

# 45 V, 0.5 A, General Purpose NPN Transistor

## BC817-40W

onsemi's BC817-40W is a General Purpose NPN Transistor that is housed in the SC-70/SOT-323 package.

### Features

- NSV Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q101 Qualified and PPAP Capable
- This Device is Pb-Free, Halogen Free/BFR Free and is RoHS Compliant

### MAXIMUM RATINGS ( $T_A = 25^\circ\text{C}$ )

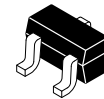
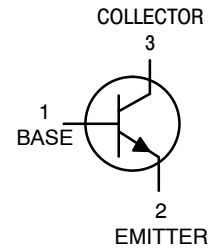
| Rating                         | Symbol    | Value | Unit |
|--------------------------------|-----------|-------|------|
| Collector – Emitter Voltage    | $V_{CEO}$ | 45    | V    |
| Collector – Base Voltage       | $V_{CBO}$ | 50    | V    |
| Emitter – Base Voltage         | $V_{EBO}$ | 5.0   | V    |
| Collector Current – Continuous | $I_C$     | 500   | mAdc |

### THERMAL CHARACTERISTICS

| Characteristic                                   | Symbol          | Max         | Unit               |
|--------------------------------------------------|-----------------|-------------|--------------------|
| Total Device Dissipation (Note 1)                | $P_D$           | 460         | mW                 |
| Thermal Resistance, Junction-to-Ambient (Note 1) | $R_{\theta JA}$ | 272         | $^\circ\text{C/W}$ |
| Junction and Storage Temperature Range           | $T_J, T_{stg}$  | -55 to +150 | $^\circ\text{C}$   |

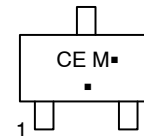
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

1. FR-4 Board, 1 oz. Cu, 100 mm<sup>2</sup>



SC-70  
CASE 419  
STYLE 3

### MARKING DIAGRAM



CE = Specific 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<sup>†</sup>

| Device          | Package         | Shipping           |
|-----------------|-----------------|--------------------|
| BC817-40WT1G    | SC-70 (Pb-Free) | 3000 / Tape & Reel |
| NSVBC817-40WT1G | SC-70 (Pb-Free) | 3000 / Tape & Reel |

<sup>†</sup>For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specification Brochure, BRD8011/D.

# BC817-40W

## 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>( $I_C = 10\text{ mA}$ )                                                                      | $V_{(VR)CEO}$ | 45        | –      | –          | V                   |
| Collector – Emitter Breakdown Voltage<br>( $V_{EB} = 0\text{ V}$ , $I_C = 10\text{ }\mu\text{A}$ )                                     | $V_{(VR)CES}$ | 50        | –      | –          | V                   |
| Emitter – Base Breakdown Voltage<br>( $I_E = 1.0\text{ }\mu\text{A}$ )                                                                 | $V_{(VR)EBO}$ | 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>$\mu\text{A}$ |
| <b>ON CHARACTERISTICS</b>                                                                                                              |               |           |        |            |                     |
| DC Current Gain (Note 2)<br>( $I_C = 100\text{ mA}$ , $V_{CE} = 1.0\text{ V}$ )<br>( $I_C = 500\text{ mA}$ , $V_{CE} = 1.0\text{ V}$ ) | $h_{FE}$      | 250<br>40 | –<br>– | 600<br>–   | –                   |
| Collector – Emitter Saturation Voltage (Note 2)<br>( $I_C = 500\text{ mA}$ , $I_B = 50\text{ mA}$ )                                    | $V_{CE(sat)}$ | –         | –      | 0.7        | V                   |
| Base – Emitter On Voltage (Note 2)<br>( $I_C = 500\text{ mA}$ , $V_{CE} = 1.0\text{ V}$ )                                              | $V_{BE(on)}$  | –         | –      | 1.2        | V                   |
| <b>SMALL – SIGNAL CHARACTERISTICS</b>                                                                                                  |               |           |        |            |                     |
| Current – Gain – Bandwidth Product<br>( $I_C = 10\text{ mA}$ , $V_{CE} = 5.0\text{ V}$ , $f = 100\text{ MHz}$ )                        | $f_T$         | 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.

