

# BC846ALT1 Series

BC846, BC847 and BC848 are Preferred Devices

## General Purpose Transistors

### NPN Silicon

#### Features

- Moisture Sensitivity Level: 1
- ESD Rating – Human Body Model: >4000 V  
– Machine Model: >400 V
- Pb-Free Packages are Available

#### MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	BC846	65	Vdc
	BC847, BC850	45	
	BC848, BC849	30	
Collector-Base Voltage	BC846	80	Vdc
	BC847, BC850	50	
	BC848, BC849	30	
Emitter-Base Voltage	BC846	6.0	Vdc
	BC847, BC850	6.0	
	BC848, BC849	5.0	
Collector Current – Continuous	I <sub>C</sub>	100	mAdc

Maximum ratings are those values beyond which device damage can occur. Maximum ratings applied to the device are individual stress limit values (not normal operating conditions) and are not valid simultaneously. If these limits are exceeded, device functional operation is not implied, damage may occur and reliability may be affected.

#### THERMAL CHARACTERISTICS

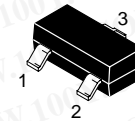
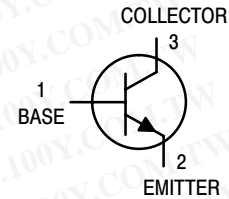
Characteristic	Symbol	Max	Unit
Total Device Dissipation FR-5 Board, (Note 1) T <sub>A</sub> = 25°C Derate above 25°C	P <sub>D</sub>	225	mW
		1.8	mW/°C
Thermal Resistance, Junction-to-Ambient (Note 1)	R <sub>θJA</sub>	556	°C/W
Total Device Dissipation Alumina Substrate (Note 2) T <sub>A</sub> = 25°C Derate above 25°C	P <sub>D</sub>	300	mW
		2.4	mW/°C
Thermal Resistance, Junction-to-Ambient (Note 2)	R <sub>θJA</sub>	417	°C/W
Junction and Storage Temperature Range	T <sub>J</sub> , T <sub>stg</sub>	-55 to +150	°C

1. FR-5 = 1.0 × 0.75 × 0.062 in.
2. Alumina = 0.4 × 0.3 × 0.024 in 99.5% alumina.



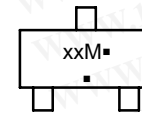
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SOT-23  
CASE 318  
STYLE 6

#### MARKING DIAGRAM



- xx = Specific Device Code
  - M = Date Code
  - = Pb-Free Package
- (Note: Microdot may be in either location)

#### ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 5 of this data sheet.

Preferred devices are recommended choices for future use and best overall value.

