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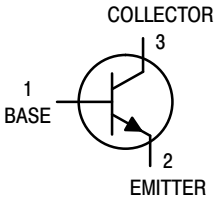
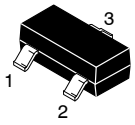
General Purpose Transistors
NPN Silicon

BC846ALT1G Series





SOT−23
CASE 318
STYLE 6

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

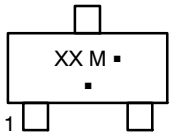
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

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.

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.

NOTE: Some of the devices on this data sheet have been **DISCONTINUED**. Please refer to the table on page 12.

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, C	$V_{(BR)CEO}$	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, C	$V_{(BR)CES}$	80	–	–	V
	BC847A, B, C BC850B, C		50	–	–	
	BC848A, B, C, BC849B, C		30	–	–	
Collector – Base Breakdown Voltage (I_C = 10 μA)	BC846A, B, C	$V_{(BR)CBO}$	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, C	$V_{(BR)EBO}$	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	–	
	BC846C, 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	
	BC846C, 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, V_{CE} = 5.0 Vdc, R_S = 2.0 kΩ, f = 1.0 kHz, BW = 200 Hz)		NF				dB
	BC846A,B,C, BC847A,B,C, BC848A,B,C		–	–	10	
	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

