

# BC817-16L, SBC817-16L, BC817-25L, SBC817-25L, BC817-40L, SBC817-40L

## General Purpose Transistors

### NPN Silicon

#### Features

- S and NSV Prefixes 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

| Rating                         | Symbol    | Value | Unit |
|--------------------------------|-----------|-------|------|
| Collector – Emitter Voltage    | $V_{CEO}$ | 45    | V    |
| Collector – Base Voltage       | $V_{CBO}$ | 50    | V    |
| Emitter – Base Voltage         | $V_{EBO}$ | 5.0   | V    |
| Collector Current – Continuous | $I_C$     | 500   | 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<br>Alumina Substrate, (Note 2)<br>$T_A = 25^\circ\text{C}$<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   | $T_J, T_{stg}$  | -65 to +150 | $^\circ\text{C}$           |

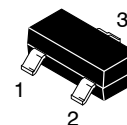
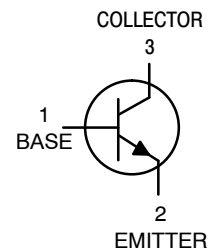
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

1. FR-5 = 1.0 x 0.75 x 0.062 in.
2. Alumina = 0.4 x 0.3 x 0.024 in 99.5% alumina.



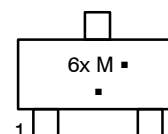
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SOT-23  
CASE 318  
STYLE 6

#### MARKING DIAGRAM



6x = Device Code  
x = A, B, or C  
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 2 of this data sheet.

# BC817-16L, SBC817-16L, BC817-25L, SBC817-25L, BC817-40L, SBC817-40L

## 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>( $I_C = 10\text{ mA}$ )   | $V_{(BR)CEO}$ | 45  | -   | -          | V                   |
| Collector - Emitter Breakdown Voltage<br>( $V_{EB} = 0, I_C = 10\ \mu\text{A}$ )                              | $V_{(BR)CES}$ | 50  | -   | -          | V                   |
| Emitter - Base Breakdown Voltage<br>( $I_E = 1.0\ \mu\text{A}$ )  | $V_{(BR)EBO}$ | 5.0 | -   | -          | V                   |
| Collector Cutoff Current<br>( $V_{CB} = 20\text{ V}$ )<br>( $V_{CB} = 20\text{ V}, T_A = 150^\circ\text{C}$ ) | $I_{CBO}$     | -   | -   | 100<br>5.0 | nA<br>$\mu\text{A}$ |

## ON CHARACTERISTICS

|   |   |               |                         |                  |                        |   |
|---|---|---------------|-------------------------|------------------|------------------------|---|
| DC Current Gain<br>( $I_C = 100\text{ mA}, V_{CE} = 1.0\text{ V}$ )<br><br>( $I_C = 500\text{ mA}, V_{CE} = 1.0\text{ V}$ ) | BC817-16, SBC817-16<br>BC817-25, SBC817-25<br>BC817-40, SBC817-40 | $h_{FE}$      | 100<br>160<br>250<br>40 | -<br>-<br>-<br>- | 250<br>400<br>600<br>- | - |
| Collector - Emitter Saturation Voltage<br>( $I_C = 500\text{ mA}, I_B = 50\text{ mA}$ )                                     |   | $V_{CE(sat)}$ | -                       | -                | 0.7                    | V |
| Base - Emitter On Voltage<br>( $I_C = 500\text{ mA}, V_{CE} = 1.0\text{ V}$ )   |   | $V_{BE(on)}$  | -                       | -                | 1.2                    | 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>( $V_{CB} = 10\text{ V}, f = 1.0\text{ MHz}$ )  | $C_{obo}$ | -   | 10 | - | pF  |

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.

## ORDERING INFORMATION

| Device          | Specific Marking | Package             | Shipping <sup>†</sup> |
|-----------------|------------------|---------------------|-----------------------|
| BC817-16LT1G    | 6A               | SOT-23<br>(Pb-Free) | 3000 / Tape & Reel    |
| NSVBC817-16LT1G |                  |                     | 10,000 / Tape & Reel  |
| BC817-16LT3G    |                  |                     |                       |
| SBC817-16LT3G   |                  |                     |                       |
| BC817-25LT1G    | 6B               | SOT-23<br>(Pb-Free) | 3000 / Tape & Reel    |
| SBC817-25LT1G   |                  |                     | 10,000 / Tape & Reel  |
| BC817-25LT3G    |                  |                     |                       |
| SBC817-25LT3G   |                  |                     |                       |
| BC817-40LT1G    | 6C               | SOT-23<br>(Pb-Free) | 3000 / Tape & Reel    |
| SBC817-40LT1G   |                  |                     | 10,000 / Tape & Reel  |
| BC817-40LT3G    |                  |                     |                       |
| SBC817-40LT3G   |                  |                     |                       |

<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.

