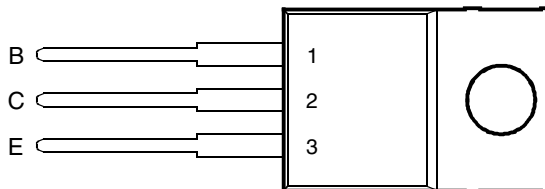


- Designed for Complementary Use with BDW63, BDW63A, BDW63B, BDW63C and BDW63D
- 60 W at 25°C Case Temperature
- 6 A Continuous Collector Current
- Minimum  $h_{FE}$  of 750 at 3V, 2 A

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 ( $I_E = 0$ )                                               | BDW64  | $V_{CBO}$           | -45         | V    |
|                                                                                    | BDW64A |                     | -60         |      |
|                                                                                    | BDW64B |                     | -80         |      |
|                                                                                    | BDW64C |                     | -100        |      |
|                                                                                    | BDW64D |                     | -120        |      |
| Collector-emitter voltage ( $I_B = 0$ ) (see Note 1)                               | BDW64  | $V_{CEO}$           | -45         | V    |
|                                                                                    | BDW64A |                     | -60         |      |
|                                                                                    | BDW64B |                     | -80         |      |
|                                                                                    | BDW64C |                     | -100        |      |
|                                                                                    | BDW64D |                     | -120        |      |
| Emitter-base voltage                                                               |        | $V_{EBO}$           | -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)                                       |        | $\frac{1}{2}LI_C^2$ | 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,  $R_{BE} = 100 \Omega$ ,  $V_{BE(off)} = 0$ ,  $R_S = 0.1 \Omega$ ,  $V_{CC} = -20$  V.

**PRODUCT INFORMATION**

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

| PARAMETER                                          | TEST CONDITIONS                                                                                                                                                                                                                                                                          |                                                                                                                                |                                                                                                                                               |                                                                                                | MIN                               | TYP | MAX                                                                | UNIT |
|----------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|-----------------------------------|-----|--------------------------------------------------------------------|------|
| $V_{(BR)CEO}$ Collector-emitter breakdown voltage  | $I_C = -30 \text{ mA}$                                                                                                                                                                                                                                                                   | $I_B = 0$                                                                                                                      | (see Note 5)                                                                                                                                  | BDW64<br>BDW64A<br>BDW64B<br>BDW64C<br>BDW64D                                                  | -45<br>-60<br>-80<br>-100<br>-120 |     |                                                                    | V    |
| $I_{CEO}$ Collector-emitter cut-off current        | $V_{CE} = -30 \text{ V}$<br>$V_{CE} = -30 \text{ V}$<br>$V_{CE} = -40 \text{ V}$<br>$V_{CE} = -50 \text{ V}$<br>$V_{CE} = -60 \text{ V}$                                                                                                                                                 | $I_B = 0$<br>$I_B = 0$<br>$I_B = 0$<br>$I_B = 0$<br>$I_B = 0$                                                                  |                                                                                                                                               | BDW64<br>BDW64A<br>BDW64B<br>BDW64C<br>BDW64D                                                  |                                   |     | -0.5<br>-0.5<br>-0.5<br>-0.5<br>-0.5                               | mA   |
| $I_{CBO}$ Collector cut-off current                | $V_{CB} = -45 \text{ V}$<br>$V_{CB} = -60 \text{ V}$<br>$V_{CB} = -80 \text{ V}$<br>$V_{CB} = -100 \text{ V}$<br>$V_{CB} = -120 \text{ V}$<br>$V_{CB} = -45 \text{ V}$<br>$V_{CB} = -60 \text{ V}$<br>$V_{CB} = -80 \text{ V}$<br>$V_{CB} = -100 \text{ V}$<br>$V_{CB} = -120 \text{ V}$ | $I_E = 0$<br>$I_E = 0$<br>$I_E = 0$<br>$I_E = 0$<br>$I_E = 0$<br>$I_E = 0$<br>$I_E = 0$<br>$I_E = 0$<br>$I_E = 0$<br>$I_E = 0$ | $T_C = 150^\circ\text{C}$<br>$T_C = 150^\circ\text{C}$<br>$T_C = 150^\circ\text{C}$<br>$T_C = 150^\circ\text{C}$<br>$T_C = 150^\circ\text{C}$ | BDW64<br>BDW64A<br>BDW64B<br>BDW64C<br>BDW64D<br>BDW64<br>BDW64A<br>BDW64B<br>BDW64C<br>BDW64D |                                   |     | -0.2<br>-0.2<br>-0.2<br>-0.2<br>-0.2<br>-5<br>-5<br>-5<br>-5<br>-5 | mA   |
| $I_{EBO}$ Emitter cut-off current                  | $V_{EB} = -5 \text{ V}$                                                                                                                                                                                                                                                                  | $I_C = 0$                                                                                                                      |                                                                                                                                               |                                                                                                |                                   |     | -2                                                                 | mA   |
| $h_{FE}$ Forward current transfer ratio            | $V_{CE} = -3 \text{ V}$<br>$V_{CE} = -3 \text{ V}$                                                                                                                                                                                                                                       | $I_C = -2 \text{ A}$<br>$I_C = -6 \text{ A}$                                                                                   | (see Notes 5 and 6)                                                                                                                           |                                                                                                | 750<br>100                        |     | 20000                                                              |      |
| $V_{BE(on)}$ Base-emitter voltage                  | $V_{CE} = -3 \text{ V}$                                                                                                                                                                                                                                                                  | $I_C = -2 \text{ A}$                                                                                                           | (see Notes 5 and 6)                                                                                                                           |                                                                                                |                                   |     | -2.5                                                               | V    |
| $V_{CE(sat)}$ Collector-emitter saturation voltage | $I_B = -12 \text{ mA}$<br>$I_B = -60 \text{ mA}$                                                                                                                                                                                                                                         | $I_C = -2 \text{ A}$<br>$I_C = -6 \text{ A}$                                                                                   | (see Notes 5 and 6)                                                                                                                           |                                                                                                |                                   |     | -2.5<br>-4                                                         | V    |
| $V_{EC}$ Parallel diode forward voltage            | $I_E = -6 \text{ A}$                                                                                                                                                                                                                                                                     | $I_B = 0$                                                                                                                      |                                                                                                                                               |                                                                                                |                                   |     | -3.5                                                               | V    |

