

# BC846, SBC846, BC847, SBC847, BC848 Series

## 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 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, SBC846 BC847, SBC847 BC848	$V_{CEO}$	65 45 30	V
Collector-Base Voltage BC846, SBC846 BC847, SBC847 BC848	$V_{CBO}$	80 50 30	V
Emitter-Base Voltage BC846, SBC846 BC847, SBC847 BC848	$V_{EBO}$	6.0 6.0 5.0	V
Collector Current – Continuous	$I_C$	100	mAdc

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.

#### THERMAL CHARACTERISTICS

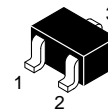
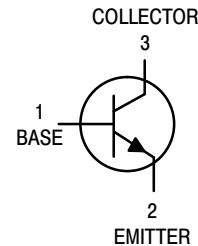
Characteristic	Symbol	Max	Unit
Total Device Dissipation FR-5 Board, (Note 1) $T_A = 25^\circ\text{C}$	$P_D$	150	mW
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	833	$^\circ\text{C}/\text{W}$
Junction and Storage Temperature	$T_J, T_{stg}$	-55 to +150	$^\circ\text{C}$

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



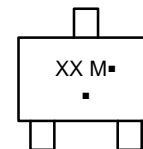
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<http://onsemi.com>



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 and shipping information in the package dimensions section on page 12 of this data sheet.

## BC846, SBC846, BC847, SBC847, BC848 Series

### 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 ( $I_C = 10\text{ mA}$ )	BC846, SBC846 Series BC847, SBC847 Series BC848 Series	$V_{(BR)CEO}$	65 45 30	– – –	– – –	V
Collector–Emitter Breakdown Voltage ( $I_C = 10\ \mu\text{A}$ , $V_{EB} = 0$ )	BC846, SBC846 Series BC847, SBC847 Series BC848 Series	$V_{(BR)CES}$	80 50 30	– – –	– – –	V
Collector–Base Breakdown Voltage ( $I_C = 10\ \mu\text{A}$ )	BC846, SBC846 Series BC847, SBC847 Series BC848 Series	$V_{(BR)CBO}$	80 50 30	– – –	– – –	V
Emitter–Base Breakdown Voltage ( $I_E = 1.0\ \mu\text{A}$ )	BC846, SBC846 Series BC847, SBC847 Series BC848 Series	$V_{(BR)EBO}$	6.0 6.0 5.0	– – –	– – –	V
Collector Cutoff Current ( $V_{CB} = 30\text{ V}$ )  ( $V_{CB} = 30\text{ V}$ , $T_A = 150^\circ\text{C}$ )		$I_{CBO}$	– –	– –	15 5.0	nA $\mu\text{A}$

### ON CHARACTERISTICS

DC Current Gain ( $I_C = 10\ \mu\text{A}$ , $V_{CE} = 5.0\text{ V}$ )	BC846A, BC847A, SBC847A, BC848A BC846B, SBC846B, BC847B, SBC847B, BC848B BC847C, SBC847C, BC848C	$h_{FE}$	– – –	90 150 270	– – –	–
( $I_C = 2.0\text{ mA}$ , $V_{CE} = 5.0\text{ V}$ )	BC846A, BC847A, SBC847A, BC848A BC846B, SBC846B, BC847B, SBC847B, BC848B BC847C, SBC847C, BC848C		110 200 420	180 290 520	220 450 800	
Collector–Emitter Saturation Voltage ( $I_C = 10\text{ mA}$ , $I_B = 0.5\text{ mA}$ ) ( $I_C = 100\text{ mA}$ , $I_B = 5.0\text{ mA}$ )		$V_{CE(sat)}$	– –	– –	0.25 0.6	V
Base–Emitter Saturation Voltage ( $I_C = 10\text{ mA}$ , $I_B = 0.5\text{ mA}$ ) ( $I_C = 100\text{ mA}$ , $I_B = 5.0\text{ mA}$ )		$V_{BE(sat)}$	– –	0.7 0.9	– –	V
Base–Emitter Voltage ( $I_C = 2.0\text{ mA}$ , $V_{CE} = 5.0\text{ V}$ ) ( $I_C = 10\text{ mA}$ , $V_{CE} = 5.0\text{ V}$ )		$V_{BE(on)}$	580 –	660 –	700 770	mV

### SMALL–SIGNAL CHARACTERISTICS

Current–Gain – Bandwidth Product ( $I_C = 10\text{ mA}$ , $V_{CE} = 5.0\text{ Vdc}$ , $f = 100\text{ MHz}$ )		$f_T$	100	–	–	MHz
Output Capacitance ( $V_{CB} = 10\text{ V}$ , $f = 1.0\text{ MHz}$ )		$C_{obo}$	–	–	4.5	pF
Noise Figure ( $I_C = 0.2\text{ mA}$ , $V_{CE} = 5.0\text{ Vdc}$ , $R_S = 2.0\text{ k}\Omega$ , $f = 1.0\text{ kHz}$ , $BW = 200\text{ Hz}$ )		NF	–	–	10	dB