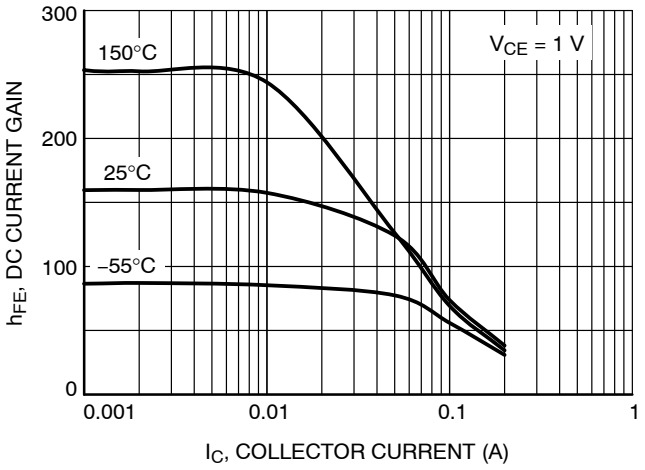


Figure 1. DC Current Gain vs. Collector Current

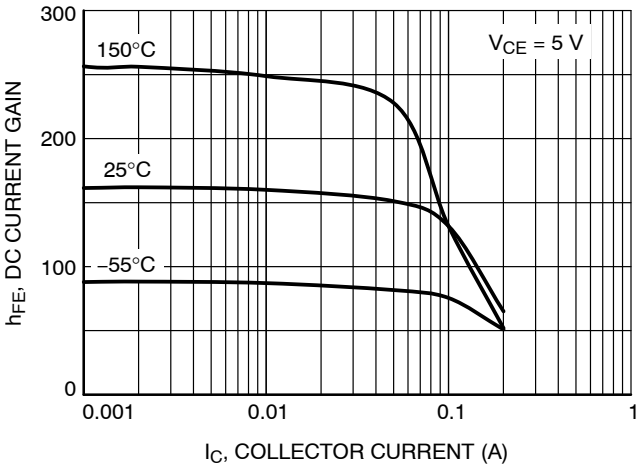


Figure 2. DC Current Gain vs. Collector Current

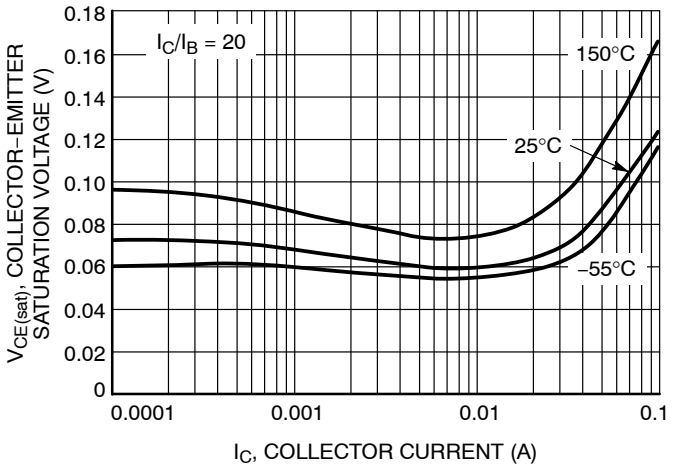


Figure 3. Collector Emitter Saturation Voltage vs. Collector Current

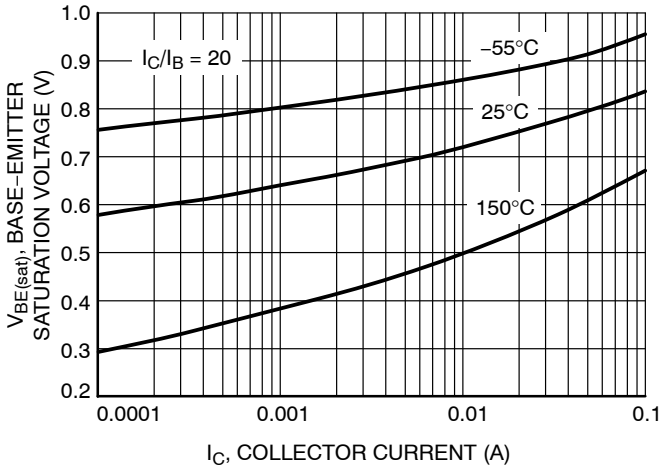


Figure 4. Base Emitter Saturation Voltage vs. Collector Current

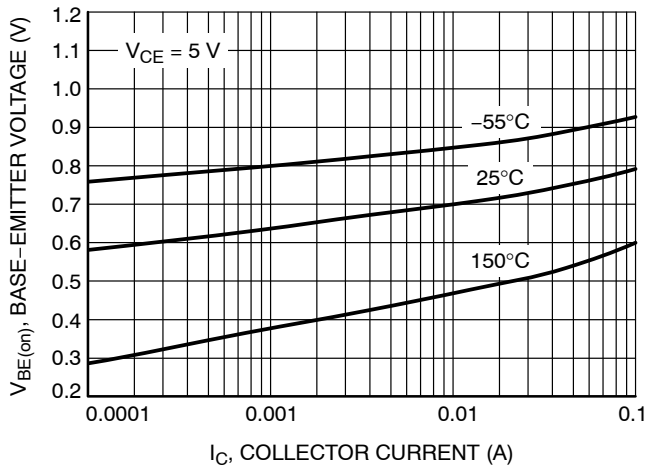


Figure 5. Base Emitter Voltage vs. Collector Current

BC846A, BC847A, BC848A, SBC846A

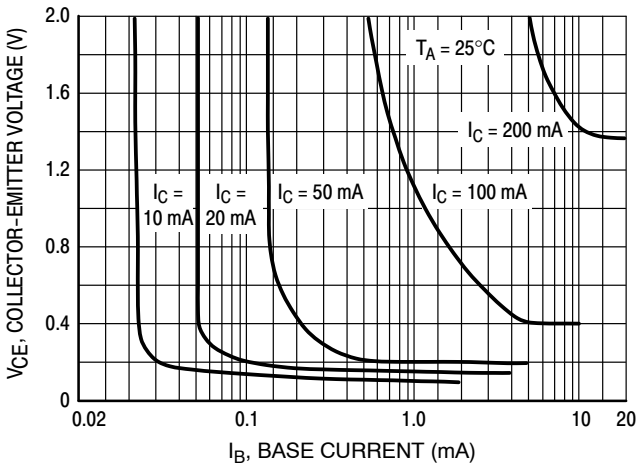


Figure 6. Collector Saturation Region

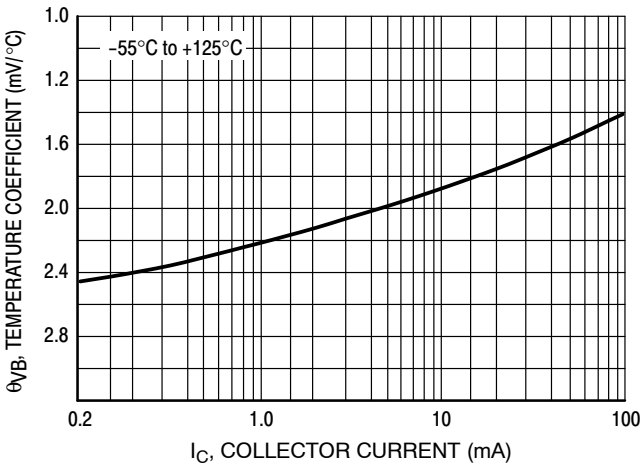


Figure 7. Base−Emitter Temperature Coefficient

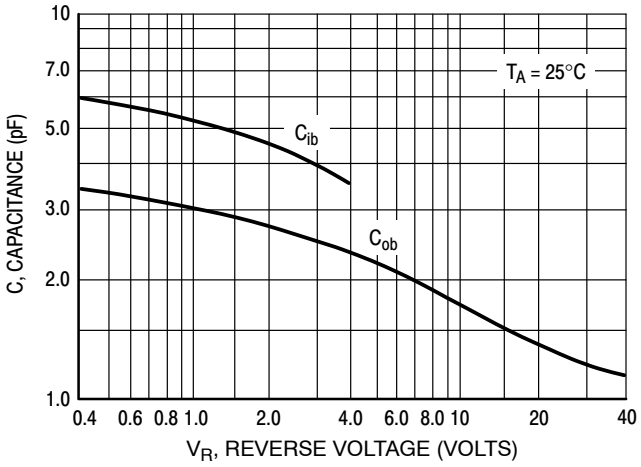


Figure 8. Capacitances

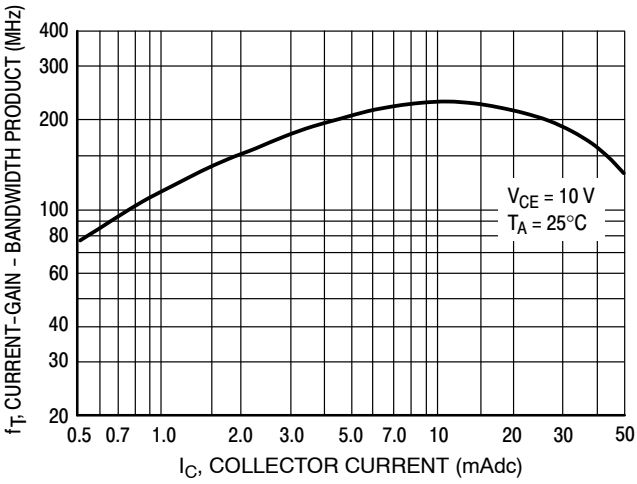


Figure 9. Current−Gain − Bandwidth Product

