

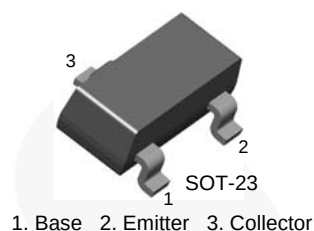


August 2015

## BC846 / BC847 / BC848 / BC850 NPN Epitaxial Silicon Transistor

### Features

- Switching and Amplifier Applications
- Suitable for Automatic Insertion in Thick and Thin-film Circuits
- Low Noise: BC850
- Complement to BC856, BC857, BC858, BC859, and BC860



### Ordering Information<sup>(1)</sup>

| Part Number | Marking | Package   | Packing Method |
|-------------|---------|-----------|----------------|
| BC846AMTF   | 8AA     | SOT-23 3L | Tape and Reel  |
| BC846BMTF   | 8AB     | SOT-23 3L | Tape and Reel  |
| BC846CMTF   | 8AC     | SOT-23 3L | Tape and Reel  |
| BC847AMTF   | 8BA     | SOT-23 3L | Tape and Reel  |
| BC847BMTF   | 8BB     | SOT-23 3L | Tape and Reel  |
| BC847CMTF   | 8BC     | SOT-23 3L | Tape and Reel  |
| BC848BMTF   | 8CB     | SOT-23 3L | Tape and Reel  |
| BC848CMTF   | 8CC     | SOT-23 3L | Tape and Reel  |
| BC850AMTF   | 8EA     | SOT-23 3L | Tape and Reel  |
| BC850CMTF   | 8EC     | SOT-23 3L | Tape and Reel  |

#### Note:

1. Affix "-A,-B,-C" means  $h_{FE}$  classification. Affix "-M" means SOT-23 package. Affix "-TF" means the tape and reel type packing.

## Absolute Maximum Ratings

Stresses exceeding the absolute maximum ratings may damage the device. The device may not function or be operable above the recommended operating conditions and stressing the parts to these levels is not recommended. In addition, extended exposure to stresses above the recommended operating conditions may affect device reliability. The absolute maximum ratings are stress ratings only. Values are at  $T_A = 25^\circ\text{C}$  unless otherwise noted.

| Symbol    | Parameter                 | Value         | Unit             |
|-----------|---------------------------|---------------|------------------|
| $V_{CBO}$ | Collector-Base Voltage    | BC846         | V                |
|           |                           | BC847 / BC850 |                  |
|           |                           | BC848         |                  |
| $V_{CEO}$ | Collector-Emitter Voltage | BC846         | V                |
|           |                           | BC847 / BC850 |                  |
|           |                           | BC848         |                  |
| $V_{EBO}$ | Emitter-Base Voltage      | BC846 / BC847 | V                |
|           |                           | BC848 / BC850 |                  |
| $I_C$     | Collector Current (DC)    | 100           | mA               |
| $T_J$     | Junction Temperature      | 150           | $^\circ\text{C}$ |
| $T_{STG}$ | Storage Temperature Range | -65 to +150   | $^\circ\text{C}$ |

## Thermal Characteristics<sup>(2)</sup>

Values are at  $T_A = 25^\circ\text{C}$  unless otherwise noted.

| Symbol          | Parameter                               | Value | Unit                      |
|-----------------|-----------------------------------------|-------|---------------------------|
| $P_D$           | Power Dissipation                       | 310   | mW                        |
|                 | Derate Above $25^\circ\text{C}$         | 2.48  | mW/ $^\circ\text{C}$      |
| $R_{\theta JA}$ | Thermal Resistance, Junction-to-Ambient | 403   | $^\circ\text{C}/\text{W}$ |

