

# BC847ATT1, BC847BTT1, BC847CTT1

## General Purpose Transistors

### NPN Silicon

These transistors are designed for general purpose amplifier applications. They are housed in the SC-75/SOT-416 package which is designed for low power surface mount applications.

#### Features

- NSV Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q101 Qualified and PPAP Capable
- Pb-Free Packages are Available

#### MAXIMUM RATINGS ( $T_A = 25^\circ\text{C}$ )

| Rating                         | Symbol    | Max | Unit |
|--------------------------------|-----------|-----|------|
| Collector-Emitter Voltage      | $V_{CEO}$ | 45  | V    |
| Collector-Base Voltage         | $V_{CBO}$ | 50  | V    |
| Emitter-Base Voltage           | $V_{EBO}$ | 6.0 | V    |
| Collector Current – Continuous | $I_C$     | 100 | mAdc |

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

#### THERMAL CHARACTERISTICS

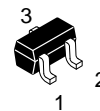
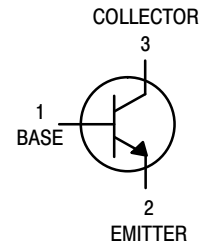
| Characteristic   | Symbol          | Max            | Unit                      |
|--|-----------------|----------------|---------------------------|
| Total Device Dissipation,<br>FR-4 Board (Note 1)<br>$T_A = 25^\circ\text{C}$<br>Derated above $25^\circ\text{C}$ | $P_D$           | 200            | mW                        |
| Thermal Resistance,<br>Junction-to-Ambient (Note 1)  | $R_{\theta JA}$ | 600            | $^\circ\text{C}/\text{W}$ |
| Total Device Dissipation,<br>FR-4 Board (Note 2)<br>$T_A = 25^\circ\text{C}$<br>Derated above $25^\circ\text{C}$ | $P_D$           | 300            | mW                        |
| Thermal Resistance,<br>Junction-to-Ambient (Note 2)  | $R_{\theta JA}$ | 400            | $^\circ\text{C}/\text{W}$ |
| Junction and Storage<br>Temperature Range  | $T_J, T_{stg}$  | -55 to<br>+150 | $^\circ\text{C}$          |

1. FR-4 @ min pad.
2. FR-4 @  $1.0 \times 1.0$  in pad.



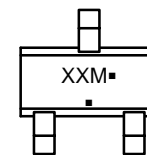
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CASE 463  
SC-75/SOT-416  
STYLE 1

#### MARKING DIAGRAM



XX = Device Code  
M = Date Code  
▪ = Pb-Free Package

(Note: Microdot may be in either location)

#### ORDERING INFORMATION

See detailed ordering, marking and shipping information in the package dimensions section on page 5 of this data sheet.

