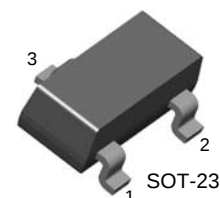


# BC846 - BC850

## NPN Epitaxial Silicon Transistor

### Features

- Switching and Amplifier Applications
- Suitable for automatic insertion in thick and thin-film circuits
- Low Noise: BC849, BC850
- Complement to BC856 ... BC860



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 : BC846    | 80         | V                |
|           | : BC847/850                       | 50         | V                |
|           | : BC848/849                       | 30         | V                |
| $V_{CEO}$ | Collector-Emitter Voltage : BC846 | 65         | V                |
|           | : BC847/850                       | 45         | V                |
|           | : BC848/849                       | 30         | V                |
| $V_{EBO}$ | Emitter-Base Voltage : BC846/847  | 6          | V                |
|           | : BC848/849/850                   | 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 to 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 | $I_C=10\text{mA}, I_B=0.5\text{mA}$<br>$I_C=100\text{mA}, I_B=5\text{mA}$                |      | 90<br>200  | 250<br>600 | mV<br>mV |
| $V_{BE}(\text{sat})$ | Collector-Base Saturation Voltage    | $I_C=10\text{mA}, I_B=0.5\text{mA}$<br>$I_C=100\text{mA}, I_B=5\text{mA}$                |      | 700<br>900 |            | mV<br>mV |
| $V_{BE}(\text{on})$  | Base-Emitter On Voltage              | $V_{CE}=5\text{V}, I_C=2\text{mA}$<br>$V_{CE}=5\text{V}, I_C=10\text{mA}$                | 580  | 660        | 700<br>720 | mV<br>mV |
| $f_T$                | 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          | pF       |
| $C_{ib}$             | Input Capacitance                    | $V_{EB}=0.5\text{V}, I_C=0, f=1\text{MHz}$                                               |      | 9          |            | 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       |
|                      | : BC846/847/848                      |                                                                                          |      | 1.2        | 4          | dB       |
|                      | : BC849/850                          |                                                                                          |      |            |            |          |
|                      | : BC849                              | $V_{CE}=5\text{V}, I_C=200\mu\text{A}$<br>$R_G=2\text{K}\Omega, f=30\sim 15000\text{Hz}$ |      | 1.4        | 4          | dB       |
|                      | : BC850                              |                                                                                          |      | 1.4        | 3          | dB       |

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

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

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

**Ordering Information**

| Device(note1) | Device Marking | Package | Packing Method | Qty(pcs) | Pin Difinitions              |
|---------------|----------------|---------|----------------|----------|------------------------------|
| BC846AMTF     | 8AA            | SOT-23  | Tape & Reel    | 3000     | 1.Base 2.Emitter 3.Collector |
| BC846BMTF     | 8AB            | SOT-23  | Tape & Reel    | 3000     | 1.Base 2.Emitter 3.Collector |
| BC846CMTF     | 8AC            | SOT-23  | Tape & Reel    | 3000     | 1.Base 2.Emitter 3.Collector |
| BC847AMTF     | 8BA            | SOT-23  | Tape & Reel    | 3000     | 1.Base 2.Emitter 3.Collector |
| BC847BMTF     | 8BB            | SOT-23  | Tape & Reel    | 3000     | 1.Base 2.Emitter 3.Collector |
| BC847CMTF     | 8BC            | SOT-23  | Tape & Reel    | 3000     | 1.Base 2.Emitter 3.Collector |
| BC848AMTF     | 8CA            | SOT-23  | Tape & Reel    | 3000     | 1.Base 2.Emitter 3.Collector |
| BC848BMTF     | 8CB            | SOT-23  | Tape & Reel    | 3000     | 1.Base 2.Emitter 3.Collector |
| BC848CMTF     | 8CC            | SOT-23  | Tape & Reel    | 3000     | 1.Base 2.Emitter 3.Collector |
| BC849AMTF     | 8DA            | SOT-23  | Tape & Reel    | 3000     | 1.Base 2.Emitter 3.Collector |
| BC849BMTF     | 8DB            | SOT-23  | Tape & Reel    | 3000     | 1.Base 2.Emitter 3.Collector |
| BC849CMTF     | 8DC            | SOT-23  | Tape & Reel    | 3000     | 1.Base 2.Emitter 3.Collector |
| BC850AMTF     | 8EA            | SOT-23  | Tape & Reel    | 3000     | 1.Base 2.Emitter 3.Collector |
| BC850BMTF     | 8EB            | SOT-23  | Tape & Reel    | 3000     | 1.Base 2.Emitter 3.Collector |
| BC850CMTF     | 8EC            | SOT-23  | Tape & Reel    | 3000     | 1.Base 2.Emitter 3.Collector |

