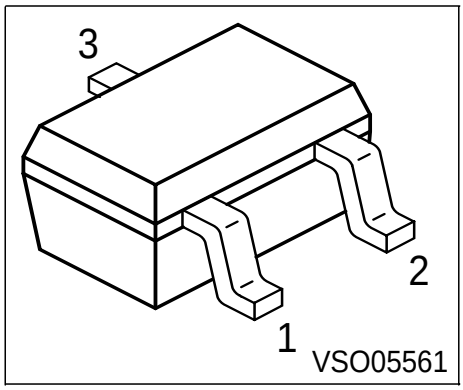
**PNP Silicon AF Transistors**

- 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:

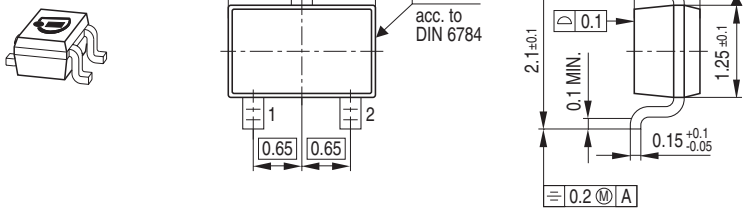
  BC846W, BC847W, BC848W

  BC849W, BC850W (NPN)

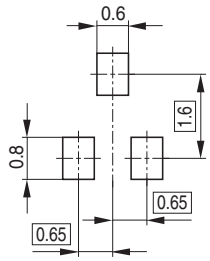



| Type | Marking | Pin Configuration | | | Package |
|---|---|---|---|---|---|
| BC856BW | 3Bs | 1 = B | 2 = E | 3 = C | SOT323 |
| BC857AW | 3Es | 1 = B | 2 = E | 3 = C | SOT323 |
| BC857BW | 3Fs | 1 = B | 2 = E | 3 = C | SOT323 |
| BC857CW | 3Gs | 1 = B | 2 = E | 3 = C | SOT323 |
| BC858BW | 3Ks | 1 = B | 2 = E | 3 = C | SOT323 |
| BC858CW | 3Ls | 1 = B | 2 = E | 3 = C | SOT323 |
| BC859AW | 4As | 1 = B | 2 = E | 3 = C | SOT323 |
| BC860BW | 4Fs | 1 = B | 2 = E | 3 = C | SOT323 |
| BC860CW | 4Gs | 1 = B | 2 = E | 3 = C | SOT323 |

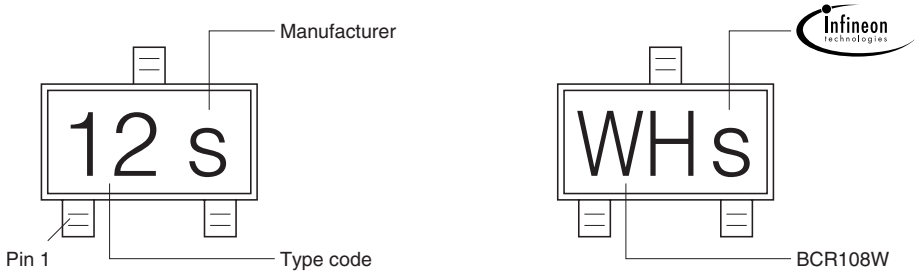
## Package Outline




## Foot Print



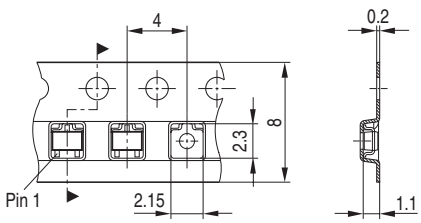

## Marking Layout




Example

## Packing

Code E6327: Reel ø180 mm = 3.000 Pieces/Reel
Code E6433: Reel ø330 mm = 10.000 Pieces/Reel



**Maximum Ratings**

| Parameter | Symbol | BC856W | BC857W<br>BC860W | BC858W<br>BC859W | Unit |
|---|---|---|---|---|---|
| Collector-emitter voltage | $V_{CEO}$ | 65 | 45 | 30 | V |
| Collector-base voltage | $V_{CBO}$ | 80 | 50 | 30 | |
| Collector-emitter voltage | $V_{CES}$ | 80 | 50 | 30 | |
| Emitter-base voltage | $V_{EBO}$ | 5 | 5 | 5 | |
| DC collector current | $I_C$ | 100 | | | mA |
| Peak collector current | $I_{CM}$ | 200 | | | mA |
| Peak base current | $I_{BM}$ | 200 | | | |
| Peak emitter current | $I_{EM}$ | 200 | | | |
| Total power dissipation, $T_S$ = 124 °C | $P_{tot}$ | 250 | | | mW |
| Junction temperature | $T_j$ | 150 | | | °C |
| Storage temperature | $T_{stg}$ | -65 ... 150 | | | |