BC846B, SBC846B

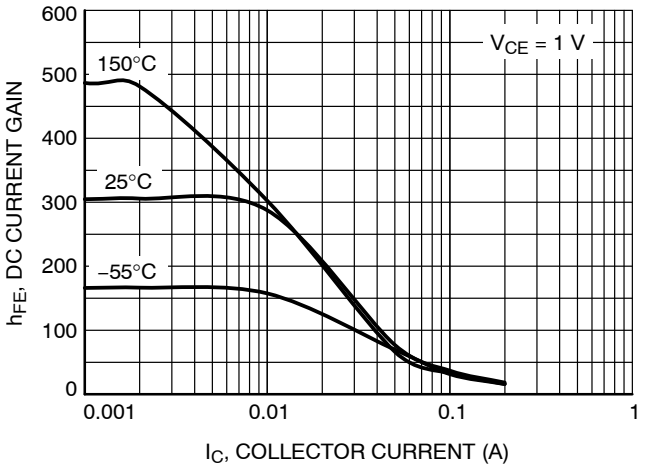


Figure 10. DC Current Gain vs. Collector Current

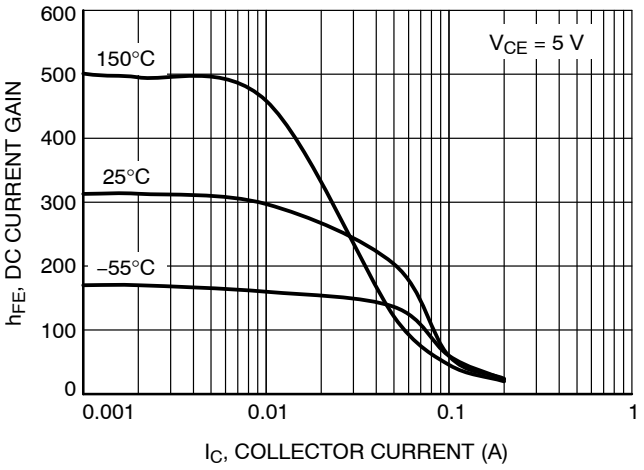


Figure 11. DC Current Gain vs. Collector Current

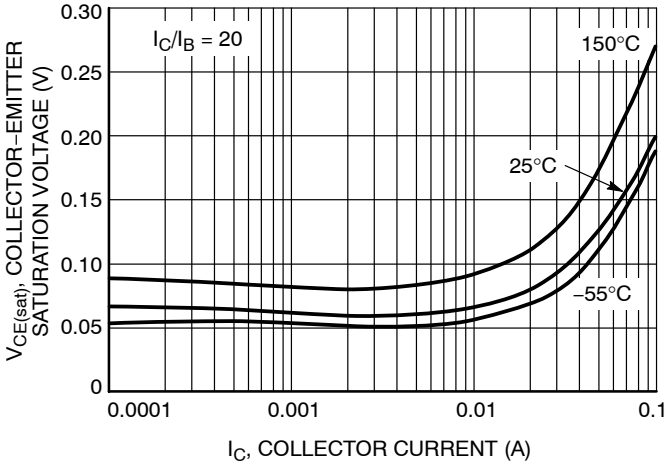


Figure 12. Collector Emitter Saturation Voltage vs. Collector Current

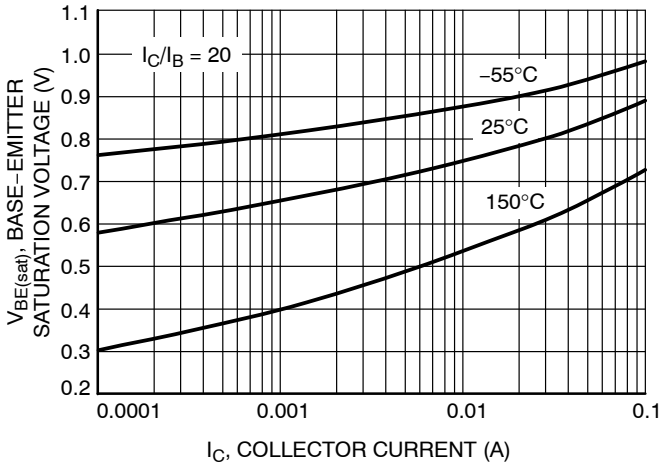


Figure 13. Base Emitter Saturation Voltage vs. Collector Current

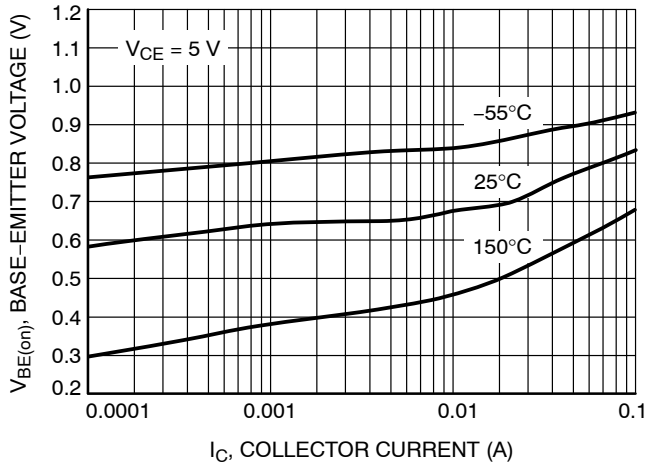


Figure 14. Base Emitter Voltage vs. Collector Current

BC846B, SBC846B

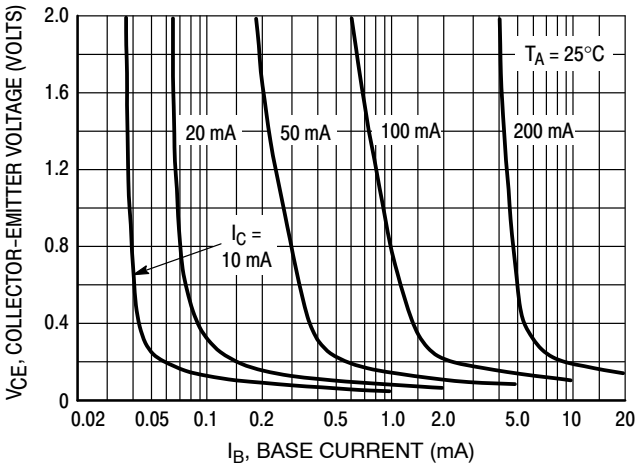


Figure 15. Collector Saturation Region

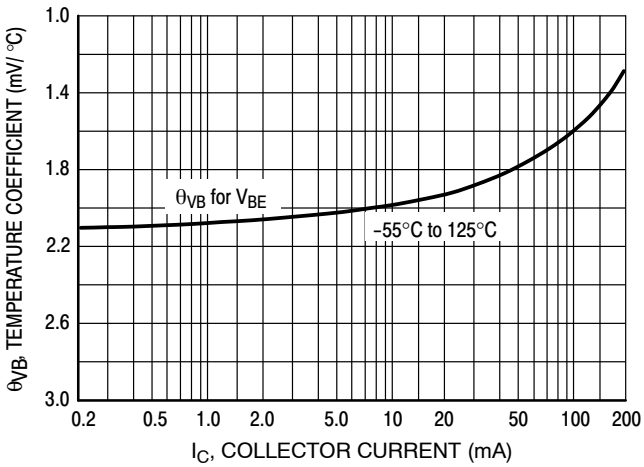


Figure 16. Base−Emitter Temperature Coefficient

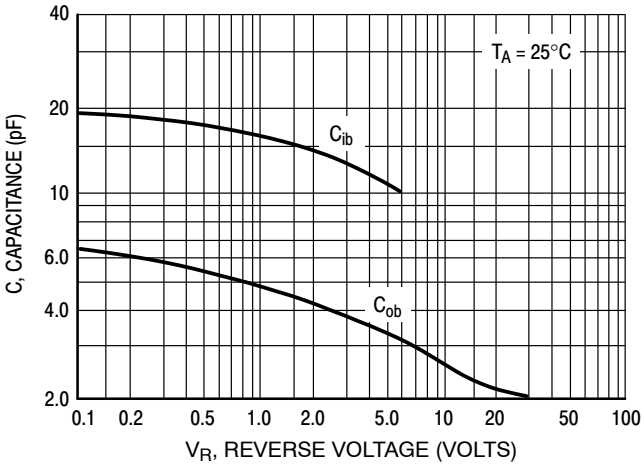


Figure 17. Capacitance

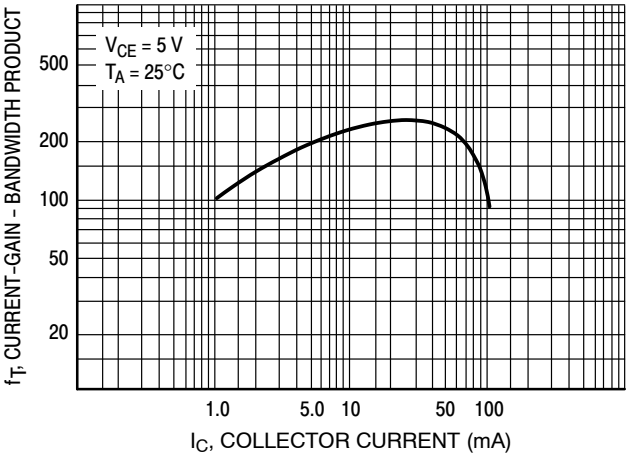


Figure 18. Current−Gain − Bandwidth Product

