

# General Purpose Transistors

## PNP Silicon

These transistors are designed for general purpose amplifier applications. They are housed in the SOT-323/SC-70 which is designed for low power surface mount applications.

### Features

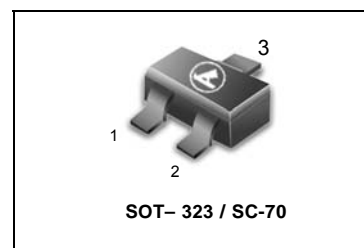
We declare that the material of product compliance with RoHS requirements.

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

LBC856AWT1G, BWT1G  
 LBC857AWT1G, BWT1G  
 CWT1G  
 LBC858AWT1G, BWT1G  
 CWT1G  
 S-LBC856AWT1G, BWT1G  
 S-LBC857AWT1G, BWT1G  
 CWT1G  
 S-LBC858AWT1G, BWT1G  
 CWT1G

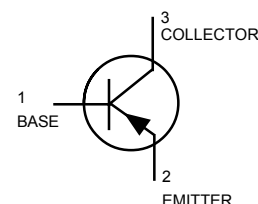
### MAXIMUM RATINGS

| Rating                         | Symbol    | BC856 | BC857 | BC858 | Unit |
|--------------------------------|-----------|-------|-------|-------|------|
| Collector-Emitter Voltage      | $V_{CEO}$ | -65   | -45   | -30   | V    |
| Collector-Base Voltage         | $V_{CBO}$ | -80   | -50   | -30   | V    |
| Emitter-Base Voltage           | $V_{EBO}$ | -5.0  | -5.0  | -5.0  | V    |
| Collector Current — Continuous | $I_C$     | -100  | -100  | -100  | mAdc |



### THERMAL CHARACTERISTICS

| Characteristic   | Symbol          | Max         | Unit               |
|--|-----------------|-------------|--------------------|
| Total Device Dissipation FR-5 Board, (1)<br>$T_A = 25^\circ\text{C}$ | $P_D$           | 150         | mW                 |
| Thermal Resistance, Junction to Ambient                              | $R_{\theta JA}$ | 833         | $^\circ\text{C/W}$ |
| Junction and Storage Temperature                                     | $T_J, T_{stg}$  | -55 to +150 | $^\circ\text{C}$   |



### DEVICE MARKING

(S-)LBC856AWT1G= 3A; (S-)LBC856BWT1G= 3B; (S-)LBC857AWT1G= 3E; (S-)LBC857BWT1G = 3F;  
 (S-)LBC857CWT1G= 3G; (S-)LBC858AWT1G= 3J; (S-)LBC858BWT1G= 3K; (S-)LBC858CWT1G= 3L

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

| Characteristic | Symbol | Min | Typ | Max | Unit |
|----------------|--------|-----|-----|-----|------|
|----------------|--------|-----|-----|-----|------|

#### OFF CHARACTERISTICS

|  |               |      |   |      |               |
|--|---------------|------|---|------|---------------|
| Collector-Emitter Breakdown Voltage<br>( $I_C = -10\text{ mA}$ )   | LBC856 Series | -65  | — | —    | v             |
|  | LBC857 Series | -45  | — | —    |               |
|  | LBC858 Series | -30  | — | —    |               |
| Collector-Emitter Breakdown Voltage<br>( $I_C = -10\ \mu\text{A}, V_{EB} = 0$ )                              | LBC856 Series | -80  | — | —    | v             |
|  | LBC857B Only  | -50  | — | —    |               |
|  | LBC858 Series | -30  | — | —    |               |
| Collector-Base Breakdown Voltage<br>( $I_C = -10\ \mu\text{A}$ )   | LBC856 Series | -80  | — | —    | v             |
|  | LBC857 Series | -50  | — | —    |               |
|  | LBC858 Series | -30  | — | —    |               |
| Emitter-Base Breakdown Voltage<br>( $I_E = -1.0\ \mu\text{A}$ )  | LBC856 Series | -5.0 | — | —    | v             |
|  | LBC857 Series | -5.0 | — | —    |               |
|  | LBC858 Series | -5.0 | — | —    |               |
| Collector Cutoff Current ( $V_{CB} = -30\text{ V}$ )<br>( $V_{CB} = -30\text{ V}, T_A = 150^\circ\text{C}$ ) | $I_{CBO}$     | —    | — | -15  | nA            |
|  |               | —    | — | -4.0 | $\mu\text{A}$ |

