# 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 <sub>CEO</sub>	65	45	30	V
Collector - Base Voltage	V <sub>CBO</sub>	80	50	30	V
Emitter - Base Voltage	V <sub>EBO</sub>	6.0	6.0	5.0	V
Collector Current – Continuous	Ι <sub>C</sub>	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

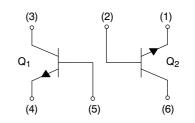
Characteristic	Symbol	Мах	Unit
Total Device Dissipation Per Device FR-5 Board (Note 1) $T_A = 25^{\circ}C$	P <sub>D</sub>	380 250	mW
Derate Above 25°C		3.0	mW/°C
Thermal Resistance, Junction to Ambient	$R_{\thetaJA}$	328	°C/W
Junction and Storage Temperature Range	T <sub>J</sub> , T <sub>stg</sub>	- 55 to +150	°C

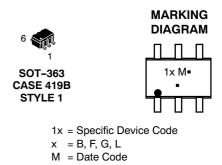
1.  $FR-5 = 1.0 \times 0.75 \times 0.062$  in



# **ON Semiconductor®**

http://onsemi.com





= Pb-Free Package

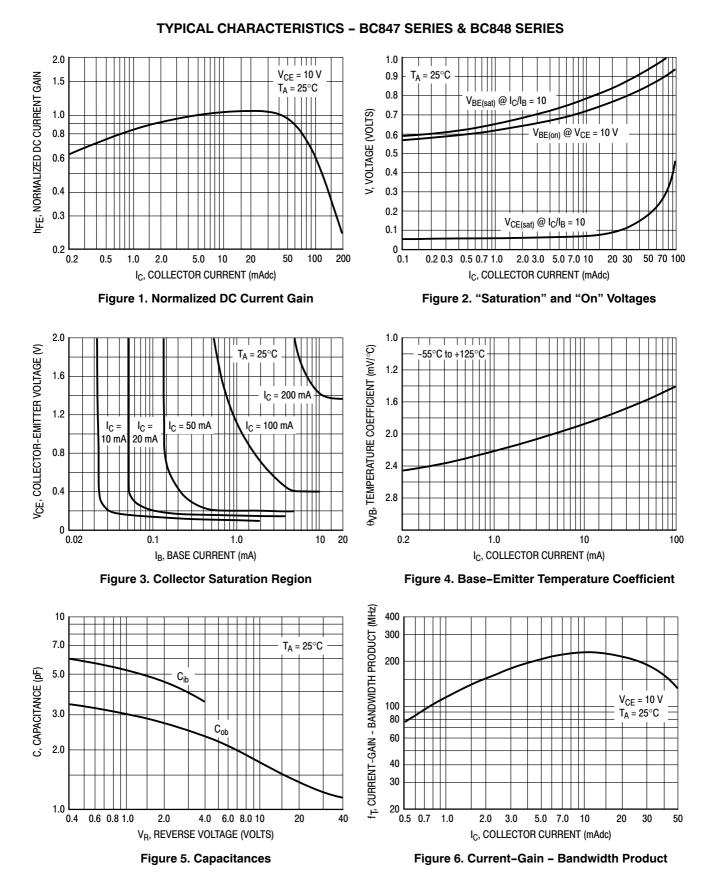
(Note: Microdot may be in either location)

#### **ORDERING INFORMATION**

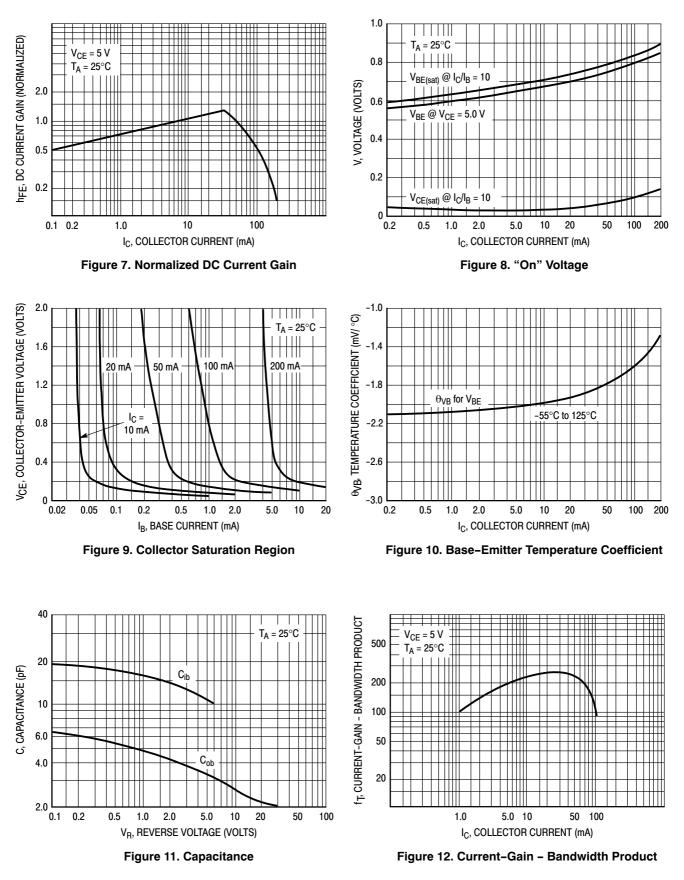
See detailed ordering and shipping information in the package dimensions section on page 6 of this data sheet.

