BC846ALT1G Series

General Purpose Transistors

NPN Silicon

Features

- Moisture Sensitivity Level: 1
- ESD Rating − Human Body Model: >4000 V
  − Machine Model: >400 V
- 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, BC850 BC848, BC849	V_{CEO}	 65 45 30	Vdc
Collector−Base Voltage BC846 BC847, BC850 BC848, BC849	V_{CBO}	 80 50 30	Vdc
Emitter−Base Voltage BC846 BC847, BC850 BC848, BC849	V_{EBO}	 6.0 6.0 5.0	Vdc
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°C Derate above 25°C	P_D	225 1.8	mW mW/°C
Thermal Resistance, Junction−to−Ambient (Note 1)	$R_{\theta JA}$	556	°C/W
Total Device Dissipation Alumina Substrate (Note 2) T_A = 25°C Derate above 25°C	P_D	300 2.4	mW mW/°C
Thermal Resistance, Junction−to−Ambient (Note 2)	$R_{\theta JA}$	417	°C/W
Junction and Storage Temperature Range	T_J, T_{stg}	−55 to +150	°C

1. FR−5 = 1.0 × 0.75 × 0.062 in.
2. Alumina = 0.4 × 0.3 × 0.024 in 99.5% alumina.

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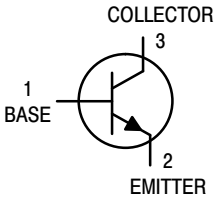
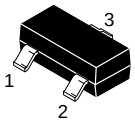
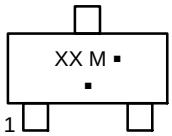




SOT−23
CASE 318
STYLE 6

MARKING DIAGRAM



XX = 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

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

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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)	BC846A, B	$V_{(BR)CEO}$	65	−	−	V
	BC847A, B, C, BC850B, C		45	−	−	
	BC848A, B, C, BC849B, C		30	−	−	
Collector−Emitter Breakdown Voltage (I_C = 10 μA, V_{EB} = 0)	BC846A, B	$V_{(BR)CES}$	80	−	−	V
	BC847A, B, C BC850B, C		50	−	−	
	BC848A, B, C, BC849B, C		30	−	−	
Collector−Base Breakdown Voltage (I_C = 10 μA)	BC846A, B	$V_{(BR)CBO}$	80	−	−	V
	BC847A, B, C, BC850B, C		50	−	−	
	BC848A, B, C, BC849B, C		30	−	−	
Emitter−Base Breakdown Voltage (I_E = 1.0 μA)	BC846A, B	$V_{(BR)EBO}$	6.0	−	−	V
	BC847A, B, C, BC850B, C		6.0	−	−	
	BC848A, B, C, BC849B, C		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	BC846A, BC847A, BC848A	h_{FE}	−	90	−	−
(I_C = 10 μA, V_{CE} = 5.0 V)	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, BC849B, BC850B		200	290	450	
	BC847C, BC848C, BC849C, BC850C		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,		NF				dB
V_{CE} = 5.0 Vdc, R_S = 2.0 kΩ,	BC846A,B, BC847A,B,C, BC848A,B,C		−	−	10	
f = 1.0 kHz, BW = 200 Hz)	BC849B,C, BC850B,C		−	−	4.0	

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.

