

# Dual General Purpose Transistors

These transistors are designed for general purpose amplifier applications. They are housed in the SOT-363/SC-88 which is designed for low power surface mount applications.

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

• Device Marking:

LBC856ADW1T1G= 3A  
 LBC856BDW1T1G= 3B  
 LBC857BDW1T1G= 3F  
 LBC857CDW1T1G= 3G  
 LBC858BDW1T1G= 3K  
 LBC858CDW1T1G= 3L

## 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

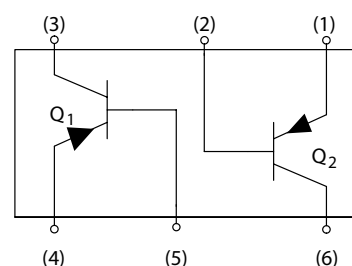
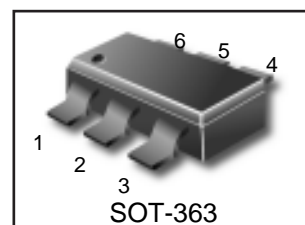
| Characteristic  | Symbol          | Max         | Unit               |
|---|-----------------|-------------|--------------------|
| Total Device Dissipation<br>Per Device<br>FR–5 Board (Note 1.)<br>$T_A = 25^\circ\text{C}$<br>Derate Above $25^\circ\text{C}$ | $P_D$           | 380<br>250  | mW                 |
| Thermal Resistance,<br>Junction to Ambient  | $R_{\theta JA}$ | 328         | $^\circ\text{C/W}$ |
| Junction and Storage<br>Temperature Range   | $T_J, T_{stg}$  | –55 to +150 | $^\circ\text{C}$   |

1. FR–5 = 1.0 x 0.75 x 0.062 in

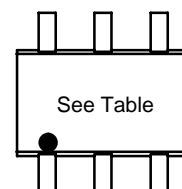
## ORDERING INFORMATION

| Device        | Shipping          |
|---------------|-------------------|
| LBC85*BDW1T1G | 3000/Tape & Reel  |
| LBC85*BDW1T3G | 10000/Tape & Reel |

## LBC85\*\* DW1T1G



## DEVICE MARKING



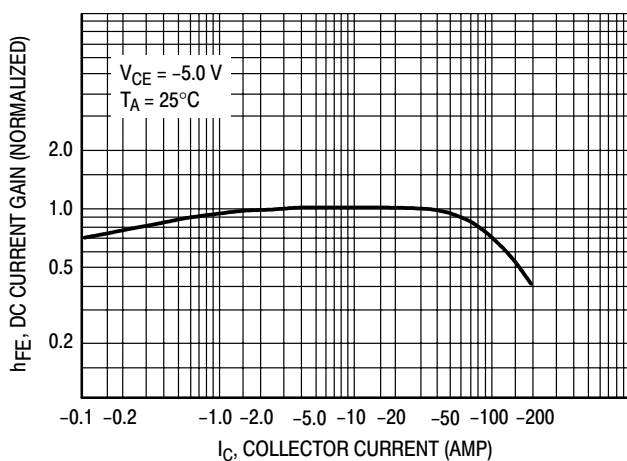
**LBC856ADW1T1G, LBC856BDW1T1G, LBC857BDW1T1G, LBC857CDW1T1G,  
LBC858BDW1T1G, LBC858CDW1T1G**

