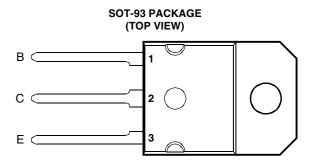
## **BOURNS®**

- Designed for Complementary Use with the BD250 Series
- 125 W at 25°C Case Temperature
- 25 A Continuous Collector Current
- 40 A Peak Collector Current
- Customer-Specified Selections Available

This model is currently available, but not recommended for new designs. For more information, see http://bourns.com/data/global/pdfs/TSP1203\_SOT93\_POM.pdf.



Pin 2 is in electrical contact with the mounting base.

MDTRAAA

## absolute maximum ratings at 25°C case temperature (unless otherwise noted)

| RATING   | SYMBOL             | VALUE            | UNIT        |    |
|--|--------------------|------------------|-------------|----|
|  | BD249              |                  | 55          |    |
| Collector-emitter voltage ( $R_{BE} = 100 \Omega$ )                                | BD249A             | V                | 70          | V  |
| Collector Crimiter Voltage (TIBE = 100 22)   | BD249B             | V <sub>CER</sub> | 90          | ٧  |
|  | BD249C             |                  | 115         |    |
|  | BD249              |                  | 45          |    |
| Collector-emitter voltage (I <sub>C</sub> = 30 mA)                                 | BD249A             | V                | 60          | V  |
| Collector-entitles voltage (IC = 30 IIIA)  | BD249B             | V <sub>CEO</sub> | 80          |    |
|  | BD249C             |                  | 100         |    |
| Emitter-base voltage   |                    |                  | 5           | V  |
| Continuous collector current   |                    |                  | 25          | Α  |
| Peak collector current (see Note 1)  |                    |                  | 40          | Α  |
| Continuous base current  |                    |                  | 5           | Α  |
| Continuous device dissipation at (or below) 25°C case temperature (see Note 2)     |                    |                  | 125         | W  |
| Continuous device dissipation at (or below) 25°C free air temperature (see Note 3) |                    |                  | 3           | W  |
| Unclamped inductive load energy (see Note 4)                                       |                    |                  | 90          | mJ |
| Operating junction temperature range   |                    |                  | -65 to +150 | °C |
| Storage temperature range  |                    |                  | -65 to +150 | °C |
| Lead temperature 3.2 mm from case for 10 seconds                                   | T <sub>L</sub> 250 |                  | °C          |    |

NOTES: 1. This value applies for  $t_p \le 0.3$  ms, duty cycle  $\le 10\%$ .

- 2. Derate linearly to 150°C case temperature at the rate of 1 W/°C.
- 3. Derate linearly to 150°C free air temperature at the rate of 24 mW/°C.
- 4. This rating is based on the capability of the transistor to operate safely in a circuit of: L = 20 mH,  $I_{B(on)}$  = 0.4 A,  $R_{BE}$  = 100  $\Omega$ ,  $V_{BE(off)}$  = 0,  $R_S$  = 0.1  $\Omega$ ,  $V_{CC}$  = 20 V.



## electrical characteristics at 25°C case temperature

| PARAMETER            |   | TEST CONDITIONS  |   |                           | MIN           | TYP | MAX               | UNIT |
|----------------------|---|--|---|---------------------------|---------------|-----|-------------------|------|
| V <sub>(BR)CEO</sub> | Collector-emitter breakdown voltage         | $I_C = 30 \text{ mA}$ $I_B = 0$ (see Note 5)                             | 1 -0  | BD249<br>BD249A           | 45<br>60      |     |                   | V    |
|                      |   |  | BD249B<br>BD249C                                    | 80<br>100                 |               |     | V                 |      |
|                      | Collector-emitter                           | V <sub>CE</sub> = 55 V<br>V <sub>CE</sub> = 70 V                         | V <sub>BE</sub> = 0<br>V <sub>BE</sub> = 0          | BD249<br>BD249A           |               |     | 0.7<br>0.7        | mA   |
| I <sub>CES</sub>     | cut-off current                             | $V_{CE} = 70 \text{ V}$ $V_{CE} = 90 \text{ V}$ $V_{CE} = 115 \text{ V}$ | $V_{BE} = 0$  | BD249B<br>BD249C          |               |     | 0.7<br>0.7<br>0.7 |      |
| I <sub>CEO</sub>     | Collector cut-off current                   | $V_{CE} = 113 \text{ V}$ $V_{CE} = 30 \text{ V}$ $V_{CE} = 60 \text{ V}$ | $I_{B} = 0$ $I_{B} = 0$                             | BD249/249A<br>BD249B/249C |               |     | 1                 | mA   |
| I <sub>EBO</sub>     | Emitter cut-off current                     | V <sub>EB</sub> = 5 V  | I <sub>C</sub> = 0                                  |                           |               |     | 1                 | mA   |
| h <sub>FE</sub>      | Forward current transfer ratio              | $V_{CE} = 4 V$ $V_{CE} = 4 V$ $V_{CE} = 4 V$                             | $I_{C} = 1.5 A$ $I_{C} = 15 A$ $I_{C} = 25 A$       | (see Notes 5 and 6)       | 25<br>10<br>5 |     |                   |      |
| V <sub>CE(sat)</sub> | Collector-emitter saturation voltage        | I <sub>B</sub> = 1.5 A<br>I <sub>B</sub> = 5 A                           | $I_{\rm C} = 15  {\rm A}$ $I_{\rm C} = 25  {\rm A}$ | (see Notes 5 and 6)       |               |     | 1.8<br>4          | ٧    |
| V <sub>BE</sub>      | Base-emitter voltage                        | $V_{CE} = 4 V$ $V_{CE} = 4 V$  | l <sub>C</sub> = 15 A<br>l <sub>C</sub> = 25 A      | (see Notes 5 and 6)       |               |     | 2<br>4            | ٧    |
| h <sub>fe</sub>      | Small signal forward current transfer ratio | V <sub>CE</sub> = 10 V   | I <sub>C</sub> = 1 A                                | f = 1 kHz                 | 25            |     |                   |      |
| h <sub>fe</sub>      | Small signal forward current transfer ratio | V <sub>CE</sub> = 10 V   | I <sub>C</sub> = 1 A                                | f = 1 MHz                 | 3             |     |                   |      |

