

# BC846BDW1T1G, BC847BDW1T1G, BC848CDW1T1G

## 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

- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant

#### 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

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.

#### THERMAL CHARACTERISTICS

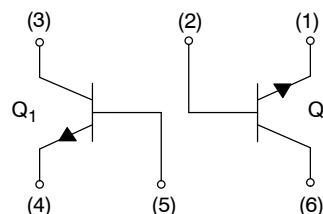
Characteristic	Symbol	Max	Unit
Total Device Dissipation Per Device FR-5 Board (Note 1) $T_A = 25^\circ\text{C}$ Derate Above $25^\circ\text{C}$	$P_D$	380 250	mW
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	328	$^\circ\text{C}/\text{W}$
Junction and Storage Temperature Range	$T_J, T_{stg}$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

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



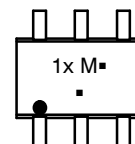
ON Semiconductor®

<http://onsemi.com>



SOT-363  
CASE 419B  
STYLE 1

#### MARKING DIAGRAM



1x = Specific Device Code  
x = B, F, G, L  
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.

# BC846BDW1T1G, BC847BDW1T1G, BC848CDW1T1G

## 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
<b>ON CHARACTERISTICS</b>						
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
<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>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

TYPICAL CHARACTERISTICS – BC846BDW1T1G

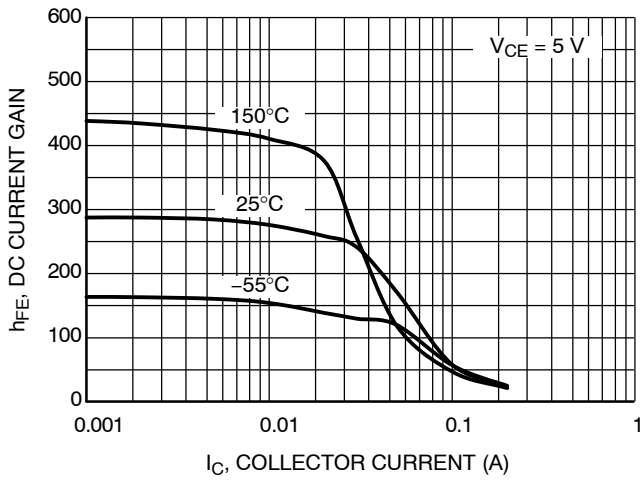


Figure 1. DC Current Gain at  $V_{CE} = 5 V$

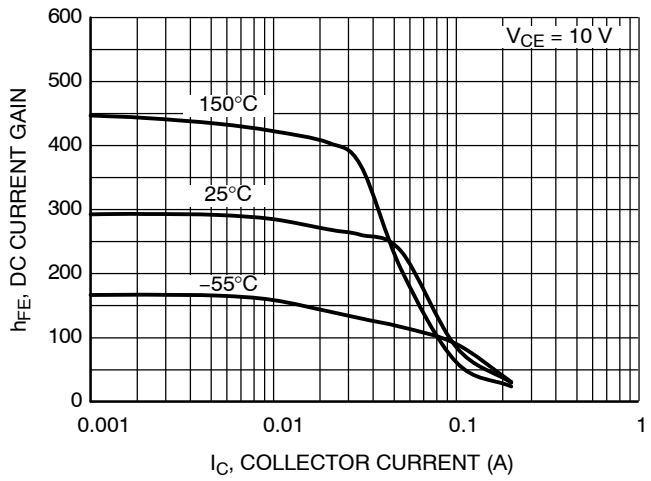


