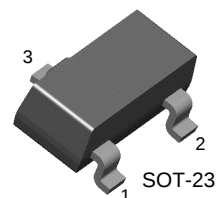


# BC856- BC860

## PNP Epitaxial Silicon Transistor

### Features

- Switching and Amplifier Applications
- Suitable for automatic insertion in thick and thin-film circuits
- Low Noise: BC859, BC860
- Complement to BC846 ... BC850



1. Base 2. Emitter 3. Collector

### Absolute Maximum Ratings\* $T_a = 25^\circ\text{C}$ unless otherwise noted

| Symbol    | Parameter                   | Value     | Units            |
|-----------|-----------------------------|-----------|------------------|
| $V_{CBO}$ | Collector-Base Voltage      |           |                  |
|           | : BC856                     | -80       | V                |
|           | : BC857/860                 | -50       | V                |
|           | : BC858/859                 | -30       | V                |
| $V_{CEO}$ | Collector-Emitter Voltage   |           |                  |
|           | : BC856                     | -65       | V                |
|           | : BC857/860                 | -45       | V                |
|           | : BC858/859                 | -30       | V                |
| $V_{EBO}$ | Emitter-Base Voltage        | -5        | V                |
| $I_C$     | Collector Current (DC)      | -100      | mA               |
| $P_C$     | Collector Power Dissipation | 310       | mW               |
| $T_J$     | Junction Temperature        | 150       | $^\circ\text{C}$ |
| $T_{STG}$ | Storage Temperature         | -65 ~ 150 | $^\circ\text{C}$ |

\* These ratings are limiting values above which the serviceability of any semiconductor device may be impaired.

### Electrical Characteristics\* $T_a = 25^\circ\text{C}$ unless otherwise noted

| Symbol               | Parameter                            | Test Condition                                                                                      | Min. | Typ. | Max. | Units |
|----------------------|--------------------------------------|-----------------------------------------------------------------------------------------------------|------|------|------|-------|
| $I_{CBO}$            | 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  |       |
| $V_{CE}(\text{sat})$ | Collector-Emitter Saturation Voltage | $I_C = -10\text{mA}, I_B = -0.5\text{mA}$                                                           |      | -90  | -300 | mV    |
|                      |                                      | $I_C = -100\text{mA}, I_B = -5\text{mA}$                                                            |      | -250 | -650 | mV    |
| $V_{BE}(\text{sat})$ | Base-Emitter 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 |      | mV    |
| $V_{BE}(\text{on})$  | Base-Emitter On Voltage              | $V_{CE} = -5\text{V}, I_C = -2\text{mA}$                                                            | -600 | -660 | -750 | mV    |
|                      |                                      | $V_{CE} = -5\text{V}, I_C = -10\text{mA}$                                                           |      |      | -800 | mV    |
| $f_T$                | Current Gain Bandwidth Product       | $V_{CE} = -5\text{V}, I_C = -10\text{mA}$<br>$f = 100\text{MHz}$                                    |      | 150  |      | MHz   |
| $C_{ob}$             | Output Capacitance                   | $V_{CB} = -10\text{V}, I_E = 0, f = 1\text{MHz}$                                                    |      |      | 6    | pF    |
| NF                   | Noise Figure                         | $V_{CE} = -5\text{V}, I_C = -200\mu\text{A}$<br>$R_G = 2\text{K}\Omega, f = 1\text{KHz}$            |      | 2    | 10   | dB    |
|                      |                                      |                                                                                                     |      | 1    | 4    | dB    |
|                      | : BC859                              | $V_{CE} = -5\text{V}, I_C = -200\mu\text{A}$<br>$R_G = 2\text{K}\Omega, f = 30 \sim 15000\text{Hz}$ |      | 1.2  | 4    | dB    |
|                      |                                      |                                                                                                     |      | 1.2  | 2    | dB    |

\* Pulse Test: Pulse Width  $\leq 300\mu\text{s}$ , Duty Cycle  $\leq 2\%$

**h<sub>FE</sub> Classification**

| Classification  | A         | B         | C         |
|-----------------|-----------|-----------|-----------|
| h <sub>FE</sub> | 110 ~ 220 | 200 ~ 450 | 420 ~ 800 |

