

# BC856BWT1, SBC856BWT1 Series, BC857BWT1, SBC857BWT1 Series, BC858AWT1 Series



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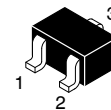
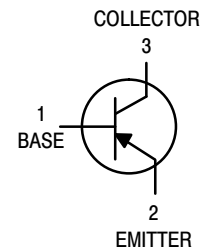
## General Purpose Transistors

### 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.

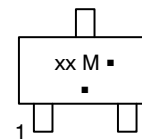
#### Features

- AEC-Q101 Qualified and PPAP Capable
- S Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements
- 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 = Date Code\*  
▪ = Pb-Free Package

(Note: Microdot may be in either location)

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

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

Rating	Symbol	Value	Unit
Collector-Emitter Voltage BC856, SBC856 BC857, SBC857 BC858	$V_{CEO}$	-65 -45 -30	V
Collector-Base Voltage BC856, SBC856 BC857, SBC857 BC858	$V_{CBO}$	-80 -50 -30	V
Emitter-Base Voltage	$V_{EBO}$	-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	$^\circ\text{C}/\text{W}$
Junction and Storage Temperature	$T_J, T_{stg}$	-55 to +150	$^\circ\text{C}$

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

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

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## 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, SBC856 Series BC857, SBC857 Series BC858 Series	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, SBC856 Series BC857B, SBC857B Only BC858 Series	V <sub>(BR)CES</sub>	-80 -50 -30	- - -	- - -	V
Collector – Base Breakdown Voltage (I <sub>C</sub> = -10 μA)	BC856, SBC856 Series BC857, SBC857 Series BC858 Series	V <sub>(BR)CBO</sub>	-80 -50 -30	- - -	- - -	V
Emitter – Base Breakdown Voltage (I <sub>E</sub> = -1.0 μA)	BC856, SBC856 Series BC857, SBC857 Series BC858 Series	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>	- -	- -	-15 -4.0	nA μA

## ON CHARACTERISTICS

DC Current Gain (I <sub>C</sub> = -10 μA, V <sub>CE</sub> = -5.0 V) SBC857B BC858B	BC856A, BC858A BC856B, SBC856B, BC857B, BC857C	h <sub>FE</sub>	- -	90 150	- -	-
(I <sub>C</sub> = -2.0 mA, V <sub>CE</sub> = -5.0 V) SBC857B, BC858B	BC856A, BC858A BC856B, SBC856B, BC857B, 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	V
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	- -	V
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	V