BC846A, BC847A, BC848A, SBC846A

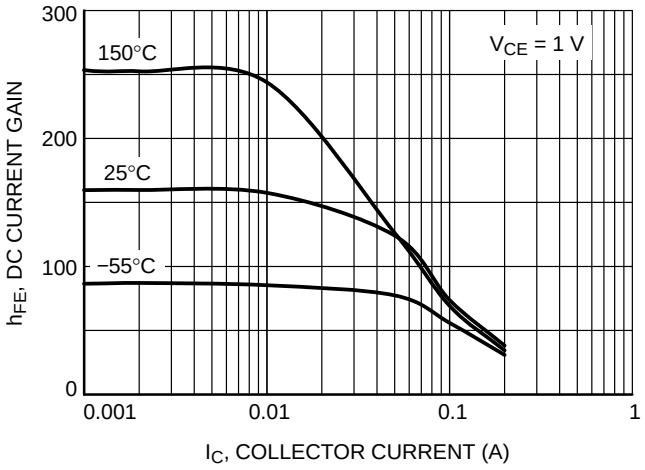


Figure 1. DC Current Gain vs. Collector Current

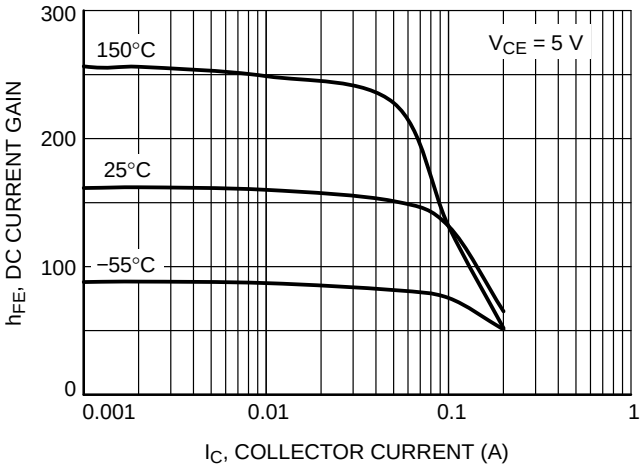


Figure 2. DC Current Gain vs. Collector Current

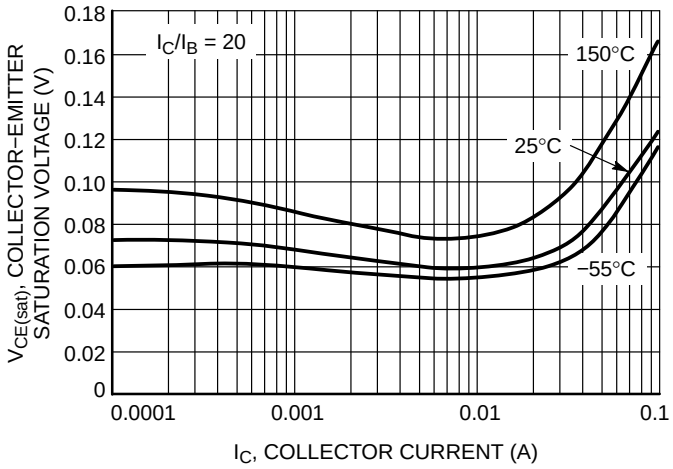


Figure 3. Collector Emitter Saturation Voltage vs. Collector Current

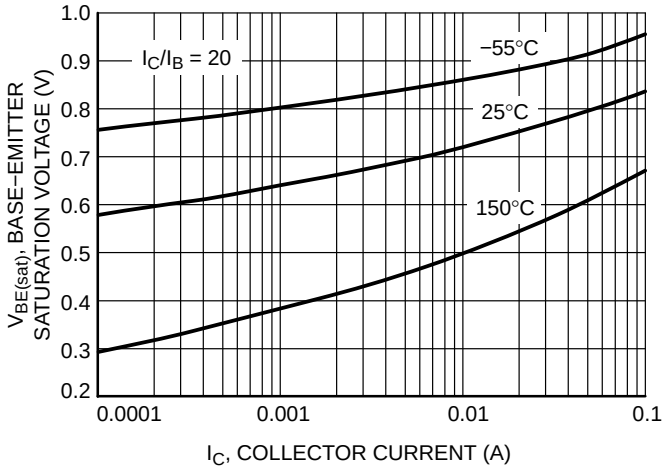


Figure 4. Base Emitter Saturation Voltage vs. Collector Current

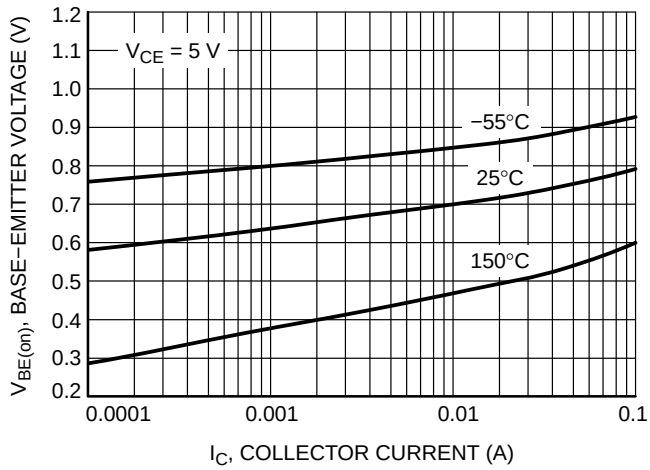


Figure 5. Base Emitter Voltage vs. Collector Current

BC846A, BC847A, BC848A, SBC846A

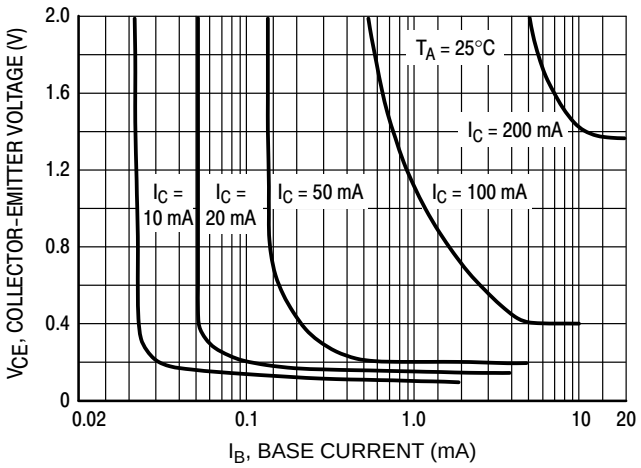


Figure 6. Collector Saturation Region

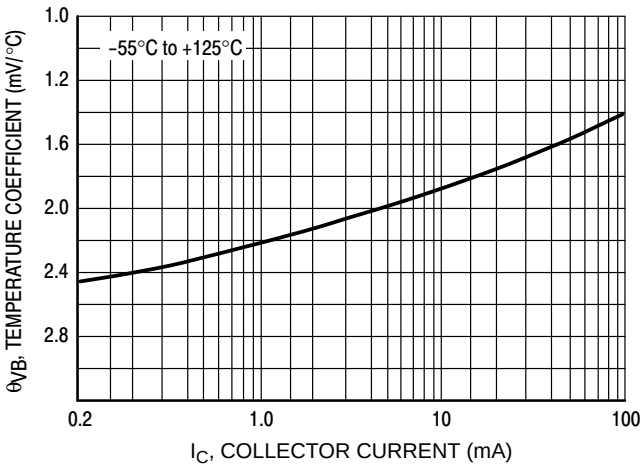


Figure 7. Base−Emitter Temperature Coefficient

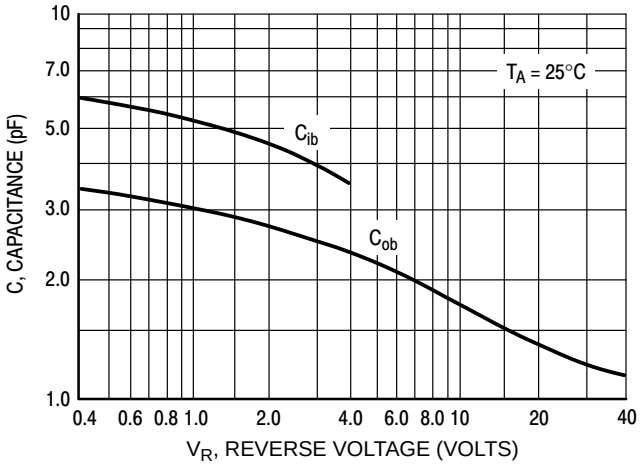


Figure 8. Capacitances

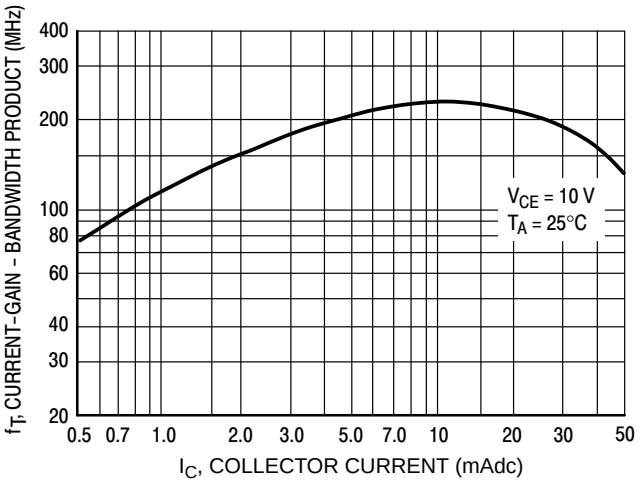


