

# BC856BDW1T1G, SBC856BDW1T1G Series, BC857BDW1T1G, SBC857BDW1T1G Series, BC858CDW1T1G 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

- 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\*

#### MAXIMUM RATINGS

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 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/ $^\circ\text{C}$ 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	$^\circ\text{C}$

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

\*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

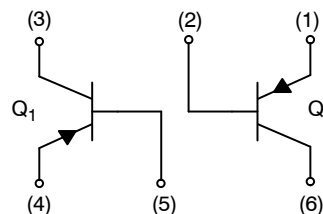


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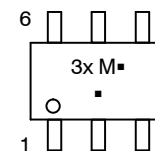
<http://onsemi.com>



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 6 of this data sheet.

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

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**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 ( $I_C = -10\text{ mA}$ ) BC856, SBC856 Series BC857, SBC857 Series BC858 Series	$V_{(BR)CEO}$	-65 -45 -30	-	-	V
Collector – Emitter Breakdown Voltage ( $I_C = -10\ \mu\text{A}$ , $V_{EB} = 0$ ) BC856, SBC856 Series BC857B, SBC857B Only BC858 Series	$V_{(BR)CES}$	-80 -50 -30	-	-	V
Collector – Base Breakdown Voltage ( $I_C = -10\ \mu\text{A}$ ) BC856, SBC856 Series BC857, SBC857 Series BC858 Series	$V_{(BR)CBO}$	-80 -50 -30	-	-	V
Emitter – Base Breakdown Voltage ( $I_E = -1.0\ \mu\text{A}$ ) BC856, SBC856 Series BC857, SBC857 Series BC858 Series	$V_{(BR)EBO}$	-5.0 -5.0 -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 -4.0	nA $\mu\text{A}$

**ON CHARACTERISTICS**

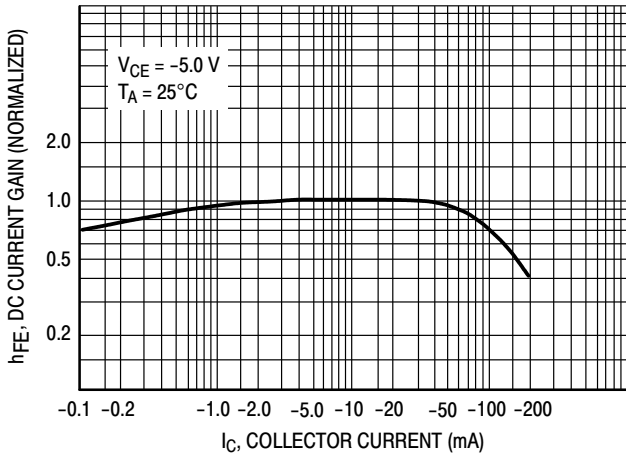
DC Current Gain ( $I_C = -10\ \mu\text{A}$ , $V_{CE} = -5.0\text{ V}$ ) BC856B, SBC856B, BC857B, SBC857B BC857C, SBC857C, BC858C ( $I_C = -2.0\text{ mA}$ , $V_{CE} = -5.0\text{ V}$ ) BC856B, SBC856B, BC857B, SBC857B BC857C, SBC857C, BC858C	$h_{FE}$	- - 220 420	150 270 290 520	- - 475 800	-
Collector – Emitter Saturation Voltage ( $I_C = -10\text{ mA}$ , $I_B = -0.5\text{ mA}$ ) ( $I_C = -100\text{ mA}$ , $I_B = -5.0\text{ mA}$ )	$V_{CE(sat)}$	- -	- -	-0.3 -0.65	V
Base – Emitter Saturation Voltage ( $I_C = -10\text{ mA}$ , $I_B = -0.5\text{ mA}$ ) ( $I_C = -100\text{ mA}$ , $I_B = -5.0\text{ mA}$ )	$V_{BE(sat)}$	- -	-0.7 -0.9	- -	V
Base – Emitter On Voltage ( $I_C = -2.0\text{ mA}$ , $V_{CE} = -5.0\text{ V}$ ) ( $I_C = -10\text{ mA}$ , $V_{CE} = -5.0\text{ V}$ )	$V_{BE(on)}$	-0.6 -	- -	-0.75 -0.82	V

