

# BU406, BU407

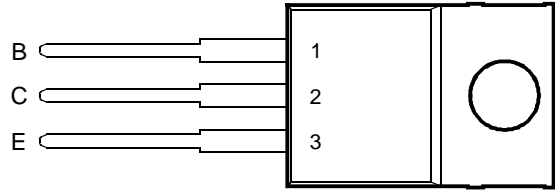
## NPN SILICON POWER TRANSISTORS

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AUGUST 1978 - REVISED MARCH 1997

- 7 A Continuous Collector Current
- 15 A Peak Collector Current
- 60 W at 25°C Case Temperature

TO-220 PACKAGE  
(TOP VIEW)



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 ( $I_E = 0$ )	BU406	$V_{CBO}$	400	V
	BU407		330	
Collector-emitter voltage ( $V_{BE} = -2$ V)	BU406	$V_{CEX}$	400	V
	BU407		330	
Collector-emitter voltage ( $I_B = 0$ )	BU406	$V_{CEO}$	200	V
	BU407		150	
Emitter-base voltage		$V_{EB}$	6	V
Continuous collector current		$I_C$	7	A
Peak collector current (see Note 1)		$I_{CM}$	15	A
Continuous base current		$I_B$	4	A
Continuous device dissipation at (or below) 25°C case temperature		$P_{tot}$	60	W
Operating junction temperature range		$T_j$	-55 to +150	°C
Storage temperature range		$T_{stg}$	-55 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
$V_{(BR)CEO}$ Collector-emitter breakdown voltage	$I_C = 30 \text{ mA}$ $I_B = 0$	140			V
$I_{CES}$ Collector-emitter cut-off current	$V_{CE} = 400 \text{ V}$ $V_{BE} = 0$ BU406			5	mA
	$V_{CE} = 330 \text{ V}$ $V_{BE} = 0$ BU407			5	
	$V_{CE} = 250 \text{ V}$ $V_{BE} = 0$ BU406			0.1	
	$V_{CE} = 200 \text{ V}$ $V_{BE} = 0$ BU407			0.1	
	$V_{CE} = 250 \text{ V}$ $V_{BE} = 0$ $T_C = 150^\circ\text{C}$ BU406			1	
	$V_{CE} = 200 \text{ V}$ $V_{BE} = 0$ $T_C = 150^\circ\text{C}$ BU407			1	
$I_{EBO}$ Emitter cut-off current	$V_{EB} = 6 \text{ V}$ $I_C = 0$			1	mA
$h_{FE}$ Forward current transfer ratio	$V_{CE} = 10 \text{ V}$ $I_C = 4 \text{ A}$ (see Notes 2 and 3)	12			
	$V_{CE} = 10 \text{ V}$ $I_C = 0.5 \text{ A}$	20			
$V_{CE(sat)}$ Collector-emitter saturation voltage	$I_B = 0.5 \text{ A}$ $I_C = 5 \text{ A}$ (see Notes 2 and 3)			1	V
$V_{BE(sat)}$ Base-emitter saturation voltage	$I_B = 0.5 \text{ A}$ $I_C = 5 \text{ A}$ (see Notes 2 and 3)			1.2	V
$f_t$ Current gain bandwidth product	$V_{CE} = 5 \text{ V}$ $I_C = 0.5 \text{ A}$ $f = 1 \text{ MHz}$ (see Note 4)		6		MHz
$C_{ob}$ Output capacitance	$V_{CB} = 20 \text{ V}$ $I_E = 0$ $f = 1 \text{ MHz}$		60		pF

NOTES: 2. These parameters must be measured using pulse techniques,  $t_p = 300 \mu\text{s}$ , duty cycle  $\leq 2\%$ .

3. These parameters must be measured using voltage-sensing contacts, separate from the current carrying contacts.

4. To obtain  $f_t$  the  $[h_{FE}]$  response is extrapolated at the rate of -6 dB per octave from  $f = 1 \text{ MHz}$  to the frequency at which  $[h_{FE}] = 1$ .

