

## Features

- ESD/Surge protection for one line with bi-directional
- Provide transient protection for each line to  
IEC 61000-4-2 (ESD)  $\pm 24\text{kV}$  /  $\pm 20\text{kV}$  (air / contact)  
IEC 61000-4-4 (EFT)  $\pm 80\text{A}$  (5/50ns)  
IEC 61000-4-5 (Lightning)  $4\text{A}$  (8/20 $\mu\text{s}$ )
- Integrate a TVS and a parallel RF decoupling capacitor in a single package
- Suitable for, **5V and below**, operating voltage applications
- Decoupling capacitor: **100pF**
- **0201 small MCSP package** saves board space
- Protect one I/O line or one power line
- Fast turn-on and low clamping voltage
- Solid-state silicon-avalanche and active circuit triggering technology
- **Green part**

## Applications

- Cellular handsets and accessories
- Audio ports
- Handheld portable applications
- Small panel modules
- Low speed data or control line protection
- Peripherals
- Consumer electronics

## Description

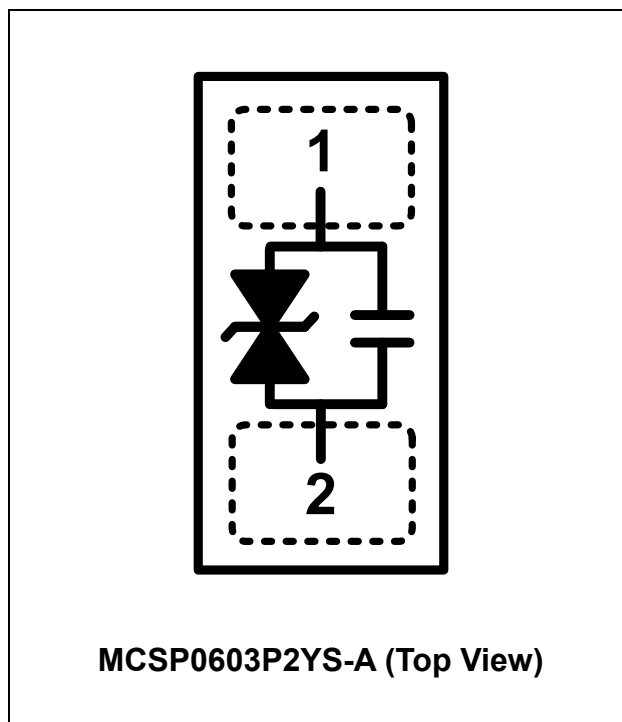
AZ5D45-01M is a design which includes a bi-directional surge rated clamping cell to protect one power line, or one control line, or one low speed data line in an electronic system. The

AZ5D45-01M has been specifically designed to protect sensitive components which are connected to power or control lines from over-voltage damage caused by Electrostatic Discharging (ESD), Electrical Fast Transients (EFT), Lightning, and Cable Discharge Event (CDE).

AZ5D45-01M is a unique design which includes proprietary clamping cell in a single package. During transient conditions, the proprietary clamping cell prevents over-voltage on the power line or control/data lines, protecting any downstream components.

AZ5D45-01M may be used to meet the ESD immunity requirements of IEC 61000-4-2, Level 4 ( $\pm 15\text{kV}$  air,  $\pm 8\text{kV}$  contact discharge).

## Circuit Diagram / Pin Configuration



## Specifications

Absolute Maximum Ratings ( $T_A = 25^\circ\text{C}$ , unless otherwise specified)			
Parameter	Symbol	Rating	Unit
Peak Pulse Current ( $t_p = 8/20\mu\text{s}$ )	$I_{PP}$	4	A
Operating Voltage	$V_{DC}$	$\pm 5.5$	V
ESD per IEC 61000-4-2 (Air)	$V_{ESD-1}$	$\pm 24$	kV
ESD per IEC 61000-4-2 (Contact)	$V_{ESD-2}$	$\pm 20$	
Lead Soldering Temperature	$T_{SOL}$	260 (10 sec.)	$^\circ\text{C}$
Operating Temperature	$T_{OP}$	-55 to +125	$^\circ\text{C}$
Storage Temperature	$T_{STO}$	-55 to +150	$^\circ\text{C}$

