ratings**

Parameter	Symbol	Value	Unit
Collector-emitter voltage BC846... BC847..., BC850... BC848..., BC849...	$V_{CEO}$	65 45 30	V
Collector-emitter voltage BC846... BC847..., BC850... BC848..., BC849...	$V_{CES}$	80 50 30	
Collector-base voltage BC846... BC847..., BC850... BC848..., BC849...	$V_{CBO}$	80 50 30	
Emitter-base voltage BC846... BC847..., BC850... BC848..., BC849...	$V_{EBO}$	6 6 6	
Collector current	$I_C$	100	mA
Peak collector current	$I_{CM}$	200	
Total power dissipation- $T_S \leq 71\text{ °C}$ , BC846-BC850 $T_S \leq 128\text{ °C}$ , BC847F-BC850F $T_S \leq 135\text{ °C}$ , BC847L3-BC848L3 $T_S \leq 109\text{ °C}$ , BC847T $T_S \leq 124\text{ °C}$ , BC846W-BC850W	$P_{tot}$	330 250 250 250 250	mW
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
BC846-BC850		≤ 240	
BC847F-BC850F		≤ 90	
BC847L3-BC848L3		≤ 60	
BC847T		≤ 165	
BC846W-BC850W		≤ 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 $I_C = 10\text{ mA}$ , $I_B = 0$ , BC846... $I_C = 10\text{ mA}$ , $I_B = 0$ , BC847..., BC850... $I_C = 10\text{ mA}$ , $I_B = 0$ , BC848..., BC849...	$V_{(BR)CEO}$	65 45 30	- - -	- - -	V
Collector-base breakdown voltage $I_C = 10\text{ }\mu\text{A}$ , $I_E = 0$ , BC846... $I_C = 10\text{ }\mu\text{A}$ , $I_E = 0$ , BC847..., BC850... $I_C = 10\text{ }\mu\text{A}$ , $I_E = 0$ , BC848..., BC849...	$V_{(BR)CBO}$	80 50 30	- - -	- - -	
Emitter-base breakdown voltage $I_E = 0$ , $I_C = 10\text{ }\mu\text{A}$	$V_{(BR)EBO}$	-	6	-	
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	$h_{FE}$	- - - 110 200 420	140 250 480 180 290 520	- - - 220 450 800	-
Collector-emitter saturation voltage <sup>1)</sup> $I_C = 10\text{ mA}$ , $I_B = 0.5\text{ mA}$ $I_C = 100\text{ mA}$ , $I_B = 5\text{ mA}$	$V_{CEsat}$	- -	90 200	250 600	mV
Base emitter saturation voltage <sup>1)</sup> $I_C = 10\text{ mA}$ , $I_B = 0.5\text{ mA}$ $I_C = 100\text{ mA}$ , $I_B = 5\text{ mA}$	$V_{BEsat}$	- -	700 900	- -	
Base-emitter voltage <sup>1)</sup> $I_C = 2\text{ mA}$ , $V_{CE} = 5\text{ V}$ $I_C = 10\text{ mA}$ , $V_{CE} = 5\text{ V}$	$V_{BE(ON)}$	580 -	660 -	700 770	

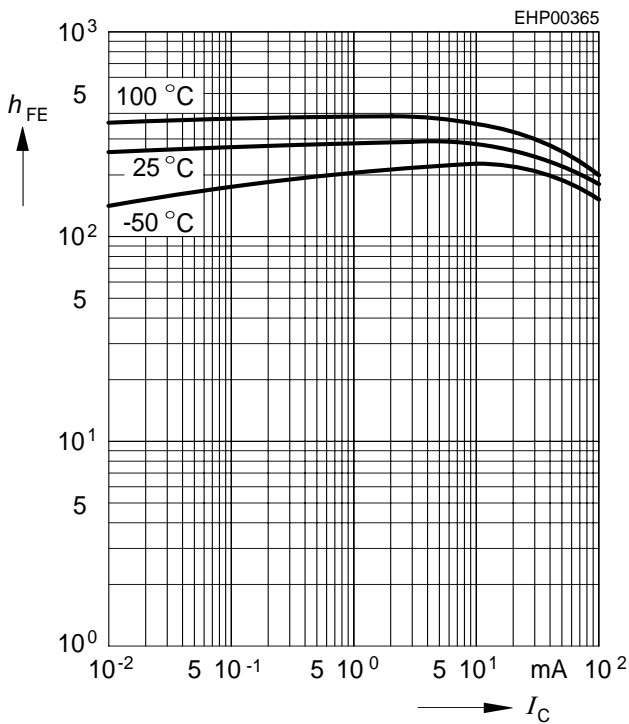
<sup>1)</sup>Pulse test:  $t < 300\mu\text{s}$ ;  $D < 2\%$

**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 $I_C = 10\text{ mA}$ , $V_{CE} = 5\text{ V}$ , $f = 100\text{ MHz}$	$f_T$	-	250	-	MHz	
Collector-base capacitance $V_{CB} = 10\text{ V}$ , $f = 1\text{ MHz}$	$C_{cb}$	-	0.95	-	pF	
Emitter-base capacitance $V_{EB} = 0.5\text{ V}$ , $f = 1\text{ MHz}$	$C_{eb}$	-	9	-		
Short-circuit input impedance $I_C = 2\text{ mA}$ , $V_{CE} = 5\text{ V}$ , $f = 1\text{ kHz}$ , $h_{FE}$ -grp.A $I_C = 2\text{ mA}$ , $V_{CE} = 5\text{ V}$ , $f = 1\text{ kHz}$ , $h_{FE}$ -grp.B $I_C = 2\text{ mA}$ , $V_{CE} = 5\text{ V}$ , $f = 1\text{ kHz}$ , $h_{FE}$ -grp.C	$h_{11e}$	-	2.7 4.5 8.7	-	k $\Omega$	
Open-circuit reverse voltage transf. ratio $I_C = 2\text{ mA}$ , $V_{CE} = 5\text{ V}$ , $f = 1\text{ kHz}$ , $h_{FE}$ -grp.A $I_C = 2\text{ mA}$ , $V_{CE} = 5\text{ V}$ , $f = 1\text{ kHz}$ , $h_{FE}$ -grp.B $I_C = 2\text{ mA}$ , $V_{CE} = 5\text{ V}$ , $f = 1\text{ kHz}$ , $h_{FE}$ -grp.C	$h_{12e}$	-	1.5 2 3	-		$10^{-4}$
Short-circuit forward current transf. ratio $I_C = 2\text{ mA}$ , $V_{CE} = 5\text{ V}$ , $f = 1\text{ kHz}$ , $h_{FE}$ -grp.A $I_C = 2\text{ mA}$ , $V_{CE} = 5\text{ V}$ , $f = 1\text{ kHz}$ , $h_{FE}$ -grp.B $I_C = 2\text{ mA}$ , $V_{CE} = 5\text{ V}$ , $f = 1\text{ kHz}$ , $h_{FE}$ -grp.C	$h_{21e}$	-	200 330 600	-		
Open-circuit output admittance $I_C = 2\text{ mA}$ , $V_{CE} = 5\text{ V}$ , $f = 1\text{ kHz}$ , $h_{FE}$ -grp.A $I_C = 2\text{ mA}$ , $V_{CE} = 5\text{ V}$ , $f = 1\text{ kHz}$ , $h_{FE}$ -grp.B $I_C = 2\text{ mA}$ , $V_{CE} = 5\text{ V}$ , $f = 1\text{ kHz}$ , $h_{FE}$ -grp.C	$h_{22e}$	-	18 30 60	-	$\mu\text{S}$	
Noise figure $I_C = 200\text{ }\mu\text{A}$ , $V_{CE} = 5\text{ V}$ , $f = 1\text{ kHz}$ , $\Delta f = 200\text{ Hz}$ , $R_S = 2\text{ k}\Omega$ , BC849..., BC850...	$F$	-	1.2	4	dB	
Equivalent noise voltage $I_C = 200\text{ }\mu\text{A}$ , $V_{CE} = 5\text{ V}$ , $R_S = 2\text{ k}\Omega$ , $f = 10 \dots 50\text{ Hz}$ , BC850...	$V_n$	-	-	0.135	$\mu\text{V}$	

