

# General Purpose Transistors

## NPN Silicon

### BCH817-16L/25L/40L, NSVBCH817-16L/25L/40L

#### Features

- 175°C  $T_{J(max)}$  – Rated for High Temperature, Mission Critical Applications
- 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 |
| Collector Current – Peak       | $I_{CM}$  | 1     | A    |

#### 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°C           | $P_D$           | 225<br>1.3  | mW<br>mW/°C |
| Thermal Resistance,<br>Junction-to-Ambient                                                               | $R_{\theta JA}$ | 400         | °C/W        |
| Total Device Dissipation<br>Alumina Substrate, (Note 2)<br>$T_A = 25^\circ\text{C}$<br>Derate above 25°C | $P_D$           | 300<br>1.8  | mW<br>mW/°C |
| Thermal Resistance,<br>Junction-to-Ambient                                                               | $R_{\theta JA}$ | 330         | °C/W        |
| Junction and Storage Temperature                                                                         | $T_J, T_{stg}$  | -55 to +175 | °C          |

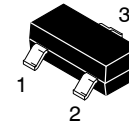
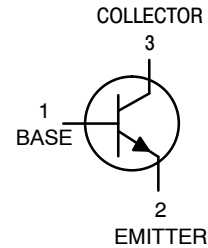
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

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.



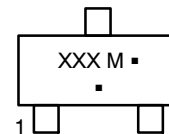
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SOT-23  
CASE 318  
STYLE 6

#### MARKING DIAGRAM



XXX = Device Code  
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 on page 2 of this data sheet.

# BCH817-16L/25L/40L, NSVBCH817-16L/25L/40L

## 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>     | –<br>– | –<br>– | 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)<br><br>(I <sub>C</sub> = 500 mA, V <sub>CE</sub> = 1.0 V) | BCH817-16, NSVBCH817-16*<br>BCH817-25, NSVBCH817-25*<br>BCH817-40, NSVBCH817-40 | h <sub>FE</sub>      | 100<br>160<br>250<br>40 | –<br>–<br>–<br>– | 250<br>400<br>600<br>– | – |
| 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  |

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> |
|--------------------|------------------|---------------------|-----------------------|
| BCH817-16LT1G**    | XXX              | SOT-23<br>(Pb-Free) | 3000 / Tape & Reel    |
| NSVBCH817-16LT1G** |                  |                     |                       |
| BCH817-25LT1G**    | XXX              | SOT-23<br>(Pb-Free) | 3000 / Tape & Reel    |
| NSVBCH817-25LT1G** |                  |                     |                       |
| BCH817-40LT1G      | 6X               | SOT-23<br>(Pb-Free) | 3000 / Tape & Reel    |
| NSVBCH817-40LT1G   |                  |                     |                       |

<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.

\*NSV Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q101 Qualified and PPAP Capable

\*\*Device release available upon request – Please contact ON Semiconductor sales.