## SMALL-SIGNAL CHARACTERISTICS

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

BC856BWT1, SBC856BWT1 Series, BC857BWT1, SBC857BWT1 Series, BC858AWT1 Series

BC857/SBC847/BC858

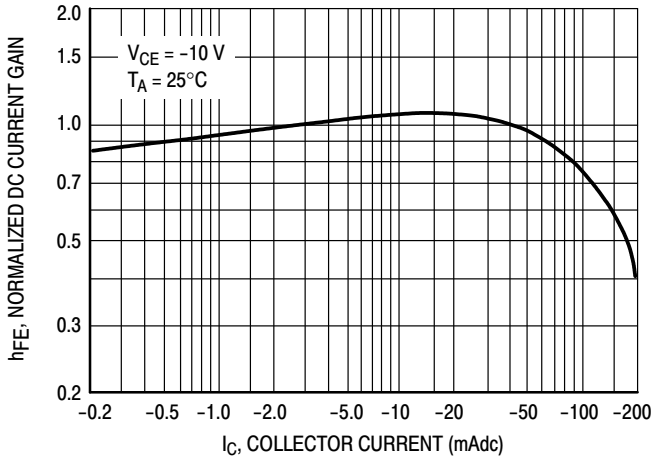


Figure 1. Normalized DC Current Gain

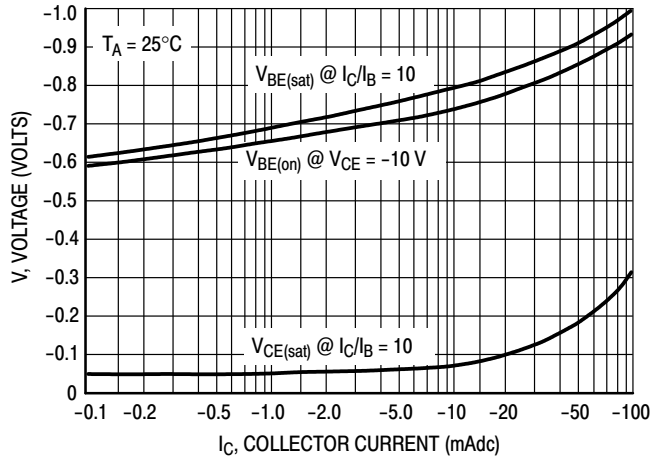


Figure 2. "Saturation" and "On" Voltages

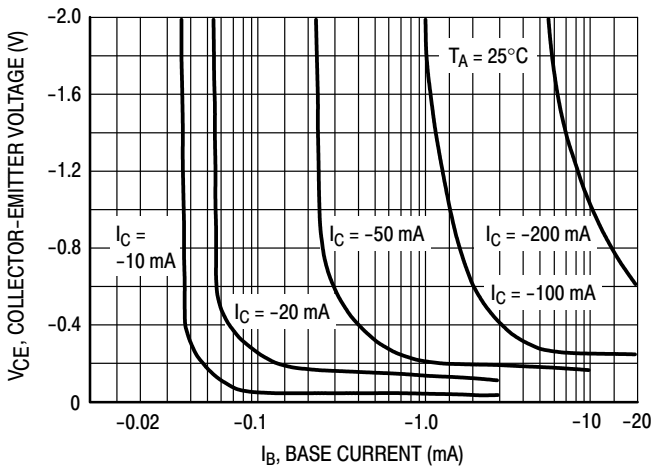


Figure 3. Collector Saturation Region