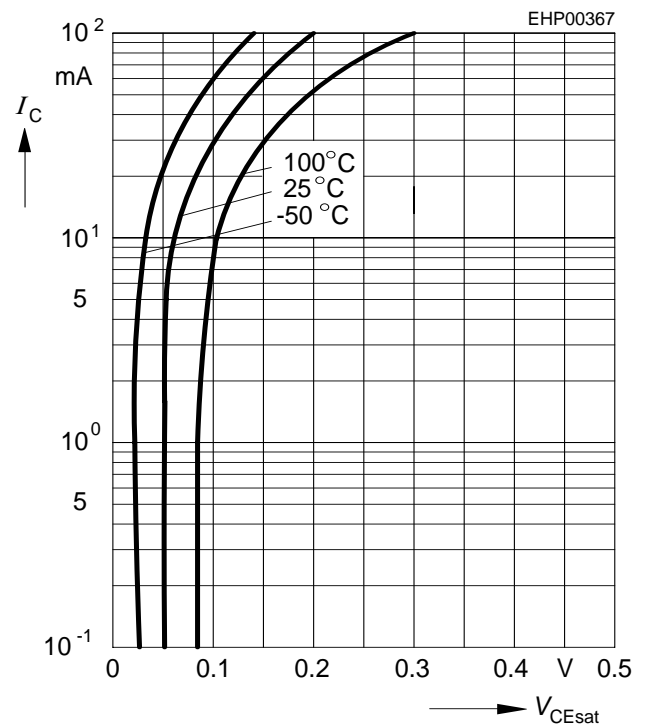
**DC current gain  $h_{FE} = f(I_C)$**

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



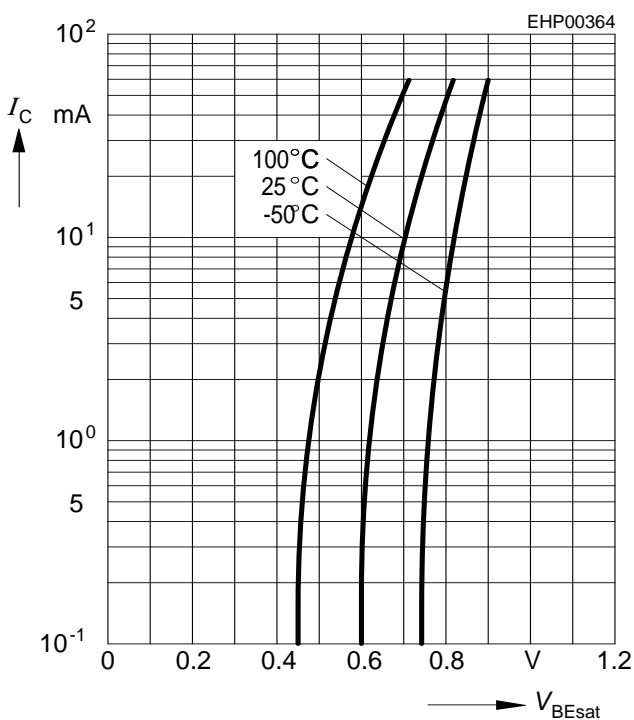
**Collector-emitter saturation voltage**

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



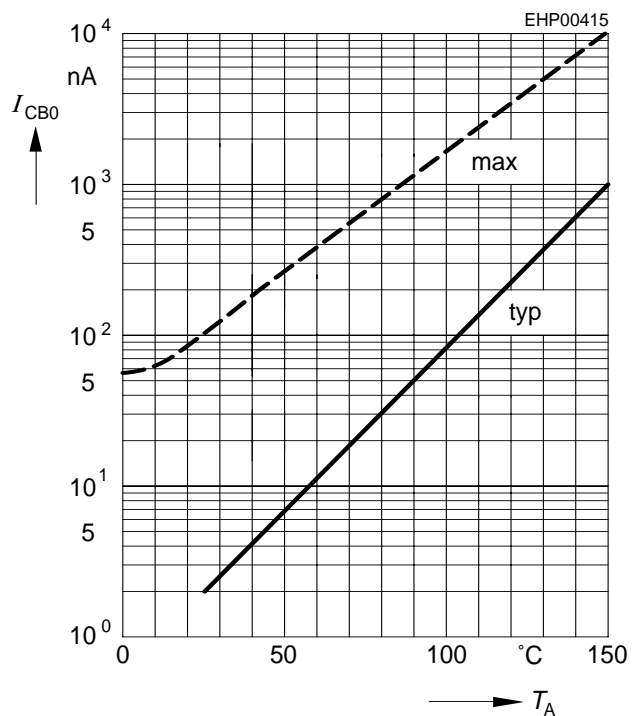
**Base-emitter saturation voltage**

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



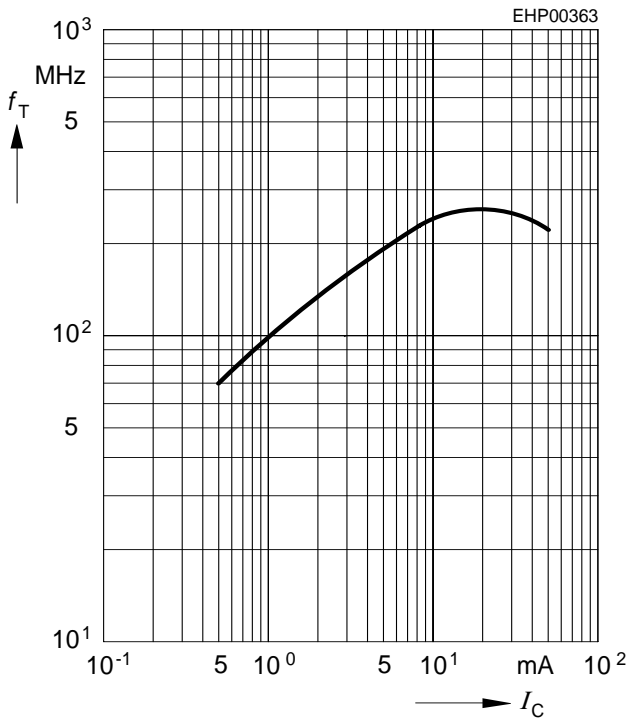
**Collector cutoff current  $I_{CBO} = f(T_A)$**

