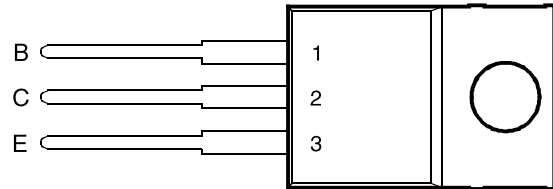


- **Designed Specifically for High Frequency Electronic Ballasts**
- **Integrated Fast t_{rr} Anti-Parallel Diode, Enhancing Reliability**
- **Diode t_{rr} Typically 1 μ s**
- **Tightly Controlled Transistor Storage Times**
- **Voltage Matched Integrated Transistor and Diode**
- **Characteristics Optimised for Cool Running**
- **Diode-Transistor Charge Coupling Minimised to Enhance Frequency Stability**

description

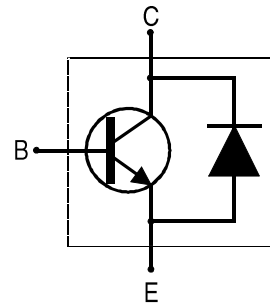
The new BULDxx range of transistors have been designed specifically for use in High Frequency Electronic Ballasts (HFEB's). This range of switching transistors has tightly controlled storage times and an integrated fast t_{rr} anti-parallel diode. The revolutionary design ensures that the diode has both fast forward and reverse recovery times, achieving the same performance as a discrete anti-parallel diode plus transistor. The integrated diode has minimal charge coupling with the transistor, increasing frequency stability, especially in lower power circuits where the circulating currents are low. By design, this new device offers a voltage matched integrated transistor and anti-parallel diode.

TO-220 PACKAGE
(TOP VIEW)



Pin 2 is in electrical contact with the mounting base.

device symbol



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

RATING	SYMBOL	VALUE	UNIT
Collector-emitter voltage ($V_{BE} = 0$)	V_{CES}	600	V
Collector-base voltage ($I_E = 0$)	V_{CBO}	600	V
Collector-emitter voltage ($I_B = 0$)	V_{CEO}	400	V
Emitter-base voltage	V_{EBO}	9	V
Continuous collector current	I_C	8	A
Peak collector current (see Note 1)	I_{CM}	12	A
Continuous base current	I_B	4	A
Peak base current (see Note 1)	I_{BM}	6	A
Continuous device dissipation at (or below) 25°C case temperature	P_{tot}	85	W
Maximum average continuous diode forward current at (or below) 25°C case temperature	$I_{E(av)}$	0.5	A
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 $t_p = 10$ ms, duty cycle $\leq 2\%$.

BUL791

NPN SILICON POWER TRANSISTOR

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

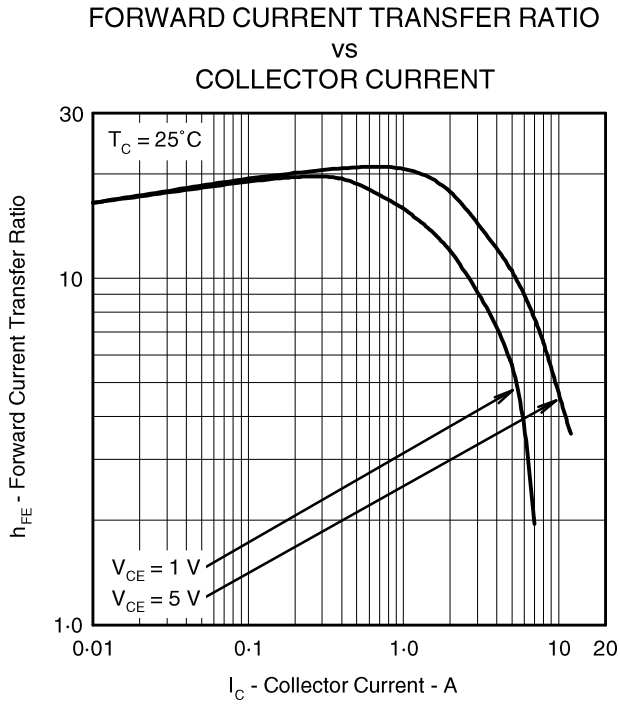


Figure 1.