2. Pulse Condition: Pulse Width = 300  $\mu\text{sec}$ , Duty Cycle  $\leq 2\%$

TYPICAL CHARACTERISTICS

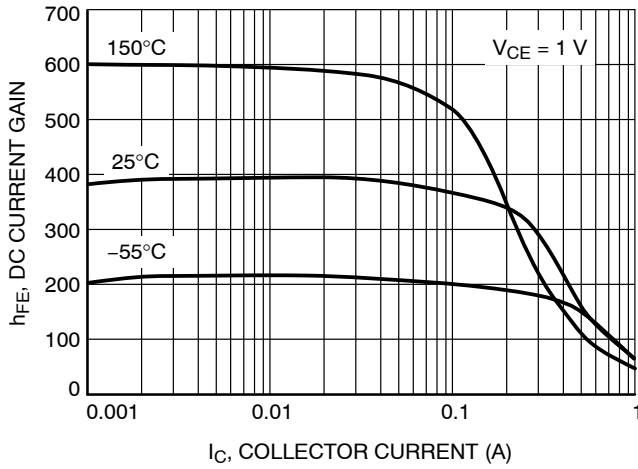


Figure 1. DC Current Gain vs. Collector Current

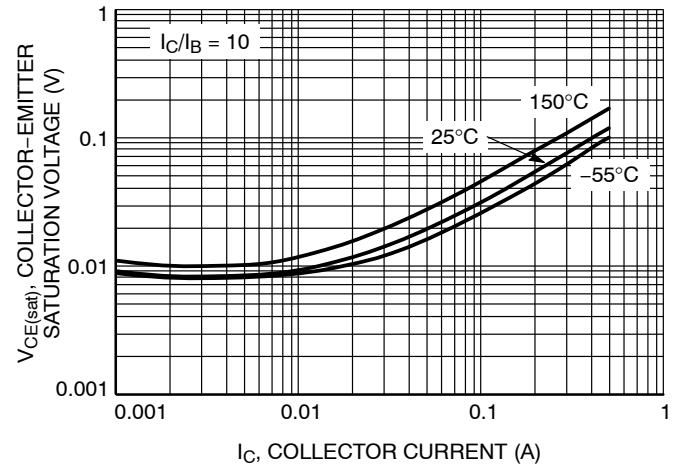


Figure 2. Collector Emitter Saturation Voltage vs. Collector Current

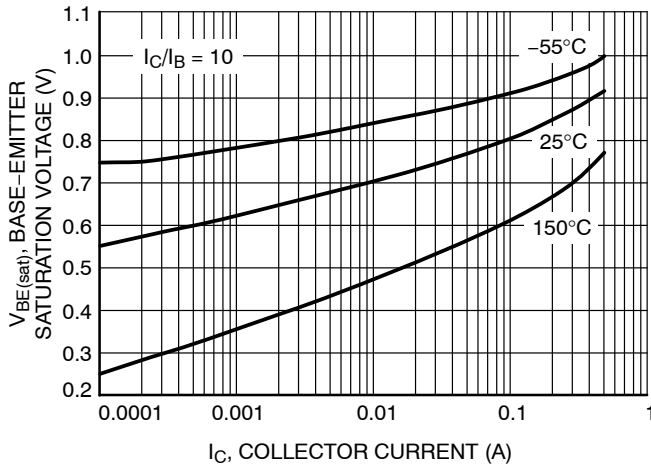


Figure 3. Base Emitter Saturation Voltage vs. Collector Current

