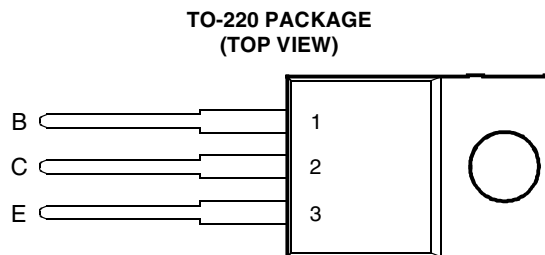


- Designed for Complementary Use with the BD540 Series
- 45 W at 25°C Case Temperature
- 5 A Continuous Collector Current
- Up to 120 V  $V_{CEO}$  rating



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	BD539	$V_{CBO}$	40	V
	BD539A		60	
	BD539B		80	
	BD539C		100	
	BD539D		120	
Collector-emitter voltage (see Note 1)	BD539	$V_{CEO}$	40	V
	BD539A		60	
	BD539B		80	
	BD539C		100	
	BD539D		120	
Emitter-base voltage		$V_{EBO}$	5	V
Continuous collector current		$I_C$	5	A
Continuous device dissipation at (or below) 25°C case temperature (see Note 2)		$P_{tot}$	45	W
Continuous device dissipation at (or below) 25°C free air temperature (see Note 3)		$P_{tot}$	2	W
Operating free air temperature range		$T_A$	-65 to +150	°C
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. These values apply when the base-emitter diode is open circuited.  
 2. Derate linearly to 150°C case temperature at the rate of 0.36 W/°C.  
 3. Derate linearly to 150°C free air temperature at the rate of 16 mW/°C.

**PRODUCT INFORMATION**

**electrical characteristics at 25°C case temperature**

PARAMETER	TEST CONDITIONS			MIN	TYP	MAX	UNIT		
$V_{(BR)CEO}$ Collector-emitter breakdown voltage	$I_C = 30 \text{ mA}$ $I_B = 0$ (see Note 4)		BD539	40			V		
			BD539A	60					
			BD539B	80					
			BD539C	100					
			BD539D	120					
$I_{CES}$ Collector-emitter cut-off current	$V_{CE} = 40 \text{ V}$ $V_{CE} = 60 \text{ V}$ $V_{CE} = 80 \text{ V}$ $V_{CE} = 100 \text{ V}$ $V_{CE} = 120 \text{ V}$	$V_{BE} = 0$ $V_{BE} = 0$ $V_{BE} = 0$ $V_{BE} = 0$ $V_{BE} = 0$	BD539			0.2	mA		
			BD539A			0.2			
			BD539B			0.2			
			BD539C			0.2			
			BD539D			0.2			
$I_{CEO}$ Collector cut-off current	$V_{CE} = 30 \text{ V}$ $V_{CE} = 60 \text{ V}$ $V_{CE} = 90 \text{ V}$	$I_B = 0$ $I_B = 0$ $I_B = 0$	BD539/539A			0.3	mA		
			BD539B/539C			0.3			
			BD539D			0.3			
$I_{EBO}$ Emitter cut-off current	$V_{EB} = 5 \text{ V}$	$I_C = 0$				1	mA		
$h_{FE}$ Forward current transfer ratio	$V_{CE} = 4 \text{ V}$ $V_{CE} = 4 \text{ V}$ $V_{CE} = 4 \text{ V}$	$I_C = 0.5 \text{ A}$ $I_C = 1 \text{ A}$ $I_C = 3 \text{ A}$		40					
								(see Notes 4 and 5)	30
									12
$V_{CE(sat)}$ Collector-emitter saturation voltage	$I_B = 125 \text{ mA}$ $I_B = 375 \text{ mA}$ $I_B = 1 \text{ A}$	$I_C = 1 \text{ A}$ $I_C = 3 \text{ A}$ $I_C = 5 \text{ A}$				0.25	V		
						(see Notes 4 and 5)		0.8	
								1.5	
$V_{BE(on)}$ Base-emitter voltage	$V_{CE} = 4 \text{ V}$	$I_C = 3 \text{ A}$	(see Notes 4 and 5)			1.25	V		
$h_{fe}$ Small signal forward current transfer ratio	$V_{CE} = 10 \text{ V}$	$I_C = 0.5 \text{ A}$	$f = 1 \text{ kHz}$	20					
$ h_{fe} $ Small signal forward current transfer ratio	$V_{CE} = 10 \text{ V}$	$I_C = 0.5 \text{ A}$	$f = 1 \text{ MHz}$	3					

NOTES: 4. These parameters must be measured using pulse techniques,  $t_p = 300 \mu\text{s}$ , duty cycle  $\leq 2\%$ .

