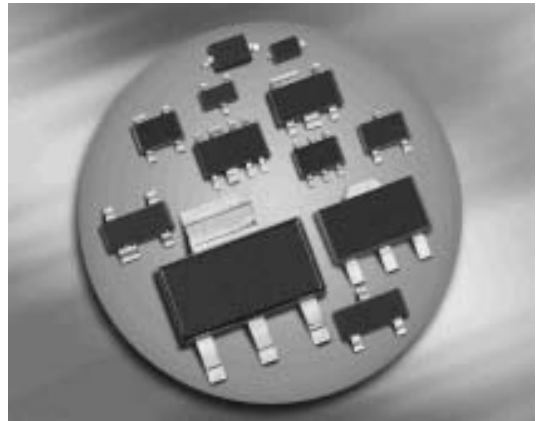


NPN Silicon AF Transistors

- 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) package¹⁾
- Qualified according AEC Q101



¹Pb-containing package may be available upon special request

Type	Marking	Pin Configuration						Package
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 ¹⁾	R_{thJS}		K/W
BC846-BC850		≤ 240	
BC847F-BC850F		≤ 90	
BC847L3-BC848L3		≤ 60	
BC847T		≤ 165	
BC846W-BC850W		≤ 105	

¹⁾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.	
DC Characteristics					
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	- -	μA
DC current gain ¹⁾ $I_C = 10\text{ }\mu\text{A}$, $V_{CE} = 5\text{ V}$, 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 ¹⁾ $I_C = 10\text{ mA}$, $I_B = 0.5\text{ mA}$ $I_C = 100\text{ mA}$, $I_B = 5\text{ mA}$	V_{CEsat}	- -	90 200	250 600	mV
Base emitter saturation voltage ¹⁾ $I_C = 10\text{ mA}$, $I_B = 0.5\text{ mA}$ $I_C = 100\text{ mA}$, $I_B = 5\text{ mA}$	V_{BEsat}	- -	700 900	- -	
Base-emitter voltage ¹⁾ $I_C = 2\text{ mA}$, $V_{CE} = 5\text{ V}$ $I_C = 10\text{ mA}$, $V_{CE} = 5\text{ V}$	$V_{BE(ON)}$	580 -	660 -	700 770	

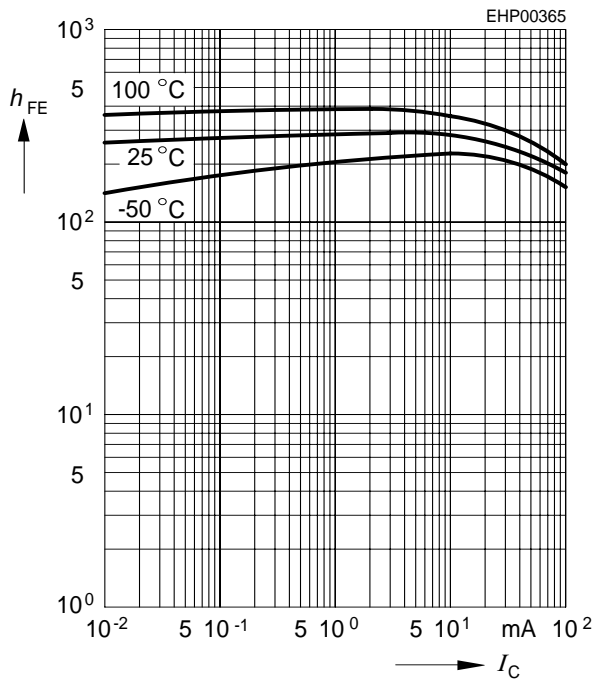
¹⁾Pulse test: $t < 300\mu\text{s}$; $D < 2\%$

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

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
AC Characteristics					
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 $I_C = 2\text{ mA}$, $V_{CE} = 5\text{ V}$, $f = 1\text{ kHz}$, $h_{FE}\text{-grp.A}$ $I_C = 2\text{ mA}$, $V_{CE} = 5\text{ V}$, $f = 1\text{ kHz}$, $h_{FE}\text{-grp.B}$ $I_C = 2\text{ mA}$, $V_{CE} = 5\text{ V}$, $f = 1\text{ kHz}$, $h_{FE}\text{-grp.C}$	h_{11e}	-	2.7 4.5 8.7	-	k Ω
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	-	μS
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	μV