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## BC846ALT1 Series

### 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 ( $I_C = 10\text{ mA}$ )	BC846A,B BC847A,B,C, BC850B,C BC848A,B,C, BC849B,C	$V_{(BR)CEO}$	65 45 30	– – –	– – –	V
Collector–Emitter Breakdown Voltage ( $I_C = 10\text{ }\mu\text{A}$ , $V_{EB} = 0$ )	BC846A,B BC847A,B,C BC850B,C BC848A,B,C, BC849B,C	$V_{(BR)CES}$	80 50 30	– – –	– – –	V
Collector–Base Breakdown Voltage ( $I_C = 10\text{ }\mu\text{A}$ )	BC846A,B BC847A,B,C, BC850B,C BC848A,B,C, BC849B,C	$V_{(BR)CBO}$	80 50 30	– – –	– – –	V
Emitter–Base Breakdown Voltage ( $I_E = 1.0\text{ }\mu\text{A}$ )	BC846A,B BC847A,B,C, BC850B,C BC848A,B,C, BC849B,C	$V_{(BR)EBO}$	6.0 6.0 5.0	– – –	– – –	V
Collector Cutoff Current ( $V_{CB} = 30\text{ V}$ ) ( $V_{CB} = 30\text{ V}$ , $T_A = 150^\circ\text{C}$ )		$I_{CBO}$	– –	– –	15 5.0	nA $\mu\text{A}$
<b>ON CHARACTERISTICS</b>						
DC Current Gain ( $I_C = 10\text{ }\mu\text{A}$ , $V_{CE} = 5.0\text{ V}$ )	BC846A, BC847A, BC848A BC846B, BC847B, BC848B BC847C, BC848C	$h_{FE}$	– – –	90 150 270	– – –	–
( $I_C = 2.0\text{ mA}$ , $V_{CE} = 5.0\text{ V}$ )	BC846A, BC847A, BC848A BC846B, BC847B, BC848B, BC849B, BC850B BC847C, BC848C, BC849C, BC850C		110 200 420	180 290 520	220 450 800	
Collector–Emitter Saturation Voltage ( $I_C = 10\text{ mA}$ , $I_B = 0.5\text{ mA}$ ) ( $I_C = 100\text{ mA}$ , $I_B = 5.0\text{ mA}$ )		$V_{CE(sat)}$	– –	– –	0.25 0.6	V
Base–Emitter Saturation Voltage ( $I_C = 10\text{ mA}$ , $I_B = 0.5\text{ mA}$ ) ( $I_C = 100\text{ mA}$ , $I_B = 5.0\text{ mA}$ )		$V_{BE(sat)}$	– –	0.7 0.9	– –	V
Base–Emitter Voltage ( $I_C = 2.0\text{ mA}$ , $V_{CE} = 5.0\text{ V}$ ) ( $I_C = 10\text{ mA}$ , $V_{CE} = 5.0\text{ V}$ )		$V_{BE(on)}$	580 –	660 –	700 770	mV
<b>SMALL–SIGNAL CHARACTERISTICS</b>						
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 ( $V_{CB} = 10\text{ V}$ , $f = 1.0\text{ MHz}$ )		$C_{obo}$	–	–	4.5	pF
Noise Figure ( $I_C = 0.2\text{ mA}$ , $V_{CE} = 5.0\text{ Vdc}$ , $R_S = 2.0\text{ k}\Omega$ , $f = 1.0\text{ kHz}$ , $BW = 200\text{ Hz}$ )	BC846A,B, BC847A,B,C, BC848A,B,C BC849B,C, BC850B,C	NF	– –	– –	10 4.0	dB

