

# BC846, SBC846, BC847, SBC847, BC848 Series

## General Purpose Transistors

### NPN Silicon

These transistors are designed for general purpose amplifier applications. They are housed in the SC-70/SOT-323 which is designed for low power surface mount applications.

#### Features

- AEC-Q101 Qualified and PPAP Capable
- S Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements
- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant

#### MAXIMUM RATINGS

| Rating                                                               | Symbol    | Value             | Unit             |
|----------------------------------------------------------------------|-----------|-------------------|------------------|
| Collector-Emitter Voltage<br>BC846, SBC846<br>BC847, SBC847<br>BC848 | $V_{CEO}$ | 65<br>45<br>30    | V                |
| Collector-Base Voltage<br>BC846, SBC846<br>BC847, SBC847<br>BC848    | $V_{CBO}$ | 80<br>50<br>30    | V                |
| Emitter-Base Voltage<br>BC846, SBC846<br>BC847, SBC847<br>BC848      | $V_{EBO}$ | 6.0<br>6.0<br>5.0 | V                |
| Collector Current – Continuous                                       | $I_C$     | 100               | mA <sub>dc</sub> |

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

#### THERMAL CHARACTERISTICS

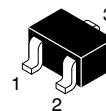
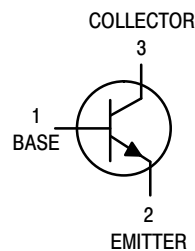
| Characteristic                                                            | Symbol          | Max         | Unit                      |
|---------------------------------------------------------------------------|-----------------|-------------|---------------------------|
| Total Device Dissipation FR-5 Board,<br>(Note 1) $T_A = 25^\circ\text{C}$ | $P_D$           | 150         | mW                        |
| Thermal Resistance,<br>Junction-to-Ambient                                | $R_{\theta JA}$ | 833         | $^\circ\text{C}/\text{W}$ |
| Junction and Storage Temperature                                          | $T_J, T_{stg}$  | -55 to +150 | $^\circ\text{C}$          |

1. FR-5 = 1.0 x 0.75 x 0.062 in.



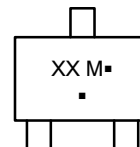
ON Semiconductor®

<http://onsemi.com>



SC-70/SOT-323  
CASE 419  
STYLE 3

#### MARKING DIAGRAM



XX = Specific Device Code  
M = Month Code  
■ = Pb-Free Package

(Note: Microdot may be in either location)

#### ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 12 of this data sheet.

# BC846, SBC846, BC847, SBC847, BC848 Series

## ELECTRICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$ unless otherwise noted)

| Characteristic                                                                                                | Symbol                                                                        | Min               | Typ         | Max         | Unit                |
|---------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------|-------------------|-------------|-------------|---------------------|
| <b>OFF CHARACTERISTICS</b>                                                                                    |                                                                               |                   |             |             |                     |
| Collector–Emitter Breakdown Voltage<br>( $I_C = 10\text{ mA}$ )                                               | BC846, SBC846 Series<br>BC847, SBC847 Series<br>BC848 Series<br>$V_{(BR)CEO}$ | 65<br>45<br>30    | –<br>–<br>– | –<br>–<br>– | V                   |
| Collector–Emitter Breakdown Voltage<br>( $I_C = 10\text{ }\mu\text{A}$ , $V_{EB} = 0$ )                       | BC846, SBC846 Series<br>BC847, SBC847 Series<br>BC848 Series<br>$V_{(BR)CES}$ | 80<br>50<br>30    | –<br>–<br>– | –<br>–<br>– | V                   |
| Collector–Base Breakdown Voltage<br>( $I_C = 10\text{ }\mu\text{A}$ )                                         | BC846, SBC846 Series<br>BC847, SBC847 Series<br>BC848 Series<br>$V_{(BR)CBO}$ | 80<br>50<br>30    | –<br>–<br>– | –<br>–<br>– | V                   |
| Emitter–Base Breakdown Voltage<br>( $I_E = 1.0\text{ }\mu\text{A}$ )                                          | BC846, SBC846 Series<br>BC847, SBC847 Series<br>BC848 Series<br>$V_{(BR)EBO}$ | 6.0<br>6.0<br>5.0 | –<br>–<br>– | –<br>–<br>– | V                   |
| Collector Cutoff Current ( $V_{CB} = 30\text{ V}$ )<br>( $V_{CB} = 30\text{ V}$ , $T_A = 150^\circ\text{C}$ ) | $I_{CBO}$                                                                     | –<br>–            | –<br>–      | 15<br>5.0   | nA<br>$\mu\text{A}$ |

## ON CHARACTERISTICS

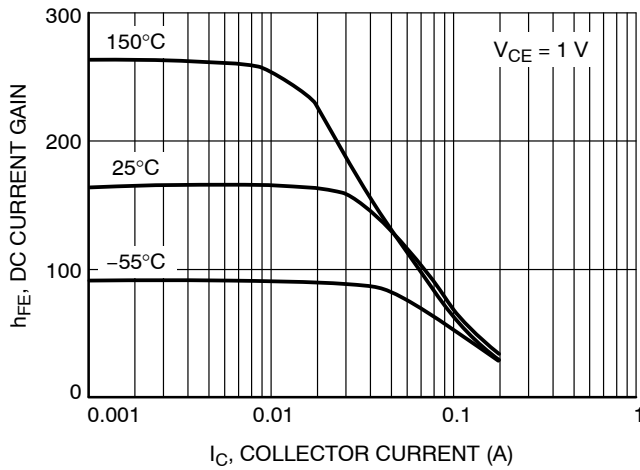
|                                                                                          |                                          |                 |     |      |     |   |
|------------------------------------------------------------------------------------------|------------------------------------------|-----------------|-----|------|-----|---|
| DC Current Gain<br>(I <sub>C</sub> = 10 μA, V <sub>CE</sub> = 5.0 V)                     | BC846A, BC847A, SBC847A, BC848A          | h <sub>FE</sub> | –   | 90   | –   | – |
|                                                                                          | BC846B, SBC846B, BC847B, SBC847B, BC848B |                 | –   | 150  | –   |   |
|                                                                                          | BC847C, SBC847C, BC848C                  |                 | –   | 270  | –   |   |
| (I <sub>C</sub> = 2.0 mA, V <sub>CE</sub> = 5.0 V)                                       | BC846A, BC847A, SBC847A, BC848A          |                 | 110 | 180  | 220 |   |
|                                                                                          | BC846B, SBC846B, BC847B, SBC847B, BC848B |                 | 200 | 290  | 450 |   |
|                                                                                          | BC847C, SBC847C, BC848C                  |                 | 420 | 520  | 800 |   |
| Collector – Emitter Saturation Voltage (I <sub>C</sub> = 10 mA, I <sub>B</sub> = 0.5 mA) | V <sub>CE(sat)</sub>                     | –               | –   | 0.25 | V   |   |
| (I <sub>C</sub> = 100 mA, I <sub>B</sub> = 5.0 mA)                                       |                                          | –               | –   | 0.6  |     |   |
| Base – Emitter Saturation Voltage (I <sub>C</sub> = 10 mA, I <sub>B</sub> = 0.5 mA)      | V <sub>BE(sat)</sub>                     | –               | 0.7 | –    | V   |   |
| (I <sub>C</sub> = 100 mA, I <sub>B</sub> = 5.0 mA)                                       |                                          | –               | 0.9 | –    |     |   |
| Base – Emitter Voltage (I <sub>C</sub> = 2.0 mA, V <sub>CE</sub> = 5.0 V)                | V <sub>BE(on)</sub>                      | 580             | 660 | 700  | mV  |   |
| (I <sub>C</sub> = 10 mA, V <sub>CE</sub> = 5.0 V)                                        |                                          | –               | –   | 770  |     |   |

