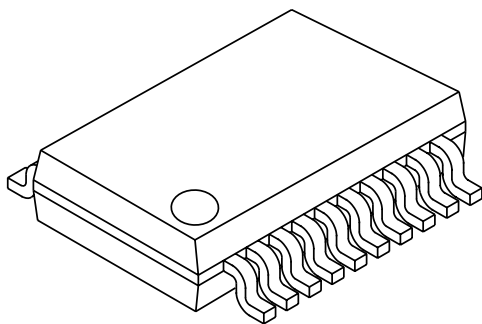


# DATA SHEET



## **BZA109TS** 9-fold ESD Transient Suppressor

Preliminary specification  
File under Discrete Semiconductors, SC01

1997 Sep 08

# 9-fold ESD Transient Suppressor

# BZA109TS

## FEATURES

- ESD rating > 8 kV, according to IEC1000-4-2
- SOT339 surface mount package
- Common anode configuration
- Non-clamping range 0 - 6.8 V, negative clamping range <0.5 V, positive clamping range >6.8 V.

## APPLICATIONS

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

## PINNING SOT339-1

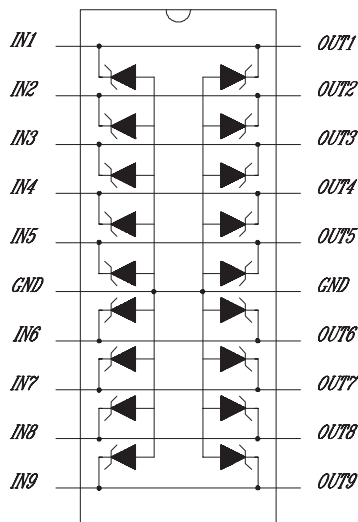


Fig.1 Symbol and pinning.

## DESCRIPTION

Monolithic silicon zener diode in a SOT339-1 package (SO20) for 9 bit wide undershoot/overshoot clamping, combined with fast ESD transient suppression.

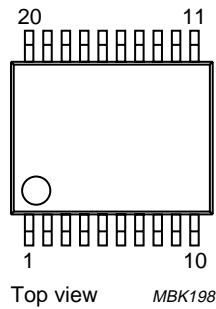


Fig.2 Simplified outline.

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**LIMITING VALUES (per diode)**

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
$I_Z$	reverse current	DC; $T_{amb} = 25\text{ }^\circ\text{C}$	–	20	mA
$I_F$	forward current	DC; $T_{amb} = 25\text{ }^\circ\text{C}$	–	100	mA
$I_{FT}$	feed-through current	DC; $T_{amb} = 25\text{ }^\circ\text{C}$ ; note 1	–	100	mA
$I_{FSM}$	peak forward current	$t_p = 1\text{ ms}$ ; square wave	–	4.5	A
$I_{ZSM}$	peak reverse current	$t_p = 1\text{ ms}$ ; square wave	–	2.5	A
$P_{tot}$	total power dissipation	$T_{amb} = 25\text{ }^\circ\text{C}$ ; note 2	–	0.95	W
$T_{stg}$	storage temperature		–65	+150	$^\circ\text{C}$
$T_j$	junction temperature		–65	+150	$^\circ\text{C}$

**THERMAL CHARACTERISTICS**

SYMBOL	PARAMETER	VALUE	UNIT
$R_{th\ j-a}$	thermal resistance from junction to ambient; note 2	135	K/W