**SMALL-SIGNAL CHARACTERISTICS**

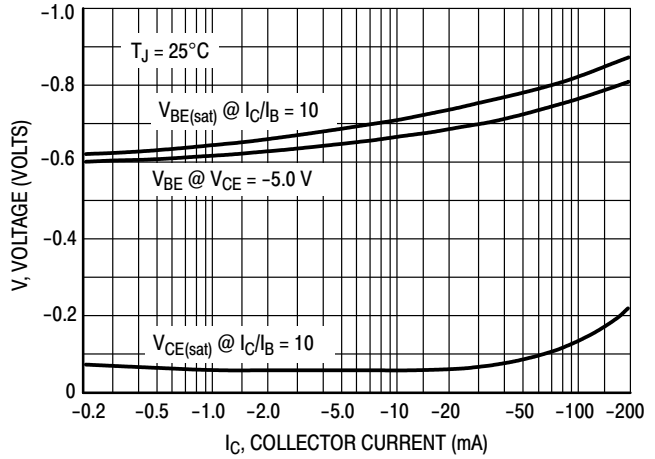
Current – Gain – Bandwidth Product ( $I_C = -10\text{ mA}$ , $V_{CE} = -5.0\text{ Vdc}$ , $f = 100\text{ MHz}$ )	$f_T$	100	-	-	MHz
Output Capacitance ( $V_{CB} = -10\text{ V}$ , $f = 1.0\text{ MHz}$ )	$C_{ob}$	-	-	4.5	pF
Noise Figure ( $I_C = -0.2\text{ mA}$ , $V_{CE} = -5.0\text{ Vdc}$ , $R_S = 2.0\text{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

**BC856BDW1T1G, SBC856BDW1T1G Series, BC857BDW1T1G,  
SBC857BDW1T1G Series, BC858CDW1T1G Series**

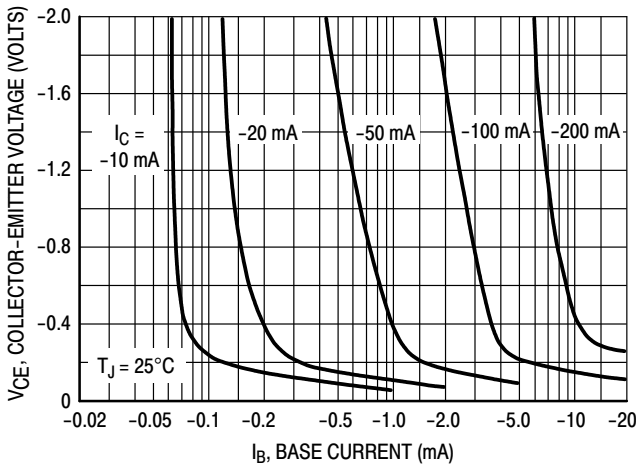
**TYPICAL CHARACTERISTICS – BC856/SBC856**



