

Features

- ESD Protect for 1 Line with Unidirectional.
- Provide ESD protection for each line to **IEC 61000-4-2 (ESD) $\pm 18\text{kV}$ (air/contact)**
- Suitable for, **12V and below**, operating voltage applications
- Ultra small 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

- Battery Contacts
- Power Manager System
- Power line Protection
- Portable Devices
- Small Panel Modules
- Touch Panels
- Cellular Handsets and Accessories
- Notebooks, desktops, and servers
- Microprocessor-based equipment
- Peripherals

Description

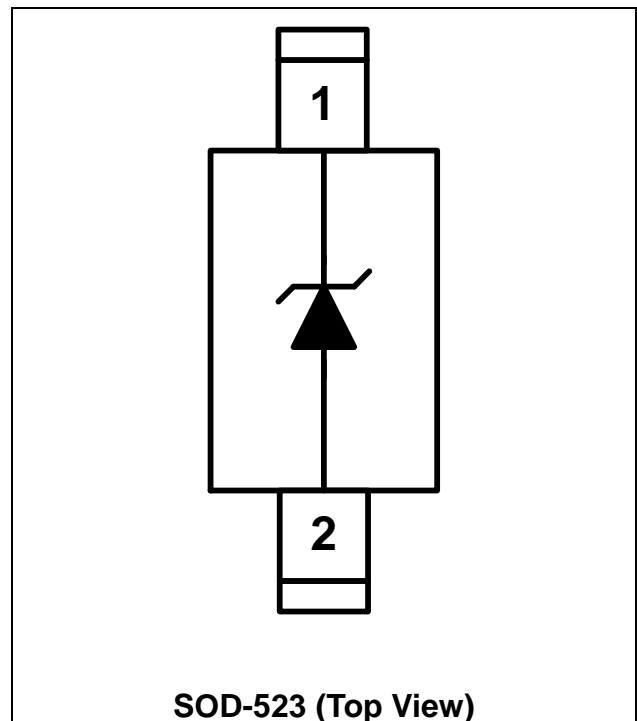
AZ9412-01H is a design which includes a unidirectional ESD rated clamping cell to protect one power line, or one control line, or one low speed data line in an electronic systems. The AZ9412-01H has been specifically designed to protect sensitive components which are connected to power and control lines from

over-voltage damage and latch-up caused by Electrostatic Discharging (ESD) and Cable Discharge Event (CDE).

AZ9412-01H 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.

AZ9412-01H may be used to meet the ESD immunity requirements of IEC61000-4-2, 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} | 13.2 | V |
| pin-1 to pin-2 ESD per IEC 61000-4-2 (Air) | V_{ESD-1} | ±18 | kV |
| pin-1 to pin-2 ESD per IEC 61000-4-2 (Contact) | V_{ESD-2} | ±18 | kV |
| Lead Soldering Temperature | T_{SOL} | 260 (10 sec.) | °C |
| Operating Temperature | T_{OP} | -55 to +125 | °C |
| Storage Temperature | T_{STO} | -55 to +150 | °C |

| ELECTRICAL CHARACTERISTICS | | | | | | |
|--------------------------------|---------------|--------------------------------------------------------------------------------|------|------|-----|-------|
| PARAMETER | SYMBOL | CONDITIONS | MINI | TYP | MAX | UNITS |
| Reverse Stand-Off Voltage | V_{RWM} | Pin-1 to pin-2, T=25 °C. | | | 12 | V |
| Reverse Leakage Current | I_{Leak} | $V_{RWM} = 12V$, T=25 °C, pin-1 to pin-2. | | | 1 | μA |
| Reverse Breakdown Voltage | V_{BV} | $I_{BV} = 1mA$, T=25 °C, pin-1 to pin-2 | 13.5 | | 18 | V |
| Forward Voltage | V_F | $I_F = 15mA$, T=25 °C, pin-2 to pin-1 | 0.6 | | 1.2 | V |
| ESD Clamping Voltage (Note 1) | V_{clamp} | IEC 61000-4-2 +8kV ($I_{TLP} = 16A$), Contact mode, T=25 °C, pin-1 to pin-2. | | 20 | | V |
| ESD Dynamic Turn-on Resistance | $R_{dynamic}$ | IEC 61000-4-2 0~+8kV, T=25 °C, Contact mode, pin-1 to pin-2. | | 0.26 | | Ω |
| Channel Input Capacitance | C_{IN} | $V_R = 0V$, f = 1MHz, T=25 °C, pin-1 to pin-2. | | 40 | 50 | pF |