### thermal characteristics

PARAMETER	MIN	TYP	MAX	UNIT
$R_{\theta JC}$ Junction to case thermal resistance			2.08	$^\circ\text{C/W}$
$R_{\theta JA}$ Junction to free air thermal resistance			70	$^\circ\text{C/W}$

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

PARAMETER	TEST CONDITIONS <sup>†</sup>	MIN	TYP	MAX	UNIT
$t_s$ Storage time	$I_C = 5 \text{ A}$ $I_{B(end)} = 0.5 \text{ A}$ (see Figures 1 and 2)		2.7		$\mu\text{s}$
$t_{(off)}$ Turn off time				750	ns

<sup>†</sup> Voltage and current values shown are nominal; exact values vary slightly with transistor parameters.

## PRODUCT INFORMATION

The timing diagram illustrates the switching characteristics of the 2N2222A transistor. The base current ( $I_B$ ) pulse is shown with a width of  $42 \mu\text{s}$  and a total duration of  $64 \mu\text{s}$ . The collector current ( $I_C$ ) pulse has a peak value of  $0.1 \text{ A}$  and a fall time  $t_{\text{off}}$ . The collector-emitter voltage ( $V_{\text{CE}}$ ) pulse has a peak value of  $V_{\text{fly}}$  and a base voltage of  $3 \text{ V}$ .

$t_{\text{off}}$  is the time for the collector current  $I_C$  to decrease to 0.1 A after the collector to emitter voltage  $V_{CE}$  has risen 3 V into its flyback excursion.

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TYPICAL CHARACTERISTICS

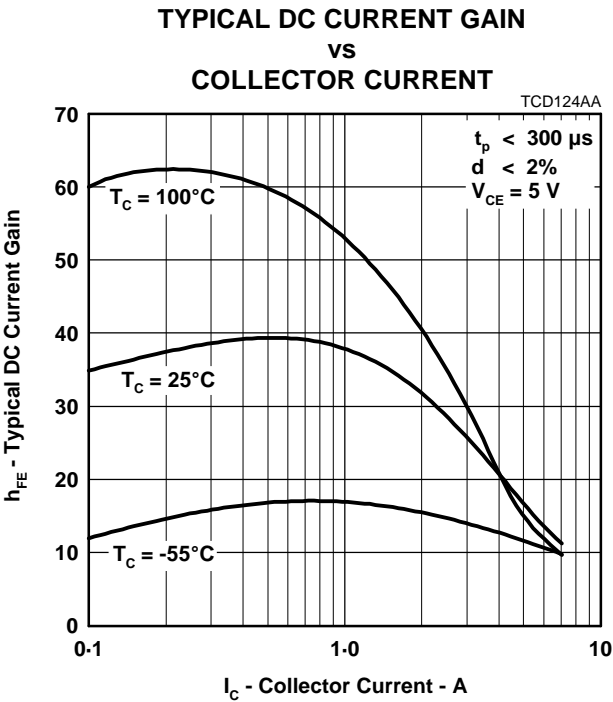


Figure 3.

