

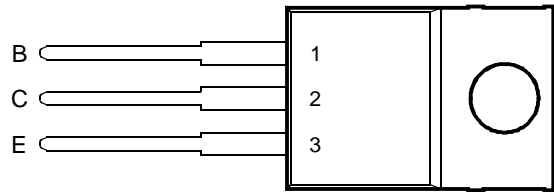
# BUL770 NPN SILICON POWER TRANSISTOR

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JULY 1991 - REVISED SEPTEMBER 1997

- **Designed Specifically for High Frequency Electronic Ballasts up to 50 W**
- **$h_{FE}$  7 to 21 at  $V_{CE} = 1\text{ V}$ ,  $I_C = 800\text{ mA}$**
- **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.

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### 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	$I_C$	2.5	A
Peak collector current (see Note 1)	$I_{CM}$	6	A
Peak collector current (see Note 2)	$I_{CM}$	8	A
Continuous base current	$I_B$	1.5	A
Peak base current (see Note 2)	$I_{BM}$	2.5	A
Continuous device dissipation at (or below) 25°C case temperature	$P_{tot}$	50	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.



# BUL770

## NPN SILICON POWER TRANSISTOR

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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 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	$\mu\text{A}$
$I_{EBO}$ Emitter cut-off current	$V_{EB} = 9 \text{ V}$ $I_C = 0$			1	mA
$V_{BE(sat)}$ Base-emitter saturation voltage	$I_B = 160 \text{ mA}$ $I_C = 800 \text{ mA}$ (see Notes 4 and 5) $I_B = 160 \text{ mA}$ $I_C = 800 \text{ mA}$ $T_C = 90^\circ\text{C}$		0.83 0.75	0.9	V
$V_{CE(sat)}$ Collector-emitter saturation voltage	$I_B = 160 \text{ mA}$ $I_C = 800 \text{ mA}$ (see Notes 4 and 5) $I_B = 160 \text{ mA}$ $I_C = 800 \text{ mA}$ $T_C = 90^\circ\text{C}$		0.18 0.22	0.25	V
$h_{FE}$ Forward current transfer ratio	$V_{CE} = 1 \text{ V}$ $I_C = 10 \text{ mA}$ $V_{CE} = 1 \text{ V}$ $I_C = 800 \text{ mA}$ $V_{CE} = 5 \text{ V}$ $I_C = 3.2 \text{ A}$	10 7 2	18.5 14.5 7.5	21 14	
$V_{FCB}$ Collector-base forward bias diode voltage	$I_{CB} = 60 \text{ mA}$		870		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			2.5	$^\circ\text{C/W}$

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

PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNIT
$t_{sv}$ Storage time	$I_C = 800 \text{ mA}$ $I_{B(on)} = 160 \text{ mA}$ $V_{CC} = 40 \text{ V}$ $L = 1 \text{ mH}$ $I_{B(off)} = 320 \text{ mA}$ $V_{CLAMP} = 300 \text{ V}$		2.5	3	$\mu\text{s}$
$t_{fi}$ Current fall time			150	190	ns
$t_{xo}$ Cross over time				300	400
$t_{sv}$ Storage time	$I_C = 800 \text{ mA}$ $I_{B(on)} = 160 \text{ mA}$ $V_{CC} = 40 \text{ V}$ $L = 1 \text{ mH}$ $I_{B(off)} = 100 \text{ mA}$ $V_{CLAMP} = 300 \text{ V}$		4.3	5	$\mu\text{s}$
$t_{fi}$ Current fall time				140	200

### resistive-load switching characteristics at 25°C case temperature

PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNIT
$t_{sv}$ Storage time	$I_C = 800 \text{ mA}$ $I_{B(on)} = 160 \text{ mA}$ $V_{CC} = 300 \text{ V}$ $I_{B(off)} = 160 \text{ mA}$		2.5	3.4	$\mu\text{s}$
$t_{fi}$ Current fall time				150	250

