

# BC846BDW1T1, BC847BDW1T1, BC848CDW1T1



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## Dual General Purpose Transistors

### NPN 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

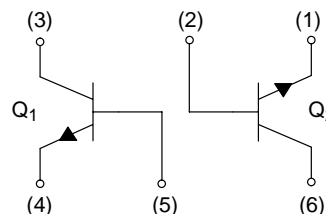
Rating	Symbol	BC846	BC847	BC848	Unit
Collector-Emitter Voltage	$V_{CEO}$	65	45	30	V
Collector-Base Voltage	$V_{CBO}$	80	50	30	V
Emitter-Base Voltage	$V_{EBO}$	6.0	6.0	5.0	V
Collector Current - Continuous	$I_C$	100	100	100	mAdc

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

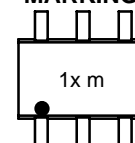
Characteristic	Symbol	Max	Unit
Total Device Dissipation Per Device FR-5 Board (Note 1) $T_A = 25^\circ\text{C}$ Derate Above $25^\circ\text{C}$	$P_D$	380 250 3.0	mW  mW/ $^\circ\text{C}$
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	328	$^\circ\text{C}/\text{W}$
Junction and Storage Temperature Range	$T_J, T_{stg}$	-55 to +150	$^\circ\text{C}$

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



SOT-363  
CASE 419B  
Style 1

#### DIAGRAM MARKING



1x = Specific Device Code  
x = B, F, G, L  
m = Date Code

#### ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 6 of this data sheet.

# BC846BDW1T1, BC847BDW1T1, BC848CDW1T1

## 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)	BC846 Series BC847 Series BC848 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)	BC846 Series BC847 Series BC848 Series	V <sub>(BR)CES</sub>	80 50 30	– – –	– – –	V
Collector–Base Breakdown Voltage (I <sub>C</sub> = 10 μA)	BC846 Series BC847 Series BC848 Series	V <sub>(BR)CBO</sub>	80 50 30	– – –	– – –	V
Emitter–Base Breakdown Voltage (I <sub>E</sub> = 1.0 μA)	BC846 Series BC847 Series BC848 Series	V <sub>(BR)EBO</sub>	6.0 6.0 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 5.0	nA μA

## ON CHARACTERISTICS

DC Current Gain (I <sub>C</sub> = 10 μA, V <sub>CE</sub> = 5.0 V)	BC846B, BC847B, BC847C, BC848C	h <sub>FE</sub>	– –	150 270	– –	–
(I <sub>C</sub> = 2.0 mA, V <sub>CE</sub> = 5.0 V)	BC846B, BC847B, BC847C, BC848C		200 420	290 520	450 800	
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>	– –	– –	0.25 0.6	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 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>	580 –	660 –	700 770	mV