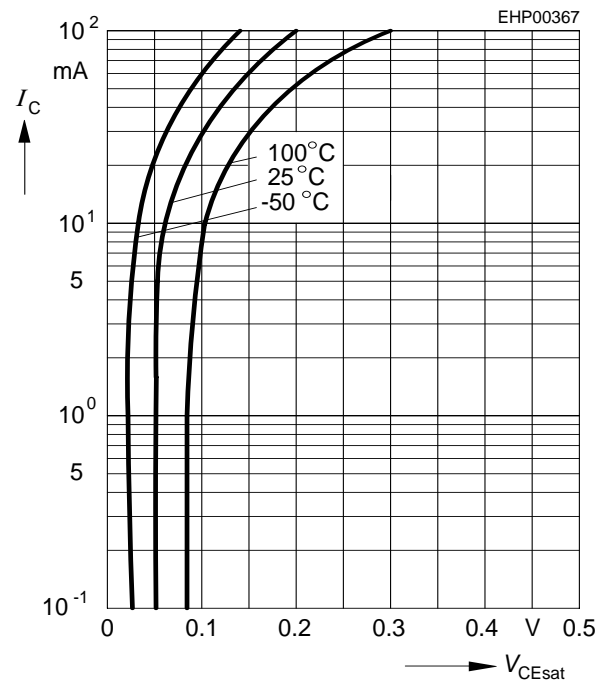
DC current gain $h_{FE} = f(I_C)$

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



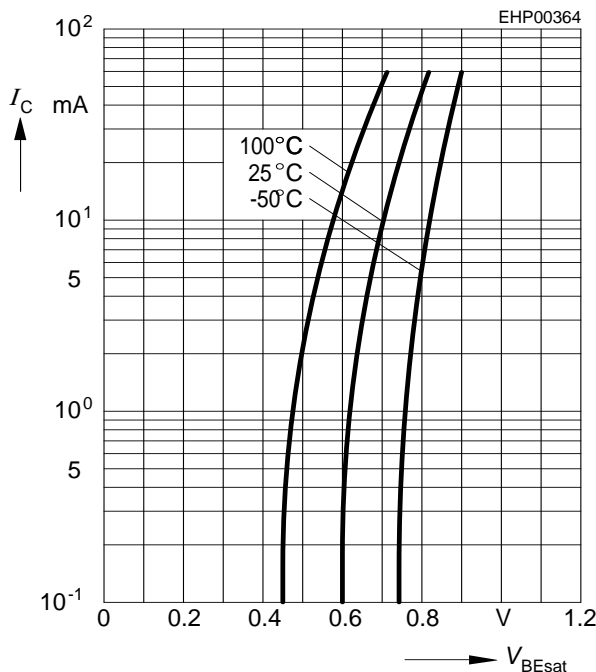
Collector-emitter saturation voltage

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



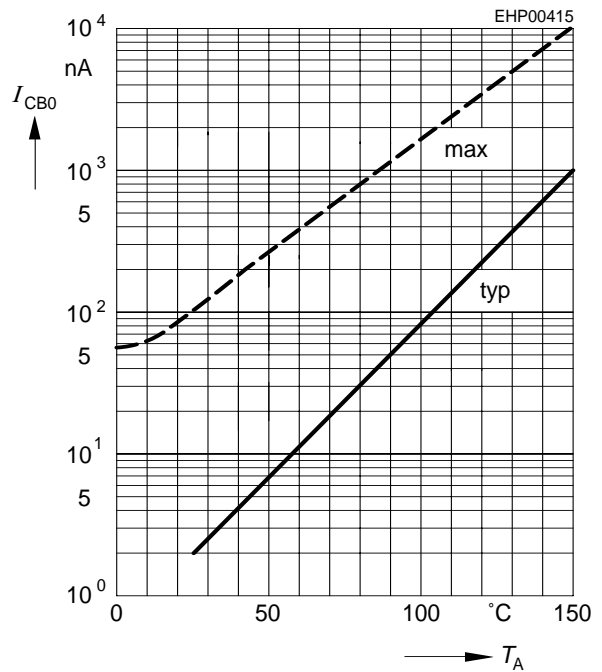
Base-emitter saturation voltage

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



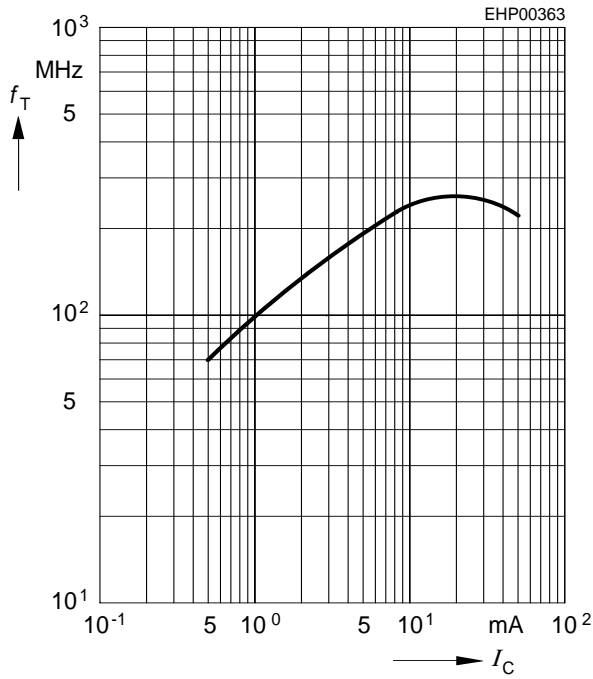
Collector cutoff current $I_{CBO} = f(T_A)$