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# BC846ALT1 Series

## BC847, BC848, BC849, BC850

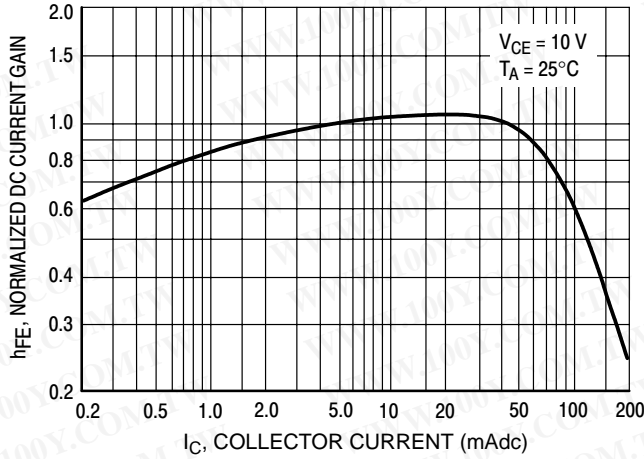


Figure 1. Normalized DC Current Gain

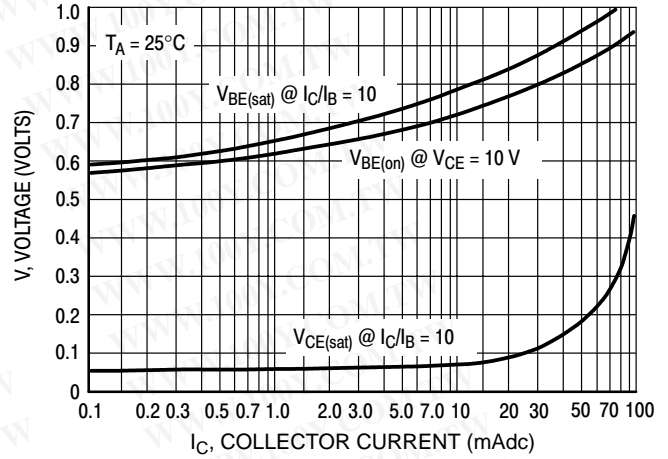


Figure 2. "Saturation" and "On" Voltages

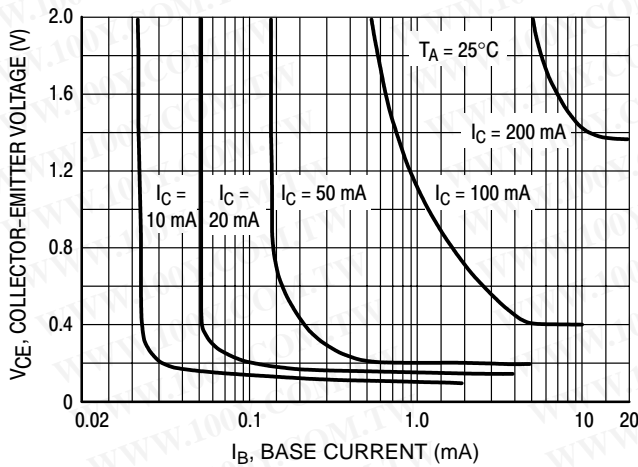


Figure 3. Collector Saturation Region

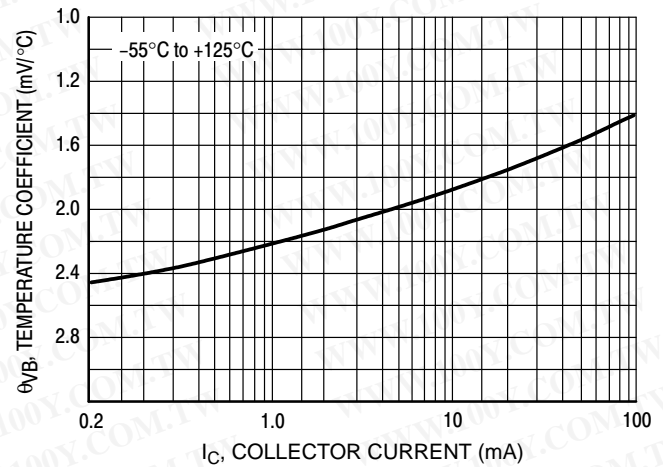


Figure 4. Base-Emitter Temperature Coefficient

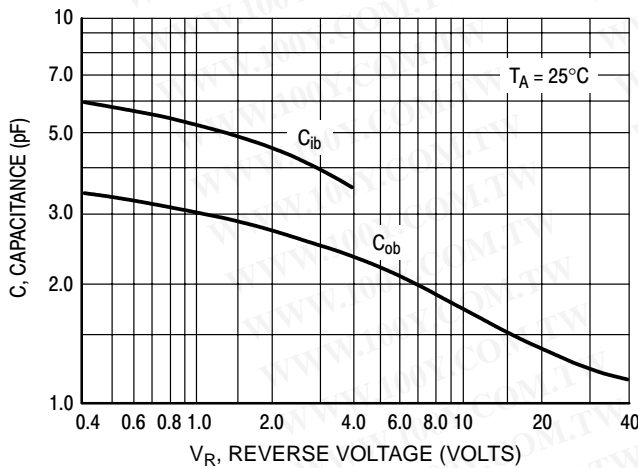


Figure 5. Capacitances

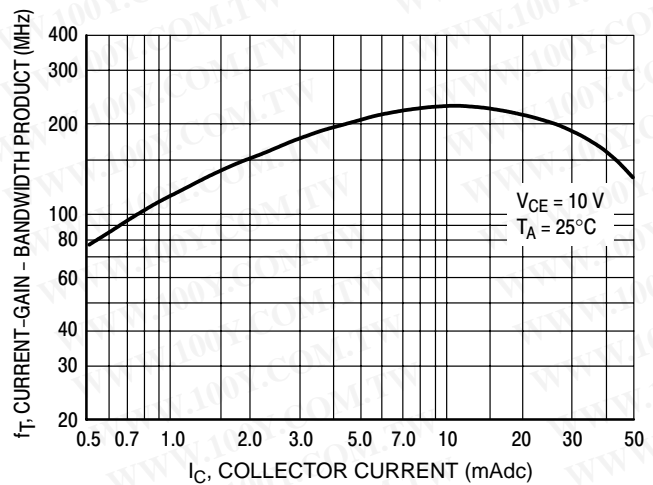


Figure 6. Current-Gain - Bandwidth Product

# BC846ALT1 Series

## BC846

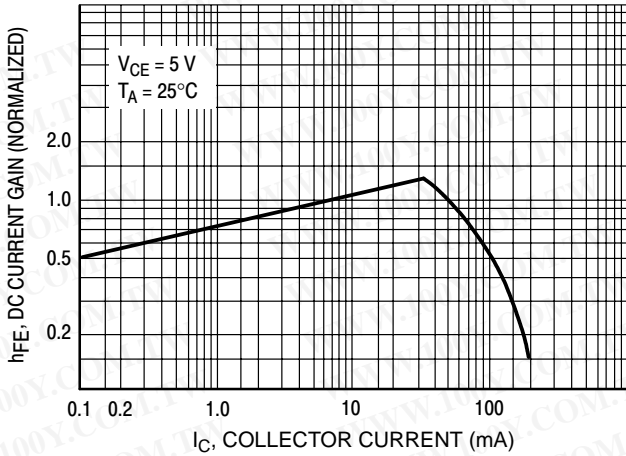


Figure 7. DC Current Gain

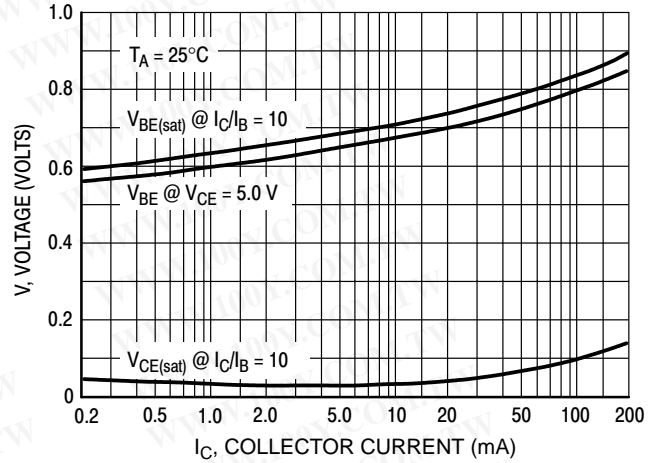