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

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 | $^\circ\text{C/W}$ |
| $R_{\theta JA}$ Junction to free air thermal resistance |     |     | 62.5 | $^\circ\text{C/W}$ |

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

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

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

**PRODUCT INFORMATION**

TYPICAL CHARACTERISTICS

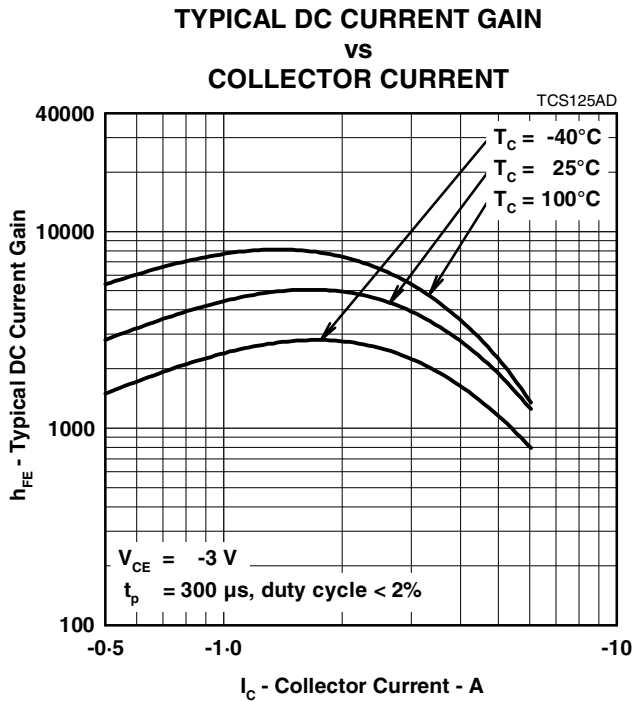


Figure 1.

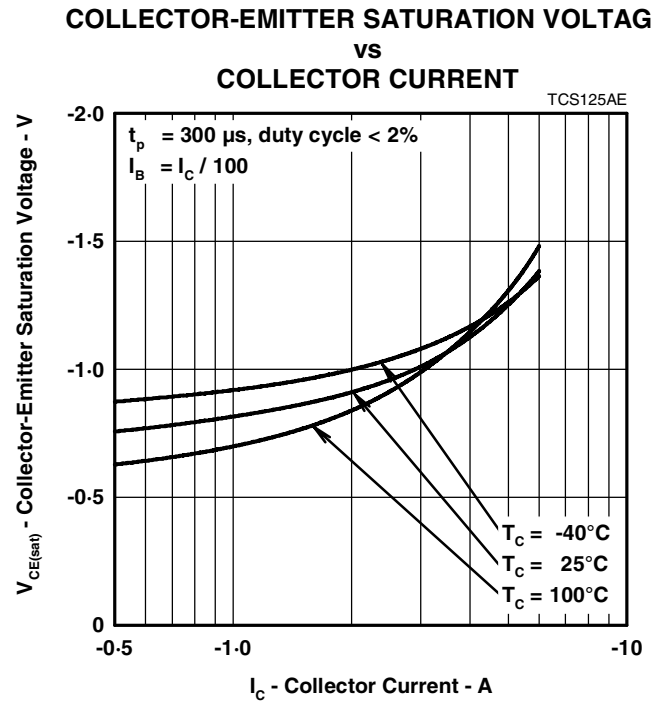


Figure 2.