**Note to the Limiting values and Thermal characteristics**

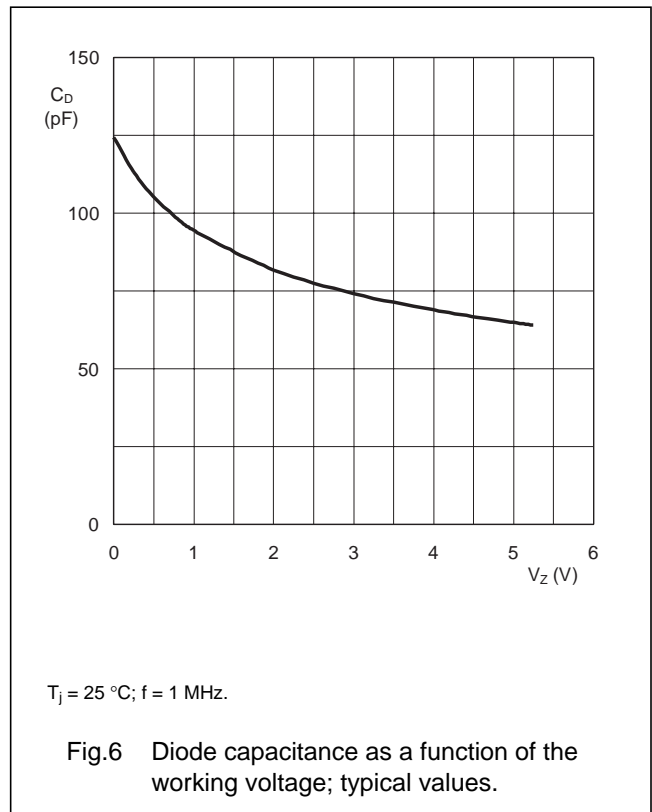
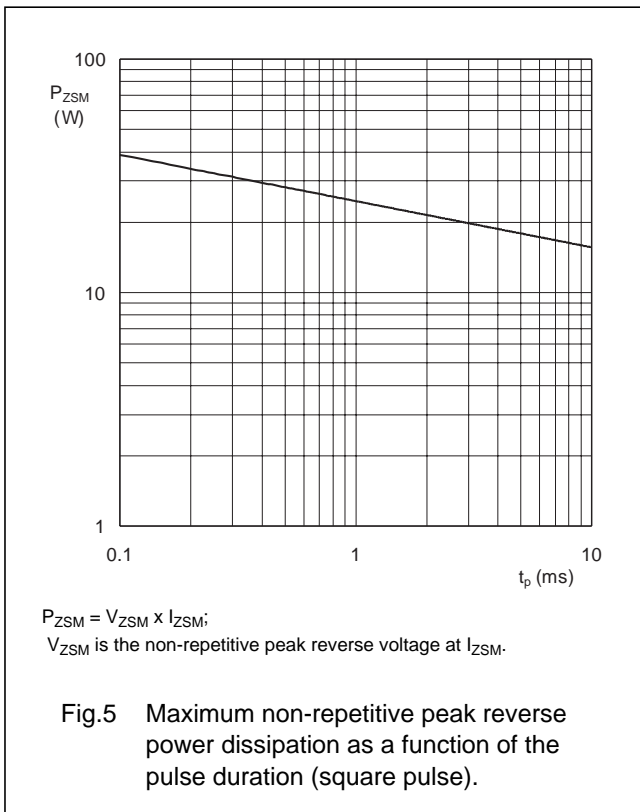