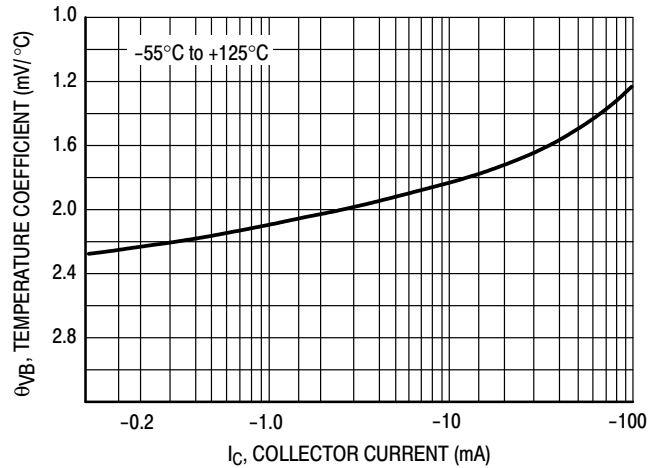


Figure 4. Base-Emitter Temperature Coefficient

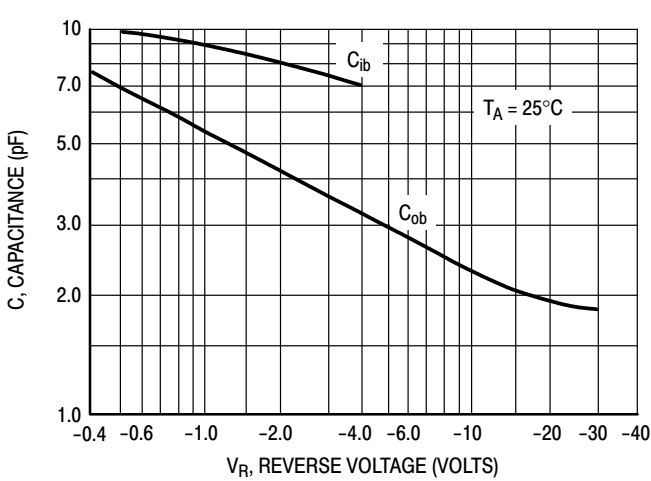


Figure 5. Capacitances

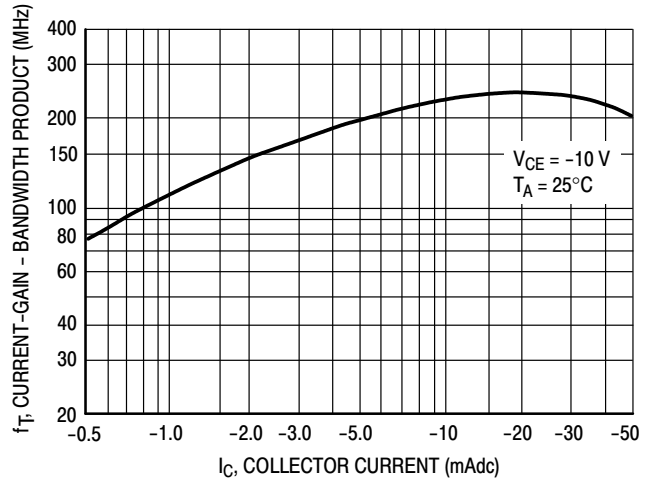


Figure 6. Current-Gain - Bandwidth Product

BC856BWT1, SBC856BWT1 Series, BC857BWT1, SBC857BWT1 Series, BC858AWT1 Series

BC856/SBC856

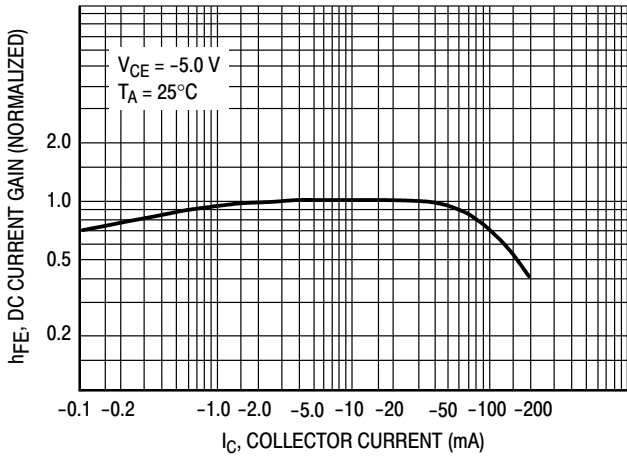


Figure 7. DC Current Gain

