

# BC846, BC847, 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

- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant

#### MAXIMUM RATINGS

Rating	Symbol	Value	Unit	
Collector-Emitter Voltage	$V_{CEO}$	BC846	65	V
		BC847	45	
		BC848	30	
Collector-Base Voltage	$V_{CBO}$	BC846	80	V
		BC847	50	
		BC848	30	
Emitter-Base Voltage	$V_{EBO}$	BC846	6.0	V
		BC847	6.0	
		BC848	5.0	
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

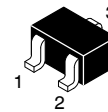
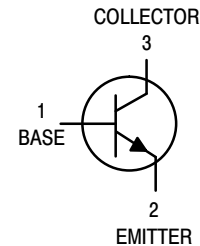
Characteristic	Symbol	Max	Unit
Total Device Dissipation FR-5 Board, (Note 1) $T_A = 25^\circ\text{C}$	$P_D$	150	mW
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	833	$^\circ\text{C}/\text{W}$
Junction and Storage Temperature	$T_J, T_{stg}$	-55 to +150	$^\circ\text{C}$

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



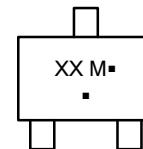
ON Semiconductor®

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

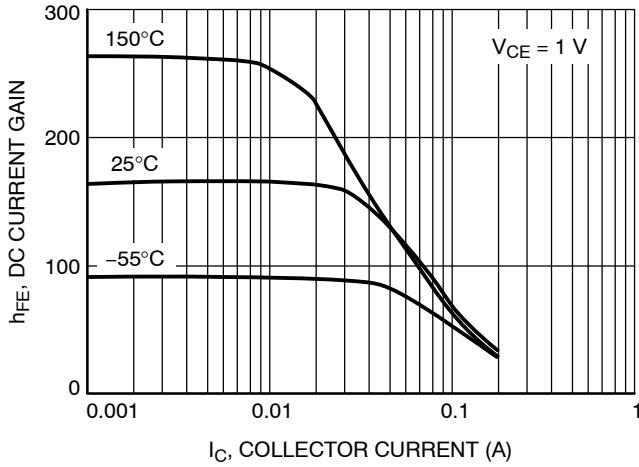
## BC846, BC847, BC848 Series

### ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25°C unless otherwise noted)

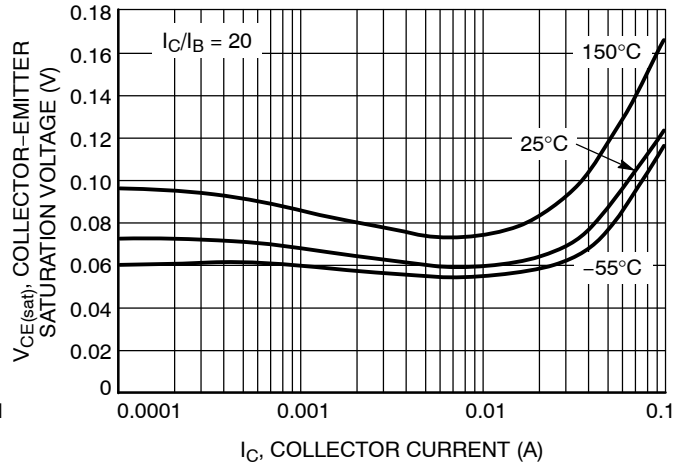
Characteristic		Symbol	Min	Typ	Max	Unit
<b>OFF CHARACTERISTICS</b>						
Collector – Emitter Breakdown Voltage (I <sub>C</sub> = 10 mA)	BC846 Series BC847 Series BC848 Series	V <sub>(BR)CEO</sub>	65 45 30	– – –	– – –	V
Collector – Emitter Breakdown Voltage (I <sub>C</sub> = 10 μA, V <sub>EB</sub> = 0)	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)	BC846A, BC847A, BC848A BC846B, BC847B, BC848B BC847C, BC848C	h <sub>FE</sub>	– – –	90 150 270	– – –	–
(I <sub>C</sub> = 2.0 mA, V <sub>CE</sub> = 5.0 V)	BC846A, BC847A, BC848A BC846B, BC847B, BC848B BC847C, BC848C		110 200 420	180 290 520	220 450 800	
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