TYPICAL CHARACTERISTICS

FORWARD CURRENT TRANSFER RATIO  
vs  
COLLECTOR CURRENT

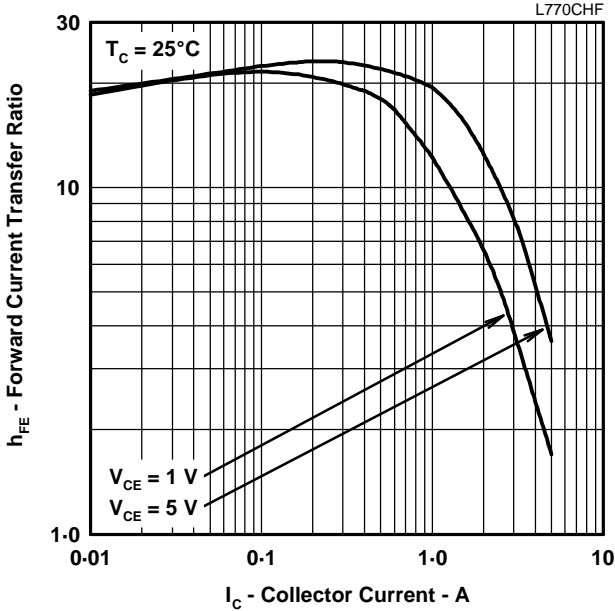


Figure 1.

COLLECTOR-EMITTER SATURATION VOLTAGE  
vs  
COLLECTOR CURRENT

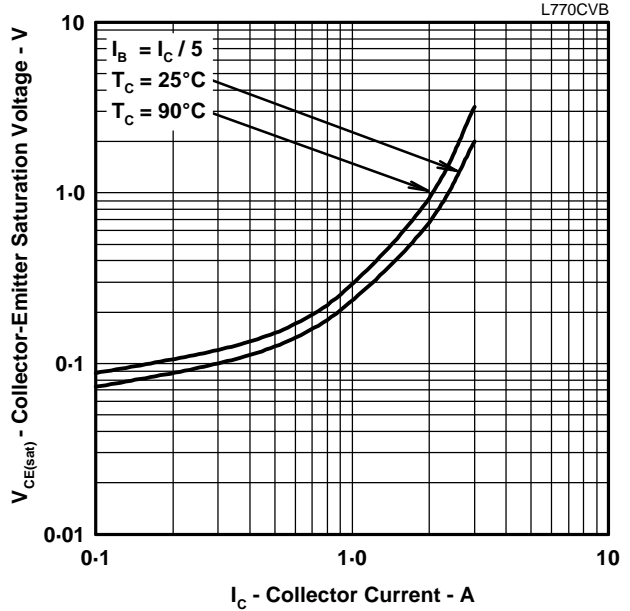


Figure 2.

INDUCTIVE SWITCHING TIMES  
vs  
COLLECTOR CURRENT

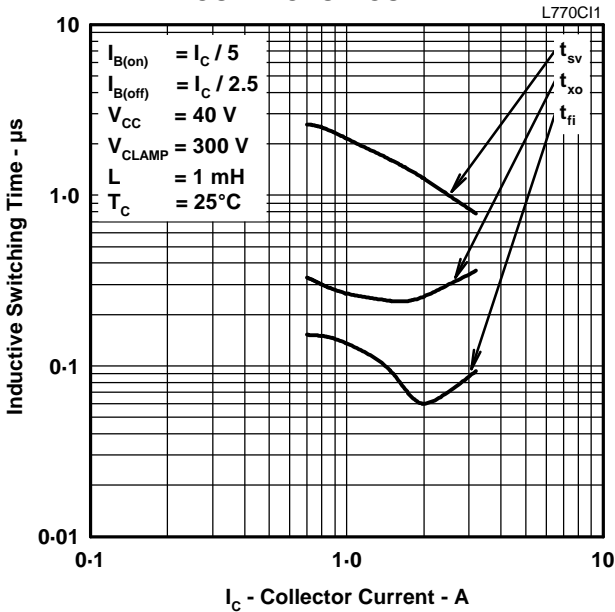


Figure 3.

INDUCTIVE SWITCHING TIMES  
vs  
CASE TEMPERATURE

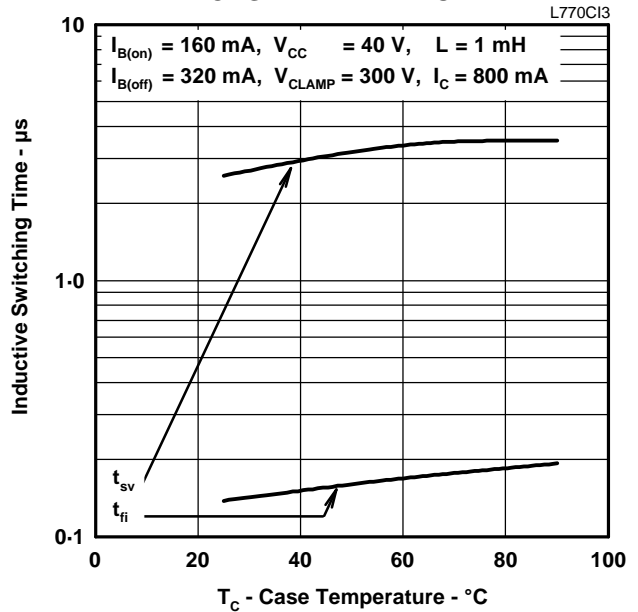


Figure 4.

