

# BC856BDW1T1, BC857BDW1T1 Series, BC858CDW1T1 Series

Preferred Devices

## Dual General Purpose Transistors

### PNP Duals

These transistors are designed for general purpose amplifier applications. They are housed in the SOT-363/SC-88 which is designed for low power surface mount applications.

#### Features

- Pb-Free Packages are Available

#### MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	$V_{CEO}$	-65 -45 -30	V
Collector-Base Voltage	$V_{CBO}$	-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 Per Device FR-5 Board (Note 1) $T_A = 25^\circ\text{C}$ Derate Above $25^\circ\text{C}$	$P_D$	380 250 3.0	mW  mW/ $^\circ\text{C}$
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	328	$^\circ\text{C}/\text{W}$
Junction and Storage Temperature Range	$T_J, T_{stg}$	-55 to +150	$^\circ\text{C}$

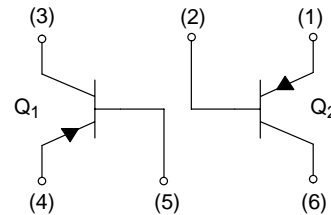
Maximum ratings are those values beyond which device damage can occur. Maximum ratings applied to the device are individual stress limit values (not normal operating conditions) and are not valid simultaneously. If these limits are exceeded, device functional operation is not implied, damage may occur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

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



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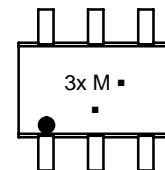
<http://onsemi.com>



1

SOT-363/SC-88  
CASE 419B  
STYLE 1

#### MARKING DIAGRAM



3x = Specific Device Code  
x = B, F, G, or L  
(See Ordering Information)  
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.

