## Features

- ESD protect for 1 line with unidirectional
- Provide transient protection for a line to
  **IEC 61000-4-2 (ESD) ±30kV (air/contact)**
  **IEC 61000-4-4 (EFT) 80A (5/50ns)**
  **IEC 61000-4-5 (Lightning) 225A (8/20μs)**
- Suitable for, **12V and below,** operating voltage applications
- 2.0mm x 2.0mm DFN package saves board space
- High surge protection
- 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
- USB VBUS Protection
- Cellular Handsets and Accessories
- Panel Modules
- Portable Devices
- Touch Panels
- Notebooks and Handhelds
- Peripherals

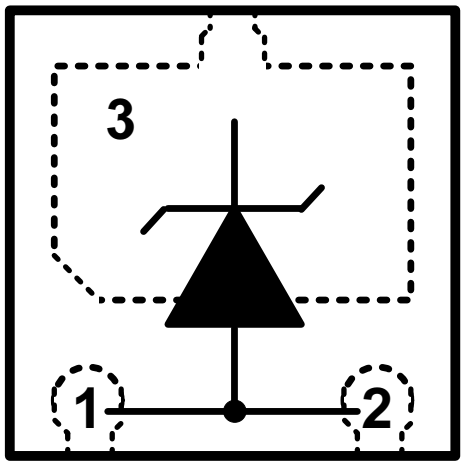
## Description

AZ4712-01F is a design which includes a unidirectional surge rated clamping cell to protect one power line, or one control line, or one low speed data line in an electronic system. The AZ4712-01F 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 Transient (EFT), Lightning, and Cable Discharge Event (CDE).

AZ4712-01F 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, and protects any downstream component.

AZ4712-01F may be used to meet the ESD immunity requirements of IEC 61000-4-2, Level 4 (±15kV air, ±8kV contact discharge).

## Circuit Diagram / Pin Configuration




**DFN2020P3E (TOP View)**
**(2.0mm x 2.0mm x 0.55mm)**

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## SPECIFICATIONS

| **ABSOLUTE MAXIMUM RATINGS** ($T_A$= 25°C, unless otherwise specified) | | | |
|---|---|---|---|
| **PARAMETER** | **SYMBOL** | **RATING** | **UNITS** |
| Peak Pulse Current (tp=8/20μs) | $I_{PP}$ (Note 1) | 225 | A |
| Operating Supply Voltage (pin-3 to pin-1 and pin-2) | $V_{DC}$ | 13.2 | V |
| ESD per IEC 61000-4-2 (Air)<br>ESD per IEC 61000-4-2 (Contact) | $V_{ESD-1}$<br>$V_{ESD-2}$ | ±30<br>±30 | 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-3 to pin-1 and pin-2, T = 25 °C. | | | 12 | V |
| Reverse Leakage Current | $I_{Leak}$ | $V_{RWM}$ = 12V, T = 25 °C,<br>pin-3 to pin-1 and pin-2. | | | 0.5 | μA |
| Reverse Breakdown Voltage | $V_{BV}$ | $I_{BV}$ = 1mA, T = 25 °C,<br>pin-3 to pin-1 and pin-2. | 13.3 | | 15.5 | V |
| Forward Voltage | $V_F$ | $I_F$ = 15mA, T = 25 °C,<br>pin-1 and pin-2 to pin-3. | 0.5 | | 1.2 | V |
| Surge Clamping Voltage (Note 1) | $V_{CL-surge}$ | $I_{PP}$ = 225A, tp = 8/20μs, T = 25 °C,<br>pin-3 to pin-1 and pin-2. | | 27 | | V |
| ESD Clamping Voltage (Note 2) | $V_{clamp}$ | IEC 61000-4-2 +8kV ($I_{TLP}$ = 16A),<br>T = 25 °C, Contact mode,<br>pin-3 to pin-1 and pin-2. | | 15 | | V |
| ESD Dynamic Turn-on Resistance | $R_{dynamic}$ | IEC 61000-4-2 0~+8kV,<br>T = 25 °C, Contact mode,<br>pin-3 to pin-1 and pin-2. | | 0.04 | | Ω |
| Channel Input Capacitance | $C_{IN}$ | $V_R$ = 0V, f = 1MHz, T = 25 °C,<br>pin-3 to pin-1 and pin-2. | | 1.1 | 1.3 | nF |

Note 1: The Peak Pulse Current measured conditions: $t_p$ = 8/20μs, 2Ω source impedance.

