

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

## General Purpose Transistors

### NPN Silicon

#### Features

- AEC-Q101 Qualified and PPAP Capable
- S 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

| 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   | $T_J, T_{stg}$  | -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 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.

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## 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)  | V <sub>(BR)CEO</sub> | 45  | -   | -          | V        |
| Collector - Emitter Breakdown Voltage<br>(V <sub>EB</sub> = 0, I <sub>C</sub> = 10 μA)                   | V <sub>(BR)CES</sub> | 50  | -   | -          | V        |
| Emitter - Base Breakdown Voltage<br>(I <sub>E</sub> = 1.0 μA)  | V <sub>(BR)EBO</sub> | 5.0 | -   | -          | V        |
| Collector Cutoff Current<br>(V <sub>CB</sub> = 20 V)<br>(V <sub>CB</sub> = 20 V, T <sub>A</sub> = 150°C) | I <sub>CBO</sub>     | -   | -   | 100<br>5.0 | nA<br>μA |

## ON CHARACTERISTICS

|   |   |                 |     |     |     |   |
|---|---|-----------------|-----|-----|-----|---|
| DC Current Gain<br>(I <sub>C</sub> = 100 mA, V <sub>CE</sub> = 1.0 V)                       | BC817-16, SBC817-16<br>BC817-25, SBC817-25<br>BC817-40, SBC817-40 | h <sub>FE</sub> | 100 | -   | 250 | - |
| (I <sub>C</sub> = 500 mA, V <sub>CE</sub> = 1.0 V)  |   |                 | 160 | -   | 400 | - |
|   |   |                 | 250 | -   | 600 | - |
|   |   |                 | 40  | -   | -   | - |
| Collector - Emitter Saturation Voltage<br>(I <sub>C</sub> = 500 mA, I <sub>B</sub> = 50 mA) | V <sub>CE(sat)</sub>  | -               | -   | 0.7 | V   |   |
| Base - Emitter On Voltage<br>(I <sub>C</sub> = 500 mA, V <sub>CE</sub> = 1.0 V)             | V <sub>BE(on)</sub>   | -               | -   | 1.2 | 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>obo</sub> | -   | 10 | - | pF  |

## ORDERING INFORMATION

| Device        | Specific Marking | Package             | Shipping <sup>†</sup> |
|---------------|------------------|---------------------|-----------------------|
| BC817-16LT1G  | 6A               | SOT-23<br>(Pb-Free) | 3000 / Tape & Reel    |
| BC817-16LT3G  |                  |                     | 10,000 / Tape & Reel  |
| SBC817-16LT3  |                  |                     |                       |
| BC817-25LT1G  | 6B               | SOT-23<br>(Pb-Free) | 3000 / Tape & Reel    |
| SBC817-25LT1G |                  |                     |                       |
| BC817-25LT3G  |                  |                     | 10,000 / Tape & Reel  |
| SBC817-25LT3G |                  |                     |                       |
| BC817-40LT1G  | 6C               | SOT-23<br>(Pb-Free) | 3000 / Tape & Reel    |
| SBC817-40LT1G |                  |                     |                       |
| BC817-40LT3G  |                  |                     | 10,000 / Tape & Reel  |
| 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