**Note1** : Affix "-A,-B,-C" means hFE classification.

Affix "-M" means SOT-23 package.

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

## Typical Performance Characteristics

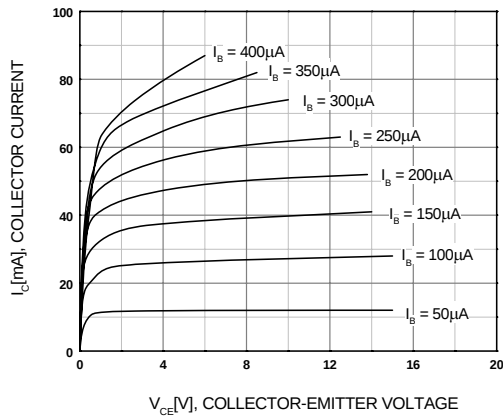


Figure 1. Static Characteristic

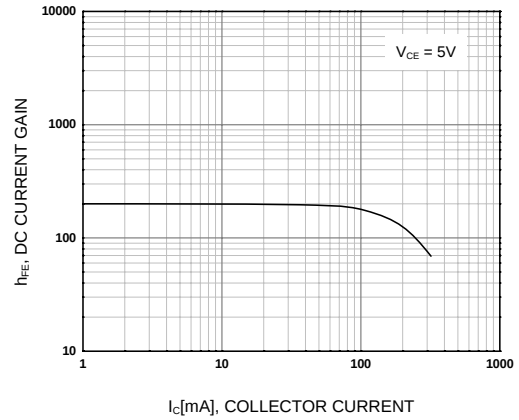


Figure 2. DC current Gain

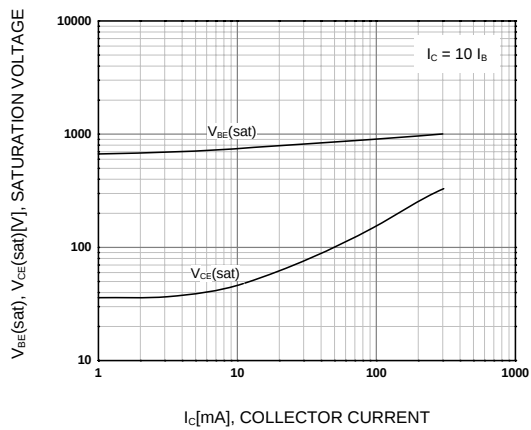


