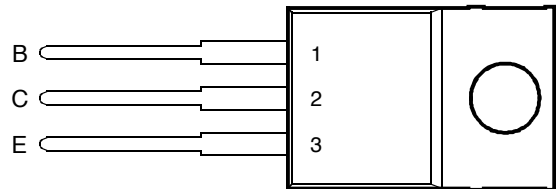


BD539, BD539A, BD539B, BD539C, BD539D NPN SILICON POWER TRANSISTORS

BOURNS®


- 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

TO-220 PACKAGE
(TOP VIEW)



Pin 2 is in electrical contact with the mounting base.

MDTRACA

 This series is obsolete and not recommended for new designs.

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

JUNE 1973 - REVISED SEPTEMBER 2002
 Specifications are subject to change without notice.

electrical characteristics at 25°C case temperature

PARAMETER	TEST CONDITIONS			MIN	TYP	MAX	UNIT
$V_{(BR)CEO}$ Collector-emitter breakdown voltage	$I_C = 30 \text{ mA}$ (see Note 4)	$I_B = 0$	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	$I_C = 1 \text{ A}$	$I_{B(on)} = 0.1 \text{ A}$	$I_{B(off)} = -0.1 \text{ A}$		0.5		μs
t_{off} Turn-off time				$V_{BE(off)} = -4.3 \text{ V}$	$R_L = 30 \Omega$	$t_p = 20 \mu\text{s}$, dc $\leq 2\%$	2

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

TYPICAL CHARACTERISTICS

TYPICAL DC CURRENT GAIN
VS
COLLECTOR CURRENT

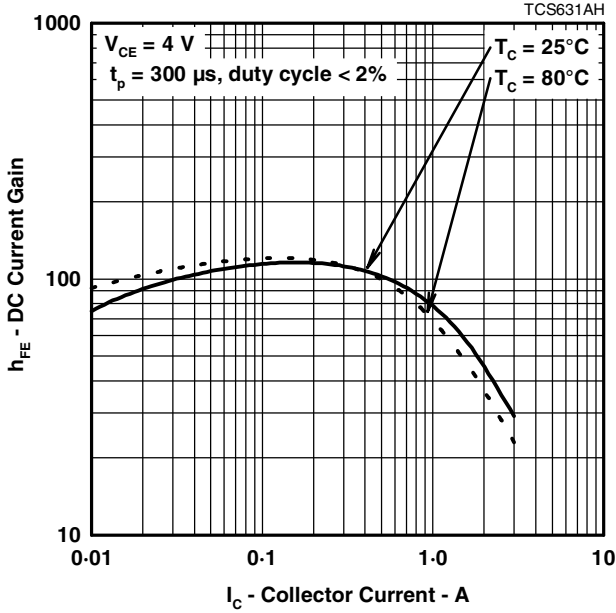


Figure 1.

COLLECTOR-EMITTER SATURATION VOLTAGE
VS
BASE CURRENT

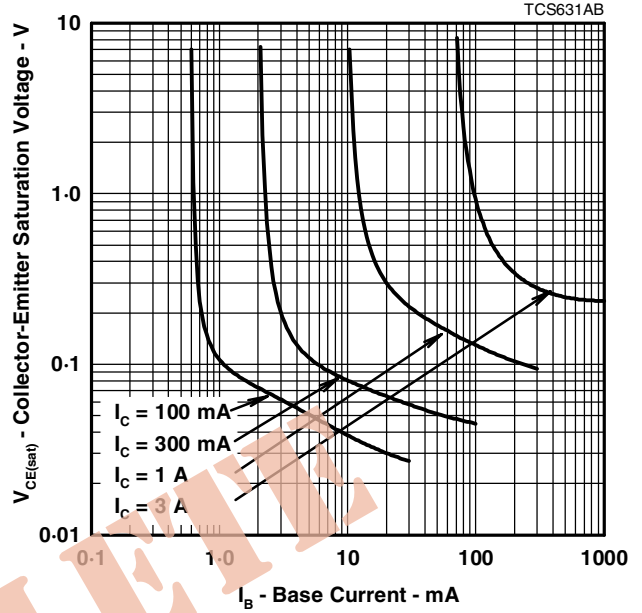


Figure 2.

