

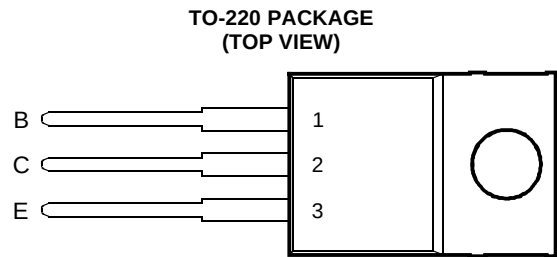
BUT11

NPN SILICON POWER TRANSISTOR

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MAY 1989 - REVISED MARCH 1997

- Rugged Triple-Diffused Planar Construction
- 100 W at 25°C Case Temperature
- 5 A Continuous Collector Current



MDTRACA

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

RATING	SYMBOL	VALUE	UNIT
Collector-base voltage ($I_E = 0$)	V_{CBO}	850	V
Collector-emitter voltage ($V_{BE} = 0$)	V_{CES}	850	V
Collector-emitter voltage ($I_B = 0$)	V_{CEO}	400	V
Emitter-base voltage	V_{EBO}	10	V
Continuous collector current	I_C	5	A
Peak collector current (see Note 1)	I_{CM}	10	A
Continuous device dissipation at (or below) 25°C case temperature	P_{tot}	100	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.



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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	$I_C = 0.1\text{ A}$ $L = 25\text{ mH}$ (see Note 2)	400			V
I_{CES} Collector-emitter cut-off current	$V_{CE} = 850\text{ V}$ $V_{BE} = 0$ $V_{CE} = 850\text{ V}$ $V_{BE} = 0$ $T_C = 125^\circ\text{C}$			50 500	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	$I_B = 0.6\text{ A}$ $I_C = 3\text{ A}$ (see Notes 3 and 4)			1.5	V
$V_{BE(sat)}$ Base-emitter saturation voltage	$I_B = 0.6\text{ A}$ $I_C = 3\text{ A}$ (see Notes 3 and 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, $t_p = 300\text{ }\mu\text{s}$, 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			1.25	$^\circ\text{C/W}$

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

PARAMETER	TEST CONDITIONS [†]	MIN	TYP	MAX	UNIT
t_{sv} Voltage storage time	$I_C = 3\text{ A}$ $I_{B(on)} = 0.6\text{ A}$ $V_{BE(off)} = -5\text{ V}$ (see Figures 1 and 2)			1.4	μs
t_{fi} Current fall time	$V_{CC} = 50\text{ V}$			150	ns
t_{sv} Voltage storage time	$I_C = 3\text{ A}$ $I_{B(on)} = 0.6\text{ A}$ $V_{BE(off)} = -5\text{ V}$			1.5	μs
t_{fi} Current fall time	$V_{CC} = 50\text{ V}$ $T_C = 100^\circ\text{C}$			300	ns

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

PRODUCT INFORMATION

[illegible]

The diagram shows three vertically aligned waveforms for a BJT switching circuit. The top waveform is the Base Current (I_B), which starts at a low level, rises to a plateau at $I_{B(on)}$, and then falls back to the low level. The middle waveform is the Collector Voltage (V_{CE}), which starts at a high level, drops to a minimum during the base current plateau, and then rises back to the high level. The bottom waveform is the Collector Current (I_C), which starts at a low level, rises to a peak during the base current plateau, and then falls back to the low level. A vertical dashed line marks the start of the base current fall. Points A, B, C, D, E, and F are marked on the waveforms with their corresponding percentages: A (90%) on I_B , B (10%) on V_{CE} , C (90%) on I_C , D (90%) on I_C , E (10%) on I_C , and F (2%) on I_C . The time intervals between these points are labeled as t_{sv} , t_{rv} , t_{fi} , t_{ti} , and t_{xo} .

Base Current

Collector Voltage

Collector Current

A (90%)

B (10%)

C (90%)

D (90%)

E (10%)

F (2%)

$I_{B(on)}$

I_B

V_{CE}

$I_{C(on)}$

A - B = t_{sv}

B - C = t_{rv}

D - E = t_{fi}

E - F = t_{ti}

B - E = t_{xo}

Figure 2. Inductive-Load Switching Waveforms

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MAXIMUM SAFE OPERATING REGIONS