## SMALL-SIGNAL CHARACTERISTICS

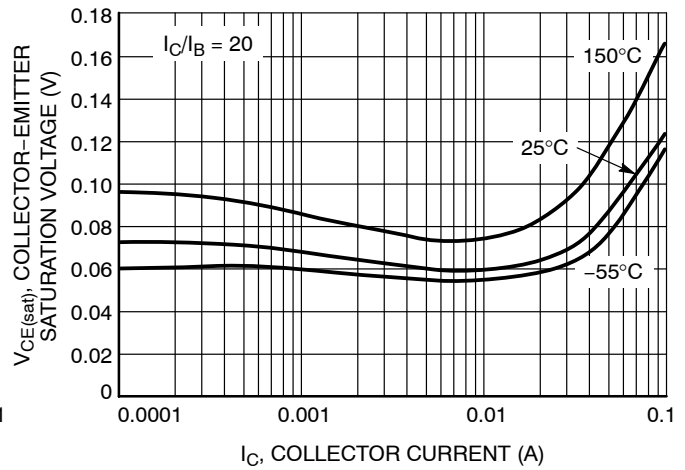
|                                                                                                                                               |           |     |   |     |     |
|-----------------------------------------------------------------------------------------------------------------------------------------------|-----------|-----|---|-----|-----|
| Current–Gain – Bandwidth Product<br>( $I_C = 10\text{ mA}$ , $V_{CE} = 5.0\text{ Vdc}$ , $f = 100\text{ MHz}$ )                               | $f_T$     | 100 | – | –   | MHz |
| Output Capacitance ( $V_{CB} = 10\text{ V}$ , $f = 1.0\text{ MHz}$ )                                                                          | $C_{obo}$ | –   | – | 4.5 | pF  |
| Noise Figure ( $I_C = 0.2\text{ mA}$ , $V_{CE} = 5.0\text{ Vdc}$ , $R_S = 2.0\text{ k}\Omega$ , $f = 1.0\text{ kHz}$ , $BW = 200\text{ Hz}$ ) | NF        | –   | – | 10  | dB  |

# BC846, SBC846, BC847, SBC847, BC848 Series

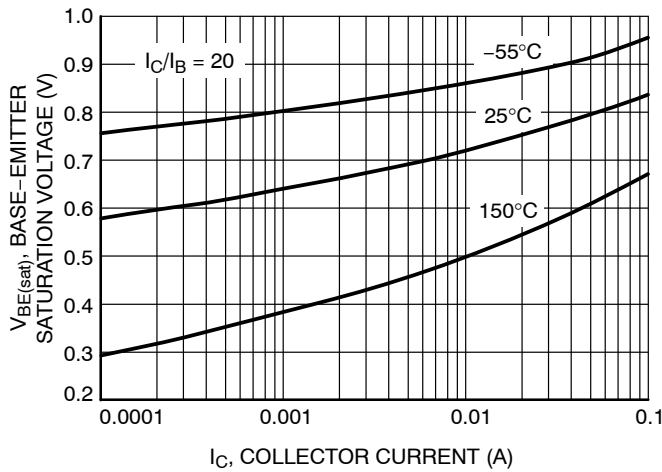
## BC846A, BC847A, SBC847A, BC848A



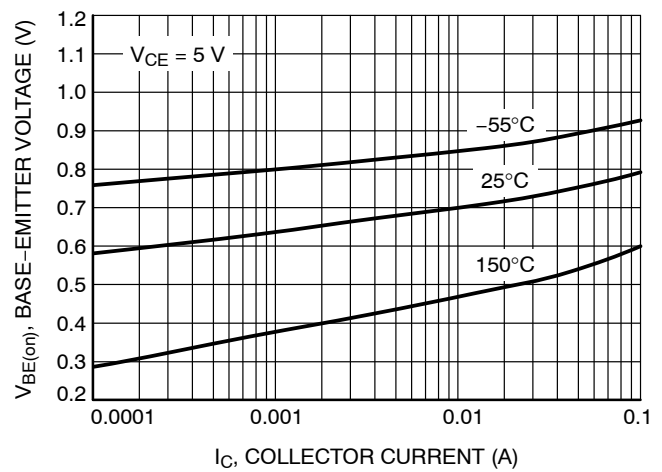
**Figure 1. DC Current Gain vs. Collector Current**