### Note:

2. PCB size: FR-4, 76 mm x 114 mm x 1.57 mm (3.0 inch x 4.5 inch x 0.062 inch) with minimum land pattern size.

**Electrical Characteristics<sup>(3)</sup>**Values are at  $T_A = 25^\circ\text{C}$  unless otherwise noted.

| Symbol        | Parameter                            | Conditions                                                    | Min. | Typ. | Max. | Unit |
|---------------|--------------------------------------|---------------------------------------------------------------|------|------|------|------|
| $I_{CBO}$     | Collector Cut-Off Current            | $V_{CB} = 30\text{ V}, I_E = 0$                               |      |      | 15   | nA   |
| $h_{FE}$      | DC Current Gain                      | $V_{CE} = 5\text{ V}, I_C = 2\text{ mA}$                      | 110  |      | 800  |      |
| $V_{CE(sat)}$ | Collector-Emitter Saturation Voltage | $I_C = 10\text{ mA}, I_B = 0.5\text{ mA}$                     |      | 90   | 250  | mV   |
|               |                                      | $I_C = 100\text{ mA}, I_B = 5\text{ mA}$                      |      | 200  | 600  |      |
| $V_{BE(sat)}$ | Collector-Base Saturation Voltage    | $I_C = 10\text{ mA}, I_B = 0.5\text{ mA}$                     |      | 700  |      | mV   |
|               |                                      | $I_C = 100\text{ mA}, I_B = 5\text{ mA}$                      |      | 900  |      |      |
| $V_{BE(on)}$  | Base-Emitter On Voltage              | $V_{CE} = 5\text{ V}, I_C = 2\text{ mA}$                      | 580  | 660  | 700  | mV   |
|               |                                      | $V_{CE} = 5\text{ V}, I_C = 10\text{ mA}$                     |      |      | 720  |      |
| $f_T$         | Current Gain Bandwidth Product       | $V_{CE} = 5\text{ V}, I_C = 10\text{ mA}, f = 100\text{ MHz}$ |      | 300  |      | MHz  |
| $C_{ob}$      | Output Capacitance                   | $V_{CB} = 10\text{ V}, I_E = 0, f = 1\text{ MHz}$             |      | 3.5  | 6.0  | pF   |
| $C_{ib}$      | Input Capacitance                    | $V_{EB} = 0.5\text{ V}, I_C = 0, f = 1\text{ MHz}$            |      | 9    |      | pF   |
| NF            | Noise Figure                         | BC846 / BC847 / BC848                                         |      | 2.0  | 10.0 | dB   |
|               |                                      | BC850                                                         |      | 1.2  | 4.0  |      |
|               |                                      | BC850                                                         |      | 1.4  | 3.0  |      |

**Note:**3. Pulse test: pulse width  $\leq 300\text{ }\mu\text{s}$ , duty cycle  $\leq 2\%$  **$h_{FE}$  Classification**

| Classification | A         | B         | C         |
|----------------|-----------|-----------|-----------|
| $h_{FE}$       | 110 ~ 220 | 200 ~ 450 | 420 ~ 800 |

