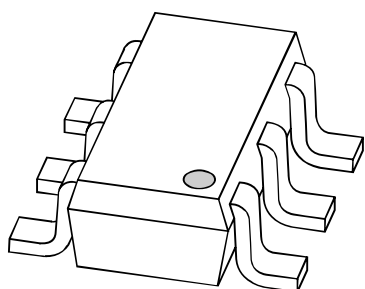


# DATA SHEET



## **BZA408B**

Quadruple bidirectional ESD  
transient voltage suppressor

Product specification  
Supersedes data of 1998 Jun 05

1998 Oct 15

# Quadruple bidirectional ESD transient voltage suppressor

**BZA408B**

## FEATURES

- ESD rating >15 kV, according to IEC1000-4-2
- SOT457 surface mount package
- Non-clamping range: -5 V to +5 V
- Channel separation: >70 dB
- Low reverse current: <100 nA
- Low diode capacitance: <75 pF.

## APPLICATIONS

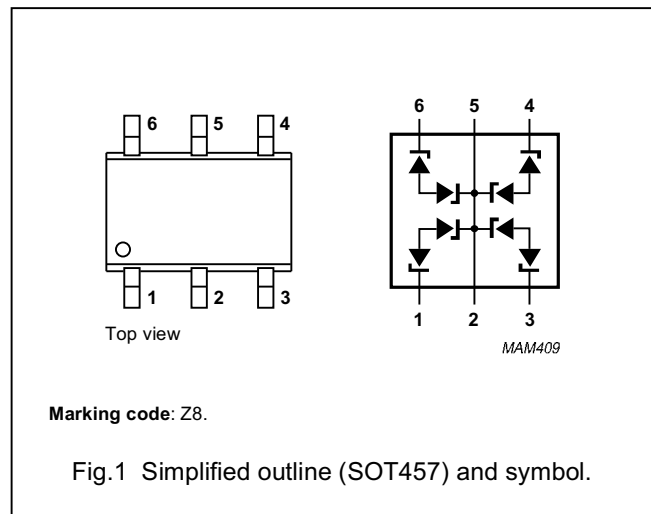
- Protection of equipment, connected to data and transmission lines, against voltage surges caused by electrostatic discharge e.g:
  - Computers and peripherals
  - Audio and video equipment
  - Communication systems
  - Medical equipment
  - Portable electronics.

## DESCRIPTION

4-bit wide monolithic bidirectional ESD transient voltage suppressor in a six lead SOT457 (SC-74) package.

## PINNING

PIN	DESCRIPTION
1	cathode 1
2, 5	ground
3	cathode 2
4	cathode 3
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> (pin 2 and / or 5 connected to ground)					
$I_{ZSM}$	non-repetitive peak reverse current	$t_p = 1$ ms; square pulse; see Fig.2	-	2	A
$P_{ZSM}$	non-repetitive peak power	$t_p = 1$ ms; square pulse	-	20	W
$T_{stg}$	storage temperature		-65	+150	°C
$T_j$	junction temperature		-65	+150	°C

# Quadruple bidirectional 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	340	K/W

## ELECTRICAL CHARACTERISTICS

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
<b>Per diode</b> (pin 2 and / or 5 connected to ground)					
$V_{RWM}$	working reverse voltage		–	5	V
$V_R$	reverse voltage	$I_{test} = 5\text{ mA}$	5.5	–	V
$V_{ZSM}$	non-repetitive peak reverse voltage	$t_p = 1\text{ ms}; I_{ZSM} = 2\text{ A}$	–	10	V
$I_R$	reverse current	$V_R = V_{RWM}$	–	100	nA
$C_d$	diode capacitance	see Fig.3 $V_R = 0; f = 1\text{ MHz}$	–	75	pF
		$V_R = 5\text{ V}; f = 1\text{ MHz}$	–	55	pF
$\alpha_{ch\ (p\ to\ p)}$	pin to pin channel separation	note 1; see Fig.4	70	–	dB