**Figure 2. Collector Emitter Saturation Voltage vs. Collector Current**



**Figure 3. Base Emitter Saturation Voltage vs. Collector Current**



**Figure 4. Base Emitter Voltage vs. Collector Current**

# BC846, SBC846, BC847, SBC847, BC848 Series

## BC846A, BC847A, SBC847A, BC848A

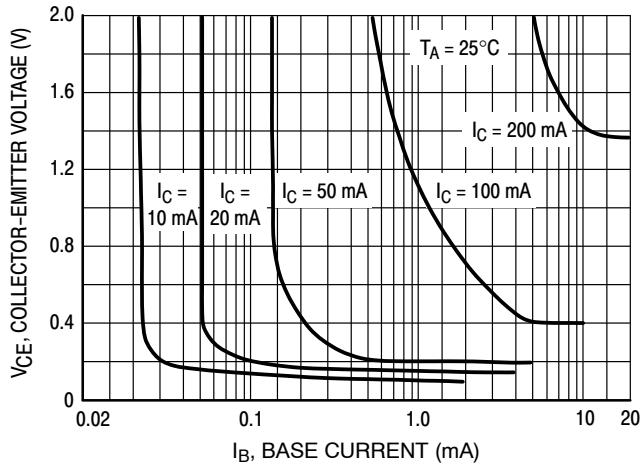


Figure 5. Collector Saturation Region

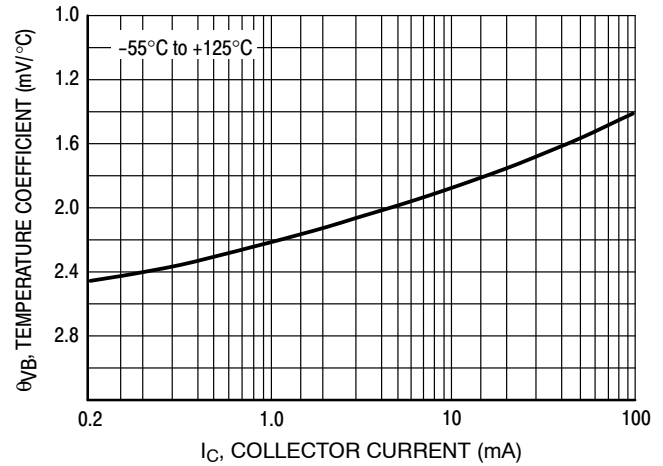


Figure 6. Base-Emitter Temperature Coefficient

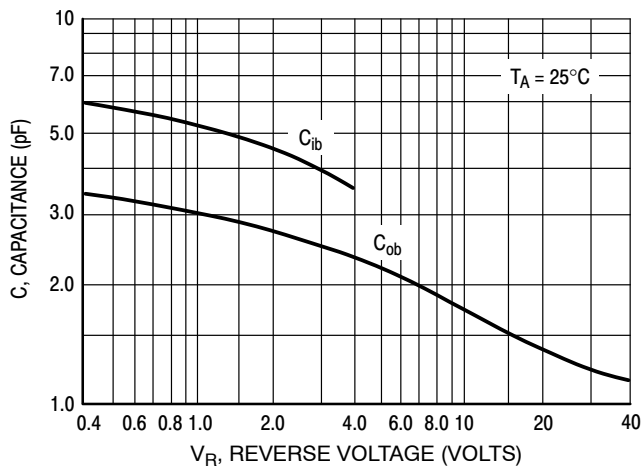


Figure 7. Capacitances

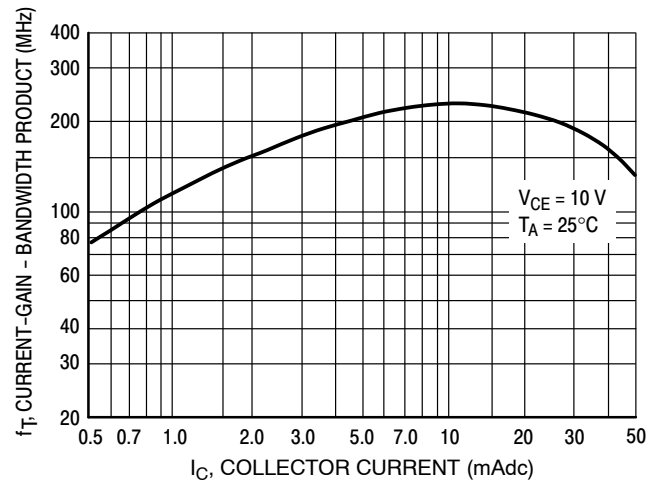
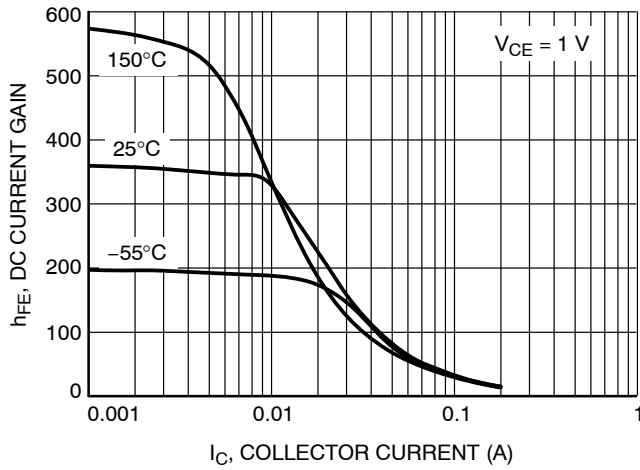


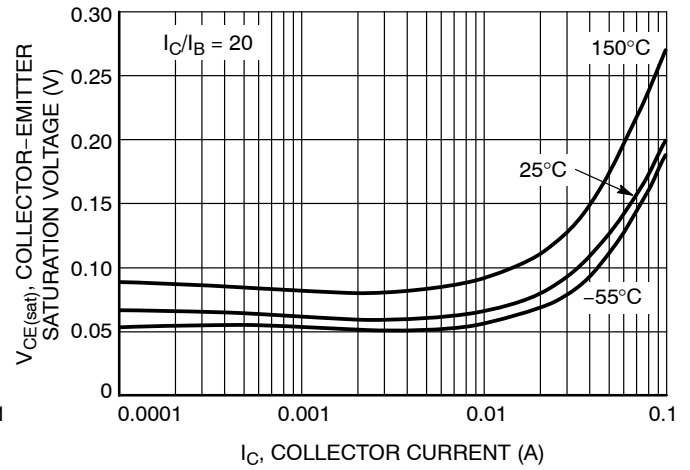
Figure 8. Current-Gain - Bandwidth Product

