BC846, BC847, BC848 Series

General Purpose Transistors

NPN Silicon

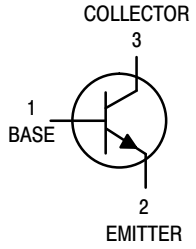
ON Semiconductor®

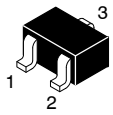
http://onsemi.com

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





SC−70/SOT−323
CASE 419
STYLE 3

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V_{CEO}		V
BC846		65	
BC847		45	
BC848		30	
Collector-Base Voltage	V_{CBO}		V
BC846		80	
BC847		50	
BC848		30	
Emitter-Base Voltage	V_{EBO}		V
BC846		6.0	
BC847		6.0	
BC848		5.0	
Collector Current − Continuous	I_C	100	mAdc

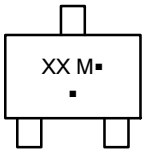
Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

THERMAL CHARACTERISTICS

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

1. FR−5 = 1.0 x 0.75 x 0.062 in.

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.

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted)

Characteristic		Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS						
Collector – Emitter Breakdown Voltage (I_C = 10 mA)	BC846 Series	$V_{(BR)CEO}$	65	–	–	V
	BC847 Series		45	–	–	
	BC848 Series		30	–	–	
Collector – Emitter Breakdown Voltage (I_C = 10 μA, V_{EB} = 0)	BC846 Series	$V_{(BR)CES}$	80	–	–	V
	BC847 Series		50	–	–	
	BC848 Series		30	–	–	
Collector – Base Breakdown Voltage (I_C = 10 μA)	BC846 Series	$V_{(BR)CBO}$	80	–	–	V
	BC847 Series		50	–	–	
	BC848 Series		30	–	–	
Emitter – Base Breakdown Voltage (I_E = 1.0 μA)	BC846 Series	$V_{(BR)EBO}$	6.0	–	–	V
	BC847 Series		6.0	–	–	
	BC848 Series		5.0	–	–	
Collector Cutoff Current (V_{CB} = 30 V)		I_{CBO}	–	–	15	nA
(V_{CB} = 30 V, T_A = 150°C)			–	–	5.0	μA
ON CHARACTERISTICS						
DC Current Gain (I_C = 10 μA, V_{CE} = 5.0 V)	BC846A, BC847A, BC848A	h_{FE}	–	90	–	–
	BC846B, BC847B, BC848B		–	150	–	
	BC847C, BC848C		–	270	–	
(I_C = 2.0 mA, V_{CE} = 5.0 V)	BC846A, BC847A, BC848A		110	180	220	
	BC846B, BC847B, BC848B		200	290	450	
	BC847C, BC848C		420	520	800	
Collector – Emitter Saturation Voltage (I_C = 10 mA, I_B = 0.5 mA)		$V_{CE(sat)}$	–	–	0.25	V
(I_C = 100 mA, I_B = 5.0 mA)			–	–	0.6	
Base – Emitter Saturation Voltage (I_C = 10 mA, I_B = 0.5 mA)		$V_{BE(sat)}$	–	0.7	–	V
(I_C = 100 mA, I_B = 5.0 mA)			–	0.9	–	
Base – Emitter Voltage (I_C = 2.0 mA, V_{CE} = 5.0 V)		$V_{BE(on)}$	580	660	700	mV
(I_C = 10 mA, V_{CE} = 5.0 V)			–	–	770	
SMALL–SIGNAL CHARACTERISTICS						
Current – Gain – Bandwidth Product (I_C = 10 mA, V_{CE} = 5.0 Vdc, f = 100 MHz)		f_T	100	–	–	MHz
Output Capacitance (V_{CB} = 10 V, f = 1.0 MHz)		C_{obo}	–	–	4.5	pF
Noise Figure (I_C = 0.2 mA, V_{CE} = 5.0 Vdc, R_S = 2.0 kΩ, f = 1.0 kHz, BW = 200 Hz)		NF	–	–	10	dB

