

# DATA SHEET

**BUJ403A**

Silicon Diffused Power Transistor

Product specification

December 1998



## Silicon Diffused Power Transistor

BUJ403A

## GENERAL DESCRIPTION

High-voltage, high-speed planar-passivated npn power switching transistor in TO220AB envelope intended for use in high frequency electronic lighting ballast applications, converters, inverters, switching regulators, motor control systems, etc.

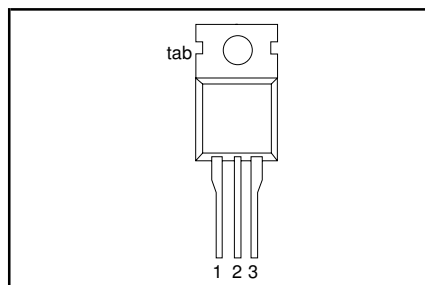
## QUICK REFERENCE DATA

| SYMBOL      | PARAMETER                             | CONDITIONS                                  | TYP. | MAX. | UNIT |
|-------------|---------------------------------------|---------------------------------------------|------|------|------|
| $V_{CESM}$  | Collector-emitter voltage peak value  | $V_{BE} = 0\text{ V}$                       | -    | 1200 | V    |
| $V_{CBO}$   | Collector-Base voltage (open emitter) |                                             | -    | 1200 | V    |
| $V_{CEO}$   | Collector-emitter voltage (open base) |                                             | -    | 550  | V    |
| $I_C$       | Collector current (DC)                |                                             | -    | 6    | A    |
| $I_{CM}$    | Collector current peak value          |                                             | -    | 10   | A    |
| $P_{tot}$   | Total power dissipation               | $T_{mb} \leq 25\text{ °C}$                  | -    | 100  | W    |
| $V_{CEsat}$ | Collector-emitter saturation voltage  | $I_C = 2\text{ A}; I_B = 0.4\text{ A}$      | 0.15 | 1.0  | V    |
| $h_{FEsat}$ | DC current gain                       | $I_C = 3\text{ A}; V_{CE} = 5\text{ V}$     | 15.5 | -    |      |
| $t_f$       | Fall time                             | $I_C = 2.5\text{ A}; I_{B1} = 0.5\text{ A}$ | 170  | 300  | ns   |

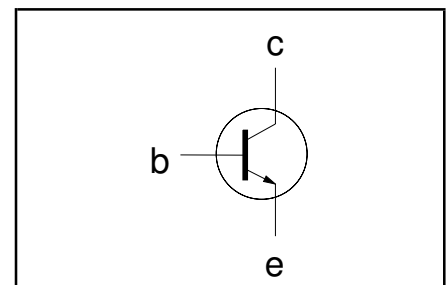
## PINNING - TO220AB

| PIN | DESCRIPTION |
|-----|-------------|
| 1   | base        |
| 2   | collector   |
| 3   | emitter     |
| tab | collector   |

## PIN CONFIGURATION



## SYMBOL



## LIMITING VALUES

Limiting values in accordance with the Absolute Maximum Rating System (IEC 134)

| SYMBOL     | PARAMETER                                | CONDITIONS                 | MIN. | MAX. | UNIT |
|------------|------------------------------------------|----------------------------|------|------|------|
| $V_{CESM}$ | Collector to emitter voltage             | $V_{BE} = 0\text{ V}$      | -    | 1200 | V    |
| $V_{CEO}$  | Collector to emitter voltage (open base) |                            | -    | 550  | V    |
| $V_{CBO}$  | Collector to base voltage (open emitter) |                            | -    | 1200 | V    |
| $I_C$      | Collector current (DC)                   |                            | -    | 6    | A    |
| $I_{CM}$   | Collector current peak value             |                            | -    | 10   | A    |
| $I_B$      | Base current (DC)                        |                            | -    | 3    | A    |
| $I_{BM}$   | Base current peak value                  |                            | -    | 5    | A    |
| $P_{tot}$  | Total power dissipation                  | $T_{mb} \leq 25\text{ °C}$ | -    | 100  | W    |
| $T_{stg}$  | Storage temperature                      |                            | -65  | 150  | °C   |
| $T_j$      | Junction temperature                     |                            | -    | 150  | °C   |

