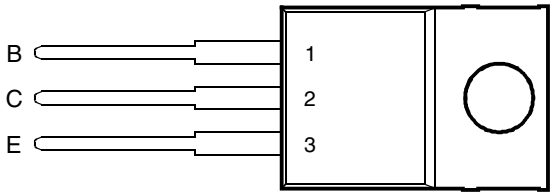
BOURNS®

- **Designed for Complementary Use with BDW64, BDW64A, BDW64B, BDW64C and BDW64D**
- **60 W at 25°C Case Temperature**
- **6 A Continuous Collector Current**
- **Minimum $h_{FE}$ of 750 at 3V, 2 A**

This series is obsolete and not recommended for new designs.

**TO-220 PACKAGE**
**(TOP VIEW)**




Pin 2 is in electrical contact with the mounting base.

MDTRACA

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

| RATING | | SYMBOL | VALUE | UNIT |
|---|---|---|---|---|
| Collector-base voltage ($I_E$ = 0) | BDW63 | $V_{CBO}$ | 45 | V |
| | BDW63A | | 60 | |
| | BDW63B | | 80 | |
| | BDW63C | | 100 | |
| | BDW63D | | 120 | |
| Collector-emitter voltage ($I_B$ = 0) (see Note 1) | BDW63 | $V_{CEO}$ | 45 | V |
| | BDW63A | | 60 | |
| | BDW63B | | 80 | |
| | BDW63C | | 100 | |
| | BDW63D | | 120 | |
| Emitter-base voltage | | $V_{EB}$ | 5 | V |
| Continuous collector current | | $I_C$ | 6 | A |
| Continuous base current | | $I_B$ | 0.1 | A |
| Continuous device dissipation at (or below) 25°C case temperature (see Note 2) | | $P_{tot}$ | 60 | W |
| Continuous device dissipation at (or below) 25°C free air temperature (see Note 3) | | $P_{tot}$ | 2 | W |
| Unclamped inductive load energy (see Note 4) | | $½LI_C^2$ | 50 | mJ |
| Operating junction temperature range | | $T_j$ | -65 to +150 | °C |
| Operating temperature range | | $T_{stg}$ | -65 to +150 | °C |
| Operating free-air temperature range | | $T_A$ | -65 to +150 | °C |



NOTES: 1. These values apply when the base-emitter diode is open circuited.
2. Derate linearly to 150°C case temperature at the rate of 0.48 W/°C.
3. Derate linearly to 150°C free air temperature at the rate of 16 mW/°C.
4. This rating is based on the capability of the transistor to operate safely in a circuit of: L = 20 mH, $I_{B(on)}$ = 5 mA, $R_{BE}$ = 100 Ω, $V_{BE(off)}$ = 0, $R_S$ = 0.1 Ω, $V_{CC}$ = 20 V.

## electrical characteristics at 25°C case temperature (unless otherwise noted)

| PARAMETER | | TEST CONDITIONS | | | | MIN | TYP | MAX | UNIT |
|---|---|---|---|---|---|---|---|---|---|
| $V_{(BR)CEO}$ | Collector-emitter breakdown voltage | $I_C$ = 30 mA | $I_B$ = 0 | (see Note 5) | BDW63 | 45 | | | V |
| | | | | | BDW63A | 60 | | | |
| | | | | | BDW63B | 80 | | | |
| | | | | | BDW63C | 100 | | | |
| | | | | | BDW63D | 120 | | | |
| $I_{CEO}$ | Collector-emitter cut-off current | $V_{CE}$ = 30 V | $I_B$ = 0 | | BDW63 | | | 0.5 | mA |
| | | $V_{CE}$ = 30 V | $I_B$ = 0 | | BDW63A | | | 0.5 | |
| | | $V_{CE}$ = 40 V | $I_B$ = 0 | | BDW63B | | | 0.5 | |
| | | $V_{CE}$ = 50 V | $I_B$ = 0 | | BDW63C | | | 0.5 | |
| | | $V_{CE}$ = 60 V | $I_B$ = 0 | | BDW63D | | | 0.5 | |
| $I_{CBO}$ | Collector cut-off current | $V_{CB}$ = 45 V | $I_E$ = 0 | | BDW63 | | | 0.2 | mA |
| | | $V_{CB}$ = 60 V | $I_E$ = 0 | | BDW63A | | | 0.2 | |
| | | $V_{CB}$ = 80 V | $I_E$ = 0 | | BDW63B | | | 0.2 | |
| | | $V_{CB}$ = 100 V | $I_E$ = 0 | | BDW63C | | | 0.2 | |
| | | $V_{CB}$ = 120 V | $I_E$ = 0 | | BDW63D | | | 0.2 | |
| | | $V_{CB}$ = 45 V | $I_E$ = 0 | $T_C$ = 150°C | BDW63 | | | 5 | |
| | | $V_{CB}$ = 60 V | $I_E$ = 0 | $T_C$ = 150°C | BDW63A | | | 5 | |
| | | $V_{CB}$ = 80 V | $I_E$ = 0 | $T_C$ = 150°C | BDW63B | | | 5 | |
| | | $V_{CB}$ = 100 V | $I_E$ = 0 | $T_C$ = 150°C | BDW63C | | | 5 | |
| | | $V_{CB}$ = 120 V | $I_E$ = 0 | $T_C$ = 150°C | BDW63D | | | 5 | |
| $I_{EBO}$ | Emitter cut-off current | $V_{EB}$ = 5 V | $I_C$ = 0 | | | | | 2 | mA |
| $h_{FE}$ | Forward current transfer ratio | $V_{CE}$ = 3 V | $I_C$ = 2 A | (see Notes 5 and 6) | | 750 | | 20000 | |
| | | $V_{CE}$ = 3 V | $I_C$ = 6 A | | | 100 | | | |
| $V_{BE(on)}$ | Base-emitter voltage | $V_{CE}$ = 3 V | $I_C$ = 2 A | (see Notes 5 and 6) | | | | 2.5 | V |
| $V_{CE(sat)}$ | Collector-emitter saturation voltage | $I_B$ = 12 mA | $I_C$ = 2 A | (see Notes 5 and 6) | | | | 2.5 | V |
| | | $I_B$ = 60 mA | $I_C$ = 6 A | | | | | 4 | |
| $V_{EC}$ | Parallel diode forward voltage | $I_E$ = 6 A | $I_B$ = 0 | | | | | 3.5 | V |



