

# BC846, BC847, BC848

## General Purpose Transistors

### NPN Silicon

These transistors are designed for general purpose amplifier applications. They are housed in the SC-70/SOT-323 which is designed for low power surface mount applications.

#### Features

- S and NSV Prefix 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 BC846 BC847 BC848	$V_{CEO}$	65 45 30	V
Collector-Base Voltage BC846 BC847 BC848	$V_{CBO}$	80 50 30	V
Emitter-Base Voltage BC846 BC847 BC848	$V_{EBO}$	6.0 6.0 5.0	V
Collector Current – Continuous	$I_C$	100	mAdc

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.

#### THERMAL CHARACTERISTICS

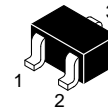
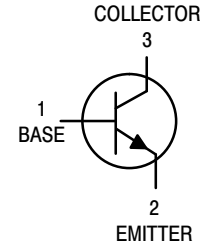
Characteristic	Symbol	Max	Unit
Total Device Dissipation FR-5 Board, (Note 1) $T_A = 25^\circ\text{C}$	$P_D$	200	mW
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	620	$^\circ\text{C}/\text{W}$
Junction and Storage Temperature	$T_J, T_{stg}$	-55 to +150	$^\circ\text{C}$

1. FR-5 = 1.0 x 0.75 x 0.062 in.



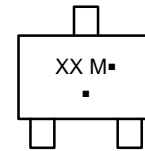
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**SC-70/SOT-323  
CASE 419  
STYLE 3**

#### MARKING DIAGRAM



XX = Specific Device Code  
M = Month Code  
▪ = Pb-Free Package  
(Note: Microdot may be in either location)

#### ORDERING INFORMATION

See detailed ordering, marking and shipping information in the package dimensions section on page 12 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 (I <sub>C</sub> = 10 mA)	BC846 Series BC847 Series BC848 Series	V <sub>(BR)CEO</sub>	65 45 30	– – –	– – –	V
Collector–Emitter Breakdown Voltage (I <sub>C</sub> = 10 μA, V <sub>EB</sub> = 0)	BC846 Series BC847 Series BC848 Series	V <sub>(BR)CES</sub>	80 50 30	– – –	– – –	V
Collector–Base Breakdown Voltage (I <sub>C</sub> = 10 μA)	BC846 Series BC847 Series BC848 Series	V <sub>(BR)CBO</sub>	80 50 30	– – –	– – –	V
Emitter–Base Breakdown Voltage (I <sub>E</sub> = 1.0 μA)	BC846 Series BC847 Series BC848 Series	V <sub>(BR)EBO</sub>	6.0 6.0 5.0	– – –	– – –	V
Collector Cutoff Current (V <sub>CB</sub> = 30 V)  (V <sub>CB</sub> = 30 V, T <sub>A</sub> = 150°C)		I <sub>CBO</sub>	– –	– –	15 5.0	nA μA
<b>ON CHARACTERISTICS</b>						
DC Current Gain (I <sub>C</sub> = 10 μA, V <sub>CE</sub> = 5.0 V)  (I <sub>C</sub> = 2.0 mA, V <sub>CE</sub> = 5.0 V)	BC846A, BC847A, BC848A BC846B, BC847B, BC848B BC847C, BC848C  BC846A, BC847A, BC848A BC846B, BC847B, BC848B BC847C, BC848C	h <sub>FE</sub>	– – –	90 150 270	– – –	–
Collector–Emitter Saturation Voltage (I <sub>C</sub> = 10 mA, I <sub>B</sub> = 0.5 mA) (I <sub>C</sub> = 100 mA, I <sub>B</sub> = 5.0 mA)		V <sub>CE(sat)</sub>	– –	– –	0.25 0.6	V
Base–Emitter Saturation Voltage (I <sub>C</sub> = 10 mA, I <sub>B</sub> = 0.5 mA) (I <sub>C</sub> = 100 mA, I <sub>B</sub> = 5.0 mA)		V <sub>BE(sat)</sub>	– –	0.7 0.9	– –	V
Base–Emitter Voltage (I <sub>C</sub> = 2.0 mA, V <sub>CE</sub> = 5.0 V) (I <sub>C</sub> = 10 mA, V <sub>CE</sub> = 5.0 V)		V <sub>BE(on)</sub>	580 –	660 –	700 770	mV
<b>SMALL–SIGNAL CHARACTERISTICS</b>						
Current–Gain – Bandwidth Product (I <sub>C</sub> = 10 mA, V <sub>CE</sub> = 5.0 Vdc, f = 100 MHz)		f <sub>T</sub>	100	–	–	MHz
Output Capacitance (V <sub>CB</sub> = 10 V, f = 1.0 MHz)		C <sub>obo</sub>	–	–	4.5	pF
Noise Figure (I <sub>C</sub> = 0.2 mA, V <sub>CE</sub> = 5.0 Vdc, R <sub>S</sub> = 2.0 kΩ, f = 1.0 kHz, BW = 200 Hz)		NF	–	–	10	dB