## THERMAL RESISTANCES

| SYMBOL         | PARAMETER                 | CONDITIONS  | TYP. | MAX. | UNIT |
|----------------|---------------------------|-------------|------|------|------|
| $R_{th\ j-mb}$ | Junction to mounting base |             | -    | 1.25 | K/W  |
| $R_{th\ j-a}$  | Junction to ambient       | in free air | 60   | -    | K/W  |

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## STATIC CHARACTERISTICS

 $T_{mb} = 25\text{ }^{\circ}\text{C}$  unless otherwise specified

| SYMBOL                                             | PARAMETER                                                                                                 | CONDITIONS                                                                                                                                                                       | MIN.                | TYP.                     | MAX.               | UNIT          |
|----------------------------------------------------|-----------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|--------------------------|--------------------|---------------|
| $I_{CES}, I_{CBO}$<br>$I_{CES}$                    | Collector cut-off current <sup>1</sup>                                                                    | $V_{BE} = 0\text{ V}; V_{CE} = V_{CESMmax}$<br>$V_{BE} = 0\text{ V}; V_{CE} = V_{CESMmax}$<br>$T_j = 125\text{ }^{\circ}\text{C}$                                                | -                   | -                        | 1.0<br>2.0         | mA<br>mA      |
| $I_{CEO}$<br>$I_{EBO}$<br>$V_{CEOsust}$            | Collector cut-off current <sup>1</sup><br>Emitter cut-off current<br>Collector-emitter sustaining voltage | $V_{CEO} = V_{CEOMmax} (550\text{ V})$<br>$V_{EB} = 7\text{ V}; I_C = 0\text{ A}$<br>$I_B = 0\text{ A}; I_C = 10\text{ mA};$<br>$L = 25\text{ mH}$                               | -<br>-<br>550       | -<br>-<br>-              | 0.1<br>0.1<br>-    | mA<br>mA<br>V |
| $V_{CEsat}$<br>$V_{BEsat}$                         | Collector-emitter saturation voltage<br>Base-emitter saturation voltage                                   | $I_C = 2.0\text{ A}; I_B = 0.4\text{ A}$<br>$I_C = 2.0\text{ A}; I_B = 0.4\text{ A}$                                                                                             | -<br>-              | 0.15<br>0.91             | 1.0<br>1.5         | V<br>V        |
| $h_{FE}$<br>$h_{FE}$<br>$h_{FEsat}$<br>$h_{FEsat}$ | DC current gain<br>DC current gain<br>DC current gain                                                     | $I_C = 1\text{ mA}; V_{CE} = 5\text{ V}$<br>$I_C = 500\text{ mA}; V_{CE} = 5\text{ V}$<br>$I_C = 2.0\text{ A}; V_{CE} = 5\text{ V}$<br>$I_C = 3.0\text{ A}; V_{CE} = 5\text{ V}$ | 13<br>20<br>13<br>- | 25<br>30<br>18.5<br>15.5 | -<br>47<br>25<br>- |               |

