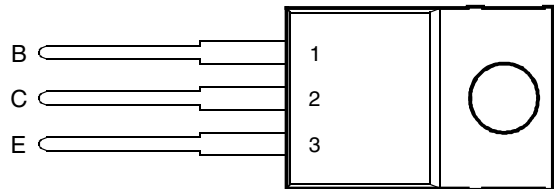


- 80 W at 25°C Case Temperature
- 7 A Continuous Collector Current
- 10 A Peak Collector Current
- Maximum $V_{CE(sat)}$ of 2 V at $I_C = 5$ A
- $I_{CEX(sus)}$ 7 A at rated $V_{(BR)CEO}$

TO-220 PACKAGE
(TOP VIEW)



This series is obsolete and not recommended for new designs.

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 ($I_E = 0$)	TIP150	V_{CBO}	300	V
	TIP151		350	
	TIP152		400	
Collector-emitter voltage ($I_B = 0$)	TIP150	V_{CEO}	300	V
	TIP151		350	
	TIP152		400	
Emitter-base voltage		V_{EBO}	8	V
Continuous collector current		I_C	7	A
Peak collector current (see Note 1)		I_{CM}	10	A
Continuous base current		I_B	1.5	A
Continuous device dissipation at (or below) 25°C case temperature (see Note 2)		P_{tot}	80	W
Continuous device dissipation at (or below) 25°C free air temperature (see Note 3)		P_{tot}	2	W
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 $t_p \leq 5$ ms, duty cycle $\leq 10\%$.
 2. Derate linearly to 150°C case temperature at the rate of 0.64 W/°C.
 3. Derate linearly to 150°C free air temperature at the rate of 16 mW/°C.

PRODUCT INFORMATION

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TIP150, TIP151, TIP152 NPN SILICON POWER DARLINGTONS

BOURNS®

electrical characteristics at 25°C case temperature

PARAMETER	TEST CONDITIONS			MIN	TYP	MAX	UNIT
$V_{(BR)CBO}$ Collector-base breakdown voltage	$I_C = 1 \text{ mA}$	$I_E = 0$	TIP150 TIP151 TIP152	300 350 400			V
$V_{(BR)CEO}$ Collector-emitter breakdown voltage	$I_C = 10 \text{ mA}$ (see Note 4)	$I_B = 0$	TIP150 TIP151 TIP152	300 350 400			V
I_{CEO} Collector-emitter cut-off current	$V_{CE} = 300 \text{ V}$ $V_{CE} = 350 \text{ V}$ $V_{CE} = 400 \text{ V}$	$I_B = 0$ $I_B = 0$ $I_B = 0$	TIP150 TIP151 TIP152			250 250 250	μA
$I_{CEX(sus)}$ Collector-emitter sustaining current	$V_{CLAMP} = V_{(BR)CEO}$			7			A
I_{EBO} Emitter cut-off current	$V_{EB} = 8 \text{ V}$	$I_C = 0$				15	mA
h_{FE} Forward current transfer ratio	$V_{CE} = 5 \text{ V}$ $V_{CE} = 5 \text{ V}$ $V_{CE} = 5 \text{ V}$	$I_C = 2.5 \text{ A}$ $I_C = 5 \text{ A}$ $I_C = 7 \text{ A}$	(see Notes 4 and 5)	150 50 15			
$V_{CE(sat)}$ Collector-emitter saturation voltage	$I_B = 10 \text{ mA}$ $I_B = 100 \text{ mA}$ $I_B = 250 \text{ mA}$	$I_C = 1 \text{ A}$ $I_C = 2 \text{ A}$ $I_C = 5 \text{ A}$	(see Notes 4 and 5)			1.5 1.5 2	V
$V_{BE(sat)}$ Base-emitter saturation voltage	$I_B = 100 \text{ mA}$ $I_B = 250 \text{ mA}$	$I_C = 2 \text{ A}$ $I_C = 5 \text{ A}$	(see Notes 4 and 5)			2.2 2.3	V
V_{EC} Parallel diode forward voltage	$I_E = 7 \text{ A}$	$I_B = 0$	(see Notes 4 and 5)			3.5	V
h_{fe} Small signal forward current transfer ratio	$V_{CE} = 5 \text{ V}$	$I_C = 0.5 \text{ A}$	$f = 1 \text{ kHz}$	200			
$ h_{fe} $ Small signal forward current transfer ratio	$V_{CE} = 5 \text{ V}$	$I_C = 0.5 \text{ A}$	$f = 1 \text{ MHz}$	10			
C_{ob} Output capacitance	$V_{CB} = 10 \text{ V}$	$I_E = 0$	$f = 1 \text{ MHz}$			100	pF

