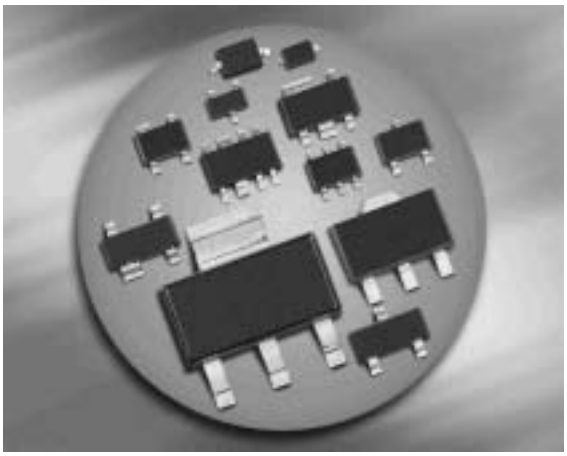
NPN Silicon AF Transistors



- 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[1)]
- Qualified according AEC Q101

AEC Qualified RoHS

[1]Pb-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	V_{CEO}		V
BC846...		65	
BC847..., BC850...		45	
BC848..., BC849...		30	
Collector-emitter voltage	V_{CES}		
BC846...		80	
BC847..., BC850...		50	
BC848..., BC849...		30	
Collector-base voltage	V_{CBO}		
BC846...		80	
BC847..., BC850...		50	
BC848..., BC849...		30	
Emitter-base voltage	V_{EBO}		
BC846...		6	
BC847..., BC850...		6	
BC848..., BC849...		6	
Collector current	I_C	100	mA
Peak collector current	I_{CM}	200	
Total power dissipation-	P_{tot}		mW
$T_S \leq 71$ °C, BC846-BC850		330	
$T_S \leq 128$ °C, BC847F-BC850F		250	
$T_S \leq 135$ °C, BC847L3-BC848L3		250	
$T_S \leq 109$ °C, BC847T		250	
$T_S \leq 124$ °C, BC846W-BC850W		250	
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°C, unless otherwise specified

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
DC Characteristics					
Collector-emitter breakdown voltage	$V_{(BR)CEO}$				V
I_C = 10 mA, I_B = 0 , BC846...		65	-	-	
I_C = 10 mA, I_B = 0 , BC847..., BC850...		45	-	-	
I_C = 10 mA, I_B = 0 , BC848..., BC849...		30	-	-	
Collector-base breakdown voltage	$V_{(BR)CBO}$				
I_C = 10 µA, I_E = 0 , BC846...		80	-	-	
I_C = 10 µA, I_E = 0 , BC847..., BC850...		50	-	-	
I_C = 10 µA, I_E = 0 , BC848..., BC849...		30	-	-	
Emitter-base breakdown voltage	$V_{(BR)EBO}$	-	6	-	
I_E = 0 , I_C = 10 µA					
Collector-base cutoff current	I_{CBO}				µA
V_{CB} = 45 V, I_E = 0		-	0.015	-	
V_{CB} = 30 V, I_E = 0 , T_A = 150 °C		-	5	-	
DC current gain[1)]	h_{FE}				-
I_C = 10 µA, V_{CE} = 5 V, h_{FE}-grp.A		-	140	-	
I_C = 10 µA, V_{CE} = 5 V, h_{FE}-grp.B		-	250	-	
I_C = 10 µA, V_{CE} = 5 V, h_{FE}-grp.C		-	480	-	
I_C = 2 mA, V_{CE} = 5 V, h_{FE}-grp.A		110	180	220	
I_C = 2 mA, V_{CE} = 5 V, h_{FE}-grp.B		200	290	450	
I_C = 2 mA, V_{CE} = 5 V, h_{FE}-grp.C		420	520	800	
Collector-emitter saturation voltage[1)]	V_{CEsat}				mV
I_C = 10 mA, I_B = 0.5 mA		-	90	250	
I_C = 100 mA, I_B = 5 mA		-	200	600	
Base emitter saturation voltage[1)]	V_{BEsat}				
I_C = 10 mA, I_B = 0.5 mA		-	700	-	
I_C = 100 mA, I_B = 5 mA		-	900	-	
Base-emitter voltage[1)]	$V_{BE(ON)}$				
I_C = 2 mA, V_{CE} = 5 V		580	660	700	
I_C = 10 mA, V_{CE} = 5 V		-	-	770	

