



## Features

- ESD/Surge Protection for 1 Line with Bidirectional.
- Provide ESD protection for each line to  
**IEC 61000-4-2 (ESD)  $\pm 30\text{kV}$  (air / contact)**  
**IEC 61000-4-4 (EFT) 80A (5/50ns)**  
**IEC 61000-4-5 (Lightning) 21A (8/20 $\mu\text{s}$ )**
- Suitable for, **3.3V** and below, operating voltage applications
- Low capacitance : 2.0pF typical
- High surge protection
- Fast turn-on and low clamping voltage
- Solid-state silicon-avalanche and active circuit triggering technology
- **Green Part**

## Applications

- xDSL Line Protection
- WAN/LAN Device
- 10/100/1000 Ethernet
- Power Supply Protection
- USB Interface Protection
- RF Interface Protection
- Peripherals

## Description

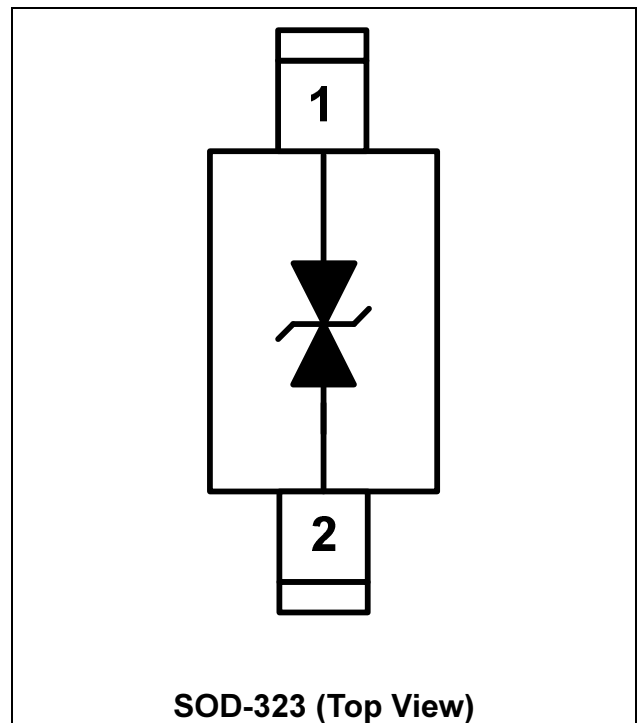
AZ1613-01L is a design which includes a bi-directional ESD rated clamping cell to protect one power line, or one control line, or one high speed data line in an electronic system. The AZ1613-01L has been specifically designed to protect sensitive components which are connected to data and transmission lines from

over-voltage caused by Electrostatic Discharging (ESD), Electrical Fast Transients (EFT), Lightning, and Cable Discharge Event (CDE).

AZ1613-01L 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.

AZ1613-01L 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			
PARAMETER	SYMBOL	RATING	UNITS
Peak Pulse Current (tp=8/20μs)	I <sub>PP</sub>	21	A
Operating Supply Voltage	V <sub>DC</sub>	±3.6	V
ESD per IEC 61000-4-2 (Air)	V <sub>ESD</sub>	±30	kV
ESD per IEC 61000-4-2 (Contact)		±30	
Lead Soldering Temperature	T <sub>SOL</sub>	260 (10 sec.)	°C
Operating Temperature	T <sub>OP</sub>	-55 to +125	°C
Storage Temperature	T <sub>STO</sub>	-55 to +150	°C