## 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>obo</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

# BC846BDW1T1, BC847BDW1T1, BC848CDW1T1

## TYPICAL CHARACTERISTICS – BC847 SERIES & BC848 SERIES

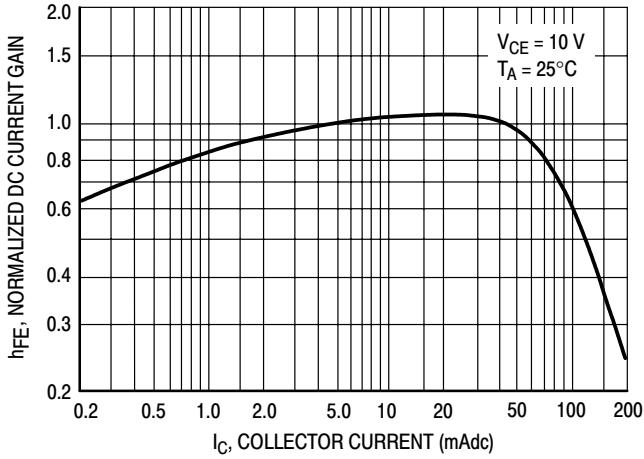


Figure 1. Normalized DC Current Gain

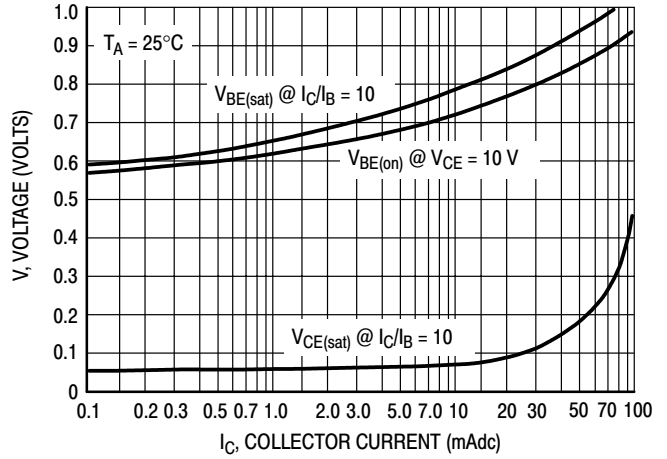


Figure 2. "Saturation" and "On" Voltages

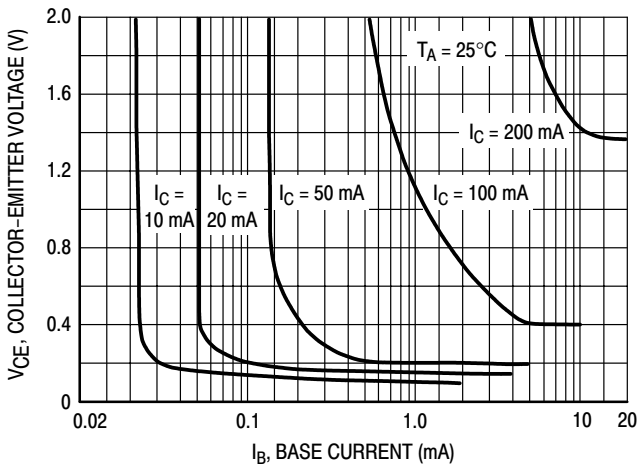


Figure 3. Collector Saturation Region

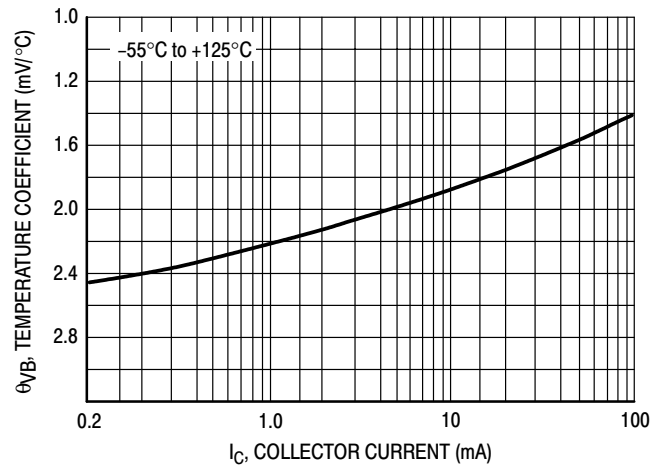


Figure 4. Base-Emitter Temperature Coefficient

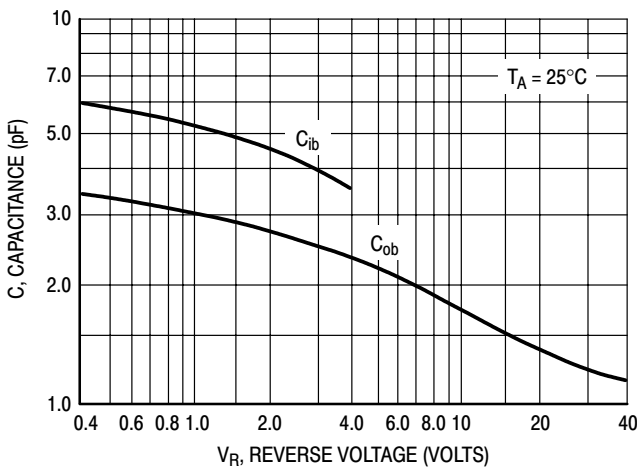


Figure 5. Capacitances

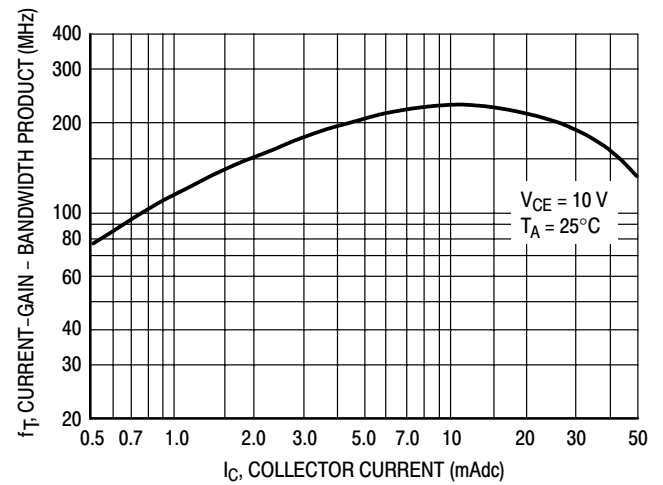


Figure 6. Current-Gain - Bandwidth Product

