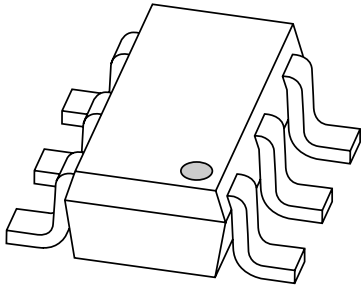


# DATA SHEET



## **BZA420A**

Quadruple ESD transient voltage  
suppressor

Product data sheet  
Supersedes data of 1998 Oct 30

1999 May 20

# Quadruple ESD transient voltage suppressor

**BZA420A**

## FEATURES

- ESD rating >8 kV, according to IEC1000-4-2
- SOT457 surface mount package
- Common anode configuration
- Non-clamping range -0.5 to 20 V
- Maximum reverse peak power dissipation: 19.6 W at  $t_p = 1$  ms
- Maximum clamping voltage at peak pulse current: 28 V at  $I_{ZSM} = 0.7$  A.

## APPLICATIONS

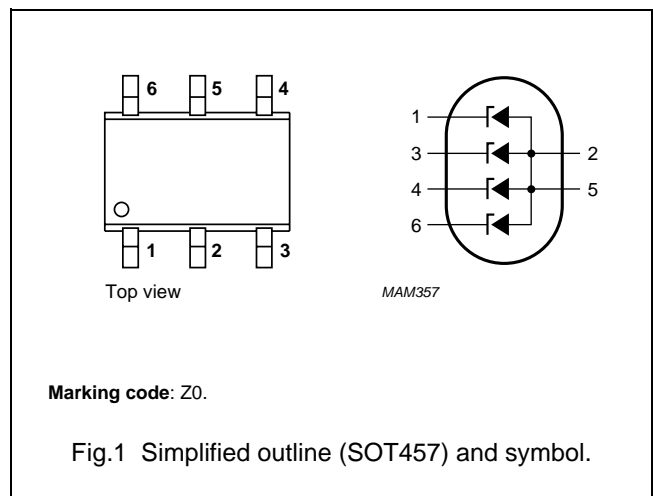
- Computers and peripherals
- Audio and video equipment
- Communication systems
- Medical equipment.

## DESCRIPTION

Monolithic transient voltage suppressor diode in a six lead SOT457 (SC-74) package for 4-bit wide ESD transient suppression at 20 V level.

## PINNING

| PIN | DESCRIPTION |
|-----|-------------|
| 1   | cathode 1   |
| 2   | common      |
| 3   | cathode 2   |
| 4   | cathode 3   |
| 5   | common      |
| 6   | cathode 4   |



## LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 134).

| SYMBOL           | PARAMETER                                     | CONDITIONS                            | MIN. | MAX.   | UNIT |
|------------------|---|---------------------------------------|------|--------|------|
| <b>Per diode</b> |   |                                       |      |        |      |
| $I_Z$            | working current                               | $T_s = 60$ °C; note 1                 | -    | note 2 | mA   |
| $I_F$            | continuous forward current                    | $T_s = 60$ °C                         | -    | 100    | mA   |
| $I_{FSM}$        | non-repetitive peak forward current           | $t_p = 1$ ms; square pulse            | -    | 3.75   | A    |
| $I_{ZSM}$        | non-repetitive peak reverse current           | $t_p = 1$ ms; square pulse; see Fig.2 | -    | 0.7    | A    |
| $P_{tot}$        | total power dissipation                       | $T_s = 60$ °C; see Fig.3              | -    | 720    | mW   |
| $P_{ZSM}$        | non repetitive peak reverse power dissipation | square pulse; $t_p = 1$ ms; see Fig.4 | -    | 19.6   | W    |
| $T_{stg}$        | storage temperature                           |                                       | -65  | +150   | °C   |
| $T_j$            | junction temperature                          |                                       | -65  | +150   | °C   |

## Notes

1.  $T_s$  is the temperature at the soldering point of the anode pin.
2. DC working current limited by  $P_{tot\ max}$ .