5. These parameters must be measured using voltage-sensing contacts, separate from the current carrying contacts.

**thermal characteristics**

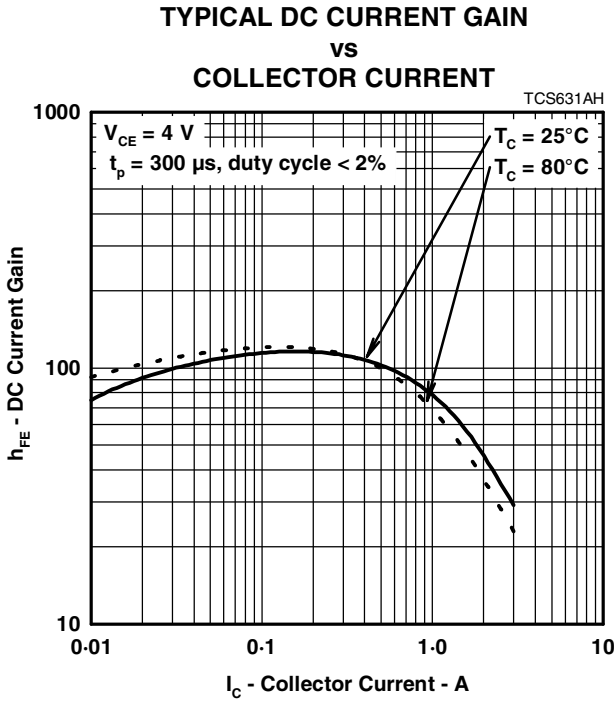
PARAMETER	MIN	TYP	MAX	UNIT
$R_{\theta JC}$ Junction to case thermal resistance			2.78	°C/W
$R_{\theta JA}$ Junction to free air thermal resistance			62.5	°C/W

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

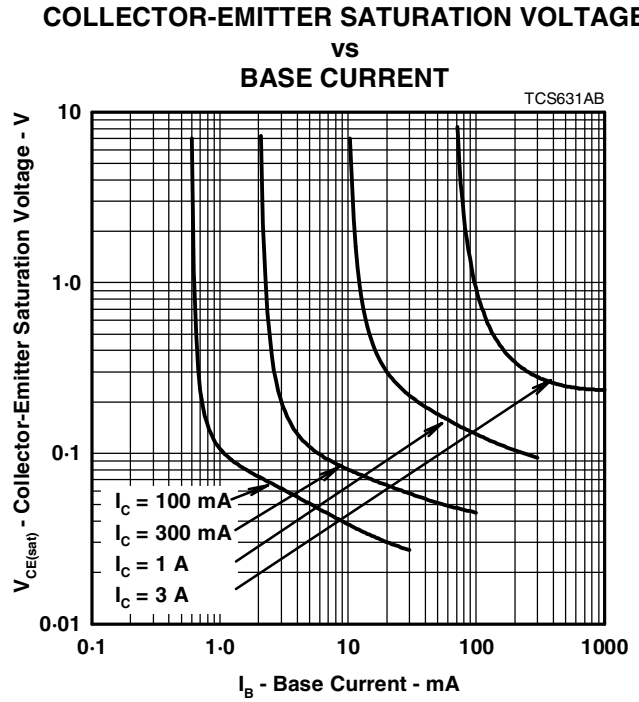
PARAMETER	TEST CONDITIONS †			MIN	TYP	MAX	UNIT
$t_{on}$ Turn-on time	$I_C = 1 \text{ A}$ $V_{BE(off)} = -4.3 \text{ V}$	$I_{B(on)} = 0.1 \text{ A}$ $R_L = 30 \Omega$	$I_{B(off)} = -0.1 \text{ A}$ $t_p = 20 \mu\text{s}$ , $dc \leq 2\%$		0.5		$\mu\text{s}$
$t_{off}$ Turn-off time					2		$\mu\text{s}$

