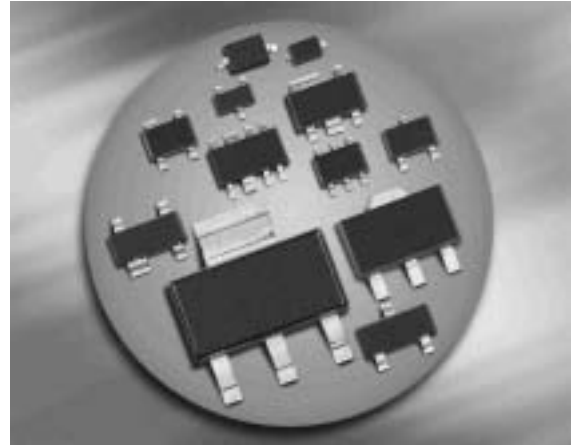


NPN Silicon AF Transistors

- 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



¹Pb-containing package may be available upon special request

| 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 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 | |

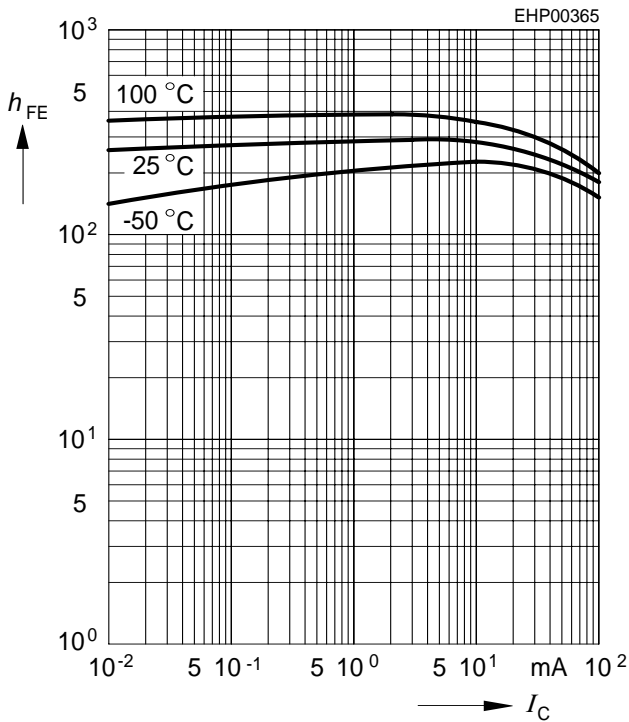
¹⁾Pulse test: $t < 300\mu\text{s}$; $D < 2\%$

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} -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 Ω | |
| 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 | - | 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 | |