## DYNAMIC CHARACTERISTICS

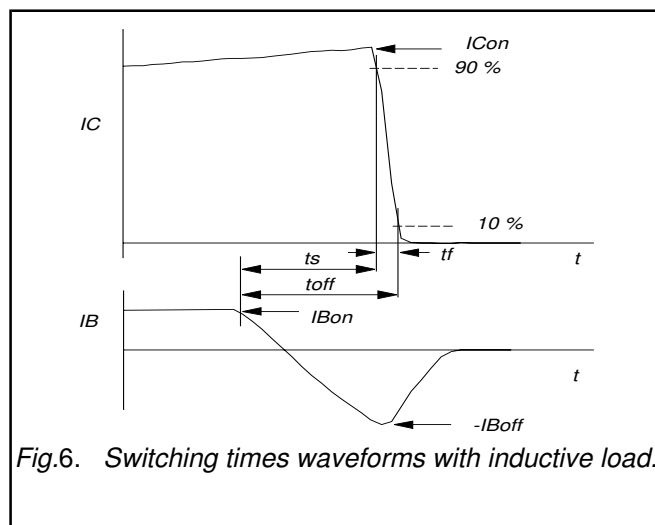
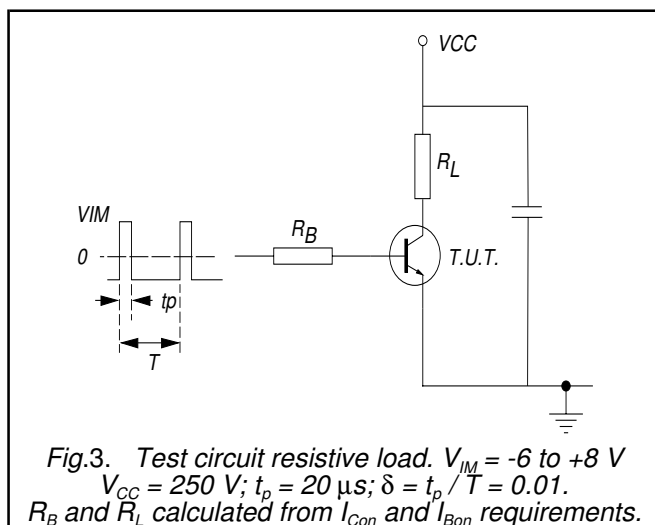
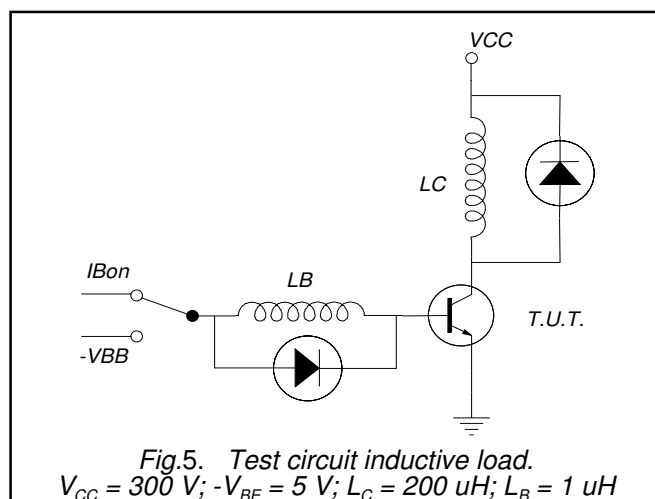
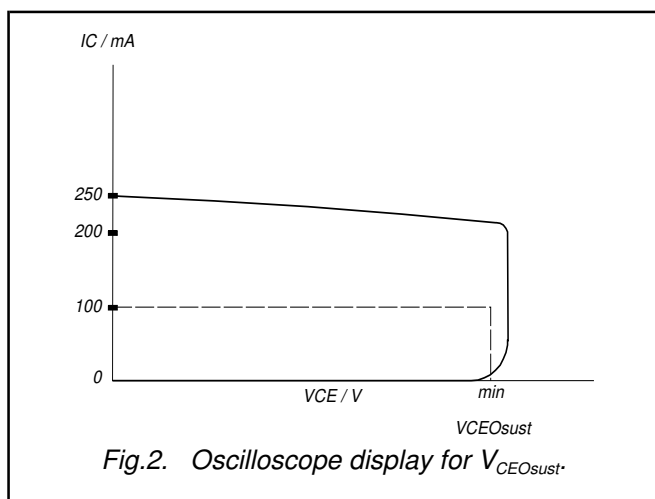
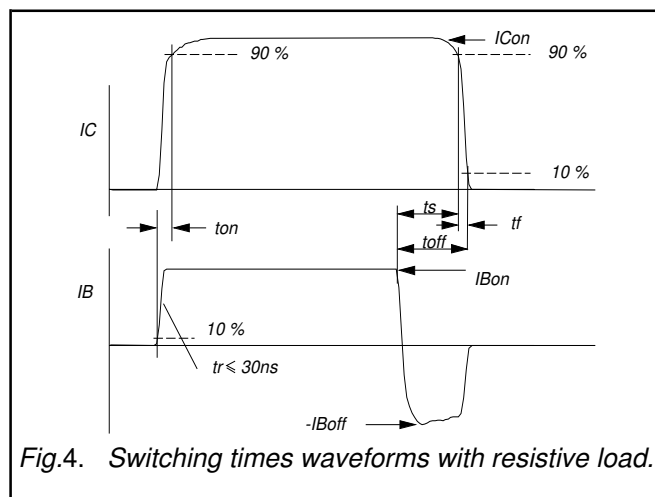
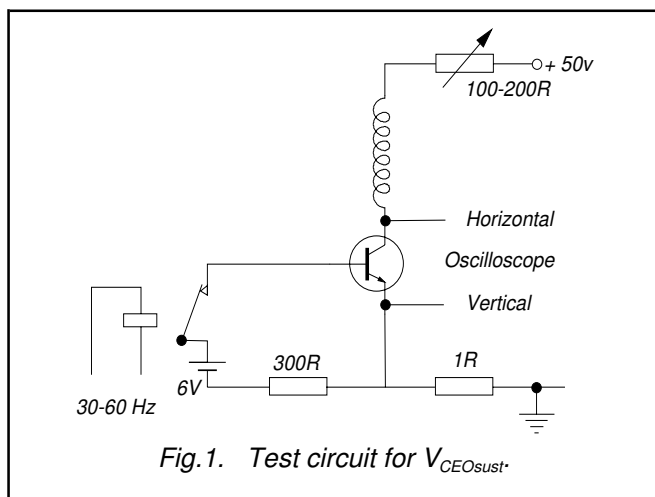
 $T_{mb} = 25\text{ }^{\circ}\text{C}$  unless otherwise specified