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## TYPICAL CHARACTERISTICS

**INDUCTIVE SWITCHING TIMES  
VS  
COLLECTOR CURRENT**

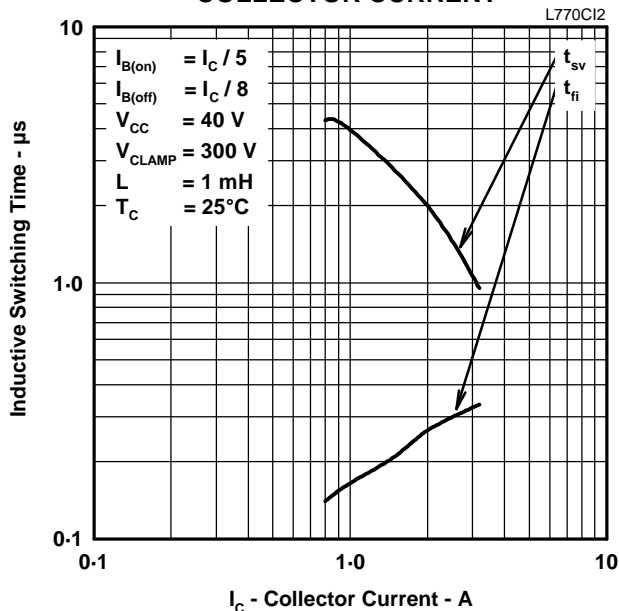


Figure 5.

**INDUCTIVE SWITCHING TIMES  
VS  
CASE TEMPERATURE**

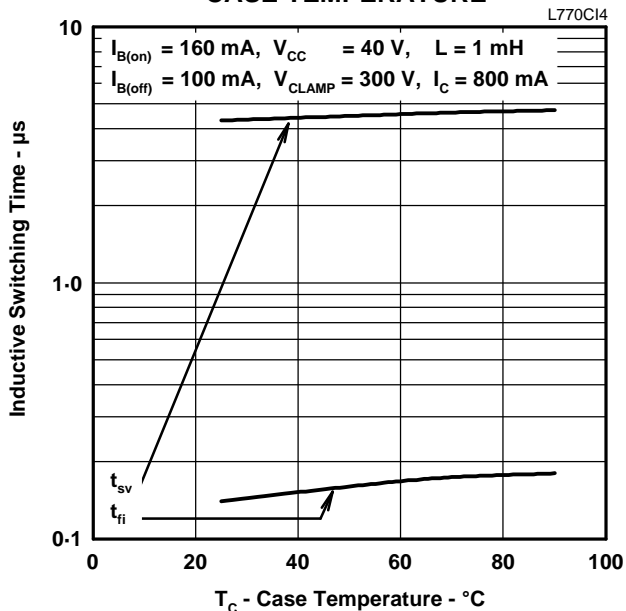


Figure 6.

**RESISTIVE SWITCHING TIMES  
VS  
COLLECTOR CURRENT**

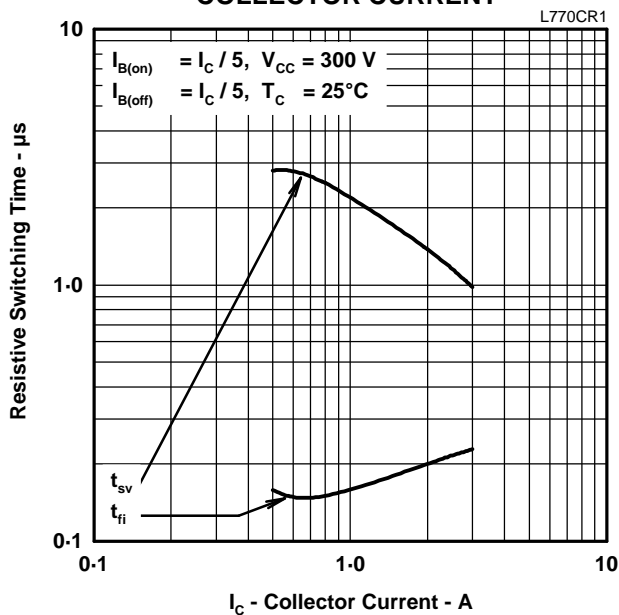


Figure 7.