BC846A, BC847A, BC848A

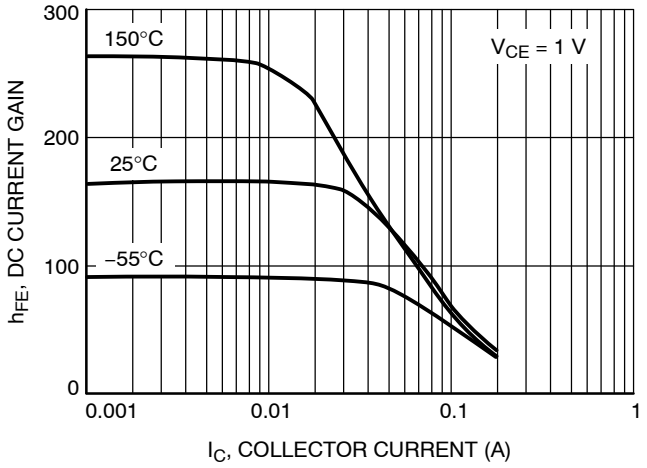


Figure 1. DC Current Gain vs. Collector Current

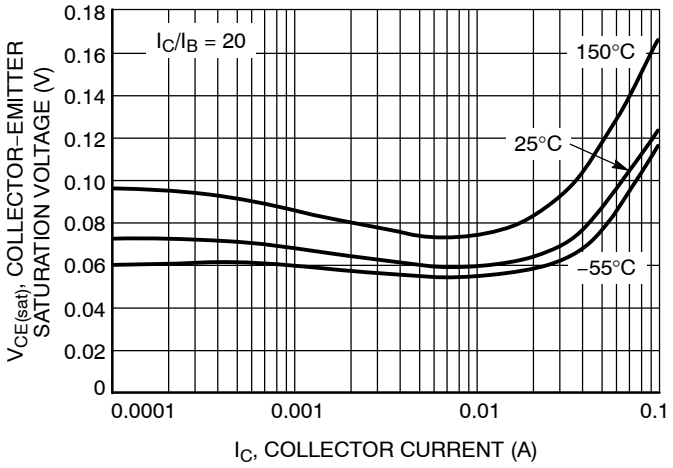


Figure 2. Collector Emitter Saturation Voltage vs. Collector Current

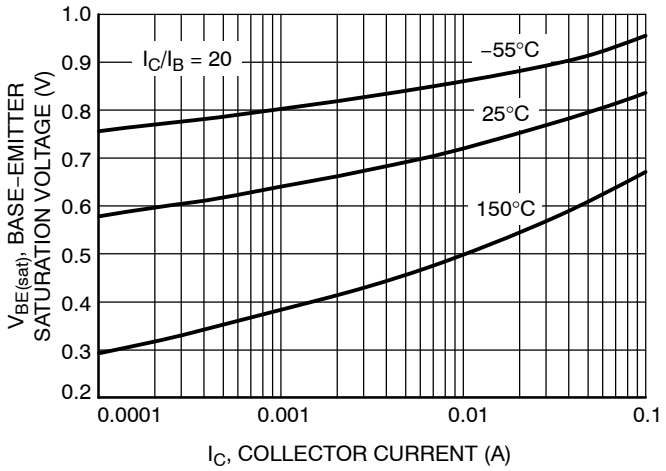


Figure 3. Base Emitter Saturation Voltage vs. Collector Current

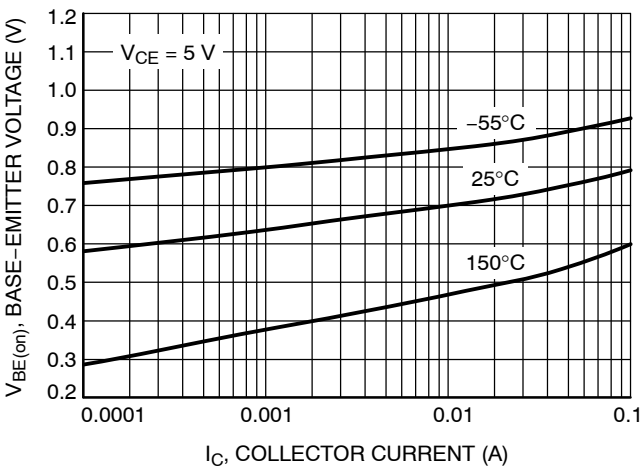


Figure 4. Base Emitter Voltage vs. Collector Current

BC846A, BC847A, BC848A

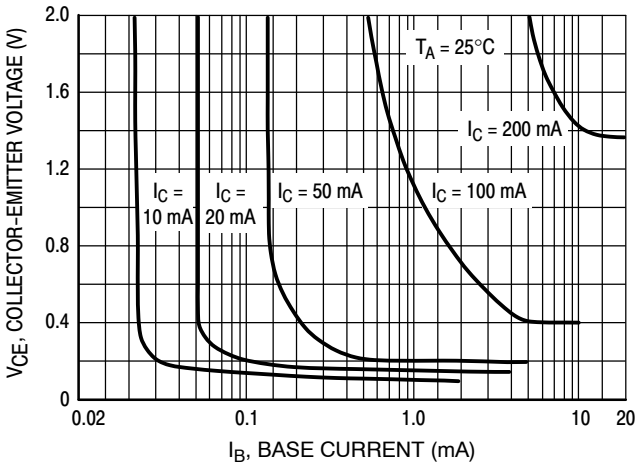


Figure 5. Collector Saturation Region

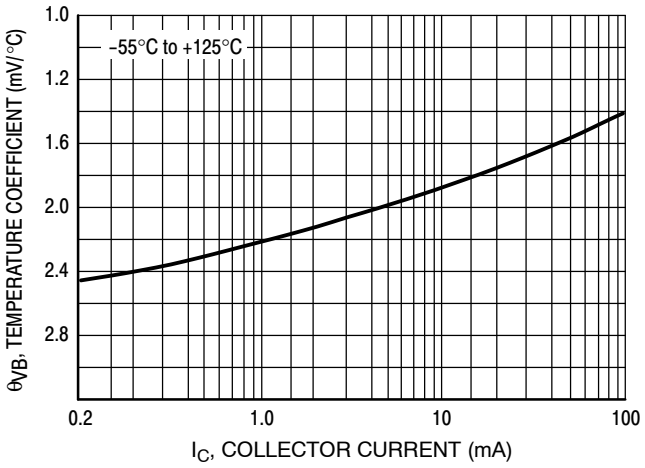