**Thermal Resistance**

| | | | |
|---|---|---|---|
| Junction - soldering point[1)] | $R_{thJS}$ | ≤105 | K/W |

**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 | BC856W | | 65 | - | - | |
| | BC857/860W | | 45 | - | - | |
| | BC858/859W | | 30 | - | - | |
| Collector-base breakdown voltage | | $V_{(BR)CBO}$ | | | | |
| $I_C$ = 10 µA, $I_E$ = 0 | BC856W | | 80 | - | - | |
| | BC857/860W | | 50 | - | - | |
| | BC858/859W | | 30 | - | - | |

[1]For calculation of $R_{thJA}$ please refer to Application Note Thermal Resistance

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

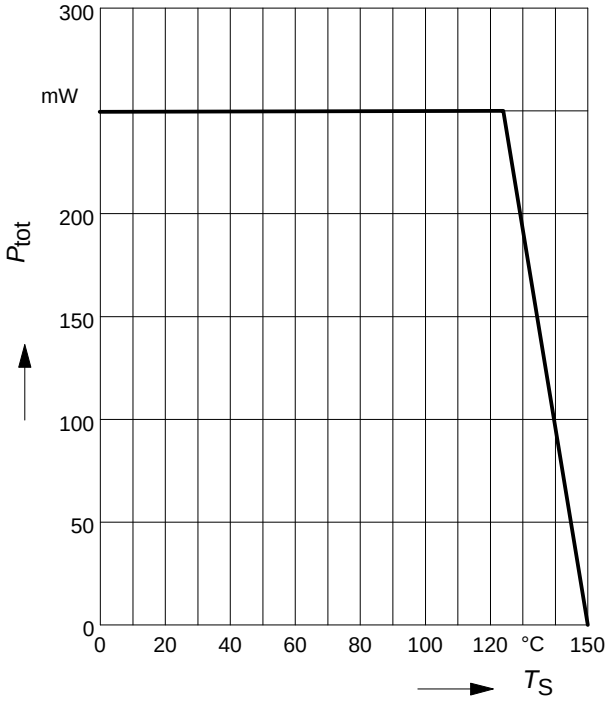
| Parameter | | Symbol | Values | | | Unit |
|---|---|---|---|---|---|---|
| | | | min. | typ. | max. | |
| **DC Characteristics** | | | | | | |
| Collector-emitter breakdown voltage | | $V_{(BR)CES}$ | | | | V |
| $I_C$ = 10 µA, $V_{BE}$ = 0 | BC856W | | 80 | - | - | |
| | BC857/860W | | 50 | - | - | |
| | BC858/859W | | 30 | - | - | |
| Emitter-base breakdown voltage | | $V_{(BR)EBO}$ | 5 | - | - | |
| $I_E$ = 1 µA, $I_C$ = 0 | | | | | | |
| Collector cutoff current | | $I_{CBO}$ | - | - | 15 | nA |
| $V_{CB}$ = 30 V, $I_E$ = 0 | | | | | | |
| Collector cutoff current | | $I_{CBO}$ | - | - | 5 | µA |
| $V_{CB}$ = 30 V, $I_E$ = 0 , $T_A$ = 150 °C | | | | | | |
| DC current gain 1) | | $h_{FE}$ | | | | - |
| $I_C$ = 10 µA, $V_{CE}$ = 5 V | $h_{FE}$-group **A** | | - | 140 | - | |
| | $h_{FE}$-group **B** | | - | 250 | - | |
| | $h_{FE}$-group **C** | | - | 480 | - | |
| DC current gain 1) | | $h_{FE}$ | | | | |
| $I_C$ = 2 mA, $V_{CE}$ = 5 V | $h_{FE}$-group **A** | | 125 | 180 | 250 | |
| | $h_{FE}$-group **B** | | 220 | 290 | 475 | |
| | $h_{FE}$-group **C** | | 420 | 520 | 800 | |
| Collector-emitter saturation voltage1) | | $V_{CEsat}$ | | | | 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%

