

## Features

- ESD Protection for 1 line with Uni-directional
- Provide ESD protection for the protected line to **IEC 61000-4-2 (ESD)  $\pm 30\text{kV}$  (air/contact) Cable Discharged Event (CDE)**
- For low operating voltage applications: **3.3V** maximum
- **0402 small DFN 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**
- **AEC-Q101 qualified**

## Applications

- Automotive Applications
- Computer Interfaces Protection
- Microprocessors Protection
- Serial and Parallel Ports Protection
- Control Signal Lines Protection
- Power lines on PCB Protection
- 3.3V operating systems

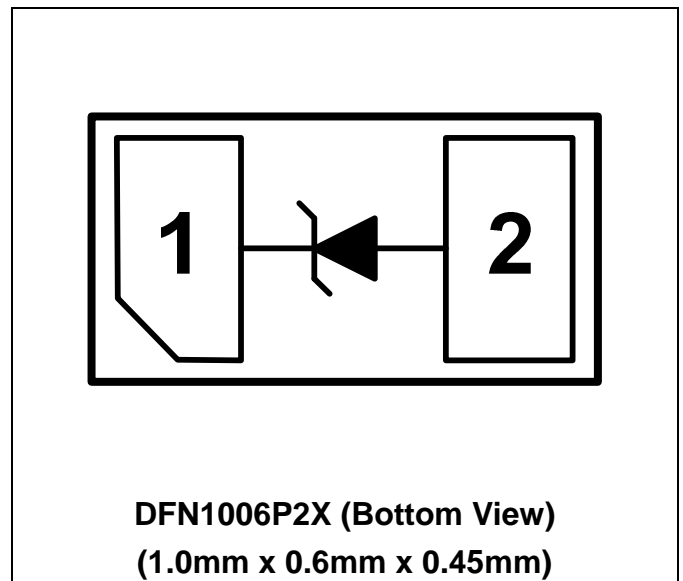
## Description

AZ9513-01F is a design which includes a uni-directional ESD rated clamping cell to protect one power line, or one control line, or one low speed data line in an electronic systems. The AZ9513-01F has been specifically designed to protect sensitive components which are connected to data and transmission lines from over-voltage caused by Electrostatic Discharging (ESD), and Cable Discharge Event (CDE).

AZ9513-01F is a unique design which includes proprietary clamping cells in a small package. During transient conditions, the proprietary clamping cells prevent over-voltage on the control/data lines, protecting any downstream components.

AZ9513-01F 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
Operating Supply Voltage (pin-1 to pin-2)	$V_{DC}$	3.6	V
ESD per IEC 61000-4-2 (Air)	$V_{ESD}$	$\pm 30$	kV
ESD per IEC 61000-4-2 (Contact)		$\pm 30$	
Lead Soldering Temperature	$T_{SOL}$	260 (10 sec.)	$^{\circ}C$
Operating Temperature	$T_{OP}$	-55 to +125	$^{\circ}C$
Storage Temperature	$T_{STO}$	-55 to +150	$^{\circ}C$