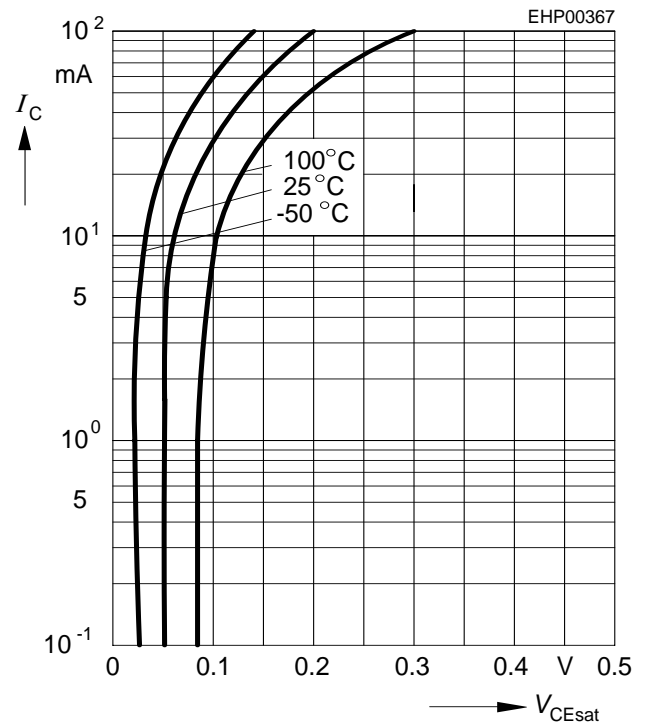
DC current gain $h_{FE} = f(I_C)$

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



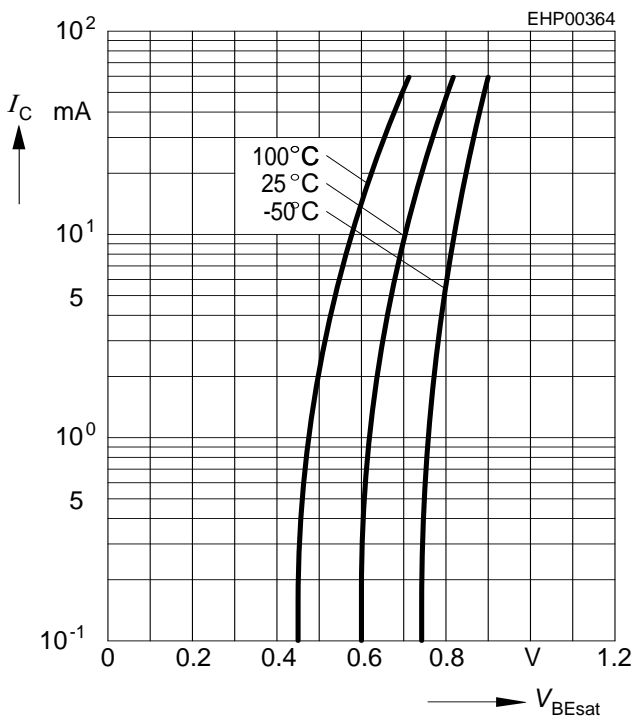
Collector-emitter saturation voltage

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



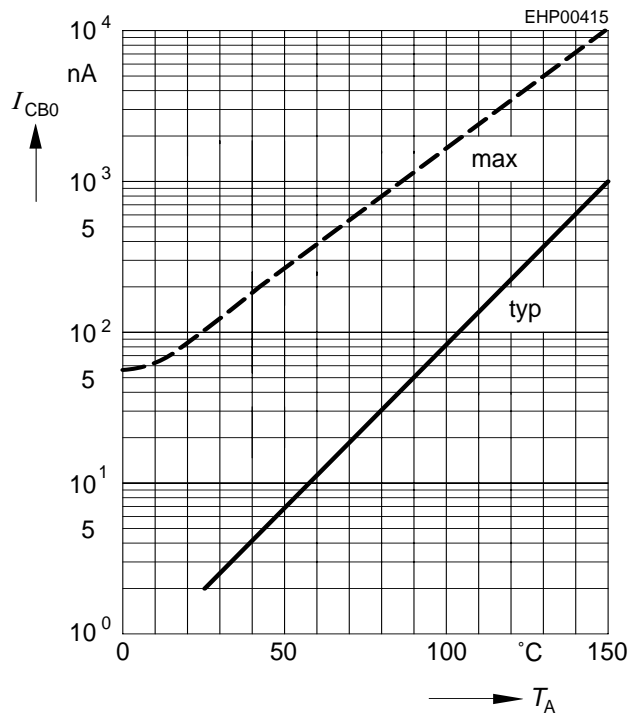
Base-emitter saturation voltage

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



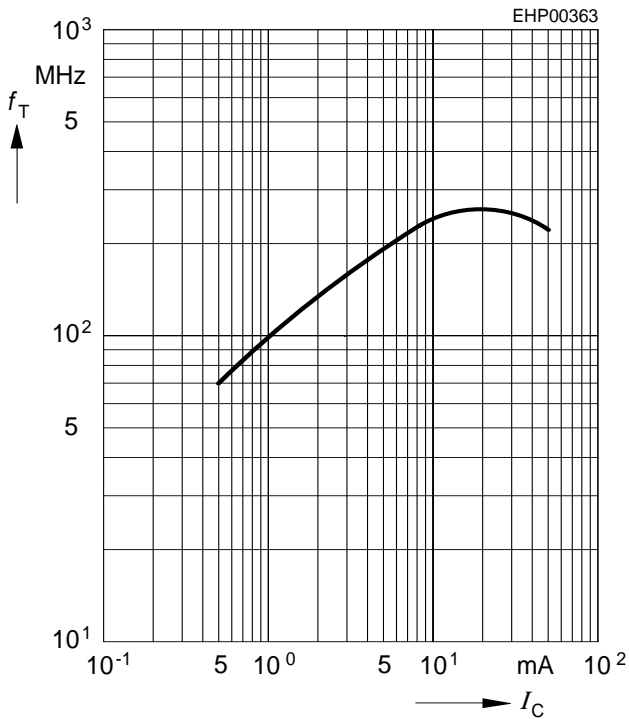
Collector cutoff current $I_{CBO} = f(T_A)$

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



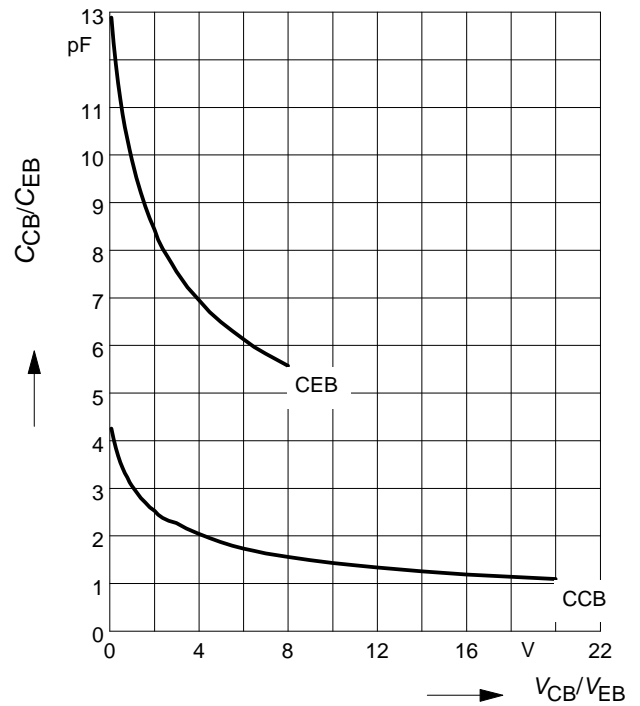
Transition frequency $f_T = f(I_C)$

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



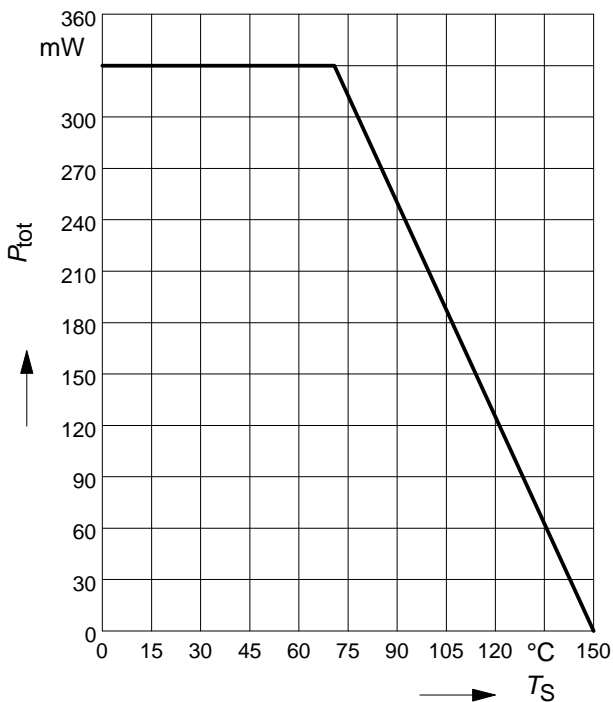
Collector-base capacitance $C_{cb} = f(V_{CB})$

