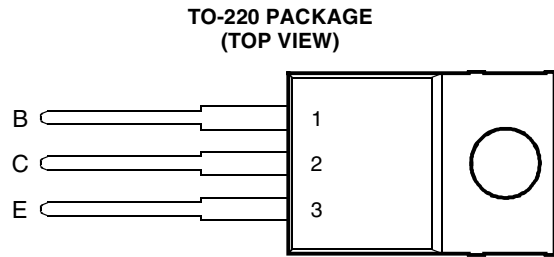**BOURNS**®

- **Designed for Complementary Use with the BD242 Series**

- **40 W at 25°C Case Temperature**

- **3 A Continuous Collector Current**

- **5 A Peak Collector Current**

- **Customer-Specified Selections Available**

**TO-220 PACKAGE
(TOP VIEW)**

B — 1
C — 2
E — 3

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)	BD241	V_{CER}	55	V
	BD241A		70	
	BD241B		90	
	BD241C		115	
Collector-emitter voltage (I_C = 30 mA)	BD241	V_{CEO}	45	V
	BD241A		60	
	BD241B		80	
	BD241C		100	
Emitter-base voltage		V_{EBO}	5	V
Continuous collector current		I_C	3	A
Peak collector current (see Note 1)		I_{CM}	5	A
Continuous base current		I_B	1	A
Continuous device dissipation at (or below) 25°C case temperature (see Note 2)		P_{tot}	40	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)		$\frac{1}{2}LI_C^2$	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 $\leq 10\%$.
2. Derate linearly to 150°C case temperature at the rate of 0.32 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.

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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)	$I_B = 0$	BD241 $\quad$ 45 BD241A $\quad$ 60 BD241B $\quad$ 80 BD241C $\quad$ 100			V
I_{CES}	Collector-emitter cut-off current	$V_{CE} = 55$ V $V_{CE} = 70$ V $V_{CE} = 90$ V $V_{CE} = 115$ V	$V_{BE} = 0$ $V_{BE} = 0$ $V_{BE} = 0$ $V_{BE} = 0$	BD241 BD241A BD241B BD241C		0.2 0.2 0.2 0.2	mA
I_{CEO}	Collector cut-off current	$V_{CE} = 30$ V $V_{CE} = 60$ V	$I_B = 0$ $I_B = 0$	BD241/241A BD241B/241C		0.3 0.3	mA
I_{EBO}	Emitter cut-off current	$V_{EB} = 5$ V	$I_C = 0$			1	mA
h_{FE}	Forward current transfer ratio	$V_{CE} = 4$ V $V_{CE} = 4$ V	$I_C = 1$ A $I_C = 3$ A	(see Notes 5 and 6)	25 10		
$V_{CE(sat)}$	Collector-emitter saturation voltage	$I_B = 0.6$ A	$I_C = 3$ A	(see Notes 5 and 6)		1.2	V
V_{BE}	Base-emitter voltage	$V_{CE} = 4$ V	$I_C = 3$ A	(see Notes 5 and 6)		1.8	V
h_{fe}	Small signal forward current transfer ratio	$V_{CE} = 10$ V	$I_C = 0.5$ A	$f = 1$ kHz	20		
$|h_{fe}|$	Small signal forward current transfer ratio	$V_{CE} = 10$ V	$I_C = 0.5$ 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			3.125	°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	$I_C = 1$ A	$I_{B(on)} = 0.1$ A	$I_{B(off)} = -0.1$ A		0.3		µs
t_{off}	Turn-off time	$V_{BE(off)} = -3.7$ V	$R_L = 20$ Ω	$t_p = 20$ µs, dc ≤ 2%		1		µs