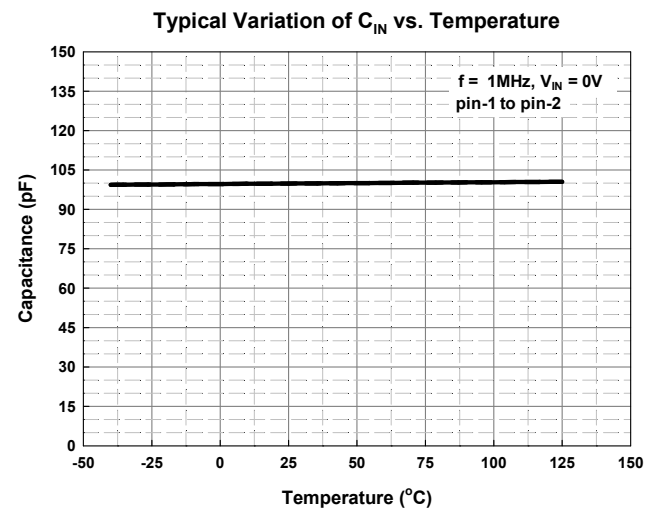
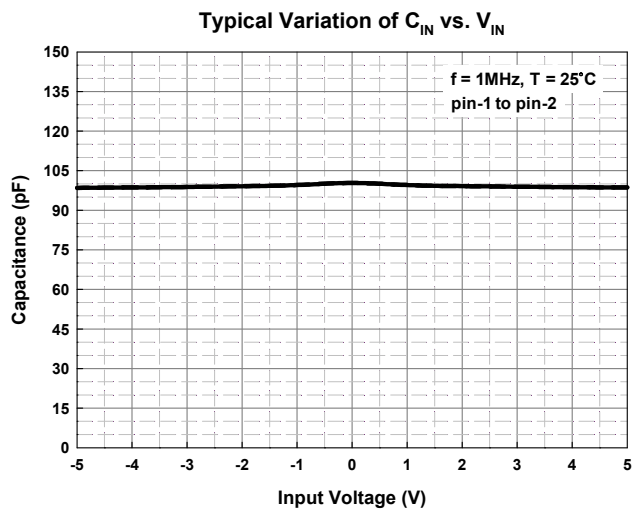
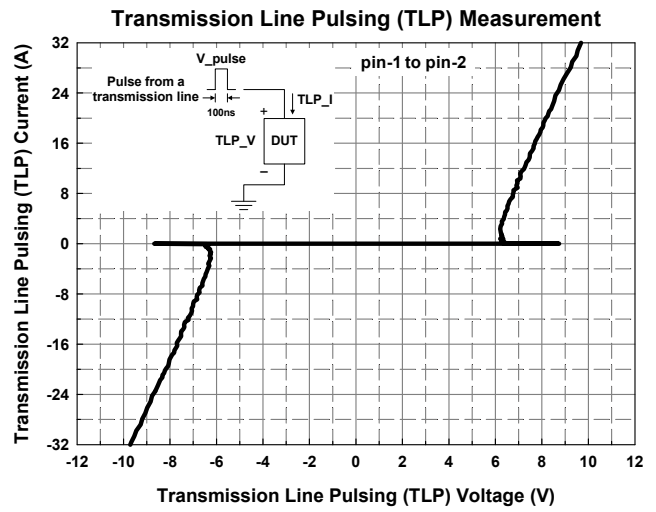
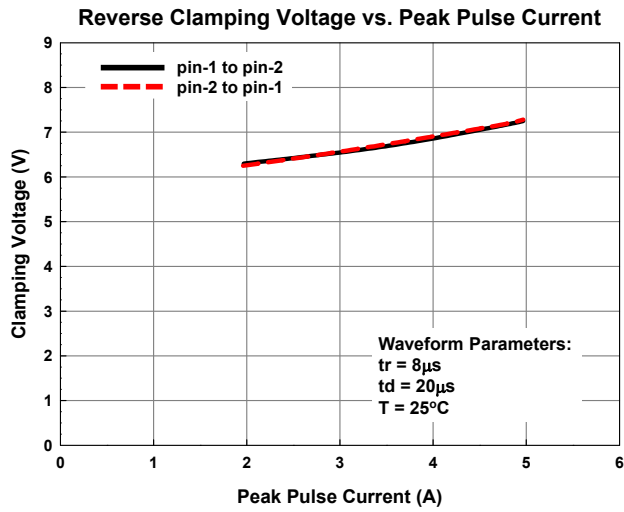
Electrical Characteristics						
Parameter	Symbol	Condition	Min	Typ	Max	Unit
Reverse Stand-Off Voltage	$V_{RWM}$	$T = 25^\circ\text{C}$ .	-5		5	V
Reverse Leakage Current	$I_{Leak}$	$V_{RWM} = \pm 5\text{V}$ , $T = 25^\circ\text{C}$ .			100	nA
Reverse Breakdown Voltage	$V_{BV}$	$I_{BV} = 1\text{mA}$ , $T = 25^\circ\text{C}$ .	6.5	8.5	10.5	V
Surge Clamping Voltage	$V_{CL-surge}$	$I_{PP} = 4\text{A}$ , $t_p = 8/20\mu\text{s}$ , $T = 25^\circ\text{C}$ .		7	9	V
ESD Clamping Voltage (Note 1)	$V_{CL-ESD}$	IEC 61000-4-2 +8kV ( $I_{TLP} = 16\text{A}$ ), contact mode, $T = 25^\circ\text{C}$ .		7.8		V
ESD Dynamic Turn-on Resistance	$R_{dynamic}$	IEC 61000-4-2 0~+8kV, $T = 25^\circ\text{C}$ , contact mode.		0.12		$\Omega$
Channel Input Capacitance	$C_{IN}$	$V_R = 0\text{V}$ to $5\text{V}$ , $f = 1\text{MHz}$ , $T = 25^\circ\text{C}$ .	85		115	pF

