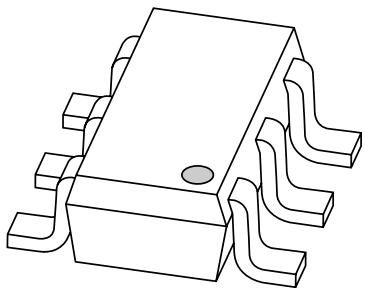


# DATA SHEET



## **BZA456A**

### Quadruple ESD transient voltage suppressor

Product data sheet  
Supersedes data of 1998 Oct 30

1999 May 25

# Quadruple ESD transient voltage suppressor

BZA456A

## FEATURES

- ESD rating >8 kV, according to IEC1000-4-2
- SOT457 surface mount package
- Common anode configuration
- Non-clamping range -0.5 to 5.6 V
- Maximum reverse peak power dissipation: 24 W at  $t_p = 1$  ms
- Maximum clamping voltage at peak pulse current: 8 V at  $I_{ZSM} = 3$  A.

## PINNING

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

## 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 5.6 V level.

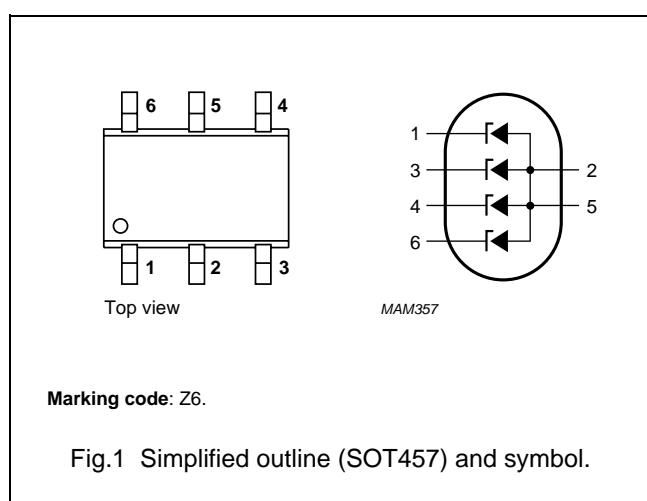


Fig.1 Simplified outline (SOT457) and symbol.

## 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	–	3	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	–	24	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

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
<b>Per diode</b>						
$V_Z$	working voltage	$I_Z = 1\text{ mA}$	5.32	5.6	5.88	V
$V_F$	forward voltage	$I_F = 200\text{ mA}$	—	—	1.3	V
$V_{ZSM}$	non-repetitive peak reverse voltage	$I_{ZSM} = 3\text{ A}; t_p = 1\text{ ms}$	—	—	8	V
$I_R$	reverse current	$V_R = 3\text{ V}$	—	—	2	$\mu\text{A}$
$r_{dif}$	differential resistance	$I_Z = 250\text{ }\mu\text{A}$	—	—	1600	$\Omega$
		$I_Z = 1\text{ mA}$	—	—	400	$\Omega$
$S_Z$	temperature coefficient of working voltage	$I_Z = 5\text{ mA}$	—	1.2	—	$\text{mV/K}$
$C_d$	diode capacitance	see Fig.5 $V_R = 0; f = 1\text{ MHz}$ $V_R = 3\text{ V}; f = 1\text{ MHz}$	—	—	240	$\text{pF}$
			—	—	140	$\text{pF}$

