

## Features

- ESD protect for one line with bi-directional
- Provide transient protection for the protected line to  
**IEC 61000-4-2 (ESD)  $\pm 15\text{kV}$  (air),  $\pm 11\text{kV}$  (contact)**
- **Ultra-low capacitance: 0.3pF typical**
- **0402 small DFN package** saves board space
- Fast turn-on and low clamping voltage
- Suitable for, **24V and below**, operating voltage applications
- Solid-state silicon-avalanche and active circuit triggering technology
- **Green part**
- **AEC-Q101 qualified**

## Applications

- Automotive applications
- Antenna ESD protection
- Near Field Communication (NFC)
- RF signal ESD protection
- Hand held portable applications
- High speed data interface

## Description

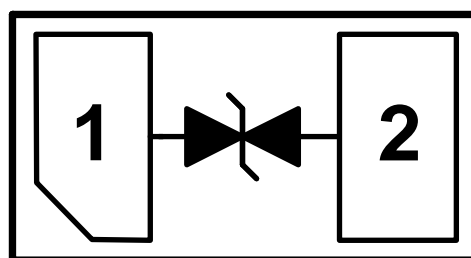
AZ9924-01F is a design which includes a bi-directional ESD rated clamping cell to protect high speed data interfaces in an electronic system. The AZ9924-01F has been specifically designed to protect sensitive components which are connected to data and transmission lines from over-voltage caused by Electrostatic Discharging (ESD).

AZ9924-01F is a unique design which includes proprietary clamping cells with ultra-low capacitance in a small package. During transient conditions, the proprietary clamping cells prevent over-voltage on the control/data lines, protecting any downstream components.

AZ9924-01F is bi-directional and may be used on lines where the signal swings above and below ground.

AZ9924-01F 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



**DFN1006P2E (Bottom View)**

## Specifications

Absolute Maximum Ratings			
Parameter	Symbol	Rating	Unit
Peak Pulse Current ( $t_p = 8/20\mu s$ )	$I_{PP}$	1	A
Operating Voltage	$V_{DC}$	$\pm 26$	V
ESD per IEC 61000-4-2 (Air)	$V_{ESD-1}$	$\pm 15$	kV
ESD per IEC 61000-4-2 (Contact)	$V_{ESD-2}$	$\pm 11$	
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	$^{\circ}C$

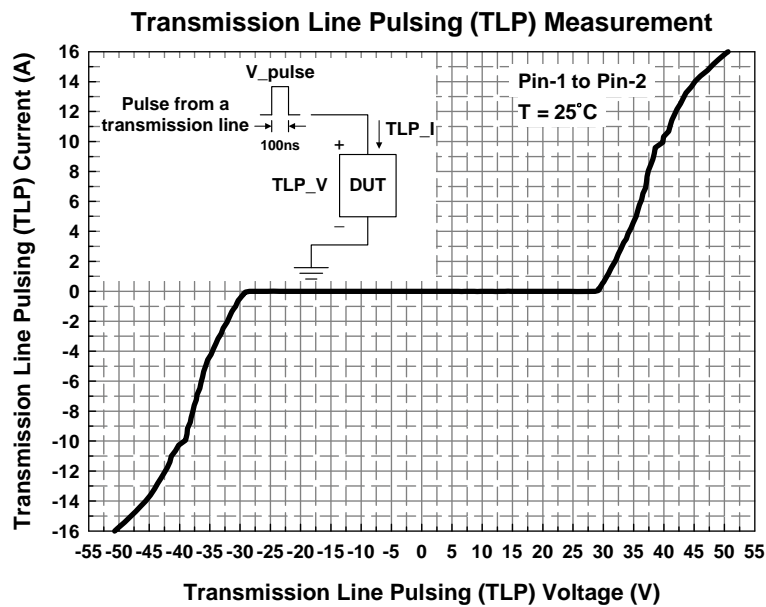
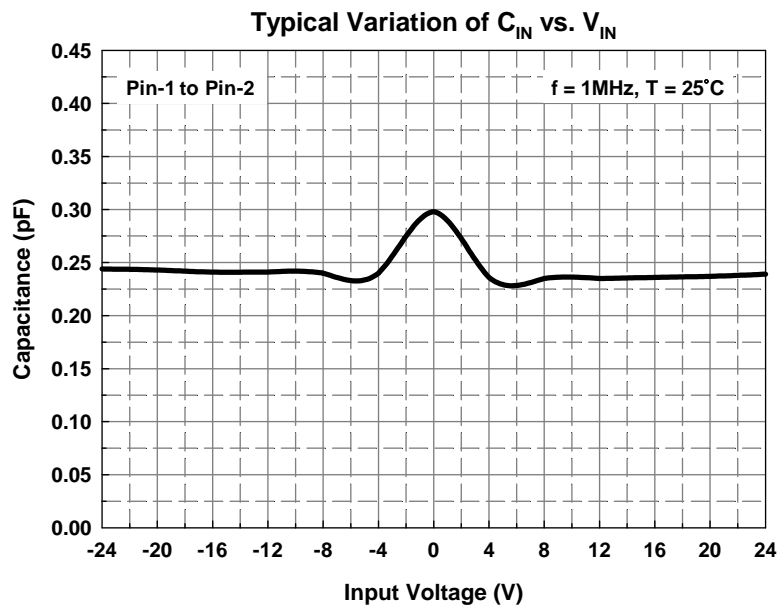
Electrical Characteristics						
Parameter	Symbol	Condition	Min	Typ	Max	Unit
Reverse Stand-Off Voltage	$V_{RWM}$	$T=25^{\circ}C$ .	-24		24	V
Reverse Leakage Current	$I_{Leak}$	$V_{RWM} = \pm 24V$ , $T=25^{\circ}C$ .			0.5	$\mu A$
Reverse Breakdown Voltage	$V_{BV}$	$I_{BV} = 1mA$ , $T=25^{\circ}C$ .	26.2		33.5	V
ESD Clamping Voltage (Note 1)	$V_{CL-ESD}$	IEC 61000-4-2 +8kV ( $I_{TLP} = 16A$ ), contact mode, $T=25^{\circ}C$ .		53		V
ESD Dynamic Turn-on Resistance	$R_{dynamic}$	IEC 61000-4-2, 0~+8kV, contact mode, $T=25^{\circ}C$ .		1.4		$\Omega$
Channel Input Capacitance	$C_{IN}$	$V_R = 0V$ , $f = 1MHz$ , $T=25^{\circ}C$ .		0.3	0.45	pF
		$V_R = 0V$ , $f = 1MHz$ , $T=125^{\circ}C$ .			0.8	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