## Typical Performance Characteristics

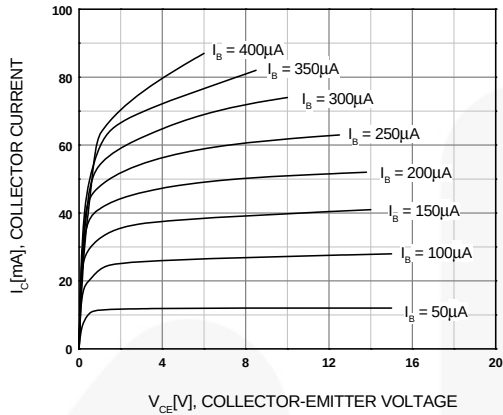


Figure 1. Static Characteristic

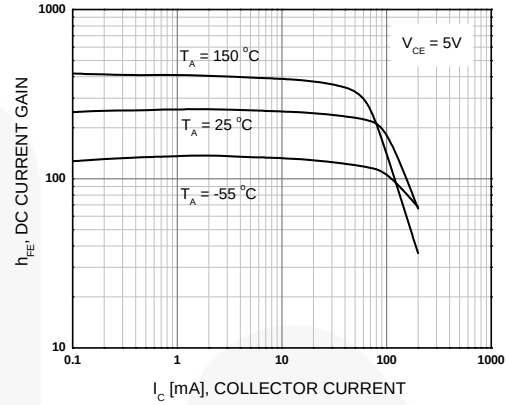


Figure 2. DC Current Gain

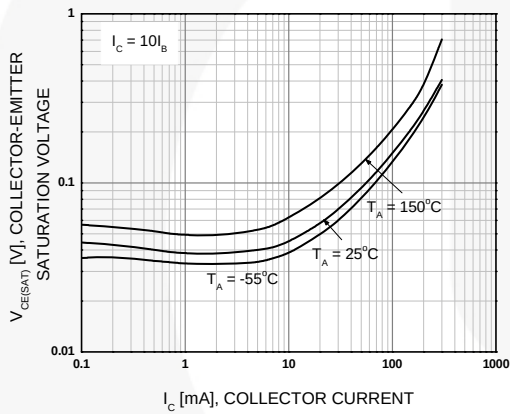


Figure 3. Collector-Emitter Saturation Voltage

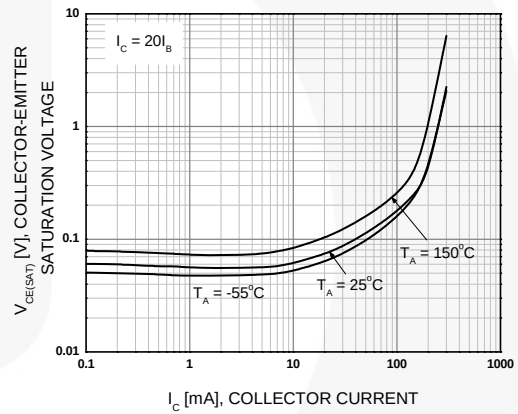