## Quadruple ESD transient voltage suppressor

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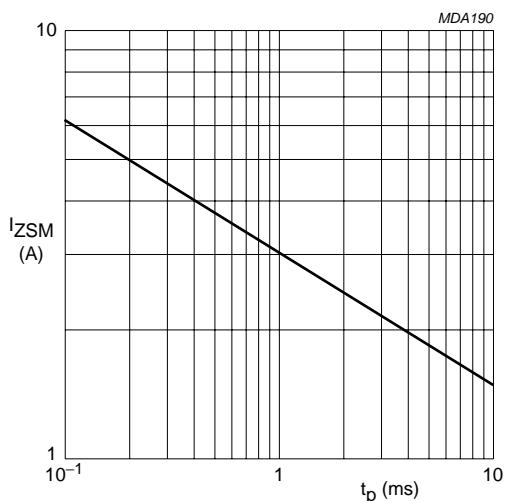
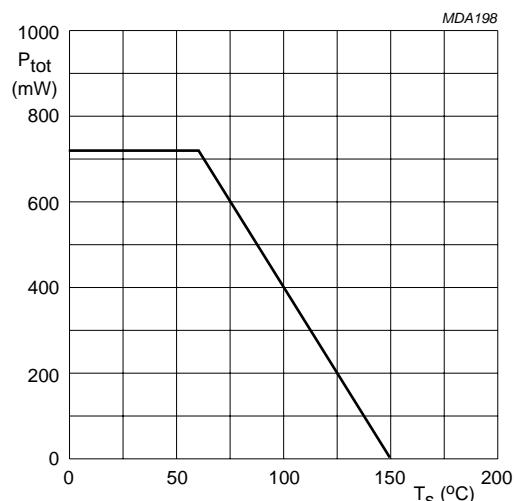
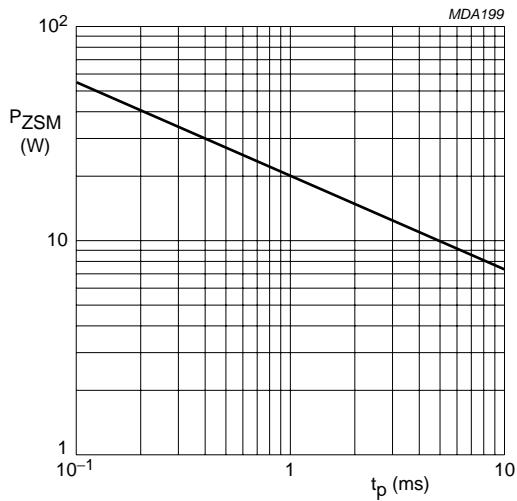


Fig.2 Maximum non-repetitive peak reverse current as a function of pulse time.



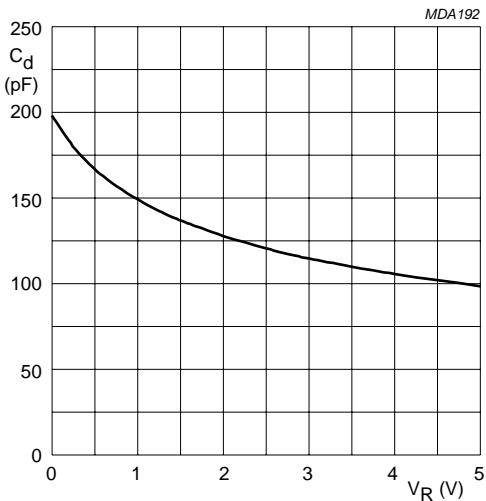
All diodes loaded.

Fig.3 Power derating curve.



$P_{ZSM} = V_{ZSM} \times I_{ZSM}$ .  
 $V_{ZSM}$  is the non-repetitive peak reverse voltage at  $I_{ZSM}$ .

Fig.4 Maximum non-repetitive peak reverse power dissipation as a function of pulse duration (square pulse).