Figure 2. DC Current Gain at  $V_{CE} = 10 V$

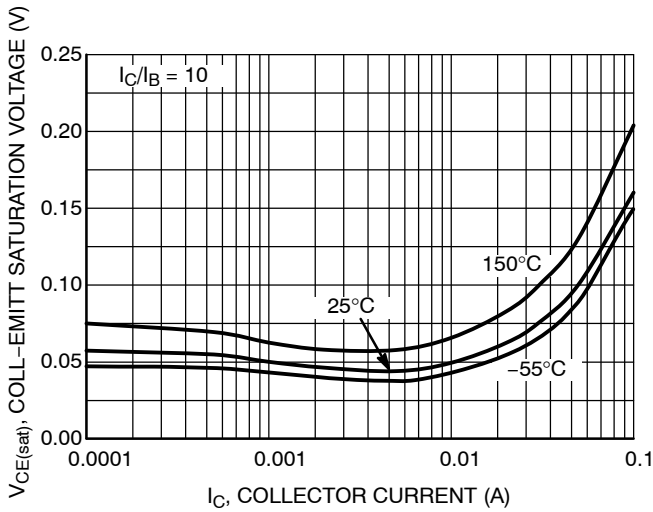


Figure 3.  $V_{CE(sat)}$  at  $I_C/I_B = 10$

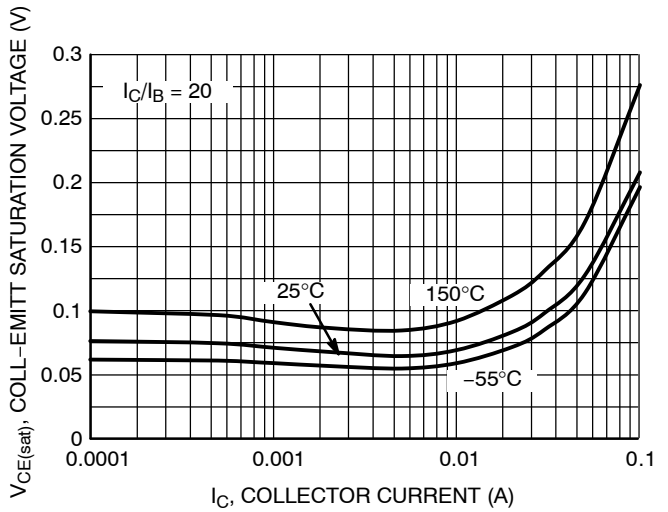


Figure 4.  $V_{CE(sat)}$  at  $I_C/I_B = 20$

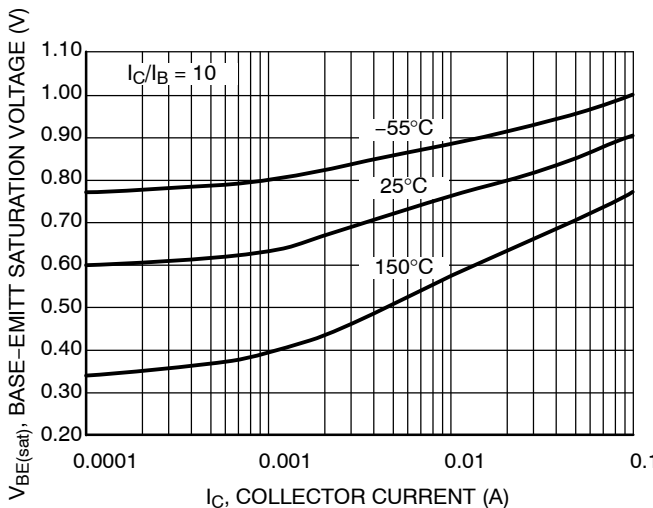


Figure 5.  $V_{BE(sat)}$  at  $I_C/I_B = 10$

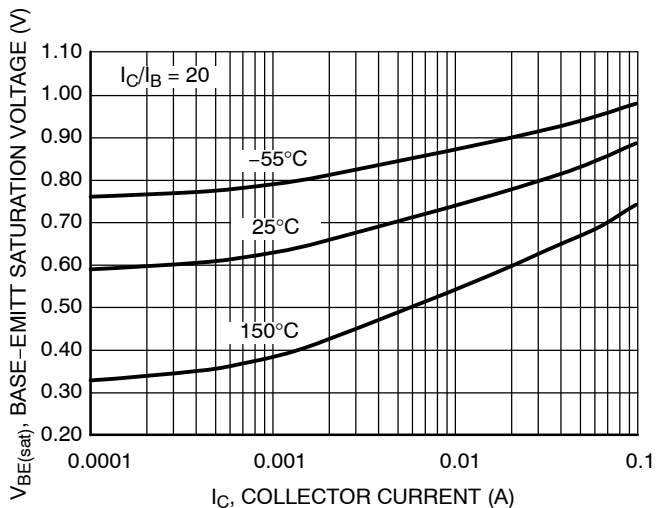


Figure 6.  $V_{BE(sat)}$  at  $I_C/I_B = 20$

# BC846BDW1T1G, BC847BDW1T1G, BC848CDW1T1G

## TYPICAL CHARACTERISTICS – BC846BDW1T1G

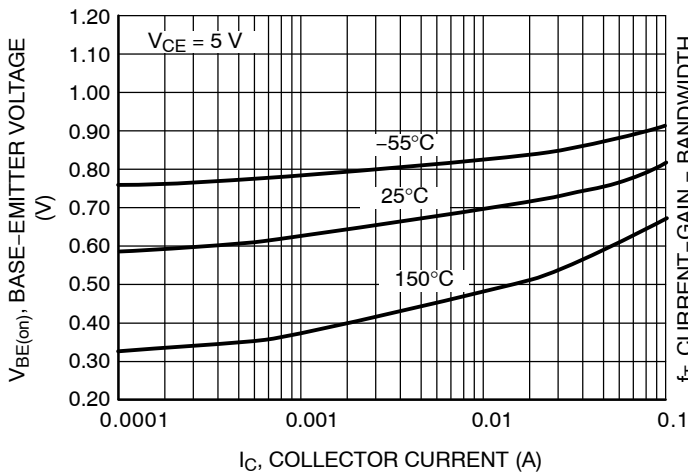


Figure 7.  $V_{BE(on)}$  at  $V_{CE} = 5\text{ V}$

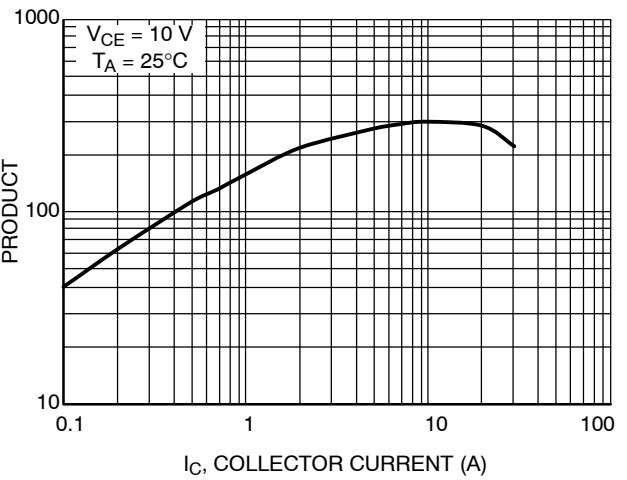


Figure 8. Current - Gain - Bandwidth Product

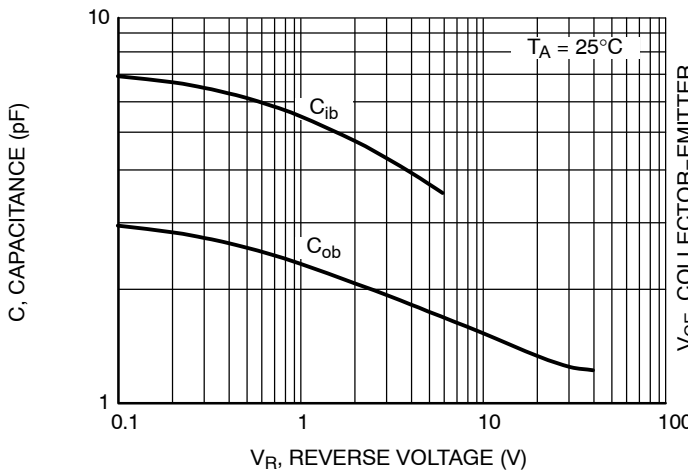