Figure 8. "On" Voltage

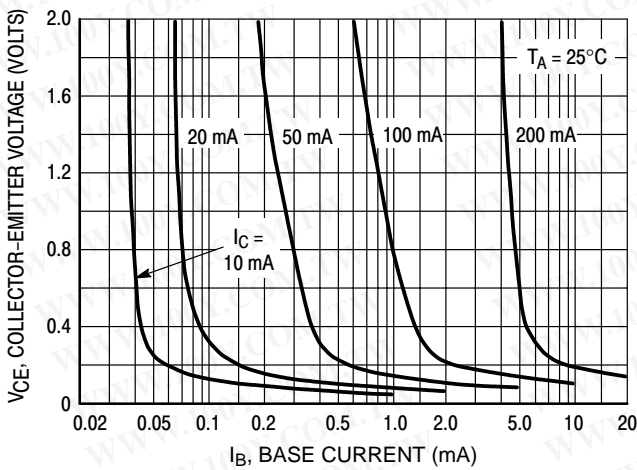


Figure 9. Collector Saturation Region

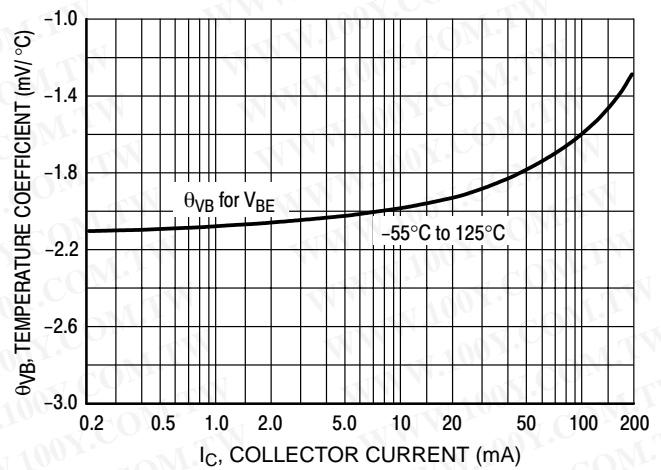


Figure 10. Base-Emitter Temperature Coefficient

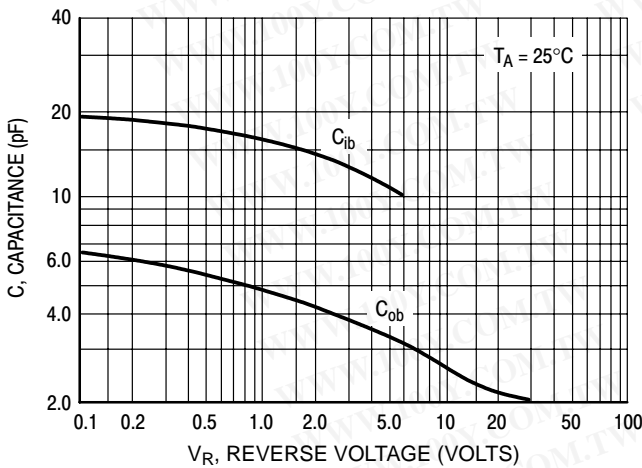


Figure 11. Capacitance

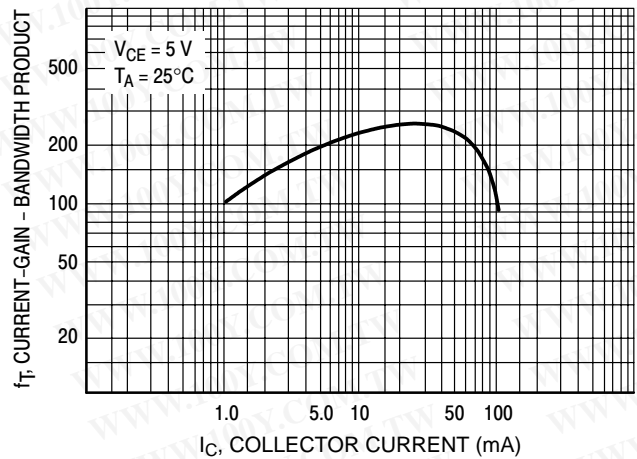


Figure 12. Current-Gain - Bandwidth Product



# BC846ALT1 Series

## ORDERING INFORMATION

Device	Marking	Package	Shipping†
BC846ALT1	1A	SOT-23	3,000 / Tape & Reel
BC846ALT1G		SOT-23 (Pb-Free)	
BC846ALT3		SOT-23	10,000 / Tape & Reel
BC846ALT3G		SOT-23 (Pb-Free)	
BC846BLT1	1B	SOT-23	3,000 / Tape & Reel
BC846BLT1G		SOT-23 (Pb-Free)	
BC846BLT3		SOT-23	10,000 / Tape & Reel
BC846BLT3G		SOT-23 (Pb-Free)	
