

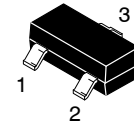
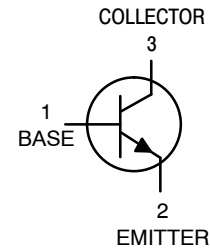
# General Purpose Transistors

## NPN Silicon

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

### 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



**SOT-23  
CASE 318  
STYLE 6**

### 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

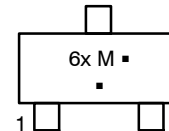
| Characteristic                                                                                                         | Symbol          | Max         | Unit                       |
|------------------------------------------------------------------------------------------------------------------------|-----------------|-------------|----------------------------|
| 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.

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

## SWITCHING CHARACTERISTICS

|                                                                                                                     |       |   |      |   |   |    |
|---------------------------------------------------------------------------------------------------------------------|-------|---|------|---|---|----|
| Delay Time ( $V_{CC} = 3.0\text{ Vdc}$ , $V_{BE} = 0.5\text{ V}$ , $I_C = 10\text{ mA}$ )                           | $t_d$ | – | 85   | – | – | ns |
| Rise Time ( $V_{CC} = 3.0\text{ Vdc}$ , $V_{BE} = 0.5\text{ V}$ , $I_C = 10\text{ mA}$ )                            | $t_r$ | – | 30   | – | – | ns |
| Storage Time ( $V_{CC} = 3.0\text{ Vdc}$ , $I_C = 10\text{ mA}$ , $I_{B1} = 1\text{ mA}$ , $I_{B2} = 1\text{ mA}$ ) | $t_s$ | – | 1000 | – | – | ns |
| Fall Time ( $V_{CC} = 3.0\text{ Vdc}$ , $I_C = 10\text{ mA}$ , $I_{B1} = 1\text{ mA}$ , $I_{B2} = 1\text{ mA}$ )    | $t_f$ | – | 300  | – | – | 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.

