

# General Purpose Transistors

## PNP Silicon

### BC856B, BC857B, BC858A

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

#### MAXIMUM RATINGS (T<sub>A</sub> = 25°C unless otherwise noted)

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V <sub>CEO</sub>	-65 -45 -30	V
Collector-Base Voltage	V <sub>CBO</sub>	-80 -50 -30	V
Emitter-Base Voltage	V <sub>EBO</sub>	-5.0	V
Collector Current - Continuous	I <sub>C</sub>	-100	mAdc
Collector Current - Peak (1 ms pulse)	I <sub>CM</sub>	-130	mA

#### THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Total Device Dissipation FR-5 Board, (Note 1) T <sub>A</sub> = 25°C	P <sub>D</sub>	150	mW
Thermal Resistance, Junction-to-Ambient	R <sub>θJA</sub>	883	°C/W
Junction and Storage Temperature	T <sub>J</sub> , T <sub>stg</sub>	-55 to +150	°C

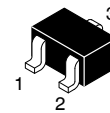
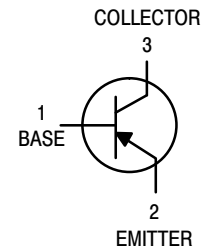
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

1. FR-5 = 1.0 x 0.75 x 0.062 in.



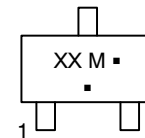
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SC-70/SOT-323  
CASE 419  
STYLE 3

#### MARKING DIAGRAM



XX = Specific Device Code

M = Date Code\*

▪ = Pb-Free Package

(Note: Microdot may be in either location)

\*Date Code orientation may vary depending upon manufacturing location.

#### ORDERING INFORMATION

See detailed ordering and shipping information on page 5 of this data sheet.

# BC856B, BC857B, BC858A

## ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25°C unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
<b>OFF CHARACTERISTICS</b>					
Collector – Emitter Breakdown Voltage (I <sub>C</sub> = -10 mA)	BC856 BC857 BC858	V <sub>(BR)CEO</sub>	-65 -45 -30	- - -	V
Collector – Emitter Breakdown Voltage (I <sub>C</sub> = -10 μA, V <sub>EB</sub> = 0)	BC856 BC857 BC858	V <sub>(BR)CES</sub>	-80 -50 -30	- - -	V
Collector – Base Breakdown Voltage (I <sub>C</sub> = -10 μA)	BC856 BC857 BC858	V <sub>(BR)CBO</sub>	-80 -50 -30	- - -	V
Emitter – Base Breakdown Voltage (I <sub>E</sub> = -1.0 μA)	BC856 BC857 BC858	V <sub>(BR)EBO</sub>	-5.0 -5.0 -5.0	- - -	V
Collector Cutoff Current (V <sub>CB</sub> = -30 V) (V <sub>CB</sub> = -30 V, T <sub>A</sub> = 150°C)		I <sub>CBO</sub>	- -	- -4.0	nA μA
<b>ON CHARACTERISTICS</b>					
DC Current Gain (I <sub>C</sub> = -10 μA, V <sub>CE</sub> = -5.0 V)	BC856A, BC858A BC856B, BC857B, BC858B BC857C	h <sub>FE</sub>	- - -	90 150 270	- - -
(I <sub>C</sub> = -2.0 mA, V <sub>CE</sub> = -5.0 V)	BC856A, BC858A BC856B, BC857B, BC858B BC857C		125 220 420	180 290 520	250 475 800
Collector – Emitter Saturation Voltage (I <sub>C</sub> = -10 mA, I <sub>B</sub> = -0.5 mA) (I <sub>C</sub> = -100 mA, I <sub>B</sub> = -5.0 mA)		V <sub>CE(sat)</sub>	- -	- -	-0.3 -0.65
Base – Emitter Saturation Voltage (I <sub>C</sub> = -10 mA, I <sub>B</sub> = -0.5 mA) (I <sub>C</sub> = -100 mA, I <sub>B</sub> = -5.0 mA)		V <sub>BE(sat)</sub>	- -	-0.7 -0.9	- -
Base – Emitter On Voltage (I <sub>C</sub> = -2.0 mA, V <sub>CE</sub> = -5.0 V) (I <sub>C</sub> = -10 mA, V <sub>CE</sub> = -5.0 V)		V <sub>BE(on)</sub>	-0.6 -	- -	-0.75 -0.82
<b>SMALL-SIGNAL CHARACTERISTICS</b>					
Current – Gain – Bandwidth Product (I <sub>C</sub> = -10 mA, V <sub>CE</sub> = -5.0 Vdc, f = 100 MHz)		f <sub>T</sub>	100	-	MHz
Output Capacitance (V <sub>CB</sub> = -10 V, f = 1.0 MHz)		C <sub>ob</sub>	-	-	4.5 pF
Noise Figure (I <sub>C</sub> = -0.2 mA, V <sub>CE</sub> = -5.0 Vdc, R <sub>S</sub> = 2.0 kΩ, f = 1.0 kHz, BW = 200 Hz)		NF	-	-	10 dB