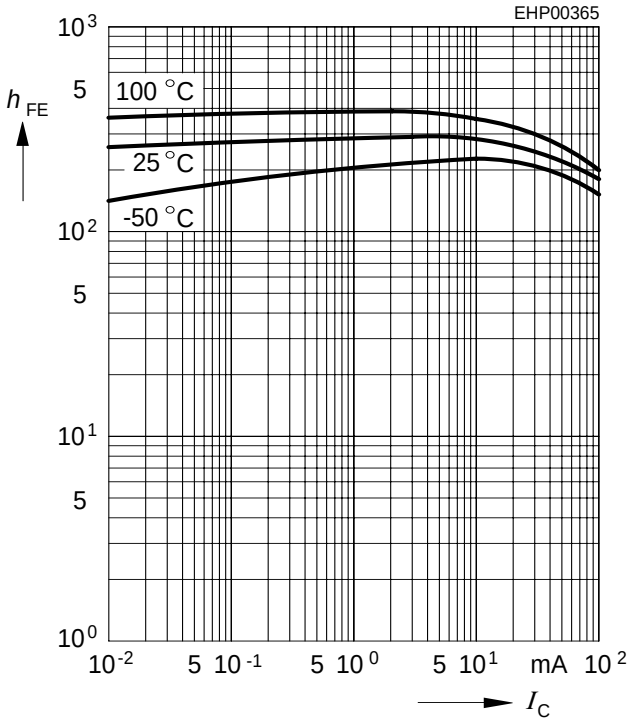
[1]Pulse test: t < 300µs; D < 2%

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

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
AC Characteristics					
Transition frequency I_C = 10 mA, V_{CE} = 5 V, f = 100 MHz	f_T	-	250	-	MHz
Collector-base capacitance V_{CB} = 10 V, f = 1 MHz	C_{cb}	-	0.95	-	pF
Emitter-base capacitance V_{EB} = 0.5 V, f = 1 MHz	C_{eb}	-	9	-	
Short-circuit input impedance	h_{11e}				kΩ
I_C = 2 mA, V_{CE} = 5 V, f = 1 kHz, h_{FE}-grp.A		-	2.7	-	
I_C = 2 mA, V_{CE} = 5 V, f = 1 kHz, h_{FE}-grp.B		-	4.5	-	
I_C = 2 mA, V_{CE} = 5 V, f = 1 kHz, h_{FE}-grp.C		-	8.7	-	
Open-circuit reverse voltage transf. ratio	h_{12e}				10^{-4}
I_C = 2 mA, V_{CE} = 5 V, f = 1 kHz, h_{FE}-grp.A		-	1.5	-	
I_C = 2 mA, V_{CE} = 5 V, f = 1 kHz, h_{FE}-grp.B		-	2	-	
I_C = 2 mA, V_{CE} = 5 V, f = 1 kHz, h_{FE}-grp.C		-	3	-	
Short-circuit forward current transf. ratio	h_{21e}				
I_C = 2 mA, V_{CE} = 5 V, f = 1 kHz, h_{FE}-grp.A		-	200	-	
I_C = 2 mA, V_{CE} = 5 V, f = 1 kHz, h_{FE}-grp.B		-	330	-	
I_C = 2 mA, V_{CE} = 5 V, f = 1 kHz, h_{FE}-grp.C		-	600	-	
Open-circuit output admittance	h_{22e}				µS
I_C = 2 mA, V_{CE} = 5 V, f = 1 kHz, h_{FE}-grp.A		-	18	-	
I_C = 2 mA, V_{CE} = 5 V, f = 1 kHz, h_{FE}-grp.B		-	30	-	
I_C = 2 mA, V_{CE} = 5 V, f = 1 kHz, h_{FE}-grp.C		-	60	-	
Noise figure I_C = 200 µA, V_{CE} = 5 V, f = 1 kHz, Δf = 200 Hz, R_S = 2 kΩ, BC849..., BC850...	F	-	1.2	4	dB
Equivalent noise voltage I_C = 200 µA, V_{CE} = 5 V, R_S = 2 kΩ, f = 10 ... 50 Hz , BC850...	V_n	-	-	0.135	µV