**Ordering Information**

| Device <sup>(note1)</sup> | Device Marking | Package | Packing Method | Qty(pcs) | Pin Difinitions              |
|---------------------------|----------------|---------|----------------|----------|------------------------------|
| BC856AMTF                 | 9AA            | SOT-23  | Tape & Reel    | 3000     | 1.Base 2.Emitter 3.Collector |
| BC856BMTF                 | 9AB            | SOT-23  | Tape & Reel    | 3000     | 1.Base 2.Emitter 3.Collector |
| BC856CMTF                 | 9AC            | SOT-23  | Tape & Reel    | 3000     | 1.Base 2.Emitter 3.Collector |
| BC857AMTF                 | 9BA            | SOT-23  | Tape & Reel    | 3000     | 1.Base 2.Emitter 3.Collector |
| BC857BMTF                 | 9BB            | SOT-23  | Tape & Reel    | 3000     | 1.Base 2.Emitter 3.Collector |
| BC857CMTF                 | 9BC            | SOT-23  | Tape & Reel    | 3000     | 1.Base 2.Emitter 3.Collector |
| BC858AMTF                 | 9CA            | SOT-23  | Tape & Reel    | 3000     | 1.Base 2.Emitter 3.Collector |
| BC858BMTF                 | 9CB            | SOT-23  | Tape & Reel    | 3000     | 1.Base 2.Emitter 3.Collector |
| BC858CMTF                 | 9CC            | SOT-23  | Tape & Reel    | 3000     | 1.Base 2.Emitter 3.Collector |
| BC859AMTF                 | 9DA            | SOT-23  | Tape & Reel    | 3000     | 1.Base 2.Emitter 3.Collector |
| BC859BMTF                 | 9DB            | SOT-23  | Tape & Reel    | 3000     | 1.Base 2.Emitter 3.Collector |
| BC859CMTF                 | 9DC            | SOT-23  | Tape & Reel    | 3000     | 1.Base 2.Emitter 3.Collector |
| BC860AMTF                 | 9EA            | SOT-23  | Tape & Reel    | 3000     | 1.Base 2.Emitter 3.Collector |
| BC860BMTF                 | 9EB            | SOT-23  | Tape & Reel    | 3000     | 1.Base 2.Emitter 3.Collector |
| BC860CMTF                 | 9EC            | SOT-23  | Tape & Reel    | 3000     | 1.Base 2.Emitter 3.Collector |

Note1 : Affix "-A,-B,-C" means h<sub>FE</sub> classification.

Affix "-M" means the matte type package.

Affix "-TF" means the tape & reel type packing.