## ORDERING INFORMATION

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

†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

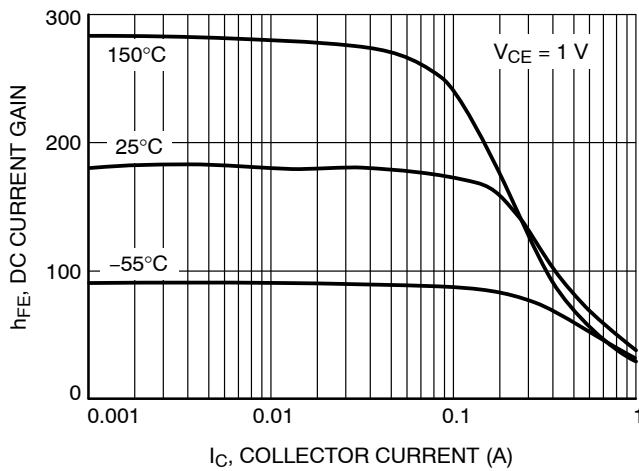


Figure 1. DC Current Gain vs. Collector Current

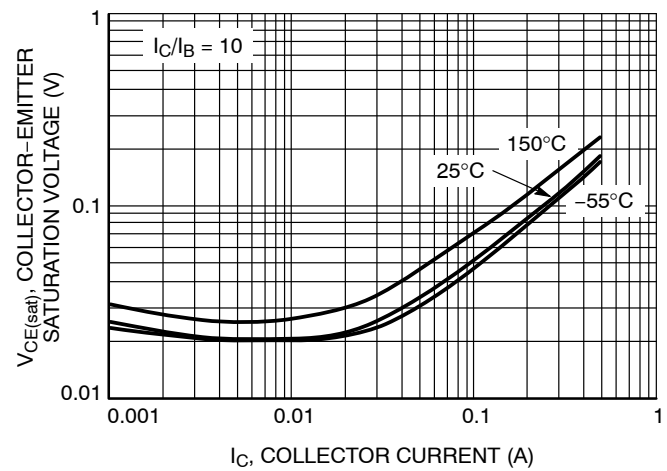


Figure 2. Collector Emitter Saturation Voltage vs. Collector Current

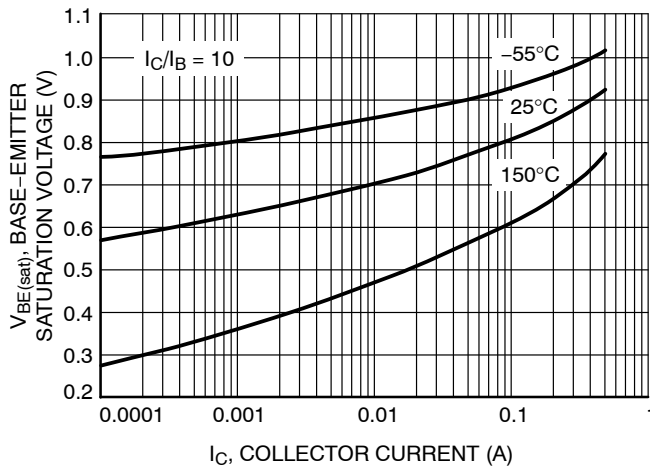