BC847B, BC848B, BC849B, BC850B, SBC847B, SBC848B

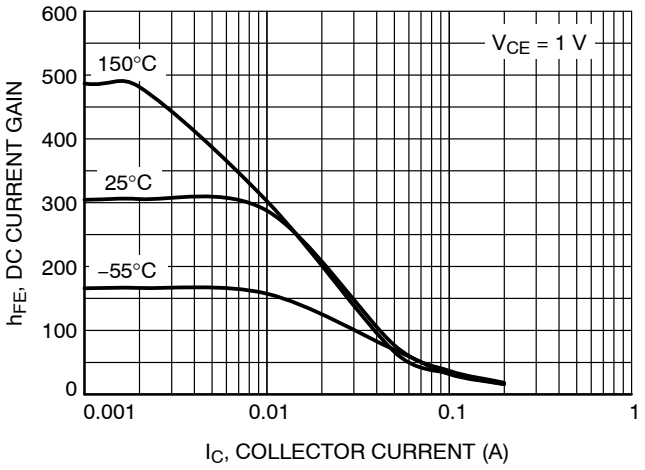


Figure 19. DC Current Gain vs. Collector Current

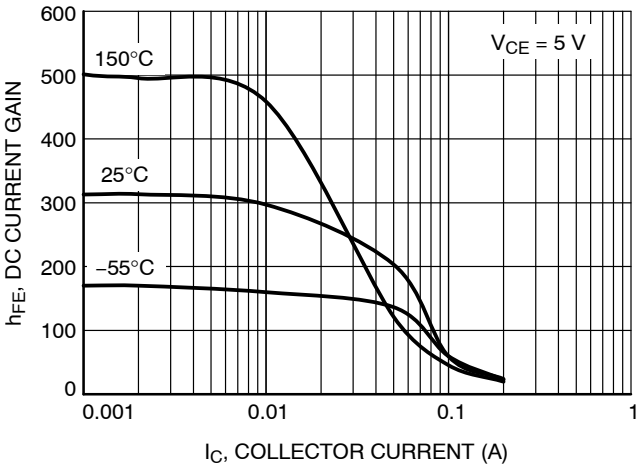


Figure 20. DC Current Gain vs. Collector Current

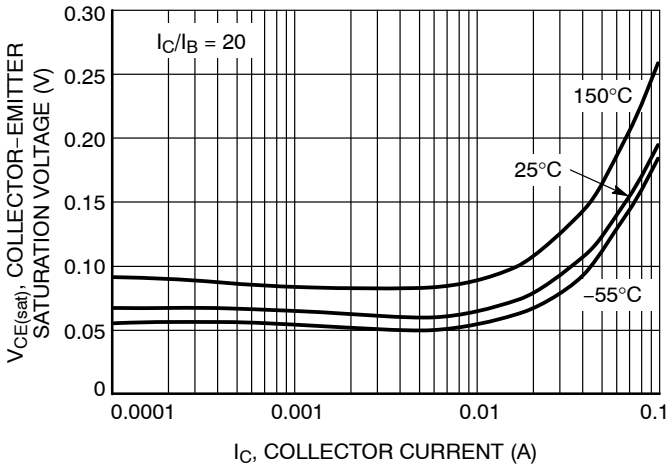


Figure 21. Collector Emitter Saturation Voltage vs. Collector Current

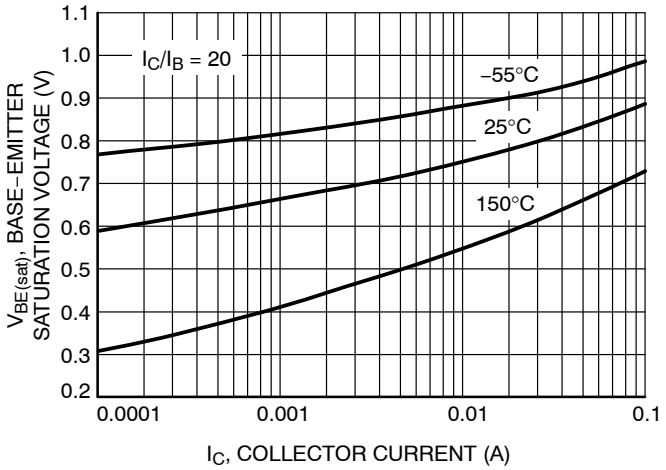


Figure 22. Base Emitter Saturation Voltage vs. Collector Current

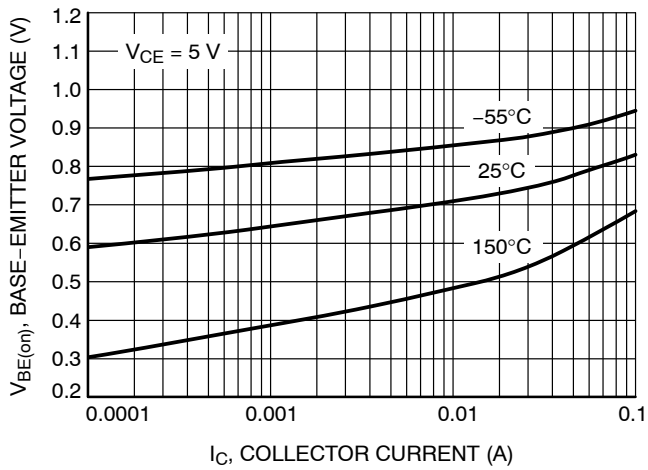


Figure 23. Base Emitter Voltage vs. Collector Current

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

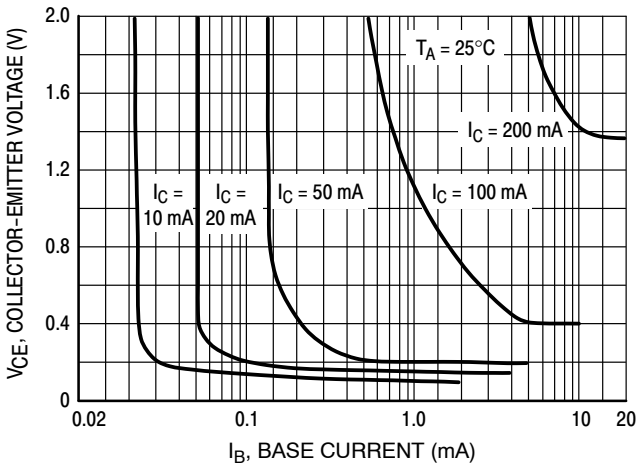


Figure 24. Collector Saturation Region

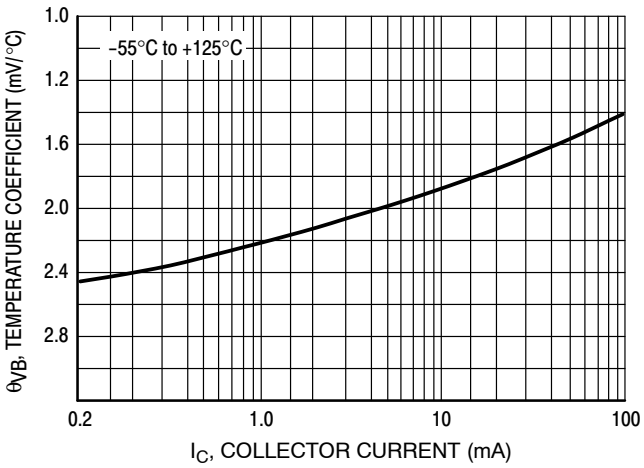


Figure 25. Base−Emitter Temperature Coefficient

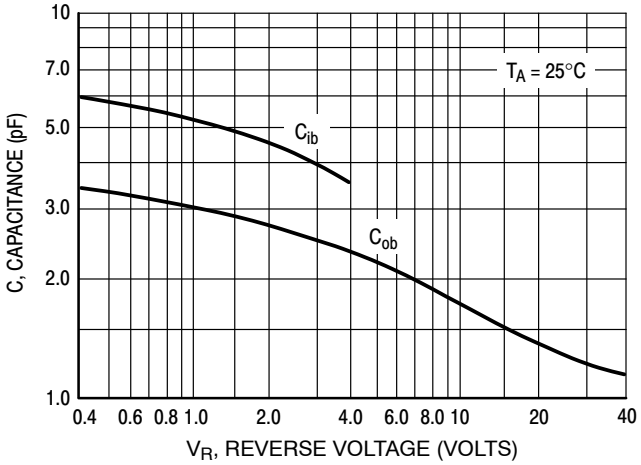


Figure 26. Capacitances