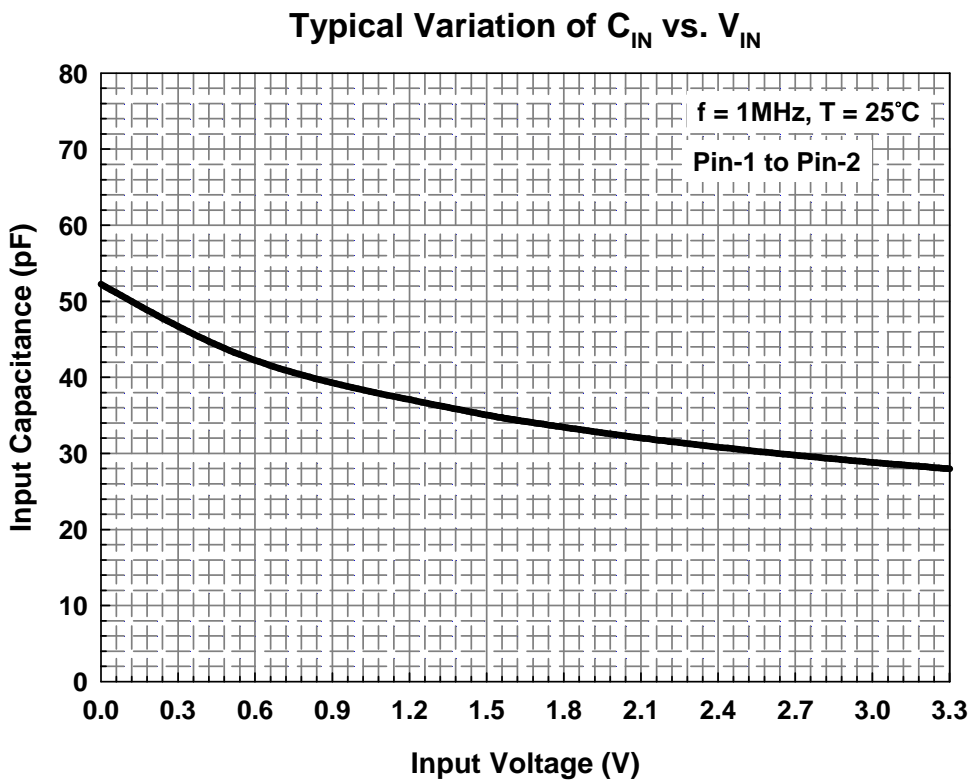
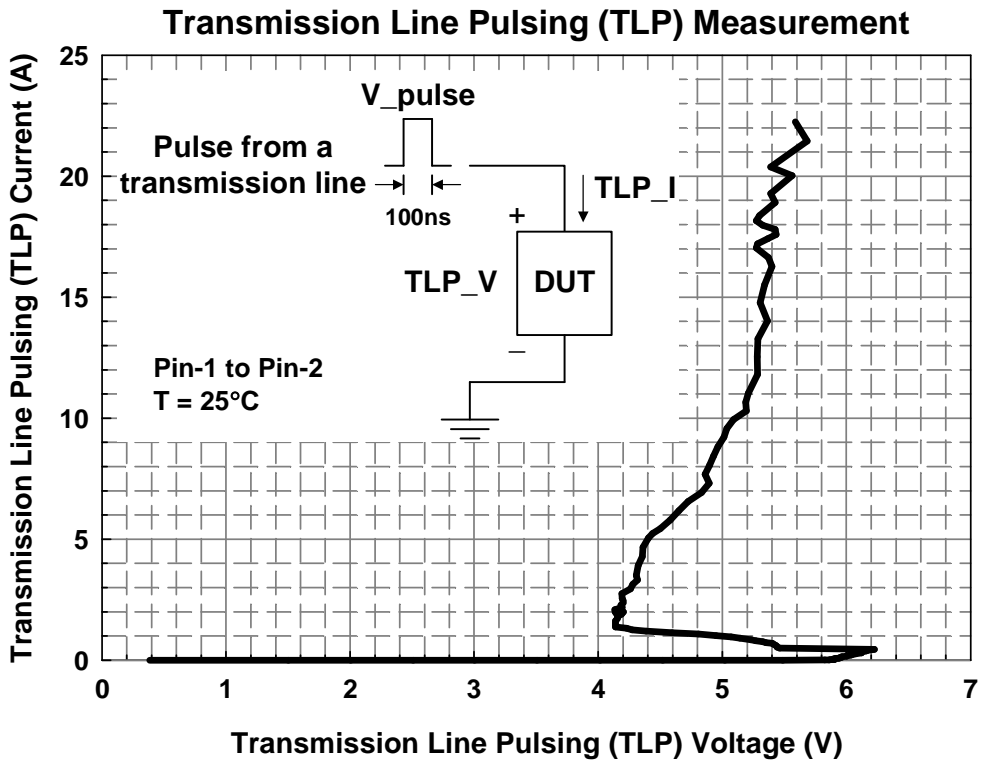
ELECTRICAL CHARACTERISTICS						
PARAMETER	SYMBOL	CONDITIONS	MINI	TYP	MAX	UNITS
Reverse Stand-Off Voltage	$V_{RWM}$	Pin-1 to pin-2, $T=25^{\circ}C$ .			3.3	V
Reverse Leakage Current	$I_{Leak}$	$V_{RWM} = 3.3V$ , $T=25^{\circ}C$ , pin-1 to pin-2.			1	$\mu A$
Reverse Breakdown Voltage	$V_{BV}$	$I_{BV} = 1mA$ , $T=25^{\circ}C$ , pin-1 to pin-2.	4.5		6.5	V
Forward Voltage	$V_F$	$I_F = 15mA$ , $T=25^{\circ}C$ , pin-2 to pin-1.	0.5		1	V
ESD Clamping Voltage (Note 1)	$V_{clamp}$	IEC 61000-4-2 +8kV ( $I_{TLP} = 16A$ ), Contact mode, $T=25^{\circ}C$ , pin-1 to pin-2.		6		V
Channel Input Capacitance	$C_{IN}$	$V_R = 0V$ , $f = 1MHz$ , $T=25^{\circ}C$ , pin-1 to pin2.		55	65	pF