TYPICAL CHARACTERISTICS - BC817-16L, SBC817-16L

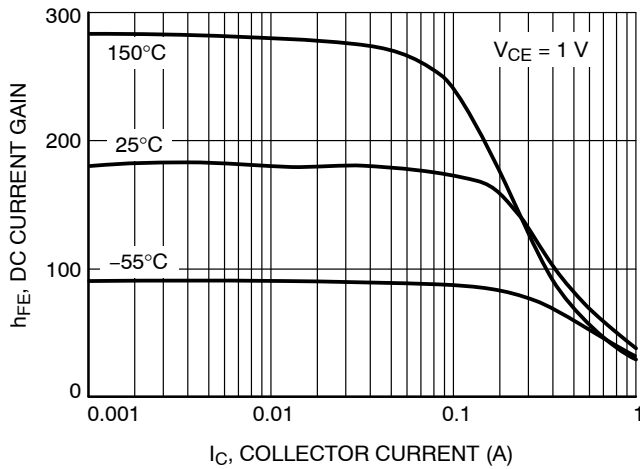


Figure 1. DC Current Gain vs. Collector Current

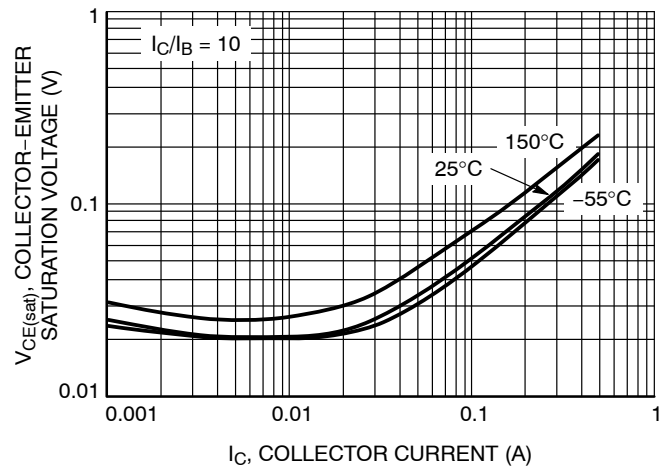


Figure 2. Collector Emitter Saturation Voltage vs. Collector Current

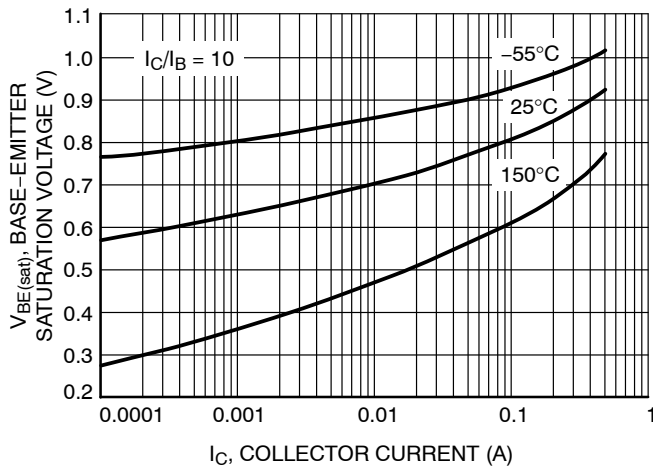


Figure 3. Base Emitter Saturation Voltage vs. Collector Current

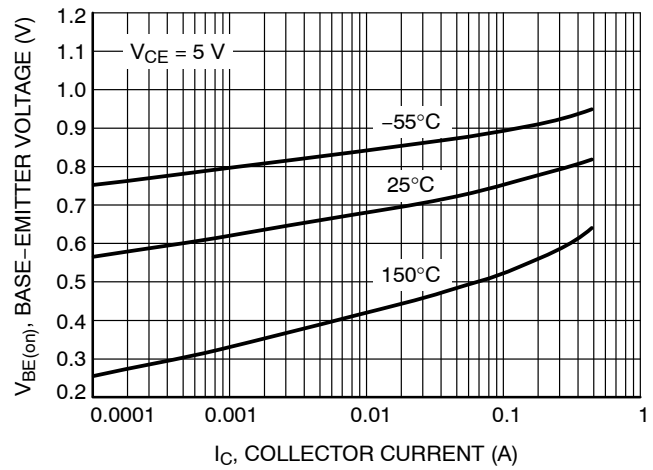


Figure 4. Base Emitter Voltage vs. Collector Current