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



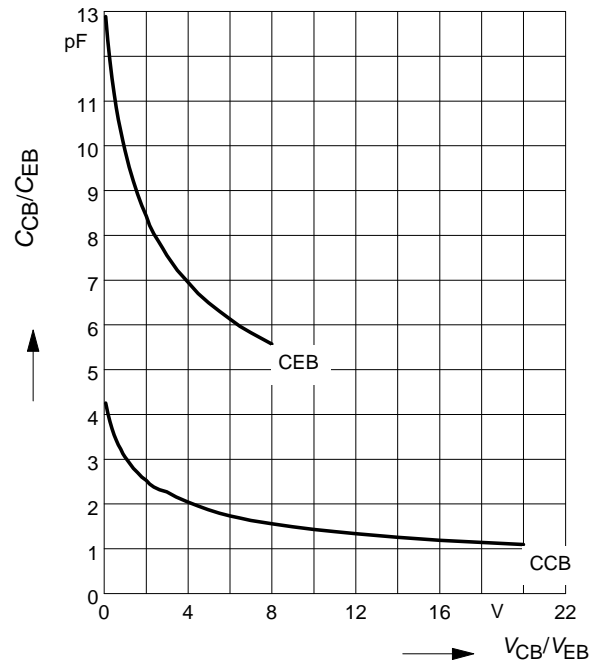
Transition frequency $f_T = f(I_C)$

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



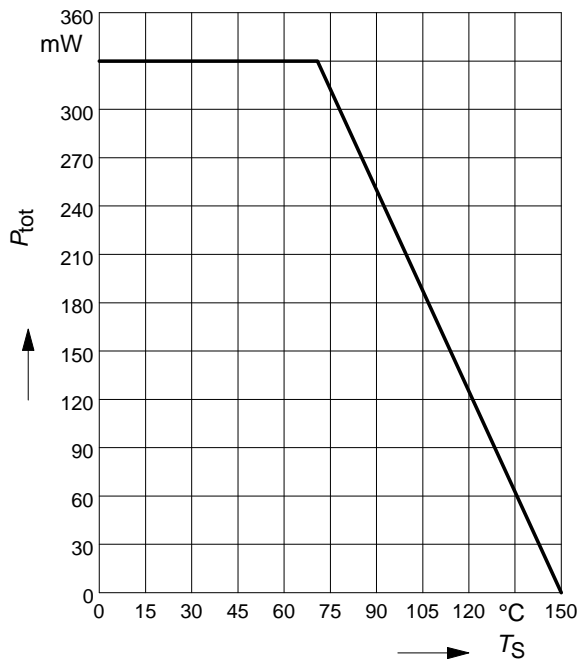
Collector-base capacitance $C_{cb} = f(V_{CB})$

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



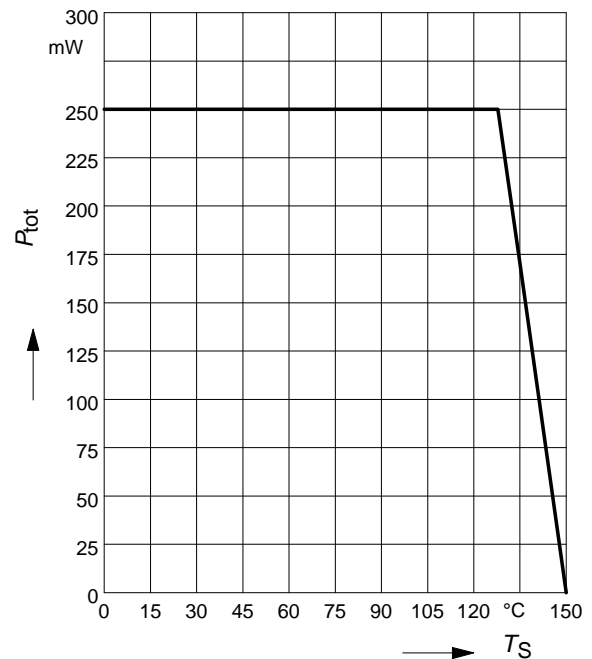
Total power dissipation $P_{tot} = f(T_S)$

BC846-BC850



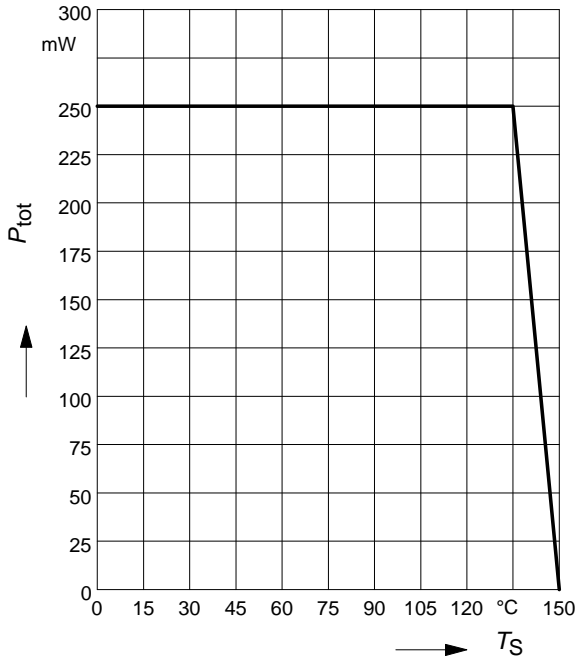
Total power dissipation $P_{tot} = f(T_S)$

BC847BF-BC850BF



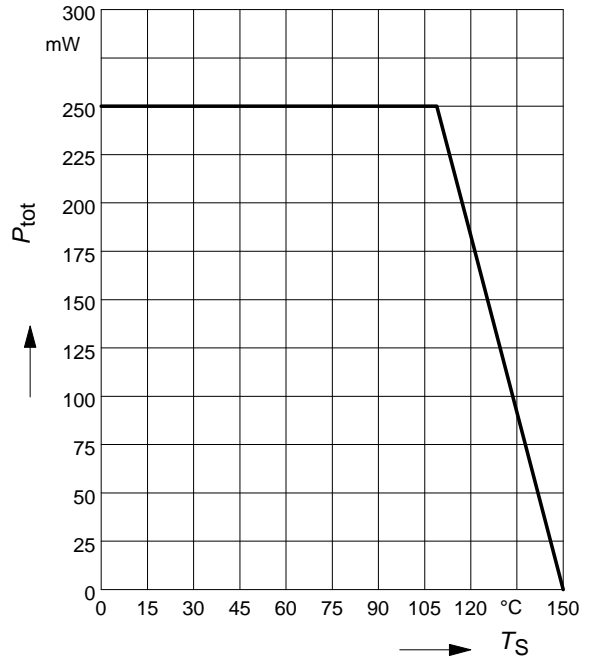
Total power dissipation $P_{tot} = f(T_S)$