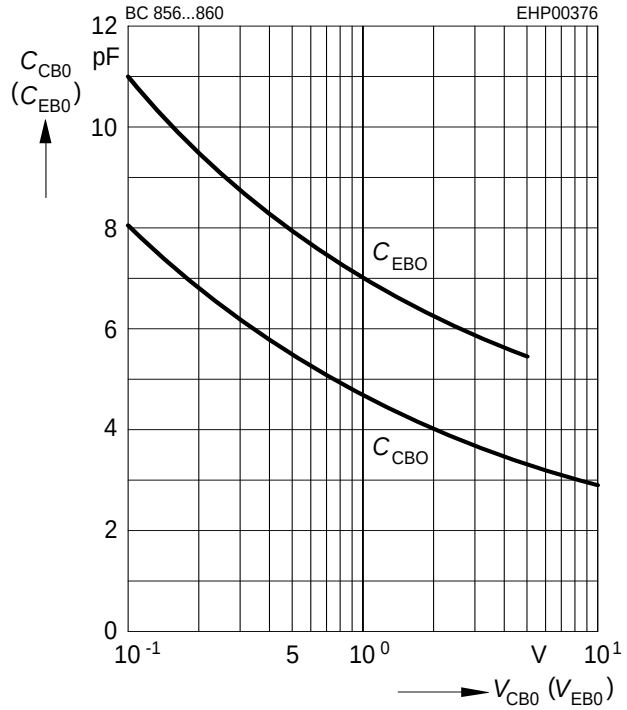
**Electrical Characteristics** at $T_A$ = 25 °C, unless otherwise specified.

| 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 | | $C_{cb}$ | - | 3 | 5 | pF |
| Emitter-base capacitance<br>$V_{EB}$ = 0.5 V, $f$ = 1 MHz | | $C_{eb}$ | - | 10 | 15 | |
| Short-circuit input impedance | | $h_{11e}$ | | | | kΩ |
| $I_C$ = 2 mA, $V_{CE}$ = 5 V, $f$ = 1 kHz | $h_{FE}$-gr.**A** | | - | 2.7 | - | |
| | $h_{FE}$-gr.**B** | | - | 4.5 | - | |
| | $h_{FE}$-gr.**C** | | - | 8.7 | - | |
| Open-circuit reverse voltage transf.ratio | | $h_{12e}$ | | | | $10^{-4}$ |
| $I_C$ = 2 mA, $V_{CE}$ = 5 V, $f$ = 1 kHz | $h_{FE}$-gr.**A** | | - | 1.5 | - | |
| | $h_{FE}$-gr.**B** | | - | 2 | - | |
| | $h_{FE}$-gr.**C** | | - | 3 | - | |
| Short-circuit forward current transf.ratio | | $h_{21e}$ | | | | - |
| $I_C$ = 2 mA, $V_{CE}$ = 5 V, $f$ = 1 kHz | $h_{FE}$-gr.**A** | | - | 200 | - | |
| | $h_{FE}$-gr.**B** | | - | 330 | - | |
| | $h_{FE}$-gr.**C** | | - | 600 | - | |
| Open-circuit output admittance | | $h_{22e}$ | | | | µS |
| $I_C$ = 2 mA, $V_{CE}$ = 5 V, $f$ = 1 kHz | $h_{FE}$-gr.**A** | | - | 18 | - | |
| | $h_{FE}$-gr.**B** | | - | 30 | - | |
| | $h_{FE}$-gr.**C** | | - | 60 | - | |
| Noise figure | | $F$ | - | - | 10 | dB |
| $I_C$ = 200 µA, $V_{CE}$ = 5 V, $R_S$ = 2 kΩ, | BC856W | | | | | |
| $f$ = 1 kHz, Δ f = 200 Hz | BC857W | | | | | |
| | BC858W | | | | | |
| Noise figure | | $F$ | | | | |
| $I_C$ = 200 µA, $V_{CE}$ = 5 V, $R_S$ = 2 kΩ, | | | | | | |
| $f$ = 1 kHz, Δ f = 200 Hz | BC859W | | - | 1 | 4 | |
| | BC860W | | - | 1 | 4 | |
| Equivalent noise voltage | | $V_n$ | - | - | 0.11 | µV |
| $I_C$ = 200 µA, $V_{CE}$ = 5 V, $R_S$ = 2 kΩ, | BC860W | | | | | |
| $f$ = 10 ... 50 Hz | | | | | | |