NOTES: 5. These parameters must be measured using pulse techniques,  $t_p$  = 300  $\mu$ s, duty cycle  $\leq$  2%.

#### thermal characteristics

| PARAMETER       |   |  | TYP | MAX | UNIT |
|-----------------|---|--|-----|-----|------|
| $R_{\theta JC}$ | Junction to case thermal resistance     |  |     | 1   | °C/W |
| $R_{\theta JA}$ | Junction to free air thermal resistance |  |     | 42  | °C/W |

## resistive-load-switching characteristics at 25°C case temperature

|                  | PARAMETER     | TEST CONDITIONS †    |                     | MIN                                    | TYP | MAX | UNIT |    |
|------------------|---------------|----------------------|---------------------|--|-----|-----|------|----|
| t <sub>on</sub>  | Turn-on time  | I <sub>C</sub> = 5 A | $I_{B(on)} = 0.5 A$ | $I_{B(off)} = -0.5 A$                  |     | 0.3 |      | μs |
| t <sub>off</sub> | Turn-off time | $V_{BE(off)} = -5 V$ | $R_1 = 5 \Omega$    | $t_{\rm p} = 20 \ \mu s, \ dc \le 2\%$ |     | 0.9 |      | μs |

<sup>&</sup>lt;sup>†</sup> Voltage and current values shown are nominal; exact values vary slightly with transistor parameters.

<sup>6.</sup> These parameters must be measured using voltage-sensing contacts, separate from the current carrying contacts.

#### **TYPICAL CHARACTERISTICS**

# **TYPICAL DC CURRENT GAIN** vs **COLLECTOR CURRENT** TCS635AD 1000 $V_{CE} = 4 V$ $T_{\rm C} = 25^{\circ}{\rm C}$ $t_p = 300 \mu s$ , duty cycle < 2%h<sub>FE</sub> - DC Current Gain 100 10 0.1 1.0 10 100 I<sub>c</sub> - Collector Current - A

Figure 1.

COLLECTOR-EMITTER SATURATION VOLTAGE

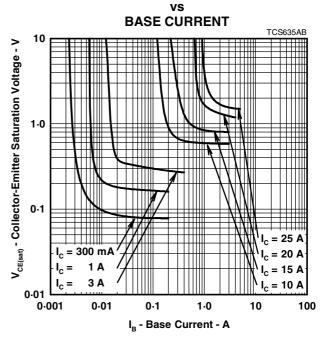


Figure 2.



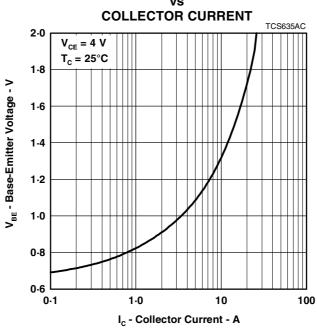
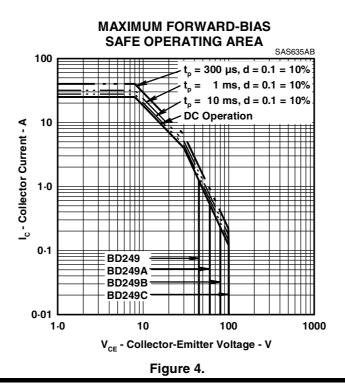


Figure 3.

#### **MAXIMUM SAFE OPERATING REGIONS**



### THERMAL INFORMATION

#### **MAXIMUM POWER DISSIPATION**

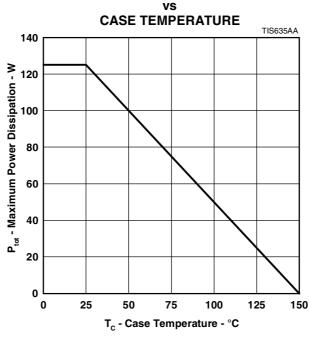


Figure 5.