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

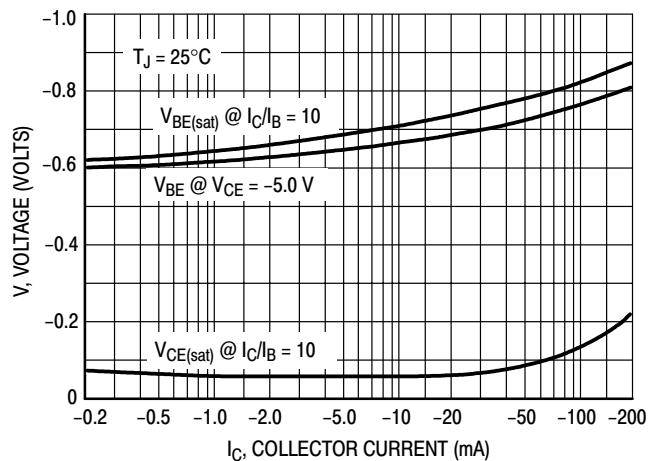
| Characteristic  | Symbol        | Min                              | Typ                                   | Max                              | Unit                |
|---|---------------|----------------------------------|---------------------------------------|----------------------------------|---------------------|
| <b>OFF CHARACTERISTICS</b>  |               |                                  |                                       |                                  |                     |
| Collector–Emitter Breakdown Voltage<br>( $I_C = -10\text{ mA}$ )<br>LBC856 Series<br>LBC857 Series<br>LBC858 Series   | $V_{(BR)CEO}$ | -65<br>-45<br>-30                | –<br>–<br>–                           | –<br>–<br>–                      | V                   |
| Collector–Emitter Breakdown Voltage<br>( $I_C = -10\text{ }\mu\text{A}$ , $V_{EB} = 0$ )<br>LBC856 Series<br>LBC857 Series<br>LBC858 Series   | $V_{(BR)CES}$ | -80<br>-50<br>-30                | –<br>–<br>–                           | –<br>–<br>–                      | V                   |
| Collector–Base Breakdown Voltage<br>( $I_C = -10\text{ }\mu\text{A}$ )<br>LBC856 Series<br>LBC857 Series<br>LBC858 Series   | $V_{(BR)CBO}$ | -80<br>-50<br>-30                | –<br>–<br>–                           | –<br>–<br>–                      | V                   |
| Emitter–Base Breakdown Voltage<br>( $I_E = -1.0\text{ }\mu\text{A}$ )<br>LBC856 Series<br>LBC857 Series<br>LBC858 Series  | $V_{(BR)EBO}$ | -5.0<br>-5.0<br>-5.0             | –<br>–<br>–                           | –<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>–                                | -15<br>-4.0                      | nA<br>$\mu\text{A}$ |
| <b>ON CHARACTERISTICS</b>   |               |                                  |                                       |                                  |                     |
| DC Current Gain<br>( $I_C = -10\text{ }\mu\text{A}$ , $V_{CE} = -5.0\text{ V}$ )<br>LBC856A<br>LBC856B, LBC857B, LBC858B<br>LBC857C, LBC858C<br><br>( $I_C = -2.0\text{ mA}$ , $V_{CE} = -5.0\text{ V}$ )<br>LBC856A<br>LBC856B, LBC857B, LBC858B<br>LBC857C, LBC858C | $h_{FE}$      | –<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>( $I_C = -10\text{ mA}$ , $I_B = -0.5\text{ mA}$ )<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                   |
| <b>SMALL-SIGNAL CHARACTERISTICS</b>   |               |                                  |                                       |                                  |                     |
| 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                  |

