

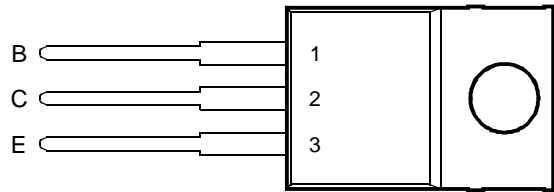
BUL791 NPN SILICON POWER TRANSISTOR

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JULY 1991 - REVISED SEPTEMBER 1997

- **Designed Specifically for High Frequency Electronic Ballasts up to 125 W**
- **h_{FE} 6 to 22 at $V_{CE} = 1\text{ V}$, $I_C = 2\text{ A}$**
- **Low Power Losses (On-state and Switching)**
- **Key Parameters Characterised at High Temperature**
- **Tight and Reproducible Parametric Distributions**

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



Pin 2 is in electrical contact with the mounting base.

MDTRACA

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

RATING	SYMBOL	VALUE	UNIT
Collector-emitter voltage ($V_{BE} = 0$)	V_{CES}	700	V
Collector-base voltage ($I_E = 0$)	V_{CBO}	700	V
Collector-emitter voltage ($I_B = 0$)	V_{CEO}	400	V
Emitter-base voltage	V_{EBO}	9	V
Continuous collector current	I_C	4	A
Peak collector current (see Note 1)	I_{CM}	8	A
Peak collector current (see Note 2)	I_{CM}	14	A
Continuous base current	I_B	2.5	A
Peak base current (see Note 2)	I_{BM}	3.5	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

NOTES: 1. This value applies for $t_p = 10\text{ ms}$, duty cycle $\leq 2\%$.
 2. This value applies for $t_p = 300\text{ }\mu\text{s}$, 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.



BUL791

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

PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNIT
$V_{CEO(sus)}$ Collector-emitter sustaining voltage	$I_C = 100\text{ mA}$ $L = 25\text{ mH}$ (see Note 3)	400			V
I_{CES} Collector-emitter cut-off current	$V_{CE} = 700\text{ V}$ $V_{BE} = 0$ $V_{CE} = 700\text{ V}$ $V_{BE} = 0$ $T_C = 90^\circ\text{C}$			10 200	μA
I_{EBO} Emitter cut-off current	$V_{EB} = 9\text{ V}$ $I_C = 0$			1	mA
$V_{BE(sat)}$ Base-emitter saturation voltage	$I_B = 400\text{ mA}$ $I_C = 2\text{ A}$ (see Notes 4 and 5) $I_B = 400\text{ mA}$ $I_C = 2\text{ A}$ $T_C = 90^\circ\text{C}$		0.94 0.86	1	V
$V_{CE(sat)}$ Collector-emitter saturation voltage	$I_B = 400\text{ mA}$ $I_C = 2\text{ A}$ (see Notes 4 and 5) $I_B = 400\text{ mA}$ $I_C = 2\text{ A}$ $T_C = 90^\circ\text{C}$		0.25 0.3	0.4	V
h_{FE} Forward current transfer ratio	$V_{CE} = 1\text{ V}$ $I_C = 10\text{ mA}$ $V_{CE} = 1\text{ V}$ $I_C = 2\text{ A}$ $V_{CE} = 5\text{ V}$ $I_C = 8\text{ A}$	10 6 2	16.5 12 6.5	22 14	
V_{FCB} Collector-base forward bias diode voltage	$I_{CB} = 60\text{ mA}$		850		mV

NOTES: 3. Inductive loop switching measurement.

