

# BCP53 Series, SBCP53 Series

## PNP Silicon Epitaxial Transistors

This PNP Silicon Epitaxial transistor is designed for use in audio amplifier applications. The device is housed in the SOT-223 package which is designed for medium power surface mount applications.

- High Current: 1.5 A
- NPN Complement is BCP56
- The SOT-223 Package can be soldered using wave or reflow. The formed leads absorb thermal stress during soldering, eliminating the possibility of damage to the die
- Device Marking:  
BCP53T1 = AH  
BCP53-10T1 = AH-10  
BCP53-16T1 = AH-16
- 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 ( $T_C = 25^\circ\text{C}$ unless otherwise noted)

| Rating                                                                                             | Symbol         | Value          | Unit                      |
|----------------------------------------------------------------------------------------------------|----------------|----------------|---------------------------|
| Collector-Emitter Voltage                                                                          | $V_{CEO}$      | -80            | Vdc                       |
| Collector-Base Voltage                                                                             | $V_{CBO}$      | -100           | Vdc                       |
| Emitter-Base Voltage                                                                               | $V_{EBO}$      | -5.0           | Vdc                       |
| Collector Current                                                                                  | $I_C$          | 1.5            | Adc                       |
| Total Power Dissipation<br>@ $T_A = 25^\circ\text{C}$ (Note 1.)<br>Derate above $25^\circ\text{C}$ | $P_D$          | 1.5<br>12      | W<br>mW/ $^\circ\text{C}$ |
| Operating and Storage<br>Temperature Range                                                         | $T_J, T_{stg}$ | -65 to<br>+150 | $^\circ\text{C}$          |

### THERMAL CHARACTERISTICS

| Characteristic                                                              | Symbol          | Max       | Unit                      |
|-----------------------------------------------------------------------------|-----------------|-----------|---------------------------|
| Thermal Resistance,<br>Junction to Ambient<br>(surface mounted)             | $R_{\theta JA}$ | 83.3      | $^\circ\text{C}/\text{W}$ |
| Lead Temperature for Soldering,<br>0.0625" from case<br>Time in Solder Bath | $T_L$           | 260<br>10 | $^\circ\text{C}$<br>s     |

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.

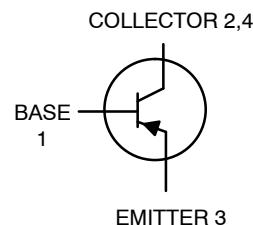
1. Device mounted on a glass epoxy printed circuit board 1.575 in. x 1.575 in. x 0.059 in.; mounting pad for the collector lead min. 0.93 sq. in.



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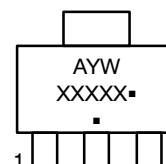
## MEDIUM POWER HIGH CURRENT SURFACE MOUNT PNP TRANSISTORS



### MARKING DIAGRAM



**SOT-223  
CASE 318E  
STYLE 1**



A = Assembly Location  
Y = Year  
W = Work Week  
XXXXX = Specific Device Code  
▪ = Pb-Free Package

(\*Note: Microdot may be in either location)

### ORDERING INFORMATION

| Device       | Package              | Shipping†             |
|--------------|----------------------|-----------------------|
| BCP53T1G     | SOT-223<br>(Pb-Free) | 1000 / Tape &<br>Reel |
| SBCP53-10T1G | SOT-223<br>(Pb-Free) | 1000 / Tape &<br>Reel |
| BCP53-10T1G  | SOT-223<br>(Pb-Free) | 1000 / Tape &<br>Reel |
| SBCP53-10T1G | SOT-223<br>(Pb-Free) | 1000 / Tape &<br>Reel |
| BCP53-16T1G  | SOT-223<br>(Pb-Free) | 1000 / Tape &<br>Reel |
| SBCP53-16T1G | SOT-223<br>(Pb-Free) | 1000 / Tape &<br>Reel |
| BCP53-16T3G  | SOT-223<br>(Pb-Free) | 4000 / Tape &<br>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.

