

# BC856B, BC857B, BC858A

## General Purpose Transistors

### PNP Silicon

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

Rating	Symbol	Value	Unit
Collector-Emitter Voltage BC856 BC857 BC858	$V_{CEO}$	-65 -45 -30	V
	$V_{CBO}$	-80 -50 -30	V
	$V_{EBO}$	-5.0	V
Collector Current – Continuous	$I_C$	-100	mAdc

#### THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Total Device Dissipation FR-5 Board, (Note 1) $T_A = 25^\circ\text{C}$	$P_D$	150	mW
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	883	°C/W
Junction and Storage Temperature	$T_J, T_{stg}$	-55 to +150	°C

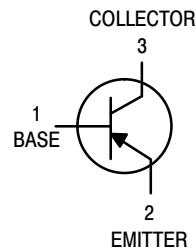
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

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

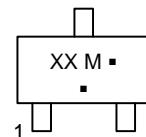


**ON Semiconductor®**

[www.onsemi.com](http://www.onsemi.com)



#### 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 in the package dimensions section on page 5 of this data sheet.

# BC856B, BC857B, BC858A

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

Characteristic	Symbol	Min	Typ	Max	Unit
<b>OFF CHARACTERISTICS</b>					
Collector–Emitter Breakdown Voltage ( $I_C = -10 \text{ mA}$ )	$V_{(\text{BR})\text{CEO}}$	-65	-	-	V
BC856		-45	-	-	
BC857		-30	-	-	
BC858					
Collector–Emitter Breakdown Voltage ( $I_C = -10 \mu\text{A}$ , $V_{EB} = 0$ )	$V_{(\text{BR})\text{CES}}$	-80	-	-	V
BC856		-50	-	-	
BC857		-30	-	-	
BC858					
Collector–Base Breakdown Voltage ( $I_C = -10 \mu\text{A}$ )	$V_{(\text{BR})\text{CBO}}$	-80	-	-	V
BC856		-50	-	-	
BC857		-30	-	-	
BC858					
Emitter–Base Breakdown Voltage ( $I_E = -1.0 \mu\text{A}$ )	$V_{(\text{BR})\text{EBO}}$	-5.0	-	-	V
BC856		-5.0	-	-	
BC857		-5.0	-	-	
BC858					
Collector Cutoff Current ( $V_{CB} = -30 \text{ V}$ ) ( $V_{CB} = -30 \text{ V}$ , $T_A = 150^\circ\text{C}$ )	$I_{CBO}$	-	-	-15 -4.0	nA $\mu\text{A}$

## ON CHARACTERISTICS

DC Current Gain ( $I_C = -10 \mu\text{A}$ , $V_{CE} = -5.0 \text{ V}$ )	$h_{FE}$	-	90	-	-
BC856A, BC585A		-	150	-	
BC856B, BC857B, BC858B		-	270	-	
BC857C					
( $I_C = -2.0 \text{ mA}$ , $V_{CE} = -5.0 \text{ V}$ )		125	180	250	
BC856A, BC858A		220	290	475	
BC856B, BC857B, BC858B		420	520	800	
BC857C					
Collector–Emitter Saturation Voltage ( $I_C = -10 \text{ mA}$ , $I_B = -0.5 \text{ mA}$ ) ( $I_C = -100 \text{ mA}$ , $I_B = -5.0 \text{ mA}$ )	$V_{CE(\text{sat})}$	-	-	-0.3 -0.65	V
Base–Emitter Saturation Voltage ( $I_C = -10 \text{ mA}$ , $I_B = -0.5 \text{ mA}$ ) ( $I_C = -100 \text{ mA}$ , $I_B = -5.0 \text{ mA}$ )	$V_{BE(\text{sat})}$	-	-0.7 -0.9	-	V
Base–Emitter On Voltage ( $I_C = -2.0 \text{ mA}$ , $V_{CE} = -5.0 \text{ V}$ ) ( $I_C = -10 \text{ mA}$ , $V_{CE} = -5.0 \text{ V}$ )	$V_{BE(\text{on})}$	-0.6 -	-	-0.75 -0.82	V