# BC847ATT1, BC847BTT1, BC847CTT1

## ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25°C unless otherwise noted)

| Characteristic   | Symbol                               | Min             | Typ               | Max               | Unit              |
|--|--------------------------------------|-----------------|-------------------|-------------------|-------------------|
| <b>OFF CHARACTERISTICS</b>   |                                      |                 |                   |                   |                   |
| Collector–Emitter Breakdown Voltage<br>(I <sub>C</sub> = 10 mA)  | BC847 Series<br>V <sub>(BR)CEO</sub> | 45              | –                 | –                 | V                 |
| Collector–Emitter Breakdown Voltage<br>(I <sub>C</sub> = 10 μA, V <sub>EB</sub> = 0)   | BC847 Series<br>V <sub>(BR)CES</sub> | 50              | –                 | –                 | V                 |
| Collector–Base Breakdown Voltage<br>(I <sub>C</sub> = 10 μA)   | BC847 Series<br>V <sub>(BR)CBO</sub> | 50              | –                 | –                 | V                 |
| Emitter–Base Breakdown Voltage<br>(I <sub>E</sub> = 1.0 μA)  | BC847 Series<br>V <sub>(BR)EBO</sub> | 6.0             | –                 | –                 | V                 |
| Collector Cutoff Current (V <sub>CB</sub> = 30 V)<br>(V <sub>CB</sub> = 30 V, T <sub>A</sub> = 150°C)  | I <sub>CBO</sub>                     | –<br>–          | –<br>–            | 15<br>5.0         | nA<br>μA          |
| <b>ON CHARACTERISTICS</b>  |                                      |                 |                   |                   |                   |
| DC Current Gain<br>(I <sub>C</sub> = 10 μA, V <sub>CE</sub> = 5.0 V)   | BC847A<br>BC847B<br>BC847C           | h <sub>FE</sub> | –<br>–<br>–       | 90<br>150<br>270  | –                 |
| (I <sub>C</sub> = 2.0 mA, V <sub>CE</sub> = 5.0 V)   | BC847A<br>BC847B<br>BC847C           |                 | 110<br>200<br>420 | 180<br>290<br>520 | 220<br>450<br>800 |
| Collector–Emitter Saturation Voltage (I <sub>C</sub> = 10 mA, I <sub>B</sub> = 0.5 mA)<br>(I <sub>C</sub> = 100 mA, I <sub>B</sub> = 5.0 mA) | V <sub>CE(sat)</sub>                 | –<br>–          | –<br>–            | 0.25<br>0.6       | V                 |
| Base–Emitter Saturation Voltage (I <sub>C</sub> = 10 mA, I <sub>B</sub> = 0.5 mA)<br>(I <sub>C</sub> = 100 mA, I <sub>B</sub> = 5.0 mA)      | V <sub>BE(sat)</sub>                 | –<br>–          | 0.7<br>0.9        | –<br>–            | V                 |
| Base–Emitter Voltage (I <sub>C</sub> = 2.0 mA, V <sub>CE</sub> = 5.0 V)<br>(I <sub>C</sub> = 10 mA, V <sub>CE</sub> = 5.0 V)                 | V <sub>BE(on)</sub>                  | 580<br>–        | 660<br>–          | 700<br>770        | mV                |
| <b>SMALL–SIGNAL CHARACTERISTICS</b>  |                                      |                 |                   |                   |                   |
| Current–Gain – Bandwidth Product<br>(I <sub>C</sub> = 10 mA, V <sub>CE</sub> = 5.0 Vdc, f = 100 MHz)   | f <sub>T</sub>                       | 100             | –                 | –                 | MHz               |
| Output Capacitance (V <sub>CB</sub> = 10 V, f = 1.0 MHz)   | C <sub>obo</sub>                     | –               | –                 | 4.5               | pF                |
| Noise Figure<br>(I <sub>C</sub> = 0.2 mA, V <sub>CE</sub> = 5.0 Vdc, R <sub>S</sub> = 2.0 kΩ, f = 1.0 kHz, BW = 200 Hz)                      | NF                                   | –               | –                 | 10                | dB                |