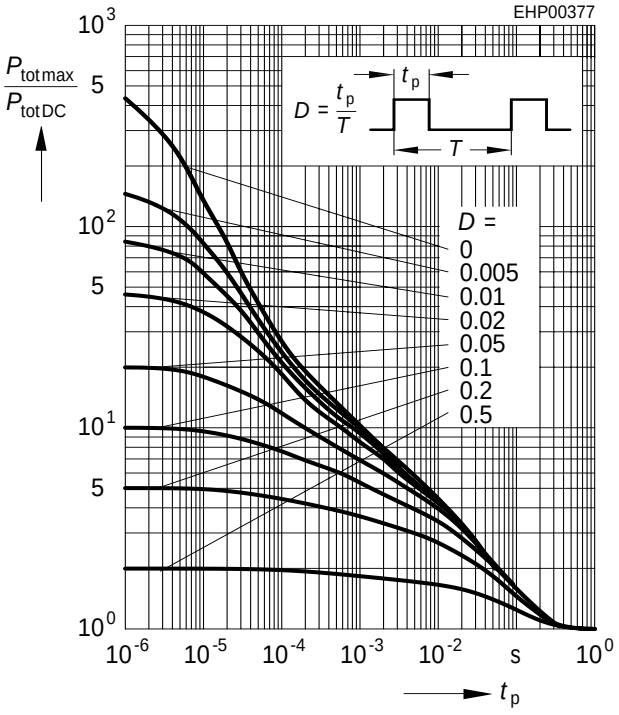
**Total power dissipation** $P_{tot} = f(T_S)$