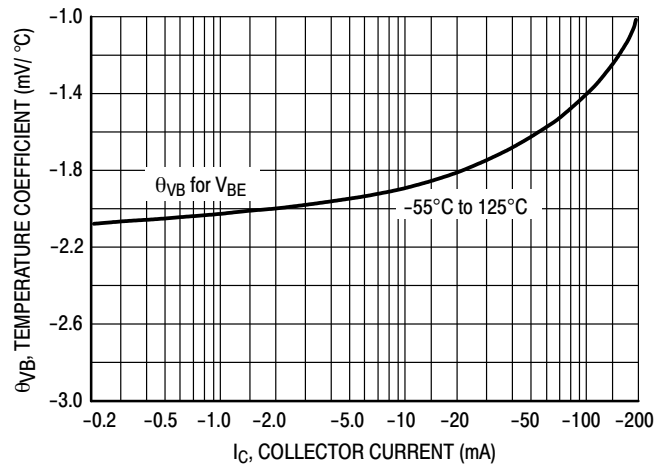
**Figure 1. DC Current Gain**



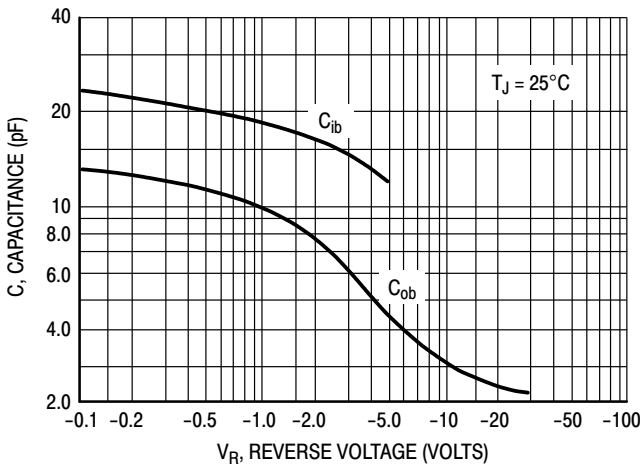
**Figure 2. "On" Voltage**



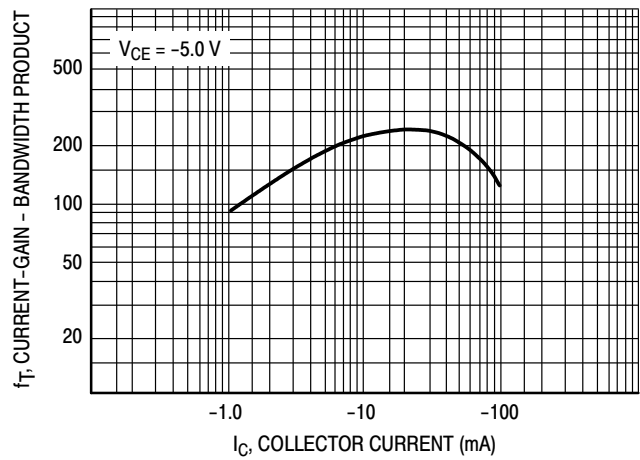
**Figure 3. Collector Saturation Region**



**Figure 4. Base-Emitter Temperature Coefficient**



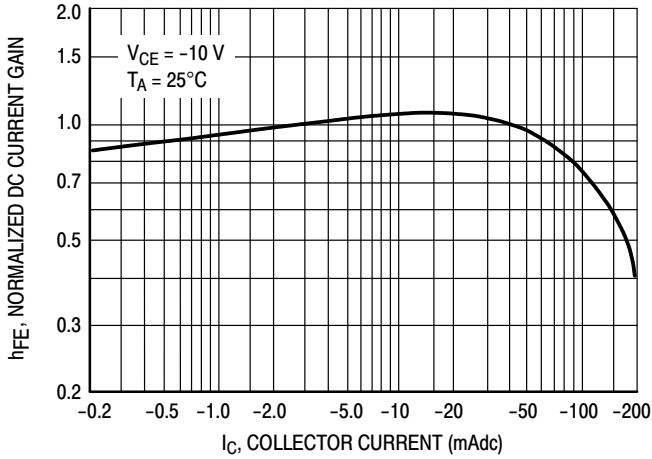
**Figure 5. Capacitance**



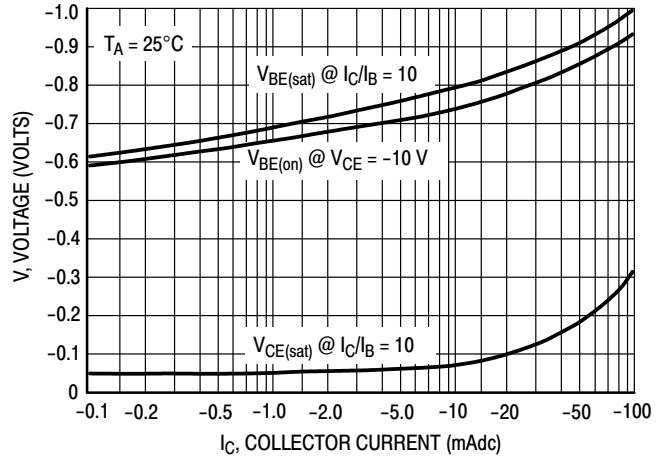
**Figure 6. Current-Gain - Bandwidth Product**