TYPICAL CHARACTERISTICS – BCH817-16L, NSVBCH817-16L

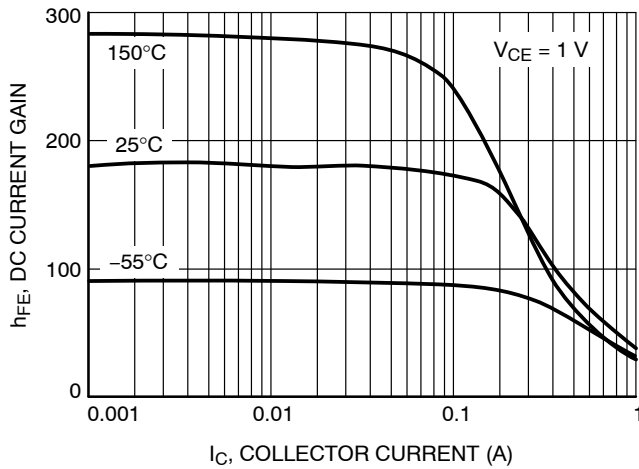


Figure 1. DC Current Gain vs. Collector Current

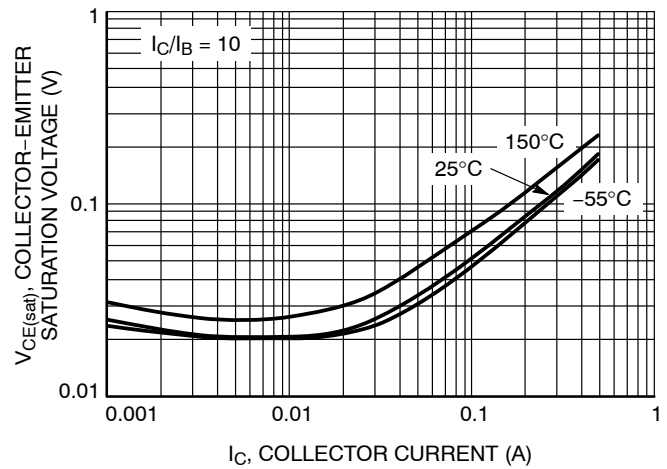


Figure 2. Collector Emitter Saturation Voltage vs. Collector Current

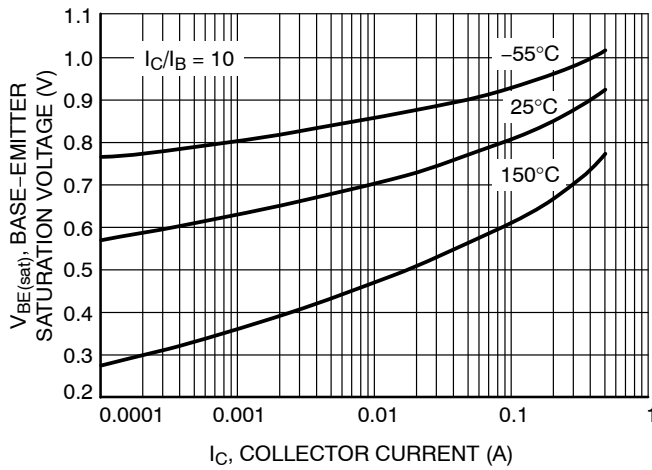


Figure 3. Base Emitter Saturation Voltage vs. Collector Current

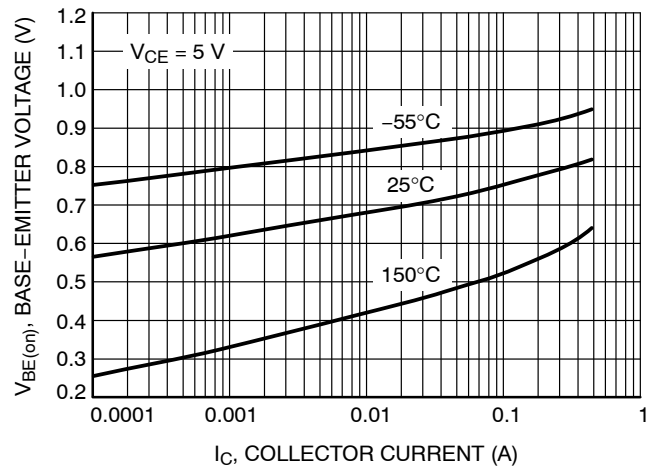


Figure 4. Base Emitter Voltage vs. Collector Current