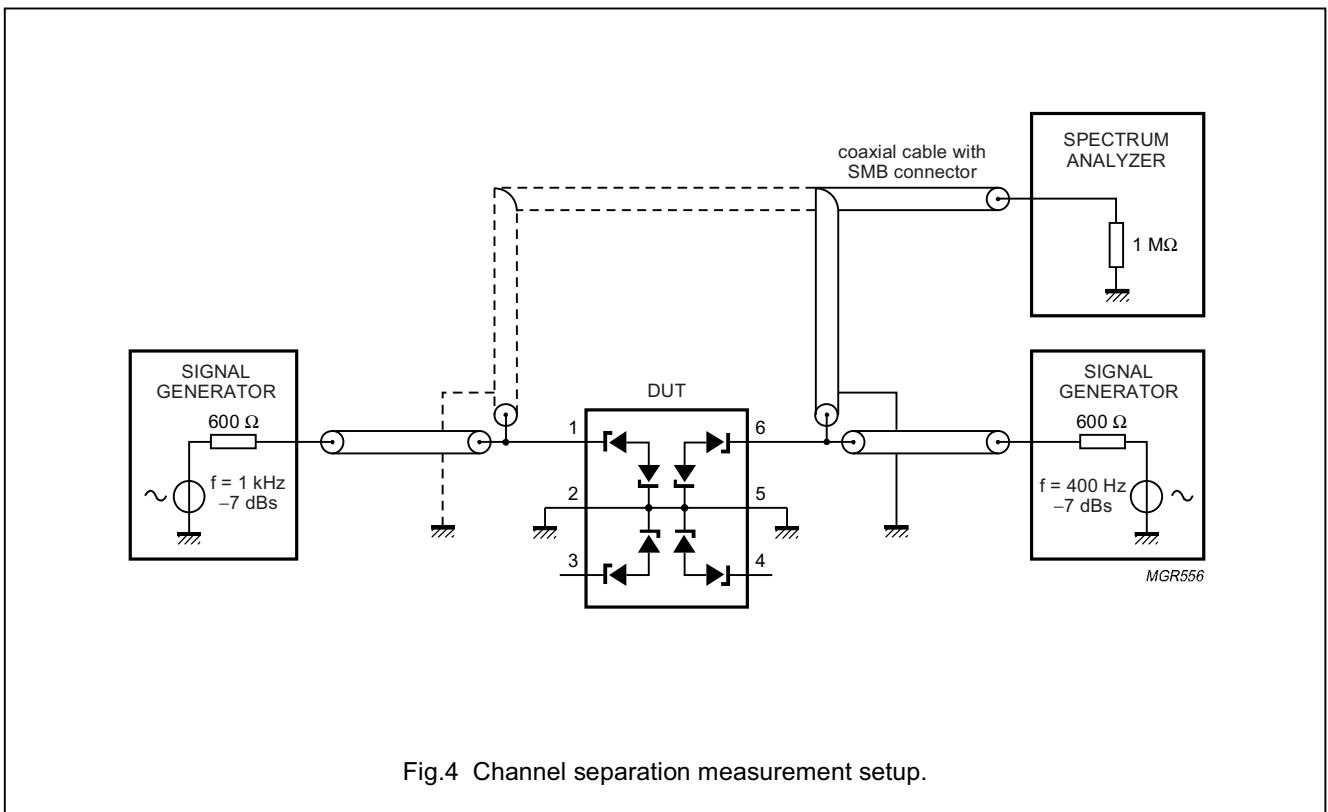
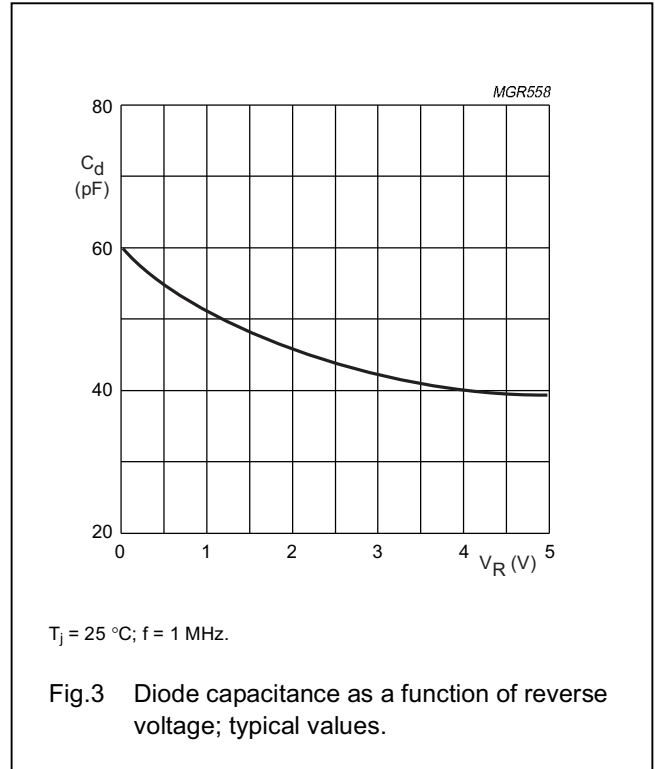