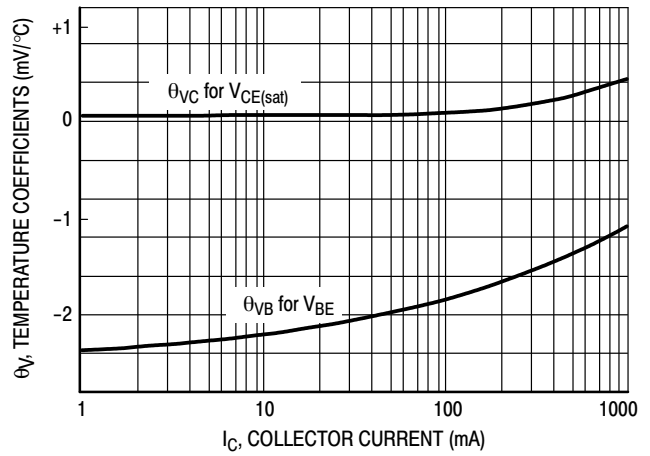


Figure 6. Temperature Coefficients

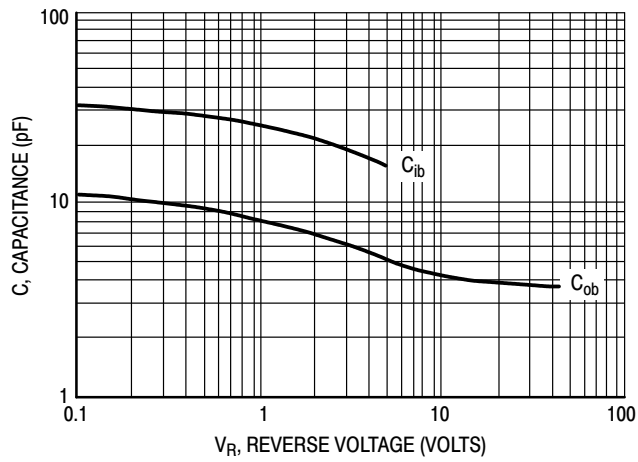


Figure 7. Capacitances

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

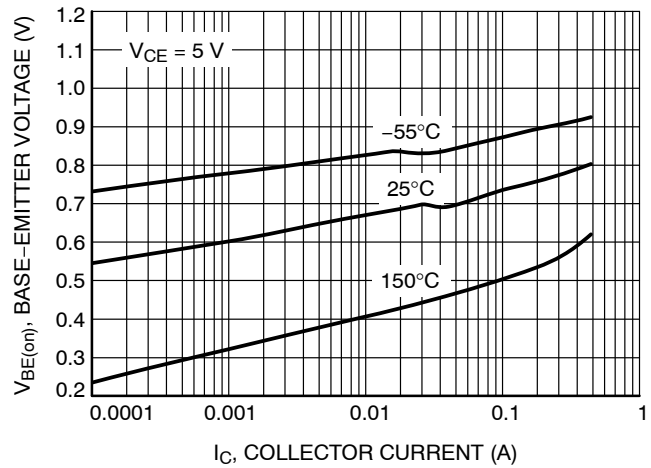


Figure 11. Base Emitter Voltage vs. Collector Current



Figure 12. Current Gain Bandwidth Product vs. Collector Current

TYPICAL CHARACTERISTICS - BC817-25L, SBC81725L



Figure 13. Saturation Region

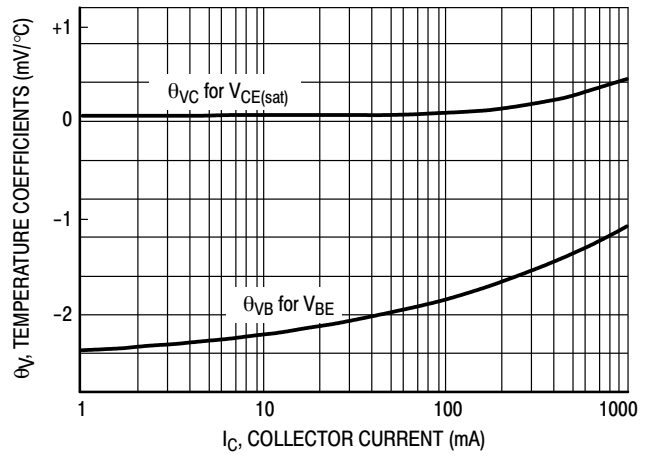


Figure 14. Temperature Coefficients



Figure 15. Capacitances

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

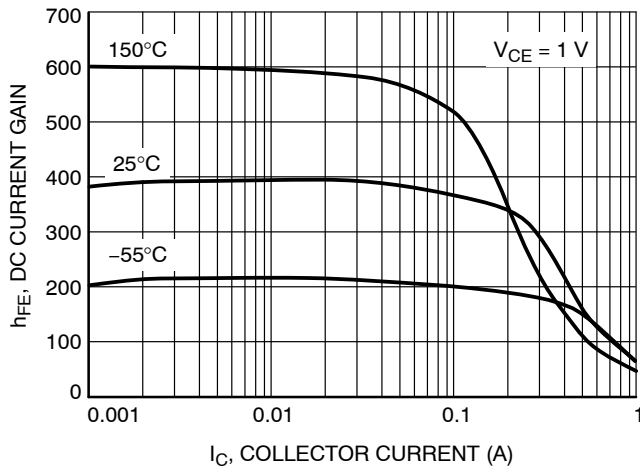


Figure 16. DC Current Gain vs. Collector Current



Figure 17. Collector Emitter Saturation Voltage vs. Collector Current

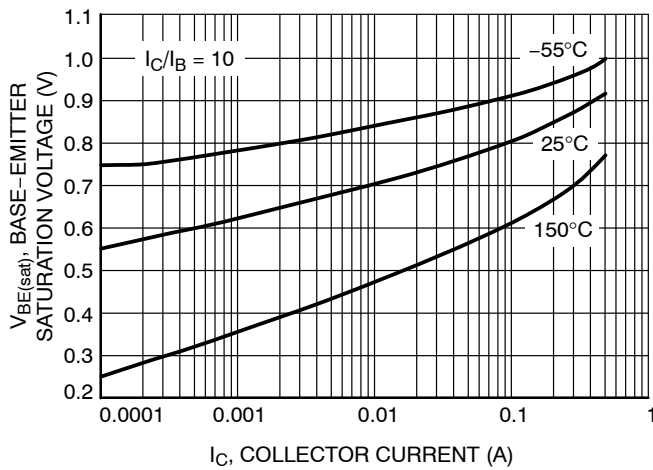


Figure 18. Base Emitter Saturation Voltage vs. Collector Current



Figure 19. Base Emitter Voltage vs. Collector Current

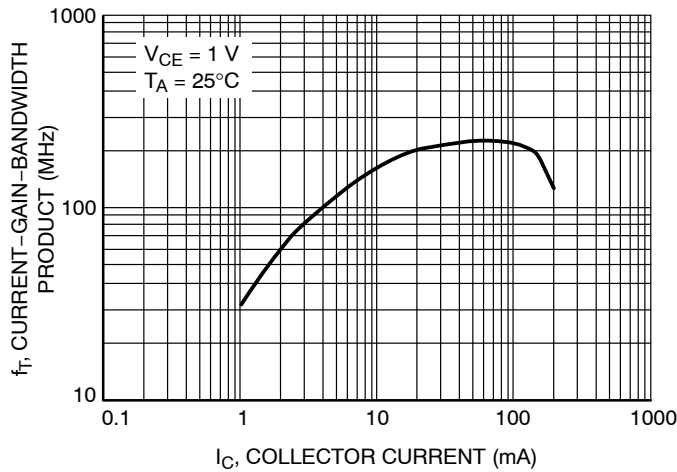


