

# BC856BWT1, SBC856BWT1 Series, BC857BWT1, SBC857BWT1 Series, BC858AWT1 Series

## General Purpose Transistors

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

| Rating                                                               | Symbol    | Value             | Unit |
|----------------------------------------------------------------------|-----------|-------------------|------|
| Collector-Emitter Voltage<br>BC856, SBC856<br>BC857, SBC857<br>BC858 | $V_{CEO}$ | -65<br>-45<br>-30 | V    |
| Collector-Base Voltage<br>BC856, SBC856<br>BC857, SBC857<br>BC858    | $V_{CBO}$ | -80<br>-50<br>-30 | V    |
| Emitter-Base Voltage                                                 | $V_{EBO}$ | -5.0              | V    |
| Collector Current – Continuous                                       | $I_C$     | -100              | mAdc |

#### 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                                | $R_{\theta JA}$ | 883         | $^\circ\text{C}/\text{W}$ |
| Junction and Storage Temperature                                          | $T_J, T_{stg}$  | -55 to +150 | $^\circ\text{C}$          |

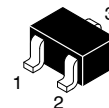
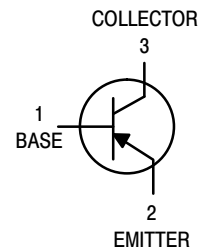
Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

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



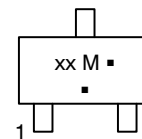
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SC-70/SOT-323  
CASE 419  
STYLE 3

#### MARKING DIAGRAM



xx = Specific Device Code

M = Date Code\*

■ = Pb-Free Package

(Note: Microdot may be in either location)

\*Date Code orientation may vary depending upon manufacturing location.

#### ORDERING INFORMATION

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

# BC856BWT1, SBC856BWT1 Series, BC857BWT1, SBC857BWT1 Series, BC858AWT1 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>( $I_C = -10\text{ mA}$ )                                                | BC856, SBC856 Series<br>BC857, SBC857 Series<br>BC858 Series | $V_{(BR)CEO}$ | -65<br>-45<br>-30    | -<br>-<br>- | V                   |
| Collector–Emitter Breakdown Voltage<br>( $I_C = -10\text{ }\mu\text{A}$ , $V_{EB} = 0$ )                        | BC856, SBC856 Series<br>BC857B, SBC857B Only<br>BC858 Series | $V_{(BR)CES}$ | -80<br>-50<br>-30    | -<br>-<br>- | V                   |
| Collector–Base Breakdown Voltage<br>( $I_C = -10\text{ }\mu\text{A}$ )                                          | BC856, SBC856 Series<br>BC857, SBC857 Series<br>BC858 Series | $V_{(BR)CBO}$ | -80<br>-50<br>-30    | -<br>-<br>- | V                   |
| Emitter–Base Breakdown Voltage<br>( $I_E = -1.0\text{ }\mu\text{A}$ )                                           | BC856, SBC856 Series<br>BC857, SBC857 Series<br>BC858 Series | $V_{(BR)EBO}$ | -5.0<br>-5.0<br>-5.0 | -<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>-      | nA<br>$\mu\text{A}$ |

## ON CHARACTERISTICS

|                                                                                                                                                   |                                                      |               |                   |                   |                   |   |
|---------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------|---------------|-------------------|-------------------|-------------------|---|
| DC Current Gain<br>( $I_C = -10\text{ }\mu\text{A}$ , $V_{CE} = -5.0\text{ V}$ )<br>SBC857B BC858B                                                | BC856A, BC858A<br>BC856B, SBC856B, BC857B,<br>BC857C | $h_{FE}$      | -<br>-<br>-       | 90<br>150<br>270  | -<br>-<br>-       | - |
| ( $I_C = -2.0\text{ mA}$ , $V_{CE} = -5.0\text{ V}$ )<br>SBC857B, BC858B                                                                          | BC856A, BC858A<br>BC856B, SBC856B, BC857B,<br>BC857C |               | 125<br>220<br>420 | 180<br>290<br>520 | 250<br>475<br>800 |   |
| Collector–Emitter Saturation Voltage<br>( $I_C = -10\text{ mA}$ , $I_B = -0.5\text{ mA}$ )<br>( $I_C = -100\text{ mA}$ , $I_B = -5.0\text{ mA}$ ) |                                                      | $V_{CE(sat)}$ | -<br>-            | -<br>-            | -0.3<br>-0.65     | V |
| Base–Emitter Saturation Voltage<br>( $I_C = -10\text{ mA}$ , $I_B = -0.5\text{ mA}$ )<br>( $I_C = -100\text{ mA}$ , $I_B = -5.0\text{ mA}$ )      |                                                      | $V_{BE(sat)}$ | -<br>-            | -0.7<br>-0.9      | -<br>-            | V |
| Base–Emitter On Voltage<br>( $I_C = -2.0\text{ mA}$ , $V_{CE} = -5.0\text{ V}$ )<br>( $I_C = -10\text{ mA}$ , $V_{CE} = -5.0\text{ V}$ )          |                                                      | $V_{BE(on)}$  | -0.6<br>-         | -<br>-            | -0.75<br>-0.82    | V |