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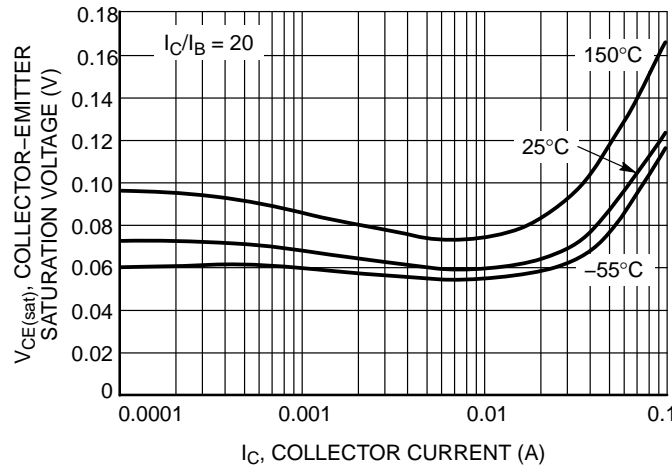
## BC846A, BC847A, BC848A



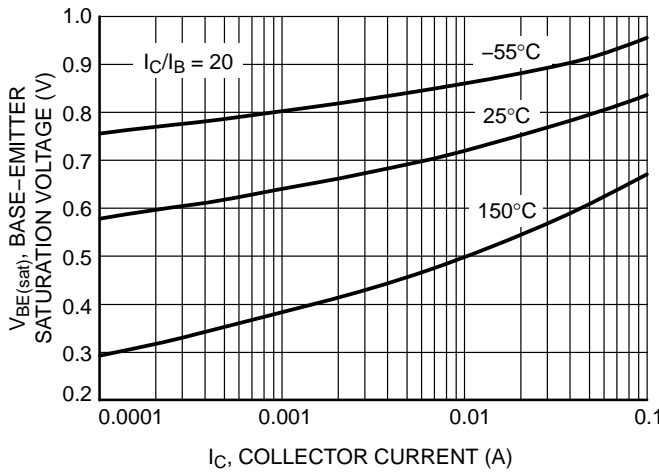
**Figure 1. DC Current Gain vs. Collector Current**



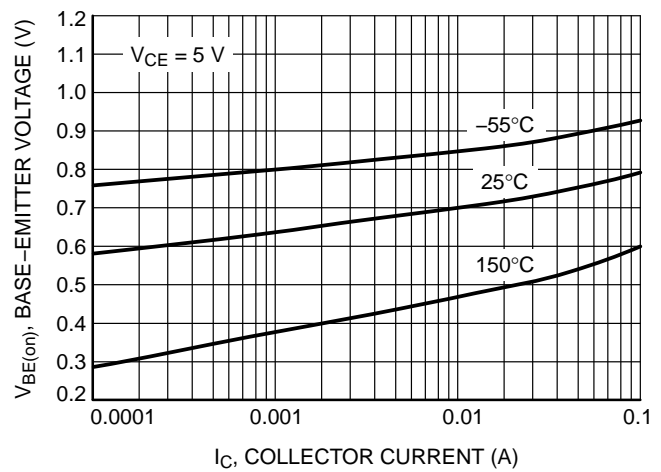
**Figure 2. DC Current Gain vs. Collector Current**