## SMALL-SIGNAL CHARACTERISTICS

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

# BC856B, BC857B, BC858A

## BC857/BC858

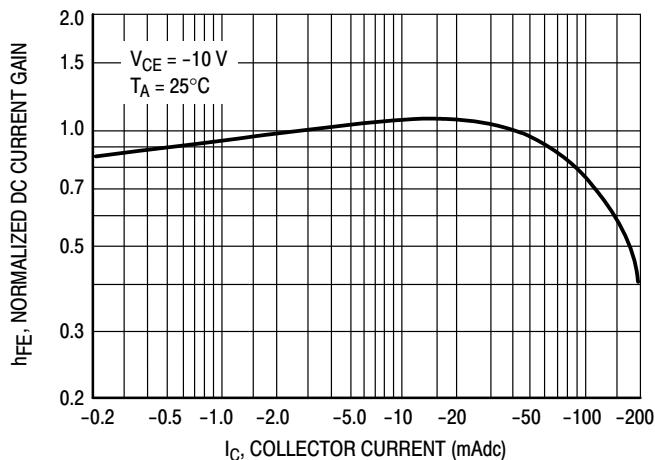


Figure 1. Normalized DC Current Gain

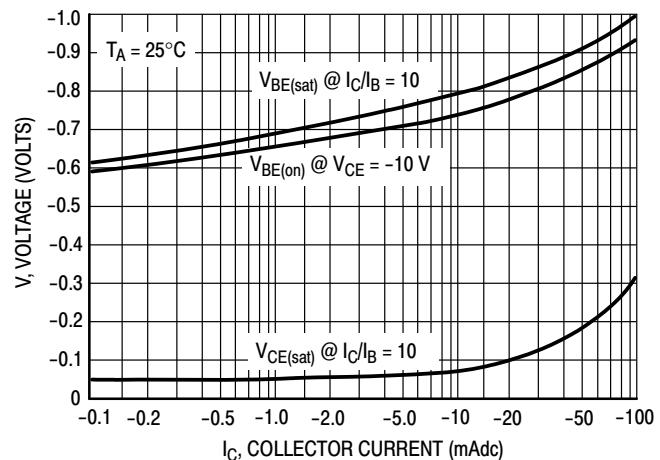


Figure 2. "Saturation" and "On" Voltages

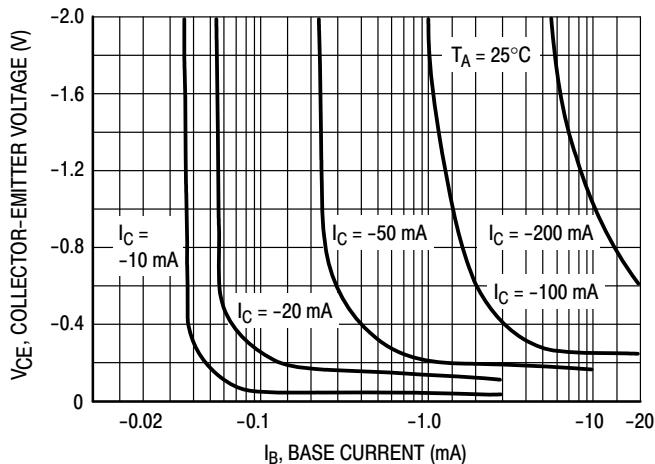


Figure 3. Collector Saturation Region