# BC846, BC847, BC848 Series

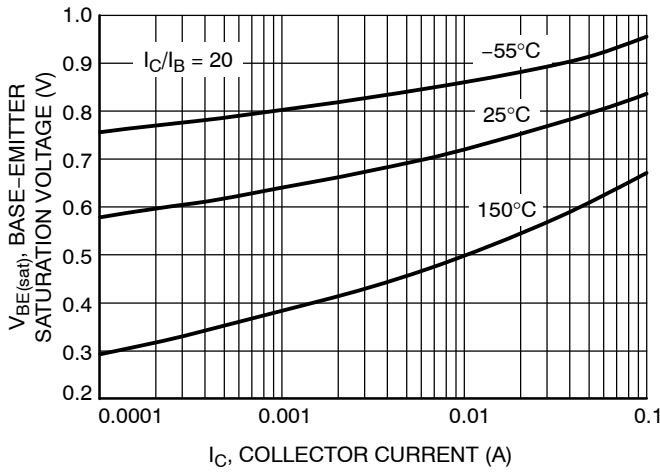
## BC846A, BC847A, BC848A



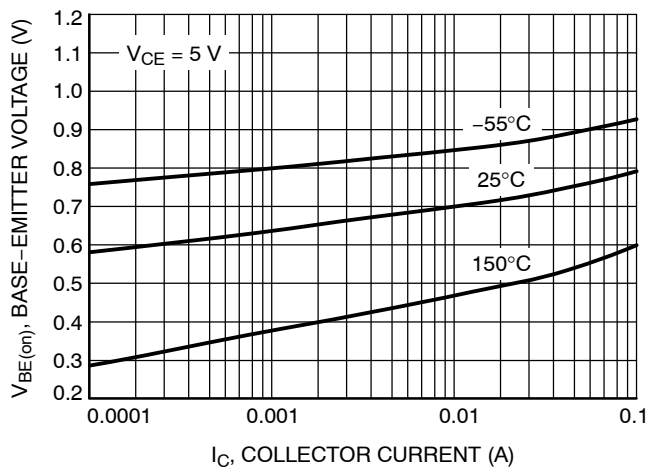
**Figure 1. DC Current Gain vs. Collector Current**