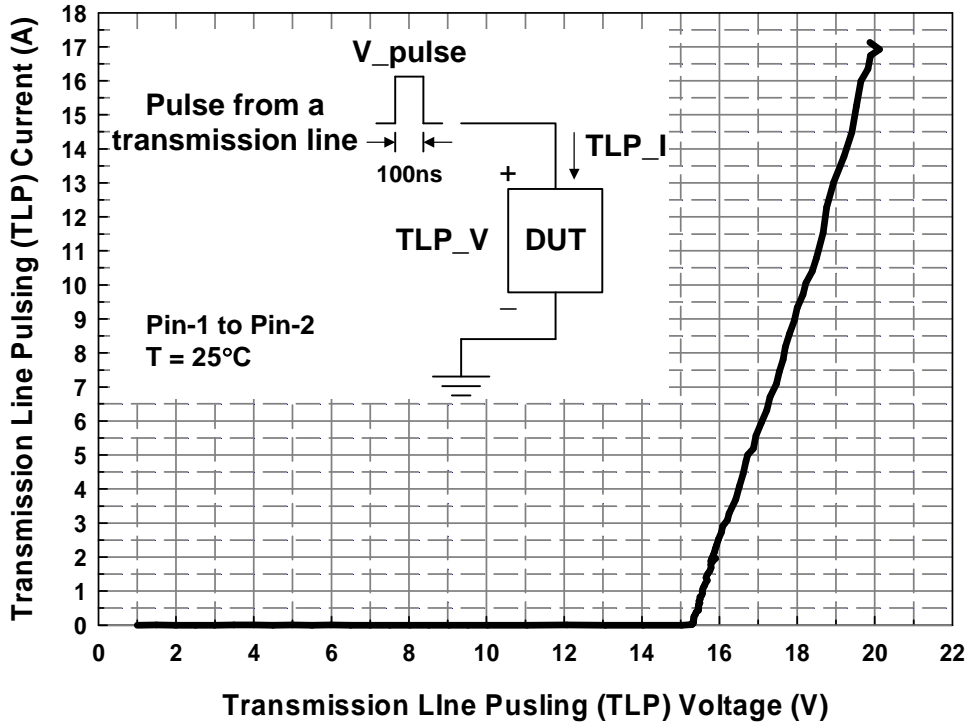
Note 1: ESD Clamping Voltage was measured by Transmission Line Pulsing (TLP) System.

