

# BC856ALT1G Series, SBC856ALT1G Series

## General Purpose Transistors

### PNP Silicon

#### Features

- AEC-Q101 Qualified and PPAP Capable
- S and NSV 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, NSVBC858, BC859 | $V_{CE0}$ | -65<br>-45<br>-30 | V    |
| Collector-Base Voltage<br>BC856, SBC856<br>BC857, SBC857<br>BC858, NSVBC858, BC859    | $V_{CBO}$ | -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) $T_A = 25^\circ\text{C}$<br>Derate above $25^\circ\text{C}$        | $P_D$           | 225<br>1.8  | mW<br>mW/ $^\circ\text{C}$ |
| Thermal Resistance,<br>Junction-to-Ambient                                                                          | $R_{\theta JA}$ | 556         | $^\circ\text{C}/\text{W}$  |
| Total Device Dissipation Alumina<br>Substrate, (Note 2) $T_A = 25^\circ\text{C}$<br>Derate above $25^\circ\text{C}$ | $P_D$           | 300<br>2.4  | mW<br>mW/ $^\circ\text{C}$ |
| Thermal Resistance,<br>Junction-to-Ambient                                                                          | $R_{\theta JA}$ | 417         | $^\circ\text{C}/\text{W}$  |
| 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.

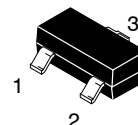
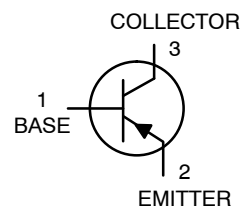
1. FR-5 =  $1.0 \times 0.75 \times 0.062$  in.

2. Alumina =  $0.4 \times 0.3 \times 0.024$  in 99.5% alumina.



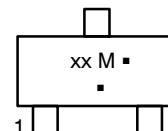
ON Semiconductor®

<http://onsemi.com>



SOT-23 (TO-236AB)  
CASE 318  
STYLE 6

#### MARKING DIAGRAM



xx = Device Code  
xx = (Refer to page 6)  
M = Date Code\*  
▪ = Pb-Free Package

(Note: Microdot may be in either location)

\*Date Code orientation and/or overbar may vary depending upon manufacturing location.

#### ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 6 of this data sheet.

# BC856ALT1G Series, SBC856ALT1G Series

## 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)<br>BC856, SBC856 Series<br>BC857, SBC857 Series<br>BC858, NSVBC858 BC859 Series                                         | V <sub>(BR)CEO</sub> | –65<br>–45<br>–30    | –<br>–<br>– | –<br>–<br>– | V        |
| Collector–Emitter Breakdown Voltage<br>(I <sub>C</sub> = –10 µA, V <sub>EB</sub> = 0)<br>BC856 S, SBC856series<br>BC857A, SBC857A, BC857B, SBC857B Only<br>BC858, NSVBC858, BC859 Series | V <sub>(BR)CES</sub> | –80<br>–50<br>–30    | –<br>–<br>– | –<br>–<br>– | V        |
| Collector–Base Breakdown Voltage<br>(I <sub>C</sub> = –10 µA)<br>BC856, SBC856 Series<br>BC857, SBC857 Series<br>BC858, NSVBC858, BC859 Series                                           | V <sub>(BR)CBO</sub> | –80<br>–50<br>–30    | –<br>–<br>– | –<br>–<br>– | V        |
| Emitter–Base Breakdown Voltage<br>(I <sub>E</sub> = –1.0 µA)<br>BC856, SBC856 Series<br>BC857, SBC857 Series<br>BC858, NSVBC858, BC859 Series                                            | V <sub>(BR)EBO</sub> | –5.0<br>–5.0<br>–5.0 | –<br>–<br>– | –<br>–<br>– | 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>–4.0 | nA<br>µA |