NOTES: 5. These parameters must be measured using pulse techniques, $t_p$ = 300 µs, duty cycle ≤ 2%.
6. These parameters must be measured using voltage-sensing contacts, separate from the current carrying contacts.

## thermal characteristics

| PARAMETER | | MIN | TYP | MAX | UNIT |
|---|---|---|---|---|---|
| $R_{\theta JC}$ | Junction to case thermal resistance | | | 2.08 | °C/W |
| $R_{\theta JA}$ | Junction to free air thermal resistance | | | 62.5 | °C/W |

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

| PARAMETER | | TEST CONDITIONS † | | | MIN | TYP | MAX | UNIT |
|---|---|---|---|---|---|---|---|---|
| $t_{on}$ | Turn-on time | $I_C$ = 3 A | $I_{B(on)}$ = 12 mA | $I_{B(off)}$ = -12 mA | | 1 | | µs |
| $t_{off}$ | Turn-off time | $V_{BE(off)}$ = -4.5 V | $R_L$ = 10 Ω | $t_p$ = 20 µs, dc ≤ 2% | | 5 | | µs |

† Voltage and current values shown are nominal; exact values vary slightly with transistor parameters.

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## TYPICAL CHARACTERISTICS

### TYPICAL DC CURRENT GAIN vs COLLECTOR CURRENT

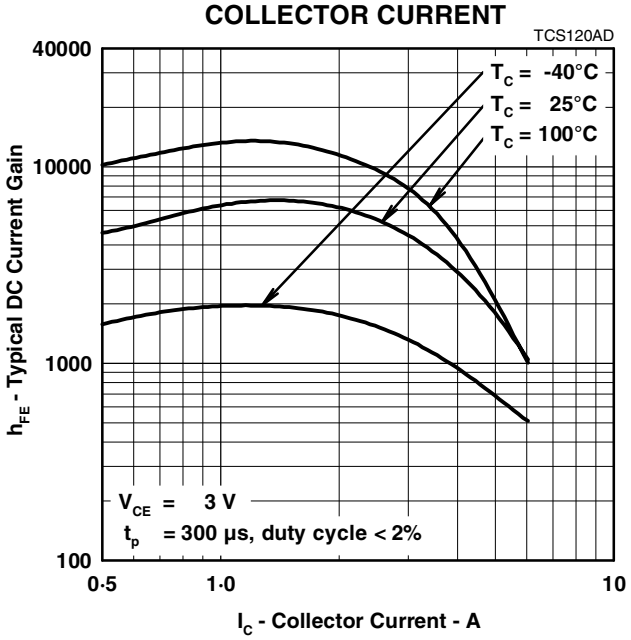


Figure 1.

### COLLECTOR-EMITTER SATURATION VOLTAGE vs COLLECTOR CURRENT

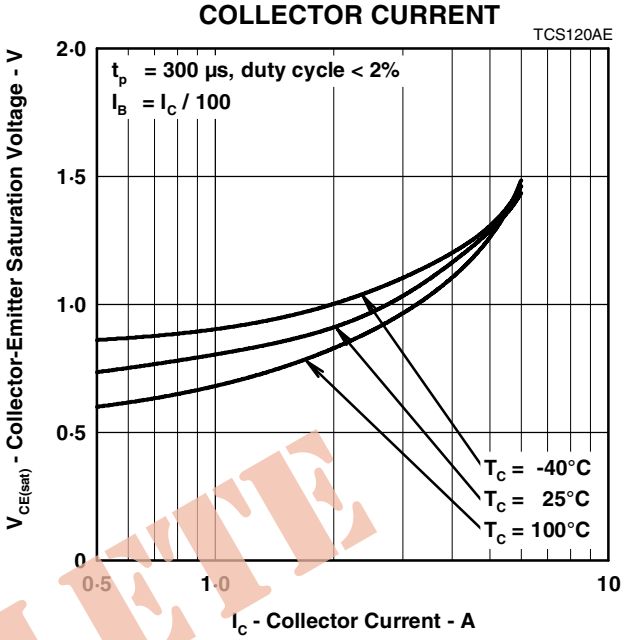


Figure 2.



