



# DATA SHEET

SEMICONDUCTOR

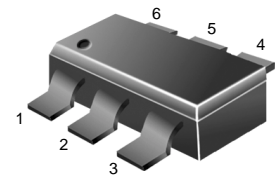
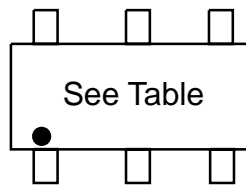
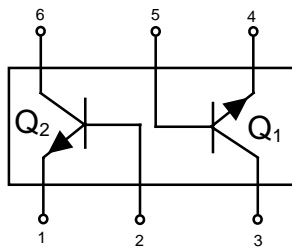
BC847BDW/BC848CDW

## 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.



SOT-363/SC-88  
CASE 419B STYLE1

### 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 |

### THERMAL CHARACTERISTICS

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

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

### ORDERING INFORMATION

| Device   | Package | Shipping        |
|----------|---------|-----------------|
| BC846BDW | SOT-363 | 3000 Units/Reel |
| BC847BDW | SOT-363 | 3000 Units/Reel |
| BC847CDW | SOT-363 | 3000 Units/Reel |
| BC848BDW | SOT-363 | 3000 Units/Reel |
| BC848CDW | SOT-363 | 3000 Units/Reel |

# ELECTRICAL CHARACTERISTICS

## BC847BDW/BC848CDW

### 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<br>(I <sub>C</sub> = 10 mA)                      | V <sub>(BR)CEO</sub> |     |     |     | V    |
| BC846 Series   |                      | 65  | —   | —   |      |
| BC847 Series   |                      | 45  | —   | —   |      |
| BC848 Series   |                      | 30  | —   | —   |      |
| Collector–Emitter Breakdown Voltage<br>(I <sub>C</sub> = 10 μA, V <sub>EB</sub> = 0) | V <sub>(BR)CES</sub> |     |     |     | V    |
| BC846 Series   |                      | 80  | —   | —   |      |
| BC847 Series   |                      | 50  | —   | —   |      |
| BC848 Series   |                      | 30  | —   | —   |      |
| Collector–Base Breakdown Voltage<br>(I <sub>C</sub> = 10 μA)                         | V <sub>(BR)CBO</sub> |     |     |     | V    |
| BC846 Series   |                      | 80  | —   | —   |      |
| BC847 Series   |                      | 50  | —   | —   |      |
| BC848 Series   |                      | 30  | —   | —   |      |
| Emitter–Base Breakdown Voltage<br>(I <sub>E</sub> = 1.0 μA)                          | V <sub>(BR)EBO</sub> |     |     |     | V    |
| BC846 Series   |                      | 6.0 | —   | —   |      |
| BC847 Series   |                      | 6.0 | —   | —   |      |
| BC848 Series   |                      | 5.0 | —   | —   |      |
| Collector Cutoff Current<br>(V <sub>CB</sub> = 30 V)                                 | I <sub>CBO</sub>     | —   | —   | 15  | nA   |
| (V <sub>CB</sub> = 30 V, T <sub>A</sub> = 150°C)                                     |                      | —   | —   | 5.0 | μA   |