# Quadruple ESD transient voltage suppressor

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## THERMAL CHARACTERISTICS

| SYMBOL        | PARAMETER   | CONDITIONS                | VALUE | UNIT |
|---------------|---|---------------------------|-------|------|
| $R_{th\ j-s}$ | thermal resistance from junction to soldering point | one or more diodes loaded | 125   | K/W  |

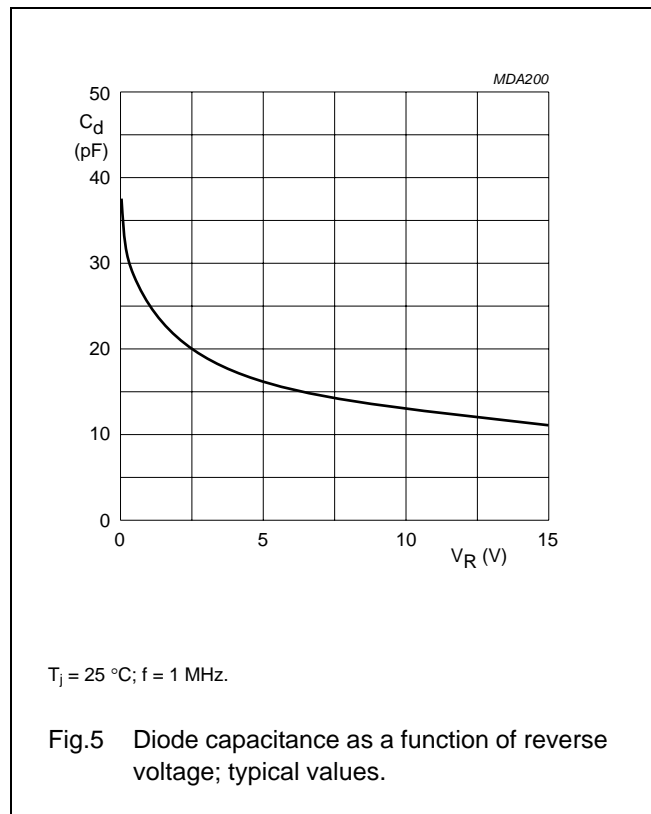
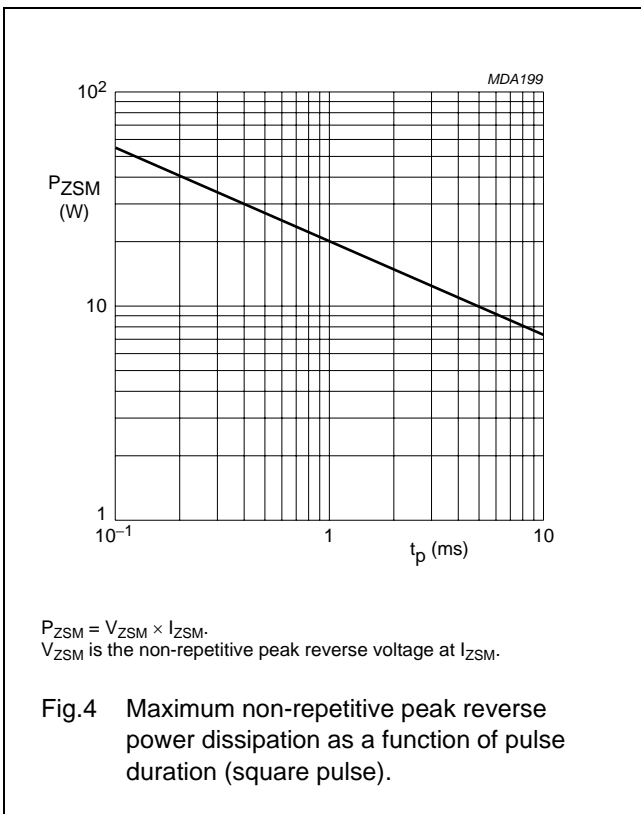
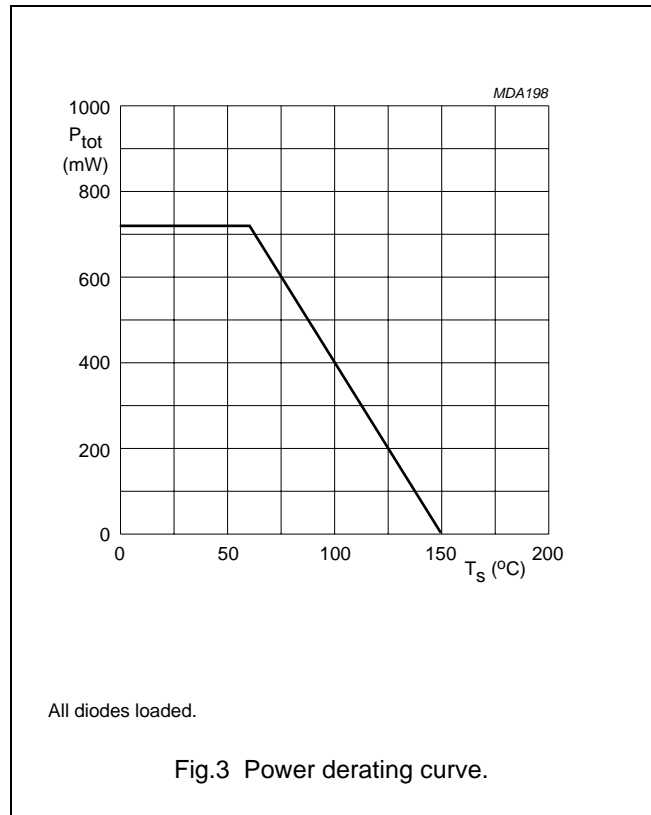
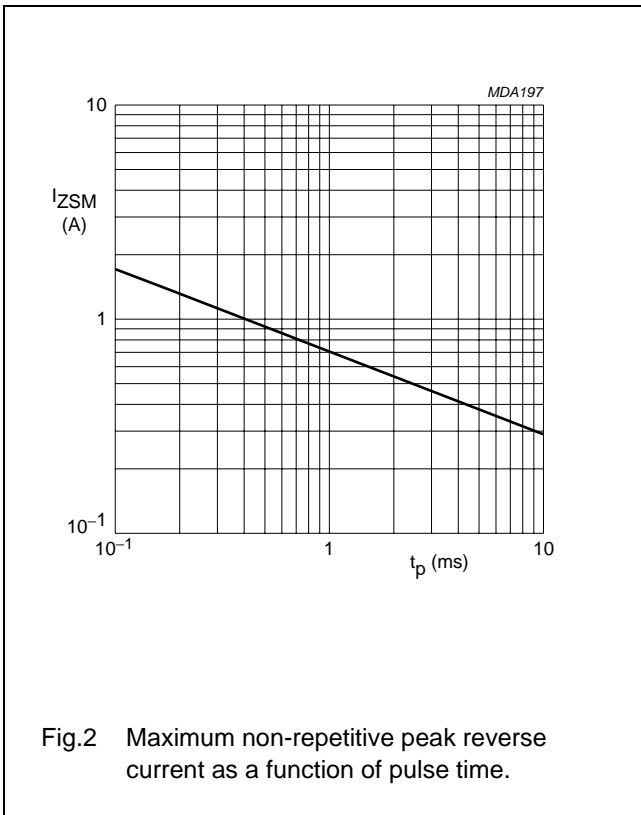
## ELECTRICAL CHARACTERISTICS