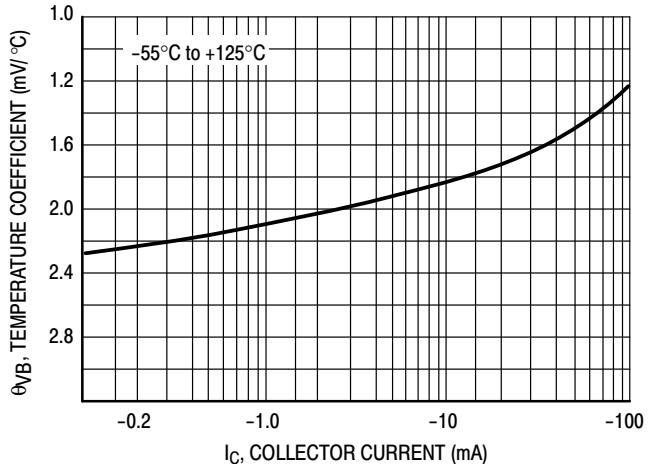


Figure 4. Base-Emitter Temperature Coefficient

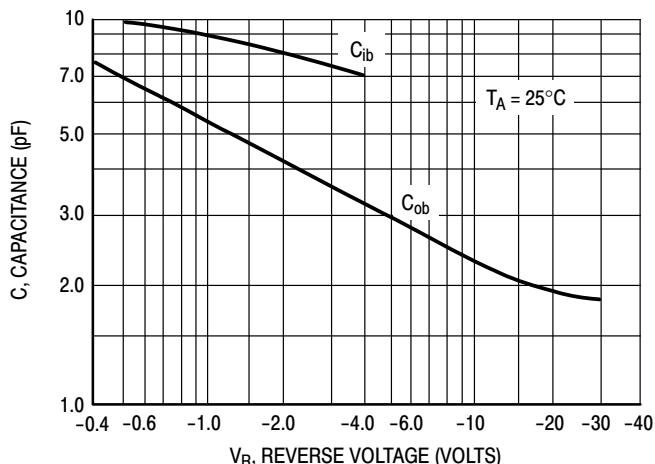


Figure 5. Capacitances

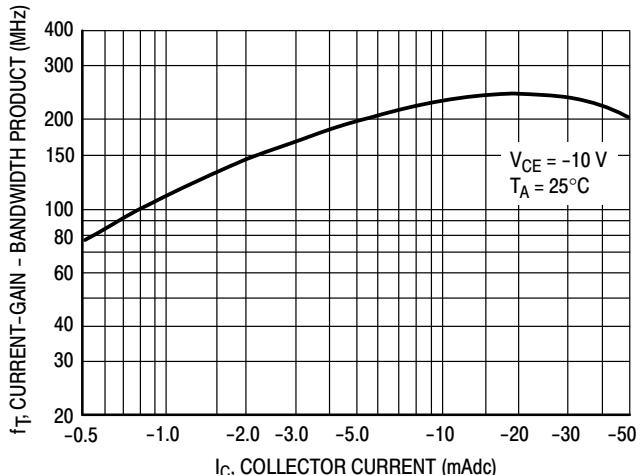


Figure 6. Current-Gain - Bandwidth Product

# BC856B, BC857B, BC858A

## BC856

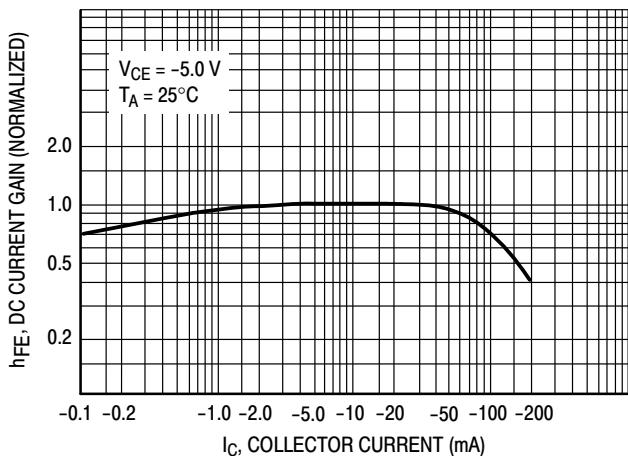


Figure 7. DC Current Gain

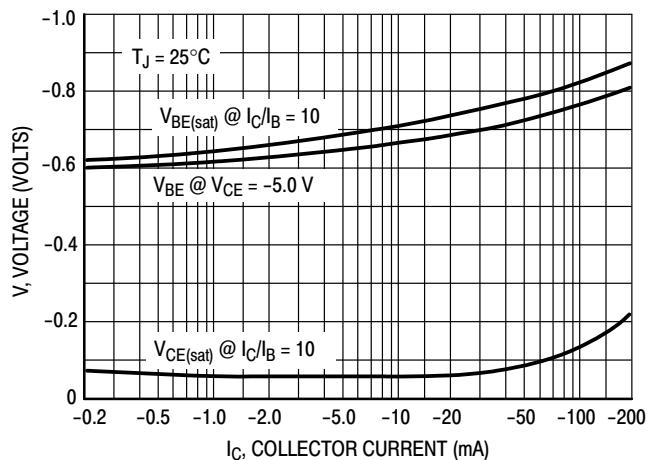