# BC846, SBC846, BC847, SBC847, BC848 Series

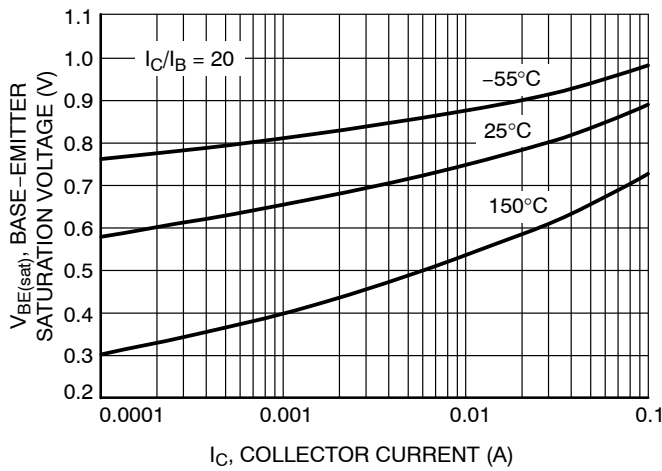
## BC846B, SBC846B



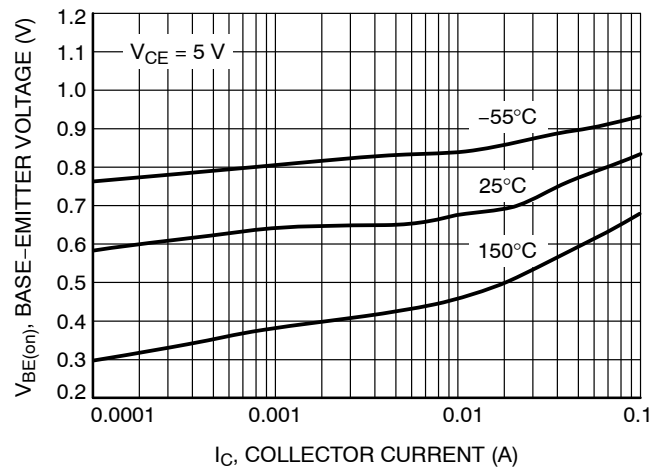
**Figure 9. DC Current Gain vs. Collector Current**



**Figure 10. Collector Emitter Saturation Voltage vs. Collector Current**



**Figure 11. Base Emitter Saturation Voltage vs. Collector Current**



**Figure 12. Base Emitter Voltage vs. Collector Current**

# BC846, SBC846, BC847, SBC847, BC848 Series

## BC846B, SBC846B

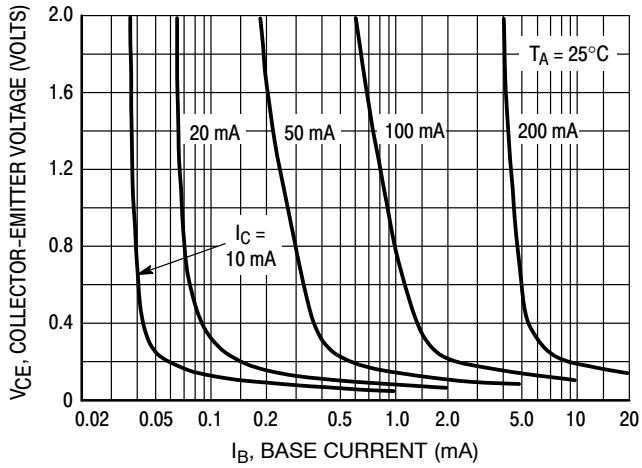


Figure 13. Collector Saturation Region

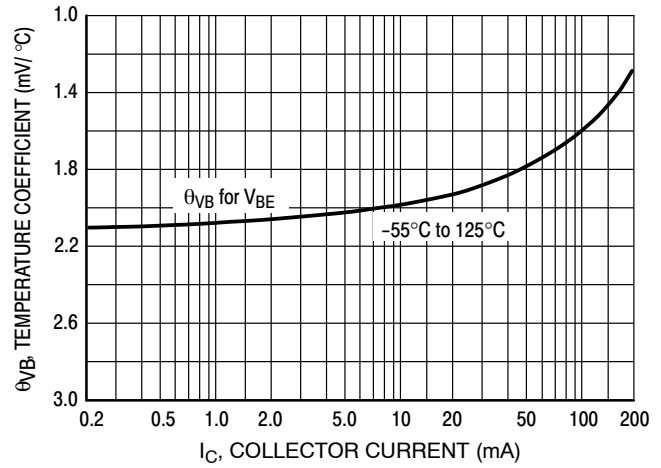


Figure 14. Base-Emitter Temperature Coefficient

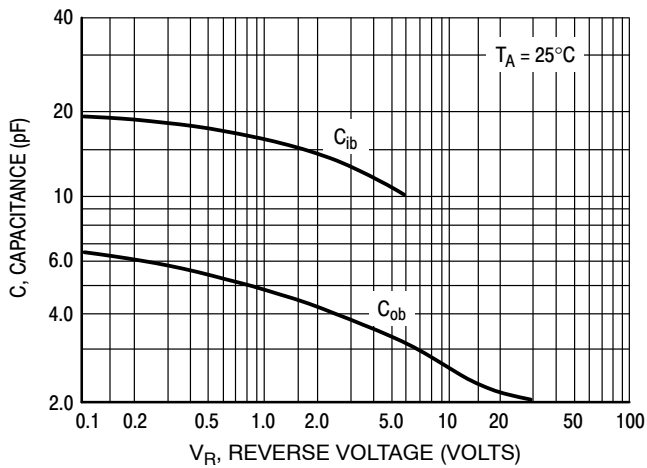


Figure 15. Capacitance

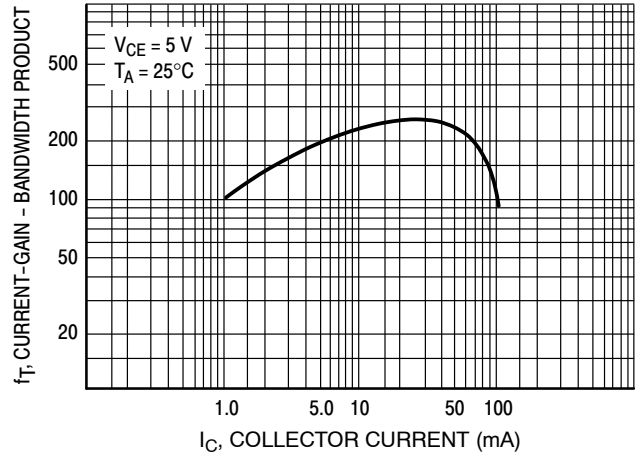
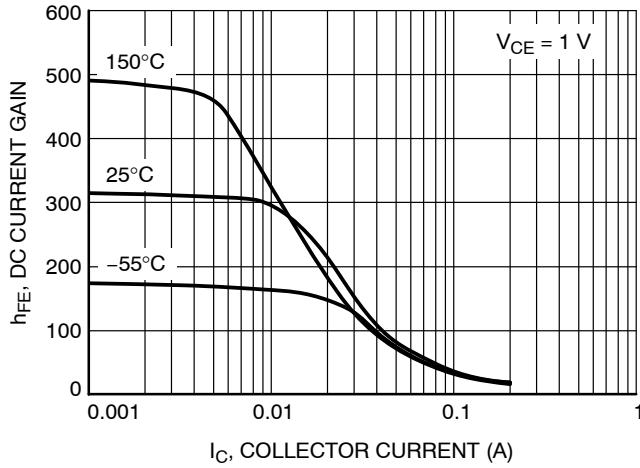