BC847ALT1	1E	SOT-23	3,000 / Tape & Reel
BC847ALT1G		SOT-23 (Pb-Free)	
BC847ALT3		SOT-23	10,000 / Tape & Reel
BC847ALT3G		SOT-23 (Pb-Free)	
BC847BLT1	1F	SOT-23	3,000 / Tape & Reel
BC847BLT1G		SOT-23 (Pb-Free)	
BC847BLT3		SOT-23	10,000 / Tape & Reel
BC847BLT3G		SOT-23 (Pb-Free)	
BC847CLT1	1G	SOT-23	3,000 / Tape & Reel
BC847CLT1G		SOT-23 (Pb-Free)	
BC847CLT3		SOT-23	10,000 / Tape & Reel
BC847CLT3G		SOT-23 (Pb-Free)	
BC848ALT1	1J	SOT-23	3,000 / Tape & Reel
BC848ALT1G		SOT-23 (Pb-Free)	
BC848BLT1	1K	SOT-23	
BC848BLT1G		SOT-23 (Pb-Free)	
BC848BLT3		SOT-23	10,000 / Tape & Reel
BC848BLT3G		SOT-23 (Pb-Free)	
BC848CLT1	1L	SOT-23	3,000 / Tape & Reel
BC848CLT1G		SOT-23 (Pb-Free)	
BC848CLT3		SOT-23	10,000 / Tape & Reel
BC848CLT3G		SOT-23 (Pb-Free)	