Figure 8. "On" Voltage

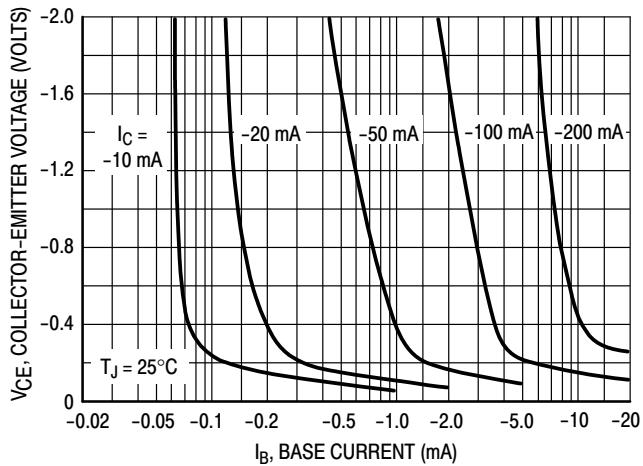


Figure 9. Collector Saturation Region

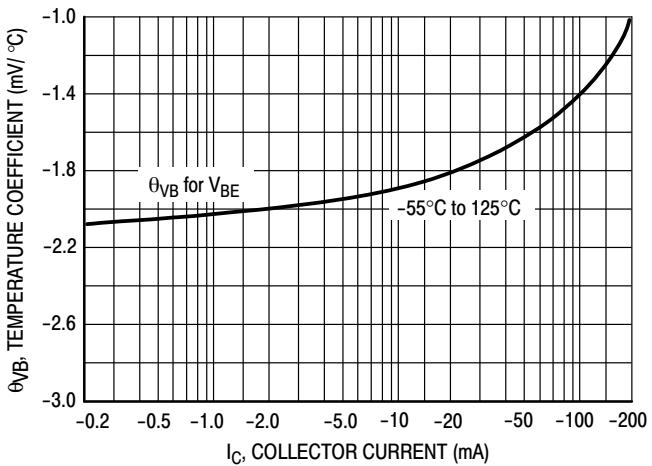


Figure 10. Base-Emitter Temperature Coefficient

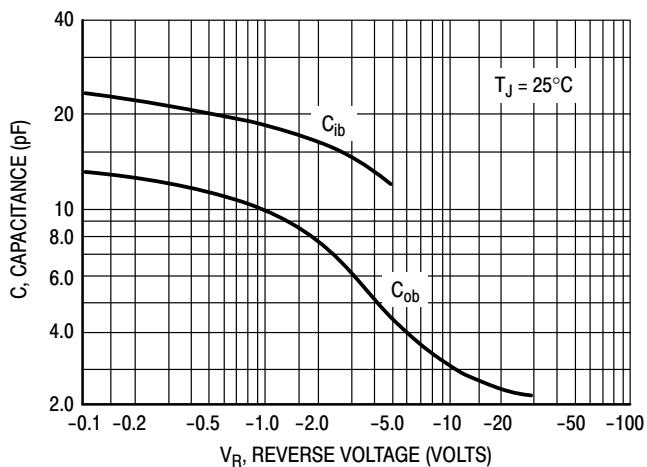


Figure 11. Capacitance

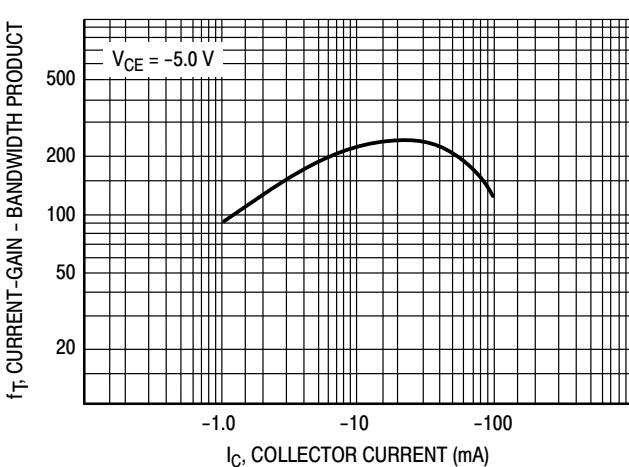


Figure 12. Current-Gain - Bandwidth Product

