

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:
BC857...-BC860...(PNP)
- Pb-free (RoHS compliant) package
- Qualified according AEC Q101¹⁾



¹⁾BC847BL3 is not qualified according AEC Q101

| Type | Marking | Pin Configuration | | | | | | Package |
|-----------|---------|-------------------|-----|-----|---|---|---|----------|
| BC847A | 1Es | 1=B | 2=E | 3=C | - | - | - | SOT23 |
| BC847B | 1Fs | 1=B | 2=E | 3=C | - | - | - | SOT23 |
| BC847BL3* | 1F | 1=B | 2=E | 3=C | - | - | - | TSLP-3-1 |
| 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 |
| BC848B | 1Ks | 1=B | 2=E | 3=C | - | - | - | SOT23 |
| 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 |
| 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 |
| 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 |

* Not qualified according AEC Q101

Maximum Ratings

| Parameter | Symbol | Value | Unit |
|---|-----------|-------------------|------|
| Collector-emitter voltage BC847..., BC850... BC848..., BC849... | V_{CEO} | 45 30 | V |
| Collector-emitter voltage BC847..., BC850... BC848..., BC849... | V_{CES} | 50 30 | |
| Collector-base voltage BC847..., BC850... BC848..., BC849... | V_{CBO} | 50 30 | |
| Emitter-base voltage BC847..., BC850... BC848..., BC849... | V_{EBO} | 6 6 | |
| Collector current | I_C | 100 | mA |
| Peak collector current, $t_p \leq 10$ ms | I_{CM} | 200 | |
| Total power dissipation- $T_S \leq 71$ °C, BC847-BC850 $T_S \leq 135$ °C, BC847BL3-BC848BL3 $T_S \leq 124$ °C, BC847W-BC850W | P_{tot} | 330 250 250 | mW |
| Junction temperature | T_j | 150 | °C |
| Storage temperature | T_{stg} | -65 ... 150 | |

Thermal Resistance

| Parameter | Symbol | Value | Unit |
|---|------------|---------------------------------------|------|
| Junction - soldering point ¹⁾ BC847-BC850 BC847BL3-BC848BL3 BC847W-BC850W | R_{thJS} | ≤ 240 ≤ 60 ≤ 105 | K/W |

¹For calculation of R_{thJA} please refer to Application Note AN077 (Thermal Resistance Calculation)

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 $I_C = 10\text{ mA}$, $I_B = 0$, BC847..., BC850... $I_C = 10\text{ mA}$, $I_B = 0$, BC848..., BC849... | $V_{(BR)CEO}$ | 45 30 | - - | - - | V |
| Collector-base breakdown voltage $I_C = 10\text{ }\mu\text{A}$, $I_E = 0$, BC847..., BC850... $I_C = 10\text{ }\mu\text{A}$, $I_E = 0$, BC848..., BC849... | $V_{(BR)CBO}$ | 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 | - | |
| 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 $I_C = 200\text{ }\mu\text{A}, V_{CE} = 5\text{ V}, f = 1\text{ kHz},$ $\Delta f = 200\text{ Hz}, R_S = 2\text{ k}\Omega, \text{BC849...}, \text{BC850...}$ | F | - | 1.2 | 4 | dB |
| Equivalent noise voltage $I_C = 200\text{ }\mu\text{A}, V_{CE} = 5\text{ V}, R_S = 2\text{ k}\Omega,$ $f = 10 \dots 50\text{ Hz}, \text{BC850...}$ | 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 $P_{tot} = f(T_S)$

BC847-BC850



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

BC847BL3/BC848BL3



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

BC847W-BC850W



Permissible Pulse Load

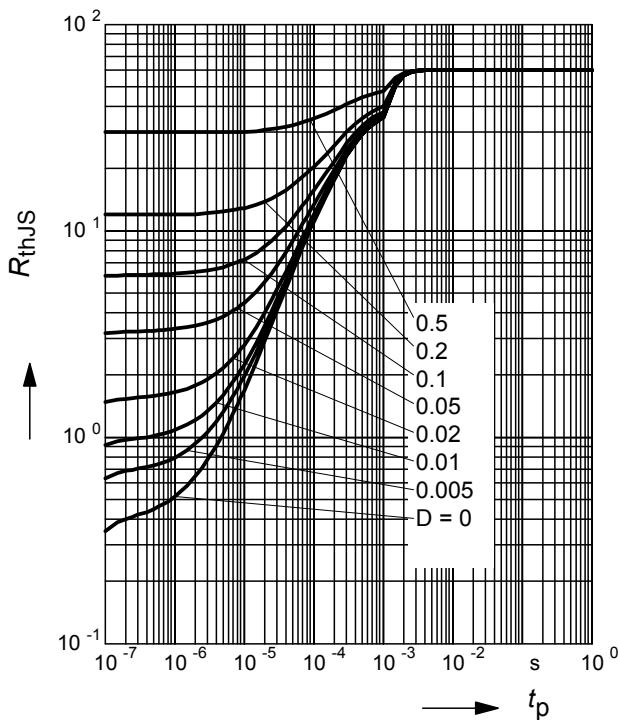
$P_{totmax}/P_{totDC} = f(t_p)$

BC847/W-BC850/W



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

BC847BL3, BC848BL3



Permissible Pulse Load

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

BC847BL3, BC848BL3



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 $F = f(I_C)$

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



Noise figure $F = f(I_C)$

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



Noise figure $F = f(I_C)$

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



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

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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