TYPICAL CHARACTERISTICS - BC817-16L, SBC817-16L



Figure 5. Saturation Region

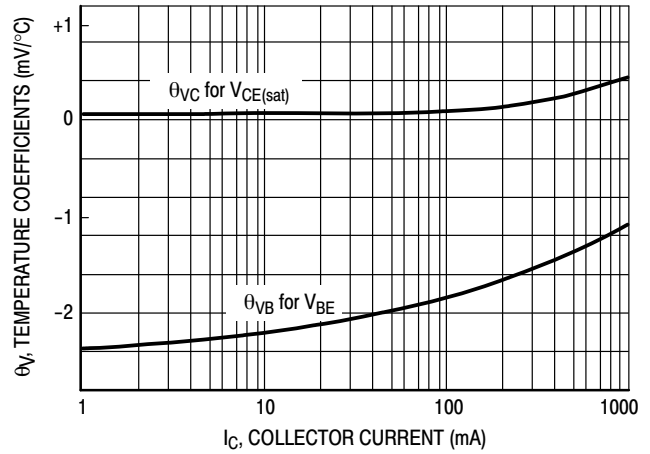


Figure 6. Temperature Coefficients

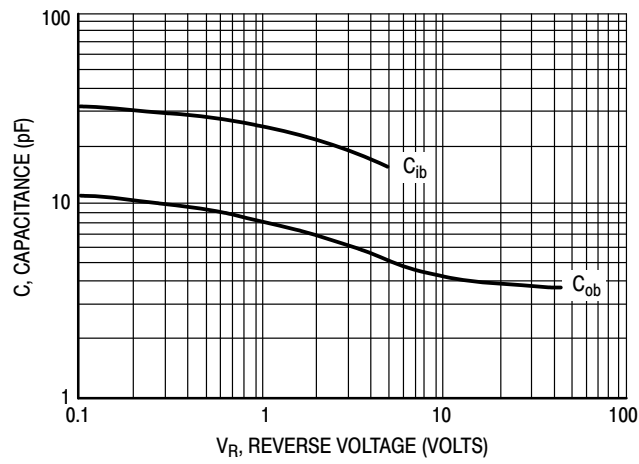


Figure 7. Capacitances

TYPICAL CHARACTERISTICS - BC817-25L, SBC817-25L

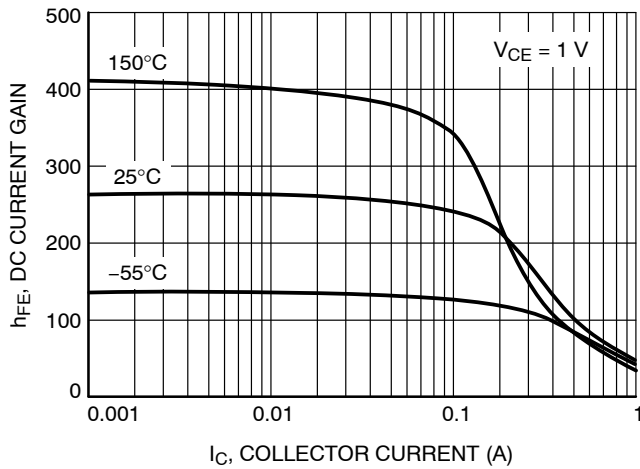


Figure 8. DC Current Gain vs. Collector Current

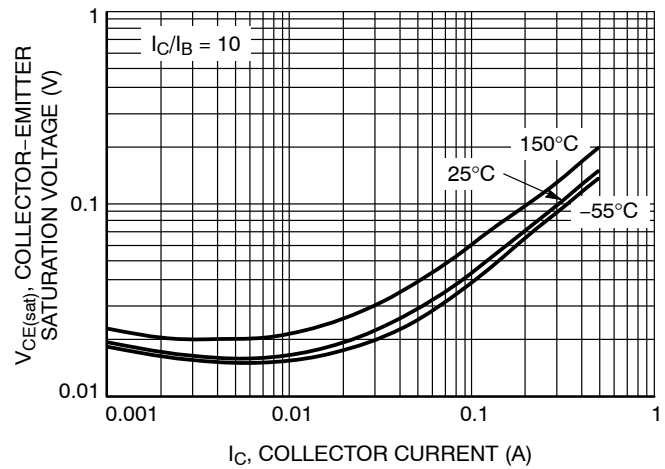