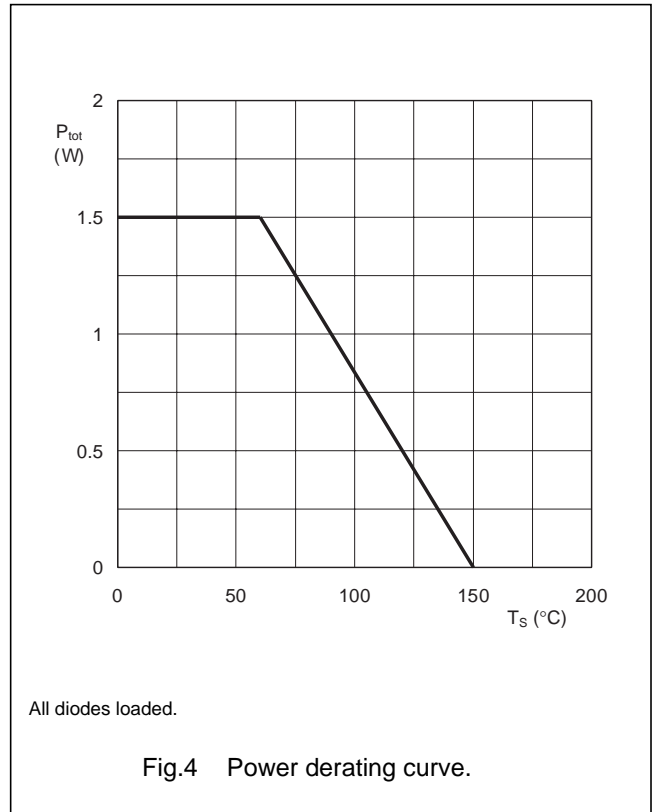
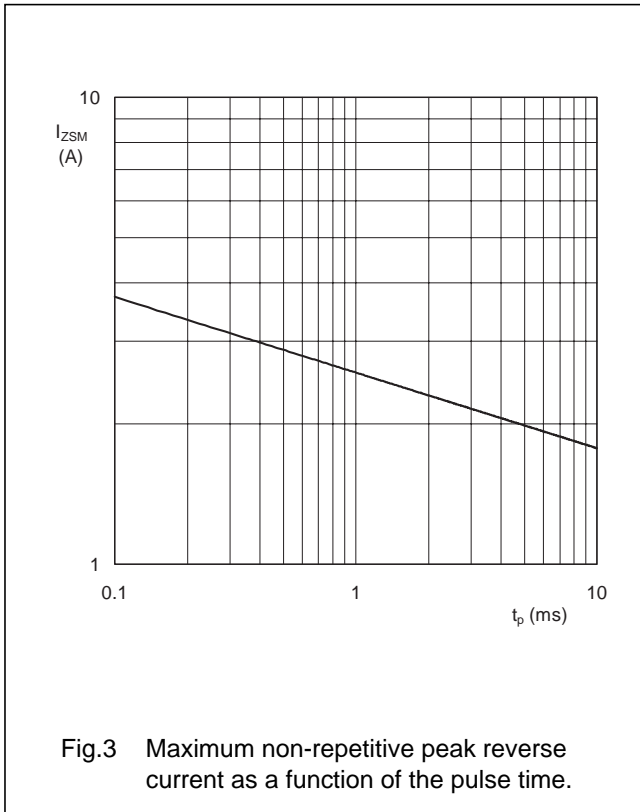
1. Current is flowing from input to corresponding output.
2. One or more diodes loaded.

