

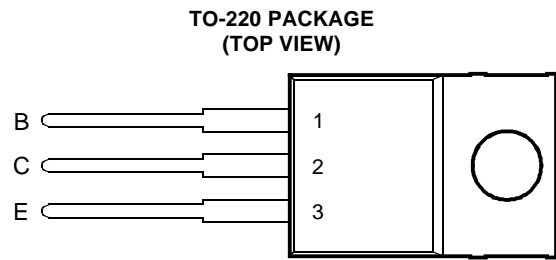
TIPL791, TIPL791A

NPN SILICON POWER TRANSISTORS

Copyright © 1997, Power Innovations Limited, UK

MAY 1989 - REVISED MARCH 1997

- 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.

MDTRACA

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 $\leq 2\%$.

PRODUCT INFORMATION

Information is current as of publication date. Products conform to specifications in accordance with the terms of Power Innovations standard warranty. Production processing does not necessarily include testing of all parameters.



TIPL791, TIPL791A

NPN SILICON POWER TRANSISTORS

MAY 1989 - REVISED MARCH 1997

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 TIPL791A	400 450			V
I_{CES} Collector-emitter cut-off current	$V_{CE} = 850 \text{ V}$ $V_{BE} = 0$ TIPL791 $V_{CE} = 1000 \text{ V}$ $V_{BE} = 0$ TIPL791A $V_{CE} = 850 \text{ V}$ $V_{BE} = 0$ $T_C = 100^\circ\text{C}$ TIPL791 $V_{CE} = 1000 \text{ V}$ $V_{BE} = 0$ $T_C = 100^\circ\text{C}$ TIPL791A			5 5 200 200	μA
I_{CEO} Collector cut-off current	$V_{CE} = 400 \text{ V}$ $I_B = 0$ TIPL791 $V_{CE} = 450 \text{ V}$ $I_B = 0$ TIPL791A			5 5	μA
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 1.0 2.5 5.0	V
$V_{BE(sat)}$ 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 1.2 1.4 1.3	V
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, $t_p = 300 \mu\text{s}$, 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_{fi} Current fall time				100	ns
t_{ti} 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_{fi} Current fall time				200	ns
t_{ti} 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.

PRODUCT INFORMATION

PARAMETER MEASUREMENT INFORMATION

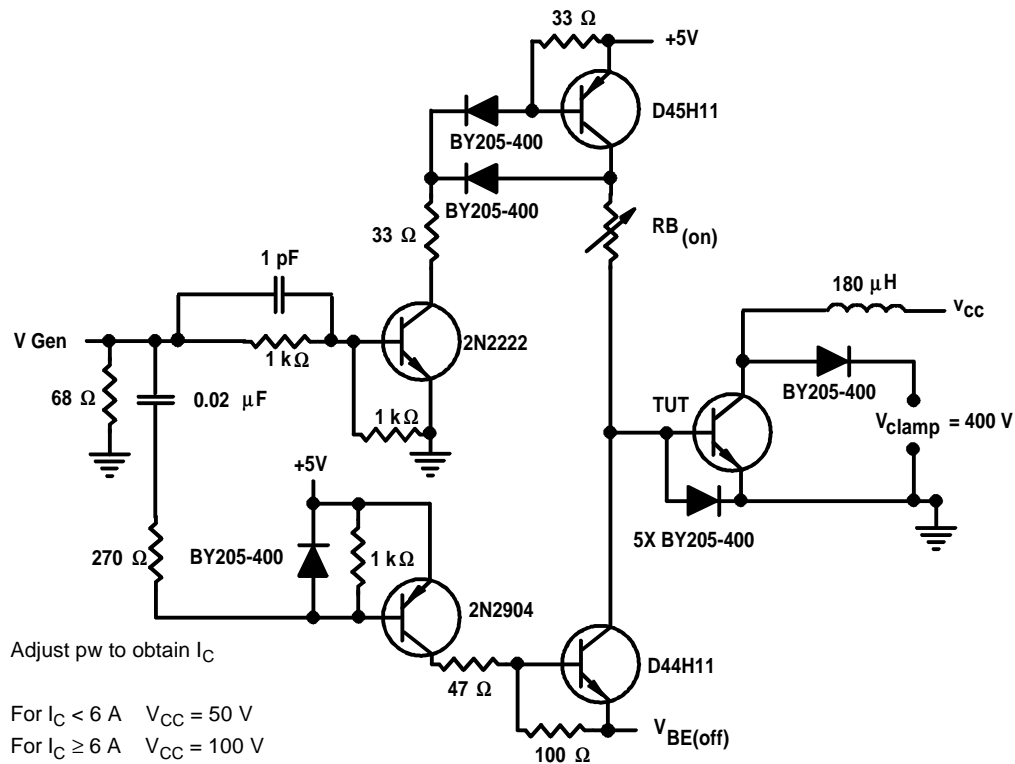
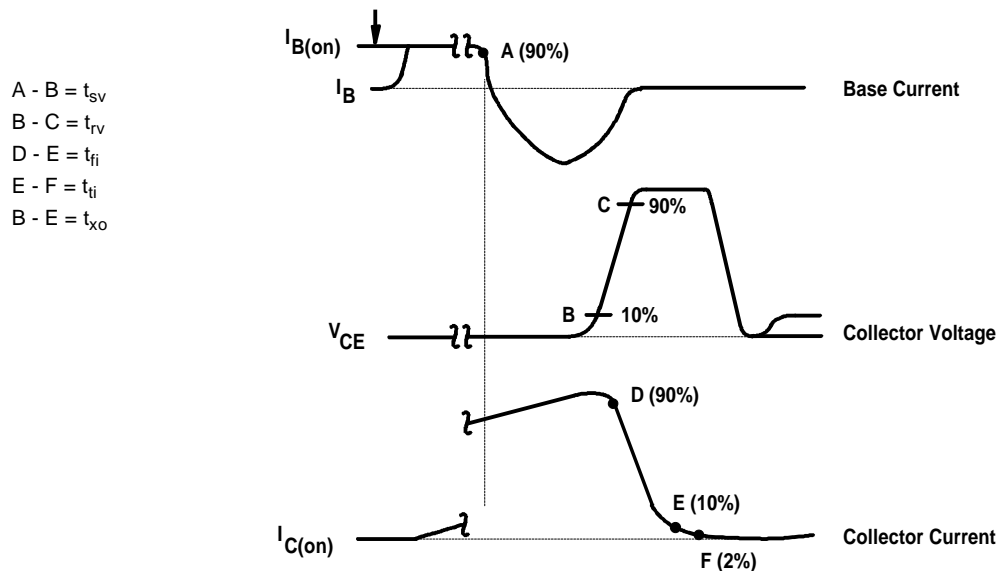