# BC856B, BC857B, BC858A

## BC857/BC858

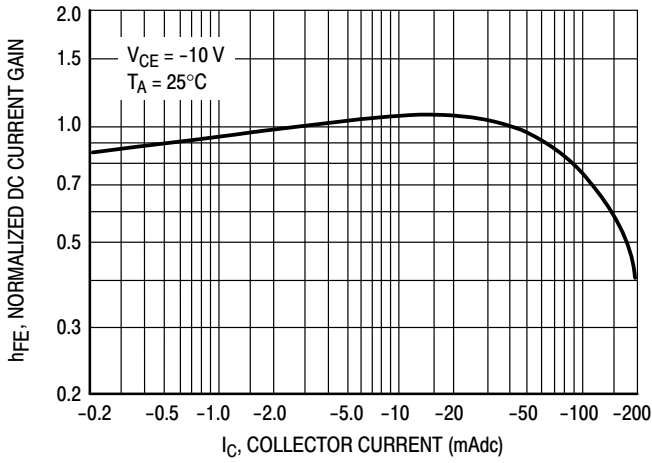


Figure 1. Normalized DC Current Gain

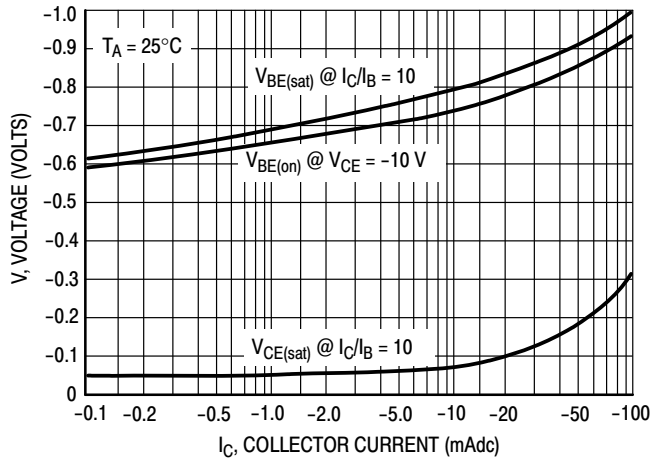


Figure 2. "Saturation" and "On" Voltages

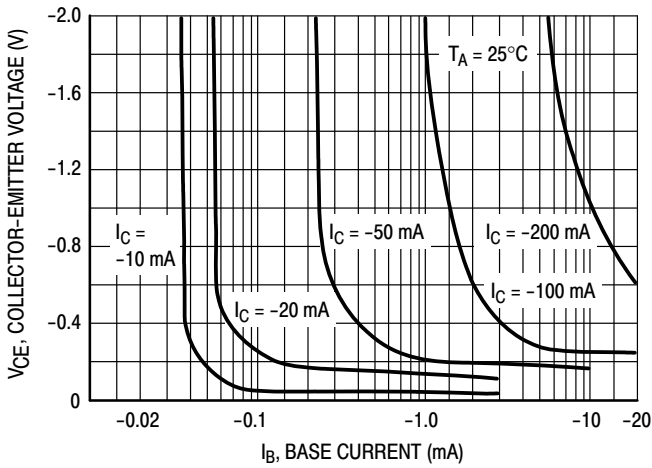


Figure 3. Collector Saturation Region

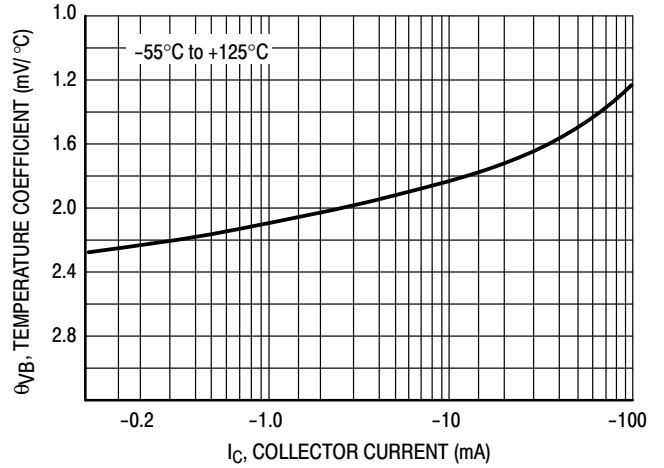


Figure 4. Base-Emitter Temperature Coefficient

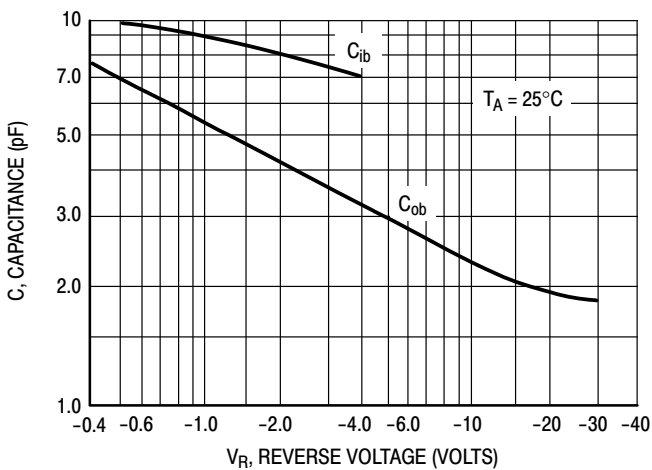


Figure 5. Capacitances

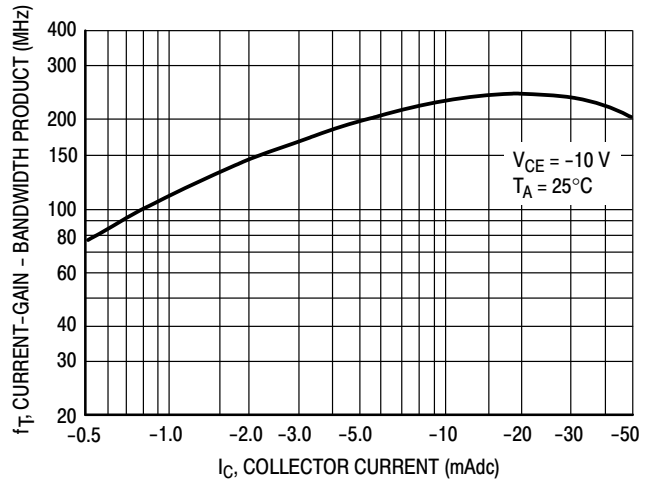