Figure 9. Current−Gain − Bandwidth Product

BC846B, SBC846B

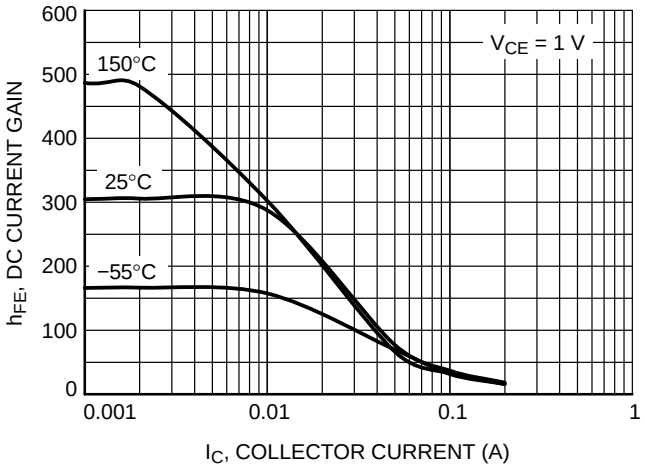


Figure 10. DC Current Gain vs. Collector Current

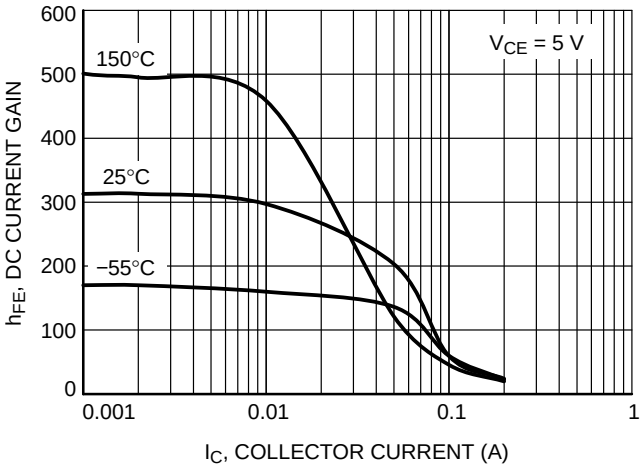


Figure 11. DC Current Gain vs. Collector Current

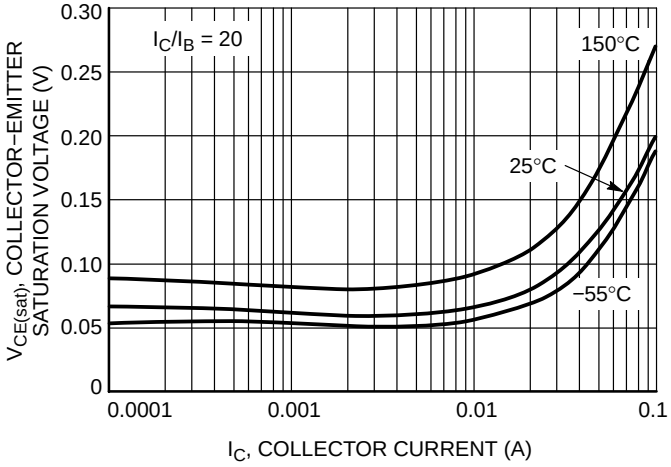


Figure 12. Collector Emitter Saturation Voltage vs. Collector Current

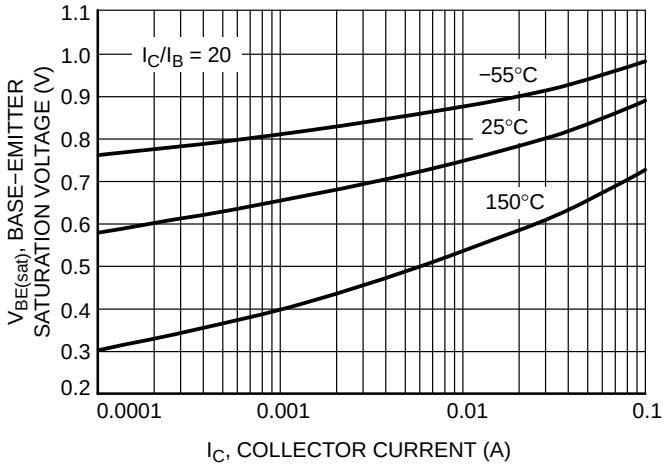


Figure 13. Base Emitter Saturation Voltage vs. Collector Current

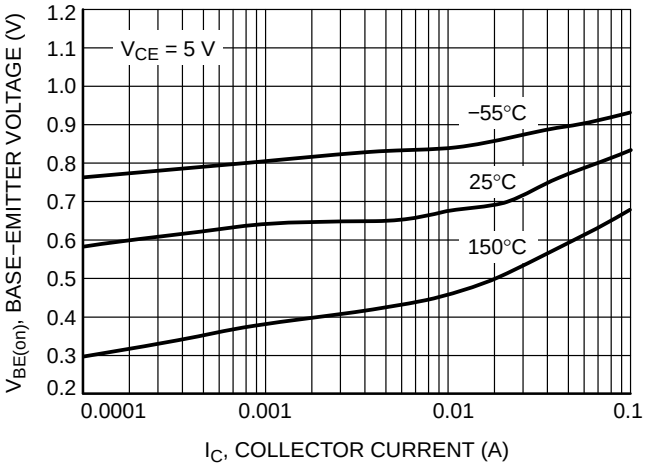


Figure 14. Base Emitter Voltage vs. Collector Current

BC846B, SBC846B

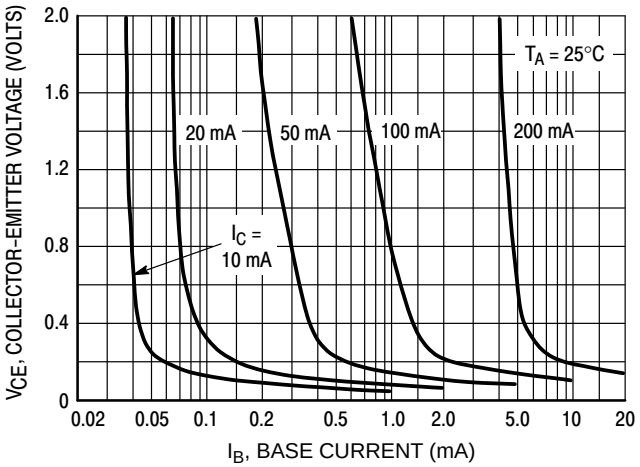


Figure 15. Collector Saturation Region

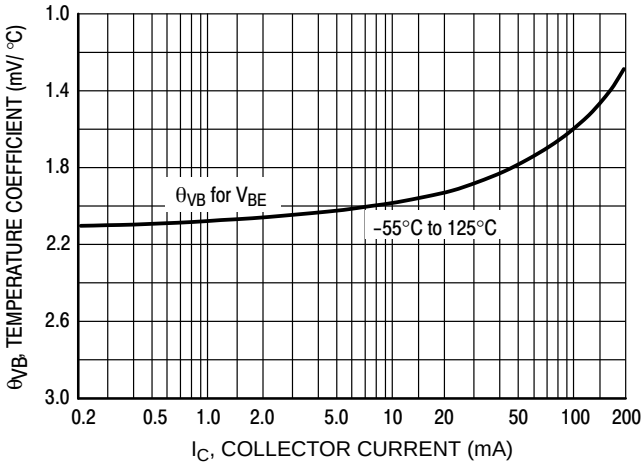


Figure 16. Base−Emitter Temperature Coefficient

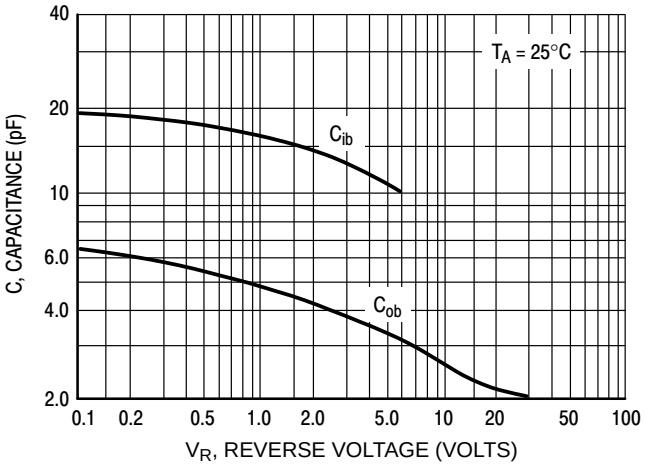


Figure 17. Capacitance

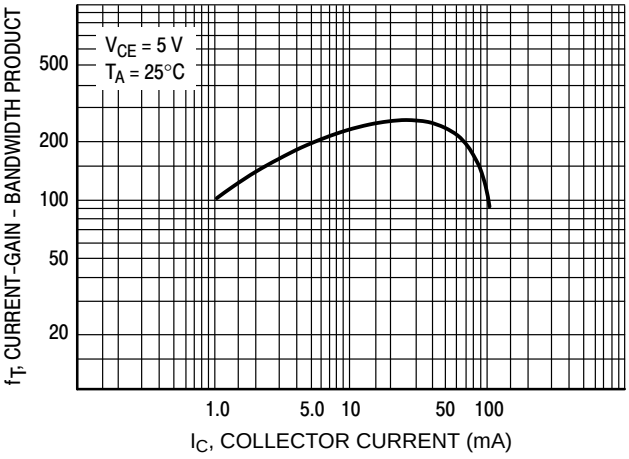


Figure 18. Current−Gain − Bandwidth Product