## ON CHARACTERISTICS

|                                                                                                                                                                                                                                                                                                                                                                                                                        |                      |                                  |                                       |                                  |   |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|----------------------------------|---------------------------------------|----------------------------------|---|
| DC Current Gain<br>(I <sub>C</sub> = –10 µA, V <sub>CE</sub> = –5.0 V)<br>BC856A, SBC856A, BC857A, SBC857A, BC858A<br>BC856B, SBC856B, BC857B, SBC857B,<br>BC858B, NSVBC858B<br>BC857C, SBC857C BC858C<br><br>(I <sub>C</sub> = –2.0 mA, V <sub>CE</sub> = –5.0 V)<br>BC856A, SBC856A, BC857A,<br>SBC857A, BC858A<br>BC856B, SBC856B, BC857B, SBC857B, BC858B,<br>NSVBC858B, BC859B<br>BC857C, SBC857C, BC858C, BC859C | h <sub>FE</sub>      | –<br>–<br>–<br>125<br>220<br>420 | 90<br>150<br>270<br>180<br>290<br>520 | –<br>–<br>–<br>250<br>475<br>800 | – |
| Collector–Emitter Saturation Voltage<br>(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>–                                | –0.3<br>–0.65                    | V |
| Base–Emitter Saturation Voltage<br>(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 On Voltage<br>(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>  | –0.6<br>–                        | –<br>–                                | –0.75<br>–0.82                   | V |

## SMALL–SIGNAL CHARACTERISTICS

|                                                                                                                                                                                                   |                 |        |        |           |     |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|--------|--------|-----------|-----|
| 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<br>(V <sub>CB</sub> = –10 V, f = 1.0 MHz)                                                                                                                                      | C <sub>ob</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)<br>BC856, SBC856, BC857, SBC857, BC858, NSVBC858 Series<br>BC859 Series | NF              | –<br>– | –<br>– | 10<br>4.0 | dB  |