## BCP53 Series, SBCP53 Series

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

| Characteristics | Symbol | Min | Typ | Max | Unit |
|-----------------|--------|-----|-----|-----|------|
|-----------------|--------|-----|-----|-----|------|

#### OFF CHARACTERISTICS

|                                                                                                      |               |      |   |      |                 |
|------------------------------------------------------------------------------------------------------|---------------|------|---|------|-----------------|
| Collector–Base Breakdown Voltage ( $I_C = -100\ \mu\text{Adc}$ , $I_E = 0$ )                         | $V_{(BR)CBO}$ | -100 | – | –    | Vdc             |
| Collector–Emitter Breakdown Voltage ( $I_C = -1.0\ \text{mAdc}$ , $I_B = 0$ )                        | $V_{(BR)CEO}$ | -80  | – | –    | Vdc             |
| Collector–Emitter Breakdown Voltage ( $I_C = -100\ \mu\text{Adc}$ , $R_{BE} = 1.0\ \text{k}\Omega$ ) | $V_{(BR)CER}$ | -100 | – | –    | Vdc             |
| Emitter–Base Breakdown Voltage ( $I_E = -10\ \mu\text{Adc}$ , $I_C = 0$ )                            | $V_{(BR)EBO}$ | -5.0 | – | –    | Vdc             |
| Collector–Base Cutoff Current ( $V_{CB} = -30\ \text{Vdc}$ , $I_E = 0$ )                             | $I_{CBO}$     | –    | – | -100 | nAdc            |
| Emitter–Base Cutoff Current ( $V_{EB} = -5.0\ \text{Vdc}$ , $I_C = 0$ )                              | $I_{EBO}$     | –    | – | -10  | $\mu\text{Adc}$ |

#### ON CHARACTERISTICS

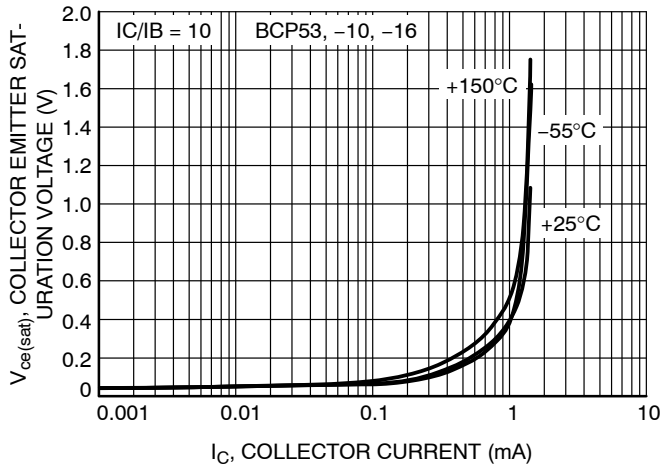
|                                                                                                                                                                                                                                                                                                        |               |     |   |      |     |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|-----|---|------|-----|
| DC Current Gain ( $I_C = -5.0\ \text{mAdc}$ , $V_{CE} = -2.0\ \text{Vdc}$ ) All Part Types<br>( $I_C = -150\ \text{mAdc}$ , $V_{CE} = -2.0\ \text{Vdc}$ )<br>BCP53, SBCP53<br>BCP53-10, SBCP53-10<br>BCP53-16, SBCP53-16<br>( $I_C = -500\ \text{mAdc}$ , $V_{CE} = -2.0\ \text{Vdc}$ ) All Part Types | $h_{FE}$      | 25  | – | –    | –   |
|                                                                                                                                                                                                                                                                                                        |               | 40  | – | 250  |     |
|                                                                                                                                                                                                                                                                                                        |               | 63  | – | 160  |     |
|                                                                                                                                                                                                                                                                                                        |               | 100 | – | 250  |     |
|                                                                                                                                                                                                                                                                                                        |               | 25  | – | –    |     |
| Collector–Emitter Saturation Voltage ( $I_C = -500\ \text{mAdc}$ , $I_B = -50\ \text{mAdc}$ )                                                                                                                                                                                                          | $V_{CE(sat)}$ | –   | – | -0.5 | Vdc |
| Base–Emitter On Voltage ( $I_C = -500\ \text{mAdc}$ , $V_{CE} = -2.0\ \text{Vdc}$ )                                                                                                                                                                                                                    | $V_{BE(on)}$  | –   | – | -1.0 | Vdc |

