

## 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)**  
**IEC 61000-4-4 (EFT)  $\pm 80\text{A}$  (5/50ns)**  
**IEC 61000-4-5 (Lightning) 6A (8/20 $\mu\text{s}$ )**
- Suitable for, **15V and below**, operating voltage applications
- **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**

## Applications

- Power Supply Protection
- Power Management
- Portable Devices
- Hand Held Portable Applications
- Low speed data and control lines protection
- Cellular Handsets and Accessories
- Notebooks, desktops, and servers
- Peripherals

## Description

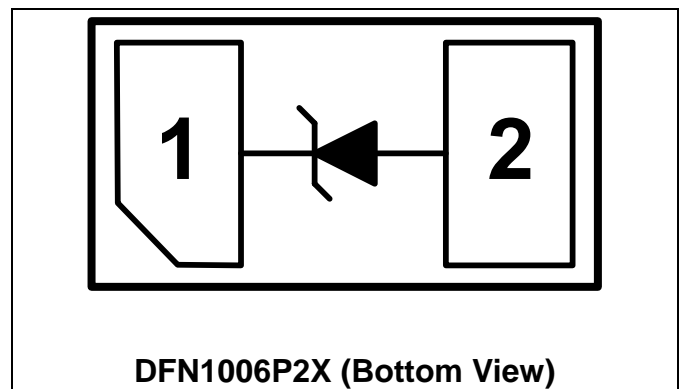
AZ4115-01F is a design which includes a uni-directional ESD rated clamping cell to protect one power line, or one control line, or one low speed data line in an electronic systems. The AZ4115-01F has been specifically designed to protect sensitive components which are connected to power and control lines from over-voltage damage and latch-up caused by Electrostatic Discharging (ESD), Electrical Fast

Transients (EFT), Lightning, and Cable Discharge Event (CDE).

AZ4115-01F 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.

AZ4115-01F 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 |
| Peak Pulse Current (tp=8/20μs)            | I <sub>PP</sub>    | 6             | A     |
| Operating Supply Voltage (pin-1 to pin-2) | V <sub>DC</sub>    | 16.5          | V     |
| ESD per IEC 61000-4-2 (Air)               | V <sub>ESD-1</sub> | ±30           | kV    |
| ESD per IEC 61000-4-2 (Contact)           | V <sub>ESD-2</sub> | ±30           |       |
| Lead Soldering Temperature                | T <sub>SOL</sub>   | 260 (10 sec.) | °C    |
| Operating Temperature                     | T <sub>OP</sub>    | -55 to +85    | °C    |
| Storage Temperature                       | T <sub>STO</sub>   | -55 to +150   | °C    |