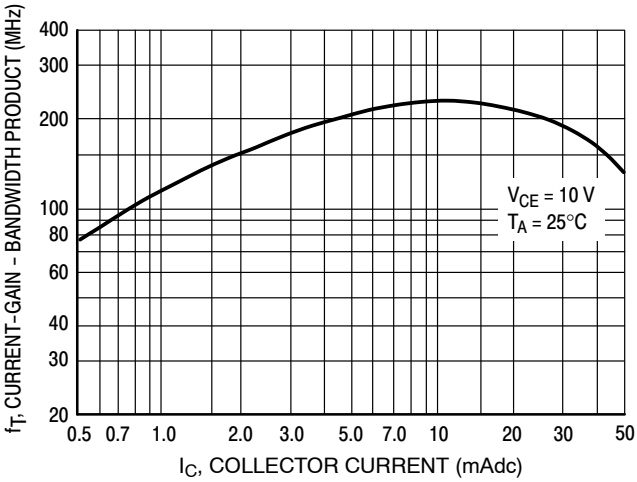


Figure 27. Current−Gain − Bandwidth Product

BC846C, BC847C, BC848C, BC849C, BC850C, SBC847C

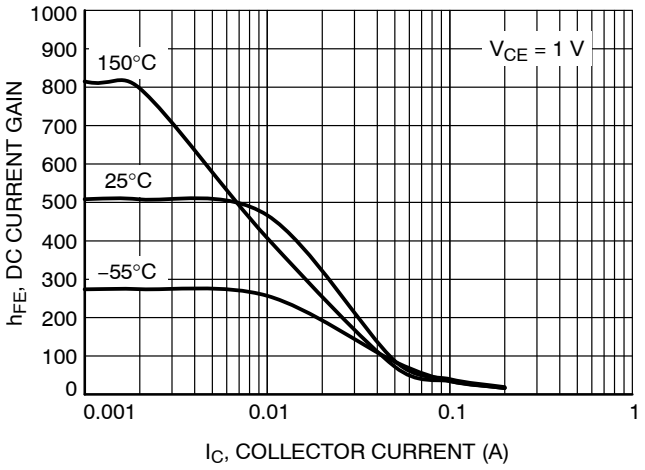


Figure 28. DC Current Gain vs. Collector Current

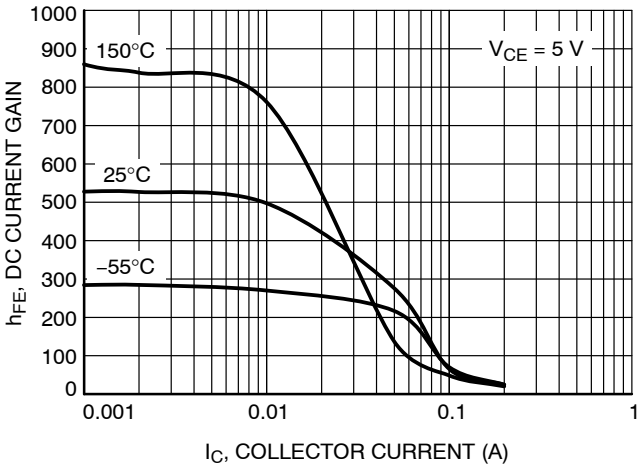


Figure 29. DC Current Gain vs. Collector Current

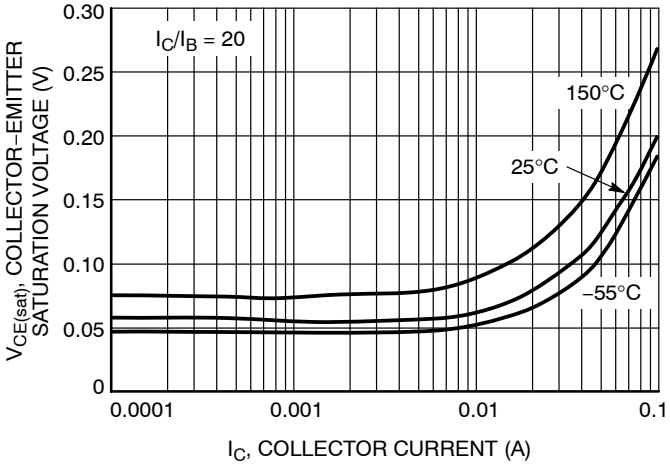


Figure 30. Collector Emitter Saturation Voltage vs. Collector Current

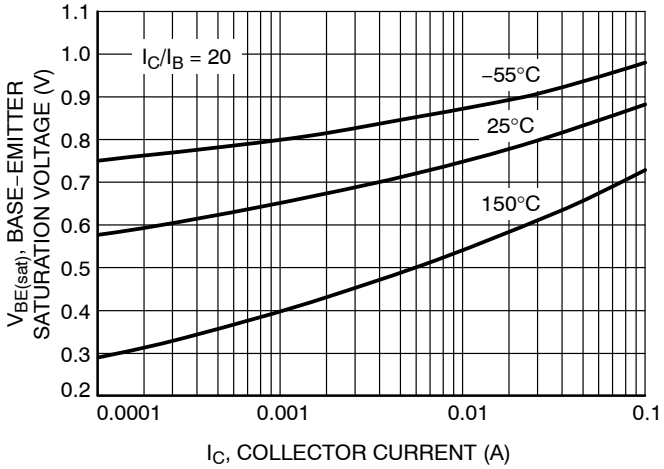


Figure 31. Base Emitter Saturation Voltage vs. Collector Current

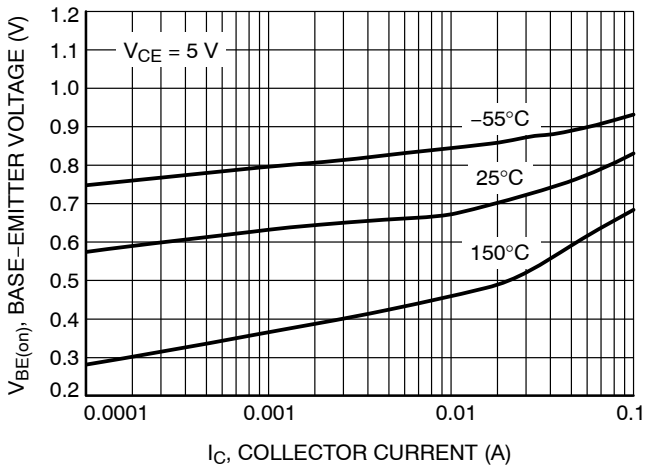


Figure 32. Base Emitter Voltage vs. Collector Current

BC846C, BC847C, BC848C, BC849C, BC850C, SBC847C

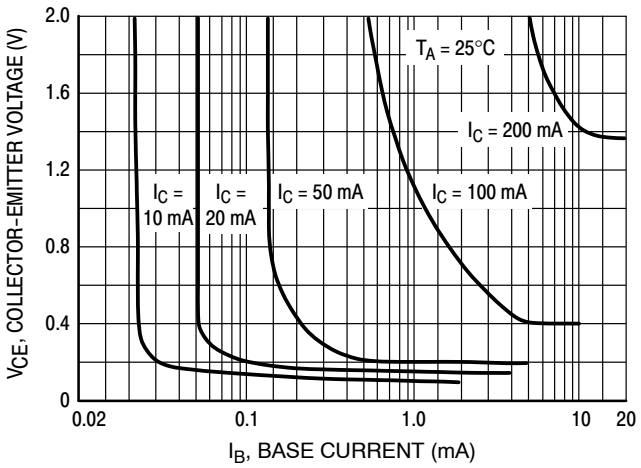


Figure 33. Collector Saturation Region

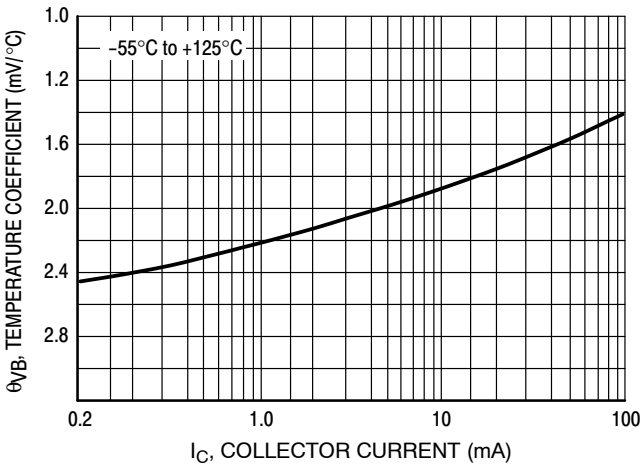


Figure 34. Base−Emitter Temperature Coefficient