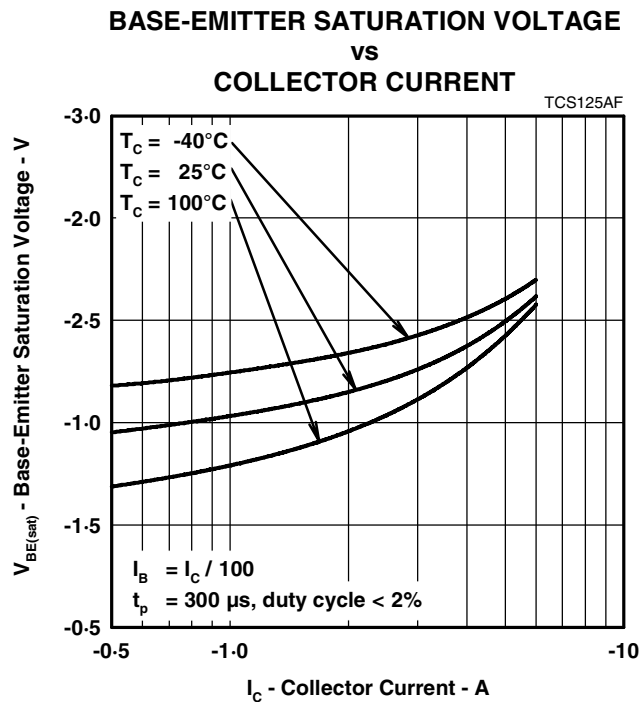


Figure 3.

**PRODUCT INFORMATION**

## MAXIMUM SAFE OPERATING REGIONS

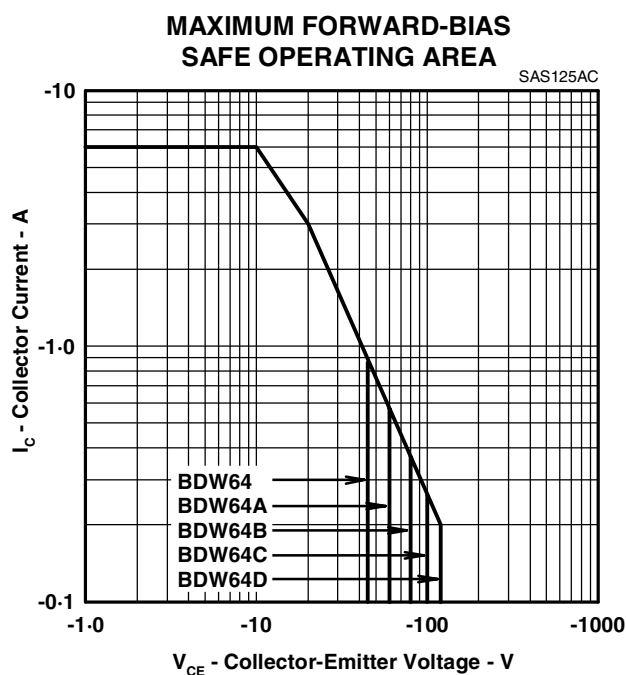


Figure 4.

## THERMAL INFORMATION

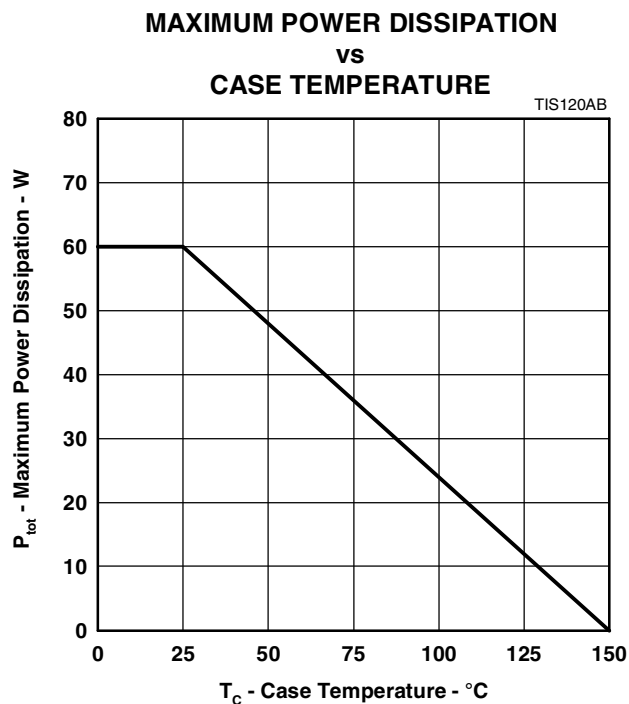


Figure 5.

## PRODUCT INFORMATION

AUGUST 1978 - REVISED SEPTEMBER 2002  
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