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, and located within 3.2 mm from the device body.

thermal characteristics

PARAMETER	MIN	TYP	MAX	UNIT
$R_{\theta JA}$ Junction to free air thermal resistance			62.5	$^\circ\text{C/W}$
$R_{\theta JC}$ Junction to case thermal resistance			1.66	$^\circ\text{C/W}$

inductive-load switching characteristics at 25°C case temperature

PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNIT
t_{sv} Storage time	$I_C = 2\text{ A}$ $I_{B(on)} = 400\text{ mA}$ $V_{CC} = 40\text{ V}$ $L = 1\text{ mH}$ $I_{B(off)} = 800\text{ mA}$ $V_{CLAMP} = 300\text{ V}$		2.2	3	μs
t_{fi} Current fall time			95	180	ns
t_{xo} Cross over time				210	300
t_{sv} Storage time	$I_C = 2\text{ A}$ $I_{B(on)} = 400\text{ mA}$ $V_{CC} = 40\text{ V}$ $L = 1\text{ mH}$ $I_{B(off)} = 250\text{ mA}$ $V_{CLAMP} = 300\text{ V}$		4	6	μs
t_{fi} Current fall time			120	230	ns

resistive-load switching characteristics at 25°C case temperature

PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNIT
t_{sv} Storage time	$I_C = 2\text{ A}$ $I_{B(on)} = 400\text{ mA}$ $V_{CC} = 300\text{ V}$ $I_{B(off)} = 400\text{ mA}$		2.2	3	μs
t_{fi} Current fall time			160	250	ns

TYPICAL CHARACTERISTICS

FORWARD CURRENT TRANSFER RATIO
VS
COLLECTOR CURRENT

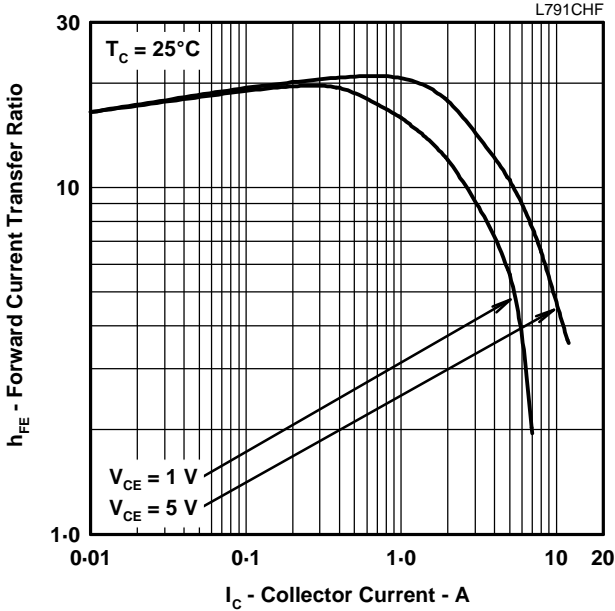


Figure 1.

COLLECTOR-EMITTER SATURATION VOLTAGE
VS
COLLECTOR CURRENT

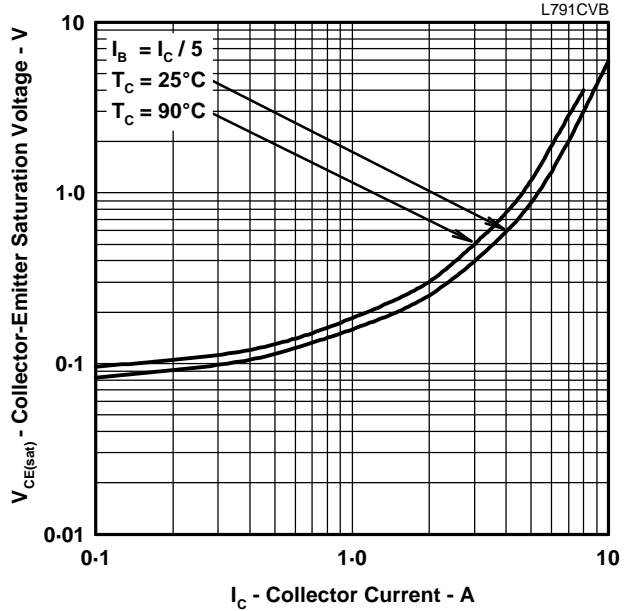


Figure 2.