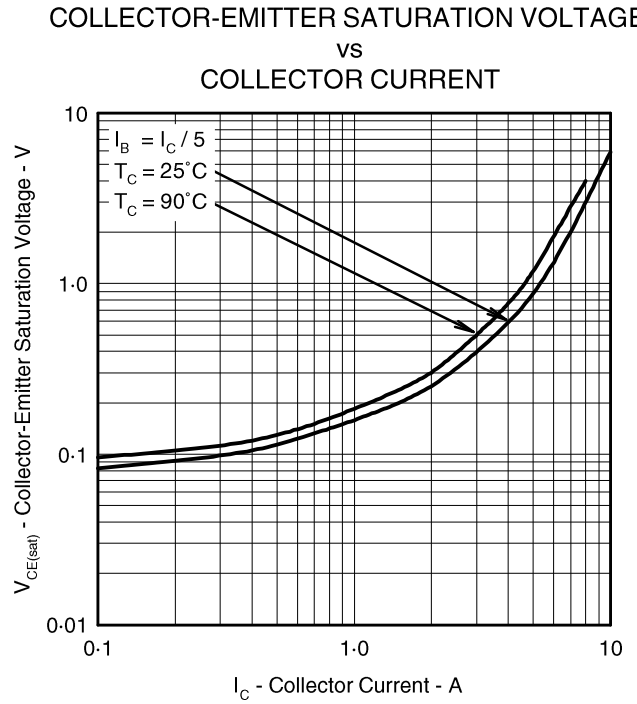


Figure 2.

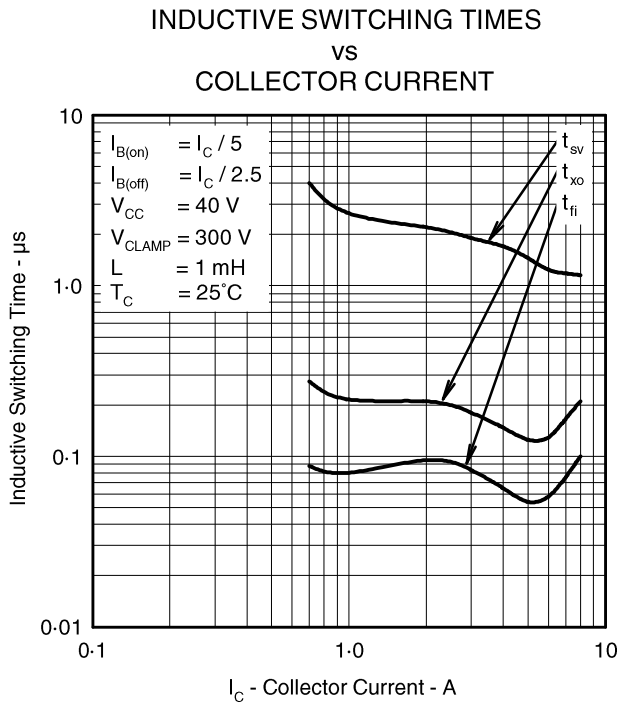


Figure 3.

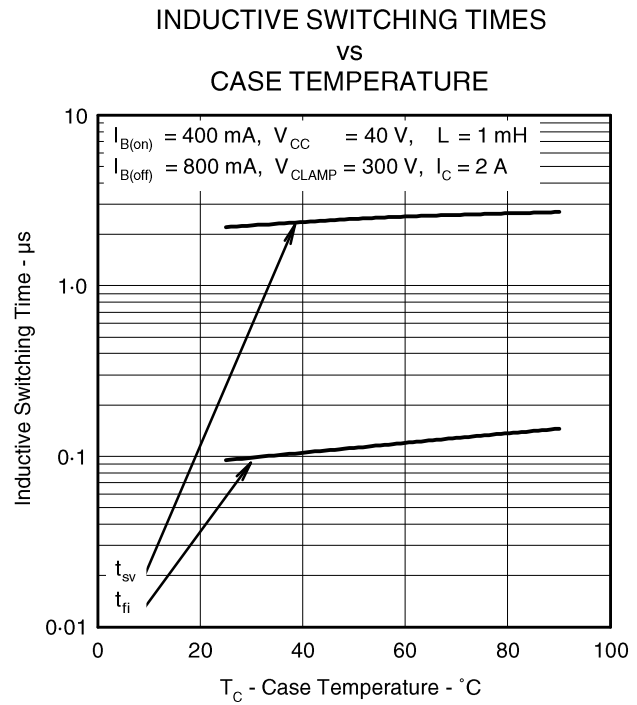


Figure 4.

