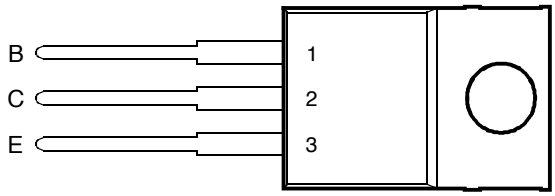
- **Designed for Complementary Use with the BD240 Series**
- **30 W at 25°C Case Temperature**
- **2 A Continuous Collector Current**
- **4 A Peak Collector Current**
- **Customer-Specified Selections Available**

This series is l _pl ibdp □ ^ka □ kl q recommended for new designs.

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-emitter voltage (R_{BE} = 100 Ω)	BD239	V_{CER}	55	V
	BD239A		70	
	BD239B		90	
	BD239C		115	
Collector-emitter voltage (I_C = 30 mA)	BD239	V_{CEO}	45	V
	BD239A		60	
	BD239B		80	
	BD239C		100	
Emitter-base voltage		V_{EBO}	5	V
Continuous collector current		I_C	2	A
Peak collector current (see Note 1)		I_{CM}	4	A
Continuous base current		I_B	0.6	A
Continuous device dissipation at (or below) 25°C case temperature (see Note 2)		P_{tot}	30	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_{C2}	32	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	250	°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 0.24 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, $I_{B(on)}$ = 0.4 A, R_{BE} = 100 Ω, $V_{BE(off)}$ = 0, R_S = 0.1 Ω, V_{CC} = 20 V.

electrical characteristics at 25°C case temperature

PARAMETER		TEST CONDITIONS			MIN	TYP	MAX	UNIT
$V_{(BR)CEO}$	Collector-emitter breakdown voltage	I_C = 30 mA (see Note 5)	I_B = 0	BD239	45			V
				BD239A	60			
				BD239B	80			
				BD239C	100			
I_{CES}	Collector-emitter cut-off current	V_{CE} = 55 V	V_{BE} = 0	BD239			0.2	mA
		V_{CE} = 70 V	V_{BE} = 0	BD239A			0.2	
		V_{CE} = 90 V	V_{BE} = 0	BD239B			0.2	
		V_{CE} = 115 V	V_{BE} = 0	BD239C			0.2	
I_{CEO}	Collector cut-off current	V_{CE} = 30 V	I_B = 0	BD239/239A			0.3	mA
		V_{CE} = 60 V	I_B = 0	BD239B/239C			0.3	
I_{EBO}	Emitter cut-off current	V_{EB} = 5 V	I_C = 0				1	µA
h_{FE}	Forward current transfer ratio	V_{CE} = 4 V	I_C = 0.2 A	(see Notes 5 and 6)	40			
		V_{CE} = 4 V	I_C = 1 A		15			
$V_{CE(sat)}$	Collector-emitter saturation voltage	I_B = 0.2 A	I_C = 1 A	(see Notes 5 and 6)			0.7	V
V_{BE}	Base-emitter voltage	V_{CE} = 4 V	I_C = 1 A	(see Notes 5 and 6)			1.3	V
h_{fe}	Small signal forward current transfer ratio	V_{CE} = 10 V	I_C = 0.2 A	f = 1 kHz	20			
$\|h_{fe}\|$	Small signal forward current transfer ratio	V_{CE} = 10 V	I_C = 0.2 A	f = 1 MHz	3			

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			4.17	°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 = 200 mA	$I_{B(on)}$ = 20 mA	$I_{B(off)}$ = -20 mA		0.3		µs
t_{off}	Turn-off time	$V_{BE(off)}$ = -3.4 V	R_L = 150 Ω	t_p = 20 µs, dc ≤ 2%		0.8		µs

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

TYPICAL CHARACTERISTICS

TYPICAL DC CURRENT GAIN vs COLLECTOR CURRENT

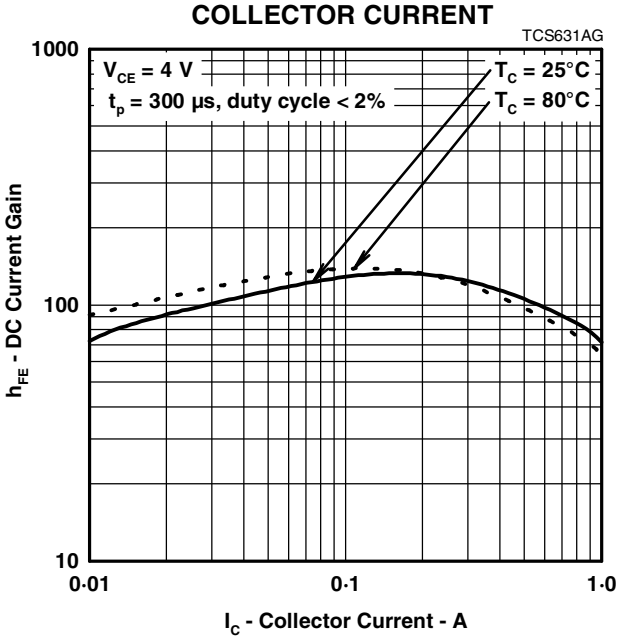


Figure 1.