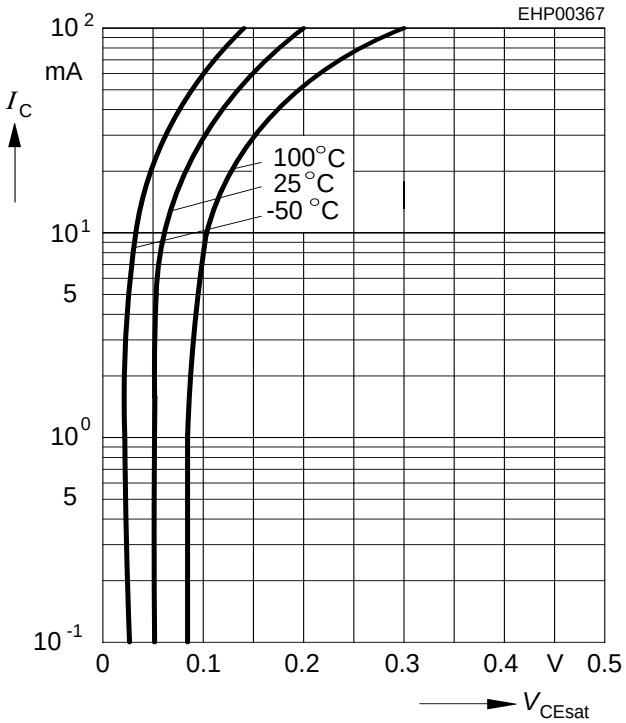
DC current gain $h_{FE} = f(I_C)$

V_{CE} = 5 V



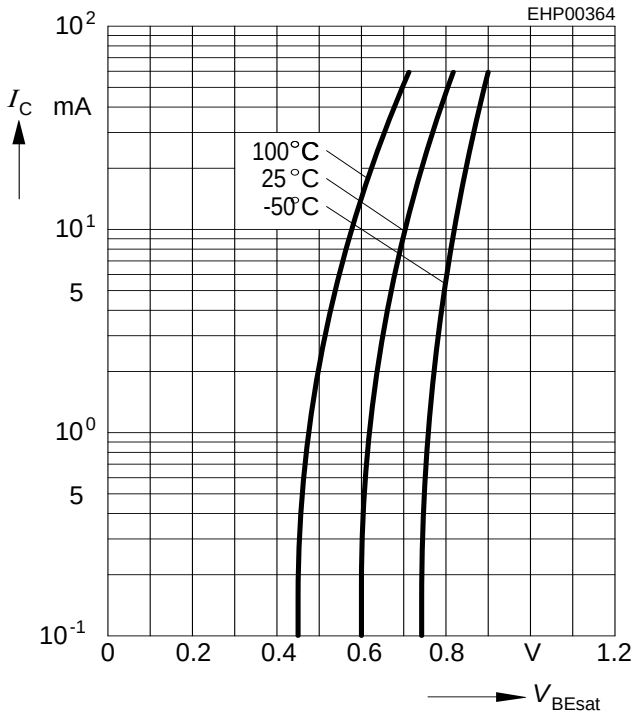
Collector-emitter saturation voltage

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



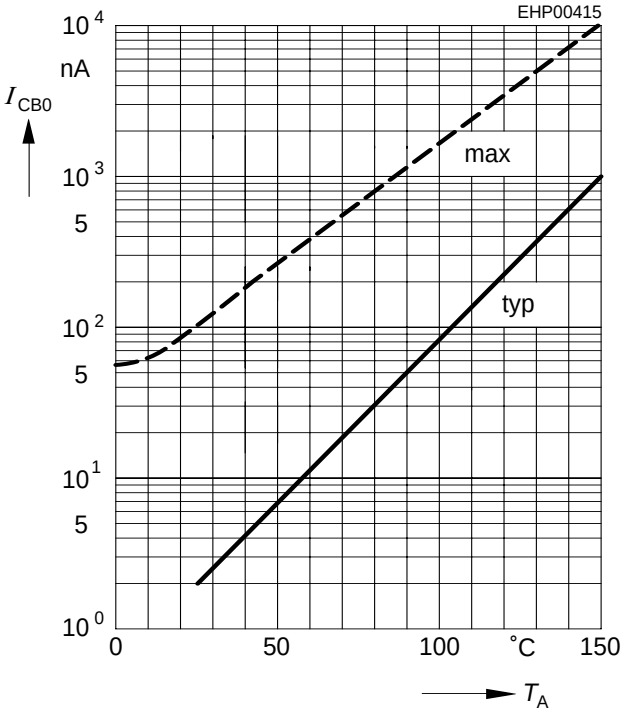
Base-emitter saturation voltage

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



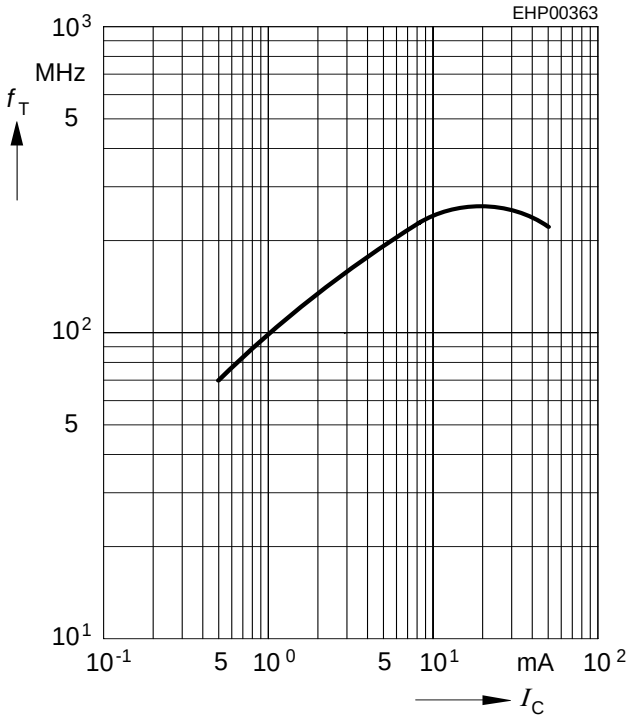
Collector cutoff current $I_{CBO} = f(T_A)$

V_{CB} = 30 V



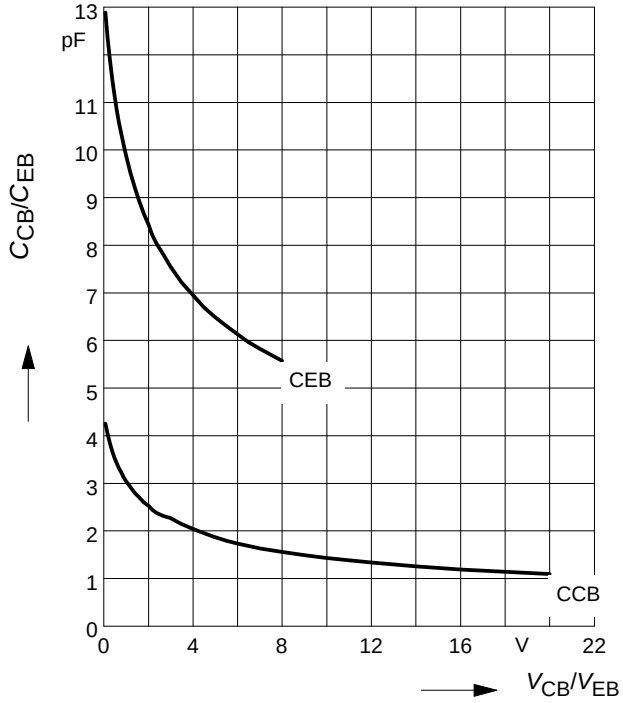
Transition frequency $f_T = f(I_C)$

V_{CE} = 5 V



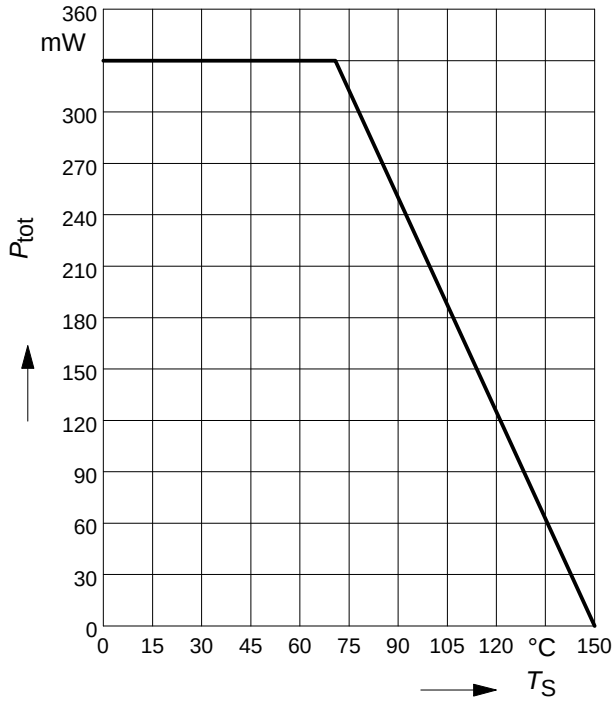
Collector-base capacitance $C_{cb} = f(V_{CB})$

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



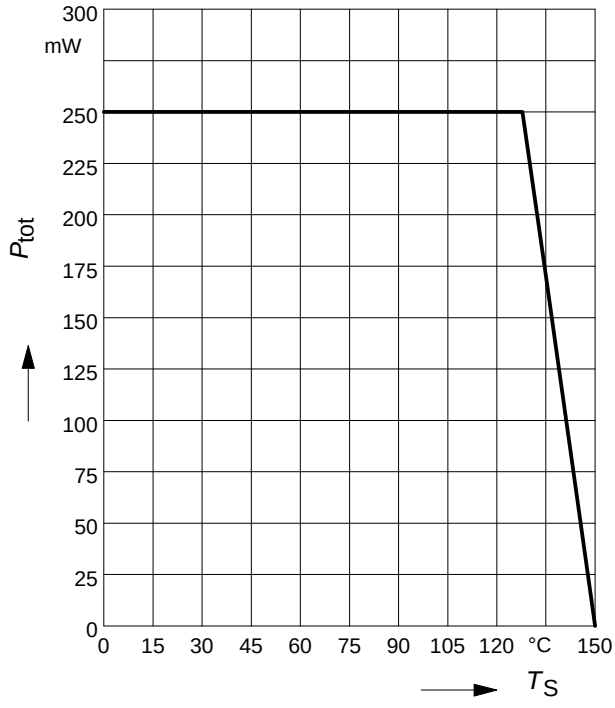
Total power dissipation $P_{tot} = f(T_S)$