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



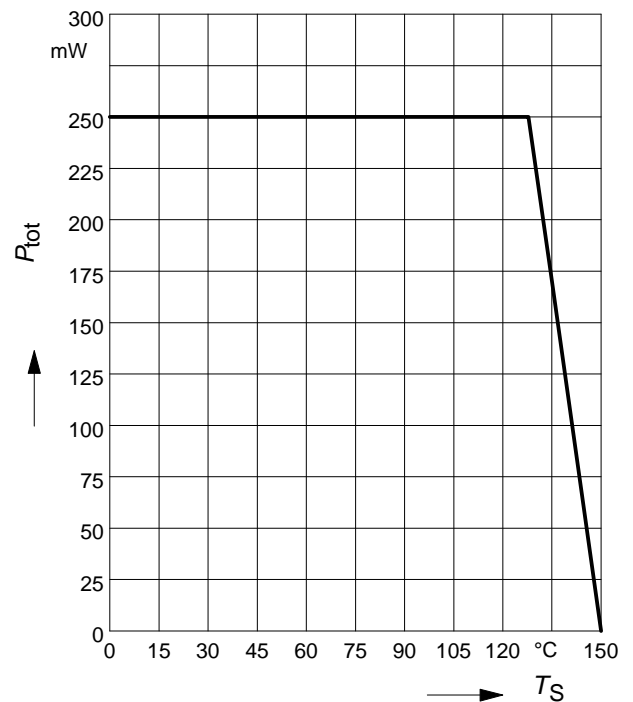
Total power dissipation $P_{tot} = f(T_S)$

BC846-BC850



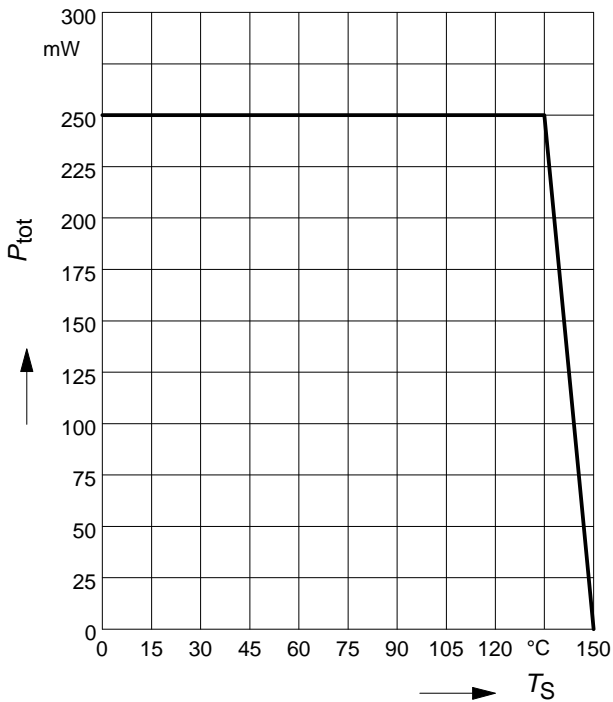
Total power dissipation $P_{tot} = f(T_S)$

BC847BF-BC850BF



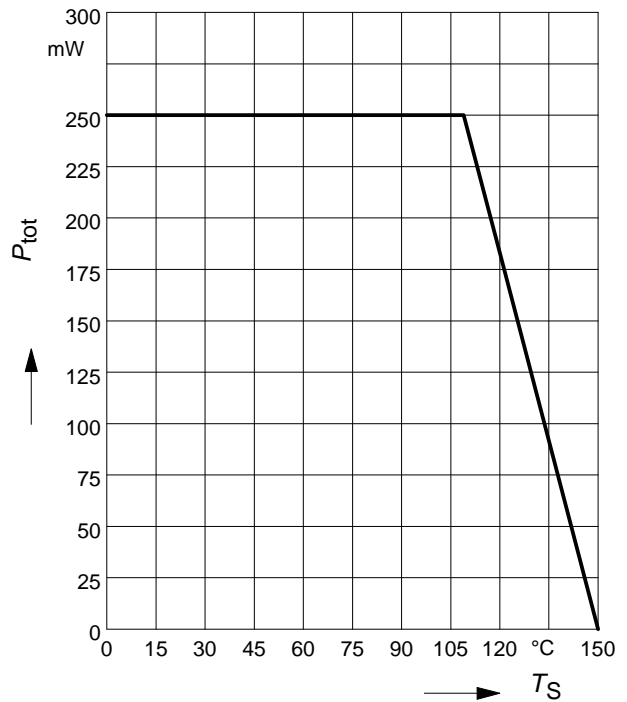
Total power dissipation $P_{tot} = f(T_S)$

BC847BL3/BC848BL3



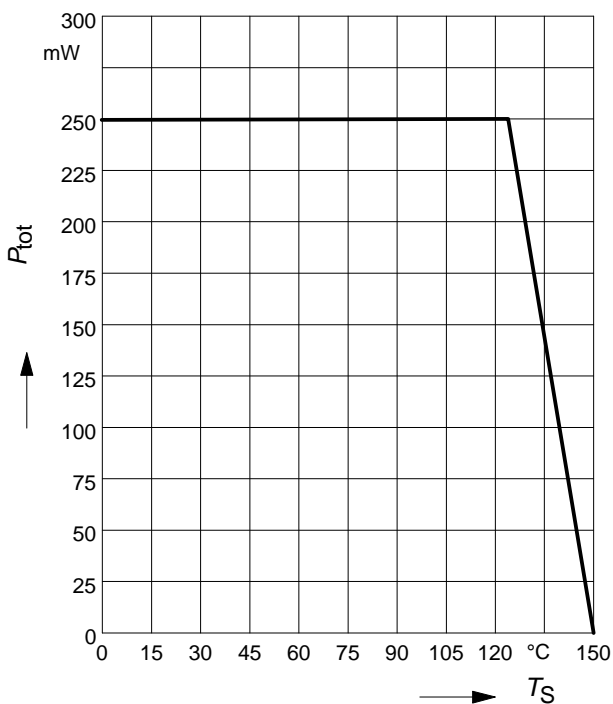
Total power dissipation $P_{tot} = f(T_S)$

