

General Purpose Transistors

NPN Silicon

BC846ALT1G Series

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

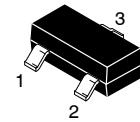
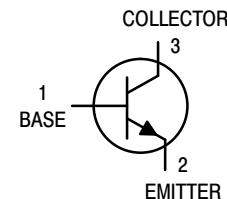
Rating	Symbol	Value	Unit
Collector-Emitter Voltage BC846 BC847, BC850 BC848, BC849	V_{CEO}	65	Vdc
		45	
		30	
Collector-Base Voltage BC846 BC847, BC850 BC848, BC849	V_{CBO}	80	Vdc
		50	
		30	
Emitter-Base Voltage BC846 BC847, BC850 BC848, BC849	V_{EBO}	6.0	Vdc
		6.0	
		5.0	
Collector Current – Continuous	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

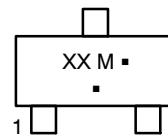
Characteristic	Symbol	Max	Unit
Total Device Dissipation FR-5 Board, (Note 1) $T_A = 25^\circ\text{C}$ Derate above 25°C	P_D	225	mW
		1.8	mW/ $^\circ\text{C}$
Thermal Resistance, Junction-to-Ambient (Note 1)	$R_{\theta JA}$	556	$^\circ\text{C}/\text{W}$
Total Device Dissipation Alumina Substrate (Note 2) $T_A = 25^\circ\text{C}$ Derate above 25°C	P_D	300	mW
		2.4	mW/ $^\circ\text{C}$
Thermal Resistance, Junction-to-Ambient (Note 2)	$R_{\theta JA}$	417	$^\circ\text{C}/\text{W}$
Junction and Storage Temperature Range	T_J, T_{stg}	-55 to +150	$^\circ\text{C}$

1. $\text{FR-5} = 1.0 \times 0.75 \times 0.062 \text{ in.}$
2. Alumina = $0.4 \times 0.3 \times 0.024 \text{ in}$ 99.5% alumina.



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.

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

BC846ALT1G Series

ELECTRICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$ unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS					
Collector – Emitter Breakdown Voltage ($I_C = 10 \text{ mA}$)	$V_{(\text{BR})\text{CEO}}$	65 45 30	– – –	– – –	V
Collector – Emitter Breakdown Voltage ($I_C = 10 \mu\text{A}$, $V_{\text{EB}} = 0$)	$V_{(\text{BR})\text{CES}}$	80 50 30	– – –	– – –	V
Collector – Base Breakdown Voltage ($I_C = 10 \mu\text{A}$)	$V_{(\text{BR})\text{CBO}}$	80 50 30	– – –	– – –	V
Emitter – Base Breakdown Voltage ($I_E = 1.0 \mu\text{A}$)	$V_{(\text{BR})\text{EBO}}$	6.0 6.0 5.0	– – –	– – –	V
Collector Cutoff Current ($V_{\text{CB}} = 30 \text{ V}$) ($V_{\text{CB}} = 30 \text{ V}$, $T_A = 150^\circ\text{C}$)	I_{CBO}	– –	– –	15 5.0	nA μA

ON CHARACTERISTICS

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

SMALL-SIGNAL CHARACTERISTICS

Current – Gain – Bandwidth Product ($I_C = 10 \text{ mA}$, $V_{\text{CE}} = 5.0 \text{ Vdc}$, $f = 100 \text{ MHz}$)	f_T	100	–	–	MHz
Output Capacitance ($V_{\text{CB}} = 10 \text{ V}$, $f = 1.0 \text{ MHz}$)	C_{obo}	–	–	4.5	pF
Noise Figure ($I_C = 0.2 \text{ mA}$, $V_{\text{CE}} = 5.0 \text{ Vdc}$, $R_S = 2.0 \text{ k}\Omega$, $f = 1.0 \text{ kHz}$, $BW = 200 \text{ Hz}$)	NF	– –	– –	10 4.0	dB

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.