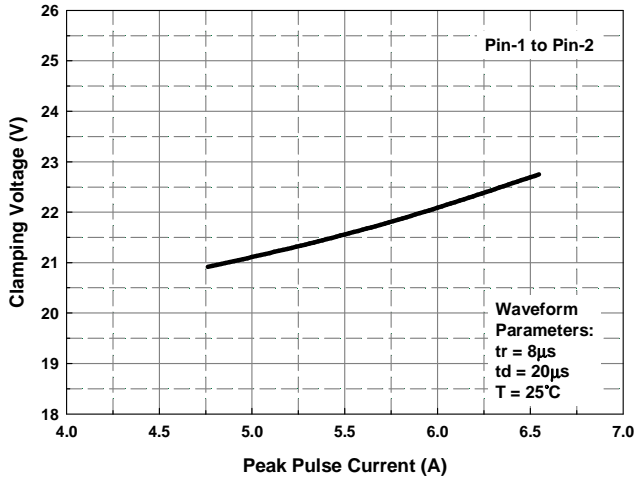
| ELECTRICAL CHARACTERISTICS     |                       |   |      |      |     |       |
|--------------------------------|-----------------------|---|------|------|-----|-------|
| PARAMETER                      | SYMBOL                | CONDITIONS  | MINI | TYP  | MAX | UNITS |
| Reverse Stand-Off Voltage      | V <sub>RWM</sub>      | Pin-1 to pin-2, T=25 °C.  |      |      | 15  | V     |
| Reverse Leakage Current        | I <sub>Leak</sub>     | V <sub>RWM</sub> = 15V, T=25 °C, pin-1 to pin-2.                                    |      |      | 0.5 | μA    |
| Reverse Breakdown Voltage      | V <sub>BV</sub>       | I <sub>BV</sub> = 1mA, T=25 °C, pin-1 to pin-2.                                     | 16.7 |      | 20  | V     |
| Forward Voltage                | V <sub>F</sub>        | I <sub>F</sub> = 15mA, T=25 °C, pin-2 to pin-1.                                     | 0.6  |      | 1.2 | V     |
| Surge Clamping Voltage         | V <sub>CL-surge</sub> | I <sub>PP</sub> =5A, tp=8/20μs, T=25 °C, pin-1 to pin-2.                            |      | 21.5 |     | V     |
| ESD Clamping Voltage (Note 1)  | V <sub>clamp</sub>    | IEC 61000-4-2 +8kV (I <sub>TLP</sub> = 16A), Contact mode, T=25 °C, pin-1 to pin-2. |      | 21   |     | V     |
| ESD Dynamic Turn-on Resistance | R <sub>dynamic</sub>  | IEC 61000-4-2 0~+8kV, T= 25 °C, Contact mode, pin-1 to pin-2.                       |      | 0.16 |     | Ω     |
| Channel Input Capacitance      | C <sub>IN</sub>       | V <sub>R</sub> = 0V, f = 1MHz, T=25 °C, pin-1 to pin-2.                             |      | 65   | 80  | pF    |

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

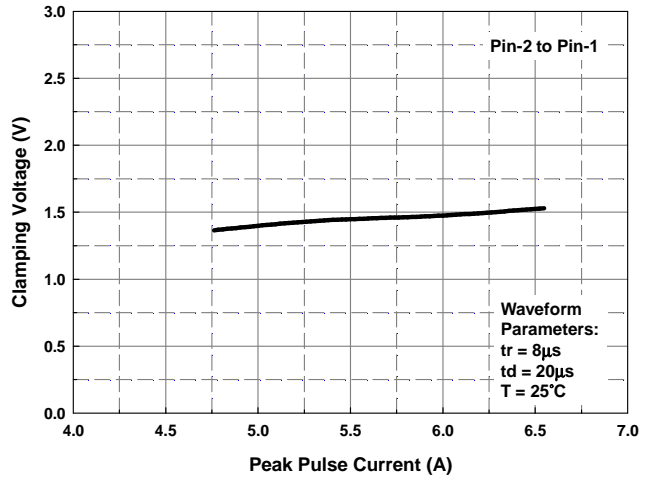
TLP conditions: Z<sub>0</sub>= 50Ω, t<sub>p</sub>= 100ns, t<sub>r</sub>= 1ns.

## Typical Characteristics

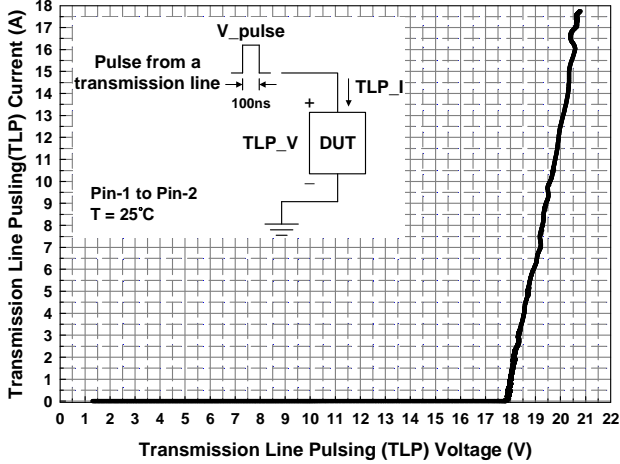
Reverse Clamping Voltage vs. Peak Pulse Current