# BC846BDW1T1, BC847BDW1T1, BC848CDW1T1

## TYPICAL CHARACTERISTICS – BC846 SERIES

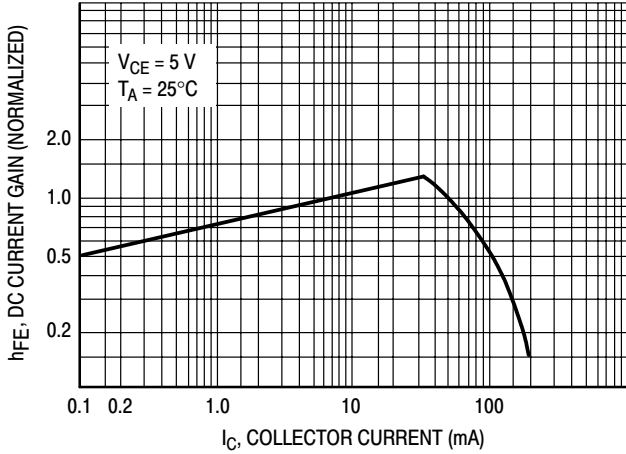


Figure 7. Normalized DC Current Gain

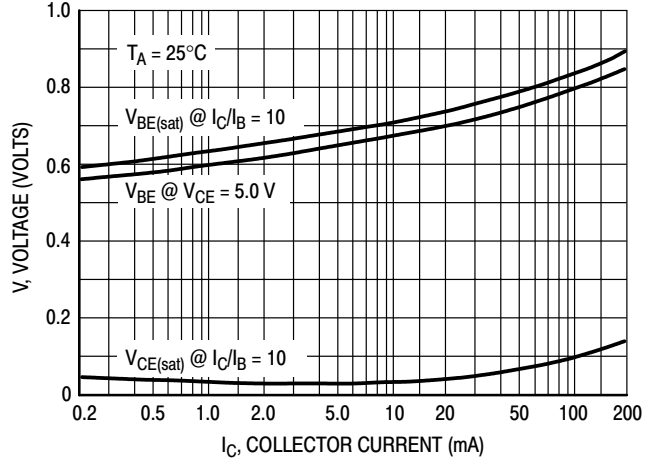


Figure 8. "On" Voltage

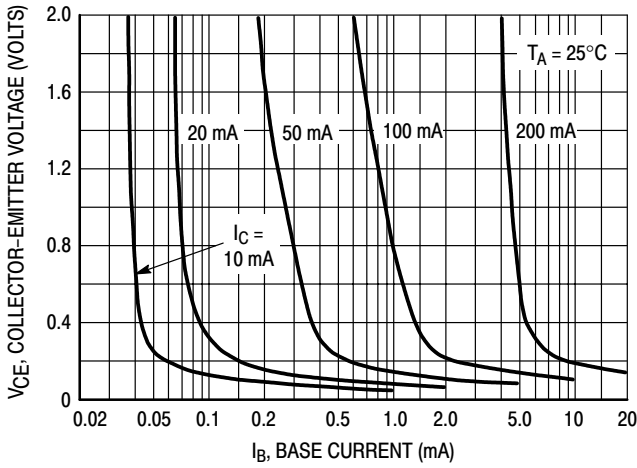


Figure 9. Collector Saturation Region

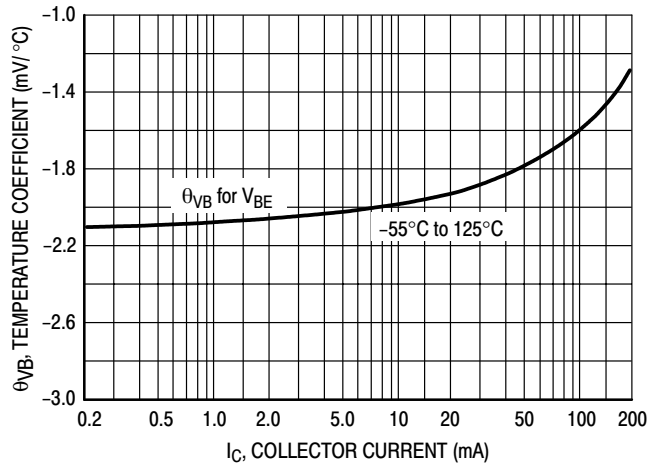


Figure 10. Base-Emitter Temperature Coefficient

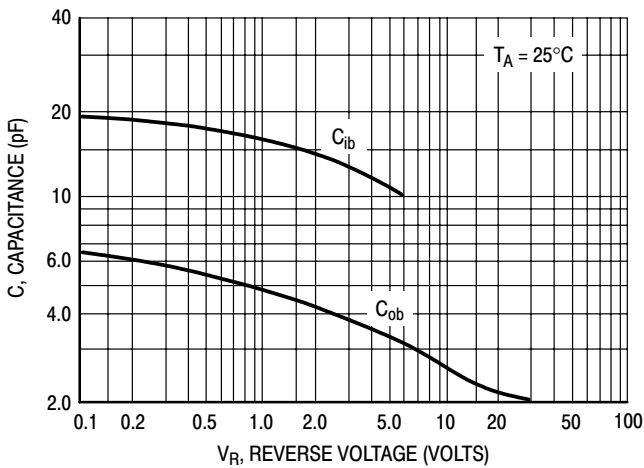


Figure 11. Capacitance

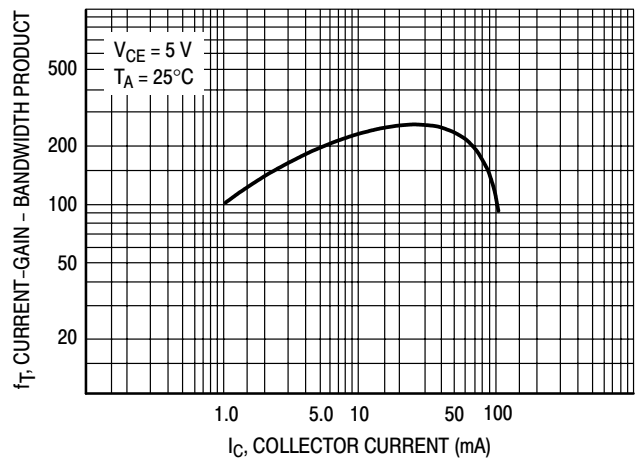


Figure 12. Current-Gain - Bandwidth Product

BC846BDW1T1, BC847BDW1T1, BC848CDW1T1

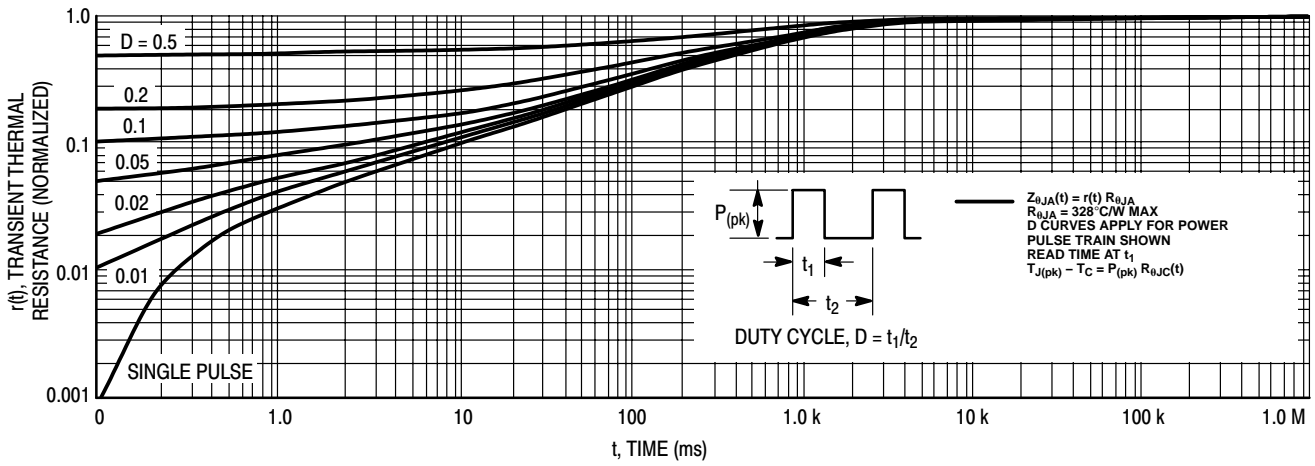


Figure 13. Thermal Response

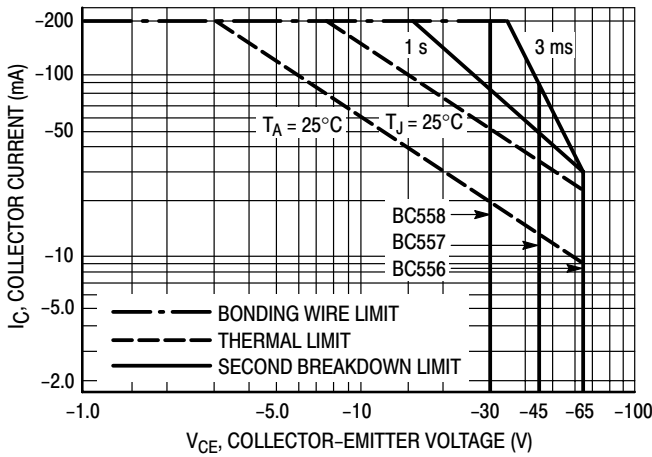


Figure 14. Active Region Safe Operating Area