Figure 9. Capacitances

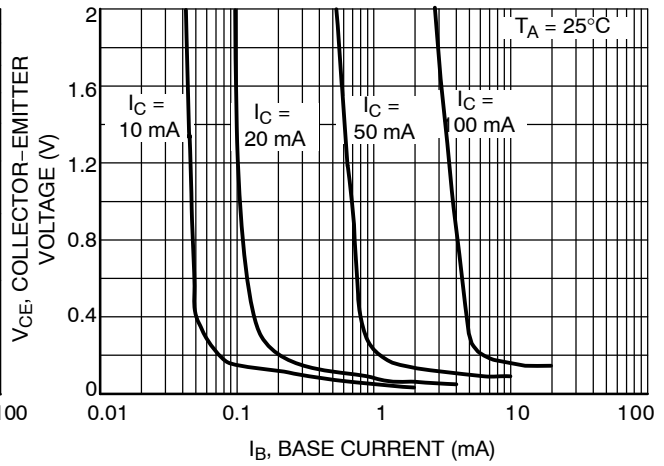


Figure 10. Collector Saturation Region

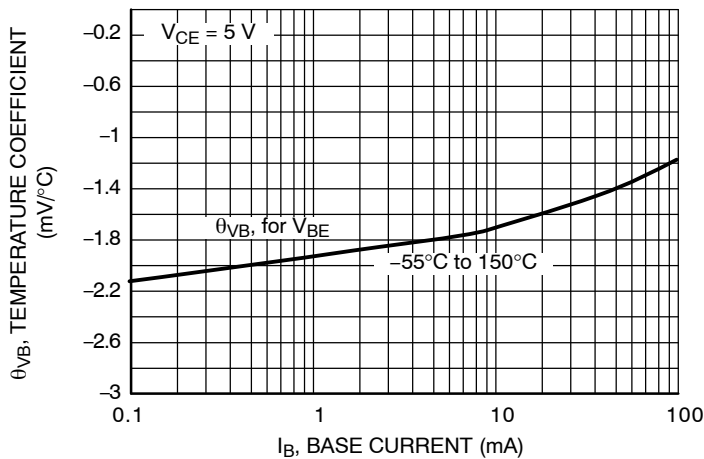


Figure 11. Base-Emitter Temperature Coefficient

TYPICAL CHARACTERISTICS – BC847BDW1T1G

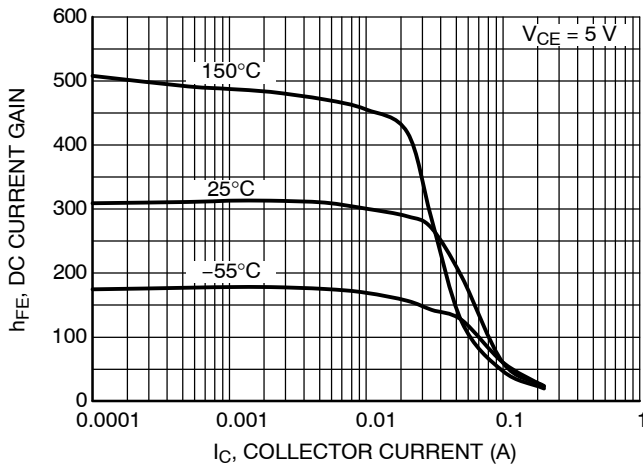


Figure 12. DC Current Gain at  $V_{CE} = 5\text{ V}$

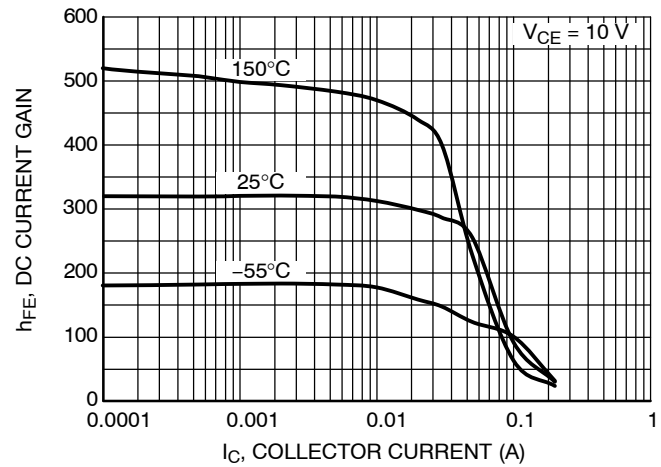


Figure 13. DC Current Gain at  $V_{CE} = 10\text{ V}$

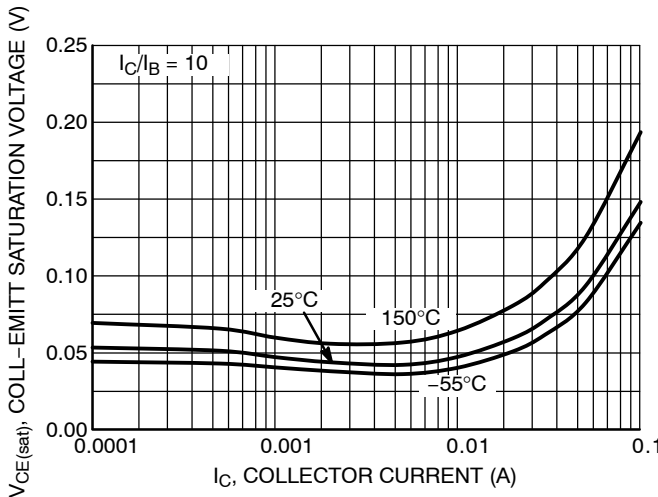


Figure 14.  $V_{CE(sat)}$  at  $I_C/I_B = 10$

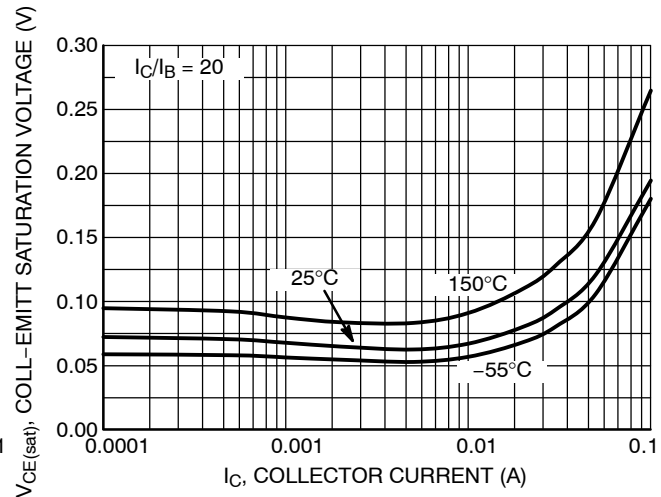


Figure 15.  $V_{CE(sat)}$  at  $I_C/I_B = 20$

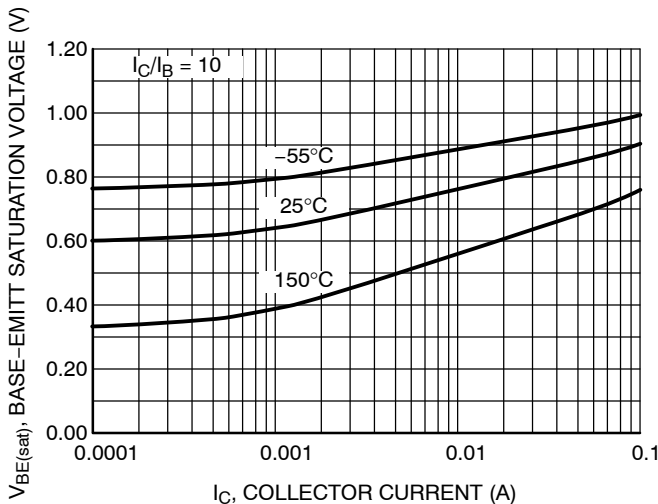


Figure 16.  $V_{BE(sat)}$  at  $I_C/I_B = 10$

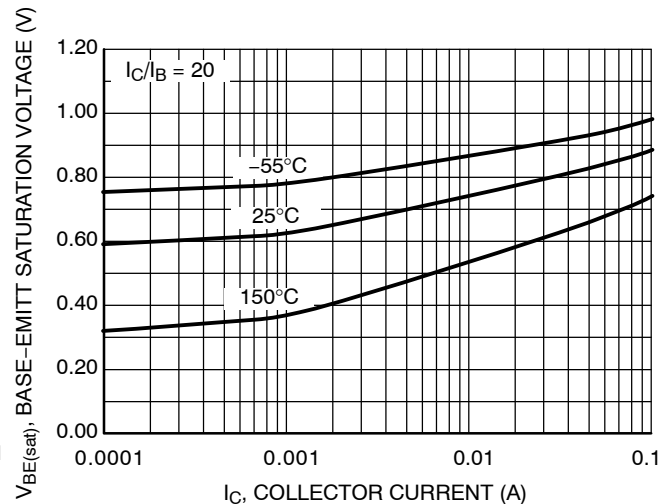