BC846ALT1G Series

BC846A, BC847A, BC848A, SBC846A

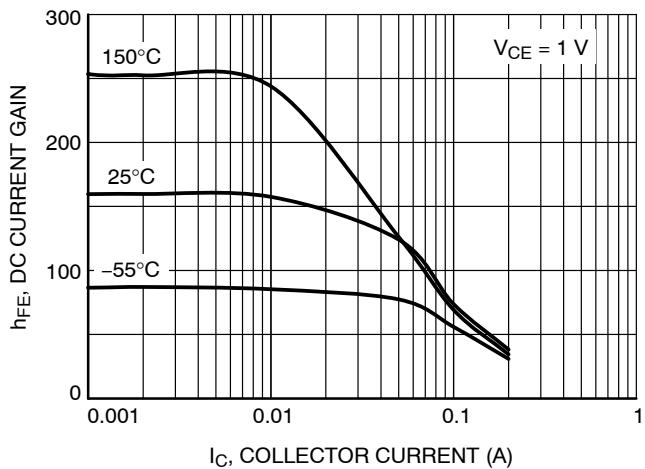


Figure 1. DC Current Gain vs. Collector Current

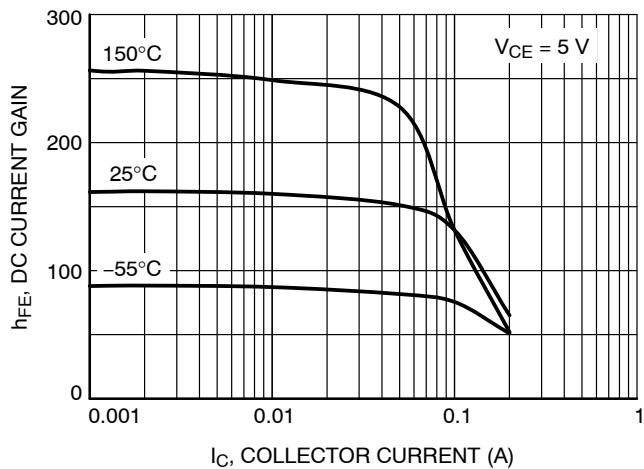


Figure 2. DC Current Gain vs. Collector Current

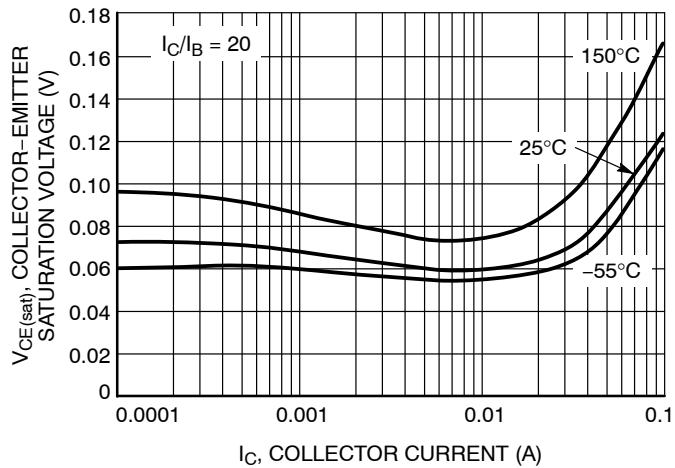


Figure 3. Collector Emitter Saturation Voltage vs. Collector Current

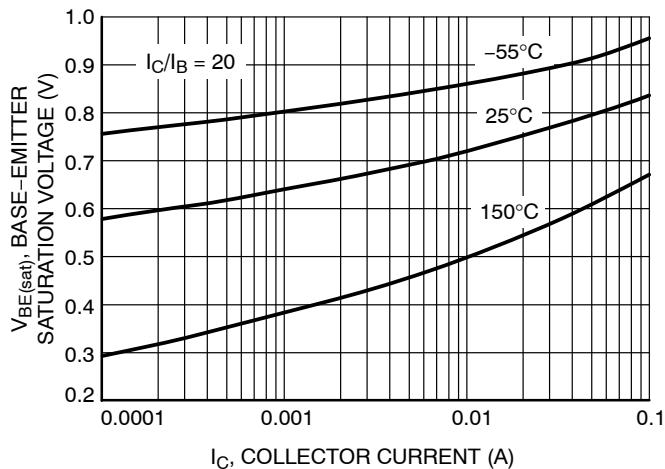


Figure 4. Base Emitter Saturation Voltage vs. Collector Current

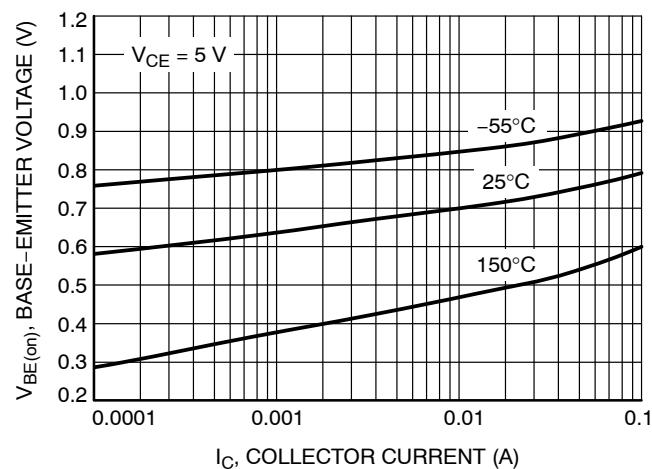


Figure 5. Base Emitter Voltage vs. Collector Current

BC846ALT1G Series

BC846A, BC847A, BC848A, SBC846A

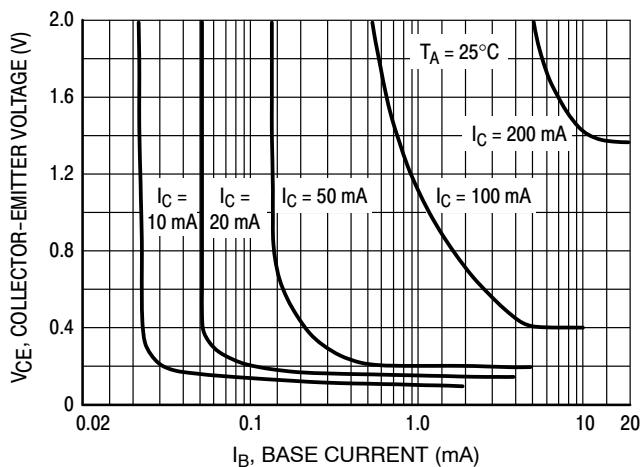


Figure 6. Collector Saturation Region

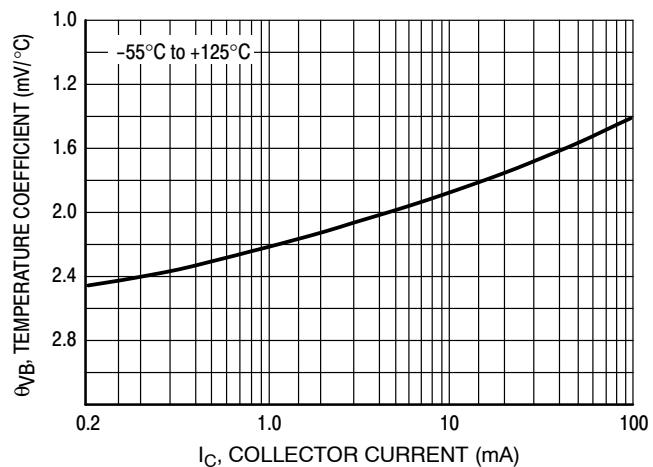


Figure 7. Base-Emitter Temperature Coefficient

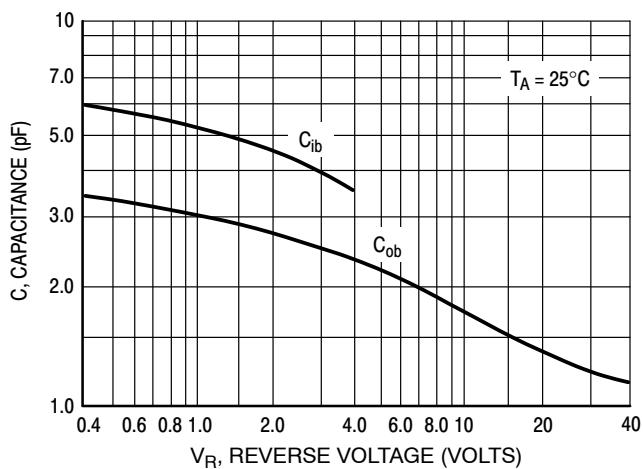


Figure 8. Capacitances

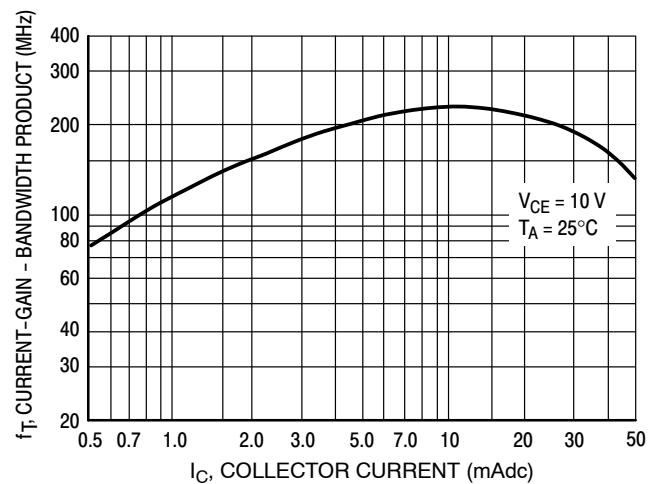