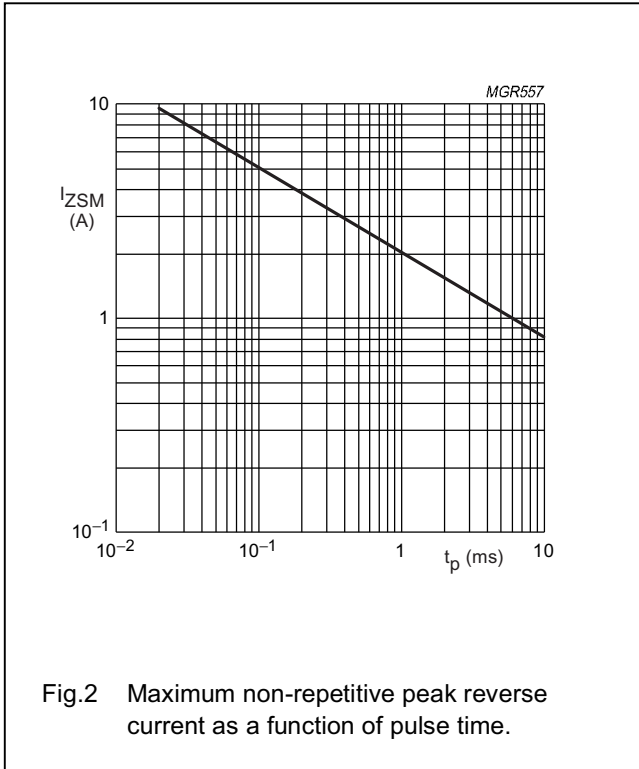
### Note