BC847BL3/BC848BL3



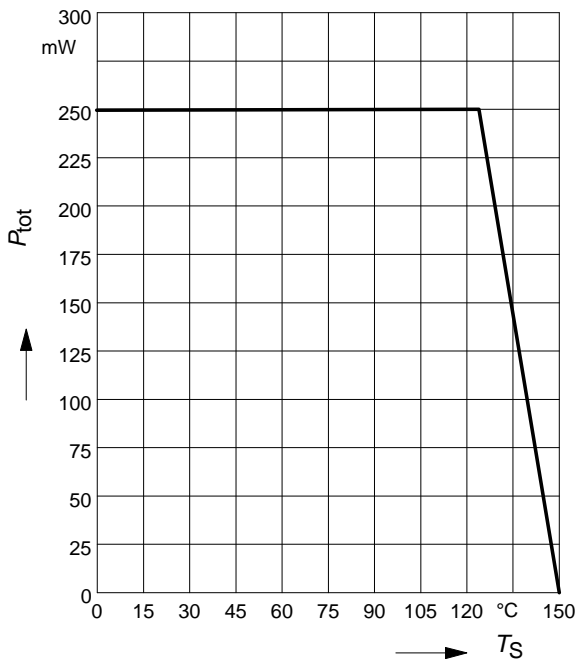
Total power dissipation $P_{tot} = f(T_S)$