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

# BC847ATT1, BC847BTT1, BC847CTT1

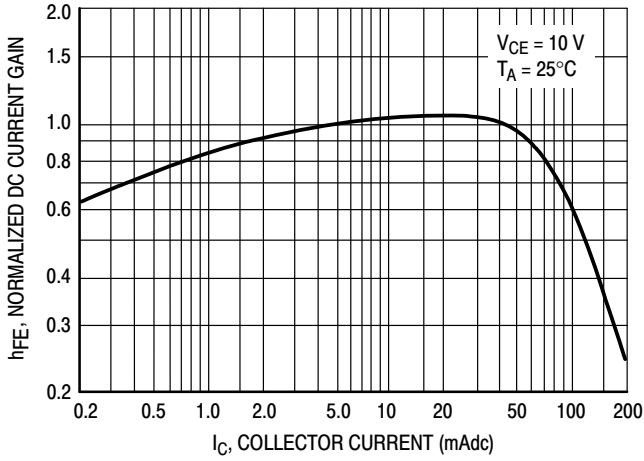


Figure 1. Normalized DC Current Gain

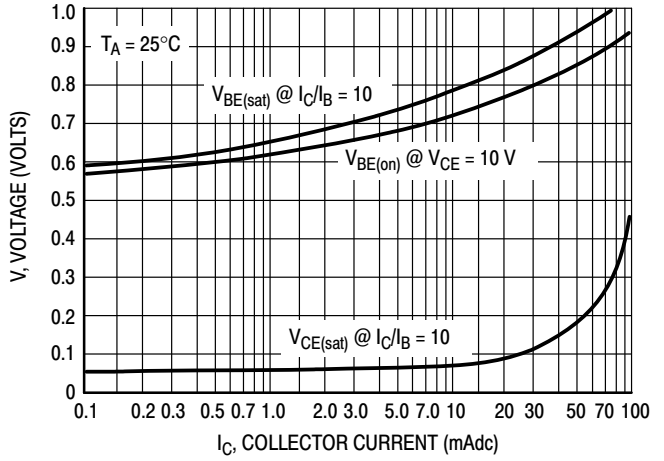


Figure 2. "Saturation" and "On" Voltages

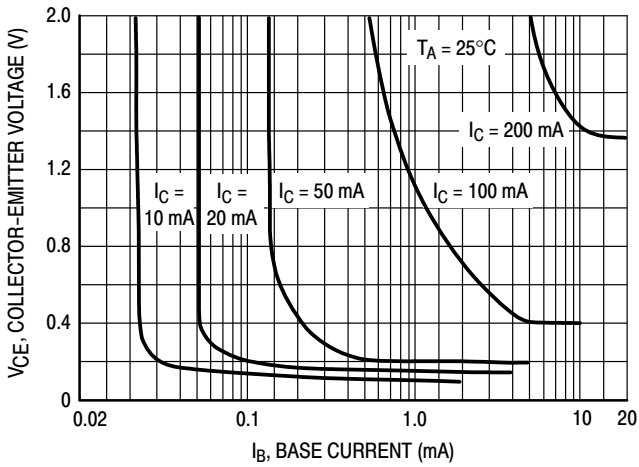


Figure 3. Collector Saturation Region

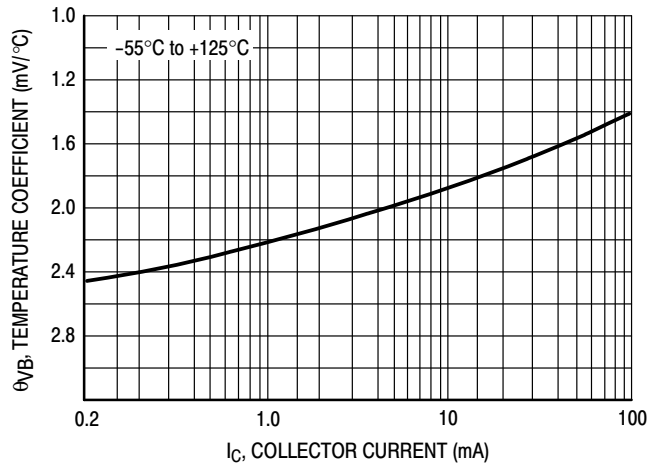


Figure 4. Base-Emitter Temperature Coefficient

# BC847ATT1, BC847BTT1, BC847CTT1

## BC847

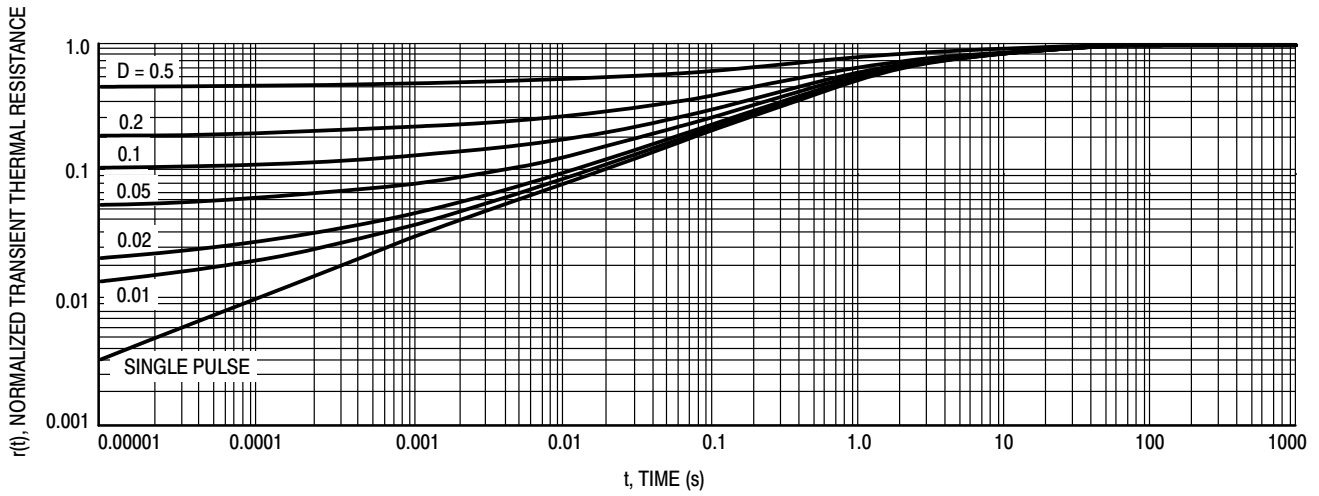


Figure 5. Normalized Thermal Response

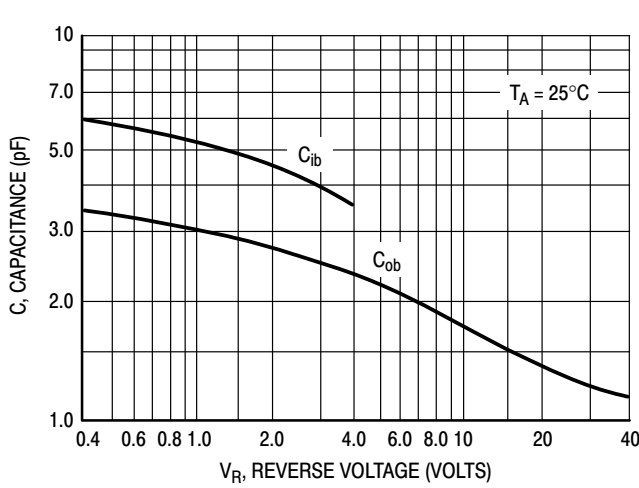


Figure 6. Capacitances

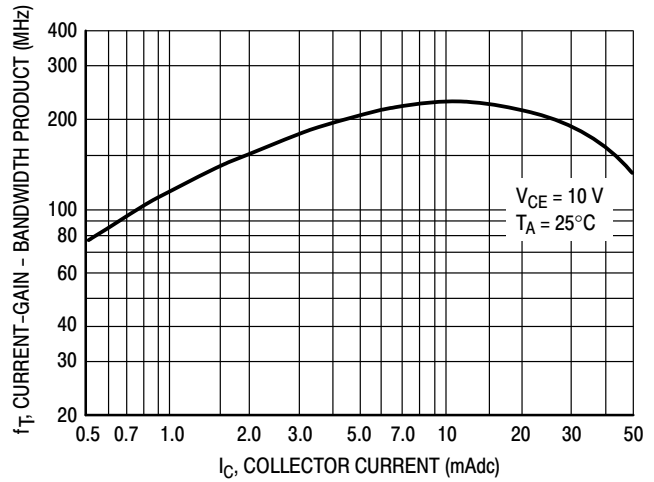


Figure 7. Current-Gain - Bandwidth Product

# BC847ATT1, BC847BTT1, BC847CTT1

## ORDERING INFORMATION

| Device         | Marking | Package                    | Shipping†           |
|----------------|---------|----------------------------|---------------------|
| BC847ATT1      | 1E      | SC-75/SOT-416              | 3,000 / Tape & Reel |
| BC847BTT1      | 1F      | SC-75/SOT-416              | 3,000 / Tape & Reel |
| BC847BTT1G     | 1F      | SC-75/SOT-416<br>(Pb-Free) |                     |
| NSVBC847BTT1G* | 1F      | SC-75/SOT-416<br>(Pb-Free) | 3,000 / Tape & Reel |
| BC847CTT1G     | 1G      | SC-75/SOT-416<br>(Pb-Free) | 3,000 / Tape & Reel |

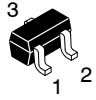
†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

\*NSV Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q101 Qualified and PPAP Capable.