BC847B, BC848B, BC849B, BC850B, SBC847B, SBC848B

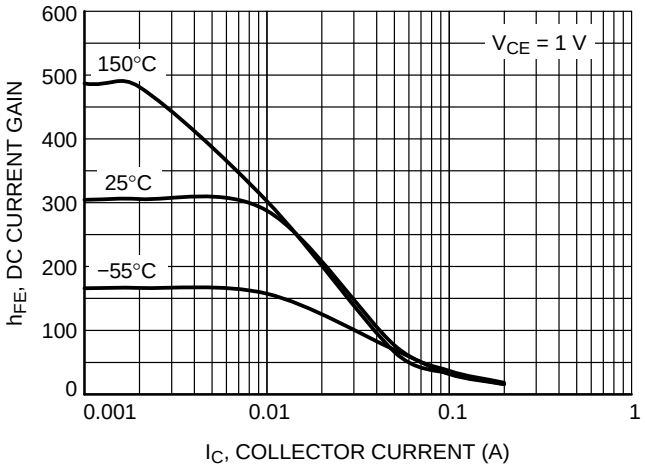


Figure 19. DC Current Gain vs. Collector Current

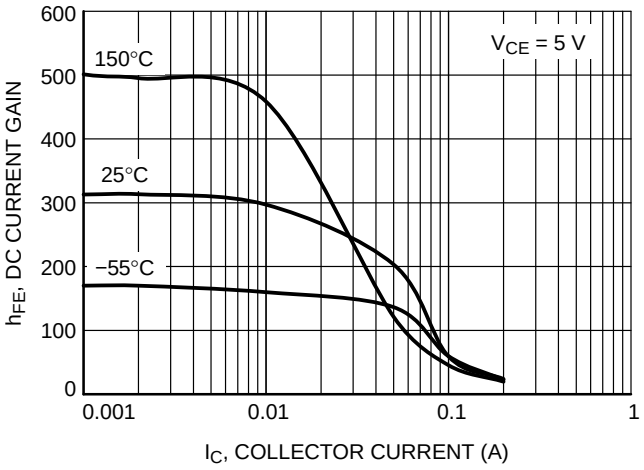


Figure 20. DC Current Gain vs. Collector Current

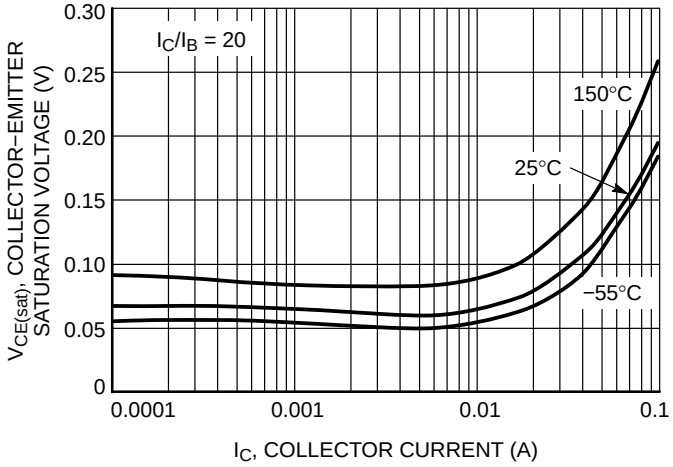


Figure 21. Collector Emitter Saturation Voltage vs. Collector Current

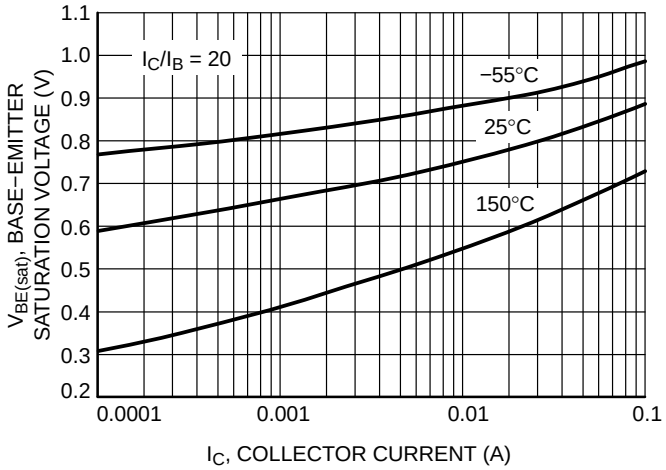


Figure 22. Base Emitter Saturation Voltage vs. Collector Current

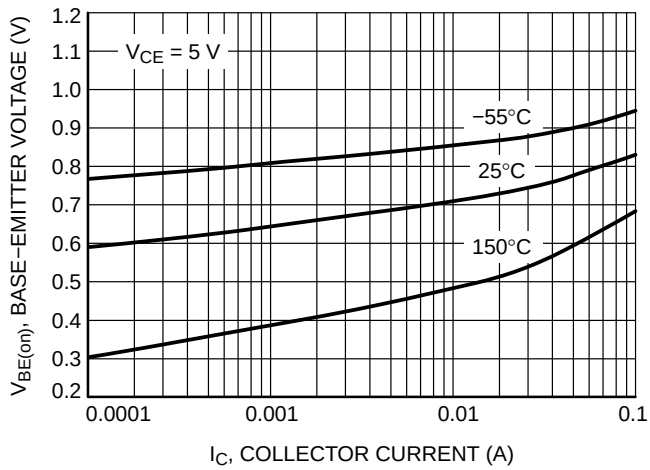


Figure 23. Base Emitter Voltage vs. Collector Current

BC847B, BC848B, BC849B, BC850B, SBC846B, SBC847B, SBC848B

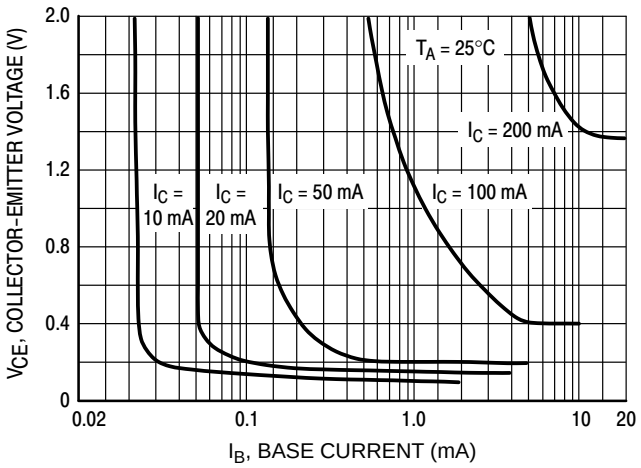


Figure 24. Collector Saturation Region

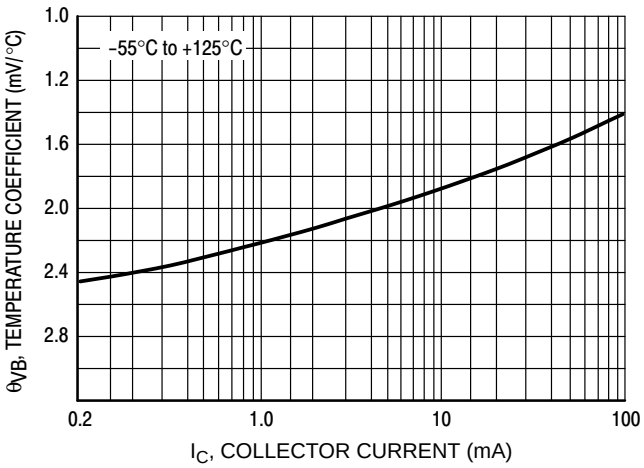


Figure 25. Base−Emitter Temperature Coefficient

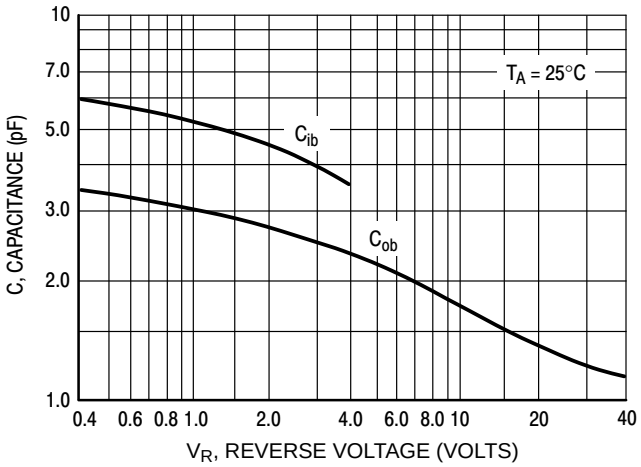


Figure 26. Capacitances