BC847BT



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

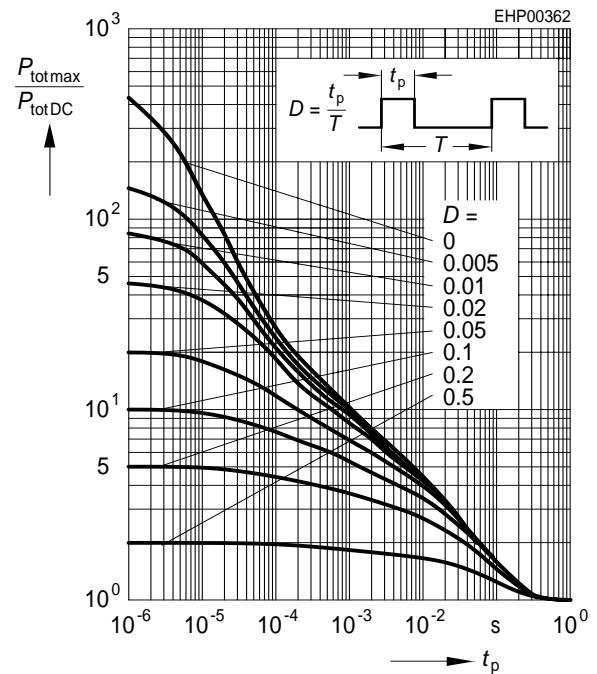
BC846W-BC850W



Permissible Pulse Load

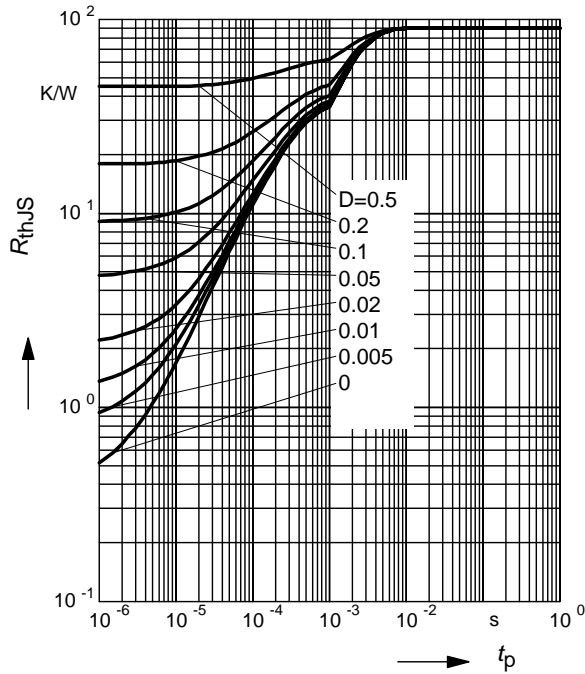
$P_{totmax}/P_{totDC} = f(t_p)$

BC846/W-BC850/W



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

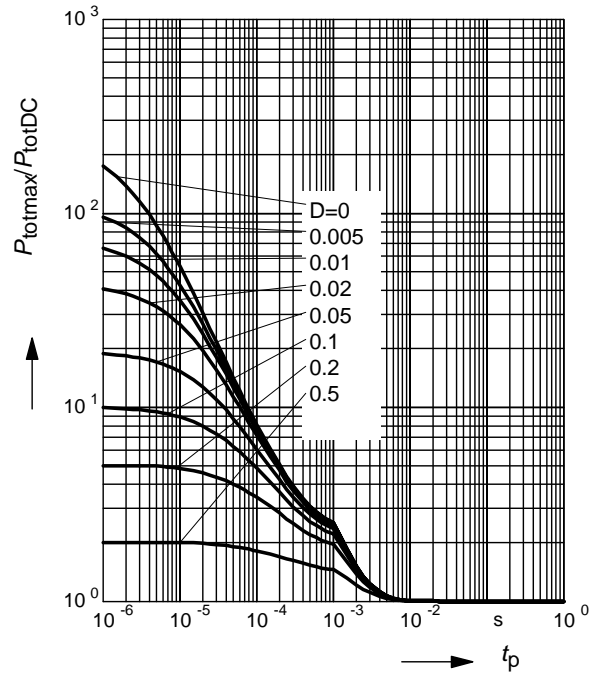
BC847BF-BC850BF



Permissible Pulse Load

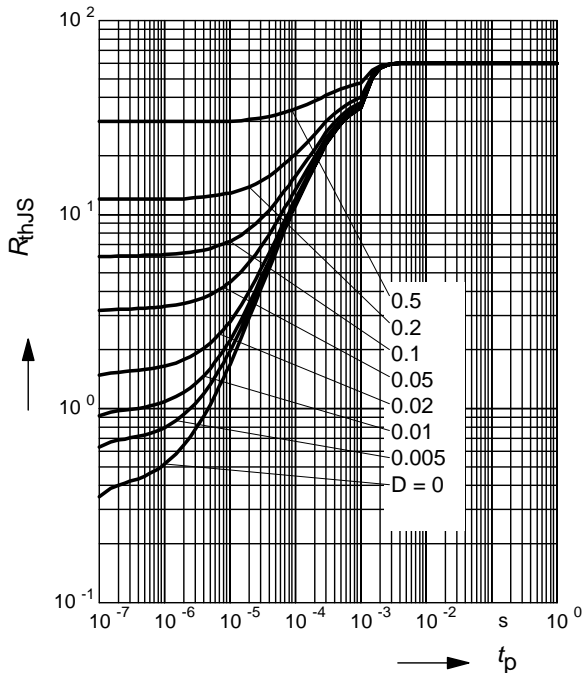
$P_{totmax}/P_{totDC} = f(t_p)$

BC847BF-BC850BF



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

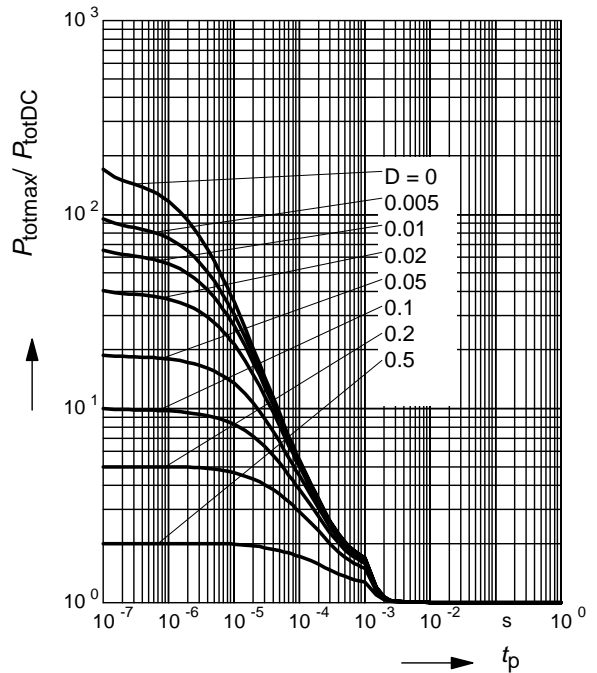
BC847BL3, BC848BL3



Permissible Pulse Load

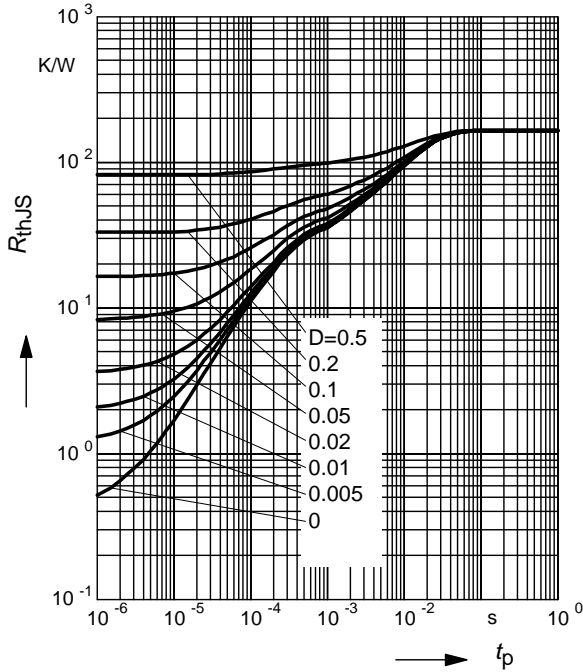
$P_{totmax}/P_{totDC} = f(t_p)$

BC847BL3, BC848BL3



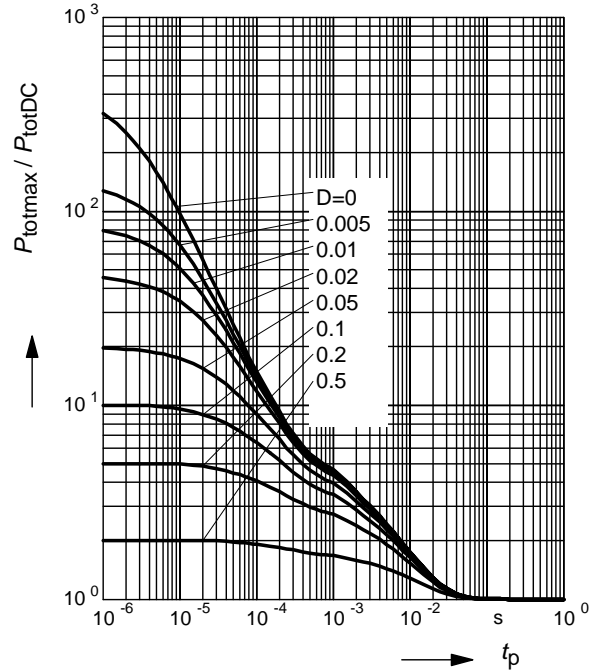
Permissible Puls Load $R_{thJS} = f(t_p)$