**ELECTRICAL CHARACTERISTICS (per diode)** $T_j = 25\text{ }^\circ\text{C}$  unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_Z$	reverse voltage	$I_Z = 250\text{ }\mu\text{A}$	6.4	6.8	7.2	V
$V_F$	forward voltage	$I_F = 100\text{ mA}$	–	–	1.1	V
$V_{ZSM}$	reverse surge voltage	$t_p = 1\text{ ms}$ ; $I_{ZSM} = 2.5\text{ A}$	–	–	10	V
$I_H$	input high current	$V_{IN} = 5.25\text{ V}$	–	–	0.5	$\mu\text{A}$
$R_Z$	zener impedance	$I_Z = 250\text{ }\mu\text{A}$	–	–	100	$\Omega$
$S_Z$	temperature coefficient of $V_Z$		–	3	–	mV/K
$C_D$	input diode capacitance	$f = 1\text{ MHz}$ ; $V_R = 0$	–	–	200	pF
		$f = 1\text{ MHz}$ ; $V_R = 5.25\text{ V}$	–	–	100	pF

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## GRAPHICAL DATA

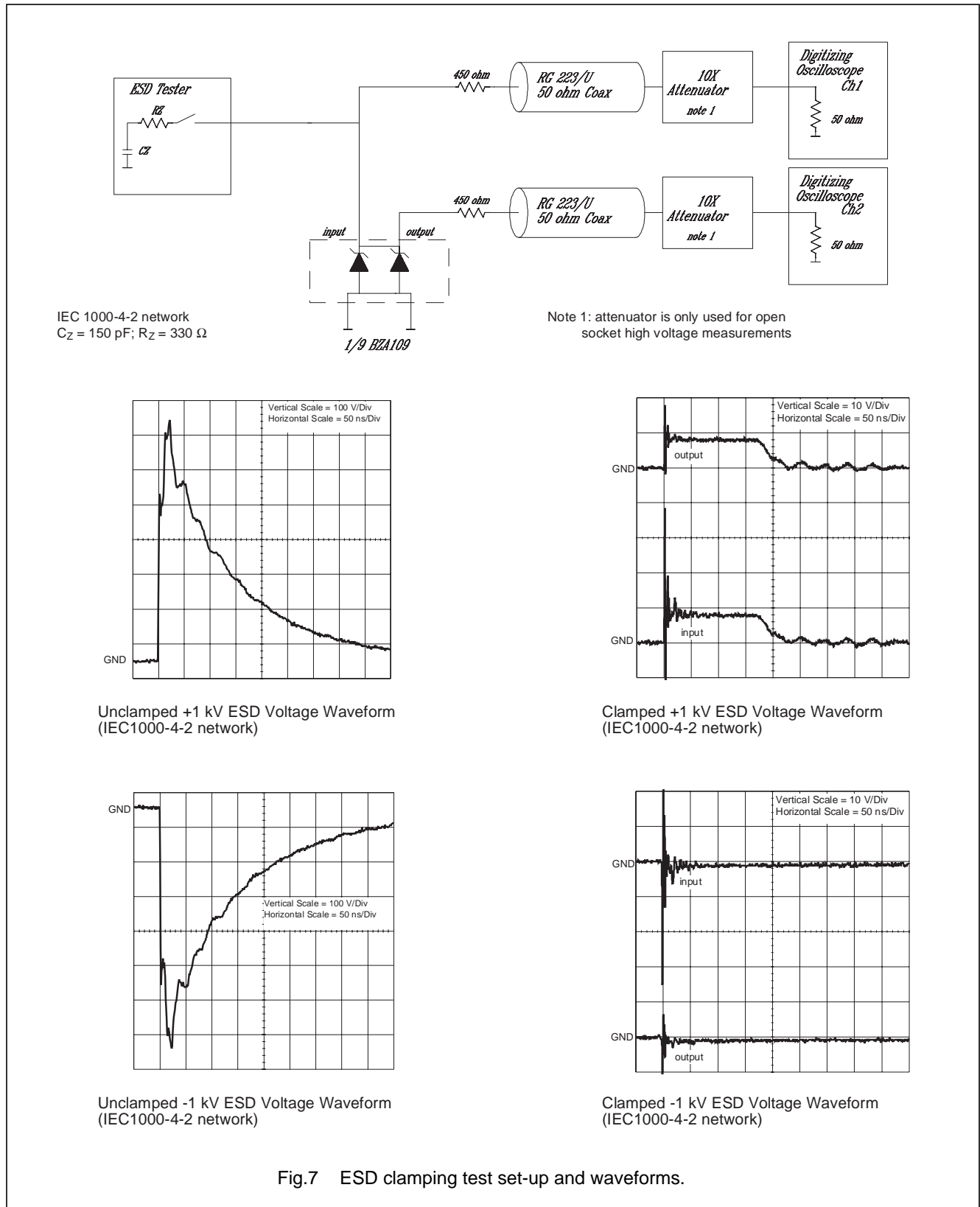


Fig.7 ESD clamping test set-up and waveforms.

# 9-fold ESD Transient Suppressor

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## TYPICAL COMMON ANODE APPLICATION

A nine-fold transient suppressor in a SOT339 package gives the possibility to protect nine separate lines using only one package. Two simplified examples are illustrated below.