INDUCTIVE SWITCHING TIMES
VS
COLLECTOR CURRENT

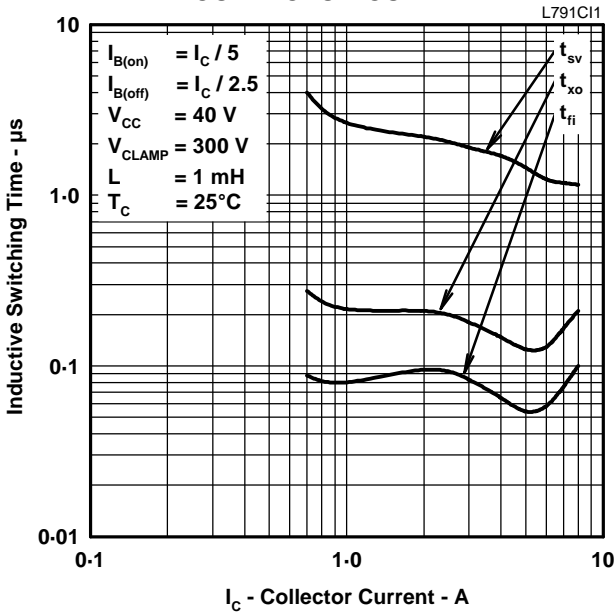


Figure 3.

INDUCTIVE SWITCHING TIMES
VS
CASE TEMPERATURE

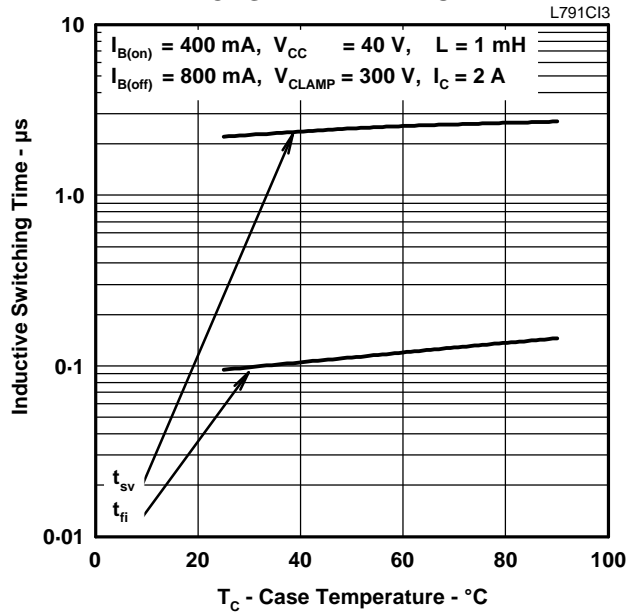


Figure 4.

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TYPICAL CHARACTERISTICS

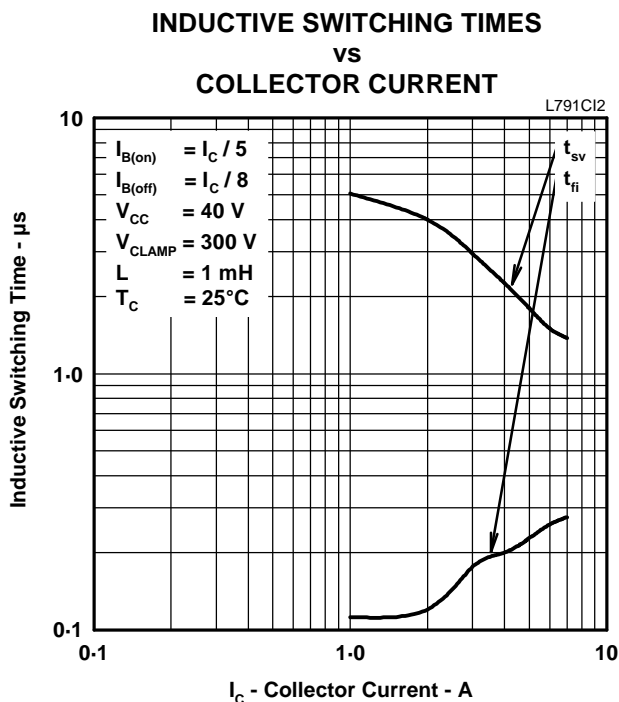


Figure 5.

