

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) 80A (5/50ns)
IEC 61000-4-5 (Lightning) 40A (8/20 μs)
Cable Discharge Event (CDE)
- For low operating voltage applications: **5.5V**
- **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

- Vbat pin for mobile device
- USB type-C CC pin protection
- Data and control lines protection
- Power line protection
- Hand held portable applications

Description

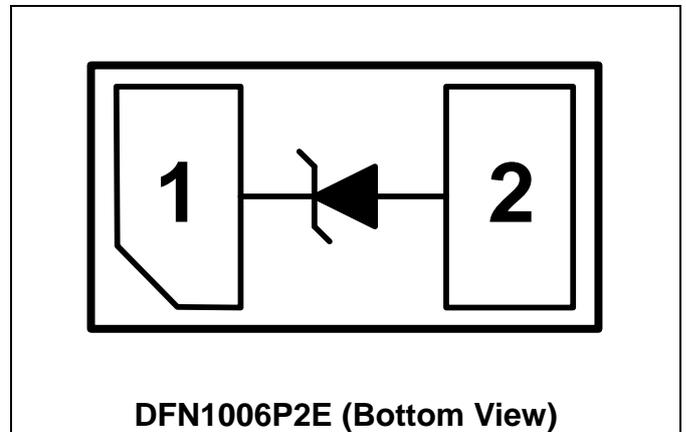
AZ5815-01F is a design which includes a uni-directional surge rated clamping cell to protect one power line, or one control line, or one low-speed data line in an electronic system. The AZ5815-01F has been specifically designed to protect sensitive components which are connected to power and control lines from over-voltage caused by Electrostatic Discharging (ESD), Electrical Fast Transients (EFT), Lightning, and Cable Discharge Event (CDE).

AZ5815-01F 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.

AZ5815-01F 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 (T _A = 25°C, unless otherwise specified) | | | |
|--|----------------------------|---------------|-------|
| PARAMETER | SYMBOL | RATING | UNITS |
| Peak Pulse Current (tp=8/20μs) | I _{PP-1} (Note 1) | 40 | A |
| | I _{PP-2} (Note 2) | 28 | |
| ESD per IEC 61000-4-2 (Air) | V _{ESD-1} | ±30 | kV |
| ESD per IEC 61000-4-2 (Contact) | V _{ESD-2} | ±30 | |
| 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. | | | 5.5 | V |
| Reverse Leakage Current | I _{Leak} | V _{RWM} = 5V, T = 25°C, pin-1 to pin-2. | | | 1.0 | μA |
| Reverse Breakdown Voltage | V _{BV} | I _{BV} = 1mA, T = 25°C, pin-1 to pin-2. | 6.2 | | 8.0 | V |
| Forward Voltage | V _F | I _F = 15mA, T = 25°C, pin-2 to pin-1. | 0.6 | | 1.2 | V |
| Surge Clamping Voltage (Note 1) | V _{CL-surge} | I _{PP} = 5A, T = 25°C, pin-1 to pin-2. | | 5.5 | | V |
| | | I _{PP} = 40A, T = 25°C, pin-1 to pin-2. | | 9.5 | | |
| ESD Clamping Voltage (Note 3) | V _{clamp} | IEC 61000-4-2 +8kV (I _{TLP} = 16A), T = 25°C, Contact mode, pin-1 to pin-2. | | 6.0 | | V |
| ESD Dynamic Turn-on Resistance | R _{dynamic} | IEC 61000-4-2, 0~+8kV, Contact mode, T = 25°C, pin-1 to pin-2. | | 0.04 | | Ω |
| Channel Input Capacitance | C _{IN} | V _R = 0V, f = 1MHz, pin-1 to pin-2, T = 25°C. | | 85 | 100 | pF |

Note 1: The Peak Pulse Current measured conditions: tp = 8/20μs, 2ohm source impedance.