BC847BT



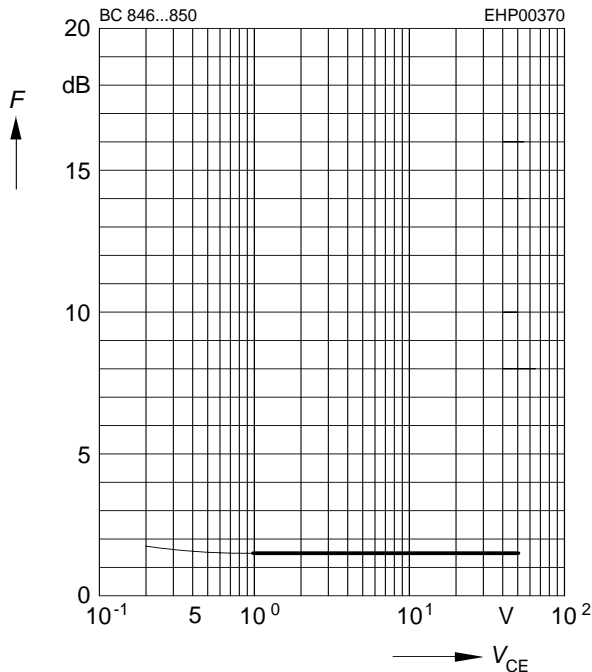
Permissible Pulse Load $P_{totmax}/P_{totDC} = f(t_p)$