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

**LBC856AWT1G, BWT1G LBC857AWT1G, BWT1G,CWT1G LBC858AWT1G, BWT1G, CWT1G  
S-LBC856AWT1G, BWT1G S-LBC857AWT1G, BWT1G,CWT1G S-LBC858AWT1G, BWT1G, CWT1G**

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

| Characteristic | Symbol | Min | Typ | Max | Unit |
|----------------|--------|-----|-----|-----|------|
|----------------|--------|-----|-----|-----|------|

**ON CHARACTERISTICS**

|  |               |           |              |                |   |
|--|---------------|-----------|--------------|----------------|---|
| DC Current Gain<br>( $I_C = -2.0\text{ mA}, V_{CE} = -5.0\text{ V}$ )  | $h_{FE}$      |           |              |                | — |
| LBC856A, LBC857A, LBC858A  |               | 125       | 180          | 250            |   |
| LBC856B, LBC857B, LBC858B  |               | 220       | 290          | 475            |   |
| LBC857C, LBC858C   |               | 420       | 520          | 800            |   |
| Collector–Emitter Saturation Voltage ( $I_C = -10\text{ mA}, I_B = -0.5\text{ mA}$ )<br>( $I_C = -100\text{ mA}, I_B = -5.0\text{ mA}$ ) | $V_{CE(sat)}$ | —         | —            | -0.3<br>-0.65  | V |
| Base–Emitter Saturation Voltage ( $I_C = -10\text{ mA}, I_B = -0.5\text{ mA}$ )<br>( $I_C = -100\text{ mA}, I_B = -5.0\text{ mA}$ )      | $V_{BE(sat)}$ | —         | -0.7<br>-0.9 | —              | V |
| Base–Emitter Voltage ( $I_C = -2.0\text{ mA}, V_{CE} = -5.0\text{ V}$ )<br>( $I_C = -10\text{ mA}, V_{CE} = -5.0\text{ V}$ )             | $V_{BE(on)}$  | -0.6<br>— | —            | -0.75<br>-0.82 | V |

**SMALL–SIGNAL CHARACTERISTICS**

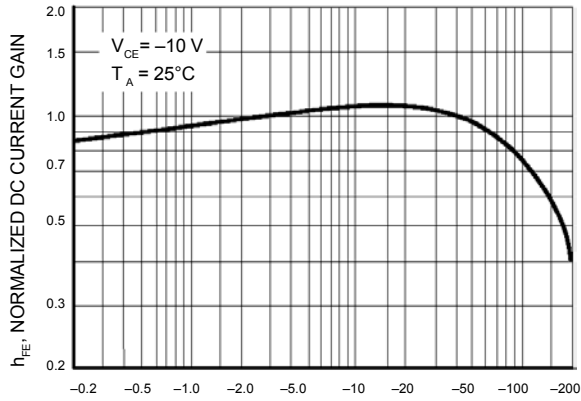
|  |          |     |   |     |     |
|--|----------|-----|---|-----|-----|
| Current–Gain — Bandwidth Product<br>( $I_C = -10\text{ mA}, V_{CE} = -5.0\text{ Vdc}, f = 100\text{ MHz}$ )                            | $f_T$    | 100 | — | —   | MHz |
| Output Capacitance ( $V_{CB} = -10\text{ V}, f = 1.0\text{ MHz}$ )   | $C_{ob}$ | —   | — | 4.5 | pF  |
| Noise Figure<br>( $I_C = -0.2\text{ mA}, V_{CE} = -5.0\text{ Vdc}, R_S = 2.0\text{ k}\Omega, f = 1.0\text{ kHz}, BW = 200\text{ Hz}$ ) | NF       | —   | — | 10  | dB  |

**ORDERING INFORMATION** (Pb–Free)

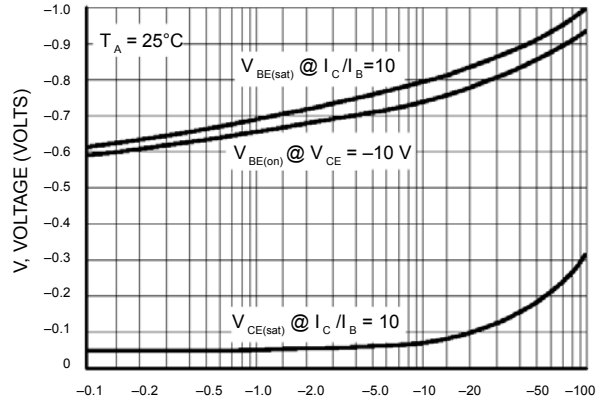
| Device             | Package | Shipping          |
|--------------------|---------|-------------------|
| LBC856AWT1G series | SOT-23  | 3000/Tape & Reel  |
| LBC856AWT3G series | SOT-23  | 10000/Tape & Reel |

