Micro Commercial Components
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# BC846A THRU BC848C

## NPN Small Signal Transistor 310mW

## Features

- Ideally Suited for Automatic Insertion
- 150°C Junction Temperature
- For Switching and AF Amplifier Applications

## Mechanical Data

- Case: SOT-23, Molded Plastic
- Terminals: Solderable per MIL-STD-202, Method 208
- Polarity: See Diagram
- Weight: 0.008 grams ( approx.)

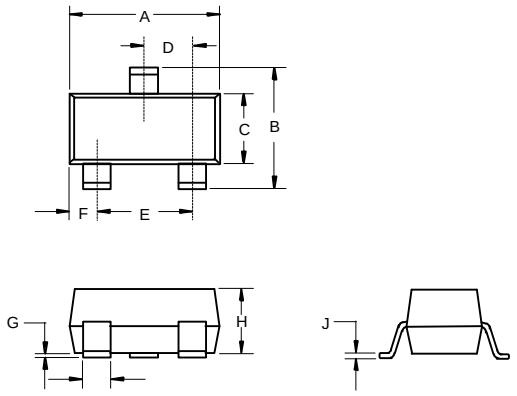
| Marking Code (Note 2) | | | |
|---|---|---|---|
| **Type** | **Marking** | **Type** | **Marking** |
| BC846A | 1A | BC847C | 1G |
| BC846B | 1B | BC848A | 1J |
| BC847A | 1E | BC848B | 1K |
| BC847B | 1F | BC848C | 1L |

Maximum Ratings @ 25°C Unless Otherwise Specified

| Charateristic | | Symbol | Value | Unit |
|---|---|---|---|---|
| Collector-Base Voltage | BC846 | $V_{CBO}$ | 80 | V |
| | BC847 | | 50 | |
| | BC848 | | 30 | |
| Collector-Emitter Voltage | BC846 | $V_{CEO}$ | 65 | V |
| | BC847 | | 45 | |
| | BC848 | | 30 | |
| Emitter-Base Voltage BC846,BC847 | BC848 | $V_{EBO}$ | 6.0<br>5.0 | V |
| Collector Current | | $I_C$ | 100 | mA |
| Peak Collector Current | | $I_{CM}$ | 200 | mA |
| Peak Emitter Current | | $I_{EM}$ | 200 | mA |
| Power Dissipation@$T_s$=50°C(Note1) | | $P_d$ | 310 | mW |
| Operating & Storage Temperature | | $T_j$, $T_{STG}$ | -55~150 | °C |

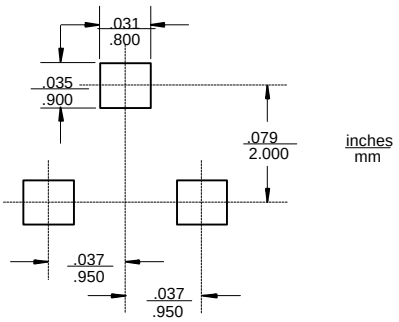
**Note:** 1. Package mounted on ceramic substrate 0.7mm X 2.5cm$^2$ area.
2. Current gain subgroup " C" is not available for BC846.

## SOT-23




| DIMENSIONS | | | | | |
|---|---|---|---|---|---|
| | INCHES | | MM | | |
| DIM | MIN | MAX | MIN | MAX | NOTE |
| A | .110 | .120 | 2.80 | 3.04 | |
| B | .083 | .098 | 2.10 | 2.64 | |
| C | .047 | .055 | 1.20 | 1.40 | |
| D | .035 | .041 | .89 | 1.03 | |
| E | .070 | .081 | 1.78 | 2.05 | |
| F | .018 | .024 | .45 | .60 | |
| G | .0005 | .0039 | .013 | .100 | |
| H | .035 | .044 | .89 | 1.12 | |
| J | .003 | .007 | .085 | .180 | |
| K | .015 | .020 | .37 | .51 | |