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

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TYPICAL CHARACTERISTICS

TYPICAL DC CURRENT GAIN
vs
COLLECTOR CURRENT

TCS631AH

V_{CE} = 4 V

t_p = 300 µs, duty cycle < 2%

T_C = 25°C

T_C = 80°C

h_{FE} - DC Current Gain

I_C - Collector Current - A
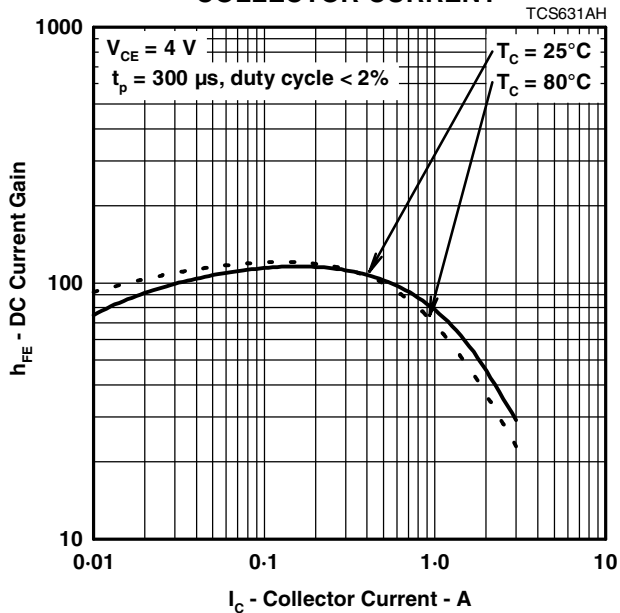
Figure 1.

COLLECTOR-EMITTER SATURATION VOLTAGE
vs
BASE CURRENT

TCS631AB

$V_{CE(sat)}$ - Collector-Emitter Saturation Voltage - V

I_C = 100 mA

I_C = 300 mA

I_C = 1 A

I_C = 3 A

I_B - Base Current - mA
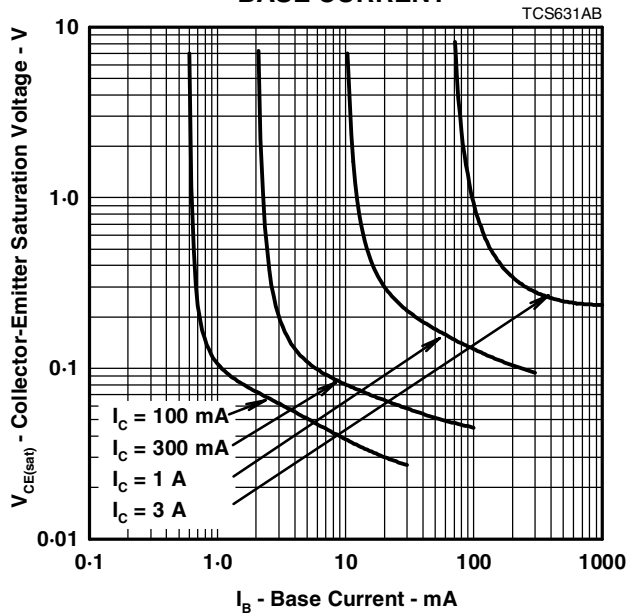
Figure 2.

BASE-EMITTER VOLTAGE
vs
COLLECTOR CURRENT

TCS631AC

V_{CE} = 4 V

T_C = 25°C

V_{BE} - Base-Emitter Voltage - V

I_C - Collector Current - A
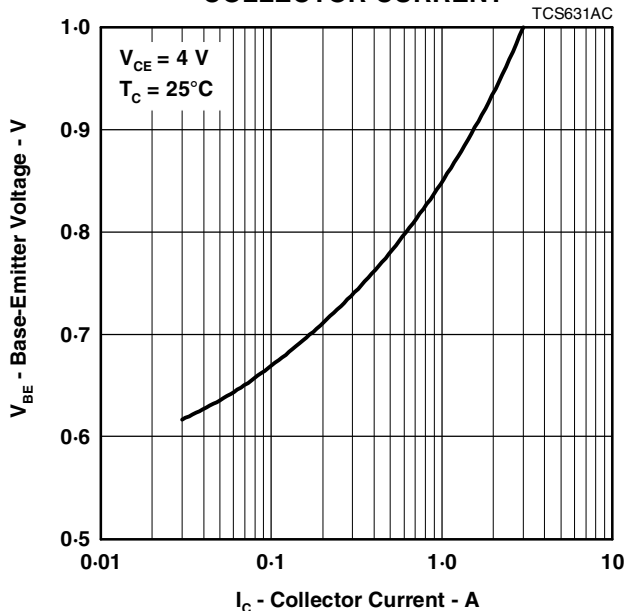
Figure 3.