- $\alpha_{ch\ (p\ to\ p)}$  is measured as follows: a –7 dBs sinewave of 400 Hz is connected to e.g. pin 6 and a –7 dBs sinewave of 1 kHz to pin 1. The 1 kHz signal of pin 1 is measured on pin 6 by means of a spectrum analyser with an input impedance of 1 M $\Omega$ . So  $\alpha_{ch\ (p\ to\ p)}$  equals the 1 kHz level on pin 1 minus the 1 kHz level on pin 6. For the 400 Hz signal the same measurement is done in the opposite way.

# Quadruple bidirectional ESD transient voltage suppressor

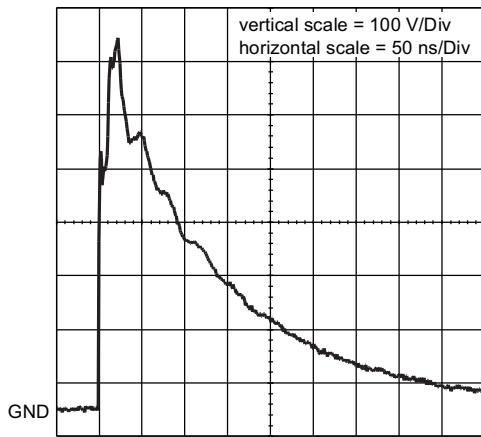
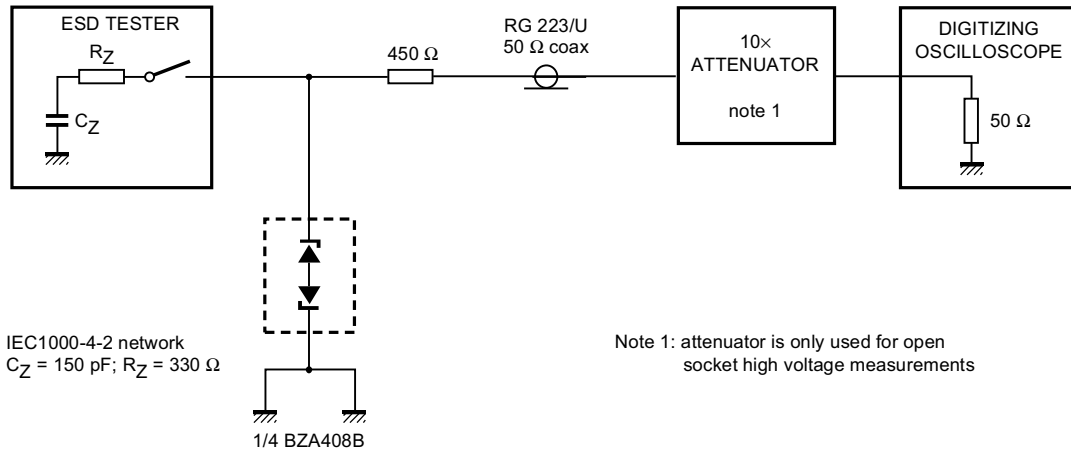
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## GRAPHICAL DATA

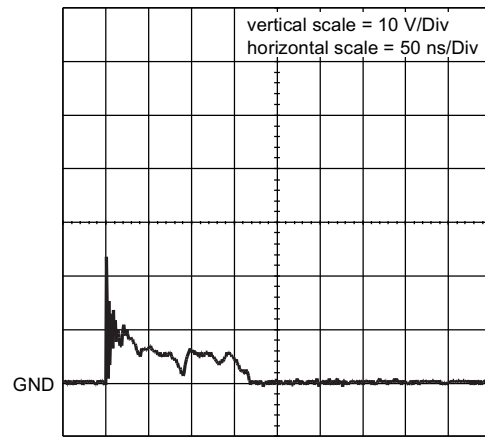


# Quadruple bidirectional ESD transient voltage suppressor

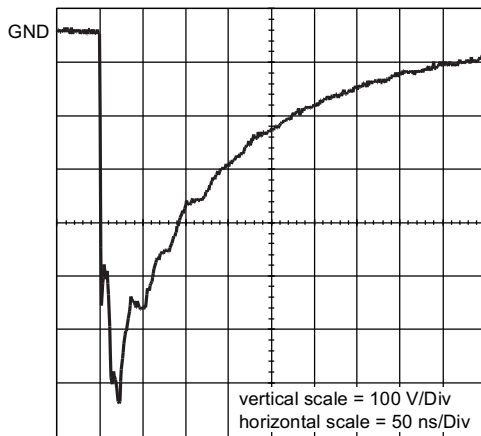
## BZA408B



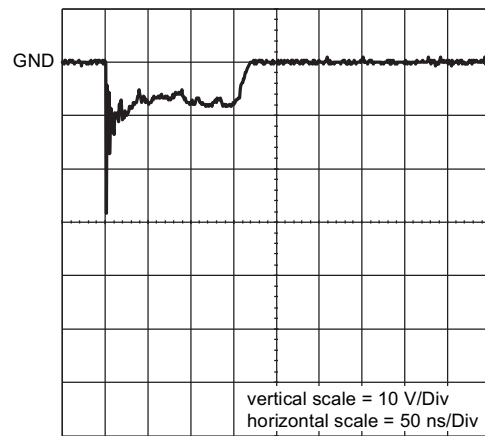
unclamped +1 kV ESD voltage waveform (IEC1000-4-2 network)



clamped +1 kV ESD voltage waveform (IEC1000-4-2 network)



unclamped -1 kV ESD voltage waveform (IEC1000-4-2 network)



clamped -1 kV ESD voltage waveform (IEC1000-4-2 network)

MGR560

Fig.5 ESD clamping test set-up and waveforms.