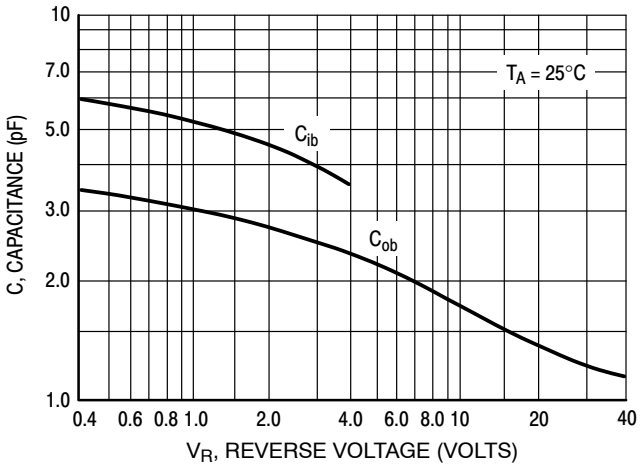


Figure 35. Capacitances

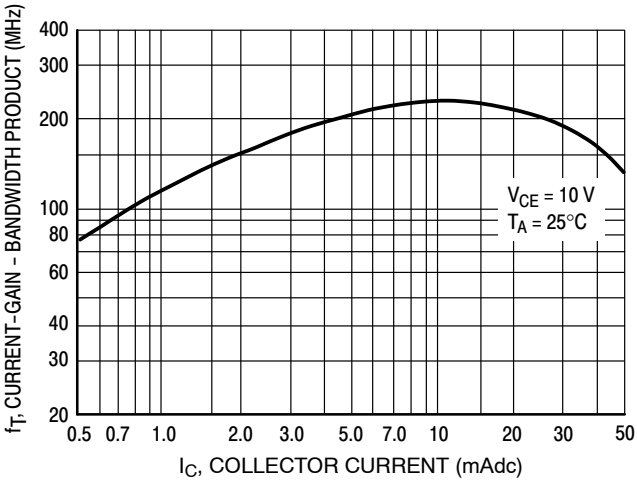


Figure 36. Current−Gain − Bandwidth Product

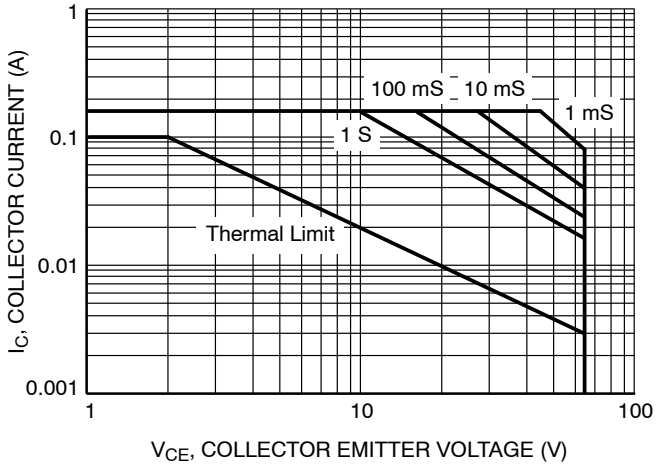


Figure 37. Safe Operating Area for BC846A, BC846B, BC846C

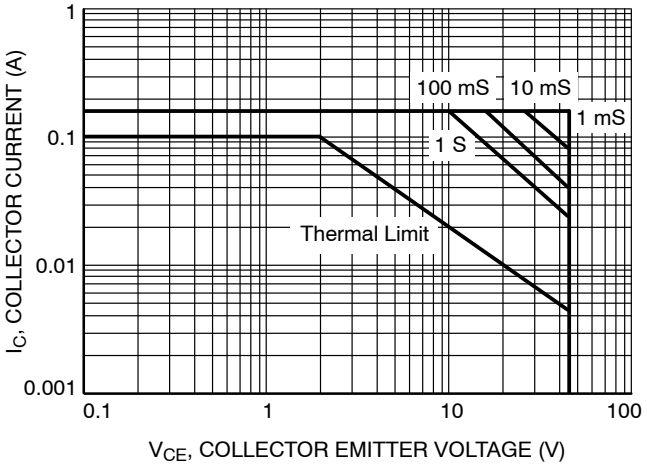


Figure 38. Safe Operating Area for BC847A, BC847B, BC847C, BC850B, BC850C

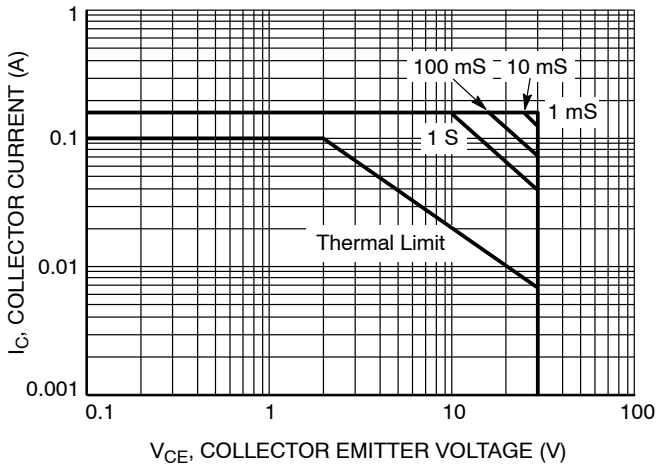


Figure 39. Safe Operating Area for BC848A, BC848B, BC848C, BC849B, BC849C

ORDERING INFORMATION

Device	Marking	Package	Shipping†
BC846ALT1G	1A	SOT−23 (Pb−Free)	3,000 / Tape & Reel
SBC846ALT1G*			
BC846ALT3G			10,000 / Tape & Reel
BC846BLT1G	1B		3,000 / Tape & Reel
SBC846BLT1G*			
BC846BLT3G			10,000 / Tape & Reel
SBC846BLT3G*			
BC846CLT1G	3C		3,000 / Tape & Reel
BC847ALT1G	1E		3,000 / Tape & Reel
BC847BLT1G	1F		3,000 / Tape & Reel
SBC847BLT1G*			