TYPICAL CHARACTERISTICS – BCH817-16L, NSVBCH817-16L

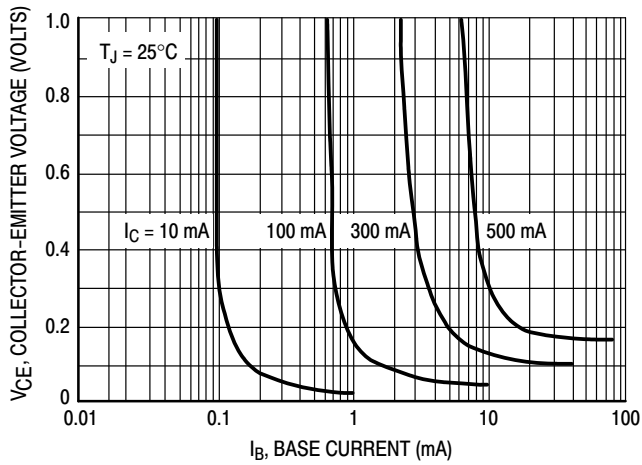


Figure 5. Saturation Region

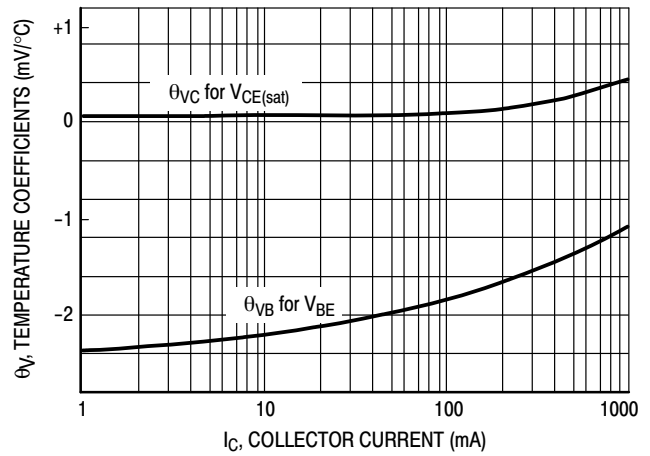


Figure 6. Temperature Coefficients

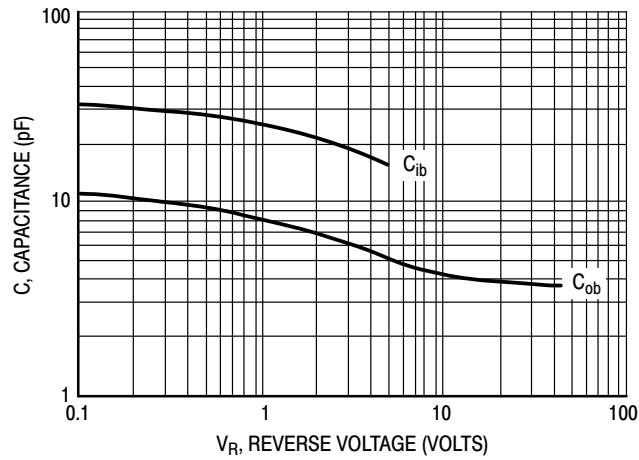


Figure 7. Capacitances

TYPICAL CHARACTERISTICS – BCH817-25L, NSVBCH817-25L

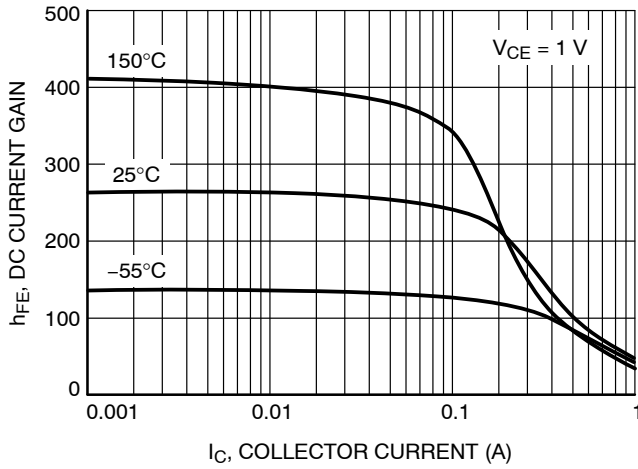


Figure 8. DC Current Gain vs. Collector Current

