

General Purpose Transistors

PNP Silicon

BC856ALT1G Series

Features

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

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

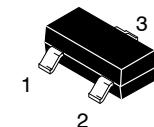
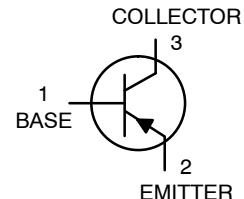
| Rating | Symbol | Value | Unit |
|---|-----------|-------------------|------|
| Collector-Emitter Voltage BC856, SBC856 BC857, SBC857 BC858, NSVBC858, BC859 | V_{CEO} | -65 -45 -30 | V |
| Collector-Base Voltage BC856, SBC856 BC857, SBC857 BC858, NSVBC858, BC859 | V_{CBO} | -80 -50 -30 | V |
| Emitter-Base Voltage | V_{EBO} | -5.0 | V |
| Collector Current – Continuous | I_C | -100 | mAdc |
| Collector Current – Peak | I_C | -200 | mAdc |

THERMAL CHARACTERISTICS

| Characteristic | Symbol | Max | Unit |
|---|-----------------|-------------|----------------------------|
| Total Device Dissipation FR-5 Board, (Note 1) $T_A = 25^\circ\text{C}$ Derate above 25°C | P_D | 225 1.8 | mW mW/ $^\circ\text{C}$ |
| Thermal Resistance, Junction-to-Ambient | $R_{\theta JA}$ | 556 | $^\circ\text{C}/\text{W}$ |
| Total Device Dissipation Alumina Substrate, (Note 2) $T_A = 25^\circ\text{C}$ Derate above 25°C | P_D | 300 2.4 | mW mW/ $^\circ\text{C}$ |
| Thermal Resistance, Junction-to-Ambient | $R_{\theta JA}$ | 417 | $^\circ\text{C}/\text{W}$ |
| Junction and Storage Temperature | T_J, T_{stg} | -55 to +150 | $^\circ\text{C}$ |

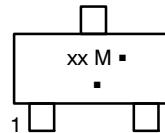
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

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.