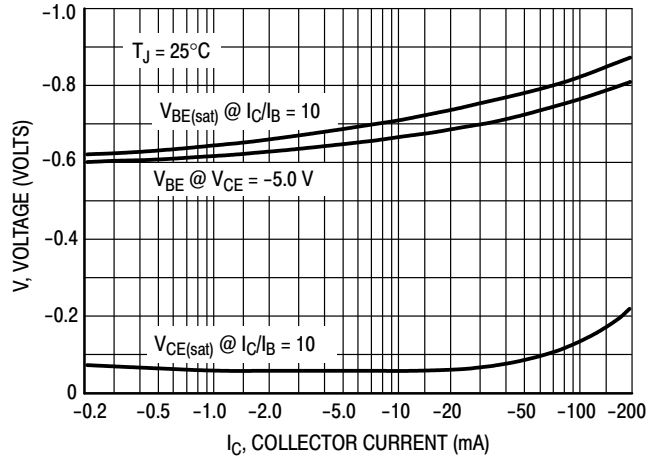


Figure 8. "On" Voltage

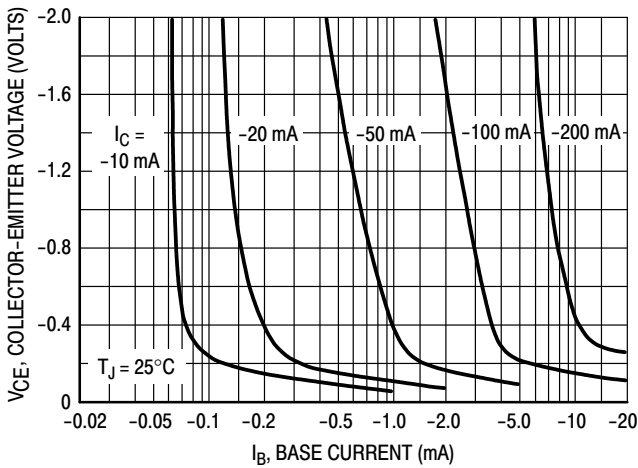


Figure 9. Collector Saturation Region

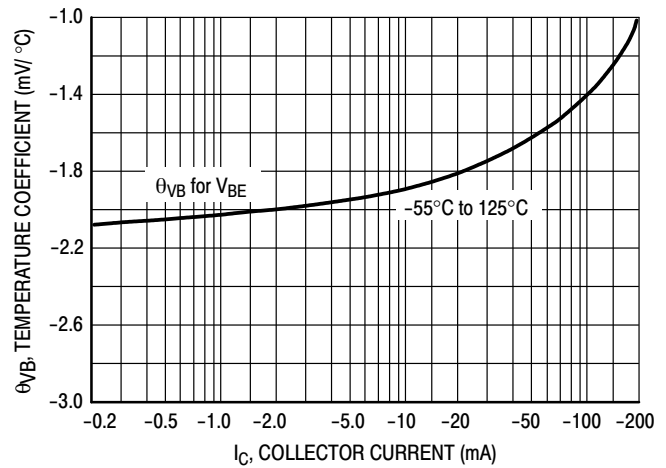


Figure 10. Base-Emitter Temperature Coefficient

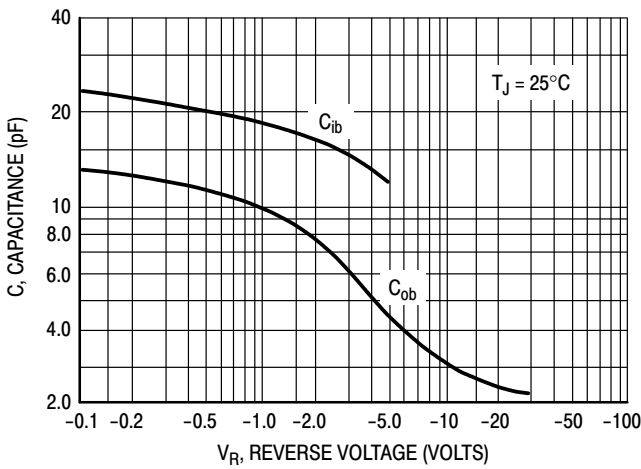


Figure 11. Capacitance

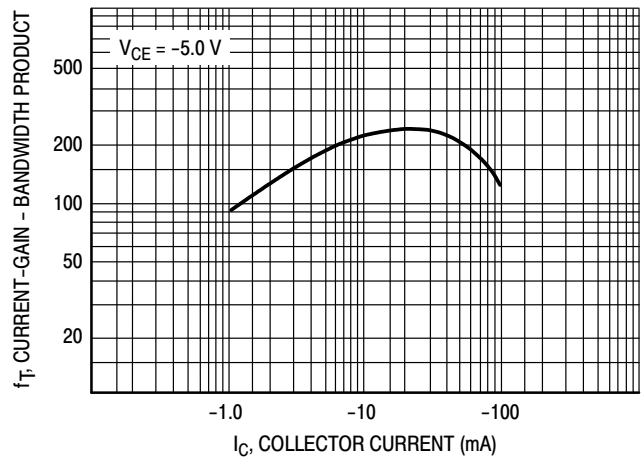
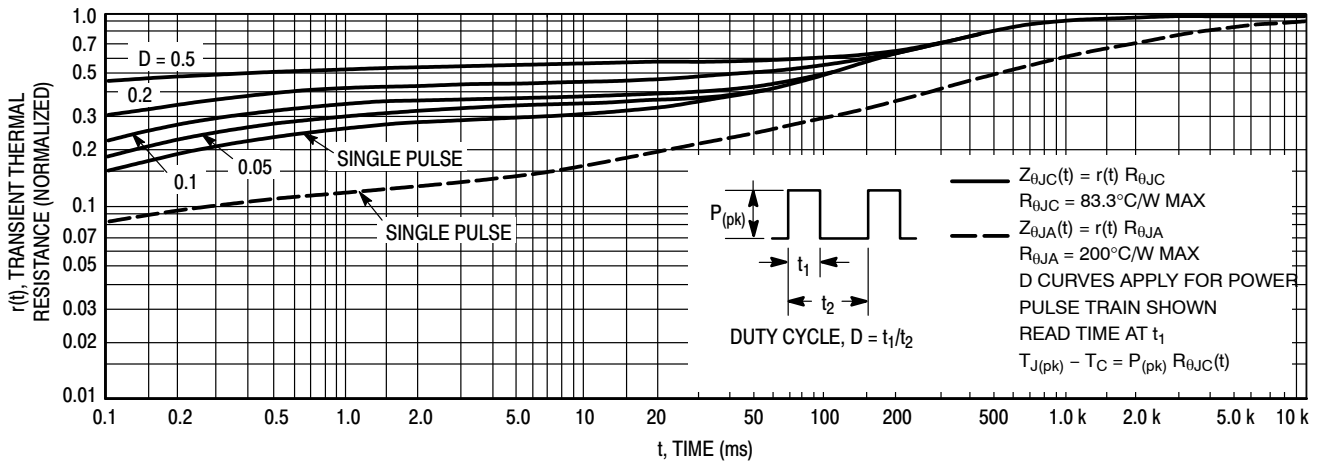
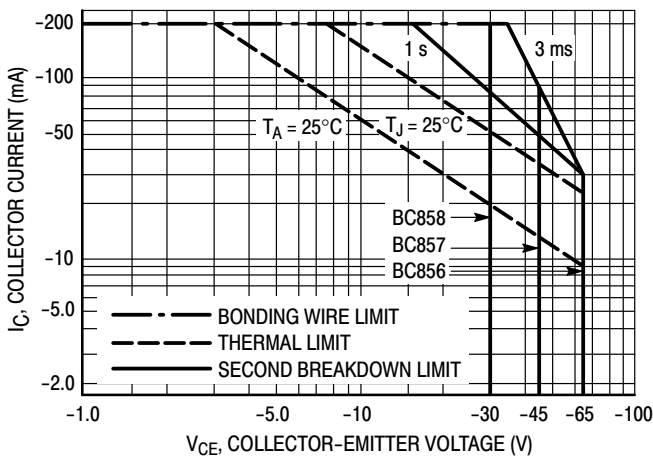