Note 2: ESD Clamping Voltage was measured by Transmission Line Pulsing (TLP) System.

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

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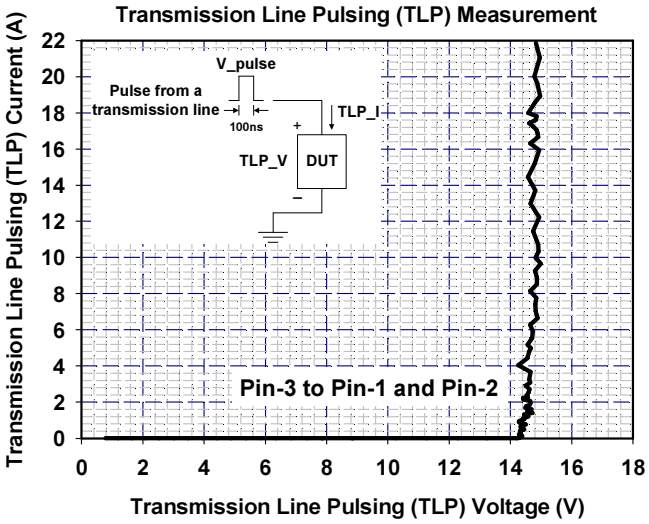
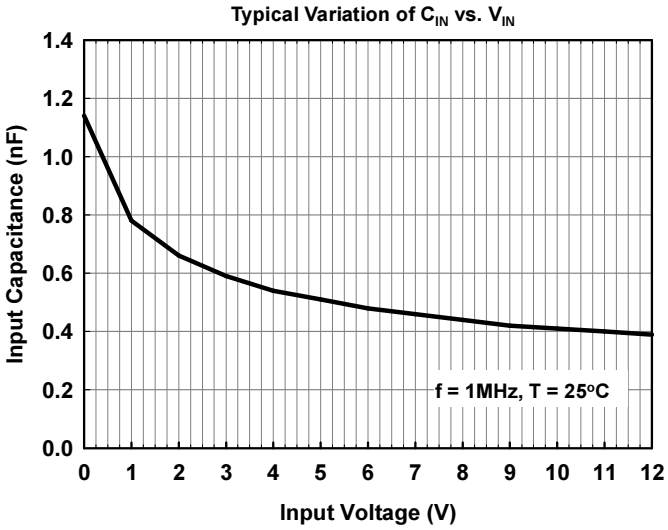
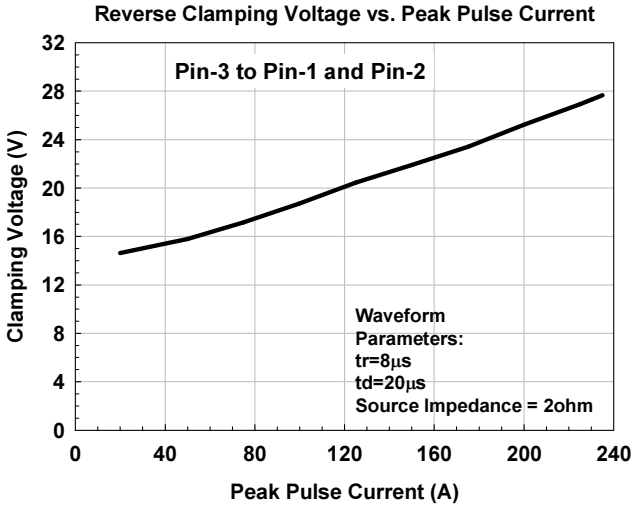
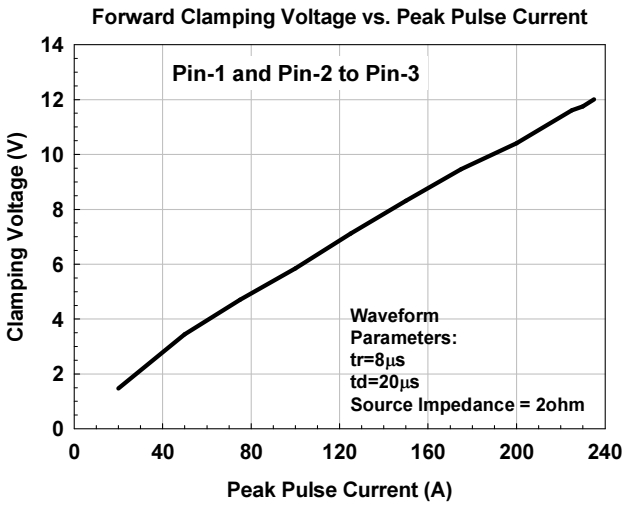
## Typical Characteristics