Figure 9. Collector Emitter Saturation Voltage vs. Collector Current



Figure 10. Base Emitter Saturation Voltage vs. Collector Current



Figure 11. Base Emitter Voltage vs. Collector Current

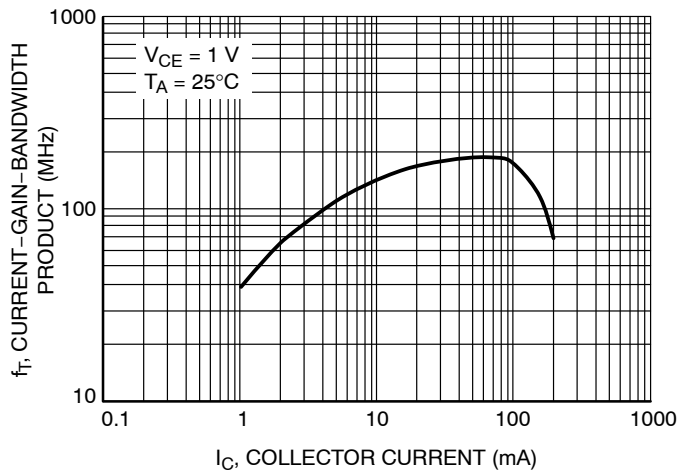


Figure 12. Current Gain Bandwidth Product vs. Collector Current

TYPICAL CHARACTERISTICS - BC817-25L, SBC81725L

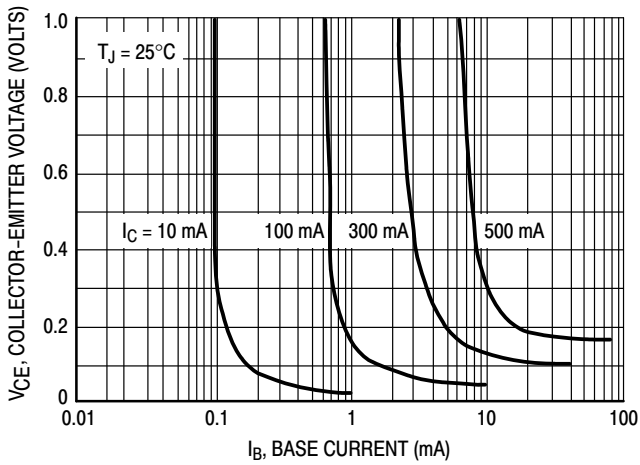


Figure 13. Saturation Region

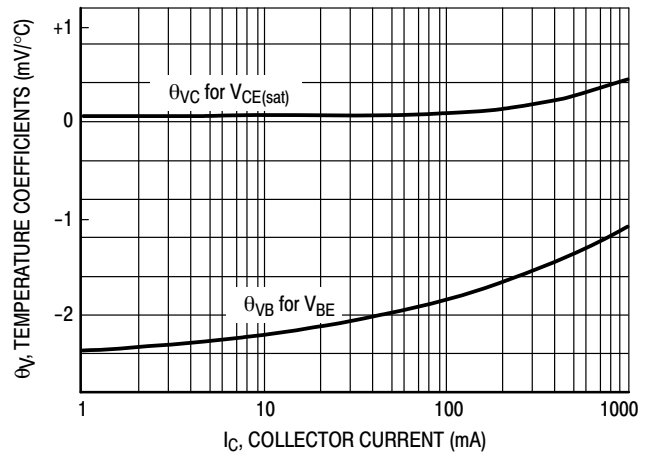