Figure 6. Base−Emitter Temperature Coefficient

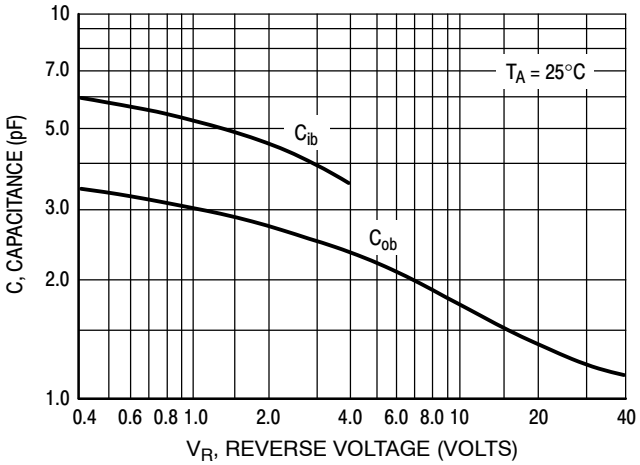


Figure 7. Capacitances

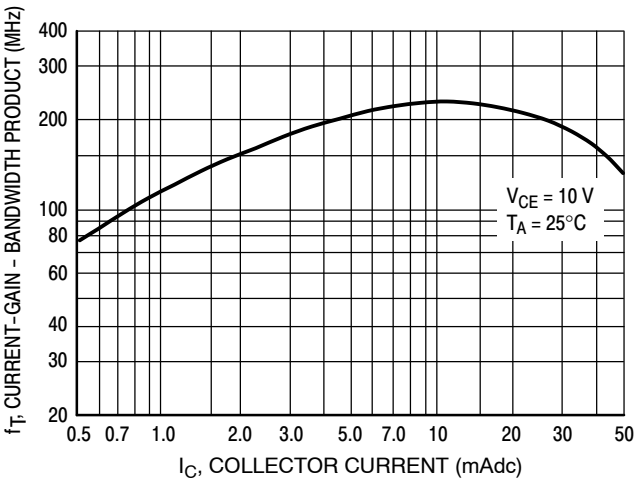


Figure 8. Current−Gain − Bandwidth Product

BC846B

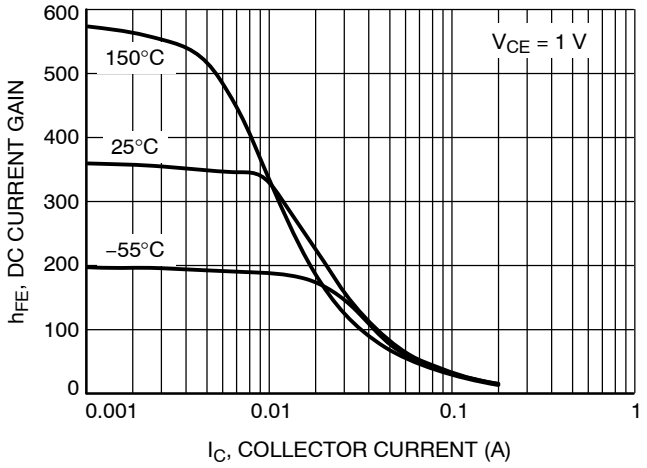


Figure 9. DC Current Gain vs. Collector Current

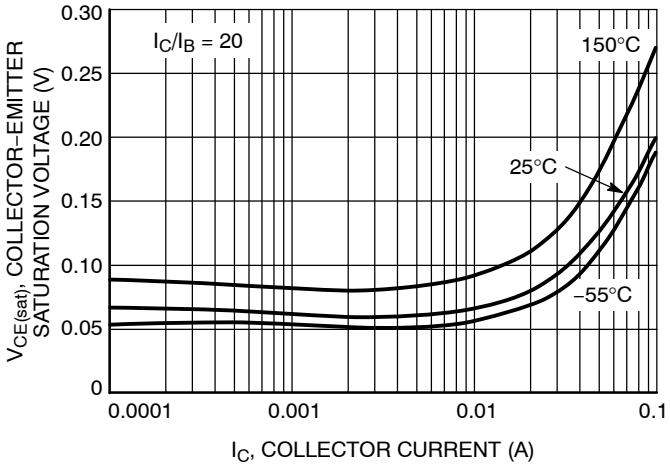


Figure 10. Collector Emitter Saturation Voltage vs. Collector Current

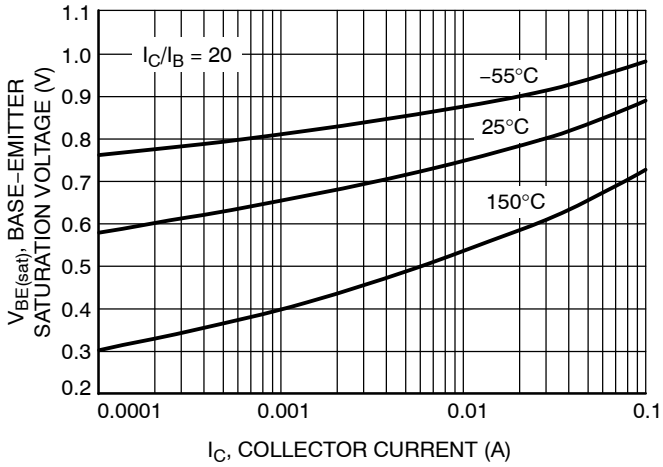


Figure 11. Base Emitter Saturation Voltage vs. Collector Current

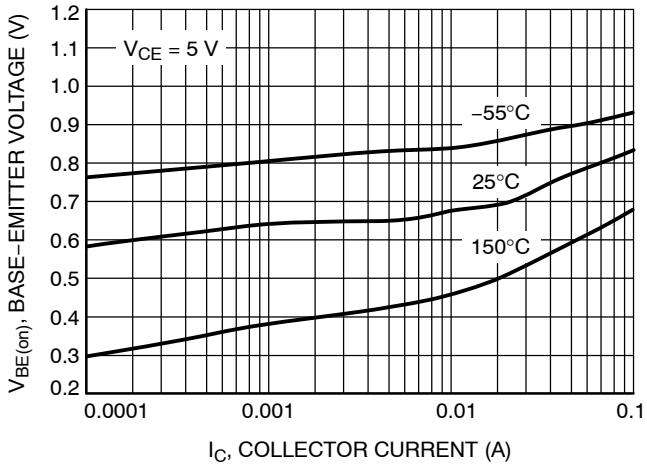