**LBC856ADW1T1G, LBC856BDW1T1G, LBC857BDW1T1G, LBC857CDW1T1G,  
LBC858BDW1T1G, LBC858CDW1T1G**

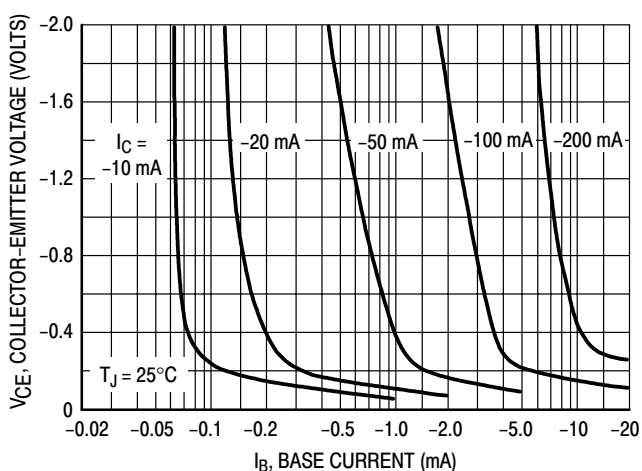
**TYPICAL CHARACTERISTICS – LBC856**



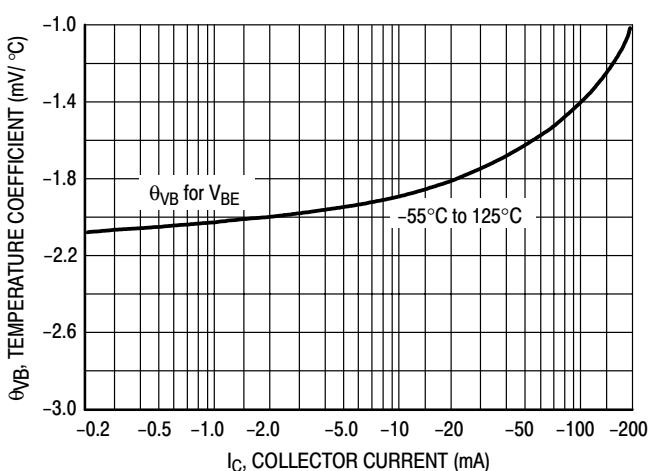
**Figure 1. DC Current Gain**



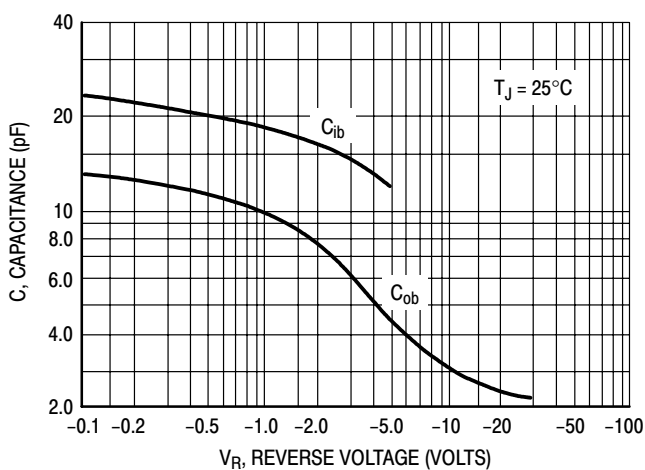
**Figure 2. "On" Voltage**



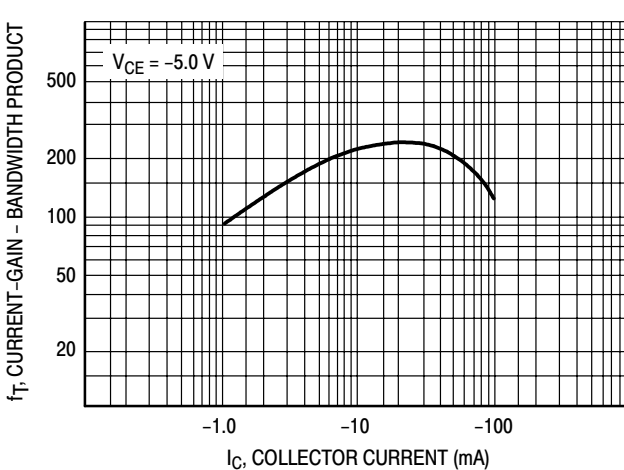
**Figure 3. Collector Saturation Region**