**BC856BDW1T1G, SBC856BDW1T1G Series, BC857BDW1T1G,  
SBC857BDW1T1G Series, BC858CDW1T1G Series**

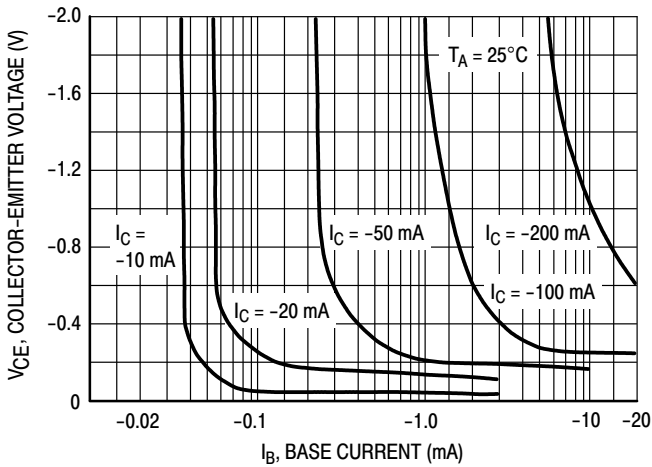
**TYPICAL CHARACTERISTICS – BC857/SBC857/BC858**



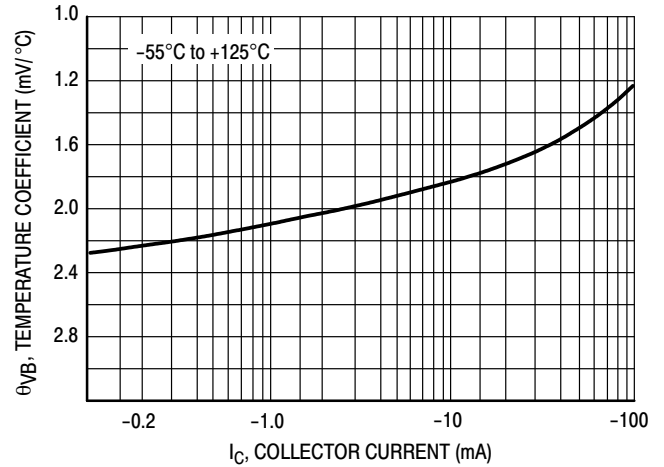
**Figure 7. Normalized DC Current Gain**



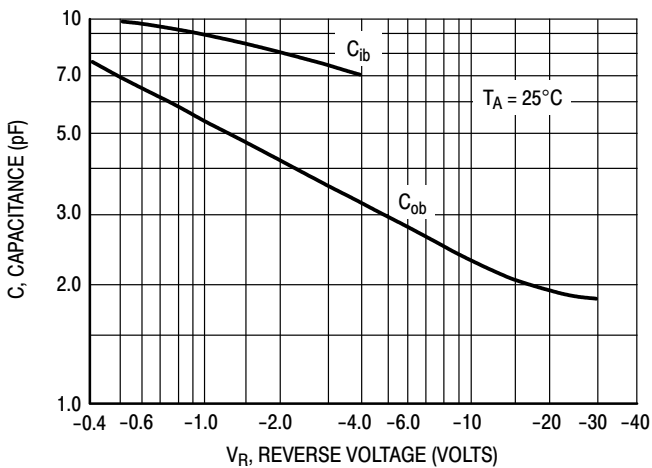
**Figure 8. "Saturation" and "On" Voltages**



