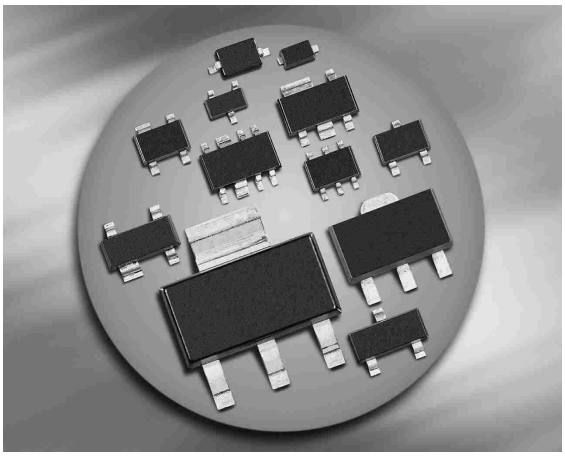
**PNP Silicon AF Transistor**

- 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 [1)]
- Qualified according AEC Q101



AEC Qualified RoHS

[1]Pb-containing package may be available upon special request

| Type | Marking | Pin Configuration | | | | | | Package |
|---|---|---|---|---|---|---|---|---|
| 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 |
| 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 |

* Not for new design

## 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, $t_p \leq 10$ ms | $I_{CM}$ | 200 | |
| Total power dissipation | $P_{tot}$ | | mW |
| $T_S \leq 71$ °C, BC856-BC860 | | 330 | |
| $T_S \leq 128$ °C, BC857BF-BC858BF | | 250 | |
| $T_S \leq 135$ °C, BC857BL3, BC860BL3 | | 250 | |
| $T_S \leq 124$ °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[1)] | $R_{thJS}$ | | K/W |
| BC856-BC860 | | ≤ 240 | |
| BC857BF-BC858BF | | ≤ 90 | |
| BC857BL3, BC858BL3 | | ≤ 60 | |
| BC856W-BC860W | | ≤ 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 , BC856... | | 65 | - | - | |
| $I_C$ = 10 mA, $I_B$ = 0 , BC857..., BC860... | | 45 | - | - | |
| $I_C$ = 10 mA, $I_B$ = 0 , BC858..., BC859... | | 30 | - | - | |
| Collector-base breakdown voltage | $V_{(BR)CBO}$ | | | | |
| $I_C$ = 10 µA, $I_E$ = 0 , BC856... | | 80 | - | - | |
| $I_C$ = 10 µA, $I_E$ = 0 , BC857..., BC860... | | 50 | - | - | |
| $I_C$ = 10 µA, $I_E$ = 0 , BC858..., BC859... | | 30 | - | - | |
| Emitter-base breakdown voltage | $V_{(BR)EBO}$ | 5 | - | - | |
| $I_E$ = 1 µA, $I_C$ = 0 | | | | | |
| 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 | | 125 | 180 | 250 | |
| $I_C$ = 2 mA, $V_{CE}$ = 5 V, $h_{FE}$-grp.B | | 220 | 290 | 475 | |
| $I_C$ = 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 | | - | 75 | 300 | |
| $I_C$ = 100 mA, $I_B$ = 5 mA | | - | 250 | 650 | |
| 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 | | - | 850 | - | |
| Base-emitter voltage[1)] | $V_{BE(ON)}$ | | | | |
| $I_C$ = 2 mA, $V_{CE}$ = 5 V | | 600 | 650 | 750 | |
| $I_C$ = 10 mA, $V_{CE}$ = 5 V | | - | - | 820 | |