TYPICAL CHARACTERISTICS

INDUCTIVE SWITCHING TIMES
 VS
 COLLECTOR CURRENT

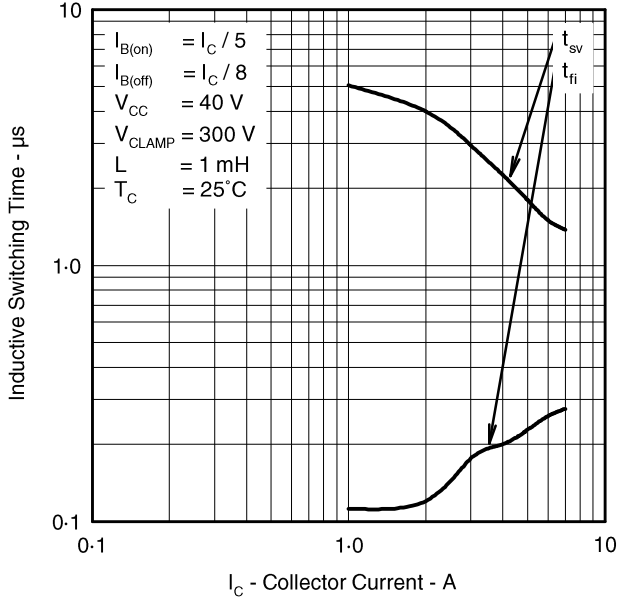


Figure 5.

INDUCTIVE SWITCHING TIMES
 VS
 CASE TEMPERATURE

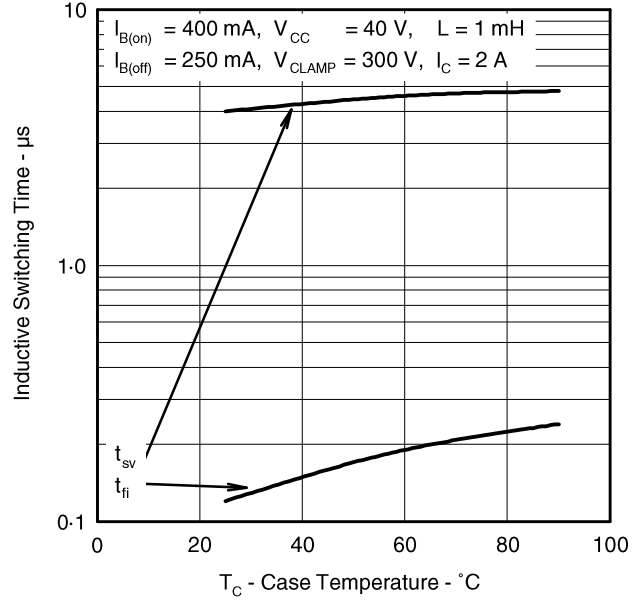


Figure 6.

RESISTIVE SWITCHING TIMES
 VS
 COLLECTOR CURRENT

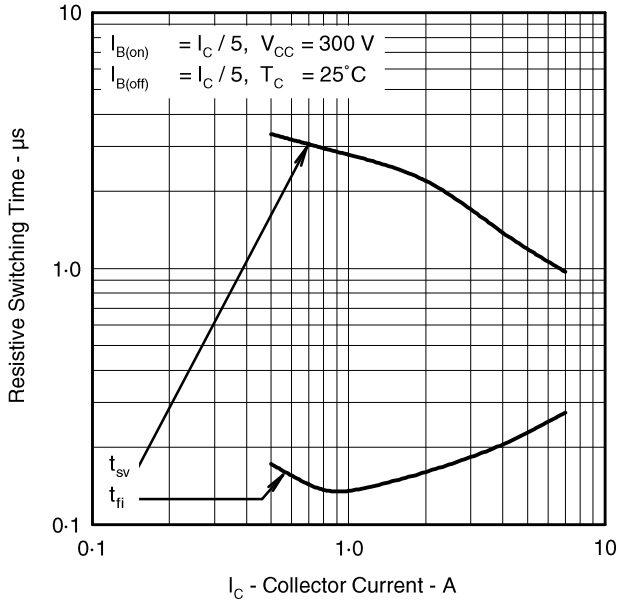


Figure 7.

