General Purpose Transistors

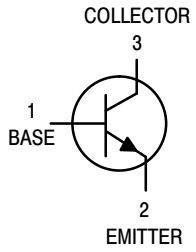
NPN Silicon

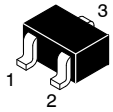
BC846, BC847, BC848

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

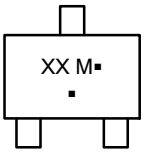
- S and NSV Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q101 Qualified and PPAP Capable
- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant





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, marking and shipping information on page 12 of this data sheet.

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage BC846 BC847 BC848	V_{CEO}	 65 45 30	V
Collector-Base Voltage BC846 BC847 BC848	V_{CBO}	 80 50 30	V
Emitter-Base Voltage BC846 BC847 BC848	V_{EBO}	 6.0 6.0 5.0	V
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	P_D	200	mW
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	620	°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.

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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)	BC846 Series BC847 Series BC848 Series	$V_{(BR)CEO}$	65 45 30	– – –	– – –	V
Collector-Emitter Breakdown Voltage (I_C = 10 μA, V_{EB} = 0)	BC846 Series BC847 Series BC848 Series	$V_{(BR)CES}$	80 50 30	– – –	– – –	V
Collector-Base Breakdown Voltage (I_C = 10 μA)	BC846 Series BC847 Series BC848 Series	$V_{(BR)CBO}$	80 50 30	– – –	– – –	V
Emitter-Base Breakdown Voltage (I_E = 1.0 μA)	BC846 Series BC847 Series BC848 Series	$V_{(BR)EBO}$	6.0 6.0 5.0	– – –	– – –	V
Collector Cutoff Current	(V_{CB} = 30 V) (V_{CB} = 30 V, T_A = 150°C)	I_{CBO}	– –	– –	15 5.0	nA μA
ON CHARACTERISTICS						
DC Current Gain (I_C = 10 μA, V_{CE} = 5.0 V) (I_C = 2.0 mA, V_{CE} = 5.0 V)	BC846A, BC847A, BC848A BC846B, BC847B, BC848B BC847C, BC848C BC846A, BC847A, BC848A BC846B, BC847B, BC848B BC847C, BC848C	h_{FE}	– – – 110 200 420	90 150 270 180 290 520	– – – 220 450 800	–
Collector-Emitter Saturation Voltage (I_C = 10 mA, I_B = 0.5 mA) (I_C = 100 mA, I_B = 5.0 mA)		$V_{CE(sat)}$	– –	– –	0.25 0.6	V
Base-Emitter Saturation Voltage (I_C = 10 mA, I_B = 0.5 mA) (I_C = 100 mA, I_B = 5.0 mA)		$V_{BE(sat)}$	– –	0.7 0.9	– –	V
Base-Emitter Voltage (I_C = 2.0 mA, V_{CE} = 5.0 V) (I_C = 10 mA, V_{CE} = 5.0 V)		$V_{BE(on)}$	580 –	660 –	700 770	mV
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

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.

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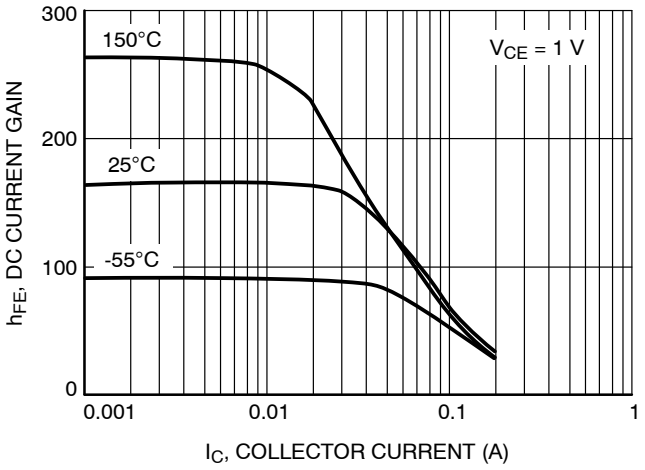