### ON CHARACTERISTICS

|  |                      |     |     |      |    |
|--|----------------------|-----|-----|------|----|
| DC Current Gain<br>(I <sub>C</sub> = 10 μA, V <sub>CE</sub> = 5.0 V)                   | h <sub>FE</sub>      |     |     |      | —  |
| BC846B, BC847B, BC848B   |                      | —   | 150 | —    |    |
| BC847C, BC848C   |                      | —   | 270 | —    |    |
| (I <sub>C</sub> = 2.0 mA, V <sub>CE</sub> = 5.0 V)                                     |                      |     |     |      |    |
| BC846B, BC847B, BC848B   |                      | 200 | 290 | 450  |    |
| BC847C, BC848C   |                      | 420 | 520 | 800  |    |
| Collector–Emitter Saturation Voltage (I <sub>C</sub> = 10 mA, I <sub>B</sub> = 0.5 mA) | V <sub>CE(sat)</sub> | —   | —   | 0.25 | V  |
| (I <sub>C</sub> = 100 mA, I <sub>B</sub> = 5.0 mA)                                     |                      | —   | —   | 0.6  |    |
| Base–Emitter Saturation Voltage (I <sub>C</sub> = 10 mA, I <sub>B</sub> = 0.5 mA)      | V <sub>BE(sat)</sub> | —   | 0.7 | —    | V  |
| (I <sub>C</sub> = 100 mA, I <sub>B</sub> = 5.0 mA)                                     |                      | —   | 0.9 | —    |    |
| Base–Emitter Voltage (I <sub>C</sub> = 2.0 mA, V <sub>CE</sub> = 5.0 V)                | V <sub>BE(on)</sub>  | 580 | 660 | 700  | mV |
| (I <sub>C</sub> = 10 mA, V <sub>CE</sub> = 5.0 V)                                      |                      | —   | —   | 770  |    |

### SMALL–SIGNAL CHARACTERISTICS

|   |                  |     |   |     |     |
|---|------------------|-----|---|-----|-----|
| Current–Gain — Bandwidth Product<br>(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,<br>V <sub>CE</sub> = 5.0 V <sub>dc</sub> , R <sub>S</sub> = 2.0 kΩ,<br>f = 1.0 kHz, BW = 200 Hz) | NF               |     |   |     | dB  |
| BC846B, BC847B, BC848B  |                  | —   | — | 10  |     |
| BC847C, BC848C  |                  | —   | — | 4.0 |     |