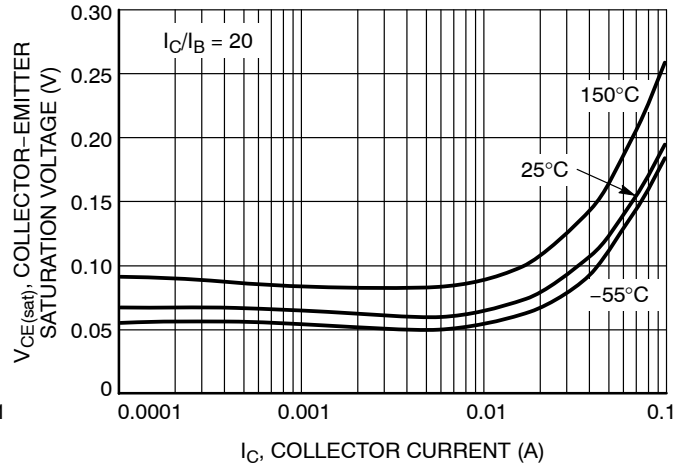
Figure 16. Current-Gain - Bandwidth Product

# BC846, SBC846, BC847, SBC847, BC848 Series

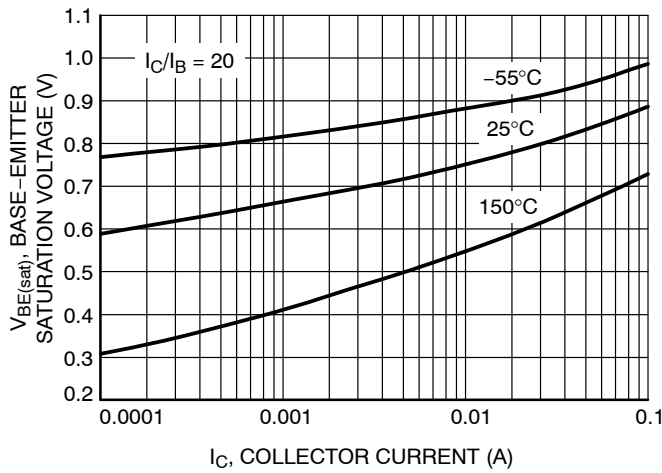
## BC847B, SBC847B, BC848B



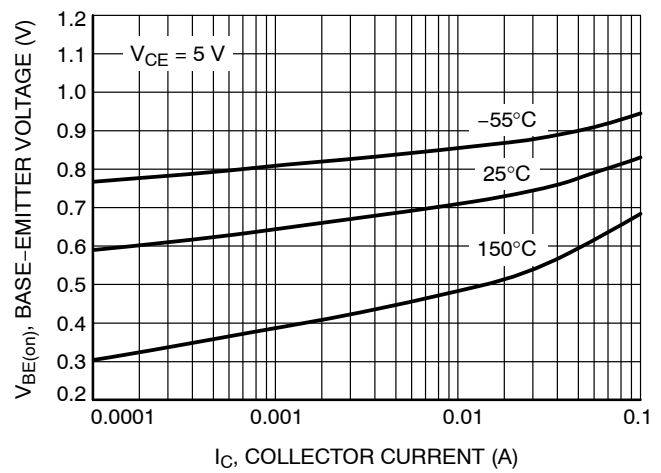
**Figure 17. DC Current Gain vs. Collector Current**