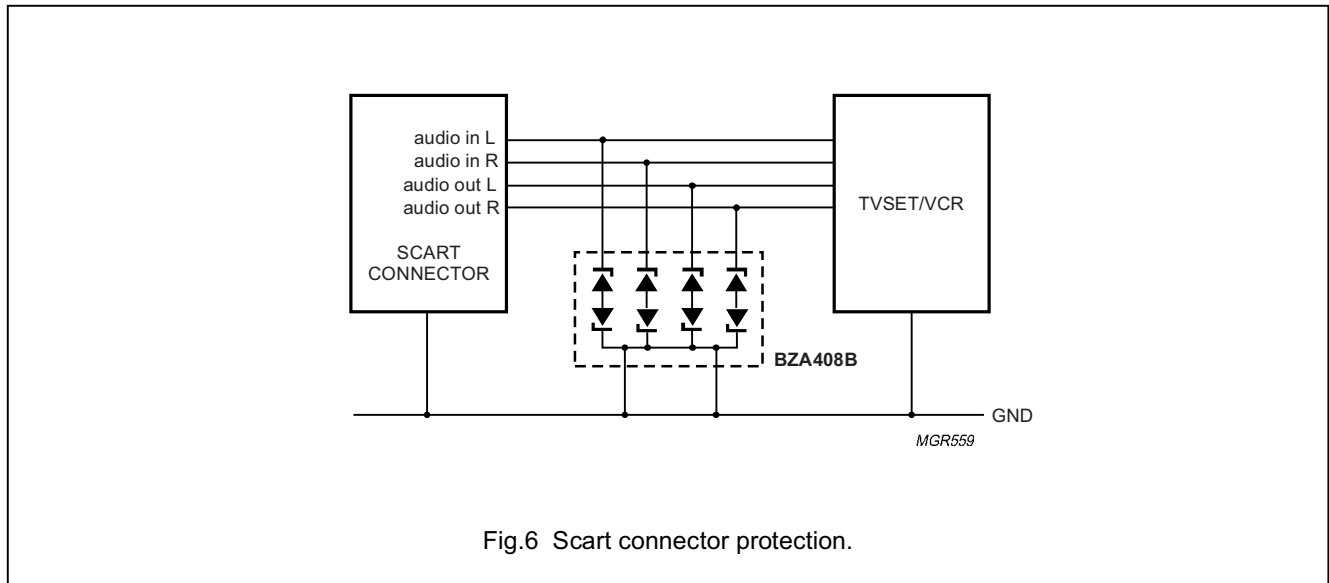
# Quadruple bidirectional ESD transient voltage suppressor

## BZA408B

### APPLICATION INFORMATION

#### Typical bidirectional application

A quadruple bidirectional transient suppressor in a SOT457 package makes it possible to protect four separate lines using only one package. One simplified example is shown in Fig.6.



#### Device placement and printed-circuit board layout

Circuit board layout is of extreme importance in the suppression of transients. The clamping voltage of the BZA408B 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.