Figure 20. Current Gain Bandwidth Product vs. Collector Current

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



Figure 21. Saturation Region



Figure 22. Temperature Coefficients

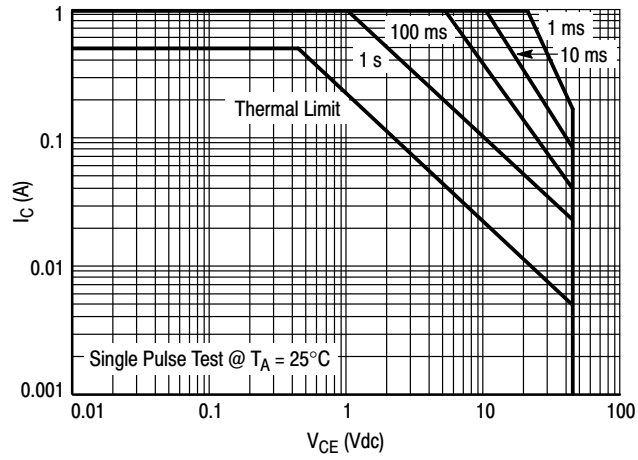


Figure 23. Capacitances



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

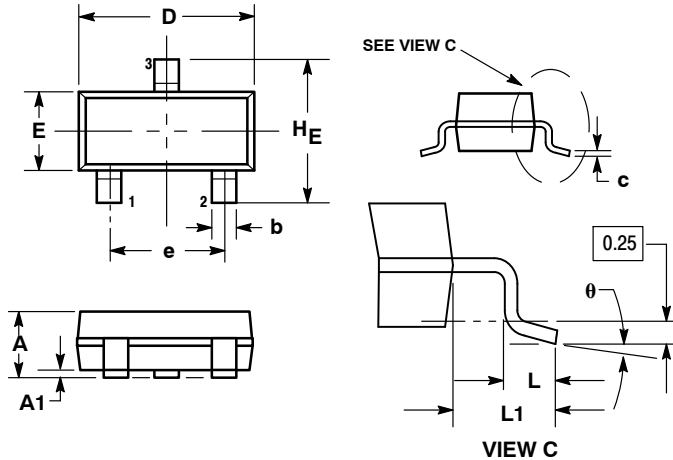
**TYPICAL CHARACTERISTICS - BC817-16L, SBC817-16L, BC817-25L, SBC817-25L, BC817-40L, SBC817-40L**



**Figure 24. Safe Operating Area**

PACKAGE DIMENSIONS

SOT-23 (TO-236)  
CASE 318-08  
ISSUE AP

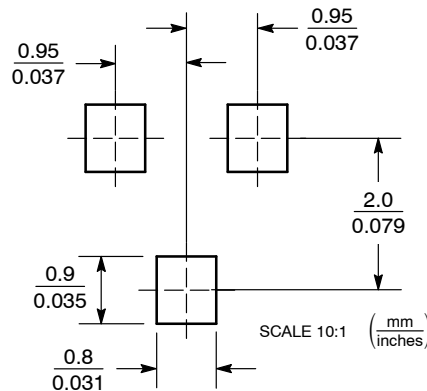


- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
  2. CONTROLLING DIMENSION: INCH.
  3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH THICKNESS. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.
  4. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS.

| 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 |
| θ   | 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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