**Figure 3. Collector-Emitter Saturation Voltage vs. Collector Current**



**Figure 4. Base-Emitter Saturation Voltage vs. Collector Current**



**Figure 5. Base-Emitter Voltage vs. Collector Current**

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## BC846A, BC847A, BC848A



Figure 6. Collector Saturation Region



Figure 7. Base-Emitter Temperature Coefficient



Figure 8. Capacitances



Figure 9. Current-Gain - Bandwidth Product

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## BC846B



**Figure 10. DC Current Gain vs. Collector Current**



**Figure 11. DC Current Gain vs. Collector Current**



**Figure 12. Collector Emitter Saturation Voltage vs. Collector Current**



**Figure 13. Base Emitter Saturation Voltage vs. Collector Current**



**Figure 14. Base Emitter Voltage vs. Collector Current**

BC846B



Figure 15. Collector Saturation Region



Figure 16. Base-Emitter Temperature Coefficient



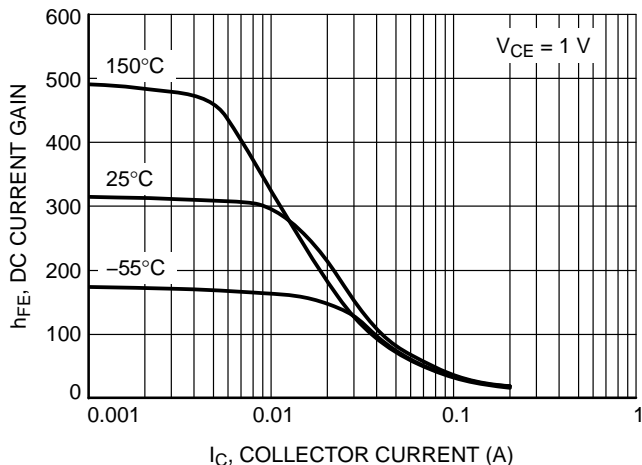
Figure 17. Capacitance



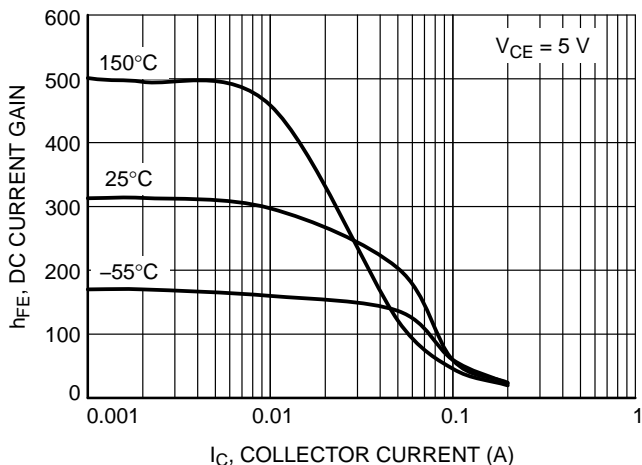
Figure 18. Current-Gain - Bandwidth Product