**SOT-23 (TO-236)
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

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

| Characteristic | Symbol | Min | Typ | Max | Unit |
|---|-----------------------------|----------------------|------------------|----------------|---------------------|
| OFF CHARACTERISTICS | | | | | |
| Collector – Emitter Breakdown Voltage ($I_C = -10 \text{ mA}$) | $V_{(\text{BR})\text{CEO}}$ | -65 -45 -30 | - | - | V |
| Collector – Emitter Breakdown Voltage ($I_C = -10 \mu\text{A}$, $V_{EB} = 0$) | $V_{(\text{BR})\text{CES}}$ | -80 -50 -30 | - | - | V |
| Collector – Base Breakdown Voltage ($I_C = -10 \mu\text{A}$) | $V_{(\text{BR})\text{CBO}}$ | -80 -50 -30 | - | - | V |
| Emitter – Base Breakdown Voltage ($I_E = -1.0 \mu\text{A}$) | $V_{(\text{BR})\text{EBO}}$ | -5.0 -5.0 -5.0 | - | - | V |
| Collector Cutoff Current ($V_{CB} = -30 \text{ V}$) ($V_{CB} = -30 \text{ V}$, $T_A = 150^\circ\text{C}$) | I_{CBO} | - | - | -15 -4.0 | nA μA |
| ON CHARACTERISTICS | | | | | |
| DC Current Gain ($I_C = -10 \mu\text{A}$, $V_{CE} = -5.0 \text{ V}$) | h_{FE} | - - - | 90 150 270 | - | - |
| ($I_C = -2.0 \text{ mA}$, $V_{CE} = -5.0 \text{ V}$) | | 125 | 180 | 250 | |
| BC856A, SBC856A, BC857A, SBC857A, BC858A BC856B, SBC856B, BC857B, SBC857B, BC858B, NSVBC858B BC857C, SBC857C BC858C | | 220 | 290 | 475 | |
| BC856A, SBC856A, BC857A, SBC857A, BC858A BC856B, SBC856B, BC857B, SBC857B, BC858B, NSVBC858B, BC859B BC857C, SBC857C, BC858C, BC859C | | 420 | 520 | 800 | |
| Collector – Emitter Saturation Voltage ($I_C = -10 \text{ mA}$, $I_B = -0.5 \text{ mA}$) ($I_C = -100 \text{ mA}$, $I_B = -5.0 \text{ mA}$) | $V_{CE(\text{sat})}$ | - - | - | -0.3 -0.65 | V |
| Base – Emitter Saturation Voltage ($I_C = -10 \text{ mA}$, $I_B = -0.5 \text{ mA}$) ($I_C = -100 \text{ mA}$, $I_B = -5.0 \text{ mA}$) | $V_{BE(\text{sat})}$ | - - | -0.7 -0.9 | - | V |
| Base – Emitter On Voltage ($I_C = -2.0 \text{ mA}$, $V_{CE} = -5.0 \text{ V}$) ($I_C = -10 \text{ mA}$, $V_{CE} = -5.0 \text{ V}$) | $V_{BE(\text{on})}$ | -0.6 - | - | -0.75 -0.82 | V |
| SMALL-SIGNAL CHARACTERISTICS | | | | | |
| Current – Gain – Bandwidth Product ($I_C = -10 \text{ mA}$, $V_{CE} = -5.0 \text{ Vdc}$, $f = 100 \text{ MHz}$) | f_T | 100 | - | - | MHz |
| Output Capacitance ($V_{CB} = -10 \text{ V}$, $f = 1.0 \text{ MHz}$) | C_{ob} | - | - | 4.5 | pF |
| Noise Figure ($I_C = -0.2 \text{ mA}$, $V_{CE} = -5.0 \text{ Vdc}$, $R_S = 2.0 \text{ k}\Omega$, $f = 1.0 \text{ kHz}$, $BW = 200 \text{ Hz}$) BC856, SBC856, BC857, SBC857, BC858, NSVBC858 Series BC859 Series | NF | - - | - | 10 4.0 | dB |
| SWITCHING CHARACTERISTICS | | | | | |
| Delay Time ($V_{CC} = -3.0 \text{ Vdc}$, $I_C = -10 \text{ mA}$, $I_E = -1 \text{ mA}$) | t_d | - | 35 | - | ns |
| Rise Time ($V_{CC} = -3.0 \text{ Vdc}$, $I_C = -10 \text{ mA}$, $I_E = -1 \text{ mA}$) | t_r | - | 25 | - | ns |
| Storage Time ($V_{CC} = -3.0 \text{ Vdc}$, $I_C = -10 \text{ mA}$, $I_E = -1 \text{ mA}$) | t_s | - | 310 | - | ns |
| Fall Time ($V_{CC} = -3.0 \text{ Vdc}$, $I_C = -10 \text{ mA}$, $I_E = -1 \text{ mA}$) | t_f | - | 40 | - | ns |

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.