Figure 9. Current-Gain - Bandwidth Product

BC846ALT1G Series

BC846B, SBC846B

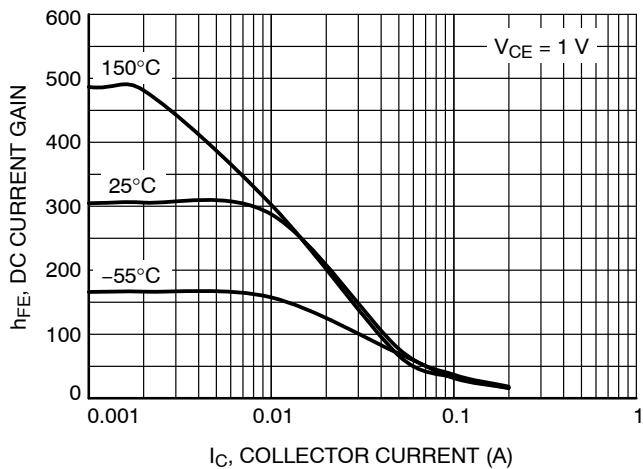


Figure 10. DC Current Gain vs. Collector Current

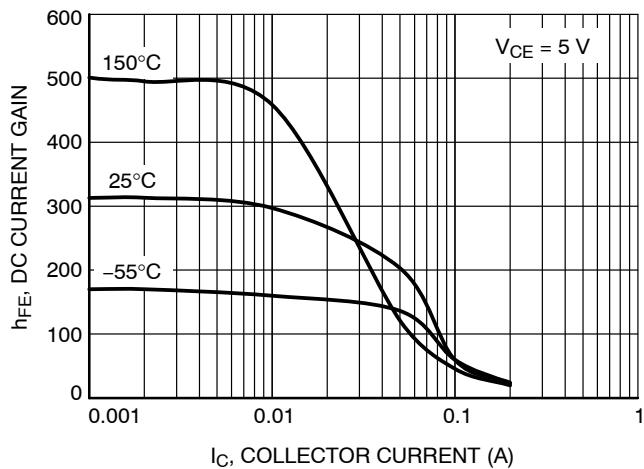


Figure 11. DC Current Gain vs. Collector Current

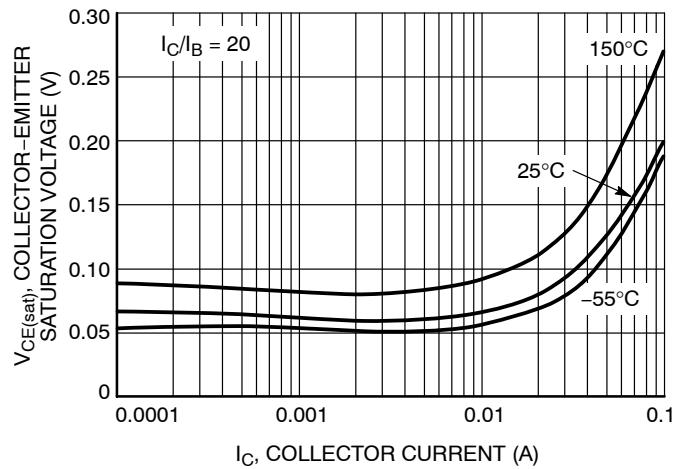


Figure 12. Collector Emitter Saturation Voltage vs. Collector Current

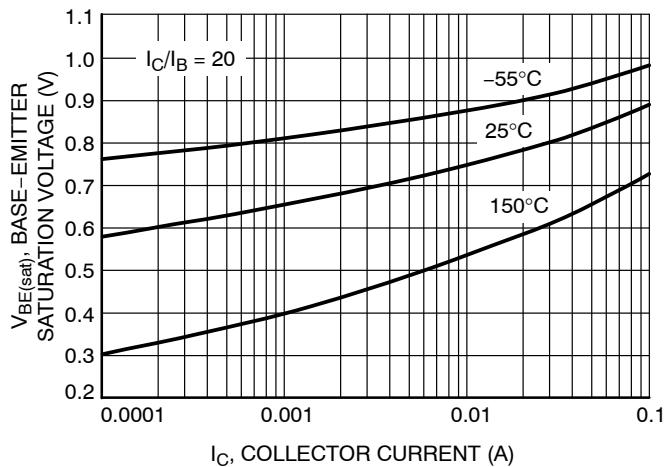


Figure 13. Base Emitter Saturation Voltage vs. Collector Current

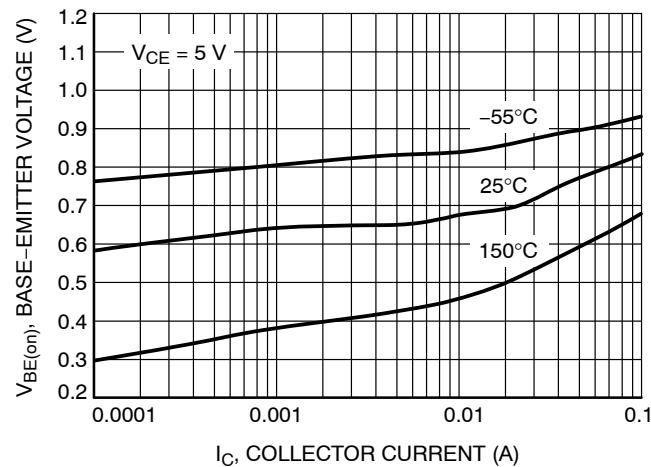


Figure 14. Base Emitter Voltage vs. Collector Current

BC846ALT1G Series

BC846B, SBC846B

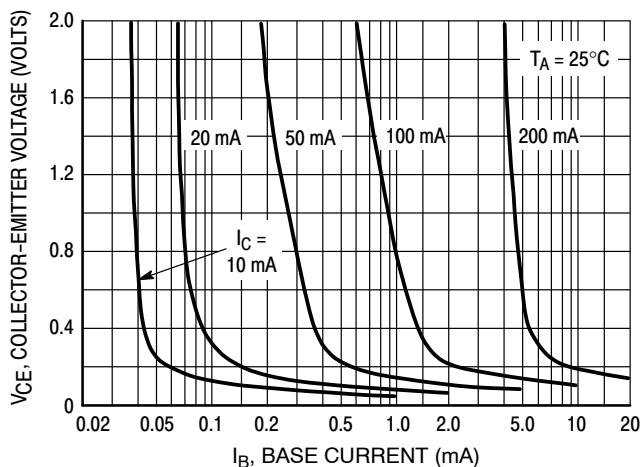


Figure 15. Collector Saturation Region

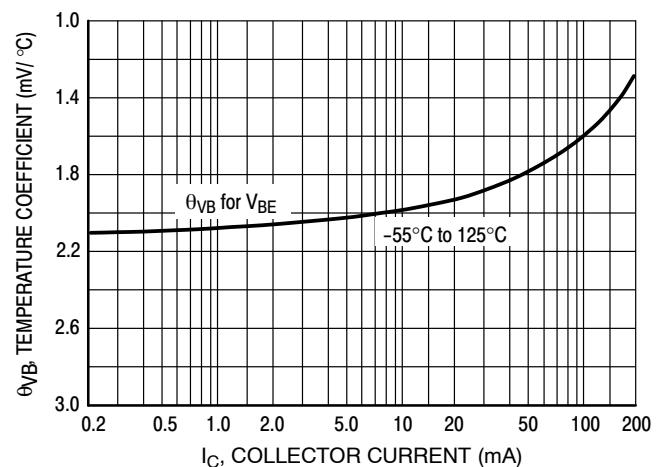


Figure 16. Base-Emitter Temperature Coefficient

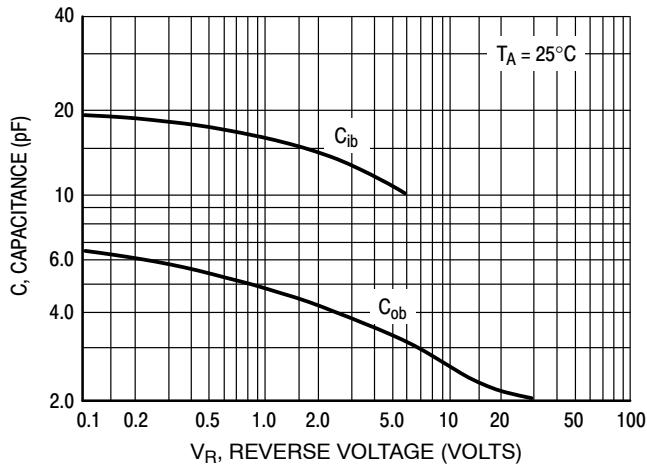


Figure 17. Capacitance

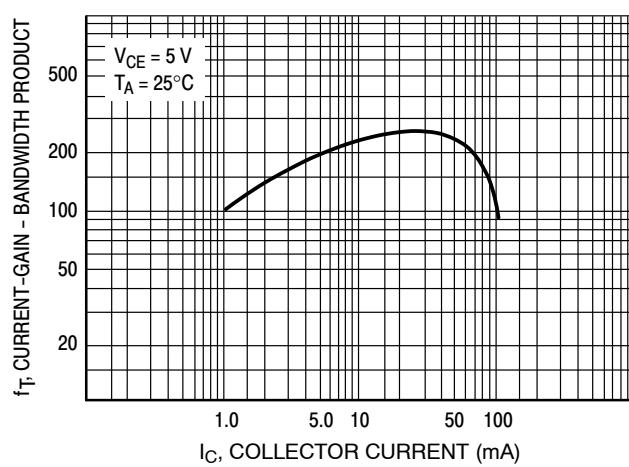