# BC846, SBC846, BC847, SBC847, BC848 Series

## BC846A, BC847A, SBC847A, BC848A

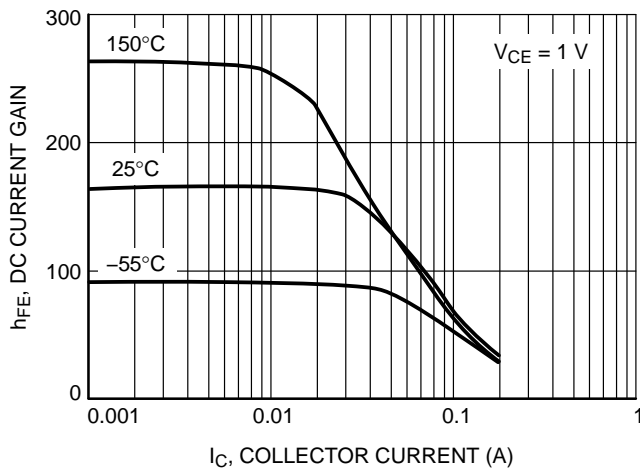


Figure 1. DC Current Gain vs. Collector Current

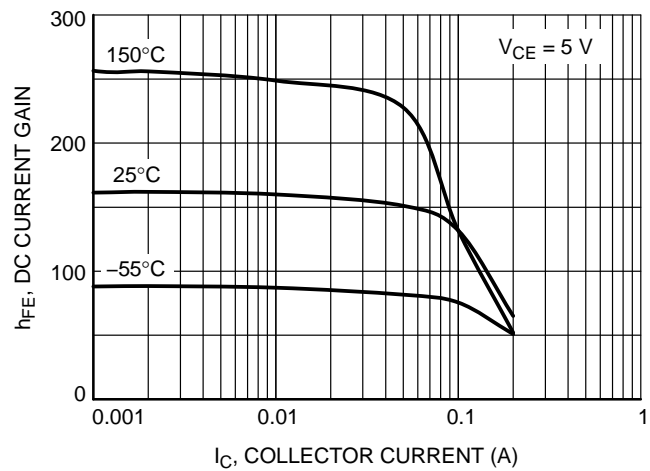


Figure 2. DC Current Gain vs. Collector Current

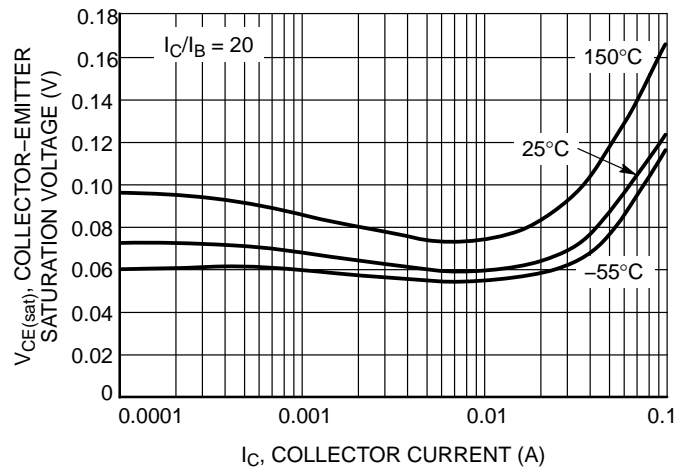


Figure 3. Collector Emitter Saturation Voltage vs. Collector Current

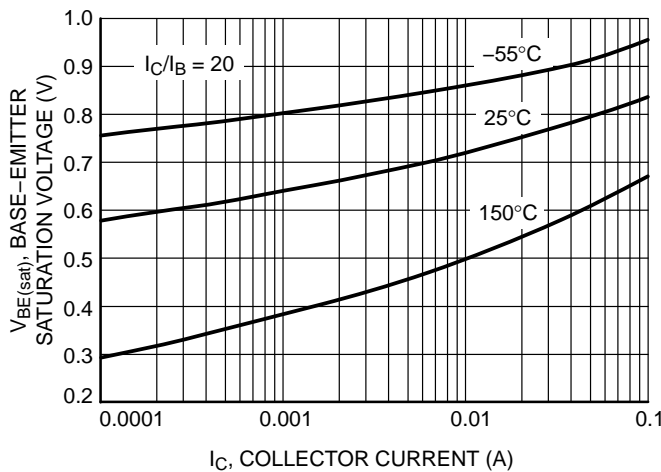


Figure 4. Base Emitter Saturation Voltage vs. Collector Current

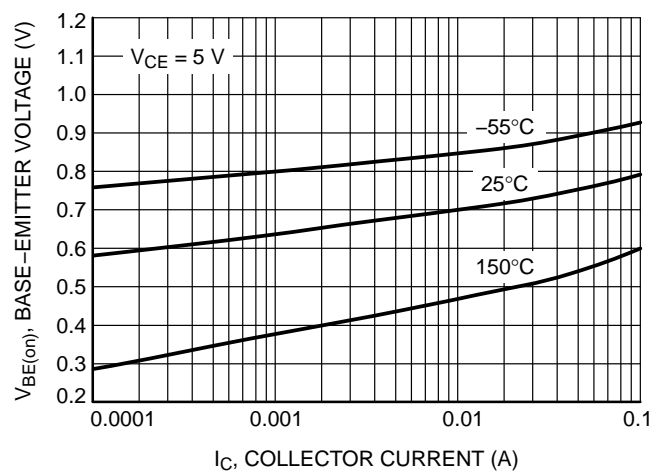


Figure 5. Base Emitter Voltage vs. Collector Current