Figure 1. DC Current Gain vs. Collector Current

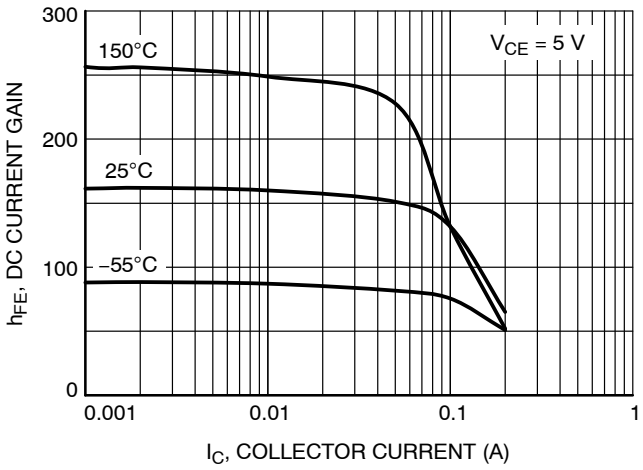

Figure 2. DC Current Gain vs. Collector Current

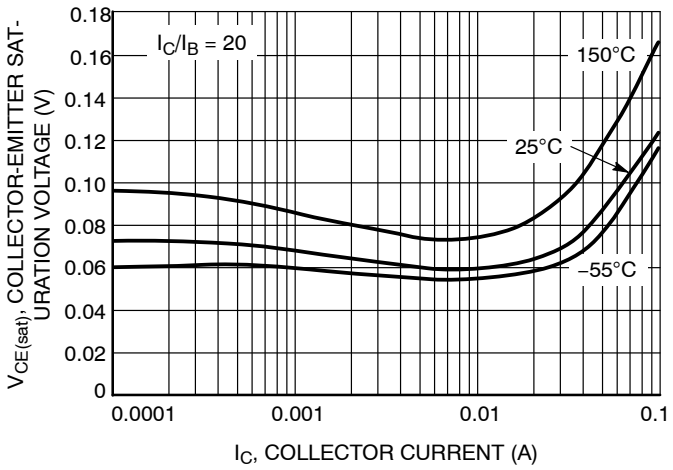

Figure 3. Collector Emitter Saturation Voltage vs. Collector Current

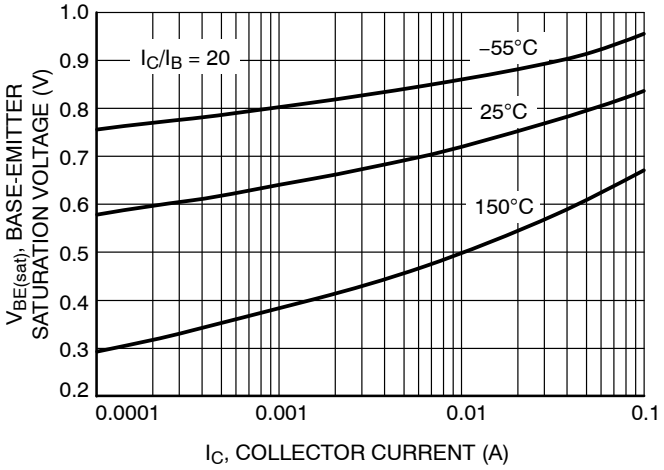

Figure 4. Base Emitter Saturation Voltage vs. Collector Current

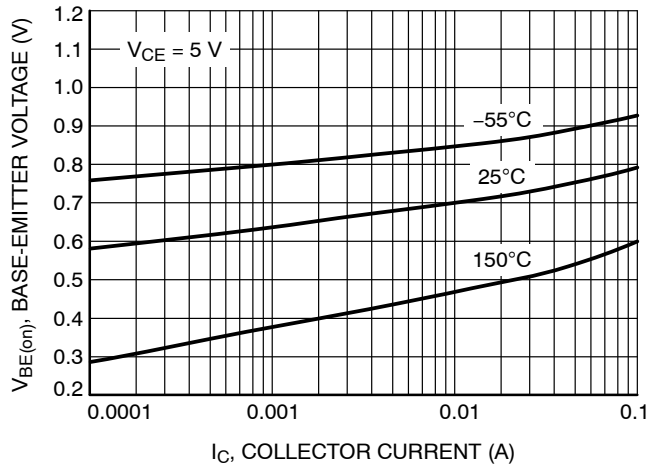

Figure 5. Base Emitter Voltage vs. Collector Current

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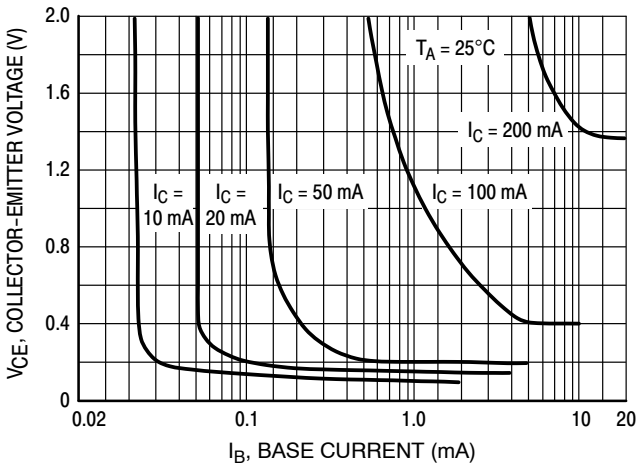