Note 1: ESD Clamping Voltage was measured by Transmission Line Pulsing (TLP) System.

TLP conditions:  $Z_0 = 50\Omega$ ,  $t_p = 100\text{ns}$ ,  $t_r = 1\text{ns}$ .



## Typical Characteristics



## Applications Information

The AZ5D45-01M is designed to protect one line against system ESD/EFT/Lightning pulses by clamping it to an acceptable reference.

The usage of the AZ5D45-01M is shown in Fig. 1. Protected line, such as data line, control line, or power line, is connected to pin-1. The pin-2 is connected to a ground plane on the board. In order to minimize parasitic inductance in the board traces, all path lengths connected to the pins of AZ5D45-01M should be kept as short as possible.

In order to obtain enough suppression of ESD induced transient, good circuit board is critical. Thus the following guidelines are recommended:

- Minimize the path length between the protected lines and the AZ5D45-01M.
- Place the AZ5D45-01M near the input terminals or connectors to restrict transient coupling.
- The ESD current return path to ground should be kept as short as possible.
- Use ground planes whenever possible.
- NEVER route critical signals near board edges and near the lines which the ESD transient easily injects to.

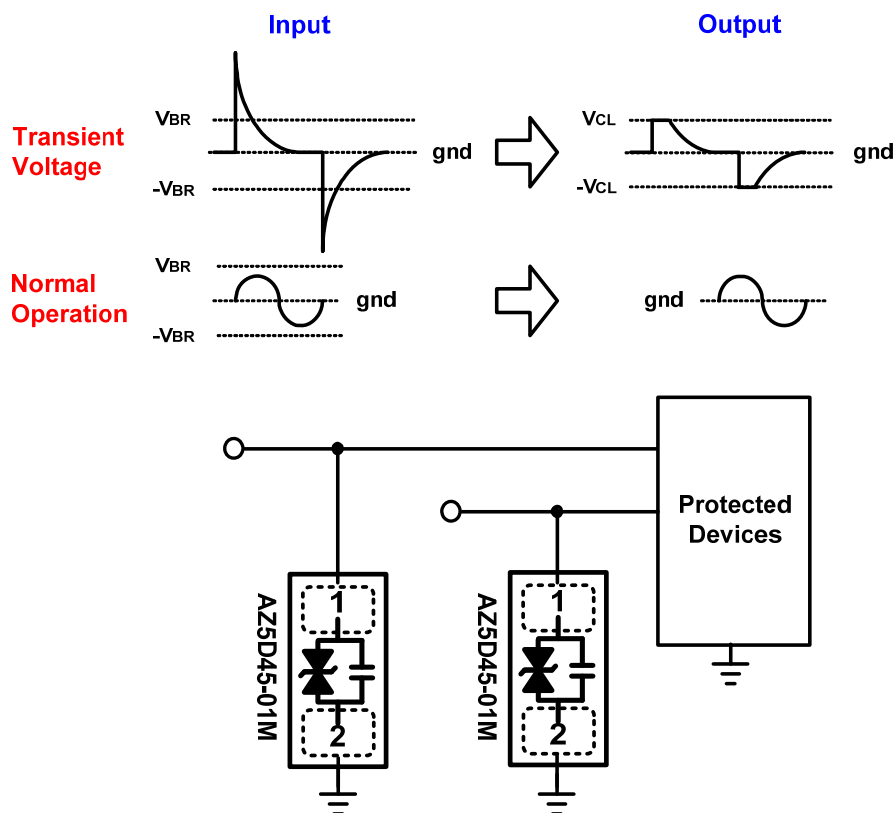


Fig. 1

Fig. 2 shows an example of using AZ5D45-01M for audio port protection. AZ5D45-01M consists of a TVS and a parallel RF decoupling capacitor, which can be used to replace two discrete

components. AZ5D45-01M can provide efficient ESD and EMI protection on any low speed lines that are susceptible to ESD damage and RF interference.

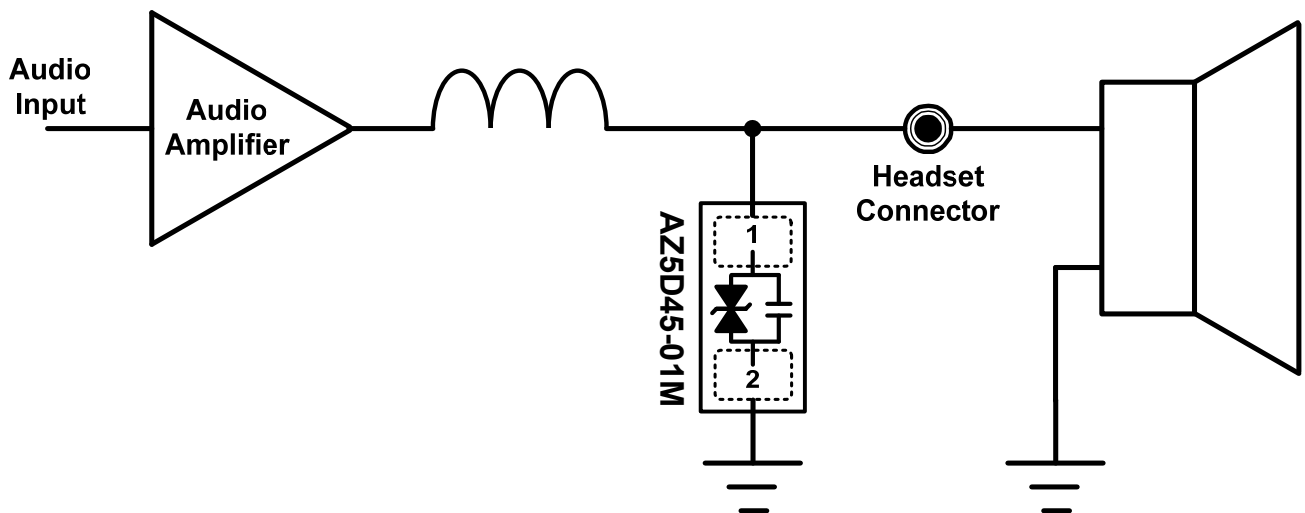
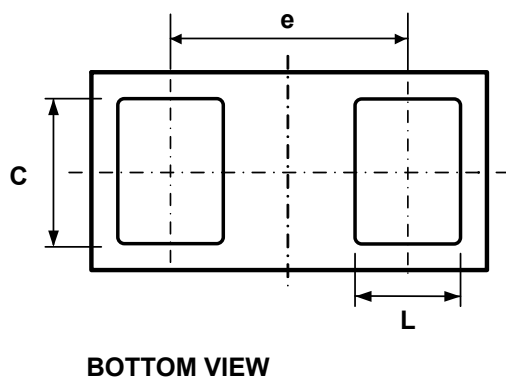
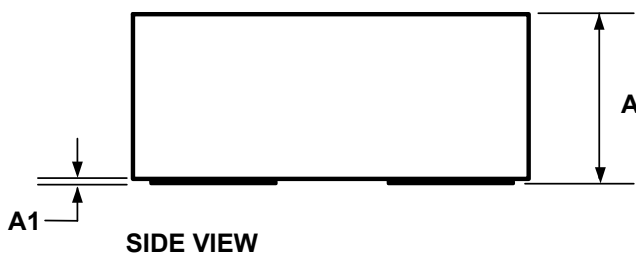
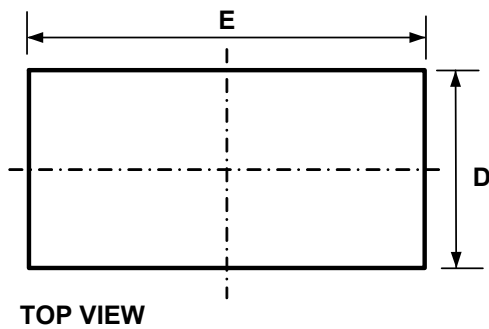