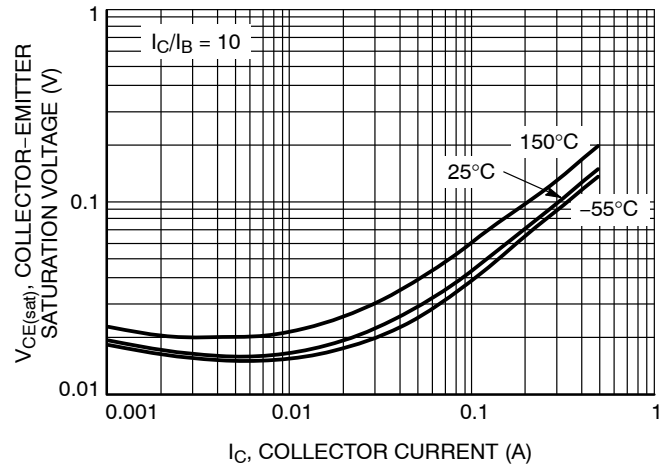


Figure 9. Collector Emitter Saturation Voltage vs. Collector Current

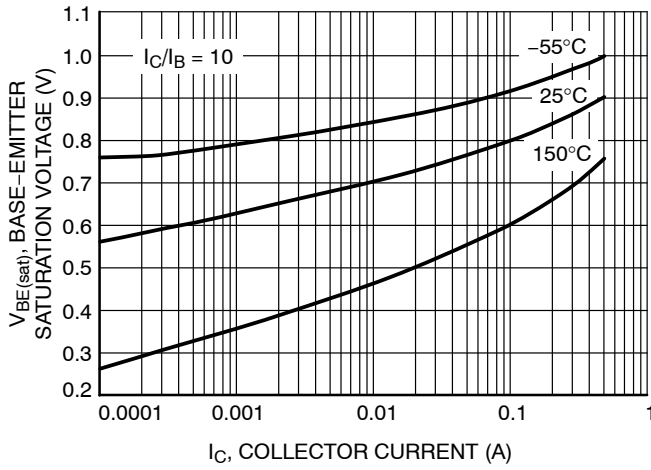


Figure 10. Base Emitter Saturation Voltage vs. Collector Current

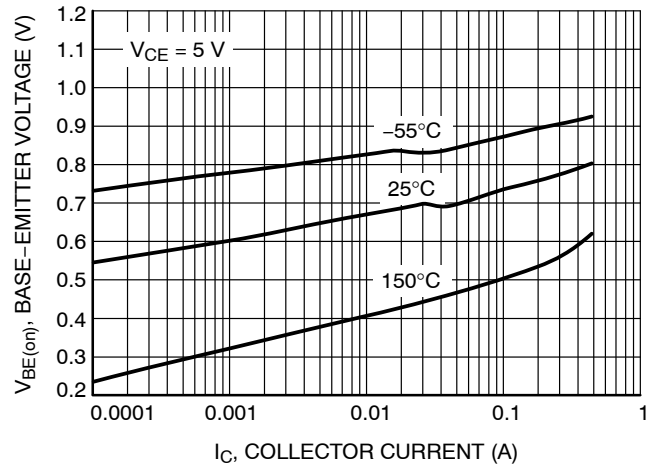


Figure 11. Base Emitter Voltage vs. Collector Current

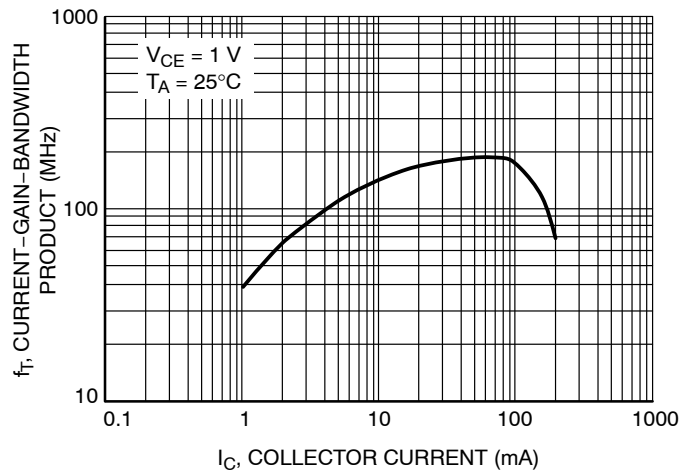


Figure 12. Current Gain Bandwidth Product vs. Collector Current

TYPICAL CHARACTERISTICS – BCH817-25L, NSVBCH81725L