BC846-BC850



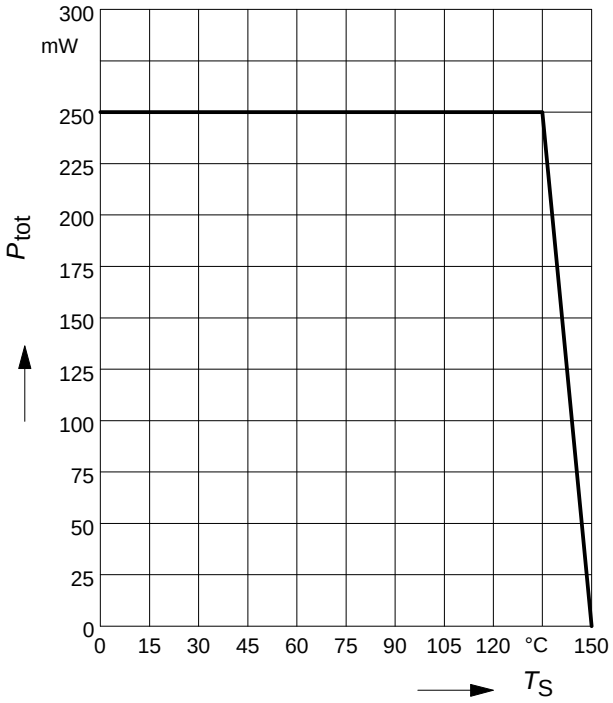
Total power dissipation $P_{tot} = f(T_S)$

BC847BF-BC850BF



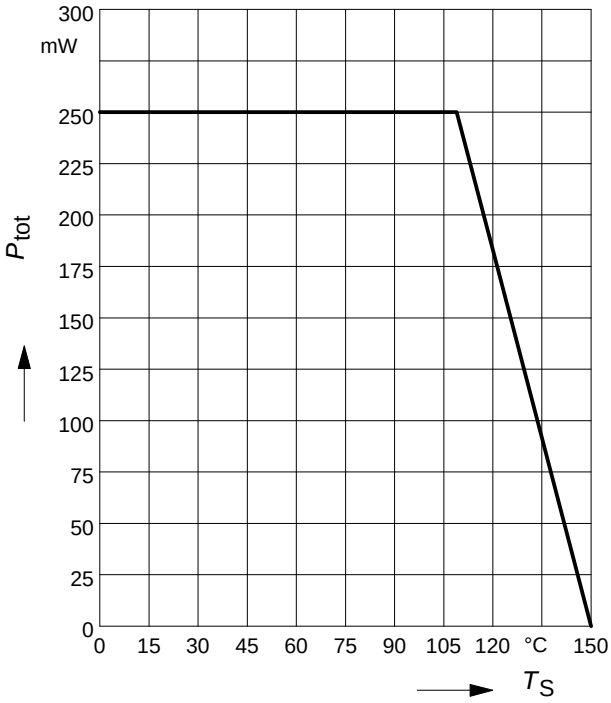
Total power dissipation $P_{tot} = f(T_S)$

BC847BL3/BC848BL3



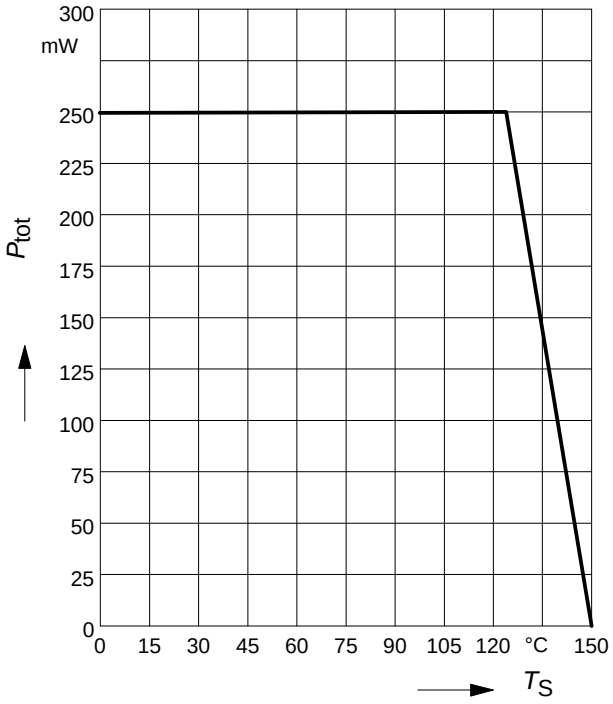
Total power dissipation $P_{tot} = f(T_S)$

