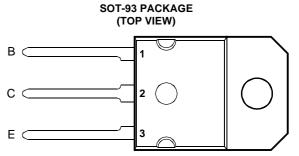
# **BOURNS®**

- Designed for Complementary Use with BDW84, BDW84A, BDW84B, BDW84C and BDW84D
- 125 W at 25°C Case Temperature
- 15 A Continuous Collector Current
- Minimum h<sub>FE</sub> of 750 at 3 V, 6 A

This model is currently available, but not recommended for new designs. For more information, see http://bourns.com/data/global/pdfs/TSP1203\_S0T93\_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	
	BDW83		45	
	BDW83A		60	
Collector-base voltage (I <sub>E</sub> = 0)	BDW83B	$V_{CBO}$	80	V
	BDW83C		100	
	BDW83D		120	
	BDW83		45	
Collector-emitter voltage (I <sub>B</sub> = 0) (see Note 1)	BDW83A		60	
	BDW83B	$V_{CEO}$	80	V
	BDW83C		100	
	BDW83D		120	
Emitter-base voltage		V <sub>EBO</sub>	5	V
Continuous collector current	I <sub>C</sub>	15	Α	
Continuous base current	I <sub>B</sub>	0.5	Α	
Continuous device dissipation at (or below) 25°C case temperature (see Note 2)	P <sub>tot</sub>	125	W	
Continuous device dissipation at (or below) 25°C free air temperature (see Note	P <sub>tot</sub>	3.5	W	
Unclamped inductive load energy (see Note 4)	½Ll <sub>C</sub> <sup>2</sup>	100	mJ	
Operating junction temperature range	Tj	-65 to +150	°C	
Operating temperature range	T <sub>stg</sub>	-65 to +150	°C	
Operating free-air temperature range	T <sub>A</sub>	-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 1 W/°C.
  - 3. Derate linearly to 150°C free air temperature at the rate of 28 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.



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

PARAMETER		TEST CONDITIONS				MIN	TYP	MAX	UNIT
V <sub>(BR)CEO</sub>	Collector-emitter breakdown voltage	I <sub>C</sub> = 30 mA	I <sub>B</sub> = 0	(see Note 5)	BDW83 BDW83A BDW83B BDW83C BDW83D	45 60 80 100 120			V
I <sub>CEO</sub>	Collector-emitter cut-off current	V <sub>CE</sub> = 60 V	$I_{B} = 0$		BDW83 BDW83A BDW83B BDW83C BDW83D			1 1 1 1	mA
Ісво	Collector cut-off current	$V_{CB} = 120 \text{ V}$ $V_{CB} = 45 \text{ V}$ $V_{CB} = 60 \text{ V}$ $V_{CB} = 80 \text{ V}$ $V_{CB} = 100 \text{ V}$	E = 0   E = 0	$T_{C} = 150^{\circ}\text{C}$	BDW83 BDW83A BDW83B BDW83C BDW83D BDW83 BDW83A BDW83A BDW83B BDW83C BDW83D			0.5 0.5 0.5 0.5 0.5 5 5 5	mA
I <sub>EBO</sub>	Emitter cut-off current	V <sub>EB</sub> = 5 V	I <sub>C</sub> = 0					2	mA
h <sub>FE</sub>	Forward current transfer ratio	$V_{CE} = 3 V$ $V_{CE} = 3 V$	$I_{C} = 6 A$ $I_{C} = 15 A$	(see Notes 5 and 6)		750 100		20000	
V <sub>BE(on)</sub>	Base-emitter voltage	V <sub>CE</sub> = 3 V	I <sub>C</sub> = 6 A	(see Notes 5 and 6)				2.5	V
V <sub>CE(sat)</sub>	Collector-emitter saturation voltage		$I_C = 6 A$ $I_C = 15 A$	(see Notes 5 and 6)				2.5 4	V
V <sub>EC</sub>	Parallel diode forward voltage	I <sub>E</sub> = 15 A	I <sub>B</sub> = 0					3.5	V

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			35.7	°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> = 10 A	$I_{B(on)} = 40 \text{ mA}$	$I_{B(off)} = -40 \text{ mA}$		0.9		μs
t <sub>off</sub>	Turn-off time	$V_{BF(off)} = -4.2 \text{ V}$	$R_1 = 3 \Omega$	$t_{\rm p} = 20 \; \mu \rm s, \; dc \leq 2\%$		7		μs

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

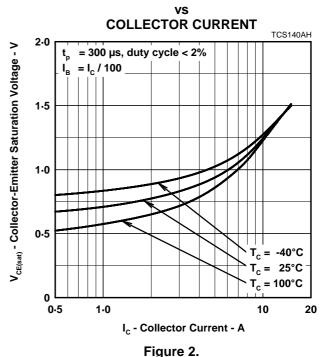
<sup>6.</sup> These parameters must be measured using voltage-sensing contacts, separate from the current carrying contacts.