Figure 1. Inductive-Load Switching Test Circuit



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

Figure 2. Inductive-Load Switching Waveforms

TIPL791, TIPL791A
NPN SILICON POWER TRANSISTORS

MAY 1989 - REVISED MARCH 1997

TYPICAL CHARACTERISTICS

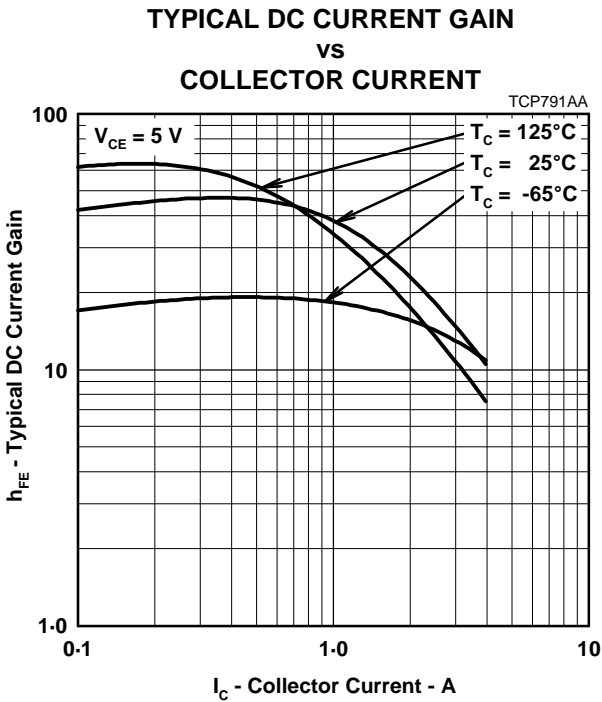


Figure 3.

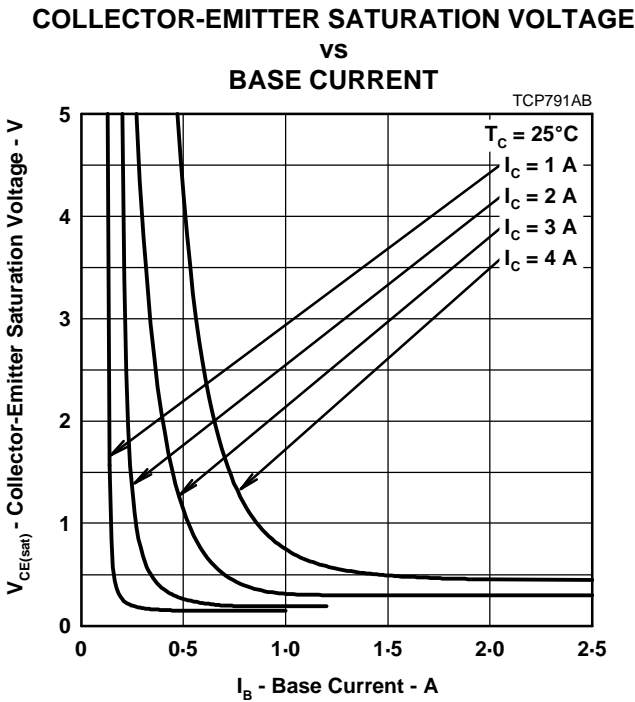


Figure 4.

