

## 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.

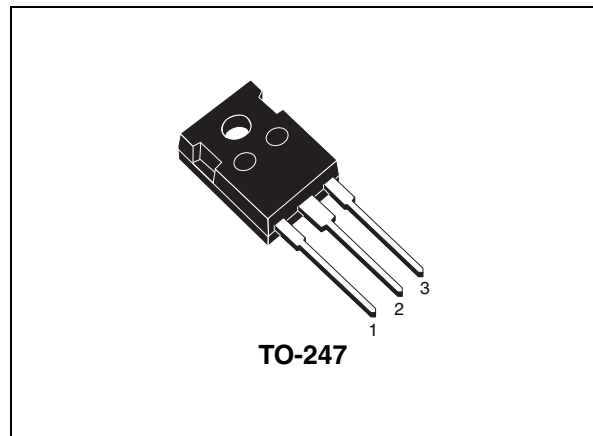


Figure 1. Internal schematic diagram

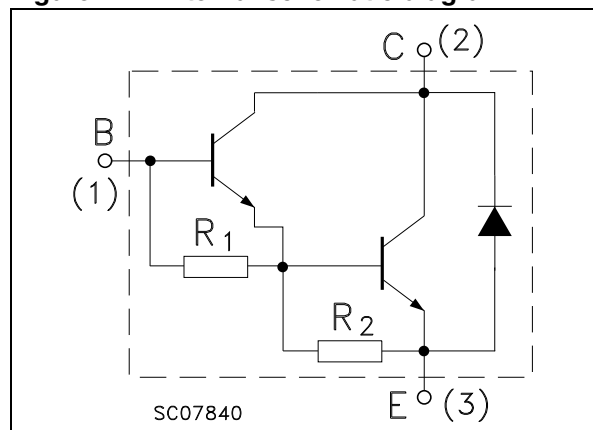


Table 1. Device summary

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 ( $t_p < 5\text{ms}$ )	40	A
$I_B$	Base current	0.5	A
$P_{TOT}$	Total dissipation at $T_C \leq 25\text{ °C}$	130	W
$T_{stg}$	Storage temperature	-65 to 150	°C
$T_J$	Max. operating junction temperature	150	°C

**Table 3. Thermal data**

Symbol	Parameter	Value	Unit
$R_{thj-case}$	Thermal resistance junction-case max	0.96	°C/W