Figure 6. Current-Gain - Bandwidth Product

# BC856B, BC857B, BC858A

## BC856

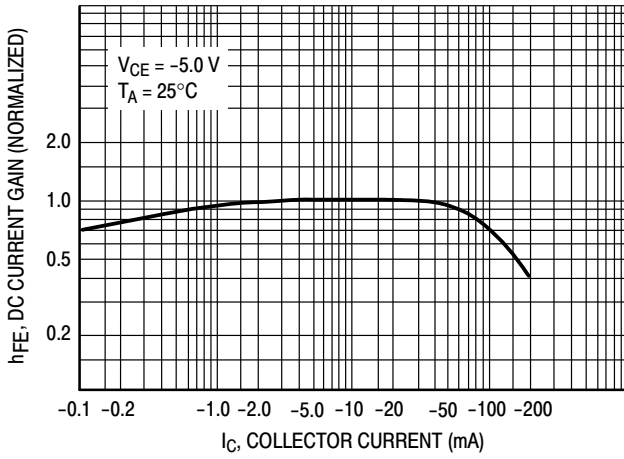


Figure 7. DC Current Gain

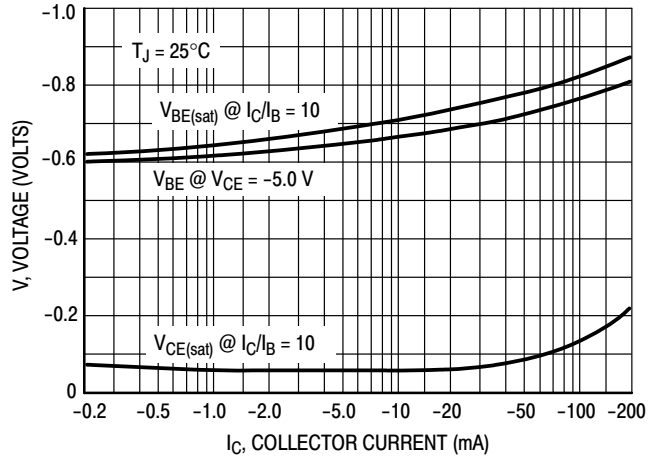


Figure 8. "On" Voltage

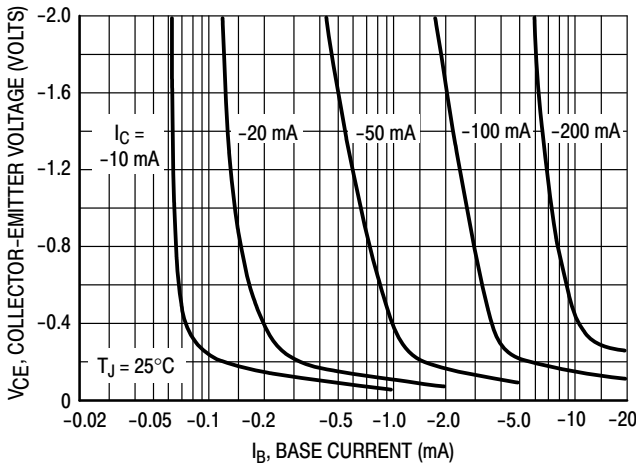


Figure 9. Collector Saturation Region

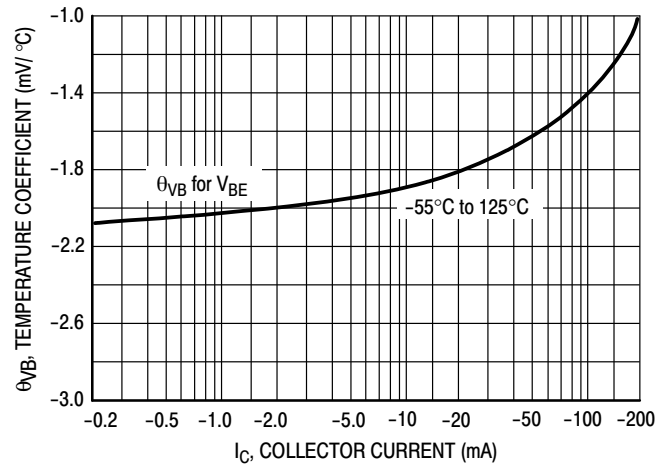


Figure 10. Base-Emitter Temperature Coefficient

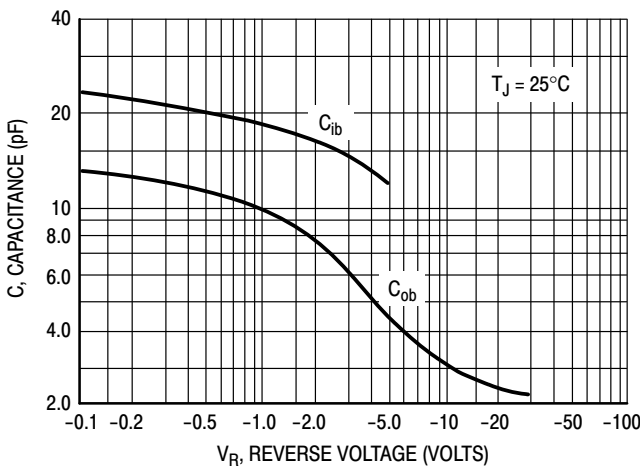


Figure 11. Capacitance