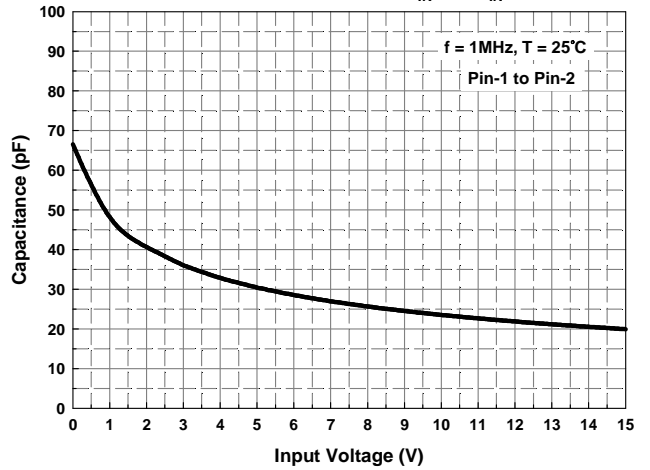
Forward Clamping Voltage vs. Peak Pulse Current



Transmission Line Pulsing (TLP) Measurement



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



## Applications Information

### Device Connection

The AZ4115-01F is designed to protect one line against System ESD/EFT/Lightning pulses by clamping them to an acceptable reference.

The usage of the AZ4115-01F 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 AZ4115-01F 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 AZ4115-01F.
- Place the AZ4115-01F 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.

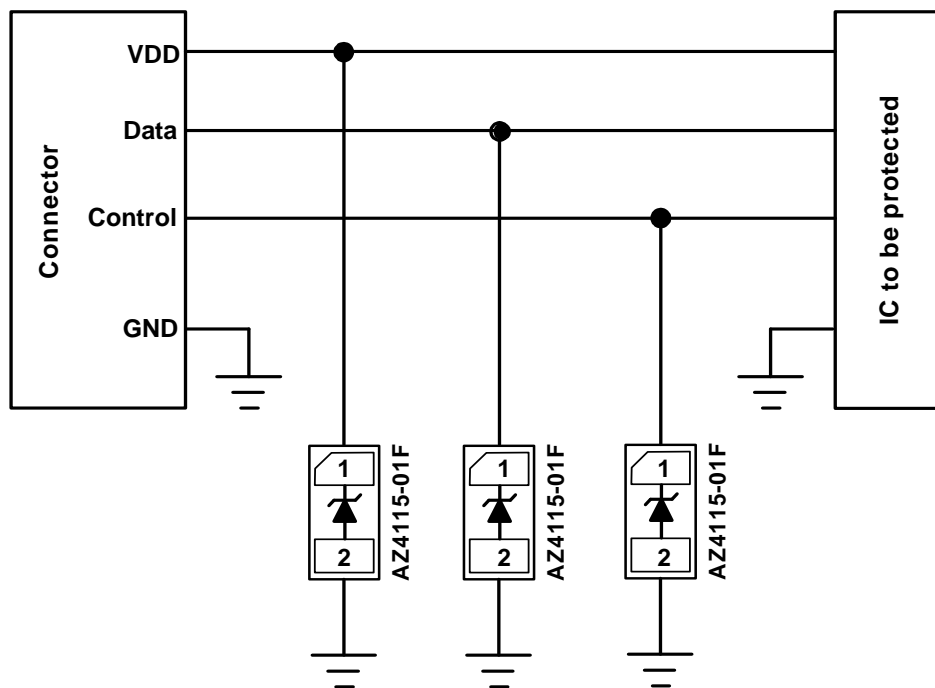
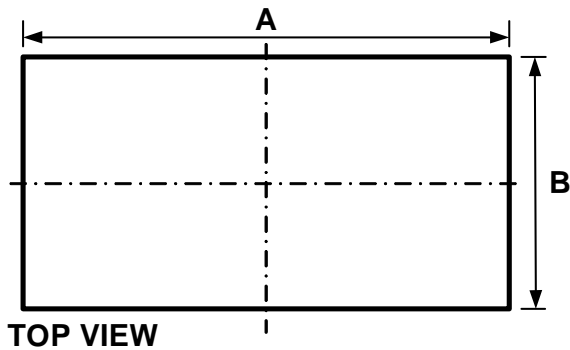


Fig. 1 ESD protection scheme by using AZ4115-01F.