Figure 6. Collector Saturation Region

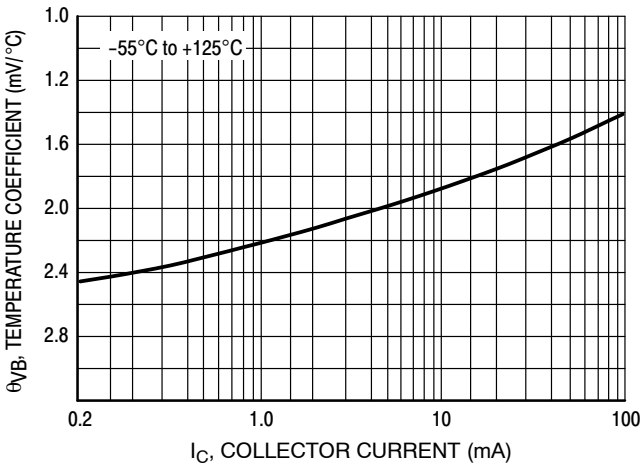

Figure 7. Base-Emitter Temperature Coefficient

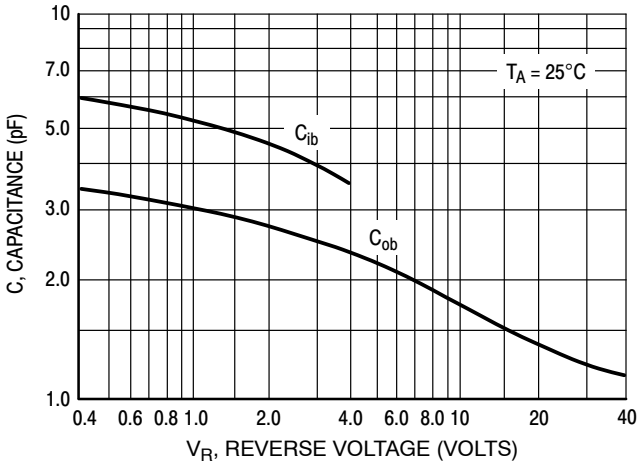

Figure 8. Capacitances

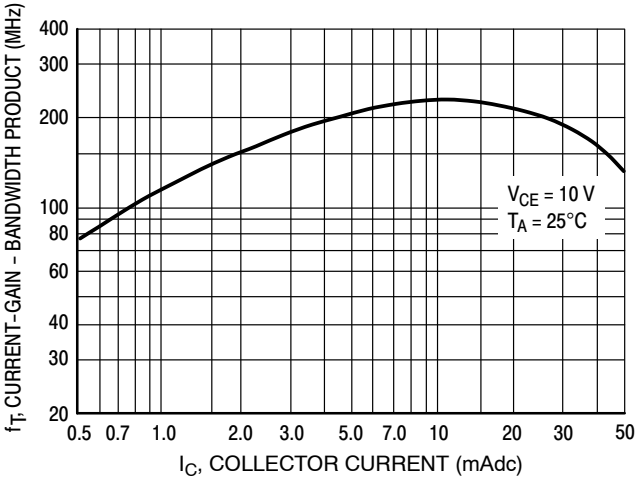

Figure 9. Current-Gain – Bandwidth Product

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BC846B

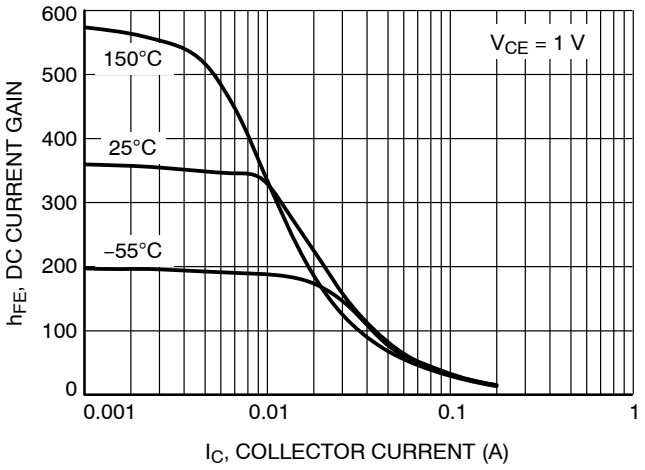

Figure 10. DC Current Gain vs. Collector Current

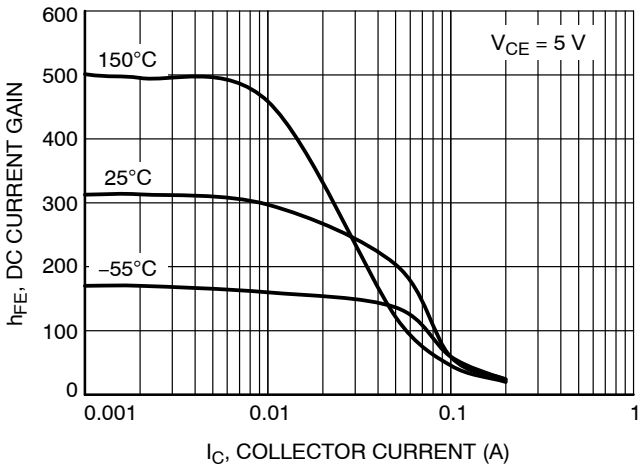

Figure 11. DC Current Gain vs. Collector Current

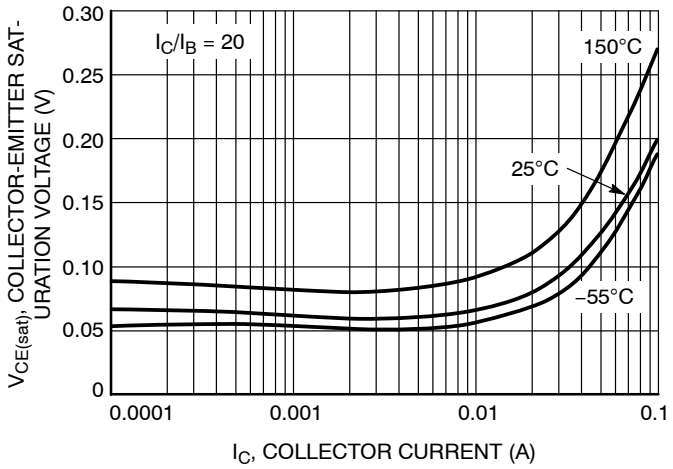

Figure 12. Collector Emitter Saturation Voltage vs. Collector Current