# BC846, SBC846, BC847, SBC847, BC848 Series

## BC846A, BC847A, SBC847A, BC848A

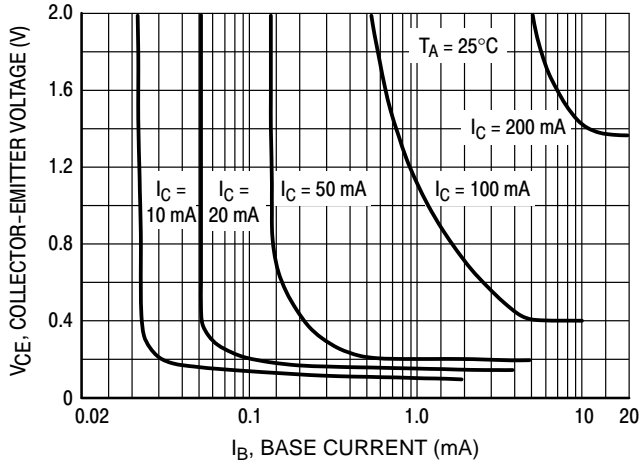


Figure 6. Collector Saturation Region

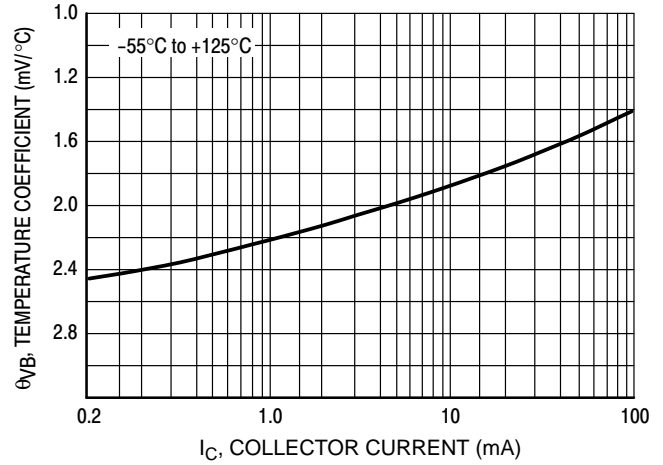


Figure 7. Base-Emitter Temperature Coefficient

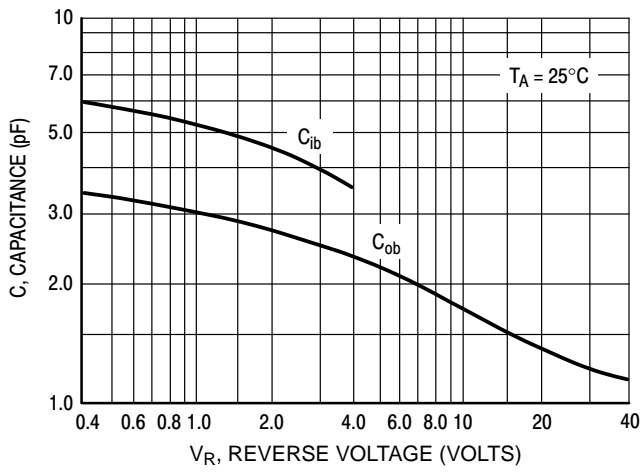


Figure 8. Capacitances

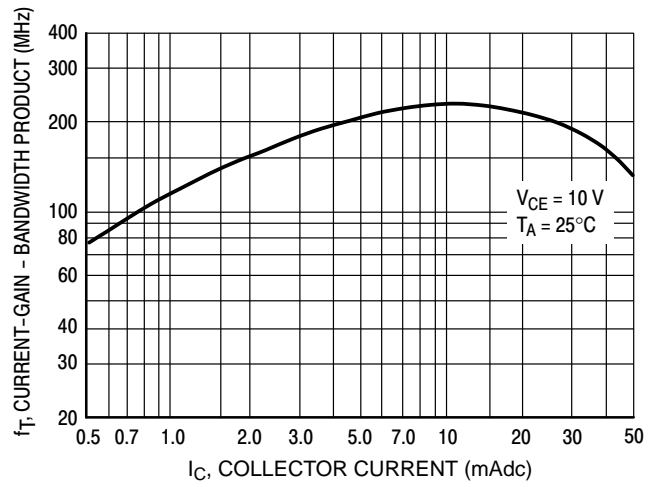
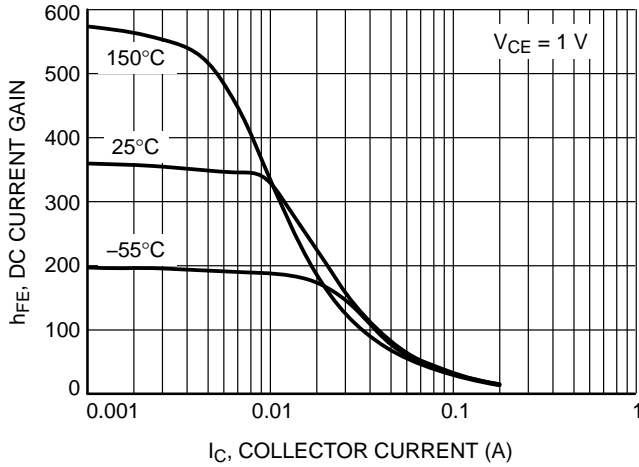


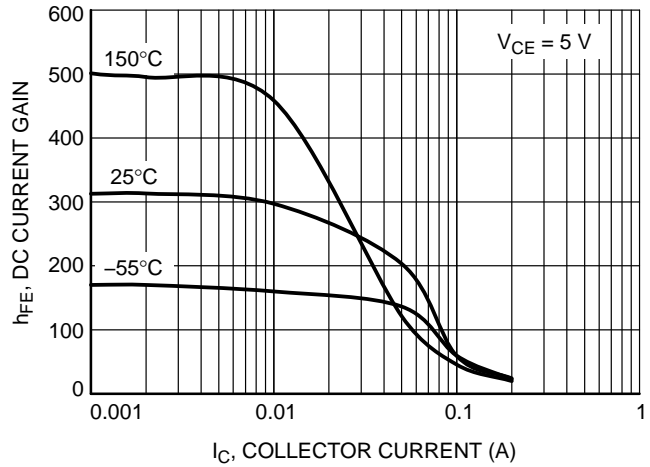
Figure 9. Current-Gain - Bandwidth Product

# BC846, SBC846, BC847, SBC847, BC848 Series

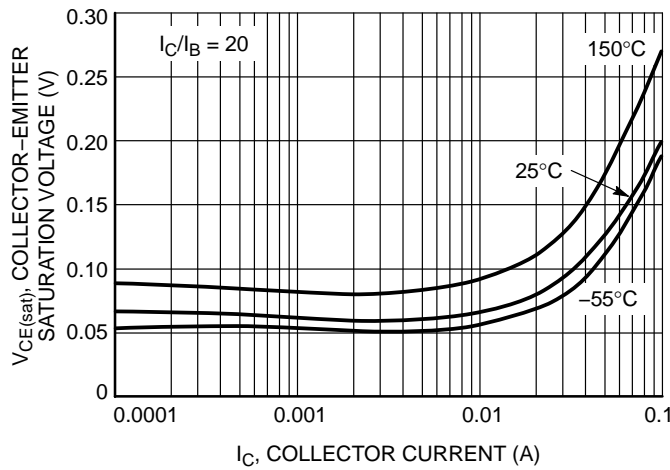
## BC846B, SBC846B



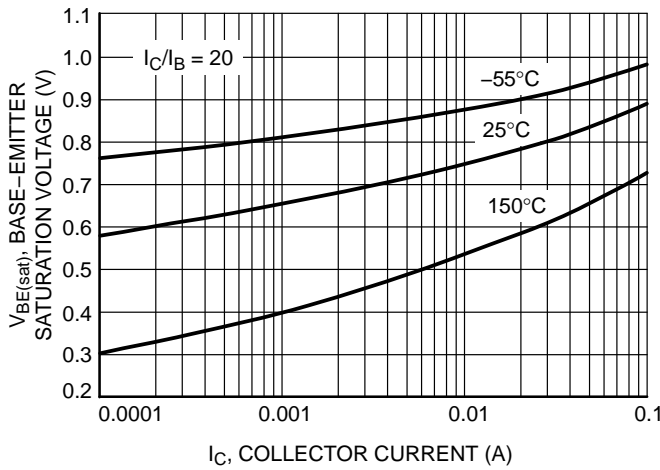
**Figure 10. DC Current Gain vs. Collector Current**