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			1.56	$^{\circ}\text{C}/\text{W}$
$R_{\theta JA}$ Junction to free air thermal resistance			62.5	$^{\circ}\text{C}/\text{W}$
$C_{\theta C}$ Thermal capacitance of case		0.9		$\text{J}/^{\circ}\text{C}$

inductive-load-switching characteristics at 25°C case temperature

PARAMETER	TEST CONDITIONS †			MIN	TYP	MAX	UNIT
t_{sv} Voltage storage time	$I_C = 5 \text{ A}$ $V_{(clamp)} = V_{(BR)CEO}$	$I_{B(on)} = 250 \text{ mA}$	$R_{BE} = 47 \Omega$		3.9		μs
t_{si} Current storage time					4.7		μs
t_{rv} Voltage transition time					1.2		μs
t_{ti} Current transition time					1.2		μs
t_{xo} Cross-over time					2.0		μs

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

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PARAMETER MEASUREMENT INFORMATION

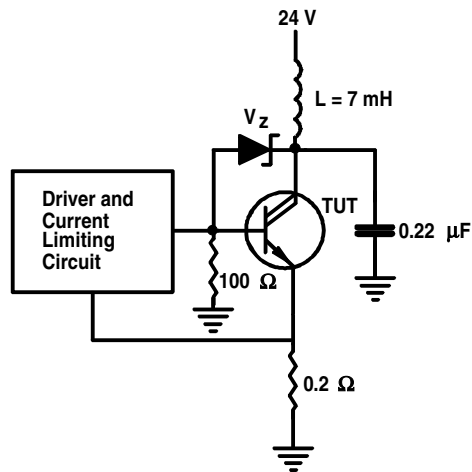


Figure 1. Functional Test Circuit

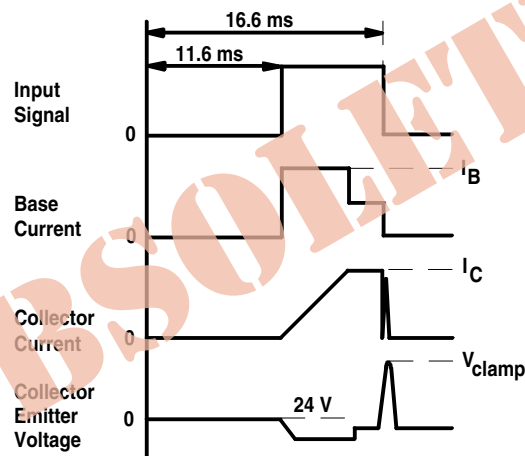


Figure 2. Functional Test Waveforms

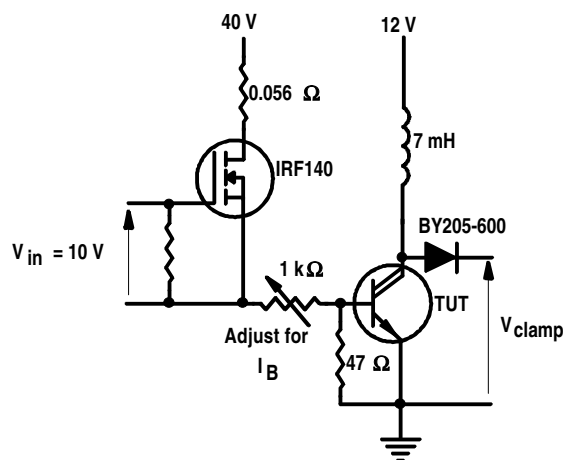


Figure 3. Switching Test Circuit

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TYPICAL CHARACTERISTICS

TYPICAL DC CURRENT GAIN
vs
COLLECTOR CURRENT

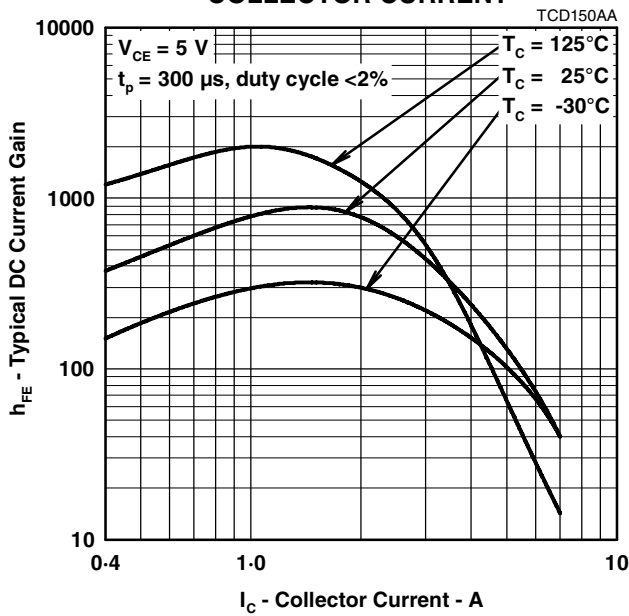


Figure 4.

COLLECTOR-EMITTER SATURATION VOLTAGE
vs
COLLECTOR CURRENT

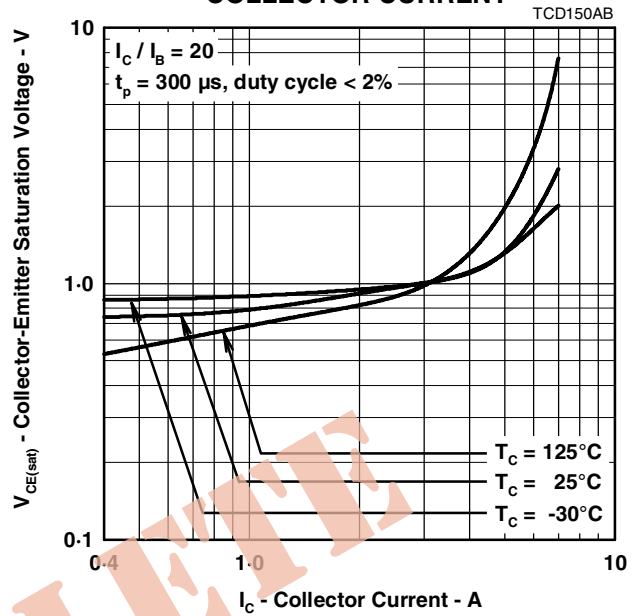


Figure 5.

BASE-EMITTER SATURATION VOLTAGE
vs
COLLECTOR CURRENT

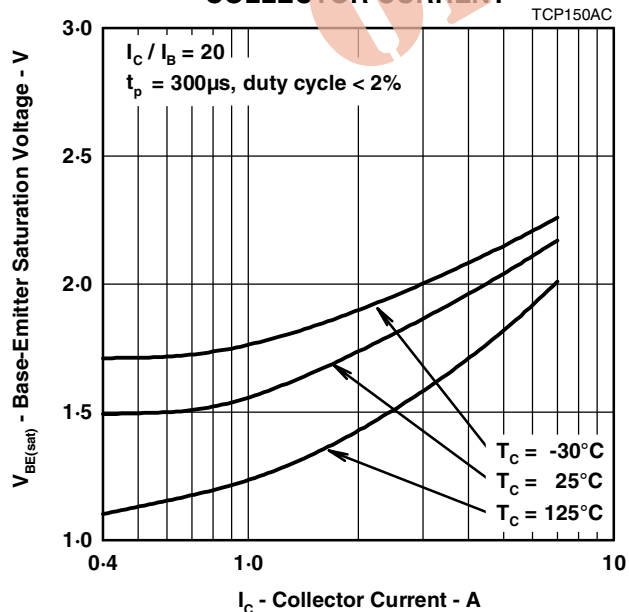


Figure 6.