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



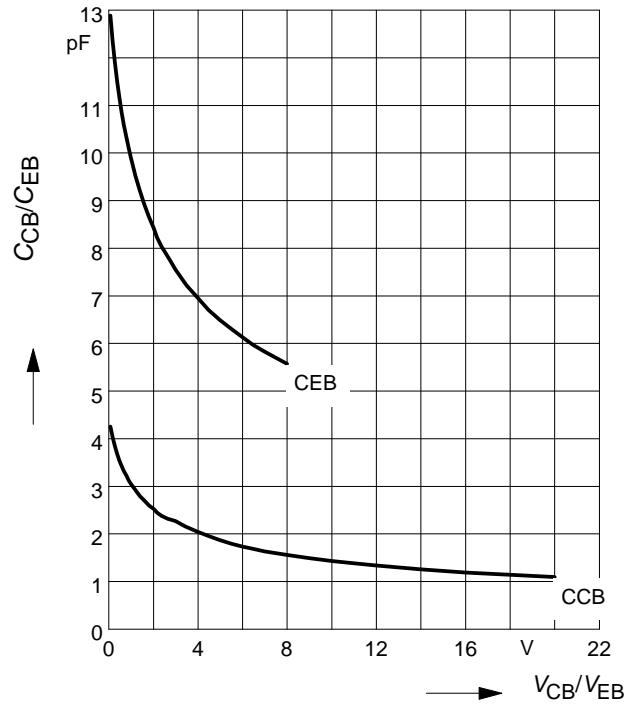
Transition frequency  $f_T = f(I_C)$

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



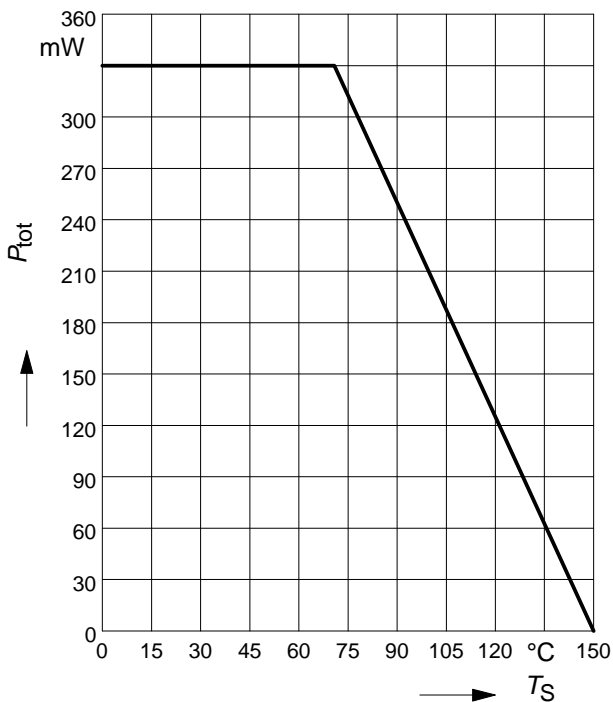
Collector-base capacitance  $C_{cb} = f(V_{CB})$

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



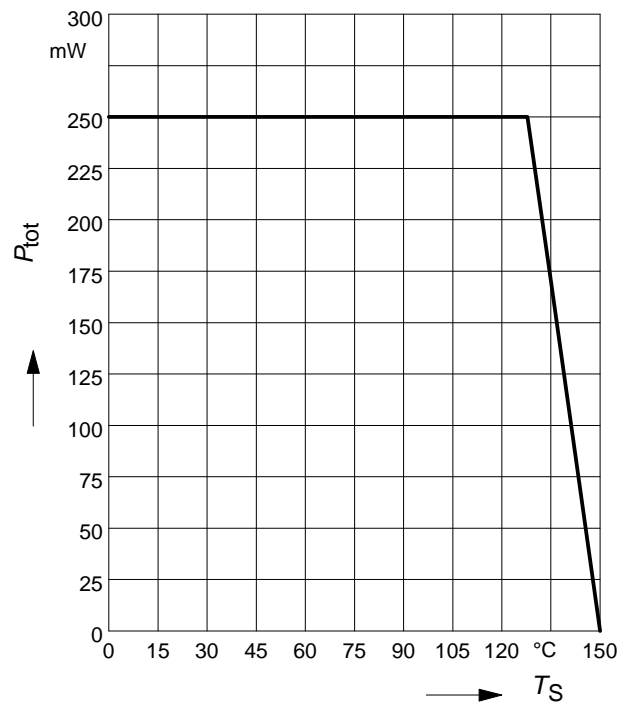
Total power dissipation  $P_{tot} = f(T_S)$