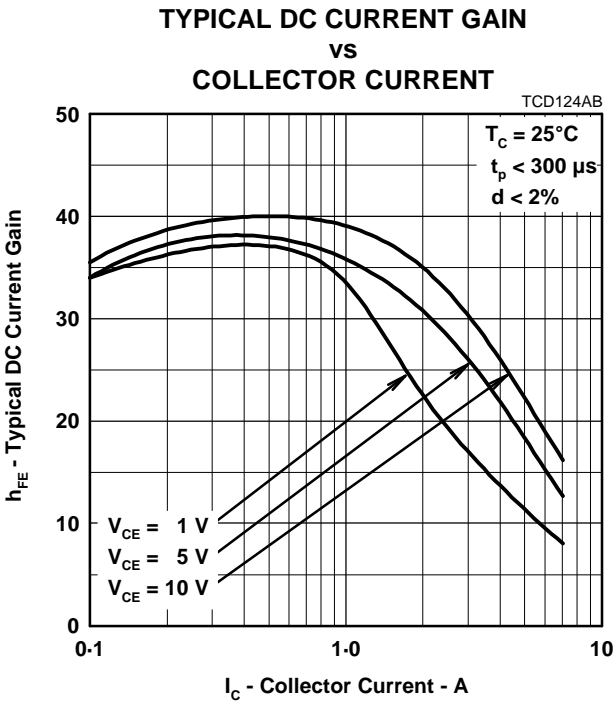


Figure 4.

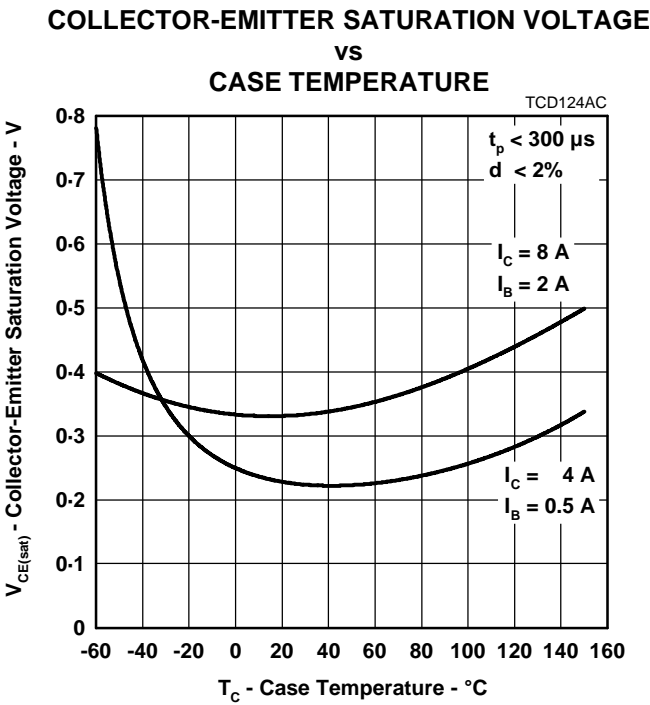


Figure 5.

MAXIMUM SAFE OPERATING REGIONS

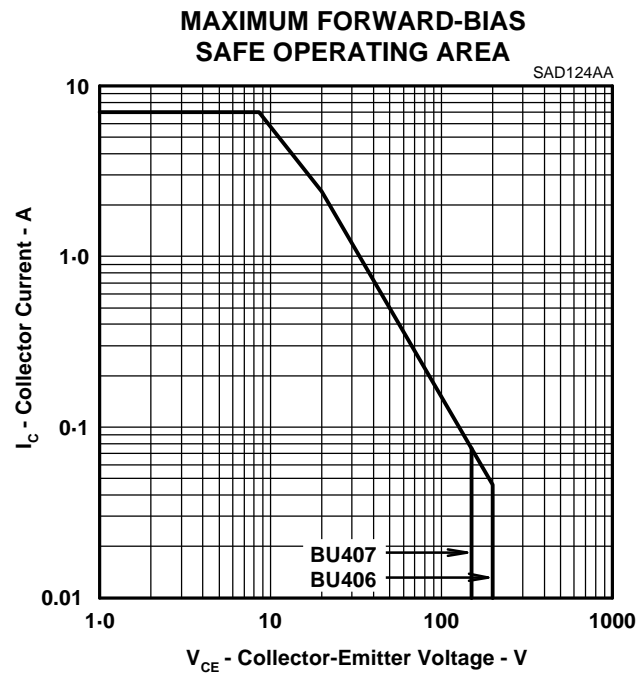


Figure 6.