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

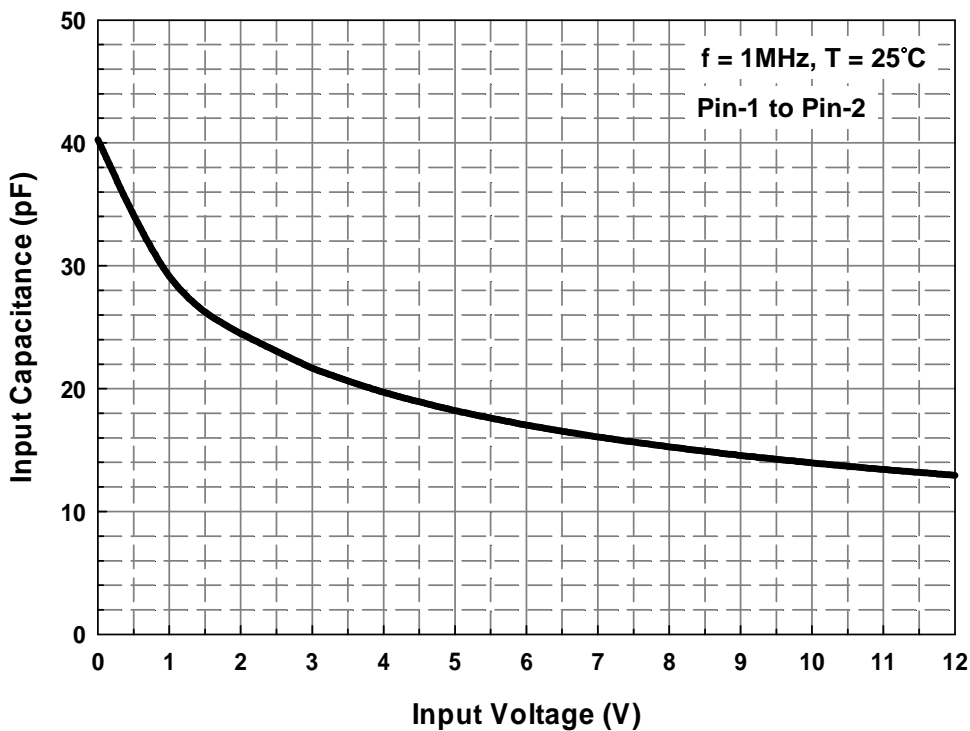


Typical Characteristics

Transmission Line Pulsing (TLP) Measurement



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



Applications Information

The AZ9412-01H is designed to protect one line against System ESD pulses by clamping them to an acceptable reference.

The usage of the AZ9412-01H 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 AZ9412-01H 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 AZ9412-01H.
- Place the AZ9412-01H 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.

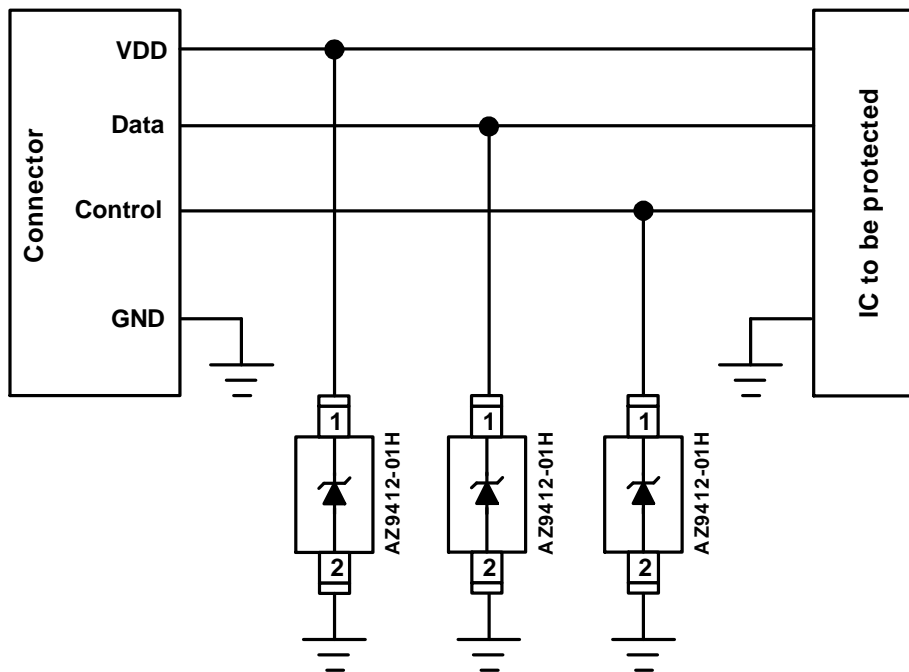
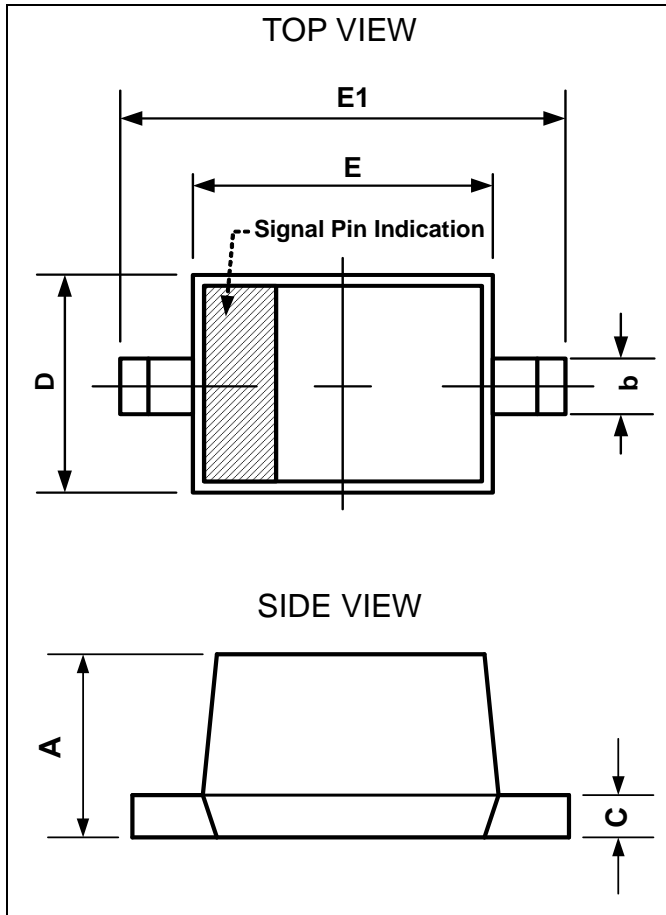


