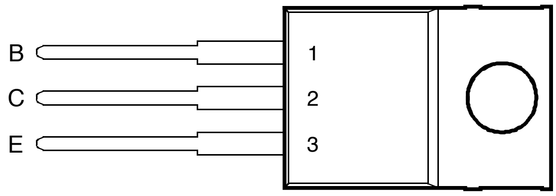
BOURNS®

- **RoHS compliant***
- **Designed for Complementary Use with BD646, BD648, BD650 and BD652**
- **62.5 W at 25°C Case Temperature**
- **8 A Continuous Collector Current**
- **Minimum h_{FE} of 750 at 3V, 3 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)	BD645	V_{CBO}	80	V
	BD647		100	
	BD649		120	
	BD651		140	
Collector-emitter voltage (I_B = 0)	BD645	V_{CEO}	60	V
	BD647		80	
	BD649		100	
	BD651		120	
Emitter-base voltage		V_{EBO}	5	V
Continuous collector current		I_C	8	A
Peak collector current (see Note 1)		I_{CM}	12	A
Continuous base current		I_B	0.3	A
Continuous device dissipation at (or below) 25°C case temperature (see Note 2)		P_{tot}	62.5	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
Storage temperature range		T_{stg}	-65 to +150	°C
Lead temperature 3.2 mm from case for 10 seconds		T_L	260	°C

NOTES: 1. This value applies for $t_p \leq 0.3$ ms, duty cycle ≤ 10%.
2. Derate linearly to 150°C case temperature at the rate of 0.4 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.

How to Order

Device	Package	Carrier	Order As
BDxxx	TO-220	Tube	BDxxx-S

Insert xxx transistor type number 645, 647, 649, etc.

*RoHS Directive 2002/95/EC Jan. 27, 2003 including annex and RoHS Recast 2011/65/EU June 8, 2011.
Specifications are subject to change without notice.
The device characteristics and parameters in this data sheet can and do vary in different applications and actual device performance may vary over time.
Users should verify actual device performance in their specific applications.

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)	BD645	60			V
					BD647	80			
					BD649	100			
					BD651	120			
I_{CEO}	Collector-emitter cut-off current	V_{CE} = 30 V	I_B = 0		BD645			0.5	mA
		V_{CE} = 40 V	I_B = 0		BD647			0.5	
		V_{CE} = 50 V	I_B = 0		BD649			0.5	
		V_{CE} = 60 V	I_B = 0		BD651			0.5	
I_{CBO}	Collector cut-off current	V_{CB} = 60 V	I_E = 0		BD645			0.2	mA
		V_{CB} = 80 V	I_E = 0		BD647			0.2	
		V_{CB} = 100 V	I_E = 0		BD649			0.2	
		V_{CB} = 120 V	I_E = 0		BD651			0.2	
		V_{CB} = 40 V	I_E = 0	T_C = 150°C	BD645			2.0	
		V_{CB} = 50 V	I_E = 0	T_C = 150°C	BD647			2.0	
		V_{CB} = 60 V	I_E = 0	T_C = 150°C	BD649			2.0	
		V_{CB} = 70 V	I_E = 0	T_C = 150°C	BD651			2.0	
I_{EBO}	Emitter cut-off current	V_{EB} = 5 V	I_C = 0	(see Notes 5 and 6)				5	mA
h_{FE}	Forward current transfer ratio	V_{CE} = 3 V	I_C = 3 A	(see Notes 5 and 6)		750			
$V_{CE(sat)}$	Collector-emitter saturation voltage	I_B = 12 mA	I_C = 3 A	(see Notes 5 and 6)				2	V
		I_B = 50 mA	I_C = 5 A					2.5	
$V_{BE(sat)}$	Base-emitter saturation voltage	I_B = 50 mA	I_C = 5 A	(see Notes 5 and 6)				3	V
$V_{BE(on)}$	Base-emitter voltage	V_{CE} = 3 V	I_C = 3 A	(see Notes 5 and 6)				2.5	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			2.0	°C/W
$R_{\theta JA}$	Junction to free air thermal resistance			62.5	°C/W

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TYPICAL CHARACTERISTICS

TYPICAL DC CURRENT GAIN vs COLLECTOR CURRENT

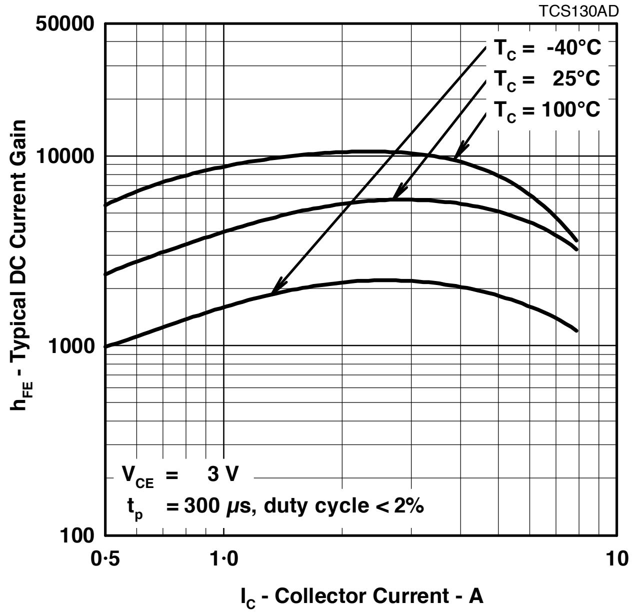

Figure 1.