## Typical Performance Characteristics

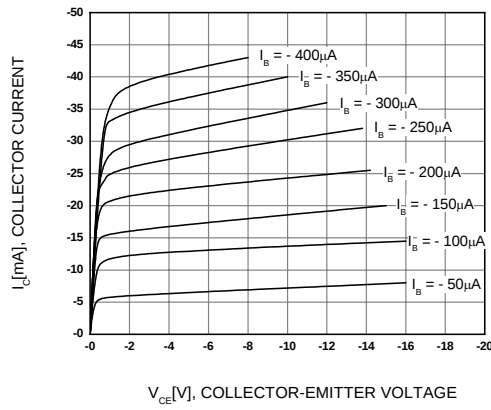


Figure 1. Static Characteristic

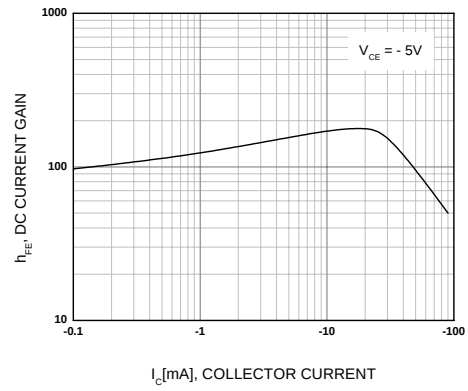


Figure 2. DC current Gain

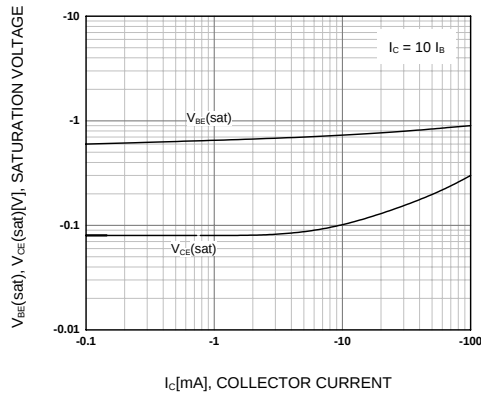


Figure 3. Base-Emitter Saturation Voltage  
Collector-Emitter Saturation Voltage

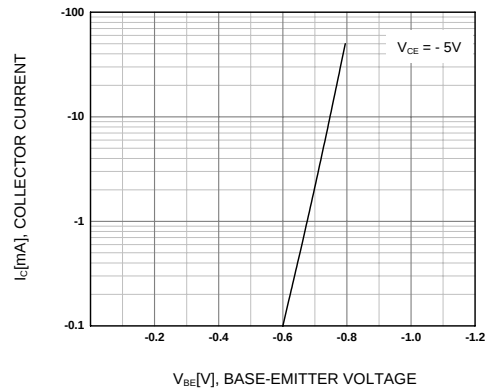


Figure 4. Base-Emitter On Voltage

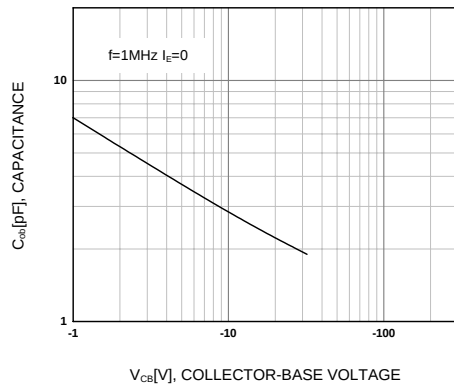


Figure 5. Collector Output Capacitance

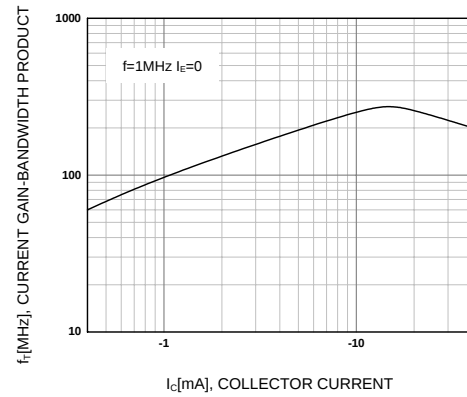
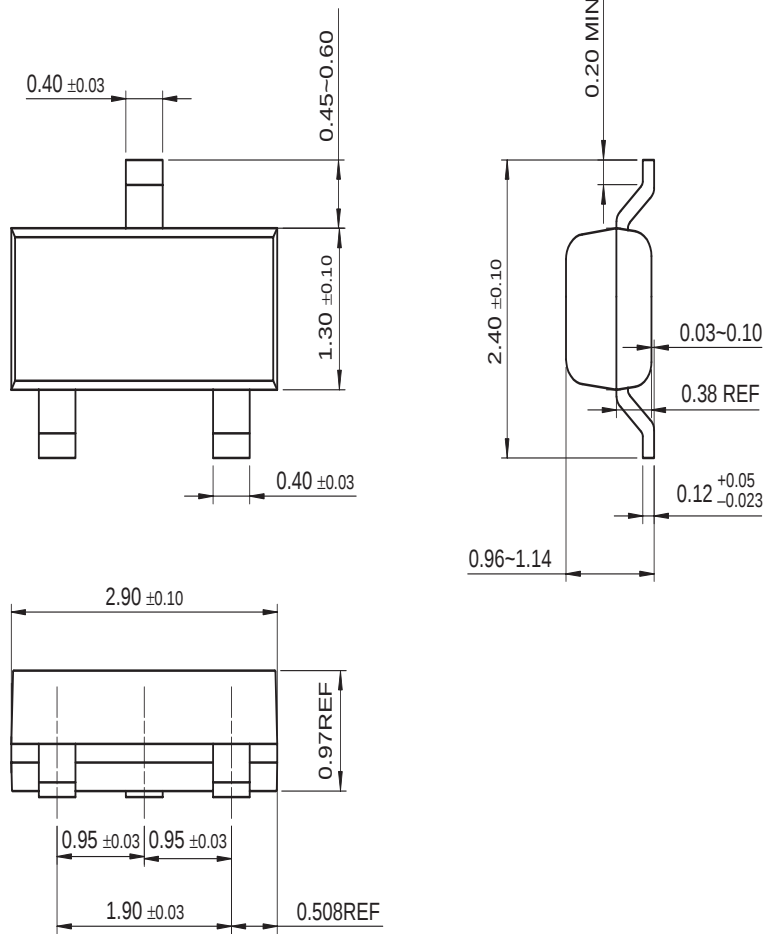


Figure 6. Current Gain Bandwidth Product

# Mechanical Dimensions

## SOT-23



Dimensions in Millimeters

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| CoolFET <sup>™</sup>                             | I <sup>2</sup> C <sup>™</sup>   | PACMAN <sup>™</sup>             | SuperFET <sup>™</sup>        |                       |
| CROSSVOLT <sup>™</sup>                           | i-Lo <sup>™</sup>               | POP <sup>™</sup>                | SuperSOT <sup>™</sup> -3     |                       |
| DOME <sup>™</sup>                                | ImpliedDisconnect <sup>™</sup>  | Power247 <sup>™</sup>           | SuperSOT <sup>™</sup> -6     |                       |
| EcoSPARK <sup>™</sup>                            | IntelliMAX <sup>™</sup>         | PowerEdge <sup>™</sup>          | SuperSOT <sup>™</sup> -8     |                       |
| E <sup>2</sup> CMOS <sup>™</sup>                 | ISOPLANAR <sup>™</sup>          | PowerSaver <sup>™</sup>         | SyncFET <sup>™</sup>         |                       |
| EnSigna <sup>™</sup>                             | LittleFET <sup>™</sup>          | PowerTrench <sup>®</sup>        | TCM <sup>™</sup>             |                       |
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Rev. I20



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