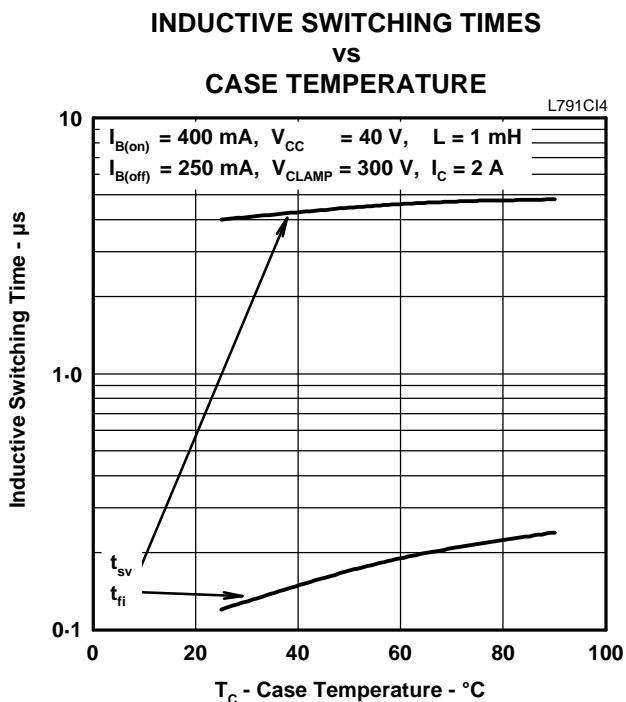


Figure 6.

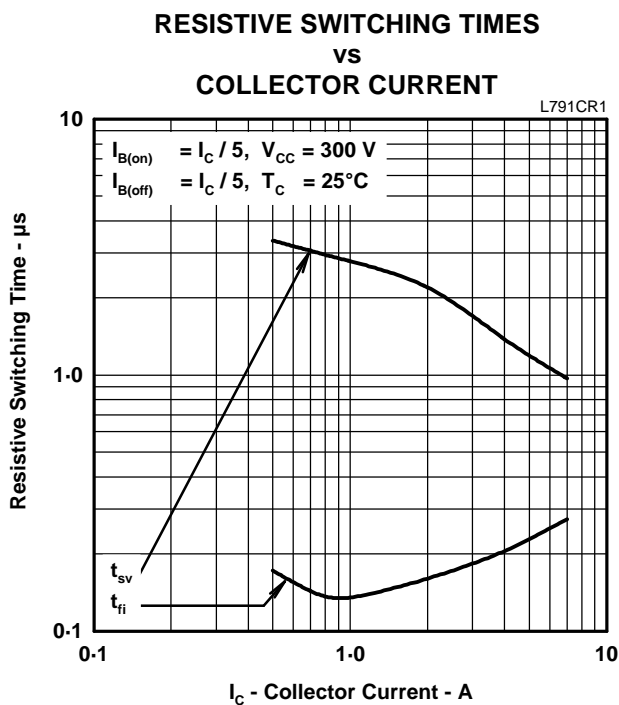


Figure 7.