BC847BLT3G			10,000 / Tape & Reel
NSVBC847BLT3G*			
BC847CLT1G	1G		3,000 / Tape & Reel
SBC847CLT1G*			
BC847CLT3G			10,000 / Tape & Reel
BC848ALT1G	1J		3,000 / Tape & Reel
BC848BLT1G	1K		3,000 / Tape & Reel
SBC848BLT1G*			
BC848BLT3G			10,000 / Tape & Reel
BC848CLT1G	1L		3,000 / Tape & Reel
NSVBC848CLT1G*			
BC848CLT3G			10,000 / Tape & Reel
BC849BLT1G	2B		3,000 / Tape & Reel
BC849CLT1G	2C		3,000 / Tape & Reel
BC850BLT1G	2F		3,000 / Tape & Reel
NSVBC850BLT1G*			
BC850CLT1G	2G		
NSVBC850CLT1G*			

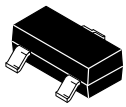
DISCONTINUED (Note 3)

BC847ALT3G	1E	SOT−23 (Pb−Free)	10,000 / Tape & Reel
NSVBC849BLT1G*	2B		3,000 / Tape & Reel
BC849BLT3G			10,000 / Tape & Reel
BC849CLT3G	2C		10,000 / 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 and NSV Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC−Q101 Qualified and PPAP Capable.