## 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<br>( $V_{CB} = -10\text{ V}$ , $f = 1.0\text{ MHz}$ )                                                                              | $C_{ob}$ | -   | - | 4.5 | pF  |
| Noise Figure<br>( $I_C = -0.2\text{ mA}$ , $V_{CE} = -5.0\text{ Vdc}$ , $R_S = 2.0\text{ k}\Omega$ ,<br>$f = 1.0\text{ kHz}$ , $BW = 200\text{ Hz}$ ) | NF       | -   | - | 10  | dB  |

# BC856BWT1, SBC856BWT1 Series, BC857BWT1, SBC857BWT1 Series, BC858AWT1 Series

## BC857/SBC847/BC858

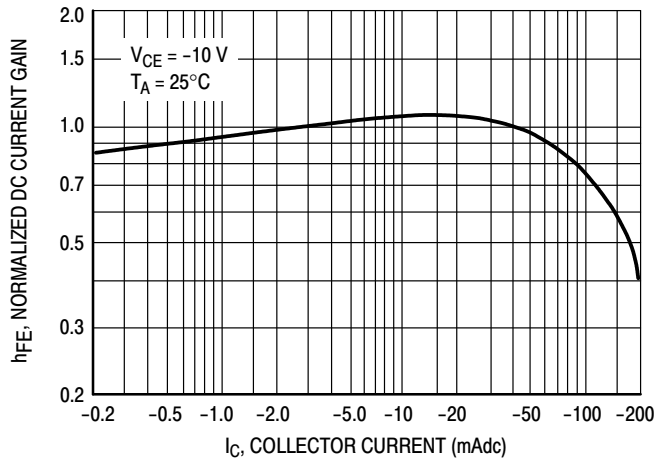


Figure 1. Normalized DC Current Gain

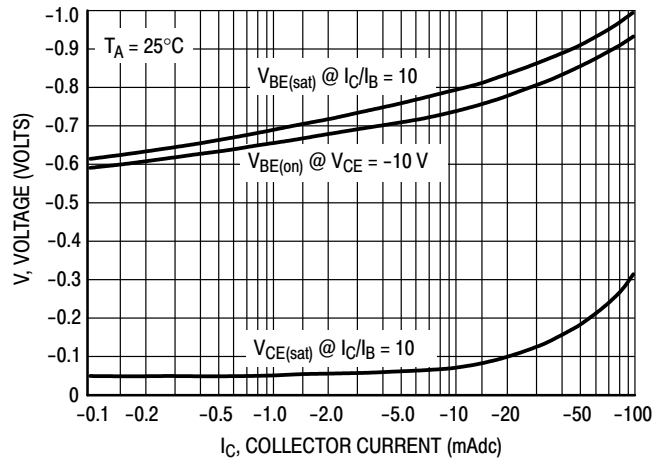


Figure 2. "Saturation" and "On" Voltages

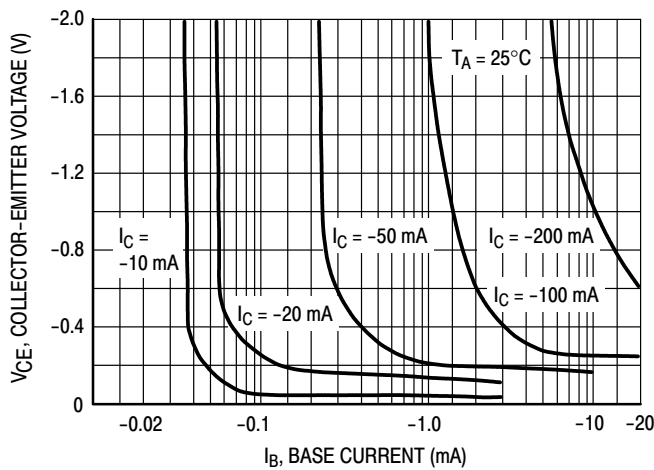


Figure 3. Collector Saturation Region

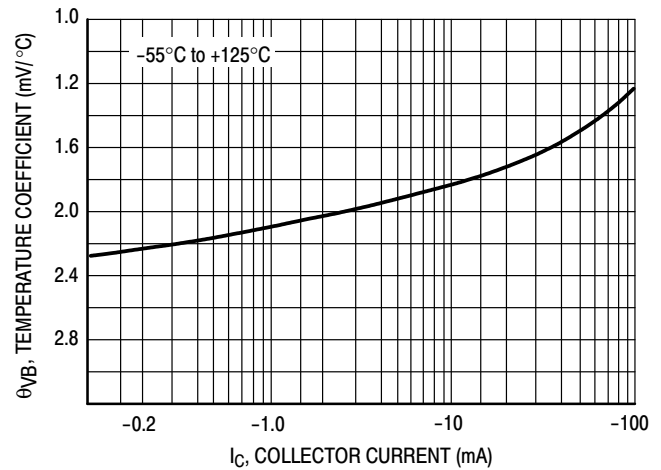