# MECHANICAL CASE OUTLINE

## PACKAGE DIMENSIONS

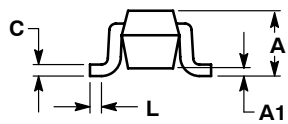
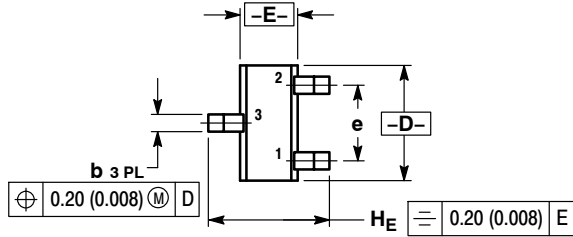
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**SC-75/SOT-416**  
CASE 463-01  
ISSUE G

DATE 07 AUG 2015

SCALE 4:1



STYLE 1:  
PIN 1. BASE  
2. EMITTER  
3. COLLECTOR

STYLE 2:  
PIN 1. ANODE  
2. N/C  
3. CATHODE

STYLE 3:  
PIN 1. ANODE  
2. ANODE  
3. CATHODE

STYLE 4:  
PIN 1. CATHODE  
2. CATHODE  
3. ANODE

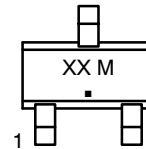
STYLE 5:  
PIN 1. GATE  
2. SOURCE  
3. DRAIN

NOTES:

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

| DIM | MILLIMETERS |      |      | INCHES   |       |       |
|-----|-------------|------|------|----------|-------|-------|
|     | MIN         | NOM  | MAX  | MIN      | NOM   | MAX   |
| A   | 0.70        | 0.80 | 0.90 | 0.027    | 0.031 | 0.035 |
| A1  | 0.00        | 0.05 | 0.10 | 0.000    | 0.002 | 0.004 |
| b   | 0.15        | 0.20 | 0.30 | 0.006    | 0.008 | 0.012 |
| C   | 0.10        | 0.15 | 0.25 | 0.004    | 0.006 | 0.010 |
| D   | 1.55        | 1.60 | 1.65 | 0.061    | 0.063 | 0.065 |
| E   | 0.70        | 0.80 | 0.90 | 0.027    | 0.031 | 0.035 |
| e   | 1.00 BSC    |      |      | 0.04 BSC |       |       |
| L   | 0.10        | 0.15 | 0.20 | 0.004    | 0.006 | 0.008 |
| HE  | 1.50        | 1.60 | 1.70 | 0.060    | 0.063 | 0.067 |

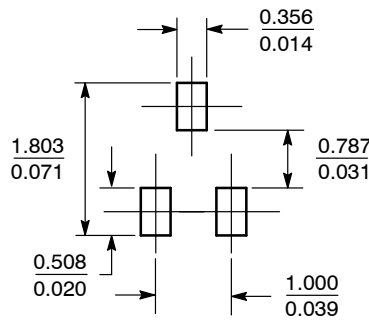
**GENERIC MARKING DIAGRAM\***



- XX = Specific Device Code
- M = Date Code
- = Pb-Free Package

\*This information is generic. Please refer to device data sheet for actual part marking. Pb-Free indicator, "G" or microdot "■", may or may not be present.

**SOLDERING FOOTPRINT\***



SCALE 10:1 (mm/inches)

\*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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| <b>DESCRIPTION:</b>     | <b>SC-75/SOT-416</b> | <b>PAGE 1 OF 1</b>   |

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[NTE101](#) [NTE13](#) [NTE15](#)