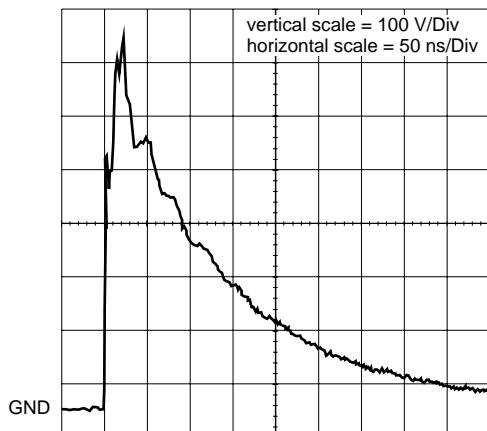
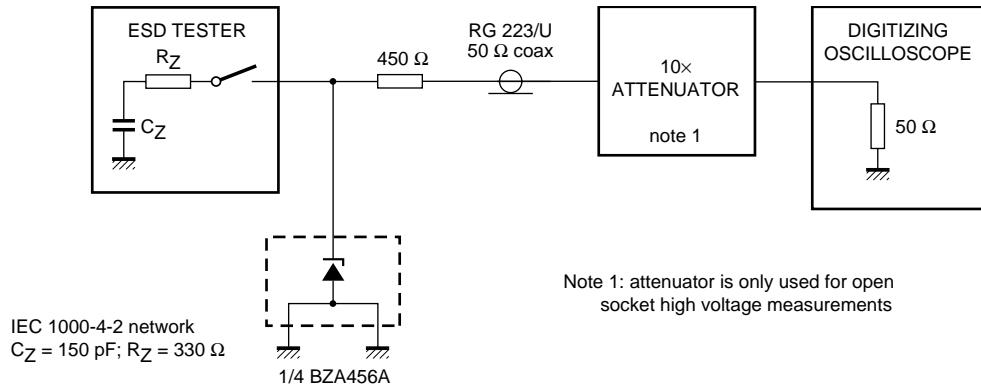


$T_J = 25$   $^{\circ}$ C;  $f = 1$  MHz.

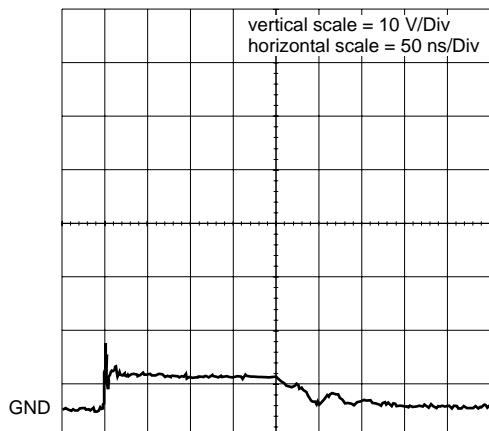
Fig.5 Diode capacitance as a function of reverse voltage; typical values.

## Quadruple ESD transient voltage suppressor

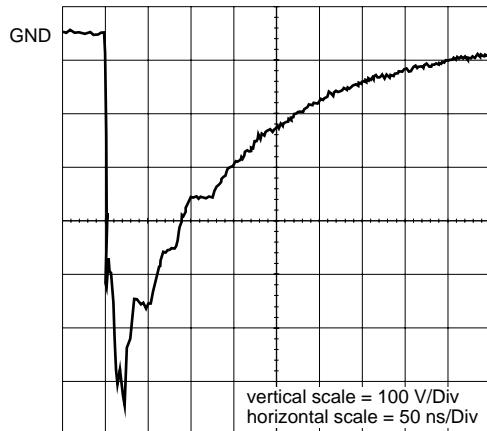
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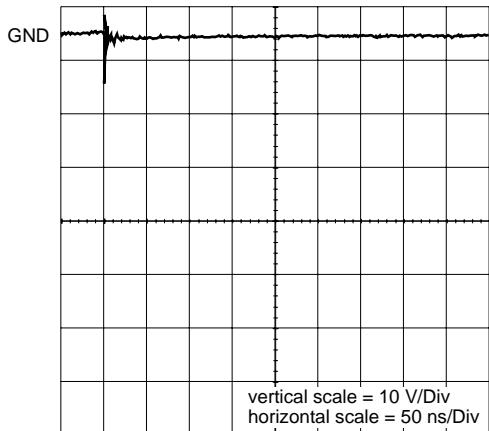
unclamped +1 kV ESD voltage waveform  
(IEC 1000-4-2 network)



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)

MGL247

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.