**RESISTIVE SWITCHING TIMES  
VS  
CASE TEMPERATURE**

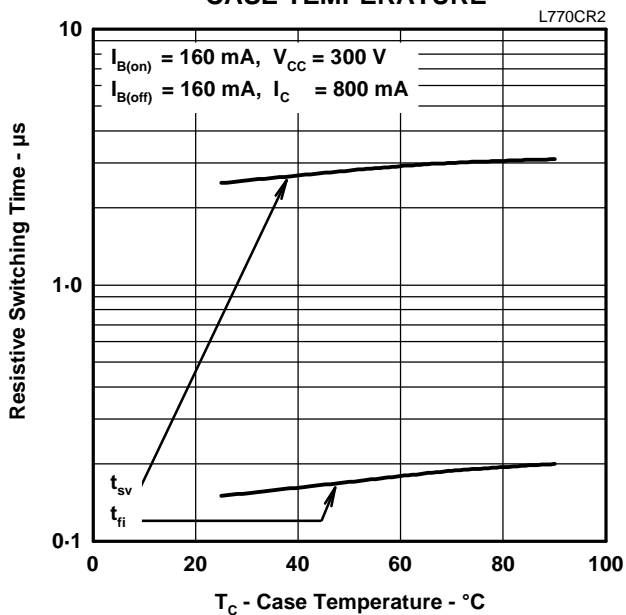
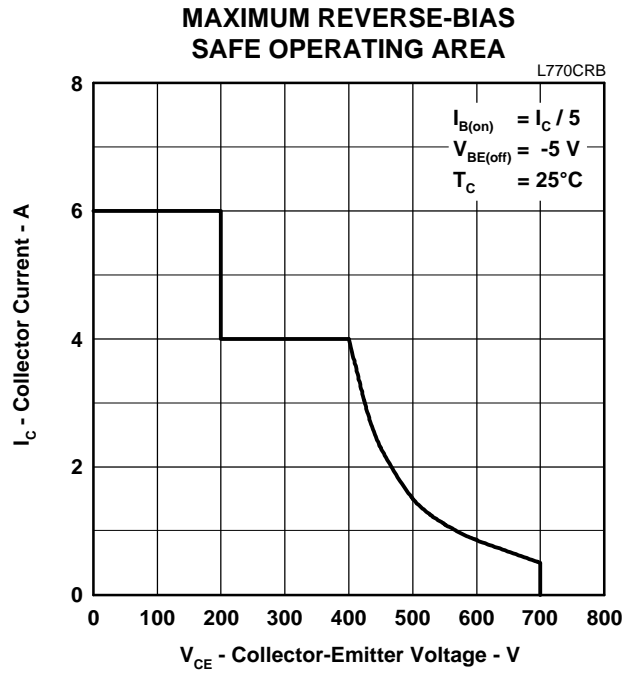
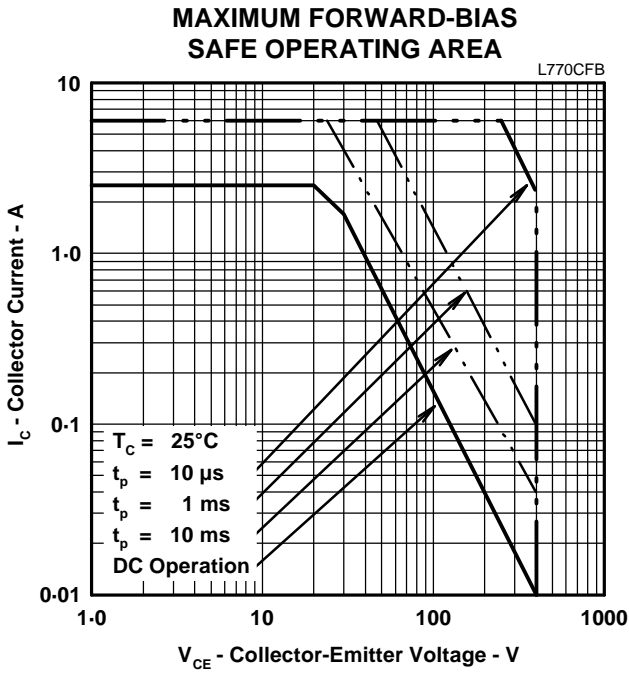


Figure 8.