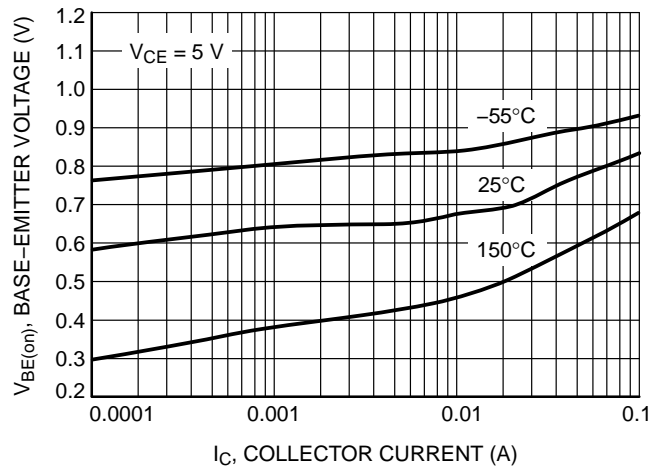
**Figure 11. DC Current Gain vs. Collector Current**



**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**

# BC846, SBC846, BC847, SBC847, BC848 Series

## BC846B, SBC846B

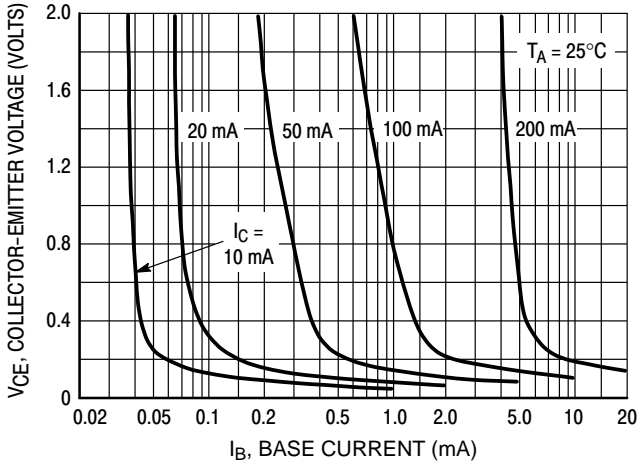


Figure 15. Collector Saturation Region

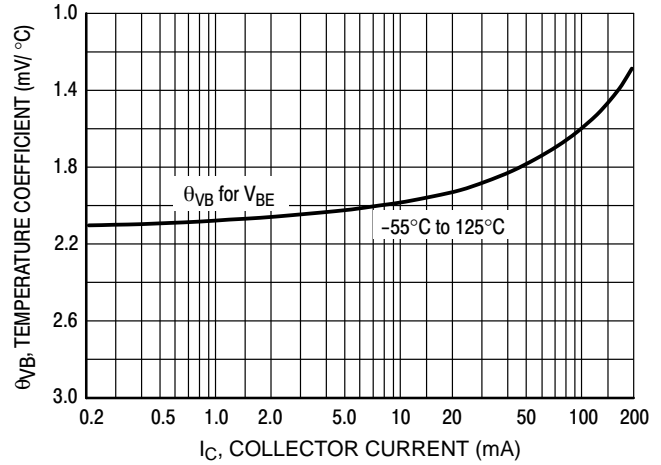


Figure 16. Base-Emitter Temperature Coefficient

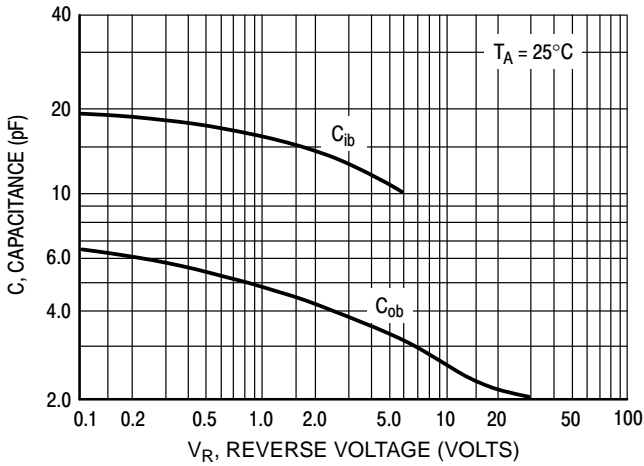


Figure 17. Capacitance

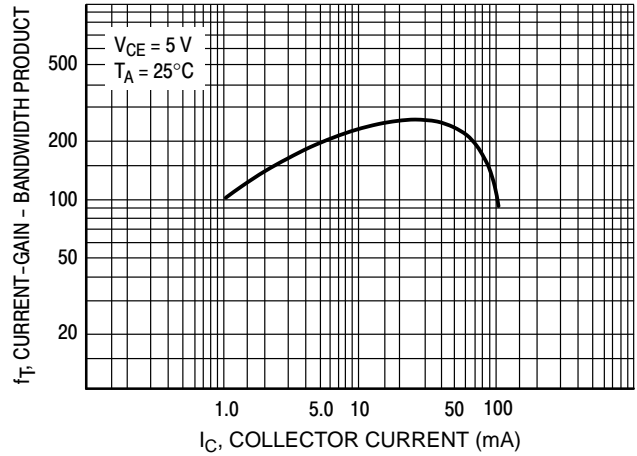


Figure 18. Current-Gain - Bandwidth Product

BC846, SBC846, BC847, SBC847, BC848 Series

BC847B, SBC847B, BC848B

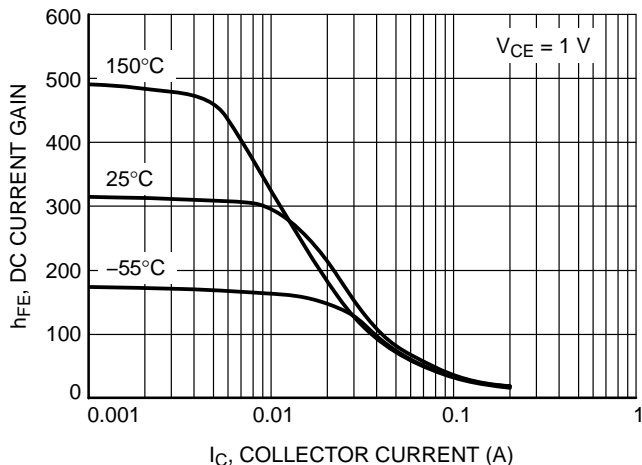


Figure 19. DC Current Gain vs. Collector Current

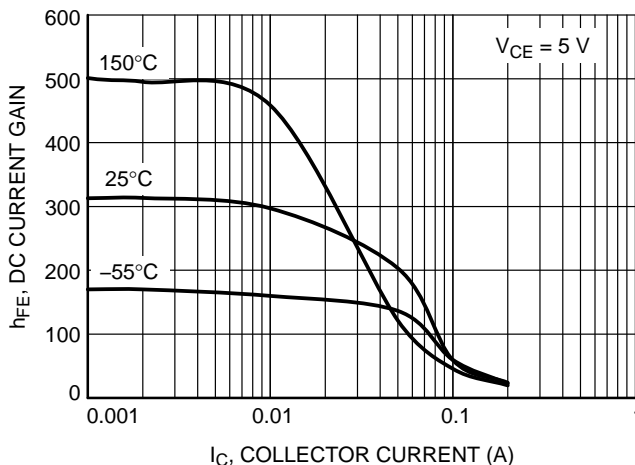