## Applications

The AZ4712-01F is designed to protect one line against system ESD/EFT/Lightning pulses by clamping them to an acceptable reference.

The usage of the AZ4712-01F is shown in Fig. 1. Protected lines, such as data lines, control lines, or power lines, are connected at pin 3. The pin 1 and pin 2 should be connected directly to a ground plane on the board. All path lengths connected to the pins of AZ4712-01F 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 AZ4712-01F.
- Place the AZ4712-01F 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.

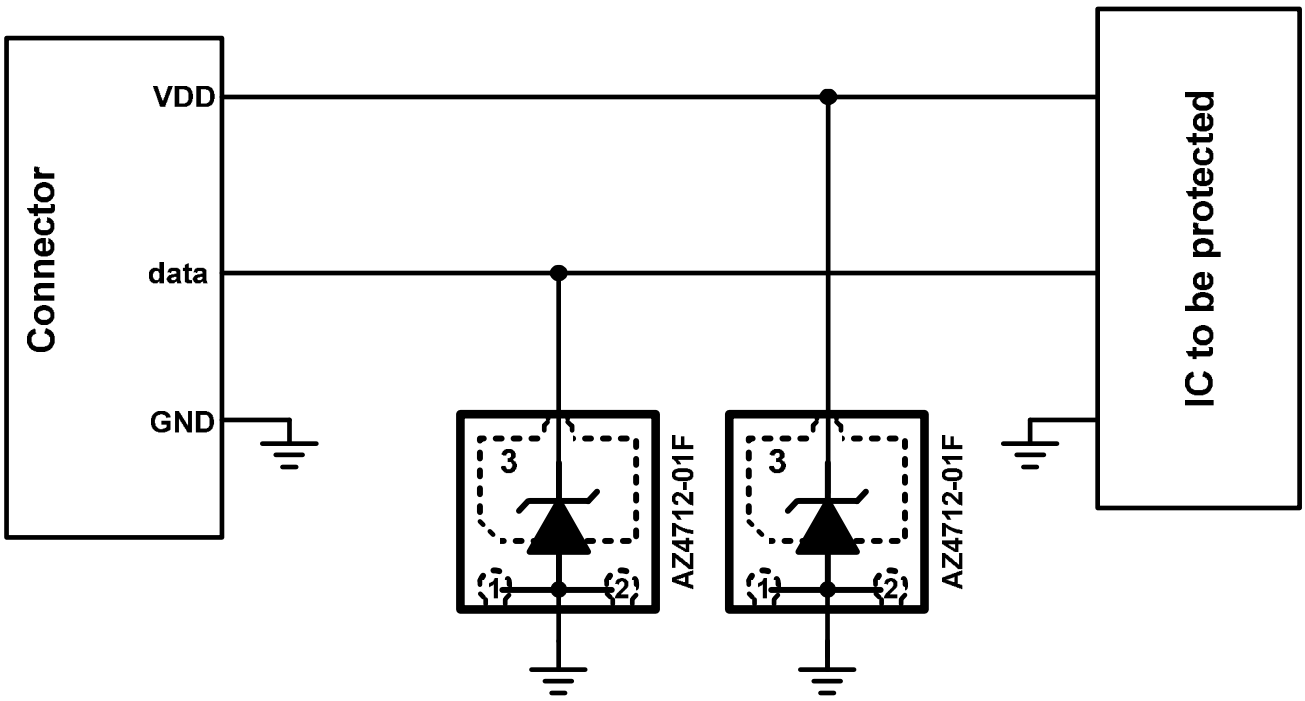



Fig. 1

Fig. 2 shows another simplified example of using AZ4712-01F to protect the control lines, low speed data lines, and power lines from ESD transient stress.