MAXIMUM SAFE OPERATING REGIONS

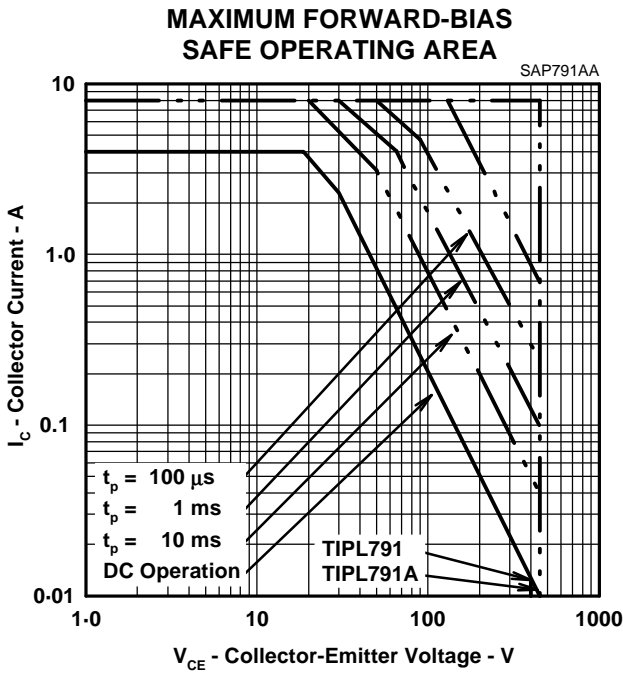


Figure 5.

PRODUCT INFORMATION

THERMAL INFORMATION

THERMAL RESPONSE JUNCTION TO CASE VS POWER PULSE DURATION

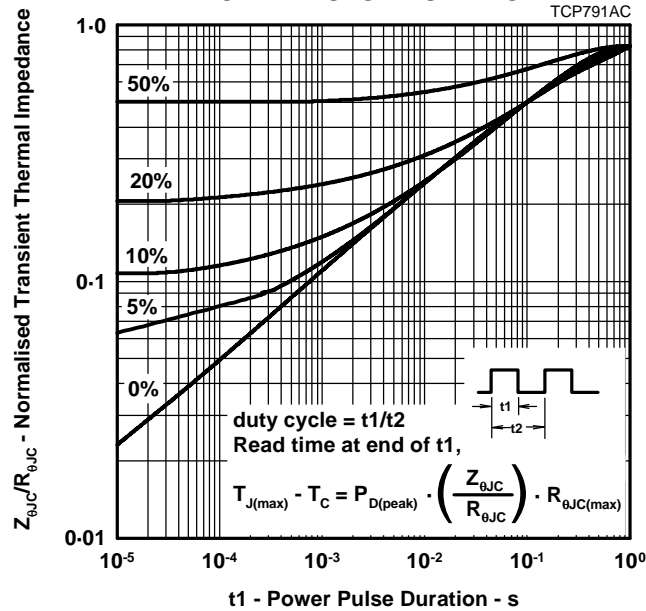


Figure 6.