| SYMBOL                     | PARAMETER                                                                                       | CONDITIONS                                                                                                                                 | TYP.        | MAX.            | UNIT                                            |
|----------------------------|-------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|-------------|-----------------|-------------------------------------------------|
| $t_{on}$<br>$t_s$<br>$t_f$ | Switching times (resistive load)<br>Turn-on time<br>Turn-off storage time<br>Turn-off fall time | $I_{Con} = 2.5\text{ A}; I_{Bon} = -I_{Boff} = 0.5\text{ A};$<br>$R_L = 75\text{ ohms}; V_{BB2} = 4\text{ V};$                             | -<br>-<br>- | 0.5<br>3<br>0.3 | $\mu\text{s}$<br>$\mu\text{s}$<br>$\mu\text{s}$ |
| $t_s$<br>$t_f$             | Switching times (inductive load)<br>Turn-off storage time<br>Turn-off fall time                 | $I_{Con} = 2.5\text{ A}; I_{Bon} = 0.5\text{ A}; L_B = 1\text{ }\mu\text{H};$<br>$-V_{BB} = 5\text{ V}$                                    | -<br>170    | 1.5<br>300      | $\mu\text{s}$<br>ns                             |
| $t_s$<br>$t_f$             | Switching times (inductive load)<br>Turn-off storage time<br>Turn-off fall time                 | $I_{Con} = 2.5\text{ A}; I_{Bon} = 0.5\text{ A}; L_B = 1\text{ }\mu\text{H};$<br>$-V_{BB} = 5\text{ V}; T_j = 100\text{ }^{\circ}\text{C}$ | -<br>-      | 1.8<br>300      | $\mu\text{s}$<br>ns                             |

<sup>1</sup> Measured with half sine-wave voltage (curve tracer).