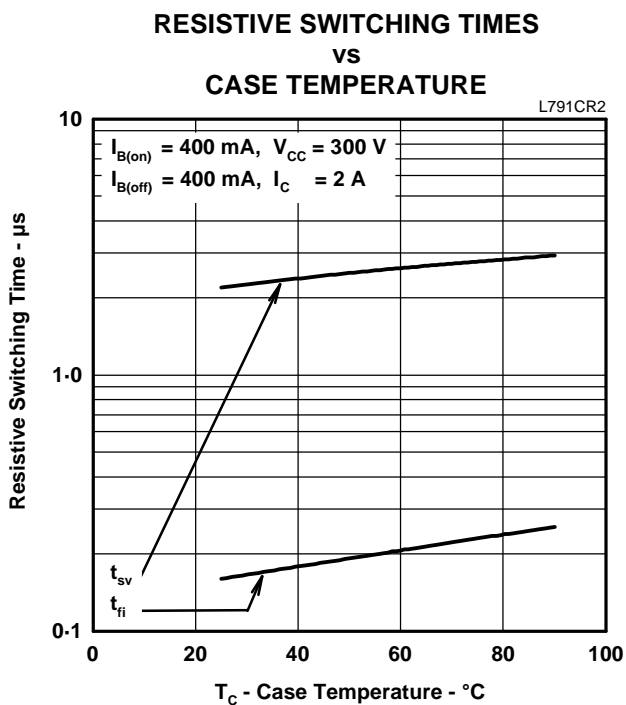


Figure 8.

MAXIMUM SAFE OPERATING REGIONS

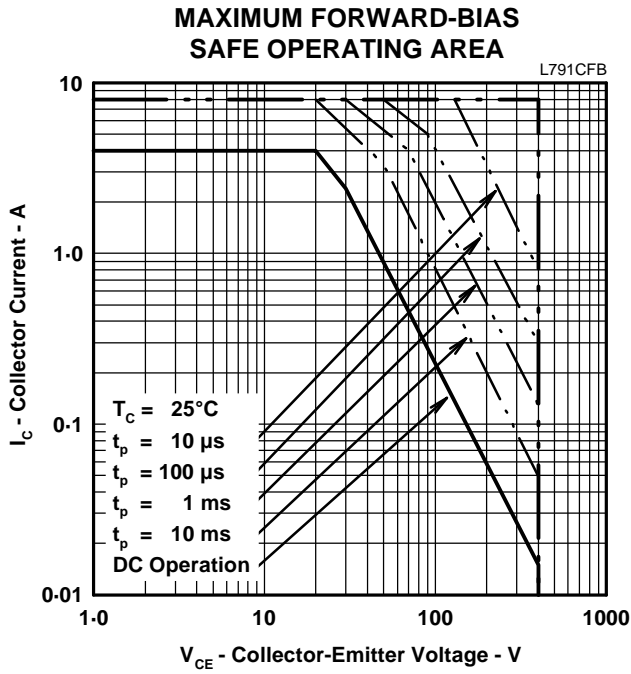


Figure 9.

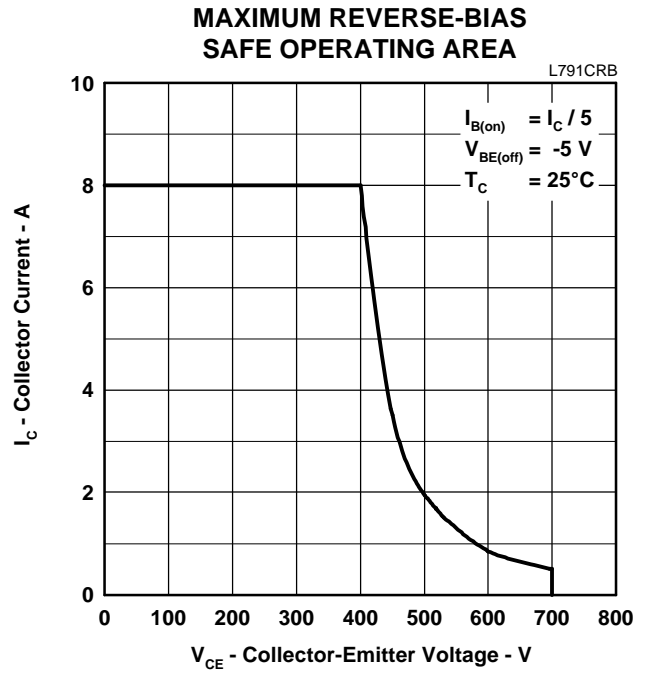


Figure 10.