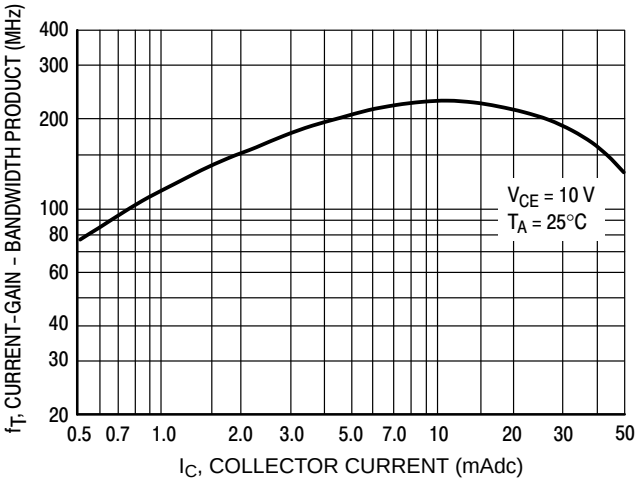


Figure 27. Current−Gain − Bandwidth Product

BC847C, BC848C, BC849C, BC850C, SBC847C

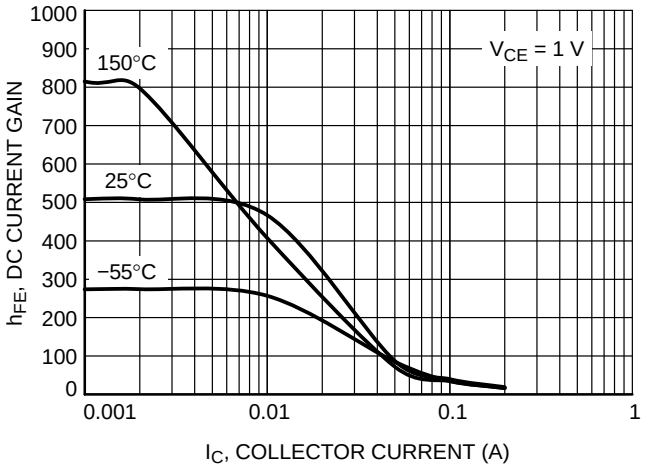


Figure 28. DC Current Gain vs. Collector Current

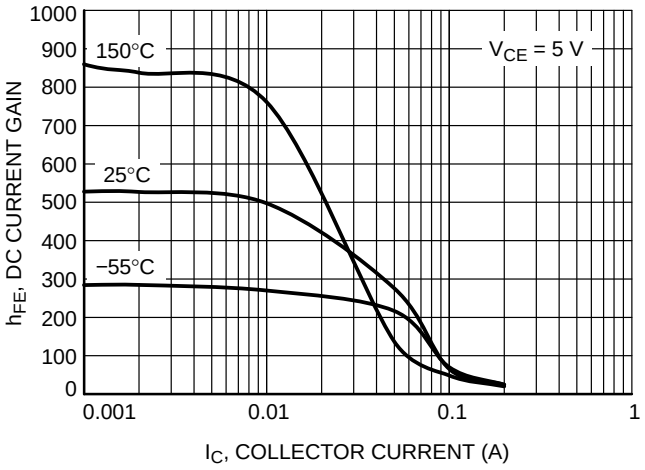


Figure 29. DC Current Gain vs. Collector Current

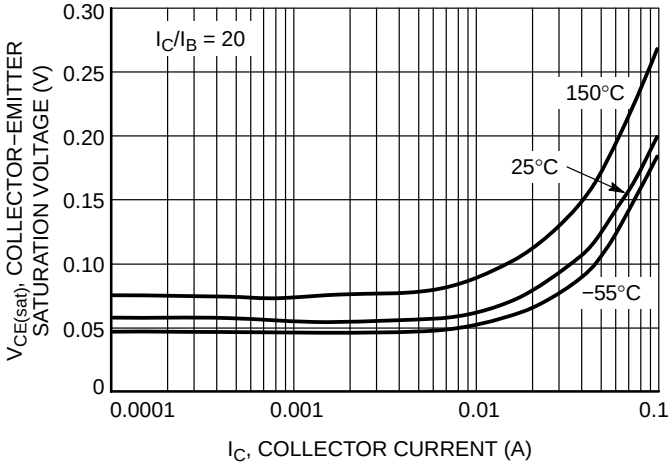


Figure 30. Collector Emitter Saturation Voltage vs. Collector Current

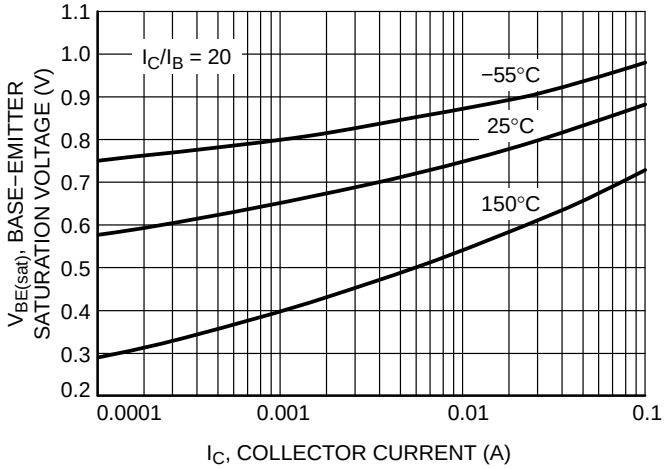


Figure 31. Base Emitter Saturation Voltage vs. Collector Current

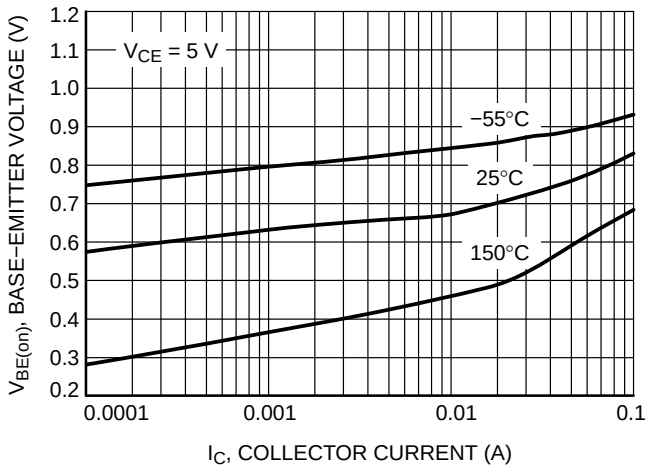


Figure 32. Base Emitter Voltage vs. Collector Current

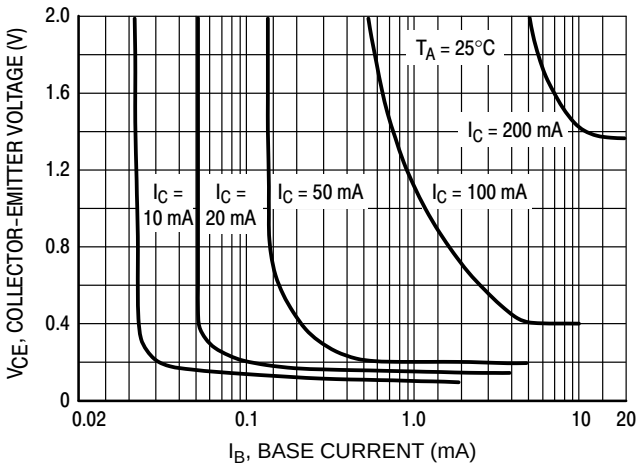


Figure 33. Collector Saturation Region

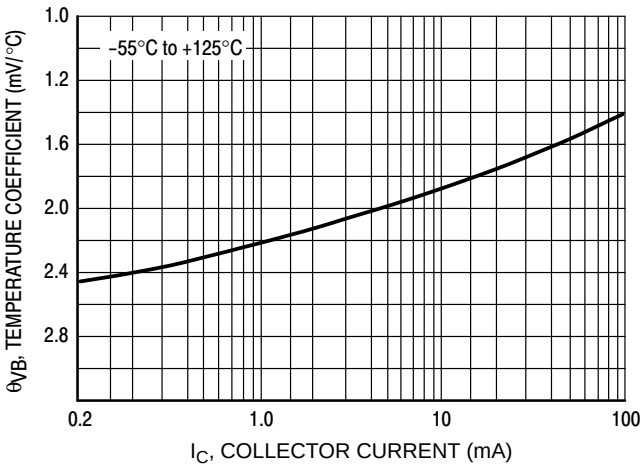


Figure 34. Base−Emitter Temperature Coefficient

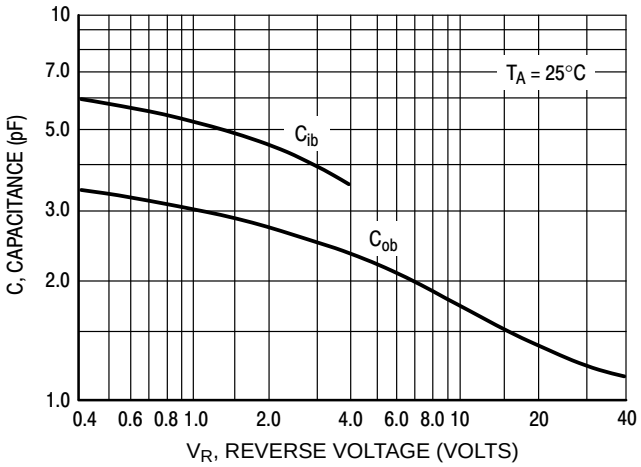