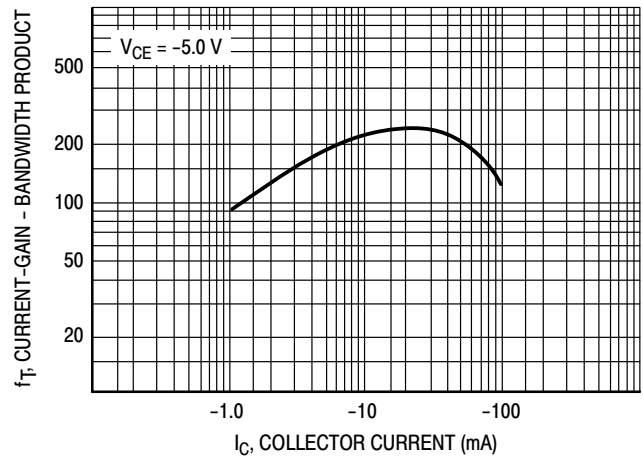


Figure 12. Current-Gain - Bandwidth Product

# BC856B, BC857B, BC858A

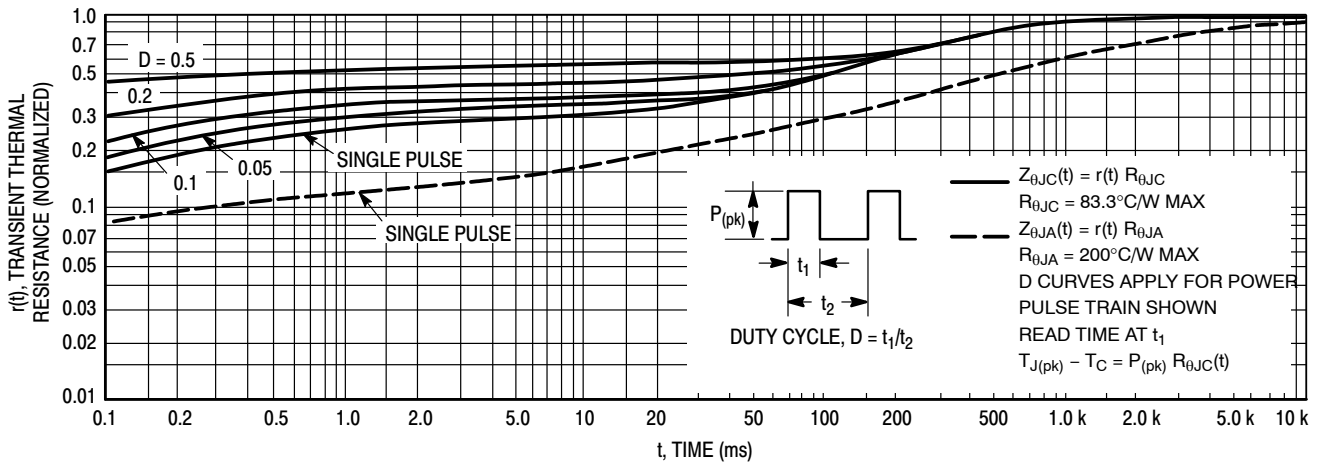


Figure 13. Thermal Response

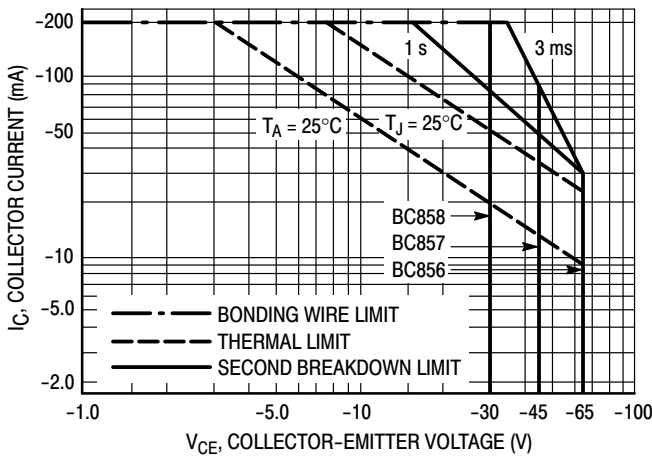


Figure 14. Active Region Safe Operating Area

The safe operating area curves indicate  $I_C$ - $V_{CE}$  limits of the transistor that must be observed for reliable operation. Collector load lines for specific circuits must fall below the limits indicated by the applicable curve.

The data of Figure 14 is based upon  $T_{J(pk)} = 150^\circ\text{C}$ ;  $T_C$  or  $T_A$  is variable depending upon conditions. Pulse curves are valid for duty cycles to 10% provided  $T_{J(pk)} \leq 150^\circ\text{C}$ .  $T_{J(pk)}$  may be calculated from the data in Figure 13. At high case or ambient temperatures, thermal limitations will reduce the power that can be handled to values less than the limitations imposed by the secondary breakdown.