BC846-BC850



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

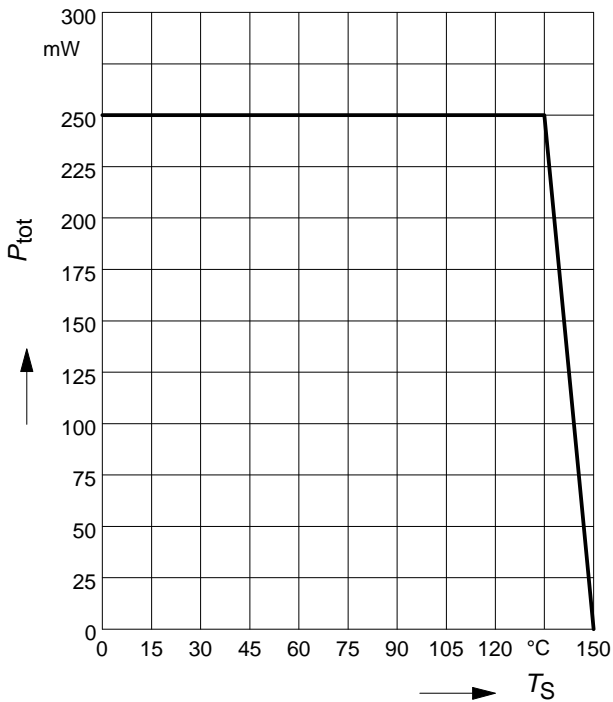
BC847BF-BC850BF





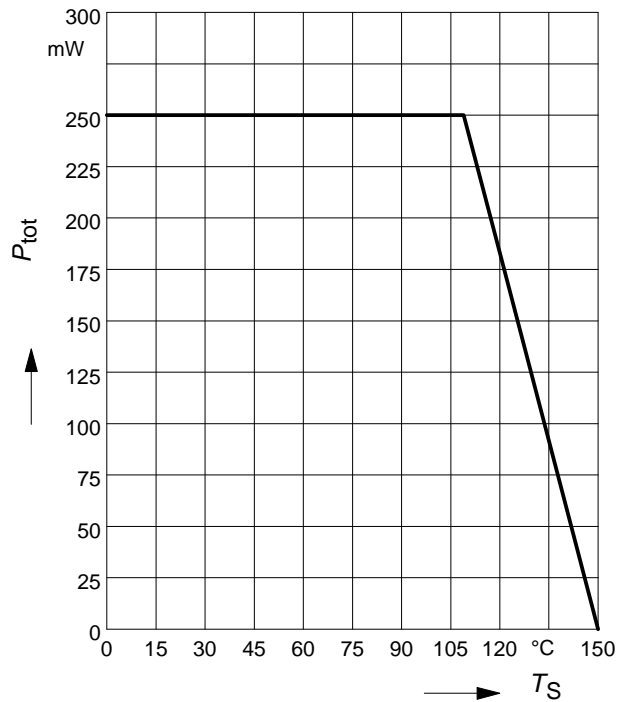
**Total power dissipation  $P_{tot} = f(T_S)$**

BC847BL3/BC848BL3



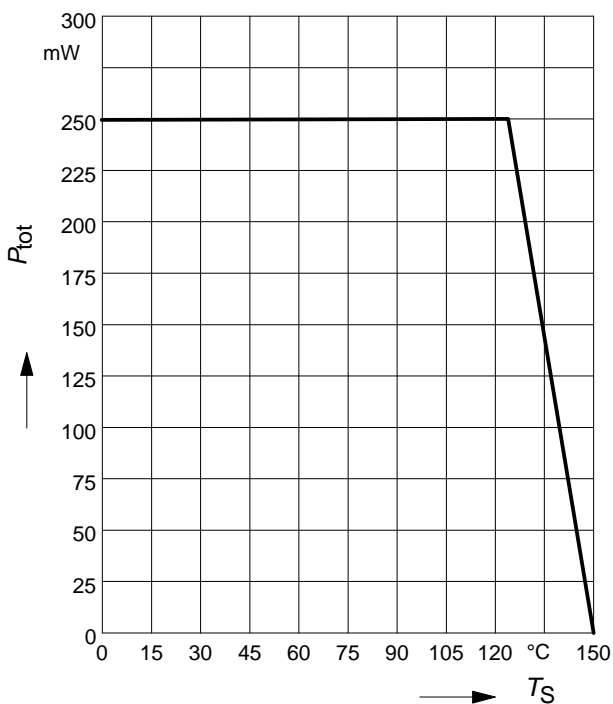
**Total power dissipation  $P_{tot} = f(T_S)$**