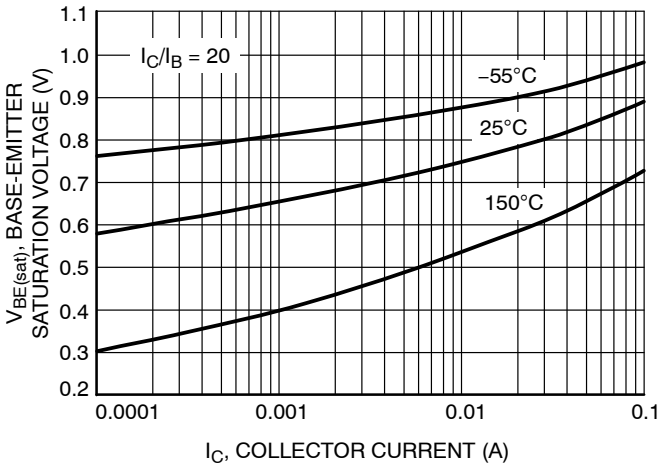

Figure 13. Base Emitter Saturation Voltage vs. Collector Current

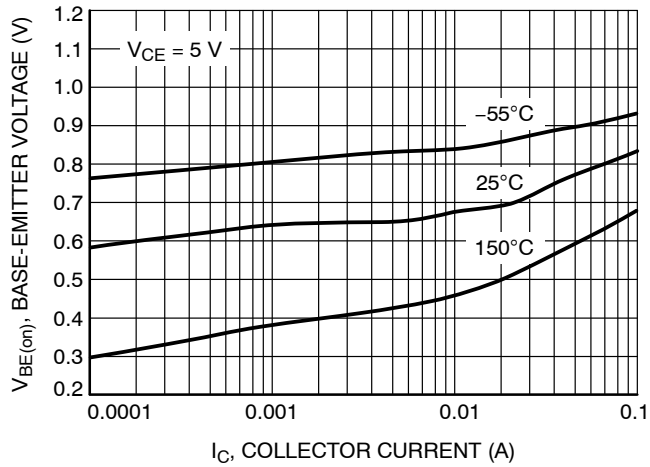

Figure 14. Base Emitter Voltage vs. Collector Current

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BC846B

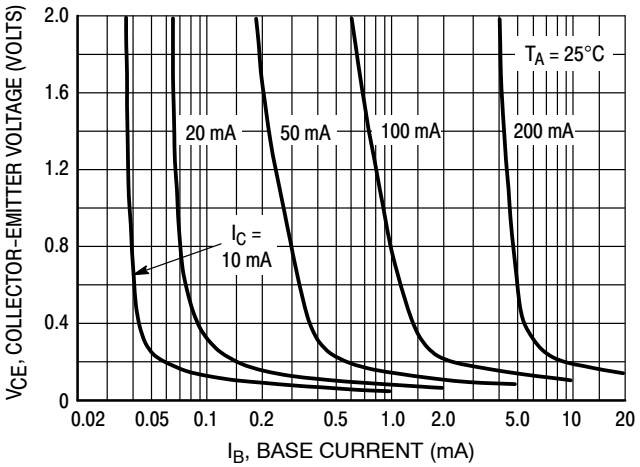

Figure 15. Collector Saturation Region

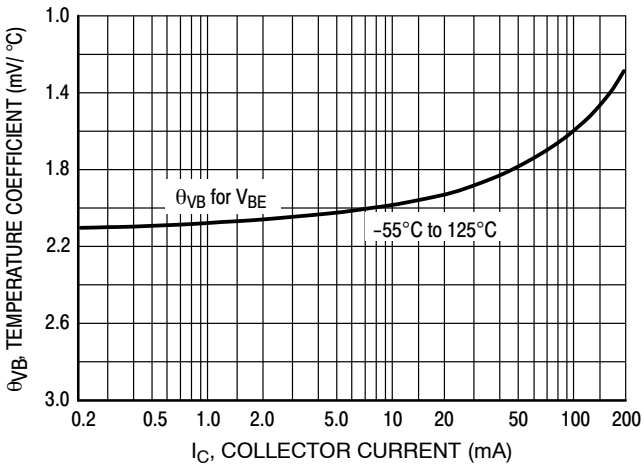

Figure 16. Base-Emitter Temperature Coefficient

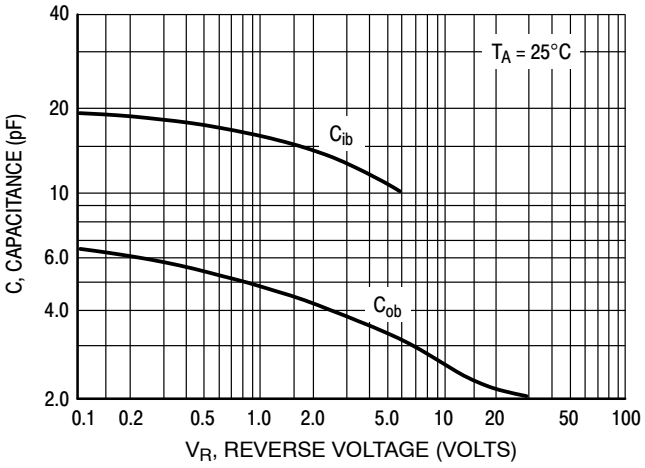

Figure 17. Capacitance

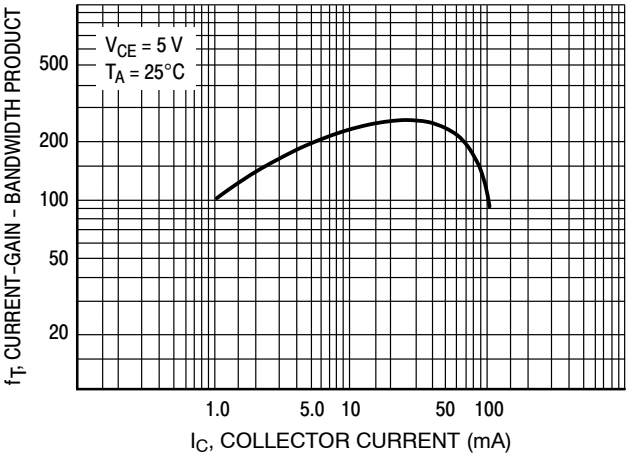

Figure 18. Current-Gain – Bandwidth Product