Figure 14. Temperature Coefficients

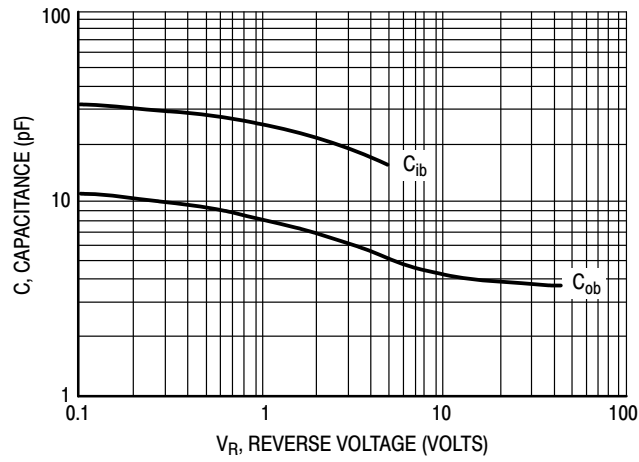


Figure 15. Capacitances

TYPICAL CHARACTERISTICS - BC817-40L, SBC817-40L



Figure 16. DC Current Gain vs. Collector Current

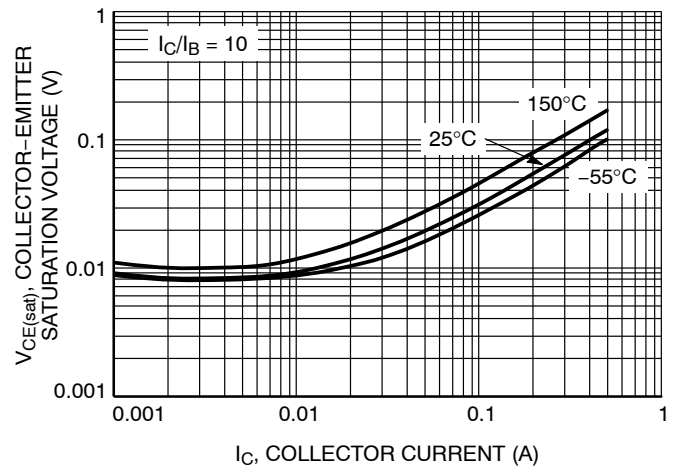


Figure 17. Collector Emitter Saturation Voltage vs. Collector Current



Figure 18. Base Emitter Saturation Voltage vs. Collector Current

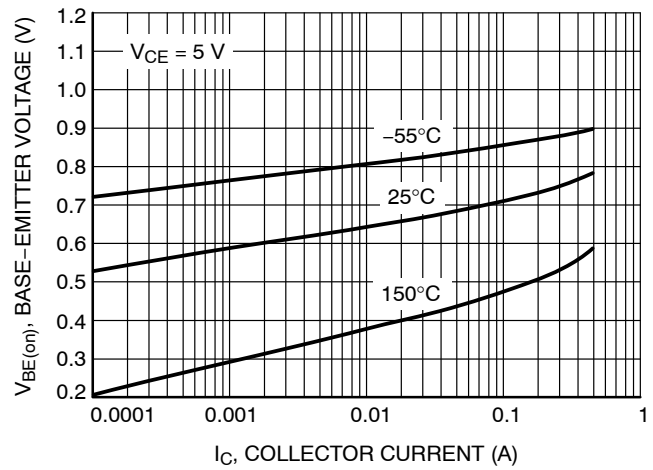