Figure 20. DC Current Gain vs. Collector Current

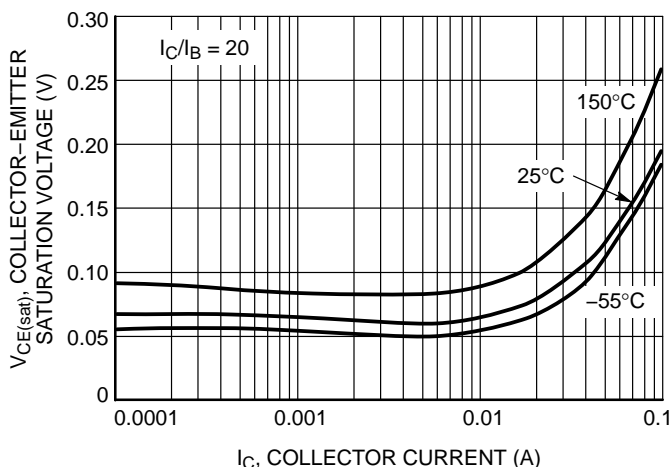


Figure 21. Collector Emitter Saturation Voltage vs. Collector Current

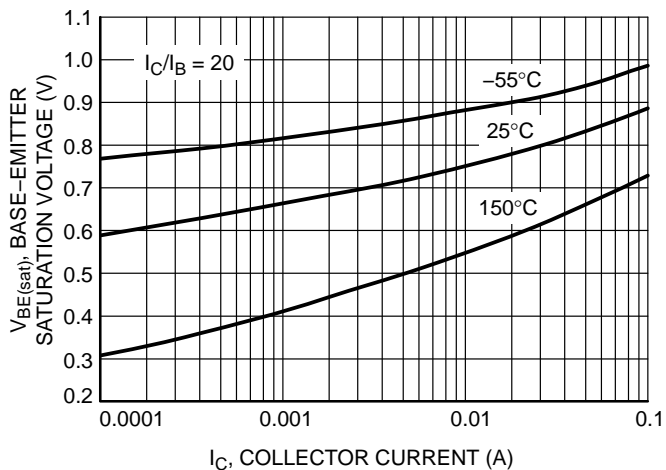


Figure 22. Base Emitter Saturation Voltage vs. Collector Current

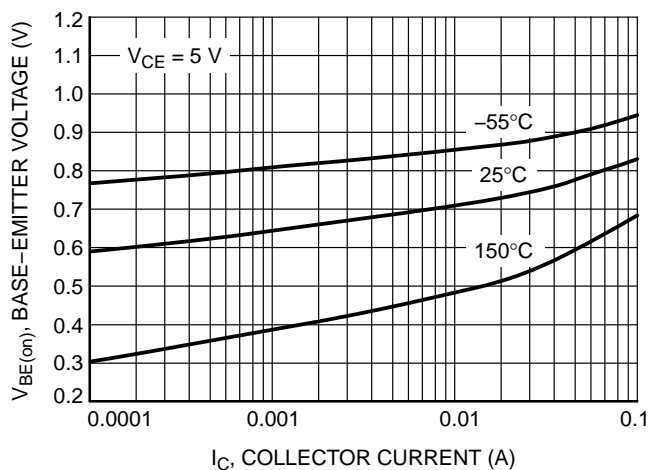


Figure 23. Base Emitter Voltage vs. Collector Current

# BC846, SBC846, BC847, SBC847, BC848 Series

## BC847B, SBC847B, BC848B

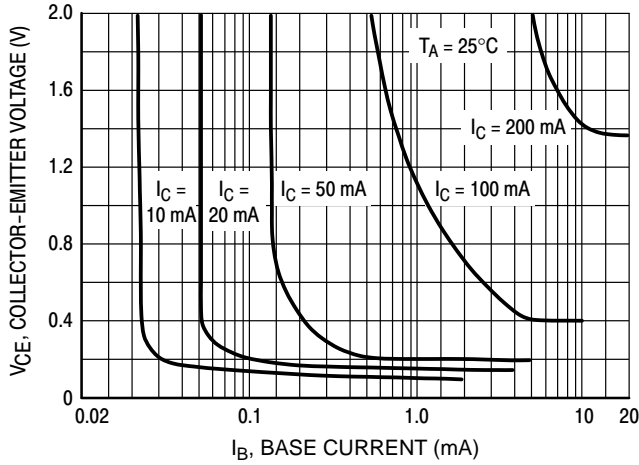


Figure 24. Collector Saturation Region

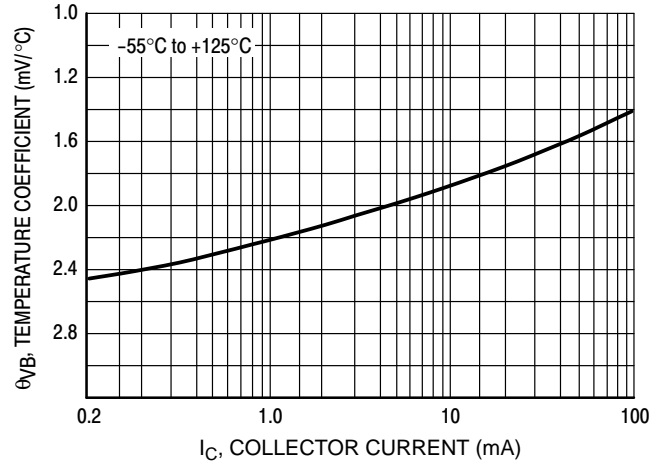


Figure 25. Base-Emitter Temperature Coefficient

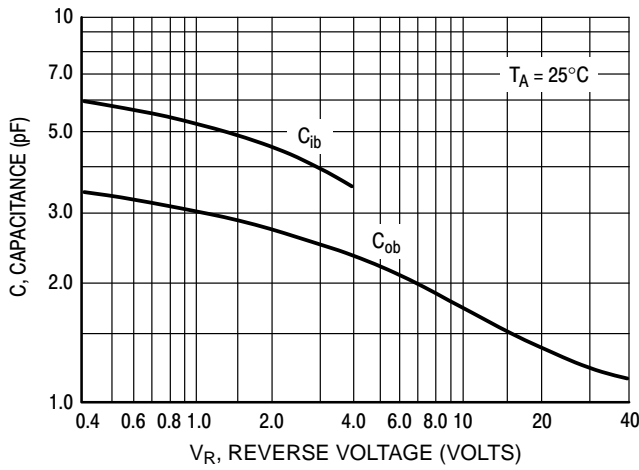


Figure 26. Capacitances

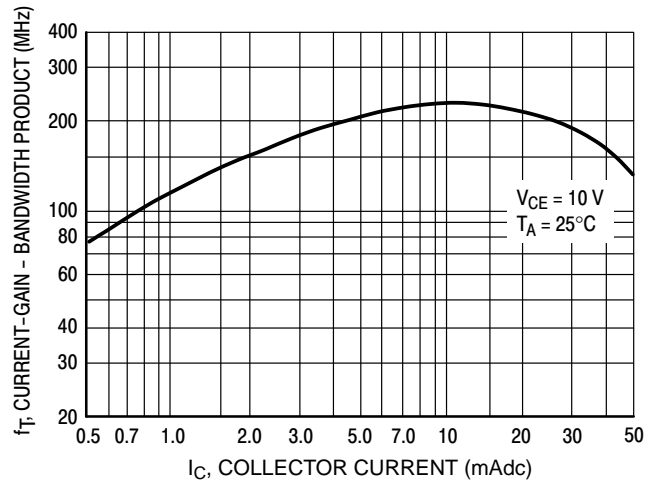