# BC856B, BC857B, BC858A

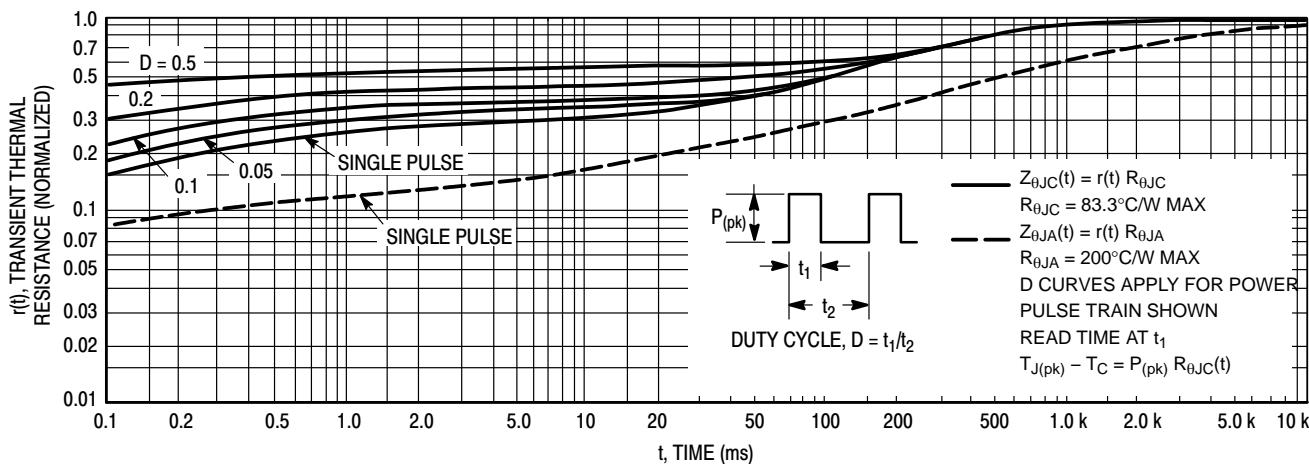


Figure 13. Thermal Response

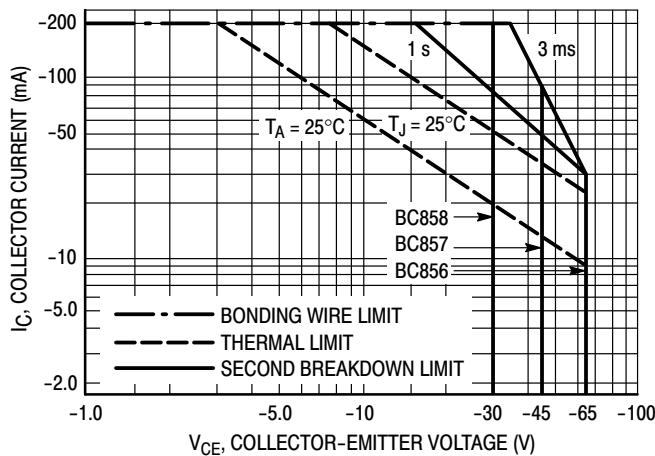


Figure 14. Active Region Safe Operating Area

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 <sup>†</sup>
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

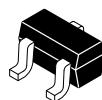
<sup>†</sup>For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