Figure 17.  $V_{BE(sat)}$  at  $I_C/I_B = 20$

BC846BDW1T1G, BC847BDW1T1G, BC848CDW1T1G

TYPICAL CHARACTERISTICS – BC847BDW1T1G

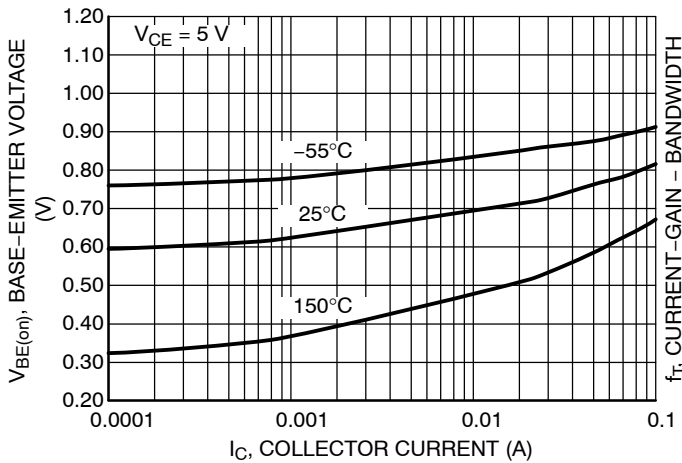


Figure 18.  $V_{BE(on)}$  at  $V_{CE} = 5 V$

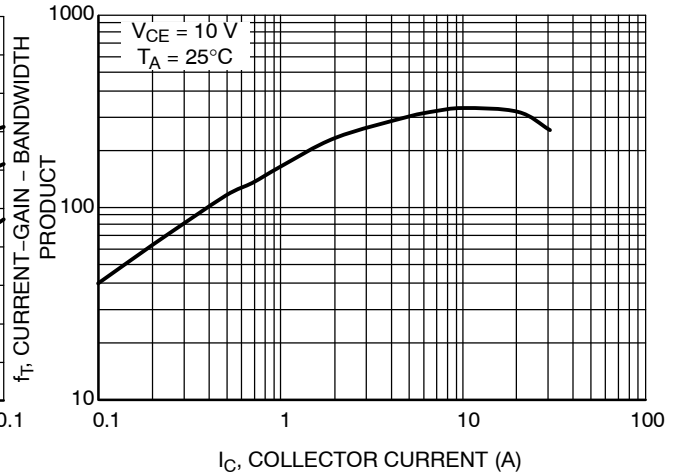


Figure 19. Current - Gain - Bandwidth Product

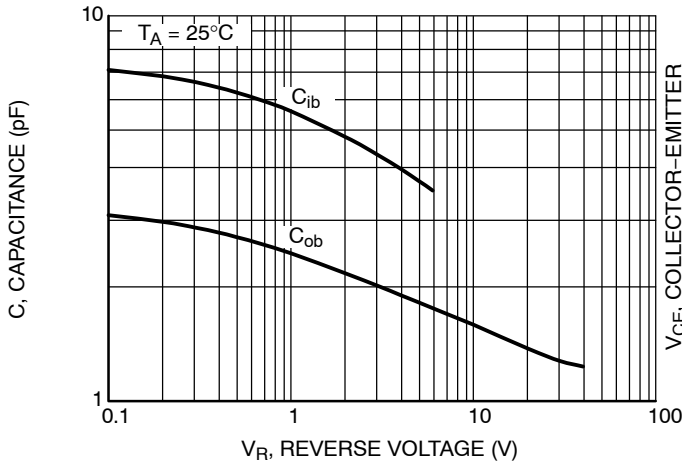


Figure 20. Capacitances

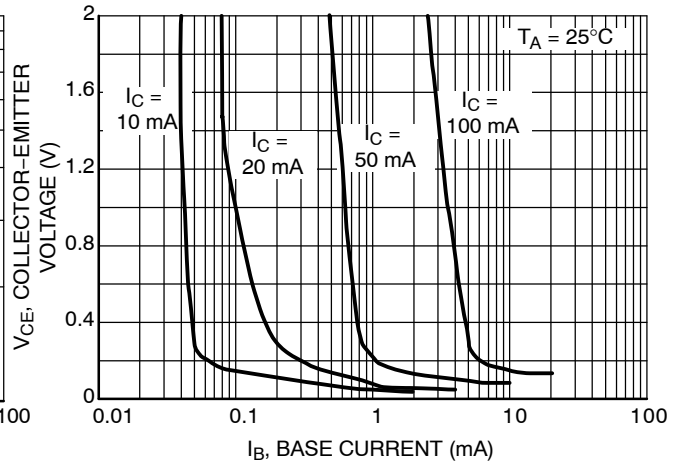


Figure 21. Collector Saturation Region

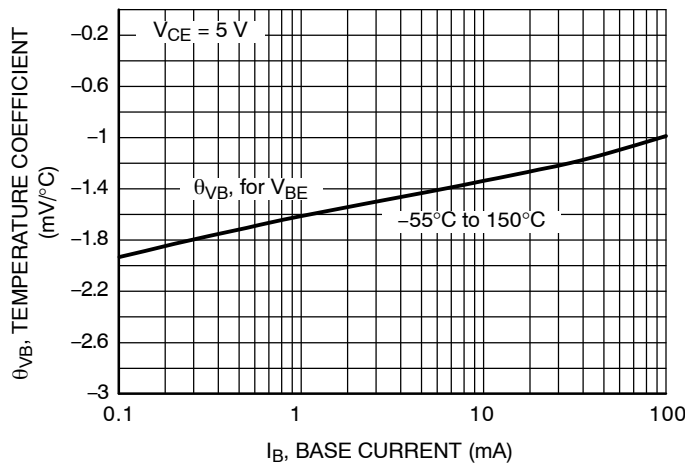


Figure 22. Base-Emitter Temperature Coefficient

# BC846BDW1T1G, BC847BDW1T1G, BC848CDW1T1G

## TYPICAL CHARACTERISTICS – BC848CDW1T1G

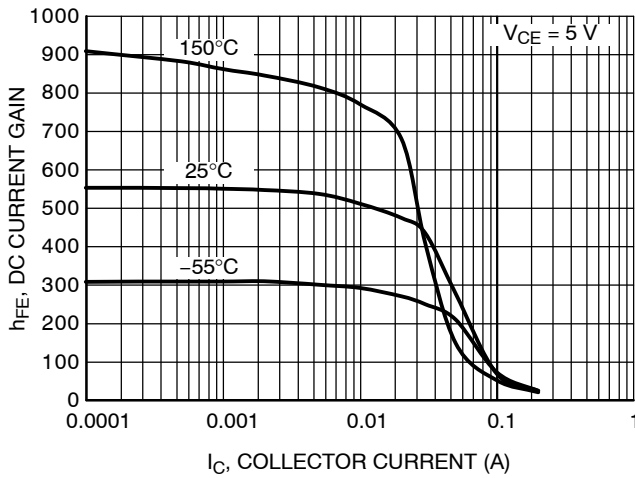


Figure 23. DC Current Gain at  $V_{CE} = 5\text{ V}$