# BC846, BC847, BC848

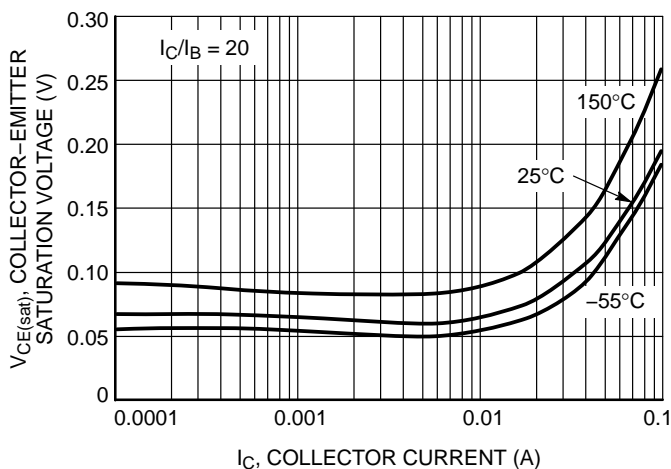
## BC847B, BC848B



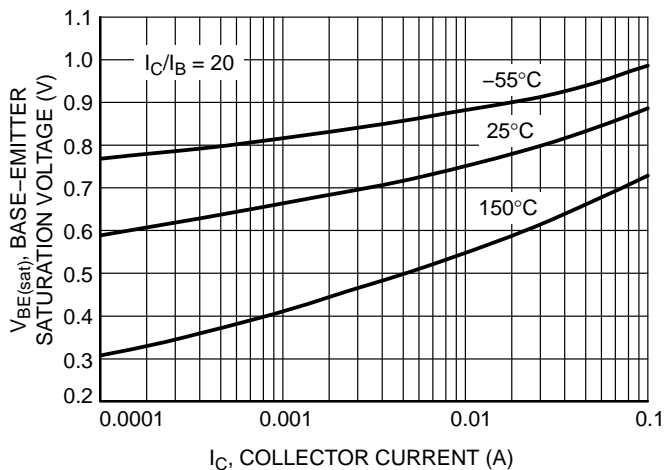
**Figure 19. DC Current Gain vs. Collector Current**



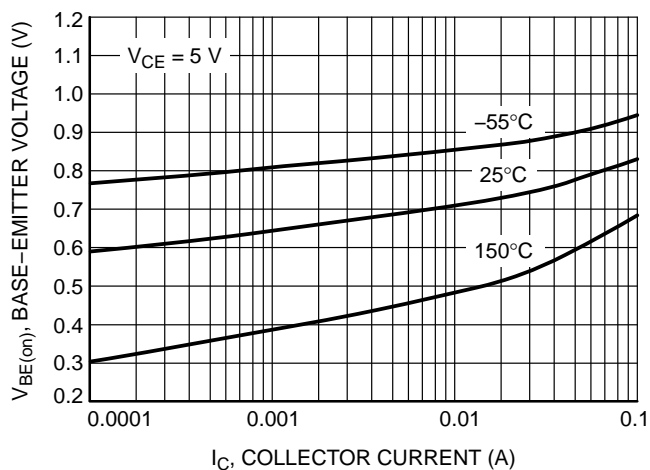
**Figure 20. DC Current Gain vs. Collector Current**