Figure 12. Base Emitter Voltage vs. Collector Current

BC846B

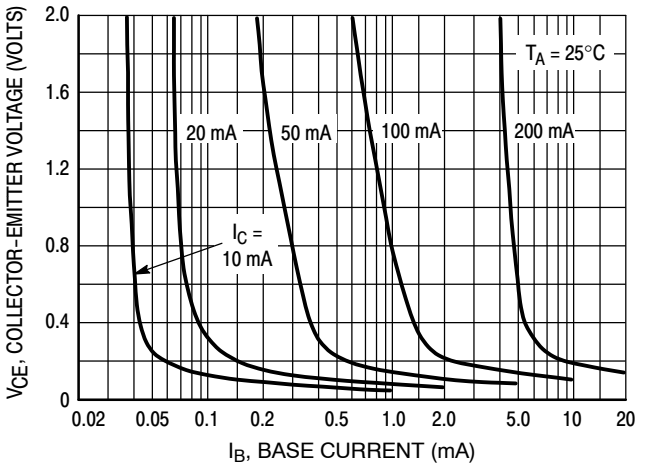


Figure 13. Collector Saturation Region

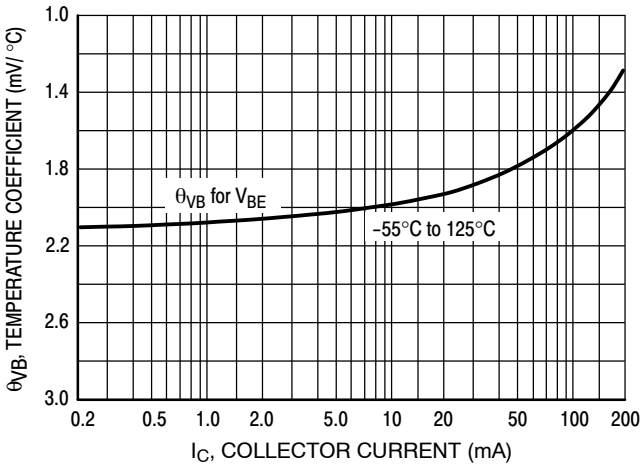


Figure 14. Base−Emitter Temperature Coefficient

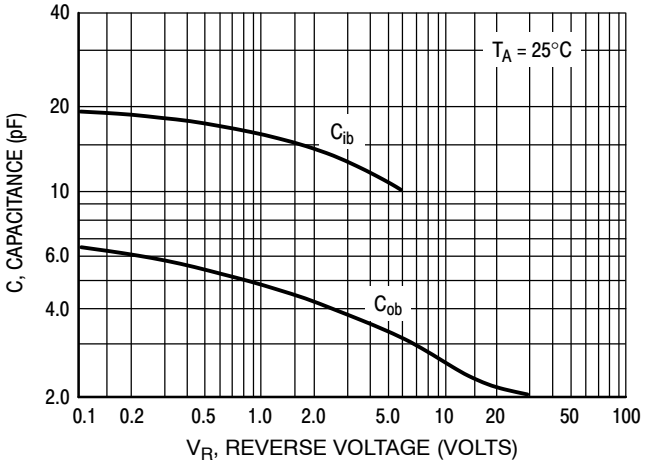


Figure 15. Capacitance

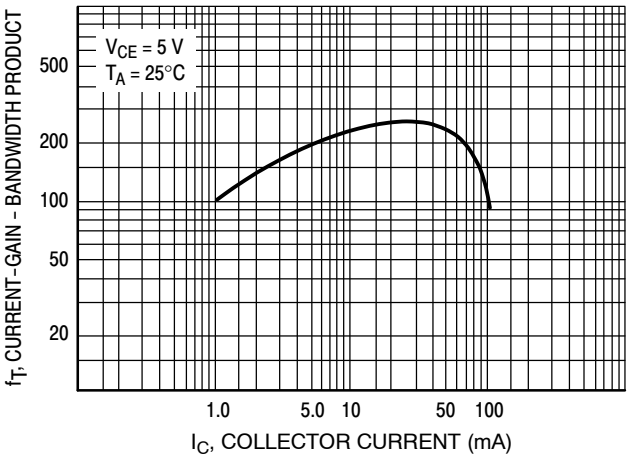


Figure 16. Current−Gain − Bandwidth Product

BC847B, BC848B

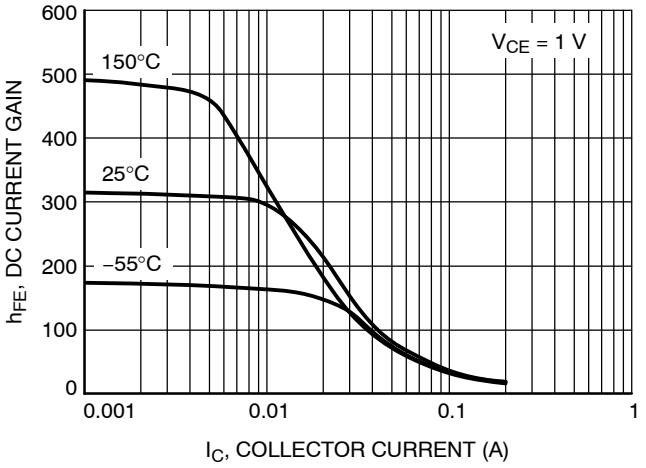


Figure 17. DC Current Gain vs. Collector Current

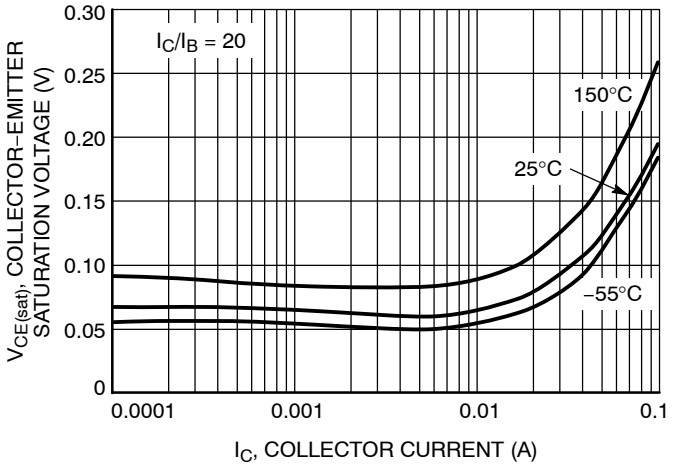


Figure 18. Collector Emitter Saturation Voltage vs. Collector Current

