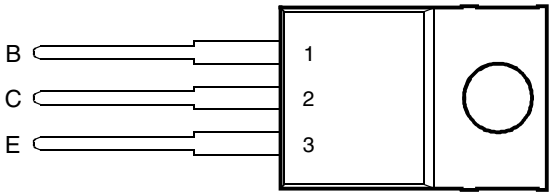
BOURNS®

- **Designed for Complementary Use with TIP125, TIP126 and TIP127**
- **65 W at 25°C Case Temperature**
- **5 A Continuous Collector Current**
- **Minimum h_{FE} of 1000 at 3 V, 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)	TIP120	V_{CBO}	60	V
	TIP121		80	
	TIP122		100	
Collector-emitter voltage (I_B = 0)	TIP120	V_{CEO}	60	V
	TIP121		80	
	TIP122		100	
Emitter-base voltage		V_{EBO}	5	V
Continuous collector current		I_C	5	A
Peak collector current (see Note 1)		I_{CM}	8	A
Continuous base current		I_B	0.1	A
Continuous device dissipation at (or below) 25°C case temperature (see Note 2)		P_{tot}	65	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 0.52 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.

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electrical characteristics at 25°C case temperatur e

PARAMETER		TEST CONDITIONS			MIN	TYP	MAX	UNIT
$V_{(BR)CEO}$	Collector-emitter breakdown voltage	I_C = 30 mA (see Note 5)	I_B = 0	TIP120 TIP121 TIP122	60 80 100			V
I_{CEO}	Collector-emitter cut-off current	V_{CE} = 30 V V_{CE} = 40 V V_{CE} = 50 V	I_B = 0 I_B = 0 I_B = 0	TIP120 TIP121 TIP122			0.5 0.5 0.5	mA
I_{CBO}	Collector cut-off current	V_{CB} = 60 V V_{CB} = 80 V V_{CB} = 100 V	I_E = 0 I_E = 0 I_E = 0	TIP120 TIP121 TIP122			0.2 0.2 0.2	mA
I_{EBO}	Emitter cut-off current	V_{EB} = 5 V	I_C = 0				2	mA
h_{FE}	Forward current transfer ratio	V_{CE} = 3 V V_{CE} = 3 V	I_C = 0.5 A I_C = 3 A	(see Notes 5 and 6)	1000 1000			
$V_{CE(sat)}$	Collector-emitter saturation voltage	I_B = 12 mA I_B = 20 mA	I_C = 3 A I_C = 5 A	(see Notes 5 and 6)			2 4	V
V_{BE}	Base-emitter voltage	V_{CE} = 3 V	I_C = 3 A	(see Notes 5 and 6)			2.5	V
V_{EC}	Parallel diode forward voltage	I_E = 5 A	I_B = 0	(see Notes 5 and 6)			3.5	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			1.92	°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 = 3 A	$I_{B(on)}$ = 12 mA	$I_{B(off)}$ = -12 mA		1.5		µs
t_{off}	Turn-off time	$V_{BE(off)}$ = -5 V	R_L = 10 Ω	t_p = 20 µs, dc ≤ 2%		8.5		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

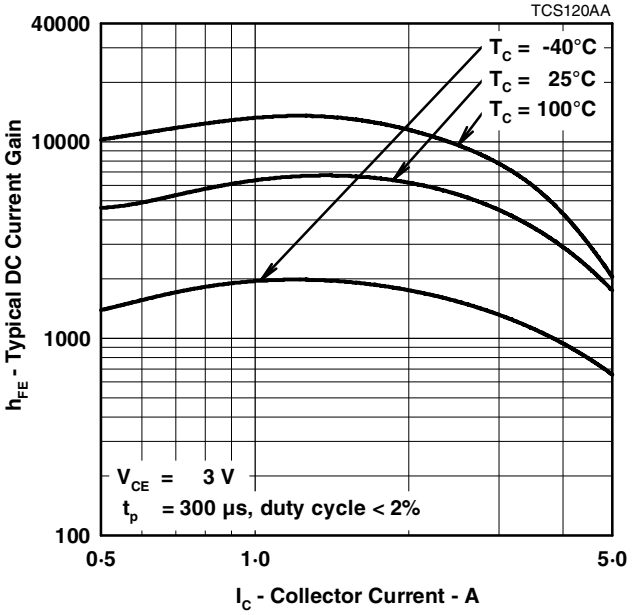

Figure 1.

COLLECTOR-EMITTER SATURATION VOLTAGE vs COLLECTOR CURRENT

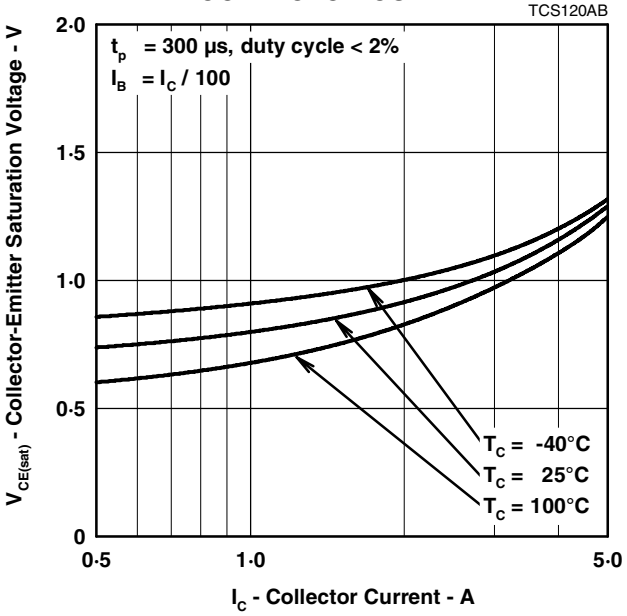

Figure 2.