BC847BT



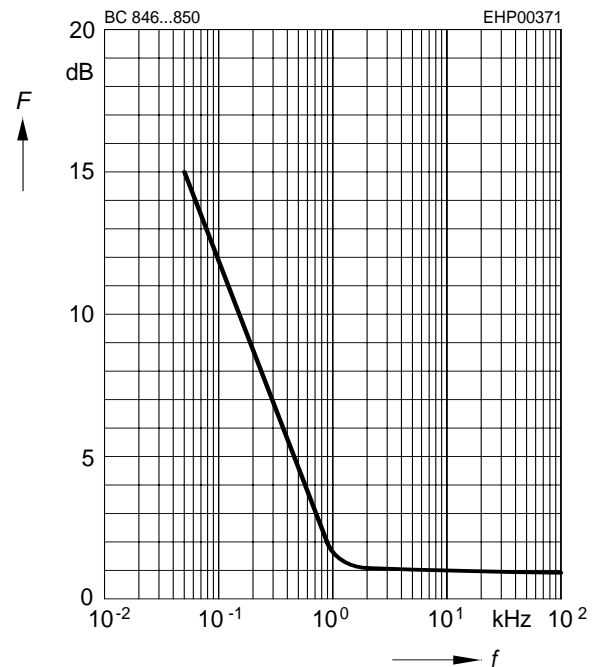
Noise figure $F = f(V_{CE})$

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



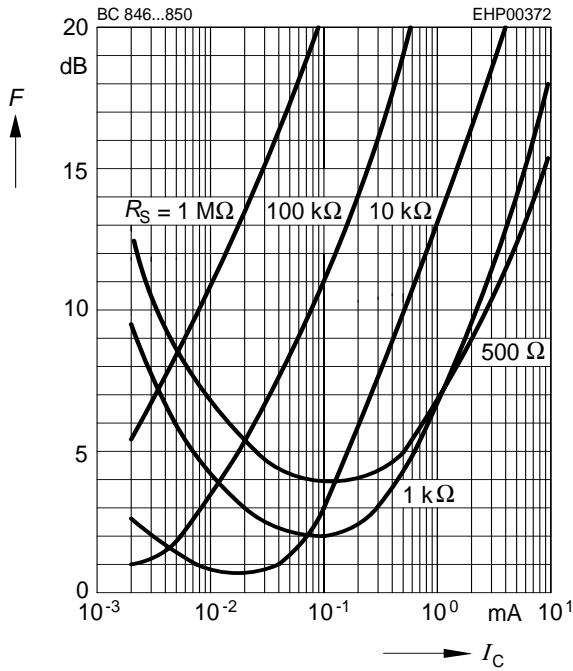
Noise figure $F = f(f)$

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



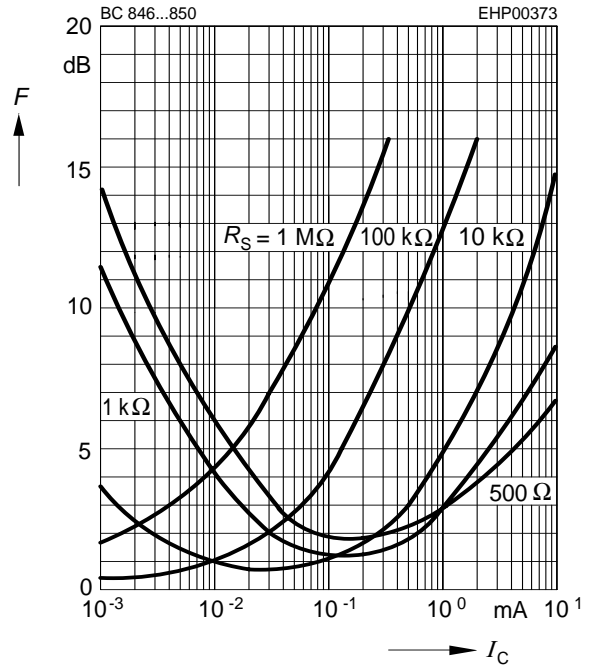
Noise figure $F = f(I_C)$

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



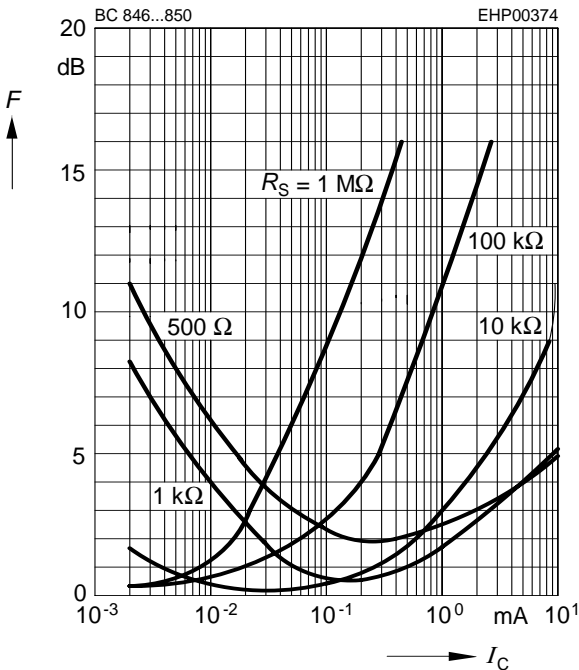
Noise figure $F = f(I_C)$

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

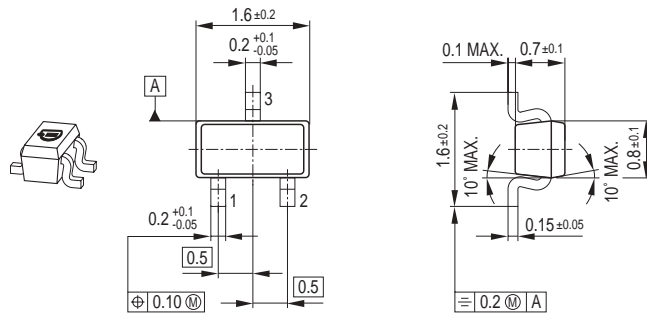


Noise figure $F = f(I_C)$

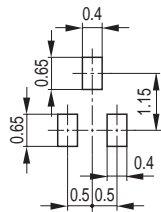
$V_{CE} = 5V, f = 10\text{kHz}$



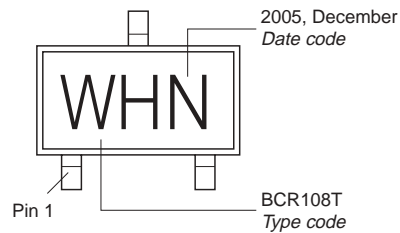
Package Outline



Foot Print

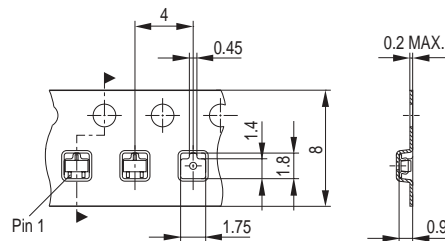


Marking Layout (Example)



Standard Packing

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

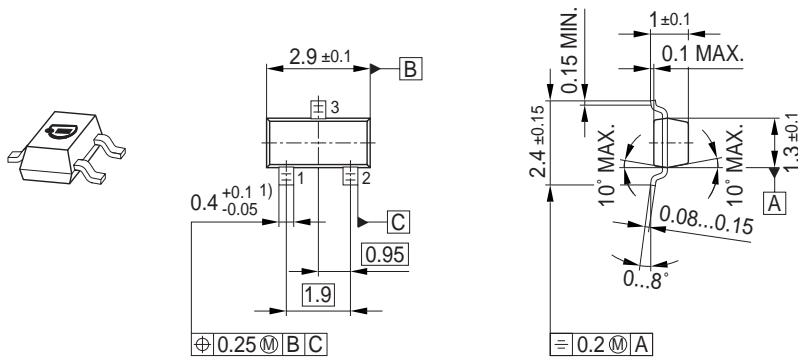


Date Code marking for discrete packages with one digit (SCD80, SC79, SC75¹⁾) CES-Code

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

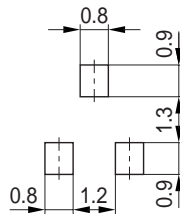
1) New Marking Layout for SC75, implemented at October 2005.

Package Outline

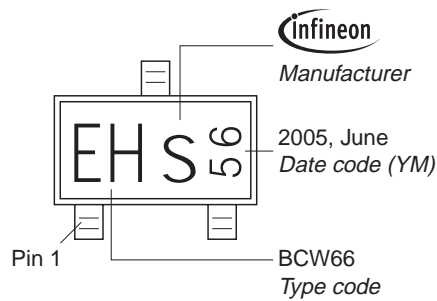


1) Lead width can be 0.6 max. in dambar area

Foot Print

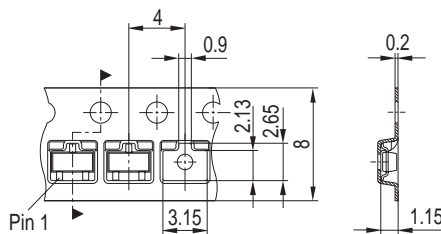


Marking Layout (Example)