BC847BT



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

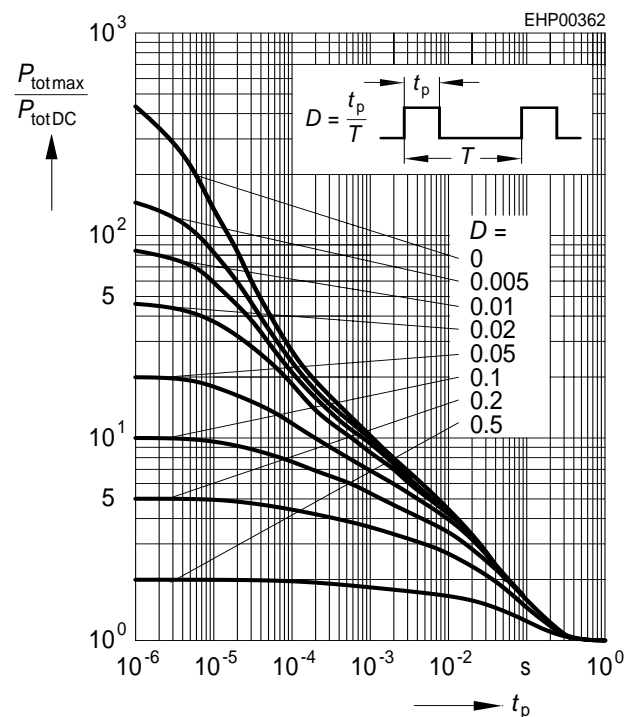
BC846W-BC850W



Permissible Pulse Load

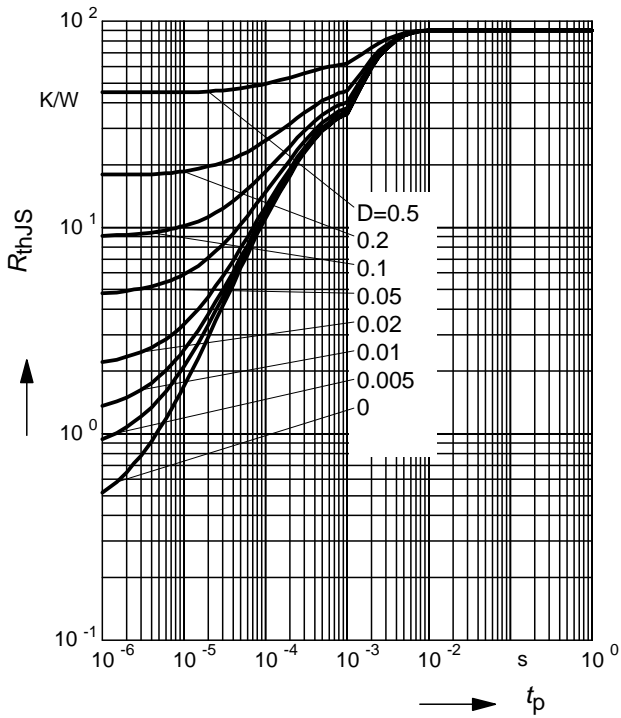
$P_{totmax}/P_{totDC} = f(t_p)$

BC846/W-BC850/W



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

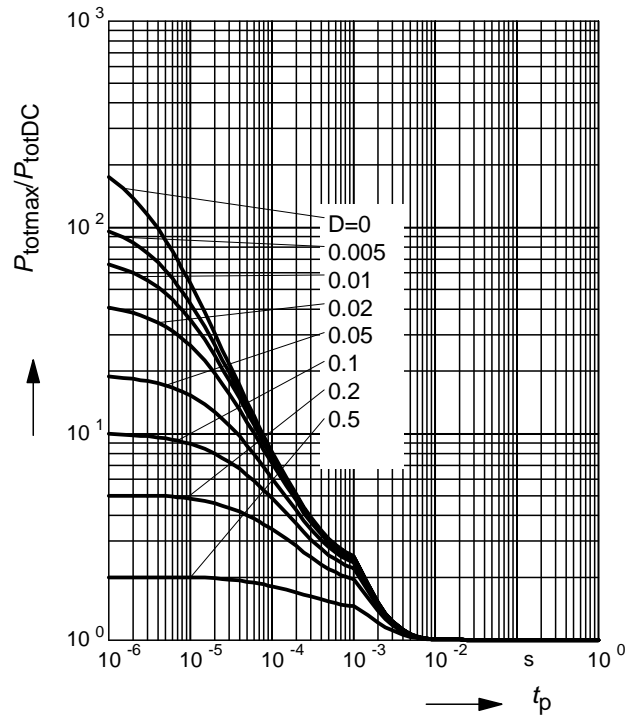
BC847BF-BC850BF



Permissible Pulse Load

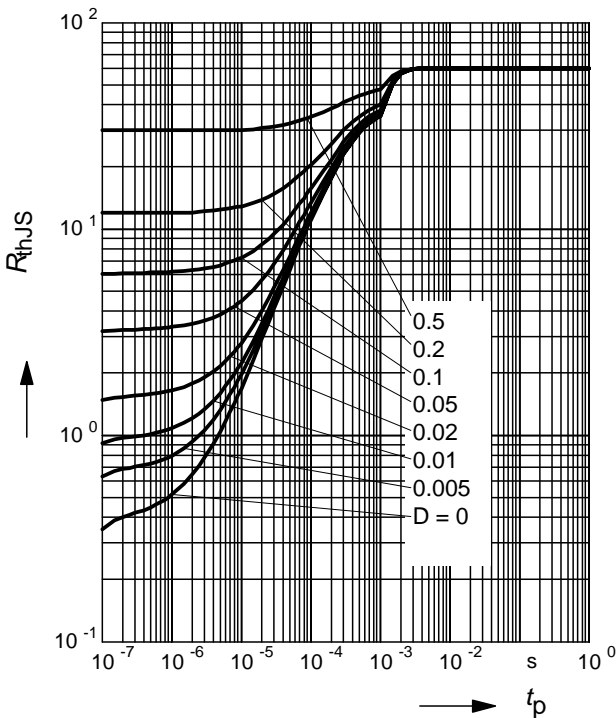
$P_{totmax}/P_{totDC} = f(t_p)$

BC847BF-BC850BF



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

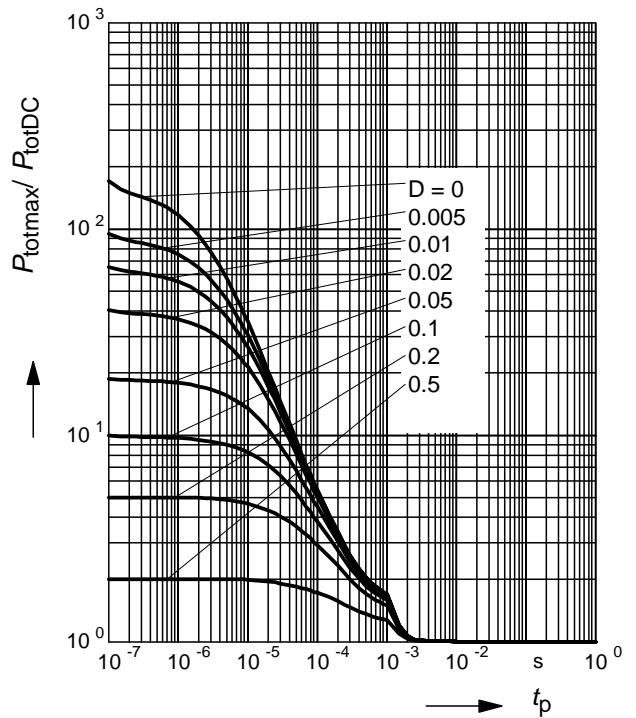