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BC847B, BC848B

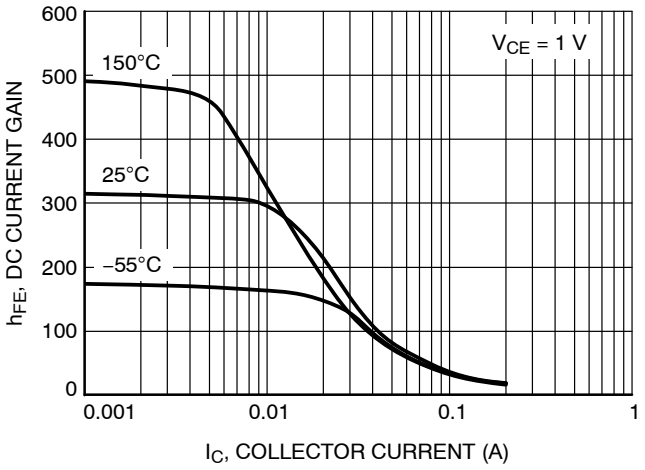

Figure 19. DC Current Gain vs. Collector Current

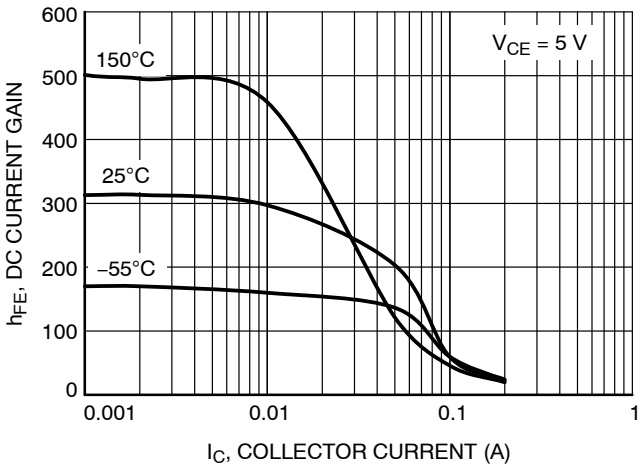

Figure 20. DC Current Gain vs. Collector Current

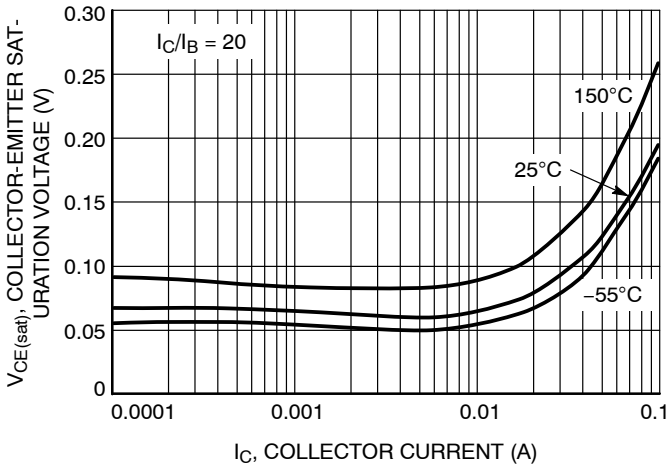

Figure 21. Collector Emitter Saturation Voltage vs. Collector Current

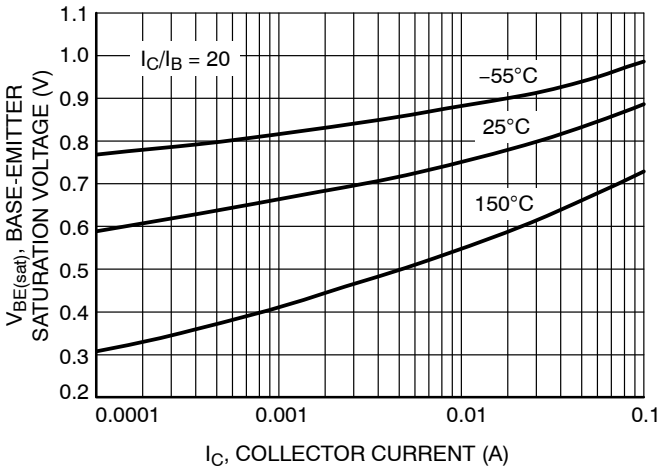

Figure 22. Base Emitter Saturation Voltage vs. Collector Current

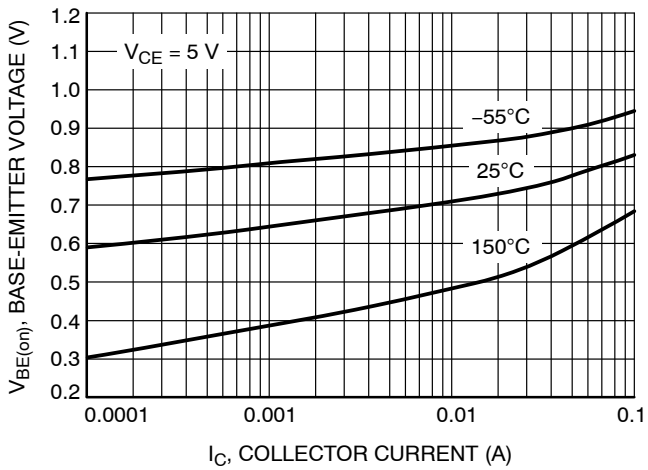

Figure 23. Base Emitter Voltage vs. Collector Current

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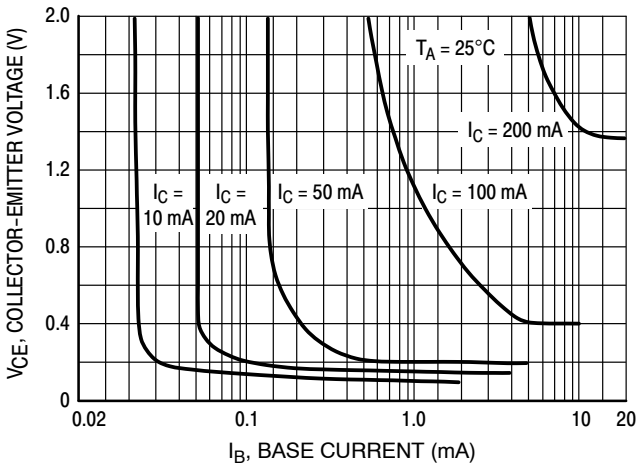