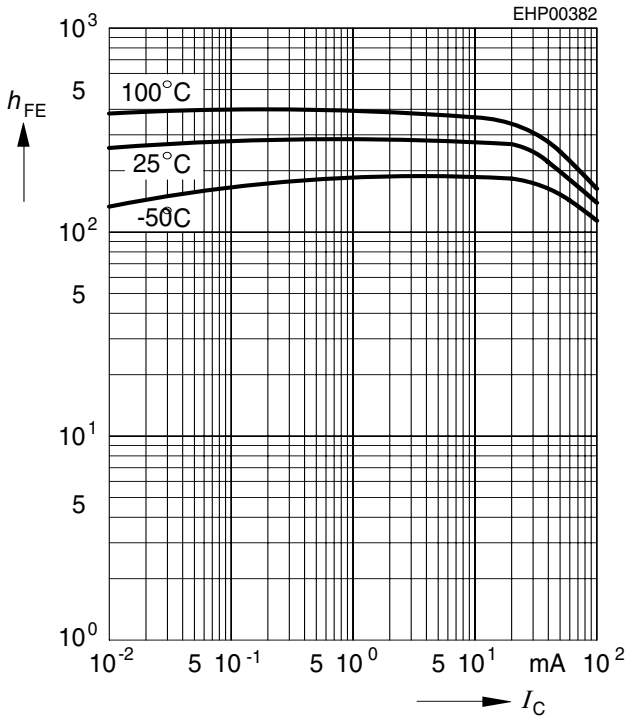
[1]Pulse test: t < 300µs; D < 2%

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

| Parameter | Symbol | Values | | | Unit |
|---|---|---|---|---|---|
| | | min. | typ. | max. | |
| **AC Characteristics** | | | | | |
| Transition frequency<br>$I_C$ = 20 mA, $V_{CE}$ = 5 V, $f$ = 100 MHz | $f_T$ | - | 250 | - | MHz |
| Collector-base capacitance<br>$V_{CB}$ = 10 V, $f$ = 1 MHz | $C_{cb}$ | - | 1.5 | - | pF |
| Emitter-base capacitance<br>$V_{EB}$ = 0.5 V, $f$ = 1 MHz | $C_{eb}$ | - | 8 | - | |
| 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<br>$I_C$ = 0.2 mA, $V_{CE}$ = 5 V, $f$ = 1 kHz,<br>$f$ = 200 Hz, $R_S$ = 2 kΩ, BC859, BC850 | $F$ | - | 1 | 4 | dB |
| Equivalent noise voltage<br>$I_C$ = 200 mA, $V_{CE}$ = 5 V, $R_S$ = 2 kΩ,<br>$f$ = 10...50 Hz, BC860 | $V_n$ | - | - | 0.11 | µV |