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.

# BC846BDW1T1, BC847BDW1T1, BC848CDW1T1

## ORDERING INFORMATION

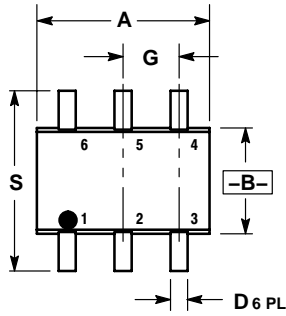
Device	Markings	Package	Shipping†
BC846BDW1T1	1B	SOT-363	3000 Units/Reel
BC846BDW1T1G		SOT-363 (Pb-Free)	
BC847BDW1T1	1F	SOT-363	3000 Units/Reel
BC847BDW1T1G		SOT-363 (Pb-Free)	
BC847BDW1T3	1F	SOT-363	10000 Units/Reel
BC847BDW1T3G		SOT-363 (Pb-Free)	
BC847CDW1T1	1G	SOT-363	3000 Units/Reel
BC847CDW1T1G		SOT-363 (Pb-Free)	
BC848CDW1T1	1L	SOT-363	3000 Units/Reel
BC848CDW1T1G		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.

# BC846BDW1T1, BC847BDW1T1, BC848CDW1T1

## PACKAGE DIMENSIONS

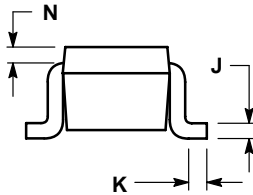
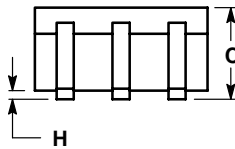
SC-88 (SOT-363)  