BC856ALT1G Series

BC857/BC858/BC859/SBC857/NSVBC858

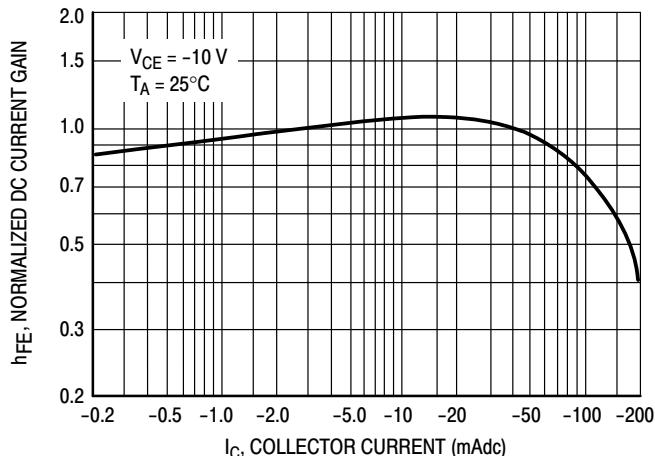


Figure 1. Normalized DC Current Gain

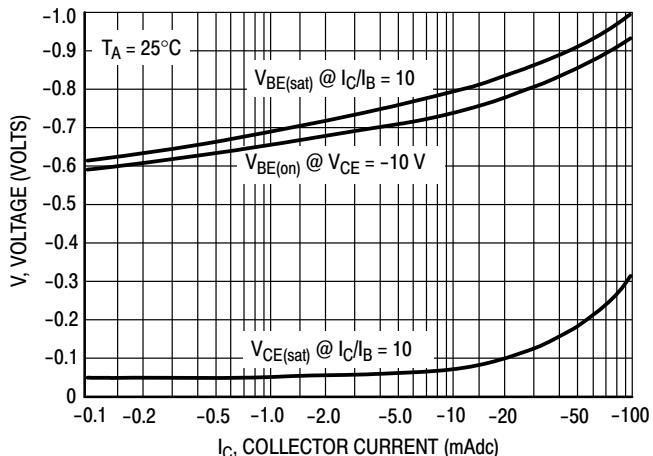


Figure 2. "Saturation" and "On" Voltages

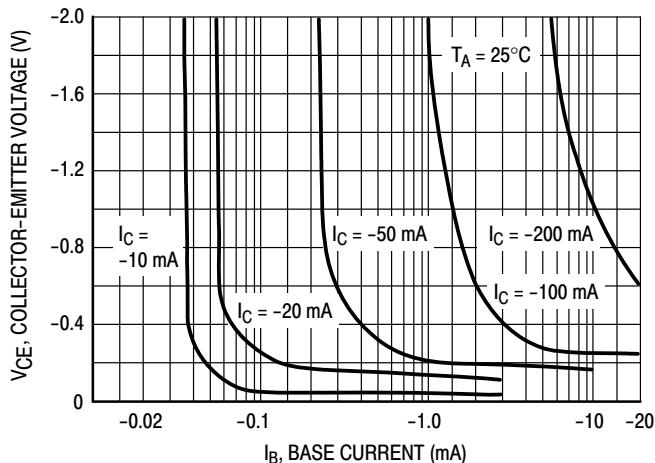