ELECTRICAL CHARACTERISTICS						
PARAMETER	SYMBOL	CONDITIONS	MINI	TYP	MAX	UNITS
Reverse Stand-Off Voltage	V <sub>RWM</sub>	T=25 °C	-3.3		3.3	V
Reverse Leakage Current	I <sub>Leak</sub>	V <sub>RWM</sub> = ±3.3V, T=25 °C			1	μA
Reverse Breakdown Voltage	V <sub>BV</sub>	I <sub>BV</sub> = 1mA, T=25 °C	4.6		7.6	V
Surge Clamping Voltage	V <sub>CL-surge</sub>	I <sub>PP</sub> = 5A, tp=8/20μs, T=25 °C		6.5		V
		I <sub>PP</sub> = 21A, tp=8/20μs, T=25 °C		10.5		
ESD Clamping Voltage (Note 1)	V <sub>clamp</sub>	IEC 61000-4-2, +8kV (I <sub>TLP</sub> = 16A), Contact mode, T=25 °C		8		V
ESD Dynamic Turn-on Resistance	R <sub>dynamic</sub>	IEC 61000-4-2, 0~+8kV, T=25 °C, Contact mode		0.16		Ω
Channel Input Capacitance	C <sub>IN</sub>	V <sub>R</sub> = 0V, f = 1MHz, T=25 °C		2.0	3.0	pF

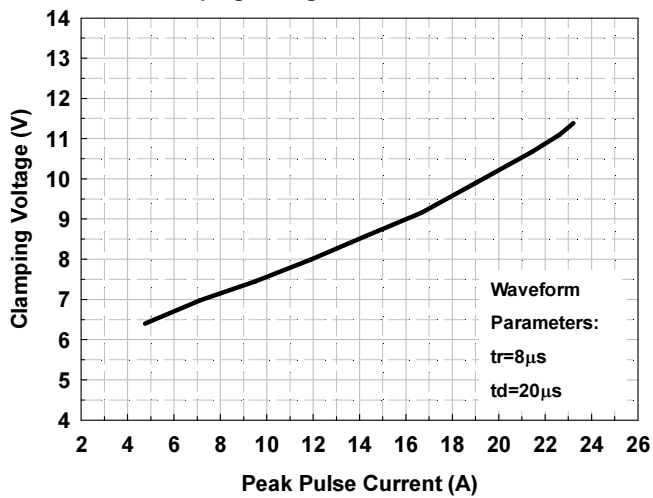
Note 1: ESD Clamping Voltage was measured by Transmission Line Pulsing (TLP) System.

TLP conditions: Z<sub>0</sub>= 50Ω, t<sub>p</sub>= 100ns, t<sub>r</sub>= 1ns.