Figure 18. Current-Gain - Bandwidth Product

BC846ALT1G Series

BC847B, BC848B, BC849B, BC850B, SBC847B, SBC848B

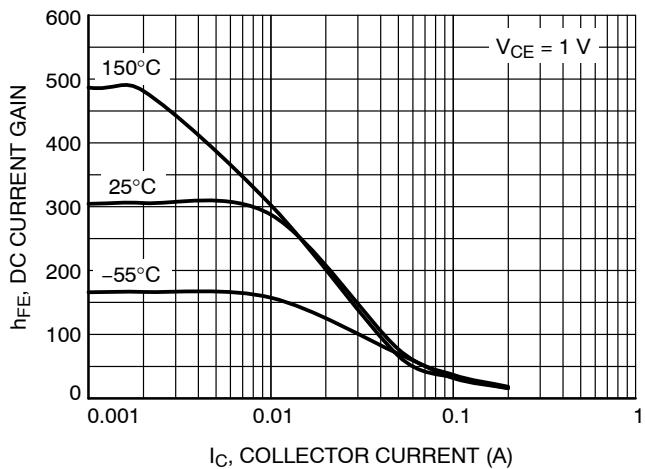


Figure 19. DC Current Gain vs. Collector Current

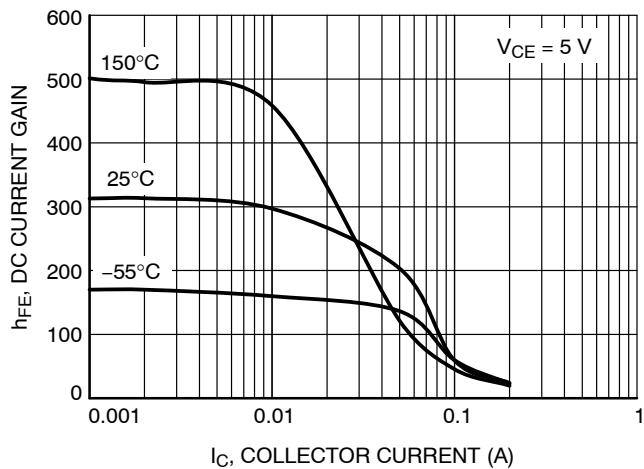


Figure 20. DC Current Gain vs. Collector Current

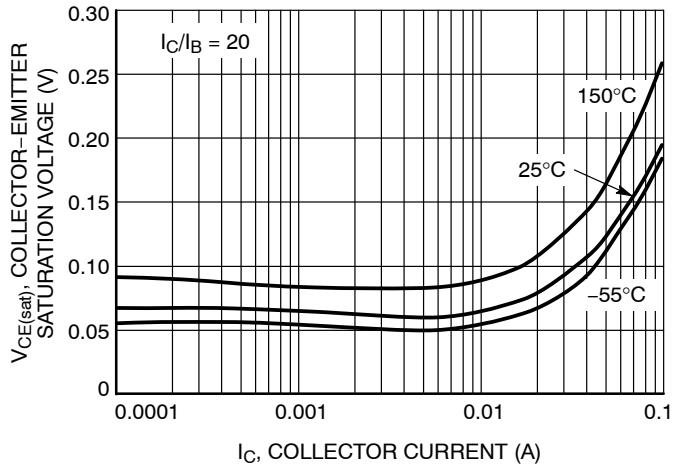


Figure 21. Collector Emitter Saturation Voltage vs. Collector Current

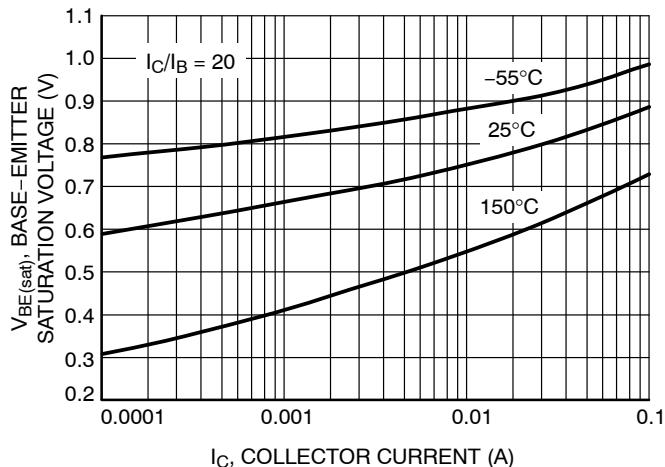


Figure 22. Base Emitter Saturation Voltage vs. Collector Current

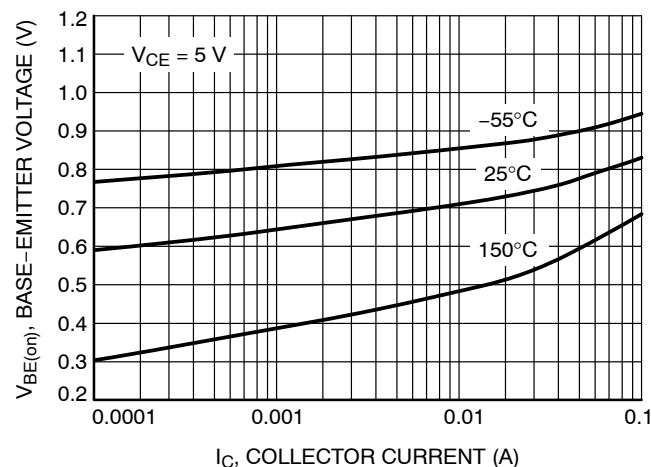


Figure 23. Base Emitter Voltage vs. Collector Current

BC846ALT1G Series

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

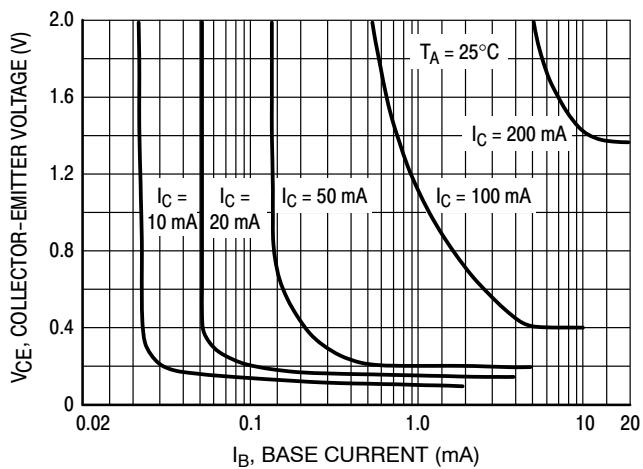


Figure 24. Collector Saturation Region

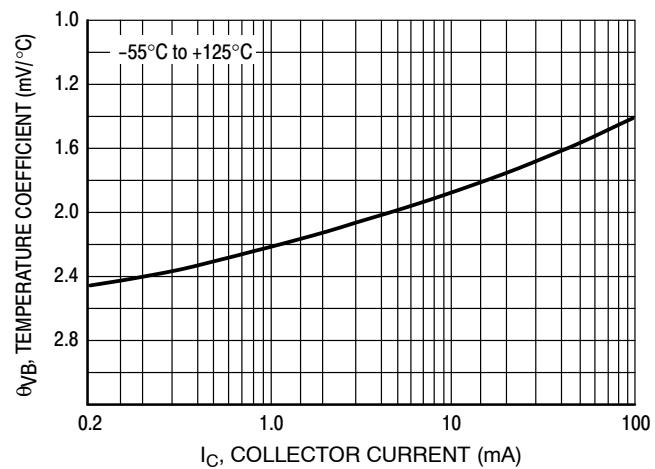


Figure 25. Base-Emitter Temperature Coefficient

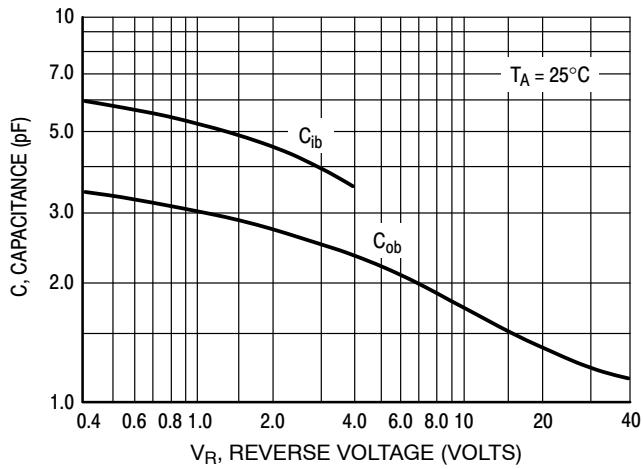