**Figure 21. Collector Emitter Saturation Voltage vs. Collector Current**



**Figure 22. Base Emitter Saturation Voltage vs. Collector Current**



**Figure 23. Base Emitter Voltage vs. Collector Current**

BC846, BC847, BC848

BC847B, BC848B

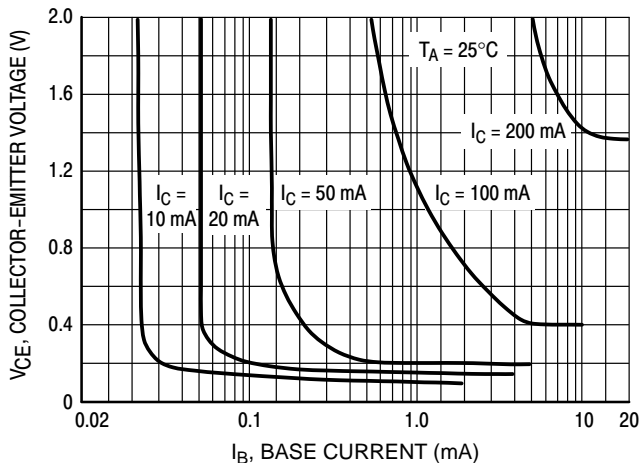


Figure 24. Collector Saturation Region



Figure 25. Base-Emitter Temperature Coefficient

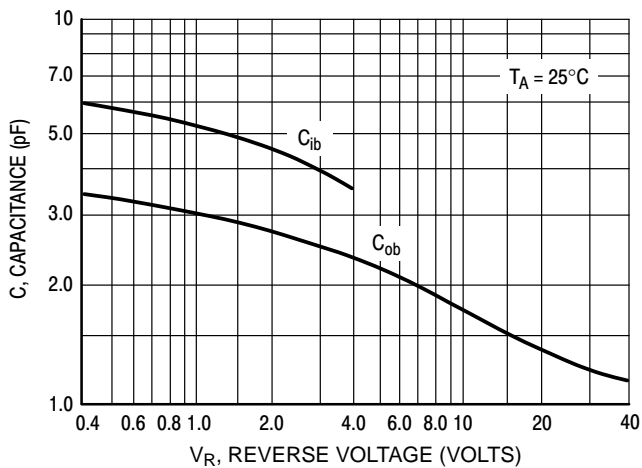


Figure 26. Capacitances

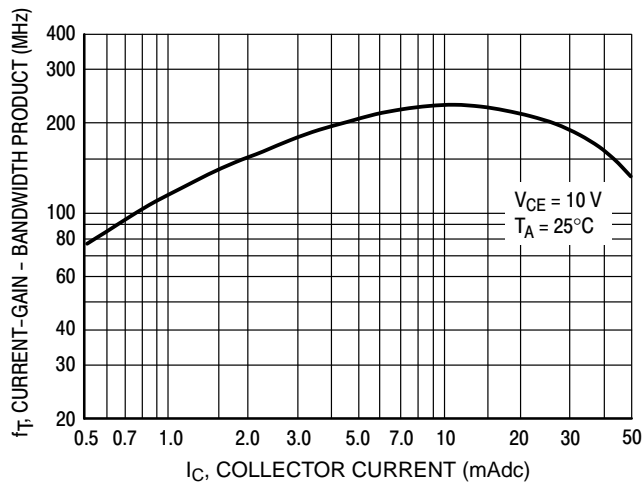
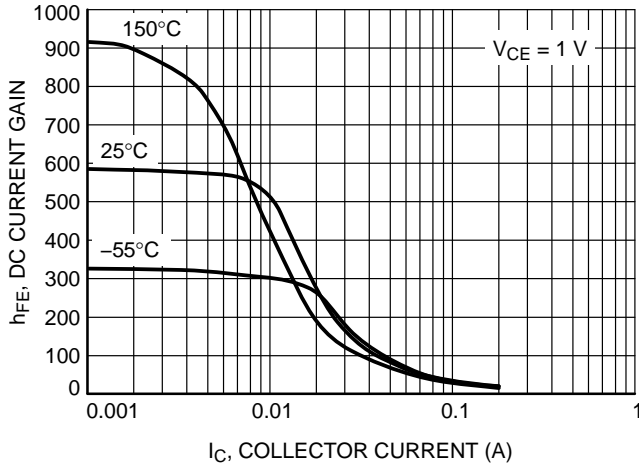