Figure 4. Base-Emitter Temperature Coefficient

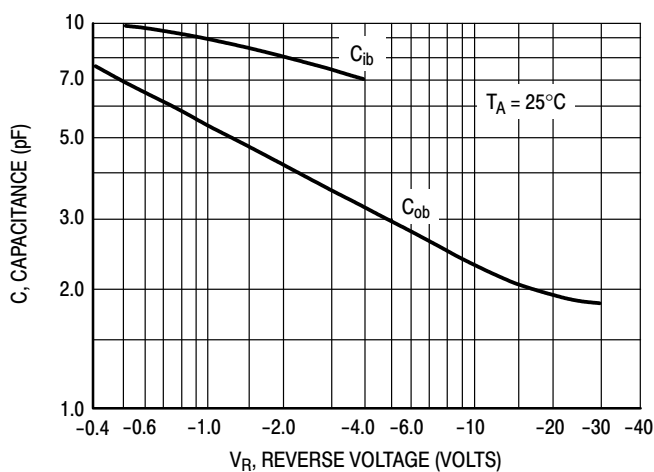


Figure 5. Capacitances

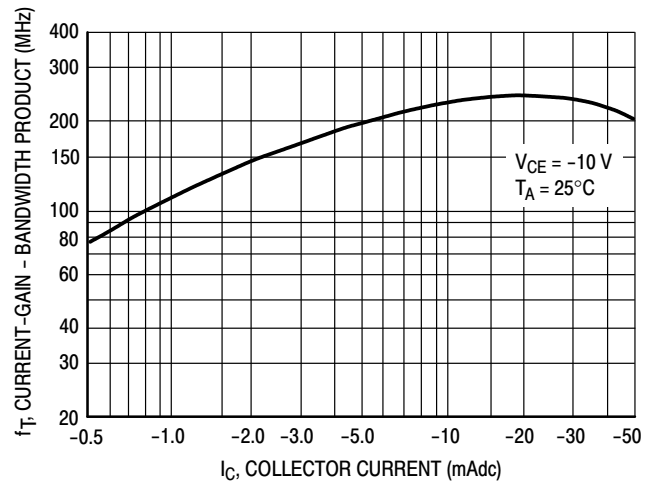


Figure 6. Current-Gain - Bandwidth Product

# BC856BWT1, SBC856BWT1 Series, BC857BWT1, SBC857BWT1 Series, BC858AWT1 Series

## BC856/SBC856

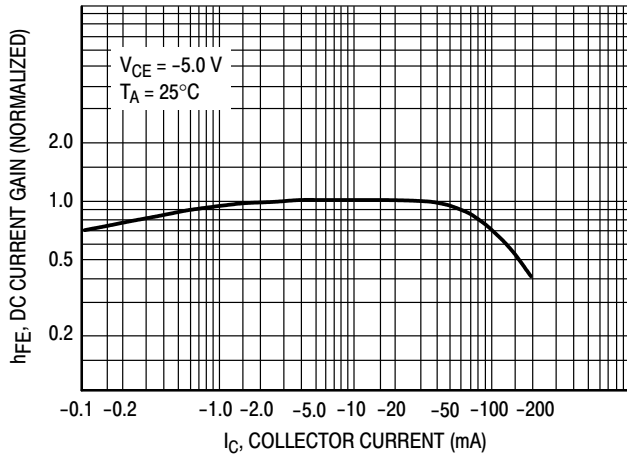


Figure 7. DC Current Gain

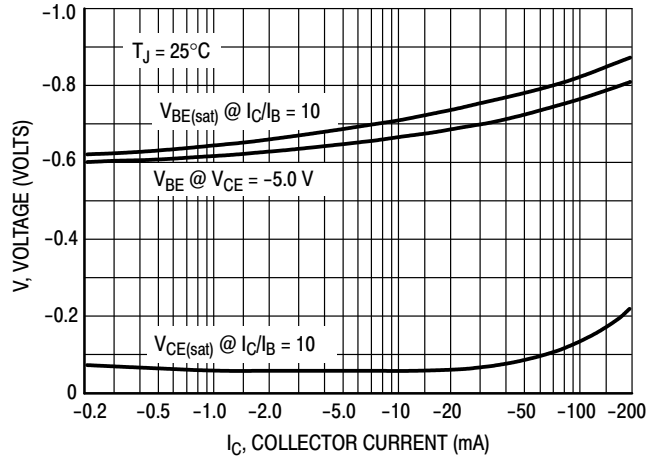


Figure 8. "On" Voltage

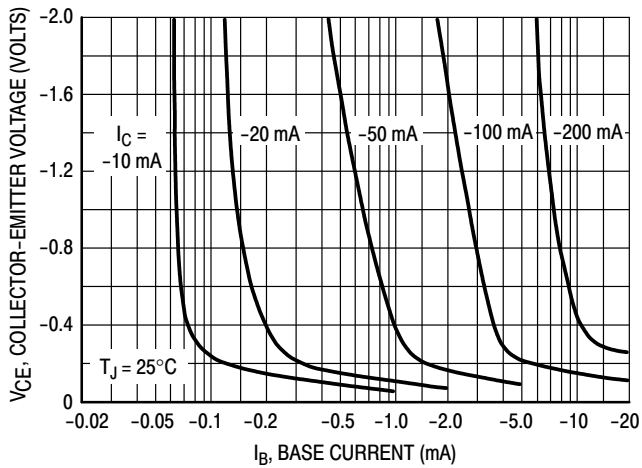


Figure 9. Collector Saturation Region

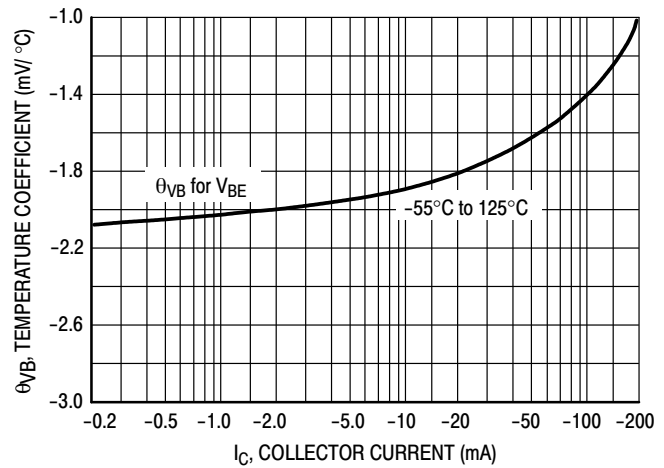


Figure 10. Base-Emitter Temperature Coefficient

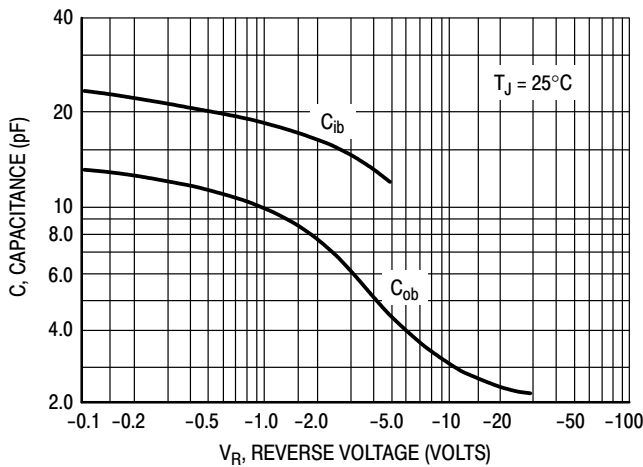


Figure 11. Capacitance

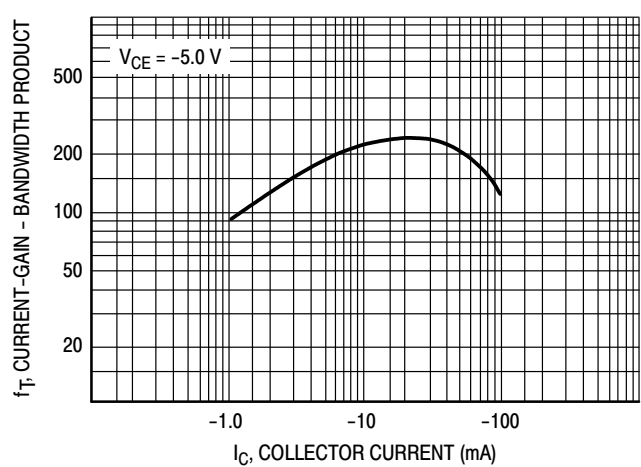


Figure 12. Current-Gain - Bandwidth Product