Figure 3. Base Emitter Saturation Voltage vs. Collector Current

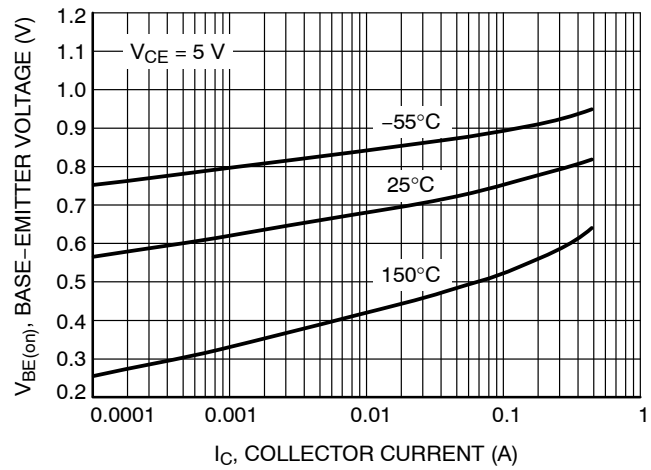


Figure 4. Base Emitter Voltage vs. Collector Current

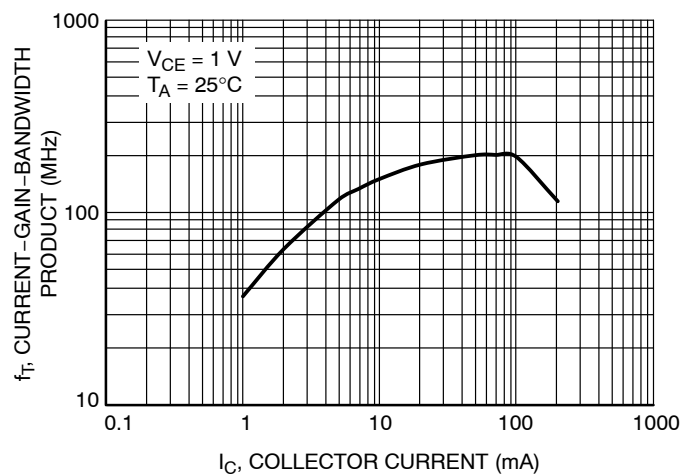


Figure 5. Current Gain Bandwidth Product vs. Collector Current

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

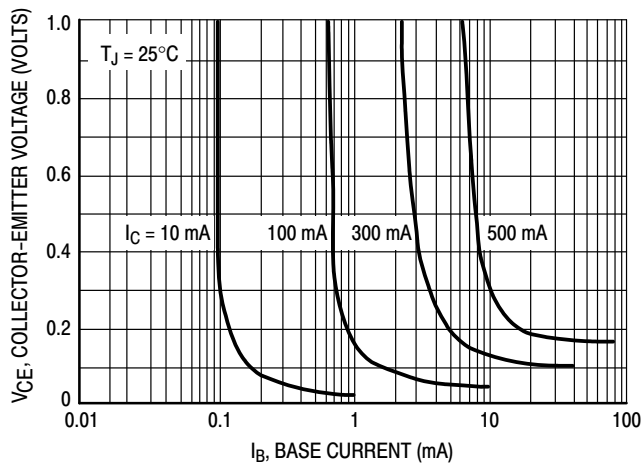


Figure 6. Saturation Region

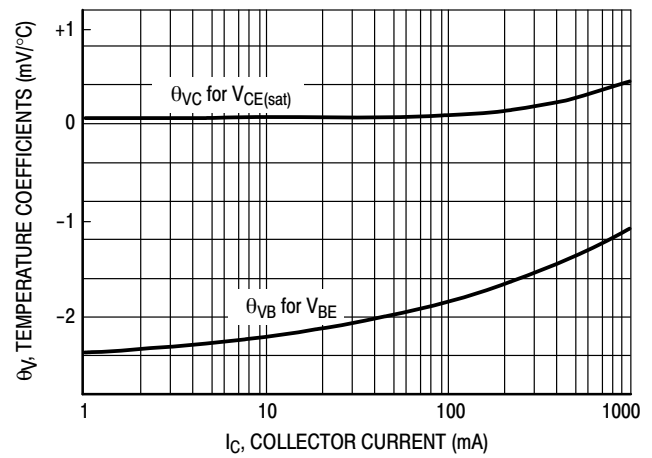