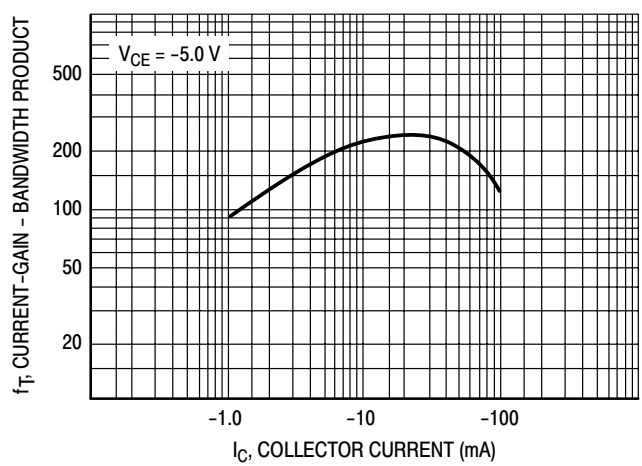
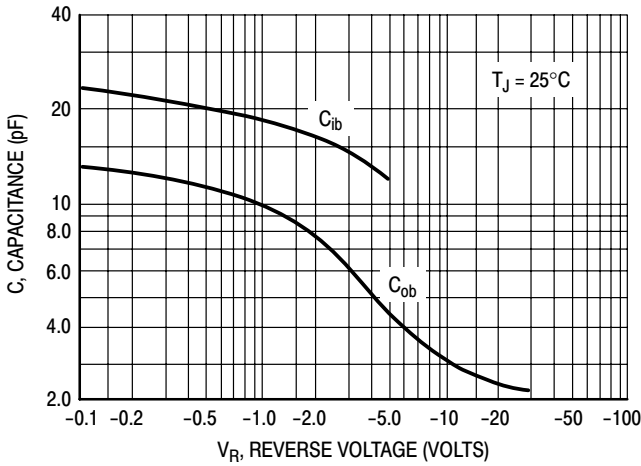
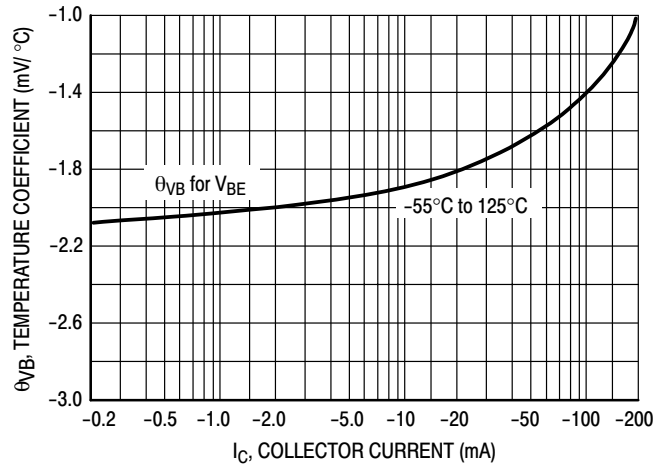
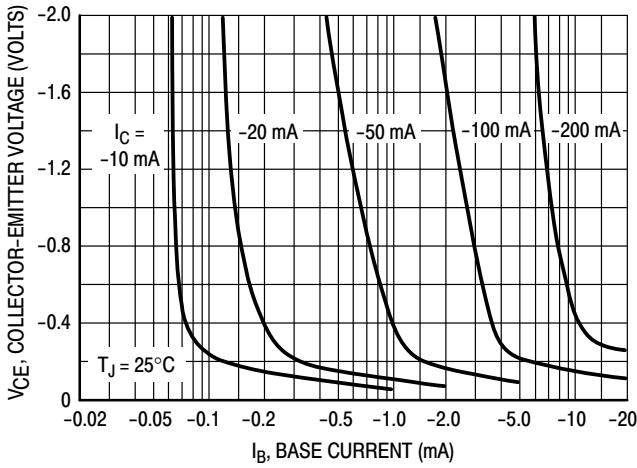
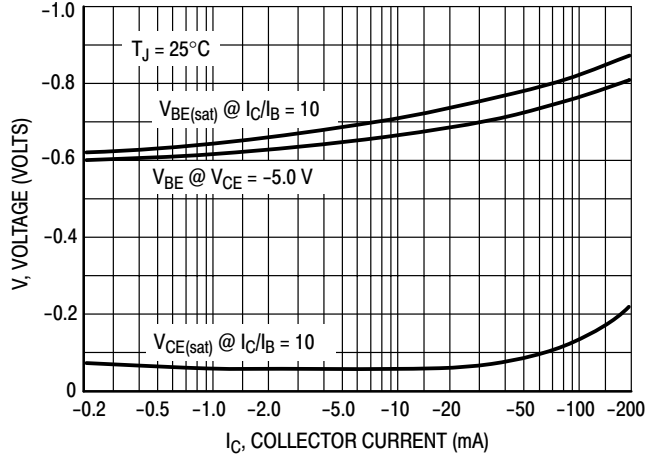
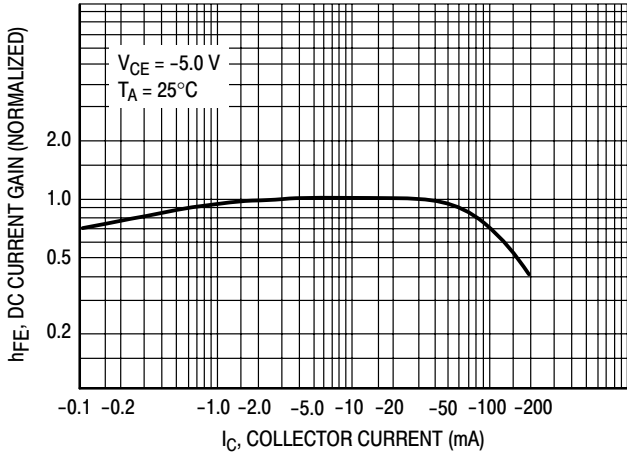
Preferred devices are recommended choices for future use and best overall value.

# BC856BDW1T1, BC857BDW1T1 Series, BC858CDW1T1 Series

## 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 Series BC857 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 Series BC857B Only BC858 Series	V <sub>(BR)CES</sub>	–80 –50 –30	– – –	– – –	V
Collector–Base Breakdown Voltage (I <sub>C</sub> = –10 μA)	BC856 Series BC857 Series BC858 Series	V <sub>(BR)CBO</sub>	–80 –50 –30	– – –	– – –	V
Emitter–Base Breakdown Voltage (I <sub>E</sub> = –1.0 μA)	BC856 Series BC857 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
<b>ON CHARACTERISTICS</b>						
DC Current Gain (I <sub>C</sub> = –10 μA, V <sub>CE</sub> = –5.0 V)	BC856B, BC857B BC857C, BC858C	h <sub>FE</sub>	– –	150 270	– –	–
(I <sub>C</sub> = –2.0 mA, V <sub>CE</sub> = –5.0 V)	BC856B, BC857B BC857C, BC858C		220 420	290 520	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
<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