**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**

# BC846, BC847, BC848 Series

## BC846A, BC847A, BC848A

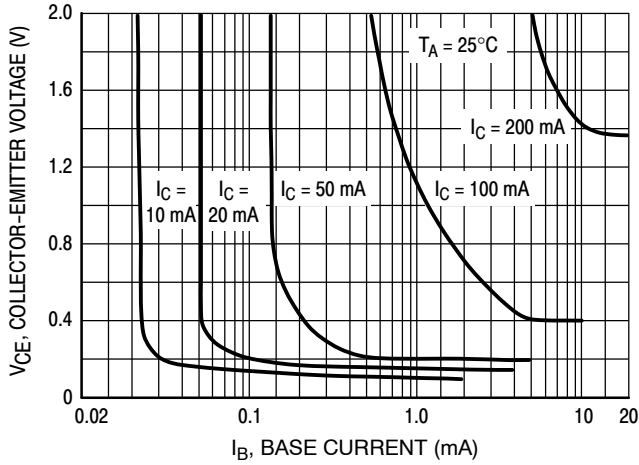


Figure 5. Collector Saturation Region

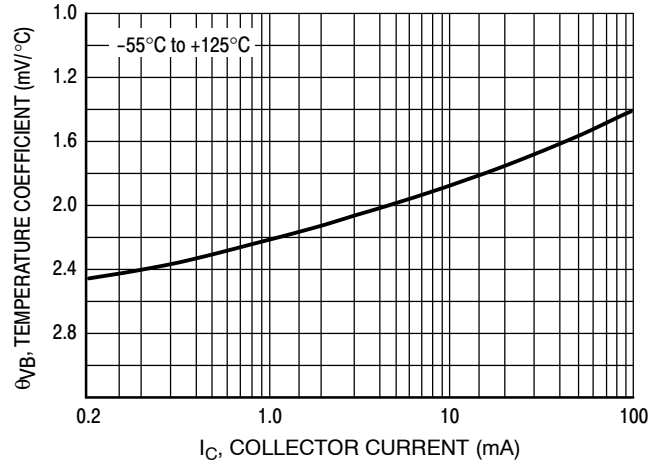


Figure 6. Base-Emitter Temperature Coefficient

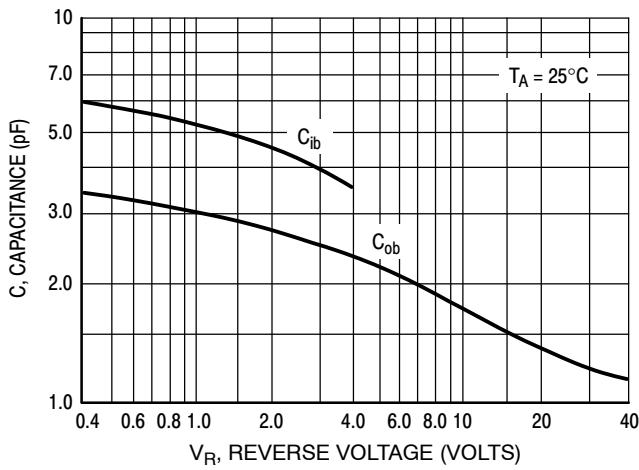


Figure 7. Capacitances

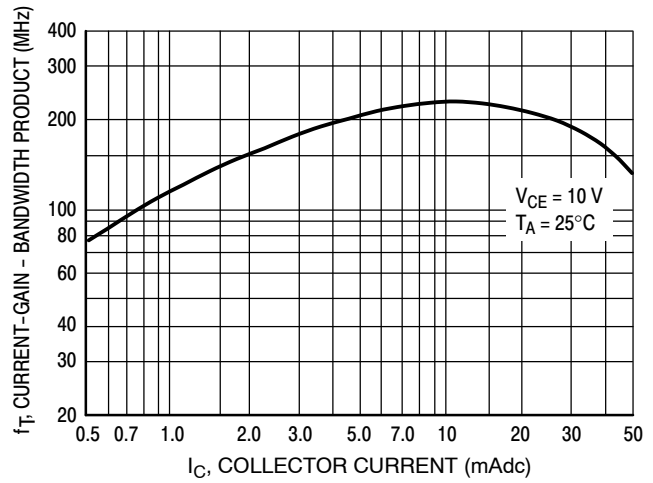
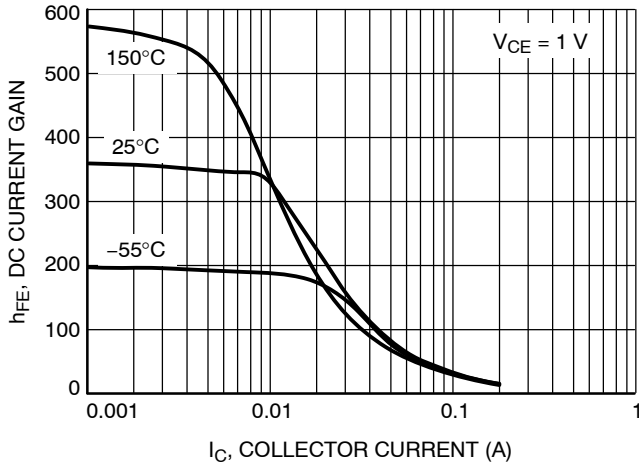


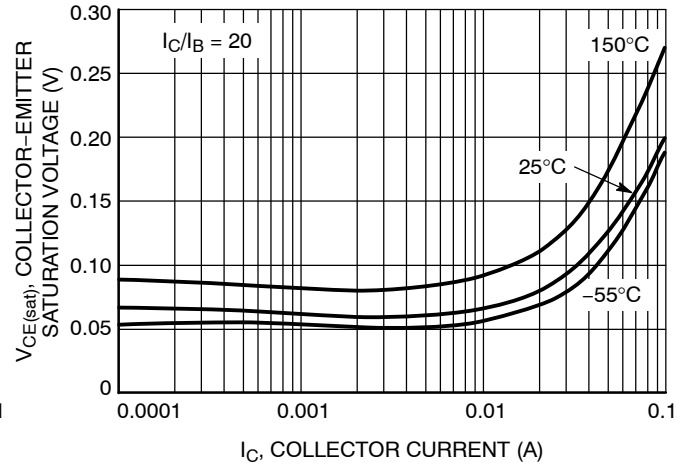
Figure 8. Current-Gain - Bandwidth Product

# BC846, BC847, BC848 Series

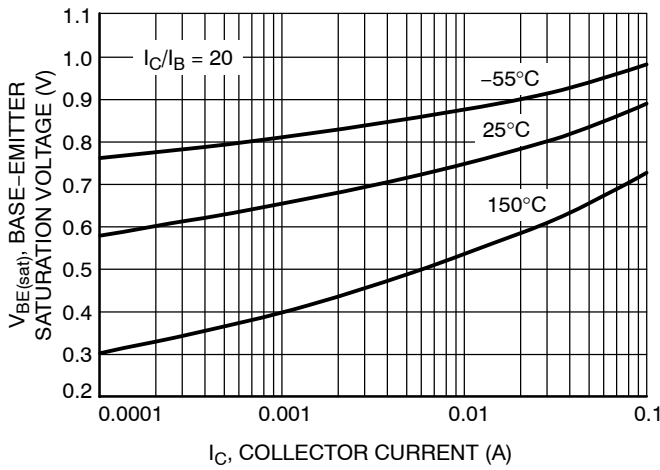
## BC846B



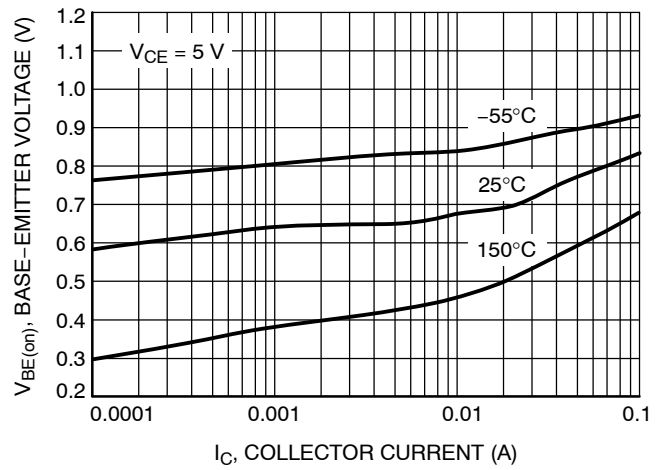
**Figure 9. DC Current Gain vs. Collector Current**