RESISTIVE SWITCHING TIMES
 VS
 CASE TEMPERATURE

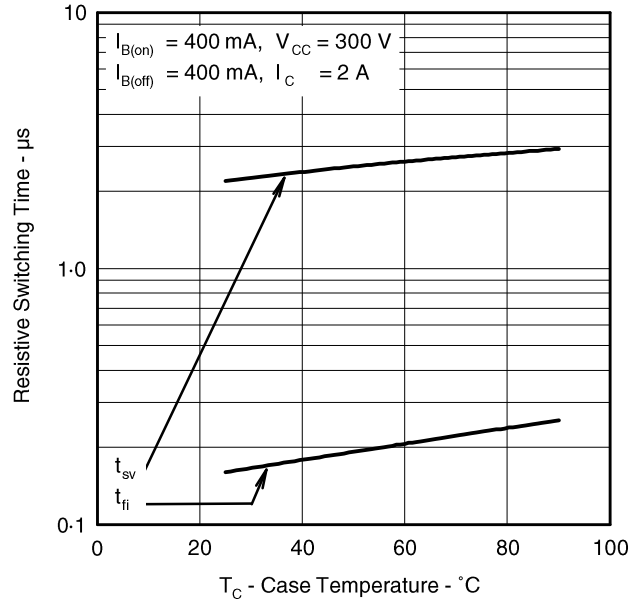


Figure 8.

MAXIMUM SAFE OPERATING REGIONS

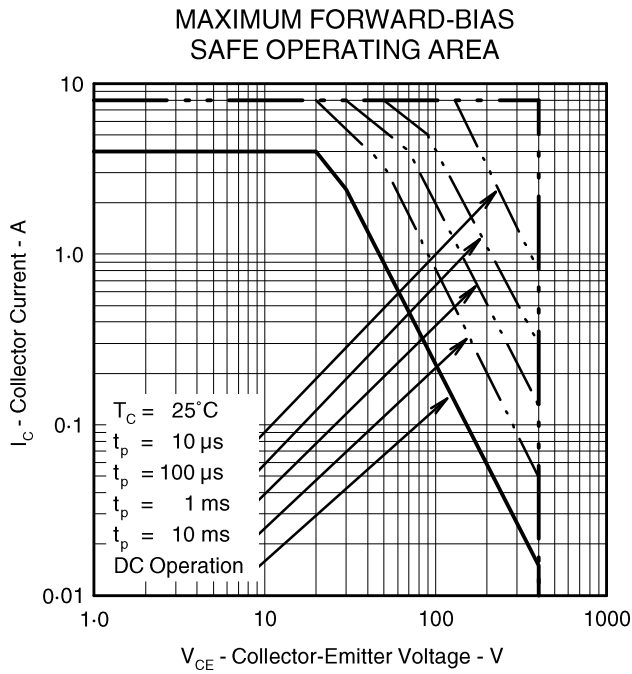


Figure 9.

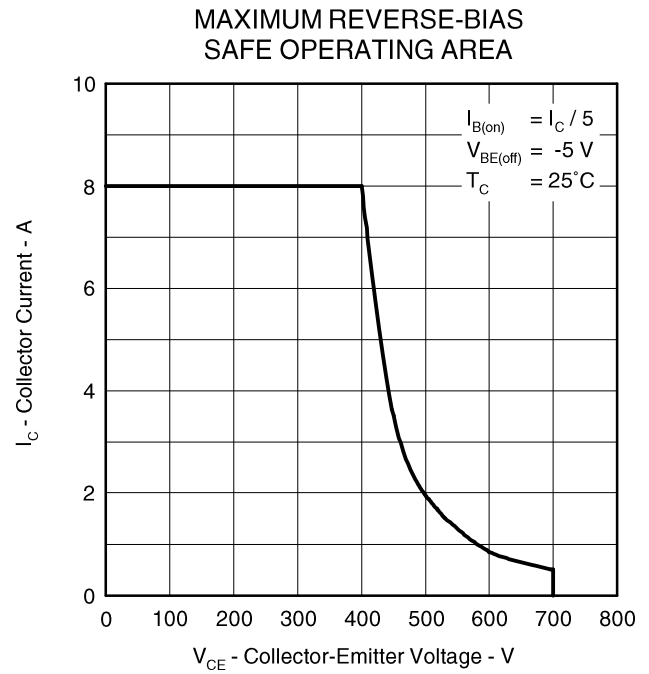


Figure 10.