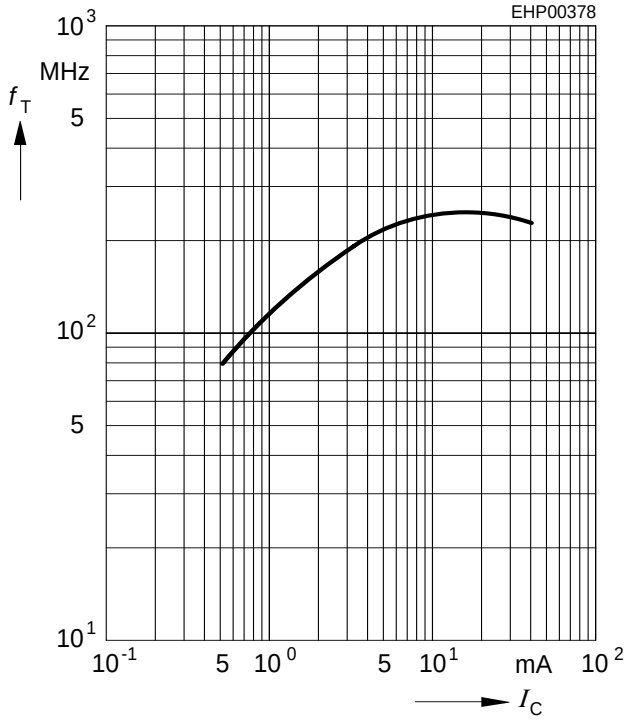

**Collector-base capacitance** $C_{CB} = f(V_{CBO})$
**Emitter-base capacitance** $C_{EB} = f(V_{EBO})$




**Permissible pulse load**
$P_{totmax} / P_{totDC} = f(t_p)$

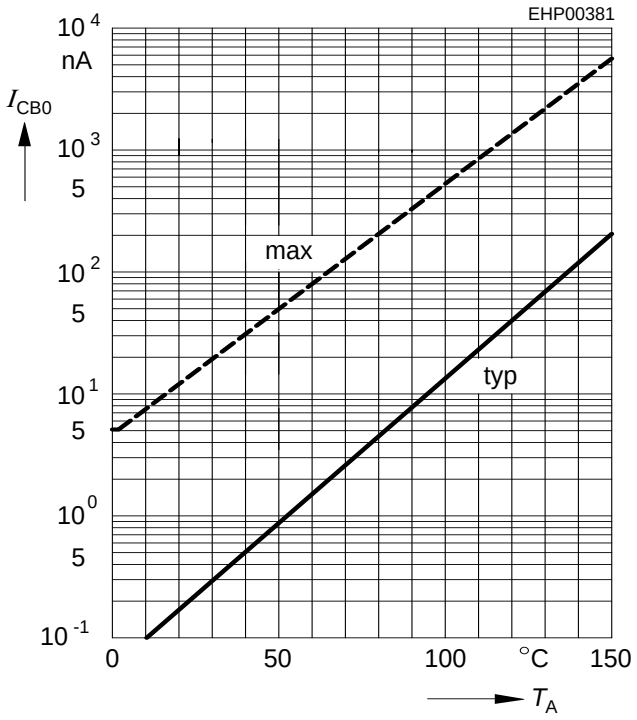



**Transition frequency** $f_T = f(I_C)$
$V_{CE} = 5V$



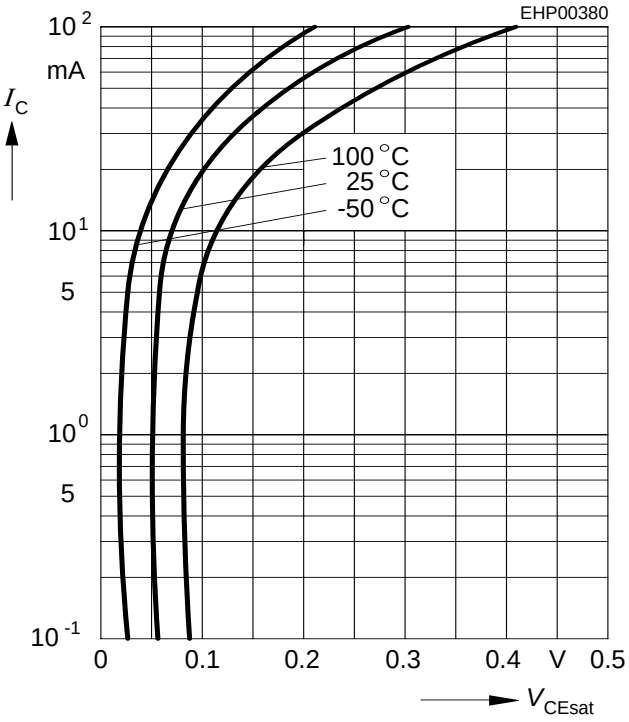
**Collector cutoff current** $I_{CBO} = f(T_A)$