Figure 27. Current-Gain - Bandwidth Product



BC846, SBC846, BC847, SBC847, BC848 Series

BC847C, SBC847C, BC848C

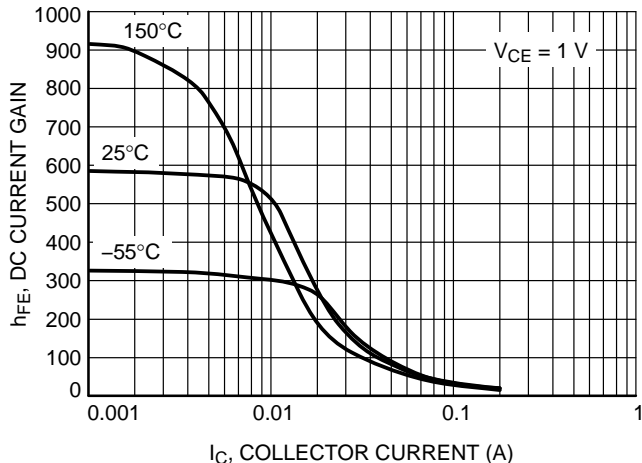


Figure 28. DC Current Gain vs. Collector Current

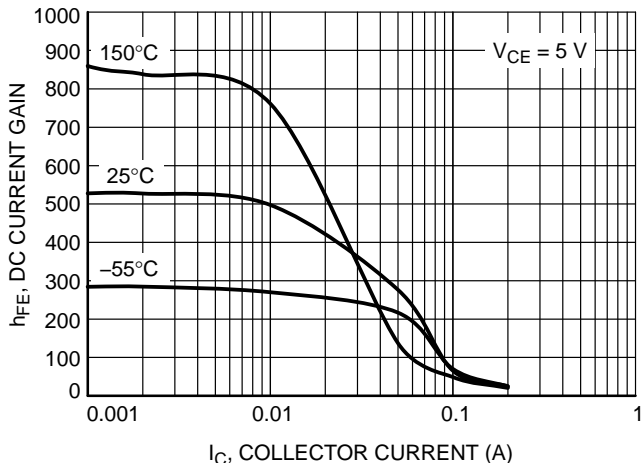


Figure 29. DC Current Gain vs. Collector Current

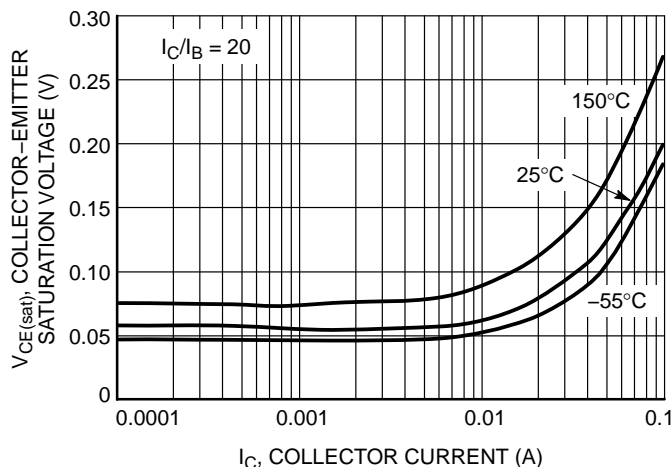


Figure 30. Collector Emitter Saturation Voltage vs. Collector Current

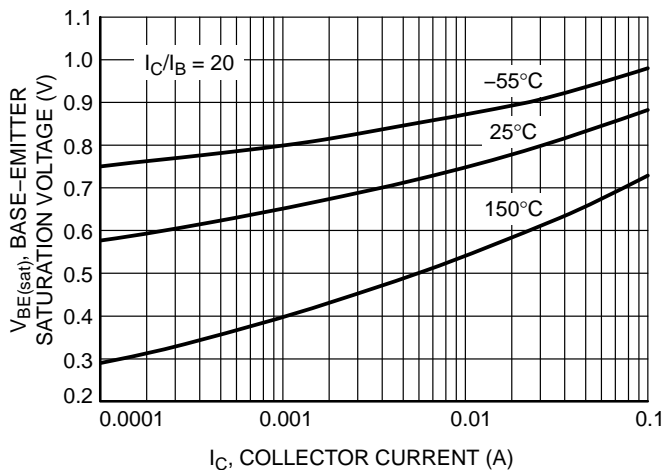


Figure 31. Base Emitter Saturation Voltage vs. Collector Current

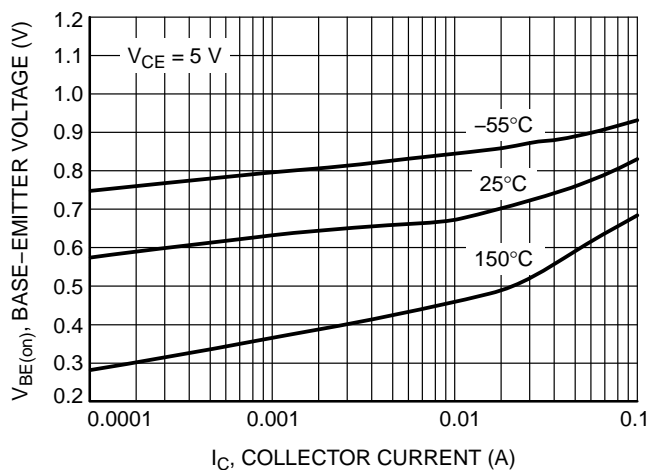


Figure 32. Base Emitter Voltage vs. Collector Current

# BC846, SBC846, BC847, SBC847, BC848 Series

## BC847C, SBC847C, BC848C

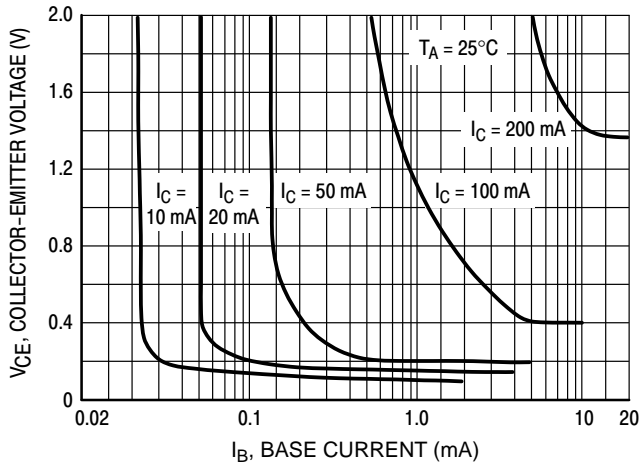