COLLECTOR-EMITTER SATURATION VOLTAGE vs BASE CURRENT

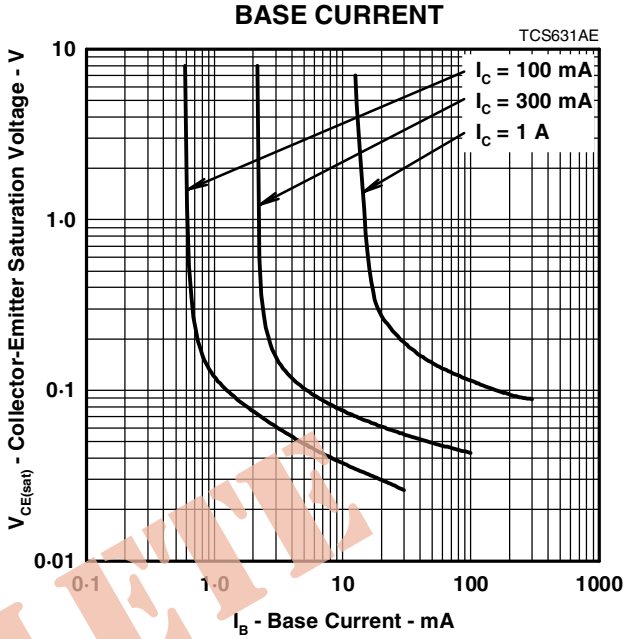


Figure 2.

BASE-EMITTER VOLTAGE vs COLLECTOR CURRENT

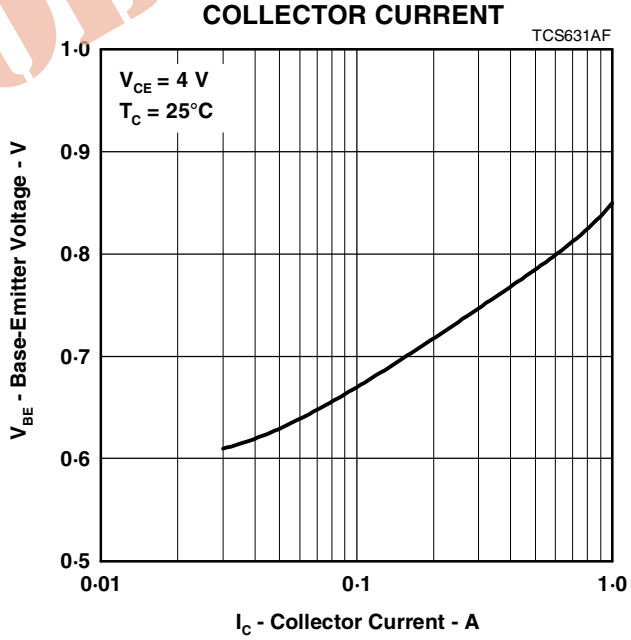


Figure 3.

MAXIMUM SAFE OPERATING REGIONS

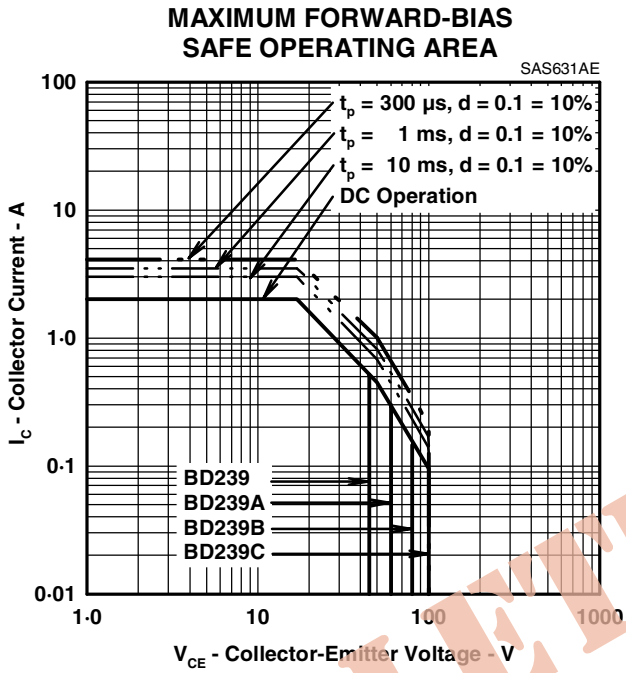


Figure 4.

THERMAL INFORMATION

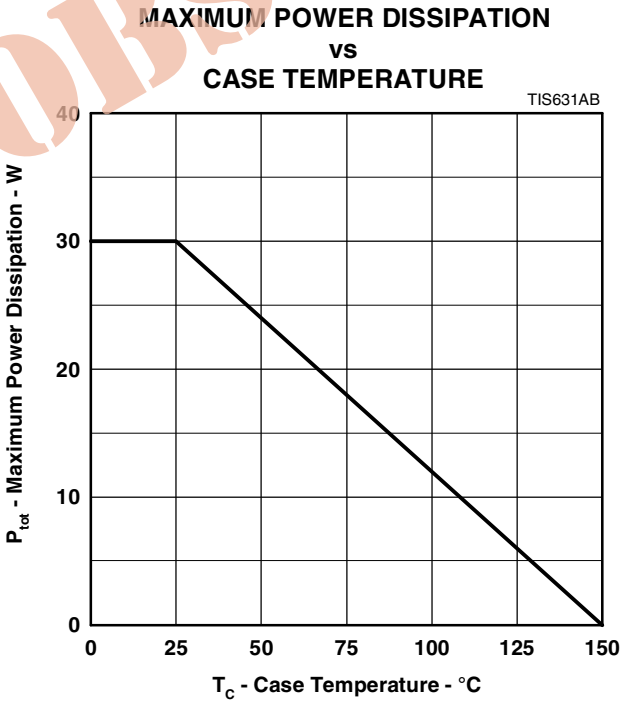


Figure 5.