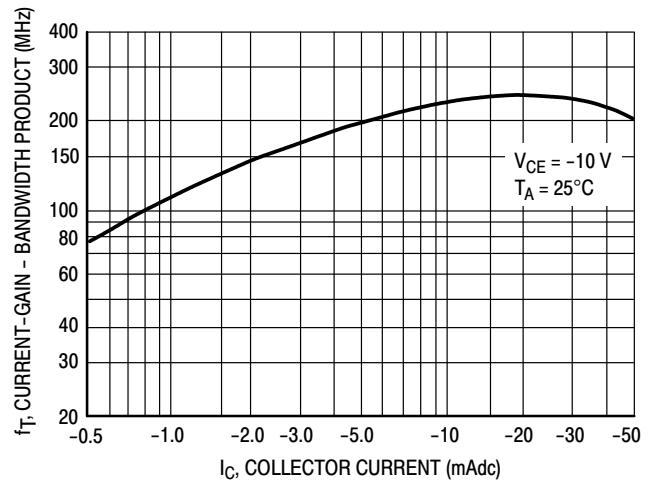
**Figure 9. Collector Saturation Region**



**Figure 10. Base-Emitter Temperature Coefficient**

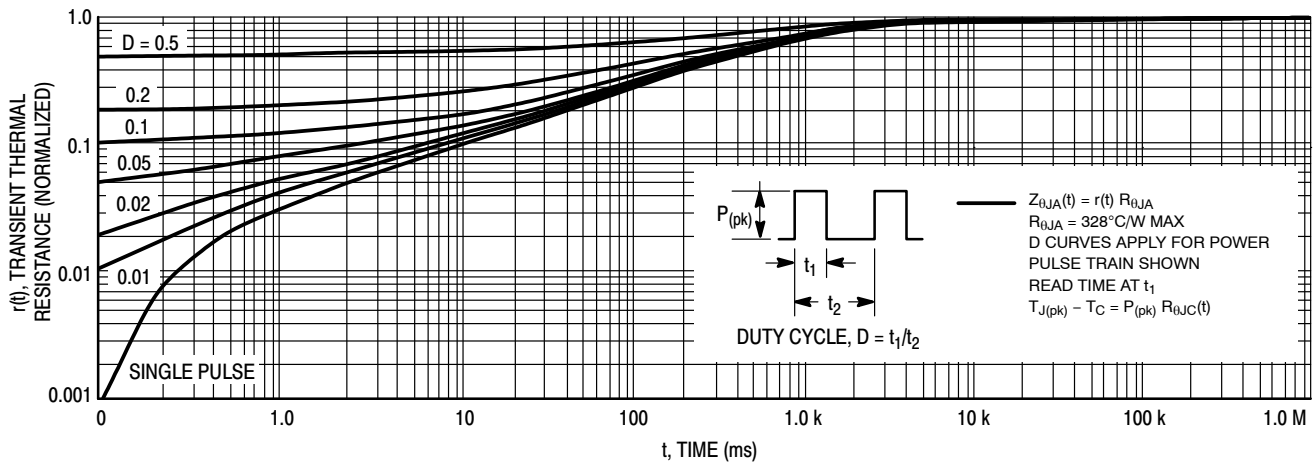


**Figure 11. Capacitances**

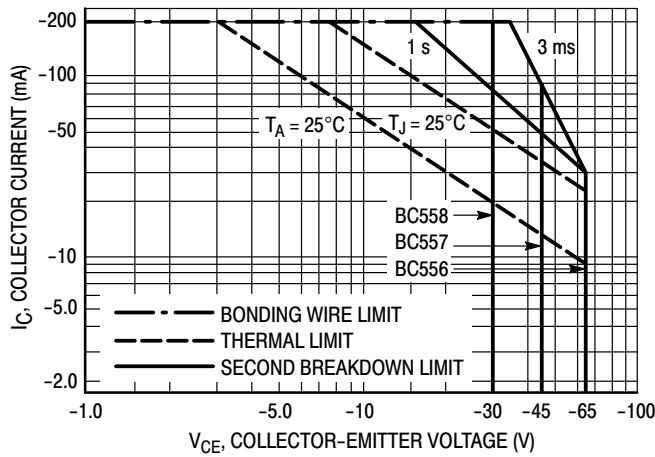


**Figure 12. Current-Gain - Bandwidth Product**

**BC856BDW1T1G, SBC856BDW1T1G Series, BC857BDW1T1G,  
SBC857BDW1T1G Series, BC858CDW1T1G 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.