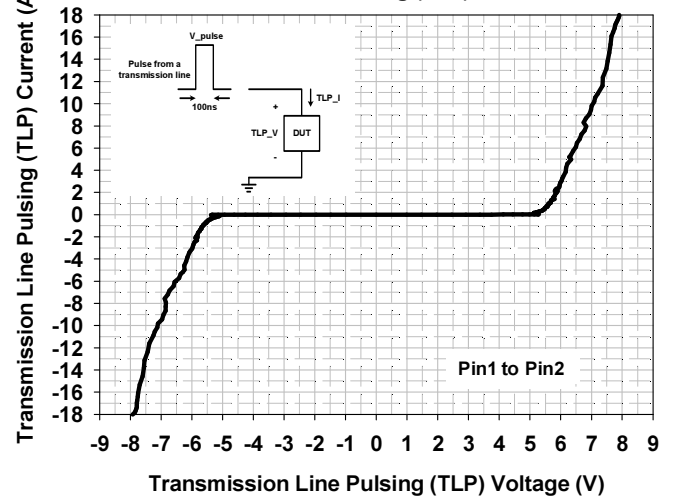


## Typical Characteristics

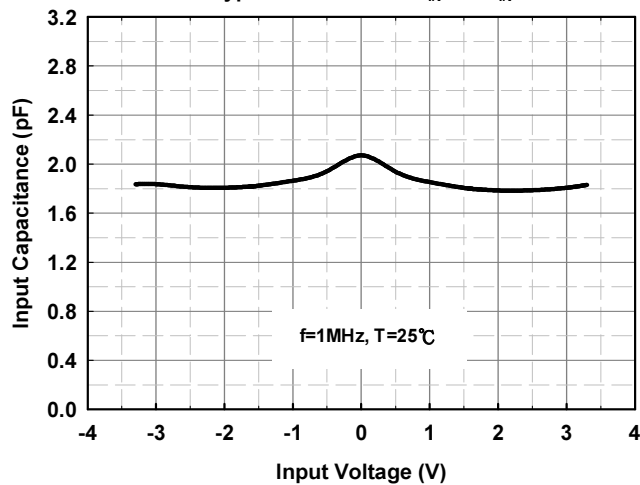
Clamping Voltage vs. Peak Pulse Current



Transmission Line Pulsing (TLP) Measurement



Typical Variation of  $C_{IN}$  vs.  $V_{IN}$



## Applications Information

The AZ1613-01L is designed to protect one line against System ESD/EFT/Lightning pulses by clamping it to an acceptable reference. It provides bidirectional protection.