**Figure 18. Collector Emitter Saturation Voltage vs. Collector Current**



**Figure 19. Base Emitter Saturation Voltage vs. Collector Current**



**Figure 20. Base Emitter Voltage vs. Collector Current**

# BC846, SBC846, BC847, SBC847, BC848 Series

## BC847B, SBC847B, BC848B

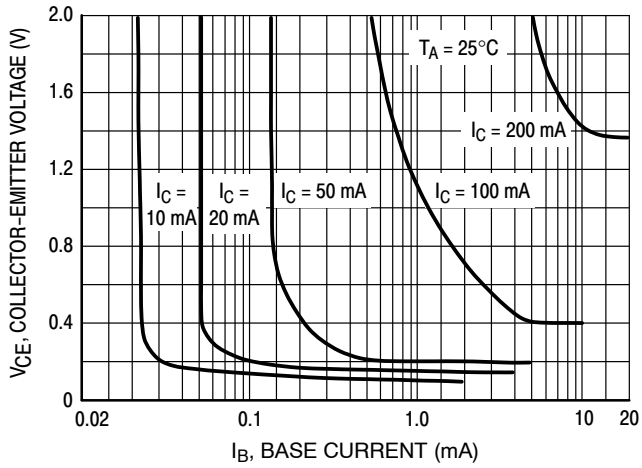


Figure 21. Collector Saturation Region

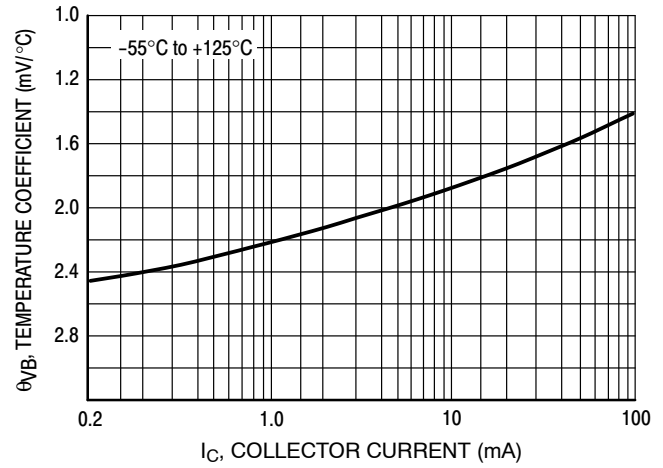


Figure 22. Base-Emitter Temperature Coefficient

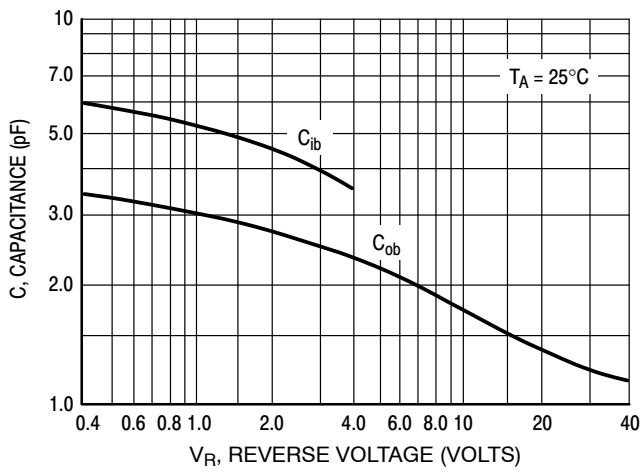


Figure 23. Capacitances

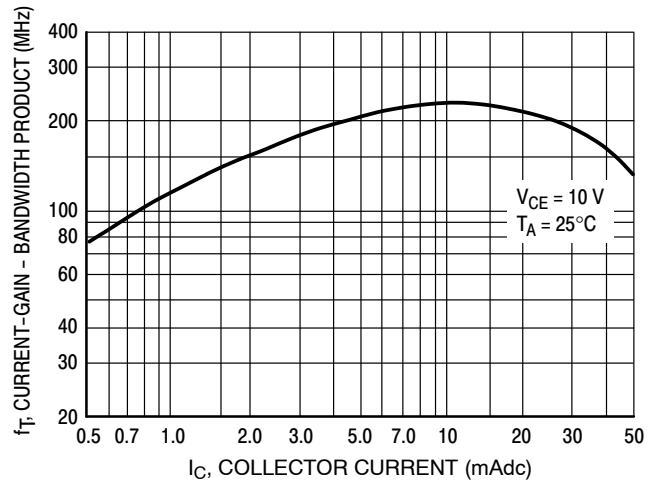
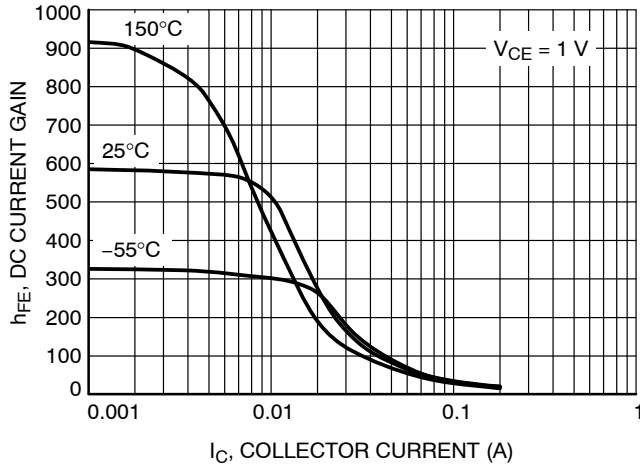


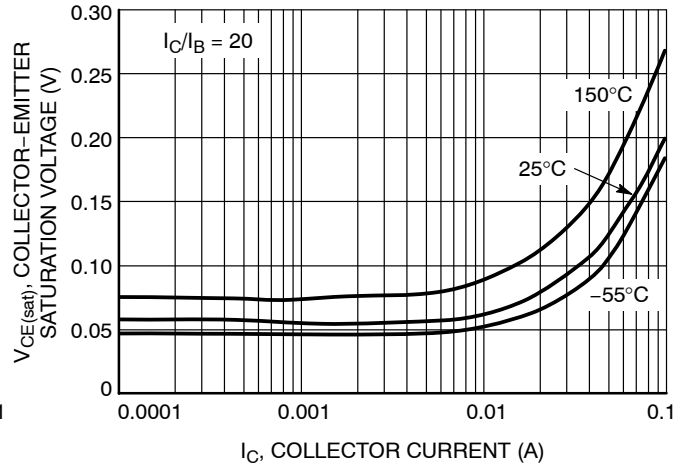
Figure 24. Current-Gain - Bandwidth Product

# BC846, SBC846, BC847, SBC847, BC848 Series

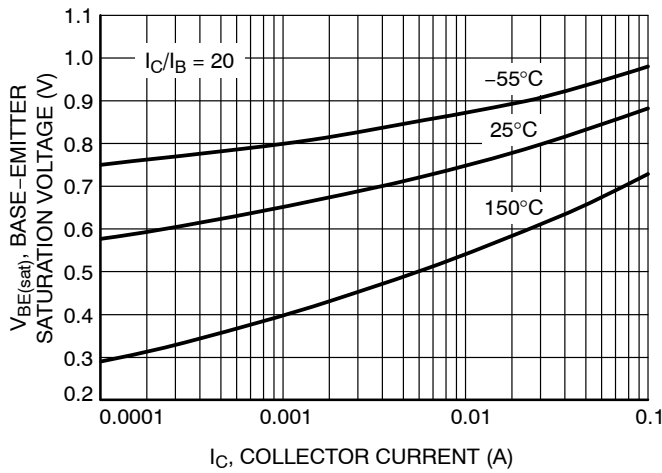
## BC847C, SBC847C, BC848C



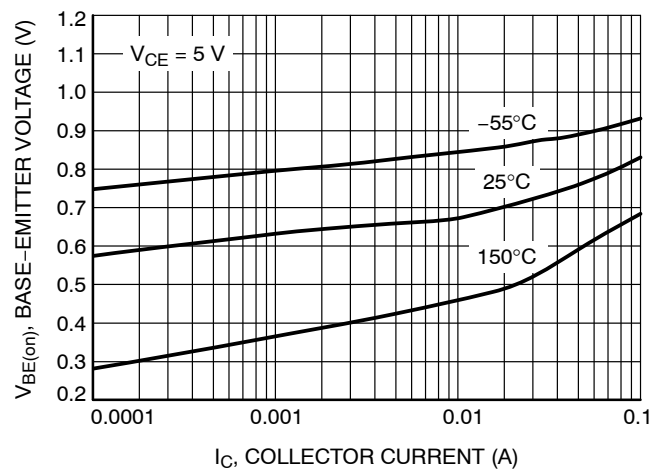
**Figure 25. DC Current Gain vs. Collector Current**