**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**

# BC846, BC847, BC848 Series

## BC846B

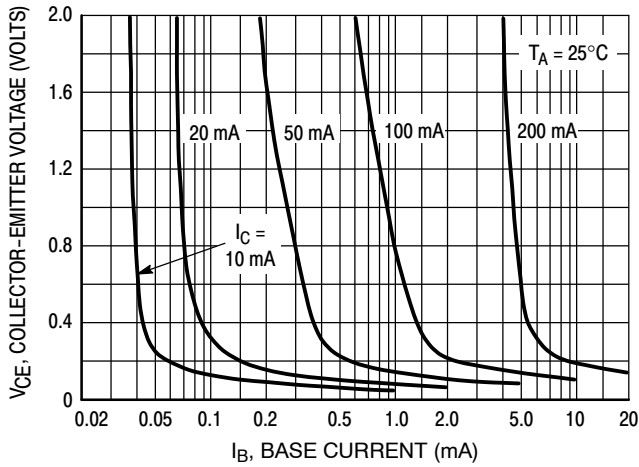


Figure 13. Collector Saturation Region

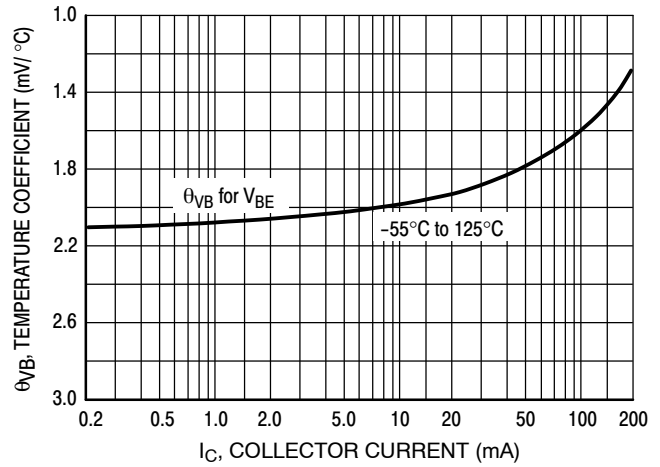


Figure 14. Base-Emitter Temperature Coefficient

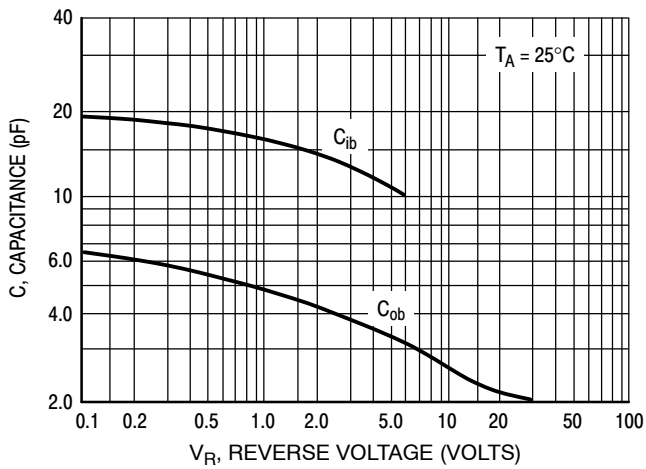


Figure 15. Capacitance

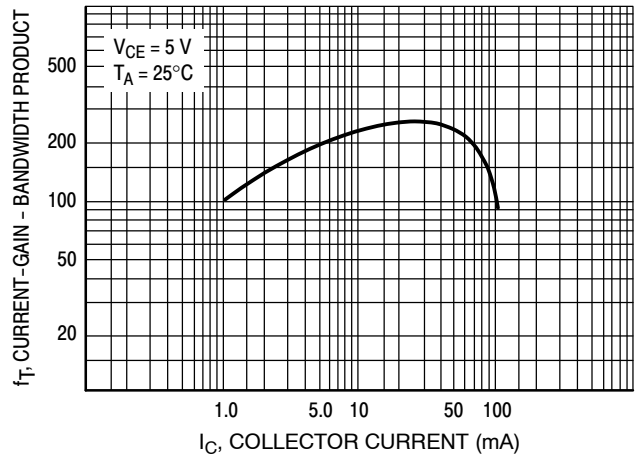
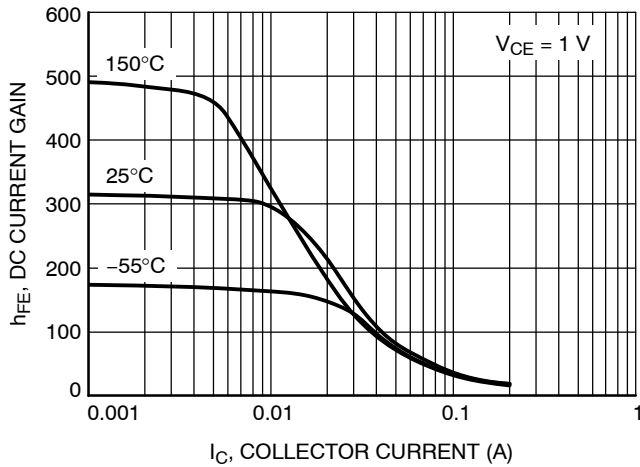


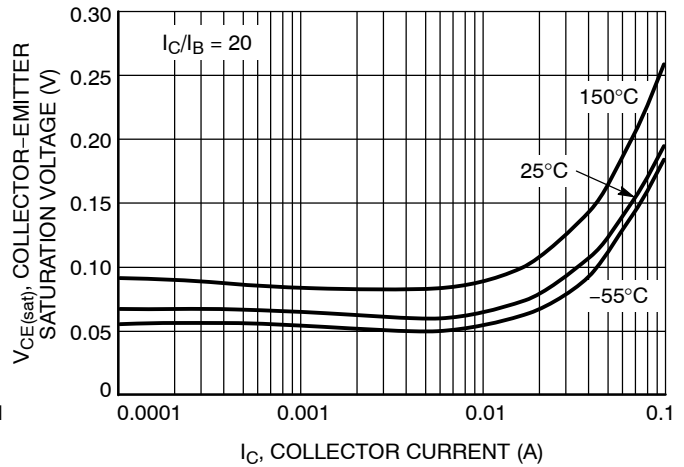
Figure 16. Current-Gain - Bandwidth Product