Figure 26. Capacitances

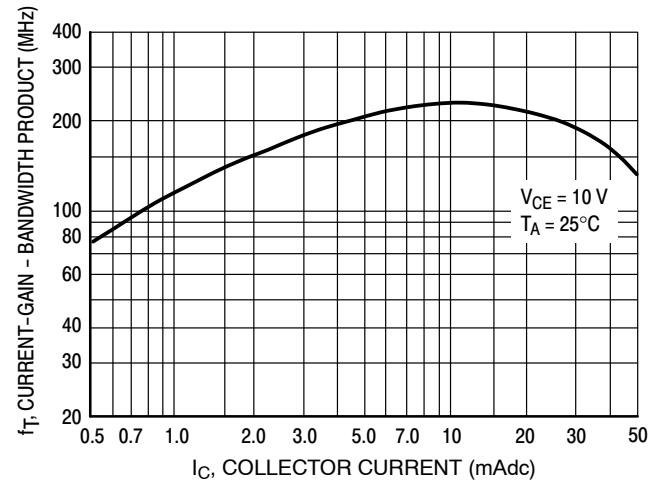


Figure 27. Current-Gain - Bandwidth Product

BC846ALT1G Series

BC846C, BC847C, BC848C, BC849C, BC850C, SBC847C

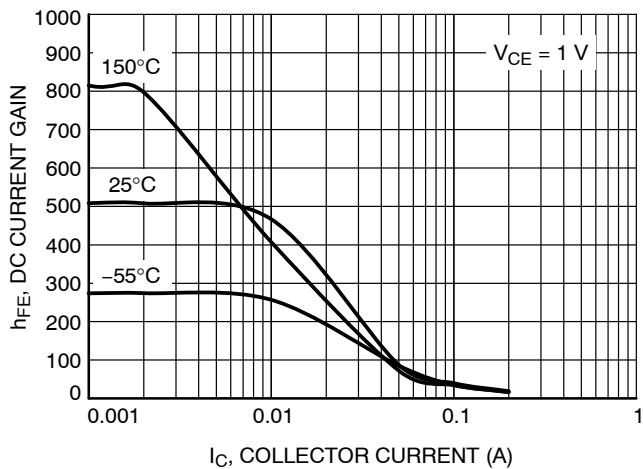


Figure 28. DC Current Gain vs. Collector Current

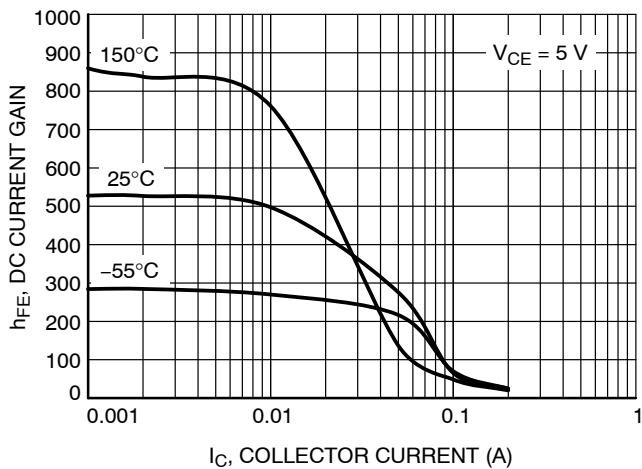


Figure 29. DC Current Gain vs. Collector Current

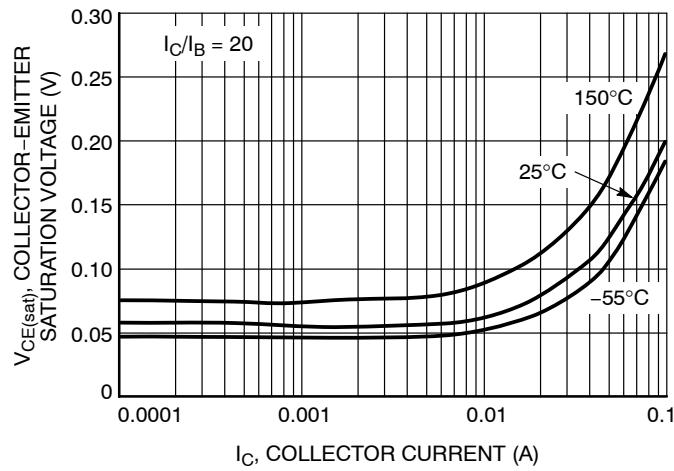


Figure 30. Collector Emitter Saturation Voltage vs. Collector Current

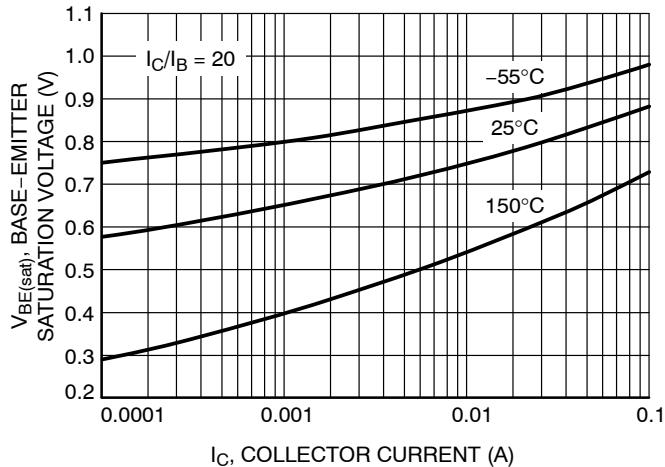


Figure 31. Base Emitter Saturation Voltage vs. Collector Current

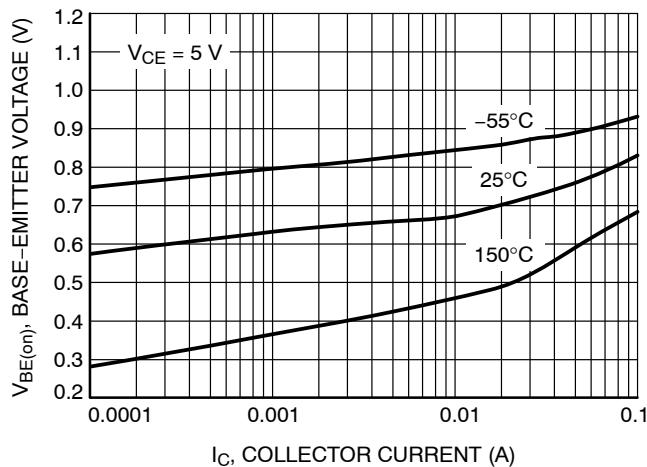


Figure 32. Base Emitter Voltage vs. Collector Current

BC846ALT1G Series

BC846C, BC847C, BC848C, BC849C, BC850C, SBC847C

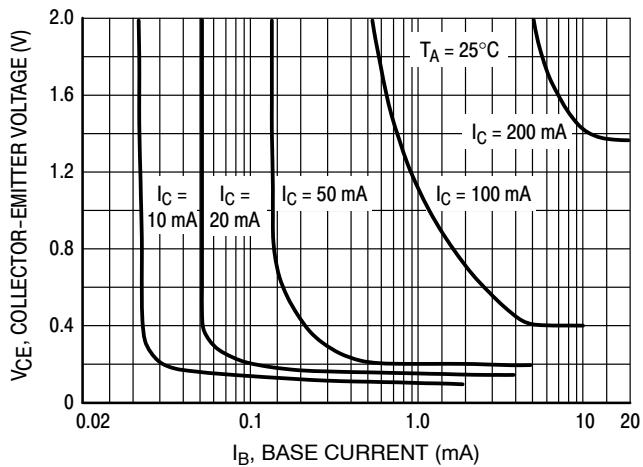


Figure 33. Collector Saturation Region

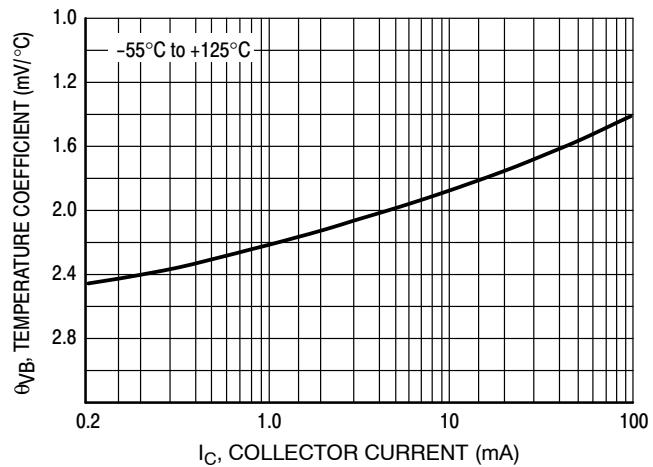


Figure 34. Base-Emitter Temperature Coefficient