# BC856ALT1G Series, SBC856ALT1G Series

## BC857/BC858/BC859/SBC857/NSVBC858

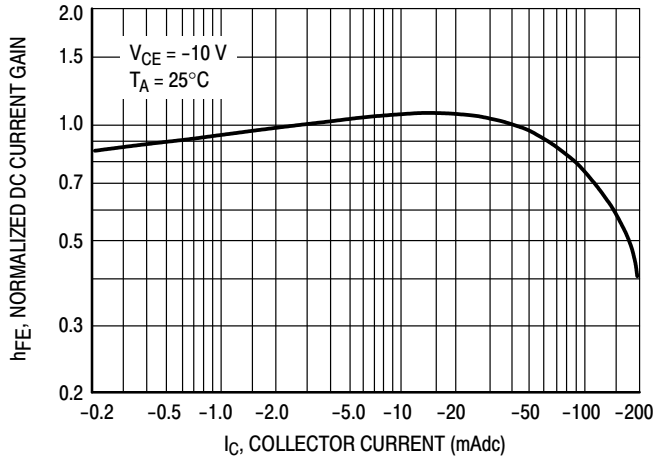


Figure 1. Normalized DC Current Gain

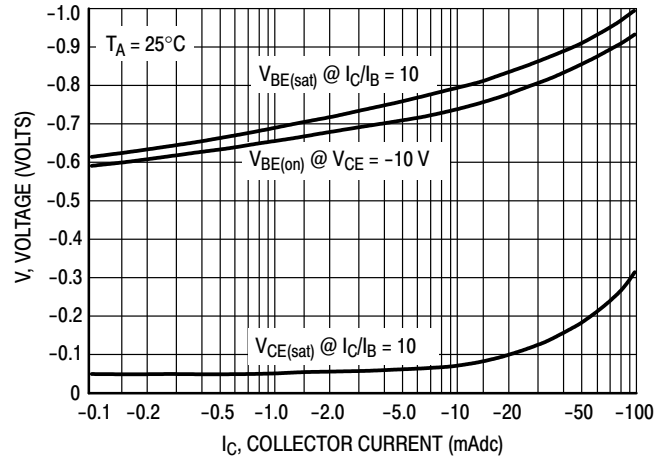


Figure 2. "Saturation" and "On" Voltages

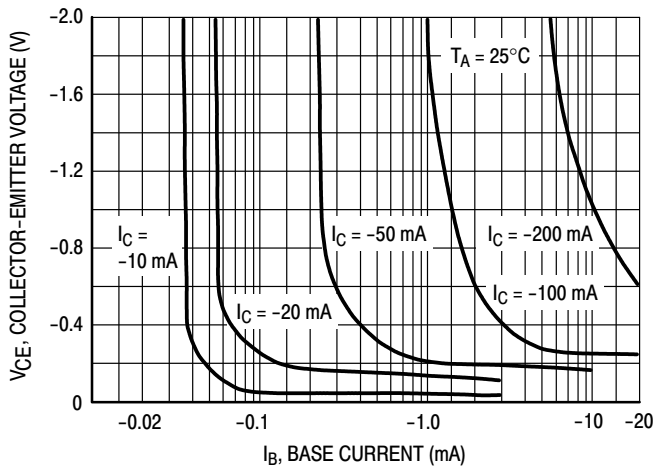


Figure 3. Collector Saturation Region

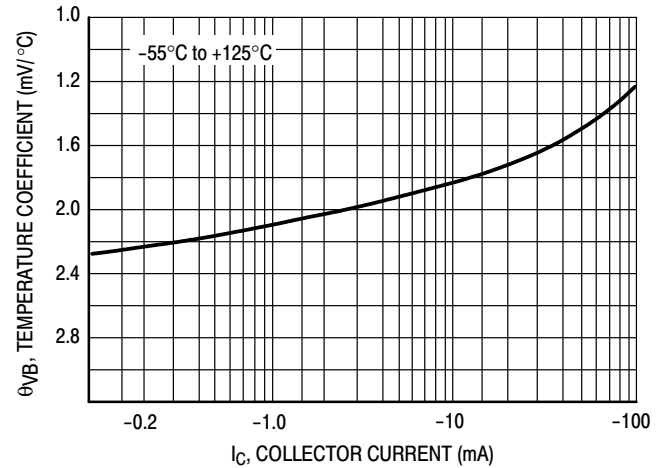


Figure 4. Base-Emitter Temperature Coefficient

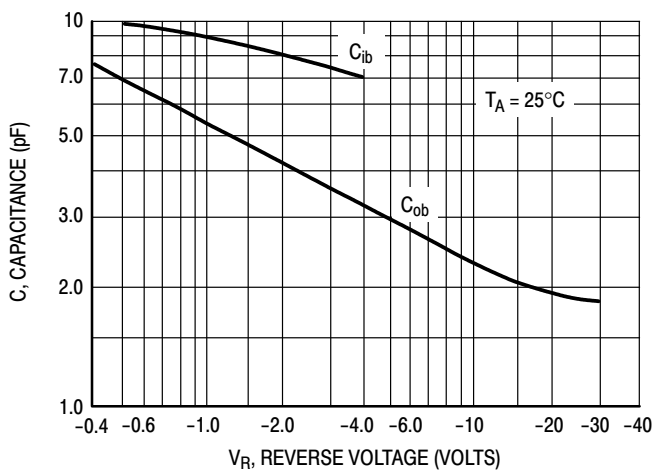


Figure 5. Capacitances

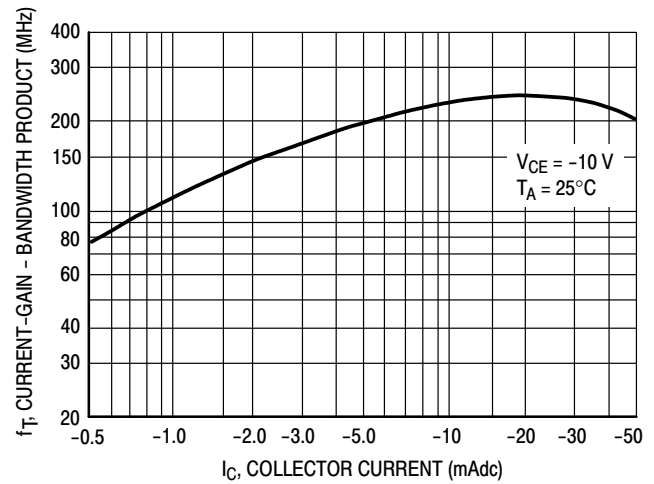


Figure 6. Current-Gain - Bandwidth Product

# BC856ALT1G Series, SBC856ALT1G Series

## BC856/SBC856

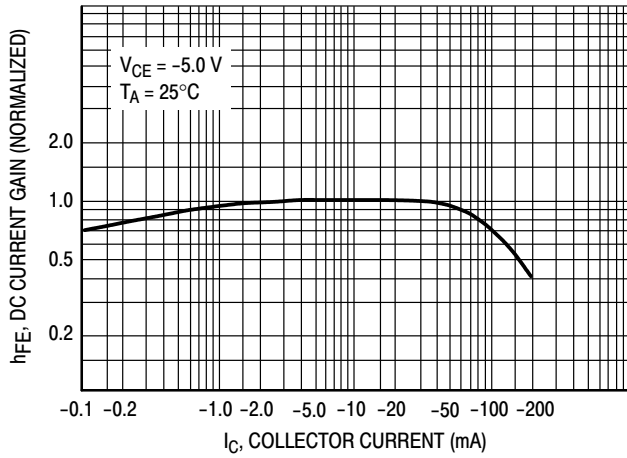


Figure 7. DC Current Gain

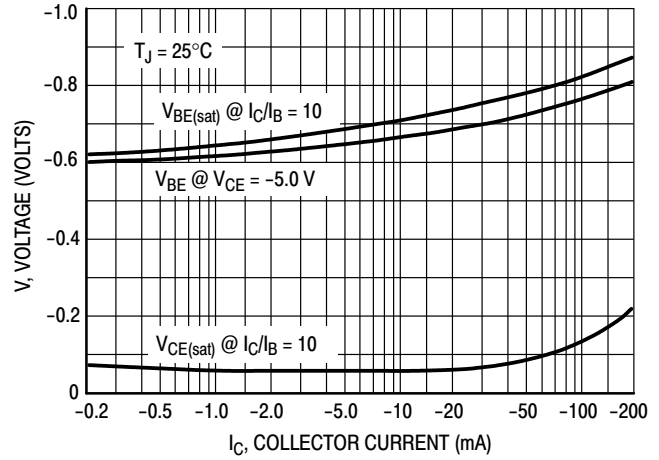


Figure 8. "On" Voltage

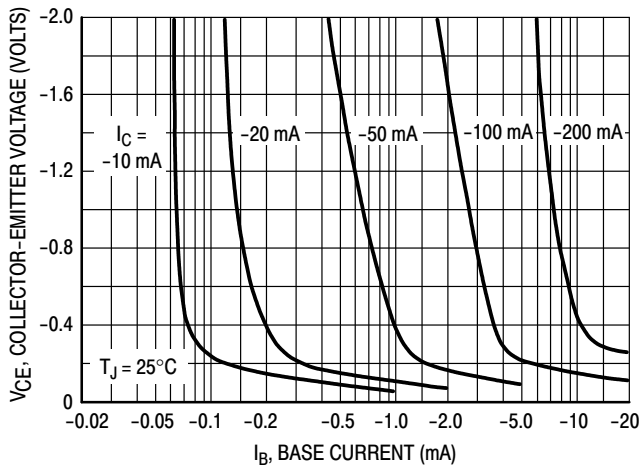


Figure 9. Collector Saturation Region