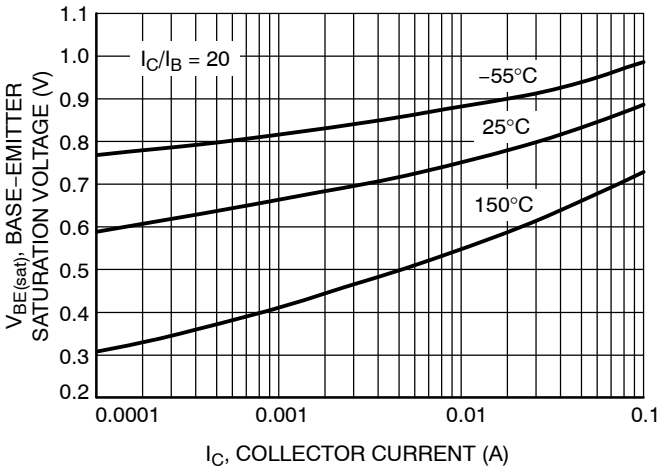


Figure 19. Base Emitter Saturation Voltage vs. Collector Current

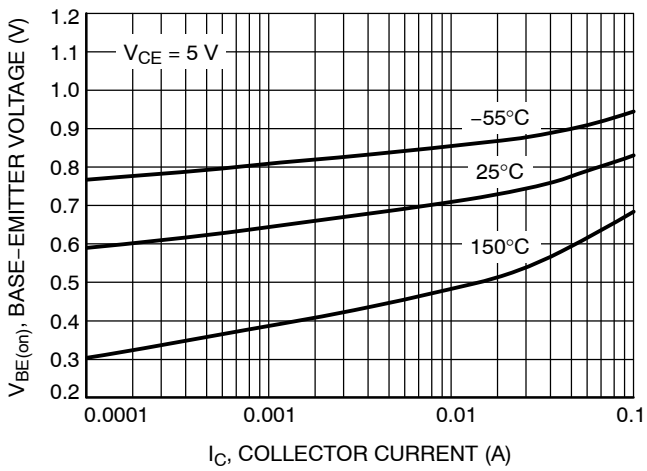


Figure 20. Base Emitter Voltage vs. Collector Current

BC847B, BC848B

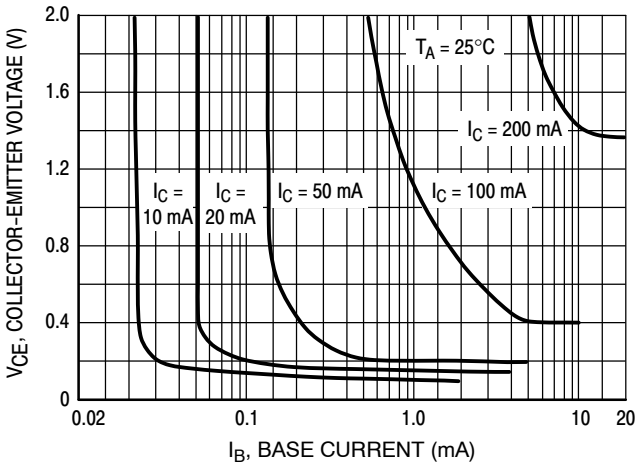


Figure 21. Collector Saturation Region

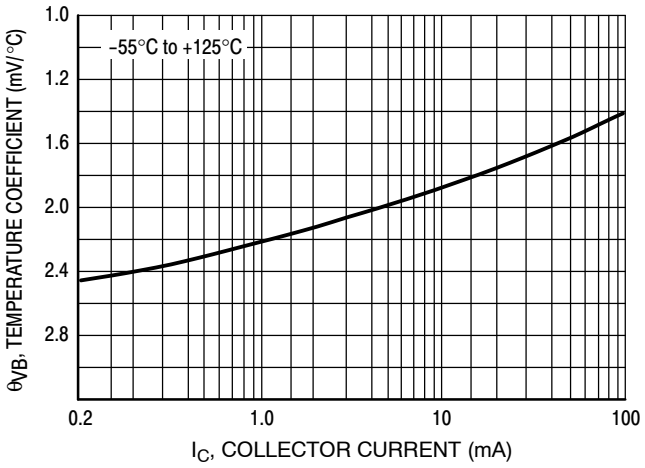


Figure 22. Base−Emitter Temperature Coefficient

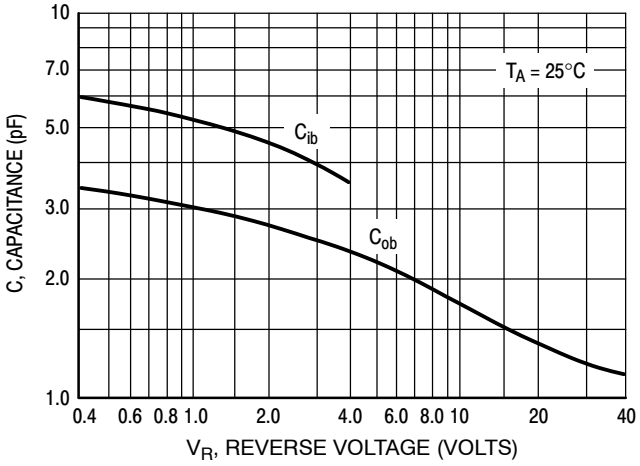


Figure 23. Capacitances

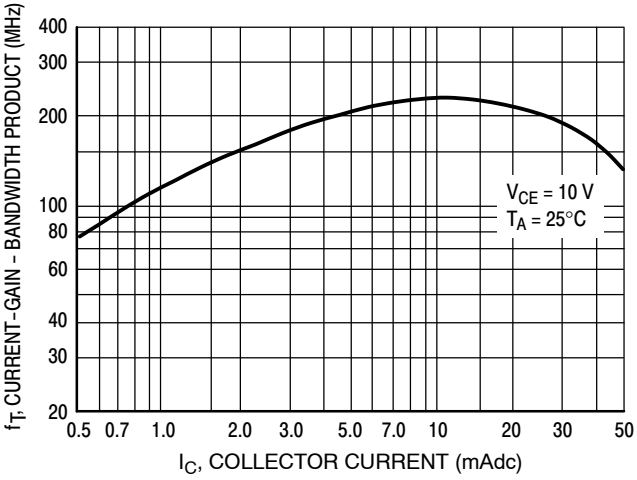


Figure 24. Current−Gain − Bandwidth Product

BC847C, BC848C