COLLECTOR-EMITTER SATURATION VOLTAGE vs COLLECTOR CURRENT

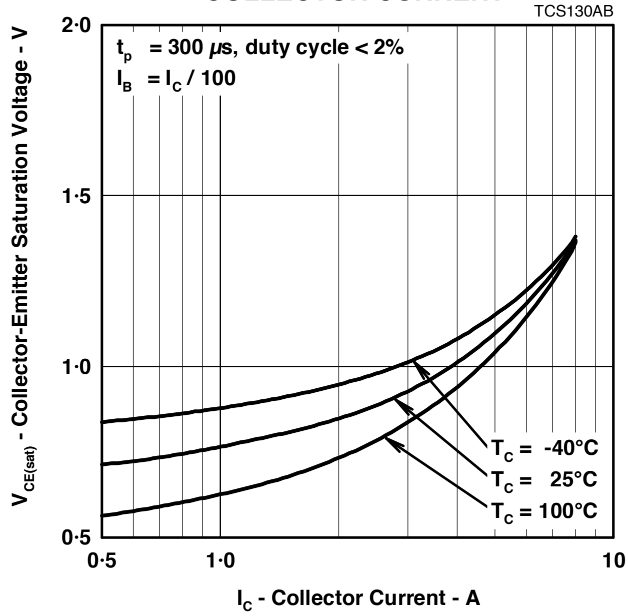

Figure 2.

BASE-EMITTER SATURATION VOLTAGE vs COLLECTOR CURRENT

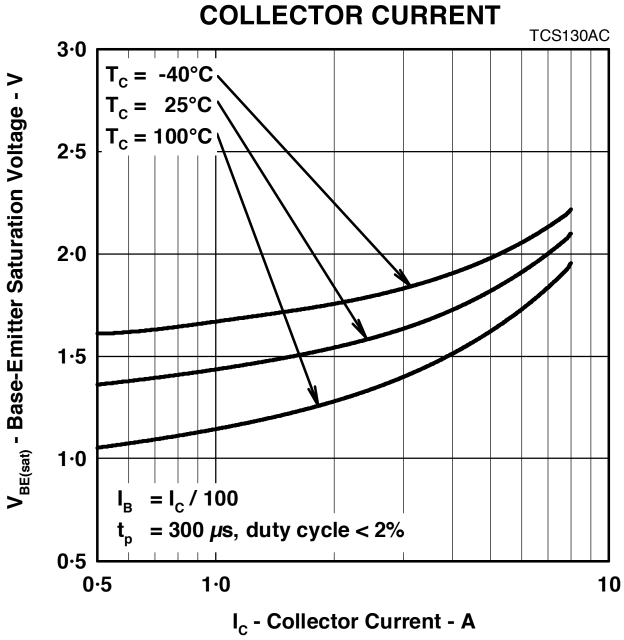

Figure 3.

MAXIMUM SAFE OPERATING REGIONS

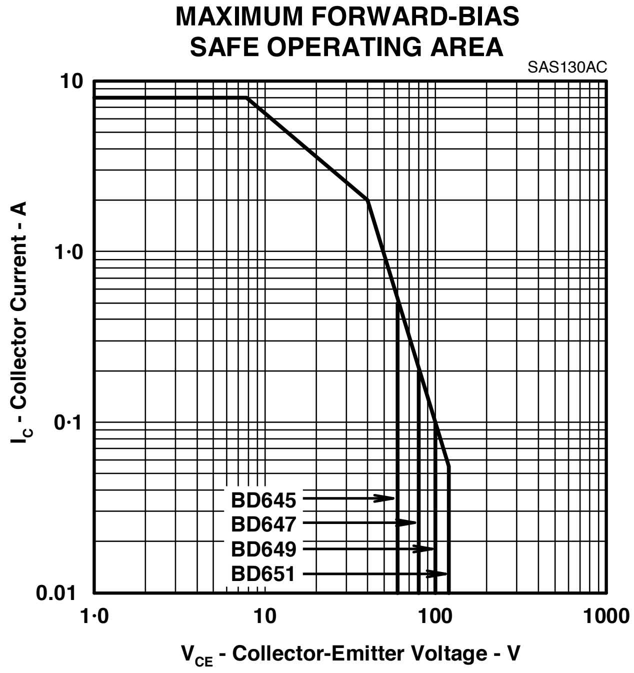

Figure 4.

THERMAL INFORMATION

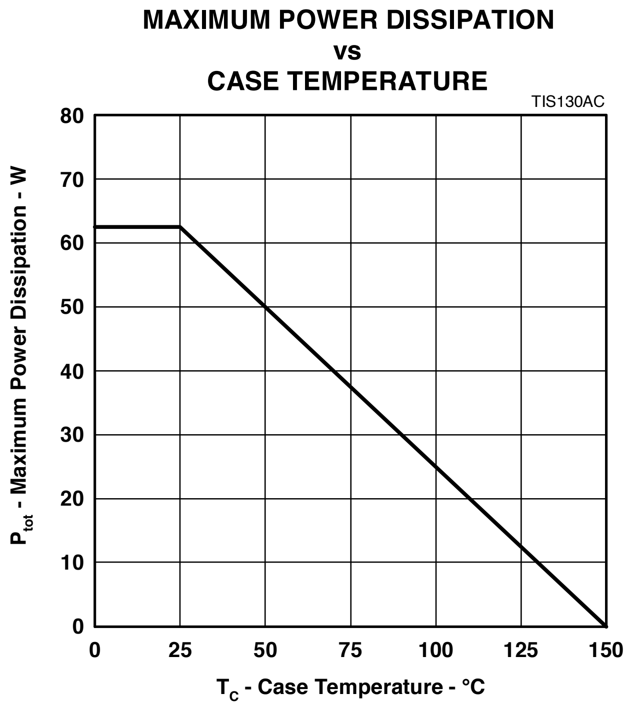

Figure 5.

Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

Bourns:

BD651 BD649 BD645 BD647 BD645-S BD647-S BD649-S BD651-S