COLLECTOR CUT-OFF CURRENT
vs
CASE TEMPERATURE

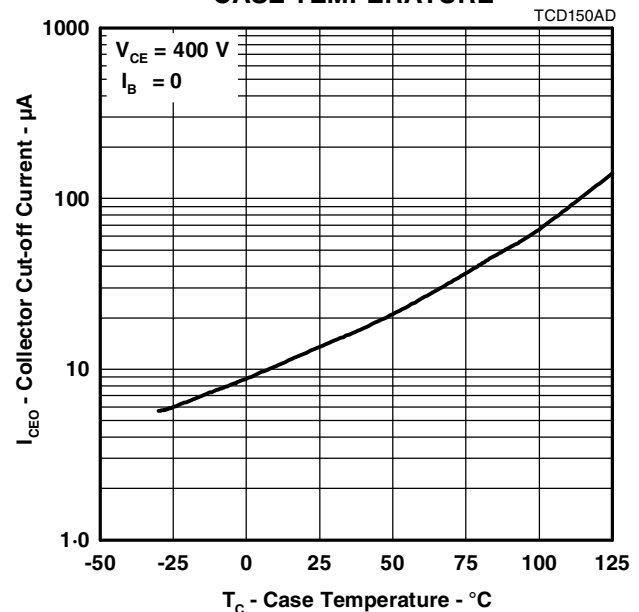


Figure 7.

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MAXIMUM SAFE OPERATING REGIONS

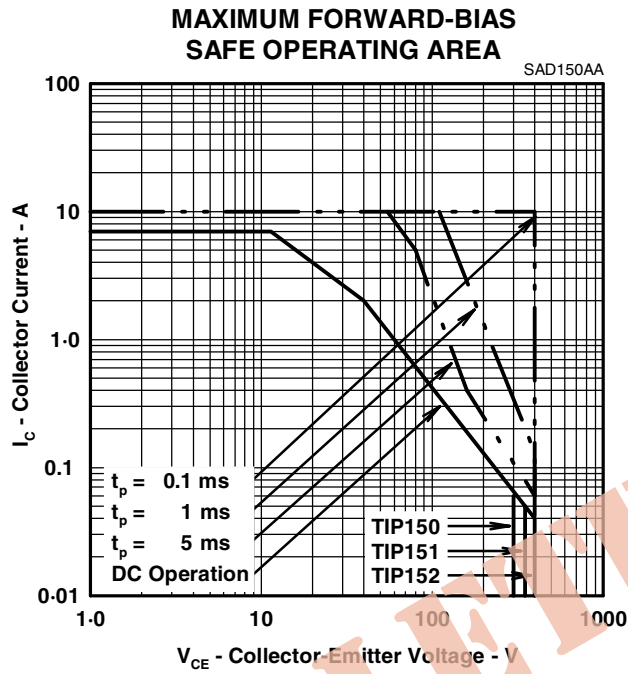


Figure 8.

THERMAL INFORMATION

**MAXIMUM POWER DISSIPATION
vs
CASE TEMPERATURE**

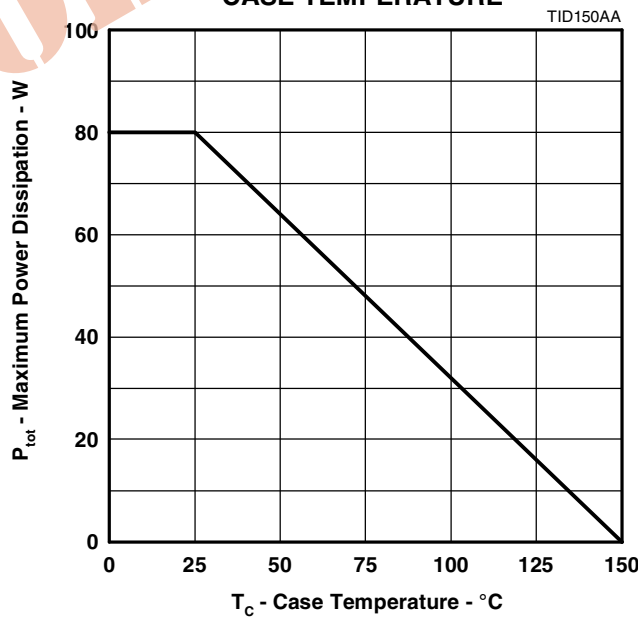


Figure 9.

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