Figure 4. Collector-Emitter Saturation Voltage

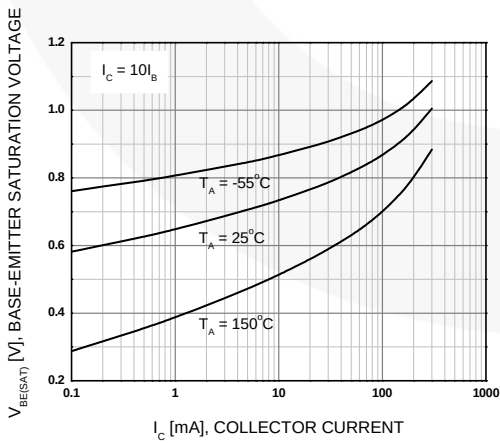


Figure 5. Base-Emitter Saturation Voltage

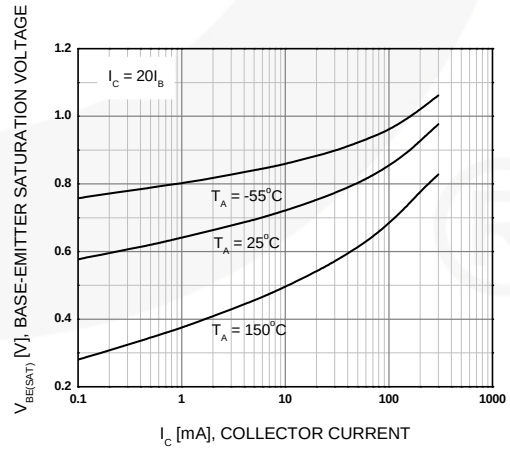


Figure 6. Base-Emitter Saturation Voltage

## Typical Performance Characteristics (Continued)

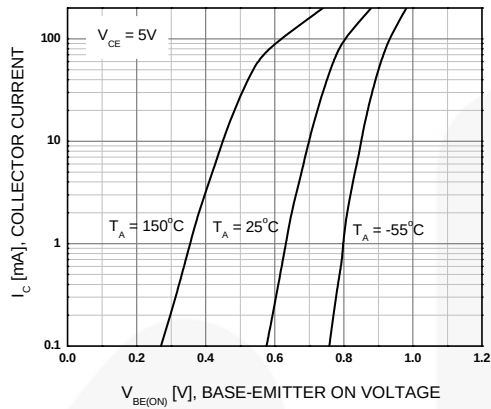