$V_{CB}$ = 30V



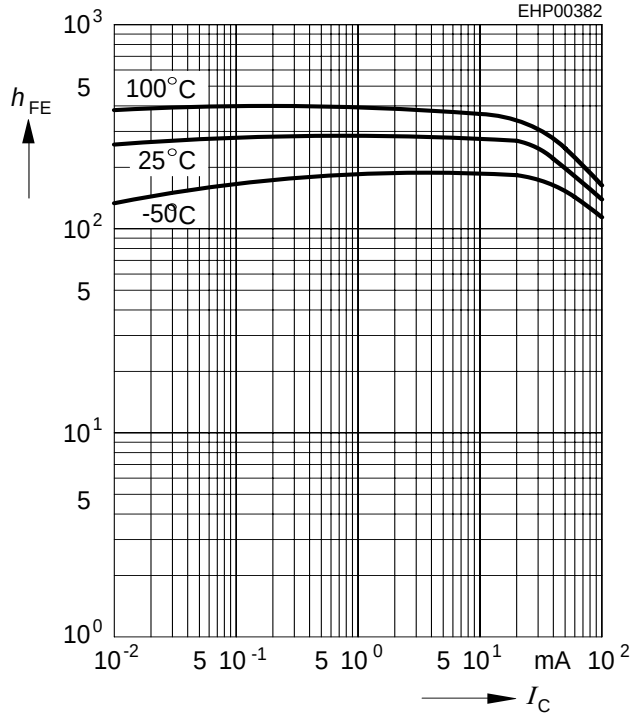

**Collector-emitter saturation voltage**

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



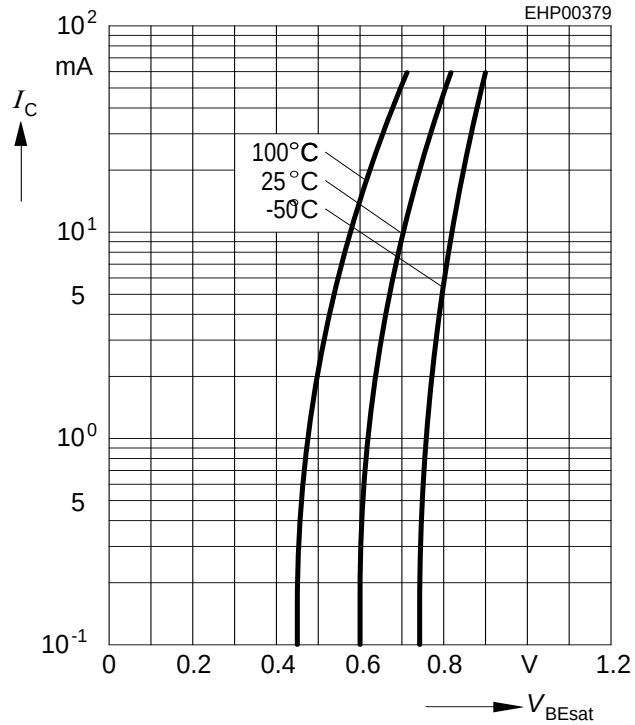

**DC current gain** $h_{FE} = f(I_C)$

$V_{CE}$ = 5V



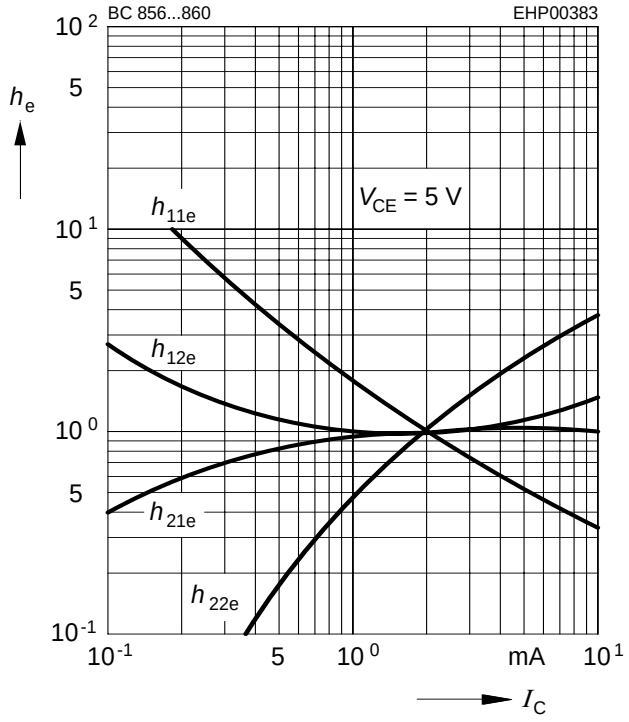

**Base-emitter saturation voltage**

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



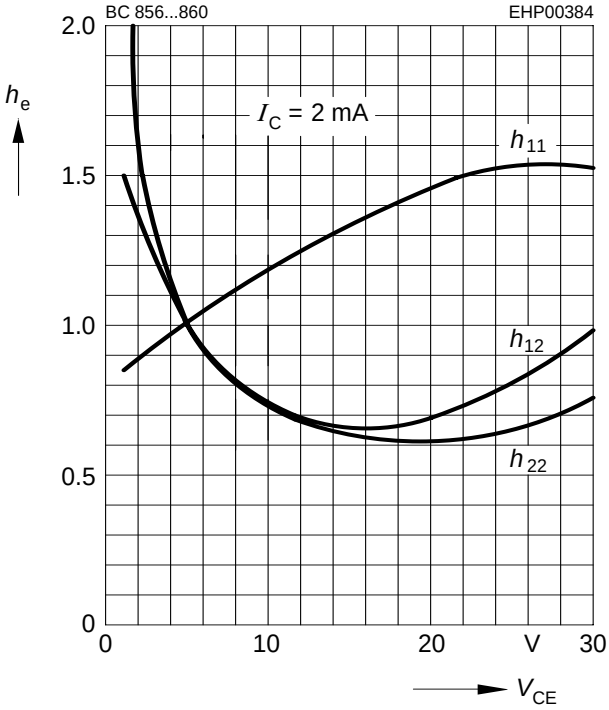
**h parameter $h_e = f(I_C)$ normalized**