**BC856BDW1T1G, SBC856BDW1T1G Series, BC857BDW1T1G,  
SBC857BDW1T1G Series, BC858CDW1T1G Series**

**ORDERING INFORMATION**

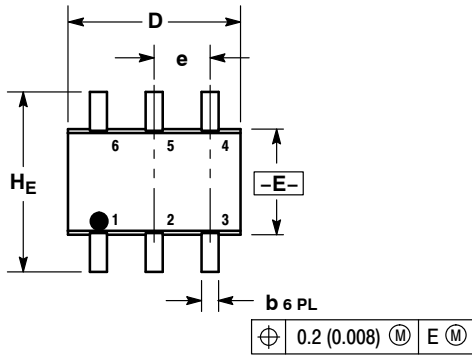
Device	Device Marking	Package	Shipping <sup>†</sup>
BC856BDW1T1G	3B	SOT-363 (Pb-Free)	3,000 / Tape & Reel
SBC856BDW1T1G	3B	SOT-363 (Pb-Free)	3,000 / Tape & Reel
BC856BDW1T3G	3B	SOT-363 (Pb-Free)	10,000 / Tape & Reel
SBC856BDW1T3G	3B	SOT-363 (Pb-Free)	10,000 / Tape & Reel
BC857BDW1T1G	3F	SOT-363 (Pb-Free)	3,000 / Tape & Reel
SBC857BDW1T1G	3F	SOT-363 (Pb-Free)	3,000 / Tape & Reel
BC857CDW1T1G	3G	SOT-363 (Pb-Free)	3,000 / Tape & Reel
SBC857CDW1T1G	3G	SOT-363 (Pb-Free)	3,000 / Tape & Reel
BC858CDW1T1G	3L	SOT-363 (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.

# BC856BDW1T1G, SBC856BDW1T1G Series, BC857BDW1T1G, SBC857BDW1T1G Series, BC858CDW1T1G Series

## PACKAGE DIMENSIONS

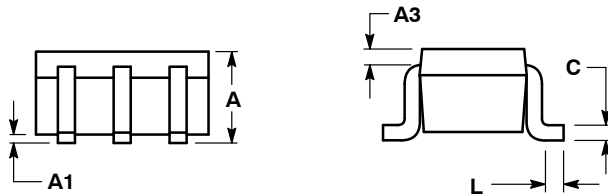
SC-88/SC70-6/SOT-363  
CASE 419B-02  
ISSUE W



NOTES:

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

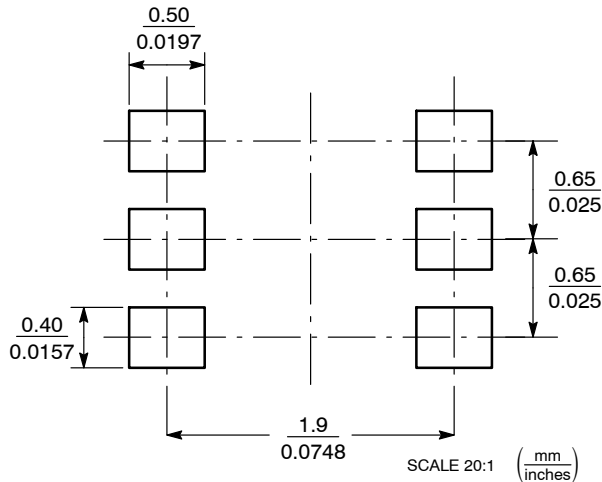
DIM	MILLIMETERS			INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	0.80	0.95	1.10	0.031	0.037	0.043
A1	0.00	0.05	0.10	0.000	0.002	0.004
A3	0.20 REF			0.008 REF		
b	0.10	0.21	0.30	0.004	0.008	0.012
C	0.10	0.14	0.25	0.004	0.005	0.010
D	1.80	2.00	2.20	0.070	0.078	0.086
E	1.15	1.25	1.35	0.045	0.049	0.053
e	0.65 BSC	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