TYPICAL CHARACTERISTICS – BC856



TYPICAL CHARACTERISTICS – BC857/BC858

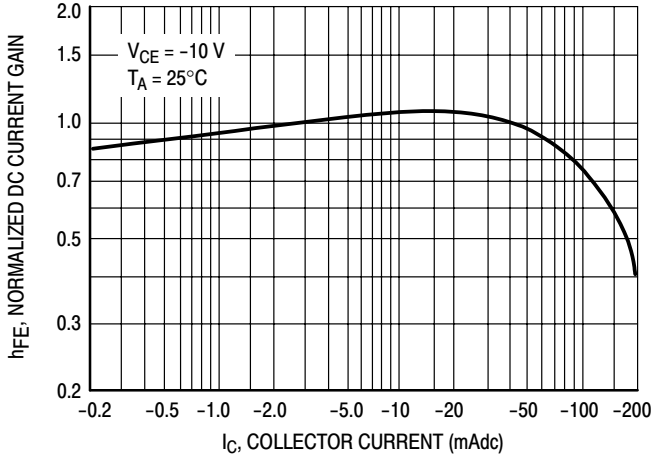


Figure 7. Normalized DC Current Gain

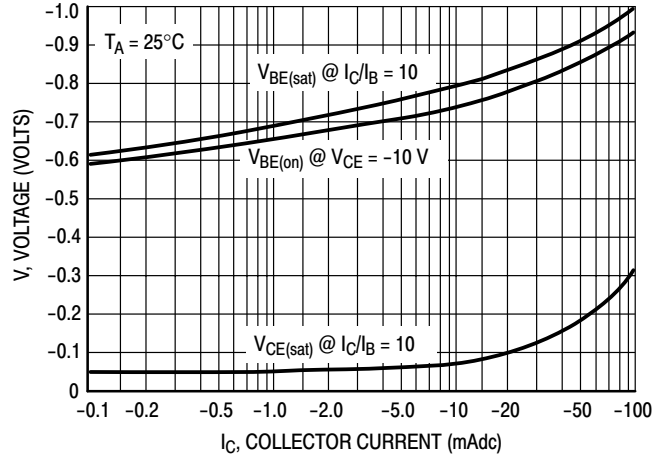


Figure 8. "Saturation" and "On" Voltages

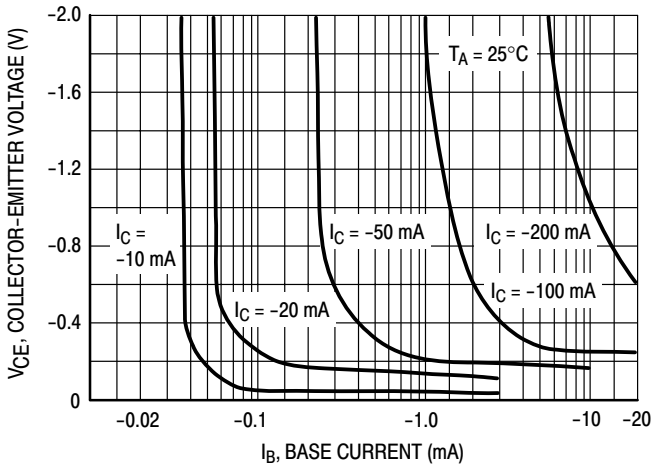


Figure 9. Collector Saturation Region