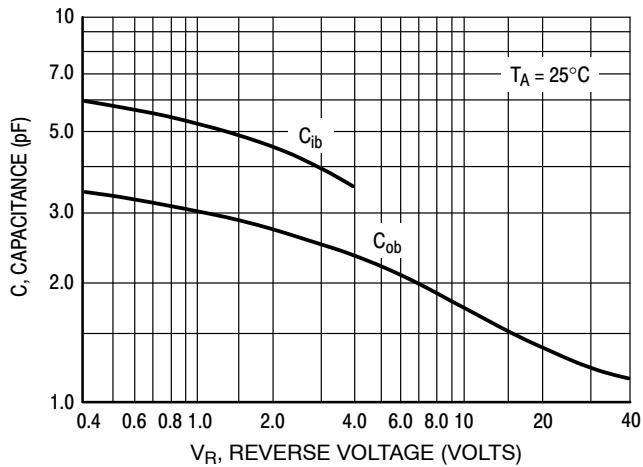


Figure 35. Capacitances

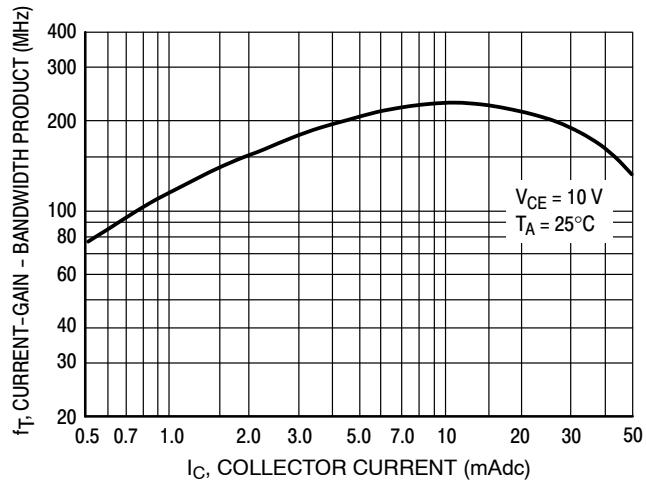


Figure 36. Current-Gain - Bandwidth Product

BC846ALT1G Series

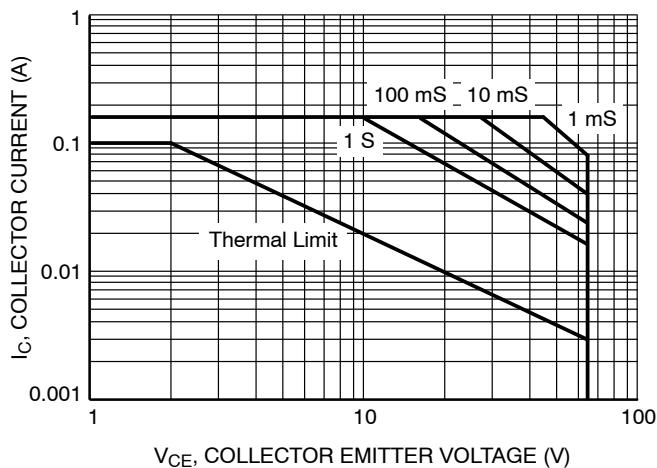


Figure 37. Safe Operating Area for BC846A, BC846B, BC846C

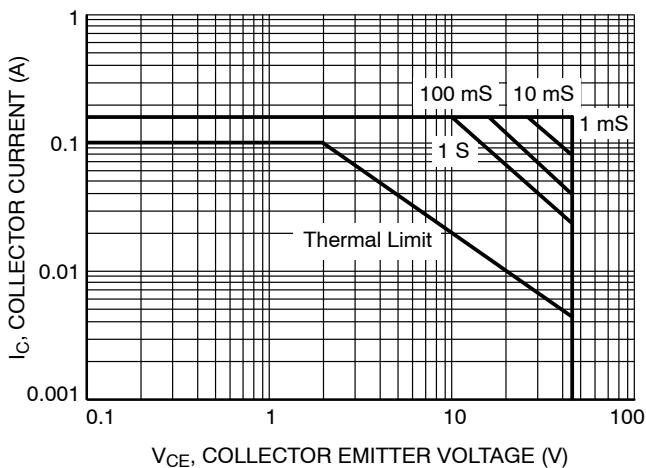


Figure 38. Safe Operating Area for BC847A, BC847B, BC847C, BC850B, BC850C

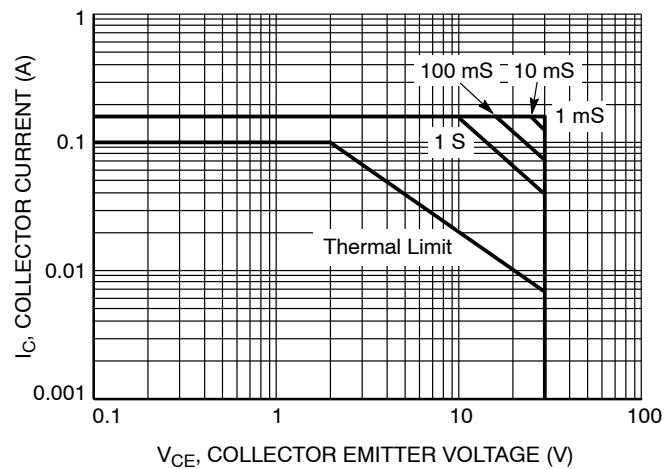


Figure 39. Safe Operating Area for BC848A, BC848B, BC848C, BC849B, BC849C

BC846ALT1G Series

ORDERING INFORMATION

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

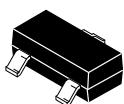
DISCONTINUED (Note 3)

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.

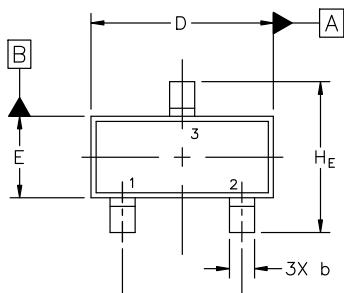
3. **DISCONTINUED:** These devices are not recommended for new design. Please contact your **onsemi** representative for information. The most current information on these devices may be available on www.onsemi.com.