Suggested Solder Pad Layout



## Electrical Characteristics @ $T_A$ = 25°C unless otherwise specified

| Characteristic | Symbol | Min | Typ | Max | Unit | Test Condition |
|---|---|---|---|---|---|---|
| Collector-Base Breakdown Voltage (Note 3) BC846 | $V_{(BR)CBO}$ | 80 | — | — | V | $I_C$ = 10μA, $I_B$ = 0 |
| BC847 | | 50 | — | — | | |
| BC848 | | 30 | — | — | | |
| Collector-Emitter Breakdown Voltage (Note 3) BC846 | $V_{(BR)CEO}$ | 65 | — | — | V | $I_C$ = 10mA, $I_B$ = 0 |
| BC847 | | 45 | — | — | | |
| BC848 | | 30 | — | — | | |
| Emitter-Base Breakdown Voltage (Note 3) BC846 | $V_{(BR)EBO}$ | 6 | — | — | V | $I_E$ = 1μA, $I_C$ = 0 |
| BC847 | | 5 | | | | |
| BC848 | | | | | | |
| H-Parameters | | | | | | |
| Small Signal Current Gain Current Gain Group A | $h_{fe}$ | — | 220 | — | — | $V_{CE}$ = 5.0V, $I_C$ = 2.0mA, f = 1.0kHz |
| B | $h_{fe}$ | — | 330 | — | — | |
| C | $h_{fe}$ | — | 600 | — | — | |
| Input Impedance Current Gain Group A | $h_{ie}$ | — | 2.7 | — | kΩ | |
| B | $h_{ie}$ | — | 4.5 | — | kΩ | |
| C | $h_{ie}$ | — | 8.7 | — | kΩ | |
| Output Admittance Current Gain Group A | $h_{oe}$ | — | 18 | — | μS | |
| B | $h_{oe}$ | — | 30 | — | μS | |
| C | $h_{oe}$ | — | 60 | — | μS | |
| Reverse Voltage Transfer Ratio A | $h_{re}$ | — | $1.5x10^{-4}$ | — | — | |
| Current Gain Group B | $h_{re}$ | — | $2x10^{-4}$ | — | — | |
| C | $h_{re}$ | — | $3x10^{-4}$ | — | — | |
| DC Current Gain Current Gain Group A | — | 110 | 180 | 220 | — | $V_{CE}$ = 5.0V, $I_C$ = 2.0mA |
| B | | 200 | 290 | 450 | | |
| (Note 3) C | | 420 | 520 | 800 | | |
| Thermal Resistance, Junction to Substrate Backside | $R_{\theta S}$ | — | — | 320 | °C/W | Note 1 |
| Thermal Resistance, Junction to Ambient Air | $R_{\theta JA}$ | — | — | 400 | °C/W | Note 1 |
| Collector-Emitter Saturation Voltage (Note 3) | $V_{CE(SAT)}$ | — | 90 | 250 | mV | $I_C$ = 10mA, $I_B$ = 0.5mA |
| | | | 200 | 600 | | $I_C$ = 100mA, $I_B$ = 5.0mA |
| Base-Emitter Saturation Voltage (Note 3) | $V_{BE(SAT)}$ | — | 700 | — | mV | $I_C$ = 10mA, $I_B$ = 0.5mA |
| | | | 900 | | | $I_C$ = 100mA, $I_B$ = 5.0mA |
| Base-Emitter Voltage (Note 3) | $V_{BE(ON)}$ | 580 | 660 | 700 | mV | $V_{CE}$ = 5.0V, $I_C$ = 2.0mA |
| | | — | — | 770 | | $V_{CE}$ = 5.0V, $I_C$ = 10mA |
| Collector-Cutoff Current (Note 3) BC846 | $I_{CES}$ | — | — | 15 | nA | $V_{CE}$ = 80V |
| BC847 | $I_{CES}$ | — | — | 15 | nA | $V_{CE}$ = 50V |
| BC848 | $I_{CES}$ | — | — | 15 | nA | $V_{CE}$ = 30V |
| | $I_{CBO}$ | — | — | 15 | nA | $V_{CB}$ = 40V |
| | $I_{CBO}$ | — | — | 5.0 | μA | $V_{CB}$ = 30V, $T_A$ = 150°C |
| Gain Bandwidth Product | $f_T$ | 100 | 300 | — | MHz | $V_{CE}$ = 5.0V, $I_C$ = 10mA, f = 100MHz |
| Collector-Base Capacitance | $C_{CBO}$ | — | 3.0 | — | pF | $V_{CB}$ = 10V, f = 1.0MHz |
| Noise Figure | NF | — | 2 | 10 | dB | $V_{CE}$ = 5V, $I_C$ = 200μA, $R_S$ = 2.0kΩ, f = 1.0kHz, Δf = 200Hz |

Notes: 1. Package mounted on ceramic substrate 0.7mm x 2.5$cm^2$ area.
2. Current gain subgroup “C” is not available for BC846.
3. Short duration pulse test to minimize self-heating effect.