BC847BT



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

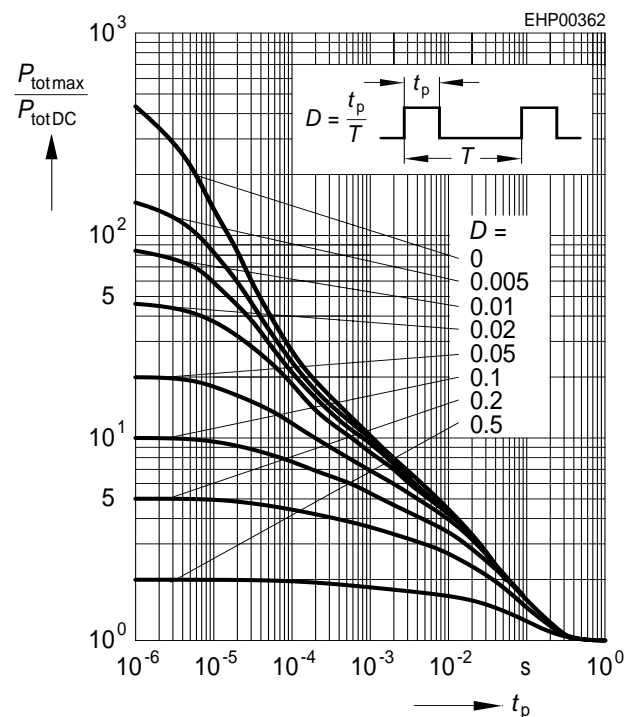
BC846W-BC850W



**Permissible Pulse Load**

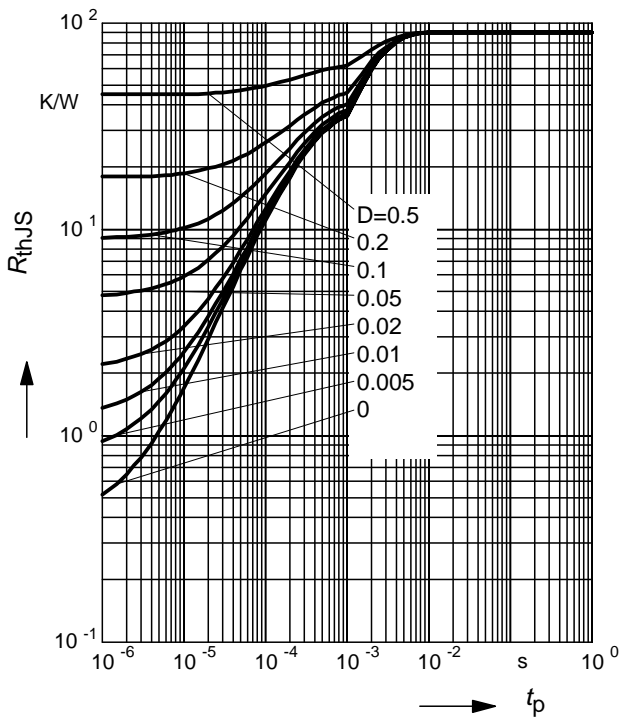
$P_{totmax}/P_{totDC} = f(t_p)$

BC846/W-BC850/W



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

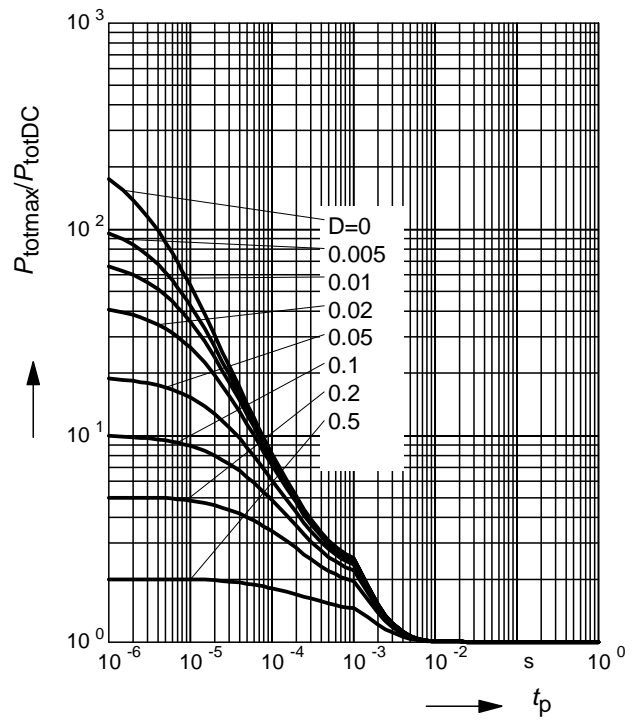
BC847BF-BC850BF



**Permissible Pulse Load**

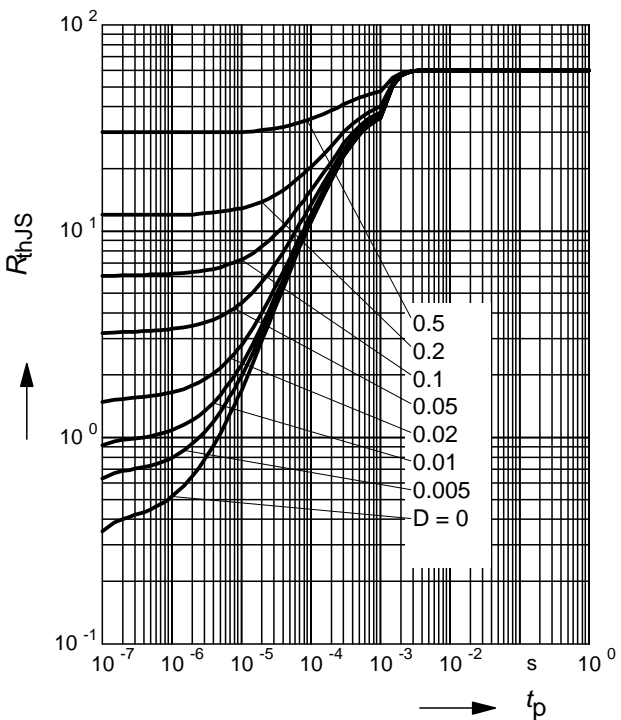
$P_{totmax}/P_{totDC} = f(t_p)$

BC847BF-BC850BF



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

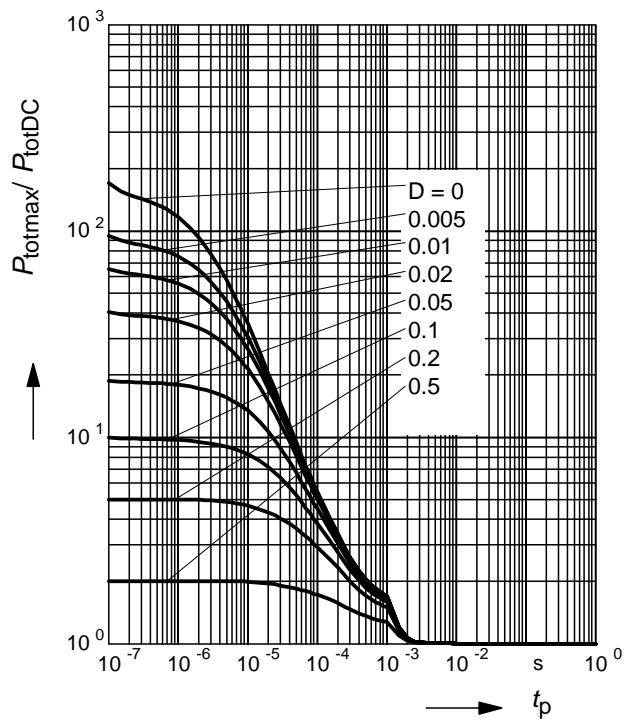
BC847BL3, BC848BL3



**Permissible Pulse Load**

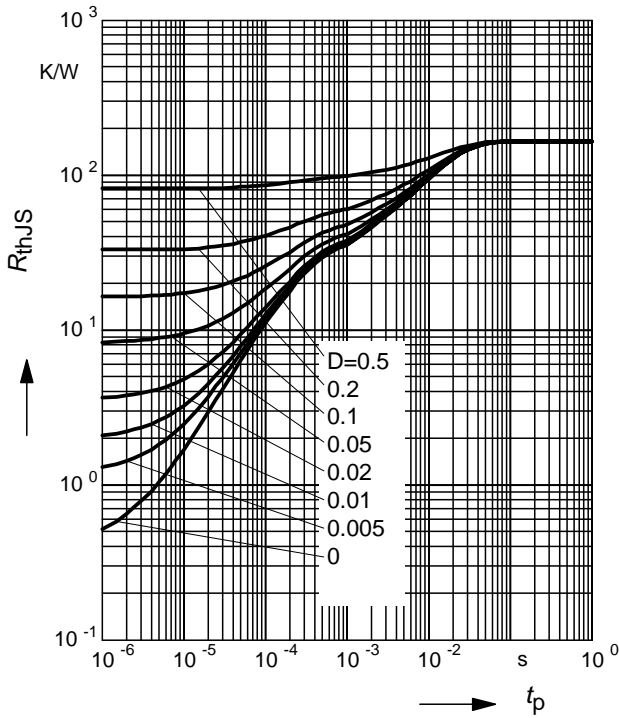
$P_{totmax}/P_{totDC} = f(t_p)$

BC847BL3, BC848BL3



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