## ORDERING INFORMATION

Device	Marking	Package	Shipping†
BC856BWT1G	3B	SC-70/SOT-323 (Pb-Free)	3,000 / Tape & Reel
SBC856BWT1G*			
BC857BWT1G	3F	SC-70/SOT-323 (Pb-Free)	3,000 / Tape & Reel
SBC857BWT1G*			
BC857CWT1G	3G	SC-70/SOT-323 (Pb-Free)	3,000 / Tape & Reel
NSVBC857CWT1G*			
BC858AWT1G	3J	SC-70/SOT-323 (Pb-Free)	3,000 / Tape & Reel
BC858BWT1G	3K	SC-70/SOT-323 (Pb-Free)	3,000 / Tape & Reel

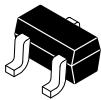
†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

\*S and NSV Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q101 Qualified and PPAP Capable.

# MECHANICAL CASE OUTLINE

## PACKAGE DIMENSIONS

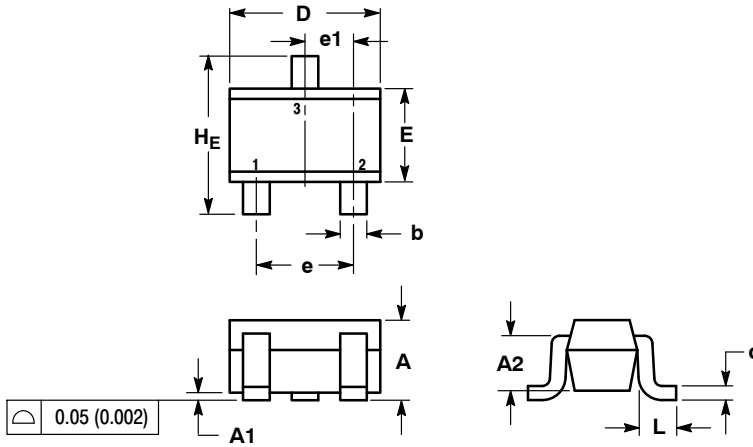
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SCALE 4:1

SC-70 (SOT-323)  
CASE 419-04  
ISSUE N

DATE 11 NOV 2008

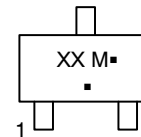


NOTES:

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

DIM	MILLIMETERS			INCHES		
	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
HE	2.00	2.10	2.40	0.079	0.083	0.095

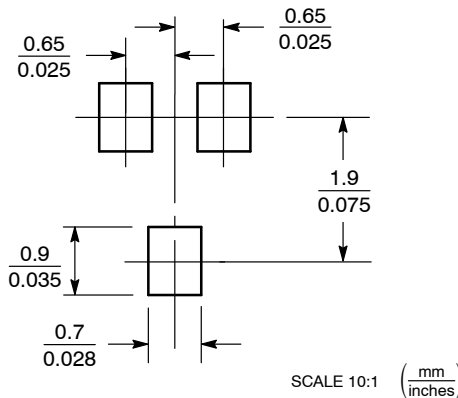
### GENERIC MARKING DIAGRAM



- 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.

### 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.

- |   |   |   |  |   |   |
|---|---|---|--|---|---|
| STYLE 1:<br>CANCELLED                                 | STYLE 2:<br>PIN 1. ANODE<br>2. N.C.<br>3. CATHODE     | STYLE 3:<br>PIN 1. BASE<br>2. EMITTER<br>3. COLLECTOR | STYLE 4:<br>PIN 1. CATHODE<br>2. CATHODE<br>3. ANODE       | STYLE 5:<br>PIN 1. ANODE<br>2. ANODE<br>3. CATHODE          |   |
| STYLE 6:<br>PIN 1. EMITTER<br>2. BASE<br>3. COLLECTOR | STYLE 7:<br>PIN 1. BASE<br>2. EMITTER<br>3. COLLECTOR | STYLE 8:<br>PIN 1. GATE<br>2. SOURCE<br>3. DRAIN      | STYLE 9:<br>PIN 1. ANODE<br>2. CATHODE<br>3. CATHODE-ANODE | STYLE 10:<br>PIN 1. CATHODE<br>2. ANODE<br>3. ANODE-CATHODE | STYLE 11:<br>PIN 1. CATHODE<br>2. CATHODE<br>3. CATHODE |

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<b>DESCRIPTION:</b>	<b>SC-70 (SOT-323)</b>	<b>PAGE 1 OF 1</b>

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