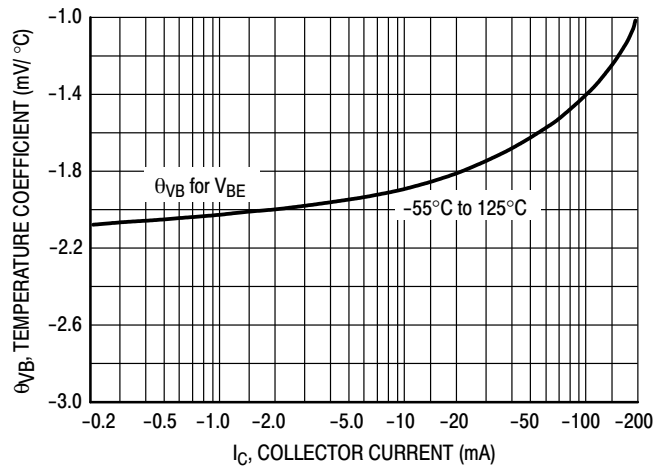


Figure 10. Base-Emitter Temperature Coefficient

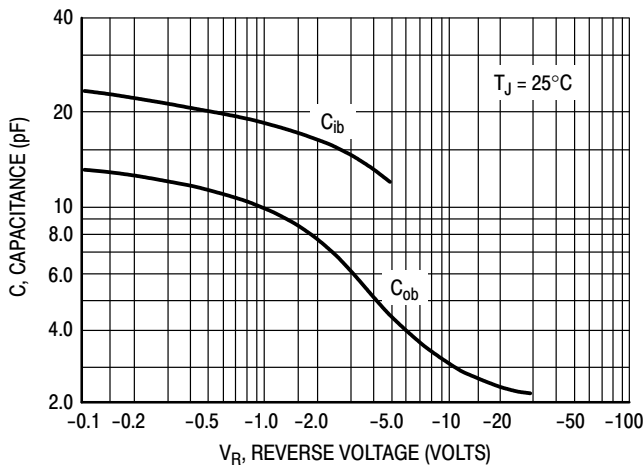


Figure 11. Capacitance

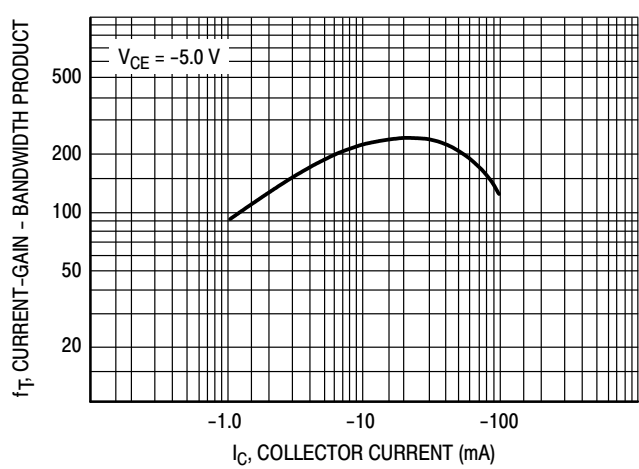


Figure 12. Current-Gain - Bandwidth Product

## BC856ALT1G Series, SBC856ALT1G Series

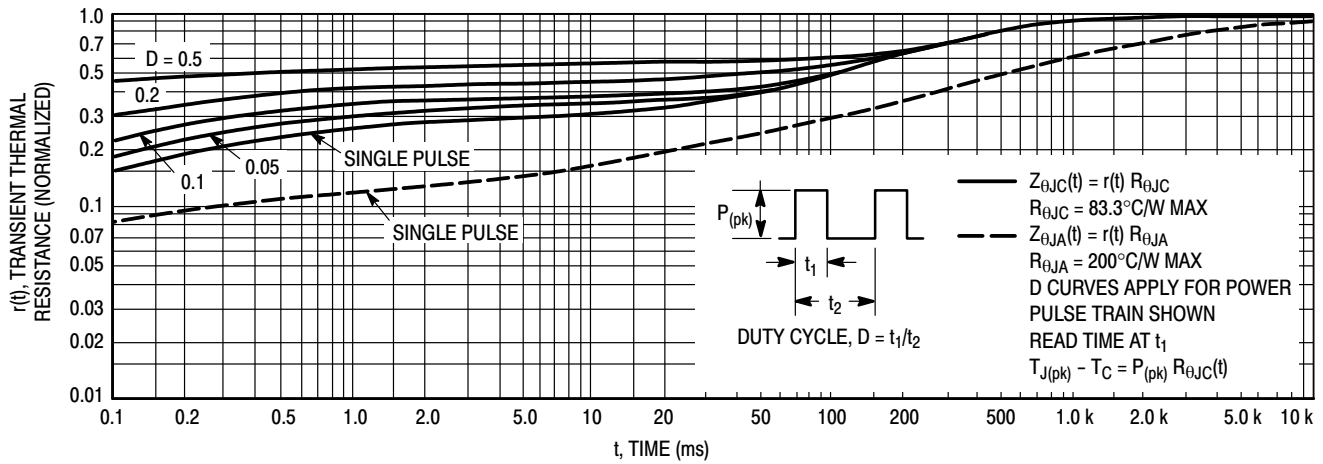


Figure 13. Thermal Response

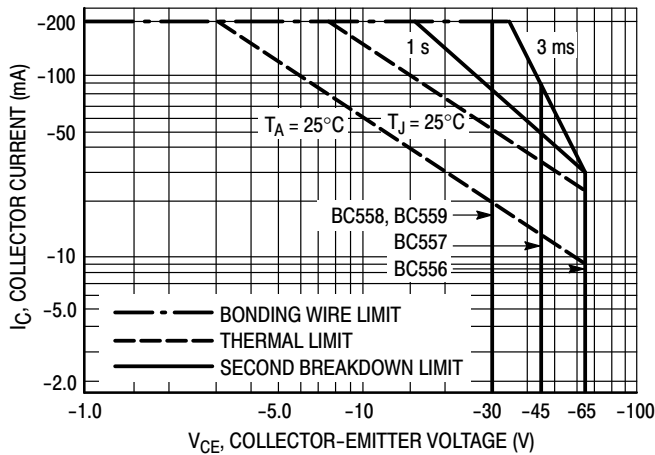


Figure 14. Active Region Safe Operating Area

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.

## BC856ALT1G Series, SBC856ALT1G Series

### ORDERING INFORMATION

| Device        | Marking | Package             | Shipping†            |
|---------------|---------|---------------------|----------------------|
| BC856ALT1G    | 3A      | SOT-23<br>(Pb-Free) | 3,000 / Tape & Reel  |
| SBC856ALT1G   |         |                     |                      |