Figure 3. Collector Saturation Region

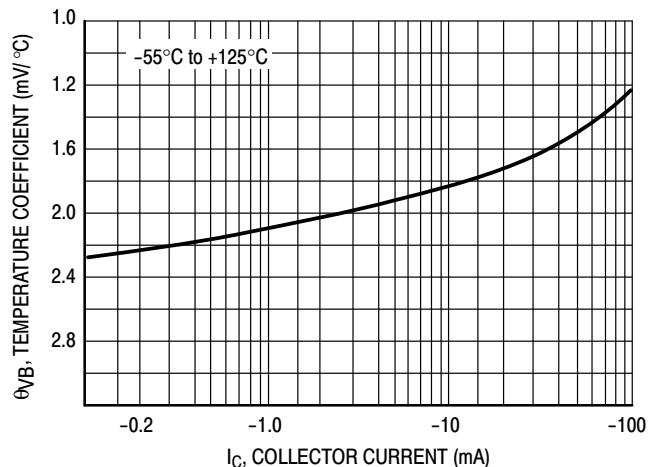


Figure 4. Base-Emitter Temperature Coefficient

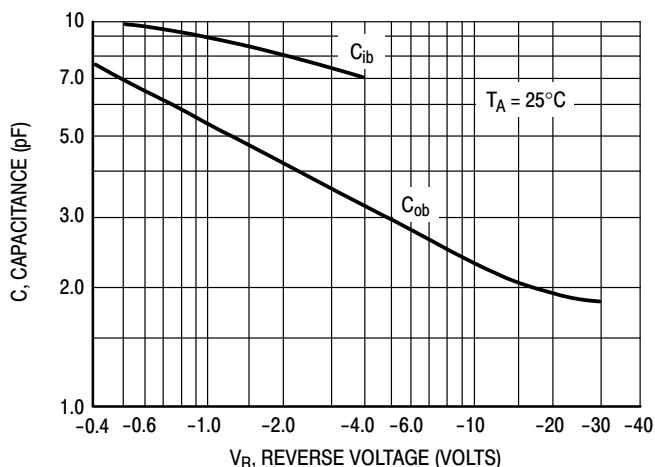


Figure 5. Capacitances

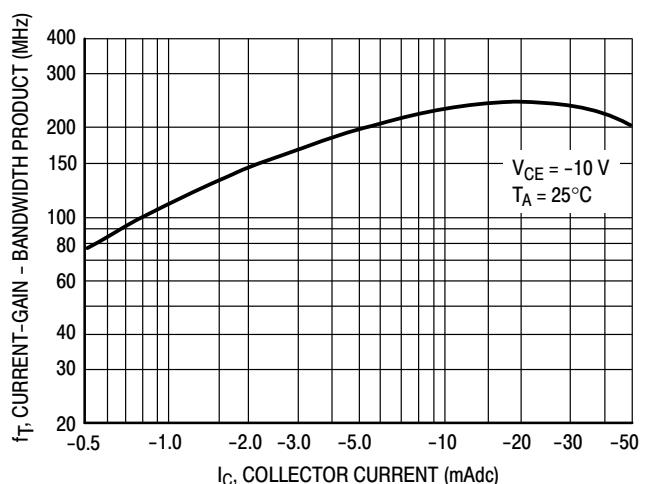