### BASE-EMITTER SATURATION VOLTAGE vs COLLECTOR CURRENT

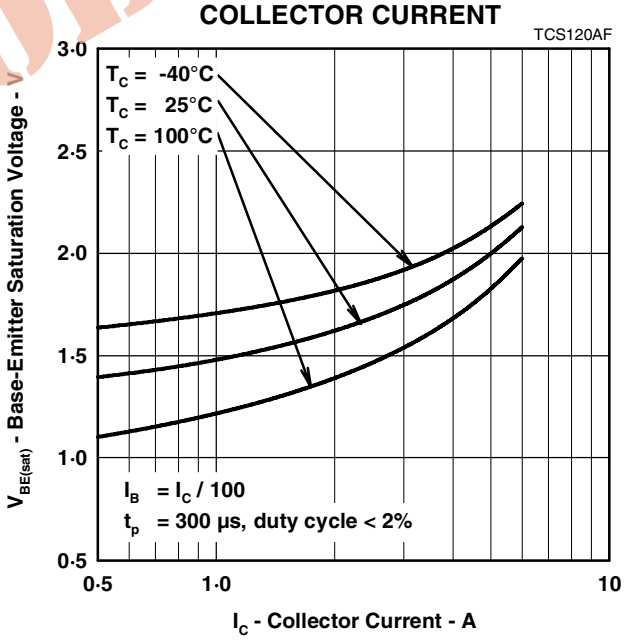


Figure 3.

## MAXIMUM SAFE OPERATING REGIONS

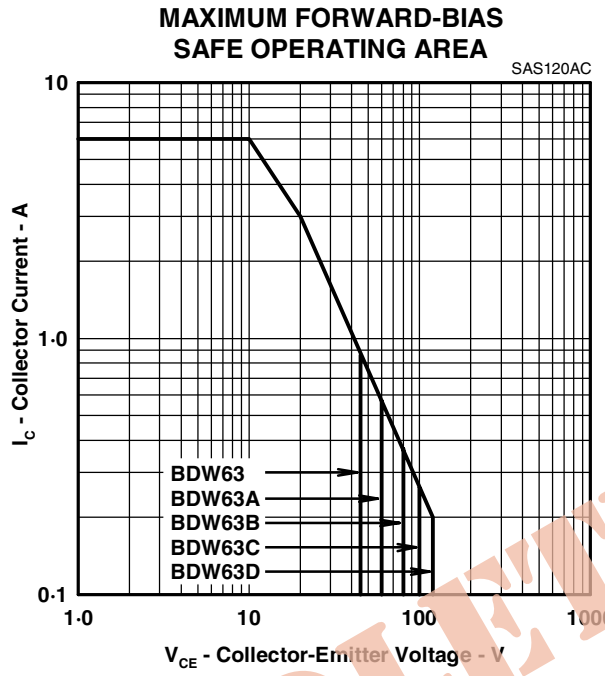


Figure 4.



## THERMAL INFORMATION

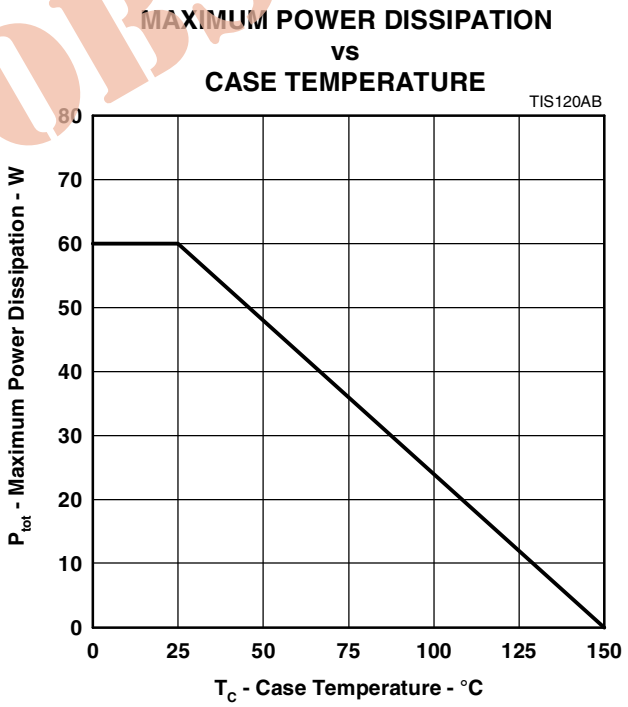


Figure 5.