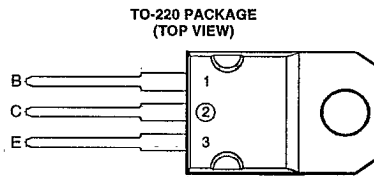


TIPL791, TIPL791A NPN SILICON POWER TRANSISTORS

MAY 1989 - REVISED MAY 1995

- Rugged Triple-Diffused Planar Construction
- 4 A Continuous Collector Current
- Operating Characteristics Fully Guaranteed at 100°C
- 1000 Volt Blocking Capability



Pin 2 is in electrical contact with the mounting base.

MDTRAC

absolute maximum ratings at 25°C case temperature (unless otherwise noted)

RATING		SYMBOL	VALUE	UNIT
Collector-base voltage ($I_E = 0$)	TIPL791	V_{CBO}	850	V
	TIPL791A		1000	
Collector-emitter voltage ($V_{BE} = 0$)	TIPL791	V_{CES}	850	V
	TIPL791A		1000	
Collector-emitter voltage ($I_B = 0$)	TIPL791	V_{CEO}	400	V
	TIPL791A		450	
Emitter-base voltage		V_{EBO}	10	V
Continuous collector current		I_C	4	A
Peak collector current (see Note 1)		I_{CM}	8	A
Continuous device dissipation at (or below) 25°C case temperature		P_{tot}	75	W
Operating junction temperature range		T_J	-65 to +150	°C
Storage temperature range		T_{stg}	-65 to +150	°C

NOTE 1: This value applies for $t_p \leq 10$ ms, duty cycle $\leq 2\%$.

Datasheet.Directory

PRODUCTION DATA information is current as of publication date. Products conform to specifications per the terms of Texas Instruments standard warranty. Production processing does not necessarily include testing of all the parameters.

 **TEXAS
INSTRUMENTS**

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NPN SILICON POWER TRANSISTORS

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electrical characteristics at 25°C case temperature (unless otherwise noted)

PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNIT
$V_{CE(sus)}$ Collector-emitter sustaining voltage	$I_C = 100\text{ mA}$ $L = 25\text{ mH}$ (see Note 2)	TIPL791	400		V
		TIPL791A	450		
I_{CES} Collector-emitter cut-off current	$V_{CE} = 850\text{ V}$ $V_{BE} = 0$ $V_{CE} = 1000\text{ V}$ $V_{BE} = 0$ $V_{CE} = 850\text{ V}$ $V_{BE} = 0$ $T_C = 100^\circ\text{C}$ $V_{CE} = 1000\text{ V}$ $V_{BE} = 0$ $T_C = 100^\circ\text{C}$	TIPL791		5	μA
		TIPL791A		5	
		TIPL791		200	
		TIPL791A		200	
I_{CEO} Collector cut-off current	$V_{CE} = 400\text{ V}$ $I_B = 0$ $V_{CE} = 450\text{ V}$ $I_B = 0$	TIPL791		5	μA
		TIPL791A		5	
I_{EBO} Emitter cut-off current	$V_{EB} = 10\text{ V}$ $I_C = 0$			1	mA
h_{FE} Forward current transfer ratio	$V_{CE} = 5\text{ V}$ $I_C = 0.5\text{ A}$ (see Notes 3 and 4)	20		60	
$V_{CE(sat)}$ Collector-emitter saturation voltage	$I_B = 0.2\text{ A}$ $I_C = 1\text{ A}$ $I_B = 0.5\text{ A}$ $I_C = 2.5\text{ A}$ (see Notes 3 and 4) $I_B = 1\text{ A}$ $I_C = 4\text{ A}$ $I_B = 1\text{ A}$ $I_C = 4\text{ A}$ $T_C = 100^\circ\text{C}$			0.5	V
				1.0	
				2.5	
				5.0	
$V_{BE(sat)}$ Base-emitter saturation voltage	$I_B = 0.2\text{ A}$ $I_C = 1\text{ A}$ $I_B = 0.5\text{ A}$ $I_C = 2.5\text{ A}$ (see Notes 3 and 4) $I_B = 1\text{ A}$ $I_C = 4\text{ A}$ $I_B = 1\text{ A}$ $I_C = 4\text{ A}$ $T_C = 100^\circ\text{C}$			1.0	V
				1.2	
				1.4	
				1.3	
f_t Current gain bandwidth product	$V_{CE} = 10\text{ V}$ $I_C = 0.5\text{ A}$ $f = 1\text{ MHz}$		12		MHz
C_{ob} Output capacitance	$V_{CB} = 20\text{ V}$ $I_E = 0$ $f = 0.1\text{ MHz}$		110		pF

NOTES: 2. Inductive loop switching measurement.

3. These parameters must be measured using pulse techniques, $t_p = 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.

4. 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			1.66	$^\circ\text{C/W}$

inductive-load-switching characteristics at 25°C case temperature (unless otherwise noted)

PARAMETER	TEST CONDITIONS †	MIN	TYP	MAX	UNIT
t_{sv} Voltage storage time	$I_C = 4\text{ A}$ $I_{B(on)} = 0.8\text{ A}$ (see Figures 1 and 2) $V_{BE(off)} = -5\text{ V}$			2	μs
t_{rv} Voltage rise time				200	ns
t_{ff} Current fall time				100	ns
t_{tl} Current tail time				50	ns
t_{xo} Cross over time				200	ns
t_{sv} Voltage storage time	$I_C = 4\text{ A}$ $I_{B(on)} = 0.8\text{ A}$ (see Figures 1 and 2) $V_{BE(off)} = -5\text{ V}$ $T_C = 100^\circ\text{C}$			2.5	μs
t_{rv} Voltage rise time				400	ns
t_{ff} Current fall time				200	ns
t_{tl} Current tail time				50	ns
t_{xo} Cross over time				600	ns