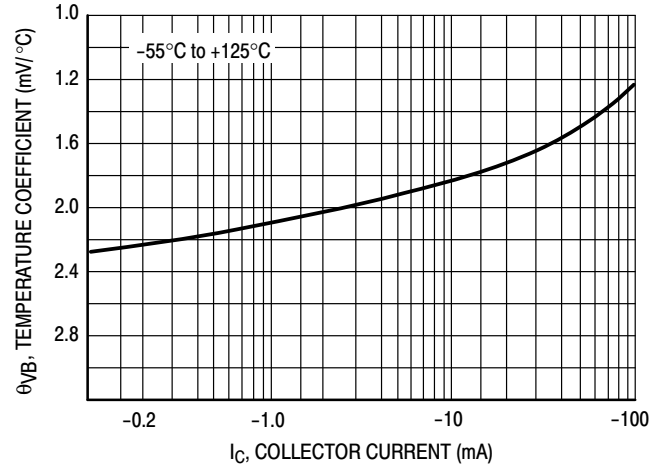


Figure 10. Base-Emitter Temperature Coefficient

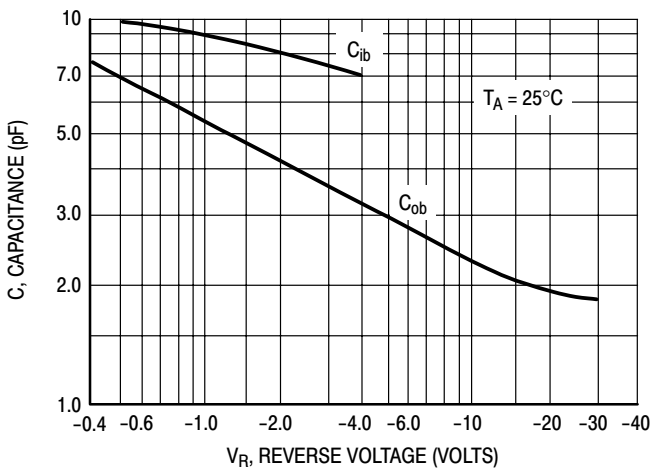


Figure 11. Capacitances

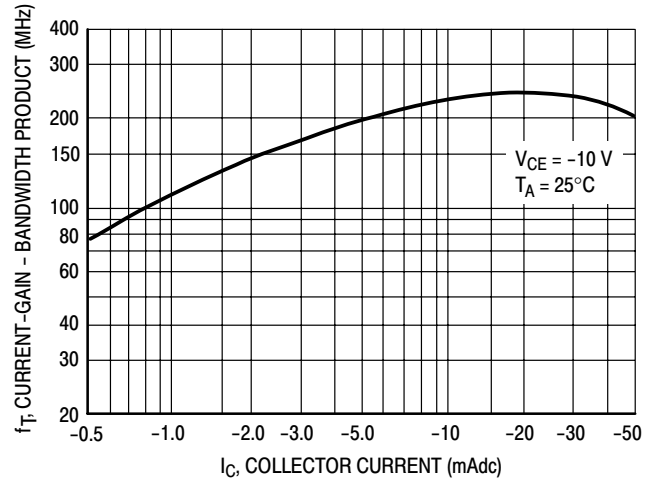
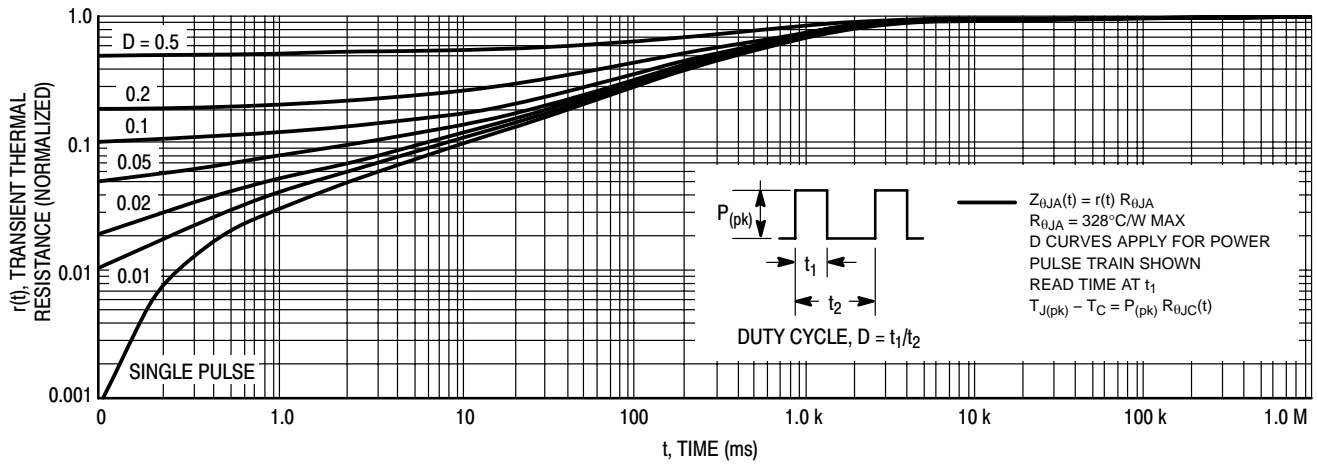
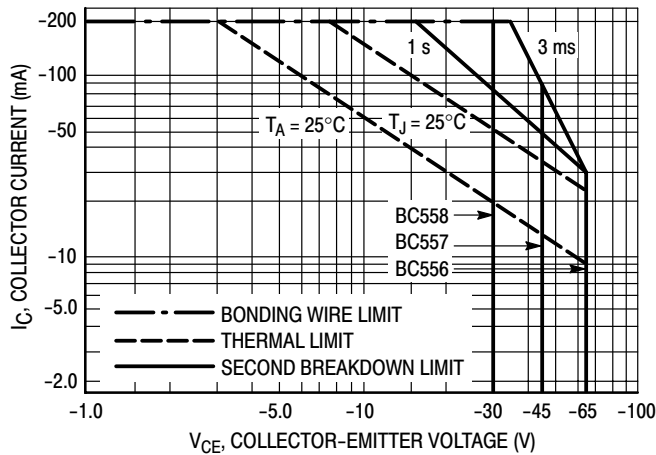