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

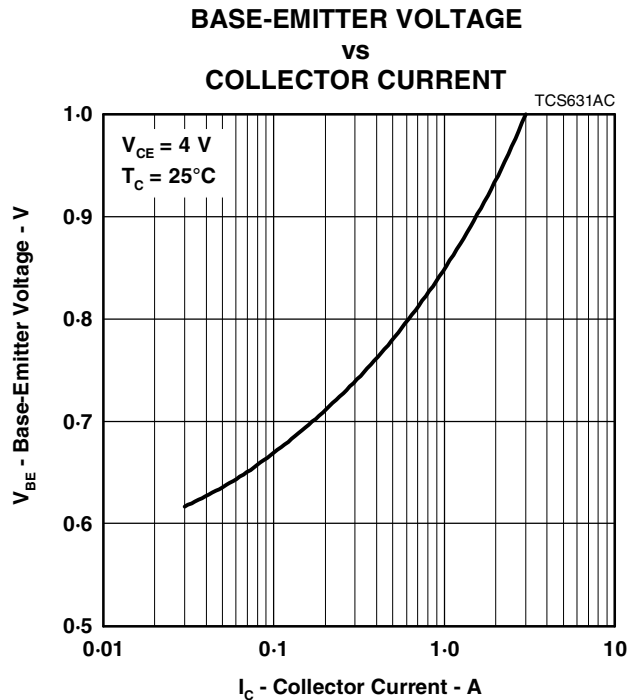
**TYPICAL CHARACTERISTICS**



**Figure 1.**



**Figure 2.**



**Figure 3.**

**PRODUCT INFORMATION**

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**MAXIMUM SAFE OPERATING REGIONS**

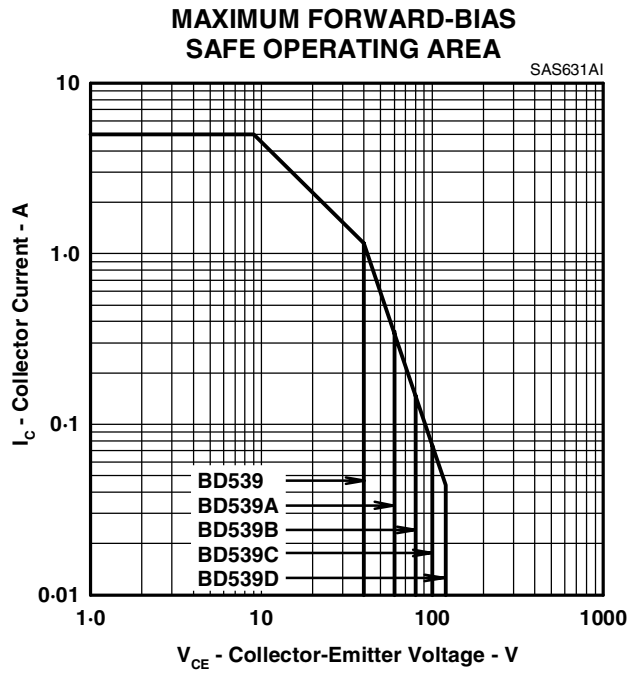


Figure 4.

**THERMAL INFORMATION**

**MAXIMUM POWER DISSIPATION  
vs  
CASE TEMPERATURE**

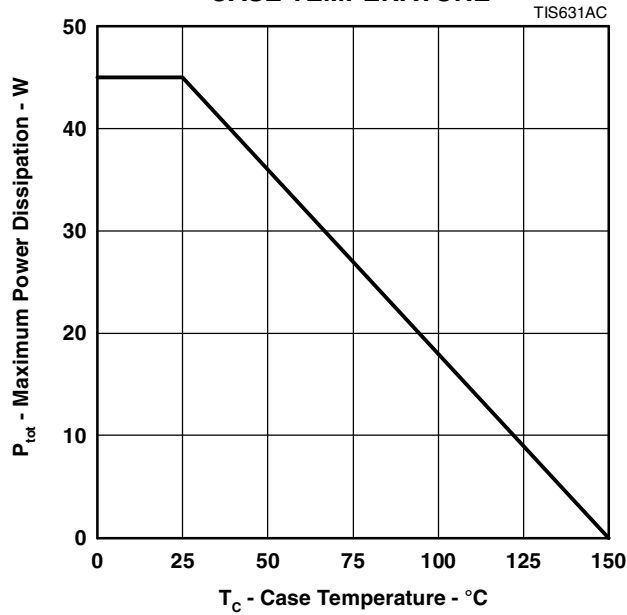


Figure 5.

**PRODUCT INFORMATION**

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