CASE 419B-02  
ISSUE T



$\oplus$	0.2 (0.008)	M	B	M
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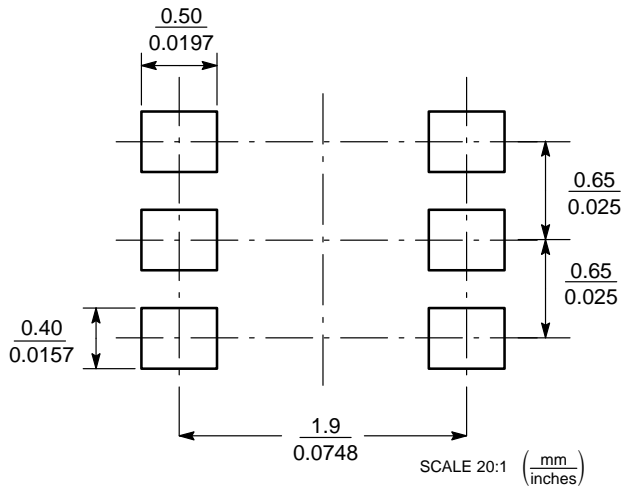
- NOTES:  
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.  
2. CONTROLLING DIMENSION: INCH.  
3. 419B-01 OBSOLETE, NEW STANDARD 419B-02.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.071	0.087	1.80	2.20
B	0.045	0.053	1.15	1.35
C	0.031	0.043	0.80	1.10
D	0.004	0.012	0.10	0.30
G	0.026 BSC		0.65 BSC	
H	---	0.004	---	0.10
J	0.004	0.010	0.10	0.25
K	0.004	0.012	0.10	0.30
N	0.008 REF		0.20 REF	
S	0.079	0.087	2.00	2.20



- 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.

# BC846BDW1T1, BC847BDW1T1, BC848CDW1T1

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**BC846BDW1T1/D**