

## NPN power Darlington transistor

Datasheet — production data

### Features

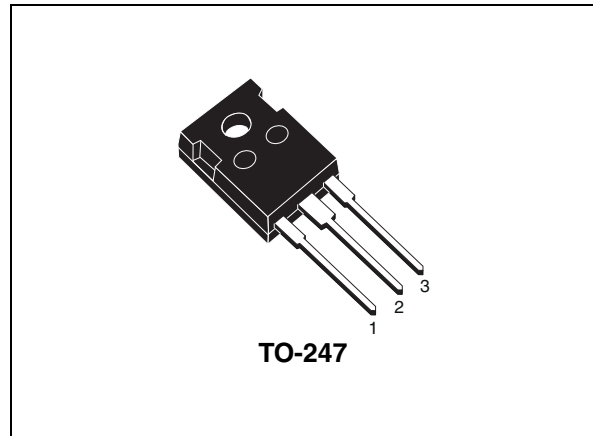
- High current capability
- Fast switching speed
- High DC current gain

### Applications

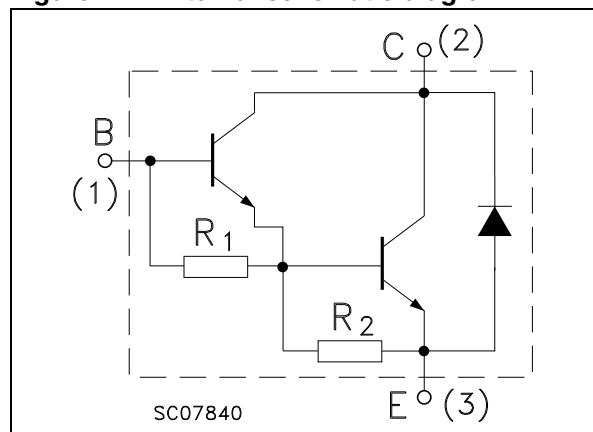
- Linear and switching industrial equipment

### Description

The BDW83C is an epitaxial-base NPN power monolithic Darlington transistor mounted in TO-247 plastic package. It is intended for use in power linear and switching applications.



**Figure 1. Internal schematic diagram**



**Table 1. Device summary**

| Order code | Marking | Package | Packaging |
|------------|---------|---------|-----------|
| BDW83C     | BDW83C  | TO-247  | Tube      |

# 1 Absolute maximum ratings

**Table 2. Absolute maximum ratings**

| Symbol    | Parameter                                                  | Value      | Unit               |
|-----------|------------------------------------------------------------|------------|--------------------|
| $V_{CBO}$ | Collector-base voltage ( $I_E = 0$ )                       | 100        | V                  |
| $V_{CEO}$ | Collector-emitter voltage ( $I_B = 0$ )                    | 100        | V                  |
| $V_{EBO}$ | Emitter-base voltage ( $I_C = 0$ )                         | 5          | V                  |
| $I_C$     | Collector current                                          | 15         | A                  |
| $I_{CM}$  | Collector peak current ( $t_p < 5ms$ )                     | 40         | A                  |
| $I_B$     | Base current                                               | 0.5        | A                  |
| $P_{TOT}$ | Total dissipation at $T_c \leq 25\text{ }^{\circ}\text{C}$ | 130        | W                  |
| $T_{stg}$ | Storage temperature                                        | -65 to 150 | $^{\circ}\text{C}$ |
| $T_J$     | Max. operating junction temperature                        | 150        | $^{\circ}\text{C}$ |

**Table 3. Thermal data**

| Symbol         | Parameter                            | Value | Unit                 |
|----------------|--------------------------------------|-------|----------------------|
| $R_{thj-case}$ | Thermal resistance junction-case max | 0.96  | $^{\circ}\text{C/W}$ |

## 2 Electrical characteristics

( $T_{\text{case}} = 25^{\circ}\text{C}$ ; unless otherwise specified)