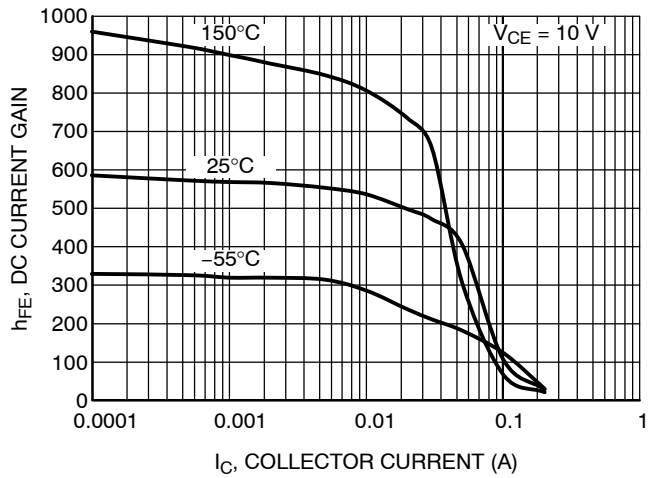


Figure 24. DC Current Gain at  $V_{CE} = 10\text{ V}$

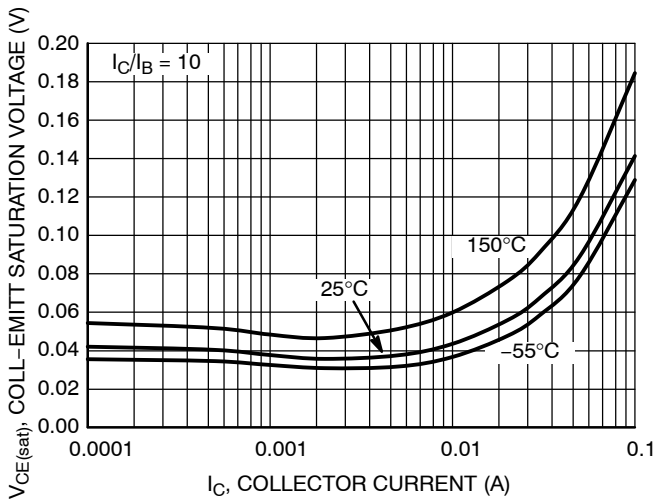


Figure 25.  $V_{CE}$  at  $I_C/I_B = 10$

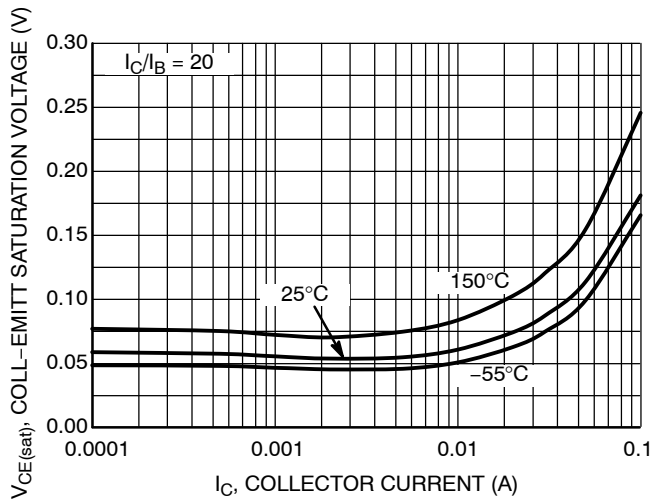


Figure 26.  $V_{CE}$  at  $I_C/I_B = 20$

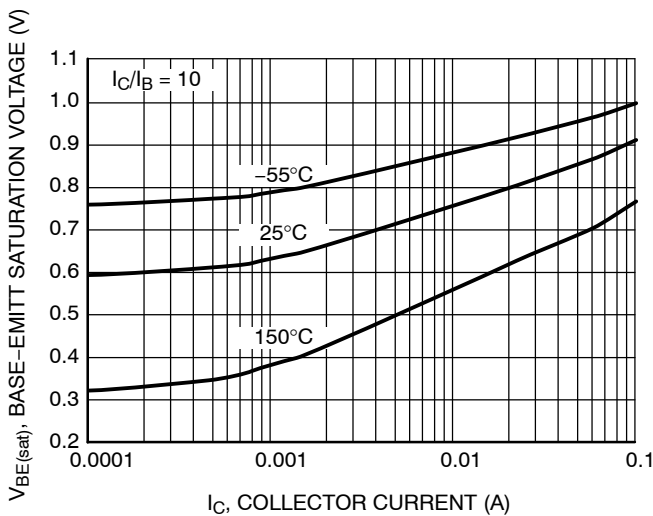


Figure 27.  $V_{BE(sat)}$  at  $I_C/I_B = 10$

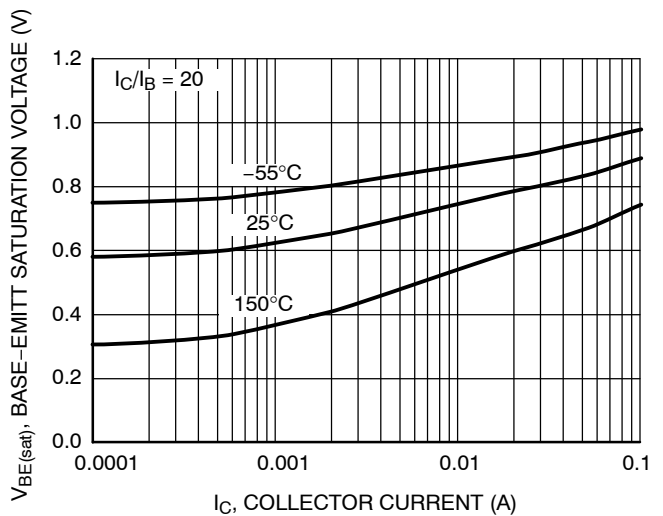


Figure 28.  $V_{BE(sat)}$  at  $I_C/I_B = 20$

BC846BDW1T1G, BC847BDW1T1G, BC848CDW1T1G

TYPICAL CHARACTERISTICS – BC848CDW1T1G

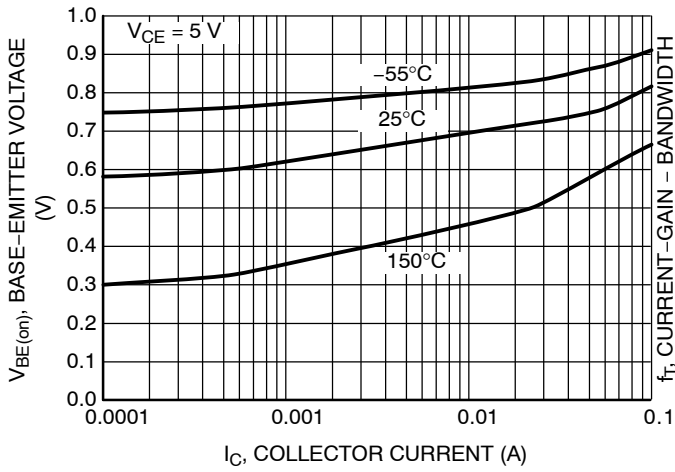


Figure 29.  $V_{BE(on)}$  at  $V_{CE} = 5\text{ V}$

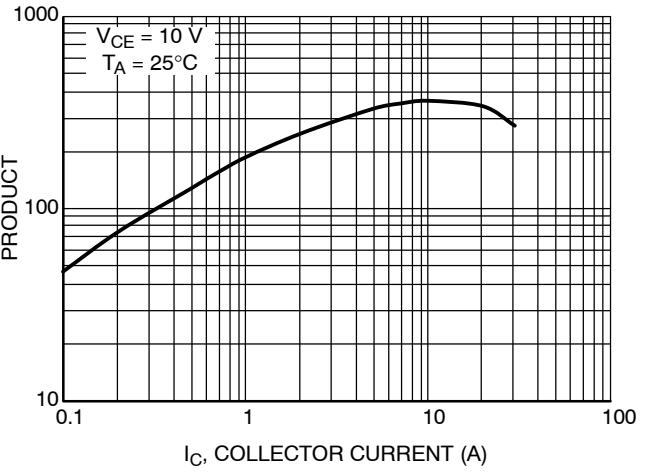


Figure 30. Current - Gain - Bandwidth Product