**Figure 4. Base-Emitter Temperature Coefficient**



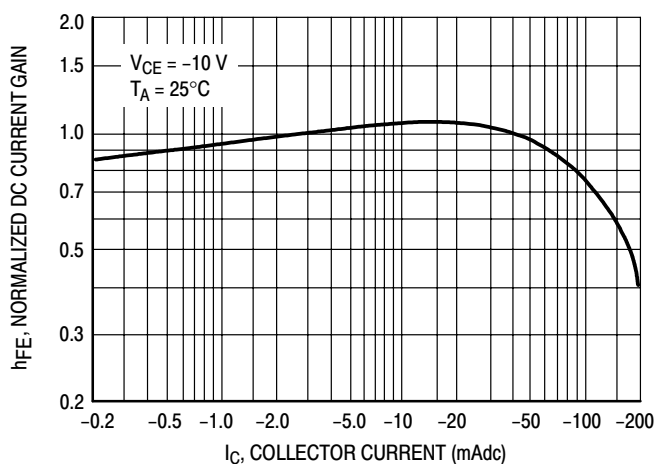
**Figure 5. Capacitance**



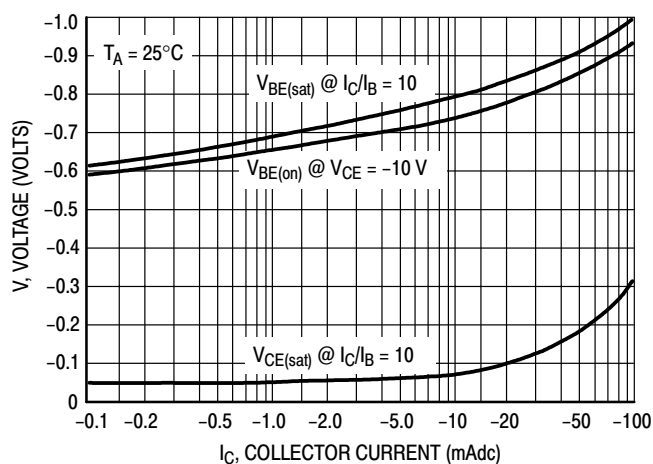
**Figure 6. Current-Gain – Bandwidth Product**

**LBC856ADW1T1G, LBC856BDW1T1G, LBC857BDW1T1G, LBC857CDW1T1G,  
LBC858BDW1T1G, LBC858CDW1T1G**

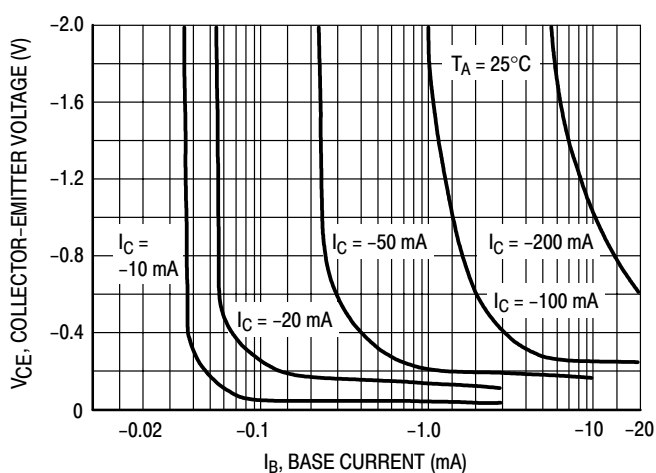
**TYPICAL CHARACTERISTICS – LBC857/LBC858**



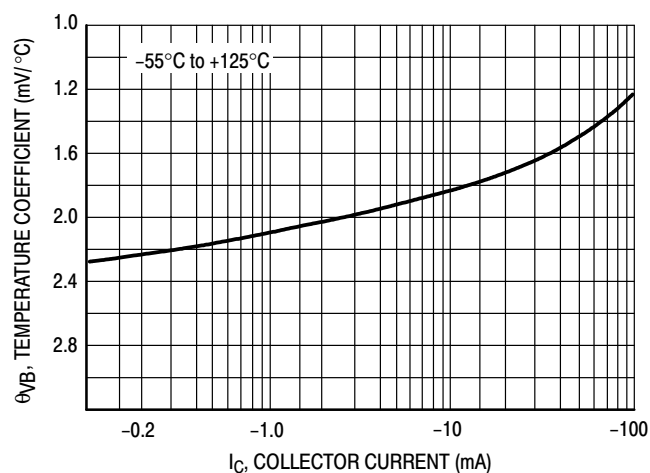
**Figure 7. Normalized DC Current Gain**