Figure 24. Collector Saturation Region

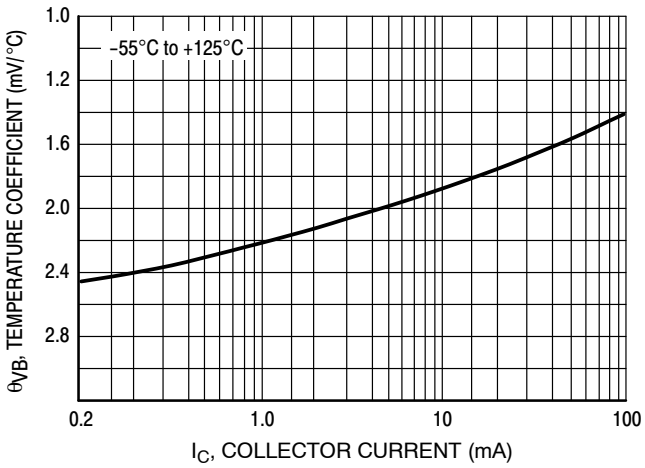

Figure 25. Base-Emitter Temperature Coefficient

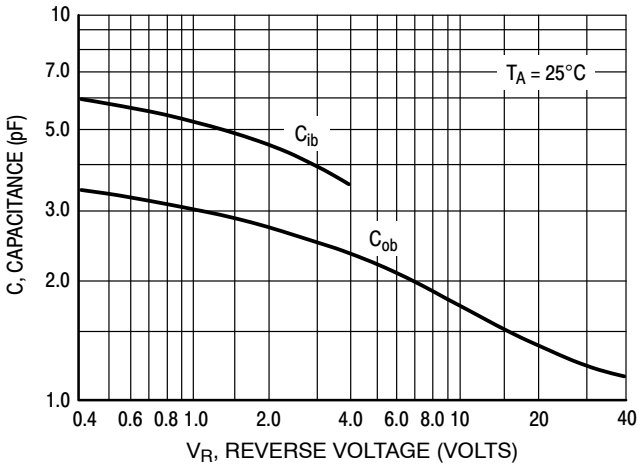

Figure 26. Capacitances

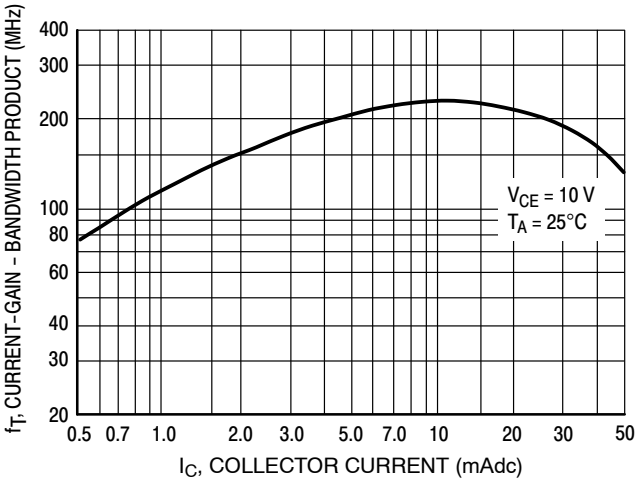

Figure 27. Current-Gain − Bandwidth Product

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BC847C, BC848C

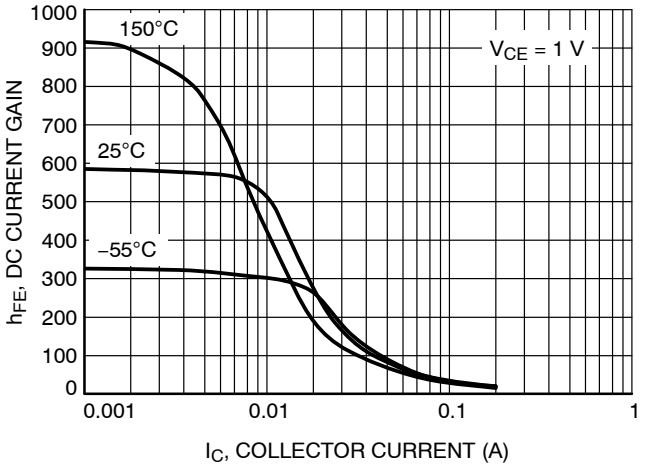

Figure 28. DC Current Gain vs. Collector Current

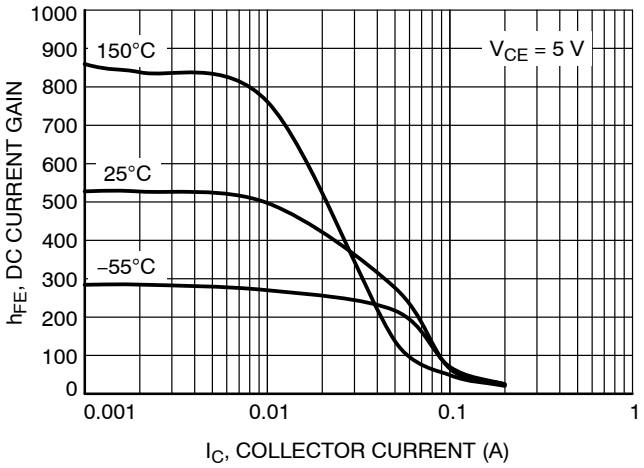

Figure 29. DC Current Gain vs. Collector Current

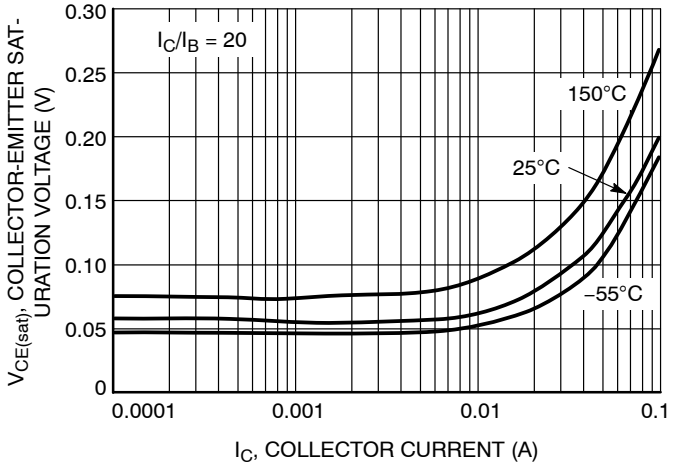

Figure 30. Collector Emitter Saturation Voltage vs. Collector Current