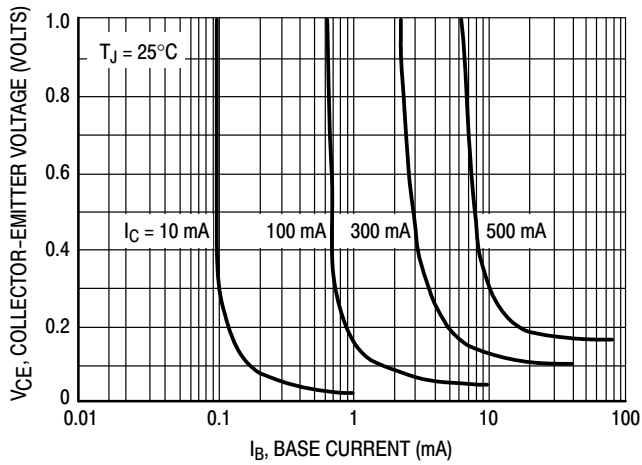


Figure 13. Saturation Region

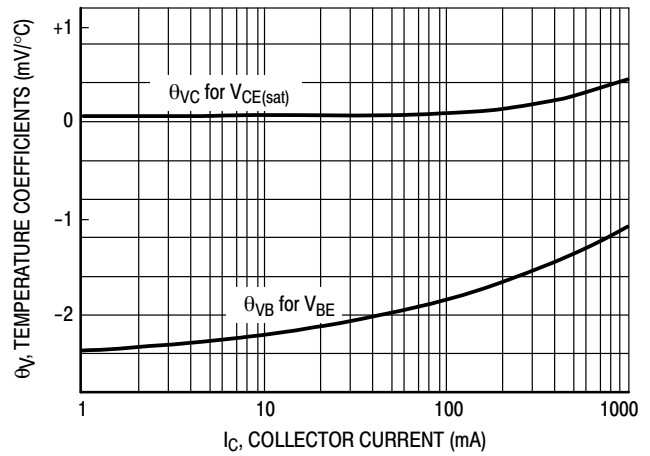


Figure 14. Temperature Coefficients

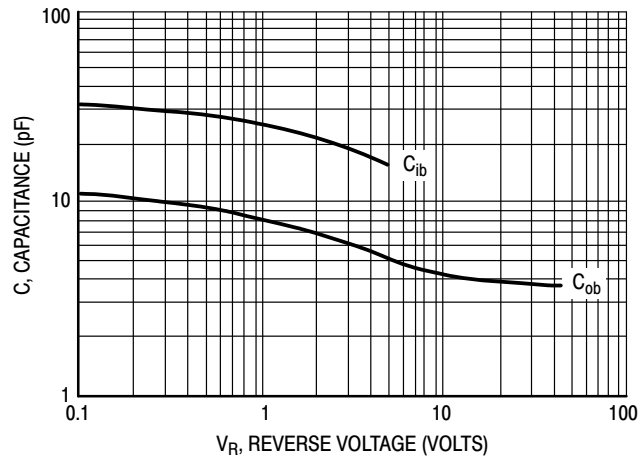


Figure 15. Capacitances

TYPICAL CHARACTERISTICS – BCH817-40L, NSVBCH817-40L

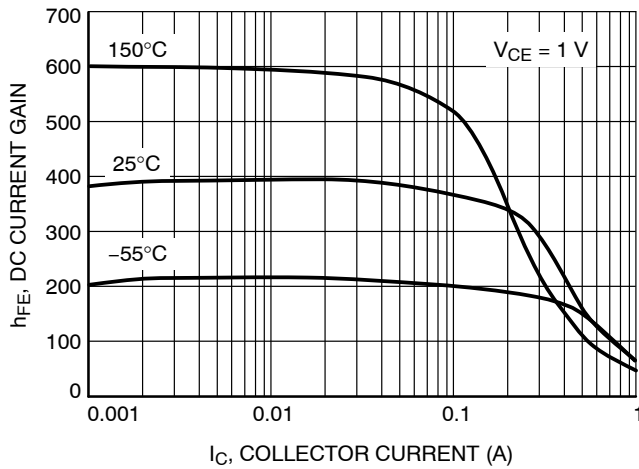


Figure 16. DC Current Gain vs. Collector Current

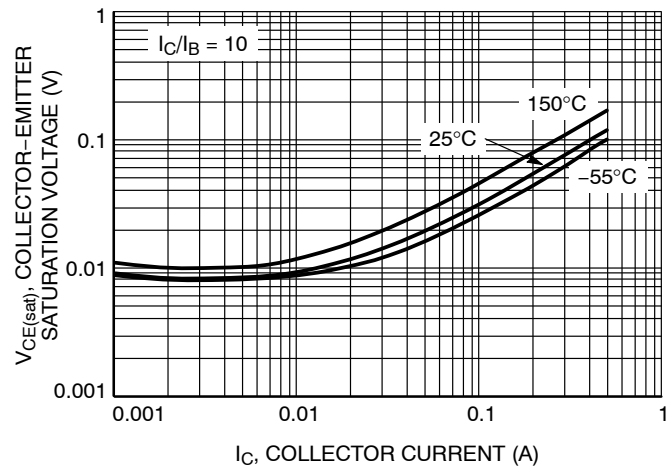