BC847BL3, BC848BL3



Permissible Pulse Load

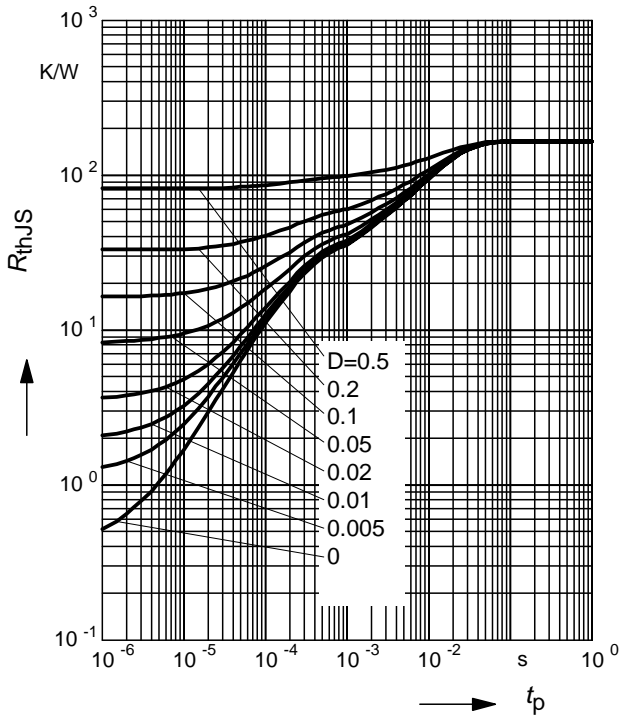
$P_{totmax}/P_{totDC} = f(t_p)$

BC847BL3, BC848BL3



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

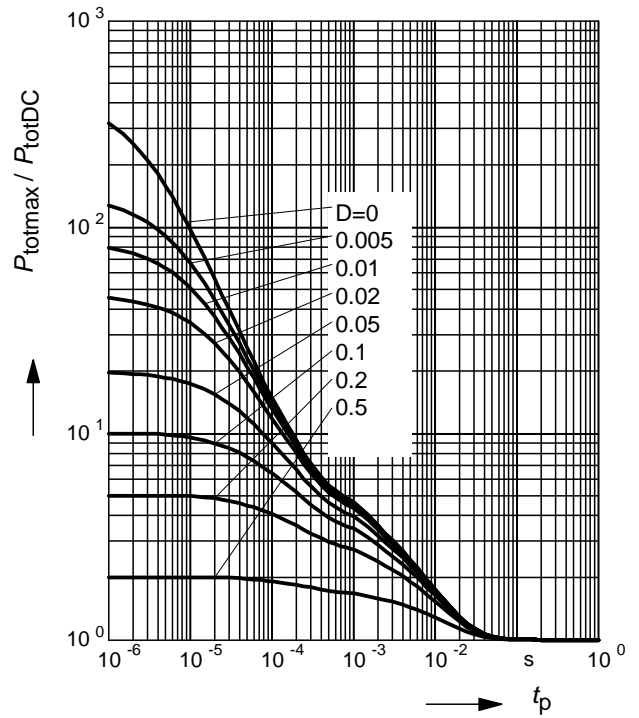
BC847BT



Permissible Pulse Load

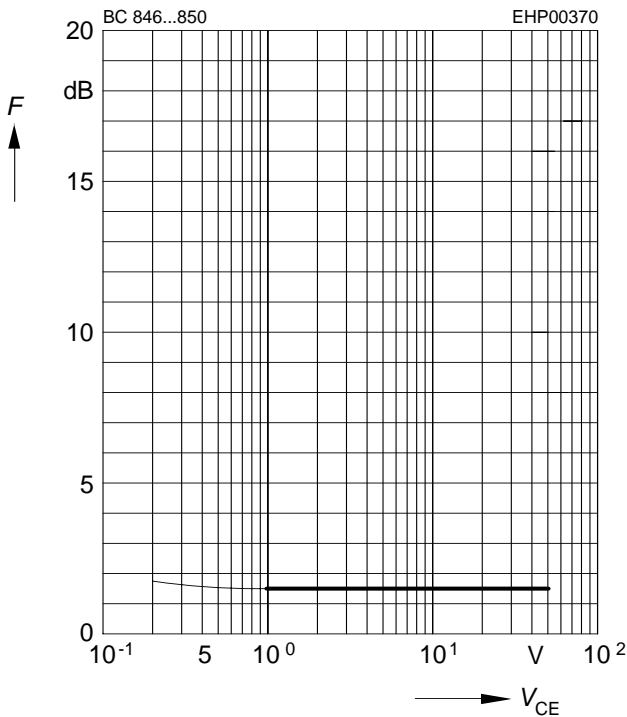
$P_{totmax}/P_{totDC} = f(t_p)$

BC847BT



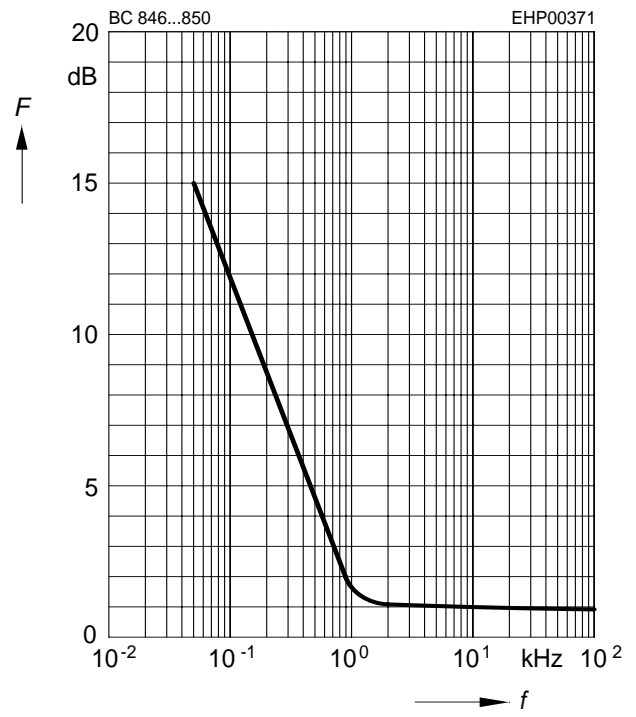
Noise figure $F = f(V_{CE})$

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



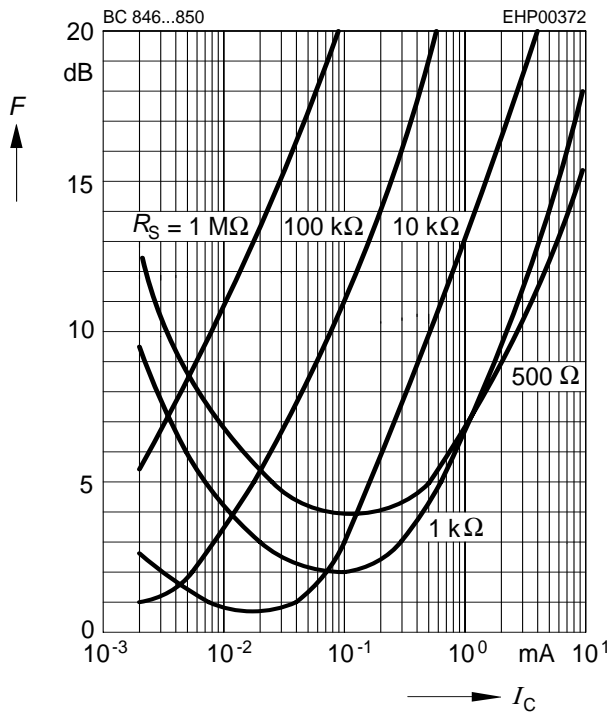
Noise figure $F = f(f)$