Figure 7. Base-Emitter On Voltage

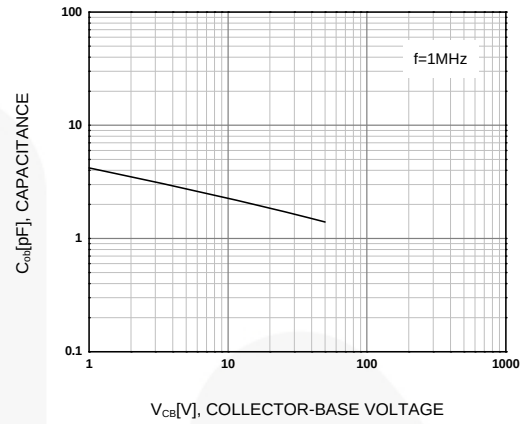


Figure 8. Collector Output Capacitance

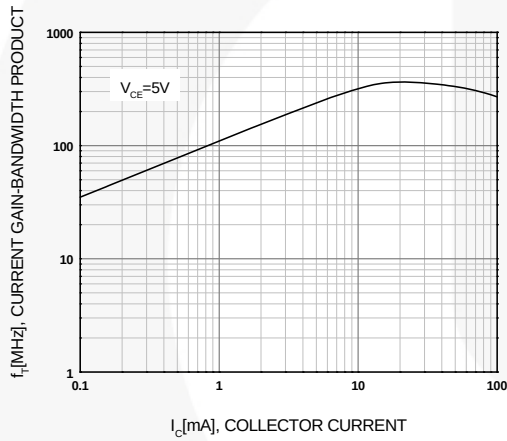
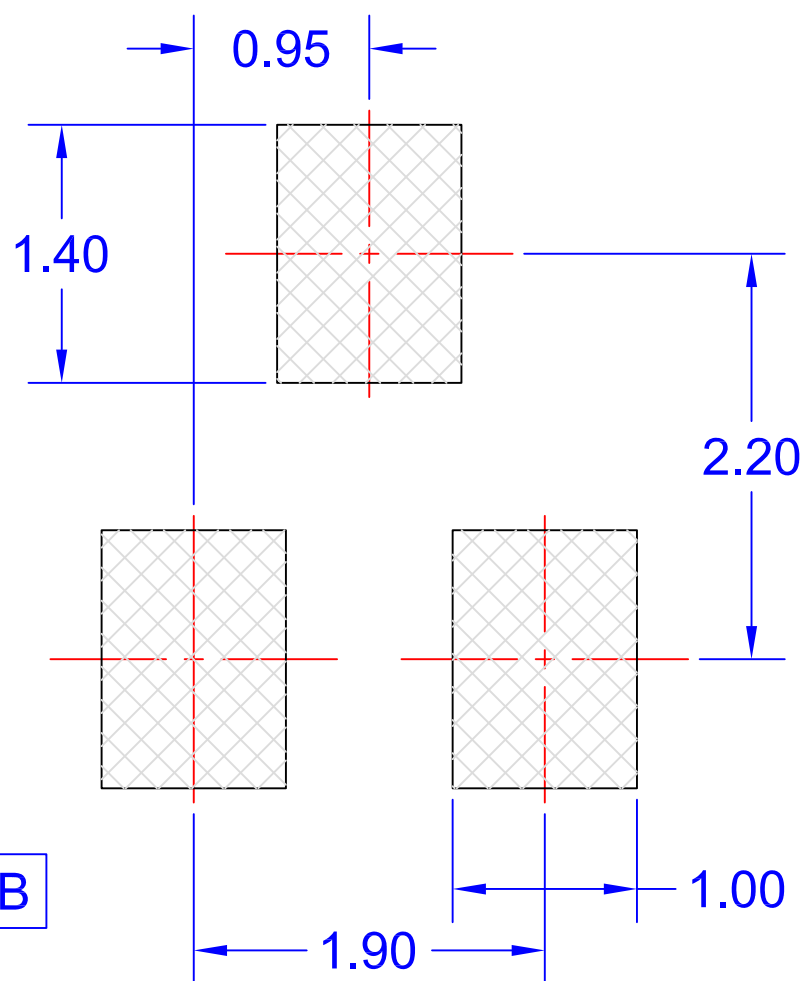
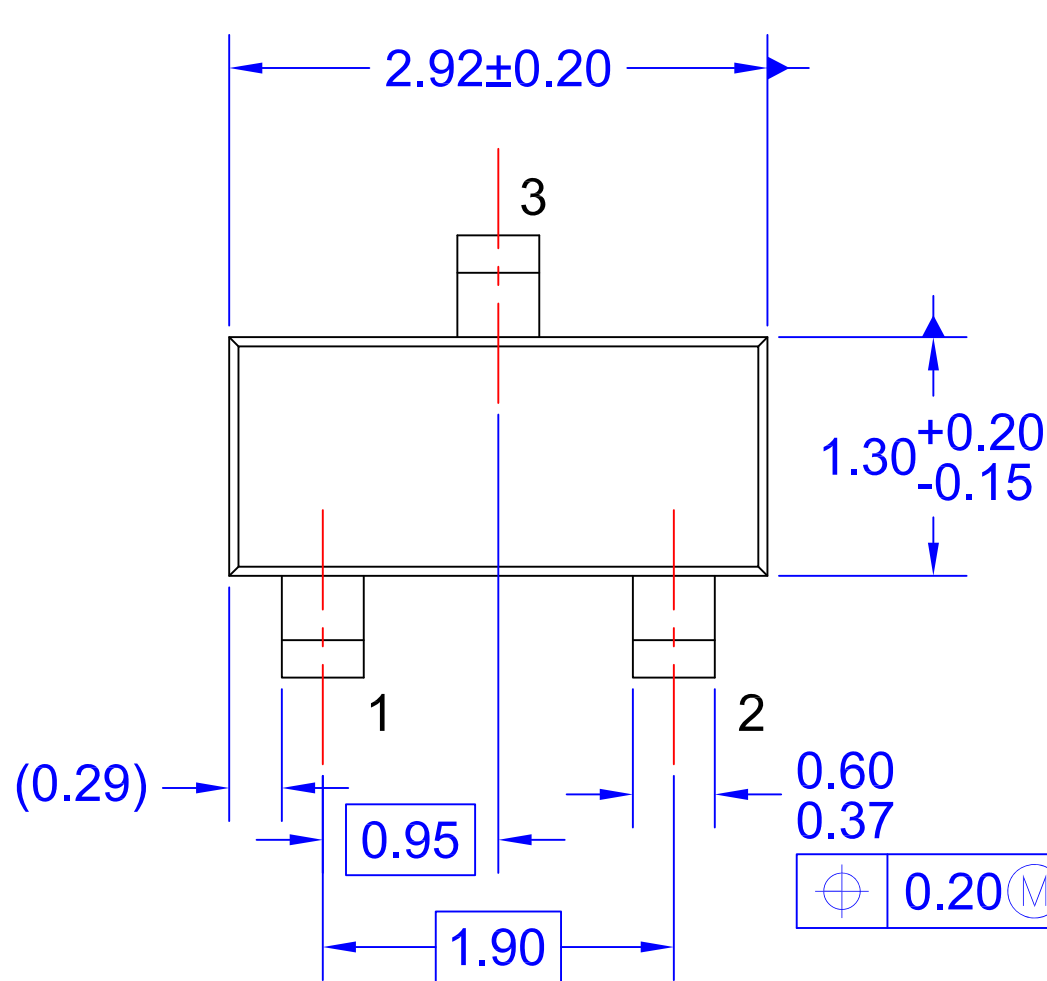
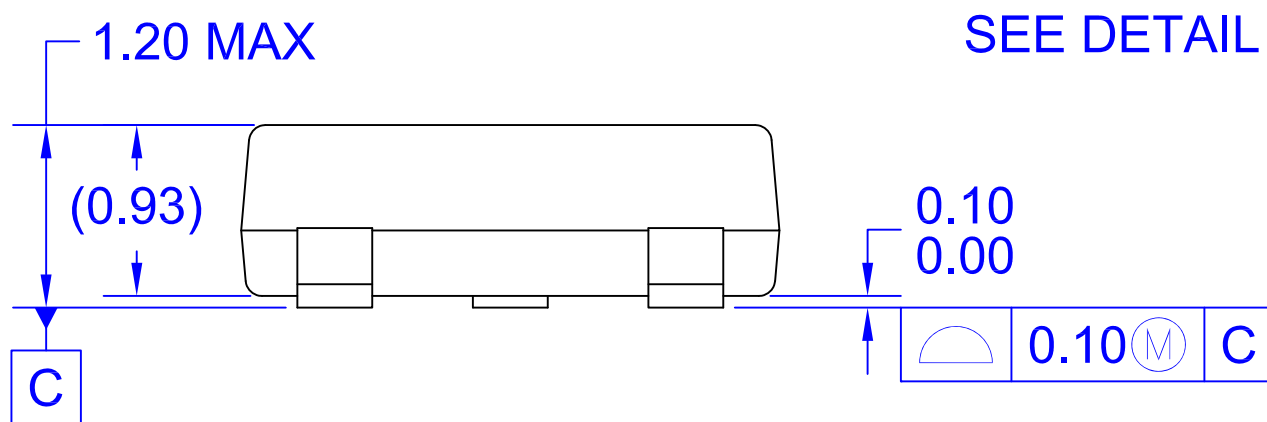