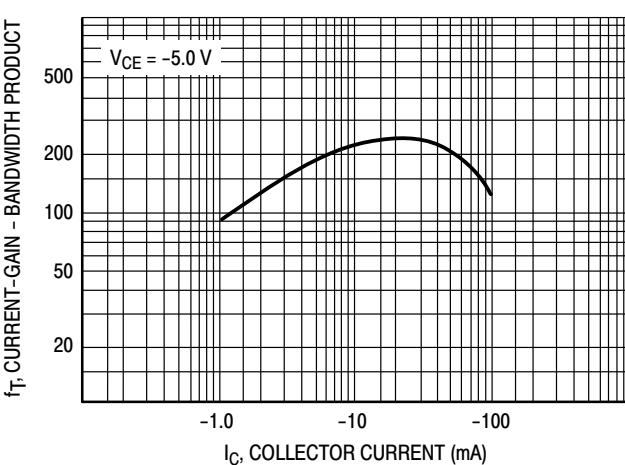
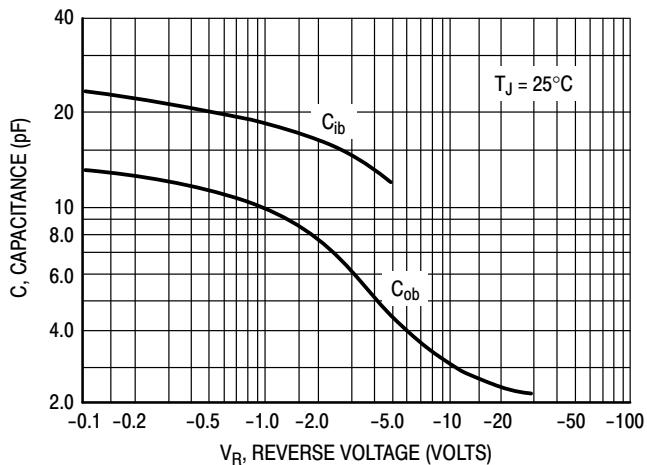
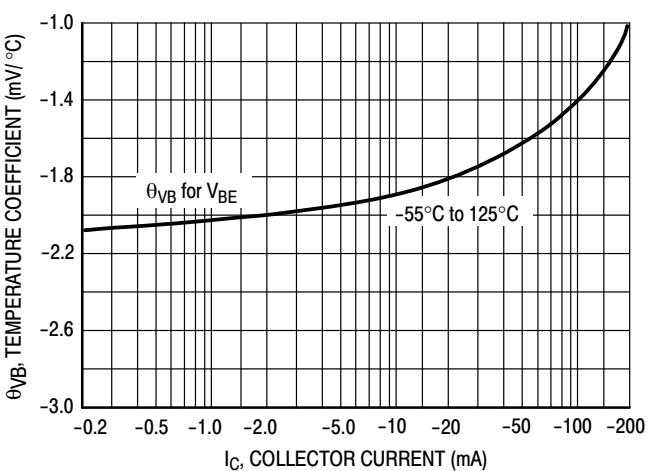
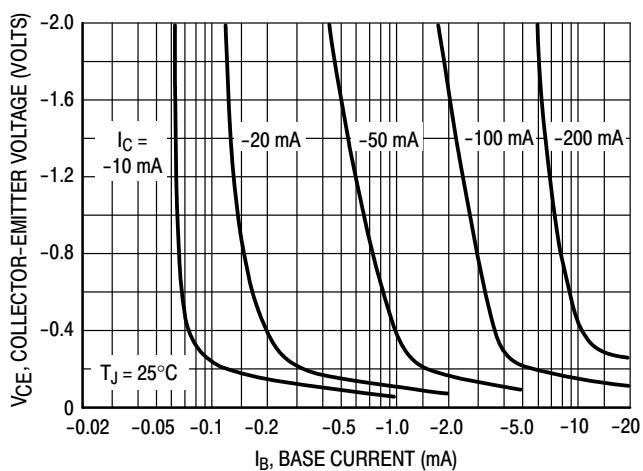
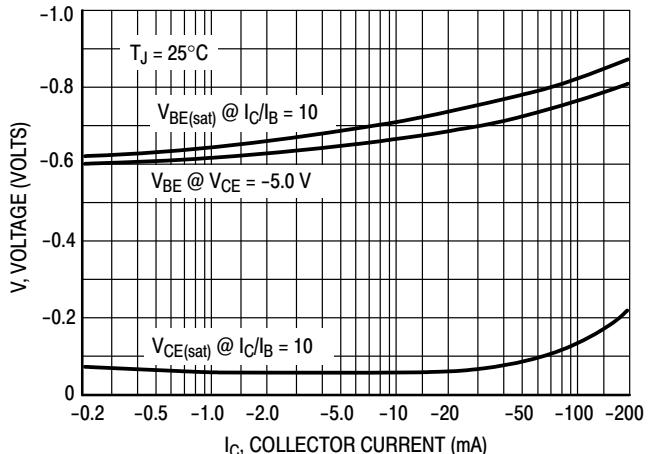
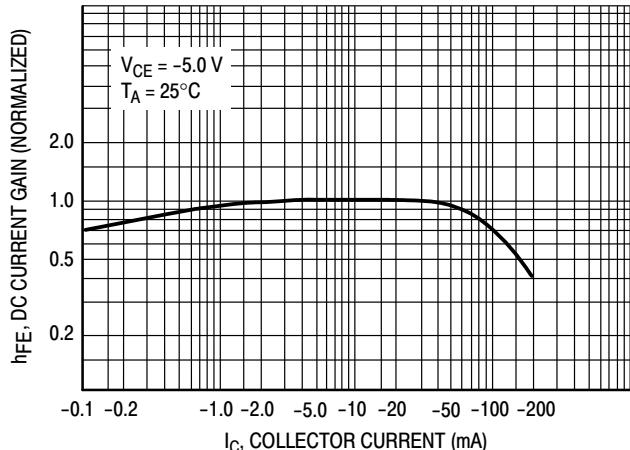