Figure 17. Collector Emitter Saturation Voltage vs. Collector Current

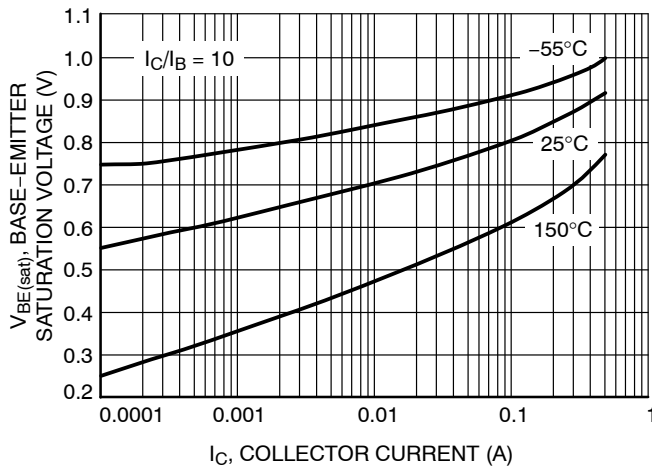


Figure 18. Base Emitter Saturation Voltage vs. Collector Current

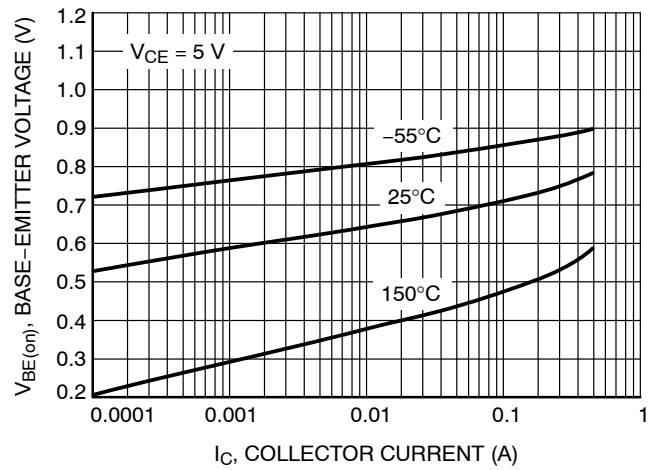


Figure 19. Base Emitter Voltage vs. Collector Current

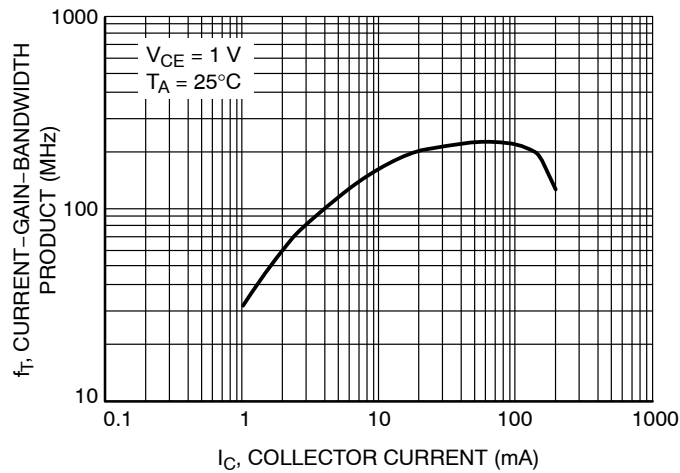


Figure 20. Current Gain Bandwidth Product vs. Collector Current

TYPICAL CHARACTERISTICS – BCH817-40L, NSVBCH817-40L