Figure 12. Current-Gain - Bandwidth Product

**BC856BWT1, SBC856BWT1 Series, BC857BWT1, SBC857BWT1 Series, BC858AWT1 Series**



**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**

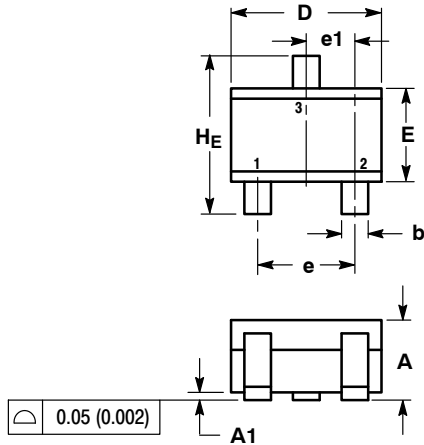
Device	Marking	Package	Shipping†
BC856BWT1G	3B	SC-70/SOT-323 (Pb-Free)	3,000 / Tape & Reel
SBC856BWT1G			
BC857BWT1G	3F	SC-70/SOT-323 (Pb-Free)	3,000 / Tape & Reel
SBC857BWT1G			
BC857CWT1G	3G	SC-70/SOT-323 (Pb-Free)	3,000 / Tape & Reel
BC858AWT1G	3J	SC-70/SOT-323 (Pb-Free)	3,000 / Tape & Reel
BC858BWT1G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

# BC856BWT1, SBC856BWT1 Series, BC857BWT1, SBC857BWT1 Series, BC858AWT1 Series

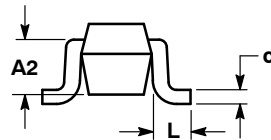
## PACKAGE DIMENSIONS

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



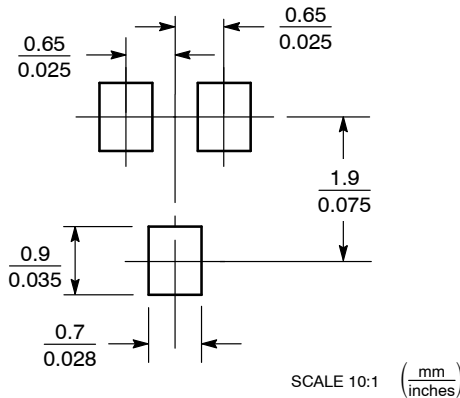
NOTES:  
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.  
2. CONTROLLING DIMENSION: INCH.

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



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

### 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.

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