# BC846, BC847, BC848 Series

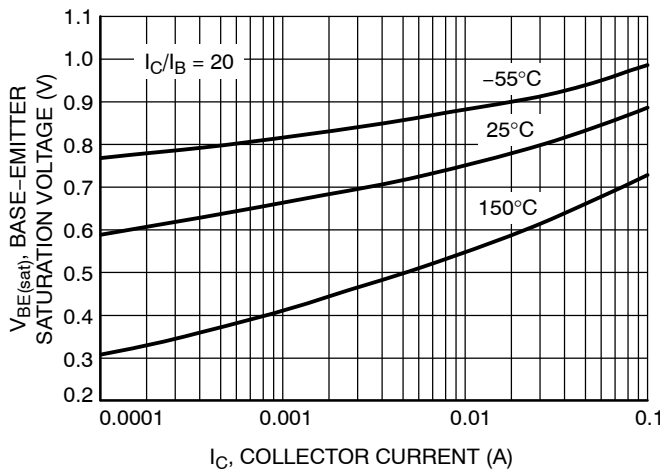
## BC847B, BC848B



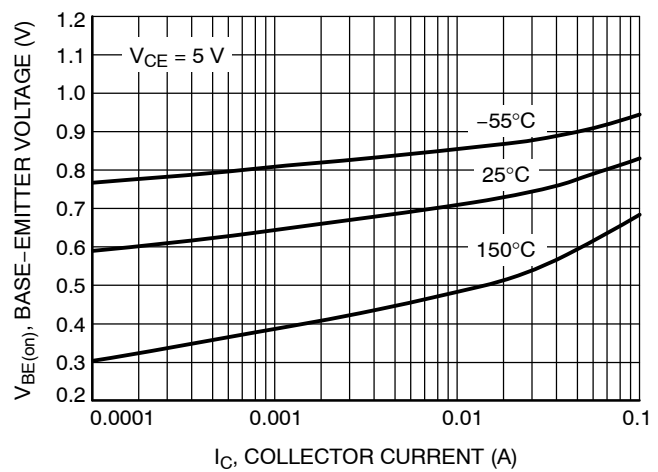
**Figure 17. DC Current Gain vs. Collector Current**