Figure 35. Capacitances

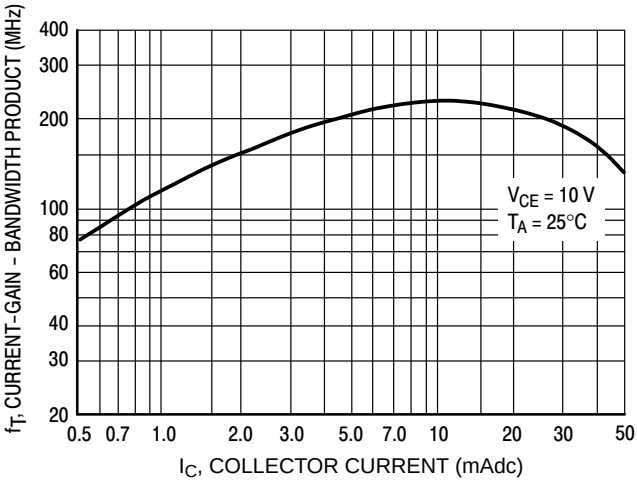


Figure 36. Current−Gain − Bandwidth Product

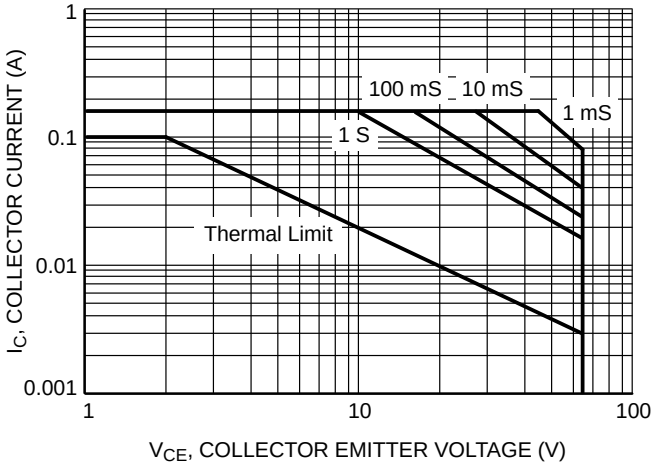


Figure 37. Safe Operating Area for BC846A, BC846B

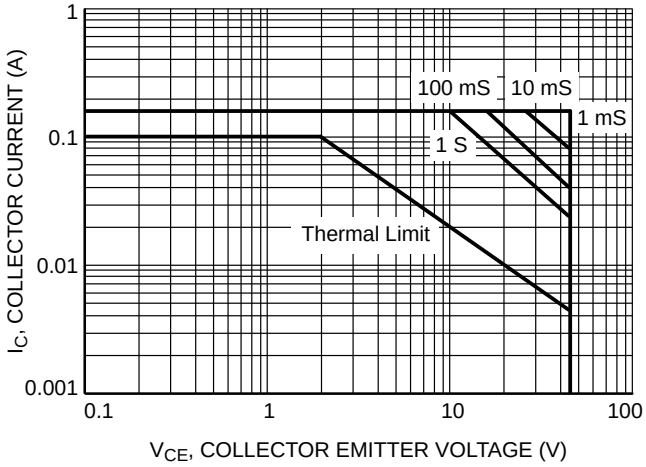


Figure 38. Safe Operating Area for BC847A, BC847B, BC847C, BC850B, BC850C

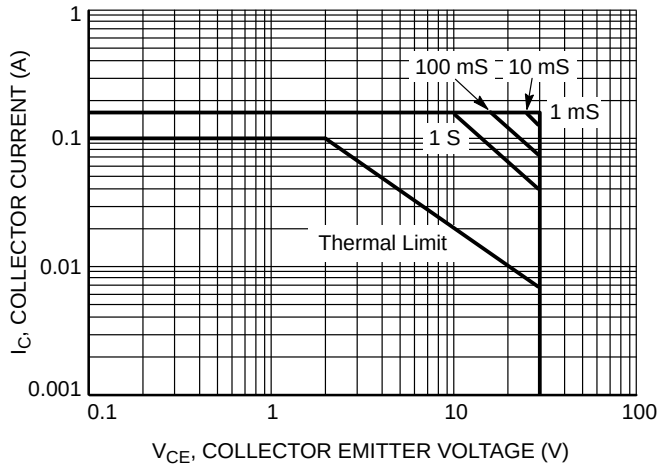


Figure 39. Safe Operating Area for BC848A, BC848B, BC848C, BC849B, BC849C

ORDERING INFORMATION

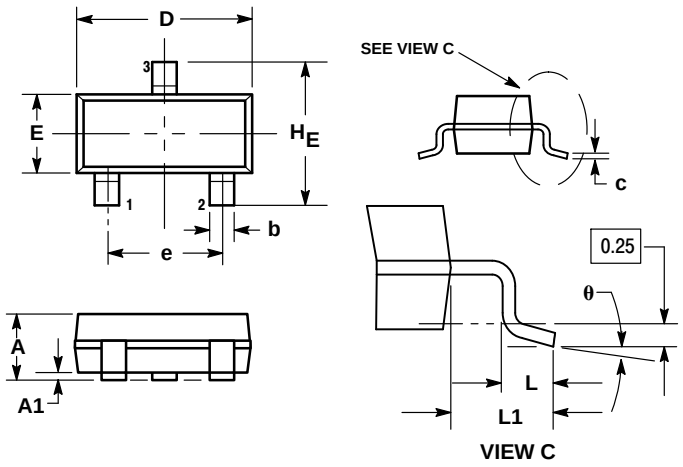
Device	Marking	Package	Shipping†
BC846ALT1G	1A	SOT−23 (Pb−Free)	3,000 / Tape & Reel
SBC846ALT1G*			
BC846ALT3G	1A	SOT−23 (Pb−Free)	10,000 / Tape & Reel
BC846BLT1G	1B	SOT−23 (Pb−Free)	3,000 / Tape & Reel
SBC846BLT1G*			
BC846BLT3G	1B	SOT−23 (Pb−Free)	10,000 / Tape & Reel
SBC846BLT3G*			
BC847ALT1G	1E	SOT−23 (Pb−Free)	3,000 / Tape & Reel
BC847ALT3G		SOT−23 (Pb−Free)	10,000 / Tape & Reel