Figure 6. Current-Gain - Bandwidth Product

BC856ALT1G Series

BC856/SBC856



BC856ALT1G Series

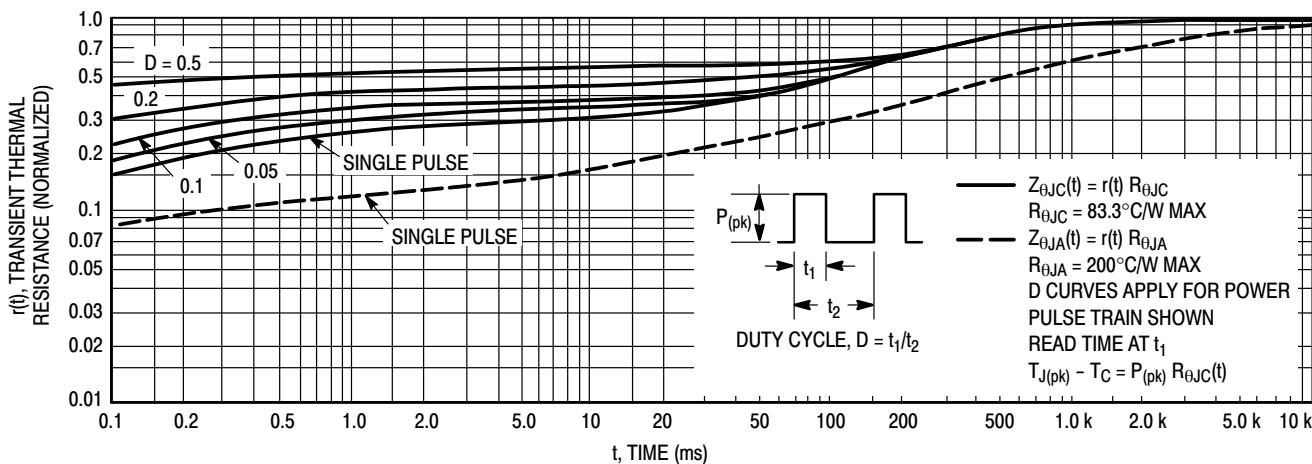


Figure 13. Thermal Response

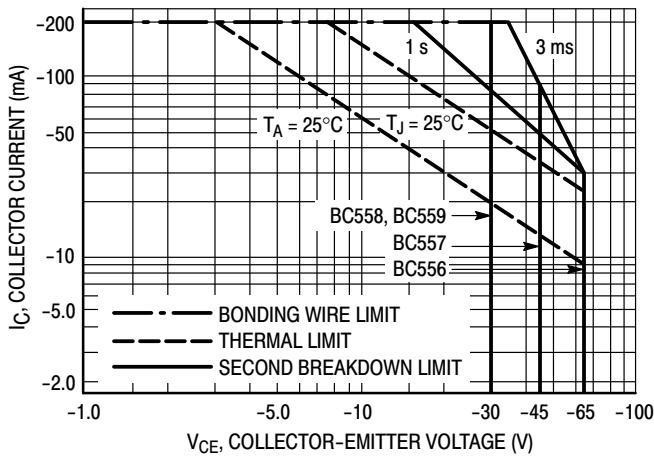


Figure 14. Active Region Safe Operating Area

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.

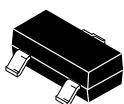
BC856ALT1G Series

ORDERING INFORMATION

| Device | Marking | Package | Shipping [†] |
|----------------|---------|---------------------|-----------------------|
| BC856ALT1G | 3A | SOT-23 (Pb-Free) | 3,000 / Tape & Reel |
| SBC856ALT1G* | | | 10,000 / Tape & Reel |
| BC856ALT3G | 3B | SOT-23 (Pb-Free) | 3,000 / Tape & Reel |
| BC856BLT1G | | | 10,000 / Tape & Reel |
| SBC856BLT1G* | 3E | SOT-23 (Pb-Free) | 3,000 / Tape & Reel |
| BC856BLT3G | | | 10,000 / Tape & Reel |
| SBC856BLT3G* | 3F | SOT-23 (Pb-Free) | 3,000 / Tape & Reel |
| BC857BLT1G | | | 10,000 / Tape & Reel |
| SBC857BLT1G* | 3G | SOT-23 (Pb-Free) | 3,000 / Tape & Reel |
| BC857BLT3G | | | 10,000 / Tape & Reel |
| NSVBC857BLT3G* | 3J | SOT-23 (Pb-Free) | 3,000 / Tape & Reel |
| BC857CLT1G | | | 10,000 / Tape & Reel |
| SBC857CLT1G* | 3K | SOT-23 (Pb-Free) | 3,000 / Tape & Reel |
| BC857CLT3G | | | 10,000 / Tape & Reel |
| BC858ALT1G | 3L | SOT-23 (Pb-Free) | 3,000 / Tape & Reel |
| BC858BLT1G | | | 10,000 / Tape & Reel |
| NSVBC858BLT1G* | 4B | SOT-23 (Pb-Free) | 3,000 / Tape & Reel |
| BC858BLT3G | | | 10,000 / Tape & Reel |
| BC858CLT1G | 4C | SOT-23 (Pb-Free) | 3,000 / Tape & Reel |
| BC858CLT3G | | | 10,000 / Tape & Reel |
| BC859BLT1G | 4B | SOT-23 (Pb-Free) | 3,000 / Tape & Reel |
| BC859BLT3G | | | 10,000 / Tape & Reel |
| BC859CLT1G | 4C | SOT-23 (Pb-Free) | 3,000 / Tape & Reel |
| BC859CLT3G | | | 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.