$V_{CE}$ = 5V



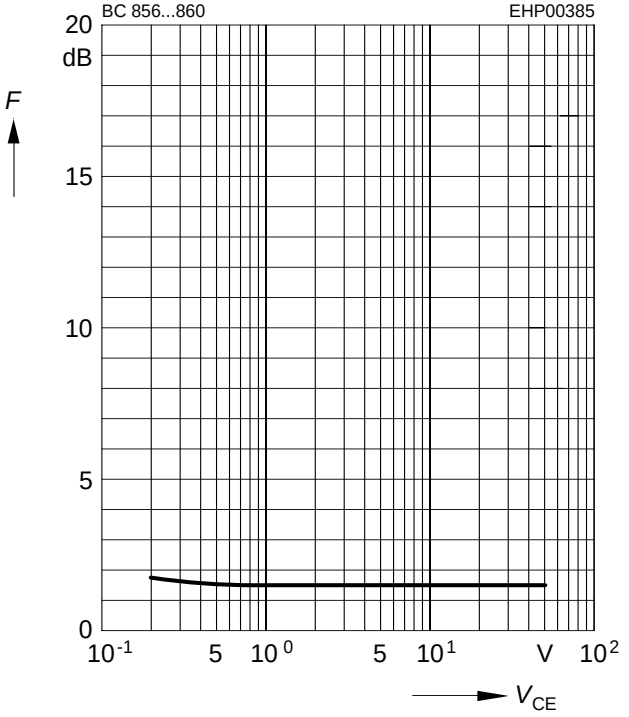

**h parameter $h_e = f(V_{CE})$ normalized**

$I_C$ = 2mA



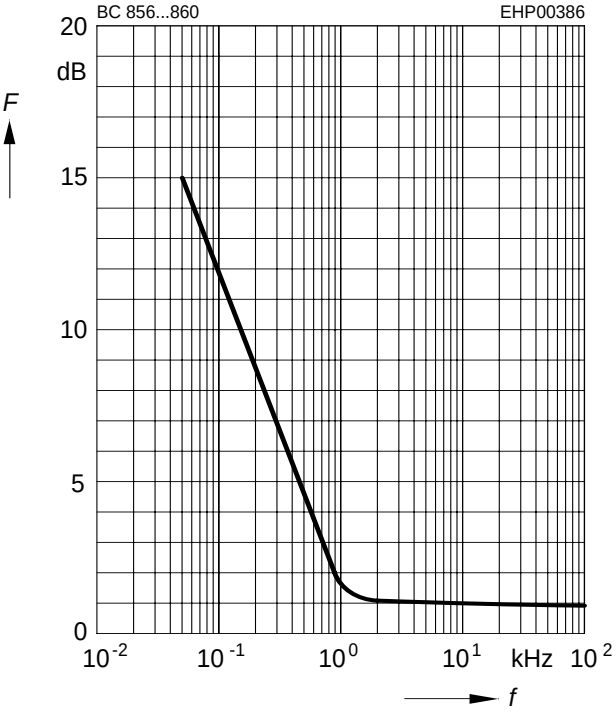

**Noise figure $F = f(V_{CE})$**

$I_C$ = 0.2mA, $R_S$ = 2kΩ, $f$ = 1kHz

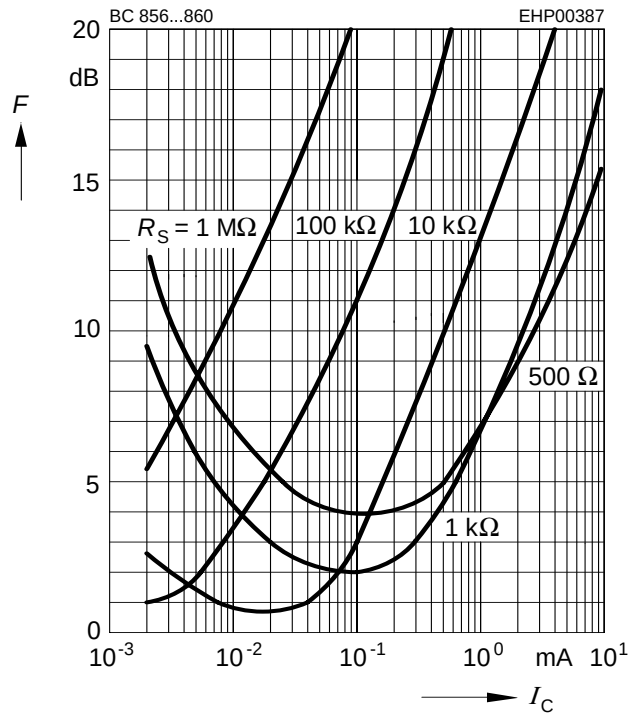



**Noise figure $F = f(f)$**

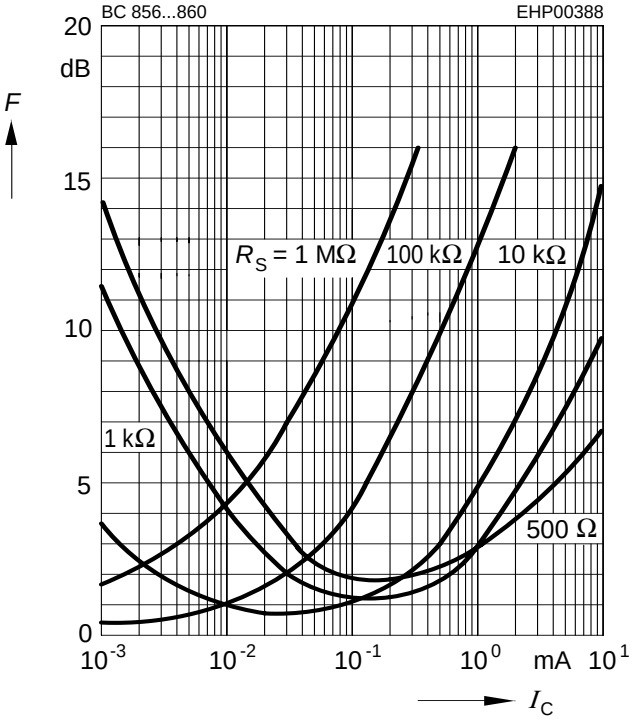
$I_C$ = 0.2mA, $V_{CE}$ = 5V, $R_S$ = 2kΩ