**Figure 26. Collector Emitter Saturation Voltage vs. Collector Current**



**Figure 27. Base Emitter Saturation Voltage vs. Collector Current**



**Figure 28. Base Emitter Voltage vs. Collector Current**

# BC846, SBC846, BC847, SBC847, BC848 Series

## BC847C, SBC847C, BC848C

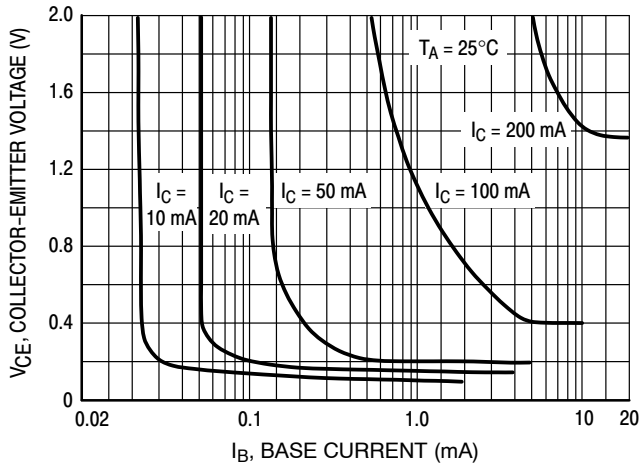


Figure 29. Collector Saturation Region

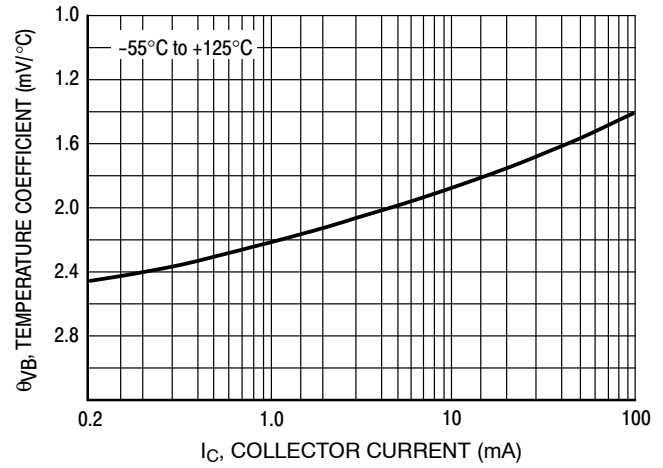


Figure 30. Base-Emitter Temperature Coefficient

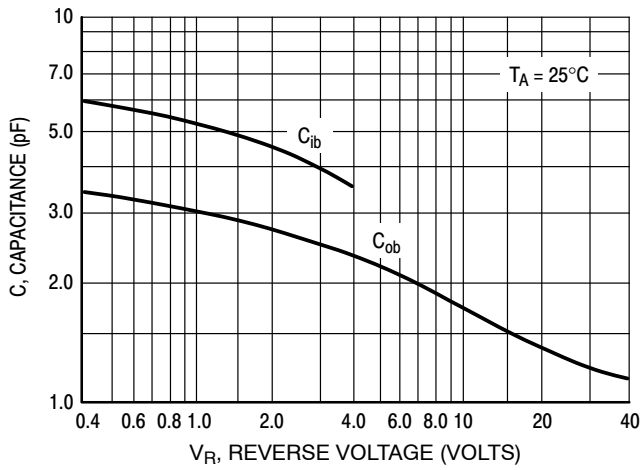


Figure 31. Capacitances

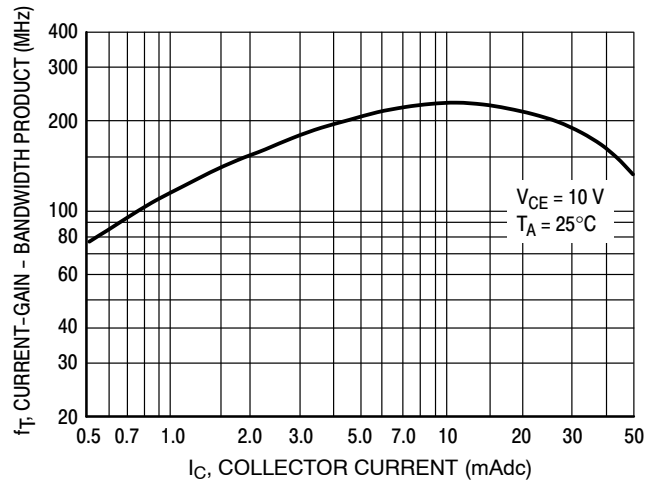
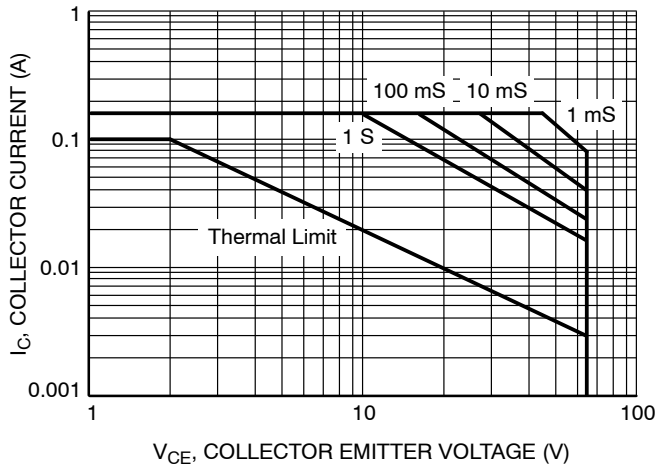
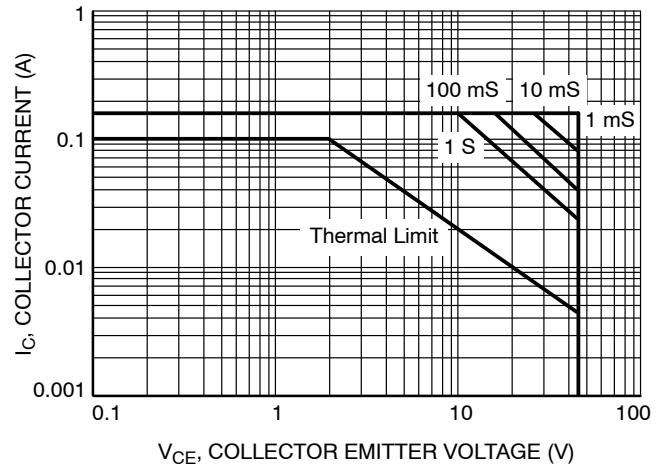