Figure 12. Current-Gain - Bandwidth Product

## BC856BDW1T1, BC857BDW1T1 Series, BC858CDW1T1 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

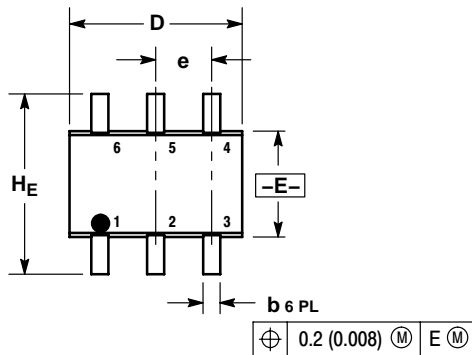
Device	Device Marking	Package	Shipping†
BC856BDW1T1	3B	SOT-363	3,000 / Tape & Reel
BC856BDW1T1G	3B	SOT-363 (Pb-Free)	
BC856BDW1T3	3B	SOT-363	10,000 / Tape & Reel
BC856BDW1T3G	3B	SOT-363 (Pb-Free)	
BC857BDW1T1	3F	SOT-363	3,000 / Tape & Reel
BC857BDW1T1G	3F	SOT-363 (Pb-Free)	
BC857CDW1T1	3G	SOT-363	3,000 / Tape & Reel
BC857CDW1T1G	3G	SOT-363 (Pb-Free)	
BC858CDW1T1	3L	SOT-363	3,000 / Tape & Reel
BC858CDW1T1G	3L	SOT-363 (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.

# BC856BDW1T1, BC857BDW1T1 Series, BC858CDW1T1 Series

## PACKAGE DIMENSIONS

SC-88 (SOT-363)  
CASE 419B-02  
ISSUE V



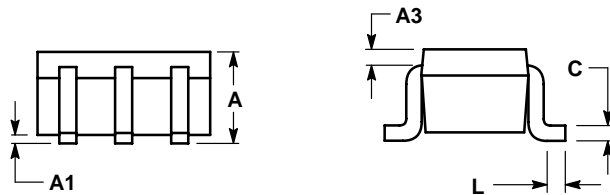
### NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. 419B-01 OBSOLETE, NEW STANDARD 419B-02.

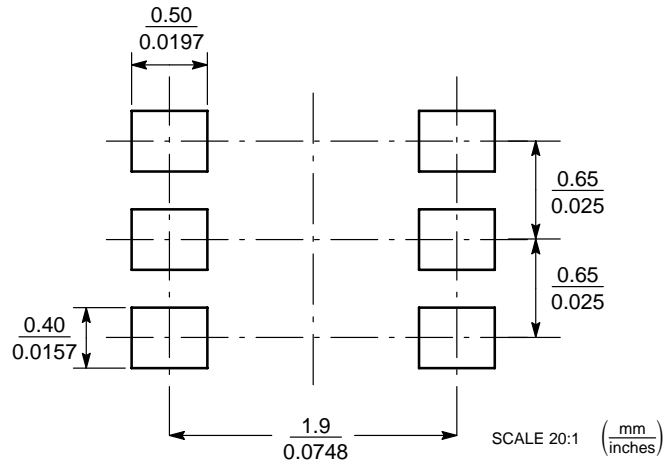
DIM	MILLIMETERS			INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	0.80	0.95	1.10	0.031	0.037	0.043
A1	0.00	0.05	0.10	0.000	0.002	0.004
A3	0.20 REF			0.008 REF		
b	0.10	0.21	0.30	0.004	0.008	0.012
c	0.10	0.14	0.25	0.004	0.005	0.010
D	1.80	2.00	2.20	0.070	0.078	0.086
E	1.15	1.25	1.35	0.045	0.049	0.053
e	0.65 BSC			0.026 BSC		
L	0.10	0.20	0.30	0.004	0.008	0.012
HE	2.00	2.10	2.20	0.078	0.082	0.086

### STYLE 1:

- PIN 1. EMITTER 2  
2. BASE 2  
3. COLLECTOR 1  
4. EMITTER 1  
5. BASE 1  
6. COLLECTOR 2



### 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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