The usage of the AZ1613-01L is shown in Fig. 1. Protected line, such as data line, control line, or power line, is connected at 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 AZ1613-01L 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 AZ1613-01L.
- Place the AZ1613-01L 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.

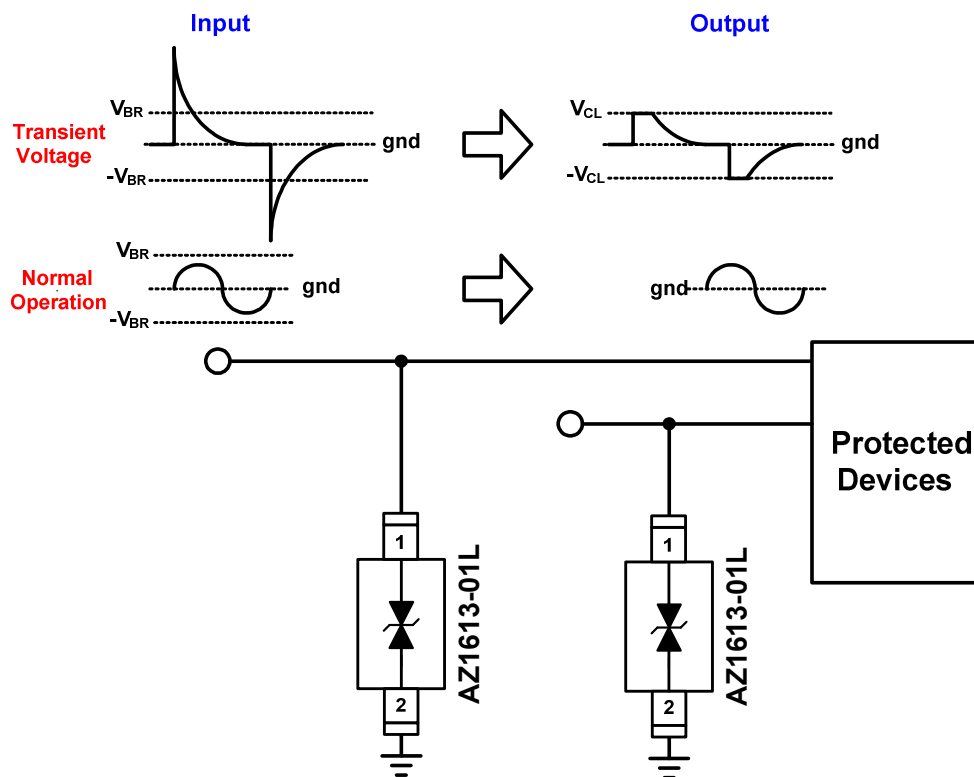
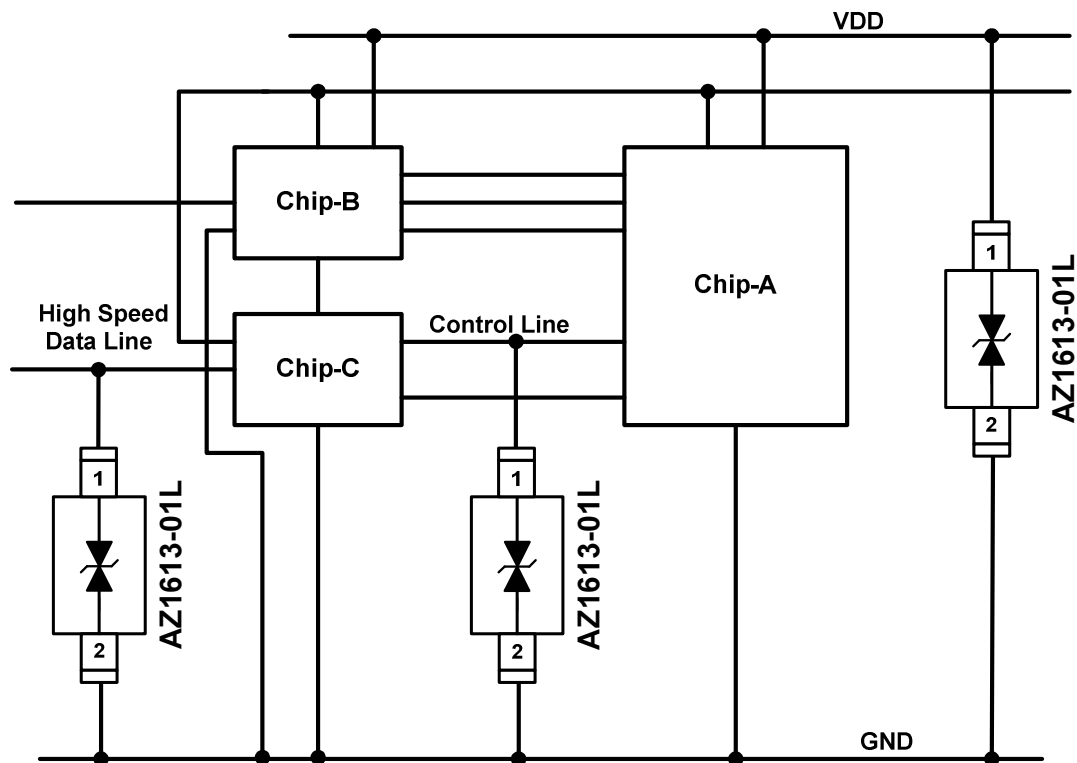