# BC856BWT1, SBC856BWT1 Series, BC857BWT1, SBC857BWT1 Series, BC858AWT1 Series

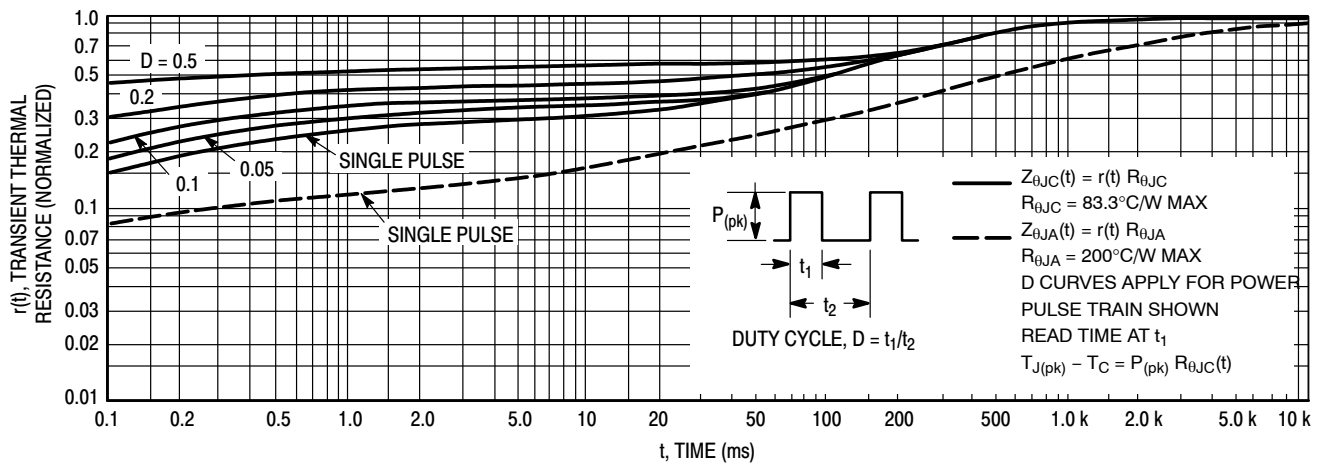


Figure 13. Thermal Response

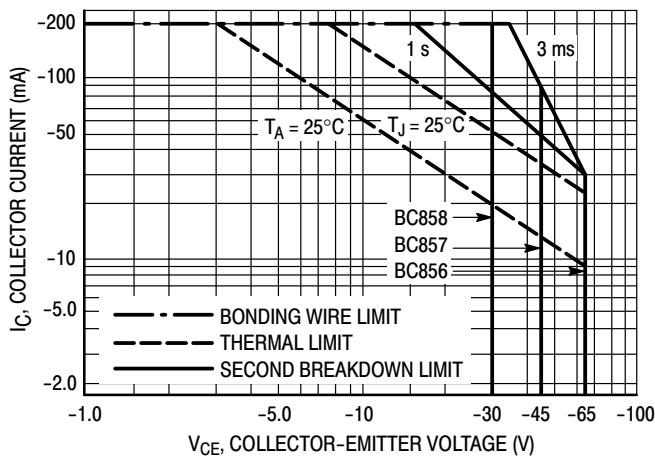


Figure 14. Active Region Safe Operating Area

The safe operating area curves indicate  $I_C$ - $V_{CE}$  limits of the transistor that must be observed for reliable operation. Collector load lines for specific circuits must fall below the limits indicated by the applicable curve.

The data of Figure 14 is based upon  $T_{J(pk)} = 150^\circ\text{C}$ ;  $T_C$  or  $T_A$  is variable depending upon conditions. Pulse curves are valid for duty cycles to 10% provided  $T_{J(pk)} \leq 150^\circ\text{C}$ .  $T_{J(pk)}$  may be calculated from the data in Figure 13. At high case or ambient temperatures, thermal limitations will reduce the power that can be handled to values less than the limitations imposed by the secondary breakdown.