$T_j = 25\text{ °C}$  unless otherwise specified.

| SYMBOL           | PARAMETER                                  | CONDITIONS                                  | MIN. | TYP. | MAX. | UNIT     |
|------------------|--|---|------|------|------|----------|
| <b>Per diode</b> |  |   |      |      |      |          |
| $V_Z$            | working voltage                            | $I_Z = 1\text{ mA}$                         | 19   | 20   | 21   | V        |
| $V_F$            | forward voltage                            | $I_F = 200\text{ mA}$                       | –    | –    | 1.3  | V        |
| $V_{ZSM}$        | non-repetitive peak reverse voltage        | $I_{ZSM} = 0.7\text{ A}; t_p = 1\text{ ms}$ | –    | –    | 28   | V        |
| $I_R$            | reverse current                            | $V_R = 15\text{ V}$                         | –    | –    | 100  | nA       |
| $r_{dif}$        | differential resistance                    | $I_Z = 1\text{ mA}$                         | –    | –    | 125  | $\Omega$ |
| $S_Z$            | temperature coefficient of working voltage | $I_Z = 5\text{ mA}$                         | –    | 16.2 | –    | mV/K     |
| $C_d$            | diode capacitance                          | see Fig.5<br>$V_R = 0; f = 1\text{ MHz}$    | –    | –    | 48   | pF       |
|                  |  | $V_R = 15\text{ V}; f = 1\text{ MHz}$       | –    | –    | 14   | pF       |