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

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



## Typical Characteristics



## Applications Information

The AZ9513-01F is designed to protect one line against System ESD pulses by clamping them to an acceptable reference.

The usage of the AZ9513-01F is shown in Fig. 1. Protected lines, such as data lines, control lines, or power lines, are connected at pin 1. The pin 2 should be connected directly to a ground plane on the board. All path lengths connected to the pins of AZ9513-01F should be kept as short as possible to minimize parasitic inductance in the board traces.

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 AZ9513-01F.
- Place the AZ9513-01F 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 PCB internal circuit.

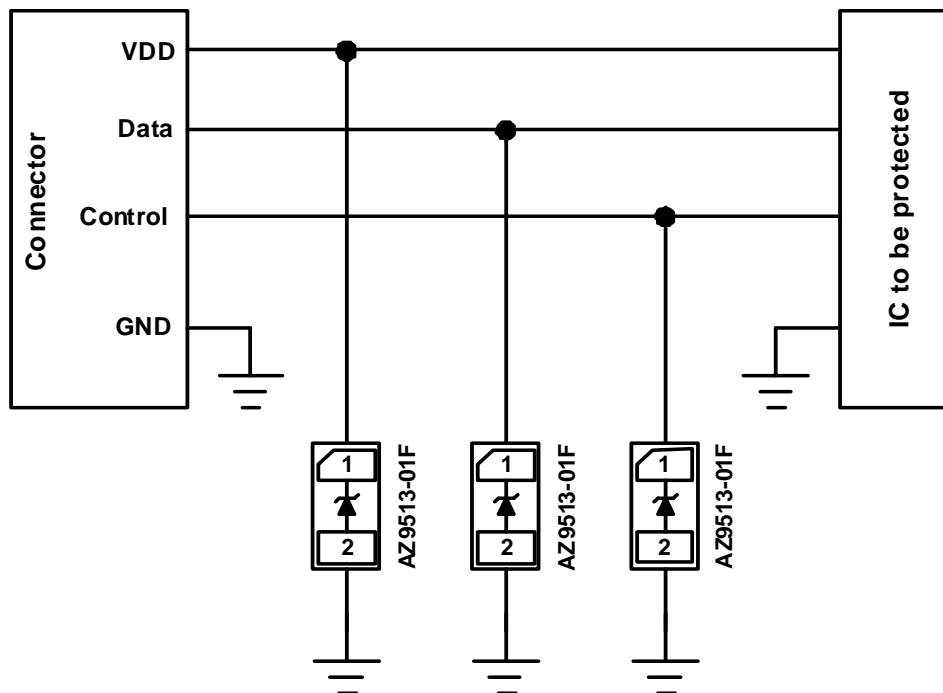
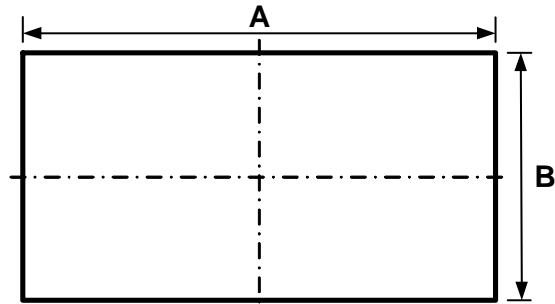