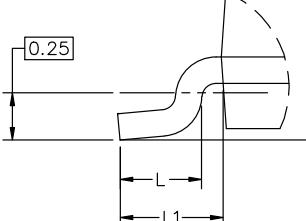
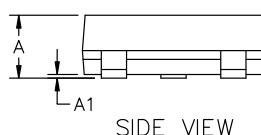
SCALE 4:1

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

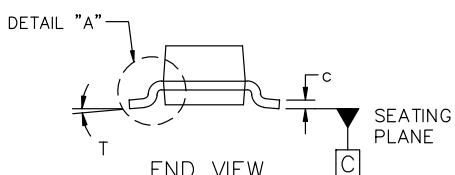
DATE 14 AUG 2024



TOP VIEW

DETAIL "A"
Scale 3:1

SIDE VIEW

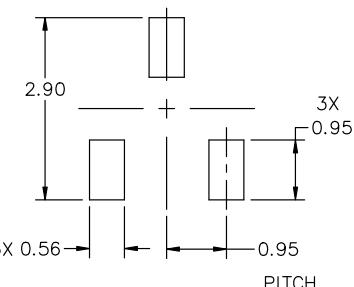


END VIEW

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
HE	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

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DESCRIPTION:	SOT-23 (TO-236) 2.90x1.30x1.00 1.90P	PAGE 1 OF 2

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CASE 318

ISSUE AU

DATE 14 AUG 2024

STYLE 1 THRU 5:
CANCELLEDSTYLE 6:
PIN 1. BASE
2. Emitter
3. CollectorSTYLE 7:
PIN 1. Emitter
2. Base
3. CollectorSTYLE 8:
PIN 1. Anode
2. No Connection
3. CathodeSTYLE 9:
PIN 1. Anode