Figure 7. Temperature Coefficients

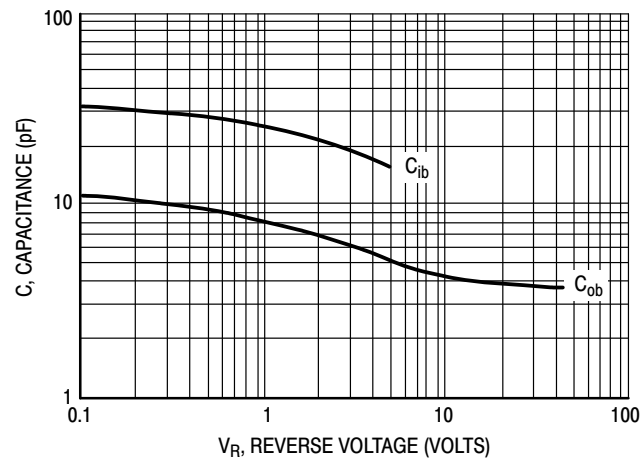


Figure 8. Capacitances

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

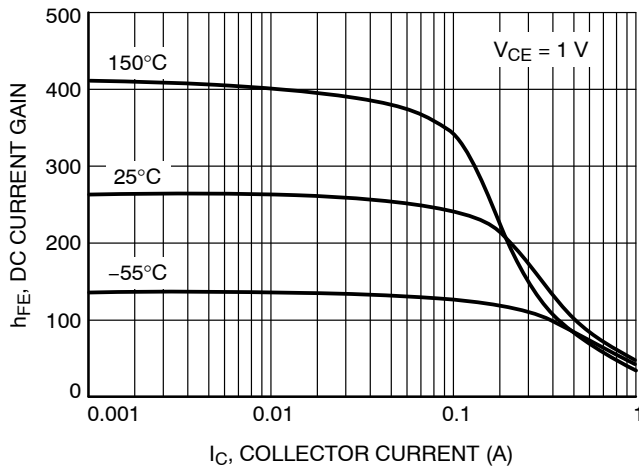


Figure 9. DC Current Gain vs. Collector Current

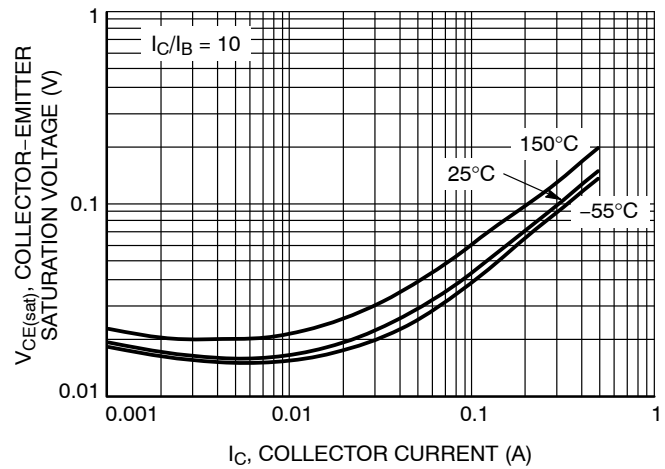


Figure 10. Collector Emitter Saturation Voltage vs. Collector Current

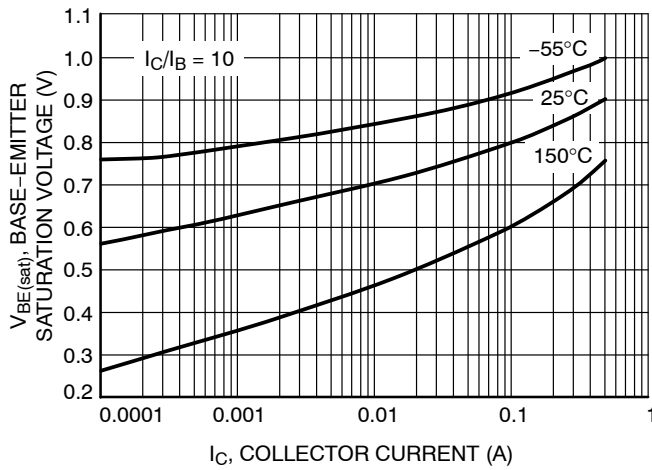