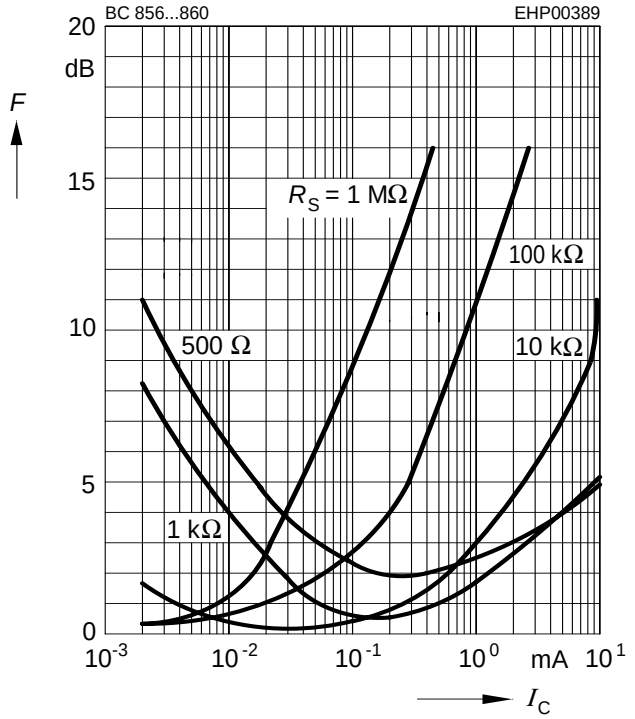
**Noise figure** $F = f(I_C)$
$V_{CE}$ = 5V, $f$ = 120Hz




**Noise figure** $F = f(I_C)$
$V_{CE}$ = 5V, $f$ = 1kHz




**Noise figure** $F = f(I_C)$
$V_{CE}$ = 5V, $f$ = 10kHz



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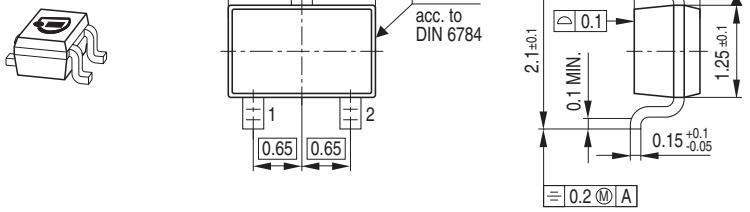


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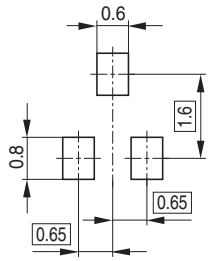


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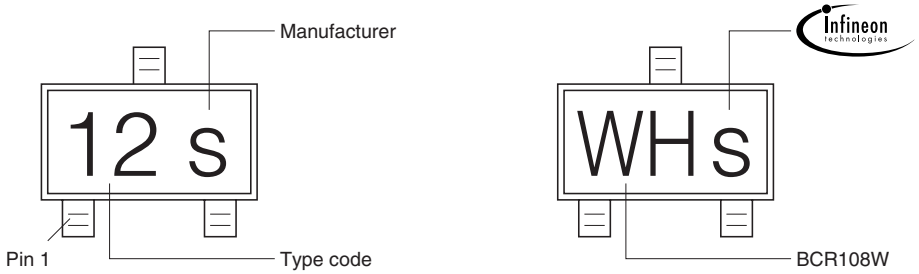


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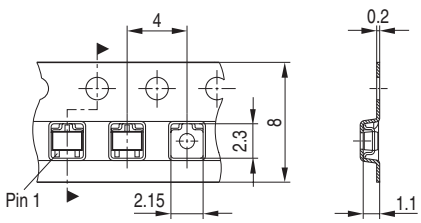

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