Fig. 1

Fig. 2 shows another simplified example of using AZ1613-01L to protect the control line, high speed data line, and power line from ESD transient stress.



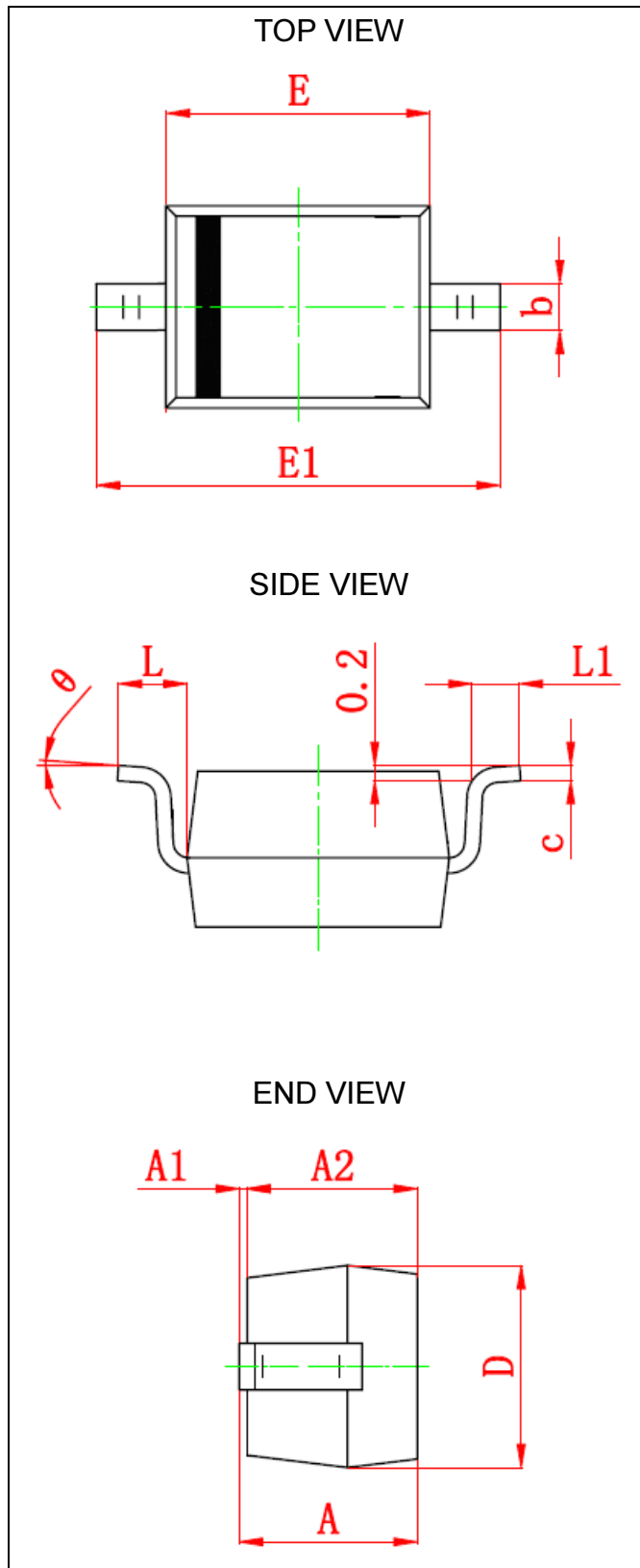
**Fig. 2**



## Mechanical Details

SOD-323

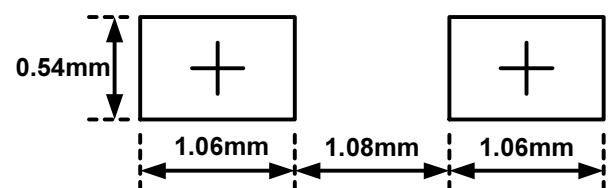
### PACKAGE DIAGRAMS



### PACKAGE DIMENSIONS

Symbol	Millimeters		Inches	
	MIN.	MAX.	MIN.	MAX.
A	0.8	1.0	0.031	0.039
A1	0	0.1	0.000	0.004
A2	0.8	0.9	0.031	0.035
b	0.25	0.35	0.010	0.014
C	0.08	0.15	0.003	0.006
D	1.2	1.4	0.047	0.055
E	1.6	1.8	0.063	0.071
E1	2.5	2.7	0.098	0.106
L	0.475REF		0.019 REF	
L1	0.25	0.4	0.010	0.016
$\theta$	0°	8°	0°	8°

### LAND LAYOUT

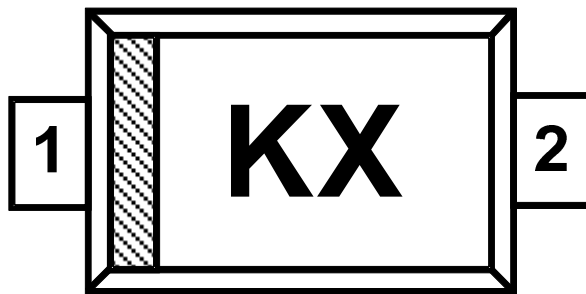


#### Notes:

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



**Top View**

K = Device Code  
X = Date Code

Part Number	Marking Code
AZ1613-01L.R7G (Green Part)	KX

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

## Ordering Information

PN#	Material	Type	Reel size	MOQ	MOQ/internal box	MOQ/carton
AZ1613-01L.R7G	Green	T/R	7 inch	3,000/reel	4 reels= 12,000/box	6 boxes =72,000/carton

## Revision History

Revision	Modification Description
Revision 2016/05/23	Preliminary Release.
Revision 2017/05/11	Formal Release.