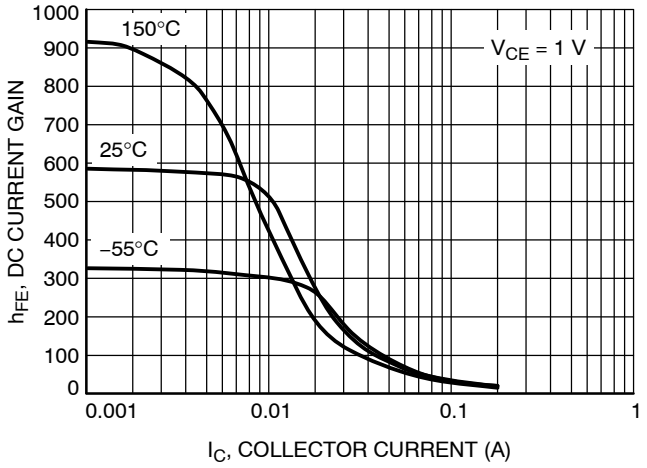


Figure 25. DC Current Gain vs. Collector Current

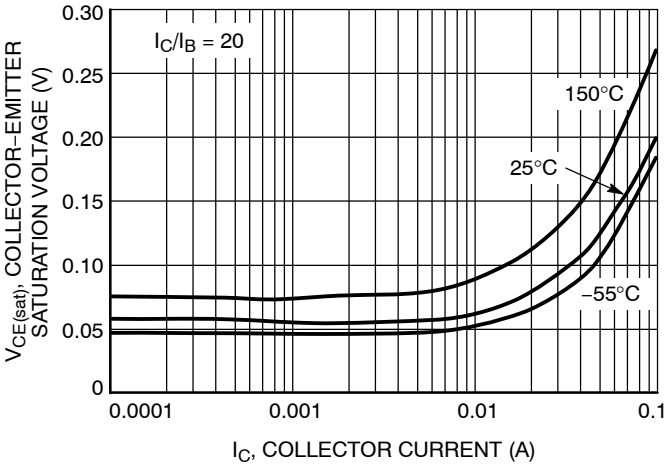


Figure 26. Collector Emitter Saturation Voltage vs. Collector Current

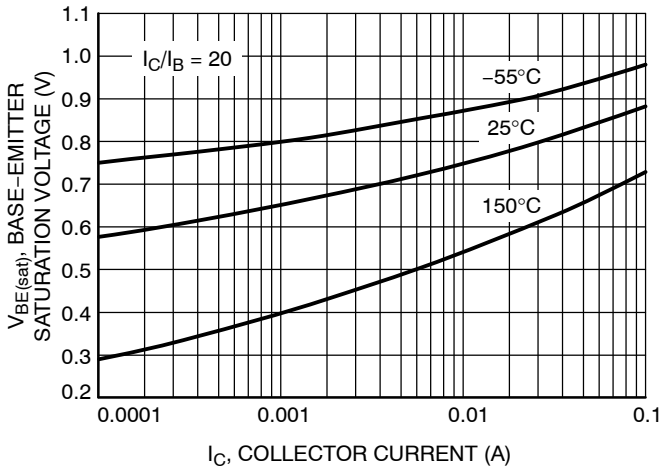


Figure 27. Base Emitter Saturation Voltage vs. Collector Current

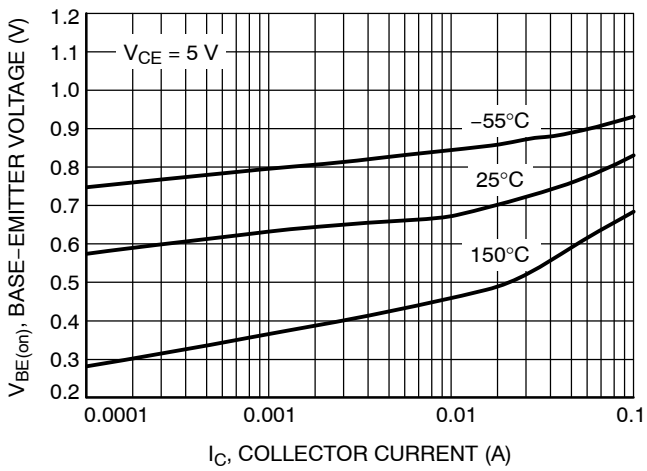


Figure 28. Base Emitter Voltage vs. Collector Current

BC847C, BC848C

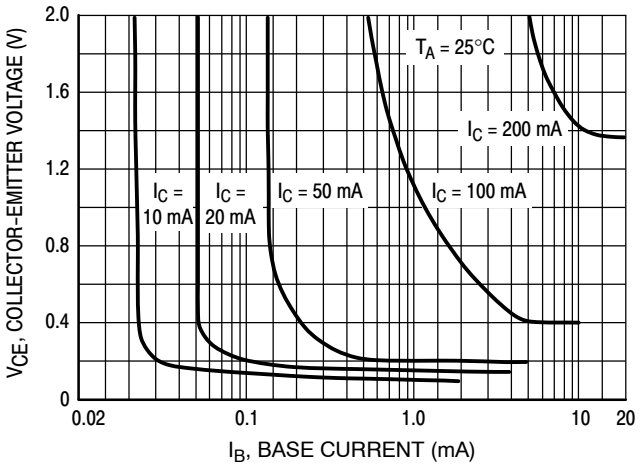


Figure 29. Collector Saturation Region

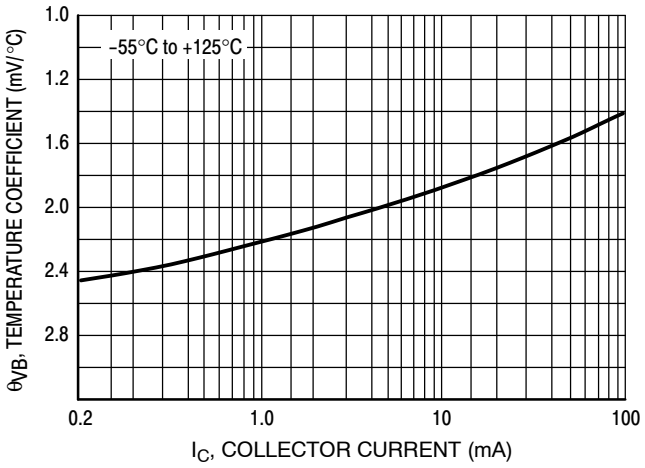


Figure 30. Base−Emitter Temperature Coefficient