| BC856ALT3G    |         |                     | 10,000 / Tape & Reel |
| BC856BLT1G    | 3B      | SOT-23<br>(Pb-Free) | 3,000 / Tape & Reel  |
| SBC856BLT1G   |         |                     |                      |
| BC856BLT3G    |         |                     | 10,000 / Tape & Reel |
| SBC856BLT3G   |         |                     |                      |
| BC857ALT1G    | 3E      | SOT-23<br>(Pb-Free) | 3,000 / Tape & Reel  |
| SBC857ALT1G   |         |                     |                      |
| BC857BLT1G    | 3F      | SOT-23<br>(Pb-Free) | 3,000 / Tape & Reel  |
| SBC857BLT1G   |         |                     |                      |
| BC857BLT3G    |         |                     | 10,000 / Tape & Reel |
| BC857CLT1G    | 3G      | SOT-23<br>(Pb-Free) | 3,000 / Tape & Reel  |
| SBC857CLT1G   |         |                     |                      |
| BC857CLT3G    |         |                     | 10,000 / Tape & Reel |
| BC858ALT1G    | 3J      | SOT-23<br>(Pb-Free) | 3,000 / Tape & Reel  |
| BC858BLT1G    | 3K      | SOT-23<br>(Pb-Free) |                      |
| NSVBC858BLT1G |         |                     |                      |
| BC858BLT3G    | 3L      | SOT-23<br>(Pb-Free) | 10,000 / Tape & Reel |
| BC858CLT1G    |         | SOT-23<br>(Pb-Free) | 3,000 / Tape & Reel  |
| BC858CLT3G    |         | SOT-23<br>(Pb-Free) | 10,000 / Tape & Reel |
| BC859BLT1G    | 4B      | SOT-23<br>(Pb-Free) | 3,000 / Tape & Reel  |
| BC859BLT3G    |         | SOT-23<br>(Pb-Free) | 10,000 / Tape & Reel |
| BC859CLT1G    | 4C      | SOT-23<br>(Pb-Free) | 3,000 / Tape & Reel  |
| BC859CLT3G    |         | SOT-23<br>(Pb-Free) | 10,000 / 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.