**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**

# BC846, BC847, BC848 Series

## BC847B, BC848B

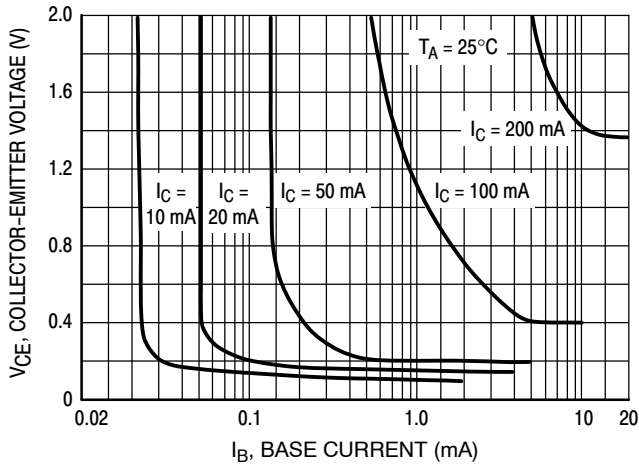


Figure 21. Collector Saturation Region

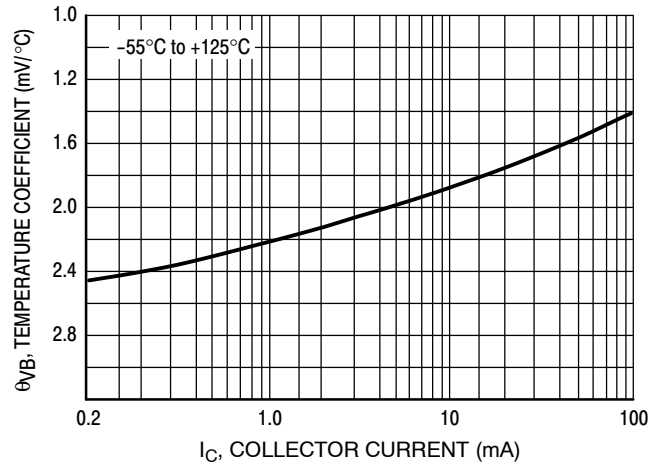


Figure 22. Base-Emitter Temperature Coefficient

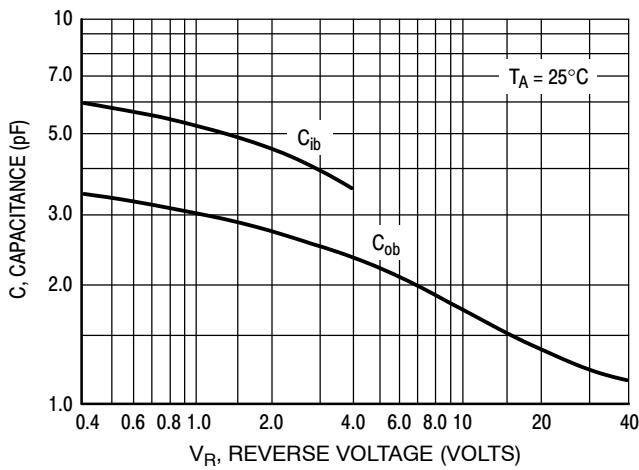


Figure 23. Capacitances

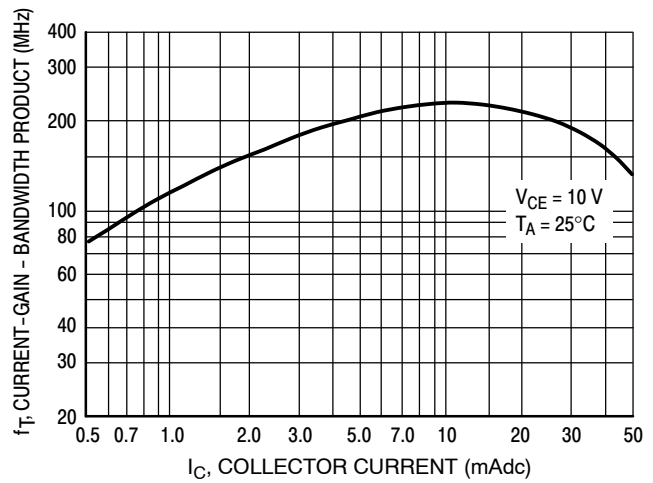
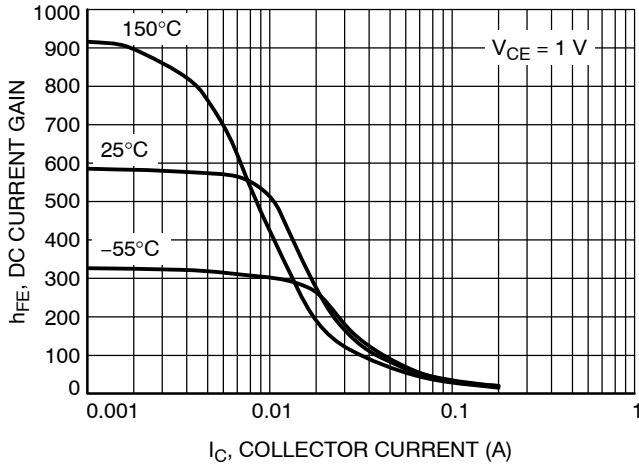


Figure 24. Current-Gain - Bandwidth Product

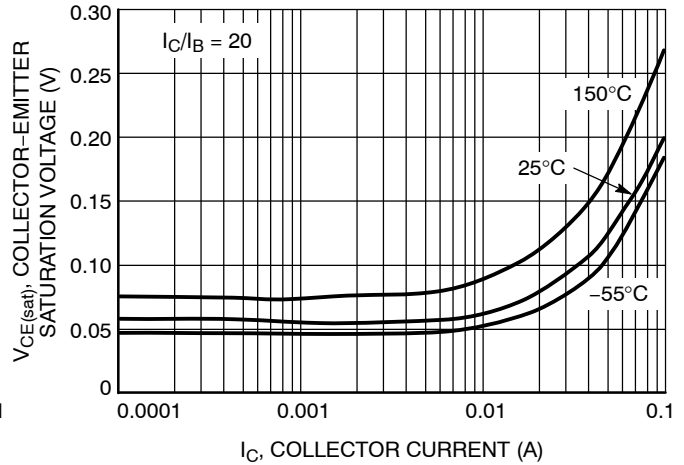


# BC846, BC847, BC848 Series

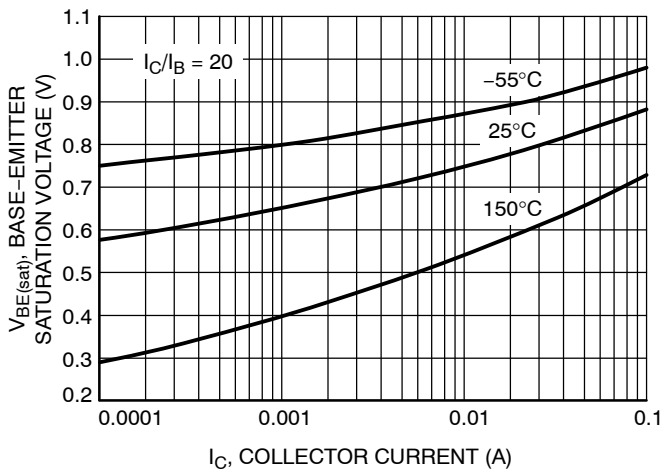
## BC847C, BC848C



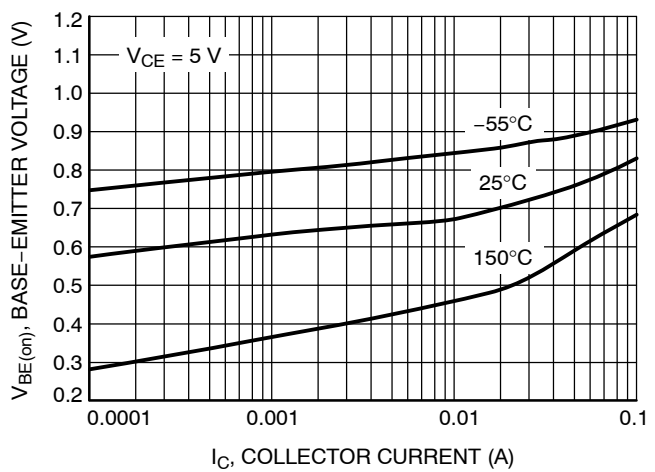
**Figure 25. DC Current Gain vs. Collector Current**