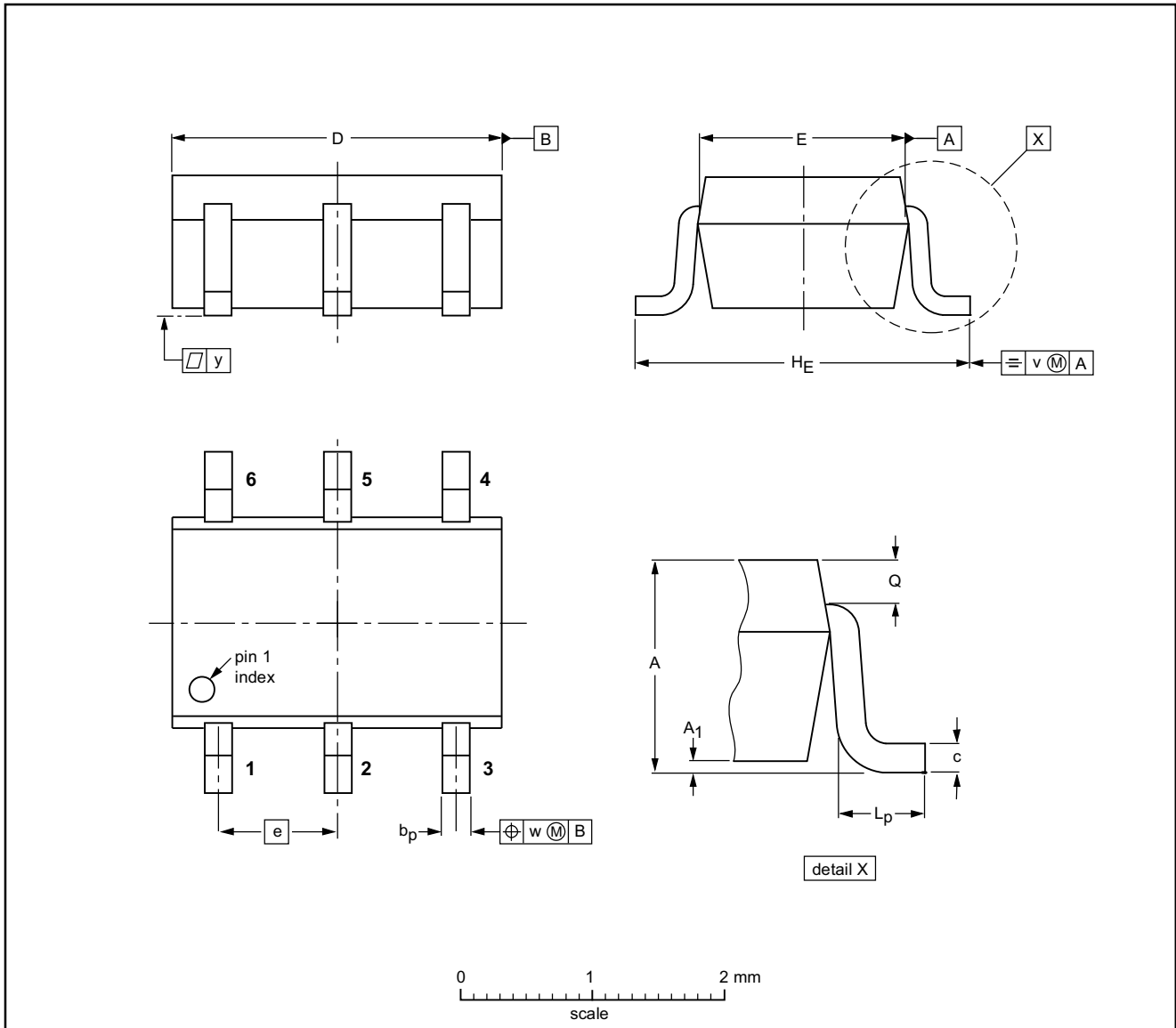
# Quadruple bidirectional ESD transient voltage suppressor

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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			
SOT457			SC-74			97-02-28

# Quadruple bidirectional ESD transient voltage suppressor

BZA408B

## DEFINITIONS

<b>Data Sheet Status</b>	
Objective specification	This data sheet contains target or goal specifications for product development.
Preliminary specification	This data sheet contains preliminary data; supplementary data may be published later.
Product specification	This data sheet contains final product specifications.
<b>Limiting values</b>	
Limiting values given are in accordance with the Absolute Maximum Rating System (IEC 134). Stress above one or more of the limiting values may cause permanent damage to the device. These are stress ratings only and operation of the device at these or at any other conditions above those given in the Characteristics sections of the specification is not implied. Exposure to limiting values for extended periods may affect device reliability.	
<b>Application information</b>	
Where application information is given, it is advisory and does not form part of the specification.	

## LIFE SUPPORT APPLICATIONS

These products are not designed for use in life support appliances, devices, or systems where malfunction of these products can reasonably be expected to result in personal injury. Philips customers using or selling these products for use in such applications do so at their own risk and agree to fully indemnify Philips for any damages resulting from such improper use or sale.

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Quadruple bidirectional ESD transient  
voltage suppressor

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**NOTES**

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**NOTES**

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**NOTES**

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