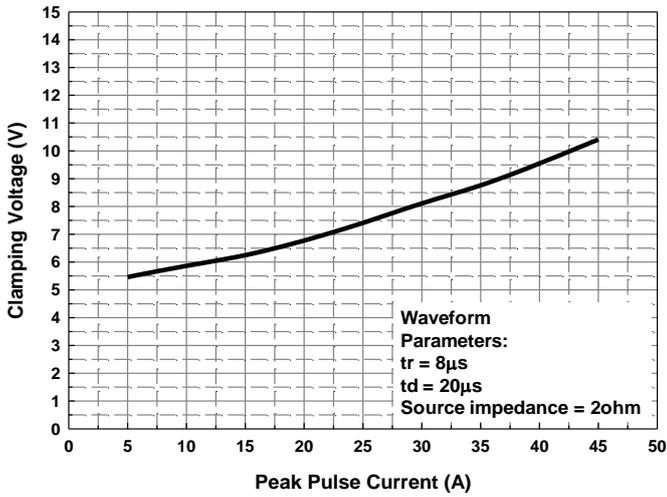
Note 2: The Peak Pulse Current measured conditions: tp = 8/20μs, 42ohm source impedance.

Note 3: ESD Clamping Voltage was measured by Transmission Line Pulsing (TLP) System.

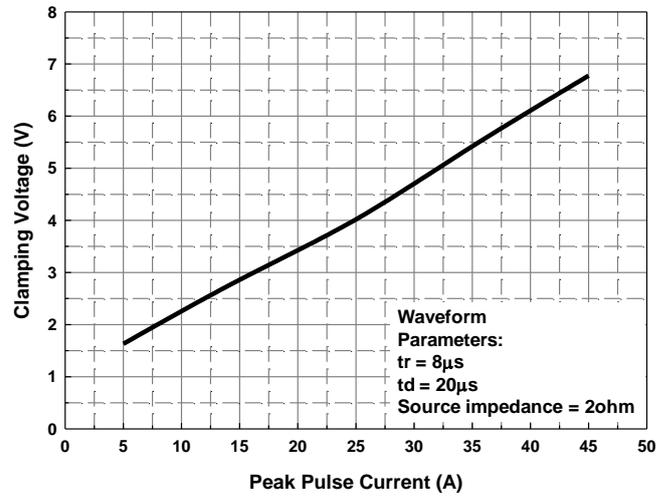
TLP conditions: Z₀= 50Ω, t_p= 100ns, t_r= 1ns.

Typical Characteristics

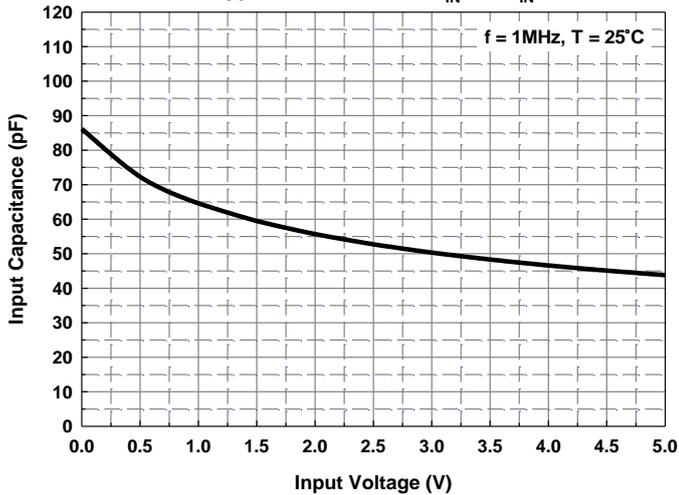
Reverse Clamping Voltage vs. Peak Pulse Current



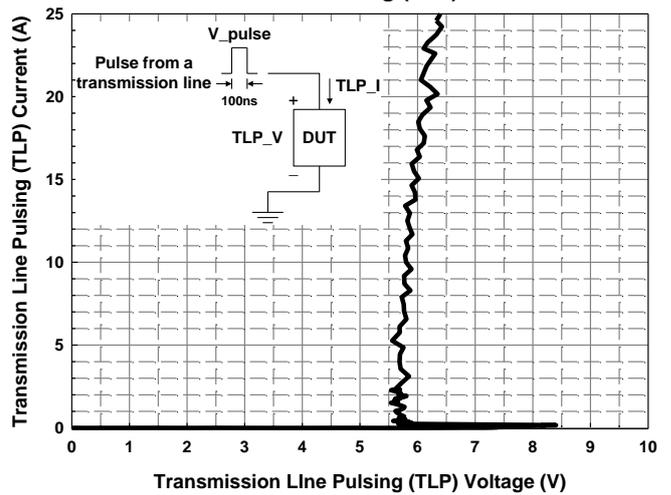
Forward Clamping Voltage vs. Peak Pulse Current



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



Transmission Line Pulsing (TLP) Measurement



Applications Information

The AZ5815-01F is designed to protect one line against system ESD / EFT / Lightning pulses by clamping it to an acceptable reference.