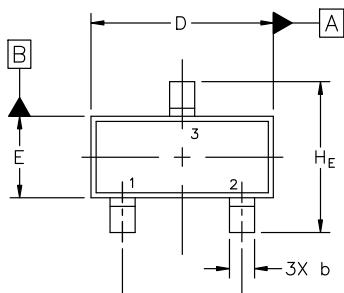
*S and NSV Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q101 Qualified and PPAP Capable.



SCALE 4:1

SOT-23 (TO-236) 2.90x1.30x1.00 1.90P
CASE 318
ISSUE AU

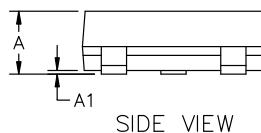
DATE 14 AUG 2024



TOP VIEW

DETAIL "A"

Scale 3:1

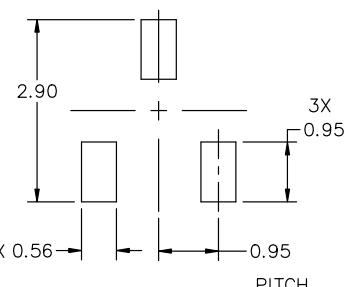
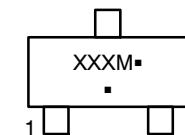


SIDE VIEW

DETAIL "A"

END VIEW

SEATING PLANE

GENERIC
MARKING DIAGRAM*

XXX = 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. Some products may not follow the Generic Marking.

| MILLIMETERS | | | |
|-------------|------|------|------|
| DIM | MIN | NOM | MAX |
| A | 0.89 | 1.00 | 1.11 |
| A1 | 0.01 | 0.06 | 0.10 |
| b | 0.37 | 0.44 | 0.50 |
| c | 0.08 | 0.14 | 0.20 |
| D | 2.80 | 2.90 | 3.04 |
| E | 1.20 | 1.30 | 1.40 |
| e | 1.78 | 1.90 | 2.04 |
| L | 0.30 | 0.43 | 0.55 |
| L1 | 0.35 | 0.54 | 0.69 |
| HE | 2.10 | 2.40 | 2.64 |
| T | 0° | --- | 10° |

NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 2018.
2. CONTROLLING DIMENSIONS: MILLIMETERS.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF THE BASE MATERIAL.
4. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS.

RECOMMENDED
MOUNTING FOOTPRINT

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

STYLES ON PAGE 2

| | | |
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SOT-23 (TO-236) 2.90x1.30x1.00 1.90P

CASE 318

ISSUE AU

DATE 14 AUG 2024

STYLE 1 THRU 5:
CANCELLEDSTYLE 6:
PIN 1. BASE
2. Emitter
3. CollectorSTYLE 7:
PIN 1. Emitter
2. Base
3. CollectorSTYLE 8:
PIN 1. Anode
2. No Connection
3. CathodeSTYLE 9:
PIN 1. Anode
2. Anode
3. CathodeSTYLE 10:
PIN 1. Drain
2. Source
3. GateSTYLE 11:
PIN 1. Anode
2. Cathode
3. Cathode-AnodeSTYLE 12:
PIN 1. Cathode
2. Cathode
3. AnodeSTYLE 13:
PIN 1. Source
2. Drain
3. GateSTYLE 14:
PIN 1. Cathode
2. Gate
3. AnodeSTYLE 15:
PIN 1. Gate
2. Cathode
3. AnodeSTYLE 16:
PIN 1. Anode
2. Cathode
3. CathodeSTYLE 17:
PIN 1. No Connection
2. Anode
3. CathodeSTYLE 18:
PIN 1. No Connection
2. Cathode
3. AnodeSTYLE 19:
PIN 1. Cathode
2. Anode
3. Cathode-AnodeSTYLE 20:
PIN 1. Cathode
2. Anode
3. GateSTYLE 21:
PIN 1. Gate
2. Source
3. DrainSTYLE 22:
PIN 1. Return
2. Output
3. InputSTYLE 23:
PIN 1. Anode
2. Anode
3. CathodeSTYLE 24:
PIN 1. Gate
2. Drain
3. SourceSTYLE 25:
PIN 1. Anode
2. Cathode
3. GateSTYLE 26:
PIN 1. Cathode
2. Anode
3. No ConnectionSTYLE 27:
PIN 1. Cathode
2. Cathode
3. CathodeSTYLE 28:
PIN 1. Anode
2. Anode
3. Anode

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