#### DYNAMIC CHARACTERISTICS

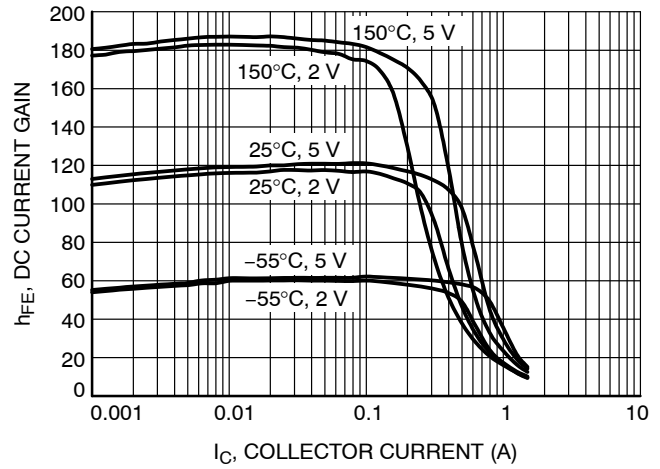
|                                                                                                                       |       |   |    |   |     |
|-----------------------------------------------------------------------------------------------------------------------|-------|---|----|---|-----|
| Current–Gain – Bandwidth Product<br>( $I_C = -10\ \text{mAdc}$ , $V_{CE} = -5.0\ \text{Vdc}$ , $f = 35\ \text{MHz}$ ) | $f_T$ | – | 50 | – | MHz |
|-----------------------------------------------------------------------------------------------------------------------|-------|---|----|---|-----|

# BCP53 Series, SBCP53 Series

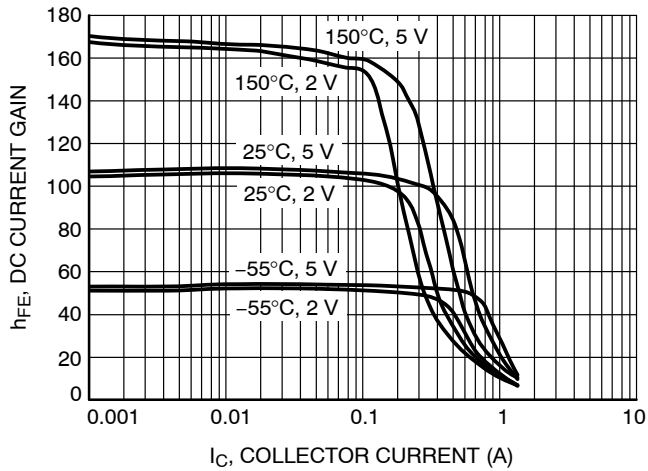
## TYPICAL CHARACTERISTICS



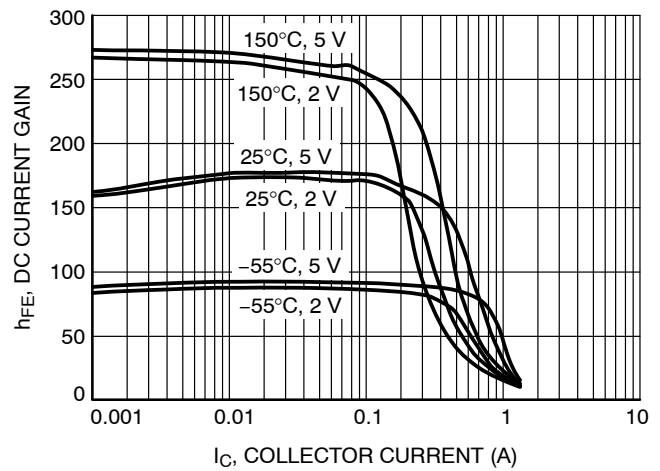
**Figure 1. Collector Emitter Saturation Voltage vs. Collector Current**