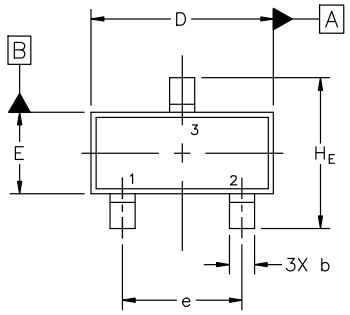
3. **DISCONTINUED:** These devices are not recommended for new design. Please contact your **onsemi** representative for information. The most current information on these devices may be available on www.onsemi.com.



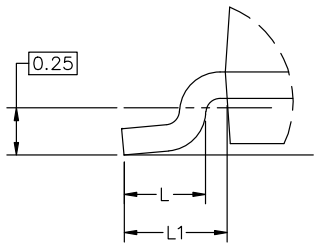
SCALE 4:1

SOT−23 (TO−236) 2.90x1.30x1.00 1.90P
CASE 318
ISSUE AU

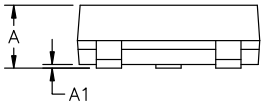
DATE 14 AUG 2024



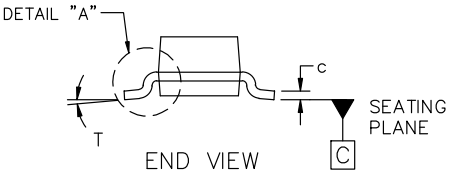
TOP VIEW



DETAIL "A"
Scale 3:1



SIDE VIEW

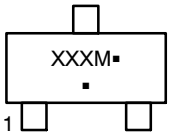


END VIEW

MILLIMETERS			
DIM	MIN	NOM	MAX
A	0.89	1.00	1.11
A1	0.01	0.06	0.10
b	0.37	0.44	0.50
c	0.08	0.14	0.20
D	2.80	2.90	3.04
E	1.20	1.30	1.40
e	1.78	1.90	2.04
L	0.30	0.43	0.55
L1	0.35	0.54	0.69
H_E	2.10	2.40	2.64
T	0°	−−−	10°

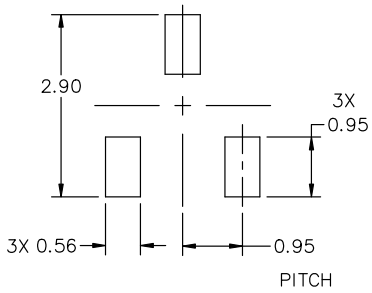
NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 2018.
2. CONTROLLING DIMENSIONS: MILLIMETERS.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF THE BASE MATERIAL.
4. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS.

GENERIC
MARKING DIAGRAM*



XXX = 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.



RECOMMENDED
MOUNTING FOOTPRINT

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

STYLES ON PAGE 2

DOCUMENT NUMBER:	**98ASB42226B**	Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red.	
DESCRIPTION:	**SOT−23 (TO−236) 2.90x1.30x1.00 1.90P**		**PAGE 1 OF 2**

SOT−23 (TO−236) 2.90x1.30x1.00 1.90P
CASE 318
ISSUE AU

DATE 14 AUG 2024

STYLE 1 THRU 5:
CANCELLED

STYLE 6:
PIN 1. BASE
2. EMITTER
3. COLLECTOR

STYLE 7:
PIN 1. EMITTER
2. BASE
3. COLLECTOR

STYLE 8:
PIN 1. ANODE
2. NO CONNECTION
3. CATHODE

STYLE 9:
PIN 1. ANODE
2. ANODE
3. CATHODE

STYLE 10:
PIN 1. DRAIN
2. SOURCE
3. GATE

STYLE 11:
PIN 1. ANODE
2. CATHODE
3. CATHODE−ANODE

STYLE 12:
PIN 1. CATHODE
2. CATHODE
3. ANODE

STYLE 13:
PIN 1. SOURCE
2. DRAIN
3. GATE

STYLE 14:
PIN 1. CATHODE
2. GATE
3. ANODE

STYLE 15:
PIN 1. GATE
2. CATHODE
3. ANODE

STYLE 16:
PIN 1. ANODE
2. CATHODE
3. CATHODE

STYLE 17:
PIN 1. NO CONNECTION
2. ANODE
3. CATHODE

STYLE 18:
PIN 1. NO CONNECTION
2. CATHODE
3. ANODE

STYLE 19:
PIN 1. CATHODE
2. ANODE
3. CATHODE−ANODE

STYLE 20:
PIN 1. CATHODE
2. ANODE
3. GATE

STYLE 21:
PIN 1. GATE
2. SOURCE
3. DRAIN

STYLE 22:
PIN 1. RETURN
2. OUTPUT
3. INPUT

STYLE 23:
PIN 1. ANODE
2. ANODE
3. CATHODE

STYLE 24:
PIN 1. GATE
2. DRAIN
3. SOURCE

STYLE 25:
PIN 1. ANODE
2. CATHODE
3. GATE

STYLE 26:
PIN 1. CATHODE
2. ANODE
3. NO CONNECTION

STYLE 27:
PIN 1. CATHODE
2. CATHODE
3. CATHODE

STYLE 28:
PIN 1. ANODE
2. ANODE
3. ANODE

ADDITIONAL INFORMATION

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BC846ALT1 BC846ALT1G BC846ALT3 BC846ALT3G BC846BLT1 BC846BLT1G BC846BLT3 BC846BLT3G BC847ALT1 BC847ALT1G BC847BLT1 BC847BLT1G BC847BLT3 BC847BLT3G BC847CLT1 BC847CLT1G BC847CLT3 BC847CLT3G BC848ALT1 BC848ALT1G BC848BLT1 BC848BLT1G BC848BLT3 BC848BLT3G BC848CLT1 BC848CLT1G BC849BLT1 BC849BLT1G BC849BLT3 BC849BLT3G BC849CLT1 BC849CLT1G BC849CLT3 BC849CLT3G BC850BLT1 BC850BLT1G BC850CLT1 BC850CLT1G SBC847BLT1G SBC846ALT1G SBC848BLT1G SBC846BLT1G SBC846BLT3G SBC847CLT1G NSVBC847BLT3G NSVBC848CLT1G NSVBC850BLT1G NSVBC850CLT1G BC846CLT1G BC848CLT3G