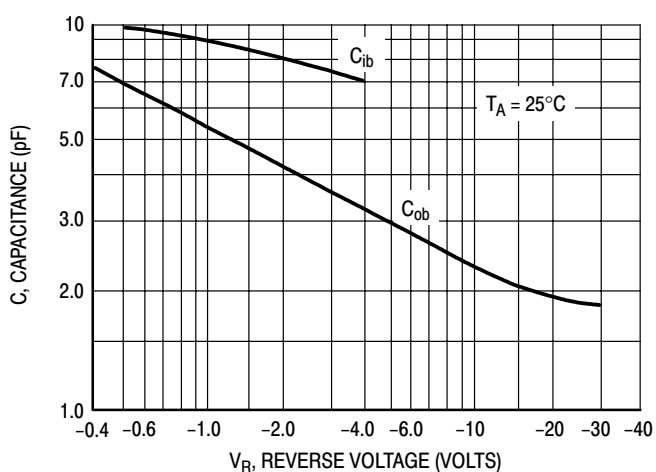
**Figure 8. "Saturation" and "On" Voltages**



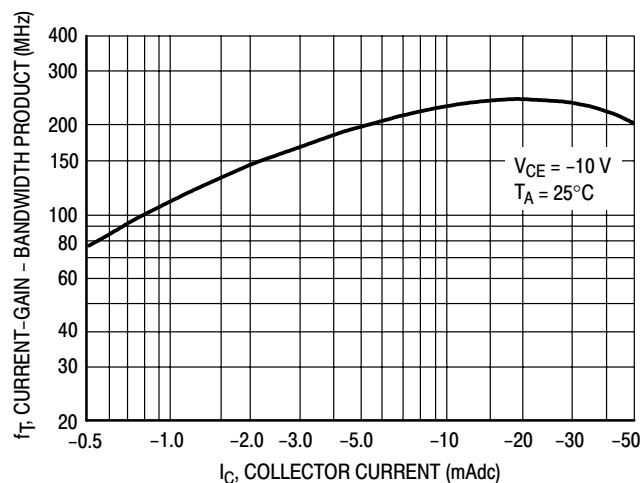
**Figure 9. Collector Saturation Region**