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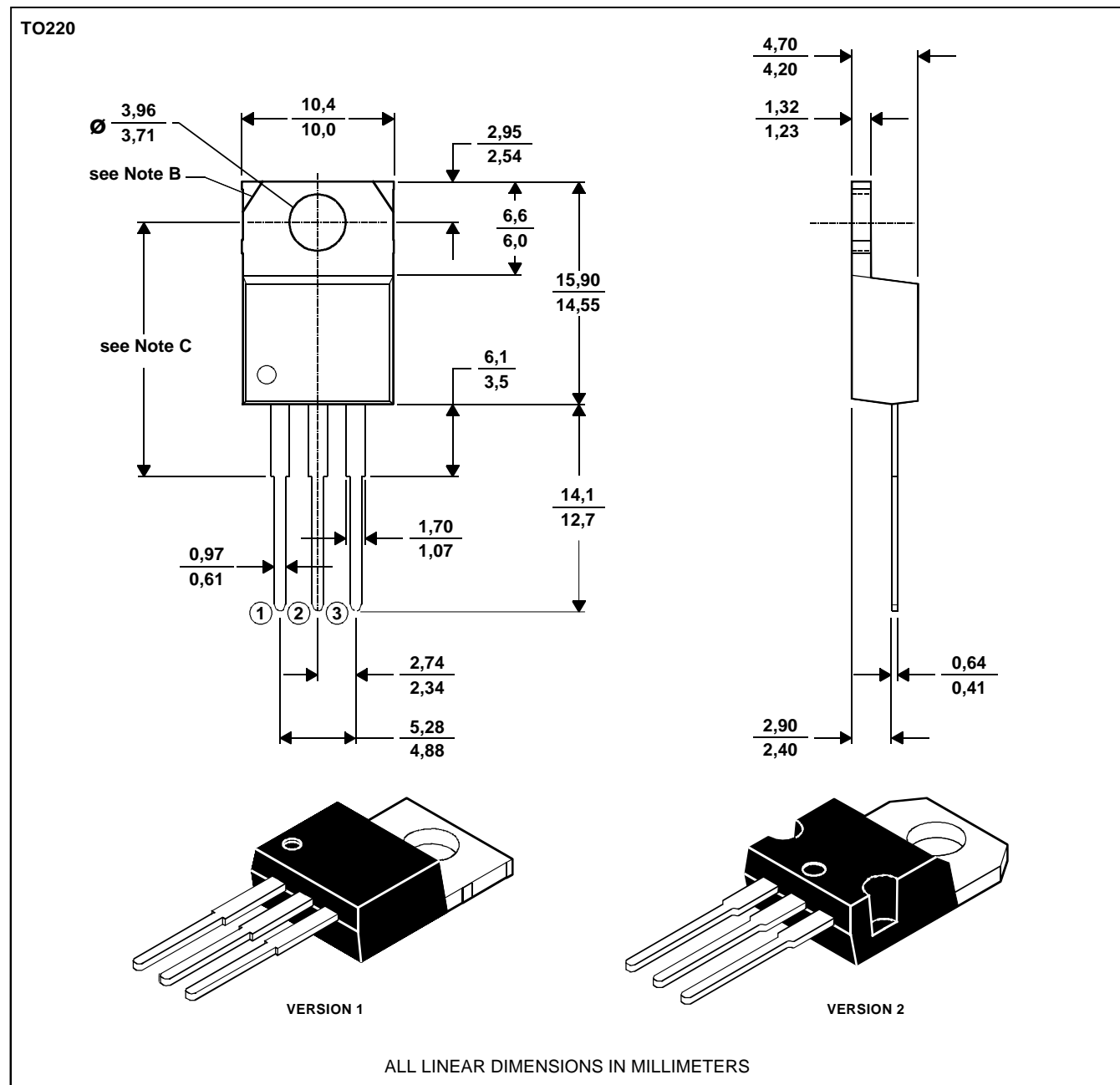
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### MECHANICAL DATA

#### 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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