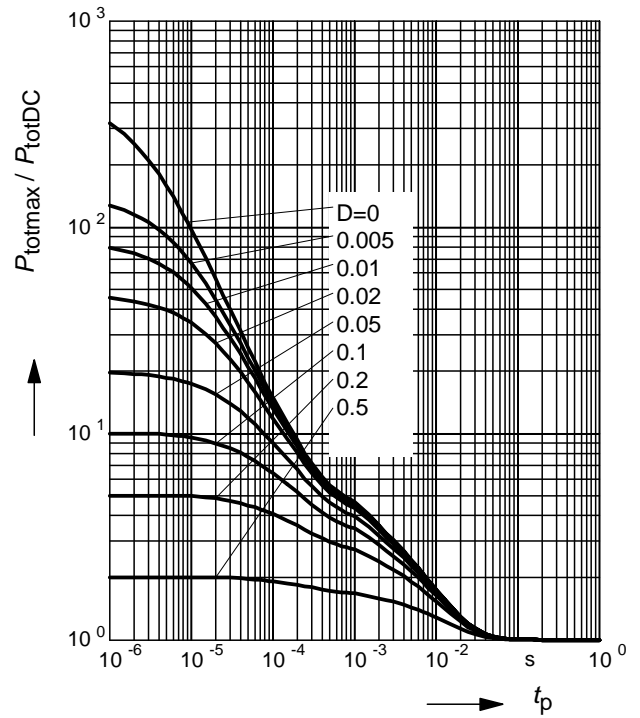
BC847BT



**Permissible Pulse Load**

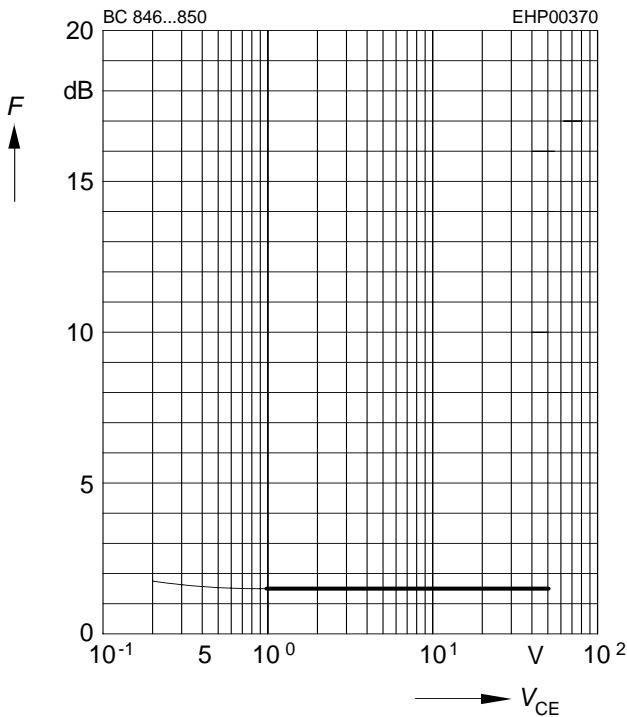
$P_{totmax}/P_{totDC} = f(t_p)$

BC847BT



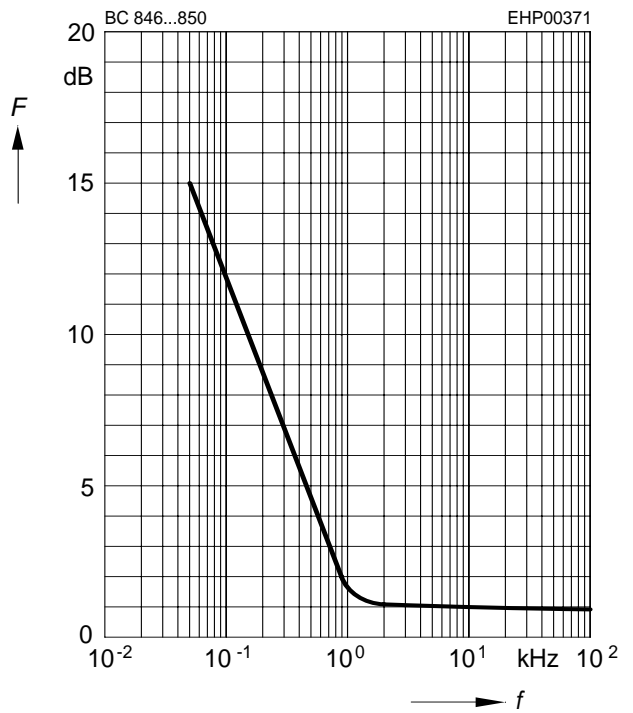
**Noise figure  $F = f(V_{CE})$**

$I_C = 0.2mA, R_S = 2k\Omega, f = 1kHz$



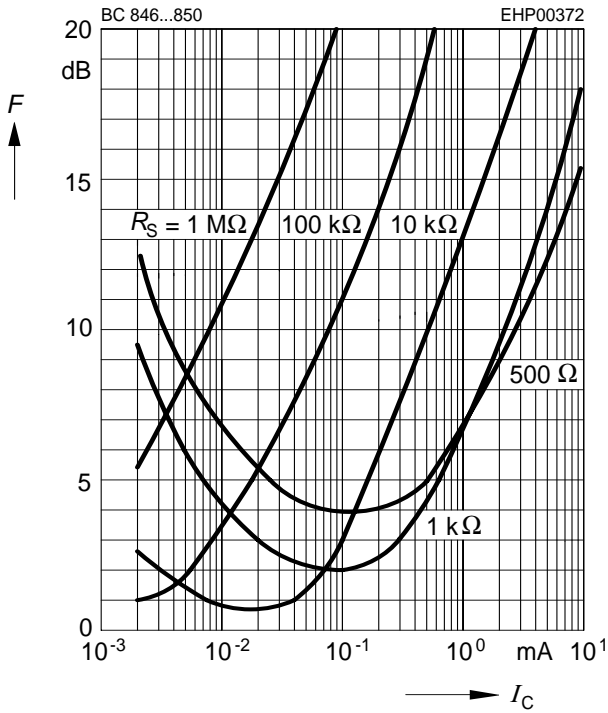
**Noise figure  $F = f(f)$**

$I_C = 0.2 mA, V_{CE} = 5V, R_S = 2 k\Omega$



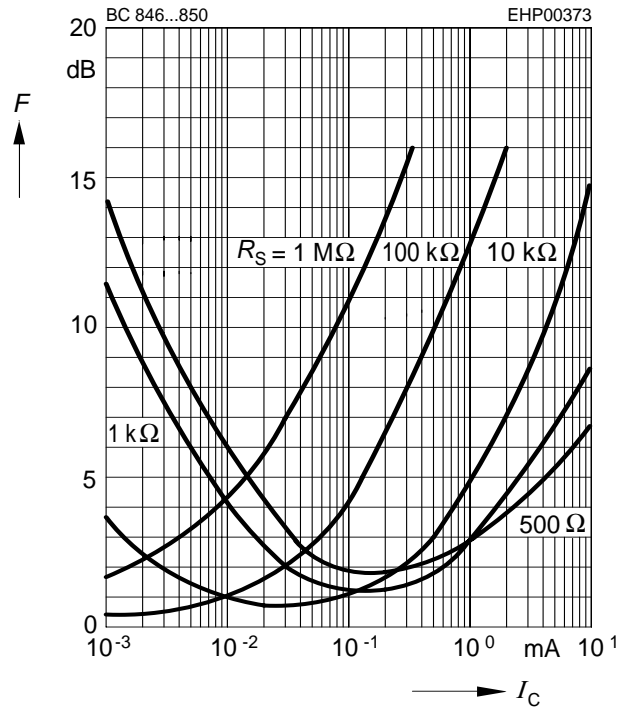
Noise figure  $F = f(I_C)$

$V_{CE} = 5V, f = 120Hz$



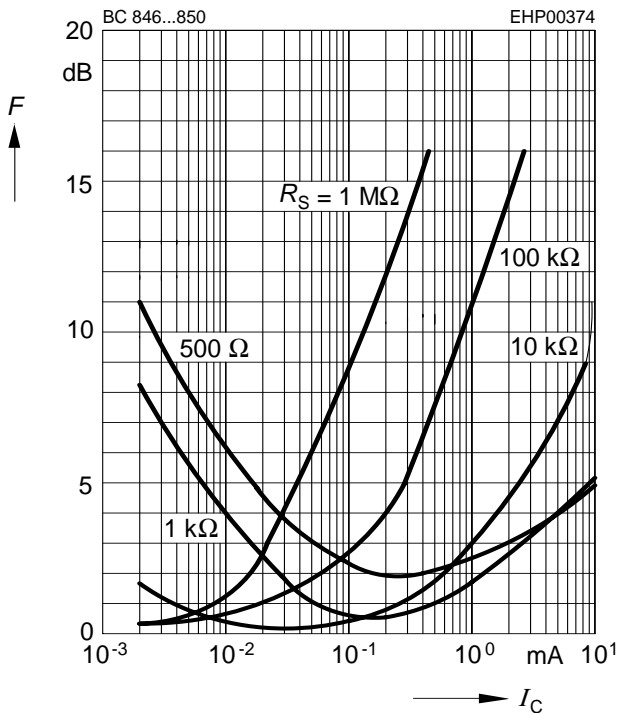
Noise figure  $F = f(I_C)$

$V_{CE} = 5V, f = 1kHz$

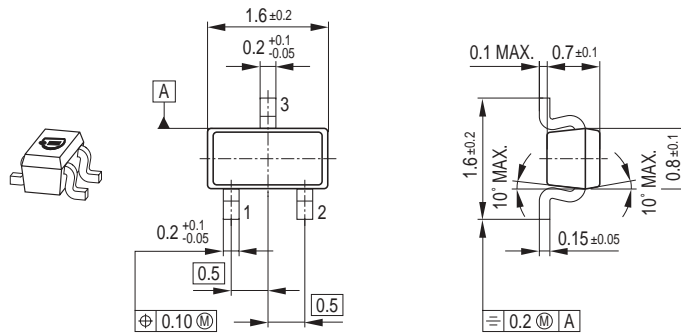


Noise figure  $F = f(I_C)$

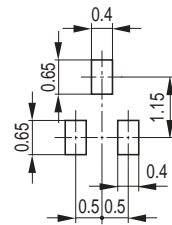
$V_{CE} = 5V, f = 10kHz$



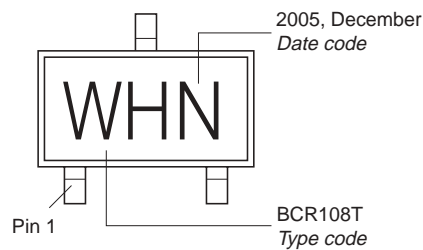
Package Outline