# DEVICE CHARACTERISTICS

## BC847BDW/BC848CDW

### TYPICAL CHARACTERISTICS

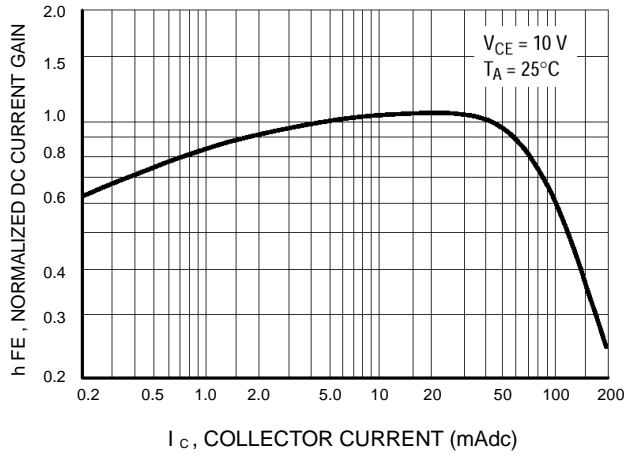


Figure 1. Normalized DC Current Gain

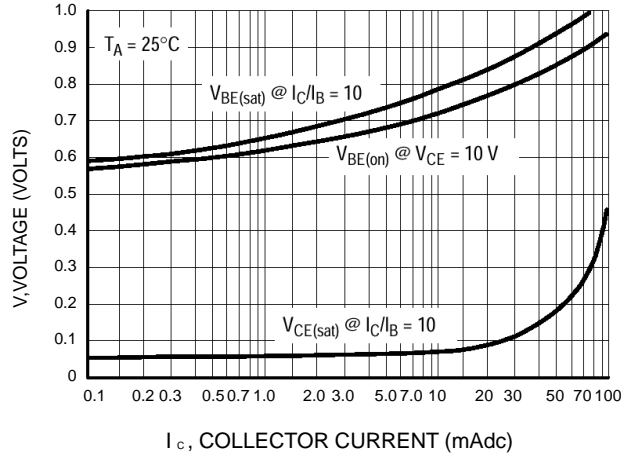


Figure 2. "Saturation" and "On" Voltages

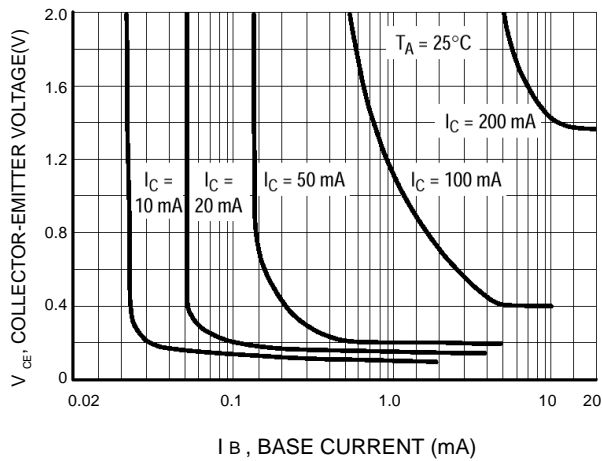


Figure 3. Collector Saturation Region