BC847BT



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

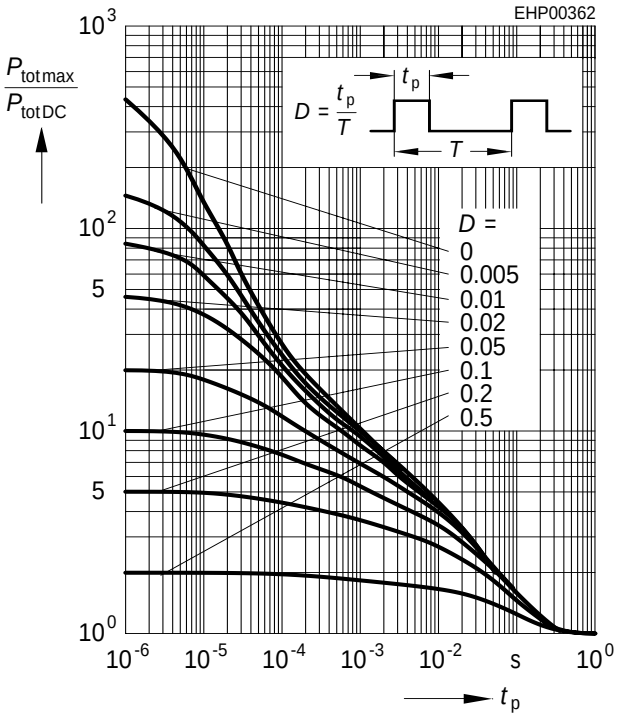
BC846W-BC850W



Permissible Pulse Load

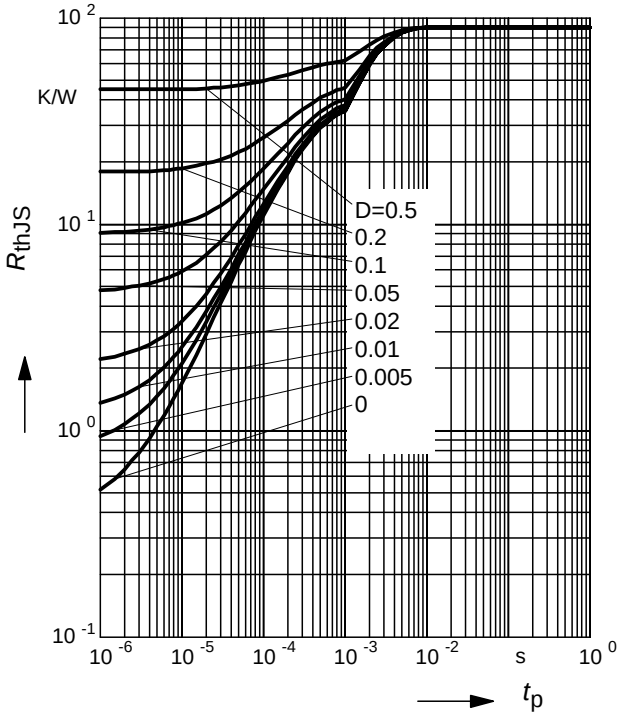
$P_{totmax}/P_{totDC} = f(t_p)$

BC846/W-BC850/W



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

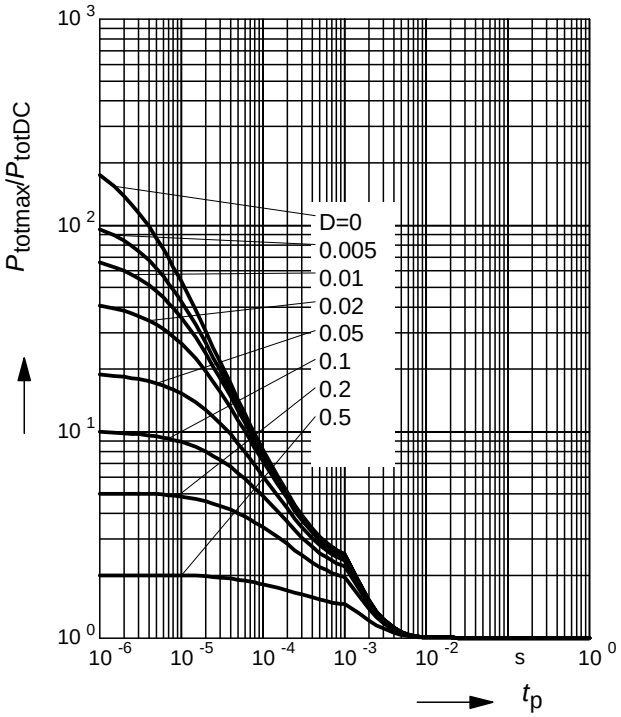
BC847BF-BC850BF



Permissible Pulse Load

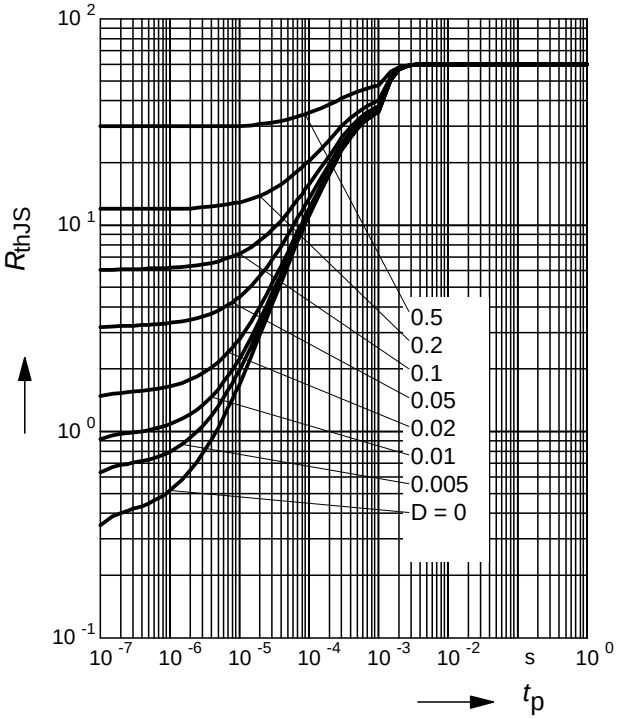
$P_{totmax}/P_{totDC} = f(t_p)$

BC847BF-BC850BF



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

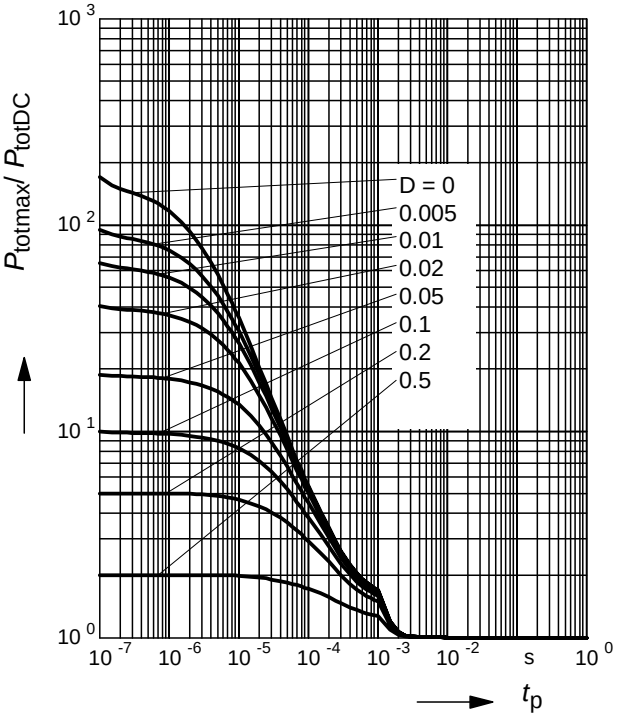
BC847BL3, BC848BL3



Permissible Pulse Load

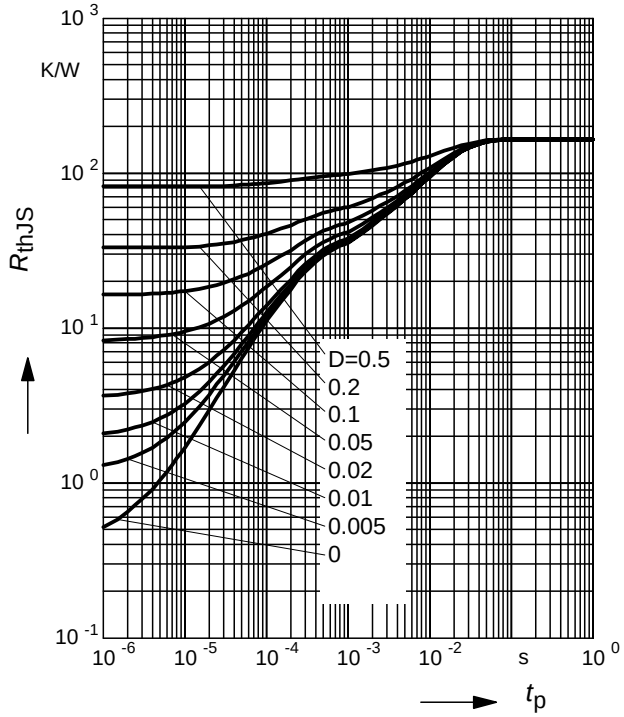
$P_{totmax}/P_{totDC} = f(t_p)$