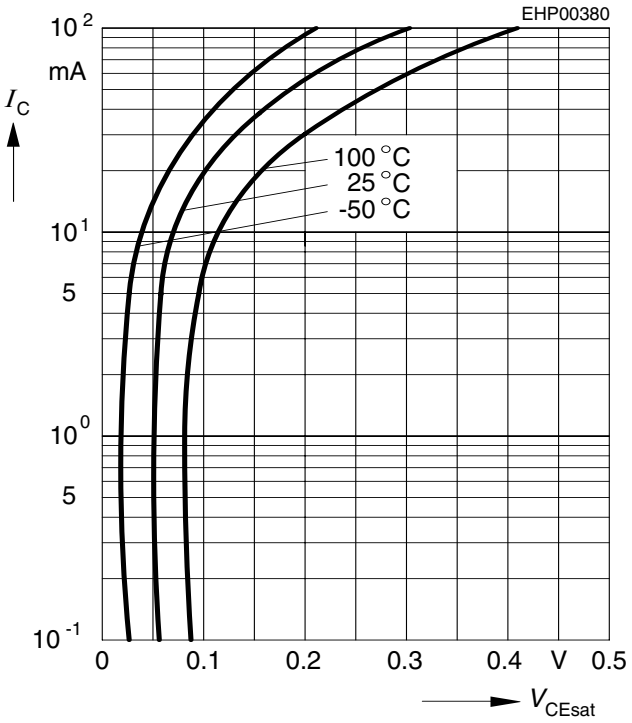
**DC current gain $h_{FE} = f(I_C)$**

$V_{CE}$ = 1 V



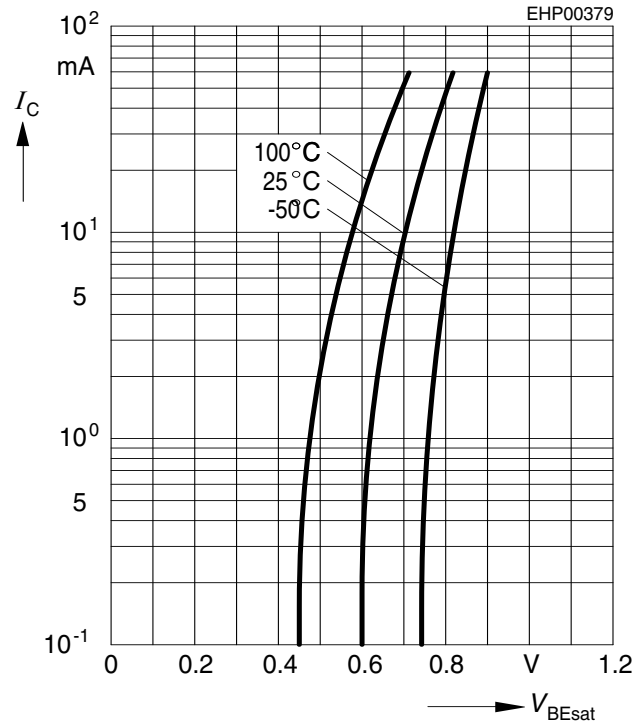

**Collector-emitter saturation voltage**

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



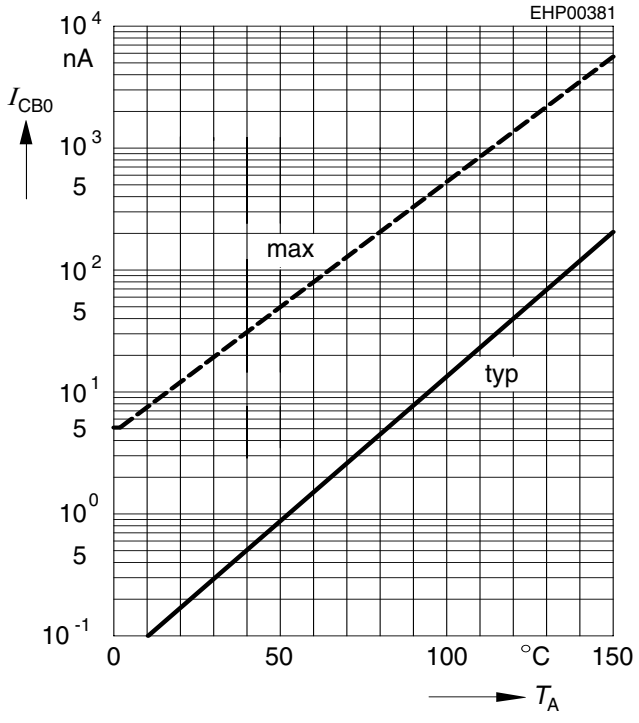