2. Anode
3. CathodeSTYLE 10:
PIN 1. Drain
2. Source
3. GateSTYLE 11:
PIN 1. Anode
2. Cathode
3. Cathode-AnodeSTYLE 12:
PIN 1. Cathode
2. Cathode
3. AnodeSTYLE 13:
PIN 1. Source
2. Drain
3. GateSTYLE 14:
PIN 1. Cathode
2. Gate
3. AnodeSTYLE 15:
PIN 1. Gate
2. Cathode
3. AnodeSTYLE 16:
PIN 1. Anode
2. Cathode
3. CathodeSTYLE 17:
PIN 1. No Connection
2. Anode
3. CathodeSTYLE 18:
PIN 1. No Connection
2. Cathode
3. AnodeSTYLE 19:
PIN 1. Cathode
2. Anode
3. Cathode-AnodeSTYLE 20:
PIN 1. Cathode
2. Anode
3. GateSTYLE 21:
PIN 1. Gate
2. Source
3. DrainSTYLE 22:
PIN 1. Return
2. Output
3. InputSTYLE 23:
PIN 1. Anode
2. Anode
3. CathodeSTYLE 24:
PIN 1. Gate
2. Drain
3. SourceSTYLE 25:
PIN 1. Anode
2. Cathode
3. GateSTYLE 26:
PIN 1. Cathode
2. Anode
3. No ConnectionSTYLE 27:
PIN 1. Cathode
2. Cathode
3. CathodeSTYLE 28:
PIN 1. Anode
2. Anode
3. Anode

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