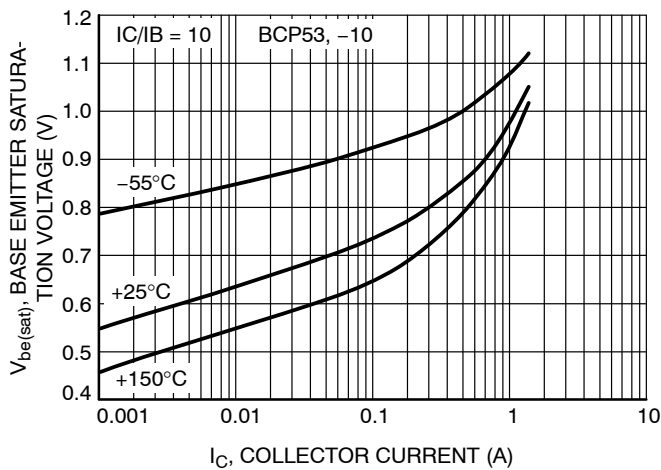
**Figure 2. DC Current Gain vs. Collector Current (BCP53)**



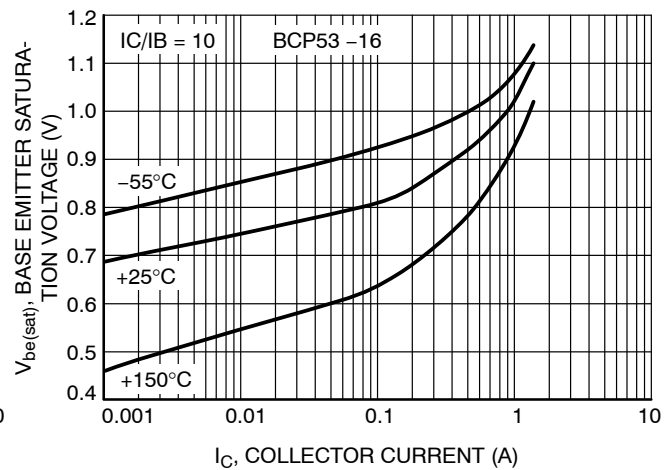
**Figure 3. DC Current Gain vs. Collector Current (BCP53-10)**



**Figure 4. DC Current Gain vs. Collector Current (BCP53-16)**



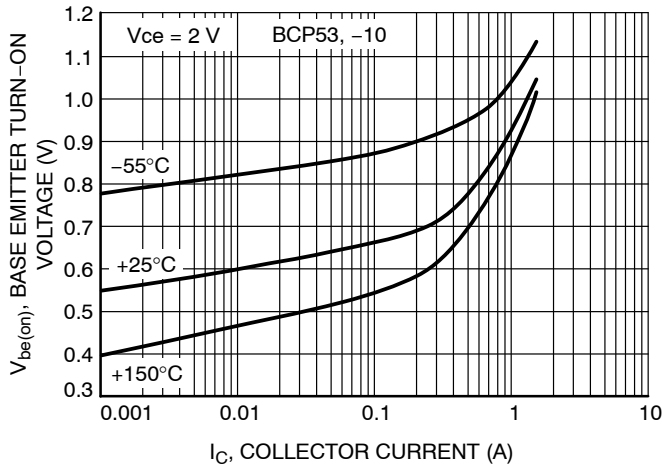
**Figure 5. BCP53, -10 Base Emitter Saturation Voltage vs. Collector Current**



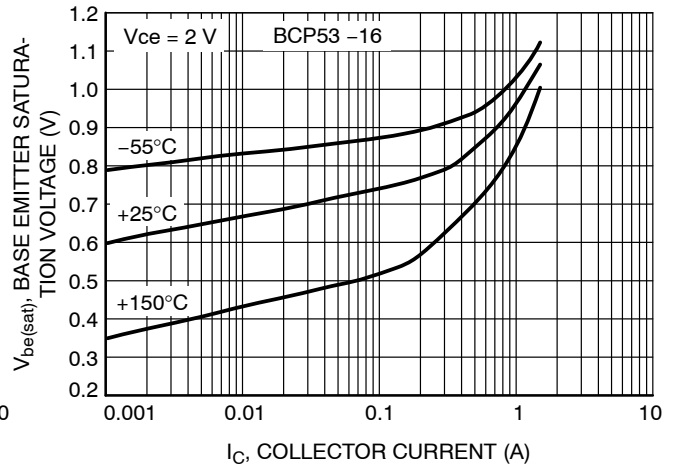
**Figure 6. BCP53-16 Base Emitter Saturation Voltage vs. Collector Current**