Figure 33. Collector Saturation Region

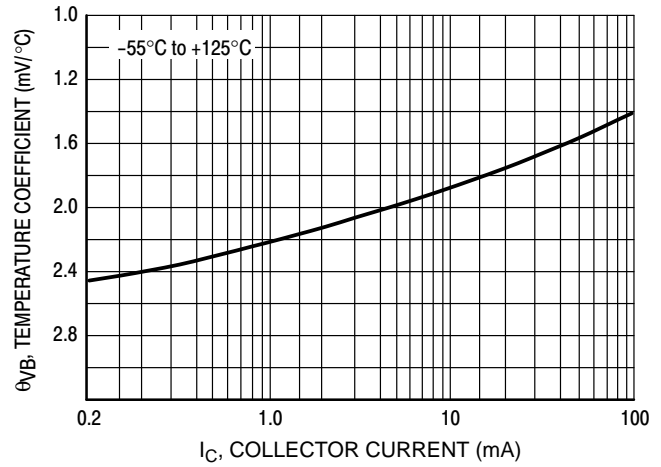


Figure 34. Base-Emitter Temperature Coefficient

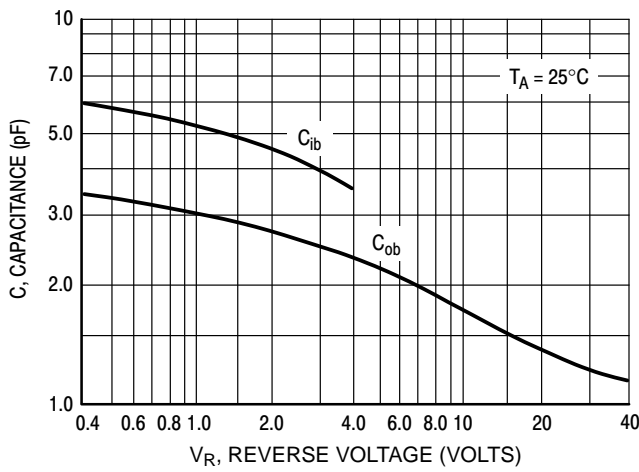


Figure 35. Capacitances

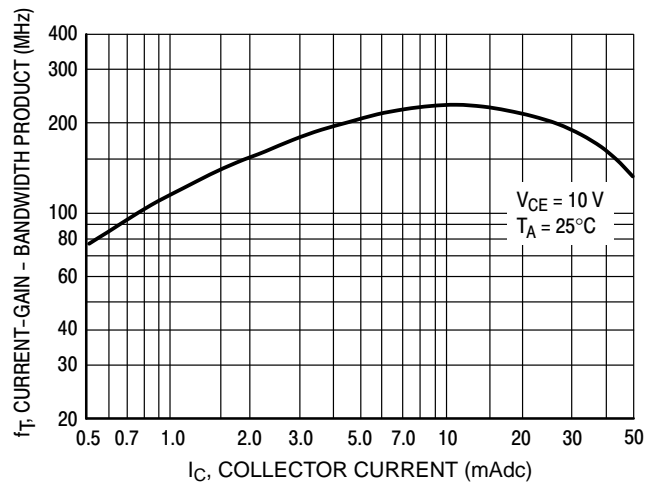
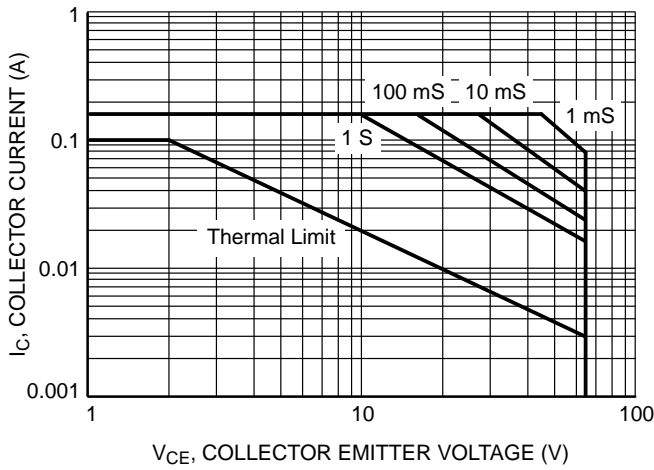
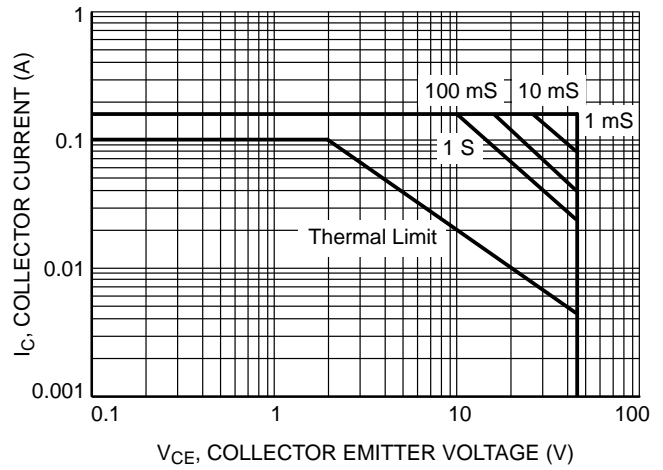


Figure 36. Current-Gain - Bandwidth Product

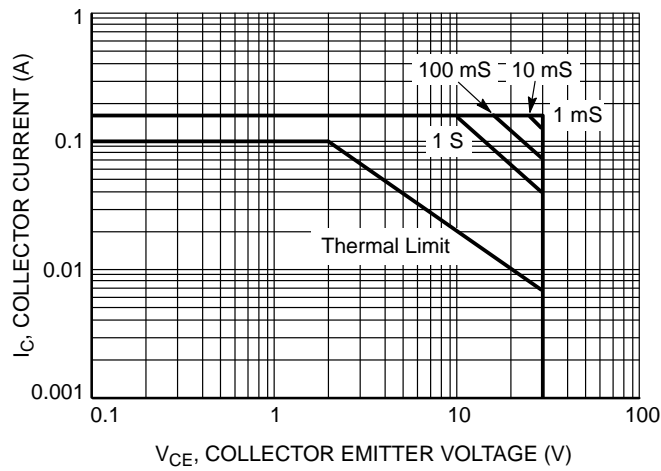
**BC846, SBC846, BC847, SBC847, BC848 Series**



**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, SBC846, BC847, SBC847, BC848 Series

### 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		3,000 / Tape & Reel
SBC847AWT1G*			
BC847BWT1G	1F		3,000 / Tape & Reel
SBC847BWT1G*			
BC847CWT1G	1G		3,000 / Tape & Reel
SBC847CWT1G*			