BC847BL3, BC848BL3



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

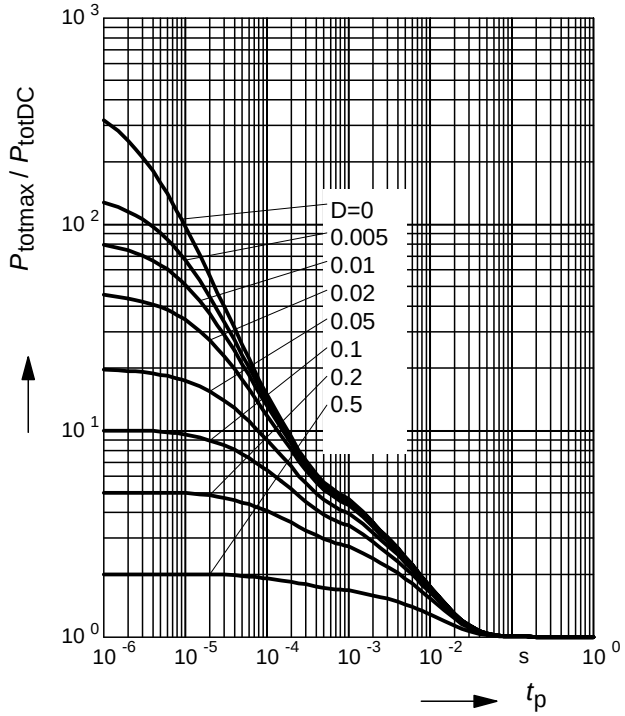
BC847BT



Permissible Pulse Load

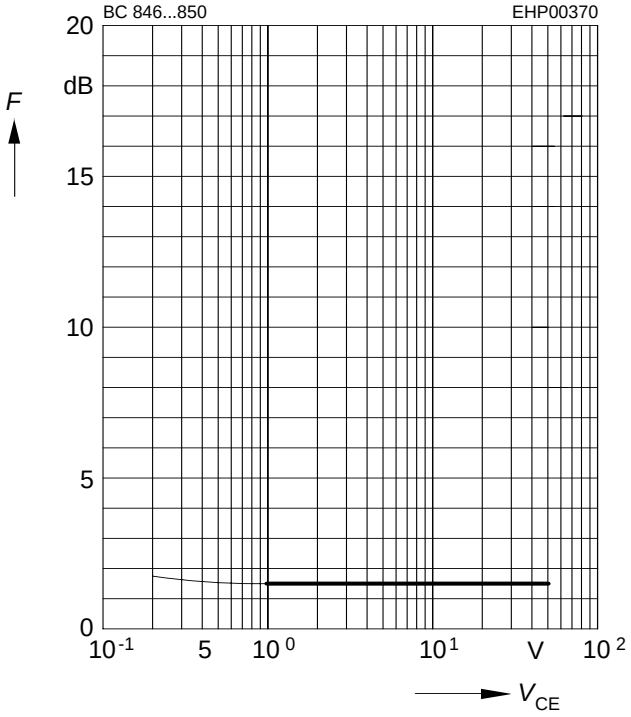
$P_{totmax}/P_{totDC} = f(t_p)$

BC847BT



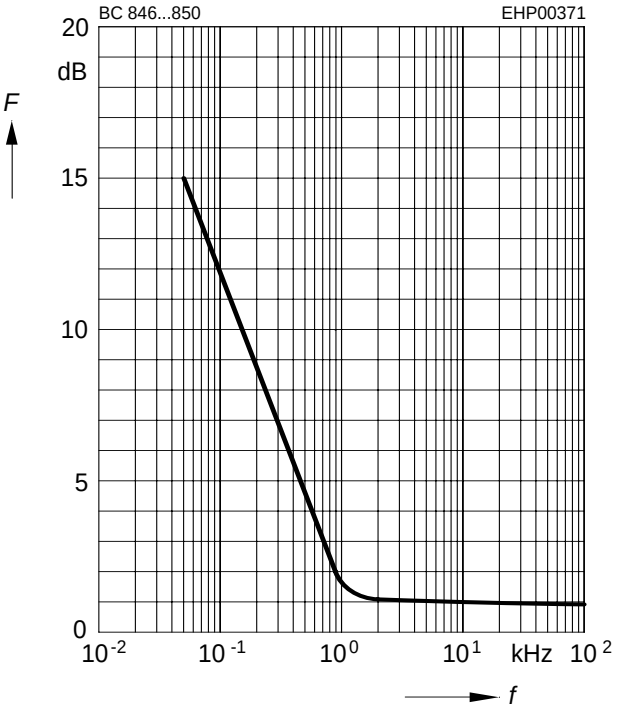
Noise figure $F = f(V_{CE})$

I_C = 0.2mA, R_S = 2kΩ , f = 1kHz



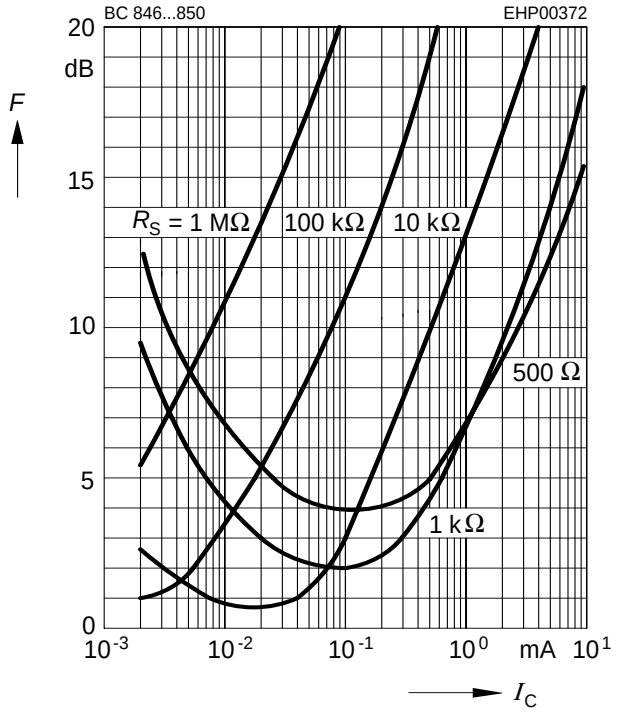
Noise figure $F = f(f)$

I_C = 0.2 mA, V_{CE} = 5V, R_S = 2 kΩ



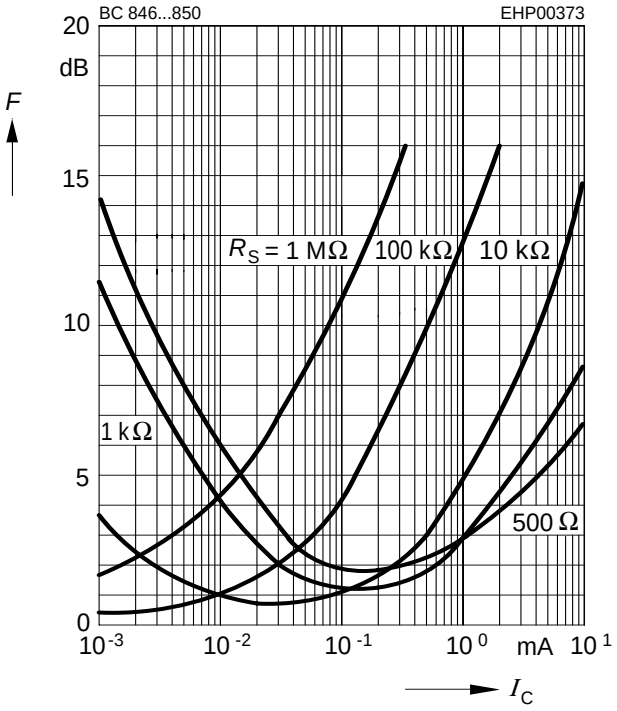
Noise figure $F = f(I_C)$

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



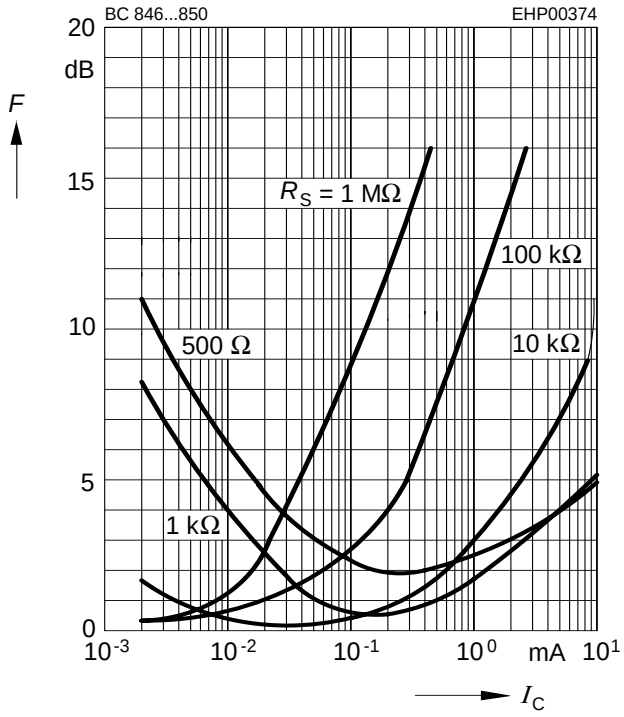
Noise figure $F = f(I_C)$