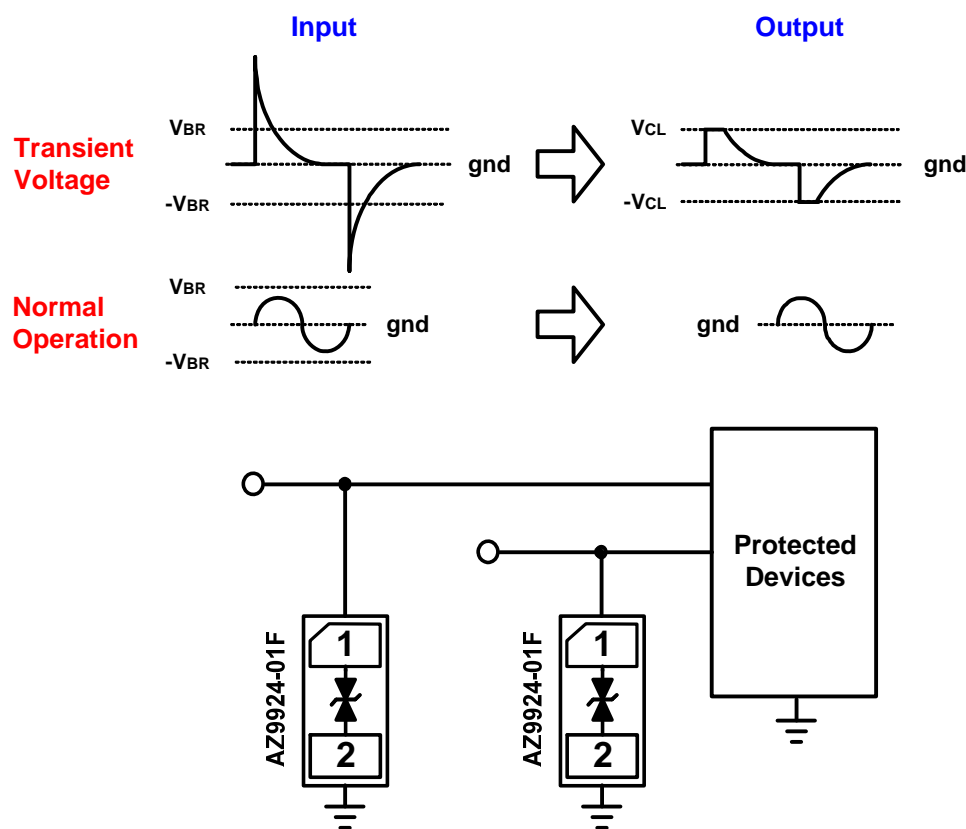
## Application Information

The AZ9924-01F is designed to protect one line against system ESD pulses by clamping it to an acceptable reference. It provides bi-directional protection.