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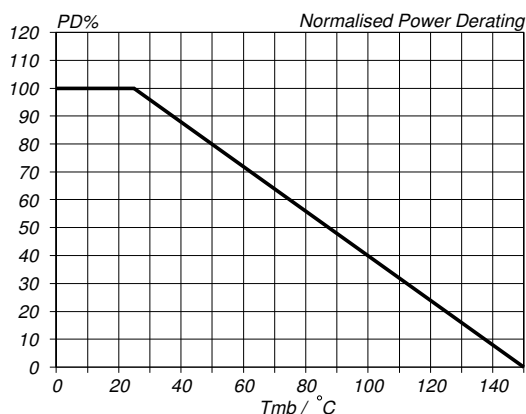


Fig. 7. Normalised power dissipation.  
 $PD\% = 100 \cdot PD / PD_{25^\circ C} = f(T_{mb})$

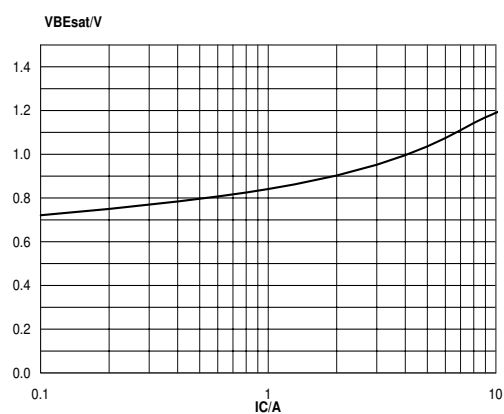


Fig. 10. Base-Emitter saturation voltage.  
 Solid lines = typ values,  $V_{BEsat} = f(I_C)$ ; at  $I_C/I_B = 4$ .

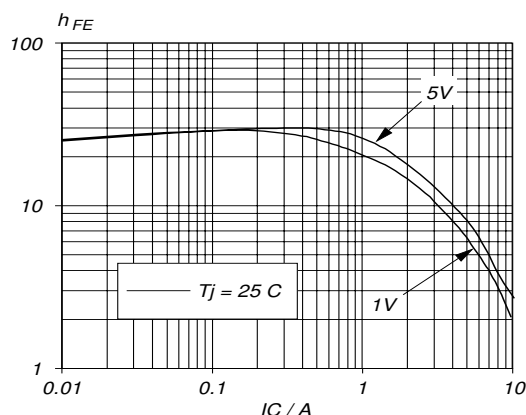


Fig. 8. Typical DC current gain.  $h_{FE} = f(I_C)$   
 parameter  $V_{CE}$

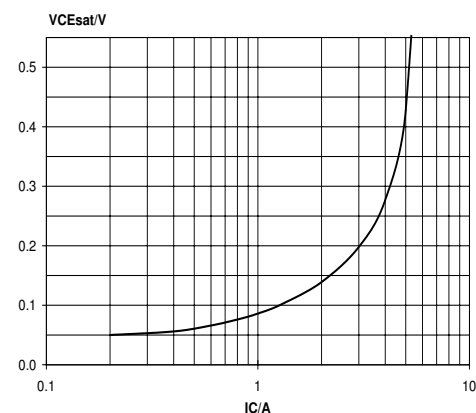


Fig. 11. Collector-Emitter saturation voltage.  
 Solid lines = typ values,  $V_{CEsat} = f(I_C)$ ; at  $I_C/I_B = 4$ .

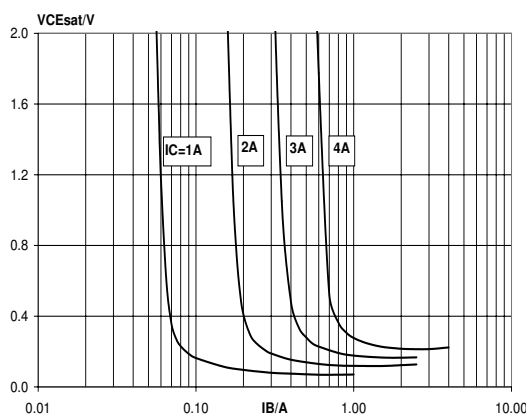


Fig. 9. Collector-Emitter saturation voltage.  
 Solid lines = typ values,  $V_{CEsat} = f(I_B)$ ;  $T_j = 25^\circ C$ .