**Base-emitter saturation voltage**

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

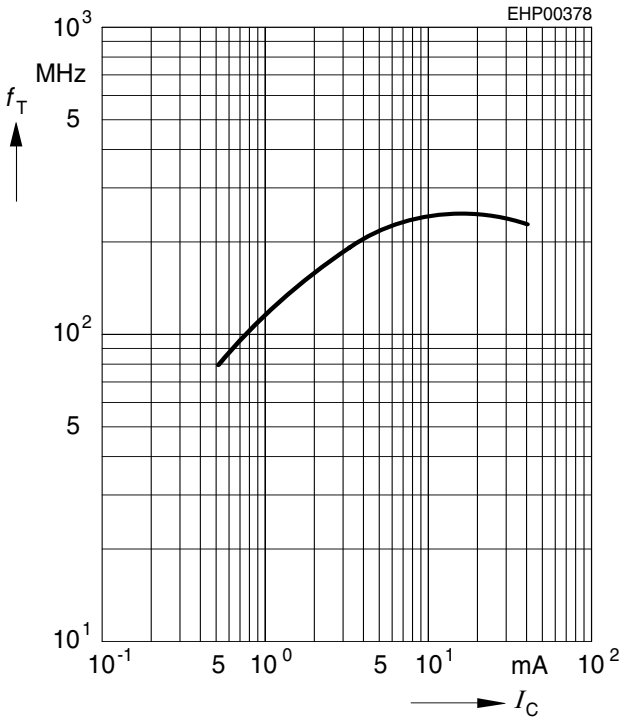



**Collector cutoff current $I_{CBO} = f(T_A)$**

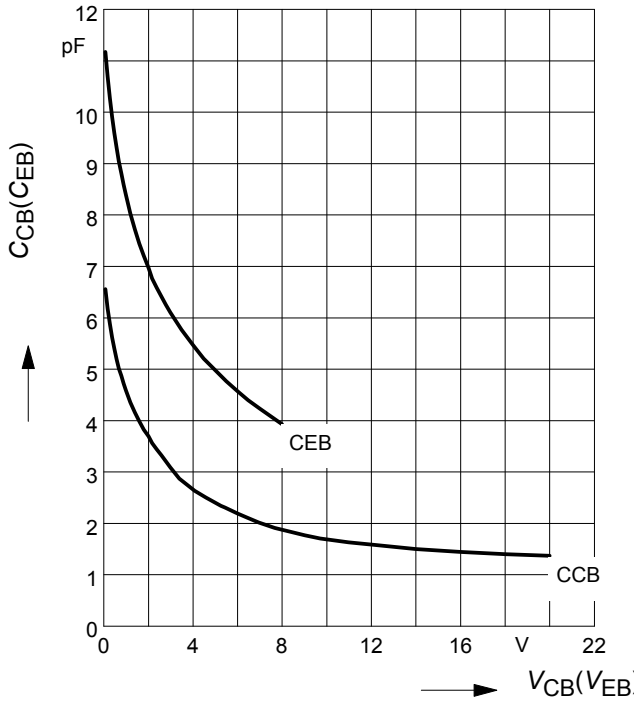
$V_{CBO}$ = 30 V



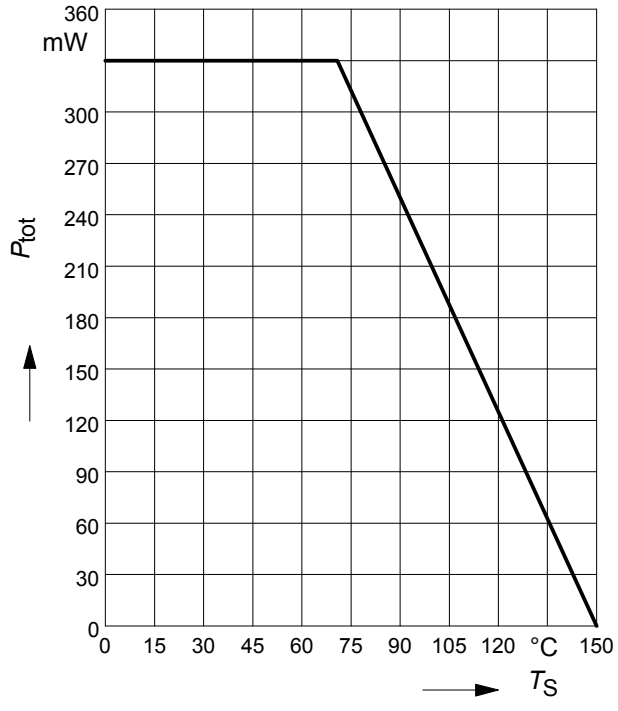
**Transition frequency** $f_T = f(I_C)$
$V_{CE}$ = 5 V