**Figure 26. Collector Emitter Saturation Voltage vs. Collector Current**



**Figure 27. Base Emitter Saturation Voltage vs. Collector Current**



**Figure 28. Base Emitter Voltage vs. Collector Current**

# BC846, BC847, BC848 Series

## BC847C, BC848C

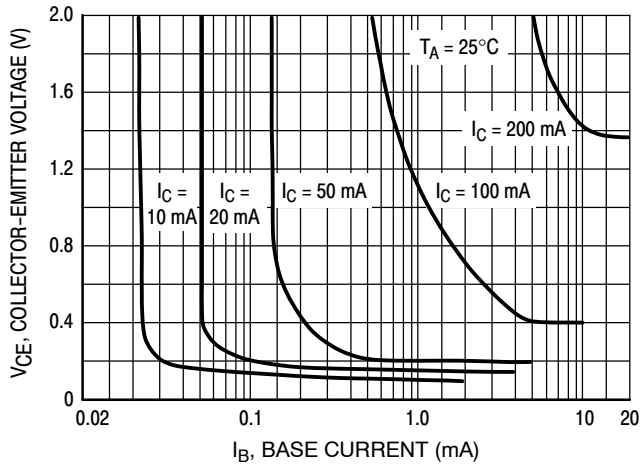


Figure 29. Collector Saturation Region

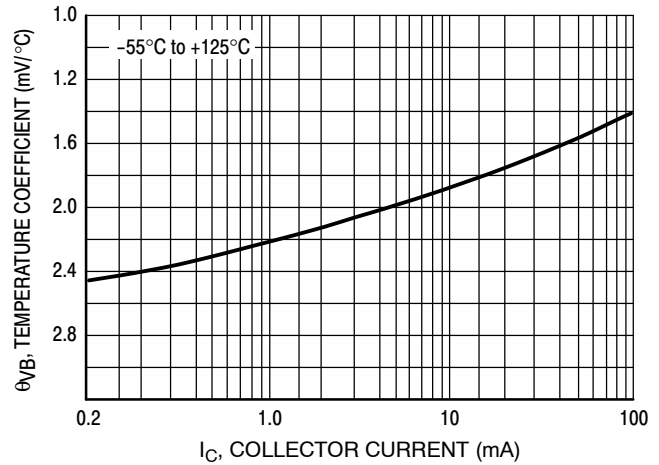


Figure 30. Base-Emitter Temperature Coefficient

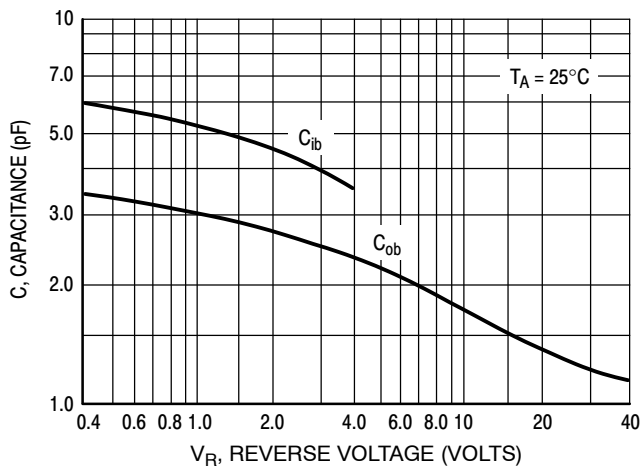


Figure 31. Capacitances

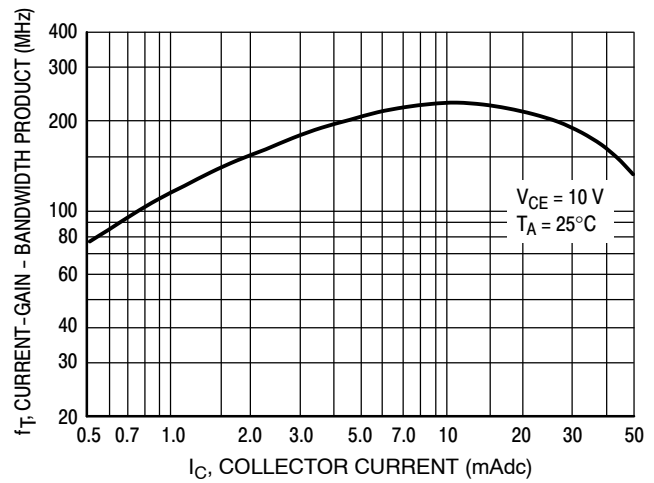
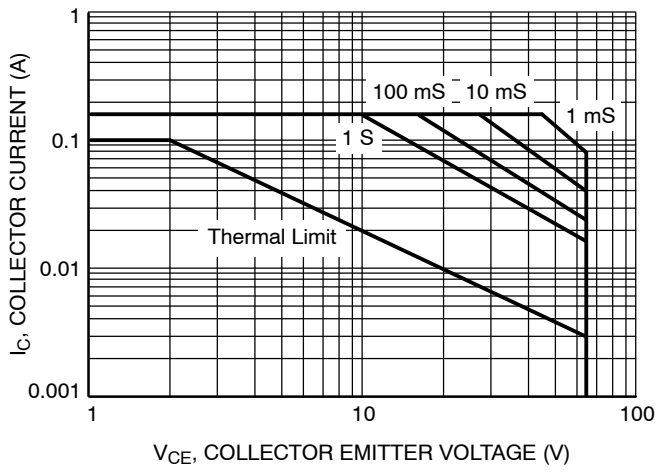
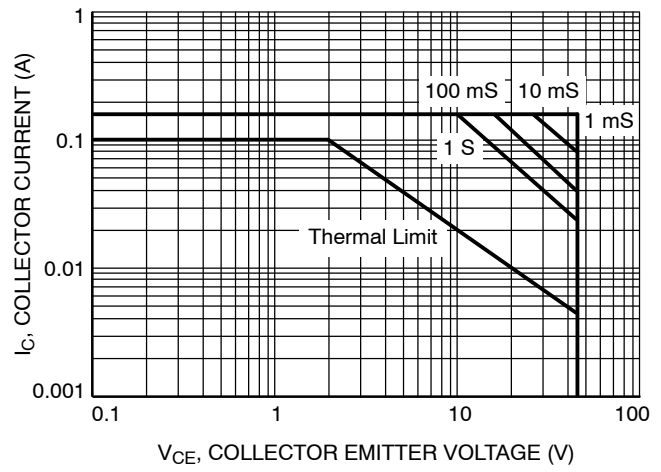