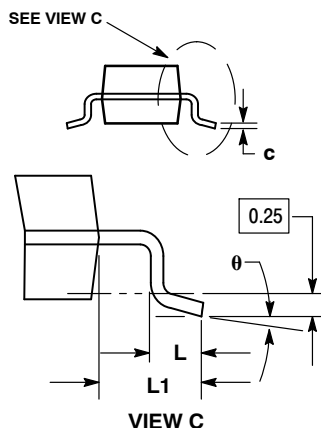
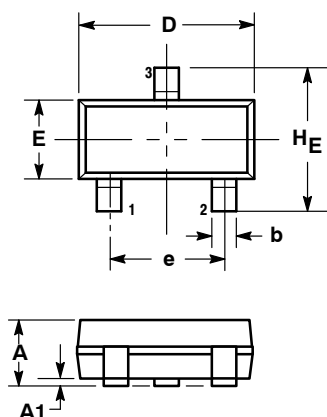
# BC856ALT1G Series, SBC856ALT1G Series

## PACKAGE DIMENSIONS

### SOT-23 (TO-236)

CASE 318-08

ISSUE AP



#### NOTES:

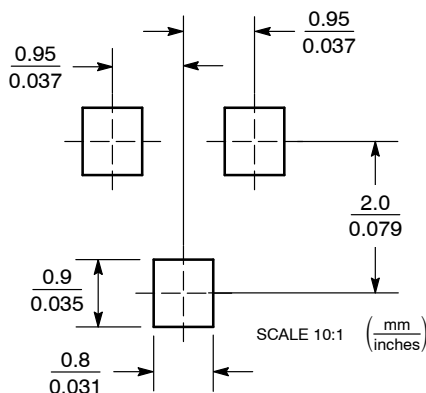
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH THICKNESS. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.
4. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS.

| DIM   | MILLIMETERS |      |      | INCHES |       |       |
|-------|-------------|------|------|--------|-------|-------|
|       | MIN         | NOM  | MAX  | MIN    | NOM   | MAX   |
| A     | 0.89        | 1.00 | 1.11 | 0.035  | 0.040 | 0.044 |
| A1    | 0.01        | 0.06 | 0.10 | 0.001  | 0.002 | 0.004 |
| b     | 0.37        | 0.44 | 0.50 | 0.015  | 0.018 | 0.020 |
| c     | 0.09        | 0.13 | 0.18 | 0.003  | 0.005 | 0.007 |
| D     | 2.80        | 2.90 | 3.04 | 0.110  | 0.114 | 0.120 |
| E     | 1.20        | 1.30 | 1.40 | 0.047  | 0.051 | 0.055 |
| e     | 1.78        | 1.90 | 2.04 | 0.070  | 0.075 | 0.081 |
| L     | 0.10        | 0.20 | 0.30 | 0.004  | 0.008 | 0.012 |
| L1    | 0.35        | 0.54 | 0.69 | 0.014  | 0.021 | 0.029 |
| HE    | 2.10        | 2.40 | 2.64 | 0.083  | 0.094 | 0.104 |
| theta | 0°          | ---  | 10°  | 0°     | ---   | 10°   |

#### STYLE 6:

- PIN 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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- Поставка электронных компонентов под контролем ВП;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- При необходимости вся продукция военного и аэрокосмического назначения проходит испытания и сертификацию в лаборатории (по согласованию с заказчиком);
- Поставка специализированных компонентов военного и аэрокосмического уровня качества (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Actel, Aeroflex, Peregrine, VPT, Syfer, Eurofarad, Texas Instruments, MS Kennedy, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

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## JONHON

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«FORSTAR» (основан в 1998 г.)

ВЧ соединители, коаксиальные кабели,  
кабельные сборки и микроволновые компоненты:

(Применяются в телекоммуникациях гражданского и специального назначения, в средствах связи, РЛС, а так же военной, авиационной и аэрокосмической отраслях промышленности).



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