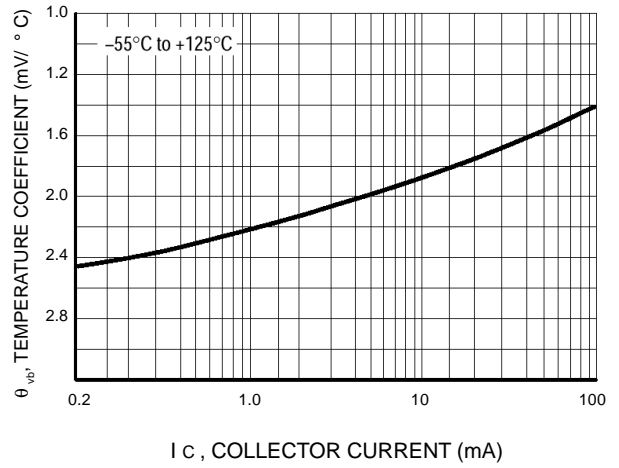
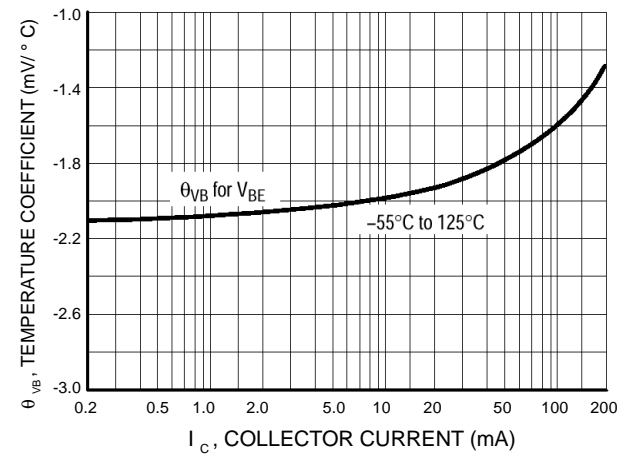
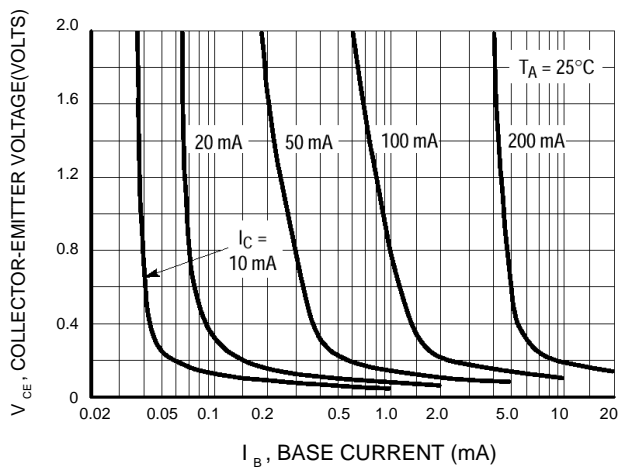
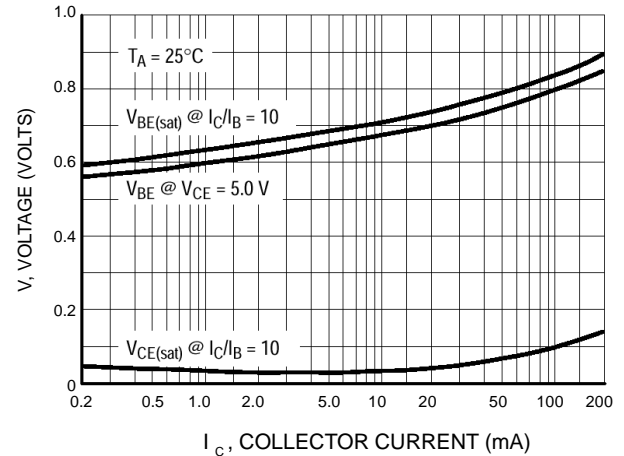
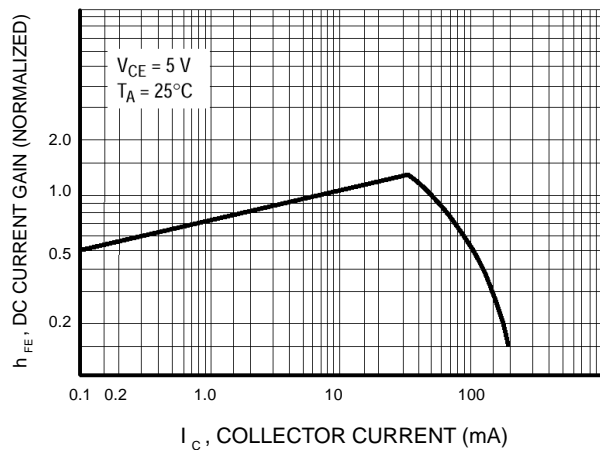
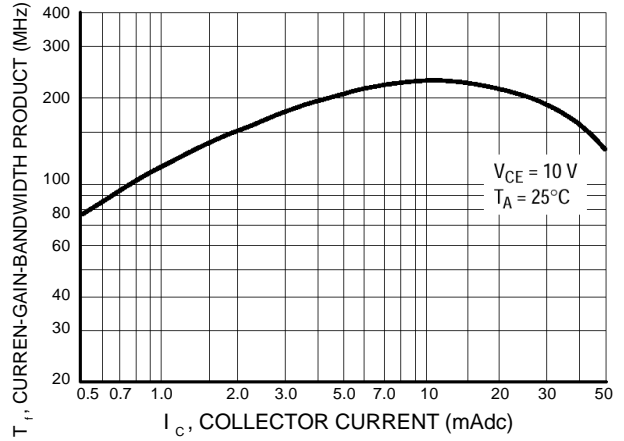
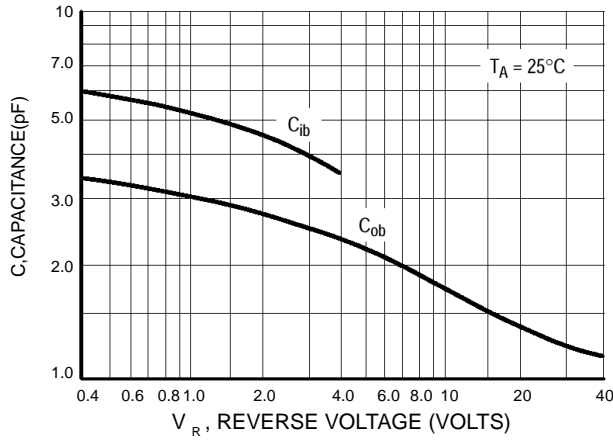