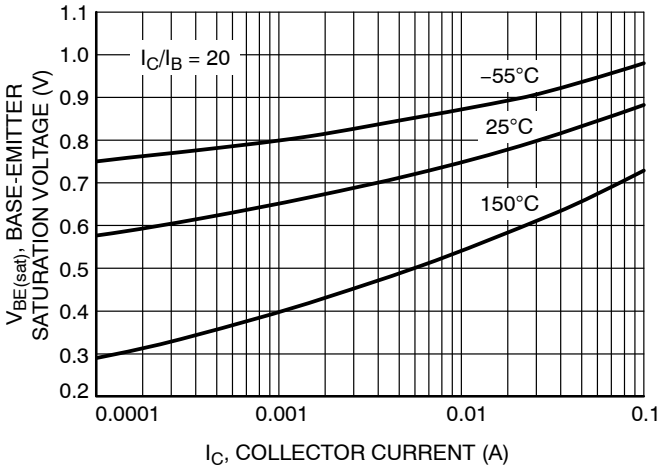

Figure 31. Base Emitter Saturation Voltage vs. Collector Current

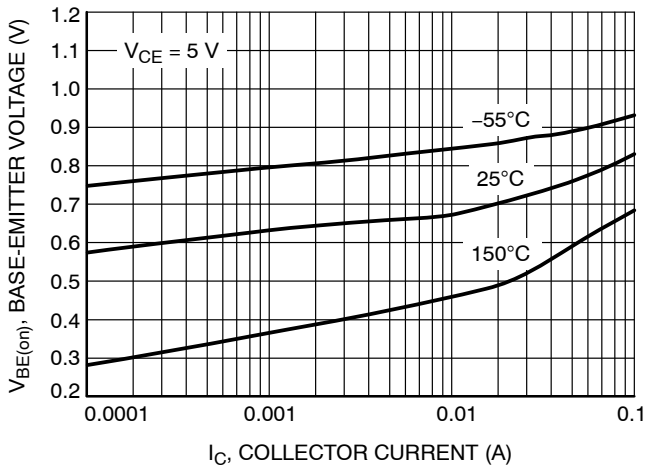

Figure 32. Base Emitter Voltage vs. Collector Current

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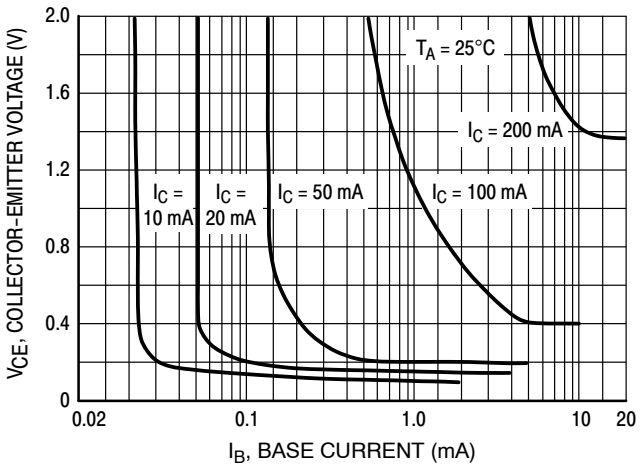

Figure 33. Collector Saturation Region

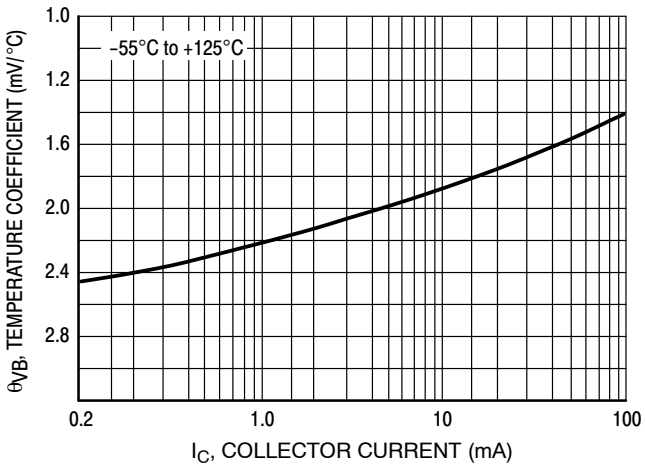

Figure 34. Base-Emitter Temperature Coefficient

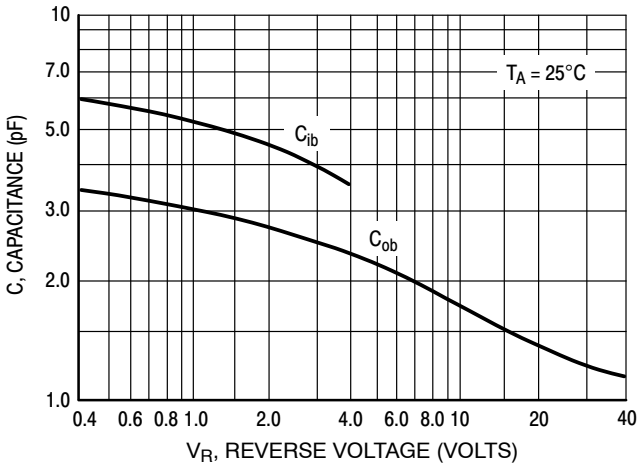

Figure 35. Capacitances

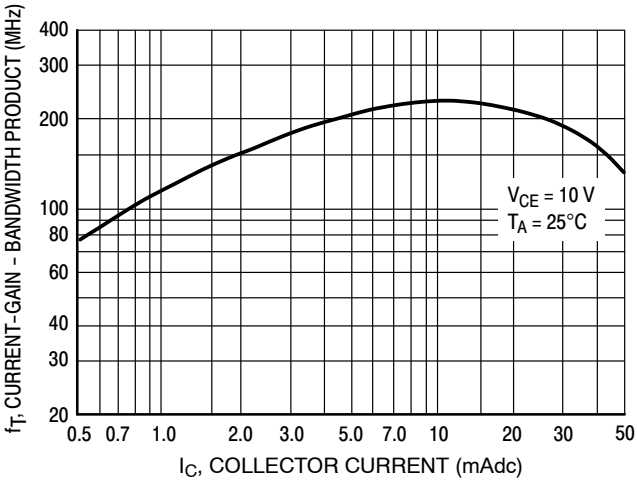

Figure 36. Current-Gain – Bandwidth Product

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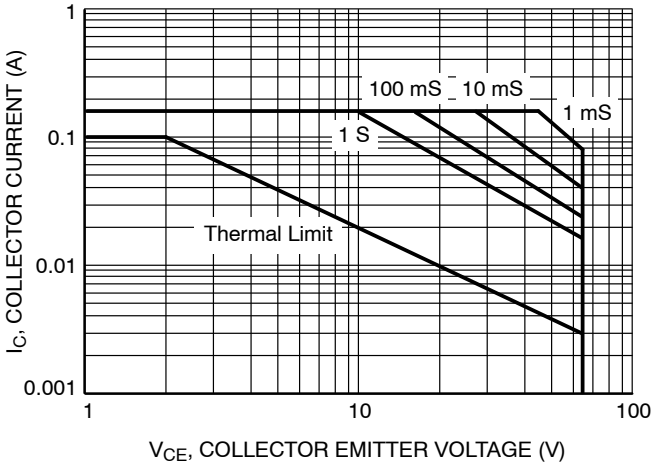