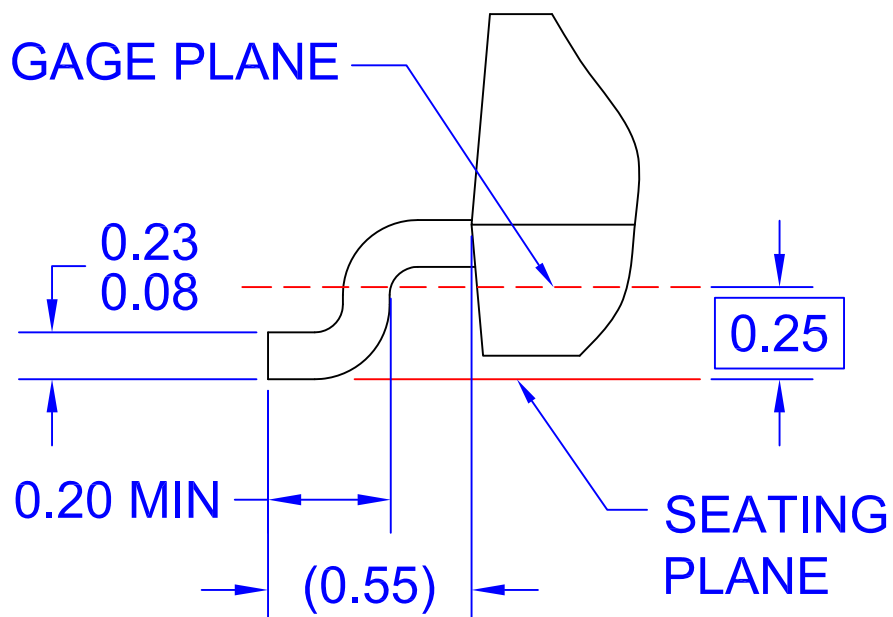
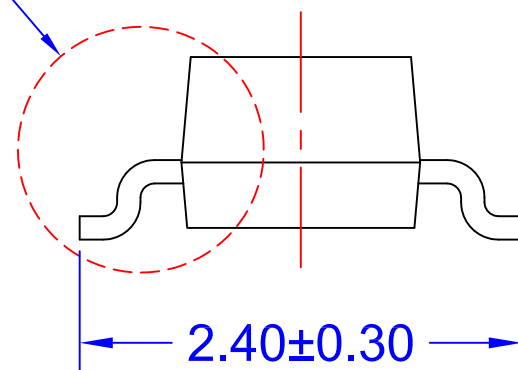
Figure 9. Current Gain Bandwidth Product



LAND PATTERN  
RECOMMENDATION



SEE DETAIL A



DETAIL A  
SCALE: 2X

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