P R O D U C T   I N F O R M A T I O N

MAXIMUM SAFE OPERATING REGIONS

MAXIMUM FORWARD-BIAS SAFE OPERATING AREA
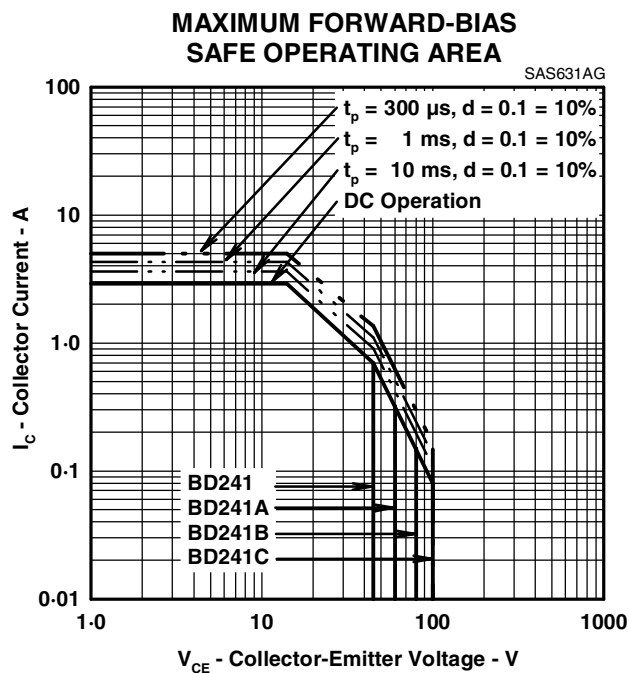
Figure 4.

THERMAL INFORMATION

MAXIMUM POWER DISSIPATION vs CASE TEMPERATURE

Figure 5.

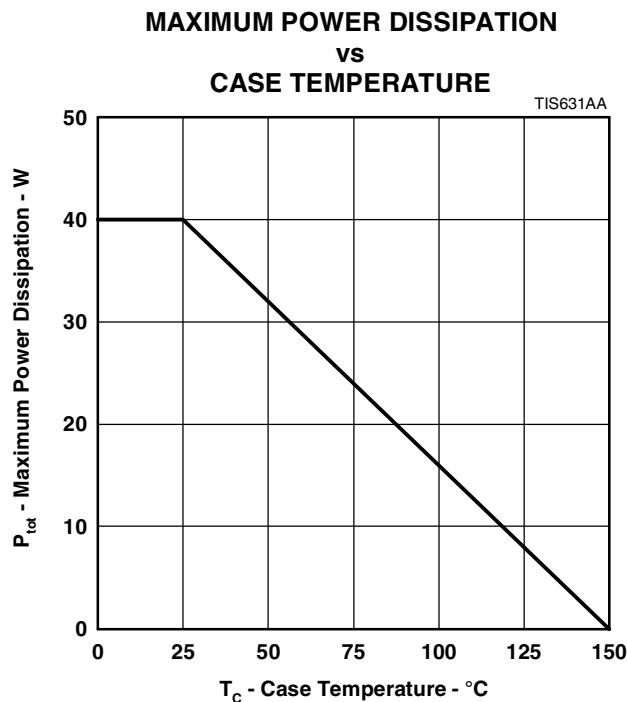**P R O D U C T   I N F O R M A T I O N**

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

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