LBC856AWT1G, BWT1G LBC857AWT1G, BWT1G, CWT1G LBC858AWT1G, BWT1G, CWT1G  
 S-LBC856AWT1G, BWT1G S-LBC857AWT1G, BWT1G, CWT1G S-LBC858AWT1G, BWT1G, CWT1G

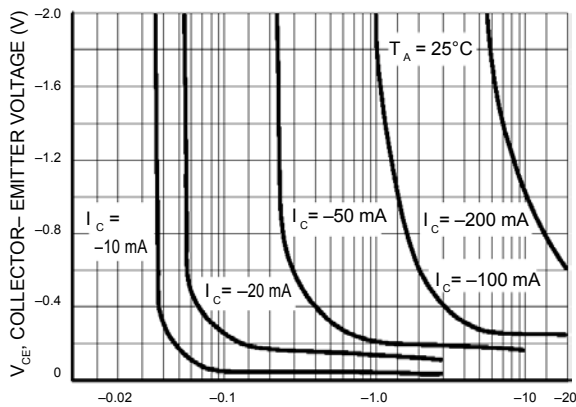
LBC857/LBC858



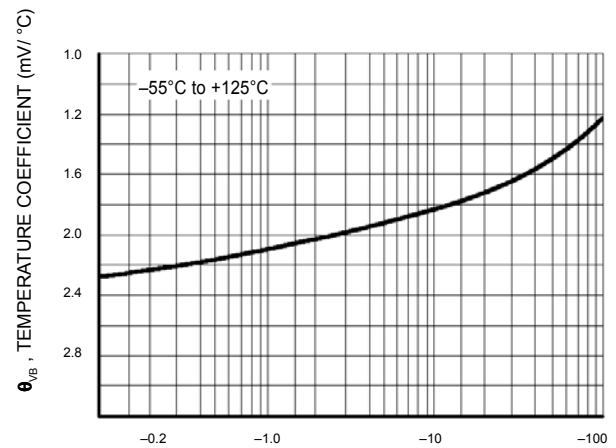
$I_C$ , COLLECTOR CURRENT (mAdc)  
**Figure 1. Normalized DC Current Gain**



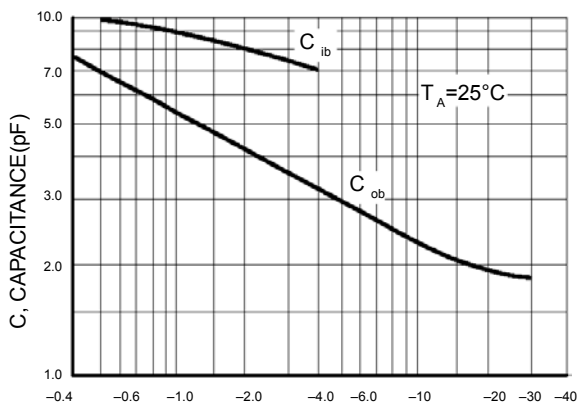
$I_C$ , COLLECTOR CURRENT (mAdc)  
**Figure 2. "Saturation" and "On" Voltages**



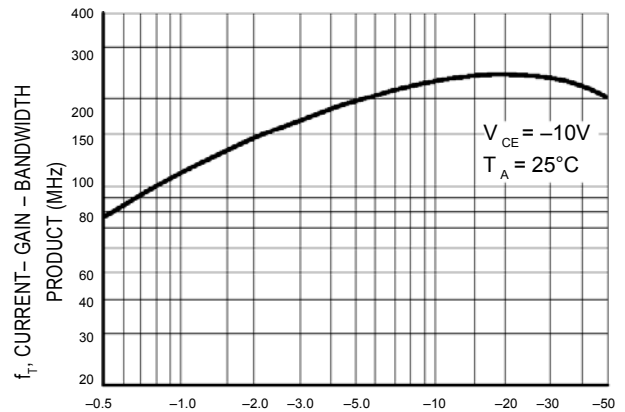
$I_B$ , BASE CURRENT (mA)  
**Figure 3. Collector Saturation Region**