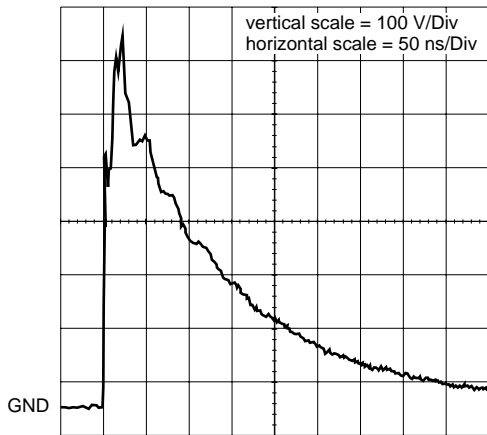
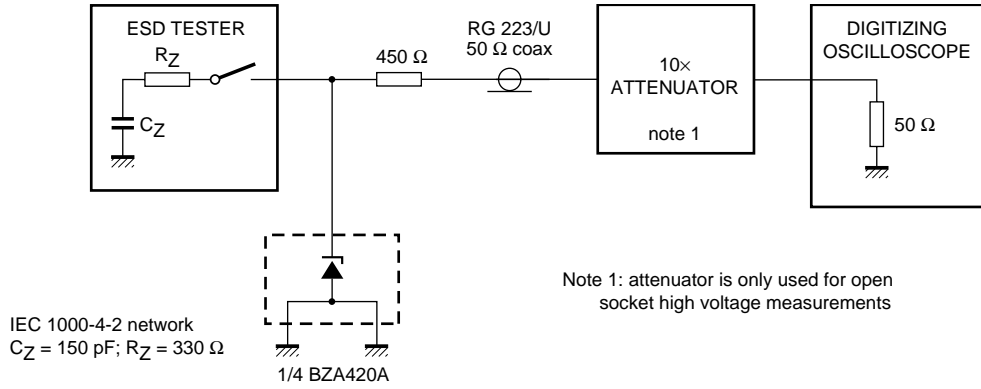
Quadruple ESD transient voltage suppressor

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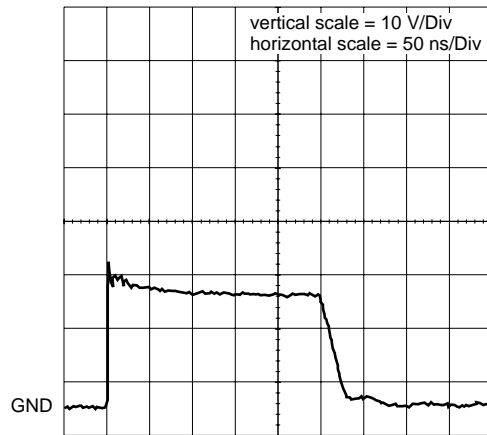


# Quadruple ESD transient voltage suppressor

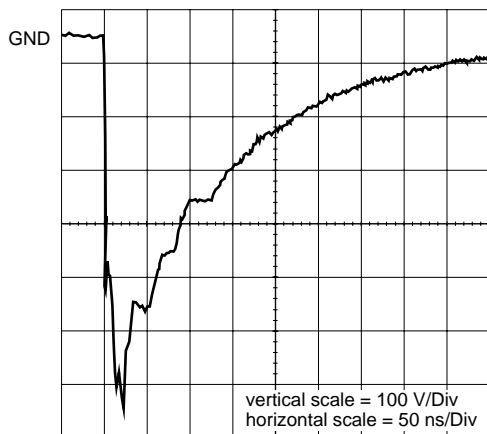
BZA420A



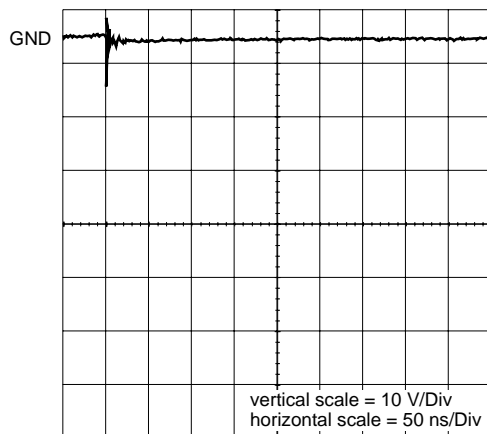
unclamped +1 kV ESD voltage waveform (IEC 1000-4-2 network)



clamped +1 kV ESD voltage waveform (IEC 1000-4-2 network)



unclamped -1 kV ESD voltage waveform (IEC 1000-4-2 network)



clamped -1 kV ESD voltage waveform (IEC 1000-4-2 network)

MBK386

Fig.6 ESD clamping test set-up and waveforms.