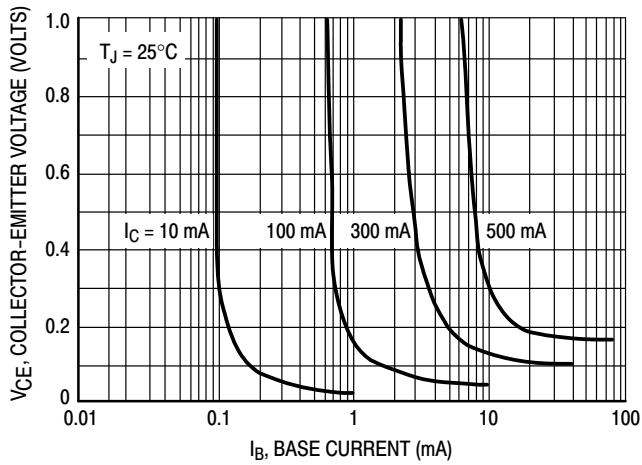


Figure 21. Saturation Region

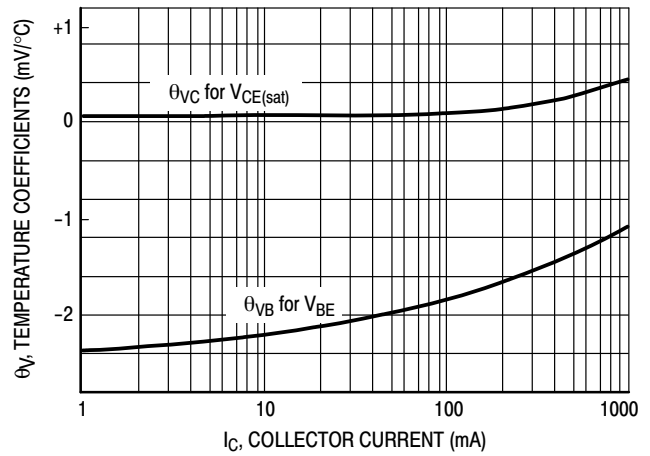


Figure 22. Temperature Coefficients

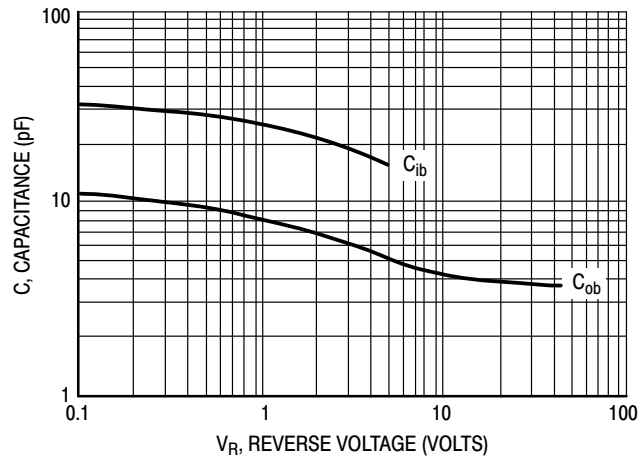


Figure 23. Capacitances

## BCH817-16L/25L/40L, NSVBCH817-16L/25L/40L

TYPICAL CHARACTERISTICS – BCH817-16L, NSVBCH817-16L, BCH817-25L, NSVBCH817-25L,  
BCH817-40L, NSVBCH817-40L

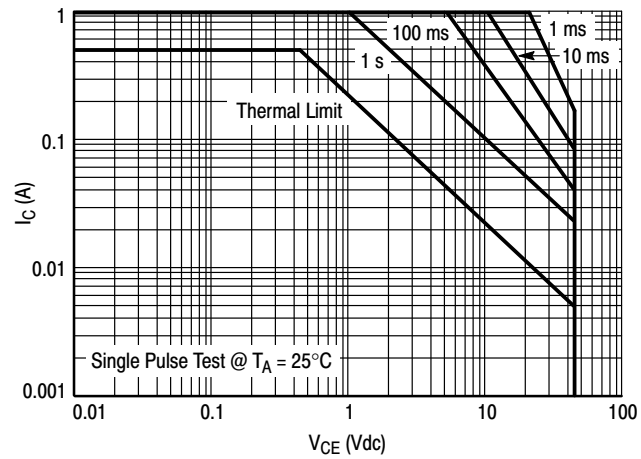
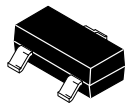