$I_C$ , COLLECTOR CURRENT (mA)  
**Figure 4. Base-Emitter Temperature Coefficient**



$V_R$ , REVERSE VOLTAGE (VOLTS)  
**Figure 5. Capacitances**



$I_C$ , COLLECTOR CURRENT (mAdc)  
**Figure 6. Current-Gain - Bandwidth Product**

LBC856AWT1G, BWT1G LBC857AWT1G, BWT1G, CWT1G LBC858AWT1G, BWT1G, CWT1G  
 S-LBC856AWT1G, BWT1G S-LBC857AWT1G, BWT1G, CWT1G S-LBC858AWT1G, BWT1G, CWT1G

LBC856

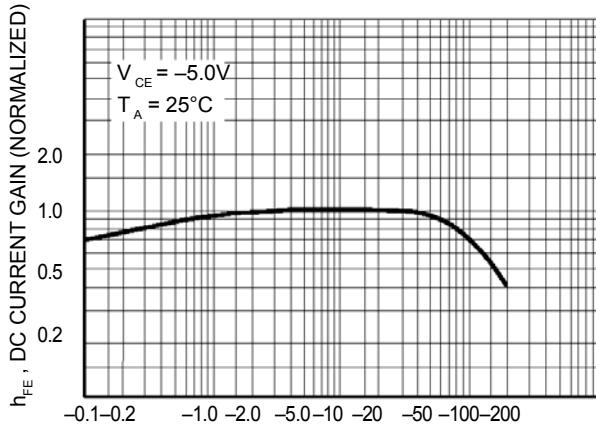


Figure 7. DC Current Gain

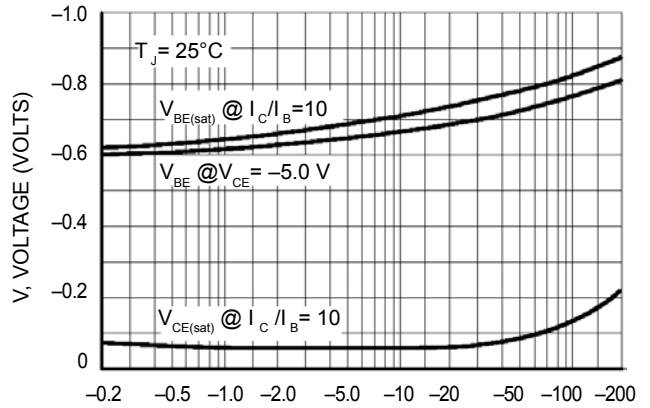