†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.

## BC846ALT1 Series

### ORDERING INFORMATION

Device	Marking	Package	Shipping†
BC849BLT1	2B	SOT-23	3,000 / Tape & Reel
BC849BLT1G		SOT-23 (Pb-Free)	
BC849BLT3		SOT-23	10,000 / Tape & Reel
BC849BLT3G		SOT-23 (Pb-Free)	
BC849CLT1	2C	SOT-23	3,000 / Tape & Reel
BC849CLT1G		SOT-23 (Pb-Free)	
BC849CLT3		SOT-23	10,000 / Tape & Reel
BC849CLT3G		SOT-23 (Pb-Free)	
BC850BLT1	2F	SOT-23	3,000 / Tape & Reel
BC850BLT1G		SOT-23 (Pb-Free)	
BC850CLT1	2G	SOT-23	
BC850CLT1G		SOT-23 (Pb-Free)	

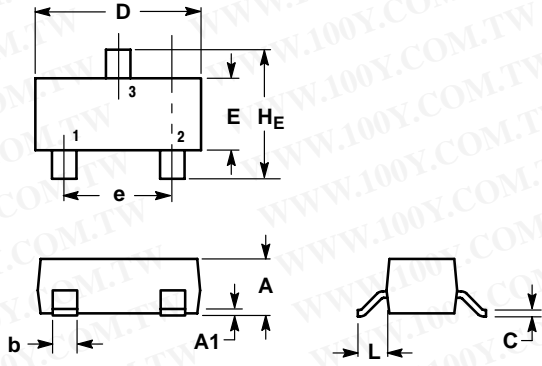
†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

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# BC846ALT1 Series

## PACKAGE DIMENSIONS

SOT-23 (TO-236)  
CASE 318-08  
ISSUE AL



NOTES:

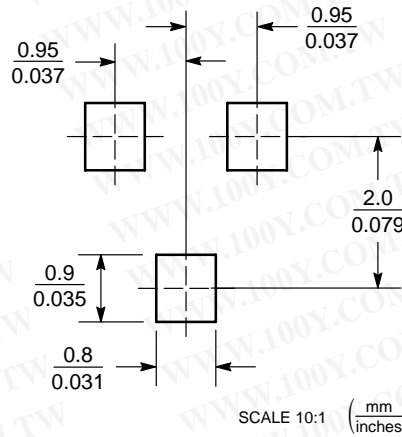
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH THICKNESS. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.
4. 318-01 THRU -07 AND -09 OBSOLETE, NEW STANDARD 318-08.

DIM	MILLIMETERS			INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	0.89	1.00	1.11	0.0350	0.0395	0.0440
A1	0.013	0.06	0.100	0.0005	0.0023	0.0040
b	0.037	0.44	0.50	0.0150	0.0175	0.0200
c	0.085	0.132	0.177	0.0034	0.0052	0.0070
D	2.80	2.90	3.04	0.1102	0.1140	0.1197
E	1.20	1.30	1.40	0.0472	0.0512	0.0551
e	1.78	1.90	2.04	0.0701	0.0750	0.0807
L	0.35	0.54	0.69	0.0140	0.0213	0.0285
HE	2.10	2.40	2.64	0.0830	0.0940	0.1039

STYLE 6:

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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