Figure 24. Safe Operating Area

# MECHANICAL CASE OUTLINE

## PACKAGE DIMENSIONS

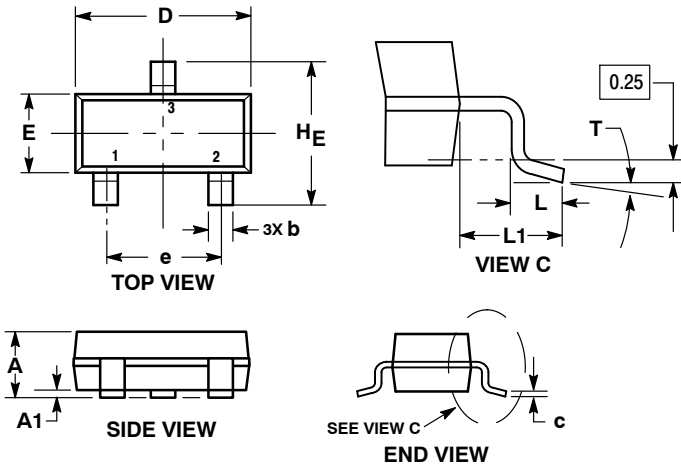
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### SOT-23 (TO-236) CASE 318-08 ISSUE AS

DATE 30 JAN 2018

SCALE 4:1

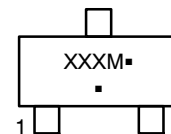


#### NOTES:

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°   |

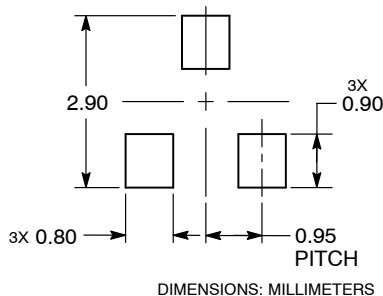
#### GENERIC MARKING DIAGRAM\*



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.

#### RECOMMENDED SOLDERING FOOTPRINT



DIMENSIONS: MILLIMETERS

STYLE 1 THRU 5:  
CANCELLED

STYLE 6:  
PIN 1. BASE  
2. EMITTER  
3. COLLECTOR

STYLE 7:  
PIN 1. EMITTER  
2. BASE  
3. COLLECTOR

STYLE 8:  
PIN 1. ANODE  
2. NO CONNECTION  
3. CATHODE

STYLE 9:  
PIN 1. ANODE  
2. ANODE  
3. CATHODE

STYLE 10:  
PIN 1. DRAIN  
2. SOURCE  
3. GATE

STYLE 11:  
PIN 1. ANODE  
2. CATHODE  
3. CATHODE-ANODE

STYLE 12:  
PIN 1. CATHODE  
2. CATHODE  
3. ANODE

STYLE 13:  
PIN 1. SOURCE  
2. DRAIN  
3. GATE

STYLE 14:  
PIN 1. CATHODE  
2. GATE  
3. ANODE

STYLE 15:  
PIN 1. GATE  
2. CATHODE  
3. ANODE

STYLE 16:  
PIN 1. ANODE  
2. CATHODE  
3. CATHODE

STYLE 17:  
PIN 1. NO CONNECTION  
2. ANODE  
3. CATHODE

STYLE 18:  
PIN 1. NO CONNECTION  
2. CATHODE  
3. ANODE

STYLE 19:  
PIN 1. CATHODE  
2. ANODE  
3. CATHODE-ANODE

STYLE 20:  
PIN 1. CATHODE  
2. ANODE  
3. GATE

STYLE 21:  
PIN 1. GATE  
2. SOURCE  
3. DRAIN

STYLE 22:  
PIN 1. RETURN  
2. OUTPUT  
3. INPUT

STYLE 23:  
PIN 1. ANODE  
2. ANODE  
3. CATHODE

STYLE 24:  
PIN 1. GATE  
2. DRAIN  
3. SOURCE

STYLE 25:  
PIN 1. ANODE  
2. CATHODE  
3. GATE

STYLE 26:  
PIN 1. CATHODE  
2. ANODE  
3. NO CONNECTION

STYLE 27:  
PIN 1. CATHODE  
2. CATHODE  
3. CATHODE

STYLE 28:  
PIN 1. ANODE  
2. ANODE  
3. ANODE

|                  |                 |                                                                                                                                                                                  |
|------------------|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
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**Europe, Middle East and Africa Technical Support:**

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