Fig. 1 ESD protection scheme by using AZ9412-01H.

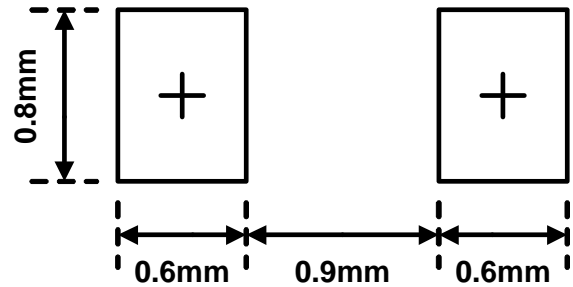
Mechanical Details

SOD-523

PACKAGE DIAGRAMS



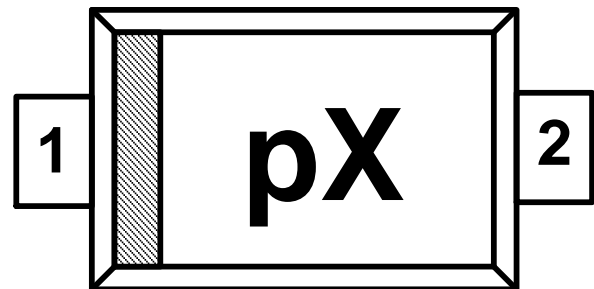
LAND LAYOUT



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



p = Device Code
X = Date Code

PACKAGE DIMENSIONS

| Symbol | Millimeters | | Inches | |
|--------|-------------|------|--------|-------|
| | MIN. | MAX. | MIN. | MAX. |
| A | 0.5 | 0.77 | 0.020 | 0.030 |
| b | 0.25 | 0.35 | 0.010 | 0.014 |
| C | 0.08 | 0.2 | 0.003 | 0.008 |
| D | 0.7 | 0.9 | 0.028 | 0.035 |
| E | 1.1 | 1.3 | 0.043 | 0.051 |
| E1 | 1.5 | 1.7 | 0.059 | 0.067 |

| Part Number | Marking Code |
|----------------------------|--------------|
| AZ9412-01H (Green Part) | pX |

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



Ordering Information

| PN# | Material | Type | Reel size | MOQ | MOQ/internal box | MOQ/carton |
|----------------|----------|------|-----------|------------|-------------------|---------------------|
| AZ9412-01H.R7G | Green | T/R | 7 inch | 3,000/reel | 4 reel=12,000/box | 6 box=72,000/carton |

Revision History

| Revision | Modification Description |
|---------------------|--------------------------|
| Revision 2015/02/10 | Preliminary Release. |
| Revision 2015/09/04 | Formal Release. |
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