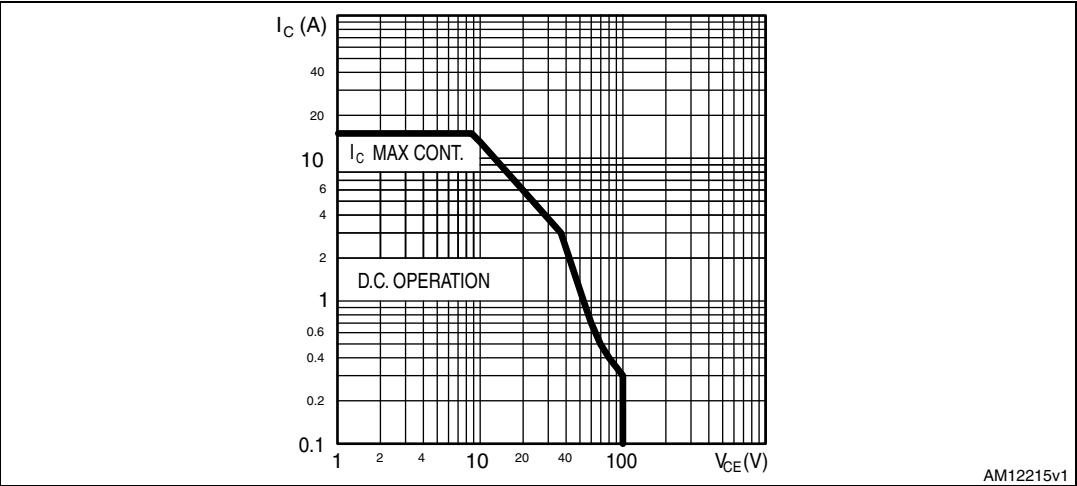
**Table 4. Electrical characteristics**

| Symbol                              | Parameter                                                         | Test conditions                                                                                                                      | Min.       | Typ.     | Max.     | Unit                           |
|-------------------------------------|-------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------|------------|----------|----------|--------------------------------|
| $I_{\text{CBO}}$                    | Collector cut-off current<br>( $I_{\text{E}} = 0$ )               | $V_{\text{CB}} = 100 \text{ V}$<br>$V_{\text{CB}} = 100 \text{ V} \quad T_{\text{C}} = 150^{\circ}\text{C}$                          |            |          | 500<br>5 | $\mu\text{A}$<br>$\text{mA}$   |
| $I_{\text{CEO}}$                    | Collector cut-off current<br>( $I_{\text{B}} = 0$ )               | $V_{\text{CE}} = 40 \text{ V}$                                                                                                       |            |          | 1        | $\text{mA}$                    |
| $I_{\text{EBO}}$                    | Emitter cut-off current<br>( $I_{\text{C}} = 0$ )                 | $V_{\text{EB}} = 5 \text{ V}$                                                                                                        |            |          | 2        | $\text{mA}$                    |
| $V_{\text{CEO(sus)}}^{(1)}$         | Collector-emitter<br>sustaining voltage<br>( $I_{\text{B}} = 0$ ) | $I_{\text{C}} = 30 \text{ mA}$                                                                                                       | 100        |          |          | $\text{V}$                     |
| $V_{\text{CE(sat)}}^{(1)}$          | Collector-emitter<br>saturation voltage                           | $I_{\text{C}} = 6 \text{ A} \quad I_{\text{B}} = 12 \text{ mA}$<br>$I_{\text{C}} = 15 \text{ A} \quad I_{\text{B}} = 150 \text{ mA}$ |            |          | 2.5<br>4 | $\text{V}$<br>$\text{V}$       |
| $V_{\text{BE(on)}}^{(1)}$           | Base-emitter on voltage                                           | $I_{\text{C}} = 6 \text{ A} \quad V_{\text{CE}} = 3 \text{ V}$                                                                       |            |          | 2.5      | $\text{V}$                     |
| $h_{\text{FE}}^{(1)}$               | DC current gain                                                   | $I_{\text{C}} = 6 \text{ A} \quad V_{\text{CE}} = 3 \text{ V}$<br>$I_{\text{C}} = 15 \text{ A} \quad V_{\text{CE}} = 3 \text{ V}$    | 750<br>100 |          | 20000    |                                |
| $V_{\text{F}}$                      | Diode forward voltage                                             | $I_{\text{F}} = 10 \text{ A}$                                                                                                        |            |          | 4        | $\text{V}$                     |
| $t_{\text{on}}$<br>$t_{\text{off}}$ | Resistive load<br>Turn-on time<br>Turn-off time                   | $V_{\text{CC}} = 30 \text{ V} \quad I_{\text{C}} = 10 \text{ A}$<br>$I_{\text{B1}} = -I_{\text{B2}} = 40 \text{ mA}$                 |            | 0.9<br>6 |          | $\mu\text{s}$<br>$\mu\text{s}$ |