Figure 11. Base Emitter Saturation Voltage vs. Collector Current

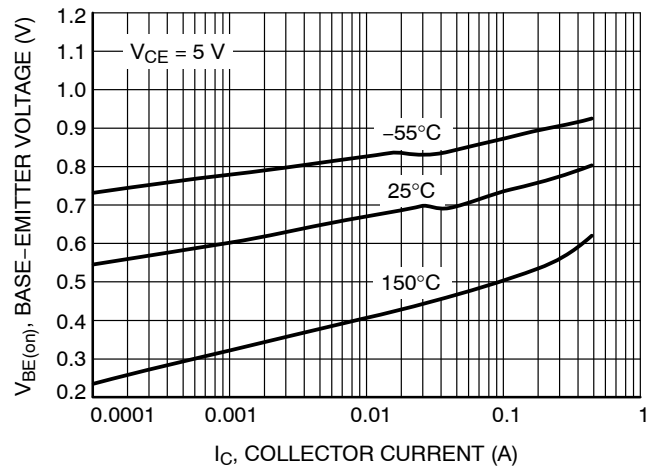


Figure 12. Base Emitter Voltage vs. Collector Current

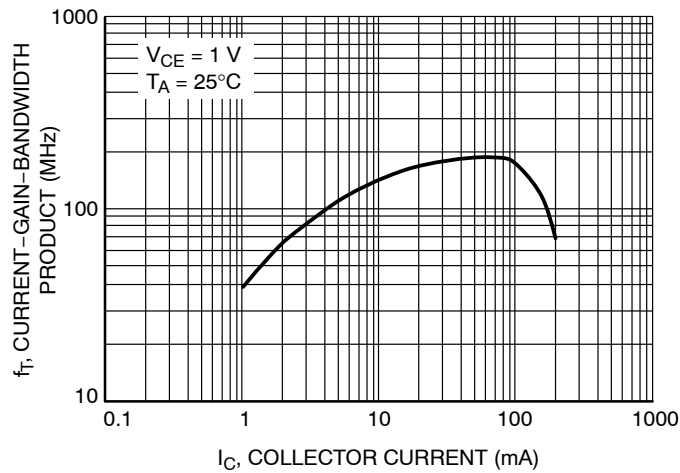


Figure 13. Current Gain Bandwidth Product vs. Collector Current

TYPICAL CHARACTERISTICS – BC817-25L, SBC81725L

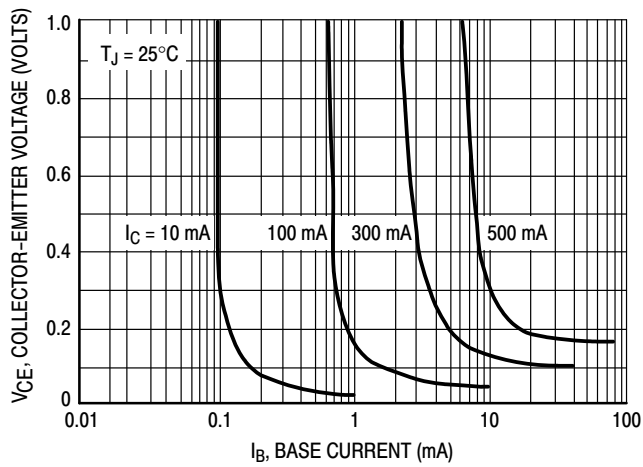


Figure 14. Saturation Region

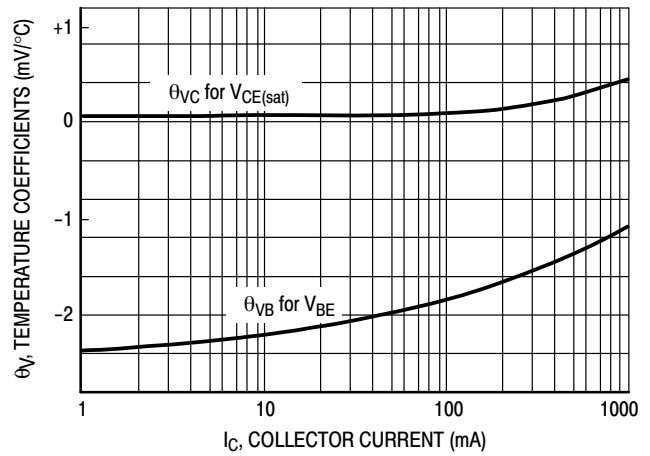