# BCP53 Series, SBCP53 Series

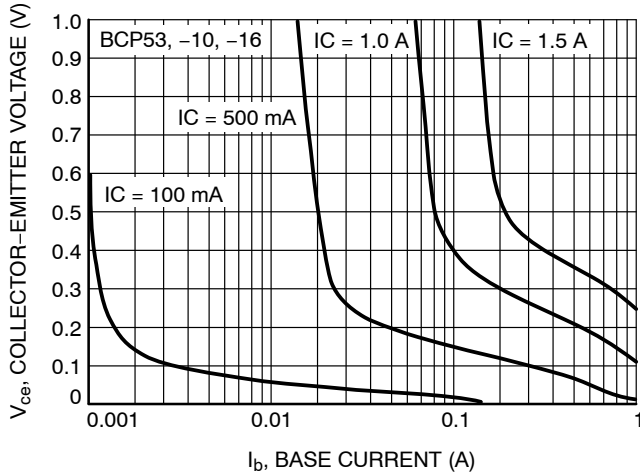
## TYPICAL CHARACTERISTICS



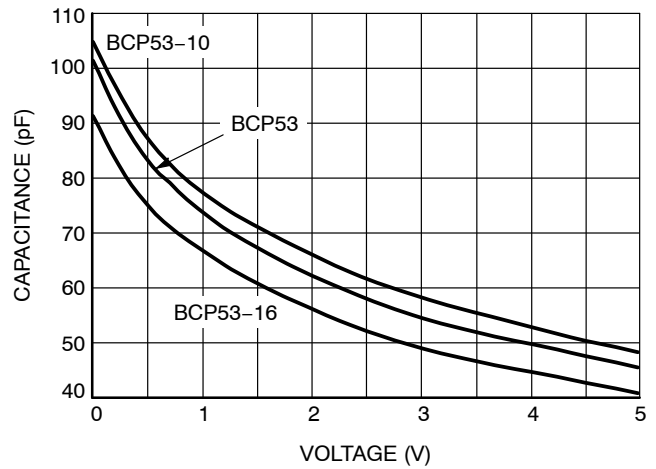
**Figure 7. BCP53, -10 Base Emitter Turn-On Voltage vs. Collector Current  $V_{BE(on)}$**



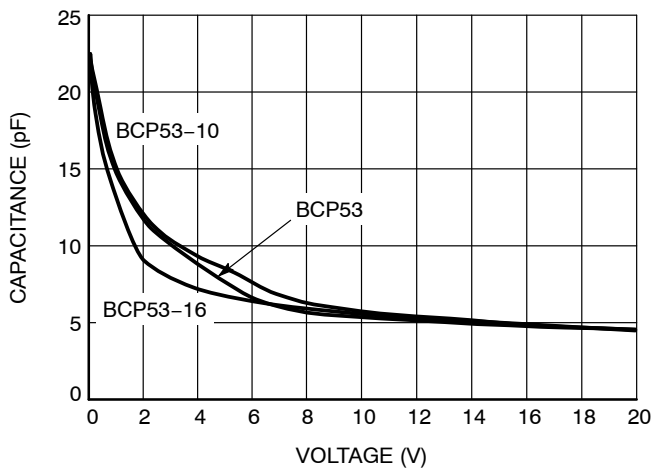
**Figure 8. BCP53-16 Base Emitter Turn-On Voltage vs. Collector Current**