Figure 37. Safe Operating Area for BC846A, BC846B

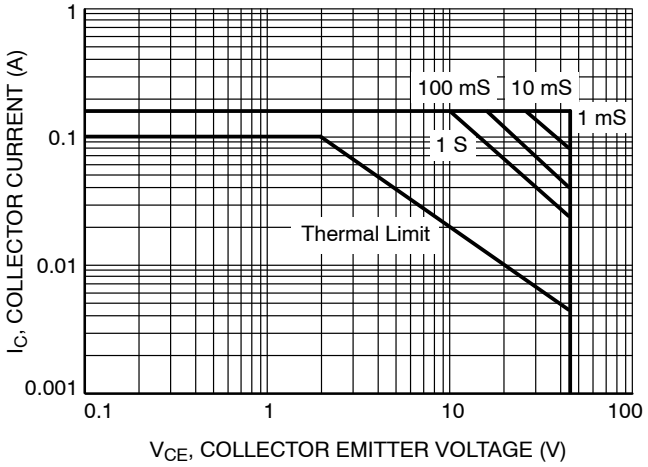

Figure 38. Safe Operating Area for BC847A, BC847B, BC847C

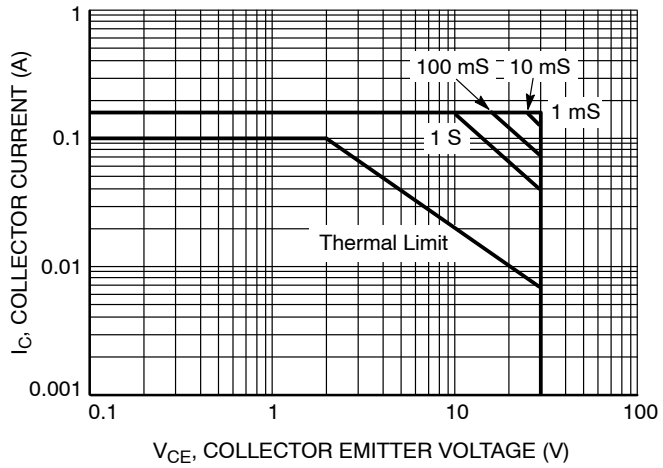

Figure 39. Safe Operating Area for BC848A, BC848B, BC848C

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DEVICE ORDERING AND SPECIFIC MARKING INFORMATION

Device	Specific Marking Code	Package	Shipping†
BC846BWT1G	1B	SC-70 (SOT-323) (Pb-Free)	3,000 / Tape & Reel
SBC846BWT1G*			
BC847AWT1G	1E		3,000 / Tape & Reel
SBC847AWT1G*			
BC847BWT1G	1F		3,000 / Tape & Reel
SBC847BWT1G*			
BC847CWT1G	1G		3,000 / Tape & Reel
SBC847CWT1G*			
BC847CWT3G	1G		10,000 / Tape & Reel
SBC847CWT3G*			
BC848BWT1G	1K		3,000 / Tape & Reel
NSVBC848BWT1G*			
BC848CWT1G	1L		

†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.

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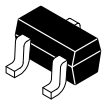
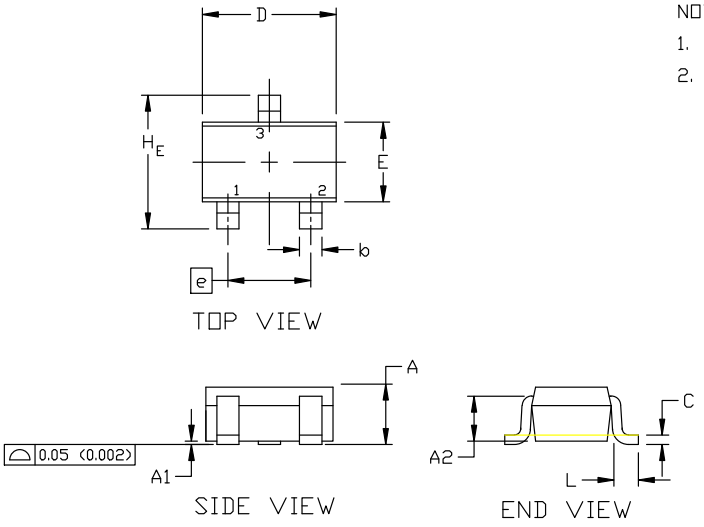


SCALE 4:1

SC−70 (SOT−323)
CASE 419
ISSUE R

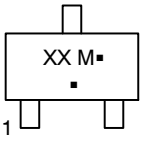
DATE 11 OCT 2022



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

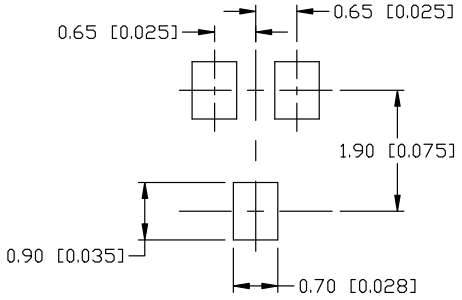
	MILLIMETERS			INCHES		
DIM	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.
A	0.80	0.90	1.00	0.032	0.035	0.040
A1	0.00	0.05	0.10	0.000	0.002	0.004
A2	0.70 REF			0.028 BSC		
b	0.30	0.35	0.40	0.012	0.014	0.016
c	0.10	0.18	0.25	0.004	0.007	0.010
D	1.80	2.00	2.20	0.071	0.080	0.087
E	1.15	1.24	1.35	0.045	0.049	0.053
e	1.20	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

GENERIC MARKING DIAGRAM



XX = 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.



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

SOLDERING FOOTPRINT

STYLE 1:
CANCELLED

STYLE 2:
PIN 1. ANODE
2. N.C.
3. CATHODE

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

STYLE 4:
PIN 1. CATHODE
2. CATHODE
3. ANODE

STYLE 5:
PIN 1. ANODE
2. ANODE
3. CATHODE

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

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

STYLE 8:
PIN 1. GATE
2. SOURCE
3. DRAIN

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

STYLE 10:
PIN 1. CATHODE
2. ANODE
3. ANODE−CATHODE

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

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