Figure 15. Temperature Coefficients

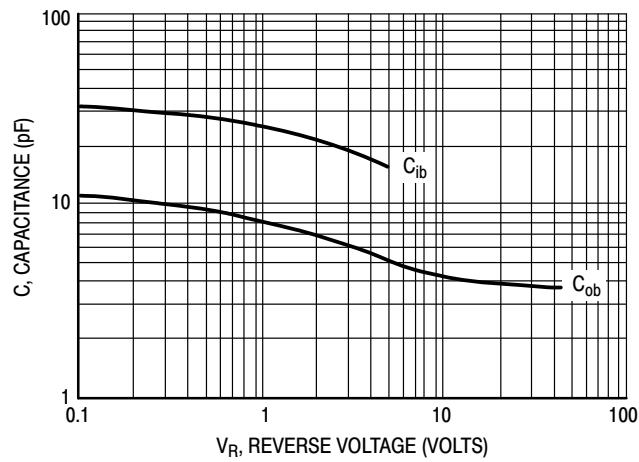


Figure 16. Capacitances

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

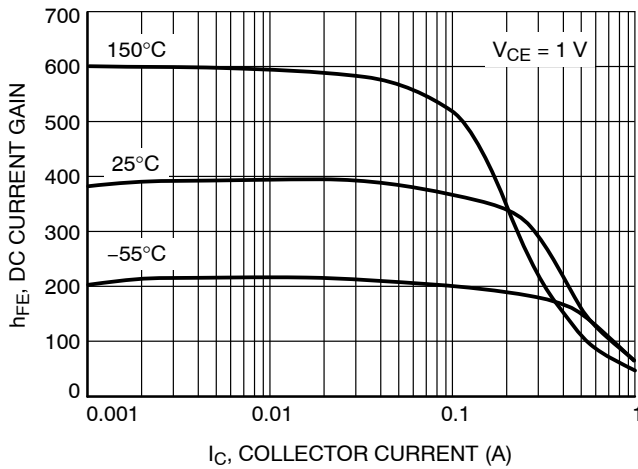


Figure 17. DC Current Gain vs. Collector Current

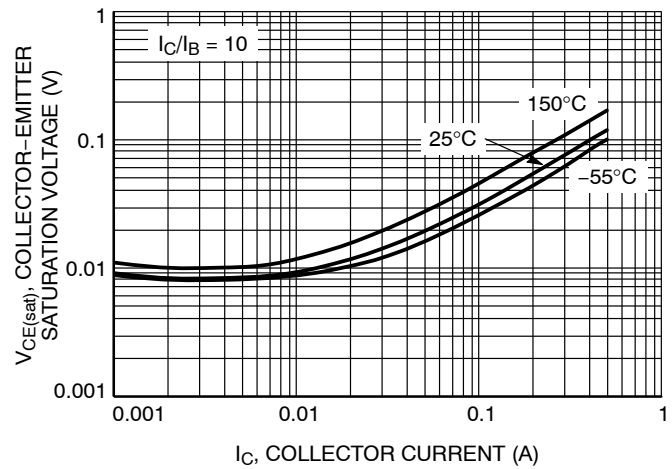


Figure 18. Collector Emitter Saturation Voltage vs. Collector Current

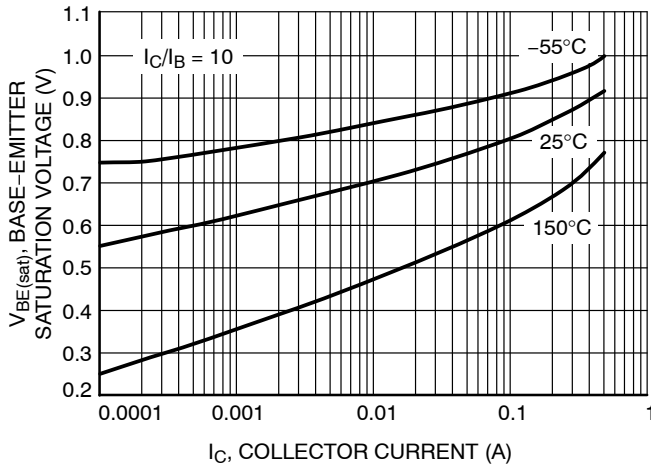