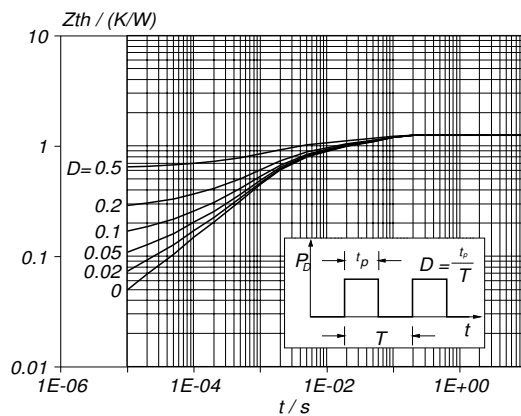
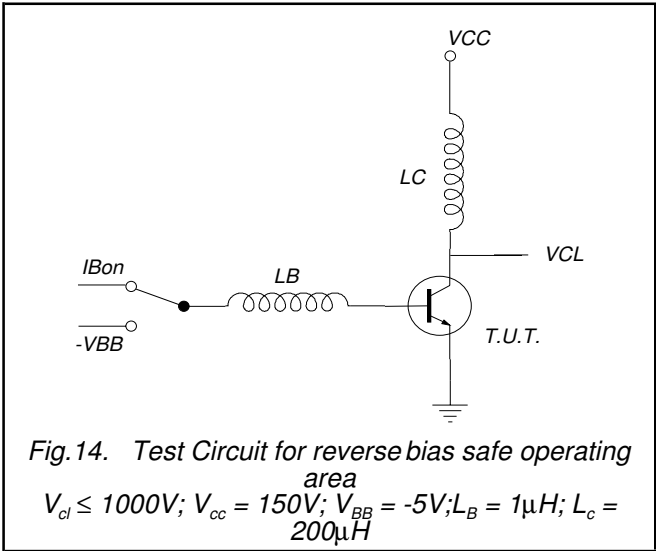
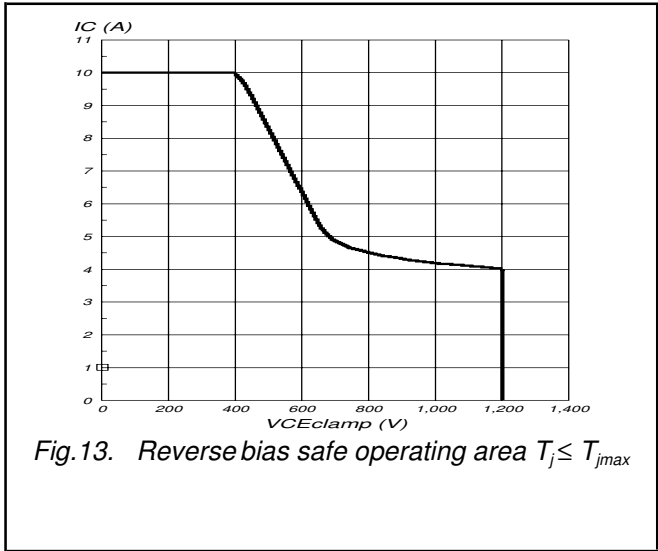


Fig. 12. Transient thermal impedance.  
 $Z_{th j-mb} = f(t)$ ; parameter  $D = t_p / T$