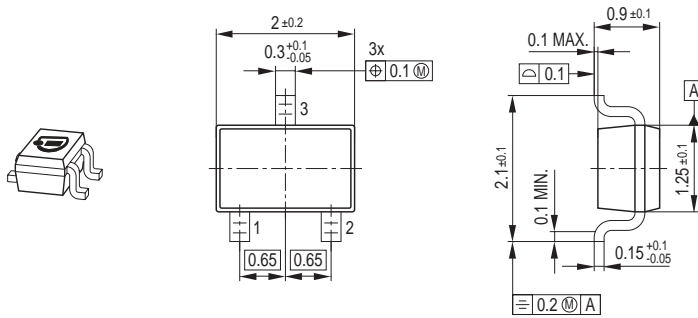


Standard Packing

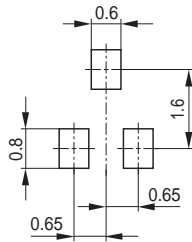
Reel \varnothing 180 mm = 3.000 Pieces/Reel
 Reel \varnothing 330 mm = 10.000 Pieces/Reel



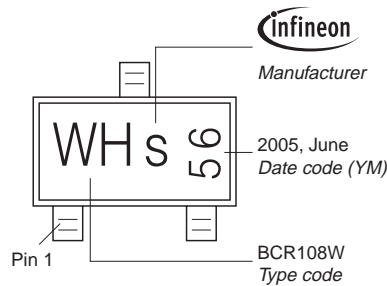
Package Outline



Foot Print

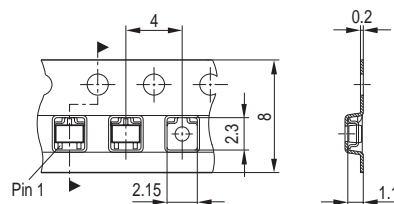


Marking Layout (Example)

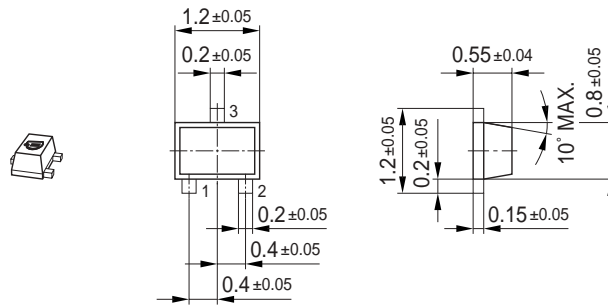


Standard Packing

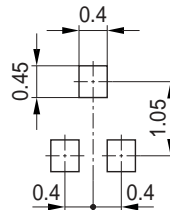
Reel \varnothing 180 mm = 3.000 Pieces/Reel
 Reel \varnothing 330 mm = 10.000 Pieces/Reel



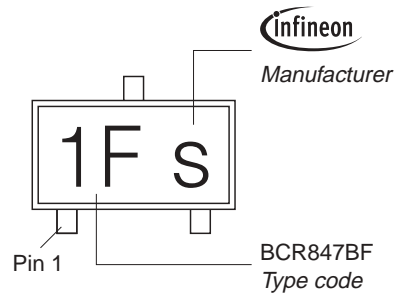
Package Outline



Foot Print

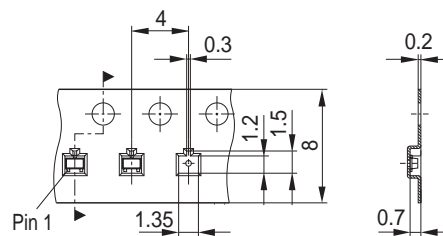


Marking Layout (Example)

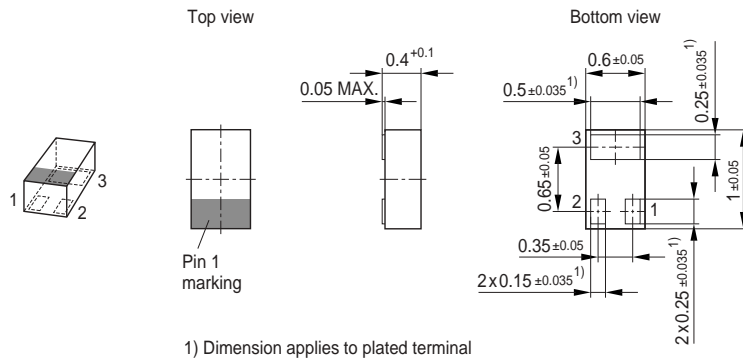


Standard Packing

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

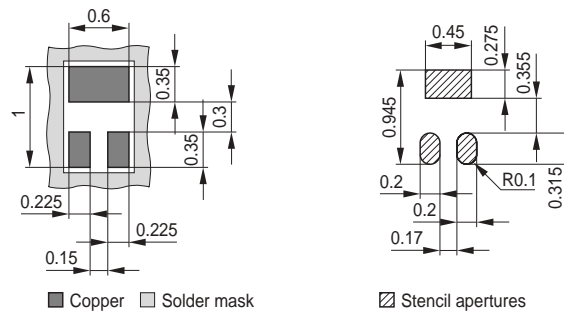


Package Outline

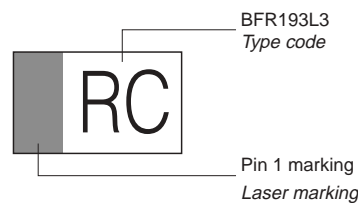


Foot Print

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

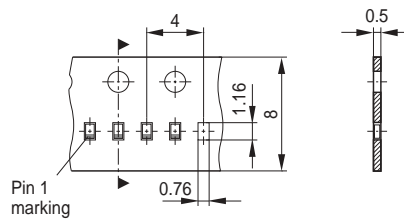


Marking Layout (Example)



Standard Packing

Reel ø180 mm = 15.000 Pieces/Reel



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