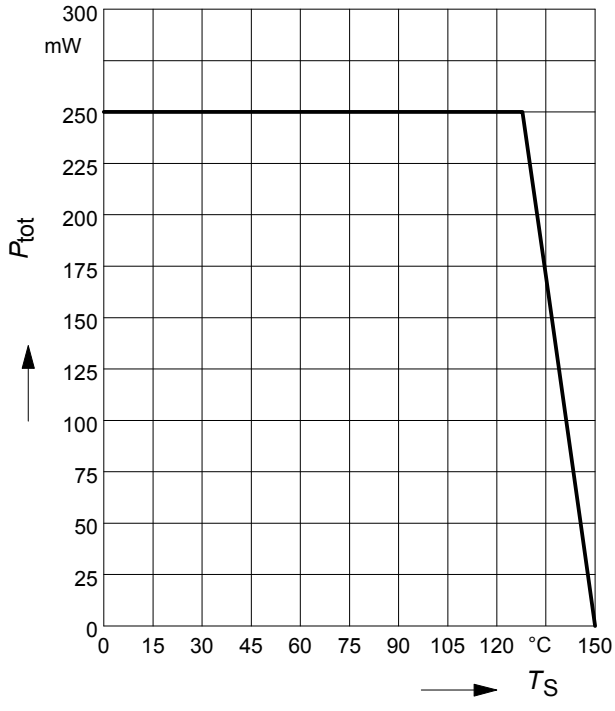

**Collector-base capacitance** $C_{cb} = f(V_{CB})$
**Emitter-base capacitance** $C_{eb} = f(V_{EB})$




**Total power dissipation** $P_{tot} = f(T_S)$
BC856-BC860

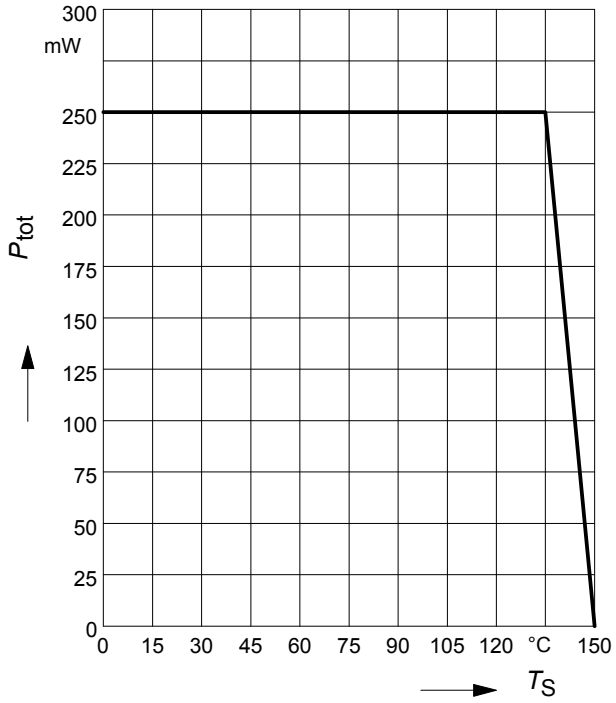



**Total power dissipation** $P_{tot} = f(T_S)$
BC857BF, BC858BF



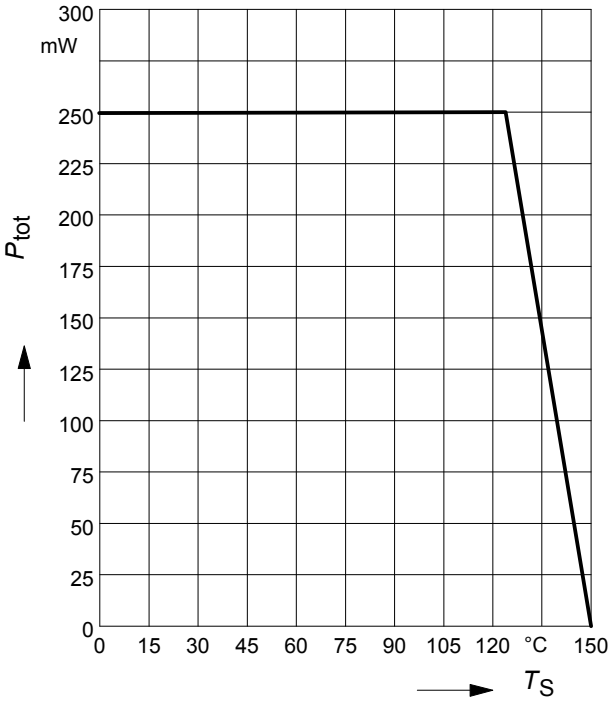
**Total power dissipation $P_{tot} = f(T_S)$**