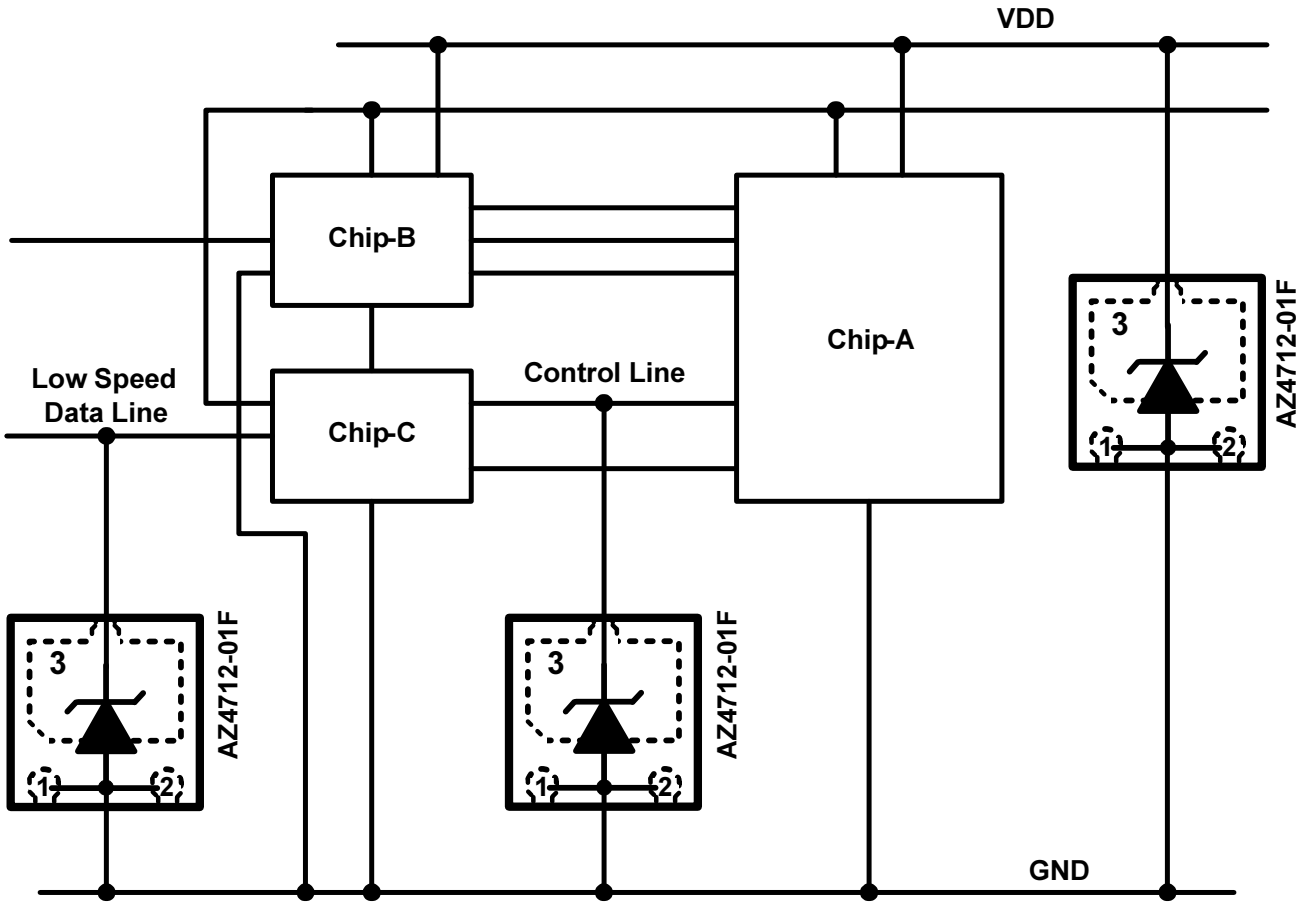
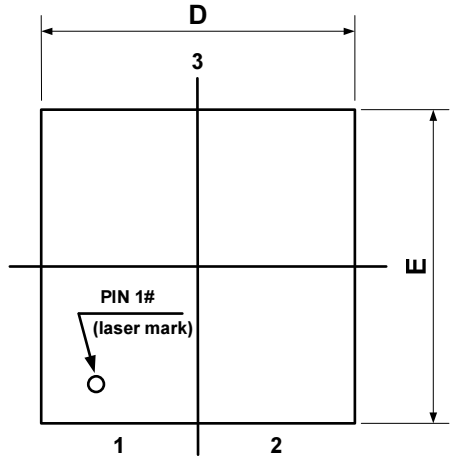