Figure 27. Current-Gain - Bandwidth Product

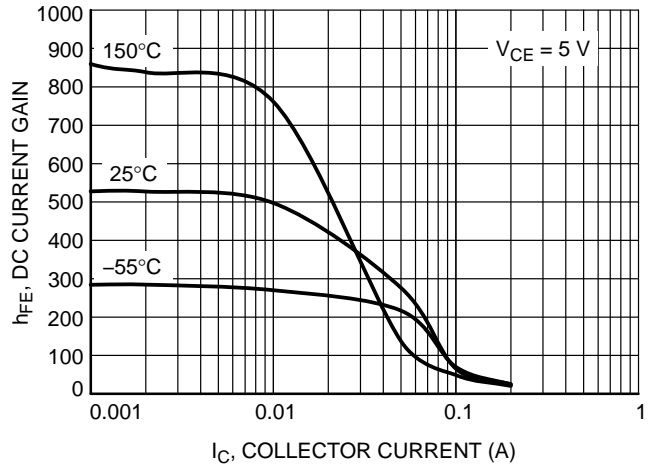


# BC846, BC847, BC848

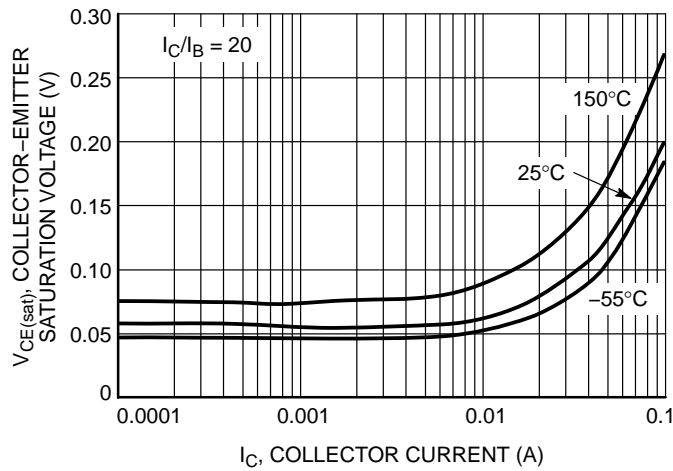
## BC847C, BC848C



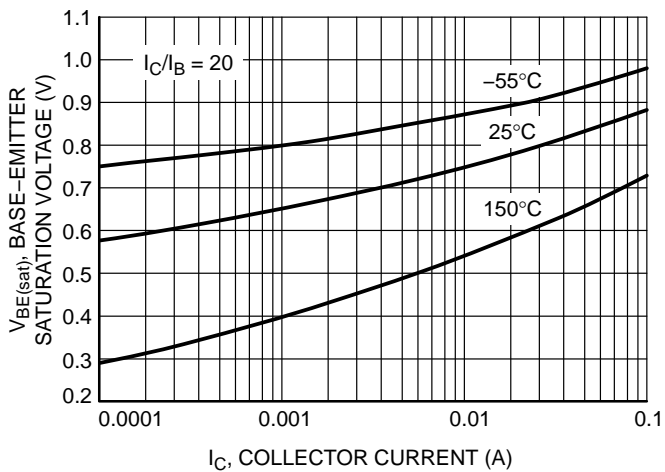
**Figure 28. DC Current Gain vs. Collector Current**



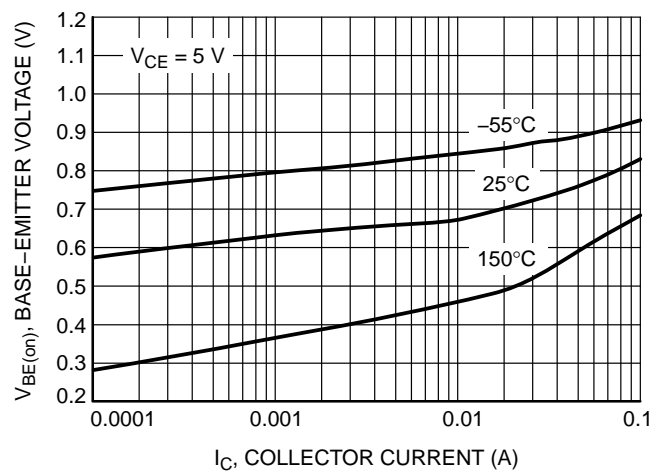
**Figure 29. DC Current Gain vs. Collector Current**