Figure 32. Current-Gain - Bandwidth Product

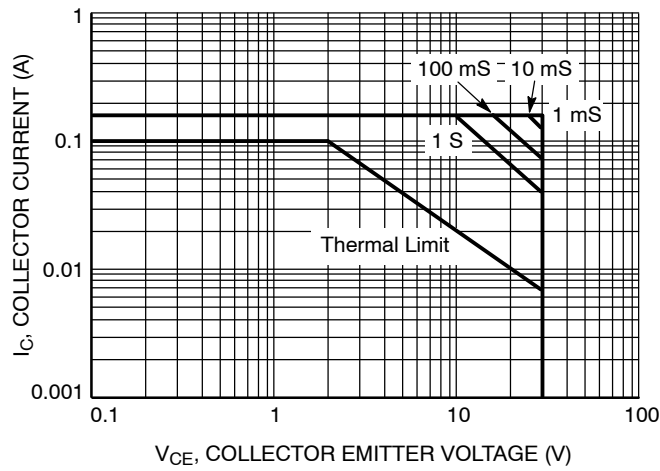
# BC846, BC847, BC848 Series



**Figure 33. Safe Operating Area for BC846A, BC846B**



**Figure 34. Safe Operating Area for BC847A, BC847B, BC847C**



**Figure 35. Safe Operating Area for BC848A, BC848B, BC848C**

## BC846, BC847, BC848 Series

### DEVICE ORDERING AND SPECIFIC MARKING INFORMATION

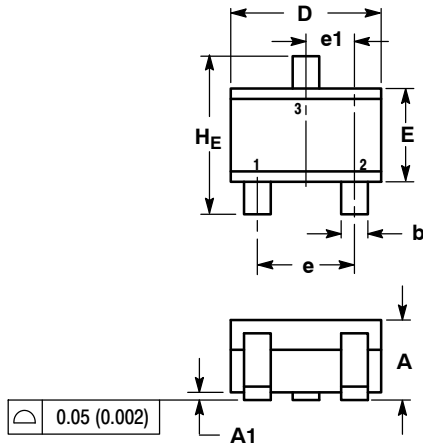
Device	Specific Marking Code	Package	Shipping†
BC846AWT1G	1A	SC-70 (SOT-323) (Pb-Free)	3,000 / Tape & Reel
BC846BWT1G	1B	SC-70 (SOT-323) (Pb-Free)	3,000 / Tape & Reel
BC847AWT1G	1E	SC-70 (SOT-323) (Pb-Free)	3,000 / Tape & Reel
BC847BWT1G	1F	SC-70 (SOT-323) (Pb-Free)	3,000 / Tape & Reel
BC847CWT1G	1G	SC-70 (SOT-323) (Pb-Free)	3,000 / Tape & Reel
BC847CWT3G	1G	SC-70 (SOT-323) (Pb-Free)	10,000 / Tape & Reel
BC848AWT1G	1J	SC-70 (SOT-323) (Pb-Free)	3,000 / Tape & Reel
BC848BWT1G	1K	SC-70 (SOT-323) (Pb-Free)	3,000 / Tape & Reel
BC848CWT1G	1L	SC-70 (SOT-323) (Pb-Free)	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.

# BC846, BC847, BC848 Series

## PACKAGE DIMENSIONS

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



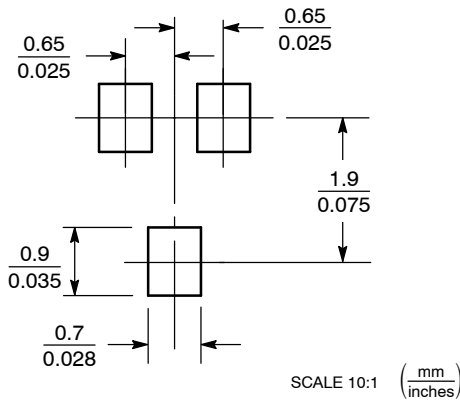
NOTES:

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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BC846AWT1/D