1. Pulsed duration = 300  $\mu\text{s}$ , duty cycle  $\leq 1.5\%$ .

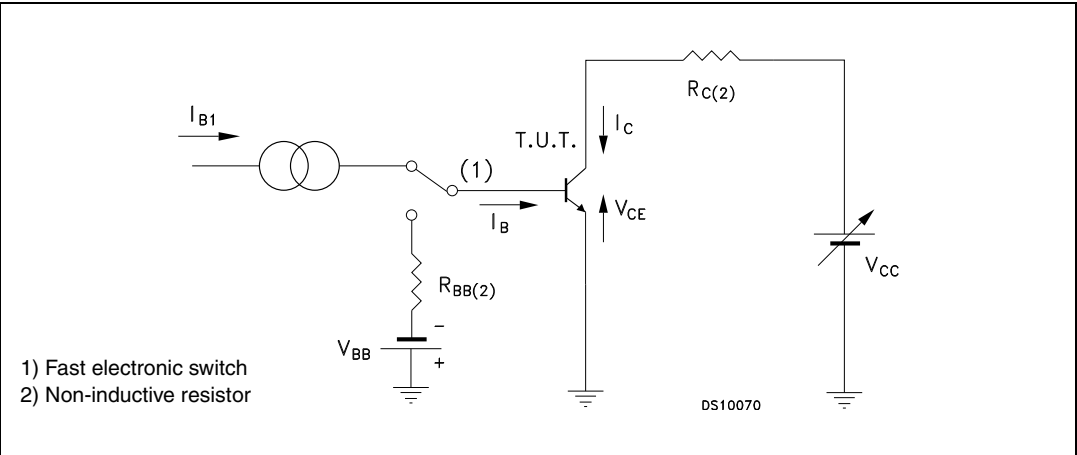
### 3 Electrical characteristics (curve)