Figure 19. Base Emitter Voltage vs. Collector Current

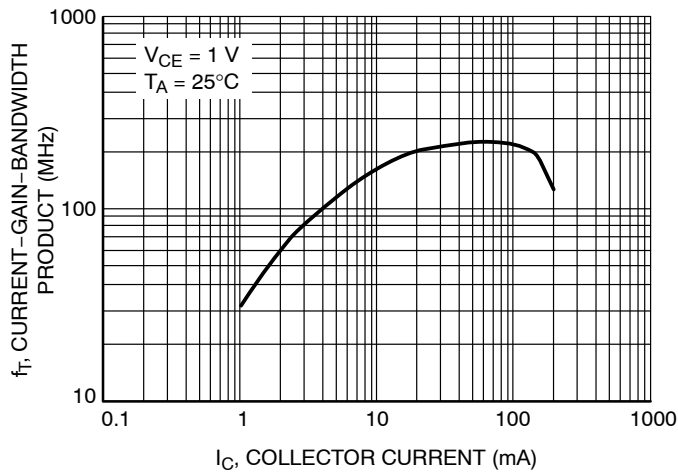


Figure 20. Current Gain Bandwidth Product vs. Collector Current

TYPICAL CHARACTERISTICS - BC817-40L, SBC817-40L

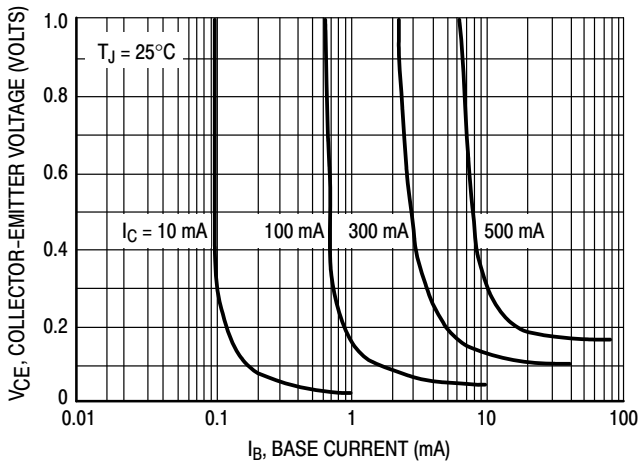


Figure 21. Saturation Region

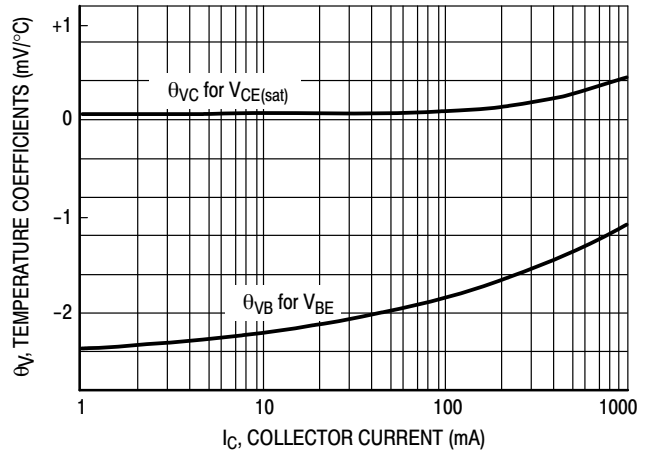


Figure 22. Temperature Coefficients

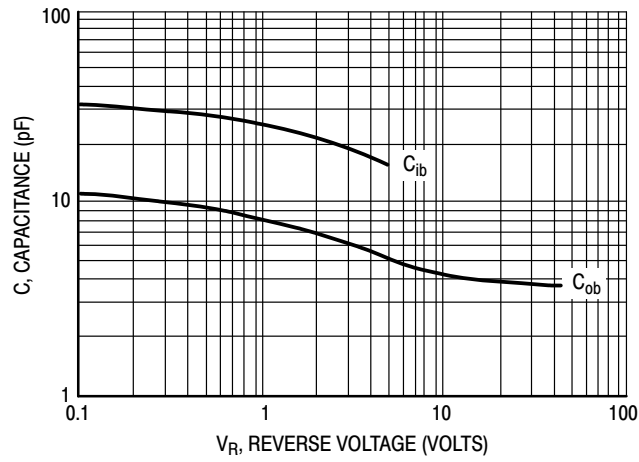
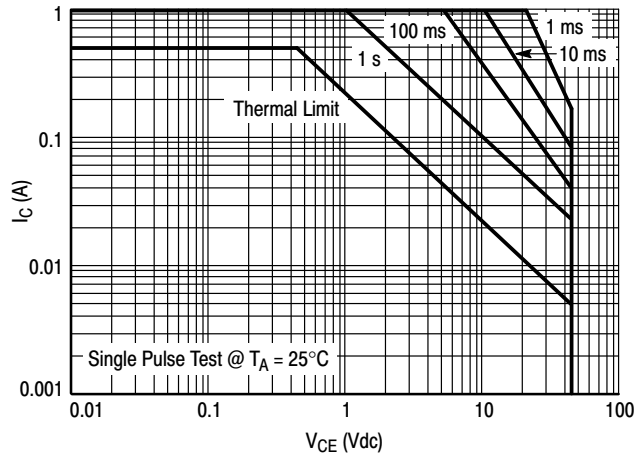