BASE-EMITTER VOLTAGE
VS
COLLECTOR CURRENT

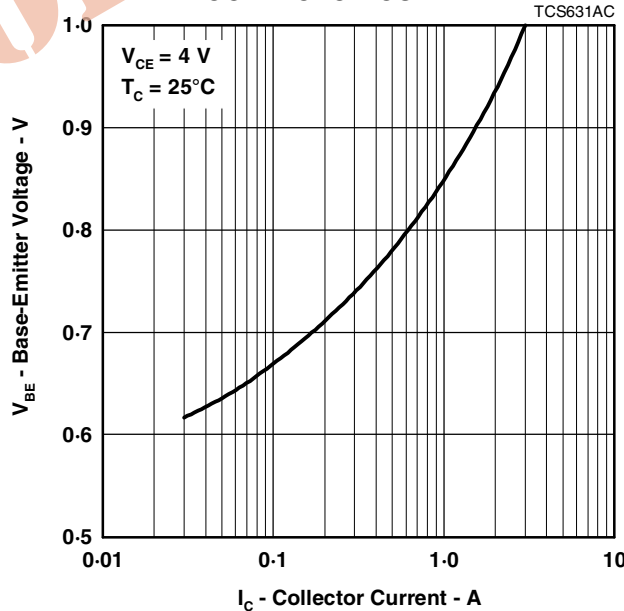


Figure 3.

PRODUCT INFORMATION

MAXIMUM SAFE OPERATING REGIONS

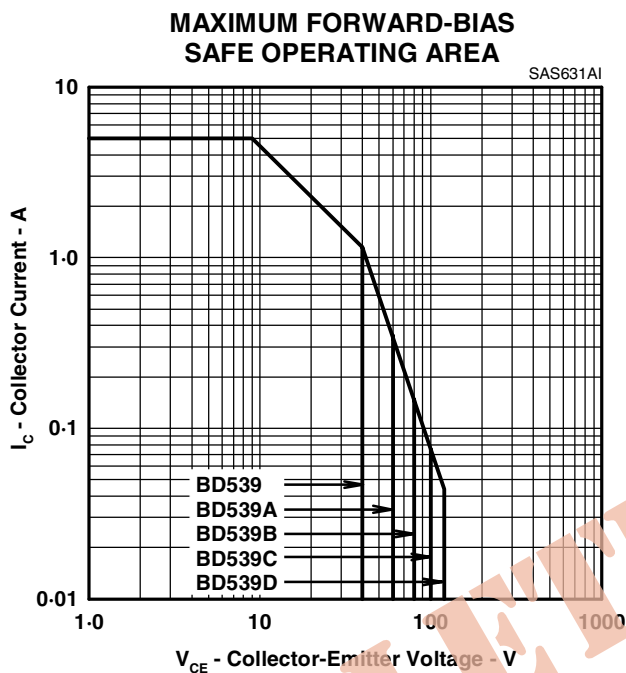


Figure 4.

THERMAL INFORMATION

**MAXIMUM POWER DISSIPATION
vs
CASE TEMPERATURE**

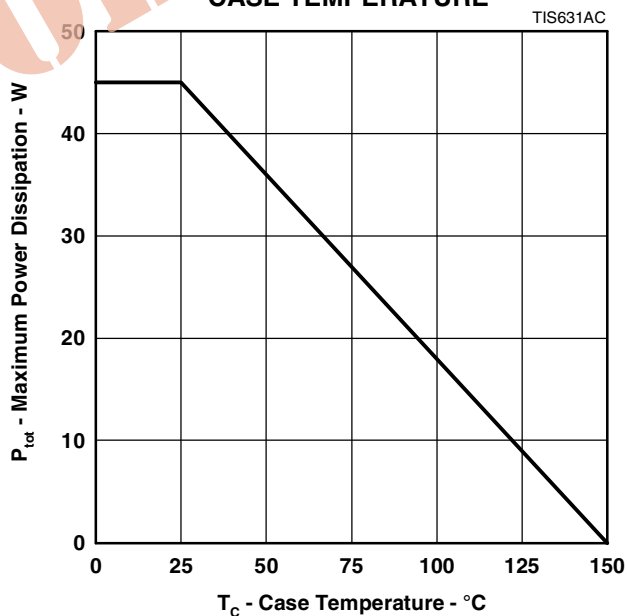


Figure 5.

PRODUCT INFORMATION