# **ELECTRICAL CHARACTERISTICS** ( $T_A = 25^{\circ}C$ unless otherwise noted)

Characteristic	Symbol	Min	Тур	Мах	Unit
OFF CHARACTERISTICS	ŀ	-	•	•	
Collector - Emitter Breakdown Voltage (I <sub>C</sub> = 10 mA) BC846 Se BC847 Se BC848 Se	ries	65 45 30		- - -	V
Collector – Emitter Breakdown Voltage ( $I_C = 10 \ \mu$ A, V <sub>EB</sub> = 0) BC846 Se BC847 Se BC848 Se	eries	80 50 30	- - -	- - -	V
Collector – Base Breakdown Voltage (I <sub>C</sub> = 10 μA) BC846 Se BC847 Se BC848 Se	eries	80 50 30	- - -	- - -	V
Emitter - Base Breakdown Voltage (I <sub>E</sub> = 1.0 $\mu$ A) BC846 Se BC847 Se BC848 Se	eries	6.0 6.0 5.0	- - -	- - -	V
ctor Cutoff Current (V <sub>CB</sub> = 30 V) (V <sub>CB</sub> = 30 V, T <sub>A</sub> = 150°C) $I_{CBO}$ $ -$		15 5.0	nA μA		
$\begin{tabular}{lllllllllllllllllllllllllllllllllll$	h <sub>FE</sub>	- - 200 420	150 270 290 520	- - 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 <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 ( $I_C = 10 \text{ mA}, V_{CE} = 5.0 \text{ Vdc}, f = 100 \text{ MHz}$ )	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 k $\Omega$ ,f = 1.0 kHz, BW = 2	200 Hz)	-	-	10	dB



## **TYPICAL CHARACTERISTICS – BC846 SERIES**



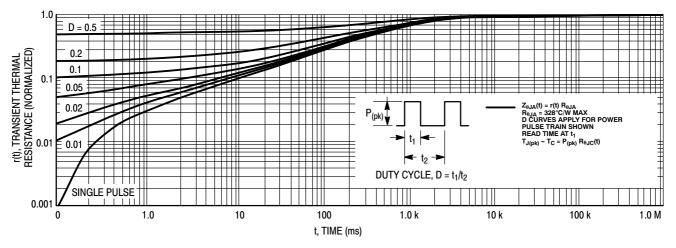


Figure 13. Thermal Response

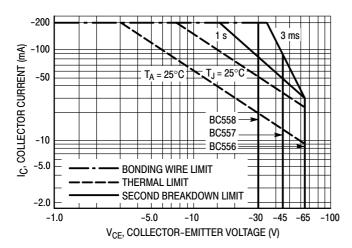


Figure 14. Active Region Safe Operating Area

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  $T_{J(pk)} = 150^{\circ}$ C;  $T_{C}$  or  $T_{A}$  is variable depending upon conditions. Pulse curves are valid for duty cycles to 10% provided  $T_{J(pk)} \le 150^{\circ}$ 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.

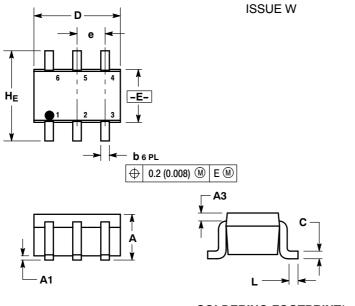
#### **ORDERING INFORMATION**

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

#### PACKAGE DIMENSIONS

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



NOTES

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M. 1982.

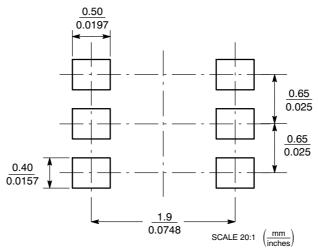
CONTROLLING DIMENSION: INCH. 2.

3. 419B-01 OBSOLETE, NEW STANDARD 419B-02.

	MIL	LIMETE	RS	INCHES		
DIM	MIN	NOM	MAX	MIN	NOM	MAX
Α	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
С	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
Е	1.15	1.25	1.35	0.045	0.049	0.053
е		0.65 BS	С	0.026 BSC		С
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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