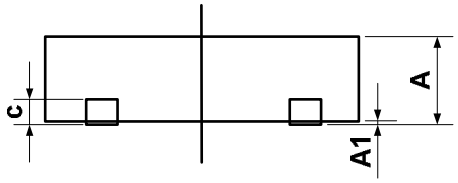

Fig. 2

## Mechanical Details

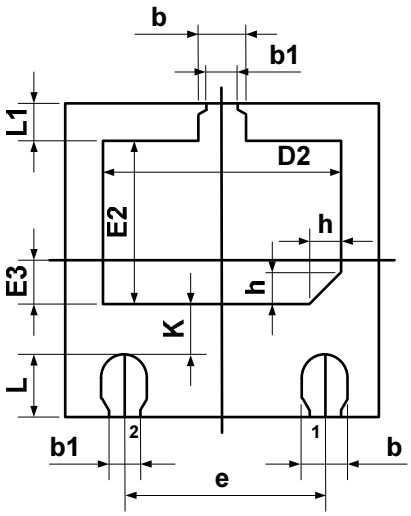
### DFN2020P3E
### PACKAGE DIAGRAMS




TOP VIEW




SIDE VIEW

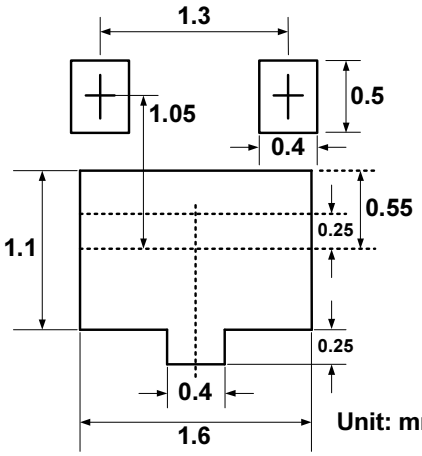



BOTTOM VIEW

### PACKAGE DIMENSIONS

| Symbol | Millimeters | | |
|---|---|---|---|
| | MIN | NOM | MAX |
| A | 0.50 | 0.55 | 0.60 |
| A1 | 0.00 | 0.02 | 0.05 |
| b | 0.25 | 0.30 | 0.35 |
| b1 | | 0.20REF | |
| c | | 0.152REF | |
| D | 1.90 | 2.00 | 2.10 |
| D2 | 1.40 | 1.50 | 1.60 |
| e | | 1.30BSC | |
| E | 1.90 | 2.00 | 2.10 |
| E2 | 0.95 | 1.05 | 1.15 |
| E3 | 0.20 | 0.30 | 0.40 |
| L | 0.35 | 0.40 | 0.45 |
| L1 | 0.20 | 0.25 | 0.30 |
| h | | 0.20REF | |
| K | 0.20 | 0.30 | 0.40 |

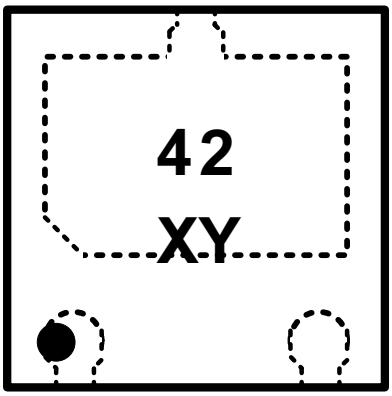
### Land Layout




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




42 = Device Code
X = Date Code ; Y = Control Code

| Part Number | Marking Code |
|---|---|
| AZ4712-01F.R7G<br>(Green Part) | 42<br>XY |

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

## Ordering Information

| PN# | Material | Type | Reel size | MOQ | MOQ/internal box | MOQ/carton |
|---|---|---|---|---|---|---|
| AZ4712-01F.R7G | Green | T/R | 7 inch | 3,000/reel | 4 reels = 12,000/box | 6 boxes = 72,000/carton |

## Revision History

| Revision | Modification Description |
|---|---|
| Revision 2017/06/28 | Formal Release. |
| | |
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