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

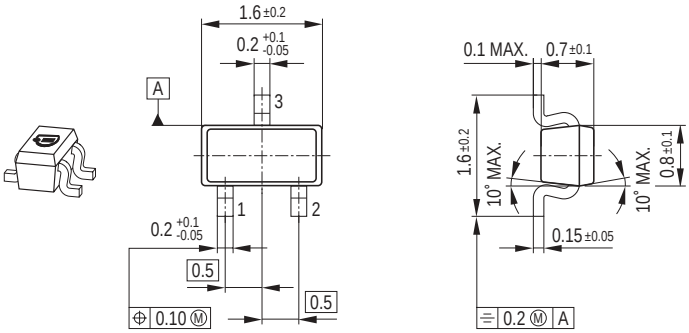


Noise figure $F = f(I_C)$

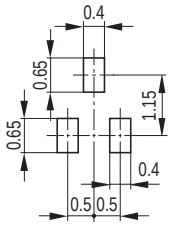
V_{CE} = 5V, f = 10kHz



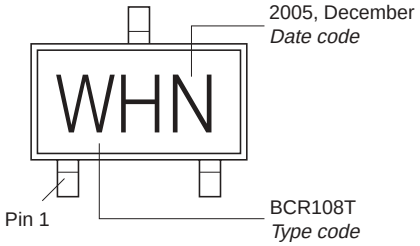
Package Outline



Foot Print

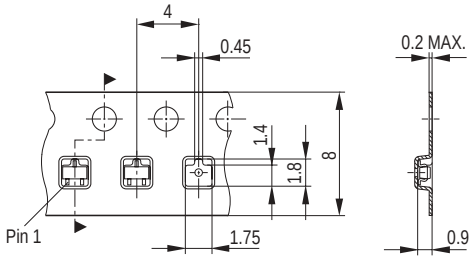


Marking Layout (Example)



Standard Packing

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

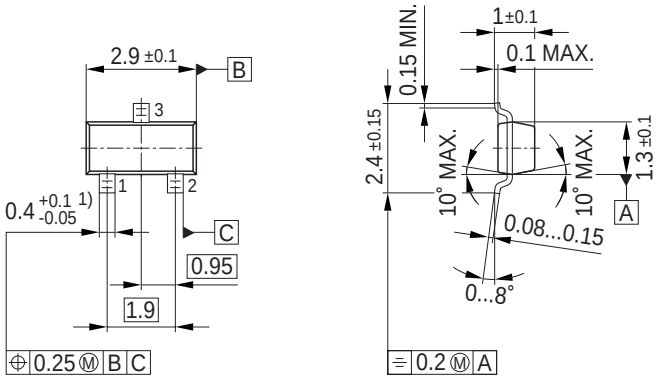


Date Code marking for discrete packages with one digit (SCD80, SC79, SC75[1)]) CES-Code

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

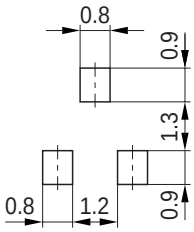
1) New Marking Layout for SC75, implemented at October 2005.