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

PARAMETER MEASUREMENT INFORMATION

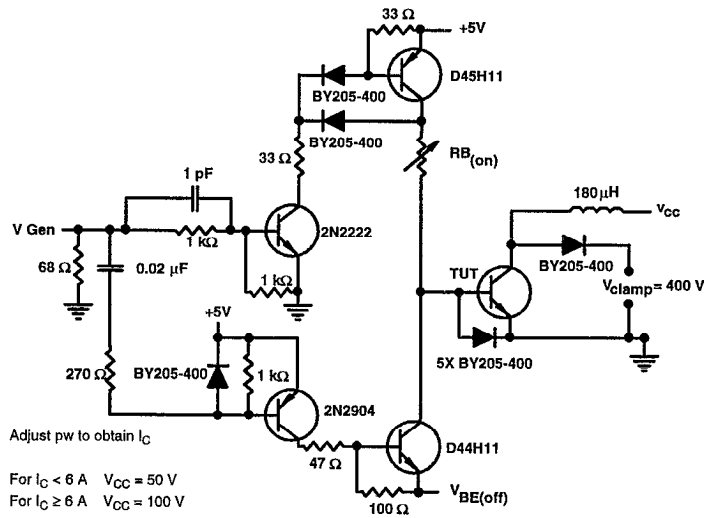
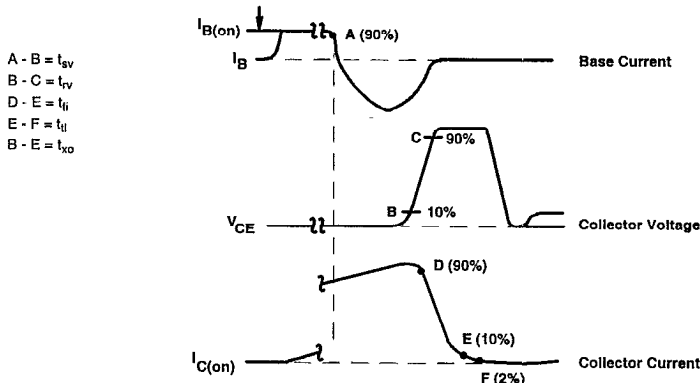


Figure 1. Inductive-Load Switching Test Circuit



NOTES: A. Waveforms are monitored on an oscilloscope with the following characteristics: $t_r < 15 \text{ ns}$, $R_{in} > 10 \Omega$, $C_{in} < 11.5 \text{ pF}$.
B. Resistors must be noninductive types.

Figure 2. Inductive-Load Switching Waveforms

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TYPICAL CHARACTERISTICS

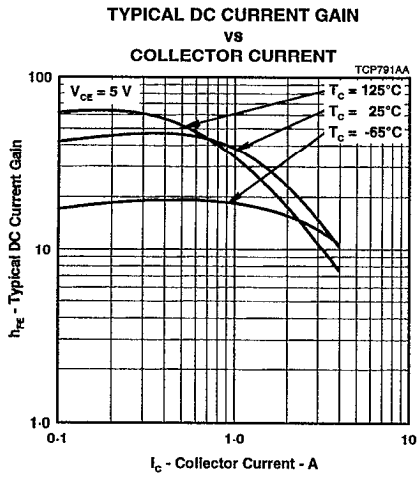


Figure 3.

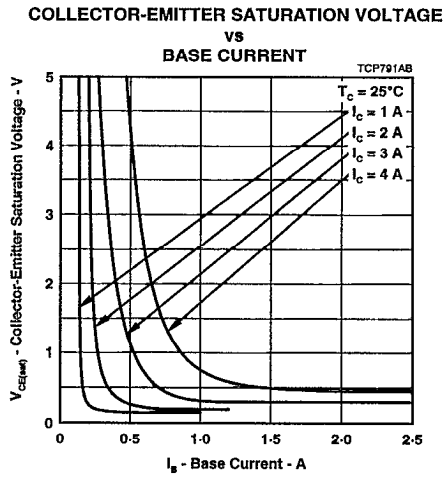


Figure 4.

MAXIMUM SAFE OPERATING REGIONS

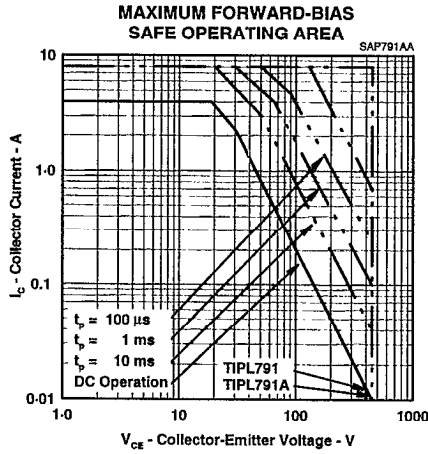


Figure 5.

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THERMAL INFORMATION

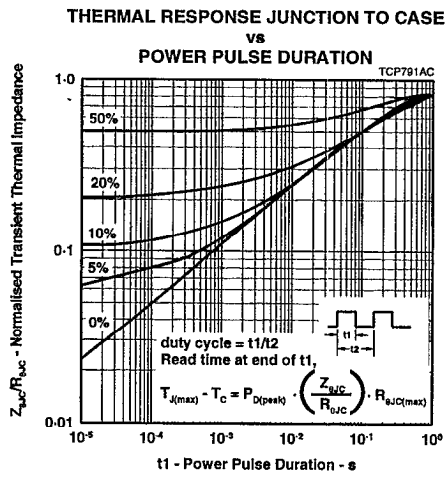


Figure 6.