## ORDERING INFORMATION

| Device      | Marking | Package                 | Shipping <sup>†</sup> |
|-------------|---------|-------------------------|-----------------------|
| BC856BWT1G  | 3B      | SC-70/SOT-323 (Pb-Free) | 3,000 / Tape & Reel   |
| SBC856BWT1G |         |                         |                       |
| BC857BWT1G  | 3F      | SC-70/SOT-323 (Pb-Free) | 3,000 / Tape & Reel   |
| SBC857BWT1G |         |                         |                       |
| BC857CWT1G  | 3G      | SC-70/SOT-323 (Pb-Free) | 3,000 / Tape & Reel   |
| BC858AWT1G  | 3J      | SC-70/SOT-323 (Pb-Free) | 3,000 / Tape & Reel   |
| BC858BWT1G  | 3K      | SC-70/SOT-323 (Pb-Free) | 3,000 / Tape & Reel   |

<sup>†</sup>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.

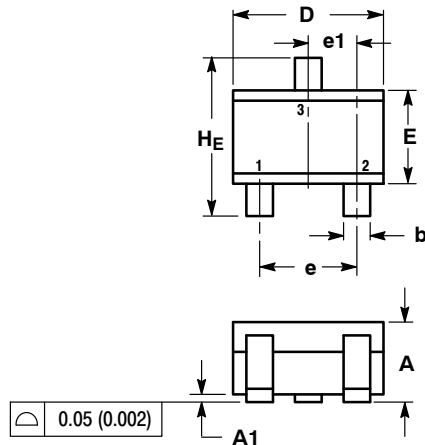
# BC856BWT1, SBC856BWT1 Series, BC857BWT1, SBC857BWT1 Series, BC858AWT1 Series

## PACKAGE DIMENSIONS

SC-70 (SOT-323)

CASE 419-04

ISSUE N



### NOTES:

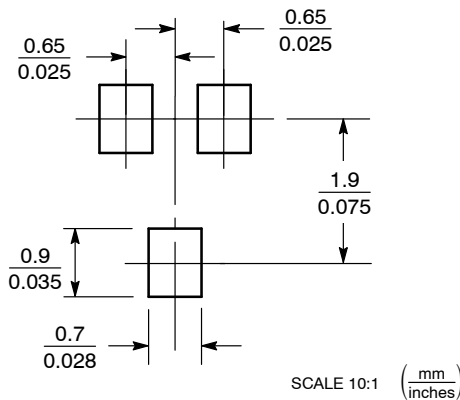
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.

| 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:

1. BASE
2. EMITTER
3. 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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BC856BWT1/D

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Телефон: 8 (812) 309-75-97 (многоканальный)

Факс: 8 (812) 320-03-32

Электронная почта: [ocean@oceanchips.ru](mailto:ocean@oceanchips.ru)

Web: <http://oceanchips.ru/>

Адрес: 198099, г. Санкт-Петербург, ул. Калинина, д. 2, корп. 4, лит. А