Figure 2. Safe operating area



#### 3.1 Test circuit

Figure 3. Resistive load switching test circuit



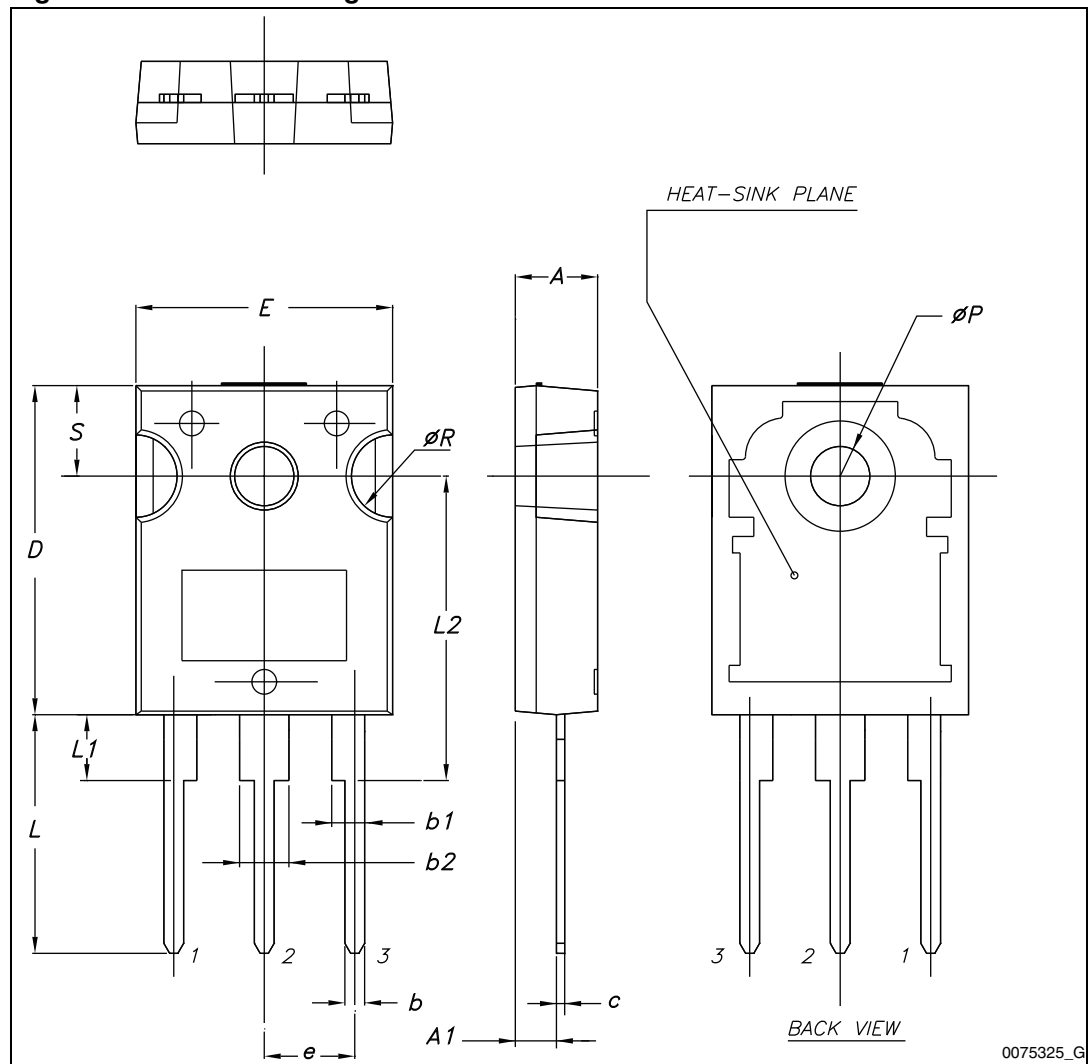
## 4 Package mechanical data

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Table 5. TO-247 mechanical data

| Dim. | mm.   |       |       |
|------|-------|-------|-------|
|      | Min.  | Typ.  | Max.  |
| A    | 4.85  |       | 5.15  |
| A1   | 2.20  |       | 2.60  |
| b    | 1.0   |       | 1.40  |
| b1   | 2.0   |       | 2.40  |
| b2   | 3.0   |       | 3.40  |
| c    | 0.40  |       | 0.80  |
| D    | 19.85 |       | 20.15 |
| E    | 15.45 |       | 15.75 |
| e    | 5.30  | 5.45  | 5.60  |
| L    | 14.20 |       | 14.80 |
| L1   | 3.70  |       | 4.30  |
| L2   |       | 18.50 |       |
| ØP   | 3.55  |       | 3.65  |
| ØR   | 4.50  |       | 5.50  |
| S    | 5.30  | 5.50  | 5.70  |

Figure 4. TO-247 drawing



## 5 Revision history

**Table 6. Document revision history**

| Date        | Revision | Changes                                                                              |
|-------------|----------|--------------------------------------------------------------------------------------|
| 02-Jan-2000 | 4        |                                                                                      |
| 16-Nov-2007 | 5        | Package change from TO-218 to TO-247.                                                |
| 02-May-2012 | 6        | – Added: <a href="#">Figure 2: Safe operating area</a><br>– Updated: mechanical data |



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