MAXIMUM SAFE OPERATING REGIONS



# BUL770 NPN SILICON POWER TRANSISTOR

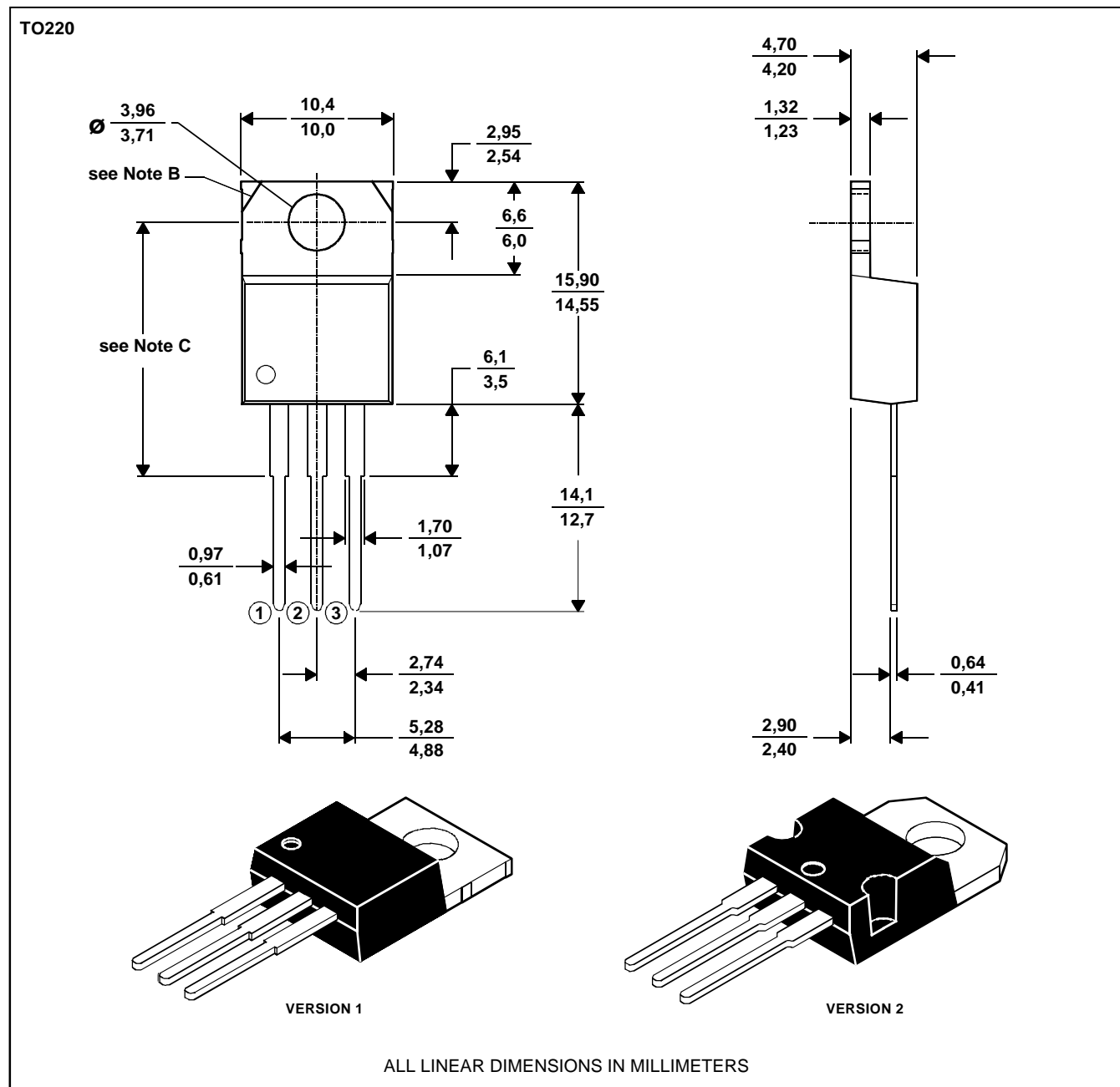
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## MECHANICAL DATA

### 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.

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## PRODUCT INFORMATION

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