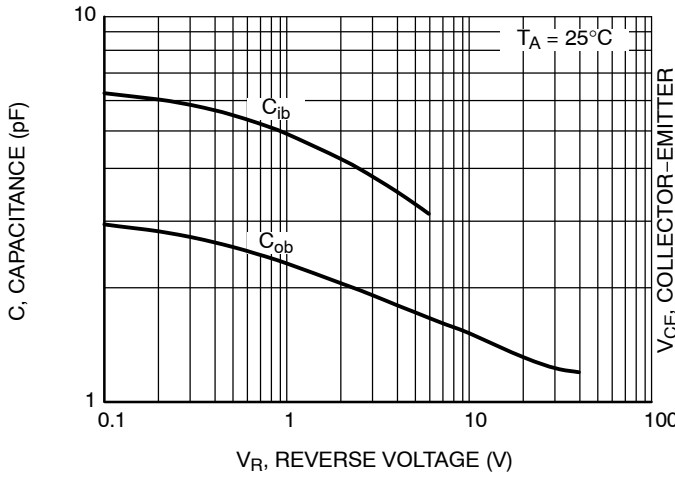


Figure 31. Capacitances

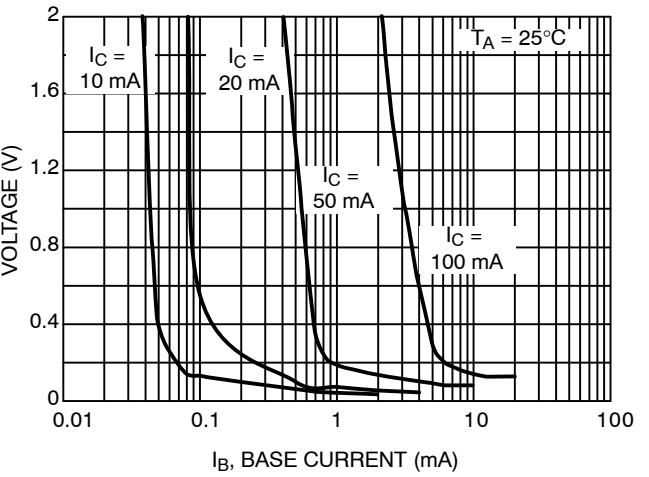


Figure 32. Collector Saturation Region

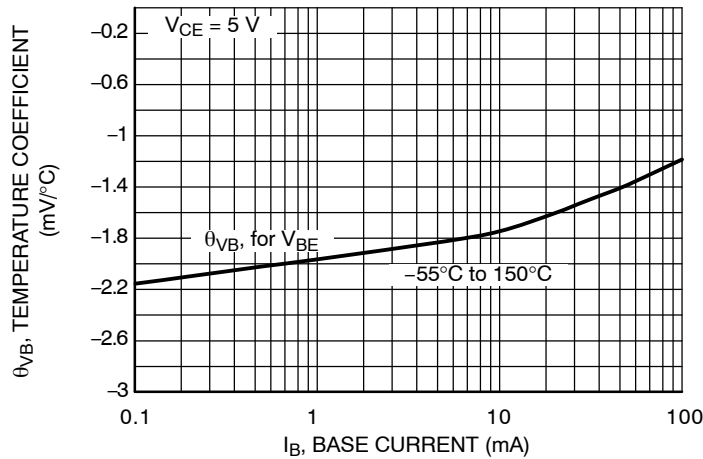


Figure 33. Base-Emitter Temperature Coefficient



# BC846BDW1T1G, BC847BDW1T1G, BC848CDW1T1G

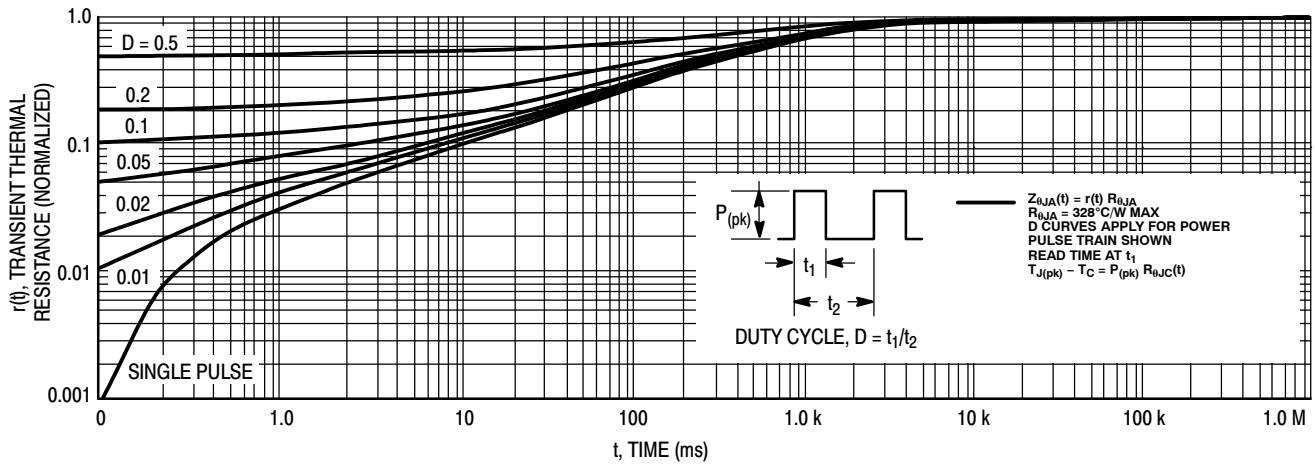


Figure 34. Thermal Response

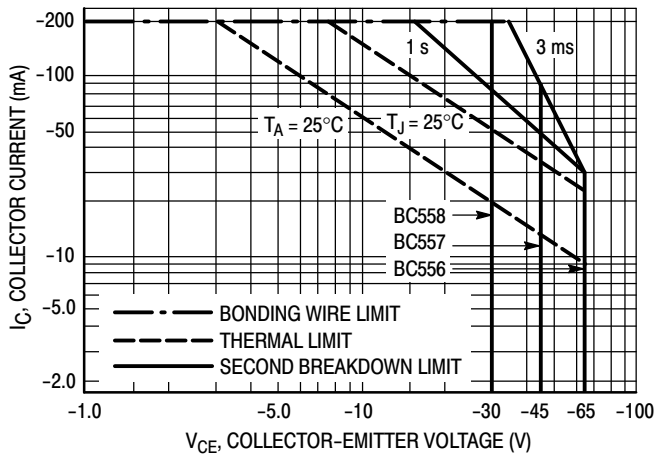


Figure 35. Active Region Safe Operating Area

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 35 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 34. 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

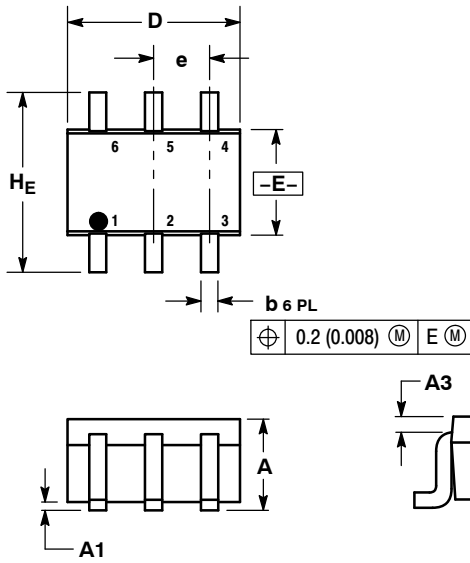
Device	Markings	Package	Shipping <sup>†</sup>