BC857BL3, BC858BL3




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

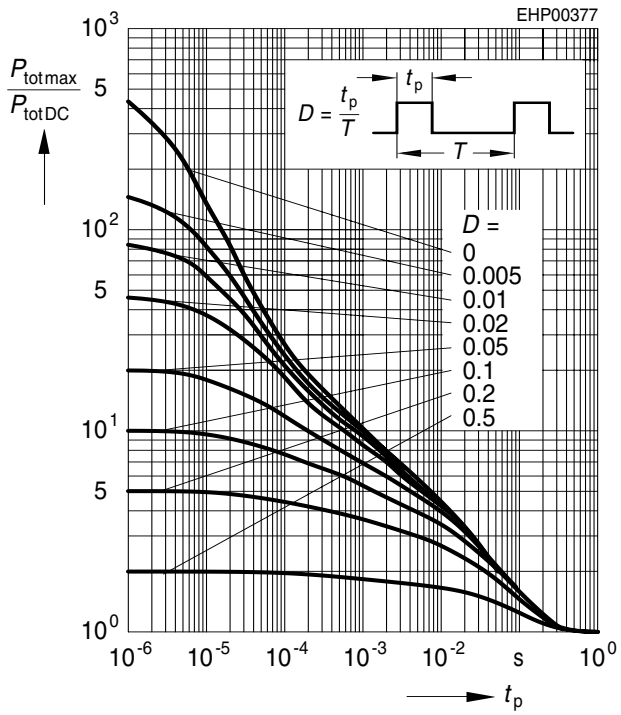
BC856W-BC860W




**Permissible Pulse Load**

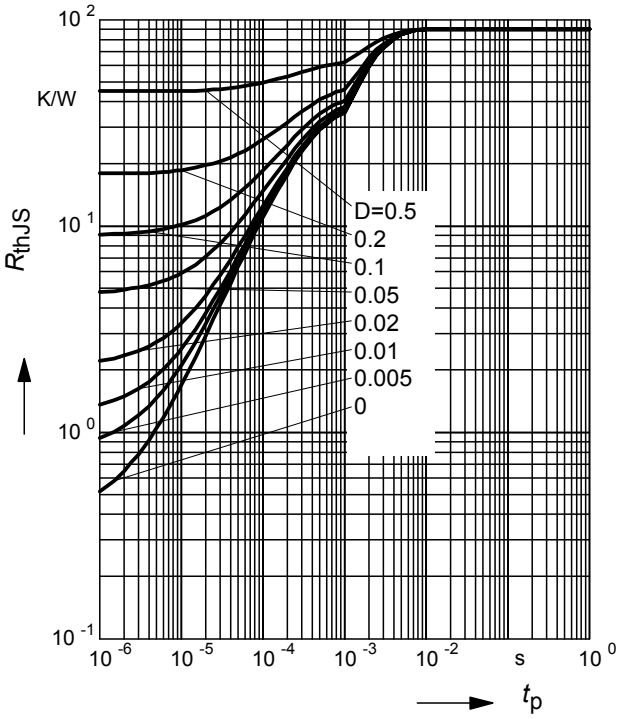
$P_{totmax}/P_{totDC} = f(t_p)$

BC856/W-BC860/W




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

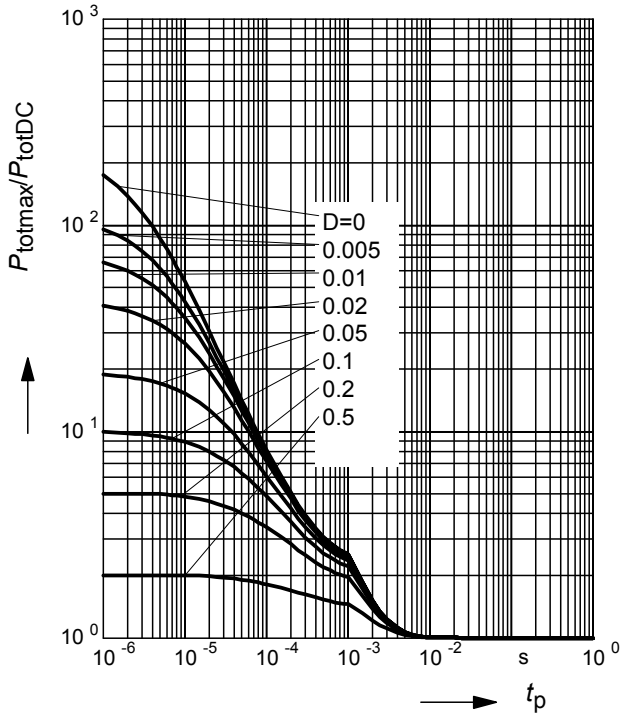
BC857BF, BC858BF



**Permissible Pulse Load**

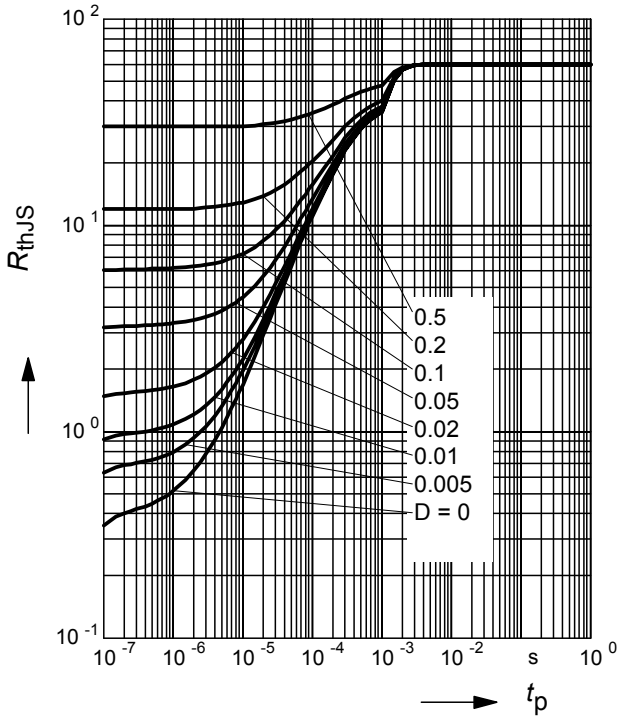
$P_{totmax}/P_{totDC} = f(t_p)$

BC857BF, BC858BF




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

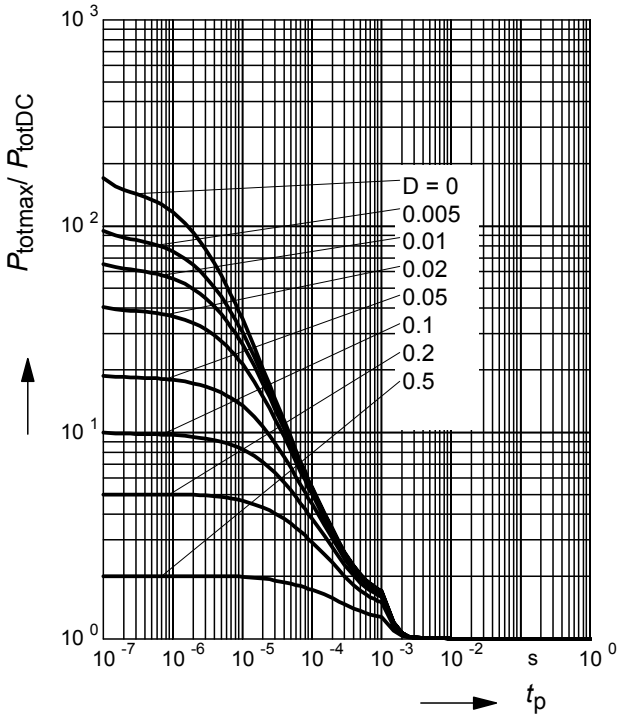