#### TYPICAL CHARACTERISTICS

# **TYPICAL DC CURRENT GAIN COLLECTOR CURRENT** TCS140AG 70000 $T_c = -40^{\circ}C$ 25°C T<sub>c</sub> = 100°C h<sub>FE</sub> - Typical DC Current Gain 10000 1000 3 V = = 300 µs, duty cycle < 2% 100 20 1.0 0.5 I<sub>c</sub> - Collector Current - A

Figure 1.

#### **COLLECTOR-EMITTER SATURATION VOLTAGE**



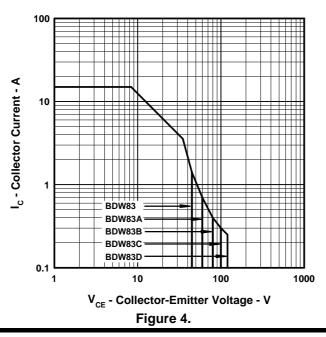
### **BASE-EMITTER SATURATION VOLTAGE** vs **COLLECTOR CURRENT** TCS140AI 3-0 $T_c = -40$ °C V<sub>BE(sat)</sub> - Base-Emitter Saturation Voltage - V T<sub>c</sub> = 25°C 2.5 $T_{c} = 100^{\circ}C$ 2.0 1.5 1.0 0.5 $= I_c / 100$ = 300 µs, duty cycle < 2% O 0.5 1.0 10 20 $\rm I_{\rm C}$ - Collector Current - A

Figure 3.

PRODUCT INFORMATION

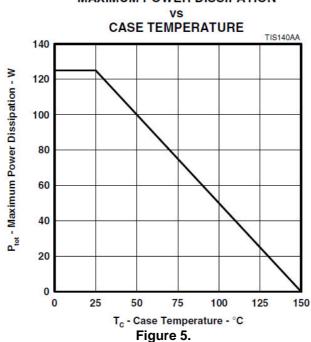
#### **MAXIMUM SAFE OPERATING REGIONS**

# MAXIMUM FORWARD-BIAS SAFE OPERATING AREA



#### THERMAL INFORMATION

#### **MAXIMUM POWER DISSIPATION**



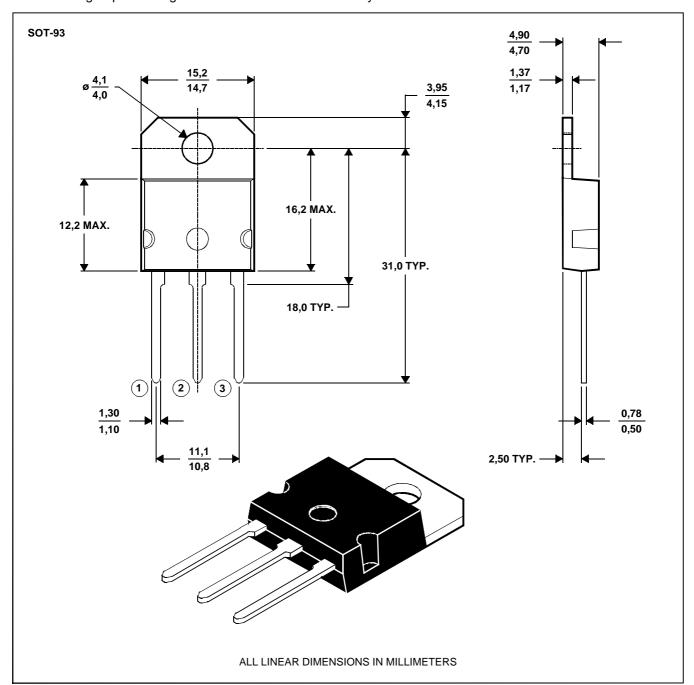
### PRODUCT INFORMATION

#### **MECHANICAL DATA**

#### **SOT-93**

#### 3-pin plastic flange-mount package

This single-in-line package consists of a circuit mounted on a lead frame and encapsulated within a plastic compound. The compound will withstand soldering temperature with no deformation, and circuit performance characteristics will remain stable when operated in high humidity conditions. Leads require no additional cleaning or processing when used in soldered assembly.



NOTE A: The centre pin is in electrical contact with the mounting tab.

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