Figure 3. Base-Emitter Saturation Voltage  
Collector-Emitter Saturation Voltage

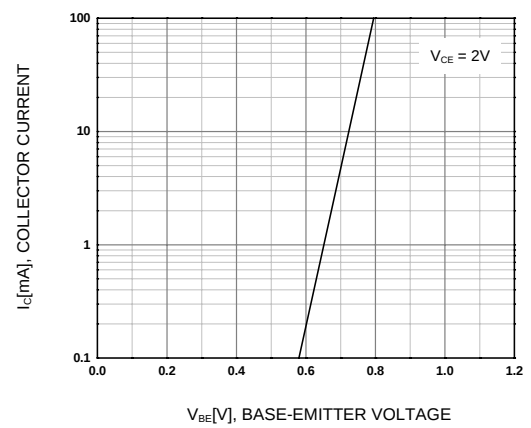


Figure 4. Base-Emitter On Voltage

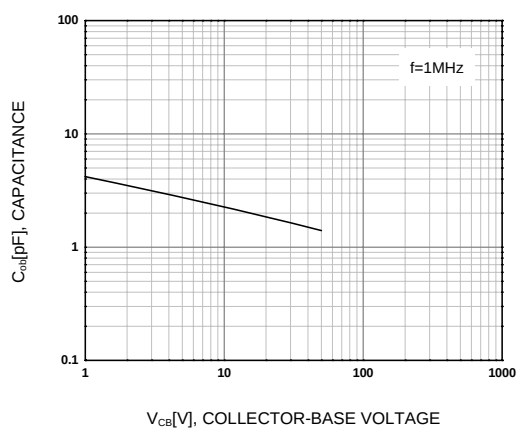


Figure 5. Collector Output Capacitance

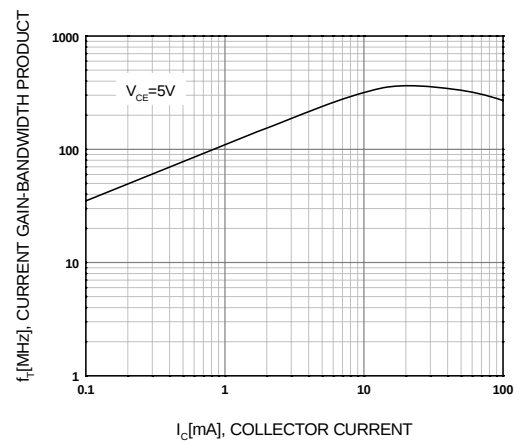
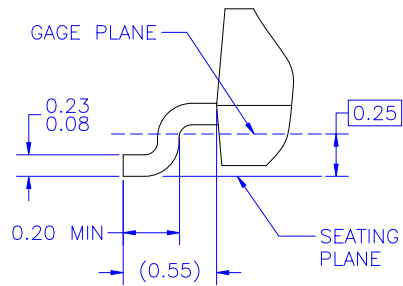
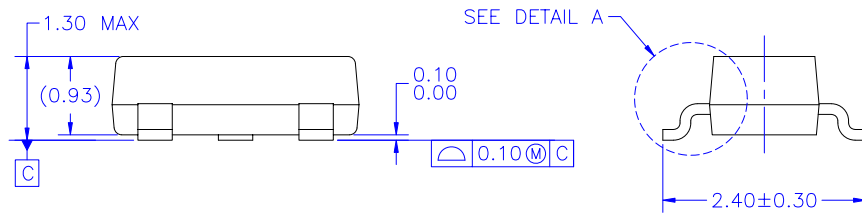
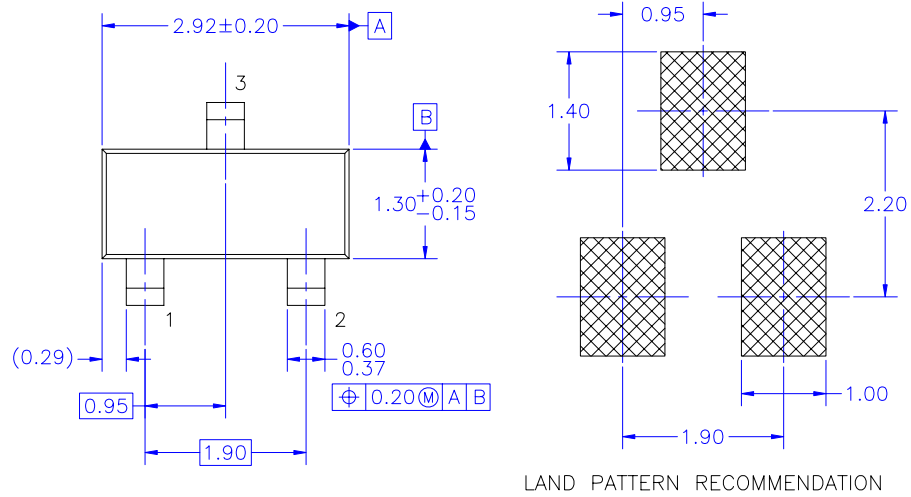