**Figure 10. Base-Emitter Temperature Coefficient**

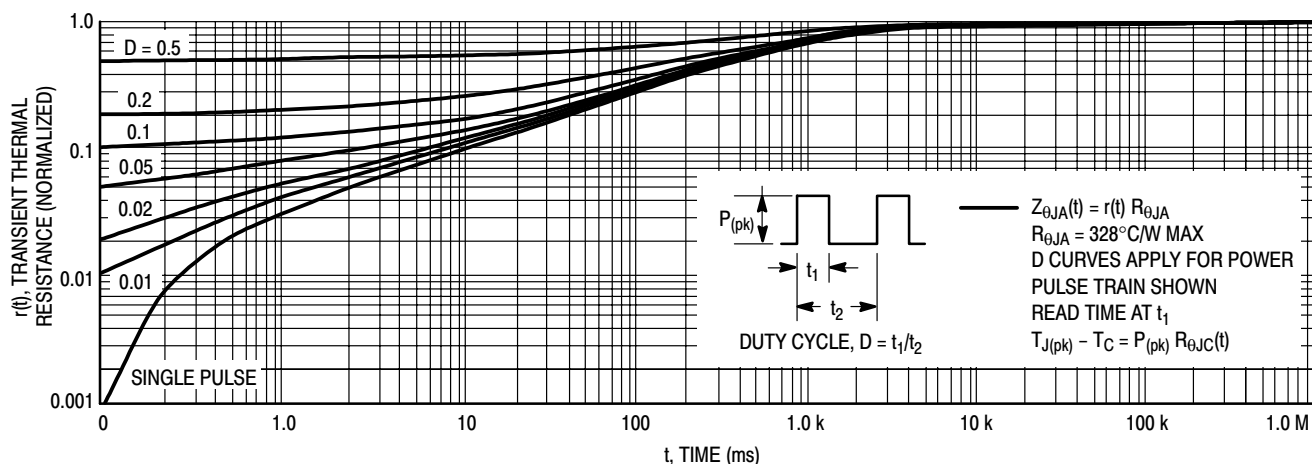


**Figure 11. Capacitances**

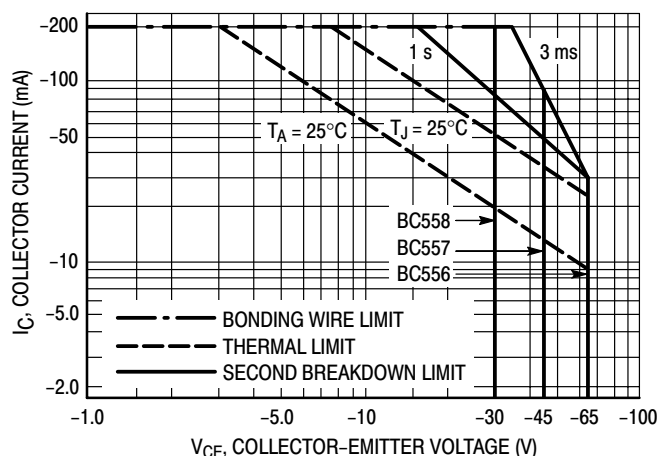


**Figure 12. Current-Gain – Bandwidth Product**

**LBC856ADW1T1G, LBC856BDW1T1G, LBC857BDW1T1G, LBC857CDW1T1G,  
LBC858BDW1T1G, LBC858CDW1T1G**



**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.

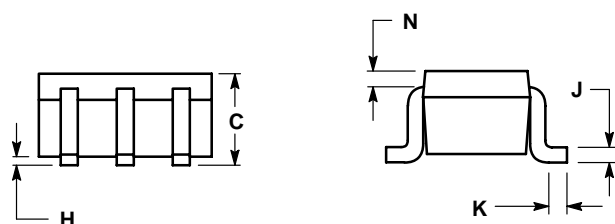
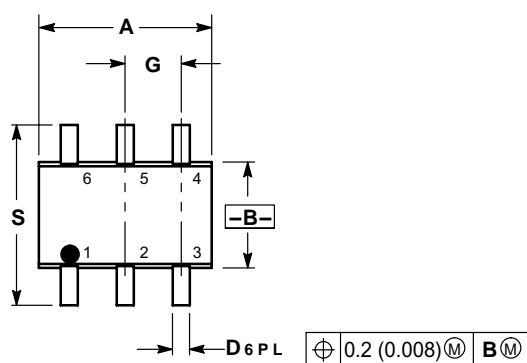
The data of Figure 14 is based upon  $T_{J(pk)} = 150^{\circ}\text{C}$ ;  $T_C$  or  $T_A$  is variable depending upon conditions. Pulse curves are valid for duty cycles to 10% provided  $T_{J(pk)} \leq 150^{\circ}\text{C}$ .  $T_{J(pk)}$  may be calculated from the data in Figure 13. At high case or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

**LBC856ADW1T1G,LBC856BDW1T1G,LBC857BDW1T1G,LBC857CDW1T1G,  
LBC858BDW1T1G, LBC858CDW1T1G**

**SC-88/SOT-363**

**NOTES:**

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



| DIM | INCHES    |       | MILLIMETERS |      |
|-----|-----------|-------|-------------|------|
|     | MIN       | MAX   | MIN         | MAX  |
| A   | 0.071     | 0.087 | 1.80        | 2.20 |
| B   | 0.045     | 0.053 | 1.15        | 1.35 |
| C   | 0.031     | 0.043 | 0.80        | 1.10 |
| D   | 0.004     | 0.012 | 0.10        | 0.30 |
| G   | 0.026 BSC |       | 0.65 BSC    |      |
| H   | ---       | 0.004 | ---         | 0.10 |
| J   | 0.004     | 0.010 | 0.10        | 0.25 |
| K   | 0.004     | 0.012 | 0.10        | 0.30 |
| N   | 0.008 REF |       | 0.20 REF    |      |
| S   | 0.079     | 0.087 | 2.00        | 2.20 |

- PIN 1. EMITTER 2  
 2. BASE 2  
 3. COLLECTOR 1  
 4. EMITTER 1  
 5. BASE 1  
 6. COLLECTOR 2