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



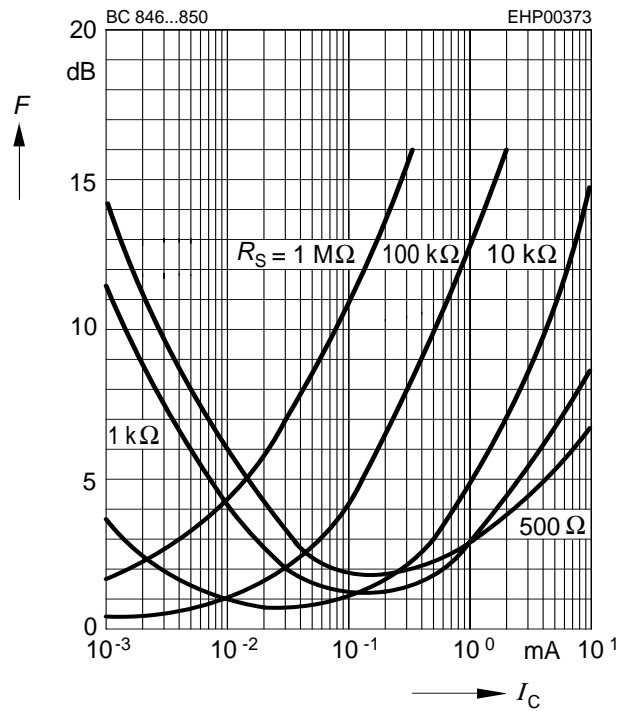
Noise figure $F = f(I_C)$

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



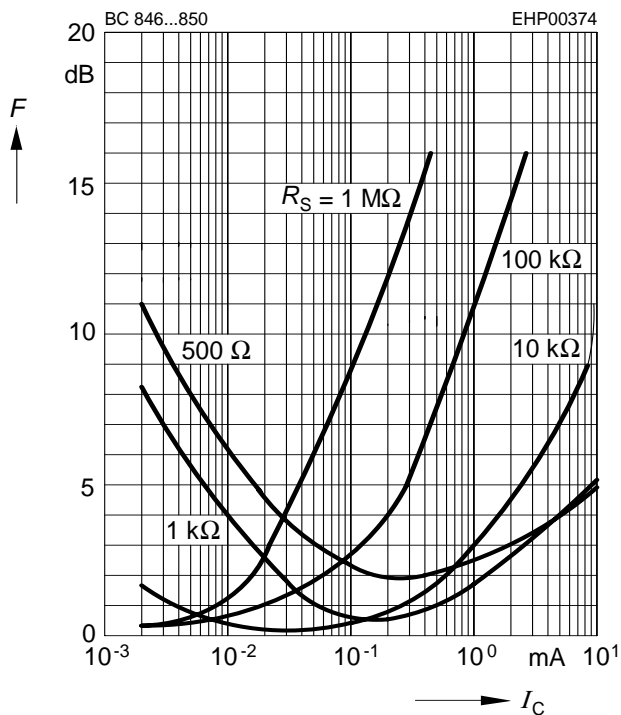
Noise figure $F = f(I_C)$

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

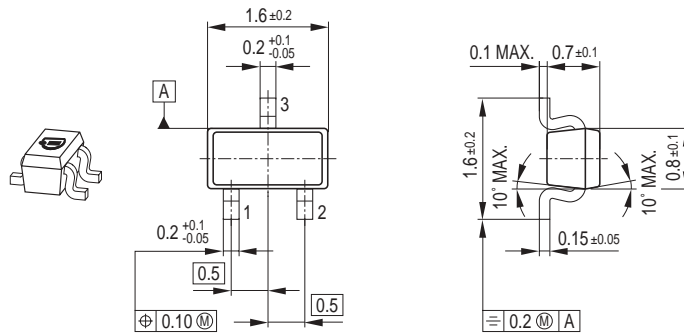


Noise figure $F = f(I_C)$

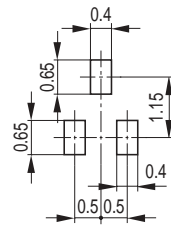
$V_{CE} = 5V, f = 10kHz$



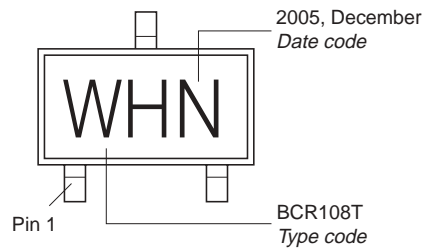
Package Outline



Foot Print

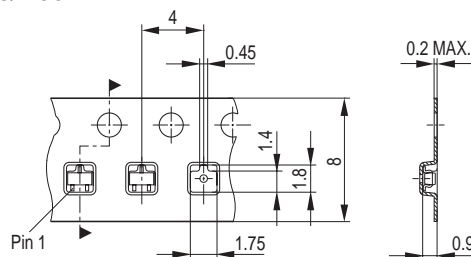


Marking Layout (Example)