Foot Print

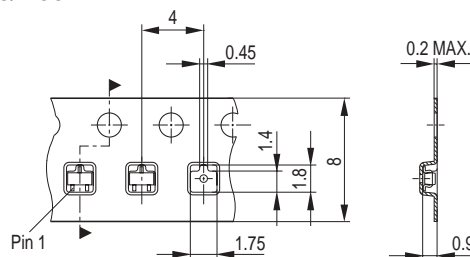


Marking Layout (Example)



Standard Packing

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

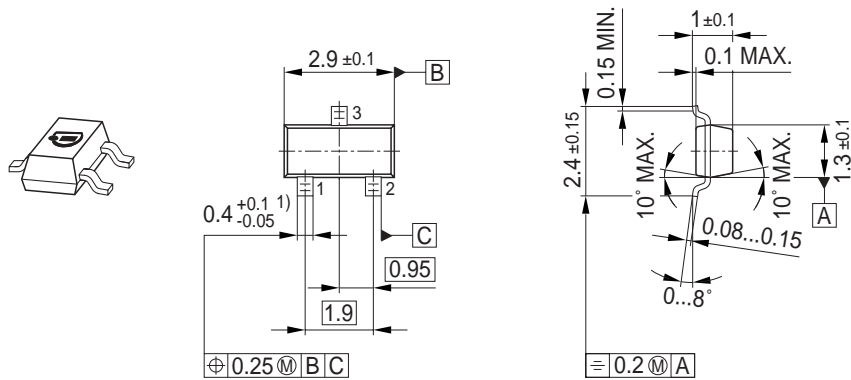


Date Code marking for discrete packages with one digit (SCD80, SC79, SC75<sup>1)</sup>) CES-Code

Month	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
01	a	p	A	P	a	p	A	P	a	p	A	P
02	b	q	B	Q	b	q	B	Q	b	q	B	Q
03	c	r	C	R	c	r	C	R	c	r	C	R
04	d	s	D	S	d	s	D	S	d	s	D	S
05	e	t	E	T	e	t	E	T	e	t	E	T
06	f	u	F	U	f	u	F	U	f	u	F	U
07	g	v	G	V	g	v	G	V	g	v	G	V
08	h	x	H	X	h	x	H	X	h	x	H	X
09	j	y	J	Y	j	y	J	Y	j	y	J	Y
10	k	z	K	Z	k	z	K	Z	k	z	K	Z
11	l	2	L	4	l	2	L	4	l	2	L	4
12	n	3	N	5	n	3	N	5	n	3	N	5

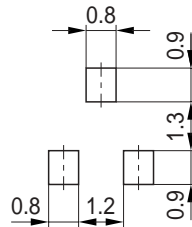
1) New Marking Layout for SC75, implemented at October 2005.