BASE-EMITTER SATURATION VOLTAGE vs COLLECTOR CURRENT

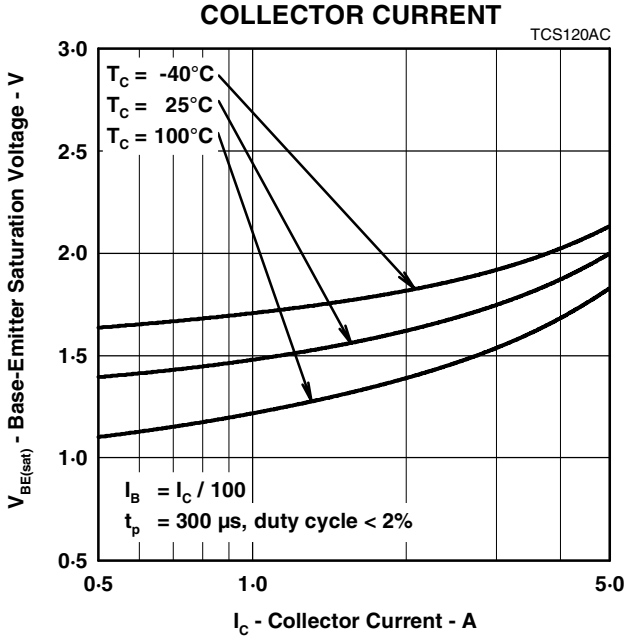

Figure 3.

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MAXIMUM SAFE OPERATING REGIONS

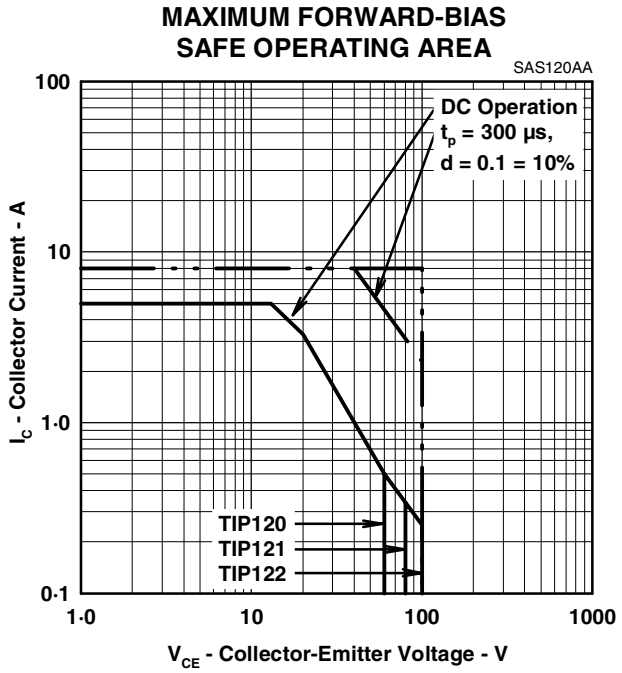

Figure 4.

THERMAL INFORMATION

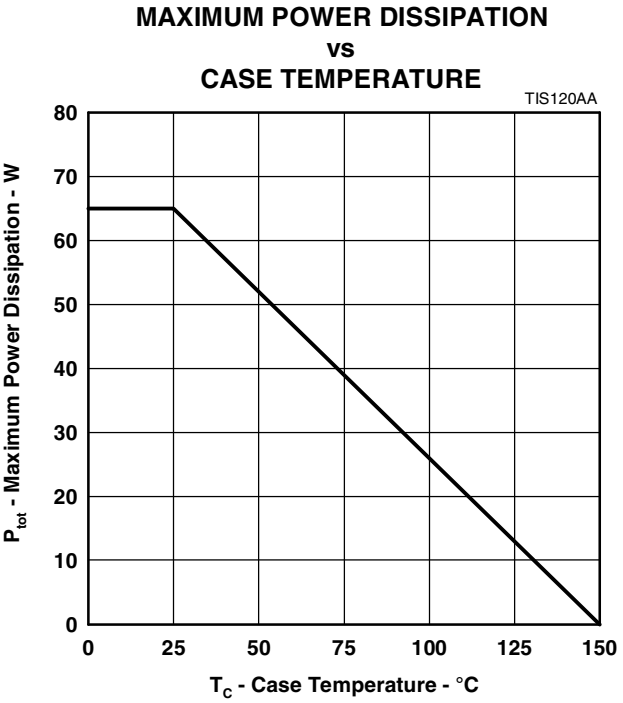

Figure 5.

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