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## MECHANICAL DATA

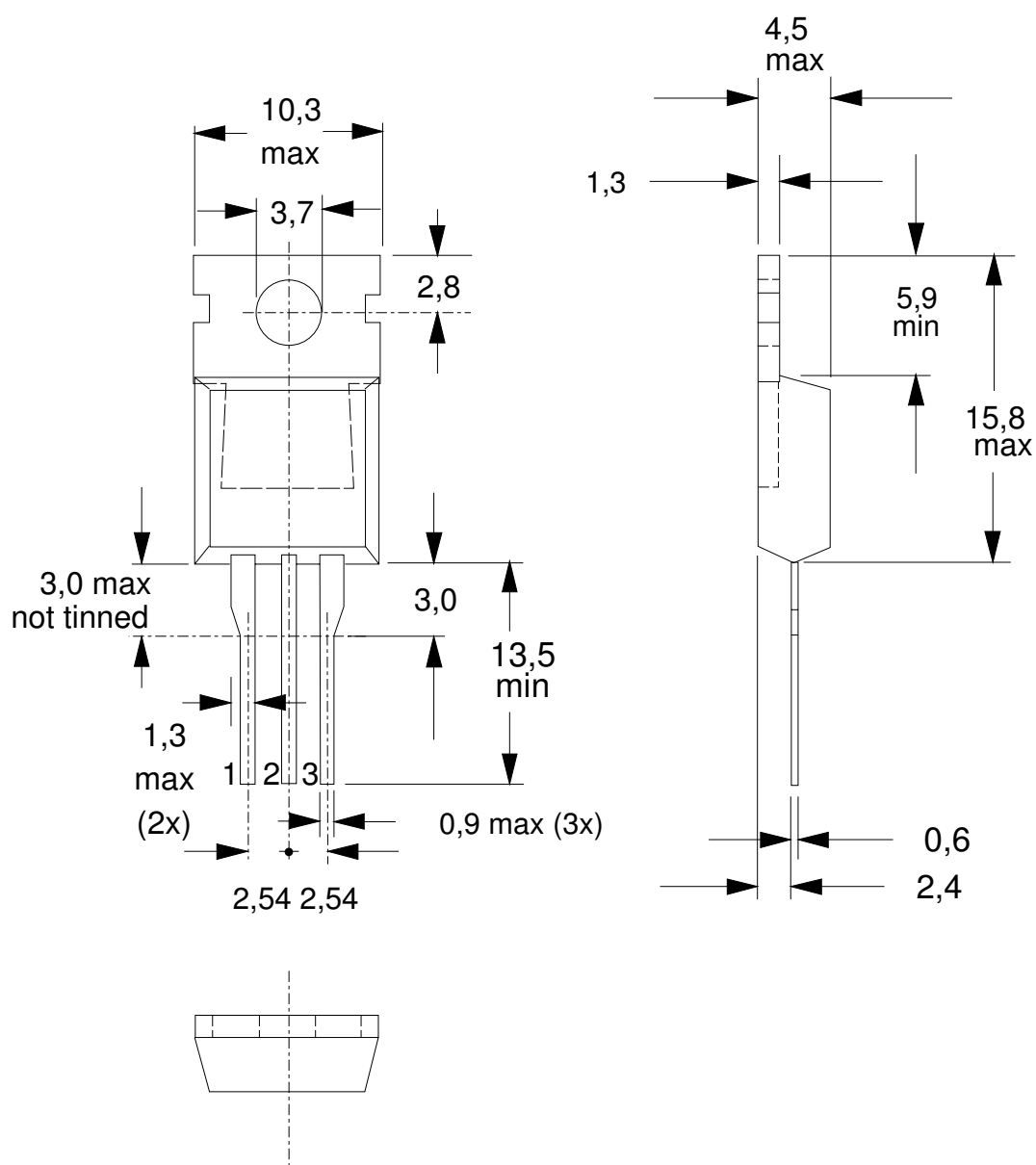
*Dimensions in mm**Net Mass: 2 g*

Fig.15. TO220AB; pin 2 connected to mounting base.

**Notes**

1. Refer to mounting instructions for TO220 envelopes.
2. Epoxy meets UL94 V0 at 1/8".

## Legal information

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|--------------------------------|-------------------------------|---------------------------------------------------------------------------------------|
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| Product data sheet             | Production                    | This document contains the product specification.                                     |

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