Figure 6. Current Gain Bandwidth Product

# Physical Dimensions

## SOT-23



NOTES: UNLESS OTHERWISE SPECIFIED

- A) REFERENCE JEDEC REGISTRATION TO-236, VARIATION AB, ISSUE H.
- B) ALL DIMENSIONS ARE IN MILLIMETERS.
- C) DIMENSIONS ARE INCLUSIVE OF BURRS, MOLD FLASH AND TIE BAR EXTRUSIONS.
- D) DIMENSIONING AND TOLERANCING PER ASME Y14.5M - 1994.
- E) DRAWING FILE NAME: MA03DREV9

DETAIL A  
SCALE: 2X

Dimensions in Millimeters



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|                                                                                     |                                                                                     |                                                                                                    |                                                                                             |
|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|
| AccuPower™                                                                          | F-PFS™                                                                              | Power-SPM™                                                                                         | The Power Franchise®                                                                        |
| Auto-SPM™                                                                           | FRFET®                                                                              | PowerTrench®                                                                                       | The Right Technology for Your Success™                                                      |
| AX-CAP™*                                                                            | Global Power Resource™                                                              | PowerXS™                                                                                           | the power®                                                                                  |
| Build it Now™                                                                       | Green FPS™                                                                          | Programmable Active Droop™                                                                         | franchise                                                                                   |
| CorePLUS™                                                                           | Green FPS™ e-Series™                                                                | QFET®                                                                                              | TinyBoost™                                                                                  |
| CorePOWER™                                                                          | Gmax™                                                                               | QS™                                                                                                | TinyBuck™                                                                                   |
| CROSSVOLT™                                                                          | GTO™                                                                                | Quiet Series™                                                                                      | TinyCalc™                                                                                   |
| CTL™                                                                                | IntelliMAX™                                                                         | RapidConfigure™                                                                                    | TinyLogic®                                                                                  |
| Current Transfer Logic™                                                             | ISOPLANAR™                                                                          |  ™                | TINYOPTO™                                                                                   |
| DEUXPEED®                                                                           | MegaBuck™                                                                           | Saving our world, 1mW/W/kW at a time™                                                              | TinyPower™                                                                                  |
| Dual Cool™                                                                          | MICROCOUPLER™                                                                       | SignalWise™                                                                                        | TinyPWM™                                                                                    |
| EcoSPARK®                                                                           | MicroFET™                                                                           | SmartMax™                                                                                          | TinyWire™                                                                                   |
| EfficientMax™                                                                       | MicroPak™                                                                           | SMART START™                                                                                       | TriFault Detect™                                                                            |
| ESBC™                                                                               | MicroPak2™                                                                          | SPM®                                                                                               | TRUECURRENT®*                                                                               |
|  ® | MillerDrive™                                                                        | STEALTH™                                                                                           | µSerDes™                                                                                    |
| Fairchild®                                                                          | MotionMax™                                                                          | SuperFET®                                                                                          |  SerDes® |
| Fairchild Semiconductor®                                                            | Motion-SPM™                                                                         | SuperSOT™.3                                                                                        | UHC®                                                                                        |
| FACT Quiet Series™                                                                  | mWSaver™                                                                            | SuperSOT™-6                                                                                        | Ultra FRFET™                                                                                |
| FACT®                                                                               | OptoHiT™                                                                            | SuperSOT™-8                                                                                        | UniFET™                                                                                     |
| FAST®                                                                               | OPTOLOGIC®                                                                          | SupreMOS®                                                                                          | VCX™                                                                                        |
| FastvCore™                                                                          | OPTOPLANAR®                                                                         | SyncFET™                                                                                           | VisualMax™                                                                                  |
| FETBench™                                                                           |  ® | Sync-Lock™                                                                                         | XS™                                                                                         |
| FlashWriter®*                                                                       | PDP SPM™                                                                            |  SYSTEM GENERAL®* |                                                                                             |
| FPS™                                                                                |                                                                                     |                                                                                                    |                                                                                             |

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|--------------------------|-----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
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Rev. I53



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