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

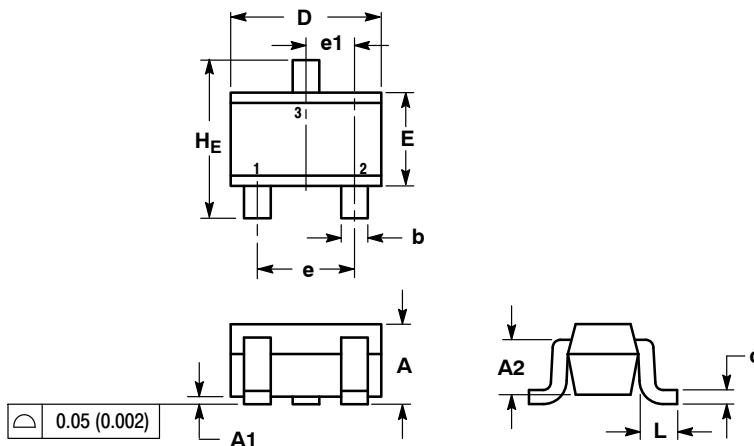
# MECHANICAL CASE OUTLINE

## PACKAGE DIMENSIONS

ON Semiconductor®



SCALE 4:1



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

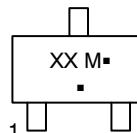
DATE 11 NOV 2008

### 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
H_E	2.00	2.10	2.40	0.079	0.083	0.095

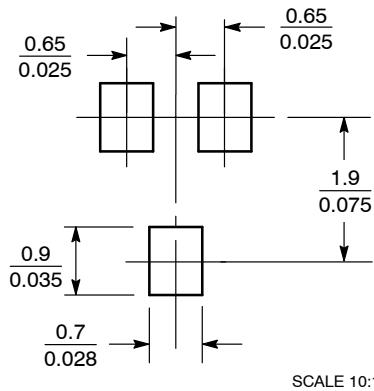
### GENERIC MARKING DIAGRAM



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.

### SOLDERING FOOTPRINT\*



SCALE 10:1 (mm)  
(inches)

\*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:  
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

DOCUMENT NUMBER:	98ASB42819B	Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red.
DESCRIPTION:	SC-70 (SOT-323)	PAGE 1 OF 1

ON Semiconductor and are trademarks of Semiconductor Components Industries, LLC dba ON Semiconductor or its subsidiaries in the United States and/or other countries. ON Semiconductor reserves the right to make changes without further notice to any products herein. ON Semiconductor makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does ON Semiconductor assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. ON Semiconductor does not convey any license under its patent rights nor the rights of others.

ON Semiconductor and  are trademarks of Semiconductor Components Industries, LLC dba ON Semiconductor or its subsidiaries in the United States and/or other countries. ON Semiconductor owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of ON Semiconductor's product/patent coverage may be accessed at [www.onsemi.com/site/pdf/Patent\\_Marking.pdf](http://www.onsemi.com/site/pdf/Patent_Marking.pdf). ON Semiconductor reserves the right to make changes without further notice to any products herein. ON Semiconductor makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does ON Semiconductor assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. Buyer is responsible for its products and applications using ON Semiconductor products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by ON Semiconductor. "Typical" parameters which may be provided in ON Semiconductor data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. ON Semiconductor does not convey any license under its patent rights nor the rights of others. ON Semiconductor products are not designed, intended, or authorized for use as a critical component in life support systems or any FDA Class 3 medical devices or medical devices with a same or similar classification in a foreign jurisdiction or any devices intended for implantation in the human body. Should Buyer purchase or use ON Semiconductor products for any such unintended or unauthorized application, Buyer shall indemnify and hold ON Semiconductor and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that ON Semiconductor was negligent regarding the design or manufacture of the part. ON Semiconductor is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

## PUBLICATION ORDERING INFORMATION

### LITERATURE FULFILLMENT:

Email Requests to: [orderlit@onsemi.com](mailto:orderlit@onsemi.com)

ON Semiconductor Website: [www.onsemi.com](http://www.onsemi.com)

### TECHNICAL SUPPORT

#### North American Technical Support:

Voice Mail: 1 800-282-9855 Toll Free USA/Canada

Phone: 011 421 33 790 2910

#### Europe, Middle East and Africa Technical Support:

Phone: 00421 33 790 2910

For additional information, please contact your local Sales Representative