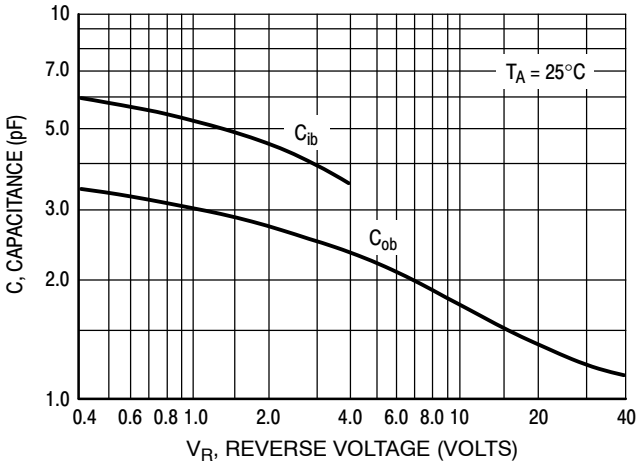


Figure 31. Capacitances

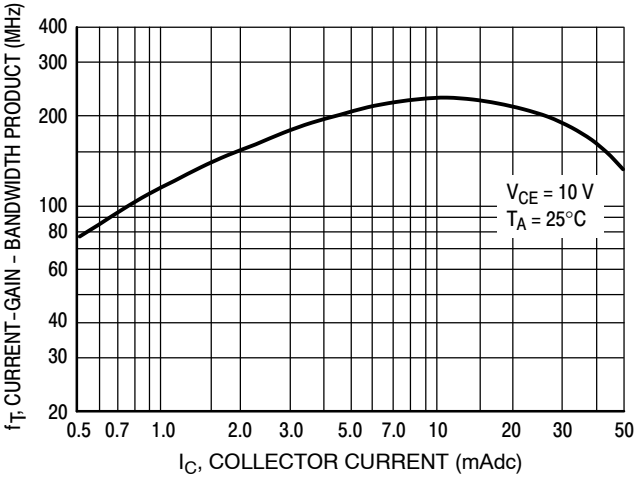


Figure 32. Current−Gain − Bandwidth Product

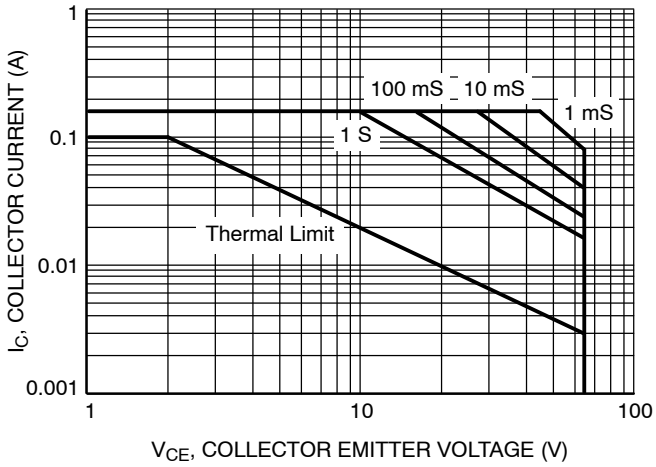


Figure 33. Safe Operating Area for BC846A, BC846B

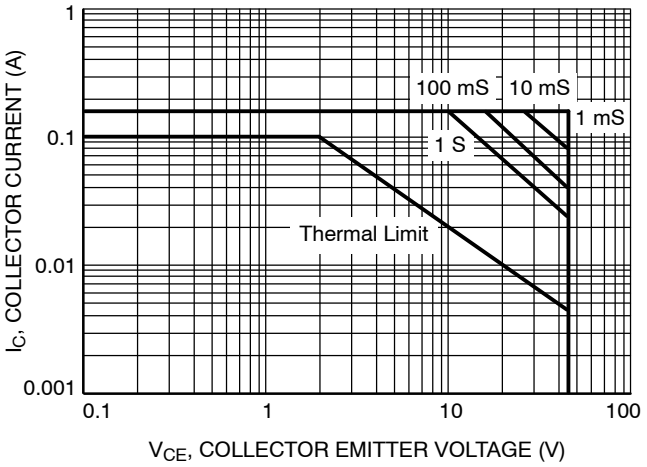


Figure 34. Safe Operating Area for BC847A, BC847B, BC847C

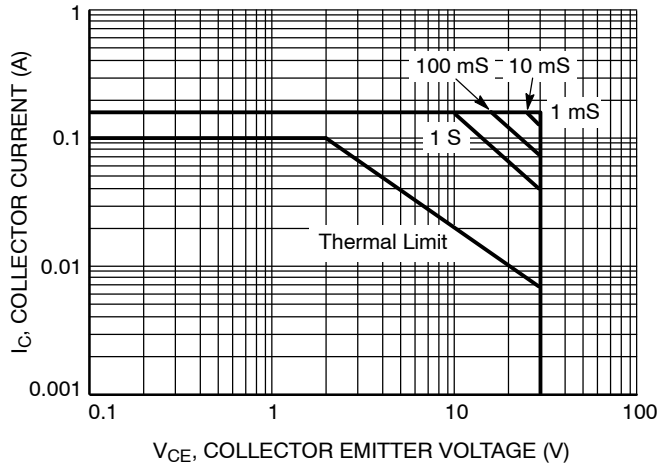


Figure 35. Safe Operating Area for BC848A, BC848B, BC848C

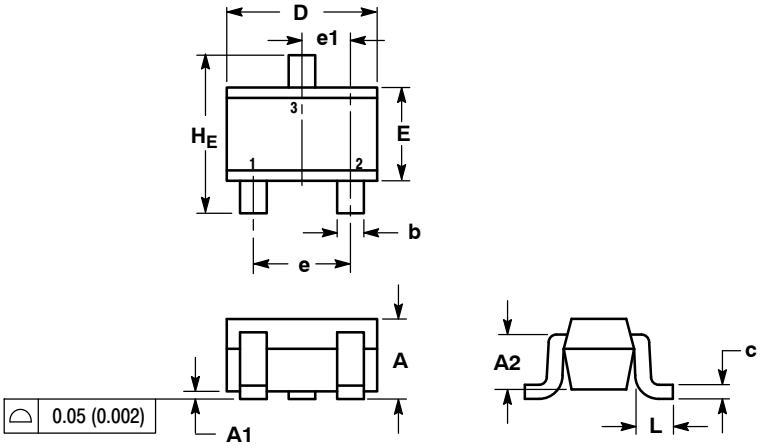
DEVICE ORDERING AND SPECIFIC MARKING INFORMATION

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.

PACKAGE DIMENSIONS

SC−70 (SOT−323)
CASE 419−04
ISSUE N

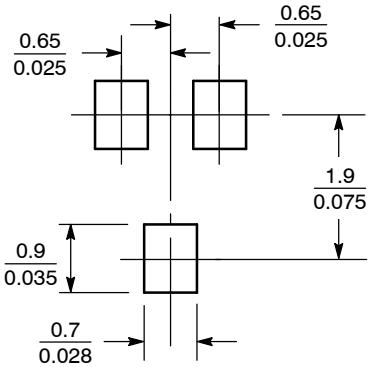


NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.

	MILLIMETERS			INCHES		
DIM	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
H_E	2.00	2.10	2.40	0.079	0.083	0.095

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

SOLDERING FOOTPRINT*



SCALE 10:1 $\left(\frac{\text{mm}}{\text{inches}}\right)$

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

PUBLICATION ORDERING INFORMATION

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