**Figure 30. Collector Emitter Saturation Voltage vs. Collector Current**



**Figure 31. Base Emitter Saturation Voltage vs. Collector Current**



**Figure 32. Base Emitter Voltage vs. Collector Current**

BC846, BC847, BC848

BC847C, BC848C

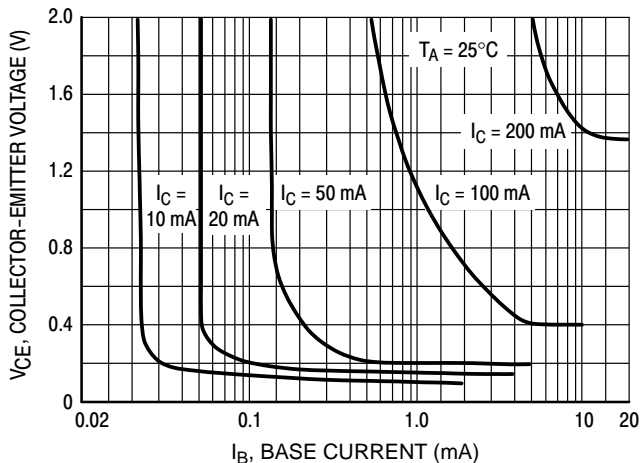


Figure 33. Collector Saturation Region

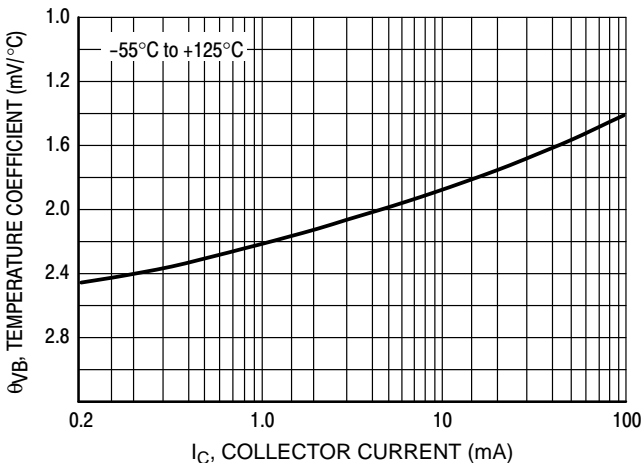


Figure 34. Base-Emitter Temperature Coefficient

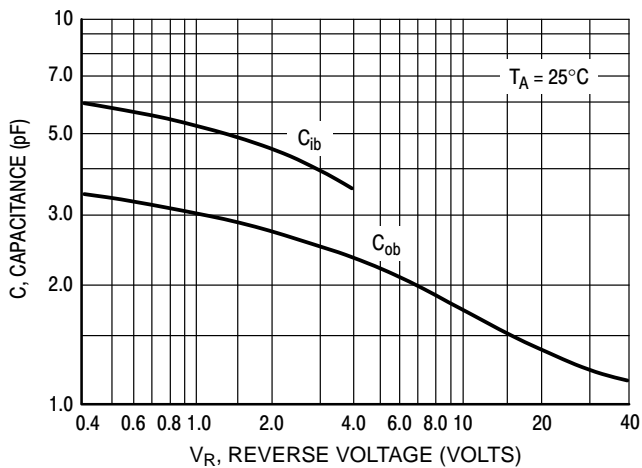


Figure 35. Capacitances

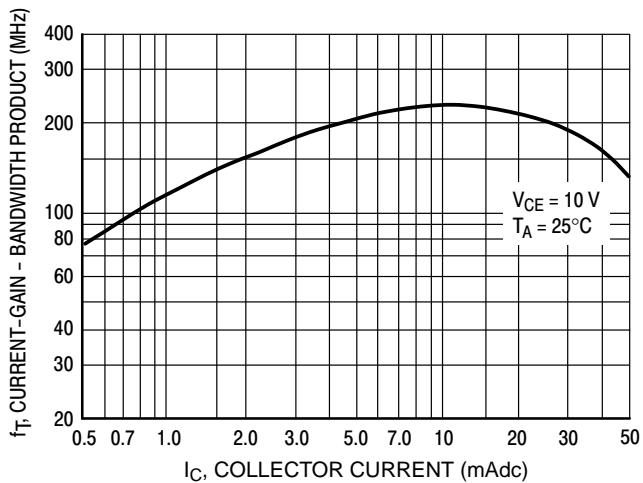


Figure 36. Current-Gain - Bandwidth Product

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**Figure 37. Safe Operating Area for BC846A, BC846B**



**Figure 38. Safe Operating Area for BC847A, BC847B, BC847C**



**Figure 39. Safe Operating Area for BC848A, BC848B, BC848C**

## BC846, BC847, BC848

### DEVICE ORDERING AND SPECIFIC MARKING INFORMATION

Device	Specific Marking Code	Package	Shipping†					
BC846BWT1G	1B	SC-70 (SOT-323) (Pb-Free)	3,000 / Tape & Reel					
SBC846BWT1G*								
BC847AWT1G	1E		SC-70 (SOT-323) (Pb-Free)	3,000 / Tape & Reel				
SBC847AWT1G*								
BC847BWT1G	1F			SC-70 (SOT-323) (Pb-Free)	3,000 / Tape & Reel			
SBC847BWT1G*								
BC847CWT1G	1G				SC-70 (SOT-323) (Pb-Free)	3,000 / Tape & Reel		
SBC847CWT1G*								
BC847CWT3G	1G					SC-70 (SOT-323) (Pb-Free)	10,000 / Tape & Reel	
SBC847CWT3G*								
BC848BWT1G	1K						SC-70 (SOT-323) (Pb-Free)	3,000 / Tape & Reel
NSVBC848BWT1G*								
BC848CWT1G	1L	SC-70 (SOT-323) (Pb-Free)						