TIPL791, TIPL791A

NPN SILICON POWER TRANSISTORS

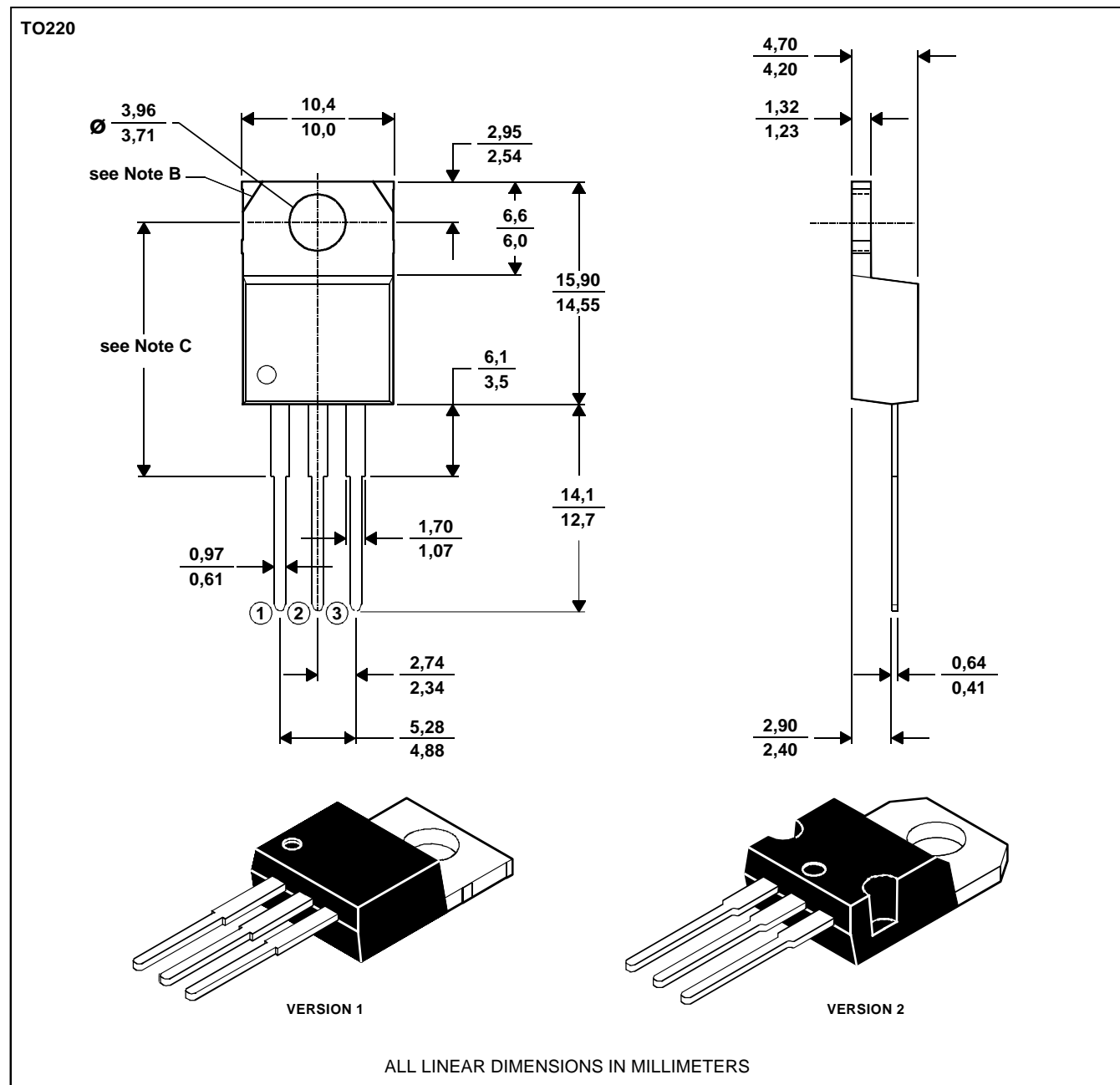
MAY 1989 - REVISED MARCH 1997

MECHANICAL DATA

TO-220

3-pin plastic flange-mount package

This single-in-line package consists of a circuit mounted on a lead frame and encapsulated within a plastic compound. The compound will withstand soldering temperature with no deformation, and circuit performance characteristics will remain stable when operated in high humidity conditions. Leads require no additional cleaning or processing when used in soldered assembly.



NOTES: A. The centre pin is in electrical contact with the mounting tab.
 B. Mounting tab corner profile according to package version.
 C. Typical fixing hole centre stand off height according to package version.
 Version 1, 18.0 mm. Version 2, 17.6 mm.

MDXXBE

PRODUCT INFORMATION

IMPORTANT NOTICE

Power Innovations Limited (PI) reserves the right to make changes to its products or to discontinue any semiconductor product or service without notice, and advises its customers to verify, before placing orders, that the information being relied on is current.

PI warrants performance of its semiconductor products to the specifications applicable at the time of sale in accordance with PI's standard warranty. Testing and other quality control techniques are utilized to the extent PI deems necessary to support this warranty. Specific testing of all parameters of each device is not necessarily performed, except as mandated by government requirements.

PI accepts no liability for applications assistance, customer product design, software performance, or infringement of patents or services described herein. Nor is any license, either express or implied, granted under any patent right, copyright, design right, or other intellectual property right of PI covering or relating to any combination, machine, or process in which such semiconductor products or services might be or are used.

PI SEMICONDUCTOR PRODUCTS ARE NOT DESIGNED, INTENDED, AUTHORIZED, OR WARRANTED TO BE SUITABLE FOR USE IN LIFE-SUPPORT APPLICATIONS, DEVICES OR SYSTEMS.

Copyright © 1997, Power Innovations Limited