Figure 19. Base Emitter Saturation Voltage vs. Collector Current

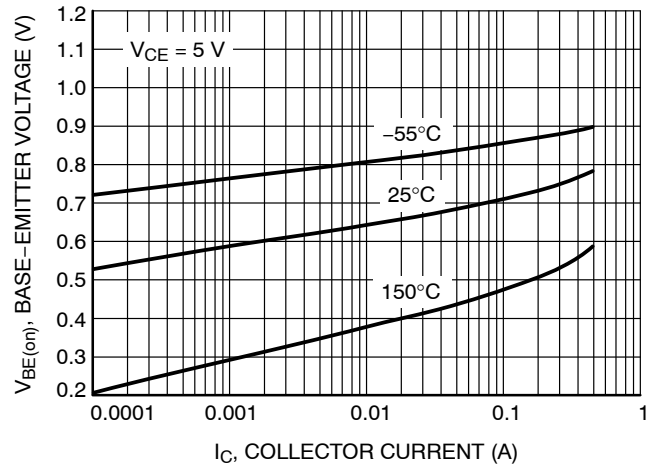


Figure 20. Base Emitter Voltage vs. Collector Current

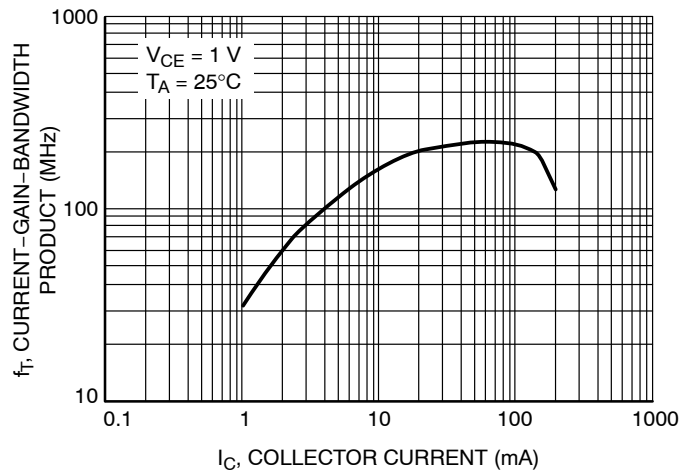


Figure 21. Current Gain Bandwidth Product vs. Collector Current

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

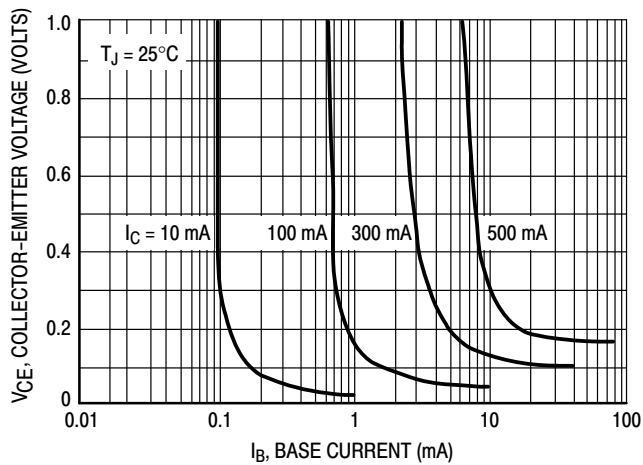


Figure 22. Saturation Region