†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.

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

# MECHANICAL CASE OUTLINE PACKAGE DIMENSIONS



SCALE 4:1

SC-70 (SOT-323)  
CASE 419  
ISSUE P

DATE 07 OCT 2021

NOTES:

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



DIM	MILLIMETERS			INCHES		
	MIN.	NDM.	MAX.	MIN.	NDM.	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	2.10	2.20	0.071	0.083	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 <sub>E</sub>	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 [DN Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D](#).

SOLDERING FOOTPRINT

- |   |   |   |  |   |   |
|---|---|---|--|---|---|
| STYLE 1:<br>CANCELLED                                 | STYLE 2:<br>PIN 1. ANODE<br>2. N.C.<br>3. CATHODE     | STYLE 3:<br>PIN 1. BASE<br>2. EMITTER<br>3. COLLECTOR | STYLE 4:<br>PIN 1. CATHODE<br>2. CATHODE<br>3. ANODE       | STYLE 5:<br>PIN 1. ANODE<br>2. ANODE<br>3. CATHODE          |   |
| STYLE 6:<br>PIN 1. EMITTER<br>2. BASE<br>3. COLLECTOR | STYLE 7:<br>PIN 1. BASE<br>2. EMITTER<br>3. COLLECTOR | STYLE 8:<br>PIN 1. GATE<br>2. SOURCE<br>3. DRAIN      | STYLE 9:<br>PIN 1. ANODE<br>2. CATHODE<br>3. CATHODE-ANODE | STYLE 10:<br>PIN 1. CATHODE<br>2. ANODE<br>3. ANODE-CATHODE | STYLE 11:<br>PIN 1. CATHODE<br>2. CATHODE<br>3. CATHODE |

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DESCRIPTION:	SC-70 (SOT-323)	PAGE 1 OF 1

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