Package Outline

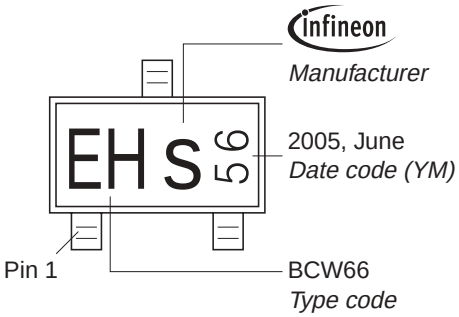


1) Lead width can be 0.6 max. in dambar area

Foot Print

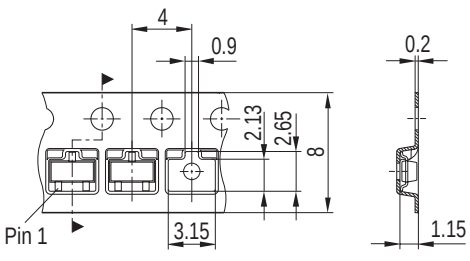


Marking Layout (Example)

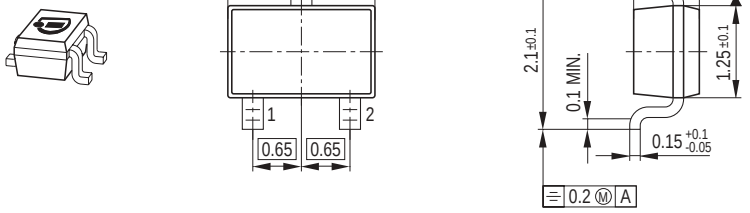


Standard Packing

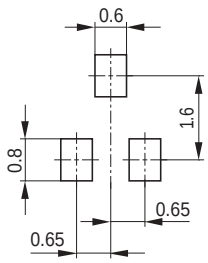
Reel ø180 mm = 3.000 Pieces/Reel
Reel ø330 mm = 10.000 Pieces/Reel



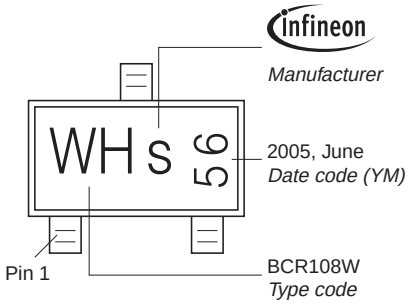
Package Outline



Foot Print

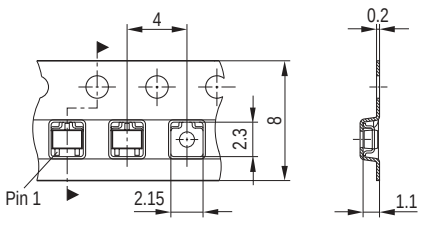


Marking Layout (Example)

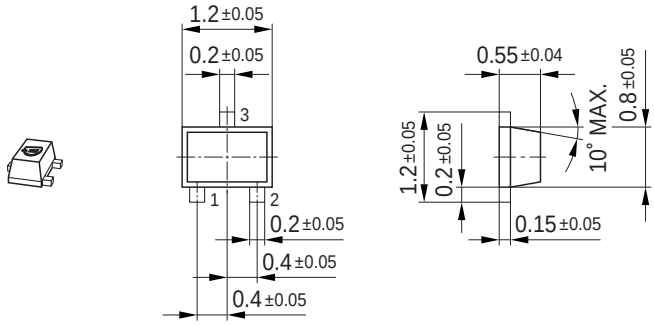


Standard Packing

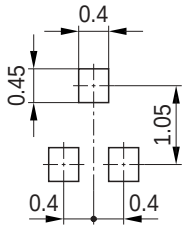
Reel ø180 mm = 3.000 Pieces/Reel
Reel ø330 mm = 10.000 Pieces/Reel



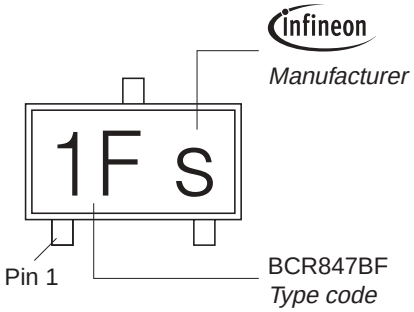
Package Outline



Foot Print

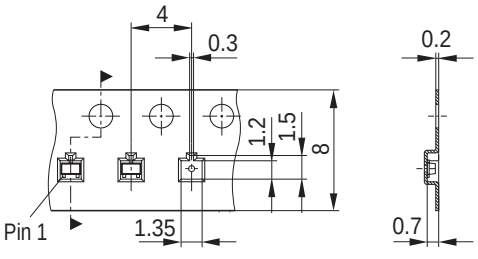


Marking Layout (Example)

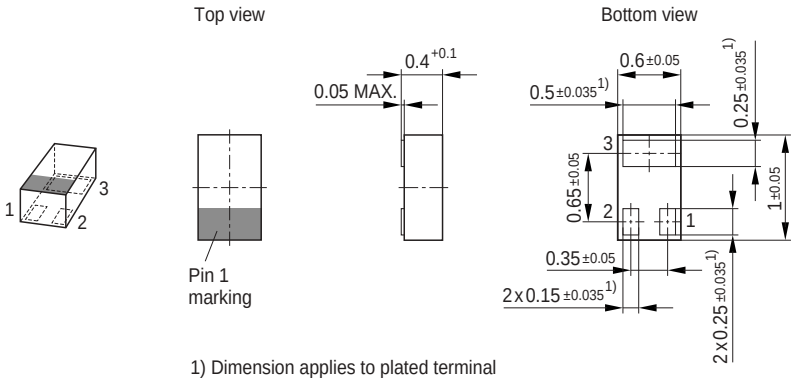


Standard Packing

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



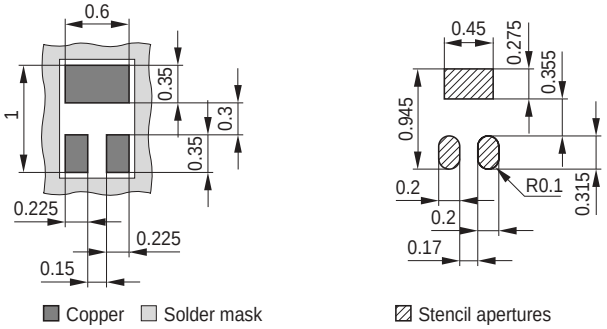
Package Outline



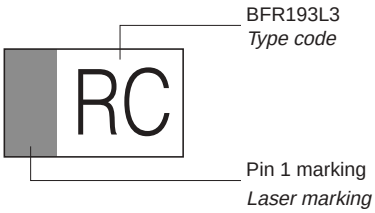
1) Dimension applies to plated terminal

Foot Print

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

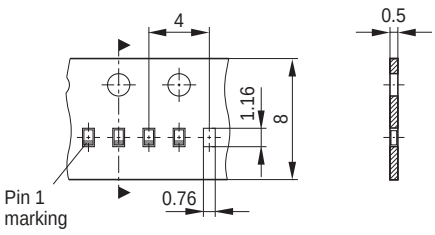


Marking Layout (Example)



Standard Packing

Reel ø180 mm = 15.000 Pieces/Reel



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