The usage of the AZ5815-01F is shown in Fig. 1. Protected lines, such as data lines, control lines, or power lines, are connected to pin 1. The pin 2 should be connected directly to a ground plane on the board. All path lengths connected to the pins of AZ5815-01F 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, a good circuit board is critical.

Thus, the following guidelines are recommended:

- Minimize the path length between the protected lines and the AZ5815-01F.
- Place the AZ5815-01F 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.

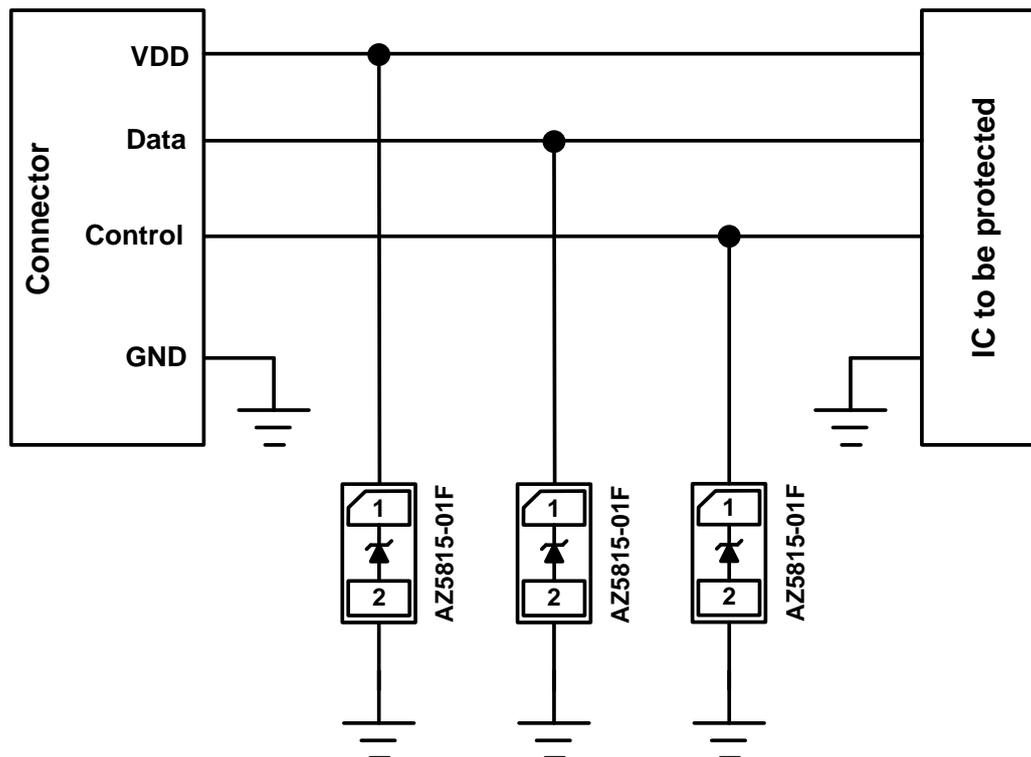
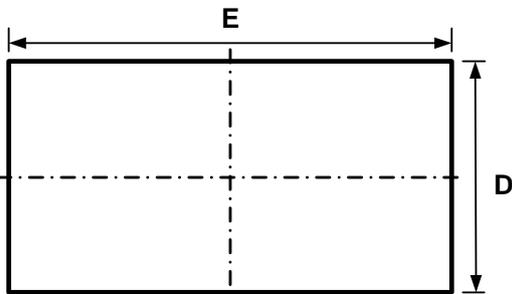