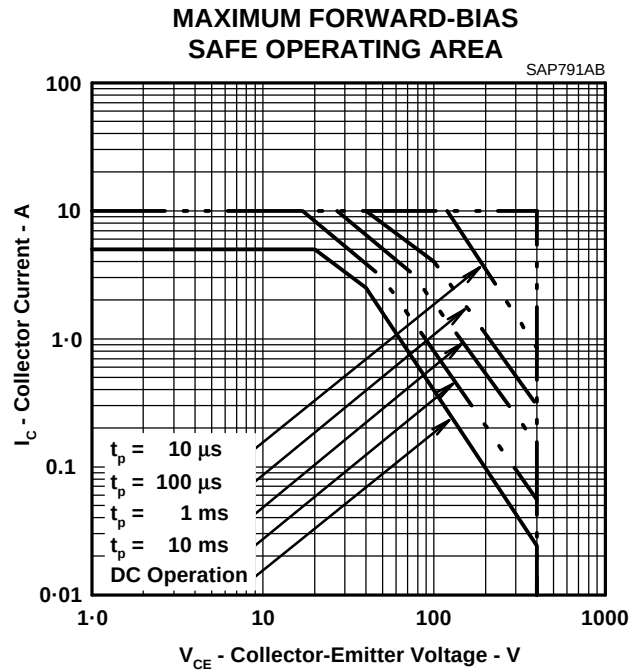


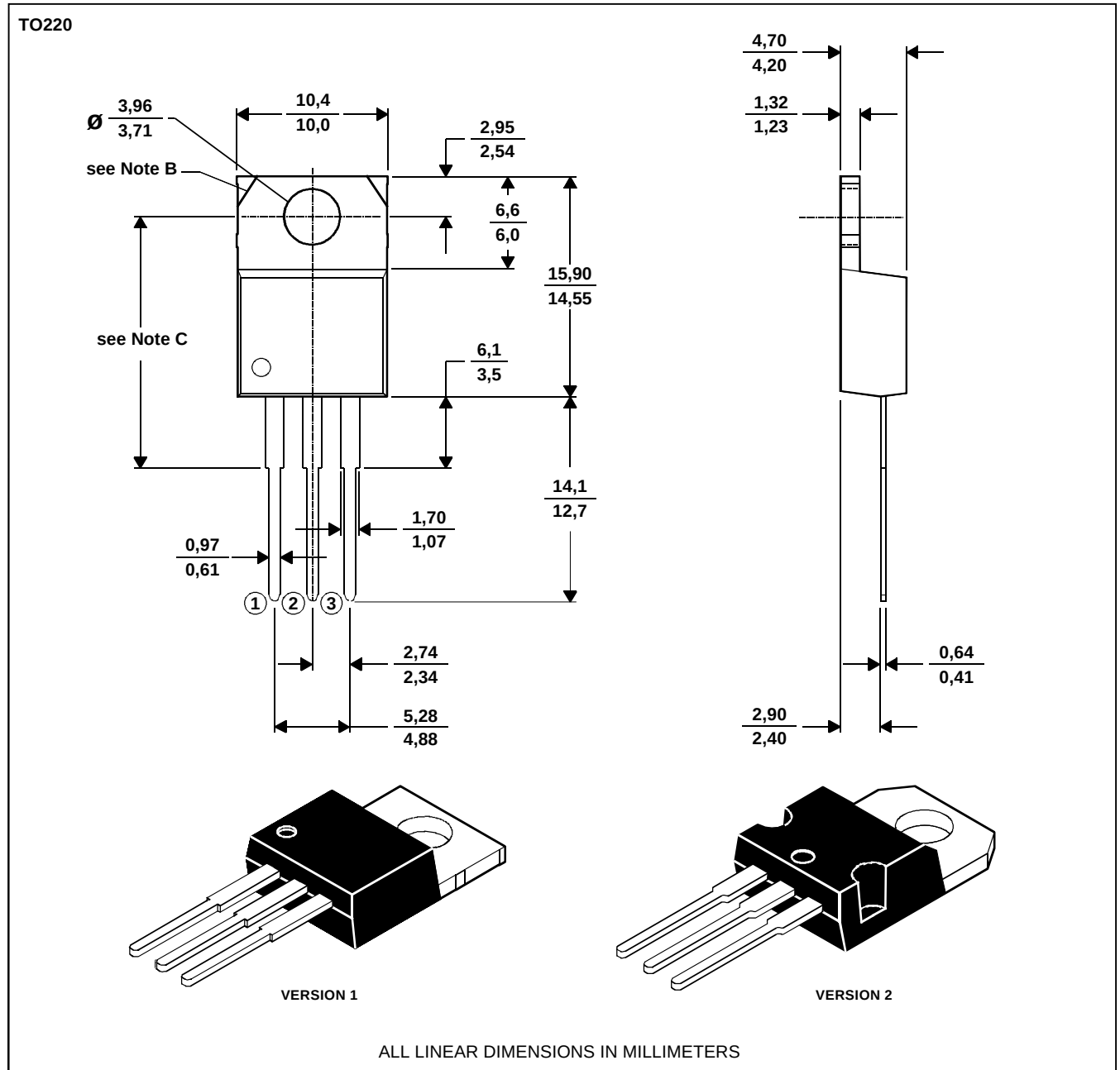
Figure 3.

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

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