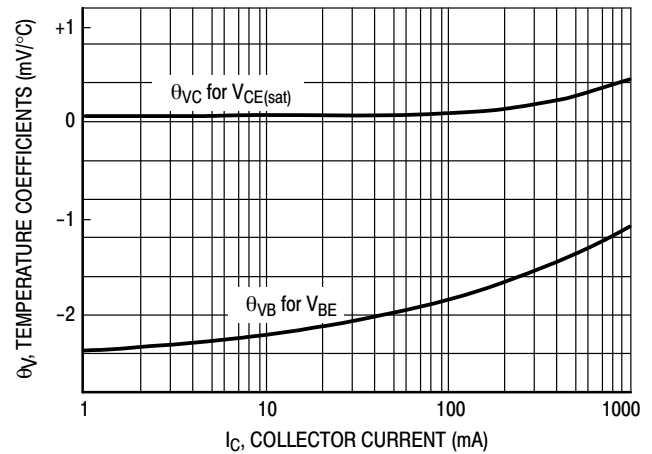


Figure 23. Temperature Coefficients

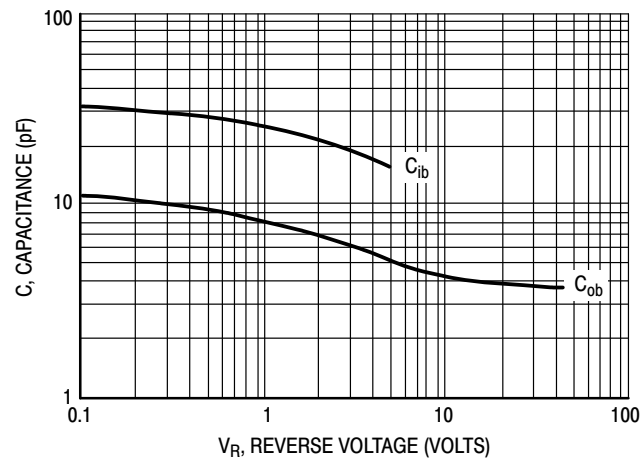


Figure 24. Capacitances

# 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

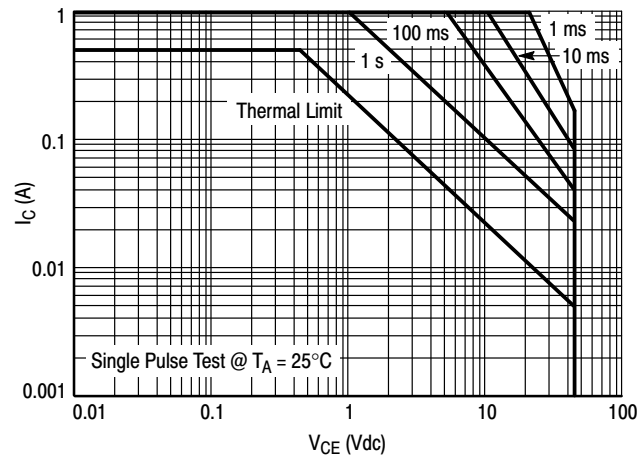


Figure 25. Safe Operating Area

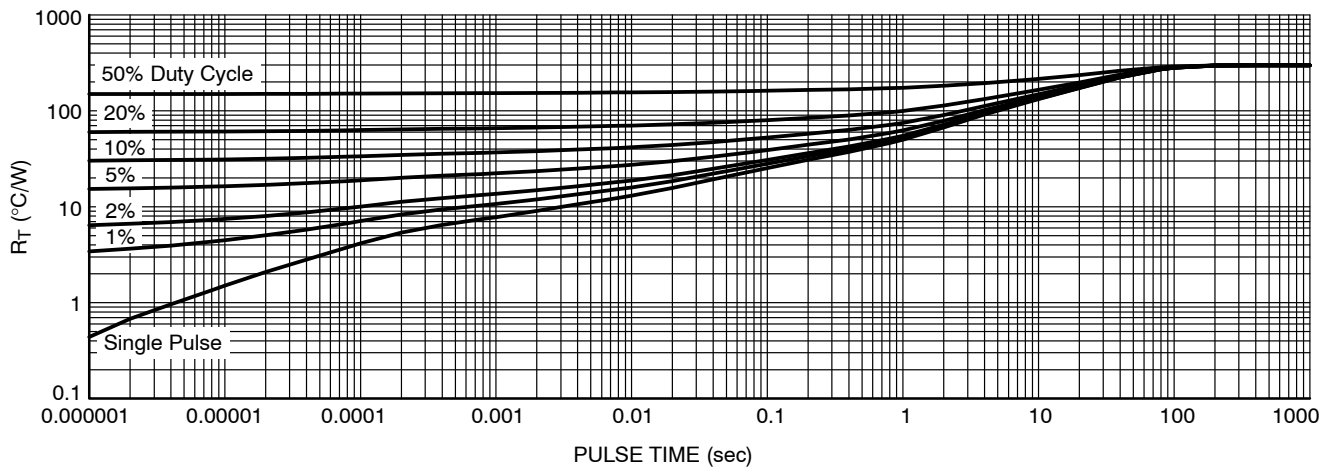


Figure 26. Thermal Response

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