Figure 23. Capacitances



**BC817-16L, SBC817-16L, BC817-25L, SBC817-25L, BC817-40L, SBC817-40L**

**TYPICAL CHARACTERISTICS - BC817-16L, SBC817-16L, BC817-25L, SBC817-25L, BC817-40L, SBC817-40L**



**Figure 24. Safe Operating Area**

# MECHANICAL CASE OUTLINE

## PACKAGE DIMENSIONS

ON Semiconductor®



**SOT-23 (TO-236)**  
CASE 318-08  
ISSUE AS

DATE 30 JAN 2018

SCALE 4:1



**NOTES:**

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: 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.

| DIM | MILLIMETERS |      |      | INCHES |       |       |
|-----|-------------|------|------|--------|-------|-------|
|     | MIN         | NOM  | MAX  | MIN    | NOM   | MAX   |
| A   | 0.89        | 1.00 | 1.11 | 0.035  | 0.039 | 0.044 |
| A1  | 0.01        | 0.06 | 0.10 | 0.000  | 0.002 | 0.004 |
| b   | 0.37        | 0.44 | 0.50 | 0.015  | 0.017 | 0.020 |
| c   | 0.08        | 0.14 | 0.20 | 0.003  | 0.006 | 0.008 |
| 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 | 0.080 |
| L   | 0.30        | 0.43 | 0.55 | 0.012  | 0.017 | 0.022 |
| L1  | 0.35        | 0.54 | 0.69 | 0.014  | 0.021 | 0.027 |
| HE  | 2.10        | 2.40 | 2.64 | 0.083  | 0.094 | 0.104 |
| T   | 0°          | ---  | 10°  | 0°     | ---   | 10°   |

**RECOMMENDED SOLDERING FOOTPRINT**



**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.

- |   |   |   |  |
|---|---|---|--|
| STYLE 1 THRU 5:<br>CANCELLED                                | STYLE 6:<br>PIN 1. BASE<br>2. EMITTER<br>3. COLLECTOR       | STYLE 7:<br>PIN 1. EMITTER<br>2. BASE<br>3. COLLECTOR       | STYLE 8:<br>PIN 1. ANODE<br>2. NO CONNECTION<br>3. CATHODE |
| STYLE 9:<br>PIN 1. ANODE<br>2. ANODE<br>3. CATHODE          | STYLE 10:<br>PIN 1. DRAIN<br>2. SOURCE<br>3. GATE           | STYLE 11:<br>PIN 1. ANODE<br>2. CATHODE<br>3. CATHODE-ANODE | STYLE 12:<br>PIN 1. CATHODE<br>2. CATHODE<br>3. ANODE      |
| STYLE 13:<br>PIN 1. SOURCE<br>2. DRAIN<br>3. GATE           | STYLE 14:<br>PIN 1. CATHODE<br>2. GATE<br>3. ANODE          | STYLE 15:<br>PIN 1. GATE<br>2. CATHODE<br>3. ANODE          | STYLE 16:<br>PIN 1. ANODE<br>2. CATHODE<br>3. CATHODE      |
| STYLE 17:<br>PIN 1. NO CONNECTION<br>2. ANODE<br>3. CATHODE | STYLE 18:<br>PIN 1. NO CONNECTION<br>2. CATHODE<br>3. ANODE | STYLE 19:<br>PIN 1. CATHODE<br>2. ANODE<br>3. CATHODE-ANODE | STYLE 20:<br>PIN 1. CATHODE<br>2. ANODE<br>3. GATE         |
| STYLE 21:<br>PIN 1. GATE<br>2. SOURCE<br>3. DRAIN           | STYLE 22:<br>PIN 1. RETURN<br>2. OUTPUT<br>3. INPUT         | STYLE 23:<br>PIN 1. ANODE<br>2. ANODE<br>3. CATHODE         | STYLE 24:<br>PIN 1. GATE<br>2. DRAIN<br>3. SOURCE          |
| STYLE 25:<br>PIN 1. ANODE<br>2. CATHODE<br>3. GATE          | STYLE 26:<br>PIN 1. CATHODE<br>2. ANODE<br>3. NO CONNECTION | STYLE 27:<br>PIN 1. CATHODE<br>2. CATHODE<br>3. CATHODE     | STYLE 28:<br>PIN 1. ANODE<br>2. ANODE<br>3. ANODE          |

|                         |                        |  |
|-------------------------|------------------------|--|
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