BC847BLT1G	1F	SOT−23 (Pb−Free)	3,000 / Tape & Reel
SBC847BLT1G*			
BC847BLT3G	1F	SOT−23 (Pb−Free)	10,000 / Tape & Reel
NSVBC847BLT3G*			
BC847CLT1G	1G	SOT−23 (Pb−Free)	3,000 / Tape & Reel
SBC847CLT1G*			
BC847CLT3G	1G	SOT−23 (Pb−Free)	10,000 / Tape & Reel
BC848ALT1G	1J	SOT−23 (Pb−Free)	3,000 / Tape & Reel
BC848BLT1G	1K	SOT−23 (Pb−Free)	3,000 / Tape & Reel
SBC848BLT1G*			
BC848BLT3G	1K	SOT−23 (Pb−Free)	10,000 / Tape & Reel
BC848CLT1G	1L	SOT−23 (Pb−Free)	3,000 / Tape & Reel
BC848CLT3G		SOT−23 (Pb−Free)	10,000 / Tape & Reel
BC849BLT1G	2B	SOT−23 (Pb−Free)	3,000 / Tape & Reel
BC849BLT3G		SOT−23 (Pb−Free)	10,000 / Tape & Reel
BC849CLT1G	2C	SOT−23 (Pb−Free)	3,000 / Tape & Reel
BC849CLT3G		SOT−23 (Pb−Free)	10,000 / Tape & Reel
BC850BLT1G	2F	SOT−23 (Pb−Free)	3,000 / Tape & Reel
NSVBC850BLT1G*			
BC850CLT1G	2G	SOT−23 (Pb−Free)	
NSVBC850CLT1G*			