Fig. 1 ESD protection scheme by using AZ9513-01F.



## Mechanical Details

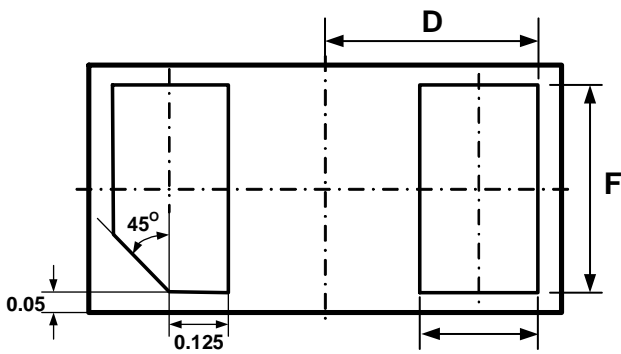
### DFN1006P2X PACKAGE DIAGRAMS



TOP VIEW



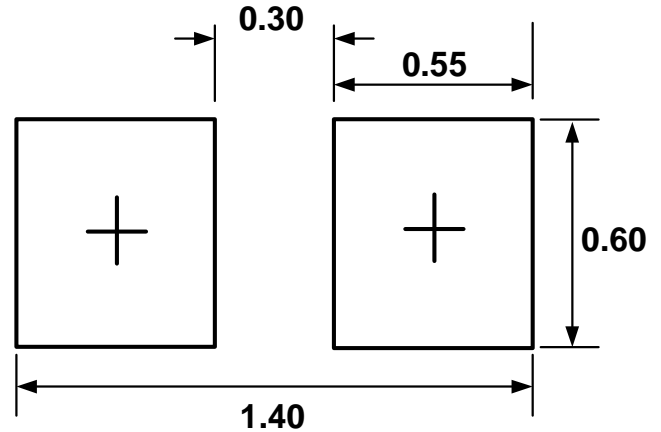
SIDE VIEW



BOTTOM VIEW

Symbol	Millimeters		Inches	
	min	max	min	max
A	0.95	1.05	0.037	0.041
B	0.55	0.65	0.022	0.026
C	0.40	0.55	0.016	0.022
D	0.45		0.018	
E	0.20	0.30	0.008	0.012
F	0.45	0.55	0.018	0.022

### LAND LAYOUT

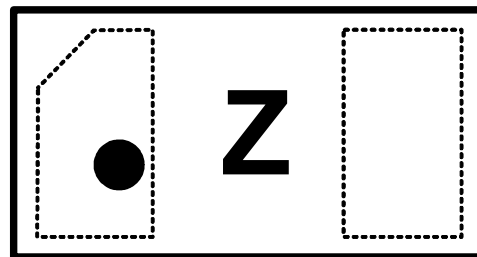


(Unit: mm)

#### 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



Top View

Part Number	Marking Code
AZ9513-01F (Green part)	Z

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



### Ordering Information

PN#	Material	Type	Reel size	MOQ	MOQ/internal box	MOQ/carton
AZ9513-01F.R7GR	Green	T/R	7 inch	12,000/reel	4 reel= 48,000/box	6 box =288,000/carton

### Revision History

Revision	Modification Description
Revision 2015/01/09	Preliminary Release.
Revision 2015/07/29	Formal Release.