Figure 8. "On" Voltage

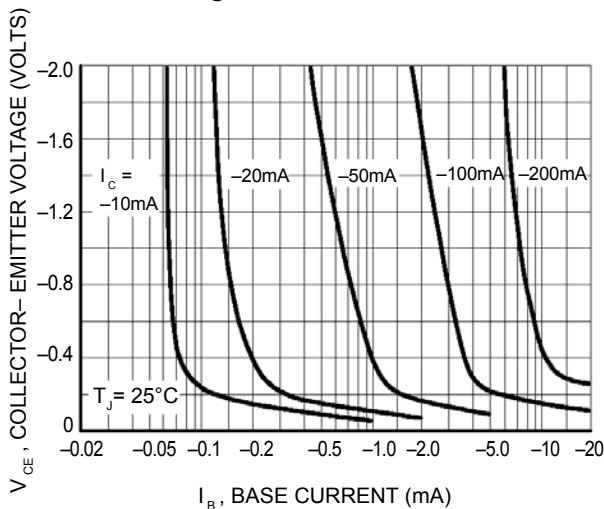


Figure 9. Collector Saturation Region

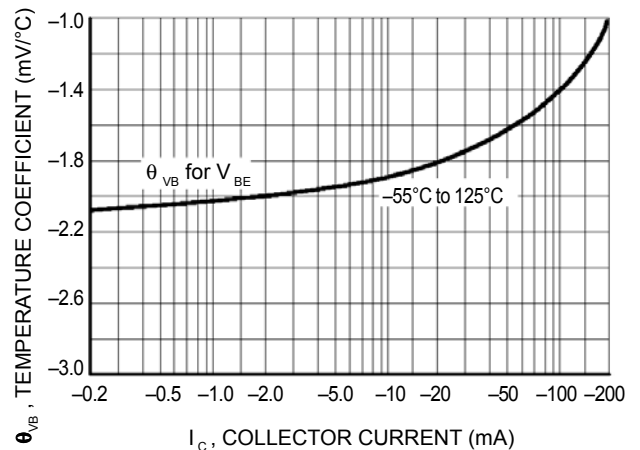


Figure 10. Base-Emitter Temperature Coefficient

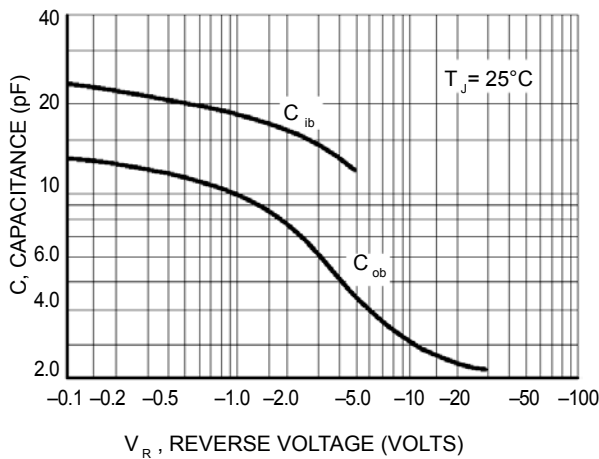


Figure 11. Capacitance

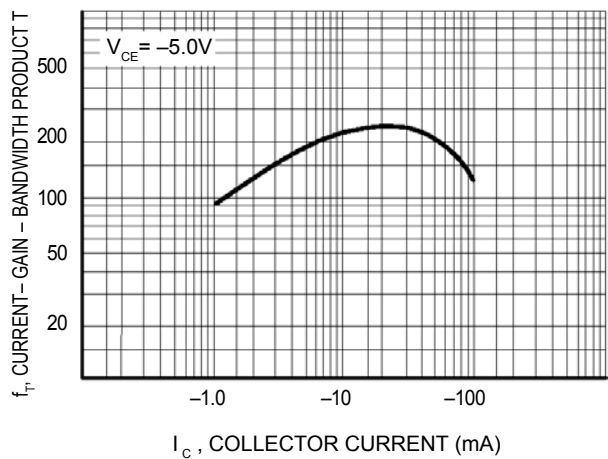


Figure 12. Current-Gain - Bandwidth Product

LBC856AWT1G, BWT1G LBC857AWT1G, BWT1G, CWT1G LBC858AWT1G, BWT1G, CWT1G  
 S-LBC856AWT1G, BWT1G S-LBC857AWT1G, BWT1G, CWT1G S-LBC858AWT1G, BWT1G, CWT1G