Fig. 2 An example of audio port protection

## Mechanical Details

### MCSP0603P2YS-A

#### Package Diagrams

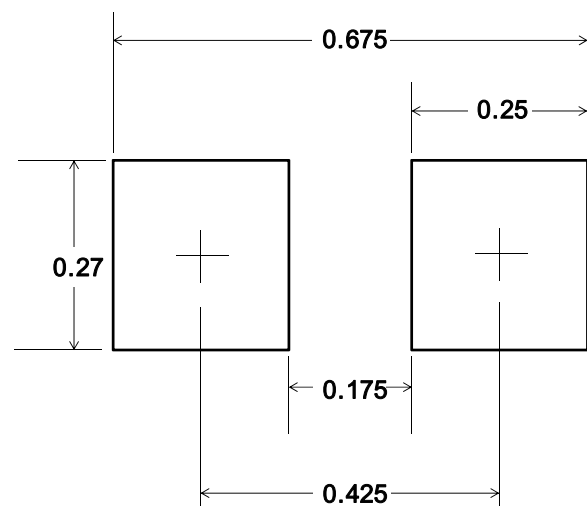


#### Package Dimensions

SYMBOL	MILLIMETERS		
	MIN.	NOM.	MAX.
E	0.580	0.600	0.620
D	0.280	0.300	0.320
A	0.235	0.250	0.265
A1	0.000	0.010	0.050
L	0.140	0.160	0.180
C	0.200	0.220	0.240
e	0.355 BSC		

## Land Layout

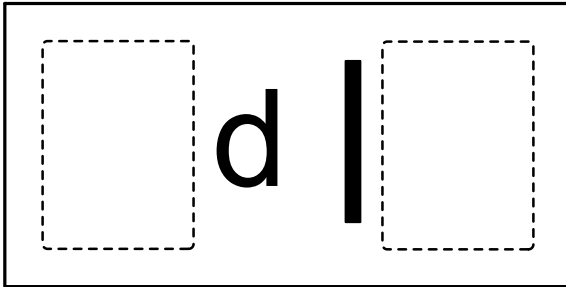
Unit: mm



#### Notes:

This LAND LAYOUT is for reference purposes only. Please consult your manufacturing partners to ensure your company's PCB design guidelines are met.

## Marking Code



d= Device Code

Part Number	Marking Code
AZ5D45-01M.R7G (Green Part)	d

Note : Green means Pb-free, RoHS, and Halogen free compliant.

## Ordering Information

PN#	Material	Type	Reel size	MOQ	MOQ/internal box	MOQ/carton
AZ5D45-01M.R7G	Green	T/R	7 inch	15,000/reel	4 reels = 60,000/box	6 boxes = 360,000/carton

## Revision History

Revision	Modification Description
Revision 2024/12/19	Preliminary Release.
Revision 2025/02/26	Formal Release.