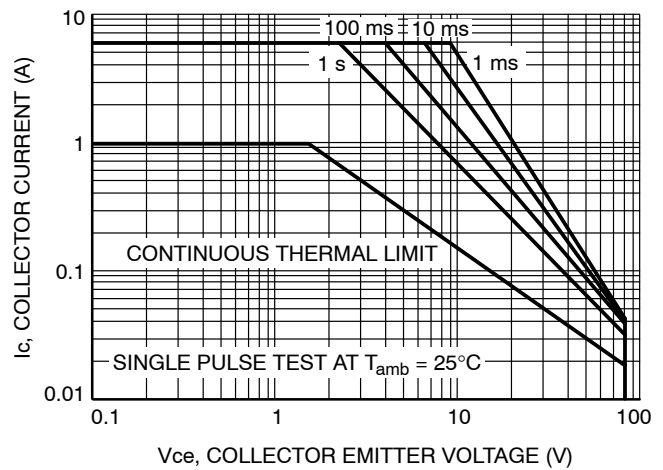
**Figure 9. BCP53, -10, -16 Saturation Region**



**Figure 10. Input Capacitance**



**Figure 11. Output Capacitance**

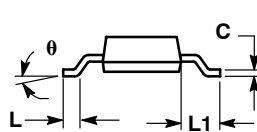
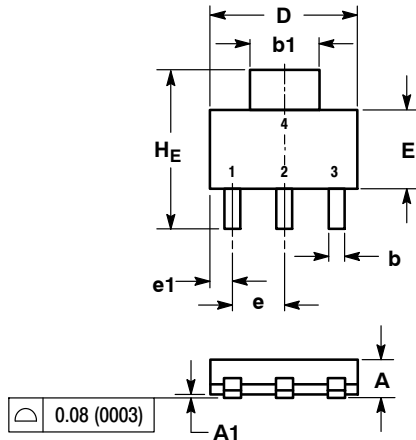


**Figure 12. Standard Operating Area**

# BCP53 Series, SBCP53 Series

## PACKAGE DIMENSIONS

SOT-223 (TO-261)  
CASE 318E-04  
ISSUE N

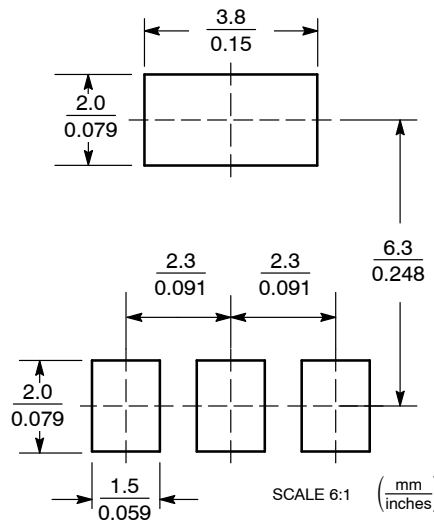


- NOTES:  
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.  
2. CONTROLLING DIMENSION: INCH

| DIM   | MILLIMETERS |      |      | INCHES |       |       |
|-------|-------------|------|------|--------|-------|-------|
|       | MIN         | NOM  | MAX  | MIN    | NOM   | MAX   |
| A     | 1.50        | 1.63 | 1.75 | 0.060  | 0.064 | 0.068 |
| A1    | 0.02        | 0.06 | 0.10 | 0.001  | 0.002 | 0.004 |
| b     | 0.60        | 0.75 | 0.89 | 0.024  | 0.030 | 0.035 |
| b1    | 2.90        | 3.06 | 3.20 | 0.115  | 0.121 | 0.126 |
| c     | 0.24        | 0.29 | 0.35 | 0.009  | 0.012 | 0.014 |
| D     | 6.30        | 6.50 | 6.70 | 0.249  | 0.256 | 0.263 |
| E     | 3.30        | 3.50 | 3.70 | 0.130  | 0.138 | 0.145 |
| e     | 2.20        | 2.30 | 2.40 | 0.087  | 0.091 | 0.094 |
| e1    | 0.85        | 0.94 | 1.05 | 0.033  | 0.037 | 0.041 |
| L     | 0.20        | ---  | ---  | 0.008  | ---   | ---   |
| L1    | 1.50        | 1.75 | 2.00 | 0.060  | 0.069 | 0.078 |
| HE    | 6.70        | 7.00 | 7.30 | 0.264  | 0.276 | 0.287 |
| theta | 0°          | ---  | 10°  | 0°     | ---   | 10°   |

STYLE 1:  
PIN 1. BASE  
2. COLLECTOR  
3. EMITTER  
4. 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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