The usage of the AZ9924-01F 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 AZ9924-01F 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:

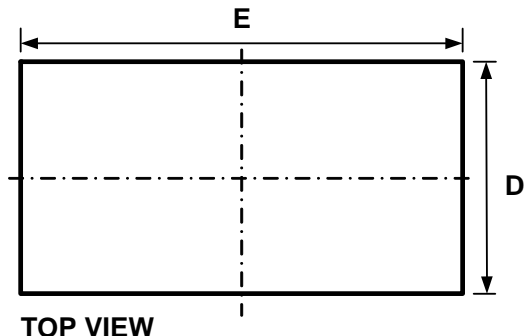
- Minimize the path length between the protected lines and the AZ9924-01F.
- Place the AZ9924-01F near the input terminals or connectors to restrict transient coupling.
- The ESD current return path to ground should be kept as short as possible.
- Use ground planes whenever possible.
- NEVER route critical signals near board edges and near the lines which the ESD transient easily injects to.



**Fig. 1**

## Mechanical Details

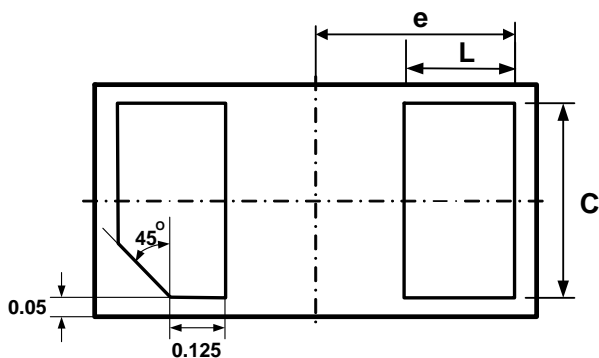
### DFN1006P2E Package Diagrams



TOP VIEW



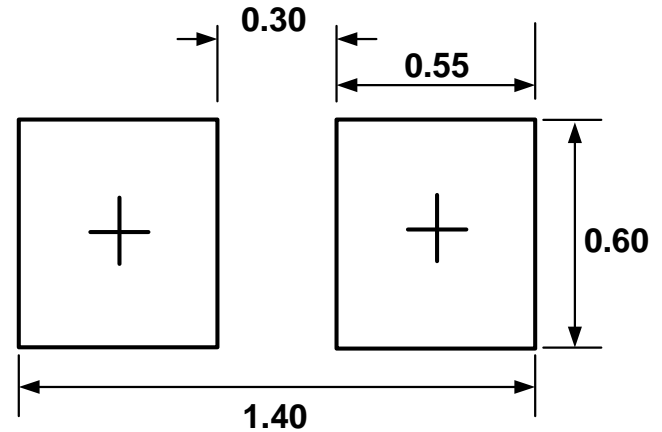
SIDE VIEW



BOTTOM VIEW

SYMBOL	MILLIMETERS	
	MIN.	MAX.
E	0.95	1.05
D	0.55	0.65
A	0.45	0.55
e	0.45 BSC	
L	0.20	0.30
C	0.45	0.55

## Land Layout

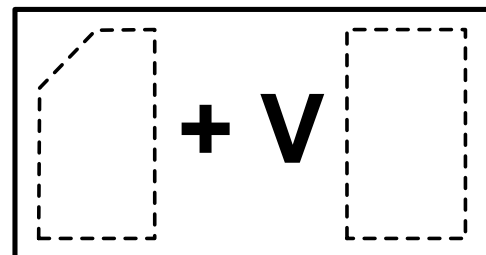


(Unit: mm)

### 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

V = Device Code

Part Number	Marking Code
AZ9924-01F.R7GR (Green part)	V

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



## Ordering Information

PN#	Material	Type	Reel size	MOQ	MOQ/internal box	MOQ/carton
AZ9924-01F.R7GR	Green	T/R	7 inch	12,000/reel	4 reels = 48,000/box	6 boxes = 288,000/carton

## Revision History

Revision	Modification Description
Revision 2021/12/02	Preliminary Release.
Revision 2023/01/18	Formal Release.