Standard Packing

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

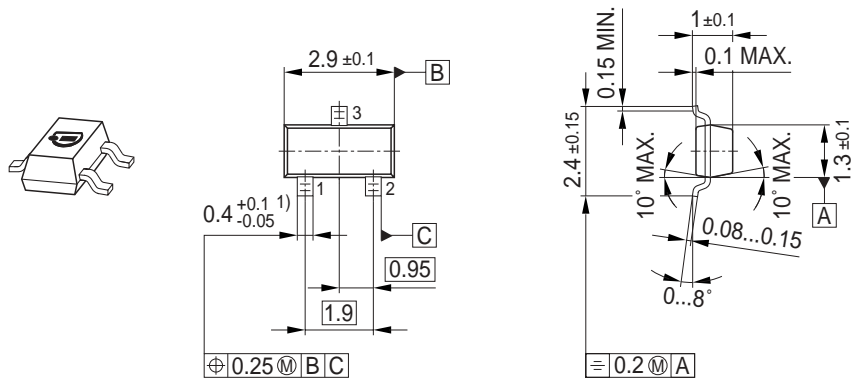


Date Code marking for discrete packages with one digit (SCD80, SC79, SC75¹⁾) CES-Code

| 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 |

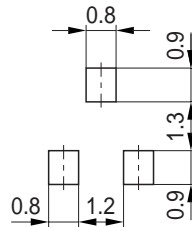
1) New Marking Layout for SC75, implemented at October 2005.

Package Outline

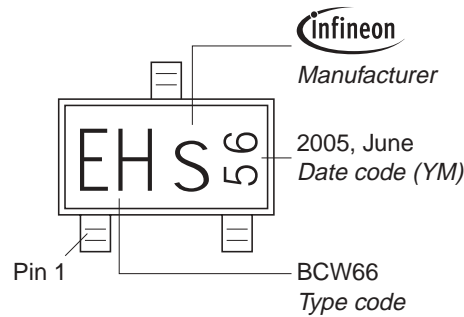


1) Lead width can be 0.6 max. in dambar area

Foot Print

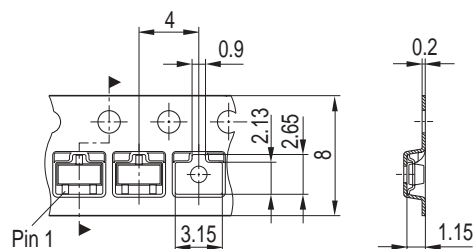


Marking Layout (Example)