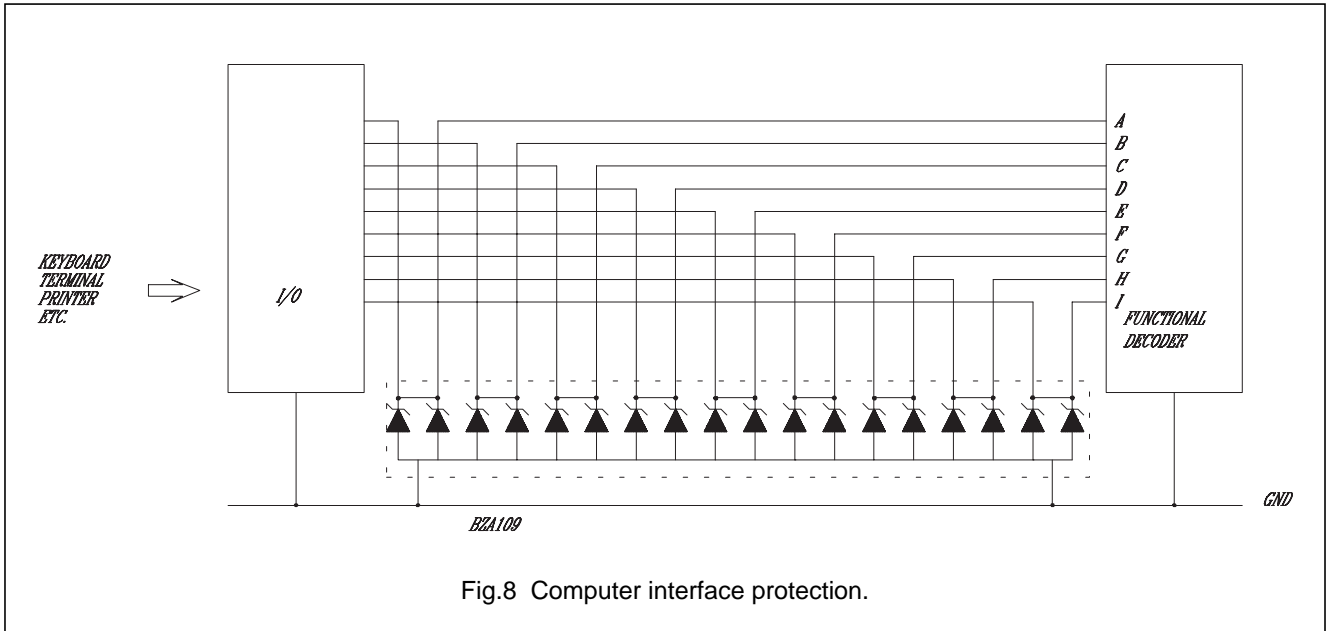


Fig.8 Computer interface protection.

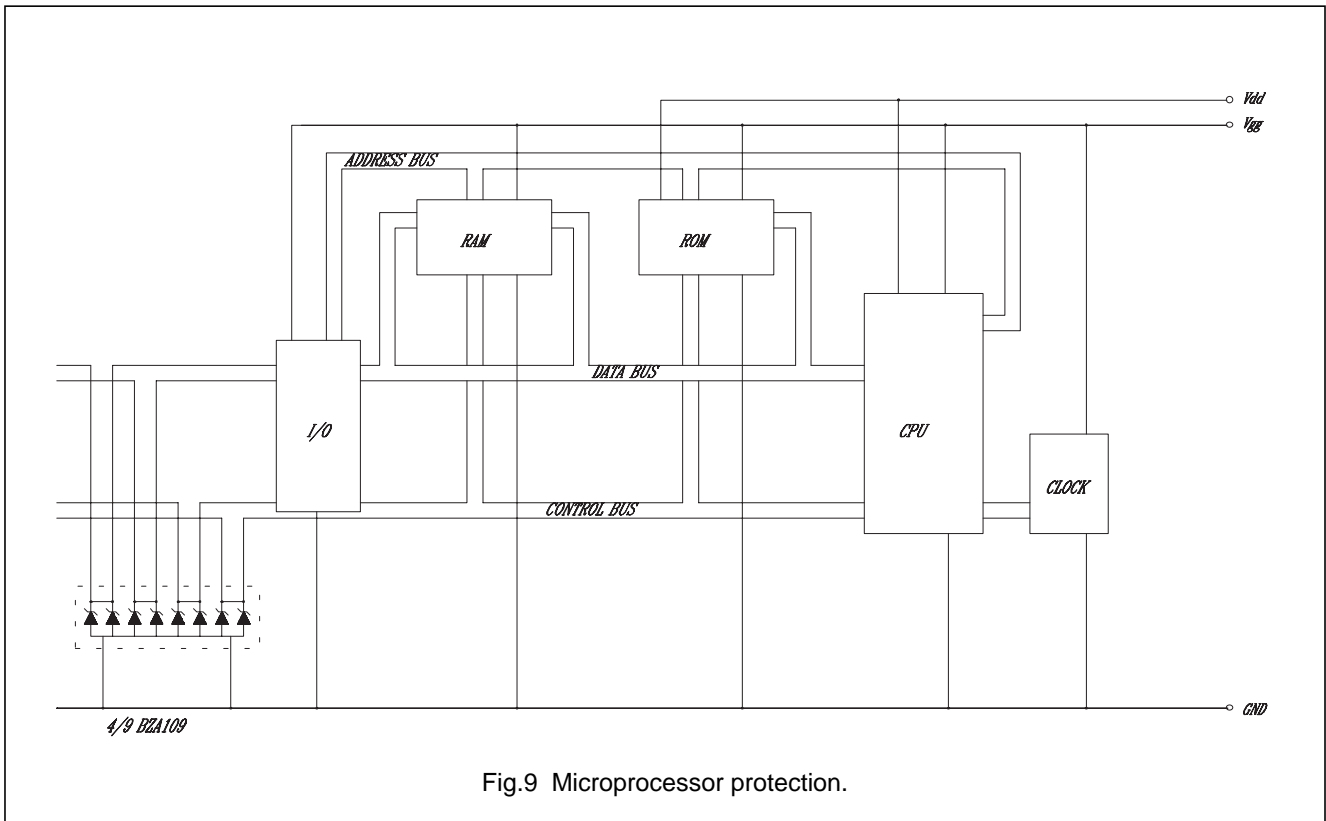


Fig.9 Microprocessor protection.