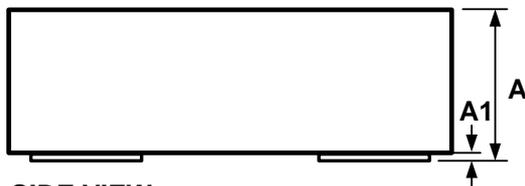
Fig. 1

Mechanical Details

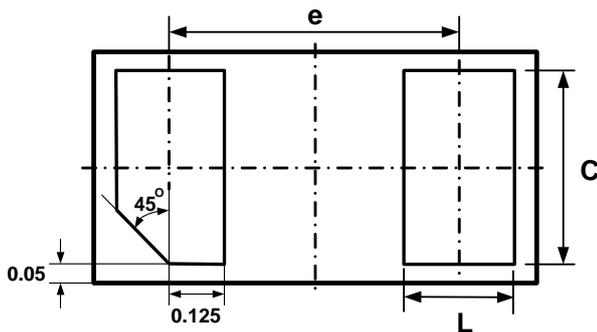
DFN1006P2E PACKAGE DIAGRAMS



TOP VIEW



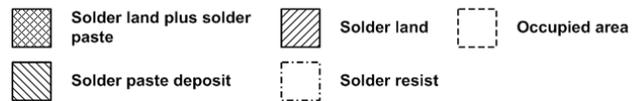
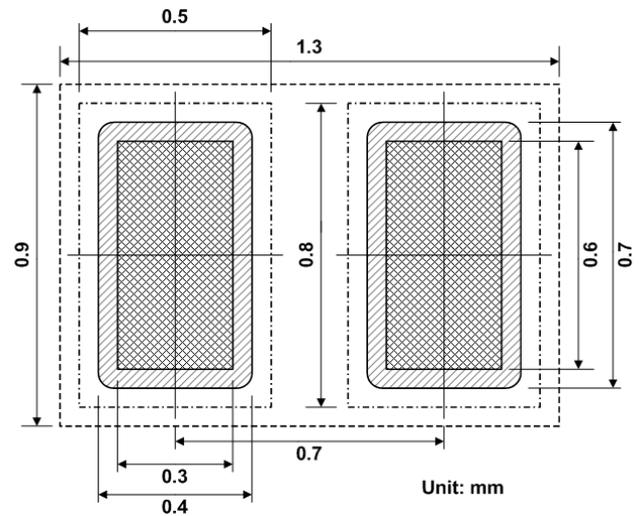
SIDE VIEW



BOTTOM VIEW

| Symbol | Millimeters | | | Inches | | |
|--------|-------------|------|------|-----------|-------|-------|
| | MIN | NOM | MAX | MIN | NOM | MAX |
| E | 0.95 | 1.00 | 1.05 | 0.037 | 0.039 | 0.041 |
| D | 0.55 | 0.60 | 0.65 | 0.022 | 0.024 | 0.026 |
| A | 0.45 | 0.50 | 0.55 | 0.018 | 0.020 | 0.022 |
| A1 | 0.00 | 0.02 | 0.05 | 0.000 | 0.001 | 0.002 |
| L | 0.20 | 0.25 | 0.30 | 0.008 | 0.010 | 0.012 |
| C | 0.45 | 0.50 | 0.55 | 0.018 | 0.020 | 0.022 |
| e | 0.65 BSC | | | 0.026 BSC | | |

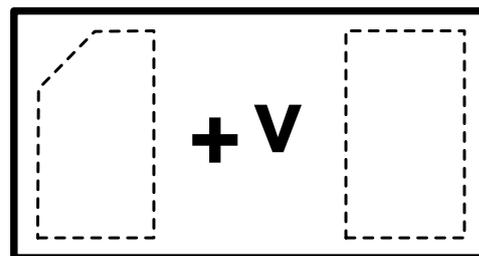
LAND LAYOUT



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

v = Device Code

| Part Number | Marking Code |
|---------------------------------|--------------|
| AZ5815-01F.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 |
|-----------------|----------|------|-----------|-------------|----------------------|--------------------------|
| AZ5815-01F.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 2017/08/04 | Formal Release. |
| Revision 2017/08/28 | <ol style="list-style-type: none"> 1. Update the maximum Reverse Stand-off Voltage (V_{RWM}) from 5V to 5.5V. 2. Update the minimum Reverse Breakdown Voltage (V_{BV}) from 6.0V to 6.2V. |
| | |
| | |
| | |
| | |
| | |
| | |
| | |