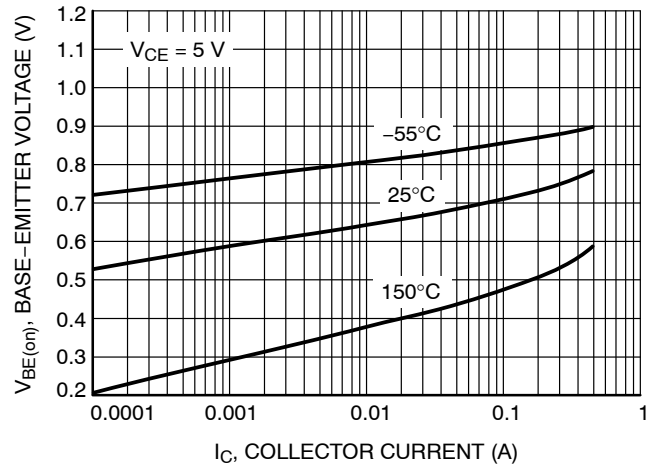


Figure 4. Base Emitter Voltage vs. Collector Current

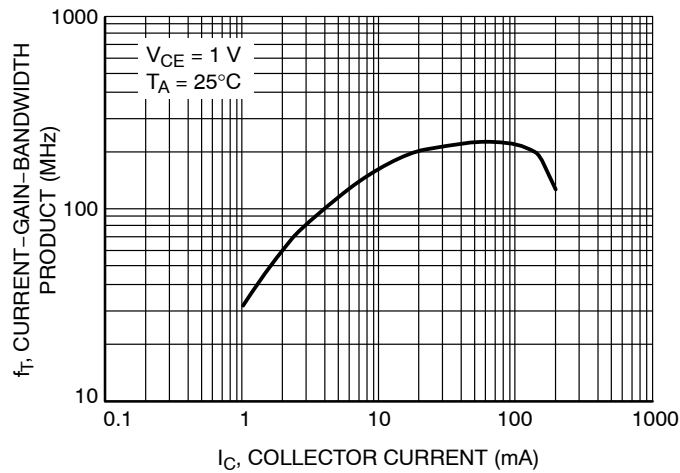


Figure 5. Current Gain Bandwidth Product vs. Collector Current

TYPICAL CHARACTERISTICS

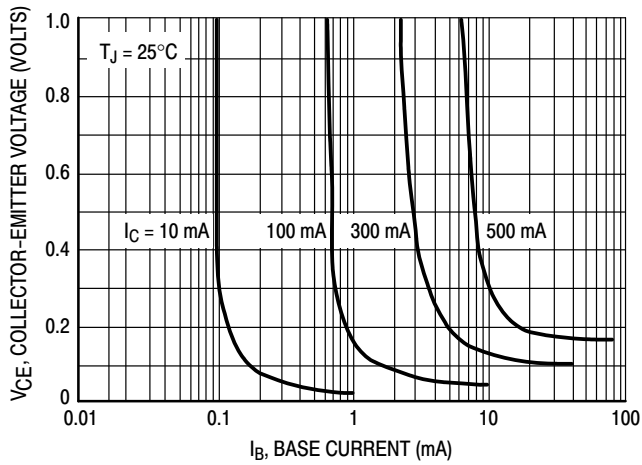


Figure 6. Saturation Region

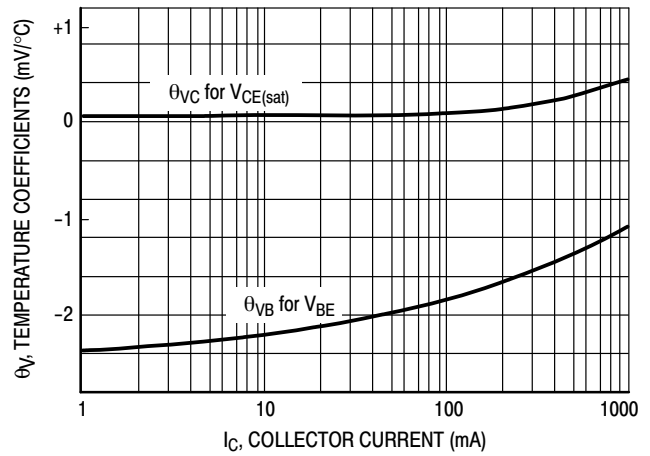


Figure 7. Temperature Coefficients