Figure 4. Base-Emitter Temperature Coefficient

# DEVICE CHARACTERISTICS

## BC847BDW/BC848CDW

### TYPICAL CHARACTERISTICS



# DEVICE CHARACTERISTICS

## BC847BDW/BC848CDW

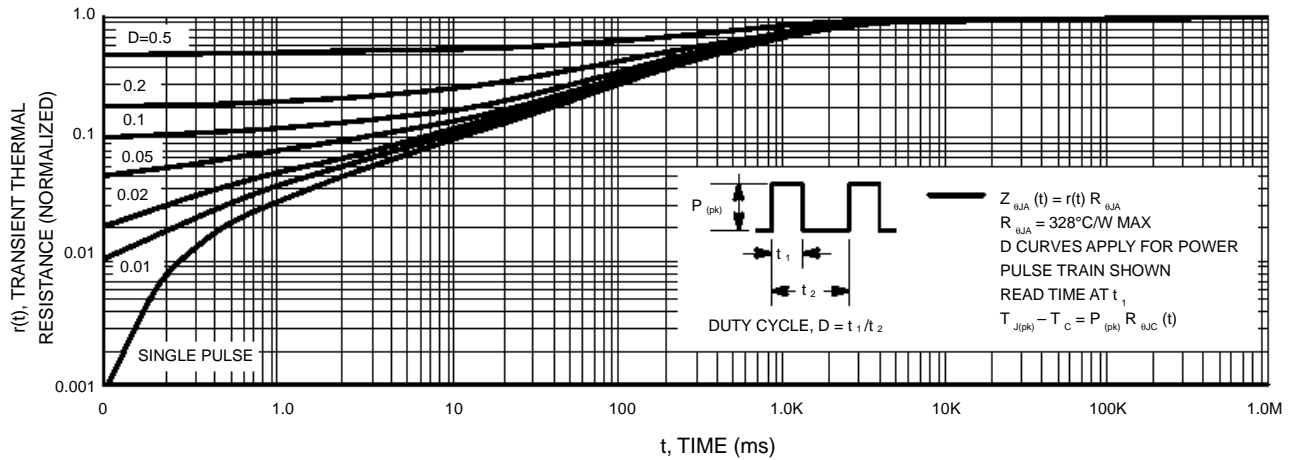


Figure 11. Thermal Response

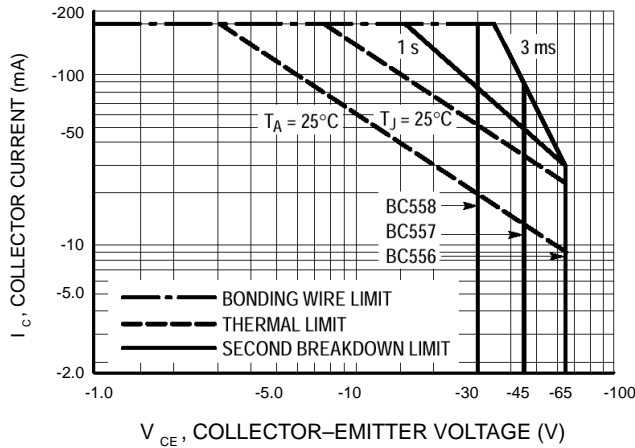


Figure 12. Active Region Safe Operating Area

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 12 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 12. 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.

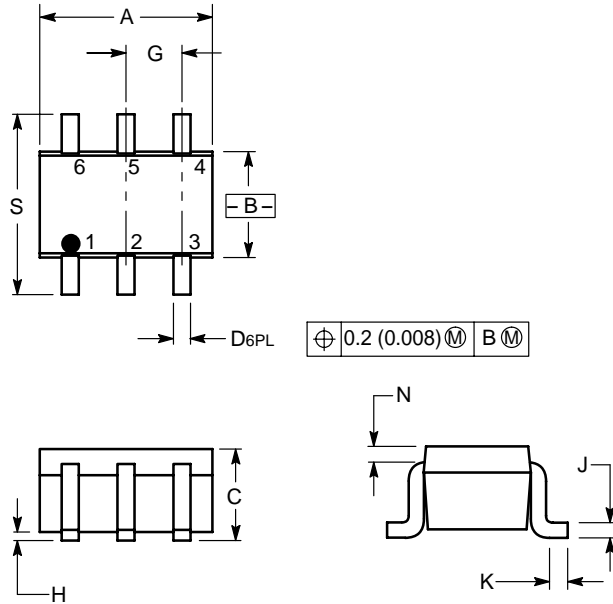
# PACKAGE OUTLINE & DIMENSIONS

## BC847BDW/BC848CDW

SC-88/SOT-363

### NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.



| 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 |

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