## Mechanical Details

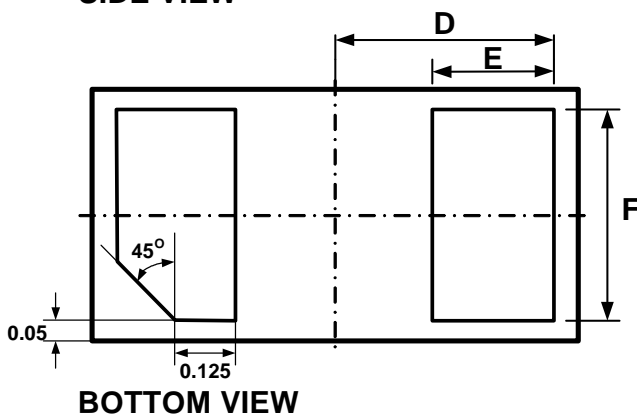
### DFN1006P2X PACKAGE DIAGRAMS



TOP VIEW

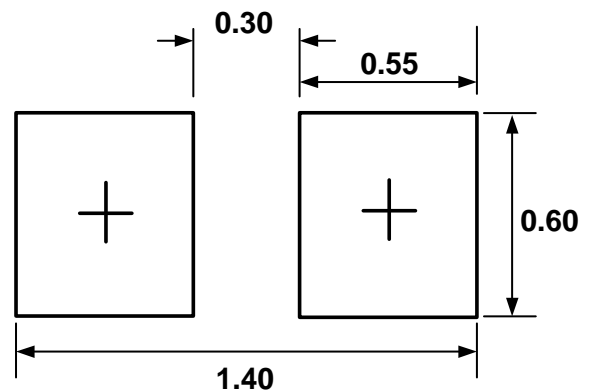


SIDE VIEW



BOTTOM VIEW

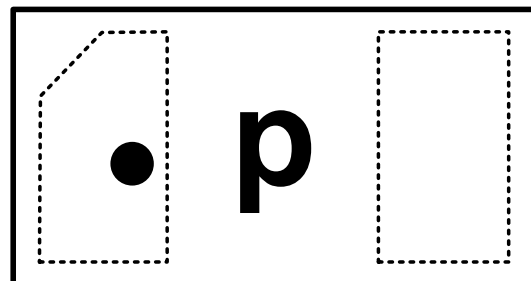
## LAND LAYOUT



### 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

## PACKAGE DIMENSIONS

| 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      | 0.41        | 0.55 | 0.016     | 0.022 |
| D      | 0.45 BSC    |      | 0.018 BSC |       |
| E      | 0.20        | 0.30 | 0.008     | 0.012 |
| F      | 0.45        | 0.55 | 0.018     | 0.022 |

| Part Number                     | Marking Code |
|---------------------------------|--------------|
| AZ4115-01F.R7GR<br>(Green Part) | p            |

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



### Ordering Information

| PN#            | Material | Type | Reel size | MOQ         | MOQ/internal box     | MOQ/carton               |
|----------------|----------|------|-----------|-------------|----------------------|--------------------------|
| AZ4115-01FR7GR | Green    | T/R  | 7 inch    | 12,000/reel | 4 reels = 48,000/box | 6 boxes = 288,000/carton |

### Revision History

| Revision            | Modification Description |
|---------------------|--------------------------|
| Revision 2016/07/19 | Preliminary Release.     |
| Revision 2017/04/25 | Formal Release.          |
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