BC847CWT3G	1G		10,000 / Tape & Reel
SBC847CWT3G*			
BC848BWT1G	1K		3,000 / Tape & Reel
BC848CWT1G	1L		3,000 / Tape & Reel

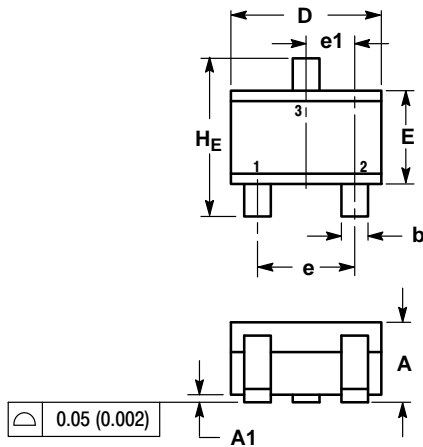
†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

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

# BC846, SBC846, BC847, SBC847, BC848 Series

## PACKAGE DIMENSIONS

### SC-70 (SOT-323) CASE 419-04 ISSUE N



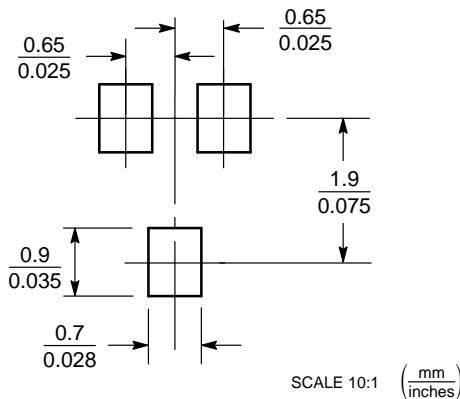
NOTES:

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

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 REF		
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
HE	2.00	2.10	2.40	0.079	0.083	0.095

STYLE 3:  
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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