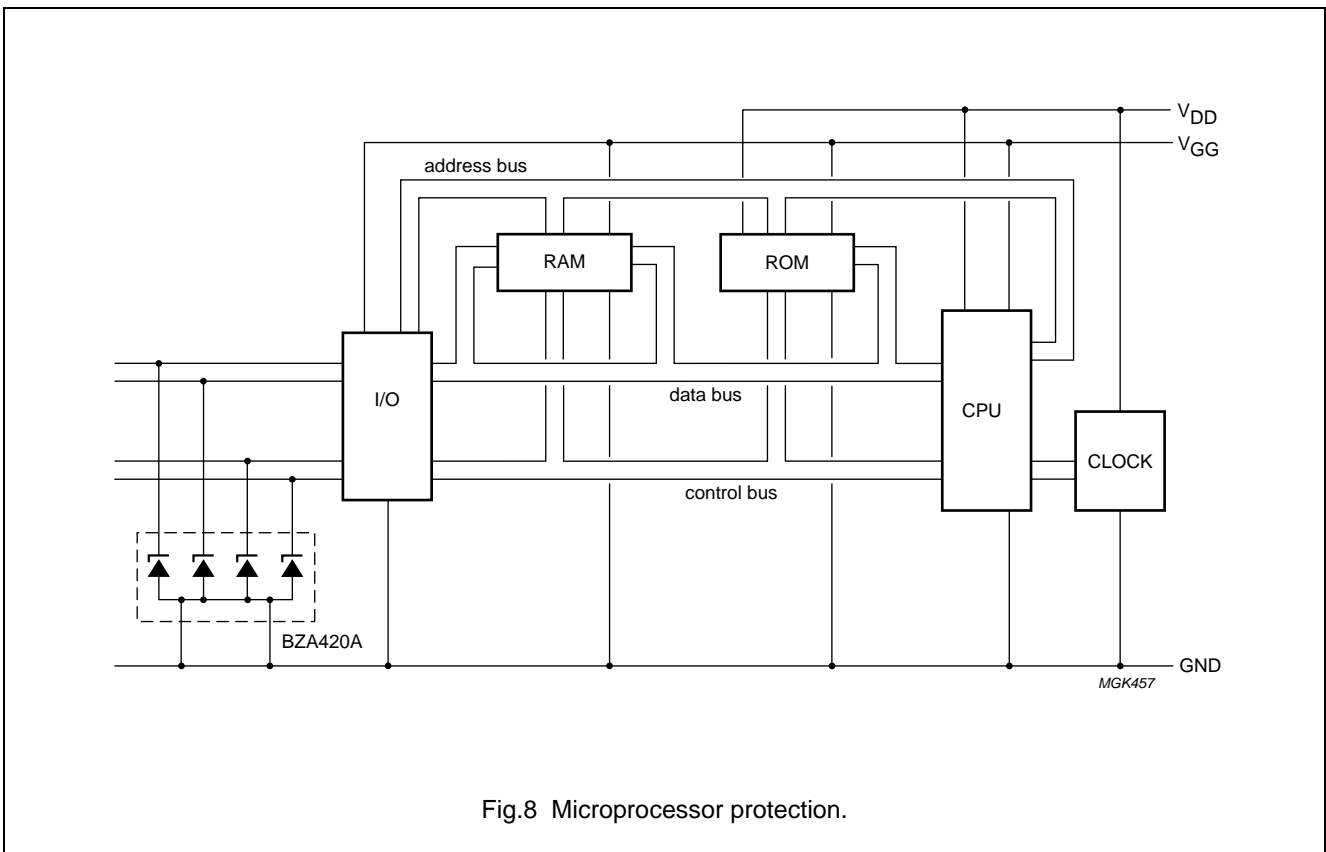
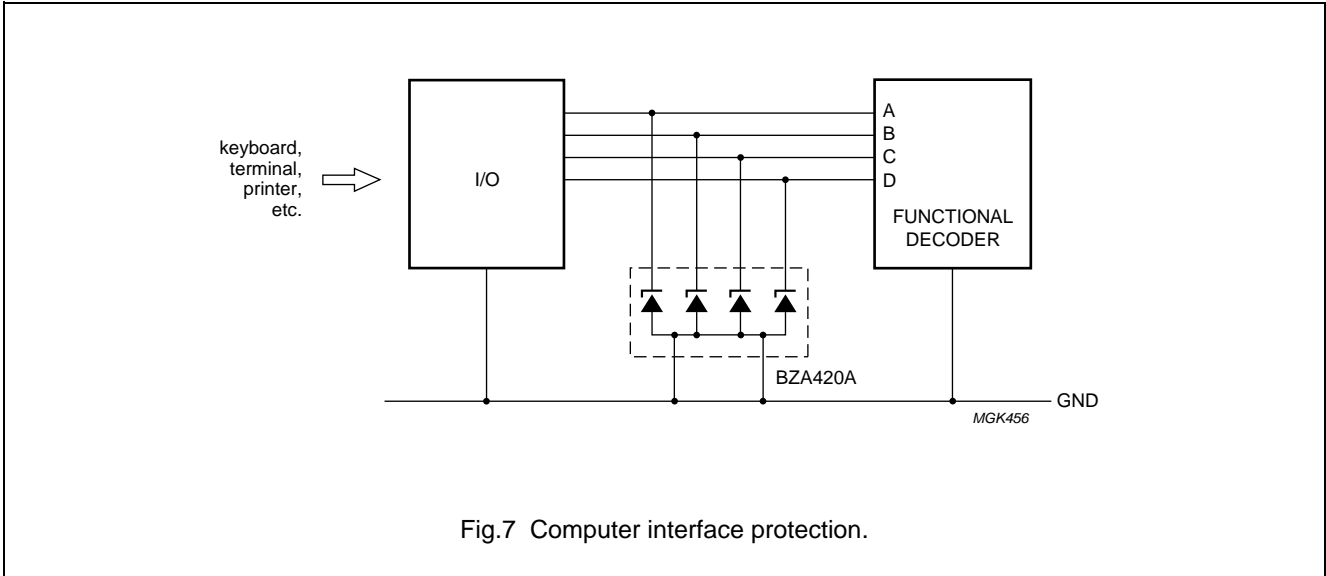
# Quadruple ESD transient voltage suppressor