Package Outline

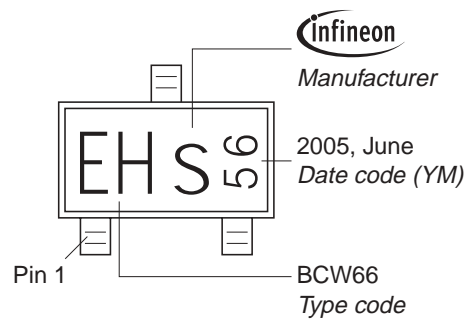


1) Lead width can be 0.6 max. in dambar area

Foot Print

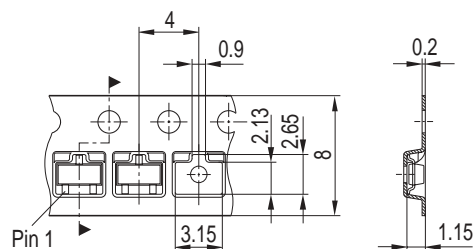


Marking Layout (Example)

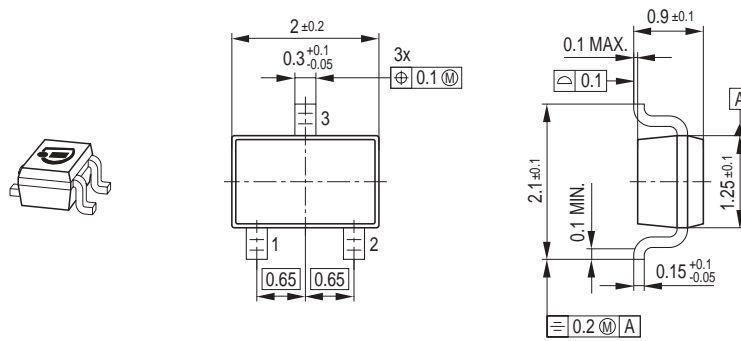


Standard Packing

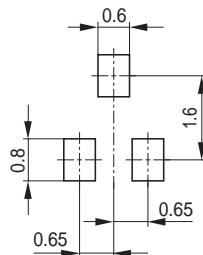
Reel  $\varnothing$ 180 mm = 3.000 Pieces/Reel  
 Reel  $\varnothing$ 330 mm = 10.000 Pieces/Reel



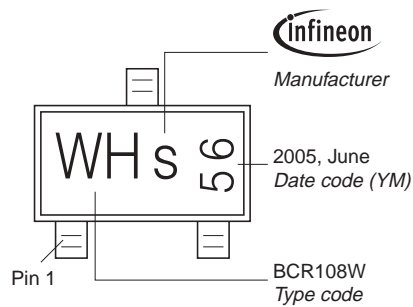
Package Outline



Foot Print

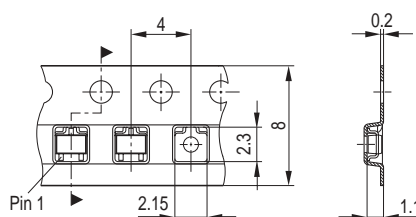


Marking Layout (Example)



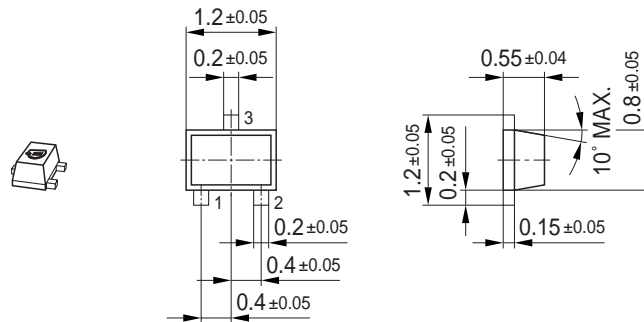
Standard Packing

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

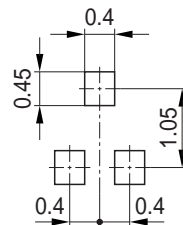




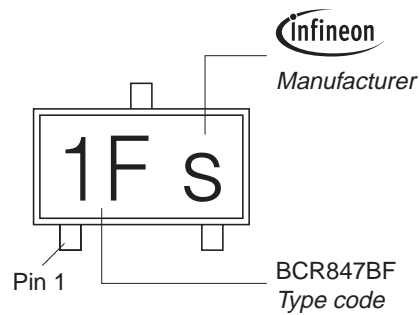
Package Outline



Foot Print

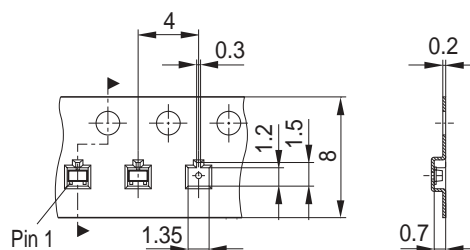


Marking Layout (Example)

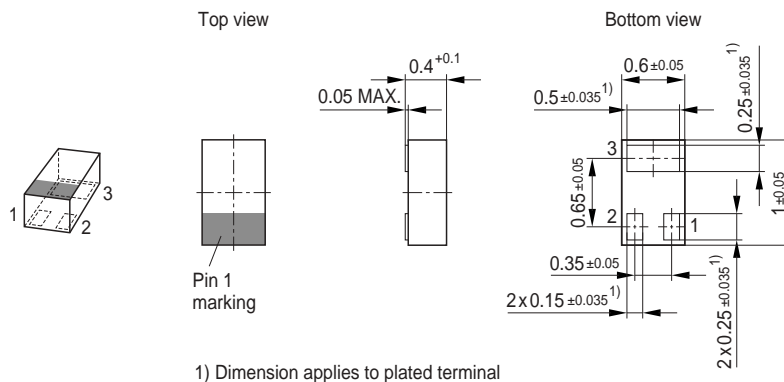


Standard Packing

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

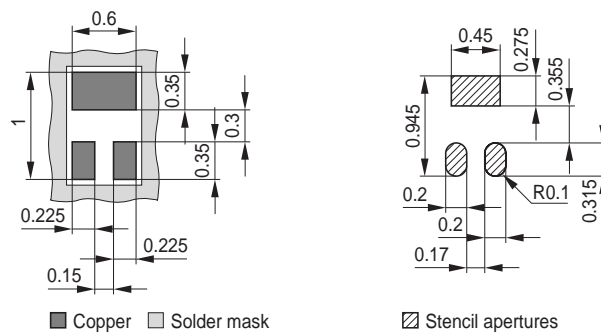


### Package Outline

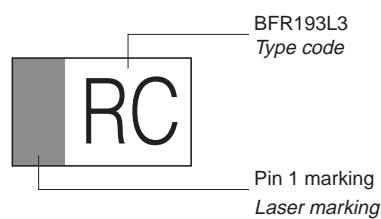


### Foot Print

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

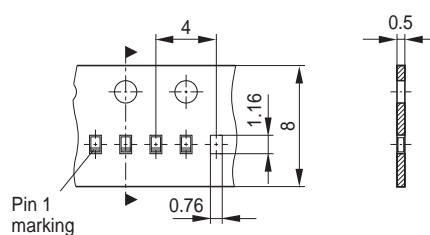


### Marking Layout (Example)



### Standard Packing

Reel ø180 mm = 15.000 Pieces/Reel



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