BC857BL3, BC858BL3



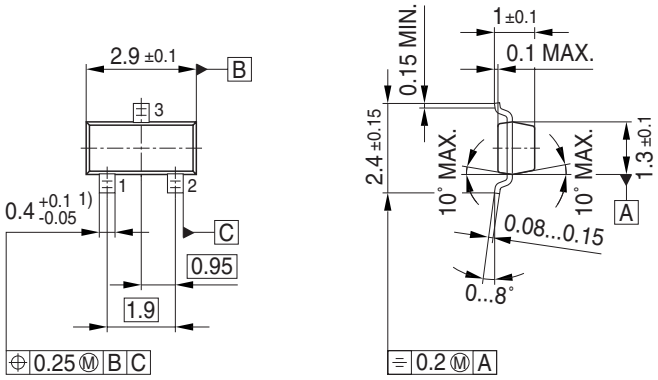

**Permissible Pulse Load**

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

BC857BL3, BC858BL3

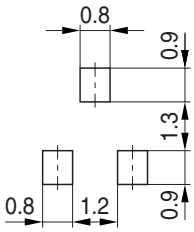


## Package Outline

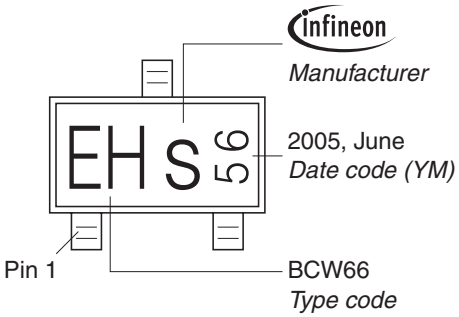



1) Lead width can be 0.6 max. in dambar area

## Foot Print

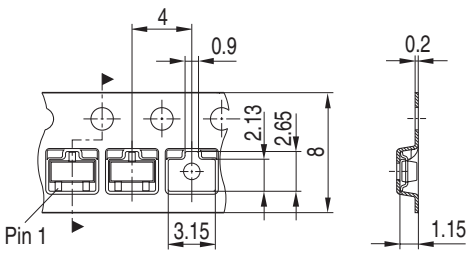



## Marking Layout (Example)

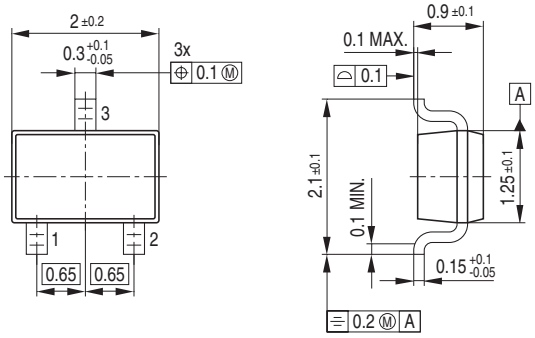



## Standard Packing

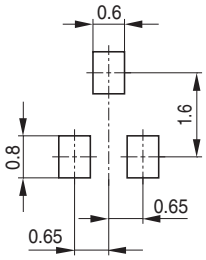
Reel ø180 mm = 3.000 Pieces/Reel
Reel ø330 mm = 10.000 Pieces/Reel