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## APPLICATION INFORMATION

### Typical common anode application

A quadruple transient suppressor in a SOT457 package makes it possible to protect four separate lines using only one package. Two simplified examples are shown in Figs 7 and 8.



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## Quadruple ESD transient voltage suppressor

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BZA420A

### Device placement and printed-circuit board layout

Circuit board layout is of extreme importance in the suppression of transients. The clamping voltage of the BZA420A is determined by the peak transient current and the rate of rise of that current ( $di/dt$ ). Since parasitic inductances can further add to the clamping voltage ( $V = L di/dt$ ) the series conductor lengths on the printed-circuit board should be kept to a minimum. This includes the lead length of the suppression element.

In addition to minimizing conductor length the following printed-circuit board layout guidelines are recommended:

1. Place the suppression element close to the input terminals or connectors
2. Keep parallel signal paths to a minimum
3. Avoid running protection conductors in parallel with unprotected conductors
4. Minimize all printed-circuit board loop areas including power and ground loops
5. Minimize the length of the transient return path to ground
6. Avoid using shared transient return paths to a common ground point.

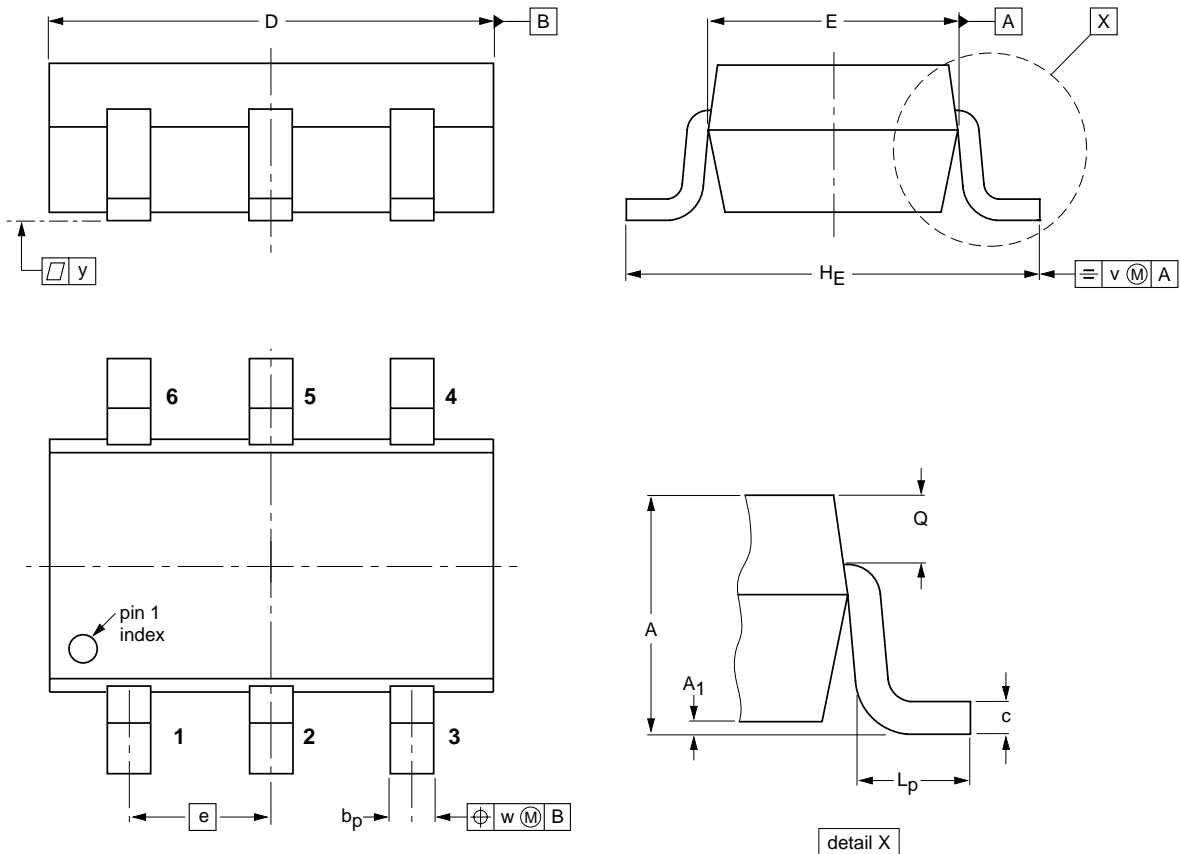
# Quadruple ESD transient voltage suppressor

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## PACKAGE OUTLINE

Plastic surface mounted package; 6 leads

SOT457



**DIMENSIONS (mm are the original dimensions)**

| UNIT | A          | A <sub>1</sub> | b <sub>p</sub> | c            | D          | E          | e    | H <sub>E</sub> | L <sub>p</sub> | Q            | v   | w   | y   |
|------|------------|----------------|----------------|--------------|------------|------------|------|----------------|----------------|--------------|-----|-----|-----|
| mm   | 1.1<br>0.9 | 0.1<br>0.013   | 0.40<br>0.25   | 0.26<br>0.10 | 3.1<br>2.7 | 1.7<br>1.3 | 0.95 | 3.0<br>2.5     | 0.6<br>0.2     | 0.33<br>0.23 | 0.2 | 0.2 | 0.1 |

| OUTLINE VERSION | REFERENCES |       |       |  | EUROPEAN PROJECTION | ISSUE DATE             |
|-----------------|------------|-------|-------|--|---------------------|------------------------|
|                 | IEC        | JEDEC | EIAJ  |  |                     |                        |
| SOT457          |            |       | SC-74 |  |                     | -97-02-28-<br>01-05-04 |



# Quadruple ESD transient voltage suppressor

BZA420A

## DATA SHEET STATUS

| DOCUMENT STATUS <sup>(1)</sup> | PRODUCT STATUS <sup>(2)</sup> | DEFINITION  |
|--------------------------------|-------------------------------|---|
| Objective data sheet           | Development                   | This document contains data from the objective specification for product development. |
| Preliminary data sheet         | Qualification                 | This document contains data from the preliminary specification.                       |
| Product data sheet             | Production                    | This document contains the product specification.                                     |

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