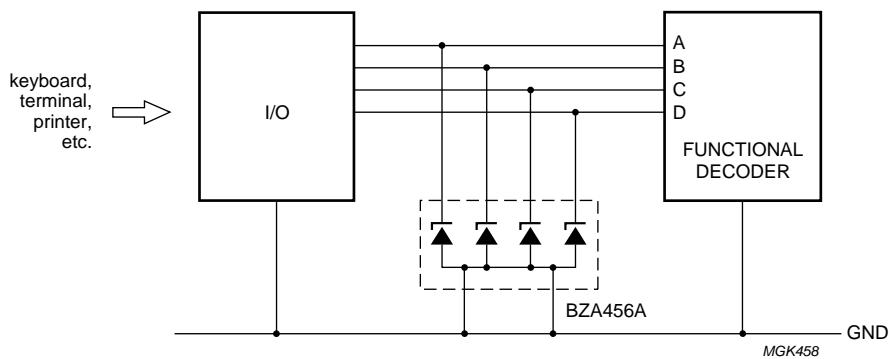


Fig.7 Computer interface protection.

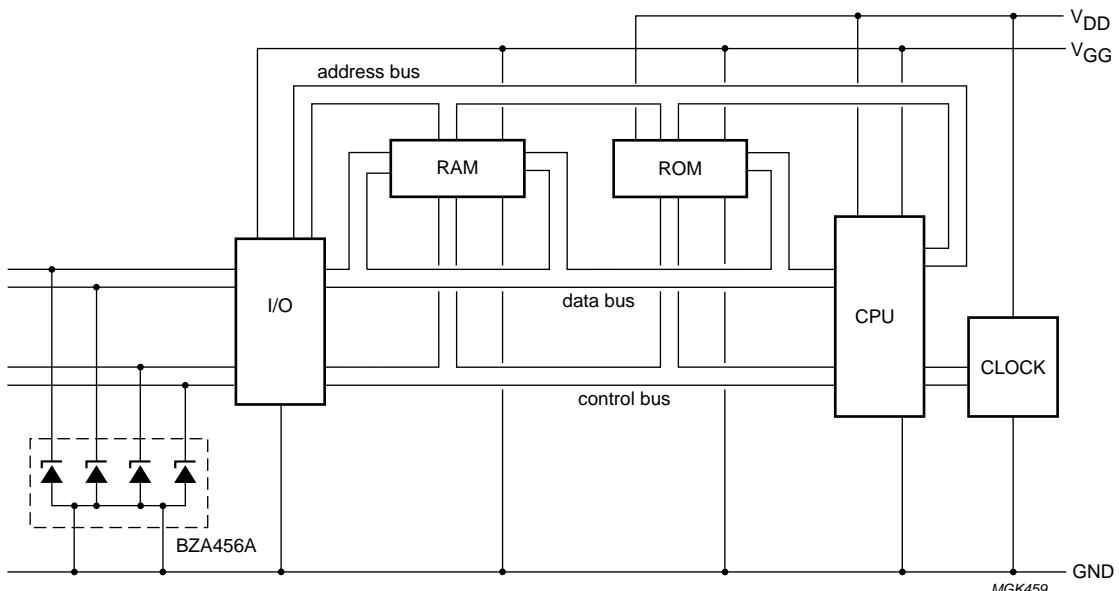


Fig.8 Microprocessor protection.

## Quadruple ESD transient voltage suppressor

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### Device placement and printed-circuit board layout

Circuit board layout is of extreme importance in the suppression of transients. The clamping voltage of the BZA456A 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.