## 2 Electrical characteristics

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

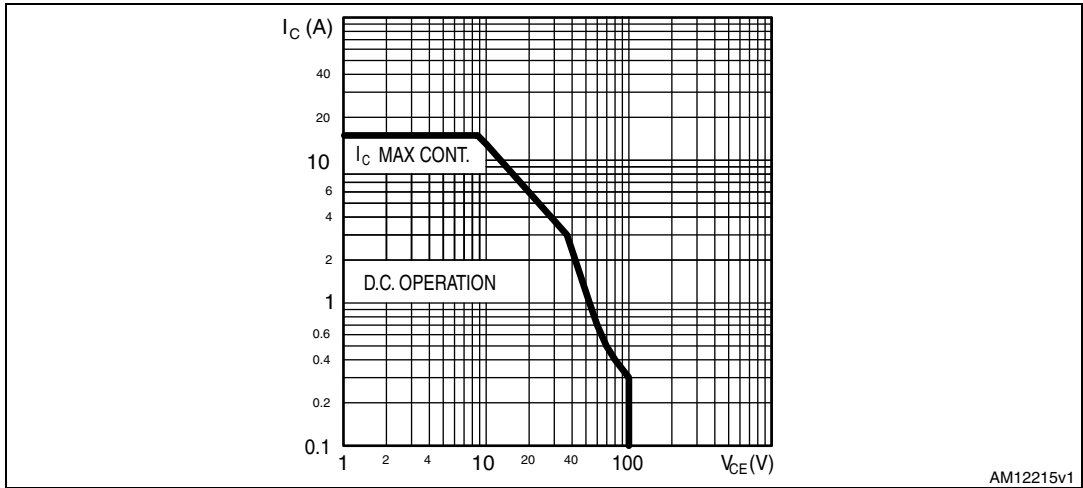
**Table 4. Electrical characteristics**

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

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

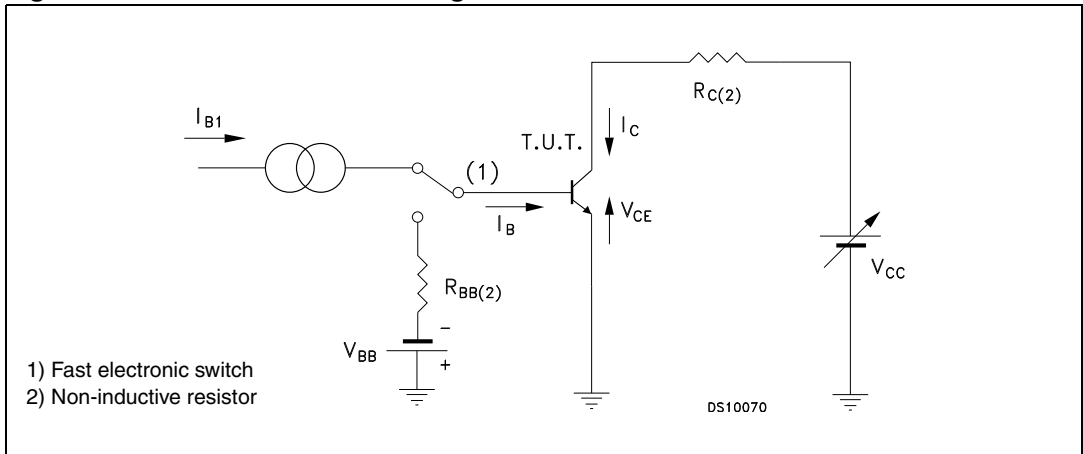
### 3 Electrical characteristics (curve)

Figure 2. Safe operating area



#### 3.1 Test circuit

Figure 3. Resistive load switching test circuit



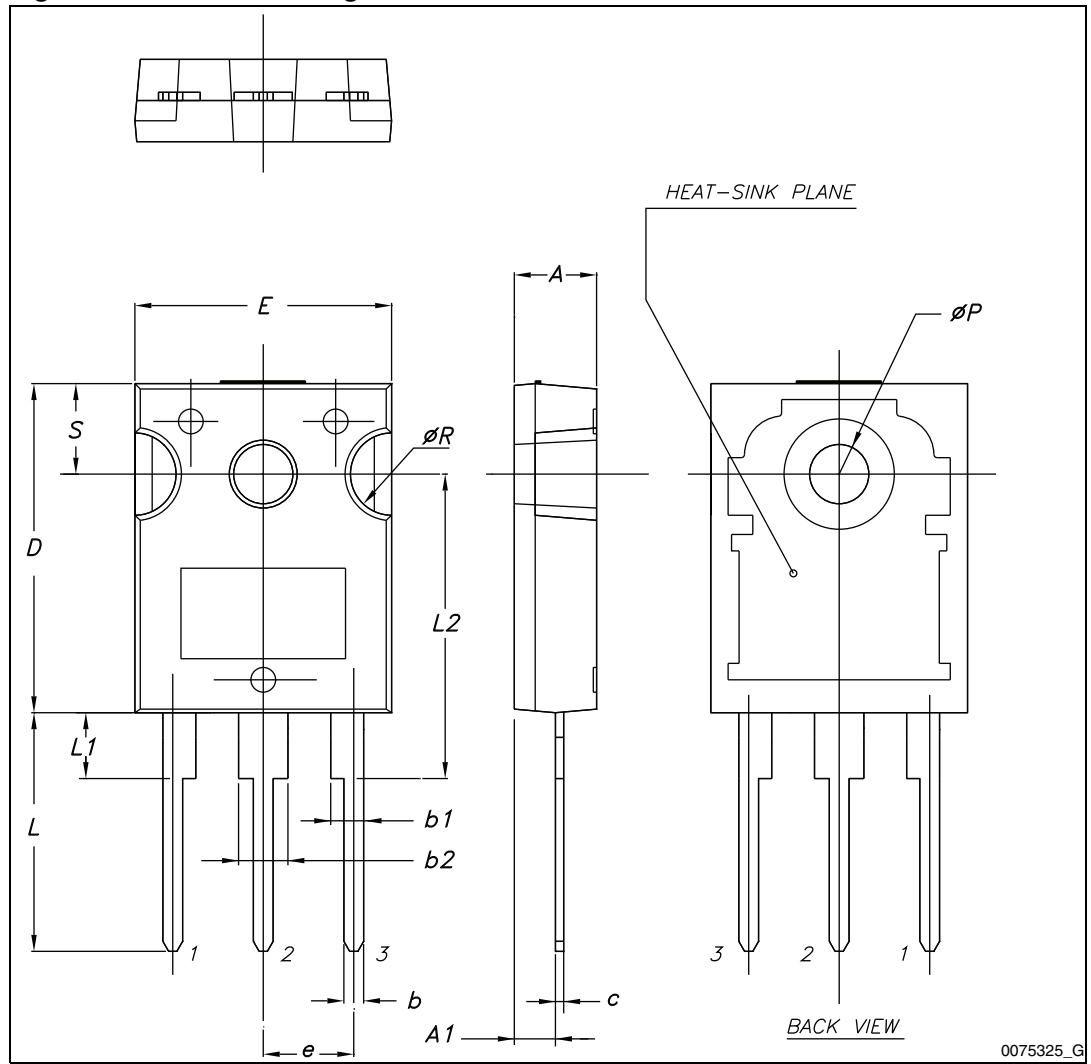
## 4 Package mechanical data

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK<sup>®</sup> packages, depending on their level of environmental compliance. ECOPACK<sup>®</sup> specifications, grade definitions and product status are available at: [www.st.com](http://www.st.com). ECOPACK<sup>®</sup> is an ST trademark.

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: <i>Figure 2: Safe operating area</i> – Updated: mechanical data



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