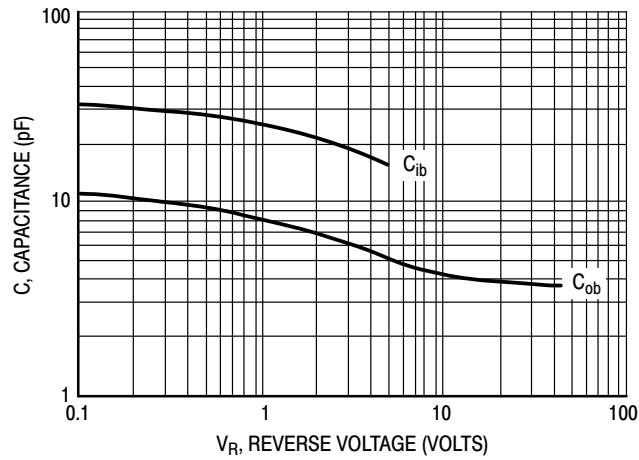


Figure 8. Capacitances

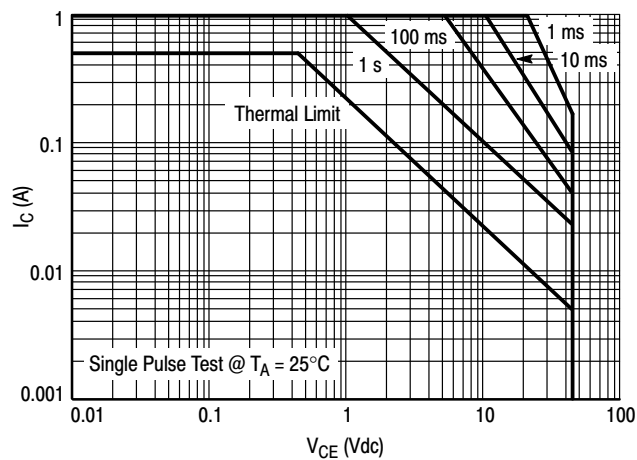


Figure 9. Safe Operating Area



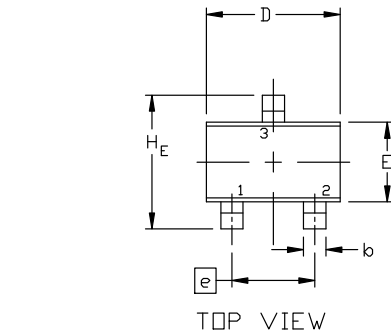
SCALE 4:1

**SC-70 (SOT-323)**  
**CASE 419**  
**ISSUE R**

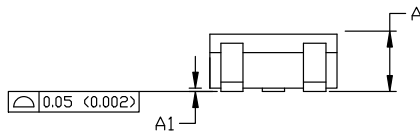
DATE 11 OCT 2022

## NOTES:

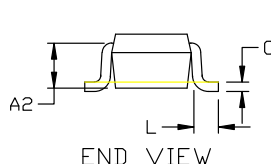
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH



TOP VIEW

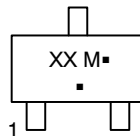


SIDE VIEW



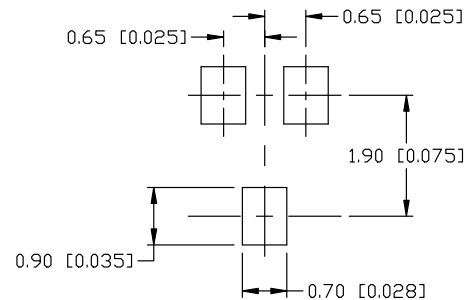
END VIEW

| DIM | MILLIMETERS |      |      | INCHES    |       |       |
|-----|-------------|------|------|-----------|-------|-------|
|     | MIN.        | NOM. | MAX. | MIN.      | NOM.  | MAX.  |
| A   | 0.80        | 0.90 | 1.00 | 0.032     | 0.035 | 0.040 |
| A1  | 0.00        | 0.05 | 0.10 | 0.000     | 0.002 | 0.004 |
| A2  | 0.70 REF    |      |      | 0.028 BSC |       |       |
| b   | 0.30        | 0.35 | 0.40 | 0.012     | 0.014 | 0.016 |
| c   | 0.10        | 0.18 | 0.25 | 0.004     | 0.007 | 0.010 |
| D   | 1.80        | 2.00 | 2.20 | 0.071     | 0.080 | 0.087 |
| E   | 1.15        | 1.24 | 1.35 | 0.045     | 0.049 | 0.053 |
| e   | 1.20        | 1.30 | 1.40 | 0.047     | 0.051 | 0.055 |
| e1  | 0.65 BSC    |      |      | 0.026 BSC |       |       |
| L   | 0.20        | 0.38 | 0.56 | 0.008     | 0.015 | 0.022 |
| H_E | 2.00        | 2.10 | 2.40 | 0.079     | 0.083 | 0.095 |

**GENERIC**  
**MARKING DIAGRAM**


XX = 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. Some products may not follow the Generic Marking.



\* For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

**SOLDERING FOOTPRINT**

STYLE 1:  
CANCELLED

STYLE 2:  
PIN 1. ANODE  
2. N.C.  
3. CATHODE

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

STYLE 4:  
PIN 1. CATHODE  
2. CATHODE  
3. ANODE

STYLE 5:  
PIN 1. ANODE  
2. ANODE  
3. CATHODE

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

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

STYLE 8:  
PIN 1. GATE  
2. SOURCE  
3. DRAIN

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

STYLE 10:  
PIN 1. CATHODE  
2. ANODE  
3. ANODE-CATHODE

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

**DOCUMENT NUMBER:** 98ASB42819B

Electronic versions are uncontrolled except when accessed directly from the Document Repository.  
Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red.

**DESCRIPTION:** SC-70 (SOT-323)

**PAGE 1 OF 1**

onsemi and onsemi are trademarks of Semiconductor Components Industries, LLC dba onsemi or its subsidiaries in the United States and/or other countries. onsemi reserves the right to make changes without further notice to any products herein. onsemi makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does onsemi assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. onsemi does not convey any license under its patent rights nor the rights of others.

**onsemi**, **Onsemi**, and other names, marks, and brands are registered and/or common law trademarks of Semiconductor Components Industries, LLC dba "**onsemi**" or its affiliates and/or subsidiaries in the United States and/or other countries. **onsemi** owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of **onsemi**'s product/patent coverage may be accessed at [www.onsemi.com/site/pdf/Patent-Marking.pdf](http://www.onsemi.com/site/pdf/Patent-Marking.pdf). **onsemi** reserves the right to make changes at any time to any products or information herein, without notice. The information herein is provided "as-is" and **onsemi** makes no warranty, representation or guarantee regarding the accuracy of the information, product features, availability, functionality, or suitability of its products for any particular purpose, nor does **onsemi** assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. Buyer is responsible for its products and applications using **onsemi** products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by **onsemi**. "Typical" parameters which may be provided in **onsemi** data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. **onsemi** does not convey any license under any of its intellectual property rights nor the rights of others. **onsemi** products are not designed, intended, or authorized for use as a critical component in life support systems or any FDA Class 3 medical devices or medical devices with a same or similar classification in a foreign jurisdiction or any devices intended for implantation in the human body. Should Buyer purchase or use **onsemi** products for any such unintended or unauthorized application, Buyer shall indemnify and hold **onsemi** and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that **onsemi** was negligent regarding the design or manufacture of the part. **onsemi** is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

## ADDITIONAL INFORMATION

### TECHNICAL PUBLICATIONS:

Technical Library: [www.onsemi.com/design/resources/technical-documentation](http://www.onsemi.com/design/resources/technical-documentation)  
onsemi Website: [www.onsemi.com](http://www.onsemi.com)

### ONLINE SUPPORT: [www.onsemi.com/support](http://www.onsemi.com/support)

For additional information, please contact your local Sales Representative at  
[www.onsemi.com/support/sales](http://www.onsemi.com/support/sales)