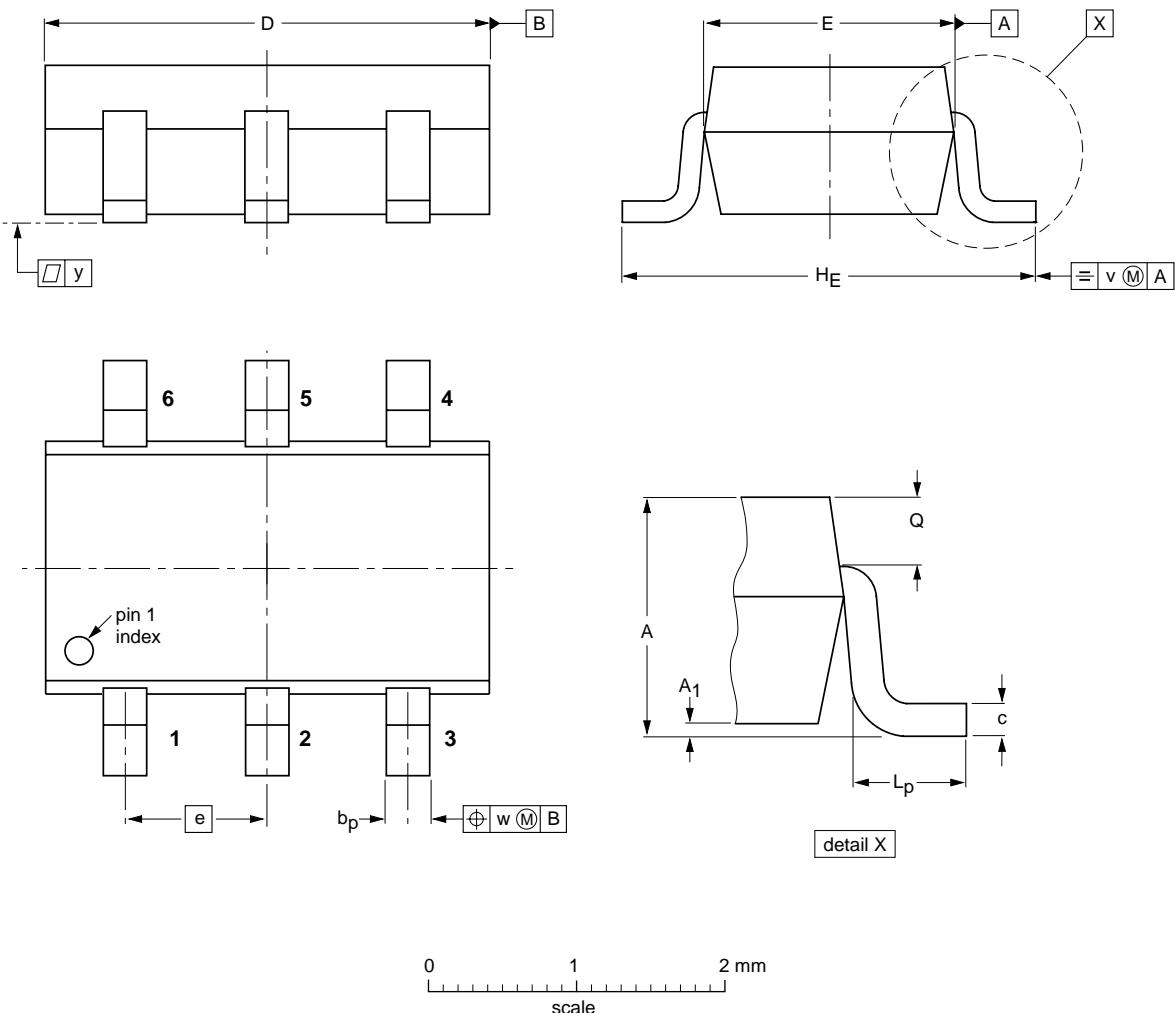
# Quadruple ESD transient voltage suppressor

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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 0.9	0.1 0.013	0.40 0.25	0.26 0.10	3.1 2.7	1.7 1.3	0.95	3.0 2.5	0.6 0.2	0.33 0.23	0.2	0.2	0.1

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

# Quadruple ESD transient voltage suppressor

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## 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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