Figure 32. Current-Gain - Bandwidth Product

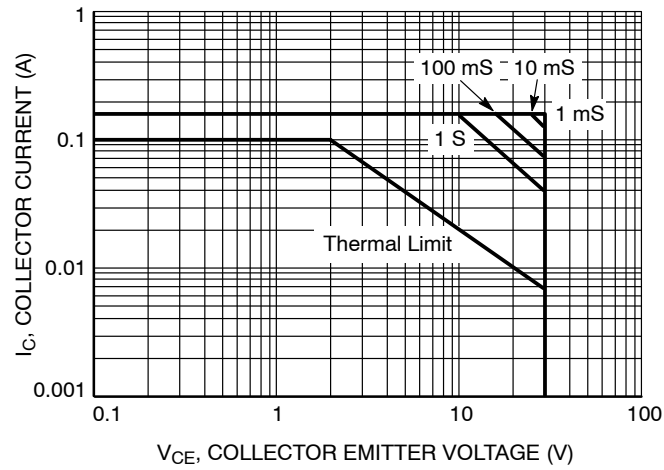
## BC846, SBC846, BC847, SBC847, BC848 Series



**Figure 33. Safe Operating Area for  
BC846A, BC846B**



**Figure 34. Safe Operating Area for  
BC847A, BC847B, BC847C**



**Figure 35. Safe Operating Area for  
BC848A, BC848B, BC848C**

## BC846, SBC846, BC847, SBC847, BC848 Series

### DEVICE ORDERING AND SPECIFIC MARKING INFORMATION

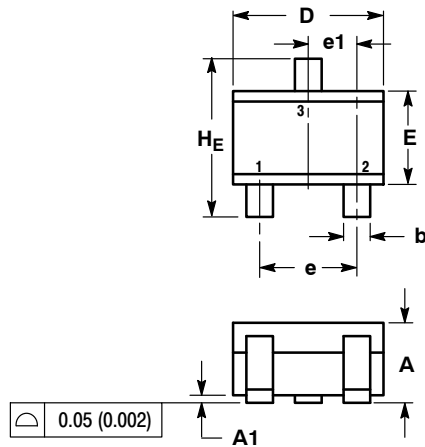
| Device      | Specific Marking Code | Package                      | Shipping†            |
|-------------|-----------------------|------------------------------|----------------------|
| BC846AWT1G  | 1A                    | SC-70 (SOT-323)<br>(Pb-Free) | 3,000 / Tape & Reel  |
| BC846BWT1G  | 1B                    | SC-70 (SOT-323)<br>(Pb-Free) | 3,000 / Tape & Reel  |
| SBC846BWT1G |                       |                              |                      |
| BC847AWT1G  | 1E                    | SC-70 (SOT-323)<br>(Pb-Free) | 3,000 / Tape & Reel  |
| SBC847AWT1G |                       |                              |                      |
| BC847BWT1G  | 1F                    | SC-70 (SOT-323)<br>(Pb-Free) | 3,000 / Tape & Reel  |
| SBC847BWT1G |                       |                              |                      |
| BC847CWT1G  | 1G                    | SC-70 (SOT-323)<br>(Pb-Free) | 3,000 / Tape & Reel  |
| SBC847CWT1G |                       |                              |                      |
| BC847CWT3G  | 1G                    | SC-70 (SOT-323)<br>(Pb-Free) | 10,000 / Tape & Reel |
| BC848AWT1G  | 1J                    | SC-70 (SOT-323)<br>(Pb-Free) | 3,000 / Tape & Reel  |
| BC848BWT1G  | 1K                    | SC-70 (SOT-323)<br>(Pb-Free) | 3,000 / Tape & Reel  |
| BC848CWT1G  | 1L                    | SC-70 (SOT-323)<br>(Pb-Free) | 3,000 / Tape & Reel  |

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

# BC846, SBC846, BC847, SBC847, BC848 Series

## PACKAGE DIMENSIONS

### SC-70 (SOT-323) CASE 419-04 ISSUE N



#### NOTES:

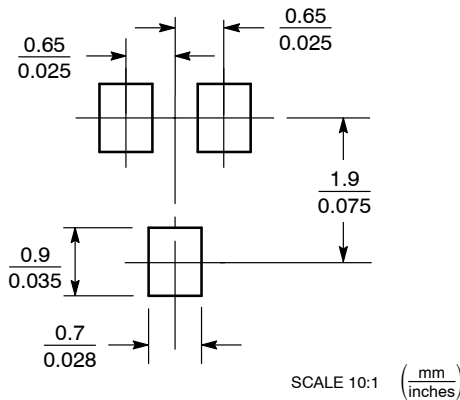
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.

| DIM | MILLIMETERS |      |      | INCHES    |       |       |
|-----|-------------|------|------|-----------|-------|-------|
|     | MIN         | NOM  | MAX  | MIN       | NOM   | MAX   |
| A   | 0.80        | 0.90 | 1.00 | 0.032     | 0.035 | 0.040 |
| A1  | 0.00        | 0.05 | 0.10 | 0.000     | 0.002 | 0.004 |
| A2  | 0.70 REF    |      |      | 0.028 REF |       |       |
| b   | 0.30        | 0.35 | 0.40 | 0.012     | 0.014 | 0.016 |
| c   | 0.10        | 0.18 | 0.25 | 0.004     | 0.007 | 0.010 |
| D   | 1.80        | 2.10 | 2.20 | 0.071     | 0.083 | 0.087 |
| E   | 1.15        | 1.24 | 1.35 | 0.045     | 0.049 | 0.053 |
| e   | 1.20        | 1.30 | 1.40 | 0.047     | 0.051 | 0.055 |
| e1  | 0.65 BSC    |      |      | 0.026 BSC |       |       |
| L   | 0.20        | 0.38 | 0.56 | 0.008     | 0.015 | 0.022 |
| HE  | 2.00        | 2.10 | 2.40 | 0.079     | 0.083 | 0.095 |

#### STYLE 3:

- PIN 1. BASE
- EMITTER
- COLLECTOR

### SOLDERING FOOTPRINT\*



\*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

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Вы можете разместить у нас заказ для любого Вашего проекта, будь то серийное производство или разработка единичного прибора.

В нашем ассортименте представлены ведущие мировые производители активных и пассивных электронных компонентов.

Нашей специализацией является поставка электронной компонентной базы двойного назначения, продукции таких производителей как XILINX, Intel (ex.ALTERA), Vicor, Microchip, Texas Instruments, Analog Devices, Mini-Circuits, Amphenol, Glenair.

Сотрудничество с глобальными дистрибьюторами электронных компонентов, предоставляет возможность заказывать и получать с международных складов практически любой перечень компонентов в оптимальные для Вас сроки.

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