BC846BDW1T1G	1B	SOT-363 (Pb-Free)	3000 / Tape & Reel
BC847BDW1T1G	1F	SOT-363 (Pb-Free)	3000 / Tape & Reel
BC847BDW1T3G	1F	SOT-363 (Pb-Free)	10000 / Tape & Reel
BC847CDW1T1G	1G	SOT-363 (Pb-Free)	3000 / Tape & Reel
BC848CDW1T1G	1L	SOT-363 (Pb-Free)	3000 / Tape & Reel

<sup>†</sup>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.

# BC846BDW1T1G, BC847BDW1T1G, BC848CDW1T1G

## PACKAGE DIMENSIONS

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

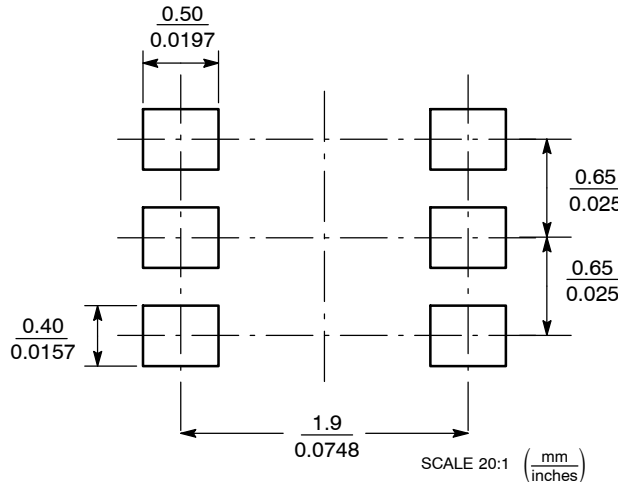


- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
  2. CONTROLLING DIMENSION: INCH.
  3. 419B-01 OBSOLETE, NEW STANDARD 419B-02.

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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