BUL791 NPN SILICON POWER TRANSISTOR

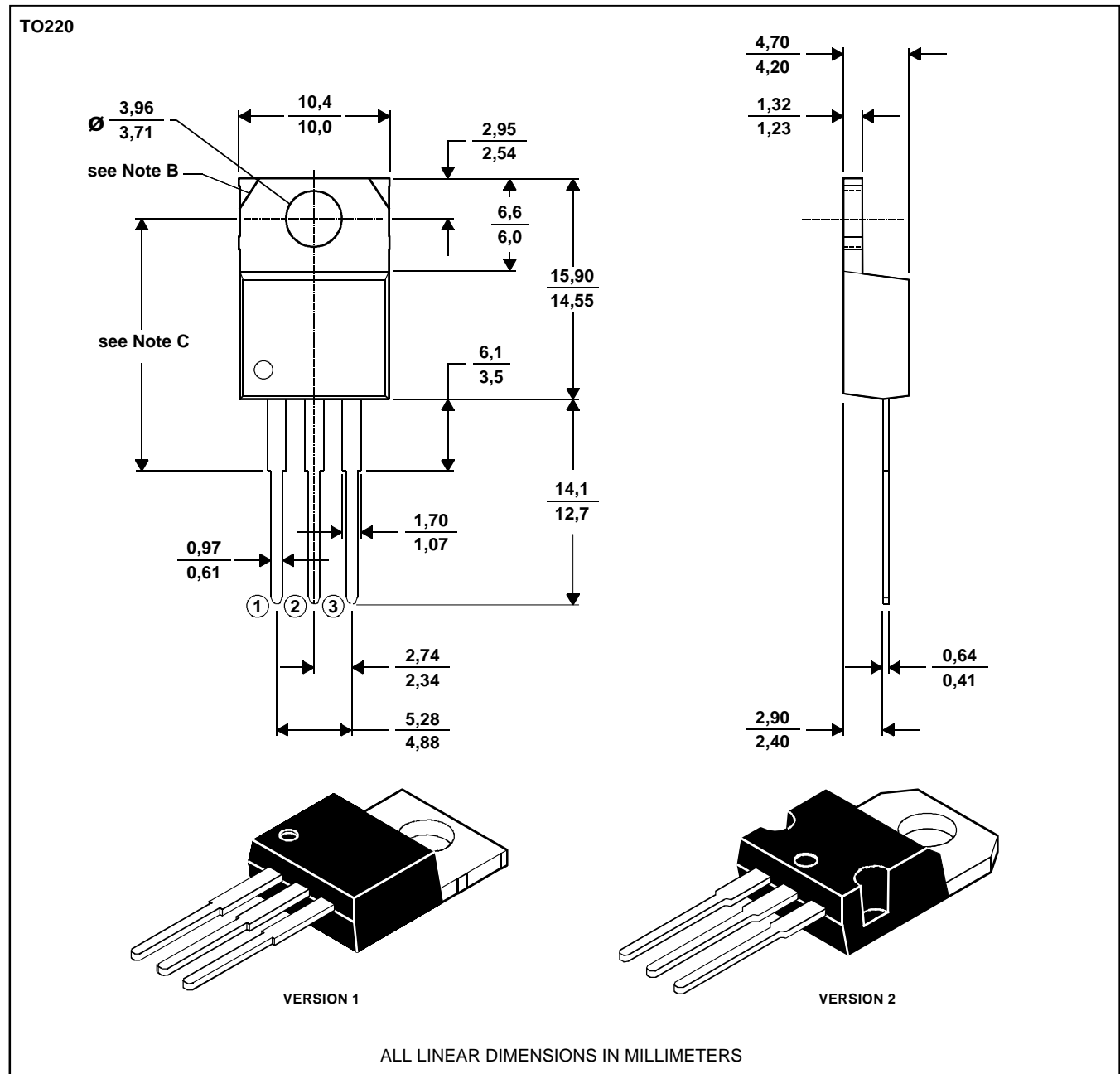
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MECHANICAL DATA

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

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