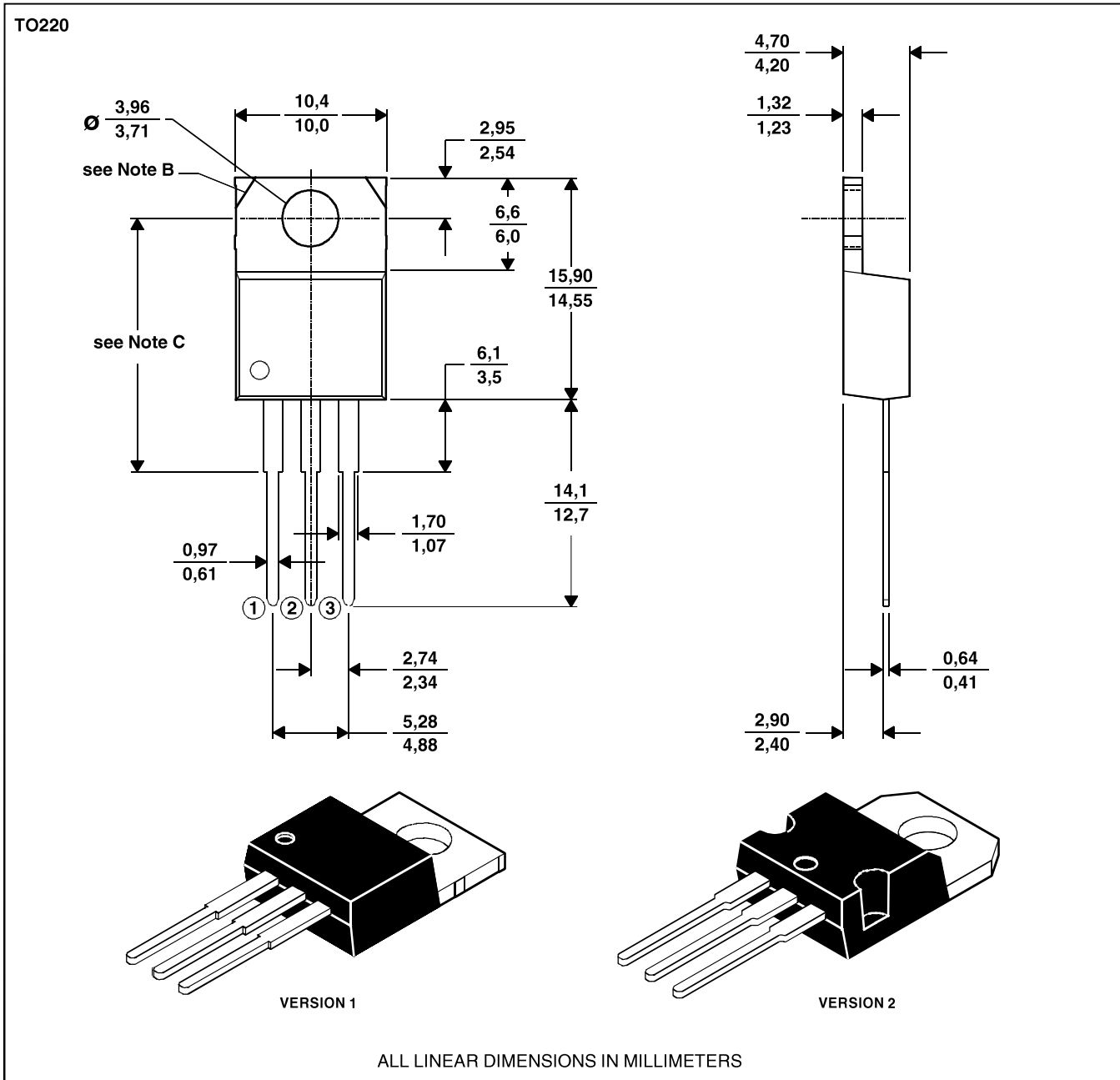
BUL791 NPN SILICON POWER TRANSISTOR

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.