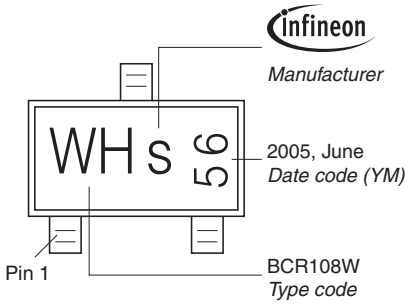
## Package Outline




## Foot Print

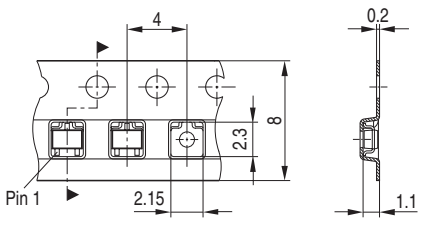



## Marking Layout (Example)

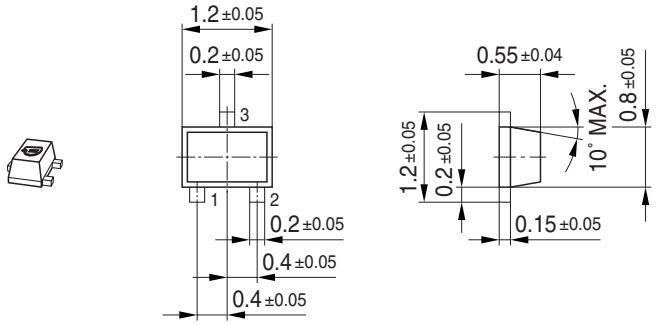



## Standard Packing

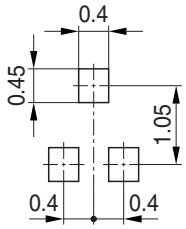
Reel ø180 mm = 3.000 Pieces/Reel
Reel ø330 mm = 10.000 Pieces/Reel



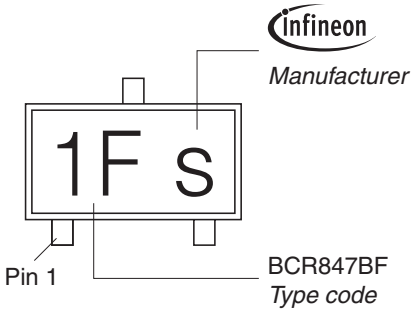
## Package Outline




## Foot Print

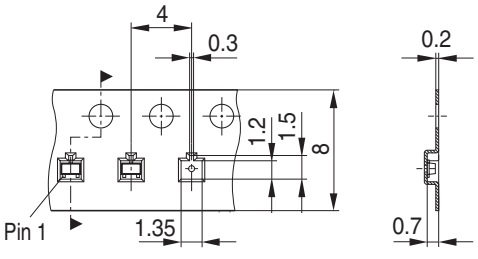



## Marking Layout (Example)

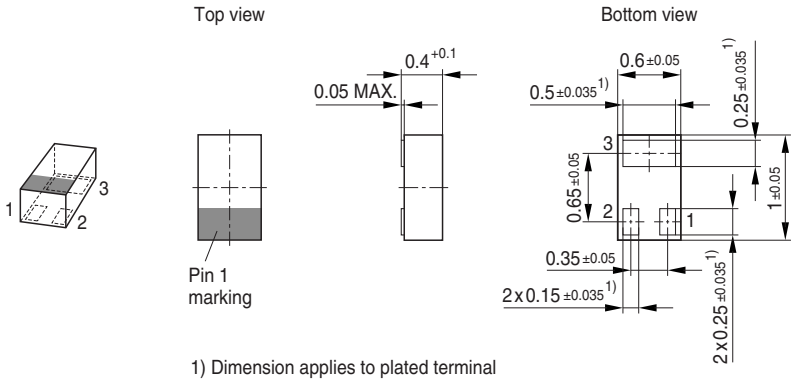



## Standard Packing

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



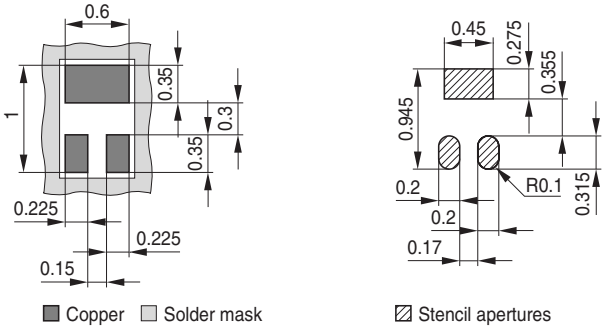
## Package Outline



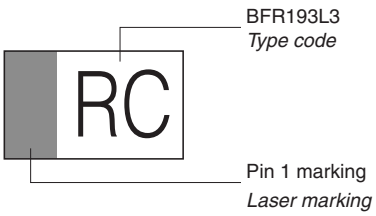

1) Dimension applies to plated terminal

## Foot Print

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

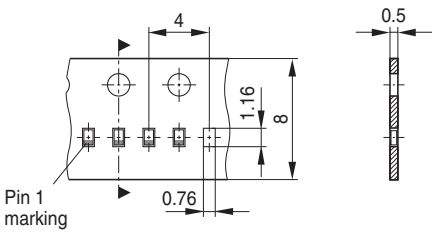



## Marking Layout (Example)




## Standard Packing

Reel ø180 mm = 15.000 Pieces/Reel



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**Information**

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