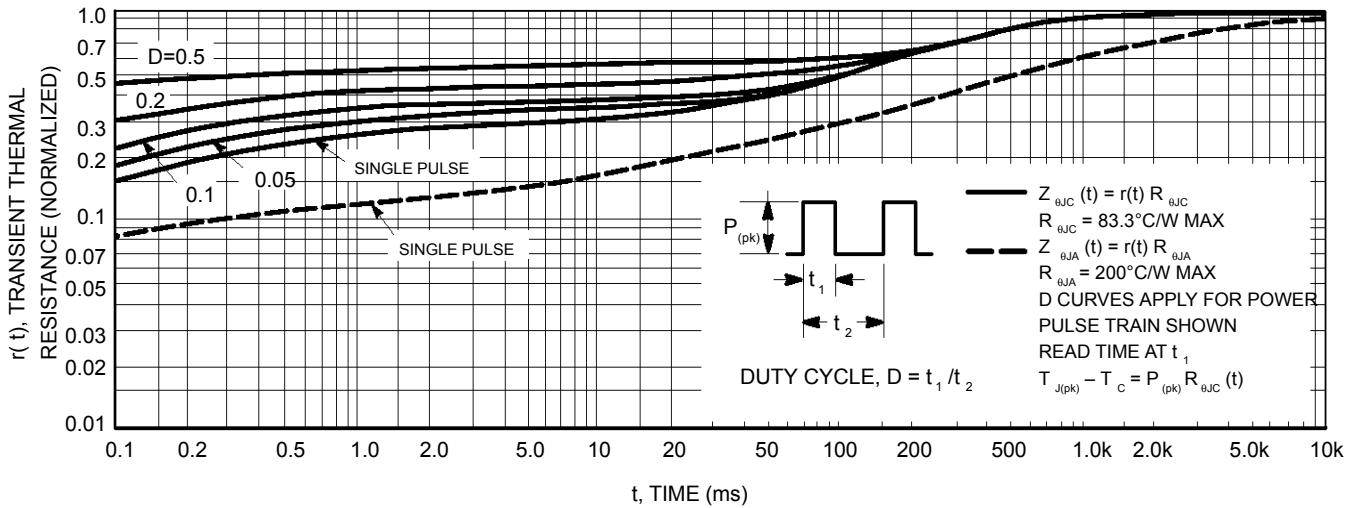


Figure 13. Thermal Response

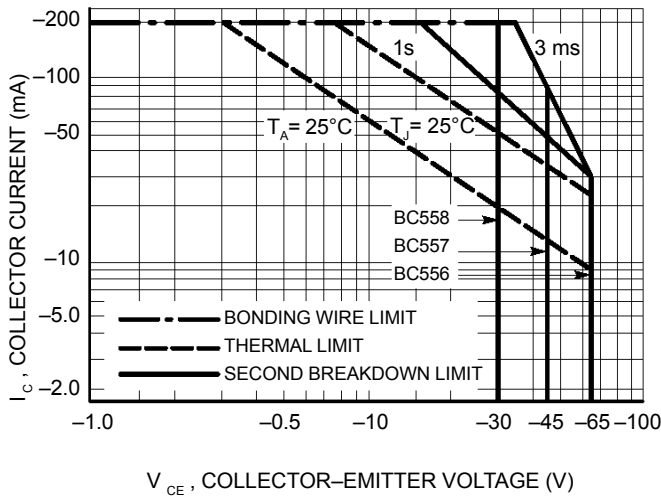


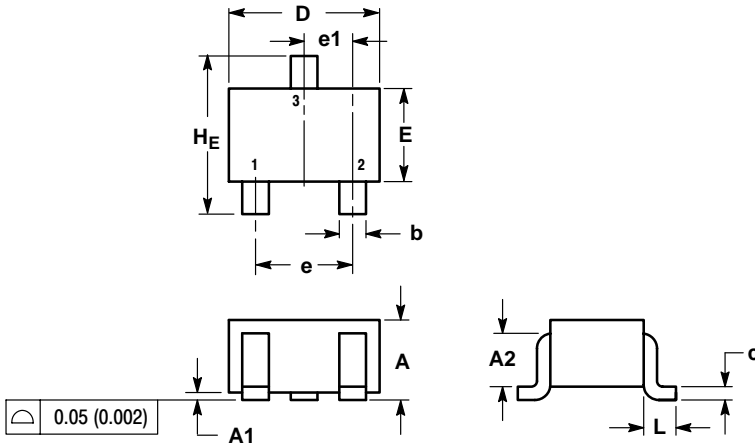
Figure 14. Active Region Safe Operating Area

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.

LBC856AWT1G, BWT1G LBC857AWT1G, BWT1G, CWT1G LBC858AWT1G, BWT1G, CWT1G  
 S-LBC856AWT1G, BWT1G S-LBC857AWT1G, BWT1G, CWT1G S-LBC858AWT1G, BWT1G, CWT1G

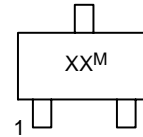
SC-70 / SOT-323



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

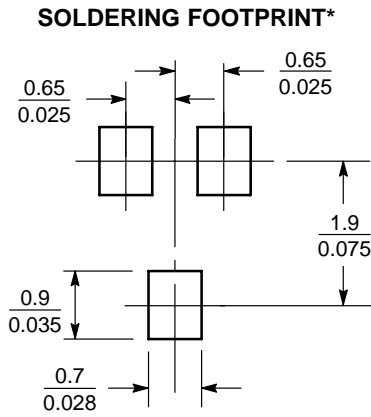
| DIM | MILLIMETERS |      |      | INCHES    |       |       |
|-----|-------------|------|------|-----------|-------|-------|
|     | MIN         | NOM  | MAX  | MIN       | NOM   | MAX   |
| A   | 0.80        | 0.90 | 1.00 | 0.032     | 0.035 | 0.040 |
| A1  | 0.00        | 0.05 | 0.10 | 0.000     | 0.002 | 0.004 |
| A2  | 0.7 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   | 0.425 REF   |      |      | 0.017 REF |       |       |
| HE  | 2.00        | 2.10 | 2.40 | 0.079     | 0.083 | 0.095 |

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.



SCALE 10:1 (mm/inches)