†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.

PACKAGE DIMENSIONS

SOT−23 (TO−236)
CASE 318−08
ISSUE AP

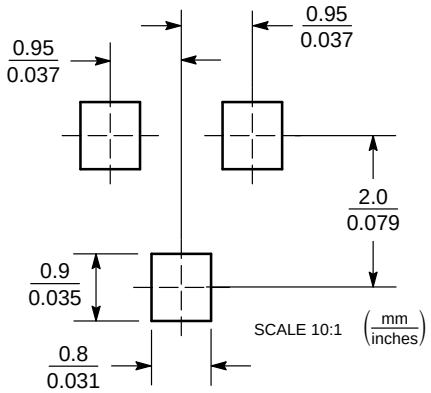


NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH THICKNESS. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.
4. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS.

	MILLIMETERS			INCHES		
DIM	MIN	NOM	MAX	MIN	NOM	MAX
A	0.89	1.00	1.11	0.035	0.040	0.044
A1	0.01	0.06	0.10	0.001	0.002	0.004
b	0.37	0.44	0.50	0.015	0.018	0.020
c	0.09	0.13	0.18	0.003	0.005	0.007
D	2.80	2.90	3.04	0.110	0.114	0.120
E	1.20	1.30	1.40	0.047	0.051	0.055
e	1.78	1.90	2.04	0.070	0.075	0.081
L	0.10	0.20	0.30	0.004	0.008	0.012
L1	0.35	0.54	0.69	0.014	0.021	0.029
H_E	2.10	2.40	2.64	0.083	0.094	0.104
θ	0°	−−−	10°	0°	−−−	10°

STYLE 6:
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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