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## 9-fold ESD Transient Suppressor

## BZA109TS

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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 BZA109TS 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 printed-circuit board layout should use minimal series conductor lengths. 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 in the area of the input terminals or connectors.
2. Reduce parallel signal paths.
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.

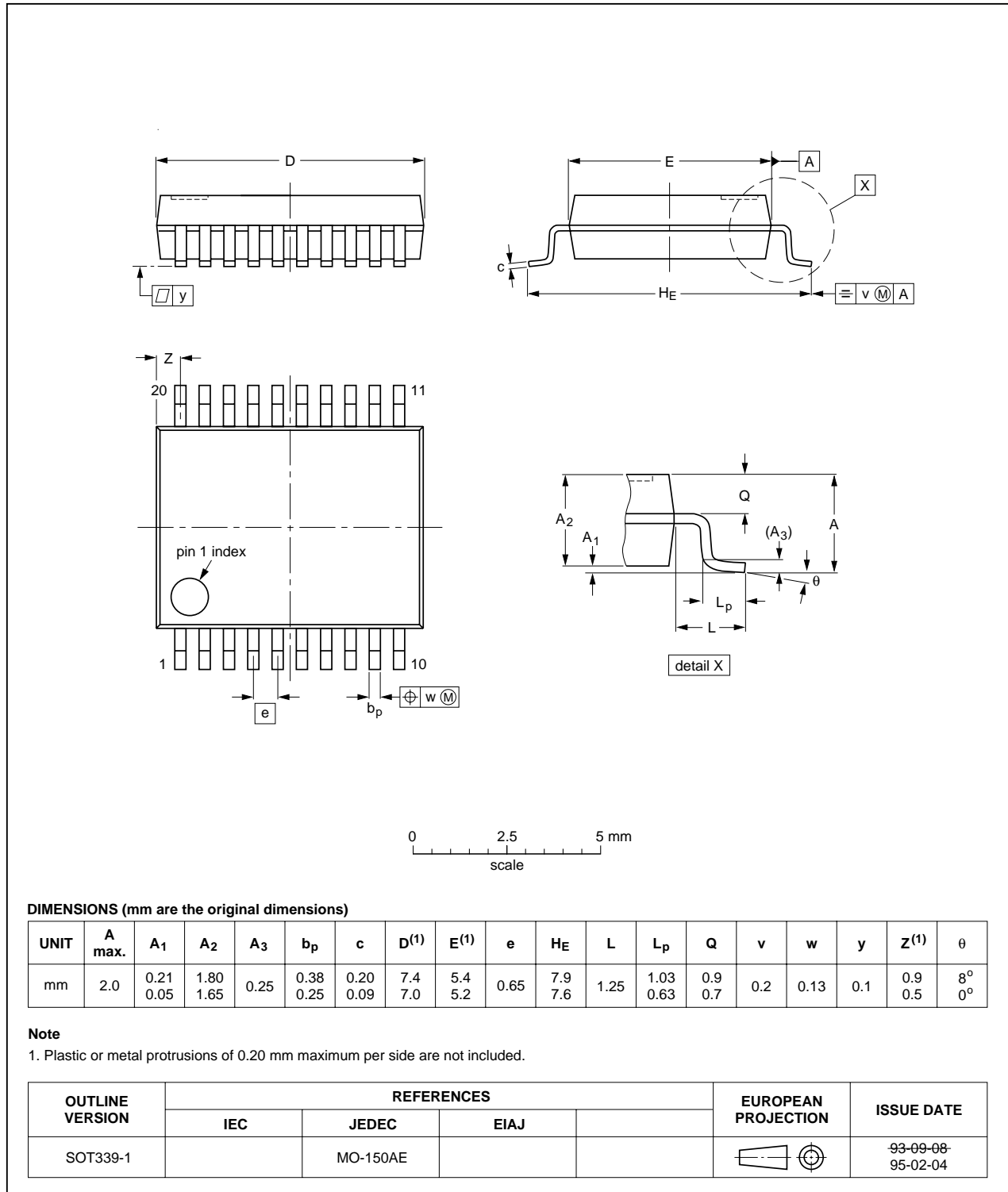
# 9-fold ESD Transient Suppressor

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## PACKAGE OUTLINE

SSOP20: plastic shrink small outline package; 20 leads; body width 5.3 mm

SOT339-1





## 9-fold ESD Transient Suppressor

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**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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**NOTES**

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**NOTES**

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