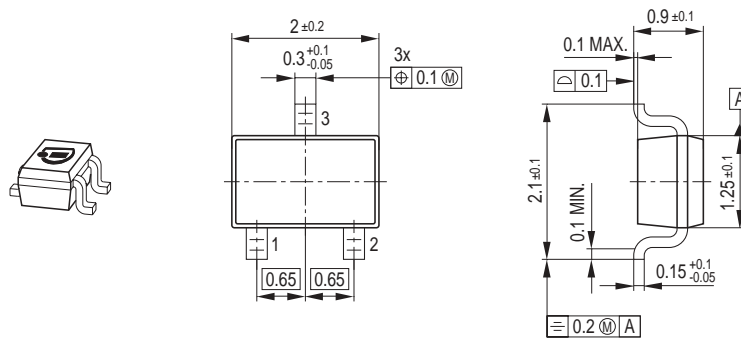


Standard Packing

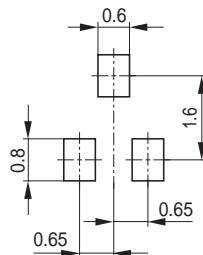
Reel \varnothing 180 mm = 3.000 Pieces/Reel
 Reel \varnothing 330 mm = 10.000 Pieces/Reel



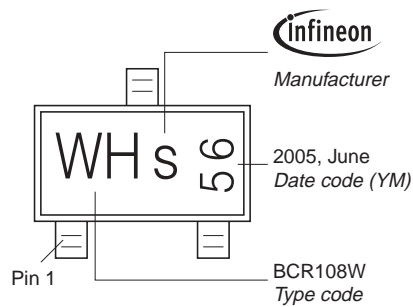
Package Outline



Foot Print

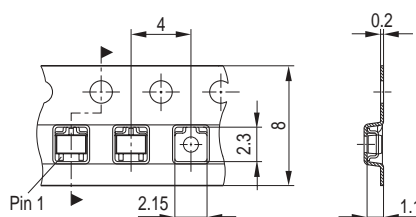


Marking Layout (Example)

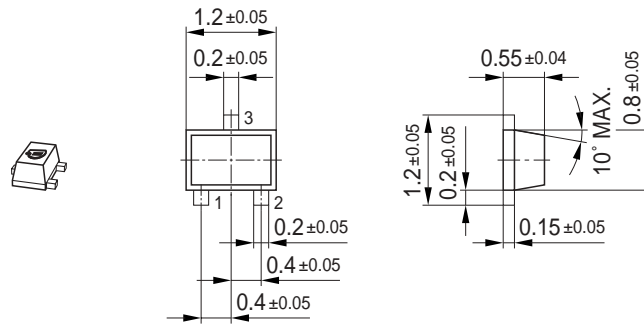


Standard Packing

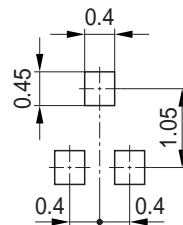
Reel $\varnothing 180$ mm = 3.000 Pieces/Reel
 Reel $\varnothing 330$ mm = 10.000 Pieces/Reel



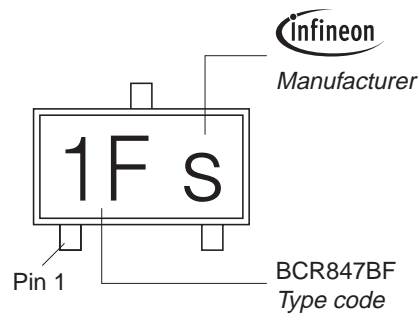
Package Outline



Foot Print

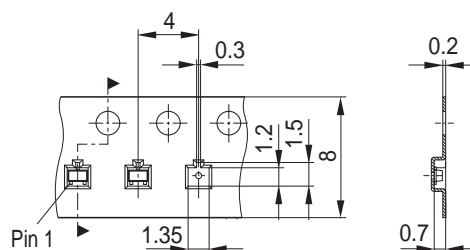


Marking Layout (Example)

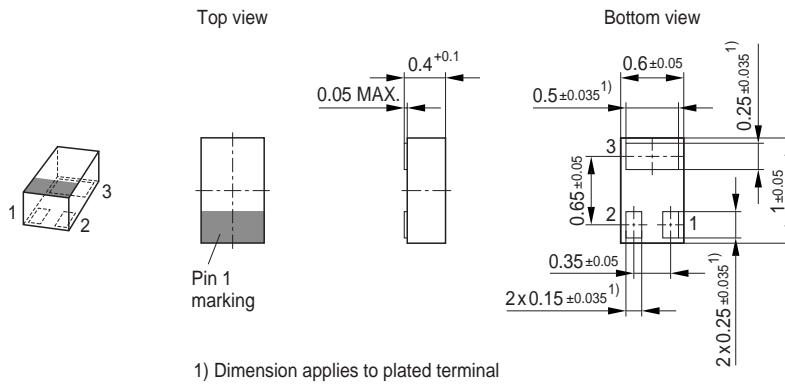


Standard Packing

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

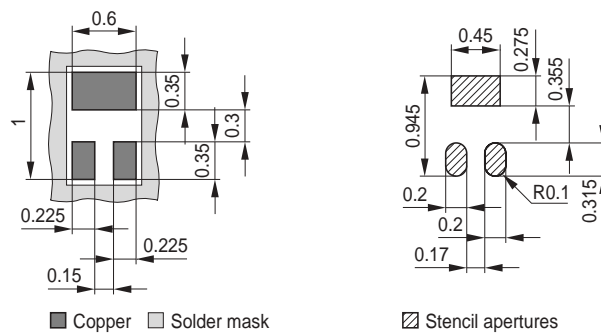


Package Outline

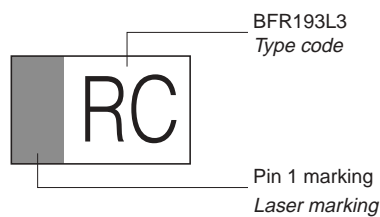


Foot Print

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

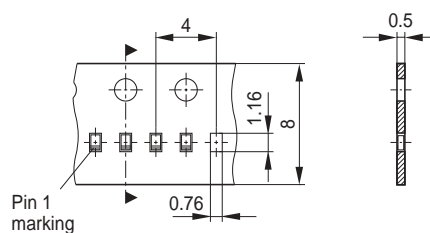


Marking Layout (Example)



Standard Packing

Reel ø180 mm = 15.000 Pieces/Reel



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